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Rod Bundle Heat Transfer Facility Two-Phase Mixture Level Swell and Uncovery Test Experiments Data Report

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Prepared by:
L.E. Hochreiter, F-B. Cheung, T.F. Lin, D.J. Miller, B.R. Lowery

The Pennsylvania State University
University Park, PA 16802

Division of Systems Analysis
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

K. Tien, Project Manager

NRC Job Code N6154

Office of Nuclear Regulatory Research

ABSTRACT

A series of two-phase level swell and uncover experiments have been performed in the US Nuclear Regulatory Commission/ Penn State Rod Bundle Heat Transfer Test (RBHT) Facility. A total of 75 experiments were performed in a quasi-steady state manner in which the inlet flooding rate into the RBHT rod bundle was slowly decreased in steps and the two-phase mixture level in the bundle was allowed to decrease. In several of the experiments the top region of the rod bundle became uncovered and the heater rod temperatures were significantly above the saturation temperature.

The range of conditions investigated in the experiments were: pressure, 0.138 to 0.414 Mpa (20 to 60 psia); Inlet subcooling 11.1 to 69.4 degrees K (20 to 125 degrees F); Inlet injection temperature 334 to 393 degrees K (142 to 247 degrees F); Peak linear power 0.492 to 1.31 kw/m (0.15 to 0.4 kw/ft); and Inlet flooding rate 2.54 to 40.64 mm/s (0.1 to 1.6 in/s).

A one-dimensional energy balance was used to calculate the saturation location in the bundle as well as the local fluid quality. The resulting calculations were used to estimate the single and two-phase friction and acceleration pressure drop components such that the differential pressure measurements could be corrected and used to estimate the local void fraction distribution along the heated bundle. The two-phase mixture level or dryout locations were also determined from the heater rod thermocouple response as the local heat transfer changed from boiling to steam cooling. The resulting data can be used to assess the void fraction models and heat transfer models in the Nuclear Regulatory Commission advanced safety analysis computer codes.

FOREWORD

A loss-of-coolant accident (LOCA) is one of the primary postulated accidents that must be considered in the design of nuclear power plants. The plant response to such an accident, including the performance of safety systems that are designed to mitigate the accident, is mainly analyzed using computer codes. For effective analyses of accidents and operational transients, the U.S. Nuclear Regulatory Commission (NRC) consolidated earlier thermal-hydraulics analysis codes into one called TRACE.

The NRC is now assessing and improving the TRACE code as weaknesses are identified. One such weakness is inaccurate prediction of peak clad temperatures of fuel rods, particularly in the later stage of a large-break loss of coolant accident (LBLOCA), called the reflood phase. Specifically, the reflood models currently employed in the TRACE code are not sufficiently accurate and, consequently, improved models must be developed to provide necessary support for risk-informed regulations. Accurate prediction of the consequences of an LBLOCA is important because this is one of the limiting postulated accidents used to determine whether plant design parameters (such as power densities, equipment sizes, etc.) have been appropriately selected to ensure safety. As the NRC places increasing emphasis on risk-informed regulations, the agency needs a more accurate and reliable computer code to obtain realistic (rather than conservative) predictions.

To develop better computer code models for an LBLOCA, we need detailed, fundamental data that show heat, mass, and momentum exchanges. Some of these detailed data have only recently become possible because of recent advances in instrumentation technology for two-phase flow measurements. Consequently, to acquire detailed, fundamental data for use in developing models for an LBLOCA, the NRC sponsored the construction of a rod bundle heat transfer (RBHT) test facility and completion of four test series; reflood tests, liquid-gas interfacial drag tests, steam cooling tests without liquid droplet injection, and steam cooling tests with liquid droplet injection.

This report presents the results of liquid-gas interfacial drag tests. The data from these tests will be used to develop and assess an interfacial drag model which is a component of a LOCA model for the TRACE code. The results of other test series will be reported in separate reports.

With improved data and code models for an LBLOCA, we can more accurately predict the consequences of LBLOCA accidents and provide better technical bases for regulations associated with such accidents. As a result, this study will help to achieve the NRC's strategic performance goals of making the agency's regulations more effective, efficient, and realistic.

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EXECUTIVE SUMMARY

As part of the Nuclear Regulatory Commission safety analysis computer code development efforts, the Rod Bundle Heat Transfer test facility has been designed and constructed at The Pennsylvania State University. The Rod Bundle Heat Transfer (RBHT) Facility is a full length simulation of a portion of a Pressurized Water Reactor (PWR) fuel assembly. The bundle is a 7 by 7 rod array with four unheated corner rods and 45 heated electrical rod which simulate a 17 by 17 PWR fuel assembly. The rod Bundle Heat Transfer Facility is full length, 3.66 m (12 ft), with typical PWR rod diameters of 9.49 mm (0.374 in) and a rod pitch of 12.6 mm (0.496 in). The heater rods have a top skewed power shape with a peak to average power of 1.5 at the 2.77 m (9.08 ft) elevation. Typical PWR mixing vane spacer grids were simulated in the RBHT bundle.

A series of 75 quasi-steady state, two-phase level swell and uncover experiments were performed in the (RBHT) Facility. The inlet flooding rated into the RBHT rod bundle was slowly decreased in steps and the two-phase mixture level in the bundle was allowed to decrease. In several of the experiments the top region of the rod bundle became uncovered and the heater rod temperatures were significantly above the saturation temperature. The range of conditions investigated in the experiments were: pressure, 0.138 to 0.414 Mpa (20 to 60 psia); Inlet subcooling 11.1 to 69.4 degrees K (20 to 125 degrees F); Inlet injection temperature 334 to 393 degrees K (142 to 247 degrees F); Peak linear power 0.492 to 1.31 kw/m (0.15 to 0.4 kw/ft); and Inlet flooding rate 2.54 to 40.64 mm/s (0.1 to 1.6 in/s). The data from these experiments were qualified and submitted to the Nuclear Regulatory Commission data bank for analysis and code validation purposes.

There are several unique features of the RBHT facility. There were traversing miniature steam probes in the bundle which measured the superheated steam temperature in the presence of entrained droplets. Steam probes were located in the bottom subcooled region, in the saturated boiling region, as well as in the upper region of the bundle where steam superheat occurred. There were a large number of sensitive differential pressure cells along the bundle which could be used, with analysis, to determine the local average void fraction over the differential pressure cell span. Some of the differential pressure cell spans were as short as 10.16 cm (4-inches). The mixing vane grids were also instrumented with miniature thermocouples such that spacer grid temperature behavior could also be characterized in addition to the heater rod and vapor temperature measurements. The detailed axial distribution of the heater rod thermocouples allowed for accurate determination of the two-phase mixture height in the RBHT facility. As the mixture height would decrease, the local thermocouple location would transition from a boiling situation to steam cooling with a corresponding sharp increase in the thermocouple response as the heater rod temperature increased.

A one-dimensional energy balance method was used to calculate the saturation location in the bundle as well as the local fluid quality distribution along the bundle in the boiling region. The resulting calculations were then used to estimate the single and two-phase friction and acceleration pressure drop components such that the differential pressure measurements could be corrected and used to estimate the local void fraction distribution along the heated bundle. The two-phase mixture level or dryout locations were also determined from the heater rod thermocouple response as the local heat transfer changed from boiling to steam cooling. The resulting data are used to assess the void fraction and heat transfer models in the Nuclear Regulatory Commission advanced safety analysis computer codes.

ABBREVIATIONS

Acronyms:

ASME – American Society of Mechanical Engineering

CHF – Critical Heat Flux

LHS – Left-Hand-Side

LOCA – Loss-of-Coolant Accident

NRC – Nuclear Regulatory Commission

OSV – Onset of Significant Void

PWR – Pressurized-Water Reactor

RBHT – Rod Bundle Heat Transfer

RHS – Right-Hand-Side

Greek Symbols:

α – void fraction

Δ – difference

ϕ^2 – two-phase multiplier

μ – viscosity

v – specific volume

ρ – density

σ – surface tension

Symbols:

A – area

c – specific heat

D_h – hydraulic diameter

D_e – hydraulic equivalent diameter

f – friction factor

Fr – Froude number

G – mass flux

g – acceleration due to gravity

g_c – gravitational constant

h – enthalpy

j – superficial velocity

\dot{m} – mass flow rate

P – pressure

PF – power factor

q' – linear power

q''' – volumetric heat rate

Re – Reynolds number

R – radius

V – velocity

We – Weber number

X – Martinelli parameter

x – quality

Subscripts:

1 ϕ – two-phase

2 ϕ – two-phase

@ 9 ft. – at elevation of 9 feet

accel – acceleration

c – cross-sectional

calc – calculated

elev – elevation

exp – experimental

f – liquid

fg – latent heat of vaporization

fo – liquid only

fric – friction

g – vapor

go – vapor only

grid – spacer grid

i – generic incremental identifier

in – inlet

mix – mixture

p – constant pressure

rel – relative

sat – saturation

span – differential pressure cell height

STP – standard temperature and pressure

T – total

TP – two-phase

wf – wall to liquid

wg – wall to vapor

1. INTRODUCTION

1.1 Introduction

The Nuclear Regulatory Commission is currently reviewing new passive nuclear reactor plant submittals which use passive means of providing long term core cooling for postulated accidents. One of the key phenomena that must be calculated in such situations is the two-phase level swell and void distributions within the reactor core at low pressure conditions. Currently there is a lack of high quality, detailed level swell data at low pressures typical of passive plant post-accident conditions. Accurate calculations of these phenomena are required to insure that the reactor core remains covered with a two-phase mixture and no core heat up is calculated to occur. There is a need for new detailed data on the void distribution such that interfacial drag can be computed. Computer code models for the mixture level, level swell, and interfacial drag can then be assessed and the accuracy of the calculations can be determined for the passive plant designs.

A series of experiments were performed as controlled two-phase level swell experiments at the Penn State/NRC Rod Bundle Heat Transfer (RBHT) Facility. The RBHT facility is designed to simulate a full-length portion of a Pressurized Water Reactor (PWR) fuel assembly. The facility consists of a 7x7-rod bundle with 45 electrically heated rods, mixing vane grids, and over 500 different channels of instrumentation, which include heater rod thermocouples, very sensitive differential pressure cells for void determination, and fluid temperature probes. This instrumentation provides detailed measurements for a better understanding of the level swell and interfacial drag phenomenon that can occur within a heated rod bundle.

The main objectives of the two-phase level swell experiments were the following:

1. Provide an experimental data base on level swell at low pressures typical of passive plant post-accident conditions, covering the anticipated ranges of bundle powers, pressures, and inlet subcooling temperatures.
2. Deduce the axial void fraction distribution along the rod bundle from the level swell data.
3. Investigate the dependence of the local void fraction on the bundle power, pressure, and inlet subcooling.

The two-phase mixture level and uncover experiments were performed over a range of powers, pressures, and inlet subcooled temperatures typical of reactor conditions. The experiments were performed using stepped inlet flow rate in which the flow was decreased, in controlled steps, until the rod bundle uncovered at the top and a two-phase mixture level existed in the heated bundle. Data was recorded for each set of inlet flow test conditions once a steady-state time period was achieved for the various flow rates.

A one-dimensional energy balance computer program was used to reduce and analyze the experimental data from the level swell experiments. The cross-section averaged flow quality was calculated at each elevation of the bundle at which the pressure drop data had been obtained. The location of the liquid saturation line was determined such that the heated length

of the bundle could be divided into a single and two-phase region. The measured pressure drop data from the differential pressure cells was corrected using both homogeneous and Friedel two-phase frictional pressure drop calculations as well as the homogenous two-phase acceleration pressure drop calculation to obtain the correct elevation pressure drop from the total measured pressure drop. The corrected elevation pressure drop was then used to calculate the bundle averaged axial void fraction as a function of axial position for the differential pressure spans along the length of the bundle.

1.2 RBHT Two-Phase Mixture Level and Uncovery Test Matrix

Several of the tests were conducted over a range of pressure, power, and inlet subcooled water temperature with only variations in the flow rates for each test. The similarities between the different tests allowed several experiments to be combined into a single test with step changes between the desired flow rates. Each individual experiment corresponds to a specific inlet flow rate at a given power, pressure, and inlet subcooling. Steady-state conditions were obtained for each “window” of data at which all conditions were constant. A minimum time period for each “window” was 60 seconds. In this manner, several experiments could be performed in a single day with just the inlet flow varying between each individual “window”.

Table 1-1 shows the ranges of the test conditions that were used for developing the test matrix.

Table 1-1 Test Matrix Conditions

Test Condition	Range
Pressure, MPa (psia)	0.138 - 0.414 (20 - 60)
Inlet Subcooling, K (°F)	11.1 - 69.4 (20 - 125)
Inlet Injection Temperature, K (°F)	334 - 393 (142 - 247)
Linear Power, kW/m (kW/ft)	0.492 - 1.31 (0.15 - 0.4)
Inlet Flow Rate, mm/s (in/s)	2.54 - 40.64 (0.1 - 1.6)

The two-phase mixture level and uncovery test series consisted of 19 steady-state experiments and one transient experiment. These experiments covered a total of 75 individual test conditions. The completed test matrix is provided below in Table 1-2. The test matrix included tests with pressures controlled for the upper plenum of 0.138, 0.207, 0.276, and 0.414 MPa (20, 30, 40, and 60 psia). The inlet flow was to be 55.6 degrees K (100 degrees F) subcooled based on the upper plenum pressures. The power and flow rate were the two variables that were adjusted during each experiment which provided the various individual test conditions.

The test matrix in Table 1-2 also includes additional test information that was obtained during shakedown testing and initial experimentations with the rod bundle as indicated by an asterisk . Also given is the number of steady-state windows for each test point. These tests are included as validated steady-state time periods were observed at the given conditions.

Table 1-2 Two-Phase Mixture Level and Uncovery Test Series Test Matrix (Nominal Values)

Experiment #	NRC Test #	Upper Plenum Pressure (kpa (psia))	Power (kW/m (kW/ft))	Flow Rate (cm/sec (in/sec))	Flow Rate (kg/sec (lb/sec))	Inlet Temperature	Validated Steady-state Periods	
Exp. 1578	1	137.9 (20)	0.656 (0.2)	3.05 (1.2)	0.1455 (0.3208)	55.5 K (100 °F) Subcooled	4	
	2	137.9 (20)	0.656 (0.2)	2.54 (1.0)	0.1213 (0.2674)		3	
Exp. 1678 A-C and Exp. 1679	3	137.9 (20)	0.656 (0.2)	2.03 (0.8)	0.0970 (0.2139)		4	
	4	137.9 (20)	0.656 (0.2)	1.52 (0.6)	0.0728 (0.1604)		3	
	5	137.9 (20)	0.656 (0.2)	1.02 (0.4)	0.0485 (0.1069)		3	
	6	137.9 (20)	0.656 (0.2)	0.51 (0.2)	0.0243 (0.0535)		3	
	6b	137.9 (20)	0.656 (0.2)	0.38 (0.15)	0.0182 (0.0401)		2	
Exp. 1582	7	137.9 (20)	1.312 (0.4)	4.06 (1.6)	0.1940 (0.4278)		55.5 K (100 °F) Subcooled	2
Exp. 1678D (1 in/sec flow rate)	8	137.9 (20)	1.312 (0.4)	3.56 (1.4)	0.1698 (0.3743)			1
	9	137.9 (20)	1.312 (0.4)	3.05 (1.2)	0.1455 (0.3208)			1
	10	137.9 (20)	1.312 (0.4)	2.54 (1.0)	0.1213 (0.2674)	3		
	11	137.9 (20)	1.312 (0.4)	2.03 (0.8)	0.0970 (0.2139)	1		
	12	137.9 (20)	1.312 (0.4)	1.52 (0.6)	0.0728 (0.1604)	1		
	12b	137.9 (20)	1.312 (0.4)	1.27 (0.5)	0.0606 (0.1337)	1		
Exp. 1651	13	137.9 (20)	1.312 (0.4)	1.02 (0.4)	0.0485 (0.1069)	1		
	14	275.8 (40)	0.656 (0.2)	3.05 (1.2)	0.1438 (0.317)	55.5 K (100 °F) Subcooled	3	
	15	275.8 (40)	0.656 (0.2)	2.54 (1.0)	0.1198 (0.2641)		2	
	16	275.8 (40)	0.656 (0.2)	2.03 (0.8)	0.0958 (0.2113)		2	
	17	275.8 (40)	0.656 (0.2)	1.52 (0.6)	0.0719 (0.1585)		2	
	18	275.8 (40)	0.656 (0.2)	1.02 (0.4)	0.0479 (0.1057)		1	
	19	275.8 (40)	0.656 (0.2)	0.51 (0.2)	0.0239 (0.0528)		1	
Exp. 1655	20	275.8 (40)	1.312 (0.4)	4.06 (1.6)	0.1917 (0.4226)		55.5 K (100 °F) Subcooled	4
	21	275.8 (40)	1.312 (0.4)	3.56 (1.4)	0.1677 (0.3698)	5		
	22	275.8 (40)	1.312 (0.4)	3.05 (1.2)	0.1438 (0.317)	3		
Exp. 1683	23	275.8 (40)	1.312 (0.4)	2.54 (1.0)	0.1198 (0.2641)	55.5 K (100 °F) Subcooled	3	
	24	275.8 (40)	1.312 (0.4)	2.03 (0.8)	0.0958 (0.2113)		4	
	25	275.8 (40)	1.312 (0.4)	1.52 (0.6)	0.0719 (0.1585)		2	
	26	275.8 (40)	1.312 (0.4)	1.02 (0.4)	0.0479 (0.1057)		2	
Exp. 1659	27	413.7 (60)	0.656 (0.2)	3.05 (1.2)	0.1425 (0.3141)	55.5 K (100 °F) Subcooled	3	
	28	413.7 (60)	0.656 (0.2)	2.54 (1.0)	0.1187 (0.2617)		2	
	29	413.7 (60)	0.656 (0.2)	2.03 (0.8)	0.0950 (0.2094_)		3	
	30	413.7 (60)	0.656 (0.2)	1.52 (0.6)	0.0712 (0.157)		1	
	31	413.7 (60)	0.656 (0.2)	1.02 (0.4)	0.0475 (0.1047)		1	
	32	413.7 (60)	0.656 (0.2)	0.51 (0.2)	0.0237 (0.0523)		1	
Exp. 1585		206.8 (30)		1.27 (0.5)	0.0606 (0.1337)	122 °F Subcooled	1	
		206.8 (30)		1.01 (0.398)	0.0481 (0.106)		1	

**Table 1-2 Two-Phase Mixture Level and Uncovery Test Series Test Matrix (Nominal Values),
Continued**

Experiment #	NRC Test #	Upper Plenum Pressure (kpa (psia))	Power (kW/m (kW/ft))	Flow Rate (cm/sec (in/sec))	Flow Rate (kg/sec (lb/sec))	Inlet Temperature	Validated Steady-state Periods	
Exp. 1637	33	206.8 (30)	0.738 (0.225)	2.54 (1.0)	0.1168 (0.2576)	11.1 K (20 °F) Subcooled	4	
	34	206.8 (30)	0.492 (0.15)	2.54 (1.0)	0.1168 (0.2576)		5	
	35	206.8 (30)	0.492 (0.15)	1.78 (0.7)	0.0818 (0.1803)		4	
	Exp. 1637	36	206.8 (30)	0.492 (0.15)	1.27 (0.5)	0.0584 (0.1288)	11.1 K (20 °F) Subcooled	5
		37	206.8 (30)	0.492 (0.15)	0.76 (0.3)	0.0351 (0.0773)		4
		38	206.8 (30)	0.492 (0.15)	0.51 (0.2)	0.0234 (0.0515)		7
		38b	206.8 (30)	0.492 (0.15)	0.38 (0.15)	0.0175 (0.0386)		4
Exp. 1647	39	206.8 (30)	0.738 (0.225)	2.54 (1.0)	0.1178 (0.2598)	22.2 K (40 °F) Subcooled	2	
Exp. 1648	40	206.8 (30)	0.492 (0.15)	2.54 (1.0)	0.1178 (0.2598)	22.2 K (40 °F) Subcooled	2	
	41	206.8 (30)	0.492 (0.15)	2.03 (0.8)	0.0943 (0.2079)		3	
	42	206.8 (30)	0.492 (0.15)	1.52 (0.6)	0.0707 (0.1559)		2	
	43	206.8 (30)	0.492 (0.15)	1.02 (0.4)	0.0471 (0.1039)		1	
	44	206.8 (30)	0.492 (0.15)	0.51 (0.2)	0.0236 (0.052)		1	
	44b	206.8 (30)	0.492 (0.15)	0.38 (0.15)	0.0177 (0.039)		3	
Exp. 1547	20	0.656 (0.2)	2.54 (1.0)	0.1243 (0.274)	11.1 K (20 °F) Subcooled	2		
Exp. 1560	137.9 (20)	0.656 (0.2)	2.03 (0.8)	0.0993 (0.219)		1		
	137.9 (20)	0.656 (0.2)	1.78 (0.7)	0.0871 (0.192)		1		
Exp. 1562	137.9 (20)	0.656 (0.2)	1.52 (0.6)	0.0744 (0.164)		1		
	137.9 (20)	0.656 (0.2)	1.27 (0.5)	0.0621 (0.137)		1		
Exp. 1566	137.9 (20)	0.656 (0.2)	1.27 (0.5)	0.0562 (0.124)		2		
	137.9 (20)	0.656 (0.2)	1.02 (0.4)	0.0499 (0.11)		1		
	137.9 (20)	0.656 (0.2)	0.76 (0.3)	0.0372 (0.082)		2		
	137.9 (20)	0.656 (0.2)	0.51 (0.2)	0.0249 (0.055)		2		
Exp. 1570	137.9 (20)	1.312 (0.4)	4.06 (1.6)	0.1987 (0.438)		11.1 K (20 °F) Subcooled	1	
	137.9 (20)	1.312 (0.4)	3.56 (1.4)	0.1742 (0.384)	1			
	137.9 (20)	1.312 (0.4)	3.05 (1.2)	0.1492 (0.329)	1			
	137.9 (20)	1.312 (0.4)	2.54 (1.0)	0.1243 (0.274)	1			
	137.9 (20)	1.312 (0.4)	2.03 (0.8)	0.0993 (0.219)	1			
	137.9 (20)	1.312 (0.4)	1.52 (0.6)	0.0744 (0.164)	1			
Exp. 1572		206.8 (30)	0.738 (0.225)	2.54 (1.0)	0.1243 (0.274)	11.1 K (20 °F) Subcooled	3	
Exp. 1572		206.8 (30)	0.492 (0.15)	2.54 (1.0)	0.1243 (0.274)	11.1 K (20 °F) Subcooled	2	
		206.8 (30)	0.492 (0.15)	1.78 (0.7)	0.0871 (0.192)		1	
		206.8 (30)	0.492 (0.15)	1.27 (0.5)	0.0621 (0.137)		1	
		206.8 (30)	0.492 (0.15)	0.76 (0.3)	0.0372 (0.082)		1	
		206.8 (30)	0.492 (0.15)	0.51 (0.2)	0.0249 (0.055)		1	
		206.8 (30)	0.492 (0.15)	0.38 (0.15)	0.0186 (0.041)		1	
		206.8 (30)	0.492 (0.15)	0.353 (0.139)	0.0172 (0.038)		1	
		206.8 (30)	0.492 (0.15)	0.287 (0.113)	0.0141 (0.031)		1	

**Table 1-2 Two-Phase Mixture Level and Uncovery Test Series Test Matrix (Nominal Values),
Continued**

Experiment #	NRC Test #	Upper Plenum Pressure (kpa (psia))	Power (kW/m (kW/ft))	Flow Rate (cm/sec (in/sec))	Flow Rate (kg/sec (lb/sec))	Inlet Temperature	Validated Steady-state Periods
Exp. 1690		206.8 (30)	0.492 (0.15)	1.52 (0.6) ? 0.305 (0.12) ? 1.52 (0.6)	0.0707 (0.1559) ? 0.0142 (.0312) ? 0.0707 (0.1559)	22.2 K (40 °F) Subcooled	N/A

Data Window Test Points = 158

1.3 RBHT Two-Phase Mixture Level and Uncovery Test Method

The experiments began with the water supply tank filled with water and the bundle also filled to an elevation of approximately 2.74 m (108 in.). The water was then heated to the desired initial inlet temperature for the individual experiment's test conditions. Once the proper inlet injection temperature was achieved, the injection flow was initiated. Power was applied to the rod bundle once the injection flow was approximately one-half of the desired maximum flow. For example, if the desired maximum flow velocity of the experiment was 40.64 mm/s (1.6 in/s), then power was applied once the flow reached a rate of approximately 20.32 mm/s (0.8 in/s).

This start-up procedure insured the bundle was completely or nearly completely covered before power was applied. The process also helped to prevent premature dryout of the rods in the upper elevations, and also prevented large amounts of water that would have needed to be drained from the system as it exited the top of the bundle while the system was brought up to the necessary test conditions. However, as was expected with some higher flow rates, some excess liquid did exit from the top of the rod bundle. The excess liquid was collected in carry-over tanks, which could be drained during the experiment. In addition to the carry-over tanks, a drainage tank was connected to the steam separator to collect the liquid that was removed from the steam. These tanks were drained as necessary. The drainage was conducted quickly in order to preserve system pressure. The drain valves were only opened for a short period of time to allow the tanks to almost completely empty. There was a perturbation on the system pressure which corrected itself once the valves were closed.

The flow rate was adjusted by several step changes to obtain the desired flow rates. Several step changes were required between each desired flow rate due to the sensitivity of the control gauges and flow meters used for measuring and adjusting the flow. Once a desired flow rate was achieved and steady-state conditions were observed, data was recorded for a minimum of sixty (60) seconds at those testing conditions. The experiments were terminated when the two-phase mixture level dropped to an elevation such that the temperatures of the heater rods exceeded a maximum of 700 – 755 K (800 – 900 °F). This maximum temperature was selected to prevent potential failure of the heater rods.

Figure 1-1 shows the inlet flow velocity versus the experimental time for test 1683 with a steady velocity time window indicated. The velocity was step changed between the desired values. These step changes are meant to achieve a steady flow velocity at each desired level for at

least 60 seconds. As can be seen in the figure, eleven (11) individual steady-state test windows were performed in this single experiment. These individual tests were for flow velocities of 40.64, 35.56, 30.48, 25.40, 20.32, 15.24, and 10.16 mm/s (1.6, 1.4, 1.2, 1.0, 0.8, 0.6, and 0.4 in/s).

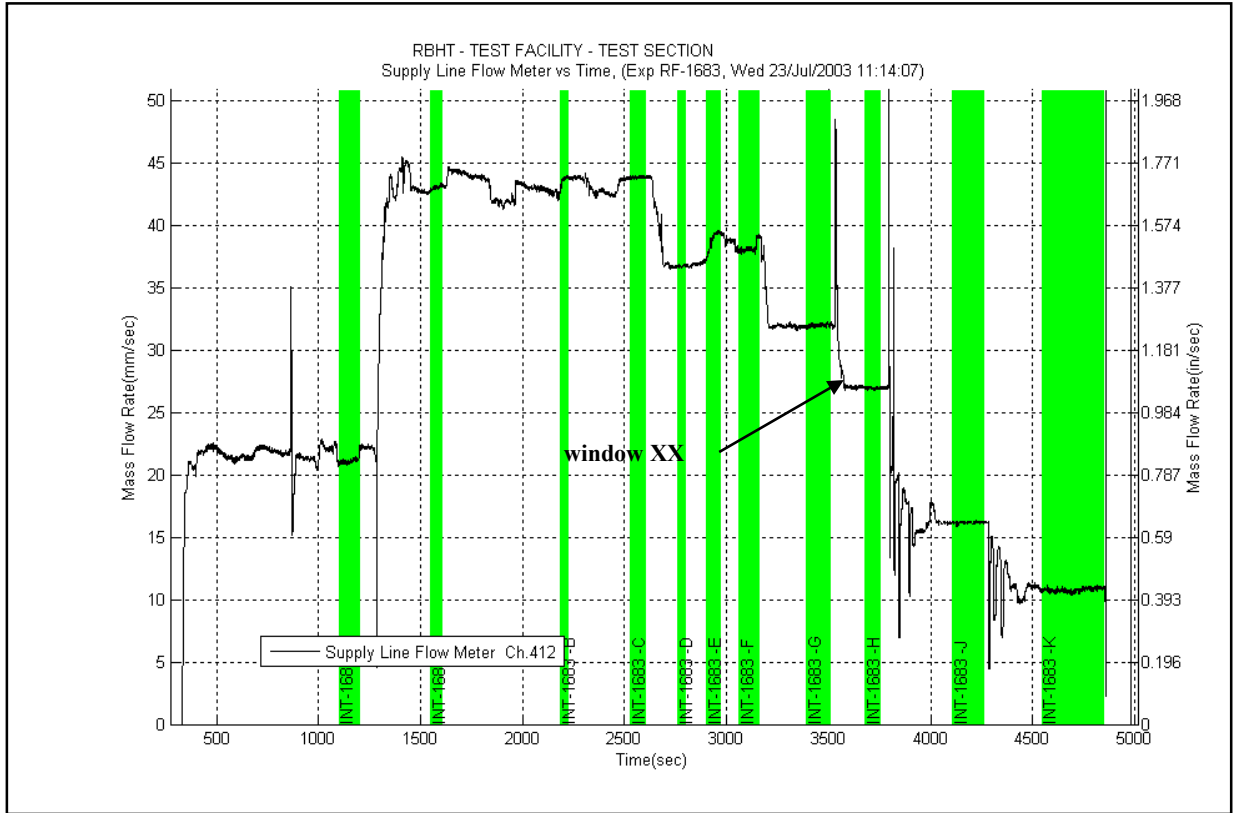


Figure 1-1 Inlet Flow Rate Versus Time for Entire Experiment Run for Experiment 1683

Figure 1-2 thru Figure 1-4 show the pressure, power, and flow velocity, respectively, during one of the steady-state condition recorded test times indicated in Figure 1-1 as window XX.

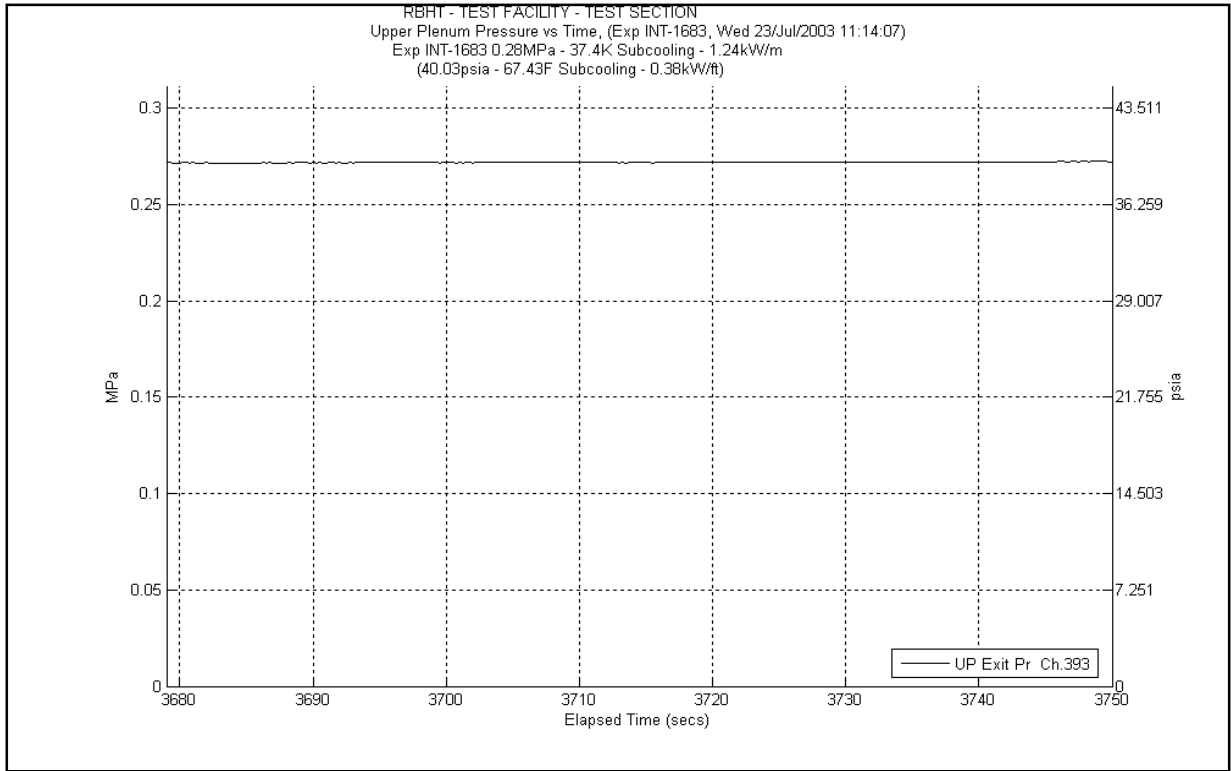


Figure 1-2 Exit Pressure Versus Time During Window XX from Figure 1-1

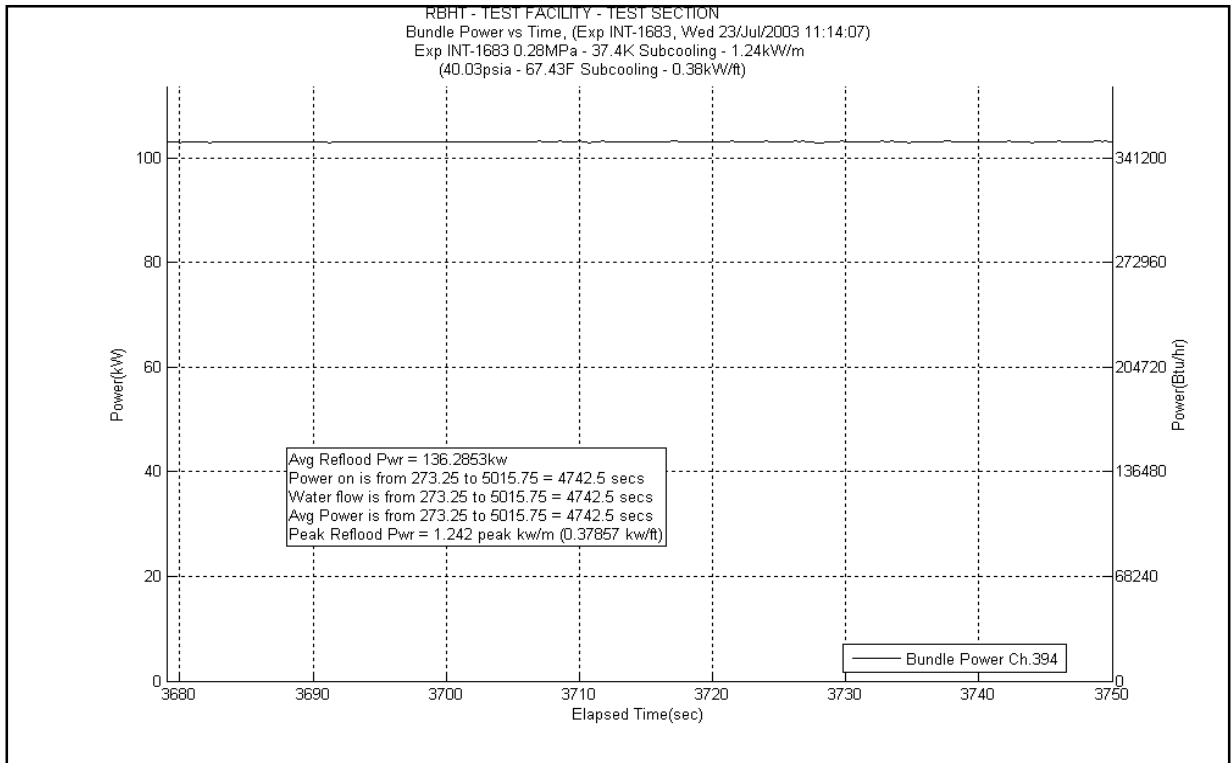


Figure 1-3 Bundle Power Versus Time During Window XX from Figure 1-1

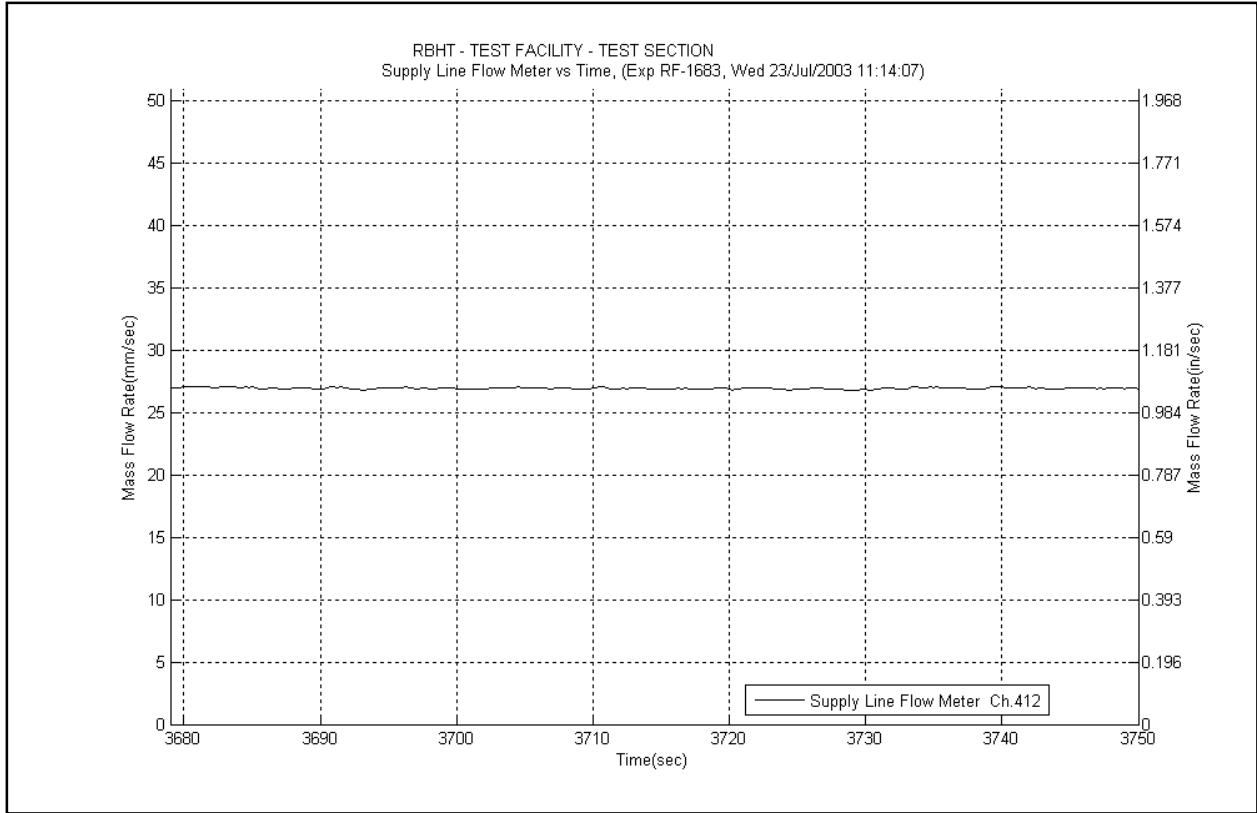


Figure 1-4 Inlet Flow Velocity Versus Time During Window XX from Figure 1-1

As one can see from the Figure 1-2 through Figure 1-4, the power remained constant while pressure and flow velocity showed very minimal variances during the recorded testing time. The ability to maintain steady-state conditions for an extended period of time is important for accurate measurements and allows for better comparisons to the model predictions of computer codes. Figure 1-5 shows the temperature plot of the heater rod thermocouples near the top of the rod bundle. The heater rods remain in nucleate boiling as long as they remain covered by a two-phase mixture. Once the mixture level decreases below the heater rod instrumented position (3.615 m, 142.3 in.) dryout occurs and the rods are cooled by steam cooling and undergo a temperature excursion. The maximum temperature the rods achieved prior to the test being scrammed is within the allowed range, as the maximum temperature is approximately 769 K (925 °F).

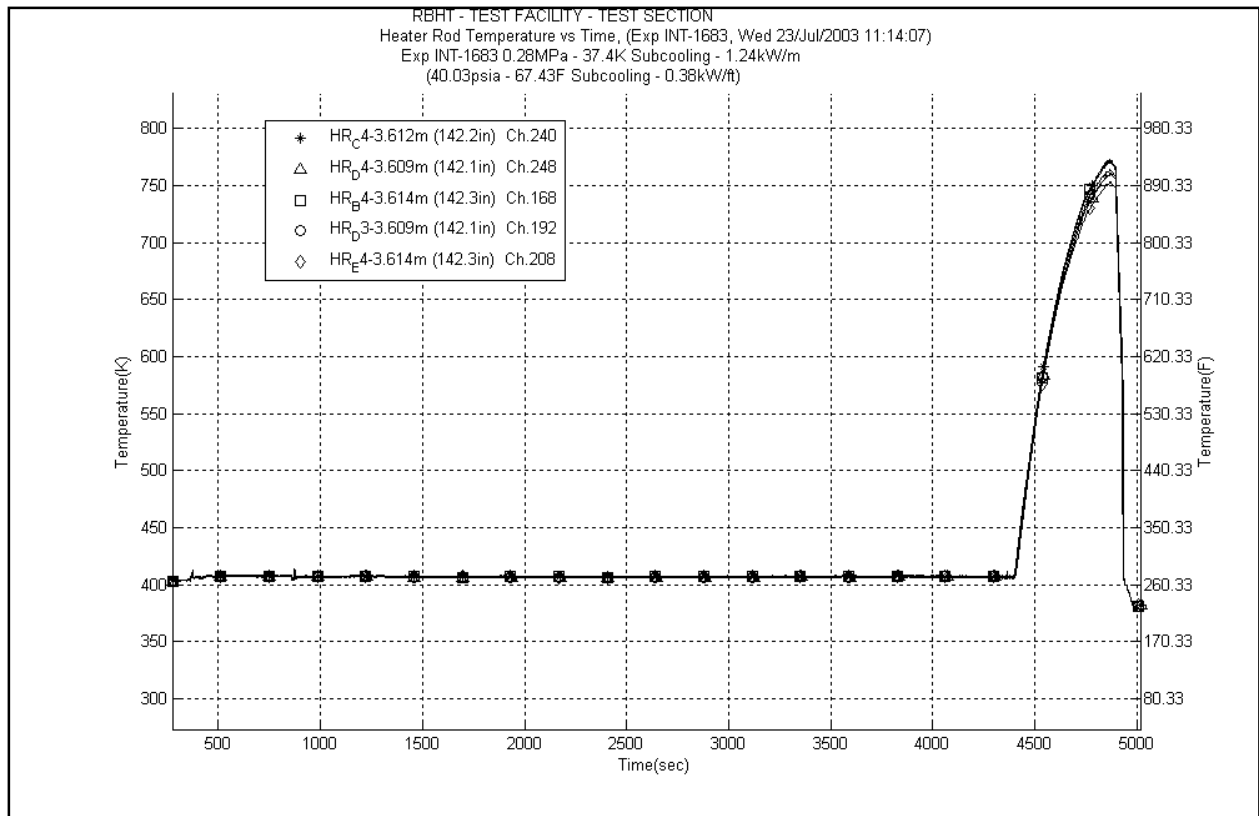


Figure 1-5 Heater Rod Temperatures Versus Time for Entire Experiment Run for Experiment 1683

2. TEST FACILITY DESCRIPTION FOR TWO-PHASE MIXTURE LEVEL AND UNCOVERY EXPERIMENTS

The Rod Bundle Heat Transfer (RBHT) Test Facility is designed to conduct systematic separate-effects tests under well-controlled conditions in order to generate fundamental rod bundle heat transfer data from single phase steam cooling tests, low flow boiling tests, steam flow tests with and without injected droplets, and forced reflood tests which simulate inverted annular film boiling, and dispersed flow film boiling heat transfer. The facility is capable of operating in both forced and variable reflood modes covering wide ranges of flow and heat transfer conditions at pressures from 138 to 414 kPa (20 to 60 psia).

2.1 General Facility Description

The test facility consists of the following major components shown schematically in Figure 2-1, and in an isometric view in Figure 2-2.

- A test section consisting of a lower plenum, a low-mass housing containing the heater rod bundle, and upper plenum
- Coolant injection and steam injection systems
- Closely coupled phase separation and liquid collection systems
- An injection system
- A pressure fluctuation damping tank and steam exhaust piping

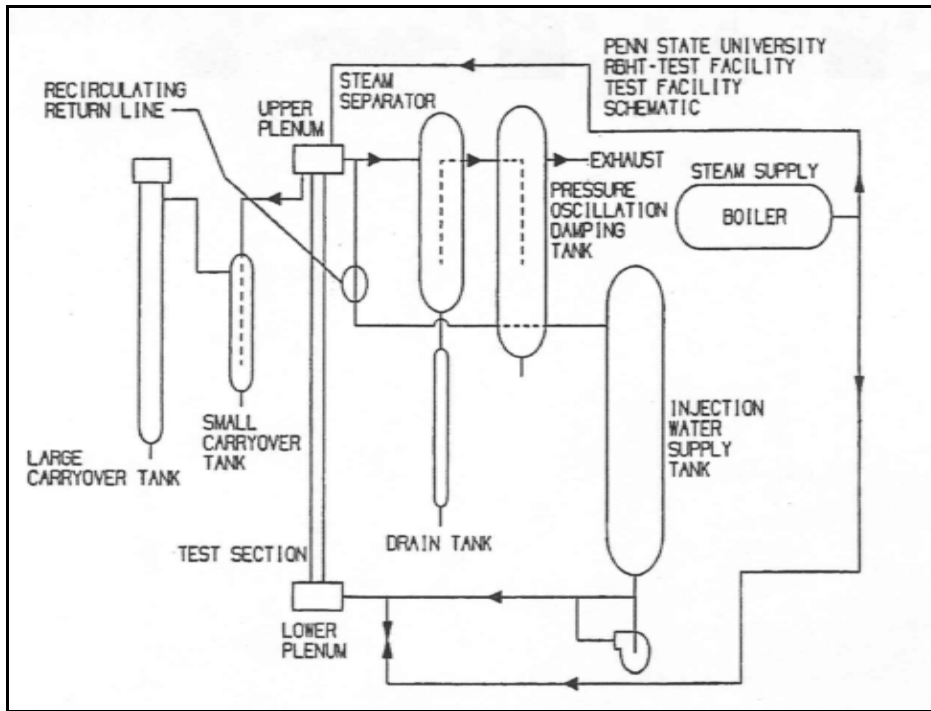


Figure 2-1 RBHT Test Facility Schematic

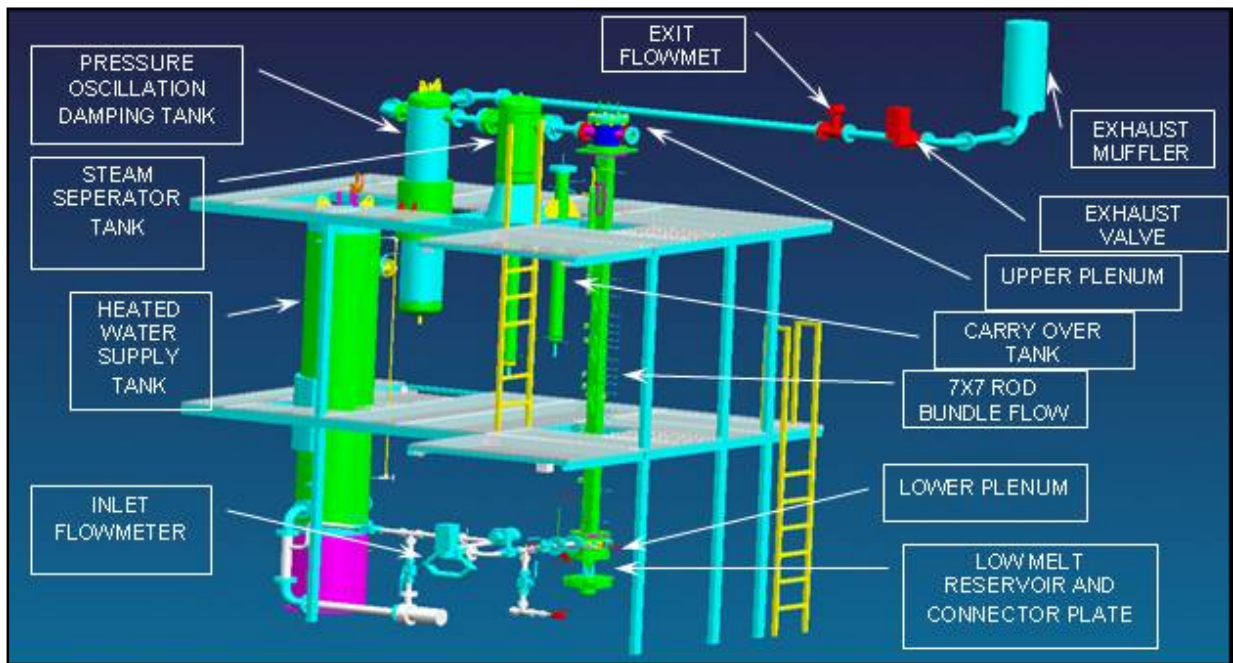


Figure 2-2 Test Facility Isometric View

2.1.1 Test Section

The test section consists of the heater rod bundle, the flow housing, and the lower and upper plenums, as shown in Figure 2-3. The heater rod bundle simulates a small portion of a 17 x 17 Pressurized Water Reactor (PWR) reactor fuel assembly. The electrically powered heater rods have a diameter of 9.5 mm (0.374 in) arranged in a 7 x 7 array with a 12.6 mm (0.496 in) pitch, as shown in Figure 2-4. The bundle has 45 heater rods and four unheated corner rods. The corner rods are used to support the bundle grid and fluid thermocouple leads. The support rods are made from Inconel 600 tubing having a diameter 9.525 mm (0.37 in), a wall thickness of 2.108 mm (0.083 in), and a total length of 3.96 m (156 in). The heater rods are single ended and consist of a Monel 500 electrical resistance element filled and surrounded by hot pressed boron nitride (BN) insulation, and enclosed in a Inconel 600 cladding, as shown in Figure 2-5. This material was chosen for its high strength and low thermal expansion coefficient at high temperatures, which minimizes rod bowing and failure at high temperature operating conditions since it was desired to re-use the heater rods for multiple experiments. The heater rods have a 3.66 m (12 ft) heated length with a skewed axial power profile, as shown in Figure 2-6, with the peak power located at the 2.74 m (9 ft) elevation. The maximum-to-average power ratio (P_{max}/P_{avg}) is 1.5 at the peak power location and 0.5 at both ends of the heated length. The bundle has a uniform radial power distribution.

Power to each rod is provided by a 60 volt, 12,600 amp, 750 kW DC power supply. Each rod is rated for 10 kW, and designed to operate at 13.8 bars (200 psig) at a maximum temperature of 1477 degrees K (2200 degrees F), but because of its solid construction it can be operated at up to 103.4 bars (1500 psig). Each rod is instrumented with eight (8) 0.508 mm (0.02 in) diameter ungrounded thermocouples attached to the inside surface of the Inconel sheath at various locations. All of the thermocouple leads exit at the heater rod bottom end. The Inconel 600 thermocouple sheath is compatible with the heater rod cladding and housing material to reduce differential thermal expansion and minimize the possibility of causing thermocouple failure during the thermocycling operations.

The rod bundle has seven (7) mixing vane grids shown in Figure 2-7. These grids are similar in design of a PWR 17 x 17 fuel assembly, but instead of having dimples and springs, these grids have all dimples which provide a cold clearance of 0.127 mm (0.005 in) around each heater rod in order to prevent bowing when the heater rods are linearly expanding at high temperatures. The grids straps are made out of Inconel 600 alloy sheets which are 0.508 mm (0.020 in) thick and are 44.45 mm (1.75 in) in height including the mixing vanes. The grids are located 522 mm (20.55 in) apart except for the spacing between the first and second grid, which is 588.26 mm (23.26 in) apart. The first grid is located 102 mm (4.01 in) above the bottom of the heated length. The grids in conjunction with the corner rods form the heater rod bundle support structure. The grid locations are similar to the ones found in a 17 x 17 PWR fuel assembly. The heater rod top extensions are attached to the 25.4 mm (1 in) thick nickel ground plate by means of a Morse taper that provides a good electrical contact. The heater rod bottom extension and copper electrode extend through the lower plenum O-ring pressure seal plate.

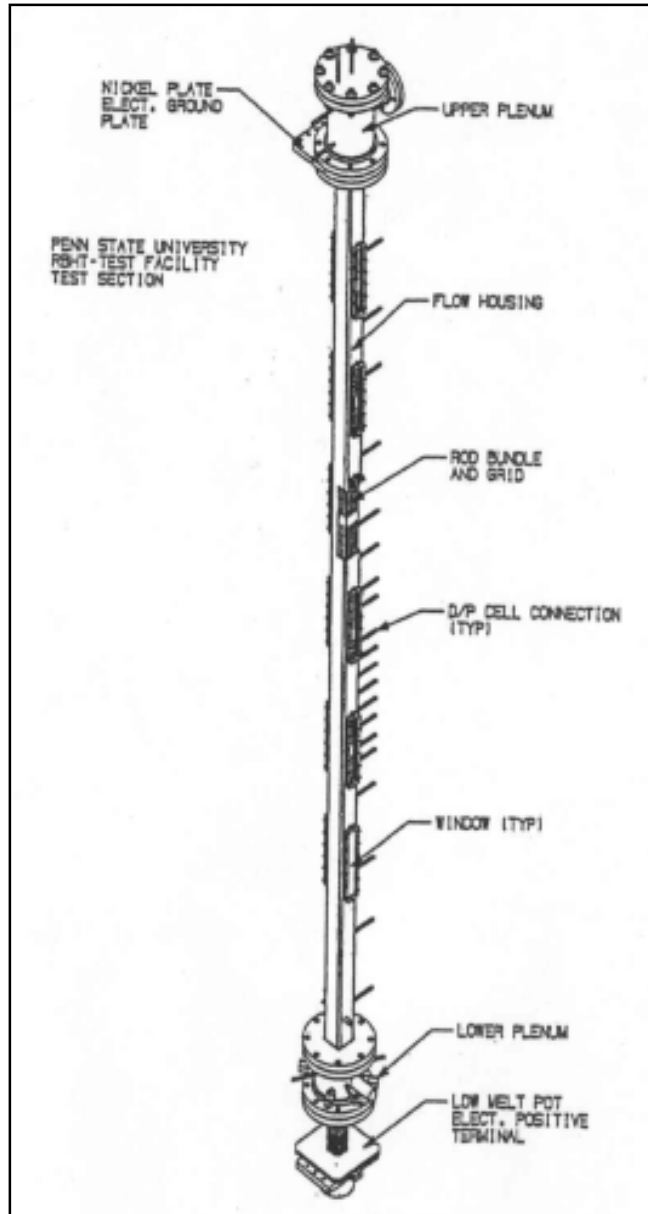


Figure 2-3 Test Section Isometric View

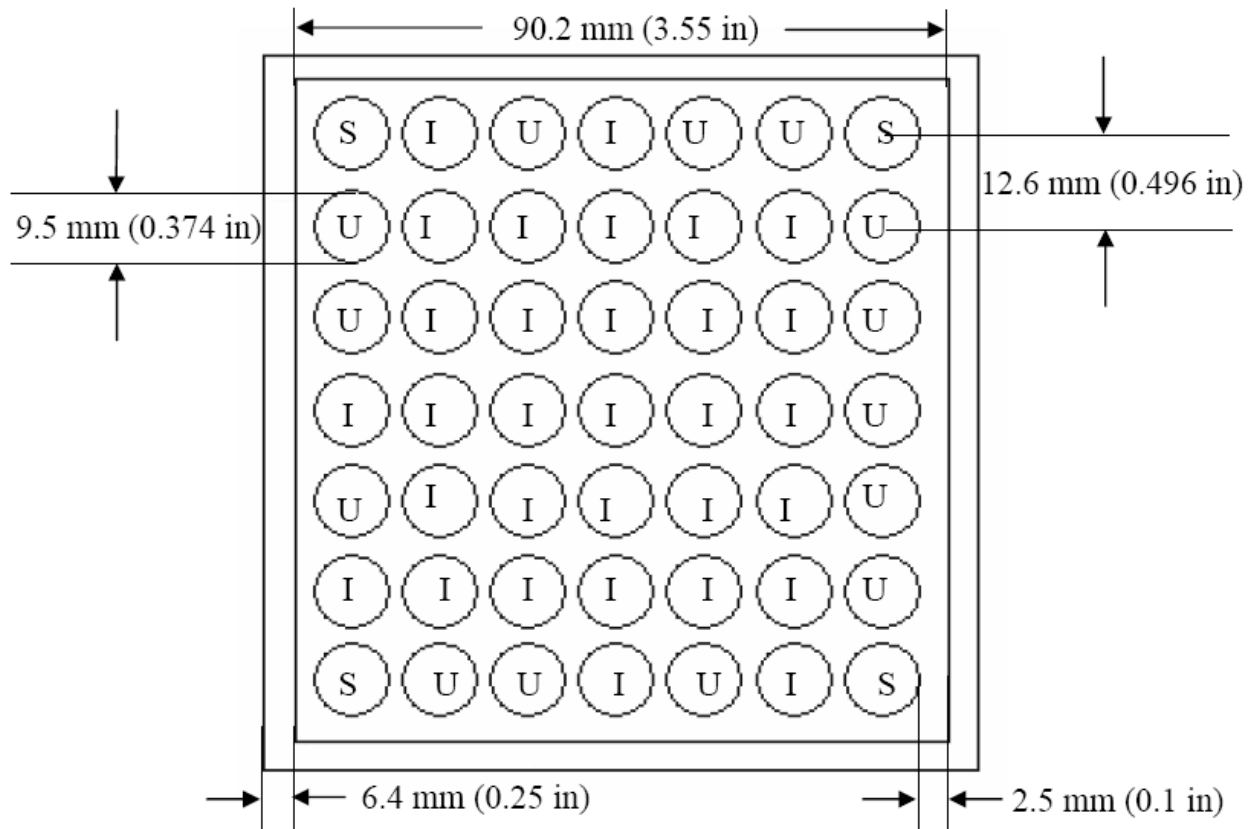


Figure 2-4 Rod Bundle Cross Section View

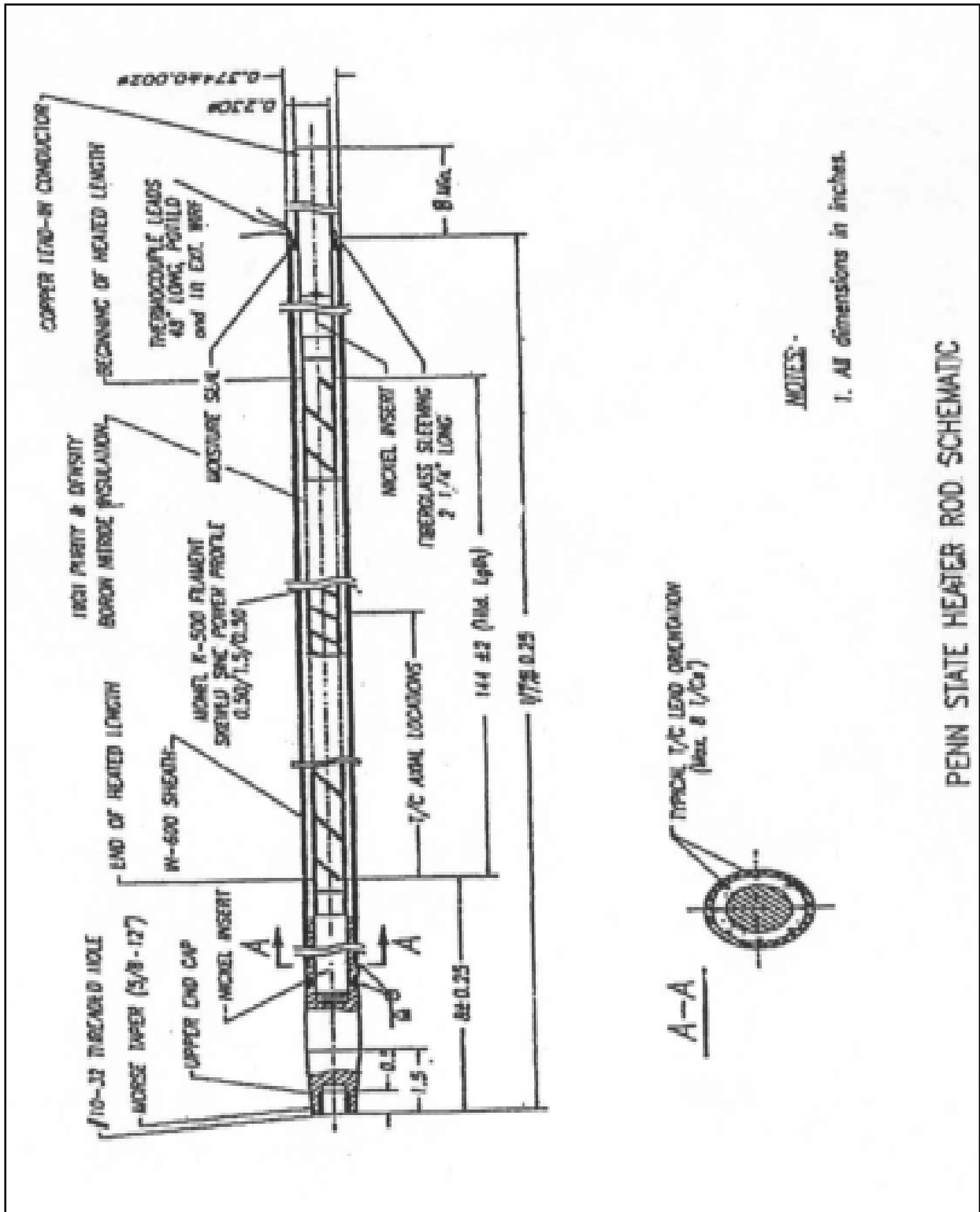


Figure 2-5 Heater Rod

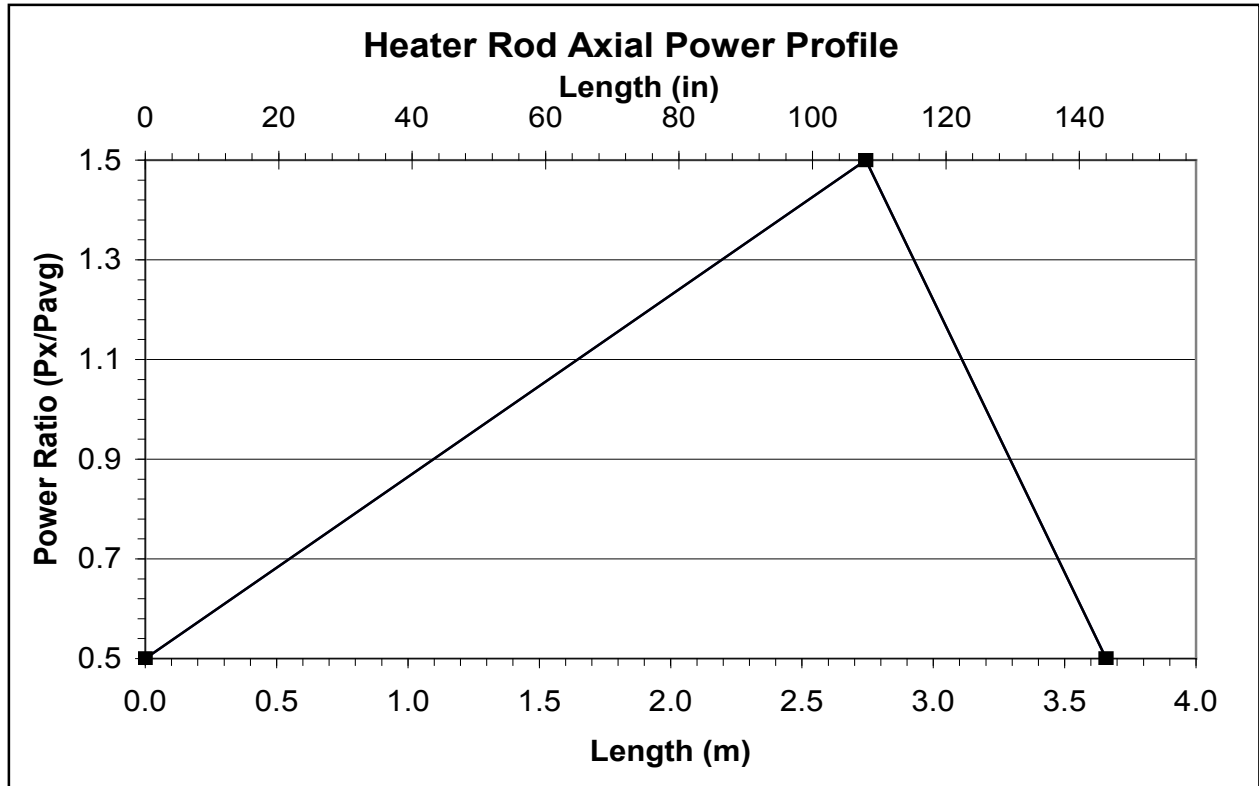


Figure 2-6 Heater Rod Axial Power Profile

The copper electrodes, which are 5.84 mm (0.23 in) in diameter and 203 mm (8 in) long, extend through holes drilled in the low-melt reservoir shown in Figure 2-8. This reservoir serves as the electrical power supply positive connection. It contains a low temperature melting alloy at about 344 degrees K (160 degrees F) which is an excellent conductor, thus providing a good electrical contact and mechanical cushion allowing for rod thermal expansion to each heater rod.

The flow housing provides the pressure and flow boundary for the heater rod bundle. It has a square geometry. Its inside dimensions are 90.2 by 90.2 mm (3.55 x 3.55 in), and wall thickness 6.4 mm (0.25 in) as shown in Figure 2-4. The housing is made out of Inconel 600, the same material used for the heater rod cladding and thermocouple sheaths. As pointed out previously, the high strength of Inconel 600 at elevated temperatures will minimize housing distortion during testing. The 6.4 mm (0.25 in) wall thickness is the minimum allowable for operating at 4.2 bars (60 psig) and 811degrees K (1000 degrees F), taking into consideration the cutouts to accommodate the large windows and numerous pressure and temperature penetrations through the walls, as shown in Figure 2-10. The empty housing has a flow area of 83.4 cm² (12.9 in²). With the rod bundle in place the flow area is 48.6 cm² (7.5 in²). This area is 7.21 percent larger than the ideal flow area of a 7 x 7 rod bundle configuration. The excess flow area is due to the flow housing inside dimensional tolerance and the space needed to insert the rod bundle in the housing. The gap between the outer rods and the flow housing inner wall is 2.5 mm (0.1 in) wide.

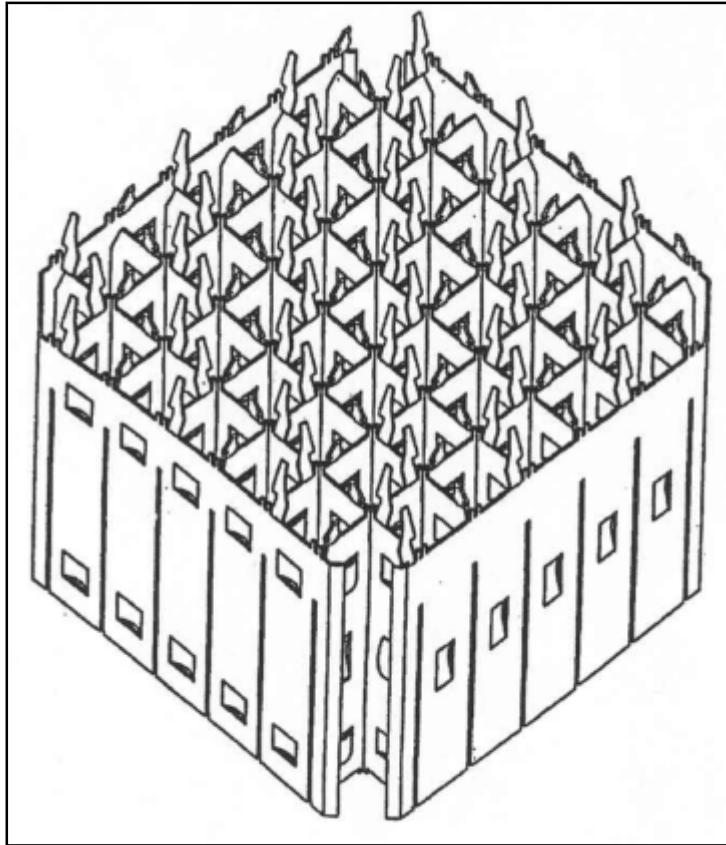


Figure 2-7 Mixing Vane Grid

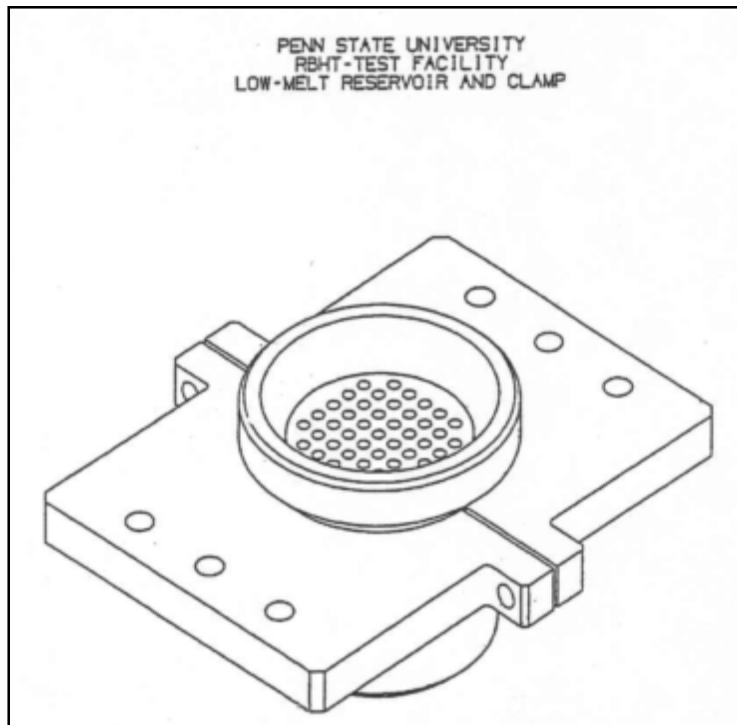


Figure 2-8 Low Melt Reservoir

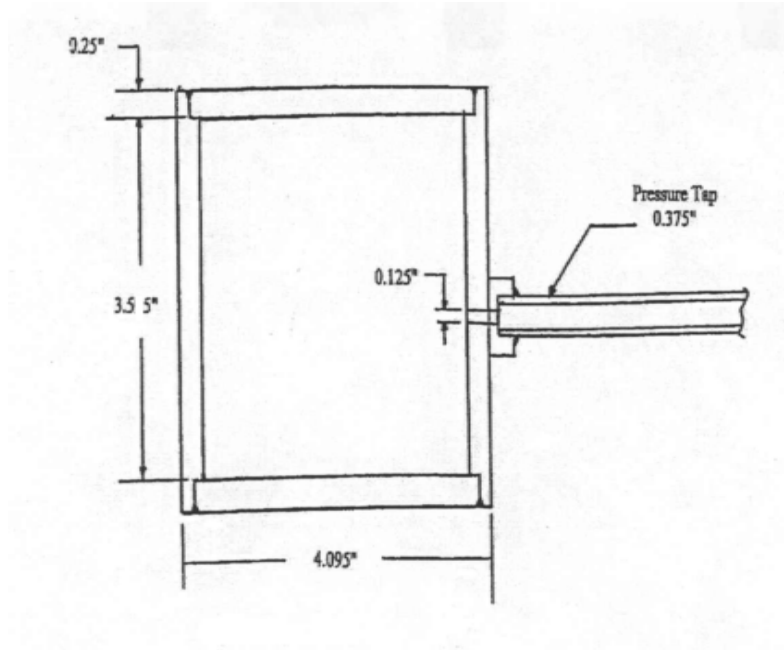


Figure 2-9 Flow Housing Cross Section View

The flow housing has six pairs of windows. Each window provides a 50.8 mm x 292 mm (2.0 in. X 11.5 in) viewing area. Each pair of windows is placed 180 degrees apart and located axially at elevations overlapping rod bundle spacer grids, thus providing a viewing area about 88.9 mm (3.5 in) below and 152 mm (6 in) above the corresponding space grids. The windows will facilitate the measurement of droplet size and velocity using a Laser illuminated Digital Camera System (LIDCS). In addition, high speed movies using diffused back lighting can be taken during the experiments for visualization and flow regime information. The windows are made out of optical grade fused quartz and are mounted on the housing by means of a bolted flange and Kemprofile high temperature gasket material, as shown in Figure 2-11.

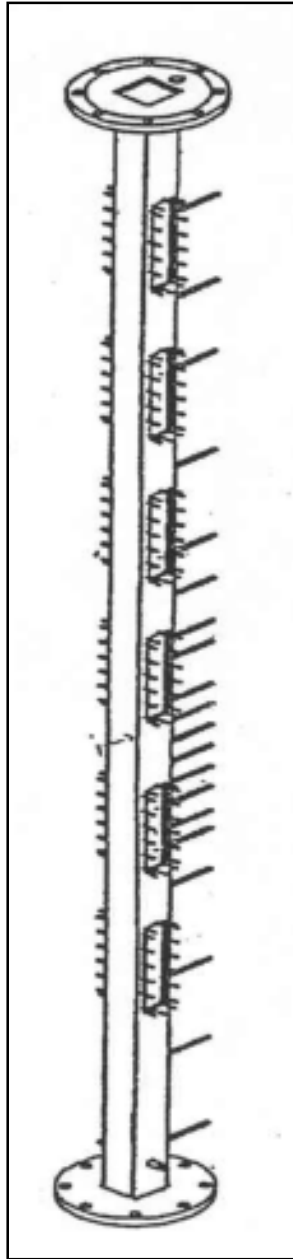


Figure 2-10 Low Mass Flow Housing

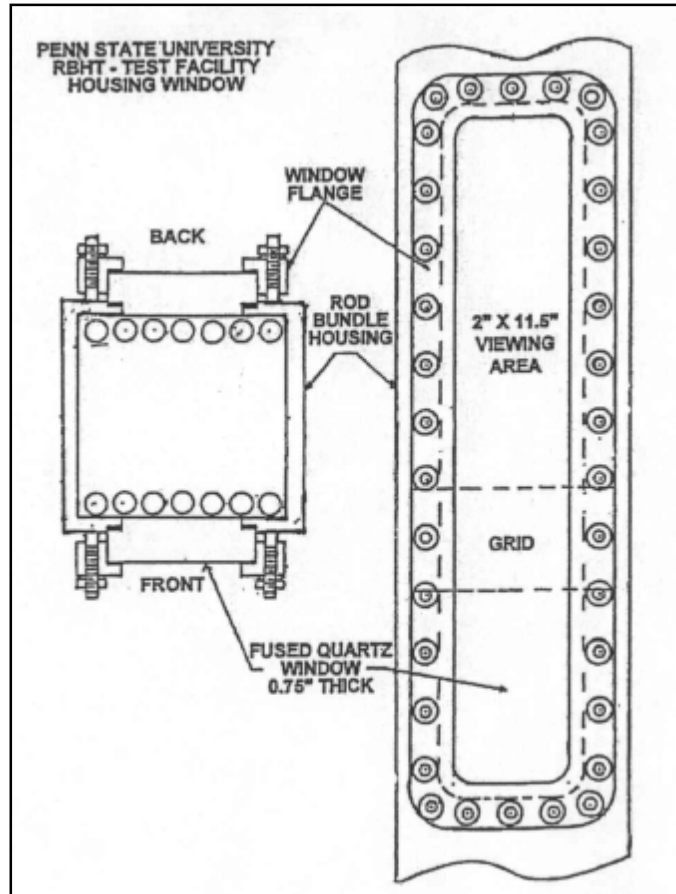


Figure 2-11 Housing Window

The flow housing is supported from the nickel plate and upper plenum, allowing it to freely expand downward, thus minimizing thermal buckling and distortion. The two-phase void fraction will be measured using sensitive differential pressure cells. The flow housing has 23 pressure taps located at various elevations, as shown in Figure 2-10. The pressure taps are connected to sensitive differential pressure (D/P) cells providing measurements to calculate single-phase friction losses for determining base rod bundle and grid loss coefficients. Among these pressure taps, 16 are located about 76.2 to 127 mm (3 to 5 in) apart to provide detailed void fraction measurements in the froth region about the quench front.

The flow housing also has 13 stand-off penetrations at various elevations for the traversing Steam Probe Rakes which measure the superheated steam temperatures in the dispersed flow regime.

2.1.2 Lower Plenum

The lower plenum is attached to the bottom of the flow housing. The lower plenum is made out of nominal 203 mm (8 in) schedule 40, 304 stainless steel pipe with an inside diameter of 202 mm (7.94 in), a height of 203 mm (8 in), and a volume of 6570 cm³ (0.232 ft³), as shown in Figure 2-12. The lower plenum is used as a reservoir for the coolant prior to injection to the rod bundle. The lower plenum connects to the injection water line and steam cooling line. It has two penetrations for thermocouples monitoring the coolant temperature during testing, and pressure taps for static and differential pressure measurements.

The lower plenum also has four Conax fittings with multiple probes sealing glands for the bundle grid, steam probes and support rod wall thermocouple extensions that are routed through the bottom of the rod bundle. It contains a flow baffle, which is attached to the flow housing bottom flange. The flow baffle has a square geometry, similar to the holes that act as a flow distributor and flow straightener to provide an even flow distribution into the rod bundle.

2.1.3 Upper Plenum

The upper plenum serves as the first stage for phase separation and liquid collection of the two-phase effluent exiting the rod bundle. The liquid phase separates due to the sudden expansion from the bundle to the larger plenum flow area. The de-entrained liquid is collected around the flow housing extension in the upper plenum. The extension acts as a weir preventing the separated liquid from falling back into the heater rod bundle. The upper plenum vessel configuration is shown in Figure 2-13. The vessel is made from a 203 mm, (8 in) 204 stainless steel pipe with an inside diameter of 202 mm (7.94 in) and a height of 305 mm (12 in). It has a volume of 9873 cm³ (0.347 ft³). The plenum has a 76.2 mm (3 in) pipe flange connection to the steam separator and two penetrations for fluid thermocouples. It is covered with a 203 mm (8 in) 304 stainless steel blind flange. This flange has a 25.4 mm (1 in) penetration for steam injection, venting, and connecting the safety relief valve and rupture disc assembly. It also has a pressure tap penetration for static and differential pressure measurements. In addition, the upper plenum contains an exhaust line baffle shown in Figure 2-14. The baffle is used to further de-entrain water from the steam and prevents water dripping from the upper plenum cover flange to be carried out by the exhaust steam. The baffle has a 76.2 mm (3 in) flange connection at one end. It is inserted through the upper plenum exit nozzle, and it is bolted between the nozzle flange and the flange of the pipe going to the steam separator.

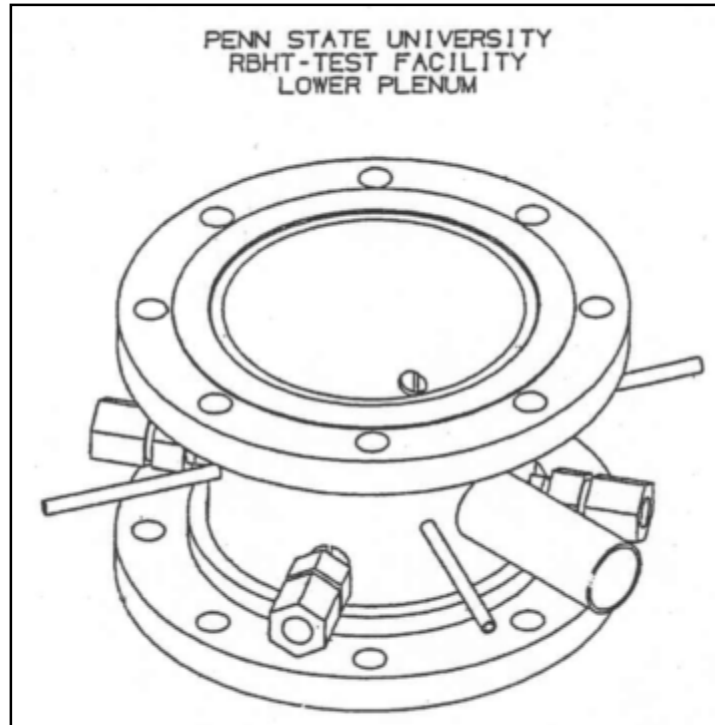


Figure 2-12 Lower Plenum

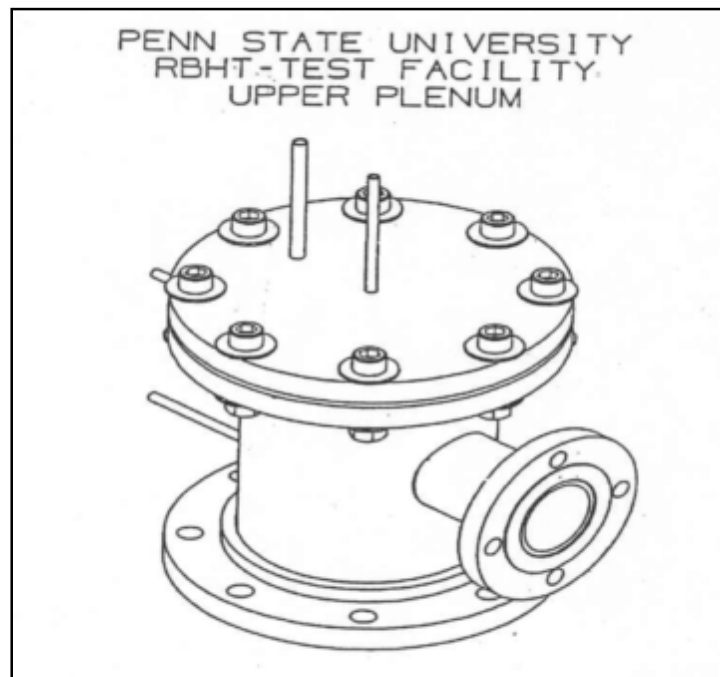


Figure 2-13 Upper Plenum

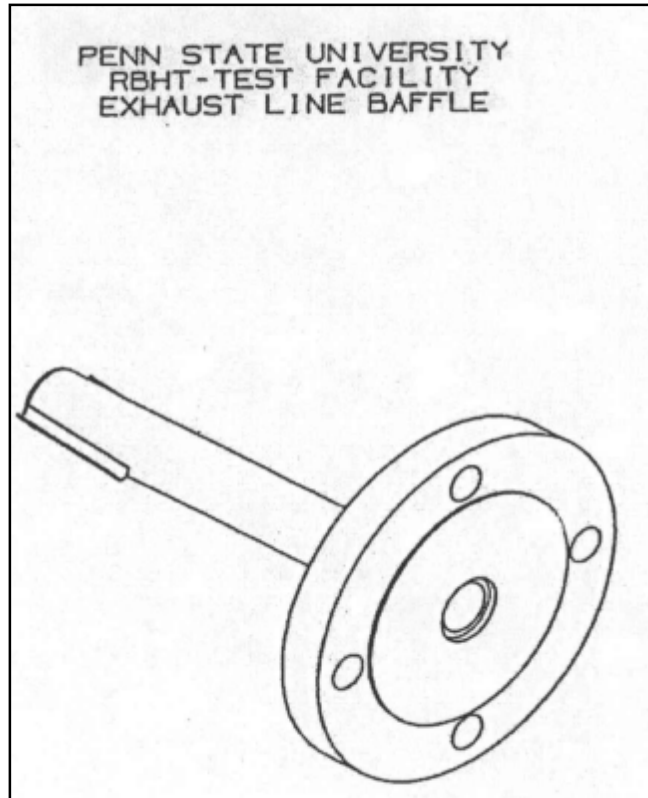


Figure 2-14 Exhaust Line Baffle

2.1.4 Large and Small Carryover Tanks

The de-entrained liquid from the upper plenum drains into the top of a 25.4 mm (1 in) tube which extends inside a small carryover tank to detect and measure the carryover liquid as soon as possible. This tank, shown in Figure 2-15, is close-coupled in series with a larger carryover tank, shown in Figure 2-16, which collects and measures the amount of liquid overflow from the smaller carryover tank. The small carryover tank has a volume of about 1388 cm³ (0.049 ft³), and is used to more accurately measure the initial water being collected as a function of time. The smaller carry over tank is made from 50.8 mm (2 in) schedule 80 stainless steel pipe having an overall length of 914 mm (36 in) including the end caps. The large carryover tank is made from a 102 mm (4 in) schedule 40 stainless steel pipe with a bottom end cap and top flanges having an overall length of 183 cm (6 ft) and a capacity of 15917 cm³ (0.562 ft³) Each tank is connected with 25.4 mm (1 in) flexible hose, and has a 25.4 mm (1 in) drain tube, and 9.5 mm (0.375 in) tubes with wall penetration for installing fluid instrumentation and level indicators.

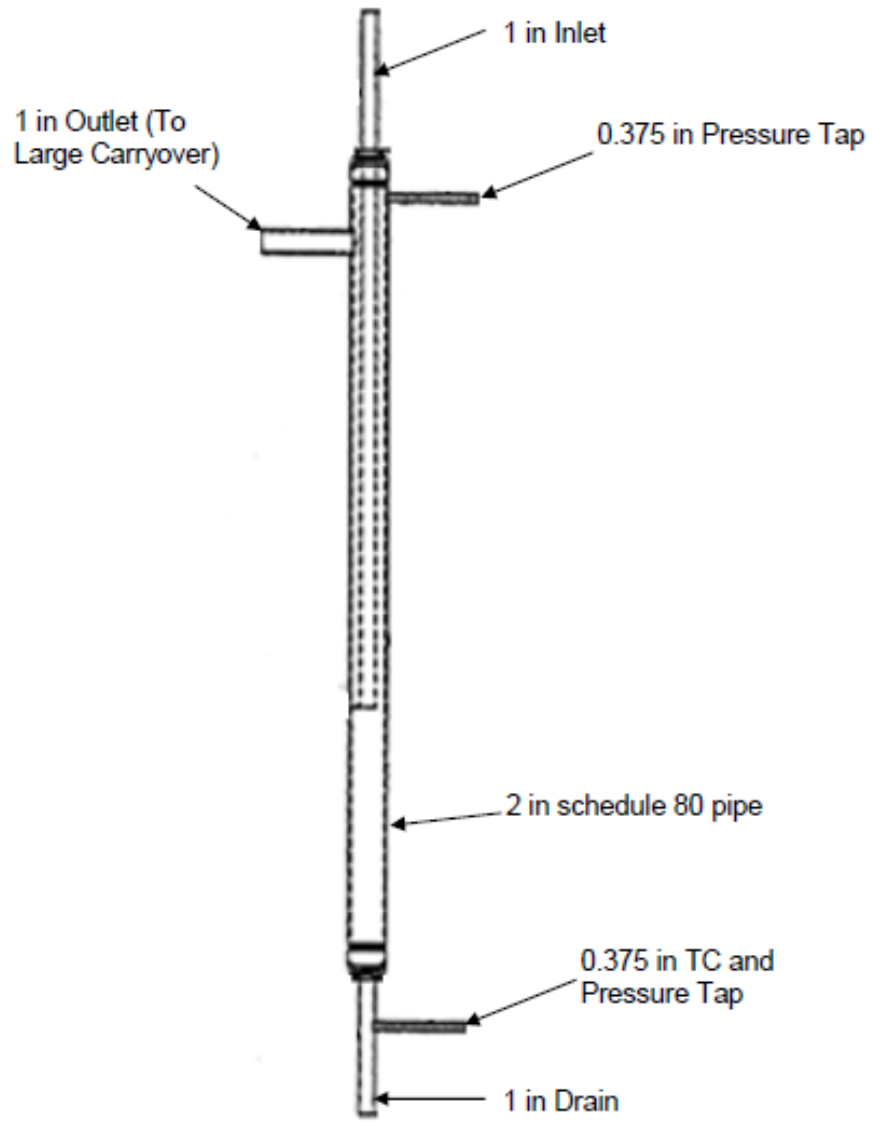


Figure 2-15 Small Carryover Tank

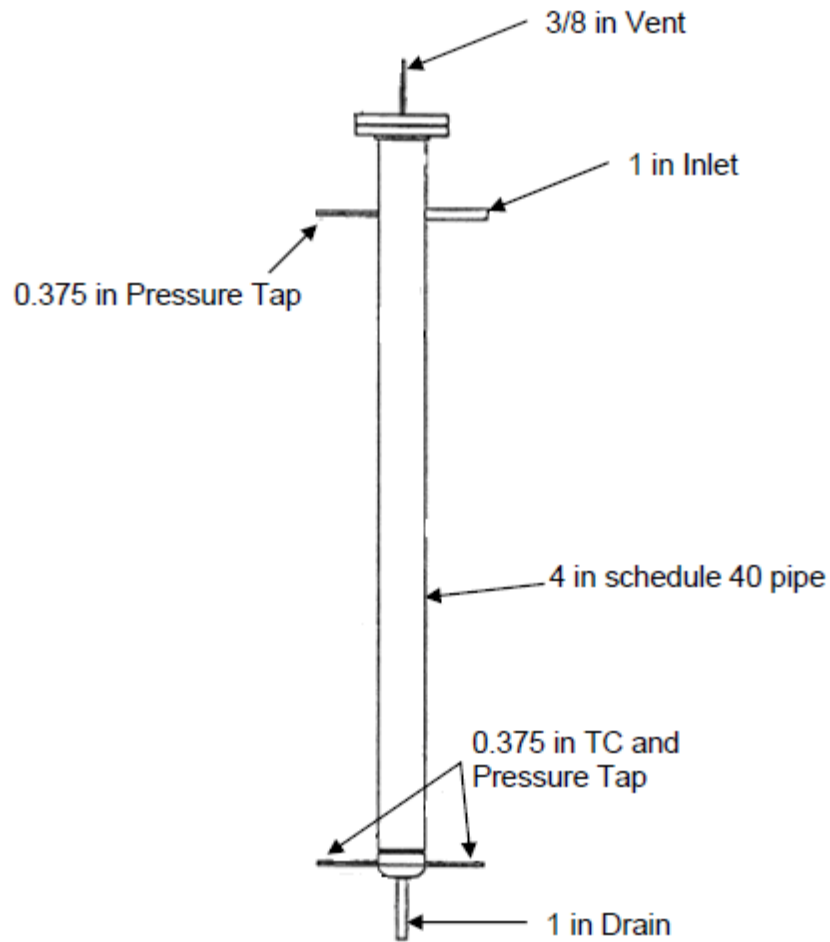


Figure 2-16 Large Carryover Tank

2.1.5 Steam Separator and Collection Tanks

The wet steam exhausted from the upper plenum flows through a steam separator (or dryer), shown in Figure 2-17, where carryover liquid droplets are further separated from the steam and collected in a small collection tank, shown in Figure 2-18, attached to the bottom of the steam separator. The steam separator relies on centrifugal force action to provide 99 percent dry steam. The separated liquid is drained into a collection tank where differential pressure cell is used as a level meter to measure liquid accumulation. The steam separator is fabricated from a 356 mm (14 in) diameter 316 stainless steel pipe and is 914 mm (36 in) long. It has 76.2 mm (3

in) connecting nozzles, a 25.4 mm (1 in) drain, and a 12.7 mm (0.5 in) top vent. It also has two pressure taps for liquid level measurements and two 38.1 mm (1.5 in) side nozzle connections. The drain tank is a small vessel with a capacity of 11329 cm³ (0.4 ft³). It is made from a 102 mm (4 in) schedule 80, 304 stainless steel pipe with an overall length of 1.78 m (70 in), including both end caps. It has a 25.4 mm (1 in) drain nozzle, a 25.4 mm (1 in) pipe top connection to the steam separator, pressure taps and fluid thermocouple connections.

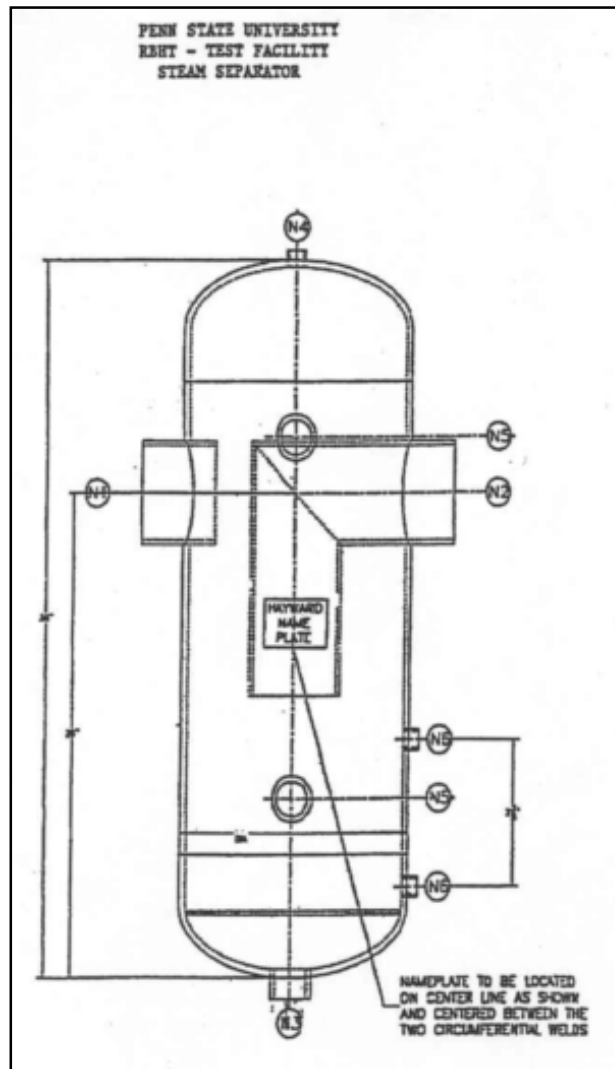


Figure 2-17 Steam Separator

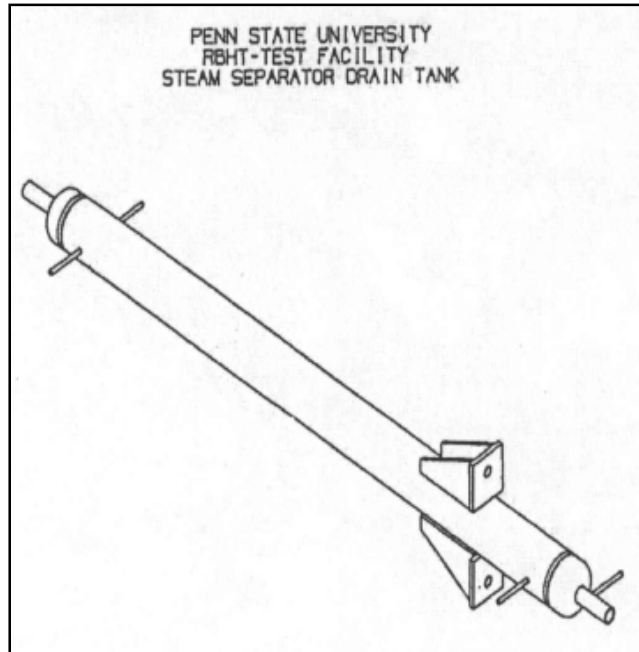


Figure 2-18 Steam Separator Collection Tank

2.1.6 Pressure Oscillation Damping Tank

The dry steam from the steam separator flows into a pressure oscillation-damping tank. As its name implies, it is used to dampen pressure oscillations at the upper plenum caused by rapidly oscillating steam generation rates in the heater rod bundle during testing. This effect is coupled to the characteristics of the pressure control valve, which is located downstream in the steam exhaust line. It is desirable to have a smooth pressure control in order to minimize uncertainties when calculating mass balances, steam generation rates, and heat transfer coefficients in the heater rod bundle, and avoid the pressure control valve causing oscillations in the bundle as it cycles. The tank has a volume of 0.209 m³ (7.38 ft³), which is approximately equal to the total volume of the rest of the test facility. The pressure tank is fabricated from 356 mm (14 in), 304 stainless steel standard schedule pipe by 2.59 m (102 in) long, as shown in Figure 2-19. Inside the tank is a 76.2 mm (3 in), schedule 40, 304 stainless steel pipe that provides a tortuous path for the steam flow to expand into a large volume, thus damping pressure oscillations. The inlet and outlet nozzles are 76.2 mm (3 in) in diameter with flanges. The vent and drain lines are made of 25.4 mm (1 in) stainless steel pipe. There are 9.53 mm (0.375 in) tube penetrations for a fluid thermocouple and two static pressure taps. The tank walls are heated with clamp-on-strip heaters up to about 11 degrees K (20 degrees F) above saturation temperatures to prevent steam condensation.

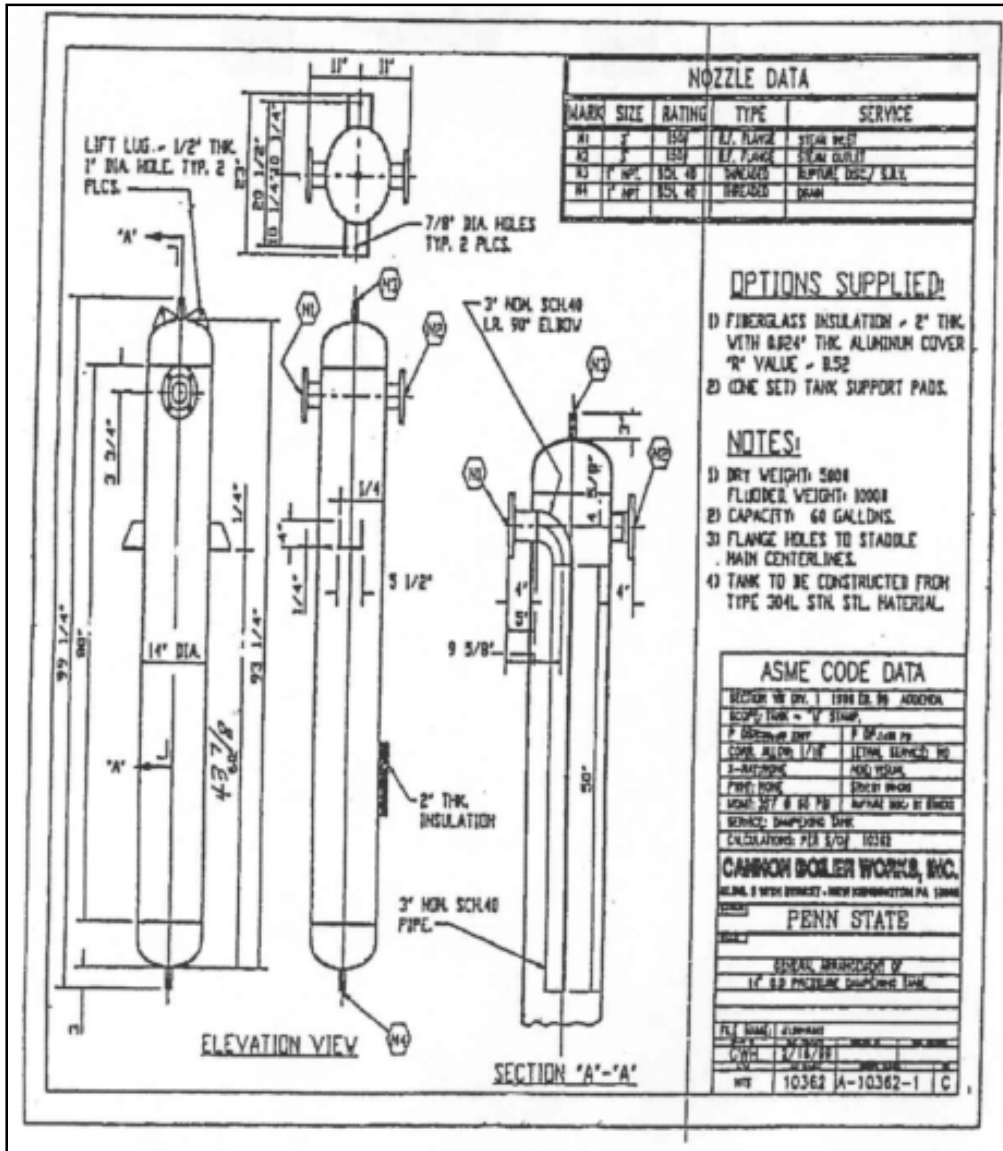


Figure 2-19 Pressure Oscillation Damping Tank

2.1.7 Exhaust Piping

The steam flowing out of the pressure oscillation-damping through a 76.2 mm (3 in) schedule 40, 304 stainless steel pipe shown schematically in Figure 2-20. The exhaust line has a Vortex flow meter, a 76.2 mm (3 in) V-Ball pressure control valve, and a muffler at the exit to minimize the noise caused by steam blowing into the atmosphere. The pressure control valve is activated by a signal from a static pressure transmitter located on the upper plenum. The line is also instrumented with a static pressure transmitter, fluid thermocouples, and outer wall thermocouples. The 76.2 mm (3 in) line has flow-straightening vanes which reduce the pipe length requirements upstream of the Vortex flow meter in order to obtain accurate flow measurements. This line has strapped-on electrical heaters to keep the wall temperatures

about 11degrees K (20 degrees F) above saturation to insure that single-phase steam flow measurements are made by the Vortex flow meter.

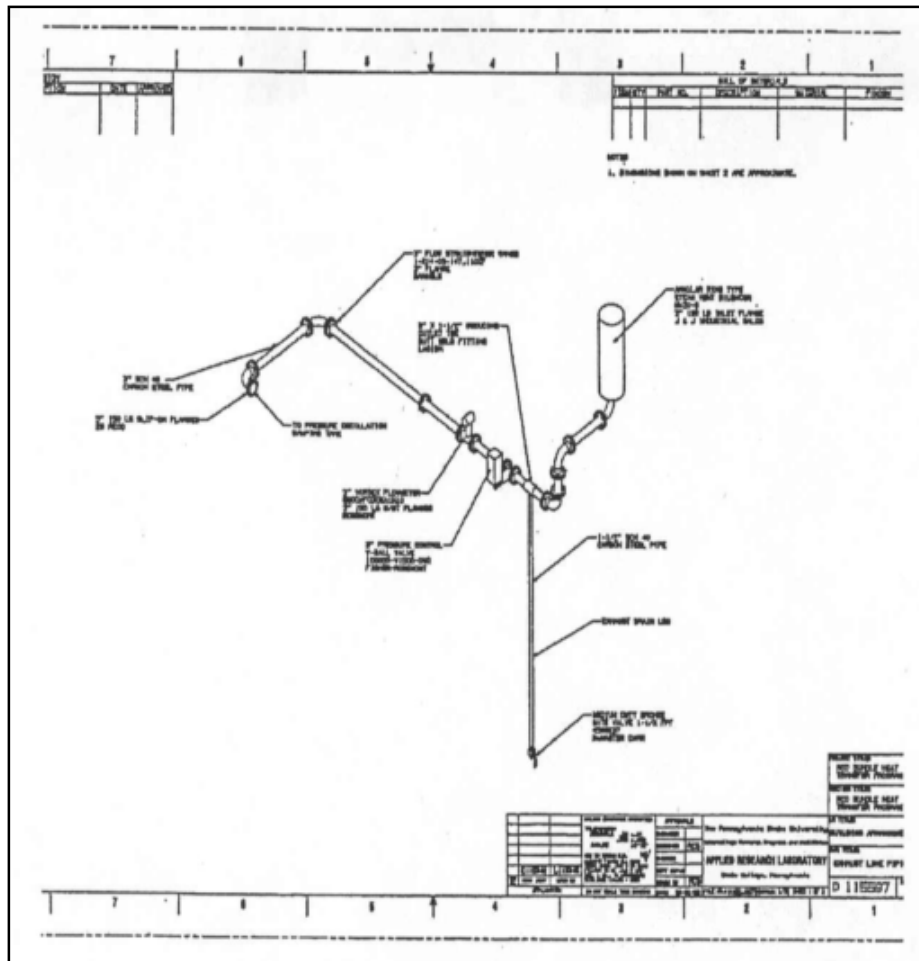


Figure 2-20 Exhaust Piping

2.1.8 Injection Water Supply Tank

The injection water system consists of a water supply tank, a circulation pump, and interconnecting lines to the test section lower plenum. The water supply tank shown in Figure 2-21, has a capacity of 0.953 m³ (251.75 gal). It is designed for 4.14 bars (60 psia) and 427 degrees K (310 degrees F). The tank is equipped with a submersible electrical heater to heat the injection water to specified test temperatures. The tank is pressurized by a nitrogen supply system, which regulates the over-pressure needed for the forced flooding injection tests. The tank has inlet and outlet nozzles, pressure taps for level measurements, fluid and wall thermocouples. Water from the tank can be circulated through the test section by a centrifugal pump with a capacity up to 0.946 m³/min (250 gpm) which are needed to perform liquid single-phase flow tests.

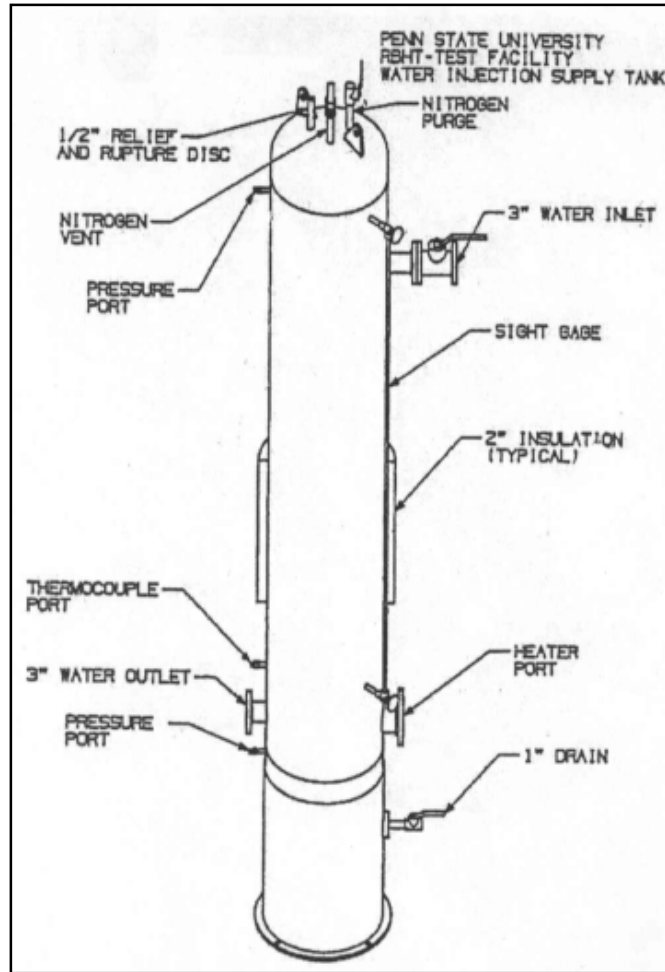


Figure 2-21 Injection Water Supply Tank

2.2 Facility Improvements Over Previous Tests

Significant improvements related to other heater rod bundle testing programs, listed in Section 3.0 Literature Review of the Peer Review Report have been incorporated in the RBHT-Test Facility. These improvements include:

- A low mass square flow housing design which better fits a square rod bundle array and minimized the housing mass and excess rod bundle flow area.
- The six pairs of windows which provide large viewing areas below and about grid locations, making it possible to observe and make void fraction measurements during testing.

- The use of a traversing steam probe rake to measure simultaneously steam temperatures in the flow subchannel and in the rod-to-rod gap. They are specially designed such that they would not stay wet after having contacted by liquid droplets.
- Differential pressure transmitters axially located 76.2 mm to 127 mm (3 to 5 in.) apart in conjunction with heater rod and flow housing wall thermocouples to obtain detailed void fraction and heat transfer information.
- Addition of a large pressure oscillation-damping tank to minimize test section oscillations observed in the FLECHT and FLECHT-SEASET tests.
- The incorporation of close coupled entrained liquid collection tanks and piping to reduce delay times for liquid collection.

2.3 Instrumentation and Data Acquisition System

The test instrumentation is designed to measure temperatures, power, flows, liquid levels, pressures, and void fractions. The local average void fraction can be calculated over the differential pressure cell spans. Detailed axial distribution of heater rod thermocouples allowed for accurate determination of the two-phase mixture height in the RBHT facility. The mixture height decreased during the experiments, resulting in the local thermocouple location transitioning from a boiling situation to steam cooling with a corresponding sharp increase in the thermocouple response as the heater rod temperature increased. Heater rod power, heat rod temperature, and fluid temperature are used to calculate heat fluxes and heat transfer coefficients, quench times, rod bundle energy losses, convective and radiation heat transfer to steam, droplets, grids, support rods, and housing. Effects of grids, support rods and housing behavior can be determined.

2.3.1 Loop Instrumentation and Controls

Loop instrumentation is shown schematically in Figure 2-23. One hundred and twenty three (123) instrumentation channels are assigned to the collection of electrical power, fluid and wall temperatures, levels, flows differential pressures, and static pressure measurements. The injection water supply tank has three fluid and three wall thermocouples to monitor water and wall temperatures during heat-up prior to testing. It has a differential pressure transmitter used as a level meter to determine water mass in the tank and mass depletion during testing. It also has a static pressure transmitter that monitors the nitrogen over pressure and controls the nitrogen flow needed to maintain a constant pressure during testing. The water injection line is equipped with a Coriolis Effect Micromotion flow meter that directly measures mass flows up to 454 kg/min (1000 lbs./min) with an accuracy of plus or minus eleven hundredths of a percent (± 0.11 percent) of rate. The steam line has a Rosemount Vortex shedding flow meter to measure flow up to 7.08 m³/min (250 ft³/min) with an accuracy of plus or minus 65 hundredths of a percent (± 0.65 percent) of rate. Each flow meter is connected through a pneumatic

controller to a V-ball flow control valve. Each line has a fluid thermocouple to measure water or steam temperature during heat-up and forced injection testing. They also have a static pressure transmitter which in conjunction with the thermocouples can determine the thermodynamic properties of the fluid. The injection line has three wall thermocouples to monitor wall temperatures during heat-up and during testing. One of these thermocouples in conjunction with a temperature controller regulates the power to an electrical heating cable wrapped around the injection line. The heating cable is used to heat-up the injection line wall and to maintain the injection water at the required injection temperature.

The small carryover tank has one fluid and two wall thermocouples. The large carryover tank instrumentation consists of one fluid thermocouple, three wall thermocouples. Both tanks have a liquid level meter, which measures the amount of carryover liquid being collected during testing. In addition, a differential pressure transmitter is connected from the top of the carryover tank to the upper plenum to determine the static pressure in the carryover tank.

The steam separator is instrumented with one fluid and two wall thermocouples. The drain tank is instrumented with two fluid and two wall thermocouples. The fluid thermocouple measures the water temperature de-entrained during testing. The wall thermocouples monitor wall temperatures during heat-up. The volume of de-entrained water is measured with a level meter connected across the drain tank.

The pressure oscillation damping tank has two fluid and three wall thermocouples which are used to monitor vessel walls during heat-up, and to insure that the vessel wall is at a temperature above saturation to prevent condensation. One wall thermocouple in conjunction with a temperature controller monitors the power applied to clamp-on heaters that heat up the tank to the desired wall temperature.

The exhaust line is equipped with a Vortex flow meter which, in conjunction with a static pressure transmitter and a fluid thermocouple measurements are used to calculate steam volumetric flows up to 7.08 m³/min (250 ft³/min). The flow meter has an accuracy of plus or minus 65 hundredths of a percent (± 0.65 percent) of the rate. The exhaust line also has three wall thermocouples to measure pipe wall temperatures. One wall thermocouple in conjunction with a temperature control regulates the power going to clamp-on-heaters which are used for heating the pipe walls up to a temperature about 11degrees K (20 degrees F) above saturation to prevent steam condensation and to insure accurate single phase steam flow measurements. The exhaust line has V-ball pressure control valve. This valve is controlled by a static pressure transmitter through a pneumatic controller connected to the top of the upper plenum in order to maintain constant test section pressure during testing.

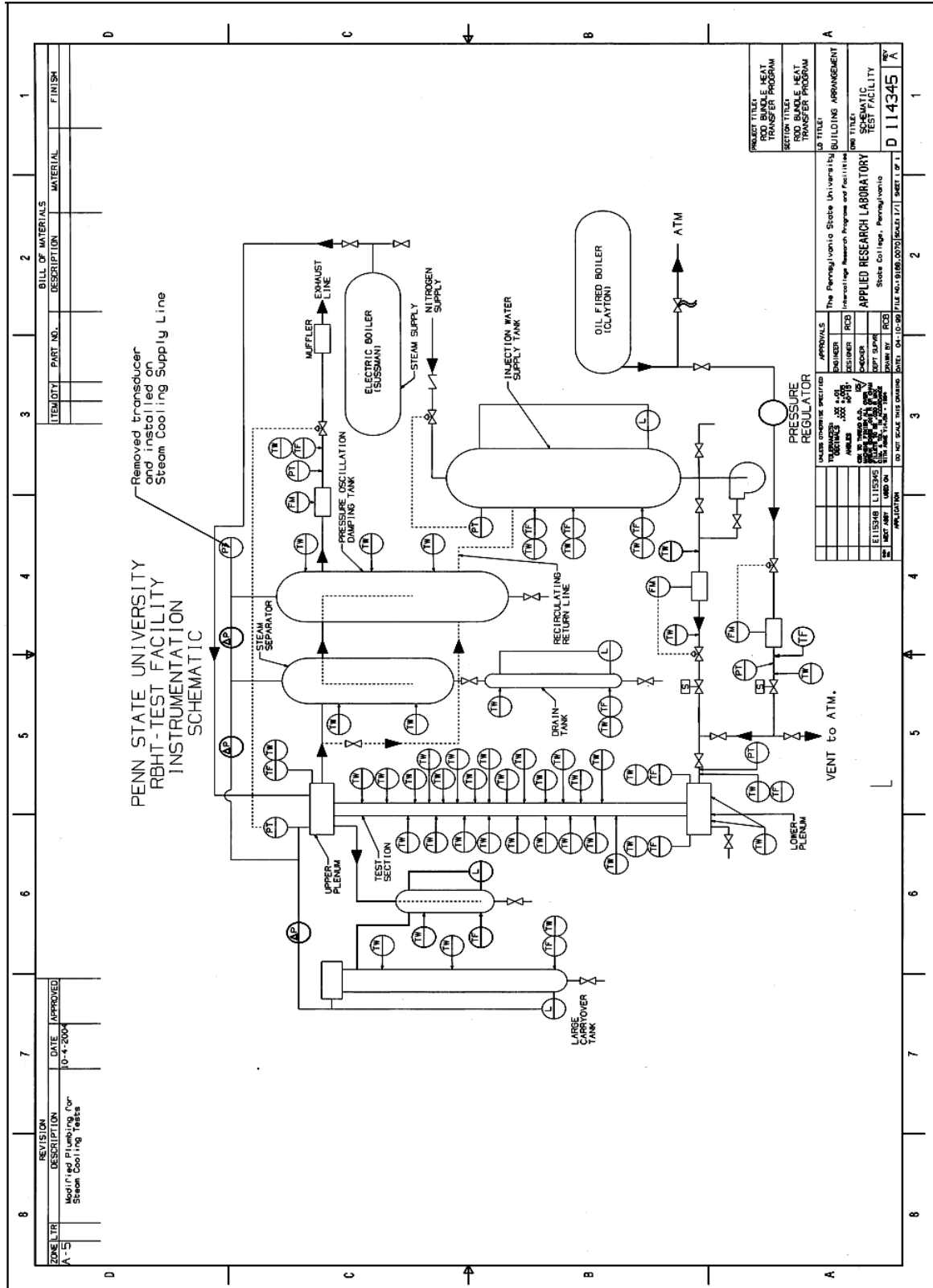


Figure 2-22 Loop Instrumentation Schematic

2.3.2 Test Section Instrumentation

The test section instrumentation consists of the heater rod bundle and flow housing, the lower plenum, and the upper plenum groups. The heater rod bundle and flow housing instrumentation is shown schematically in Figure 2-24. This figure shows the instrumentation axial locations in relation to heater rod heated length, heater axial power profile, grids, steam probes and steam probe rakes, housing pressure taps and windows.

Six grids have thermocouples attached to their surfaces in order to determine dryout behavior during testing shown in Figure 2-25 through Figure 2-30. Grid and Steam Probes axial locations are shown schematically in Figure 2-24. Eight groups of heater rods have thermocouples at different elevations to cover, as much as possible, the entire rod bundle heated length. The radial location of each heater rod group is shown in Figure 2-31. The radial locations of instrumentation rods were chosen in order to be able to characterize heat transfer of hot rods simulated by the center rods, rod-to-rod and rod-to-housing radiation heat transfer. For this purpose, heater rod thermocouples, steam probes, and housing wall thermocouples are located at the same elevations. In addition, symmetrical location of the same group of instrumented heater rods will help in the data analysis and will determine any anomalies in the radial flow distribution through the heater rod bundle. Heater rod thermocouples are also placed at varying distances downstream from a grid to determine the decreasing heat transfer gradient between grid spans. The steam probes or fluid thermocouples are located at short distances upstream and downstream of a grid to determine the effect of water droplets being shattered by the grids on droplet size and distribution, and the desuperheating effect on the steam temperatures in the dispersed flow regime.

The vapor or steam temperature is measured using miniature thermocouples having a diameter of 0.813 mm (0.032 in) which are attached to the spacer grids, as well as the traversing steam probe rakes having a diameter of 0.381 mm (0.015 in). These are very small diameter thermocouples that have a fast response time such that they can follow the vapor temperature accurately in a dispersed, non-equilibrium, two-phase flow. As the froth front approaches, the number and sizes of the droplets increase which can lead to wetting of these thermocouples.

The traversing steam probe rakes are located at the spans between the grids at the upper heater rod bundle elevations, as shown schematically in Figure 2-32. The traversing steam probe rakes will measure steam temperatures in the heater rod bundle flow subchannels and the gap between the heater rods during the dispersed flow regime. The traversing steam probe rake is shown in Figure 2-32. Each rake consists of three 0.381 mm (0.015 in) diameter ungrounded thermocouples mounted on a 0.356 mm (0.014 in) thick by 6.35 mm (0.25 in) wide Inconel strip. The thermocouples are spaced 12.6 mm (0.496 in) apart which correspond to the heater rod spacing in the bundle. The thermocouple tips are located facing the steam flow. A 2.39 mm (0.094 in) diameter tube attached to the strip is used to traverse the steam probe rake across the rod bundle. This tube also carries the thermocouples leads outside the flow housing through an extension tube and a pressure seal. The tube is attached to an automated sliding mechanism shown in Figure 2-33. It consists of a sliding bar, a 24 DCV motor with a ball drive shaft, and a linear potentiometer provides a voltage input to the Data Acquisition System which determines the rake thermocouple location and travel distances across the heater rod bundle.

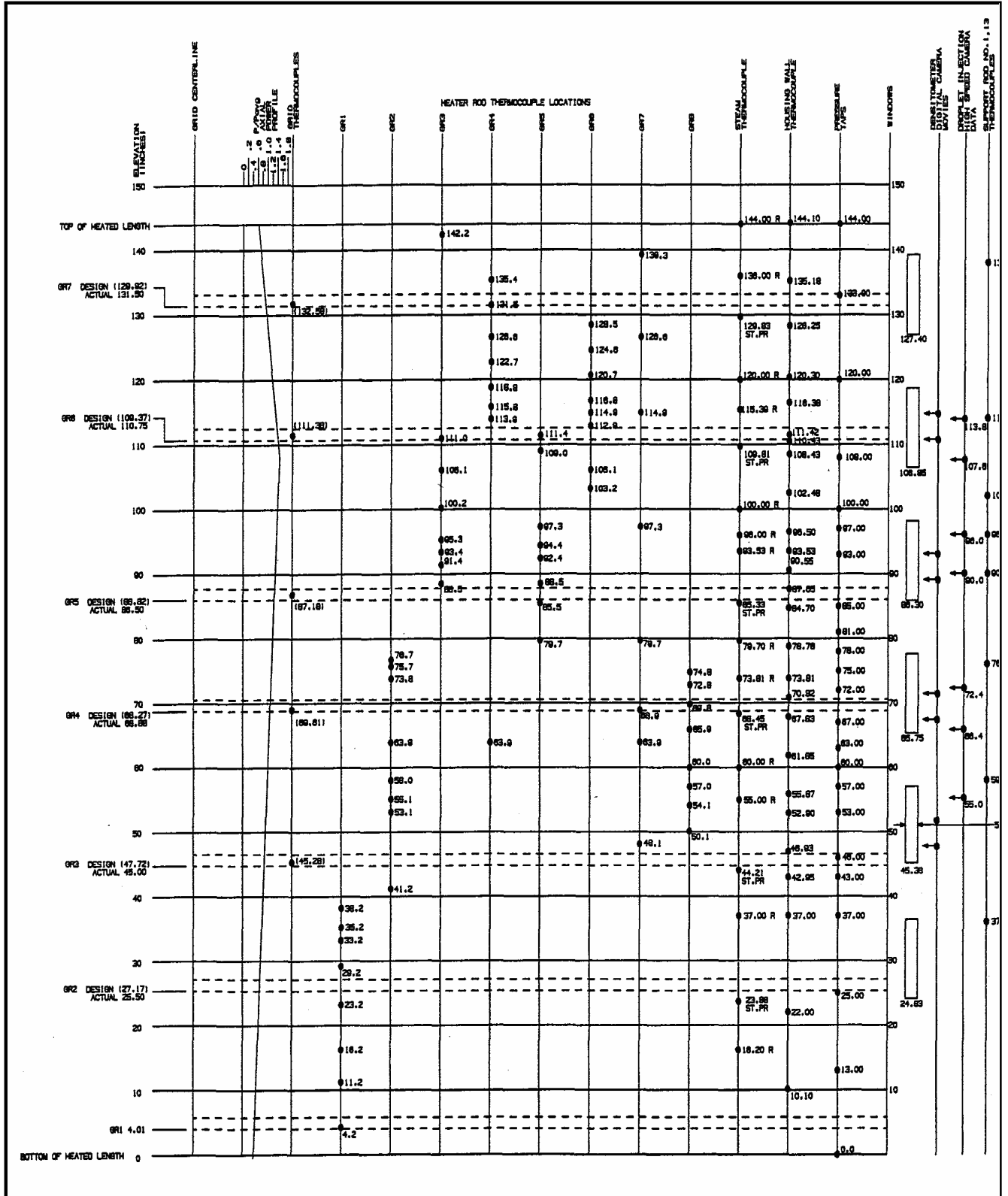


Figure 2-23 Rod Bundle and Housing Instrumentation Axial Locations

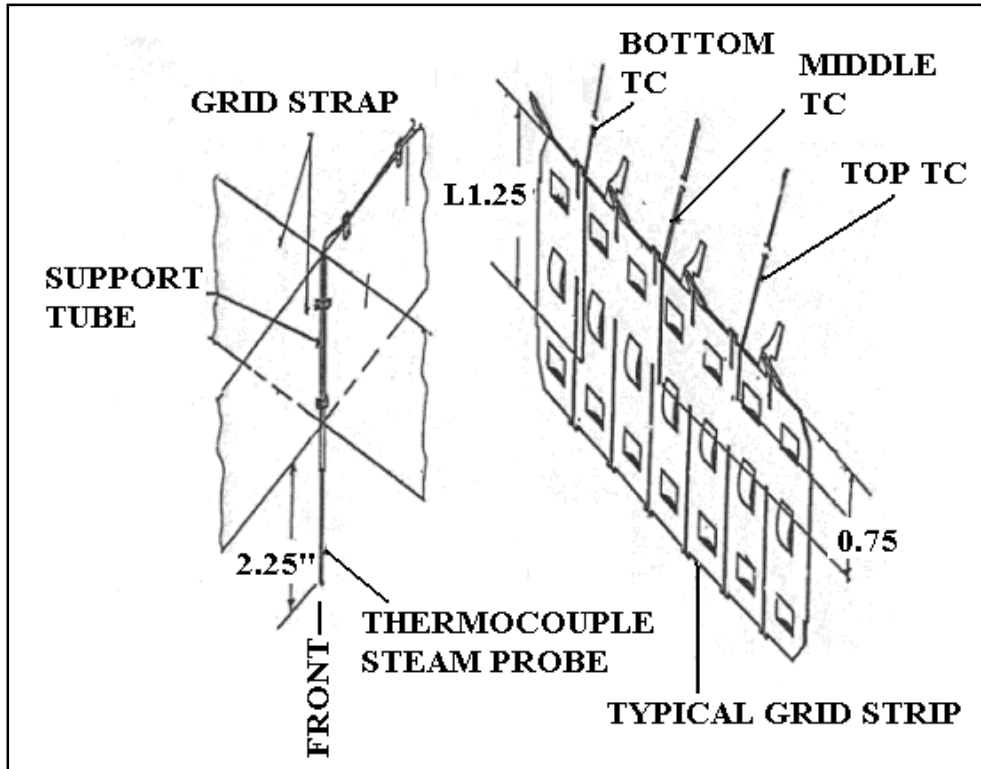


Figure 2-24 Mixing Vane Grid Instrumentation

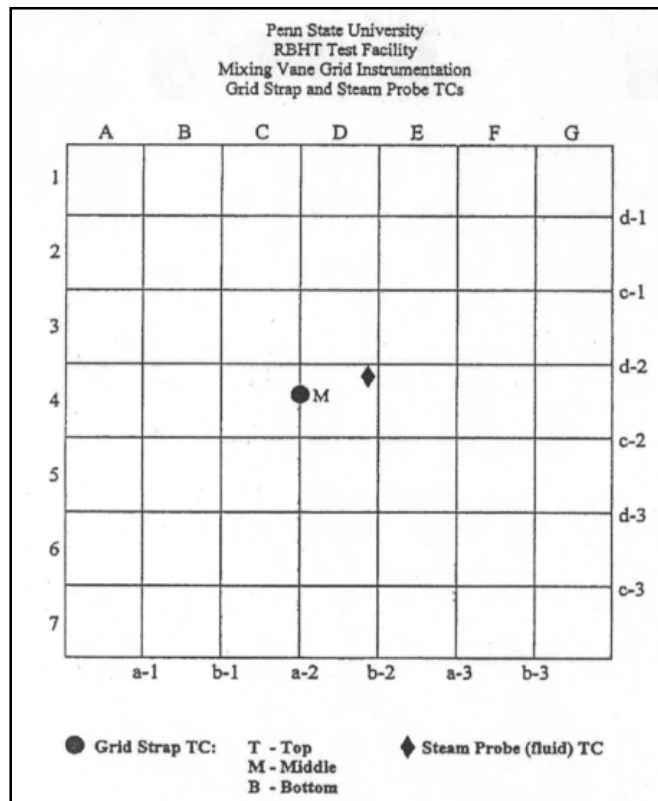


Figure 2-25 Grid No. 2 Instrumentation

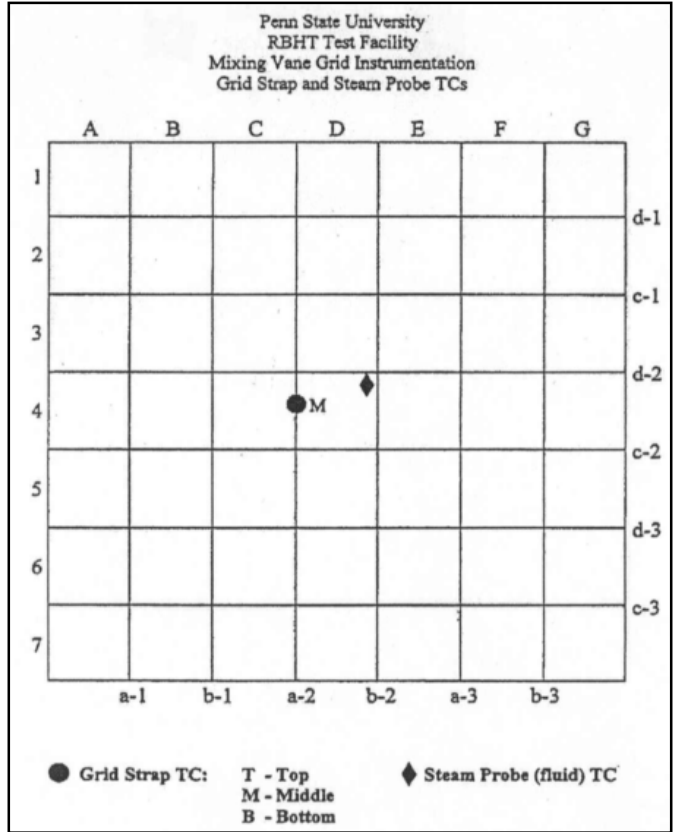


Figure 2-26 Grid No. 3 Instrumentation

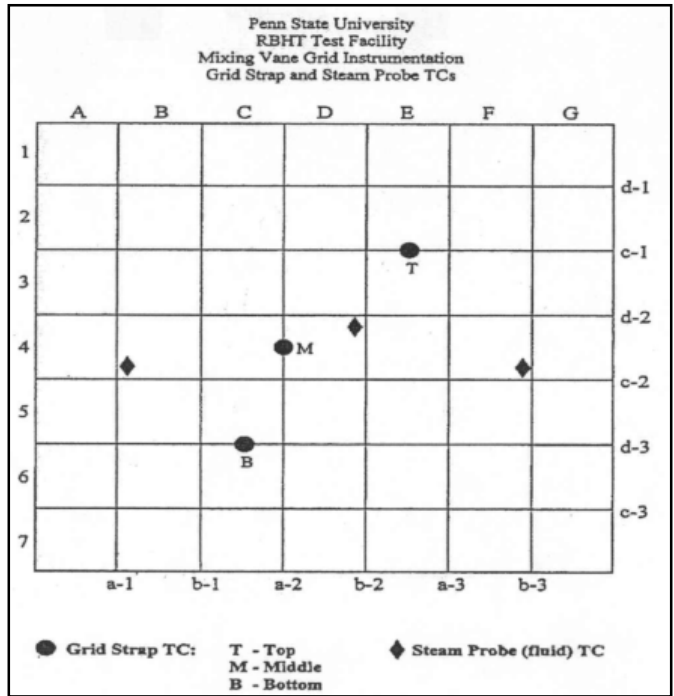


Figure 2-27 Grid No. 4 Instrumentation

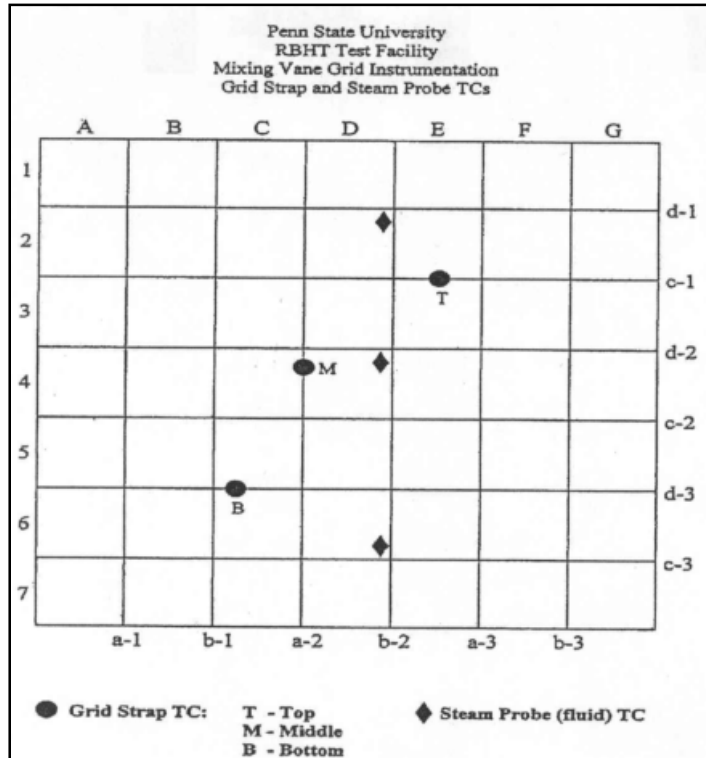


Figure 2-28 Grid No. 5 Instrumentation

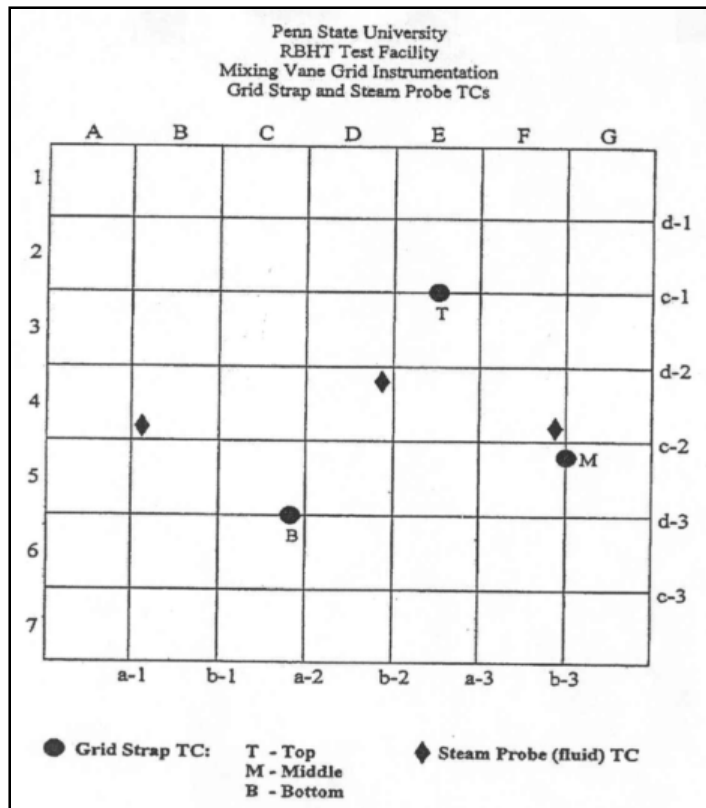


Figure 2-29 Grid No. 6 Instrumentation

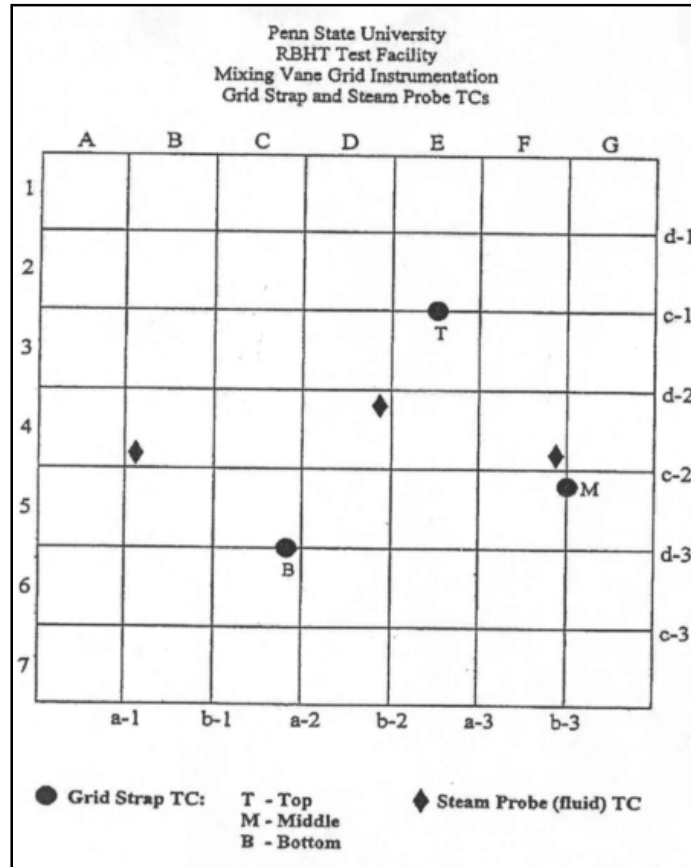


Figure 2-30 Grid No. 7 Instrumentation

Two fluid thermocouples are placed 24.5 mm (1 in) below the bottom of the bundle heated length such that injection water temperatures are monitored throughout the test.

There are twenty-three pressure taps located at various elevations along the rod bundle providing measurements to calculate single phase flow heater rod bundle and grid friction losses, bundle mass inventory, and void fraction. The spans of these taps are listed in Table 2-1. These pressure taps can also be seen on the right-hand-side of the rod bundle test section in the Figure 2-22, with each connected to a sensitive differential pressure cell. Sixteen of these differential pressure cells measure the pressure drop over spans of only 76.2 to 127 mm (3 to 5 in), which provides an accurate and detailed estimate of void fraction in the froth region in the bundle. The other differential pressure cells span ranges up to 304.8 mm (12 in.). In addition, heater rod and housing wall thermocouples are placed at these pressure tap mid spans locations to determine convective and radiant heat transfer coefficients in the froth region where the differential pressure cells will give the average void fraction.

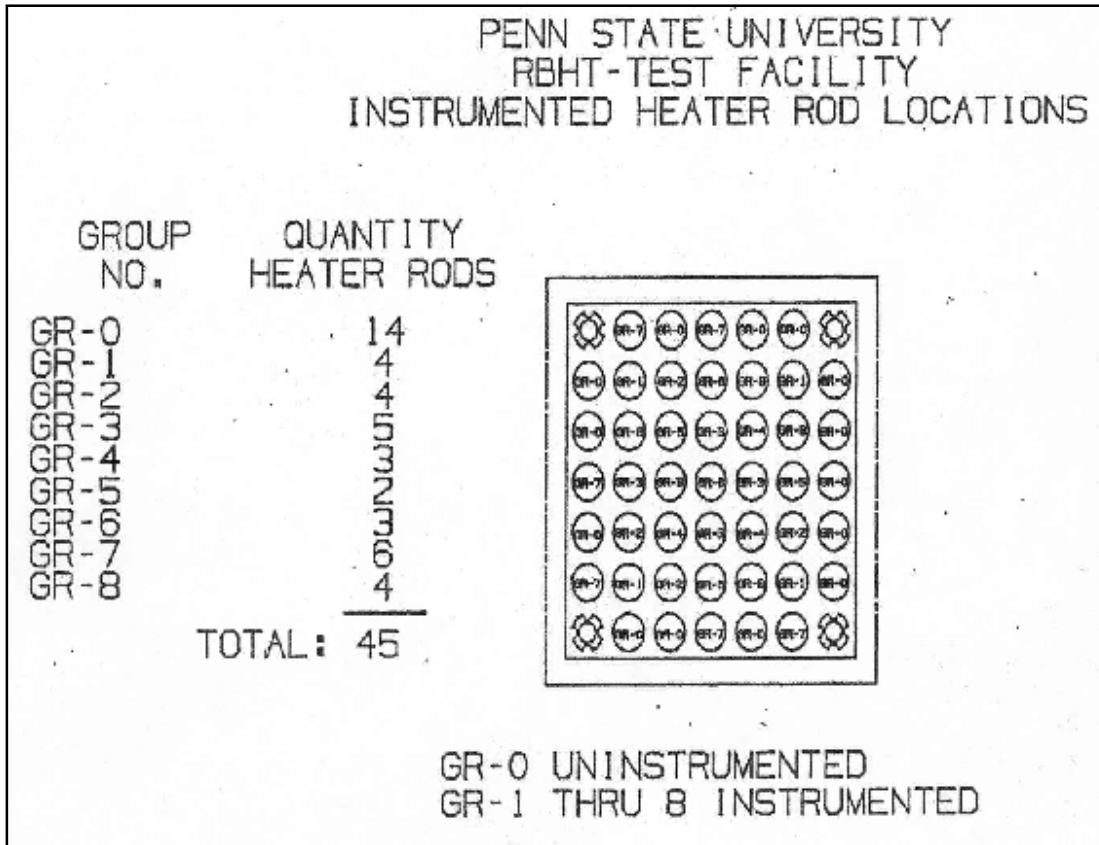


Figure 2-31 Instrumental Heater Rod Radial Location

The flow housing has six pairs of windows at the following elevations: 61.4 cm (37.2 in), 114 cm (44.7 in), 166 cm (65.3 in), 218 cm (85.8 in), 270 cm (106.4 in) and 322 cm (126.9 in). Each pair of windows are 180 degrees apart. The window lenses are made from optical grade fused quartz and provide a viewing area of about 10.2 cm (4 in) below and 15.2 cm (6 in) above the grid number two to seven. The windows are preheated to prevent wetting during the time when dispersed flow is occurring and LCDS measurements are being made using infrared heaters on each window and by pulsing the heater rod bundle when preheating the flow housing walls.

The four corner support rods are unheated, they are used to support the bundle grids and to route the grid and steam probes thermocouple leads going out of the bundle. These rods are instrumented with eight (8) thermocouples attached at various elevations corresponding to heater rods and housing wall thermocouples. The purpose of this arrangement is to quantify radiation heat transfer losses to unheated surfaces and determine their behavior during tests.

The DC power supply can be controlled by regulating the voltage, current, or total power output. The voltage drop across the heater rod bundle is measured by a voltmeter connected to voltage taps at the Low-Melt pot and the Nickel Ground Plate. The electrical current is measured by a copper shunt calibrated for 15,000 amps proportional to an output signal of 0-50 millivolts.

Table 2-1 Differential Pressure Cell Spans Along Bundle (from bottom of heated length)

Differential Pressure Cell	Span (mm)	Span (in.)
1	0-3658	0-144
2	0-330	0-13
3	330-635	13-25
4	635-940	25-37
5	940-1092	37-43
6	1092-1168	43-46
7	1168-1346	46-53
8	1346-1448	53-57
9	1448-1524	57-60
10	1524-1600	60-63
11	1600-1702	63-67
12	1702-1829	67-72
13	1829-1905	72-75
14	1905-1981	75-78
15	1981-2057	78-81
16	2057-2159	81-85
17	2159-2362	85-93
18	2362-2464	93-97
19	2464-2540	97-100
20	2540-2743	100-108
21	2743-3048	108-120
22	3048-3378	120-133
23	3378-3658	133-144

The Lower Plenum is instrumented with two fluid thermocouples and two wall thermocouples. The fluid thermocouples monitor the injection water temperature prior and during testing. The wall thermocouples measure the vessel wall temperature during heat-up and testing. One of the wall thermocouples in conjunction with a temperature controller regulates electrical power to clamp-on-heater rods to maintain the vessel wall at inlet temperatures.

The Upper Plenum is also instrumented with two fluid thermocouples and two wall thermocouples. The fluid thermocouples measure steam and carryover liquid during testing. The wall thermocouples monitor vessel wall temperatures during heat-up and testing. The Upper Plenum is also instrumented with a static pressure transmitter which measures and controls the test section pressure during testing.

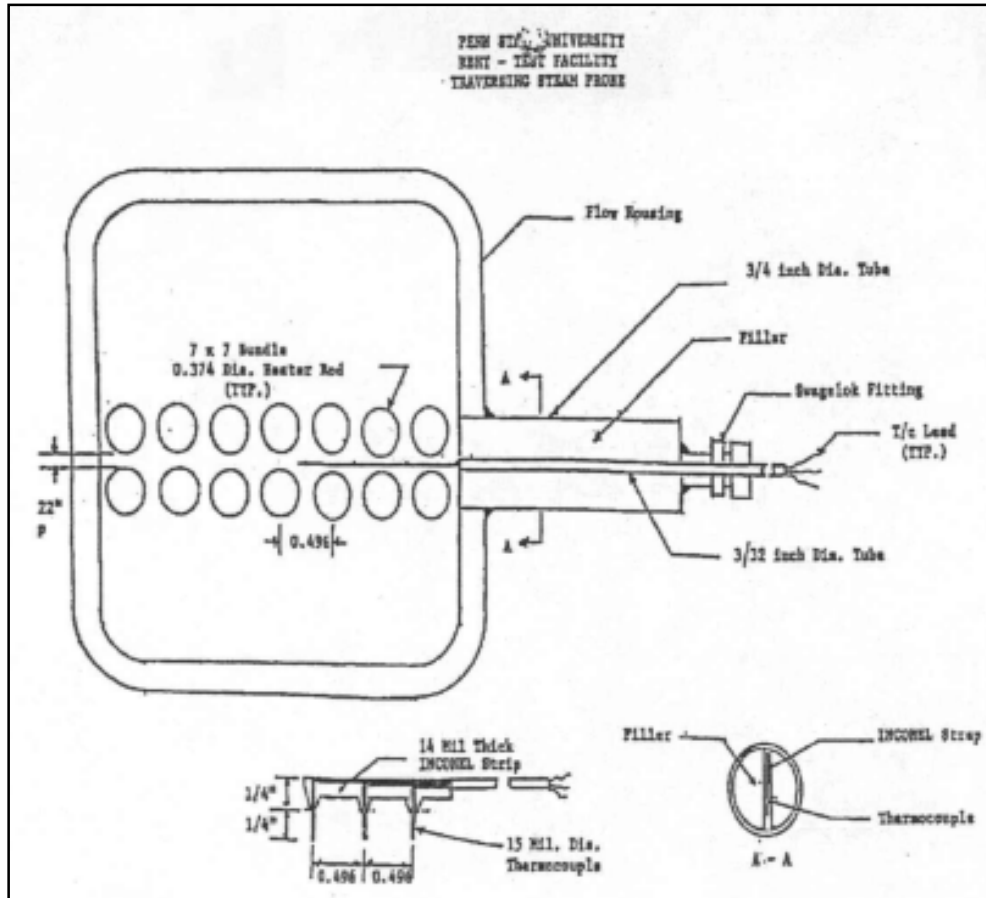


Figure 2-32 Traversing Steam Probe Rake Schematic

2.3.3 Data Acquisition System

The control and data acquisition system provides control functions and data collection functions for RBHT Test Facility. This system consists of two parts, the computer and display terminals residing in the control room and the VXI mainframe and terminal panels residing in the test facility. The two parts are connected via an industry standard IEEE 1394 (Firewire) serial control and data interface.

The computer provides the display, control, and data storage functions. It has the capability of displaying control function set points and process variables, and critical operating parameters during tests, along with selected variable such as various rod temperatures displayed in real-times during the experiment. This system will provide dial, meter, and strip-chart functions as required. The computer collects and saves data from the various instruments, such as voltage, current, pressure, level, flow and temperature; and provides control functions such as heater rod power, injection water pressure, upper and low plenum temperatures, etc.

The instrumentation part of this system which residing in the test facility, consists of an industry standard VXI mainframe (Vme bus with extensions for Instrumentation) from Hewlett-Packard (HP-E8401AA), and a set of terminal panels (HP E1586A). The VXI mainframe contains a firewire controller card (HPE8491A) and seven state-of-the art data acquisition and control cards (HP E1419A). The terminal panels provide the isothermal reference junctions needed for the thermocouples, as well as the voltage and current-loop input/output (i/o) interface to the RBHT Test Facility. These terminal panels are connected to the HP E1419A cards with SCSI cables. Seven cards yield a capability of 448 I/O channels. The VXI mainframe can hold up to twelve cards, and the firewire interface can support up to sixteen mainframes.

Each E1419A card can support up to eight signal conditioning plug-ins (scp's), conditioning eight channels each. Each E1509A scp contains low-pass anti-aliasing filters, fixed at 7 Hz. Because of this, the scan rate for each channel must be greater than or equal to the Nyquist rate of 14 Hz. The maximum a/d conversion rate on each HP E1419A card is nominally 100kHz, but is controlled to rate the user requires. The seven cards can be synchronized to perform the scans simultaneously. The theoretical maximum scan rate for each channel (on any individual card) is $100,000/64 = 1,562.5$ Hz, if all 64 channels are scanned. (Note, the actual scan rate would be less because of multiplexer switching, amplifier settling times due to gain changes, etc. There are different scp's available from HP providing different filter values to scan at these rates.) The normal data-scanning rate will be 2 Hz during the majority of the tests, but this rate can be increased to 10 Hz for specific times during testing.

3. CALCULATIONAL METHODS USED FOR THE RBHT TWO-PHASE MIXTURE LEVEL AND UNCOVERY EXPERIMENTS

3.1 Introduction

The pressure drop data for the two-phase mixture level swell and uncovery experiments were analyzed to derive the axial void distribution along the bundle for different experimental conditions. The Bundle Energy Balance computer program described later in the chapter was used to reduce and analyze the experimental data. The analysis program was used to correct the measured pressure drop for two-phase friction and acceleration losses such that the void distribution could be calculated.

3.2 Analyzed RBHT Experiments

All experiments were analyzed using the Bundle Energy Balance computer program, but a selected few of the experiments are presented here for comparisons. The test conditions for the selected experiments are presented below in Table 3-1.

Table 3-1 Test Conditions for the Analyzed RBHT Experiments

EXP #	Pressure MPa (psia)	Inlet Temperature K (°F)	Inlet Subcooling K (°F)	Power (kW)
1566	0.1379 (20)	370.4 (207)	11.1 (20)	72
1570	0.1379 (20)	370.4 (207)	11.1 (20)	144
1582	0.1379 (20)	326.5 (128)	55.6 (100)	144
1651	0.2758 (40)	348.2 (167)	55.6 (100)	72
1659	0.4137 (60)	362.6 (193)	55.6 (100)	72
1678/79	0.1379 (20)	326.5 (128)	55.6 (100)	72
1683	0.2758 (40)	348.2 (167)	55.6 (100)	144

Experiment 1678/79 will be treated as the base case for all comparisons as it provides a test that can compare individual parametric changes between all other experiments which are discussed here. Experiments 1678 and 1679 are combined to represent the base case as they were performed on the same testing day, and the data for experiment 1679 is a continuation of experiment 1678. The final test conditions that were to be performed under the 1678 name were completed using the name experiment 1679 as a result of a necessary data acquisition system restart.

The effects of increasing pressure will be studied in comparisons with experiments 1678/79, 1651 and 1659. Studies on the effect of increasing the power will be studied through comparisons with experiment 1582 and experiment 1678/79. Experiment 1566 will be compared to experiment 1678/79 to study the result of increasing the inlet temperature, as the inlet subcooling is 11.1 degrees K (20 degrees F) for experiment 1566 compared to the 55.6 degrees K (100 degrees F) used in the other experiments. The remaining experiments 1570

and 1683 will be compared with experiment 1678/79 in order to determine the effects of changing multiple conditions. Experiments 1570 and 1678/79 compare the effects of decreasing the inlet subcooling and increasing the power, while experiments 1683 and 1678/79 will be used to study the result of increasing both the pressure and the power.

The uncorrected void fraction plots from the data as a function of elevation are shown in Figure 3-1 for the base case.

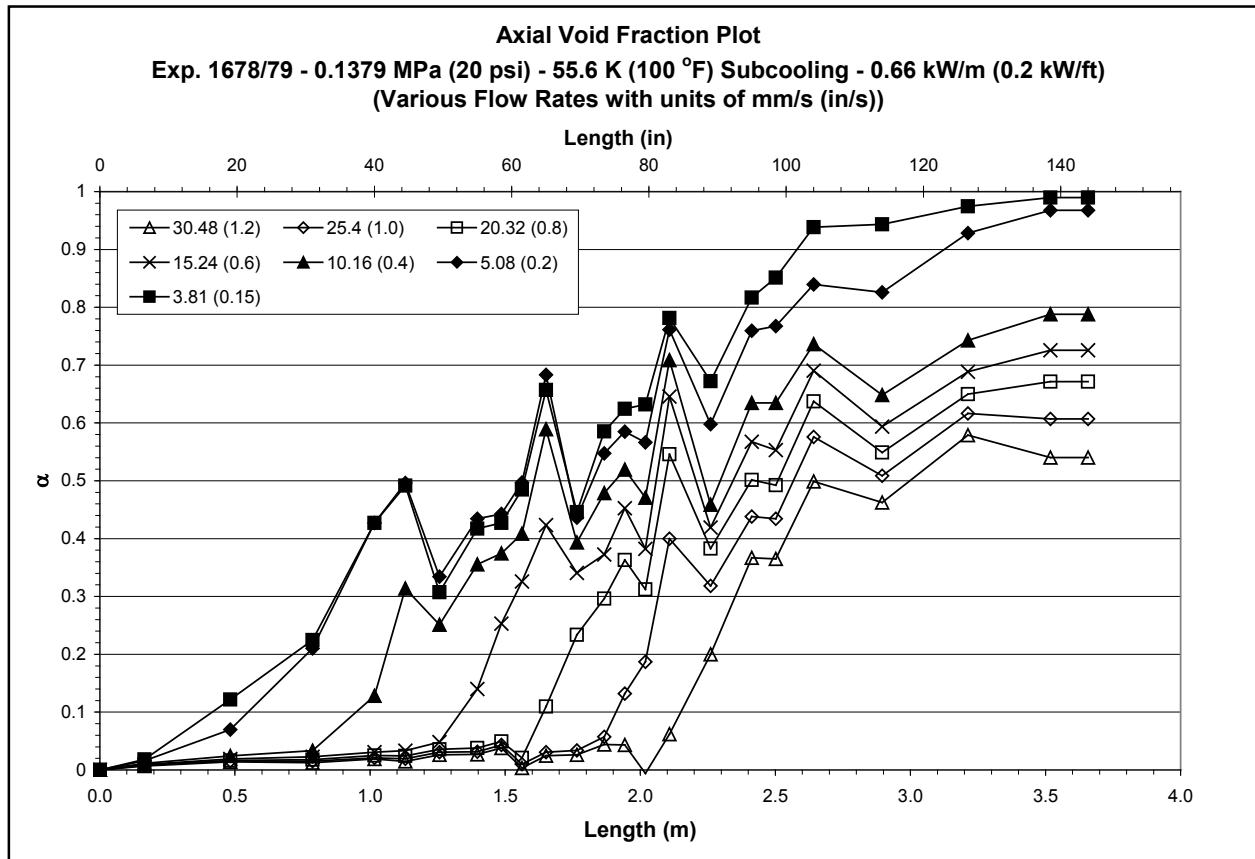


Figure 3-1 Axial Void Fraction Plot for Uncorrected RBHT Data

As can be seen from Figure 3-1, the void fraction begins to increase at lower elevations with decreased flow rates as boiling begins lower in the bundle and increase vapor flow is generated. The void fraction does not increase in a monotonic fashion but shows dips and spikes. As will be discussed, the spacer grids are a contributing factor in the irregular behavior of the void distribution.

The measured level within the various spans of the differential pressure cells are divided by the full length of the spans and subtracted from one to obtain an estimate of the uncorrected local void fraction. The uncorrected void fractions must be corrected for losses due to friction and acceleration. When the differential pressure cell spans a spacer grid location, the grid effects must also be accounted for. In addition, there are also temperature and density corrections that are necessary for the differential pressure cell readings. The differential pressure cells are initially calibrated by filling the entire bundle with water at standard temperature and pressure conditions. This results in the test readings to be slightly lower because of the density

difference between the reference conditions and the test conditions. In order to correct for this difference, the pressure drop measurements are corrected by multiplying the reference density divided by the experiment density. This correction would become a very tedious process since the density is a function of temperature, which is changing as flow progresses upward through the bundle. Since the correction is small, to simplify this correction, an average temperature over the length of the bundle is utilized to correct all differential pressure cell measurements, relative to the reference conditions.

3.3 ENERGY BALANCE Program

The use of a cross-sectional averaged energy balance allows calculation of the bundle single and two-phase conditions. The parameters that were calculated included bundle average quality, the flow rates of both the liquid and vapor, and the mixture Reynolds number, density, and velocity.

3.3.1 Bundle Energy Balance Computer Code Background

The user interactive computer program STEAM INTERACT was obtained to provide ASME steam table properties for the various calculations that are used in the Bundle Energy Balance code. At the time this program was first obtained, it was modified in the year 2002 by John Burkardt [1]. The program and modifications made by Burkardt are based on the referenced work of Lester Haar, John Gallagher, and George Kell [2] and the work of C. A. Meyer, R. B. McClintock, G. J. Silvestri, and R. C. Spencer [3]. The referenced work of Haar, Gallagher, and Kell centered on the NBS/NRC steam tables and developing computer programs for providing the properties of both vapor and liquid states of water. The work by Meyer et al. was in developing the ASME steam table properties. The input and resulting output were all in metric units. The program code was modified for this project by D. J. Miller [4] to accept inputs that are in British units and to provide both metric and British units for all calculated output values.

Some of the desired steam table properties were not included in the original STEAM INTERACT program. These included the values of the liquid and vapor phase enthalpies, densities, and viscosities. In order to have the code also calculate these quantities, the property calculations subroutine from the computer program PWRDNC [5] was incorporated into the subroutines of STEAM INTERACT. The combination of the two programs' calculated properties provides the necessary values for all further calculations.

3.3.2 Bundle Energy Balance Computer Code Equations and Derivations

The modified steam interact code provides the user with the vapor and liquid properties for the provided pressure and temperature. Thus the remaining test conditions that are required from the user are the inlet mass flow rate (lbm/sec) and the bundle power (kW). With these four given conditions and the resulting steam table properties, a cross-sectional averaged energy balance can be used to calculate the saturation line and the local average quality axially in the rod bundle. From the calculation of the local quality, several other values can be calculated. The derivations for calculating the quality and other values are presented below, based on the equations from Collier and Thome [6].

The derivation of the equation for the mixture quality comes from first determining the location of the saturation line. This can be found from the energy balance equation

$$\dot{m}dh = q'(z)dz \quad (3-1)$$

where the nomenclature for the terms in this and all following equations have been provided in the abbreviations section at the beginning of this report. The vapor generation due to fluid flashing caused by the pressure drop in the bundle was found to be negligible compared to the vapor generation due to heating. This is shown in Appendix B.

A more detailed explanation of assumptions and resulting derivations were conducted by Miller [4], which results in the final expression

$$h_f - h_{in} = \frac{1}{\dot{m}} \int_{z_{in}}^{z_{sat}} q'(z)dz \quad (3-2)$$

As discussed earlier, the bundle axial shape is skewed towards the top of the bundle as a triangular profile. The integration of the right-hand-side (RHS) requires the inclusion of the equations for the peak-to-average power ratio equation for the respective elevations of interest. The expressions for the power factor for the upper and lower portions of the rod bundle with 9 ft (2.74 m) elevation being the location of unity for each are given as

$$PF = \begin{cases} \frac{z}{9} + 0.5, & \text{for elevations} \leq 9 \text{ feet} \\ -\frac{z}{3} + 4.5, & \text{for elevations} \geq 9 \text{ feet} \end{cases} \quad (3-3)$$

One can now apply the integral on the RHS of the expression to determine the elevation of the saturation line, such that

$$h(z) - h_{in} = \frac{\bar{q}'}{\dot{m}} \int_{z_{in}}^{z_{sat}} \left(\frac{z}{9} + 0.5 \right) dz \quad (3-4)$$

this gives

$$(h_f - h_{in}) \frac{\dot{m}}{q'} = \left[\frac{z^2}{18} + 0.5z \right]_{z_{in}}^{z_{sat}} \quad (3-5)$$

or

$$(h_f - h_{in}) \frac{\dot{m}}{q'} = \left[\frac{z_{sat}^2}{18} + 0.5z_{sat} \right] - \frac{z_{in}^2}{18} + 0.5z_{in} \quad (3-6)$$

and the final simplified expression becomes

$$(h_f - h_{in}) \frac{\dot{m}}{q'} = \left[\frac{z_{sat}^2}{18} + 0.5z_{sat} \right] \quad (3-7)$$

This equation can now be rearranged to obtain a new expression, using interpolation, which calculates the elevation of the saturation line, as shown below

$$(h_f - h_{in}) \frac{\dot{m}}{q'} = \left[\frac{z_{sat}}{18} + 0.5 \right] z_{sat} \quad (3-8)$$

giving

$$z_{sat} = \frac{(h_f - h_{in}) \frac{\dot{m}}{q'}}{\left[\frac{z_{sat}}{18} + 0.5 \right]} \quad (3-9)$$

where an initial guess for z_{sat} is entered into the RHS to calculate a new value for z_{sat} on the LHS. Through interpolation then one can determine the elevation of the saturation line.

The remaining local qualities along the rod bundle can now be calculated, since all other unknown values have thus been determined. The flow quality below the saturation line is known to be zero, so above the saturation line the quality is calculated as

$$x(z) - x_{sat}^0 = \frac{1}{\dot{m} h_{fg}} \int_{z_{sat}}^z q'(z) dz \quad (3-10)$$

The expressions for the power factor must be used for the appropriate elevations along the rod bundle. For the elevations up to the 9 ft (2.74 m) elevation, the equation becomes

$$x(z) = \frac{q'}{\dot{m}_r h_{fg}} \int_{z_{sat}}^z \left(\frac{z}{9} + 0.5 \right) dz \quad (3-11)$$

while the equation for elevations above 9 ft is

$$x - x_{@9ft.} = \frac{q'}{\dot{m}_r h_{fg}} \int_9^z \left(-\frac{z}{3} + 4.5 \right) dz \quad (3-12)$$

Applying the integrals in these equations, they respectively become

$$x = \frac{q'}{\dot{m} h_{fg}} \left\{ \left[\frac{z^2}{18} + 0.5z \right] - \left[\frac{z_{sat}^2}{18} + 0.5z_{sat} \right] \right\} \quad (3-13)$$

and

$$x = x_{@9ft.} + \frac{q'}{\dot{m} h_{fg}} \left\{ \left[-\frac{z^2}{6} + 4.5z \right] - \left[-\frac{9^2}{6} + 4.5(9) \right] \right\} \quad (3-14)$$

If there are cases in which the flow quality was calculated to be greater than 1.0, the computer code will force the quality to a value of 1.0. This is similar to what was done for the elevations below the saturation line where the quality was calculated to be less than 0.0, which required the code to force the value to 0.0.

Once the rod bundle average quality has been determined, the other desired values can be calculated as a function of the quality. The liquid and vapor mass flow rates are found using the expressions

$$\dot{m}_f = \dot{m}_T(1-x) \quad (3-15)$$

and

$$\dot{m}_g = \dot{m}_T x \quad (3-16)$$

Calculation of the mixture Reynolds number can be performed by using the following expression

$$\text{Re}_{mix} = \frac{\rho_{mix} V_{mix} D_H}{\mu_{mix}} \quad (3-17)$$

The terms in the mixture Reynolds number expression will now be examined on an individual basis. First, ρ_{mix} can be determined from the quality as

$$\rho_{mix} = (1-x)\rho_f + x\rho_g \quad (3-18)$$

In a similar manner from Collier [6], the expression for $\frac{1}{\mu_{mix}}$ can also be found from the quality as

$$\frac{1}{\mu_{mix}} = \frac{1-x}{\mu_f} + \frac{x}{\mu_g} \quad (3-19)$$

The remaining term, V_{mix} is derived in the following manner by Dougall [7] as

$$V_{mix} = \frac{Q_f + Q_g}{A_T} \quad (3-20)$$

where $Q_f = \frac{\dot{m}_f}{\rho_f}$ and $Q_g = \frac{\dot{m}_g}{\rho_g}$. If one substitutes these expressions back into the original equation for the mixture velocity, then one obtains the expression

$$V_{mix} = \frac{1}{A_T} \left(\frac{\dot{m}_f}{\rho_f} + \frac{\dot{m}_g}{\rho_g} \right) \quad (3-21)$$

Recalling the expressions for the liquid and vapor phase mass flows, one can rewrite the previous equation to obtain the following form as

$$V_{mix}(z) = \frac{\dot{m}_T}{A_T} \left(\frac{1-x(z)}{\rho_f} + \frac{x(z)}{\rho_g} \right) \quad (3-22)$$

3.3.3 Superficial Phase Velocity

Knowledge of the flow regime is very important for developing more realistic two-phase flow models. Two-phase flow models are the starting point for selecting the constitutive relationships between the phases. These relationships include interfacial drag, interfacial heat and mass transfer, wall drag for each phase, wall heat transfer for each phase, and the steadiness of the flow. The mass velocity is expressed as the mass flow divided by the flow area given as

$$G = \frac{W}{A} \quad (3-23)$$

The form of the liquid superficial velocity is then given as

$$j_f = \frac{G(1-x)}{\rho_f} \quad (3-24)$$

and the vapor superficial velocity is represented as

$$j_g = \frac{Gx}{\rho_g} \quad (3-25)$$

3.3.4 Pressure Drop Correlations and Models

The energy balance program was used to estimate the frictional pressure drop and acceleration pressure drop components. By calculating these components and subtracting them from the total pressure drop, a more accurate estimate of the elevation head and void fraction can be made. In analyzing the raw data from the RBHT facility, the measured pressure drops are obtained in units of inches of water. These values along with the given test conditions and the previously calculated quantities in the program provide a starting point for correcting the data.

First, the experimental pressure drop values are converted to the more standard units of pounds per square feet. This is completed using the following conversion formula

$$\Delta P_{\text{exp}} \left[\frac{lb_f}{ft^2} \right] = \frac{\rho_{STP} g \Delta P_{\text{exp}} [\text{inches } H_2O]}{g_c} \quad (3-26)$$

Three pressure drop models were used to correct the data for the two-phase friction. The models were the homogeneous model, the homogeneous two-phase multiplier model, and the Friedel [9] model.

Comparing the frictional pressure drop terms for each model, the frictional term in the homogeneous model is written as the following

$$\Delta P_{fric_{homogeneous}} = \frac{2f_{TP}G^2}{D_e g_c} \left[(z_{i+1} - z_i)v_i + \frac{4\bar{q}v_{fg}}{D_e Gh_{fg}} \left(\frac{z_{i+1}^2 - z_i^2}{2} \right) \right] \quad (3-27)$$

where f_{TP} is the two-phase friction factor and can be assumed to have a value of 0.005 based on the data by Wallis [10]. The specific volume for each span is calculated in the following manner

$$v_i = v_f + x_i v_{fg} \quad (3-28)$$

It should also be noted that the second term within the brackets is only calculated when two-phase flow exists, therefore when the quality is greater than zero.

For the homogeneous two-phase multiplier model, the two-phase multiplier can be defined as

$$\phi_{fo}^2 = \left[1 + \frac{x_{span} v_{fg}}{v_f} \right] \left[1 + \frac{x_{span} \mu_{fg}}{\mu_g} \right]^{1/4} \quad (3-29)$$

The frictional pressure drop term becomes

$$\Delta P_{fric_{2\phi}} = \left[\frac{2f_o G^2 v_f}{D_e g_c} \right] (z_{i+1} - z_i) \phi_{fo}^2 \quad (3-30)$$

where

$$f_o = \frac{16}{Re} \quad (3-31)$$

when the flow is laminar, and for turbulent flow, the expression for f_o becomes

$$f_o = \frac{0.079}{\left(\frac{GD_e}{\mu_f} \right)^{1/4}} \quad (3-32)$$

The frictional pressure drop term for the Friedel model [9] is given below as

$$\Delta P_{fric_{Friedel}} = \left[\frac{2f_o G^2 v_f}{D_e g_c} \right] (z_{i+1} - z_i) \phi_{fo_{Friedel}}^2 \quad (3-33)$$

where the two-phase multiplier is defined in the following manner

$$\phi_{fo}^2 = A_1 + \frac{3.24 A_2 A_3}{Fr^{0.045} We^{0.035}} \quad (3-34)$$

The various terms in Equation 3-34 are defined further below

$$A_1 = (1 - x_{span_{avg}})^2 + x_{span_{avg}}^2 \left(\frac{\rho_f f_{go}}{\rho_g f_{fo}} \right) \quad (3-35)$$

where

$$f_{fo} = \frac{0.079}{\left(\frac{GD_e}{\mu_f} \right)^{1/4}} \quad (3-36)$$

and

$$f_{go} = \frac{0.079}{\left(\frac{GD_e}{\mu_g} \right)^{1/4}} \quad (3-37)$$

The remaining terms are defined as follows

$$A_2 = x_{span_{avg}}^{0.78} \left(1 - x_{span_{avg}} \right)^{0.224} \quad (3-38)$$

$$A_3 = \left(\frac{\rho_f}{\rho_g} \right)^{0.91} \left(\frac{\mu_g}{\mu_f} \right)^{0.19} \left(1 - \frac{\mu_g}{\mu_f} \right)^{0.7} \quad (3-39)$$

$$Fr = \frac{G^2}{g D_e \rho} \quad (3-40)$$

and

$$We = \frac{G^2 D_e}{\rho \sigma} \quad (3-41)$$

where

$$\frac{1}{\rho} = \frac{x_{span_{avg}}}{\rho_g} + \frac{\left(1 - x_{span_{avg}} \right)}{\rho_f} = v_f + x_{span_{avg}} v_{fg} = \bar{v} \quad (3-42)$$

The remaining pressure drop terms to be defined are the losses due to acceleration and gravity. First, the acceleration loss for homogeneous flow for each span can be expressed as

$$\Delta P_{accel} = \frac{4Gv_{fg}\overline{q}''}{g_c D_e h_{fg}} (z_{i+1} - z_i) \quad (3-43)$$

It can be assumed that there are no acceleration losses until the quality is greater than zero and the two-phase region begins. If this assumption is made, then the following holds true when the wetted and heated perimeters are equal.

$$x_{i+1} - x_i = \frac{4\overline{q}''}{GD_e h_{fg}} (z_{i+1} - z_i) \quad (3-44)$$

Rearranging Equation 3-44 gives

$$(z_{i+1} - z_i) = \frac{(x_{i+1} - x_i)GD_e h_{fg}}{4\overline{q}''} \quad (3-45)$$

Substituting Equation 3-45 into Equation 3-43 gives the final form of the acceleration pressure drop term as

$$\Delta P_{accel} = \frac{G^2 v_{fg}}{g_c} (x_{i+1} - x_i) \quad (3-46)$$

The elevation pressure drop term can now be obtained for the differential pressure cells which do not contain a spacer grid. This is completed by subtracting out the frictional and acceleration terms from the experimental pressure drop data as shown below

$$\Delta P_{elev} = \Delta P_{exp} - \Delta P_{fric} - \Delta P_{accel} \quad (3-47)$$

The elevation pressure drop term can be used to calculate the collapsed liquid level within each differential pressure cell span as

$$z_{calc} = \frac{\Delta P_{elev} g_c}{\rho_{STP} g} \quad (3-48)$$

Using this calculated liquid level and the actual span length of the respective differential pressure cell, the void fraction can be calculated as

$$\alpha = 1 - \frac{z_{calc}}{z_{actual}} \quad (3-49)$$

The previous calculations provide the void fractions and elevation losses for the cells that do not contain spacer grids. If the average void fraction of the two neighboring cells is used to represent the void fraction within the remaining cells that contain spacer grids, then the elevation pressure drop losses can be calculated for these remaining cells. The elevation pressure drop term for the cells contain spacer grids can be written as

$$\Delta P_{elev} = \frac{\rho_{span, avg} g (z_{i+1} - z_i)}{g_c} \quad (3-50)$$

where

$$\rho_{span, avg} = \alpha \rho_g + (1 - \alpha) \rho_f \quad (3-51)$$

The elevation pressure drop and the previous values for the frictional and acceleration components can now be used to determine the losses due to the spacer grids in the corresponding cells as

$$\Delta P_{grid} = \Delta P_{exp} - \Delta P_{fric} - \Delta P_{accel} - \Delta P_{elev} \quad (3-52)$$

3.3.5 Axial Void Fraction

In review, the different methods used to correct the pressure drop data to derive the local void fraction distribution include using the homogeneous two-phase friction model [6], the Freidel two-phase friction model [9], and the homogeneous model acceleration pressure drop model. The homogeneous acceleration pressure drop model was used since it is only a function of the flow quality and properties, whereas, the separated flow acceleration pressure drop is a function of both the void (which is what we are solving for) and the quality [6]. Therefore, the homogeneous acceleration calculation is much more straight forward and does not require an iteration.

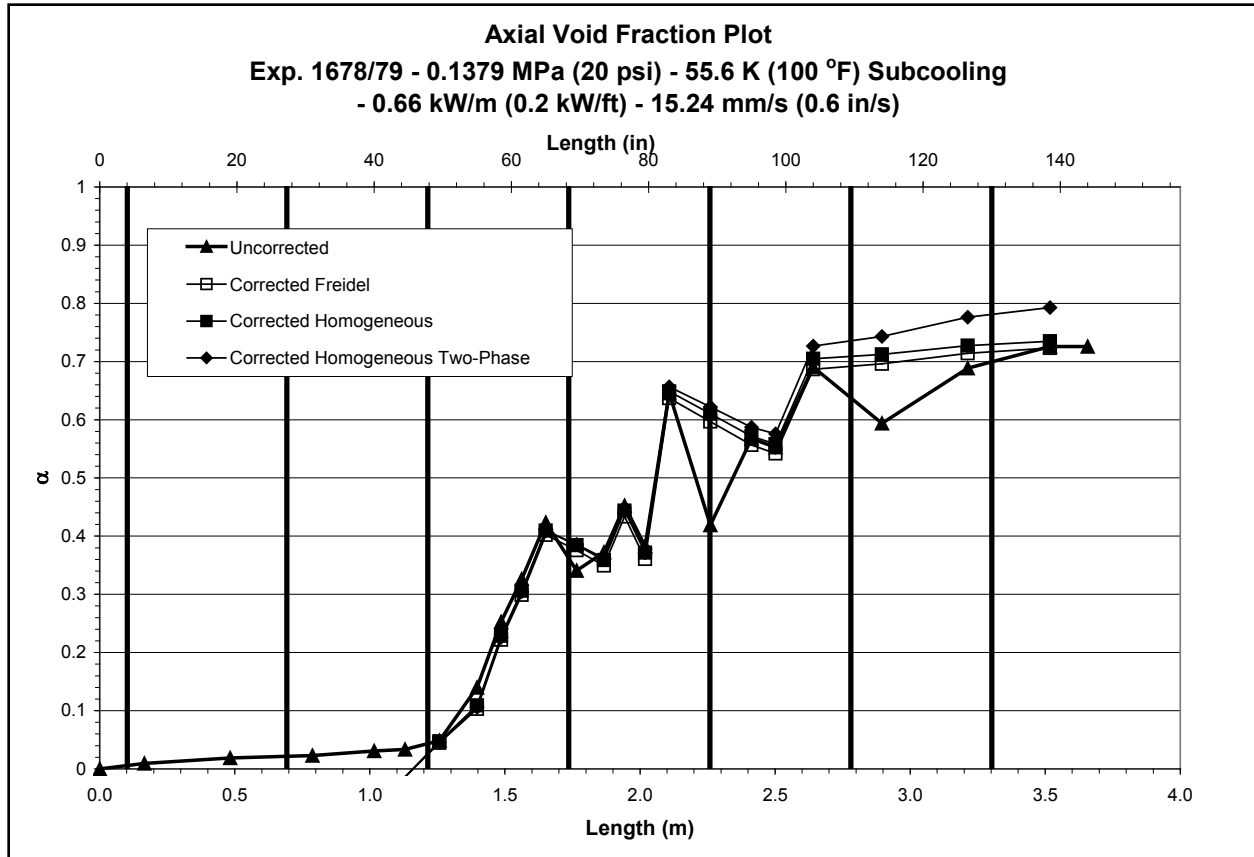


Figure 3-2 Comparison of Corrected and Uncorrected Differential Pressure Cell Data, with Different Frictional Models

Figure 3-2 shows the effects of the different frictional corrections on the uncorrected void fraction data. Both corrections used the homogeneous acceleration correction term. As the figure indicates, there is a small difference between the two different friction corrections, and the effects of both the frictional and acceleration corrections are small, causing less than a 5 percent change in the calculated void fraction. This means that the measured pressure drop in the experiment is dominated by the elevation head. Since the Freidel model is currently claimed to be the most accurate two-phase frictional model [6], it was chosen to correct all the measured pressure drop data. Additionally from Figure 3-2, the effects of the spacer grids are observed as large dips can be observed in the uncorrected data around the spacer grid locations.

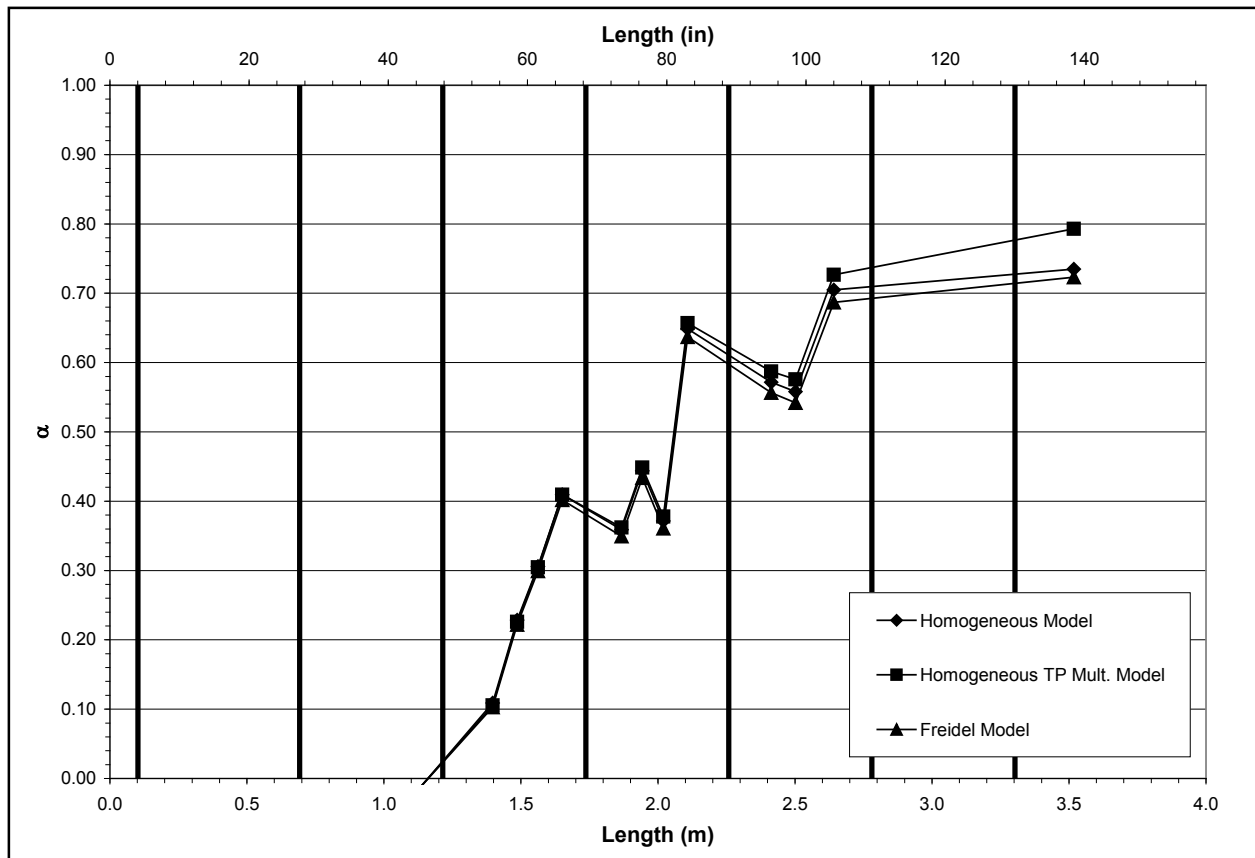


Figure 3-3 Axial Void Fraction Plot for Corrected RBHT Data

Plots of void fraction versus bundle height were expected to be smooth, but this is not seen in Figure 3-3. The void fraction appears to reach local maximums at elevations of 1.753 and 2.235 m (69 and 88 in). These locations are within differential pressure cells that are immediately below the location of a spacer grid. The effects of this close proximity to the neighboring grid spacers, such as the potential turning of the flow or stagnation of the flow, could be resulting in biased readings across those differential pressure spans. If the spans containing the spacer grids and the lower neighboring differential pressure cells are removed from the data, the void fraction plots become much smoother as a function of height as seen in Figure 3-4.

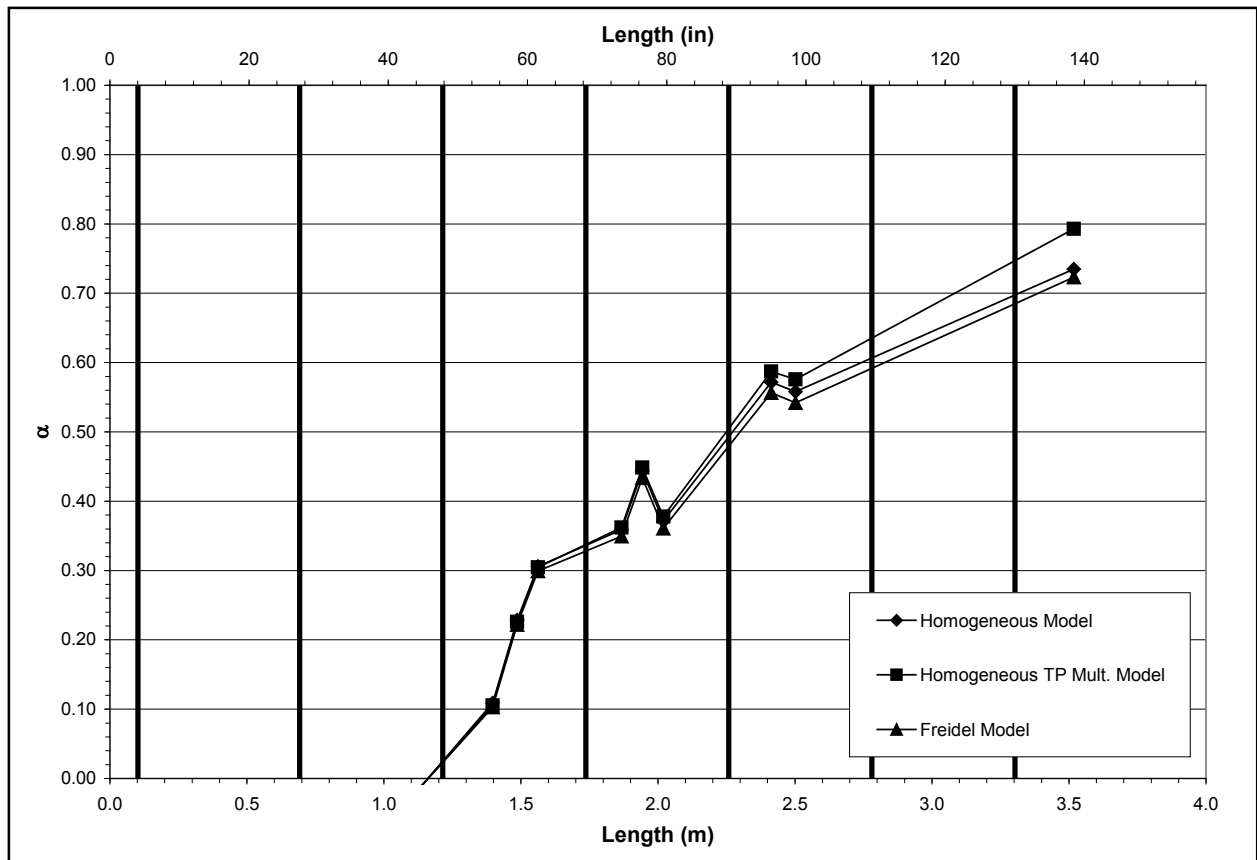


Figure 3-4 Corrected Axial Void Fraction Plot Smoothed Over Rod Bundle Length

Figure 3-4 shows the effects of the different friction corrections on the smoothed data. Again, the corrections are small indicating that the pressure drop is dominated by the elevation head, not the friction or acceleration pressure drops.

A sample input deck and resulting output are provided below in Figure 3-5 and Figure 3-6, respectively.

```

20          !Pressure (psia)
128         !Inlet Temp (Degrees F)
1          !Properties Output Flag (1 = Yes)
72         !Power (kw)
.1069      !Mass Flow Rate (lbm/sec)
12.852200 !DP Cell Level 0-13 elev. (in. of H2O)
11.709300 !DP Cell Level 13-25 elev. (in. of H2O)
11.600100 !DP Cell Level 25-37 elev. (in. of H2O)
5.230900  !DP Cell Level 37-43 elev. (in. of H2O)
2.058900  !DP Cell Level 43-46 elev. (in. of H2O)
5.241400  !DP Cell Level 46-53 elev. (in. of H2O)
2.578400  !DP Cell Level 53-57 elev. (in. of H2O)
1.877000  !DP Cell Level 57-60 elev. (in. of H2O)
1.774800  !DP Cell Level 60-63 elev. (in. of H2O)
1.643500  !DP Cell Level 63-67 elev. (in. of H2O)
3.032600  !DP Cell Level 67-72 elev. (in. of H2O)
1.564200  !DP Cell Level 72-75 elev. (in. of H2O)
1.441600  !DP Cell Level 75-78 elev. (in. of H2O)
1.588100  !DP Cell Level 78-81 elev. (in. of H2O)
1.164900  !DP Cell Level 81-85 elev. (in. of H2O)
4.329500  !DP Cell Level 85-93 elev. (in. of H2O)
1.462000  !DP Cell Level 93-97 elev. (in. of H2O)
1.096300  !DP Cell Level 97-100 elev. (in. of H2O)
2.108900  !DP Cell Level 100-108 elev. (in. of H2O)
4.220600  !DP Cell Level 108-120 elev. (in. of H2O)
3.344200  !DP Cell Level 120-133 elev. (in. of H2O)
2.332700  !DP Cell Level 133-144 elev. (in. of H2O)

```

Figure 3-5 Sample Input Deck for ENERGY BALANCE Program

Pressure and temperature were input.			
A =	-8.8220791	BTU/LB	KJ/kg
C =	5068.2642	FT/s	M/s
CJTH =	-0.25376295E-02	F/PSIA	K/MPa
CJTT =	0.13695613E-01	F/T3/LB	CM3/g
CP =	0.99868465	BTU/(LB F)	KJ/(kg K)
CV =	0.95767553	BTU/(LB F)	KJ/(kg K)
RHO =	61.587490	LB/FT3	G/CM3
DPOR =	5316.0678	PSIA FT3/LB	MPa CM3/g
DPDT =	87.201436	PSIA/F	MPa/K
DVDR =	-0.26364223E-03	F76/LB2	CM6/g2
DVDT =	0.43246219E-05	F73/(LB F)	CM3/(g K)
EPS =	68.832298	J	
ETA =	0.12529326E+13	LB/(FT HR)	MPa s
G =	-8.7619727	BTU/LB	KJ/kg
H =	96.050603	BTU/LB	KJ/kg
LAMBDA =	93081401.	BTU/(HR FT F)	MW/(m K)
P =	20.000434	PSIA	MPa
PR =	3.3452172	J	
S =	0.17831216	BTU/(LB F)	KJ/(kg K)
SIGMA =	0.46172789E-02	LB/FT	Pa M
T =	128.00000	Degrees F	K
U =	95.990496	BTU/LB	KJ/kg
V =	0.16237064E-01	F73/LB	CM3/g
VIR =	-0.68221865	F73/LB	CM3/g
ADDITIONAL CALCULATED PROPERTIES			
HG =	1156.3215	BTU/LB	KJ/kg
HF =	196.26895	BTU/LB	KJ/kg
HIN =	96.002426	BTU/LB	KJ/kg
HFG =	96.015258	BTU/LB	KJ/kg
RHOF =	59.403673	LB/FT3	G/CM3
RHOG =	0.49785097E-01	LB/FT3	G/CM3
RHOIN =	61.583429	LB/FT3	G/CM3
TSAT =	227.96146	Degrees F	K
VISCF =	0.61610121	LB/(FT HR)	MPa s
VISCG =	0.30319572E-01	LB/(FT HR)	MPa s
VISCIN =	1.2418013	LB/(FT HR)	MPa s
VISCFG =	0.58578163	LB/(FT HR)	MPa s
MUF =	0.16833976E-01	F73/LB	CM3/g
MUG =	20.086332	F73/LB	CM3/g
MUIN =	0.16238134E-01	F73/LB	CM3/g
MUFG =	20.069498	F73/LB	CM3/g
PWR =	245685.60	BTU/hr	kW
Mdot =	0.16040000	lbm/sec	g/sec
Zsat =	3.9351786		

Figure 3-6 Sample Output for ENERGY BALANCE Program

Elevation (FT.)	Quality	Vapor Flow (lbm/sec)	Liquid Flow (lbm/sec)	Mixed Velocity (FT/sec)	Mixed Reynolds	Mixed Density (lbm/FT ³)
0.00	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
0.25	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
0.50	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
0.75	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
1.00	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
1.25	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
1.50	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
1.75	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
2.00	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
2.25	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
2.50	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
2.75	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
3.00	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
3.25	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
3.50	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
3.75	0.0000E+00	0.0000E+00	0.1604E+00	0.5158E-01	0.6251E+03	0.5940E+02
4.00	0.2252E-02	0.3613E-03	0.1600E+00	0.1901E+00	0.2398E+04	0.5927E+02
4.25	0.1110E-01	0.1781E-02	0.1586E+00	0.7341E+00	0.1069E+05	0.5874E+02
4.50	0.2021E-01	0.3241E-02	0.1572E+00	0.1294E+01	0.2136E+05	0.5820E+02
4.75	0.2957E-01	0.4742E-02	0.1557E+00	0.1870E+01	0.3455E+05	0.5765E+02
5.00	0.3918E-01	0.6285E-02	0.1541E+00	0.2461E+01	0.5035E+05	0.5708E+02
5.25	0.4906E-01	0.7869E-02	0.1525E+00	0.3068E+01	0.6888E+05	0.5649E+02
5.50	0.5919E-01	0.9494E-02	0.1509E+00	0.3691E+01	0.9022E+05	0.5589E+02
5.75	0.6958E-01	0.1116E-01	0.1492E+00	0.4330E+01	0.1145E+06	0.5527E+02
6.00	0.8022E-01	0.1267E-01	0.1475E+00	0.4984E+01	0.1417E+06	0.5464E+02
6.25	0.9112E-01	0.1458E-01	0.1458E+00	0.5654E+01	0.1720E+06	0.5400E+02
6.50	0.1023E+00	0.1640E-01	0.1440E+00	0.6340E+01	0.2053E+06	0.5333E+02
6.75	0.1137E+00	0.1824E-01	0.1422E+00	0.7042E+01	0.2418E+06	0.5266E+02
7.00	0.1254E+00	0.2011E-01	0.1403E+00	0.7760E+01	0.2815E+06	0.5196E+02
7.25	0.1373E+00	0.2202E-01	0.1384E+00	0.8493E+01	0.3244E+06	0.5126E+02
7.50	0.1495E+00	0.2397E-01	0.1364E+00	0.9242E+01	0.3704E+06	0.5053E+02
7.75	0.1619E+00	0.2597E-01	0.1344E+00	0.1001E+02	0.4197E+06	0.4979E+02
8.00	0.1746E+00	0.2801E-01	0.1324E+00	0.1079E+02	0.4720E+06	0.4904E+02
8.25	0.1876E+00	0.3008E-01	0.1303E+00	0.1158E+02	0.5275E+06	0.4827E+02
8.50	0.2008E+00	0.3220E-01	0.1282E+00	0.1240E+02	0.5859E+06	0.4749E+02
8.75	0.2142E+00	0.3436E-01	0.1260E+00	0.1322E+02	0.6473E+06	0.4669E+02
9.00	0.2279E+00	0.3656E-01	0.1238E+00	0.1407E+02	0.7115E+06	0.4587E+02
9.25	0.2414E+00	0.3872E-01	0.1217E+00	0.1490E+02	0.7759E+06	0.4508E+02
9.50	0.2541E+00	0.4076E-01	0.1196E+00	0.1568E+02	0.8377E+06	0.4432E+02
9.75	0.2660E+00	0.4267E-01	0.1177E+00	0.1641E+02	0.8965E+06	0.4361E+02
10.00	0.2772E+00	0.4446E-01	0.1159E+00	0.1710E+02	0.9521E+06	0.4295E+02
10.25	0.2876E+00	0.4613E-01	0.1143E+00	0.1773E+02	0.1004E+07	0.4234E+02
10.50	0.2972E+00	0.4767E-01	0.1127E+00	0.1833E+02	0.1053E+07	0.4176E+02
10.75	0.3060E+00	0.4909E-01	0.1111E+00	0.1887E+02	0.1098E+07	0.4124E+02
11.00	0.3141E+00	0.5038E-01	0.1100E+00	0.1937E+02	0.1138E+07	0.4076E+02
11.25	0.3214E+00	0.5156E-01	0.1088E+00	0.1982E+02	0.1175E+07	0.4033E+02
11.50	0.3280E+00	0.5261E-01	0.1078E+00	0.2022E+02	0.1209E+07	0.3994E+02
11.75	0.3337E+00	0.5353E-01	0.1069E+00	0.2057E+02	0.1238E+07	0.3960E+02
12.00	0.3387E+00	0.5433E-01	0.1061E+00	0.2088E+02	0.1263E+07	0.3930E+02

Figure 3-6 Sample Output for ENERGY BALANCE Program, Continued

Homogenous Void	Zivi Void	Wallis Void	LockMart Void	Thom Void	Baroczy Void	CunYeh Void	CunYehMod Void
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
0.7293E+00	0.2064E+00	0.1425E+00	0.4287E+00	0.4181E+00	0.4286E+00	0.4296E-01	0.4296E-01
0.9609E+00	0.5630E+00	0.3453E+00	0.6768E+00	0.7813E+00	0.7091E+00	0.1448E+00	0.1448E+00
0.9799E+00	0.7037E+00	0.4497E+00	0.7955E+00	0.8678E+00	0.7927E+00	0.2026E+00	0.2026E+00
0.9844E+00	0.7782E+00	0.5198E+00	0.8797E+00	0.9065E+00	0.8362E+00	0.2442E+00	0.2442E+00
0.9889E+00	0.8245E+00	0.5718E+00	0.8270E+00	0.9285E+00	0.8636E+00	0.2799E+00	0.2799E+00
0.9905E+00	0.8560E+00	0.6126E+00	0.8475E+00	0.9426E+00	0.8828E+00	0.3118E+00	0.3118E+00
0.9889E+00	0.8787E+00	0.6460E+00	0.8632E+00	0.9524E+00	0.8972E+00	0.3402E+00	0.3402E+00
0.9905E+00	0.8960E+00	0.6739E+00	0.8758E+00	0.9597E+00	0.9084E+00	0.3630E+00	0.3630E+00
0.9917E+00	0.9095E+00	0.6977E+00	0.8861E+00	0.9652E+00	0.9175E+00	0.3842E+00	0.3842E+00
0.9927E+00	0.9203E+00	0.7185E+00	0.8948E+00	0.9696E+00	0.9249E+00	0.4042E+00	0.4042E+00
0.9935E+00	0.9429E+00	0.7675E+00	0.9022E+00	0.9732E+00	0.9312E+00	0.4232E+00	0.4232E+00
0.9948E+00	0.9483E+00	0.7806E+00	0.9145E+00	0.9786E+00	0.9414E+00	0.4415E+00	0.4415E+00
0.9953E+00	0.9529E+00	0.7926E+00	0.9241E+00	0.9824E+00	0.9455E+00	0.4589E+00	0.4589E+00
0.9957E+00	0.9570E+00	0.8036E+00	0.9320E+00	0.9840E+00	0.9524E+00	0.4758E+00	0.4758E+00
0.9961E+00	0.9606E+00	0.8137E+00	0.9395E+00	0.9854E+00	0.9545E+00	0.4921E+00	0.4921E+00
0.9964E+00	0.9638E+00	0.8231E+00	0.9455E+00	0.9866E+00	0.9554E+00	0.5095E+00	0.5095E+00
0.9969E+00	0.9666E+00	0.8318E+00	0.9487E+00	0.9876E+00	0.9561E+00	0.5233E+00	0.5233E+00
0.9972E+00	0.9691E+00	0.8398E+00	0.9416E+00	0.9886E+00	0.9576E+00	0.5384E+00	0.5384E+00
0.9975E+00	0.9714E+00	0.8474E+00	0.9444E+00	0.9895E+00	0.9609E+00	0.5531E+00	0.5531E+00
0.9974E+00	0.9734E+00	0.8543E+00	0.9468E+00	0.9902E+00	0.9627E+00	0.5674E+00	0.5674E+00
0.9978E+00	0.9751E+00	0.8603E+00	0.9490E+00	0.9908E+00	0.9648E+00	0.5815E+00	0.5815E+00
0.9979E+00	0.9766E+00	0.8655E+00	0.9509E+00	0.9914E+00	0.9666E+00	0.5949E+00	0.5949E+00
0.9978E+00	0.9779E+00	0.8702E+00	0.9525E+00	0.9919E+00	0.9682E+00	0.6070E+00	0.6070E+00
0.9979E+00	0.9789E+00	0.8743E+00	0.9540E+00	0.9923E+00	0.9696E+00	0.6181E+00	0.6181E+00
0.9979E+00	0.9799E+00	0.8779E+00	0.9553E+00	0.9926E+00	0.9708E+00	0.6282E+00	0.6282E+00
0.9981E+00	0.9807E+00	0.8811E+00	0.9564E+00	0.9929E+00	0.9719E+00	0.6374E+00	0.6374E+00
0.9982E+00	0.9814E+00	0.8840E+00	0.9574E+00	0.9932E+00	0.9728E+00	0.6458E+00	0.6458E+00
0.9982E+00	0.9820E+00	0.8864E+00	0.9583E+00	0.9934E+00	0.9734E+00	0.6533E+00	0.6533E+00
0.9983E+00	0.9825E+00	0.8886E+00	0.9590E+00	0.9936E+00	0.9743E+00	0.6600E+00	0.6600E+00
0.9983E+00	0.9830E+00	0.8904E+00	0.9597E+00	0.9938E+00	0.9752E+00	0.6661E+00	0.6661E+00
0.9984E+00	0.9835E+00	0.8920E+00	0.9604E+00	0.9939E+00	0.9762E+00	0.6714E+00	0.6714E+00
0.9984E+00	0.9840E+00	0.8933E+00	0.9612E+00	0.9940E+00	0.9771E+00	0.6760E+00	0.6760E+00
0.9984E+00	0.9845E+00	0.8944E+00	0.9620E+00	0.9941E+00	0.9780E+00	0.6800E+00	0.6800E+00

Figure 3-6 Sample Output for ENERGY BALANCE Program, Continued

DP Cell (in.)	Hom Void	Hom Two-Phase Void	Freidel Void	Hom DP (lbf/FT ²)	Hom Two-Phase DP (lbf/FT ²)	Freidel DP (lbf/FT ²)	Flow Regime
6.50	-1.44E-01	-1.437E-01	-1.44E-01	0.1567E+01	0.1564E+01	0.1567E+01	sp1
19.00	-2.28E-01	-2.2874E-01	-2.28E-01	0.6112E+02	0.6112E+02	0.6112E+02	sp1
31.00	-2.26E-01	-2.250E-01	-2.26E-01	0.1286E+00	0.1286E+00	0.1286E+00	sp1
40.00	-1.163E-01	-1.1636E-01	-1.163E-01	0.3019E+02	0.3019E+02	0.3019E+02	sp1
44.50	-1.137E-01	-1.1368E-01	-1.137E-01	0.1506E+02	0.1506E+02	0.1506E+02	sp1
49.50	0.4757E-01	0.47591E-01	0.4757E-01	0.1276E+01	0.1276E+01	0.1276E+01	bubbly
55.00	0.1089E+00	0.1085E+00	0.1089E+00	0.1774E+02	0.1774E+02	0.1774E+02	bubbly - slug
58.50	0.2285E+00	0.2280E+00	0.2285E+00	0.1146E+02	0.1146E+02	0.1146E+02	slug
61.50	0.3060E+00	0.3045E+00	0.3060E+00	0.1031E+02	0.1033E+02	0.1041E+02	slug
65.00	0.4095E+00	0.4093E+00	0.4019E+00	0.1169E+02	0.1170E+02	0.1184E+02	slug
69.50	0.3842E+00	0.3857E+00	0.3757E+00	0.1481E+01	0.1480E+01	0.1481E+01	slug
73.50	0.3589E+00	0.3621E+00	0.3494E+00	0.9521E+01	0.9473E+01	0.9662E+01	slug
76.50	0.4438E+00	0.4485E+00	0.4537E+00	0.8260E+01	0.8291E+01	0.8411E+01	slug
79.50	0.3716E+00	0.3777E+00	0.3607E+00	0.9333E+01	0.9241E+01	0.9494E+01	slug
83.00	0.6488E+00	0.6568E+00	0.6370E+00	0.6954E+01	0.6795E+01	0.7187E+01	slug - annular
89.00	0.6103E+00	0.6219E+00	0.5968E+00	0.1549E+02	0.1527E+02	0.1578E+02	slug
95.00	0.5717E+00	0.5870E+00	0.5566E+00	0.8480E+01	0.8177E+01	0.8779E+01	slug
98.50	0.5580E+00	0.5757E+00	0.5419E+00	0.6564E+01	0.6301E+01	0.6804E+01	slug
104.00	0.7048E+00	0.7265E+00	0.6869E+00	0.1169E+02	0.1108E+02	0.1240E+02	slug - annular
114.00	0.7123E+00	0.7431E+00	0.6960E+00	0.6395E+01	0.6331E+01	0.6509E+01	slug - annular
126.50	0.7272E+00	0.7763E+00	0.7142E+00	0.1709E+01	0.1892E+01	0.1852E+01	slug - annular
138.50	0.7347E+00	0.7929E+00	0.7233E+00	0.1445E+02	0.1128E+02	0.1507E+02	slug - annular

DP Cell (in.)	Hom Fric DP (lbf/FT ²)	Hom Two-Phase Fric DP (lbf/FT ²)	Freidel Fric DP (lbf/FT ²)	Accel DP (lbf/FT ²)	Int. Drag (lbf/FT ³)	fi*Ai/VoLume (1/FT)
6.50	0.1524E-02	0.7801E-02	0.1524E-02	0.0000E+00	0.0000E+00	0.0000E+00
19.00	0.1407E-02	0.7201E-02	0.1407E-02	0.0000E+00	0.0000E+00	0.0000E+00
31.00	0.1407E-02	0.7201E-02	0.1407E-02	0.0000E+00	0.0000E+00	0.0000E+00
40.00	0.7033E-03	0.3600E-02	0.7033E-03	0.0000E+00	0.0000E+00	0.0000E+00
44.50	0.3517E-03	0.1800E-02	0.3517E-03	0.0000E+00	0.0000E+00	0.0000E+00
49.50	0.2036E+00	0.4896E-01	0.2508E-01	0.1004E+00	0.2516E+01	0.6005E+01
55.00	0.1435E+00	0.7598E-01	0.2740E-01	0.7278E-01	0.5404E+01	0.1523E+01
58.50	0.1218E+00	0.8584E-01	0.2643E-01	0.5632E-01	0.1016E+02	0.1280E+01
61.50	0.1344E+00	0.1126E+00	0.3112E-01	0.5782E-01	0.1234E+02	0.9406E+00
65.00	0.1994E+00	0.1948E+00	0.4845E-01	0.7943E-01	0.1419E+02	0.6699E+00
69.50	0.2831E+00	0.3210E+00	0.7130E-01	0.1033E+00	0.1381E+02	0.3957E+00
73.50	0.1887E+00	0.2370E+00	0.4831E-01	0.6382E-01	0.1318E+02	0.2615E+00
76.50	0.2032E+00	0.2724E+00	0.5241E-01	0.6533E-01	0.1430E+02	0.2223E+00
79.50	0.2182E+00	0.3096E+00	0.5649E-01	0.6683E-01	0.1321E+02	0.1643E+00
83.00	0.3149E+00	0.4735E+00	0.8163E-01	0.9144E-01	0.1360E+02	0.1333E+00
89.00	0.7156E+00	0.1171E+01	0.1850E+00	0.1908E+00	0.1416E+02	0.9649E-01
95.00	0.4026E+00	0.7053E+00	0.1033E+00	0.9945E-01	0.1425E+02	0.7078E-01
98.50	0.3224E+00	0.5848E+00	0.8231E-01	0.7634E-01	0.1407E+02	0.5896E-01
104.00	0.9482E+00	0.1808E+01	0.2401E+00	0.2108E+00	0.1280E+02	0.4114E-01
114.00	0.1493E+01	0.3388E+01	0.4130E+00	0.2683E+00	0.1240E+02	0.2794E-01
126.50	0.1490E+01	0.4461E+01	0.5060E+00	0.2310E+00	0.1193E+02	0.1943E-01
138.50	0.1087E+01	0.4254E+01	0.4625E+00	0.1294E+00	0.1162E+02	0.1553E-01

Figure 3-6 Sample Output for ENERGY BALANCE Program, Continued

3.4 Experimental Data Comparisons

The RBHT experiments compared the effects of changing parameters such as pressure, inlet subcooling, flow rate, and power. These comparisons will be presented in the following sections and figures. Additional figures of the experiments and individual test “windows” are provided in Appendix A. Several of the experiments will be compared in this section using Experiment 1678/79 as a base case for comparisons. The conditions for this case are the following: pressure is 0.1379 MPa (20 psia), flow rate is 15.24 mm/s (0.6 in/s), power is 72 kW, and inlet subcooling is 55.6 deg K (100 deg F). The effects of changing the flow rate were shown in Figure 3-1. The elevation at which boiling occurs will decrease as the flow is decreased, and increase to higher elevations as the flow is increased. This is expected as the lower flow rates will result in uncovering at the upper elevations of the rod bundle, and rod heat up will occur.

The interface between the two-phase mixture level and the single phase vapor flow can be plotted to see that the elevation at which this interface occurs will move as the flow is decreased or maintained at a low rate for an extended period of time. This is shown in Figure 3-7, where the interface is initially observed to be at the exit of the rod bundle, but falls to an elevation of approximately 2.972 m (117 in) within 300 sec as the flow is decreased from 15.24 to 10.16 mm/s (0.6 to 0.4 in/s).

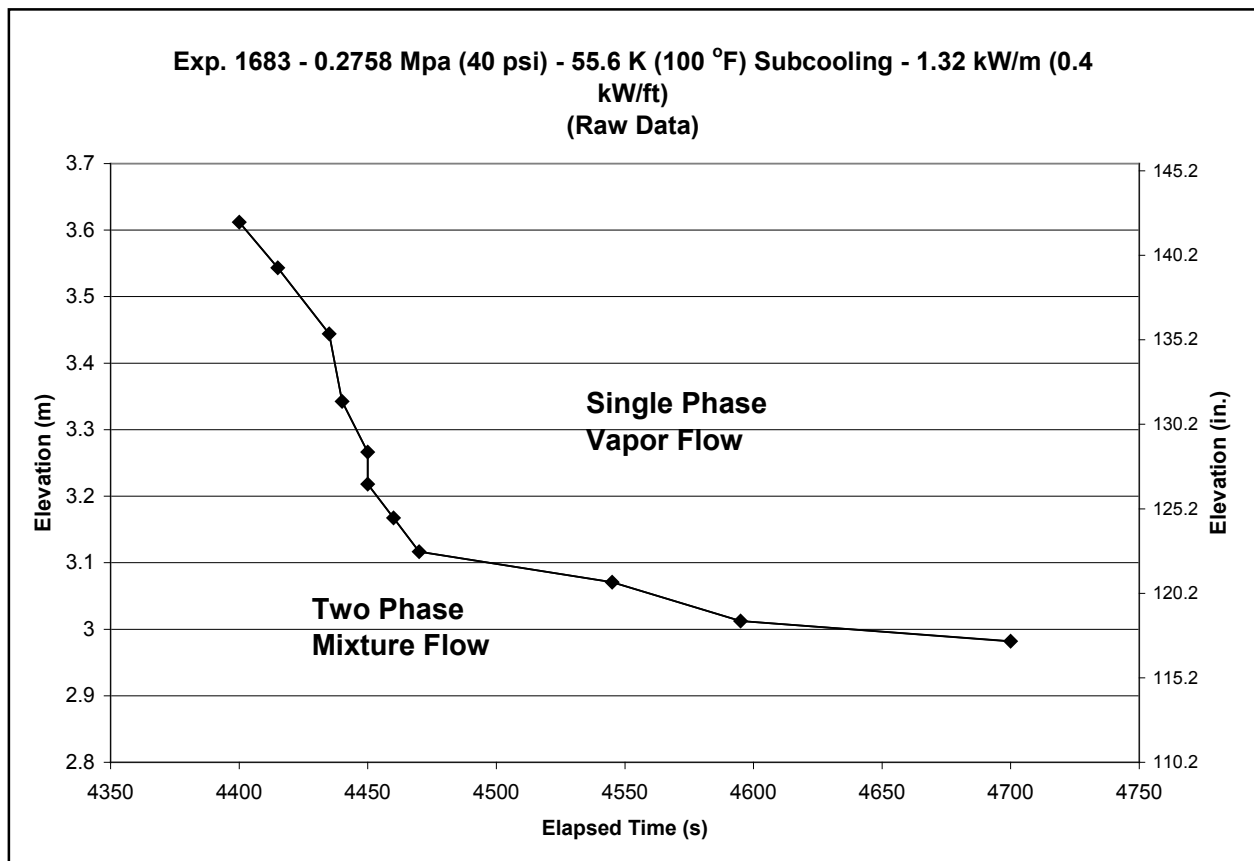


Figure 3-7 Single Phase Vapor and Two-Phase Flow Interface versus Experimental Time

Similarly, this interface movement can be seen in the temperature plots of the heater rods at various elevations. The heater rod temperatures will begin to rise rapidly as the two-phase

mixture level drops below the elevation of each thermocouple. Figure 3-8 shows that the two-phase mixture level drops below an elevation of 3.607 m (142 in) around 4400 seconds in the experiment, as the flow is being reduced from 15.24 to 10.16 mm/s (0.6 to 0.4 in/s). The single phase vapor flow that continues to pass this elevation is not sufficient to properly cool the heater rods and thus the temperature is observed to continue to rise until it reaches the scram temperature around 700 degrees K (800 degrees F).

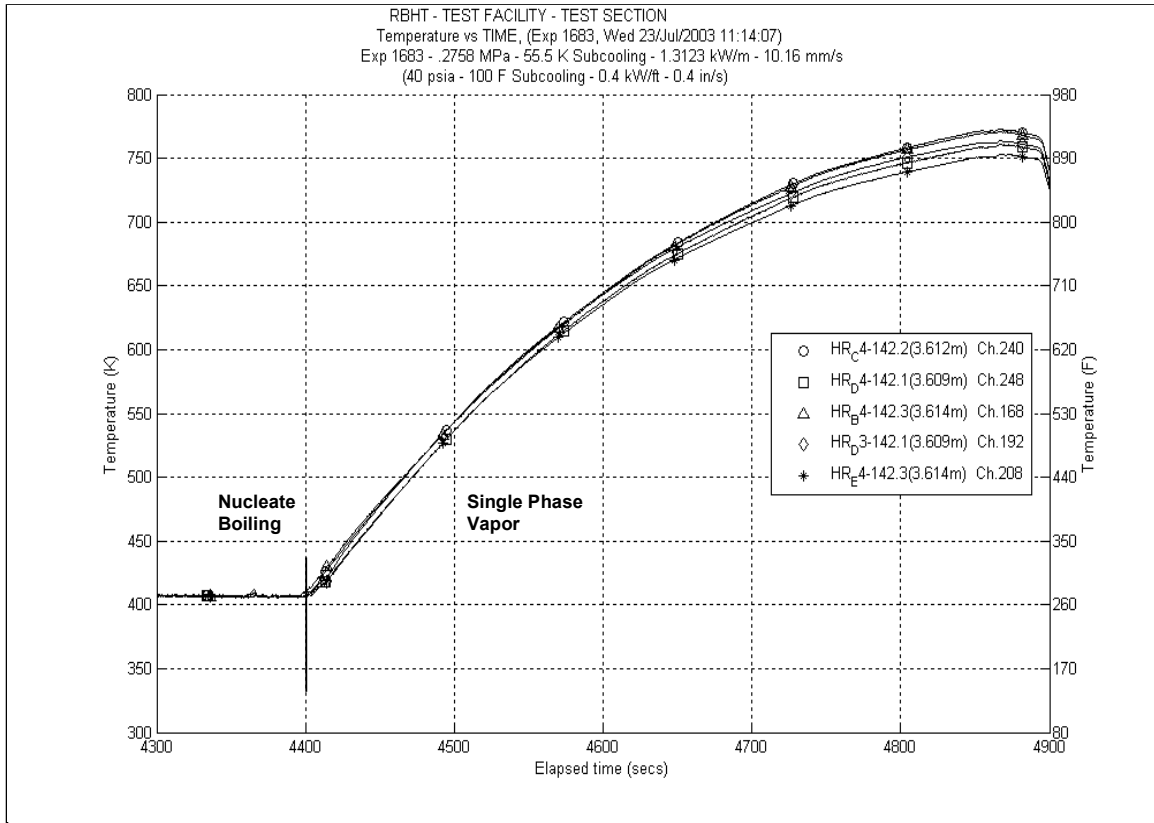


Figure 3-8 Heater Rod Temperatures at an Elevation of Approximately 3.607 m (142 in.)

In Figure 3-9, a lower elevation is used to show the fluctuations that occur at the interface between the two-phase mixture and the single phase vapor flow. The interface is continuously falling and rising as the vapor bubbles flow upward and exit from the liquid flow. The liquid flow is also oscillating, and the heater rod temperatures are observed to fluctuate as the interface begins to fall to a lower elevation. In both figures, it is observed that while the two-phase mixture level is sufficiently high, nucleate boiling is occurring in the lower elevations and the temperatures are held constant.

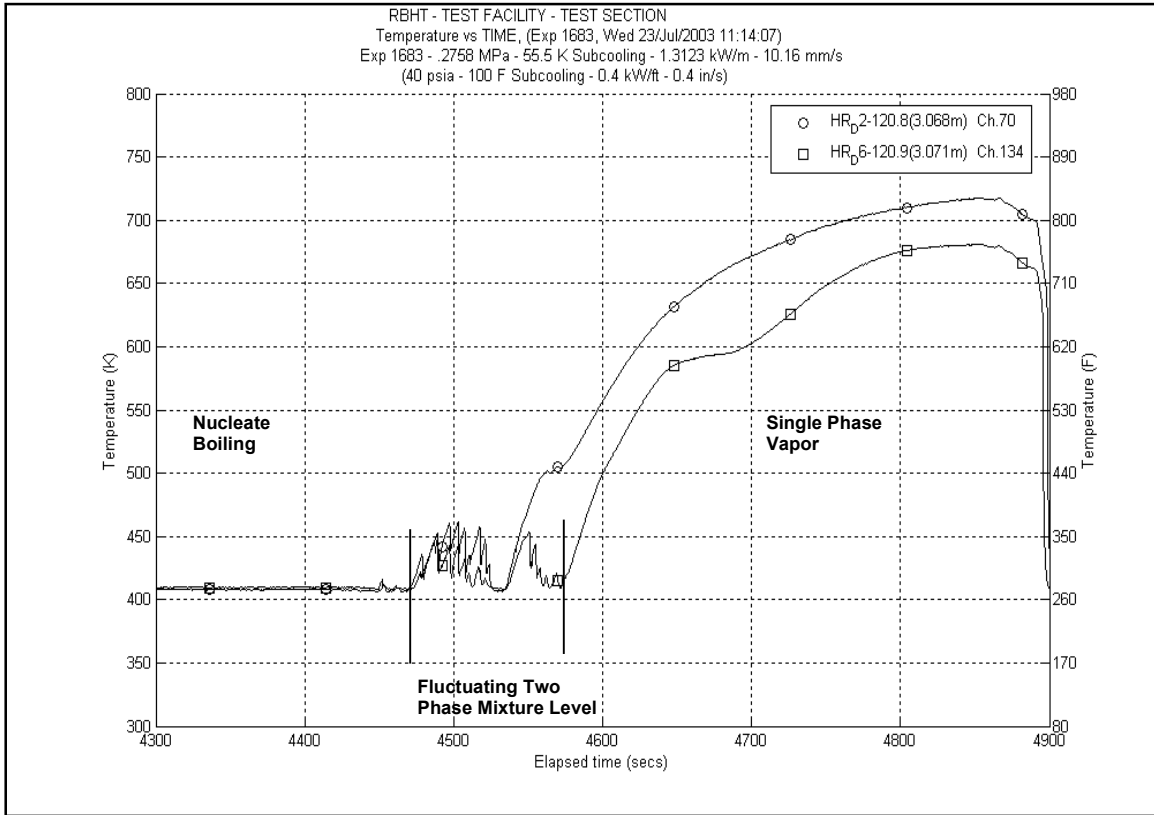


Figure 3-9 Heater Rod Temperatures at an Elevation of Approximately 3.073 m (121 in.)

In each of the previous three figures, the interface between the two-phase mixture and the single phase vapor is observed to fall as the flow was decreased to a very low flow rate. For the experiments discussed in this report, the lowest flow rates that were achieved in each experiment are presented below in Table 3-2. The minimum flow rate achieved is observed to decrease as the power and inlet temperature are reduced. This is expected as the decreased power will produce less heat for the coolant to remove, and the lower inlet temperature provides additional cooling and thus allows for more heat removal.

It also appears that a decrease in pressure will allow lower flow rates to be achieved in the experiment, since the two-phase mixture will swell to a greater height at lower pressure. This can be observed by comparing the minimum flow rates for all of the experiments. As pressure increases the mass flow rate which corresponds to the designated flow rate will decrease. The values in Table 3-2 show this when comparing experiments 1651 and 1659. The flow rate is stated to be 5.08 mm/s (0.2 in/s), but the corresponding mass flow rate decreases from 0.02395 to 0.02372 kg/s (0.0528 to 0.0523 lb/s) as the pressure is increased from 0.2758 to 0.4137 MPa (40 to 60 psia). The decrease in the mass flow rate will result in the coolant flow being less effective at removing heat. However, increasing pressure is known to suppress boiling and as is shown in the following figures, the void fraction will be lower at higher pressures. The lowest flow rate of 3.81 mm/s (0.15 in/s) is achieved for the 0.1379 MPa (20 psia) case, Experiment 1678/79. This lower flow rate was not achieved for the higher pressure cases, as a result of the mass flow rates being lower than the minimum mass flow rate that could be controlled accurately by the inlet flow meter.

Table 3-2 Minimum Achieved Flow Rates for Various Experimental Conditions

EXP #	Pressure, MPa (psia)	Inlet Temperature, K (°F)	Inlet Subcooling, K (°F)	Power, kW	Flow Rate, mm/s (in/s)	Mass Flow Rate, kg/s (lbm/s)
1566	0.1379 (20)	370.4 (207)	11.1 (20)	72	5.08 (0.2)	0.025 (0.055)
1570	0.1379 (20)	370.4 (207)	11.1 (20)	144	15.24 (0.6)	0.0744 (0.164)
1582	0.1379 (20)	326.5 (128)	55.6 (100)	144	10.16 (0.4)	0.0485 (0.1069)
1651	0.2758 (40)	348.2 (167)	55.6 (100)	72	5.08 (0.2)	0.0239 (0.0528)
1659	0.4137 (60)	362.6 (193)	55.6 (100)	72	5.08 (0.2)	0.0237 (0.0523)
1678/79	0.1379 (20)	326.5 (128)	55.6 (100)	72	3.81 (0.15)	0.0182 (0.0401)
1683	0.2758 (40)	348.2 (167)	55.6 (100)	144	10.16 (0.4)	0.0479 (0.1057)

3.5 Void Fraction versus Elevation Data Comparisons

One way in which the effects of changing experimental conditions can be observed is by comparing the void fraction distributions along the length of the rod bundle. The effects of increasing pressure can be seen further in Figure 3-10, where the corrected experimental data for Experiments 1651, 1659, and 1678/79 are presented for comparisons. The increased pressure suppresses boiling and thus results in the void fraction being slightly lower. In Figure 3-10, a 0.1379 MPa (20 psi) increase in pressure appears to lower the void fraction by approximately 10 percent.

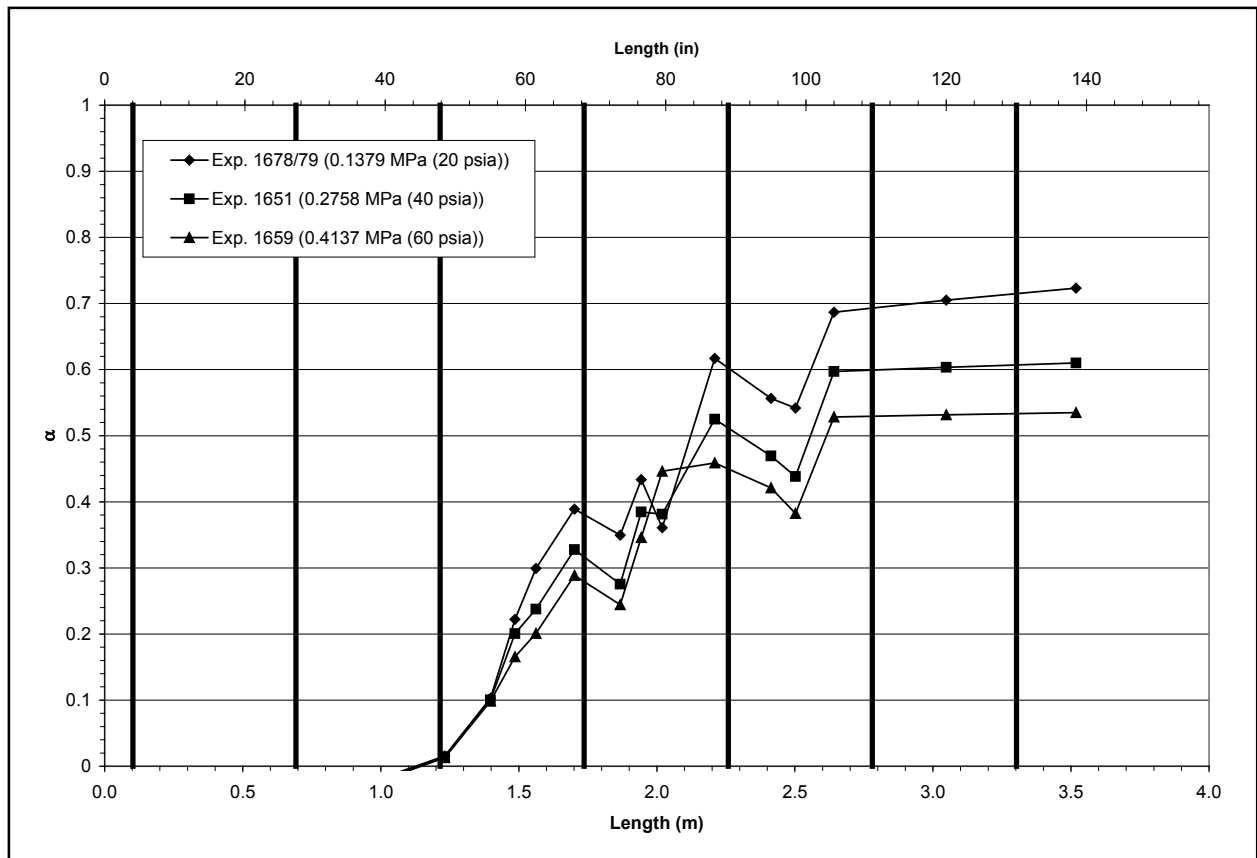


Figure 3-10 Comparisons of Experimental Data at Various Pressures with Flow Rate at 15.24 mm/s (0.6 in/s)

Similarly, comparisons can be made between Experiments 1678/79 and 1582 and between Experiments 1651 and 1683 for studying the effects of increasing power as shown in Figure 3-11. The void fraction plots between each of these comparisons show that the void fraction greatly increases throughout the bundle and thus lowers the elevation at which the saturation line is located. As was seen in the previous plots for increased pressure, the experiments at 0.2758 MPa (40 psia) are slightly below the cases at 0.1379 MPa (20 psia) due to the higher pressure which reduces the phase slip and thereby reduces the void fraction. The effect of increasing both power and pressure indicates that the change in power has a greater effect than the change in pressure. The void fractions at the exit of the bundle for the two higher power cases are much closer to one as compared to the void fractions for the lower power cases. Additionally, the 0.2758 MPa (40 psia) case at the higher power results in a void fraction that is approximately 0.3 greater than at the lower power. In comparison, the two 0.1379 MPa (20 psia) tests show an increase of void fraction of about 0.2.

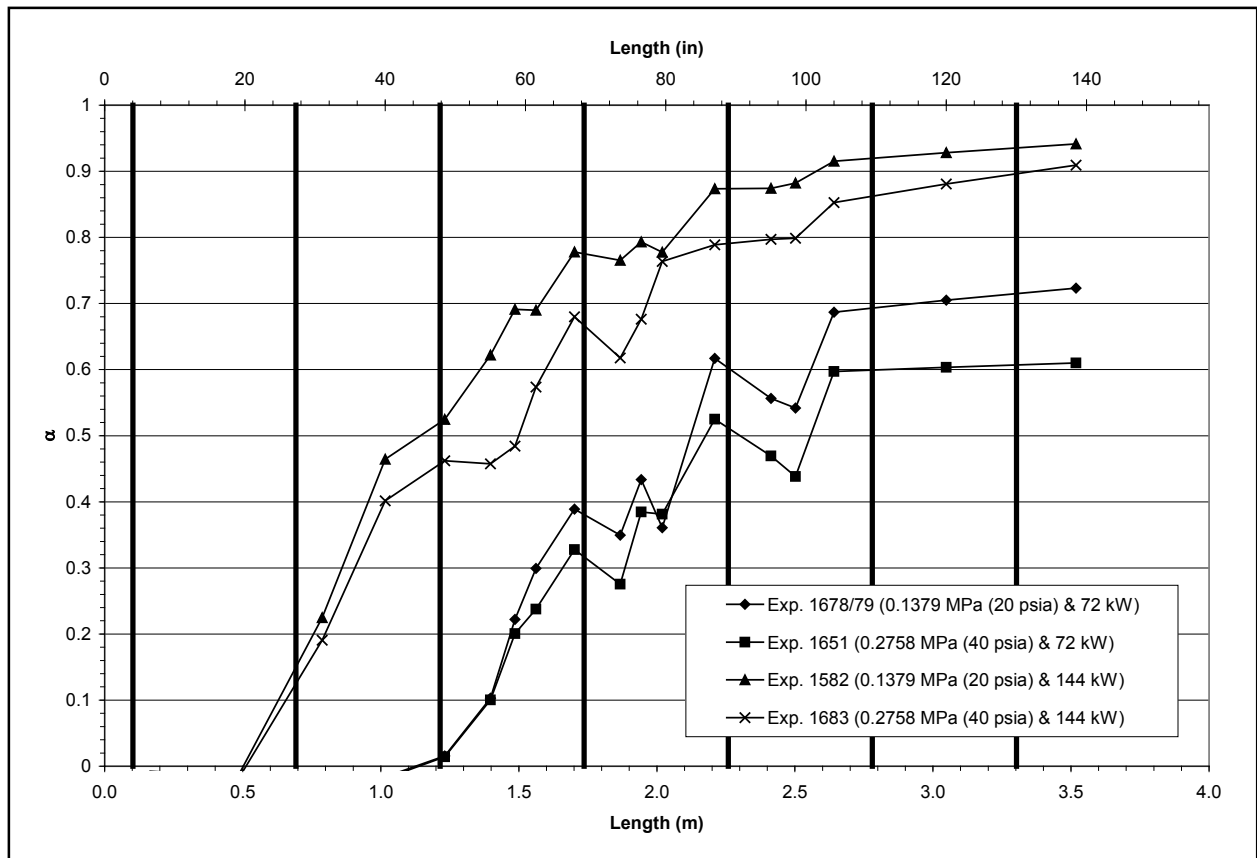


Figure 3-11 Comparison of Experimental Data for Various Powers and Pressures with Flow Rate at 15.24 mm/s (0.6 in/s)

Figure 3-12 shows another comparison for four of the experiments listed in Table 3-2. Comparisons of the void fraction distribution in the bundle between Experiment 1678/79 and Experiment 1566 provide details on the effects of decreasing the amount of subcooling for the inlet flow. One observation that can be made is that the effect of decreasing the subcooling results in the saturation line being located at lower elevations. However, this does not result in the void fraction increasing rapidly along the bundle length. Instead, the decreased subcooling appears to result in a smoother trend in the void fraction distribution along the rod bundle length.

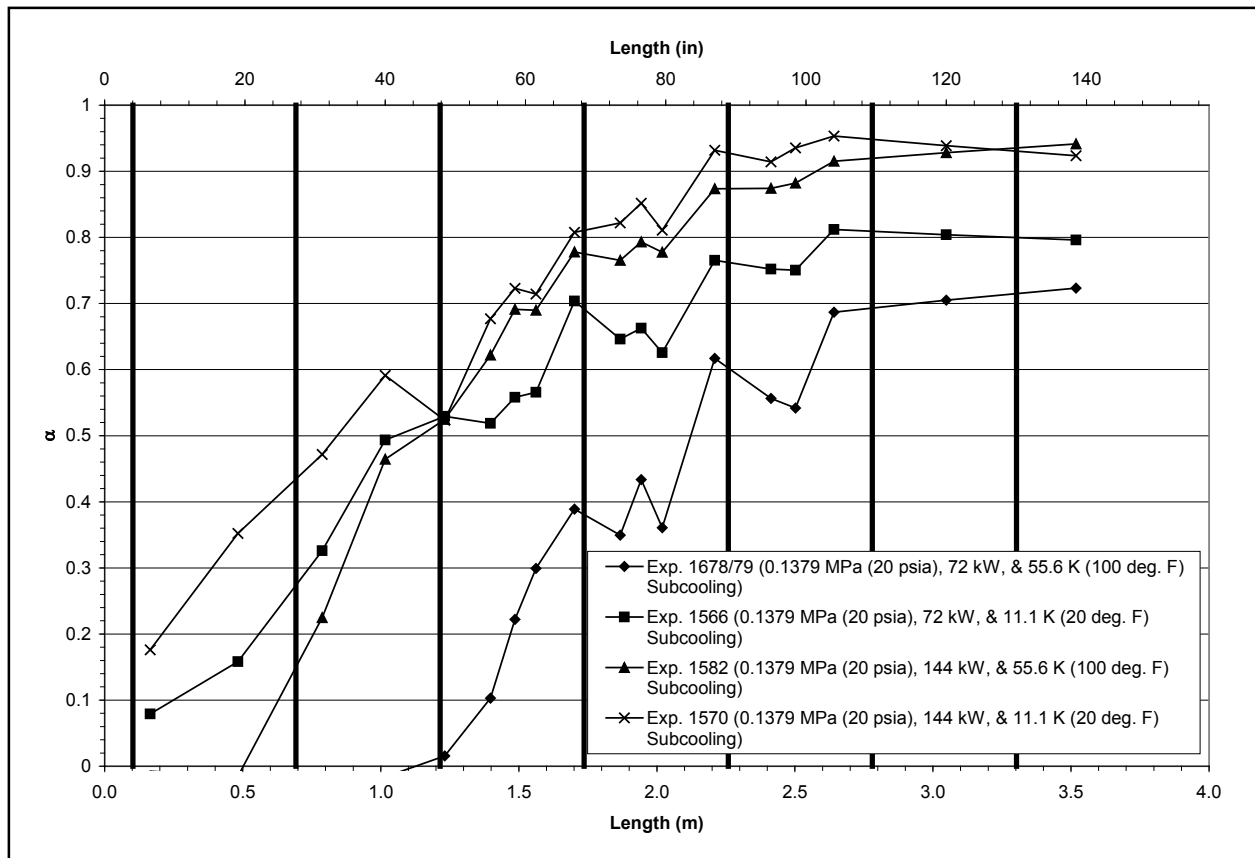


Figure 3-12 Comparison of Experimental Data for Various Powers, Pressures, and Inlet Subcooling with Flow Rate at 15.24 mm/s (0.6 in/s)

Also included in Figure 3-12 are comparisons between Experiment 1678/79 and experiments 1582 and 1570. These additional comparisons provide information as to the effects of increasing the power and for increasing the power while decreasing the inlet flow subcooling. As was observed in Figure 3-11, the increase in power results in a lower saturation line and thus a greater void fraction at the exit of the bundle. Similarly, decreasing the inlet subcooling results in reaching the saturation point farther down in the heated length of the rod bundle. However, when one compares the two higher power experiments (Experiments 1570 and 1582), it is observed that the void fractions near the exit of the bundle for the two cases appear to become approximately equal. For these void fractions to be equivalent, the coolant flow appears to be sufficient such that the void and the rod temperature are maintained near constant at the exit.

3.6 Void Fraction versus Quality Data Comparisons

In many cases, more information can be obtained by plotting void fraction versus quality. The following figures compare the void fraction versus quality plots for the three experiments currently being analyzed. Figure 3-13 shows that for these experiments approximately the same quality is observed, but the void fraction is greatest for the lower pressure case.

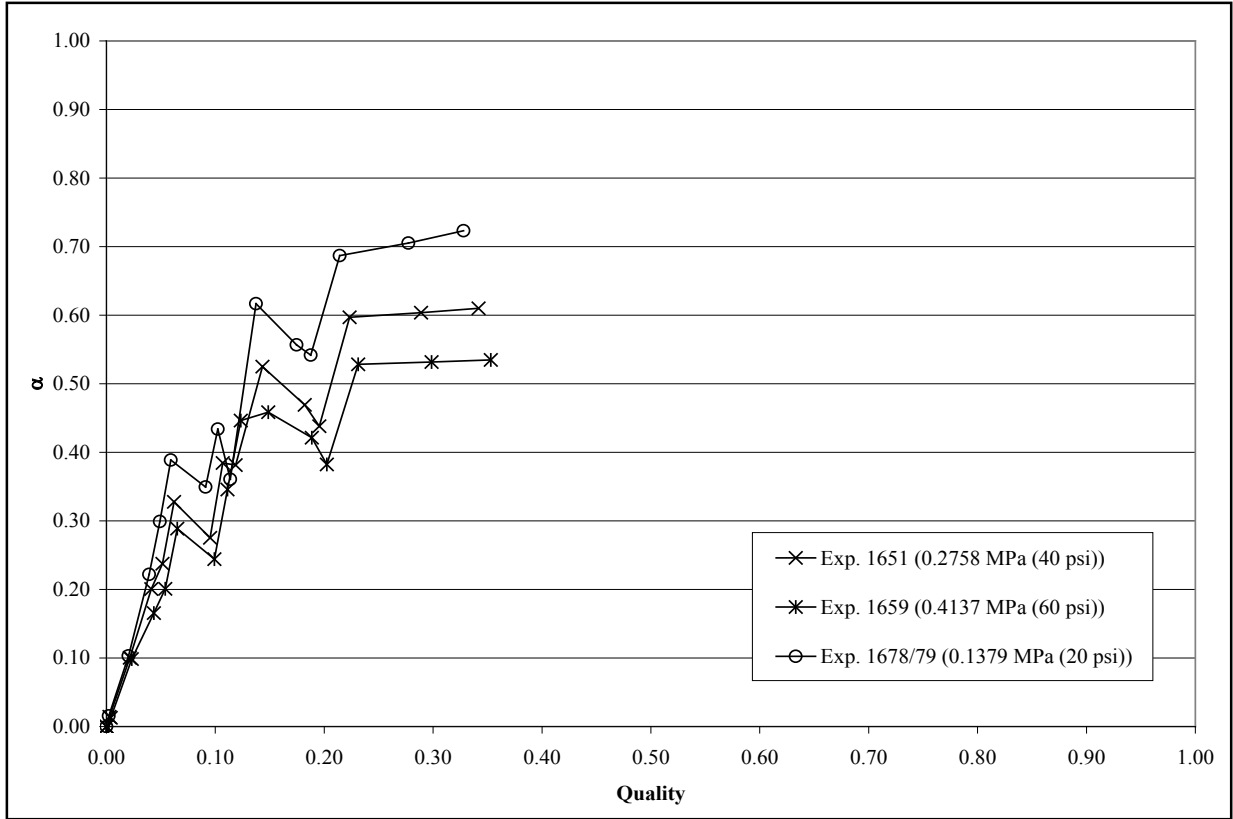


Figure 3-13 Void Fraction Versus Quality for Various Experiments at Different Pressures with Flow Rate at 15.24 mm/s (0.6 in/s)

Figure 3-14 shows that with the increase in power a greater quality and void fraction are observed in the flow.

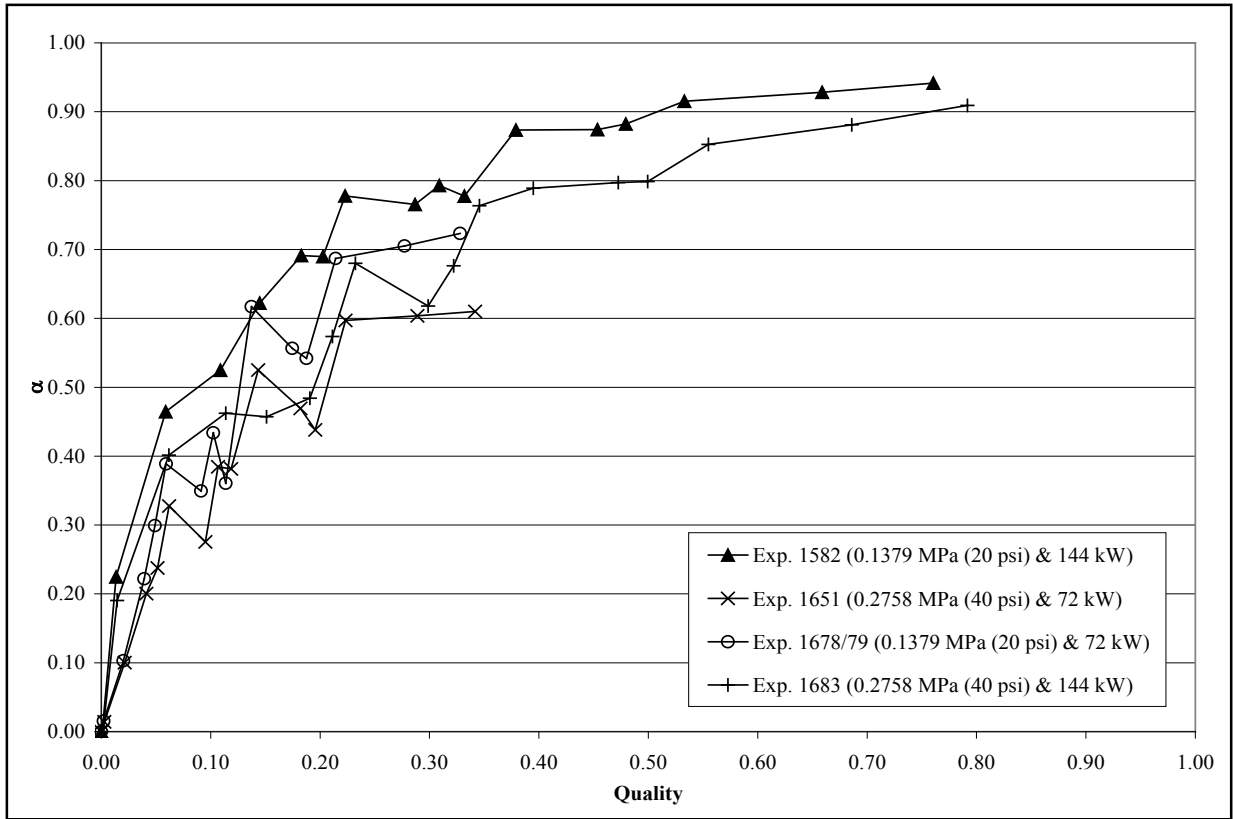


Figure 3-14 Void Fraction Versus Quality for Various Experiments at Different Pressures and Powers with Flow Rate at 15.24 mm/s (0.6 in/s)

Figure 3-15 shows the effects of increasing power and decreasing inlet subcooling. Again as was observed with the power increases in Figure 3-14, the void fraction and quality reach much greater values than the cases at lower power and higher inlet subcooling. These effects are expected as the power and subcooling changes necessitate additional cooling and thus result in the two-phase interface to occur at lower elevations along the rod bundle.

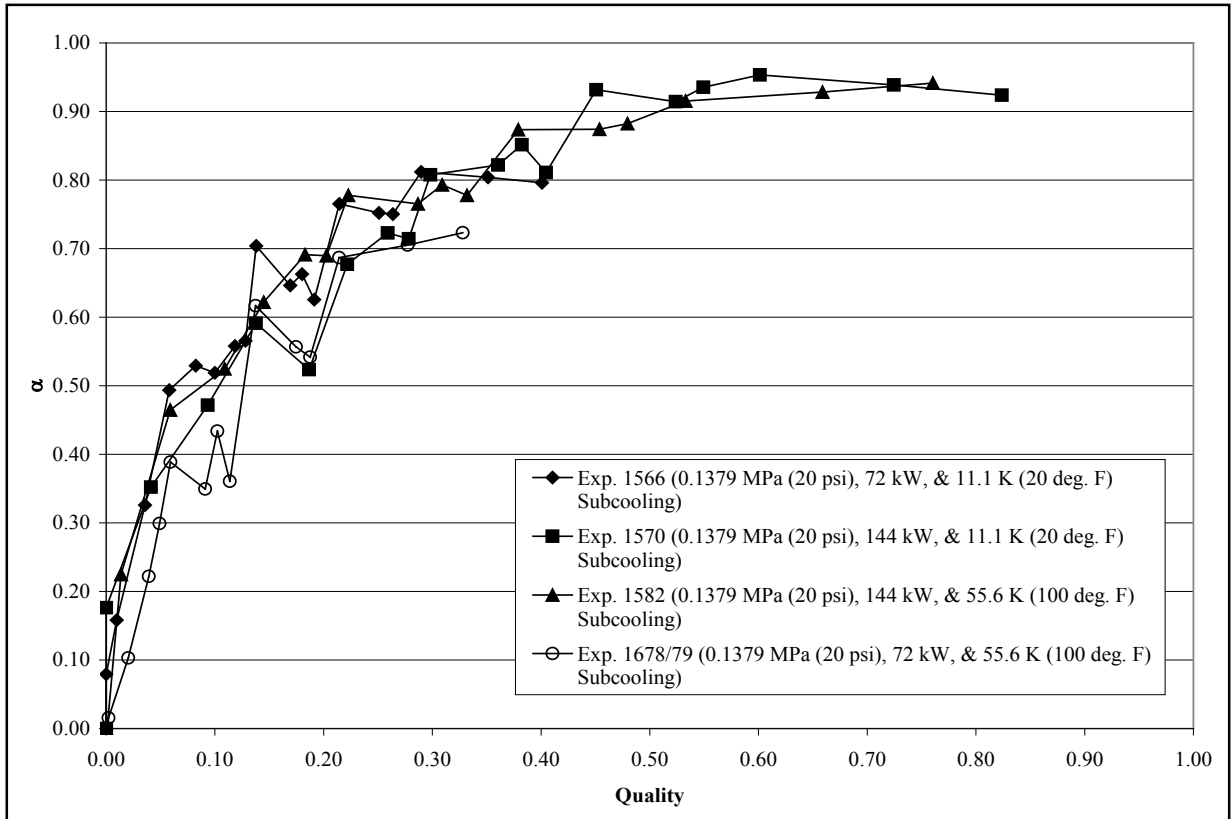


Figure 3-15 Void Fraction Versus Quality for Various Experiments at Different Inlet Subcoolings and Powers with Flow Rate at 15.24 mm/s (0.6 in/s)

4. CONCLUSIONS

4.1 Conclusions

A series of level swell boil-off tests were performed in the RBHT test facility to provide an experimental data base that can be used to assess computer codes such as the NRC TRACE code. The measured pressure drop data were corrected for both two-phase frictional and acceleration pressure drop to obtain the local void fraction. The corrections were found to be a small percentage of the measured pressure drop.

Experimental data plots showed that in low-pressure low-flow boil-off tests, the effects of decreasing the subcooling or increasing the power appear to cause the greatest changes in the void fraction distribution along the length of the bundle. The effects of decreasing the subcooling caused a greater length of the rod bundle to be in a two-phase flow condition and the exit void to be slightly increased. The effects of increasing the power did decrease the elevation at which two-phase flow begins, and the void fraction was found to increase at a much more rapid rate as expected, such that in some experiments the flow at the top of the rod bundle was single phase vapor. Either by decreasing the inlet subcooling or increasing the power will result in higher void fractions in the bundle as expected.

The effect of increasing pressure was observed to be relatively small. The higher pressure showed some suppression of boiling as the saturation line moved upward in the bundle, with other conditions being the same. The void fraction at the exit was also observed to be slightly lower as the pressure increased.

The effects of changing multiple inlet conditions were analyzed. The effects of increased power and pressure were studied, and it was observed that the saturation line remained at approximately the same location as when only the power was increased. Increasing power does have a more significant effect on the void fraction than pressure. However, the increased pressure slows the rate at which the void fraction increased over the length of the bundle due to the reduced phase slip and a higher saturation temperature. The other multiple condition analysis studied the effects of decreasing the subcooling while also increasing the power. The results of this experiment were slightly different than expected. The effects of decreasing the amount of subcooling and increasing the power were to decrease the elevation at which the onset of boiling occurs resulting in an increase in the value of the void fraction over the length of the rod bundle. These effects were seen in the experiments, except the void fraction at the exit appears to be slightly lower than in the case of only increasing the power.

4.2 Recommendations for Future Work

There are areas of additional analysis of the current experimental data that could be completed. Such areas include the onset of boiling within the subcooled region, flow regime assessment, and additional comparisons to other level swell data. The subcooled region below the saturation level can be analyzed further to calculate the onset of subcooled nucleate boiling. Also, the boiling region of the rod bundle can be compared with various known boiling correlations, such as those developed by Rohsenow, Jens-Lottes, and Chen. These areas of analysis, and others, would be useful in further validating the effectiveness of current correlations and models in modeling the newer advanced reactor designs and the possible transient scenarios that may occur in each.

5. REFERENCES

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APPENDIX A. TEST RESULTS FOR ALL VALID EXPERIMENTS

The following data represents the validated results of the Two-phase mixture level and uncover Test Series. This data is presented for steady-state windows during the respective experiments. For each steady-state window, the following plots and tables are provided:

- **Summary and Comment Sheet** – listing of the as-run conditions for the experiment steady-state window.
- **Critical Instrument Plots** – verify that steady-state conditions were achieved and maintained for boundary conditions during the respective time windows of the experiment. The following experimental data is plotted over the steady-state window:
 1. Upper Plenum Pressure
 2. Bundle Power
 3. Inlet Flow Rate
 4. Inlet Flow Temperature
- **Data Tables** – tabulated representation of the following test parameters versus elevation:
 1. Superficial Phase Velocities
 2. Quality
 3. Local Pressure
 4. Local Heat Flux
 5. $\Delta P_{\text{measured}}$
 6. $\Delta P_{\text{friction}}$
 7. $\Delta P_{\text{acceleration}}$
 8. ΔP_{grid}
 9. $\alpha_{\text{corrected}}$
 10. α_{minimum}
 11. α_{maximum}

RBHT Two-Phase Mixture Level and Uncovery Test INT-1547-A

Test Conditions

Date: 5/21/2003

Steady-state time window: 400 – 600 seconds

Inlet flow rate: 1.402 cm/sec (0.552 in./sec)

Inlet mass flow rate: 0.0621 kg/sec (0.137 lbm/sec)

Inlet flow temperature: 368.5 K (203.7 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 76.44 kW

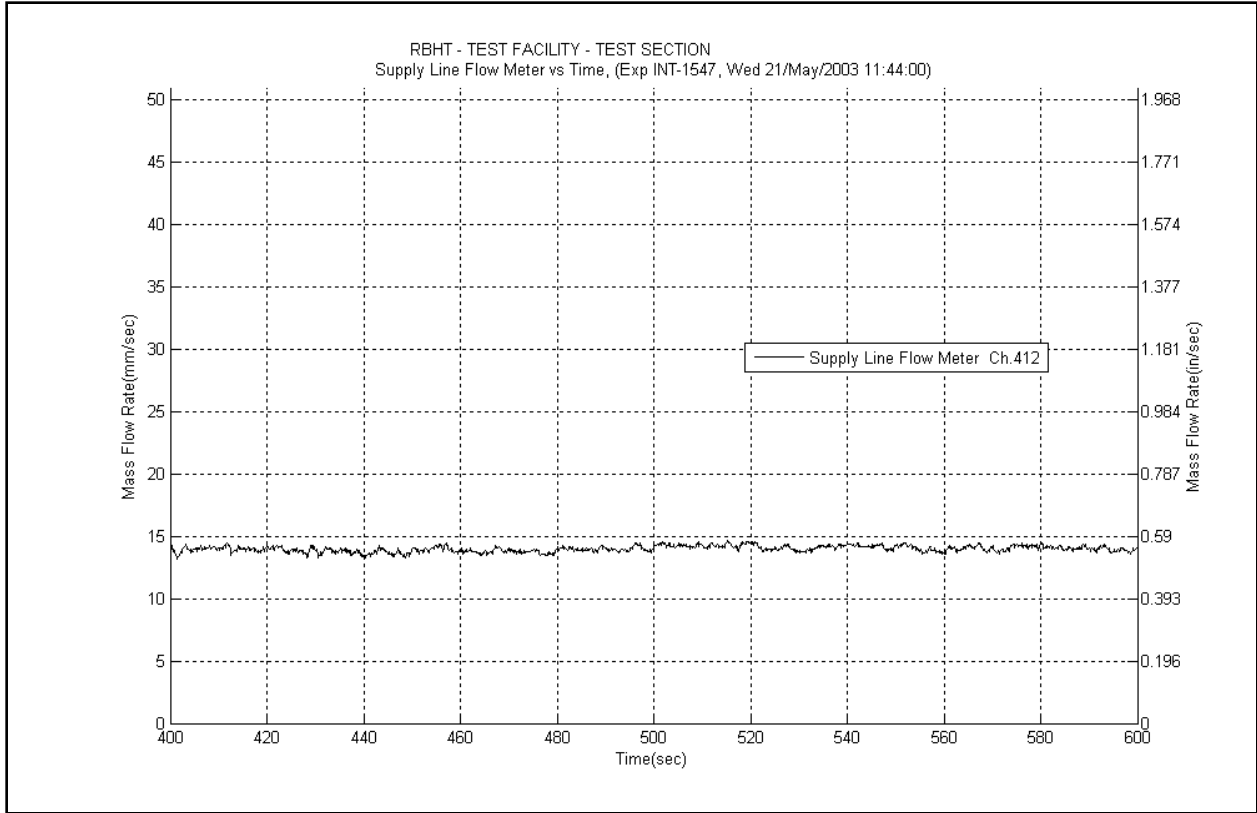


Figure A-1 Inlet Flow Plot for Experiment 1547A

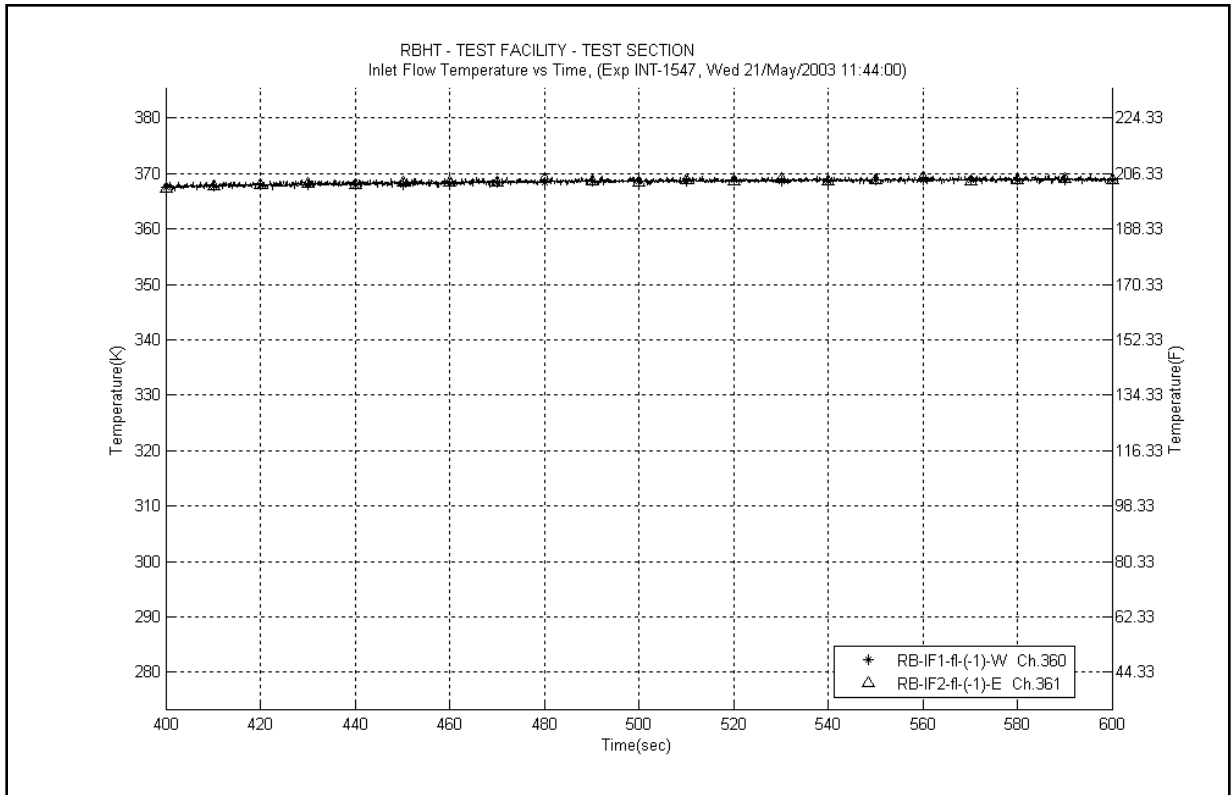


Figure A-2 Inlet Temperature Plot for Experiment 1547A

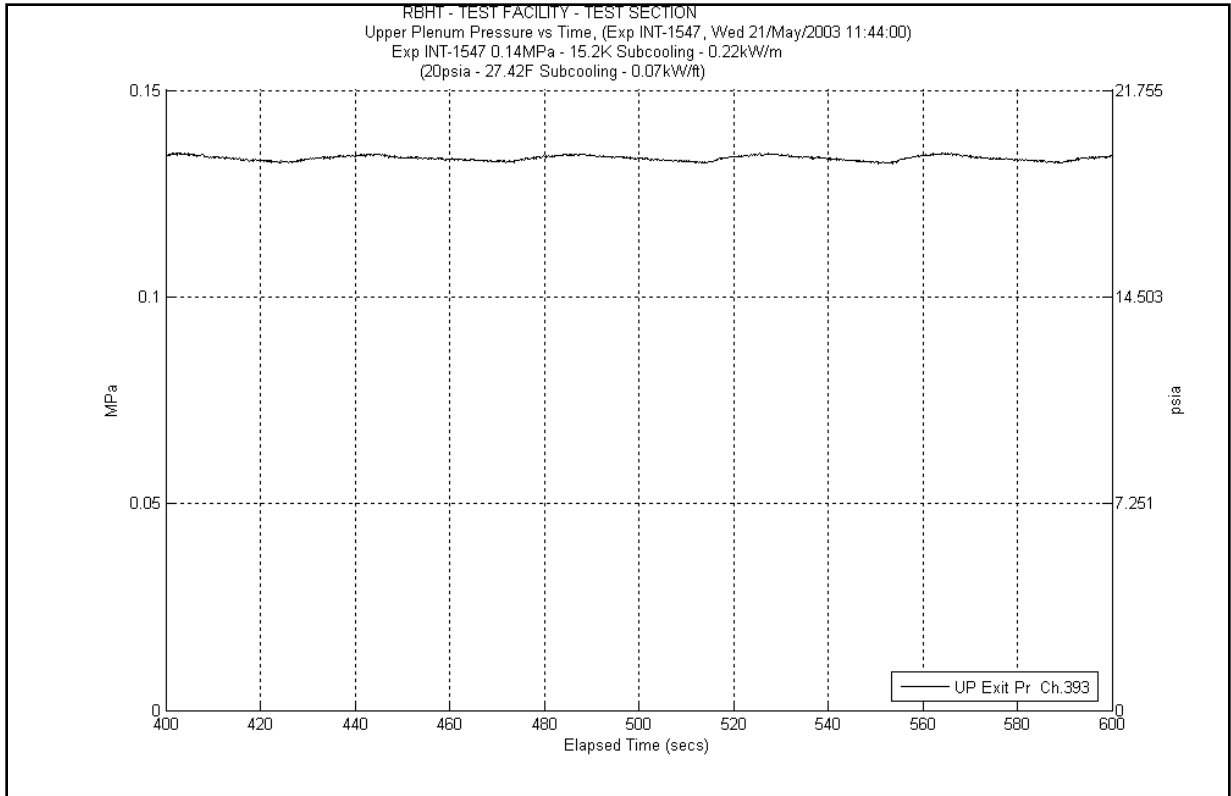


Figure A-3 System Pressure Plot for Experiment 1547A

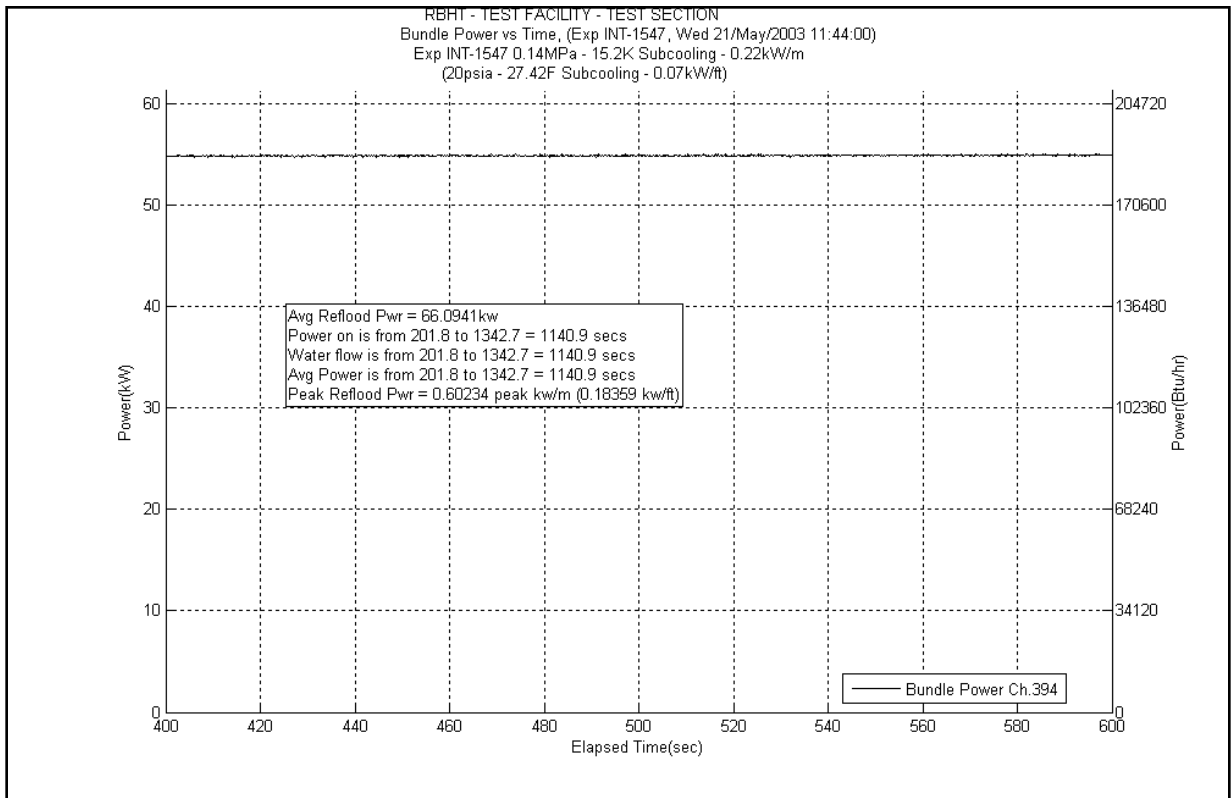


Figure A-4 Bundle Power Plot for Experiment 1547A

Table A-1 Data Results for RBHT Test 1547A for Time Period 400 to 600 seconds

Results for RBHT Test 1547
Valid Time Period 400 to 600 seconds
Collapsed Liquid Level = 62.46 inches = 1586.4 mm
(Z_{osv}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.779	12.651	605.731	0.495	23.701	0.117	5.602	0.000	0.000	12.04	576.478	2892.04	138471.618	0.789	0.785	0.793
*	120-133	3048-3378	383	0.768	15.663	749.952	0.547	26.191	0.209	10.007	-0.213	-10.195	15.12	723.949	2907.16	139195.568	0.776	0.772	0.780
*	108-120	2743-3048	382	0.682	19.797	947.884	0.455	21.786	0.261	12.497	3.481	166.670	15.6	746.932	2922.76	139942.500	0.750	0.746	0.754
	100-108	2540-2743	381	0.725	11.415	546.550	0.272	13.023	0.191	9.145	0.000	0.000	10.95	524.289	2933.71	140466.789	0.737	0.733	0.741
	97-100	2464-2540	380	0.666	5.204	249.155	0.095	4.549	0.069	3.304	0.000	0.000	5.039	241.269	2938.75	140708.057	0.677	0.674	0.680
	93-97	2362-2464	379	0.668	6.902	330.466	0.121	5.794	0.090	4.309	0.000	0.000	6.687	320.175	2945.44	141028.233	0.678	0.675	0.681
*	85-93	2159-2362	378	0.548	18.774	898.899	0.224	10.725	0.173	8.283	5.477	262.235	12.9	617.655	2958.34	141645.888	0.690	0.687	0.693
	81-85	2057-2159	377	0.692	6.398	306.347	0.103	4.932	0.083	3.974	0.000	0.000	6.209	297.289	2964.55	141943.176	0.701	0.697	0.705
	78-81	1981-2057	376	0.551	7.001	335.191	0.073	3.495	0.061	2.921	0.000	0.000	6.866	328.746	2971.41	142271.922	0.559	0.556	0.562
	75-78	1905-1981	375	0.584	6.486	310.574	0.070	3.352	0.059	2.825	0.000	0.000	6.355	304.279	2977.77	142576.201	0.592	0.589	0.595
	72-75	1829-1905	374	0.572	6.673	319.525	0.067	3.208	0.058	2.777	0.000	0.000	6.544	313.328	2984.31	142889.530	0.580	0.577	0.583
*	67-72	1702-1829	373	0.505	12.859	615.677	0.105	5.027	0.093	4.453	2.561	122.606	10.1	483.591	2994.41	143373.120	0.611	0.608	0.614
	63-67	1600-1702	372	0.635	7.587	363.289	0.078	3.735	0.072	3.447	0.000	0.000	7.435	355.990	3001.85	143729.110	0.642	0.639	0.645
	60-63	1524-1600	371	0.499	7.806	373.733	0.055	2.633	0.052	2.490	0.000	0.000	7.694	368.391	3009.54	144097.501	0.506	0.503	0.509
	57-60	1448-1524	370	0.500	7.785	372.738	0.052	2.490	0.051	2.442	0.000	0.000	7.679	367.672	3017.22	144465.173	0.507	0.504	0.510
	53-57	1346-1448	369	0.471	10.984	525.912	0.065	3.112	0.066	3.160	0.000	0.000	10.85	519.501	3028.07	144984.674	0.478	0.476	0.480
*	46-53	1168-1346	368	0.314	24.923	1193.310	0.101	4.836	0.109	5.219	5.803	277.839	18.91	905.416	3046.98	145890.090	0.480	0.478	0.482
	43-46	1092-1168	367	0.476	8.159	390.642	0.038	1.819	0.045	2.155	0.000	0.000	8.074	386.585	3055.05	146276.675	0.482	0.480	0.484
	37-43	940-1092	366	0.436	17.590	842.205	0.068	3.256	0.085	4.070	0.000	0.000	17.43	834.553	3072.48	147111.228	0.441	0.439	0.443
*	25-37	635-940	365	0.280	44.860	2147.908	0.103	4.932	0.154	7.374	2.483	118.886	42.12	2016.716	3114.6	149127.944	0.324	0.322	0.326
	13-25	330-635	364	0.204	49.586	2374.186	0.052	2.490	0.132	6.320	0.000	0.000	49.39	2364.806	3163.99	151492.750	0.207	0.206	0.208
*	0-13	0-330	363	0.036	65.093	3116.679	0.010	0.479	0.010	0.479	4.573	218.966	60.5	2896.756	3224.49	154389.506	0.104	0.103	0.105

Table A-2 Energy Balance Results for RBHT Test 1547A for Time Period 400 to 600 seconds

Results for RBHT Test 1547 Valid Time Period 400 to 600 seconds								
Elevation	Elevation	q''w	q''w	x	J _g	J _g	J _f	J _f
(ft)	(mm)	(BTU/hr-ft ²)	(kW/m ²)		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2466.565	7.78096	0.00E+00	0.00E+00	0.00E+00	4.39E-02	1.34E-02
0.25	6.35	2603.597	8.21323	0.00E+00	0.00E+00	0.00E+00	4.39E-02	1.34E-02
0.50	12.70	2740.628	8.64551	0.00E+00	0.00E+00	0.00E+00	4.39E-02	1.34E-02
0.75	19.05	2877.660	9.07778	0.00E+00	0.00E+00	0.00E+00	4.39E-02	1.34E-02
1.00	25.40	3014.691	9.51006	9.64E-05	5.05E-03	1.54E-03	4.39E-02	1.34E-02
1.25	31.75	3151.722	9.94233	7.28E-03	3.82E-01	1.16E-01	4.36E-02	1.33E-02
1.50	38.10	3288.754	10.37461	1.48E-02	7.75E-01	2.36E-01	4.33E-02	1.32E-02
1.75	44.45	3425.785	10.80688	2.26E-02	1.18E+00	3.61E-01	4.30E-02	1.31E-02
2.00	50.80	3562.817	11.23916	3.08E-02	1.61E+00	4.91E-01	4.26E-02	1.30E-02
2.25	57.15	3699.848	11.67143	3.92E-02	2.06E+00	6.27E-01	4.22E-02	1.29E-02
2.50	63.50	3836.880	12.10371	4.80E-02	2.52E+00	7.67E-01	4.18E-02	1.28E-02
2.75	69.85	3973.911	12.53599	5.71E-02	2.99E+00	9.12E-01	4.14E-02	1.26E-02
3.00	76.20	4110.942	12.96826	6.65E-02	3.49E+00	1.06E+00	4.10E-02	1.25E-02
3.25	82.55	4247.974	13.40054	7.62E-02	4.00E+00	1.22E+00	4.06E-02	1.24E-02
3.50	88.90	4385.005	13.83281	8.63E-02	4.52E+00	1.38E+00	4.02E-02	1.22E-02
3.75	95.25	4522.037	14.26509	9.67E-02	5.07E+00	1.54E+00	3.97E-02	1.21E-02
4.00	101.60	4659.068	14.69736	1.07E-01	5.63E+00	1.72E+00	3.92E-02	1.20E-02
4.25	107.95	4796.099	15.12964	1.18E-01	6.21E+00	1.89E+00	3.87E-02	1.18E-02
4.50	114.30	4933.131	15.56191	1.30E-01	6.80E+00	2.07E+00	3.82E-02	1.17E-02
4.75	120.65	5070.162	15.99419	1.41E-01	7.41E+00	2.26E+00	3.77E-02	1.15E-02
5.00	127.00	5207.194	16.42646	1.53E-01	8.04E+00	2.45E+00	3.72E-02	1.13E-02
5.25	133.35	5344.225	16.85874	1.66E-01	8.68E+00	2.65E+00	3.67E-02	1.12E-02
5.50	139.70	5481.256	17.29101	1.78E-01	9.34E+00	2.85E+00	3.61E-02	1.10E-02
5.75	146.05	5618.288	17.72329	1.91E-01	1.00E+01	3.06E+00	3.55E-02	1.08E-02
6.00	152.40	5755.319	18.15557	2.04E-01	1.07E+01	3.27E+00	3.50E-02	1.07E-02
6.25	158.75	5892.351	18.58784	2.18E-01	1.14E+01	3.48E+00	3.44E-02	1.05E-02
6.50	165.10	6029.382	19.02012	2.32E-01	1.22E+01	3.71E+00	3.38E-02	1.03E-02
6.75	171.45	6166.414	19.45239	2.46E-01	1.29E+01	3.93E+00	3.31E-02	1.01E-02
7.00	177.80	6303.445	19.88467	2.61E-01	1.37E+01	4.16E+00	3.25E-02	9.90E-03
7.25	184.15	6440.476	20.31694	2.76E-01	1.44E+01	4.40E+00	3.18E-02	9.71E-03
7.50	190.50	6577.508	20.74922	2.91E-01	1.52E+01	4.64E+00	3.12E-02	9.50E-03
7.75	196.85	6714.539	21.18149	3.06E-01	1.60E+01	4.89E+00	3.05E-02	9.30E-03
8.00	203.20	6851.571	21.61377	3.22E-01	1.69E+01	5.14E+00	2.98E-02	9.08E-03
8.25	209.55	6988.602	22.04604	3.38E-01	1.77E+01	5.40E+00	2.91E-02	8.87E-03
8.50	215.90	7125.633	22.47832	3.55E-01	1.86E+01	5.67E+00	2.84E-02	8.65E-03
8.75	222.25	7262.665	22.91059	3.71E-01	1.95E+01	5.93E+00	2.76E-02	8.42E-03
9.00	228.60	7399.696	23.34287	3.88E-01	2.04E+01	6.21E+00	2.69E-02	8.19E-03
9.25	234.95	6988.602	22.04604	4.05E-01	2.12E+01	6.47E+00	2.61E-02	7.97E-03
9.50	241.30	6577.508	20.74922	4.21E-01	2.21E+01	6.73E+00	2.55E-02	7.76E-03
9.75	247.65	6166.414	19.45239	4.36E-01	2.28E+01	6.96E+00	2.48E-02	7.56E-03
10.00	254.00	5755.319	18.15557	4.50E-01	2.36E+01	7.18E+00	2.42E-02	7.37E-03
10.25	260.35	5344.225	16.85874	4.63E-01	2.43E+01	7.39E+00	2.36E-02	7.20E-03
10.50	266.70	4933.131	15.56191	4.75E-01	2.49E+01	7.58E+00	2.31E-02	7.04E-03
10.75	273.05	4522.037	14.26509	4.86E-01	2.55E+01	7.76E+00	2.26E-02	6.89E-03
11.00	279.40	4110.942	12.96826	4.96E-01	2.60E+01	7.92E+00	2.22E-02	6.76E-03
11.25	285.75	3699.848	11.67143	5.05E-01	2.65E+01	8.07E+00	2.18E-02	6.63E-03
11.50	292.10	3288.754	10.37461	5.13E-01	2.69E+01	8.19E+00	2.14E-02	6.53E-03
11.75	298.45	2877.660	9.07778	5.20E-01	2.73E+01	8.31E+00	2.11E-02	6.43E-03
12.00	304.80	2466.565	7.78096	5.26E-01	2.76E+01	8.41E+00	2.08E-02	6.35E-03

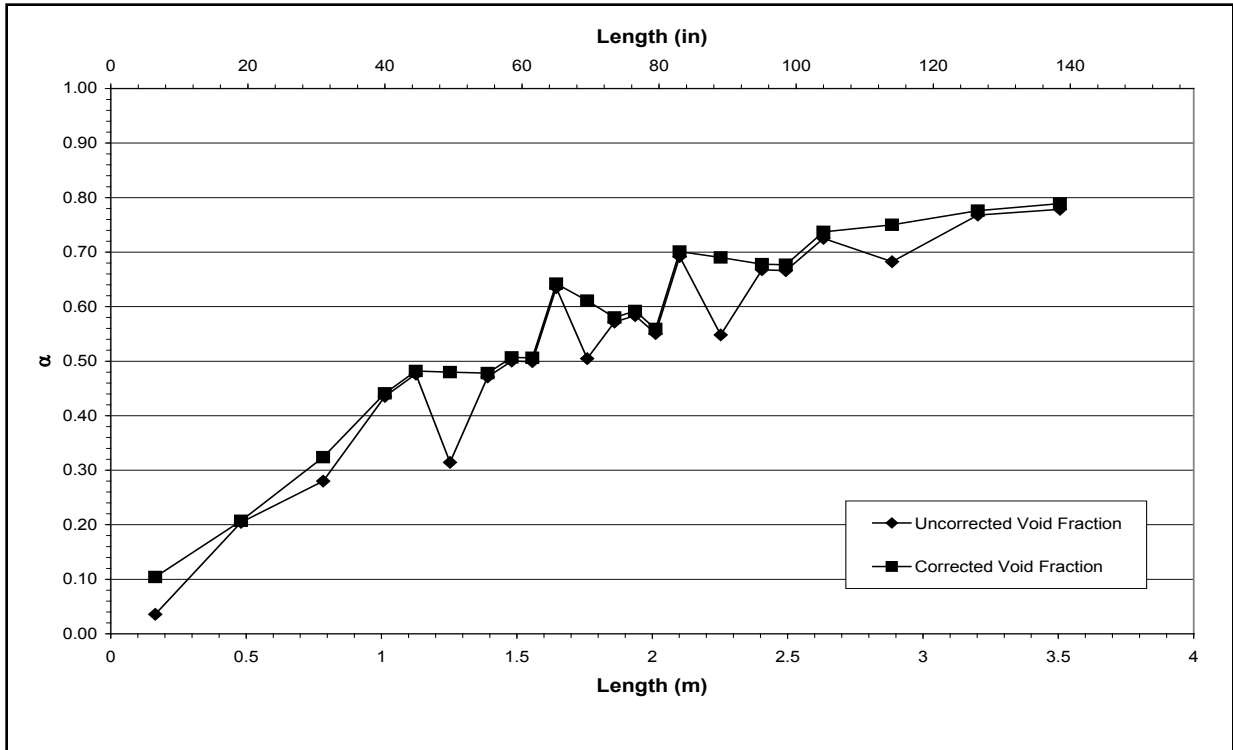


Figure A-5 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1547A for Time Period 400 to 600 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1560-A

Test Conditions

Date: 5/22/2003

Steady-state time window: 1600 – 1800 seconds

Inlet flow rate: 2.548 cm/sec (1.003 in./sec)

Inlet mass flow rate: 0.125 kg/sec (0.275 lbm/sec)

Inlet flow temperature: 367.8 K (202.4 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 77.02 kW

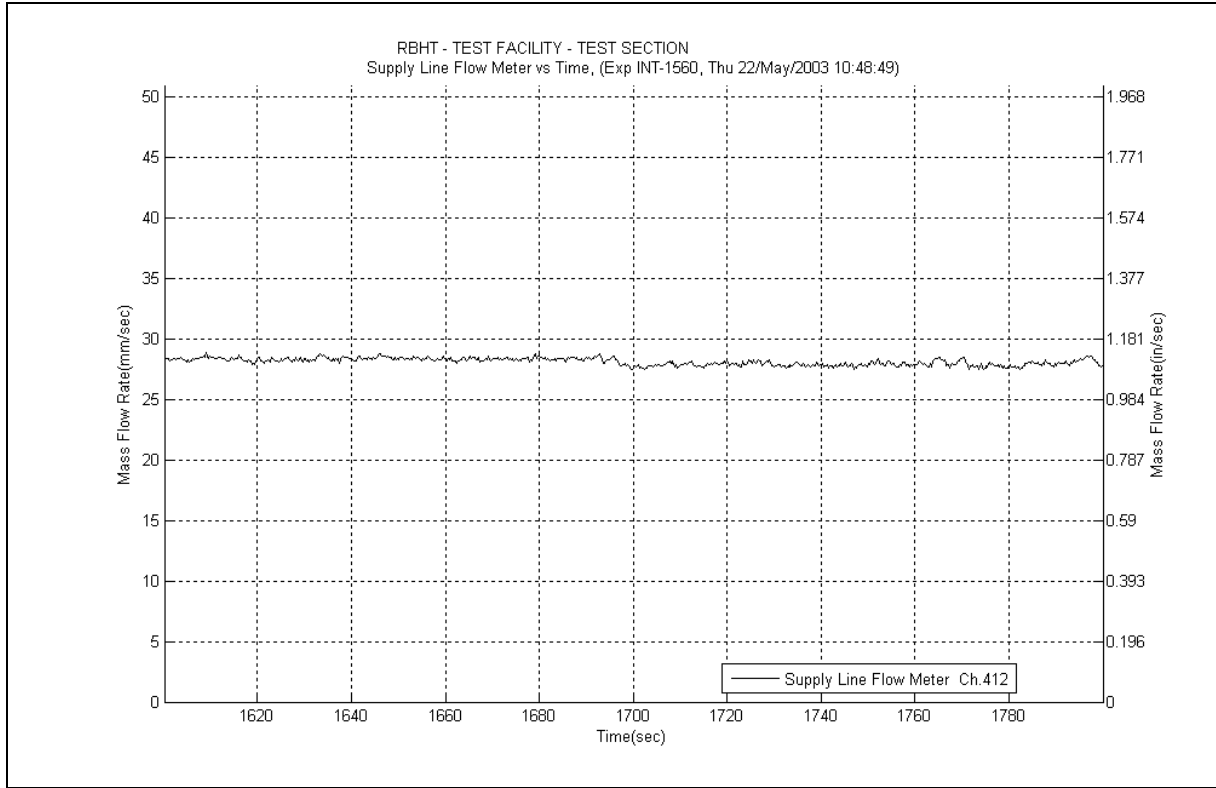


Figure A-6 Inlet Flow Plot for Experiment 1560A

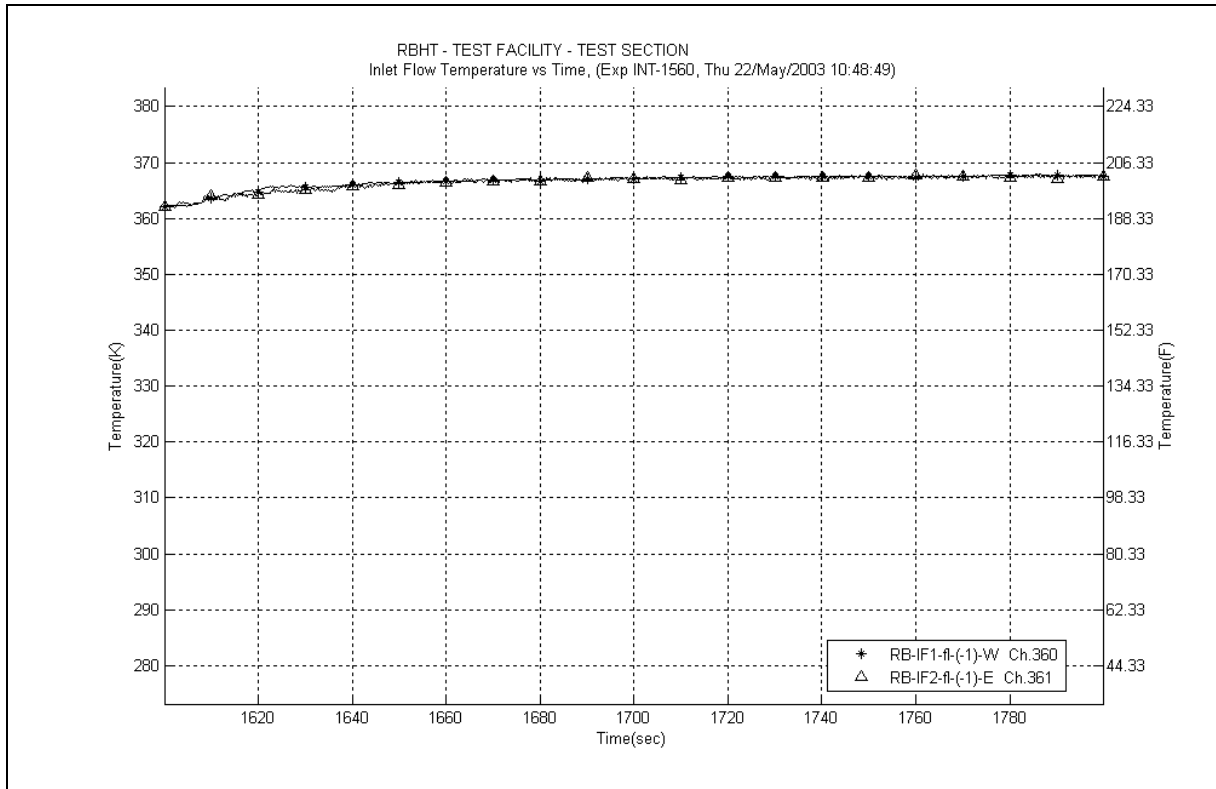


Figure A-7 Inlet Temperature Plot for Experiment 1560A

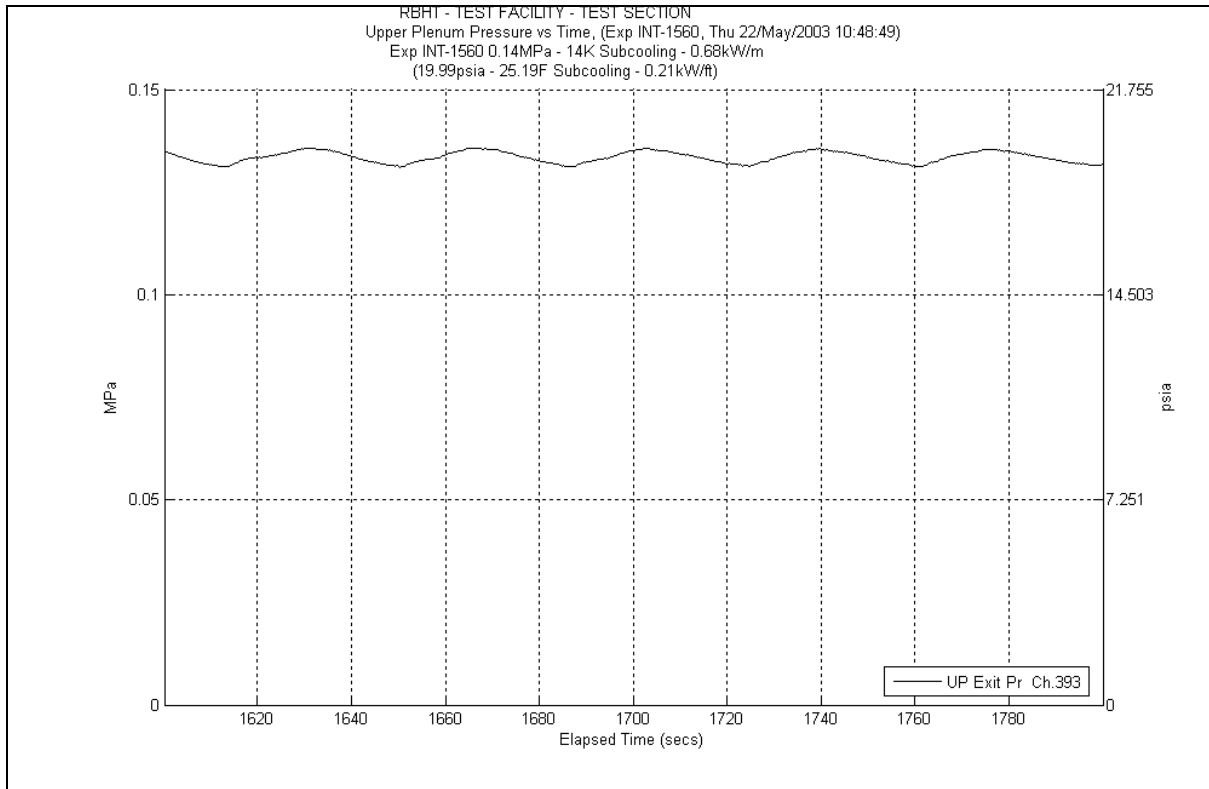


Figure A-8 System Pressure Plot for Experiment 1560A

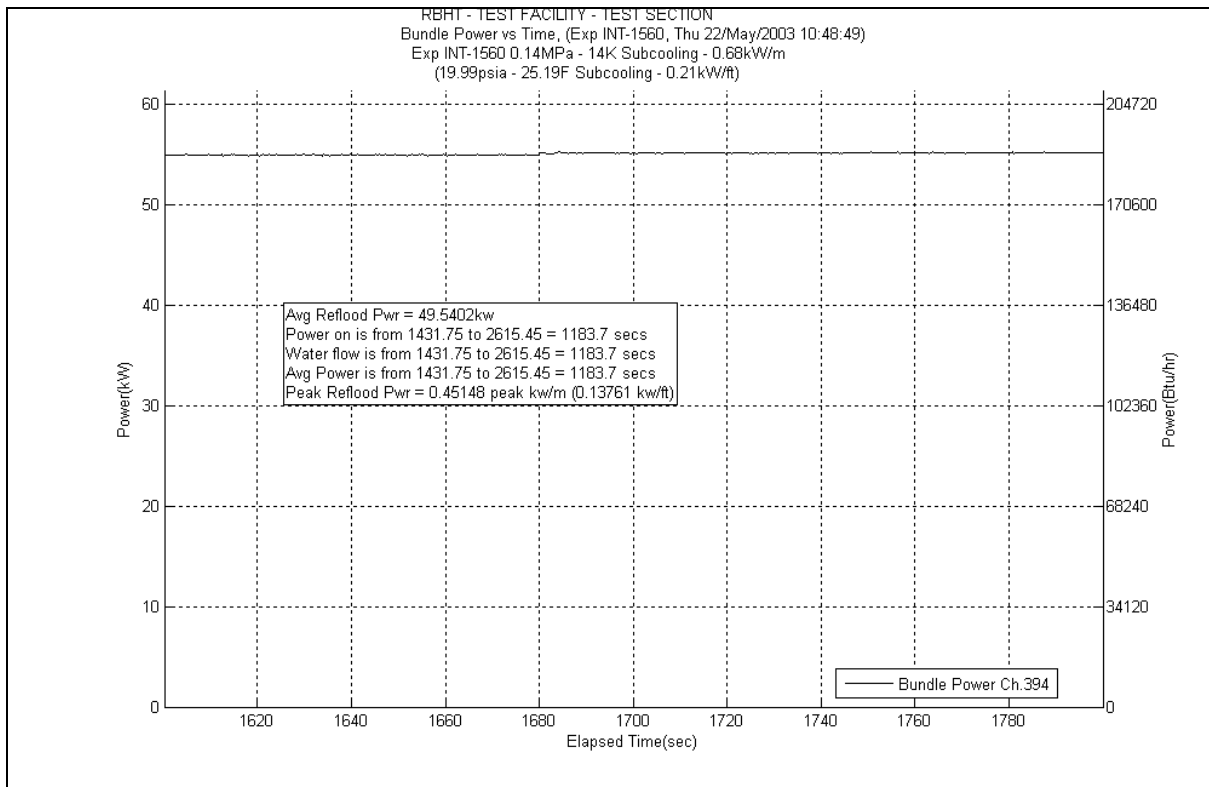


Figure A-9 Bundle Power Plot for Experiment 1560A

Table A-3 Data Results for RBHT Test 1560A for Time Period 1600 to 1800 seconds

Results for RBHT Test 1560
Valid Time Period 1600 to 1800 seconds
Collapsed Liquid Level = 76.732 inches = 1949.01 mm
(Z_{ass}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\sigma_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{inc} (lbf/ft ²)	ΔP_{inc} (Pa)	ΔP_{inc} (lbf/ft ²)	ΔP_{accd} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	Plocal (lbf/ft ²)	Plocal (Pa)	$\sigma_{corrected}$	σ_{min}	σ_{max}
	133-144	3378-3658	384	0.67	19.013	910.337	0.989	47.354	0.237	11.348	0.000	0.000	17.78	851.3109695	2897.78	138746.4511	0.689	0.686	0.692
*	120-133	3048-3378	383	0.67	22.082	1057.294	1.098	52.573	0.423	20.253	-1.739	-83.262	22.3	1067.729731	2920.08	139814.1809	0.67	0.667	0.673
*	108-120	2743-3048	382	0.55	27.847	1333.304	0.918	43.954	0.528	25.281	3.431	164.260	22.97	1099.809503	2943.05	140913.9904	0.631	0.628	0.634
	100-108	2540-2743	381	0.59	17.045	816.095	0.550	26.334	0.386	18.482	0.000	0.000	16.1	770.8721377	2959.15	141684.8625	0.612	0.609	0.615
	97-100	2464-2540	380	0.53	7.400	354.338	0.193	9.241	0.140	6.703	0.000	0.000	7.068	338.4176565	2966.218	142023.2802	0.546	0.543	0.549
	93-97	2362-2464	379	0.53	9.831	470.710	0.246	11.779	0.182	8.714	0.000	0.000	9.402	450.1701763	2975.62	142473.4503	0.547	0.544	0.550
*	85-93	2159-2362	378	0.41	24.424	1169.438	0.453	21.690	0.349	16.710	5.302	253.872	18.32	877.1663082	2993.94	143350.6166	0.559	0.556	0.562
	81-85	2057-2159	377	0.55	9.296	445.098	0.208	9.959	0.167	7.996	0.000	0.000	8.919	427.0440122	3002.859	143777.6607	0.571	0.568	0.574
	78-81	1981-2057	376	0.41	9.130	437.141	0.148	7.086	0.122	5.841	0.000	0.000	8.856	424.027556	3011.715	144201.6882	0.431	0.429	0.433
	75-78	1905-1981	375	0.45	8.616	412.524	0.141	6.751	0.120	5.746	0.000	0.000	8.351	399.8480262	3020.066	144601.5362	0.464	0.462	0.466
	72-75	1829-1905	374	0.42	8.964	429.184	0.134	6.416	0.117	5.602	0.000	0.000	8.708	416.941278	3028.774	145018.4775	0.441	0.439	0.443
*	67-72	1702-1829	373	0.37	16.432	786.754	0.208	9.959	0.189	9.049	1.915	91.676	14.12	676.0692288	3042.894	145694.5467	0.456	0.454	0.458
	63-67	1600-1702	372	0.46	11.280	540.085	0.153	7.326	0.145	6.943	0.000	0.000	10.98	525.7252219	3053.874	146220.272	0.471	0.469	0.473
	60-63	1524-1600	371	0.32	10.579	506.516	0.106	5.075	0.106	5.075	0.000	0.000	10.36	496.0394625	3064.234	146716.3114	0.335	0.333	0.337
	57-60	1448-1524	370	0.35	10.054	481.402	0.100	4.788	0.103	4.932	0.000	0.000	9.849	471.5726512	3074.083	147187.8841	0.368	0.366	0.370
	53-57	1346-1448	369	0.31	14.396	689.280	0.122	5.841	0.133	6.368	0.000	0.000	14.14	677.026834	3088.223	147864.9109	0.319	0.317	0.321
*	46-53	1168-1346	368	0.20	29.140	1395.220	0.184	8.810	0.221	10.582	3.525	168.767	25.21	1207.061279	3113.433	149071.9722	0.306	0.304	0.308
	43-46	1092-1168	367	0.28	11.171	534.863	0.067	3.208	0.090	4.309	0.000	0.000	11.01	527.1616296	3124.443	149599.1338	0.293	0.292	0.294
	37-43	940-1092	366	0.22	24.274	1162.227	0.111	5.315	0.172	8.235	0.000	0.000	23.98	1148.168563	3148.423	150747.3024	0.23	0.229	0.231
*	25-37	635-940	365	0.09	56.488	2704.653	0.123	5.889	0.311	14.891	2.284	109.351	53.77	2574.521419	3202.193	153321.8238	0.137	0.136	0.138
	13-25	330-635	364	0.04	59.619	2854.594	0.012	0.575	0.006	0.287	0.000	0.000	59.58	2852.705712	3261.773	156174.5295	0.044	0.042	0.046
*	0-13	0-330	363	0.03	65.348	3128.863	0.004	0.192	0.000	0.000	-0.676	-32.383	66.02	3161.054567	3327.793	159335.5841	0.022	0.021	0.023

Table A-4 Energy Balance Results for RBHT Test 1560A for Time Period 1600 to 1800 seconds

Results for RBHT Test 1560 Valid Time Period 1600 to 1800 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2481.7082	7.828726	0.00E+00	0.00E+00	0.00E+00	8.83E-02	4.01E-02
0.25	6.35	2619.5809	8.263655	0.00E+00	0.00E+00	0.00E+00	8.83E-02	4.01E-02
0.50	12.70	2757.4535	8.698584	0.00E+00	0.00E+00	0.00E+00	8.83E-02	4.01E-02
0.75	19.05	2895.3262	9.133513	0.00E+00	0.00E+00	0.00E+00	8.83E-02	4.01E-02
1.00	25.40	3033.1989	9.568442	0.00E+00	0.00E+00	0.00E+00	8.83E-02	4.01E-02
1.25	31.75	3171.0716	10.00337	0.00E+00	0.00E+00	0.00E+00	8.83E-02	4.01E-02
1.50	38.10	3308.9442	10.4383	0.00E+00	0.00E+00	0.00E+00	8.83E-02	4.01E-02
1.75	44.45	3446.8169	10.87323	0.00E+00	0.00E+00	0.00E+00	8.83E-02	4.01E-02
2.00	50.80	3584.6896	11.30816	0.00E+00	0.00E+00	0.00E+00	8.83E-02	4.01E-02
2.25	57.15	3722.5623	11.74309	3.22E-03	3.39E-01	1.54E-01	8.80E-02	3.99E-02
2.50	63.50	3860.4349	12.17802	7.61E-03	8.02E-01	3.64E-01	8.76E-02	3.98E-02
2.75	69.85	3998.3076	12.61295	1.22E-02	1.28E+00	5.81E-01	8.72E-02	3.96E-02
3.00	76.20	4136.1803	13.04788	1.69E-02	1.78E+00	8.07E-01	8.68E-02	3.94E-02
3.25	82.55	4274.053	13.48281	2.18E-02	2.29E+00	1.04E+00	8.64E-02	3.92E-02
3.50	88.90	4411.9257	13.91773	2.68E-02	2.82E+00	1.28E+00	8.59E-02	3.90E-02
3.75	95.25	4549.7983	14.35266	3.20E-02	3.37E+00	1.53E+00	8.55E-02	3.88E-02
4.00	101.60	4687.671	14.78759	3.74E-02	3.93E+00	1.78E+00	8.50E-02	3.86E-02
4.25	107.95	4825.5437	15.22252	4.29E-02	4.51E+00	2.05E+00	8.45E-02	3.83E-02
4.50	114.30	4963.4164	15.65745	4.85E-02	5.11E+00	2.32E+00	8.40E-02	3.81E-02
4.75	120.65	5101.289	16.09238	5.44E-02	5.73E+00	2.60E+00	8.35E-02	3.79E-02
5.00	127.00	5239.1617	16.52731	6.04E-02	6.36E+00	2.88E+00	8.30E-02	3.76E-02
5.25	133.35	5377.0344	16.96224	6.65E-02	7.01E+00	3.18E+00	8.24E-02	3.74E-02
5.50	139.70	5514.9071	17.39717	7.28E-02	7.67E+00	3.48E+00	8.19E-02	3.71E-02
5.75	146.05	5652.7797	17.8321	7.93E-02	8.35E+00	3.79E+00	8.13E-02	3.69E-02
6.00	152.40	5790.6524	18.26703	8.59E-02	9.05E+00	4.11E+00	8.07E-02	3.66E-02
6.25	158.75	5928.5251	18.70196	9.27E-02	9.77E+00	4.43E+00	8.01E-02	3.63E-02
6.50	165.10	6066.3978	19.13688	9.97E-02	1.05E+01	4.76E+00	7.95E-02	3.61E-02
6.75	171.45	6204.2704	19.57181	1.07E-01	1.12E+01	5.10E+00	7.89E-02	3.58E-02
7.00	177.80	6342.1431	20.00674	1.14E-01	1.20E+01	5.45E+00	7.82E-02	3.55E-02
7.25	184.15	6480.0158	20.44167	1.22E-01	1.28E+01	5.80E+00	7.76E-02	3.52E-02
7.50	190.50	6617.8885	20.8766	1.29E-01	1.36E+01	6.17E+00	7.69E-02	3.49E-02
7.75	196.85	6755.7612	21.31153	1.37E-01	1.44E+01	6.54E+00	7.62E-02	3.46E-02
8.00	203.20	6893.6338	21.74646	1.45E-01	1.53E+01	6.92E+00	7.55E-02	3.43E-02
8.25	209.55	7031.5065	22.18139	1.53E-01	1.61E+01	7.30E+00	7.48E-02	3.39E-02
8.50	215.90	7169.3792	22.61632	1.61E-01	1.70E+01	7.70E+00	7.41E-02	3.36E-02
8.75	222.25	7307.2519	23.05125	1.70E-01	1.79E+01	8.10E+00	7.33E-02	3.33E-02
9.00	228.60	7445.1245	23.48618	1.78E-01	1.87E+01	8.50E+00	7.26E-02	3.29E-02
9.25	234.95	7031.5065	22.18139	1.86E-01	1.96E+01	8.91E+00	7.19E-02	3.26E-02
9.50	241.30	6617.8885	20.8766	1.94E-01	2.05E+01	9.28E+00	7.12E-02	3.23E-02
9.75	247.65	6204.2704	19.57181	2.02E-01	2.13E+01	9.64E+00	7.05E-02	3.20E-02
10.00	254.00	5790.6524	18.26703	2.09E-01	2.20E+01	9.97E+00	6.99E-02	3.17E-02
10.25	260.35	5377.0344	16.96224	2.15E-01	2.27E+01	1.03E+01	6.93E-02	3.14E-02
10.50	266.70	4963.4164	15.65745	2.21E-01	2.33E+01	1.06E+01	6.88E-02	3.12E-02
10.75	273.05	4549.7983	14.35266	2.27E-01	2.39E+01	1.08E+01	6.83E-02	3.10E-02
11.00	279.40	4136.1803	13.04788	2.32E-01	2.44E+01	1.11E+01	6.79E-02	3.08E-02
11.25	285.75	3722.5623	11.74309	2.36E-01	2.49E+01	1.13E+01	6.74E-02	3.06E-02
11.50	292.10	3308.9442	10.4383	2.40E-01	2.53E+01	1.15E+01	6.71E-02	3.04E-02
11.75	298.45	2895.3262	9.133513	2.44E-01	2.57E+01	1.17E+01	6.68E-02	3.03E-02
12.00	304.80	2481.7082	7.828726	2.47E-01	2.60E+01	1.18E+01	6.65E-02	3.02E-02

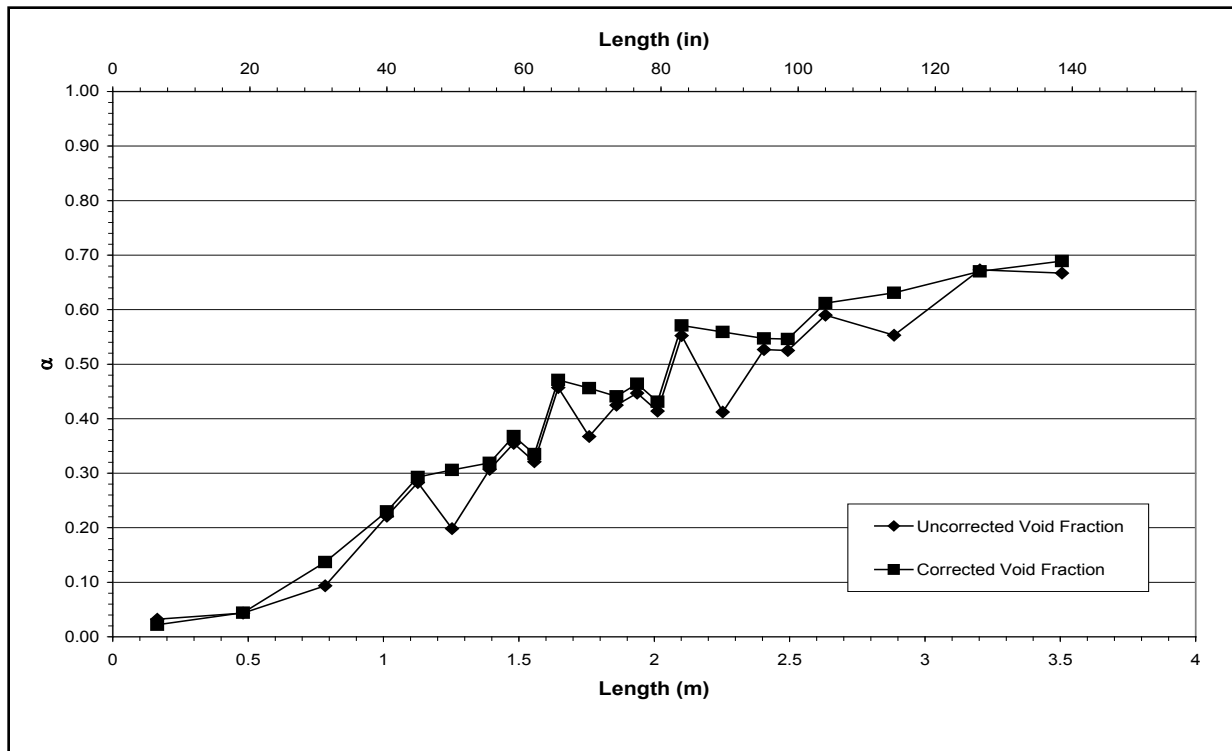


Figure A-10 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1560A for Time Period 1600 to 1800 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1560-B

Test Conditions

Date: 5/22/2003

Steady-state time window: 1900 – 2020 seconds

Inlet flow rate: 1.783 cm/sec (0.702 in./sec)

Inlet mass flow rate: 0.087 kg/sec (0.192 lbm/sec)

Inlet flow temperature: 367.8 K (202.4 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 77.02 kW

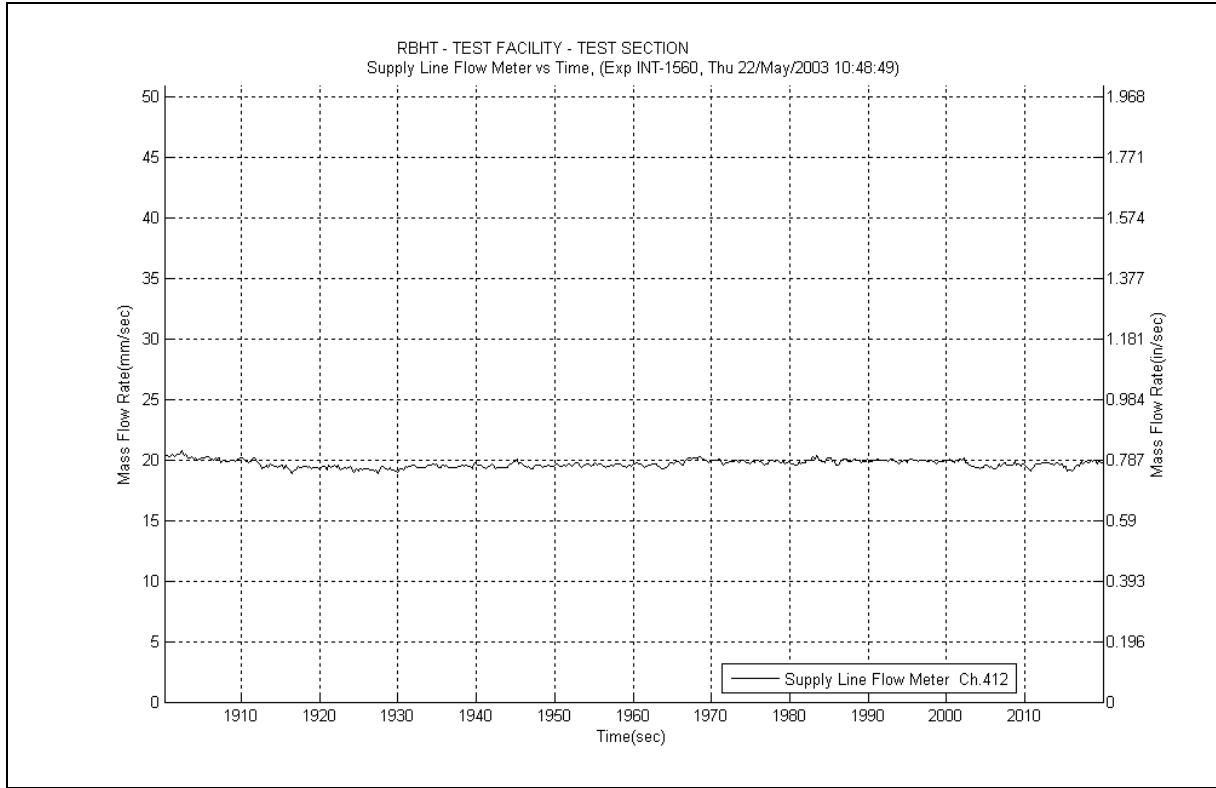


Figure A-11 Inlet Flow Plot for Experiment 1560B

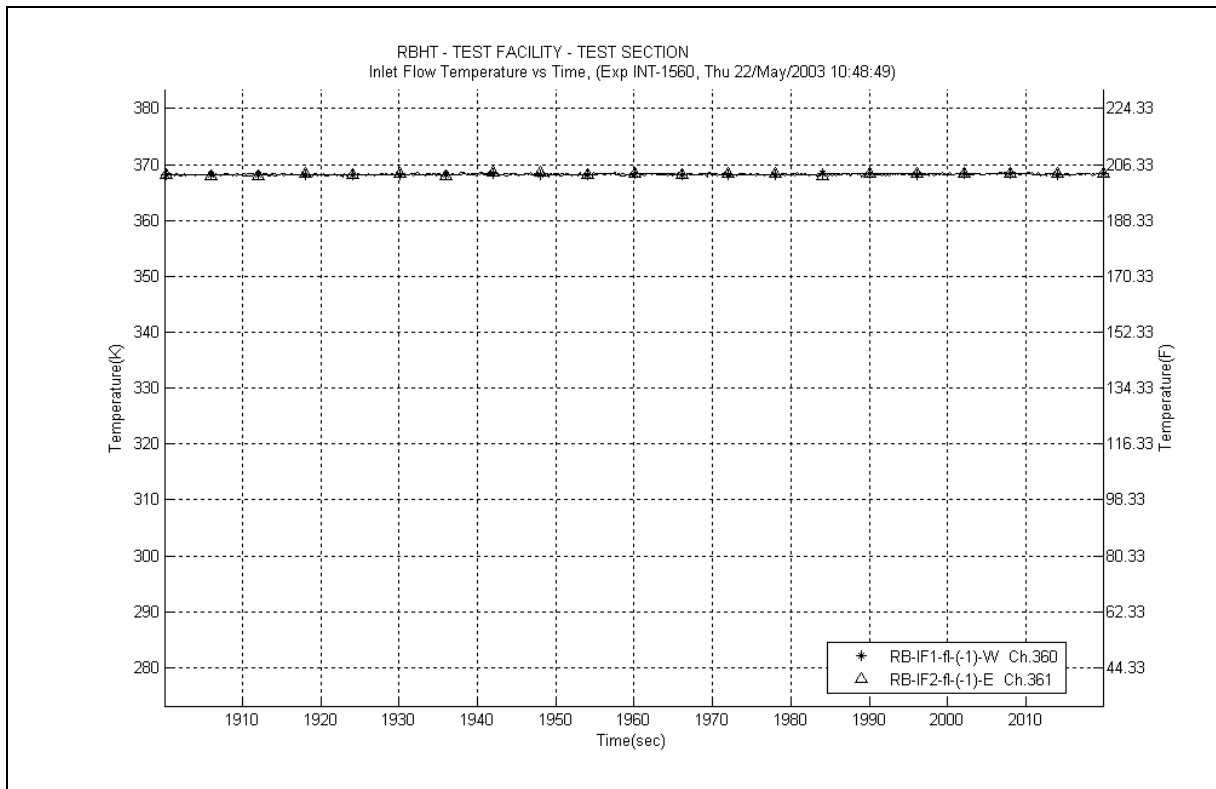


Figure A-12 Inlet Temperature Plot for Experiment 1560B

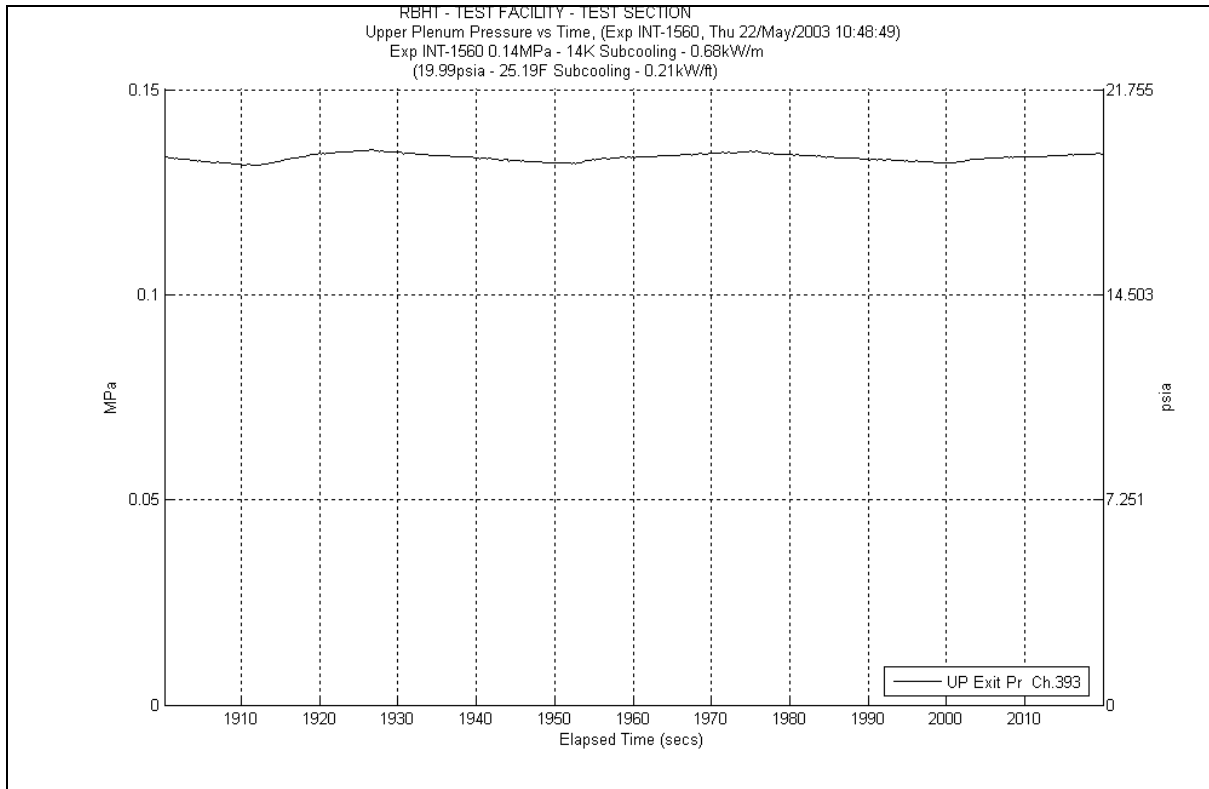


Figure A-13 System Pressure Plot for Experiment 1560B

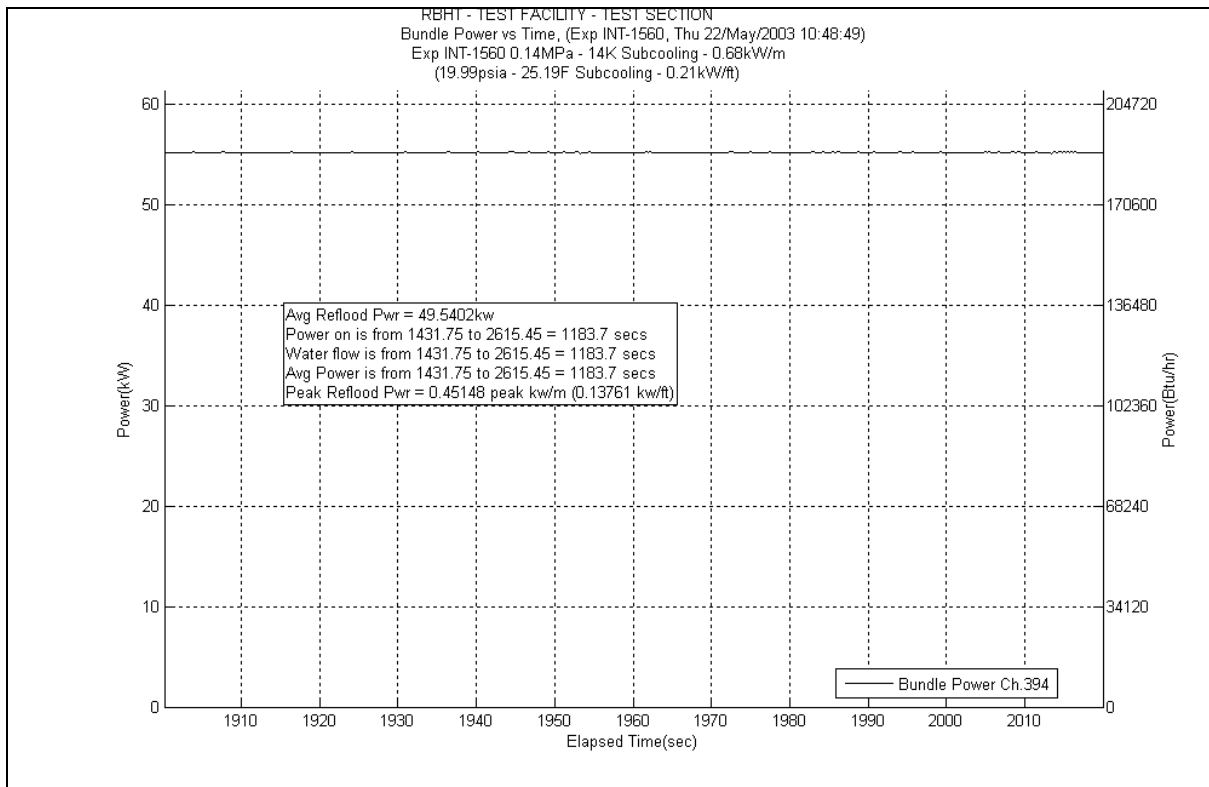


Figure A-14 Bundle Power Plot for Experiment 1560B

Table A-5 Data Results for RBHT Test 1560B for Time Period 1900 to 2020 seconds

Results for RBHT Test 1560
Valid Time Period 1900 to 2020 seconds
Collapsed Liquid Level = 66.091 inches = 1678.72 mm
(Z_{oil}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{acccl} (lbf/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.796	11.675	558.983	0.697	33.373	0.166	7.948	0.000	0.000	10.81	517.586	2890.81	138412.7257	0.811	0.807	0.815
*	120-133	3048-3378	383	0.822	11.997	574.400	0.773	37.011	0.296	14.173	-1.752	-83.906	12.68	607.122	2903.49	139019.8474	0.812	0.808	0.816
*	108-120	2743-3048	382	0.748	15.684	750.947	0.646	30.931	0.370	17.716	3.138	150.241	11.53	552.059	2915.02	139571.9068	0.815	0.811	0.819
	100-108	2540-2743	381	0.801	8.289	396.858	0.387	18.530	0.271	12.976	0.000	0.000	7.629	365.278	2922.649	139937.1852	0.816	0.812	0.820
	97-100	2464-2540	380	0.739	4.061	194.451	0.136	6.512	0.098	4.692	0.000	0.000	3.825	183.142	2926.474	140120.3272	0.754	0.750	0.758
	93-97	2362-2464	379	0.744	5.323	254.874	0.173	8.283	0.128	6.129	0.000	0.000	5.021	240.407	2931.495	140360.734	0.758	0.754	0.762
*	85-93	2159-2362	378	0.602	16.541	791.976	0.320	15.322	0.245	11.731	6.534	312.838	9.442	452.085	2940.937	140812.8194	0.773	0.769	0.777
	81-85	2057-2159	377	0.774	4.690	224.538	0.147	7.038	0.117	5.602	0.000	0.000	4.421	211.679	2945.358	141024.498	0.787	0.783	0.791
	78-81	1981-2057	376	0.626	5.822	278.746	0.105	5.027	0.086	4.118	0.000	0.000	5.63	269.566	2950.988	141294.0638	0.639	0.636	0.642
	75-78	1905-1981	375	0.659	5.318	254.626	0.100	4.788	0.084	4.022	0.000	0.000	5.129	245.578	2956.117	141539.6417	0.671	0.668	0.674
	72-75	1829-1905	374	0.644	5.552	265.815	0.096	4.597	0.082	3.926	0.000	0.000	5.374	257.309	2961.491	141796.9502	0.655	0.652	0.658
*	67-72	1702-1829	373	0.556	11.519	551.523	0.150	7.182	0.132	6.320	3.255	155.841	7.982	382.180	2969.473	142179.1304	0.693	0.690	0.696
	63-67	1600-1702	372	0.720	5.822	278.746	0.111	5.315	0.102	4.884	0.000	0.000	5.606	268.417	2975.079	142447.5471	0.73	0.726	0.734
	60-63	1524-1600	371	0.552	6.985	334.445	0.078	3.735	0.074	3.543	0.000	0.000	6.832	327.118	2981.911	142774.665	0.561	0.558	0.564
	57-60	1448-1524	370	0.567	6.746	323.007	0.074	3.543	0.072	3.447	0.000	0.000	6.599	315.962	2988.51	143090.6268	0.576	0.573	0.579
	53-57	1346-1448	369	0.530	9.769	467.726	0.091	4.357	0.093	4.453	0.000	0.000	9.582	458.789	2998.092	143549.4155	0.539	0.536	0.542
*	46-53	1168-1346	368	0.349	23.671	1133.383	0.141	6.751	0.155	7.421	6.815	326.313	16.56	792.897	3014.652	144342.3125	0.544	0.541	0.547
	43-46	1092-1168	367	0.543	7.125	341.159	0.053	2.538	0.063	3.016	0.000	0.000	7.004	335.353	3021.656	144677.6658	0.55	0.547	0.553
	37-43	940-1092	366	0.470	16.525	791.230	0.093	4.453	0.121	5.794	0.000	0.000	16.31	780.927	3037.966	145458.5928	0.477	0.475	0.479
*	25-37	635-940	365	0.258	46.236	2213.802	0.132	6.320	0.218	10.438	1.816	86.961	44.07	2110.083	3082.036	147568.6758	0.293	0.292	0.294
	13-25	330-635	364	0.106	55.740	2668.846	0.058	2.777	0.137	6.560	0.000	0.000	55.53	2658.791	3137.566	150227.4664	0.109	0.108	0.110
*	0-13	0-330	363	0.035	65.181	3120.906	0.002	0.096	0.000	0.000	1.359	65.092	63.82	3055.718	3201.386	153283.1844	0.054	0.051	0.057

Table A-6 Energy Balance Results for RBHT Test 1560B for Time Period 1900 to 2020 seconds

Results for RBHT Test 1560 Valid Time Period 1900 to 2020 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2486.5552	7.844016	0.00E+00	0.00E+00	0.00E+00	6.18E-02	2.80E-02
0.25	6.35	2624.6972	8.279795	0.00E+00	0.00E+00	0.00E+00	6.18E-02	2.80E-02
0.50	12.70	2762.8392	8.715573	0.00E+00	0.00E+00	0.00E+00	6.18E-02	2.80E-02
0.75	19.05	2900.9811	9.151352	0.00E+00	0.00E+00	0.00E+00	6.18E-02	2.80E-02
1.00	25.40	3039.1231	9.587131	0.00E+00	0.00E+00	0.00E+00	6.18E-02	2.80E-02
1.25	31.75	3177.265	10.02291	0.00E+00	0.00E+00	0.00E+00	6.18E-02	2.80E-02
1.50	38.10	3315.407	10.45869	2.79E-03	2.06E-01	9.33E-02	6.16E-02	2.80E-02
1.75	44.45	3453.549	10.89447	8.40E-03	6.19E-01	2.81E-01	6.13E-02	2.78E-02
2.00	50.80	3591.6909	11.33025	1.42E-02	1.05E+00	4.76E-01	6.09E-02	2.76E-02
2.25	57.15	3729.8329	11.76602	2.03E-02	1.50E+00	6.79E-01	6.06E-02	2.75E-02
2.50	63.50	3867.9748	12.2018	2.66E-02	1.96E+00	8.89E-01	6.02E-02	2.73E-02
2.75	69.85	4006.1168	12.63758	3.31E-02	2.44E+00	1.11E+00	5.98E-02	2.71E-02
3.00	76.20	4144.2587	13.07336	3.99E-02	2.94E+00	1.33E+00	5.93E-02	2.69E-02
3.25	82.55	4282.4007	13.50914	4.68E-02	3.45E+00	1.57E+00	5.89E-02	2.67E-02
3.50	88.90	4420.5427	13.94492	5.41E-02	3.98E+00	1.81E+00	5.85E-02	2.65E-02
3.75	95.25	4558.6846	14.3807	6.15E-02	4.53E+00	2.06E+00	5.80E-02	2.63E-02
4.00	101.60	4696.8266	14.81647	6.92E-02	5.10E+00	2.31E+00	5.75E-02	2.61E-02
4.25	107.95	4834.9685	15.25225	7.71E-02	5.68E+00	2.58E+00	5.70E-02	2.59E-02
4.50	114.30	4973.1105	15.68803	8.52E-02	6.28E+00	2.85E+00	5.65E-02	2.56E-02
4.75	120.65	5111.2525	16.12381	9.35E-02	6.89E+00	3.13E+00	5.60E-02	2.54E-02
5.00	127.00	5249.3944	16.55959	1.02E-01	7.53E+00	3.41E+00	5.55E-02	2.52E-02
5.25	133.35	5387.5364	16.99537	1.11E-01	8.18E+00	3.71E+00	5.50E-02	2.49E-02
5.50	139.70	5525.6783	17.43115	1.20E-01	8.85E+00	4.01E+00	5.44E-02	2.47E-02
5.75	146.05	5663.8203	17.86693	1.29E-01	9.52E+00	4.32E+00	5.38E-02	2.44E-02
6.00	152.40	5801.9622	18.3027	1.39E-01	1.02E+01	4.64E+00	5.32E-02	2.41E-02
6.25	158.75	5940.1042	18.73848	1.49E-01	1.09E+01	4.97E+00	5.26E-02	2.39E-02
6.50	165.10	6078.2462	19.17426	1.58E-01	1.17E+01	5.30E+00	5.20E-02	2.36E-02
6.75	171.45	6216.3881	19.61004	1.69E-01	1.24E+01	5.64E+00	5.14E-02	2.33E-02
7.00	177.80	6354.5301	20.04582	1.79E-01	1.32E+01	5.99E+00	5.07E-02	2.30E-02
7.25	184.15	6492.672	20.4816	1.90E-01	1.40E+01	6.34E+00	5.01E-02	2.27E-02
7.50	190.50	6630.814	20.91738	2.01E-01	1.48E+01	6.70E+00	4.94E-02	2.24E-02
7.75	196.85	6768.956	21.35315	2.12E-01	1.56E+01	7.08E+00	4.87E-02	2.21E-02
8.00	203.20	6907.0979	21.78893	2.23E-01	1.64E+01	7.45E+00	4.80E-02	2.18E-02
8.25	209.55	7045.2399	22.22471	2.35E-01	1.73E+01	7.84E+00	4.73E-02	2.15E-02
8.50	215.90	7183.3818	22.66049	2.46E-01	1.82E+01	8.24E+00	4.66E-02	2.11E-02
8.75	222.25	7321.5238	23.09627	2.58E-01	1.90E+01	8.64E+00	4.58E-02	2.08E-02
9.00	228.60	7459.6657	23.53205	2.71E-01	1.99E+01	9.04E+00	4.51E-02	2.05E-02
9.25	234.95	7045.2399	22.22471	2.83E-01	2.08E+01	9.45E+00	4.43E-02	2.01E-02
9.50	241.30	6630.814	20.91738	2.94E-01	2.17E+01	9.83E+00	4.36E-02	1.98E-02
9.75	247.65	6216.3881	19.61004	3.05E-01	2.24E+01	1.02E+01	4.30E-02	1.95E-02
10.00	254.00	5801.9622	18.3027	3.15E-01	2.32E+01	1.05E+01	4.24E-02	1.92E-02
10.25	260.35	5387.5364	16.99537	3.24E-01	2.39E+01	1.08E+01	4.18E-02	1.90E-02
10.50	266.70	4973.1105	15.68803	3.32E-01	2.45E+01	1.11E+01	4.13E-02	1.87E-02
10.75	273.05	4558.6846	14.3807	3.40E-01	2.51E+01	1.14E+01	4.08E-02	1.85E-02
11.00	279.40	4144.2587	13.07336	3.47E-01	2.56E+01	1.16E+01	4.03E-02	1.83E-02
11.25	285.75	3729.8329	11.76602	3.54E-01	2.61E+01	1.18E+01	3.99E-02	1.81E-02
11.50	292.10	3315.407	10.45869	3.60E-01	2.65E+01	1.20E+01	3.96E-02	1.79E-02
11.75	298.45	2900.9811	9.151352	3.65E-01	2.69E+01	1.22E+01	3.93E-02	1.78E-02
12.00	304.80	2486.5552	7.844016	3.69E-01	2.72E+01	1.24E+01	3.90E-02	1.77E-02

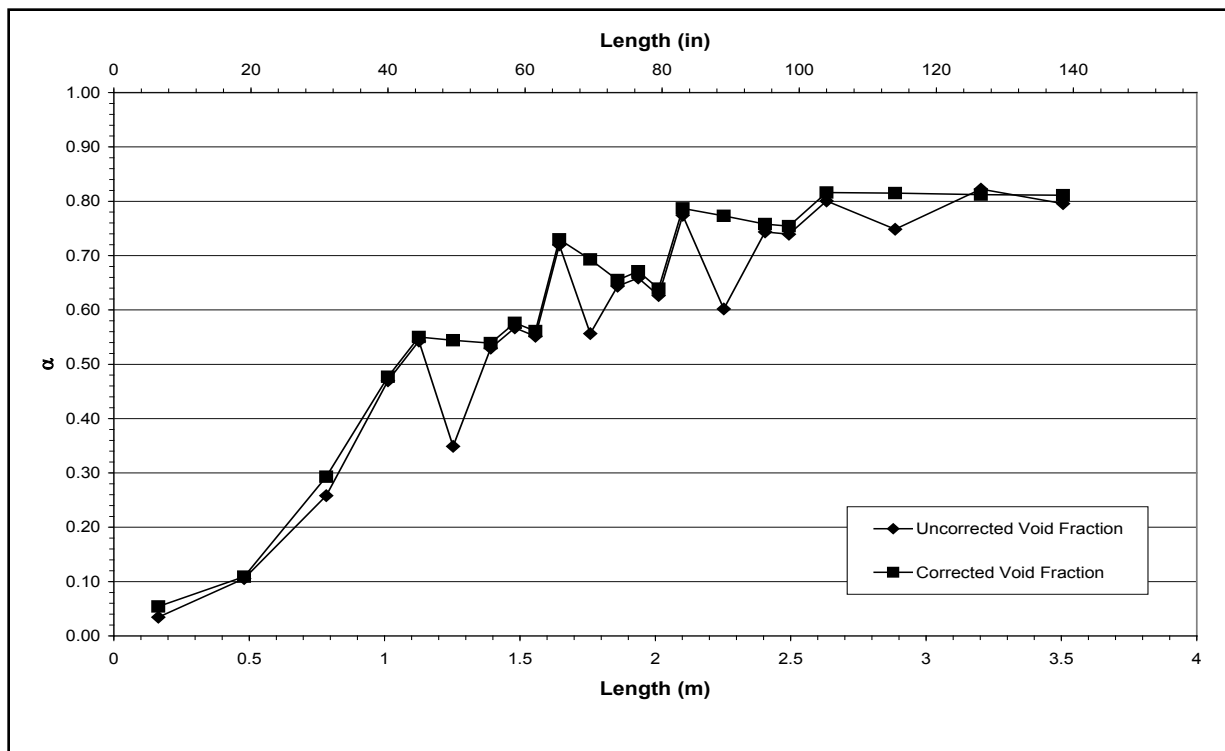


Figure A-15 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1560B for Time Period 1900 to 2020 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1560-C

Test Conditions

Date: 5/22/2003

Steady-state time window: 2090 – 2180 seconds

Inlet flow rate: 1.212 cm/sec (0.477 in./sec)

Inlet mass flow rate: 0.059 kg/sec (0.131 lbm/sec)

Inlet flow temperature: 367.8 K (202.4 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 77.02 kW

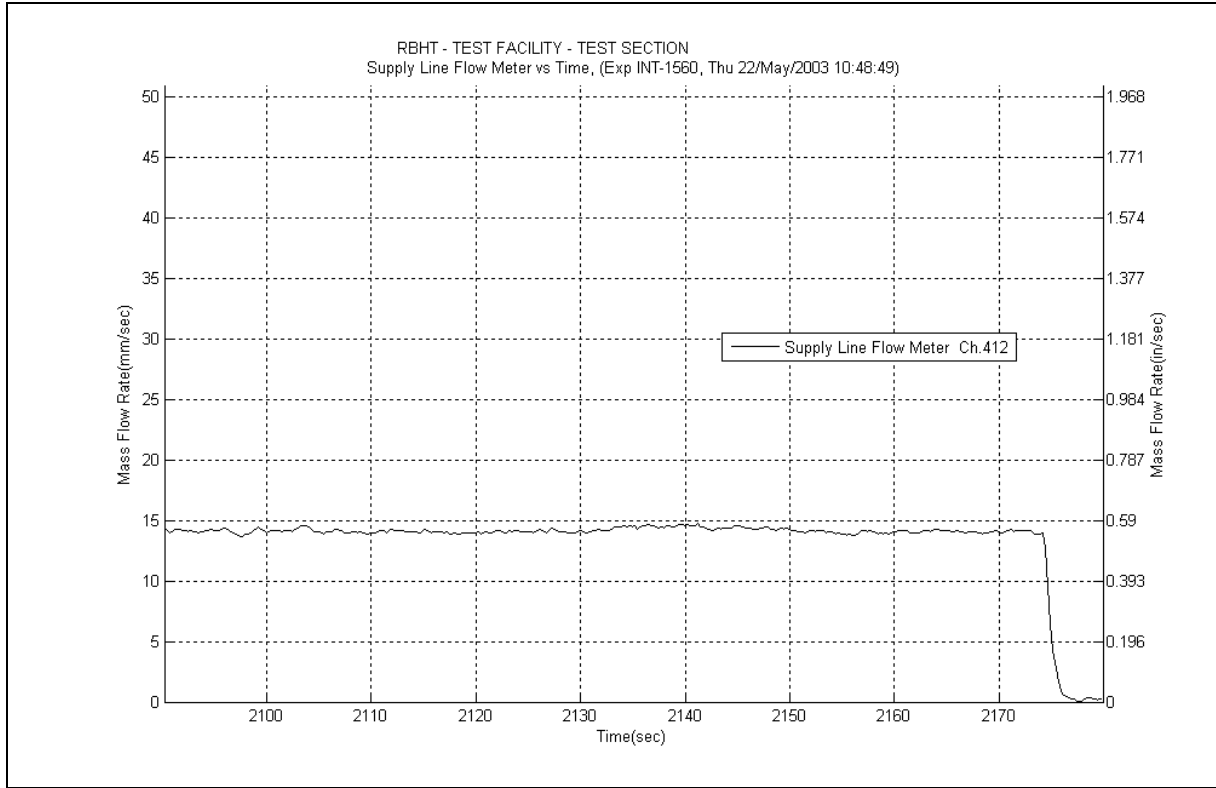


Figure A-16 Inlet Flow Plot for Experiment 1560C

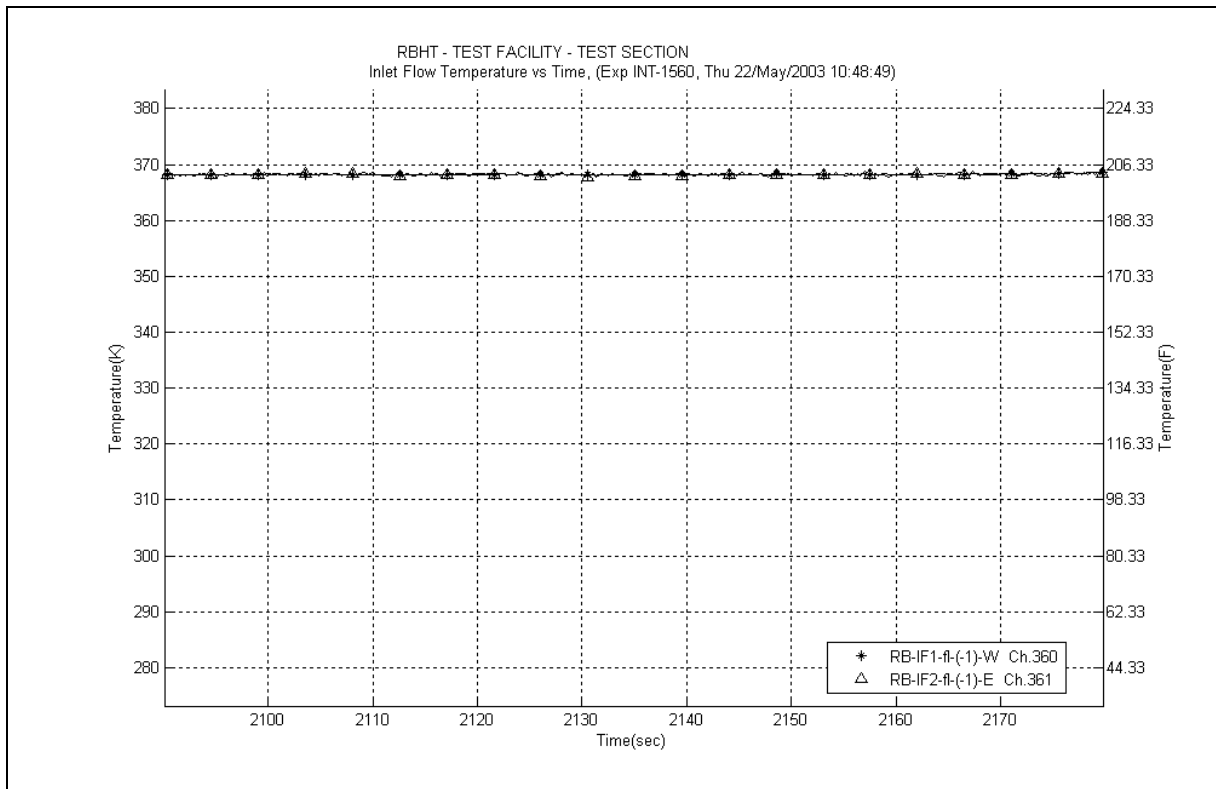


Figure A-17 Inlet Temperature Plot for Experiment 1560C

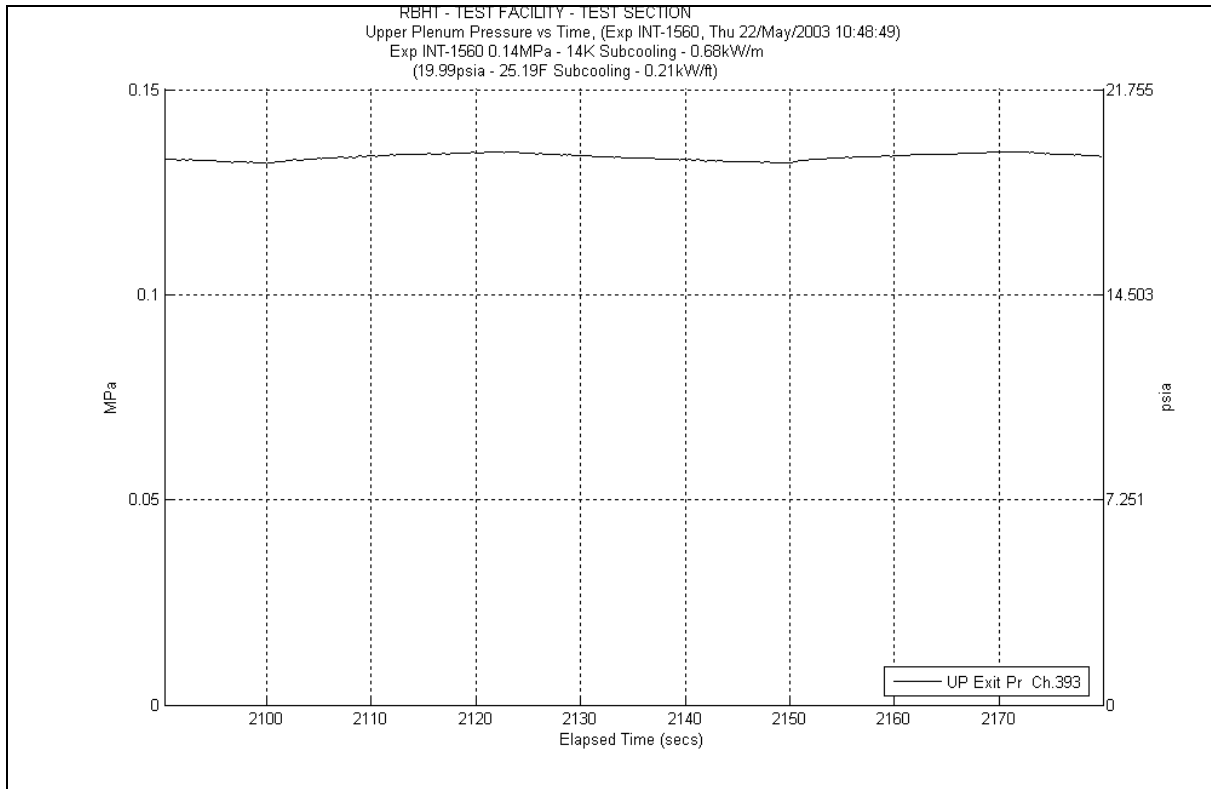


Figure A-18 System Pressure Plot for Experiment 1560C

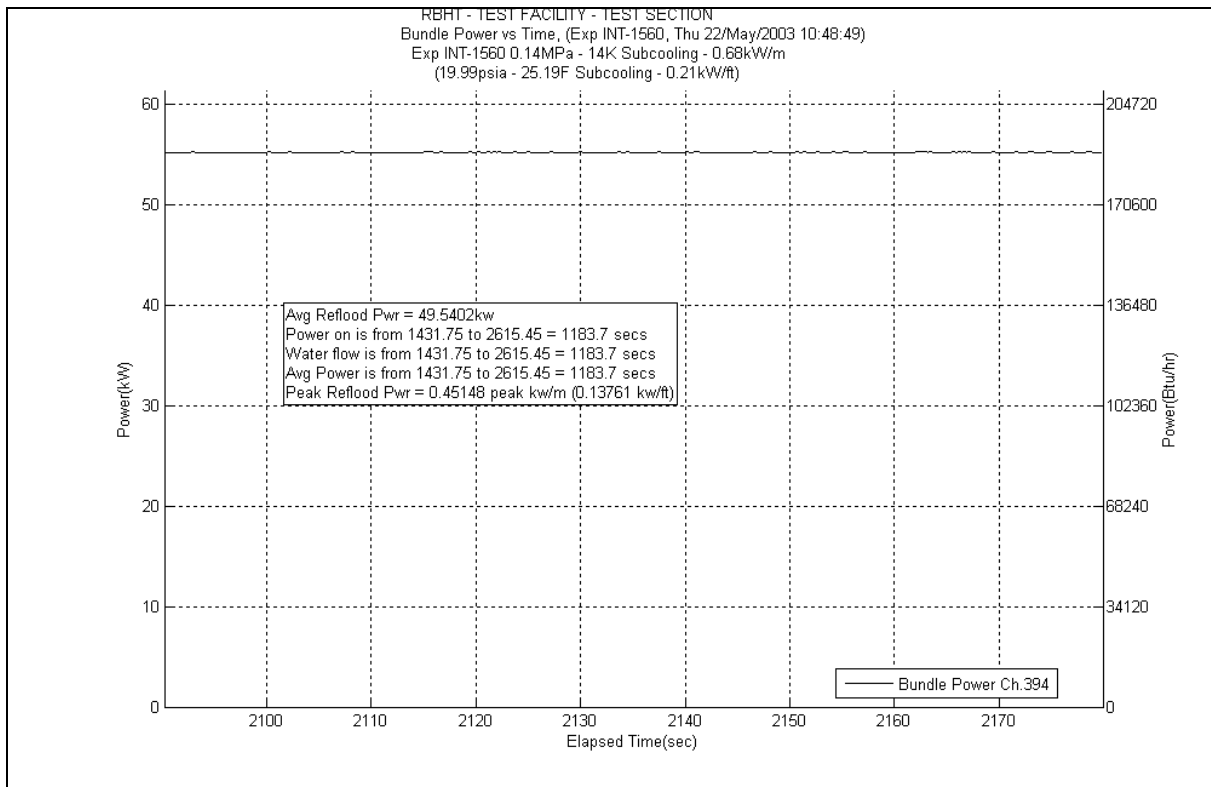


Figure A-19 Bundle Power Plot for Experiment 1560C

Table A-7 Data Results for RBHT Test 1560C for Time Period 2090 to 2180 seconds

Results for RBHT Test 1560
Valid Time Period 2090 to 2180 seconds
Collapsed Liquid Level = 61.892 inches = 1572.05 mm
(Z_{avg}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{fic} (Pa)	ΔP_{acccl} (lbf/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.841	9.062	433.908	0.476	22.791	0.113	5.410	0.000	0.000	8.47	405.546	2888.47	138300.6859	0.852	0.848	0.856	
*	120-133	3048-3378	383	0.868	8.901	426.200	0.526	25.185	0.201	9.624	-88.848	0.000	10.03	480.239	2898.5	138780.9249	0.851	0.847	0.855	
*	108-120	2743-3048	382	0.795	12.770	611.450	0.437	20.924	0.251	12.018	2.779	133.078	9.303	445.430	2907.803	139226.3549	0.851	0.847	0.855	
	100-108	2540-2743	381	0.840	6.663	319.028	0.261	12.497	0.184	8.810	0.000	0.000	6.216	297.624	2914.019	139523.9786	0.85	0.846	0.854	
	97-100	2464-2540	380	0.779	3.443	164.860	0.091	4.357	0.067	3.208	0.000	0.000	3.283	157.191	2917.302	139681.1695	0.789	0.785	0.793	
	93-97	2362-2464	379	0.776	4.653	222.798	0.116	5.554	0.087	4.166	0.000	0.000	4.446	212.876	2921.748	139894.0451	0.786	0.782	0.790	
*	85-93	2159-2362	378	0.642	14.858	711.410	0.215	10.294	0.166	7.948	6.076	290.926	8.401	402.242	2930.149	140296.2872	0.798	0.794	0.802	
	81-85	2057-2159	377	0.801	4.134	197.932	0.099	4.740	0.080	3.830	0.000	0.000	3.955	189.366	2934.104	140485.6536	0.81	0.806	0.814	
	78-81	1981-2057	376	0.652	5.427	259.848	0.070	3.352	0.058	2.777	0.000	0.000	5.296	253.574	2939.4	140739.2274	0.66	0.657	0.663	
	75-78	1905-1981	375	0.690	4.835	231.501	0.067	3.208	0.057	2.729	0.000	0.000	4.71	225.516	2944.11	140964.7434	0.698	0.695	0.701	
	72-75	1829-1905	374	0.676	5.048	241.696	0.064	3.064	0.056	2.681	0.000	0.000	4.928	235.954	2949.038	141200.6973	0.684	0.681	0.687	
*	67-72	1702-1829	373	0.584	10.807	517.457	0.100	4.788	0.090	4.309	3.329	159.409	7.288	348.951	2956.326	141549.6487	0.719	0.715	0.723	
	63-67	1600-1702	372	0.748	5.235	250.647	0.074	3.543	0.069	3.304	0.000	0.000	5.091	243.758	2961.417	141793.407	0.755	0.751	0.759	
	60-63	1524-1600	371	0.595	6.310	302.119	0.053	2.538	0.050	2.394	0.000	0.000	6.207	297.193	2967.624	142090.5998	0.602	0.599	0.605	
	57-60	1448-1524	370	0.602	6.206	297.146	0.050	2.394	0.049	2.346	0.000	0.000	6.103	292.213	2973.727	142382.813	0.608	0.605	0.611	
	53-57	1346-1448	369	0.573	8.875	424.956	0.062	2.969	0.063	3.016	0.000	0.000	8.746	418.761	2982.473	142801.5737	0.579	0.576	0.582	
*	46-53	1168-1346	368	0.384	22.404	1072.711	0.097	4.644	0.105	5.027	6.822	326.640	15.38	736.398	2997.853	143537.9721	0.577	0.574	0.580	
	43-46	1092-1168	367	0.569	6.710	321.266	0.037	1.772	0.043	2.059	0.000	0.000	6.626	317.255	3004.479	143855.2267	0.575	0.572	0.578	
	37-43	940-1092	366	0.534	14.515	694.999	0.066	3.160	0.082	3.926	0.000	0.000	14.36	687.560	3018.839	144542.7872	0.539	0.536	0.542	
*	25-37	635-940	365	0.285	44.533	2132.242	0.099	4.740	0.148	7.086	5.666	271.280	38.62	1849.136	3057.459	146391.9227	0.38	0.378	0.382	
	13-25	330-635	364	0.219	48.703	2331.914	0.050	2.394	0.127	6.081	0.000	0.000	48.51	2322.671	3105.969	148714.594	0.221	0.220	0.222	
*	0-13	0-330	363	0.036	65.083	3116.182	0.011	0.527	0.013	0.622	5.039	241.260	60.02	2873.773	3165.989	151588.367	0.111	0.110	0.112	

Table A-8 Energy Balance Results for RBHT Test 1560C for Time Period 2090 to 2180 seconds

Results for RBHT Test 1560 Valid Time Period 2090 to 2180 seconds								
Elevation	Elevation	q _w ["]	q _w ["]	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2486.2913	7.843183	0.00E+00	0.00E+00	0.00E+00	4.20E-02	1.90E-02
0.25	6.35	2624.4186	8.278916	0.00E+00	0.00E+00	0.00E+00	4.20E-02	1.90E-02
0.50	12.70	2762.5459	8.714648	0.00E+00	0.00E+00	0.00E+00	4.20E-02	1.90E-02
0.75	19.05	2900.6732	9.150381	0.00E+00	0.00E+00	0.00E+00	4.20E-02	1.90E-02
1.00	25.40	3038.8005	9.586113	9.29E-04	4.65E-02	2.11E-02	4.19E-02	1.90E-02
1.25	31.75	3176.9278	10.02185	8.51E-03	4.26E-01	1.93E-01	4.16E-02	1.89E-02
1.50	38.10	3315.0551	10.45758	1.64E-02	8.23E-01	3.73E-01	4.13E-02	1.87E-02
1.75	44.45	3453.1824	10.89331	2.47E-02	1.24E+00	5.61E-01	4.09E-02	1.86E-02
2.00	50.80	3591.3097	11.32904	3.33E-02	1.67E+00	7.56E-01	4.06E-02	1.84E-02
2.25	57.15	3729.437	11.76478	4.22E-02	2.11E+00	9.59E-01	4.02E-02	1.82E-02
2.50	63.50	3867.5642	12.20051	5.15E-02	2.58E+00	1.17E+00	3.98E-02	1.81E-02
2.75	69.85	4005.6915	12.63624	6.11E-02	3.06E+00	1.39E+00	3.94E-02	1.79E-02
3.00	76.20	4143.8188	13.07197	7.10E-02	3.56E+00	1.61E+00	3.90E-02	1.77E-02
3.25	82.55	4281.9461	13.5077	8.13E-02	4.07E+00	1.85E+00	3.85E-02	1.75E-02
3.50	88.90	4420.0734	13.94344	9.19E-02	4.60E+00	2.09E+00	3.81E-02	1.73E-02
3.75	95.25	4558.2007	14.37917	1.03E-01	5.15E+00	2.34E+00	3.76E-02	1.71E-02
4.00	101.60	4696.328	14.8149	1.14E-01	5.72E+00	2.59E+00	3.72E-02	1.69E-02
4.25	107.95	4834.4553	15.25063	1.26E-01	6.30E+00	2.86E+00	3.67E-02	1.66E-02
4.50	114.30	4972.5826	15.68637	1.38E-01	6.90E+00	3.13E+00	3.62E-02	1.64E-02
4.75	120.65	5110.7099	16.1221	1.50E-01	7.52E+00	3.41E+00	3.57E-02	1.62E-02
5.00	127.00	5248.8372	16.55783	1.63E-01	8.15E+00	3.70E+00	3.51E-02	1.59E-02
5.25	133.35	5386.9645	16.99356	1.76E-01	8.80E+00	3.99E+00	3.46E-02	1.57E-02
5.50	139.70	5525.0918	17.4293	1.89E-01	9.46E+00	4.29E+00	3.40E-02	1.54E-02
5.75	146.05	5663.2191	17.86503	2.03E-01	1.01E+01	4.60E+00	3.35E-02	1.52E-02
6.00	152.40	5801.3464	18.30076	2.17E-01	1.09E+01	4.92E+00	3.29E-02	1.49E-02
6.25	158.75	5939.4737	18.73649	2.31E-01	1.16E+01	5.25E+00	3.23E-02	1.46E-02
6.50	165.10	6077.601	19.17223	2.46E-01	1.23E+01	5.58E+00	3.16E-02	1.44E-02
6.75	171.45	6215.7283	19.60796	2.61E-01	1.31E+01	5.92E+00	3.10E-02	1.41E-02
7.00	177.80	6353.8555	20.04369	2.76E-01	1.38E+01	6.27E+00	3.04E-02	1.38E-02
7.25	184.15	6491.9828	20.47942	2.92E-01	1.46E+01	6.62E+00	2.97E-02	1.35E-02
7.50	190.50	6630.1101	20.91516	3.08E-01	1.54E+01	6.99E+00	2.90E-02	1.32E-02
7.75	196.85	6768.2374	21.35089	3.24E-01	1.62E+01	7.36E+00	2.84E-02	1.29E-02
8.00	203.20	6906.3647	21.78662	3.41E-01	1.71E+01	7.74E+00	2.77E-02	1.25E-02
8.25	209.55	7044.492	22.22235	3.58E-01	1.79E+01	8.12E+00	2.69E-02	1.22E-02
8.50	215.90	7182.6193	22.65809	3.75E-01	1.88E+01	8.52E+00	2.62E-02	1.19E-02
8.75	222.25	7320.7466	23.09382	3.93E-01	1.97E+01	8.92E+00	2.55E-02	1.16E-02
9.00	228.60	7458.8739	23.52955	4.11E-01	2.06E+01	9.33E+00	2.47E-02	1.12E-02
9.25	234.95	7044.492	22.22235	4.29E-01	2.15E+01	9.73E+00	2.40E-02	1.09E-02
9.50	241.30	6630.1101	20.91516	4.45E-01	2.23E+01	1.01E+01	2.33E-02	1.06E-02
9.75	247.65	6215.7283	19.60796	4.61E-01	2.31E+01	1.05E+01	2.26E-02	1.03E-02
10.00	254.00	5801.3464	18.30076	4.76E-01	2.38E+01	1.08E+01	2.20E-02	9.98E-03
10.25	260.35	5386.9645	16.99356	4.89E-01	2.45E+01	1.11E+01	2.14E-02	9.72E-03
10.50	266.70	4972.5826	15.68637	5.02E-01	2.51E+01	1.14E+01	2.09E-02	9.48E-03
10.75	273.05	4558.2007	14.37917	5.14E-01	2.57E+01	1.17E+01	2.04E-02	9.26E-03
11.00	279.40	4143.8188	13.07197	5.24E-01	2.62E+01	1.19E+01	2.00E-02	9.06E-03
11.25	285.75	3729.437	11.76478	5.34E-01	2.67E+01	1.21E+01	1.96E-02	8.87E-03
11.50	292.10	3315.0551	10.45758	5.42E-01	2.72E+01	1.23E+01	1.92E-02	8.71E-03
11.75	298.45	2900.6732	9.150381	5.50E-01	2.75E+01	1.25E+01	1.89E-02	8.57E-03
12.00	304.80	2486.2913	7.843183	5.57E-01	2.79E+01	1.26E+01	1.86E-02	8.44E-03

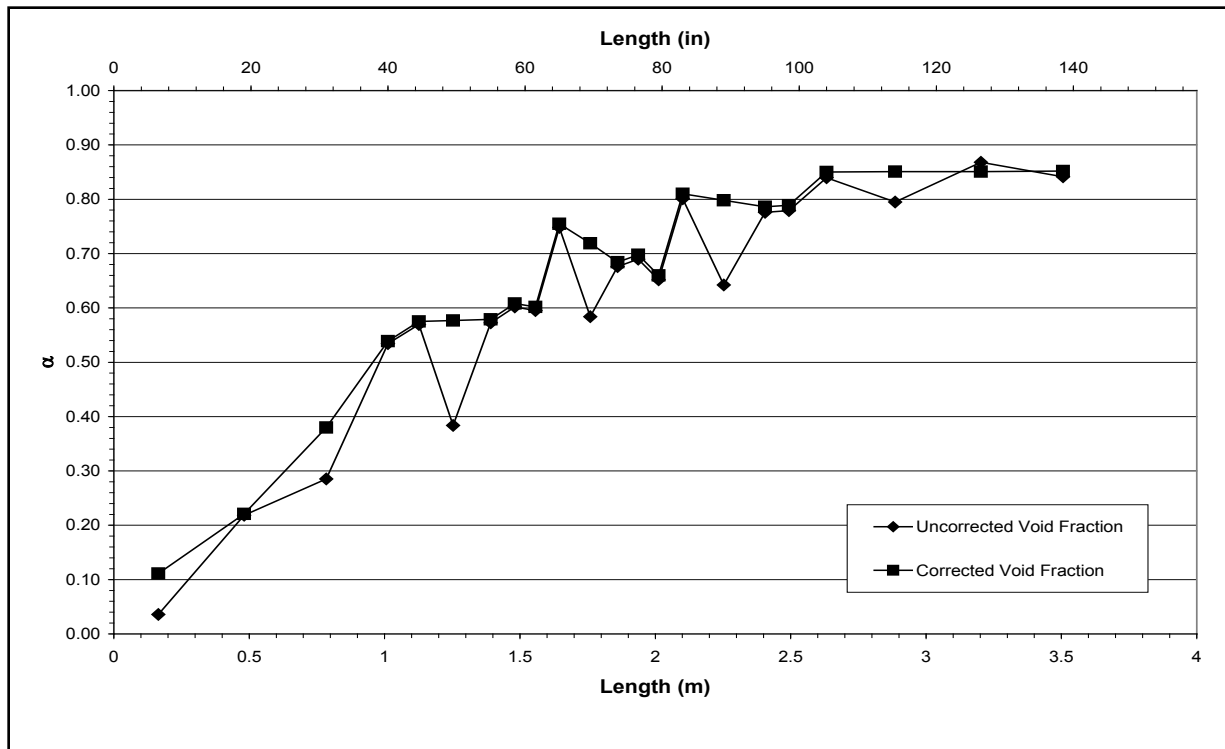


Figure A-20 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1560C for Time Period 2090 to 2180 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1560-D

Test Conditions

Date: 5/22/2003

Steady-state time window: 2220 – 2310 seconds

Inlet flow rate: 0.772 cm/sec (0.304 in./sec)

Inlet mass flow rate: 0.038 kg/sec (0.083 lbm/sec)

Inlet flow temperature: 367.8 K (202.4 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 77.02 kW

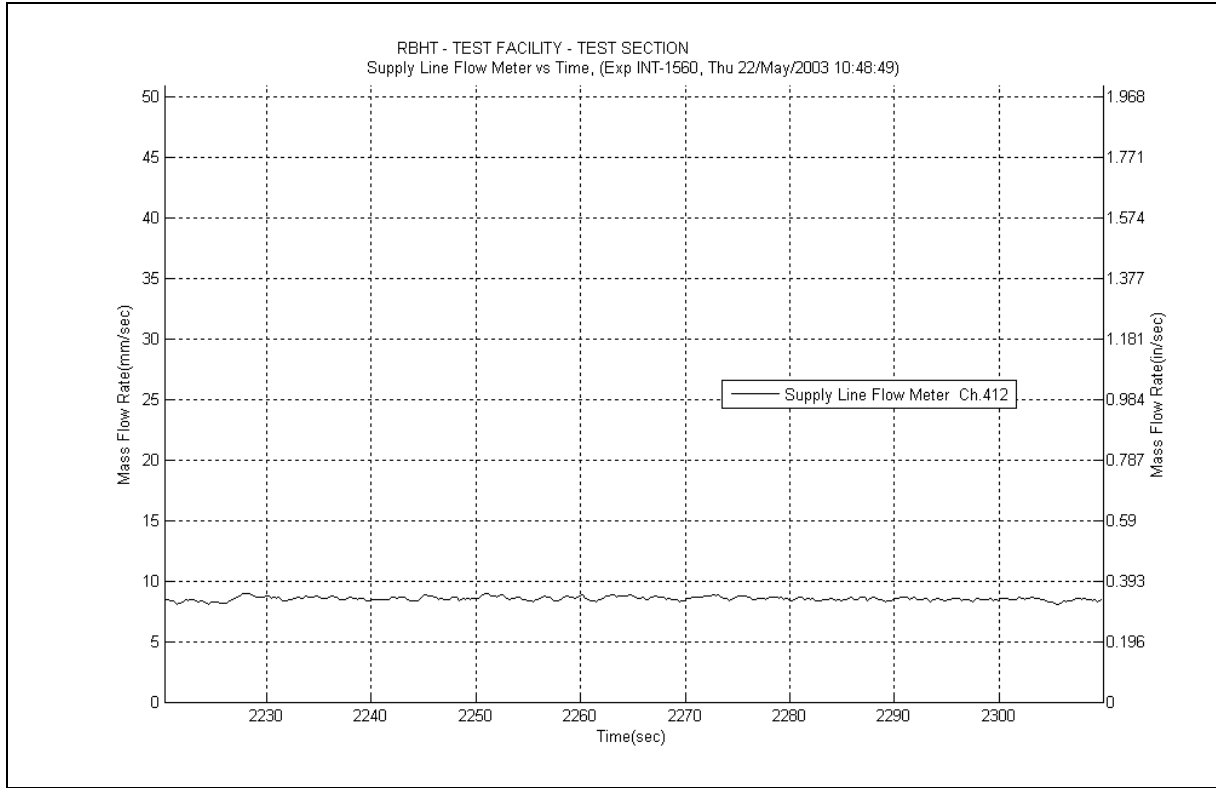


Figure A-21 Inlet Flow Plot for Experiment 1560D

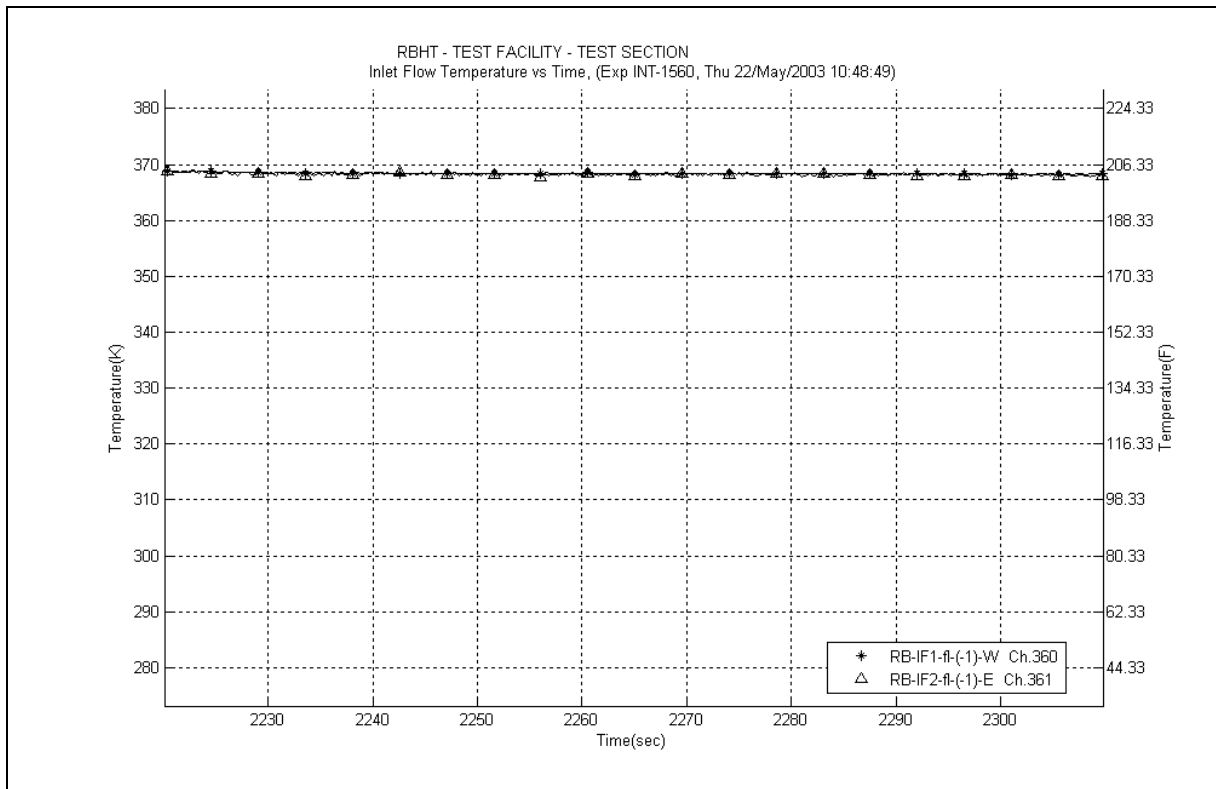


Figure A-22 Inlet Temperature Plot for Experiment 1560D

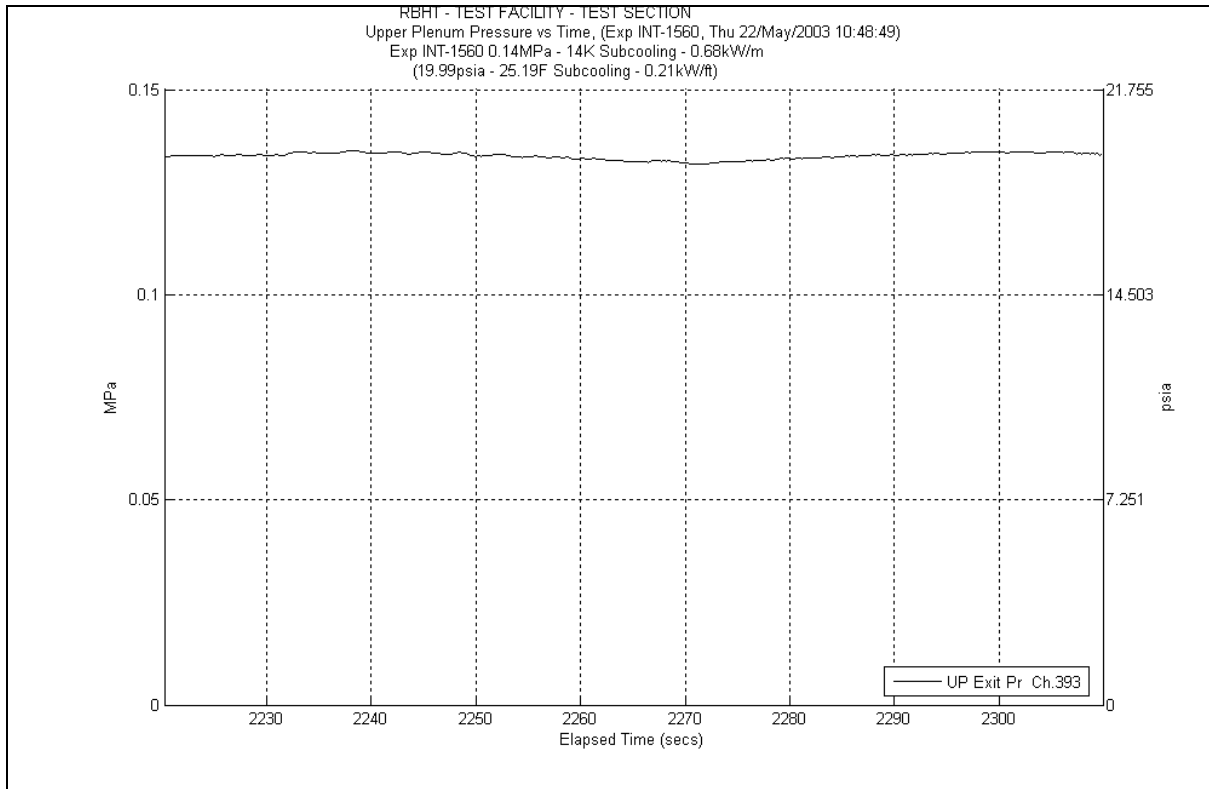


Figure A-23 System Pressure Plot for Experiment 1560D

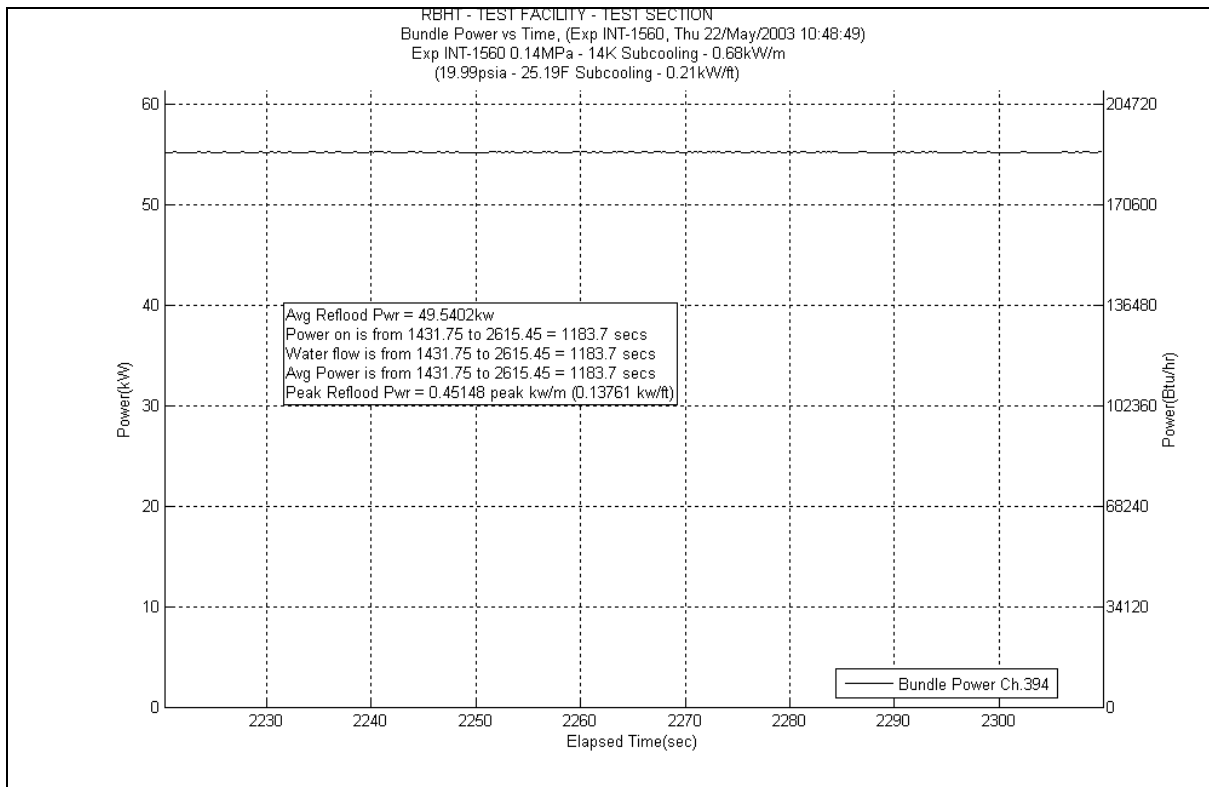


Figure A-24 Bundle Power Plot for Experiment 1560D

Table A-9 Data Results for RBHT Test 1560D for Time Period 2220 to 2310 seconds

Results for RBHT Test 1560
Valid Time Period 2220 to 2310 seconds
Collapsed Liquid Level = 54.785 inches = 1391.54 mm
(Z_{CSL}) Onset of Significant Void = 6.5 inches = 165 mm
(Z_{2s}) Two-Phase Level (Dryout) = 112.70 inches = 2862.58 mm
(S) Level Swell = 2.226

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.885	6.564	314.304	0.299	14.316	0.072	3.447	0.000	0.000	6.189	296.331	2886.2	138191.4711	0.892	0.888	0.896
*	120-133	3048-3378	383	0.912	5.936	284.216	0.336	16.088	0.129	6.177	-1.929	-92.362	7.4	354.314	2893.6	138545.785	0.89	0.886	0.894
*	108-120	2743-3048	382	0.846	9.587	459.023	0.281	13.454	0.161	7.709	2.154	103.129	6.991	334.731	2900.6	138880.5158	0.888	0.884	0.892
	100-108	2540-2743	381	0.880	5.001	239.458	0.168	8.044	0.118	5.650	0.000	0.000	4.714	225.708	2905.3	139106.2234	0.887	0.883	0.891
	97-100	2464-2540	380	0.826	2.706	129.551	0.058	2.777	0.043	2.059	0.000	0.000	2.604	124.680	2907.9	139230.9036	0.833	0.829	0.837
	93-97	2362-2464	379	0.807	4.004	191.715	0.074	3.543	0.056	2.681	0.000	0.000	3.874	185.488	2911.8	139416.3917	0.813	0.809	0.817
*	85-93	2159-2362	378	0.674	13.549	648.749	0.137	6.560	0.107	5.123	5.311	254.311	7.994	382.755	2919.8	139799.1465	0.808	0.804	0.812
	81-85	2057-2159	377	0.796	4.233	202.656	0.063	3.016	0.051	2.442	0.000	0.000	4.119	197.219	2923.9	139996.3652	0.802	0.798	0.806
	78-81	1981-2057	376	0.649	5.469	261.837	0.045	2.155	0.037	1.772	0.000	0.000	5.385	257.835	2929.3	140254.2004	0.654	0.651	0.657
	75-78	1905-1981	375	0.676	5.048	241.696	0.043	2.059	0.037	1.772	0.000	0.000	4.966	237.773	2934.2	140491.9738	0.681	0.678	0.684
	72-75	1829-1905	374	0.659	5.308	254.128	0.041	1.963	0.036	1.724	0.000	0.000	5.231	250.462	2939.5	140742.4354	0.664	0.661	0.667
*	67-72	1702-1829	373	0.567	11.249	538.593	0.063	3.016	0.058	2.777	2.976	142.480	8.152	390.320	2947.6	141132.7553	0.686	0.683	0.689
	63-67	1600-1702	372	0.703	6.164	295.157	0.047	2.250	0.044	2.107	0.000	0.000	6.069	290.585	2953.7	141423.3405	0.708	0.704	0.712
	60-63	1524-1600	371	0.561	6.840	327.483	0.033	1.580	0.032	1.532	0.000	0.000	6.777	324.149	2960.5	141747.4899	0.565	0.562	0.568
	57-60	1448-1524	370	0.569	6.710	321.266	0.031	1.484	0.032	1.532	0.000	0.000	6.645	318.164	2967.1	142065.6542	0.573	0.570	0.576
	53-57	1346-1448	369	0.532	9.727	465.736	0.039	1.867	0.041	1.963	0.000	0.000	9.644	461.757	2976.7	142527.4114	0.536	0.533	0.539
*	46-53	1168-1346	368	0.361	23.240	1112.744	0.061	2.921	0.068	3.256	6.001	287.337	17.11	819.231	2993.9	143346.6426	0.529	0.526	0.532
	43-46	1092-1168	367	0.520	7.484	358.316	0.023	1.101	0.028	1.341	0.000	0.000	7.43	355.750	3001.3	143702.3929	0.523	0.520	0.526
	37-43	940-1092	366	0.506	15.409	737.768	0.042	2.011	0.053	2.538	0.000	0.000	15.31	733.047	3016.6	144435.4396	0.508	0.505	0.511
*	25-37	635-940	365	0.313	42.840	2051.180	0.065	3.112	0.095	4.549	6.140	293.974	36.54	1749.545	3053.1	146184.9842	0.413	0.411	0.415
	13-25	330-635	364	0.316	42.601	2039.741	0.038	1.819	0.082	3.926	0.000	0.000	42.47	2033.475	3095.6	148218.4587	0.318	0.316	0.320
*	0-13	0-330	363	0.052	63.987	3063.715	0.016	0.766	0.033	1.580	7.188	344.164	56.75	2717.205	3152.4	150935.6633	0.159	0.158	0.160

Table A-10 Energy Balance Results for RBHT Test 1560D for Time Period 2220 to 2310 seconds

Results for RBHT Test 1560 Valid Time Period 2220 to 2310 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2486.8233	7.844862	0.00E+00	0.00E+00	0.00E+00	2.68E-02	1.22E-02
0.25	6.35	2624.9802	8.280687	0.00E+00	0.00E+00	0.00E+00	2.68E-02	1.22E-02
0.50	12.70	2763.137	8.716513	0.00E+00	0.00E+00	0.00E+00	2.68E-02	1.22E-02
0.75	19.05	2901.2939	9.152339	5.38E-03	1.73E-01	7.84E-02	2.66E-02	1.21E-02
1.00	25.40	3039.4507	9.588164	1.67E-02	5.38E-01	2.44E-01	2.63E-02	1.19E-02
1.25	31.75	3177.6076	10.02399	2.86E-02	9.20E-01	4.17E-01	2.60E-02	1.18E-02
1.50	38.10	3315.7644	10.45982	4.10E-02	1.32E+00	5.98E-01	2.57E-02	1.17E-02
1.75	44.45	3453.9213	10.89564	5.39E-02	1.73E+00	7.87E-01	2.53E-02	1.15E-02
2.00	50.80	3592.0781	11.33147	6.74E-02	2.17E+00	9.83E-01	2.50E-02	1.13E-02
2.25	57.15	3730.235	11.76729	8.14E-02	2.62E+00	1.19E+00	2.46E-02	1.12E-02
2.50	63.50	3868.3918	12.20312	9.59E-02	3.08E+00	1.40E+00	2.42E-02	1.10E-02
2.75	69.85	4006.5487	12.63894	1.11E-01	3.57E+00	1.62E+00	2.38E-02	1.08E-02
3.00	76.20	4144.7055	13.07477	1.27E-01	4.07E+00	1.84E+00	2.34E-02	1.06E-02
3.25	82.55	4282.8624	13.5106	1.43E-01	4.58E+00	2.08E+00	2.30E-02	1.04E-02
3.50	88.90	4421.0192	13.94642	1.59E-01	5.12E+00	2.32E+00	2.25E-02	1.02E-02
3.75	95.25	4559.1761	14.38225	1.76E-01	5.67E+00	2.57E+00	2.21E-02	1.00E-02
4.00	101.60	4697.3329	14.81807	1.94E-01	6.24E+00	2.83E+00	2.16E-02	9.79E-03
4.25	107.95	4835.4898	15.2539	2.12E-01	6.83E+00	3.10E+00	2.11E-02	9.57E-03
4.50	114.30	4973.6467	15.68972	2.31E-01	7.43E+00	3.37E+00	2.06E-02	9.34E-03
4.75	120.65	5111.8035	16.12555	2.50E-01	8.05E+00	3.65E+00	2.01E-02	9.11E-03
5.00	127.00	5249.9604	16.56137	2.70E-01	8.68E+00	3.94E+00	1.96E-02	8.87E-03
5.25	133.35	5388.1172	16.9972	2.90E-01	9.34E+00	4.24E+00	1.90E-02	8.62E-03
5.50	139.70	5526.2741	17.43303	3.11E-01	1.00E+01	4.54E+00	1.84E-02	8.37E-03
5.75	146.05	5664.4309	17.86885	3.33E-01	1.07E+01	4.85E+00	1.79E-02	8.11E-03
6.00	152.40	5802.5878	18.30468	3.55E-01	1.14E+01	5.17E+00	1.73E-02	7.84E-03
6.25	158.75	5940.7446	18.7405	3.77E-01	1.21E+01	5.50E+00	1.67E-02	7.57E-03
6.50	165.10	6078.9015	19.17633	4.00E-01	1.29E+01	5.83E+00	1.61E-02	7.29E-03
6.75	171.45	6217.0583	19.61215	4.24E-01	1.36E+01	6.18E+00	1.54E-02	7.01E-03
7.00	177.80	6355.2152	20.04798	4.48E-01	1.44E+01	6.53E+00	1.48E-02	6.71E-03
7.25	184.15	6493.372	20.48381	4.72E-01	1.52E+01	6.88E+00	1.41E-02	6.42E-03
7.50	190.50	6631.5289	20.91963	4.97E-01	1.60E+01	7.25E+00	1.35E-02	6.11E-03
7.75	196.85	6769.6857	21.35546	5.23E-01	1.68E+01	7.62E+00	1.28E-02	5.80E-03
8.00	203.20	6907.8426	21.79128	5.49E-01	1.76E+01	8.00E+00	1.21E-02	5.48E-03
8.25	209.55	7045.9994	22.22711	5.76E-01	1.85E+01	8.39E+00	1.14E-02	5.16E-03
8.50	215.90	7184.1563	22.66293	6.03E-01	1.94E+01	8.79E+00	1.06E-02	4.83E-03
8.75	222.25	7322.3131	23.09876	6.30E-01	2.03E+01	9.19E+00	9.90E-03	4.49E-03
9.00	228.60	7460.47	23.53459	6.59E-01	2.12E+01	9.61E+00	9.15E-03	4.15E-03
9.25	234.95	7045.9994	22.22711	6.86E-01	2.21E+01	1.00E+01	8.40E-03	3.81E-03
9.50	241.30	6631.5289	20.91963	7.13E-01	2.29E+01	1.04E+01	7.70E-03	3.49E-03
9.75	247.65	6217.0583	19.61215	7.37E-01	2.37E+01	1.07E+01	7.05E-03	3.20E-03
10.00	254.00	5802.5878	18.30468	7.60E-01	2.44E+01	1.11E+01	6.43E-03	2.92E-03
10.25	260.35	5388.1172	16.9972	7.81E-01	2.51E+01	1.14E+01	5.86E-03	2.66E-03
10.50	266.70	4973.6467	15.68972	8.01E-01	2.58E+01	1.17E+01	5.33E-03	2.42E-03
10.75	273.05	4559.1761	14.38225	8.19E-01	2.63E+01	1.20E+01	4.84E-03	2.19E-03
11.00	279.40	4144.7055	13.07477	8.36E-01	2.69E+01	1.22E+01	4.39E-03	1.99E-03
11.25	285.75	3730.235	11.76729	8.51E-01	2.74E+01	1.24E+01	3.99E-03	1.81E-03
11.50	292.10	3315.7644	10.45982	8.65E-01	2.78E+01	1.26E+01	3.63E-03	1.65E-03
11.75	298.45	2901.2939	9.152339	8.76E-01	2.82E+01	1.28E+01	3.31E-03	1.50E-03
12.00	304.80	2486.8233	7.844862	8.87E-01	2.85E+01	1.29E+01	3.04E-03	1.38E-03

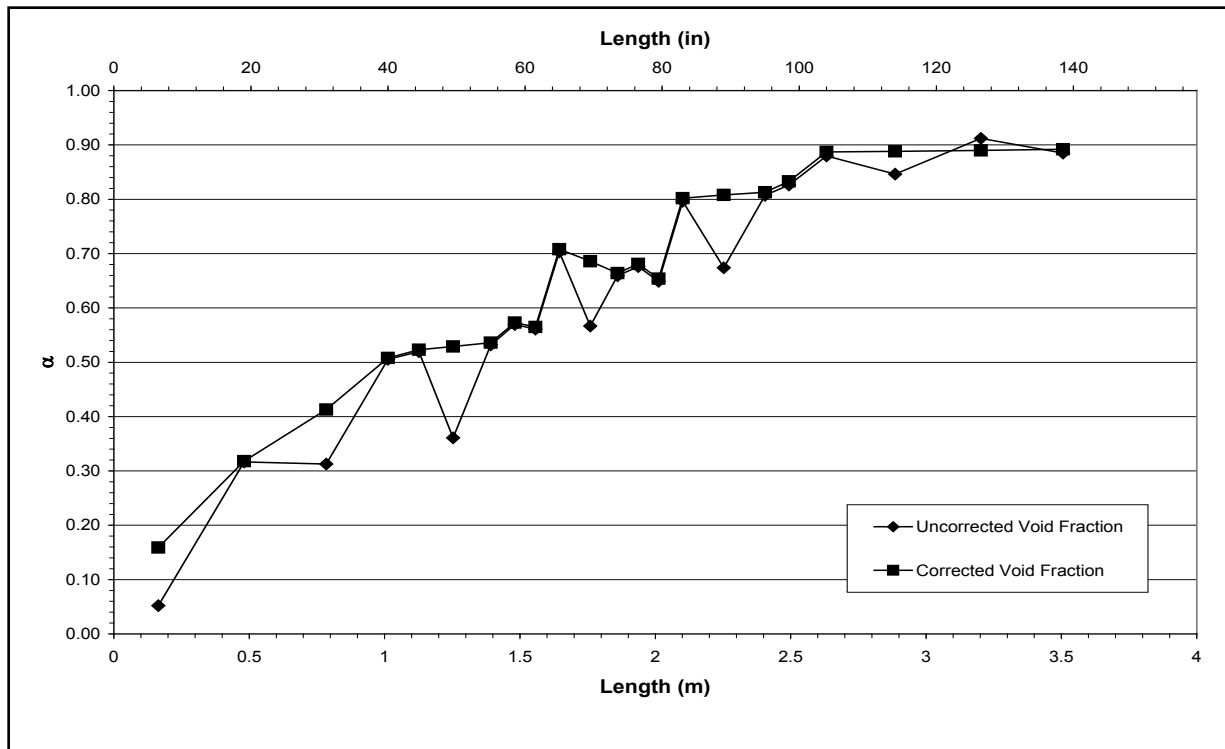


Figure A-25 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1560D for Time Period 2220 to 2310 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1566-A

Test Conditions

Date: 5/28/2003

Steady-state time window: 500 – 700 seconds

Inlet flow rate: 2.068 cm/sec (0.814 in./sec)

Inlet mass flow rate: 0.101 kg/sec (0.223 lbm/sec)

Inlet flow temperature: 369.4 K (205.3 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 76.84 kW

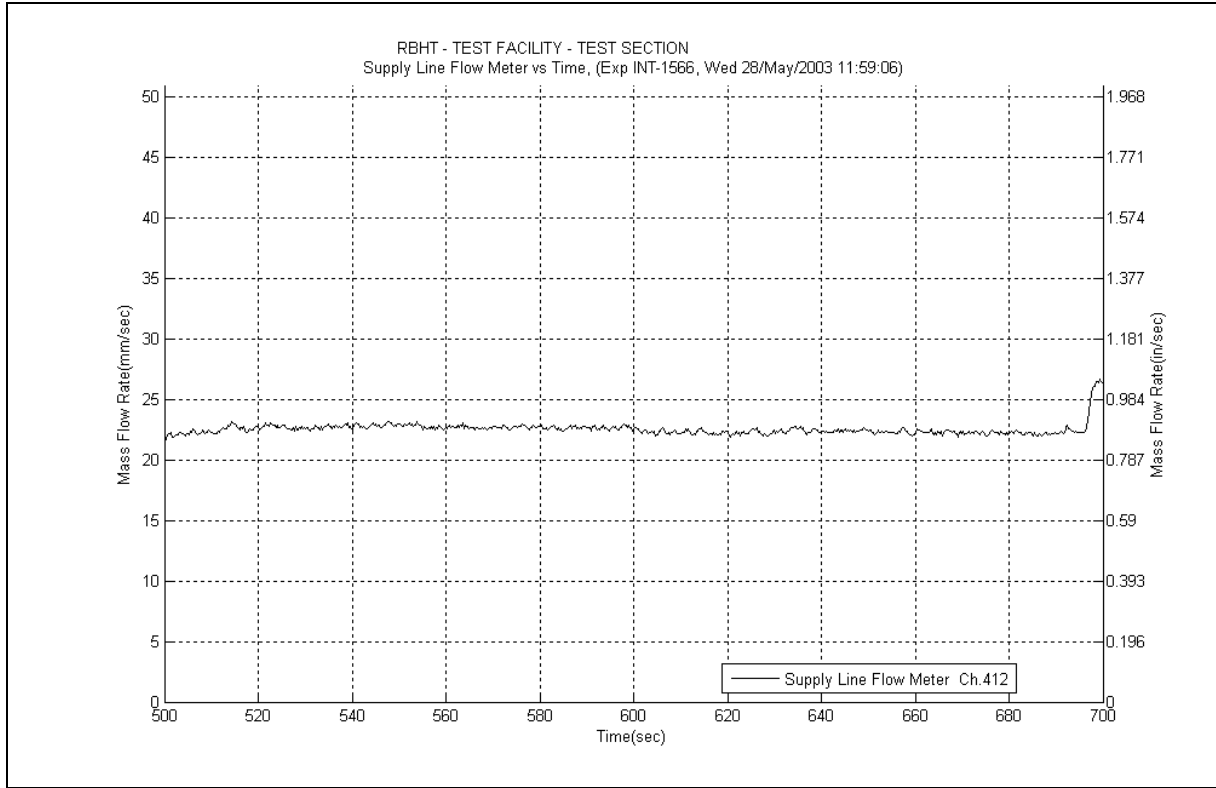


Figure A-26 Inlet Flow Plot for Experiment 1566A

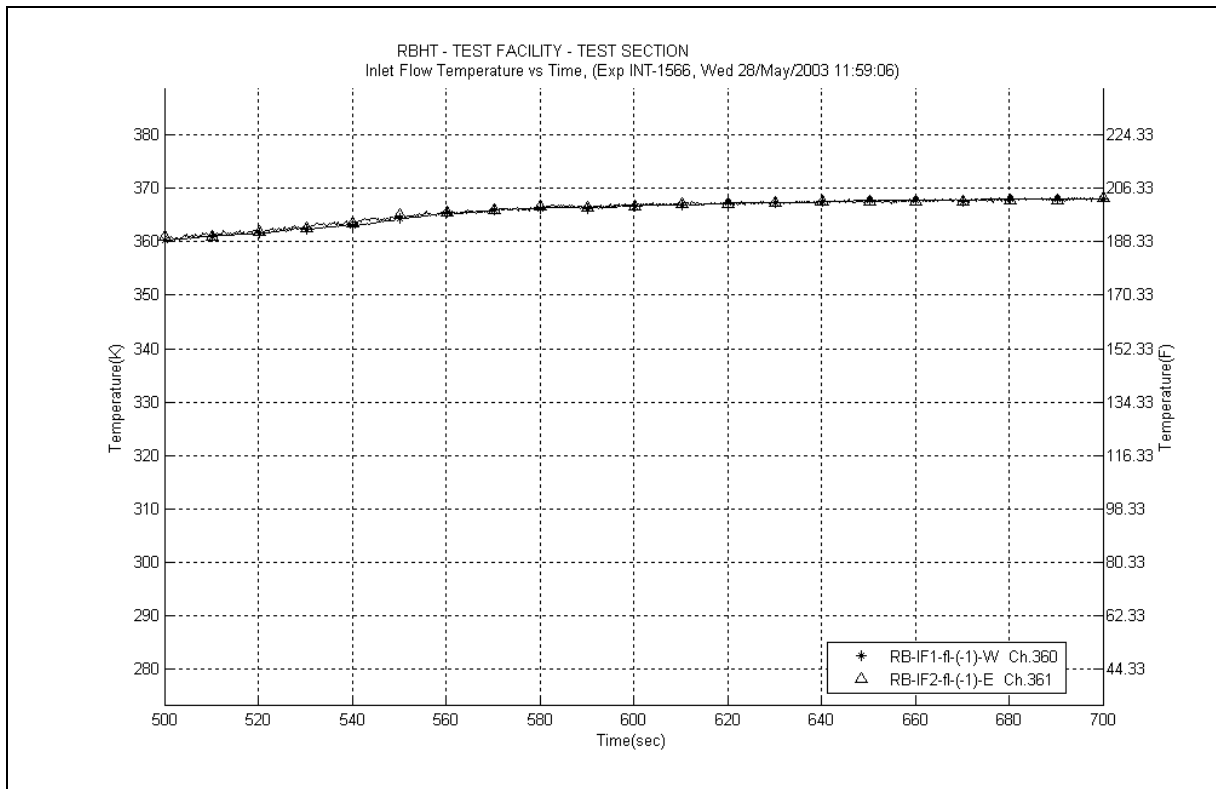


Figure A-27 Inlet Temperature Plot for Experiment 1566A

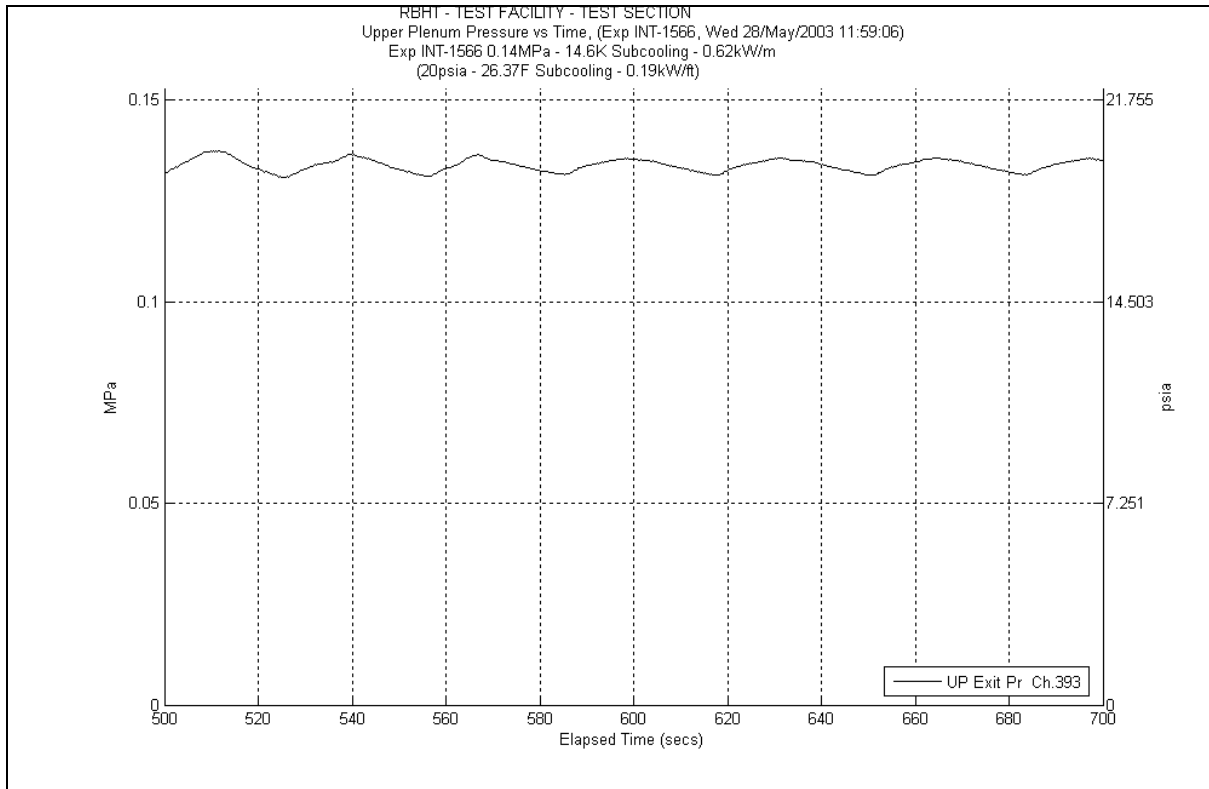


Figure A-28 System Pressure Plot for Experiment 1566A

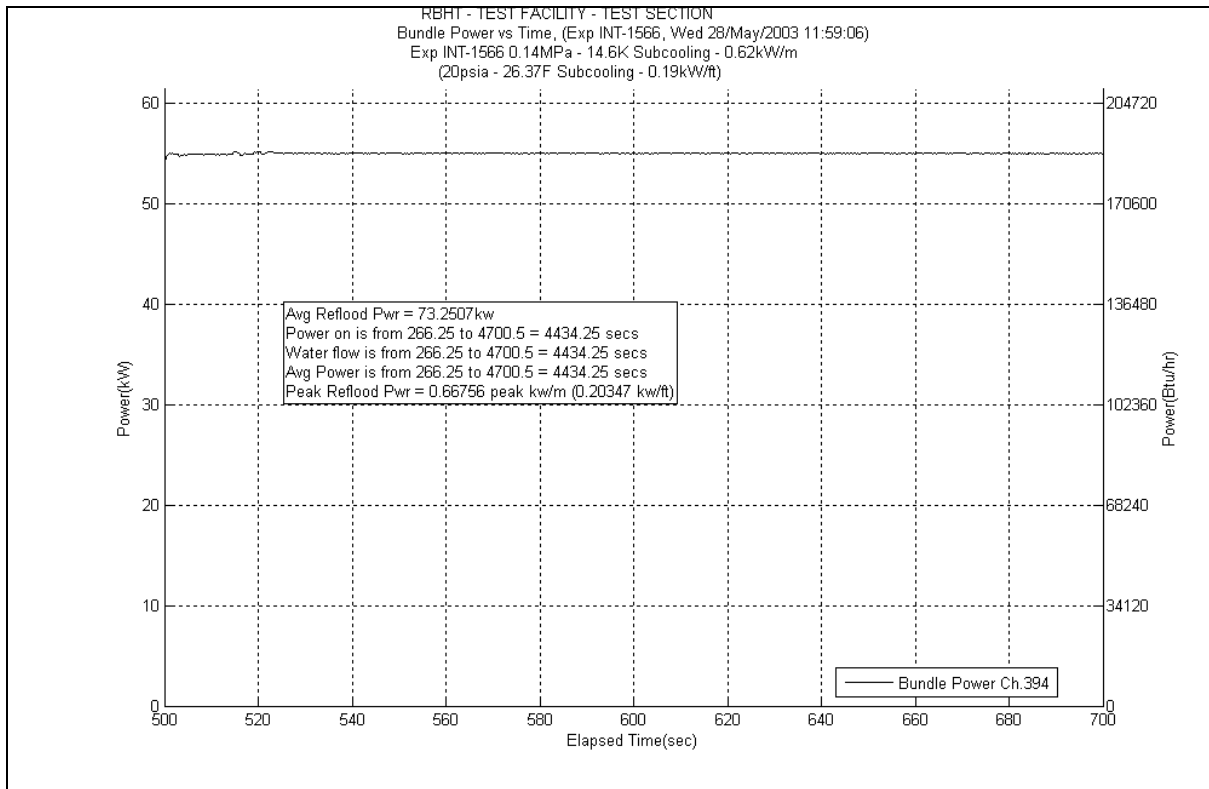


Figure A-29 Bundle Power Plot for Experiment 1566A

Table A-11 Data Results for RBHT Test 1566A for Time Period 500 to 700 seconds

Results for RBHT Test 1566
Valid Time Period 500 to 700 seconds
Collapsed Liquid Level = 77.069 inches = 1957.56 mm
(Z_{OSV}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.771	13.108	627.613	0.787	37.682	0.189	9.049	0.000	0.000	12.13	580.788	2892.13	138475.9277	0.788	0.784	0.792
*	120-133	3048-3378	383	0.773	15.320	733.541	0.872	41.752	0.338	16.184	-2.930	-140.274	17.04	815.880	2909.17	139291.8073	0.748	0.744	0.752
*	108-120	2743-3048	382	0.641	22.373	1071.219	0.729	34.905	0.422	20.205	0.512	24.508	20.71	991.600	2929.88	140283.4074	0.668	0.665	0.671
	100-108	2540-2743	381	0.610	16.219	776.559	0.436	20.876	0.309	14.795	0.000	0.000	15.47	740.708	2945.35	141024.115	0.628	0.625	0.631
	97-100	2464-2540	380	0.540	7.162	342.899	0.153	7.326	0.112	5.363	0.000	0.000	6.896	330.182	2952.246	141354.2972	0.557	0.554	0.560
	93-97	2362-2464	379	0.542	9.519	455.790	0.195	9.337	0.146	6.991	0.000	0.000	9.177	439.397	2961.423	141793.6943	0.558	0.555	0.561
*	85-93	2159-2362	378	0.416	24.279	1162.476	0.360	17.237	0.279	13.359	5.480	262.375	18.16	869.505	2979.583	142663.1998	0.563	0.560	0.566
	81-85	2057-2159	377	0.553	9.286	444.600	0.165	7.900	0.134	6.416	0.000	0.000	8.983	430.108	2988.566	143093.3081	0.567	0.564	0.570
	78-81	1981-2057	376	0.413	9.140	437.638	0.117	5.602	0.098	4.692	0.000	0.000	8.921	427.140	2997.487	143520.4479	0.427	0.425	0.429
	75-78	1905-1981	375	0.452	8.533	408.545	0.112	5.363	0.096	4.597	0.000	0.000	8.322	398.459	3005.809	143918.9074	0.466	0.464	0.468
	72-75	1829-1905	374	0.434	8.823	422.470	0.107	5.123	0.093	4.453	0.000	0.000	8.619	412.680	3014.428	144331.5873	0.447	0.445	0.449
*	67-72	1702-1829	373	0.355	16.738	801.425	0.166	7.948	0.151	7.230	2.591	124.063	13.83	662.184	3028.258	144993.7713	0.467	0.465	0.469
	63-67	1600-1702	372	0.477	10.875	520.690	0.123	5.889	0.116	5.554	0.000	0.000	10.63	508.967	3038.888	145502.7384	0.488	0.486	0.490
	60-63	1524-1600	371	0.356	10.039	480.656	0.086	4.118	0.085	4.070	0.000	0.000	9.865	472.339	3048.753	145975.0772	0.367	0.365	0.369
	57-60	1448-1524	370	0.361	9.956	476.677	0.081	3.878	0.082	3.926	0.000	0.000	9.791	468.796	3058.544	146443.8728	0.371	0.369	0.373
	53-57	1346-1448	369	0.325	14.022	671.377	0.099	4.740	0.106	5.075	0.000	0.000	13.81	661.226	3072.354	147105.0991	0.335	0.333	0.337
*	46-53	1168-1346	368	0.217	28.449	1362.148	0.151	7.230	0.177	8.475	3.801	181.996	24.32	1164.448	3096.674	148269.547	0.331	0.329	0.333
	43-46	1092-1168	367	0.318	10.620	508.506	0.056	2.681	0.072	3.447	0.000	0.000	10.49	502.264	3107.164	148771.8109	0.327	0.325	0.329
	37-43	940-1092	366	0.261	23.038	1103.047	0.096	4.597	0.138	6.607	0.000	0.000	22.8	1091.670	3129.964	149863.4807	0.268	0.267	0.269
*	25-37	635-940	365	0.124	54.572	2612.898	0.122	5.841	0.249	11.922	1.781	85.251	52.42	2509.883	3182.384	152373.3638	0.159	0.158	0.160
	13-25	330-635	364	0.047	59.375	2842.907	0.040	1.915	0.068	3.256	0.000	0.000	59.25	2836.905	3241.634	155210.269	0.049	0.047	0.051
*	0-13	0-330	363	0.032	65.337	3128.366	0.003	0.144	0.000	0.000	-0.506	-24.214	65.84	3152.436	3307.474	158362.7051	0.025	0.024	0.026

Table A-12 Energy Balance Results for RBHT Test 1566A for Time Period 500 to 700 seconds

Results for RBHT Test 1566 Valid Time Period 500 to 700 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2474.4321	7.805773	0.00E+00	0.00E+00	0.00E+00	7.08E-02	3.21E-02
0.25	6.35	2611.9006	8.239427	0.00E+00	0.00E+00	0.00E+00	7.08E-02	3.21E-02
0.50	12.70	2749.369	8.673081	0.00E+00	0.00E+00	0.00E+00	7.08E-02	3.21E-02
0.75	19.05	2886.8375	9.106735	0.00E+00	0.00E+00	0.00E+00	7.08E-02	3.21E-02
1.00	25.40	3024.3059	9.540389	0.00E+00	0.00E+00	0.00E+00	7.08E-02	3.21E-02
1.25	31.75	3161.7744	9.974043	0.00E+00	0.00E+00	0.00E+00	7.08E-02	3.21E-02
1.50	38.10	3299.2428	10.4077	0.00E+00	0.00E+00	0.00E+00	7.08E-02	3.21E-02
1.75	44.45	3436.7113	10.84135	0.00E+00	0.00E+00	0.00E+00	7.08E-02	3.21E-02
2.00	50.80	3574.1797	11.27501	4.41E-03	3.73E-01	1.69E-01	7.05E-02	3.20E-02
2.25	57.15	3711.6482	11.70866	9.68E-03	8.18E-01	3.71E-01	7.01E-02	3.18E-02
2.50	63.50	3849.1166	12.14231	1.52E-02	1.28E+00	5.80E-01	6.97E-02	3.16E-02
2.75	69.85	3986.5851	12.57597	2.08E-02	1.76E+00	7.97E-01	6.93E-02	3.14E-02
3.00	76.20	4124.0535	13.00962	2.67E-02	2.25E+00	1.02E+00	6.89E-02	3.12E-02
3.25	82.55	4261.522	13.44328	3.28E-02	2.77E+00	1.25E+00	6.85E-02	3.11E-02
3.50	88.90	4398.9904	13.87693	3.90E-02	3.29E+00	1.49E+00	6.80E-02	3.08E-02
3.75	95.25	4536.4589	14.31058	4.55E-02	3.84E+00	1.74E+00	6.76E-02	3.06E-02
4.00	101.60	4673.9273	14.74424	5.22E-02	4.40E+00	2.00E+00	6.71E-02	3.04E-02
4.25	107.95	4811.3958	15.17789	5.90E-02	4.98E+00	2.26E+00	6.66E-02	3.02E-02
4.50	114.30	4948.8642	15.61155	6.61E-02	5.58E+00	2.53E+00	6.61E-02	3.00E-02
4.75	120.65	5086.3327	16.0452	7.33E-02	6.19E+00	2.81E+00	6.56E-02	2.97E-02
5.00	127.00	5223.8011	16.47885	8.08E-02	6.82E+00	3.09E+00	6.51E-02	2.95E-02
5.25	133.35	5361.2696	16.91251	8.84E-02	7.47E+00	3.39E+00	6.45E-02	2.93E-02
5.50	139.70	5498.738	17.34616	9.63E-02	8.13E+00	3.69E+00	6.40E-02	2.90E-02
5.75	146.05	5636.2065	17.77982	1.04E-01	8.82E+00	4.00E+00	6.34E-02	2.88E-02
6.00	152.40	5773.6749	18.21347	1.13E-01	9.51E+00	4.31E+00	6.28E-02	2.85E-02
6.25	158.75	5911.1434	18.64712	1.21E-01	1.02E+01	4.64E+00	6.22E-02	2.82E-02
6.50	165.10	6048.6118	19.08078	1.30E-01	1.10E+01	4.97E+00	6.16E-02	2.79E-02
6.75	171.45	6186.0803	19.51443	1.39E-01	1.17E+01	5.31E+00	6.10E-02	2.77E-02
7.00	177.80	6323.5488	19.94809	1.48E-01	1.25E+01	5.65E+00	6.03E-02	2.74E-02
7.25	184.15	6461.0172	20.38174	1.57E-01	1.32E+01	6.01E+00	5.97E-02	2.71E-02
7.50	190.50	6598.4857	20.81539	1.66E-01	1.40E+01	6.37E+00	5.90E-02	2.68E-02
7.75	196.85	6735.9541	21.24905	1.76E-01	1.49E+01	6.74E+00	5.83E-02	2.65E-02
8.00	203.20	6873.4226	21.6827	1.86E-01	1.57E+01	7.12E+00	5.76E-02	2.61E-02
8.25	209.55	7010.891	22.11636	1.96E-01	1.65E+01	7.50E+00	5.69E-02	2.58E-02
8.50	215.90	7148.3595	22.55001	2.06E-01	1.74E+01	7.89E+00	5.62E-02	2.55E-02
8.75	222.25	7285.8279	22.98366	2.17E-01	1.83E+01	8.29E+00	5.55E-02	2.52E-02
9.00	228.60	7423.2964	23.41732	2.27E-01	1.92E+01	8.70E+00	5.47E-02	2.48E-02
9.25	234.95	7010.891	22.11636	2.38E-01	2.01E+01	9.10E+00	5.40E-02	2.45E-02
9.50	241.30	6598.4857	20.81539	2.48E-01	2.09E+01	9.48E+00	5.33E-02	2.42E-02
9.75	247.65	6186.0803	19.51443	2.57E-01	2.17E+01	9.83E+00	5.26E-02	2.39E-02
10.00	254.00	5773.6749	18.21347	2.65E-01	2.24E+01	1.02E+01	5.20E-02	2.36E-02
10.25	260.35	5361.2696	16.91251	2.73E-01	2.31E+01	1.05E+01	5.14E-02	2.33E-02
10.50	266.70	4948.8642	15.61155	2.81E-01	2.37E+01	1.08E+01	5.09E-02	2.31E-02
10.75	273.05	4536.4589	14.31058	2.88E-01	2.43E+01	1.10E+01	5.04E-02	2.29E-02
11.00	279.40	4124.0535	13.00962	2.94E-01	2.48E+01	1.13E+01	5.00E-02	2.27E-02
11.25	285.75	3711.6482	11.70866	3.00E-01	2.53E+01	1.15E+01	4.96E-02	2.25E-02
11.50	292.10	3299.2428	10.4077	3.05E-01	2.57E+01	1.17E+01	4.92E-02	2.23E-02
11.75	298.45	2886.8375	9.106735	3.09E-01	2.61E+01	1.18E+01	4.89E-02	2.22E-02
12.00	304.80	2474.4321	7.805773	3.13E-01	2.64E+01	1.20E+01	4.86E-02	2.21E-02

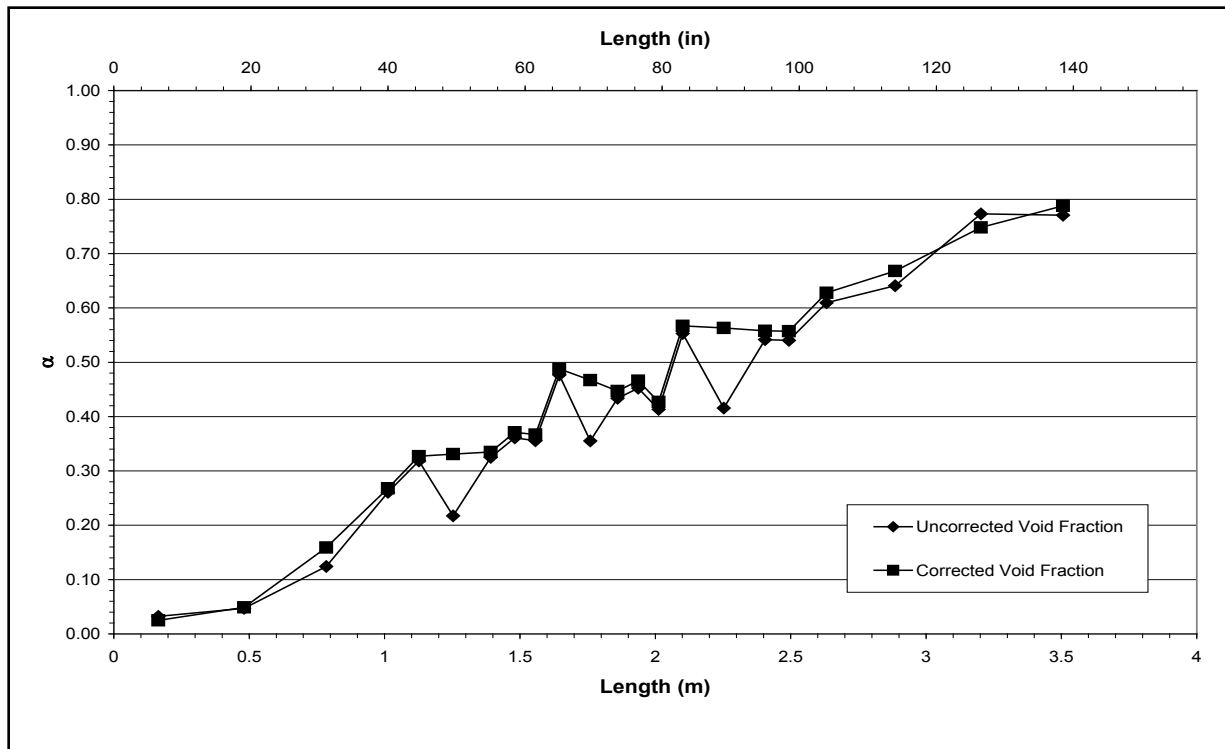


Figure A-30 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1566A for Time Period 500 to 700 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1566-B

Test Conditions

Date: 5/28/2003

Steady-state time window: 3300 – 3400 seconds

Inlet flow rate: 1.516 cm/sec (0.597 in./sec)

Inlet mass flow rate: 0.074 kg/sec (0.164 lbm/sec)

Inlet flow temperature: 369.4 K (205.3 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 76.84 kW

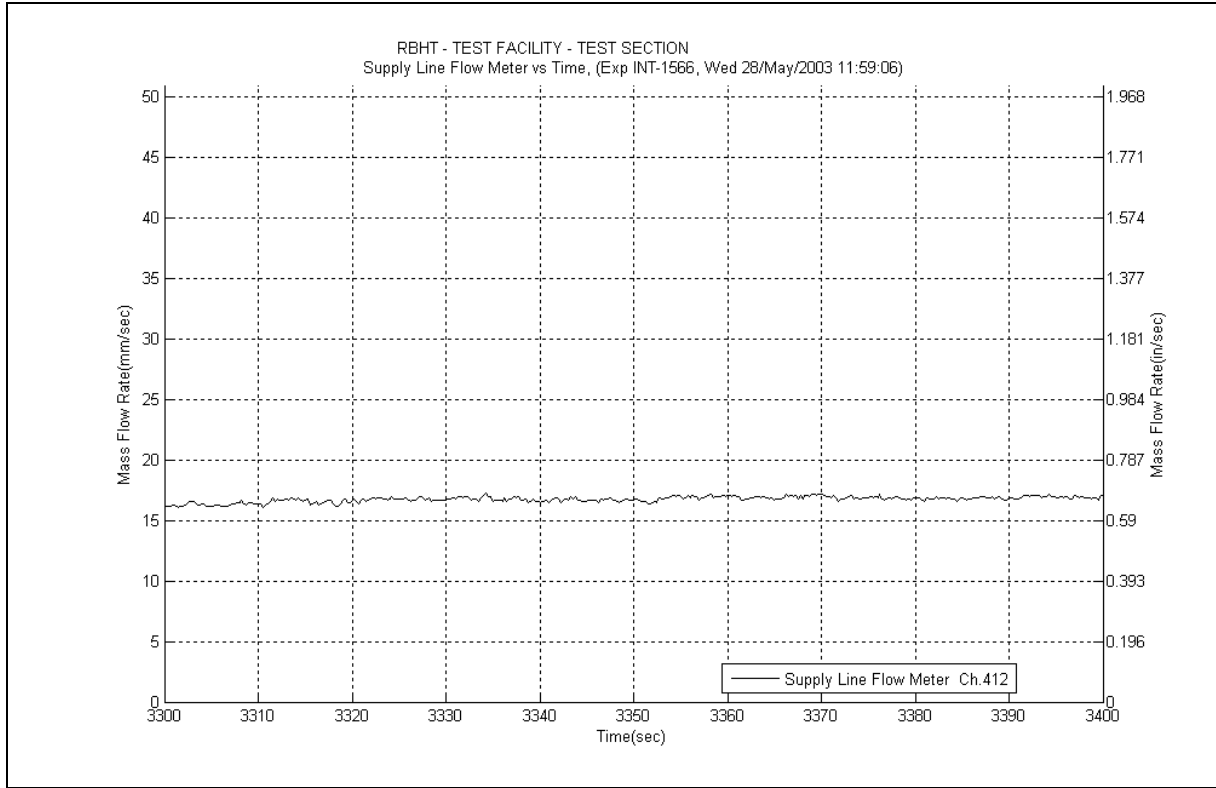


Figure A-31 Inlet Flow Plot for Experiment 1566B

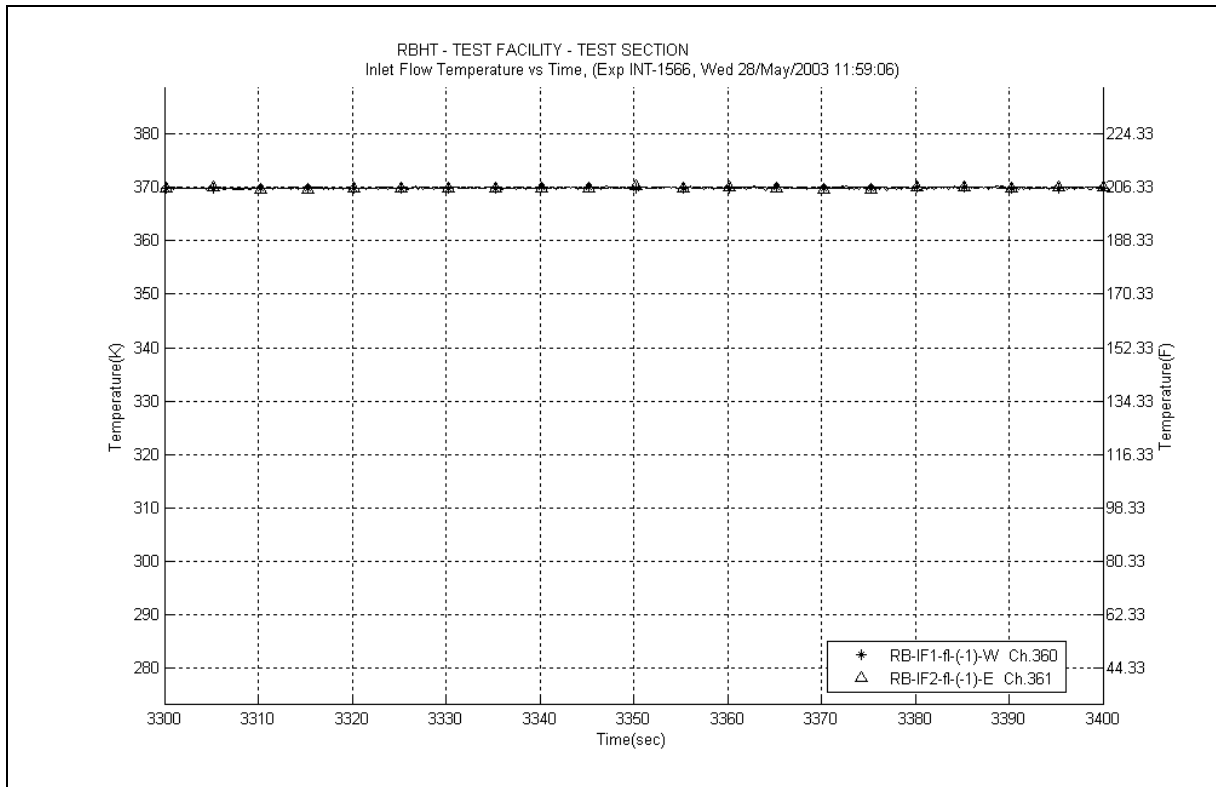


Figure A-32 Inlet Temperature Plot for Experiment 1566B

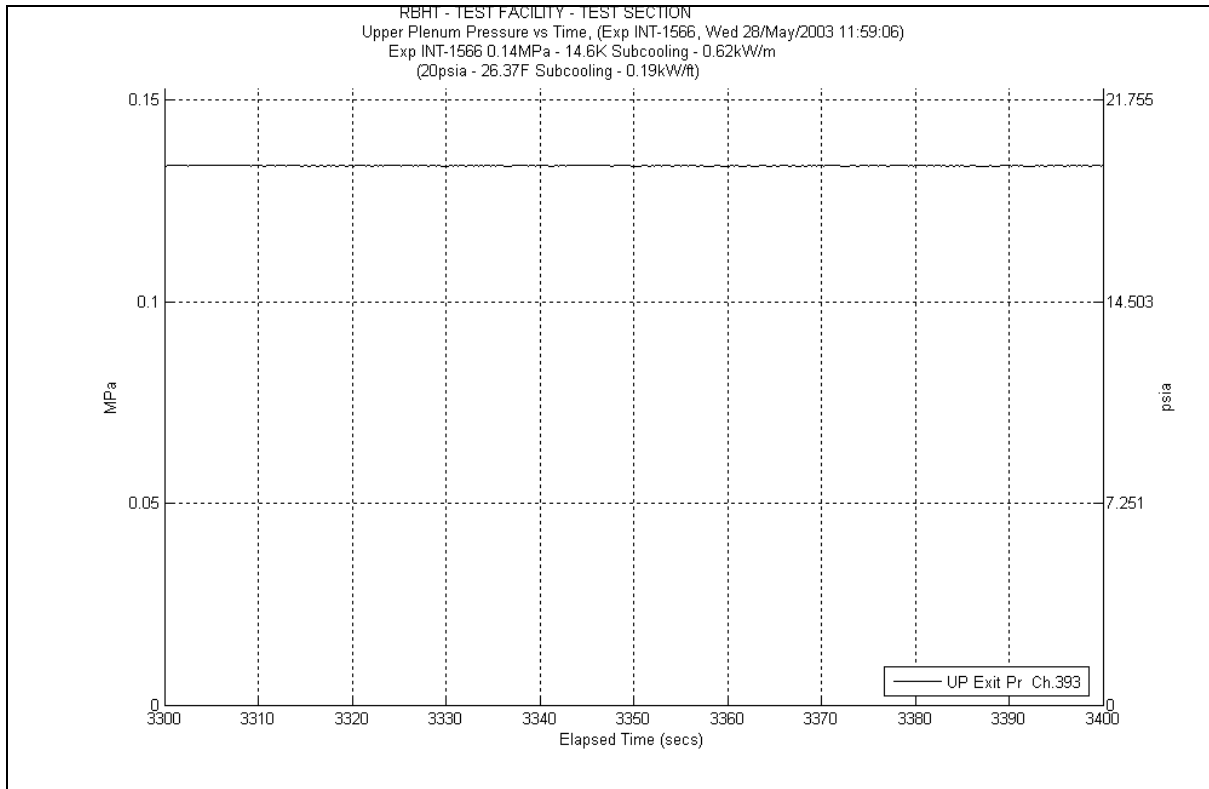


Figure A-33 System Pressure Plot for Experiment 1566B

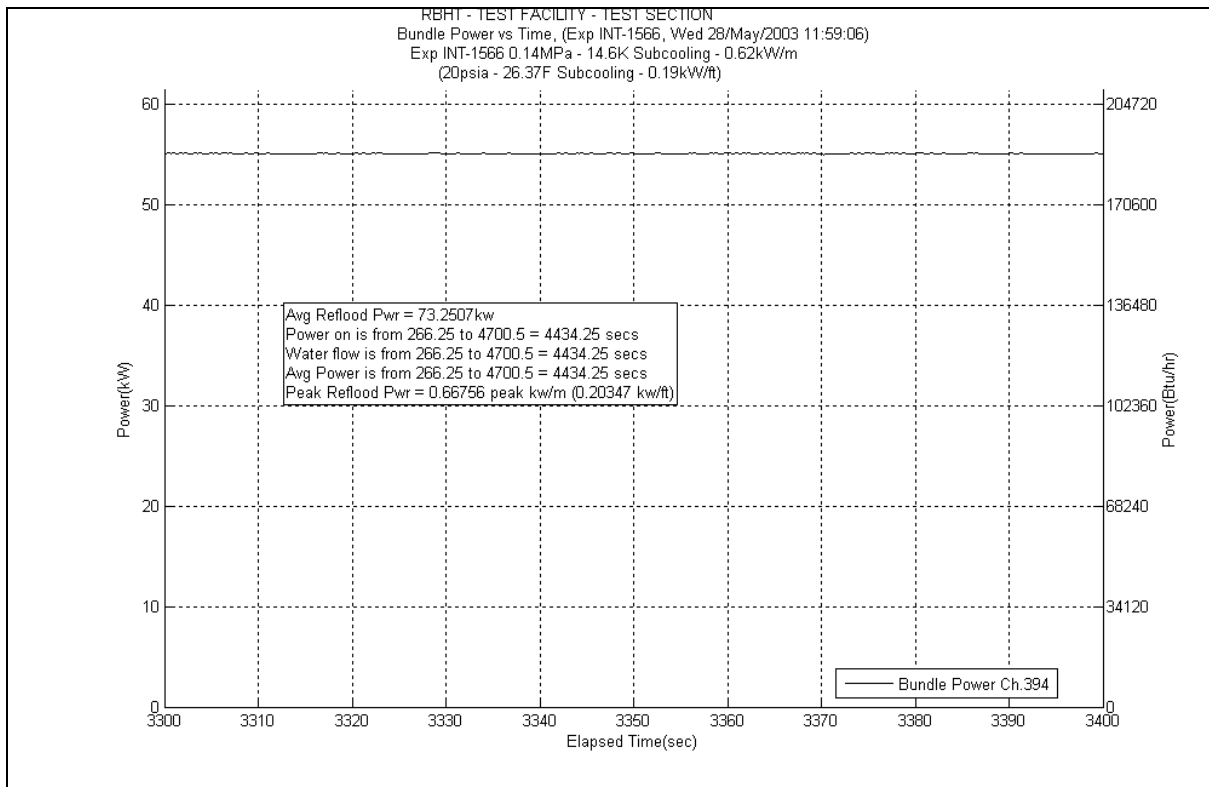


Figure A-34 Bundle Power Plot for Experiment 1566B

Table A-13 Data Results for RBHT Test 1566B for Time Period 3300 to 3400 seconds

Results for RBHT Test 1566
Valid Time Period 3300 to 3400 seconds
Collapsed Liquid Level = 64.703 inches = 1643.45 mm
(Z_{OSL}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acccl} (lbf/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.793	11.810	565.448	0.596	28.537	0.141	6.751	0.000	0.000	11.07	530.034	2891.1	138425.1746	0.806	0.802	0.810
*	120-133	3048-3378	383	0.826	11.778	563.956	0.660	31.601	0.252	12.066	-1.954	-93.535	12.82	613.825	2903.9	139038.9995	0.81	0.806	0.814
*	108-120	2743-3048	382	0.754	15.341	734.536	0.551	26.382	0.314	15.034	3.116	149.200	11.36	543.920	2915.3	139582.9192	0.818	0.814	0.822
	100-108	2540-2743	381	0.808	7.977	381.939	0.330	15.800	0.230	11.012	0.000	0.000	7.417	355.128	2922.7	139938.0471	0.821	0.817	0.825
	97-100	2464-2540	380	0.750	3.895	186.493	0.116	5.554	0.083	3.974	0.000	0.000	3.697	177.013	2926.4	140115.0604	0.763	0.759	0.767
	93-97	2362-2464	379	0.752	5.152	246.669	0.147	7.038	0.108	5.171	0.000	0.000	4.896	234.422	2931.3	140349.4821	0.764	0.760	0.768
*	85-93	2159-2362	378	0.594	16.878	808.138	0.273	13.071	0.208	9.959	6.955	333.023	9.442	452.085	2940.7	140801.5675	0.773	0.769	0.777
	81-85	2057-2159	377	0.770	4.773	228.517	0.126	6.033	0.100	4.788	0.000	0.000	4.546	217.664	2945.2	141019.2312	0.781	0.777	0.785
	78-81	1981-2057	376	0.633	5.718	273.772	0.090	4.309	0.073	3.495	0.000	0.000	5.552	265.831	2950.8	141285.0624	0.644	0.641	0.647
	75-78	1905-1981	375	0.669	5.162	247.166	0.086	4.118	0.071	3.399	0.000	0.000	5.002	239.497	2955.8	141524.5594	0.679	0.676	0.682
	72-75	1829-1905	374	0.653	5.401	258.604	0.082	3.926	0.070	3.352	0.000	0.000	5.245	251.132	2961	141775.6913	0.663	0.660	0.666
*	67-72	1702-1829	373	0.528	12.246	586.336	0.128	6.129	0.112	5.363	4.214	201.761	7.792	373.083	2968.8	142148.7743	0.7	0.697	0.704
	63-67	1600-1702	372	0.728	5.656	270.789	0.095	4.549	0.087	4.166	0.000	0.000	5.473	262.049	2974.3	142410.823	0.737	0.733	0.741
	60-63	1524-1600	371	0.578	6.575	314.801	0.067	3.208	0.063	3.016	0.000	0.000	6.444	308.540	2980.8	142719.3633	0.586	0.583	0.589
	57-60	1448-1524	370	0.571	6.684	320.023	0.064	3.064	0.061	2.921	0.000	0.000	6.558	313.999	2987.3	143033.3621	0.579	0.576	0.582
	53-57	1346-1448	369	0.534	9.680	463.498	0.079	3.783	0.079	3.783	0.000	0.000	9.519	455.772	2996.8	143489.1342	0.542	0.539	0.545
*	46-53	1168-1346	368	0.361	23.235	1112.496	0.124	5.937	0.132	6.320	6.559	314.045	16.42	786.194	3013.3	144275.328	0.548	0.545	0.551
	43-46	1092-1168	367	0.548	7.037	336.932	0.047	2.250	0.054	2.586	0.000	0.000	6.932	331.906	3020.2	144607.234	0.555	0.552	0.558
	37-43	940-1092	366	0.512	15.216	728.568	0.083	3.974	0.103	4.932	0.000	0.000	15.03	719.640	3035.2	145326.8743	0.518	0.515	0.521
*	25-37	635-940	365	0.276	45.120	2160.340	0.124	5.937	0.185	8.858	4.871	233.208	39.94	1912.337	3075.2	147239.2117	0.359	0.357	0.361
	13-25	330-635	364	0.197	50.053	2396.566	0.060	2.873	0.159	7.613	0.000	0.000	49.82	2385.394	3125	149624.6061	0.2	0.199	0.201
*	0-13	0-330	363	0.036	65.093	3116.679	0.005	0.239	0.003	0.144	4.355	208.528	60.73	2907.768	3185.7	152532.3741	0.1	0.095	0.105

Table A-14 Energy Balance Results for RBHT Test 1566B for Time Period 3300 to 3400 seconds

Results for RBHT Test 1566 Valid Time Period 3300 to 3400 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2479.7591	7.822577	0.00E+00	0.00E+00	0.00E+00	5.26E-02	2.39E-02
0.25	6.35	2617.5235	8.257165	0.00E+00	0.00E+00	0.00E+00	5.26E-02	2.39E-02
0.50	12.70	2755.2879	8.691752	0.00E+00	0.00E+00	0.00E+00	5.26E-02	2.39E-02
0.75	19.05	2893.0523	9.12634	0.00E+00	0.00E+00	0.00E+00	5.26E-02	2.39E-02
1.00	25.40	3030.8167	9.560928	0.00E+00	0.00E+00	0.00E+00	5.26E-02	2.39E-02
1.25	31.75	3168.5811	9.995515	4.50E-03	2.83E-01	1.28E-01	5.24E-02	2.37E-02
1.50	38.10	3306.3455	10.4301	1.08E-02	6.78E-01	3.08E-01	5.20E-02	2.36E-02
1.75	44.45	3444.1099	10.86469	1.74E-02	1.09E+00	4.95E-01	5.17E-02	2.34E-02
2.00	50.80	3581.8743	11.29928	2.42E-02	1.52E+00	6.89E-01	5.13E-02	2.33E-02
2.25	57.15	3719.6387	11.73387	3.13E-02	1.97E+00	8.92E-01	5.09E-02	2.31E-02
2.50	63.50	3857.403	12.16845	3.87E-02	2.43E+00	1.10E+00	5.06E-02	2.29E-02
2.75	69.85	3995.1674	12.60304	4.64E-02	2.91E+00	1.32E+00	5.02E-02	2.27E-02
3.00	76.20	4132.9318	13.03763	5.43E-02	3.40E+00	1.54E+00	4.97E-02	2.26E-02
3.25	82.55	4270.6962	13.47222	6.24E-02	3.92E+00	1.78E+00	4.93E-02	2.24E-02
3.50	88.90	4408.4606	13.9068	7.09E-02	4.45E+00	2.02E+00	4.89E-02	2.22E-02
3.75	95.25	4546.225	14.34139	7.96E-02	4.99E+00	2.27E+00	4.84E-02	2.20E-02
4.00	101.60	4683.9894	14.77598	8.86E-02	5.56E+00	2.52E+00	4.79E-02	2.17E-02
4.25	107.95	4821.7538	15.21057	9.79E-02	6.14E+00	2.78E+00	4.74E-02	2.15E-02
4.50	114.30	4959.5182	15.64515	1.07E-01	6.74E+00	3.06E+00	4.69E-02	2.13E-02
4.75	120.65	5097.2826	16.07974	1.17E-01	7.35E+00	3.34E+00	4.64E-02	2.11E-02
5.00	127.00	5235.047	16.51433	1.27E-01	7.98E+00	3.62E+00	4.59E-02	2.08E-02
5.25	133.35	5372.8114	16.94892	1.38E-01	8.63E+00	3.91E+00	4.54E-02	2.06E-02
5.50	139.70	5510.5758	17.3835	1.48E-01	9.29E+00	4.21E+00	4.48E-02	2.03E-02
5.75	146.05	5648.3402	17.81809	1.59E-01	9.98E+00	4.53E+00	4.42E-02	2.01E-02
6.00	152.40	5786.1046	18.25268	1.70E-01	1.07E+01	4.84E+00	4.36E-02	1.98E-02
6.25	158.75	5923.869	18.68727	1.82E-01	1.14E+01	5.17E+00	4.30E-02	1.95E-02
6.50	165.10	6061.6334	19.12186	1.93E-01	1.21E+01	5.50E+00	4.24E-02	1.92E-02
6.75	171.45	6199.3978	19.55644	2.05E-01	1.29E+01	5.84E+00	4.18E-02	1.90E-02
7.00	177.80	6337.1622	19.99103	2.17E-01	1.36E+01	6.18E+00	4.12E-02	1.87E-02
7.25	184.15	6474.9265	20.42562	2.30E-01	1.44E+01	6.54E+00	4.05E-02	1.84E-02
7.50	190.50	6612.6909	20.86021	2.43E-01	1.52E+01	6.90E+00	3.98E-02	1.81E-02
7.75	196.85	6750.4553	21.29479	2.56E-01	1.60E+01	7.27E+00	3.91E-02	1.78E-02
8.00	203.20	6888.2197	21.72938	2.69E-01	1.69E+01	7.65E+00	3.85E-02	1.74E-02
8.25	209.55	7025.9841	22.16397	2.82E-01	1.77E+01	8.04E+00	3.77E-02	1.71E-02
8.50	215.90	7163.7485	22.59856	2.96E-01	1.86E+01	8.43E+00	3.70E-02	1.68E-02
8.75	222.25	7301.5129	23.03314	3.10E-01	1.95E+01	8.83E+00	3.63E-02	1.65E-02
9.00	228.60	7439.2773	23.46773	3.25E-01	2.04E+01	9.24E+00	3.55E-02	1.61E-02
9.25	234.95	7025.9841	22.16397	3.39E-01	2.13E+01	9.64E+00	3.48E-02	1.58E-02
9.50	241.30	6612.6909	20.86021	3.52E-01	2.21E+01	1.00E+01	3.41E-02	1.55E-02
9.75	247.65	6199.3978	19.55644	3.65E-01	2.29E+01	1.04E+01	3.34E-02	1.52E-02
10.00	254.00	5786.1046	18.25268	3.76E-01	2.36E+01	1.07E+01	3.28E-02	1.49E-02
10.25	260.35	5372.8114	16.94892	3.87E-01	2.43E+01	1.10E+01	3.22E-02	1.46E-02
10.50	266.70	4959.5182	15.64515	3.97E-01	2.49E+01	1.13E+01	3.17E-02	1.44E-02
10.75	273.05	4546.225	14.34139	4.06E-01	2.55E+01	1.16E+01	3.12E-02	1.42E-02
11.00	279.40	4132.9318	13.03763	4.15E-01	2.60E+01	1.18E+01	3.08E-02	1.40E-02
11.25	285.75	3719.6387	11.73387	4.22E-01	2.65E+01	1.20E+01	3.04E-02	1.38E-02
11.50	292.10	3306.3455	10.4301	4.29E-01	2.69E+01	1.22E+01	3.00E-02	1.36E-02
11.75	298.45	2893.0523	9.12634	4.35E-01	2.73E+01	1.24E+01	2.97E-02	1.35E-02
12.00	304.80	2479.7591	7.822577	4.41E-01	2.76E+01	1.25E+01	2.94E-02	1.33E-02

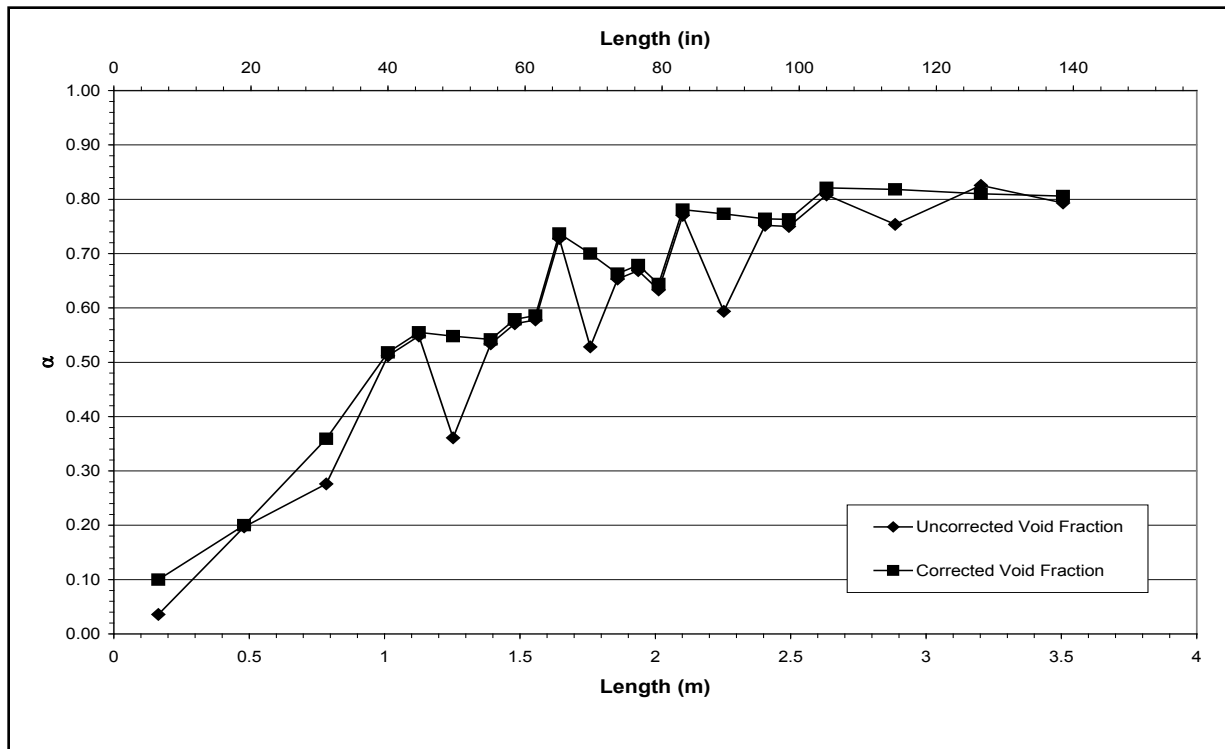


Figure A-35 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1566B for Time Period 3300 to 3400 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1566-C

Test Conditions

Date: 5/28/2003

Steady-state time window: 4110 – 4220 seconds

Inlet flow rate: 1.013 cm/sec (0.399 in./sec)

Inlet mass flow rate: 0.049 kg/sec (0.109 lbm/sec)

Inlet flow temperature: 369.4 K (205.3 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 76.84 kW

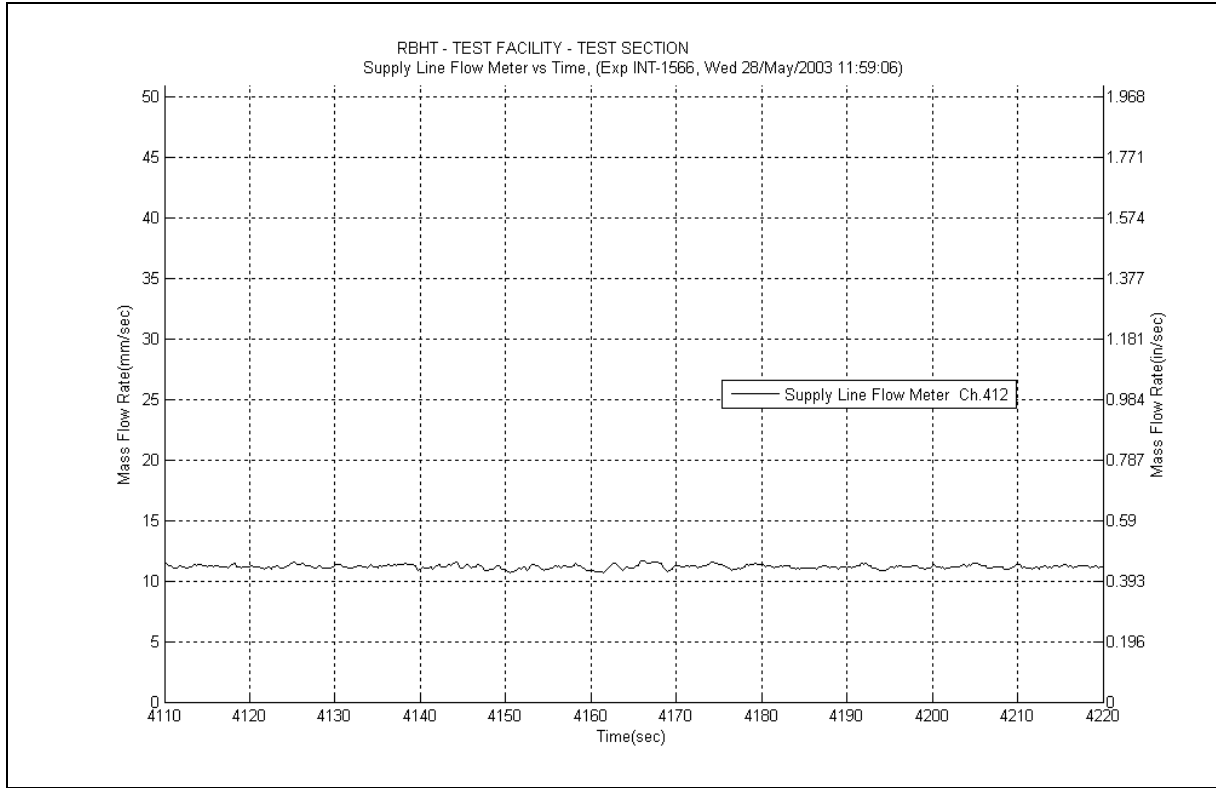


Figure A-36 Inlet Flow Plot for Experiment 1566C

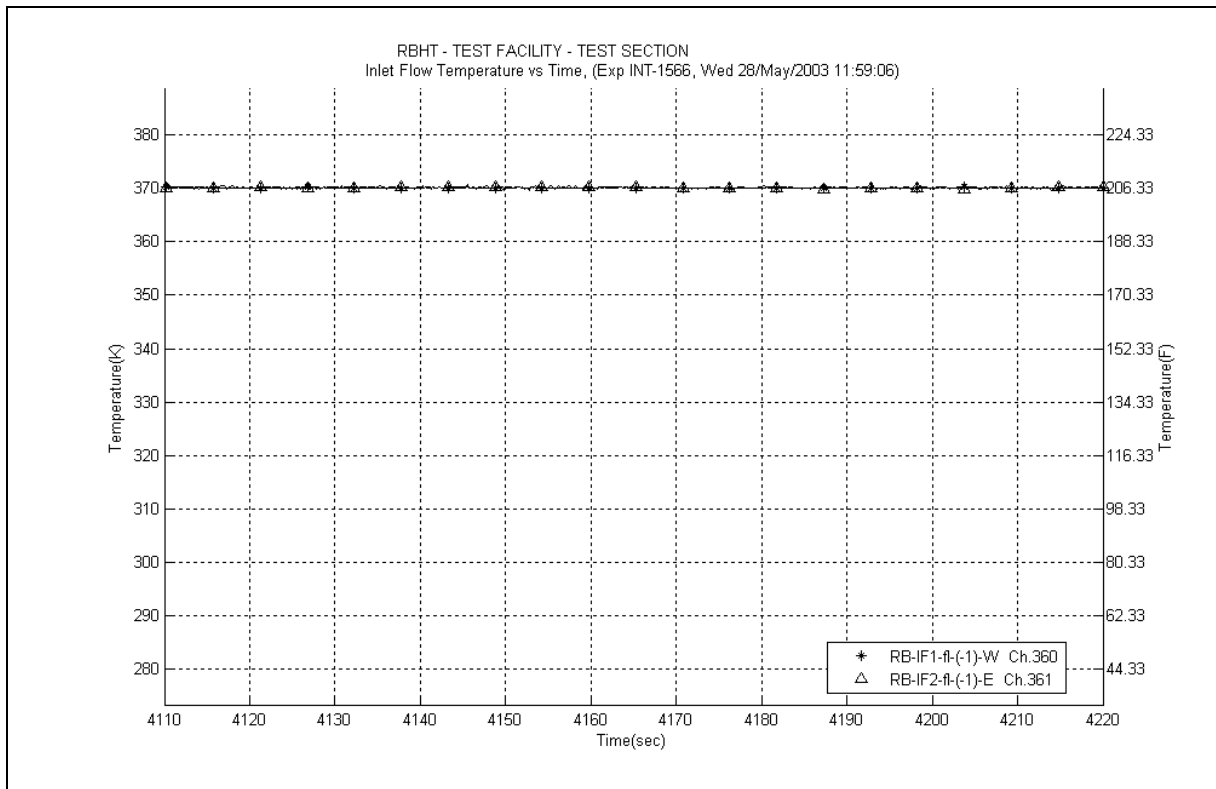


Figure A-37 Inlet Temperature Plot for Experiment 1566C

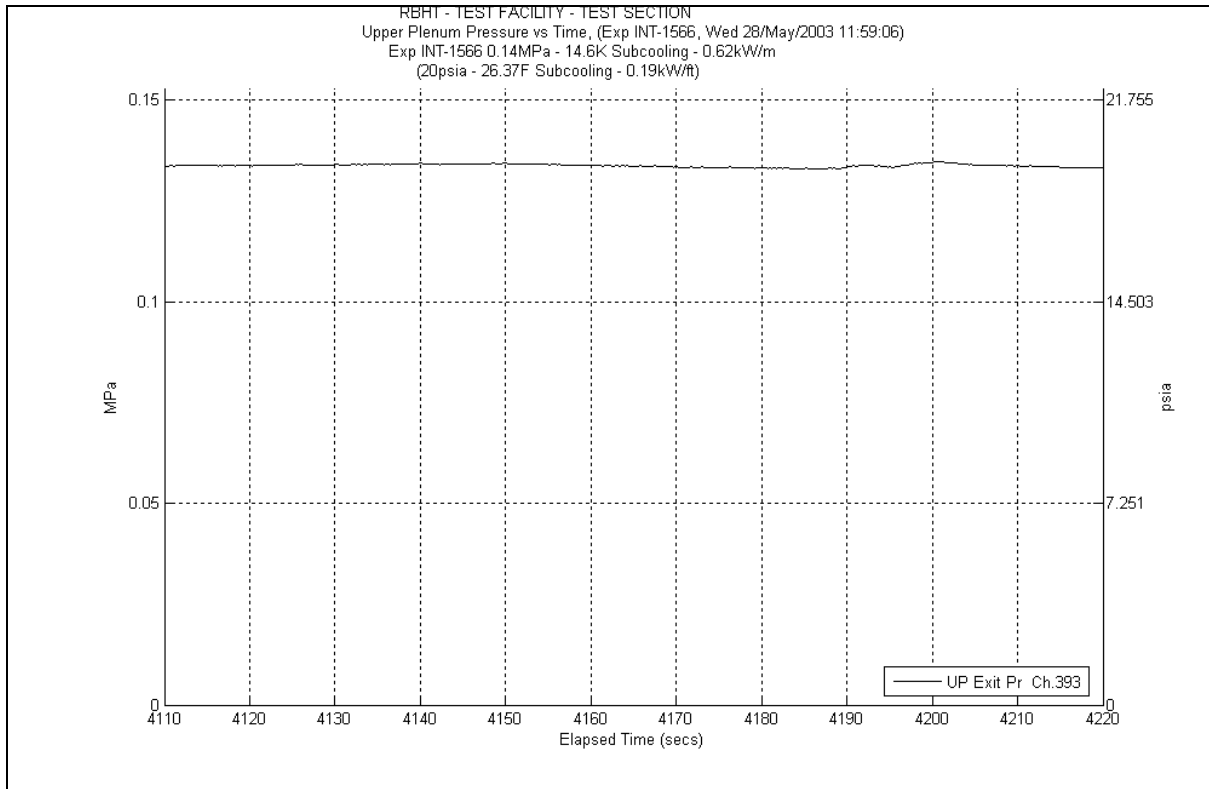


Figure A-38 System Pressure Plot for Experiment 1566C

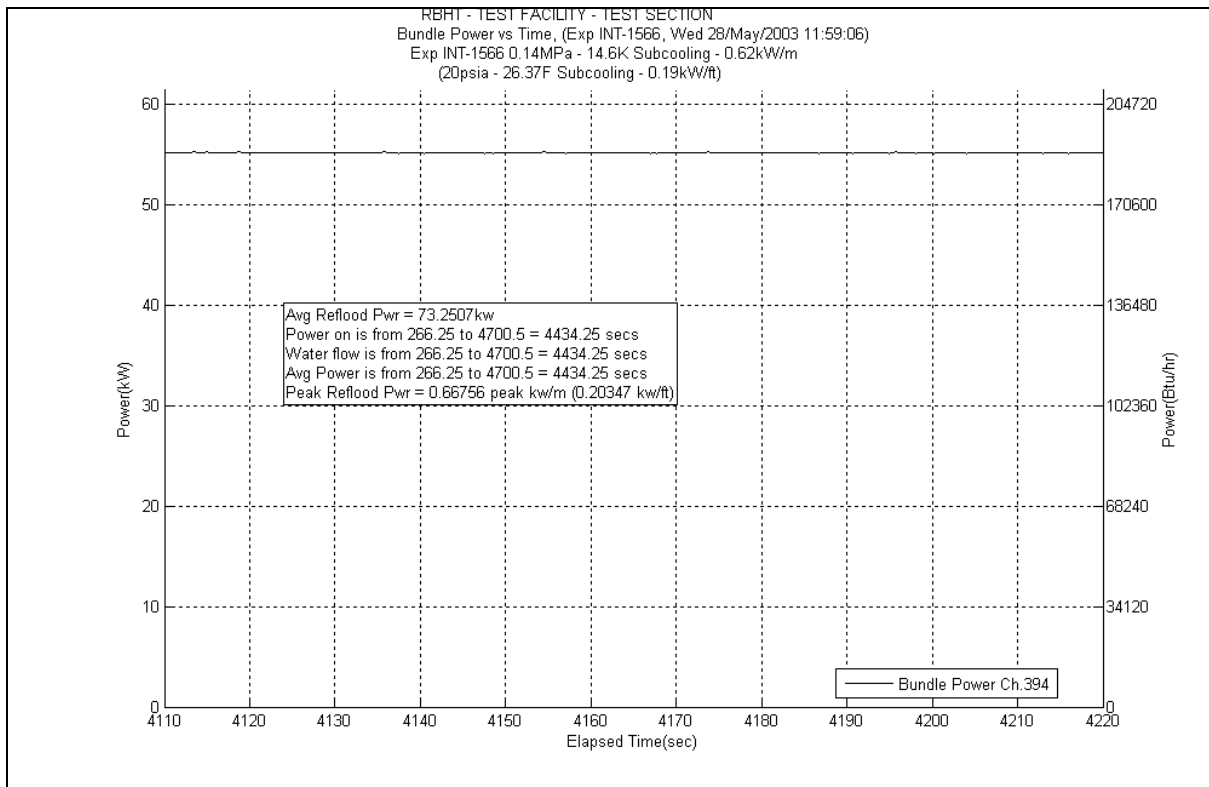


Figure A-39 Bundle Power Plot for Experiment 1566C

Table A-15 Data Results for RBHT Test 1566C for Time Period 4110 to 4220 seconds

Results for RBHT Test 1566
Valid Time Period 4110 to 4220 seconds
Collapsed Liquid Level = 60.290 inches = 1531.37 mm
(Z_{onset}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lb/ft ²)	ΔP_{fic} (Pa)	ΔP_{acccl} (lb/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.828	9.836	470.958	0.400	19.152	0.094	4.501	0.000	0.000	9.34	447.202	2889.34	138342.3418	0.836	0.832	0.840
*	120-133	3048-3378	383	0.856	9.717	465.239	0.442	21.163	0.168	8.044	-1.883	-90.172	10.99	526.204	2900.33	138868.5458	0.837	0.833	0.841
*	108-120	2743-3048	382	0.783	13.555	648.997	0.368	17.620	0.210	10.055	2.927	140.126	10.05	481.197	2910.38	139349.7424	0.839	0.835	0.843
	100-108	2540-2743	381	0.830	7.047	337.429	0.219	10.486	0.153	7.326	0.000	0.000	6.673	319.505	2917.053	139669.2473	0.839	0.835	0.843
	97-100	2464-2540	380	0.771	3.573	171.077	0.076	3.639	0.055	2.633	0.000	0.000	3.438	164.612	2920.491	139833.8596	0.779	0.775	0.783
	93-97	2362-2464	379	0.770	4.788	229.263	0.097	4.644	0.072	3.447	0.000	0.000	4.618	221.111	2925.109	140054.9707	0.778	0.774	0.782
*	85-93	2159-2362	378	0.620	15.798	756.418	0.180	8.618	0.139	6.655	6.527	312.520	8.952	428.624	2934.061	140483.5947	0.785	0.781	0.789
	81-85	2057-2159	377	0.784	4.482	214.592	0.083	3.974	0.066	3.160	0.000	0.000	4.333	207.465	2938.394	140691.0599	0.791	0.787	0.795
	78-81	1981-2057	376	0.646	5.510	263.826	0.059	2.825	0.049	2.346	0.000	0.000	5.398	258.458	2943.792	140949.5175	0.653	0.650	0.656
	75-78	1905-1981	375	0.681	4.975	238.214	0.056	2.681	0.047	2.250	0.000	0.000	4.872	233.273	2948.664	141182.7901	0.687	0.684	0.690
	72-75	1829-1905	374	0.669	5.152	246.669	0.054	2.586	0.046	2.202	0.000	0.000	5.047	241.652	2953.711	141424.4418	0.676	0.673	0.679
*	67-72	1702-1829	373	0.545	11.815	565.697	0.084	4.022	0.075	3.591	4.192	200.706	7.464	357.378	2961.175	141781.82	0.712	0.708	0.716
	63-67	1600-1702	372	0.743	5.334	255.372	0.062	2.969	0.058	2.777	0.000	0.000	5.213	249.600	2966.388	142031.4198	0.749	0.745	0.753
	60-63	1524-1600	371	0.605	6.149	294.411	0.044	2.107	0.042	2.011	0.000	0.000	6.06	290.154	2972.448	142321.5742	0.611	0.608	0.614
	57-60	1448-1524	370	0.599	6.242	298.887	0.042	2.011	0.041	1.963	0.000	0.000	6.159	294.895	2978.607	142616.4687	0.605	0.602	0.608
	53-57	1346-1448	369	0.557	9.213	441.119	0.052	2.490	0.053	2.538	0.000	0.000	9.106	435.998	2987.713	143052.4663	0.562	0.559	0.565
*	46-53	1168-1346	368	0.378	22.622	1083.154	0.082	3.926	0.088	4.213	6.592	315.634	15.86	759.381	3003.573	143811.8472	0.564	0.561	0.567
	43-46	1092-1168	367	0.561	6.840	327.483	0.031	1.484	0.036	1.724	0.000	0.000	6.768	324.054	3010.341	144135.9007	0.565	0.562	0.568
	37-43	940-1092	366	0.546	14.147	677.344	0.056	2.681	0.068	3.256	0.000	0.000	14.02	671.281	3024.361	144807.1819	0.55	0.547	0.553
*	25-37	635-940	365	0.304	43.359	2076.045	0.086	4.118	0.124	5.937	7.099	339.907	36.05	1726.083	3060.411	146533.2652	0.421	0.419	0.423
	13-25	330-635	364	0.290	44.226	2117.571	0.050	2.394	0.106	5.075	0.000	0.000	44.06	2109.604	3104.471	148642.8693	0.293	0.292	0.294
*	0-13	0-330	363	0.045	64.491	3087.835	0.019	0.910	0.034	1.628	6.828	326.915	57.61	2758.382	3162.081	151401.2509	0.146	0.145	0.147

Table A-16 Energy Balance Results for RBHT Test 1566C for Time Period 4110 to 4220 seconds

Results for RBHT Test 1566 Valid Time Period 4110 to 4220 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2480.1405	7.82378	0.00E+00	0.00E+00	0.00E+00	3.51E-02	1.59E-02
0.25	6.35	2617.9261	8.258435	0.00E+00	0.00E+00	0.00E+00	3.51E-02	1.59E-02
0.50	12.70	2755.7117	8.693089	0.00E+00	0.00E+00	0.00E+00	3.51E-02	1.59E-02
0.75	19.05	2893.4973	9.127744	1.02E-03	4.25E-02	1.93E-02	3.50E-02	1.59E-02
1.00	25.40	3031.2829	9.562398	9.66E-03	4.05E-01	1.84E-01	3.47E-02	1.58E-02
1.25	31.75	3169.0685	9.997053	1.87E-02	7.83E-01	3.55E-01	3.44E-02	1.56E-02
1.50	38.10	3306.854	10.43171	2.82E-02	1.18E+00	5.35E-01	3.41E-02	1.55E-02
1.75	44.45	3444.6396	10.86636	3.80E-02	1.59E+00	7.22E-01	3.37E-02	1.53E-02
2.00	50.80	3582.4252	11.30102	4.83E-02	2.02E+00	9.17E-01	3.34E-02	1.51E-02
2.25	57.15	3720.2108	11.73567	5.89E-02	2.47E+00	1.12E+00	3.30E-02	1.50E-02
2.50	63.50	3857.9964	12.17032	7.00E-02	2.93E+00	1.33E+00	3.26E-02	1.48E-02
2.75	69.85	3995.782	12.60498	8.15E-02	3.41E+00	1.55E+00	3.22E-02	1.46E-02
3.00	76.20	4133.5676	13.03963	9.33E-02	3.91E+00	1.77E+00	3.18E-02	1.44E-02
3.25	82.55	4271.3531	13.47429	1.06E-01	4.42E+00	2.01E+00	3.14E-02	1.42E-02
3.50	88.90	4409.1387	13.90894	1.18E-01	4.95E+00	2.24E+00	3.09E-02	1.40E-02
3.75	95.25	4546.9243	14.3436	1.31E-01	5.50E+00	2.49E+00	3.05E-02	1.38E-02
4.00	101.60	4684.7099	14.77825	1.45E-01	6.06E+00	2.75E+00	3.00E-02	1.36E-02
4.25	107.95	4822.4955	15.21291	1.59E-01	6.64E+00	3.01E+00	2.95E-02	1.34E-02
4.50	114.30	4960.2811	15.64756	1.73E-01	7.24E+00	3.28E+00	2.90E-02	1.32E-02
4.75	120.65	5098.0667	16.08222	1.88E-01	7.85E+00	3.56E+00	2.85E-02	1.29E-02
5.00	127.00	5235.8522	16.51687	2.03E-01	8.49E+00	3.85E+00	2.80E-02	1.27E-02
5.25	133.35	5373.6378	16.95152	2.18E-01	9.14E+00	4.14E+00	2.74E-02	1.24E-02
5.50	139.70	5511.4234	17.38618	2.34E-01	9.80E+00	4.45E+00	2.69E-02	1.22E-02
5.75	146.05	5649.209	17.82083	2.50E-01	1.05E+01	4.76E+00	2.63E-02	1.19E-02
6.00	152.40	5786.9946	18.25549	2.67E-01	1.12E+01	5.07E+00	2.57E-02	1.17E-02
6.25	158.75	5924.7802	18.69014	2.84E-01	1.19E+01	5.40E+00	2.51E-02	1.14E-02
6.50	165.10	6062.5658	19.1248	3.02E-01	1.26E+01	5.73E+00	2.45E-02	1.11E-02
6.75	171.45	6200.3513	19.55945	3.20E-01	1.34E+01	6.07E+00	2.39E-02	1.08E-02
7.00	177.80	6338.1369	19.99411	3.38E-01	1.41E+01	6.42E+00	2.32E-02	1.05E-02
7.25	184.15	6475.9225	20.42876	3.57E-01	1.49E+01	6.77E+00	2.26E-02	1.02E-02
7.50	190.50	6613.7081	20.86341	3.76E-01	1.57E+01	7.13E+00	2.19E-02	9.94E-03
7.75	196.85	6751.4937	21.29807	3.95E-01	1.65E+01	7.50E+00	2.12E-02	9.63E-03
8.00	203.20	6889.2793	21.73272	4.15E-01	1.74E+01	7.88E+00	2.05E-02	9.31E-03
8.25	209.55	7027.0648	22.16738	4.35E-01	1.82E+01	8.27E+00	1.98E-02	8.99E-03
8.50	215.90	7164.8504	22.60203	4.56E-01	1.91E+01	8.66E+00	1.91E-02	8.65E-03
8.75	222.25	7302.636	23.03669	4.77E-01	2.00E+01	9.06E+00	1.83E-02	8.32E-03
9.00	228.60	7440.4216	23.47134	4.99E-01	2.09E+01	9.47E+00	1.76E-02	7.98E-03
9.25	234.95	7027.0648	22.16738	5.20E-01	2.18E+01	9.87E+00	1.68E-02	7.64E-03
9.50	241.30	6613.7081	20.86341	5.40E-01	2.26E+01	1.02E+01	1.61E-02	7.32E-03
9.75	247.65	6200.3513	19.55945	5.58E-01	2.34E+01	1.06E+01	1.55E-02	7.03E-03
10.00	254.00	5786.9946	18.25549	5.76E-01	2.41E+01	1.09E+01	1.49E-02	6.75E-03
10.25	260.35	5373.6378	16.95152	5.92E-01	2.48E+01	1.12E+01	1.43E-02	6.49E-03
10.50	266.70	4960.2811	15.64756	6.07E-01	2.54E+01	1.15E+01	1.38E-02	6.25E-03
10.75	273.05	4546.9243	14.3436	6.21E-01	2.60E+01	1.18E+01	1.33E-02	6.03E-03
11.00	279.40	4133.5676	13.03963	6.34E-01	2.65E+01	1.20E+01	1.28E-02	5.83E-03
11.25	285.75	3720.2108	11.73567	6.45E-01	2.70E+01	1.23E+01	1.24E-02	5.64E-03
11.50	292.10	3306.854	10.43171	6.56E-01	2.74E+01	1.24E+01	1.21E-02	5.48E-03
11.75	298.45	2893.4973	9.127744	6.65E-01	2.78E+01	1.26E+01	1.18E-02	5.34E-03
12.00	304.80	2480.1405	7.82378	6.72E-01	2.82E+01	1.28E+01	1.15E-02	5.21E-03

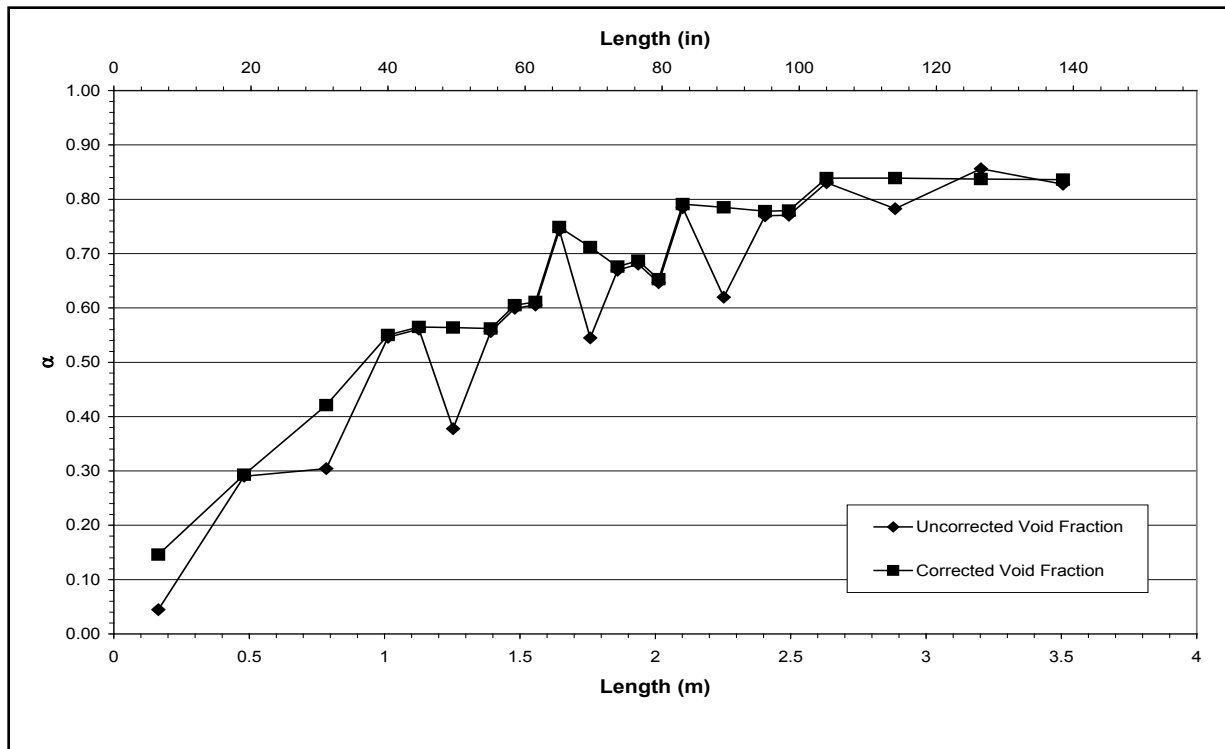


Figure A-40 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1566C for Time Period 4110 to 4220 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1566-D

Test Conditions

Date: 5/28/2003

Steady-state time window: 4380 – 4460 seconds

Inlet flow rate: 0.744 cm/sec (0.293 in./sec)

Inlet mass flow rate: 0.036 kg/sec (0.080 lbm/sec)

Inlet flow temperature: 369.4 K (205.3 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 76.84 kW

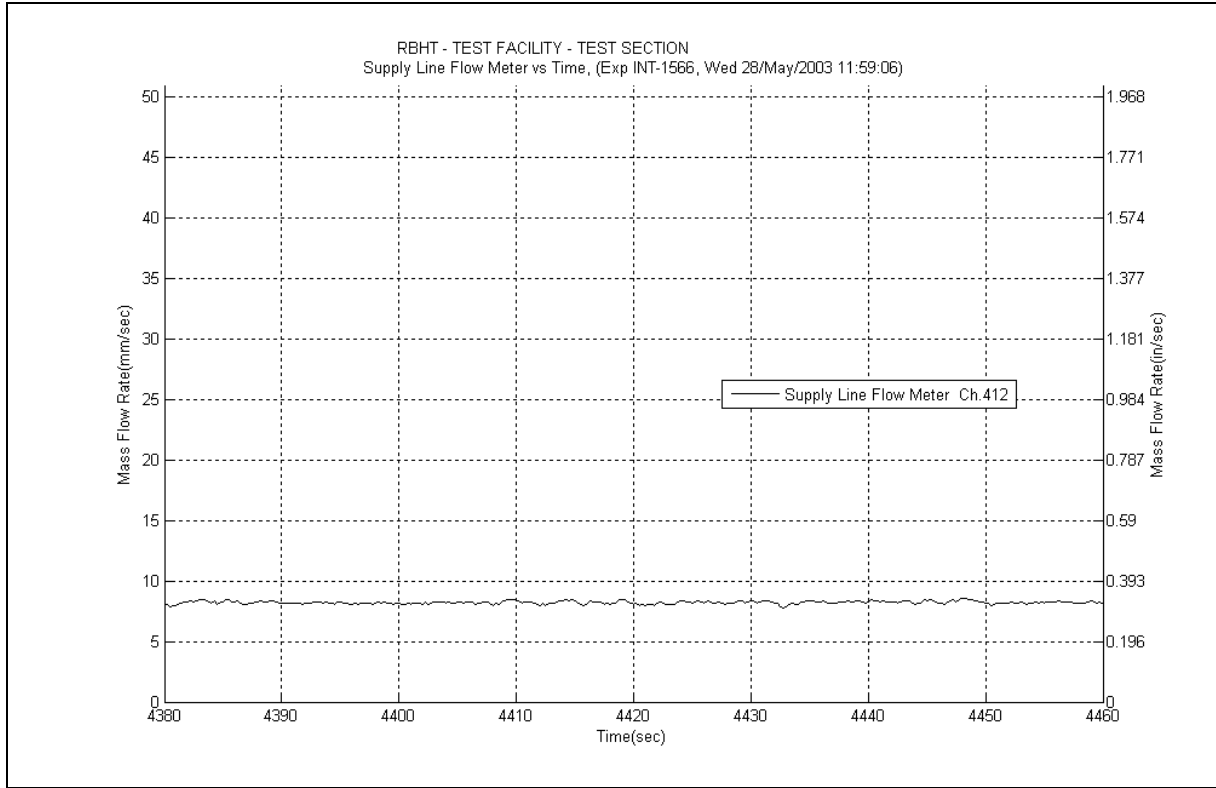


Figure A-41 Inlet Flow Plot for Experiment 1566D

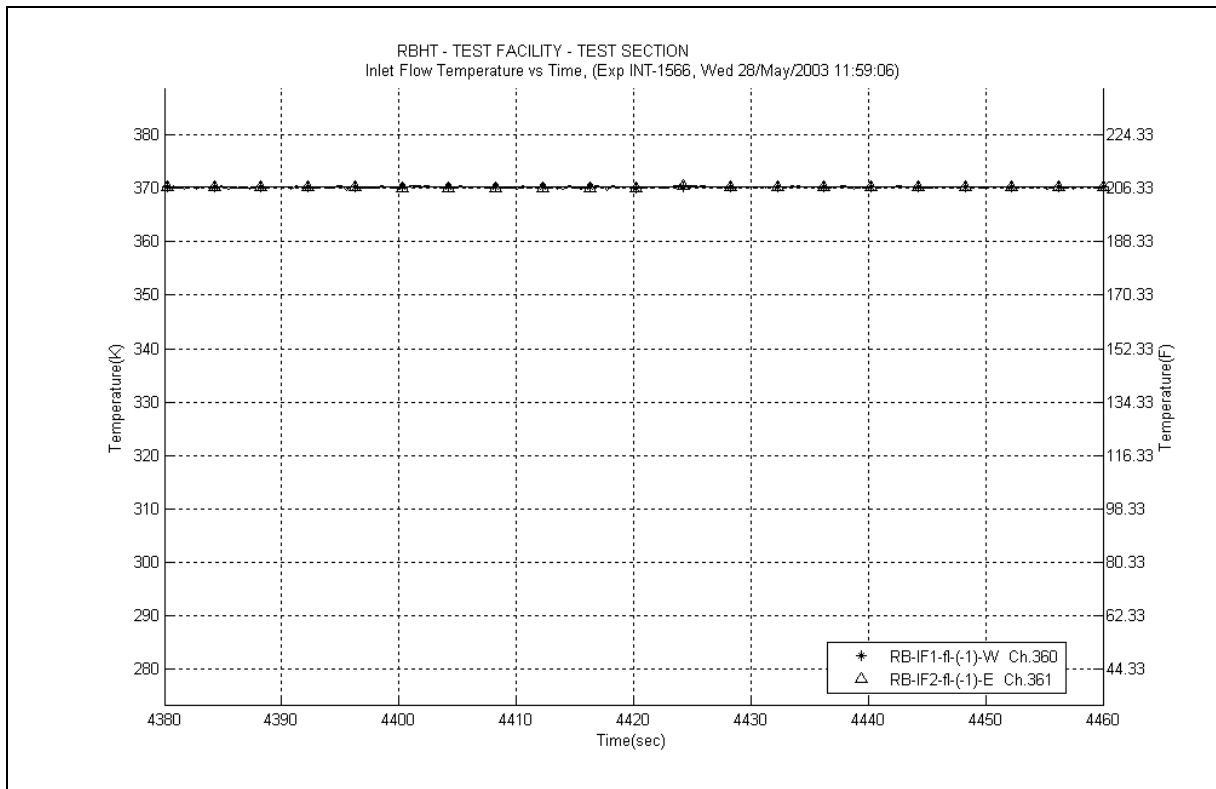


Figure A-42 Inlet Temperature Plot for Experiment 1566D

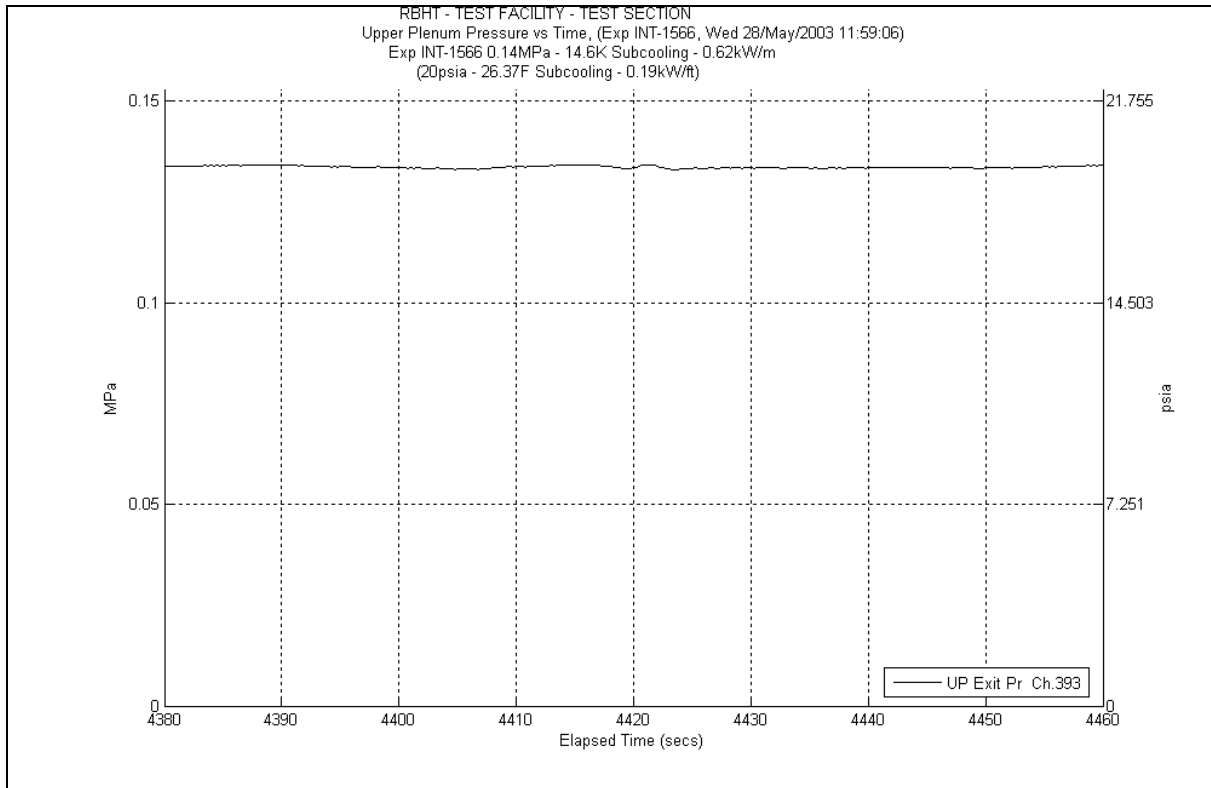


Figure A-43 System Pressure Plot for Experiment 1566D

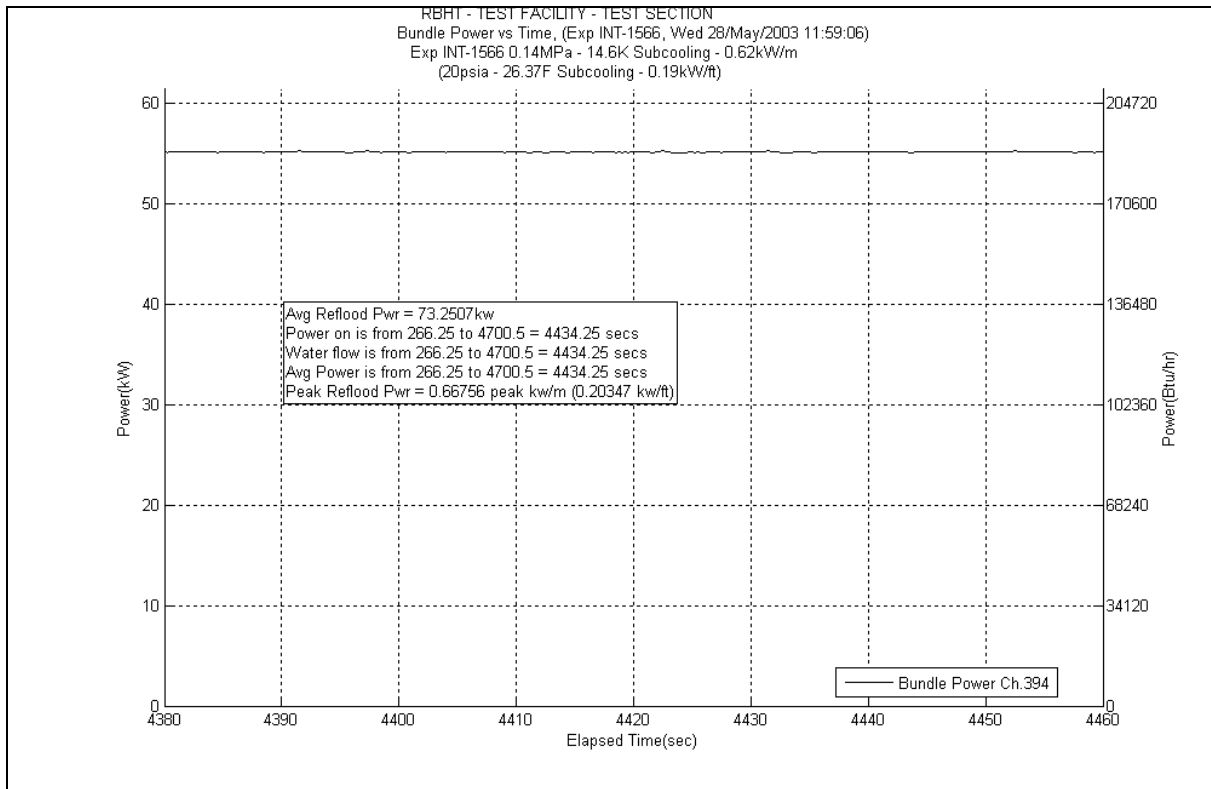


Figure A-44 Bundle Power Plot for Experiment 1566D

Table A-17 Data Results for RBHT Test 1566D for Time Period 4380 to 4460 seconds

Results for RBHT Test 1566
Valid Time Period 4380 to 4460 seconds
Collapsed Liquid Level = 57.720 inches = 1531.37 mm
(Z_{cs1}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.866	7.672	367.342	0.282	13.521	0.069	3.310	0.000	0.000	7.318	350.388	2887.3	138245.5279	0.872	0.868	0.876
*	120-133	3048-3378	383	0.892	7.286	348.839	0.320	15.307	0.123	5.908	-1.936	-92.717	8.779	420.341	2896.1	138665.8687	0.870	0.866	0.874
*	108-120	2743-3048	382	0.812	11.736	561.929	0.269	12.889	0.154	7.378	2.969	142.148	8.344	399.513	2904.4	139065.3815	0.866	0.862	0.870
	100-108	2540-2743	381	0.858	5.918	283.378	0.161	7.699	0.113	5.396	0.000	0.000	5.643	270.188	2910.1	139335.5698	0.864	0.860	0.868
	97-100	2464-2540	380	0.795	3.195	152.988	0.056	2.688	0.041	1.953	0.000	0.000	3.097	148.285	2913.2	139483.855	0.801	0.797	0.805
	93-97	2362-2464	379	0.788	4.408	211.041	0.071	3.420	0.053	2.544	0.000	0.000	4.282	205.023	2917.5	139688.8782	0.794	0.790	0.798
*	85-93	2159-2362	378	0.640	14.945	715.585	0.132	6.296	0.102	4.884	6.244	298.955	8.468	405.450	2925.9	140094.3282	0.796	0.792	0.800
	81-85	2057-2159	377	0.793	4.297	205.750	0.060	2.884	0.049	2.339	0.000	0.000	4.187	200.475	2930.1	140294.8029	0.798	0.794	0.802
	78-81	1981-2057	376	0.659	5.319	254.659	0.043	2.052	0.036	1.710	0.000	0.000	5.238	250.797	2935.4	140545.5997	0.664	0.660	0.667
	75-78	1905-1981	375	0.688	4.854	232.423	0.041	1.959	0.035	1.671	0.000	0.000	4.777	228.724	2940.1	140774.3237	0.693	0.690	0.697
	72-75	1829-1905	374	0.677	5.035	241.085	0.039	1.868	0.034	1.633	0.000	0.000	4.96	237.486	2945.1	141011.8097	0.682	0.678	0.685
*	67-72	1702-1829	373	0.559	11.458	548.609	0.061	2.919	0.055	2.636	3.999	191.469	7.343	351.585	2952.4	141363.3945	0.717	0.714	0.721
	63-67	1600-1702	372	0.749	5.224	250.127	0.045	2.163	0.042	2.032	0.000	0.000	5.135	245.865	2957.6	141609.2596	0.753	0.749	0.756
	60-63	1524-1600	371	0.616	5.986	286.613	0.032	1.525	0.031	1.479	0.000	0.000	5.921	283.499	2963.5	141892.7586	0.620	0.617	0.623
	57-60	1448-1524	370	0.611	6.060	290.165	0.030	1.444	0.030	1.441	0.000	0.000	5.998	287.186	2969.5	142179.9444	0.615	0.612	0.618
	53-57	1346-1448	369	0.574	8.852	423.846	0.038	1.801	0.039	1.861	0.000	0.000	8.773	420.053	2978.3	142599.9979	0.578	0.575	0.580
*	46-53	1168-1346	368	0.394	22.014	1054.024	0.059	2.823	0.065	3.093	6.130	293.515	15.76	754.593	2994	143354.5907	0.566	0.563	0.569
	43-46	1092-1168	367	0.552	6.984	334.414	0.023	1.083	0.026	1.262	0.000	0.000	6.933	331.954	3001	143686.5445	0.555	0.552	0.558
	37-43	940-1092	366	0.564	13.587	650.558	0.041	1.945	0.050	2.408	0.000	0.000	13.49	645.905	3014.4	144332.4492	0.567	0.564	0.570
*	25-37	635-940	365	0.316	42.603	2039.829	0.063	3.033	0.091	4.354	7.958	381.052	34.49	1651.390	3048.9	145983.8393	0.446	0.444	0.449
	13-25	330-635	364	0.324	42.122	2016.821	0.039	1.848	0.078	3.739	0.000	0.000	41.99	2010.492	3090.9	147994.3312	0.326	0.324	0.328
*	0-13	0-330	363	0.059	63.515	3041.137	0.017	0.800	0.037	1.789	6.971	333.791	56.49	2704.756	3147.4	150699.087	0.163	0.162	0.164

Table A-18 Energy Balance Results for RBHT Test 1566D for Time Period 4380 to 4460 seconds

Results for RBHT Test 1566 Valid Time Period 4380 to 4460 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2480.3081	7.824309	0.00E+00	0.00E+00	0.00E+00	2.58E-02	1.17E-02
0.25	6.35	2618.103	8.258993	0.00E+00	0.00E+00	0.00E+00	2.58E-02	1.17E-02
0.50	12.70	2755.8979	8.693677	0.00E+00	0.00E+00	0.00E+00	2.58E-02	1.17E-02
0.75	19.05	2893.6928	9.12836	9.67E-03	2.98E-01	1.35E-01	2.55E-02	1.16E-02
1.00	25.40	3031.4877	9.563044	2.14E-02	6.59E-01	2.99E-01	2.52E-02	1.15E-02
1.25	31.75	3169.2826	9.997728	3.37E-02	1.04E+00	4.71E-01	2.49E-02	1.13E-02
1.50	38.10	3307.0775	10.43241	4.66E-02	1.43E+00	6.50E-01	2.46E-02	1.12E-02
1.75	44.45	3444.8724	10.8671	6.00E-02	1.85E+00	8.37E-01	2.42E-02	1.10E-02
2.00	50.80	3582.6673	11.30178	7.39E-02	2.28E+00	1.03E+00	2.39E-02	1.08E-02
2.25	57.15	3720.4621	11.73646	8.84E-02	2.72E+00	1.23E+00	2.35E-02	1.07E-02
2.50	63.50	3858.257	12.17115	1.04E-01	3.19E+00	1.44E+00	2.31E-02	1.05E-02
2.75	69.85	3996.0519	12.60583	1.19E-01	3.67E+00	1.66E+00	2.27E-02	1.03E-02
3.00	76.20	4133.8468	13.04051	1.35E-01	4.16E+00	1.89E+00	2.23E-02	1.01E-02
3.25	82.55	4271.6417	13.4752	1.52E-01	4.67E+00	2.12E+00	2.19E-02	9.92E-03
3.50	88.90	4409.4366	13.90988	1.69E-01	5.20E+00	2.36E+00	2.14E-02	9.72E-03
3.75	95.25	4547.2315	14.34457	1.87E-01	5.75E+00	2.61E+00	2.10E-02	9.51E-03
4.00	101.60	4685.0264	14.77925	2.05E-01	6.31E+00	2.86E+00	2.05E-02	9.30E-03
4.25	107.95	4822.8213	15.21393	2.24E-01	6.90E+00	3.13E+00	2.00E-02	9.08E-03
4.50	114.30	4960.6162	15.64862	2.44E-01	7.49E+00	3.40E+00	1.95E-02	8.85E-03
4.75	120.65	5098.4111	16.0833	2.64E-01	8.11E+00	3.68E+00	1.90E-02	8.62E-03
5.00	127.00	5236.206	16.51799	2.84E-01	8.74E+00	3.96E+00	1.85E-02	8.38E-03
5.25	133.35	5374.0009	16.95267	3.05E-01	9.39E+00	4.26E+00	1.79E-02	8.13E-03
5.50	139.70	5511.7958	17.38735	3.27E-01	1.01E+01	4.56E+00	1.74E-02	7.88E-03
5.75	146.05	5649.5907	17.82204	3.49E-01	1.07E+01	4.87E+00	1.68E-02	7.62E-03
6.00	152.40	5787.3856	18.25672	3.72E-01	1.14E+01	5.19E+00	1.62E-02	7.35E-03
6.25	158.75	5925.1805	18.6914	3.95E-01	1.21E+01	5.51E+00	1.56E-02	7.08E-03
6.50	165.10	6062.9754	19.12609	4.19E-01	1.29E+01	5.84E+00	1.50E-02	6.80E-03
6.75	171.45	6200.7702	19.56077	4.43E-01	1.36E+01	6.18E+00	1.44E-02	6.52E-03
7.00	177.80	6338.5651	19.99546	4.68E-01	1.44E+01	6.53E+00	1.37E-02	6.23E-03
7.25	184.15	6476.36	20.43014	4.93E-01	1.52E+01	6.88E+00	1.31E-02	5.93E-03
7.50	190.50	6614.1549	20.86482	5.19E-01	1.60E+01	7.25E+00	1.24E-02	5.63E-03
7.75	196.85	6751.9498	21.29951	5.46E-01	1.68E+01	7.62E+00	1.17E-02	5.32E-03
8.00	203.20	6889.7447	21.73419	5.73E-01	1.76E+01	7.99E+00	1.10E-02	5.00E-03
8.25	209.55	7027.5396	22.16888	6.00E-01	1.85E+01	8.38E+00	1.03E-02	4.68E-03
8.50	215.90	7165.3345	22.60356	6.29E-01	1.93E+01	8.77E+00	9.58E-03	4.35E-03
8.75	222.25	7303.1294	23.03824	6.57E-01	2.02E+01	9.17E+00	8.84E-03	4.01E-03
9.00	228.60	7440.9243	23.47293	6.87E-01	2.11E+01	9.58E+00	8.09E-03	3.67E-03
9.25	234.95	7027.5396	22.16888	7.15E-01	2.20E+01	9.98E+00	7.35E-03	3.33E-03
9.50	241.30	6614.1549	20.86482	7.42E-01	2.28E+01	1.04E+01	6.65E-03	3.02E-03
9.75	247.65	6200.7702	19.56077	7.68E-01	2.36E+01	1.07E+01	5.99E-03	2.72E-03
10.00	254.00	5787.3856	18.25672	7.92E-01	2.44E+01	1.10E+01	5.38E-03	2.44E-03
10.25	260.35	5374.0009	16.95267	8.14E-01	2.50E+01	1.14E+01	4.81E-03	2.18E-03
10.50	266.70	4960.6162	15.64862	8.34E-01	2.57E+01	1.16E+01	4.28E-03	1.94E-03
10.75	273.05	4547.2315	14.34457	8.53E-01	2.63E+01	1.19E+01	3.79E-03	1.72E-03
11.00	279.40	4133.8468	13.04051	8.70E-01	2.68E+01	1.21E+01	3.35E-03	1.52E-03
11.25	285.75	3720.4621	11.73646	8.86E-01	2.73E+01	1.24E+01	2.94E-03	1.34E-03
11.50	292.10	3307.0775	10.43241	9.00E-01	2.77E+01	1.26E+01	2.58E-03	1.17E-03
11.75	298.45	2893.6928	9.12836	9.12E-01	2.81E+01	1.27E+01	2.27E-03	1.03E-03
12.00	304.80	2480.3081	7.824309	9.23E-01	2.84E+01	1.29E+01	1.99E-03	9.03E-04

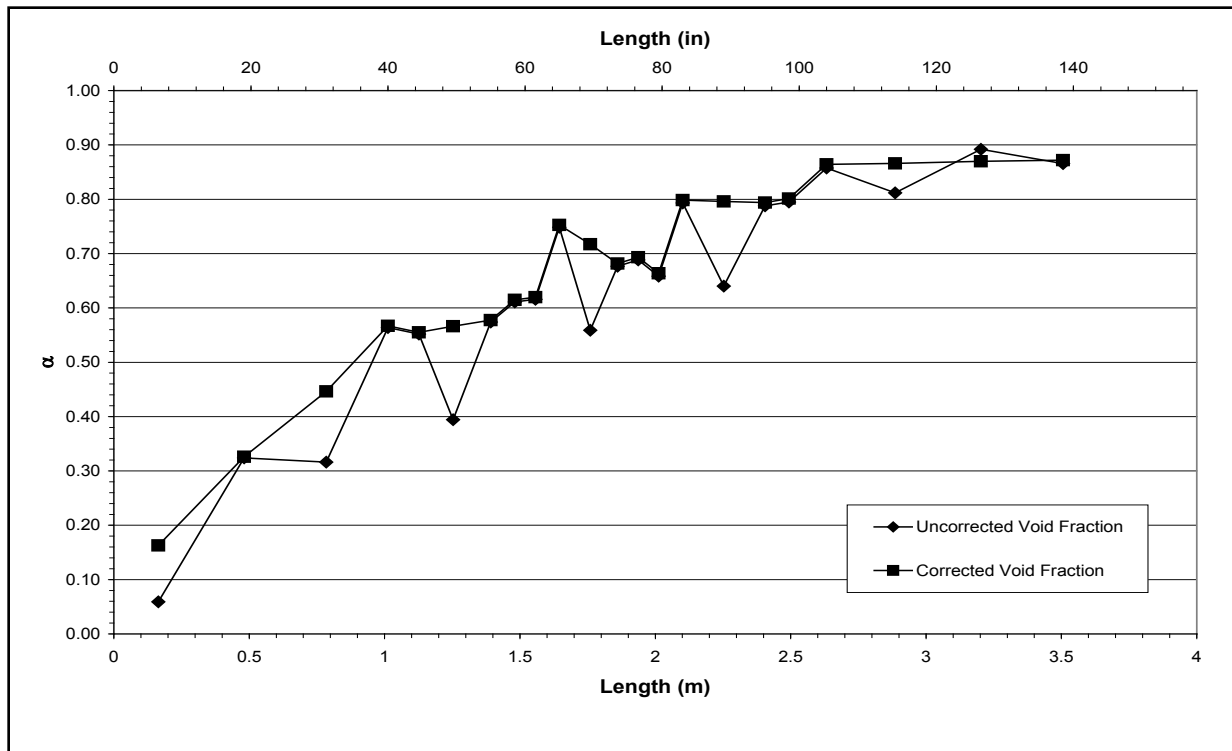


Figure A-45 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1566D for Time Period 4380 to 4460 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1566-E

Test Conditions

Date: 5/28/2003

Steady-state time window: 4600 – 4650 seconds

Inlet flow rate: 0.508 cm/sec (0.200 in./sec)

Inlet mass flow rate: 0.025 kg/sec (0.055 lbm/sec)

Inlet flow temperature: 369.4 K (205.3 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 76.84 kW

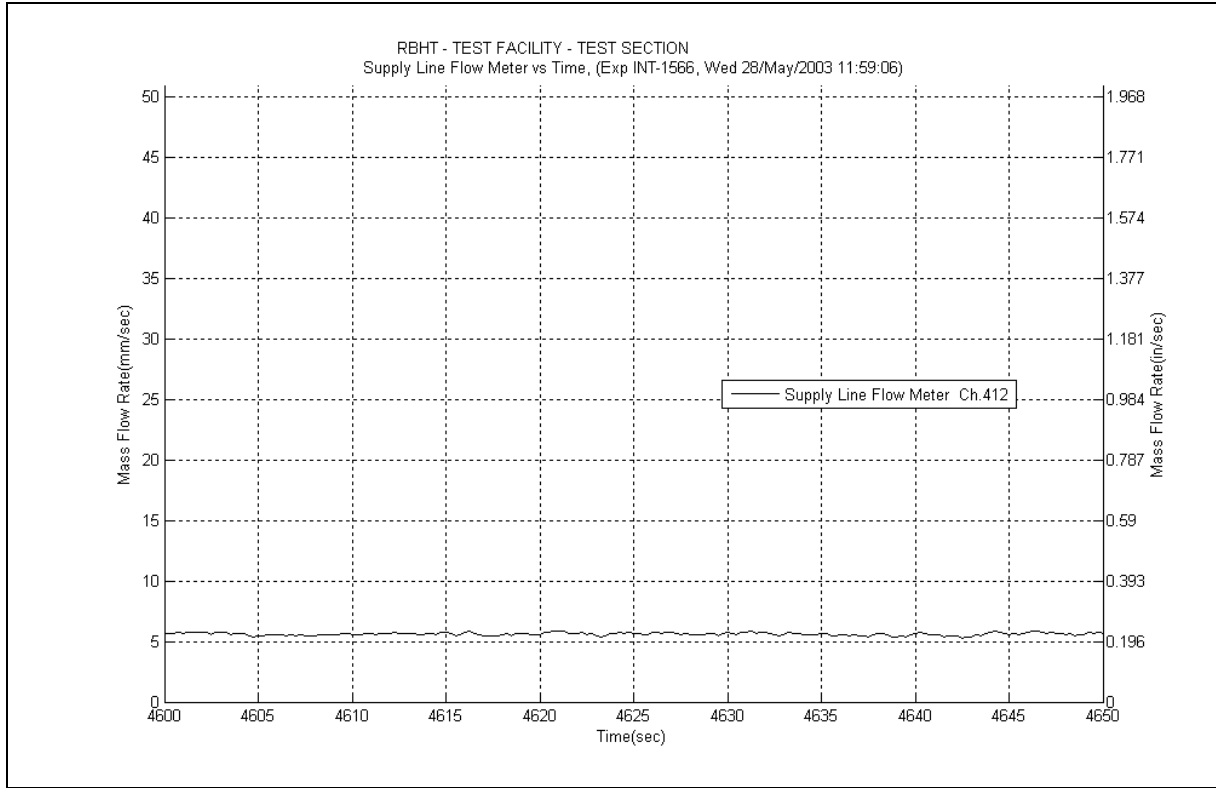


Figure A-46 Inlet Flow Plot for Experiment 1566E

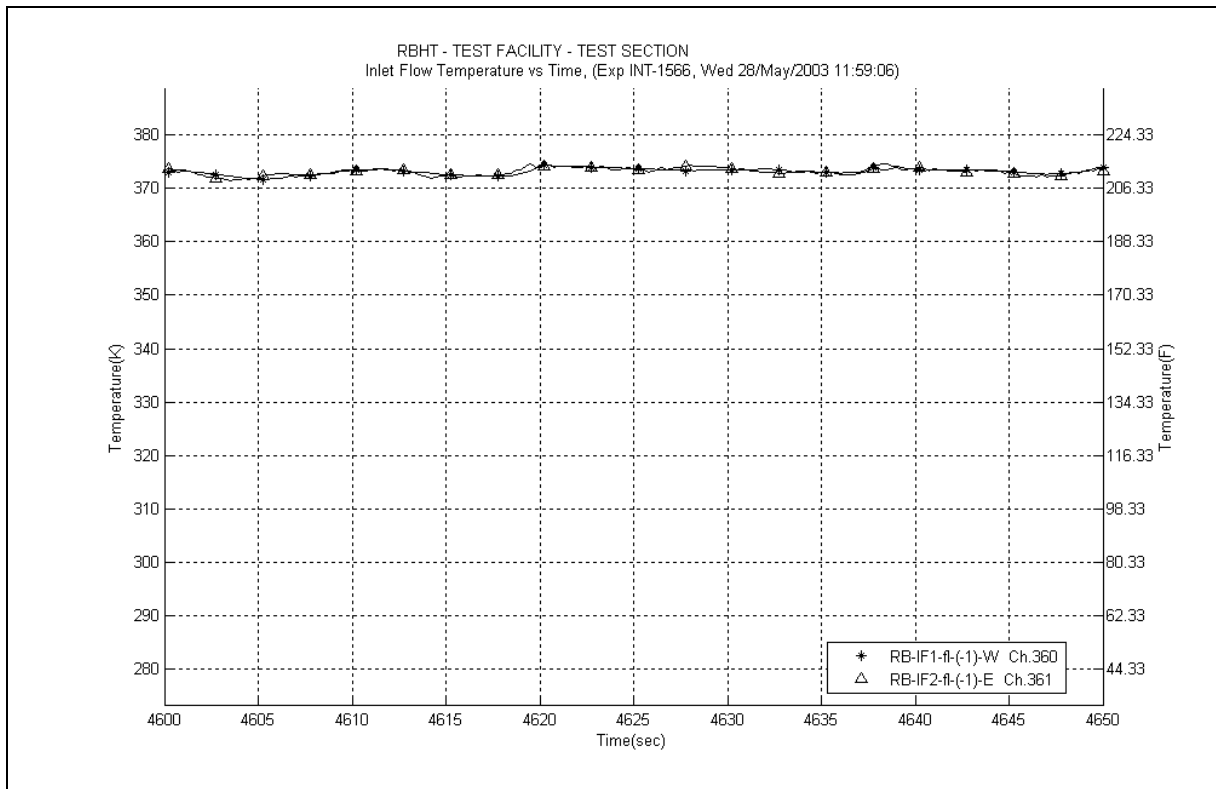


Figure A-47 Inlet Temperature Plot for Experiment 1566E

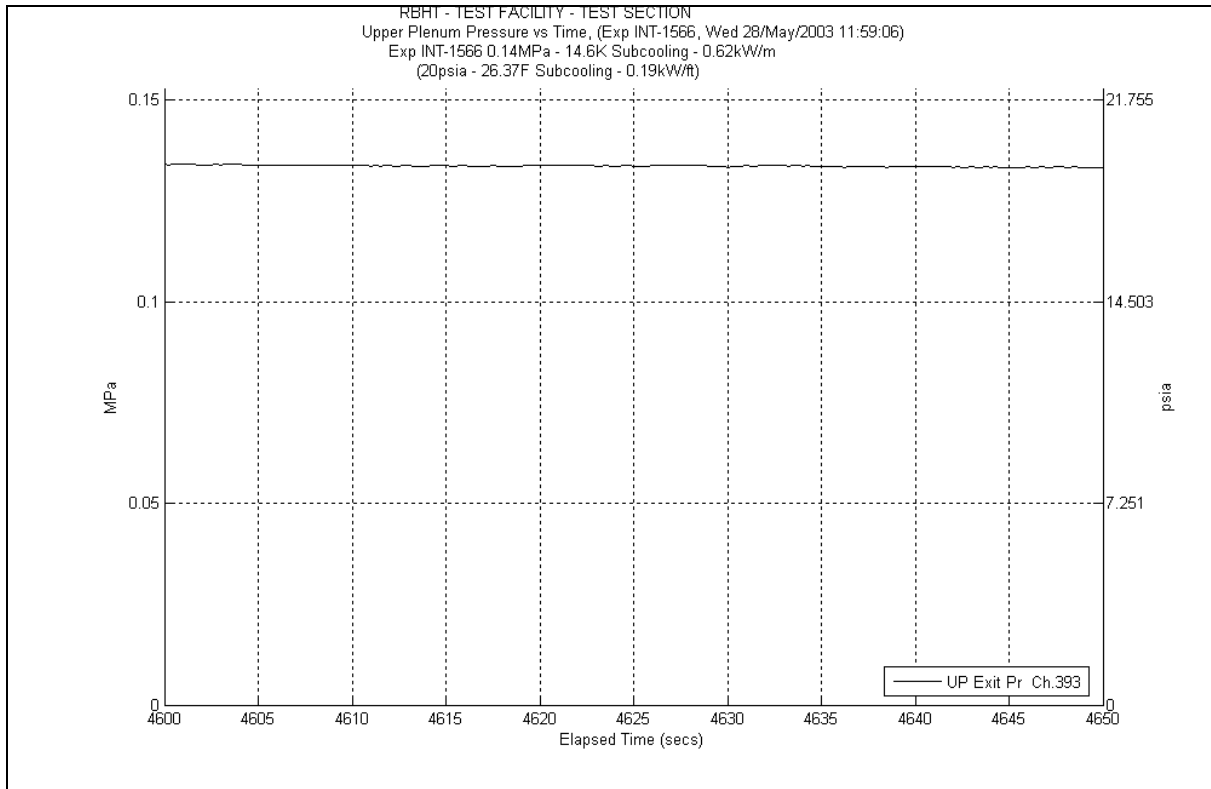


Figure A-48 System Pressure Plot for Experiment 1566E

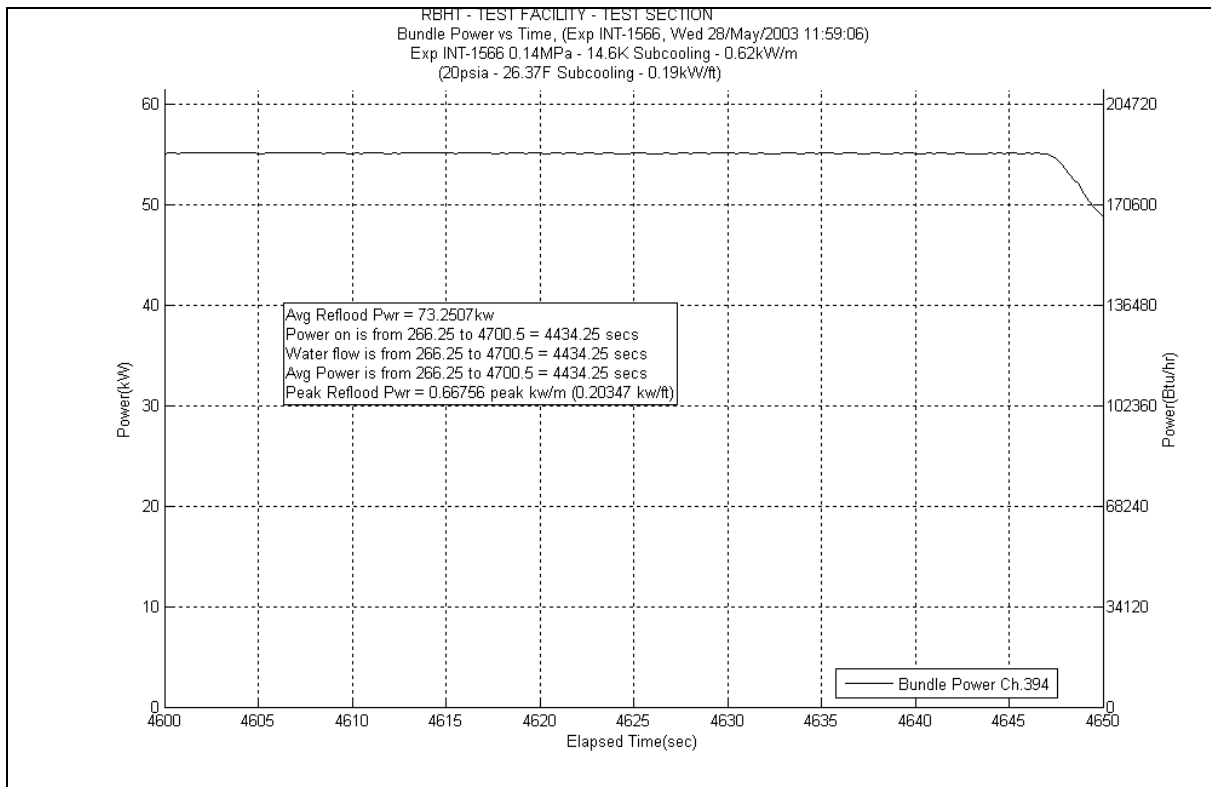


Figure A-49 Bundle Power Plot for Experiment 1566E

Table A-19 Data Results for RBHT Test 1566E for Time Period 4600 to 4650 seconds

Results for RBHT Test 1566
Valid Time Period 4600 to 4650 seconds
Collapsed Liquid Level = 50.794 inches = 1466.09 mm
(Z_{CSL}) Onset of Significant Void = 6.5 inches = 165 mm
(Z_{2s}) Two-Phase Level (Dryout) = 112.70 inches = 2862.58 mm
(S) Level Swell = 2.303

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.939	3.505	167.844	0.085	4.070	0.000	0.000	0.000	0.000	3.416	163.559	2883.4	138058.6991	0.94	0.935	0.945
*	120-133	3048-3378	383	0.958	2.856	136.762	0.101	4.836	0.000	0.000	-2.009	-96.176	4.764	228.102	2888.2	138286.8007	0.929	0.924	0.934
*	108-120	2743-3048	382	0.896	6.497	311.071	0.093	4.453	0.000	0.000	0.664	31.786	5.74	274.833	2893.9	138561.6333	0.908	0.903	0.913
	100-108	2540-2743	381	0.893	4.440	212.603	0.099	4.740	0.064	3.064	0.000	0.000	4.274	204.640	2898.2	138766.2736	0.897	0.893	0.901
	97-100	2464-2540	380	0.812	2.929	140.243	0.037	1.772	0.028	1.341	0.000	0.000	2.864	137.129	2901.1	138903.4026	0.816	0.812	0.820
	93-97	2362-2464	379	0.782	4.534	217.078	0.048	2.298	0.037	1.772	0.000	0.000	4.446	212.876	2905.5	139116.2782	0.786	0.782	0.790
*	85-93	2159-2362	378	0.663	13.996	670.133	0.090	4.309	0.070	3.352	4.305	206.126	9.531	456.347	2915	139572.625	0.771	0.767	0.775
	81-85	2057-2159	377	0.752	5.162	247.166	0.041	1.963	0.034	1.628	0.000	0.000	5.085	243.471	2920.1	139816.0961	0.755	0.751	0.759
	78-81	1981-2057	376	0.607	6.123	293.168	0.029	1.389	0.025	1.197	0.000	0.000	6.067	290.490	2926.2	140106.5856	0.611	0.608	0.614
	75-78	1905-1981	375	0.639	5.630	269.545	0.028	1.341	0.024	1.149	0.000	0.000	5.575	266.932	2931.8	140373.518	0.642	0.639	0.645
	72-75	1829-1905	374	0.616	5.978	286.205	0.027	1.293	0.023	1.101	0.000	0.000	5.927	283.786	2937.7	140657.3043	0.619	0.616	0.622
*	67-72	1702-1829	373	0.501	12.957	620.402	0.042	2.011	0.038	1.819	3.278	156.969	9.599	459.603	2947.3	141116.9069	0.63	0.627	0.633
	63-67	1600-1702	372	0.638	7.515	359.808	0.031	1.484	0.029	1.389	0.000	0.000	7.454	356.899	2954.7	141473.8063	0.641	0.638	0.644
	60-63	1524-1600	371	0.525	7.406	354.586	0.022	1.053	0.021	1.005	0.000	0.000	7.362	352.494	2962.1	141826.3008	0.527	0.524	0.530
	57-60	1448-1524	370	0.526	7.385	353.592	0.021	1.005	0.021	1.005	0.000	0.000	7.34	351.441	2969.4	142177.7419	0.529	0.526	0.532
	53-57	1346-1448	369	0.492	10.558	505.522	0.026	1.245	0.027	1.293	0.000	0.000	10.5	502.743	2979.9	142680.4846	0.494	0.492	0.496
*	46-53	1168-1346	368	0.339	24.040	1151.038	0.040	1.915	0.044	2.107	5.206	249.261	18.75	897.755	2998.7	143578.2394	0.484	0.482	0.486
	43-46	1092-1168	367	0.472	8.226	393.874	0.015	0.718	0.018	0.862	0.000	0.000	8.192	392.235	3006.9	143970.4744	0.474	0.472	0.476
	37-43	940-1092	366	0.479	16.240	777.553	0.028	1.341	0.035	1.676	0.000	0.000	16.17	774.224	3023.1	144744.6982	0.481	0.479	0.483
*	25-37	635-940	365	0.331	41.708	1996.972	0.044	2.107	0.063	3.016	5.411	259.063	36.19	1732.787	3059.2	146477.4847	0.419	0.417	0.421
	13-25	330-635	364	0.356	40.129	1921.380	0.028	1.341	0.054	2.586	0.000	0.000	40.03	1916.647	3099.3	148394.1314	0.357	0.355	0.359
*	0-13	0-330	363	0.083	61.879	2962.760	0.013	0.622	0.037	1.772	6.399	306.363	55.43	2654.003	3154.7	151048.134	0.179	0.178	0.180

Table A-20 Energy Balance Results for RBHT Test 1566E for Time Period 4600 to 4650 seconds

Results for RBHT Test 1566 Valid Time Period 4600 to 4650 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2473.6942	7.803445	0.00E+00	0.00E+00	0.00E+00	1.76E-02	7.98E-03
0.25	6.35	2611.1217	8.23697	0.00E+00	0.00E+00	0.00E+00	1.76E-02	7.98E-03
0.50	12.70	2748.5491	8.670494	1.42E-02	3.00E-01	1.36E-01	1.74E-02	7.87E-03
0.75	19.05	2885.9766	9.104019	3.05E-02	6.48E-01	2.94E-01	1.71E-02	7.74E-03
1.00	25.40	3023.404	9.537544	4.77E-02	1.01E+00	4.59E-01	1.68E-02	7.60E-03
1.25	31.75	3160.8315	9.971069	6.57E-02	1.39E+00	6.32E-01	1.64E-02	7.46E-03
1.50	38.10	3298.2589	10.40459	8.45E-02	1.79E+00	8.13E-01	1.61E-02	7.31E-03
1.75	44.45	3435.6864	10.83812	1.04E-01	2.21E+00	1.00E+00	1.58E-02	7.15E-03
2.00	50.80	3573.1138	11.27164	1.24E-01	2.64E+00	1.20E+00	1.54E-02	6.99E-03
2.25	57.15	3710.5413	11.70517	1.46E-01	3.09E+00	1.40E+00	1.50E-02	6.82E-03
2.50	63.50	3847.9688	12.13869	1.68E-01	3.56E+00	1.61E+00	1.47E-02	6.65E-03
2.75	69.85	3985.3962	12.57222	1.90E-01	4.04E+00	1.83E+00	1.43E-02	6.46E-03
3.00	76.20	4122.8237	13.00574	2.14E-01	4.54E+00	2.06E+00	1.38E-02	6.28E-03
3.25	82.55	4260.2511	13.43927	2.38E-01	5.06E+00	2.29E+00	1.34E-02	6.08E-03
3.50	88.90	4397.6786	13.87279	2.63E-01	5.59E+00	2.54E+00	1.30E-02	5.88E-03
3.75	95.25	4535.106	14.30632	2.89E-01	6.14E+00	2.79E+00	1.25E-02	5.67E-03
4.00	101.60	4672.5335	14.73984	3.16E-01	6.71E+00	3.04E+00	1.20E-02	5.46E-03
4.25	107.95	4809.9609	15.17337	3.44E-01	7.30E+00	3.31E+00	1.16E-02	5.24E-03
4.50	114.30	4947.3884	15.60689	3.72E-01	7.90E+00	3.58E+00	1.11E-02	5.01E-03
4.75	120.65	5084.8159	16.04041	4.01E-01	8.52E+00	3.86E+00	1.05E-02	4.78E-03
5.00	127.00	5222.2433	16.47394	4.31E-01	9.15E+00	4.15E+00	1.00E-02	4.54E-03
5.25	133.35	5359.6708	16.90746	4.62E-01	9.81E+00	4.45E+00	9.47E-03	4.30E-03
5.50	139.70	5497.0982	17.34099	4.94E-01	1.05E+01	4.75E+00	8.91E-03	4.04E-03
5.75	146.05	5634.5257	17.77451	5.26E-01	1.12E+01	5.06E+00	8.34E-03	3.78E-03
6.00	152.40	5771.9531	18.20804	5.59E-01	1.19E+01	5.38E+00	7.76E-03	3.52E-03
6.25	158.75	5909.3806	18.64156	5.93E-01	1.26E+01	5.71E+00	7.16E-03	3.25E-03
6.50	165.10	6046.808	19.07509	6.28E-01	1.33E+01	6.04E+00	6.55E-03	2.97E-03
6.75	171.45	6184.2355	19.50861	6.63E-01	1.41E+01	6.39E+00	5.93E-03	2.69E-03
7.00	177.80	6321.663	19.94214	7.00E-01	1.49E+01	6.74E+00	5.29E-03	2.40E-03
7.25	184.15	6459.0904	20.37566	7.37E-01	1.56E+01	7.09E+00	4.63E-03	2.10E-03
7.50	190.50	6596.5179	20.80919	7.75E-01	1.64E+01	7.46E+00	3.96E-03	1.80E-03
7.75	196.85	6733.9453	21.24271	8.14E-01	1.73E+01	7.83E+00	3.28E-03	1.49E-03
8.00	203.20	6871.3728	21.67624	8.53E-01	1.81E+01	8.21E+00	2.59E-03	1.17E-03
8.25	209.55	7008.8002	22.10976	8.93E-01	1.90E+01	8.60E+00	1.88E-03	8.51E-04
8.50	215.90	7146.2277	22.54329	9.35E-01	1.98E+01	9.00E+00	1.15E-03	5.22E-04
8.75	222.25	7283.6551	22.97681	9.77E-01	2.07E+01	9.40E+00	4.14E-04	1.88E-04
9.00	228.60	7421.0826	23.41033	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
9.25	234.95	7008.8002	22.10976	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
9.50	241.30	6596.5179	20.80919	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
9.75	247.65	6184.2355	19.50861	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
10.00	254.00	5771.9531	18.20804	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
10.25	260.35	5359.6708	16.90746	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
10.50	266.70	4947.3884	15.60689	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
10.75	273.05	4535.106	14.30632	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
11.00	279.40	4122.8237	13.00574	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
11.25	285.75	3710.5413	11.70517	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
11.50	292.10	3298.2589	10.40459	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
11.75	298.45	2885.9766	9.104019	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00
12.00	304.80	2473.6942	7.803445	1.00E+00	2.12E+01	9.63E+00	0.00E+00	0.00E+00

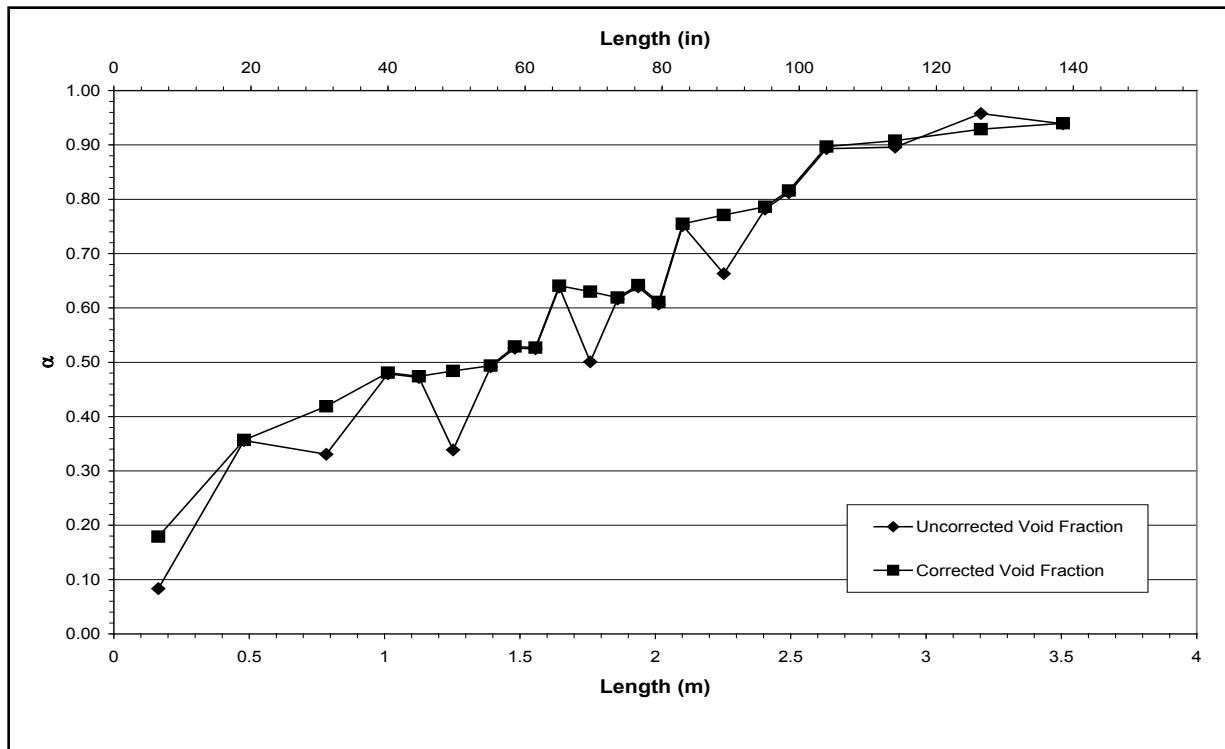


Figure A-50 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1566E for Time Period 4600 to 4650 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-A

Test Conditions

Date: 6/5/2003

Steady-state time window: 11384 – 11516 seconds

Inlet flow rate: 2.543 cm/sec (1.001 in./sec)

Inlet mass flow rate: 0.124 kg/sec (0.274 lbm/sec)

Inlet flow temperature: 382.0 K (228.0 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 81.15 kW

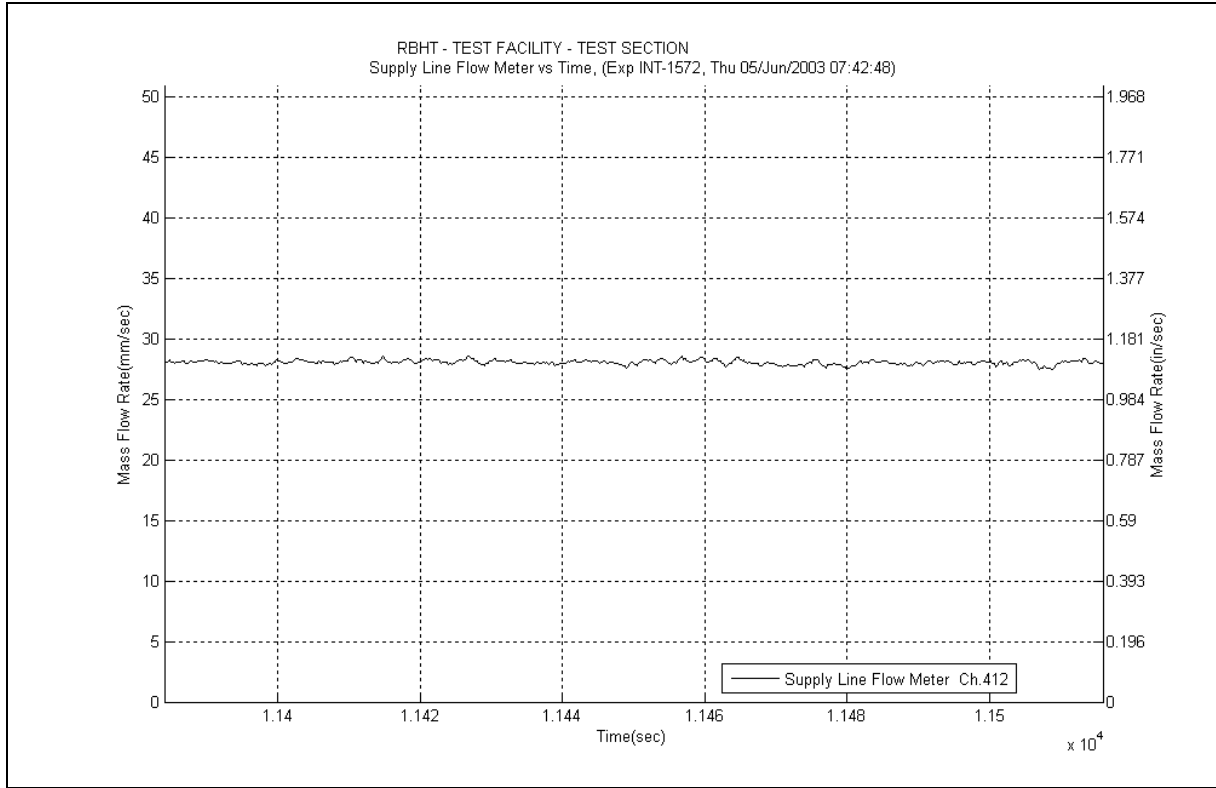


Figure A-51 Inlet Flow Plot for Experiment 1572A

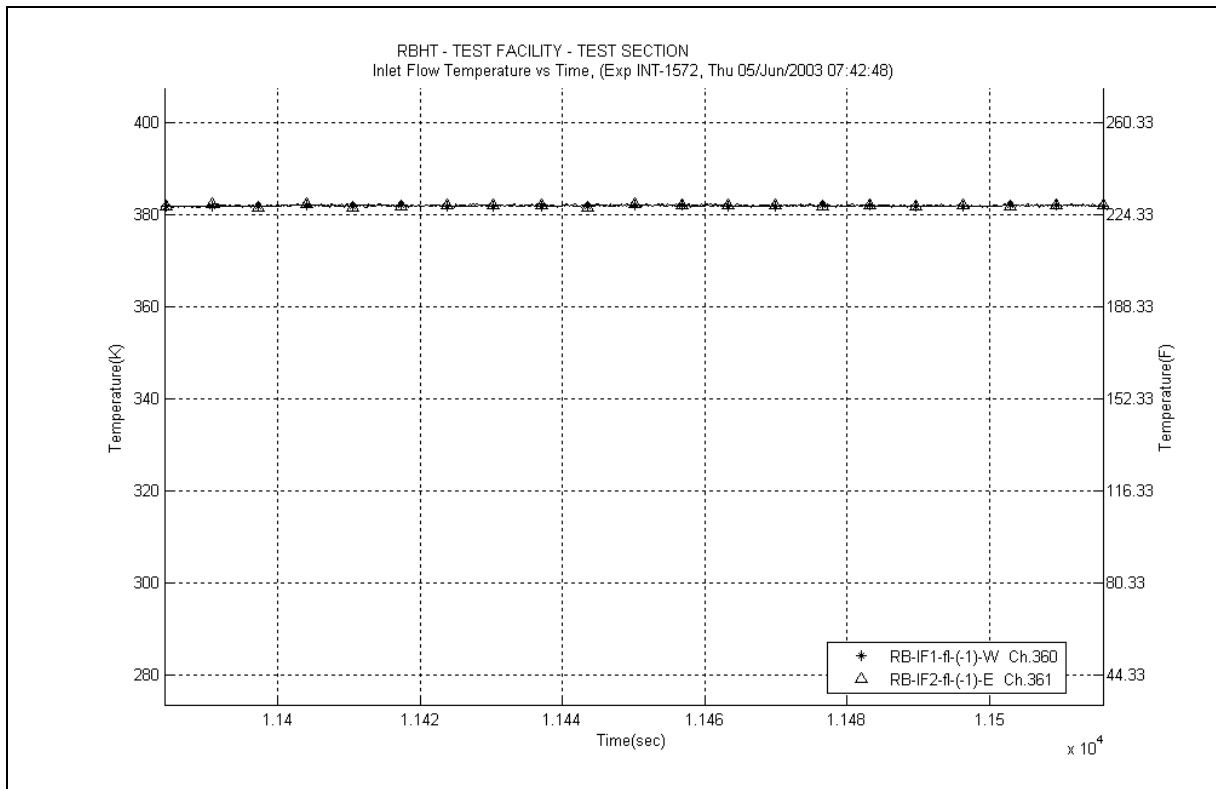


Figure A-52 Inlet Temperature Plot for Experiment 1572A

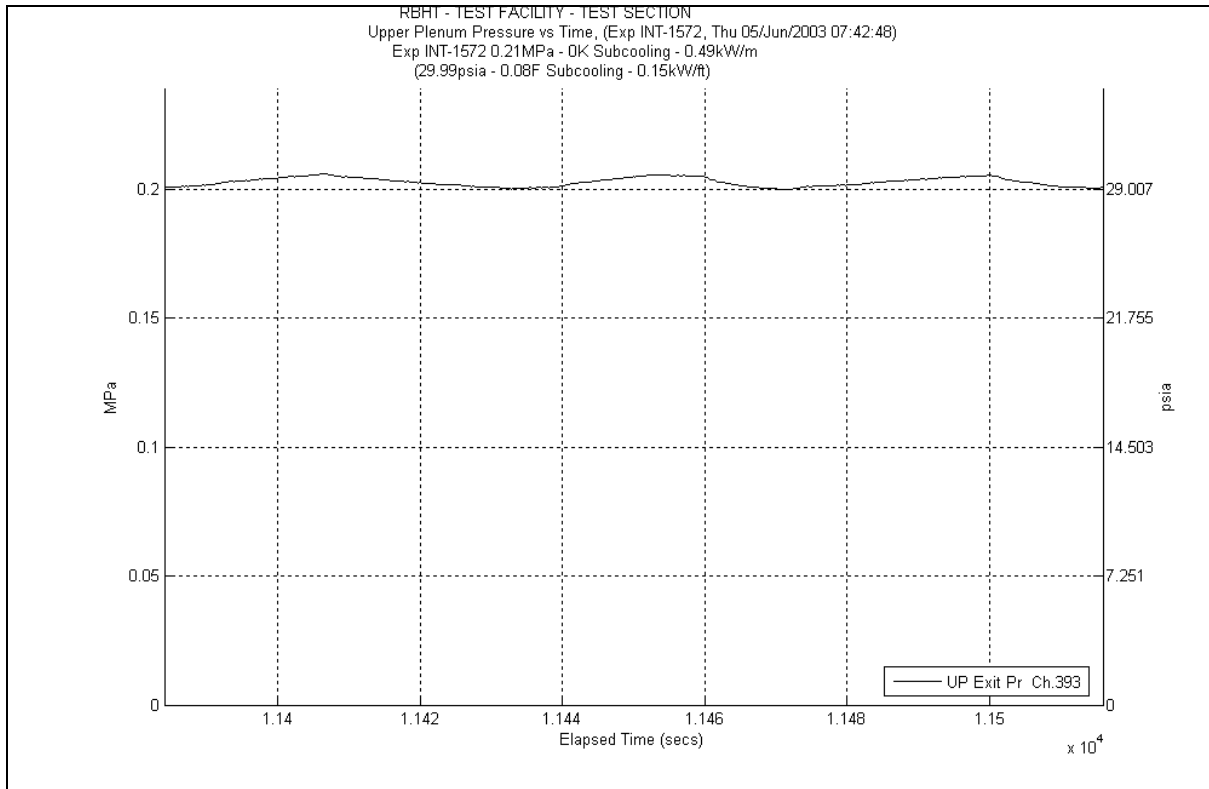


Figure A-53 System Pressure Plot for Experiment 1572A

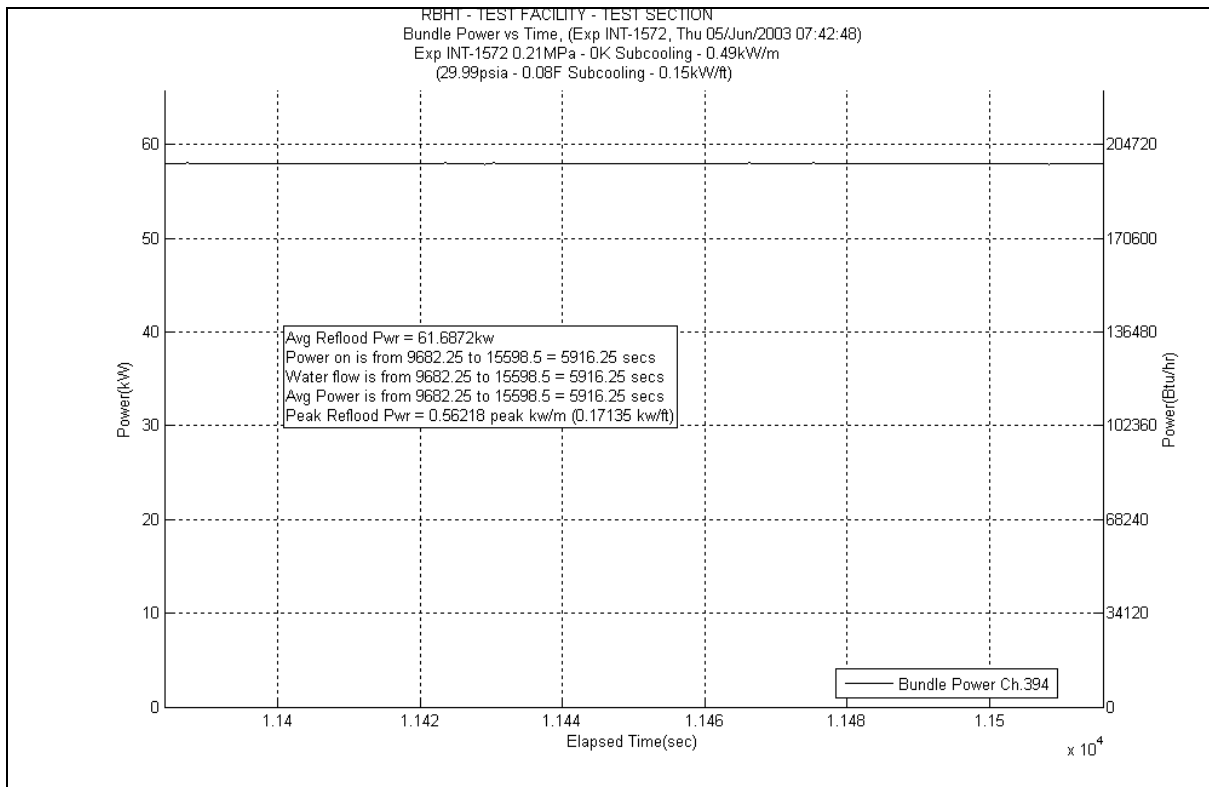


Figure A-54 Bundle Power Plot for Experiment 1572A

Table A-21 Data Results for RBHT Test 1572A for Time Period 11384 to 11516 seconds

Results for RBHT Test 1572
Valid Time Period 11384 to 11516 seconds
Collapsed Liquid Level = 74.439 inches = 1890.75 mm
(Z_{SSL}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{unconnected}$ (lbf/ft ²)	$\Delta P_{unconnected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.745	14.541	696.242	0.801	38.352	0.174	8.331	0.000	0.000	13.56	649.256	4333.56	207491.9665	0.763	0.759	0.767
*	120-133	3048-3378	383	0.753	16.650	797.197	0.890	42.613	0.310	14.843	-0.400	-19.161	15.85	758.902	4349.41	208250.8686	0.765	0.761	0.769
*	108-120	2743-3048	382	0.685	19.605	938.684	0.747	35.767	0.387	18.530	4.161	199.221	14.31	685.166	4363.72	208936.0351	0.777	0.766	0.774
	100-108	2540-2743	381	0.755	10.169	486.872	0.449	21.498	0.283	13.550	0.000	0.000	9.436	451.798	4373.156	209387.8332	0.773	0.769	0.777
	97-100	2464-2540	380	0.674	5.079	243.187	0.158	7.565	0.102	4.884	0.000	0.000	4.815	230.543	4377.971	209618.3766	0.691	0.688	0.694
	93-97	2362-2464	379	0.681	6.637	317.785	0.201	9.624	0.133	6.368	0.000	0.000	6.302	301.741	4384.273	209920.118	0.697	0.694	0.700
*	85-93	2159-2362	378	0.509	20.415	977.475	0.373	17.859	0.256	12.257	7.946	380.456	11.84	566.902	4396.113	210487.0202	0.715	0.711	0.719
	81-85	2057-2159	377	0.719	5.832	279.243	0.172	8.235	0.123	5.889	0.000	0.000	5.533	264.921	4401.646	210751.9417	0.734	0.730	0.738
	78-81	1981-2057	376	0.617	5.967	285.708	0.122	5.841	0.090	4.309	0.000	0.000	5.751	275.359	4407.397	211027.3011	0.631	0.628	0.634
	75-78	1905-1981	375	0.592	6.357	304.357	0.117	5.602	0.088	4.213	0.000	0.000	6.147	294.320	4413.544	211321.621	0.605	0.602	0.608
	72-75	1829-1905	374	0.562	6.819	326.488	0.112	5.363	0.086	4.118	0.000	0.000	6.617	316.824	4420.161	211638.4447	0.575	0.572	0.578
*	67-72	1702-1829	373	0.463	13.934	667.149	0.174	8.331	0.138	6.607	3.821	182.936	9.801	469.274	4429.962	212107.7191	0.622	0.619	0.625
	63-67	1600-1702	372	0.659	7.094	339.667	0.129	6.177	0.107	5.123	0.000	0.000	6.859	328.411	4436.821	212436.1297	0.67	0.667	0.673
	60-63	1524-1600	371	0.484	8.039	384.923	0.090	4.309	0.078	3.735	0.000	0.000	7.869	376.770	4444.69	212812.8995	0.495	0.493	0.497
	57-60	1448-1524	370	0.479	8.117	388.652	0.085	4.070	0.075	3.591	0.000	0.000	7.953	380.792	4452.643	213193.6912	0.489	0.487	0.491
	53-57	1346-1448	369	0.444	11.560	553.513	0.105	5.027	0.098	4.692	0.000	0.000	11.35	543.441	4463.993	213737.1321	0.453	0.451	0.455
*	46-53	1168-1346	368	0.317	24.840	1189.331	0.162	7.757	0.162	7.757	5.766	276.063	18.75	897.755	4482.743	214634.8869	0.484	0.482	0.486
	43-46	1092-1168	367	0.507	7.686	368.014	0.060	2.873	0.066	3.160	0.000	0.000	7.558	361.879	4490.301	214996.7659	0.515	0.512	0.518
	37-43	940-1092	366	0.397	18.784	899.396	0.104	4.980	0.126	6.033	0.000	0.000	18.55	888.179	4508.851	215884.9447	0.405	0.403	0.407
*	25-37	635-940	365	0.217	48.797	2336.390	0.140	6.703	0.228	10.917	1.139	54.513	47.29	2264.257	4556.141	218149.202	0.241	0.240	0.242
	13-25	330-635	364	0.075	57.641	2759.855	0.053	2.538	0.092	4.405	0.000	0.000	57.48	2752.157	4613.621	220901.3592	0.077	0.073	0.081
*	0-13	0-330	363	0.043	64.579	3092.062	0.005	0.239	0.000	0.000	-0.306	-14.649	64.88	3106.471	4678.501	224007.8303	0.039	0.037	0.041

Table A-22 Energy Balance Results for RBHT Test 1572A for Time Period 11384 to 11516 seconds

Results for RBHT Test 1572 Valid Time Period 11384 to 11516 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2621.0984	8.268442	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
0.25	6.35	2766.7149	8.7278	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
0.50	12.70	2912.3315	9.187158	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
0.75	19.05	3057.9481	9.646516	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
1.00	25.40	3203.5647	10.10587	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
1.25	31.75	3349.1812	10.56523	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
1.50	38.10	3494.7978	11.02459	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
1.75	44.45	3640.4144	11.48395	1.93E-03	1.39E-01	6.30E-02	8.89E-02	4.03E-02
2.00	50.80	3786.031	11.9433	6.31E-03	4.54E-01	2.06E-01	8.85E-02	4.01E-02
2.25	57.15	3931.6475	12.40266	1.09E-02	7.82E-01	3.55E-01	8.81E-02	3.99E-02
2.50	63.50	4077.2641	12.86202	1.56E-02	1.12E+00	5.09E-01	8.76E-02	3.98E-02
2.75	69.85	4222.8807	13.32138	2.05E-02	1.47E+00	6.69E-01	8.72E-02	3.96E-02
3.00	76.20	4368.4973	13.78074	2.56E-02	1.84E+00	8.34E-01	8.68E-02	3.94E-02
3.25	82.55	4514.1138	14.24009	3.08E-02	2.22E+00	1.01E+00	8.63E-02	3.91E-02
3.50	88.90	4659.7304	14.69945	3.62E-02	2.61E+00	1.18E+00	8.58E-02	3.89E-02
3.75	95.25	4805.347	15.15881	4.18E-02	3.01E+00	1.36E+00	8.53E-02	3.87E-02
4.00	101.60	4950.9636	15.61817	4.76E-02	3.42E+00	1.55E+00	8.48E-02	3.85E-02
4.25	107.95	5096.5801	16.07753	5.35E-02	3.85E+00	1.75E+00	8.43E-02	3.82E-02
4.50	114.30	5242.1967	16.53688	5.96E-02	4.29E+00	1.94E+00	8.37E-02	3.80E-02
4.75	120.65	5387.8133	16.99624	6.59E-02	4.74E+00	2.15E+00	8.32E-02	3.77E-02
5.00	127.00	5533.4299	17.4556	7.23E-02	5.20E+00	2.36E+00	8.26E-02	3.75E-02
5.25	133.35	5679.0464	17.91496	7.89E-02	5.68E+00	2.58E+00	8.20E-02	3.72E-02
5.50	139.70	5824.663	18.37432	8.57E-02	6.17E+00	2.80E+00	8.14E-02	3.69E-02
5.75	146.05	5970.2796	18.83367	9.27E-02	6.67E+00	3.02E+00	8.08E-02	3.66E-02
6.00	152.40	6115.8962	19.29303	9.98E-02	7.18E+00	3.26E+00	8.01E-02	3.64E-02
6.25	158.75	6261.5127	19.75239	1.07E-01	7.71E+00	3.50E+00	7.95E-02	3.61E-02
6.50	165.10	6407.1293	20.21175	1.15E-01	8.25E+00	3.74E+00	7.88E-02	3.58E-02
6.75	171.45	6552.7459	20.6711	1.22E-01	8.79E+00	3.99E+00	7.82E-02	3.55E-02
7.00	177.80	6698.3625	21.13046	1.30E-01	9.35E+00	4.24E+00	7.75E-02	3.51E-02
7.25	184.15	6843.979	21.58982	1.38E-01	9.93E+00	4.50E+00	7.67E-02	3.48E-02
7.50	190.50	6989.5956	22.04918	1.46E-01	1.05E+01	4.77E+00	7.60E-02	3.45E-02
7.75	196.85	7135.2122	22.50854	1.55E-01	1.11E+01	5.04E+00	7.53E-02	3.41E-02
8.00	203.20	7280.8288	22.96789	1.63E-01	1.17E+01	5.32E+00	7.45E-02	3.38E-02
8.25	209.55	7426.4454	23.42725	1.72E-01	1.24E+01	5.60E+00	7.37E-02	3.35E-02
8.50	215.90	7572.0619	23.88661	1.81E-01	1.30E+01	5.89E+00	7.30E-02	3.31E-02
8.75	222.25	7717.6785	24.34597	1.90E-01	1.36E+01	6.19E+00	7.22E-02	3.27E-02
9.00	228.60	7863.2951	24.80533	1.99E-01	1.43E+01	6.49E+00	7.13E-02	3.24E-02
9.25	234.95	7426.4454	23.42725	2.08E-01	1.50E+01	6.78E+00	7.05E-02	3.20E-02
9.50	241.30	6989.5956	22.04918	2.16E-01	1.56E+01	7.06E+00	6.98E-02	3.17E-02
9.75	247.65	6552.7459	20.6711	2.24E-01	1.61E+01	7.32E+00	6.91E-02	3.13E-02
10.00	254.00	6115.8962	19.29303	2.32E-01	1.67E+01	7.57E+00	6.84E-02	3.10E-02
10.25	260.35	5679.0464	17.91496	2.39E-01	1.72E+01	7.79E+00	6.78E-02	3.07E-02
10.50	266.70	5242.1967	16.53688	2.45E-01	1.76E+01	8.00E+00	6.72E-02	3.05E-02
10.75	273.05	4805.347	15.15881	2.51E-01	1.81E+01	8.20E+00	6.67E-02	3.02E-02
11.00	279.40	4368.4973	13.78074	2.57E-01	1.85E+01	8.37E+00	6.62E-02	3.00E-02
11.25	285.75	3931.6475	12.40266	2.61E-01	1.88E+01	8.53E+00	6.58E-02	2.98E-02
11.50	292.10	3494.7978	11.02459	2.66E-01	1.91E+01	8.68E+00	6.54E-02	2.97E-02
11.75	298.45	3057.9481	9.646516	2.70E-01	1.94E+01	8.80E+00	6.50E-02	2.95E-02
12.00	304.80	2621.0984	8.268442	2.73E-01	1.96E+01	8.91E+00	6.47E-02	2.94E-02

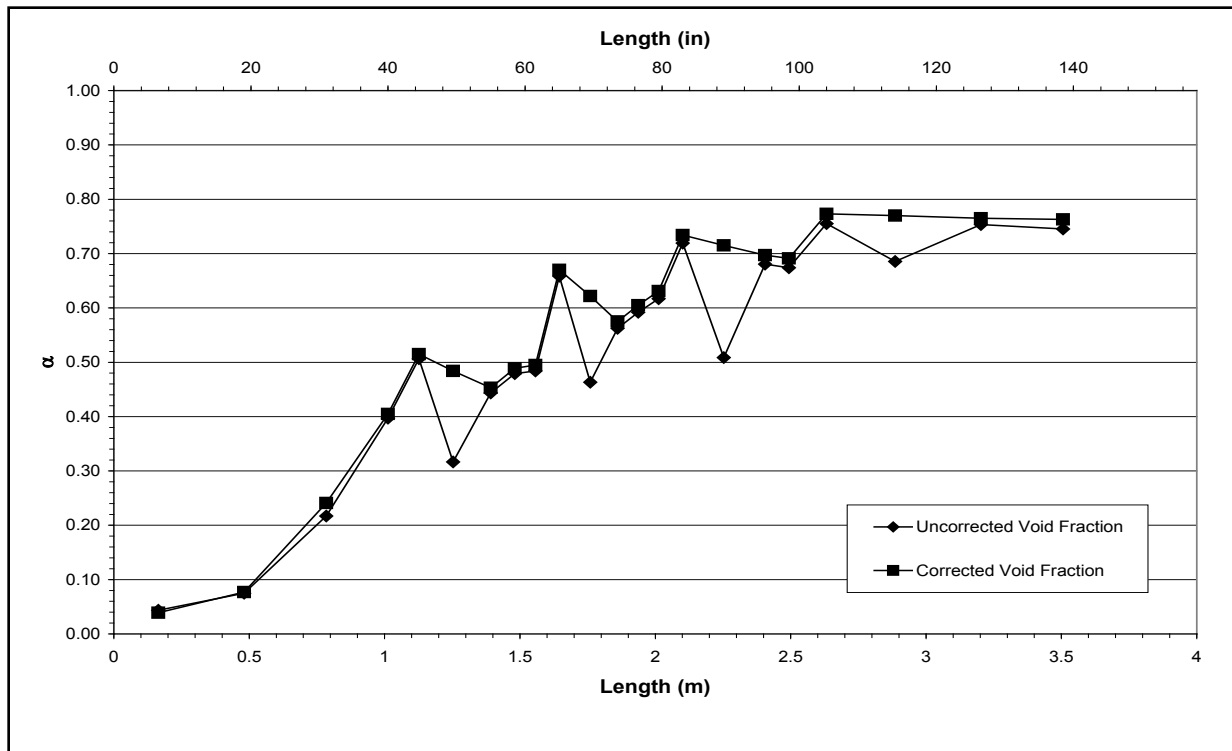


Figure A-55 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572A for Time Period 11384 to 11516 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-B

Test Conditions

Date: 6/5/2003

Steady-state time window: 11672 – 11750 seconds

Inlet flow rate: 2.560 cm/sec (1.008 in./sec)

Inlet mass flow rate: 0.125 kg/sec (0.276 lbm/sec)

Inlet flow temperature: 382.0 K (228.0 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 81.15 kW

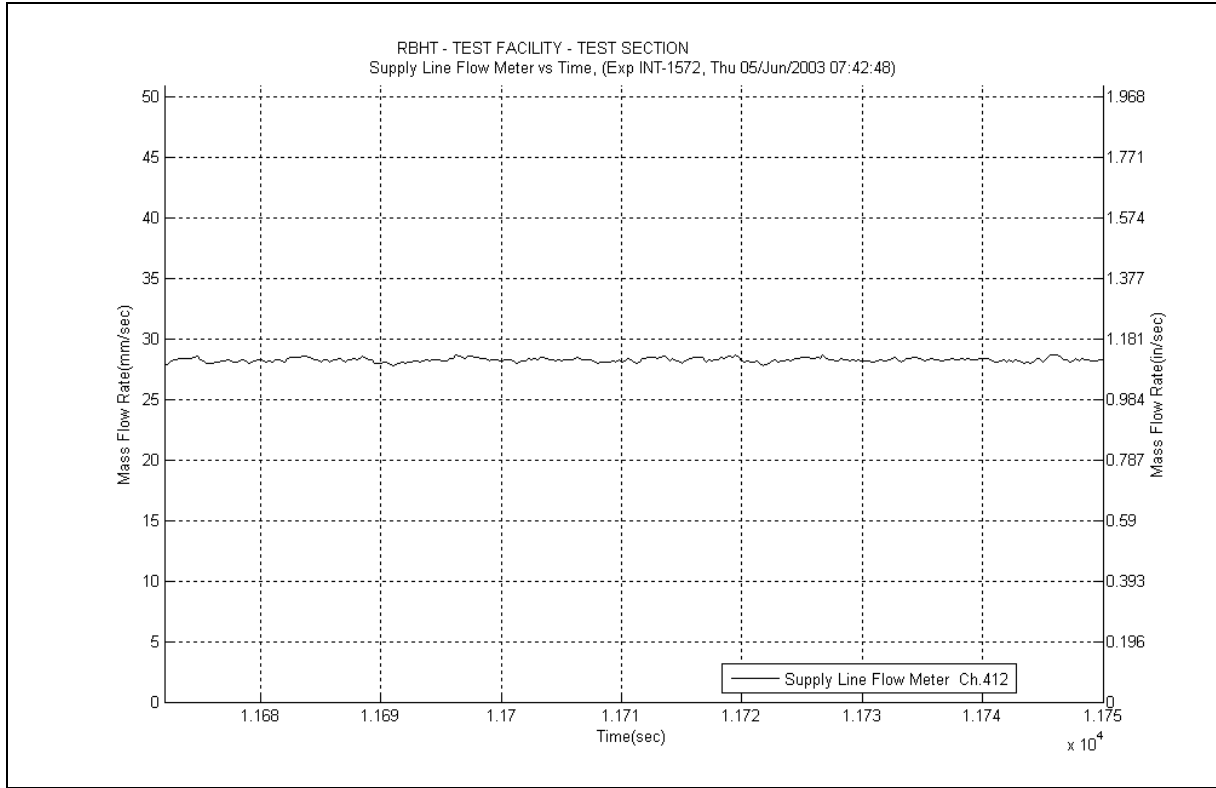


Figure A-56 Inlet Flow Plot for Experiment 1572B

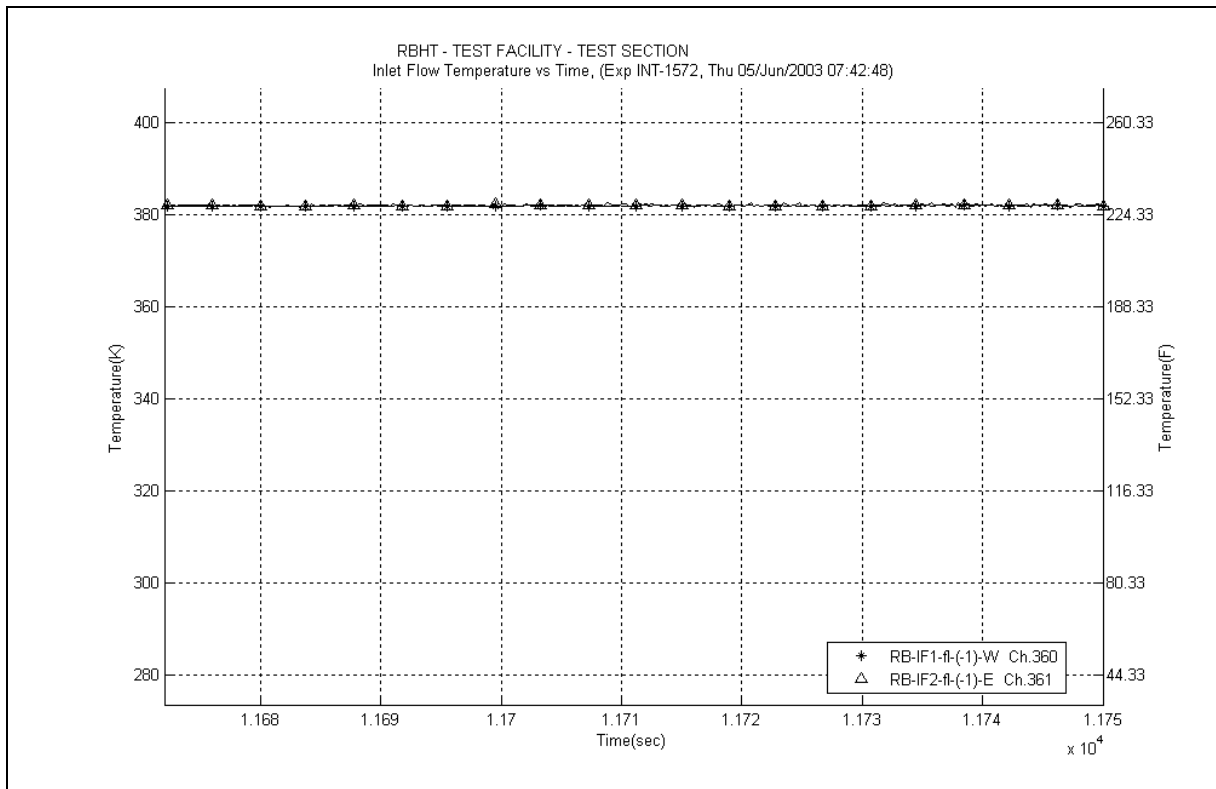


Figure A-57 Inlet Temperature Plot for Experiment 1572B

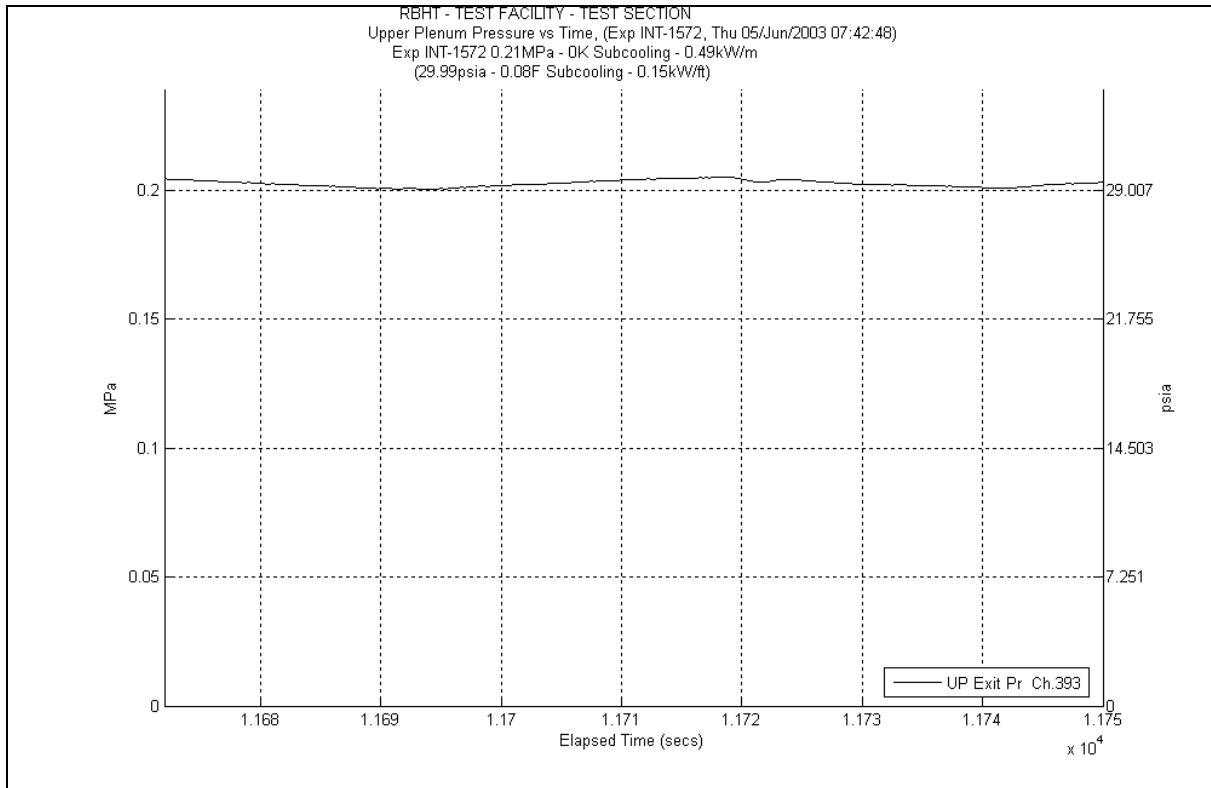


Figure A-58 System Pressure Plot for Experiment 1572B

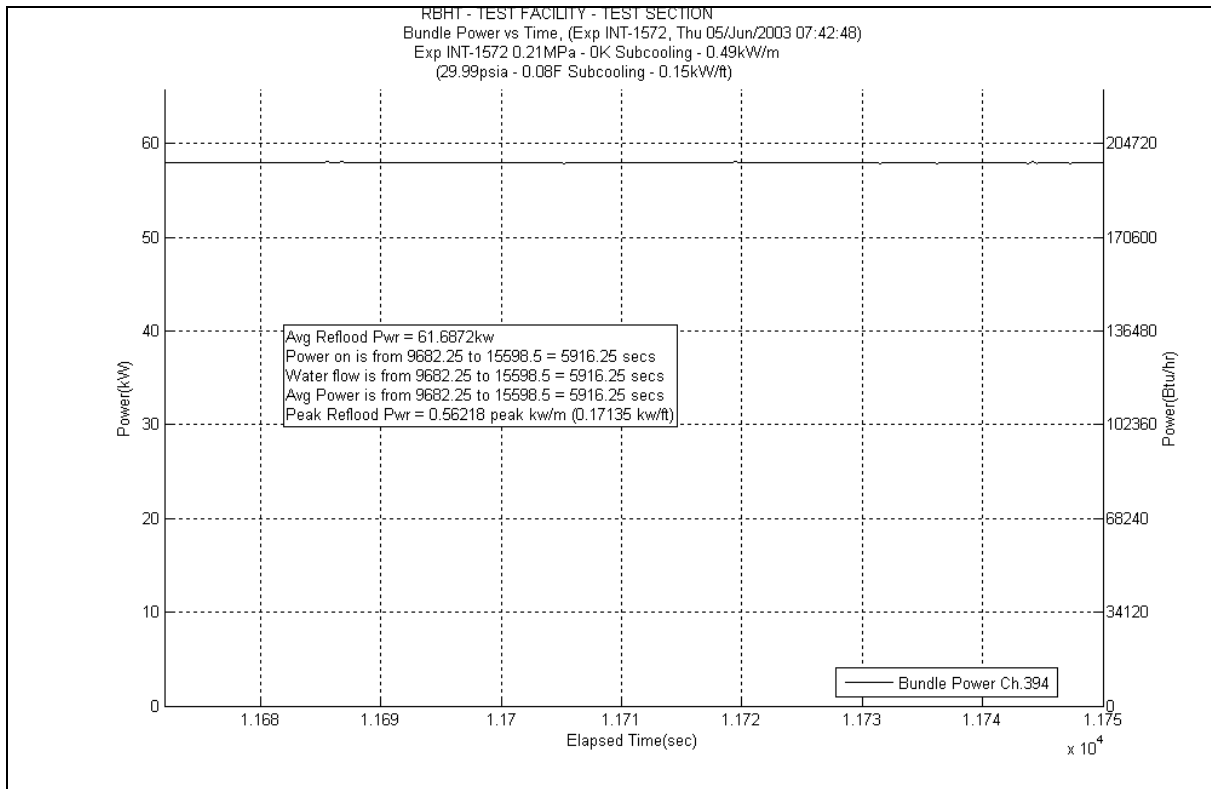


Figure A-59 Bundle Power Plot for Experiment 1572B

Table A-23 Data Results for RBHT Test 1572B for Time Period 11672 to 11750 seconds

Results for RBHT Test 1572
Valid Time Period 11672 to 11750 seconds
Collapsed Liquid Level = 73.702 inches = 1872.04 mm
(Z_{OSV}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{\text{uncorrected}}$	$\Delta P_{\text{uncorrected}}$ (lb/ft ²)	$\Delta P_{\text{uncorrected}}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{\text{corrected}}$ (lb/ft ²)	$\Delta P_{\text{corrected}}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{\text{corrected}}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.747	14.437	691.269	0.806	38.591	0.174	8.331	0.000	0.000	13.45	643.989	207486.6997	0.764	0.760	0.768	
*	120-133	3048-3378	383	0.751	16.806	804.657	0.896	42.901	0.311	14.891	-0.141	-6.770	15.74	753.635	208240.3349	0.767	0.763	0.771	
*	108-120	2743-3048	382	0.683	19.750	945.646	0.752	36.006	0.389	18.625	4.369	209.200	14.24	681.815	208922.1498	0.771	0.767	0.775	
	100-108	2540-2743	381	0.756	10.137	485.380	0.452	21.642	0.284	13.598	0.000	0.000	9.397	449.931	209372.0806	0.774	0.770	0.778	
	97-100	2464-2540	380	0.673	5.100	244.182	0.159	7.613	0.103	4.932	0.000	0.000	4.835	231.501	209603.5816	0.69	0.687	0.693	
	93-97	2362-2464	379	0.680	6.653	318.531	0.203	9.720	0.134	6.416	0.000	0.000	6.313	302.268	209905.8497	0.696	0.693	0.699	
*	85-93	2159-2362	378	0.509	20.410	977.226	0.375	17.955	0.257	12.305	7.948	380.542	11.83	566.423	210472.2731	0.715	0.711	0.719	
	81-85	2057-2159	377	0.720	5.817	278.497	0.173	8.283	0.123	5.889	0.000	0.000	5.52	264.299	210736.5721	0.734	0.730	0.738	
	78-81	1981-2057	376	0.621	5.905	282.724	0.123	5.889	0.090	4.309	0.000	0.000	5.687	272.295	211008.8672	0.635	0.632	0.638	
	75-78	1905-1981	375	0.593	6.336	303.363	0.118	5.650	0.088	4.213	0.000	0.000	6.13	293.506	211302.3731	0.606	0.603	0.609	
	72-75	1829-1905	374	0.566	6.757	323.504	0.112	5.363	0.086	4.118	0.000	0.000	6.554	313.807	211616.1803	0.579	0.576	0.582	
*	67-72	1702-1829	373	0.459	14.058	673.117	0.175	8.379	0.139	6.655	4.043	193.596	9.701	464.486	212080.6667	0.626	0.623	0.629	
	63-67	1600-1702	372	0.662	7.021	336.186	0.130	6.224	0.107	5.123	0.000	0.000	6.783	324.772	212405.4385	0.673	0.670	0.676	
	60-63	1524-1600	371	0.484	8.044	385.171	0.091	4.357	0.078	3.735	0.000	0.000	7.87	376.818	212782.2561	0.495	0.493	0.497	
	57-60	1448-1524	370	0.481	8.091	387.409	0.086	4.118	0.076	3.639	0.000	0.000	7.929	379.643	213161.8987	0.491	0.489	0.493	
	53-57	1346-1448	369	0.441	11.612	555.999	0.106	5.075	0.098	4.692	0.000	0.000	11.4	545.835	213707.7336	0.451	0.449	0.453	
*	46-53	1168-1346	368	0.313	24.975	1195.796	0.163	7.804	0.163	7.804	5.859	280.517	18.79	899.670	214607.4036	0.483	0.481	0.485	
	43-46	1092-1168	367	0.507	7.686	368.014	0.061	2.921	0.066	3.160	0.000	0.000	7.556	361.783	214969.1869	0.515	0.512	0.518	
	37-43	940-1092	366	0.399	18.738	897.158	0.105	5.027	0.127	6.081	0.000	0.000	18.5	885.785	215854.9716	0.406	0.404	0.408	
*	25-37	635-940	365	0.227	48.163	2306.054	0.140	6.703	0.229	10.965	0.394	18.862	47.4	2269.524	218124.4958	0.239	0.238	0.240	
	13-25	330-635	364	0.070	57.947	2774.526	0.053	2.538	0.090	4.309	0.000	0.000	57.79	2767.000	220891.4958	0.072	0.068	0.076	
*	0-13	0-330	363	0.043	64.589	3092.559	0.005	0.239	0.000	0.000	-0.466	-22.291	65.05	3114.611	224006.1066	0.036	0.034	0.038	

Table A-24 Energy Balance Results for RBHT Test 1572B for Time Period 11672 to 11750 seconds

Results for RBHT Test 1572 Valid Time Period 11672 to 11750 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2618.2014	8.259303	0.00E+00	0.00E+00	0.00E+00	8.97E-02	4.07E-02
0.25	6.35	2763.6571	8.718153	0.00E+00	0.00E+00	0.00E+00	8.97E-02	4.07E-02
0.50	12.70	2909.1127	9.177004	0.00E+00	0.00E+00	0.00E+00	8.97E-02	4.07E-02
0.75	19.05	3054.5683	9.635854	0.00E+00	0.00E+00	0.00E+00	8.97E-02	4.07E-02
1.00	25.40	3200.024	10.0947	0.00E+00	0.00E+00	0.00E+00	8.97E-02	4.07E-02
1.25	31.75	3345.4796	10.55355	0.00E+00	0.00E+00	0.00E+00	8.97E-02	4.07E-02
1.50	38.10	3490.9352	11.0124	0.00E+00	0.00E+00	0.00E+00	8.97E-02	4.07E-02
1.75	44.45	3636.3909	11.47125	1.77E-03	1.28E-01	5.81E-02	8.95E-02	4.06E-02
2.00	50.80	3781.8465	11.9301	6.11E-03	4.43E-01	2.01E-01	8.91E-02	4.04E-02
2.25	57.15	3927.3021	12.38895	1.06E-02	7.70E-01	3.49E-01	8.87E-02	4.02E-02
2.50	63.50	4072.7578	12.84781	1.53E-02	1.11E+00	5.03E-01	8.83E-02	4.00E-02
2.75	69.85	4218.2134	13.30666	2.02E-02	1.46E+00	6.63E-01	8.78E-02	3.98E-02
3.00	76.20	4363.6691	13.76551	2.52E-02	1.83E+00	8.28E-01	8.74E-02	3.96E-02
3.25	82.55	4509.1247	14.22436	3.04E-02	2.20E+00	9.99E-01	8.69E-02	3.94E-02
3.50	88.90	4654.5803	14.68321	3.58E-02	2.59E+00	1.18E+00	8.64E-02	3.92E-02
3.75	95.25	4800.036	15.14206	4.13E-02	2.99E+00	1.36E+00	8.59E-02	3.90E-02
4.00	101.60	4945.4916	15.60091	4.70E-02	3.41E+00	1.55E+00	8.54E-02	3.88E-02
4.25	107.95	5090.9472	16.05976	5.29E-02	3.83E+00	1.74E+00	8.49E-02	3.85E-02
4.50	114.30	5236.4029	16.51861	5.90E-02	4.27E+00	1.94E+00	8.44E-02	3.83E-02
4.75	120.65	5381.8585	16.97746	6.52E-02	4.72E+00	2.14E+00	8.38E-02	3.80E-02
5.00	127.00	5527.3141	17.43631	7.16E-02	5.19E+00	2.35E+00	8.32E-02	3.78E-02
5.25	133.35	5672.7698	17.89516	7.81E-02	5.66E+00	2.57E+00	8.26E-02	3.75E-02
5.50	139.70	5818.2254	18.35401	8.49E-02	6.15E+00	2.79E+00	8.20E-02	3.72E-02
5.75	146.05	5963.681	18.81286	9.18E-02	6.65E+00	3.02E+00	8.14E-02	3.69E-02
6.00	152.40	6109.1367	19.27171	9.89E-02	7.16E+00	3.25E+00	8.08E-02	3.66E-02
6.25	158.75	6254.5923	19.73056	1.06E-01	7.69E+00	3.49E+00	8.01E-02	3.64E-02
6.50	165.10	6400.0479	20.18941	1.14E-01	8.22E+00	3.73E+00	7.95E-02	3.60E-02
6.75	171.45	6545.5036	20.64826	1.21E-01	8.77E+00	3.98E+00	7.88E-02	3.57E-02
7.00	177.80	6690.9592	21.10711	1.29E-01	9.34E+00	4.24E+00	7.81E-02	3.54E-02
7.25	184.15	6836.4148	21.56596	1.37E-01	9.91E+00	4.50E+00	7.74E-02	3.51E-02
7.50	190.50	6981.8705	22.02481	1.45E-01	1.05E+01	4.76E+00	7.67E-02	3.48E-02
7.75	196.85	7127.3261	22.48366	1.53E-01	1.11E+01	5.03E+00	7.59E-02	3.44E-02
8.00	203.20	7272.7818	22.94251	1.62E-01	1.17E+01	5.31E+00	7.52E-02	3.41E-02
8.25	209.55	7418.2374	23.40136	1.70E-01	1.23E+01	5.59E+00	7.44E-02	3.37E-02
8.50	215.90	7563.693	23.86021	1.79E-01	1.30E+01	5.88E+00	7.36E-02	3.34E-02
8.75	222.25	7709.1487	24.31906	1.88E-01	1.36E+01	6.17E+00	7.28E-02	3.30E-02
9.00	228.60	7854.6043	24.77791	1.97E-01	1.43E+01	6.48E+00	7.20E-02	3.27E-02
9.25	234.95	7418.2374	23.40136	2.06E-01	1.49E+01	6.77E+00	7.12E-02	3.23E-02
9.50	241.30	6981.8705	22.02481	2.14E-01	1.55E+01	7.05E+00	7.04E-02	3.19E-02
9.75	247.65	6545.5036	20.64826	2.22E-01	1.61E+01	7.31E+00	6.97E-02	3.16E-02
10.00	254.00	6109.1367	19.27171	2.30E-01	1.66E+01	7.55E+00	6.91E-02	3.13E-02
10.25	260.35	5672.7698	17.89516	2.37E-01	1.71E+01	7.78E+00	6.84E-02	3.10E-02
10.50	266.70	5236.4029	16.51861	2.43E-01	1.76E+01	7.99E+00	6.79E-02	3.08E-02
10.75	273.05	4800.036	15.14206	2.49E-01	1.80E+01	8.18E+00	6.73E-02	3.05E-02
11.00	279.40	4363.6691	13.76551	2.54E-01	1.84E+01	8.36E+00	6.69E-02	3.03E-02
11.25	285.75	3927.3021	12.38895	2.59E-01	1.88E+01	8.52E+00	6.64E-02	3.01E-02
11.50	292.10	3490.9352	11.0124	2.64E-01	1.91E+01	8.66E+00	6.60E-02	2.99E-02
11.75	298.45	3054.5683	9.635854	2.67E-01	1.94E+01	8.79E+00	6.57E-02	2.98E-02
12.00	304.80	2618.2014	8.259303	2.71E-01	1.96E+01	8.90E+00	6.54E-02	2.97E-02

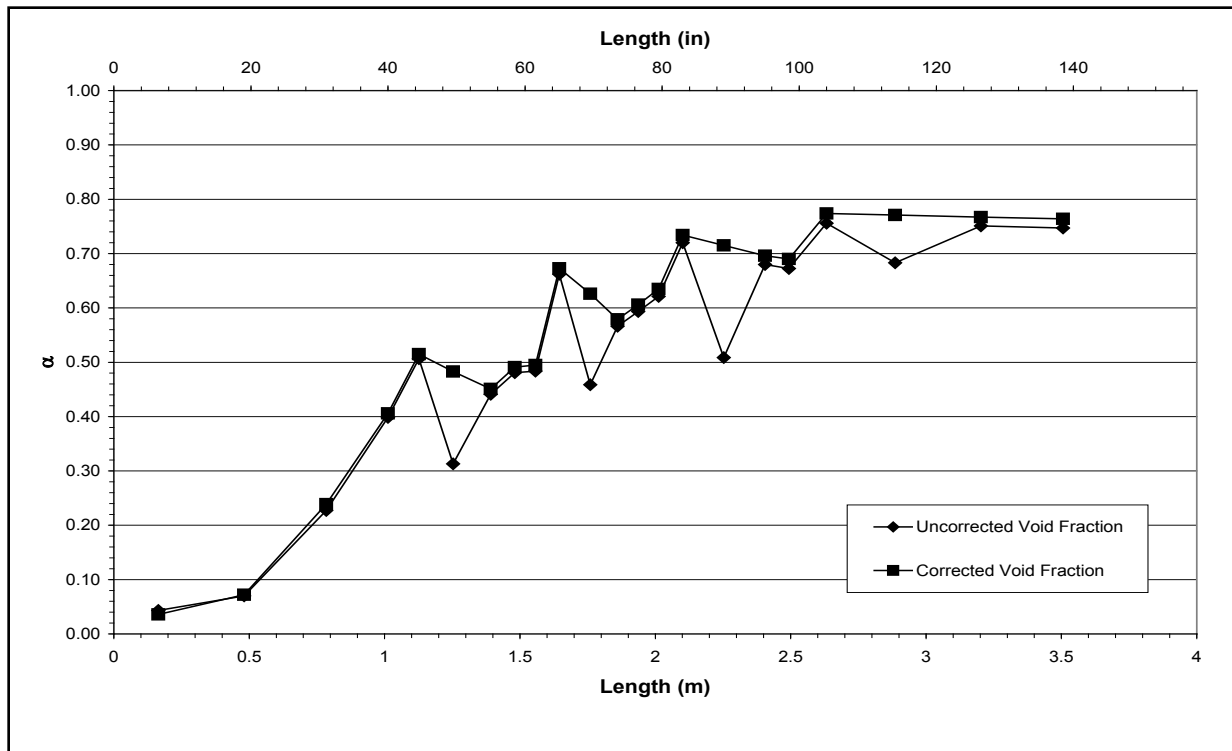


Figure A-60 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572B for Time Period 11672 to 11750 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-C

Test Conditions

Date: 6/5/2003

Steady-state time window: 12089 – 12210 seconds

Inlet flow rate: 2.537 cm/sec (0.999 in./sec)

Inlet mass flow rate: 0.124 kg/sec (0.274 lbm/sec)

Inlet flow temperature: 382.0 K (228.0 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 81.15 kW

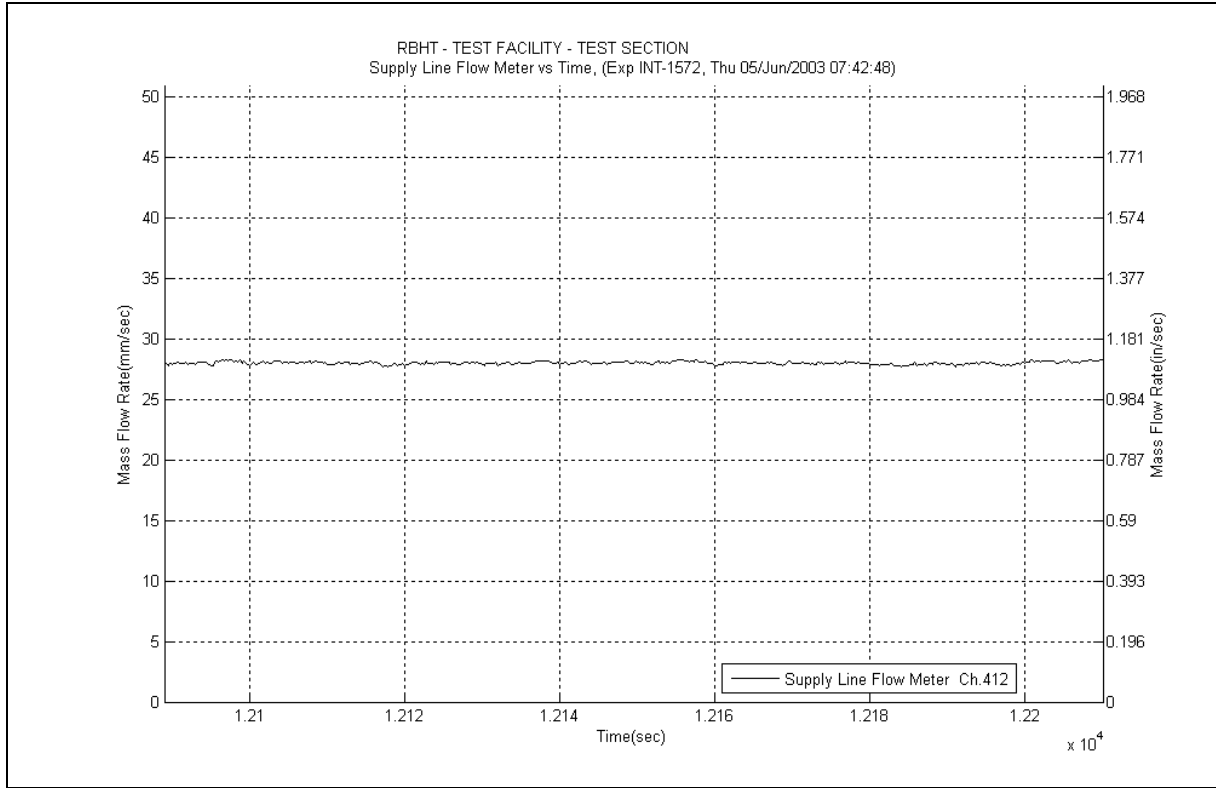


Figure A-61 Inlet Flow Plot for Experiment 1572C

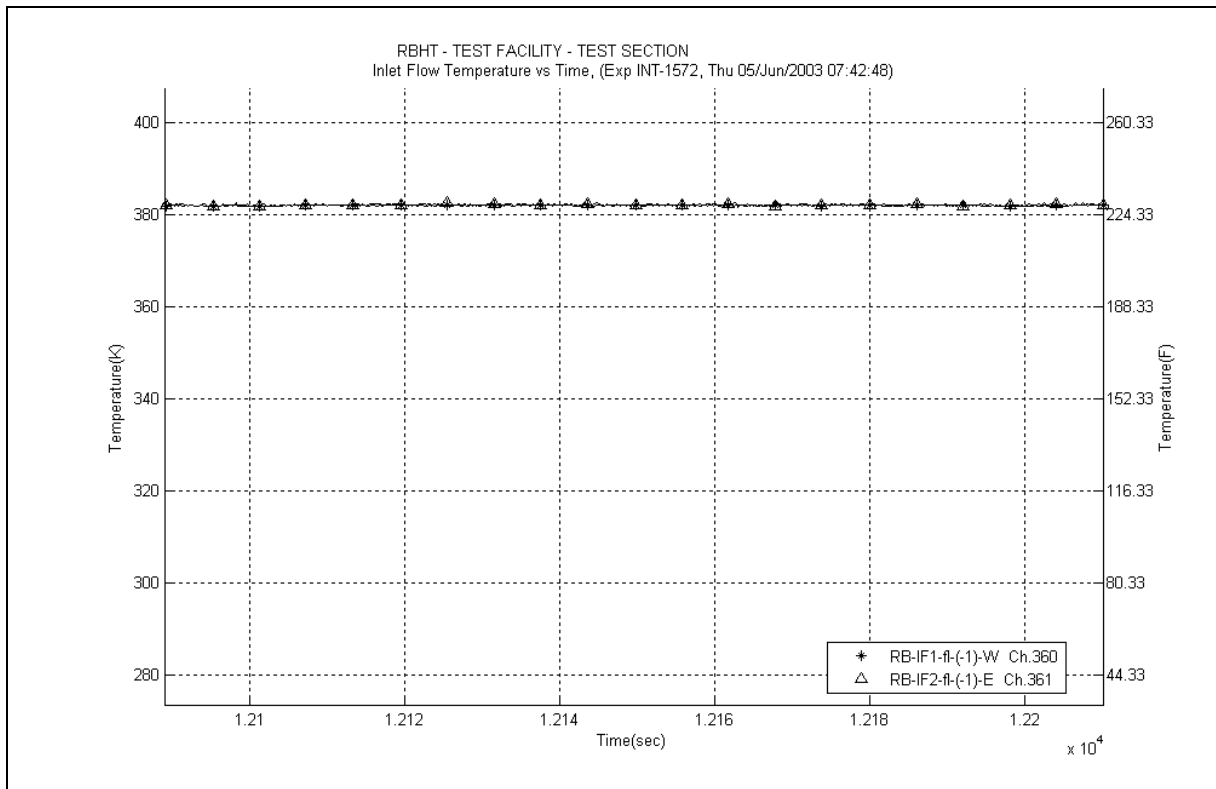


Figure A-62 Inlet Temperature Plot for Experiment 1572C

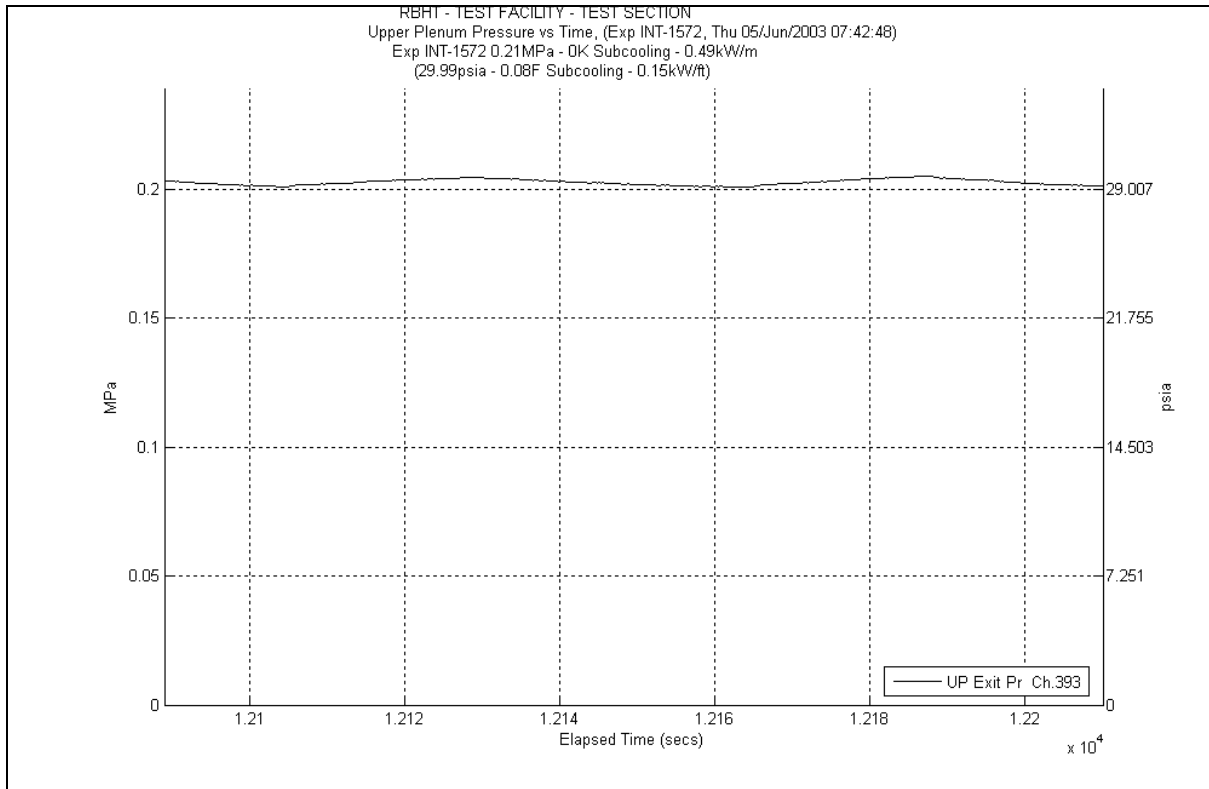


Figure A-63 System Pressure Plot for Experiment 1572C

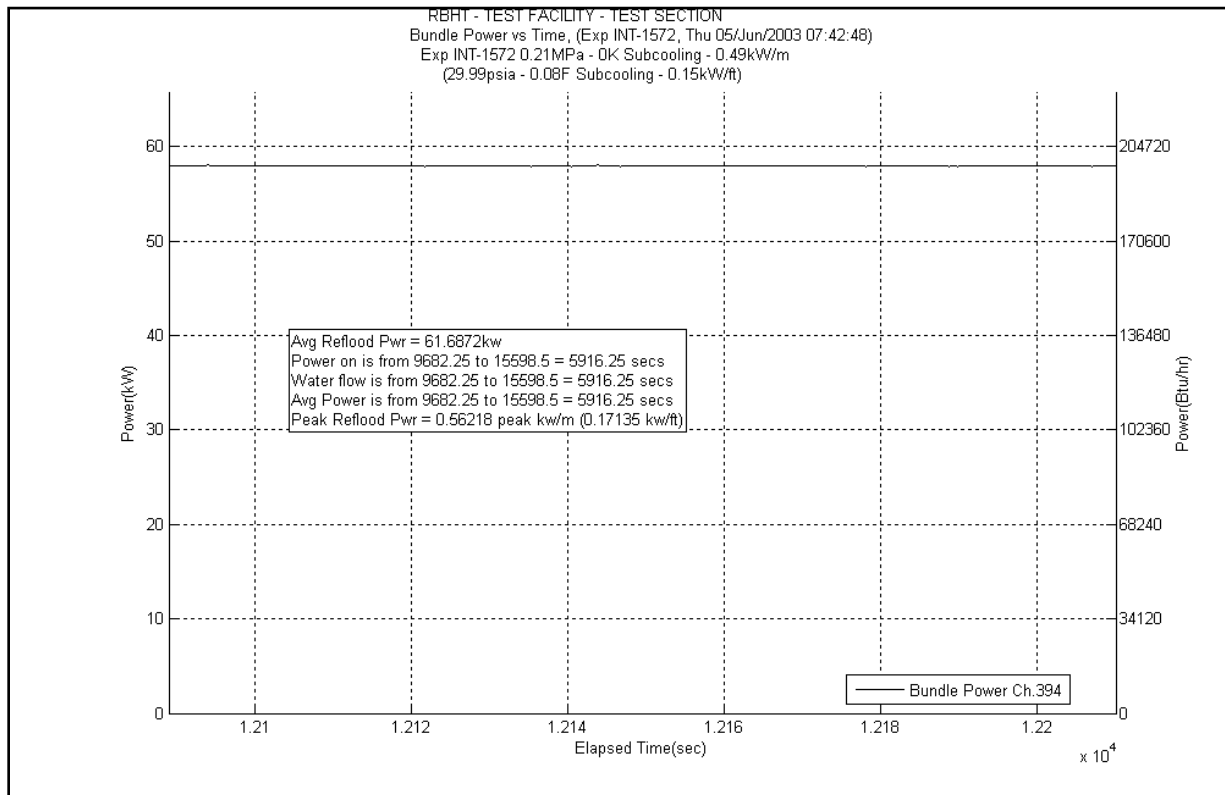


Figure A-64 Bundle Power Plot for Experiment 1572C

Table A-25 Data Results for RBHT Test 1572C for Time Period 12089 to 12210 seconds

Results for RBHT Test 1572
Valid Time Period 12089 to 12210 seconds
Collapsed Liquid Level = 74.098 inches = 1882.10 mm
(Z_{SSL}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lb/ft ²)	ΔP_{fic} (Pa)	ΔP_{acccl} (lb/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P _{local} (lb/ft ²)	P _{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.751	14.209	680.328	0.799	38.256	0.173	8.283	0.000	0.000	13.23	633.456	4333.23	207476.166	0.768	0.764	0.772
*	120-133	3048-3378	383	0.752	16.769	802.917	0.888	42.518	0.309	14.795	-0.088	-4.201	15.66	749.805	4348.89	208225.9709	0.768	0.764	0.772
*	108-120	2743-3048	382	0.677	20.119	963.301	0.745	35.671	0.385	18.434	4.479	214.454	14.51	694.743	4363.4	208920.7134	0.767	0.763	0.771
	100-108	2540-2743	381	0.749	10.423	499.057	0.448	21.450	0.282	13.502	0.000	0.000	9.69	463.960	4373.09	209384.6731	0.767	0.763	0.771
	97-100	2464-2540	380	0.665	5.224	250.150	0.157	7.517	0.102	4.884	0.000	0.000	4.963	237.630	4378.053	209622.3028	0.681	0.678	0.684
	93-97	2362-2464	379	0.674	6.782	324.747	0.201	9.624	0.133	6.368	0.000	0.000	6.446	308.636	4384.499	209930.9389	0.69	0.687	0.693
*	85-93	2159-2362	378	0.499	20.810	996.373	0.372	17.811	0.255	12.209	8.073	386.522	12.11	579.830	4396.609	210510.7688	0.708	0.704	0.712
	81-85	2057-2159	377	0.713	5.962	285.459	0.171	8.188	0.122	5.841	0.000	0.000	5.666	271.290	4402.275	210782.0584	0.727	0.723	0.731
	78-81	1981-2057	376	0.607	6.128	293.416	0.122	5.841	0.089	4.261	0.000	0.000	5.915	283.212	4408.19	211065.2701	0.62	0.617	0.623
	75-78	1905-1981	375	0.581	6.533	312.812	0.117	5.602	0.087	4.166	0.000	0.000	6.327	302.938	4414.517	211368.2085	0.594	0.591	0.597
	72-75	1829-1905	374	0.548	7.047	337.429	0.111	5.315	0.085	4.070	0.000	0.000	6.847	327.836	4421.364	211696.0446	0.56	0.557	0.563
*	67-72	1702-1829	373	0.456	14.131	676.598	0.174	8.331	0.138	6.607	3.649	174.717	10.17	486.942	4431.534	212182.9868	0.608	0.605	0.611
	63-67	1600-1702	372	0.645	7.375	353.094	0.129	6.177	0.106	5.075	0.000	0.000	7.138	341.769	4438.672	212524.7561	0.656	0.653	0.659
	60-63	1524-1600	371	0.479	8.117	388.652	0.090	4.309	0.077	3.687	0.000	0.000	7.945	380.409	4446.617	212905.1647	0.49	0.488	0.492
	57-60	1448-1524	370	0.470	8.257	395.366	0.085	4.070	0.075	3.591	0.000	0.000	8.094	387.543	4454.711	213292.7075	0.48	0.478	0.482
	53-57	1346-1448	369	0.433	11.784	564.205	0.105	5.027	0.097	4.644	0.000	0.000	11.58	554.453	4466.291	213847.1609	0.442	0.440	0.444
*	46-53	1168-1346	368	0.309	25.125	1203.007	0.162	7.757	0.162	7.757	5.641	270.108	19.16	917.386	4485.451	214764.5466	0.473	0.471	0.475
	43-46	1092-1168	367	0.495	7.868	376.717	0.060	2.873	0.066	3.160	0.000	0.000	7.741	370.641	4493.192	215135.1877	0.503	0.500	0.506
	37-43	940-1092	366	0.389	19.054	912.326	0.104	4.980	0.126	6.033	0.000	0.000	18.82	901.106	4512.012	216036.2941	0.396	0.394	0.398
*	25-37	635-940	365	0.224	48.381	2316.498	0.140	6.703	0.227	10.869	0.374	17.910	47.64	2281.015	4559.652	218317.3096	0.235	0.234	0.236
	13-25	330-635	364	0.072	57.802	2767.563	0.054	2.586	0.093	4.453	0.000	0.000	57.64	2759.818	4617.292	221077.1276	0.075	0.071	0.079
*	0-13	0-330	363	0.043	64.595	3092.808	0.004	0.192	0.000	0.000	-0.379	-18.164	64.97	3110.780	4682.262	224187.9079	0.037	0.035	0.039

Table A-26 Energy Balance Results for RBHT Test 1572C for Time Period 12089 to 12210 seconds

Results for RBHT Test 1572 Valid Time Period 12089 to 12210 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2616.6702	8.254473	0.00E+00	0.00E+00	0.00E+00	0.088872	0.040311
0.25	6.35	2762.0408	8.713055	0.00E+00	0.00E+00	0.00E+00	0.088872	0.040311
0.50	12.70	2907.4114	9.171637	0.00E+00	0.00E+00	0.00E+00	0.088872	0.040311
0.75	19.05	3052.7819	9.630218	0.00E+00	0.00E+00	0.00E+00	0.088872	0.040311
1.00	25.40	3198.1525	10.0888	0.00E+00	0.00E+00	0.00E+00	0.088872	0.040311
1.25	31.75	3343.5231	10.54738	0.00E+00	0.00E+00	0.00E+00	0.088872	0.040311
1.50	38.10	3488.8936	11.00596	0.00E+00	0.00E+00	0.00E+00	0.088872	0.040311
1.75	44.45	3634.2642	11.46455	2.12E-03	0.152313	0.069088	0.088684	0.040226
2.00	50.80	3779.6348	11.92313	6.50E-03	0.467212	0.211923	0.088294	0.040049
2.25	57.15	3925.0053	12.38171	1.11E-02	0.794613	0.360429	0.087889	0.039866
2.50	63.50	4070.3759	12.84029	1.58E-02	1.133725	0.514246	0.08747	0.039675
2.75	69.85	4215.7465	13.29887	2.07E-02	1.485768	0.67393	0.087034	0.039478
3.00	76.20	4361.117	13.75745	2.58E-02	1.850026	0.839153	0.086584	0.039273
3.25	82.55	4506.4876	14.21604	3.10E-02	2.226497	1.009917	0.086118	0.039062
3.50	88.90	4651.8582	14.67462	3.64E-02	2.615901	1.186546	0.085636	0.038844
3.75	95.25	4797.2287	15.1332	4.20E-02	3.0168	1.36839	0.08514	0.038619
4.00	101.60	4942.5993	15.59178	4.78E-02	3.430631	1.5561	0.084628	0.038387
4.25	107.95	5087.9699	16.05036	5.37E-02	3.856675	1.749349	0.084101	0.038148
4.50	114.30	5233.3404	16.50895	5.98E-02	4.294934	1.948139	0.083559	0.037902
4.75	120.65	5378.711	16.96753	6.61E-02	4.746125	2.152795	0.083001	0.037648
5.00	127.00	5524.0816	17.42611	7.25E-02	5.208811	2.362664	0.082429	0.037389
5.25	133.35	5669.4521	17.88469	7.91E-02	5.684429	2.5784	0.08184	0.037122
5.50	139.70	5814.8227	18.34327	8.59E-02	6.172261	2.799676	0.081237	0.036848
5.75	146.05	5960.1933	18.80186	9.29E-02	6.672307	3.026492	0.080618	0.036568
6.00	152.40	6105.5638	19.26044	1.00E-01	7.184567	3.258848	0.079985	0.03628
6.25	158.75	6250.9344	19.71902	1.07E-01	7.70904	3.496743	0.079336	0.035986
6.50	165.10	6396.305	20.1776	1.15E-01	8.247883	3.741157	0.078669	0.035684
6.75	171.45	6541.6755	20.63618	1.22E-01	8.79391	3.988829	0.077994	0.035377
7.00	177.80	6687.0461	21.09476	1.30E-01	9.36149	4.246278	0.077292	0.035059
7.25	184.15	6832.4167	21.55335	1.38E-01	9.929071	4.503727	0.07659	0.03474
7.50	190.50	6977.7872	22.01193	1.46E-01	10.51821	4.770953	0.075861	0.03441
7.75	196.85	7123.1578	22.47051	1.55E-01	11.11452	5.041437	0.075123	0.034075
8.00	203.20	7268.5284	22.92909	1.63E-01	11.7324	5.321698	0.074359	0.033729
8.25	209.55	7413.8989	23.38767	1.72E-01	12.35027	5.601959	0.073595	0.033382
8.50	215.90	7559.2695	23.84626	1.81E-01	12.9897	5.891996	0.072804	0.033023
8.75	222.25	7704.6401	24.30484	1.90E-01	13.63631	6.185293	0.072004	0.03266
9.00	228.60	7850.0106	24.76342	1.99E-01	14.29729	6.485107	0.071186	0.032289
9.25	234.95	7413.8989	23.38767	2.08E-01	14.9439	6.778403	0.070387	0.031927
9.50	241.30	6977.7872	22.01193	2.17E-01	15.55459	7.055405	0.069631	0.031584
9.75	247.65	6541.6755	20.63618	2.25E-01	16.12935	7.316113	0.06892	0.031262
10.00	254.00	6105.5638	19.26044	2.32E-01	16.66819	7.560526	0.068254	0.030959
10.25	260.35	5669.4521	17.88469	2.39E-01	17.17111	7.788646	0.067632	0.030677
10.50	266.70	5233.3404	16.50895	2.45E-01	17.63093	7.997212	0.067063	0.030419
10.75	273.05	4797.2287	15.1332	2.51E-01	18.05482	8.189484	0.066538	0.030181
11.00	279.40	4361.117	13.75745	2.57E-01	18.44997	8.368721	0.06605	0.029959
11.25	285.75	3925.0053	12.38171	2.62E-01	18.80201	8.528404	0.065614	0.029762
11.50	292.10	3488.8936	11.00596	2.66E-01	19.11095	8.668535	0.065232	0.029589
11.75	298.45	3052.7819	9.630218	2.70E-01	19.39115	8.79563	0.064885	0.029431
12.00	304.80	2616.6702	8.254473	2.73E-01	19.63542	8.90643	0.064583	0.029294

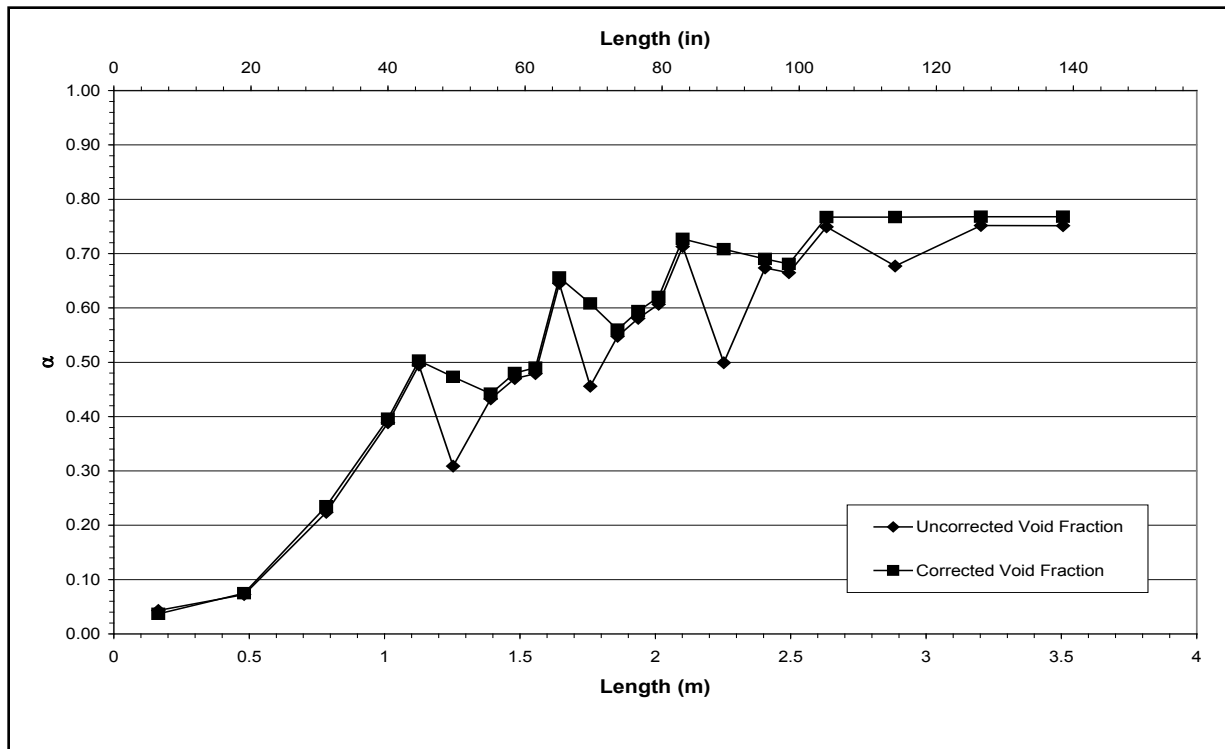


Figure A-65 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572C for Time Period 12089 to 12210 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-D

Test Conditions

Date: 6/5/2003

Steady-state time window: 12482 – 12575 seconds

Inlet flow rate: 2.525 cm/sec (0.994 in./sec)

Inlet mass flow rate: 0.123 kg/sec (0.272 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.92 kW

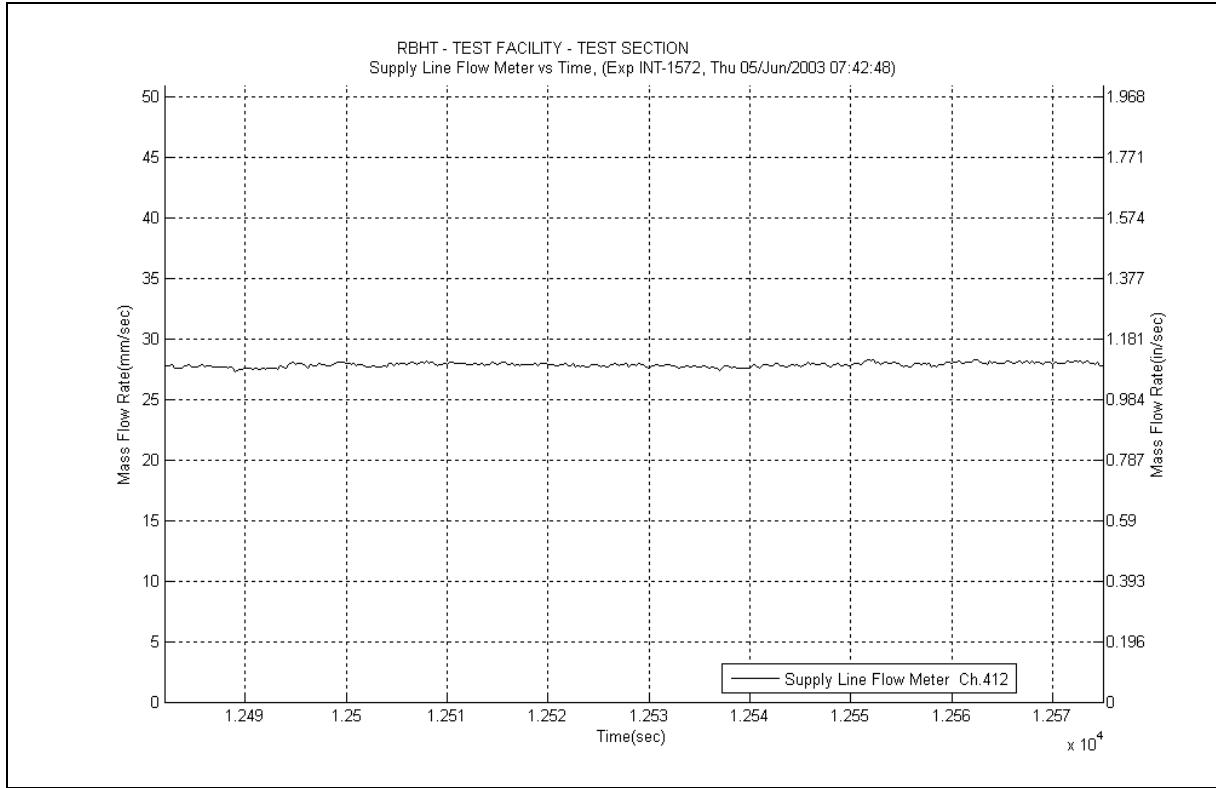


Figure A-66 Inlet Flow Plot for Experiment 1572D

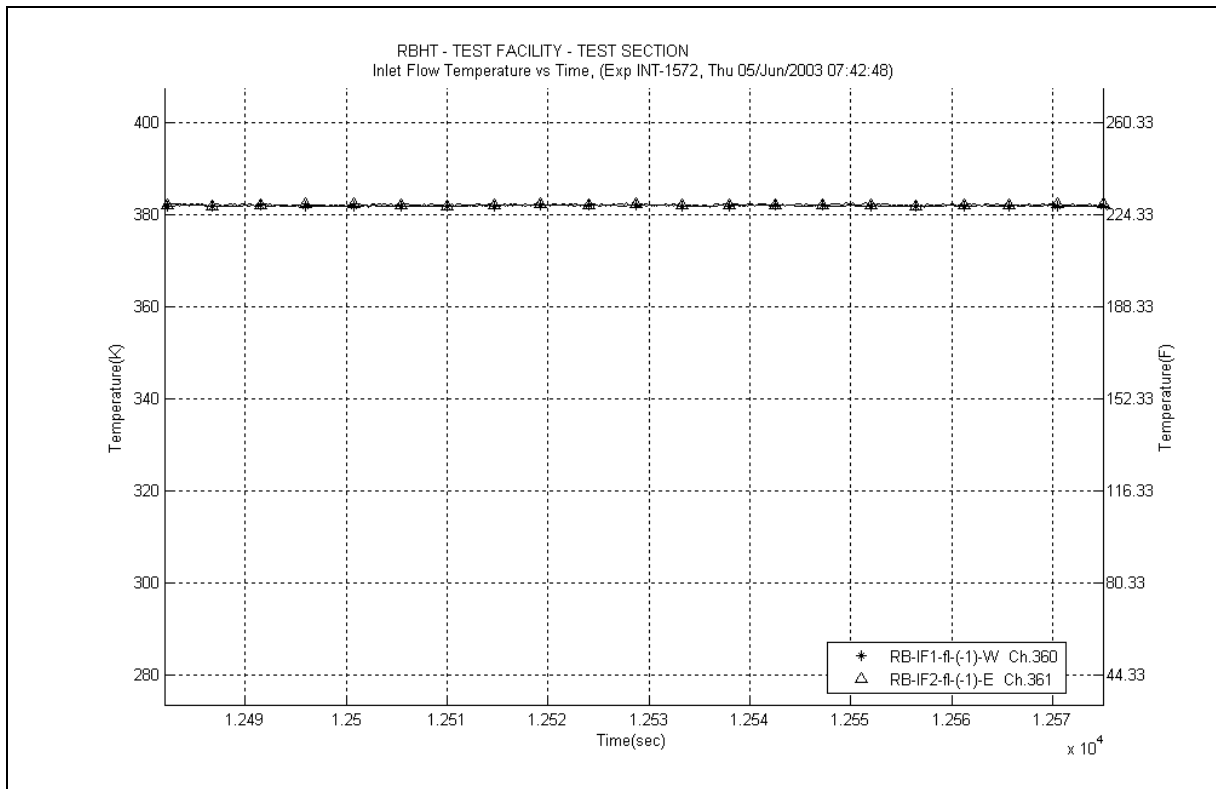


Figure A-67 Inlet Temperature Plot for Experiment 1572D

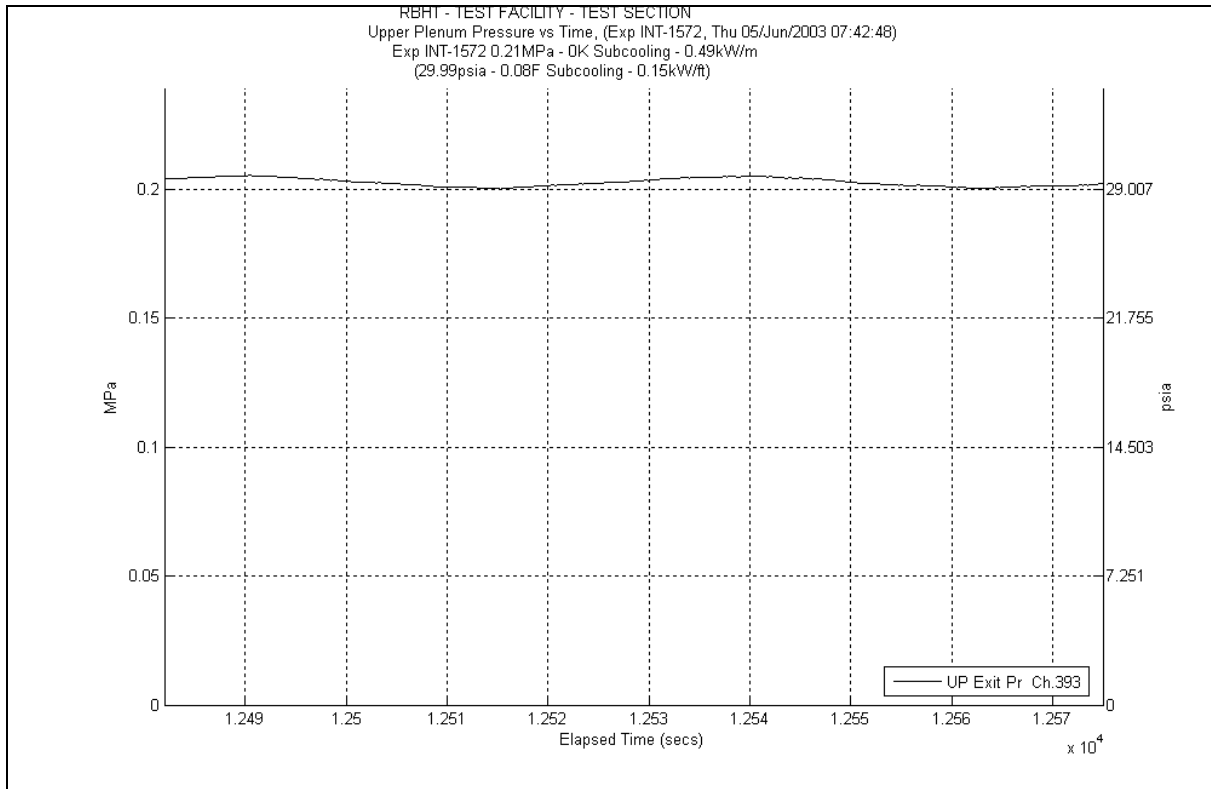


Figure A-68: System Pressure Plot for Experiment 1572D

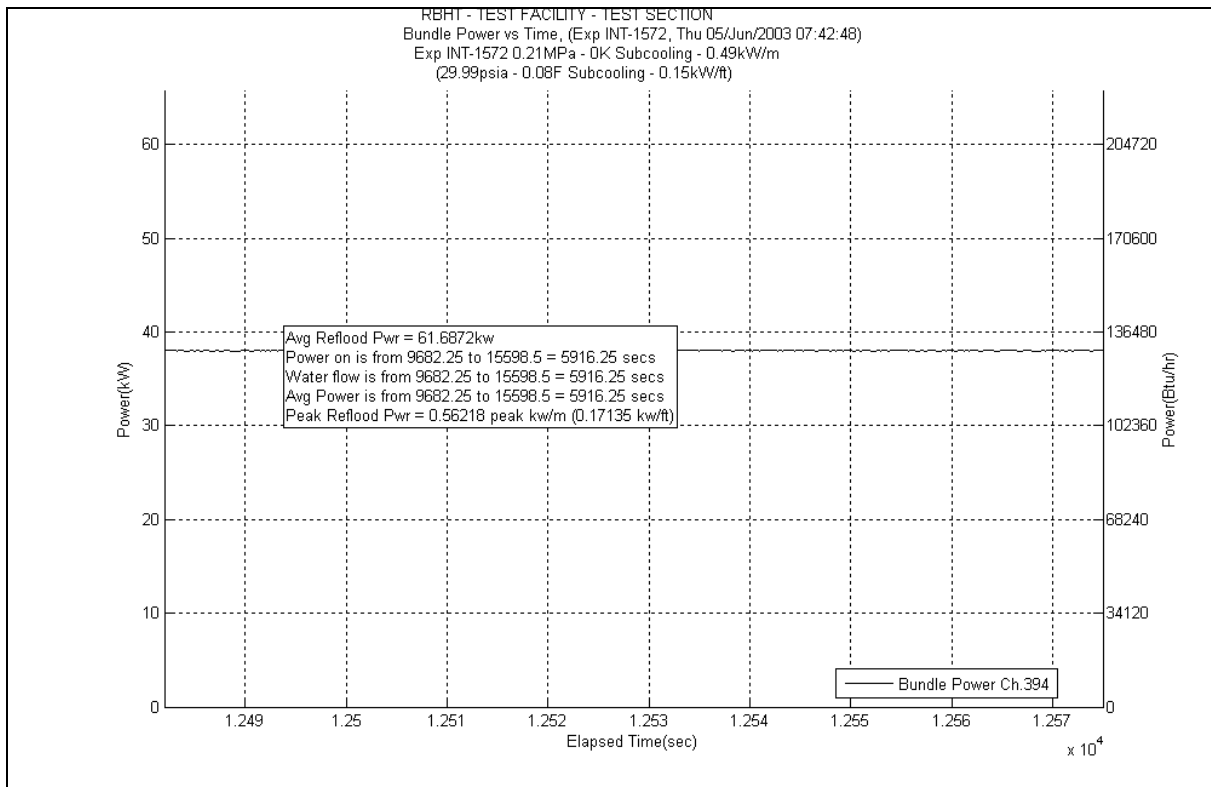


Figure A-69 Bundle Power Plot for Experiment 1572D

Table A-27 Data Results for RBHT Test 1572D for Time Period 12482 to 12575 seconds

Results for RBHT Test 1572
Valid Time Period 12482 to 12575 seconds
Collapsed Liquid Level = 90.039 inches = 2286.98 mm
(Z_{osv}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P _{local} (lb/ft ²)	P _{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.611	22.227	1064.256	0.568	27.196	0.114	5.458	0.000	0.000	21.54	1031.341	207874.051	4341.54	207874.051	0.623	0.620	0.626
*	120-133	3048-3378	383	0.656	23.240	1112.744	0.633	30.308	0.204	9.768	-2.797	-133.914	25.2	1206.582	209080.6335	4366.74	209080.6335	0.627	0.624	0.630
*	108-120	2743-3048	382	0.556	27.670	1324.850	0.531	25.424	0.254	12.162	4.085	195.594	22.8	1091.670	210172.3033	4389.54	210172.3033	0.634	0.631	0.637
	100-108	2540-2743	381	0.626	15.559	744.979	0.319	15.274	0.186	8.906	0.000	0.000	15.05	720.598	210892.9012	4404.59	210892.9012	0.638	0.635	0.641
	97-100	2464-2540	380	0.487	7.993	382.685	0.112	5.363	0.067	3.208	0.000	0.000	7.809	373.897	211266.7981	4412.399	211266.7981	0.499	0.497	0.501
	93-97	2362-2464	379	0.517	10.034	480.407	0.143	6.847	0.088	4.213	0.000	0.000	9.801	469.274	211736.0725	4422.2	211736.0725	0.528	0.525	0.531
*	85-93	2159-2362	378	0.403	24.814	1188.088	0.263	12.593	0.168	8.044	6.933	33.1941	17.45	835.510	212571.583	4439.65	212571.583	0.58	0.577	0.583
	81-85	2057-2159	377	0.622	7.852	375.971	0.121	5.794	0.081	3.878	0.000	0.000	7.65	366.284	212937.867	4447.3	212937.867	0.632	0.629	0.635
	78-81	1981-2057	376	0.474	8.190	392.134	0.086	4.118	0.059	2.825	0.000	0.000	8.045	385.197	213323.0636	4455.345	213323.0636	0.484	0.482	0.486
	75-78	1905-1981	375	0.451	8.548	409.291	0.082	3.926	0.058	2.777	0.000	0.000	8.407	402.529	213725.5929	4463.752	213725.5929	0.46	0.458	0.462
	72-75	1829-1905	374	0.391	9.488	454.298	0.078	3.735	0.056	2.681	0.000	0.000	9.352	447.776	214173.3691	4473.104	214173.3691	0.4	0.398	0.402
*	67-72	1702-1829	373	0.395	15.720	752.688	0.120	5.746	0.091	4.357	1.259	60.291	14.25	682.294	214855.6628	4487.354	214855.6628	0.451	0.449	0.453
	63-67	1600-1702	372	0.495	10.496	502.538	0.088	4.213	0.070	3.352	0.000	0.000	10.34	495.082	215350.7446	4497.694	215350.7446	0.502	0.499	0.505
	60-63	1524-1600	371	0.347	10.174	487.121	0.061	2.921	0.051	2.442	0.000	0.000	10.06	481.675	215832.42	4507.754	215832.42	0.354	0.352	0.356
	57-60	1448-1524	370	0.351	10.111	484.137	0.057	2.729	0.050	2.394	0.000	0.000	10	478.803	216311.2226	4517.754	216311.2226	0.358	0.356	0.360
	53-57	1346-1448	369	0.321	14.115	675.852	0.069	3.304	0.064	3.064	0.000	0.000	13.98	669.366	216980.5886	4531.734	216980.5886	0.327	0.325	0.329
*	46-53	1168-1346	368	0.225	28.158	1348.224	0.103	4.932	0.107	5.123	3.538	169.412	24.41	1168.757	218149.3456	4556.144	218149.3456	0.328	0.326	0.330
	43-46	1092-1168	367	0.325	10.522	503.781	0.037	1.772	0.044	2.107	0.000	0.000	10.44	499.870	218649.2155	4566.584	218649.2155	0.33	0.328	0.332
	37-43	940-1092	366	0.213	24.513	1173.666	0.059	2.825	0.083	3.974	0.000	0.000	24.36	1166.363	219815.5786	4590.944	219815.5786	0.218	0.217	0.219
*	25-37	635-940	365	0.070	57.958	2775.023	0.063	3.016	0.119	5.698	3.956	189.393	53.82	2576.915	222392.494	4644.764	222392.494	0.136	0.135	0.137
	13-25	330-635	364	0.054	58.934	2821.771	0.004	0.192	0.000	0.000	0.000	0.000	58.91	2820.626	4703.674	225213.12	0.054	0.051	0.057	
*	0-13	0-330	363	0.043	64.621	3094.051	0.004	0.192	0.000	0.000	-1.033	-49.479	65.65	3143.339	4769.324	228356.4588	0.027	0.026	0.028	

Table A-28 Energy Balance Results for RBHT Test 1572D for Time Period 12482 to 12575 seconds

Results for RBHT Test 1572 Valid Time Period 12482 to 12575 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1740.4293	5.490309	0.00E+00	0.00E+00	0.00E+00	8.84E-02	4.01E-02
0.25	6.35	1837.1199	5.795326	0.00E+00	0.00E+00	0.00E+00	8.84E-02	4.01E-02
0.50	12.70	1933.8104	6.100343	0.00E+00	0.00E+00	0.00E+00	8.84E-02	4.01E-02
0.75	19.05	2030.5009	6.40536	0.00E+00	0.00E+00	0.00E+00	8.84E-02	4.01E-02
1.00	25.40	2127.1914	6.710377	0.00E+00	0.00E+00	0.00E+00	8.84E-02	4.01E-02
1.25	31.75	2223.8819	7.015394	0.00E+00	0.00E+00	0.00E+00	8.84E-02	4.01E-02
1.50	38.10	2320.5725	7.320411	0.00E+00	0.00E+00	0.00E+00	8.84E-02	4.01E-02
1.75	44.45	2417.263	7.625429	0.00E+00	0.00E+00	0.00E+00	8.84E-02	4.01E-02
2.00	50.80	2513.9535	7.930446	0.00E+00	0.00E+00	0.00E+00	8.84E-02	4.01E-02
2.25	57.15	2610.644	8.235463	0.00E+00	0.00E+00	0.00E+00	8.84E-02	4.01E-02
2.50	63.50	2707.3345	8.54048	2.53E-03	1.81E-01	8.19E-02	8.82E-02	4.00E-02
2.75	69.85	2804.0251	8.845497	5.81E-03	4.14E-01	1.88E-01	8.79E-02	3.99E-02
3.00	76.20	2900.7156	9.150514	9.20E-03	6.56E-01	2.98E-01	8.76E-02	3.97E-02
3.25	82.55	2997.4061	9.455531	1.27E-02	9.06E-01	4.11E-01	8.73E-02	3.96E-02
3.50	88.90	3094.0966	9.760549	1.63E-02	1.16E+00	5.28E-01	8.69E-02	3.94E-02
3.75	95.25	3190.7871	10.06557	2.01E-02	1.43E+00	6.49E-01	8.66E-02	3.93E-02
4.00	101.60	3287.4777	10.37058	2.39E-02	1.71E+00	7.73E-01	8.63E-02	3.91E-02
4.25	107.95	3384.1682	10.6756	2.79E-02	1.99E+00	9.02E-01	8.59E-02	3.90E-02
4.50	114.30	3480.8587	10.98062	3.20E-02	2.28E+00	1.03E+00	8.56E-02	3.88E-02
4.75	120.65	3577.5492	11.28563	3.62E-02	2.58E+00	1.17E+00	8.52E-02	3.86E-02
5.00	127.00	3674.2397	11.59065	4.05E-02	2.89E+00	1.31E+00	8.48E-02	3.85E-02
5.25	133.35	3770.9302	11.89567	4.49E-02	3.20E+00	1.45E+00	8.44E-02	3.83E-02
5.50	139.70	3867.6208	12.20069	4.94E-02	3.53E+00	1.60E+00	8.40E-02	3.81E-02
5.75	146.05	3964.3113	12.5057	5.41E-02	3.86E+00	1.75E+00	8.36E-02	3.79E-02
6.00	152.40	4061.0018	12.81072	5.89E-02	4.20E+00	1.90E+00	8.32E-02	3.77E-02
6.25	158.75	4157.6923	13.11574	6.38E-02	4.55E+00	2.06E+00	8.28E-02	3.75E-02
6.50	165.10	4254.3828	13.42075	6.88E-02	4.90E+00	2.22E+00	8.23E-02	3.73E-02
6.75	171.45	4351.0734	13.72577	7.39E-02	5.27E+00	2.39E+00	8.19E-02	3.71E-02
7.00	177.80	4447.7639	14.03079	7.91E-02	5.64E+00	2.56E+00	8.14E-02	3.69E-02
7.25	184.15	4544.4544	14.33581	8.44E-02	6.02E+00	2.73E+00	8.09E-02	3.67E-02
7.50	190.50	4641.1449	14.64082	8.99E-02	6.41E+00	2.91E+00	8.04E-02	3.65E-02
7.75	196.85	4737.8354	14.94584	9.55E-02	6.81E+00	3.09E+00	8.00E-02	3.63E-02
8.00	203.20	4834.526	15.25086	1.01E-01	7.22E+00	3.27E+00	7.94E-02	3.60E-02
8.25	209.55	4931.2165	15.55587	1.07E-01	7.63E+00	3.46E+00	7.89E-02	3.58E-02
8.50	215.90	5027.907	15.86089	1.13E-01	8.05E+00	3.65E+00	7.84E-02	3.56E-02
8.75	222.25	5124.5975	16.16591	1.19E-01	8.48E+00	3.85E+00	7.79E-02	3.53E-02
9.00	228.60	5221.288	16.47093	1.25E-01	8.92E+00	4.05E+00	7.73E-02	3.51E-02
9.25	234.95	4931.2165	15.55587	1.31E-01	9.35E+00	4.24E+00	7.68E-02	3.48E-02
9.50	241.30	4641.1449	14.64082	1.37E-01	9.76E+00	4.42E+00	7.63E-02	3.46E-02
9.75	247.65	4351.0734	13.72577	1.42E-01	1.01E+01	4.60E+00	7.58E-02	3.44E-02
10.00	254.00	4061.0018	12.81072	1.47E-01	1.05E+01	4.76E+00	7.54E-02	3.42E-02
10.25	260.35	3770.9302	11.89567	1.52E-01	1.08E+01	4.91E+00	7.50E-02	3.40E-02
10.50	266.70	3480.8587	10.98062	1.56E-01	1.11E+01	5.05E+00	7.46E-02	3.38E-02
10.75	273.05	3190.7871	10.06557	1.60E-01	1.14E+01	5.18E+00	7.42E-02	3.37E-02
11.00	279.40	2900.7156	9.150514	1.64E-01	1.17E+01	5.30E+00	7.39E-02	3.35E-02
11.25	285.75	2610.644	8.235463	1.67E-01	1.19E+01	5.40E+00	7.36E-02	3.34E-02
11.50	292.10	2320.5725	7.320411	1.70E-01	1.21E+01	5.50E+00	7.34E-02	3.33E-02
11.75	298.45	2030.5009	6.40536	1.73E-01	1.23E+01	5.58E+00	7.31E-02	3.32E-02
12.00	304.80	1740.4293	5.490309	1.75E-01	1.25E+01	5.65E+00	7.29E-02	3.31E-02

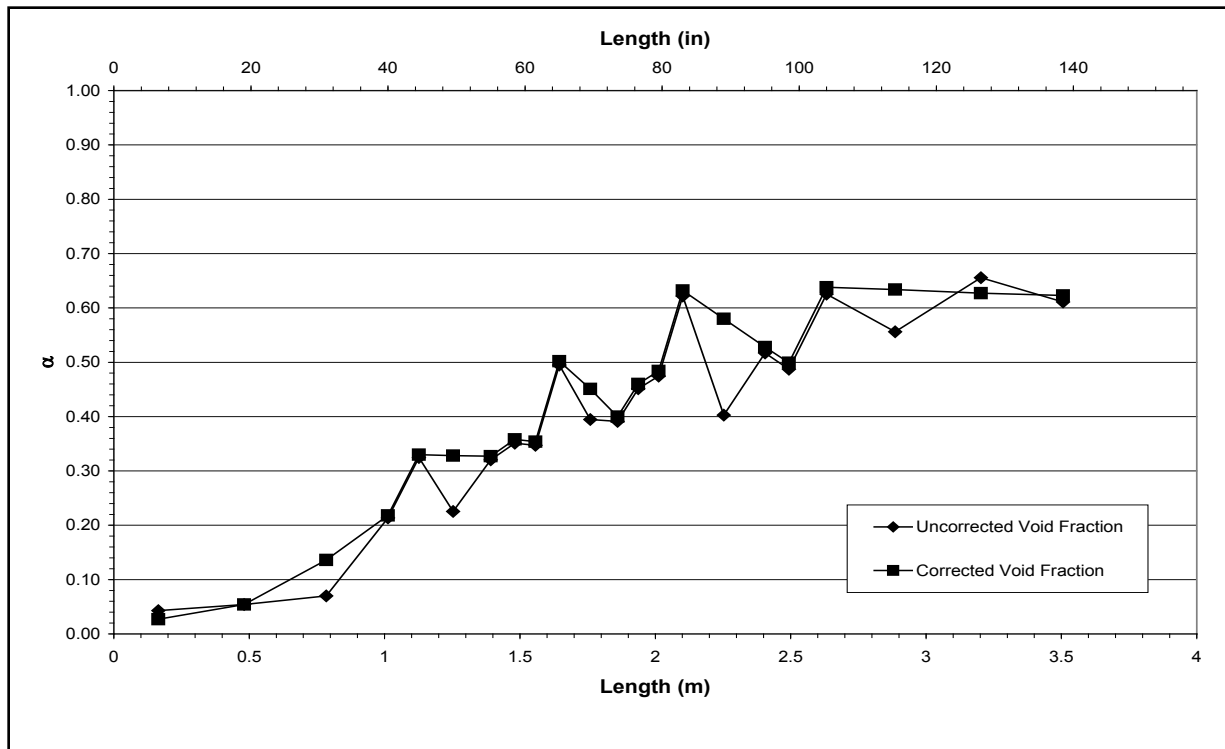


Figure A-70 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572D for Time Period 12482 to 12575 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-E

Test Conditions

Date: 6/5/2003

Steady-state time window: 13358 – 13478 seconds

Inlet flow rate: 1.781 cm/sec (0.701 in./sec)

Inlet mass flow rate: 0.087 kg/sec (0.192 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.92 kW

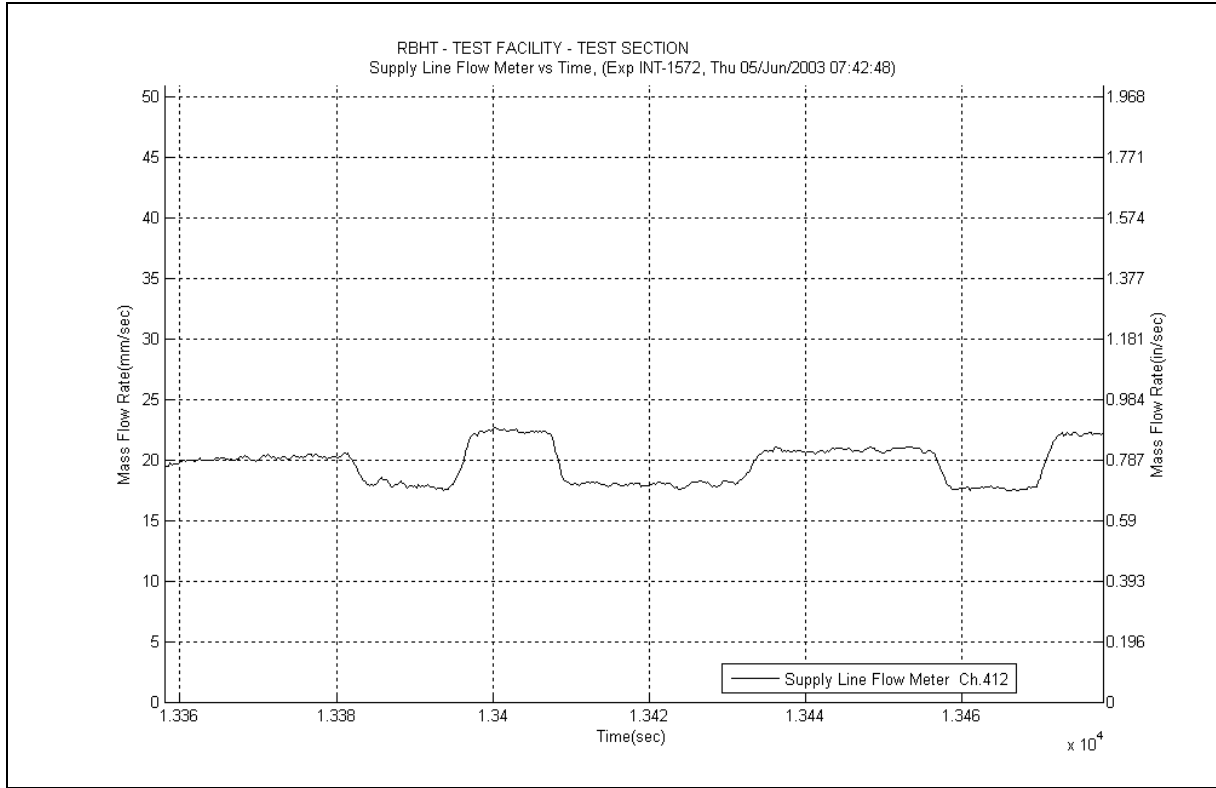


Figure A-71 Inlet Flow Plot for Experiment 1572E

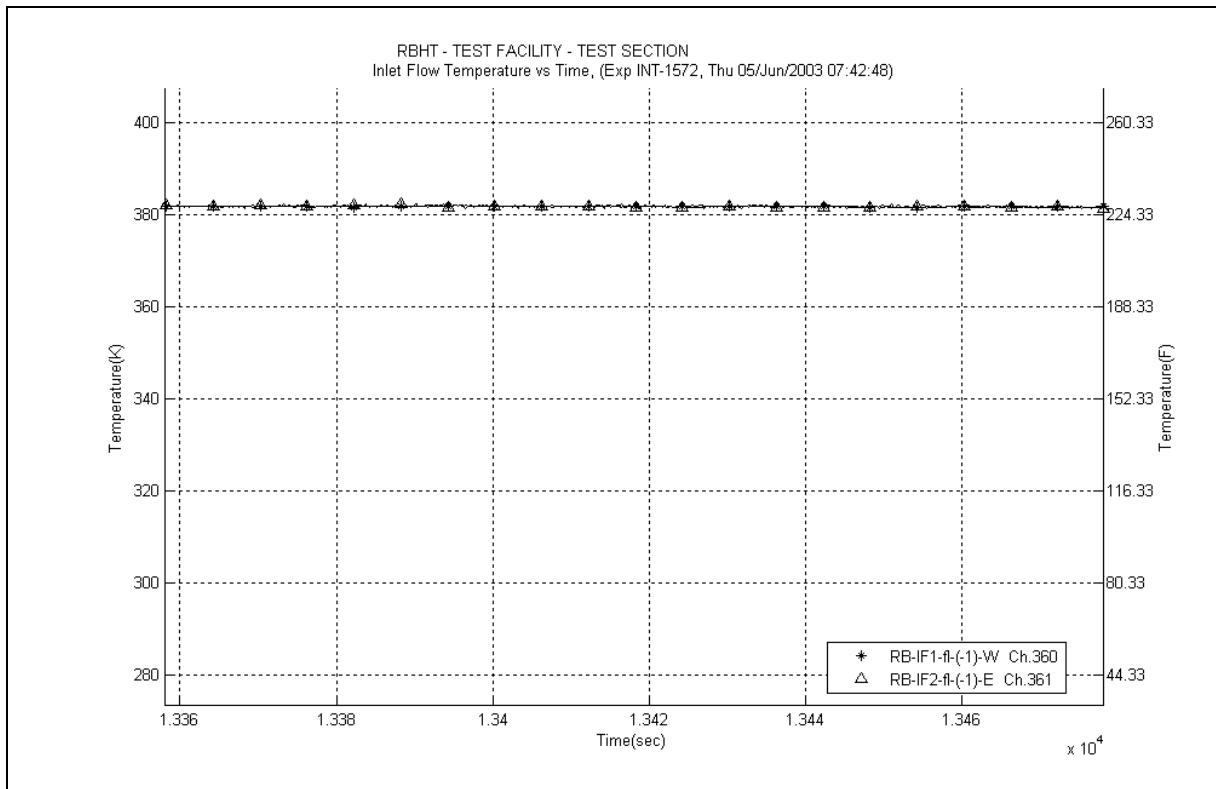


Figure A-72 Inlet Temperature Plot for Experiment 1572E

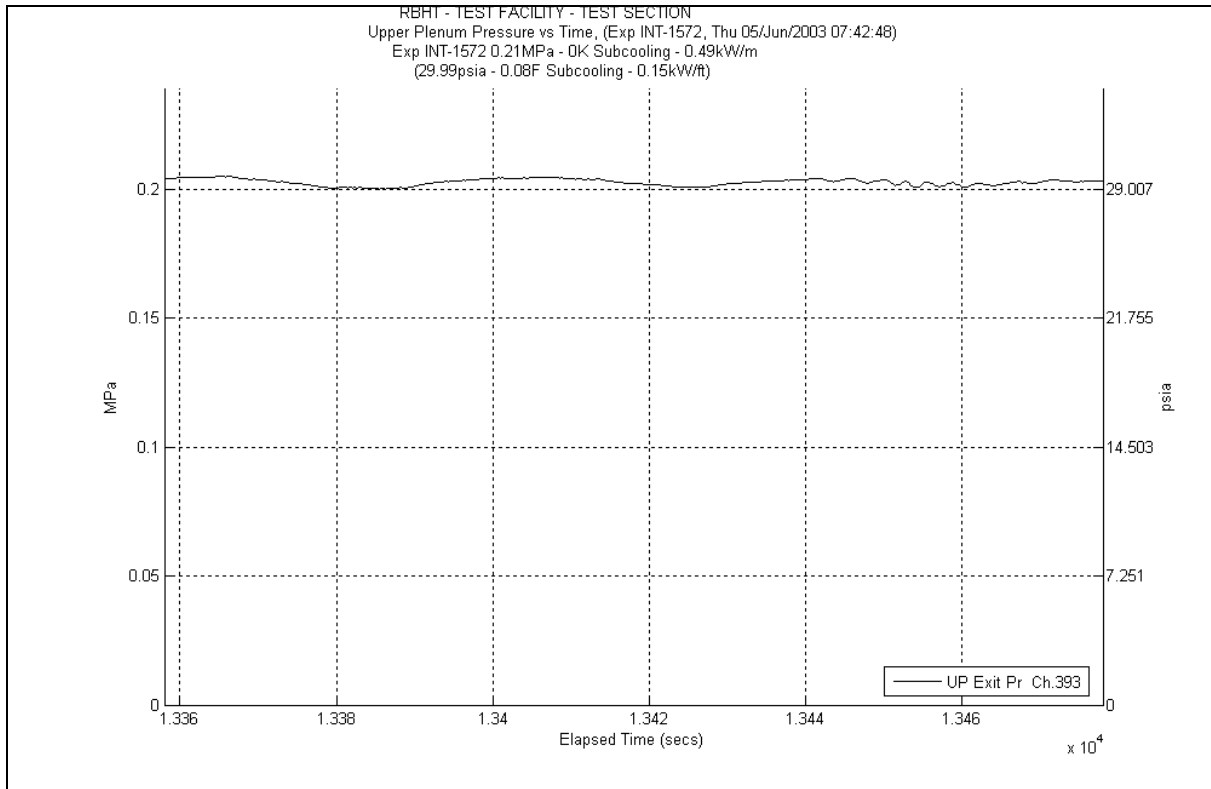


Figure A-73 System Pressure Plot for Experiment 1572E

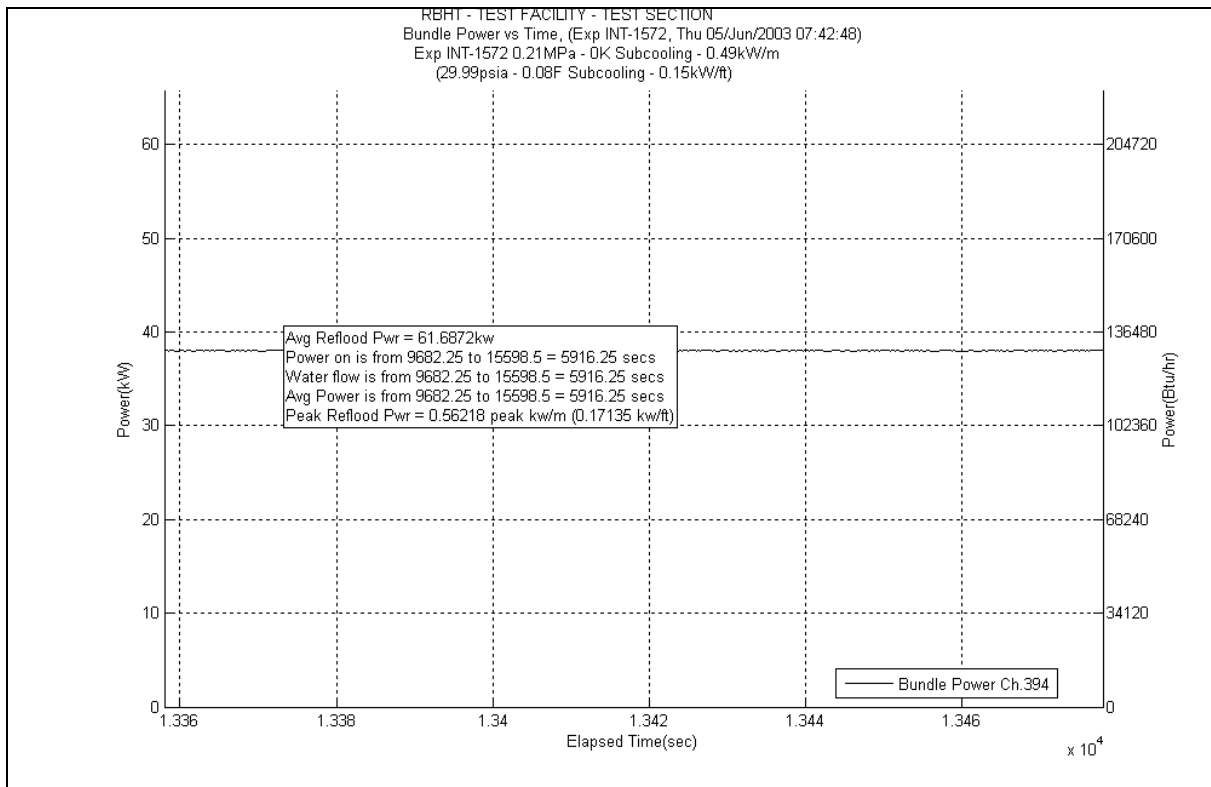


Figure A-74 Bundle Power Plot for Experiment 1572E

Table A-29 Data Results for RBHT Test 1572E for Time Period 13358 to 13478 seconds

Results for RBHT Test 1572
Valid Time Period 13358 to 13478 seconds
Collapsed Liquid Level = 85.112 inches = 2161.83 mm
(Z_{SSL}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{acc (lbf/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.663	19.252	921.775	0.394	18.865	0.081	3.878	0.000	0.000	18.77	898.712	207741.4227	0.671	0.668	0.674	
*	120-133	3048-3378	383	0.685	21.246	1017.260	0.438	20.972	0.144	6.895	-1.656	-79.294	22.32	1068.687	4361.09	0.669	0.666	0.672	
*	108-120	2743-3048	382	0.582	26.024	1246.025	0.368	17.620	0.179	8.571	4.637	222.010	20.84	997.825	209807.9346	0.666	0.663	0.669	
	100-108	2540-2743	381	0.655	14.334	686.296	0.222	10.629	0.131	6.272	0.000	0.000	13.98	669.366	210477.3005	0.664	0.661	0.667	
	97-100	2464-2540	380	0.513	7.587	363.289	0.078	3.735	0.047	2.250	0.000	0.000	7.46	357.187	210834.4873	0.521	0.518	0.524	
	93-97	2362-2464	379	0.536	9.634	461.261	0.099	4.740	0.062	2.969	0.000	0.000	9.47	453.426	211287.9133	0.544	0.541	0.547	
*	85-93	2159-2362	378	0.416	24.258	1161.481	0.184	8.810	0.119	5.698	7.305	349.767	16.65	797.206	4429.49	0.599	0.596	0.602	
	81-85	2057-2159	377	0.648	7.317	350.359	0.085	4.070	0.057	2.729	0.000	0.000	7.175	343.541	212428.6604	0.655	0.652	0.658	
	78-81	1981-2057	376	0.505	7.707	369.008	0.060	2.873	0.042	2.011	0.000	0.000	7.602	363.986	212792.6461	0.512	0.509	0.515	
	75-78	1905-1981	375	0.488	7.982	382.187	0.058	2.777	0.041	1.963	0.000	0.000	7.881	377.344	213169.9904	0.494	0.492	0.496	
	72-75	1829-1905	374	0.427	8.933	427.692	0.055	2.633	0.040	1.915	0.000	0.000	8.835	423.022	213593.0125	0.433	0.431	0.435	
*	67-72	1702-1829	373	0.406	15.429	738.763	0.086	4.118	0.064	3.064	2.169	103.871	13.11	627.710	214220.7227	0.495	0.493	0.497	
	63-67	1600-1702	372	0.552	9.312	445.844	0.063	3.016	0.049	2.346	0.000	0.000	9.195	440.259	214660.9816	0.557	0.554	0.560	
	60-63	1524-1600	371	0.376	9.717	465.239	0.044	2.107	0.036	1.724	0.000	0.000	9.632	461.183	215122.1643	0.382	0.380	0.384	
	57-60	1448-1524	370	0.381	9.639	461.509	0.042	2.011	0.035	1.676	0.000	0.000	9.557	457.592	215579.7559	0.386	0.384	0.388	
	53-57	1346-1448	369	0.358	13.347	639.051	0.052	2.490	0.045	2.155	0.000	0.000	13.24	633.935	216213.6905	0.362	0.360	0.364	
*	46-53	1168-1346	368	0.255	27.094	1297.249	0.079	3.783	0.075	3.591	5.120	245.128	21.82	1044.747	217258.4377	0.4	0.398	0.402	
	43-46	1092-1168	367	0.433	8.829	422.719	0.029	1.389	0.031	1.484	0.000	0.000	8.766	419.718	217678.156	0.437	0.435	0.439	
	37-43	940-1092	366	0.299	21.843	1045.855	0.050	2.394	0.059	2.825	0.000	0.000	21.73	1040.438	218718.594	0.302	0.300	0.304	
*	25-37	635-940	365	0.144	53.356	2554.712	0.065	3.112	0.106	5.075	2.165	103.674	51.02	2442.851	221161.4447	0.181	0.180	0.182	
	13-25	330-635	364	0.059	58.648	2808.095	0.023	1.101	0.033	1.580	0.000	0.000	58.57	2804.347	223965.7914	0.06	0.057	0.063	
*	0-13	0-330	363	0.044	64.569	3091.565	0.002	0.096	0.000	0.000	-0.903	-43.252	65.47	3134.720	227100.5118	0.03	0.029	0.032	

Table A-30 Energy Balance Results for RBHT Test 1572E for Time Period 13358 to 13478 seconds

Results for RBHT Test 1572 Valid Time Period 13358 to 13478 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1738.4259	5.483989	0.00E+00	0.00E+00	0.00E+00	6.23E-02	2.83E-02
0.25	6.35	1835.0051	5.788655	0.00E+00	0.00E+00	0.00E+00	6.23E-02	2.83E-02
0.50	12.70	1931.5843	6.093321	0.00E+00	0.00E+00	0.00E+00	6.23E-02	2.83E-02
0.75	19.05	2028.1635	6.397987	0.00E+00	0.00E+00	0.00E+00	6.23E-02	2.83E-02
1.00	25.40	2124.7428	6.702653	0.00E+00	0.00E+00	0.00E+00	6.23E-02	2.83E-02
1.25	31.75	2221.322	7.007319	0.00E+00	0.00E+00	0.00E+00	6.23E-02	2.83E-02
1.50	38.10	2317.9012	7.311985	0.00E+00	0.00E+00	0.00E+00	6.23E-02	2.83E-02
1.75	44.45	2414.4804	7.616651	1.86E-04	9.34E-03	4.24E-03	6.23E-02	2.83E-02
2.00	50.80	2511.0596	7.921317	4.34E-03	2.18E-01	9.91E-02	6.21E-02	2.81E-02
2.25	57.15	2607.6388	8.225983	8.65E-03	4.36E-01	1.98E-01	6.18E-02	2.80E-02
2.50	63.50	2704.2181	8.530649	1.31E-02	6.61E-01	3.00E-01	6.15E-02	2.79E-02
2.75	69.85	2800.7973	8.835315	1.78E-02	8.95E-01	4.06E-01	6.12E-02	2.78E-02
3.00	76.20	2897.3765	9.139981	2.26E-02	1.14E+00	5.16E-01	6.09E-02	2.76E-02
3.25	82.55	2993.9557	9.444647	2.75E-02	1.39E+00	6.29E-01	6.06E-02	2.75E-02
3.50	88.90	3090.5349	9.749313	3.27E-02	1.64E+00	7.46E-01	6.03E-02	2.73E-02
3.75	95.25	3187.1141	10.05398	3.80E-02	1.91E+00	8.67E-01	6.00E-02	2.72E-02
4.00	101.60	3283.6934	10.35865	4.34E-02	2.19E+00	9.92E-01	5.96E-02	2.70E-02
4.25	107.95	3380.2726	10.66331	4.90E-02	2.47E+00	1.12E+00	5.93E-02	2.69E-02
4.50	114.30	3476.8518	10.96798	5.48E-02	2.76E+00	1.25E+00	5.89E-02	2.67E-02
4.75	120.65	3573.431	11.27264	6.08E-02	3.06E+00	1.39E+00	5.85E-02	2.66E-02
5.00	127.00	3670.0102	11.57731	6.69E-02	3.37E+00	1.53E+00	5.82E-02	2.64E-02
5.25	133.35	3766.5894	11.88198	7.31E-02	3.68E+00	1.67E+00	5.78E-02	2.62E-02
5.50	139.70	3863.1687	12.18664	7.96E-02	4.01E+00	1.82E+00	5.74E-02	2.60E-02
5.75	146.05	3959.7479	12.49131	8.62E-02	4.34E+00	1.97E+00	5.70E-02	2.58E-02
6.00	152.40	4056.3271	12.79597	9.29E-02	4.68E+00	2.12E+00	5.65E-02	2.56E-02
6.25	158.75	4152.9063	13.10064	9.98E-02	5.03E+00	2.28E+00	5.61E-02	2.54E-02
6.50	165.10	4249.4855	13.40531	1.07E-01	5.38E+00	2.44E+00	5.57E-02	2.52E-02
6.75	171.45	4346.0647	13.70997	1.14E-01	5.75E+00	2.61E+00	5.52E-02	2.50E-02
7.00	177.80	4442.644	14.01464	1.22E-01	6.12E+00	2.78E+00	5.47E-02	2.48E-02
7.25	184.15	4539.2232	14.3193	1.29E-01	6.50E+00	2.95E+00	5.43E-02	2.46E-02
7.50	190.50	4635.8024	14.62397	1.37E-01	6.89E+00	3.13E+00	5.38E-02	2.44E-02
7.75	196.85	4732.3816	14.92864	1.45E-01	7.29E+00	3.31E+00	5.33E-02	2.42E-02
8.00	203.20	4828.9608	15.2333	1.53E-01	7.69E+00	3.49E+00	5.28E-02	2.39E-02
8.25	209.55	4925.54	15.53797	1.61E-01	8.11E+00	3.68E+00	5.23E-02	2.37E-02
8.50	215.90	5022.1193	15.84263	1.70E-01	8.53E+00	3.87E+00	5.18E-02	2.35E-02
8.75	222.25	5118.6985	16.1473	1.78E-01	8.96E+00	4.06E+00	5.12E-02	2.32E-02
9.00	228.60	5215.2777	16.45197	1.87E-01	9.40E+00	4.26E+00	5.07E-02	2.30E-02
9.25	234.95	4925.54	15.53797	1.95E-01	9.83E+00	4.46E+00	5.02E-02	2.27E-02
9.50	241.30	4635.8024	14.62397	2.03E-01	1.02E+01	4.64E+00	4.97E-02	2.25E-02
9.75	247.65	4346.0647	13.70997	2.11E-01	1.06E+01	4.82E+00	4.92E-02	2.23E-02
10.00	254.00	4056.3271	12.79597	2.18E-01	1.10E+01	4.98E+00	4.87E-02	2.21E-02
10.25	260.35	3766.5894	11.88198	2.25E-01	1.13E+01	5.13E+00	4.83E-02	2.19E-02
10.50	266.70	3476.8518	10.96798	2.31E-01	1.16E+01	5.27E+00	4.79E-02	2.17E-02
10.75	273.05	3187.1141	10.05398	2.36E-01	1.19E+01	5.40E+00	4.76E-02	2.16E-02
11.00	279.40	2897.3765	9.139981	2.41E-01	1.22E+01	5.51E+00	4.73E-02	2.14E-02
11.25	285.75	2607.6388	8.225983	2.46E-01	1.24E+01	5.62E+00	4.70E-02	2.13E-02
11.50	292.10	2317.9012	7.311985	2.50E-01	1.26E+01	5.71E+00	4.67E-02	2.12E-02
11.75	298.45	2028.1635	6.397987	2.54E-01	1.28E+01	5.80E+00	4.65E-02	2.11E-02
12.00	304.80	1738.4259	5.483989	2.57E-01	1.29E+01	5.87E+00	4.63E-02	2.10E-02

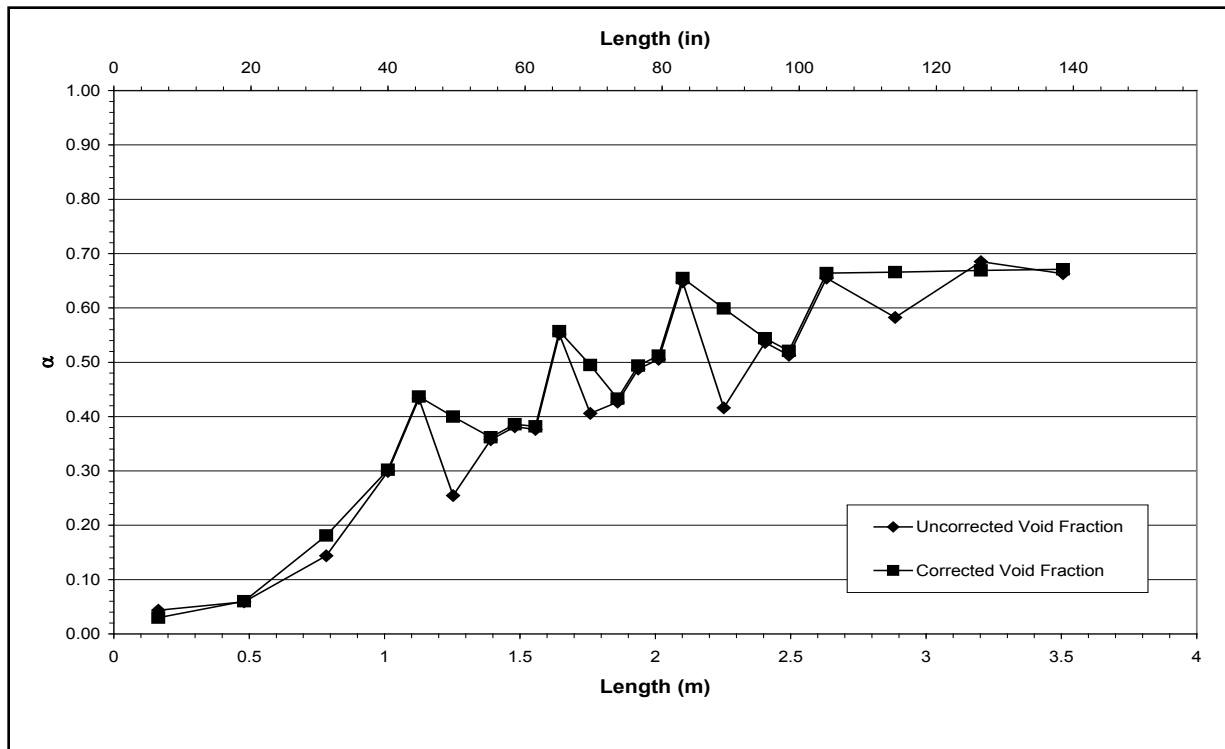


Figure A-75 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572E for Time Period 13358 to 13478 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-F

Test Conditions

Date: 6/5/2003

Steady-state time window: 13845 – 14001 seconds

Inlet flow rate: 1.275 cm/sec (0.502 in./sec)

Inlet mass flow rate: 0.063 kg/sec (0.138 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.92 kW

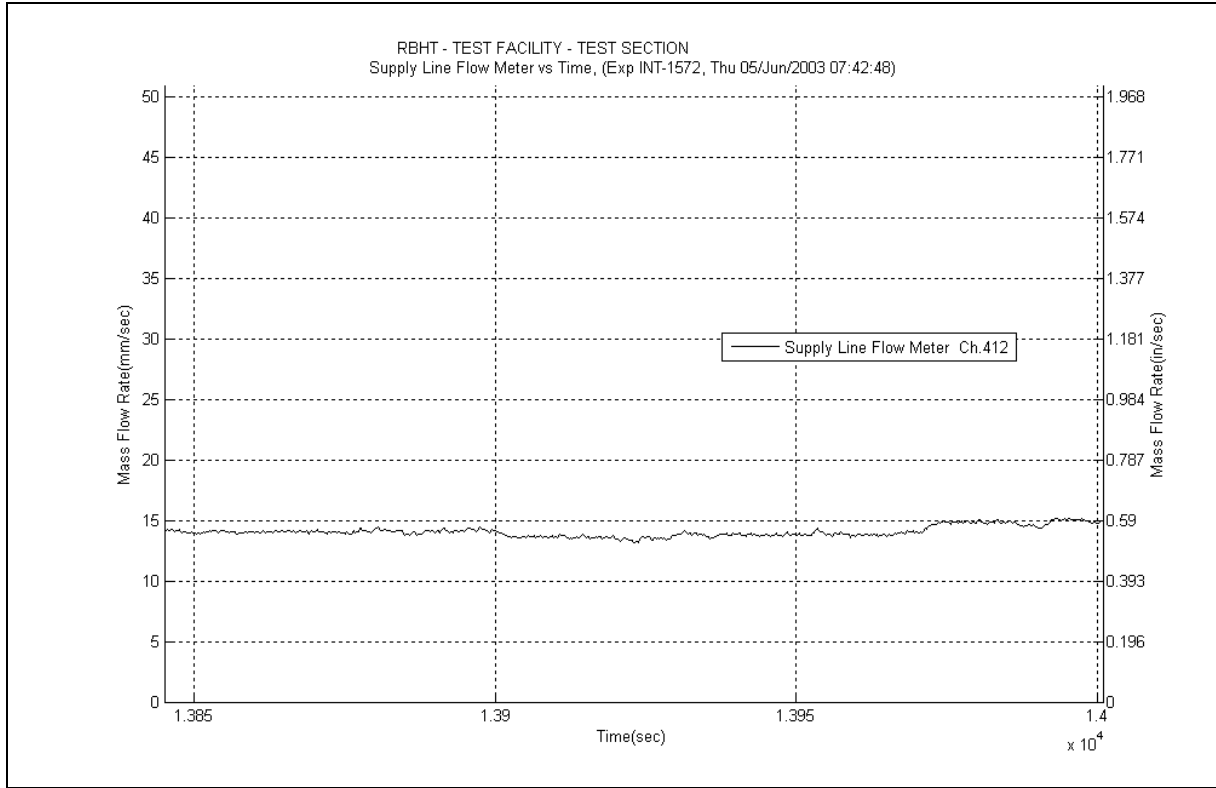


Figure A-76 Inlet Flow Plot for Experiment 1572F

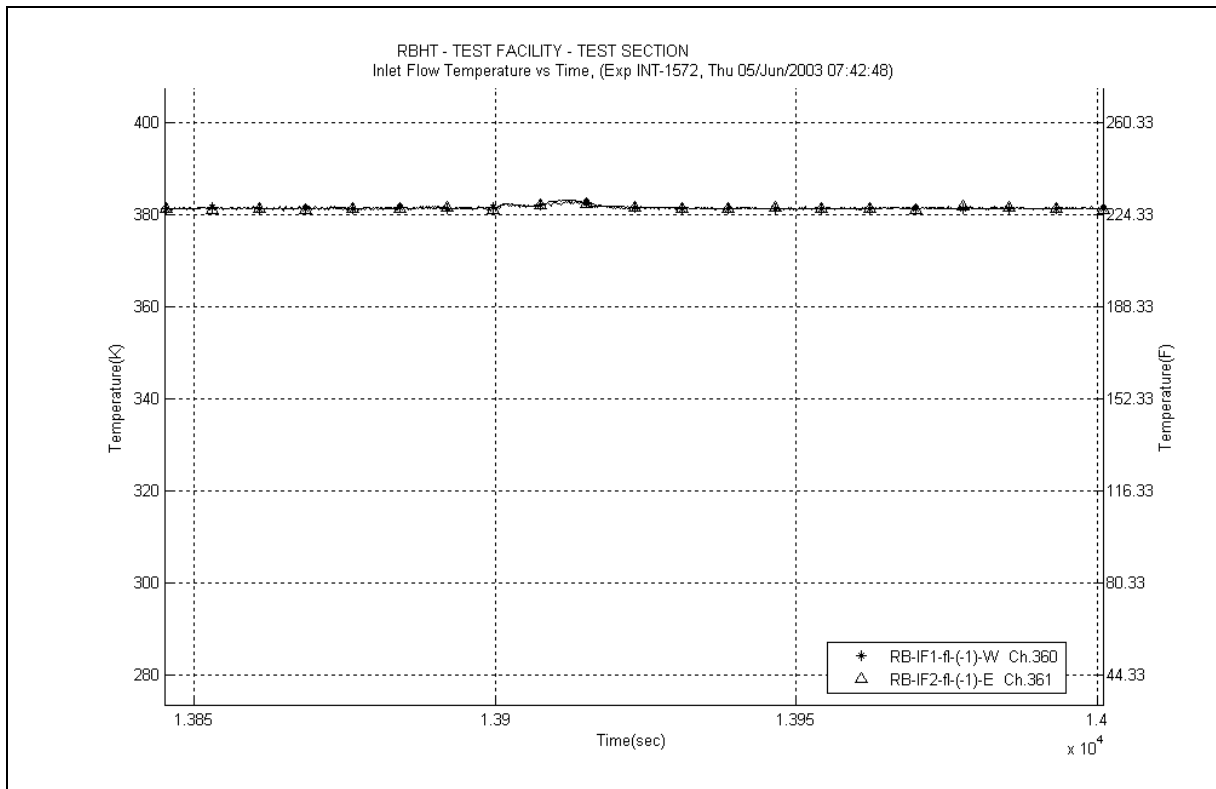


Figure A-77 Inlet Temperature Plot for Experiment 1572F

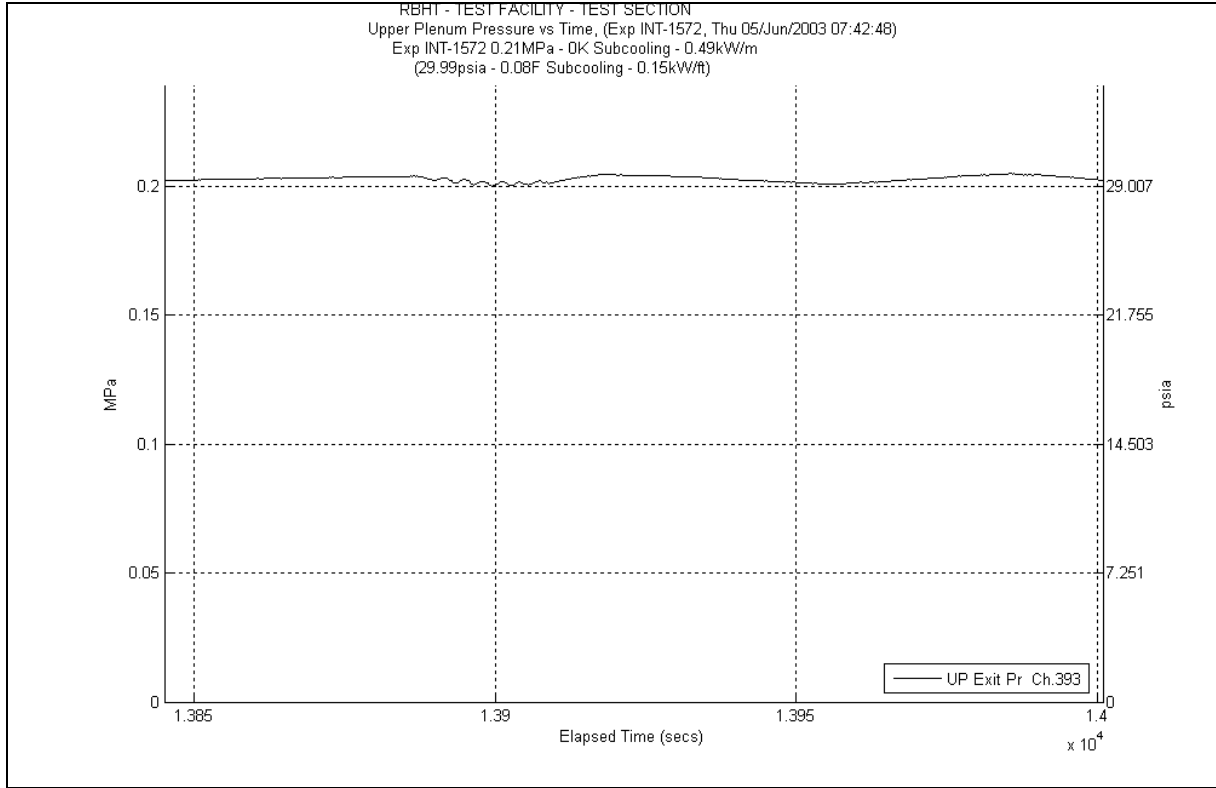


Figure A-78 System Pressure Plot for Experiment 1572F

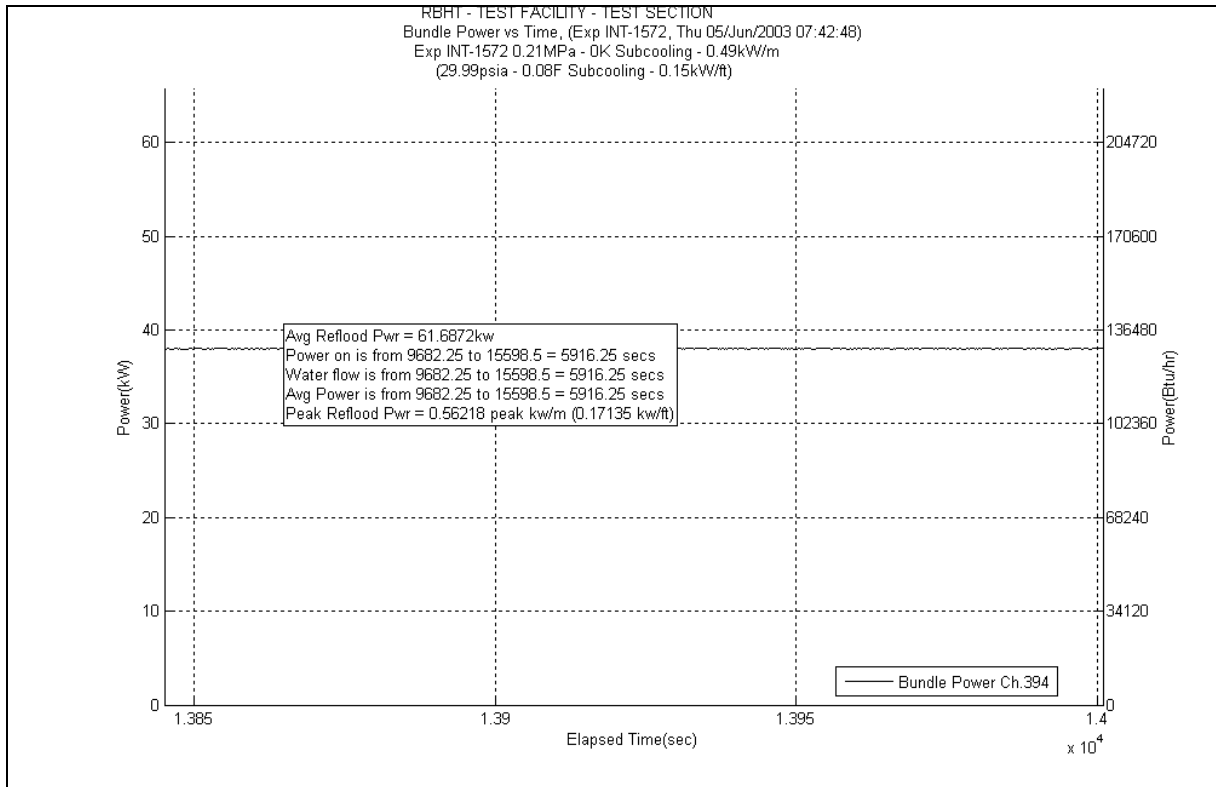


Figure A-79 Bundle Power Plot for Experiment 1572F

Table A-31 Data Results for RBHT Test 1572F for Time Period 13845 to 14001 seconds

Results for RBHT Test 1572
Valid Time Period 13845 to 14001 seconds
Collapsed Liquid Level = 82.330 inches = 2091.17 mm
(Z_{csl}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acccl} (lbf/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.695	17.396	832.930	0.297	14.196	0.061	2.935	0.000	0.000	17.03	815.401	4337.03	207658.111	0.702	0.698	0.705
*	120-133	3048-3378	383	0.705	19.904	953.007	0.330	15.781	0.109	5.238	-1.005	-48.122	20.47	980.109	4357.5	208638.2199	0.697	0.693	0.700
*	108-120	2743-3048	382	0.600	24.949	1194.578	0.276	13.229	0.137	6.540	5.006	239.707	19.53	935.101	4377.03	209573.3213	0.686	0.683	0.690
	100-108	2540-2743	381	0.675	13.505	646.635	0.166	7.953	0.100	4.784	0.000	0.000	13.23	633.456	4390.26	210206.7771	0.681	0.678	0.685
	97-100	2464-2540	380	0.531	7.313	350.135	0.058	2.794	0.036	1.731	0.000	0.000	7.216	345.504	4397.476	210552.281	0.537	0.534	0.539
	93-97	2362-2464	379	0.561	9.127	437.016	0.075	3.569	0.047	2.256	0.000	0.000	9.003	431.066	4406.479	210983.347	0.567	0.564	0.569
*	85-93	2159-2362	378	0.424	23.919	1145.269	0.138	6.617	0.090	4.329	7.901	378.293	15.79	756.029	4422.269	211739.3762	0.620	0.617	0.623
	81-85	2057-2159	377	0.668	6.892	329.994	0.064	3.049	0.043	2.074	0.000	0.000	6.783	324.772	4429.052	212064.148	0.673	0.670	0.677
	78-81	1981-2057	376	0.523	7.434	355.954	0.045	2.176	0.032	1.516	0.000	0.000	7.355	352.159	4436.407	212416.3073	0.528	0.525	0.530
	75-78	1905-1981	375	0.507	7.689	368.138	0.043	2.082	0.031	1.481	0.000	0.000	7.612	364.465	4444.019	212780.7718	0.511	0.509	0.514
	72-75	1829-1905	374	0.453	8.523	408.097	0.042	1.989	0.030	1.447	0.000	0.000	8.449	404.540	4452.468	213185.3121	0.458	0.455	0.460
*	67-72	1702-1829	373	0.411	15.305	732.795	0.065	3.111	0.049	2.337	2.791	133.632	12.4	593.715	4464.868	213779.0273	0.522	0.519	0.525
	63-67	1600-1702	372	0.583	8.670	415.134	0.048	2.305	0.038	1.801	0.000	0.000	8.582	410.908	4473.45	214189.9357	0.587	0.584	0.590
	60-63	1524-1600	371	0.396	9.413	450.693	0.034	1.623	0.027	1.311	0.000	0.000	9.349	447.633	4482.799	214637.5682	0.400	0.398	0.402
	57-60	1448-1524	370	0.394	9.440	452.010	0.032	1.532	0.027	1.277	0.000	0.000	9.379	449.069	4492.178	215086.6371	0.398	0.396	0.400
	53-57	1346-1448	369	0.372	13.043	624.505	0.040	1.903	0.034	1.650	0.000	0.000	12.96	620.528	4505.138	215707.1653	0.376	0.374	0.378
*	46-53	1168-1346	368	0.273	26.443	1266.117	0.062	2.946	0.057	2.742	5.665	271.223	20.66	989.206	4525.798	216696.3714	0.432	0.429	0.434
	43-46	1092-1168	367	0.484	8.032	384.574	0.023	1.109	0.023	1.118	0.000	0.000	7.983	382.228	4533.781	217078.5995	0.488	0.485	0.490
	37-43	940-1092	366	0.335	20.716	991.872	0.041	1.943	0.045	2.135	0.000	0.000	20.62	987.291	4554.401	218065.8904	0.338	0.336	0.340
*	25-37	635-940	365	0.193	50.268	2406.860	0.057	2.748	0.081	3.860	1.320	63.217	48.81	2337.035	4603.211	220402.9257	0.217	0.215	0.218
	13-25	330-635	364	0.094	56.463	2703.459	0.025	1.192	0.049	2.333	0.000	0.000	56.37	2699.010	4659.581	223101.9358	0.095	0.090	0.100
*	0-13	0-330	363	0.045	64.485	3087.536	0.001	0.061	0.000	0.000	0.203	9.732	64.28	3077.743	4723.861	226179.6787	0.048	0.045	0.050

Table A-32 Energy Balance Results for RBHT Test 1572F for Time Period 13845 to 14001 seconds

Results for RBHT Test 1572 Valid Time Period 13845 to 14001 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1738.9613	5.485677	0.00E+00	0.00E+00	0.00E+00	4.75E-02	2.15E-02
0.25	6.35	1835.5702	5.790437	0.00E+00	0.00E+00	0.00E+00	4.75E-02	2.15E-02
0.50	12.70	1932.1792	6.095197	0.00E+00	0.00E+00	0.00E+00	4.75E-02	2.15E-02
0.75	19.05	2028.7882	6.399957	0.00E+00	0.00E+00	0.00E+00	4.75E-02	2.15E-02
1.00	25.40	2125.3971	6.704717	0.00E+00	0.00E+00	0.00E+00	4.75E-02	2.15E-02
1.25	31.75	2222.0061	7.009477	0.00E+00	0.00E+00	0.00E+00	4.75E-02	2.15E-02
1.50	38.10	2318.615	7.314237	2.09E-03	8.02E-02	3.64E-02	4.74E-02	2.15E-02
1.75	44.45	2415.224	7.618996	7.33E-03	2.81E-01	1.27E-01	4.71E-02	2.14E-02
2.00	50.80	2511.833	7.923756	1.28E-02	4.90E-01	2.22E-01	4.68E-02	2.13E-02
2.25	57.15	2608.4419	8.228516	1.85E-02	7.07E-01	3.21E-01	4.66E-02	2.11E-02
2.50	63.50	2705.0509	8.533276	2.43E-02	9.33E-01	4.23E-01	4.63E-02	2.10E-02
2.75	69.85	2801.6598	8.838036	3.04E-02	1.17E+00	5.29E-01	4.60E-02	2.09E-02
3.00	76.20	2898.2688	9.142796	3.68E-02	1.41E+00	6.39E-01	4.57E-02	2.07E-02
3.25	82.55	2994.8778	9.447556	4.33E-02	1.66E+00	7.52E-01	4.54E-02	2.06E-02
3.50	88.90	3091.4867	9.752316	5.00E-02	1.92E+00	8.69E-01	4.51E-02	2.04E-02
3.75	95.25	3188.0957	10.05708	5.70E-02	2.18E+00	9.90E-01	4.48E-02	2.03E-02
4.00	101.60	3284.7046	10.36184	6.41E-02	2.46E+00	1.11E+00	4.44E-02	2.01E-02
4.25	107.95	3381.3136	10.6666	7.15E-02	2.74E+00	1.24E+00	4.41E-02	2.00E-02
4.50	114.30	3477.9226	10.97135	7.91E-02	3.03E+00	1.38E+00	4.37E-02	1.98E-02
4.75	120.65	3574.5315	11.27611	8.69E-02	3.33E+00	1.51E+00	4.33E-02	1.97E-02
5.00	127.00	3671.1405	11.58087	9.49E-02	3.64E+00	1.65E+00	4.30E-02	1.95E-02
5.25	133.35	3767.7494	11.88563	1.03E-01	3.96E+00	1.79E+00	4.26E-02	1.93E-02
5.50	139.70	3864.3584	12.19039	1.12E-01	4.28E+00	1.94E+00	4.22E-02	1.91E-02
5.75	146.05	3960.9674	12.49515	1.20E-01	4.61E+00	2.09E+00	4.17E-02	1.89E-02
6.00	152.40	4057.5763	12.79991	1.29E-01	4.95E+00	2.25E+00	4.13E-02	1.87E-02
6.25	158.75	4154.1853	13.10467	1.38E-01	5.30E+00	2.40E+00	4.09E-02	1.85E-02
6.50	165.10	4250.7942	13.40943	1.48E-01	5.66E+00	2.57E+00	4.05E-02	1.83E-02
6.75	171.45	4347.4032	13.71419	1.57E-01	6.02E+00	2.73E+00	4.00E-02	1.81E-02
7.00	177.80	4444.0122	14.01895	1.67E-01	6.39E+00	2.90E+00	3.95E-02	1.79E-02
7.25	184.15	4540.6211	14.32371	1.77E-01	6.78E+00	3.07E+00	3.91E-02	1.77E-02
7.50	190.50	4637.2301	14.62847	1.87E-01	7.16E+00	3.25E+00	3.86E-02	1.75E-02
7.75	196.85	4733.839	14.93323	1.97E-01	7.56E+00	3.43E+00	3.81E-02	1.73E-02
8.00	203.20	4830.448	15.23799	2.08E-01	7.97E+00	3.61E+00	3.76E-02	1.71E-02
8.25	209.55	4927.057	15.54275	2.19E-01	8.38E+00	3.80E+00	3.71E-02	1.68E-02
8.50	215.90	5023.6659	15.84751	2.30E-01	8.80E+00	3.99E+00	3.66E-02	1.66E-02
8.75	222.25	5120.2749	16.15227	2.41E-01	9.23E+00	4.19E+00	3.60E-02	1.63E-02
9.00	228.60	5216.8838	16.45703	2.52E-01	9.67E+00	4.39E+00	3.55E-02	1.61E-02
9.25	234.95	4927.057	15.54275	2.64E-01	1.01E+01	4.58E+00	3.49E-02	1.59E-02
9.50	241.30	4637.2301	14.62847	2.74E-01	1.05E+01	4.77E+00	3.44E-02	1.56E-02
9.75	247.65	4347.4032	13.71419	2.84E-01	1.09E+01	4.94E+00	3.40E-02	1.54E-02
10.00	254.00	4057.5763	12.79991	2.94E-01	1.12E+01	5.10E+00	3.35E-02	1.52E-02
10.25	260.35	3767.7494	11.88563	3.02E-01	1.16E+01	5.25E+00	3.31E-02	1.50E-02
10.50	266.70	3477.9226	10.97135	3.10E-01	1.19E+01	5.39E+00	3.27E-02	1.49E-02
10.75	273.05	3188.0957	10.05708	3.18E-01	1.22E+01	5.52E+00	3.24E-02	1.47E-02
11.00	279.40	2898.2688	9.142796	3.24E-01	1.24E+01	5.64E+00	3.21E-02	1.45E-02
11.25	285.75	2608.4419	8.228516	3.30E-01	1.27E+01	5.74E+00	3.18E-02	1.44E-02
11.50	292.10	2318.615	7.314237	3.36E-01	1.29E+01	5.84E+00	3.15E-02	1.43E-02
11.75	298.45	2028.7882	6.399957	3.41E-01	1.31E+01	5.92E+00	3.13E-02	1.42E-02
12.00	304.80	1738.9613	5.485677	3.45E-01	1.32E+01	5.99E+00	3.11E-02	1.41E-02

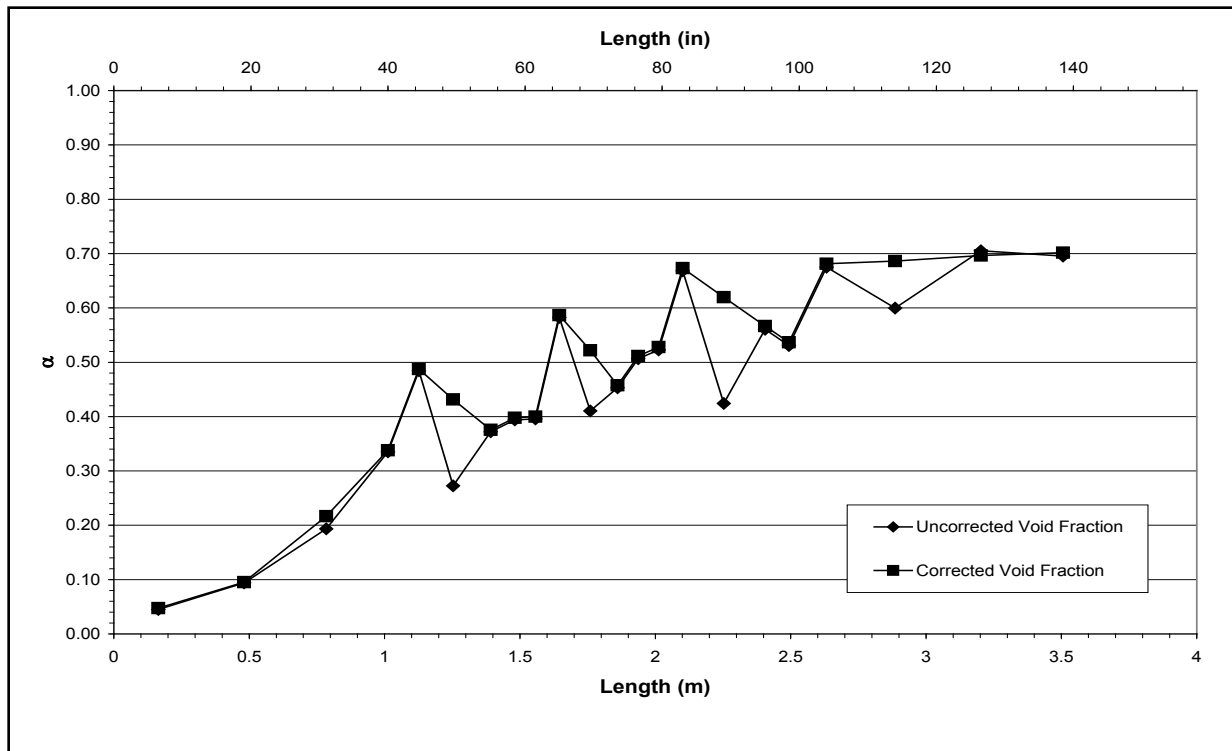


Figure A-80 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572F for Time Period 13845 to 14001 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-G

Test Conditions

Date: 6/5/2003

Steady-state time window: 14172 – 14259 seconds

Inlet flow rate: 0.772 cm/sec (0.304 in./sec)

Inlet mass flow rate: 0.038 kg/sec (0.083 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.92 kW

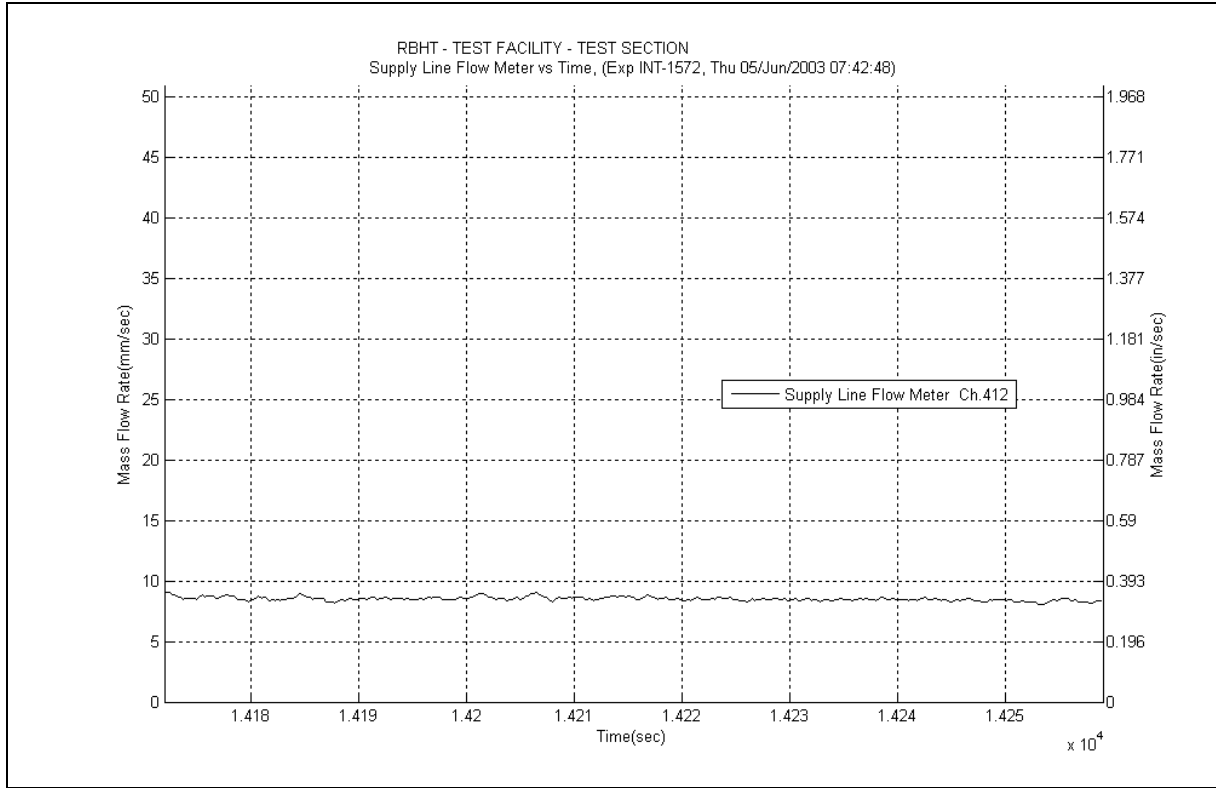


Figure A-81 Inlet Flow Plot for Experiment 1572G

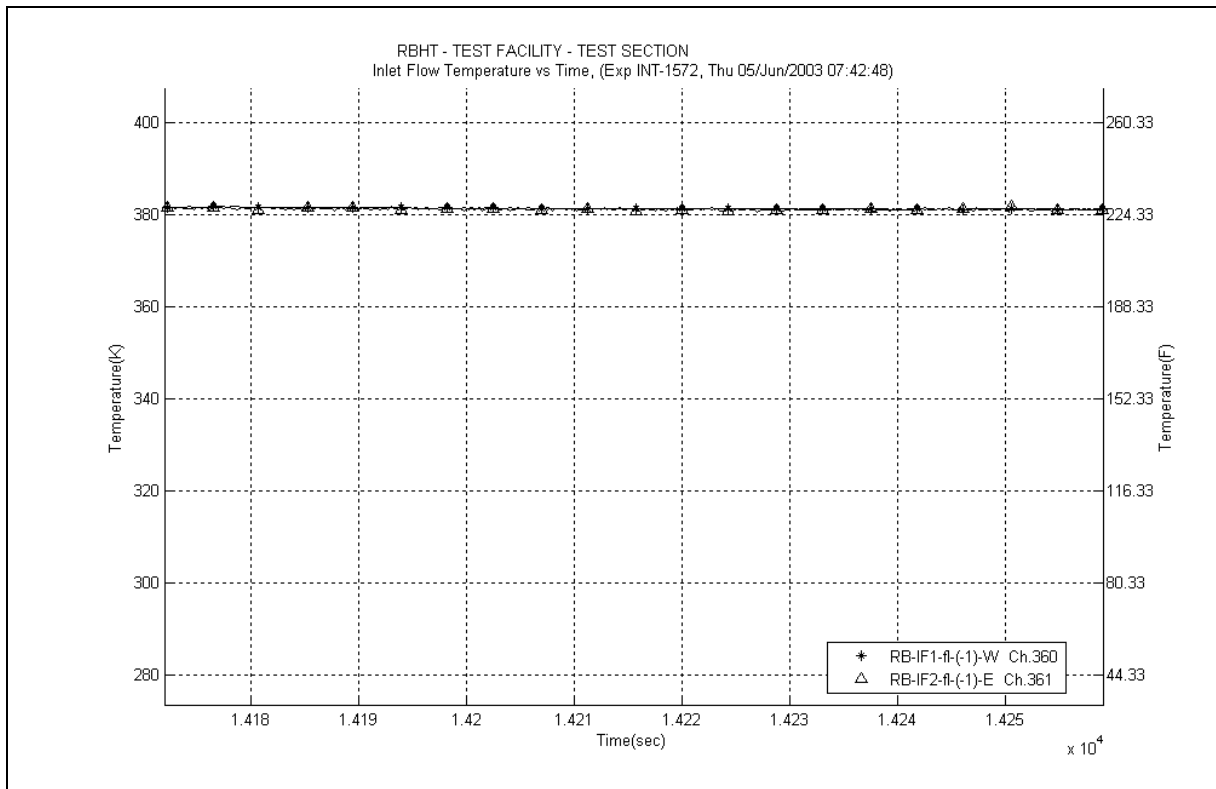


Figure A-82 Inlet Temperature Plot for Experiment 1572G

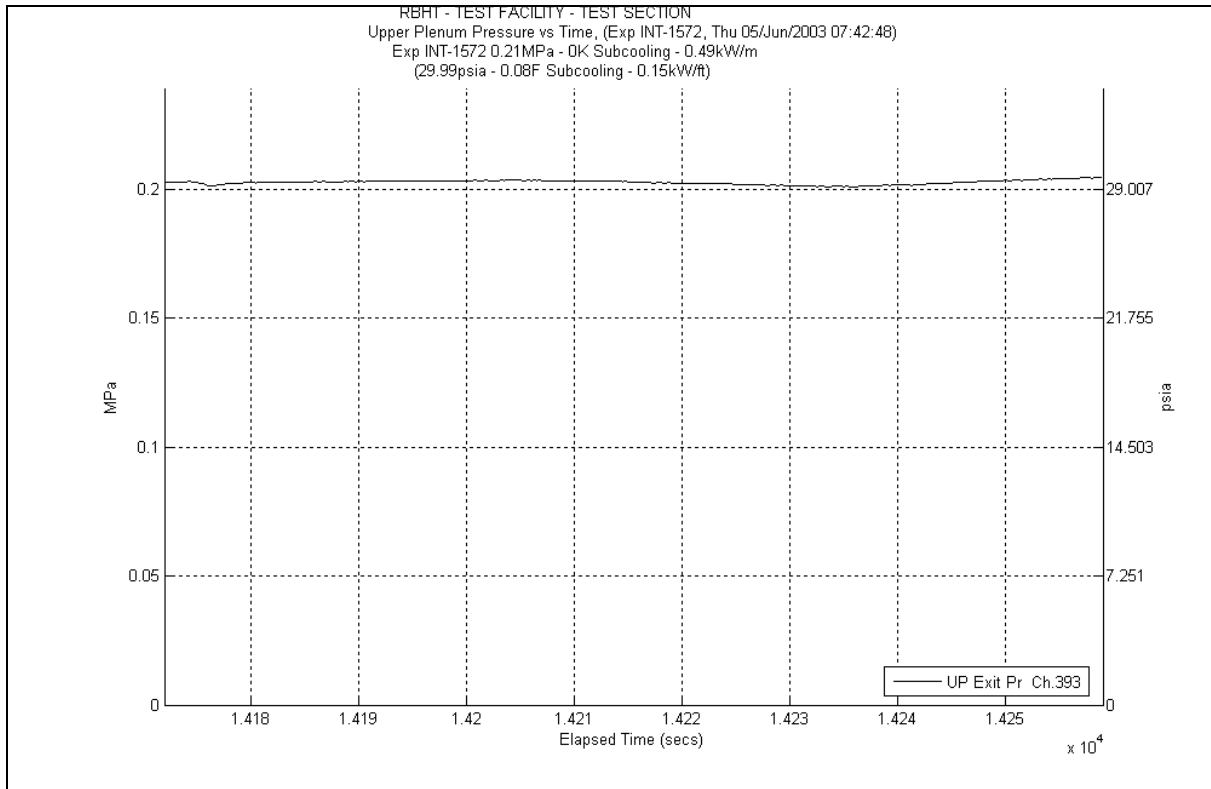


Figure A-83 System Pressure Plot for Experiment 1572G

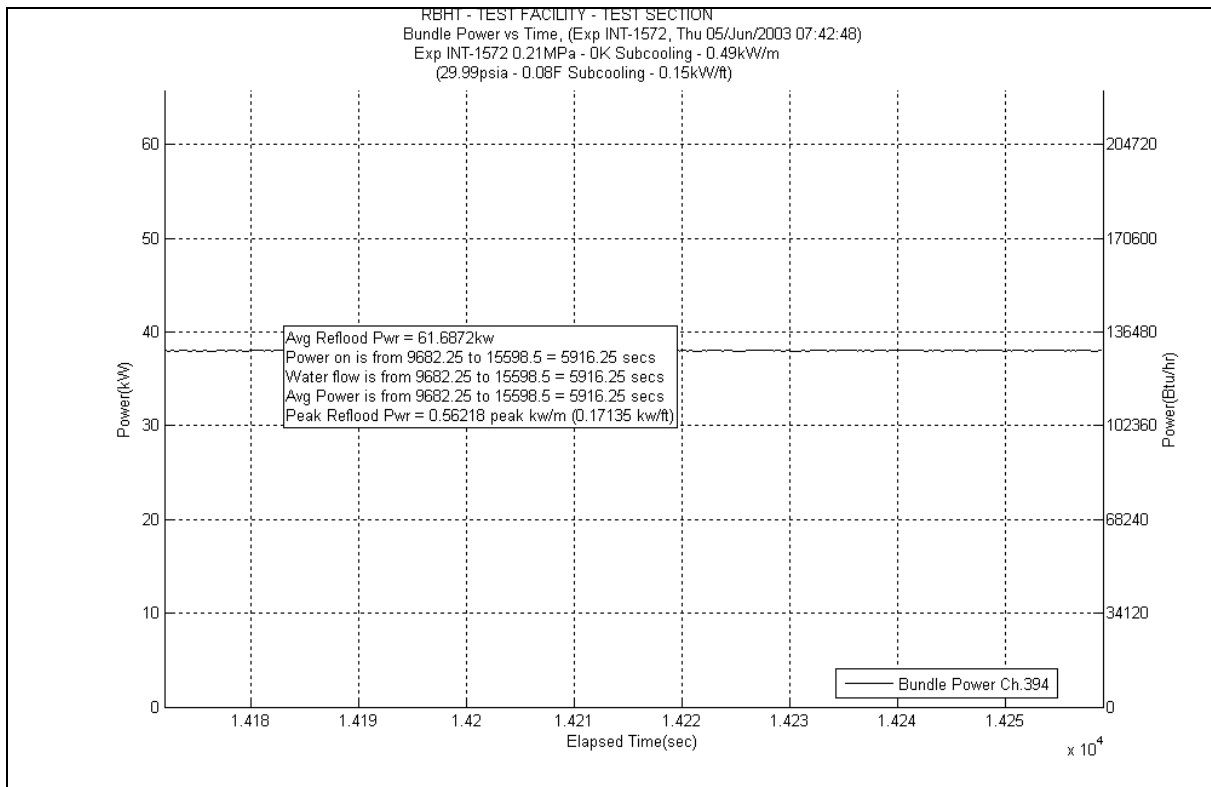


Figure A-84 Bundle Power Plot for Experiment 1572G

Table A-33 Data Results for RBHT Test 1572G for Time Period 14172 to 14259 seconds

Results for RBHT Test 1572
Valid Time Period 14172 to 14259 seconds
Collapsed Liquid Level = 78.420 inches = 1991.87 mm
(Z_{onset}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.778	12.708	608.466	0.167	7.996	0.035	1.676	0.000	0.000	12.5	598.503	4332.5	207441.2135	0.781	0.777	0.785
*	120-133	3048-3378	383	0.762	16.053	768.602	0.185	8.858	0.062	2.969	-0.124	-5.957	15.93	762.732	4348.43	208203.9459	0.764	0.760	0.768
*	108-120	2743-3048	382	0.650	21.786	1043.120	0.154	7.374	0.078	3.735	4.704	225.230	16.85	806.782	4365.28	209010.7283	0.73	0.726	0.734
	100-108	2540-2743	381	0.709	12.095	579.124	0.092	4.405	0.057	2.729	0.000	0.000	11.94	571.690	4377.22	209582.4185	0.712	0.708	0.716
	97-100	2464-2540	380	0.572	6.673	319.525	0.032	1.532	0.021	1.005	0.000	0.000	6.618	316.872	4383.838	209899.2901	0.575	0.572	0.578
	93-97	2362-2464	379	0.586	8.595	411.529	0.041	1.963	0.027	1.293	0.000	0.000	8.525	408.179	4392.363	210307.4693	0.59	0.587	0.593
*	85-93	2159-2362	378	0.441	23.235	1112.496	0.076	3.639	0.052	2.490	8.087	387.206	15.02	719.161	4407.383	211026.6307	0.639	0.636	0.642
	81-85	2057-2159	377	0.685	6.554	313.806	0.035	1.676	0.025	1.197	0.000	0.000	6.49	310.743	4413.873	211337.3736	0.688	0.685	0.691
	78-81	1981-2057	376	0.545	7.084	339.169	0.025	1.197	0.018	0.862	0.000	0.000	7.038	336.981	4420.911	211674.3549	0.548	0.545	0.551
	75-78	1905-1981	375	0.536	7.229	346.132	0.024	1.149	0.018	0.862	0.000	0.000	7.185	344.020	4428.096	212018.3745	0.539	0.536	0.542
	72-75	1829-1905	374	0.491	7.935	379.949	0.023	1.101	0.017	0.814	0.000	0.000	7.893	377.919	4435.989	212396.2934	0.493	0.491	0.495
*	67-72	1702-1829	373	0.414	15.227	729.065	0.036	1.724	0.028	1.341	3.633	173.941	11.53	552.059	4447.519	212948.3527	0.556	0.553	0.559
	63-67	1600-1702	372	0.616	7.977	381.939	0.027	1.293	0.021	1.005	0.000	0.000	7.926	379.499	4455.445	213327.8516	0.618	0.615	0.621
	60-63	1524-1600	371	0.416	9.094	435.400	0.019	0.910	0.016	0.766	0.000	0.000	9.055	433.556	4464.5	213761.4074	0.419	0.417	0.421
	57-60	1448-1524	370	0.420	9.042	432.914	0.018	0.862	0.015	0.718	0.000	0.000	9.003	431.066	4473.503	214192.4733	0.422	0.420	0.424
	53-57	1346-1448	369	0.400	12.469	597.028	0.022	1.053	0.020	0.958	0.000	0.000	12.42	594.673	4485.923	214787.1461	0.402	0.400	0.404
*	46-53	1168-1346	368	0.278	26.247	1256.717	0.035	1.676	0.033	1.580	6.619	316.924	19.56	936.538	4505.483	215723.6839	0.462	0.460	0.464
	43-46	1092-1168	367	0.520	7.473	357.819	0.013	0.622	0.013	0.622	0.000	0.000	7.444	356.421	4512.927	216080.1046	0.522	0.519	0.525
	37-43	940-1092	366	0.385	19.179	918.294	0.024	1.149	0.025	1.197	0.000	0.000	19.12	915.471	4532.047	216995.5751	0.386	0.384	0.388
*	25-37	635-940	365	0.230	47.986	2297.600	0.036	1.724	0.046	2.202	3.614	173.057	44.29	2120.617	4576.337	219116.1917	0.289	0.288	0.290
	13-25	330-635	364	0.191	50.412	2413.723	0.020	0.958	0.039	1.867	0.000	0.000	50.34	2410.292	4626.677	221526.4838	0.192	0.191	0.193
*	0-13	0-330	363	0.048	64.304	3078.883	0.006	0.287	0.008	0.383	3.280	157.038	61.01	2921.174	4687.687	224447.6583	0.096	0.091	0.101

Table A-34 Energy Balance Results for RBHT Test 1572G for Time Period 14172 to 14259 seconds

Results for RBHT Test 1572 Valid Time Period 14172 to 14259 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1740.5582	5.490715	0.00E+00	0.00E+00	0.00E+00	2.70E-02	1.22E-02
0.25	6.35	1837.2559	5.795755	0.00E+00	0.00E+00	0.00E+00	2.70E-02	1.22E-02
0.50	12.70	1933.9535	6.100794	0.00E+00	0.00E+00	0.00E+00	2.70E-02	1.22E-02
0.75	19.05	2030.6512	6.405834	0.00E+00	0.00E+00	0.00E+00	2.70E-02	1.22E-02
1.00	25.40	2127.3489	6.710874	4.81E-03	1.05E-01	4.76E-02	2.69E-02	1.22E-02
1.25	31.75	2224.0466	7.015914	1.33E-02	2.90E-01	1.31E-01	2.66E-02	1.21E-02
1.50	38.10	2320.7443	7.320953	2.21E-02	4.83E-01	2.19E-01	2.64E-02	1.20E-02
1.75	44.45	2417.4419	7.625993	3.13E-02	6.84E-01	3.10E-01	2.62E-02	1.19E-02
2.00	50.80	2514.1396	7.931033	4.09E-02	8.93E-01	4.05E-01	2.59E-02	1.17E-02
2.25	57.15	2610.8373	8.236073	5.09E-02	1.11E+00	5.04E-01	2.56E-02	1.16E-02
2.50	63.50	2707.535	8.541112	6.12E-02	1.34E+00	6.06E-01	2.54E-02	1.15E-02
2.75	69.85	2804.2326	8.846152	7.20E-02	1.57E+00	7.12E-01	2.51E-02	1.14E-02
3.00	76.20	2900.9303	9.151192	8.31E-02	1.81E+00	8.22E-01	2.48E-02	1.12E-02
3.25	82.55	2997.628	9.456231	9.45E-02	2.06E+00	9.36E-01	2.45E-02	1.11E-02
3.50	88.90	3094.3257	9.761271	1.06E-01	2.32E+00	1.05E+00	2.41E-02	1.09E-02
3.75	95.25	3191.0233	10.06631	1.19E-01	2.59E+00	1.17E+00	2.38E-02	1.08E-02
4.00	101.60	3287.721	10.37135	1.31E-01	2.86E+00	1.30E+00	2.35E-02	1.06E-02
4.25	107.95	3384.4187	10.67639	1.44E-01	3.15E+00	1.43E+00	2.31E-02	1.05E-02
4.50	114.30	3481.1164	10.98143	1.58E-01	3.44E+00	1.56E+00	2.27E-02	1.03E-02
4.75	120.65	3577.8141	11.28647	1.71E-01	3.74E+00	1.70E+00	2.24E-02	1.02E-02
5.00	127.00	3674.5117	11.59151	1.85E-01	4.05E+00	1.84E+00	2.20E-02	9.98E-03
5.25	133.35	3771.2094	11.89655	2.00E-01	4.36E+00	1.98E+00	2.16E-02	9.80E-03
5.50	139.70	3867.9071	12.20159	2.15E-01	4.69E+00	2.13E+00	2.12E-02	9.62E-03
5.75	146.05	3964.6048	12.50663	2.30E-01	5.02E+00	2.28E+00	2.08E-02	9.43E-03
6.00	152.40	4061.3024	12.81167	2.46E-01	5.36E+00	2.43E+00	2.04E-02	9.24E-03
6.25	158.75	4158.0001	13.11671	2.62E-01	5.71E+00	2.59E+00	1.99E-02	9.05E-03
6.50	165.10	4254.6978	13.42175	2.78E-01	6.07E+00	2.75E+00	1.95E-02	8.84E-03
6.75	171.45	4351.3955	13.72679	2.95E-01	6.43E+00	2.92E+00	1.90E-02	8.64E-03
7.00	177.80	4448.0931	14.03183	3.12E-01	6.80E+00	3.09E+00	1.86E-02	8.43E-03
7.25	184.15	4544.7908	14.33687	3.29E-01	7.19E+00	3.26E+00	1.81E-02	8.22E-03
7.50	190.50	4641.4885	14.64191	3.47E-01	7.58E+00	3.44E+00	1.76E-02	8.00E-03
7.75	196.85	4738.1862	14.94695	3.65E-01	7.97E+00	3.62E+00	1.71E-02	7.77E-03
8.00	203.20	4834.8839	15.25199	3.84E-01	8.38E+00	3.80E+00	1.66E-02	7.54E-03
8.25	209.55	4931.5815	15.55703	4.03E-01	8.80E+00	3.99E+00	1.61E-02	7.31E-03
8.50	215.90	5028.2792	15.86207	4.22E-01	9.22E+00	4.18E+00	1.56E-02	7.08E-03
8.75	222.25	5124.9769	16.16711	4.42E-01	9.65E+00	4.38E+00	1.51E-02	6.83E-03
9.00	228.60	5221.6746	16.47215	4.62E-01	1.01E+01	4.58E+00	1.45E-02	6.59E-03
9.25	234.95	4931.5815	15.55703	4.82E-01	1.05E+01	4.77E+00	1.40E-02	6.34E-03
9.50	241.30	4641.4885	14.64191	5.01E-01	1.09E+01	4.96E+00	1.35E-02	6.12E-03
9.75	247.65	4351.3955	13.72679	5.18E-01	1.13E+01	5.13E+00	1.30E-02	5.90E-03
10.00	254.00	4061.3024	12.81167	5.35E-01	1.17E+01	5.29E+00	1.26E-02	5.70E-03
10.25	260.35	3771.2094	11.89655	5.50E-01	1.20E+01	5.44E+00	1.22E-02	5.51E-03
10.50	266.70	3481.1164	10.98143	5.64E-01	1.23E+01	5.58E+00	1.18E-02	5.34E-03
10.75	273.05	3191.0233	10.06631	5.77E-01	1.26E+01	5.71E+00	1.14E-02	5.18E-03
11.00	279.40	2900.9303	9.151192	5.89E-01	1.28E+01	5.83E+00	1.11E-02	5.04E-03
11.25	285.75	2610.8373	8.236073	6.00E-01	1.31E+01	5.93E+00	1.08E-02	4.91E-03
11.50	292.10	2320.7443	7.320953	6.09E-01	1.33E+01	6.03E+00	1.06E-02	4.79E-03
11.75	298.45	2030.6512	6.405834	6.18E-01	1.35E+01	6.11E+00	1.03E-02	4.69E-03
12.00	304.80	1740.5582	5.490715	6.25E-01	1.36E+01	6.19E+00	1.01E-02	4.59E-03

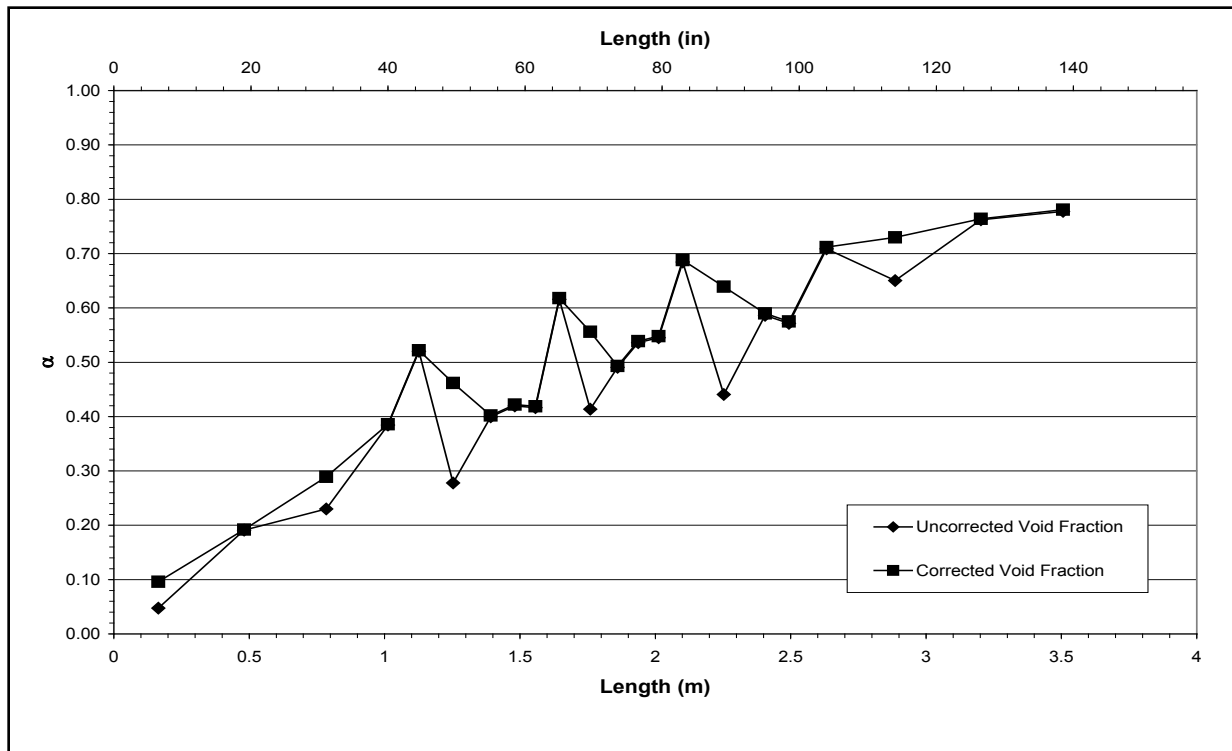


Figure A-85 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572G for Time Period 14172 to 14259 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-H

Test Conditions

Date: 6/5/2003

Steady-state time window: 14376 – 14469 seconds

Inlet flow rate: 0.508 cm/sec (0.200 in./sec)

Inlet mass flow rate: 0.025 kg/sec (0.055 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.92 kW

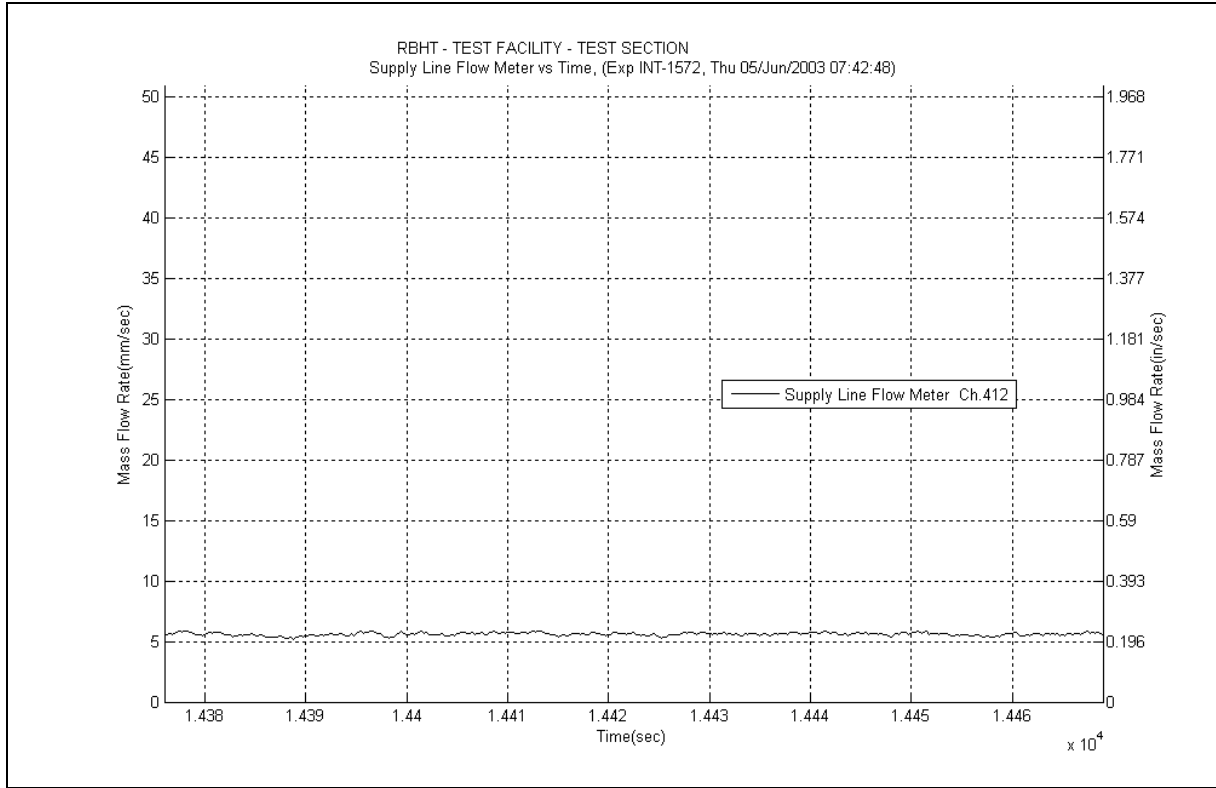


Figure A-86 Inlet Flow Plot for Experiment 1572H

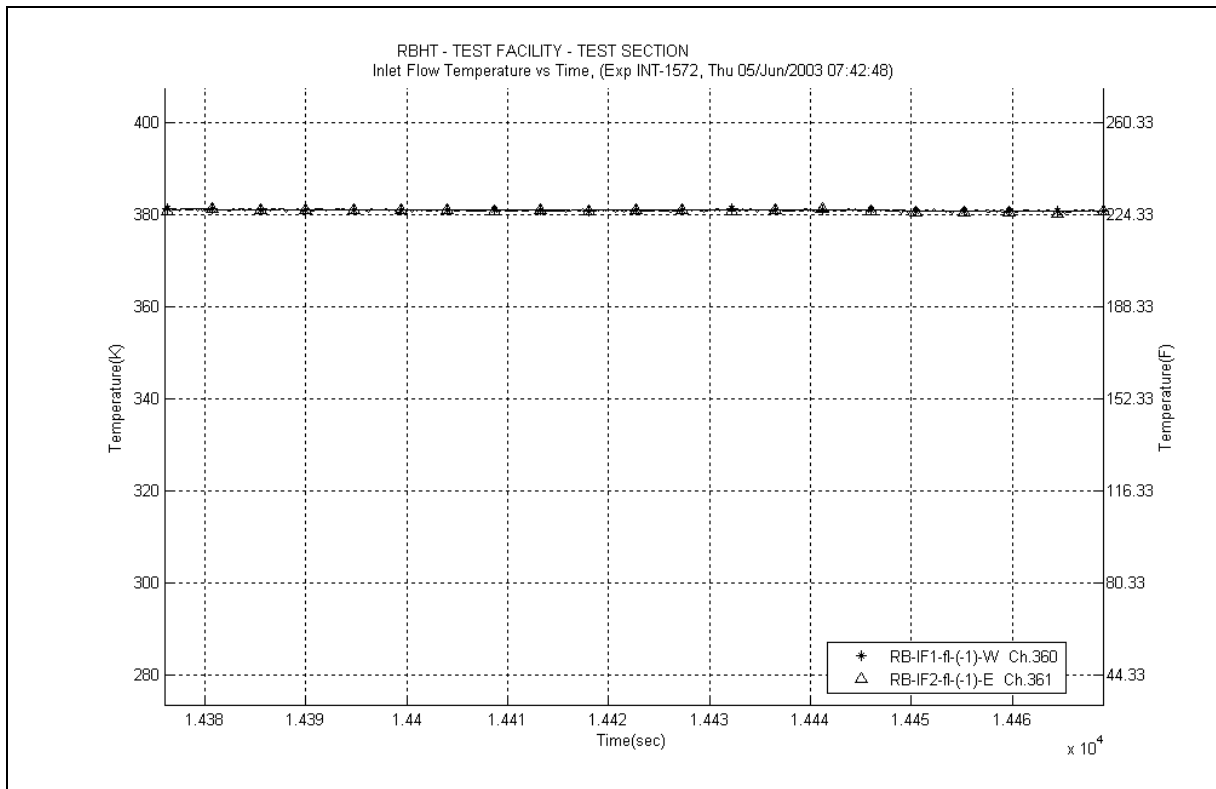


Figure A-87 Inlet Temperature Plot for Experiment 1572H

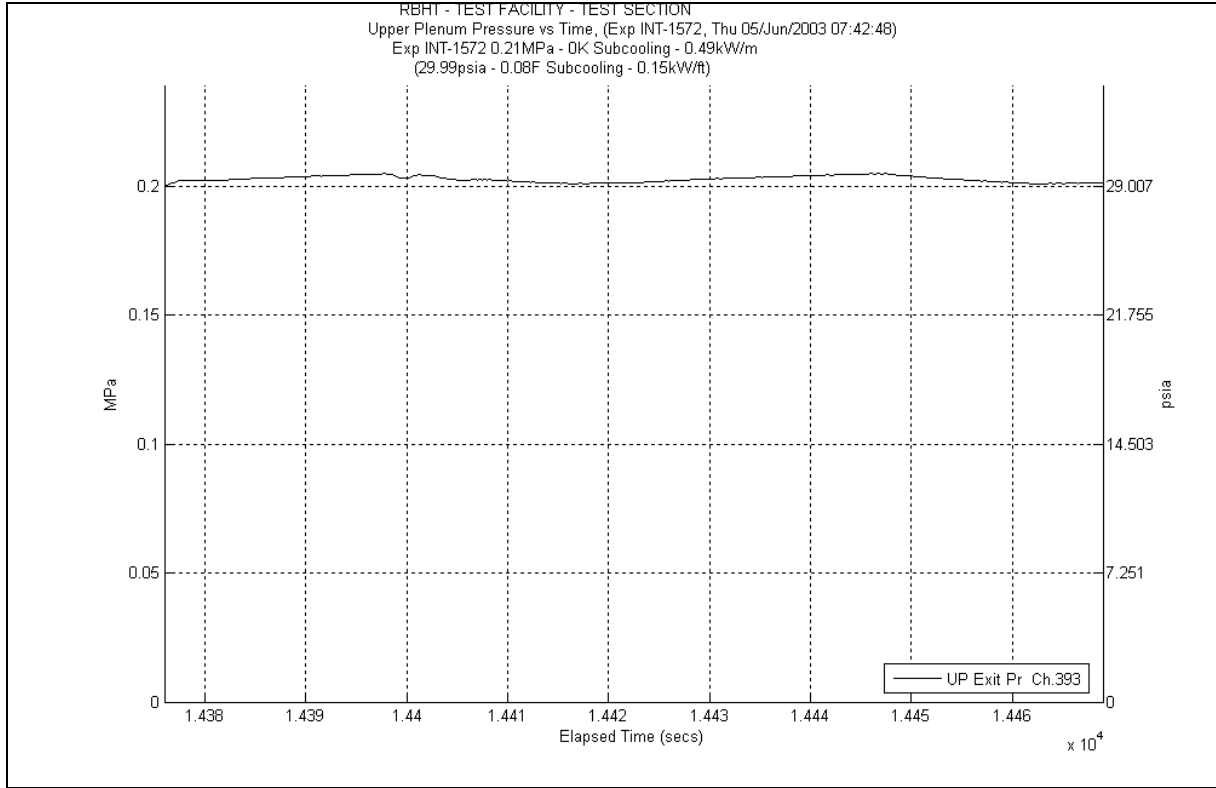


Figure A-88 System Pressure Plot for Experiment 1572H

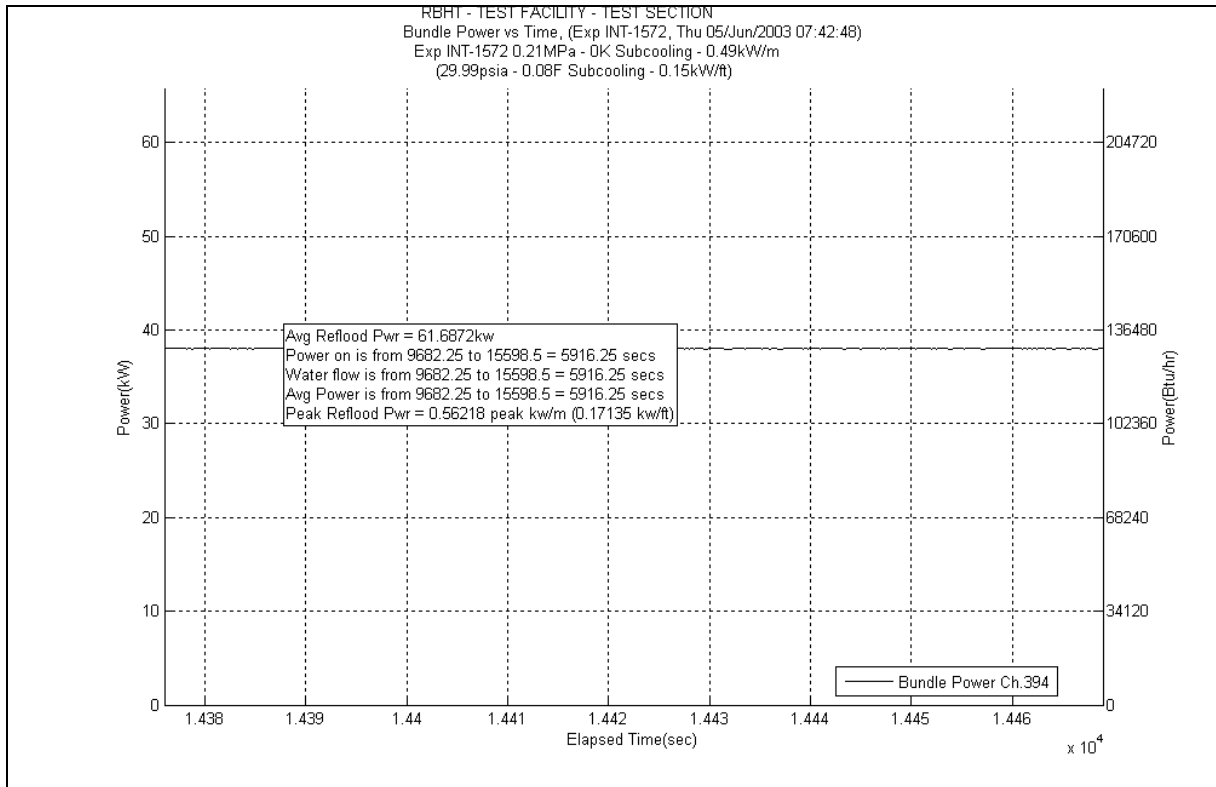


Figure A-89 Bundle Power Plot for Experiment 1572H

Table A-35 Data Results for RBHT Test 1572H for Time Period 14376 to 14469 seconds

Results for RBHT Test 1572
 Valid Time Period 14376 to 14469 seconds
 Collapsed Liquid Level = 73.602 inches = 1869.50 mm
 (Z_{os}) Onset of Significant Void = 6.5 inches = 165 mm
 (Z₂₀) Two-Phase Level (Dryout) = 142.20 inches = 3611.88 mm
 (S) Level Swell = 2.031

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P _{local} (lb/ft ²)	P _{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.818	10.407	498.311	0.100	4.788	0.023	1.101	0.000	0.000	10.28	492.209	4330.28	207334.9193	0.82	0.816	0.824
*	120-133	3048-3378	383	0.778	14.972	716.881	0.116	5.534	0.041	1.963	0.895	42.871	13.92	666.493	4344.2	208001.4125	0.794	0.790	0.798
*	108-120	2743-3048	382	0.655	21.495	1029.195	0.099	4.740	0.051	2.442	5.215	249.705	16.13	772.309	4360.33	208773.721	0.741	0.737	0.745
	100-108	2540-2743	381	0.713	11.945	571.913	0.060	2.873	0.037	1.772	0.000	0.000	11.84	566.902	4372.17	209340.6232	0.715	0.711	0.719
	97-100	2464-2540	380	0.586	6.455	309.082	0.021	1.005	0.014	0.670	0.000	0.000	6.419	307.343	4378.589	209647.9666	0.588	0.585	0.591
	93-97	2362-2464	379	0.588	8.569	410.286	0.027	1.293	0.018	0.862	0.000	0.000	8.52	407.940	4387.109	210055.9064	0.59	0.587	0.593
*	85-93	2159-2362	378	0.442	23.193	1110.507	0.049	2.346	0.034	1.628	8.250	395.032	14.86	711.501	4401.969	210767.407	0.642	0.639	0.645
	81-85	2057-2159	377	0.693	6.388	305.849	0.023	1.101	0.016	0.766	0.000	0.000	6.345	303.800	4408.314	211071.2073	0.695	0.692	0.698
	78-81	1981-2057	376	0.548	7.037	336.932	0.016	0.766	0.012	0.575	0.000	0.000	7.005	335.401	4415.319	211406.6085	0.55	0.547	0.553
	75-78	1905-1981	375	0.543	7.120	340.910	0.015	0.718	0.012	0.575	0.000	0.000	7.089	339.423	4422.408	211746.0316	0.545	0.542	0.548
	72-75	1829-1905	374	0.496	7.858	376.220	0.015	0.718	0.011	0.527	0.000	0.000	7.828	374.807	4430.236	212120.8383	0.497	0.495	0.499
*	67-72	1702-1829	373	0.412	15.258	730.557	0.023	1.101	0.018	0.862	3.827	183.238	11.39	545.356	4441.626	212666.1944	0.561	0.558	0.564
	63-67	1600-1702	372	0.624	7.821	374.479	0.017	0.814	0.014	0.670	0.000	0.000	7.786	372.796	4449.412	213038.9901	0.625	0.622	0.628
	60-63	1524-1600	371	0.426	8.948	428.438	0.012	0.575	0.010	0.479	0.000	0.000	8.92	427.092	4458.332	213466.082	0.427	0.425	0.429
	57-60	1448-1524	370	0.428	8.907	426.448	0.011	0.527	0.010	0.479	0.000	0.000	8.88	425.177	4467.212	213891.2586	0.43	0.428	0.432
	53-57	1346-1448	369	0.410	12.256	586.833	0.014	0.670	0.013	0.622	0.000	0.000	12.23	585.576	4479.442	214476.8342	0.411	0.409	0.413
*	46-53	1168-1346	368	0.278	26.247	1256.717	0.022	1.053	0.021	1.005	6.934	332.006	19.27	922.653	4498.712	215399.4867	0.47	0.468	0.472
	43-46	1092-1168	367	0.527	7.369	352.846	0.009	0.431	0.009	0.431	0.000	0.000	7.349	351.872	4506.061	215751.3587	0.528	0.525	0.531
	37-43	940-1092	366	0.396	18.821	901.137	0.015	0.718	0.017	0.814	0.000	0.000	18.78	899.191	4524.841	216650.55	0.397	0.395	0.399
*	25-37	635-940	365	0.245	47.052	2252.841	0.024	1.149	0.030	1.436	4.228	202.417	42.77	2047.839	4567.611	218698.3886	0.314	0.312	0.316
	13-25	330-635	364	0.229	48.028	2299.589	0.014	0.670	0.026	1.245	0.000	0.000	47.97	2296.816	4615.581	220995.2045	0.23	0.229	0.231
*	0-13	0-330	363	0.055	63.800	3054.763	0.006	0.287	0.011	0.527	4.053	194.062	59.73	2859.888	4675.311	223855.0922	0.115	0.114	0.116

Table A-36 Energy Balance Results for RBHT Test 1572H for Time Period 14376 to 14469 seconds

Results for RBHT Test 1572 Valid Time Period 14376 to 14469 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1742.0015	5.495268	0.00E+00	0.00E+00	0.00E+00	1.78E-02	8.05E-03
0.25	6.35	1838.7793	5.800561	0.00E+00	0.00E+00	0.00E+00	1.78E-02	8.05E-03
0.50	12.70	1935.5572	6.105853	0.00E+00	0.00E+00	0.00E+00	1.78E-02	8.05E-03
0.75	19.05	2032.3351	6.411146	7.65E-03	1.10E-01	4.98E-02	1.76E-02	7.99E-03
1.00	25.40	2129.1129	6.716439	2.00E-02	2.86E-01	1.30E-01	1.74E-02	7.89E-03
1.25	31.75	2225.8908	7.021731	3.29E-02	4.71E-01	2.14E-01	1.72E-02	7.79E-03
1.50	38.10	2322.6686	7.327024	4.63E-02	6.65E-01	3.01E-01	1.69E-02	7.68E-03
1.75	44.45	2419.4465	7.632317	6.03E-02	8.66E-01	3.93E-01	1.67E-02	7.57E-03
2.00	50.80	2516.2244	7.937609	7.49E-02	1.08E+00	4.88E-01	1.64E-02	7.45E-03
2.25	57.15	2613.0022	8.242902	9.01E-02	1.29E+00	5.87E-01	1.62E-02	7.33E-03
2.50	63.50	2709.7801	8.548195	1.06E-01	1.52E+00	6.89E-01	1.59E-02	7.20E-03
2.75	69.85	2806.5579	8.853487	1.22E-01	1.75E+00	7.96E-01	1.56E-02	7.07E-03
3.00	76.20	2903.3358	9.15878	1.39E-01	2.00E+00	9.06E-01	1.53E-02	6.93E-03
3.25	82.55	3000.1136	9.464073	1.57E-01	2.25E+00	1.02E+00	1.50E-02	6.79E-03
3.50	88.90	3096.8915	9.769365	1.75E-01	2.51E+00	1.14E+00	1.47E-02	6.65E-03
3.75	95.25	3193.6694	10.07466	1.93E-01	2.77E+00	1.26E+00	1.43E-02	6.50E-03
4.00	101.60	3290.4472	10.37995	2.12E-01	3.05E+00	1.38E+00	1.40E-02	6.34E-03
4.25	107.95	3387.2251	10.68524	2.32E-01	3.33E+00	1.51E+00	1.36E-02	6.18E-03
4.50	114.30	3484.0029	10.99054	2.53E-01	3.62E+00	1.64E+00	1.33E-02	6.02E-03
4.75	120.65	3580.7808	11.29583	2.73E-01	3.92E+00	1.78E+00	1.29E-02	5.85E-03
5.00	127.00	3677.5587	11.60112	2.95E-01	4.23E+00	1.92E+00	1.25E-02	5.68E-03
5.25	133.35	3774.3365	11.90641	3.17E-01	4.55E+00	2.06E+00	1.21E-02	5.50E-03
5.50	139.70	3871.1144	12.21171	3.40E-01	4.87E+00	2.21E+00	1.17E-02	5.32E-03
5.75	146.05	3967.8922	12.517	3.63E-01	5.21E+00	2.36E+00	1.13E-02	5.13E-03
6.00	152.40	4064.6701	12.82229	3.87E-01	5.55E+00	2.52E+00	1.09E-02	4.94E-03
6.25	158.75	4161.448	13.12758	4.11E-01	5.90E+00	2.68E+00	1.05E-02	4.74E-03
6.50	165.10	4258.2258	13.43288	4.36E-01	6.25E+00	2.84E+00	1.00E-02	4.54E-03
6.75	171.45	4355.0037	13.73817	4.61E-01	6.62E+00	3.00E+00	9.56E-03	4.34E-03
7.00	177.80	4451.7815	14.04346	4.87E-01	6.99E+00	3.17E+00	9.10E-03	4.13E-03
7.25	184.15	4548.5594	14.34876	5.14E-01	7.38E+00	3.35E+00	8.63E-03	3.91E-03
7.50	190.50	4645.3373	14.65405	5.41E-01	7.77E+00	3.52E+00	8.15E-03	3.69E-03
7.75	196.85	4742.1151	14.95934	5.69E-01	8.17E+00	3.70E+00	7.65E-03	3.47E-03
8.00	203.20	4838.893	15.26463	5.97E-01	8.57E+00	3.89E+00	7.15E-03	3.24E-03
8.25	209.55	4935.6708	15.56993	6.26E-01	8.99E+00	4.08E+00	6.64E-03	3.01E-03
8.50	215.90	5032.4487	15.87522	6.56E-01	9.41E+00	4.27E+00	6.11E-03	2.77E-03
8.75	222.25	5129.2266	16.18051	6.86E-01	9.84E+00	4.46E+00	5.58E-03	2.53E-03
9.00	228.60	5226.0044	16.4858	7.16E-01	1.03E+01	4.66E+00	5.04E-03	2.28E-03
9.25	234.95	4935.6708	15.56993	7.47E-01	1.07E+01	4.86E+00	4.50E-03	2.04E-03
9.50	241.30	4645.3373	14.65405	7.75E-01	1.11E+01	5.04E+00	4.00E-03	1.81E-03
9.75	247.65	4355.0037	13.73817	8.02E-01	1.15E+01	5.22E+00	3.52E-03	1.60E-03
10.00	254.00	4064.6701	12.82229	8.26E-01	1.19E+01	5.38E+00	3.08E-03	1.40E-03
10.25	260.35	3774.3365	11.90641	8.50E-01	1.22E+01	5.53E+00	2.67E-03	1.21E-03
10.50	266.70	3484.0029	10.99054	8.71E-01	1.25E+01	5.67E+00	2.29E-03	1.04E-03
10.75	273.05	3193.6694	10.07466	8.91E-01	1.28E+01	5.80E+00	1.94E-03	8.79E-04
11.00	279.40	2903.3358	9.15878	9.09E-01	1.30E+01	5.92E+00	1.62E-03	7.34E-04
11.25	285.75	2613.0022	8.242902	9.25E-01	1.33E+01	6.02E+00	1.33E-03	6.02E-04
11.50	292.10	2322.6686	7.327024	9.40E-01	1.35E+01	6.12E+00	1.07E-03	4.85E-04
11.75	298.45	2032.3351	6.411146	9.53E-01	1.37E+01	6.20E+00	8.40E-04	3.81E-04
12.00	304.80	1742.0015	5.495268	9.64E-01	1.38E+01	6.27E+00	6.43E-04	2.92E-04

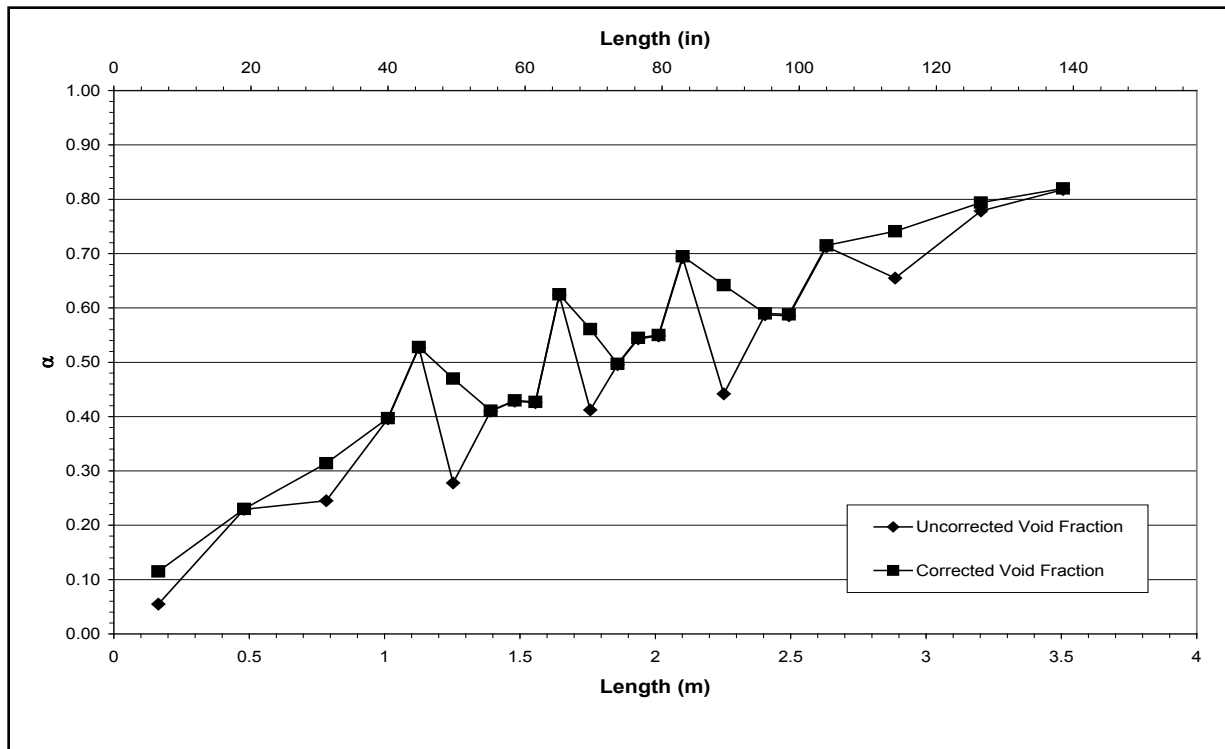


Figure A-90 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572H for Time Period 14376 to 14469 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-I

Test Conditions

Date: 6/5/2003

Steady-state time window: 13079 – 13148 seconds

Inlet flow rate: 2.543 cm/sec (1.001 in./sec)

Inlet mass flow rate: 0.124 kg/sec (0.274 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.92 kW

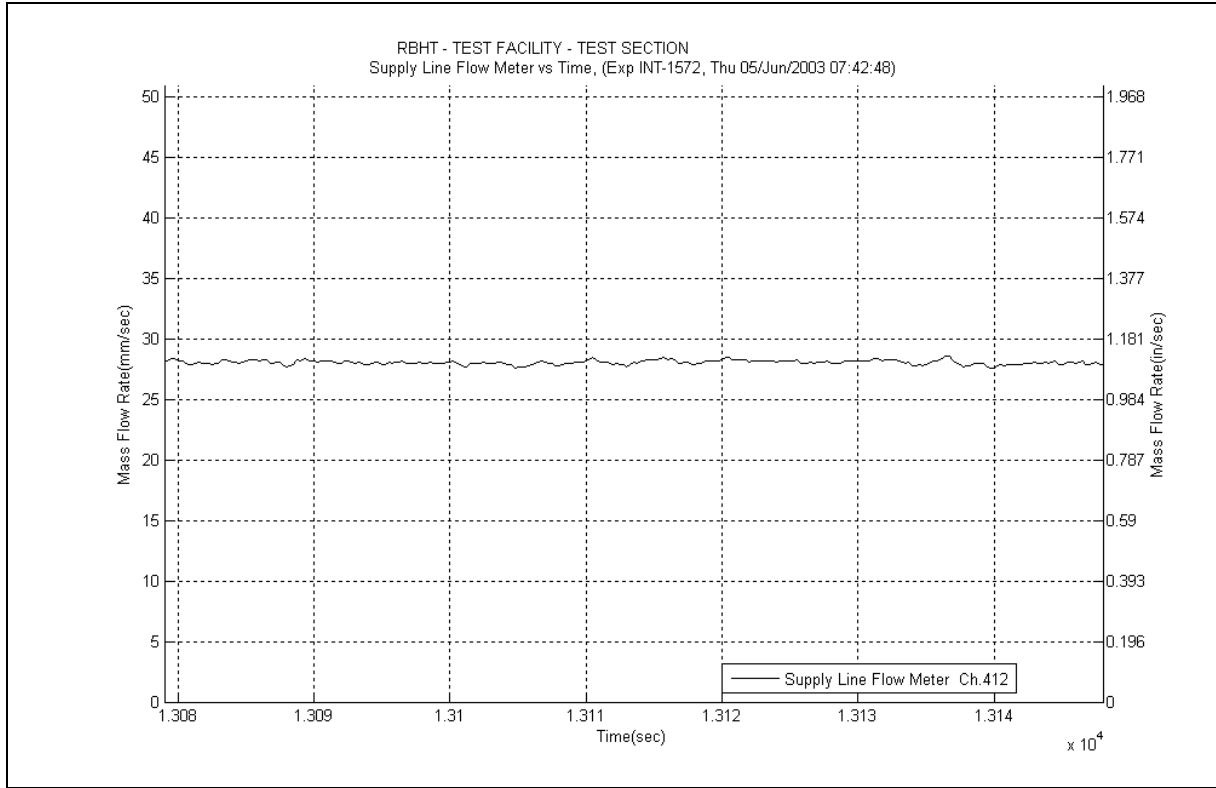


Figure A-91 Inlet Flow Plot for Experiment 15721

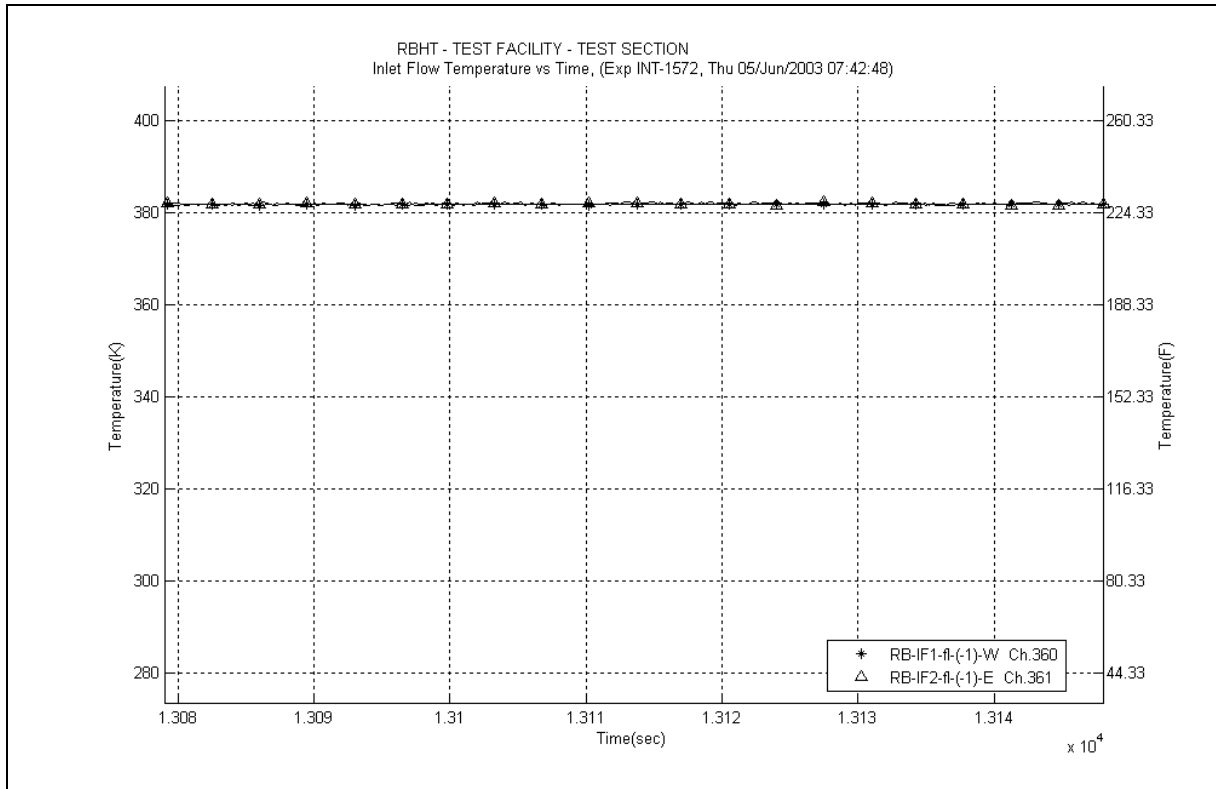


Figure A-92 Inlet Temperature Plot for Experiment 15721

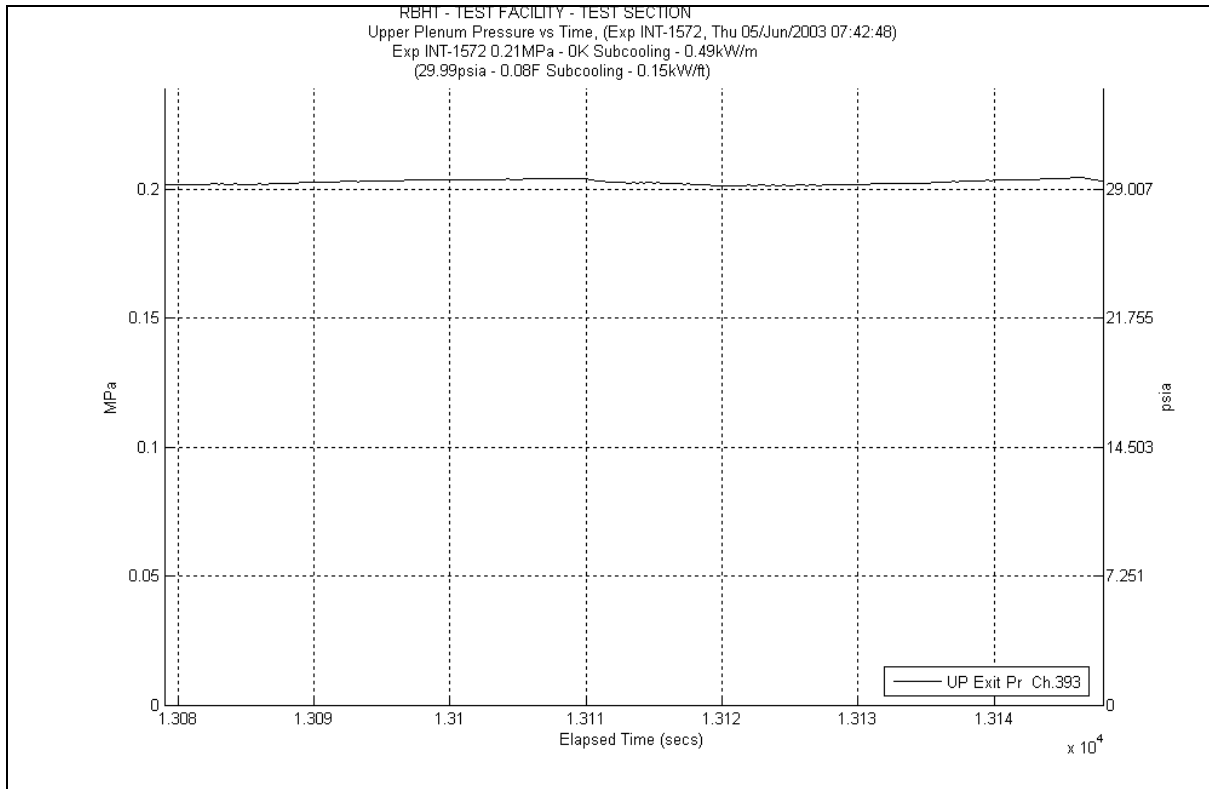


Figure A-93 System Pressure Plot for Experiment 15721

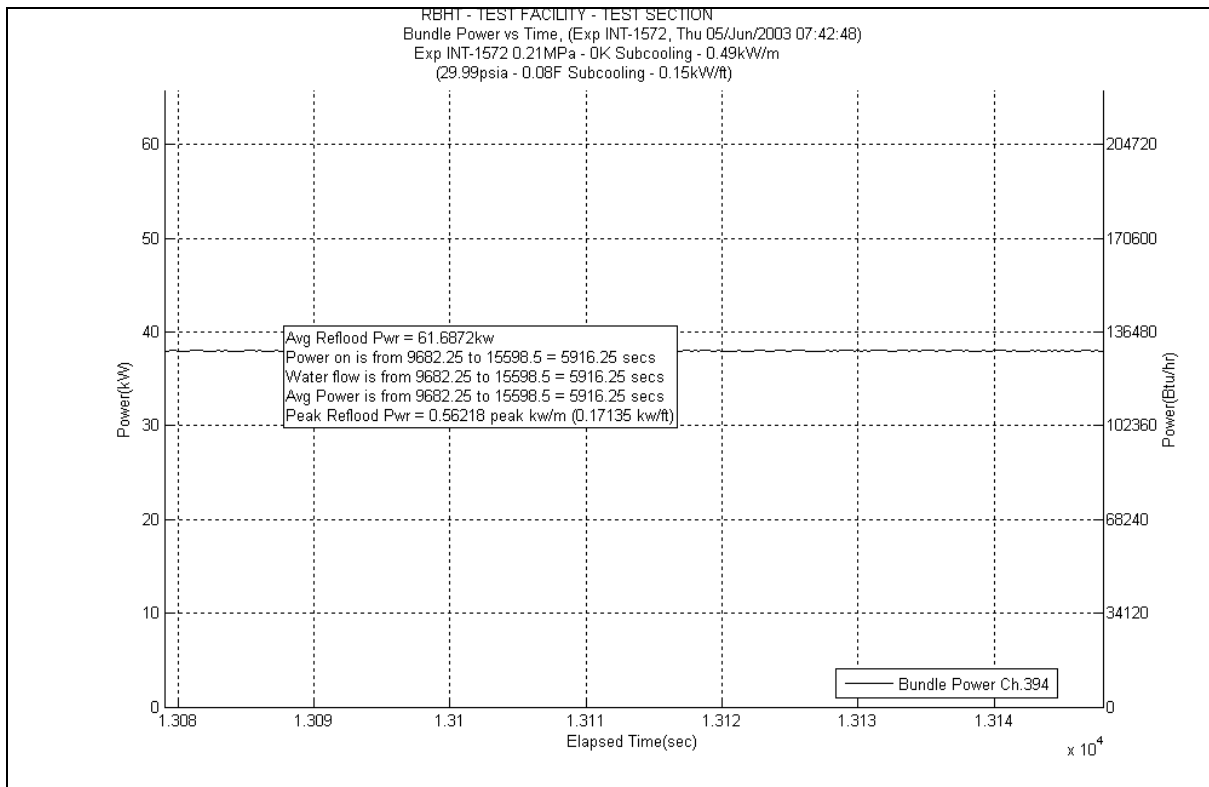


Figure A-94 Bundle Power Plot for Experiment 15721

Table A-37 Data Results for RBHT Test 15721 for Time Period 13079 to 13148 seconds

Results for RBHT Test 1572
Valid Time Period 13079 to 13148 seconds
Collapsed Liquid Level = 91.182 inches = 2316.03 mm
(Z_{csl}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acccl} (lbf/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.621	21.661	1037.152	0.572	27.388	0.115	5.506	0.000	0.000	20.96	1003.570	207846.2804	0.633	0.630	0.636	
*	120-133	3048-3378	383	0.656	23.245	1112.993	0.637	30.500	0.205	9.815	-2.277	-109.007	24.68	1181.685	209027.9652	0.634	0.631	0.637	
*	108-120	2743-3048	382	0.557	27.608	1321.866	0.535	25.616	0.256	12.257	4.227	202.378	22.59	1081.615	210109.5802	0.637	0.634	0.640	
	100-108	2540-2743	381	0.627	15.512	742.741	0.321	15.370	0.188	9.001	0.000	0.000	15	718.204	210827.784	0.639	0.636	0.642	
	97-100	2464-2540	380	0.488	7.972	381.690	0.113	5.410	0.068	3.256	0.000	0.000	7.789	372.939	211200.7234	0.5	0.498	0.503	
	93-97	2362-2464	379	0.522	9.940	475.931	0.144	6.895	0.088	4.213	0.000	0.000	9.704	464.630	211665.3534	0.533	0.530	0.536	
*	85-93	2159-2362	378	0.399	24.985	1196.294	0.265	12.688	0.170	8.140	7.140	341.870	17.41	833.595	212498.9486	0.581	0.578	0.584	
	81-85	2057-2159	377	0.619	7.909	378.706	0.121	5.794	0.081	3.878	0.000	0.000	7.704	368.869	212867.8181	0.629	0.626	0.632	
	78-81	1981-2057	376	0.476	8.159	390.642	0.086	4.118	0.059	2.825	0.000	0.000	8.012	383.617	213251.4348	0.486	0.484	0.488	
	75-78	1905-1981	375	0.452	8.533	408.545	0.082	3.926	0.058	2.777	0.000	0.000	8.39	401.715	213653.1501	0.461	0.459	0.463	
	72-75	1829-1905	374	0.383	9.618	460.515	0.078	3.735	0.057	2.729	0.000	0.000	9.478	453.809	214106.9592	0.392	0.390	0.394	
*	67-72	1702-1829	373	0.398	15.637	748.709	0.121	5.794	0.092	4.405	1.014	48.556	14.41	689.955	214796.9137	0.445	0.443	0.447	
	63-67	1600-1702	372	0.491	10.584	506.765	0.088	4.213	0.071	3.399	0.000	0.000	10.42	498.912	215295.826	0.498	0.496	0.500	
	60-63	1524-1600	371	0.346	10.184	487.618	0.061	2.921	0.051	2.442	0.000	0.000	10.07	482.154	215777.9802	0.354	0.352	0.356	
	57-60	1448-1524	370	0.350	10.127	484.883	0.057	2.729	0.050	2.394	0.000	0.000	10.02	479.760	216257.7403	0.357	0.355	0.359	
	53-57	1346-1448	369	0.316	14.204	680.080	0.069	3.304	0.065	3.112	0.000	0.000	14.06	673.196	216930.9367	0.323	0.321	0.325	
*	46-53	1168-1346	368	0.224	28.226	1351.456	0.103	4.932	0.108	5.171	3.435	164.457	24.58	1176.897	218107.8335	0.324	0.322	0.326	
	43-46	1092-1168	367	0.319	10.605	507.760	0.037	1.772	0.044	2.107	0.000	0.000	10.52	503.700	218611.5338	0.324	0.322	0.326	
	37-43	940-1092	366	0.207	24.720	1183.612	0.059	2.825	0.084	4.022	0.000	0.000	24.57	1176.418	219787.9517	0.211	0.210	0.212	
*	25-37	635-940	365	0.048	59.355	2841.912	0.062	2.969	0.115	5.506	5.588	267.534	53.59	2565.903	222353.8547	0.14	0.139	0.141	
	13-25	330-635	364	0.068	58.061	2779.996	0.004	0.192	0.000	0.000	0.000	0.000	58.04	2778.970	225132.8248	0.068	0.065	0.071	
*	0-13	0-330	363	0.043	64.641	3095.046	0.005	0.239	0.000	0.000	-0.544	-26.029	65.18	3120.835	228253.6599	0.034	0.032	0.036	

Table A-38 Energy Balance Results for RBHT Test 1572I for Time Period 13079 to 13148 seconds

Results for RBHT Test 1572 Valid Time Period 13079 to 13148 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1739.1793	5.486365	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
0.25	6.35	1835.8004	5.791163	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
0.50	12.70	1932.4215	6.095962	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
0.75	19.05	2029.0426	6.40076	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
1.00	25.40	2125.6636	6.705558	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
1.25	31.75	2222.2847	7.010356	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
1.50	38.10	2318.9058	7.315154	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
1.75	44.45	2415.5269	7.619952	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
2.00	50.80	2512.1479	7.92475	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
2.25	57.15	2608.769	8.229548	0.00E+00	0.00E+00	0.00E+00	8.90E-02	4.04E-02
2.50	63.50	2705.3901	8.534346	2.08E-03	1.50E-01	6.80E-02	8.89E-02	4.03E-02
2.75	69.85	2802.0112	8.839144	5.33E-03	3.84E-01	1.74E-01	8.86E-02	4.02E-02
3.00	76.20	2898.6322	9.143942	8.70E-03	6.26E-01	2.84E-01	8.83E-02	4.00E-02
3.25	82.55	2995.2533	9.44874	1.22E-02	8.76E-01	3.97E-01	8.80E-02	3.99E-02
3.50	88.90	3091.8744	9.753538	1.58E-02	1.13E+00	5.15E-01	8.76E-02	3.97E-02
3.75	95.25	3188.4955	10.05834	1.95E-02	1.40E+00	6.35E-01	8.73E-02	3.96E-02
4.00	101.60	3285.1165	10.36313	2.33E-02	1.68E+00	7.60E-01	8.70E-02	3.94E-02
4.25	107.95	3381.7376	10.66793	2.72E-02	1.96E+00	8.88E-01	8.66E-02	3.93E-02
4.50	114.30	3478.3587	10.97273	3.13E-02	2.25E+00	1.02E+00	8.63E-02	3.91E-02
4.75	120.65	3574.9798	11.27753	3.54E-02	2.55E+00	1.16E+00	8.59E-02	3.90E-02
5.00	127.00	3671.6008	11.58233	3.97E-02	2.86E+00	1.30E+00	8.55E-02	3.88E-02
5.25	133.35	3768.2219	11.88712	4.41E-02	3.17E+00	1.44E+00	8.51E-02	3.86E-02
5.50	139.70	3864.843	12.19192	4.86E-02	3.50E+00	1.59E+00	8.47E-02	3.84E-02
5.75	146.05	3961.4641	12.49672	5.32E-02	3.83E+00	1.74E+00	8.43E-02	3.82E-02
6.00	152.40	4058.0851	12.80152	5.80E-02	4.17E+00	1.89E+00	8.39E-02	3.80E-02
6.25	158.75	4154.7062	13.10632	6.28E-02	4.52E+00	2.05E+00	8.34E-02	3.78E-02
6.50	165.10	4251.3273	13.41112	6.78E-02	4.87E+00	2.21E+00	8.30E-02	3.76E-02
6.75	171.45	4347.9484	13.71591	7.28E-02	5.24E+00	2.38E+00	8.26E-02	3.74E-02
7.00	177.80	4444.5694	14.02071	7.80E-02	5.61E+00	2.55E+00	8.21E-02	3.72E-02
7.25	184.15	4541.1905	14.32551	8.33E-02	5.99E+00	2.72E+00	8.16E-02	3.70E-02
7.50	190.50	4637.8116	14.63031	8.88E-02	6.38E+00	2.90E+00	8.11E-02	3.68E-02
7.75	196.85	4734.4326	14.93511	9.43E-02	6.78E+00	3.08E+00	8.06E-02	3.66E-02
8.00	203.20	4831.0537	15.2399	9.99E-02	7.19E+00	3.26E+00	8.01E-02	3.64E-02
8.25	209.55	4927.6748	15.5447	1.06E-01	7.60E+00	3.45E+00	7.96E-02	3.61E-02
8.50	215.90	5024.2959	15.8495	1.12E-01	8.03E+00	3.64E+00	7.91E-02	3.59E-02
8.75	222.25	5120.9169	16.1543	1.18E-01	8.45E+00	3.83E+00	7.86E-02	3.56E-02
9.00	228.60	5217.538	16.4591	1.24E-01	8.89E+00	4.03E+00	7.80E-02	3.54E-02
9.25	234.95	4927.6748	15.5447	1.30E-01	9.32E+00	4.23E+00	7.75E-02	3.52E-02
9.50	241.30	4637.8116	14.63031	1.35E-01	9.73E+00	4.41E+00	7.70E-02	3.49E-02
9.75	247.65	4347.9484	13.71591	1.41E-01	1.01E+01	4.59E+00	7.65E-02	3.47E-02
10.00	254.00	4058.0851	12.80152	1.46E-01	1.05E+01	4.75E+00	7.61E-02	3.45E-02
10.25	260.35	3768.2219	11.88712	1.50E-01	1.08E+01	4.90E+00	7.57E-02	3.43E-02
10.50	266.70	3478.3587	10.97273	1.54E-01	1.11E+01	5.04E+00	7.53E-02	3.42E-02
10.75	273.05	3188.4955	10.05834	1.58E-01	1.14E+01	5.17E+00	7.49E-02	3.40E-02
11.00	279.40	2898.6322	9.143942	1.62E-01	1.17E+01	5.29E+00	7.46E-02	3.38E-02
11.25	285.75	2608.769	8.229548	1.65E-01	1.19E+01	5.39E+00	7.43E-02	3.37E-02
11.50	292.10	2318.9058	7.315154	1.68E-01	1.21E+01	5.48E+00	7.41E-02	3.36E-02
11.75	298.45	2029.0426	6.40076	1.71E-01	1.23E+01	5.57E+00	7.38E-02	3.35E-02
12.00	304.80	1739.1793	5.486365	1.73E-01	1.24E+01	5.64E+00	7.36E-02	3.34E-02

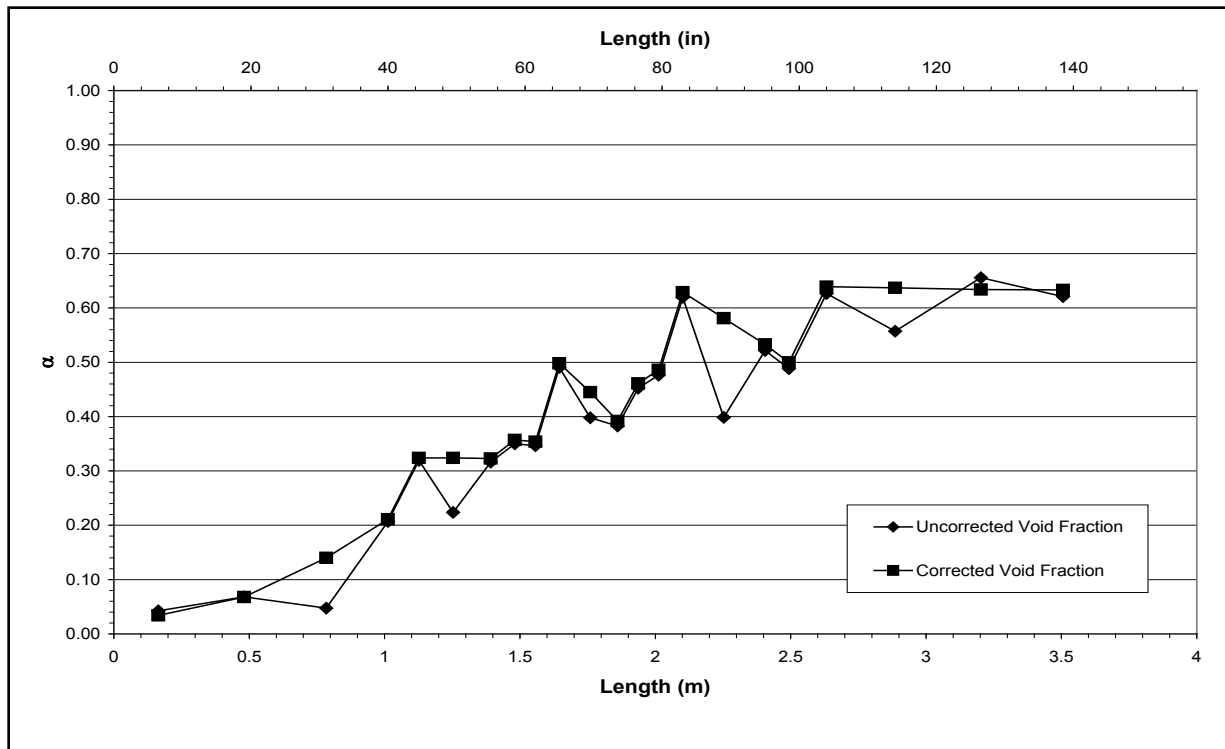


Figure A-95 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572I for Time Period 13079 to 13148 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-J

Test Conditions

Date: 6/5/2003

Steady-state time window: 14601 – 14739 seconds

Inlet flow rate: 0.376 cm/sec (0.148 in./sec)

Inlet mass flow rate: 0.019 kg/sec (0.041 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.92 kW

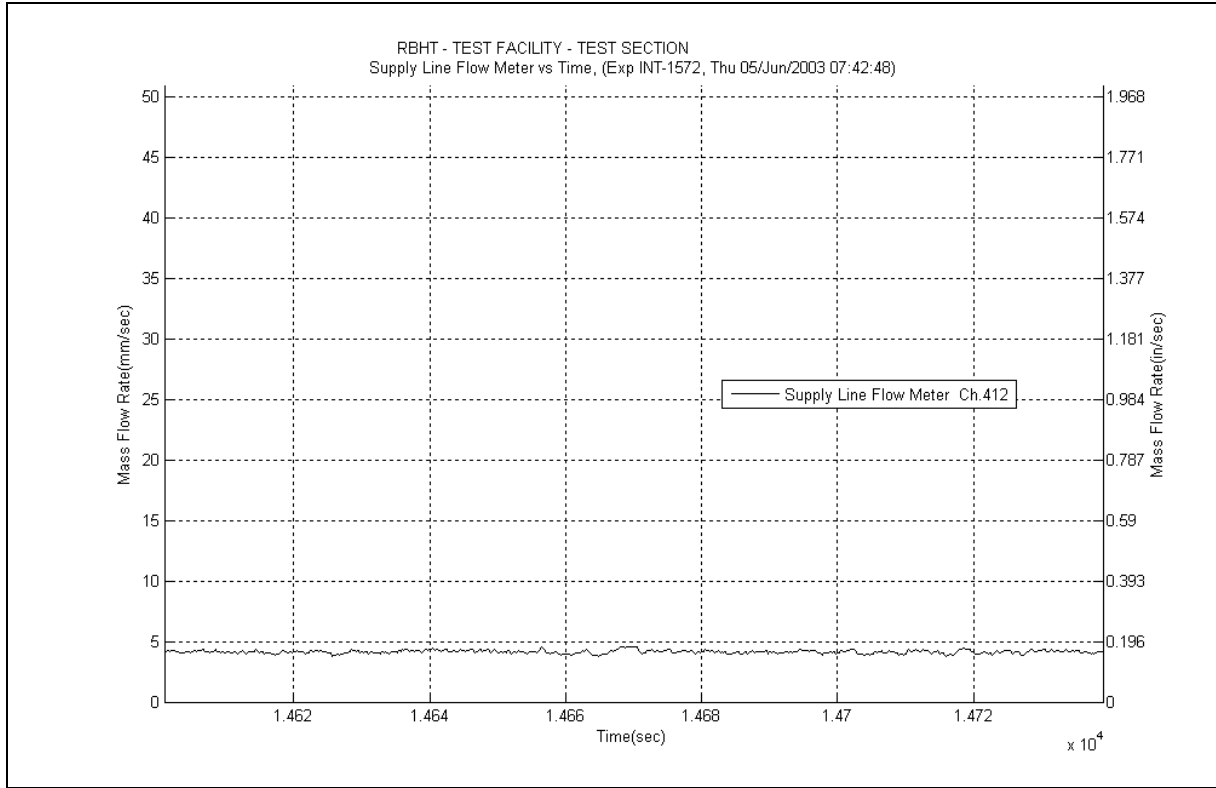


Figure A-96 Inlet Flow Plot for Experiment 1572J

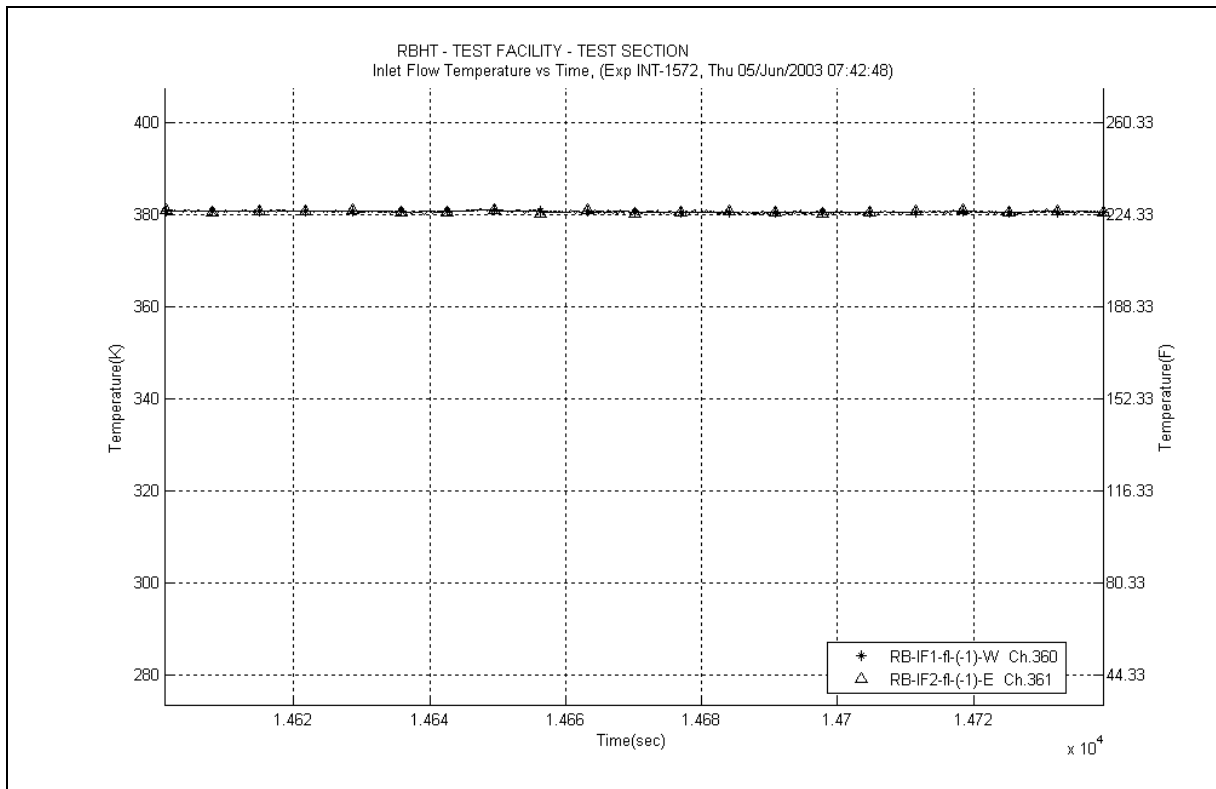


Figure A-97 Inlet Temperature Plot for Experiment 1572J

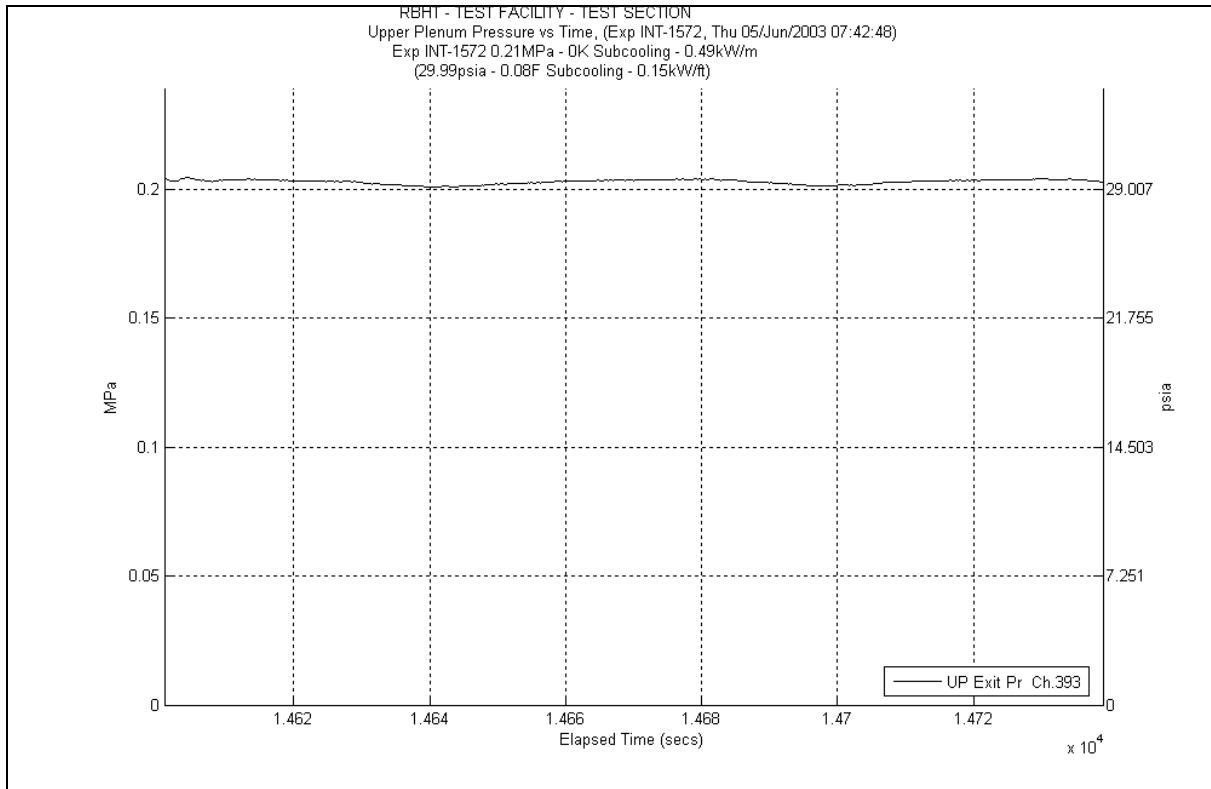


Figure A-98 System Pressure Plot for Experiment 1572J

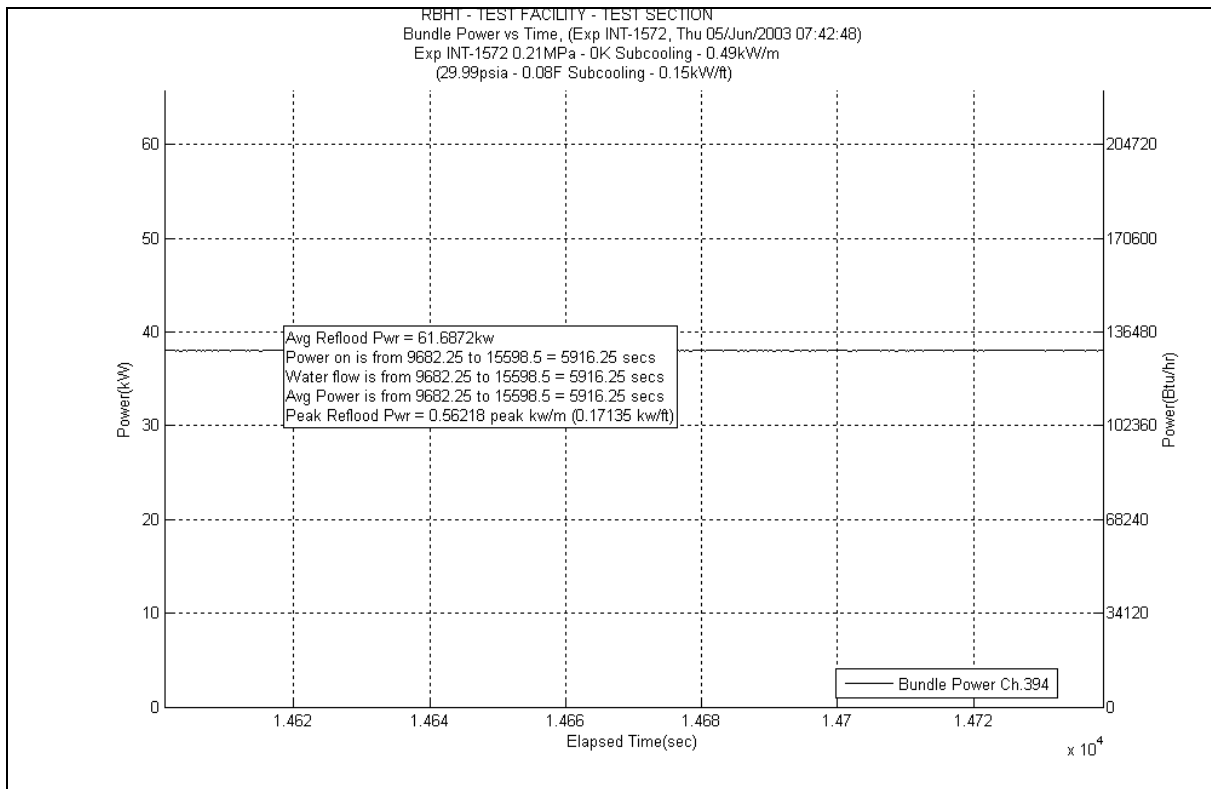


Figure A-99 Bundle Power Plot for Experiment 1572J

Table A-39 Data Results for RBHT Test 1572J for Time Period 14601 to 14739 seconds

Results for RBHT Test 1572

Valid Time Period 14601 to 14739 seconds

Collapsed Liquid Level = 69.910 inches = 1775.71 mm

(Z_{sv}) Onset of Significant Void = 6.5 inches = 165 mm

(Z_{2s}) Two-Phase Level (Dryout) = 131.60 inches = 3342.64 mm

(S) Level Swell = 1.957

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.905	5.443	260.594	0.033	1.580	0.000	0.000	0.000	0.000	5.406	258.841	4325.406	207101.5509	0.905	0.900	0.910
*	120-133	3048-3378	383	0.847	10.304	493.337	0.039	1.867	0.000	0.000	1.085	51.929	9.18	439.541	4334.586	207541.0917	0.864	0.860	0.868
*	108-120	2743-3048	382	0.704	18.426	882.238	0.056	2.681	0.006	0.287	4.734	226.662	13.63	652.608	4348.216	208193.6996	0.781	0.777	0.785
	100-108	2540-2743	381	0.738	10.875	520.690	0.041	1.963	0.028	1.341	0.000	0.000	10.8	517.107	4359.016	208710.8063	0.74	0.736	0.744
	97-100	2464-2540	380	0.633	5.723	274.021	0.015	0.718	0.010	0.479	0.000	0.000	5.695	272.678	4364.711	208983.4844	0.634	0.631	0.637
	93-97	2362-2464	379	0.623	7.832	374.976	0.019	0.910	0.013	0.622	0.000	0.000	7.796	373.274	4372.507	209356.7589	0.625	0.622	0.628
*	85-93	2159-2362	378	0.455	22.643	1084.149	0.036	1.724	0.025	1.197	8.542	408.989	14.04	672.239	4386.547	210028.9977	0.662	0.659	0.665
	81-85	2057-2159	377	0.698	6.274	300.379	0.016	0.766	0.012	0.575	0.000	0.000	6.244	298.964	4392.791	210327.962	0.699	0.696	0.702
	78-81	1981-2057	376	0.557	6.907	330.715	0.012	0.575	0.009	0.431	0.000	0.000	6.884	329.608	4399.675	210657.5697	0.558	0.555	0.561
	75-78	1905-1981	375	0.548	7.042	337.180	0.011	0.527	0.009	0.431	0.000	0.000	7.019	336.072	4406.694	210993.6412	0.549	0.546	0.552
	72-75	1829-1905	374	0.509	7.655	366.522	0.011	0.527	0.008	0.383	0.000	0.000	7.631	365.374	4414.325	211359.0155	0.51	0.507	0.513
*	67-72	1702-1829	373	0.423	14.988	717.627	0.017	0.814	0.014	0.670	3.867	185.151	11.09	530.992	4425.415	211890.0075	0.573	0.570	0.576
	63-67	1600-1702	372	0.635	7.587	363.289	0.012	0.575	0.010	0.479	0.000	0.000	7.563	362.118	4432.978	212252.1259	0.636	0.633	0.639
	60-63	1524-1600	371	0.438	8.761	419.486	0.009	0.431	0.008	0.383	0.000	0.000	8.741	418.521	4441.719	212670.6472	0.439	0.437	0.441
	57-60	1448-1524	370	0.431	8.860	424.211	0.008	0.383	0.007	0.335	0.000	0.000	8.841	423.309	4450.56	213093.9566	0.432	0.430	0.434
	53-57	1346-1448	369	0.414	12.173	582.854	0.010	0.479	0.010	0.479	0.000	0.000	12.15	581.745	4462.71	213675.7017	0.415	0.413	0.417
*	46-53	1168-1346	368	0.280	26.185	1253.734	0.016	0.766	0.016	0.766	7.103	340.082	19.05	912.119	4481.76	214587.8206	0.476	0.474	0.478
	43-46	1092-1168	367	0.536	7.234	346.381	0.006	0.287	0.006	0.287	0.000	0.000	7.217	345.552	4488.977	214933.3724	0.537	0.534	0.540
	37-43	940-1092	366	0.412	18.327	877.514	0.011	0.527	0.012	0.575	0.000	0.000	18.3	876.209	4507.277	215809.5811	0.413	0.411	0.415
*	25-37	635-940	365	0.254	46.485	2225.738	0.018	0.862	0.022	1.053	4.815	230.567	41.63	1993.255	4548.907	217802.8362	0.332	0.330	0.334
	13-25	330-635	364	0.250	46.714	2236.678	0.011	0.527	0.019	0.910	0.000	0.000	46.67	2234.572	4595.577	220037.4078	0.251	0.250	0.252
*	0-13	0-330	363	0.065	63.151	3023.681	0.005	0.239	0.010	0.479	4.106	196.591	59.03	2826.372	4654.607	222863.7794	0.125	0.124	0.126

Table A-40 Energy Balance Results for RBHT Test 1572J for Time Period 14601 to 14739 seconds

Results for RBHT Test 1572 Valid Time Period 14601 to 14739 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1740.3265	5.489984	0.00E+00	0.00E+00	0.00E+00	1.31E-02	5.96E-03
0.25	6.35	1837.0113	5.794983	0.00E+00	0.00E+00	0.00E+00	1.31E-02	5.96E-03
0.50	12.70	1933.6961	6.099982	2.86E-03	3.04E-02	1.38E-02	1.31E-02	5.95E-03
0.75	19.05	2030.3809	6.404982	1.87E-02	1.99E-01	9.01E-02	1.29E-02	5.85E-03
1.00	25.40	2127.0657	6.709981	3.53E-02	3.75E-01	1.70E-01	1.27E-02	5.75E-03
1.25	31.75	2223.7505	7.01498	5.27E-02	5.60E-01	2.54E-01	1.25E-02	5.65E-03
1.50	38.10	2320.4353	7.319979	7.09E-02	7.53E-01	3.41E-01	1.22E-02	5.54E-03
1.75	44.45	2417.1202	7.624978	8.98E-02	9.54E-01	4.33E-01	1.20E-02	5.43E-03
2.00	50.80	2513.805	7.929977	1.10E-01	1.16E+00	5.27E-01	1.17E-02	5.31E-03
2.25	57.15	2610.4898	8.234976	1.30E-01	1.38E+00	6.26E-01	1.14E-02	5.19E-03
2.50	63.50	2707.1746	8.539975	1.51E-01	1.61E+00	7.28E-01	1.12E-02	5.06E-03
2.75	69.85	2803.8594	8.844975	1.73E-01	1.84E+00	8.35E-01	1.09E-02	4.93E-03
3.00	76.20	2900.5442	9.149974	1.96E-01	2.08E+00	9.45E-01	1.06E-02	4.79E-03
3.25	82.55	2997.229	9.454973	2.20E-01	2.33E+00	1.06E+00	1.03E-02	4.65E-03
3.50	88.90	3093.9138	9.759972	2.44E-01	2.59E+00	1.18E+00	9.94E-03	4.51E-03
3.75	95.25	3190.5986	10.06497	2.69E-01	2.86E+00	1.30E+00	9.61E-03	4.36E-03
4.00	101.60	3287.2834	10.36997	2.95E-01	3.13E+00	1.42E+00	9.27E-03	4.20E-03
4.25	107.95	3383.9682	10.67497	3.22E-01	3.42E+00	1.55E+00	8.92E-03	4.04E-03
4.50	114.30	3480.653	10.97997	3.49E-01	3.71E+00	1.68E+00	8.56E-03	3.88E-03
4.75	120.65	3577.3378	11.28497	3.77E-01	4.01E+00	1.82E+00	8.19E-03	3.71E-03
5.00	127.00	3674.0226	11.58997	4.06E-01	4.31E+00	1.96E+00	7.80E-03	3.54E-03
5.25	133.35	3770.7074	11.89497	4.36E-01	4.63E+00	2.10E+00	7.41E-03	3.36E-03
5.50	139.70	3867.3922	12.19996	4.67E-01	4.96E+00	2.25E+00	7.01E-03	3.18E-03
5.75	146.05	3964.077	12.50496	4.98E-01	5.29E+00	2.40E+00	6.60E-03	2.99E-03
6.00	152.40	4060.7619	12.80996	5.30E-01	5.63E+00	2.55E+00	6.18E-03	2.80E-03
6.25	158.75	4157.4467	13.11496	5.63E-01	5.98E+00	2.71E+00	5.75E-03	2.61E-03
6.50	165.10	4254.1315	13.41996	5.96E-01	6.33E+00	2.87E+00	5.31E-03	2.41E-03
6.75	171.45	4350.8163	13.72496	6.31E-01	6.70E+00	3.04E+00	4.85E-03	2.20E-03
7.00	177.80	4447.5011	14.02996	6.66E-01	7.07E+00	3.21E+00	4.39E-03	1.99E-03
7.25	184.15	4544.1859	14.33496	7.02E-01	7.45E+00	3.38E+00	3.92E-03	1.78E-03
7.50	190.50	4640.8707	14.63996	7.39E-01	7.84E+00	3.56E+00	3.44E-03	1.56E-03
7.75	196.85	4737.5555	14.94496	7.76E-01	8.24E+00	3.74E+00	2.94E-03	1.34E-03
8.00	203.20	4834.2403	15.24996	8.14E-01	8.65E+00	3.92E+00	2.44E-03	1.11E-03
8.25	209.55	4930.9251	15.55496	8.53E-01	9.06E+00	4.11E+00	1.93E-03	8.74E-04
8.50	215.90	5027.6099	15.85995	8.93E-01	9.49E+00	4.30E+00	1.40E-03	6.37E-04
8.75	222.25	5124.2947	16.16495	9.34E-01	9.92E+00	4.50E+00	8.72E-04	3.95E-04
9.00	228.60	5220.9795	16.46995	9.75E-01	1.04E+01	4.70E+00	3.27E-04	1.48E-04
9.25	234.95	4930.9251	15.55496	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00
9.50	241.30	4640.8707	14.63996	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00
9.75	247.65	4350.8163	13.72496	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00
10.00	254.00	4060.7619	12.80996	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00
10.25	260.35	3770.7074	11.89497	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00
10.50	266.70	3480.653	10.97997	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00
10.75	273.05	3190.5986	10.06497	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00
11.00	279.40	2900.5442	9.149974	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00
11.25	285.75	2610.4898	8.234976	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00
11.50	292.10	2320.4353	7.319979	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00
11.75	298.45	2030.3809	6.404982	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00
12.00	304.80	1740.3265	5.489984	1.00E+00	1.06E+01	4.82E+00	0.00E+00	0.00E+00

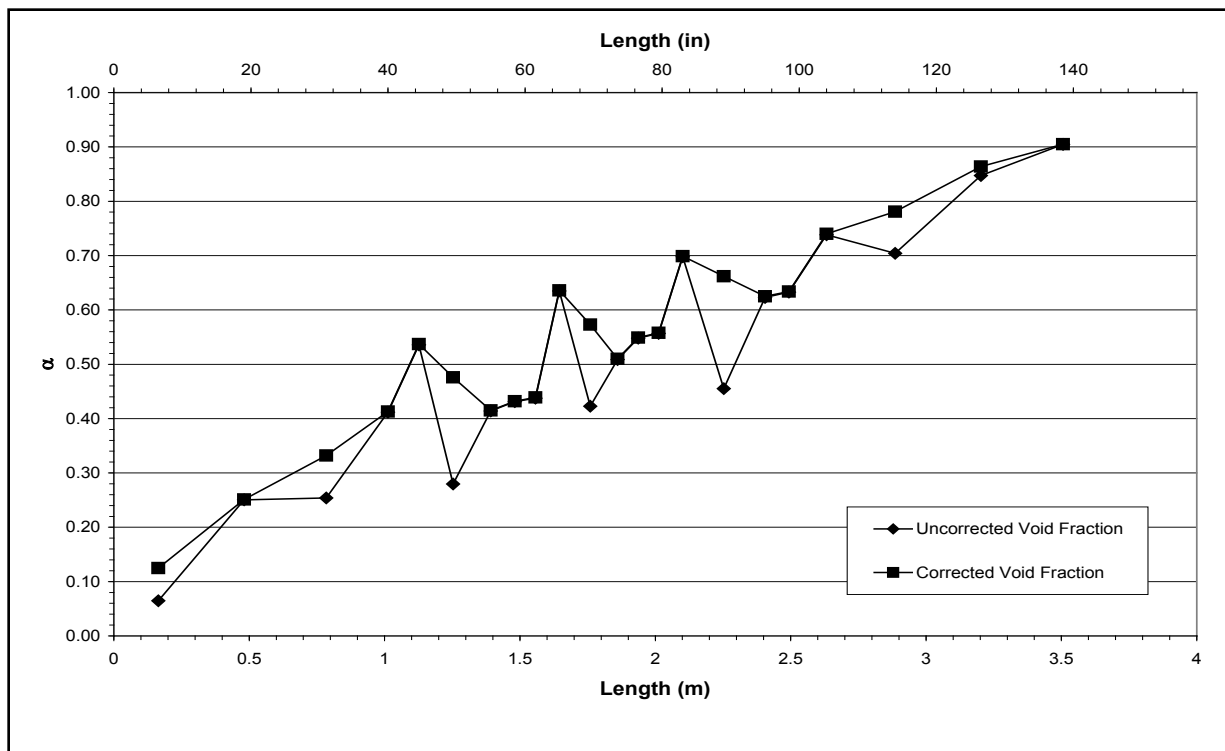


Figure A-100 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572J for Time Period 14601 to 14739 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-K

Test Conditions

Date: 6/5/2003

Steady-state time window: 14820 – 14940 seconds

Inlet flow rate: 0.348 cm/sec (0.137 in./sec)

Inlet mass flow rate: 0.017 kg/sec (0.038 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.92 kW

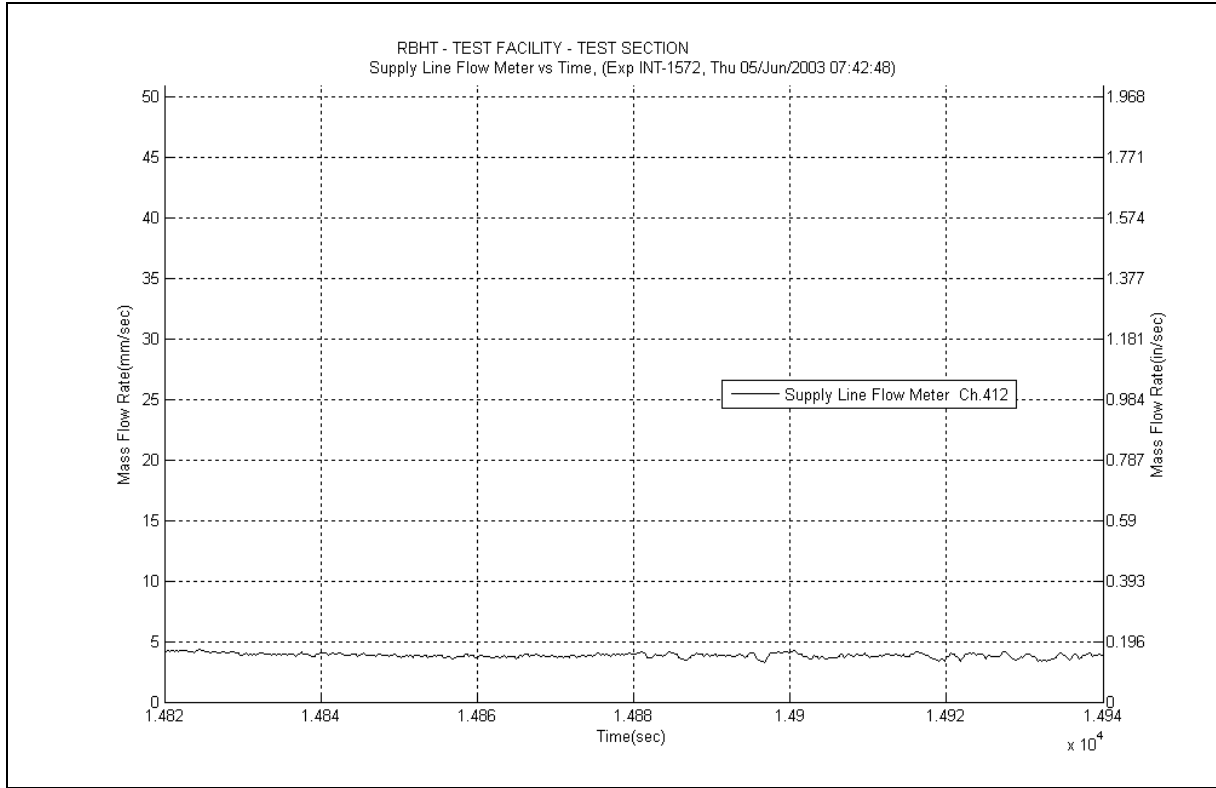


Figure A-101 Inlet Flow Plot for Experiment 1572K

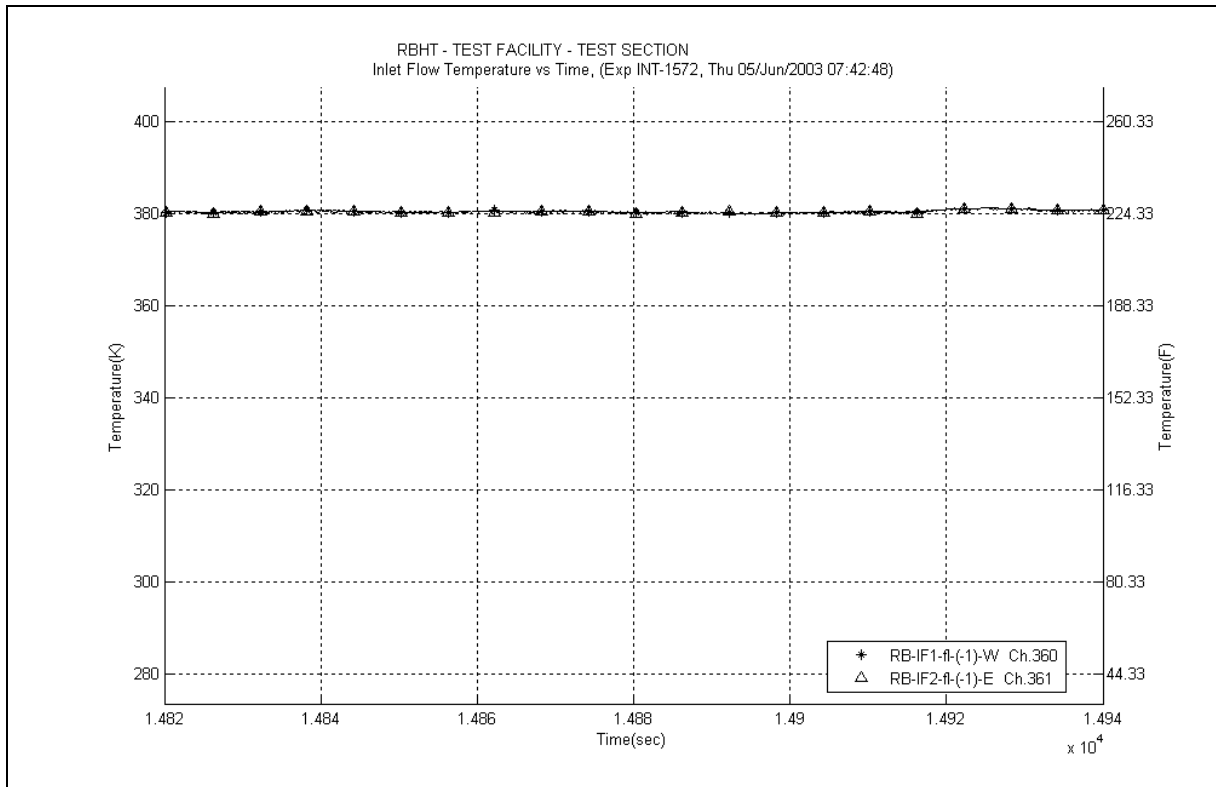


Figure A-102 Inlet Temperature Plot for Experiment 1572K

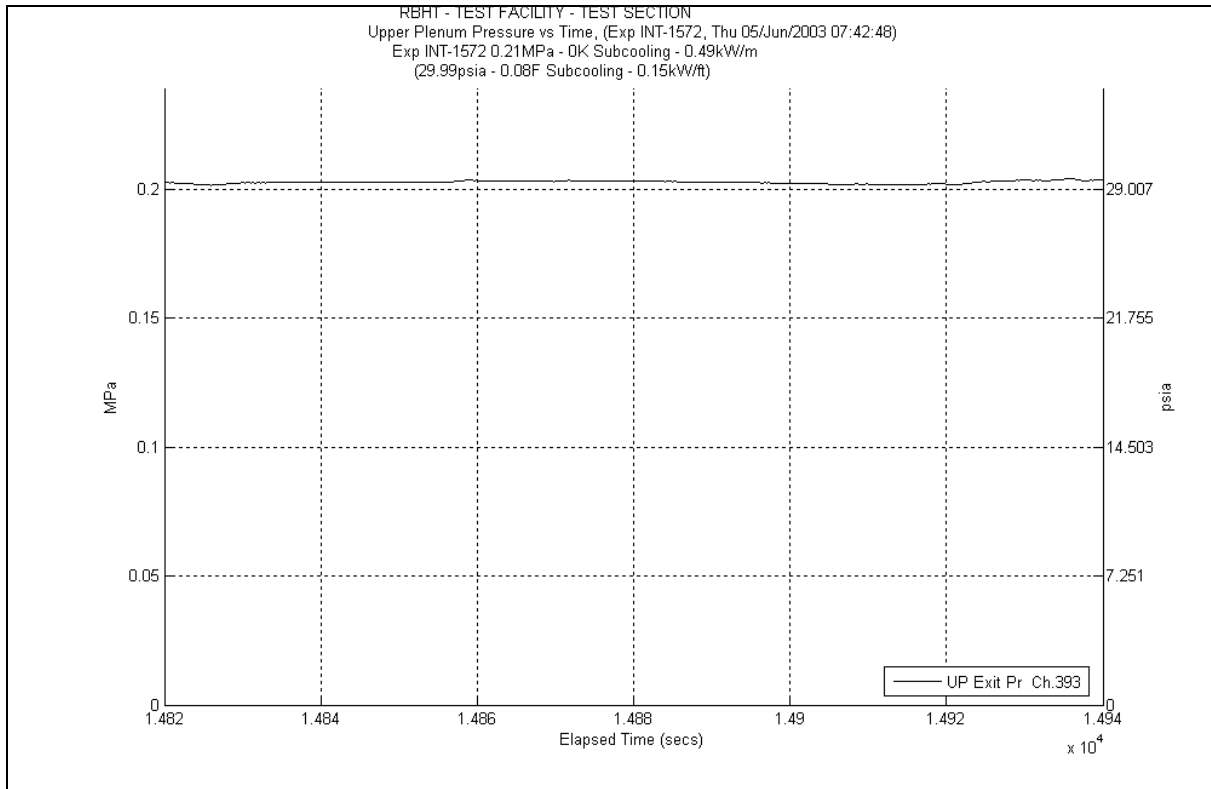


Figure A-103 System Pressure Plot for Experiment 1572K

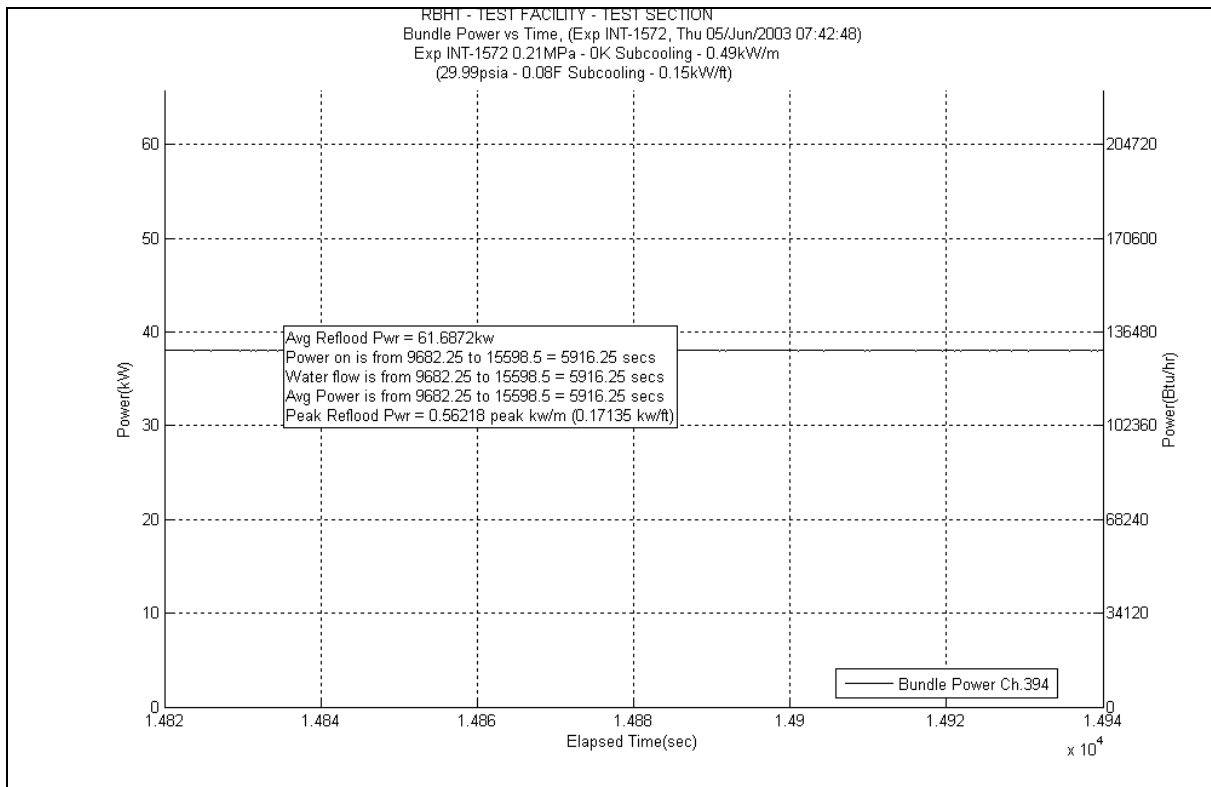


Figure A-104 Bundle Power Plot for Experiment 1572K

Table A-41 Data Results for RBHT Test 1572K for Time Period 14820 to 14940 seconds

Results for RBHT Test 1572
Valid Time Period 14820 to 14940 seconds
Collapsed Liquid Level = 66.141 inches = 1679.98 mm
(Z_{OSV}) Onset of Significant Void = 6.5 inches = 165 mm
($Z_{2\phi}$) Two-Phase Level (Dryout) = 122.70 inches = 3116.58 mm
(S) Level Swell = 1.927

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.976	1.397	66.889	0.028	1.341	0.000	0.000	0.000	0.000	1.369	65.548	4321.369	206908.2583	0.976	0.971	0.981
*	120-133	3048-3378	383	0.947	3.573	171.077	0.033	1.580	0.000	0.000	-1.401	-67.080	4.941	236.576	4326.31	207144.8347	0.927	0.922	0.932
*	108-120	2743-3048	382	0.797	12.635	604.985	0.031	1.484	0.000	0.000	1.904	91.182	10.7	512.319	4337.01	207657.1534	0.828	0.824	0.832
	100-108	2540-2743	381	0.778	9.229	441.865	0.034	1.628	0.014	0.670	0.000	0.000	9.177	439.397	4346.187	208096.5505	0.779	0.775	0.783
	97-100	2464-2540	380	0.682	4.949	236.971	0.013	0.622	0.009	0.431	0.000	0.000	4.924	235.762	4351.111	208332.3129	0.684	0.681	0.687
	93-97	2362-2464	379	0.673	6.793	325.245	0.017	0.814	0.012	0.575	0.000	0.000	6.761	323.718	4357.872	208656.0313	0.674	0.671	0.677
*	85-93	2159-2362	378	0.487	21.324	1020.990	0.033	1.580	0.023	1.101	8.418	403.047	12.85	615.261	4370.722	209271.2926	0.691	0.688	0.694
	81-85	2057-2159	377	0.706	6.118	292.919	0.015	0.718	0.011	0.527	0.000	0.000	6.092	291.687	4376.814	209562.9792	0.707	0.703	0.711
	78-81	1981-2057	376	0.556	6.912	330.964	0.011	0.527	0.008	0.383	0.000	0.000	6.89	329.895	4383.704	209892.8741	0.558	0.555	0.561
	75-78	1905-1981	375	0.553	6.969	333.699	0.010	0.479	0.008	0.383	0.000	0.000	6.949	332.720	4390.653	210225.594	0.554	0.551	0.557
	72-75	1829-1905	374	0.515	7.551	361.549	0.010	0.479	0.008	0.383	0.000	0.000	7.53	360.538	4398.183	210586.1324	0.517	0.514	0.520
*	67-72	1702-1829	373	0.415	15.180	726.827	0.016	0.766	0.013	0.622	4.161	199.235	10.99	526.204	4409.173	211112.3364	0.577	0.574	0.580
	63-67	1600-1702	372	0.636	7.572	362.543	0.011	0.527	0.010	0.479	0.000	0.000	7.55	361.496	4416.723	211473.8323	0.636	0.633	0.639
	60-63	1524-1600	371	0.432	8.849	423.713	0.008	0.383	0.007	0.335	0.000	0.000	8.831	422.831	4425.554	211896.6629	0.433	0.431	0.435
	57-60	1448-1524	370	0.438	8.761	419.486	0.008	0.383	0.007	0.335	0.000	0.000	8.743	418.617	4434.297	212315.28	0.439	0.437	0.441
	53-57	1346-1448	369	0.419	12.080	578.378	0.010	0.479	0.009	0.431	0.000	0.000	12.06	577.436	4446.357	212892.7159	0.419	0.417	0.421
*	46-53	1168-1346	368	0.279	26.206	1254.728	0.015	0.718	0.015	0.718	7.176	343.567	19	909.725	4465.357	213802.4408	0.477	0.475	0.479
	43-46	1092-1168	367	0.534	7.255	347.375	0.006	0.287	0.006	0.287	0.000	0.000	7.241	346.701	4472.598	214149.1417	0.535	0.532	0.538
	37-43	940-1092	366	0.415	18.234	873.038	0.010	0.479	0.011	0.527	0.000	0.000	18.21	871.899	4490.808	215021.0412	0.416	0.414	0.418
*	25-37	635-940	365	0.255	46.460	2224.494	0.016	0.766	0.021	1.005	4.763	228.031	41.66	1994.692	4532.468	217015.7327	0.331	0.329	0.333
	13-25	330-635	364	0.247	46.958	2248.365	0.010	0.479	0.018	0.862	0.000	0.000	46.91	2246.063	4579.378	219261.7955	0.247	0.246	0.248
*	0-13	0-330	363	0.065	63.115	3021.940	0.005	0.239	0.010	0.479	3.940	188.626	59.16	2832.596	4638.538	222094.3915	0.124	0.123	0.125

Table A-42 Energy Balance Results for RBHT Test 1572K for Time Period 14820 to 14940 seconds

Results for RBHT Test 1572 Valid Time Period 14820 to 14940 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1740.9716	5.492019	0.00E+00	0.00E+00	0.00E+00	1.22E-02	5.54E-03
0.25	6.35	1837.6922	5.797131	0.00E+00	0.00E+00	0.00E+00	1.22E-02	5.54E-03
0.50	12.70	1934.4128	6.102243	4.76E-03	4.70E-02	2.13E-02	1.21E-02	5.51E-03
0.75	19.05	2031.1335	6.407356	2.18E-02	2.15E-01	9.76E-02	1.19E-02	5.42E-03
1.00	25.40	2127.8541	6.712468	3.97E-02	3.92E-01	1.78E-01	1.17E-02	5.32E-03
1.25	31.75	2224.5748	7.01758	5.85E-02	5.77E-01	2.62E-01	1.15E-02	5.21E-03
1.50	38.10	2321.2954	7.322692	7.80E-02	7.70E-01	3.49E-01	1.13E-02	5.10E-03
1.75	44.45	2418.0161	7.627804	9.85E-02	9.71E-01	4.40E-01	1.10E-02	4.99E-03
2.00	50.80	2514.7367	7.932916	1.20E-01	1.18E+00	5.35E-01	1.07E-02	4.87E-03
2.25	57.15	2611.4573	8.238029	1.42E-01	1.40E+00	6.34E-01	1.05E-02	4.75E-03
2.50	63.50	2708.178	8.543141	1.65E-01	1.62E+00	7.36E-01	1.02E-02	4.62E-03
2.75	69.85	2804.8986	8.848253	1.88E-01	1.86E+00	8.43E-01	9.91E-03	4.49E-03
3.00	76.20	2901.6193	9.153365	2.13E-01	2.10E+00	9.52E-01	9.61E-03	4.36E-03
3.25	82.55	2998.3399	9.458477	2.38E-01	2.35E+00	1.07E+00	9.30E-03	4.22E-03
3.50	88.90	3095.0606	9.763589	2.65E-01	2.61E+00	1.18E+00	8.98E-03	4.07E-03
3.75	95.25	3191.7812	10.0687	2.92E-01	2.88E+00	1.30E+00	8.65E-03	3.92E-03
4.00	101.60	3288.5018	10.37381	3.20E-01	3.15E+00	1.43E+00	8.31E-03	3.77E-03
4.25	107.95	3385.2225	10.67893	3.48E-01	3.43E+00	1.56E+00	7.95E-03	3.61E-03
4.50	114.30	3481.9431	10.98404	3.78E-01	3.73E+00	1.69E+00	7.59E-03	3.44E-03
4.75	120.65	3578.6638	11.28915	4.08E-01	4.03E+00	1.83E+00	7.22E-03	3.28E-03
5.00	127.00	3675.3844	11.59426	4.40E-01	4.33E+00	1.97E+00	6.84E-03	3.10E-03
5.25	133.35	3772.1051	11.89937	4.72E-01	4.65E+00	2.11E+00	6.45E-03	2.93E-03
5.50	139.70	3868.8257	12.20449	5.04E-01	4.97E+00	2.26E+00	6.05E-03	2.74E-03
5.75	146.05	3965.5463	12.5096	5.38E-01	5.31E+00	2.41E+00	5.64E-03	2.56E-03
6.00	152.40	4062.267	12.81471	5.73E-01	5.65E+00	2.56E+00	5.22E-03	2.37E-03
6.25	158.75	4158.9876	13.11982	6.08E-01	6.00E+00	2.72E+00	4.78E-03	2.17E-03
6.50	165.10	4255.7083	13.42494	6.44E-01	6.35E+00	2.88E+00	4.34E-03	1.97E-03
6.75	171.45	4352.4289	13.73005	6.81E-01	6.72E+00	3.05E+00	3.89E-03	1.76E-03
7.00	177.80	4449.1496	14.03516	7.19E-01	7.09E+00	3.22E+00	3.43E-03	1.55E-03
7.25	184.15	4545.8702	14.34027	7.58E-01	7.47E+00	3.39E+00	2.95E-03	1.34E-03
7.50	190.50	4642.5908	14.64538	7.98E-01	7.86E+00	3.57E+00	2.47E-03	1.12E-03
7.75	196.85	4739.3115	14.9505	8.38E-01	8.26E+00	3.75E+00	1.98E-03	8.97E-04
8.00	203.20	4836.0321	15.25561	8.79E-01	8.67E+00	3.93E+00	1.48E-03	6.69E-04
8.25	209.55	4932.7528	15.56072	9.21E-01	9.08E+00	4.12E+00	9.62E-04	4.36E-04
8.50	215.90	5029.4734	15.86583	9.64E-01	9.51E+00	4.31E+00	4.38E-04	1.99E-04
8.75	222.25	5126.1941	16.17095	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
9.00	228.60	5222.9147	16.47606	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
9.25	234.95	4932.7528	15.56072	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
9.50	241.30	4642.5908	14.64538	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
9.75	247.65	4352.4289	13.73005	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
10.00	254.00	4062.267	12.81471	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
10.25	260.35	3772.1051	11.89937	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
10.50	266.70	3481.9431	10.98404	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
10.75	273.05	3191.7812	10.0687	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
11.00	279.40	2901.6193	9.153365	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
11.25	285.75	2611.4573	8.238029	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
11.50	292.10	2321.2954	7.322692	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
11.75	298.45	2031.1335	6.407356	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00
12.00	304.80	1740.9716	5.492019	1.00E+00	9.86E+00	4.47E+00	0.00E+00	0.00E+00

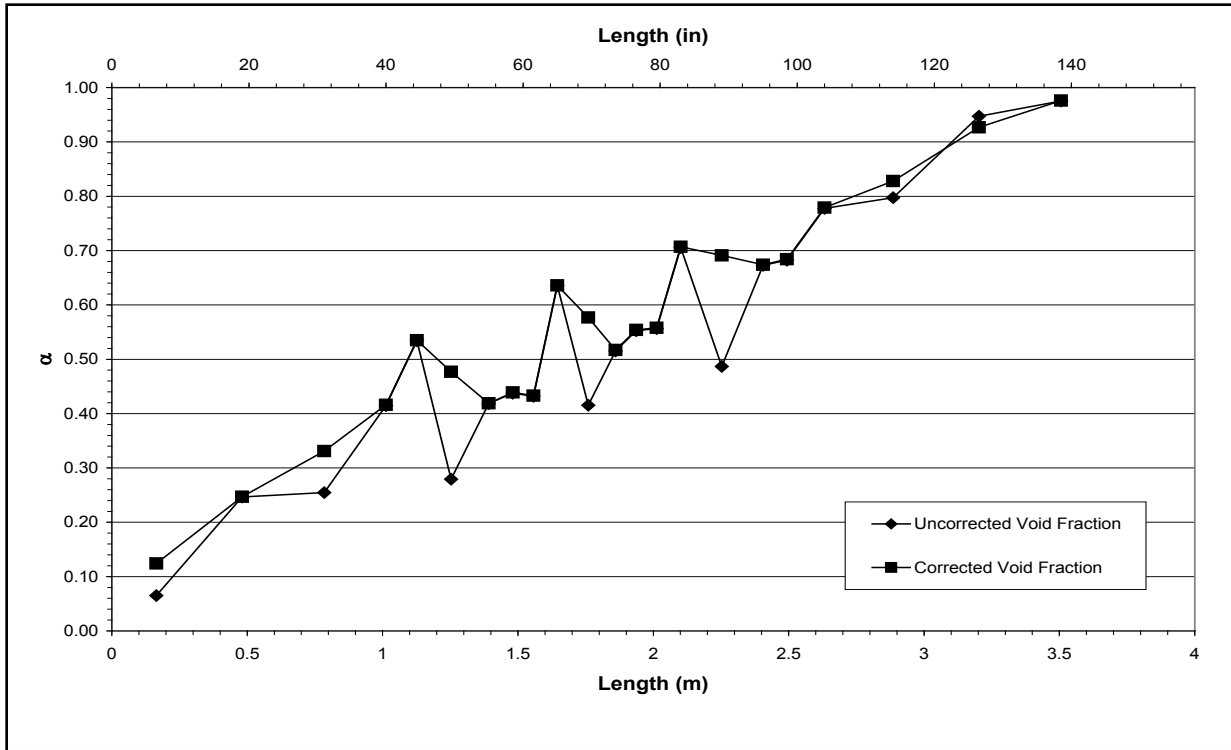


Figure A-105 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572K for Time Period 14820 to 14940 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1572-L

Test Conditions

Date: 6/5/2003

Steady-state time window: 15411 – 15456 seconds

Inlet flow rate: 0.284 cm/sec (0.112 in./sec)

Inlet mass flow rate: 0.014 kg/sec (0.031 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.92 kW

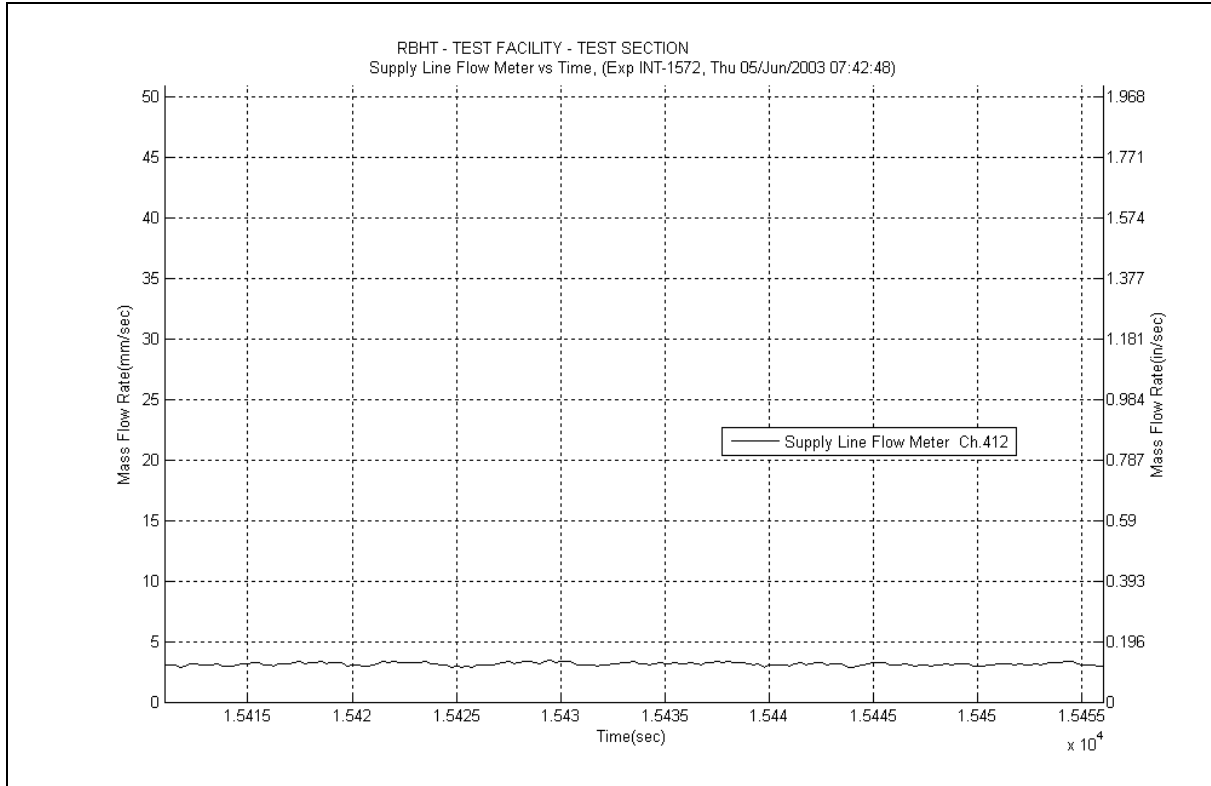


Figure A-106 Inlet Flow Plot for Experiment 1572L

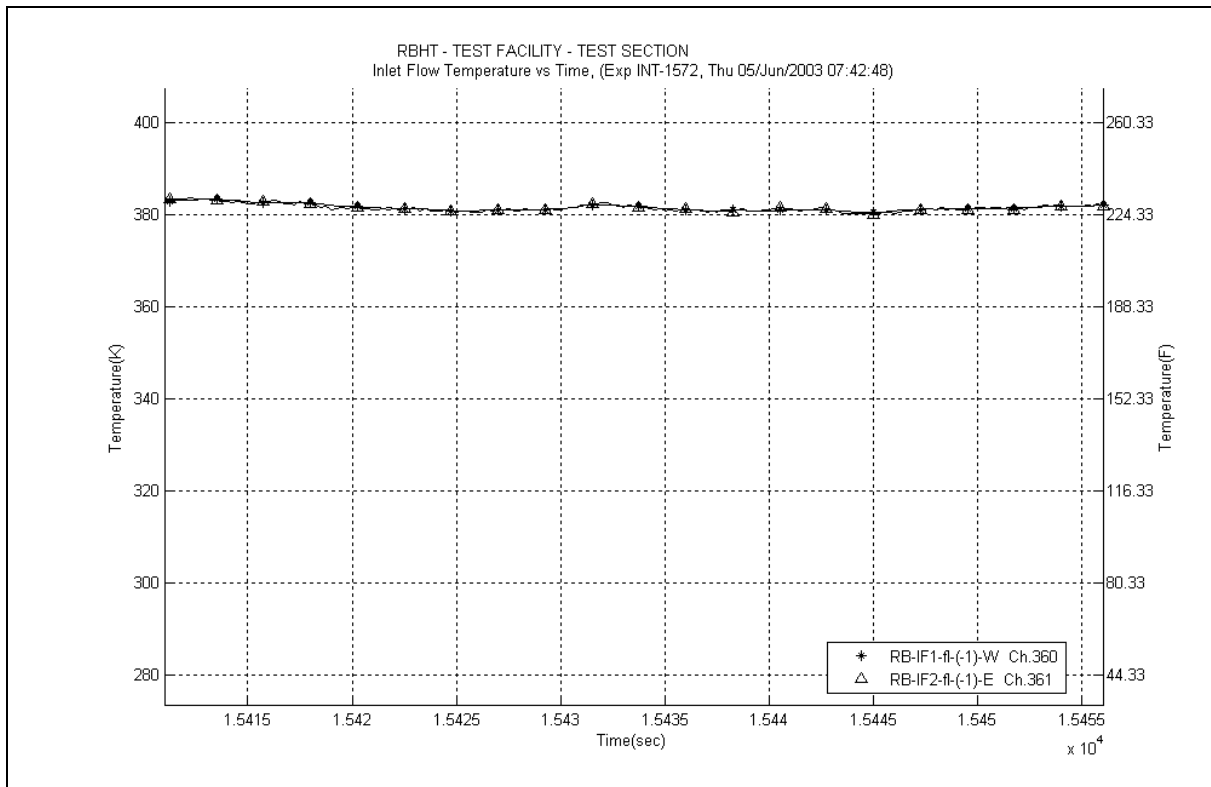


Figure A-107 Inlet Temperature Plot for Experiment 1572L

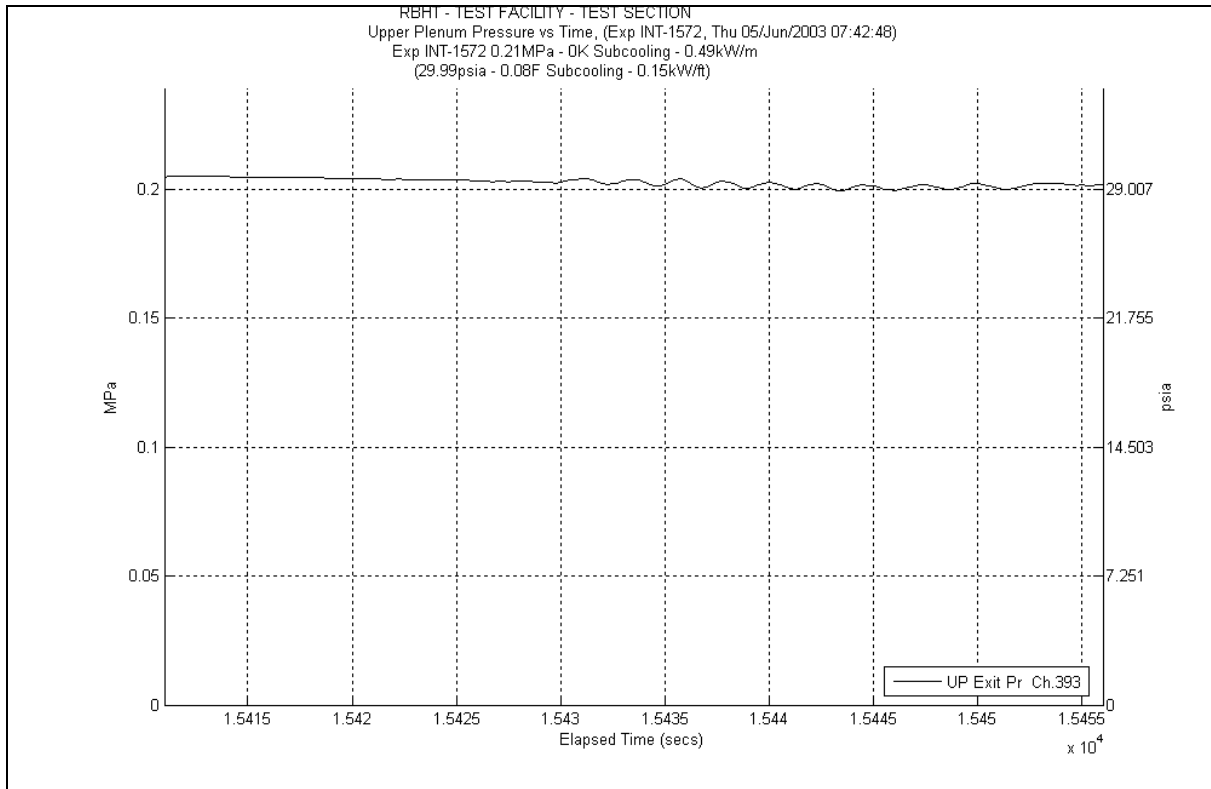


Figure A-108 System Pressure Plot for Experiment 1572L

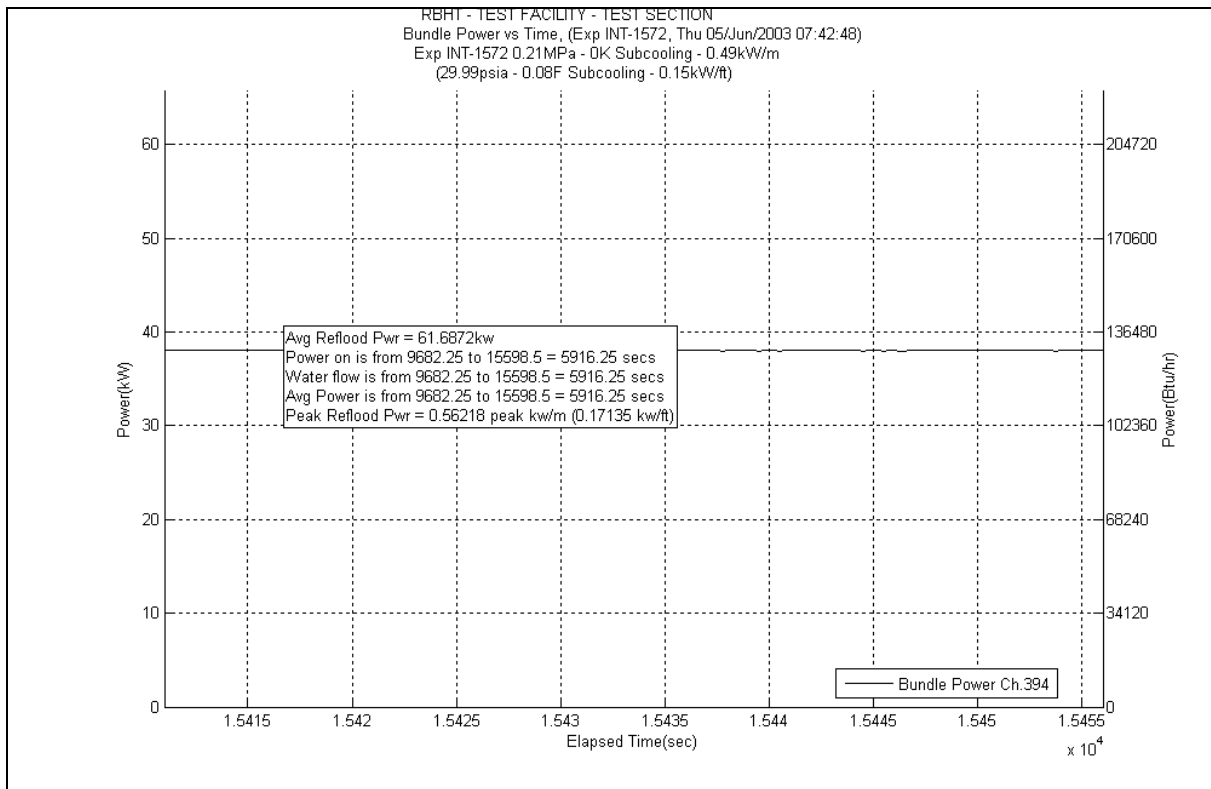


Figure A-109 Bundle Power Plot for Experiment 1572L

Table A-43 Data Results for RBHT Test 1572L for Time Period 15411 to 15456 seconds

Results for RBHT Test 1572
Valid Time Period 15411 to 15456 seconds
Collapsed Liquid Level = 56.494 inches = 1434.93 mm
(Z_{osv}) Onset of Significant Void = 6.5 inches = 165 mm
(Z_{2s}) Two-Phase Level (Dryout) = 97.20 inches = 2468.88 mm
(S) Level Swell = 1.774

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.986	0.784	37.547	0.019	0.910	0.000	0.000	0.000	0.000	0.763	36.533	4320.763	206879.2429	0.987	0.982	0.992
*	120-133	3048-3378	383	0.994	0.400	19.147	0.022	1.053	0.000	0.000	-1.235	-59.138	1.613	77.231	4322.376	206956.4737	0.976	0.971	0.981
*	108-120	2743-3048	382	0.971	1.807	86.533	0.020	0.958	0.000	0.000	-1.015	-48.585	2.802	134.160	4325.178	207090.6342	0.955	0.950	0.960
	100-108	2540-2743	381	0.944	2.321	111.150	0.014	0.670	0.000	0.000	0.000	0.000	2.305	110.364	4327.483	207200.9982	0.945	0.940	0.950
	97-100	2464-2540	380	0.886	1.776	85.041	0.005	0.239	0.000	0.000	0.000	0.000	1.773	84.892	4329.256	207285.8899	0.886	0.882	0.890
	93-97	2362-2464	379	0.838	3.360	160.882	0.007	0.335	0.000	0.000	0.000	0.000	3.35	160.399	4332.606	207446.2888	0.839	0.835	0.843
*	85-93	2159-2362	378	0.673	13.596	650.987	0.023	1.101	0.014	0.670	4.133	197.896	9.426	451.319	4342.032	207897.6081	0.773	0.769	0.777
	81-85	2057-2159	377	0.707	6.097	291.924	0.012	0.575	0.009	0.431	0.000	0.000	6.076	290.920	4348.108	208188.5285	0.707	0.703	0.711
	78-81	1981-2057	376	0.580	6.538	313.060	0.009	0.431	0.007	0.335	0.000	0.000	6.519	312.131	4354.627	208500.6599	0.582	0.579	0.585
	75-78	1905-1981	375	0.517	7.530	360.554	0.008	0.383	0.006	0.287	0.000	0.000	7.512	359.676	4362.139	208860.3364	0.518	0.515	0.521
	72-75	1829-1905	374	0.473	8.211	393.128	0.008	0.383	0.006	0.287	0.000	0.000	8.194	392.331	4370.333	209252.6672	0.474	0.472	0.476
*	67-72	1702-1829	373	0.411	15.305	732.795	0.012	0.575	0.010	0.479	2.623	125.578	12.66	606.164	4382.993	209858.8313	0.512	0.509	0.515
	63-67	1600-1702	372	0.550	9.358	448.082	0.009	0.431	0.008	0.383	0.000	0.000	9.337	447.058	4392.33	210305.8892	0.55	0.547	0.553
	60-63	1524-1600	371	0.402	9.312	445.844	0.007	0.335	0.006	0.287	0.000	0.000	9.296	445.095	4401.626	210750.9841	0.403	0.401	0.405
	57-60	1448-1524	370	0.395	9.431	451.563	0.006	0.287	0.006	0.287	0.000	0.000	9.418	450.936	4411.044	211201.9204	0.395	0.393	0.397
	53-57	1346-1448	369	0.354	13.414	642.284	0.008	0.383	0.007	0.335	0.000	0.000	13.4	641.595	4424.444	211843.5158	0.355	0.353	0.357
*	46-53	1168-1346	368	0.253	27.156	1300.233	0.012	0.575	0.012	0.575	5.272	252.421	21.86	1046.662	4446.304	212890.1782	0.398	0.396	0.400
	43-46	1092-1168	367	0.441	8.704	416.751	0.005	0.239	0.005	0.239	0.000	0.000	8.692	416.175	4454.996	213306.3534	0.442	0.440	0.444
	37-43	940-1092	366	0.364	19.807	948.382	0.008	0.383	0.009	0.431	0.000	0.000	19.78	947.071	4474.776	214253.4249	0.365	0.363	0.367
*	25-37	635-940	365	0.259	46.153	2209.823	0.013	0.622	0.017	0.814	3.233	154.803	42.89	2053.584	4517.666	216307.0091	0.312	0.310	0.314
	13-25	330-635	364	0.258	46.257	2214.797	0.008	0.383	0.015	0.718	0.000	0.000	46.22	2213.025	4563.886	218520.0346	0.258	0.257	0.259
*	0-13	0-330	363	0.075	62.439	2989.615	0.004	0.192	0.009	0.431	3.646	174.591	58.78	2814.402	4622.666	221334.4361	0.129	0.128	0.130

Table A-44 Energy Balance Results for RBHT Test 1572L for Time Period 15411 to 15456 seconds

Results for RBHT Test 1572 Valid Time Period 15411 to 15456 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1740.3028	5.489909	0.00E+00	0.00E+00	0.00E+00	9.93E-03	4.51E-03
0.25	6.35	1836.9863	5.794904	0.00E+00	0.00E+00	0.00E+00	9.93E-03	4.51E-03
0.50	12.70	1933.6698	6.099899	1.41E-02	1.13E-01	5.14E-02	9.79E-03	4.44E-03
0.75	19.05	2030.3533	6.404894	3.51E-02	2.82E-01	1.28E-01	9.58E-03	4.35E-03
1.00	25.40	2127.0367	6.709889	5.71E-02	4.58E-01	2.08E-01	9.37E-03	4.25E-03
1.25	31.75	2223.7202	7.014884	8.01E-02	6.43E-01	2.92E-01	9.14E-03	4.14E-03
1.50	38.10	2320.4037	7.319879	1.04E-01	8.36E-01	3.79E-01	8.90E-03	4.04E-03
1.75	44.45	2417.0872	7.624874	1.29E-01	1.04E+00	4.71E-01	8.65E-03	3.92E-03
2.00	50.80	2513.7707	7.929869	1.55E-01	1.25E+00	5.66E-01	8.39E-03	3.81E-03
2.25	57.15	2610.4542	8.234864	1.82E-01	1.47E+00	6.65E-01	8.12E-03	3.68E-03
2.50	63.50	2707.1377	8.539859	2.11E-01	1.69E+00	7.67E-01	7.84E-03	3.56E-03
2.75	69.85	2803.8212	8.844854	2.40E-01	1.92E+00	8.73E-01	7.55E-03	3.43E-03
3.00	76.20	2900.5047	9.149849	2.70E-01	2.17E+00	9.83E-01	7.25E-03	3.29E-03
3.25	82.55	2997.1881	9.454844	3.01E-01	2.42E+00	1.10E+00	6.94E-03	3.15E-03
3.50	88.90	3093.8716	9.759839	3.33E-01	2.68E+00	1.21E+00	6.62E-03	3.00E-03
3.75	95.25	3190.5551	10.06483	3.67E-01	2.94E+00	1.34E+00	6.29E-03	2.85E-03
4.00	101.60	3287.2386	10.36983	4.01E-01	3.22E+00	1.46E+00	5.95E-03	2.70E-03
4.25	107.95	3383.9221	10.67482	4.36E-01	3.50E+00	1.59E+00	5.60E-03	2.54E-03
4.50	114.30	3480.6056	10.97982	4.72E-01	3.79E+00	1.72E+00	5.24E-03	2.38E-03
4.75	120.65	3577.2891	11.28481	5.10E-01	4.09E+00	1.86E+00	4.87E-03	2.21E-03
5.00	127.00	3673.9726	11.58981	5.48E-01	4.40E+00	2.00E+00	4.49E-03	2.04E-03
5.25	133.35	3770.656	11.8948	5.87E-01	4.72E+00	2.14E+00	4.10E-03	1.86E-03
5.50	139.70	3867.3395	12.1998	6.28E-01	5.04E+00	2.29E+00	3.70E-03	1.68E-03
5.75	146.05	3964.023	12.50479	6.69E-01	5.38E+00	2.44E+00	3.29E-03	1.49E-03
6.00	152.40	4060.7065	12.80979	7.12E-01	5.72E+00	2.59E+00	2.86E-03	1.30E-03
6.25	158.75	4157.39	13.11478	7.55E-01	6.07E+00	2.75E+00	2.43E-03	1.10E-03
6.50	165.10	4254.0735	13.41978	8.00E-01	6.42E+00	2.91E+00	1.99E-03	9.03E-04
6.75	171.45	4350.757	13.72477	8.45E-01	6.79E+00	3.08E+00	1.54E-03	6.98E-04
7.00	177.80	4447.4405	14.02977	8.92E-01	7.16E+00	3.25E+00	1.08E-03	4.88E-04
7.25	184.15	4544.124	14.33476	9.39E-01	7.54E+00	3.42E+00	6.04E-04	2.74E-04
7.50	190.50	4640.8074	14.63976	9.88E-01	7.93E+00	3.60E+00	1.21E-04	5.50E-05
7.75	196.85	4737.4909	14.94475	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
8.00	203.20	4834.1744	15.24975	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
8.25	209.55	4930.8579	15.55474	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
8.50	215.90	5027.5414	15.85974	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
8.75	222.25	5124.2249	16.16473	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
9.00	228.60	5220.9084	16.46973	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
9.25	234.95	4930.8579	15.55474	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
9.50	241.30	4640.8074	14.63976	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
9.75	247.65	4350.757	13.72477	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
10.00	254.00	4060.7065	12.80979	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
10.25	260.35	3770.656	11.8948	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
10.50	266.70	3480.6056	10.97982	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
10.75	273.05	3190.5551	10.06483	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
11.00	279.40	2900.5047	9.149849	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
11.25	285.75	2610.4542	8.234864	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
11.50	292.10	2320.4037	7.319879	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
11.75	298.45	2030.3533	6.404894	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00
12.00	304.80	1740.3028	5.489909	1.00E+00	8.03E+00	3.64E+00	0.00E+00	0.00E+00

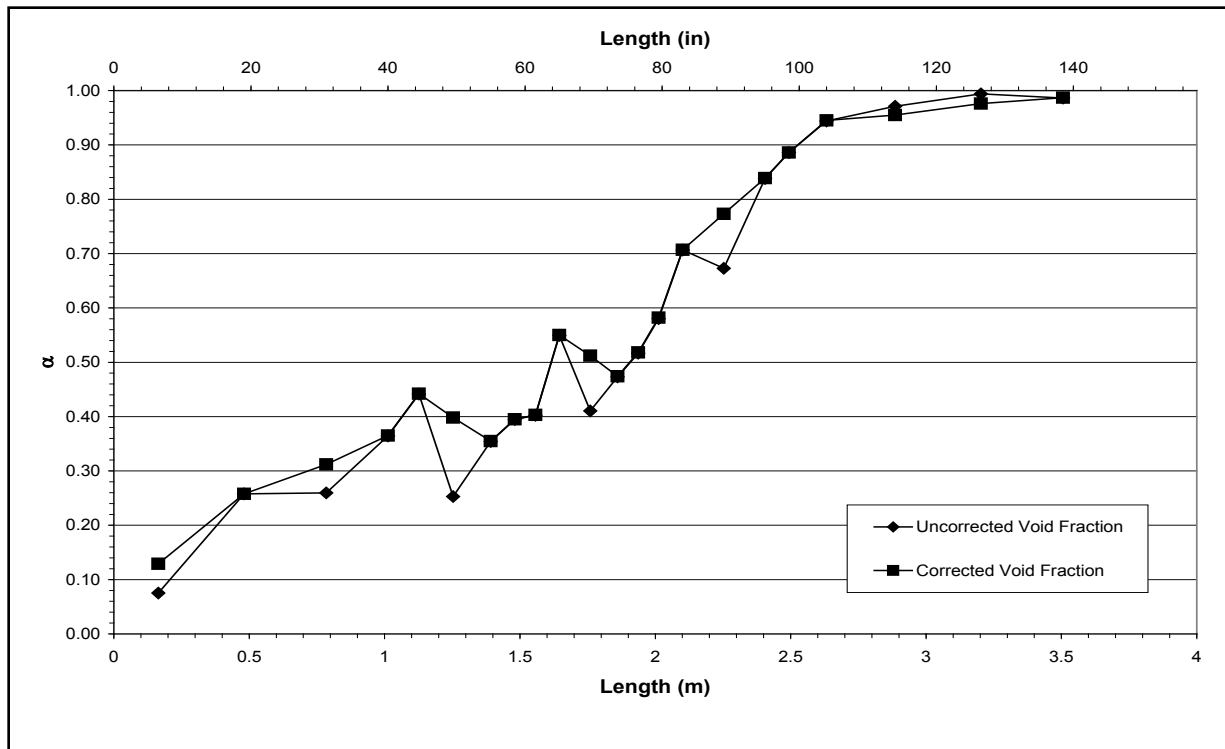


Figure A-110 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1572L for Time Period 15411 to 15456 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1578-A

Test Conditions

Date: 6/10/2003

Steady-state time window: 930 – 1040 seconds

Inlet flow rate: 2.515 cm/sec (0.990 in./sec)

Inlet mass flow rate: 0.120 kg/sec (0.265 lbm/sec)

Inlet flow temperature: 382.5 K (131.7 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 69.53 kW

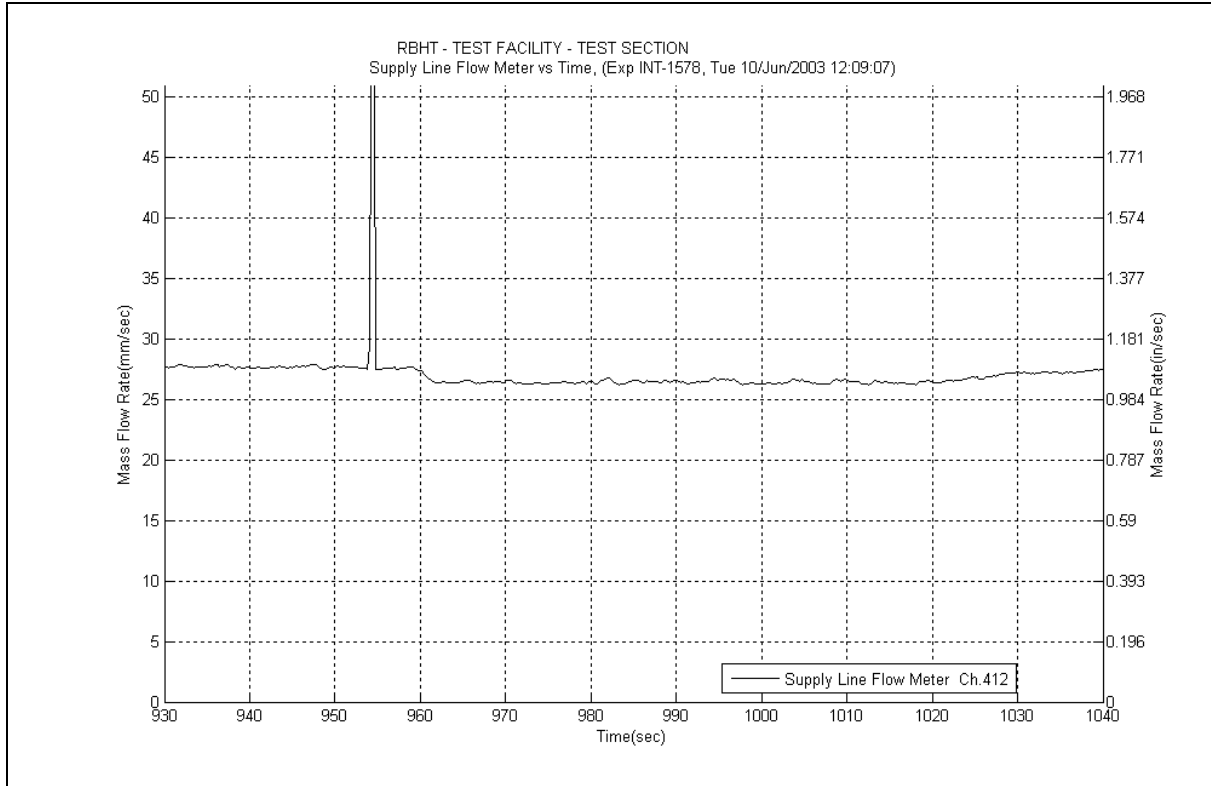


Figure A-111 Inlet Flow Plot for Experiment 1578A

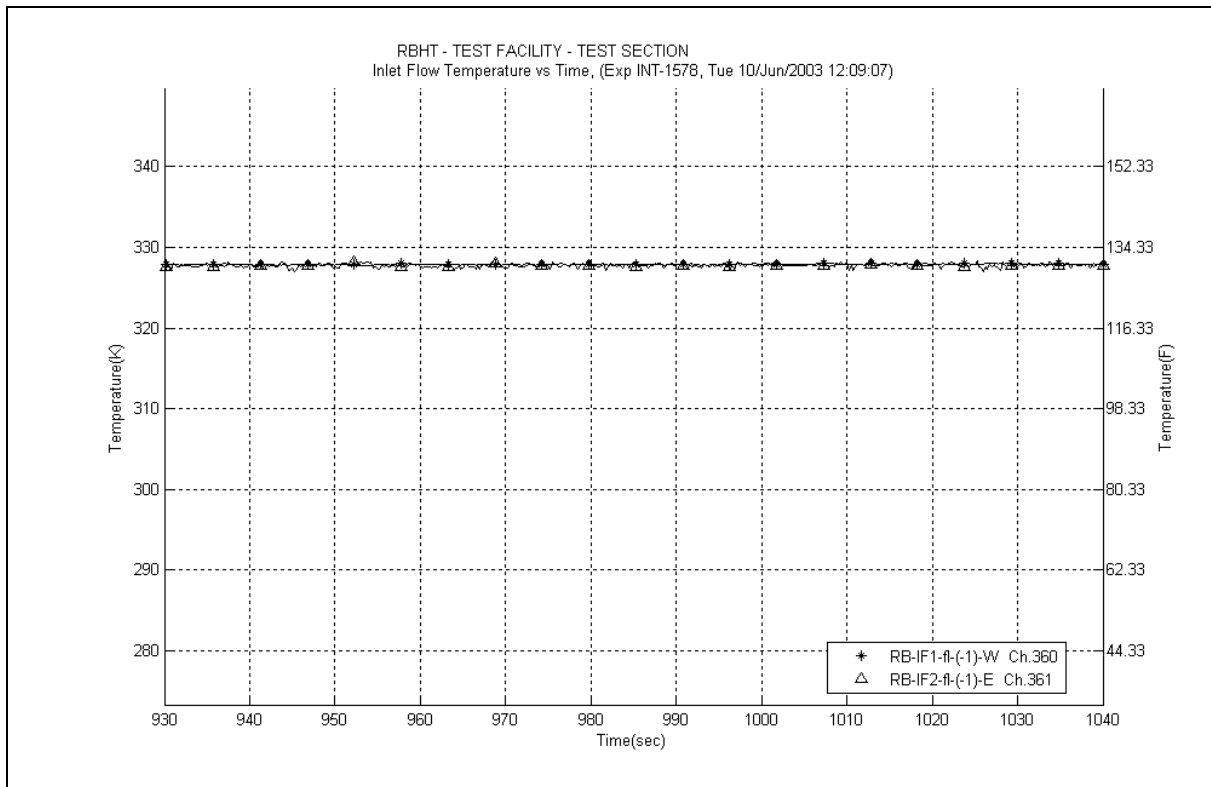


Figure A-112 Inlet Temperature Plot for Experiment 1578A

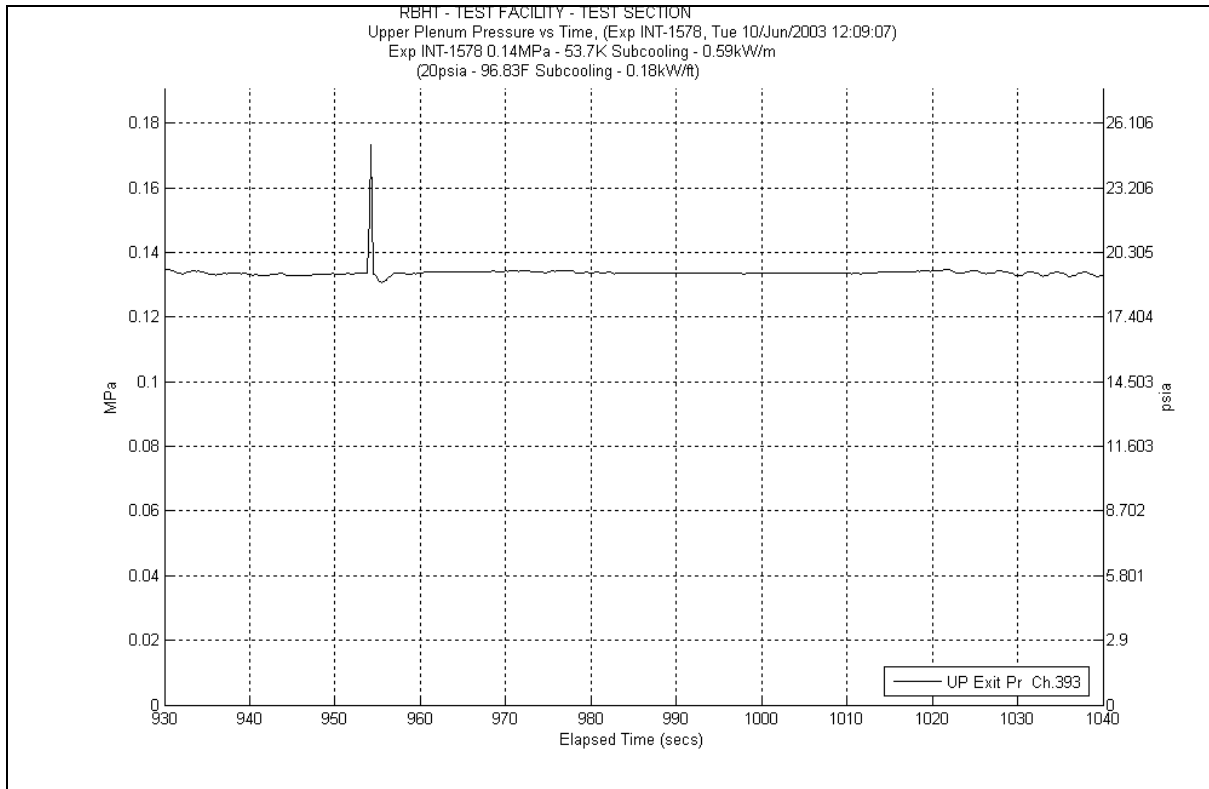


Figure A-113 System Pressure Plot for Experiment 1578A

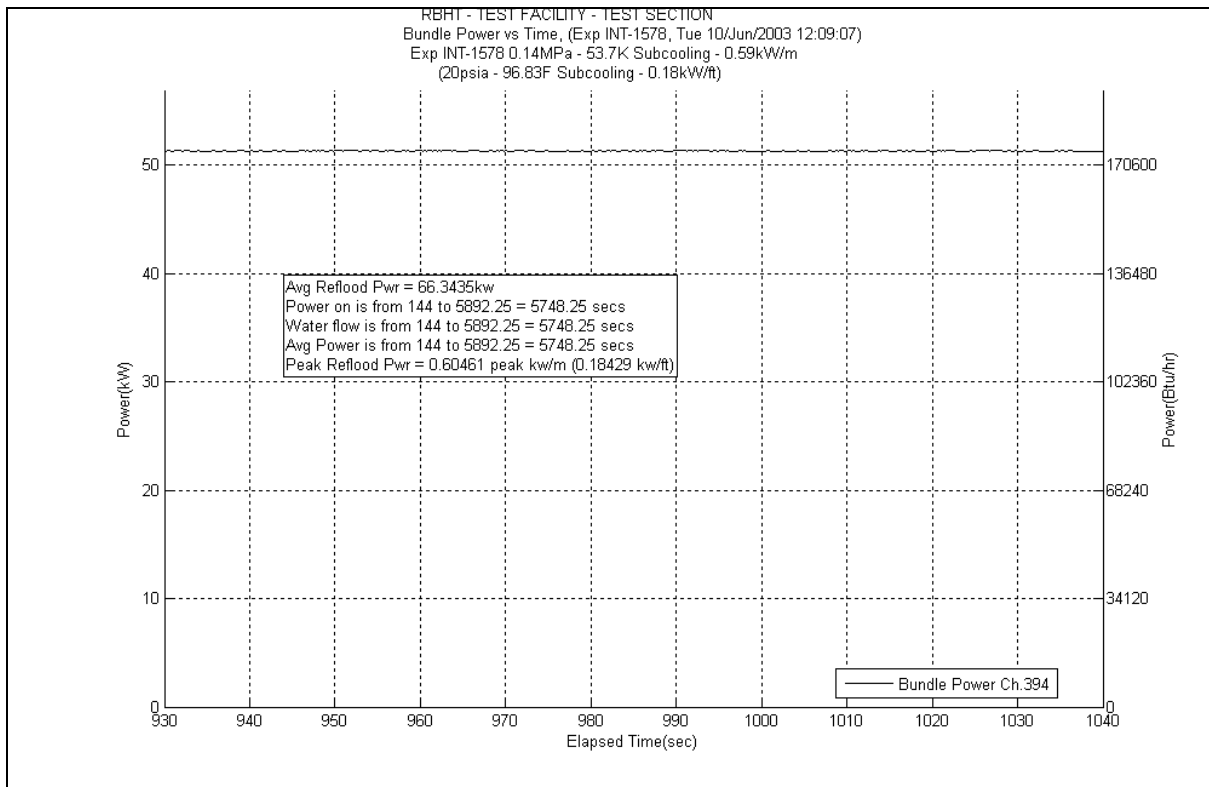


Figure A-114 Bundle Power Plot for Experiment 1578A

Table A-45 Data Results for RBHT Test 1578A for Time Period 930 to 1040 seconds

Results for RBHT Test 1578
Valid Time Period 930 to 1040 seconds
Collapsed Liquid Level = 103.244 inches = 2622.41 mm
(Z_{SSL}) Onset of Significant Void = 58.5 inches = 1486 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc (lb/ft ²)	ΔP_{acc (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.681	18.213	872.044	0.688	32.942	0.214	10.246	0.000	0.000	17.31	828.807	2897.31	138723.9474	0.697	0.694	0.700
*	120-133	3048-3378	383	0.676	21.843	1045.855	0.745	35.671	0.382	18.290	-0.584	-27.955	21.3	1019.849	2918.61	139743.7969	0.684	0.681	0.687
*	108-120	2743-3048	382	0.573	26.590	1273.129	0.594	28.441	0.476	22.791	4.300	205.878	21.22	1016.019	2939.83	140759.8159	0.659	0.656	0.662
	100-108	2540-2743	381	0.631	15.351	735.033	0.333	15.944	0.348	16.662	0.000	0.000	14.67	702.403	2954.5	141462.2193	0.647	0.644	0.650
	97-100	2464-2540	380	0.473	8.211	393.128	0.110	5.267	0.126	6.033	0.000	0.000	7.973	381.749	2962.473	141843.9686	0.488	0.486	0.490
	93-97	2362-2464	379	0.479	10.823	518.203	0.135	6.464	0.164	7.852	0.000	0.000	10.52	503.700	2972.993	142347.6689	0.493	0.491	0.495
*	85-93	2159-2362	378	0.368	26.278	1258.209	0.226	10.821	0.315	15.082	4.617	221.075	21.12	1011.231	2994.113	143358.8999	0.492	0.490	0.494
	81-85	2057-2159	377	0.478	10.838	518.949	0.090	4.309	0.151	7.230	0.000	0.000	10.6	507.531	3004.713	143866.4307	0.49	0.488	0.492
	78-81	1981-2057	376	0.335	10.366	496.321	0.057	2.729	0.110	5.267	0.000	0.000	10.19	487.900	3014.903	144354.3305	0.346	0.344	0.348
	75-78	1905-1981	375	0.288	11.088	530.885	0.047	2.250	0.108	5.171	0.000	0.000	10.93	523.331	3025.833	144877.6617	0.298	0.297	0.299
	72-75	1829-1905	374	0.214	12.246	586.336	0.036	1.724	0.105	5.027	0.000	0.000	12.1	579.351	3037.933	145457.0128	0.223	0.222	0.224
*	67-72	1702-1829	373	0.102	23.323	1116.723	0.032	1.532	0.161	7.709	0.580	27.782	22.55	1079.700	3060.483	146536.7126	0.132	0.131	0.133
	63-67	1600-1702	372	0.040	19.948	955.095	0.001	0.048	0.000	0.000	0.000	0.000	19.94	954.732	3080.423	147491.4449	0.04	0.038	0.042
	60-63	1524-1600	371	0.013	15.372	736.028	0.001	0.048	0.000	0.000	0.000	0.000	15.37	735.920	3095.793	148227.3645	0.013	0.012	0.014
	57-60	1448-1524	370	0.051	14.780	707.681	0.001	0.048	0.000	0.000	0.000	0.000	14.78	707.670	3110.573	148935.0347	0.051	0.048	0.054
	53-57	1346-1448	369	0.037	20.010	958.079	0.001	0.048	0.000	0.000	0.000	0.000	20	957.605	3130.573	149892.6398	0.037	0.035	0.039
*	46-53	1168-1346	368	0.035	35.086	1679.933	0.002	0.096	0.000	0.000	-0.156	-7.463	35.24	1687.300	3165.813	151579.9401	0.03	0.029	0.032
	43-46	1092-1168	367	0.024	15.206	728.071	0.001	0.048	0.000	0.000	0.000	0.000	15.2	727.780	3181.013	152307.72	0.024	0.023	0.025
	37-43	940-1092	366	0.027	30.324	1451.914	0.002	0.096	0.000	0.000	0.000	0.000	30.31	1451.251	3211.323	153758.9706	0.027	0.026	0.028
*	25-37	635-940	365	0.019	61.157	2928.196	0.004	0.192	0.000	0.000	0.273	13.055	60.88	2914.950	3272.203	156673.9206	0.023	0.022	0.024
	13-25	330-635	364	0.019	61.157	2928.196	0.004	0.192	0.000	0.000	0.000	0.000	61.13	2926.920	3333.333	159600.8407	0.019	0.018	0.020
*	0-13	0-330	363	0.009	66.926	3204.455	0.004	0.192	0.000	0.000	0.062	2.990	66.86	3201.274	3400.193	162802.1147	0.009	0.009	0.009

Table A-46 Energy Balance Results for RBHT Test 1578A for Time Period 930 to 1040 seconds

Results for RBHT Test 1578 Valid Time Period 930 to 1040 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2325.5858	7.336227	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
0.25	6.35	2454.785	7.743795	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
0.50	12.70	2583.9843	8.151363	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
0.75	19.05	2713.1835	8.558931	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
1.00	25.40	2842.3827	8.966499	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
1.25	31.75	2971.5819	9.374067	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
1.50	38.10	3100.7811	9.781635	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
1.75	44.45	3229.9803	10.1892	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
2.00	50.80	3359.1795	10.59677	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
2.25	57.15	3488.3788	11.00434	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
2.50	63.50	3617.578	11.41191	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
2.75	69.85	3746.7772	11.81948	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
3.00	76.20	3875.9764	12.22704	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
3.25	82.55	4005.1756	12.63461	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
3.50	88.90	4134.3748	13.04218	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
3.75	95.25	4263.574	13.44975	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
4.00	101.60	4392.7732	13.85732	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
4.25	107.95	4521.9725	14.26488	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
4.50	114.30	4651.1717	14.67245	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
4.75	120.65	4780.3709	15.08002	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
5.00	127.00	4909.5701	15.48759	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
5.25	133.35	5038.7693	15.89516	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
5.50	139.70	5167.9685	16.30273	0.00E+00	0.00E+00	0.00E+00	8.50E-02	3.86E-02
5.75	146.05	5297.1677	16.71029	3.61E-03	3.66E-01	1.66E-01	8.47E-02	3.84E-02
6.00	152.40	5426.3669	17.11786	1.01E-02	1.02E+00	4.63E-01	8.42E-02	3.82E-02
6.25	158.75	5555.5662	17.52543	1.67E-02	1.69E+00	7.68E-01	8.36E-02	3.79E-02
6.50	165.10	5684.7654	17.933	2.34E-02	2.38E+00	1.08E+00	8.30E-02	3.77E-02
6.75	171.45	5813.9646	18.34057	3.04E-02	3.08E+00	1.40E+00	8.25E-02	3.74E-02
7.00	177.80	5943.1638	18.74813	3.75E-02	3.80E+00	1.72E+00	8.19E-02	3.71E-02
7.25	184.15	6072.363	19.1557	4.47E-02	4.53E+00	2.06E+00	8.12E-02	3.68E-02
7.50	190.50	6201.5622	19.56327	5.21E-02	5.28E+00	2.40E+00	8.06E-02	3.66E-02
7.75	196.85	6330.7614	19.97084	5.96E-02	6.05E+00	2.74E+00	8.00E-02	3.63E-02
8.00	203.20	6459.9607	20.37841	6.73E-02	6.83E+00	3.10E+00	7.93E-02	3.60E-02
8.25	209.55	6589.1599	20.78598	7.52E-02	7.63E+00	3.46E+00	7.86E-02	3.57E-02
8.50	215.90	6718.3591	21.19354	8.32E-02	8.44E+00	3.83E+00	7.80E-02	3.54E-02
8.75	222.25	6847.5583	21.60111	9.14E-02	9.27E+00	4.20E+00	7.73E-02	3.50E-02
9.00	228.60	6976.7575	22.00868	9.97E-02	1.01E+01	4.59E+00	7.66E-02	3.47E-02
9.25	234.95	6589.1599	20.78598	1.08E-01	1.09E+01	4.96E+00	7.59E-02	3.44E-02
9.50	241.30	6201.5622	19.56327	1.16E-01	1.17E+01	5.31E+00	7.52E-02	3.41E-02
9.75	247.65	5813.9646	18.34057	1.23E-01	1.25E+01	5.65E+00	7.46E-02	3.38E-02
10.00	254.00	5426.3669	17.11786	1.30E-01	1.31E+01	5.96E+00	7.40E-02	3.36E-02
10.25	260.35	5038.7693	15.89516	1.36E-01	1.38E+01	6.25E+00	7.35E-02	3.33E-02
10.50	266.70	4651.1717	14.67245	1.42E-01	1.44E+01	6.52E+00	7.30E-02	3.31E-02
10.75	273.05	4263.574	13.44975	1.47E-01	1.49E+01	6.76E+00	7.25E-02	3.29E-02
11.00	279.40	3875.9764	12.22704	1.52E-01	1.54E+01	6.99E+00	7.21E-02	3.27E-02
11.25	285.75	3488.3788	11.00434	1.56E-01	1.59E+01	7.20E+00	7.17E-02	3.25E-02
11.50	292.10	3100.7811	9.781635	1.60E-01	1.63E+01	7.38E+00	7.14E-02	3.24E-02
11.75	298.45	2713.1835	8.558931	1.64E-01	1.66E+01	7.54E+00	7.11E-02	3.23E-02
12.00	304.80	2325.5858	7.336227	1.67E-01	1.69E+01	7.68E+00	7.08E-02	3.21E-02

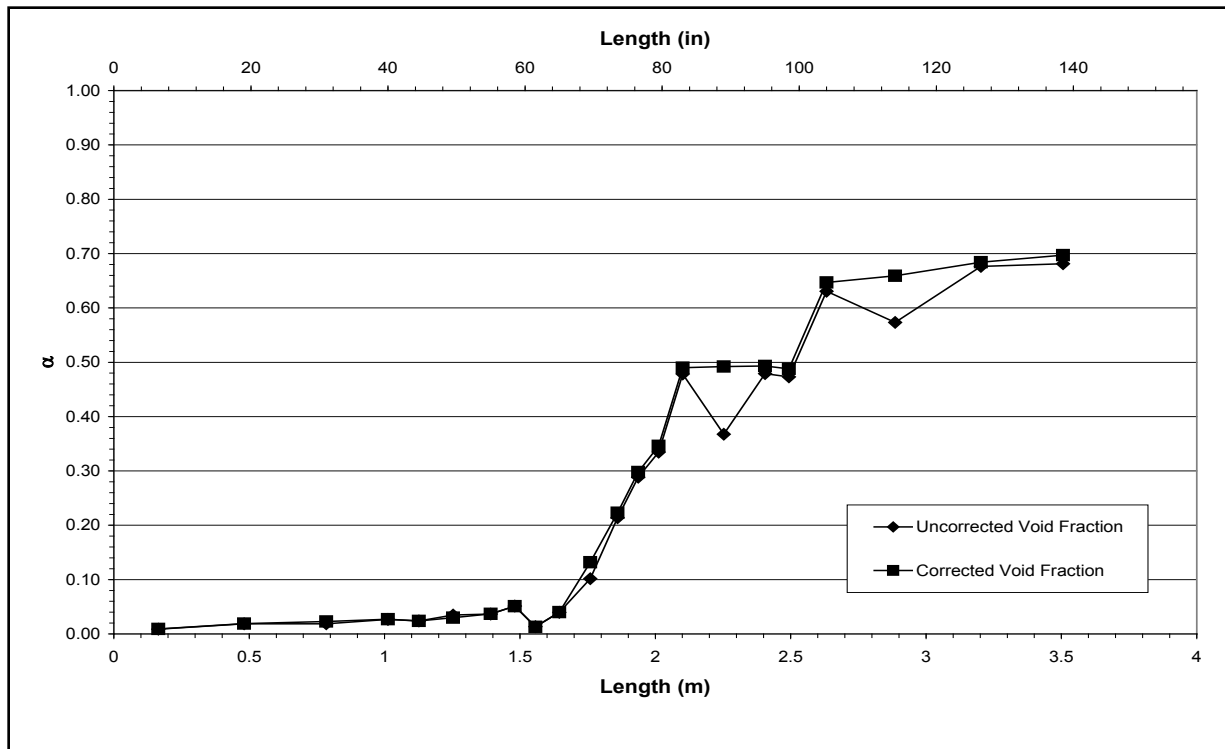


Figure A-115 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1578A for Time Period 930 to 1040 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1578-B

Test Conditions

Date: 6/10/2003

Steady-state time window: 662 – 896 seconds

Inlet flow rate: 2.134 cm/sec (0.840 in./sec)

Inlet mass flow rate: 0.102 kg/sec (0.225 lbm/sec)

Inlet flow temperature: 328.5 K (131.7 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 69.53 kW

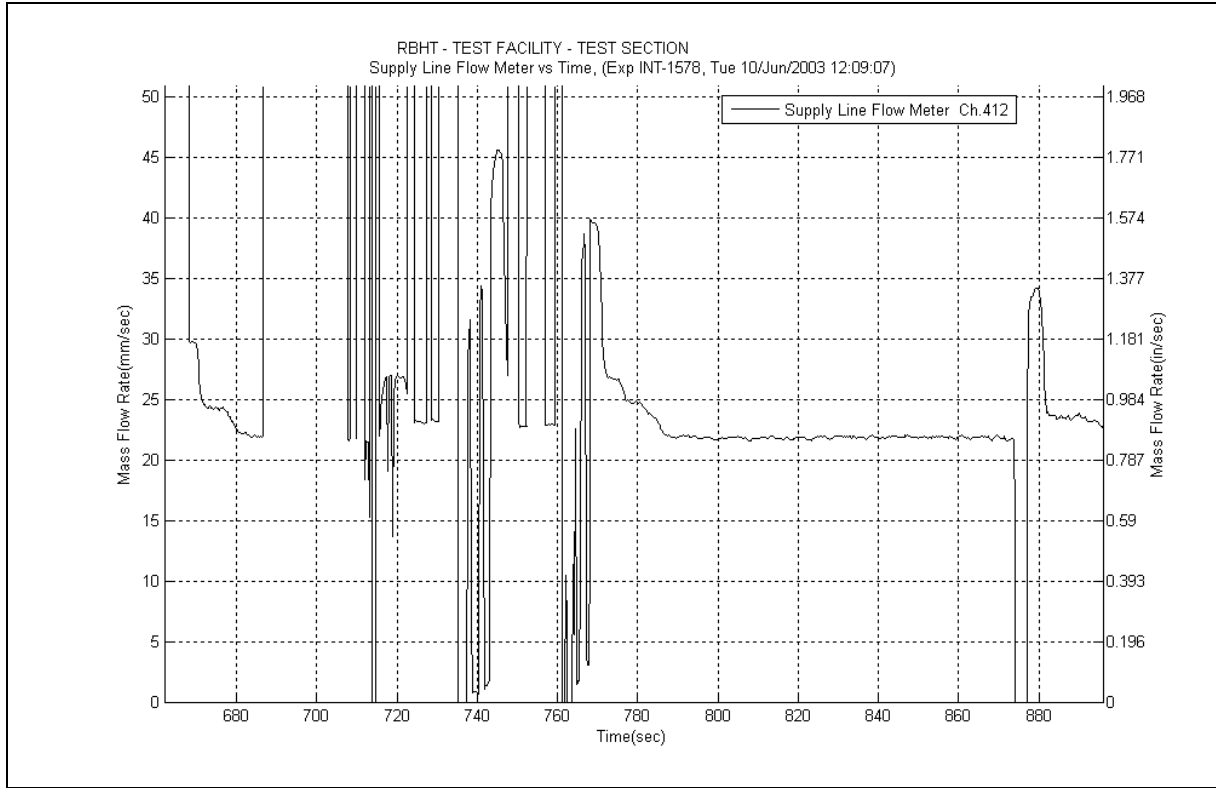


Figure A-116: Inlet Flow Plot for Experiment 1578B

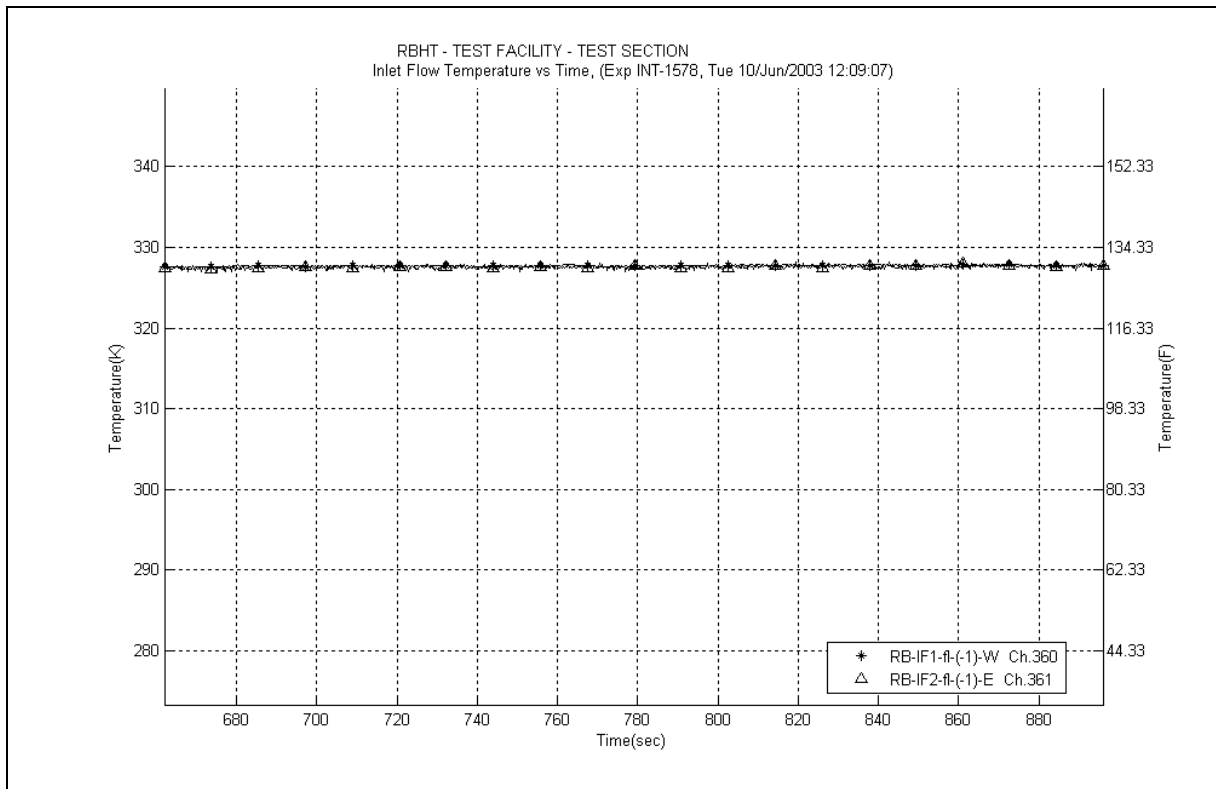


Figure A-117 Inlet Temperature Plot for Experiment 1578B

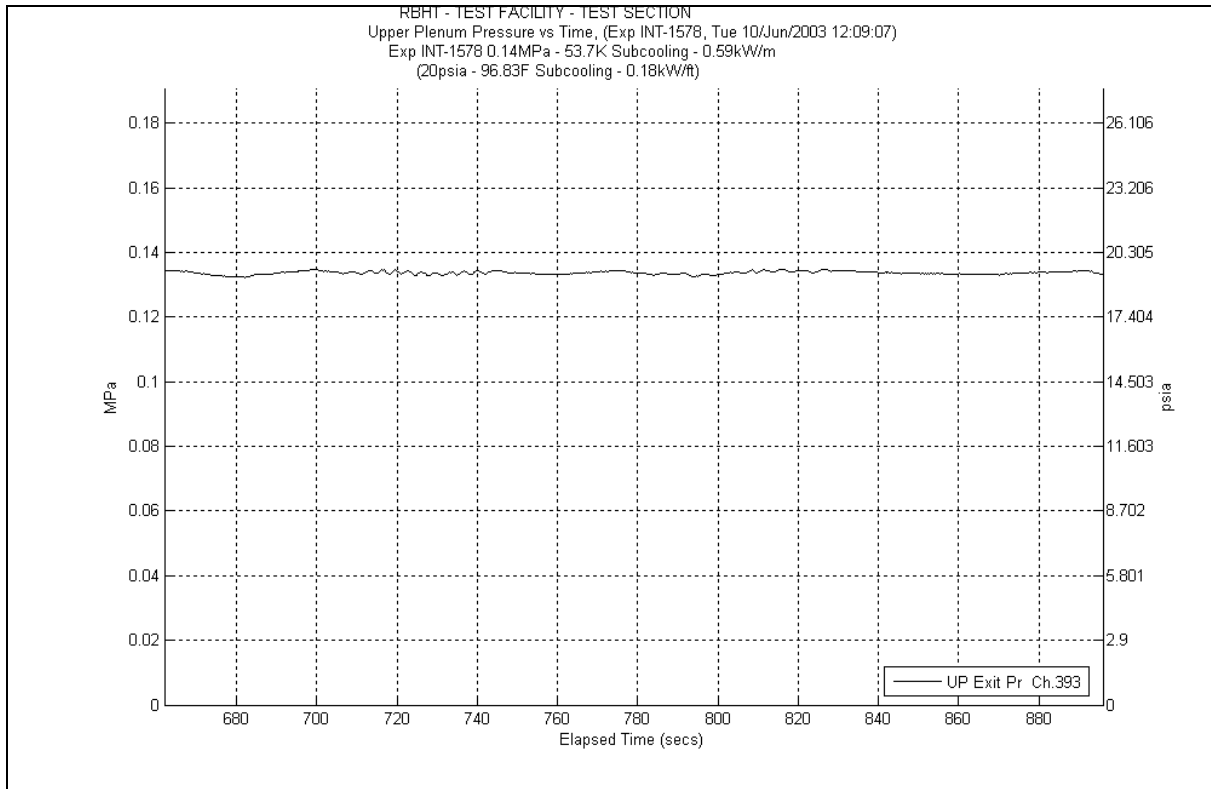


Figure A-118 System Pressure Plot for Experiment 1578B

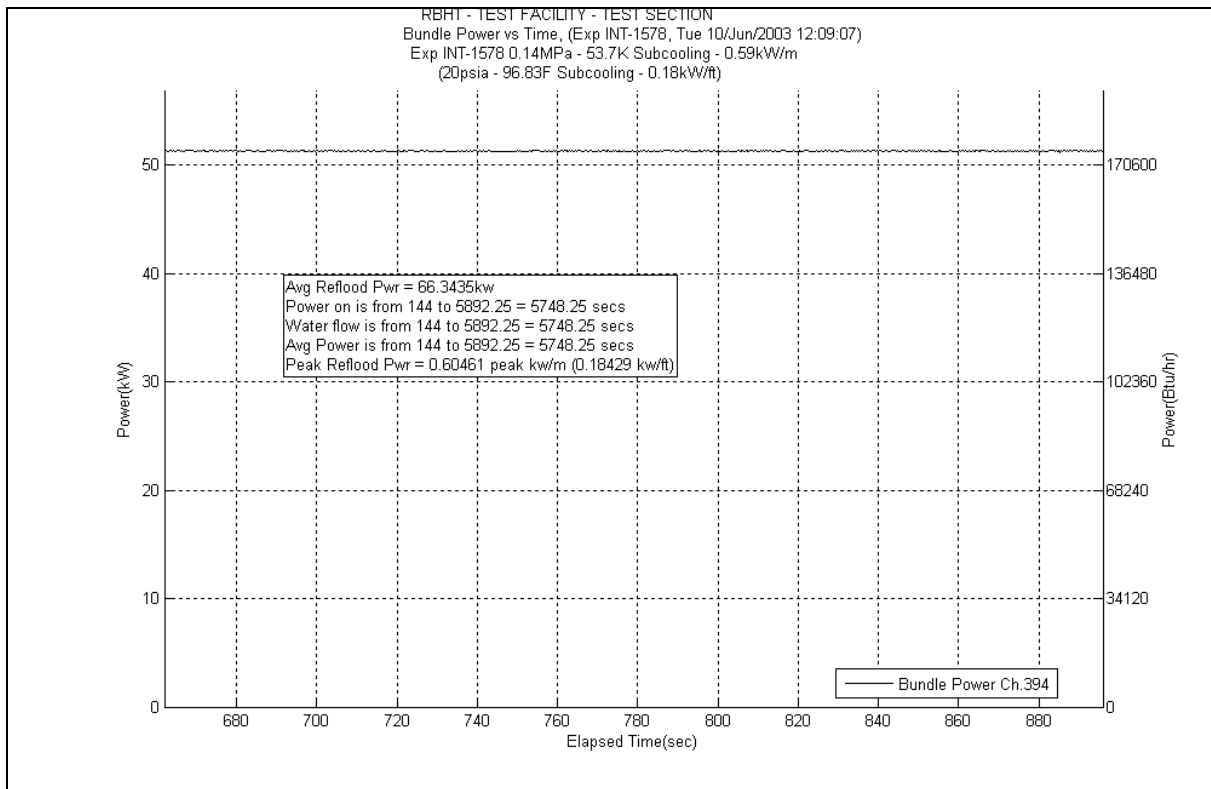


Figure A-119 Bundle Power Plot for Experiment 1578B

Table A-47 Data Results for RBHT Test 1578B for Time Period 662 to 896 seconds

Results for RBHT Test 1578
Valid Time Period 662 to 896 seconds
Collapsed Liquid Level = 102.921 inches = 2614.20 mm
(Z_{OSV}) Onset of Significant Void = 58.5 inches = 1486 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{inc} (lbf/ft ²)	ΔP_{inc} (Pa)	ΔP_{acccl} (lbf/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grnd} (lbf/ft ²)	ΔP_{grnd} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.663	19.262	922.272	0.610	29.207	0.181	8.666	0.000	0.000	18.47	884.348	2898.47	138779.4885	0.677	0.674	0.680
*	120-133	3048-3378	383	0.667	22.461	1075.446	0.664	31.792	0.324	15.513	-0.947	-45.335	22.42	1073.475	2920.89	139852.9639	0.668	0.665	0.671
*	108-120	2743-3048	382	0.568	26.896	1287.800	0.536	25.664	0.404	19.344	4.166	199.481	21.79	1043.311	2942.68	140896.2747	0.65	0.647	0.653
	100-108	2540-2743	381	0.627	15.497	741.995	0.306	14.651	0.296	14.173	0.000	0.000	14.89	712.937	2957.57	141609.2117	0.641	0.638	0.644
	97-100	2464-2540	380	0.468	8.283	396.609	0.103	4.932	0.107	5.123	0.000	0.000	8.073	386.537	2965.643	141995.749	0.482	0.480	0.484
	93-97	2362-2464	379	0.479	10.828	518.452	0.128	6.129	0.139	6.655	0.000	0.000	10.56	505.616	2976.203	142501.3645	0.492	0.490	0.494
*	85-93	2159-2362	378	0.366	26.356	1261.939	0.222	10.629	0.268	12.832	4.616	221.022	21.25	1017.455	2997.453	143518.82	0.488	0.486	0.490
	81-85	2057-2159	377	0.474	10.922	522.928	0.094	4.501	0.128	6.129	0.000	0.000	10.7	512.319	3008.153	144031.1387	0.485	0.483	0.487
	78-81	1981-2057	376	0.335	10.366	496.321	0.063	3.016	0.094	4.501	0.000	0.000	10.21	488.857	3018.363	144519.9962	0.345	0.343	0.347
	75-78	1905-1981	375	0.283	11.166	534.615	0.056	2.681	0.092	4.405	0.000	0.000	11.02	527.640	3029.383	145047.6366	0.293	0.292	0.294
	72-75	1829-1905	374	0.207	12.350	591.309	0.049	2.346	0.089	4.261	0.000	0.000	12.21	584.618	3041.593	145632.2545	0.216	0.215	0.217
*	67-72	1702-1829	373	0.092	23.578	1128.907	0.064	3.064	0.144	6.895	0.820	39.248	22.55	1079.700	3064.143	146711.9543	0.131	0.130	0.132
	63-67	1600-1702	372	0.039	19.963	955.841	0.034	1.628	0.111	5.315	0.000	0.000	19.81	948.508	3083.953	147660.4622	0.046	0.044	0.048
	60-63	1524-1600	371	0.013	15.372	736.028	0.012	0.575	0.081	3.878	0.000	0.000	15.27	731.132	3099.223	148391.5937	0.019	0.018	0.020
	57-60	1448-1524	370	0.051	14.780	707.681	0.002	0.096	0.005	0.239	0.000	0.000	14.77	707.191	3113.993	149098.7851	0.052	0.049	0.055
	53-57	1346-1448	369	0.037	20.010	958.079	0.001	0.048	0.000	0.000	0.000	0.000	20	957.605	3133.993	150056.3903	0.037	0.035	0.039
*	46-53	1168-1346	368	0.035	35.086	1679.933	0.002	0.096	0.000	0.000	-0.146	-6.984	35.23	1686.821	3169.223	151743.2117	0.031	0.029	0.033
	43-46	1092-1168	367	0.024	15.201	727.822	0.001	0.048	0.000	0.000	0.000	0.000	15.2	727.780	3184.423	152470.9916	0.024	0.023	0.025
	37-43	940-1092	366	0.027	30.319	1451.665	0.001	0.048	0.000	0.000	0.000	0.000	30.31	1451.251	3214.733	153922.2422	0.027	0.026	0.028
*	25-37	635-940	365	0.020	61.094	2925.212	0.003	0.144	0.000	0.000	0.231	11.076	60.86	2913.992	3275.593	156836.2347	0.023	0.022	0.024
	13-25	330-635	364	0.019	61.125	2926.704	0.003	0.144	0.000	0.000	0.000	0.000	61.11	2925.963	3336.703	159762.1972	0.019	0.018	0.020
*	0-13	0-330	363	0.009	66.911	3203.709	0.003	0.144	0.000	0.000	0.068	3.249	66.84	3200.316	3403.543	162962.5136	0.01	0.010	0.011

Table A-48 Energy Balance Results for RBHT Test 1578B for Time Period 662 to 896 seconds

Results for RBHT Test 1578 Valid Time Period 662 to 896 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2325.8095	7.336932	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
0.25	6.35	2455.0212	7.744539	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
0.50	12.70	2584.2328	8.152147	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
0.75	19.05	2713.4444	8.559754	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
1.00	25.40	2842.6561	8.967361	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
1.25	31.75	2971.8677	9.374969	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
1.50	38.10	3101.0794	9.782576	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
1.75	44.45	3230.291	10.19018	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
2.00	50.80	3359.5026	10.59779	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
2.25	57.15	3488.7143	11.0054	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
2.50	63.50	3617.9259	11.41301	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
2.75	69.85	3747.1375	11.82061	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
3.00	76.20	3876.3492	12.22822	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
3.25	82.55	4005.5608	12.63583	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
3.50	88.90	4134.7725	13.04343	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
3.75	95.25	4263.9841	13.45104	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
4.00	101.60	4393.1957	13.85865	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
4.25	107.95	4522.4074	14.26626	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
4.50	114.30	4651.619	14.67386	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
4.75	120.65	4780.8307	15.08147	0.00E+00	0.00E+00	0.00E+00	7.22E-02	3.27E-02
5.00	127.00	4910.0423	15.48908	4.38E-04	3.77E-02	1.71E-02	7.21E-02	3.27E-02
5.25	133.35	5039.2539	15.89669	7.50E-03	6.45E-01	2.93E-01	7.16E-02	3.25E-02
5.50	139.70	5168.4656	16.30429	1.47E-02	1.27E+00	5.76E-01	7.11E-02	3.22E-02
5.75	146.05	5297.6772	16.7119	2.22E-02	1.91E+00	8.66E-01	7.06E-02	3.20E-02
6.00	152.40	5426.8889	17.11951	2.98E-02	2.56E+00	1.16E+00	7.00E-02	3.18E-02
6.25	158.75	5556.1005	17.52712	3.76E-02	3.23E+00	1.47E+00	6.94E-02	3.15E-02
6.50	165.10	5685.3121	17.93472	4.55E-02	3.92E+00	1.78E+00	6.89E-02	3.12E-02
6.75	171.45	5814.5238	18.34233	5.37E-02	4.62E+00	2.10E+00	6.83E-02	3.10E-02
7.00	177.80	5943.7354	18.74994	6.21E-02	5.34E+00	2.42E+00	6.77E-02	3.07E-02
7.25	184.15	6072.9471	19.15754	7.06E-02	6.08E+00	2.76E+00	6.71E-02	3.04E-02
7.50	190.50	6202.1587	19.56515	7.93E-02	6.83E+00	3.10E+00	6.64E-02	3.01E-02
7.75	196.85	6331.3703	19.97276	8.82E-02	7.59E+00	3.44E+00	6.58E-02	2.98E-02
8.00	203.20	6460.582	20.38037	9.73E-02	8.37E+00	3.80E+00	6.51E-02	2.95E-02
8.25	209.55	6589.7936	20.78797	1.07E-01	9.17E+00	4.16E+00	6.45E-02	2.92E-02
8.50	215.90	6719.0053	21.19558	1.16E-01	9.99E+00	4.53E+00	6.38E-02	2.89E-02
8.75	222.25	6848.2169	21.60319	1.26E-01	1.08E+01	4.90E+00	6.31E-02	2.86E-02
9.00	228.60	6977.4285	22.0108	1.35E-01	1.17E+01	5.29E+00	6.24E-02	2.83E-02
9.25	234.95	6589.7936	20.78797	1.45E-01	1.25E+01	5.66E+00	6.17E-02	2.80E-02
9.50	241.30	6202.1587	19.56515	1.54E-01	1.33E+01	6.02E+00	6.10E-02	2.77E-02
9.75	247.65	5814.5238	18.34233	1.63E-01	1.40E+01	6.35E+00	6.04E-02	2.74E-02
10.00	254.00	5426.8889	17.11951	1.71E-01	1.47E+01	6.66E+00	5.98E-02	2.71E-02
10.25	260.35	5039.2539	15.89669	1.78E-01	1.53E+01	6.95E+00	5.93E-02	2.69E-02
10.50	266.70	4651.619	14.67386	1.85E-01	1.59E+01	7.22E+00	5.88E-02	2.67E-02
10.75	273.05	4263.9841	13.45104	1.91E-01	1.65E+01	7.47E+00	5.84E-02	2.65E-02
11.00	279.40	3876.3492	12.22822	1.97E-01	1.70E+01	7.69E+00	5.79E-02	2.63E-02
11.25	285.75	3488.7143	11.0054	2.02E-01	1.74E+01	7.90E+00	5.76E-02	2.61E-02
11.50	292.10	3101.0794	9.782576	2.07E-01	1.78E+01	8.08E+00	5.72E-02	2.60E-02
11.75	298.45	2713.4444	8.559754	2.11E-01	1.82E+01	8.24E+00	5.69E-02	2.58E-02
12.00	304.80	2325.8095	7.336932	2.15E-01	1.85E+01	8.38E+00	5.67E-02	2.57E-02

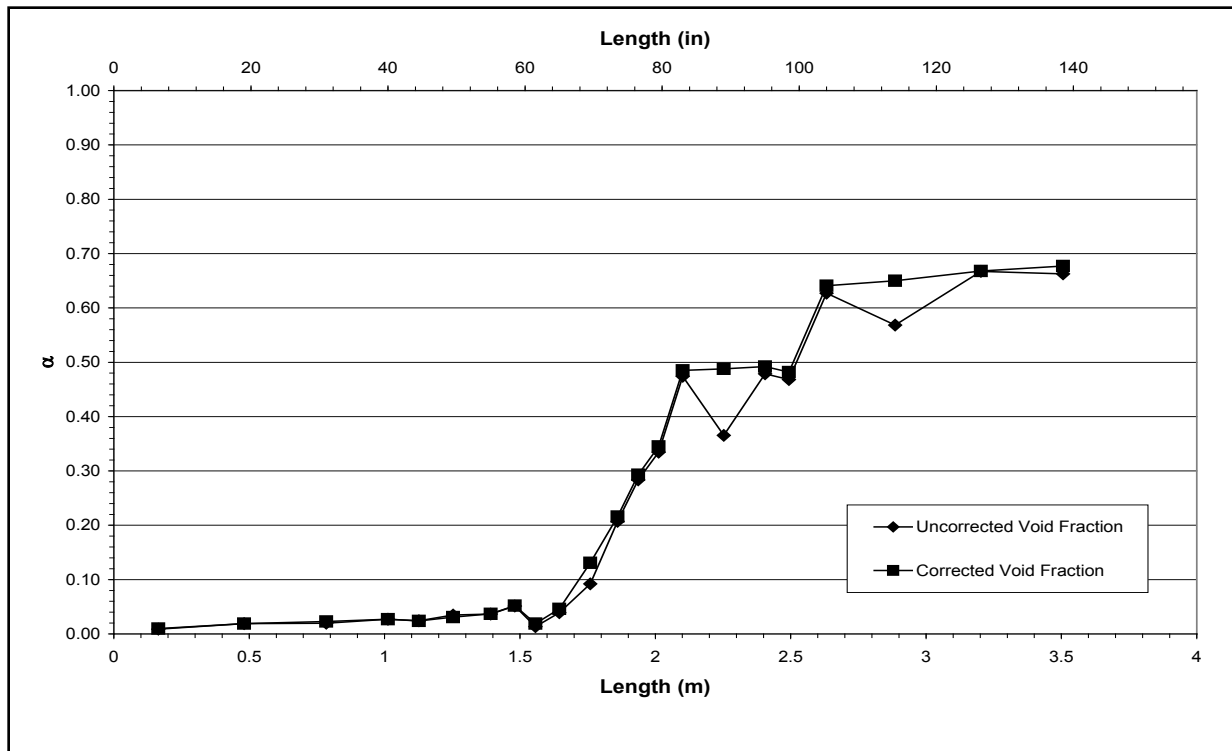


Figure A-120 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1578B for Time Period 662 to 896 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1578-C

Test Conditions

Date: 6/10/2003

Steady-state time window: 1106 – 1178 seconds

Inlet flow rate: 3.056 cm/sec (1.203 in./sec)

Inlet mass flow rate: 0.146 kg/sec (0.322 lbm/sec)

Inlet flow temperature: 328.5 K (131.7 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 69.53 kW

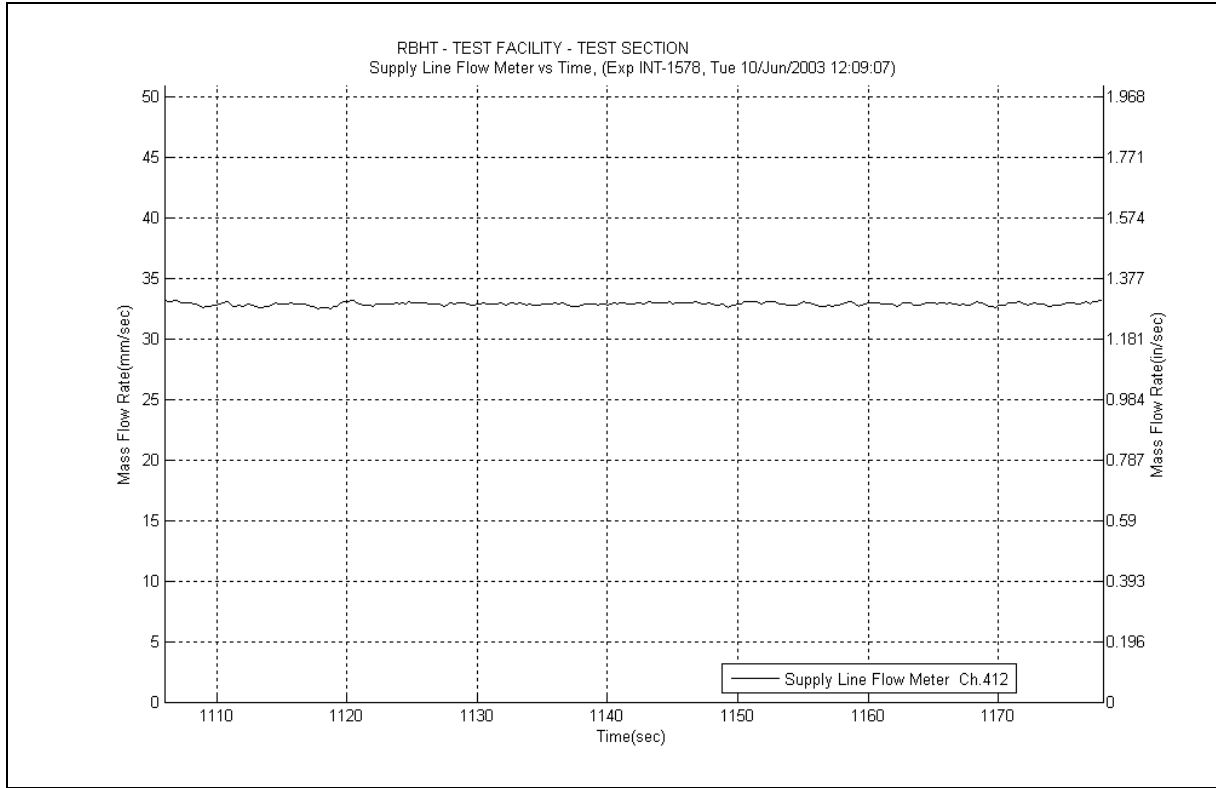


Figure A-121 Inlet Flow Plot for Experiment 1578C

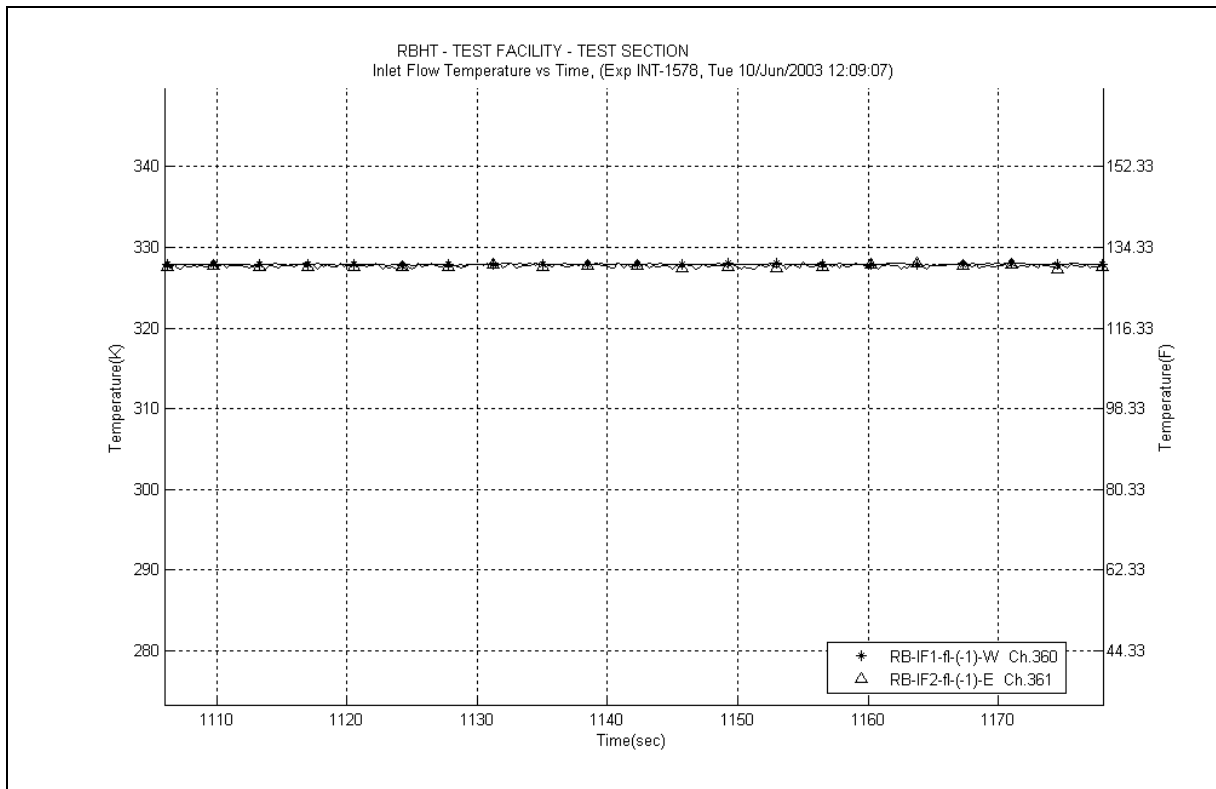


Figure A-122 Inlet Temperature Plot for Experiment 1578C

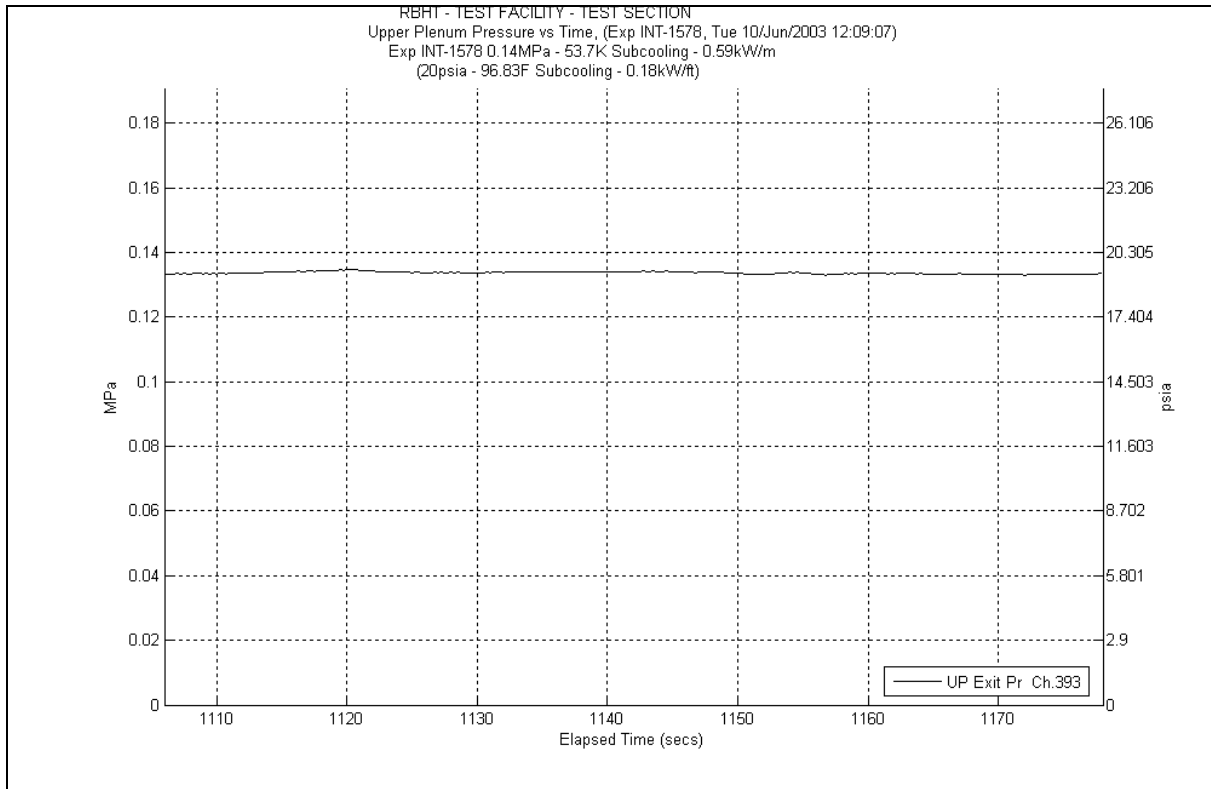


Figure A-123 System Pressure Plot for Experiment 1578C

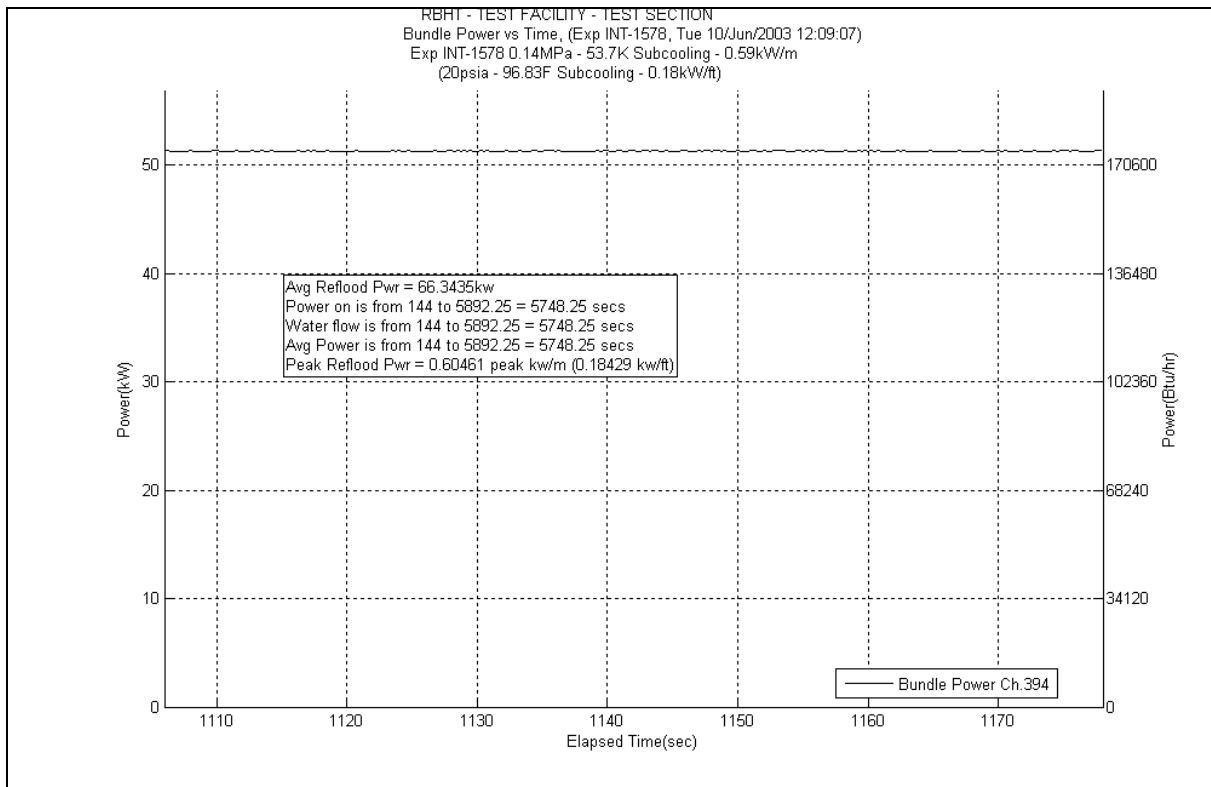


Figure A-124 Bundle Power Plot for Experiment 1578C

Table A-49 Data Results for RBHT Test 1578C for Time Period 1106 to 1178 seconds

Results for RBHT Test 1578
Valid Time Period 1106 to 1178 seconds
Collapsed Liquid Level = 110.594 inches = 2809.09 mm
(Z_{OSV}) Onset of Significant Void = 69.5 inches = 1765.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.634	20.914	1001.346	0.776	37.155	12.449	0.260	0.000	0.000	19.87	951.381	2899.87	138846.5209	0.652	0.649	0.655
*	120-133	3048-3378	383	0.644	24.056	1151.784	0.830	39.741	22.169	0.463	-1.707	-81.755	24.47	1171.630	2924.34	140018.1508	0.638	0.635	0.641
*	108-120	2743-3048	382	0.531	29.254	1400.690	0.645	30.883	27.675	0.578	174.333	24.39	1167.799	2948.73	141185.9502	0.609	0.606	0.612	
	100-108	2540-2743	381	0.576	17.637	844.442	0.346	16.567	20.253	0.423	0.000	0.000	16.86	807.261	2965.59	141993.2114	0.594	0.591	0.597
	97-100	2464-2540	380	0.428	8.907	426.448	0.110	5.267	7.326	0.153	0.000	0.000	8.641	413.733	2974.231	142406.9447	0.445	0.443	0.447
	93-97	2362-2464	379	0.423	11.991	574.151	0.129	6.177	9.576	0.200	0.000	0.000	11.66	558.284	2985.891	142965.2285	0.439	0.437	0.441
*	85-93	2159-2362	378	0.308	28.745	1376.322	0.195	9.337	18.338	0.383	2.297	109.985	25.87	1238.662	3011.761	144203.8907	0.377	0.375	0.379
	81-85	2057-2159	377	0.304	14.458	692.264	0.060	2.873	8.762	0.183	0.000	0.000	14.21	680.378	3025.971	144884.2692	0.316	0.314	0.318
	78-81	1981-2057	376	0.168	12.963	620.650	0.024	1.149	6.416	0.134	0.000	0.000	12.8	612.867	3038.771	145497.1364	0.178	0.177	0.179
	75-78	1905-1981	375	0.131	13.544	648.500	0.008	0.383	1.436	0.030	0.000	0.000	13.5	646.383	3052.271	146143.5199	0.133	0.132	0.134
	72-75	1829-1905	374	0.087	14.225	681.074	0.001	0.048	0.000	0.000	0.000	0.000	14.22	680.857	3066.491	146824.3772	0.087	0.083	0.091
*	67-72	1702-1829	373	0.036	25.042	1199.029	0.002	0.096	0.000	0.000	0.630	30.176	24.41	1168.757	3090.901	147993.1342	0.059	0.056	0.062
	63-67	1600-1702	372	0.032	20.109	962.804	0.002	0.096	0.000	0.000	0.000	0.000	20.1	962.393	3111.001	148955.5274	0.032	0.030	0.034
	60-63	1524-1600	371	0.009	15.440	739.260	0.001	0.048	0.000	0.000	0.000	0.000	15.43	738.792	3126.431	149694.3198	0.009	0.009	0.009
	57-60	1448-1524	370	0.047	14.853	711.162	0.001	0.048	0.000	0.000	0.000	0.000	14.85	711.022	3141.281	150405.3416	0.047	0.045	0.049
	53-57	1346-1448	369	0.033	20.093	962.058	0.002	0.096	0.000	0.000	0.000	0.000	20.09	961.914	3161.371	151367.256	0.033	0.031	0.035
*	46-53	1168-1346	368	0.031	35.211	1685.901	0.003	0.144	0.000	0.000	-0.172	-8.246	35.38	1694.003	3196.751	153061.2594	0.026	0.025	0.027
	43-46	1092-1168	367	0.020	15.268	731.054	0.001	0.048	0.000	0.000	0.000	0.000	15.26	730.653	3212.011	153791.9122	0.02	0.019	0.021
	37-43	940-1092	366	0.024	30.407	1455.892	0.003	0.144	0.000	0.000	0.000	0.000	30.4	1455.560	3242.411	155247.472	0.024	0.023	0.025
*	25-37	635-940	365	0.016	61.302	2935.159	0.006	0.287	0.000	0.000	0.296	14.176	61	2920.696	3303.411	158168.1677	0.021	0.020	0.022
	13-25	330-635	364	0.018	61.229	2931.678	0.006	0.287	0.000	0.000	0.000	0.000	61.21	2930.751	3364.621	161098.9182	0.018	0.017	0.019
*	0-13	0-330	363	0.008	66.978	3206.942	0.006	0.287	0.000	0.000	0.072	3.465	66.9	3203.189	3431.521	164302.1074	0.009	0.009	0.009

Table A-50 Energy Balance Results for RBHT Test 1578C for Time Period 1106 to 1178 seconds

Results for RBHT Test 1578 Valid Time Period 1106 to 1178 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2325.2847	7.335277	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
0.25	6.35	2454.4672	7.742792	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
0.50	12.70	2583.6497	8.150307	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
0.75	19.05	2712.8322	8.557823	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
1.00	25.40	2842.0147	8.965338	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
1.25	31.75	2971.1971	9.372853	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
1.50	38.10	3100.3796	9.780369	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
1.75	44.45	3229.5621	10.18788	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
2.00	50.80	3358.7446	10.5954	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
2.25	57.15	3487.9271	11.00291	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
2.50	63.50	3617.1096	11.41043	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
2.75	69.85	3746.292	11.81795	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
3.00	76.20	3875.4745	12.22546	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
3.25	82.55	4004.657	12.63298	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
3.50	88.90	4133.8395	13.04049	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
3.75	95.25	4263.022	13.44801	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
4.00	101.60	4392.2045	13.85552	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
4.25	107.95	4521.3869	14.26304	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
4.50	114.30	4650.5694	14.67055	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
4.75	120.65	4779.7519	15.07807	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
5.00	127.00	4908.9344	15.48558	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
5.25	133.35	5038.1169	15.8931	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
5.50	139.70	5167.2994	16.30061	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
5.75	146.05	5296.4819	16.70813	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
6.00	152.40	5425.6643	17.11565	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
6.25	158.75	5554.8468	17.52316	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.68E-02
6.50	165.10	5684.0293	17.93068	1.26E-03	1.55E-01	7.04E-02	1.03E-01	4.68E-02
6.75	171.45	5813.2118	18.33819	6.96E-03	8.58E-01	3.89E-01	1.03E-01	4.65E-02
7.00	177.80	5942.3943	18.74571	1.28E-02	1.58E+00	7.15E-01	1.02E-01	4.62E-02
7.25	184.15	6071.5768	19.15322	1.87E-02	2.31E+00	1.05E+00	1.01E-01	4.60E-02
7.50	190.50	6200.7592	19.56074	2.48E-02	3.06E+00	1.39E+00	1.01E-01	4.57E-02
7.75	196.85	6329.9417	19.96825	3.10E-02	3.83E+00	1.74E+00	1.00E-01	4.54E-02
8.00	203.20	6459.1242	20.37577	3.74E-02	4.61E+00	2.09E+00	9.94E-02	4.51E-02
8.25	209.55	6588.3067	20.78328	4.38E-02	5.40E+00	2.45E+00	9.88E-02	4.48E-02
8.50	215.90	6717.4892	21.1908	5.04E-02	6.22E+00	2.82E+00	9.81E-02	4.45E-02
8.75	222.25	6846.6717	21.59831	5.72E-02	7.04E+00	3.20E+00	9.74E-02	4.42E-02
9.00	228.60	6975.8542	22.00583	6.40E-02	7.89E+00	3.58E+00	9.67E-02	4.39E-02
9.25	234.95	7105.0367	22.41335	7.07E-02	8.72E+00	3.95E+00	9.60E-02	4.35E-02
9.50	241.30	7234.2192	22.82087	7.71E-02	9.50E+00	4.31E+00	9.53E-02	4.32E-02
9.75	247.65	7363.4017	23.22839	8.30E-02	1.02E+01	4.64E+00	9.47E-02	4.30E-02
10.00	254.00	7492.5842	23.63591	8.86E-02	1.09E+01	4.95E+00	9.41E-02	4.27E-02
10.25	260.35	7621.7667	24.04343	9.38E-02	1.16E+01	5.24E+00	9.36E-02	4.25E-02
10.50	266.70	7750.9492	24.45095	9.86E-02	1.21E+01	5.51E+00	9.31E-02	4.22E-02
10.75	273.05	7880.1317	24.85847	1.03E-01	1.27E+01	5.76E+00	9.26E-02	4.20E-02
11.00	279.40	8009.3142	25.26599	1.07E-01	1.32E+01	5.98E+00	9.22E-02	4.18E-02
11.25	285.75	8138.4967	25.67351	1.11E-01	1.36E+01	6.19E+00	9.19E-02	4.17E-02
11.50	292.10	8267.6792	26.08103	1.14E-01	1.40E+01	6.37E+00	9.15E-02	4.15E-02
11.75	298.45	8396.8617	26.48855	1.17E-01	1.44E+01	6.53E+00	9.12E-02	4.14E-02
12.00	304.80	8526.0442	26.89607	1.19E-01	1.47E+01	6.67E+00	9.10E-02	4.13E-02

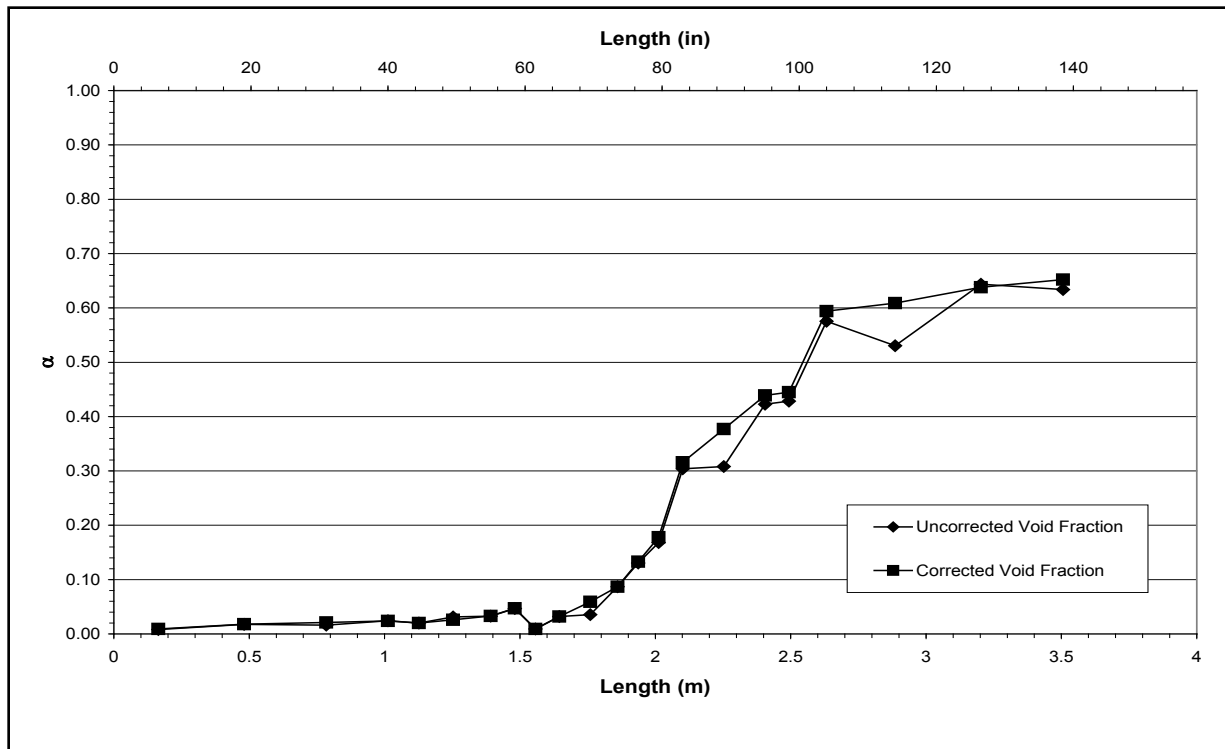


Figure A-125 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1578C for Time Period 1106 to 1178 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1578-D

Test Conditions

Date: 6/10/2003

Steady-state time window: 1350 – 1470 seconds

Inlet flow rate: 1.521 cm/sec (0.599 in./sec)

Inlet mass flow rate: 0.073 kg/sec (0.160 lbm/sec)

Inlet flow temperature: 328.5 K (131.7 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 69.53 kW

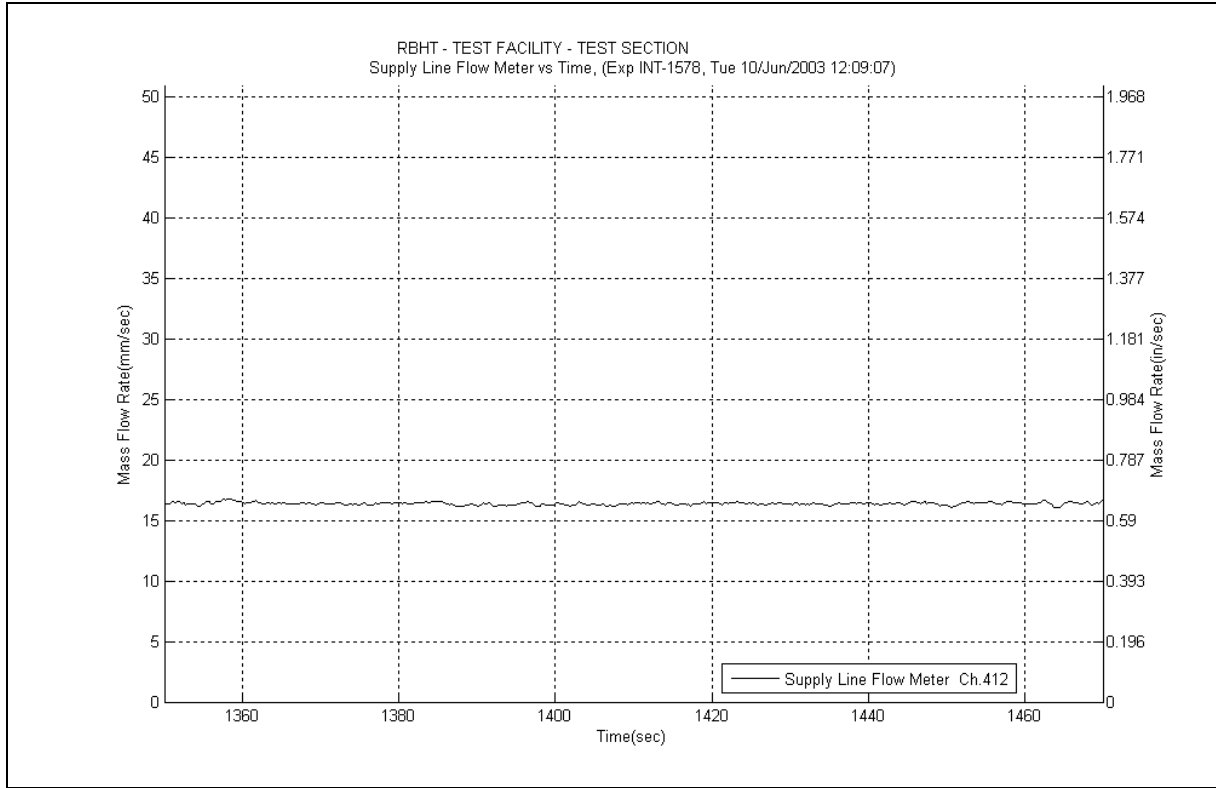


Figure A-126 Inlet Flow Plot for Experiment 1578D

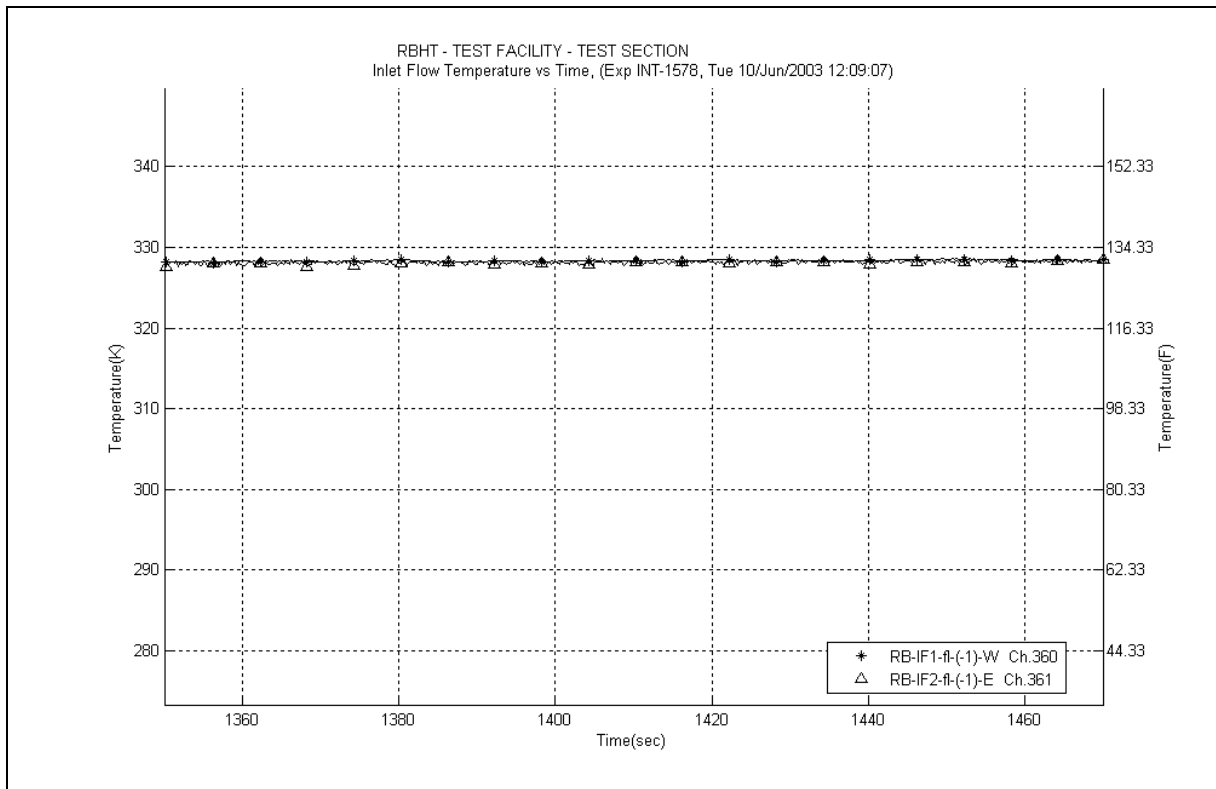


Figure A-127 Inlet Temperature Plot for Experiment 1578D

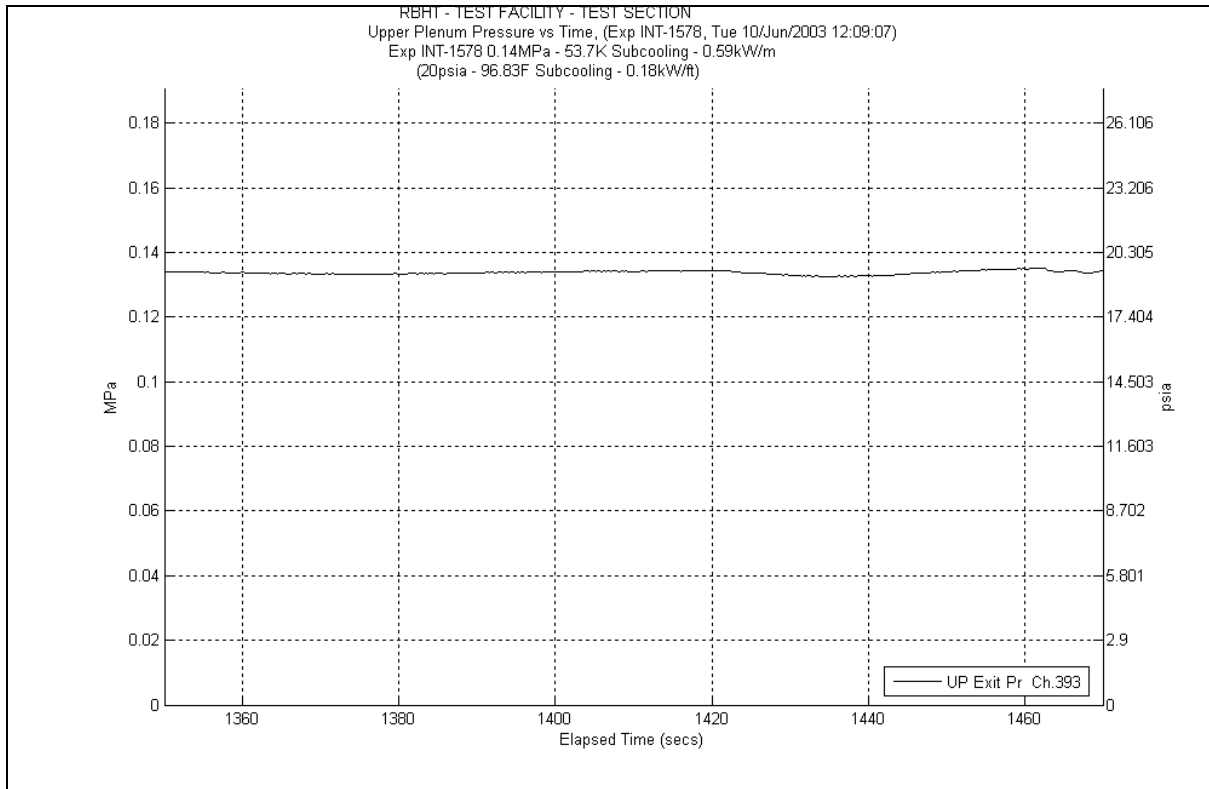


Figure A-128 System Pressure Plot for Experiment 1578D

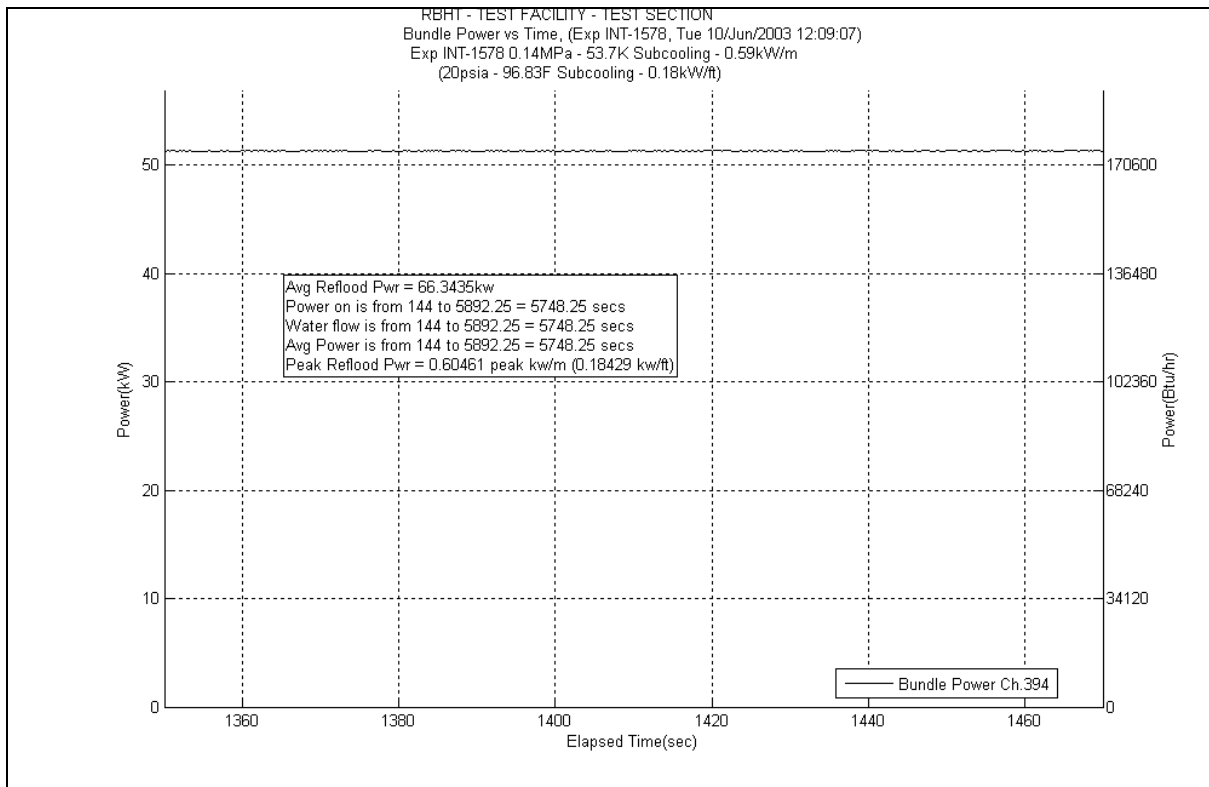


Figure A-129 Bundle Power Plot for Experiment 1578D

Table A-51 Data Results for RBHT Test 1578D for Time Period 1350 to 1470 seconds

Results for RBHT Test 1578
Valid Time Period 1350 to 1470 seconds
Collapsed Liquid Level = 91.785 inches = 2331.35 mm
(Z_{osv}) Onset of Significant Void = 53.5 inches = 1257 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{\text{uncorrected}}$	$\Delta P_{\text{uncorrected}}$ (lb/ft ²)	$\Delta P_{\text{uncorrected}}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{\text{corrected}}$ (lb/ft ²)	$\Delta P_{\text{corrected}}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{\text{corrected}}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.728	15.549	744.482	0.466	22.312	0.129	6.177	0.000	0.000	14.95	715.810	2894.95	138610.95	0.738	0.734	0.742
*	120-133	3048-3378	383	0.713	19.407	929.235	0.511	24.467	0.231	11.060	0.265	12.711	18.4	880.997	2913.35	139491.9467	0.727	0.723	0.731
*	108-120	2743-3048	382	0.614	24.035	1150.789	0.417	19.966	0.288	13.790	4.980	238.431	18.35	878.603	2931.7	140370.5494	0.705	0.701	0.709
	100-108	2540-2743	381	0.684	13.144	629.353	0.243	11.635	0.211	10.103	0.000	0.000	12.69	607.600	2944.39	140978.1499	0.695	0.692	0.698
	97-100	2464-2540	380	0.546	7.068	338.424	0.083	3.974	0.076	3.639	0.000	0.000	6.906	330.661	2951.296	141308.811	0.557	0.554	0.560
	93-97	2362-2464	379	0.547	9.416	450.817	0.105	5.027	0.099	4.740	0.000	0.000	9.208	440.881	2960.504	141749.6924	0.557	0.554	0.560
*	85-93	2159-2362	378	0.408	24.590	1177.396	0.188	9.001	0.191	9.145	6.361	304.586	17.85	854.663	2978.354	142604.355	0.57	0.567	0.573
	81-85	2057-2159	377	0.576	8.818	422.221	0.083	3.974	0.091	4.357	0.000	0.000	8.642	413.781	2986.996	143018.1361	0.584	0.581	0.587
	78-81	1981-2057	376	0.395	9.431	451.563	0.058	2.777	0.067	3.208	0.000	0.000	9.301	445.334	2996.297	143463.4704	0.403	0.401	0.405
	75-78	1905-1981	375	0.385	9.577	458.525	0.054	2.586	0.065	3.112	0.000	0.000	9.455	452.708	3005.752	143916.1782	0.393	0.391	0.395
	72-75	1829-1905	374	0.323	10.542	504.776	0.050	2.394	0.064	3.064	0.000	0.000	10.42	498.912	3016.172	144415.0905	0.331	0.329	0.333
*	67-72	1702-1829	373	0.276	18.805	900.391	0.074	3.543	0.103	4.932	1.088	52.096	17.54	839.820	3033.712	145254.9102	0.324	0.322	0.326
	63-67	1600-1702	372	0.312	14.297	684.555	0.050	2.394	0.079	3.783	0.000	0.000	14.16	677.984	3047.872	145932.8947	0.318	0.316	0.320
	60-63	1524-1600	371	0.207	12.350	591.309	0.033	1.580	0.058	2.777	0.000	0.000	12.25	586.533	3060.122	146519.4278	0.213	0.212	0.214
	57-60	1448-1524	370	0.181	12.760	610.953	0.028	1.341	0.056	2.681	0.000	0.000	12.67	606.643	3072.792	147126.0707	0.187	0.186	0.188
	53-57	1346-1448	369	0.101	18.686	894.671	0.030	1.436	0.073	3.495	0.000	0.000	18.58	889.615	3091.372	148015.6858	0.105	0.104	0.106
*	46-53	1168-1346	368	0.045	34.712	1662.030	0.028	1.341	0.121	5.794	0.743	35.585	33.82	1619.310	3125.192	149634.9961	0.069	0.066	0.072
	43-46	1092-1168	367	0.033	15.061	721.108	0.001	0.048	0.001	0.048	0.000	0.000	15.05	720.598	3140.242	150355.594	0.033	0.031	0.035
	37-43	940-1092	366	0.034	30.116	1441.968	0.001	0.048	0.000	0.000	0.000	0.000	30.11	1441.675	3170.352	151797.2685	0.034	0.032	0.036
*	25-37	635-940	365	0.026	60.700	2906.314	0.001	0.048	0.000	0.000	0.139	6.638	60.56	2899.628	3230.912	154696.8969	0.028	0.027	0.029
	13-25	330-635	364	0.022	60.933	2917.504	0.001	0.048	0.000	0.000	0.000	0.000	60.91	2916.386	3291.822	157613.2834	0.022	0.021	0.023
*	0-13	0-330	363	0.010	66.828	3199.731	0.002	0.096	0.000	0.000	0.086	4.107	66.74	3195.528	3358.562	160808.8117	0.011	0.010	0.012

Table A-52 Energy Balance Results for RBHT Test 1578D for Time Period 1350 to 1470 seconds

Results for RBHT Test 1578 Valid Time Period 1350 to 1470 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2327.4503	7.342108	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
0.25	6.35	2456.7531	7.750003	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
0.50	12.70	2586.0559	8.157898	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
0.75	19.05	2715.3587	8.565793	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
1.00	25.40	2844.6615	8.973688	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
1.25	31.75	2973.9643	9.381583	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
1.50	38.10	3103.2671	9.789478	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
1.75	44.45	3232.5699	10.19737	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
2.00	50.80	3361.8727	10.60527	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
2.25	57.15	3491.1755	11.01316	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
2.50	63.50	3620.4783	11.42106	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
2.75	69.85	3749.7811	11.82895	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
3.00	76.20	3879.0839	12.23685	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
3.25	82.55	4008.3867	12.64474	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
3.50	88.90	4137.6895	13.05264	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
3.75	95.25	4266.9923	13.46053	0.00E+00	0.00E+00	0.00E+00	5.15E-02	2.33E-02
4.00	101.60	4396.2951	13.86843	5.87E-03	3.60E-01	1.63E-01	5.12E-02	2.32E-02
4.25	107.95	4525.5979	14.27632	1.47E-02	9.05E-01	4.10E-01	5.07E-02	2.30E-02
4.50	114.30	4654.9007	14.68422	2.39E-02	1.47E+00	6.65E-01	5.02E-02	2.28E-02
4.75	120.65	4784.2035	15.09211	3.33E-02	2.04E+00	9.26E-01	4.98E-02	2.26E-02
5.00	127.00	4913.5063	15.50001	4.29E-02	2.63E+00	1.19E+00	4.93E-02	2.23E-02
5.25	133.35	5042.8091	15.9079	5.28E-02	3.24E+00	1.47E+00	4.87E-02	2.21E-02
5.50	139.70	5172.1119	16.3158	6.30E-02	3.87E+00	1.75E+00	4.82E-02	2.19E-02
5.75	146.05	5301.4147	16.72369	7.34E-02	4.51E+00	2.04E+00	4.77E-02	2.16E-02
6.00	152.40	5430.7175	17.13159	8.41E-02	5.16E+00	2.34E+00	4.71E-02	2.14E-02
6.25	158.75	5560.0203	17.53948	9.50E-02	5.83E+00	2.65E+00	4.66E-02	2.11E-02
6.50	165.10	5689.3231	17.94738	1.06E-01	6.52E+00	2.96E+00	4.60E-02	2.09E-02
6.75	171.45	5818.6258	18.35527	1.18E-01	7.22E+00	3.27E+00	4.54E-02	2.06E-02
7.00	177.80	5947.9286	18.76317	1.29E-01	7.94E+00	3.60E+00	4.48E-02	2.03E-02
7.25	184.15	6077.2314	19.17106	1.41E-01	8.67E+00	3.93E+00	4.42E-02	2.00E-02
7.50	190.50	6206.5342	19.57896	1.54E-01	9.42E+00	4.27E+00	4.36E-02	1.98E-02
7.75	196.85	6335.837	19.98685	1.66E-01	1.02E+01	4.62E+00	4.29E-02	1.95E-02
8.00	203.20	6465.1398	20.39475	1.79E-01	1.10E+01	4.98E+00	4.23E-02	1.92E-02
8.25	209.55	6594.4426	20.80264	1.92E-01	1.18E+01	5.34E+00	4.16E-02	1.89E-02
8.50	215.90	6723.7454	21.21053	2.05E-01	1.26E+01	5.71E+00	4.09E-02	1.86E-02
8.75	222.25	6853.0482	21.61843	2.19E-01	1.34E+01	6.08E+00	4.02E-02	1.82E-02
9.00	228.60	6982.351	22.02632	2.32E-01	1.43E+01	6.47E+00	3.95E-02	1.79E-02
9.25	234.95	6594.4426	20.80264	2.46E-01	1.51E+01	6.84E+00	3.88E-02	1.76E-02
9.50	241.30	6206.5342	19.57896	2.59E-01	1.59E+01	7.20E+00	3.82E-02	1.73E-02
9.75	247.65	5818.6258	18.35527	2.71E-01	1.66E+01	7.53E+00	3.75E-02	1.70E-02
10.00	254.00	5430.7175	17.13159	2.82E-01	1.73E+01	7.84E+00	3.70E-02	1.68E-02
10.25	260.35	5042.8091	15.9079	2.92E-01	1.79E+01	8.13E+00	3.64E-02	1.65E-02
10.50	266.70	4654.9007	14.68422	3.02E-01	1.85E+01	8.40E+00	3.59E-02	1.63E-02
10.75	273.05	4266.9923	13.46053	3.11E-01	1.91E+01	8.65E+00	3.55E-02	1.61E-02
11.00	279.40	3879.0839	12.23685	3.19E-01	1.96E+01	8.87E+00	3.51E-02	1.59E-02
11.25	285.75	3491.1755	11.01316	3.26E-01	2.00E+01	9.08E+00	3.47E-02	1.57E-02
11.50	292.10	3103.2671	9.789478	3.33E-01	2.04E+01	9.26E+00	3.43E-02	1.56E-02
11.75	298.45	2715.3587	8.565793	3.38E-01	2.08E+01	9.42E+00	3.40E-02	1.54E-02
12.00	304.80	2327.4503	7.342108	3.43E-01	2.11E+01	9.56E+00	3.38E-02	1.53E-02

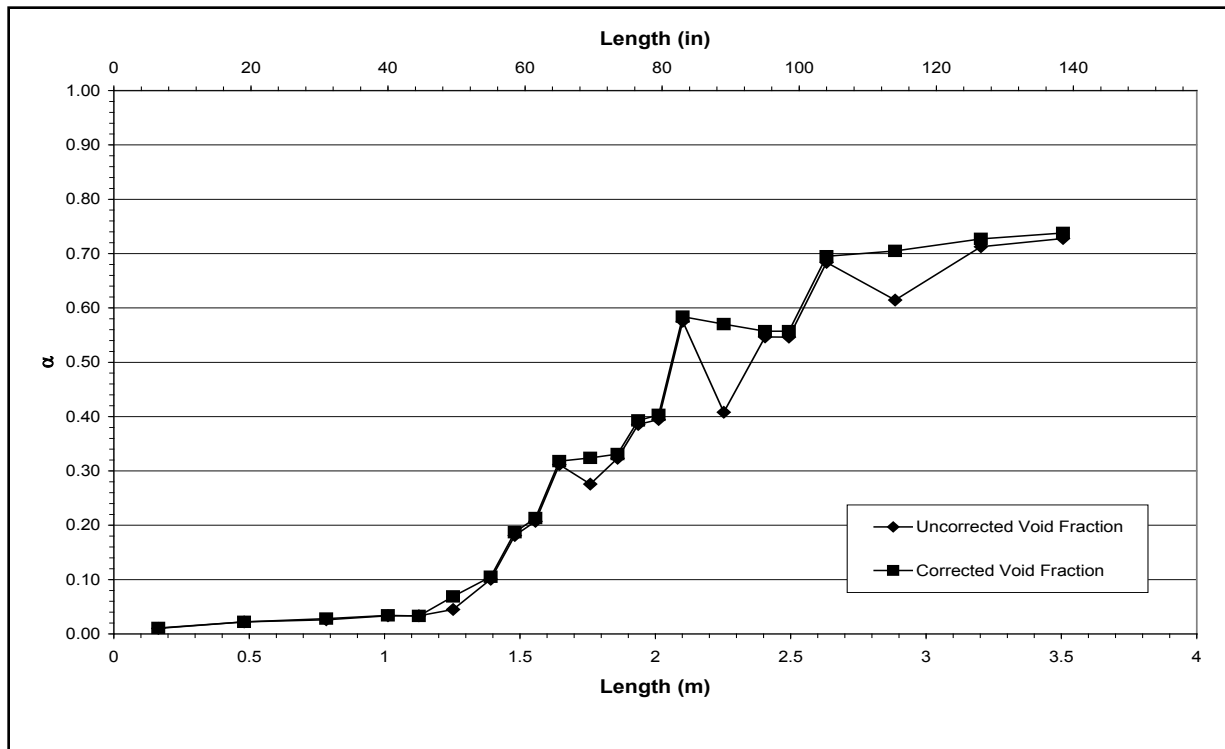


Figure A-130 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1578D for Time Period 1350 to 1470 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1578-E

Test Conditions

Date: 6/10/2003

Steady-state time window: 1854 – 1962 seconds

Inlet flow rate: 1.019 cm/sec (0.401 in./sec)

Inlet mass flow rate: 0.049 kg/sec (0.107 lbm/sec)

Inlet flow temperature: 328.5 K (131.7 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 69.53 kW

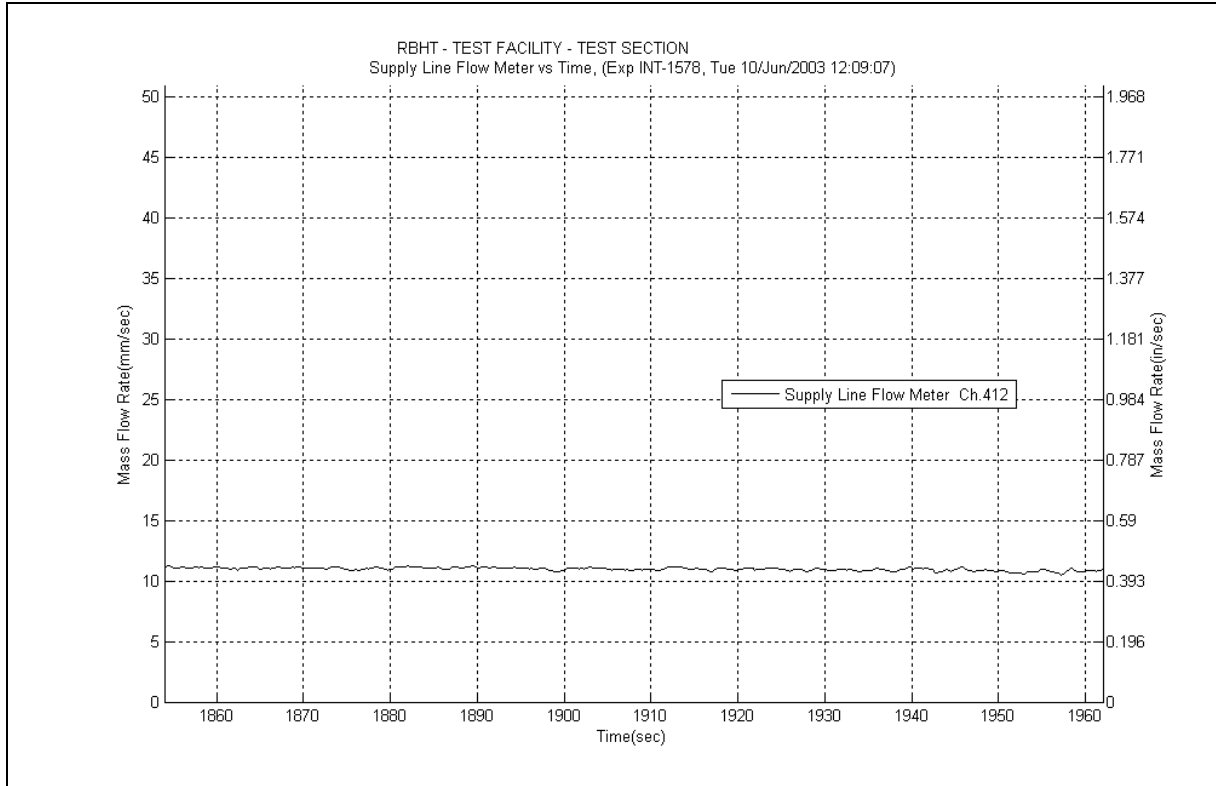


Figure A-131 Inlet Flow Plot for Experiment 1578E

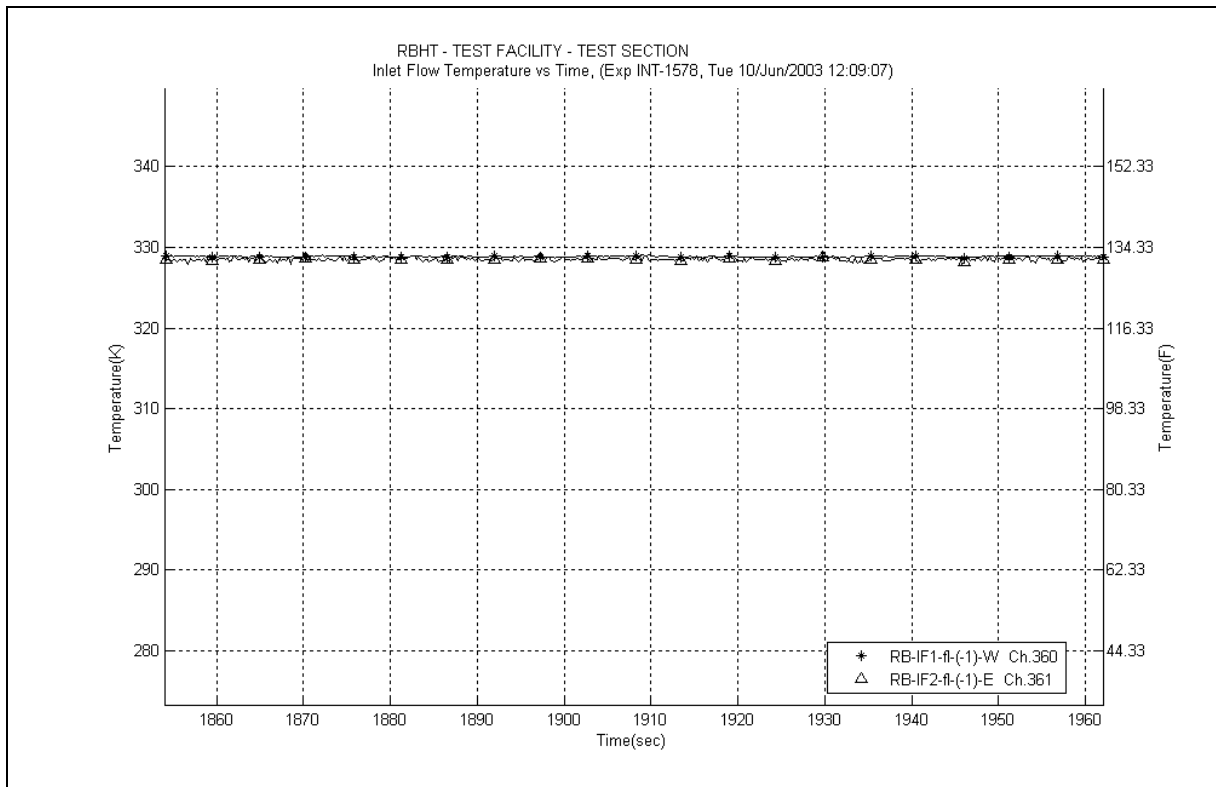


Figure A-132 Inlet Temperature Plot for Experiment 1578E

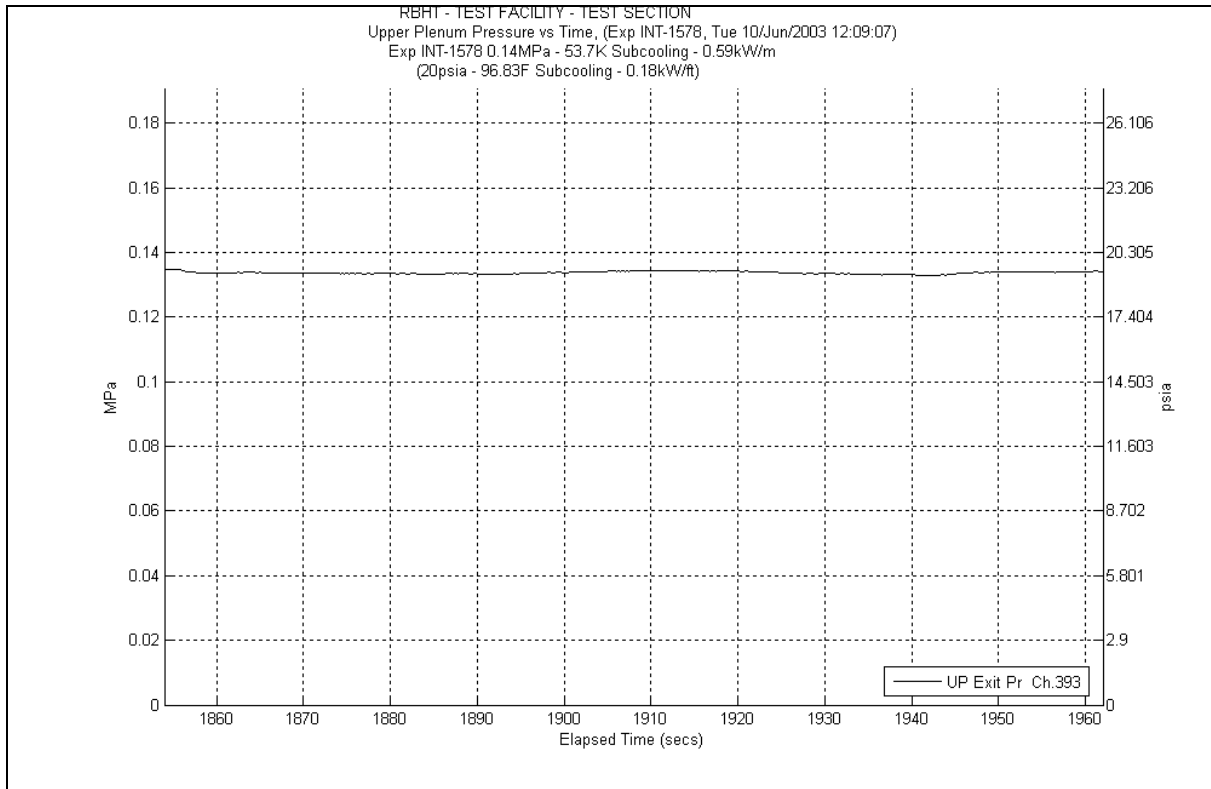


Figure A-133 System Pressure Plot for Experiment 1578E

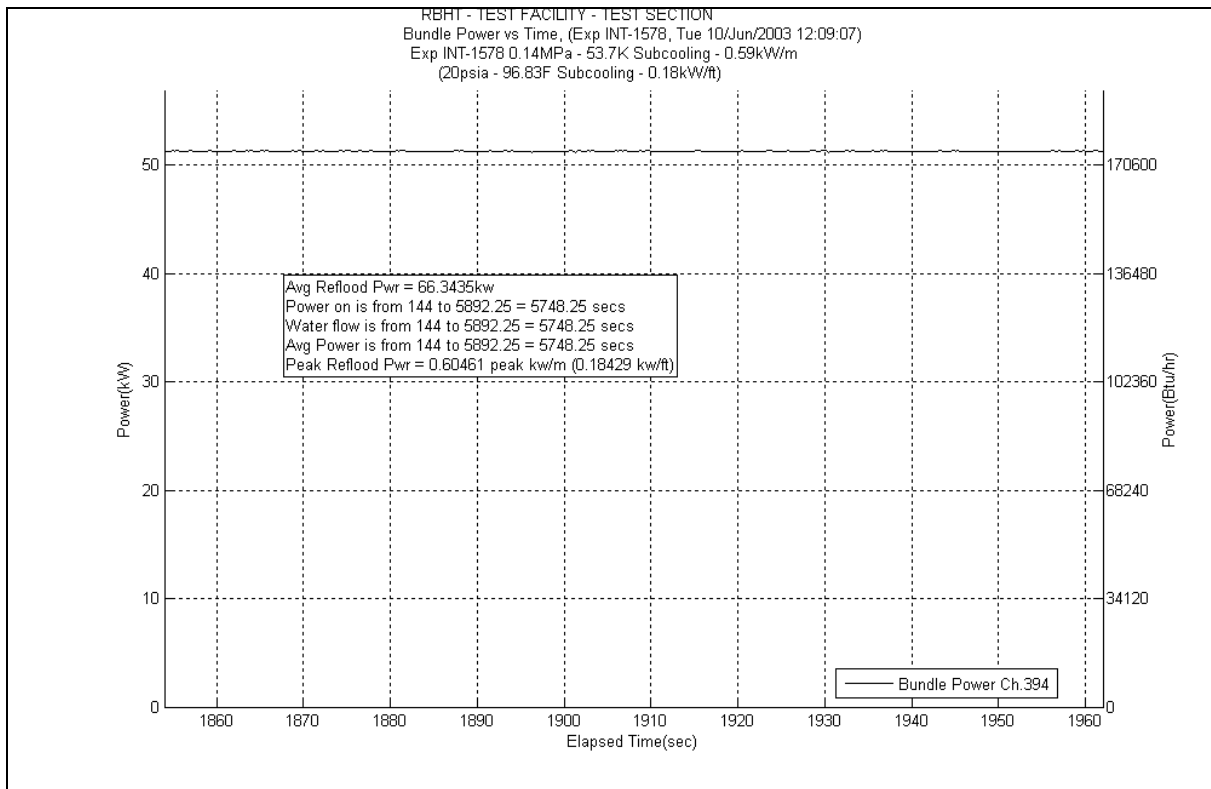


Figure A-134 Bundle Power Plot for Experiment 1578E

Table A-53 Data Results for RBHT Test 1578E for Time Period 1854 to 1962 seconds

Results for RBHT Test 1578
Valid Time Period 1854 to 1962 seconds
Collapsed Liquid Level = 81.123 inches = 2060.51 mm
(Z_{OSV}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.813	10.698	512.235	0.331	15.848	0.087	4.166	0.000	0.000	10.28	492.209	2890.28	138387.3492	0.82	0.816	0.824
*	120-133	3048-3378	383	0.779	14.926	714.643	0.363	17.381	0.155	7.421	1.298	62.131	13.11	627.710	2903.39	139015.0594	0.806	0.802	0.810
*	108-120	2743-3048	382	0.689	19.361	926.997	0.298	14.268	0.193	9.241	4.980	238.431	13.89	665.057	2917.28	139680.1161	0.777	0.773	0.781
	100-108	2540-2743	381	0.755	10.174	487.121	0.175	8.379	0.141	6.751	0.000	0.000	9.855	471.860	2927.135	140151.9761	0.763	0.759	0.767
	97-100	2464-2540	380	0.667	5.183	248.161	0.060	2.873	0.051	2.442	0.000	0.000	5.07	242.753	2932.205	140394.729	0.675	0.672	0.678
	93-97	2362-2464	379	0.663	7.011	335.688	0.076	3.639	0.067	3.208	0.000	0.000	6.863	328.602	2939.068	140723.3312	0.67	0.667	0.673
*	85-93	2159-2362	378	0.482	21.521	1030.439	0.138	6.607	0.128	6.129	8.485	406.272	12.77	611.431	2951.838	141334.7621	0.693	0.690	0.696
	81-85	2057-2159	377	0.710	6.029	288.692	0.062	2.969	0.061	2.921	0.000	0.000	5.904	282.685	2957.742	141617.4471	0.716	0.712	0.720
	78-81	1981-2057	376	0.527	7.369	352.846	0.044	2.107	0.045	2.155	0.000	0.000	7.278	348.473	2965.02	141965.9196	0.533	0.530	0.536
	75-78	1905-1981	375	0.550	7.016	335.937	0.041	1.963	0.044	2.107	0.000	0.000	6.929	331.762	2971.949	142297.6819	0.555	0.552	0.558
	72-75	1829-1905	374	0.502	7.764	371.744	0.039	1.867	0.043	2.059	0.000	0.000	7.677	367.577	2979.626	142665.2586	0.507	0.504	0.510
*	67-72	1702-1829	373	0.400	15.570	745.477	0.059	2.825	0.069	3.304	3.742	179.149	11.7	560.199	2991.326	143225.4577	0.549	0.546	0.552
	63-67	1600-1702	372	0.587	8.590	411.280	0.043	2.059	0.053	2.538	0.000	0.000	8.489	406.456	2999.815	143631.9132	0.591	0.588	0.594
	60-63	1524-1600	371	0.418	9.068	434.157	0.029	1.389	0.039	1.867	0.000	0.000	8.994	430.635	3008.809	144062.5482	0.423	0.421	0.425
	57-60	1448-1524	370	0.394	9.447	452.309	0.027	1.293	0.038	1.819	0.000	0.000	9.379	449.069	3018.188	144511.6171	0.398	0.396	0.400
	53-57	1346-1448	369	0.355	13.399	641.538	0.032	1.532	0.049	2.346	0.000	0.000	13.32	637.765	3031.508	145149.3821	0.359	0.357	0.361
*	46-53	1168-1346	368	0.232	27.930	1337.283	0.045	2.155	0.081	3.878	2.944	140.946	24.86	1190.303	3056.368	146339.6853	0.316	0.314	0.318
	43-46	1092-1168	367	0.270	11.373	544.561	0.015	0.718	0.033	1.580	0.000	0.000	11.32	542.005	3067.688	146881.6898	0.273	0.272	0.274
	37-43	940-1092	366	0.118	27.483	1315.898	0.021	1.005	0.063	3.016	0.000	0.000	27.39	1311.440	3095.078	148193.1301	0.121	0.120	0.122
*	25-37	635-940	365	0.037	60.045	2874.984	0.018	0.862	0.037	1.772	2.310	110.617	57.68	2761.733	3152.758	150954.8633	0.074	0.070	0.078
	13-25	330-635	364	0.028	60.596	2901.341	0.001	0.048	0.000	0.000	0.000	0.000	60.57	2900.107	3213.328	153854.9705	0.028	0.027	0.029
*	0-13	0-330	363	0.012	66.708	3194.012	0.001	0.048	0.000	0.000	0.147	7.054	66.56	3186.910	3279.888	157041.8804	0.014	0.013	0.015

Table A-54 Energy Balance Results for RBHT Test 1578E for Time Period 1854 to 1962 seconds

Results for RBHT Test 1578 Valid Time Period 1854 to 1962 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2324.3226	7.332242	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
0.25	6.35	2453.4517	7.739588	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
0.50	12.70	2582.5807	8.146935	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
0.75	19.05	2711.7097	8.554282	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
1.00	25.40	2840.8388	8.961629	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
1.25	31.75	2969.9678	9.368975	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
1.50	38.10	3099.0968	9.776322	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
1.75	44.45	3228.2259	10.18367	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
2.00	50.80	3357.3549	10.59102	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
2.25	57.15	3486.484	10.99836	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
2.50	63.50	3615.613	11.40571	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
2.75	69.85	3744.742	11.81306	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
3.00	76.20	3873.8711	12.2204	1.02E-02	4.17E-01	1.89E-01	3.41E-02	1.55E-02
3.25	82.55	4003.0001	12.62775	2.19E-02	8.98E-01	4.08E-01	3.37E-02	1.53E-02
3.50	88.90	4132.1291	13.0351	3.39E-02	1.40E+00	6.33E-01	3.33E-02	1.51E-02
3.75	95.25	4261.2582	13.44244	4.64E-02	1.91E+00	8.65E-01	3.29E-02	1.49E-02
4.00	101.60	4390.3872	13.84979	5.93E-02	2.44E+00	1.11E+00	3.24E-02	1.47E-02
4.25	107.95	4519.5162	14.25714	7.25E-02	2.98E+00	1.35E+00	3.20E-02	1.45E-02
4.50	114.30	4648.6453	14.66448	8.61E-02	3.54E+00	1.61E+00	3.15E-02	1.43E-02
4.75	120.65	4777.7743	15.07183	1.00E-01	4.12E+00	1.87E+00	3.10E-02	1.41E-02
5.00	127.00	4906.9033	15.47918	1.15E-01	4.71E+00	2.14E+00	3.05E-02	1.38E-02
5.25	133.35	5036.0324	15.88652	1.29E-01	5.32E+00	2.41E+00	3.00E-02	1.36E-02
5.50	139.70	5165.1614	16.29387	1.44E-01	5.94E+00	2.69E+00	2.95E-02	1.34E-02
5.75	146.05	5294.2904	16.70122	1.60E-01	6.58E+00	2.98E+00	2.90E-02	1.31E-02
6.00	152.40	5423.4195	17.10856	1.76E-01	7.23E+00	3.28E+00	2.84E-02	1.29E-02
6.25	158.75	5552.5485	17.51591	1.92E-01	7.90E+00	3.58E+00	2.78E-02	1.26E-02
6.50	165.10	5681.6775	17.92326	2.09E-01	8.59E+00	3.89E+00	2.73E-02	1.24E-02
6.75	171.45	5810.8066	18.3306	2.26E-01	9.29E+00	4.21E+00	2.67E-02	1.21E-02
7.00	177.80	5939.9356	18.73795	2.43E-01	1.00E+01	4.54E+00	2.61E-02	1.18E-02
7.25	184.15	6069.0647	19.1453	2.61E-01	1.07E+01	4.87E+00	2.55E-02	1.16E-02
7.50	190.50	6198.1937	19.55264	2.79E-01	1.15E+01	5.21E+00	2.48E-02	1.13E-02
7.75	196.85	6327.3227	19.95999	2.98E-01	1.23E+01	5.56E+00	2.42E-02	1.10E-02
8.00	203.20	6456.4518	20.36734	3.17E-01	1.30E+01	5.91E+00	2.35E-02	1.07E-02
8.25	209.55	6585.5808	20.77468	3.36E-01	1.38E+01	6.27E+00	2.29E-02	1.04E-02
8.50	215.90	6714.7098	21.18203	3.56E-01	1.46E+01	6.64E+00	2.22E-02	1.01E-02
8.75	222.25	6843.8389	21.58938	3.76E-01	1.55E+01	7.02E+00	2.15E-02	9.75E-03
9.00	228.60	6972.9679	21.99672	3.97E-01	1.63E+01	7.40E+00	2.08E-02	9.43E-03
9.25	234.95	7102.0969	22.40406	4.17E-01	1.71E+01	7.78E+00	2.01E-02	9.12E-03
9.50	241.30	7231.2259	22.81140	4.36E-01	1.79E+01	8.13E+00	1.94E-02	8.82E-03
9.75	247.65	7360.3549	23.21874	4.54E-01	1.87E+01	8.46E+00	1.88E-02	8.54E-03
10.00	254.00	7489.4839	23.62608	4.70E-01	1.93E+01	8.77E+00	1.83E-02	8.28E-03
10.25	260.35	7618.6129	24.03342	4.86E-01	2.00E+01	9.06E+00	1.77E-02	8.04E-03
10.50	266.70	7747.7419	24.44076	5.00E-01	2.06E+01	9.33E+00	1.72E-02	7.81E-03
10.75	273.05	7876.8709	24.84810	5.14E-01	2.11E+01	9.58E+00	1.68E-02	7.61E-03
11.00	279.40	8006.0001	25.25544	5.26E-01	2.16E+01	9.81E+00	1.63E-02	7.42E-03
11.25	285.75	8135.1291	25.66278	5.37E-01	2.21E+01	1.00E+01	1.60E-02	7.25E-03
11.50	292.10	8264.2582	26.07012	5.46E-01	2.25E+01	1.02E+01	1.56E-02	7.09E-03
11.75	298.45	8393.3872	26.47746	5.55E-01	2.28E+01	1.04E+01	1.53E-02	6.96E-03
12.00	304.80	8522.5162	26.88480	5.63E-01	2.31E+01	1.05E+01	1.51E-02	6.84E-03

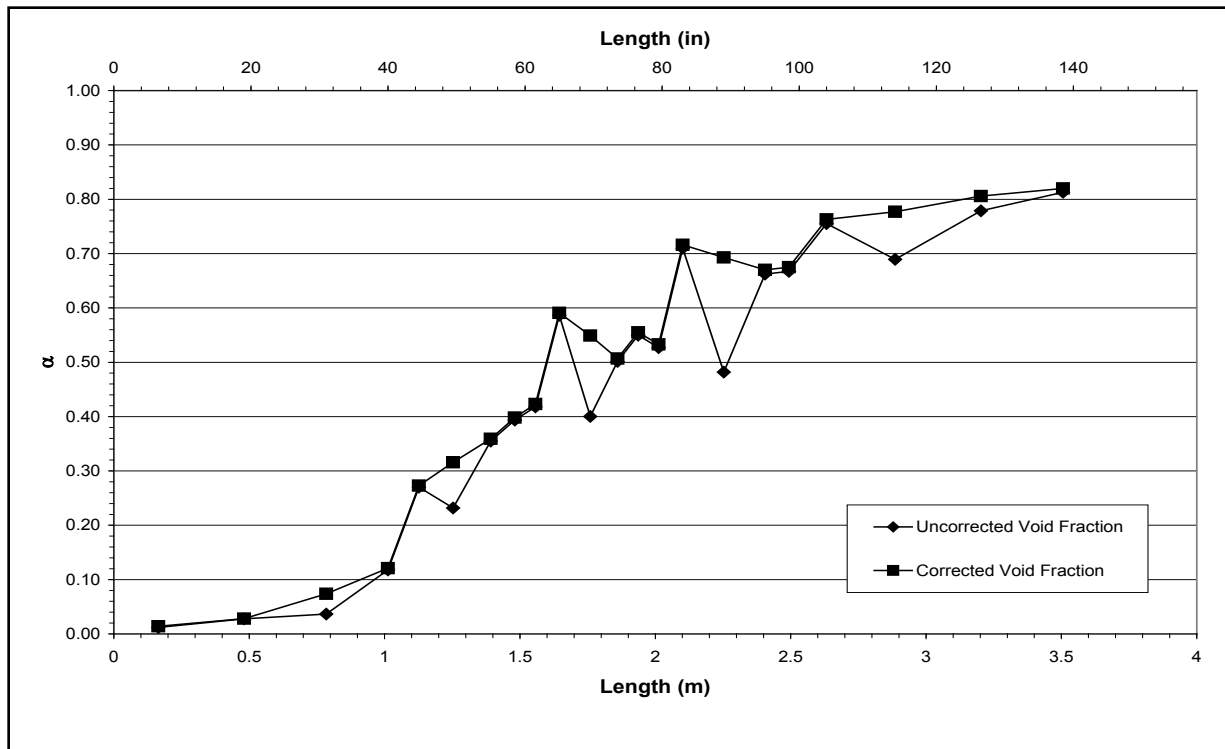


Figure A-135 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1578E for Time Period 1854 to 1962 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1578-F

Test Conditions

Date: 6/10/2003

Steady-state time window: 2269 – 2389 seconds

Inlet flow rate: 0.505 cm/sec (0.199 in./sec)

Inlet mass flow rate: 0.024 kg/sec (0.053 lbm/sec)

Inlet flow temperature: 328.5 K (131.7 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 69.53 kW

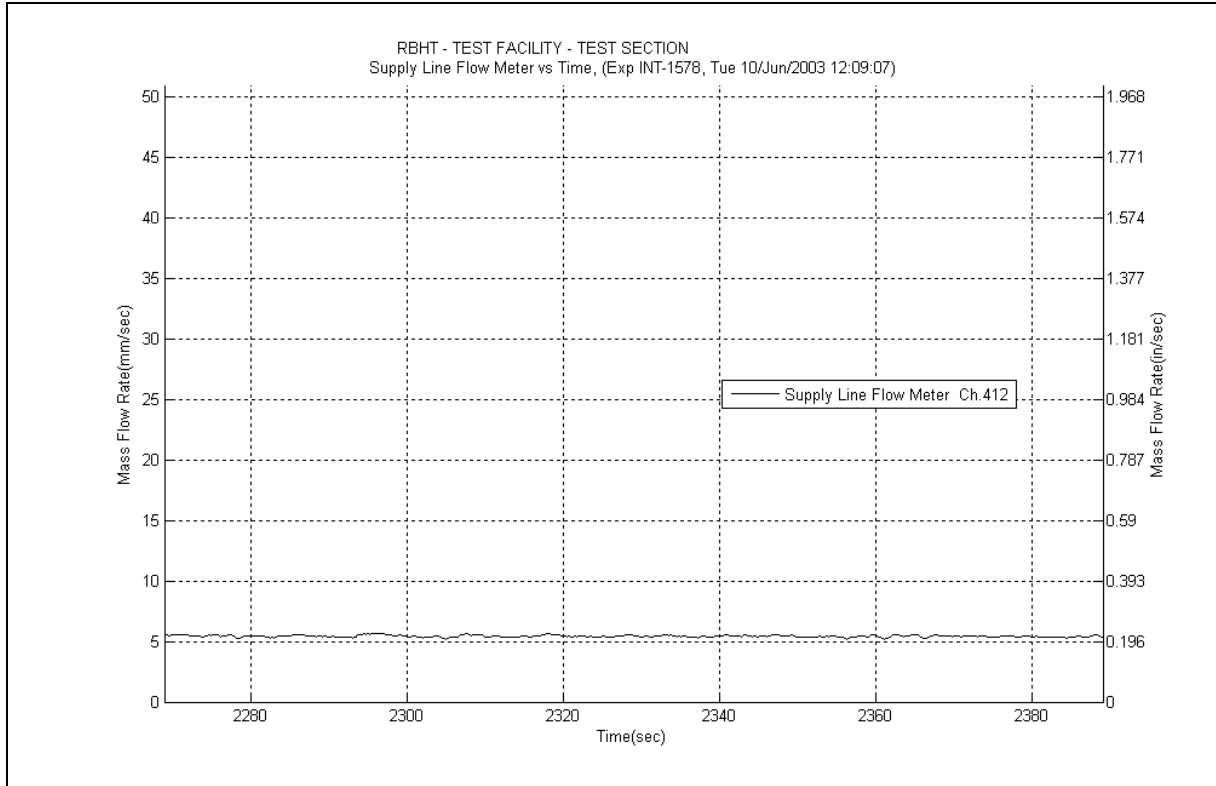


Figure A-136 Inlet Flow Plot for Experiment 1578F

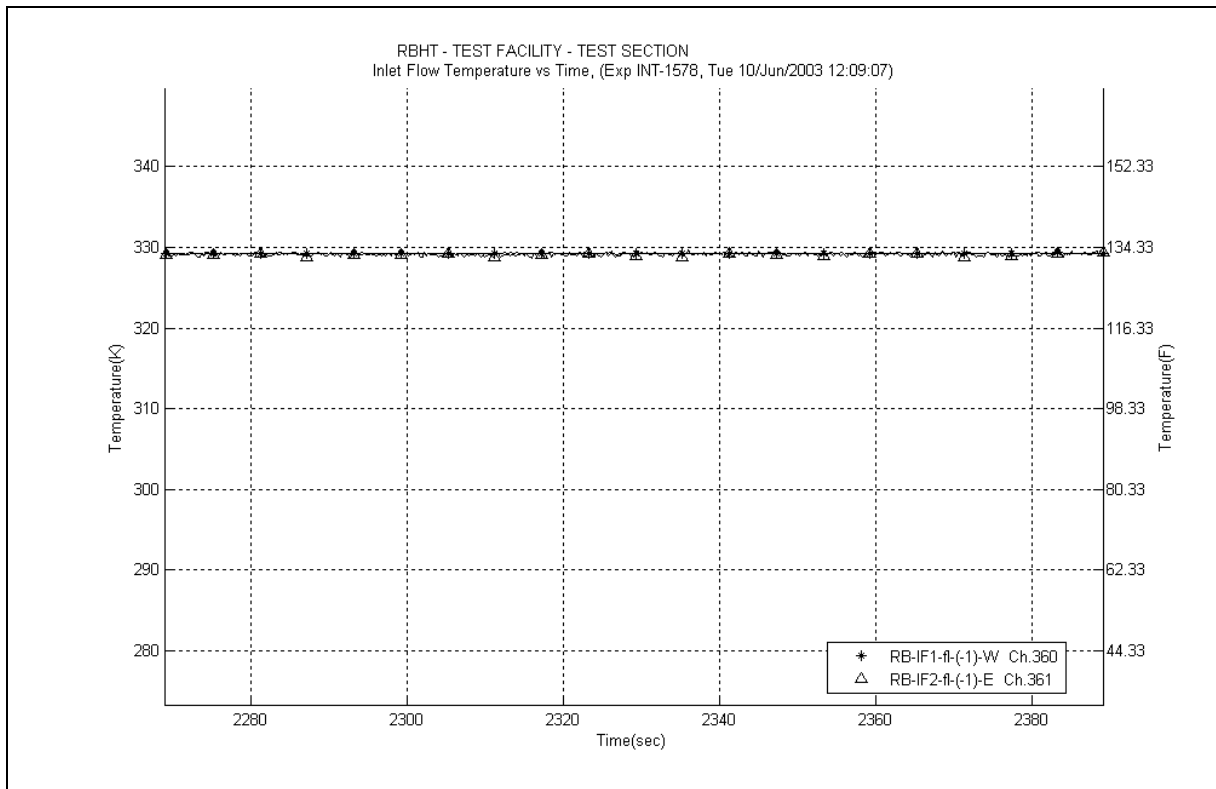


Figure A-137 Inlet Temperature Plot for Experiment 1578F

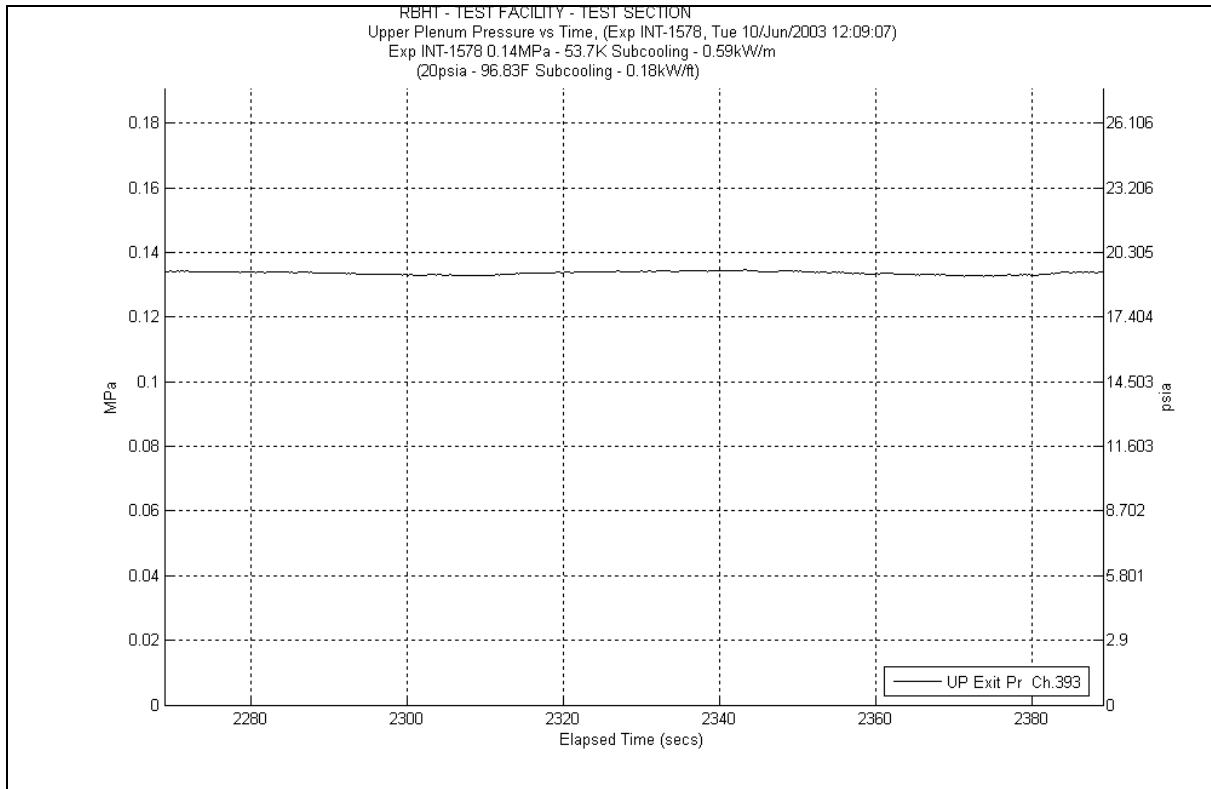


Figure A-138 System Pressure Plot for Experiment 1578F

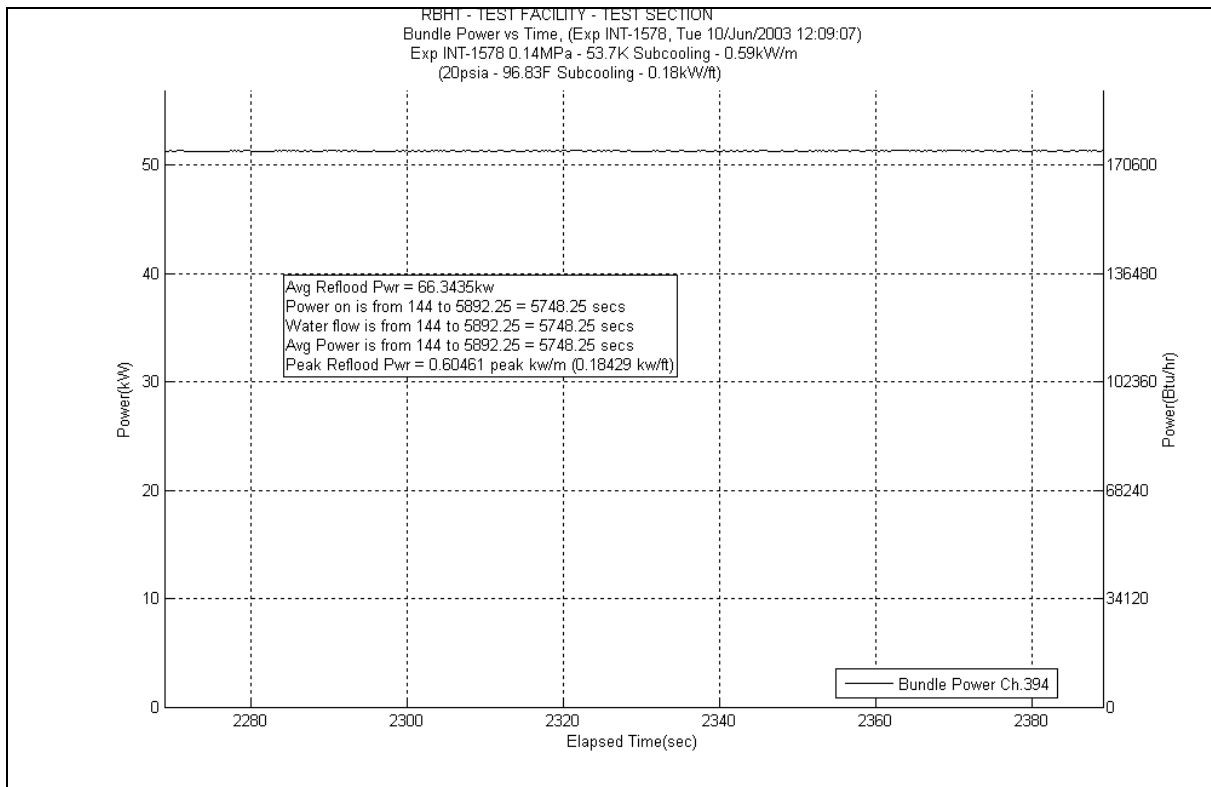


Figure A-139 Bundle Power Plot for Experiment 1578F

Table A-55 Data Results for RBHT Test 1578F for Time Period 2269 to 2389 seconds

Results for RBHT Test 1578
Valid Time Period 2269 to 2389 seconds
Collapsed Liquid Level = 66.684 inches = 1693.78 mm
(Z_{OSV}) Onset of Significant Void = 19 inches = 482.5 mm
(Z_{2θ}) Two-Phase Level (Dryout) = 139.50 inches = 3543.30 mm
(S) Level Swell = 2.503

Grids	Elevation (in)	Elevation (mm)	Chan.	α _{uncorrected}	ΔP _{uncorrected} (lbf/ft ²)	ΔP _{uncorrected} (Pa)	ΔP _{fric} (lbf/ft ²)	ΔP _{fric} (Pa)	ΔP _{fric} (Pa)	ΔP _{fric} (lbf/ft ²)	ΔP _{accel} (Pa)	ΔP _{accel} (Pa)	ΔP _{accel} (lbf/ft ²)	ΔP _{grid} (Pa)	ΔP _{grid} (Pa)	ΔP _{grid} (lbf/ft ²)	ΔP _{corrected} (lbf/ft ²)	ΔP _{corrected} (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	U _{corrected}	α _{min}	α _{max}	
	133-144	3378-3658	384	0.942	3.293	157.649	0.079	3.783	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.209	153.648	2883.209	138048.7879	0.944	0.939	0.949	
*	120-133	3048-3378	383	0.891	7.380	353.343	0.094	4.501	0.000	0.000	0.000	0.000	1.684	80.617	5.602	268.225	2888.811	138317.0131	2888.811	138317.0131	0.917	0.912	0.922	
*	108-120	2743-3048	382	0.794	12.853	615.428	0.139	6.655	0.060	2.873	4.144	198.439	8.51	407.461	2897.321	138724.4741	8.51	407.461	2897.321	138724.4741	0.863	0.859	0.867	
	100-108	2540-2743	381	0.833	6.949	332.704	0.091	4.357	0.070	3.352	0.000	0.000	0.000	6.786	324.915	2904.107	6.786	324.915	2904.107	139049.3895	0.837	0.833	0.841	
	97-100	2464-2540	380	0.757	3.781	181.023	0.032	1.532	0.025	1.197	0.000	0.000	0.000	3.722	178.210	2907.829	3.722	178.210	2907.829	139227.5998	0.761	0.757	0.765	
	93-97	2362-2464	379	0.754	5.110	244.679	0.041	1.963	0.033	1.580	0.000	0.000	0.000	5.037	241.173	2912.866	5.037	241.173	2912.866	139468.7727	0.757	0.753	0.761	
*	85-93	2159-2362	378	0.583	17.341	830.269	0.075	3.591	0.063	3.016	0.000	0.000	7.143	341.986	10.06	481.675	2922.926	10.06	481.675	2922.926	139950.4481	0.758	0.754	0.762
	81-85	2057-2159	377	0.755	5.089	243.685	0.034	1.628	0.030	1.436	0.000	0.000	0.000	5.023	240.503	2927.949	5.023	240.503	2927.949	140190.9506	0.758	0.754	0.762	
	78-81	1981-2057	376	0.610	6.071	290.681	0.024	1.149	0.022	1.053	0.000	0.000	0.000	6.024	288.431	2933.973	6.024	288.431	2933.973	140479.3813	0.613	0.610	0.616	
	75-78	1905-1981	375	0.617	5.972	285.957	0.023	1.101	0.022	1.053	0.000	0.000	0.000	5.924	283.643	2939.897	5.924	283.643	2939.897	140763.0239	0.62	0.617	0.623	
	72-75	1829-1905	374	0.590	6.383	305.601	0.021	1.005	0.021	1.005	0.000	0.000	0.000	6.335	303.321	2946.232	6.335	303.321	2946.232	141066.3453	0.593	0.590	0.596	
*	67-72	1702-1829	373	0.458	14.074	673.863	0.033	1.580	0.034	1.628	0.034	225.177	9.304	445.478	2955.536	141511.8233	9.304	445.478	2955.536	141511.8233	0.642	0.639	0.645	
	63-67	1600-1702	372	0.688	6.492	310.822	0.024	1.149	0.026	1.245	0.000	0.000	0.000	6.439	308.301	2961.975	6.439	308.301	2961.975	141820.1242	0.69	0.687	0.693	
	60-63	1524-1600	371	0.520	7.473	357.819	0.017	0.814	0.019	0.910	0.000	0.000	0.000	7.433	355.894	2969.408	7.433	355.894	2969.408	142176.0182	0.523	0.520	0.526	
	57-60	1448-1524	370	0.494	7.889	377.711	0.016	0.766	0.019	0.910	0.000	0.000	0.000	7.85	375.860	2977.258	7.85	375.860	2977.258	142551.8782	0.496	0.494	0.498	
	53-57	1346-1448	369	0.456	11.295	540.831	0.019	0.910	0.024	1.149	0.000	0.000	0.000	11.25	538.653	2988.508	11.25	538.653	2988.508	143090.5311	0.459	0.457	0.461	
*	46-53	1168-1346	368	0.325	24.523	1174.163	0.030	1.436	0.040	1.915	0.040	274.493	18.72	896.318	3007.228	143986.8495	18.72	896.318	3007.228	143986.8495	0.485	0.483	0.487	
	43-46	1092-1168	367	0.510	7.639	365.776	0.011	0.527	0.016	0.766	0.000	0.000	0.000	7.611	364.417	3014.839	7.611	364.417	3014.839	144351.2661	0.511	0.508	0.514	
	37-43	940-1092	366	0.432	17.704	847.675	0.019	0.910	0.031	1.484	0.000	0.000	0.000	17.65	845.087	3032.489	17.65	845.087	3032.489	145196.3527	0.434	0.432	0.436	
*	25-37	635-940	365	0.225	48.324	2313.762	0.026	1.245	0.056	2.681	0.056	73.349	46.71	2236.487	3079.199	147432.8395	46.71	2236.487	3079.199	147432.8395	0.25	0.249	0.251	
	13-25	330-635	364	0.066	58.181	2785.715	0.010	0.479	0.028	1.341	0.000	0.000	0.000	58.13	2783.279	3137.329	58.13	2783.279	3137.329	150216.1188	0.067	0.064	0.070	
*	0-13	0-330	363	0.016	66.417	3180.087	0.000	0.000	0.000	0.000	0.000	56.858	65.23	3123.229	3202.559	153339.348	65.23	3123.229	3202.559	153339.348	0.034	0.032	0.036	

Table A-56 Energy Balance Results for RBHT Test 1578F for Time Period 2269 to 2389 seconds

Results for RBHT Test 1578 Valid Time Period 2269 to 2389 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2328.6715	7.34596	0.00E+00	0.00E+00	0.00E+00	1.71E-02	7.74E-03
0.25	6.35	2458.0421	7.754069	0.00E+00	0.00E+00	0.00E+00	1.71E-02	7.74E-03
0.50	12.70	2587.4127	8.162178	0.00E+00	0.00E+00	0.00E+00	1.71E-02	7.74E-03
0.75	19.05	2716.7834	8.570287	0.00E+00	0.00E+00	0.00E+00	1.71E-02	7.74E-03
1.00	25.40	2846.154	8.978396	0.00E+00	0.00E+00	0.00E+00	1.71E-02	7.74E-03
1.25	31.75	2975.5246	9.386505	0.00E+00	0.00E+00	0.00E+00	1.71E-02	7.74E-03
1.50	38.10	3104.8953	9.794614	0.00E+00	0.00E+00	0.00E+00	1.71E-02	7.74E-03
1.75	44.45	3234.2659	10.20272	1.75E-02	3.57E-01	1.62E-01	1.68E-02	7.60E-03
2.00	50.80	3363.6366	10.61083	3.73E-02	7.60E-01	3.45E-01	1.64E-02	7.45E-03
2.25	57.15	3493.0072	11.01894	5.79E-02	1.18E+00	5.35E-01	1.61E-02	7.29E-03
2.50	63.50	3622.3778	11.42705	7.93E-02	1.61E+00	7.32E-01	1.57E-02	7.12E-03
2.75	69.85	3751.7485	11.83516	1.01E-01	2.06E+00	9.36E-01	1.53E-02	6.95E-03
3.00	76.20	3881.1191	12.24327	1.24E-01	2.53E+00	1.15E+00	1.49E-02	6.78E-03
3.25	82.55	4010.4897	12.65138	1.48E-01	3.01E+00	1.37E+00	1.45E-02	6.59E-03
3.50	88.90	4139.8604	13.05949	1.72E-01	3.51E+00	1.59E+00	1.41E-02	6.40E-03
3.75	95.25	4269.231	13.46759	1.98E-01	4.02E+00	1.83E+00	1.37E-02	6.21E-03
4.00	101.60	4398.6017	13.8757	2.24E-01	4.55E+00	2.07E+00	1.32E-02	6.01E-03
4.25	107.95	4527.9723	14.28381	2.51E-01	5.10E+00	2.31E+00	1.28E-02	5.80E-03
4.50	114.30	4657.3429	14.69192	2.78E-01	5.66E+00	2.57E+00	1.23E-02	5.59E-03
4.75	120.65	4786.7136	15.10003	3.06E-01	6.24E+00	2.83E+00	1.18E-02	5.37E-03
5.00	127.00	4916.0842	15.50814	3.36E-01	6.83E+00	3.10E+00	1.13E-02	5.14E-03
5.25	133.35	5045.4548	15.91625	3.65E-01	7.44E+00	3.37E+00	1.08E-02	4.91E-03
5.50	139.70	5174.8255	16.32436	3.96E-01	8.06E+00	3.66E+00	1.03E-02	4.67E-03
5.75	146.05	5304.1961	16.73247	4.28E-01	8.70E+00	3.95E+00	9.77E-03	4.43E-03
6.00	152.40	5433.5667	17.14057	4.60E-01	9.36E+00	4.24E+00	9.22E-03	4.18E-03
6.25	158.75	5562.9374	17.54868	4.93E-01	1.00E+01	4.55E+00	8.65E-03	3.93E-03
6.50	165.10	5692.308	17.95679	5.27E-01	1.07E+01	4.86E+00	8.08E-03	3.66E-03
6.75	171.45	5821.6787	18.3649	5.61E-01	1.14E+01	5.18E+00	7.49E-03	3.40E-03
7.00	177.80	5951.0493	18.77301	5.96E-01	1.21E+01	5.51E+00	6.88E-03	3.12E-03
7.25	184.15	6080.4199	19.18112	6.33E-01	1.29E+01	5.84E+00	6.27E-03	2.84E-03
7.50	190.50	6209.7906	19.58923	6.69E-01	1.36E+01	6.18E+00	5.64E-03	2.56E-03
7.75	196.85	6339.1612	19.99734	7.07E-01	1.44E+01	6.53E+00	5.00E-03	2.27E-03
8.00	203.20	6468.5318	20.40545	7.46E-01	1.52E+01	6.88E+00	4.34E-03	1.97E-03
8.25	209.55	6597.9025	20.81355	7.85E-01	1.60E+01	7.25E+00	3.67E-03	1.67E-03
8.50	215.90	6727.2731	21.22166	8.25E-01	1.68E+01	7.62E+00	2.99E-03	1.36E-03
8.75	222.25	6856.6438	21.62977	8.66E-01	1.76E+01	7.99E+00	2.29E-03	1.04E-03
9.00	228.60	6986.0144	22.03788	9.07E-01	1.85E+01	8.38E+00	1.59E-03	7.20E-04
9.25	234.95	6597.9025	20.81355	9.48E-01	1.93E+01	8.75E+00	8.90E-04	4.04E-04
9.50	241.30	6209.7906	19.58923	9.86E-01	2.01E+01	9.11E+00	2.35E-04	1.07E-04
9.75	247.65	5821.6787	18.3649	1.00E+00	2.04E+01	9.23E+00	0.00E+00	0.00E+00
10.00	254.00	5433.5667	17.14057	1.00E+00	2.04E+01	9.23E+00	0.00E+00	0.00E+00
10.25	260.35	5045.4548	15.91625	1.00E+00	2.04E+01	9.23E+00	0.00E+00	0.00E+00
10.50	266.70	4657.3429	14.69192	1.00E+00	2.04E+01	9.23E+00	0.00E+00	0.00E+00
10.75	273.05	4269.231	13.46759	1.00E+00	2.04E+01	9.23E+00	0.00E+00	0.00E+00
11.00	279.40	3881.1191	12.24327	1.00E+00	2.04E+01	9.23E+00	0.00E+00	0.00E+00
11.25	285.75	3493.0072	11.01894	1.00E+00	2.04E+01	9.23E+00	0.00E+00	0.00E+00
11.50	292.10	3104.8953	9.794614	1.00E+00	2.04E+01	9.23E+00	0.00E+00	0.00E+00
11.75	298.45	2716.7834	8.570287	1.00E+00	2.04E+01	9.23E+00	0.00E+00	0.00E+00
12.00	304.80	2328.6715	7.34596	1.00E+00	2.04E+01	9.23E+00	0.00E+00	0.00E+00

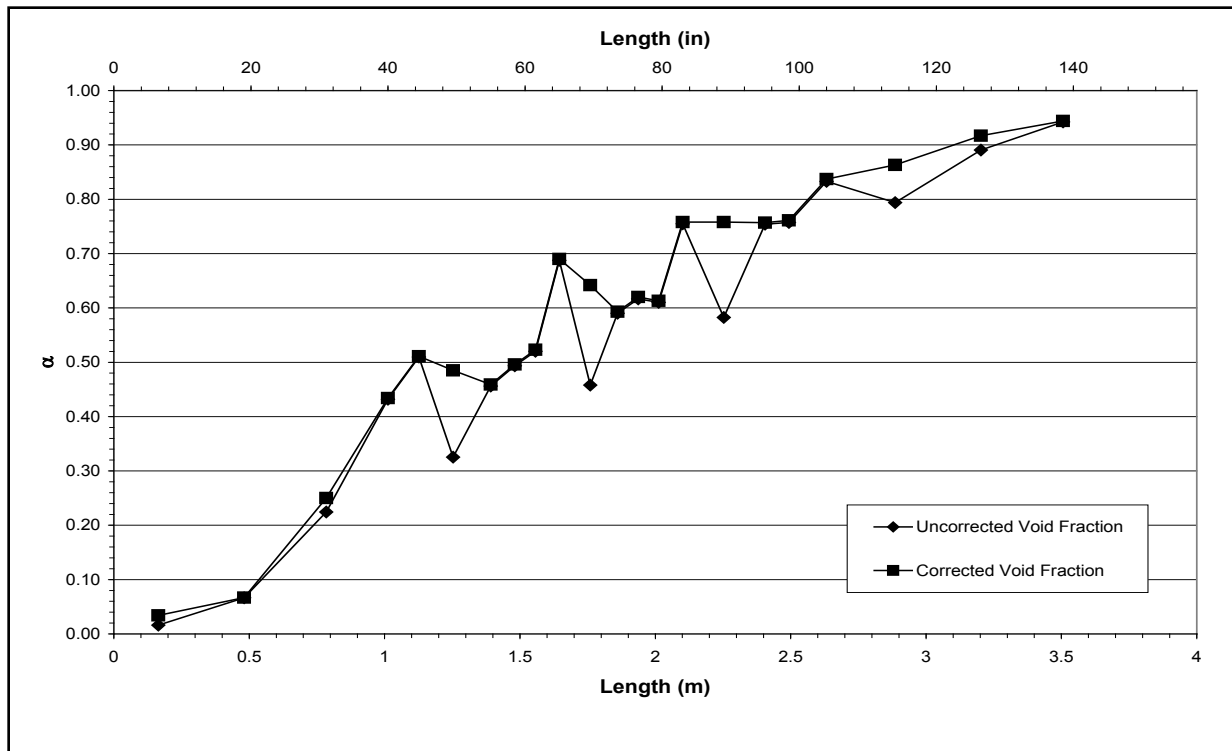


Figure A-140 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1578F for Time Period 2269 to 2389 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1578-G

Test Conditions

Date: 6/10/2003

Steady-state time window: 2665 – 2845 seconds

Inlet flow rate: 0.424 cm/sec (0.167 in./sec)

Inlet mass flow rate: 0.020 kg/sec (0.045 lbm/sec)

Inlet flow temperature: 328.5 K (131.7 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 69.53 kW

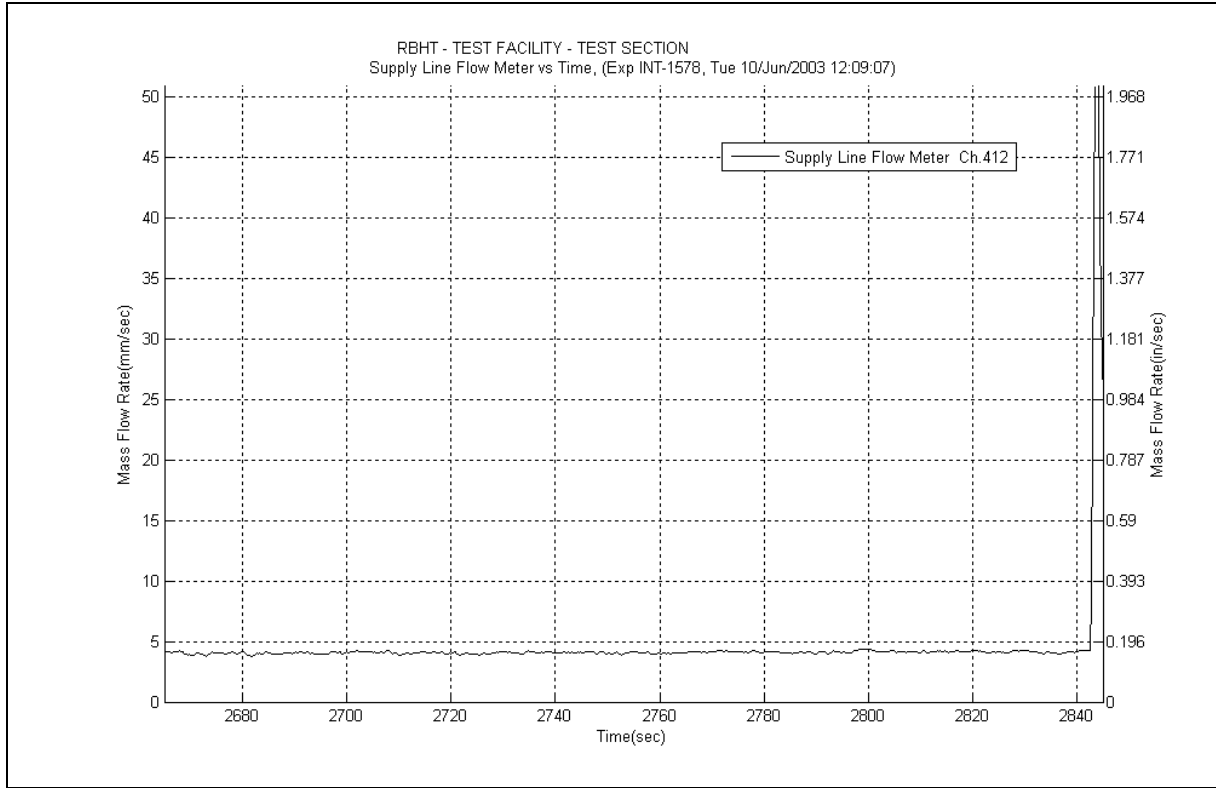


Figure A-141 Inlet Flow Plot for Experiment 1578G

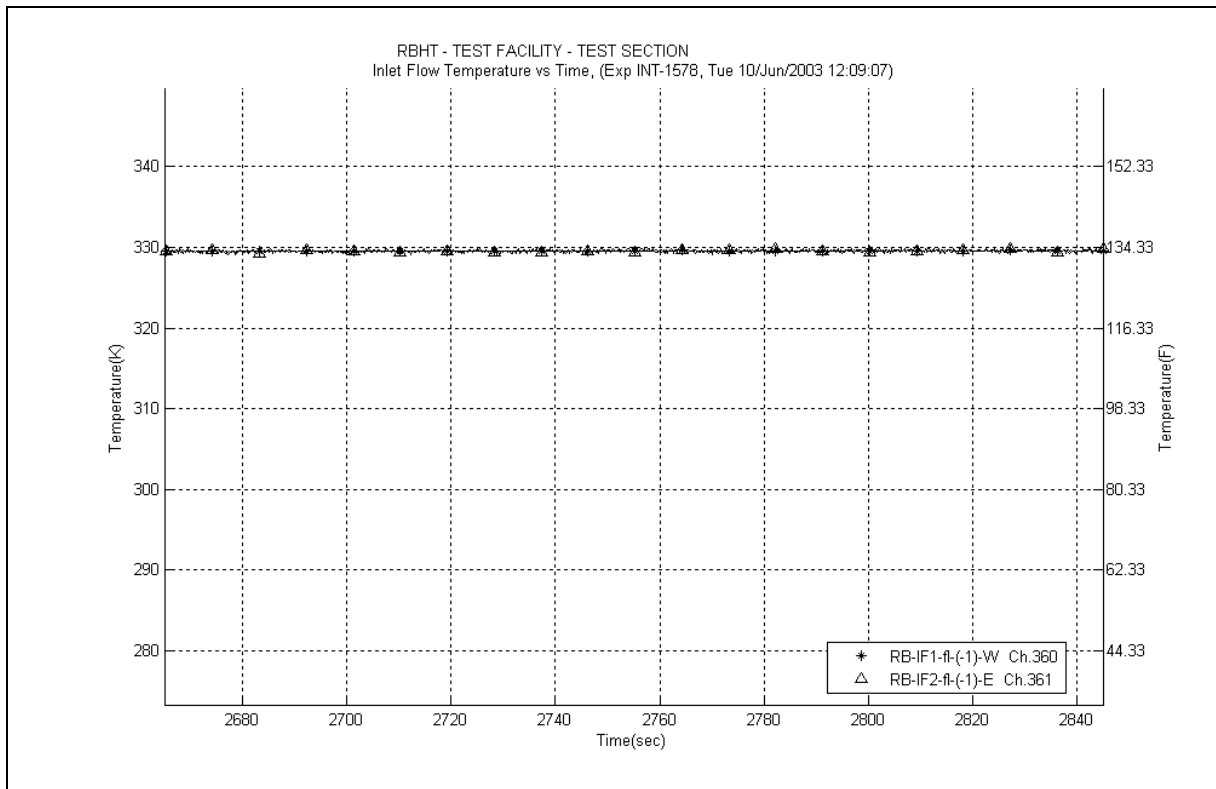


Figure A-142 Inlet Temperature Plot for Experiment 1578G

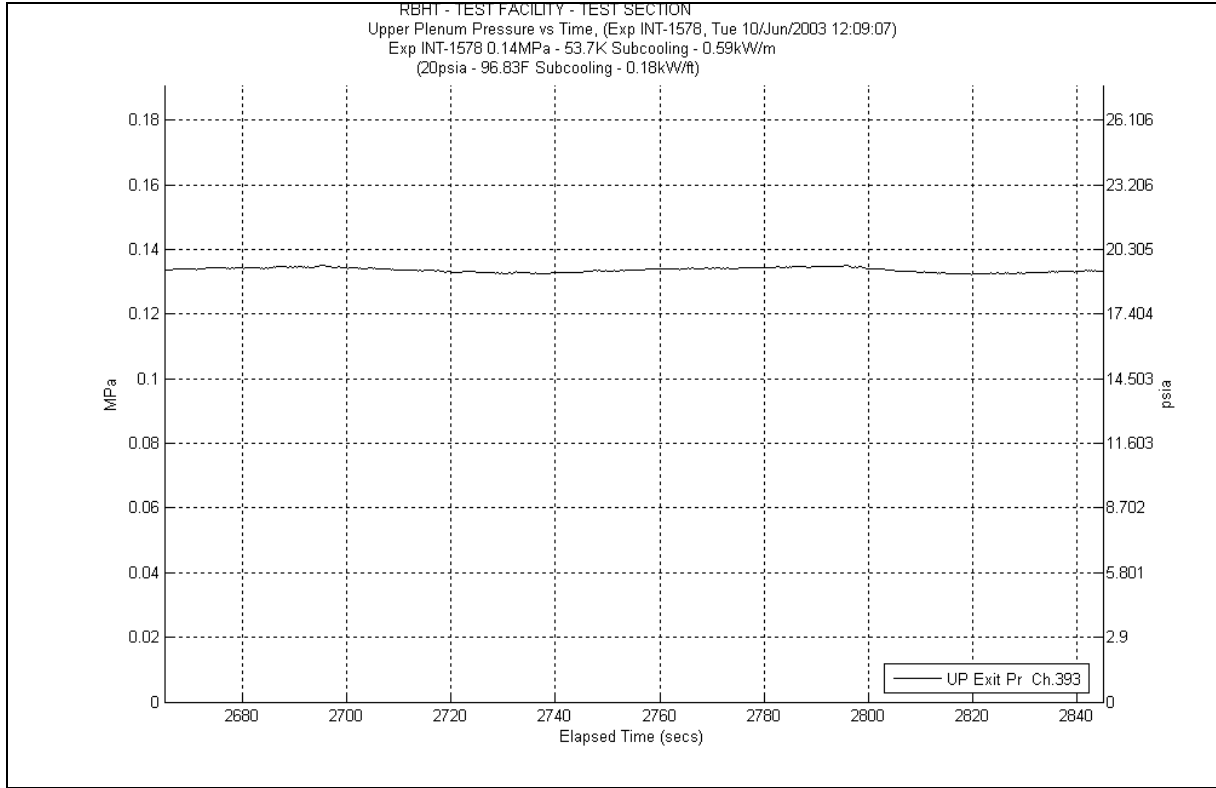


Figure A-143 System Pressure Plot for Experiment 1578G

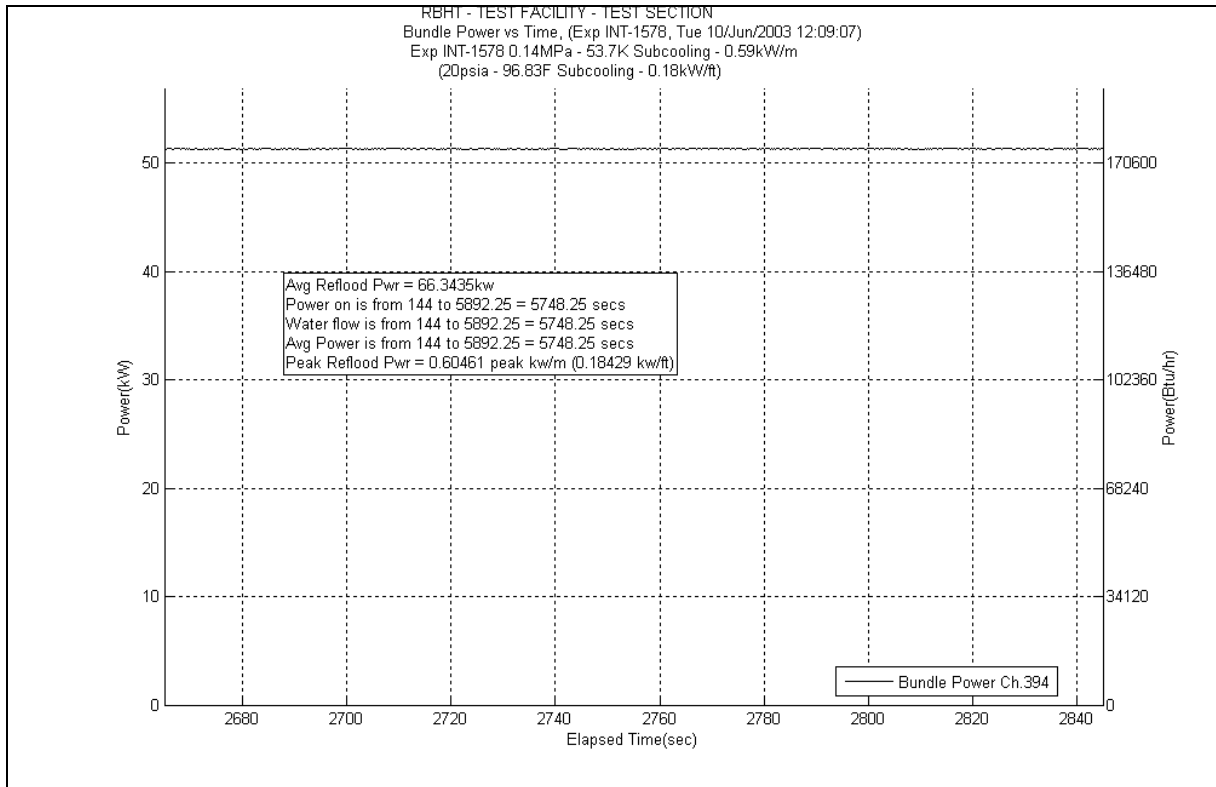


Figure A-144 Bundle Power Plot for Experiment 1578G

Table A-57 Data Results for RBHT Test 1578G for Time Period 2665 to 2845 seconds

Results for RBHT Test 1578
 Valid Time Period 2665 to 2845 seconds
 Collapsed Liquid Level = 55.809 inches = 1417.55 mm
 (Z_{OSL}) Onset of Significant Void = 6.5 inches = 165 mm
 ($Z_{2\sigma}$) Two-Phase Level (Dryout) = 97.20 inches = 2468.88 mm
 (S) Level Swell = 2.029

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	1.002	-0.093	-4.476	0.056	2.681	0.000	0.000	0.000	0.000	-0.149	-7.134	2879.851	137888.006	1.003	0.998	1.008
*	120-133	3048-3378	383	0.971	1.984	94.987	0.066	3.160	0.000	0.000	1.518	72.675	0.4	19.152	2880.251	137907.1581	0.994	0.989	0.999
*	108-120	2743-3048	382	0.937	3.921	187.737	0.061	2.921	0.000	0.000	2.429	116.299	1.431	68.517	2881.682	137975.6748	0.977	0.972	0.982
	100-108	2540-2743	381	0.967	1.387	66.392	0.063	3.016	0.015	0.718	0.000	0.000	1.308	62.627	2882.99	138038.3021	0.969	0.964	0.974
	97-100	2464-2540	380	0.924	1.179	56.445	0.025	1.197	0.021	1.005	0.000	0.000	1.131	54.153	2884.121	138092.4547	0.927	0.922	0.932
	93-97	2362-2464	379	0.882	2.462	117.864	0.033	1.580	0.028	1.341	0.000	0.000	2.401	114.960	2886.522	138207.4152	0.884	0.880	0.888
*	85-93	2159-2362	378	0.710	12.033	576.141	0.063	3.016	0.053	2.538	5.905	282.730	6.012	287.856	2892.534	138495.2713	0.855	0.851	0.859
	81-85	2057-2159	377	0.824	3.666	175.553	0.029	1.389	0.026	1.245	0.000	0.000	3.611	172.896	2896.145	138668.1669	0.826	0.822	0.830
	78-81	1981-2057	376	0.680	4.991	238.960	0.020	0.958	0.019	0.910	0.000	0.000	4.951	237.055	2901.096	138905.2221	0.682	0.679	0.685
	75-78	1905-1981	375	0.678	5.012	239.955	0.019	0.910	0.018	0.862	0.000	0.000	4.973	238.109	2906.069	139143.3306	0.681	0.678	0.684
	72-75	1829-1905	374	0.654	5.385	257.858	0.018	0.862	0.018	0.862	0.000	0.000	5.347	256.016	2911.416	139399.3463	0.657	0.654	0.660
*	67-72	1702-1829	373	0.519	12.500	598.520	0.028	1.341	0.029	1.389	4.322	206.955	8.121	388.836	2919.537	139788.1819	0.687	0.684	0.690
	63-67	1600-1702	372	0.716	5.910	282.973	0.021	1.005	0.022	1.053	0.000	0.000	5.864	280.770	2925.401	140068.9517	0.718	0.714	0.722
	60-63	1524-1600	371	0.558	6.892	329.969	0.014	0.670	0.016	0.766	0.000	0.000	6.857	328.315	2932.258	140397.2666	0.56	0.557	0.563
	57-60	1448-1524	370	0.527	7.375	353.094	0.014	0.670	0.016	0.766	0.000	0.000	7.343	351.585	2939.601	140748.8514	0.529	0.526	0.532
	53-57	1346-1448	369	0.483	10.740	514.225	0.017	0.814	0.020	0.958	0.000	0.000	10.7	512.319	2950.301	141261.1701	0.485	0.483	0.487
*	46-53	1168-1346	368	0.333	24.242	1160.735	0.026	1.245	0.034	1.628	6.282	300.806	17.9	857.057	2968.201	142118.2267	0.507	0.504	0.510
	43-46	1092-1168	367	0.529	7.343	351.602	0.010	0.479	0.014	0.670	0.000	0.000	7.319	350.436	2975.52	142468.6623	0.53	0.527	0.533
	37-43	940-1092	366	0.470	16.510	790.484	0.017	0.814	0.026	1.245	0.000	0.000	16.46	788.109	2991.98	143256.7713	0.472	0.470	0.474
*	25-37	635-940	365	0.256	46.350	2219.272	0.023	1.101	0.048	2.298	3.539	169.471	42.74	2046.402	3034.72	145303.1735	0.314	0.312	0.316
	13-25	330-635	364	0.156	52.619	2519.403	0.010	0.479	0.033	1.580	0.000	0.000	52.56	2516.586	3087.28	147819.7598	0.156	0.155	0.157
*	0-13	0-330	363	0.020	66.137	3166.659	0.000	0.000	0.000	0.000	3.917	187.550	62.22	2979.110	3149.5	150798.8694	0.078	0.074	0.082

Table A-58 Energy Balance Results for RBHT Test 1578G for Time Period 2665 to 2845 seconds

Results for RBHT Test 1578 Valid Time Period 2665 to 2845 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2327.9047	7.343542	0.00E+00	0.00E+00	0.00E+00	1.44E-02	6.51E-03
0.25	6.35	2457.2328	7.751516	0.00E+00	0.00E+00	0.00E+00	1.44E-02	6.51E-03
0.50	12.70	2586.5608	8.159491	0.00E+00	0.00E+00	0.00E+00	1.44E-02	6.51E-03
0.75	19.05	2715.8888	8.567465	0.00E+00	0.00E+00	0.00E+00	1.44E-02	6.51E-03
1.00	25.40	2845.2169	8.97544	0.00E+00	0.00E+00	0.00E+00	1.44E-02	6.51E-03
1.25	31.75	2974.5449	9.383414	0.00E+00	0.00E+00	0.00E+00	1.44E-02	6.51E-03
1.50	38.10	3103.873	9.791389	1.75E-02	2.99E-01	1.36E-01	1.41E-02	6.40E-03
1.75	44.45	3233.201	10.19936	4.01E-02	6.86E-01	3.11E-01	1.38E-02	6.25E-03
2.00	50.80	3362.5291	10.60734	6.36E-02	1.09E+00	4.94E-01	1.34E-02	6.10E-03
2.25	57.15	3491.8571	11.01531	8.80E-02	1.51E+00	6.84E-01	1.31E-02	5.94E-03
2.50	63.50	3621.1851	11.42329	1.13E-01	1.94E+00	8.81E-01	1.27E-02	5.78E-03
2.75	69.85	3750.5132	11.83126	1.40E-01	2.39E+00	1.09E+00	1.24E-02	5.60E-03
3.00	76.20	3879.8412	12.23924	1.67E-01	2.86E+00	1.30E+00	1.20E-02	5.43E-03
3.25	82.55	4009.1693	12.64721	1.95E-01	3.34E+00	1.51E+00	1.16E-02	5.24E-03
3.50	88.90	4138.4973	13.05519	2.24E-01	3.84E+00	1.74E+00	1.11E-02	5.05E-03
3.75	95.25	4267.8253	13.46316	2.54E-01	4.35E+00	1.97E+00	1.07E-02	4.86E-03
4.00	101.60	4397.1534	13.87113	2.85E-01	4.88E+00	2.21E+00	1.03E-02	4.66E-03
4.25	107.95	4526.4814	14.27911	3.17E-01	5.42E+00	2.46E+00	9.81E-03	4.45E-03
4.50	114.30	4655.8095	14.68708	3.50E-01	5.99E+00	2.71E+00	9.34E-03	4.24E-03
4.75	120.65	4785.1375	15.09506	3.83E-01	6.56E+00	2.98E+00	8.86E-03	4.02E-03
5.00	127.00	4914.4655	15.50303	4.18E-01	7.15E+00	3.24E+00	8.36E-03	3.79E-03
5.25	133.35	5043.7936	15.91101	4.53E-01	7.76E+00	3.52E+00	7.85E-03	3.56E-03
5.50	139.70	5173.1216	16.31898	4.90E-01	8.38E+00	3.80E+00	7.33E-03	3.32E-03
5.75	146.05	5302.4497	16.72696	5.27E-01	9.02E+00	4.09E+00	6.79E-03	3.08E-03
6.00	152.40	5431.7777	17.13493	5.65E-01	9.68E+00	4.39E+00	6.24E-03	2.83E-03
6.25	158.75	5561.1057	17.5429	6.04E-01	1.04E+01	4.69E+00	5.68E-03	2.58E-03
6.50	165.10	5690.4338	17.95088	6.45E-01	1.10E+01	5.01E+00	5.10E-03	2.31E-03
6.75	171.45	5819.7618	18.35885	6.86E-01	1.17E+01	5.33E+00	4.51E-03	2.05E-03
7.00	177.80	5949.0899	18.76683	7.28E-01	1.25E+01	5.65E+00	3.91E-03	1.78E-03
7.25	184.15	6078.4179	19.1748	7.70E-01	1.32E+01	5.98E+00	3.30E-03	1.50E-03
7.50	190.50	6207.7459	19.58278	8.14E-01	1.39E+01	6.32E+00	2.67E-03	1.21E-03
7.75	196.85	6337.074	19.99075	8.59E-01	1.47E+01	6.67E+00	2.02E-03	9.18E-04
8.00	203.20	6466.402	20.39873	9.05E-01	1.55E+01	7.03E+00	1.37E-03	6.21E-04
8.25	209.55	6595.7301	20.8067	9.51E-01	1.63E+01	7.39E+00	7.01E-04	3.18E-04
8.50	215.90	6725.0581	21.21468	9.99E-01	1.71E+01	7.76E+00	1.87E-05	8.47E-06
8.75	222.25	6854.3861	21.62265	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
9.00	228.60	6983.7142	22.03062	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
9.25	234.95	6595.7301	20.8067	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
9.50	241.30	6207.7459	19.58278	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
9.75	247.65	5819.7618	18.35885	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
10.00	254.00	5431.7777	17.13493	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
10.25	260.35	5043.7936	15.91101	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
10.50	266.70	4655.8095	14.68708	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
10.75	273.05	4267.8253	13.46316	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
11.00	279.40	3879.8412	12.23924	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
11.25	285.75	3491.8571	11.01531	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
11.50	292.10	3103.873	9.791389	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
11.75	298.45	2715.8888	8.567465	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00
12.00	304.80	2327.9047	7.343542	1.00E+00	1.71E+01	7.77E+00	0.00E+00	0.00E+00

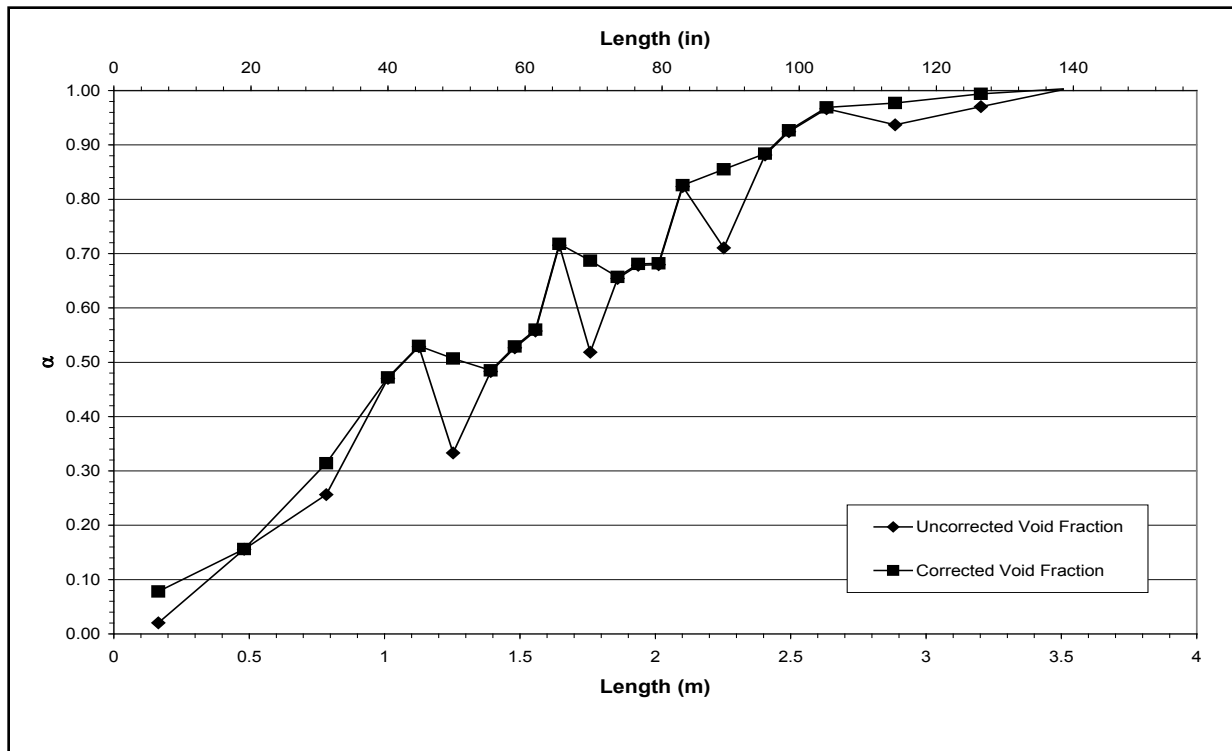


Figure A-145 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1578G for Time Period 2665 to 2845 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1578-H

Test Conditions

Date: 6/10/2003

Steady-state time window: 4279 – 4335 seconds

Inlet flow rate: 1.471 cm/sec (0.579 in./sec)

Inlet mass flow rate: 0.070 kg/sec (0.155 lbm/sec)

Inlet flow temperature: 328.5 K (131.7 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 69.53 kW

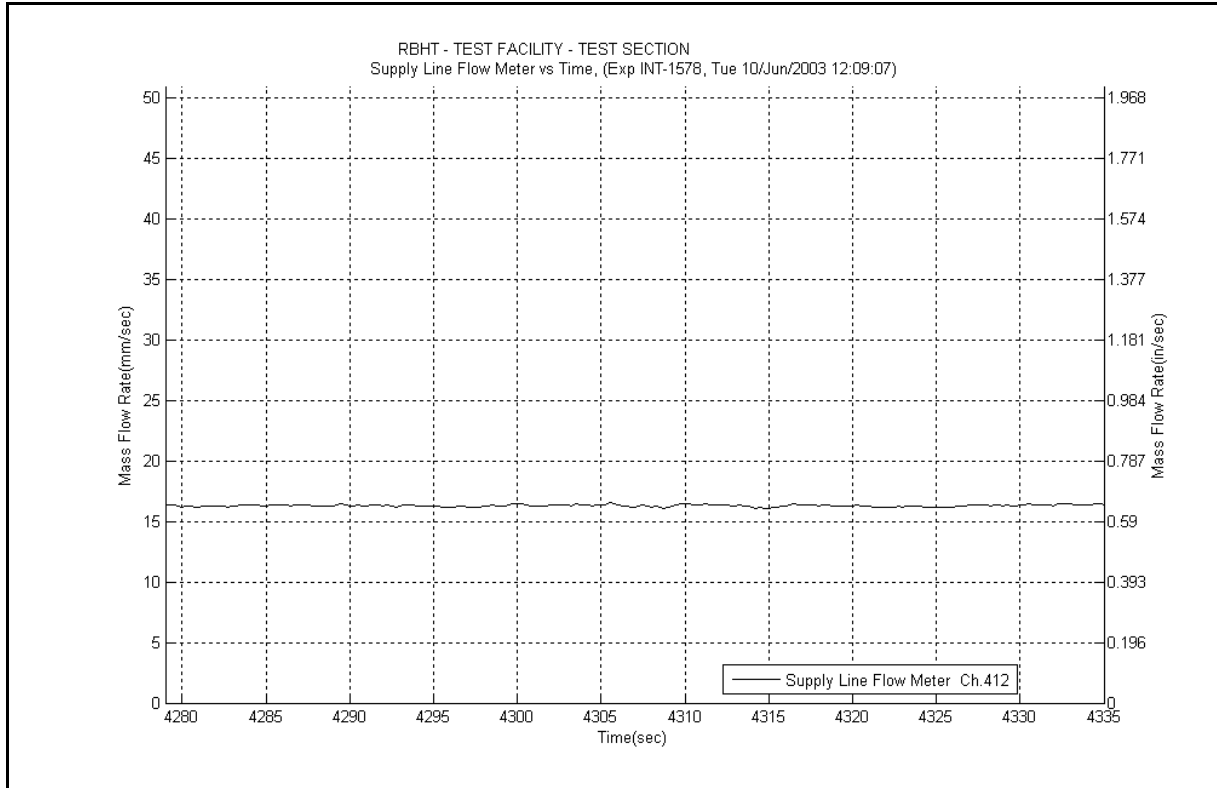


Figure A-146 Inlet Flow Plot for Experiment 1578H

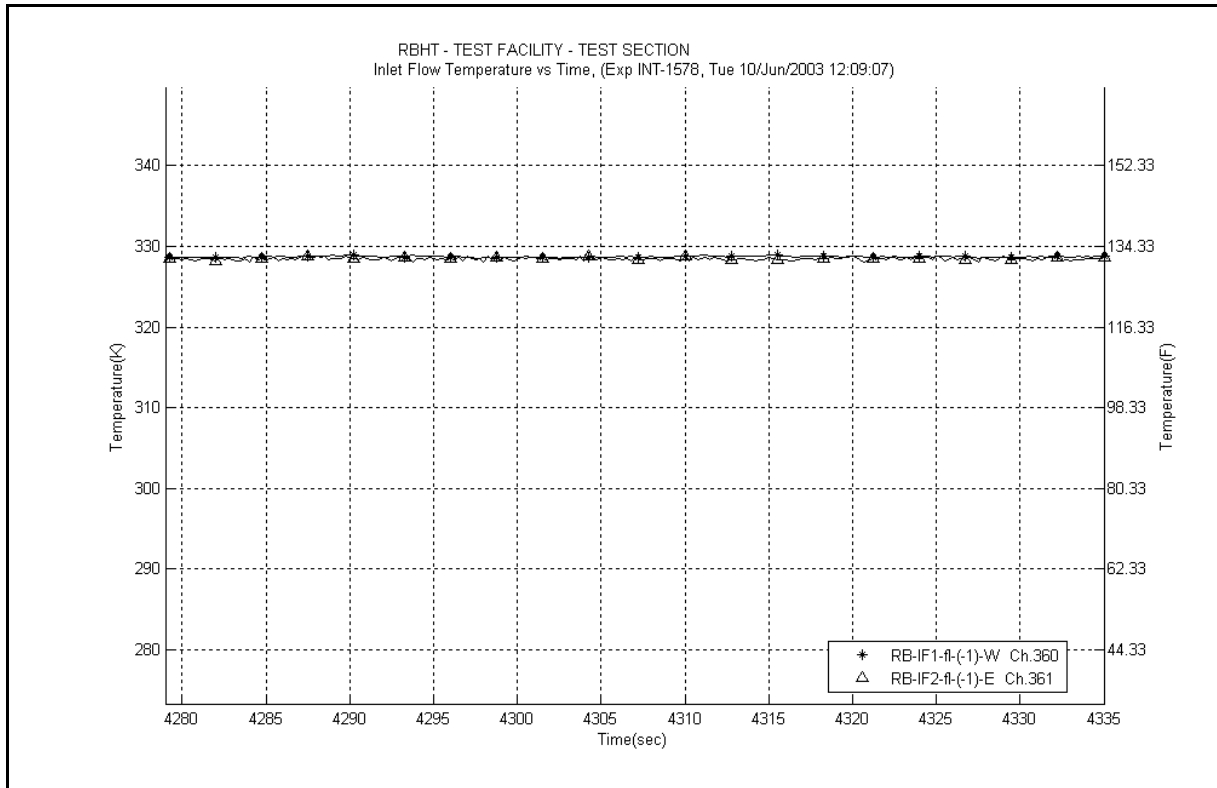


Figure A-147 Inlet Temperature Plot for Experiment 1578H

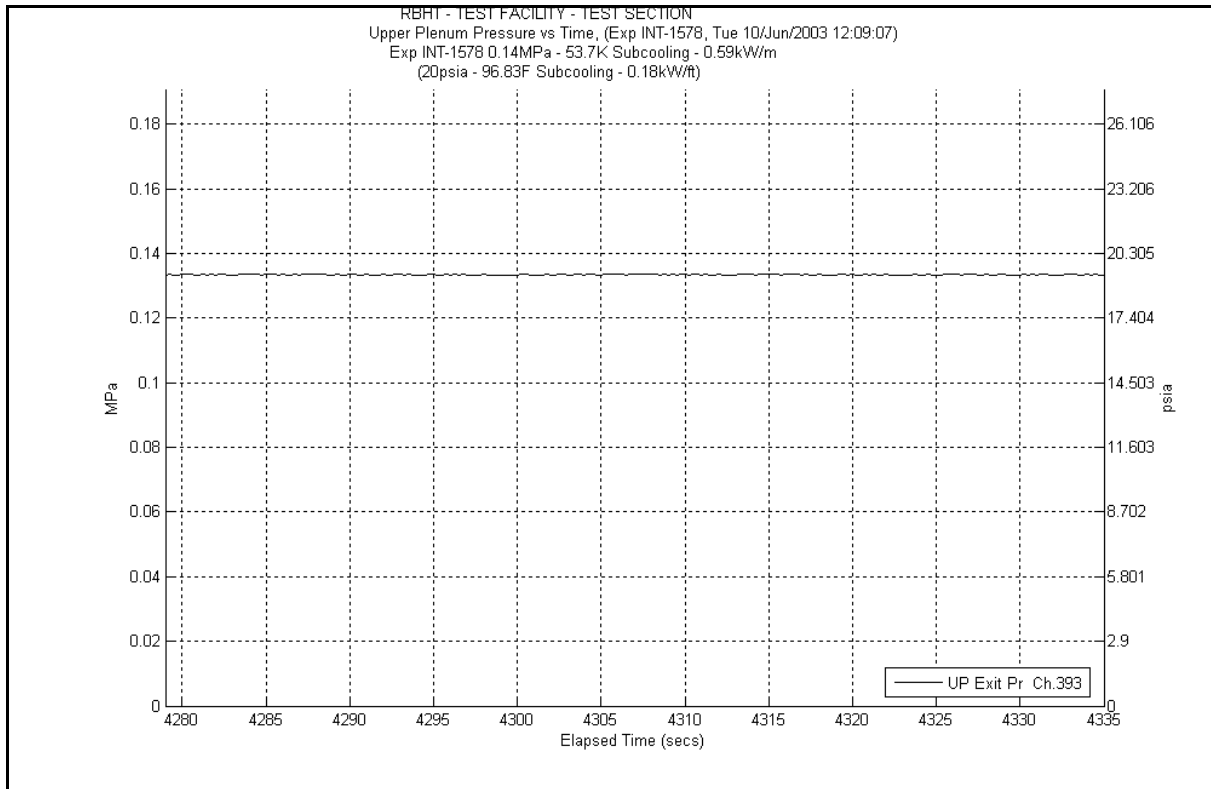


Figure A-148 System Pressure Plot for Experiment 1578H

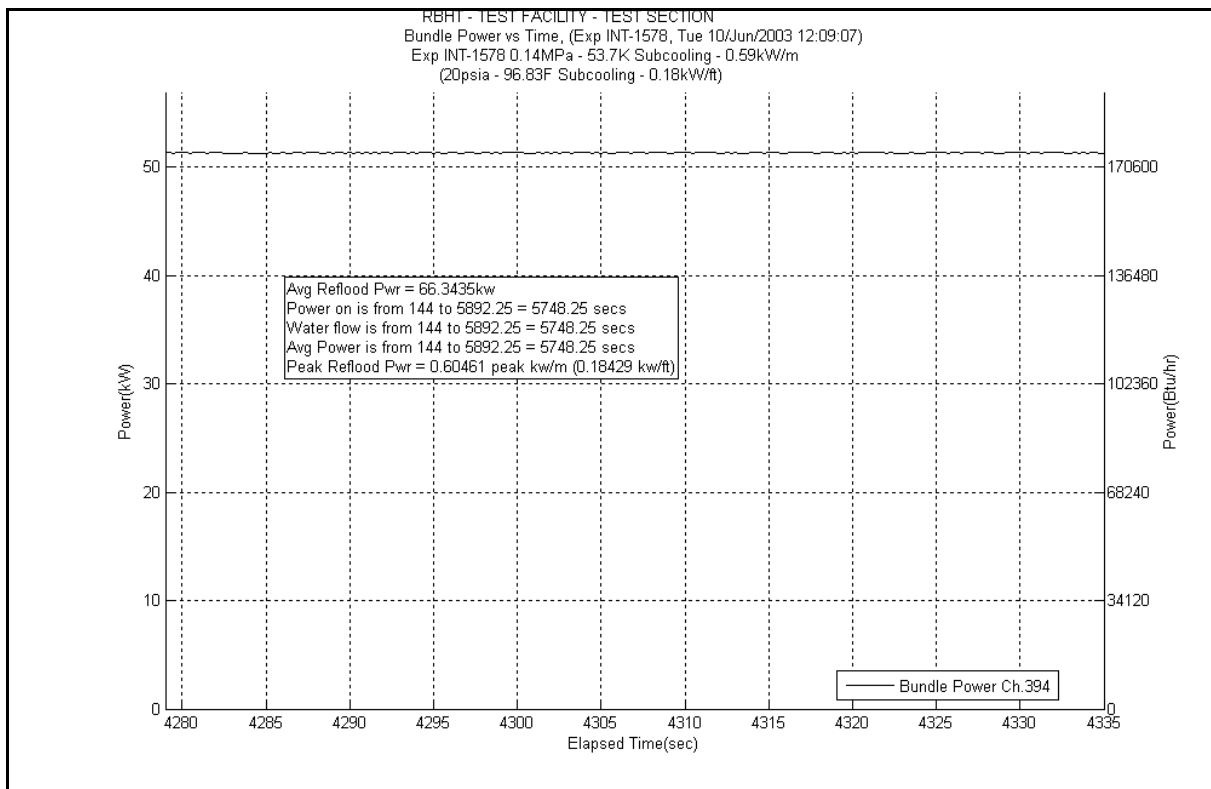


Figure A-149 Bundle Power Plot for Experiment 1578H

Table A-59 Data Results for RBHT Test 1578H for Time Period 4279 to 4335 seconds

Results for RBHT Test 1578
Valid Time Period 4279 to 4335 seconds
Collapsed Liquid Level = 89.822 inches = 2281.48 mm
(Z_{OSV}) Onset of Significant Void = 49.5 inches = 1257 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lb/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.750	14.302	684.804	0.456	21.833	0.126	6.033	0.000	0.000	13.71	656.438	2893.71	138551.5785	0.76	0.756	0.764
*	120-133	3048-3378	383	0.730	18.249	873.784	0.499	23.892	0.224	10.725	0.886	42.439	16.64	796.727	2910.35	139348.306	0.753	0.749	0.757
*	108-120	2743-3048	382	0.648	21.947	1050.829	0.408	19.535	0.280	13.406	5.099	244.142	16.16	773.745	2926.51	140122.0509	0.741	0.737	0.745
	100-108	2540-2743	381	0.724	11.482	549.783	0.238	11.396	0.205	9.815	0.000	0.000	11.04	528.598	2937.55	140650.649	0.734	0.730	0.738
	97-100	2464-2540	380	0.601	6.211	297.395	0.082	3.926	0.074	3.543	0.000	0.000	6.055	289.915	2943.605	140940.5639	0.611	0.608	0.614
	93-97	2362-2464	379	0.594	8.434	403.821	0.103	4.932	0.097	4.644	0.000	0.000	8.234	394.246	2951.839	141334.8099	0.604	0.601	0.607
*	85-93	2159-2362	378	0.446	23.012	1101.803	0.185	8.858	0.185	8.858	7.582	363.011	15.06	721.077	2966.899	142055.8866	0.638	0.635	0.641
	81-85	2057-2159	377	0.663	6.995	334.942	0.082	3.926	0.089	4.261	0.000	0.000	6.823	326.687	2973.722	142382.5736	0.672	0.669	0.675
	78-81	1981-2057	376	0.497	7.832	374.976	0.057	2.729	0.065	3.112	0.000	0.000	7.705	368.917	2981.427	142751.491	0.505	0.502	0.508
	75-78	1905-1981	375	0.484	8.034	384.674	0.053	2.538	0.063	3.016	0.000	0.000	7.914	378.924	2989.341	143130.4153	0.492	0.490	0.494
	72-75	1829-1905	374	0.417	9.088	435.151	0.049	2.346	0.062	2.969	0.000	0.000	8.976	429.773	2998.317	143560.1885	0.424	0.422	0.426
*	67-72	1702-1829	373	0.364	16.504	790.235	0.074	3.543	0.100	4.788	2.050	98.174	14.28	683.730	3012.597	144243.9186	0.45	0.448	0.452
	63-67	1600-1702	372	0.470	11.010	527.155	0.051	2.442	0.077	3.687	0.000	0.000	10.88	520.937	3023.477	144764.8558	0.476	0.474	0.478
	60-63	1524-1600	371	0.340	10.283	492.343	0.033	1.580	0.056	2.681	0.000	0.000	10.19	487.900	3033.667	145252.7556	0.346	0.344	0.348
	57-60	1448-1524	370	0.306	10.807	517.457	0.029	1.389	0.055	2.633	0.000	0.000	10.72	513.276	3044.387	145766.032	0.312	0.310	0.314
	53-57	1346-1448	369	0.198	16.660	797.695	0.032	1.532	0.071	3.399	0.000	0.000	16.55	792.418	3060.937	146558.4502	0.203	0.202	0.204
*	46-53	1168-1346	368	0.066	33.949	1625.477	0.034	1.628	0.117	5.602	1.838	87.994	31.96	1530.253	3092.897	148088.7032	0.121	0.120	0.122
	43-46	1092-1168	367	0.036	15.014	718.870	0.004	0.192	0.024	1.149	0.000	0.000	14.98	717.246	3107.877	148805.9495	0.038	0.036	0.040
	37-43	940-1092	366	0.036	30.028	1437.740	0.001	0.048	0.000	0.000	0.000	0.000	30.02	1437.365	3137.897	150243.3148	0.036	0.034	0.038
*	25-37	635-940	365	0.026	60.689	2905.817	0.001	0.048	0.000	0.000	0.218	10.450	60.47	2895.319	3198.367	153138.6339	0.029	0.028	0.030
	13-25	330-635	364	0.022	60.933	2917.504	0.001	0.048	0.000	0.000	0.000	0.000	60.91	2916.386	3259.277	156055.0204	0.022	0.021	0.023
*	0-13	0-330	363	0.010	66.838	3200.228	0.001	0.048	0.000	0.000	0.097	4.652	66.74	3195.528	3326.017	159250.5487	0.011	0.010	0.012

Table A-60 Energy Balance Results for RBHT Test 1578H for Time Period 4279 to 4335 seconds

Results for RBHT Test 1578 Valid Time Period 4279 to 4335 seconds								
Elevation	Elevation	q _w ["]	q _w ["]	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2327.9737	7.343759	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
0.25	6.35	2457.3056	7.751746	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
0.50	12.70	2586.6375	8.159733	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
0.75	19.05	2715.9694	8.567719	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
1.00	25.40	2845.3012	8.975706	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
1.25	31.75	2974.6331	9.383693	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
1.50	38.10	3103.965	9.791679	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
1.75	44.45	3233.2969	10.19967	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
2.00	50.80	3362.6287	10.60765	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
2.25	57.15	3491.9606	11.01564	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
2.50	63.50	3621.2925	11.42363	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
2.75	69.85	3750.6244	11.83161	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
3.00	76.20	3879.9562	12.2396	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
3.25	82.55	4009.2881	12.64759	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
3.50	88.90	4138.62	13.05557	0.00E+00	0.00E+00	0.00E+00	4.98E-02	2.26E-02
3.75	95.25	4267.9519	13.46356	1.48E-03	8.84E-02	4.01E-02	4.97E-02	2.25E-02
4.00	101.60	4397.2837	13.87155	1.04E-02	6.19E-01	2.81E-01	4.92E-02	2.23E-02
4.25	107.95	4526.6156	14.27953	1.96E-02	1.17E+00	5.29E-01	4.88E-02	2.21E-02
4.50	114.30	4655.9475	14.68752	2.90E-02	1.73E+00	7.84E-01	4.83E-02	2.19E-02
4.75	120.65	4785.2794	15.09551	3.87E-02	2.31E+00	1.05E+00	4.78E-02	2.17E-02
5.00	127.00	4914.6112	15.50349	4.87E-02	2.90E+00	1.32E+00	4.73E-02	2.15E-02
5.25	133.35	5043.9431	15.91148	5.90E-02	3.51E+00	1.59E+00	4.68E-02	2.12E-02
5.50	139.70	5173.275	16.31947	6.95E-02	4.14E+00	1.88E+00	4.63E-02	2.10E-02
5.75	146.05	5302.6069	16.72745	8.02E-02	4.78E+00	2.17E+00	4.58E-02	2.08E-02
6.00	152.40	5431.9387	17.13544	9.13E-02	5.44E+00	2.47E+00	4.52E-02	2.05E-02
6.25	158.75	5561.2706	17.54343	1.03E-01	6.11E+00	2.77E+00	4.47E-02	2.03E-02
6.50	165.10	5690.6025	17.95141	1.14E-01	6.80E+00	3.09E+00	4.41E-02	2.00E-02
6.75	171.45	5819.9344	18.3594	1.26E-01	7.50E+00	3.40E+00	4.35E-02	1.97E-02
7.00	177.80	5949.2662	18.76739	1.38E-01	8.23E+00	3.73E+00	4.29E-02	1.95E-02
7.25	184.15	6078.5981	19.17537	1.51E-01	8.96E+00	4.07E+00	4.23E-02	1.92E-02
7.50	190.50	6207.93	19.58336	1.63E-01	9.71E+00	4.41E+00	4.16E-02	1.89E-02
7.75	196.85	6337.2619	19.99134	1.76E-01	1.05E+01	4.75E+00	4.10E-02	1.86E-02
8.00	203.20	6466.5937	20.39933	1.89E-01	1.13E+01	5.11E+00	4.03E-02	1.83E-02
8.25	209.55	6595.9256	20.80732	2.03E-01	1.21E+01	5.47E+00	3.97E-02	1.80E-02
8.50	215.90	6725.2575	21.2153	2.16E-01	1.29E+01	5.84E+00	3.90E-02	1.77E-02
8.75	222.25	6854.5894	21.62329	2.30E-01	1.37E+01	6.22E+00	3.83E-02	1.74E-02
9.00	228.60	6983.9212	22.03128	2.45E-01	1.46E+01	6.61E+00	3.76E-02	1.70E-02
9.25	234.95	6595.9256	20.80732	2.59E-01	1.54E+01	6.98E+00	3.69E-02	1.67E-02
9.50	241.30	6207.93	19.58336	2.72E-01	1.62E+01	7.34E+00	3.62E-02	1.64E-02
9.75	247.65	5819.9344	18.3594	2.84E-01	1.69E+01	7.68E+00	3.56E-02	1.62E-02
10.00	254.00	5431.9387	17.13544	2.96E-01	1.76E+01	7.99E+00	3.51E-02	1.59E-02
10.25	260.35	5043.9431	15.91148	3.06E-01	1.82E+01	8.28E+00	3.45E-02	1.57E-02
10.50	266.70	4655.9475	14.68752	3.16E-01	1.88E+01	8.55E+00	3.40E-02	1.54E-02
10.75	273.05	4267.9519	13.46356	3.26E-01	1.94E+01	8.80E+00	3.36E-02	1.52E-02
11.00	279.40	3879.9562	12.2396	3.34E-01	1.99E+01	9.02E+00	3.31E-02	1.50E-02
11.25	285.75	3491.9606	11.01564	3.42E-01	2.03E+01	9.23E+00	3.28E-02	1.49E-02
11.50	292.10	3103.965	9.791679	3.48E-01	2.07E+01	9.41E+00	3.24E-02	1.47E-02
11.75	298.45	2715.9694	8.567719	3.54E-01	2.11E+01	9.57E+00	3.21E-02	1.46E-02
12.00	304.80	2327.9737	7.343759	3.60E-01	2.14E+01	9.71E+00	3.19E-02	1.45E-02

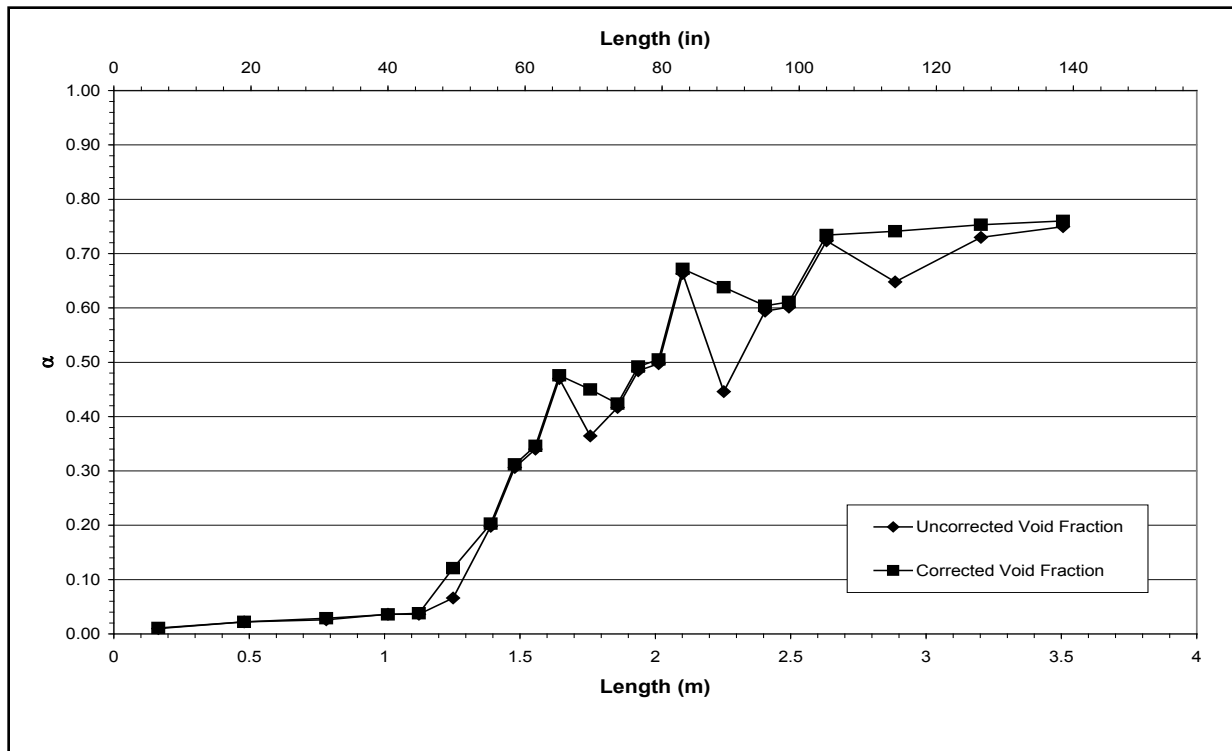


Figure A-150 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1578H for Time Period 4279 to 4335 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1578-I

Test Conditions

Date: 6/10/2003

Steady-state time window: 5296 – 5370 seconds

Inlet flow rate: 2.035 cm/sec (0.801 in./sec)

Inlet mass flow rate: 0.097 kg/sec (0.214 lbm/sec)

Inlet flow temperature: 328.5 K (131.7 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 69.53 kW

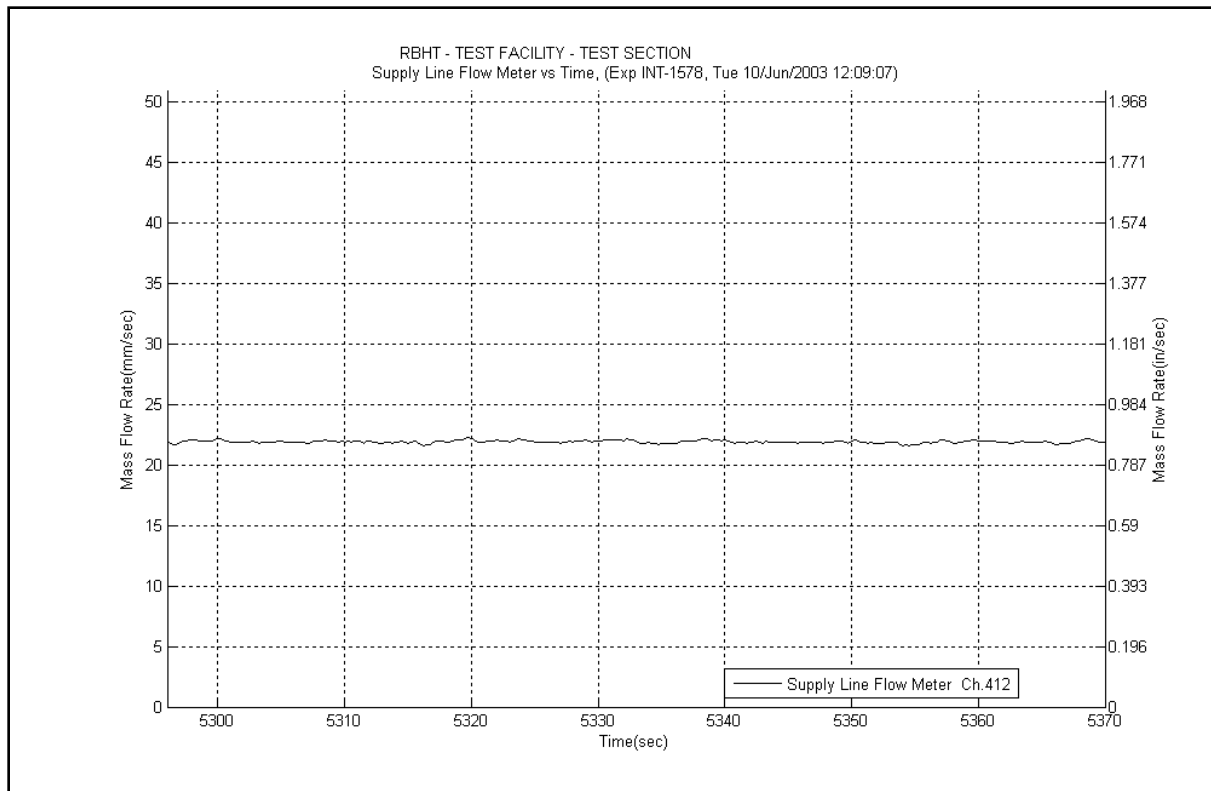


Figure A-151 Inlet Flow Plot for Experiment 1578I

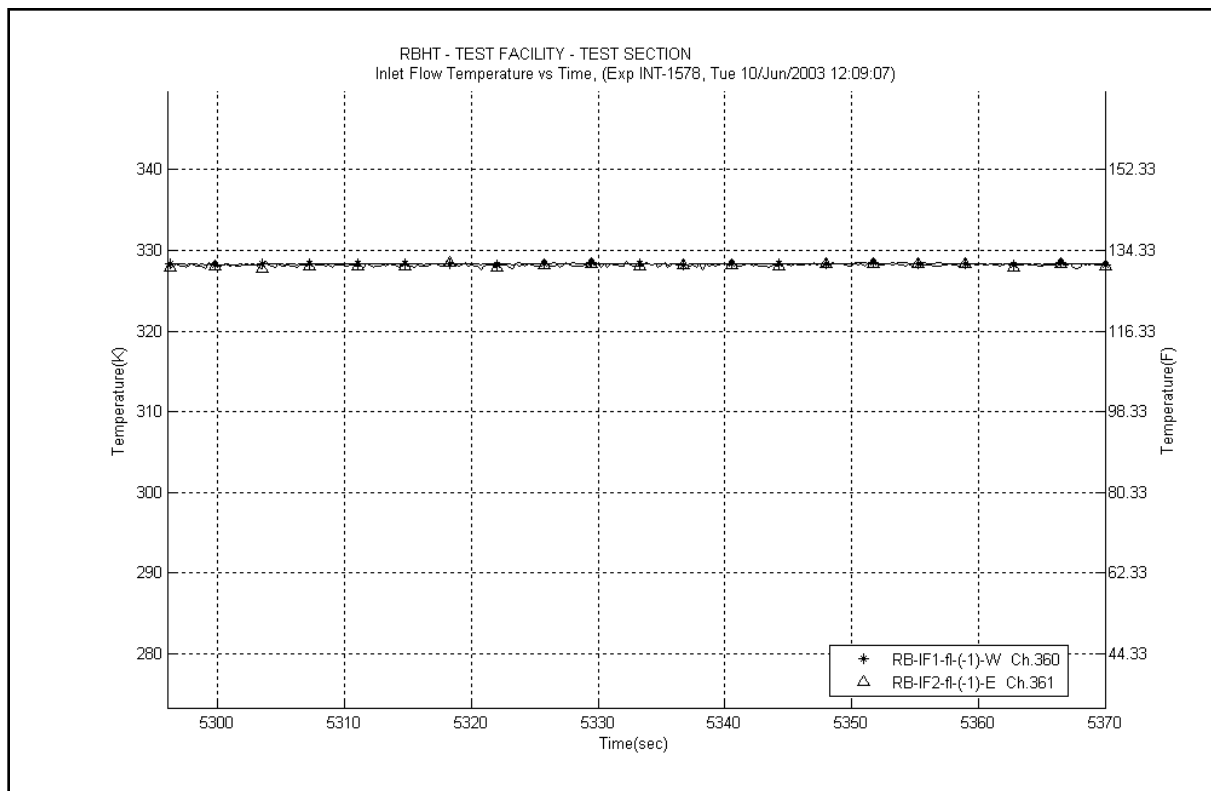


Figure A-152 Inlet Temperature Plot for Experiment 1578I

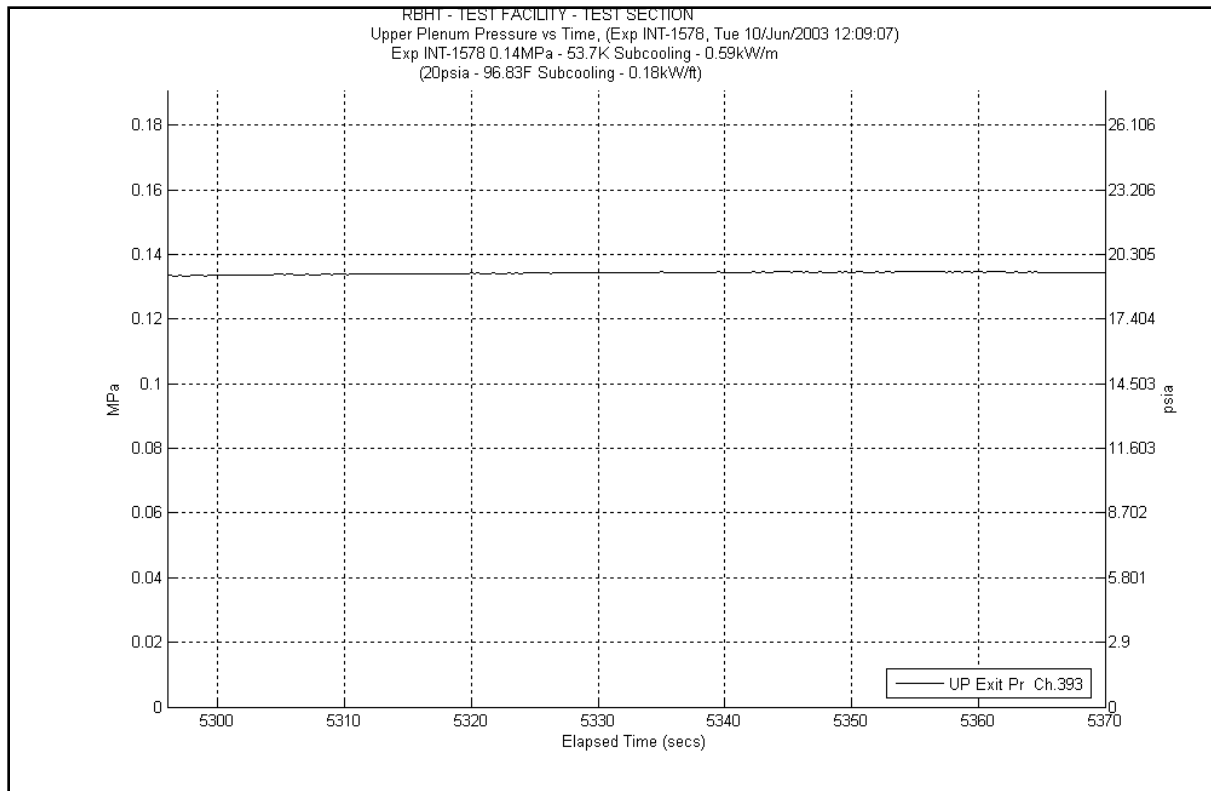


Figure A-153 System Pressure Plot for Experiment 1578I

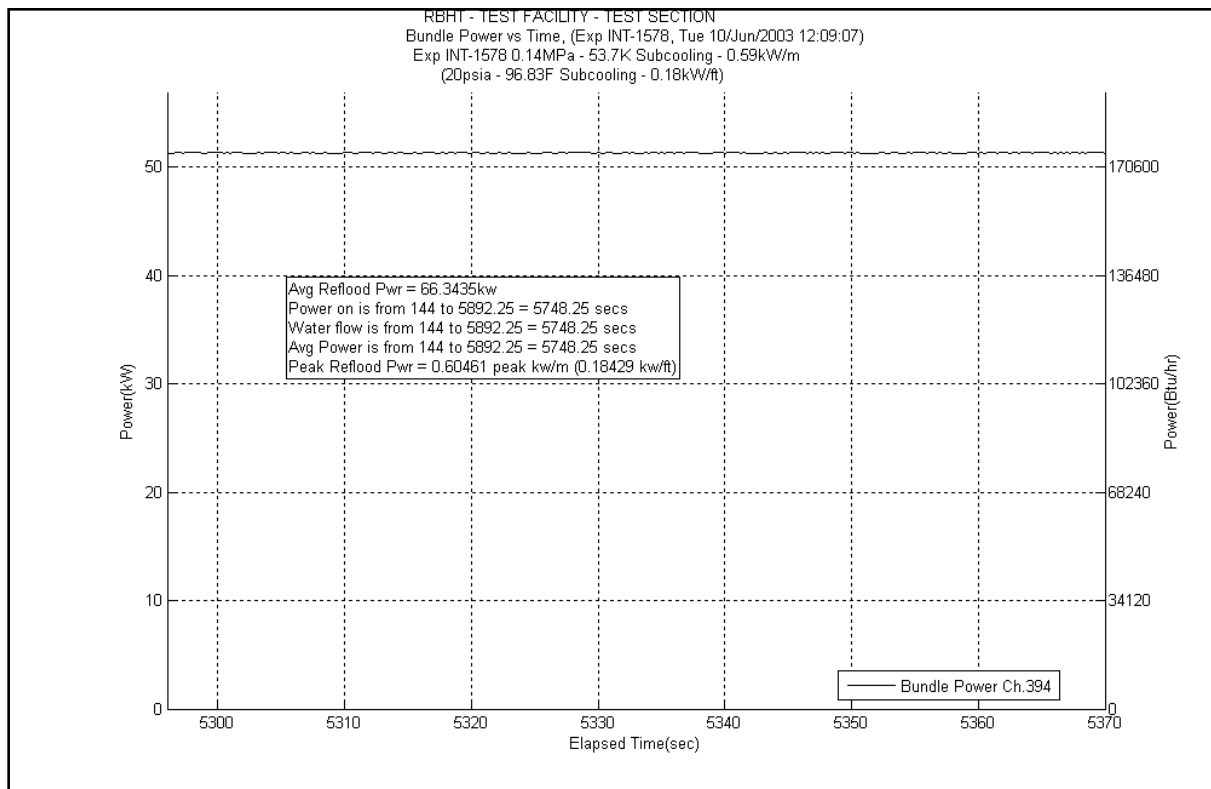


Figure A-154 Bundle Power Plot for Experiment 1578I

Table A-61 Data Results for RBHT Test 1578I for Time Period 5296 to 5370 seconds

Results for RBHT Test 1578
Valid Time Period 5296 to 5370 seconds
Collapsed Liquid Level = 98.800 inches = 2509.51 mm
(Z_{CSV}) Onset of Significant Void = 58.5 inches = 1486 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	α _{uncorrected}	ΔP _{uncorrected} (lbf/ft ²)	ΔP _{uncorrected} (Pa)	ΔP _{fric} (lbf/ft ²)	ΔP _{fric} (Pa)	ΔP _{accel} (lbf/ft ²)	ΔP _{accel} (Pa)	ΔP _{grid} (lbf/ft ²)	ΔP _{grid} (Pa)	ΔP _{corrected} (lbf/ft ²)	ΔP _{corrected} (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	α _{corrected}	α _{min}	α _{max}
	133-144	3378-3658	384	0.701	17.065	817.090	0.592	28.345	0.174	8.331	0.000	0.000	16.3	780.448	2896.3	138675.5883	0.715	0.711	0.719
*	120-133	3048-3378	383	0.692	20.799	995.875	0.645	30.883	0.310	14.843	0.134	6.430	19.71	943.720	2916	139619.3082	0.708	0.704	0.712
*	108-120	2743-3048	382	0.603	24.741	1184.607	0.523	25.041	0.387	18.530	4.811	230.353	19.02	910.682	2935	140529.9907	0.695	0.692	0.698
	100-108	2540-2743	381	0.674	13.539	648.251	0.300	14.364	0.283	13.550	0.000	0.000	12.95	620.049	2948	141150.04	0.688	0.685	0.691
	97-100	2464-2540	380	0.511	7.619	364.781	0.102	4.884	0.102	4.884	0.000	0.000	7.412	354.888	2955.4	141504.9285	0.524	0.521	0.527
	93-97	2362-2464	379	0.528	9.810	469.715	0.126	6.033	0.133	6.368	0.000	0.000	9.546	457.065	2964.9	141961.9934	0.54	0.537	0.543
*	85-93	2159-2362	378	0.405	24.715	1183.363	0.222	10.629	0.256	12.257	5.997	287.141	18.24	873.336	2983.2	142835.3293	0.561	0.558	0.564
	81-85	2057-2159	377	0.571	8.917	426.946	0.095	4.549	0.123	5.889	0.000	0.000	8.697	416.415	2991.9	143251.7439	0.581	0.578	0.584
	78-81	1981-2057	376	0.410	9.197	440.373	0.064	3.064	0.090	4.309	0.000	0.000	9.038	432.742	3000.9	143684.4857	0.42	0.418	0.422
	75-78	1905-1981	375	0.386	9.561	457.779	0.058	2.777	0.088	4.213	0.000	0.000	9.411	450.601	3010.3	144135.0868	0.396	0.394	0.398
	72-75	1829-1905	374	0.329	10.459	500.797	0.051	2.442	0.086	4.118	0.000	0.000	10.32	494.124	3020.6	144629.211	0.337	0.335	0.339
*	67-72	1702-1829	373	0.277	18.784	899.396	0.070	3.352	0.138	6.607	-0.444	-21.246	19.02	910.682	3039.7	145539.8935	0.267	0.266	0.268
	63-67	1600-1702	372	0.190	16.826	805.652	0.041	1.963	0.107	5.123	0.000	0.000	16.67	798.164	3056.3	146338.0574	0.197	0.196	0.198
	60-63	1524-1600	371	0.028	15.139	724.838	0.021	1.005	0.078	3.735	0.000	0.000	15.03	719.640	3071.4	147057.6977	0.035	0.033	0.037
	57-60	1448-1524	370	0.055	14.723	704.945	0.010	0.479	0.071	3.399	0.000	0.000	14.64	700.967	3086	147758.6646	0.06	0.057	0.063
	53-57	1346-1448	369	0.041	19.927	954.101	0.001	0.048	0.000	0.000	0.000	0.000	19.92	953.775	3105.9	148712.4393	0.041	0.039	0.043
*	46-53	1168-1346	368	0.038	34.956	1673.717	0.001	0.048	0.000	0.000	-0.145	-6.928	35.1	1680.597	3141	150393.0364	0.034	0.032	0.036
	43-46	1092-1168	367	0.027	15.154	725.584	0.001	0.048	0.000	0.000	0.000	0.000	15.15	725.386	3156.2	151118.4223	0.027	0.026	0.028
	37-43	940-1092	366	0.029	30.256	1448.681	0.001	0.048	0.000	0.000	0.000	0.000	30.24	1447.899	3186.4	152566.3212	0.029	0.028	0.030
*	25-37	635-940	365	0.021	61.032	2922.229	0.003	0.144	0.000	0.000	0.249	11.923	60.78	2910.162	3247.2	155476.4832	0.024	0.023	0.025
	13-25	330-635	364	0.020	61.089	2924.964	0.003	0.144	0.000	0.000	0.000	0.000	61.07	2924.047	3308.3	158400.5305	0.02	0.019	0.021
*	0-13	0-330	363	0.009	66.895	3202.963	0.003	0.144	0.000	0.000	0.072	3.461	66.82	3199.359	3375.1	161599.8893	0.01	0.010	0.011

Table A-62 Energy Balance Results for RBHT Test 1578I for Time Period 5296 to 5370 seconds

Results for RBHT Test 1578 Valid Time Period 5296 to 5370 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2327.5966	7.34257	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
0.25	6.35	2456.9076	7.75049	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
0.50	12.70	2586.2185	8.158411	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
0.75	19.05	2715.5294	8.566331	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
1.00	25.40	2844.8403	8.974252	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
1.25	31.75	2974.1513	9.382172	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
1.50	38.10	3103.4622	9.790093	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
1.75	44.45	3232.7731	10.19801	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
2.00	50.80	3362.084	10.60593	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
2.25	57.15	3491.395	11.01385	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
2.50	63.50	3620.7059	11.42178	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
2.75	69.85	3750.0168	11.8297	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
3.00	76.20	3879.3277	12.23762	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
3.25	82.55	4008.6387	12.64554	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
3.50	88.90	4137.9496	13.05346	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
3.75	95.25	4267.2605	13.46138	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
4.00	101.60	4396.5714	13.8693	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
4.25	107.95	4525.8824	14.27722	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
4.50	114.30	4655.1933	14.68514	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
4.75	120.65	4784.5042	15.09306	0.00E+00	0.00E+00	0.00E+00	6.88E-02	3.12E-02
5.00	127.00	4913.8151	15.50098	6.76E-03	5.56E-01	2.52E-01	6.83E-02	3.10E-02
5.25	133.35	5043.1261	15.9089	1.42E-02	1.17E+00	5.29E-01	6.78E-02	3.08E-02
5.50	139.70	5172.437	16.31682	2.18E-02	1.79E+00	8.12E-01	6.73E-02	3.05E-02
5.75	146.05	5301.7479	16.72474	2.96E-02	2.43E+00	1.10E+00	6.68E-02	3.03E-02
6.00	152.40	5431.0588	17.13266	3.75E-02	3.09E+00	1.40E+00	6.62E-02	3.00E-02
6.25	158.75	5560.3697	17.54058	4.57E-02	3.76E+00	1.71E+00	6.57E-02	2.98E-02
6.50	165.10	5689.6807	17.9485	5.41E-02	4.45E+00	2.02E+00	6.51E-02	2.95E-02
6.75	171.45	5818.9916	18.35642	6.27E-02	5.15E+00	2.34E+00	6.45E-02	2.93E-02
7.00	177.80	5948.3025	18.76434	7.14E-02	5.87E+00	2.66E+00	6.39E-02	2.90E-02
7.25	184.15	6077.6134	19.17227	8.04E-02	6.61E+00	3.00E+00	6.33E-02	2.87E-02
7.50	190.50	6206.9244	19.58019	8.95E-02	7.36E+00	3.34E+00	6.27E-02	2.84E-02
7.75	196.85	6336.2353	19.98811	9.88E-02	8.13E+00	3.69E+00	6.20E-02	2.81E-02
8.00	203.20	6465.5462	20.39603	1.08E-01	8.91E+00	4.04E+00	6.14E-02	2.78E-02
8.25	209.55	6594.8571	20.80395	1.18E-01	9.72E+00	4.41E+00	6.07E-02	2.75E-02
8.50	215.90	6724.1681	21.21187	1.28E-01	1.05E+01	4.78E+00	6.00E-02	2.72E-02
8.75	222.25	6853.479	21.61979	1.38E-01	1.14E+01	5.15E+00	5.93E-02	2.69E-02
9.00	228.60	6982.7899	22.02771	1.48E-01	1.22E+01	5.54E+00	5.86E-02	2.66E-02
9.25	234.95	6594.8571	20.80395	1.59E-01	1.30E+01	5.92E+00	5.79E-02	2.63E-02
9.50	241.30	6206.9244	19.58019	1.68E-01	1.38E+01	6.27E+00	5.72E-02	2.60E-02
9.75	247.65	5818.9916	18.35642	1.77E-01	1.46E+01	6.60E+00	5.66E-02	2.57E-02
10.00	254.00	5431.0588	17.13266	1.85E-01	1.52E+01	6.92E+00	5.61E-02	2.54E-02
10.25	260.35	5043.1261	15.9089	1.93E-01	1.59E+01	7.21E+00	5.55E-02	2.52E-02
10.50	266.70	4655.1933	14.68514	2.00E-01	1.65E+01	7.48E+00	5.50E-02	2.50E-02
10.75	273.05	4267.2605	13.46138	2.07E-01	1.70E+01	7.72E+00	5.46E-02	2.48E-02
11.00	279.40	3879.3277	12.23762	2.13E-01	1.75E+01	7.95E+00	5.42E-02	2.46E-02
11.25	285.75	3491.395	11.01385	2.19E-01	1.80E+01	8.15E+00	5.38E-02	2.44E-02
11.50	292.10	3103.4622	9.790093	2.23E-01	1.84E+01	8.34E+00	5.34E-02	2.42E-02
11.75	298.45	2715.5294	8.566331	2.28E-01	1.87E+01	8.50E+00	5.31E-02	2.41E-02
12.00	304.80	2327.5966	7.34257	2.32E-01	1.90E+01	8.64E+00	5.29E-02	2.40E-02

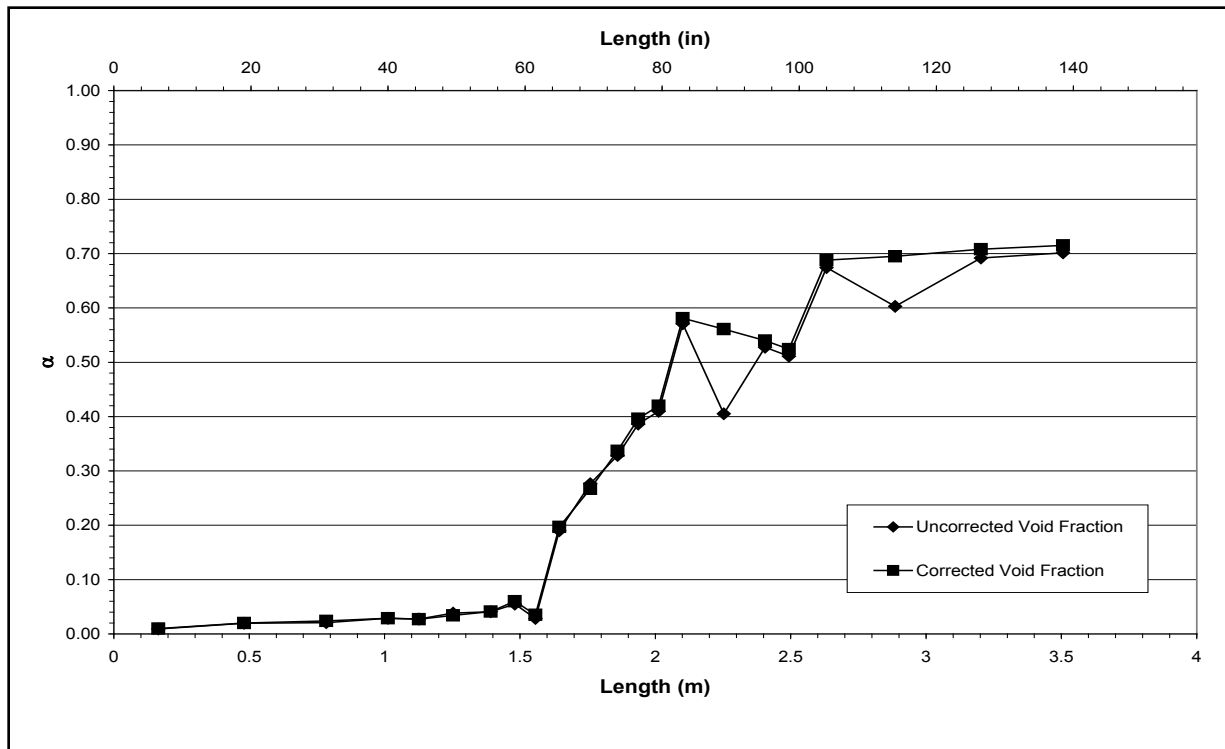


Figure A-155 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 15781 for Time Period 5296 to 5370 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1578-J

Test Conditions

Date: 6/10/2003

Steady-state time window: 5566 – 5676 seconds

Inlet flow rate: 1.019 cm/sec (0.401 in./sec)

Inlet mass flow rate: 0.049 kg/sec (0.107 lbm/sec)

Inlet flow temperature: 328.5 K (131.7 °F)

Upper plenum pressure: 133.8 kPa (19.4 psia)

Bundle power: 69.53 kW

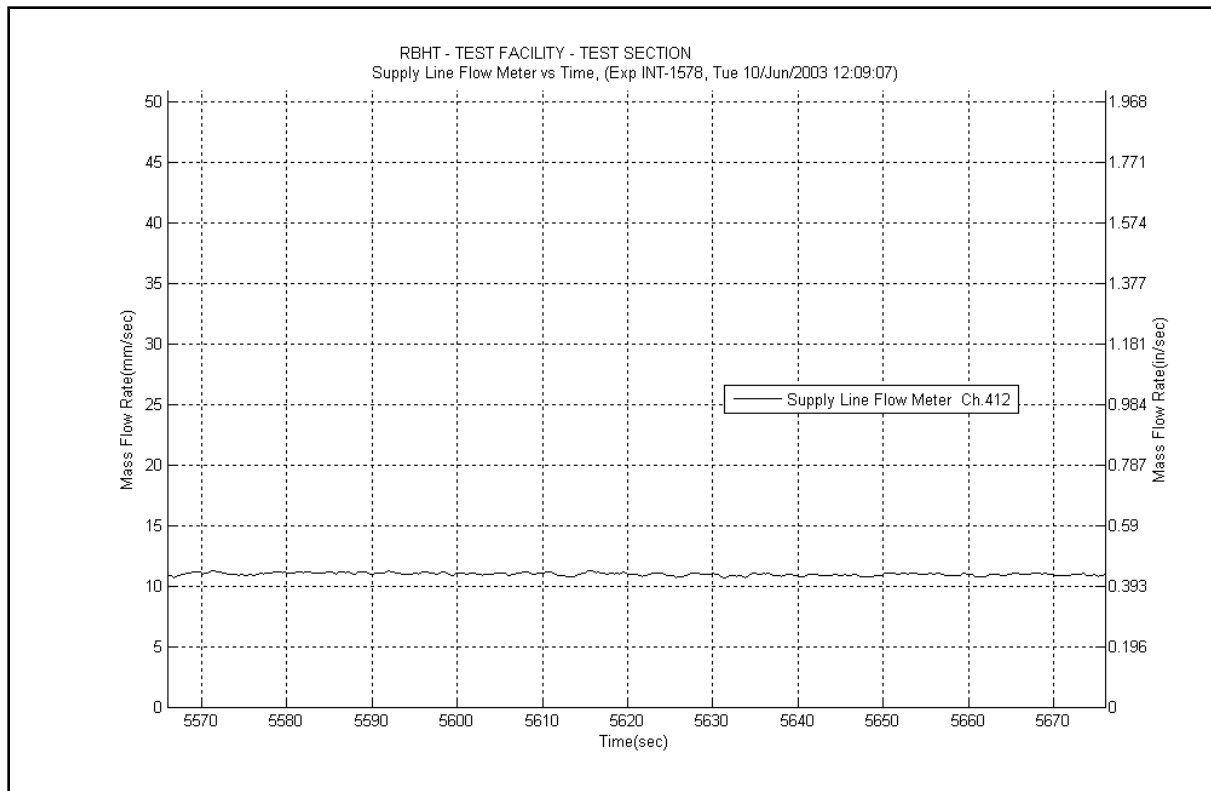


Figure A-156 Inlet Flow Plot for Experiment 1578J

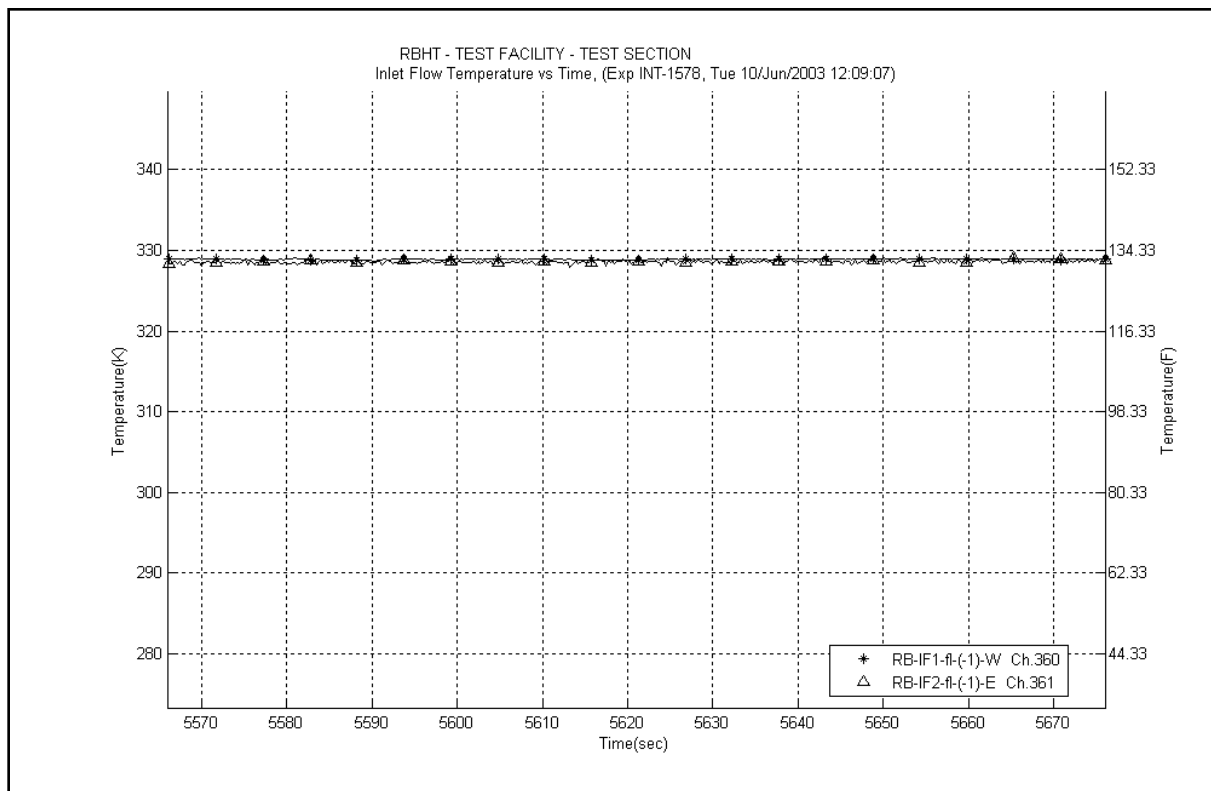


Figure A-157 Inlet Temperature Plot for Experiment 1578J

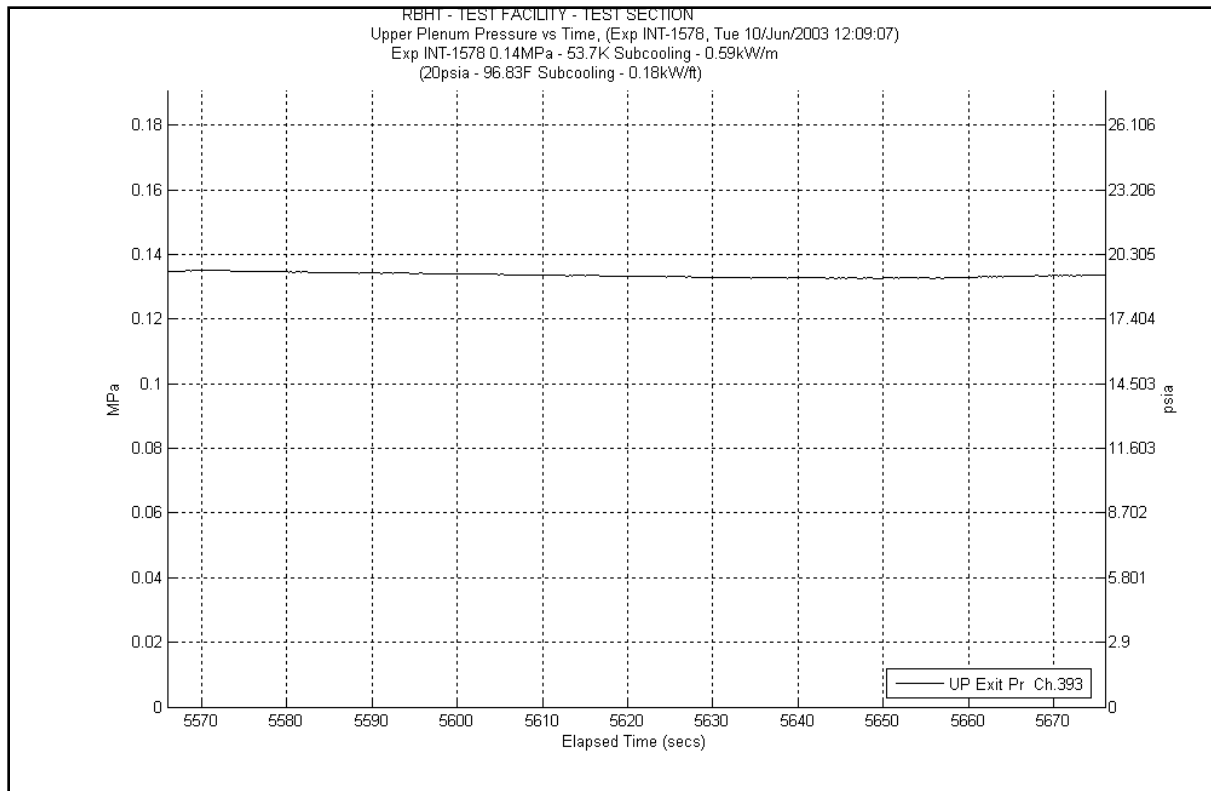


Figure A-158 System Pressure Plot for Experiment 1578J

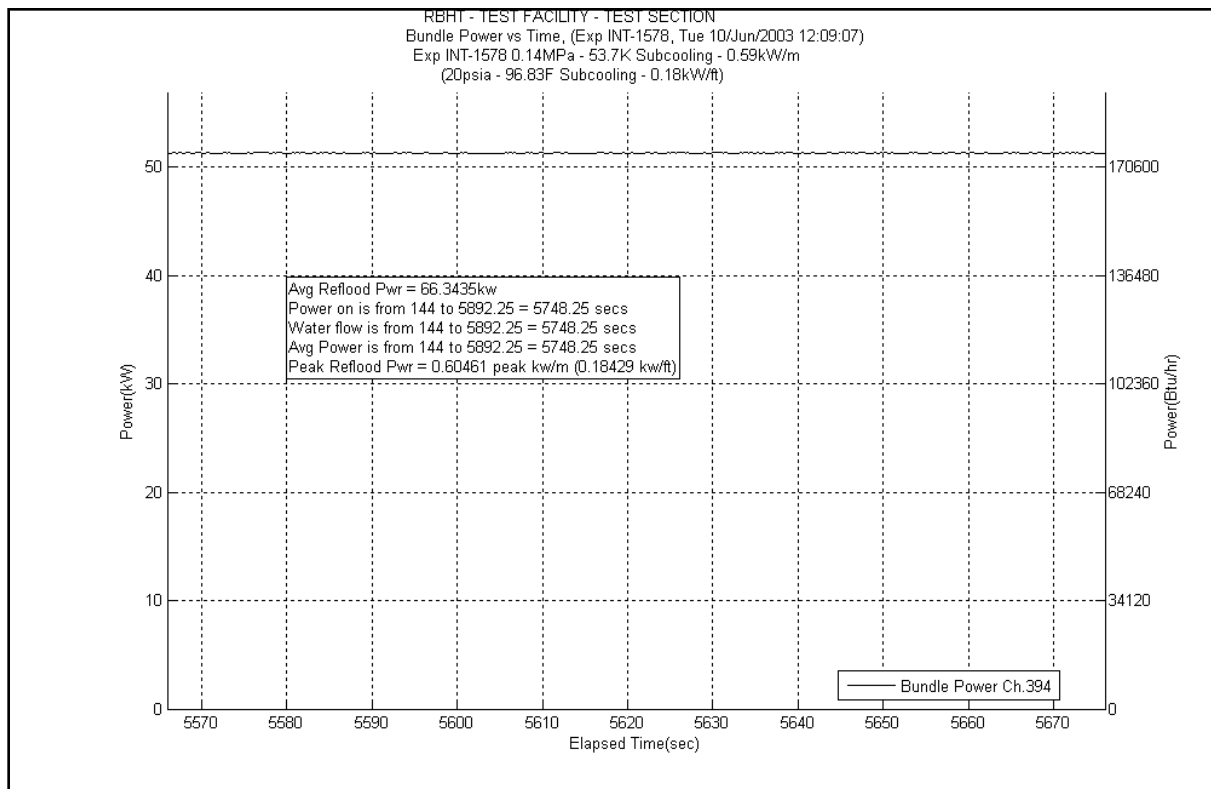


Figure A-159 Bundle Power Plot for Experiment 1578J

Table A-63 Data Results for RBHT Test 1578J for Time Period 5566 to 5676 seconds

Results for RBHT Test 1578
Valid Time Period 5566 to 5676 seconds
Collapsed Liquid Level = 81.472 inches = 2069.38 mm
(Z_{oss}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{acccl} (lb/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.804	11.223	537.350	0.332	15.896	0.087	4.166	0.000	0.000	10.8	517.107	2890.8	138412.2469	0.811	0.807	0.815
*	120-133	3048-3378	383	0.768	15.684	750.947	0.364	17.428	0.155	7.421	1.435	68.701	13.73	657.396	2904.53	139069.6429	0.797	0.793	0.801
*	108-120	2743-3048	382	0.678	20.098	962.306	0.299	14.316	0.194	9.289	5.155	246.832	14.45	691.870	2918.98	139761.5126	0.768	0.764	0.772
	100-108	2540-2743	381	0.746	10.548	505.024	0.175	8.379	0.142	6.799	0.000	0.000	10.23	489.815	2929.21	140251.3276	0.754	0.750	0.758
	97-100	2464-2540	380	0.644	5.541	265.318	0.061	2.921	0.051	2.442	0.000	0.000	5.43	259.990	2934.64	140511.3174	0.651	0.648	0.654
	93-97	2362-2464	379	0.635	7.577	362.792	0.076	3.639	0.067	3.208	0.000	0.000	7.429	355.702	2942.069	140867.0198	0.642	0.639	0.645
*	85-93	2159-2362	378	0.468	22.087	1057.542	0.139	6.655	0.128	6.129	8.130	389.278	13.69	655.481	2955.759	141522.5006	0.671	0.668	0.674
	81-85	2057-2159	377	0.693	6.383	305.601	0.063	3.016	0.061	2.921	0.000	0.000	6.257	299.587	2962.016	141822.0873	0.699	0.696	0.702
	78-81	1981-2057	376	0.533	7.281	348.618	0.044	2.107	0.045	2.155	0.000	0.000	7.188	344.163	2969.204	142166.2506	0.539	0.536	0.542
	75-78	1905-1981	375	0.528	7.349	351.851	0.041	1.963	0.044	2.107	0.000	0.000	7.261	347.659	2976.465	142513.9092	0.534	0.531	0.537
	72-75	1829-1905	374	0.467	8.299	397.355	0.039	1.867	0.043	2.059	0.000	0.000	8.213	393.241	2984.678	142907.1497	0.473	0.471	0.475
*	67-72	1702-1829	373	0.388	15.897	761.142	0.060	2.873	0.069	3.304	3.138	150.238	12.63	604.728	2997.308	143511.8773	0.513	0.510	0.516
	63-67	1600-1702	372	0.549	9.364	448.330	0.043	2.059	0.053	2.538	0.000	0.000	9.262	443.467	3006.57	143955.3443	0.554	0.551	0.557
	60-63	1524-1600	371	0.394	9.447	452.309	0.029	1.389	0.039	1.867	0.000	0.000	9.373	448.782	3015.943	144404.1259	0.398	0.396	0.400
	57-60	1448-1524	370	0.362	9.935	475.683	0.027	1.293	0.038	1.819	0.000	0.000	9.867	472.434	3025.81	144876.5604	0.367	0.365	0.369
	53-57	1346-1448	369	0.311	14.323	685.799	0.032	1.532	0.049	2.346	0.000	0.000	14.24	681.815	3040.05	145558.3753	0.314	0.312	0.316
*	46-53	1168-1346	368	0.196	29.228	1399.447	0.045	2.155	0.081	3.878	2.582	123.630	26.52	1269.784	3066.57	146828.1597	0.27	0.269	0.271
	43-46	1092-1168	367	0.223	12.111	579.870	0.015	0.718	0.033	1.580	0.000	0.000	12.06	577.436	3078.63	147405.5956	0.226	0.225	0.227
	37-43	940-1092	366	0.094	28.241	1352.202	0.021	1.005	0.063	3.016	0.000	0.000	28.15	1347.829	3106.78	148753.4248	0.096	0.091	0.101
*	25-37	635-940	365	0.036	60.092	2877.221	0.018	0.862	0.038	1.819	1.586	75.939	58.45	2798.601	3165.23	151552.0259	0.062	0.059	0.065
	13-25	330-635	364	0.027	60.617	2902.336	0.001	0.048	0.000	0.000	0.000	0.000	60.59	2901.065	3225.82	154453.0906	0.027	0.026	0.028
*	0-13	0-330	363	0.011	66.739	3195.504	0.001	0.048	0.000	0.000	0.168	8.067	66.57	3187.389	3292.39	157640.4793	0.014	0.013	0.015

Table A-64 Energy Balance Results for RBHT Test 1578J for Time Period 5566 to 5676 seconds

Results for RBHT Test 1578 Valid Time Period 5566 to 5676 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2329.5553	7.348748	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
0.25	6.35	2458.975	7.757012	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
0.50	12.70	2588.3948	8.165276	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
0.75	19.05	2717.8145	8.57354	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
1.00	25.40	2847.2343	8.981804	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
1.25	31.75	2976.654	9.390067	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
1.50	38.10	3106.0737	9.798331	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
1.75	44.45	3235.4935	10.2066	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
2.00	50.80	3364.9132	10.61486	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
2.25	57.15	3494.3329	11.02312	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
2.50	63.50	3623.7527	11.43139	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
2.75	69.85	3753.1724	11.83965	0.00E+00	0.00E+00	0.00E+00	3.45E-02	1.56E-02
3.00	76.20	3882.5922	12.24791	1.06E-02	4.34E-01	1.97E-01	3.41E-02	1.55E-02
3.25	82.55	4012.0119	12.65618	2.23E-02	9.17E-01	4.16E-01	3.37E-02	1.53E-02
3.50	88.90	4141.4316	13.06444	3.44E-02	1.42E+00	6.42E-01	3.33E-02	1.51E-02
3.75	95.25	4270.8514	13.47271	4.69E-02	1.93E+00	8.75E-01	3.29E-02	1.49E-02
4.00	101.60	4400.2711	13.88097	5.98E-02	2.46E+00	1.12E+00	3.24E-02	1.47E-02
4.25	107.95	4529.6909	14.28923	7.30E-02	3.01E+00	1.36E+00	3.20E-02	1.45E-02
4.50	114.30	4659.1106	14.6975	8.67E-02	3.57E+00	1.62E+00	3.15E-02	1.43E-02
4.75	120.65	4788.5303	15.10576	1.01E-01	4.14E+00	1.88E+00	3.10E-02	1.41E-02
5.00	127.00	4917.9501	15.51402	1.15E-01	4.74E+00	2.15E+00	3.05E-02	1.38E-02
5.25	133.35	5047.3698	15.92229	1.30E-01	5.35E+00	2.43E+00	3.00E-02	1.36E-02
5.50	139.70	5176.7896	16.33055	1.45E-01	5.97E+00	2.71E+00	2.95E-02	1.34E-02
5.75	146.05	5306.2093	16.73882	1.61E-01	6.61E+00	3.00E+00	2.89E-02	1.31E-02
6.00	152.40	5435.629	17.14708	1.77E-01	7.27E+00	3.30E+00	2.84E-02	1.29E-02
6.25	158.75	5565.0488	17.55534	1.93E-01	7.94E+00	3.60E+00	2.78E-02	1.26E-02
6.50	165.10	5694.4685	17.96361	2.10E-01	8.63E+00	3.92E+00	2.72E-02	1.24E-02
6.75	171.45	5823.8882	18.37187	2.27E-01	9.34E+00	4.23E+00	2.67E-02	1.21E-02
7.00	177.80	5953.308	18.78013	2.44E-01	1.01E+01	4.56E+00	2.60E-02	1.18E-02
7.25	184.15	6082.7277	19.1884	2.62E-01	1.08E+01	4.89E+00	2.54E-02	1.15E-02
7.50	190.50	6212.1475	19.59666	2.80E-01	1.15E+01	5.24E+00	2.48E-02	1.13E-02
7.75	196.85	6341.5672	20.00493	2.99E-01	1.23E+01	5.58E+00	2.42E-02	1.10E-02
8.00	203.20	6470.9869	20.41319	3.18E-01	1.31E+01	5.94E+00	2.35E-02	1.07E-02
8.25	209.55	6600.4067	20.82145	3.38E-01	1.39E+01	6.30E+00	2.28E-02	1.04E-02
8.50	215.90	6729.8264	21.22972	3.57E-01	1.47E+01	6.67E+00	2.22E-02	1.00E-02
8.75	222.25	6859.2462	21.63798	3.78E-01	1.55E+01	7.05E+00	2.15E-02	9.73E-03
9.00	228.60	6988.6659	22.04625	3.98E-01	1.64E+01	7.43E+00	2.08E-02	9.41E-03
9.25	234.95	6600.4067	20.82145	4.18E-01	1.72E+01	7.81E+00	2.01E-02	9.10E-03
9.50	241.30	6212.1475	19.59666	4.37E-01	1.80E+01	8.16E+00	1.94E-02	8.80E-03
9.75	247.65	5823.8882	18.37187	4.55E-01	1.87E+01	8.50E+00	1.88E-02	8.52E-03
10.00	254.00	5435.629	17.14708	4.72E-01	1.94E+01	8.81E+00	1.82E-02	8.26E-03
10.25	260.35	5047.3698	15.92229	4.87E-01	2.01E+01	9.10E+00	1.77E-02	8.01E-03
10.50	266.70	4659.1106	14.6975	5.02E-01	2.07E+01	9.37E+00	1.72E-02	7.79E-03
10.75	273.05	4270.8514	13.47271	5.15E-01	2.12E+01	9.62E+00	1.67E-02	7.58E-03
11.00	279.40	3882.5922	12.24791	5.27E-01	2.17E+01	9.84E+00	1.63E-02	7.39E-03
11.25	285.75	3494.3329	11.02312	5.38E-01	2.22E+01	1.00E+01	1.59E-02	7.22E-03
11.50	292.10	3106.0737	9.798331	5.48E-01	2.26E+01	1.02E+01	1.56E-02	7.07E-03
11.75	298.45	2717.8145	8.57354	5.57E-01	2.29E+01	1.04E+01	1.53E-02	6.93E-03
12.00	304.80	2329.5553	7.348748	5.64E-01	2.32E+01	1.05E+01	1.50E-02	6.82E-03

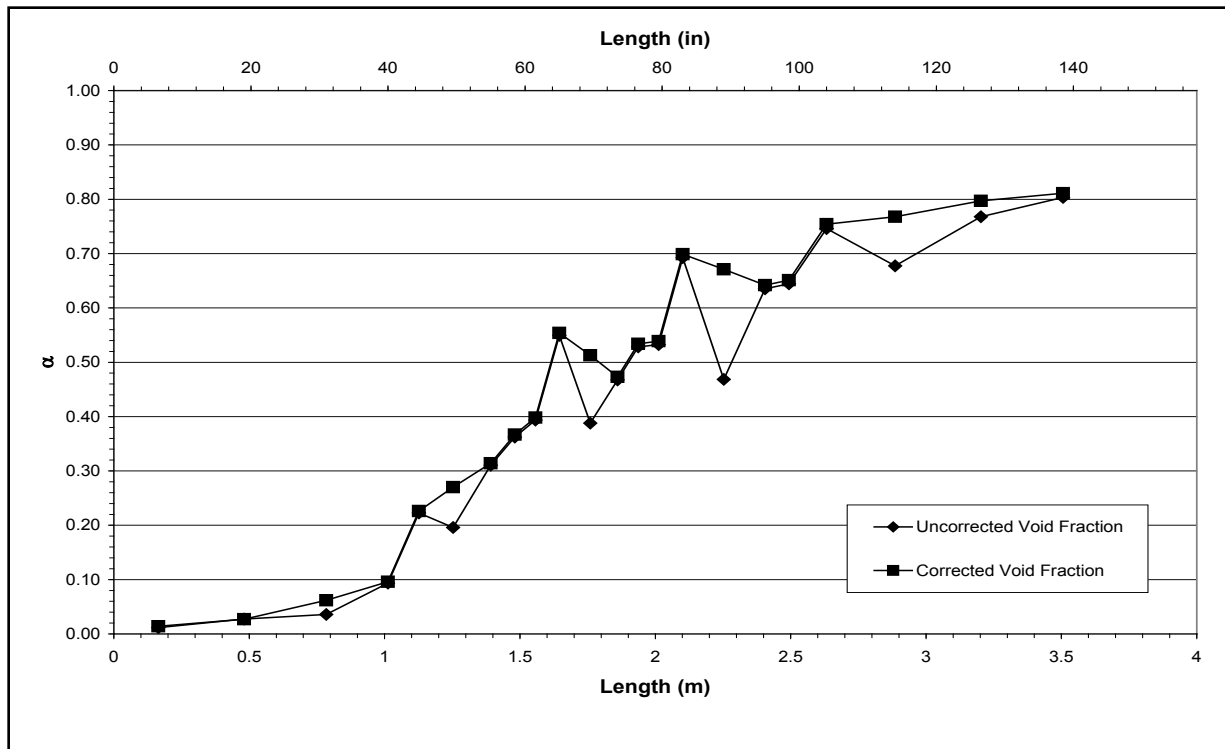


Figure A-160 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1578J for Time Period 5566 to 5676 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1582-A

Test Conditions

Date: 6/11/2003

Steady-state time window: 1010 – 1080 seconds

Inlet flow rate: 4.021 cm/sec (1.583 in./sec)

Inlet mass flow rate: 0.192 kg/sec (0.423 lbm/sec)

Inlet flow temperature: 326 K (128 °F)

Upper plenum pressure: 138.0 kPa (20.02 psia)

Bundle power: 141.43 kW

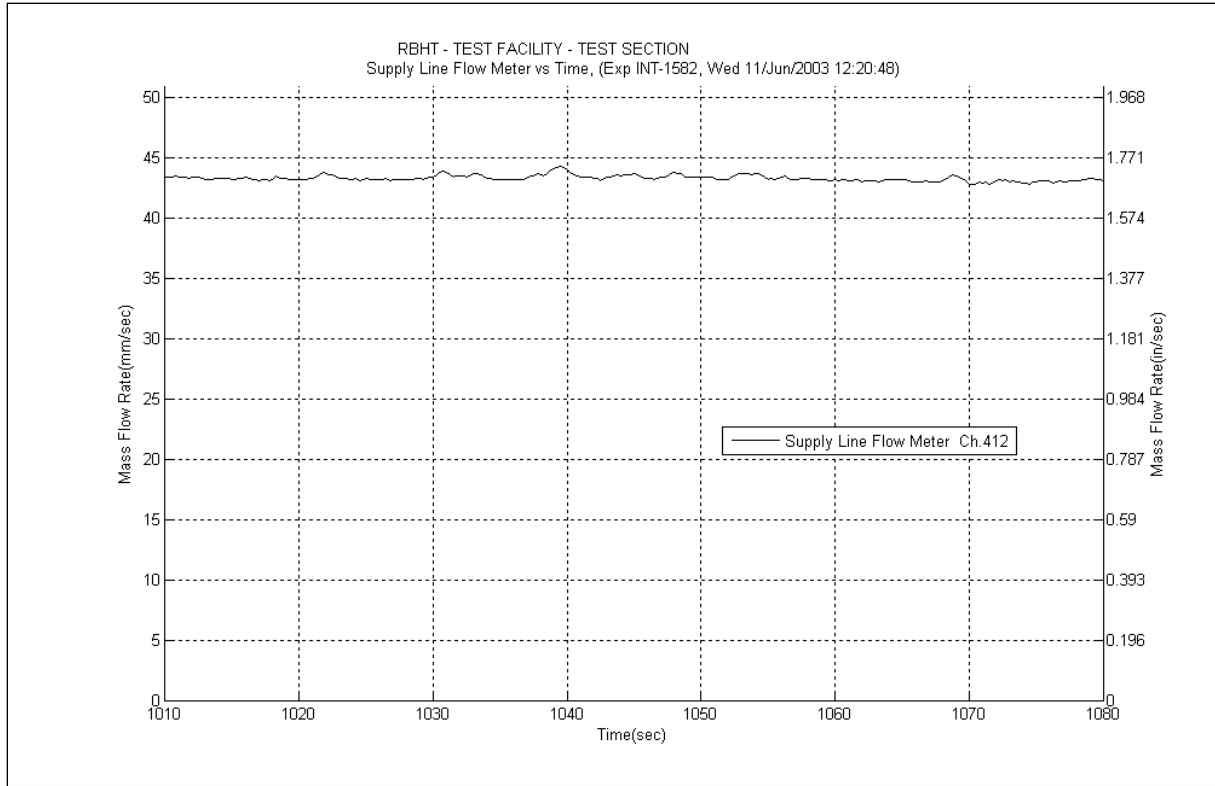


Figure A-161 Inlet Flow Plot for Experiment 1582A

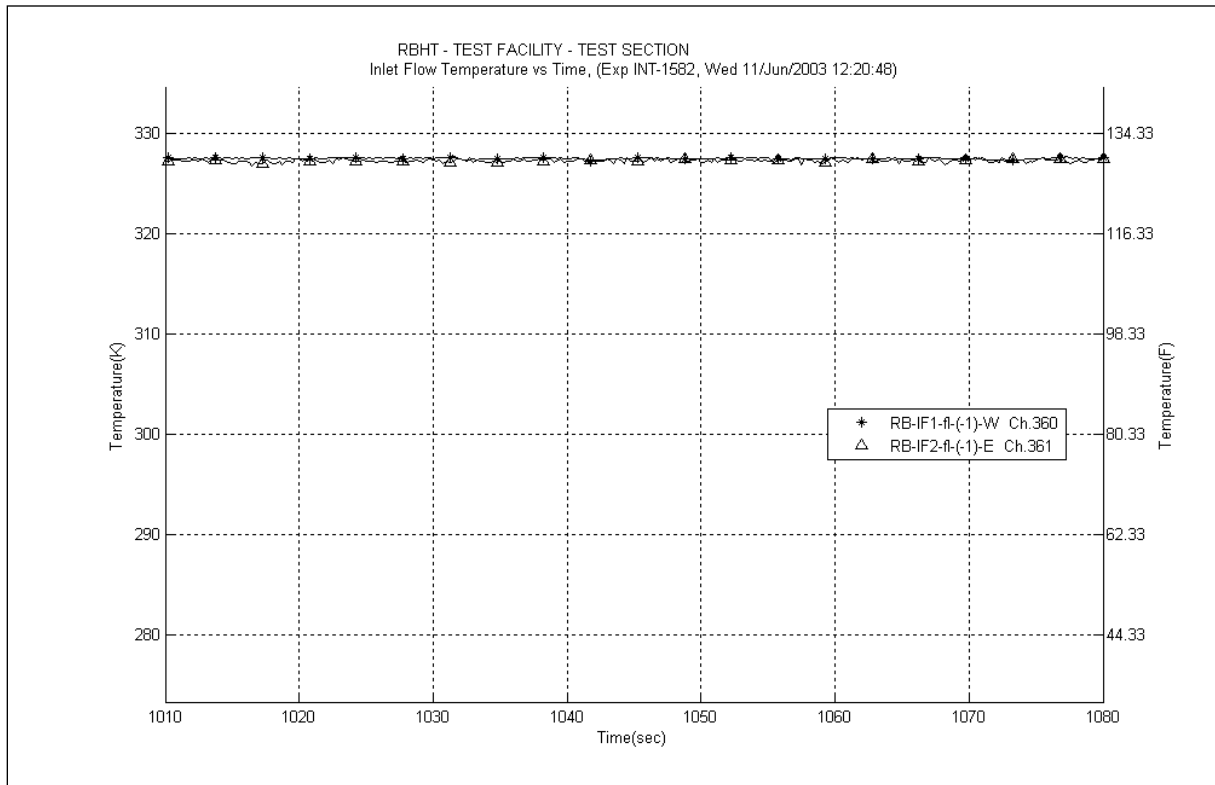


Figure A-162 Inlet Temperature Plot for Experiment 1582A

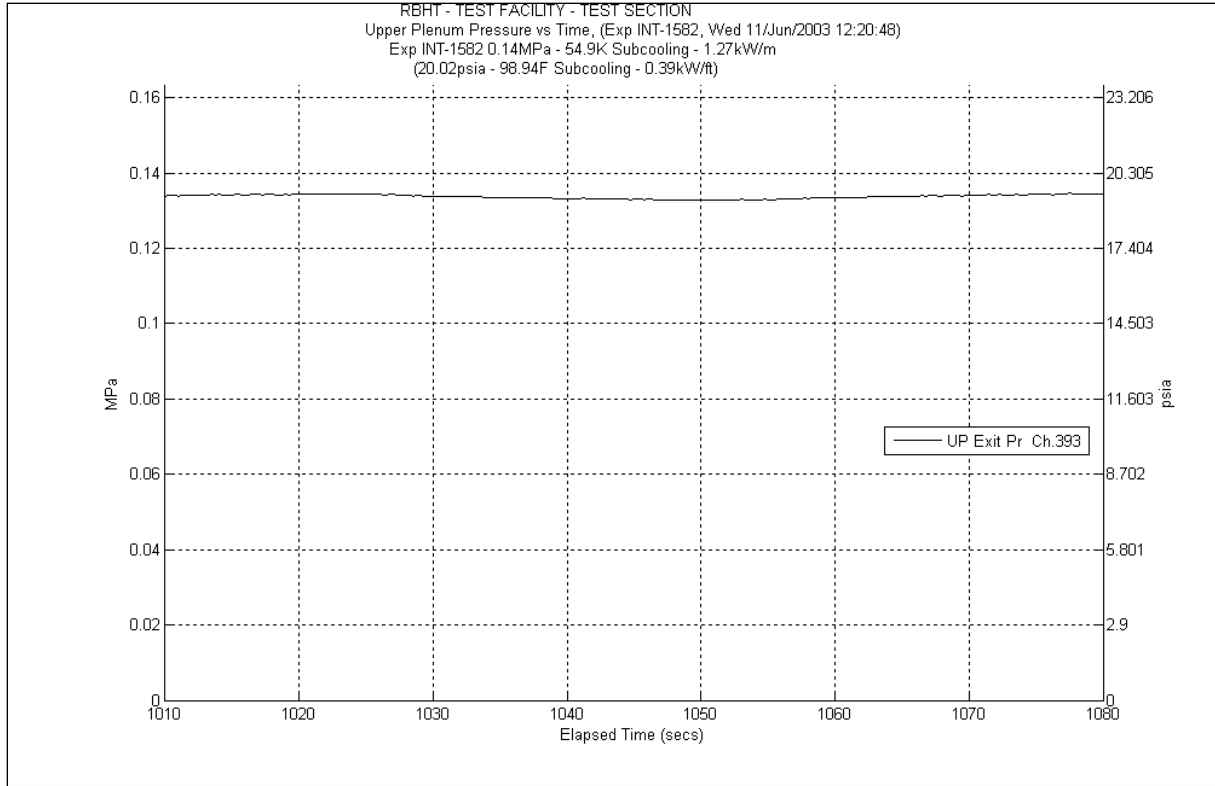


Figure A-163 System Pressure Plot for Experiment 1582A

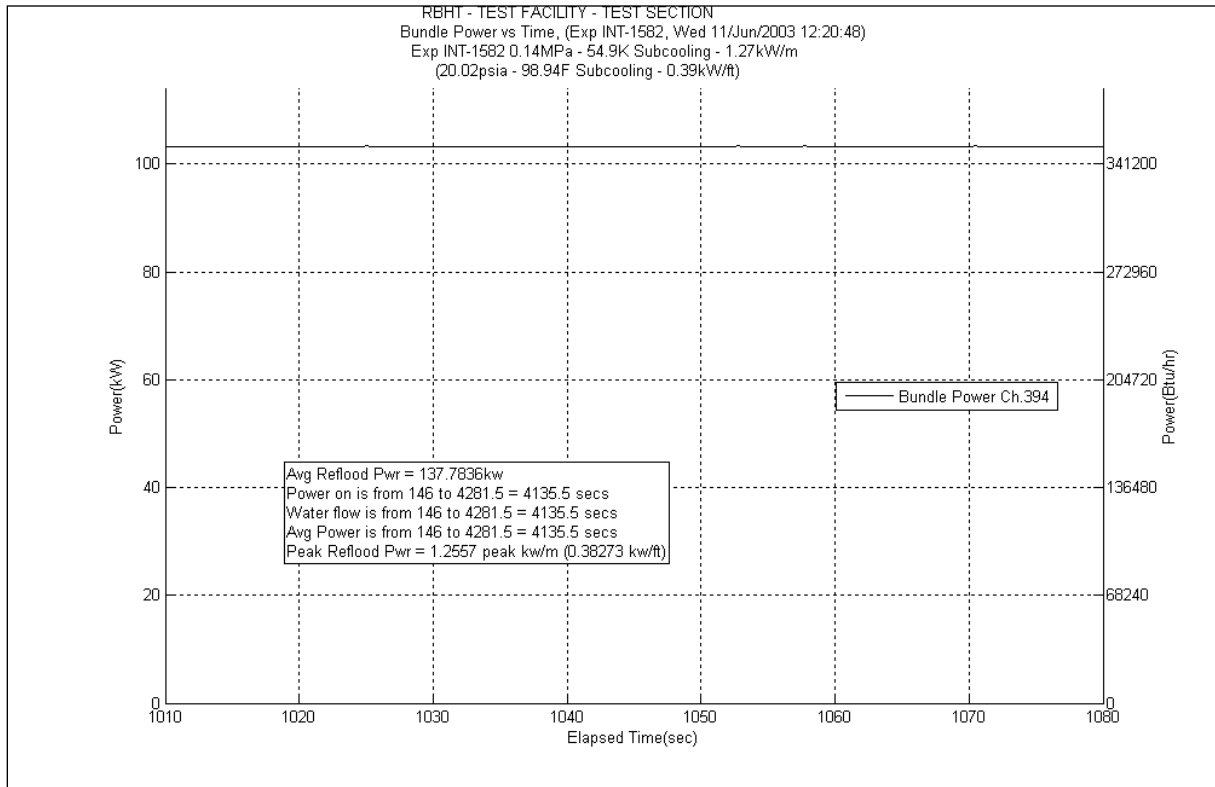


Figure A-164 Bundle Power Plot for Experiment 1582A

Table A-65 Data Results for RBHT Test 1582A for Time Period 1010 to 1080 seconds

Results for RBHT Test 1582
Valid Time Period 1010 to 1080 seconds
Collapsed Liquid Level = 88.1324 inches = 2238.56 mm
(Z_{OSV}) Onset of Significant Void = 58.5 inches = 1486 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	α _{uncorrected}	ΔP _{uncorrected} (lbf/ft ²)	ΔP _{uncorrected} (Pa)	ΔP _{inc} (lbf/ft ²)	ΔP _{inc} (Pa)	ΔP _{acc} (lbf/ft ²)	ΔP _{acc} (Pa)	ΔP _{grid} (lbf/ft ²)	ΔP _{grid} (Pa)	ΔP _{corrected} (lbf/ft ²)	ΔP _{corrected} (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	α _{corrected}	α _{min}	α _{max}
	133-144	3378-3658	384	0.792	11.903	569.924	2.108	100.932	0.684	32.750	0.000	0.000	9.107	436.046	2889.107	138331.1857	0.841	0.837	0.845
*	120-133	3048-3378	383	0.755	16.567	793.219	2.295	109.885	1.220	58.414	2.292	109.728	10.76	515.192	2899.867	138846.3772	0.841	0.837	0.845
*	108-120	2743-3048	382	0.709	18.156	869.308	1.853	88.722	1.523	72.922	4.863	232.836	9.917	474.829	2909.784	139321.2057	0.841	0.837	0.845
	100-108	2540-2743	381	0.789	8.787	420.729	1.061	50.801	1.114	53.339	0.000	0.000	6.607	316.345	139637.5506	0.841	0.837	0.845	
	97-100	2464-2540	380	0.726	4.264	204.148	0.359	17.189	0.403	19.296	0.000	0.000	3.499	167.533	139805.0836	0.775	0.771	0.779	
	93-97	2362-2464	379	0.730	5.604	268.302	0.446	21.355	0.525	25.137	0.000	0.000	4.633	221.829	140026.9128	0.777	0.773	0.781	
*	85-93	2159-2362	378	0.552	18.597	890.444	0.780	37.347	1.008	48.263	6.945	332.543	9.864	472.291	140499.2037	0.763	0.759	0.767	
	81-85	2057-2159	377	0.709	6.050	289.687	0.333	15.944	0.483	23.126	0.000	0.000	5.231	250.462	140749.6653	0.748	0.744	0.752	
	78-81	1981-2057	376	0.562	6.819	326.488	0.224	10.725	0.353	16.902	0.000	0.000	6.239	298.725	141048.3902	0.599	0.596	0.602	
	75-78	1905-1981	375	0.538	7.203	344.889	0.202	9.672	0.345	16.519	0.000	0.000	6.653	318.547	141366.9376	0.573	0.570	0.576	
	72-75	1829-1905	374	0.472	8.221	393.626	0.179	8.571	0.337	16.136	0.000	0.000	7.704	368.869	141735.8071	0.505	0.502	0.508	
*	67-72	1702-1829	373	0.379	16.125	772.083	0.244	11.683	0.544	26.047	0.867	41.526	14.47	692.827	142428.6344	0.443	0.441	0.445	
	63-67	1600-1702	372	0.353	13.446	643.775	0.142	6.799	0.420	20.110	0.000	0.000	12.88	616.698	143045.3321	0.38	0.378	0.382	
	60-63	1524-1600	371	0.104	13.965	668.641	0.071	3.399	0.305	14.603	0.000	0.000	13.58	650.214	143695.546	0.128	0.127	0.129	
	57-60	1448-1524	370	0.057	14.687	703.205	0.033	1.580	0.250	11.970	0.000	0.000	14.4	689.476	144385.0217	0.075	0.071	0.079	
	53-57	1346-1448	369	0.042	19.906	953.106	0.003	0.144	0.000	0.000	0.000	0.000	19.89	952.338	145337.36	0.042	0.040	0.044	
*	46-53	1168-1346	368	0.039	34.951	1673.468	0.006	0.287	0.000	0.000	-0.205	-9.810	35.15	1682.991	147020.3511	0.033	0.031	0.035	
	43-46	1092-1168	367	0.023	15.216	728.568	0.002	0.096	0.000	0.000	0.000	0.000	15.21	728.259	147748.6098	0.023	0.022	0.024	
	37-43	940-1092	366	0.029	30.262	1448.930	0.005	0.239	0.000	0.000	0.000	0.000	30.25	1448.378	149196.9875	0.029	0.028	0.030	
	25-37	635-940	365	0.020	61.079	2924.466	0.010	0.479	0.000	0.000	0.269	12.868	60.8	2911.120	152108.1072	0.024	0.023	0.025	
	13-25	330-635	364	0.019	61.131	2926.953	0.010	0.479	0.000	0.000	0.000	0.000	61.1	2925.484	155033.5909	0.019	0.018	0.020	
*	0-13	0-330	363	0.008	66.999	3207.937	0.011	0.527	0.000	0.000	0.148	7.093	66.84	3200.316	158233.9072	0.01	0.010	0.011	

Table A-66 Energy Balance Results for RBHT Test 1582A for Time Period 1010 to 1080 seconds

Results for RBHT Test 1582 Valid Time Period 1010 to 1080 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	4652.9395	14.67803	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
0.25	6.35	4911.4362	15.49348	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
0.50	12.70	5169.9328	16.30892	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
0.75	19.05	5428.4295	17.12437	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
1.00	25.40	5686.9261	17.93981	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
1.25	31.75	5945.4227	18.75526	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
1.50	38.10	6203.9194	19.57071	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
1.75	44.45	6462.416	20.38615	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
2.00	50.80	6720.9127	21.2016	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
2.25	57.15	6979.4093	22.01704	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
2.50	63.50	7237.9059	22.83249	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
2.75	69.85	7496.4026	23.64794	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
3.00	76.20	7754.8992	24.46338	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
3.25	82.55	8013.3959	25.27883	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
3.50	88.90	8271.8925	26.09428	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
3.75	95.25	8530.3891	26.90972	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
4.00	101.60	8788.8858	27.72517	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
4.25	107.95	9047.3824	28.54061	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
4.50	114.30	9305.8791	29.35606	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
4.75	120.65	9564.3757	30.17151	0.00E+00	0.00E+00	0.00E+00	1.36E-01	6.17E-02
5.00	127.00	9822.8723	30.98695	6.12E-03	9.93E-01	4.50E-01	1.35E-01	6.13E-02
5.25	133.35	10081.369	31.8024	1.36E-02	2.21E+00	1.00E+00	1.34E-01	6.08E-02
5.50	139.70	10339.866	32.61784	2.13E-02	3.45E+00	1.57E+00	1.33E-01	6.04E-02
5.75	146.05	10598.362	33.43329	2.92E-02	4.73E+00	2.15E+00	1.32E-01	5.99E-02
6.00	152.40	10856.859	34.24874	3.73E-02	6.04E+00	2.74E+00	1.31E-01	5.94E-02
6.25	158.75	11115.356	35.06418	4.55E-02	7.38E+00	3.35E+00	1.30E-01	5.89E-02
6.50	165.10	11373.852	35.87963	5.40E-02	8.76E+00	3.97E+00	1.29E-01	5.84E-02
6.75	171.45	11632.349	36.69507	6.27E-02	1.02E+01	4.61E+00	1.27E-01	5.78E-02
7.00	177.80	11890.845	37.51052	7.15E-02	1.16E+01	5.26E+00	1.26E-01	5.73E-02
7.25	184.15	12149.342	38.32597	8.06E-02	1.31E+01	5.93E+00	1.25E-01	5.67E-02
7.50	190.50	12407.839	39.14141	8.98E-02	1.46E+01	6.61E+00	1.24E-01	5.61E-02
7.75	196.85	12666.335	39.95686	9.93E-02	1.61E+01	7.30E+00	1.22E-01	5.56E-02
8.00	203.20	12924.832	40.77231	1.09E-01	1.77E+01	8.01E+00	1.21E-01	5.50E-02
8.25	209.55	13183.329	41.58775	1.19E-01	1.93E+01	8.73E+00	1.20E-01	5.44E-02
8.50	215.90	13441.825	42.4032	1.29E-01	2.09E+01	9.47E+00	1.18E-01	5.37E-02
8.75	222.25	13700.322	43.21864	1.39E-01	2.25E+01	1.02E+01	1.17E-01	5.31E-02
9.00	228.60	13958.819	44.03409	1.49E-01	2.42E+01	1.10E+01	1.16E-01	5.25E-02
9.25	234.95	13183.329	41.58775	1.60E-01	2.59E+01	1.17E+01	1.14E-01	5.18E-02
9.50	241.30	12407.839	39.14141	1.69E-01	2.74E+01	1.24E+01	1.13E-01	5.12E-02
9.75	247.65	11632.349	36.69507	1.78E-01	2.89E+01	1.31E+01	1.12E-01	5.07E-02
10.00	254.00	10856.859	34.24874	1.87E-01	3.03E+01	1.37E+01	1.11E-01	5.02E-02
10.25	260.35	10081.369	31.8024	1.95E-01	3.16E+01	1.43E+01	1.10E-01	4.97E-02
10.50	266.70	9305.8791	29.35606	2.02E-01	3.27E+01	1.49E+01	1.09E-01	4.92E-02
10.75	273.05	8530.3891	26.90972	2.09E-01	3.38E+01	1.53E+01	1.08E-01	4.88E-02
11.00	279.40	7754.8992	24.46338	2.15E-01	3.48E+01	1.58E+01	1.07E-01	4.84E-02
11.25	285.75	6979.4093	22.01704	2.20E-01	3.57E+01	1.62E+01	1.06E-01	4.81E-02
11.50	292.10	6203.9194	19.57071	2.25E-01	3.65E+01	1.66E+01	1.05E-01	4.78E-02
11.75	298.45	5428.4295	17.12437	2.30E-01	3.73E+01	1.69E+01	1.05E-01	4.75E-02
12.00	304.80	4652.9395	14.67803	2.34E-01	3.79E+01	1.72E+01	1.04E-01	4.73E-02

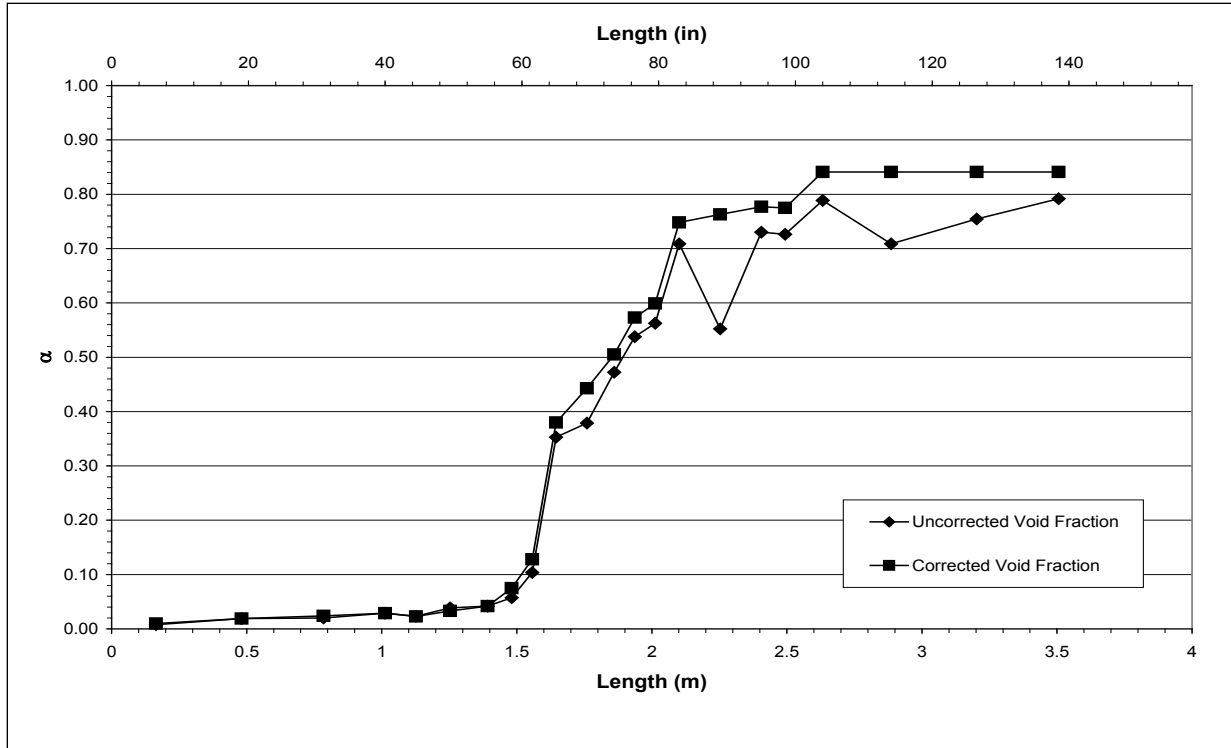


Figure A-165 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1582A for Time Period 1010 to 1080 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1582-B

Test Conditions

Date: 6/11/2003

Steady-state time window: 1694 – 1748 seconds

Inlet flow rate: 4.021 cm/sec (1.583 in./sec)

Inlet mass flow rate: 0.192 kg/sec (0.423 lbm/sec)

Inlet flow temperature: 326 K (128 °F)

Upper plenum pressure: 138.0 kPa (20.02 psia)

Bundle power: 141.43 kW

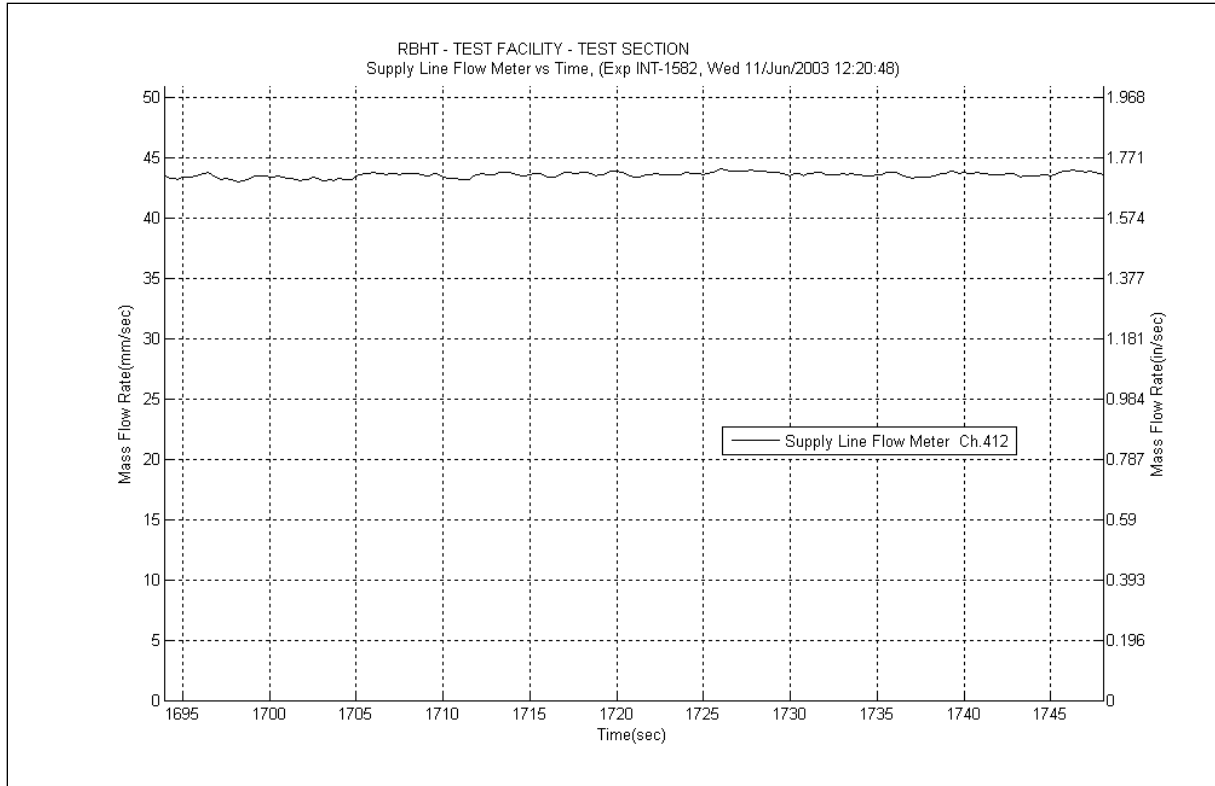


Figure A-166 Inlet Flow Plot for Experiment 1582B

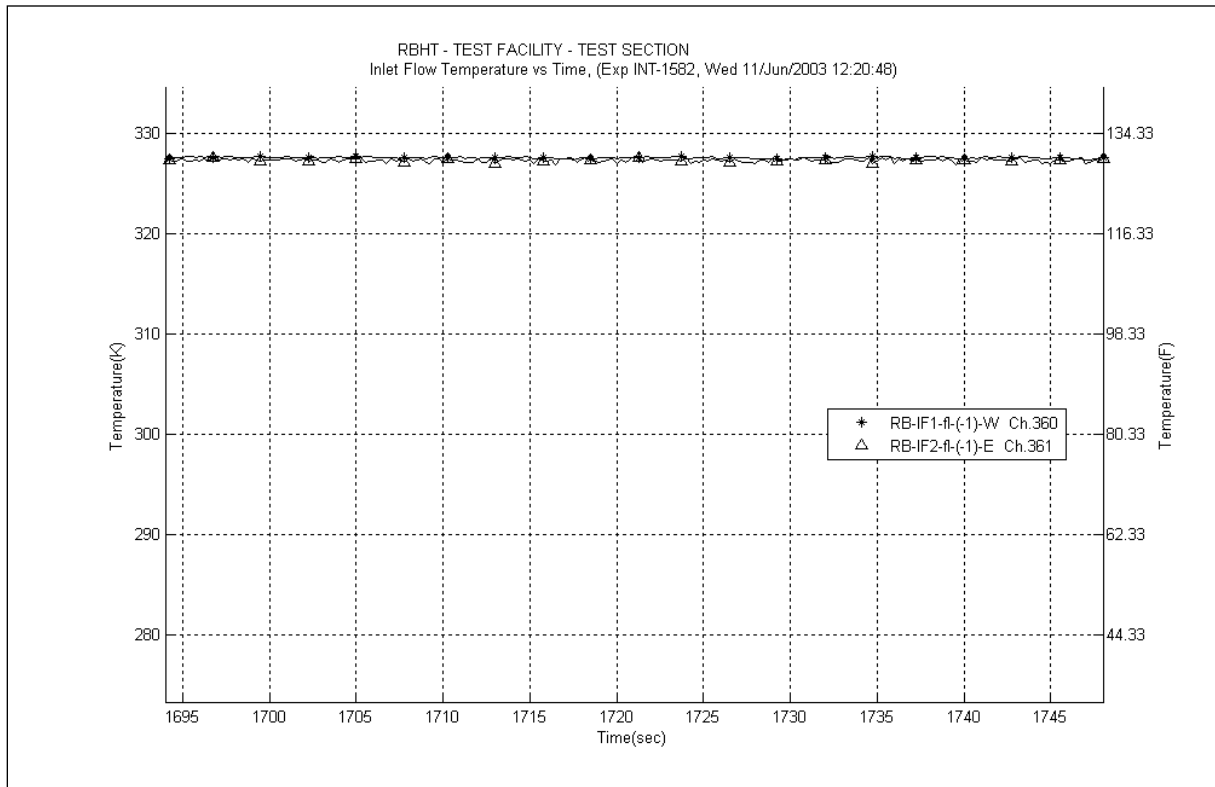


Figure A-167 Inlet Temperature Plot for Experiment 1582B

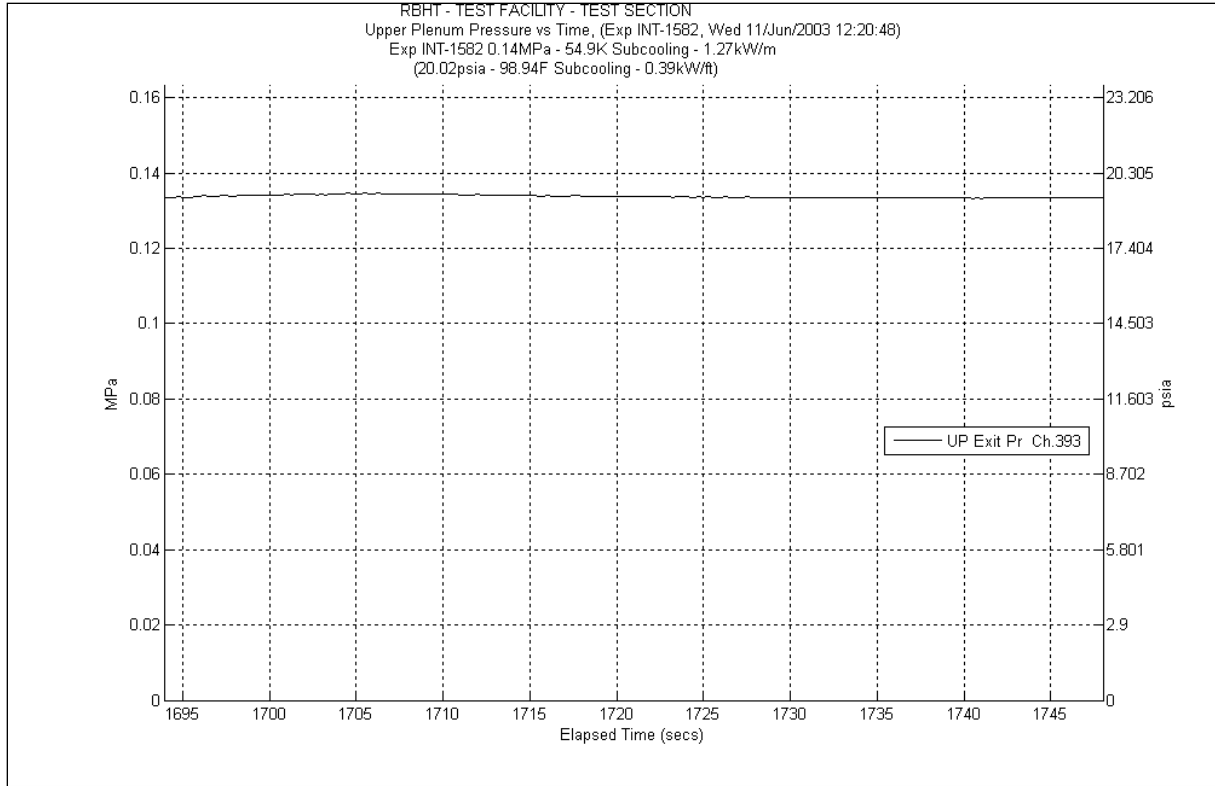


Figure A-168 System Pressure Plot for Experiment 1582B

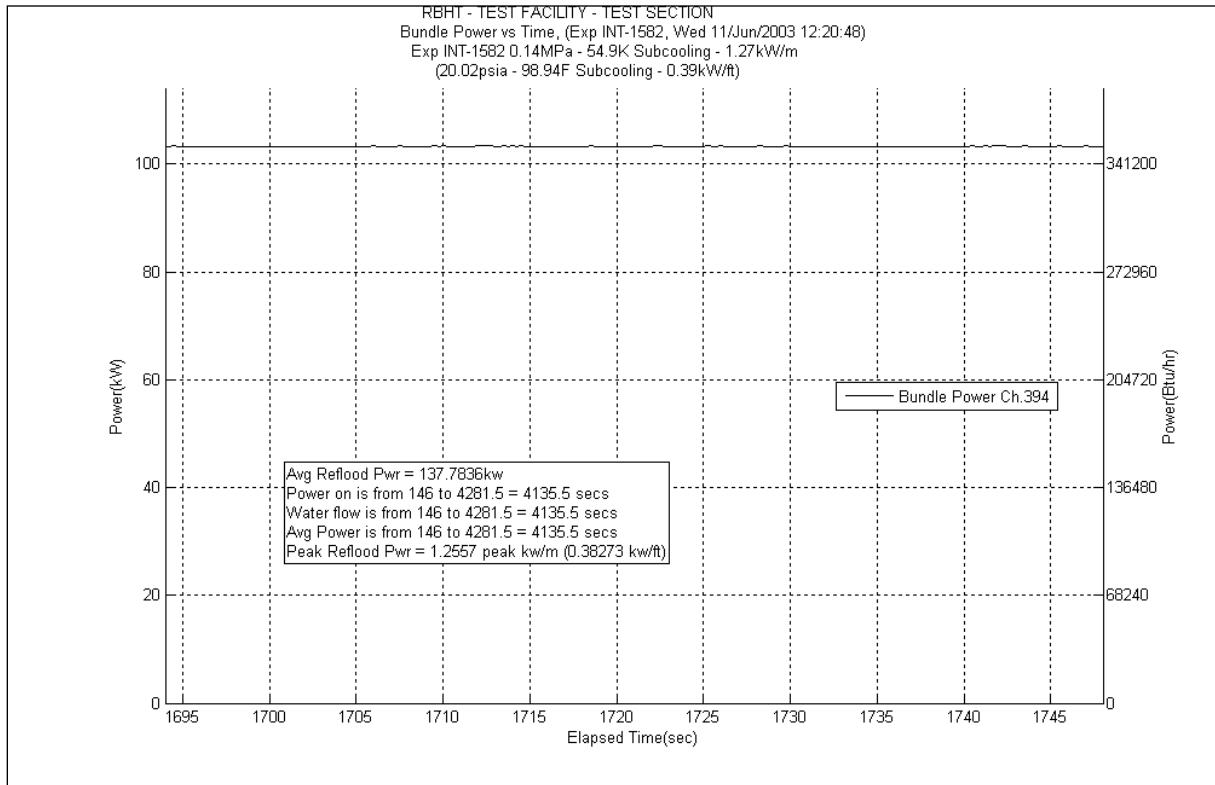


Figure A-169 Bundle Power Plot for Experiment 1582B

Table A-67 Data Results for RBHT Test 1582B for Time Period 1694 to 1748 seconds

Results for RBHT Test 1582																			
Valid Time Period 1694 to 1748 seconds																			
Collapsed Liquid Level = 88.338 inches = 2243.79 mm																			
(Z _{osv}) Onset of Significant Void = 58.5 inches = 1486 mm																			
Grids	Elevation (in)	Elevation (mm)	Chan.	α _{uncorrected}	ΔP _{uncorrected} (lbf/ft ²)	ΔP _{uncorrected} (Pa)	ΔP _{finc} (lbf/ft ²)	ΔP _{finc} (Pa)	ΔP _{acccl} (lbf/ft ²)	ΔP _{acccl} (Pa)	ΔP _{grid} (lbf/ft ²)	ΔP _{grid} (Pa)	ΔP _{corrected} (lbf/ft ²)	ΔP _{corrected} (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	α _{corrected}	α _{min}	α _{max}
	133-144	3378-3658	384	0.797	11.597	555.253	2.122	101.602	0.689	32.989	0.000	0.000	8.783	420.532	2888.783	138315.6725	0.846	0.842	0.850
*	120-133	3048-3378	383	0.754	16.577	793.716	2.309	110.556	1.230	58.893	2.548	122.004	10.49	502.264	2899.273	138817.9364	0.845	0.841	0.849
*	108-120	2743-3048	382	0.710	18.073	865.330	1.864	89.249	1.535	73.496	4.781	228.905	9.893	473.679	2909.166	139291.6157	0.841	0.837	0.845
	100-108	2540-2743	381	0.787	8.855	423.962	1.067	51.088	1.123	53.770	0.000	0.000	6.665	319.122	2915.831	139610.7376	0.84	0.836	0.844
	97-100	2464-2540	380	0.727	4.259	203.900	0.361	17.285	0.406	19.439	0.000	0.000	3.492	167.198	2919.323	139777.9355	0.776	0.772	0.780
	93-97	2362-2464	379	0.727	5.671	271.535	0.448	21.450	0.529	25.329	0.000	0.000	4.691	224.606	2924.014	140002.5418	0.774	0.770	0.778
*	85-93	2159-2362	378	0.555	18.509	886.217	0.783	37.490	1.016	48.646	6.760	323.672	9.95	476.409	2933.964	140478.9503	0.76	0.756	0.764
	81-85	2057-2159	377	0.707	6.081	291.178	0.334	15.992	0.487	23.318	0.000	0.000	5.258	251.754	2939.222	140730.7047	0.747	0.743	0.751
	78-81	1981-2057	376	0.561	6.845	327.731	0.225	10.773	0.356	17.045	0.000	0.000	6.264	299.922	2945.486	141030.6267	0.598	0.595	0.601
	75-78	1905-1981	375	0.542	7.141	341.905	0.202	9.672	0.348	16.662	0.000	0.000	6.589	315.483	2952.075	141346.1097	0.577	0.574	0.580
	72-75	1829-1905	374	0.472	8.226	393.874	0.179	8.571	0.340	16.279	0.000	0.000	7.705	368.917	2959.78	141715.0271	0.505	0.502	0.508
*	67-72	1702-1829	373	0.381	16.084	770.094	0.244	11.683	0.549	26.286	0.851	40.734	14.44	691.391	2974.22	142406.418	0.444	0.442	0.446
	63-67	1600-1702	372	0.355	13.409	642.035	0.141	6.751	0.423	20.253	0.000	0.000	12.84	614.782	2987.06	143021.2005	0.382	0.380	0.384
	60-63	1524-1600	371	0.103	13.980	669.387	0.069	3.304	0.308	14.747	0.000	0.000	13.6	651.171	3000.66	143672.372	0.127	0.126	0.128
	57-60	1448-1524	370	0.059	14.666	702.210	0.032	1.532	0.230	11.012	0.000	0.000	14.4	689.476	3015.06	144361.8477	0.076	0.072	0.080
	53-57	1346-1448	369	0.042	19.911	953.355	0.003	0.144	0.000	0.000	0.000	0.000	19.9	952.817	3034.96	145314.6648	0.042	0.040	0.044
*	46-53	1168-1346	368	0.039	34.951	1673.468	0.006	0.287	0.000	0.000	-0.215	-10.289	35.16	1683.470	3070.12	146998.1346	0.033	0.031	0.035
	43-46	1092-1168	367	0.023	15.216	728.568	0.002	0.096	0.000	0.000	0.000	0.000	15.21	728.259	3085.33	147726.3933	0.023	0.022	0.024
	37-43	940-1092	366	0.028	30.277	1449.676	0.005	0.239	0.000	0.000	0.000	0.000	30.26	1448.857	3115.59	149175.2499	0.029	0.028	0.030
	25-37	635-940	365	0.020	61.105	2925.710	0.010	0.479	0.000	0.000	0.275	1.3154	60.82	2912.077	3176.41	152087.3271	0.024	0.023	0.025
	13-25	330-635	364	0.019	61.141	2927.450	0.010	0.479	0.000	0.000	0.000	0.000	61.11	2925.963	3237.52	155013.2896	0.019	0.018	0.020
*	0-13	0-330	363	0.008	67.004	3208.185	0.011	0.527	0.000	0.000	0.143	6.863	66.85	3200.795	3304.37	158214.0848	0.01	0.010	0.011

Table A-68 Energy Balance Results for RBHT Test 1582B for Time Period 1694 to 1748 seconds

Results for RBHT Test 1582 Valid Time Period 1694 to 1748 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
0.25	6.35	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
0.50	12.70	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
0.75	19.05	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
1.00	25.40	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
1.25	31.75	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
1.50	38.10	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
1.75	44.45	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
2.00	50.80	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
2.25	57.15	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
2.50	63.50	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
2.75	69.85	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
3.00	76.20	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
3.25	82.55	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
3.50	88.90	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
3.75	95.25	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
4.00	101.60	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
4.25	107.95	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
4.50	114.30	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
4.75	120.65	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
5.00	127.00	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
5.25	133.35	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
5.50	139.70	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
5.75	146.05	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
6.00	152.40	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
6.25	158.75	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
6.50	165.10	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
6.75	171.45	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
7.00	177.80	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
7.25	184.15	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
7.50	190.50	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
7.75	196.85	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
8.00	203.20	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
8.25	209.55	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
8.50	215.90	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
8.75	222.25	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
9.00	228.60	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
9.25	234.95	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
9.50	241.30	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
9.75	247.65	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
10.00	254.00	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
10.25	260.35	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
10.50	266.70	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
10.75	273.05	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
11.00	279.40	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
11.25	285.75	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
11.50	292.10	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
11.75	298.45	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02
12.00	304.80	0	0	0.00E+00	0.00E+00	0.00E+00	1.37E-01	6.21E-02

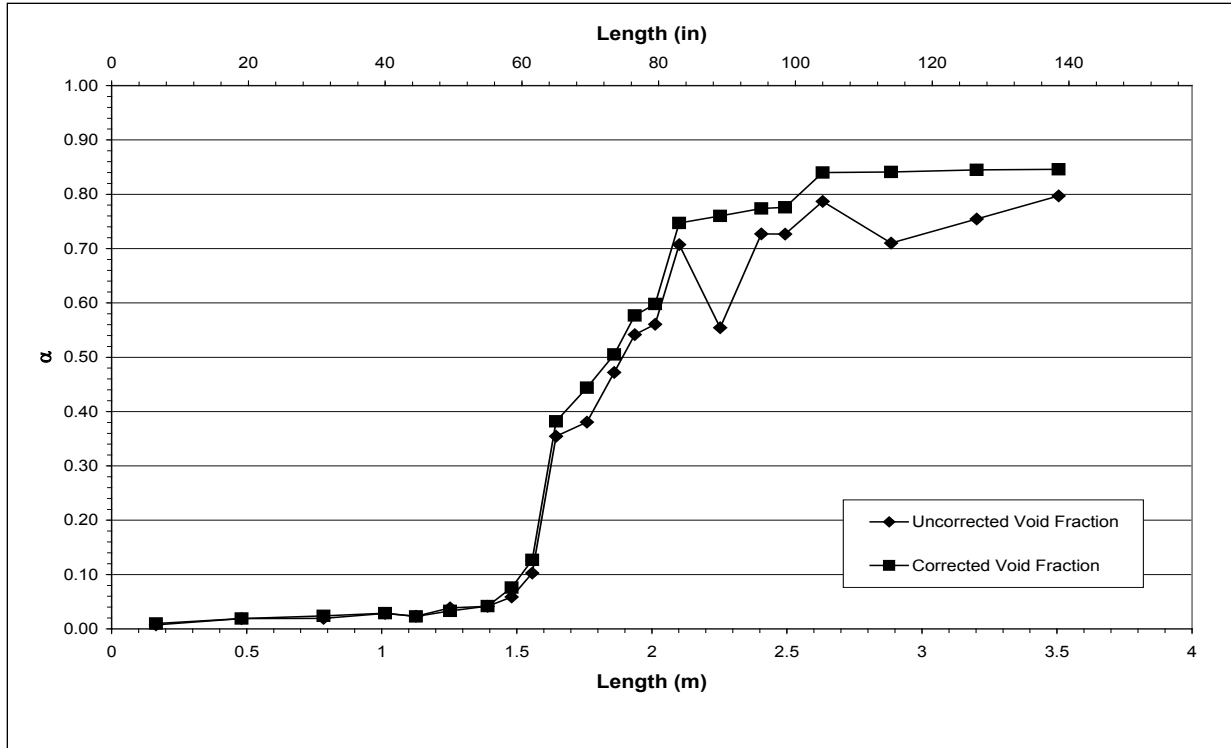


Figure A-170 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1582B for Time Period 1694 to 1748 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1582-C

Test Conditions

Date: 6/11/2003

Steady-state time window: 2039 – 2100 seconds

Inlet flow rate: 3.546 cm/sec (1.396 in./sec)

Inlet mass flow rate: 0.169 kg/sec (0.373 lbm/sec)

Inlet flow temperature: 326 K (128 °F)

Upper plenum pressure: 138.0 kPa (20.02 psia)

Bundle power: 141.43 kW

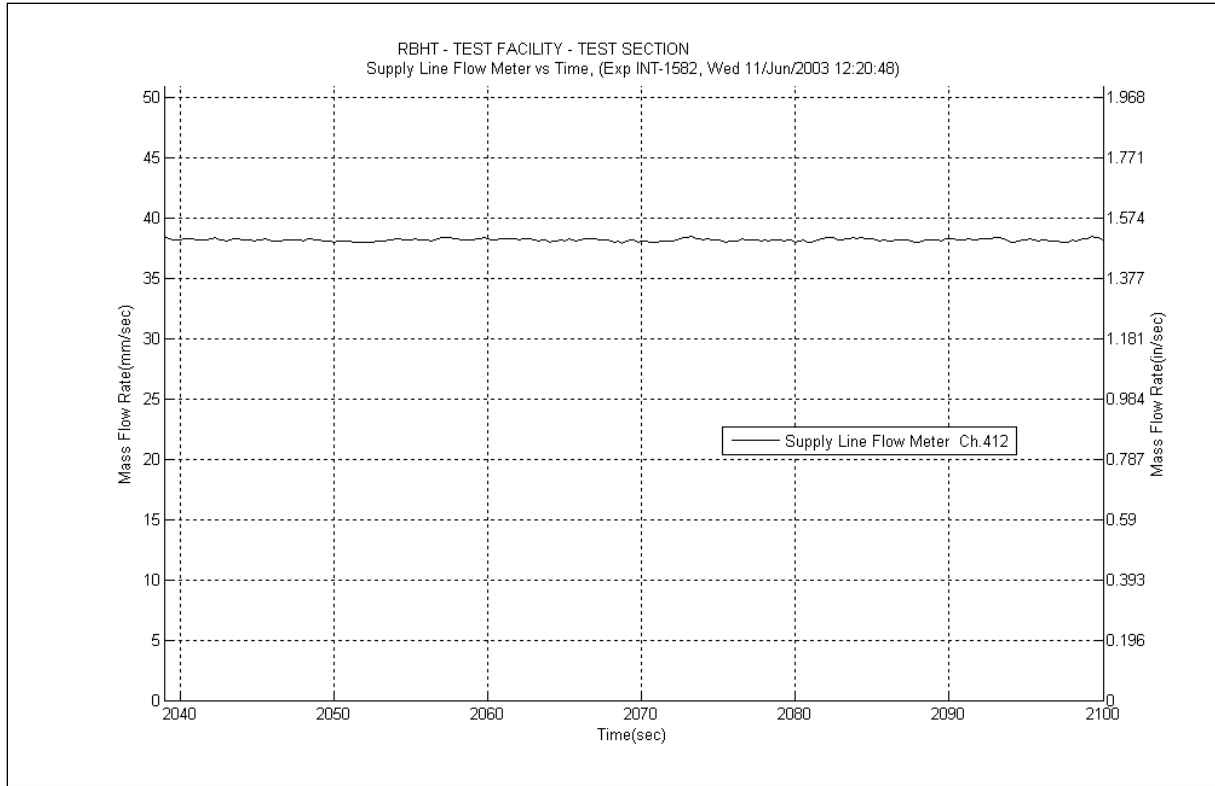


Figure A-171 Inlet Flow Plot for Experiment 1582C

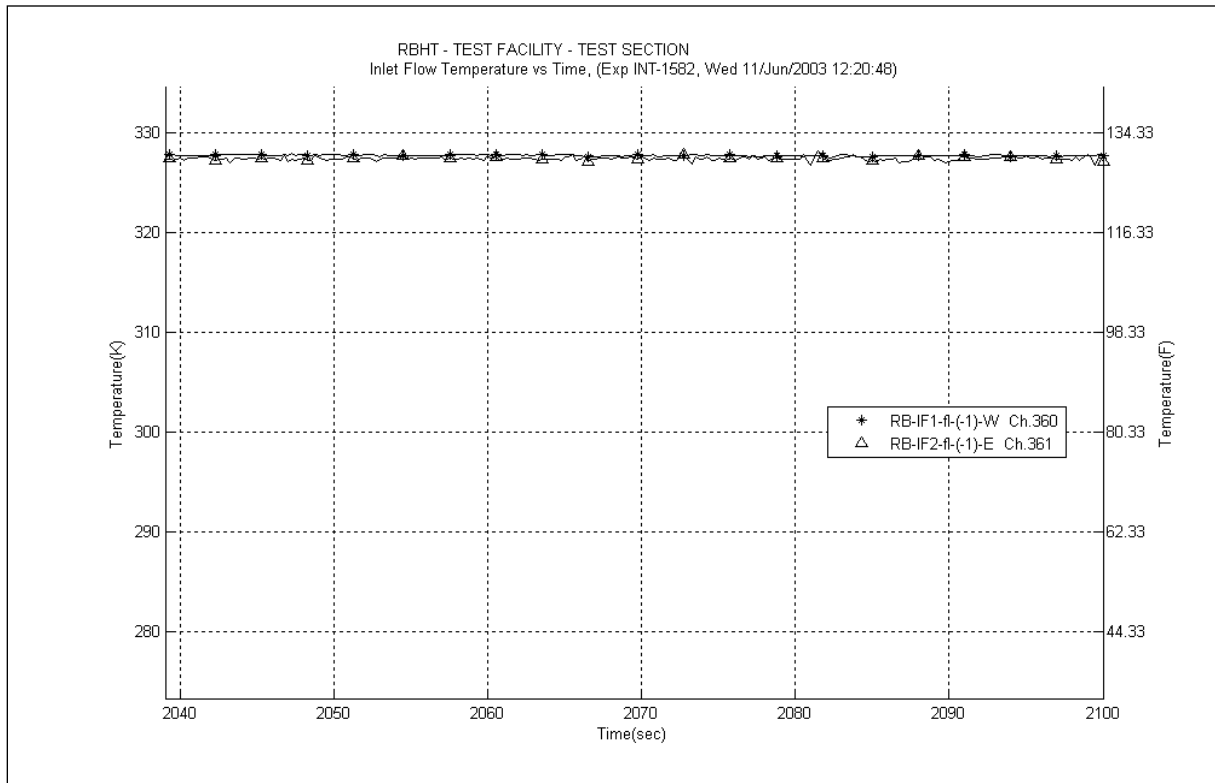


Figure A-172 Inlet Temperature Plot for Experiment 1582C

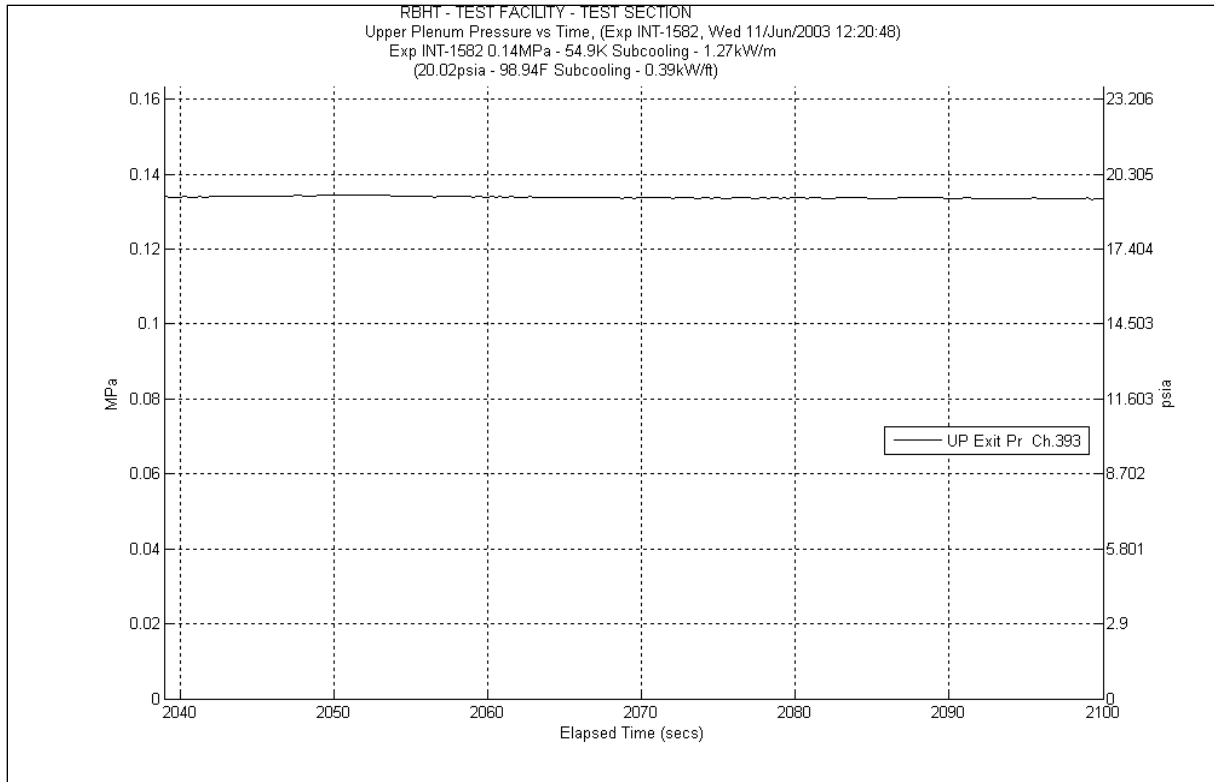


Figure A-173 System Pressure Plot for Experiment 1582C

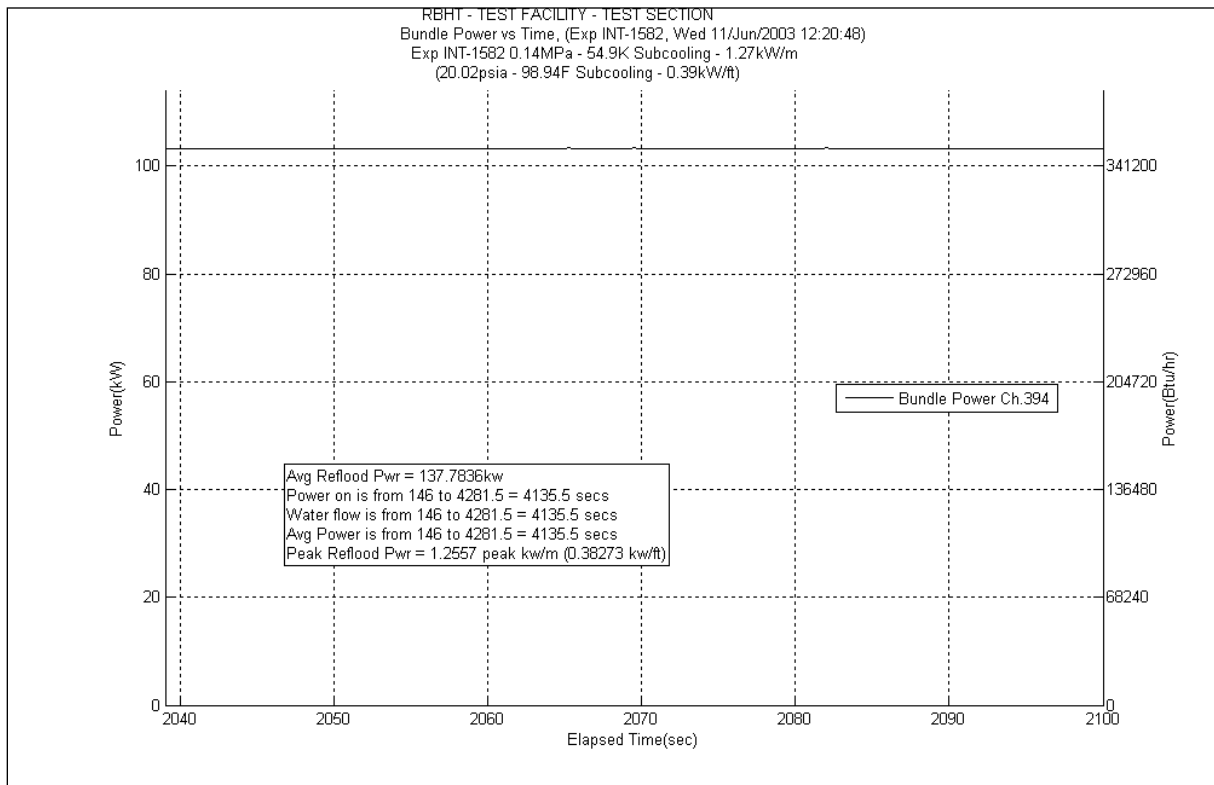


Figure A-174 Bundle Power Plot for Experiment 1582C

Table A-69 Data Results for RBHT Test 1582C for Time Period 2039 to 2100 seconds

Results for RBHT Test 1582
Valid Time Period 2039 to 2100 seconds
Collapsed Liquid Level = 83.218 inches = 2113.74 mm
(Z_{CSV}) Onset of Significant Void = 49.5 inches = 1257 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.820	10.304	493.337	1.914	91.643	0.602	28.824	0.000	0.000	7.784	372.700	2887.784	138267.8401	0.864	0.860	0.868
*	120-133	3048-3378	383	0.776	15.139	724.838	2.088	99.974	1.076	51.519	2.631	125.952	9.344	447.393	2897.128	138715.2332	0.862	0.858	0.866
*	108-120	2743-3048	382	0.731	16.774	803.165	1.694	81.109	1.342	64.255	4.843	231.906	8.895	425.895	2906.023	139141.1281	0.857	0.853	0.861
	100-108	2540-2743	381	0.808	7.982	382.187	0.978	46.827	0.982	47.018	0.000	0.000	6.02	288.239	2912.043	139429.3672	0.855	0.851	0.859
	97-100	2464-2540	380	0.752	3.859	184.753	0.333	15.944	0.355	16.997	0.000	0.000	3.167	151.637	2915.21	139581.004	0.797	0.793	0.801
	93-97	2362-2464	379	0.755	5.084	243.436	0.416	19.918	0.463	22.169	0.000	0.000	4.205	201.336	2919.415	139782.3405	0.798	0.794	0.802
*	85-93	2159-2362	378	0.590	17.050	816.344	0.738	35.336	0.889	42.566	6.684	320.017	8.739	418.426	2928.154	140200.7661	0.79	0.786	0.794
	81-85	2057-2159	377	0.746	5.282	252.885	0.321	15.370	0.426	20.397	0.000	0.000	4.534	217.089	2932.688	140417.8551	0.782	0.778	0.786
	78-81	1981-2057	376	0.623	5.868	280.984	0.220	10.534	0.311	14.891	0.000	0.000	5.336	255.489	2938.024	140673.3442	0.657	0.654	0.660
	75-78	1905-1981	375	0.611	6.061	290.184	0.201	9.624	0.304	14.556	0.000	0.000	5.552	265.831	2943.576	140939.1754	0.644	0.641	0.647
	72-75	1829-1905	374	0.546	7.079	338.921	0.183	8.762	0.297	14.220	0.000	0.000	6.597	315.866	2950.173	141255.0414	0.576	0.573	0.579
*	67-72	1702-1829	373	0.437	14.630	700.470	0.263	12.593	0.480	22.983	2.397	114.750	11.49	550.144	2961.663	141805.1856	0.558	0.555	0.561
	63-67	1600-1702	372	0.513	10.122	484.634	0.170	8.140	0.370	17.716	0.000	0.000	9.581	458.741	2971.244	142263.9263	0.539	0.536	0.542
	60-63	1524-1600	371	0.387	9.545	457.033	0.103	4.932	0.269	12.880	0.000	0.000	9.169	439.014	2980.413	142702.9404	0.411	0.409	0.413
	57-60	1448-1524	370	0.299	10.916	522.679	0.079	3.783	0.262	12.545	0.000	0.000	10.57	506.094	2990.983	143209.0347	0.321	0.319	0.323
	53-57	1346-1448	369	0.090	18.914	905.612	0.062	2.969	0.339	16.231	0.000	0.000	18.51	886.264	3009.493	144095.2983	0.109	0.108	0.110
*	46-53	1168-1346	368	0.044	34.764	1664.516	0.031	1.484	0.064	3.064	0.819	39.221	33.85	1620.747	3043.343	145716.045	0.069	0.066	0.072
	43-46	1092-1168	367	0.028	15.139	724.838	0.002	0.096	0.000	0.000	0.000	0.000	15.13	724.428	3058.473	146440.4733	0.029	0.028	0.030
	37-43	940-1092	366	0.032	30.173	1444.703	0.004	0.192	0.000	0.000	0.000	0.000	30.16	1444.069	3088.633	147884.5418	0.032	0.030	0.034
*	25-37	635-940	365	0.022	60.954	2918.499	0.008	0.383	0.000	0.000	0.266	12.742	60.68	2905.374	3149.313	150789.9158	0.026	0.025	0.027
	13-25	330-635	364	0.020	61.079	2924.466	0.008	0.383	0.000	0.000	0.000	0.000	61.05	2923.090	3210.363	153713.0055	0.02	0.019	0.021
*	0-13	0-330	363	0.008	66.963	3206.196	0.008	0.383	0.000	0.000	0.145	6.933	66.81	3198.880	3277.173	156911.8855	0.01	0.010	0.011

Table A-70 Energy Balance Results for RBHT Test 1582C for Time Period 2039 to 2100 seconds

Results for RBHT Test 1582 Valid Time Period 2039 to 2100 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	4649.5302	14.66727	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
0.25	6.35	4907.8374	15.48212	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
0.50	12.70	5166.1446	16.29697	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
0.75	19.05	5424.4519	17.11182	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
1.00	25.40	5682.7591	17.92667	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
1.25	31.75	5941.0663	18.74152	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
1.50	38.10	6199.3736	19.55637	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
1.75	44.45	6457.6808	20.37121	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
2.00	50.80	6715.988	21.18606	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
2.25	57.15	6974.2953	22.00091	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
2.50	63.50	7232.6025	22.81576	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
2.75	69.85	7490.9097	23.63061	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
3.00	76.20	7749.2169	24.44546	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
3.25	82.55	8007.5242	25.26031	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
3.50	88.90	8265.8314	26.07516	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
3.75	95.25	8524.1386	26.89	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
4.00	101.60	8782.4459	27.70485	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
4.25	107.95	9040.7531	28.5197	0.00E+00	0.00E+00	0.00E+00	1.20E-01	5.44E-02
4.50	114.30	9299.0603	29.33455	4.64E-03	6.64E-01	3.01E-01	1.19E-01	5.41E-02
4.75	120.65	9557.3676	30.1494	1.27E-02	1.82E+00	8.23E-01	1.18E-01	5.37E-02
5.00	127.00	9815.6748	30.96425	2.10E-02	3.00E+00	1.36E+00	1.17E-01	5.33E-02
5.25	133.35	10073.982	31.7791	2.95E-02	4.21E+00	1.91E+00	1.16E-01	5.28E-02
5.50	139.70	10332.289	32.59394	3.82E-02	5.46E+00	2.48E+00	1.15E-01	5.23E-02
5.75	146.05	10590.596	33.40879	4.71E-02	6.74E+00	3.06E+00	1.14E-01	5.18E-02
6.00	152.40	10848.904	34.22364	5.63E-02	8.05E+00	3.65E+00	1.13E-01	5.13E-02
6.25	158.75	11107.211	35.03849	6.56E-02	9.39E+00	4.26E+00	1.12E-01	5.08E-02
6.50	165.10	11365.518	35.85334	7.52E-02	1.08E+01	4.88E+00	1.11E-01	5.03E-02
6.75	171.45	11623.825	36.66819	8.50E-02	1.22E+01	5.52E+00	1.10E-01	4.98E-02
7.00	177.80	11882.133	37.48304	9.51E-02	1.36E+01	6.17E+00	1.09E-01	4.92E-02
7.25	184.15	12140.44	38.29788	1.05E-01	1.51E+01	6.83E+00	1.07E-01	4.87E-02
7.50	190.50	12398.747	39.11273	1.16E-01	1.66E+01	7.51E+00	1.06E-01	4.81E-02
7.75	196.85	12657.054	39.92758	1.27E-01	1.81E+01	8.21E+00	1.05E-01	4.75E-02
8.00	203.20	12915.362	40.74243	1.37E-01	1.97E+01	8.91E+00	1.03E-01	4.69E-02
8.25	209.55	13173.669	41.55728	1.49E-01	2.12E+01	9.63E+00	1.02E-01	4.63E-02
8.50	215.90	13431.976	42.37213	1.60E-01	2.29E+01	1.04E+01	1.01E-01	4.57E-02
8.75	222.25	13690.283	43.18698	1.72E-01	2.45E+01	1.11E+01	9.94E-02	4.51E-02
9.00	228.60	13948.591	44.00182	1.83E-01	2.62E+01	1.19E+01	9.79E-02	4.44E-02
9.25	234.95	13173.669	41.55728	1.95E-01	2.79E+01	1.26E+01	9.66E-02	4.38E-02
9.50	241.30	12398.747	39.11273	2.06E-01	2.94E+01	1.34E+01	9.52E-02	4.32E-02
9.75	247.65	11623.825	36.66819	2.16E-01	3.09E+01	1.40E+01	9.40E-02	4.26E-02
10.00	254.00	10848.904	34.22364	2.26E-01	3.23E+01	1.46E+01	9.29E-02	4.21E-02
10.25	260.35	10073.982	31.7791	2.35E-01	3.36E+01	1.52E+01	9.18E-02	4.16E-02
10.50	266.70	9299.0603	29.33455	2.43E-01	3.47E+01	1.58E+01	9.08E-02	4.12E-02
10.75	273.05	8524.1386	26.89	2.50E-01	3.58E+01	1.62E+01	8.99E-02	4.08E-02
11.00	279.40	7749.2169	24.44546	2.57E-01	3.68E+01	1.67E+01	8.91E-02	4.04E-02
11.25	285.75	6974.2953	22.00091	2.64E-01	3.77E+01	1.71E+01	8.83E-02	4.01E-02
11.50	292.10	6199.3736	19.55637	2.69E-01	3.85E+01	1.75E+01	8.76E-02	3.97E-02
11.75	298.45	5424.4519	17.11182	2.74E-01	3.92E+01	1.78E+01	8.70E-02	3.95E-02
12.00	304.80	4649.5302	14.66727	2.79E-01	3.98E+01	1.81E+01	8.65E-02	3.92E-02

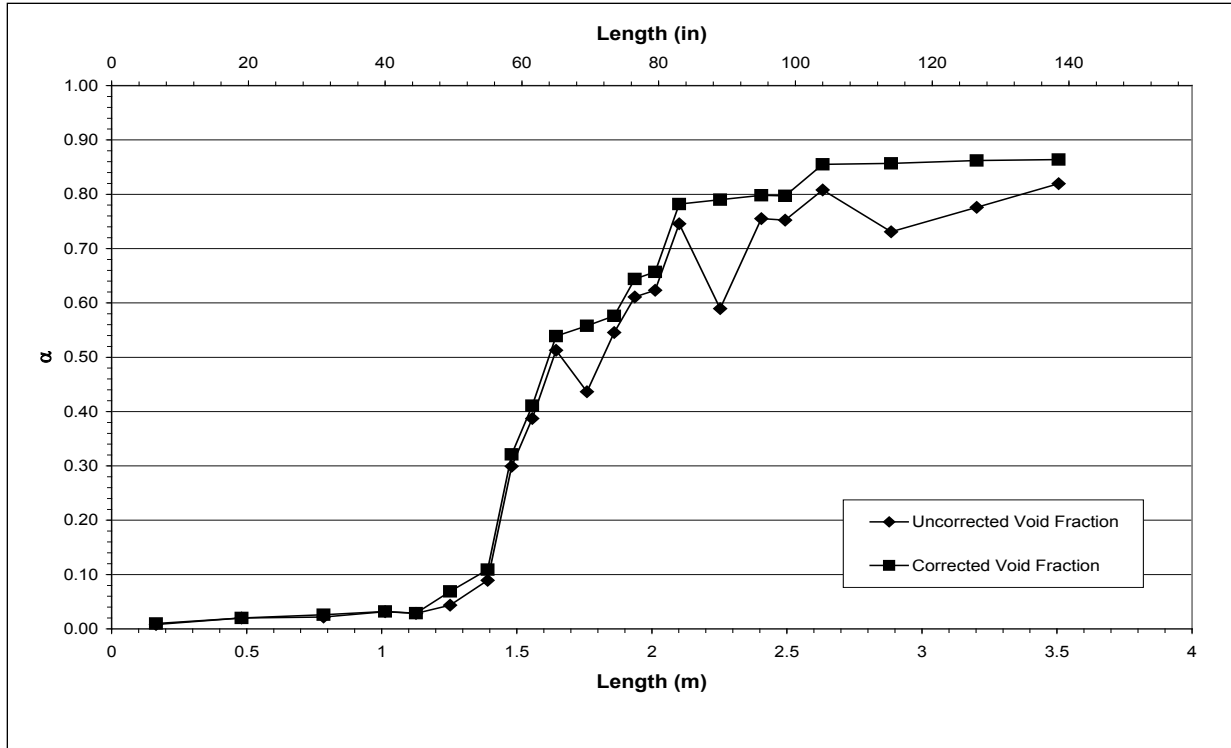


Figure A-175 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1582C for Time Period 2039 to 2100 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1582-D

Test Conditions

Date: 6/11/2003

Steady-state time window: 2231 – 2291 seconds

Inlet flow rate: 2.868 cm/sec (1.129 in./sec)

Inlet mass flow rate: 0.145 kg/sec (0.319 lbm/sec)

Inlet flow temperature: 326 K (128 °F)

Upper plenum pressure: 138.0 kPa (20.02 psia)

Bundle power: 141.43 kW

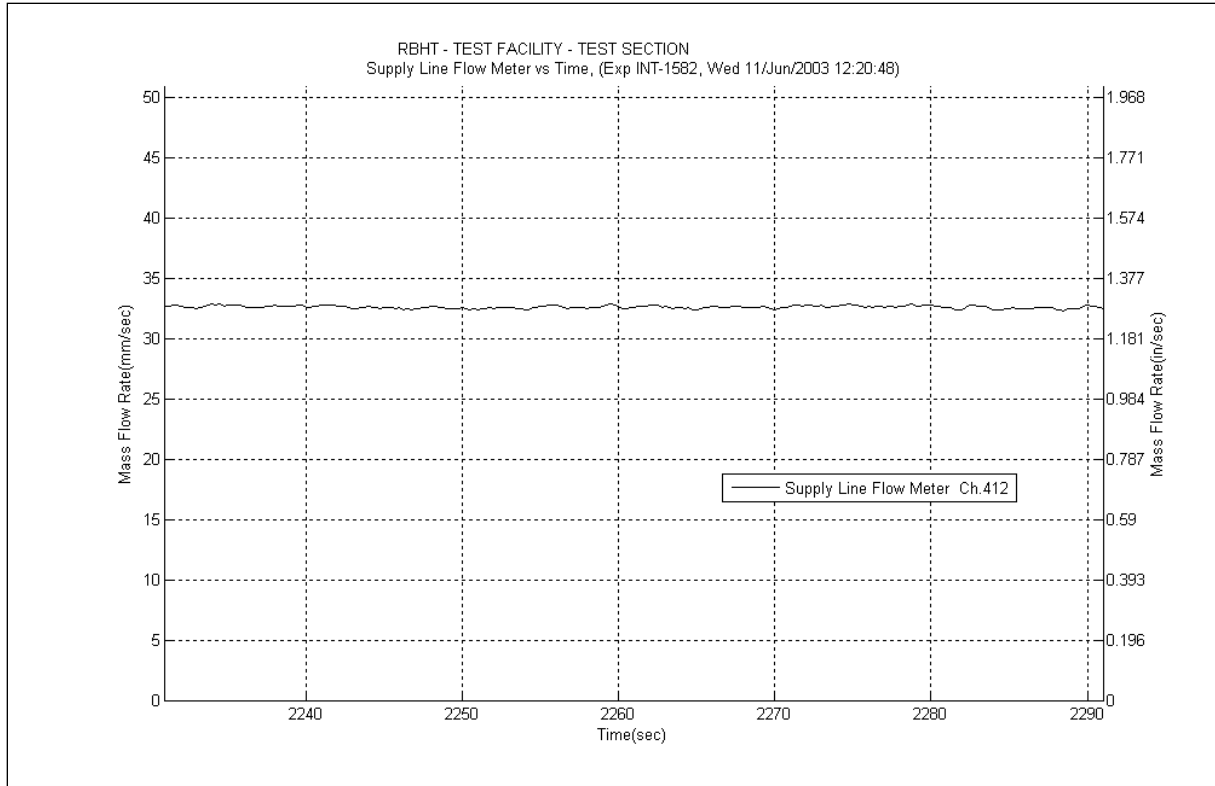


Figure A-176 Inlet Flow Plot for Experiment 1582D

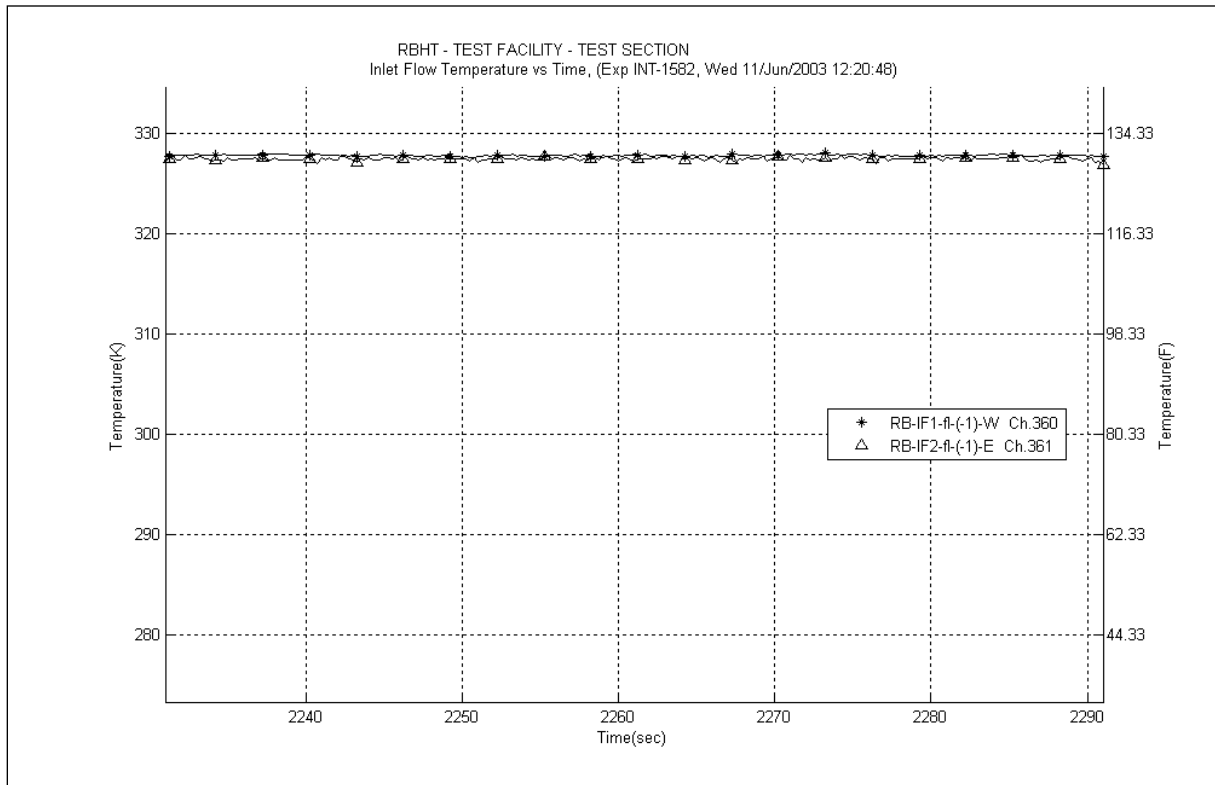


Figure A-177 Inlet Temperature Plot for Experiment 1582D

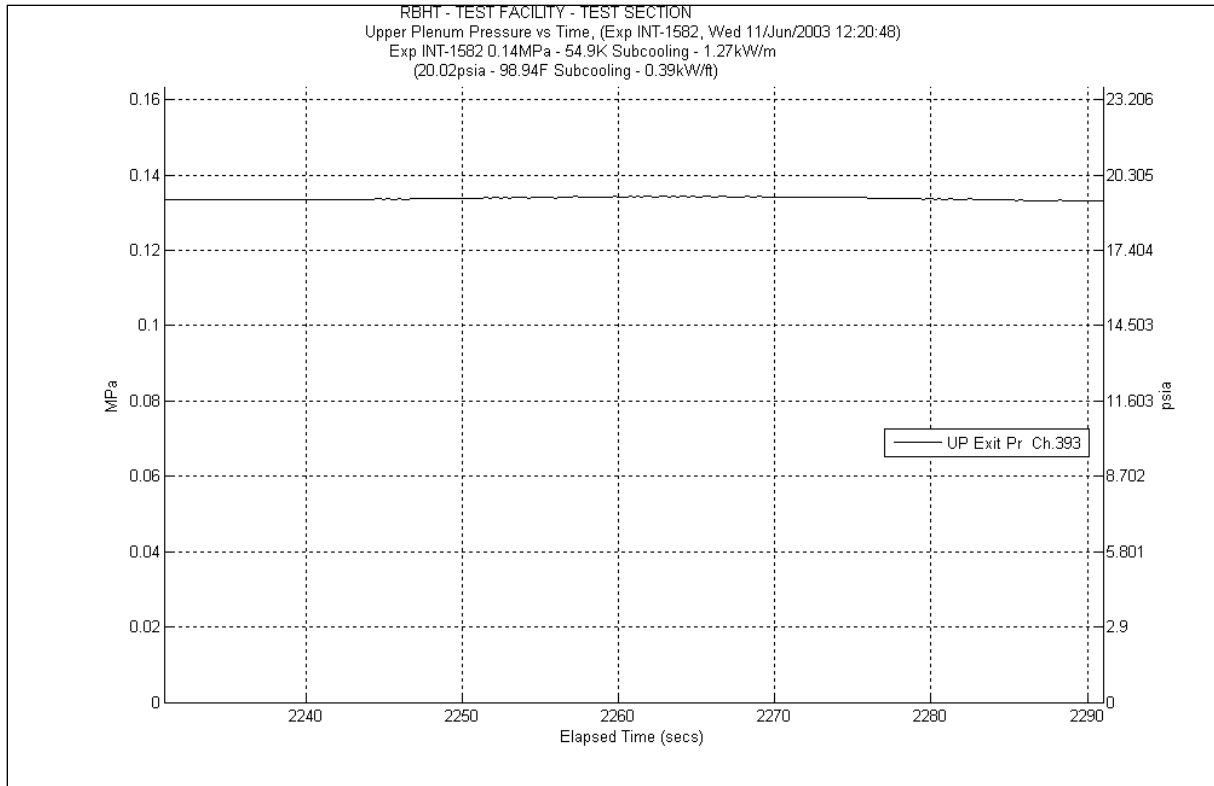


Figure A-178 System Pressure Plot for Experiment 1582D

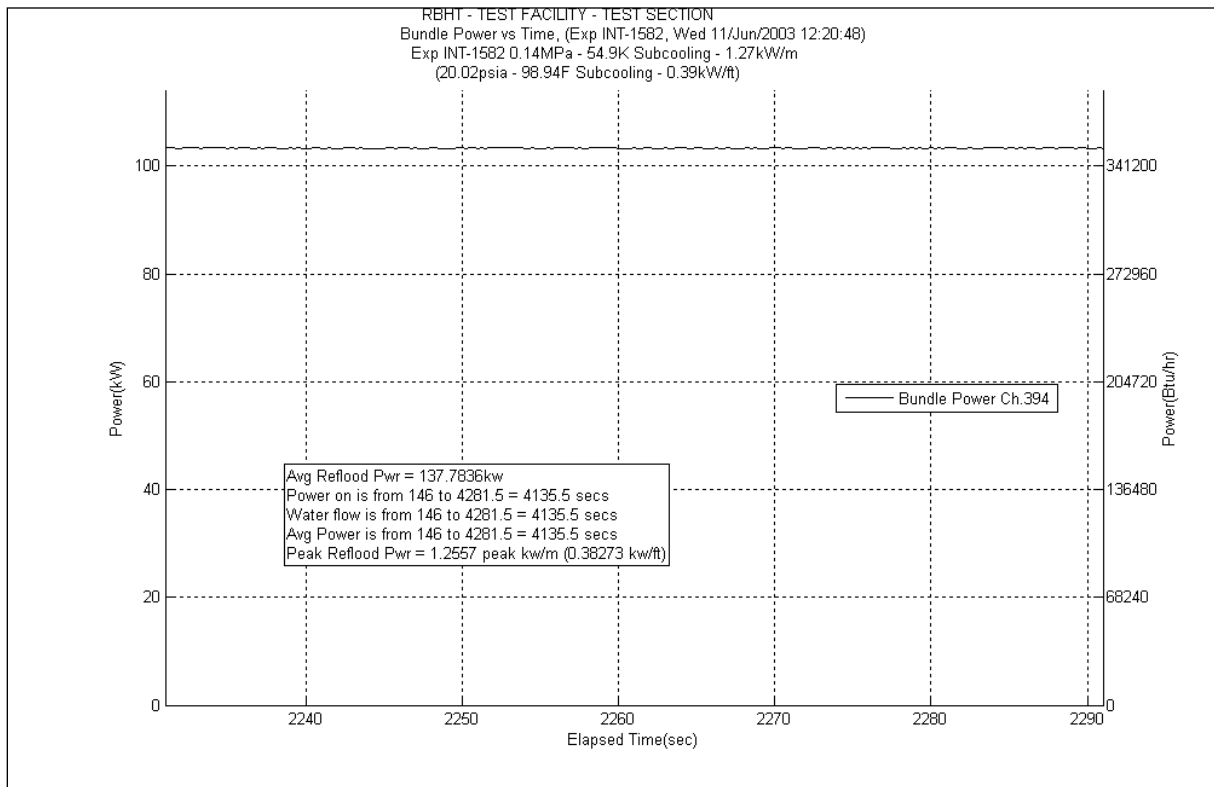


Figure A-179 Bundle Power Plot for Experiment 1582D

Table A-71 Data Results for RBHT Test 1582D for Time Period 2231 to 2291 seconds

Results for RBHT Test 1582
Valid Time Period 2231 to 2291 seconds
Collapsed Liquid Level = 77.746 inches = 1974.76 mm
(Z_{oav}) Onset of Significant Void = 49.5 inches = 1257 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.838	9.280	444.352	1.692	81.013	0.515	24.658	0.000	0.000	7.07	338.513	2887.07	138233.6536	0.876	0.872	0.880
*	120-133	3048-3378	383	0.794	13.892	665.160	1.848	88.483	0.920	44.050	2.578	123.443	8.546	409.185	2895.616	138642.8383	0.873	0.869	0.877
*	108-120	2743-3048	382	0.750	15.590	746.471	1.504	72.012	1.148	54.967	4.697	224.912	8.241	394.581	2903.857	139037.4195	0.868	0.864	0.872
	100-108	2540-2743	381	0.824	7.328	350.856	0.873	41.799	0.840	40.219	0.000	0.000	5.612	268.704	2909.469	139306.1235	0.865	0.861	0.869
	97-100	2464-2540	380	0.774	3.516	168.341	0.299	14.316	0.304	14.556	0.000	0.000	2.911	139.379	2912.38	139445.5029	0.813	0.809	0.817
	93-97	2362-2464	379	0.775	4.679	224.041	0.376	18.003	0.396	18.961	0.000	0.000	3.906	187.020	2916.286	139632.5232	0.812	0.808	0.816
*	85-93	2159-2362	378	0.618	15.892	760.893	0.673	32.223	0.760	36.389	6.376	305.265	8.083	387.016	2924.369	140019.5393	0.805	0.801	0.809
	81-85	2057-2159	377	0.767	4.840	231.749	0.297	14.220	0.364	17.428	0.000	0.000	4.177	199.996	2928.546	140219.5351	0.799	0.795	0.803
	78-81	1981-2057	376	0.659	5.313	254.377	0.206	9.863	0.266	12.736	0.000	0.000	4.839	231.693	2933.385	140451.2277	0.689	0.686	0.692
	75-78	1905-1981	375	0.652	5.427	259.848	0.191	9.145	0.260	12.449	0.000	0.000	4.971	238.013	2938.356	140689.2404	0.681	0.678	0.684
	72-75	1829-1905	374	0.604	6.164	295.157	0.177	8.475	0.254	12.162	0.000	0.000	5.732	274.450	2944.088	140963.6901	0.632	0.629	0.635
*	67-72	1702-1829	373	0.472	13.716	656.706	0.261	12.497	0.410	19.631	3.345	160.140	9.7	464.438	2953.788	141428.1286	0.626	0.623	0.629
	63-67	1600-1702	372	0.597	8.377	401.085	0.179	8.571	0.316	15.130	0.000	0.000	7.877	377.153	2961.665	141805.2813	0.621	0.618	0.624
	60-63	1524-1600	371	0.466	8.320	398.350	0.116	5.554	0.230	11.012	0.000	0.000	7.973	381.749	2969.638	142187.0306	0.488	0.486	0.490
	57-60	1448-1524	370	0.422	9.010	431.422	0.099	4.740	0.224	10.725	0.000	0.000	8.684	415.792	2978.322	142602.8228	0.442	0.440	0.444
	53-57	1346-1448	369	0.298	14.593	698.729	0.105	5.027	0.290	13.885	0.000	0.000	14.19	679.421	2992.512	143282.2436	0.317	0.315	0.319
*	46-53	1168-1346	368	0.097	32.843	1572.513	0.099	4.740	0.466	22.312	2.308	110.489	29.97	1434.971	3022.482	144717.2149	0.175	0.174	0.176
	43-46	1092-1168	367	0.034	15.050	720.611	0.001	0.048	0.000	0.000	0.000	0.000	15.05	720.598	3037.532	145437.8128	0.034	0.032	0.036
	37-43	940-1092	366	0.035	30.064	1439.481	0.003	0.144	0.000	0.000	0.000	0.000	30.05	1438.802	3067.582	146876.6145	0.035	0.033	0.037
*	25-37	635-940	365	0.025	60.757	2909.050	0.006	0.287	0.000	0.000	0.221	10.570	60.53	2898.192	3128.112	149774.8065	0.028	0.027	0.029
	13-25	330-635	364	0.022	60.975	2919.493	0.006	0.287	0.000	0.000	0.000	0.000	60.95	2918.302	3189.062	152693.1081	0.022	0.021	0.023
*	0-13	0-330	363	0.009	66.906	3203.461	0.006	0.287	0.000	0.000	0.140	6.687	66.76	3196.486	3255.822	155889.5941	0.011	0.010	0.012

Table A-72 Energy Balance Results for RBHT Test 1582D for Time Period 2231 to 2291 seconds

Results for RBHT Test 1582 Valid Time Period 2231 to 2291 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	4655.5135	14.68615	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
0.25	6.35	4914.1531	15.50205	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
0.50	12.70	5172.7928	16.31794	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
0.75	19.05	5431.4324	17.13384	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
1.00	25.40	5690.0721	17.94974	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
1.25	31.75	5948.7117	18.76564	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
1.50	38.10	6207.3513	19.58153	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
1.75	44.45	6465.991	20.39743	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
2.00	50.80	6724.6306	21.21333	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
2.25	57.15	6983.2702	22.02922	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
2.50	63.50	7241.9099	22.84512	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
2.75	69.85	7500.5495	23.66102	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
3.00	76.20	7759.1892	24.47692	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
3.25	82.55	8017.8288	25.29281	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
3.50	88.90	8276.4684	26.10871	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
3.75	95.25	8535.1081	26.92461	0.00E+00	0.00E+00	0.00E+00	1.02E-01	4.65E-02
4.00	101.60	8793.7477	27.7405	5.16E-03	6.30E-01	2.86E-01	1.02E-01	4.62E-02
4.25	107.95	9052.3874	28.5564	1.41E-02	1.72E+00	7.80E-01	1.01E-01	4.58E-02
4.50	114.30	9311.027	29.3723	2.33E-02	2.84E+00	1.29E+00	1.00E-01	4.54E-02
4.75	120.65	9569.6666	30.1882	3.27E-02	3.99E+00	1.81E+00	9.91E-02	4.49E-02
5.00	127.00	9828.3063	31.00409	4.24E-02	5.18E+00	2.35E+00	9.81E-02	4.45E-02
5.25	133.35	10086.946	31.81999	5.24E-02	6.40E+00	2.90E+00	9.71E-02	4.40E-02
5.50	139.70	10345.586	32.63589	6.26E-02	7.64E+00	3.47E+00	9.60E-02	4.35E-02
5.75	146.05	10604.225	33.45179	7.30E-02	8.92E+00	4.05E+00	9.49E-02	4.31E-02
6.00	152.40	10862.865	34.26768	8.38E-02	1.02E+01	4.64E+00	9.38E-02	4.26E-02
6.25	158.75	11121.504	35.08358	9.48E-02	1.16E+01	5.25E+00	9.27E-02	4.21E-02
6.50	165.10	11380.144	35.89948	1.06E-01	1.29E+01	5.87E+00	9.16E-02	4.15E-02
6.75	171.45	11638.784	36.71537	1.18E-01	1.44E+01	6.51E+00	9.04E-02	4.10E-02
7.00	177.80	11897.423	37.53127	1.29E-01	1.58E+01	7.17E+00	8.92E-02	4.04E-02
7.25	184.15	12156.063	38.34717	1.41E-01	1.73E+01	7.83E+00	8.79E-02	3.99E-02
7.50	190.50	12414.703	39.16307	1.54E-01	1.88E+01	8.51E+00	8.67E-02	3.93E-02
7.75	196.85	12673.342	39.97896	1.66E-01	2.03E+01	9.20E+00	8.54E-02	3.87E-02
8.00	203.20	12931.982	40.79486	1.79E-01	2.19E+01	9.91E+00	8.41E-02	3.81E-02
8.25	209.55	13190.622	41.61076	1.92E-01	2.35E+01	1.06E+01	8.28E-02	3.75E-02
8.50	215.90	13449.261	42.42665	2.05E-01	2.51E+01	1.14E+01	8.14E-02	3.69E-02
8.75	222.25	13707.901	43.24255	2.19E-01	2.67E+01	1.21E+01	8.00E-02	3.63E-02
9.00	228.60	13966.54	44.05845	2.33E-01	2.84E+01	1.29E+01	7.86E-02	3.56E-02
9.25	234.95	13190.622	41.61076	2.46E-01	3.01E+01	1.36E+01	7.72E-02	3.50E-02
9.50	241.30	12414.703	39.16307	2.59E-01	3.17E+01	1.44E+01	7.59E-02	3.44E-02
9.75	247.65	11638.784	36.71537	2.71E-01	3.31E+01	1.50E+01	7.47E-02	3.39E-02
10.00	254.00	10862.865	34.26768	2.82E-01	3.45E+01	1.56E+01	7.35E-02	3.33E-02
10.25	260.35	10086.946	31.81999	2.93E-01	3.58E+01	1.62E+01	7.24E-02	3.29E-02
10.50	266.70	9311.027	29.3723	3.03E-01	3.70E+01	1.68E+01	7.14E-02	3.24E-02
10.75	273.05	8535.1081	26.92461	3.11E-01	3.80E+01	1.73E+01	7.05E-02	3.20E-02
11.00	279.40	7759.1892	24.47692	3.20E-01	3.90E+01	1.77E+01	6.97E-02	3.16E-02
11.25	285.75	6983.2702	22.02922	3.27E-01	3.99E+01	1.81E+01	6.89E-02	3.13E-02
11.50	292.10	6207.3513	19.58153	3.34E-01	4.08E+01	1.85E+01	6.83E-02	3.10E-02
11.75	298.45	5431.4324	17.13384	3.39E-01	4.15E+01	1.88E+01	6.77E-02	3.07E-02
12.00	304.80	4655.5135	14.68615	3.44E-01	4.21E+01	1.91E+01	6.71E-02	3.05E-02

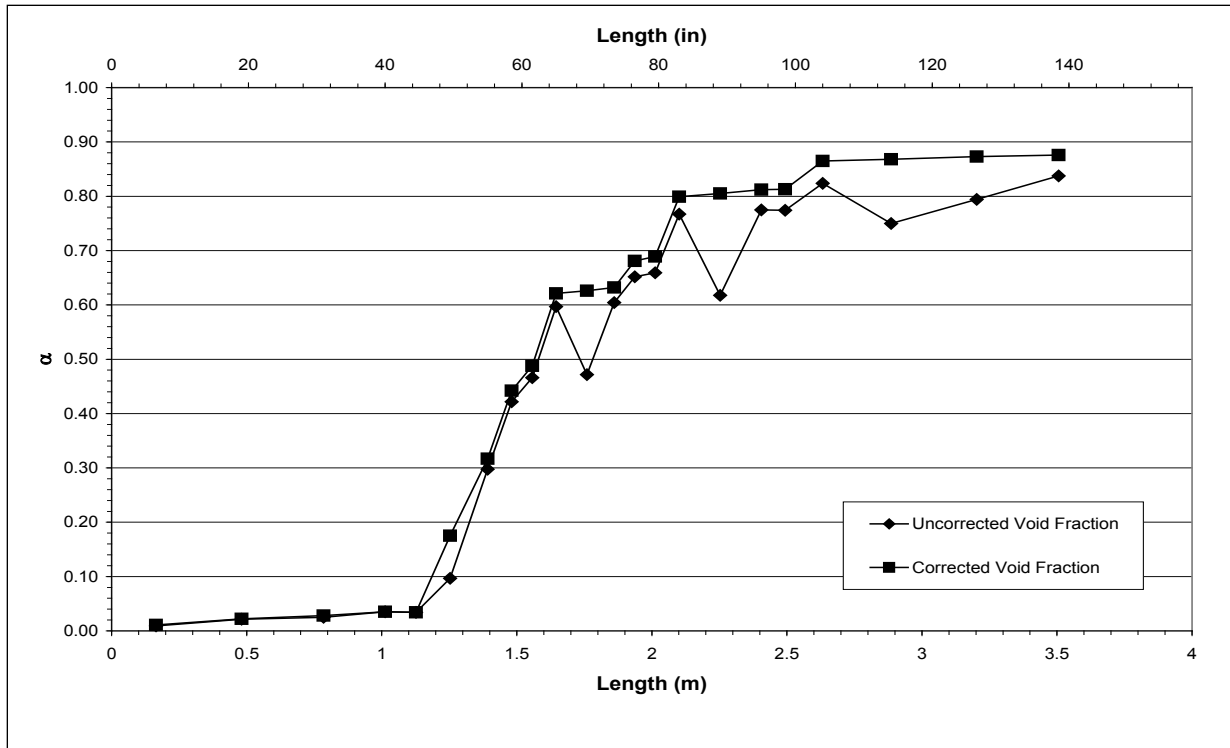


Figure A-180 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1582D for Time Period 2231 to 2291 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1582-E

Test Conditions

Date: 6/11/2003

Steady-state time window: 2430 – 2490 seconds

Inlet flow rate: 2.535 cm/sec (0.998 in./sec)

Inlet mass flow rate: 0.121 kg/sec (0.267 lbm/sec)

Inlet flow temperature: 326 K (128 °F)

Upper plenum pressure: 138.0 kPa (20.02 psia)

Bundle power: 141.43 kW

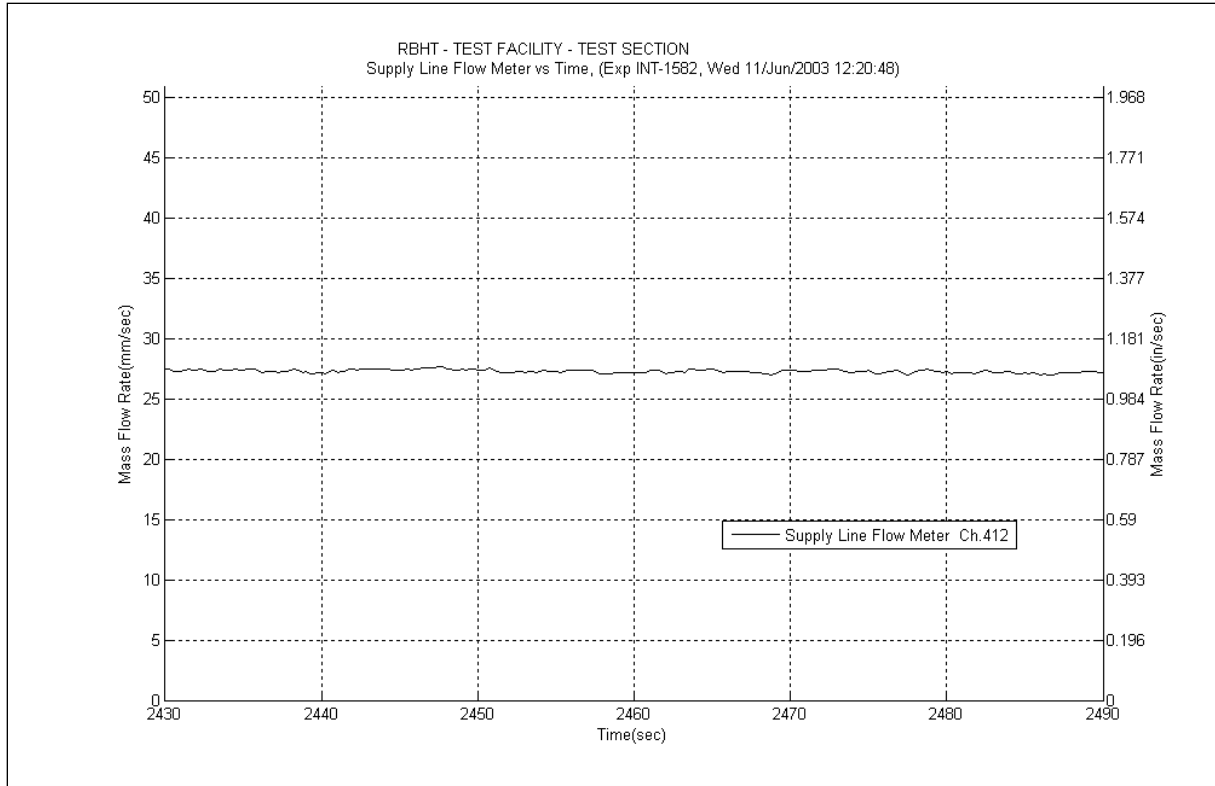


Figure A-181 Inlet Flow Plot for Experiment 1582E

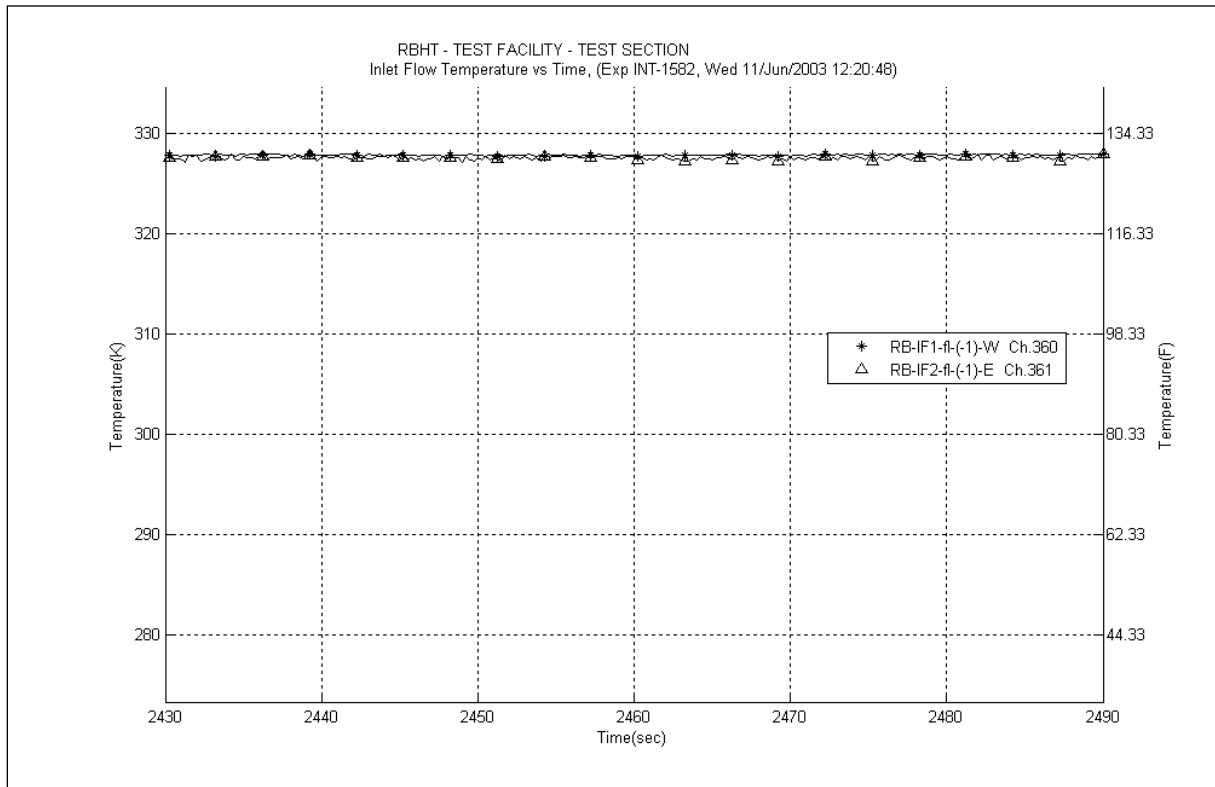


Figure A-182 Inlet Temperature Plot for Experiment 1582E

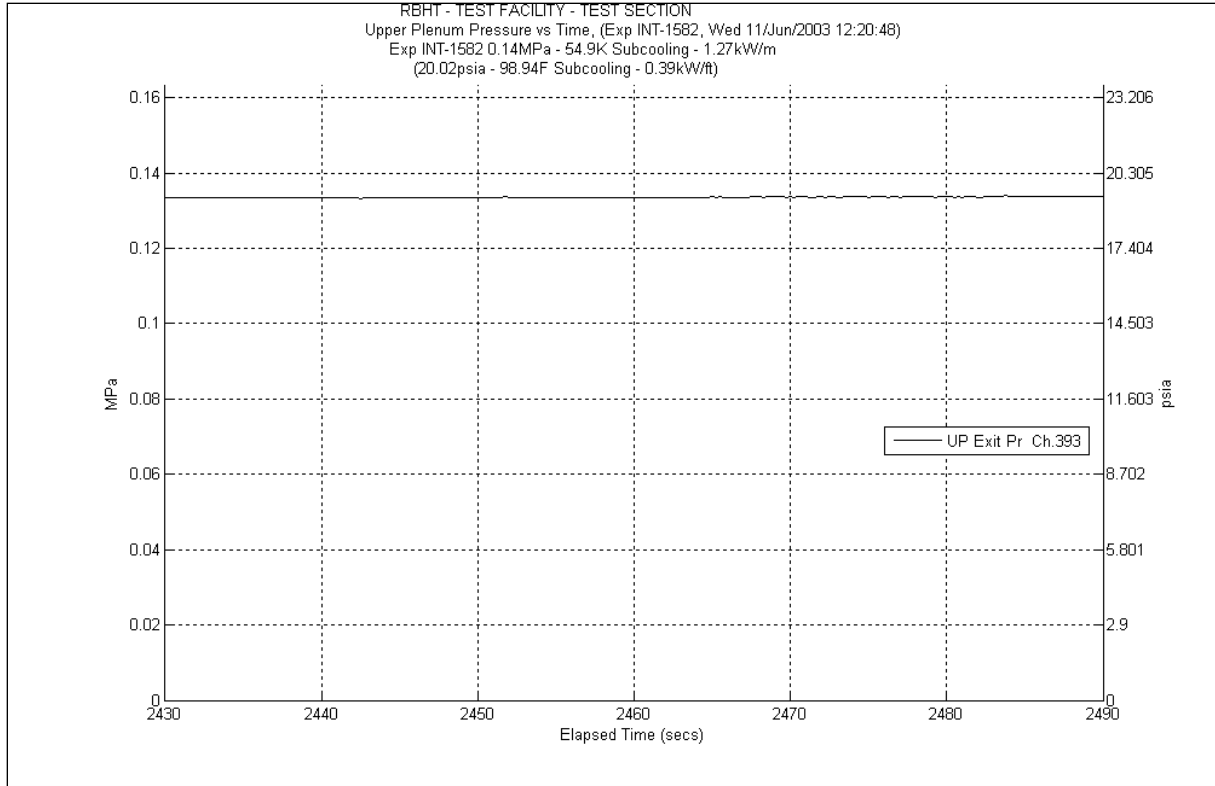


Figure A-183 System Pressure Plot for Experiment 1582E

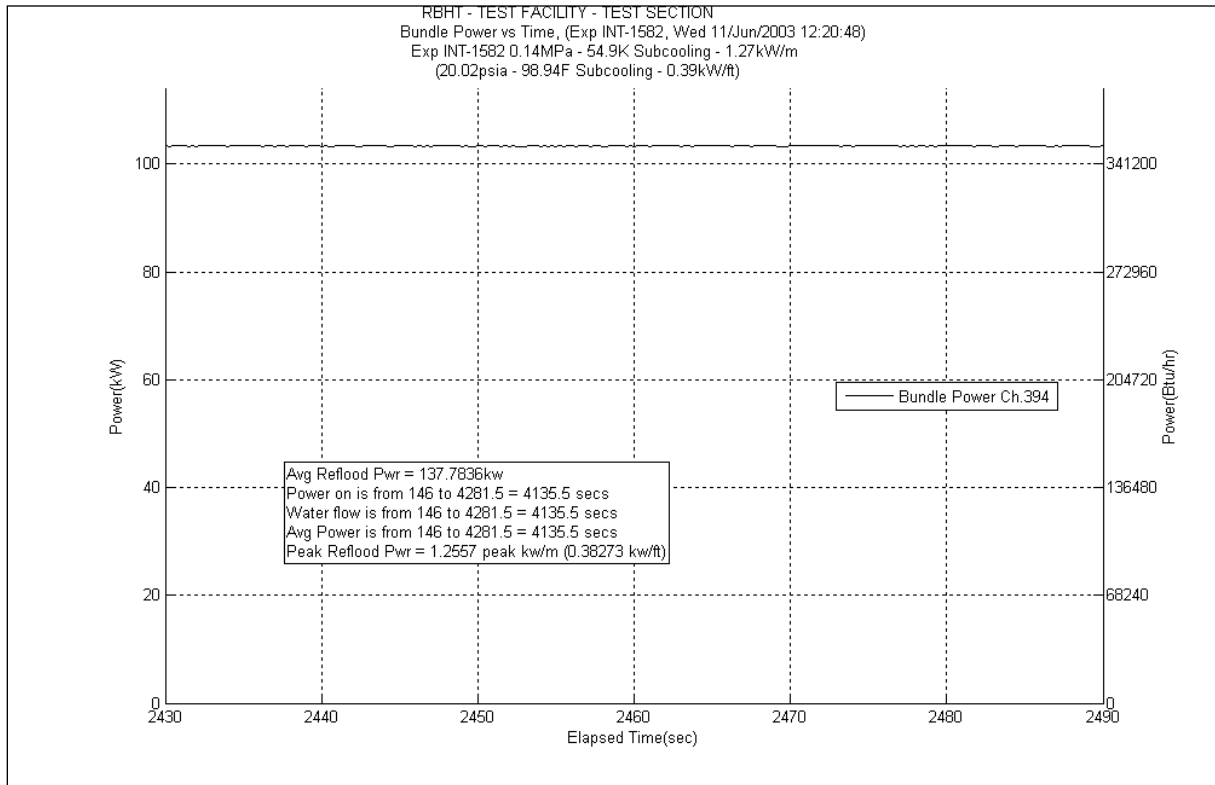


Figure A-184 Bundle Power Plot for Experiment 1582E

Table A-73 Data Results for RBHT Test 1582E for Time Period 2430 to 2490 seconds

Results for RBHT Test 1582
Valid Time Period 2430 to 2490 seconds
Collapsed Liquid Level = 72.467 inches = 1840.65 mm
(Z_{osv}) Onset of Significant Void = 40 inches = 1016 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	α _{uncorrected}	ΔP _{uncorrected} (lbf/ft ²)	ΔP _{uncorrected} (Pa)	ΔP _{fric} (lbf/ft ²)	ΔP _{fric} (Pa)	ΔP _{accel} (lbf/ft ²)	ΔP _{accel} (Pa)	ΔP _{grid} (lbf/ft ²)	ΔP _{grid} (Pa)	ΔP _{corrected} (lbf/ft ²)	ΔP _{corrected} (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	α _{corrected}	α _{min}	α _{max}
	133-144	3378-3658	384	0.862	7.878	377.214	1.465	70.145	0.431	20.636	0.000	0.000	5.979	286.276	2886	138181.4162	0.895	0.891	0.899
*	120-133	3048-3378	383	0.817	12.355	591.557	1.601	76.656	0.770	36.868	2.673	127.981	7.311	350.053	2893.3	138531.4688	0.892	0.888	0.896
*	108-120	2743-3048	382	0.776	13.980	669.387	1.306	62.532	0.961	46.013	4.513	216.105	7.2	344.738	2900.5	138876.2066	0.884	0.880	0.888
	100-108	2540-2743	381	0.846	6.419	307.341	0.761	36.437	0.703	33.660	0.000	0.000	4.951	237.055	2905.4	139113.2618	0.881	0.877	0.885
	97-100	2464-2540	380	0.802	3.090	147.951	0.262	12.545	0.254	12.162	0.000	0.000	2.572	123.148	2908	139236.4098	0.835	0.831	0.839
	93-97	2362-2464	379	0.799	4.181	200.170	0.329	15.753	0.332	15.896	0.000	0.000	3.52	168.539	2911.5	139404.9483	0.831	0.827	0.835
*	85-93	2159-2362	378	0.653	14.401	689.529	0.594	28.441	0.636	30.452	5.921	283.504	7.25	347.132	2918.8	139752.0802	0.825	0.821	0.829
	81-85	2057-2159	377	0.793	4.300	205.889	0.265	12.688	0.305	14.603	0.000	0.000	3.731	178.641	2922.5	139930.7214	0.82	0.816	0.824
	78-81	1981-2057	376	0.695	4.752	227.522	0.185	8.858	0.223	10.677	0.000	0.000	4.344	207.992	2926.9	140138.7132	0.721	0.717	0.725
	75-78	1905-1981	375	0.693	4.783	229.014	0.173	8.283	0.218	10.438	0.000	0.000	4.389	210.146	2931.2	140348.8597	0.718	0.714	0.722
	72-75	1829-1905	374	0.661	5.276	252.637	0.162	7.757	0.213	10.198	0.000	0.000	4.902	234.709	2936.1	140583.5687	0.685	0.682	0.688
*	67-72	1702-1829	373	0.514	12.615	603.990	0.244	11.683	0.343	16.423	4.025	192.699	8.003	383.186	2944.2	140966.7544	0.692	0.689	0.695
	63-67	1600-1702	372	0.677	6.710	321.266	0.171	8.188	0.265	12.688	0.000	0.000	6.269	300.161	2950.4	141266.9157	0.698	0.695	0.701
	60-63	1524-1600	371	0.558	6.892	329.969	0.115	5.506	0.193	9.241	0.000	0.000	6.581	315.100	2957	141582.0157	0.577	0.574	0.580
	57-60	1448-1524	370	0.515	7.561	362.046	0.103	4.932	0.188	9.001	0.000	0.000	7.267	347.946	2964.3	141929.9615	0.533	0.530	0.536
	53-57	1346-1448	369	0.437	11.701	560.226	0.118	5.650	0.243	11.635	0.000	0.000	11.34	542.962	2975.6	142472.9237	0.454	0.452	0.456
*	46-53	1168-1346	368	0.271	26.496	1268.653	0.150	7.182	0.403	19.296	0.893	42.775	25.05	1199.400	3000.7	143672.3241	0.311	0.309	0.313
	43-46	1092-1168	367	0.154	13.181	631.094	0.038	1.819	0.164	7.852	0.000	0.000	12.97	621.007	3013.6	144293.331	0.167	0.166	0.168
	37-43	940-1092	366	0.054	29.467	1410.885	0.037	1.772	0.149	7.134	0.000	0.000	29.27	1401.455	3042.9	145694.7861	0.06	0.057	0.063
*	25-37	635-940	365	0.029	60.497	2896.617	0.004	0.192	0.000	0.000	0.803	38.453	59.69	2857.973	3102.6	148552.7587	0.042	0.040	0.044
	13-25	330-635	364	0.024	60.855	2913.774	0.004	0.192	0.000	0.000	0.000	0.000	60.83	2912.556	3163.4	151465.3147	0.024	0.023	0.025
*	0-13	0-330	363	0.010	66.854	3200.974	0.004	0.192	0.000	0.000	0.150	7.169	66.7	3193.613	3230.1	154658.9279	0.012	0.011	0.013

Table A-74 Energy Balance Results for RBHT Test 1582E for Time Period 2430 to 2490 seconds

Results for RBHT Test 1582 Valid Time Period 2430 to 2490 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	4657.9468	14.69383	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
0.25	6.35	4916.7216	15.51015	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
0.50	12.70	5175.4964	16.32647	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
0.75	19.05	5434.2712	17.1428	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
1.00	25.40	5693.0461	17.95912	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
1.25	31.75	5951.8209	18.77544	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
1.50	38.10	6210.5957	19.59177	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
1.75	44.45	6469.3705	20.40809	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
2.00	50.80	6728.1453	21.22441	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
2.25	57.15	6986.9202	22.04074	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
2.50	63.50	7245.695	22.85706	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
2.75	69.85	7504.4698	23.67339	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
3.00	76.20	7763.2446	24.48971	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
3.25	82.55	8022.0195	25.30603	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
3.50	88.90	8280.7943	26.12236	5.89E-03	6.02E-01	2.73E-01	8.52E-02	3.86E-02
3.75	95.25	8539.5691	26.93868	1.59E-02	1.63E+00	7.39E-01	8.43E-02	3.83E-02
4.00	101.60	8798.3439	27.755	2.63E-02	2.69E+00	1.22E+00	8.35E-02	3.79E-02
4.25	107.95	9057.1187	28.57133	3.70E-02	3.78E+00	1.71E+00	8.25E-02	3.74E-02
4.50	114.30	9315.8936	29.38765	4.79E-02	4.90E+00	2.22E+00	8.16E-02	3.70E-02
4.75	120.65	9574.6684	30.20397	5.92E-02	6.05E+00	2.75E+00	8.06E-02	3.66E-02
5.00	127.00	9833.4432	31.0203	7.08E-02	7.24E+00	3.28E+00	7.96E-02	3.61E-02
5.25	133.35	10092.218	31.83662	8.27E-02	8.45E+00	3.83E+00	7.86E-02	3.57E-02
5.50	139.70	10350.993	32.65295	9.49E-02	9.70E+00	4.40E+00	7.76E-02	3.52E-02
5.75	146.05	10609.768	33.46927	1.07E-01	1.10E+01	4.98E+00	7.65E-02	3.47E-02
6.00	152.40	10868.542	34.28559	1.20E-01	1.23E+01	5.58E+00	7.54E-02	3.42E-02
6.25	158.75	11127.317	35.10192	1.33E-01	1.36E+01	6.18E+00	7.43E-02	3.37E-02
6.50	165.10	11386.092	35.91824	1.47E-01	1.50E+01	6.81E+00	7.31E-02	3.32E-02
6.75	171.45	11644.867	36.73456	1.61E-01	1.64E+01	7.45E+00	7.19E-02	3.26E-02
7.00	177.80	11903.642	37.55089	1.75E-01	1.79E+01	8.10E+00	7.07E-02	3.21E-02
7.25	184.15	12162.417	38.36721	1.89E-01	1.93E+01	8.77E+00	6.95E-02	3.15E-02
7.50	190.50	12421.191	39.18353	2.04E-01	2.08E+01	9.44E+00	6.83E-02	3.10E-02
7.75	196.85	12679.966	39.99986	2.19E-01	2.24E+01	1.01E+01	6.70E-02	3.04E-02
8.00	203.20	12938.741	40.81618	2.34E-01	2.39E+01	1.08E+01	6.57E-02	2.98E-02
8.25	209.55	13197.516	41.63251	2.50E-01	2.55E+01	1.16E+01	6.43E-02	2.92E-02
8.50	215.90	13456.291	42.44883	2.66E-01	2.71E+01	1.23E+01	6.29E-02	2.86E-02
8.75	222.25	13715.066	43.26515	2.82E-01	2.88E+01	1.31E+01	6.16E-02	2.79E-02
9.00	228.60	13973.84	44.08148	2.98E-01	3.05E+01	1.38E+01	6.01E-02	2.73E-02
9.25	234.95	13197.516	41.63251	3.15E-01	3.22E+01	1.46E+01	5.87E-02	2.66E-02
9.50	241.30	12421.191	39.18353	3.30E-01	3.37E+01	1.53E+01	5.74E-02	2.61E-02
9.75	247.65	11644.867	36.73456	3.44E-01	3.52E+01	1.60E+01	5.62E-02	2.55E-02
10.00	254.00	10868.542	34.28559	3.58E-01	3.66E+01	1.66E+01	5.51E-02	2.50E-02
10.25	260.35	10092.218	31.83662	3.70E-01	3.78E+01	1.72E+01	5.40E-02	2.45E-02
10.50	266.70	9315.8936	29.38765	3.82E-01	3.90E+01	1.77E+01	5.30E-02	2.40E-02
10.75	273.05	8539.5691	26.93868	3.93E-01	4.01E+01	1.82E+01	5.21E-02	2.36E-02
11.00	279.40	7763.2446	24.48971	4.02E-01	4.11E+01	1.86E+01	5.12E-02	2.32E-02
11.25	285.75	6986.9202	22.04074	4.11E-01	4.20E+01	1.91E+01	5.05E-02	2.29E-02
11.50	292.10	6210.5957	19.59177	4.19E-01	4.28E+01	1.94E+01	4.98E-02	2.26E-02
11.75	298.45	5434.2712	17.1428	4.26E-01	4.35E+01	1.97E+01	4.92E-02	2.23E-02
12.00	304.80	4657.9468	14.69383	4.32E-01	4.41E+01	2.00E+01	4.87E-02	2.21E-02

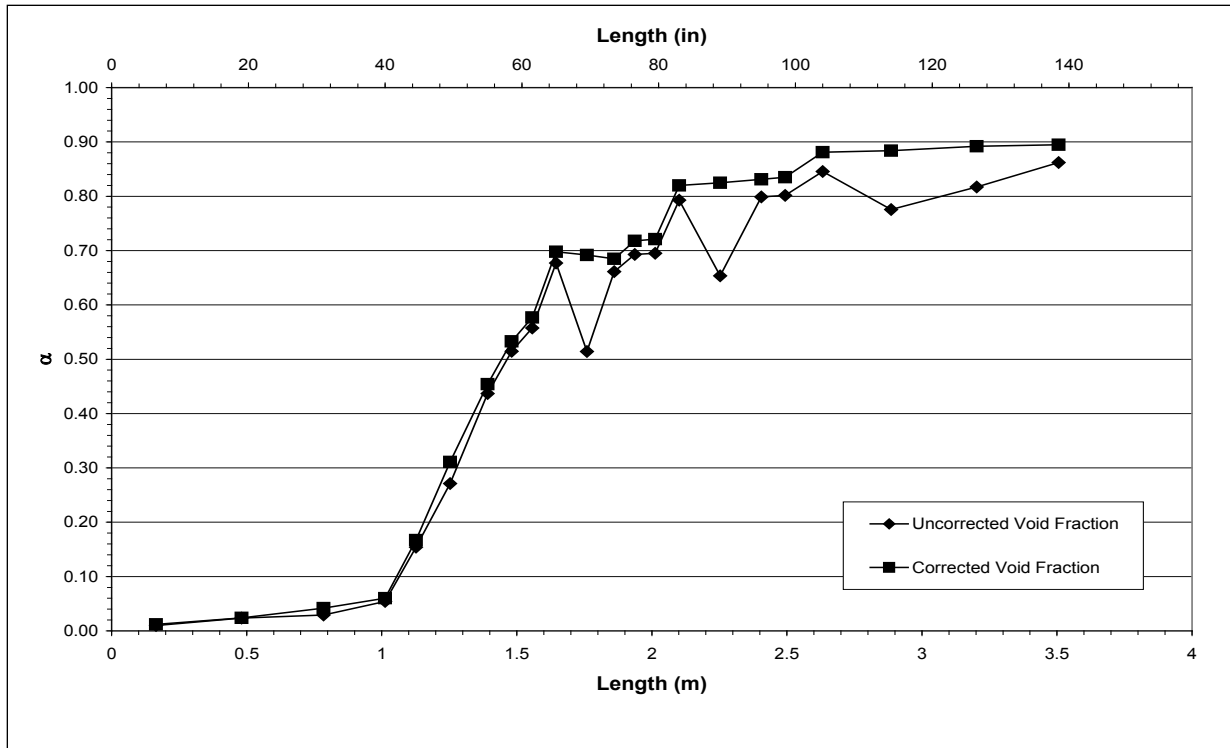


Figure A-185 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1582E for Time Period 2430 to 2490 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1582-F

Test Conditions

Date: 6/11/2003

Steady-state time window: 2630 – 2690 seconds

Inlet flow rate: 2.03 cm/sec (0.800 in./sec)

Inlet mass flow rate: 0.097 kg/sec (0.214 lbm/sec)

Inlet flow temperature: 326 K (128 °F)

Upper plenum pressure: 138.0 kPa (20.02 psia)

Bundle power: 141.43 kW

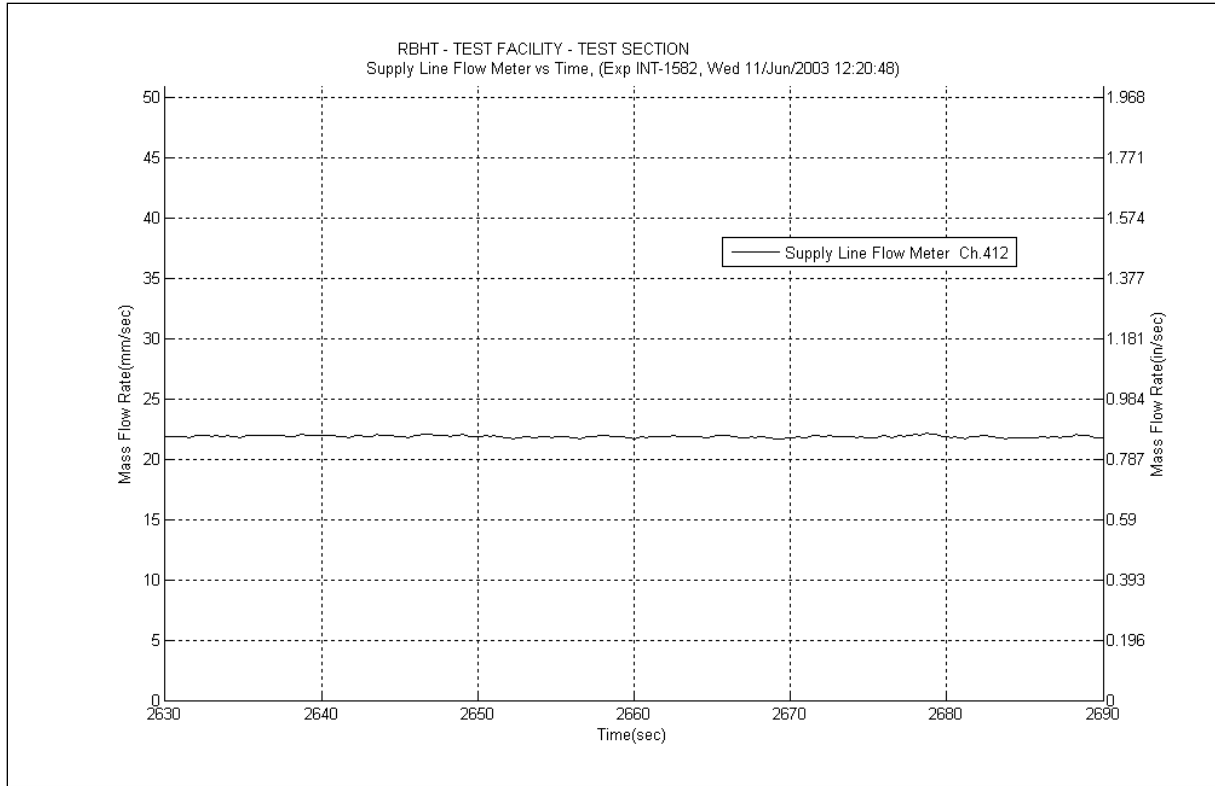


Figure A-186 Inlet Flow Plot for Experiment 1582F

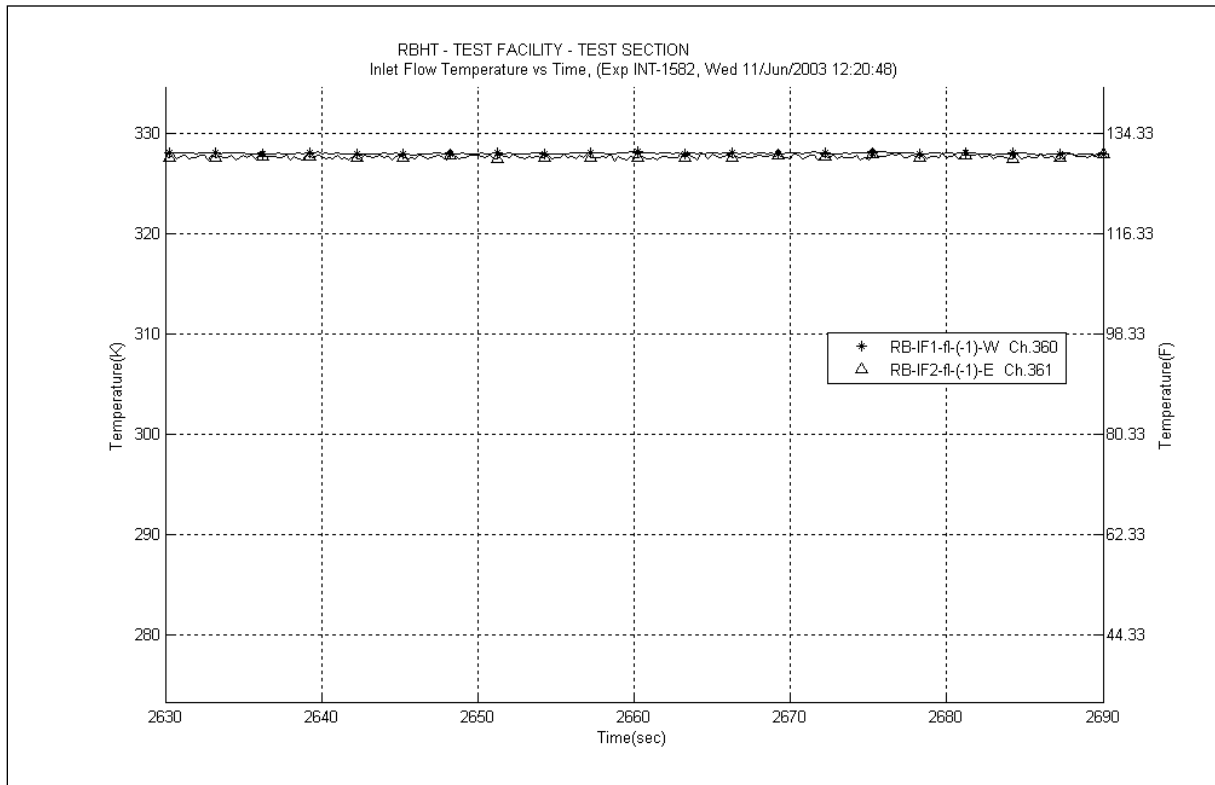


Figure A-187 Inlet Temperature Plot for Experiment 1582F

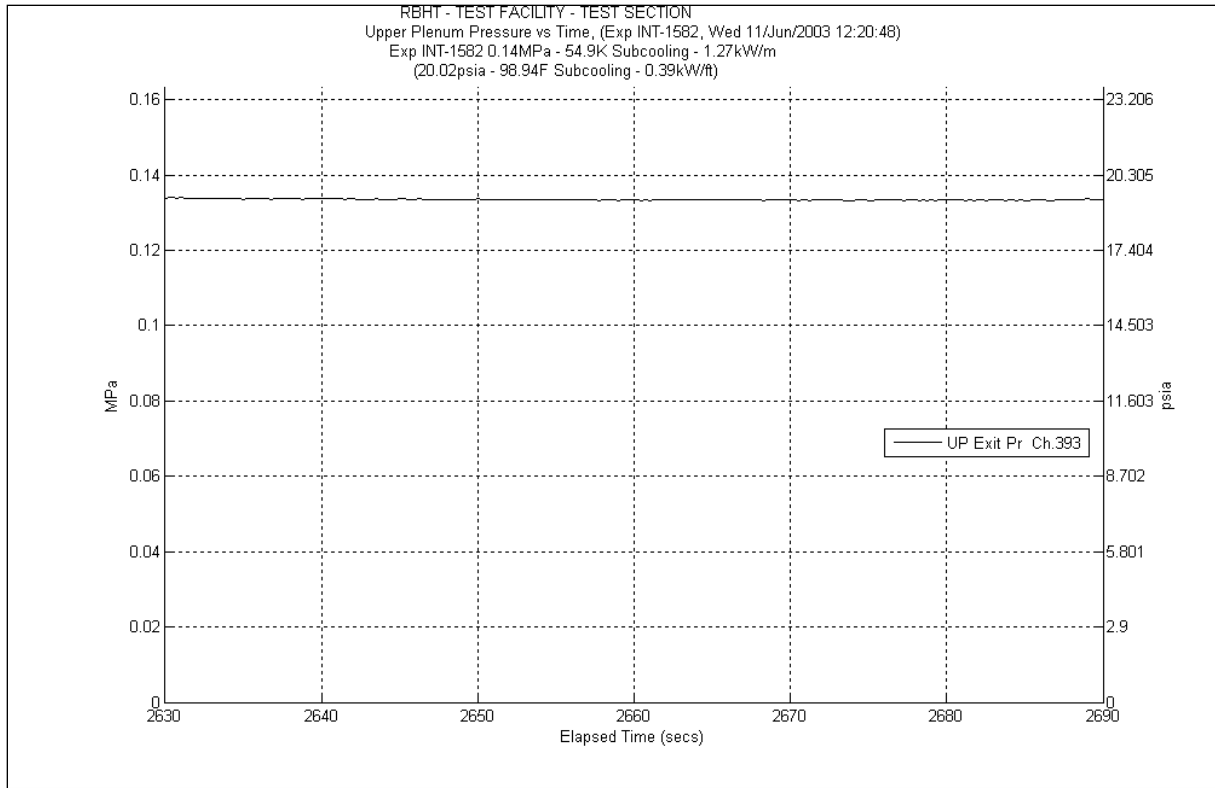


Figure A-188 System Pressure Plot for Experiment 1582F

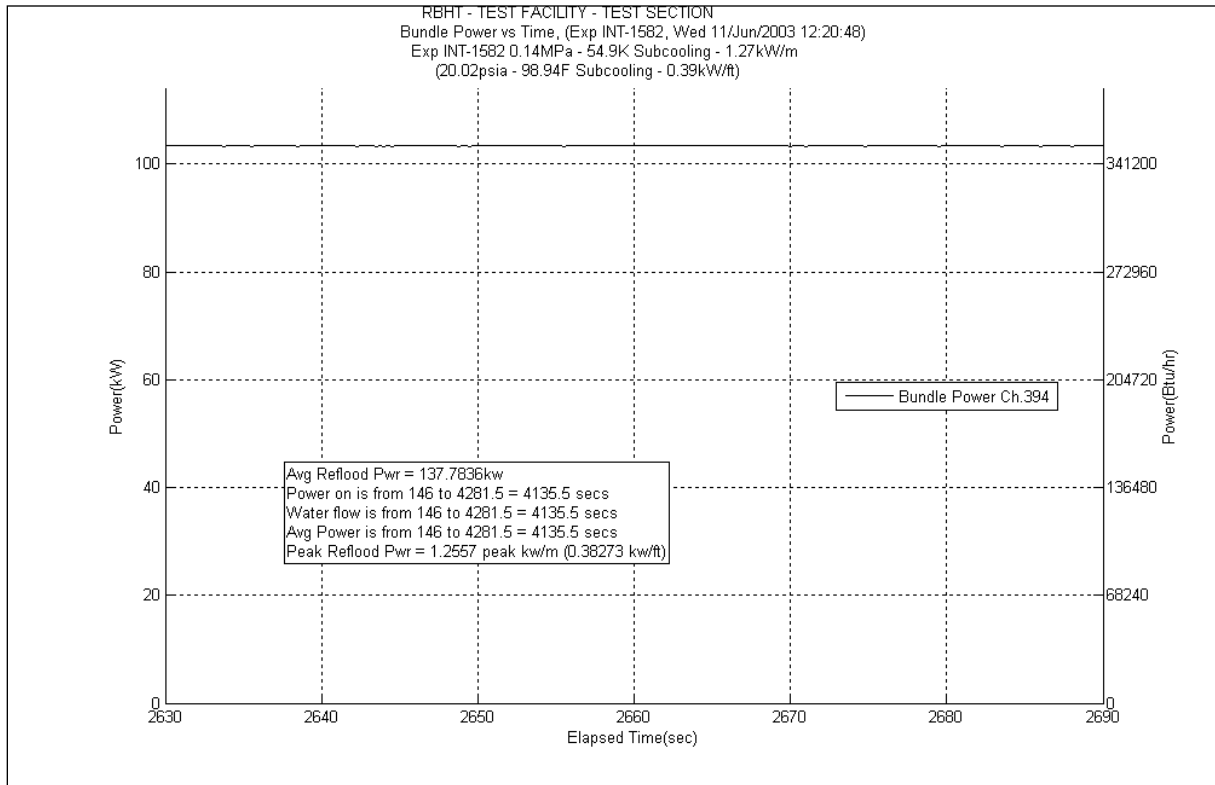


Figure A-189 Bundle Power Plot for Experiment 1582F

Table A-75 Data Results for RBHT Test 1582F for Time Period 2630 to 2690 seconds

Results for RBHT Test 1582																			
Valid Time Period 2630 to 2690 seconds																			
Collapsed Liquid Level = 65.896 inches = 1673.75 mm																			
(Z _{OSL}) Onset of Significant Void = 31 inches = 787.5 mm																			
Grids	Elevation (in)	Elevation (mm)	Chan.	α _{uncorrected}	ΔP _{uncorrected} (lbf/ft ²)	ΔP _{uncorrected} (Pa)	ΔP _{fric} (lbf/ft ²)	ΔP _{fric} (Pa)	ΔP _{accel} (lbf/ft ²)	ΔP _{accel} (Pa)	ΔP _{grid} (lbf/ft ²)	ΔP _{grid} (Pa)	ΔP _{corrected} (lbf/ft ²)	ΔP _{corrected} (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	α _{corrected}	α _{min}	α _{max}
	133-144	3378-3658	384	0.893	6.133	293.665	1.223	58.558	0.346	16.567	0.000	0.000	4.563	218.478	2884.563	138113.6178	0.92	0.915	0.925
*	120-133	3048-3378	383	0.844	10.563	505.770	1.337	64.016	0.618	29.590	2.896	138.672	5.712	273.492	2890.275	138387.1098	0.915	0.910	0.920
*	108-120	2743-3048	382	0.808	11.955	572.411	1.091	52.237	0.771	36.916	4.231	202.584	5.862	280.674	2896.137	138667.7839	0.906	0.901	0.911
	100-108	2540-2743	381	0.872	5.308	254.128	0.636	30.452	0.564	27.004	0.000	0.000	4.104	196.501	2900.241	138864.2844	0.901	0.896	0.906
	97-100	2464-2540	380	0.836	2.560	122.588	0.219	10.486	0.204	9.768	0.000	0.000	2.138	102.368	2902.379	138966.6524	0.863	0.859	0.867
	93-97	2362-2464	379	0.829	3.547	169.833	0.277	13.263	0.266	12.736	0.000	0.000	3.005	143.880	2905.384	139110.5326	0.855	0.851	0.859
*	85-93	2159-2362	378	0.700	12.469	597.028	0.501	23.988	0.511	24.467	5.321	254.780	6.136	293.793	2911.52	139404.3259	0.852	0.848	0.856
	81-85	2057-2159	377	0.827	3.604	172.569	0.225	10.773	0.245	11.731	0.000	0.000	3.131	149.913	2914.651	139554.2389	0.849	0.845	0.853
	78-81	1981-2057	376	0.733	4.160	199.175	0.158	7.565	0.179	8.571	0.000	0.000	3.822	182.998	2918.473	139737.2373	0.755	0.751	0.759
	75-78	1905-1981	375	0.740	4.056	194.202	0.149	7.134	0.175	8.379	0.000	0.000	3.73	178.593	2922.203	139915.8306	0.761	0.757	0.765
	72-75	1829-1905	374	0.719	4.378	209.619	0.140	6.703	0.171	8.188	0.000	0.000	4.064	194.585	2926.267	140110.416	0.739	0.735	0.743
*	67-72	1702-1829	373	0.574	11.051	529.144	0.213	10.198	0.276	13.215	4.042	193.551	6.52	312.179	2932.787	140422.5953	0.749	0.745	0.753
	63-67	1600-1702	372	0.741	5.380	257.610	0.153	7.326	0.213	10.198	0.000	0.000	5.013	240.024	2937.8	140662.619	0.759	0.755	0.763
	60-63	1524-1600	371	0.644	5.546	265.567	0.104	4.980	0.155	7.421	0.000	0.000	5.285	253.047	2943.085	140915.6662	0.661	0.658	0.664
	57-60	1448-1524	370	0.617	5.967	285.708	0.095	4.549	0.151	7.230	0.000	0.000	5.718	273.779	2948.803	141189.4455	0.633	0.630	0.636
	53-57	1346-1448	369	0.541	9.535	456.536	0.114	5.458	0.195	9.337	0.000	0.000	9.225	441.695	2958.028	141631.1409	0.556	0.553	0.559
*	46-53	1168-1346	368	0.380	22.539	1079.176	0.160	7.661	0.323	15.465	3.936	188.459	18.12	867.590	2976.148	142498.7311	0.501	0.498	0.504
	43-46	1092-1168	367	0.435	8.803	421.475	0.052	2.490	0.132	6.320	0.000	0.000	8.616	412.536	2984.764	142911.2674	0.447	0.445	0.449
	37-43	940-1092	366	0.276	22.560	1080.170	0.073	3.495	0.252	12.066	0.000	0.000	22.23	1064.378	3006.994	143975.6455	0.286	0.285	0.287
*	25-37	635-940	365	0.040	59.843	2865.286	0.061	2.921	0.135	6.464	7.097	339.794	52.55	2516.108	3059.544	146491.753	0.157	0.156	0.158
	13-25	330-635	364	0.027	60.658	2904.325	0.003	0.144	0.000	0.000	0.000	0.000	60.64	2903.459	3120.184	149395.2118	0.027	0.026	0.028
*	0-13	0-330	363	0.011	66.776	3197.244	0.003	0.144	0.000	0.000	0.183	8.754	66.59	3188.346	3186.774	152583.5581	0.013	0.012	0.014

Table A-76 Energy Balance Results for RBHT Test 1582F for Time Period 2630 to 2690 seconds

Results for RBHT Test 1582 Valid Time Period 2630 to 2690 seconds								
Elevation	Elevation	q ^{''} _w	q ^{''} _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	4661.0209	14.70352	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
0.25	6.35	4919.9665	15.52039	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
0.50	12.70	5178.9121	16.33725	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
0.75	19.05	5437.8577	17.15411	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
1.00	25.40	5696.8033	17.97097	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
1.25	31.75	5955.7489	18.78784	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
1.50	38.10	6214.6945	19.6047	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
1.75	44.45	6473.6401	20.42156	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
2.00	50.80	6732.5857	21.23842	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
2.25	57.15	6991.5313	22.05528	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
2.50	63.50	7250.4769	22.87215	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
2.75	69.85	7509.4225	23.68901	0.00E+00	0.00E+00	0.00E+00	6.87E-02	3.12E-02
3.00	76.20	7768.3681	24.50587	9.11E-03	7.47E-01	3.39E-01	6.81E-02	3.09E-02
3.25	82.55	8027.3138	25.32273	2.09E-02	1.71E+00	7.76E-01	6.73E-02	3.05E-02
3.50	88.90	8286.2594	26.1396	3.30E-02	2.71E+00	1.23E+00	6.64E-02	3.01E-02
3.75	95.25	8545.205	26.95646	4.56E-02	3.74E+00	1.69E+00	6.56E-02	2.97E-02
4.00	101.60	8804.1506	27.77332	5.85E-02	4.80E+00	2.18E+00	6.47E-02	2.93E-02
4.25	107.95	9063.0962	28.59018	7.18E-02	5.89E+00	2.67E+00	6.38E-02	2.89E-02
4.50	114.30	9322.0418	29.40705	8.55E-02	7.01E+00	3.18E+00	6.28E-02	2.85E-02
4.75	120.65	9580.9874	30.22391	9.96E-02	8.16E+00	3.70E+00	6.19E-02	2.81E-02
5.00	127.00	9839.933	31.04077	1.14E-01	9.35E+00	4.24E+00	6.09E-02	2.76E-02
5.25	133.35	10098.879	31.85763	1.29E-01	1.06E+01	4.79E+00	5.99E-02	2.72E-02
5.50	139.70	10357.824	32.6745	1.44E-01	1.18E+01	5.36E+00	5.88E-02	2.67E-02
5.75	146.05	10616.77	33.49136	1.60E-01	1.31E+01	5.94E+00	5.77E-02	2.62E-02
6.00	152.40	10875.715	34.30822	1.76E-01	1.44E+01	6.54E+00	5.66E-02	2.57E-02
6.25	158.75	11134.661	35.12508	1.92E-01	1.58E+01	7.15E+00	5.55E-02	2.52E-02
6.50	165.10	11393.607	35.94195	2.09E-01	1.71E+01	7.77E+00	5.44E-02	2.47E-02
6.75	171.45	11652.552	36.75881	2.26E-01	1.85E+01	8.41E+00	5.32E-02	2.41E-02
7.00	177.80	11911.498	37.57567	2.44E-01	2.00E+01	9.06E+00	5.20E-02	2.36E-02
7.25	184.15	12170.443	38.39253	2.62E-01	2.14E+01	9.73E+00	5.07E-02	2.30E-02
7.50	190.50	12429.389	39.20939	2.80E-01	2.30E+01	1.04E+01	4.95E-02	2.24E-02
7.75	196.85	12688.335	40.02626	2.99E-01	2.45E+01	1.11E+01	4.82E-02	2.19E-02
8.00	203.20	12947.28	40.84312	3.18E-01	2.61E+01	1.18E+01	4.69E-02	2.13E-02
8.25	209.55	13206.226	41.65998	3.37E-01	2.77E+01	1.25E+01	4.55E-02	2.07E-02
8.50	215.90	13465.171	42.47684	3.57E-01	2.93E+01	1.33E+01	4.42E-02	2.00E-02
8.75	222.25	13724.117	43.29371	3.77E-01	3.09E+01	1.40E+01	4.28E-02	1.94E-02
9.00	228.60	13983.063	44.11057	3.98E-01	3.26E+01	1.48E+01	4.14E-02	1.88E-02
9.25	234.95	13206.226	41.65998	4.18E-01	3.43E+01	1.56E+01	4.00E-02	1.81E-02
9.50	241.30	12429.389	39.20939	4.37E-01	3.59E+01	1.63E+01	3.87E-02	1.75E-02
9.75	247.65	11652.552	36.75881	4.55E-01	3.73E+01	1.69E+01	3.74E-02	1.70E-02
10.00	254.00	10875.715	34.30822	4.72E-01	3.87E+01	1.76E+01	3.63E-02	1.65E-02
10.25	260.35	10098.879	31.85763	4.88E-01	4.00E+01	1.81E+01	3.52E-02	1.60E-02
10.50	266.70	9322.0418	29.40705	5.02E-01	4.12E+01	1.87E+01	3.42E-02	1.55E-02
10.75	273.05	8545.205	26.95646	5.16E-01	4.23E+01	1.92E+01	3.33E-02	1.51E-02
11.00	279.40	7768.3681	24.50587	5.28E-01	4.33E+01	1.96E+01	3.25E-02	1.47E-02
11.25	285.75	6991.5313	22.05528	5.39E-01	4.42E+01	2.00E+01	3.17E-02	1.44E-02
11.50	292.10	6214.6945	19.6047	5.49E-01	4.50E+01	2.04E+01	3.10E-02	1.41E-02
11.75	298.45	5437.8577	17.15411	5.57E-01	4.57E+01	2.07E+01	3.04E-02	1.38E-02
12.00	304.80	4661.0209	14.70352	5.65E-01	4.63E+01	2.10E+01	2.99E-02	1.36E-02

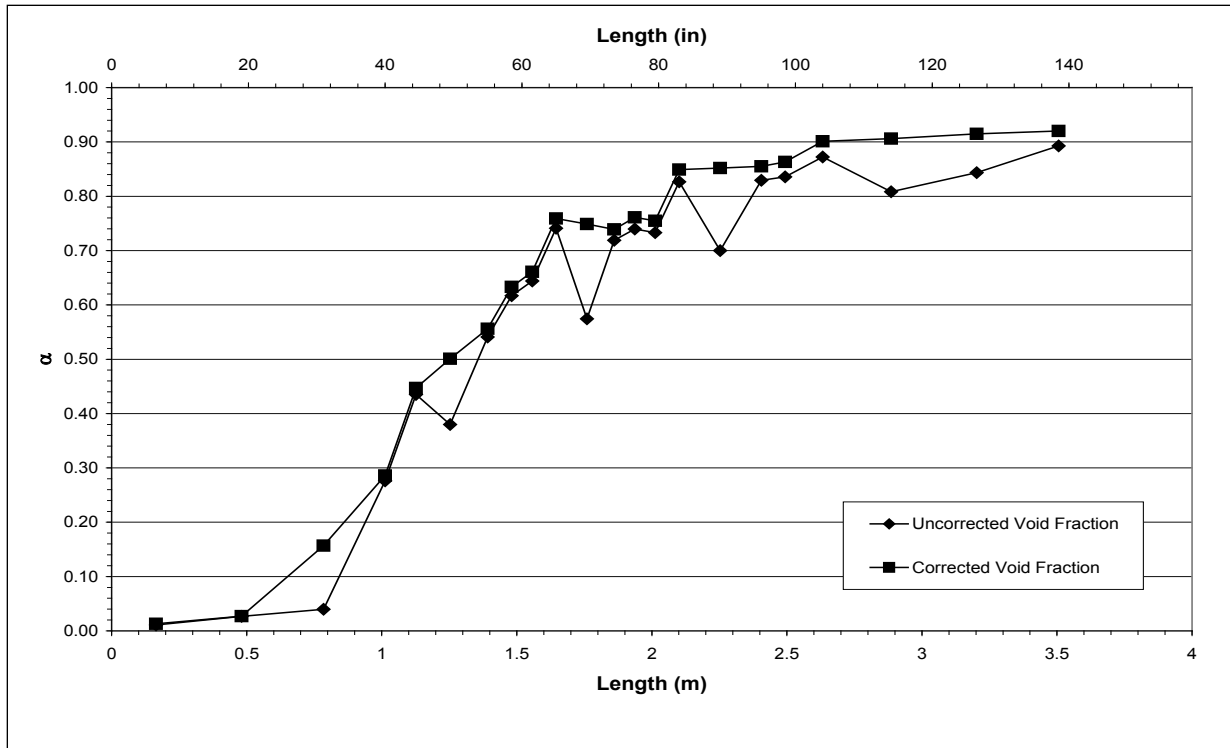


Figure A-190 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1582F for Time Period 2630 to 2690 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1582-G

Test Conditions

Date: 6/11/2003

Steady-state time window: 2822 – 2894 seconds

Inlet flow rate: 1.534 cm/sec (0.604 in./sec)

Inlet mass flow rate: 0.0735 kg/sec (0.162 lbm/sec)

Inlet flow temperature: 326 K (128 °F)

Upper plenum pressure: 138.0 kPa (20.02 psia)

Bundle power: 141.43 kW

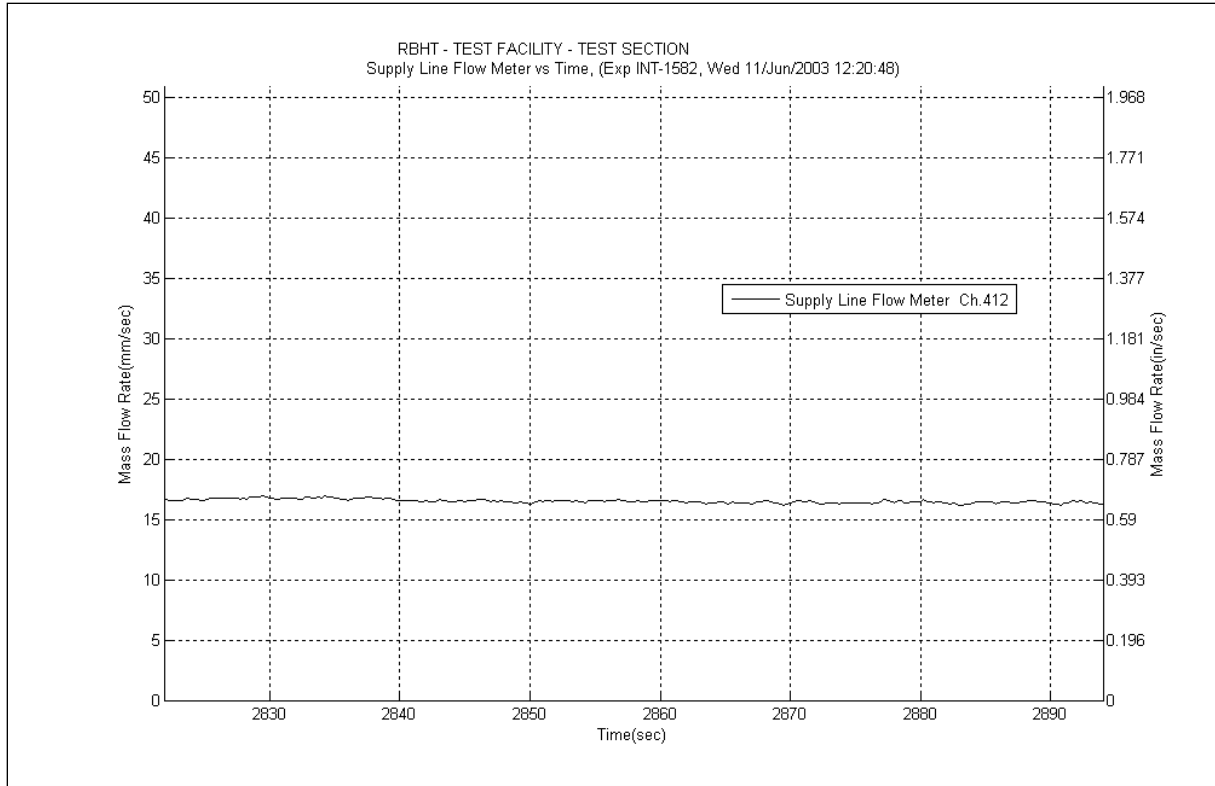


Figure A-191 Inlet Flow Plot for Experiment 1582G

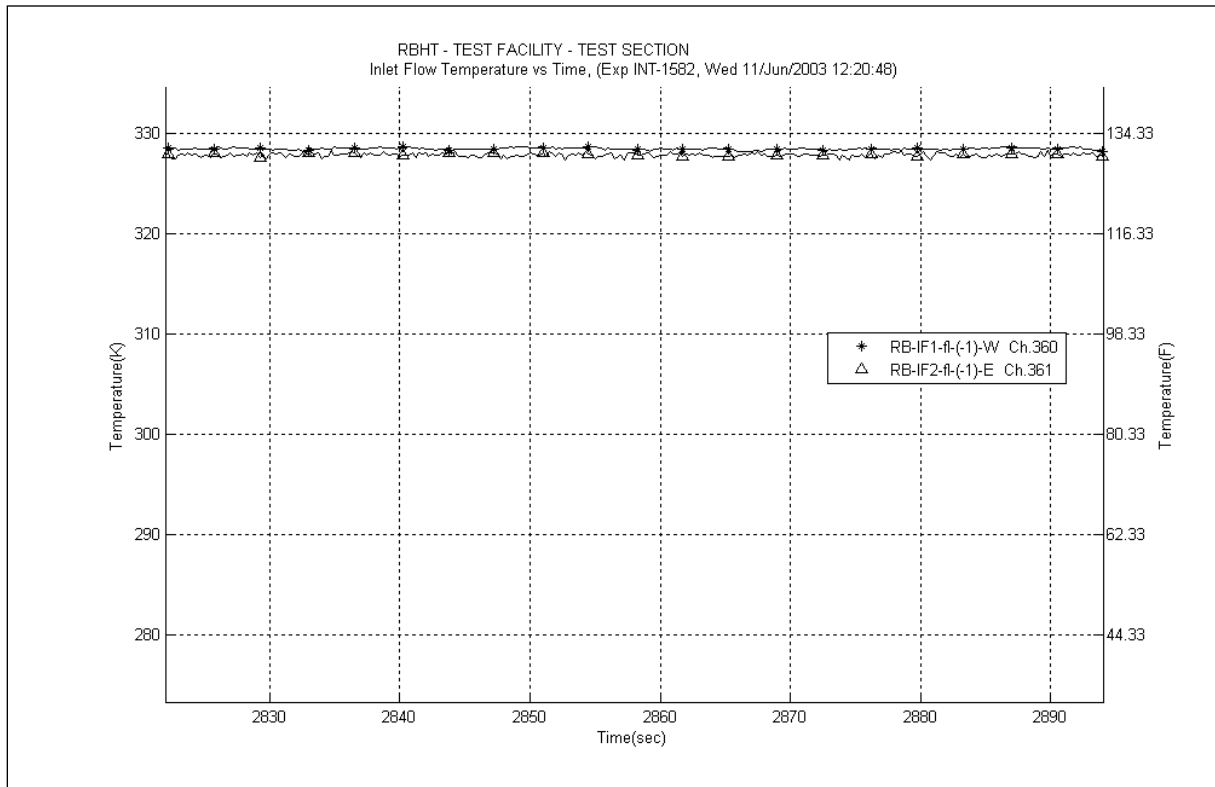


Figure A-192 Inlet Temperature Plot for Experiment 1582G

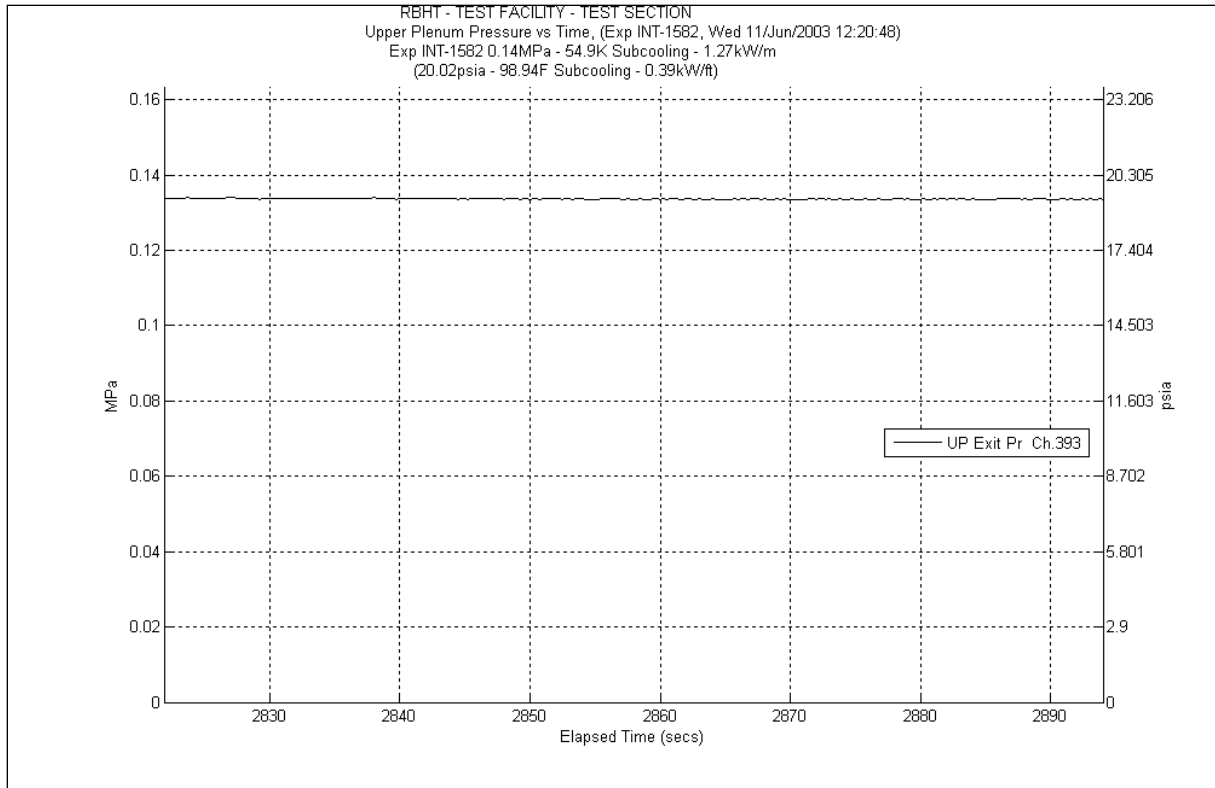


Figure A-193 System Pressure Plot for Experiment 1582G

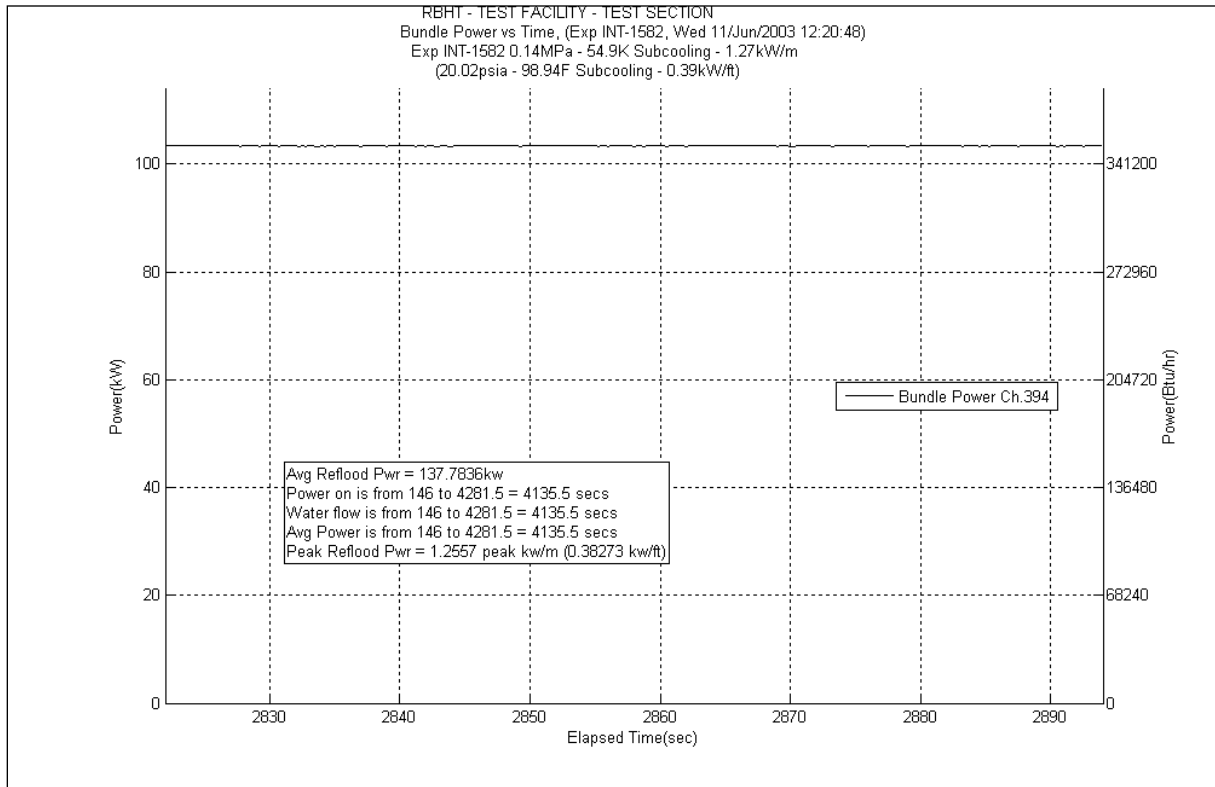


Figure A-194 Bundle Power Plot for Experiment 1582G

Table A-77 Data Results for RBHT Test 1582G for Time Period 2822 to 2894 seconds

Results for RBHT Test 1582
Valid Time Period 2822 to 2894 seconds
Collapsed Liquid Level = 58.445 inches = 1484.51 mm
(Z_{OSV}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lbf/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.923	4.393	210.315	0.960	45.941	0.261	12.511	0.000	0.000	3.17	151.780	2883.17	138046.9206	0.945	0.940	0.949
*	120-133	3048-3378	383	0.865	9.145	437.862	1.054	50.466	0.467	22.336	3.452	165.303	4.172	199.756	2887.342	138246.677	0.938	0.934	0.943
*	108-120	2743-3048	382	0.834	10.325	494.382	0.862	41.287	0.582	27.881	4.245	203.241	4.636	221.973	2891.978	138468.6499	0.926	0.921	0.930
	100-108	2540-2743	381	0.897	4.283	205.068	0.504	24.112	0.426	20.392	0.000	0.000	3.352	160.495	2895.33	138629.1445	0.919	0.915	0.924
	97-100	2464-2540	380	0.867	2.072	99.215	0.174	8.312	0.154	7.383	0.000	0.000	1.744	83.503	2897.074	138712.6477	0.888	0.884	0.892
	93-97	2362-2464	379	0.860	2.906	139.149	0.219	10.486	0.201	9.614	0.000	0.000	2.485	118.982	2899.559	138831.6301	0.880	0.876	0.885
*	85-93	2159-2362	378	0.741	10.762	515.294	0.397	19.023	0.386	18.458	4.990	238.939	4.989	238.875	2904.548	139070.5047	0.880	0.876	0.884
	81-85	2057-2159	377	0.862	2.868	137.334	0.126	6.028	0.185	8.843	0.000	0.000	2.504	119.892	2907.052	139190.3969	0.879	0.875	0.884
	78-81	1981-2057	376	0.771	3.562	170.555	0.179	8.566	0.135	6.464	0.000	0.000	3.3	158.005	2910.352	139348.4017	0.803	0.799	0.807
	75-78	1905-1981	375	0.787	3.322	159.067	0.125	5.980	0.132	6.315	0.000	0.000	3.07	146.992	2913.422	139495.3941	0.792	0.788	0.796
	72-75	1829-1905	374	0.761	3.724	178.313	0.112	5.372	0.129	6.172	0.000	0.000	3.482	166.719	2916.904	139662.1132	0.788	0.784	0.792
*	67-72	1702-1829	373	0.624	9.767	467.626	0.119	5.698	0.208	9.964	3.840	183.883	5.599	268.082	2922.503	139930.1947	0.784	0.780	0.788
	63-67	1600-1702	372	0.778	4.602	220.361	0.086	4.131	0.160	7.680	0.000	0.000	4.316	206.651	2926.819	140136.8459	0.776	0.773	0.780
	60-63	1524-1600	371	0.691	4.811	230.332	0.172	8.250	0.117	5.592	0.000	0.000	4.606	220.536	2931.425	140357.3824	0.706	0.702	0.709
	57-60	1448-1524	370	0.693	4.776	228.691	0.080	3.831	0.114	5.444	0.000	0.000	4.581	219.339	2936.006	140576.7218	0.704	0.701	0.708
	53-57	1346-1448	369	0.628	7.725	369.879	0.097	4.647	0.147	7.034	0.000	0.000	7.479	358.096	2943.485	140934.8183	0.640	0.637	0.643
*	46-53	1168-1346	368	0.445	20.186	966.509	0.144	6.876	0.244	11.688	4.458	213.462	15.34	734.483	2958.825	141669.3014	0.578	0.575	0.581
	43-46	1092-1168	367	0.506	7.690	368.213	0.051	2.444	0.100	4.767	0.000	0.000	7.537	360.873	2966.362	142030.1749	0.516	0.514	0.519
	37-43	940-1092	366	0.481	16.179	774.644	0.083	3.970	0.190	9.097	0.000	0.000	15.9	761.296	2982.262	142791.471	0.490	0.487	0.492
*	25-37	635-940	365	0.192	50.365	2411.510	0.088	4.212	0.302	14.455	3.936	188.436	46.04	2204.407	3028.302	144995.878	0.261	0.260	0.262
	13-25	330-635	364	0.032	60.301	2887.217	0.001	0.068	0.000	0.000	0.000	0.000	60.28	2886.222	3088.582	147882.0999	0.032	0.031	0.034
*	0-13	0-330	363	0.012	66.670	3192.196	0.002	0.074	0.000	0.000	0.269	12.873	66.4	3179.249	3154.982	151061.349	0.016	0.015	0.017

Table A-78 Energy Balance Results for RBHT Test 1582G for Time Period 2822 to 2894 seconds

Results for RBHT Test 1582 Valid Time Period 2822 to 2894 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	4659.2785	14.69803	0.00E+00	0.00E+00	0.00E+00	5.19E-02	2.35E-02
0.25	6.35	4918.1273	15.51458	0.00E+00	0.00E+00	0.00E+00	5.19E-02	2.35E-02
0.50	12.70	5176.9761	16.33114	0.00E+00	0.00E+00	0.00E+00	5.19E-02	2.35E-02
0.75	19.05	5435.8249	17.1477	0.00E+00	0.00E+00	0.00E+00	5.19E-02	2.35E-02
1.00	25.40	5694.6737	17.96425	0.00E+00	0.00E+00	0.00E+00	5.19E-02	2.35E-02
1.25	31.75	5953.5225	18.78081	0.00E+00	0.00E+00	0.00E+00	5.19E-02	2.35E-02
1.50	38.10	6212.3713	19.59737	0.00E+00	0.00E+00	0.00E+00	5.19E-02	2.35E-02
1.75	44.45	6471.2201	20.41393	0.00E+00	0.00E+00	0.00E+00	5.19E-02	2.35E-02
2.00	50.80	6730.0689	21.23048	0.00E+00	0.00E+00	0.00E+00	5.19E-02	2.35E-02
2.25	57.15	6988.9177	22.04704	2.04E-03	1.26E-01	5.74E-02	5.18E-02	2.35E-02
2.50	63.50	7247.7665	22.8636	1.61E-02	9.96E-01	4.52E-01	5.10E-02	2.32E-02
2.75	69.85	7506.6153	23.68015	3.07E-02	1.90E+00	8.61E-01	5.03E-02	2.28E-02
3.00	76.20	7765.4641	24.49671	4.57E-02	2.83E+00	1.28E+00	4.95E-02	2.25E-02
3.25	82.55	8024.3129	25.31327	6.13E-02	3.80E+00	1.72E+00	4.87E-02	2.21E-02
3.50	88.90	8283.1617	26.12982	7.74E-02	4.79E+00	2.17E+00	4.79E-02	2.17E-02
3.75	95.25	8542.0105	26.94638	9.40E-02	5.82E+00	2.64E+00	4.70E-02	2.13E-02
4.00	101.60	8800.8593	27.76294	1.11E-01	6.88E+00	3.12E+00	4.61E-02	2.09E-02
4.25	107.95	9059.7081	28.5795	1.29E-01	7.97E+00	3.61E+00	4.52E-02	2.05E-02
4.50	114.30	9318.5569	29.39605	1.47E-01	9.09E+00	4.13E+00	4.43E-02	2.01E-02
4.75	120.65	9577.4057	30.21261	1.66E-01	1.02E+01	4.65E+00	4.33E-02	1.96E-02
5.00	127.00	9836.2545	31.02917	1.85E-01	1.14E+01	5.19E+00	4.23E-02	1.92E-02
5.25	133.35	10095.103	31.84572	2.04E-01	1.26E+01	5.74E+00	4.13E-02	1.87E-02
5.50	139.70	10353.952	32.66228	2.25E-01	1.39E+01	6.30E+00	4.02E-02	1.83E-02
5.75	146.05	10612.801	33.47884	2.45E-01	1.52E+01	6.89E+00	3.92E-02	1.78E-02
6.00	152.40	10871.65	34.2954	2.66E-01	1.65E+01	7.48E+00	3.81E-02	1.73E-02
6.25	158.75	11130.499	35.11195	2.88E-01	1.78E+01	8.09E+00	3.69E-02	1.68E-02
6.50	165.10	11389.347	35.92851	3.10E-01	1.92E+01	8.71E+00	3.58E-02	1.62E-02
6.75	171.45	11648.196	36.74507	3.33E-01	2.06E+01	9.35E+00	3.46E-02	1.57E-02
7.00	177.80	11907.045	37.56162	3.56E-01	2.21E+01	1.00E+01	3.34E-02	1.51E-02
7.25	184.15	12165.894	38.37818	3.80E-01	2.35E+01	1.07E+01	3.22E-02	1.46E-02
7.50	190.50	12424.743	39.19474	4.04E-01	2.50E+01	1.14E+01	3.09E-02	1.40E-02
7.75	196.85	12683.591	40.01129	4.29E-01	2.66E+01	1.21E+01	2.96E-02	1.34E-02
8.00	203.20	12942.44	40.82785	4.54E-01	2.81E+01	1.28E+01	2.83E-02	1.28E-02
8.25	209.55	13201.289	41.64441	4.80E-01	2.97E+01	1.35E+01	2.70E-02	1.22E-02
8.50	215.90	13460.138	42.46097	5.07E-01	3.14E+01	1.42E+01	2.56E-02	1.16E-02
8.75	222.25	13718.987	43.27752	5.33E-01	3.30E+01	1.50E+01	2.42E-02	1.10E-02
9.00	228.60	13977.835	44.09408	5.61E-01	3.47E+01	1.57E+01	2.28E-02	1.03E-02
9.25	234.95	13201.289	41.64441	5.88E-01	3.64E+01	1.65E+01	2.14E-02	9.71E-03
9.50	241.30	12424.743	39.19474	6.13E-01	3.79E+01	1.72E+01	2.01E-02	9.11E-03
9.75	247.65	11648.196	36.74507	6.37E-01	3.94E+01	1.79E+01	1.89E-02	8.55E-03
10.00	254.00	10871.65	34.2954	6.59E-01	4.08E+01	1.85E+01	1.77E-02	8.03E-03
10.25	260.35	10095.103	31.84572	6.79E-01	4.21E+01	1.91E+01	1.66E-02	7.54E-03
10.50	266.70	9318.5569	29.39605	6.99E-01	4.33E+01	1.96E+01	1.56E-02	7.09E-03
10.75	273.05	8542.0105	26.94638	7.16E-01	4.43E+01	2.01E+01	1.47E-02	6.68E-03
11.00	279.40	7765.4641	24.49671	7.32E-01	4.53E+01	2.06E+01	1.39E-02	6.30E-03
11.25	285.75	6988.9177	22.04704	7.47E-01	4.62E+01	2.10E+01	1.31E-02	5.96E-03
11.50	292.10	6212.3713	19.59737	7.60E-01	4.70E+01	2.13E+01	1.25E-02	5.65E-03
11.75	298.45	5435.8249	17.1477	7.71E-01	4.78E+01	2.17E+01	1.19E-02	5.38E-03
12.00	304.80	4659.2785	14.69803	7.81E-01	4.84E+01	2.19E+01	1.13E-02	5.15E-03

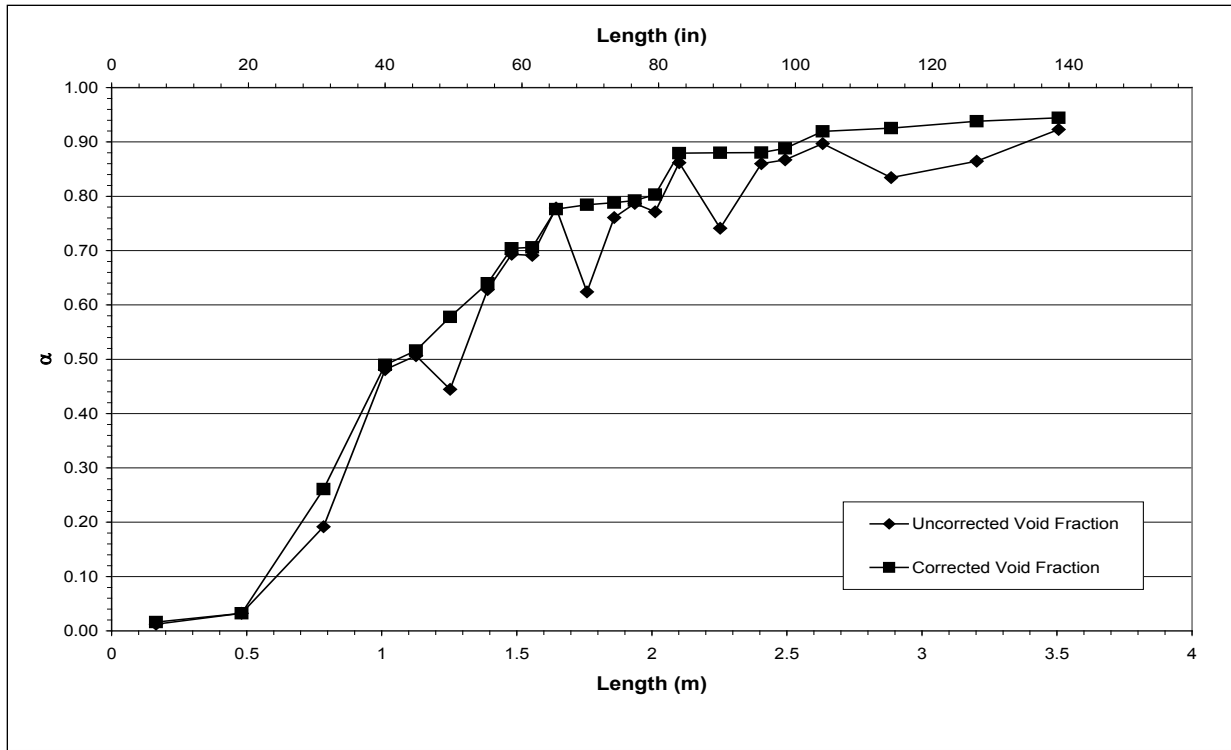


Figure A-195 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1582G for Time Period 2822 to 2894 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1582-H

Test Conditions

Date: 6/11/2003

Steady-state time window: 3600 – 3668 seconds

Inlet flow rate: 0.765 cm/sec (0.301 in./sec)

Inlet mass flow rate: 0.0608 kg/sec (0.134 lbm/sec)

Inlet flow temperature: 326 K (128 °F)

Upper plenum pressure: 138.0 kPa (20.02 psia)

Bundle power: 141.43 kW

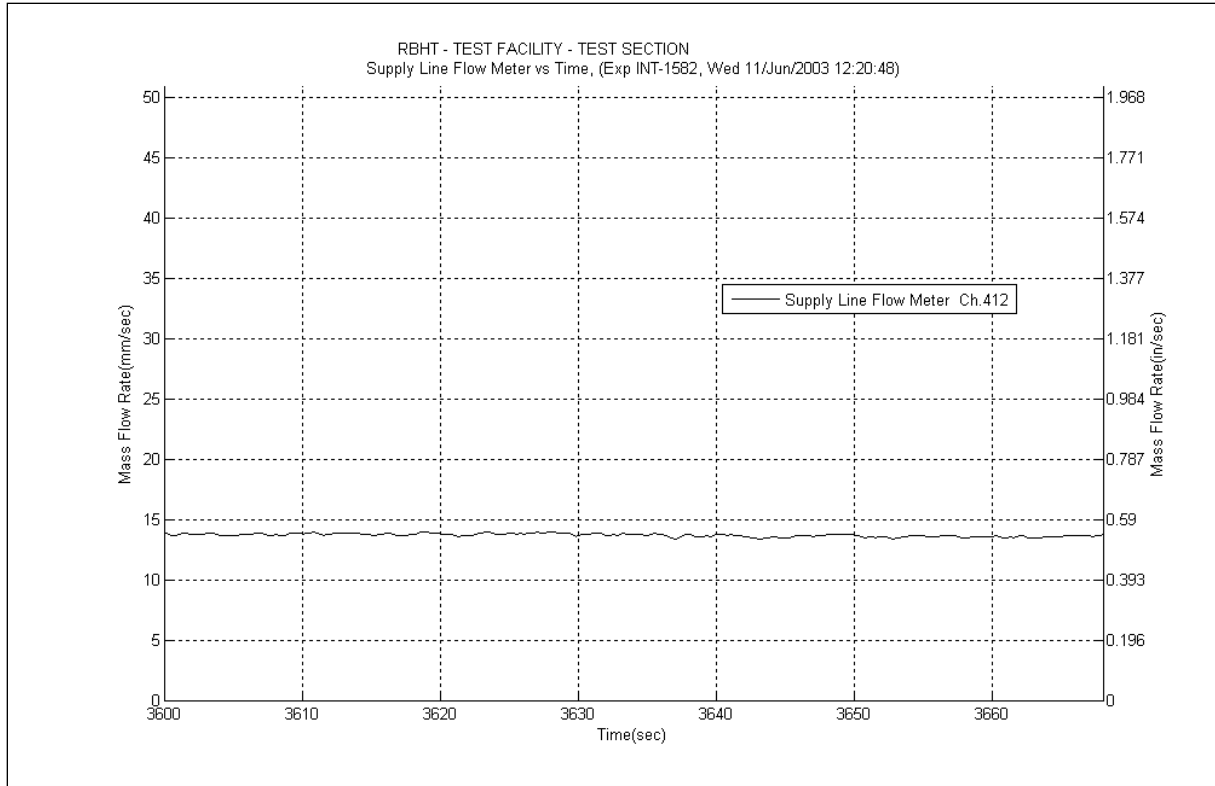


Figure A-196 Inlet Flow Plot for Experiment 1582H

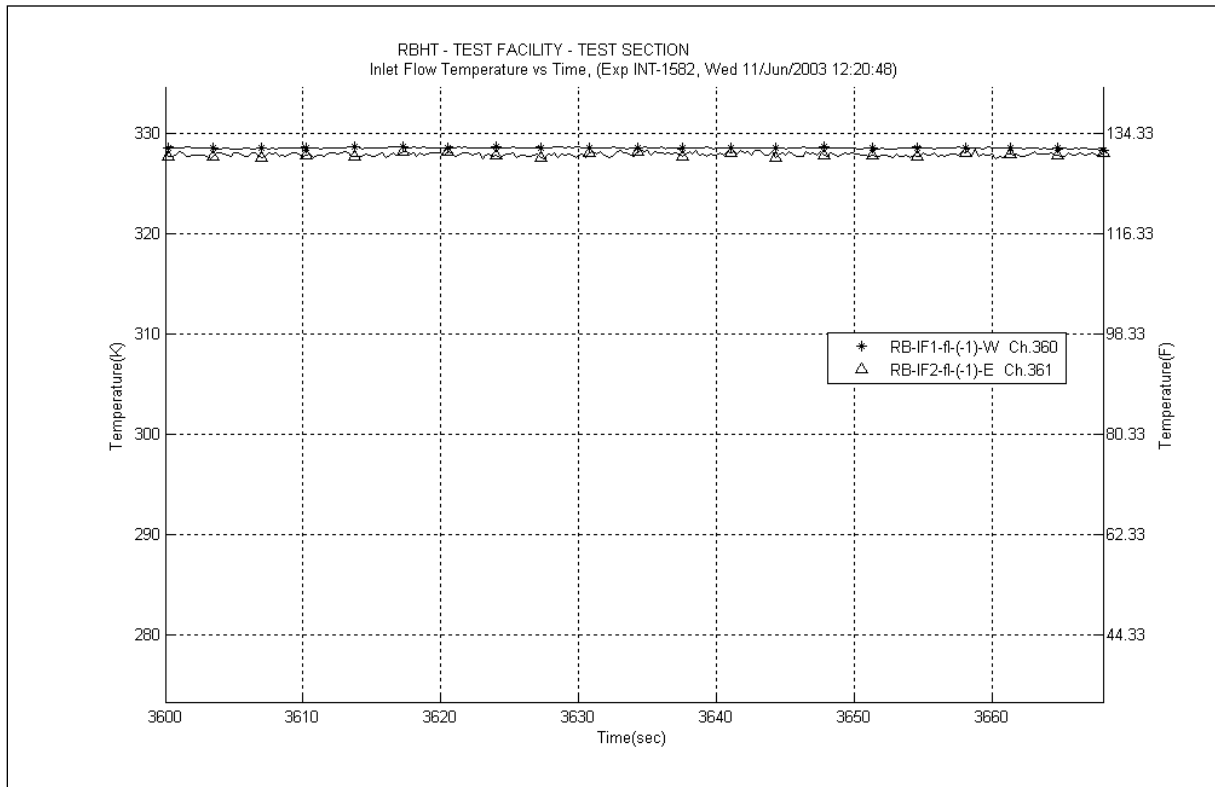


Figure A-197 Inlet Temperature Plot for Experiment 1582H

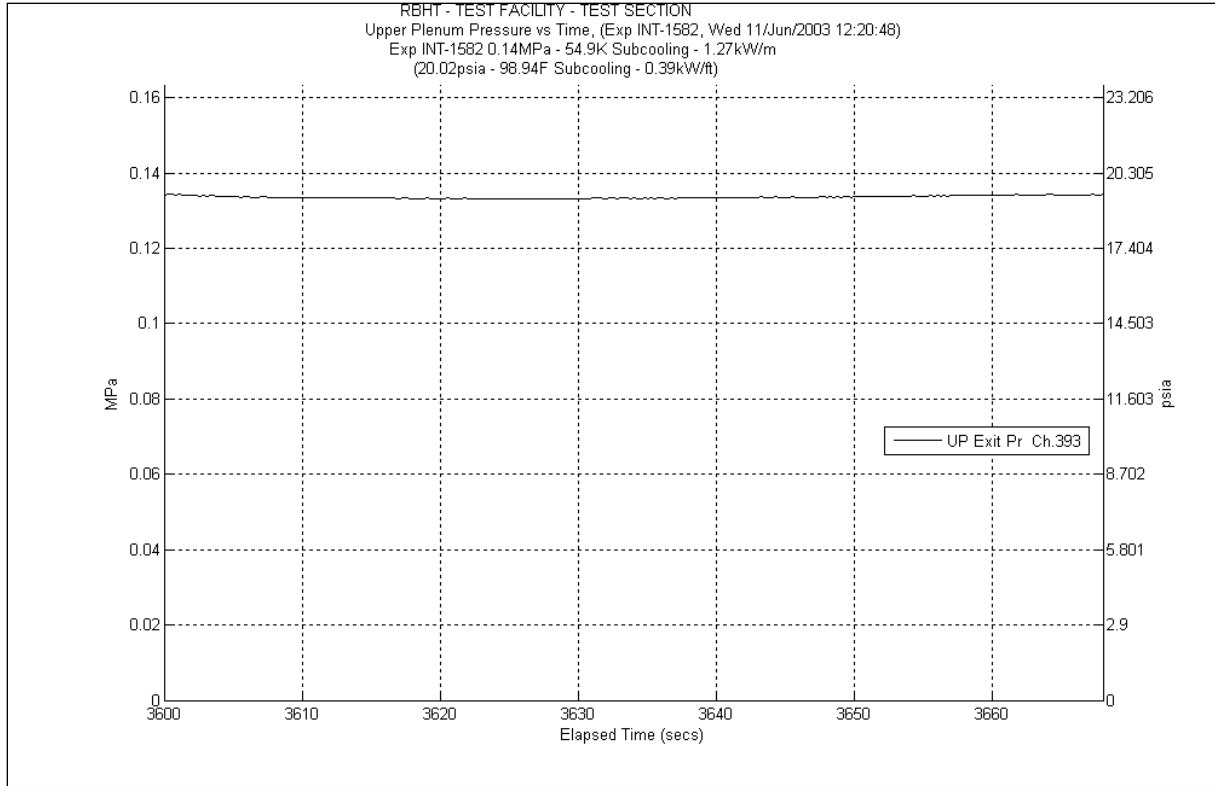


Figure A-198 System Pressure Plot for Experiment 1582H

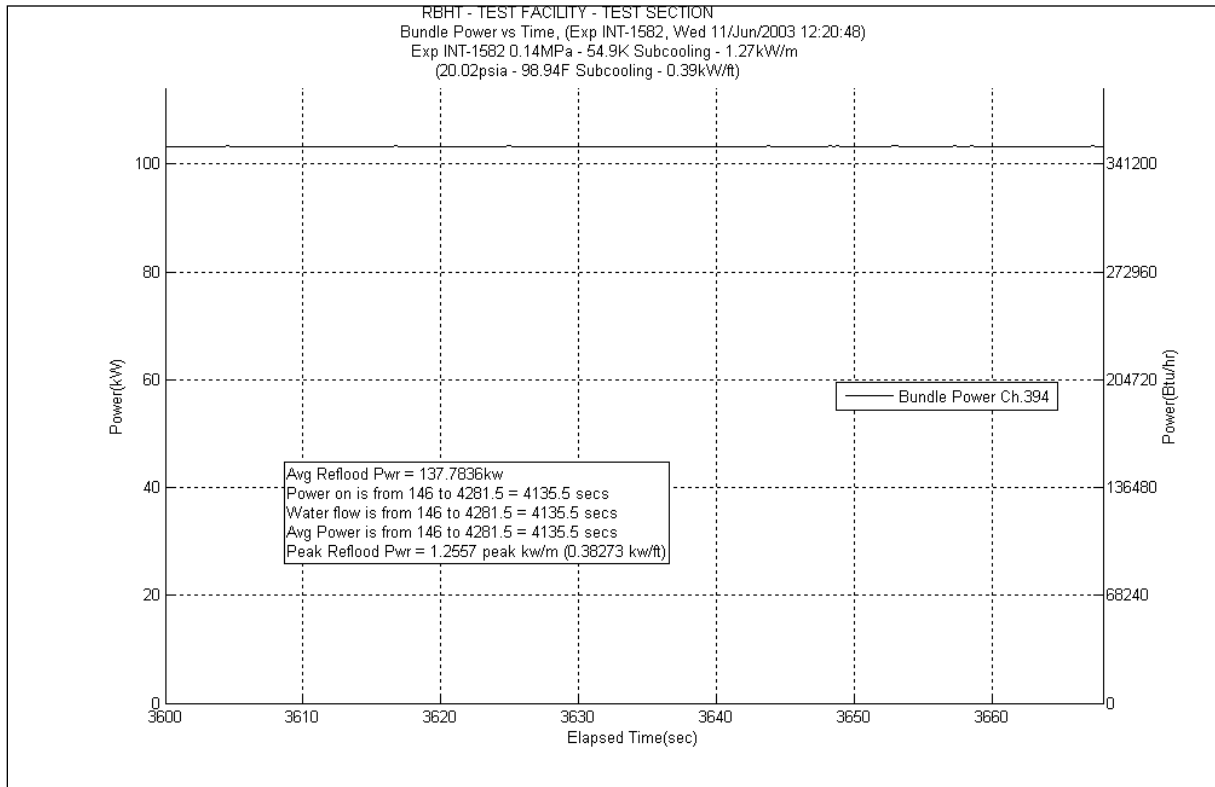


Figure A-199 Bundle Power Plot for Experiment 1582H

Table A-79 Data Results for RBHT Test 1582H for Time Period 3600 to 3668 seconds

Results for RBHT Test 1582
Valid Time Period 3600 to 3668 seconds
Collapsed Liquid Level = 54.486 inches = 1383.94 mm
(Z_{osv}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.946	3.080	147.454	0.766	36.676	10.390	0.000	0.000	0.000	0.000	2.098	100.453	2882.098	137995.5929	0.963	0.958	0.968
*	120-133	3048-3378	383	0.879	8.174	391.388	0.874	41.847	18.530	3.935	188.423	0.000	0.000	2.978	142.587	2885.076	138138.1803	0.956	0.951	0.961
*	108-120	2743-3048	382	0.852	9.234	442.114	0.729	34.905	23.126	4.352	208.362	0.000	0.000	3.67	175.721	2888.746	138313.9009	0.941	0.936	0.946
	100-108	2540-2743	381	0.915	3.537	169.336	0.428	20.493	16.902	0.000	0.000	0.000	0.000	2.753	131.814	2891.499	138445.7152	0.934	0.929	0.939
	97-100	2464-2540	380	0.887	1.766	84.544	0.148	7.086	6.129	0.000	0.000	0.000	0.000	1.489	71.294	2892.988	138517.0089	0.904	0.899	0.909
	93-97	2362-2464	379	0.880	2.488	119.107	0.187	8.954	7.948	0.000	0.000	0.000	0.000	2.135	102.224	2895.123	138619.2333	0.897	0.893	0.901
*	85-93	2159-2362	378	0.765	9.763	467.477	0.339	16.231	15.274	4.981	238.514	0.000	0.000	4.124	197.458	2899.247	138816.6915	0.901	0.896	0.906
	81-85	2057-2159	377	0.890	2.295	109.907	0.153	7.326	7.326	0.000	0.000	0.000	0.000	1.989	95.234	2901.236	138911.9253	0.904	0.899	0.909
	78-81	1981-2057	376	0.801	3.106	148.697	0.108	5.171	5.363	0.000	0.000	0.000	0.000	2.884	138.087	2904.12	139050.012	0.815	0.811	0.819
	75-78	1905-1981	375	0.814	2.898	138.751	0.102	4.884	5.219	0.000	0.000	0.000	0.000	2.684	128.511	2906.804	139178.5226	0.828	0.824	0.832
	72-75	1829-1905	374	0.787	3.324	159.141	0.096	4.597	5.123	0.000	0.000	0.000	0.000	3.119	149.339	2909.923	139327.8611	0.8	0.796	0.804
*	67-72	1702-1829	373	0.660	8.818	422.221	0.148	7.086	8.235	3.538	169.413	0.000	0.000	4.96	237.486	2914.883	139565.3472	0.809	0.805	0.813
	63-67	1600-1702	372	0.807	4.020	192.461	0.107	5.123	6.368	0.000	0.000	0.000	0.000	3.777	180.844	2918.66	139746.1909	0.818	0.814	0.822
	60-63	1524-1600	371	0.717	4.414	211.359	0.074	3.543	4.644	0.000	0.000	0.000	0.000	4.241	203.060	2922.901	139949.2511	0.728	0.724	0.732
	57-60	1448-1524	370	0.736	4.118	197.186	0.069	3.304	4.501	0.000	0.000	0.000	0.000	3.955	189.366	2926.856	140138.6175	0.746	0.742	0.750
	53-57	1346-1448	369	0.679	6.679	319.774	0.085	4.070	5.841	0.000	0.000	0.000	0.000	6.471	309.833	2933.327	140448.4506	0.688	0.685	0.691
*	46-53	1168-1346	368	0.502	18.099	866.573	0.127	6.081	9.672	3.870	185.285	0.000	0.000	13.9	665.536	2947.227	141113.9862	0.617	0.614	0.620
	43-46	1092-1168	367	0.538	7.193	344.391	0.046	2.202	3.974	0.000	0.000	0.000	0.000	7.064	338.226	2954.291	141452.2123	0.547	0.544	0.550
	37-43	940-1092	366	0.571	13.362	639.797	0.078	3.735	7.565	0.000	0.000	0.000	0.000	13.12	628.189	2967.411	142080.4013	0.579	0.576	0.582
*	25-37	635-940	365	0.290	44.252	2118.815	0.093	4.453	13.646	1.244	59.581	0.000	0.000	42.63	2041.135	3010.041	144121.5367	0.316	0.314	0.318
	13-25	330-635	364	0.052	59.095	2829.479	0.025	1.197	2.442	0.000	0.000	0.000	0.000	59	2824.935	3069.041	146946.4718	0.053	0.050	0.056
*	0-13	0-330	363	0.013	66.610	3189.287	0.001	0.048	0.000	0.000	0.000	0.000	0.000	65.7	3145.733	3134.741	150092.2047	0.026	0.025	0.027

Table A-80 Energy Balance Results for RBHT Test 1582H for Time Period 7105 to 7225 seconds

Results for RBHT Test 1582 Valid Time Period 3600 to 3668 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	4657.2053	14.69149	0.00E+00	0.00E+00	0.00E+00	4.30E-02	1.95E-02
0.25	6.35	4915.9389	15.50768	0.00E+00	0.00E+00	0.00E+00	4.30E-02	1.95E-02
0.50	12.70	5174.6725	16.32387	0.00E+00	0.00E+00	0.00E+00	4.30E-02	1.95E-02
0.75	19.05	5433.4062	17.14007	0.00E+00	0.00E+00	0.00E+00	4.30E-02	1.95E-02
1.00	25.40	5692.1398	17.95626	0.00E+00	0.00E+00	0.00E+00	4.30E-02	1.95E-02
1.25	31.75	5950.8734	18.77245	0.00E+00	0.00E+00	0.00E+00	4.30E-02	1.95E-02
1.50	38.10	6209.607	19.58865	0.00E+00	0.00E+00	0.00E+00	4.30E-02	1.95E-02
1.75	44.45	6468.3407	20.40484	0.00E+00	0.00E+00	0.00E+00	4.30E-02	1.95E-02
2.00	50.80	6727.0743	21.22104	7.11E-03	3.65E-01	1.65E-01	4.27E-02	1.94E-02
2.25	57.15	6985.8079	22.03723	2.34E-02	1.20E+00	5.45E-01	4.20E-02	1.91E-02
2.50	63.50	7244.5415	22.85342	4.04E-02	2.07E+00	9.40E-01	4.13E-02	1.87E-02
2.75	69.85	7503.2752	23.66962	5.79E-02	2.97E+00	1.35E+00	4.05E-02	1.84E-02
3.00	76.20	7762.0088	24.48581	7.61E-02	3.90E+00	1.77E+00	3.97E-02	1.80E-02
3.25	82.55	8020.7424	25.302	9.49E-02	4.87E+00	2.21E+00	3.89E-02	1.77E-02
3.50	88.90	8279.476	26.1182	1.14E-01	5.87E+00	2.66E+00	3.81E-02	1.73E-02
3.75	95.25	8538.2097	26.93439	1.34E-01	6.89E+00	3.13E+00	3.72E-02	1.69E-02
4.00	101.60	8796.9433	27.75059	1.55E-01	7.95E+00	3.61E+00	3.64E-02	1.65E-02
4.25	107.95	9055.6769	28.56678	1.76E-01	9.04E+00	4.10E+00	3.54E-02	1.61E-02
4.50	114.30	9314.4106	29.38297	1.98E-01	1.02E+01	4.61E+00	3.45E-02	1.56E-02
4.75	120.65	9573.1442	30.19917	2.21E-01	1.13E+01	5.13E+00	3.35E-02	1.52E-02
5.00	127.00	9831.8778	31.01536	2.44E-01	1.25E+01	5.67E+00	3.25E-02	1.48E-02
5.25	133.35	10090.611	31.83155	2.67E-01	1.37E+01	6.22E+00	3.15E-02	1.43E-02
5.50	139.70	10349.345	32.64775	2.92E-01	1.50E+01	6.79E+00	3.05E-02	1.38E-02
5.75	146.05	10608.079	33.46394	3.17E-01	1.62E+01	7.37E+00	2.94E-02	1.33E-02
6.00	152.40	10866.812	34.28014	3.42E-01	1.76E+01	7.96E+00	2.83E-02	1.28E-02
6.25	158.75	11125.546	35.09633	3.68E-01	1.89E+01	8.57E+00	2.72E-02	1.23E-02
6.50	165.10	11384.28	35.91252	3.95E-01	2.03E+01	9.20E+00	2.60E-02	1.18E-02
6.75	171.45	11643.013	36.72872	4.23E-01	2.17E+01	9.84E+00	2.48E-02	1.13E-02
7.00	177.80	11901.747	37.54491	4.51E-01	2.31E+01	1.05E+01	2.36E-02	1.07E-02
7.25	184.15	12160.48	38.3611	4.79E-01	2.46E+01	1.12E+01	2.24E-02	1.02E-02
7.50	190.50	12419.214	39.1773	5.08E-01	2.61E+01	1.18E+01	2.11E-02	9.59E-03
7.75	196.85	12677.948	39.99349	5.38E-01	2.76E+01	1.25E+01	1.99E-02	9.01E-03
8.00	203.20	12936.681	40.80968	5.69E-01	2.92E+01	1.32E+01	1.85E-02	8.41E-03
8.25	209.55	13195.415	41.62588	6.00E-01	3.08E+01	1.40E+01	1.72E-02	7.81E-03
8.50	215.90	13454.149	42.44207	6.32E-01	3.24E+01	1.47E+01	1.58E-02	7.19E-03
8.75	222.25	13712.882	43.25827	6.64E-01	3.41E+01	1.55E+01	1.45E-02	6.56E-03
9.00	228.60	13971.616	44.07446	6.97E-01	3.58E+01	1.62E+01	1.30E-02	5.91E-03
9.25	234.95	13195.415	41.62588	7.29E-01	3.74E+01	1.70E+01	1.16E-02	5.28E-03
9.50	241.30	12419.214	39.1773	7.60E-01	3.90E+01	1.77E+01	1.03E-02	4.69E-03
9.75	247.65	11643.013	36.72872	7.88E-01	4.05E+01	1.84E+01	9.11E-03	4.13E-03
10.00	254.00	10866.812	34.28014	8.15E-01	4.18E+01	1.90E+01	7.95E-03	3.61E-03
10.25	260.35	10090.611	31.83155	8.40E-01	4.31E+01	1.96E+01	6.88E-03	3.12E-03
10.50	266.70	9314.4106	29.38297	8.63E-01	4.43E+01	2.01E+01	5.88E-03	2.67E-03
10.75	273.05	8538.2097	26.93439	8.84E-01	4.54E+01	2.06E+01	4.97E-03	2.26E-03
11.00	279.40	7762.0088	24.48581	9.04E-01	4.64E+01	2.10E+01	4.14E-03	1.88E-03
11.25	285.75	6985.8079	22.03723	9.21E-01	4.73E+01	2.14E+01	3.38E-03	1.53E-03
11.50	292.10	6209.607	19.58865	9.37E-01	4.81E+01	2.18E+01	2.71E-03	1.23E-03
11.75	298.45	5433.4062	17.14007	9.51E-01	4.88E+01	2.21E+01	2.11E-03	9.58E-04
12.00	304.80	4657.2053	14.69149	9.63E-01	4.94E+01	2.24E+01	1.60E-03	7.24E-04

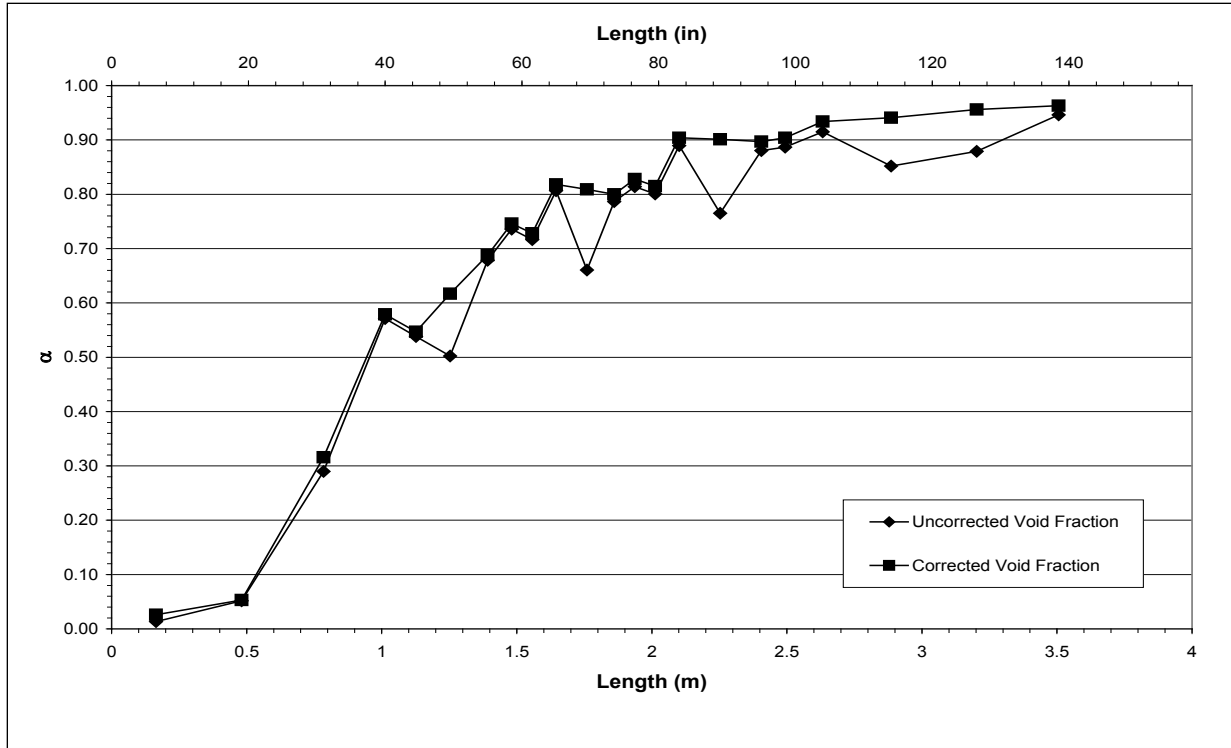


Figure A-200 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1582H for Time Period 3600 to 3668 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1582-I

Test Conditions

Date: 6/11/2003

Inlet flow rate: 1.019 cm/sec (0.401 in./sec)

Inlet mass flow rate: 0.0485 kg/sec (0.107 lbm/sec)

Inlet flow temperature: 326 K (128 °F)

Upper plenum pressure: 138.0 kPa (20.02 psia)

Bundle power: 141.43 kW

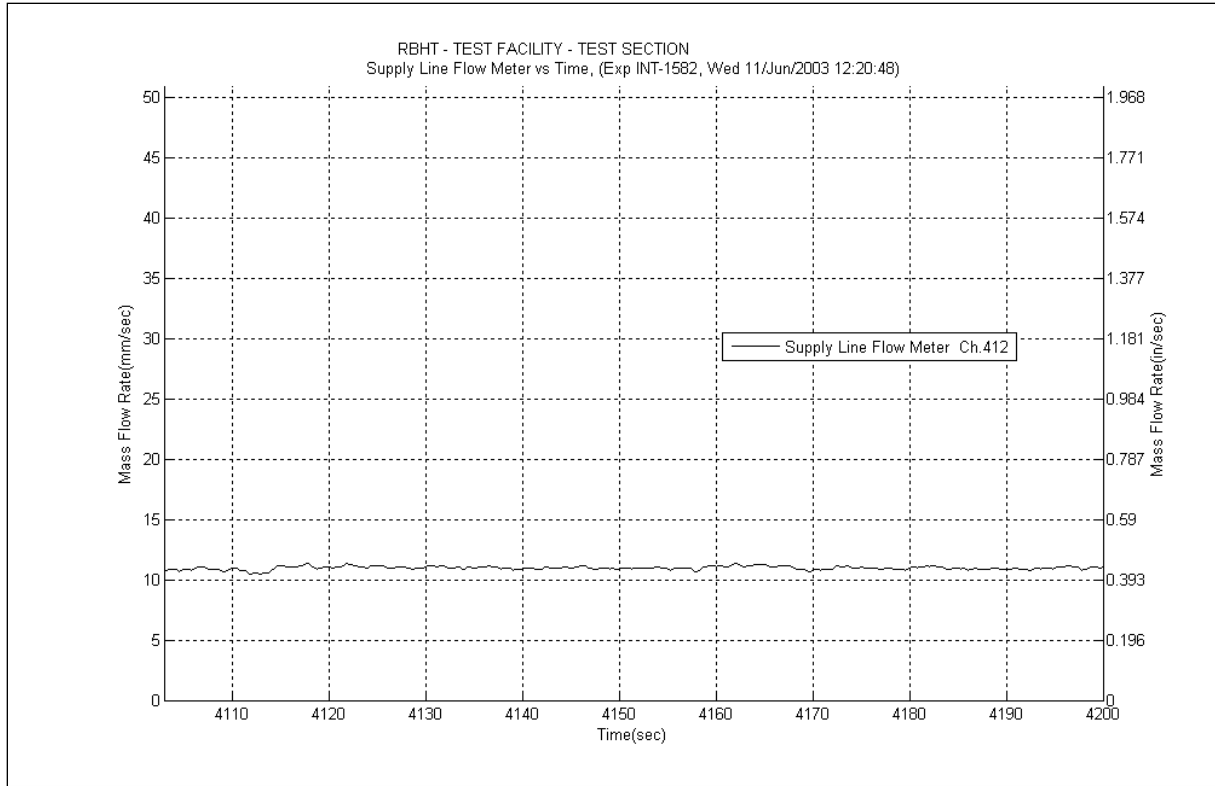


Figure A-201 Inlet Flow Plot for Experiment 15821

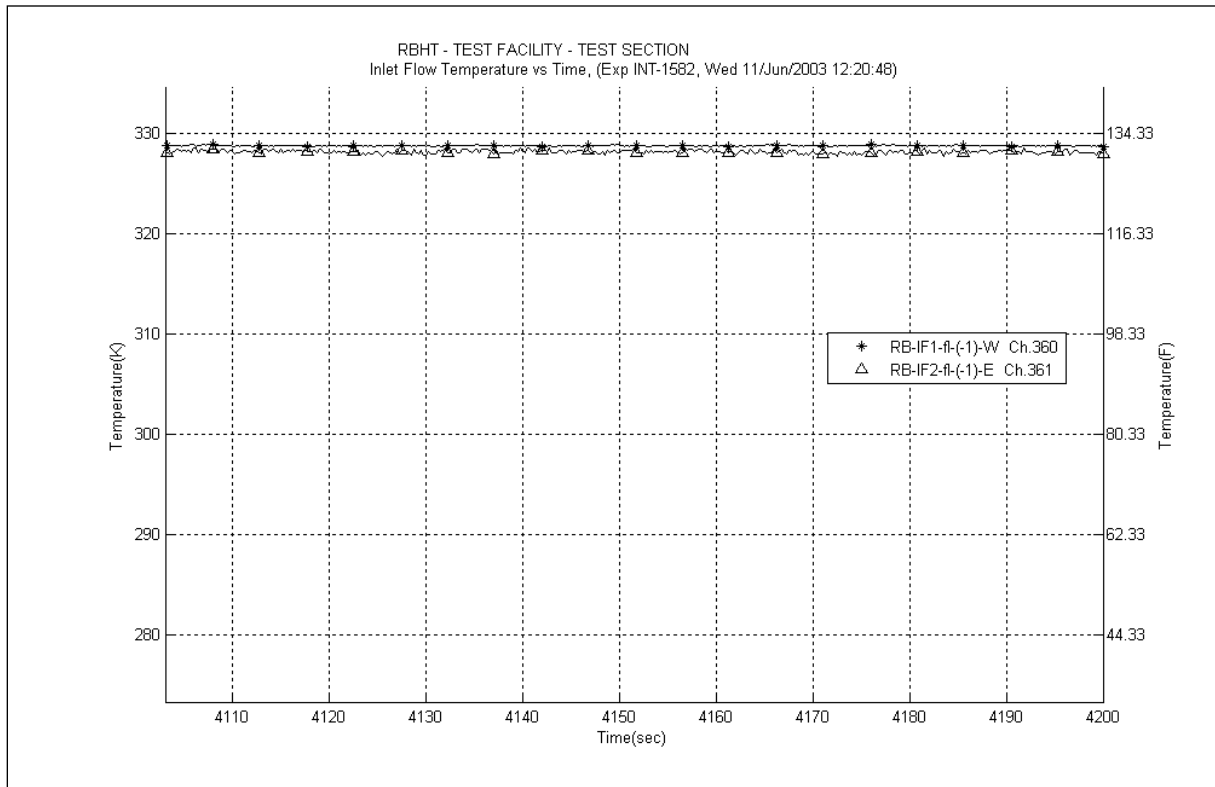


Figure A-202 Inlet Temperature Plot for Experiment 15821

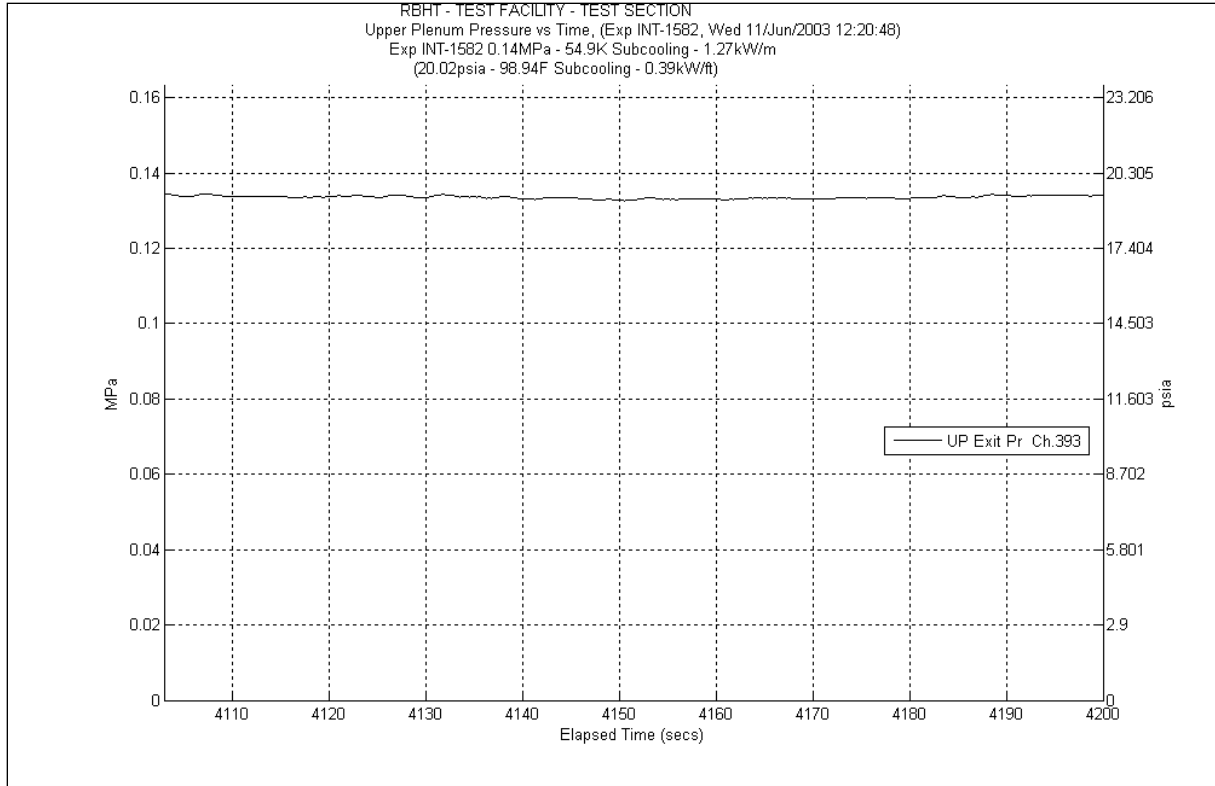


Figure A-203 System Pressure Plot for Experiment 1582I

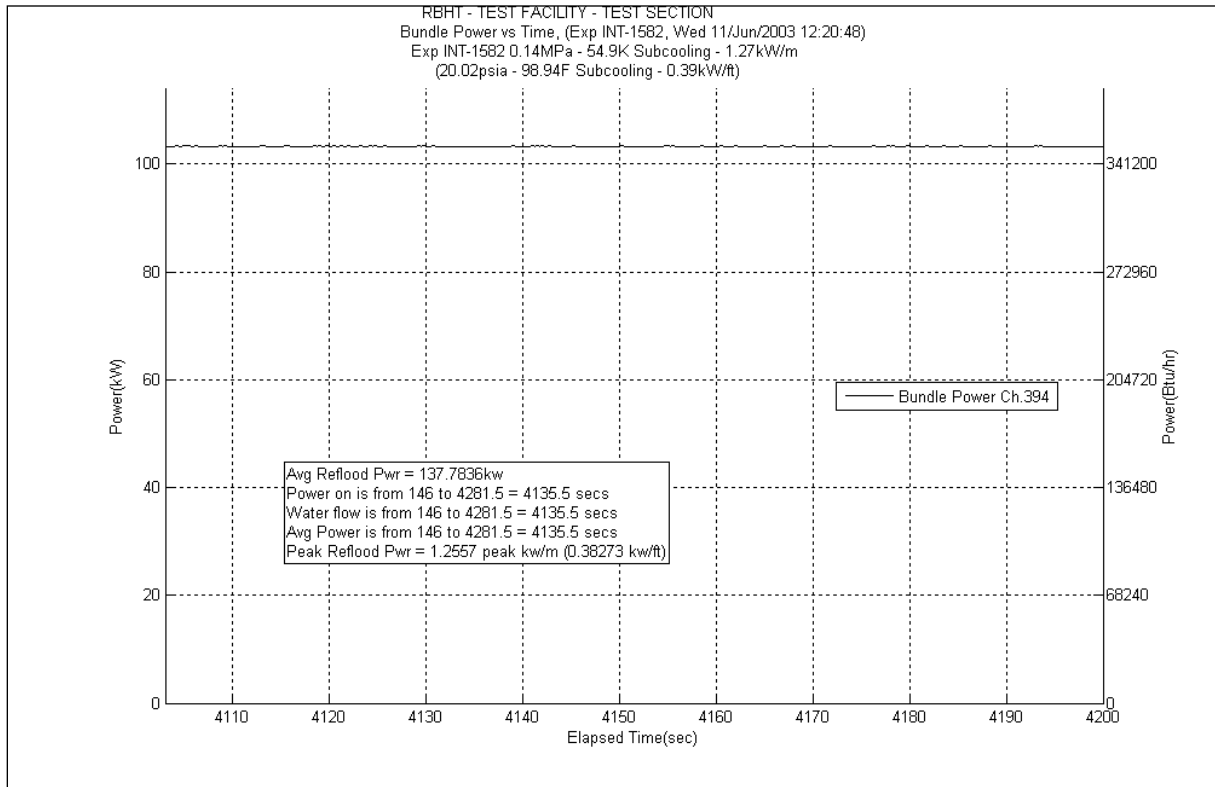


Figure A-204 Bundle Power Plot for Experiment 1582I

Table A-81 Data Results for RBHT Test 15821 for Time Period 4103 to 4200 seconds

Results for RBHT Test 1582																			
Valid Time Period 4103 to 4200 seconds																			
Collapsed Liquid Level = 50.180 inches = 1274.56 mm																			
(Z_{OSV}) Onset of Significant Void = 6.5 inches = 165 mm																			
$(Z_{2\phi})$ Two-Phase Level (Dryout) = 113.60 inches = 2885.44 mm																			
(S) Level Swell = 3.00																			
Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.980	1.127	53.959	0.327	15.657	0.000	0.000	0.000	0.000	0.797	38.161	2880.797	137933.3007	0.986	0.981	0.991
*	120-133	3048-3378	383	0.912	5.910	282.973	0.387	18.530	0.000	0.000	4.171	199.709	1.352	64.734	2882.149	137998.0348	0.98	0.975	0.985
*	108-120	2743-3048	382	0.891	6.777	324.499	0.549	26.286	0.274	13.119	3.949	189.093	2.005	96.000	2884.154	138094.0347	0.968	0.963	0.973
	100-108	2540-2743	381	0.946	2.228	106.674	0.349	16.710	0.286	13.694	0.000	0.000	1.589	76.082	2885.743	138170.1165	0.962	0.957	0.967
	97-100	2464-2540	380	0.919	1.262	60.424	0.122	5.841	0.104	4.980	0.000	0.000	1.038	49.700	2886.781	138219.8162	0.933	0.928	0.938
	93-97	2362-2464	379	0.893	2.218	106.177	0.155	7.421	0.135	6.464	0.000	0.000	1.924	92.122	2888.705	138311.9378	0.907	0.902	0.912
*	85-93	2159-2362	378	0.774	9.410	450.568	0.282	13.502	0.259	12.401	4.629	221.653	4.24	203.012	2892.945	138514.9501	0.898	0.894	0.902
	81-85	2057-2159	377	0.877	2.566	122.837	0.128	6.129	0.124	5.937	0.000	0.000	2.315	110.843	2895.26	138625.7929	0.889	0.885	0.893
	78-81	1981-2057	376	0.786	3.334	159.638	0.090	4.309	0.091	4.357	0.000	0.000	3.152	150.919	2898.412	138776.7115	0.798	0.794	0.802
	75-78	1905-1981	375	0.800	3.111	148.946	0.085	4.070	0.089	4.261	0.000	0.000	2.934	140.481	2901.346	138917.1921	0.812	0.808	0.816
	72-75	1829-1905	374	0.763	3.698	177.044	0.080	3.830	0.087	4.166	0.000	0.000	3.531	169.065	2904.877	139086.2573	0.773	0.769	0.777
*	67-72	1702-1829	373	0.640	9.348	447.584	0.124	5.937	0.140	6.703	3.164	151.493	5.92	283.451	2910.797	139369.7084	0.772	0.768	0.776
	63-67	1600-1702	372	0.761	4.965	237.717	0.090	4.309	0.108	5.171	0.000	0.000	4.763	228.054	2915.56	139597.7621	0.771	0.767	0.775
	60-63	1524-1600	371	0.673	5.089	243.685	0.063	3.016	0.078	3.735	0.000	0.000	4.947	236.864	2920.507	139834.6257	0.682	0.679	0.685
	57-60	1448-1524	370	0.685	4.913	235.230	0.058	2.777	0.076	3.639	0.000	0.000	4.774	228.580	2925.281	140063.2061	0.694	0.691	0.697
	53-57	1346-1448	369	0.630	7.681	367.765	0.072	3.447	0.099	4.740	0.000	0.000	7.506	359.389	2932.787	140422.5953	0.639	0.636	0.642
*	46-53	1168-1346	368	0.497	18.301	876.271	0.109	5.219	0.164	7.852	1.968	94.242	16.06	768.957	2948.847	141191.5522	0.558	0.555	0.561
	43-46	1092-1168	367	0.471	8.242	394.620	0.040	1.915	0.067	3.208	0.000	0.000	8.134	389.458	2956.981	141581.0102	0.478	0.476	0.480
	37-43	940-1092	366	0.549	14.058	673.117	0.069	3.304	0.128	6.129	0.000	0.000	13.86	663.620	2970.841	142244.6306	0.555	0.552	0.558
*	25-37	635-940	365	0.350	40.503	1939.284	0.093	4.453	0.231	11.060	-0.661	-31.659	40.84	1955.430	3011.681	144200.0603	0.344	0.342	0.346
	13-25	330-635	364	0.131	54.135	2592.011	0.037	1.772	0.111	5.315	0.000	0.000	53.97	2584.097	3065.651	146784.1578	0.134	0.133	0.135
*	0-13	0-330	363	0.015	66.469	3182.573	0.001	0.048	0.000	0.000	3.488	167.027	62.98	3015.499	3128.631	149799.6563	0.067	0.064	0.070

Table A-82 Energy Balance Results for RBHT Test 1582I for Time Period 4103 to 4200 seconds

Results for RBHT Test 1582 Valid Time Period 4103 to 4200 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	4658.6938	14.69618	0.00E+00	0.00E+00	0.00E+00	3.44E-02	1.56E-02
0.25	6.35	4917.5101	15.51264	0.00E+00	0.00E+00	0.00E+00	3.44E-02	1.56E-02
0.50	12.70	5176.3264	16.32909	0.00E+00	0.00E+00	0.00E+00	3.44E-02	1.56E-02
0.75	19.05	5435.1427	17.14555	0.00E+00	0.00E+00	0.00E+00	3.44E-02	1.56E-02
1.00	25.40	5693.959	17.962	0.00E+00	0.00E+00	0.00E+00	3.44E-02	1.56E-02
1.25	31.75	5952.7754	18.77845	0.00E+00	0.00E+00	0.00E+00	3.44E-02	1.56E-02
1.50	38.10	6211.5917	19.59491	0.00E+00	0.00E+00	0.00E+00	3.44E-02	1.56E-02
1.75	44.45	6470.408	20.41136	1.57E-02	6.55E-01	2.97E-01	3.39E-02	1.54E-02
2.00	50.80	6729.2243	21.22782	3.53E-02	1.47E+00	6.67E-01	3.32E-02	1.51E-02
2.25	57.15	6988.0407	22.04427	5.57E-02	2.32E+00	1.05E+00	3.25E-02	1.47E-02
2.50	63.50	7246.857	22.86073	7.69E-02	3.20E+00	1.45E+00	3.18E-02	1.44E-02
2.75	69.85	7505.6733	23.67718	9.88E-02	4.11E+00	1.87E+00	3.10E-02	1.41E-02
3.00	76.20	7764.4896	24.49364	1.22E-01	5.06E+00	2.29E+00	3.02E-02	1.37E-02
3.25	82.55	8023.3059	25.31009	1.45E-01	6.03E+00	2.74E+00	2.94E-02	1.34E-02
3.50	88.90	8282.1223	26.12655	1.69E-01	7.04E+00	3.19E+00	2.86E-02	1.30E-02
3.75	95.25	8540.9386	26.943	1.94E-01	8.08E+00	3.67E+00	2.77E-02	1.26E-02
4.00	101.60	8799.7549	27.75945	2.20E-01	9.15E+00	4.15E+00	2.69E-02	1.22E-02
4.25	107.95	9058.5712	28.57591	2.47E-01	1.03E+01	4.65E+00	2.59E-02	1.18E-02
4.50	114.30	9317.3875	29.39236	2.74E-01	1.14E+01	5.17E+00	2.50E-02	1.13E-02
4.75	120.65	9576.2039	30.20882	3.02E-01	1.26E+01	5.70E+00	2.40E-02	1.09E-02
5.00	127.00	9835.0202	31.02527	3.31E-01	1.38E+01	6.24E+00	2.30E-02	1.05E-02
5.25	133.35	10093.836	31.84173	3.60E-01	1.50E+01	6.80E+00	2.20E-02	9.99E-03
5.50	139.70	10352.653	32.65818	3.91E-01	1.63E+01	7.38E+00	2.10E-02	9.51E-03
5.75	146.05	10611.469	33.47464	4.22E-01	1.76E+01	7.96E+00	1.99E-02	9.03E-03
6.00	152.40	10870.285	34.29109	4.54E-01	1.89E+01	8.57E+00	1.88E-02	8.53E-03
6.25	158.75	11129.102	35.10755	4.86E-01	2.02E+01	9.18E+00	1.77E-02	8.02E-03
6.50	165.10	11387.918	35.924	5.20E-01	2.16E+01	9.82E+00	1.65E-02	7.50E-03
6.75	171.45	11646.734	36.74046	5.54E-01	2.31E+01	1.05E+01	1.54E-02	6.96E-03
7.00	177.80	11905.551	37.55691	5.89E-01	2.45E+01	1.11E+01	1.41E-02	6.42E-03
7.25	184.15	12164.367	38.37336	6.25E-01	2.60E+01	1.18E+01	1.29E-02	5.86E-03
7.50	190.50	12423.183	39.18982	6.61E-01	2.75E+01	1.25E+01	1.17E-02	5.29E-03
7.75	196.85	12682	40.00627	6.99E-01	2.91E+01	1.32E+01	1.04E-02	4.71E-03
8.00	203.20	12940.816	40.82273	7.37E-01	3.07E+01	1.39E+01	9.06E-03	4.11E-03
8.25	209.55	13199.632	41.63918	7.76E-01	3.23E+01	1.46E+01	7.73E-03	3.50E-03
8.50	215.90	13458.449	42.45564	8.15E-01	3.39E+01	1.54E+01	6.36E-03	2.89E-03
8.75	222.25	13717.265	43.27209	8.56E-01	3.56E+01	1.62E+01	4.97E-03	2.25E-03
9.00	228.60	13976.081	44.08855	8.97E-01	3.73E+01	1.69E+01	3.55E-03	1.61E-03
9.25	234.95	13199.632	41.63918	9.37E-01	3.90E+01	1.77E+01	2.17E-03	9.82E-04
9.50	241.30	12423.183	39.18982	9.75E-01	4.06E+01	1.84E+01	8.54E-04	3.87E-04
9.75	247.65	11646.734	36.74046	1.00E+00	4.16E+01	1.89E+01	0.00E+00	0.00E+00
10.00	254.00	10870.285	34.29109	1.00E+00	4.16E+01	1.89E+01	0.00E+00	0.00E+00
10.25	260.35	10093.836	31.84173	1.00E+00	4.16E+01	1.89E+01	0.00E+00	0.00E+00
10.50	266.70	9317.3875	29.39236	1.00E+00	4.16E+01	1.89E+01	0.00E+00	0.00E+00
10.75	273.05	8540.9386	26.943	1.00E+00	4.16E+01	1.89E+01	0.00E+00	0.00E+00
11.00	279.40	7764.4896	24.49364	1.00E+00	4.16E+01	1.89E+01	0.00E+00	0.00E+00
11.25	285.75	6988.0407	22.04427	1.00E+00	4.16E+01	1.89E+01	0.00E+00	0.00E+00
11.50	292.10	6211.5917	19.59491	1.00E+00	4.16E+01	1.89E+01	0.00E+00	0.00E+00
11.75	298.45	5435.1427	17.14555	1.00E+00	4.16E+01	1.89E+01	0.00E+00	0.00E+00
12.00	304.80	4658.6938	14.69618	1.00E+00	4.16E+01	1.89E+01	0.00E+00	0.00E+00

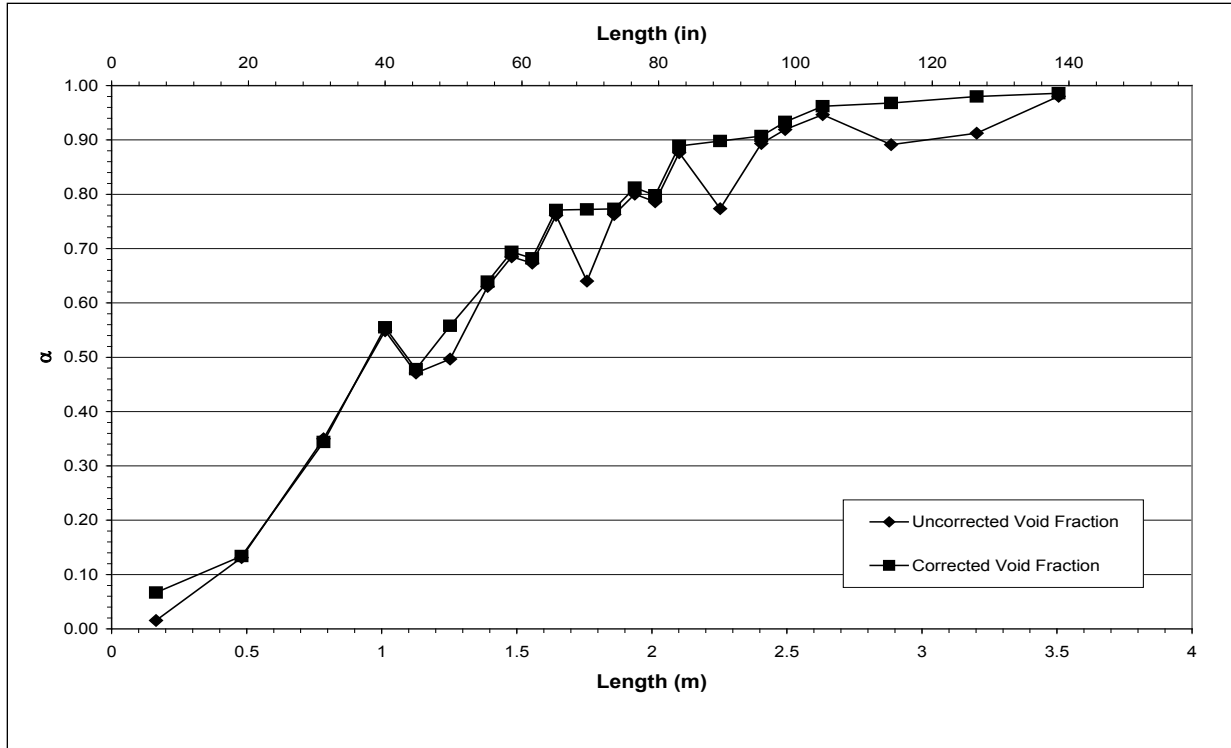


Figure A-205 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1582I for Time Period 4103 to 4200 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1595-A

Test Conditions

Date: 6/16/2003

Steady-state time window: 2965 – 3060 seconds

Inlet flow rate: 2.545 cm/sec (1.002 in./sec)

Inlet mass flow rate: 0.117 kg/sec (0.258 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 90.81 kW

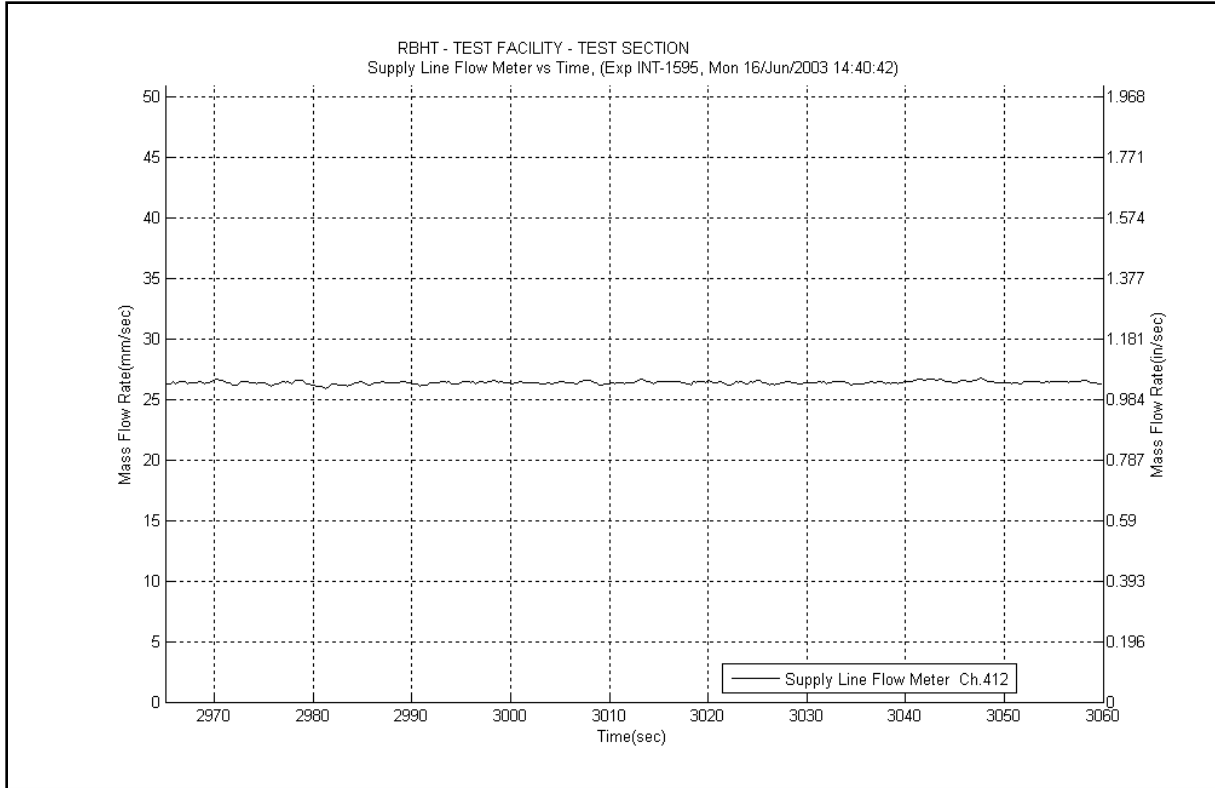


Figure A-206 Inlet Flow Plot for Experiment 1595A

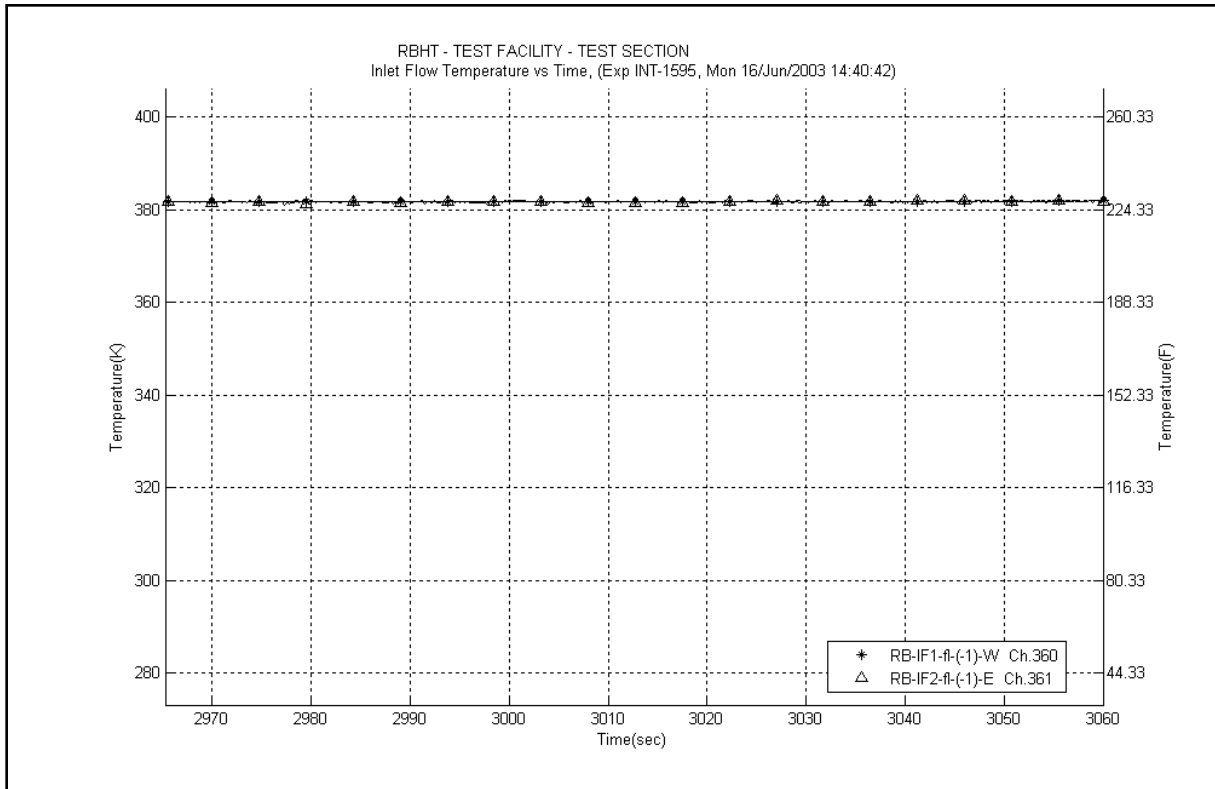


Figure A-207 Inlet Temperature Plot for Experiment 1595A

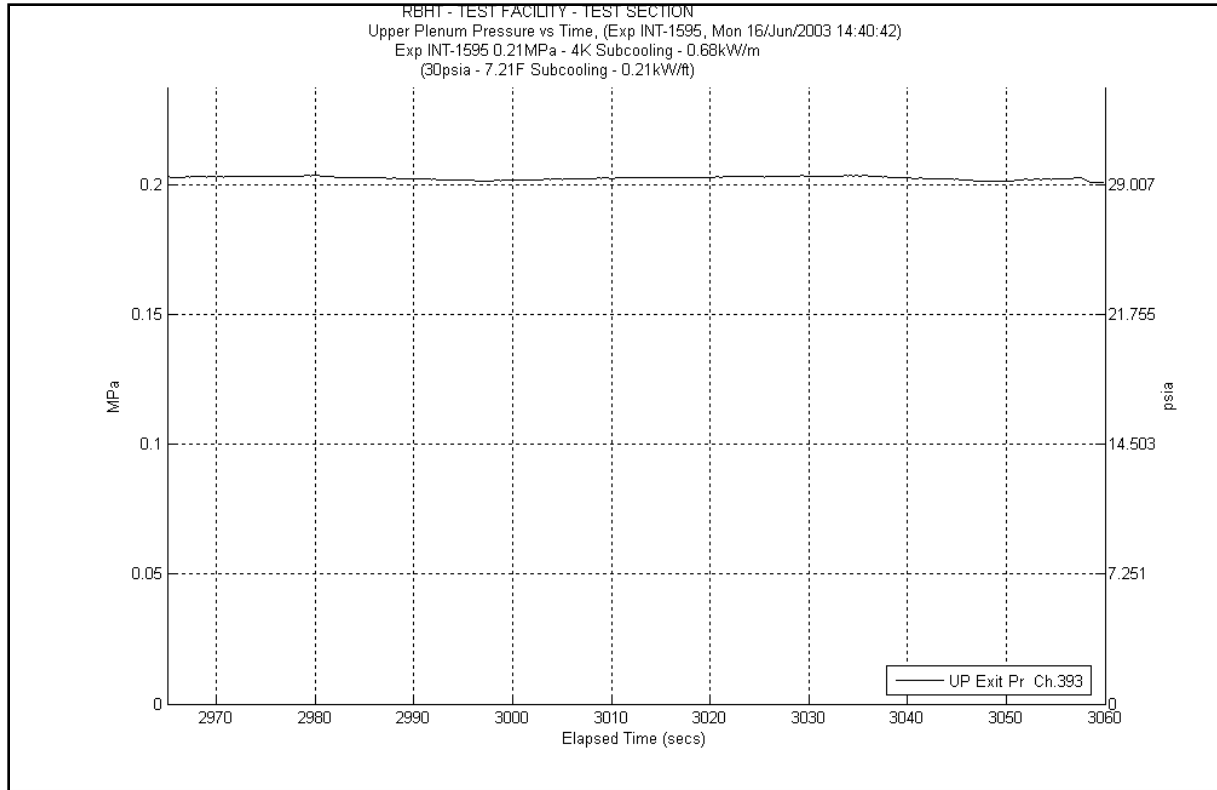


Figure A-208 System Pressure Plot for Experiment 1595A

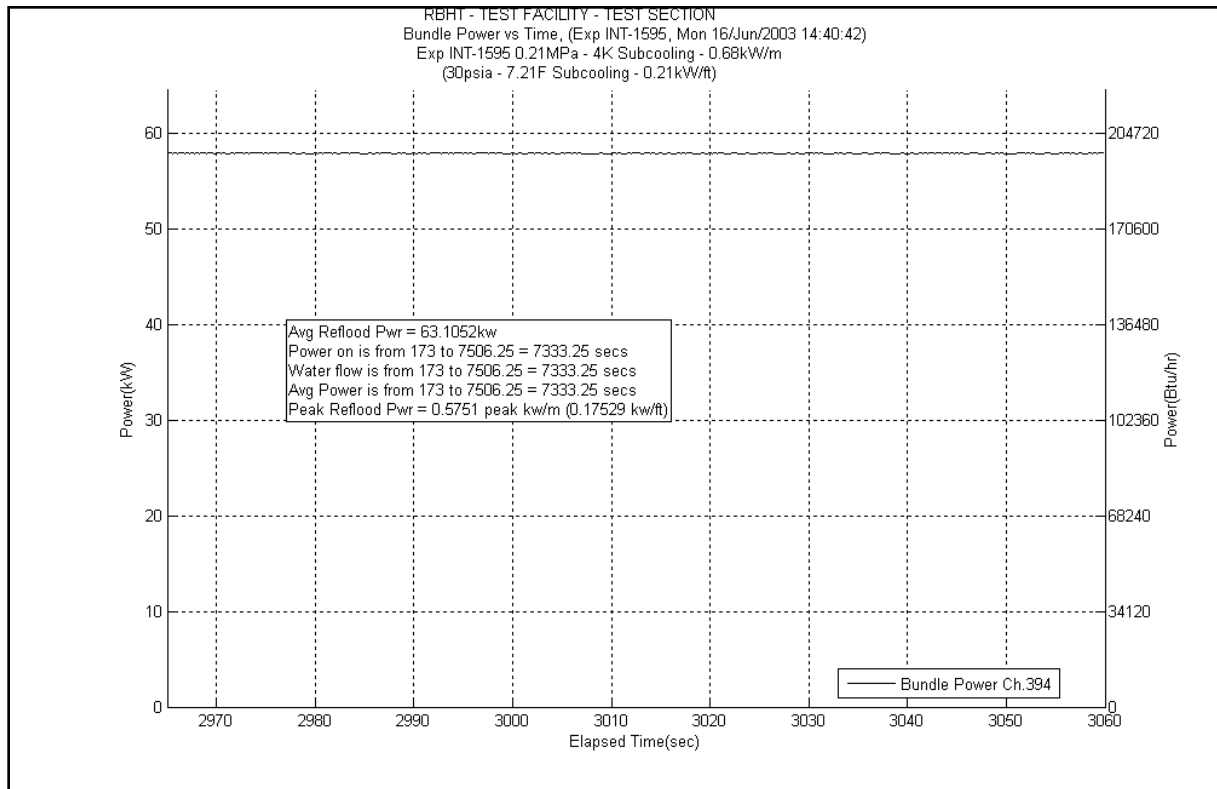


Figure A-209 Bundle Power Plot for Experiment 1595A

Table A-83 Data Results for RBHT Test 1595A for Time Period 2965 to 3060 seconds

Results for RBHT Test 1595																			
Valid Time Period 2965 to 3060 seconds																			
Collapsed Liquid Level = 75.056 inches = 1906.42 mm																			
(Z _{OSL}) Onset of Significant Void = 19 inches = 482.5 mm																			
Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lb/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.752	14.141	677.096	0.749	35.862	0.163	7.804	0.000	0.000	13.22	632.977	4333.22	207475.6872	0.768	0.764	0.772
*	120-133	3048-3378	383	0.749	16.935	810.874	0.832	39.836	0.290	13.885	0.153	7.347	15.66	749.805	4348.88	208225.4921	0.768	0.764	0.772
*	108-120	2743-3048	382	0.677	20.135	964.047	0.698	33.420	0.362	17.333	4.555	218.073	14.52	695.221	4363.4	208920.7134	0.767	0.763	0.771
	100-108	2540-2743	381	0.750	10.392	497.565	0.419	20.062	0.265	12.688	0.000	0.000	9.704	464.630	4373.104	209385.3434	0.766	0.762	0.770
	97-100	2464-2540	380	0.671	5.131	245.674	0.147	7.038	0.096	4.597	0.000	0.000	4.884	233.847	4377.988	209619.1906	0.686	0.683	0.689
	93-97	2362-2464	379	0.674	6.782	324.747	0.188	9.001	0.125	5.985	0.000	0.000	6.466	309.594	4384.454	209928.7843	0.689	0.686	0.692
*	85-93	2159-2362	378	0.495	21.002	1005.573	0.348	16.662	0.240	11.491	8.284	396.632	12.13	580.788	4396.584	210509.5718	0.708	0.704	0.712
	81-85	2057-2159	377	0.714	5.946	284.713	0.160	7.661	0.115	5.506	0.000	0.000	5.667	271.337	4402.251	210780.9093	0.727	0.723	0.731
	78-81	1981-2057	376	0.753	3.843	184.007	0.114	5.458	0.084	4.022	0.000	0.000	3.646	174.571	4405.897	210955.4807	0.766	0.762	0.770
	75-78	1905-1981	375	0.602	6.206	297.146	0.109	5.219	0.082	3.926	0.000	0.000	6.011	287.808	4411.908	211243.2889	0.614	0.611	0.617
	72-75	1829-1905	374	0.540	7.167	343.148	0.104	4.980	0.080	3.830	0.000	0.000	6.982	334.300	4418.89	211577.5889	0.552	0.549	0.555
*	67-72	1702-1829	373	0.429	14.827	709.919	0.163	7.804	0.130	6.224	4.324	207.032	10.21	488.857	4429.1	212066.4463	0.607	0.604	0.610
	63-67	1600-1702	372	0.651	7.245	346.878	0.120	5.746	0.100	4.788	0.000	0.000	7.022	336.215	4436.122	212402.6614	0.662	0.659	0.665
	60-63	1524-1600	371	0.479	8.112	388.404	0.085	4.070	0.073	3.495	0.000	0.000	7.951	380.696	4444.073	212783.3574	0.49	0.488	0.492
	57-60	1448-1524	370	0.464	8.351	399.842	0.080	3.830	0.071	3.399	0.000	0.000	8.195	392.379	4452.268	213175.7361	0.474	0.472	0.476
	53-57	1346-1448	369	0.429	11.872	568.432	0.099	4.740	0.091	4.357	0.000	0.000	11.68	559.241	4463.948	213734.9775	0.438	0.436	0.440
*	46-53	1168-1346	368	0.326	24.492	1172.671	0.152	7.278	0.152	7.278	5.078	243.124	19.11	914.992	4483.058	214649.9692	0.474	0.472	0.476
	43-46	1092-1168	367	0.503	7.748	370.998	0.057	2.729	0.062	2.969	0.000	0.000	7.625	365.087	4490.683	215015.0561	0.51	0.507	0.513
	37-43	940-1092	366	0.405	18.530	887.212	0.098	4.692	0.118	5.650	0.000	0.000	18.31	876.688	4508.993	215891.7437	0.412	0.410	0.414
*	25-37	635-940	365	0.231	47.919	2294.367	0.133	6.368	0.214	10.246	0.482	23.071	47.09	2254.681	4556.083	218146.425	0.244	0.243	0.245
	13-25	330-635	364	0.073	57.745	2764.828	0.053	2.538	0.095	4.549	0.000	0.000	57.58	2756.945	4613.663	220903.3702	0.076	0.072	0.080
*	0-13	0-330	363	0.042	64.709	3098.278	0.004	0.192	0.000	0.000	-0.225	-10.778	64.93	3108.865	4678.593	224012.2352	0.038	0.036	0.040

Table A-84 Energy Balance Results for RBHT Test 1595A for Time Period 2965 to 3060 seconds

Results for RBHT Test 1595 Valid Time Period 2965 to 3060 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2610.5752	8.2352	0.00E+00	0.00E+00	0.00E+00	8.37E-02	3.80E-02
0.25	6.35	2755.6071	8.6928	0.00E+00	0.00E+00	0.00E+00	8.37E-02	3.80E-02
0.50	12.70	2900.6391	9.1503	0.00E+00	0.00E+00	0.00E+00	8.37E-02	3.80E-02
0.75	19.05	3045.671	9.6078	0.00E+00	0.00E+00	0.00E+00	8.37E-02	3.80E-02
1.00	25.40	3190.703	10.065	0.00E+00	0.00E+00	0.00E+00	8.37E-02	3.80E-02
1.25	31.75	3335.7349	10.523	0.00E+00	0.00E+00	0.00E+00	8.37E-02	3.80E-02
1.50	38.10	3480.7669	10.98	0.00E+00	0.00E+00	0.00E+00	8.37E-02	3.80E-02
1.75	44.45	3625.7989	11.438	2.96E-03	2.01E-01	9.10E-02	8.35E-02	3.79E-02
2.00	50.80	3770.8308	11.895	7.60E-03	5.15E-01	2.34E-01	8.31E-02	3.77E-02
2.25	57.15	3915.8628	12.353	1.24E-02	8.41E-01	3.82E-01	8.27E-02	3.75E-02
2.50	63.50	4060.8947	12.81	1.74E-02	1.18E+00	5.35E-01	8.23E-02	3.73E-02
2.75	69.85	4205.9267	13.268	2.26E-02	1.53E+00	6.95E-01	8.18E-02	3.71E-02
3.00	76.20	4350.9586	13.725	2.80E-02	1.89E+00	8.60E-01	8.14E-02	3.69E-02
3.25	82.55	4495.9906	14.183	3.35E-02	2.27E+00	1.03E+00	8.09E-02	3.67E-02
3.50	88.90	4641.0225	14.64	3.93E-02	2.66E+00	1.21E+00	8.05E-02	3.65E-02
3.75	95.25	4786.0545	15.098	4.52E-02	3.06E+00	1.39E+00	8.00E-02	3.63E-02
4.00	101.60	4931.0864	15.555	5.13E-02	3.47E+00	1.58E+00	7.94E-02	3.60E-02
4.25	107.95	5076.1184	16.013	5.76E-02	3.90E+00	1.77E+00	7.89E-02	3.58E-02
4.50	114.30	5221.1503	16.47	6.40E-02	4.34E+00	1.97E+00	7.84E-02	3.56E-02
4.75	120.65	5366.1823	16.928	7.07E-02	4.79E+00	2.17E+00	7.78E-02	3.53E-02
5.00	127.00	5511.2143	17.386	7.75E-02	5.25E+00	2.38E+00	7.73E-02	3.50E-02
5.25	133.35	5656.2462	17.843	8.45E-02	5.72E+00	2.60E+00	7.67E-02	3.48E-02
5.50	139.70	5801.2782	18.301	9.17E-02	6.21E+00	2.82E+00	7.61E-02	3.45E-02
5.75	146.05	5946.3101	18.758	9.90E-02	6.71E+00	3.04E+00	7.54E-02	3.42E-02
6.00	152.40	6091.3421	19.216	1.07E-01	7.22E+00	3.27E+00	7.48E-02	3.39E-02
6.25	158.75	6236.374	19.673	1.14E-01	7.74E+00	3.51E+00	7.42E-02	3.36E-02
6.50	165.10	6381.406	20.131	1.22E-01	8.28E+00	3.75E+00	7.35E-02	3.33E-02
6.75	171.45	6526.4379	20.588	1.30E-01	8.82E+00	4.00E+00	7.28E-02	3.30E-02
7.00	177.80	6671.4699	21.046	1.39E-01	9.39E+00	4.26E+00	7.21E-02	3.27E-02
7.25	184.15	6816.5018	21.503	1.47E-01	9.96E+00	4.52E+00	7.14E-02	3.24E-02
7.50	190.50	6961.5338	21.961	1.56E-01	1.05E+01	4.78E+00	7.07E-02	3.21E-02
7.75	196.85	7106.5658	22.418	1.65E-01	1.11E+01	5.06E+00	7.00E-02	3.17E-02
8.00	203.20	7251.5977	22.876	1.74E-01	1.18E+01	5.33E+00	6.92E-02	3.14E-02
8.25	209.55	7396.6297	23.333	1.83E-01	1.24E+01	5.62E+00	6.84E-02	3.10E-02
8.50	215.90	7541.6616	23.791	1.92E-01	1.30E+01	5.90E+00	6.77E-02	3.07E-02
8.75	222.25	7686.6936	24.248	2.02E-01	1.37E+01	6.20E+00	6.69E-02	3.03E-02
9.00	228.60	7831.7255	24.706	2.11E-01	1.43E+01	6.49E+00	6.60E-02	3.00E-02
9.25	234.95	7976.7575	25.164	2.21E-01	1.50E+01	6.79E+00	6.52E-02	2.96E-02
9.50	241.30	8121.7895	25.622	2.30E-01	1.56E+01	7.07E+00	6.45E-02	2.92E-02
9.75	247.65	8266.8215	26.08	2.38E-01	1.61E+01	7.32E+00	6.38E-02	2.89E-02
10.00	254.00	8411.8535	26.538	2.46E-01	1.67E+01	7.57E+00	6.31E-02	2.86E-02
10.25	260.35	8556.8855	26.996	2.54E-01	1.72E+01	7.79E+00	6.25E-02	2.83E-02
10.50	266.70	8701.9175	27.454	2.61E-01	1.76E+01	8.00E+00	6.19E-02	2.81E-02
10.75	273.05	8846.9495	27.912	2.67E-01	1.81E+01	8.20E+00	6.14E-02	2.79E-02
11.00	279.40	8991.9815	28.37	2.73E-01	1.85E+01	8.37E+00	6.09E-02	2.76E-02
11.25	285.75	9137.0135	28.828	2.78E-01	1.88E+01	8.53E+00	6.05E-02	2.74E-02
11.50	292.10	9282.0455	29.286	2.82E-01	1.91E+01	8.68E+00	6.01E-02	2.73E-02
11.75	298.45	9427.0775	29.744	2.87E-01	1.94E+01	8.80E+00	5.98E-02	2.71E-02
12.00	304.80	9572.1095	30.202	2.90E-01	1.96E+01	8.91E+00	5.95E-02	2.70E-02

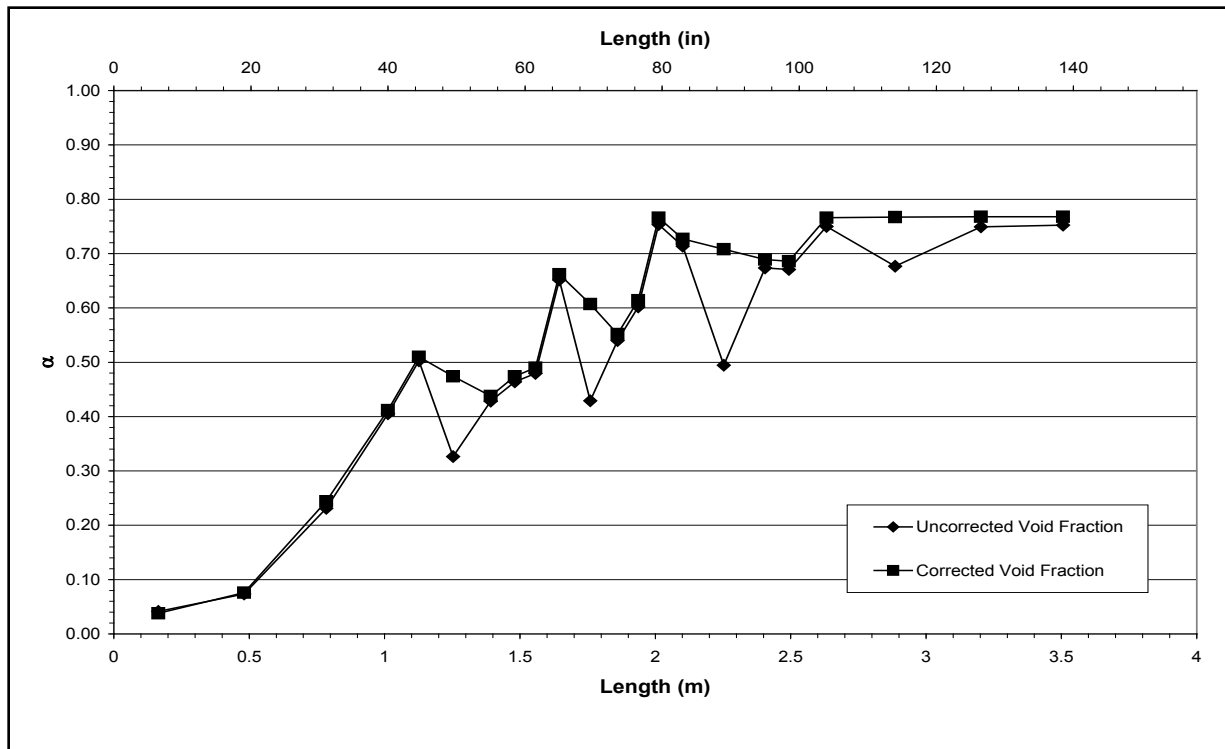


Figure A-210 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1595A for Time Period 2965 to 3060 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1595-B

Test Conditions

Date: 6/16/2003

Steady-state time window: 3765 – 3885 seconds

Inlet flow rate: 2.550 cm/sec (1.004 in./sec)

Inlet mass flow rate: 0.117 kg/sec (0.259 lbm/sec)

Inlet flow temperature: 382.9 K (229.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.83 kW

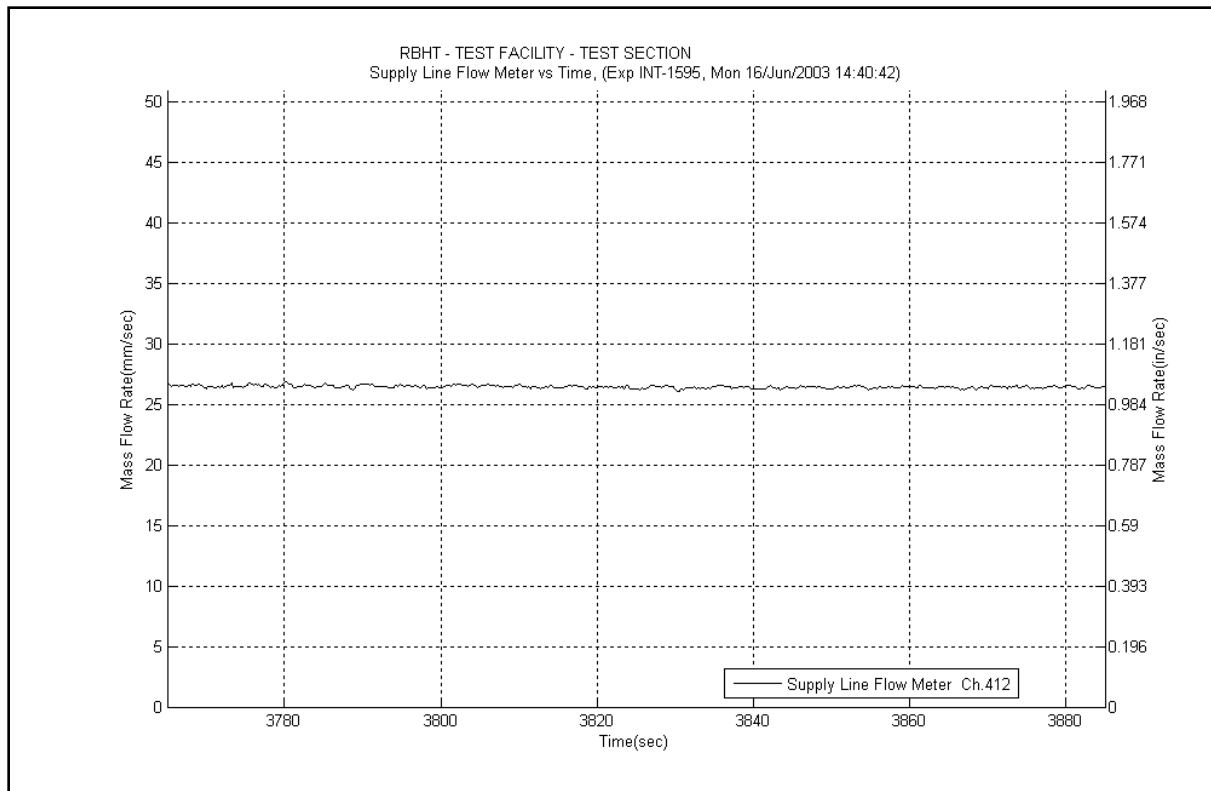


Figure A-211 Inlet Flow Plot for Experiment 1595B

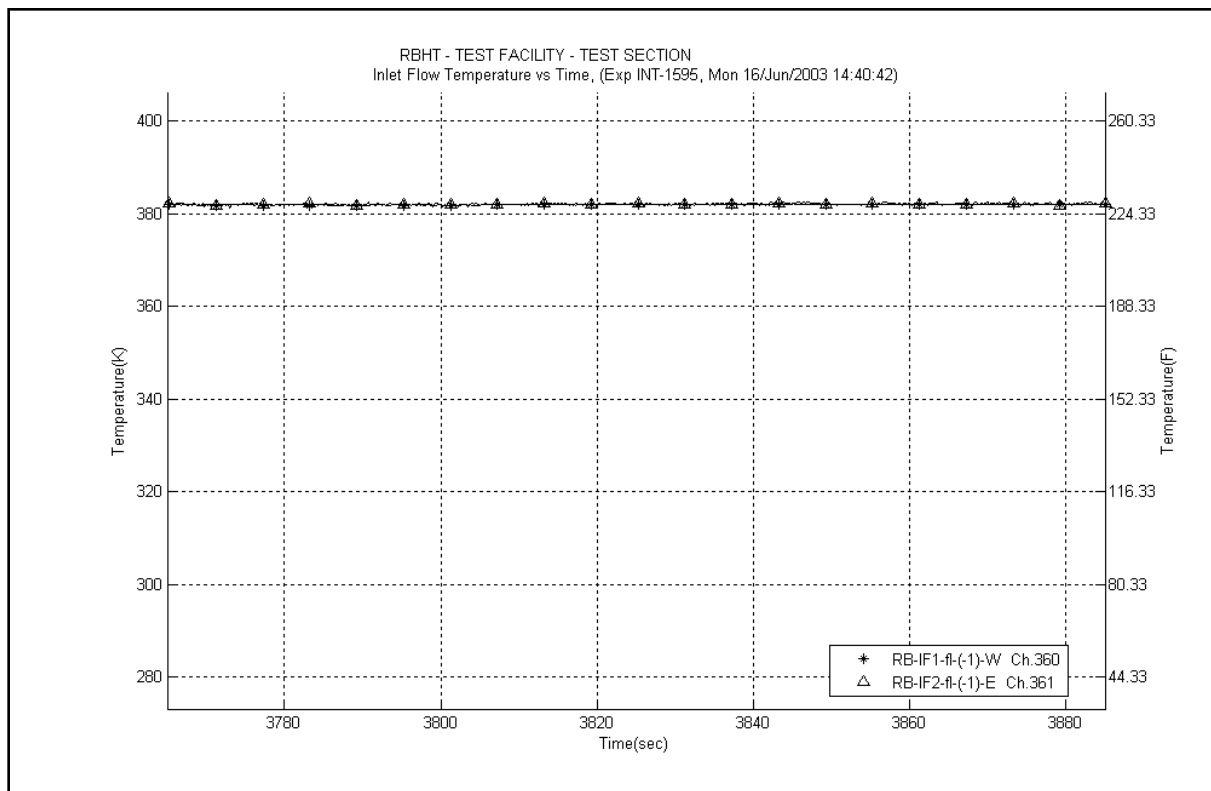


Figure A-212 Inlet Temperature Plot for Experiment 1595B

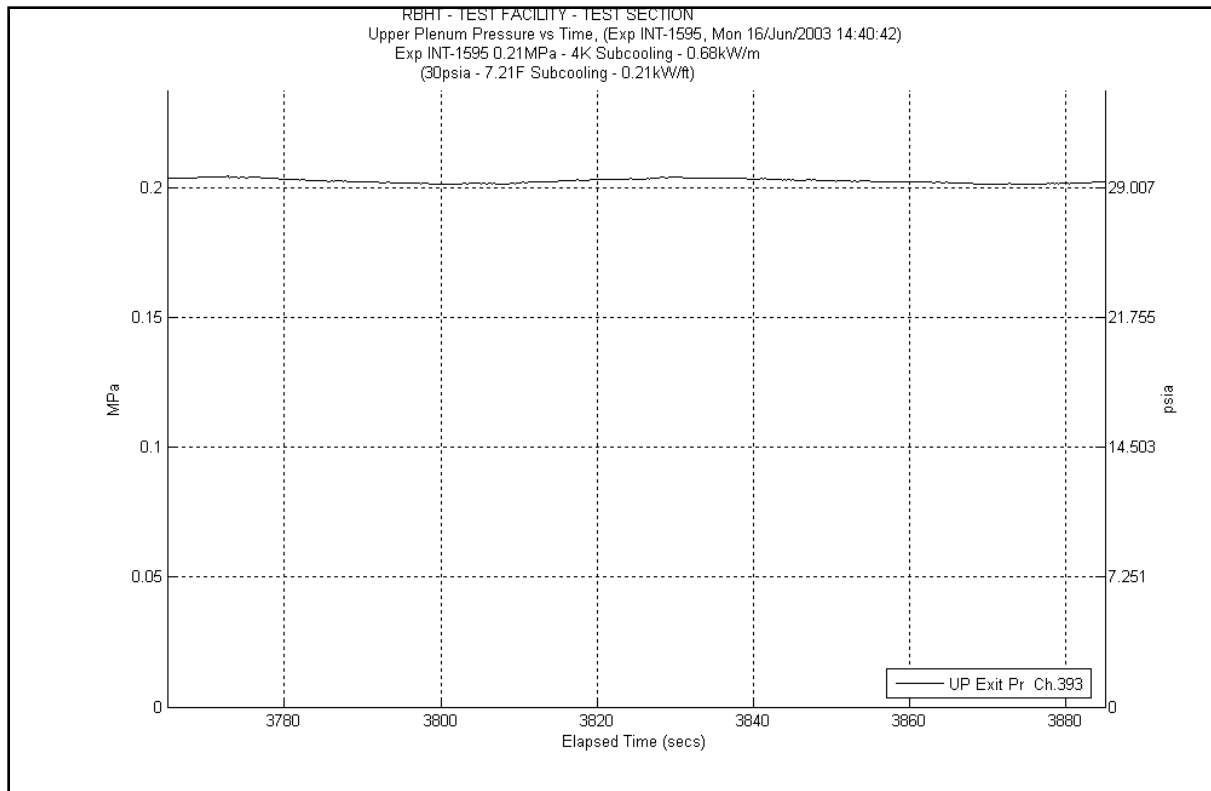


Figure A-213 System Pressure Plot for Experiment 1595B

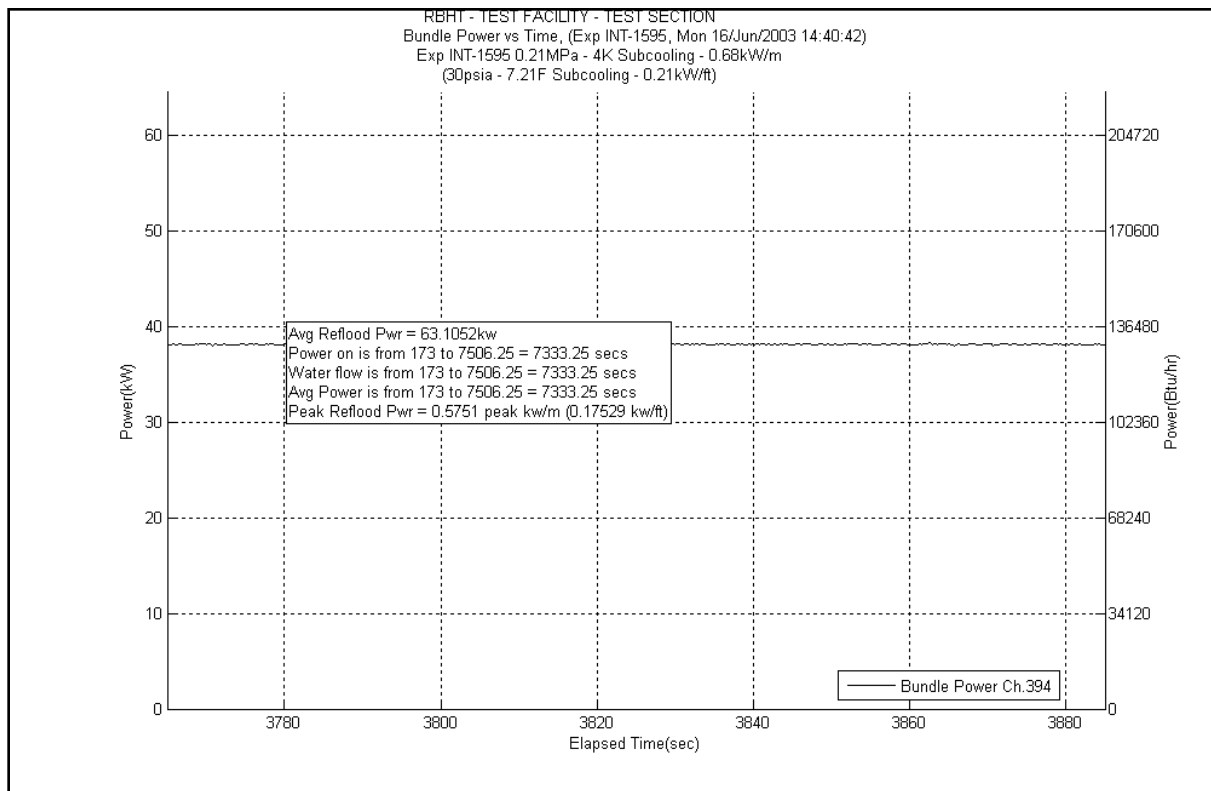


Figure A-214 Bundle Power Plot for Experiment 1595B

Table A-85 Data Results for RBHT Test 1595B for Time Period 3765 to 3885 seconds

Results for RBHT Test 1595																			
Valid Time Period 3765 to 3885 seconds																			
Collapsed Liquid Level = 90.847 inches = 2307.50 mm																			
(Z _{OSL}) Onset of Significant Void = 19 inches = 482.5 mm																			
Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lbf/ft ²)	$\Delta P_{unconnected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lbf/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.597	23.038	1103.047	0.539	25.807	0.108	5.171	0.000	0.000	22.38	1071.560	4342.38	207914.2704	0.608	0.605	0.611
*	120-133	3048-3378	383	0.647	23.853	1142.086	0.600	28.728	0.194	9.289	-2.941	-140.818	26	1244.887	4368.38	209159.1571	0.615	0.612	0.618
*	108-120	2743-3048	382	0.543	28.470	1363.143	0.503	24.084	0.242	11.587	4.555	218.087	23.17	1109.386	4391.55	210268.5426	0.628	0.625	0.631
	100-108	2540-2743	381	0.623	15.653	749.455	0.303	14.508	0.177	8.475	0.000	0.000	15.17	726.343	4406.72	210994.8861	0.635	0.632	0.638
	97-100	2464-2540	380	0.487	7.993	382.685	0.106	5.075	0.064	3.064	0.000	0.000	7.817	374.280	4414.537	211369.1661	0.498	0.496	0.500
	93-97	2362-2464	379	0.521	9.956	476.677	0.135	6.464	0.083	3.974	0.000	0.000	9.731	465.923	4424.268	211835.0889	0.531	0.528	0.534
*	85-93	2159-2362	378	0.395	25.141	1203.753	0.250	11.970	0.160	7.661	7.311	350.048	17.42	834.074	4441.688	212669.163	0.581	0.578	0.584
	81-85	2057-2159	377	0.621	7.883	377.463	0.115	5.506	0.077	3.687	0.000	0.000	7.688	368.103	4449.376	213037.2664	0.63	0.627	0.633
	78-81	1981-2057	376	0.616	5.988	286.703	0.082	3.926	0.056	2.681	0.000	0.000	5.847	279.956	4455.223	213317.2222	0.625	0.622	0.628
	75-78	1905-1981	375	0.456	8.470	405.561	0.078	3.735	0.055	2.633	0.000	0.000	8.336	399.130	4463.559	213716.3521	0.465	0.463	0.467
	72-75	1829-1905	374	0.357	10.013	479.413	0.074	3.543	0.053	2.538	0.000	0.000	9.881	473.105	4473.44	214189.4569	0.366	0.364	0.368
*	67-72	1702-1829	373	0.387	15.928	762.634	0.115	5.506	0.086	4.118	0.997	47.734	14.73	705.276	4488.17	214894.7331	0.433	0.431	0.435
	63-67	1600-1702	372	0.492	10.553	505.273	0.084	4.022	0.067	3.208	0.000	0.000	10.4	497.955	4498.57	215392.6877	0.499	0.497	0.501
	60-63	1524-1600	371	0.349	10.148	485.878	0.059	2.825	0.048	2.298	0.000	0.000	10.04	480.718	4508.61	215873.4055	0.356	0.354	0.358
	57-60	1448-1524	370	0.341	10.267	491.597	0.055	2.633	0.047	2.250	0.000	0.000	10.16	486.463	4518.77	216359.8689	0.348	0.346	0.350
	53-57	1346-1448	369	0.316	14.214	680.577	0.067	3.208	0.061	2.921	0.000	0.000	14.08	674.154	4532.85	217034.0229	0.322	0.320	0.324
*	46-53	1168-1346	368	0.239	27.670	1324.850	0.100	4.788	0.101	4.836	3.049	145.990	24.42	1169.236	4557.27	218203.2588	0.328	0.326	0.330
	43-46	1092-1168	367	0.329	10.449	500.300	0.036	1.724	0.041	1.963	0.000	0.000	10.37	496.518	4567.64	218699.7771	0.334	0.332	0.336
	37-43	940-1092	366	0.231	23.952	1146.811	0.059	2.825	0.079	3.783	0.000	0.000	23.81	1140.029	4591.45	219839.806	0.236	0.235	0.237
*	25-37	635-940	365	0.065	58.248	2788.948	0.063	3.016	0.126	6.033	4.949	236.978	53.11	2542.920	4644.56	222382.7265	0.148	0.147	0.149
	13-25	330-635	364	0.059	58.633	2807.349	0.004	0.192	0.000	0.000	0.000	0.000	58.61	2806.262	4703.17	225188.9883	0.059	0.056	0.062
*	0-13	0-330	363	0.041	64.740	3099.770	0.004	0.192	0.000	0.000	-0.754	-36.099	65.49	3135.678	4768.66	228324.6663	0.03	0.029	0.032

Table A-86 Energy Balance Results for RBHT Test 1595B for Time Period 3765 to 3885 seconds

Results for RBHT Test 1595 Valid Time Period 3765 to 3885 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1737.9565	5.4825	0.00E+00	0.00E+00	0.00E+00	8.39E-02	3.81E-02
0.25	6.35	1834.5097	5.7871	0.00E+00	0.00E+00	0.00E+00	8.39E-02	3.81E-02
0.50	12.70	1931.0628	6.0917	0.00E+00	0.00E+00	0.00E+00	8.39E-02	3.81E-02
0.75	19.05	2027.616	6.3963	0.00E+00	0.00E+00	0.00E+00	8.39E-02	3.81E-02
1.00	25.40	2124.1691	6.7008	0.00E+00	0.00E+00	0.00E+00	8.39E-02	3.81E-02
1.25	31.75	2220.7222	7.0054	0.00E+00	0.00E+00	0.00E+00	8.39E-02	3.81E-02
1.50	38.10	2317.2754	7.31	0.00E+00	0.00E+00	0.00E+00	8.39E-02	3.81E-02
1.75	44.45	2413.8285	7.6146	0.00E+00	0.00E+00	0.00E+00	8.39E-02	3.81E-02
2.00	50.80	2510.3817	7.9192	0.00E+00	0.00E+00	0.00E+00	8.39E-02	3.81E-02
2.25	57.15	2606.9348	8.2238	5.38E-04	3.65E-02	1.65E-02	8.39E-02	3.81E-02
2.50	63.50	2703.4879	8.5283	3.86E-03	2.62E-01	1.19E-01	8.36E-02	3.79E-02
2.75	69.85	2800.0411	8.8329	7.31E-03	4.96E-01	2.25E-01	8.33E-02	3.78E-02
3.00	76.20	2896.5942	9.1375	1.09E-02	7.37E-01	3.35E-01	8.30E-02	3.77E-02
3.25	82.55	2993.1474	9.4421	1.46E-02	9.88E-01	4.48E-01	8.27E-02	3.75E-02
3.50	88.90	3089.7005	9.7467	1.84E-02	1.25E+00	5.65E-01	8.24E-02	3.74E-02
3.75	95.25	3186.2537	10.051	2.23E-02	1.51E+00	6.86E-01	8.21E-02	3.72E-02
4.00	101.60	3282.8068	10.356	2.63E-02	1.79E+00	8.11E-01	8.17E-02	3.71E-02
4.25	107.95	3379.3599	10.66	3.05E-02	2.07E+00	9.39E-01	8.14E-02	3.69E-02
4.50	114.30	3475.9131	10.965	3.48E-02	2.36E+00	1.07E+00	8.10E-02	3.67E-02
4.75	120.65	3572.4662	11.27	3.92E-02	2.66E+00	1.21E+00	8.06E-02	3.66E-02
5.00	127.00	3669.0194	11.574	4.38E-02	2.97E+00	1.35E+00	8.03E-02	3.64E-02
5.25	133.35	3765.5725	11.879	4.84E-02	3.28E+00	1.49E+00	7.99E-02	3.62E-02
5.50	139.70	3862.1256	12.183	5.32E-02	3.61E+00	1.64E+00	7.95E-02	3.60E-02
5.75	146.05	3958.6788	12.488	5.81E-02	3.94E+00	1.79E+00	7.91E-02	3.59E-02
6.00	152.40	4055.2319	12.793	6.31E-02	4.28E+00	1.94E+00	7.86E-02	3.57E-02
6.25	158.75	4151.7851	13.097	6.82E-02	4.63E+00	2.10E+00	7.82E-02	3.55E-02
6.50	165.10	4248.3382	13.402	7.35E-02	4.99E+00	2.26E+00	7.78E-02	3.53E-02
6.75	171.45	4344.8913	13.706	7.89E-02	5.35E+00	2.43E+00	7.73E-02	3.51E-02
7.00	177.80	4441.4445	14.011	8.44E-02	5.72E+00	2.60E+00	7.69E-02	3.49E-02
7.25	184.15	4537.9976	14.315	9.00E-02	6.10E+00	2.77E+00	7.64E-02	3.46E-02
7.50	190.50	4634.5508	14.62	9.57E-02	6.49E+00	2.95E+00	7.59E-02	3.44E-02
7.75	196.85	4731.1039	14.925	1.02E-01	6.89E+00	3.13E+00	7.54E-02	3.42E-02
8.00	203.20	4827.657	15.229	1.08E-01	7.30E+00	3.31E+00	7.49E-02	3.40E-02
8.25	209.55	4924.2102	15.534	1.14E-01	7.71E+00	3.50E+00	7.44E-02	3.37E-02
8.50	215.90	5020.7633	15.838	1.20E-01	8.13E+00	3.69E+00	7.39E-02	3.35E-02
8.75	222.25	5117.3165	16.143	1.26E-01	8.56E+00	3.88E+00	7.33E-02	3.33E-02
9.00	228.60	5213.8696	16.448	1.33E-01	9.00E+00	4.08E+00	7.28E-02	3.30E-02
9.25	234.95	4924.2102	15.534	1.39E-01	9.44E+00	4.28E+00	7.23E-02	3.28E-02
9.50	241.30	4634.5508	14.62	1.45E-01	9.84E+00	4.46E+00	7.18E-02	3.26E-02
9.75	247.65	4344.8913	13.706	1.51E-01	1.02E+01	4.64E+00	7.13E-02	3.23E-02
10.00	254.00	4055.2319	12.793	1.56E-01	1.06E+01	4.80E+00	7.09E-02	3.21E-02
10.25	260.35	3765.5725	11.879	1.61E-01	1.09E+01	4.95E+00	7.04E-02	3.20E-02
10.50	266.70	3475.9131	10.965	1.65E-01	1.12E+01	5.09E+00	7.01E-02	3.18E-02
10.75	273.05	3186.2537	10.051	1.70E-01	1.15E+01	5.22E+00	6.97E-02	3.16E-02
11.00	279.40	2896.5942	9.1375	1.73E-01	1.18E+01	5.33E+00	6.94E-02	3.15E-02
11.25	285.75	2606.9348	8.2238	1.77E-01	1.20E+01	5.44E+00	6.91E-02	3.13E-02
11.50	292.10	2317.2754	7.31	1.80E-01	1.22E+01	5.53E+00	6.88E-02	3.12E-02
11.75	298.45	2027.616	6.3963	1.83E-01	1.24E+01	5.62E+00	6.86E-02	3.11E-02
12.00	304.80	1737.9565	5.4825	1.85E-01	1.25E+01	5.69E+00	6.84E-02	3.10E-02

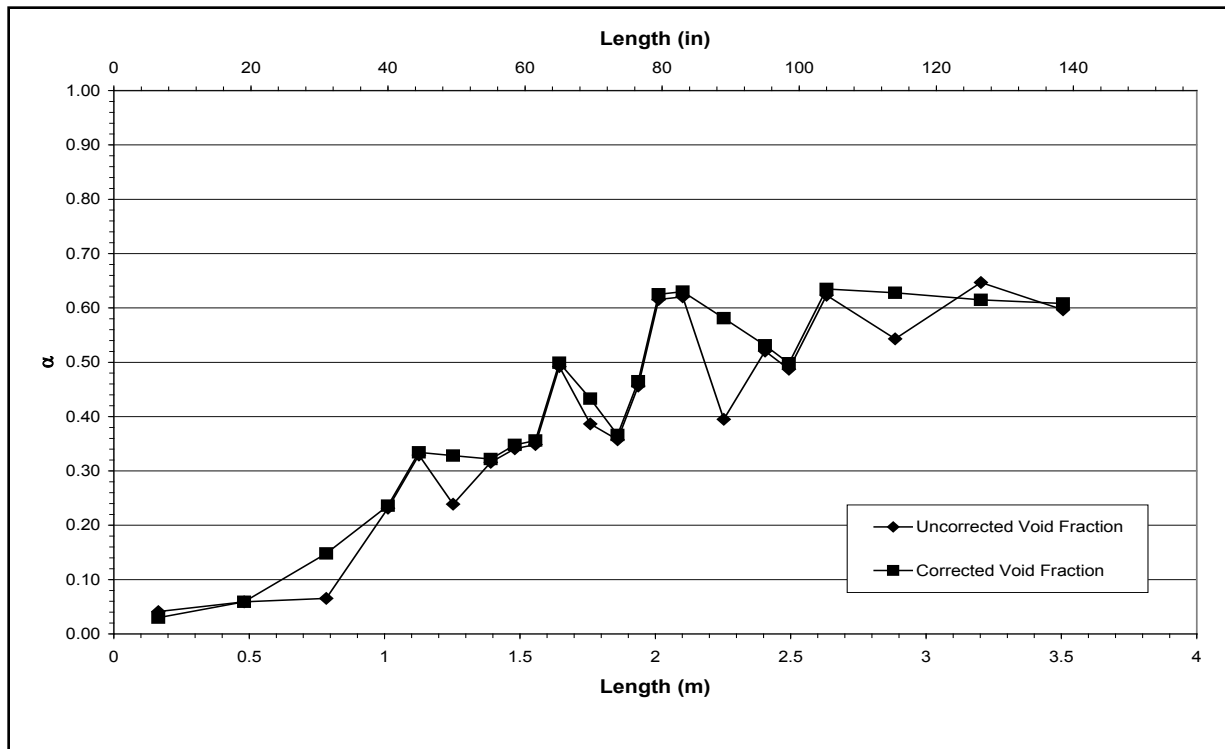


Figure A-215 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1595B for Time Period 3765 to 3885 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1595-C

Test Conditions

Date: 6/16/2003

Steady-state time window: 4255 – 4380 seconds

Inlet flow rate: 1.775 cm/sec (0.699 in./sec)

Inlet mass flow rate: 0.082 kg/sec (0.180 lbm/sec)

Inlet flow temperature: 382.9 K (229.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.83 kW

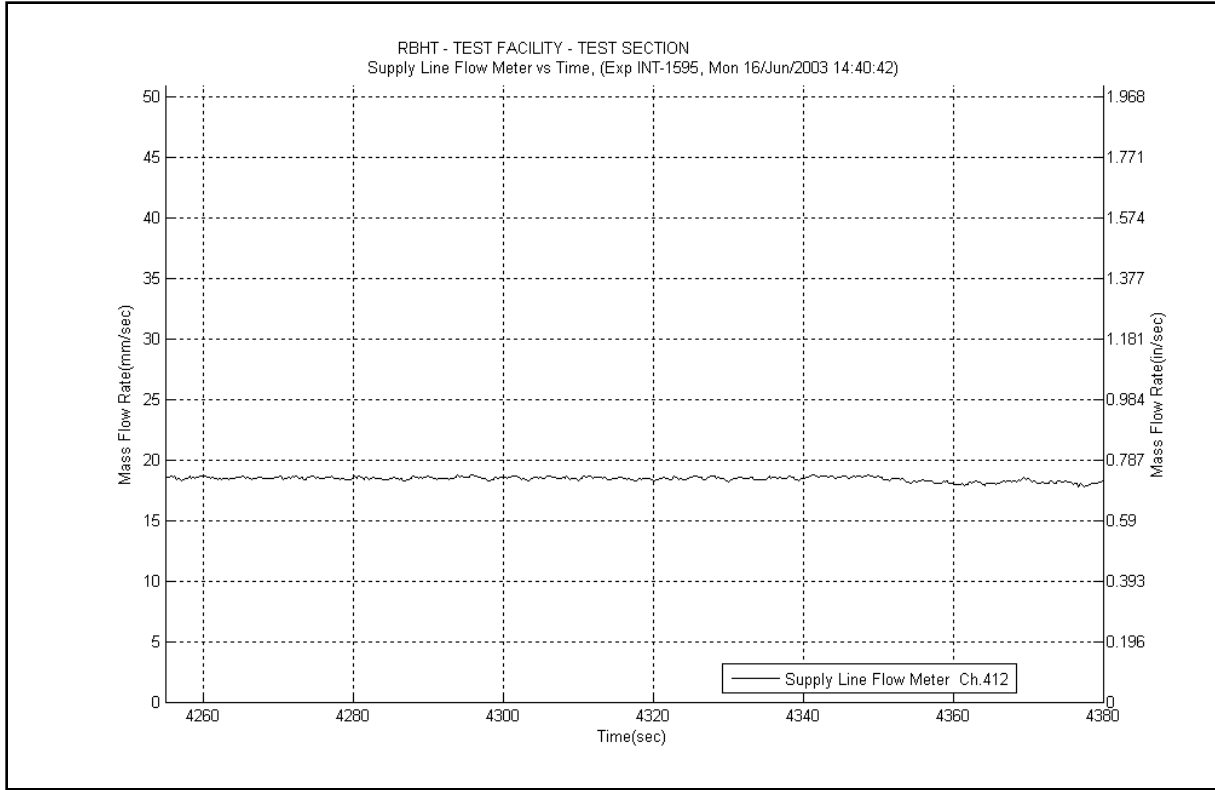


Figure A-216 Inlet Flow Plot for Experiment 1595C

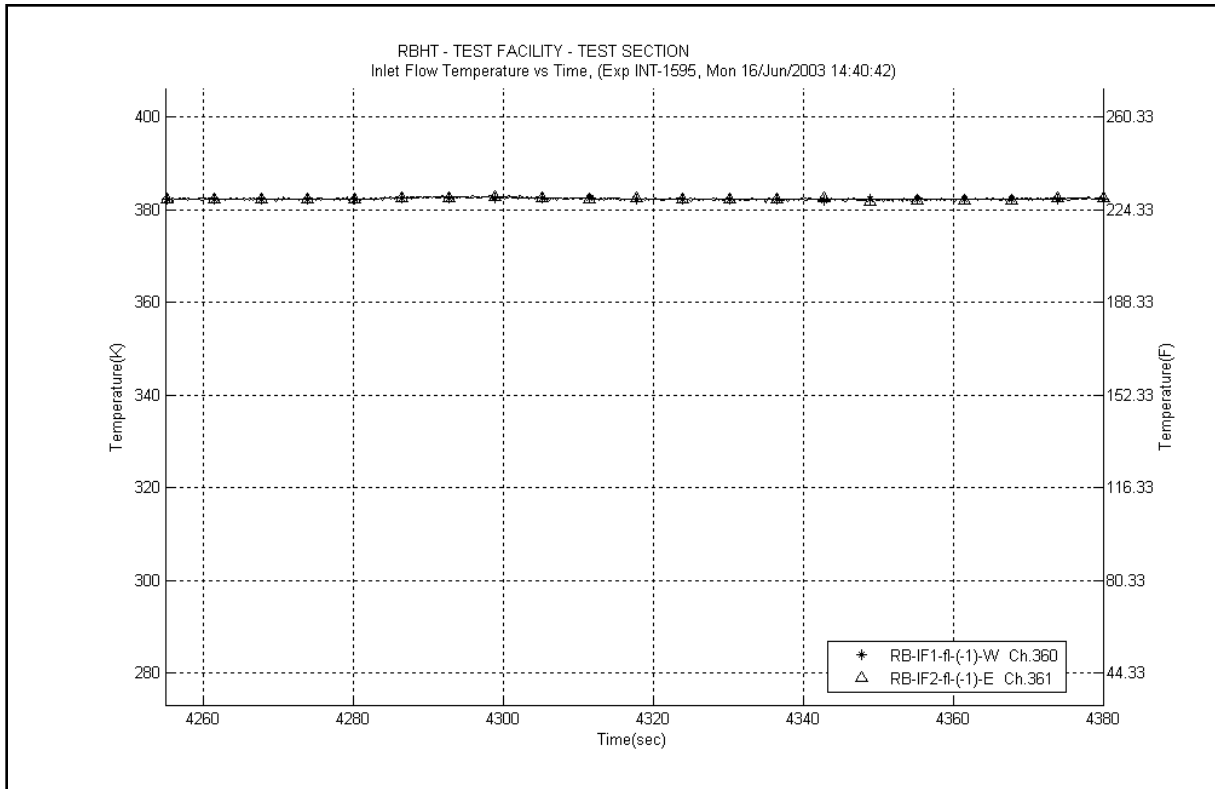


Figure A-217 Inlet Temperature Plot for Experiment 1595C

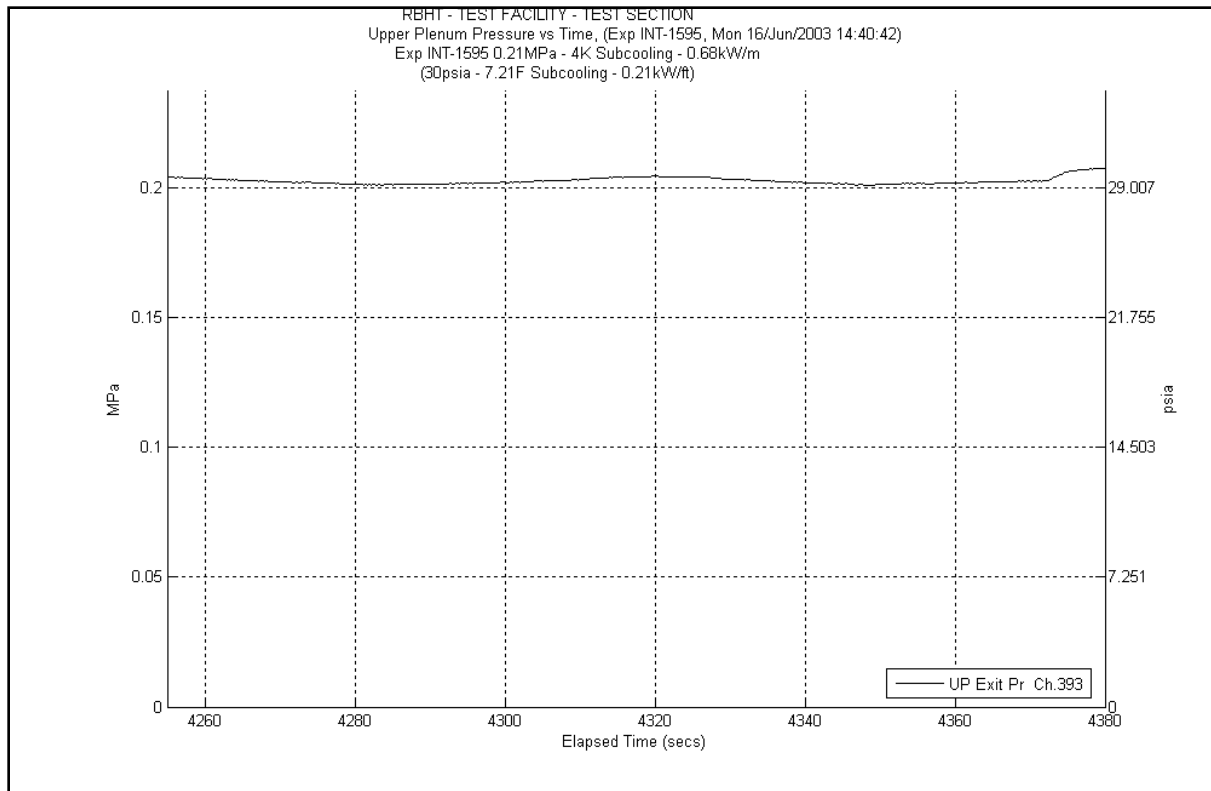


Figure A-218 System Pressure Plot for Experiment 1595C

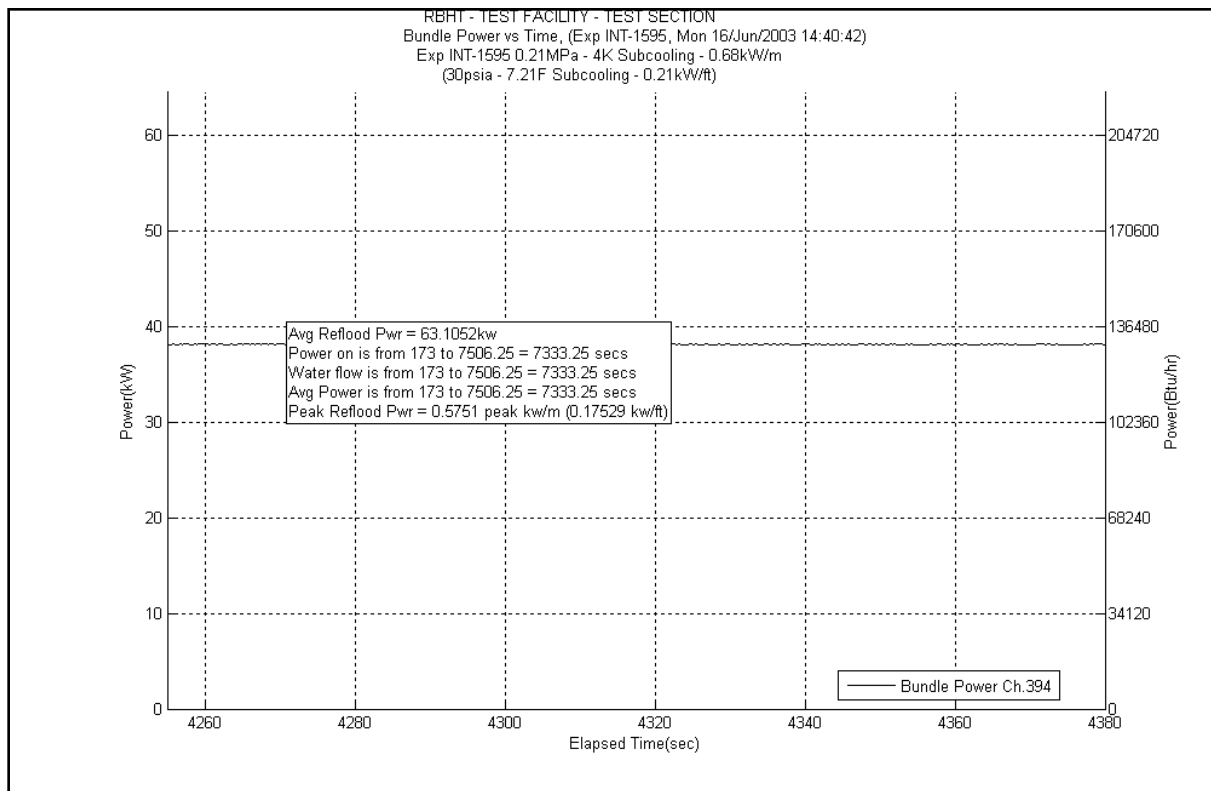


Figure A-219 Bundle Power Plot for Experiment 1595C

Table A-87 Data Results for RBHT Test 1595C for Time Period 4255 to 4380 seconds

Results for RBHT Test 1595																			
Valid Time Period 4255 to 4380 seconds																			
Collapsed Liquid Level = 86.027 inches = 2185.08 mm																			
(Z _{OSL}) Onset of Significant Void = 19 inches = 482.5 mm																			
Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lbf/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.647	20.161	965.290	0.369	17.668	0.075	3.591	0.000	0.000	19.71	943.720	4339.71	207786.4301	0.655	0.652	0.658
*	120-133	3048-3378	383	0.671	22.181	1062.018	0.411	19.679	0.135	6.464	-1.555	-74.468	23.19	1110.343	4362.9	208896.7733	0.656	0.653	0.659
*	108-120	2743-3048	382	0.564	27.161	1300.481	0.345	16.519	0.168	8.044	5.438	260.378	21.21	1015.540	4384.11	209912.3135	0.66	0.657	0.663
	100-108	2540-2743	381	0.653	14.406	689.777	0.208	9.959	0.123	5.889	0.000	0.000	14.07	673.675	4398.18	210585.9887	0.661	0.658	0.664
	97-100	2464-2540	380	0.500	7.795	373.236	0.073	3.495	0.045	2.155	0.000	0.000	7.673	367.385	4405.853	210953.3739	0.507	0.504	0.510
	93-97	2362-2464	379	0.540	9.556	457.531	0.093	4.453	0.058	2.777	0.000	0.000	9.4	450.074	4415.253	211403.4484	0.547	0.544	0.550
*	85-93	2159-2362	378	0.408	24.580	1176.898	0.173	8.283	0.111	5.315	7.626	365.136	16.67	798.164	4431.923	212201.6122	0.599	0.596	0.602
	81-85	2057-2159	377	0.644	7.406	354.586	0.080	3.830	0.053	2.538	0.000	0.000	7.27	348.089	4439.193	212549.7017	0.65	0.647	0.653
	78-81	1981-2057	376	0.638	5.635	269.794	0.057	2.729	0.039	1.867	0.000	0.000	5.537	265.113	4444.73	212814.8147	0.645	0.642	0.648
	75-78	1905-1981	375	0.496	7.847	375.722	0.054	2.586	0.038	1.819	0.000	0.000	7.75	371.072	4452.48	213185.8867	0.502	0.499	0.505
	72-75	1829-1905	374	0.398	9.379	449.076	0.052	2.490	0.037	1.772	0.000	0.000	9.286	444.616	4461.766	213630.5028	0.404	0.402	0.406
*	67-72	1702-1829	373	0.389	15.876	760.147	0.081	3.878	0.060	2.873	2.135	102.225	13.6	651.171	4475.366	214281.6742	0.476	0.474	0.478
	63-67	1600-1702	372	0.544	9.483	454.049	0.060	2.873	0.046	2.202	0.000	0.000	9.376	448.925	4484.742	214730.5995	0.549	0.546	0.552
	60-63	1524-1600	371	0.374	9.758	467.228	0.042	2.011	0.034	1.628	0.000	0.000	9.677	463.337	4494.419	215193.9368	0.379	0.377	0.381
	57-60	1448-1524	370	0.369	9.826	470.461	0.040	1.915	0.033	1.580	0.000	0.000	9.75	466.833	4504.169	215660.7693	0.374	0.372	0.376
	53-57	1346-1448	369	0.348	13.555	648.997	0.049	2.346	0.042	2.011	0.000	0.000	13.46	644.468	4517.629	216305.2376	0.352	0.350	0.354
*	46-53	1168-1346	368	0.270	26.538	1270.642	0.076	3.639	0.070	3.352	4.372	209.328	22.02	1054.323	4539.649	217359.5608	0.394	0.392	0.396
	43-46	1092-1168	367	0.432	8.844	423.465	0.028	1.341	0.029	1.389	0.000	0.000	8.782	420.484	4548.431	217780.0452	0.436	0.434	0.438
	37-43	940-1092	366	0.303	21.734	1040.634	0.049	2.346	0.055	2.633	0.000	0.000	21.62	1035.171	4570.051	218815.2164	0.306	0.304	0.308
*	25-37	635-940	365	0.161	52.286	2503.488	0.066	3.160	0.099	4.740	1.451	69.496	50.67	2426.093	4620.721	221241.309	0.187	0.186	0.188
	13-25	330-635	364	0.067	58.176	2785.467	0.026	1.245	0.044	2.107	0.000	0.000	58.09	2781.364	4678.811	224022.6731	0.068	0.065	0.071
*	0-13	0-330	363	0.042	64.657	3095.792	0.002	0.096	0.000	0.000	-0.555	-26.576	65.21	3122.272	4744.021	227144.9447	0.034	0.032	0.036

Table A-88 Energy Balance Results for RBHT Test 1595C for Time Period 4255 to 4380 seconds

Results for RBHT Test 1595 Valid Time Period 4255 to 4380 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1738.4222	5.484	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
0.25	6.35	1835.0012	5.7886	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
0.50	12.70	1931.5802	6.0933	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
0.75	19.05	2028.1593	6.398	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
1.00	25.40	2124.7383	6.7026	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
1.25	31.75	2221.3173	7.0073	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
1.50	38.10	2317.8963	7.312	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
1.75	44.45	2414.4753	7.6166	2.74E-03	1.29E-01	5.87E-02	5.83E-02	2.64E-02
2.00	50.80	2511.0543	7.9213	7.17E-03	3.38E-01	1.53E-01	5.80E-02	2.63E-02
2.25	57.15	2607.6333	8.226	1.18E-02	5.55E-01	2.52E-01	5.78E-02	2.62E-02
2.50	63.50	2704.2123	8.5306	1.65E-02	7.80E-01	3.54E-01	5.75E-02	2.61E-02
2.75	69.85	2800.7914	8.8353	2.15E-02	1.01E+00	4.60E-01	5.72E-02	2.59E-02
3.00	76.20	2897.3704	9.14	2.66E-02	1.26E+00	5.69E-01	5.69E-02	2.58E-02
3.25	82.55	2993.9494	9.4446	3.19E-02	1.51E+00	6.83E-01	5.66E-02	2.57E-02
3.50	88.90	3090.5284	9.7493	3.74E-02	1.76E+00	8.00E-01	5.63E-02	2.55E-02
3.75	95.25	3187.1074	10.054	4.30E-02	2.03E+00	9.21E-01	5.59E-02	2.54E-02
4.00	101.60	3283.6864	10.359	4.88E-02	2.30E+00	1.05E+00	5.56E-02	2.52E-02
4.25	107.95	3380.2654	10.663	5.48E-02	2.59E+00	1.17E+00	5.53E-02	2.51E-02
4.50	114.30	3476.8444	10.968	6.10E-02	2.88E+00	1.31E+00	5.49E-02	2.49E-02
4.75	120.65	3573.4235	11.273	6.73E-02	3.18E+00	1.44E+00	5.45E-02	2.47E-02
5.00	127.00	3670.0025	11.577	7.38E-02	3.48E+00	1.58E+00	5.41E-02	2.46E-02
5.25	133.35	3766.5815	11.882	8.05E-02	3.80E+00	1.72E+00	5.38E-02	2.44E-02
5.50	139.70	3863.1605	12.187	8.74E-02	4.12E+00	1.87E+00	5.34E-02	2.42E-02
5.75	146.05	3959.7395	12.491	9.44E-02	4.45E+00	2.02E+00	5.29E-02	2.40E-02
6.00	152.40	4056.3185	12.796	1.02E-01	4.79E+00	2.17E+00	5.25E-02	2.38E-02
6.25	158.75	4152.8975	13.101	1.09E-01	5.14E+00	2.33E+00	5.21E-02	2.36E-02
6.50	165.10	4249.4765	13.405	1.17E-01	5.50E+00	2.49E+00	5.17E-02	2.34E-02
6.75	171.45	4346.0555	13.71	1.24E-01	5.86E+00	2.66E+00	5.12E-02	2.32E-02
7.00	177.80	4442.6346	14.015	1.32E-01	6.24E+00	2.83E+00	5.07E-02	2.30E-02
7.25	184.15	4539.2136	14.319	1.40E-01	6.61E+00	3.00E+00	5.03E-02	2.28E-02
7.50	190.50	4635.7926	14.624	1.49E-01	7.01E+00	3.18E+00	4.98E-02	2.26E-02
7.75	196.85	4732.3716	14.929	1.57E-01	7.40E+00	3.36E+00	4.93E-02	2.24E-02
8.00	203.20	4828.9506	15.233	1.66E-01	7.81E+00	3.54E+00	4.88E-02	2.21E-02
8.25	209.55	4925.5296	15.538	1.74E-01	8.22E+00	3.73E+00	4.83E-02	2.19E-02
8.50	215.90	5022.1086	15.843	1.83E-01	8.64E+00	3.92E+00	4.78E-02	2.17E-02
8.75	222.25	5118.6876	16.147	1.92E-01	9.07E+00	4.11E+00	4.72E-02	2.14E-02
9.00	228.60	5215.2667	16.452	2.02E-01	9.51E+00	4.31E+00	4.67E-02	2.12E-02
9.25	234.95	4925.5296	15.538	2.11E-01	9.94E+00	4.51E+00	4.61E-02	2.09E-02
9.50	241.30	4635.7926	14.624	2.19E-01	1.03E+01	4.69E+00	4.56E-02	2.07E-02
9.75	247.65	4346.0555	13.71	2.27E-01	1.07E+01	4.87E+00	4.52E-02	2.05E-02
10.00	254.00	4056.3185	12.796	2.35E-01	1.11E+01	5.03E+00	4.47E-02	2.03E-02
10.25	260.35	3766.5815	11.882	2.42E-01	1.14E+01	5.18E+00	4.43E-02	2.01E-02
10.50	266.70	3476.8444	10.968	2.49E-01	1.17E+01	5.32E+00	4.39E-02	1.99E-02
10.75	273.05	3187.1074	10.054	2.55E-01	1.20E+01	5.45E+00	4.36E-02	1.98E-02
11.00	279.40	2897.3704	9.14	2.60E-01	1.23E+01	5.56E+00	4.33E-02	1.96E-02
11.25	285.75	2607.6333	8.226	2.65E-01	1.25E+01	5.67E+00	4.30E-02	1.95E-02
11.50	292.10	2317.8963	7.312	2.69E-01	1.27E+01	5.76E+00	4.27E-02	1.94E-02
11.75	298.45	2028.1593	6.398	2.73E-01	1.29E+01	5.85E+00	4.25E-02	1.93E-02
12.00	304.80	1738.4222	5.484	2.77E-01	1.30E+01	5.92E+00	4.23E-02	1.92E-02

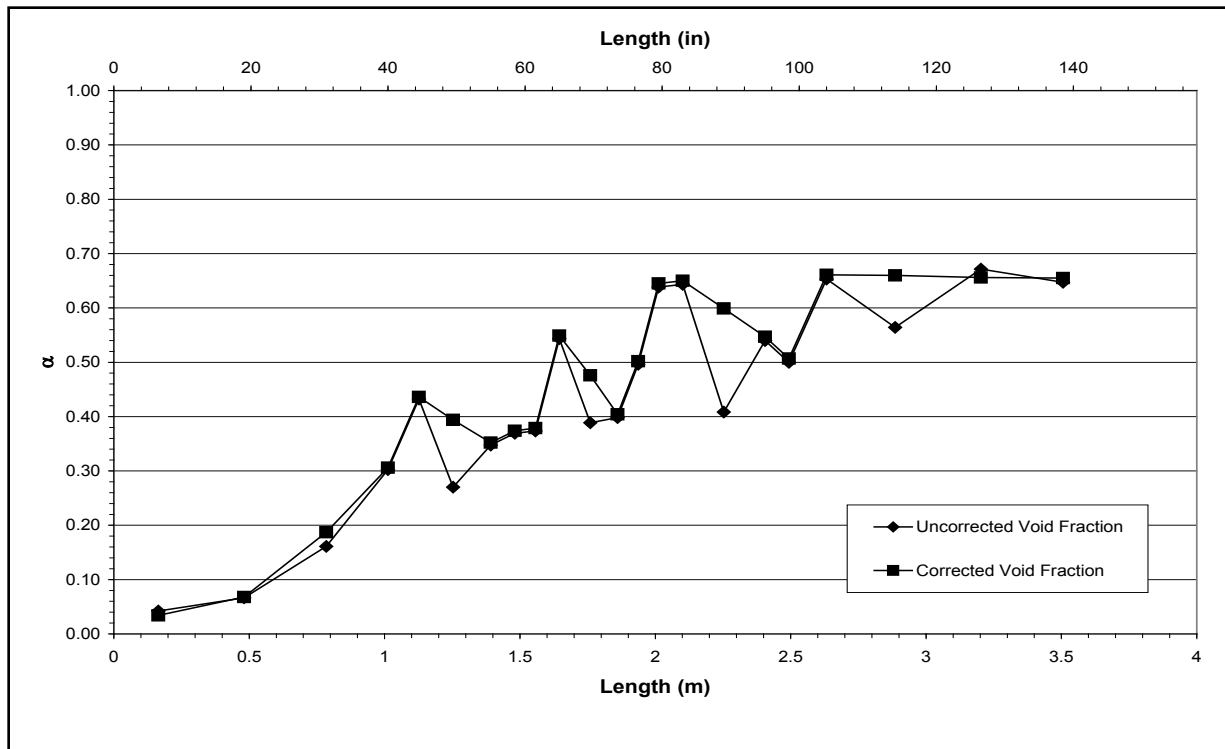


Figure A-220 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1595C for Time Period 4255 to 4380 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1595-D

Test Conditions

Date: 6/16/2003

Steady-state time window: 4800 – 4905 seconds

Inlet flow rate: 1.275 cm/sec (0.502 in./sec)

Inlet mass flow rate: 0.059 kg/sec (0.129 lbm/sec)

Inlet flow temperature: 382.9 K (229.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.83 kW

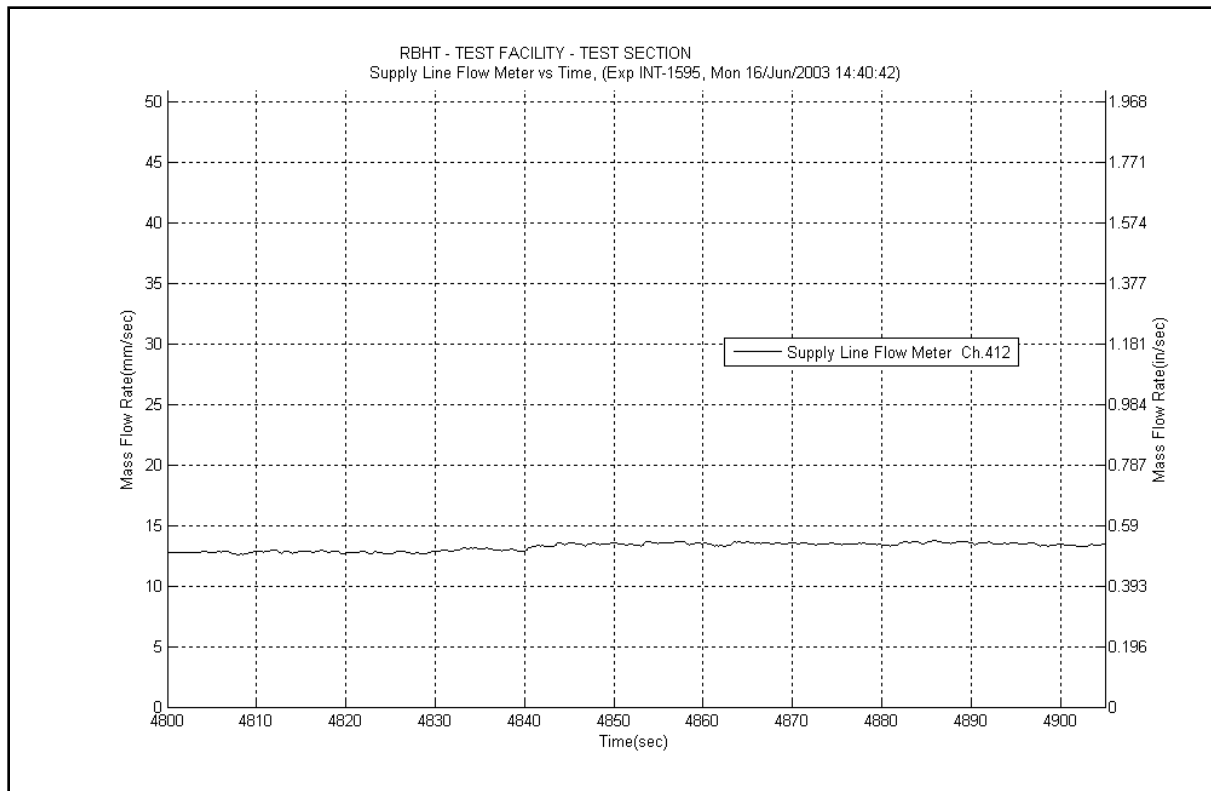


Figure A-221 Inlet Flow Plot for Experiment 1595D

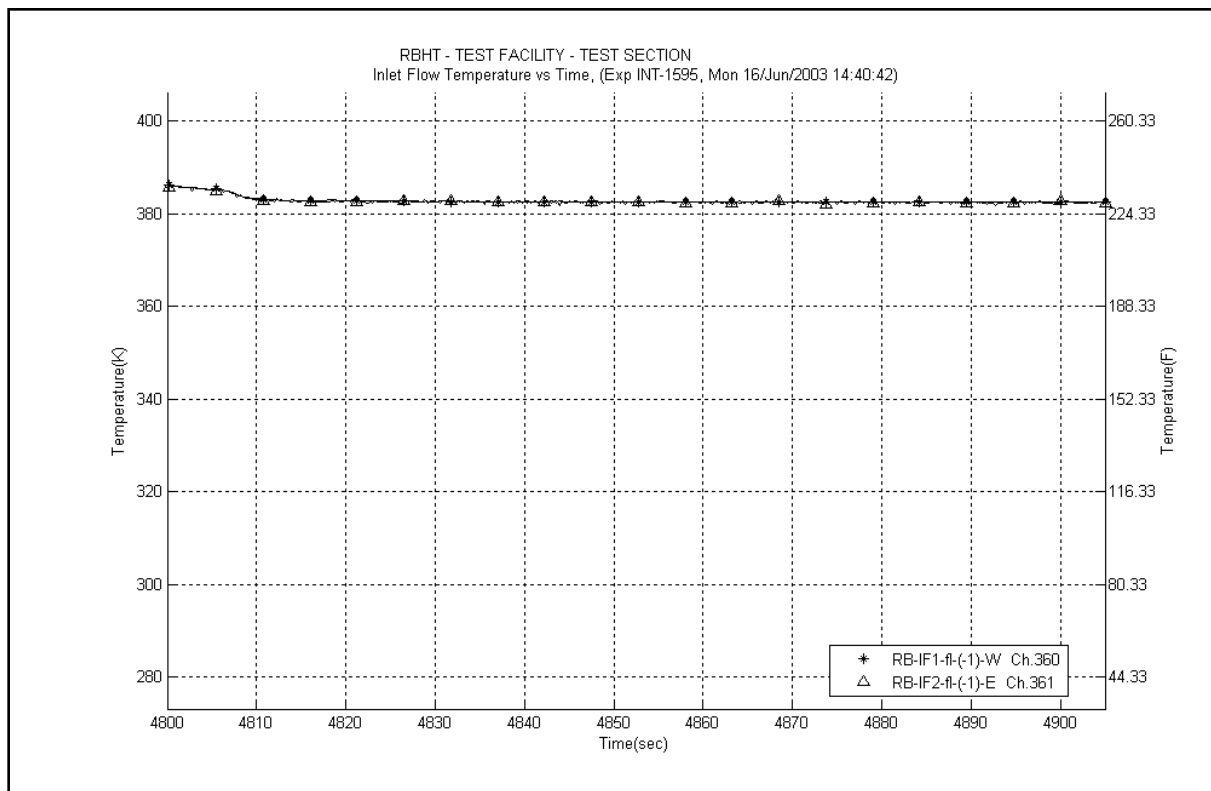


Figure A-222 Inlet Temperature Plot for Experiment 1595D

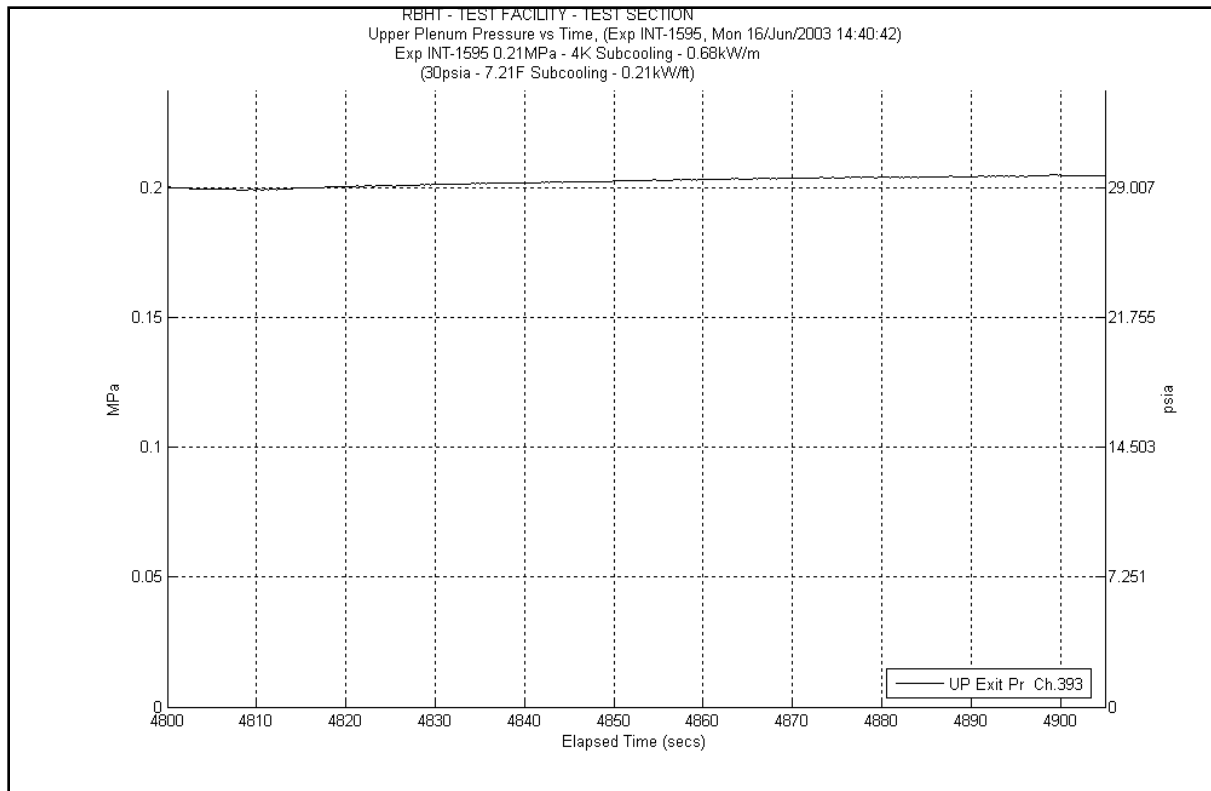


Figure A-223 System Pressure Plot for Experiment 1595D

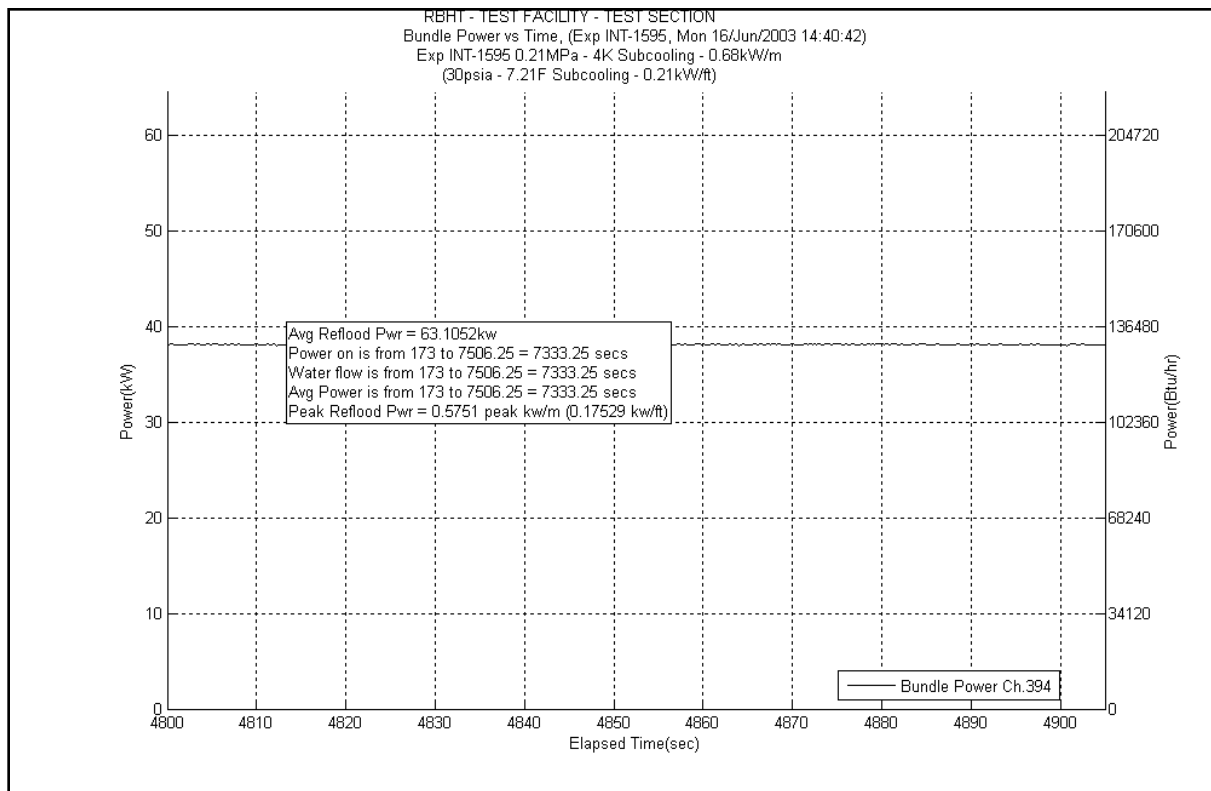


Figure A-224 Bundle Power Plot for Experiment 1595D

Table A-89 Data Results for RBHT Test 1595D for Time Period 4800 to 4905 seconds

Results for RBHT Test 1595
Valid Time Period 4800 to 4905 seconds
Collapsed Liquid Level = 83.508 inches = 2121.11 mm
(Z_{csl}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{acc1} (lbf/ft ²)	ΔP_{acc1} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
*	133-144	3378-3658	384	0.663	19.231	920.780	0.261	12.497	0.054	2.586	0.000	0.000	18.91	905.416	4338.91	207748.1259	0.669	0.666	0.672
	120-133	3048-3378	383	0.679	21.661	1037.152	0.290	13.885	0.096	4.597	-0.995	-47.623	22.27	1066.293	4361.18	208814.4192	0.67	0.667	0.673
*	108-120	2743-3048	382	0.579	26.211	1254.977	0.243	11.635	0.120	5.746	5.438	260.360	20.41	977.236	4381.59	209791.6553	0.672	0.669	0.675
	100-108	2540-2743	381	0.668	13.799	660.684	0.146	6.991	0.088	4.213	0.000	0.000	13.56	649.256	4395.15	210440.9116	0.674	0.671	0.677
	97-100	2464-2540	380	0.522	7.442	356.327	0.051	2.442	0.032	1.532	0.000	0.000	7.356	352.207	4402.506	210793.1187	0.528	0.525	0.531
	93-97	2362-2464	379	0.550	9.343	447.336	0.066	3.160	0.041	1.963	0.000	0.000	9.23	441.935	4411.736	211235.0535	0.556	0.553	0.559
*	85-93	2159-2362	378	0.417	24.222	1159.741	0.122	5.841	0.080	3.830	7.800	373.451	16.22	776.618	4427.956	212011.6713	0.61	0.607	0.613
	81-85	2057-2159	377	0.659	7.084	339.169	0.056	2.681	0.038	1.819	0.000	0.000	6.987	334.539	4434.943	212346.2106	0.664	0.661	0.667
	78-81	1981-2057	376	0.654	5.396	258.356	0.040	1.915	0.028	1.341	0.000	0.000	5.324	254.914	4440.267	212601.1251	0.658	0.655	0.661
	75-78	1905-1981	375	0.517	7.530	360.554	0.038	1.819	0.027	1.293	0.000	0.000	7.463	357.330	4447.73	212958.4555	0.521	0.518	0.524
	72-75	1829-1905	374	0.428	8.907	426.448	0.037	1.772	0.027	1.293	0.000	0.000	8.84	423.261	4456.57	213381.7169	0.432	0.430	0.434
*	67-72	1702-1829	373	0.385	15.964	764.375	0.058	2.777	0.043	2.059	3.033	145.235	12.83	614.304	4469.4	213996.0206	0.506	0.503	0.509
	63-67	1600-1702	372	0.576	8.813	421.973	0.043	2.059	0.033	1.580	0.000	0.000	8.735	418.234	4478.135	214414.2547	0.579	0.576	0.582
	60-63	1524-1600	371	0.392	9.467	453.303	0.030	1.436	0.024	1.149	0.000	0.000	9.411	450.601	4487.546	214864.8558	0.396	0.394	0.398
	57-60	1448-1524	370	0.389	9.525	456.039	0.029	1.389	0.023	1.101	0.000	0.000	9.47	453.426	4497.016	215318.2818	0.392	0.390	0.394
	53-57	1346-1448	369	0.363	13.238	633.829	0.036	1.724	0.030	1.436	0.000	0.000	13.17	630.583	4510.186	215948.8648	0.366	0.364	0.368
*	46-53	1168-1346	368	0.285	25.993	1244.533	0.055	2.633	0.050	2.394	4.878	233.542	21.01	1005.964	4531.196	216954.829	0.422	0.420	0.424
	43-46	1092-1168	367	0.475	8.174	391.388	0.021	1.005	0.021	1.005	0.000	0.000	8.13	389.266	4539.326	217344.0955	0.478	0.476	0.480
	37-43	940-1092	366	0.340	20.555	984.188	0.037	1.772	0.039	1.867	0.000	0.000	20.47	980.109	4559.796	218324.2043	0.343	0.341	0.345
*	25-37	635-940	365	0.203	49.664	2377.916	0.055	2.633	0.071	3.399	1.628	77.940	47.91	2293.943	4607.706	220618.1475	0.231	0.230	0.232
	13-25	330-635	364	0.118	54.971	2632.045	0.026	1.245	0.056	2.681	0.000	0.000	54.87	2627.190	4662.576	223245.3372	0.119	0.118	0.120
*	0-13	0-330	363	0.044	64.543	3090.321	0.001	0.048	0.000	0.000	1.072	51.314	63.47	3038.960	4726.046	226284.2971	0.06	0.057	0.063

Table A-90 Energy Balance Results for RBHT Test 1595D for Time Period 4800 to 4905 seconds

Results for RBHT Test 1595 Valid Time Period 4800 to 4905 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1738.2622	5.4835	0.00E+00	0.00E+00	0.00E+00	4.20E-02	1.90E-02
0.25	6.35	1834.8323	5.7881	0.00E+00	0.00E+00	0.00E+00	4.20E-02	1.90E-02
0.50	12.70	1931.4024	6.0927	0.00E+00	0.00E+00	0.00E+00	4.20E-02	1.90E-02
0.75	19.05	2027.9725	6.3974	0.00E+00	0.00E+00	0.00E+00	4.20E-02	1.90E-02
1.00	25.40	2124.5427	6.702	0.00E+00	0.00E+00	0.00E+00	4.20E-02	1.90E-02
1.25	31.75	2221.1128	7.0067	1.92E-03	6.46E-02	2.93E-02	4.19E-02	1.90E-02
1.50	38.10	2317.6829	7.3113	7.60E-03	2.56E-01	1.16E-01	4.17E-02	1.89E-02
1.75	44.45	2414.253	7.6159	1.35E-02	4.56E-01	2.07E-01	4.14E-02	1.88E-02
2.00	50.80	2510.8231	7.9206	1.97E-02	6.64E-01	3.01E-01	4.11E-02	1.87E-02
2.25	57.15	2607.3933	8.2252	2.61E-02	8.80E-01	3.99E-01	4.09E-02	1.85E-02
2.50	63.50	2703.9634	8.5298	3.28E-02	1.10E+00	5.01E-01	4.06E-02	1.84E-02
2.75	69.85	2800.5335	8.8345	3.96E-02	1.34E+00	6.06E-01	4.03E-02	1.83E-02
3.00	76.20	2897.1036	9.1391	4.68E-02	1.58E+00	7.16E-01	4.00E-02	1.81E-02
3.25	82.55	2993.6737	9.4438	5.42E-02	1.83E+00	8.28E-01	3.97E-02	1.80E-02
3.50	88.90	3090.2439	9.7484	6.18E-02	2.08E+00	9.45E-01	3.94E-02	1.79E-02
3.75	95.25	3186.814	10.053	6.96E-02	2.35E+00	1.07E+00	3.91E-02	1.77E-02
4.00	101.60	3283.3841	10.358	7.77E-02	2.62E+00	1.19E+00	3.87E-02	1.76E-02
4.25	107.95	3379.9542	10.662	8.61E-02	2.90E+00	1.32E+00	3.84E-02	1.74E-02
4.50	114.30	3476.5243	10.967	9.47E-02	3.19E+00	1.45E+00	3.80E-02	1.72E-02
4.75	120.65	3573.0945	11.272	1.04E-01	3.49E+00	1.58E+00	3.76E-02	1.71E-02
5.00	127.00	3669.6646	11.576	1.13E-01	3.80E+00	1.72E+00	3.72E-02	1.69E-02
5.25	133.35	3766.2347	11.881	1.22E-01	4.11E+00	1.86E+00	3.69E-02	1.67E-02
5.50	139.70	3862.8048	12.185	1.31E-01	4.43E+00	2.01E+00	3.65E-02	1.65E-02
5.75	146.05	3959.375	12.49	1.41E-01	4.76E+00	2.16E+00	3.60E-02	1.64E-02
6.00	152.40	4055.9451	12.795	1.51E-01	5.10E+00	2.31E+00	3.56E-02	1.62E-02
6.25	158.75	4152.5152	13.099	1.62E-01	5.45E+00	2.47E+00	3.52E-02	1.60E-02
6.50	165.10	4249.0853	13.404	1.72E-01	5.80E+00	2.63E+00	3.48E-02	1.58E-02
6.75	171.45	4345.6554	13.709	1.83E-01	6.17E+00	2.80E+00	3.43E-02	1.56E-02
7.00	177.80	4442.2256	14.013	1.94E-01	6.54E+00	2.96E+00	3.38E-02	1.54E-02
7.25	184.15	4538.7957	14.318	2.05E-01	6.92E+00	3.14E+00	3.34E-02	1.51E-02
7.50	190.50	4635.3658	14.623	2.17E-01	7.30E+00	3.31E+00	3.29E-02	1.49E-02
7.75	196.85	4731.9359	14.927	2.28E-01	7.70E+00	3.49E+00	3.24E-02	1.47E-02
8.00	203.20	4828.506	15.232	2.40E-01	8.10E+00	3.67E+00	3.19E-02	1.45E-02
8.25	209.55	4925.0762	15.537	2.53E-01	8.52E+00	3.86E+00	3.14E-02	1.42E-02
8.50	215.90	5021.6463	15.841	2.65E-01	8.93E+00	4.05E+00	3.09E-02	1.40E-02
8.75	222.25	5118.2164	16.146	2.78E-01	9.36E+00	4.25E+00	3.03E-02	1.38E-02
9.00	228.60	5214.7865	16.45	2.91E-01	9.80E+00	4.45E+00	2.98E-02	1.35E-02
9.25	234.95	4925.0762	15.537	3.03E-01	1.02E+01	4.64E+00	2.92E-02	1.33E-02
9.50	241.30	4635.3658	14.623	3.15E-01	1.06E+01	4.82E+00	2.87E-02	1.30E-02
9.75	247.65	4345.6554	13.709	3.27E-01	1.10E+01	5.00E+00	2.83E-02	1.28E-02
10.00	254.00	4055.9451	12.795	3.37E-01	1.14E+01	5.16E+00	2.78E-02	1.26E-02
10.25	260.35	3766.2347	11.881	3.47E-01	1.17E+01	5.31E+00	2.74E-02	1.24E-02
10.50	266.70	3476.5243	10.967	3.56E-01	1.20E+01	5.44E+00	2.70E-02	1.23E-02
10.75	273.05	3186.814	10.053	3.64E-01	1.23E+01	5.57E+00	2.67E-02	1.21E-02
11.00	279.40	2897.1036	9.1391	3.72E-01	1.25E+01	5.69E+00	2.64E-02	1.20E-02
11.25	285.75	2607.3933	8.2252	3.79E-01	1.28E+01	5.79E+00	2.61E-02	1.18E-02
11.50	292.10	2317.6829	7.3113	3.85E-01	1.30E+01	5.89E+00	2.58E-02	1.17E-02
11.75	298.45	2027.9725	6.3974	3.90E-01	1.32E+01	5.97E+00	2.56E-02	1.16E-02
12.00	304.80	1738.2622	5.4835	3.95E-01	1.33E+01	6.04E+00	2.54E-02	1.15E-02

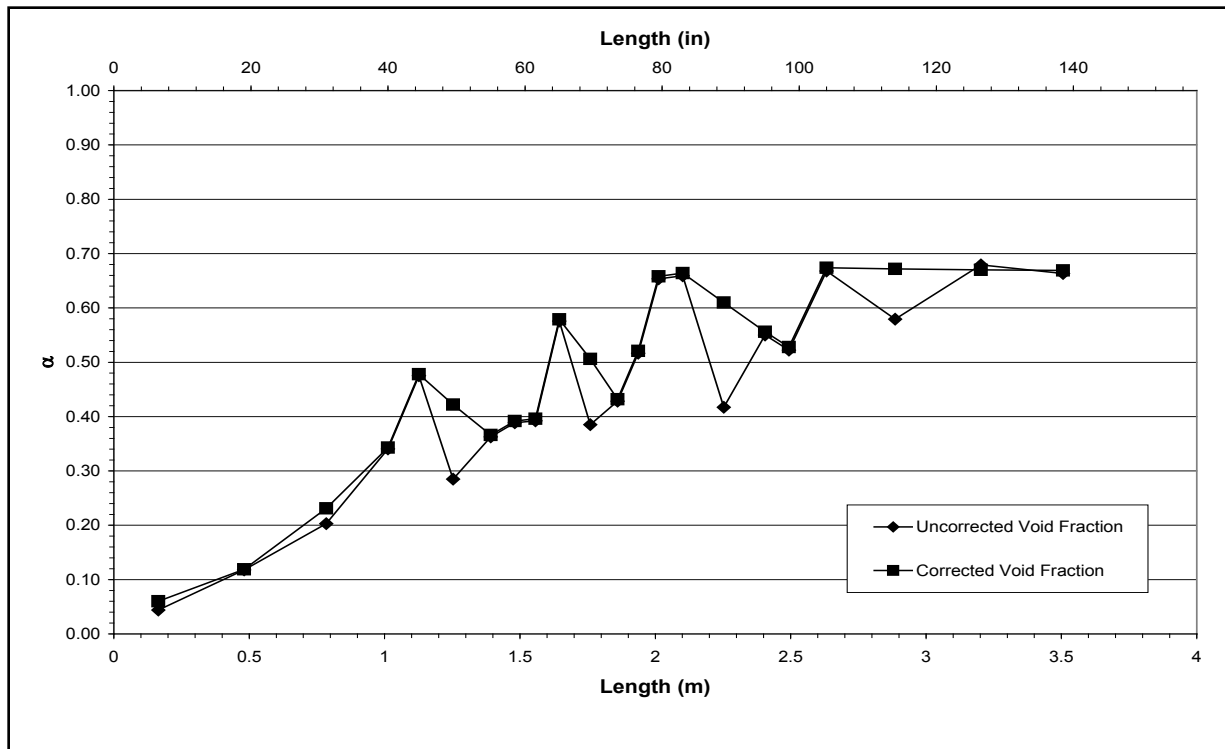


Figure A-225 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1595D for Time Period 4800 to 4905 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1595-E

Test Conditions

Date: 6/16/2003

Steady-state time window: 6397 – 6580 seconds

Inlet flow rate: 0.765 cm/sec (0.301 in./sec)

Inlet mass flow rate: 0.035 kg/sec (0.078 lbm/sec)

Inlet flow temperature: 382.9 K (229.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.83 kW

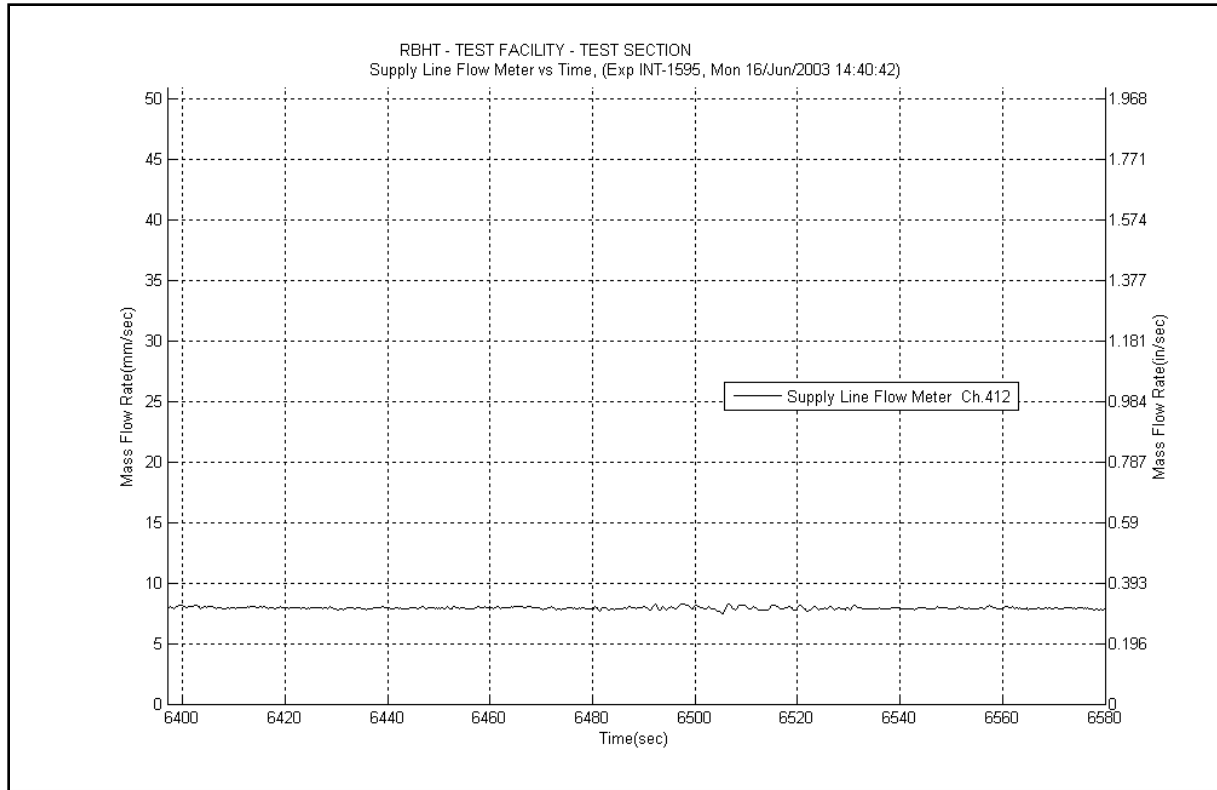


Figure A-226 Inlet Flow Plot for Experiment 1595E

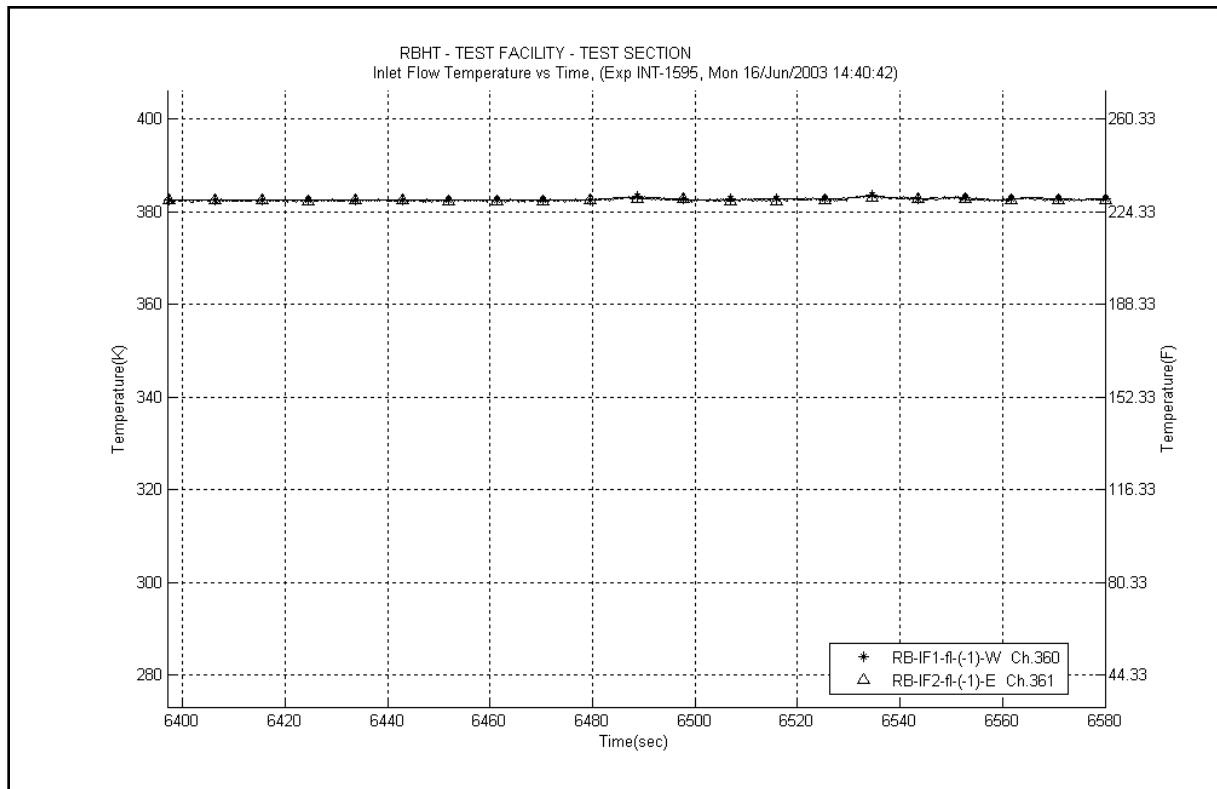


Figure A-227 Inlet Temperature Plot for Experiment 1595E

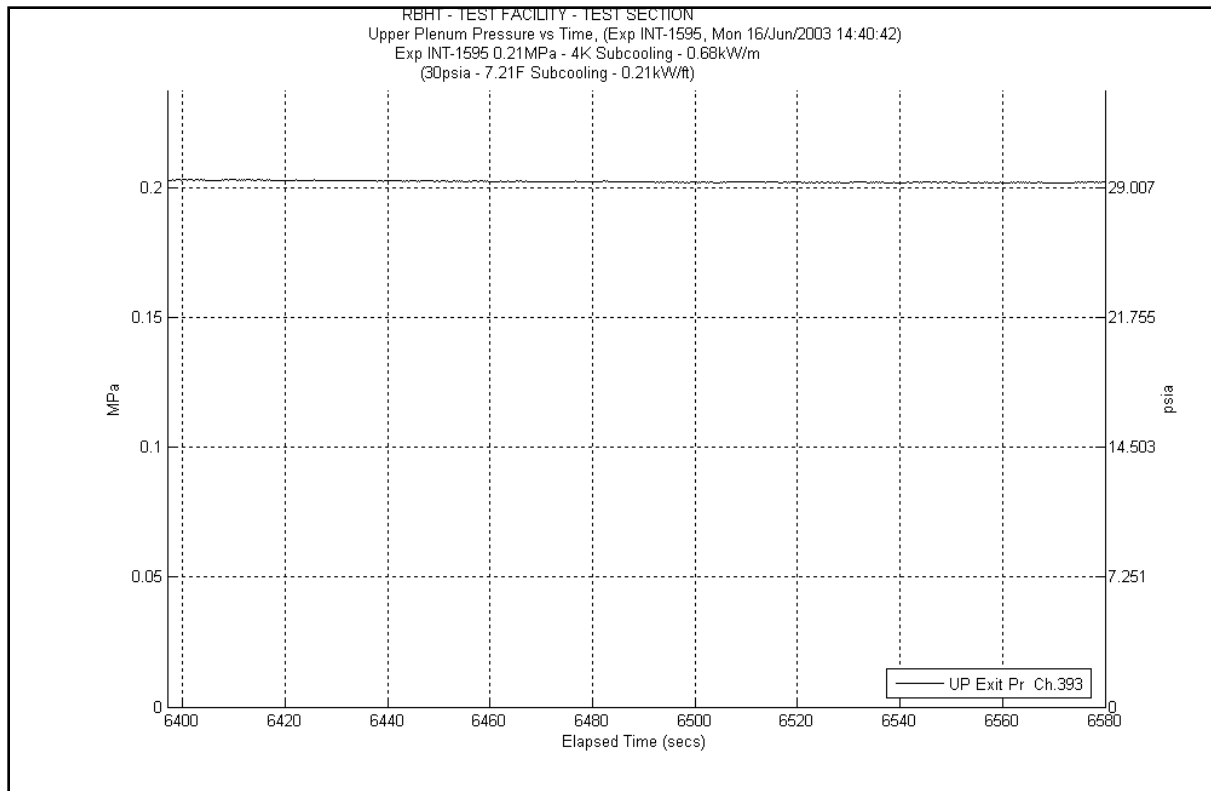


Figure A-228 System Pressure Plot for Experiment 1595E

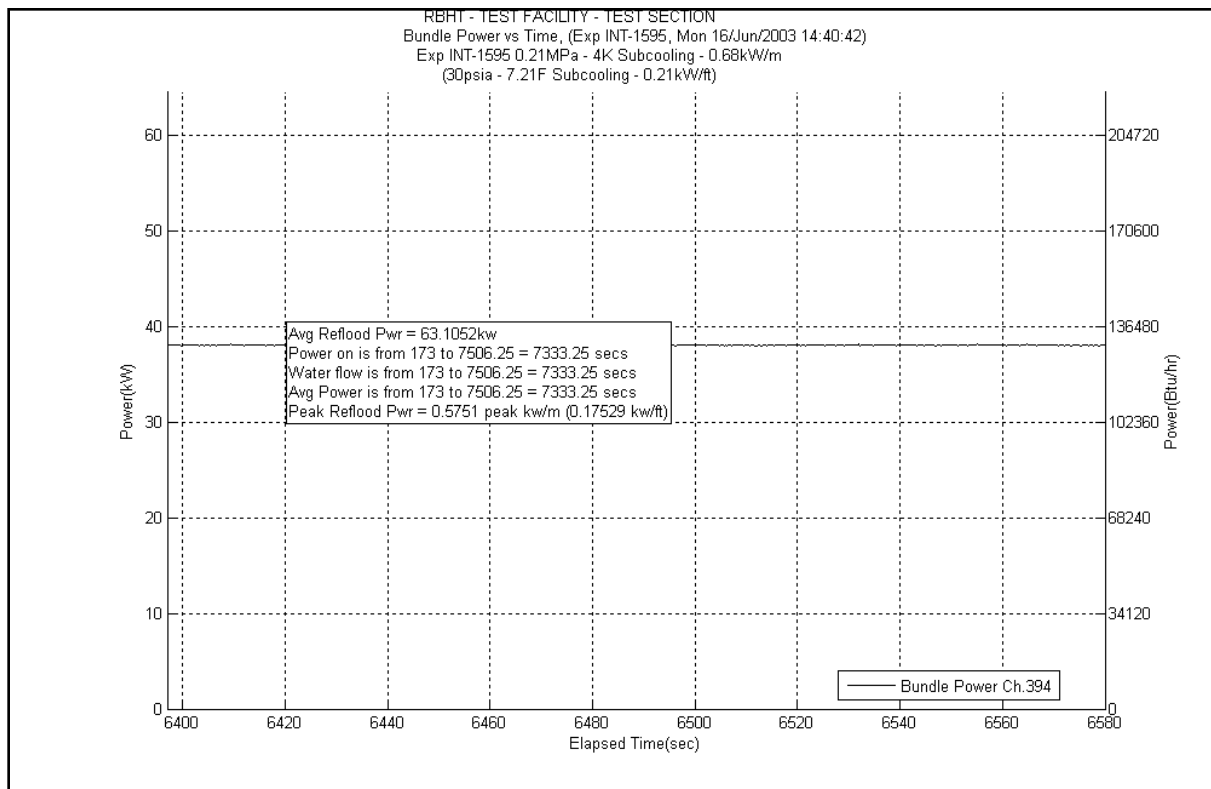


Figure A-229 Bundle Power Plot for Experiment 1595E

Table A-91 Data Results for RBHT Test 1595E for Time Period 6397 to 6580 seconds

Results for RBHT Test 1595
Valid Time Period 6397 to 6580 seconds
Collapsed Liquid Level = 79.392 inches = 2016.55 mm
(Z_{osv}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{\text{uncorrected}}$	$\Delta P_{\text{uncorrected}}$ (lb/ft ²)	$\Delta P_{\text{uncorrected}}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{\text{corrected}}$ (lb/ft ²)	$\Delta P_{\text{corrected}}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{\text{corrected}}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.709	16.608	795.208	0.155	7.421	0.032	1.532	0.000	0.000	16.42	786.194	4336.42	207628.9041	0.713	0.709	0.717
*	120-133	3048-3378	383	0.705	19.948	955.095	0.172	8.235	0.058	2.777	-0.012	-0.595	19.73	944.677	4356.15	208573.5815	0.708	0.704	0.712
*	108-120	2743-3048	382	0.596	25.177	1205.494	0.144	6.895	0.072	3.447	6.141	294.045	18.82	901.106	4374.97	209474.688	0.698	0.695	0.701
	100-108	2540-2743	381	0.690	12.890	617.169	0.086	4.118	0.053	2.538	0.000	0.000	12.75	610.473	4387.72	210085.1612	0.693	0.690	0.696
	97-100	2464-2540	380	0.535	7.245	346.878	0.030	1.436	0.019	0.910	0.000	0.000	7.193	344.403	4394.913	210429.5639	0.538	0.535	0.541
	93-97	2362-2464	379	0.573	8.870	424.708	0.038	1.819	0.025	1.197	0.000	0.000	8.805	421.586	4403.718	210851.1496	0.576	0.573	0.579
*	85-93	2159-2362	378	0.424	23.920	1145.319	0.071	3.399	0.048	2.298	8.361	400.350	15.44	739.271	4419.158	211590.4208	0.628	0.625	0.631
	81-85	2057-2159	377	0.678	6.694	320.520	0.033	1.580	0.023	1.101	0.000	0.000	6.638	317.829	4425.796	211908.2499	0.68	0.677	0.683
	78-81	1981-2057	376	0.667	5.183	248.161	0.023	1.101	0.017	0.814	0.000	0.000	5.139	246.057	4430.935	212154.3066	0.67	0.667	0.673
	75-78	1905-1981	375	0.537	7.219	345.635	0.022	1.053	0.016	0.766	0.000	0.000	7.177	343.637	4438.112	212497.9432	0.539	0.536	0.542
	72-75	1829-1905	374	0.466	8.320	398.350	0.021	1.005	0.016	0.766	0.000	0.000	8.278	396.353	4446.39	212894.2959	0.469	0.467	0.471
*	67-72	1702-1829	373	0.387	15.918	762.137	0.034	1.628	0.026	1.245	3.868	185.180	11.99	574.084	4458.38	213468.3802	0.538	0.535	0.541
	63-67	1600-1702	372	0.606	8.190	392.134	0.025	1.197	0.020	0.958	0.000	0.000	8.141	389.793	4466.521	213858.1734	0.608	0.605	0.611
	60-63	1524-1600	371	0.414	9.130	437.141	0.018	0.862	0.015	0.718	0.000	0.000	9.096	435.519	4475.617	214293.6922	0.416	0.414	0.418
	57-60	1448-1524	370	0.407	9.244	442.611	0.017	0.814	0.014	0.670	0.000	0.000	9.209	440.929	4484.826	214734.6215	0.409	0.407	0.411
	53-57	1346-1448	369	0.391	12.661	606.228	0.021	1.005	0.018	0.862	0.000	0.000	12.62	604.249	4497.446	215338.8703	0.392	0.390	0.394
*	46-53	1168-1346	368	0.289	25.847	1237.571	0.033	1.580	0.030	1.436	5.844	279.822	19.94	954.732	4517.386	216293.6026	0.451	0.449	0.453
	43-46	1092-1168	367	0.508	7.660	366.771	0.013	0.622	0.012	0.575	0.000	0.000	7.632	365.422	4525.018	216659.0248	0.51	0.507	0.513
	37-43	940-1092	366	0.377	19.423	929.981	0.023	1.101	0.024	1.149	0.000	0.000	19.37	927.441	4544.388	217586.4653	0.378	0.376	0.380
*	25-37	635-940	365	0.238	47.519	2275.220	0.035	1.676	0.043	2.059	3.231	154.700	44.21	2116.786	4588.598	219703.2515	0.29	0.289	0.291
	13-25	330-635	364	0.202	49.747	2381.895	0.020	0.958	0.037	1.772	0.000	0.000	49.68	2378.691	4638.278	222081.9427	0.203	0.202	0.204
*	0-13	0-330	363	0.047	64.319	3079.629	0.008	0.383	0.012	0.575	3.649	174.734	60.65	2903.938	4698.928	224985.8803	0.101	0.100	0.102

Table A-92 Energy Balance Results for RBHT Test 1595E for Time Period 6397 to 6580 seconds

Results for RBHT Test 1595 Valid Time Period 6397 to 6580 seconds								
Elevation	Elevation	q _w	q _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1735.7464	5.4755	0.00E+00	0.00E+00	0.00E+00	2.52E-02	1.14E-02
0.25	6.35	1832.1768	5.7797	0.00E+00	0.00E+00	0.00E+00	2.52E-02	1.14E-02
0.50	12.70	1928.6071	6.0839	0.00E+00	0.00E+00	0.00E+00	2.52E-02	1.14E-02
0.75	19.05	2025.0375	6.3881	8.96E-04	1.82E-02	8.27E-03	2.51E-02	1.14E-02
1.00	25.40	2121.4678	6.6923	9.56E-03	1.95E-01	8.82E-02	2.49E-02	1.13E-02
1.25	31.75	2217.8982	6.9965	1.86E-02	3.79E-01	1.72E-01	2.47E-02	1.12E-02
1.50	38.10	2314.3286	7.3007	2.81E-02	5.72E-01	2.59E-01	2.44E-02	1.11E-02
1.75	44.45	2410.7589	7.6049	3.80E-02	7.73E-01	3.50E-01	2.42E-02	1.10E-02
2.00	50.80	2507.1893	7.9091	4.82E-02	9.82E-01	4.45E-01	2.39E-02	1.09E-02
2.25	57.15	2603.6196	8.2133	5.89E-02	1.20E+00	5.44E-01	2.37E-02	1.07E-02
2.50	63.50	2700.05	8.5175	7.00E-02	1.42E+00	6.46E-01	2.34E-02	1.06E-02
2.75	69.85	2796.4803	8.8217	8.15E-02	1.66E+00	7.52E-01	2.31E-02	1.05E-02
3.00	76.20	2892.9107	9.1259	9.33E-02	1.90E+00	8.62E-01	2.28E-02	1.03E-02
3.25	82.55	2989.3411	9.4301	1.06E-01	2.15E+00	9.75E-01	2.25E-02	1.02E-02
3.50	88.90	3085.7714	9.7343	1.18E-01	2.41E+00	1.09E+00	2.22E-02	1.01E-02
3.75	95.25	3182.2018	10.038	1.31E-01	2.67E+00	1.21E+00	2.18E-02	9.91E-03
4.00	101.60	3278.6321	10.343	1.45E-01	2.95E+00	1.34E+00	2.15E-02	9.76E-03
4.25	107.95	3375.0625	10.647	1.59E-01	3.23E+00	1.47E+00	2.12E-02	9.60E-03
4.50	114.30	3471.4928	10.951	1.73E-01	3.52E+00	1.60E+00	2.08E-02	9.43E-03
4.75	120.65	3567.9232	11.255	1.88E-01	3.82E+00	1.73E+00	2.04E-02	9.27E-03
5.00	127.00	3664.3535	11.559	2.03E-01	4.13E+00	1.87E+00	2.01E-02	9.09E-03
5.25	133.35	3760.7839	11.864	2.18E-01	4.45E+00	2.02E+00	1.97E-02	8.92E-03
5.50	139.70	3857.2143	12.168	2.34E-01	4.77E+00	2.16E+00	1.93E-02	8.74E-03
5.75	146.05	3953.6446	12.472	2.51E-01	5.10E+00	2.31E+00	1.89E-02	8.55E-03
6.00	152.40	4050.075	12.776	2.67E-01	5.44E+00	2.47E+00	1.84E-02	8.36E-03
6.25	158.75	4146.5053	13.08	2.84E-01	5.79E+00	2.63E+00	1.80E-02	8.16E-03
6.50	165.10	4242.9357	13.385	3.02E-01	6.15E+00	2.79E+00	1.76E-02	7.96E-03
6.75	171.45	4339.366	13.689	3.20E-01	6.51E+00	2.95E+00	1.71E-02	7.76E-03
7.00	177.80	4435.7964	13.993	3.38E-01	6.88E+00	3.12E+00	1.66E-02	7.55E-03
7.25	184.15	4532.2268	14.297	3.57E-01	7.27E+00	3.30E+00	1.62E-02	7.34E-03
7.50	190.50	4628.6571	14.601	3.76E-01	7.66E+00	3.47E+00	1.57E-02	7.12E-03
7.75	196.85	4725.0875	14.906	3.96E-01	8.05E+00	3.65E+00	1.52E-02	6.90E-03
8.00	203.20	4821.5178	15.21	4.16E-01	8.46E+00	3.84E+00	1.47E-02	6.67E-03
8.25	209.55	4917.9482	15.514	4.36E-01	8.87E+00	4.02E+00	1.42E-02	6.44E-03
8.50	215.90	5014.3785	15.818	4.57E-01	9.29E+00	4.22E+00	1.37E-02	6.20E-03
8.75	222.25	5110.8089	16.122	4.78E-01	9.73E+00	4.41E+00	1.31E-02	5.96E-03
9.00	228.60	5207.2393	16.427	4.99E-01	1.02E+01	4.61E+00	1.26E-02	5.71E-03
9.25	234.95	4917.9482	15.514	5.21E-01	1.06E+01	4.81E+00	1.21E-02	5.47E-03
9.50	241.30	4628.6571	14.601	5.40E-01	1.10E+01	4.99E+00	1.16E-02	5.24E-03
9.75	247.65	4339.366	13.689	5.59E-01	1.14E+01	5.16E+00	1.11E-02	5.03E-03
10.00	254.00	4050.075	12.776	5.77E-01	1.17E+01	5.32E+00	1.06E-02	4.83E-03
10.25	260.35	3760.7839	11.864	5.93E-01	1.21E+01	5.48E+00	1.02E-02	4.64E-03
10.50	266.70	3471.4928	10.951	6.08E-01	1.24E+01	5.61E+00	9.86E-03	4.47E-03
10.75	273.05	3182.2018	10.038	6.22E-01	1.27E+01	5.74E+00	9.51E-03	4.31E-03
11.00	279.40	2892.9107	9.1259	6.35E-01	1.29E+01	5.86E+00	9.19E-03	4.17E-03
11.25	285.75	2603.6196	8.2133	6.46E-01	1.32E+01	5.97E+00	8.90E-03	4.04E-03
11.50	292.10	2314.3286	7.3007	6.56E-01	1.34E+01	6.06E+00	8.64E-03	3.92E-03
11.75	298.45	2025.0375	6.3881	6.66E-01	1.35E+01	6.14E+00	8.41E-03	3.82E-03
12.00	304.80	1735.7464	5.4755	6.73E-01	1.37E+01	6.22E+00	8.22E-03	3.73E-03

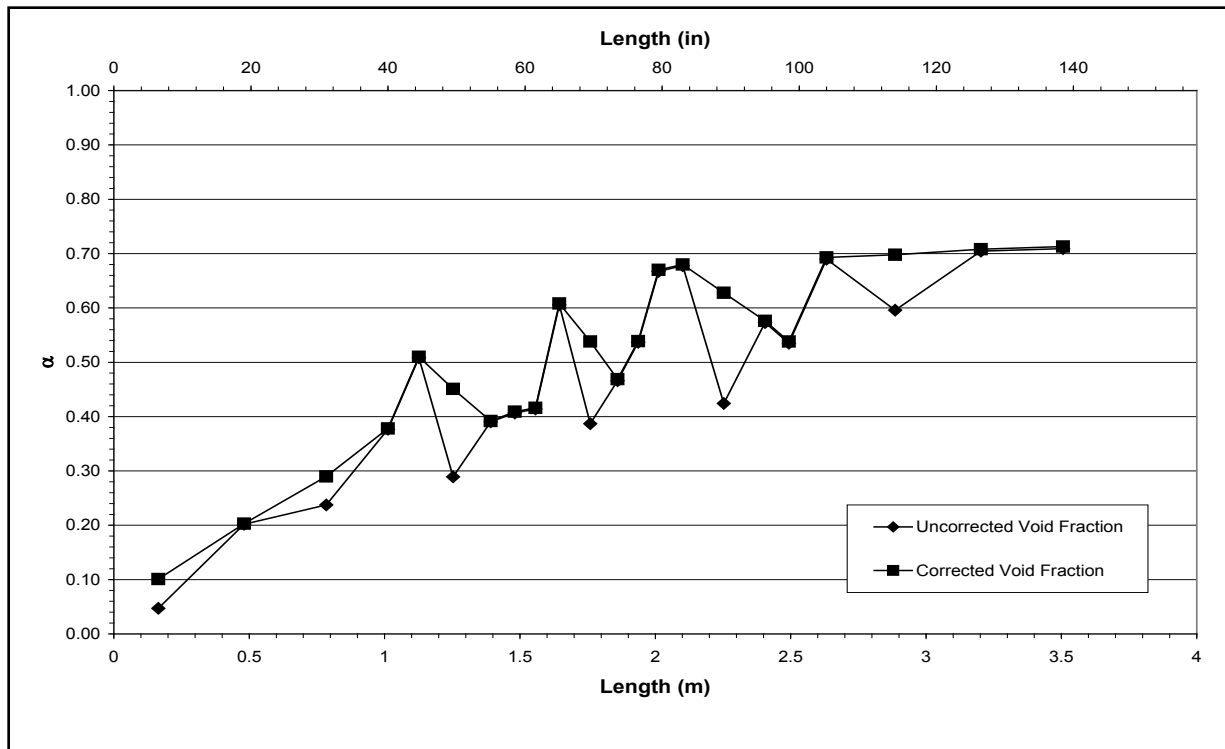


Figure A-230 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1595E for Time Period 6397 to 6580 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1595-F

Test Conditions

Date: 6/16/2003

Steady-state time window: 6742 – 6862 seconds

Inlet flow rate: 0.503 cm/sec (0.198 in./sec)

Inlet mass flow rate: 0.023 kg/sec (0.051 lbm/sec)

Inlet flow temperature: 382.9 K (229.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.83 kW

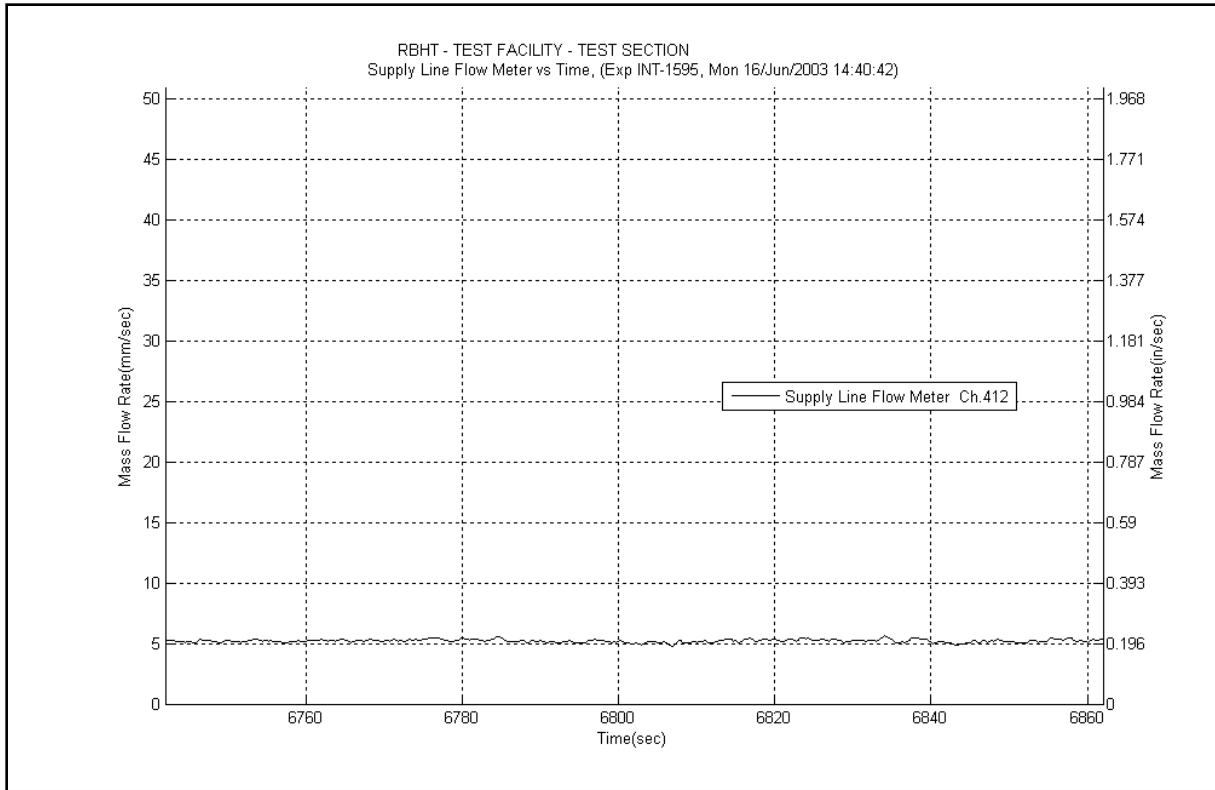


Figure A-231 Inlet Flow Plot for Experiment 1595F

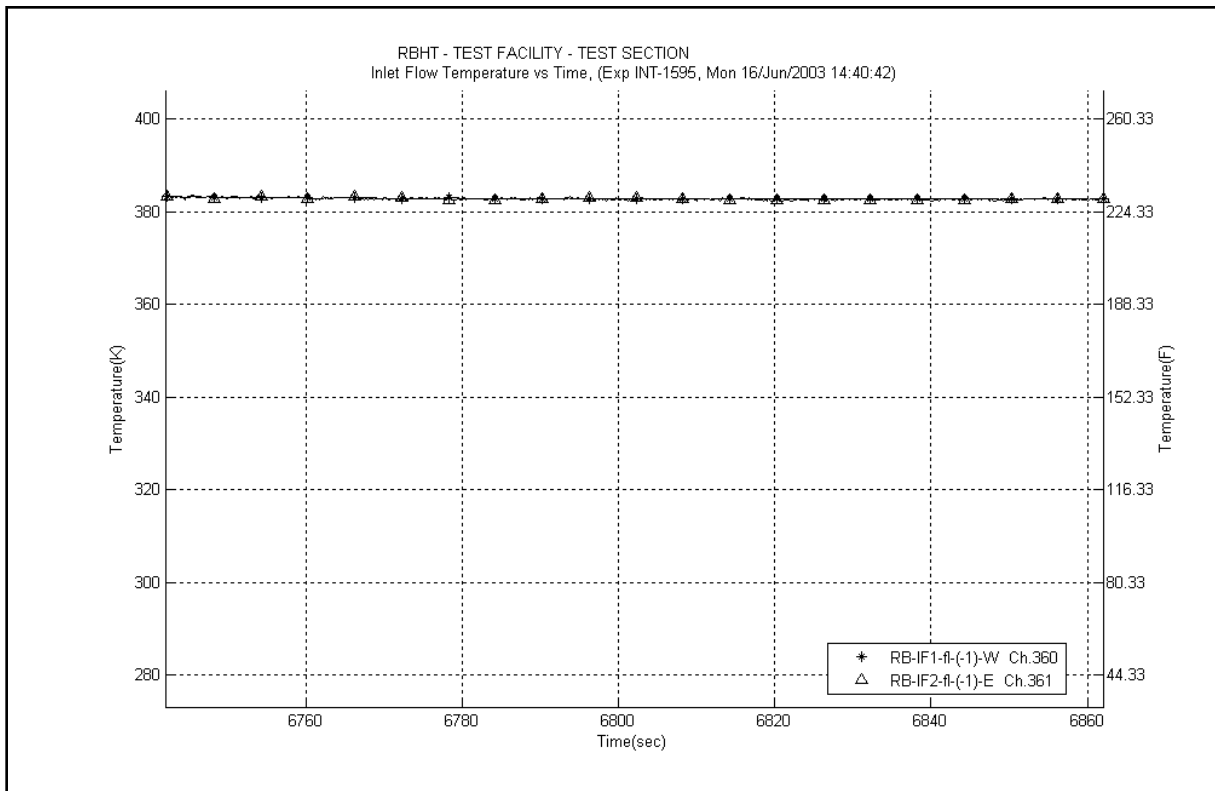


Figure A-232 Inlet Temperature Plot for Experiment 1595F

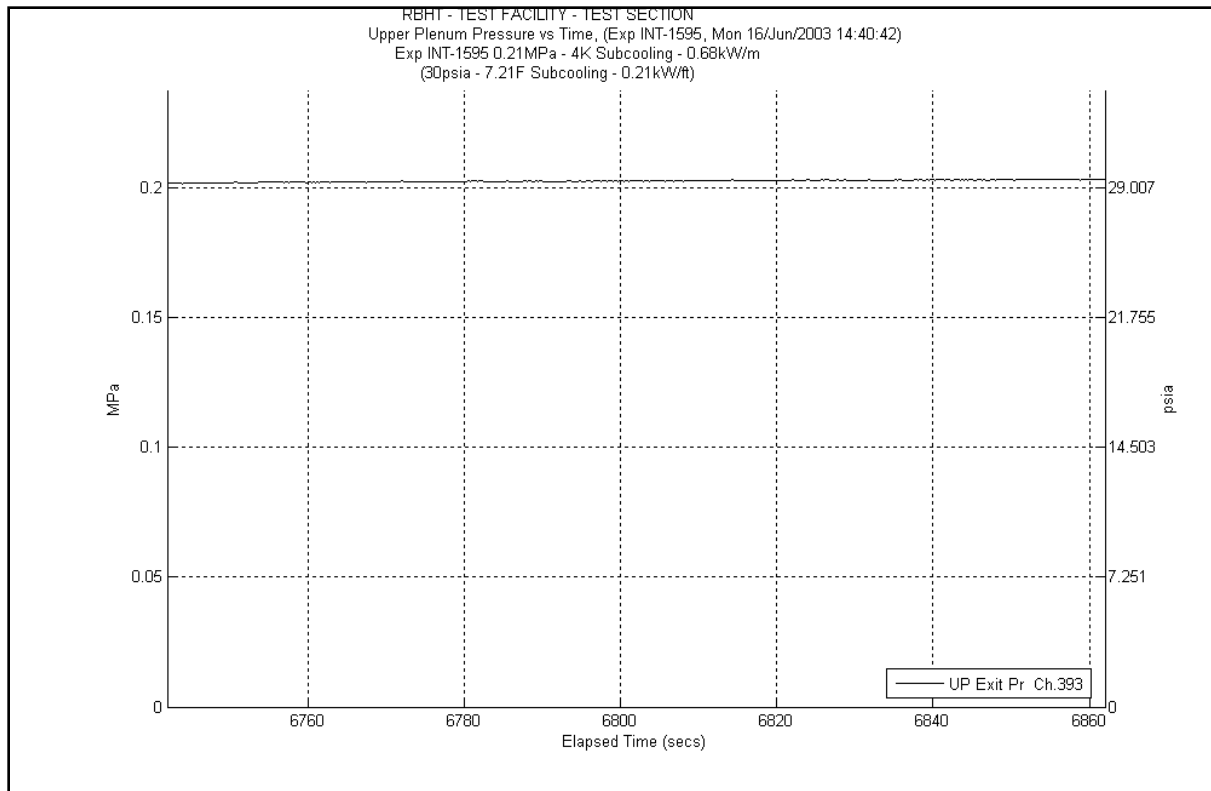


Figure A-233 System Pressure Plot for Experiment 1595F

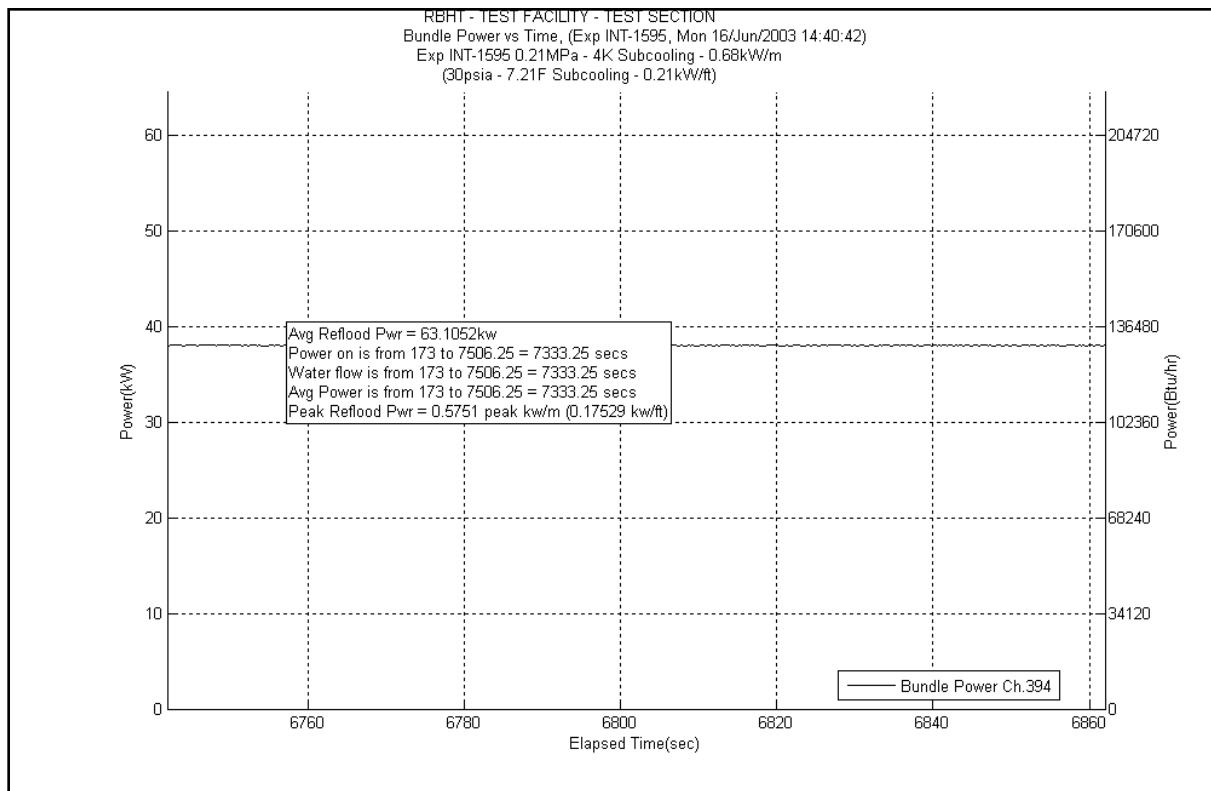


Figure A-234 Bundle Power Plot for Experiment 1595F

Table A-93 Data Results for RBHT Test 1595F for Time Period 6742 to 6862 seconds

Results for RBHT Test 1595
Valid Time Period 6742 to 6862 seconds
Collapsed Liquid Level = 76.625 inches = 1946.27 mm
(Z_{osv}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lb/ft ²)	$\Delta P_{unconnected}$ (Pa)	ΔP_{fic} (lb/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.758	13.809	661.182	0.078	3.735	0.007	0.335	0.000	0.000	13.72	656.917	4333.72	207499.6274	0.76	0.756	0.764
*	120-133	3048-3378	383	0.731	18.166	869.806	0.103	4.932	0.038	1.819	0.845	40.472	17.18	822.583	4350.9	208322.2102	0.745	0.741	0.749
*	108-120	2743-3048	382	0.611	24.232	1160.238	0.091	4.357	0.047	2.250	6.444	308.544	17.65	845.087	4368.55	209167.2967	0.717	0.713	0.721
	100-108	2540-2743	381	0.700	12.459	596.530	0.055	2.633	0.035	1.676	0.000	0.000	12.36	591.800	4380.91	209759.0967	0.702	0.698	0.706
	97-100	2464-2540	380	0.559	6.871	328.975	0.019	0.910	0.013	0.622	0.000	0.000	6.838	327.405	4387.748	210086.5019	0.561	0.558	0.564
	93-97	2362-2464	379	0.576	8.803	421.475	0.025	1.197	0.016	0.766	0.000	0.000	8.759	419.383	4396.507	210505.8851	0.578	0.575	0.581
*	85-93	2159-2362	378	0.429	23.723	1135.870	0.046	2.202	0.031	1.484	8.346	399.615	15.3	732.568	4411.807	211238.453	0.632	0.629	0.635
	81-85	2057-2159	377	0.684	6.575	314.801	0.021	1.005	0.015	0.718	0.000	0.000	6.536	312.945	4418.343	211551.3984	0.685	0.682	0.688
	78-81	1981-2057	376	0.670	5.136	245.923	0.015	0.718	0.011	0.527	0.000	0.000	5.106	244.477	4423.449	211795.8749	0.672	0.669	0.675
	75-78	1905-1981	375	0.544	7.099	339.915	0.014	0.670	0.011	0.527	0.000	0.000	7.073	338.657	4430.522	212134.532	0.546	0.543	0.549
	72-75	1829-1905	374	0.479	8.112	388.404	0.014	0.670	0.011	0.527	0.000	0.000	8.084	387.064	4438.606	212521.596	0.481	0.479	0.483
*	67-72	1702-1829	373	0.390	15.834	758.158	0.021	1.005	0.017	0.814	4.086	195.661	11.71	560.678	4450.316	213082.2738	0.549	0.546	0.552
	63-67	1600-1702	372	0.616	7.987	382.436	0.016	0.766	0.013	0.622	0.000	0.000	7.956	380.935	4458.272	213463.2091	0.617	0.614	0.620
	60-63	1524-1600	371	0.423	8.990	430.427	0.011	0.527	0.010	0.479	0.000	0.000	8.964	429.199	4467.236	213892.4078	0.424	0.422	0.426
	57-60	1448-1524	370	0.410	9.192	440.125	0.011	0.527	0.009	0.431	0.000	0.000	9.167	438.918	4476.403	214331.3261	0.411	0.409	0.413
	53-57	1346-1448	369	0.396	12.557	601.255	0.013	0.622	0.012	0.575	0.000	0.000	12.53	599.940	4488.933	214931.2657	0.397	0.395	0.399
*	46-53	1168-1346	368	0.287	25.930	1241.549	0.021	1.005	0.020	0.958	6.249	299.218	19.64	940.368	4508.573	215871.6339	0.46	0.458	0.462
	43-46	1092-1168	367	0.521	7.458	357.073	0.008	0.383	0.008	0.383	0.000	0.000	7.437	356.085	4516.01	216227.7194	0.523	0.520	0.526
	37-43	940-1092	366	0.396	18.836	901.882	0.014	0.670	0.015	0.718	0.000	0.000	18.8	900.149	4534.81	217127.8682	0.397	0.395	0.399
*	25-37	635-940	365	0.250	46.745	2238.170	0.023	1.101	0.028	1.341	4.284	205.127	42.41	2030.602	4577.22	219158.4699	0.319	0.317	0.321
	13-25	330-635	364	0.241	47.275	2263.534	0.014	0.670	0.024	1.149	0.000	0.000	47.22	2260.906	4624.44	221419.3757	0.242	0.241	0.243
*	0-13	0-330	363	0.061	63.374	3034.373	0.006	0.287	0.013	0.622	4.035	193.207	59.32	2840.257	4683.76	224259.6325	0.121	0.120	0.122

Table A-94 Energy Balance Results for RBHT Test 1595F for Time Period 6742 to 6862 seconds

Results for RBHT Test 1595 Valid Time Period 6742 to 6862 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1733.2725	5.4677	0.00E+00	0.00E+00	0.00E+00	1.65E-02	7.49E-03
0.25	6.35	1829.5654	5.7715	0.00E+00	0.00E+00	0.00E+00	1.65E-02	7.49E-03
0.50	12.70	1925.8583	6.0753	9.18E-04	1.23E-02	5.57E-03	1.65E-02	7.49E-03
0.75	19.05	2022.1512	6.379	1.35E-02	1.80E-01	8.16E-02	1.63E-02	7.39E-03
1.00	25.40	2118.4441	6.6828	2.66E-02	3.56E-01	1.61E-01	1.61E-02	7.29E-03
1.25	31.75	2214.7371	6.9865	4.04E-02	5.40E-01	2.45E-01	1.59E-02	7.19E-03
1.50	38.10	2311.03	7.2903	5.48E-02	7.32E-01	3.32E-01	1.56E-02	7.08E-03
1.75	44.45	2407.3229	7.5941	6.98E-02	9.33E-01	4.23E-01	1.54E-02	6.97E-03
2.00	50.80	2503.6158	7.8978	8.54E-02	1.14E+00	5.18E-01	1.51E-02	6.85E-03
2.25	57.15	2599.9087	8.2016	1.02E-01	1.36E+00	6.16E-01	1.48E-02	6.73E-03
2.50	63.50	2696.2016	8.5054	1.19E-01	1.58E+00	7.18E-01	1.46E-02	6.61E-03
2.75	69.85	2792.4946	8.8091	1.36E-01	1.82E+00	8.24E-01	1.43E-02	6.47E-03
3.00	76.20	2888.7875	9.1129	1.54E-01	2.06E+00	9.33E-01	1.40E-02	6.34E-03
3.25	82.55	2985.0804	9.4166	1.73E-01	2.31E+00	1.05E+00	1.37E-02	6.20E-03
3.50	88.90	3081.3733	9.7204	1.92E-01	2.57E+00	1.16E+00	1.33E-02	6.06E-03
3.75	95.25	3177.6662	10.024	2.12E-01	2.83E+00	1.28E+00	1.30E-02	5.91E-03
4.00	101.60	3273.9591	10.328	2.32E-01	3.11E+00	1.41E+00	1.27E-02	5.75E-03
4.25	107.95	3370.252	10.632	2.54E-01	3.39E+00	1.54E+00	1.23E-02	5.59E-03
4.50	114.30	3466.545	10.935	2.75E-01	3.68E+00	1.67E+00	1.20E-02	5.43E-03
4.75	120.65	3562.8379	11.239	2.98E-01	3.98E+00	1.80E+00	1.16E-02	5.26E-03
5.00	127.00	3659.1308	11.543	3.21E-01	4.28E+00	1.94E+00	1.12E-02	5.09E-03
5.25	133.35	3755.4237	11.847	3.44E-01	4.60E+00	2.09E+00	1.08E-02	4.91E-03
5.50	139.70	3851.7166	12.151	3.68E-01	4.92E+00	2.23E+00	1.04E-02	4.73E-03
5.75	146.05	3948.0095	12.454	3.93E-01	5.25E+00	2.38E+00	1.00E-02	4.55E-03
6.00	152.40	4044.3025	12.758	4.19E-01	5.59E+00	2.54E+00	9.61E-03	4.36E-03
6.25	158.75	4140.5954	13.062	4.45E-01	5.94E+00	2.69E+00	9.18E-03	4.16E-03
6.50	165.10	4236.8883	13.366	4.71E-01	6.30E+00	2.86E+00	8.74E-03	3.96E-03
6.75	171.45	4333.1812	13.669	4.99E-01	6.66E+00	3.02E+00	8.29E-03	3.76E-03
7.00	177.80	4429.4741	13.973	5.26E-01	7.03E+00	3.19E+00	7.82E-03	3.55E-03
7.25	184.15	4525.767	14.277	5.55E-01	7.41E+00	3.36E+00	7.36E-03	3.34E-03
7.50	190.50	4622.06	14.581	5.84E-01	7.80E+00	3.54E+00	6.87E-03	3.12E-03
7.75	196.85	4718.3529	14.884	6.14E-01	8.20E+00	3.72E+00	6.38E-03	2.90E-03
8.00	203.20	4814.6458	15.188	6.44E-01	8.60E+00	3.90E+00	5.88E-03	2.67E-03
8.25	209.55	4910.9387	15.492	6.75E-01	9.02E+00	4.09E+00	5.37E-03	2.44E-03
8.50	215.90	5007.2316	15.796	7.06E-01	9.44E+00	4.28E+00	4.85E-03	2.20E-03
8.75	222.25	5103.5245	16.099	7.39E-01	9.87E+00	4.48E+00	4.32E-03	1.96E-03
9.00	228.60	5199.8174	16.403	7.71E-01	1.03E+01	4.68E+00	3.78E-03	1.71E-03
9.25	234.95	4910.9387	15.492	8.04E-01	1.07E+01	4.87E+00	3.25E-03	1.47E-03
9.50	241.30	4622.06	14.581	8.34E-01	1.11E+01	5.05E+00	2.75E-03	1.25E-03
9.75	247.65	4333.1812	13.669	8.62E-01	1.15E+01	5.23E+00	2.27E-03	1.03E-03
10.00	254.00	4044.3025	12.758	8.89E-01	1.19E+01	5.39E+00	1.84E-03	8.33E-04
10.25	260.35	3755.4237	11.847	9.14E-01	1.22E+01	5.54E+00	1.43E-03	6.47E-04
10.50	266.70	3466.545	10.935	9.37E-01	1.25E+01	5.68E+00	1.05E-03	4.74E-04
10.75	273.05	3177.6662	10.024	9.58E-01	1.28E+01	5.81E+00	6.97E-04	3.16E-04
11.00	279.40	2888.7875	9.1129	9.77E-01	1.31E+01	5.92E+00	3.78E-04	1.72E-04
11.25	285.75	2599.9087	8.2016	9.95E-01	1.33E+01	6.03E+00	9.09E-05	4.12E-05
11.50	292.10	2311.03	7.2903	1.00E+00	1.34E+01	6.06E+00	0.00E+00	0.00E+00
11.75	298.45	2022.1512	6.379	1.00E+00	1.34E+01	6.06E+00	0.00E+00	0.00E+00
12.00	304.80	1733.2725	5.4677	1.00E+00	1.34E+01	6.06E+00	0.00E+00	0.00E+00

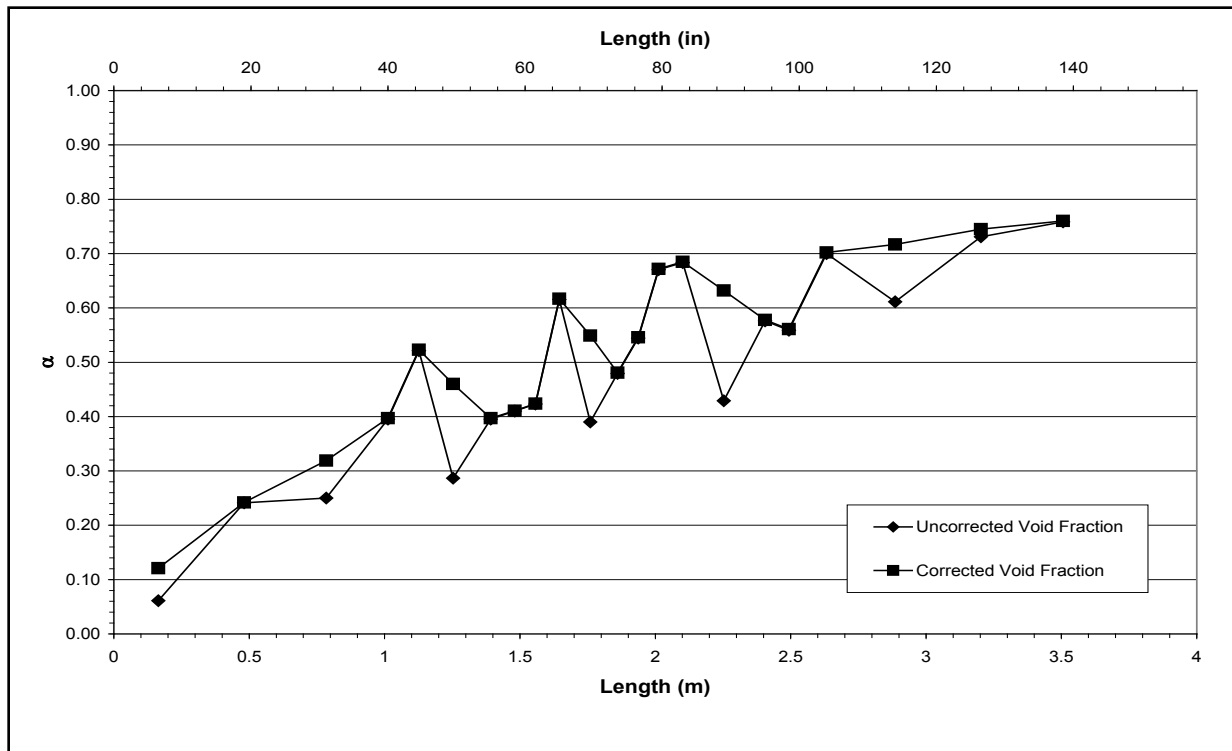


Figure A-235 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1595F for Time Period 6742 to 6862 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1595-G

Test Conditions

Date: 6/16/2003

Steady-state time window: 7105 – 7225 seconds

Inlet flow rate: 0.373 cm/sec (0.147 in./sec)

Inlet mass flow rate: 0.017 kg/sec (0.038 lbm/sec)

Inlet flow temperature: 382.9 K (229.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.83 kW

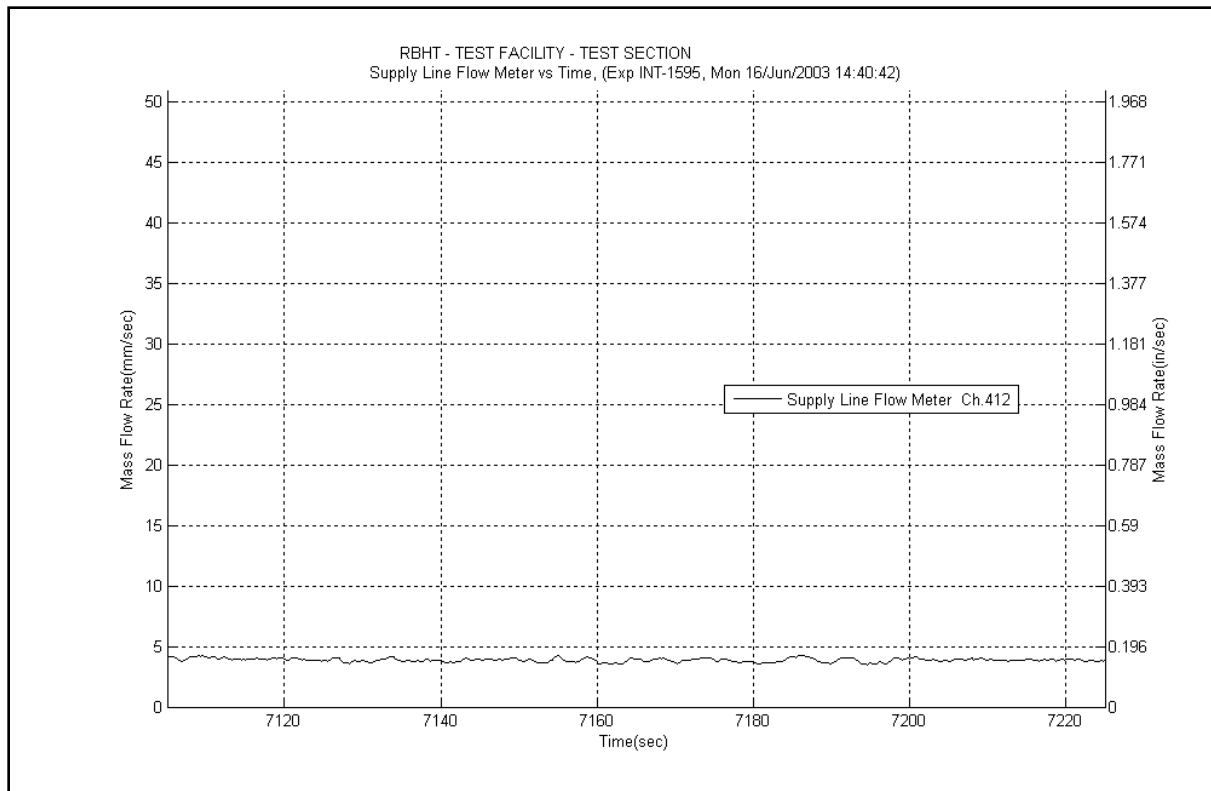


Figure A-236 Inlet Flow Plot for Experiment 1595G

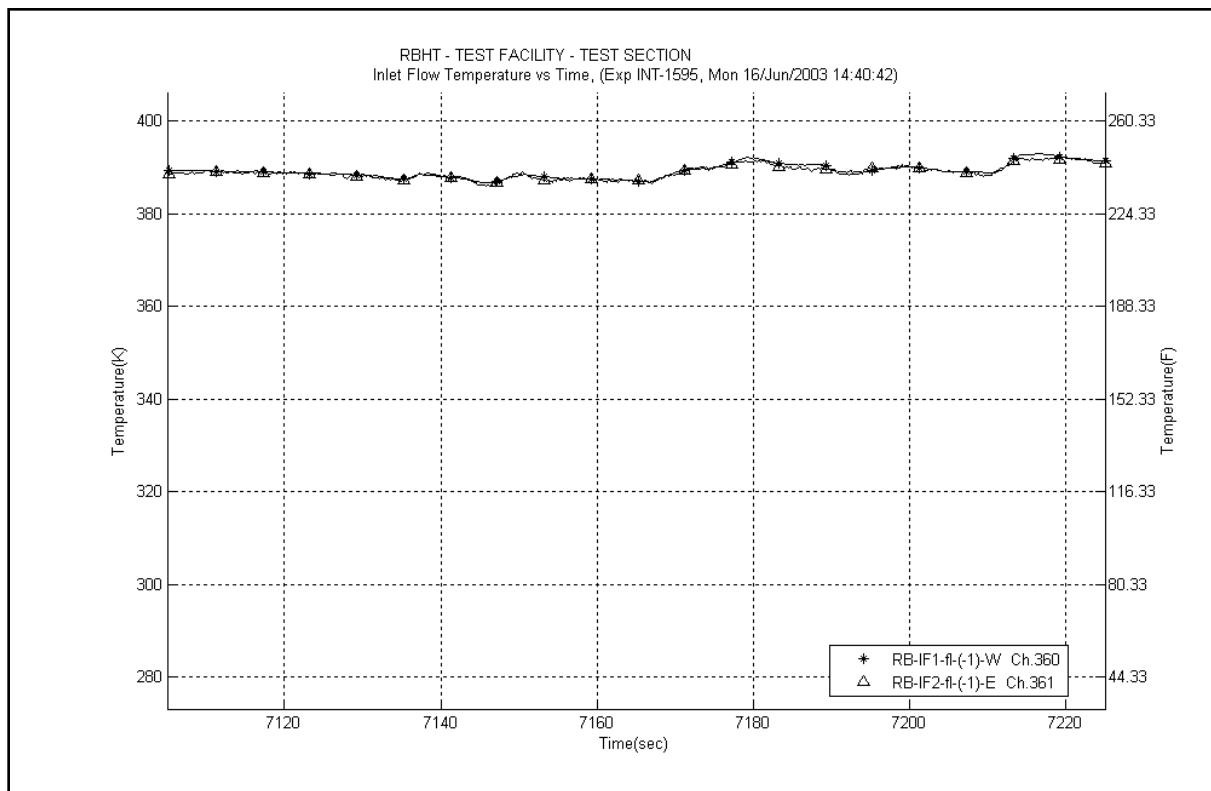


Figure A-237 Inlet Temperature Plot for Experiment 1595G

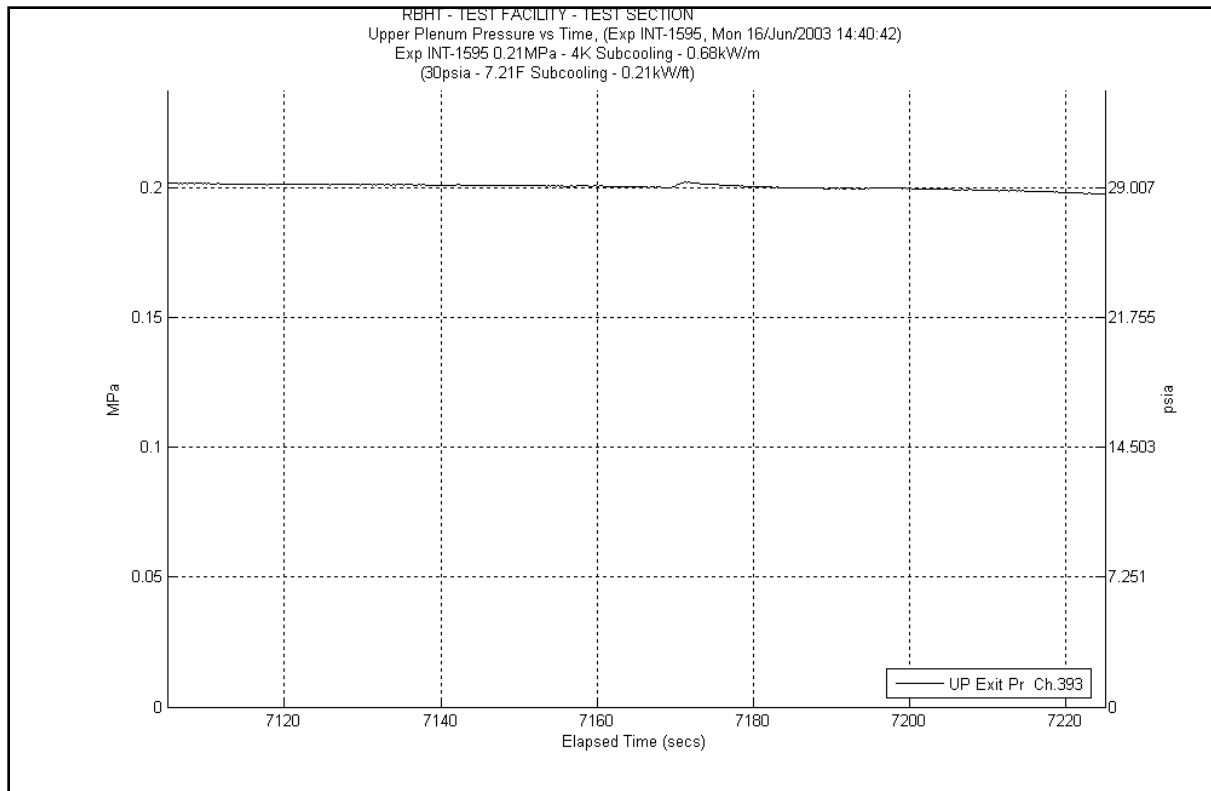


Figure A-238 System Pressure Plot for Experiment 1595G

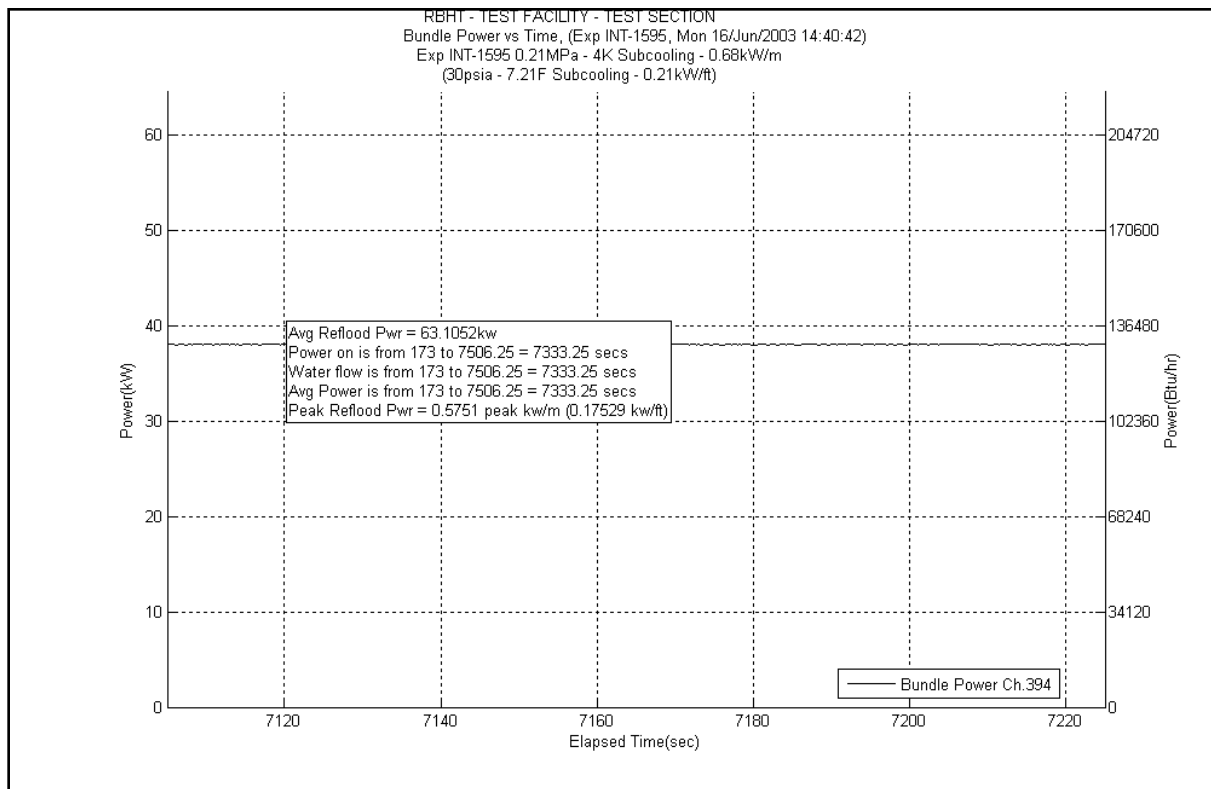


Figure A-239 Bundle Power Plot for Experiment 1595G

Table A-95 Data Results for RBHT Test 1595G for Time Period 7105 to 7225 seconds

Results for RBHT Test 1595																			
Valid Time Period 7105 to 7225 seconds																			
Collapsed Liquid Level = 66.932 inches = 1700.06 mm																			
(Z _{onset}) Onset of Significant Void = 6.5 inches = 165 mm																			
(Z _{2σ}) Two-Phase Level (Dryout) = 124.70 inches = 3167.38 mm																			
(S) Level Swell = 1.888																			
Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P _{local} (lb/ft ²)	P _{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.950	2.856	136.762	0.029	1.389	0.000	0.000	0.000	0.000	2.825	135.262	4322.825	206977.972	0.951	0.946	0.956
*	120-133	3048-3378	383	0.904	6.481	310.325	0.034	1.628	0.000	0.000	-0.096	-4.583	6.543	313.281	4329.368	207291.2525	0.903	0.898	0.908
*	108-120	2743-3048	382	0.757	15.133	724.589	0.032	1.532	0.000	0.000	3.151	150.888	11.95	572.169	4341.318	207863.4216	0.808	0.804	0.812
	100-108	2540-2743	381	0.760	9.992	478.418	0.035	1.676	0.013	0.622	0.000	0.000	9.941	475.978	4351.259	208339.3992	0.761	0.757	0.765
	97-100	2464-2540	380	0.660	5.297	253.631	0.014	0.670	0.009	0.431	0.000	0.000	5.274	252.520	4356.533	208591.9197	0.661	0.658	0.664
	93-97	2362-2464	379	0.652	7.234	346.381	0.018	0.862	0.012	0.575	0.000	0.000	7.201	344.786	4363.734	208936.7054	0.653	0.650	0.656
*	85-93	2159-2362	378	0.467	22.129	1059.532	0.034	1.628	0.024	1.149	8.681	415.638	13.39	641.117	4377.124	209577.822	0.678	0.675	0.681
	81-85	2057-2159	377	0.701	6.222	297.892	0.016	0.766	0.011	0.527	0.000	0.000	6.191	296.427	4383.315	209874.2487	0.702	0.698	0.706
	78-81	1981-2057	376	0.674	5.074	242.939	0.011	0.527	0.008	0.383	0.000	0.000	5.051	241.843	4388.366	210116.0919	0.676	0.673	0.679
	75-78	1905-1981	375	0.559	6.876	329.223	0.011	0.527	0.008	0.383	0.000	0.000	6.855	328.219	4395.221	210444.3111	0.56	0.557	0.563
	72-75	1829-1905	374	0.498	7.816	374.230	0.010	0.479	0.008	0.383	0.000	0.000	7.794	373.179	4403.015	210817.4898	0.5	0.498	0.503
*	67-72	1702-1829	373	0.394	15.736	753.434	0.016	0.766	0.013	0.622	4.427	211.956	11.28	540.089	4414.295	211357.5791	0.565	0.562	0.568
	63-67	1600-1702	372	0.630	7.686	368.014	0.012	0.575	0.010	0.479	0.000	0.000	7.661	366.811	4421.956	211724.3897	0.631	0.628	0.634
	60-63	1524-1600	371	0.437	8.777	420.232	0.008	0.383	0.007	0.335	0.000	0.000	8.757	419.287	4430.713	212143.6771	0.438	0.436	0.440
	57-60	1448-1524	370	0.425	8.958	428.935	0.008	0.383	0.007	0.335	0.000	0.000	8.939	428.002	4439.652	212571.6788	0.426	0.424	0.428
	53-57	1346-1448	369	0.407	12.329	590.314	0.010	0.479	0.009	0.431	0.000	0.000	12.31	589.406	4451.962	213161.0847	0.407	0.405	0.409
*	46-53	1168-1346	368	0.294	25.681	1229.614	0.016	0.766	0.015	0.718	6.390	305.956	19.26	922.174	4471.222	214083.2585	0.47	0.468	0.472
	43-46	1092-1168	367	0.532	7.291	349.116	0.006	0.287	0.006	0.287	0.000	0.000	7.276	348.377	4478.498	214431.6352	0.533	0.530	0.536
	37-43	940-1092	366	0.419	18.104	866.822	0.011	0.527	0.012	0.575	0.000	0.000	18.07	865.196	4496.568	215296.8315	0.42	0.418	0.422
*	25-37	635-940	365	0.262	46.013	2203.110	0.017	0.814	0.021	1.005	4.995	239.157	40.98	1962.133	4537.548	217258.9644	0.342	0.340	0.344
	13-25	330-635	364	0.264	45.852	2195.401	0.012	0.575	0.018	0.862	0.000	0.000	45.81	2193.395	4583.358	219452.359	0.265	0.264	0.266
*	0-13	0-330	363	0.080	62.138	2975.193	0.006	0.287	0.014	0.670	3.558	170.367	58.56	2803.868	4641.918	222256.2268	0.132	0.131	0.133

Table A-96 Energy Balance Results for RBHT Test 1595G for Time Period 7105 to 7225 seconds

Results for RBHT Test 1595 Valid Time Period 7105 to 7225 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1732.1093	5.4641	0.00E+00	0.00E+00	0.00E+00	1.23E-02	5.56E-03
0.25	6.35	1828.3376	5.7676	5.77E-03	5.80E-02	2.63E-02	1.22E-02	5.53E-03
0.50	12.70	1924.5659	6.0712	2.18E-02	2.19E-01	9.95E-02	1.20E-02	5.44E-03
0.75	19.05	2020.7942	6.3747	3.87E-02	3.89E-01	1.76E-01	1.18E-02	5.35E-03
1.00	25.40	2117.0225	6.6783	5.64E-02	5.67E-01	2.57E-01	1.16E-02	5.25E-03
1.25	31.75	2213.2508	6.9819	7.50E-02	7.53E-01	3.42E-01	1.13E-02	5.15E-03
1.50	38.10	2309.4791	7.2854	9.43E-02	9.48E-01	4.30E-01	1.11E-02	5.04E-03
1.75	44.45	2405.7074	7.589	1.15E-01	1.15E+00	5.22E-01	1.09E-02	4.93E-03
2.00	50.80	2501.9357	7.8925	1.36E-01	1.36E+00	6.18E-01	1.06E-02	4.81E-03
2.25	57.15	2598.164	8.1961	1.57E-01	1.58E+00	7.17E-01	1.03E-02	4.69E-03
2.50	63.50	2694.3923	8.4997	1.80E-01	1.81E+00	8.20E-01	1.01E-02	4.56E-03
2.75	69.85	2790.6206	8.8032	2.03E-01	2.04E+00	9.27E-01	9.77E-03	4.43E-03
3.00	76.20	2886.8489	9.1068	2.28E-01	2.29E+00	1.04E+00	9.47E-03	4.30E-03
3.25	82.55	2983.0772	9.4103	2.53E-01	2.54E+00	1.15E+00	9.16E-03	4.16E-03
3.50	88.90	3079.3055	9.7139	2.79E-01	2.80E+00	1.27E+00	8.85E-03	4.01E-03
3.75	95.25	3175.5338	10.017	3.06E-01	3.07E+00	1.39E+00	8.52E-03	3.86E-03
4.00	101.60	3271.7621	10.321	3.33E-01	3.35E+00	1.52E+00	8.18E-03	3.71E-03
4.25	107.95	3367.9904	10.625	3.62E-01	3.63E+00	1.65E+00	7.83E-03	3.55E-03
4.50	114.30	3464.2187	10.928	3.91E-01	3.93E+00	1.78E+00	7.47E-03	3.39E-03
4.75	120.65	3560.447	11.232	4.21E-01	4.23E+00	1.92E+00	7.10E-03	3.22E-03
5.00	127.00	3656.6753	11.535	4.52E-01	4.54E+00	2.06E+00	6.72E-03	3.05E-03
5.25	133.35	3752.9036	11.839	4.84E-01	4.86E+00	2.20E+00	6.33E-03	2.87E-03
5.50	139.70	3849.1319	12.142	5.16E-01	5.19E+00	2.35E+00	5.94E-03	2.69E-03
5.75	146.05	3945.3602	12.446	5.49E-01	5.52E+00	2.50E+00	5.53E-03	2.51E-03
6.00	152.40	4041.5885	12.749	5.84E-01	5.86E+00	2.66E+00	5.11E-03	2.32E-03
6.25	158.75	4137.8168	13.053	6.19E-01	6.22E+00	2.82E+00	4.68E-03	2.12E-03
6.50	165.10	4234.0451	13.357	6.54E-01	6.58E+00	2.98E+00	4.24E-03	1.92E-03
6.75	171.45	4330.2734	13.66	6.91E-01	6.94E+00	3.15E+00	3.79E-03	1.72E-03
7.00	177.80	4426.5016	13.964	7.29E-01	7.32E+00	3.32E+00	3.33E-03	1.51E-03
7.25	184.15	4522.7299	14.267	7.67E-01	7.71E+00	3.50E+00	2.86E-03	1.30E-03
7.50	190.50	4618.9582	14.571	8.06E-01	8.10E+00	3.67E+00	2.38E-03	1.08E-03
7.75	196.85	4715.1865	14.874	8.46E-01	8.50E+00	3.86E+00	1.89E-03	8.57E-04
8.00	203.20	4811.4148	15.178	8.87E-01	8.91E+00	4.04E+00	1.39E-03	6.31E-04
8.25	209.55	4907.6431	15.482	9.28E-01	9.33E+00	4.23E+00	8.81E-04	3.99E-04
8.50	215.90	5003.8714	15.785	9.71E-01	9.75E+00	4.42E+00	3.59E-04	1.63E-04
8.75	222.25	5100.0997	16.089	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
9.00	228.60	5196.328	16.392	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
9.25	234.95	4907.6431	15.482	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
9.50	241.30	4618.9582	14.571	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
9.75	247.65	4330.2734	13.66	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
10.00	254.00	4041.5885	12.749	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
10.25	260.35	3752.9036	11.839	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
10.50	266.70	3464.2187	10.928	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
10.75	273.05	3175.5338	10.017	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
11.00	279.40	2886.8489	9.1068	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
11.25	285.75	2598.164	8.1961	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
11.50	292.10	2309.4791	7.2854	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
11.75	298.45	2020.7942	6.3747	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00
12.00	304.80	1732.1093	5.4641	1.00E+00	1.00E+01	4.56E+00	0.00E+00	0.00E+00

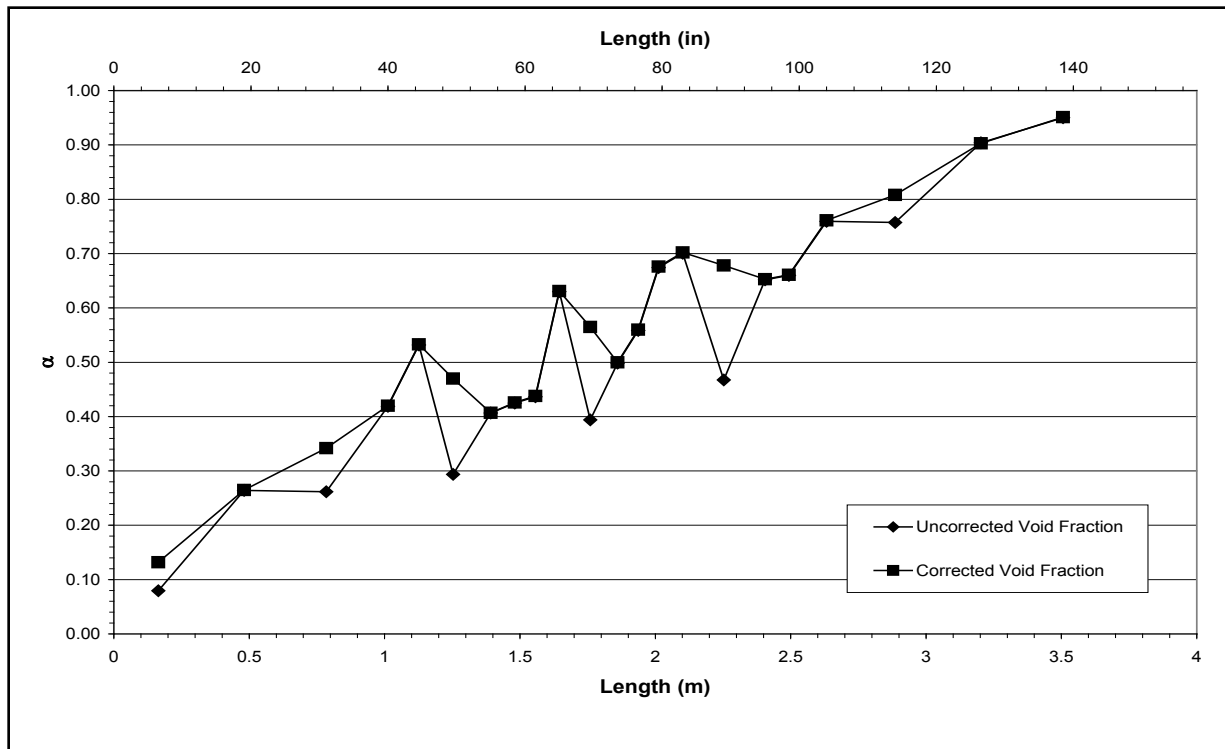


Figure A-240 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1595G for Time Period 7105 to 7225 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1616-A

Test Conditions

Date: 6/18/2003

Steady-state time window: 3150 – 3253 seconds

Inlet flow rate: 2.532 cm/sec (0.997 in./sec)

Inlet mass flow rate: 0.117 kg/sec (0.257 lbm/sec)

Inlet flow temperature: 381.3 K (226.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 81.40 kW

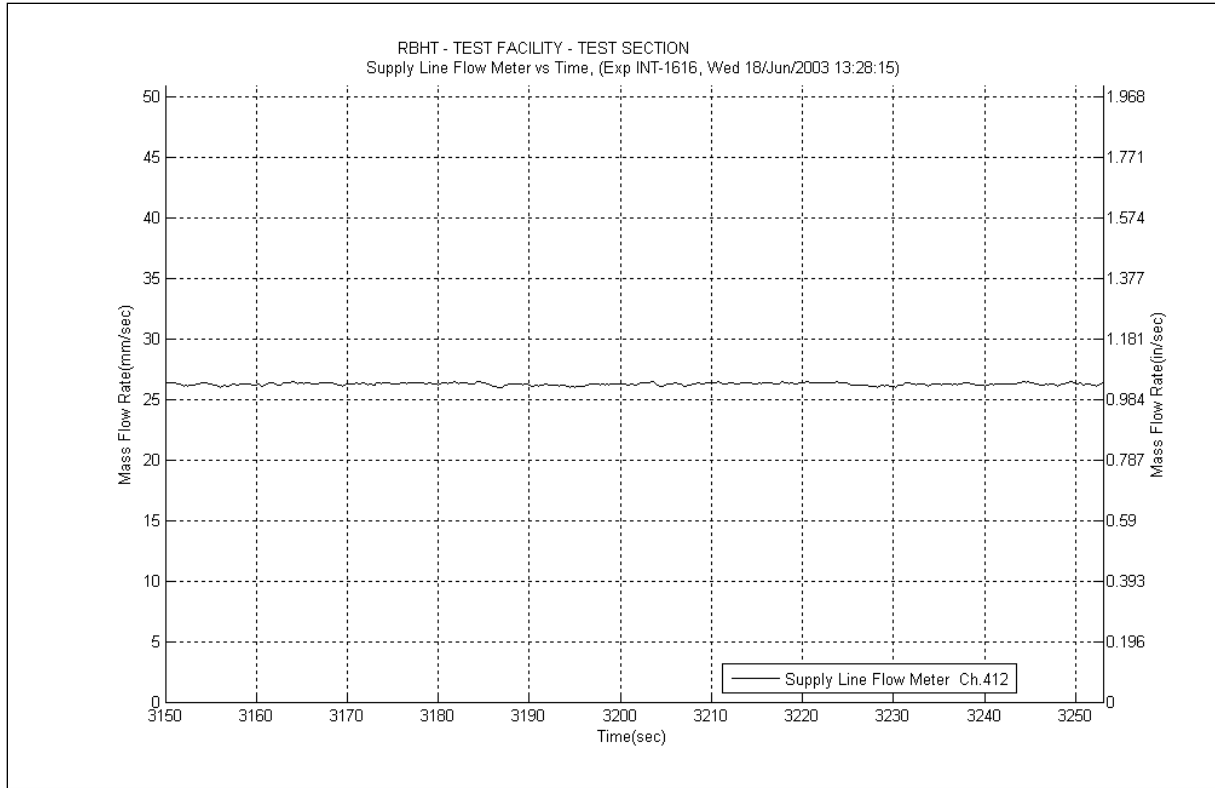


Figure A-241 Inlet Flow Plot for Experiment 1616A

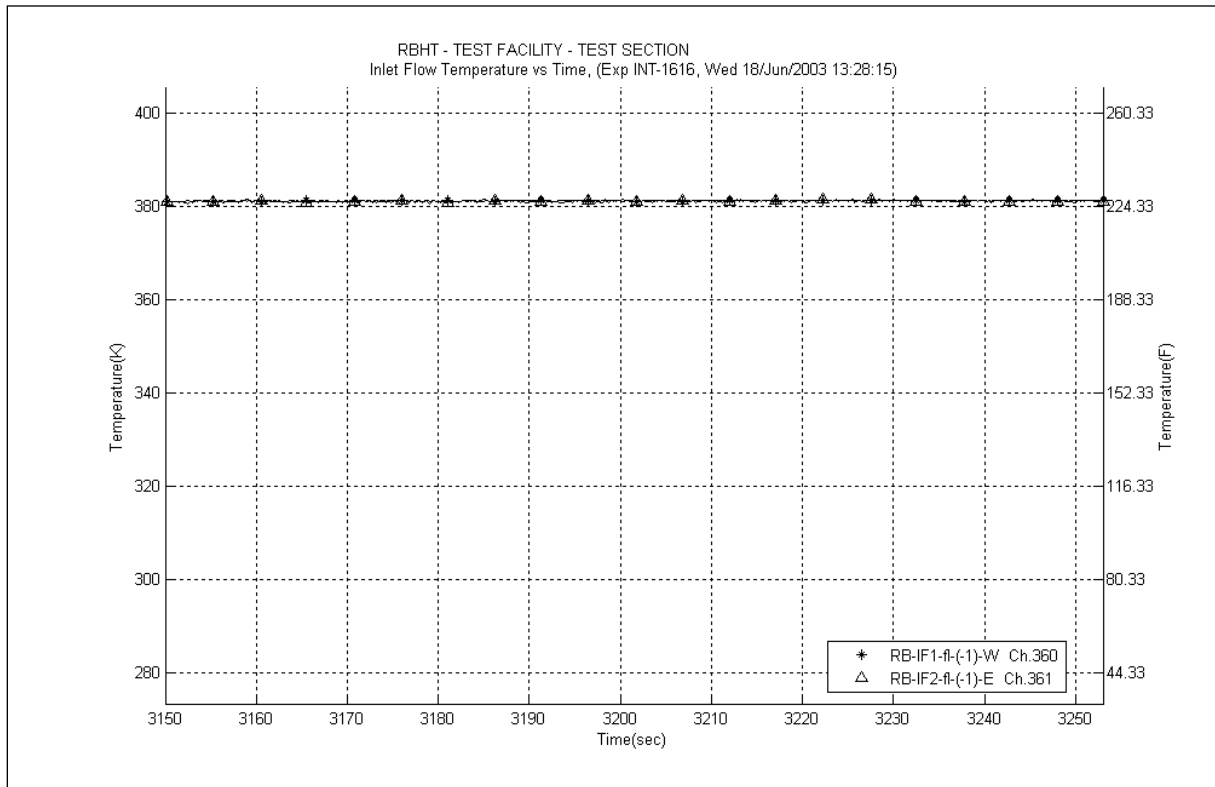


Figure A-242 Inlet Temperature Plot for Experiment 1616A

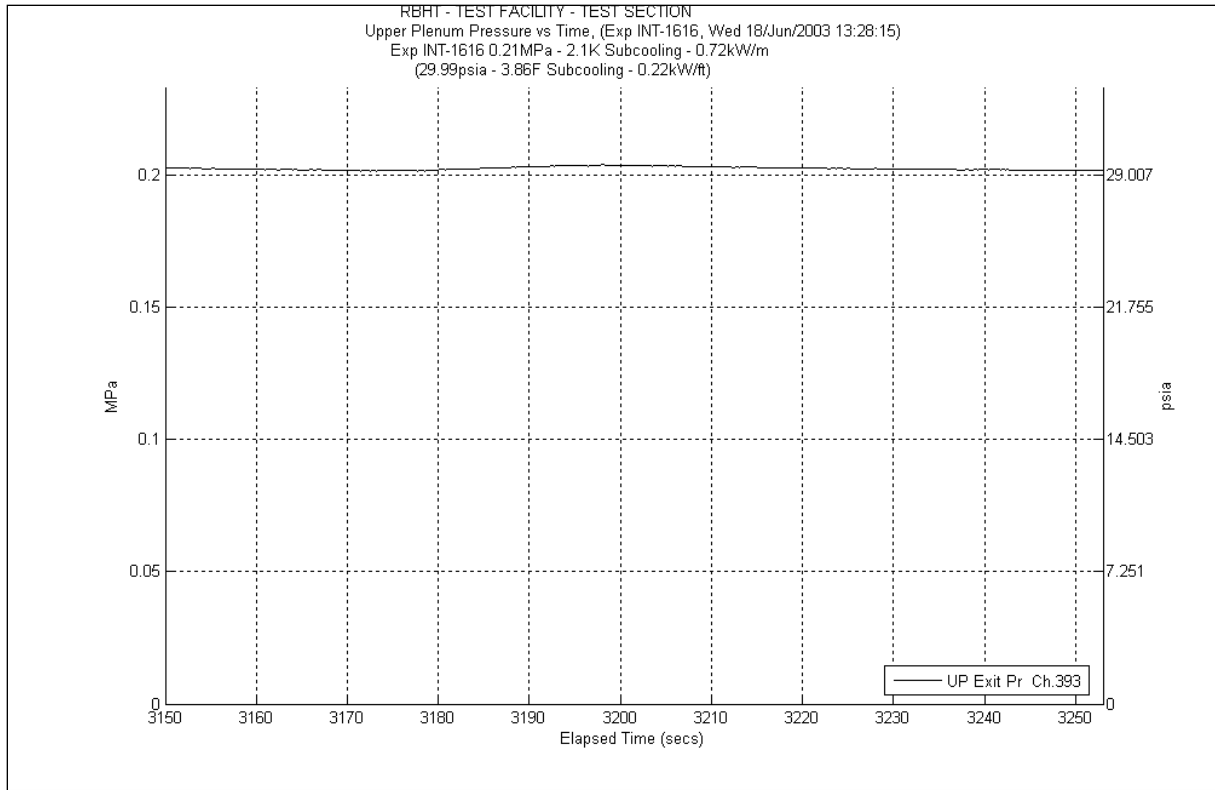


Figure A-243 System Pressure Plot for Experiment 1616A

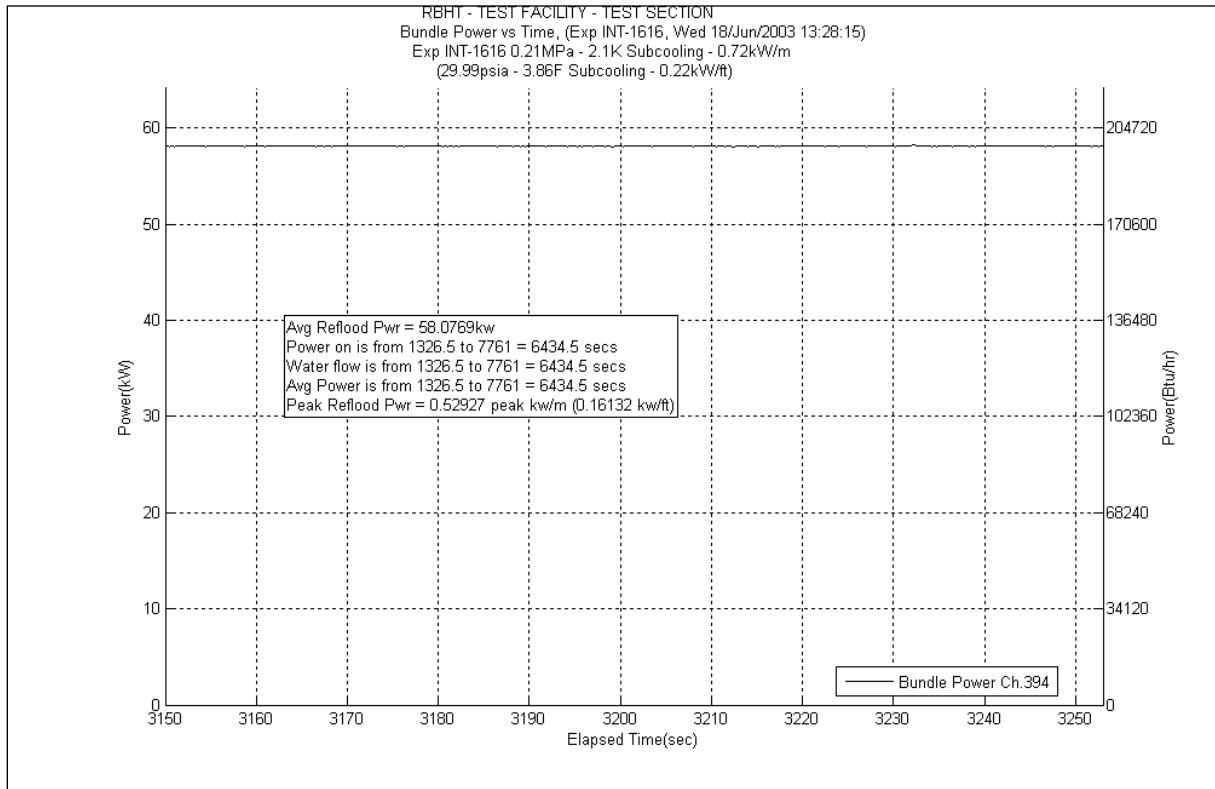


Figure A-244 Bundle Power Plot for Experiment 1616A

Table A-97 Data Results for RBHT Test 1616A for Time Period 3150 to 3253 seconds

Results for RBHT Test 1616
Valid Time Period 3150 to 3253 seconds
Collapsed Liquid Level = 74.904 inches = 1902.57 mm
(Z_{OSV}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lb/ft^2)	$\Delta P_{unconnected}$ (Pa)	ΔP_{fric} (lb/ft^2)	ΔP_{fric} (Pa)	ΔP_{acc} (lb/ft^2)	ΔP_{acc} (Pa)	ΔP_{grid} (lb/ft^2)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft^2)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft^2)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.751	14.204	680.080	0.747	35.767	0.163	7.804	0.000	0.000	13.29	636.329	4333.29	207479.0389	0.767	0.763	0.771
*	120-133	3048-3378	383	0.744	17.283	827.534	0.830	39.741	0.291	13.933	0.442	21.182	15.72	752.678	4349.01	208231.7165	0.767	0.763	0.771
*	108-120	2743-3048	382	0.678	20.093	962.058	0.696	33.325	0.363	17.381	4.514	216.131	14.52	695.221	4363.53	208926.9378	0.767	0.763	0.771
	100-108	2540-2743	381	0.750	10.376	496.819	0.418	20.014	0.265	12.688	0.000	0.000	9.688	463.864	4373.218	209390.8018	0.767	0.763	0.771
	97-100	2464-2540	380	0.667	5.188	248.409	0.147	7.038	0.096	4.597	0.000	0.000	4.943	236.672	4378.161	209627.4739	0.683	0.680	0.686
	93-97	2362-2464	379	0.672	6.808	325.991	0.187	8.954	0.125	5.985	0.000	0.000	6.495	310.982	4384.656	209938.4561	0.687	0.684	0.690
*	85-93	2159-2362	378	0.494	21.007	1005.822	0.347	16.614	0.240	11.491	8.250	395.013	12.17	582.703	4396.826	210521.1589	0.707	0.703	0.711
	81-85	2057-2159	377	0.714	5.946	284.713	0.160	7.661	0.115	5.506	0.000	0.000	5.672	271.577	4402.498	210792.7357	0.727	0.723	0.731
	78-81	1981-2057	376	0.750	3.895	186.493	0.114	5.458	0.084	4.022	0.000	0.000	3.696	176.965	4406.194	210969.7011	0.763	0.759	0.767
	75-78	1905-1981	375	0.599	6.248	299.136	0.109	5.219	0.082	3.926	0.000	0.000	6.054	289.867	4412.248	211259.5682	0.611	0.608	0.614
	72-75	1829-1905	374	0.529	7.333	351.105	0.104	4.980	0.080	3.830	0.000	0.000	7.144	342.057	4419.392	211601.6247	0.541	0.538	0.544
*	67-72	1702-1829	373	0.429	14.832	710.167	0.162	7.757	0.130	6.224	4.190	200.625	10.35	495.561	4429.742	212097.1854	0.601	0.598	0.604
	63-67	1600-1702	372	0.651	7.260	347.624	0.120	5.746	0.100	4.788	0.000	0.000	7.04	337.077	4436.782	212434.2624	0.661	0.658	0.664
	60-63	1524-1600	371	0.479	8.112	388.404	0.084	4.022	0.073	3.495	0.000	0.000	7.953	380.792	4444.735	212815.0541	0.489	0.487	0.491
	57-60	1448-1524	370	0.457	8.465	405.312	0.079	3.783	0.071	3.399	0.000	0.000	8.314	398.076	4453.049	213213.1306	0.466	0.464	0.468
	53-57	1346-1448	369	0.428	11.877	568.681	0.098	4.692	0.092	4.405	0.000	0.000	11.68	559.241	4464.729	213772.372	0.437	0.435	0.439
*	46-53	1168-1346	368	0.325	24.554	1175.655	0.150	7.182	0.152	7.278	5.062	242.373	19.19	918.822	4483.919	214691.1941	0.472	0.470	0.474
	43-46	1092-1168	367	0.499	7.811	373.982	0.056	2.681	0.062	2.969	0.000	0.000	7.69	368.199	4491.609	215059.3933	0.506	0.503	0.509
	37-43	940-1092	366	0.394	18.883	904.120	0.097	4.644	0.118	5.650	0.000	0.000	18.66	893.446	4510.269	215952.8389	0.401	0.399	0.403
*	25-37	635-940	365	0.230	47.992	2297.848	0.130	6.224	0.214	10.246	0.138	6.587	47.51	2274.791	4557.779	218227.6299	0.237	0.236	0.238
	13-25	330-635	364	0.072	57.854	2770.050	0.050	2.394	0.088	4.213	0.000	0.000	57.7	2762.691	4615.479	220990.3207	0.074	0.070	0.078
*	0-13	0-330	363	0.043	64.631	3094.548	0.004	0.192	0.000	0.000	-0.373	-17.860	65	3112.217	4680.479	224102.5374	0.037	0.035	0.039

Table A-98 Energy Balance Results for RBHT Test 1616A for Time Period 3150 to 3253 seconds

Results for RBHT Test 1616 Valid Time Period 3150 to 3253 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2626.4439	8.2853	0.00E+00	0.00E+00	0.00E+00	8.34E-02	3.78E-02
0.25	6.35	2772.3574	8.7456	0.00E+00	0.00E+00	0.00E+00	8.34E-02	3.78E-02
0.50	12.70	2918.271	9.2059	0.00E+00	0.00E+00	0.00E+00	8.34E-02	3.78E-02
0.75	19.05	3064.1845	9.6662	0.00E+00	0.00E+00	0.00E+00	8.34E-02	3.78E-02
1.00	25.40	3210.0981	10.126	0.00E+00	0.00E+00	0.00E+00	8.34E-02	3.78E-02
1.25	31.75	3356.0116	10.587	0.00E+00	0.00E+00	0.00E+00	8.34E-02	3.78E-02
1.50	38.10	3501.9252	11.047	0.00E+00	0.00E+00	0.00E+00	8.34E-02	3.78E-02
1.75	44.45	3647.8387	11.507	2.28E-03	1.53E-01	6.96E-02	8.32E-02	3.77E-02
2.00	50.80	3793.7522	11.968	6.97E-03	4.70E-01	2.13E-01	8.28E-02	3.75E-02
2.25	57.15	3939.6658	12.428	1.18E-02	7.98E-01	3.62E-01	8.24E-02	3.74E-02
2.50	63.50	4085.5793	12.888	1.69E-02	1.14E+00	5.17E-01	8.19E-02	3.72E-02
2.75	69.85	4231.4929	13.349	2.21E-02	1.49E+00	6.77E-01	8.15E-02	3.70E-02
3.00	76.20	4377.4064	13.809	2.76E-02	1.86E+00	8.43E-01	8.11E-02	3.68E-02
3.25	82.55	4523.32	14.269	3.32E-02	2.24E+00	1.01E+00	8.06E-02	3.66E-02
3.50	88.90	4669.2335	14.729	3.90E-02	2.63E+00	1.19E+00	8.01E-02	3.63E-02
3.75	95.25	4815.1471	15.19	4.50E-02	3.03E+00	1.37E+00	7.96E-02	3.61E-02
4.00	101.60	4961.0606	15.65	5.11E-02	3.45E+00	1.56E+00	7.91E-02	3.59E-02
4.25	107.95	5106.9742	16.11	5.75E-02	3.87E+00	1.76E+00	7.86E-02	3.56E-02
4.50	114.30	5252.8877	16.571	6.40E-02	4.31E+00	1.96E+00	7.80E-02	3.54E-02
4.75	120.65	5398.8013	17.031	7.07E-02	4.77E+00	2.16E+00	7.75E-02	3.51E-02
5.00	127.00	5544.7148	17.491	7.76E-02	5.23E+00	2.37E+00	7.69E-02	3.49E-02
5.25	133.35	5690.6284	17.951	8.47E-02	5.71E+00	2.59E+00	7.63E-02	3.46E-02
5.50	139.70	5836.5419	18.412	9.19E-02	6.20E+00	2.81E+00	7.57E-02	3.43E-02
5.75	146.05	5982.4555	18.872	9.94E-02	6.70E+00	3.04E+00	7.51E-02	3.41E-02
6.00	152.40	6128.369	19.332	1.07E-01	7.21E+00	3.27E+00	7.44E-02	3.38E-02
6.25	158.75	6274.2826	19.793	1.15E-01	7.74E+00	3.51E+00	7.38E-02	3.35E-02
6.50	165.10	6420.1961	20.253	1.23E-01	8.28E+00	3.75E+00	7.31E-02	3.32E-02
6.75	171.45	6566.1097	20.713	1.31E-01	8.83E+00	4.01E+00	7.24E-02	3.29E-02
7.00	177.80	6712.0232	21.174	1.39E-01	9.40E+00	4.26E+00	7.17E-02	3.25E-02
7.25	184.15	6857.9368	21.634	1.48E-01	9.98E+00	4.53E+00	7.10E-02	3.22E-02
7.50	190.50	7003.8503	22.094	1.57E-01	1.06E+01	4.79E+00	7.03E-02	3.19E-02
7.75	196.85	7149.7638	22.554	1.66E-01	1.12E+01	5.06E+00	6.95E-02	3.15E-02
8.00	203.20	7295.6774	23.015	1.75E-01	1.18E+01	5.34E+00	6.88E-02	3.12E-02
8.25	209.55	7441.5909	23.475	1.84E-01	1.24E+01	5.63E+00	6.80E-02	3.09E-02
8.50	215.90	7587.5045	23.935	1.94E-01	1.30E+01	5.92E+00	6.72E-02	3.05E-02
8.75	222.25	7733.418	24.396	2.03E-01	1.37E+01	6.21E+00	6.64E-02	3.01E-02
9.00	228.60	7879.3316	24.856	2.13E-01	1.44E+01	6.51E+00	6.56E-02	2.98E-02
9.25	234.95	7441.5909	23.475	2.23E-01	1.50E+01	6.81E+00	6.48E-02	2.94E-02
9.50	241.30	7003.8503	22.094	2.32E-01	1.56E+01	7.08E+00	6.40E-02	2.90E-02
9.75	247.65	6566.1097	20.713	2.40E-01	1.62E+01	7.35E+00	6.33E-02	2.87E-02
10.00	254.00	6128.369	19.332	2.48E-01	1.67E+01	7.59E+00	6.27E-02	2.84E-02
10.25	260.35	5690.6284	17.951	2.56E-01	1.72E+01	7.82E+00	6.20E-02	2.81E-02
10.50	266.70	5252.8877	16.571	2.63E-01	1.77E+01	8.03E+00	6.15E-02	2.79E-02
10.75	273.05	4815.1471	15.19	2.69E-01	1.81E+01	8.23E+00	6.09E-02	2.76E-02
11.00	279.40	4377.4064	13.809	2.75E-01	1.85E+01	8.40E+00	6.04E-02	2.74E-02
11.25	285.75	3939.6658	12.428	2.80E-01	1.89E+01	8.56E+00	6.00E-02	2.72E-02
11.50	292.10	3501.9252	11.047	2.85E-01	1.92E+01	8.71E+00	5.96E-02	2.70E-02
11.75	298.45	3064.1845	9.6662	2.89E-01	1.95E+01	8.83E+00	5.93E-02	2.69E-02
12.00	304.80	2626.4439	8.2853	2.92E-01	1.97E+01	8.94E+00	5.90E-02	2.68E-02

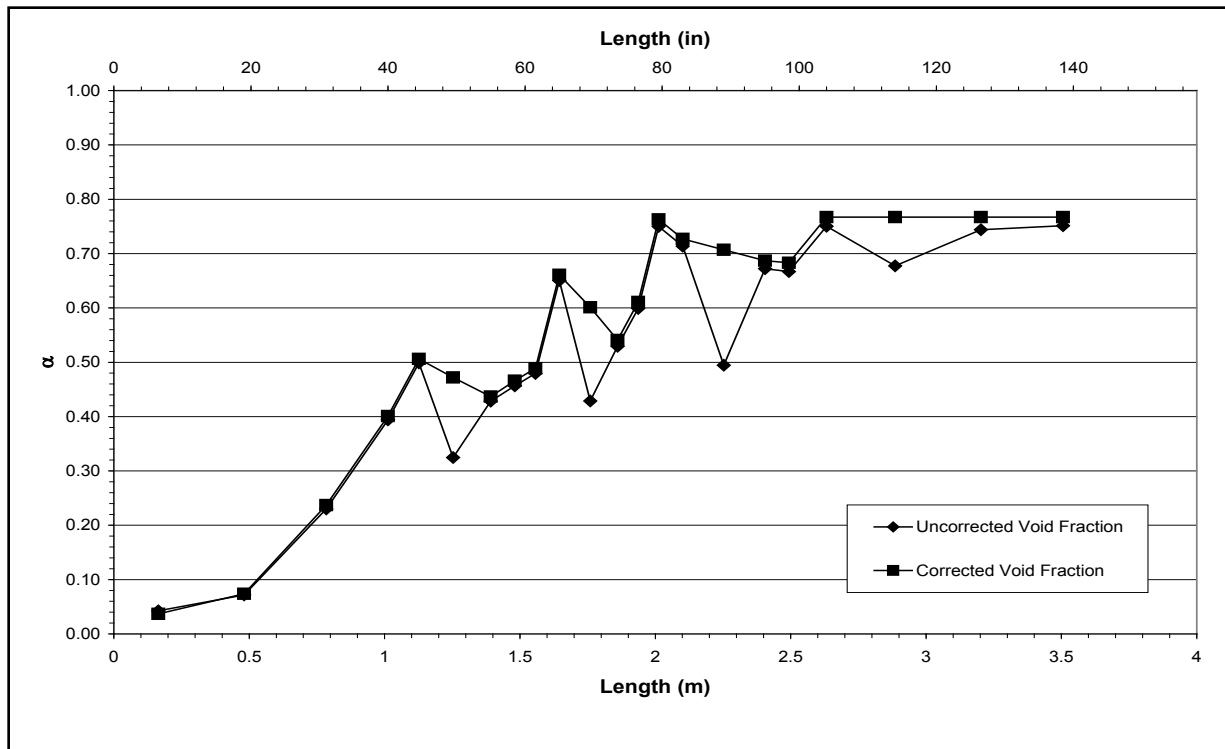


Figure A-245 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1616A for Time Period 3150 to 3253 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1616-B

Test Conditions

Date: 6/18/2003

Steady-state time window: 3570 – 3659 seconds

Inlet flow rate: 2.553 cm/sec (1.005 in./sec)

Inlet mass flow rate: 0.117 kg/sec (0.259 lbm/sec)

Inlet flow temperature: 382.2 K (228.2 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.93 kW

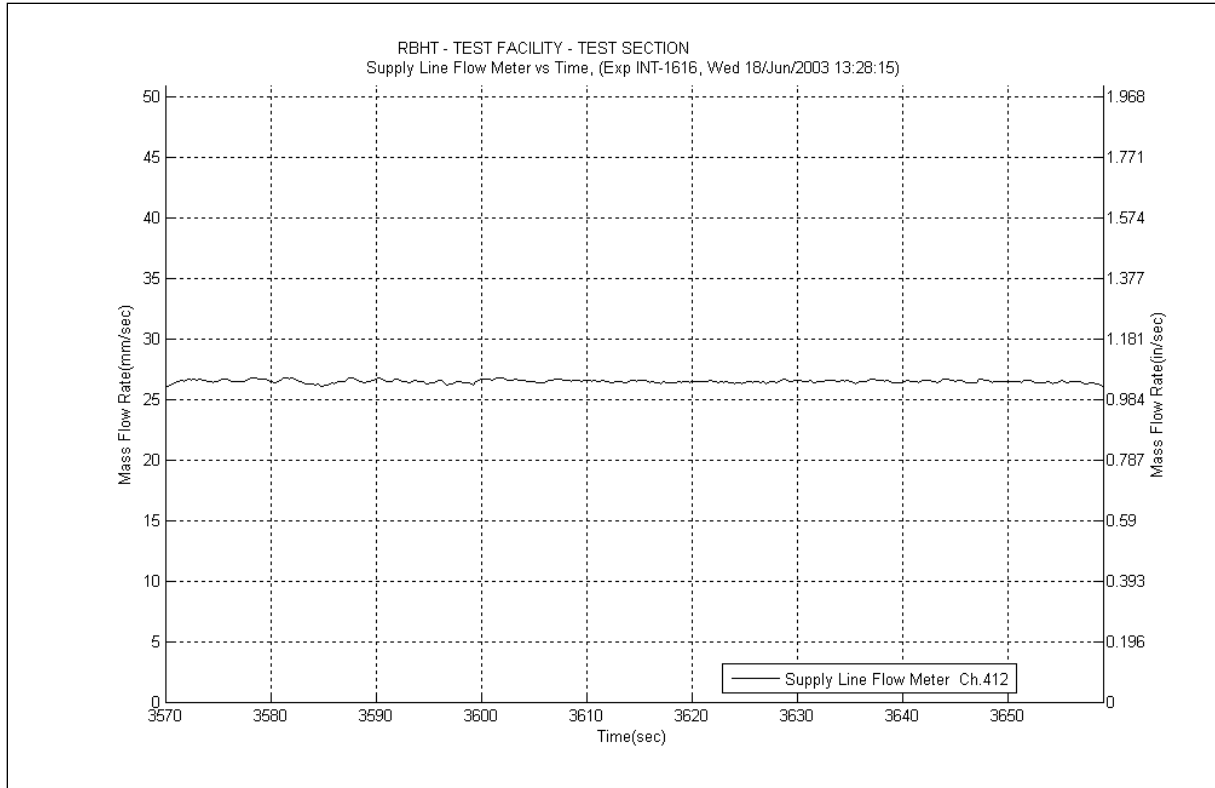


Figure A-246 Inlet Flow Plot for Experiment 1616B

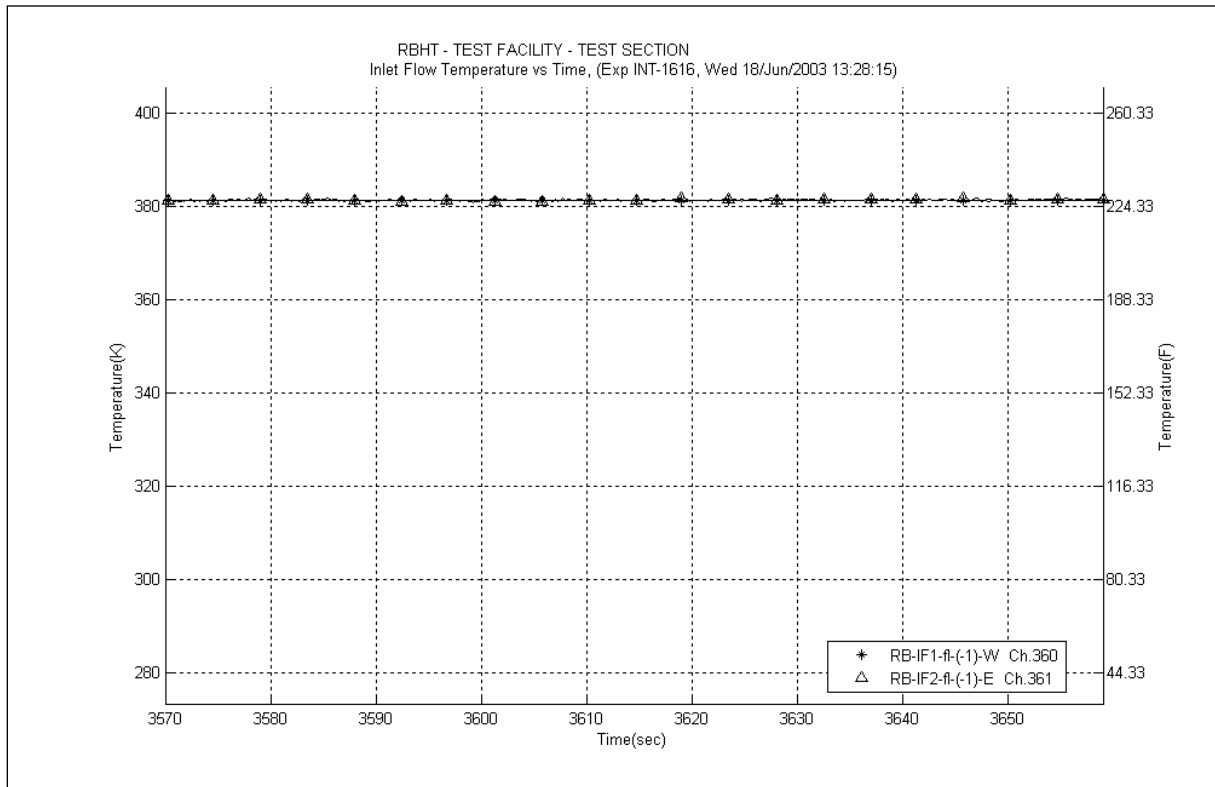


Figure A-247 Inlet Temperature Plot for Experiment 1616B

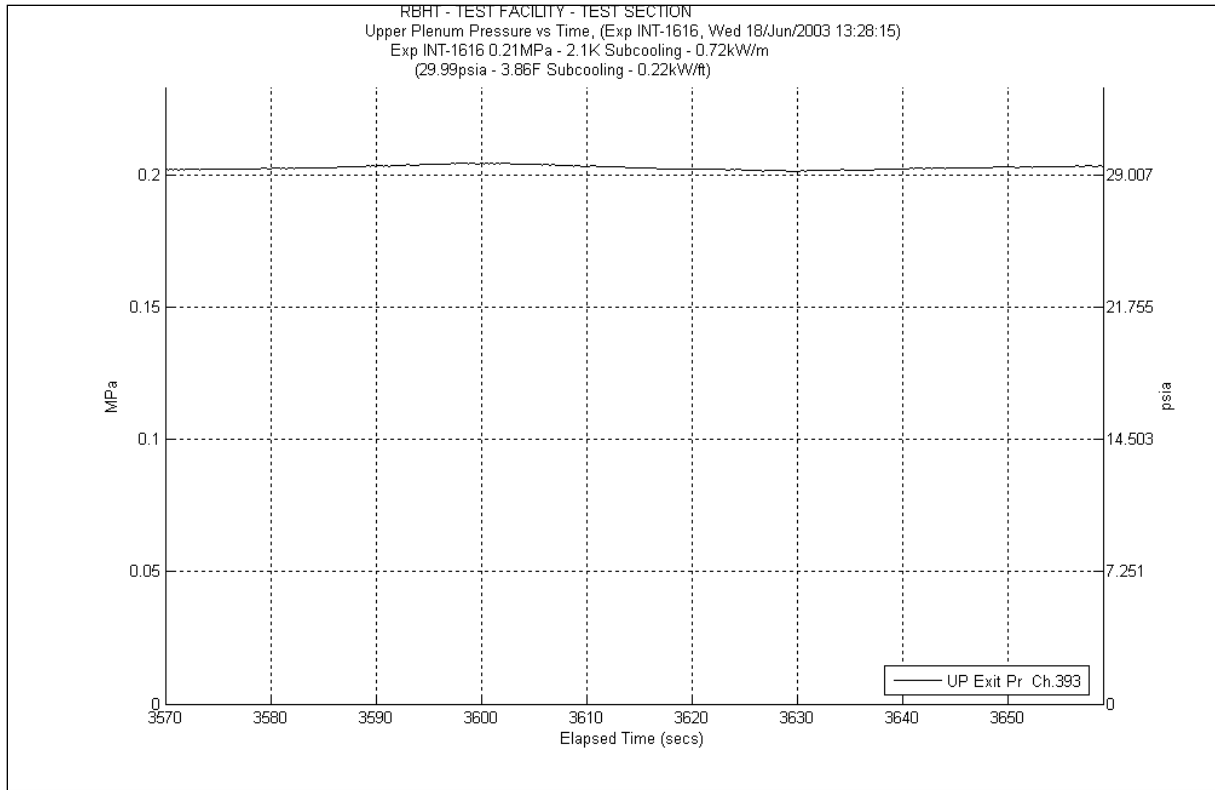


Figure A-248 System Pressure Plot for Experiment 1616B

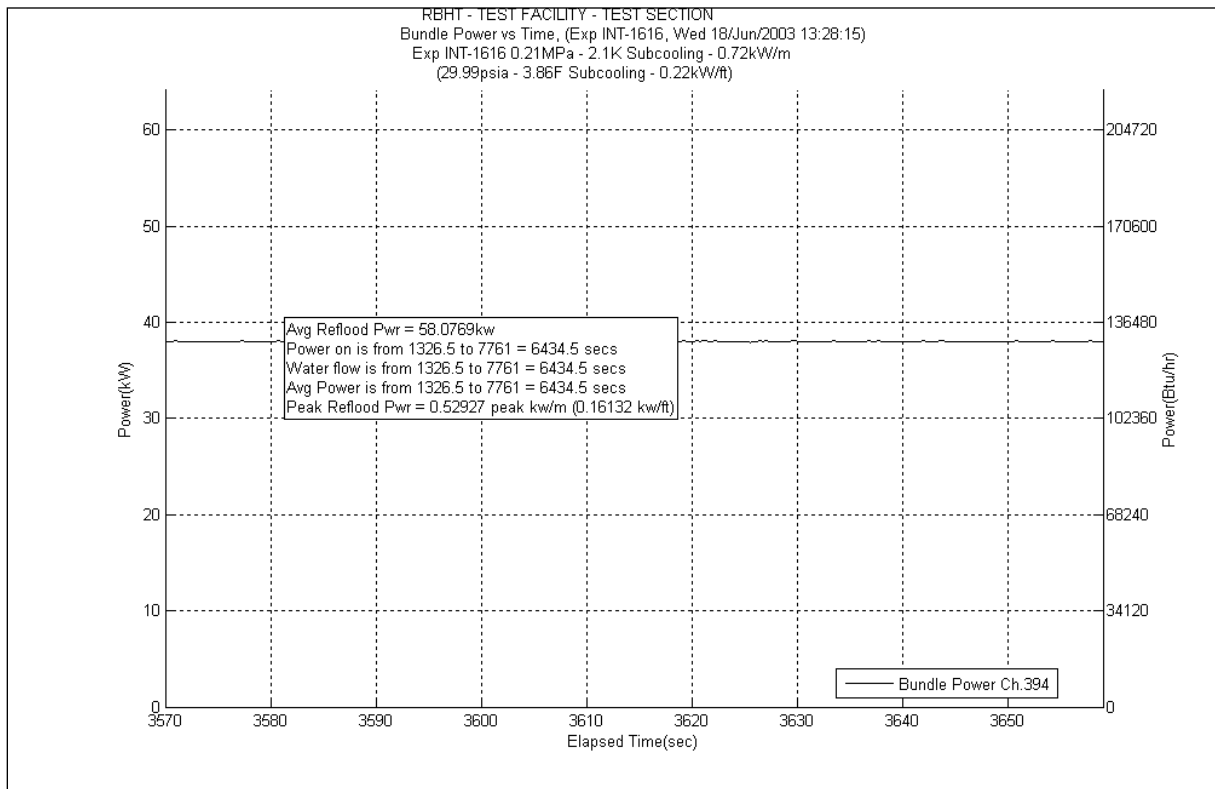


Figure A-249 Bundle Power Plot for Experiment 1616B

Table A-99 Data Results for RBHT Test 1616B for Time Period 3570 to 3659 seconds

Results for RBHT Test 1616
Valid Time Period 3570 to 3659 seconds
Collapsed Liquid Level = 91.229 inches = 2317.22 mm
(Z_{csl}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lb/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.600	22.871	1095.090	0.537	25.712	0.109	5.219	0.000	0.000	22.22	1063.899	4342.22	207906.6096	0.611	0.608	0.614
*	120-133	3048-3378	383	0.645	23.952	1146.811	0.598	28.632	0.194	9.289	-2.730	-130.730	25.89	1239.620	4368.11	209146.2294	0.617	0.614	0.620
*	108-120	2743-3048	382	0.543	28.470	1363.143	0.501	23.988	0.242	11.587	4.527	216.746	23.2	1110.822	4391.31	210257.0514	0.628	0.625	0.631
	100-108	2540-2743	381	0.622	15.725	752.936	0.301	14.412	0.177	8.475	0.000	0.000	15.24	729.695	4406.55	210986.7465	0.633	0.630	0.636
	97-100	2464-2540	380	0.486	8.003	383.182	0.106	5.075	0.064	3.064	0.000	0.000	7.833	375.046	4414.383	211361.7925	0.497	0.495	0.499
	93-97	2362-2464	379	0.522	9.924	475.185	0.135	6.464	0.083	3.974	0.000	0.000	9.704	464.630	4424.087	211826.4226	0.533	0.530	0.536
*	85-93	2159-2362	378	0.396	25.115	1202.510	0.248	11.874	0.160	7.661	7.227	346.028	17.48	836.947	4441.567	212663.3694	0.579	0.576	0.582
	81-85	2057-2159	377	0.616	7.972	381.690	0.114	5.458	0.077	3.687	0.000	0.000	7.777	372.365	4449.344	213035.7342	0.626	0.623	0.629
	78-81	1981-2057	376	0.614	6.019	288.195	0.081	3.878	0.056	2.681	0.000	0.000	5.879	281.488	4455.223	213317.2222	0.623	0.620	0.626
	75-78	1905-1981	375	0.460	8.413	402.826	0.077	3.687	0.055	2.633	0.000	0.000	8.279	396.401	4463.502	213713.6229	0.468	0.466	0.470
	72-75	1829-1905	374	0.355	10.054	481.402	0.073	3.495	0.054	2.586	0.000	0.000	9.925	475.212	4473.427	214188.8344	0.363	0.361	0.365
*	67-72	1702-1829	373	0.375	16.229	777.056	0.113	5.410	0.087	4.166	1.279	61.246	14.75	706.234	4488.177	214895.0682	0.432	0.430	0.434
	63-67	1600-1702	372	0.494	10.516	503.532	0.083	3.974	0.067	3.208	0.000	0.000	10.37	496.518	4498.547	215391.5865	0.501	0.498	0.504
	60-63	1524-1600	371	0.347	10.174	487.121	0.058	2.777	0.049	2.346	0.000	0.000	10.06	481.675	4508.607	215873.2619	0.354	0.352	0.356
	57-60	1448-1524	370	0.335	10.366	496.321	0.054	2.586	0.047	2.250	0.000	0.000	10.26	491.251	4518.867	216364.5133	0.341	0.339	0.343
	53-57	1346-1448	369	0.317	14.193	679.582	0.065	3.112	0.061	2.921	0.000	0.000	14.06	673.196	4532.927	217037.7097	0.323	0.321	0.325
*	46-53	1168-1346	368	0.233	27.893	1335.542	0.097	4.644	0.102	4.884	3.154	151.032	24.54	1174.982	4557.467	218212.6912	0.325	0.323	0.327
	43-46	1092-1168	367	0.322	10.563	505.770	0.035	1.676	0.041	1.963	0.000	0.000	10.49	502.264	4567.957	218714.9551	0.327	0.325	0.329
	37-43	940-1092	366	0.222	24.248	1160.984	0.056	2.681	0.079	3.783	0.000	0.000	24.1	1153.914	4592.057	219868.8693	0.226	0.225	0.227
*	25-37	635-940	365	0.068	58.072	2780.493	0.059	2.825	0.114	5.458	4.309	206.307	53.59	2565.903	4645.647	222434.7723	0.14	0.139	0.141
	13-25	330-635	364	0.053	59.007	2825.252	0.004	0.192	0.000	0.000	0.000	0.000	58.98	2823.978	4704.627	225258.7498	0.053	0.050	0.056
*	0-13	0-330	363	0.042	64.662	3096.040	0.004	0.192	0.000	0.000	-1.032	-49.405	65.69	3145.254	4770.317	228404.0039	0.027	0.026	0.028

Table A-100 Energy Balance Results for RBHT Test 1616B for Time Period 3570 to 3659 seconds

Results for RBHT Test 1616 Valid Time Period 3570 to 3659 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1739.5551	5.4876	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
0.25	6.35	1836.197	5.7924	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
0.50	12.70	1932.839	6.0973	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
0.75	19.05	2029.4809	6.4021	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
1.00	25.40	2126.1229	6.707	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
1.25	31.75	2222.7648	7.0119	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
1.50	38.10	2319.4067	7.3167	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
1.75	44.45	2416.0487	7.6216	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
2.00	50.80	2512.6906	7.9265	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
2.25	57.15	2609.3326	8.2313	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
2.50	63.50	2705.9745	8.5362	2.65E-03	1.80E-01	8.17E-02	8.38E-02	3.80E-02
2.75	69.85	2802.6165	8.8411	6.10E-03	4.14E-01	1.88E-01	8.35E-02	3.79E-02
3.00	76.20	2899.2584	9.1459	9.66E-03	6.56E-01	2.98E-01	8.32E-02	3.78E-02
3.25	82.55	2995.9004	9.4508	1.34E-02	9.06E-01	4.11E-01	8.29E-02	3.76E-02
3.50	88.90	3092.5423	9.7556	1.72E-02	1.16E+00	5.28E-01	8.26E-02	3.75E-02
3.75	95.25	3189.1843	10.061	2.11E-02	1.43E+00	6.49E-01	8.23E-02	3.73E-02
4.00	101.60	3285.8262	10.365	2.51E-02	1.71E+00	7.74E-01	8.19E-02	3.72E-02
4.25	107.95	3382.4682	10.67	2.93E-02	1.99E+00	9.02E-01	8.16E-02	3.70E-02
4.50	114.30	3479.1101	10.975	3.36E-02	2.28E+00	1.03E+00	8.12E-02	3.68E-02
4.75	120.65	3575.7521	11.28	3.80E-02	2.58E+00	1.17E+00	8.08E-02	3.67E-02
5.00	127.00	3672.394	11.585	4.25E-02	2.89E+00	1.31E+00	8.05E-02	3.65E-02
5.25	133.35	3769.036	11.89	4.72E-02	3.20E+00	1.45E+00	8.01E-02	3.63E-02
5.50	139.70	3865.6779	12.195	5.20E-02	3.53E+00	1.60E+00	7.97E-02	3.61E-02
5.75	146.05	3962.3199	12.499	5.69E-02	3.86E+00	1.75E+00	7.93E-02	3.60E-02
6.00	152.40	4058.9618	12.804	6.19E-02	4.20E+00	1.91E+00	7.88E-02	3.58E-02
6.25	158.75	4155.6038	13.109	6.70E-02	4.55E+00	2.06E+00	7.84E-02	3.56E-02
6.50	165.10	4252.2457	13.414	7.23E-02	4.91E+00	2.23E+00	7.80E-02	3.54E-02
6.75	171.45	4348.8877	13.719	7.76E-02	5.27E+00	2.39E+00	7.75E-02	3.52E-02
7.00	177.80	4445.5296	14.024	8.31E-02	5.64E+00	2.56E+00	7.71E-02	3.49E-02
7.25	184.15	4542.1715	14.329	8.88E-02	6.03E+00	2.73E+00	7.66E-02	3.47E-02
7.50	190.50	4638.8135	14.633	9.45E-02	6.42E+00	2.91E+00	7.61E-02	3.45E-02
7.75	196.85	4735.4554	14.938	1.00E-01	6.82E+00	3.09E+00	7.56E-02	3.43E-02
8.00	203.20	4832.0974	15.243	1.06E-01	7.22E+00	3.27E+00	7.51E-02	3.41E-02
8.25	209.55	4928.7393	15.548	1.12E-01	7.63E+00	3.46E+00	7.46E-02	3.38E-02
8.50	215.90	5025.3813	15.853	1.19E-01	8.06E+00	3.66E+00	7.41E-02	3.36E-02
8.75	222.25	5122.0232	16.158	1.25E-01	8.49E+00	3.85E+00	7.35E-02	3.34E-02
9.00	228.60	5218.6652	16.463	1.32E-01	8.93E+00	4.05E+00	7.30E-02	3.31E-02
9.25	234.95	4928.7393	15.548	1.38E-01	9.36E+00	4.24E+00	7.25E-02	3.29E-02
9.50	241.30	4638.8135	14.633	1.44E-01	9.76E+00	4.43E+00	7.20E-02	3.26E-02
9.75	247.65	4348.8877	13.719	1.49E-01	1.01E+01	4.60E+00	7.15E-02	3.24E-02
10.00	254.00	4058.9618	12.804	1.55E-01	1.05E+01	4.76E+00	7.10E-02	3.22E-02
10.25	260.35	3769.036	11.89	1.60E-01	1.08E+01	4.92E+00	7.06E-02	3.20E-02
10.50	266.70	3479.1101	10.975	1.64E-01	1.11E+01	5.05E+00	7.02E-02	3.19E-02
10.75	273.05	3189.1843	10.061	1.68E-01	1.14E+01	5.18E+00	6.99E-02	3.17E-02
11.00	279.40	2899.2584	9.1459	1.72E-01	1.17E+01	5.30E+00	6.96E-02	3.16E-02
11.25	285.75	2609.3326	8.2313	1.76E-01	1.19E+01	5.41E+00	6.93E-02	3.14E-02
11.50	292.10	2319.4067	7.3167	1.79E-01	1.21E+01	5.50E+00	6.90E-02	3.13E-02
11.75	298.45	2029.4809	6.4021	1.81E-01	1.23E+01	5.58E+00	6.88E-02	3.12E-02
12.00	304.80	1739.5551	5.4876	1.84E-01	1.25E+01	5.66E+00	6.86E-02	3.11E-02

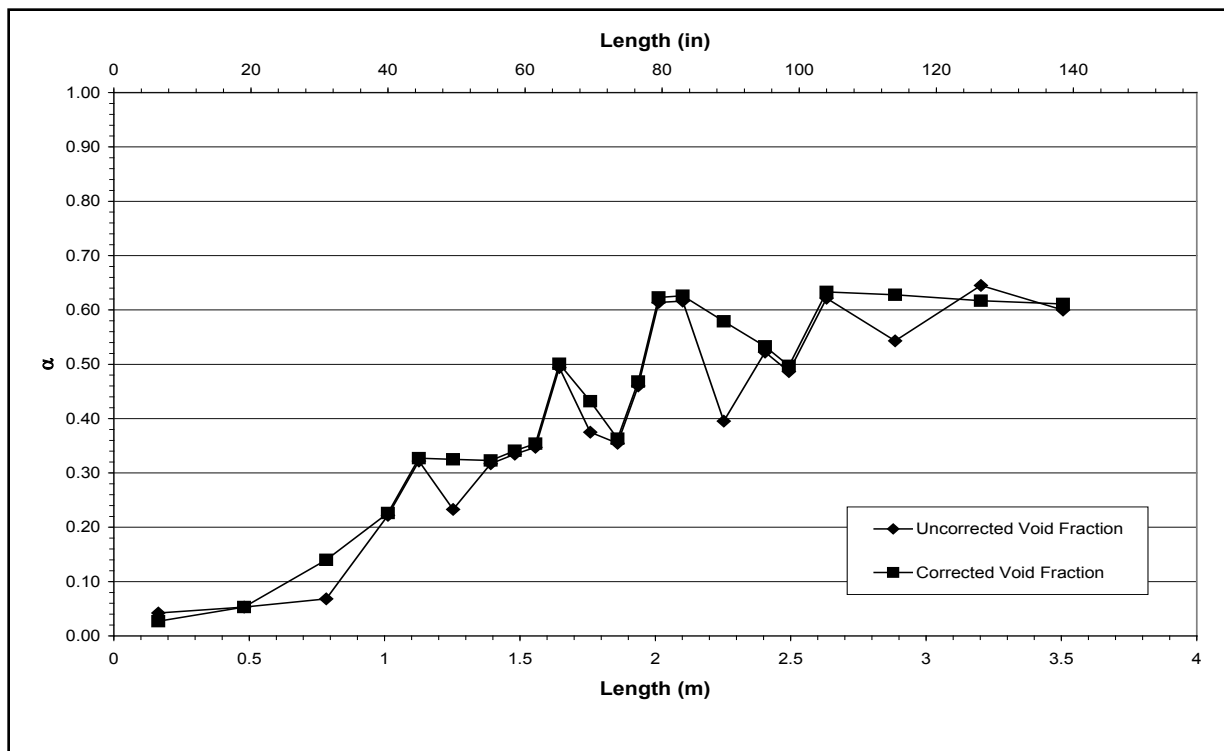


Figure A-250 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1616B for Time Period 3570 to 3659 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1616-C

Test Conditions

Date: 6/18/2003

Steady-state time window: 3800 – 3890 seconds

Inlet flow rate: 2.548 cm/sec (1.003 in./sec)

Inlet mass flow rate: 0.117 kg/sec (0.259 lbm/sec)

Inlet flow temperature: 382.2 K (228.2 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.93 kW

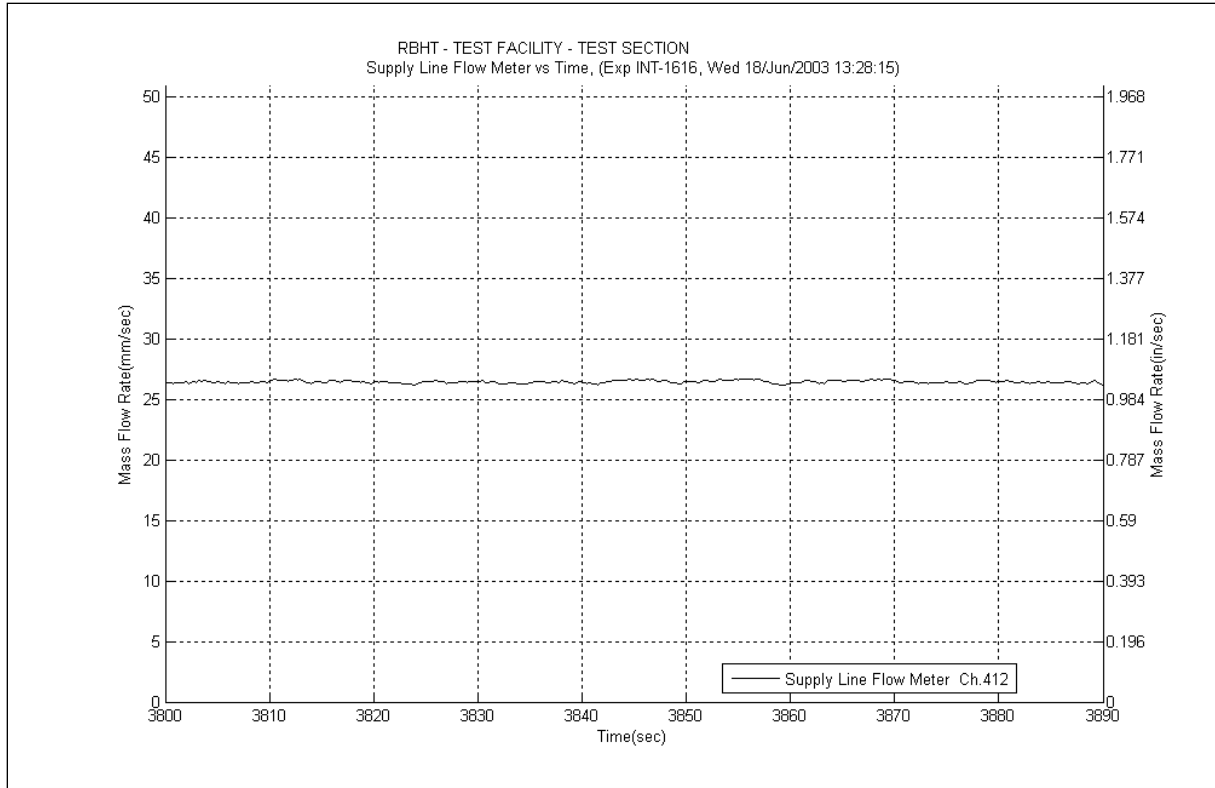


Figure A-251 Inlet Flow Plot for Experiment 1616C

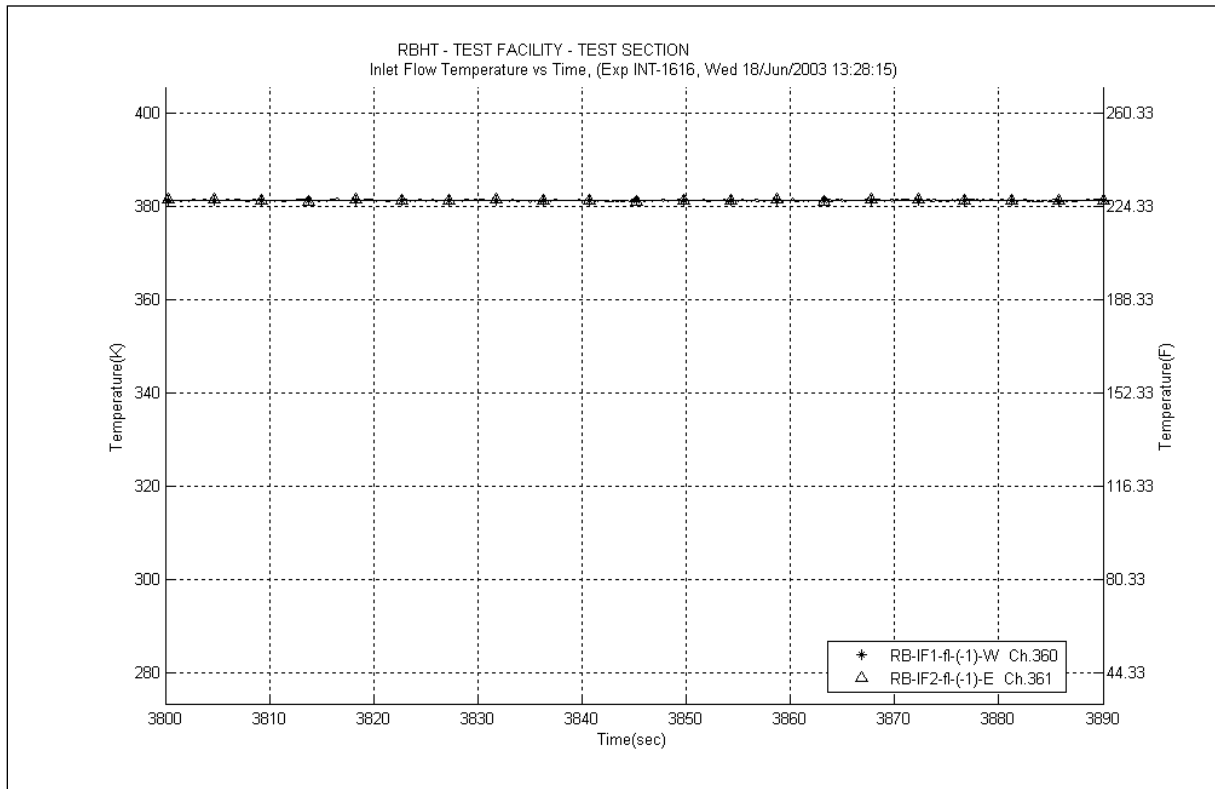


Figure A-252 Inlet Temperature Plot for Experiment 1616C

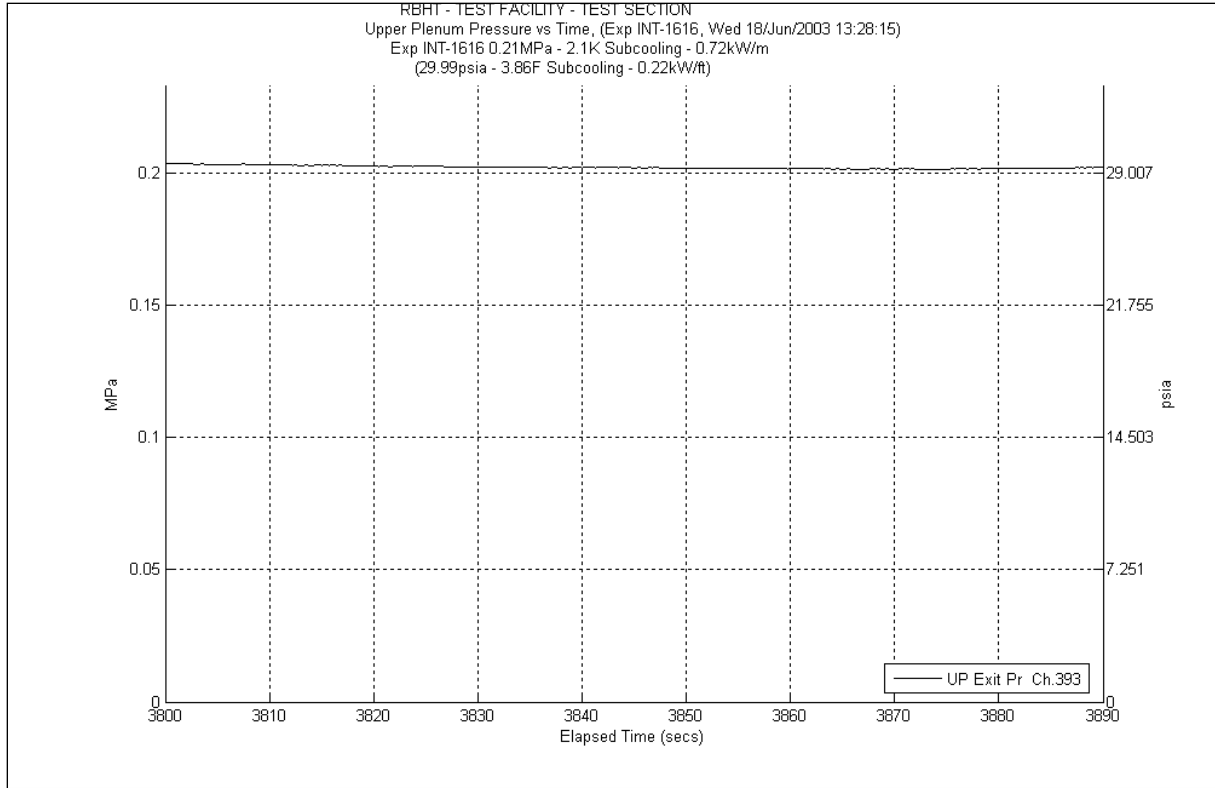


Figure A-253 System Pressure Plot for Experiment 1616C

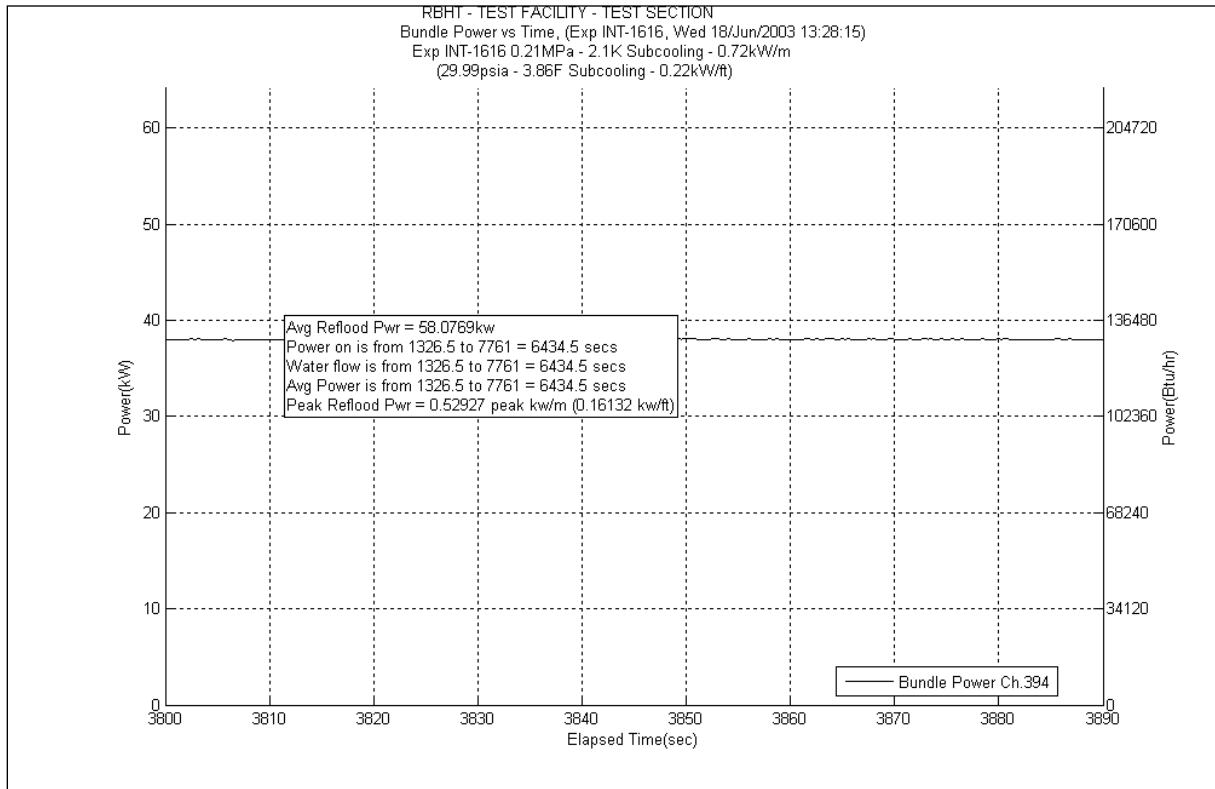


Figure A-254 Bundle Power Plot for Experiment 1616C

Table A-101 Data Results for RBHT Test 1616C for Time Period 3800 to 3890 seconds

Results for RBHT Test 1616
Valid Time Period 3800 to 3890 seconds
Collapsed Liquid Level = 90.668 inches = 2302.98 mm
(Z_{csv}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lbf/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.599	22.918	1097.328	0.536	25.664	0.108	5.171	0.000	0.000	22.27	1066.293	4342.27	207909.0036	0.61	0.607	0.613
*	120-133	3048-3378	383	0.645	23.936	1146.065	0.596	28.537	0.194	9.289	-2.734	-130.902	25.88	1239.141	4368.15	209148.1446	0.617	0.614	0.620
*	108-120	2743-3048	382	0.546	28.324	1356.181	0.500	23.940	0.242	11.587	4.482	214.620	23.1	1106.034	4391.25	210254.1786	0.629	0.626	0.632
	100-108	2540-2743	381	0.624	15.611	747.466	0.300	14.364	0.177	8.475	0.000	0.000	15.13	724.428	4406.38	210978.6068	0.636	0.633	0.639
	97-100	2464-2540	380	0.483	8.055	385.669	0.105	5.027	0.064	3.064	0.000	0.000	7.881	377.344	4414.261	211355.9511	0.494	0.492	0.496
	93-97	2362-2464	379	0.522	9.924	475.185	0.134	6.416	0.083	3.974	0.000	0.000	9.702	464.534	4423.963	211820.4854	0.533	0.530	0.536
*	85-93	2159-2362	378	0.395	25.131	1203.256	0.248	11.874	0.160	7.661	7.253	347.253	17.47	836.468	4441.433	212656.9535	0.579	0.576	0.582
	81-85	2057-2159	377	0.617	7.956	380.944	0.113	5.410	0.077	3.687	0.000	0.000	7.766	371.838	4449.199	213028.7916	0.626	0.623	0.629
	78-81	1981-2057	376	0.614	6.014	287.946	0.081	3.878	0.056	2.681	0.000	0.000	5.876	281.344	4455.075	213310.136	0.623	0.620	0.626
	75-78	1905-1981	375	0.463	8.372	400.837	0.077	3.687	0.055	2.633	0.000	0.000	8.238	394.438	4463.313	213704.5735	0.471	0.469	0.473
	72-75	1829-1905	374	0.350	10.122	484.634	0.073	3.495	0.053	2.538	0.000	0.000	9.992	478.420	4473.305	214182.993	0.358	0.356	0.360
*	67-72	1702-1829	373	0.386	15.933	762.883	0.113	5.410	0.086	4.118	0.904	43.290	14.83	710.064	4488.135	214893.0573	0.429	0.427	0.431
	63-67	1600-1702	372	0.492	10.563	505.770	0.083	3.974	0.067	3.208	0.000	0.000	10.41	498.433	4498.545	215391.4907	0.499	0.497	0.501
	60-63	1524-1600	371	0.345	10.200	488.364	0.057	2.729	0.048	2.298	0.000	0.000	10.09	483.112	4508.635	215874.6025	0.352	0.350	0.354
	57-60	1448-1524	370	0.335	10.366	496.321	0.053	2.538	0.047	2.250	0.000	0.000	10.26	491.251	4518.895	216365.854	0.341	0.339	0.343
	53-57	1346-1448	369	0.316	14.209	680.328	0.065	3.112	0.061	2.921	0.000	0.000	14.08	674.154	4532.975	217040.008	0.322	0.320	0.324
*	46-53	1168-1346	368	0.235	27.795	1330.817	0.097	4.644	0.101	4.836	3.077	147.313	24.52	1174.024	4557.495	218214.0319	0.325	0.323	0.327
	43-46	1092-1168	367	0.324	10.537	504.527	0.034	1.628	0.041	1.963	0.000	0.000	10.46	500.827	4567.955	218714.8594	0.328	0.326	0.330
	37-43	940-1092	366	0.224	24.175	1157.503	0.056	2.681	0.079	3.783	0.000	0.000	24.03	1150.563	4591.985	219865.4219	0.229	0.228	0.230
*	25-37	635-940	365	0.071	57.916	2773.034	0.059	2.825	0.113	5.410	4.224	202.247	53.52	2562.551	4645.505	222427.9733	0.141	0.140	0.142
	13-25	330-635	364	0.053	59.007	2825.252	0.004	0.192	0.000	0.000	0.000	0.000	58.98	2823.978	4704.485	225251.9509	0.053	0.050	0.056
*	0-13	0-330	363	0.042	64.673	3096.538	0.004	0.192	0.000	0.000	-1.021	-48.908	65.69	3145.254	4770.175	228397.2049	0.027	0.026	0.028

Table A-102 Energy Balance Results for RBHT Test 1616C for Time Period 3800 to 3890 seconds

Results for RBHT Test 1616								
Valid Time Period 3800 to 3890 seconds								
Elevation	Elevation	q _w	q _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1741.4702	5.4936	0.00E+00	0.00E+00	0.00E+00	8.38E-02	3.80E-02
0.25	6.35	1838.2185	5.7988	0.00E+00	0.00E+00	0.00E+00	8.38E-02	3.80E-02
0.50	12.70	1934.9669	6.104	0.00E+00	0.00E+00	0.00E+00	8.38E-02	3.80E-02
0.75	19.05	2031.7152	6.4092	0.00E+00	0.00E+00	0.00E+00	8.38E-02	3.80E-02
1.00	25.40	2128.4636	6.7144	0.00E+00	0.00E+00	0.00E+00	8.38E-02	3.80E-02
1.25	31.75	2225.2119	7.0196	0.00E+00	0.00E+00	0.00E+00	8.38E-02	3.80E-02
1.50	38.10	2321.9603	7.3248	0.00E+00	0.00E+00	0.00E+00	8.38E-02	3.80E-02
1.75	44.45	2418.7086	7.63	0.00E+00	0.00E+00	0.00E+00	8.38E-02	3.80E-02
2.00	50.80	2515.4569	7.9352	0.00E+00	0.00E+00	0.00E+00	8.38E-02	3.80E-02
2.25	57.15	2612.2053	8.2404	0.00E+00	0.00E+00	0.00E+00	8.38E-02	3.80E-02
2.50	63.50	2708.9536	8.5456	2.60E-03	1.76E-01	7.98E-02	8.36E-02	3.79E-02
2.75	69.85	2805.702	8.8508	6.06E-03	4.10E-01	1.86E-01	8.33E-02	3.78E-02
3.00	76.20	2902.4503	9.156	9.63E-03	6.52E-01	2.96E-01	8.30E-02	3.77E-02
3.25	82.55	2999.1987	9.4612	1.33E-02	9.02E-01	4.09E-01	8.27E-02	3.75E-02
3.50	88.90	3095.947	9.7664	1.72E-02	1.16E+00	5.26E-01	8.24E-02	3.74E-02
3.75	95.25	3192.6954	10.072	2.11E-02	1.43E+00	6.47E-01	8.21E-02	3.72E-02
4.00	101.60	3289.4437	10.377	2.52E-02	1.70E+00	7.72E-01	8.17E-02	3.71E-02
4.25	107.95	3386.192	10.682	2.93E-02	1.99E+00	9.01E-01	8.14E-02	3.69E-02
4.50	114.30	3482.9404	10.987	3.36E-02	2.28E+00	1.03E+00	8.10E-02	3.68E-02
4.75	120.65	3579.6887	11.292	3.81E-02	2.58E+00	1.17E+00	8.07E-02	3.66E-02
5.00	127.00	3676.4371	11.598	4.26E-02	2.88E+00	1.31E+00	8.03E-02	3.64E-02
5.25	133.35	3773.1854	11.903	4.73E-02	3.20E+00	1.45E+00	7.99E-02	3.62E-02
5.50	139.70	3869.9338	12.208	5.21E-02	3.52E+00	1.60E+00	7.95E-02	3.61E-02
5.75	146.05	3966.6821	12.513	5.70E-02	3.86E+00	1.75E+00	7.91E-02	3.59E-02
6.00	152.40	4063.4304	12.818	6.20E-02	4.20E+00	1.90E+00	7.86E-02	3.57E-02
6.25	158.75	4160.1788	13.124	6.72E-02	4.55E+00	2.06E+00	7.82E-02	3.55E-02
6.50	165.10	4256.9271	13.429	7.25E-02	4.90E+00	2.22E+00	7.78E-02	3.53E-02
6.75	171.45	4353.6755	13.734	7.78E-02	5.27E+00	2.39E+00	7.73E-02	3.51E-02
7.00	177.80	4450.4238	14.039	8.34E-02	5.64E+00	2.56E+00	7.69E-02	3.49E-02
7.25	184.15	4547.1722	14.344	8.90E-02	6.02E+00	2.73E+00	7.64E-02	3.46E-02
7.50	190.50	4643.9205	14.65	9.48E-02	6.41E+00	2.91E+00	7.59E-02	3.44E-02
7.75	196.85	4740.6689	14.955	1.01E-01	6.81E+00	3.09E+00	7.54E-02	3.42E-02
8.00	203.20	4837.4172	15.26	1.07E-01	7.21E+00	3.27E+00	7.49E-02	3.40E-02
8.25	209.55	4934.1655	15.565	1.13E-01	7.63E+00	3.46E+00	7.44E-02	3.37E-02
8.50	215.90	5030.9139	15.87	1.19E-01	8.05E+00	3.65E+00	7.39E-02	3.35E-02
8.75	222.25	5127.6622	16.176	1.25E-01	8.49E+00	3.85E+00	7.33E-02	3.33E-02
9.00	228.60	5224.4106	16.481	1.32E-01	8.93E+00	4.05E+00	7.28E-02	3.30E-02
9.25	234.95	4934.1655	15.565	1.38E-01	9.35E+00	4.24E+00	7.23E-02	3.28E-02
9.50	241.30	4643.9205	14.65	1.44E-01	9.76E+00	4.43E+00	7.18E-02	3.25E-02
9.75	247.65	4353.6755	13.734	1.50E-01	1.01E+01	4.60E+00	7.13E-02	3.23E-02
10.00	254.00	4063.4304	12.818	1.55E-01	1.05E+01	4.76E+00	7.08E-02	3.21E-02
10.25	260.35	3773.1854	11.903	1.60E-01	1.08E+01	4.91E+00	7.04E-02	3.19E-02
10.50	266.70	3482.9404	10.987	1.65E-01	1.11E+01	5.05E+00	7.00E-02	3.18E-02
10.75	273.05	3192.6954	10.072	1.69E-01	1.14E+01	5.18E+00	6.97E-02	3.16E-02
11.00	279.40	2902.4503	9.156	1.73E-01	1.17E+01	5.30E+00	6.94E-02	3.15E-02
11.25	285.75	2612.2053	8.2404	1.76E-01	1.19E+01	5.41E+00	6.91E-02	3.13E-02
11.50	292.10	2321.9603	7.3248	1.79E-01	1.21E+01	5.50E+00	6.88E-02	3.12E-02
11.75	298.45	2031.7152	6.4092	1.82E-01	1.23E+01	5.58E+00	6.86E-02	3.11E-02
12.00	304.80	1741.4702	5.4936	1.84E-01	1.25E+01	5.65E+00	6.84E-02	3.10E-02

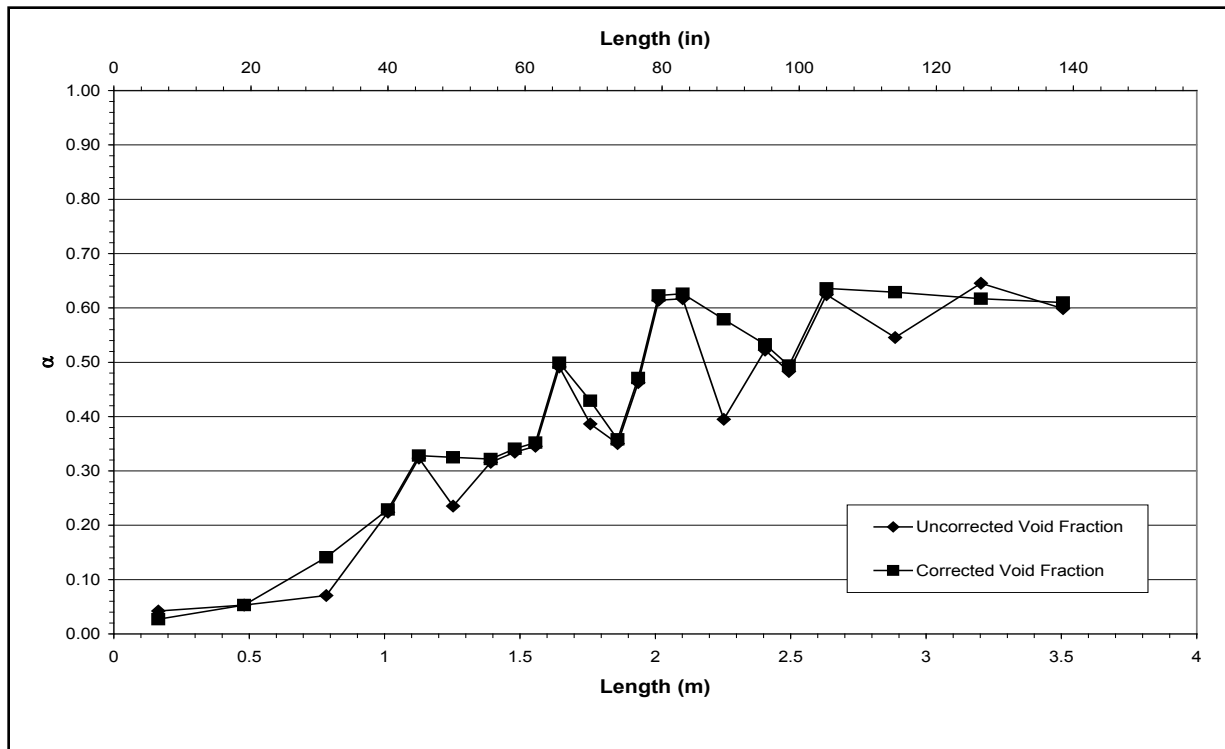


Figure A-255 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1616C for Time Period 3800 to 3890 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1616-D

Test Conditions

Date: 6/18/2003

Steady-state time window: 4033 – 4170 seconds

Inlet flow rate: 1.770 cm/sec (0.697 in./sec)

Inlet mass flow rate: 0.082 kg/sec (0.180 lbm/sec)

Inlet flow temperature: 382.2 K (228.2 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.93 kW

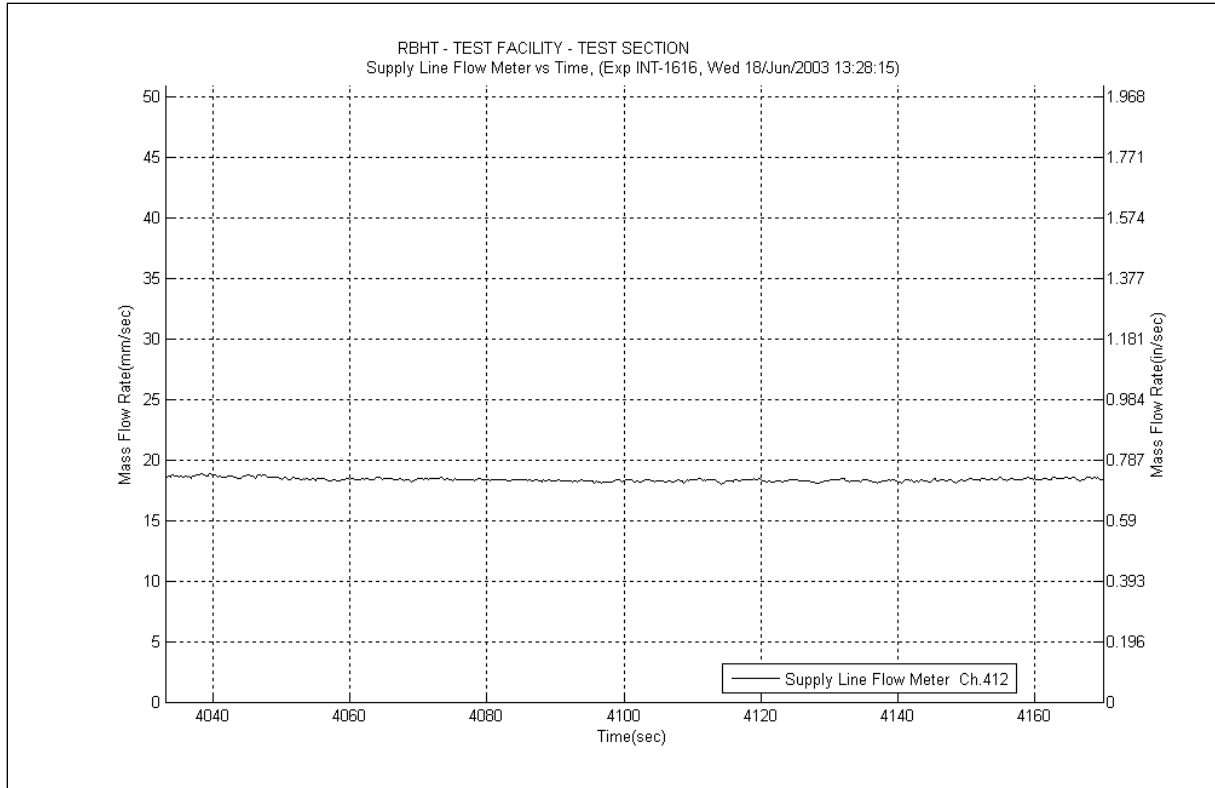


Figure A-256 Inlet Flow Plot for Experiment 1616D

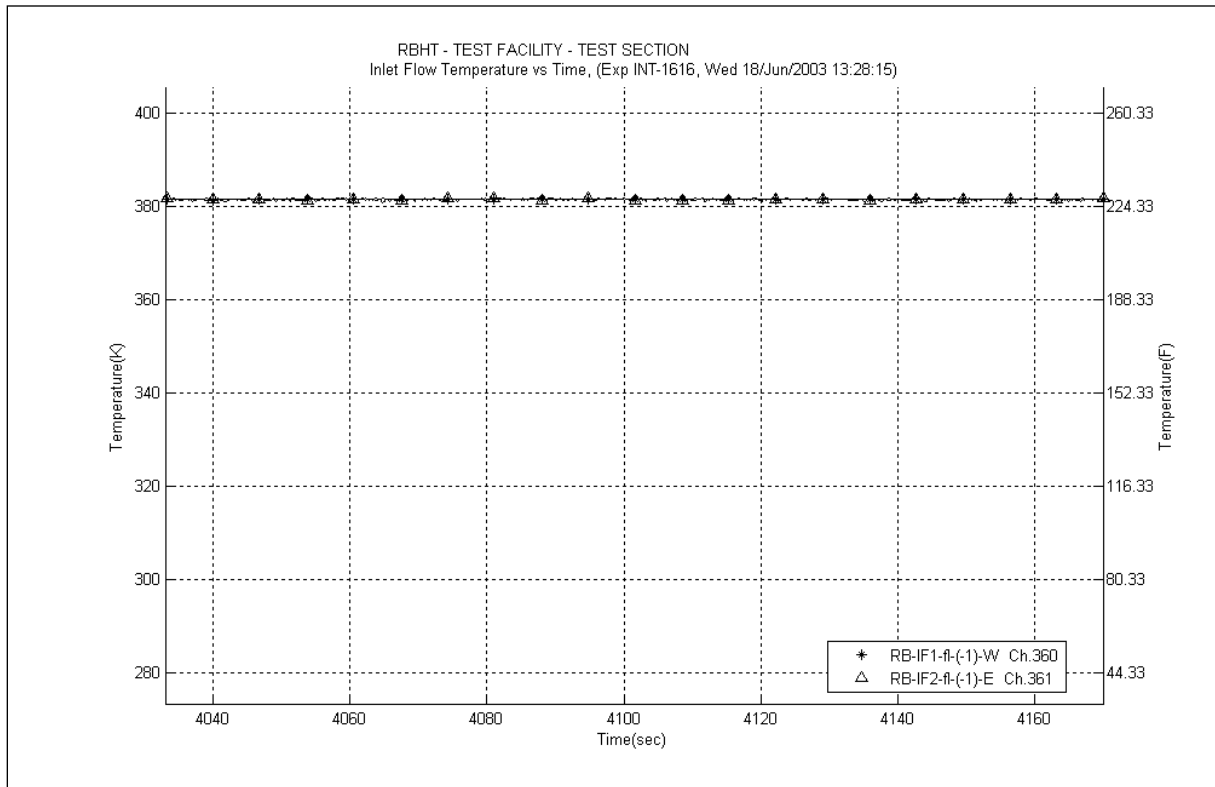


Figure A-257 Inlet Temperature Plot for Experiment 1616D

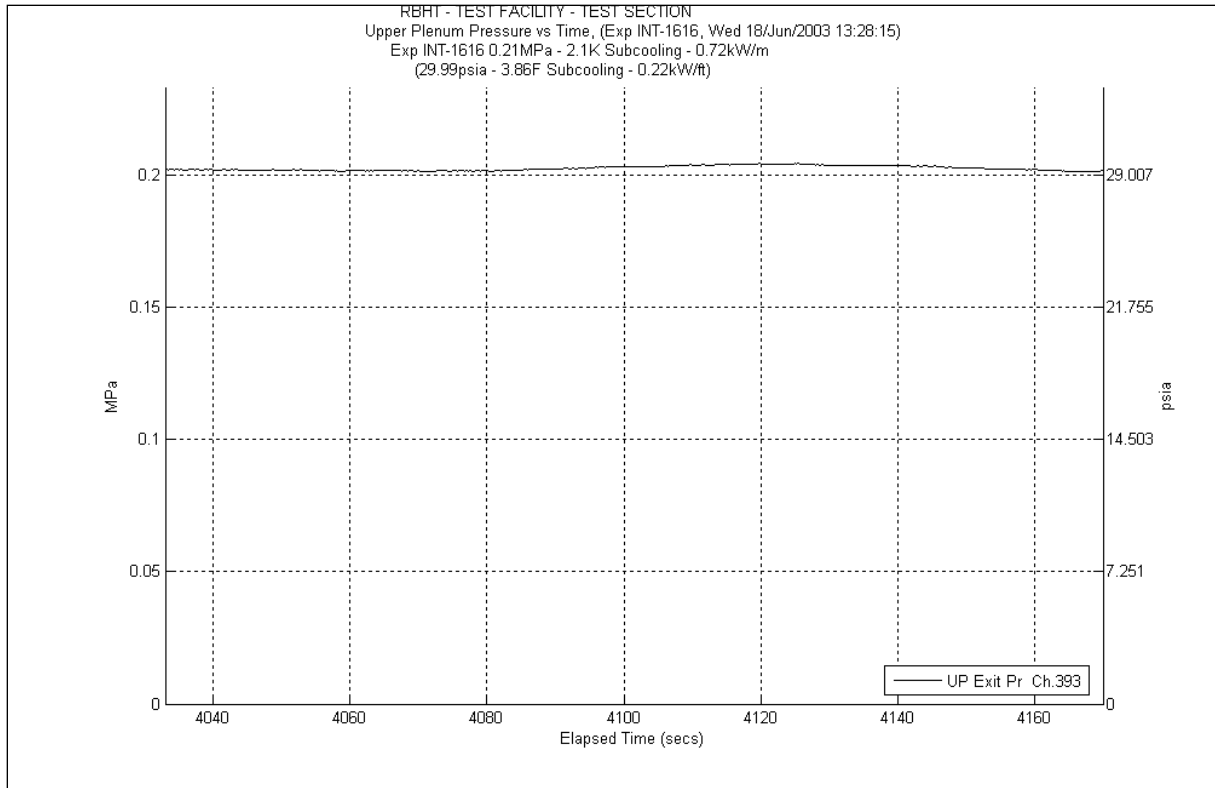


Figure A-258 System Pressure Plot for Experiment 1616D

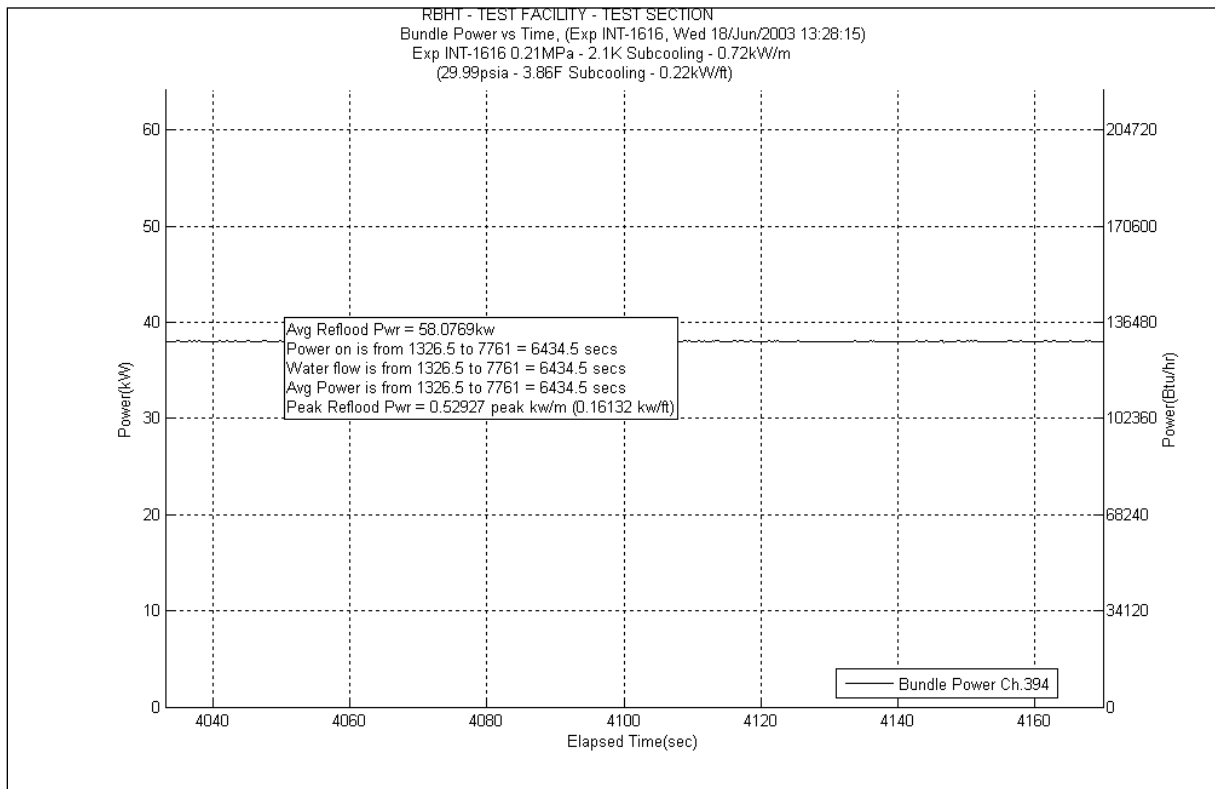


Figure A-259 Bundle Power Plot for Experiment 1616D

Table A-103 Data Results for RBHT Test 16'16D for Time Period 4033 to 4170 seconds

Results for RBHT Test 1616
Valid Time Period 4033 to 4170 seconds
Collapsed Liquid Level = 86.403 inches = 2194.64 mm
(Z_{GS}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lbf/ft ²)	$\Delta P_{unconnected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acccl} (lbf/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.634	20.882	999.854	0.368	17.620	0.075	3.591	0.000	0.000	20.43	978.194	4340.43	207820.9039	0.642	0.639	0.645
*	120-133	3048-3378	383	0.663	22.783	1090.863	0.409	19.583	0.135	6.464	-1.711	-81.916	23.95	1146.732	4364.38	208967.636	0.645	0.642	0.648
*	108-120	2743-3048	382	0.564	27.192	1301.973	0.343	16.423	0.168	8.044	4.941	236.590	21.74	1040.917	4386.12	210008.5528	0.651	0.648	0.654
	100-108	2540-2743	381	0.646	14.702	703.951	0.206	9.863	0.123	5.889	0.000	0.000	14.37	688.039	4400.49	210696.5921	0.654	0.651	0.657
	97-100	2464-2540	380	0.504	7.728	370.003	0.073	3.495	0.044	2.107	0.000	0.000	7.609	364.321	4408.099	211060.913	0.511	0.508	0.514
	93-97	2362-2464	379	0.540	9.566	458.028	0.093	4.453	0.058	2.777	0.000	0.000	9.414	450.745	4417.513	211511.6577	0.547	0.544	0.550
*	85-93	2159-2362	378	0.407	24.637	1179.633	0.172	8.235	0.111	5.315	7.614	364.568	16.74	801.516	4434.253	212313.1732	0.597	0.594	0.600
	81-85	2057-2159	377	0.641	7.458	357.073	0.079	3.783	0.053	2.538	0.000	0.000	7.325	350.723	4441.578	212663.8961	0.647	0.644	0.650
	78-81	1981-2057	376	0.637	5.656	270.789	0.056	2.681	0.039	1.867	0.000	0.000	5.556	266.023	4447.134	212929.9188	0.643	0.640	0.646
	75-78	1905-1981	375	0.497	7.842	375.474	0.054	2.586	0.038	1.819	0.000	0.000	7.745	370.833	4454.879	213300.7514	0.503	0.500	0.506
	72-75	1829-1905	374	0.381	9.649	462.007	0.051	2.442	0.037	1.772	0.000	0.000	9.557	457.592	4464.436	213758.343	0.386	0.384	0.388
*	67-72	1702-1829	373	0.389	15.855	759.153	0.080	3.830	0.060	2.873	1.775	84.999	13.94	667.451	4478.376	214425.7938	0.463	0.461	0.465
	63-67	1600-1702	372	0.535	9.670	463.001	0.059	2.825	0.046	2.202	0.000	0.000	9.563	457.879	4487.939	214883.6727	0.54	0.537	0.543
	60-63	1524-1600	371	0.376	9.727	465.736	0.042	2.011	0.034	1.628	0.000	0.000	9.647	461.901	4497.586	215345.5736	0.381	0.379	0.383
	57-60	1448-1524	370	0.361	9.961	476.926	0.039	1.867	0.033	1.580	0.000	0.000	9.885	473.296	4507.471	215818.8699	0.365	0.363	0.367
	53-57	1346-1448	369	0.341	13.700	655.960	0.048	2.298	0.042	2.011	0.000	0.000	13.6	651.171	4521.071	216470.0414	0.345	0.343	0.347
*	46-53	1168-1346	368	0.271	26.507	1269.150	0.074	3.543	0.070	3.352	3.783	181.119	22.58	1081.136	4543.651	217551.1776	0.379	0.377	0.381
	43-46	1092-1168	367	0.409	9.208	440.871	0.028	1.341	0.029	1.389	0.000	0.000	9.148	438.009	4552.799	217989.1862	0.413	0.411	0.415
	37-43	940-1092	366	0.287	22.227	1064.256	0.048	2.298	0.055	2.633	0.000	0.000	22.12	1059.111	4574.919	219048.2975	0.29	0.289	0.291
*	25-37	635-940	365	0.153	52.816	2528.852	0.063	3.016	0.099	4.740	1.364	65.317	51.29	2455.778	4626.209	221504.0759	0.177	0.176	0.178
	13-25	330-635	364	0.063	58.425	2797.402	0.024	1.149	0.037	1.772	0.000	0.000	58.34	2793.334	4684.549	224297.41	0.064	0.061	0.067
*	0-13	0-330	363	0.043	64.579	3092.062	0.002	0.096	0.000	0.000	-0.773	-37.009	65.35	3128.975	4749.899	227426.3848	0.032	0.030	0.034

Table A-104 Energy Balance Results for RBHT Test 1616D for Time Period 4033 to 4170 seconds

Results for RBHT Test 1616 Valid Time Period 4033 to 4170 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1740.3051	5.4899	0.00E+00	0.00E+00	0.00E+00	5.83E-02	2.64E-02
0.25	6.35	1836.9887	5.7949	0.00E+00	0.00E+00	0.00E+00	5.83E-02	2.64E-02
0.50	12.70	1933.6724	6.0999	0.00E+00	0.00E+00	0.00E+00	5.83E-02	2.64E-02
0.75	19.05	2030.356	6.4049	0.00E+00	0.00E+00	0.00E+00	5.83E-02	2.64E-02
1.00	25.40	2127.0396	6.7099	0.00E+00	0.00E+00	0.00E+00	5.83E-02	2.64E-02
1.25	31.75	2223.7232	7.0149	0.00E+00	0.00E+00	0.00E+00	5.83E-02	2.64E-02
1.50	38.10	2320.4068	7.3199	0.00E+00	0.00E+00	0.00E+00	5.83E-02	2.64E-02
1.75	44.45	2417.0904	7.6249	1.47E-03	6.93E-02	3.15E-02	5.82E-02	2.64E-02
2.00	50.80	2513.7741	7.9299	5.92E-03	2.79E-01	1.26E-01	5.80E-02	2.63E-02
2.25	57.15	2610.4577	8.2349	1.05E-02	4.96E-01	2.25E-01	5.77E-02	2.62E-02
2.50	63.50	2707.1413	8.5399	1.53E-02	7.22E-01	3.28E-01	5.74E-02	2.60E-02
2.75	69.85	2803.8249	8.8449	2.03E-02	9.56E-01	4.34E-01	5.71E-02	2.59E-02
3.00	76.20	2900.5085	9.1499	2.54E-02	1.20E+00	5.43E-01	5.68E-02	2.58E-02
3.25	82.55	2997.1921	9.4549	3.08E-02	1.45E+00	6.57E-01	5.65E-02	2.56E-02
3.50	88.90	3093.8758	9.7599	3.62E-02	1.71E+00	7.74E-01	5.62E-02	2.55E-02
3.75	95.25	3190.5594	10.065	4.19E-02	1.97E+00	8.95E-01	5.59E-02	2.53E-02
4.00	101.60	3287.243	10.37	4.77E-02	2.25E+00	1.02E+00	5.55E-02	2.52E-02
4.25	107.95	3383.9266	10.675	5.38E-02	2.53E+00	1.15E+00	5.52E-02	2.50E-02
4.50	114.30	3480.6102	10.98	5.99E-02	2.82E+00	1.28E+00	5.48E-02	2.49E-02
4.75	120.65	3577.2938	11.285	6.63E-02	3.12E+00	1.42E+00	5.44E-02	2.47E-02
5.00	127.00	3673.9775	11.59	7.28E-02	3.43E+00	1.56E+00	5.41E-02	2.45E-02
5.25	133.35	3770.6611	11.895	7.95E-02	3.75E+00	1.70E+00	5.37E-02	2.43E-02
5.50	139.70	3867.3447	12.2	8.64E-02	4.07E+00	1.85E+00	5.33E-02	2.42E-02
5.75	146.05	3964.0283	12.505	9.35E-02	4.40E+00	2.00E+00	5.28E-02	2.40E-02
6.00	152.40	4060.7119	12.81	1.01E-01	4.74E+00	2.15E+00	5.24E-02	2.38E-02
6.25	158.75	4157.3956	13.115	1.08E-01	5.09E+00	2.31E+00	5.20E-02	2.36E-02
6.50	165.10	4254.0792	13.42	1.16E-01	5.45E+00	2.47E+00	5.16E-02	2.34E-02
6.75	171.45	4350.7628	13.725	1.24E-01	5.82E+00	2.64E+00	5.11E-02	2.32E-02
7.00	177.80	4447.4464	14.03	1.31E-01	6.19E+00	2.81E+00	5.06E-02	2.30E-02
7.25	184.15	4544.13	14.335	1.40E-01	6.57E+00	2.98E+00	5.02E-02	2.28E-02
7.50	190.50	4640.8136	14.64	1.48E-01	6.96E+00	3.16E+00	4.97E-02	2.25E-02
7.75	196.85	4737.4973	14.945	1.56E-01	7.36E+00	3.34E+00	4.92E-02	2.23E-02
8.00	203.20	4834.1809	15.25	1.65E-01	7.77E+00	3.52E+00	4.87E-02	2.21E-02
8.25	209.55	4930.8645	15.555	1.74E-01	8.18E+00	3.71E+00	4.82E-02	2.18E-02
8.50	215.90	5027.5481	15.86	1.83E-01	8.60E+00	3.90E+00	4.77E-02	2.16E-02
8.75	222.25	5124.2317	16.165	1.92E-01	9.04E+00	4.10E+00	4.71E-02	2.14E-02
9.00	228.60	5220.9153	16.47	2.01E-01	9.47E+00	4.30E+00	4.66E-02	2.11E-02
9.25	234.95	4930.8645	15.555	2.10E-01	9.90E+00	4.49E+00	4.60E-02	2.09E-02
9.50	241.30	4640.8136	14.64	2.19E-01	1.03E+01	4.68E+00	4.55E-02	2.07E-02
9.75	247.65	4350.7628	13.725	2.27E-01	1.07E+01	4.85E+00	4.51E-02	2.04E-02
10.00	254.00	4060.7119	12.81	2.35E-01	1.11E+01	5.01E+00	4.46E-02	2.02E-02
10.25	260.35	3770.6611	11.895	2.42E-01	1.14E+01	5.16E+00	4.42E-02	2.01E-02
10.50	266.70	3480.6102	10.98	2.48E-01	1.17E+01	5.30E+00	4.38E-02	1.99E-02
10.75	273.05	3190.5594	10.065	2.54E-01	1.20E+01	5.43E+00	4.35E-02	1.97E-02
11.00	279.40	2900.5085	9.1499	2.60E-01	1.22E+01	5.55E+00	4.32E-02	1.96E-02
11.25	285.75	2610.4577	8.2349	2.65E-01	1.25E+01	5.65E+00	4.29E-02	1.94E-02
11.50	292.10	2320.4068	7.3199	2.69E-01	1.27E+01	5.75E+00	4.26E-02	1.93E-02
11.75	298.45	2030.356	6.4049	2.73E-01	1.29E+01	5.83E+00	4.24E-02	1.92E-02
12.00	304.80	1740.3051	5.4899	2.76E-01	1.30E+01	5.91E+00	4.22E-02	1.91E-02

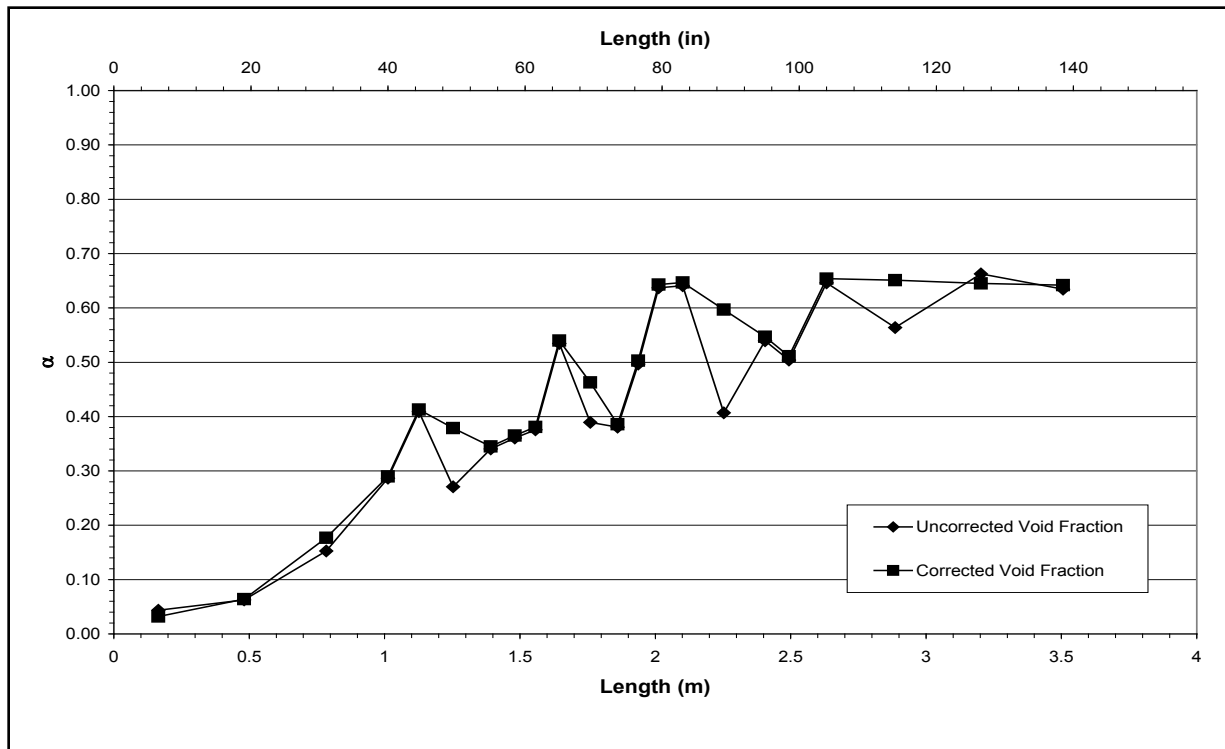


Figure A-260 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1616D for Time Period 4033 to 4170 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1616-E

Test Conditions

Date: 6/18/2003

Steady-state time window: 4270 – 4412 seconds

Inlet flow rate: 1.781 cm/sec (0.701 in./sec)

Inlet mass flow rate: 0.082 kg/sec (0.181 lbm/sec)

Inlet flow temperature: 382.2 K (228.2 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.93 kW

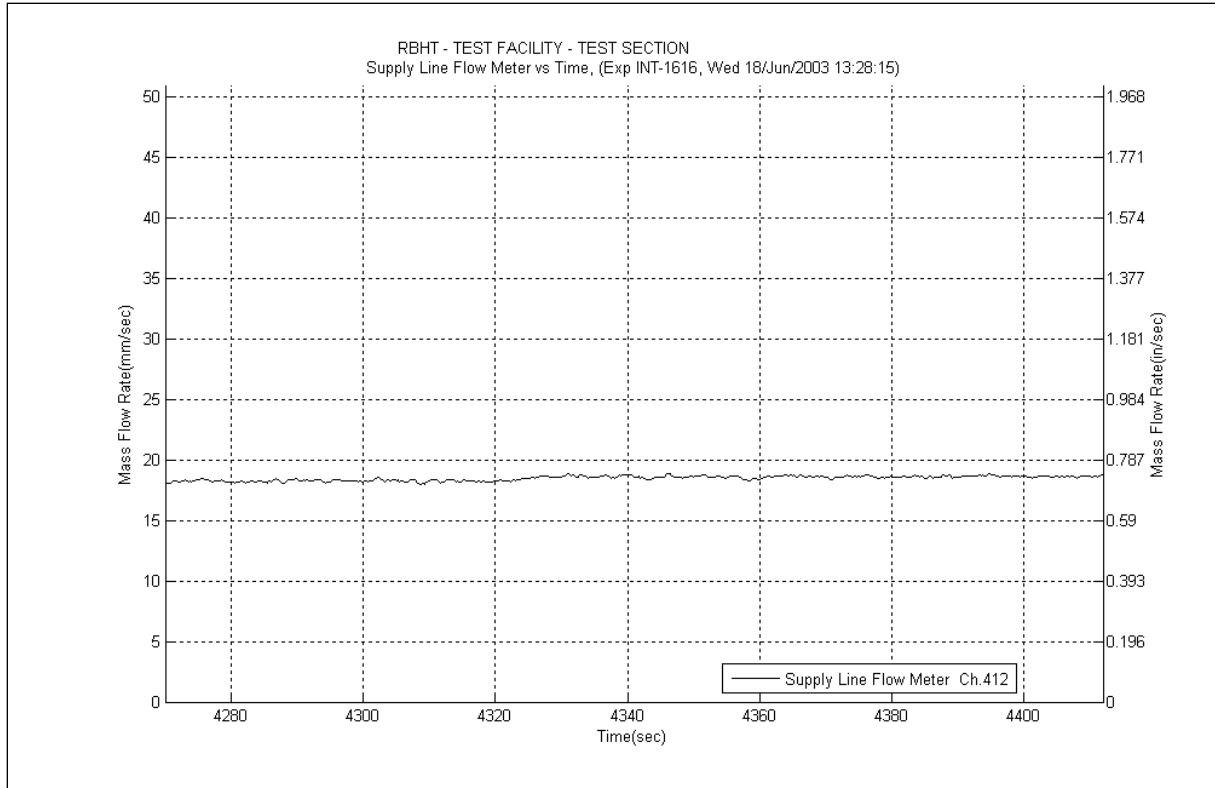


Figure A-261 Inlet Flow Plot for Experiment 1616E

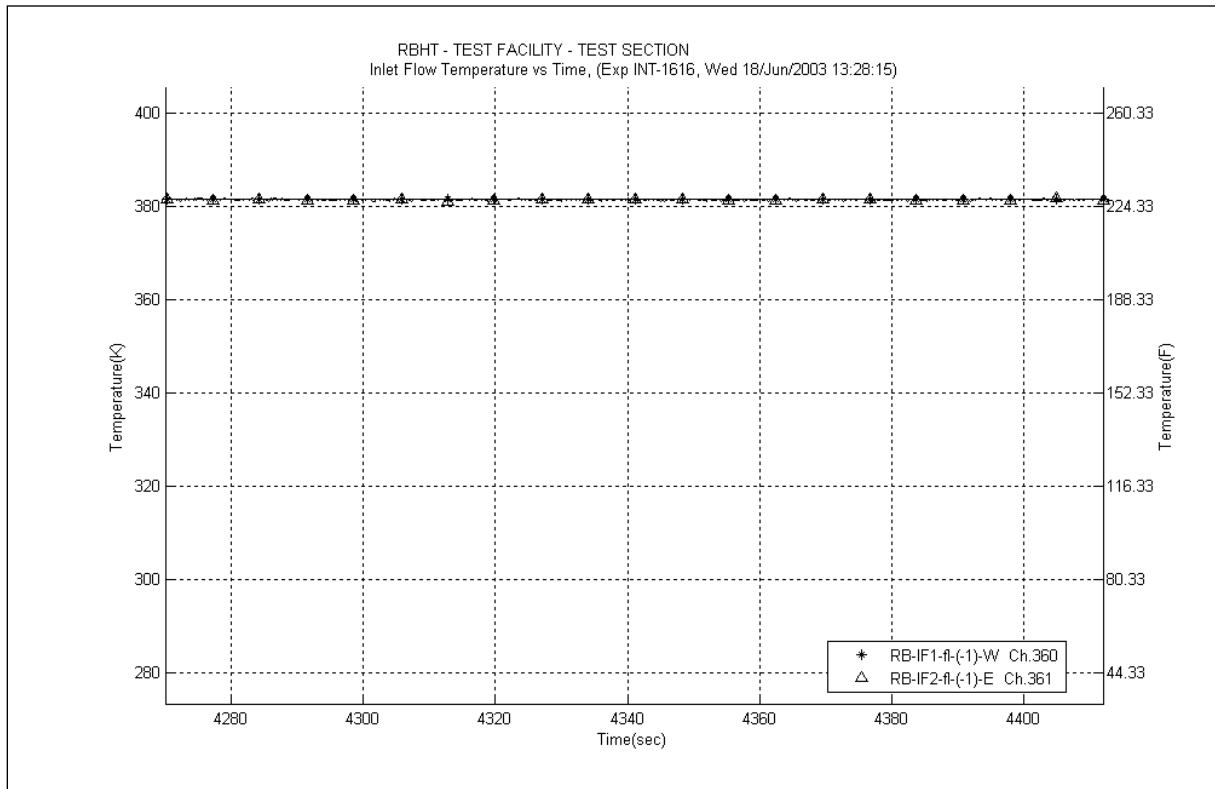


Figure A-262 Inlet Temperature Plot for Experiment 1616E

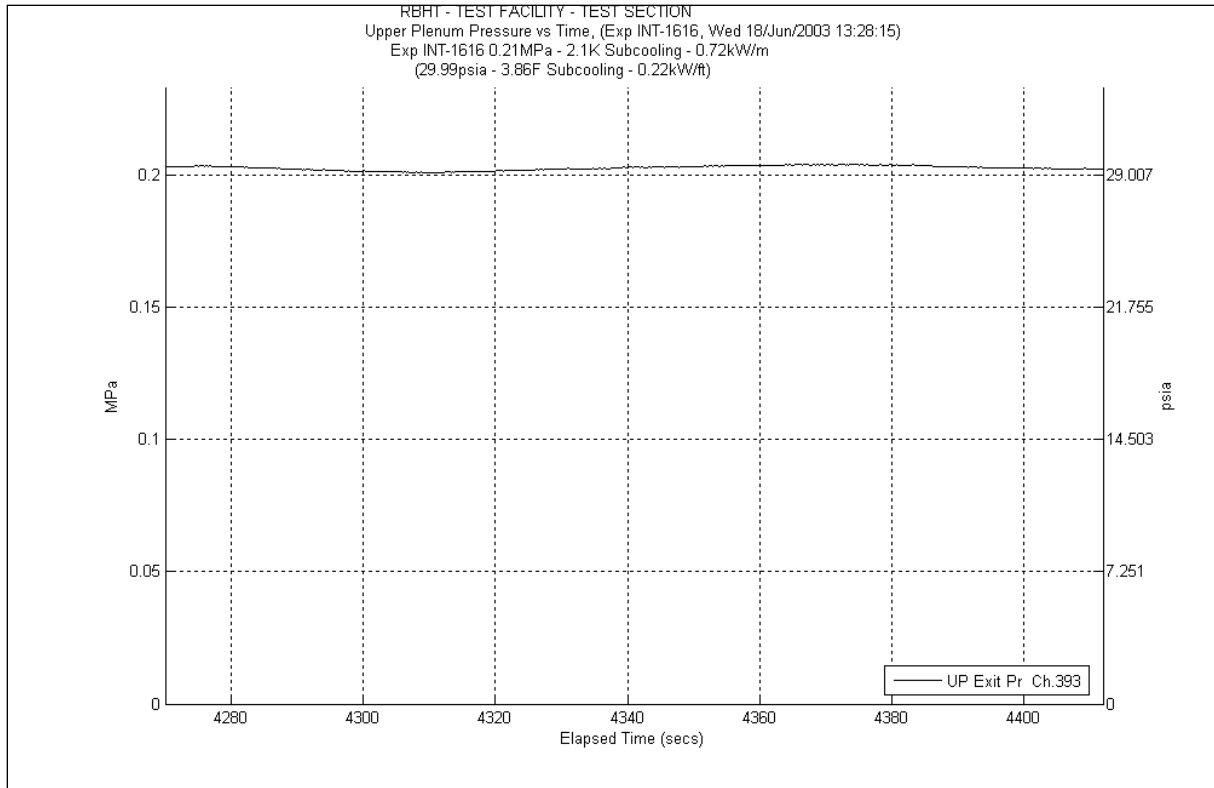


Figure A-263 System Pressure Plot for Experiment 1616E

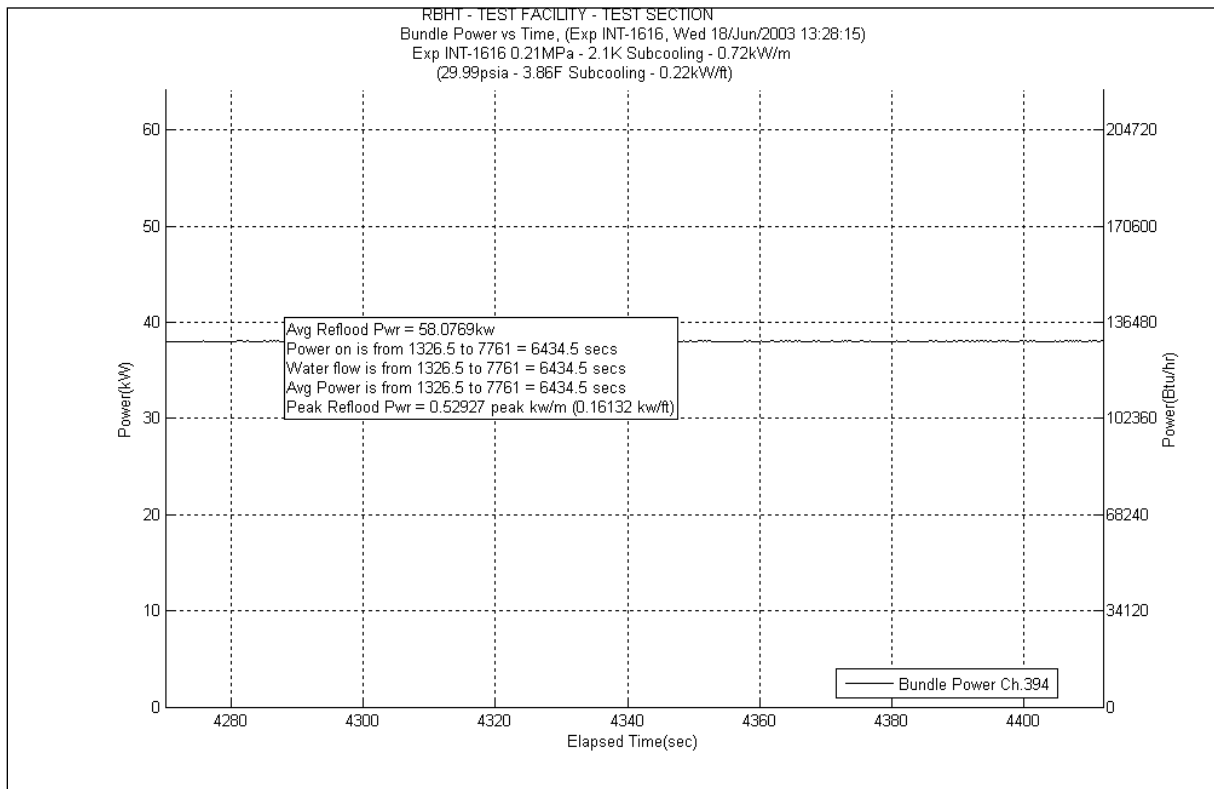


Figure A-264 Bundle Power Plot for Experiment 1616E

Table A-105 Data Results for RBHT Test 1616E for Time Period 4270 to 4412 seconds

Results for RBHT Test 1616
Valid Time Period 4270 to 4412 seconds
Collapsed Liquid Level = 86.395 inches = 2194.43 mm
(Z_{OSV}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lbf/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.644	20.327	973.247	0.370	17.716	0.076	3.639	0.000	0.000	19.88	951.860	4339.88	207794.5697	0.652	0.649	0.655
*	120-133	3048-3378	383	0.668	22.414	1073.208	0.411	19.679	0.136	6.512	-1.493	-71.465	23.36	1118.483	4363.24	208913.0526	0.654	0.651	0.657
*	108-120	2743-3048	382	0.565	27.120	1298.492	0.345	16.519	0.169	8.092	5.286	253.074	21.32	1020.807	4384.56	209933.8596	0.658	0.655	0.661
	100-108	2540-2743	381	0.652	14.469	692.761	0.208	9.959	0.124	5.937	0.000	0.000	14.13	676.548	4398.69	210610.4077	0.66	0.657	0.663
	97-100	2464-2540	380	0.503	7.738	370.500	0.073	3.495	0.045	2.155	0.000	0.000	7.617	364.704	4406.307	210975.1116	0.511	0.508	0.514
	93-97	2362-2464	379	0.545	9.447	452.309	0.093	4.453	0.058	2.777	0.000	0.000	9.294	444.999	4415.601	211420.1107	0.553	0.550	0.556
*	85-93	2159-2362	378	0.411	24.466	1171.428	0.173	8.283	0.112	5.363	7.651	366.321	16.53	791.461	4432.131	212211.5713	0.602	0.599	0.605
	81-85	2057-2159	377	0.645	7.369	352.846	0.080	3.830	0.054	2.586	0.000	0.000	7.235	346.414	4439.366	212557.985	0.652	0.649	0.655
	78-81	1981-2057	376	0.640	5.609	268.551	0.057	2.729	0.039	1.867	0.000	0.000	5.511	263.868	4444.877	212821.8531	0.646	0.643	0.649
	75-78	1905-1981	375	0.502	7.759	371.495	0.054	2.586	0.038	1.819	0.000	0.000	7.664	366.954	4452.541	213188.8074	0.508	0.505	0.511
	72-75	1829-1905	374	0.393	9.462	453.055	0.052	2.490	0.037	1.772	0.000	0.000	9.37	448.638	4461.911	213637.4454	0.398	0.396	0.400
*	67-72	1702-1829	373	0.390	15.850	758.904	0.081	3.878	0.060	2.873	2.019	96.672	13.69	655.481	4475.601	214292.9261	0.473	0.471	0.475
	63-67	1600-1702	372	0.542	9.525	456.039	0.060	2.873	0.047	2.250	0.000	0.000	9.413	450.697	4485.014	214743.623	0.547	0.544	0.550
	60-63	1524-1600	371	0.380	9.665	462.752	0.042	2.011	0.034	1.628	0.000	0.000	9.585	458.932	4494.599	215202.5552	0.385	0.383	0.387
	57-60	1448-1524	370	0.364	9.904	474.191	0.039	1.867	0.033	1.580	0.000	0.000	9.826	470.471	4504.425	215673.0266	0.369	0.367	0.371
	53-57	1346-1448	369	0.349	13.518	647.257	0.049	2.346	0.043	2.059	0.000	0.000	13.42	642.553	4517.845	216315.5797	0.354	0.352	0.356
*	46-53	1168-1346	368	0.274	26.403	1264.177	0.075	3.591	0.071	3.399	4.207	201.427	22.05	1055.760	4539.895	217371.3394	0.393	0.391	0.395
	43-46	1092-1168	367	0.429	8.896	425.951	0.028	1.341	0.029	1.389	0.000	0.000	8.836	423.070	4548.731	217794.4093	0.433	0.431	0.435
	37-43	940-1092	366	0.297	21.916	1049.337	0.048	2.298	0.055	2.633	0.000	0.000	21.8	1043.790	4570.531	218838.1989	0.3	0.299	0.302
*	25-37	635-940	365	0.158	52.505	2513.932	0.063	3.016	0.100	4.788	1.242	59.447	51.1	2446.681	4621.631	221284.88	0.18	0.179	0.181
	13-25	330-635	364	0.059	58.669	2809.089	0.024	1.149	0.037	1.772	0.000	0.000	58.59	2805.304	4680.221	224090.1843	0.06	0.057	0.063
*	0-13	0-330	363	0.043	64.584	3092.311	0.002	0.096	0.000	0.000	-0.898	-42.984	65.48	3135.199	4745.701	227225.3835	0.03	0.029	0.032

Table A-106 Energy Balance Results for RBHT Test 1616E for Time Period 4270 to 4412 seconds

Results for RBHT Test 1616 Valid Time Period 4270 to 4412 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1740.5431	5.4907	0.00E+00	0.00E+00	0.00E+00	5.86E-02	2.66E-02
0.25	6.35	1837.2399	5.7957	0.00E+00	0.00E+00	0.00E+00	5.86E-02	2.66E-02
0.50	12.70	1933.9367	6.1007	0.00E+00	0.00E+00	0.00E+00	5.86E-02	2.66E-02
0.75	19.05	2030.6336	6.4058	0.00E+00	0.00E+00	0.00E+00	5.86E-02	2.66E-02
1.00	25.40	2127.3304	6.7108	0.00E+00	0.00E+00	0.00E+00	5.86E-02	2.66E-02
1.25	31.75	2224.0272	7.0159	0.00E+00	0.00E+00	0.00E+00	5.86E-02	2.66E-02
1.50	38.10	2320.7241	7.3209	0.00E+00	0.00E+00	0.00E+00	5.86E-02	2.66E-02
1.75	44.45	2417.4209	7.6259	1.31E-03	6.23E-02	2.83E-02	5.85E-02	2.66E-02
2.00	50.80	2514.1177	7.931	5.73E-03	2.72E-01	1.23E-01	5.83E-02	2.64E-02
2.25	57.15	2610.8146	8.236	1.03E-02	4.90E-01	2.22E-01	5.80E-02	2.63E-02
2.50	63.50	2707.5114	8.541	1.51E-02	7.15E-01	3.24E-01	5.77E-02	2.62E-02
2.75	69.85	2804.2083	8.8461	2.00E-02	9.50E-01	4.31E-01	5.74E-02	2.61E-02
3.00	76.20	2900.9051	9.1511	2.52E-02	1.19E+00	5.41E-01	5.71E-02	2.59E-02
3.25	82.55	2997.6019	9.4561	3.04E-02	1.44E+00	6.54E-01	5.68E-02	2.58E-02
3.50	88.90	3094.2988	9.7612	3.59E-02	1.70E+00	7.72E-01	5.65E-02	2.56E-02
3.75	95.25	3190.9956	10.066	4.15E-02	1.97E+00	8.93E-01	5.62E-02	2.55E-02
4.00	101.60	3287.6924	10.371	4.73E-02	2.24E+00	1.02E+00	5.58E-02	2.53E-02
4.25	107.95	3384.3893	10.676	5.33E-02	2.53E+00	1.15E+00	5.55E-02	2.52E-02
4.50	114.30	3481.0861	10.981	5.95E-02	2.82E+00	1.28E+00	5.51E-02	2.50E-02
4.75	120.65	3577.7829	11.286	6.58E-02	3.12E+00	1.41E+00	5.48E-02	2.48E-02
5.00	127.00	3674.4798	11.591	7.23E-02	3.43E+00	1.55E+00	5.44E-02	2.47E-02
5.25	133.35	3771.1766	11.896	7.90E-02	3.74E+00	1.70E+00	5.40E-02	2.45E-02
5.50	139.70	3867.8735	12.201	8.58E-02	4.07E+00	1.85E+00	5.36E-02	2.43E-02
5.75	146.05	3964.5703	12.507	9.28E-02	4.40E+00	2.00E+00	5.32E-02	2.41E-02
6.00	152.40	4061.2671	12.812	1.00E-01	4.74E+00	2.15E+00	5.28E-02	2.39E-02
6.25	158.75	4157.964	13.117	1.07E-01	5.09E+00	2.31E+00	5.23E-02	2.37E-02
6.50	165.10	4254.6608	13.422	1.15E-01	5.45E+00	2.47E+00	5.19E-02	2.35E-02
6.75	171.45	4351.3576	13.727	1.23E-01	5.81E+00	2.64E+00	5.14E-02	2.33E-02
7.00	177.80	4448.0545	14.032	1.31E-01	6.19E+00	2.81E+00	5.10E-02	2.31E-02
7.25	184.15	4544.7513	14.337	1.39E-01	6.57E+00	2.98E+00	5.05E-02	2.29E-02
7.50	190.50	4641.4481	14.642	1.47E-01	6.96E+00	3.16E+00	5.00E-02	2.27E-02
7.75	196.85	4738.145	14.947	1.55E-01	7.36E+00	3.34E+00	4.95E-02	2.25E-02
8.00	203.20	4834.8418	15.252	1.64E-01	7.77E+00	3.52E+00	4.90E-02	2.22E-02
8.25	209.55	4931.5387	15.557	1.73E-01	8.18E+00	3.71E+00	4.85E-02	2.20E-02
8.50	215.90	5028.2355	15.862	1.82E-01	8.60E+00	3.90E+00	4.80E-02	2.18E-02
8.75	222.25	5124.9323	16.167	1.91E-01	9.04E+00	4.10E+00	4.74E-02	2.15E-02
9.00	228.60	5221.6292	16.472	2.00E-01	9.48E+00	4.30E+00	4.69E-02	2.13E-02
9.25	234.95	4931.5387	15.557	2.09E-01	9.91E+00	4.49E+00	4.64E-02	2.10E-02
9.50	241.30	4641.4481	14.642	2.18E-01	1.03E+01	4.68E+00	4.59E-02	2.08E-02
9.75	247.65	4351.3576	13.727	2.26E-01	1.07E+01	4.85E+00	4.54E-02	2.06E-02
10.00	254.00	4061.2671	12.812	2.33E-01	1.11E+01	5.01E+00	4.50E-02	2.04E-02
10.25	260.35	3771.1766	11.896	2.40E-01	1.14E+01	5.17E+00	4.45E-02	2.02E-02
10.50	266.70	3481.0861	10.981	2.47E-01	1.17E+01	5.30E+00	4.42E-02	2.00E-02
10.75	273.05	3190.9956	10.066	2.53E-01	1.20E+01	5.43E+00	4.38E-02	1.99E-02
11.00	279.40	2900.9051	9.1511	2.58E-01	1.22E+01	5.55E+00	4.35E-02	1.97E-02
11.25	285.75	2610.8146	8.236	2.63E-01	1.25E+01	5.66E+00	4.32E-02	1.96E-02
11.50	292.10	2320.7241	7.3209	2.68E-01	1.27E+01	5.75E+00	4.29E-02	1.95E-02
11.75	298.45	2030.6336	6.4058	2.71E-01	1.29E+01	5.84E+00	4.27E-02	1.94E-02
12.00	304.80	1740.5431	5.4907	2.75E-01	1.30E+01	5.91E+00	4.25E-02	1.93E-02

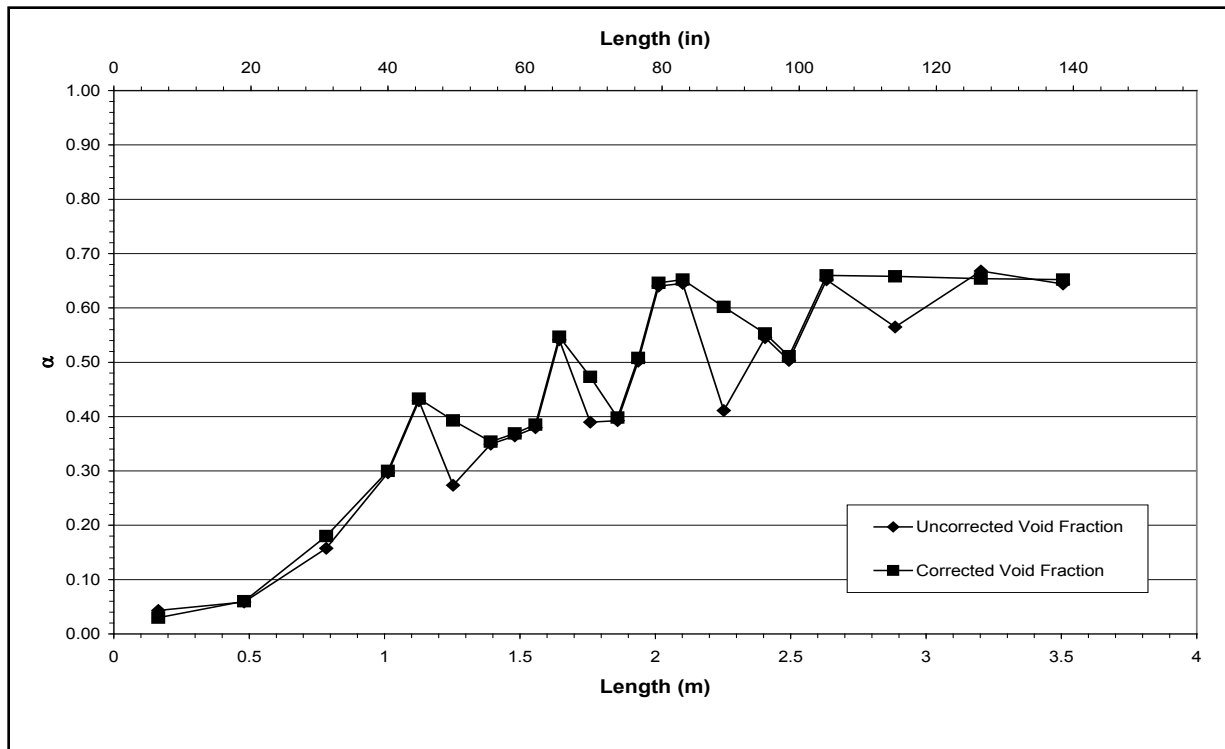


Figure A-265 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1616E for Time Period 4270 to 4412 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1616-F

Test Conditions

Date: 6/18/2003

Steady-state time window: 5234 – 5495 seconds

Inlet flow rate: 1.273 cm/sec (0.501 in./sec)

Inlet mass flow rate: 0.059 kg/sec (0.129 lbm/sec)

Inlet flow temperature: 382.2 K (228.2 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.93 kW

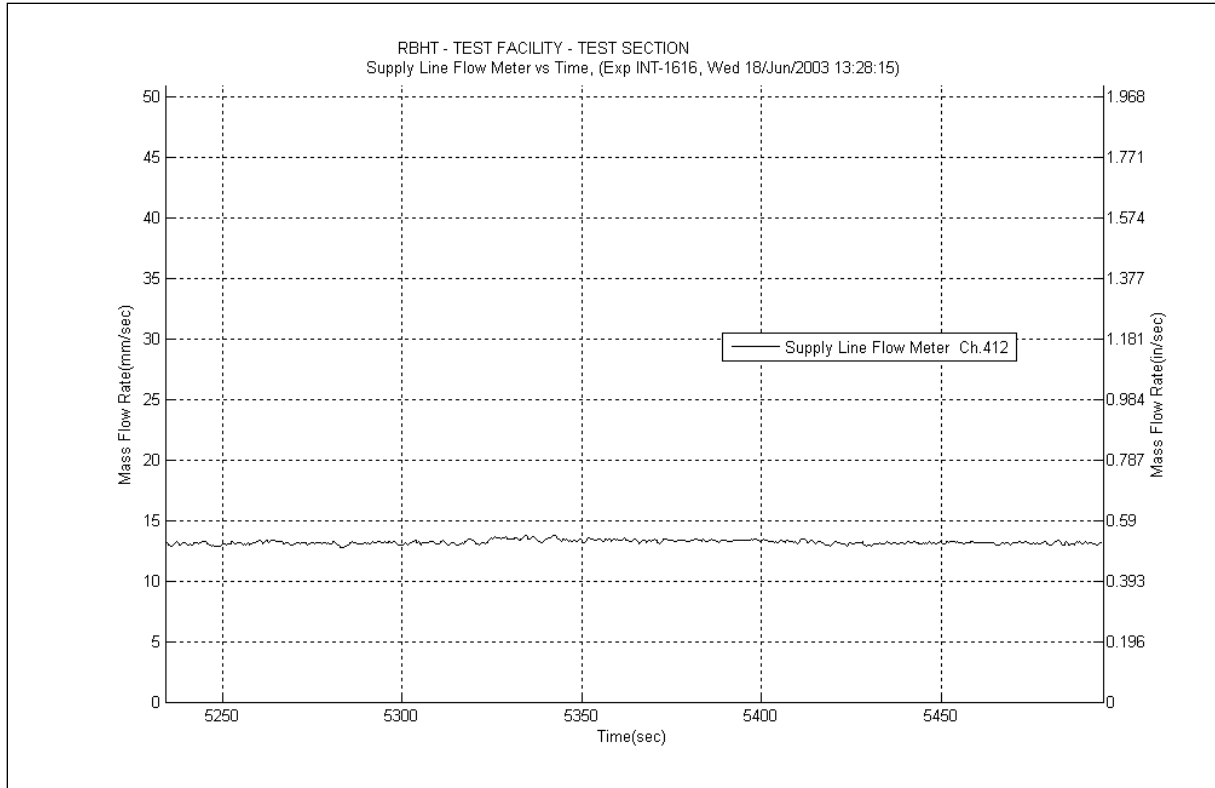


Figure A-266 Inlet Flow Plot for Experiment 1616F

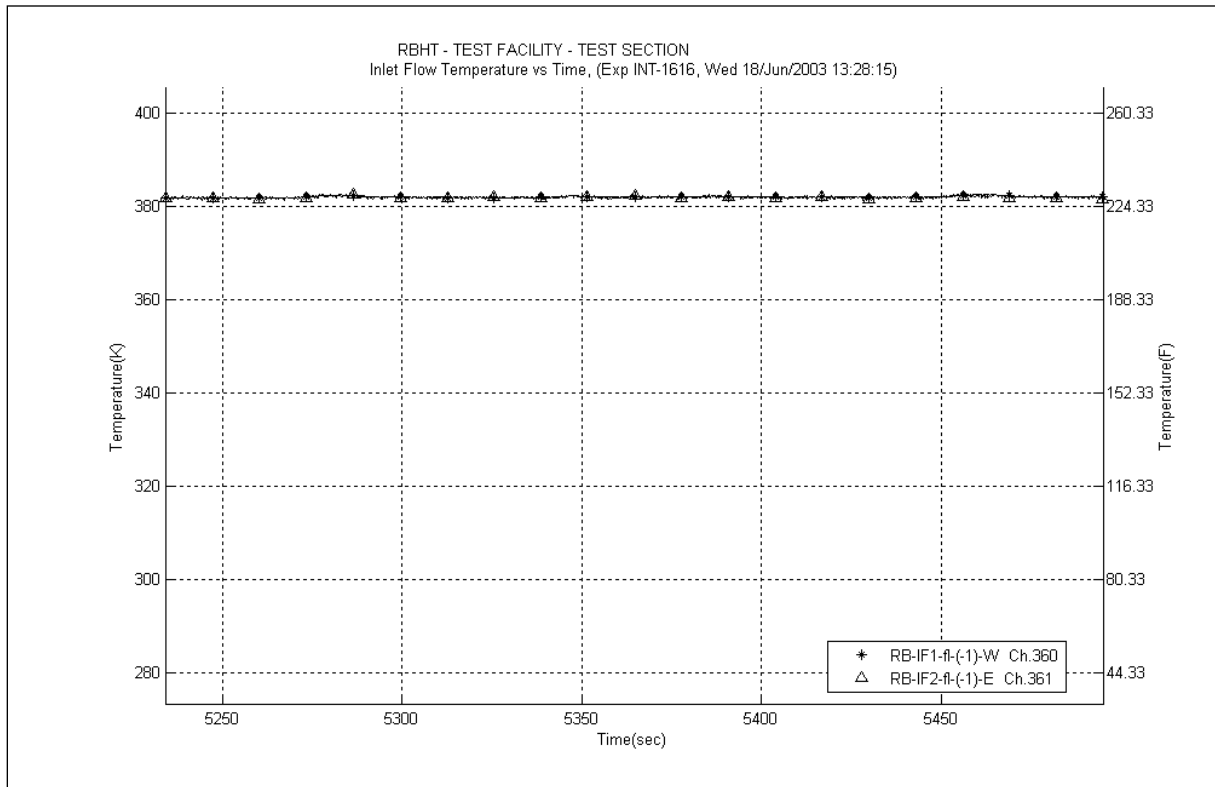


Figure A-267 Inlet Temperature Plot for Experiment 1616F

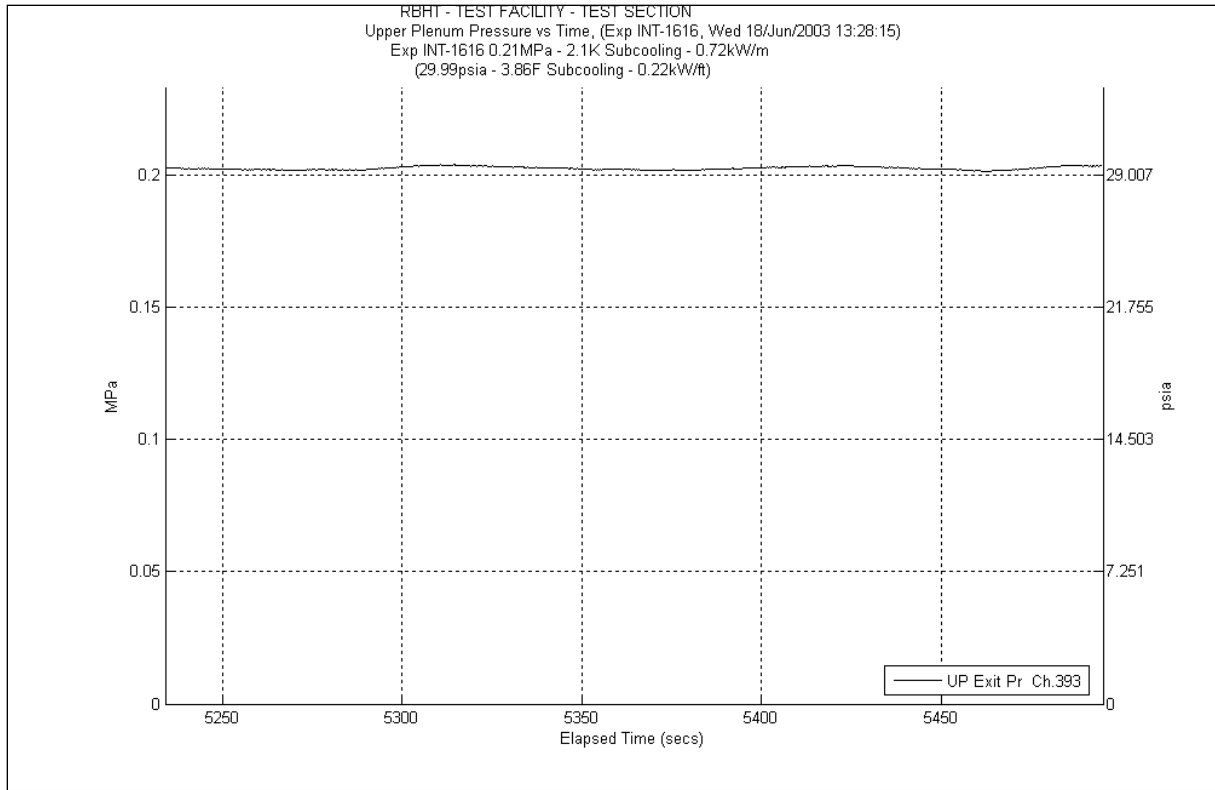


Figure A-268 System Pressure Plot for Experiment 1616F

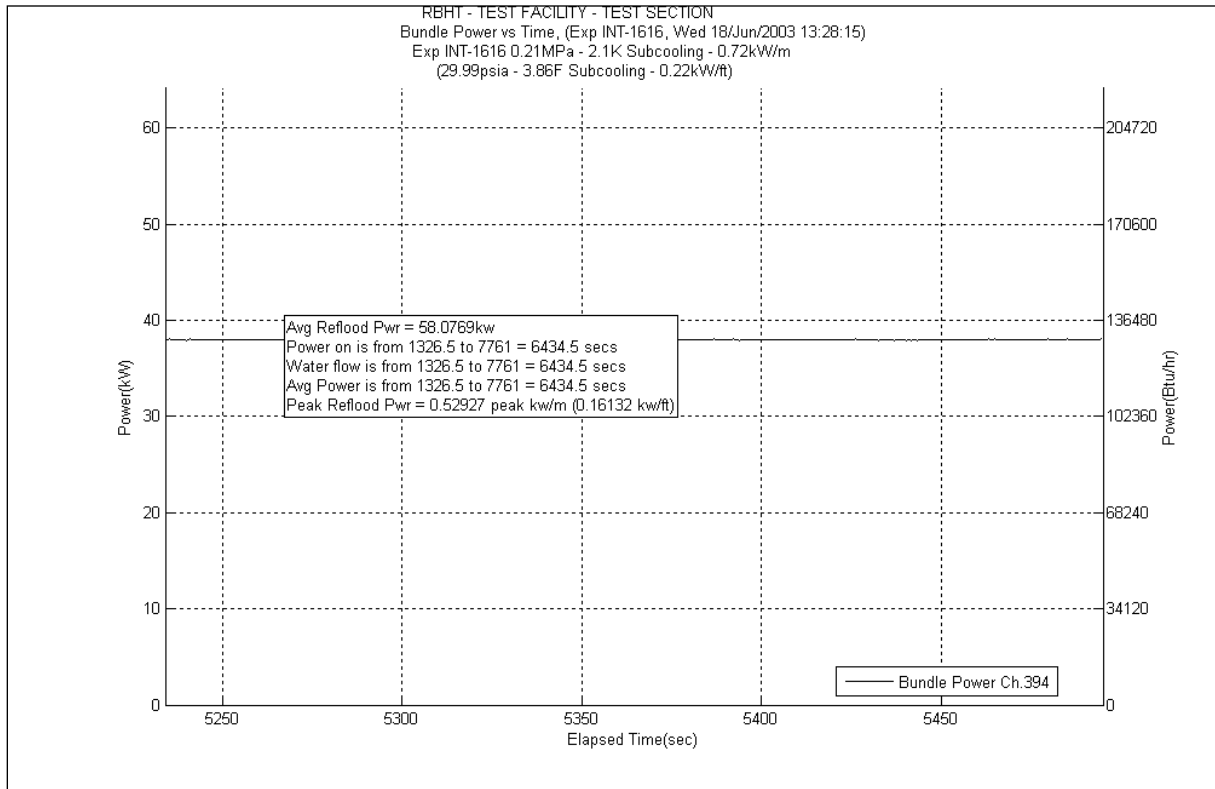


Figure A-269 Bundle Power Plot for Experiment 1616F

Table A-107 Data Results for RBHT Test 1616F for Time Period 5234 to 5495 seconds

Results for RBHT Test 1616
Valid Time Period 5234 to 5495 seconds
Collapsed Liquid Level = 82.973 inches = 2107.50 mm
(Z_{obs}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.680	18.275	875.027	0.262	12.545	0.054	2.586	0.000	0.000	17.95	859.451	4337.95	207702.1609	0.686	0.683	0.689
*	120-133	3048-3378	383	0.689	21.028	1006.816	0.291	13.933	0.097	4.644	-0.720	-34.484	21.36	1022.722	4359.31	208724.8831	0.684	0.681	0.687
*	108-120	2743-3048	382	0.583	26.019	1245.776	0.244	11.683	0.121	5.794	5.684	272.131	19.97	956.169	4379.28	209681.0519	0.679	0.676	0.682
	100-108	2540-2743	381	0.672	13.638	652.976	0.146	6.991	0.088	4.213	0.000	0.000	13.4	641.595	4392.68	210322.6473	0.677	0.674	0.680
	97-100	2464-2540	380	0.524	7.421	355.332	0.051	2.442	0.032	1.532	0.000	0.000	7.336	351.250	4400.016	210673.8969	0.529	0.526	0.532
	93-97	2362-2464	379	0.556	9.223	441.617	0.066	3.160	0.042	2.011	0.000	0.000	9.113	436.333	4409.129	211110.2297	0.561	0.558	0.564
*	85-93	2159-2362	378	0.418	24.201	1158.746	0.122	5.841	0.080	3.830	7.999	382.990	16	766.084	4425.129	211876.3138	0.615	0.612	0.618
	81-85	2057-2159	377	0.664	6.985	334.445	0.056	2.681	0.038	1.819	0.000	0.000	6.889	329.847	4432.018	212206.1609	0.668	0.665	0.671
	78-81	1981-2057	376	0.658	5.328	255.123	0.040	1.915	0.028	1.341	0.000	0.000	5.257	251.707	4437.275	212457.8674	0.663	0.660	0.666
	75-78	1905-1981	375	0.519	7.489	358.565	0.038	1.819	0.027	1.293	0.000	0.000	7.419	355.224	4444.694	212813.091	0.524	0.521	0.527
	72-75	1829-1905	374	0.431	8.865	424.459	0.037	1.772	0.027	1.293	0.000	0.000	8.797	421.203	4453.491	213234.2936	0.435	0.433	0.437
*	67-72	1702-1829	373	0.389	15.876	760.147	0.057	2.729	0.043	2.059	3.016	144.407	12.76	610.952	4466.251	213845.2457	0.509	0.506	0.512
	63-67	1600-1702	372	0.578	8.761	419.486	0.043	2.059	0.033	1.580	0.000	0.000	8.681	415.649	4474.932	214260.8942	0.582	0.579	0.585
	60-63	1524-1600	371	0.395	9.421	451.066	0.030	1.436	0.024	1.149	0.000	0.000	9.362	448.255	4484.294	214709.1492	0.399	0.397	0.401
	57-60	1448-1524	370	0.385	9.577	458.525	0.028	1.341	0.024	1.149	0.000	0.000	9.523	455.964	4493.817	215165.1129	0.389	0.387	0.391
	53-57	1346-1448	369	0.367	13.150	629.602	0.035	1.676	0.030	1.436	0.000	0.000	13.08	626.274	4506.897	215791.3866	0.37	0.368	0.372
*	46-53	1168-1346	368	0.283	26.081	1248.760	0.055	2.633	0.051	2.442	5.185	248.255	20.79	995.431	4527.687	216786.8172	0.428	0.426	0.430
	43-46	1092-1168	367	0.483	8.060	385.917	0.021	1.005	0.021	1.005	0.000	0.000	8.014	383.712	4535.701	217170.5296	0.486	0.484	0.488
	37-43	940-1092	366	0.335	20.721	992.145	0.037	1.772	0.039	1.867	0.000	0.000	20.64	988.249	4556.341	218158.7781	0.337	0.335	0.339
*	25-37	635-940	365	0.208	49.378	2364.240	0.054	2.586	0.071	3.399	1.043	49.948	48.21	2308.307	4604.551	220467.0852	0.226	0.225	0.227
	13-25	330-635	364	0.114	55.236	2644.726	0.025	1.197	0.054	2.586	0.000	0.000	55.14	2640.117	4659.691	223107.2026	0.115	0.114	0.116
*	0-13	0-330	363	0.045	64.454	3086.094	0.001	0.048	0.000	0.000	0.843	40.383	63.61	3045.663	4723.301	226152.8658	0.057	0.054	0.060

Table A-108 Energy Balance Results for RBHT Test 1616F for Time Period 5234 to 5495 seconds

Results for RBHT Test 1616 Valid Time Period 5234 to 5495 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1740.3626	5.4901	0.00E+00	0.00E+00	0.00E+00	4.19E-02	1.90E-02
0.25	6.35	1837.0495	5.7951	0.00E+00	0.00E+00	0.00E+00	4.19E-02	1.90E-02
0.50	12.70	1933.7363	6.1001	0.00E+00	0.00E+00	0.00E+00	4.19E-02	1.90E-02
0.75	19.05	2030.4231	6.4051	0.00E+00	0.00E+00	0.00E+00	4.19E-02	1.90E-02
1.00	25.40	2127.1099	6.7101	0.00E+00	0.00E+00	0.00E+00	4.19E-02	1.90E-02
1.25	31.75	2223.7967	7.0151	9.90E-04	3.35E-02	1.52E-02	4.19E-02	1.90E-02
1.50	38.10	2320.4835	7.3201	6.69E-03	2.26E-01	1.03E-01	4.16E-02	1.89E-02
1.75	44.45	2417.1703	7.6251	1.26E-02	4.28E-01	1.94E-01	4.14E-02	1.88E-02
2.00	50.80	2513.8572	7.9301	1.88E-02	6.37E-01	2.89E-01	4.11E-02	1.87E-02
2.25	57.15	2610.544	8.2351	2.52E-02	8.54E-01	3.88E-01	4.08E-02	1.85E-02
2.50	63.50	2707.2308	8.5402	3.19E-02	1.08E+00	4.90E-01	4.06E-02	1.84E-02
2.75	69.85	2803.9176	8.8452	3.88E-02	1.31E+00	5.96E-01	4.03E-02	1.83E-02
3.00	76.20	2900.6044	9.1502	4.60E-02	1.56E+00	7.06E-01	4.00E-02	1.81E-02
3.25	82.55	2997.2912	9.4552	5.34E-02	1.81E+00	8.19E-01	3.97E-02	1.80E-02
3.50	88.90	3093.978	9.7602	6.10E-02	2.06E+00	9.37E-01	3.93E-02	1.78E-02
3.75	95.25	3190.6649	10.065	6.89E-02	2.33E+00	1.06E+00	3.90E-02	1.77E-02
4.00	101.60	3287.3517	10.37	7.70E-02	2.61E+00	1.18E+00	3.87E-02	1.75E-02
4.25	107.95	3384.0385	10.675	8.54E-02	2.89E+00	1.31E+00	3.83E-02	1.74E-02
4.50	114.30	3480.7253	10.98	9.40E-02	3.18E+00	1.44E+00	3.80E-02	1.72E-02
4.75	120.65	3577.4121	11.285	1.03E-01	3.48E+00	1.58E+00	3.76E-02	1.71E-02
5.00	127.00	3674.0989	11.59	1.12E-01	3.79E+00	1.72E+00	3.72E-02	1.69E-02
5.25	133.35	3770.7857	11.895	1.21E-01	4.10E+00	1.86E+00	3.68E-02	1.67E-02
5.50	139.70	3867.4726	12.2	1.31E-01	4.43E+00	2.01E+00	3.64E-02	1.65E-02
5.75	146.05	3964.1594	12.505	1.41E-01	4.76E+00	2.16E+00	3.60E-02	1.63E-02
6.00	152.40	4060.8462	12.81	1.51E-01	5.10E+00	2.31E+00	3.56E-02	1.61E-02
6.25	158.75	4157.533	13.115	1.61E-01	5.45E+00	2.47E+00	3.52E-02	1.59E-02
6.50	165.10	4254.2198	13.42	1.72E-01	5.81E+00	2.63E+00	3.47E-02	1.57E-02
6.75	171.45	4350.9066	13.725	1.82E-01	6.17E+00	2.80E+00	3.43E-02	1.55E-02
7.00	177.80	4447.5934	14.03	1.93E-01	6.55E+00	2.97E+00	3.38E-02	1.53E-02
7.25	184.15	4544.2802	14.335	2.05E-01	6.93E+00	3.14E+00	3.33E-02	1.51E-02
7.50	190.50	4640.9671	14.64	2.16E-01	7.32E+00	3.32E+00	3.28E-02	1.49E-02
7.75	196.85	4737.6539	14.945	2.28E-01	7.71E+00	3.50E+00	3.24E-02	1.47E-02
8.00	203.20	4834.3407	15.25	2.40E-01	8.12E+00	3.68E+00	3.19E-02	1.44E-02
8.25	209.55	4931.0275	15.555	2.52E-01	8.54E+00	3.87E+00	3.13E-02	1.42E-02
8.50	215.90	5027.7143	15.86	2.65E-01	8.96E+00	4.06E+00	3.08E-02	1.40E-02
8.75	222.25	5124.4011	16.165	2.77E-01	9.39E+00	4.26E+00	3.03E-02	1.37E-02
9.00	228.60	5221.0879	16.47	2.90E-01	9.83E+00	4.46E+00	2.97E-02	1.35E-02
9.25	234.95	4931.0275	15.555	3.03E-01	1.03E+01	4.65E+00	2.92E-02	1.32E-02
9.50	241.30	4640.9671	14.64	3.15E-01	1.07E+01	4.84E+00	2.87E-02	1.30E-02
9.75	247.65	4350.9066	13.725	3.26E-01	1.10E+01	5.01E+00	2.82E-02	1.28E-02
10.00	254.00	4060.8462	12.81	3.37E-01	1.14E+01	5.17E+00	2.78E-02	1.26E-02
10.25	260.35	3770.7857	11.895	3.47E-01	1.17E+01	5.32E+00	2.74E-02	1.24E-02
10.50	266.70	3480.7253	10.98	3.56E-01	1.20E+01	5.46E+00	2.70E-02	1.22E-02
10.75	273.05	3190.6649	10.065	3.64E-01	1.23E+01	5.59E+00	2.66E-02	1.21E-02
11.00	279.40	2900.6044	9.1502	3.72E-01	1.26E+01	5.71E+00	2.63E-02	1.19E-02
11.25	285.75	2610.544	8.2351	3.79E-01	1.28E+01	5.81E+00	2.60E-02	1.18E-02
11.50	292.10	2320.4835	7.3201	3.85E-01	1.30E+01	5.91E+00	2.58E-02	1.17E-02
11.75	298.45	2030.4231	6.4051	3.90E-01	1.32E+01	5.99E+00	2.55E-02	1.16E-02
12.00	304.80	1740.3626	5.4901	3.95E-01	1.34E+01	6.07E+00	2.53E-02	1.15E-02

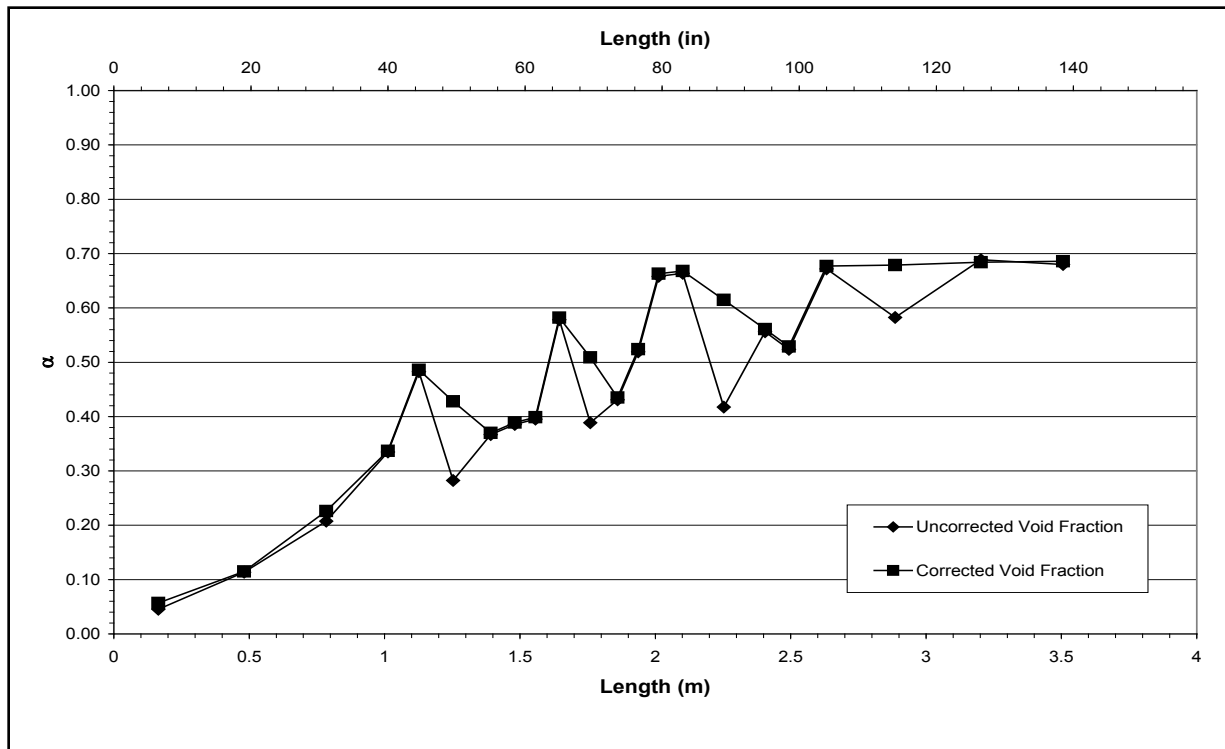


Figure A-270 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1616F for Time Period 5234 to 5495 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1616-G

Test Conditions

Date: 6/18/2003

Steady-state time window: 5700 – 5820 seconds

Inlet flow rate: 1.267 cm/sec (0.499 in./sec)

Inlet mass flow rate: 0.059 kg/sec (0.129 lbm/sec)

Inlet flow temperature: 382.2 K (228.2 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.93 kW

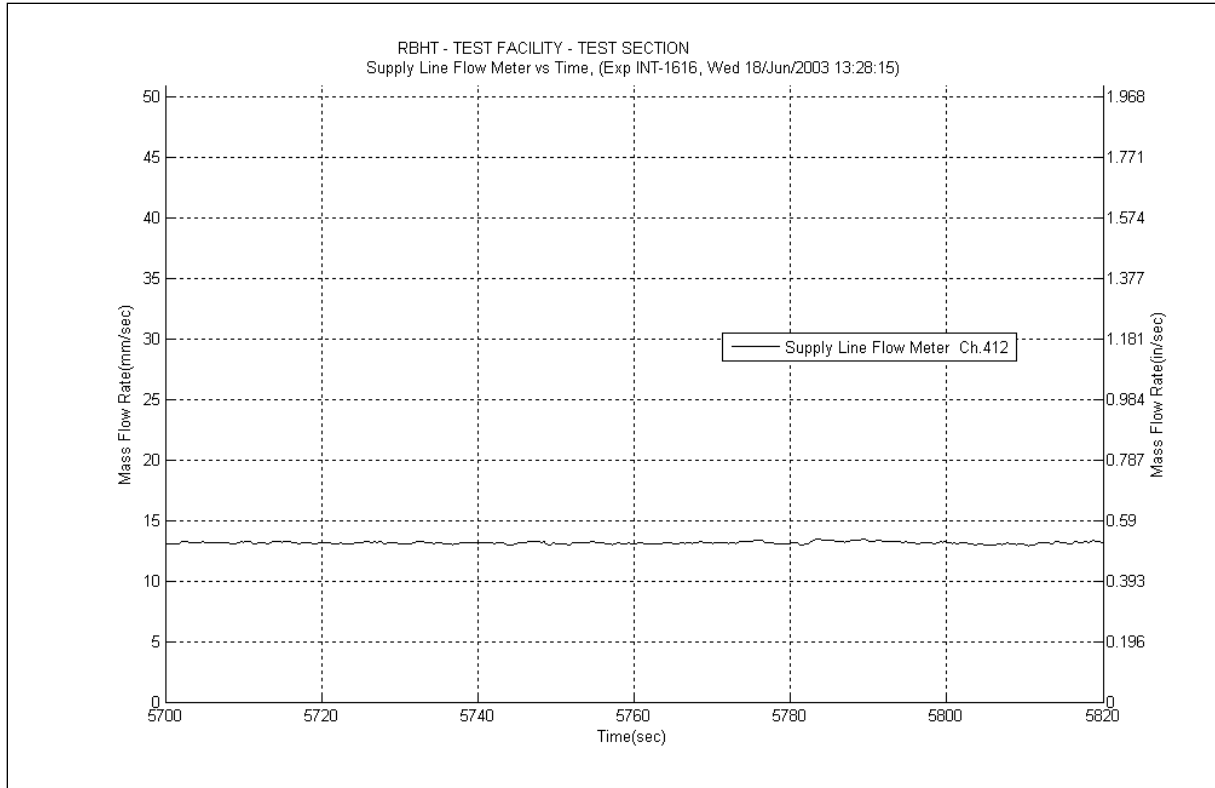


Figure A-271 Inlet Flow Plot for Experiment 1616G

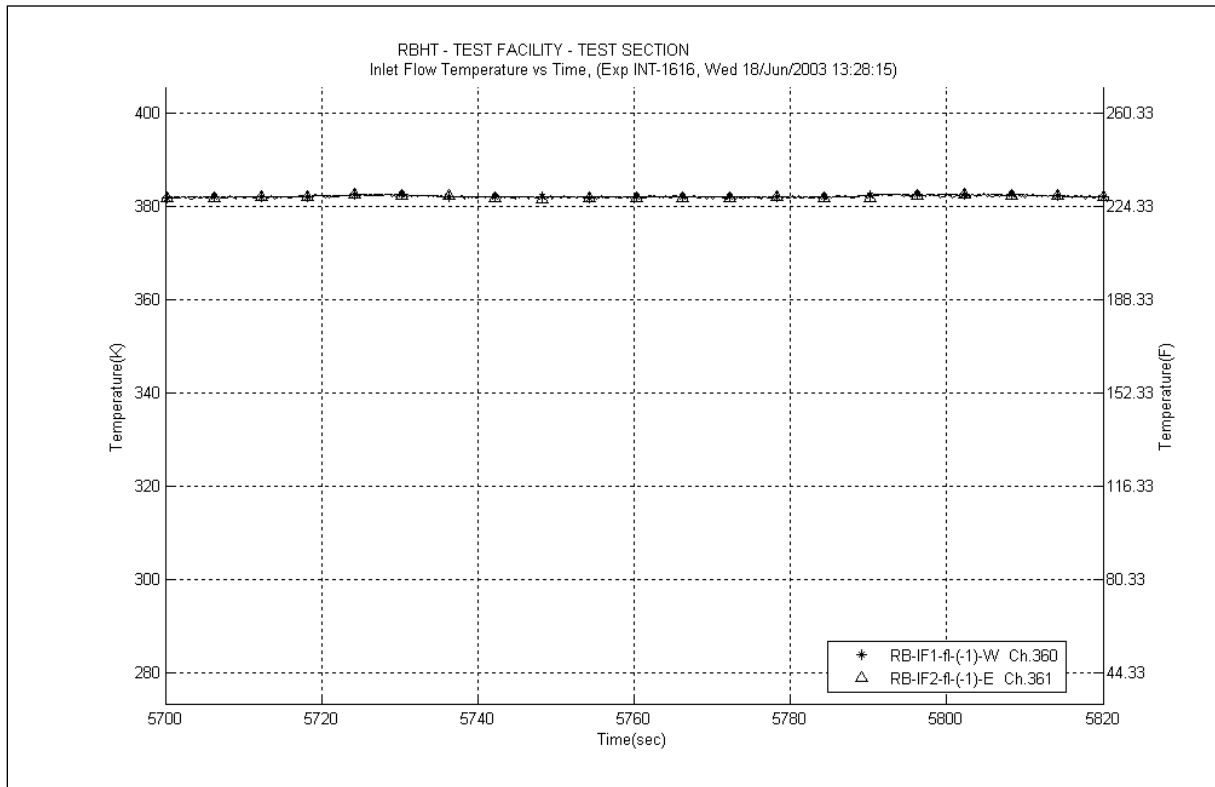


Figure A-272 Inlet Temperature Plot for Experiment 1616G

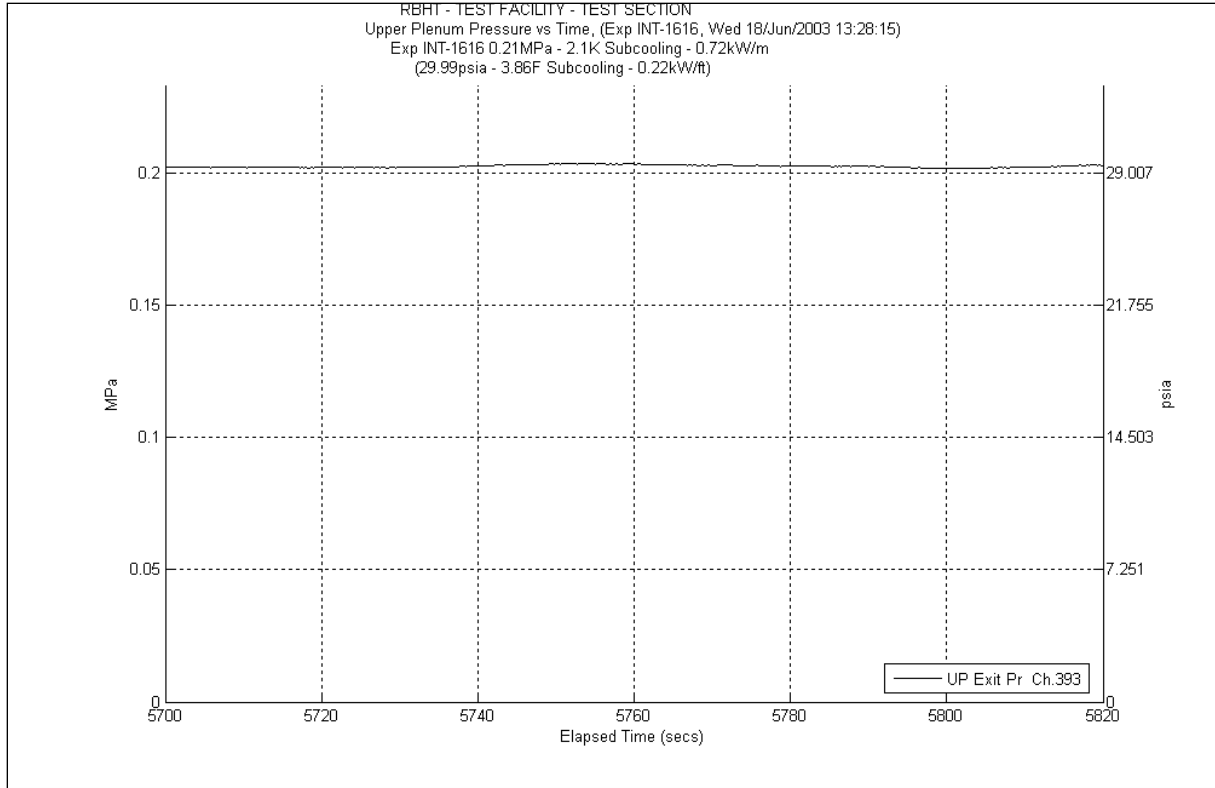


Figure A-273 System Pressure Plot for Experiment 1616G

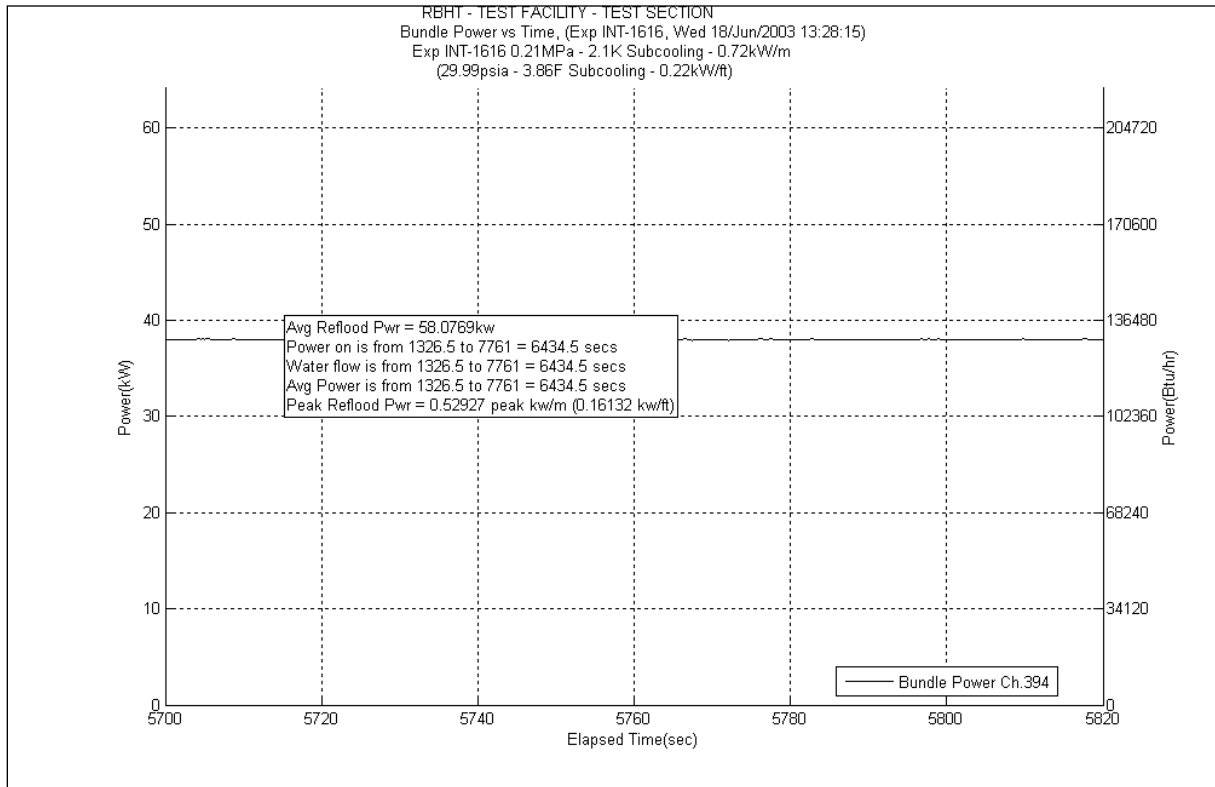


Figure A-274 Bundle Power Plot for Experiment 1616G

Table A-109 Data Results for RBHT Test 1616G for Time Period 5700 to 5820 seconds

Results for RBHT Test 1616
Valid Time Period 5700 to 5820 seconds
Collapsed Liquid Level = 83.260 inches = 2114.81 mm
(Z_{OVS}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.694	17.502	837.977	0.261	12.497	0.054	2.586	0.000	0.000	17.18	822.583	4337.18	207665.2931	0.699	0.696	0.702
*	120-133	3048-3378	383	0.693	20.716	991.897	0.290	13.885	0.096	4.597	-0.270	-12.918	20.6	986.333	4357.78	208651.6263	0.695	0.692	0.698
*	108-120	2743-3048	382	0.585	25.847	1237.571	0.243	11.635	0.120	5.746	5.924	283.652	19.56	936.538	4377.34	209588.1642	0.686	0.683	0.689
	100-108	2540-2743	381	0.676	13.461	644.521	0.146	6.991	0.088	4.213	0.000	0.000	13.23	633.456	4390.57	210221.62	0.682	0.679	0.685
	97-100	2464-2540	380	0.528	7.359	352.348	0.051	2.442	0.032	1.532	0.000	0.000	7.275	348.329	4397.845	210569.9488	0.533	0.530	0.536
	93-97	2362-2464	379	0.554	9.275	444.103	0.065	3.112	0.041	1.963	0.000	0.000	9.166	438.870	4407.011	211008.8193	0.559	0.556	0.562
*	85-93	2159-2362	378	0.418	24.196	1158.498	0.121	5.794	0.080	3.830	7.985	382.311	16.01	766.563	4423.021	211775.3822	0.615	0.612	0.618
	81-85	2057-2159	377	0.666	6.943	332.456	0.056	2.681	0.038	1.819	0.000	0.000	6.847	327.836	4429.868	212103.2183	0.67	0.667	0.673
	78-81	1981-2057	376	0.658	5.323	254.874	0.040	1.915	0.028	1.341	0.000	0.000	5.252	251.467	4435.12	212354.6854	0.663	0.660	0.666
	75-78	1905-1981	375	0.521	7.463	357.322	0.038	1.819	0.027	1.293	0.000	0.000	7.393	353.979	4442.513	212708.6642	0.525	0.522	0.528
	72-75	1829-1905	374	0.430	8.875	424.956	0.037	1.772	0.027	1.293	0.000	0.000	8.807	421.681	4451.32	213130.3456	0.435	0.433	0.437
*	67-72	1702-1829	373	0.387	15.923	762.385	0.057	2.729	0.043	2.059	3.043	145.688	12.78	611.910	4464.1	213742.2553	0.508	0.505	0.511
	63-67	1600-1702	372	0.578	8.777	420.232	0.043	2.059	0.033	1.580	0.000	0.000	8.698	416.462	4472.798	214158.7177	0.581	0.578	0.584
	60-63	1524-1600	371	0.400	9.353	447.833	0.030	1.436	0.024	1.149	0.000	0.000	9.296	445.095	4482.094	214603.8126	0.403	0.401	0.405
	57-60	1448-1524	370	0.382	9.623	460.763	0.028	1.341	0.023	1.101	0.000	0.000	9.569	458.166	4491.663	215061.9788	0.386	0.384	0.388
	53-57	1346-1448	369	0.366	13.170	630.597	0.035	1.676	0.030	1.436	0.000	0.000	13.1	627.231	4504.763	215689.2102	0.369	0.367	0.371
*	46-53	1168-1346	368	0.287	25.915	1240.803	0.055	2.633	0.050	2.394	4.900	234.600	20.91	1001.176	4525.673	216690.3863	0.425	0.423	0.427
	43-46	1092-1168	367	0.478	8.138	389.647	0.021	1.005	0.021	1.005	0.000	0.000	8.094	387.543	4533.767	217077.9291	0.48	0.478	0.482
	37-43	940-1092	366	0.336	20.706	991.399	0.037	1.772	0.039	1.867	0.000	0.000	20.62	987.291	4554.387	218065.22	0.338	0.336	0.340
*	25-37	635-940	365	0.206	49.487	2369.462	0.054	2.586	0.071	3.399	1.072	51.339	48.29	2312.138	4602.677	220377.3576	0.225	0.224	0.226
	13-25	330-635	364	0.110	55.444	2654.673	0.025	1.197	0.055	2.633	0.000	0.000	55.35	2650.172	4658.027	223027.5299	0.112	0.111	0.113
*	0-13	0-330	363	0.046	64.397	3083.359	0.001	0.048	0.000	0.000	0.676	32.381	63.72	3050.930	4721.747	226078.4598	0.056	0.053	0.059

Table A-110 Energy Balance Results for RBHT Test 1616G for Time Period 5700 to 5820 seconds

Results for RBHT Test 1616 Valid Time Period 5700 to 5820 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1739.988	5.4889	0.00E+00	0.00E+00	0.00E+00	4.17E-02	1.89E-02
0.25	6.35	1836.654	5.7939	0.00E+00	0.00E+00	0.00E+00	4.17E-02	1.89E-02
0.50	12.70	1933.32	6.0988	0.00E+00	0.00E+00	0.00E+00	4.17E-02	1.89E-02
0.75	19.05	2029.986	6.4037	0.00E+00	0.00E+00	0.00E+00	4.17E-02	1.89E-02
1.00	25.40	2126.652	6.7087	0.00E+00	0.00E+00	0.00E+00	4.17E-02	1.89E-02
1.25	31.75	2223.318	7.0136	1.36E-03	4.60E-02	2.09E-02	4.17E-02	1.89E-02
1.50	38.10	2319.984	7.3186	7.08E-03	2.39E-01	1.08E-01	4.14E-02	1.88E-02
1.75	44.45	2416.65	7.6235	1.30E-02	4.40E-01	2.00E-01	4.12E-02	1.87E-02
2.00	50.80	2513.316	7.9284	1.93E-02	6.49E-01	2.95E-01	4.09E-02	1.86E-02
2.25	57.15	2609.982	8.2334	2.57E-02	8.67E-01	3.93E-01	4.07E-02	1.84E-02
2.50	63.50	2706.648	8.5383	3.24E-02	1.09E+00	4.96E-01	4.04E-02	1.83E-02
2.75	69.85	2803.314	8.8433	3.93E-02	1.33E+00	6.02E-01	4.01E-02	1.82E-02
3.00	76.20	2899.98	9.1482	4.65E-02	1.57E+00	7.12E-01	3.98E-02	1.81E-02
3.25	82.55	2996.646	9.4531	5.39E-02	1.82E+00	8.25E-01	3.95E-02	1.79E-02
3.50	88.90	3093.312	9.7581	6.16E-02	2.08E+00	9.42E-01	3.92E-02	1.78E-02
3.75	95.25	3189.978	10.063	6.95E-02	2.34E+00	1.06E+00	3.88E-02	1.76E-02
4.00	101.60	3286.644	10.368	7.77E-02	2.62E+00	1.19E+00	3.85E-02	1.75E-02
4.25	107.95	3383.31	10.673	8.61E-02	2.90E+00	1.32E+00	3.82E-02	1.73E-02
4.50	114.30	3479.976	10.978	9.47E-02	3.19E+00	1.45E+00	3.78E-02	1.71E-02
4.75	120.65	3576.642	11.283	1.04E-01	3.49E+00	1.59E+00	3.74E-02	1.70E-02
5.00	127.00	3673.3081	11.588	1.13E-01	3.80E+00	1.72E+00	3.70E-02	1.68E-02
5.25	133.35	3769.9741	11.893	1.22E-01	4.12E+00	1.87E+00	3.66E-02	1.66E-02
5.50	139.70	3866.6401	12.198	1.32E-01	4.44E+00	2.02E+00	3.62E-02	1.64E-02
5.75	146.05	3963.3061	12.503	1.42E-01	4.77E+00	2.17E+00	3.58E-02	1.63E-02
6.00	152.40	4059.9721	12.807	1.52E-01	5.11E+00	2.32E+00	3.54E-02	1.61E-02
6.25	158.75	4156.6381	13.112	1.62E-01	5.46E+00	2.48E+00	3.50E-02	1.59E-02
6.50	165.10	4253.3041	13.417	1.73E-01	5.82E+00	2.64E+00	3.45E-02	1.57E-02
6.75	171.45	4349.9701	13.722	1.83E-01	6.19E+00	2.81E+00	3.41E-02	1.55E-02
7.00	177.80	4446.6361	14.027	1.95E-01	6.56E+00	2.98E+00	3.36E-02	1.53E-02
7.25	184.15	4543.3021	14.332	2.06E-01	6.94E+00	3.15E+00	3.32E-02	1.50E-02
7.50	190.50	4639.9681	14.637	2.17E-01	7.33E+00	3.33E+00	3.27E-02	1.48E-02
7.75	196.85	4736.6341	14.942	2.29E-01	7.73E+00	3.51E+00	3.22E-02	1.46E-02
8.00	203.20	4833.3001	15.247	2.41E-01	8.14E+00	3.69E+00	3.17E-02	1.44E-02
8.25	209.55	4929.9661	15.552	2.54E-01	8.55E+00	3.88E+00	3.12E-02	1.41E-02
8.50	215.90	5026.6321	15.857	2.66E-01	8.97E+00	4.07E+00	3.06E-02	1.39E-02
8.75	222.25	5123.2981	16.162	2.79E-01	9.41E+00	4.27E+00	3.01E-02	1.37E-02
9.00	228.60	5219.9641	16.467	2.92E-01	9.84E+00	4.46E+00	2.96E-02	1.34E-02
9.25	234.95	4929.9661	15.552	3.05E-01	1.03E+01	4.66E+00	2.90E-02	1.32E-02
9.50	241.30	4639.9681	14.637	3.17E-01	1.07E+01	4.84E+00	2.85E-02	1.29E-02
9.75	247.65	4349.9701	13.722	3.28E-01	1.11E+01	5.02E+00	2.81E-02	1.27E-02
10.00	254.00	4059.9721	12.807	3.39E-01	1.14E+01	5.18E+00	2.76E-02	1.25E-02
10.25	260.35	3769.9741	11.893	3.48E-01	1.18E+01	5.33E+00	2.72E-02	1.23E-02
10.50	266.70	3479.976	10.978	3.58E-01	1.21E+01	5.47E+00	2.68E-02	1.22E-02
10.75	273.05	3189.978	10.063	3.66E-01	1.23E+01	5.60E+00	2.65E-02	1.20E-02
11.00	279.40	2899.98	9.1482	3.74E-01	1.26E+01	5.72E+00	2.62E-02	1.19E-02
11.25	285.75	2609.982	8.2334	3.81E-01	1.28E+01	5.82E+00	2.59E-02	1.17E-02
11.50	292.10	2319.984	7.3186	3.87E-01	1.30E+01	5.92E+00	2.56E-02	1.16E-02
11.75	298.45	2029.986	6.4037	3.92E-01	1.32E+01	6.00E+00	2.54E-02	1.15E-02
12.00	304.80	1739.988	5.4889	3.97E-01	1.34E+01	6.07E+00	2.52E-02	1.14E-02

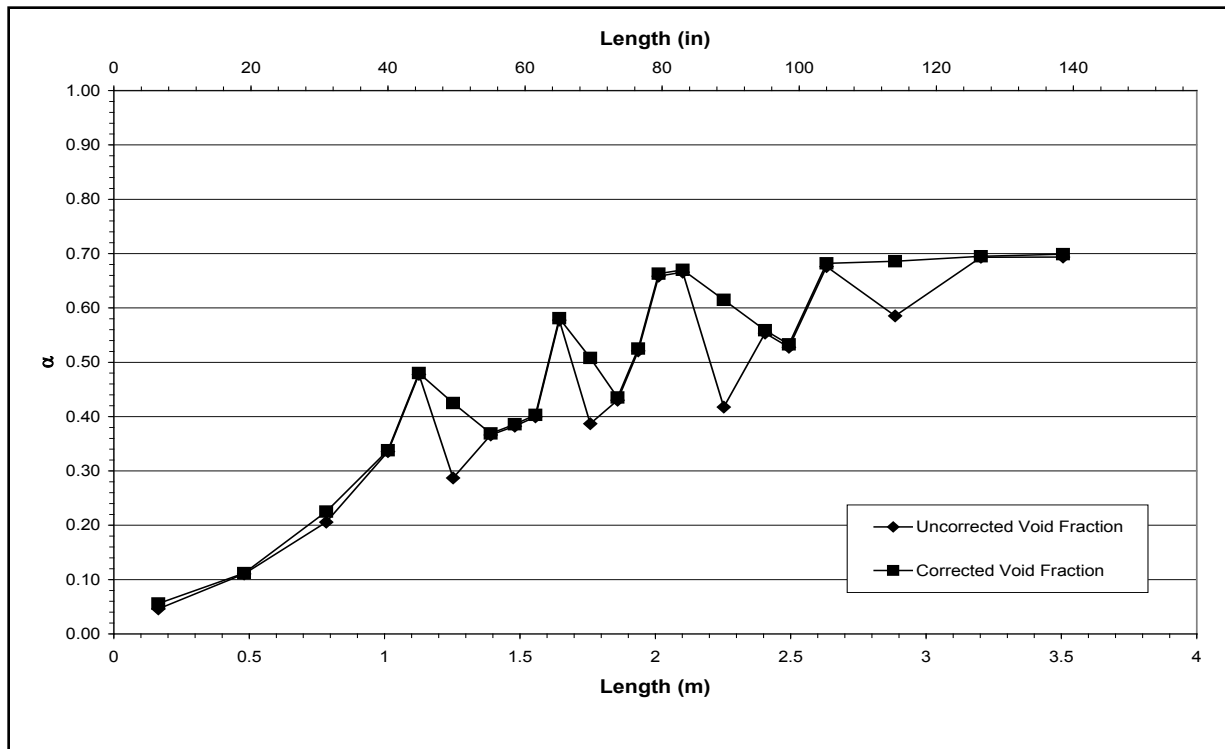


Figure A-275 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1616G for Time Period 5700 to 5820 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1616-H

Test Conditions

Date: 6/18/2003

Steady-state time window: 6083 – 6497 seconds

Inlet flow rate: 0.759 cm/sec (0.299 in./sec)

Inlet mass flow rate: 0.035 kg/sec (0.077 lbm/sec)

Inlet flow temperature: 382.2 K (228.2 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.93 kW

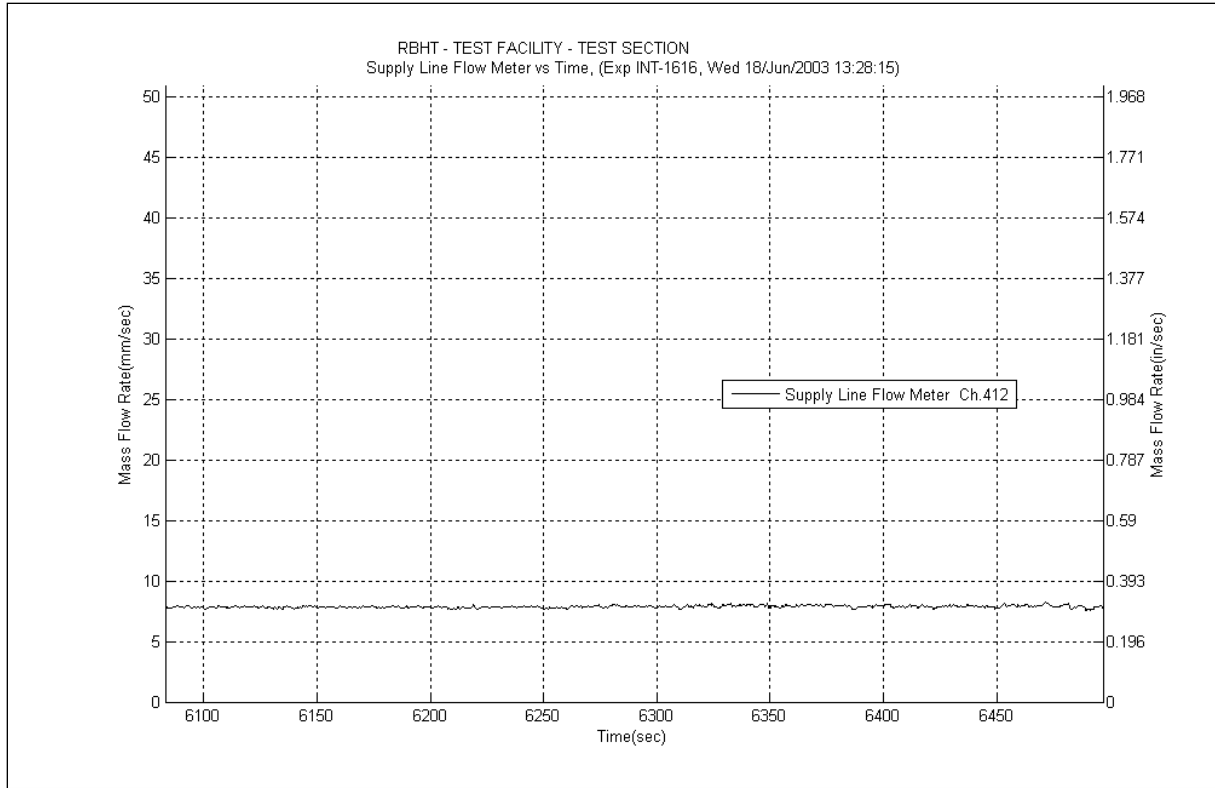


Figure A-276 Inlet Flow Plot for Experiment 1616H

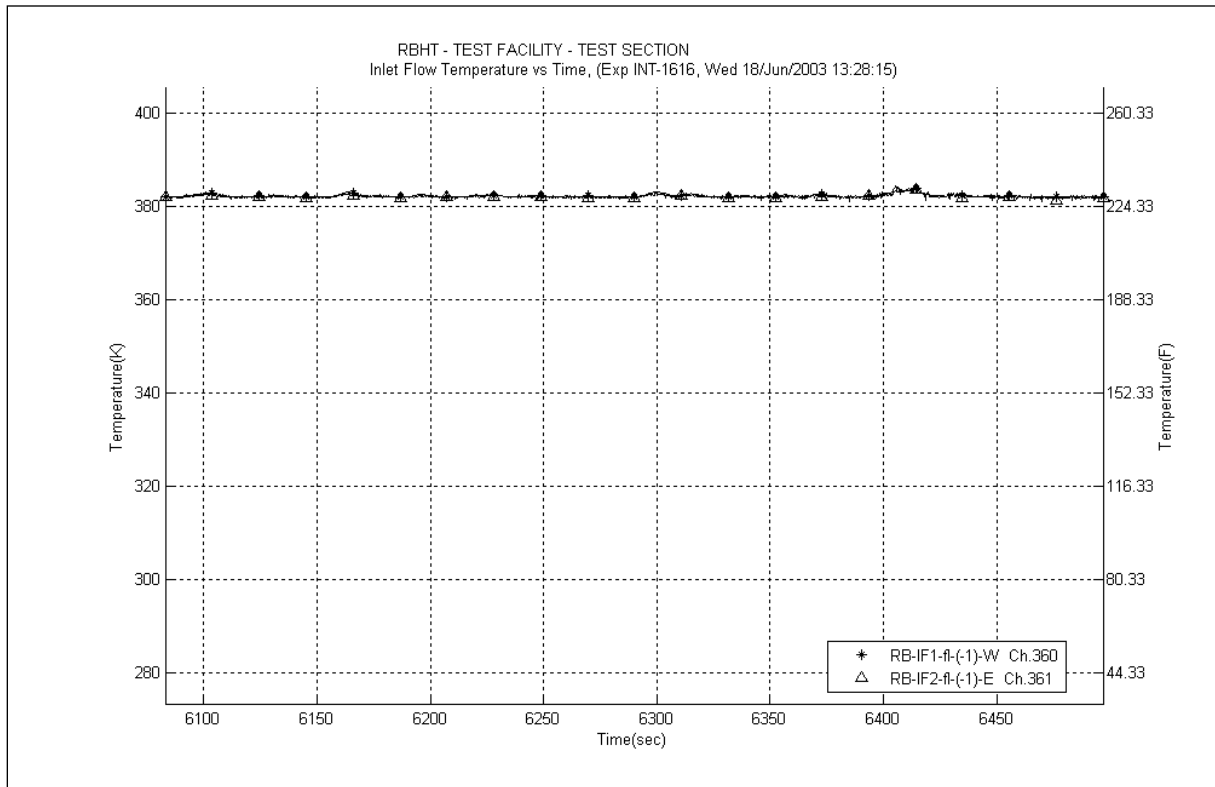


Figure A-277 Inlet Temperature Plot for Experiment 1616H

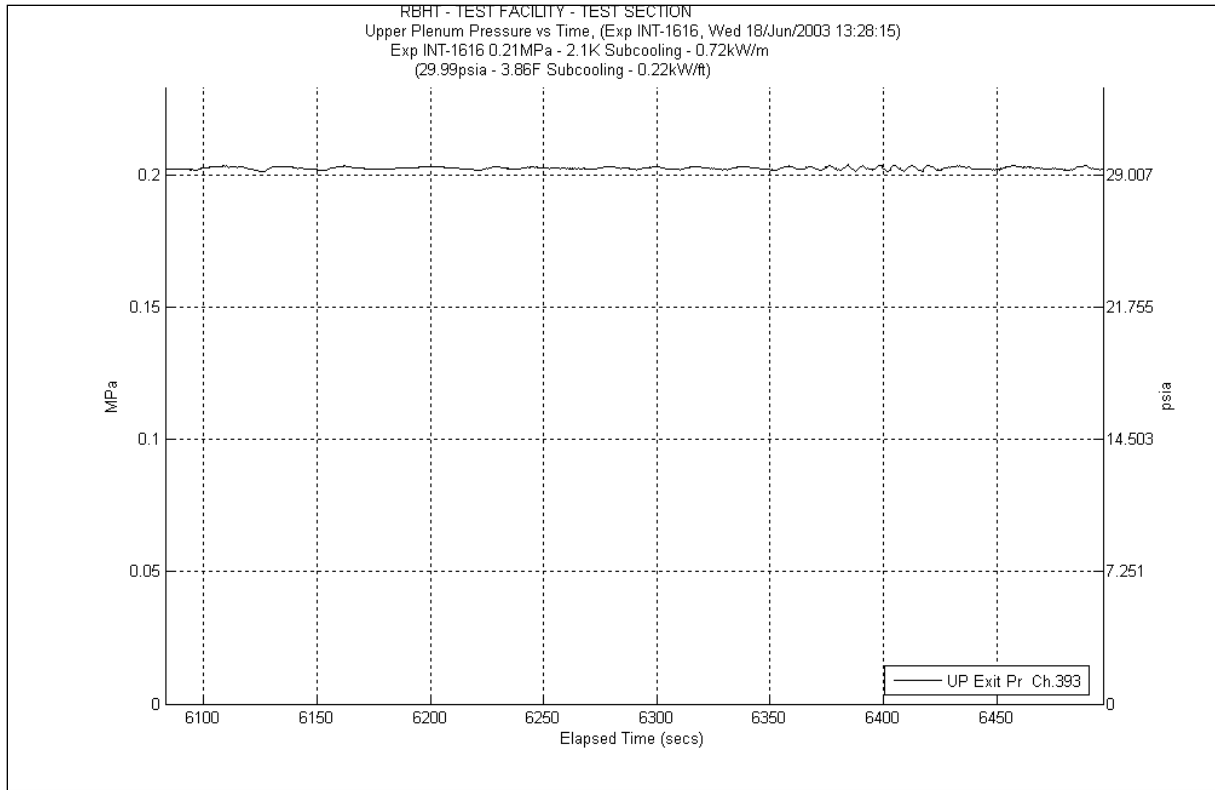


Figure A-278 System Pressure Plot for Experiment 1616H

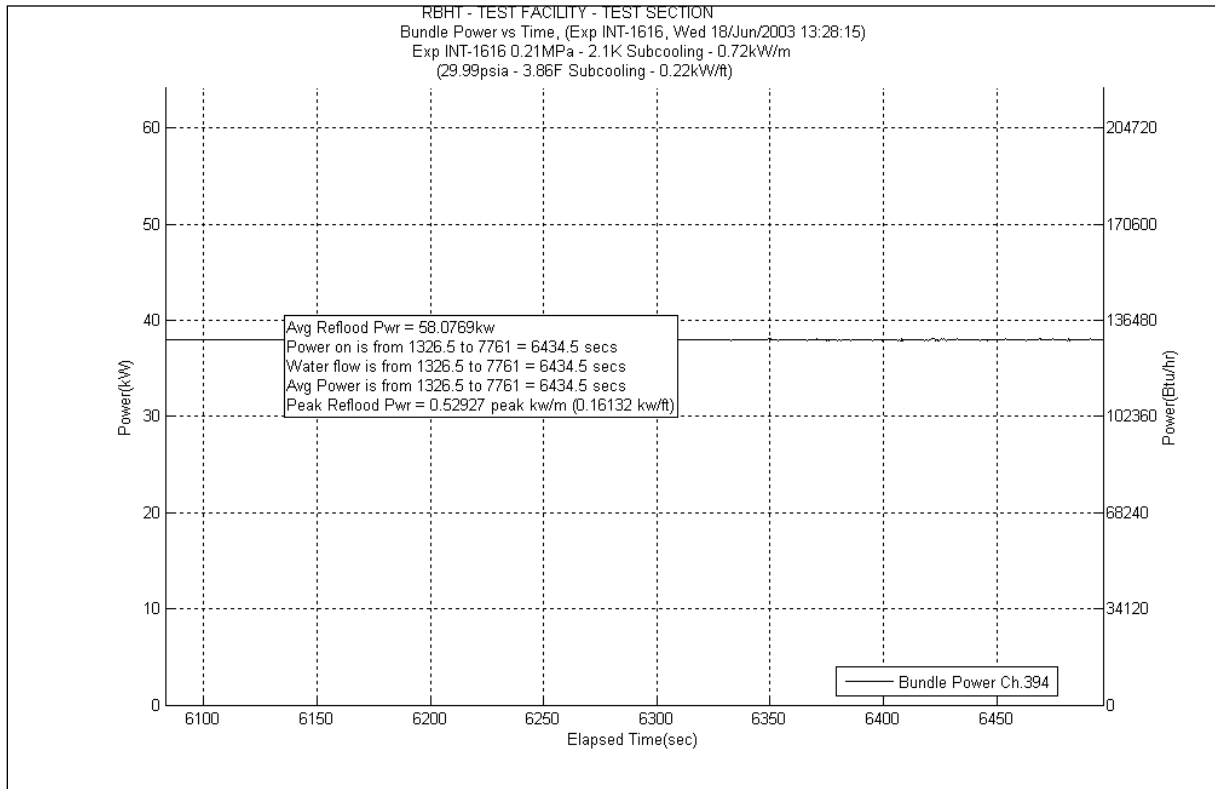


Figure A-279 Bundle Power Plot for Experiment 1616H

Table A-111 Data Results for RBHT Test 16'16H for Time Period 6083 to 6497 seconds

Results for RBHT Test 16'16

Valid Time Period 6083 to 6497 seconds
 Collapsed Liquid Level = 77.974 inches = 1980.53 mm
 (Z_{sev}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{acc1} (lbf/ft ²)	ΔP_{acc1} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.762	13.586	650.489	0.154	7.374	0.032	1.532	0.000	0.000	13.39	641.117	4333.39	207483.8269	0.766	0.762	0.770
*	120-133	3048-3378	383	0.735	17.881	856.129	0.171	8.188	0.058	2.777	0.742	35.510	16.91	809.655	4350.3	208293.482	0.749	0.745	0.753
*	108-120	2743-3048	382	0.618	23.801	1139.599	0.143	6.847	0.072	3.447	5.966	285.655	17.62	843.650	4367.92	209137.1322	0.717	0.713	0.721
	100-108	2540-2743	381	0.698	12.557	601.255	0.085	4.070	0.053	2.538	0.000	0.000	12.41	594.194	4380.33	209731.3261	0.701	0.697	0.705
	97-100	2464-2540	380	0.550	7.016	335.937	0.030	1.436	0.019	0.910	0.000	0.000	6.965	333.486	4387.295	210064.8121	0.553	0.550	0.556
	93-97	2362-2464	379	0.576	8.803	421.475	0.038	1.819	0.025	1.197	0.000	0.000	8.738	418.378	4396.033	210483.1898	0.579	0.576	0.582
*	85-93	2159-2362	378	0.430	23.702	1134.875	0.071	3.399	0.048	2.298	8.243	394.694	15.34	734.483	4411.373	211217.673	0.631	0.628	0.634
	81-85	2057-2159	377	0.679	6.663	319.028	0.033	1.580	0.023	1.101	0.000	0.000	6.604	316.201	4417.977	211533.8742	0.682	0.679	0.685
	78-81	1981-2057	376	0.677	5.038	241.198	0.023	1.101	0.017	0.814	0.000	0.000	4.993	239.066	4422.97	211772.9403	0.679	0.676	0.682
	75-78	1905-1981	375	0.540	7.162	342.899	0.022	1.053	0.016	0.766	0.000	0.000	7.119	340.860	4430.089	212113.7999	0.543	0.540	0.546
	72-75	1829-1905	374	0.463	8.361	400.339	0.021	1.005	0.016	0.766	0.000	0.000	8.324	398.555	4438.413	212512.3551	0.466	0.464	0.468
*	67-72	1702-1829	373	0.387	15.918	762.137	0.033	1.580	0.026	1.245	3.809	182.355	12.05	576.957	4450.463	213089.3122	0.536	0.533	0.539
	63-67	1600-1702	372	0.604	8.237	394.372	0.025	1.197	0.020	0.958	0.000	0.000	8.188	392.044	4458.651	213481.3558	0.606	0.603	0.609
	60-63	1524-1600	371	0.413	9.140	437.638	0.017	0.814	0.014	0.670	0.000	0.000	9.107	436.046	4467.758	213917.4013	0.415	0.413	0.417
	57-60	1448-1524	370	0.404	9.280	444.352	0.017	0.814	0.014	0.670	0.000	0.000	9.246	442.701	4477.004	214360.1021	0.406	0.404	0.408
	53-57	1346-1448	369	0.388	12.718	608.963	0.021	1.005	0.018	0.862	0.000	0.000	12.68	607.122	4489.684	214967.2238	0.39	0.388	0.392
*	46-53	1168-1346	368	0.288	25.878	1239.063	0.032	1.532	0.030	1.436	5.896	282.319	19.92	953.775	4509.604	215920.9985	0.452	0.450	0.454
	43-46	1092-1168	367	0.513	7.593	363.538	0.012	0.575	0.012	0.575	0.000	0.000	7.563	362.118	4517.167	216283.1169	0.514	0.511	0.517
	37-43	940-1092	366	0.375	19.465	931.970	0.022	1.053	0.023	1.101	0.000	0.000	19.41	929.356	4536.577	217212.4727	0.377	0.375	0.379
*	25-37	635-940	365	0.240	47.368	2268.009	0.034	1.628	0.042	2.011	3.112	149.021	44.18	2115.350	4580.757	219327.8224	0.291	0.290	0.292
	13-25	330-635	364	0.204	49.607	2375.181	0.020	0.958	0.036	1.724	0.000	0.000	49.54	2371.988	4630.297	221699.8103	0.205	0.204	0.206
*	0-13	0-330	363	0.050	64.158	3071.921	0.007	0.335	0.011	0.527	3.560	170.473	60.58	2900.586	4690.877	224600.3963	0.102	0.101	0.103

Table A-112 Energy Balance Results for RBHT Test 1616H for Time Period 6083 to 6497 seconds

Results for RBHT Test 1616 Valid Time Period 6083 to 6497 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1737.7489	5.4819	0.00E+00	0.00E+00	0.00E+00	2.50E-02	1.13E-02
0.25	6.35	1834.2905	5.7864	0.00E+00	0.00E+00	0.00E+00	2.50E-02	1.13E-02
0.50	12.70	1930.8321	6.0909	0.00E+00	0.00E+00	0.00E+00	2.50E-02	1.13E-02
0.75	19.05	2027.3737	6.3955	3.32E-04	6.69E-03	3.04E-03	2.50E-02	1.13E-02
1.00	25.40	2123.9153	6.7	9.06E-03	1.83E-01	8.30E-02	2.48E-02	1.12E-02
1.25	31.75	2220.4569	7.0046	1.82E-02	3.67E-01	1.67E-01	2.45E-02	1.11E-02
1.50	38.10	2316.9985	7.3091	2.77E-02	5.60E-01	2.54E-01	2.43E-02	1.10E-02
1.75	44.45	2413.5401	7.6137	3.77E-02	7.61E-01	3.45E-01	2.41E-02	1.09E-02
2.00	50.80	2510.0817	7.9182	4.80E-02	9.70E-01	4.40E-01	2.38E-02	1.08E-02
2.25	57.15	2606.6233	8.2228	5.88E-02	1.19E+00	5.38E-01	2.35E-02	1.07E-02
2.50	63.50	2703.165	8.5273	6.99E-02	1.41E+00	6.41E-01	2.32E-02	1.05E-02
2.75	69.85	2799.7066	8.8319	8.15E-02	1.65E+00	7.47E-01	2.30E-02	1.04E-02
3.00	76.20	2896.2482	9.1364	9.35E-02	1.89E+00	8.56E-01	2.27E-02	1.03E-02
3.25	82.55	2992.7898	9.441	1.06E-01	2.14E+00	9.70E-01	2.23E-02	1.01E-02
3.50	88.90	3089.3314	9.7455	1.19E-01	2.40E+00	1.09E+00	2.20E-02	9.99E-03
3.75	95.25	3185.873	10.05	1.32E-01	2.66E+00	1.21E+00	2.17E-02	9.84E-03
4.00	101.60	3282.4146	10.355	1.45E-01	2.94E+00	1.33E+00	2.14E-02	9.69E-03
4.25	107.95	3378.9562	10.659	1.59E-01	3.22E+00	1.46E+00	2.10E-02	9.53E-03
4.50	114.30	3475.4978	10.964	1.74E-01	3.51E+00	1.59E+00	2.06E-02	9.37E-03
4.75	120.65	3572.0394	11.268	1.89E-01	3.81E+00	1.73E+00	2.03E-02	9.20E-03
5.00	127.00	3668.581	11.573	2.04E-01	4.12E+00	1.87E+00	1.99E-02	9.03E-03
5.25	133.35	3765.1226	11.877	2.20E-01	4.43E+00	2.01E+00	1.95E-02	8.85E-03
5.50	139.70	3861.6642	12.182	2.36E-01	4.76E+00	2.16E+00	1.91E-02	8.67E-03
5.75	146.05	3958.2058	12.486	2.52E-01	5.09E+00	2.31E+00	1.87E-02	8.48E-03
6.00	152.40	4054.7474	12.791	2.69E-01	5.43E+00	2.46E+00	1.83E-02	8.29E-03
6.25	158.75	4151.289	13.096	2.86E-01	5.78E+00	2.62E+00	1.78E-02	8.09E-03
6.50	165.10	4247.8306	13.4	3.04E-01	6.13E+00	2.78E+00	1.74E-02	7.89E-03
6.75	171.45	4344.3722	13.705	3.22E-01	6.50E+00	2.95E+00	1.70E-02	7.69E-03
7.00	177.80	4440.9138	14.009	3.40E-01	6.87E+00	3.12E+00	1.65E-02	7.48E-03
7.25	184.15	4537.4555	14.314	3.59E-01	7.25E+00	3.29E+00	1.60E-02	7.27E-03
7.50	190.50	4633.9971	14.618	3.78E-01	7.64E+00	3.47E+00	1.55E-02	7.05E-03
7.75	196.85	4730.5387	14.923	3.98E-01	8.04E+00	3.65E+00	1.50E-02	6.82E-03
8.00	203.20	4827.0803	15.227	4.18E-01	8.45E+00	3.83E+00	1.45E-02	6.60E-03
8.25	209.55	4923.6219	15.532	4.39E-01	8.86E+00	4.02E+00	1.40E-02	6.36E-03
8.50	215.90	5020.1635	15.836	4.60E-01	9.28E+00	4.21E+00	1.35E-02	6.13E-03
8.75	222.25	5116.7051	16.141	4.81E-01	9.71E+00	4.41E+00	1.30E-02	5.88E-03
9.00	228.60	5213.2467	16.446	5.03E-01	1.02E+01	4.60E+00	1.24E-02	5.64E-03
9.25	234.95	4923.6219	15.532	5.24E-01	1.06E+01	4.80E+00	1.19E-02	5.40E-03
9.50	241.30	4633.9971	14.618	5.44E-01	1.10E+01	4.98E+00	1.14E-02	5.17E-03
9.75	247.65	4344.3722	13.705	5.63E-01	1.14E+01	5.16E+00	1.09E-02	4.96E-03
10.00	254.00	4054.7474	12.791	5.81E-01	1.17E+01	5.32E+00	1.05E-02	4.76E-03
10.25	260.35	3765.1226	11.877	5.97E-01	1.21E+01	5.47E+00	1.01E-02	4.57E-03
10.50	266.70	3475.4978	10.964	6.12E-01	1.24E+01	5.61E+00	9.69E-03	4.40E-03
10.75	273.05	3185.873	10.05	6.26E-01	1.26E+01	5.74E+00	9.34E-03	4.24E-03
11.00	279.40	2896.2482	9.1364	6.39E-01	1.29E+01	5.85E+00	9.02E-03	4.09E-03
11.25	285.75	2606.6233	8.2228	6.51E-01	1.31E+01	5.96E+00	8.73E-03	3.96E-03
11.50	292.10	2316.9985	7.3091	6.61E-01	1.33E+01	6.05E+00	8.48E-03	3.84E-03
11.75	298.45	2027.3737	6.3955	6.70E-01	1.35E+01	6.14E+00	8.25E-03	3.74E-03
12.00	304.80	1737.7489	5.4819	6.78E-01	1.37E+01	6.21E+00	8.05E-03	3.65E-03

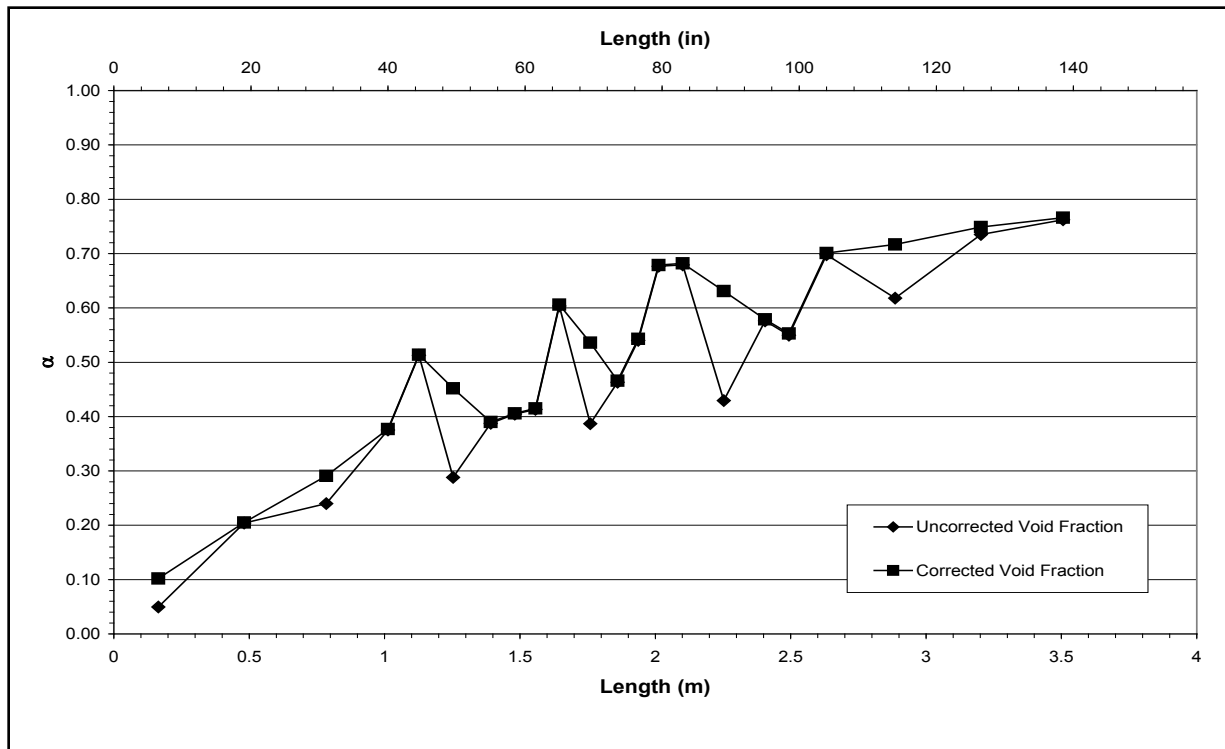


Figure A-280 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1616H for Time Period 6083 to 6497 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1616-I

Test Conditions

Date: 6/18/2003

Steady-state time window: 7500 – 7710 seconds

Inlet flow rate: 0.508 cm/sec (0.200 in./sec)

Inlet mass flow rate: 0.023 kg/sec (0.051 lbm/sec)

Inlet flow temperature: 382.2 K (228.2 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.93 kW

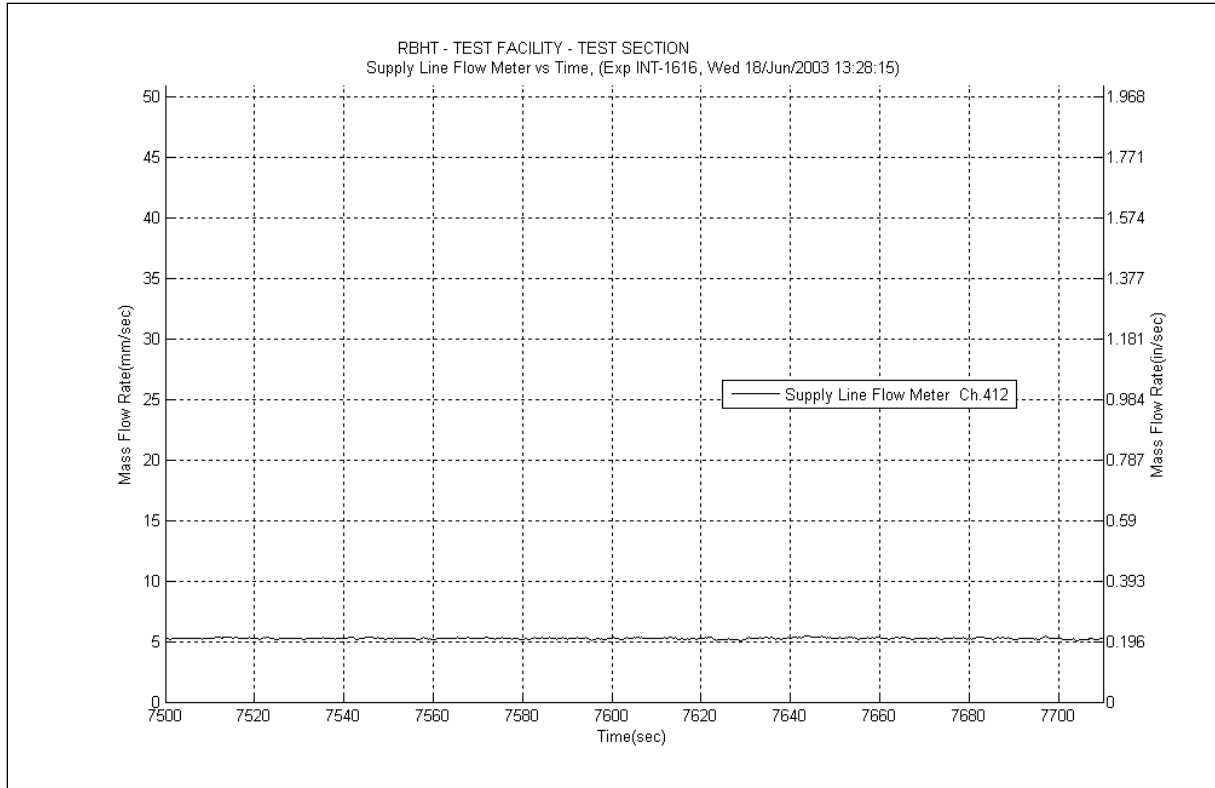


Figure A-281 Inlet Flow Plot for Experiment 16161

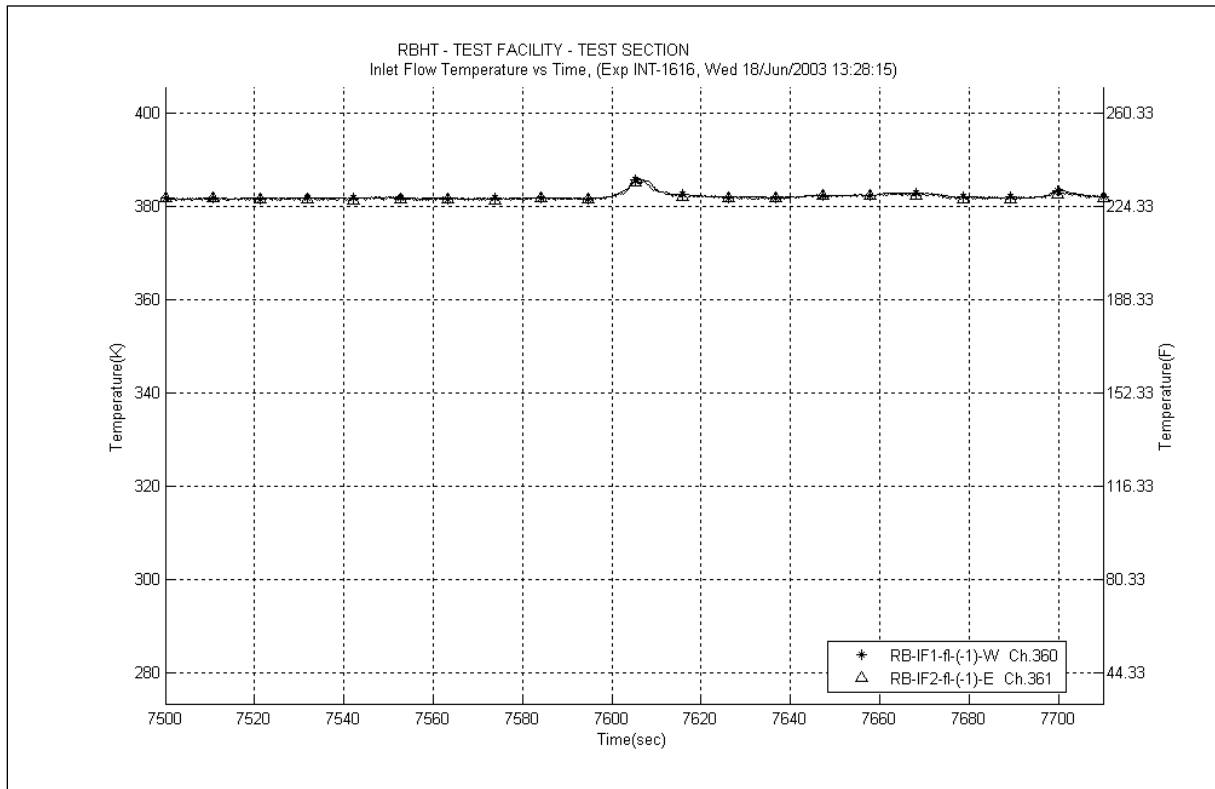


Figure A-282 Inlet Temperature Plot for Experiment 16161

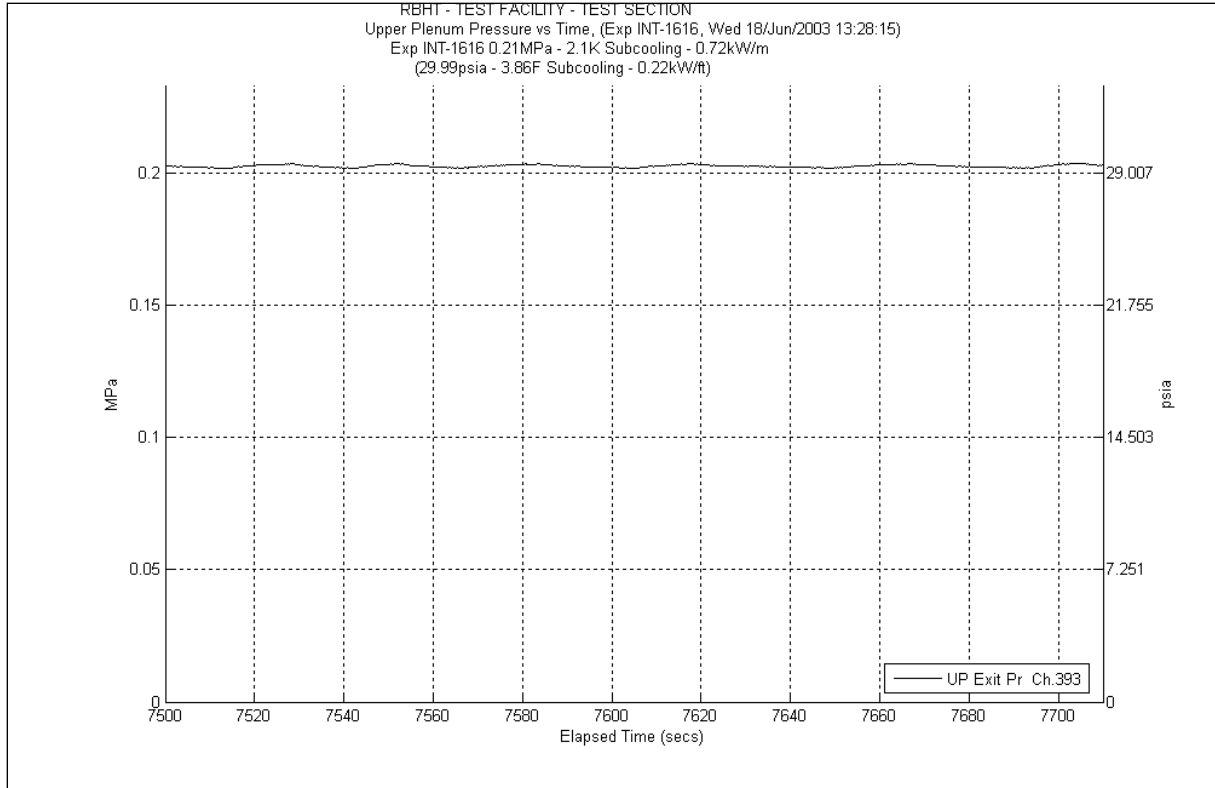


Figure A-283 System Pressure Plot for Experiment 16161

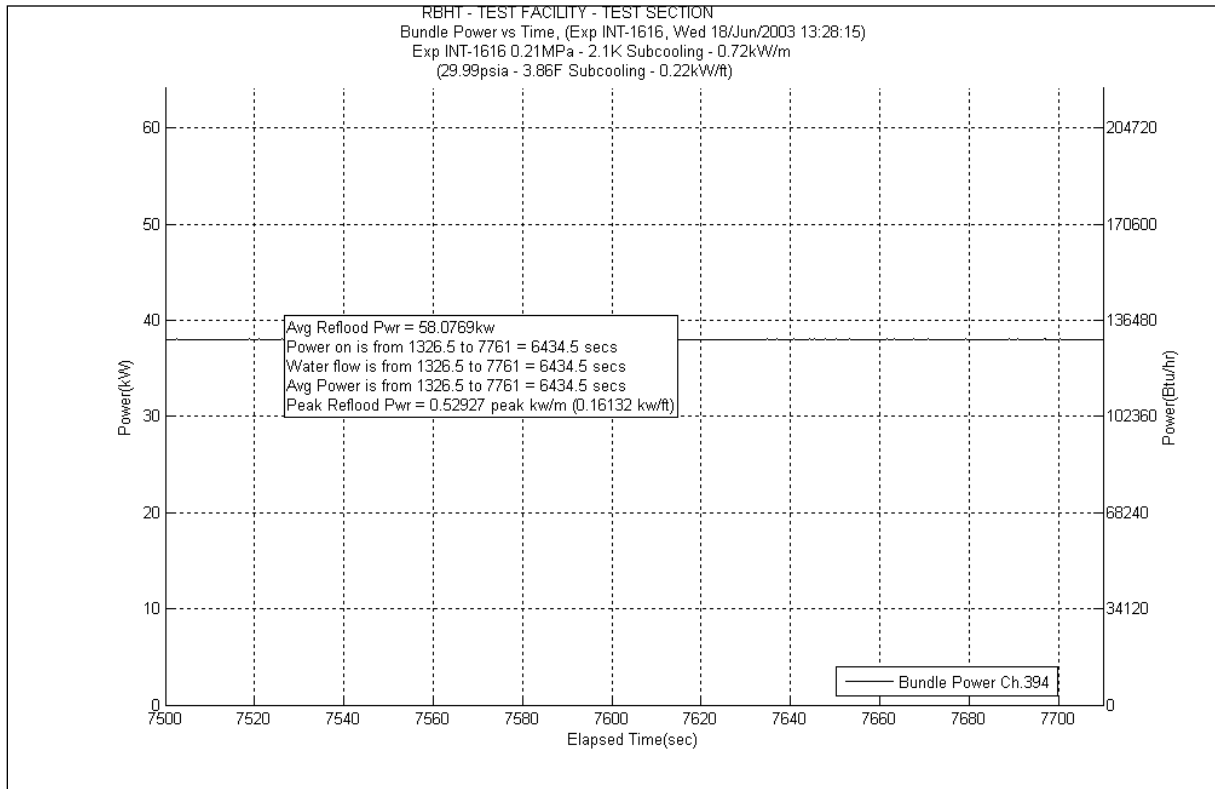


Figure A-284 Bundle Power Plot for Experiment 16161

Table A-113 Data Results for RBHT Test 1616I for Time Period 7500 to 7710 seconds

Results for RBHT Test 1616
Valid Time Period 7500 to 7710 seconds
Collapsed Liquid Level = 76.477 inches = 1942.52 mm
(Z_{lev}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	α _{uncorrected}	ΔP _{uncorrected} (lbf/ft ²)	ΔP _{uncorrected} (Pa)	ΔP _{fic} (lbf/ft ²)	ΔP _{fic} (Pa)	ΔP _{accel} (lbf/ft ²)	ΔP _{accel} (Pa)	ΔP _{grid} (lbf/ft ²)	ΔP _{grid} (Pa)	ΔP _{corrected} (lbf/ft ²)	ΔP _{corrected} (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	α _{corrected}	α _{min}	α _{max}
	133-144	3378-3658	384	0.796	11.628	556.745	0.082	3.926	0.010	0.479	0.000	0.000	11.53	552.059	4331.53	207394.7696	0.798	0.794	0.802
*	120-133	3048-3378	383	0.756	16.489	789.489	0.105	5.027	0.039	1.867	1.265	60.560	15.08	722.034	4346.61	208116.8039	0.777	0.773	0.781
*	108-120	2743-3048	382	0.636	22.664	1085.143	0.092	4.405	0.048	2.298	5.934	284.107	16.59	794.333	4363.2	208911.1373	0.734	0.730	0.738
	100-108	2540-2743	381	0.710	12.043	576.638	0.056	2.681	0.035	1.676	0.000	0.000	11.95	572.169	4375.15	209483.3064	0.712	0.708	0.716
	97-100	2464-2540	380	0.564	6.798	325.493	0.020	0.958	0.013	0.622	0.000	0.000	6.764	323.862	4381.914	209807.1685	0.566	0.563	0.569
	93-97	2362-2464	379	0.586	8.595	411.529	0.025	1.197	0.017	0.814	0.000	0.000	8.551	409.424	4390.465	210216.5925	0.588	0.585	0.591
*	85-93	2159-2362	378	0.440	23.271	1114.236	0.046	2.202	0.032	1.532	7.833	375.061	15.36	735.441	4405.825	210952.0333	0.63	0.627	0.633
	81-85	2057-2159	377	0.670	6.850	327.980	0.021	1.005	0.015	0.718	0.000	0.000	6.81	326.065	4412.635	211278.0978	0.672	0.669	0.675
	78-81	1981-2057	376	0.654	5.396	258.356	0.015	0.718	0.011	0.527	0.000	0.000	5.367	256.973	4418.002	211535.0712	0.655	0.652	0.658
	75-78	1905-1981	375	0.527	7.369	352.846	0.015	0.718	0.011	0.527	0.000	0.000	7.342	351.537	4425.344	211886.608	0.529	0.526	0.532
	72-75	1829-1905	374	0.452	8.538	408.794	0.014	0.670	0.011	0.527	0.000	0.000	8.51	407.461	4433.854	212294.069	0.454	0.452	0.456
*	67-72	1702-1829	373	0.378	16.151	773.326	0.022	1.053	0.017	0.814	3.632	173.913	12.48	597.546	4446.334	212891.6146	0.519	0.516	0.522
	63-67	1600-1702	372	0.583	8.662	414.762	0.016	0.766	0.013	0.622	0.000	0.000	8.628	413.111	4454.962	213304.7255	0.585	0.582	0.588
	60-63	1524-1600	371	0.397	9.390	449.574	0.011	0.527	0.010	0.479	0.000	0.000	9.366	448.446	4464.328	213753.172	0.399	0.397	0.401
	57-60	1448-1524	370	0.388	9.540	456.785	0.011	0.527	0.009	0.431	0.000	0.000	9.514	455.533	4473.842	214208.7047	0.389	0.387	0.391
	53-57	1346-1448	369	0.374	12.999	622.391	0.013	0.622	0.012	0.575	0.000	0.000	12.97	621.007	4486.812	214829.7117	0.375	0.373	0.377
*	46-53	1168-1346	368	0.273	26.418	1264.923	0.021	1.005	0.020	0.958	5.707	273.275	20.67	989.685	4507.482	215819.3966	0.431	0.429	0.433
	43-46	1092-1168	367	0.486	8.008	383.431	0.008	0.383	0.008	0.383	0.000	0.000	7.988	382.467	4515.47	216201.8641	0.487	0.485	0.489
	37-43	940-1092	366	0.353	20.176	966.036	0.015	0.718	0.016	0.766	0.000	0.000	20.14	964.308	4535.61	217166.1725	0.354	0.352	0.356
*	25-37	635-940	365	0.250	46.719	2236.927	0.023	1.101	0.028	1.341	2.608	124.881	44.06	2109.604	4579.67	219275.7766	0.293	0.292	0.294
	13-25	330-635	364	0.231	47.903	2293.621	0.014	0.670	0.024	1.149	0.000	0.000	47.85	2291.070	4627.52	221566.8469	0.232	0.231	0.233
*	0-13	0-330	363	0.058	63.623	3046.309	0.006	0.287	0.012	0.575	3.945	188.911	59.66	2856.536	4687.18	224423.383	0.116	0.115	0.117

Table A-114 Energy Balance Results for RBHT Test 1616I for Time Period 7500 to 7710 seconds

Results for RBHT Test 1616 Valid Time Period 7500 to 7710 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1740.8985	5.4918	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.57E-03
0.25	6.35	1837.6151	5.7969	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.57E-03
0.50	12.70	1934.3317	6.102	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.57E-03
0.75	19.05	2031.0483	6.4071	1.20E-02	1.62E-01	7.35E-02	1.65E-02	7.48E-03
1.00	25.40	2127.7648	6.7122	2.51E-02	3.39E-01	1.54E-01	1.63E-02	7.38E-03
1.25	31.75	2224.4814	7.0173	3.88E-02	5.24E-01	2.38E-01	1.60E-02	7.27E-03
1.50	38.10	2321.198	7.3224	5.31E-02	7.17E-01	3.25E-01	1.58E-02	7.17E-03
1.75	44.45	2417.9146	7.6275	6.80E-02	9.18E-01	4.16E-01	1.55E-02	7.05E-03
2.00	50.80	2514.6312	7.9326	8.36E-02	1.13E+00	5.12E-01	1.53E-02	6.94E-03
2.25	57.15	2611.3478	8.2377	9.97E-02	1.35E+00	6.10E-01	1.50E-02	6.81E-03
2.50	63.50	2708.0644	8.5428	1.17E-01	1.57E+00	7.13E-01	1.47E-02	6.69E-03
2.75	69.85	2804.7809	8.8479	1.34E-01	1.81E+00	8.19E-01	1.45E-02	6.55E-03
3.00	76.20	2901.4975	9.153	1.52E-01	2.05E+00	9.29E-01	1.42E-02	6.42E-03
3.25	82.55	2998.2141	9.4581	1.70E-01	2.30E+00	1.04E+00	1.38E-02	6.28E-03
3.50	88.90	3094.9307	9.7632	1.90E-01	2.56E+00	1.16E+00	1.35E-02	6.13E-03
3.75	95.25	3191.6473	10.068	2.09E-01	2.82E+00	1.28E+00	1.32E-02	5.98E-03
4.00	101.60	3288.3639	10.373	2.30E-01	3.10E+00	1.41E+00	1.28E-02	5.83E-03
4.25	107.95	3385.0804	10.678	2.51E-01	3.39E+00	1.54E+00	1.25E-02	5.67E-03
4.50	114.30	3481.797	10.984	2.72E-01	3.68E+00	1.67E+00	1.21E-02	5.51E-03
4.75	120.65	3578.5136	11.289	2.95E-01	3.98E+00	1.80E+00	1.18E-02	5.34E-03
5.00	127.00	3675.2302	11.594	3.18E-01	4.29E+00	1.94E+00	1.14E-02	5.16E-03
5.25	133.35	3771.9468	11.899	3.41E-01	4.60E+00	2.09E+00	1.10E-02	4.99E-03
5.50	139.70	3868.6634	12.204	3.65E-01	4.93E+00	2.23E+00	1.06E-02	4.81E-03
5.75	146.05	3965.3799	12.509	3.90E-01	5.26E+00	2.39E+00	1.02E-02	4.62E-03
6.00	152.40	4062.0965	12.814	4.15E-01	5.60E+00	2.54E+00	9.76E-03	4.43E-03
6.25	158.75	4158.8131	13.119	4.41E-01	5.95E+00	2.70E+00	9.33E-03	4.23E-03
6.50	165.10	4255.5297	13.424	4.67E-01	6.31E+00	2.86E+00	8.89E-03	4.03E-03
6.75	171.45	4352.2463	13.729	4.94E-01	6.67E+00	3.03E+00	8.44E-03	3.83E-03
7.00	177.80	4448.9629	14.035	5.22E-01	7.05E+00	3.20E+00	7.97E-03	3.62E-03
7.25	184.15	4545.6794	14.34	5.50E-01	7.43E+00	3.37E+00	7.50E-03	3.40E-03
7.50	190.50	4642.396	14.645	5.79E-01	7.82E+00	3.55E+00	7.02E-03	3.18E-03
7.75	196.85	4739.1126	14.95	6.09E-01	8.22E+00	3.73E+00	6.52E-03	2.96E-03
8.00	203.20	4835.8292	15.255	6.39E-01	8.63E+00	3.91E+00	6.02E-03	2.73E-03
8.25	209.55	4932.5458	15.56	6.70E-01	9.04E+00	4.10E+00	5.51E-03	2.50E-03
8.50	215.90	5029.2624	15.865	7.01E-01	9.46E+00	4.29E+00	4.99E-03	2.26E-03
8.75	222.25	5125.979	16.17	7.33E-01	9.90E+00	4.49E+00	4.45E-03	2.02E-03
9.00	228.60	5222.6955	16.475	7.66E-01	1.03E+01	4.69E+00	3.91E-03	1.77E-03
9.25	234.95	4932.5458	15.56	7.98E-01	1.08E+01	4.88E+00	3.38E-03	1.53E-03
9.50	241.30	4642.396	14.645	8.28E-01	1.12E+01	5.07E+00	2.87E-03	1.30E-03
9.75	247.65	4352.2463	13.729	8.56E-01	1.16E+01	5.24E+00	2.40E-03	1.09E-03
10.00	254.00	4062.0965	12.814	8.83E-01	1.19E+01	5.40E+00	1.96E-03	8.88E-04
10.25	260.35	3771.9468	11.899	9.07E-01	1.22E+01	5.56E+00	1.54E-03	7.01E-04
10.50	266.70	3481.797	10.984	9.30E-01	1.26E+01	5.69E+00	1.16E-03	5.28E-04
10.75	273.05	3191.6473	10.068	9.51E-01	1.28E+01	5.82E+00	8.14E-04	3.69E-04
11.00	279.40	2901.4975	9.153	9.70E-01	1.31E+01	5.94E+00	4.94E-04	2.24E-04
11.25	285.75	2611.3478	8.2377	9.88E-01	1.33E+01	6.05E+00	2.04E-04	9.23E-05
11.50	292.10	2321.198	7.3224	1.00E+00	1.35E+01	6.12E+00	0.00E+00	0.00E+00
11.75	298.45	2031.0483	6.4071	1.00E+00	1.35E+01	6.12E+00	0.00E+00	0.00E+00
12.00	304.80	1740.8985	5.4918	1.00E+00	1.35E+01	6.12E+00	0.00E+00	0.00E+00

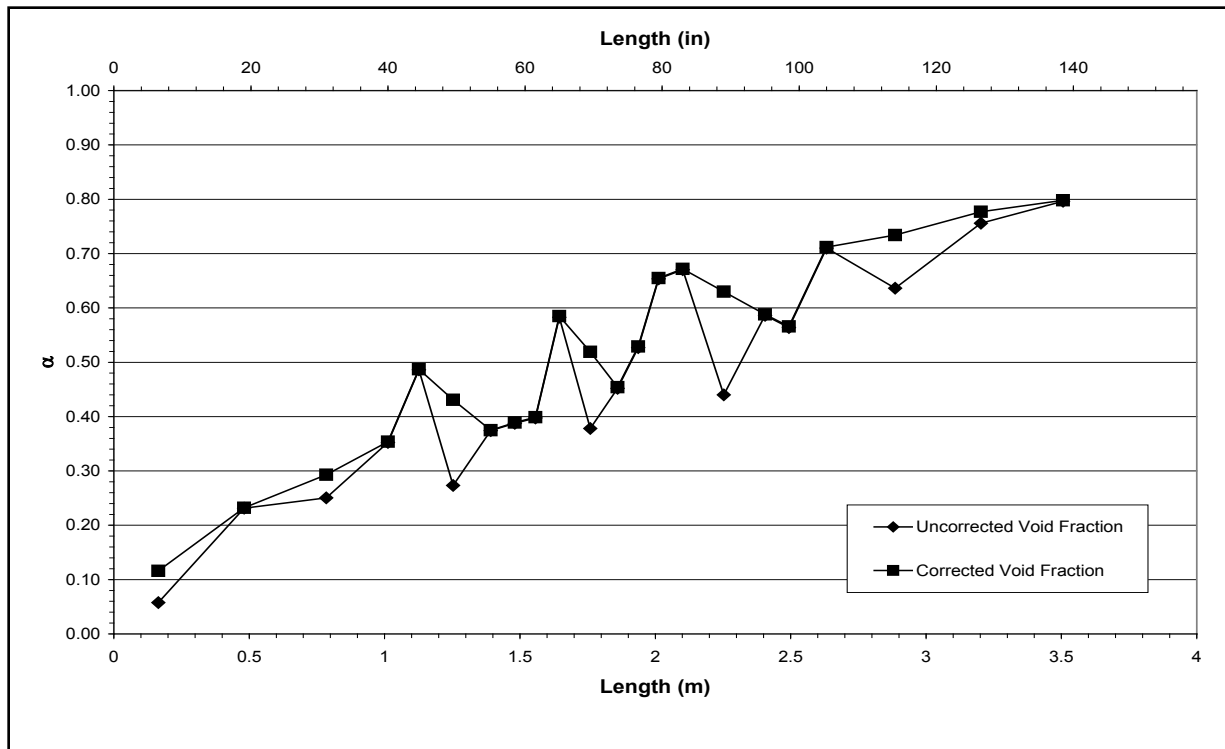


Figure A-285 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1616I for Time Period 7500 to 7710 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1617-A

Test Conditions

Date: 6/18/2003

Steady-state time window: 810 – 990 seconds

Inlet flow rate: 0.503 cm/sec (0.198 in./sec)

Inlet mass flow rate: 0.023 kg/sec (0.051 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.89 kW

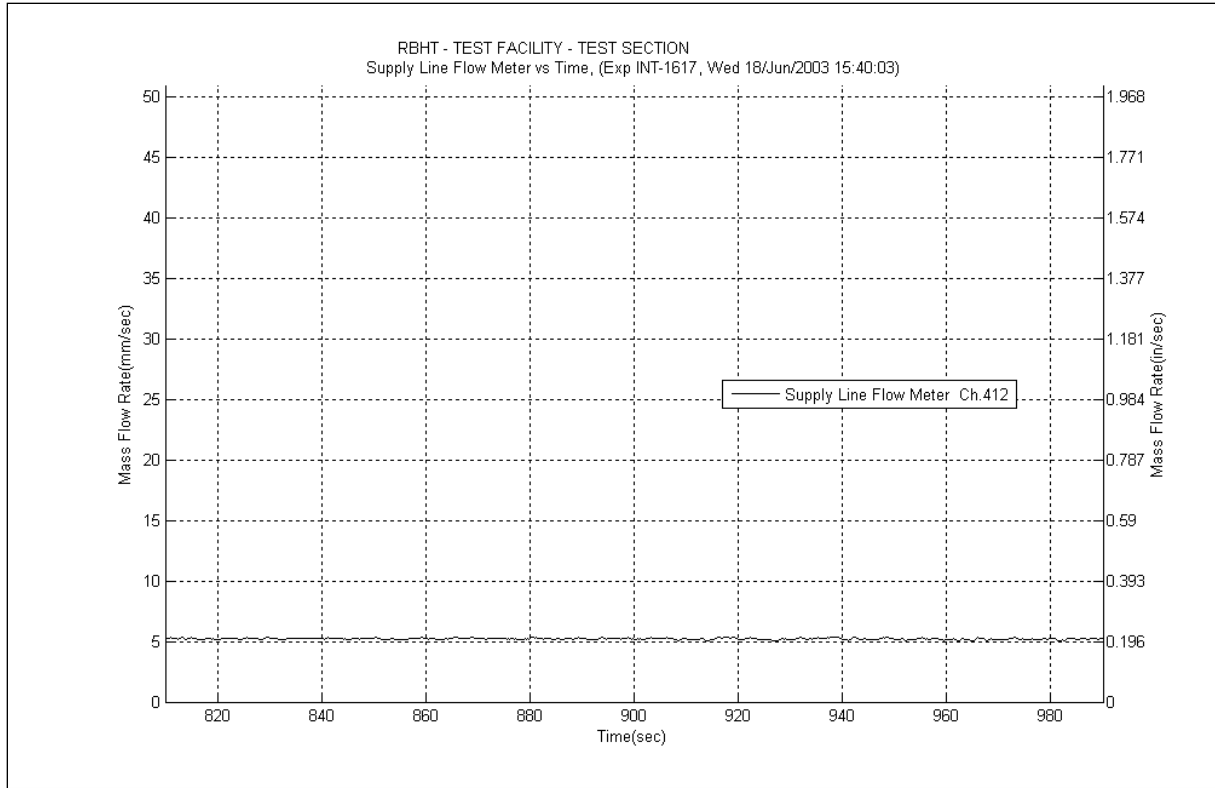


Figure A-286 Inlet Flow Plot for Experiment 1617A

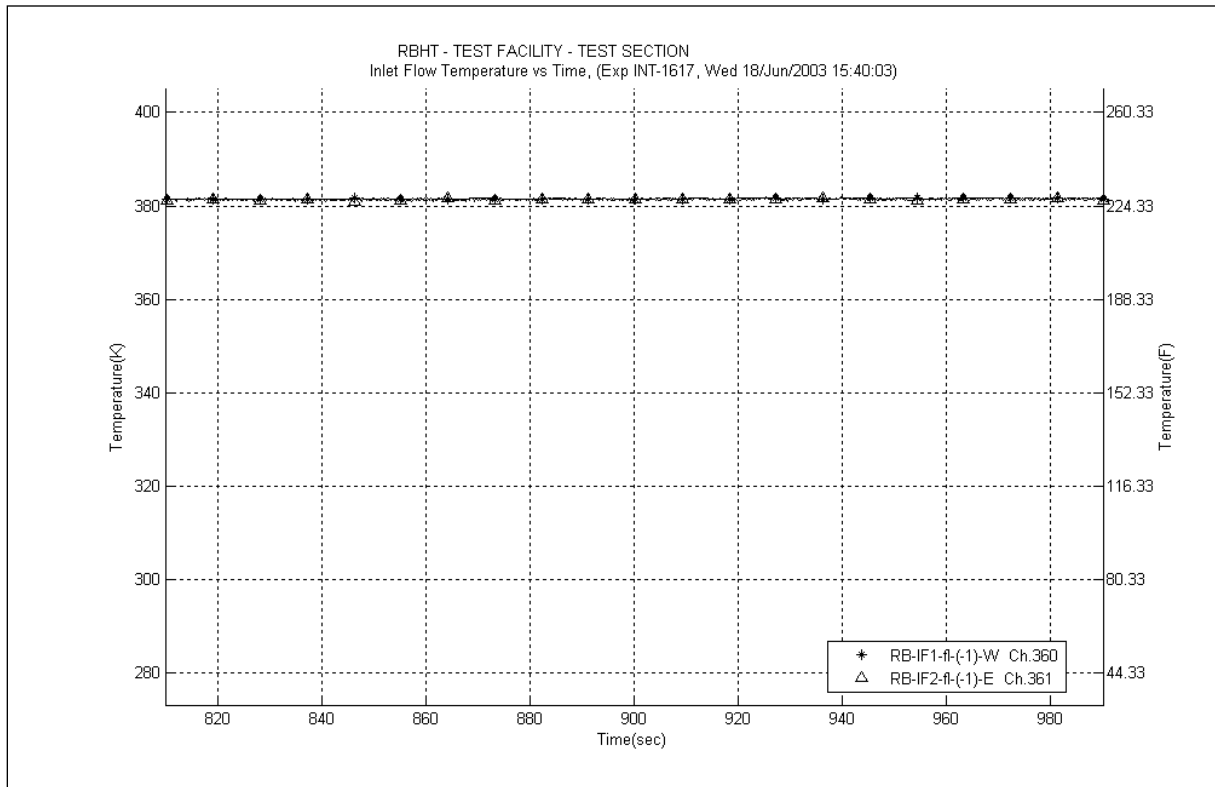


Figure A-287 Inlet Temperature Plot for Experiment 1617A

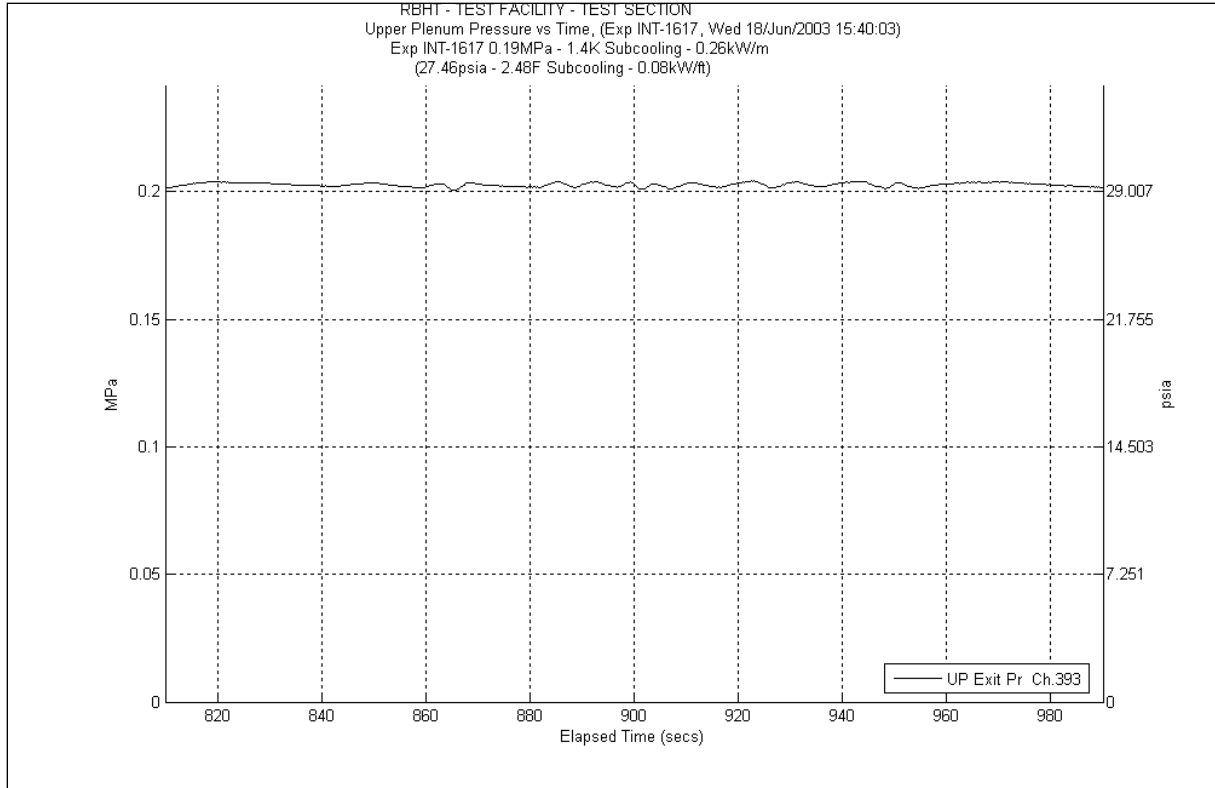


Figure A-288 System Pressure Plot for Experiment 1617A

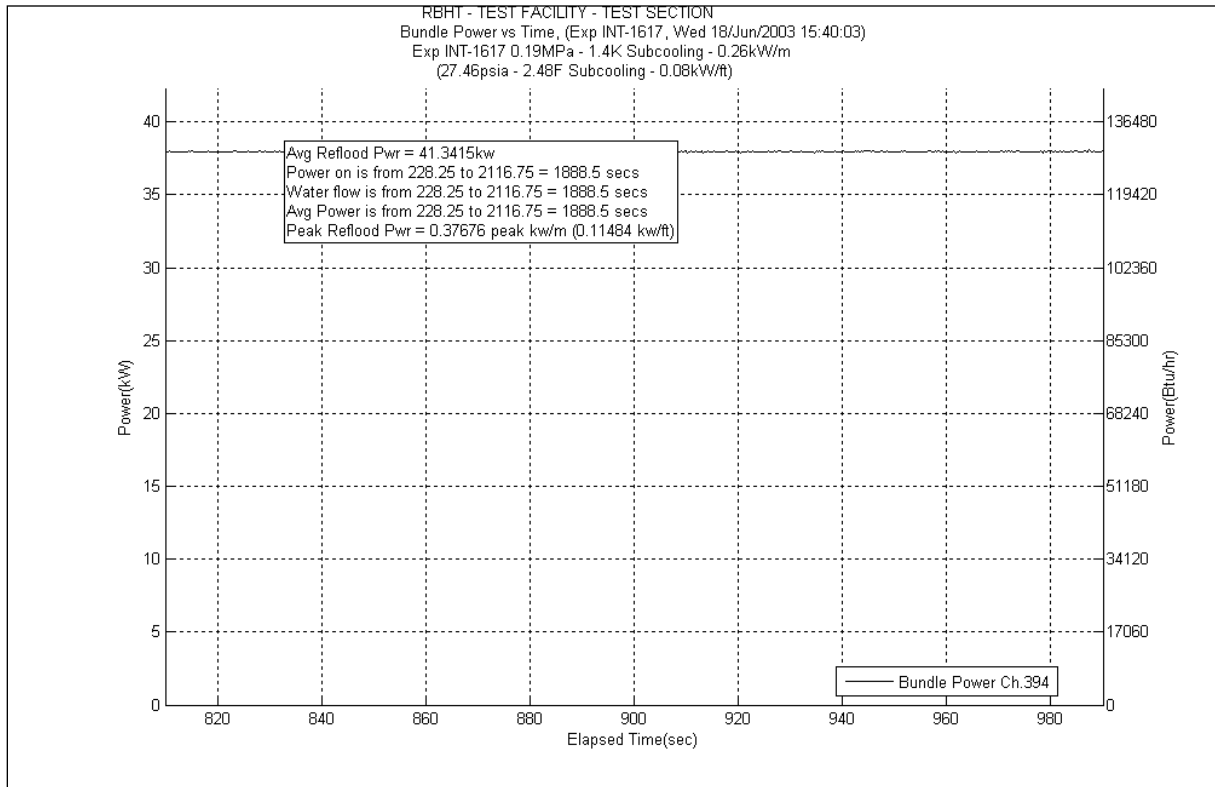


Figure A-289 Bundle Power Plot for Experiment 1617A

Table A-115 Data Results for RBHT Test 1617A for Time Period 810 to 990 seconds

Results for RBHT Test 1617
Valid Time Period 810 to 990 seconds
Collapsed Liquid Level = 72.946 inches = 1852.83 mm
(Z_{lev}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{acc1} (lbf/ft ²)	ΔP_{acc1} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.895	6.014	287.946	0.079	3.783	0.008	0.383	0.000	0.000	5.927	283.786	4325.927	207126.4965	0.896	0.892	0.900
*	120-133	3048-3378	383	0.834	11.223	537.350	0.103	4.932	0.038	1.819	1.418	67.884	9.664	462.715	4335.591	207589.2113	0.857	0.853	0.861
*	108-120	2743-3048	382	0.708	18.203	871.546	0.091	4.357	0.048	2.298	4.234	202.707	13.83	662.184	4349.421	208251.3953	0.778	0.774	0.782
	100-108	2540-2743	381	0.737	10.948	524.171	0.055	2.633	0.035	1.676	0.000	0.000	10.85	519.501	4360.271	208770.8961	0.739	0.735	0.743
	97-100	2464-2540	380	0.619	5.931	283.967	0.019	0.910	0.013	0.622	0.000	0.000	5.895	282.254	4366.166	209053.1502	0.622	0.619	0.625
	93-97	2362-2464	379	0.617	7.961	381.193	0.025	1.197	0.016	0.766	0.000	0.000	7.915	378.972	4374.081	209432.1224	0.619	0.616	0.622
*	85-93	2159-2362	378	0.440	23.277	1114.485	0.046	2.202	0.032	1.532	8.849	423.669	14.35	687.082	4388.431	210119.2041	0.654	0.651	0.657
	81-85	2057-2159	377	0.688	6.476	310.076	0.021	1.005	0.015	0.718	0.000	0.000	6.439	308.301	4394.87	210427.5051	0.69	0.687	0.693
	78-81	1981-2057	376	0.684	4.923	235.728	0.015	0.718	0.011	0.527	0.000	0.000	4.893	234.278	4399.763	210661.7832	0.686	0.683	0.689
	75-78	1905-1981	375	0.538	7.198	344.640	0.014	0.670	0.011	0.527	0.000	0.000	7.17	343.301	4406.933	211005.0846	0.54	0.537	0.543
	72-75	1829-1905	374	0.483	8.060	385.917	0.014	0.670	0.011	0.527	0.000	0.000	8.032	384.574	4414.965	211389.6588	0.484	0.482	0.486
*	67-72	1702-1829	373	0.399	15.606	747.217	0.021	1.005	0.017	0.814	3.878	185.678	11.69	559.720	4426.655	211949.3791	0.55	0.547	0.553
	63-67	1600-1702	372	0.614	8.029	384.425	0.016	0.766	0.013	0.622	0.000	0.000	7.997	382.898	4434.652	212332.2775	0.615	0.612	0.618
	60-63	1524-1600	371	0.421	9.026	432.168	0.011	0.527	0.010	0.479	0.000	0.000	9.002	431.018	4443.654	212763.2955	0.422	0.420	0.424
	57-60	1448-1524	370	0.408	9.223	441.617	0.011	0.527	0.009	0.431	0.000	0.000	9.198	440.403	4452.852	213203.6981	0.409	0.407	0.411
	53-57	1346-1448	369	0.397	12.537	600.260	0.013	0.622	0.012	0.575	0.000	0.000	12.51	598.982	4465.362	213802.6802	0.398	0.396	0.400
*	46-53	1168-1346	368	0.281	26.133	1251.247	0.021	1.005	0.020	0.958	6.472	309.873	19.62	939.411	4484.982	214742.0908	0.46	0.458	0.462
	43-46	1092-1168	367	0.521	7.458	357.073	0.008	0.383	0.008	0.383	0.000	0.000	7.438	356.133	4492.42	215098.2242	0.523	0.520	0.526
	37-43	940-1092	366	0.394	18.878	903.872	0.014	0.670	0.016	0.766	0.000	0.000	18.84	902.064	4511.26	216000.2882	0.395	0.393	0.397
*	25-37	635-940	365	0.248	46.865	2243.890	0.022	1.053	0.028	1.341	4.065	194.615	42.75	2046.881	4554.01	218047.1692	0.314	0.312	0.316
	13-25	330-635	364	0.232	47.883	2292.627	0.014	0.670	0.024	1.149	0.000	0.000	47.83	2290.113	4601.84	220337.2819	0.232	0.231	0.233
*	0-13	0-330	363	0.057	63.681	3049.044	0.006	0.287	0.012	0.575	4.013	192.125	59.65	2856.057	4661.49	223193.3392	0.116	0.115	0.117

Table A-116 Energy Balance Results for RBHT Test 1617A for Time Period 810 to 990 seconds

Results for RBHT Test 1617 Valid Time Period 810 to 990 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1738.2508	5.4834	0.00E+00	0.00E+00	0.00E+00	1.66E-02	7.51E-03
0.25	6.35	1834.8202	5.7881	0.00E+00	0.00E+00	0.00E+00	1.66E-02	7.51E-03
0.50	12.70	1931.3897	6.0927	0.00E+00	0.00E+00	0.00E+00	1.66E-02	7.51E-03
0.75	19.05	2027.9592	6.3973	1.08E-02	1.45E-01	6.56E-02	1.64E-02	7.43E-03
1.00	25.40	2124.5287	6.702	2.40E-02	3.21E-01	1.46E-01	1.62E-02	7.33E-03
1.25	31.75	2221.0982	7.0066	3.78E-02	5.06E-01	2.29E-01	1.59E-02	7.22E-03
1.50	38.10	2317.6677	7.3112	5.22E-02	6.98E-01	3.17E-01	1.57E-02	7.12E-03
1.75	44.45	2414.2372	7.6159	6.72E-02	8.99E-01	4.08E-01	1.54E-02	7.00E-03
2.00	50.80	2510.8066	7.9205	8.29E-02	1.11E+00	5.03E-01	1.52E-02	6.89E-03
2.25	57.15	2607.3761	8.2252	9.91E-02	1.33E+00	6.01E-01	1.49E-02	6.76E-03
2.50	63.50	2703.9456	8.5298	1.16E-01	1.55E+00	7.04E-01	1.46E-02	6.64E-03
2.75	69.85	2800.5151	8.8344	1.33E-01	1.78E+00	8.09E-01	1.43E-02	6.51E-03
3.00	76.20	2897.0846	9.1391	1.52E-01	2.03E+00	9.19E-01	1.40E-02	6.37E-03
3.25	82.55	2993.6541	9.4437	1.70E-01	2.28E+00	1.03E+00	1.37E-02	6.23E-03
3.50	88.90	3090.2236	9.7483	1.90E-01	2.53E+00	1.15E+00	1.34E-02	6.09E-03
3.75	95.25	3186.793	10.053	2.09E-01	2.80E+00	1.27E+00	1.31E-02	5.94E-03
4.00	101.60	3283.3625	10.358	2.30E-01	3.08E+00	1.40E+00	1.27E-02	5.78E-03
4.25	107.95	3379.932	10.662	2.51E-01	3.36E+00	1.52E+00	1.24E-02	5.62E-03
4.50	114.30	3476.5015	10.967	2.73E-01	3.65E+00	1.66E+00	1.20E-02	5.46E-03
4.75	120.65	3573.071	11.272	2.95E-01	3.95E+00	1.79E+00	1.17E-02	5.29E-03
5.00	127.00	3669.6405	11.576	3.18E-01	4.26E+00	1.93E+00	1.13E-02	5.12E-03
5.25	133.35	3766.21	11.881	3.42E-01	4.57E+00	2.07E+00	1.09E-02	4.94E-03
5.50	139.70	3862.7794	12.185	3.66E-01	4.90E+00	2.22E+00	1.05E-02	4.76E-03
5.75	146.05	3959.3489	12.49	3.91E-01	5.23E+00	2.37E+00	1.01E-02	4.57E-03
6.00	152.40	4055.9184	12.795	4.16E-01	5.57E+00	2.53E+00	9.66E-03	4.38E-03
6.25	158.75	4152.4879	13.099	4.42E-01	5.92E+00	2.68E+00	9.23E-03	4.19E-03
6.50	165.10	4249.0574	13.404	4.69E-01	6.27E+00	2.85E+00	8.79E-03	3.99E-03
6.75	171.45	4345.6269	13.709	4.96E-01	6.64E+00	3.01E+00	8.34E-03	3.78E-03
7.00	177.80	4442.1964	14.013	5.24E-01	7.01E+00	3.18E+00	7.88E-03	3.57E-03
7.25	184.15	4538.7658	14.318	5.53E-01	7.39E+00	3.35E+00	7.40E-03	3.36E-03
7.50	190.50	4635.3353	14.622	5.82E-01	7.78E+00	3.53E+00	6.92E-03	3.14E-03
7.75	196.85	4731.9048	14.927	6.12E-01	8.18E+00	3.71E+00	6.43E-03	2.92E-03
8.00	203.20	4828.4743	15.232	6.42E-01	8.59E+00	3.89E+00	5.93E-03	2.69E-03
8.25	209.55	4925.0438	15.536	6.73E-01	9.00E+00	4.08E+00	5.42E-03	2.46E-03
8.50	215.90	5021.6133	15.841	7.04E-01	9.42E+00	4.27E+00	4.89E-03	2.22E-03
8.75	222.25	5118.1828	16.146	7.37E-01	9.85E+00	4.47E+00	4.36E-03	1.98E-03
9.00	228.60	5214.7523	16.45	7.69E-01	1.03E+01	4.67E+00	3.82E-03	1.73E-03
9.25	234.95	4925.0438	15.536	8.02E-01	1.07E+01	4.86E+00	3.28E-03	1.49E-03
9.50	241.30	4635.3353	14.622	8.32E-01	1.11E+01	5.05E+00	2.78E-03	1.26E-03
9.75	247.65	4345.6269	13.709	8.60E-01	1.15E+01	5.22E+00	2.31E-03	1.05E-03
10.00	254.00	4055.9184	12.795	8.87E-01	1.19E+01	5.38E+00	1.87E-03	8.48E-04
10.25	260.35	3766.21	11.881	9.12E-01	1.22E+01	5.53E+00	1.46E-03	6.62E-04
10.50	266.70	3476.5015	10.967	9.35E-01	1.25E+01	5.67E+00	1.08E-03	4.89E-04
10.75	273.05	3186.793	10.053	9.56E-01	1.28E+01	5.80E+00	7.28E-04	3.30E-04
11.00	279.40	2897.0846	9.1391	9.75E-01	1.30E+01	5.92E+00	4.07E-04	1.85E-04
11.25	285.75	2607.3761	8.2252	9.93E-01	1.33E+01	6.02E+00	1.19E-04	5.41E-05
11.50	292.10	2317.6677	7.3112	1.00E+00	1.34E+01	6.07E+00	0.00E+00	0.00E+00
11.75	298.45	2027.9592	6.3973	1.00E+00	1.34E+01	6.07E+00	0.00E+00	0.00E+00
12.00	304.80	1738.2508	5.4834	1.00E+00	1.34E+01	6.07E+00	0.00E+00	0.00E+00

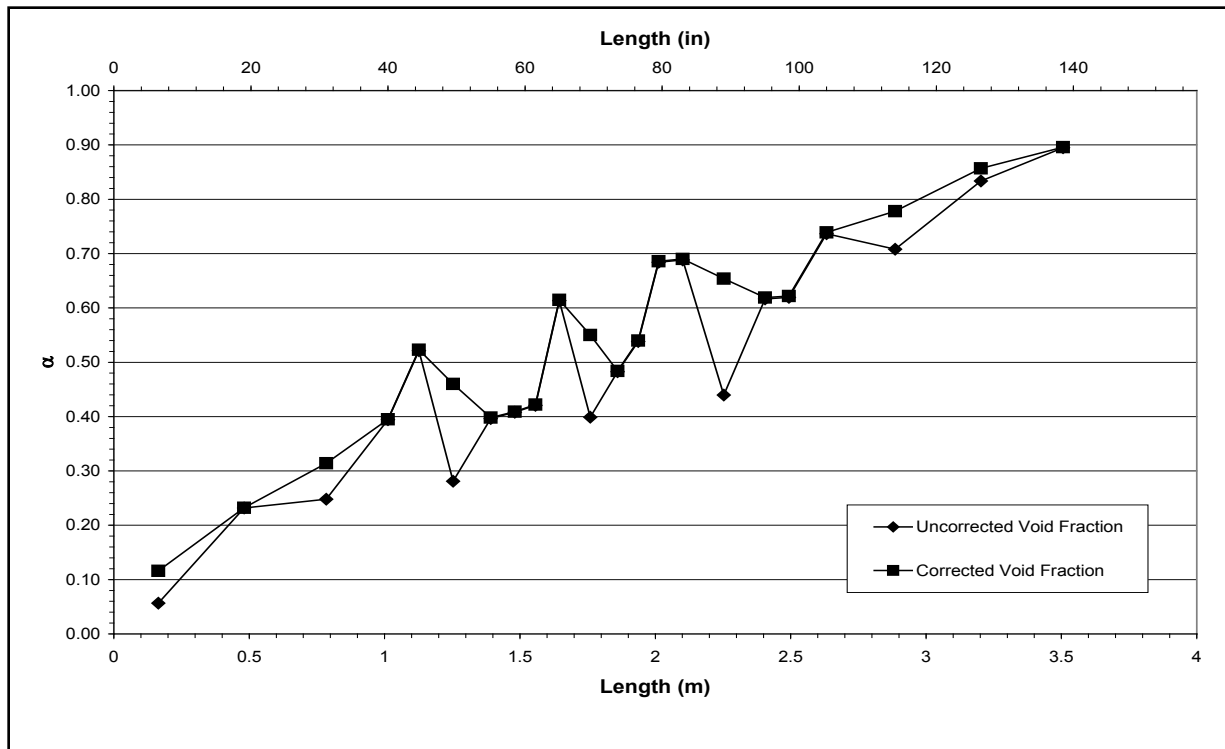


Figure A-290 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1617A for Time Period 810 to 990 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1617-B

Test Conditions

Date: 6/18/2003

Steady-state time window: 1220 – 1368 seconds

Inlet flow rate: 0.508 cm/sec (0.200 in./sec)

Inlet mass flow rate: 0.024 kg/sec (0.052 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.89 kW

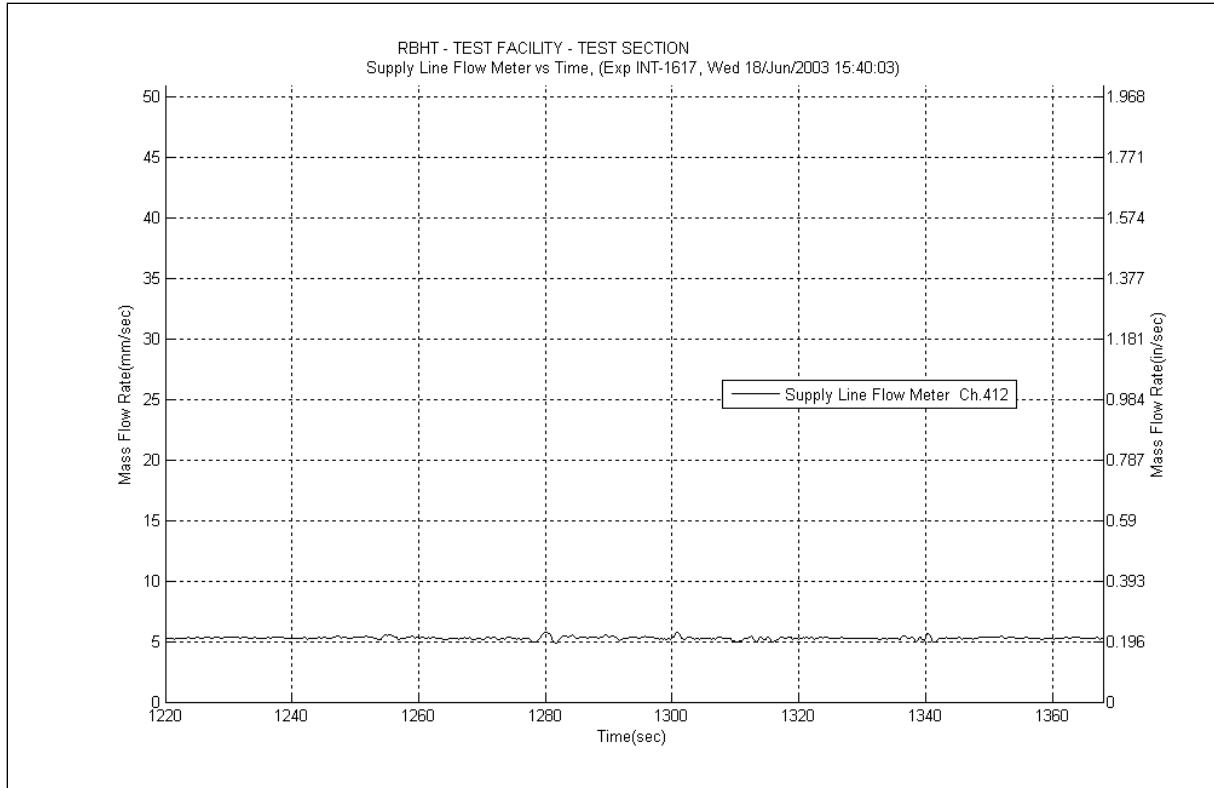


Figure A-291 Inlet Flow Plot for Experiment 1617B

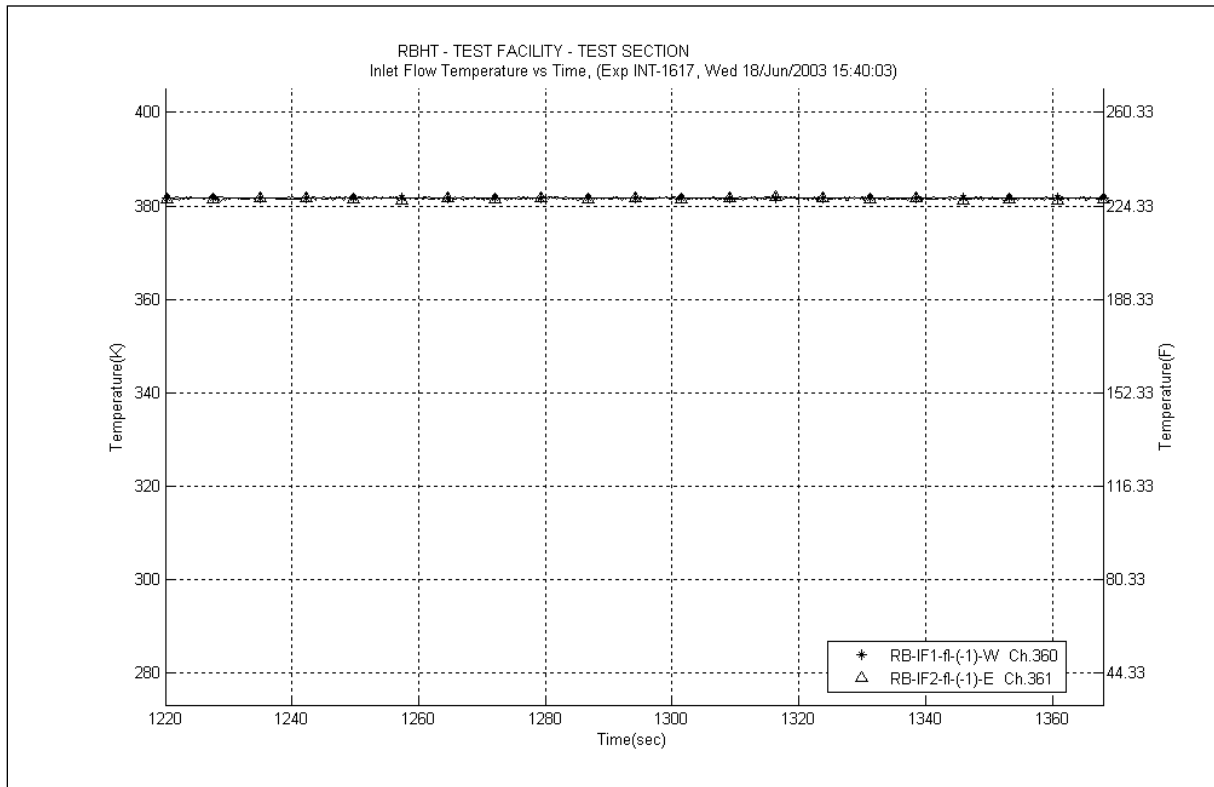


Figure A-292 Inlet Temperature Plot for Experiment 1617B

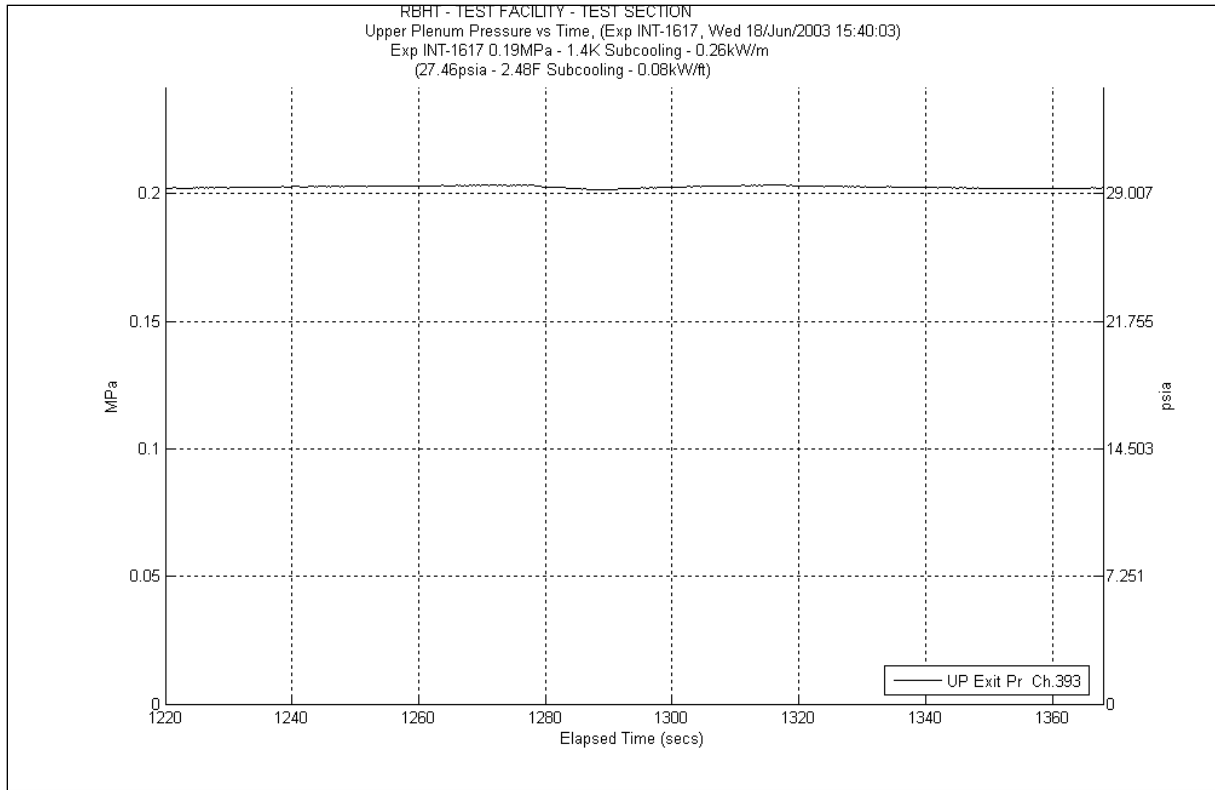


Figure A-293 System Pressure Plot for Experiment 1617B

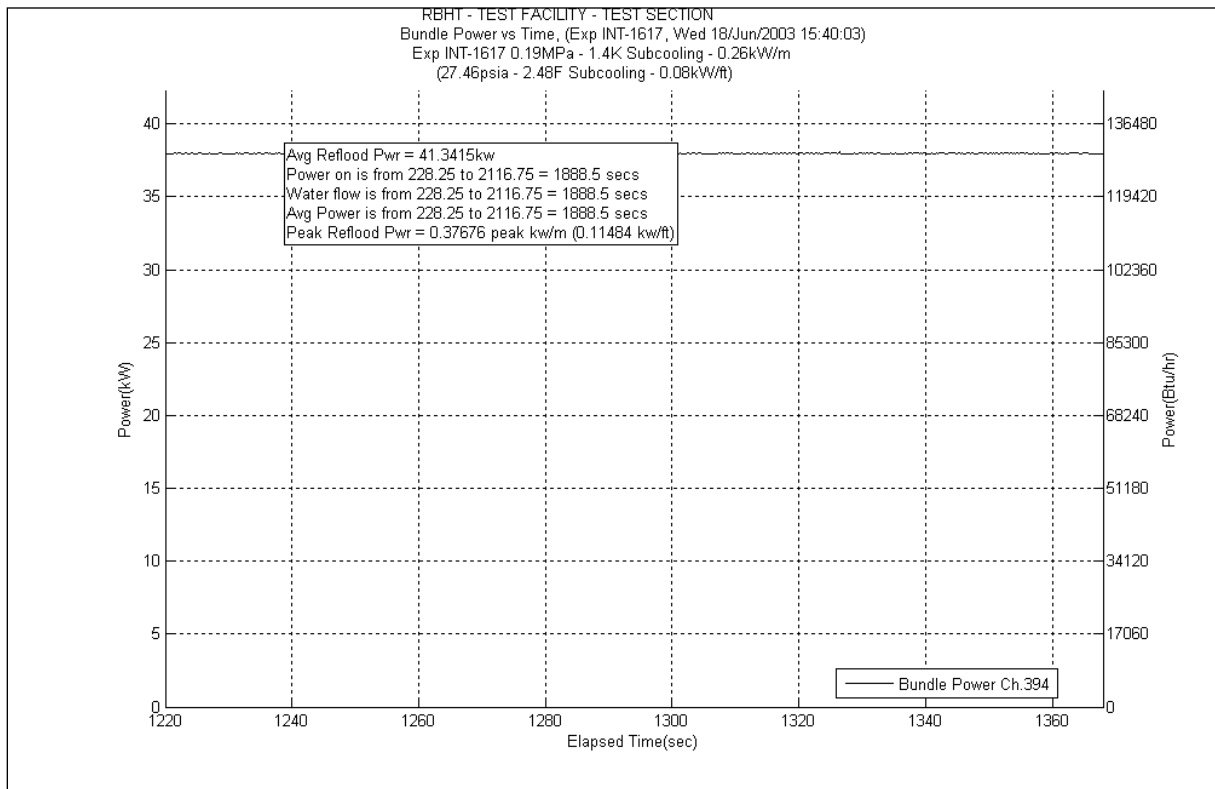


Figure A-294 Bundle Power Plot for Experiment 1617B

Table A-117 Data Results for RBHT Test 1617B for Time Period 1220 to 1368 seconds

Results for RBHT Test 1617
Valid Time Period 1220 to 1368 seconds
Collapsed Liquid Level = 76.142 inches = 1934.00 mm
(Z_{lev}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{acc1} (lbf/ft ²)	ΔP_{acc1} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.815	10.568	506.019	0.083	3.974	0.012	0.575	0.000	0.000	10.47	501.306	4330.47	207344.0165	0.817	0.813	0.821
*	120-133	3048-3378	383	0.767	15.757	754.428	0.105	5.027	0.039	1.867	1.503	71.943	14.11	675.590	4344.58	208019.607	0.791	0.787	0.795
*	108-120	2743-3048	382	0.637	22.648	1084.397	0.092	4.405	0.048	2.298	6.268	300.119	16.24	777.575	4360.82	208797.1823	0.739	0.735	0.743
	100-108	2540-2743	381	0.711	11.997	574.400	0.056	2.681	0.035	1.676	0.000	0.000	11.9	569.775	4372.72	209366.9574	0.713	0.709	0.717
	97-100	2464-2540	380	0.562	6.824	326.737	0.020	0.958	0.013	0.622	0.000	0.000	6.79	325.107	4379.51	209692.0643	0.564	0.561	0.567
	93-97	2362-2464	379	0.579	8.751	418.989	0.025	1.197	0.017	0.814	0.000	0.000	8.705	416.798	4388.215	210108.862	0.581	0.578	0.584
*	85-93	2159-2362	378	0.435	23.474	1123.934	0.046	2.202	0.032	1.532	8.226	393.856	15.17	726.343	4403.385	210835.2055	0.635	0.632	0.638
	81-85	2057-2159	377	0.687	6.502	311.320	0.021	1.005	0.015	0.718	0.000	0.000	6.463	309.450	4409.848	211144.6556	0.689	0.686	0.692
	78-81	1981-2057	376	0.688	4.856	232.495	0.015	0.718	0.011	0.527	0.000	0.000	4.827	231.118	4414.675	211375.7736	0.69	0.687	0.693
	75-78	1905-1981	375	0.547	7.053	337.678	0.015	0.718	0.011	0.527	0.000	0.000	7.024	336.311	4421.699	211712.0845	0.549	0.546	0.552
	72-75	1829-1905	374	0.483	8.050	385.420	0.014	0.670	0.011	0.527	0.000	0.000	8.024	384.191	4429.723	212096.2757	0.485	0.483	0.487
*	67-72	1702-1829	373	0.391	15.803	756.666	0.022	1.053	0.017	0.814	4.134	197.951	11.63	556.847	4441.353	212653.1231	0.552	0.549	0.555
	63-67	1600-1702	372	0.618	7.946	380.447	0.016	0.766	0.013	0.622	0.000	0.000	7.915	378.972	4449.268	213032.0953	0.619	0.616	0.622
	60-63	1524-1600	371	0.424	8.969	429.432	0.011	0.527	0.010	0.479	0.000	0.000	8.945	428.289	4458.213	213460.3842	0.426	0.424	0.428
	57-60	1448-1524	370	0.407	9.234	442.114	0.011	0.527	0.009	0.431	0.000	0.000	9.209	440.929	4467.422	213901.3135	0.409	0.407	0.411
	53-57	1346-1448	369	0.395	12.568	601.752	0.013	0.622	0.012	0.575	0.000	0.000	12.54	600.418	4479.962	214501.7319	0.396	0.394	0.398
*	46-53	1168-1346	368	0.290	25.816	1236.079	0.021	1.005	0.020	0.958	6.165	295.184	19.61	938.932	4499.572	215440.6638	0.46	0.458	0.462
	43-46	1092-1168	367	0.523	7.426	355.581	0.008	0.383	0.008	0.383	0.000	0.000	7.406	354.601	4506.978	215795.2649	0.525	0.522	0.528
	37-43	940-1092	366	0.390	19.013	910.337	0.015	0.718	0.016	0.766	0.000	0.000	18.98	908.767	4525.958	216704.0322	0.391	0.389	0.393
*	25-37	635-940	365	0.253	46.537	2228.224	0.023	1.101	0.028	1.341	3.706	177.465	42.78	2048.317	4568.738	218752.3496	0.313	0.311	0.315
	13-25	330-635	364	0.235	47.654	2281.686	0.014	0.670	0.024	1.149	0.000	0.000	47.6	2279.100	4616.338	221031.4498	0.236	0.235	0.237
*	0-13	0-330	363	0.057	63.639	3047.055	0.006	0.287	0.012	0.575	4.091	195.881	59.53	2850.312	4675.868	223881.7615	0.118	0.117	0.119

Table A-118 Energy Balance Results for RBHT Test 1617B for Time Period 1220 to 1368 seconds

Results for RBHT Test 1617 Valid Time Period 1220 to 1368 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1739.0449	5.4859	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.60E-03
0.25	6.35	1835.6585	5.7907	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.60E-03
0.50	12.70	1932.2721	6.0955	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.60E-03
0.75	19.05	2028.8857	6.4003	1.08E-02	1.46E-01	6.63E-02	1.66E-02	7.52E-03
1.00	25.40	2125.4993	6.705	2.38E-02	3.22E-01	1.46E-01	1.63E-02	7.42E-03
1.25	31.75	2222.1129	7.0098	3.75E-02	5.07E-01	2.30E-01	1.61E-02	7.31E-03
1.50	38.10	2318.7265	7.3146	5.17E-02	7.00E-01	3.17E-01	1.59E-02	7.20E-03
1.75	44.45	2415.3401	7.6194	6.66E-02	9.01E-01	4.08E-01	1.56E-02	7.09E-03
2.00	50.80	2511.9537	7.9241	8.20E-02	1.11E+00	5.03E-01	1.54E-02	6.97E-03
2.25	57.15	2608.5673	8.2289	9.81E-02	1.33E+00	6.02E-01	1.51E-02	6.85E-03
2.50	63.50	2705.1809	8.5337	1.15E-01	1.55E+00	7.04E-01	1.48E-02	6.73E-03
2.75	69.85	2801.7945	8.8385	1.32E-01	1.79E+00	8.10E-01	1.45E-02	6.59E-03
3.00	76.20	2898.4081	9.1432	1.50E-01	2.03E+00	9.20E-01	1.42E-02	6.46E-03
3.25	82.55	2995.0217	9.448	1.68E-01	2.28E+00	1.03E+00	1.39E-02	6.32E-03
3.50	88.90	3091.6353	9.7528	1.88E-01	2.54E+00	1.15E+00	1.36E-02	6.17E-03
3.75	95.25	3188.2489	10.058	2.07E-01	2.80E+00	1.27E+00	1.33E-02	6.02E-03
4.00	101.60	3284.8625	10.362	2.28E-01	3.08E+00	1.40E+00	1.29E-02	5.87E-03
4.25	107.95	3381.4761	10.667	2.48E-01	3.36E+00	1.52E+00	1.26E-02	5.71E-03
4.50	114.30	3478.0897	10.972	2.70E-01	3.65E+00	1.66E+00	1.22E-02	5.55E-03
4.75	120.65	3574.7033	11.277	2.92E-01	3.95E+00	1.79E+00	1.19E-02	5.38E-03
5.00	127.00	3671.3169	11.581	3.15E-01	4.26E+00	1.93E+00	1.15E-02	5.21E-03
5.25	133.35	3767.9305	11.886	3.38E-01	4.57E+00	2.07E+00	1.11E-02	5.03E-03
5.50	139.70	3864.5441	12.191	3.62E-01	4.90E+00	2.22E+00	1.07E-02	4.85E-03
5.75	146.05	3961.1577	12.496	3.87E-01	5.23E+00	2.37E+00	1.03E-02	4.66E-03
6.00	152.40	4057.7713	12.801	4.12E-01	5.57E+00	2.53E+00	9.85E-03	4.47E-03
6.25	158.75	4154.3849	13.105	4.38E-01	5.92E+00	2.68E+00	9.42E-03	4.27E-03
6.50	165.10	4250.9985	13.41	4.64E-01	6.28E+00	2.85E+00	8.98E-03	4.07E-03
6.75	171.45	4347.6121	13.715	4.91E-01	6.64E+00	3.01E+00	8.53E-03	3.87E-03
7.00	177.80	4444.2257	14.02	5.18E-01	7.01E+00	3.18E+00	8.07E-03	3.66E-03
7.25	184.15	4540.8393	14.324	5.47E-01	7.40E+00	3.35E+00	7.59E-03	3.44E-03
7.50	190.50	4637.4529	14.629	5.75E-01	7.78E+00	3.53E+00	7.11E-03	3.23E-03
7.75	196.85	4734.0665	14.934	6.05E-01	8.18E+00	3.71E+00	6.62E-03	3.00E-03
8.00	203.20	4830.6801	15.239	6.35E-01	8.59E+00	3.90E+00	6.12E-03	2.77E-03
8.25	209.55	4927.2937	15.543	6.65E-01	9.00E+00	4.08E+00	5.60E-03	2.54E-03
8.50	215.90	5023.9073	15.848	6.97E-01	9.42E+00	4.27E+00	5.08E-03	2.30E-03
8.75	222.25	5120.5209	16.153	7.29E-01	9.86E+00	4.47E+00	4.55E-03	2.06E-03
9.00	228.60	5217.1346	16.458	7.61E-01	1.03E+01	4.67E+00	4.00E-03	1.82E-03
9.25	234.95	4927.2937	15.543	7.93E-01	1.07E+01	4.86E+00	3.47E-03	1.57E-03
9.50	241.30	4637.4529	14.629	8.23E-01	1.11E+01	5.05E+00	2.97E-03	1.35E-03
9.75	247.65	4347.6121	13.715	8.51E-01	1.15E+01	5.22E+00	2.50E-03	1.13E-03
10.00	254.00	4057.7713	12.801	8.77E-01	1.19E+01	5.38E+00	2.06E-03	9.32E-04
10.25	260.35	3767.9305	11.886	9.02E-01	1.22E+01	5.53E+00	1.64E-03	7.46E-04
10.50	266.70	3478.0897	10.972	9.25E-01	1.25E+01	5.67E+00	1.26E-03	5.74E-04
10.75	273.05	3188.2489	10.058	9.46E-01	1.28E+01	5.80E+00	9.13E-04	4.14E-04
11.00	279.40	2898.4081	9.1432	9.65E-01	1.31E+01	5.92E+00	5.93E-04	2.69E-04
11.25	285.75	2608.5673	8.2289	9.82E-01	1.33E+01	6.03E+00	3.05E-04	1.38E-04
11.50	292.10	2318.7265	7.3146	9.97E-01	1.35E+01	6.12E+00	4.52E-05	2.05E-05
11.75	298.45	2028.8857	6.4003	1.00E+00	1.35E+01	6.14E+00	0.00E+00	0.00E+00
12.00	304.80	1739.0449	5.4859	1.00E+00	1.35E+01	6.14E+00	0.00E+00	0.00E+00

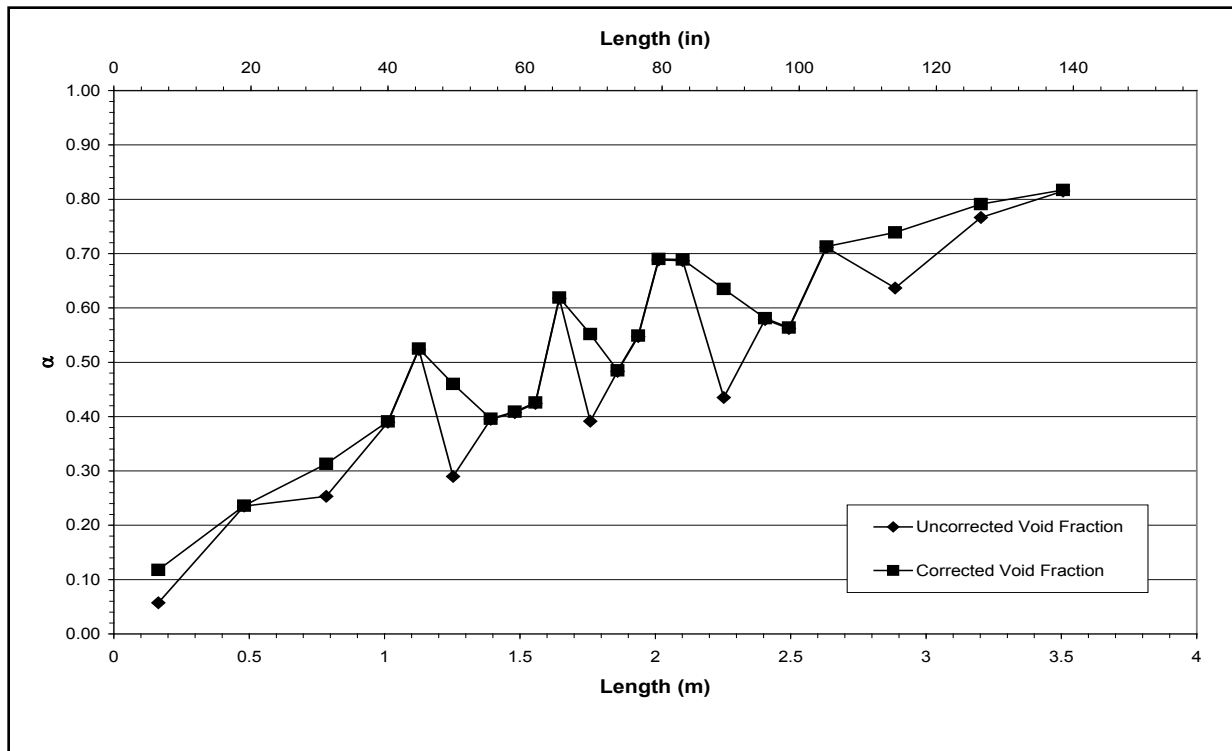


Figure A-295 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1617B for Time Period 1220 to 1368 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1617-C

Test Conditions

Date: 6/18/2003

Steady-state time window: 1620 – 1770 seconds

Inlet flow rate: 0.376 cm/sec (0.148 in./sec)

Inlet mass flow rate: 0.017 kg/sec (0.038 lbm/sec)

Inlet flow temperature: 381.8 K (227.5 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.89 kW

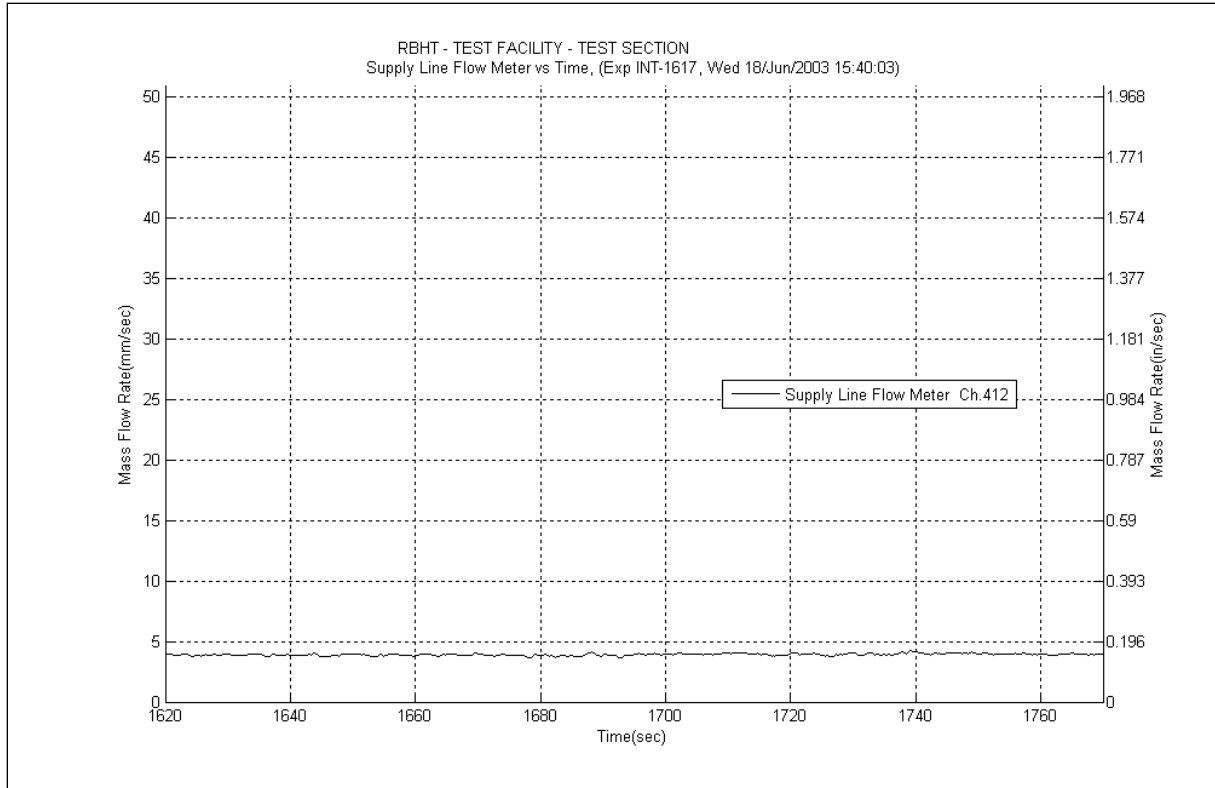


Figure A-296 Inlet Flow Plot for Experiment 1617C

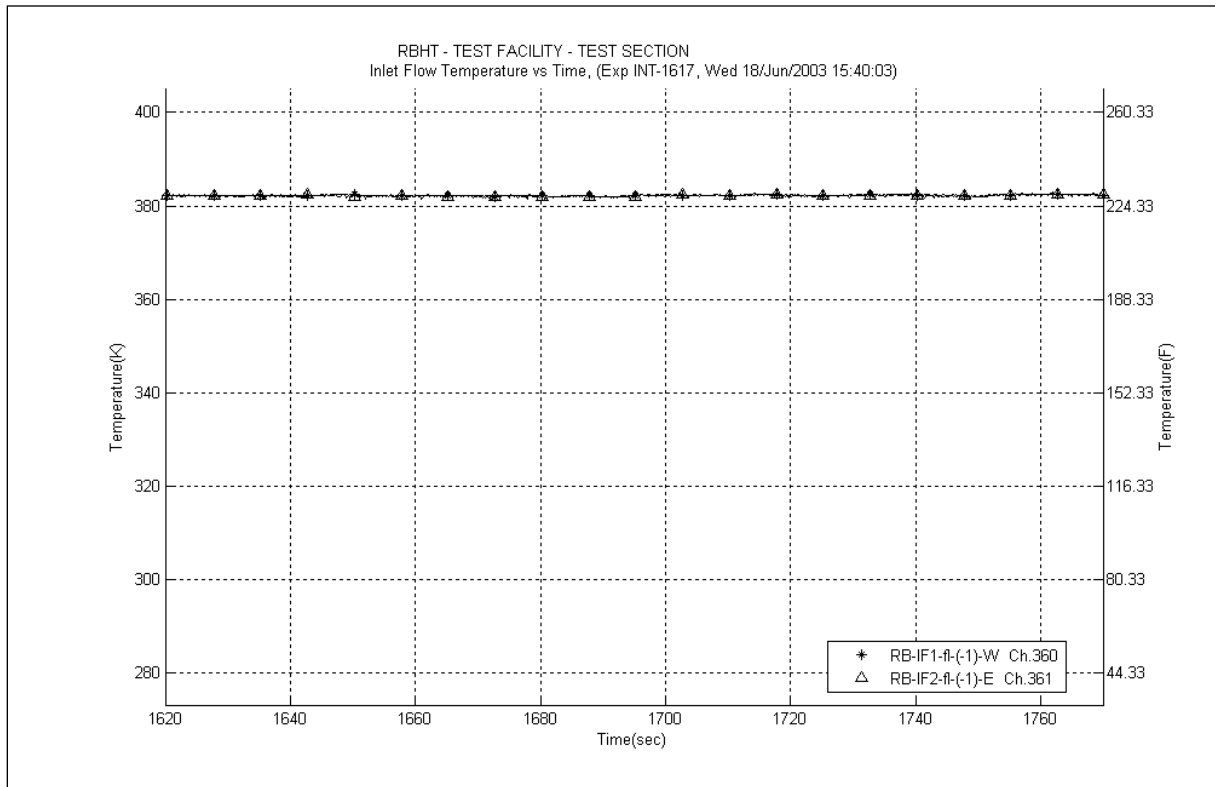


Figure A-297 Inlet Temperature Plot for Experiment 1617C

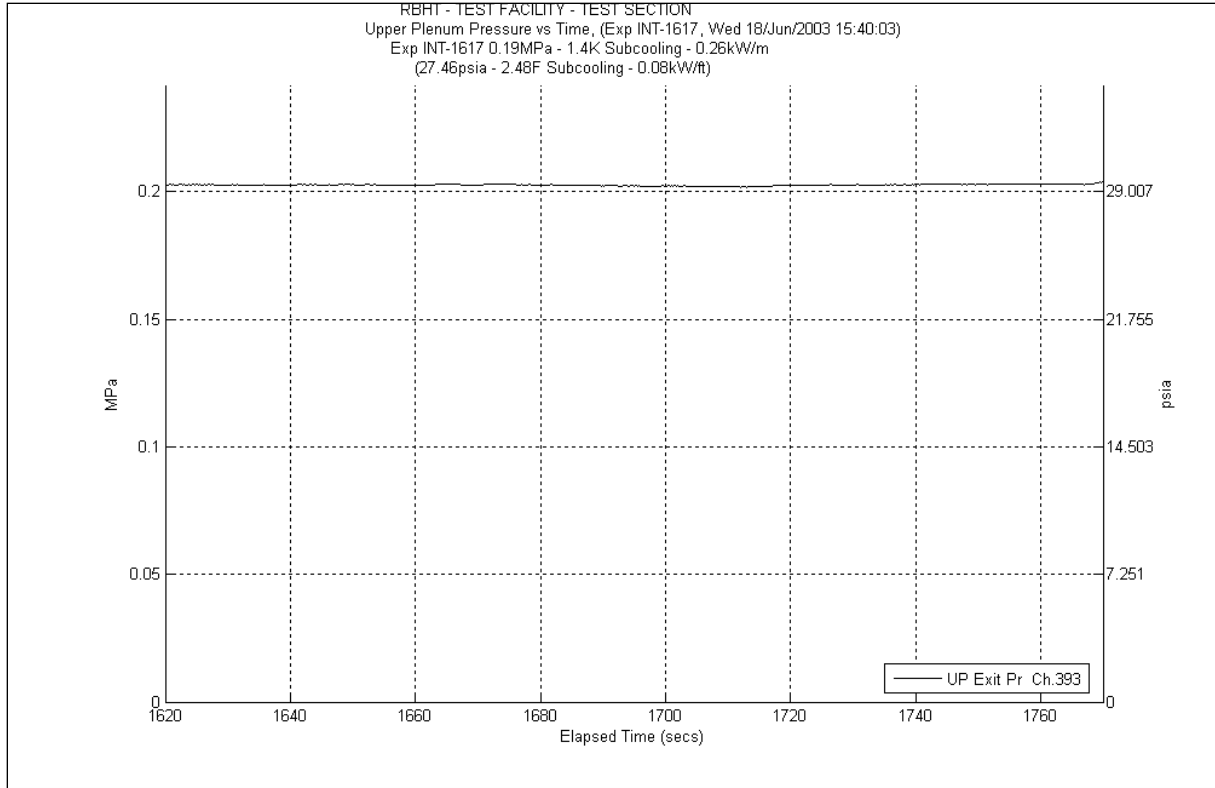


Figure A-298 System Pressure Plot for Experiment 1617C

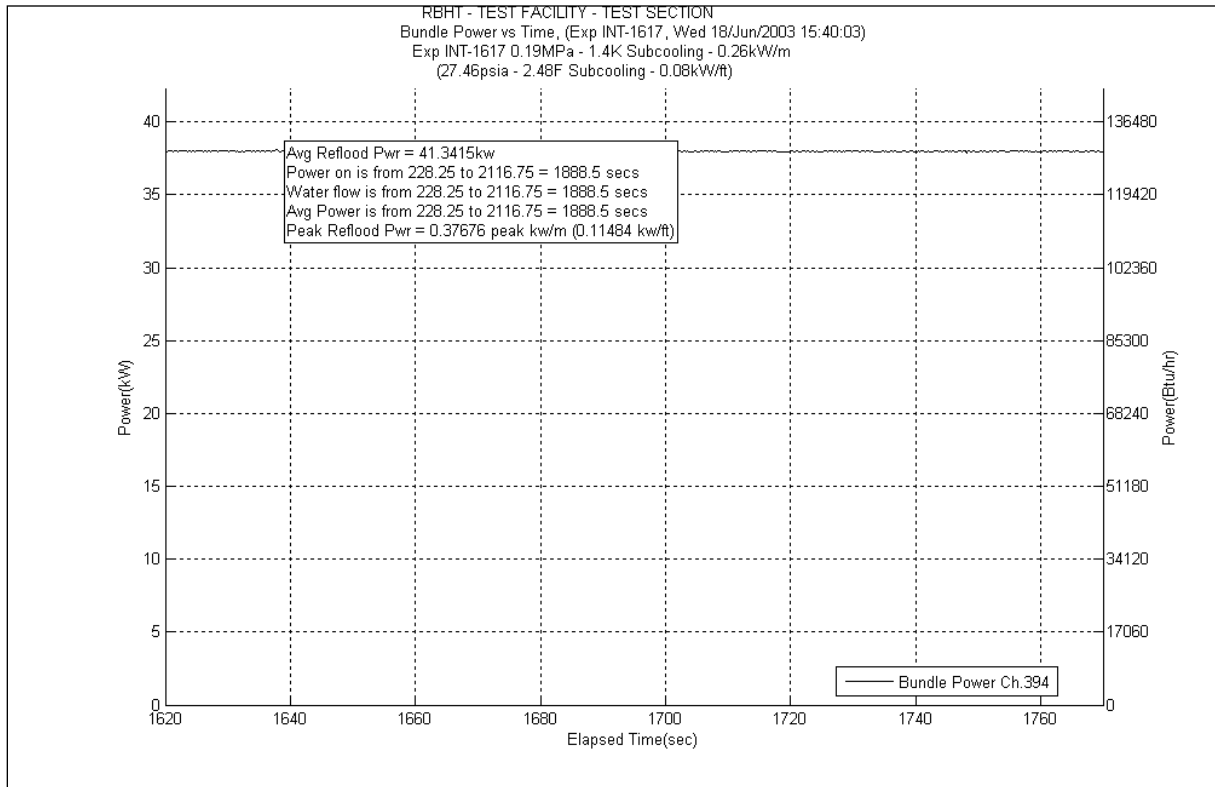


Figure A-299 Bundle Power Plot for Experiment 1617C

Table A-119 Data Results for RBHT Test 1617C for Time Period 1620 to 1770 seconds

Results for RBHT Test 1617

Valid Time Period 1620 to 1770 seconds

Collapsed Liquid Level = 67.609 inches = 1717.27 mm

(Z_{OSV}) Onset of Significant Void = 6.5 inches = 165 mm

($Z_{2\phi}$) Two-Phase Level (Dryout) = 124.70 inches = 3167.38 mm

(S) Level Swell = 1.906

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.961	2.202	105.431	0.029	1.389	0.000	0.000	0.000	0.000	2.173	104.044	4322.173	206946.754	0.962	0.957	0.967
*	120-133	3048-3378	383	0.912	5.926	283.719	0.035	1.676	0.000	0.000	0.034	1.608	5.857	280.435	4328.03	207227.1887	0.913	0.908	0.918
*	108-120	2743-3048	382	0.761	14.879	712.405	0.032	1.532	0.000	0.000	3.367	161.208	11.48	549.665	4339.51	207776.8541	0.816	0.812	0.820
	100-108	2540-2743	381	0.766	9.732	465.985	0.036	1.724	0.017	0.814	0.000	0.000	9.677	463.337	4349.187	208240.1913	0.767	0.763	0.771
	97-100	2464-2540	380	0.667	5.183	248.161	0.014	0.670	0.009	0.431	0.000	0.000	5.159	247.014	4354.346	208487.2055	0.669	0.666	0.672
	93-97	2362-2464	379	0.659	7.089	339.418	0.018	0.862	0.012	0.575	0.000	0.000	7.054	337.747	4361.4	208824.9529	0.66	0.657	0.663
*	85-93	2159-2362	378	0.468	22.087	1057.542	0.034	1.628	0.024	1.149	8.779	420.352	13.25	634.413	4374.65	209459.3663	0.681	0.678	0.684
	81-85	2057-2159	377	0.700	6.227	298.141	0.016	0.766	0.011	0.527	0.000	0.000	6.196	296.666	4380.846	209756.0324	0.702	0.698	0.706
	78-81	1981-2057	376	0.692	4.799	229.760	0.011	0.527	0.008	0.383	0.000	0.000	4.779	228.820	4385.625	209984.8521	0.693	0.690	0.696
	75-78	1905-1981	375	0.559	6.876	329.223	0.011	0.527	0.008	0.383	0.000	0.000	6.855	328.219	4392.48	210313.0713	0.56	0.557	0.563
	72-75	1829-1905	374	0.498	7.816	374.230	0.010	0.479	0.008	0.383	0.000	0.000	7.793	373.131	4400.273	210686.2021	0.5	0.498	0.503
*	67-72	1702-1829	373	0.389	15.871	759.899	0.016	0.766	0.013	0.622	4.472	214.112	11.37	544.399	4411.643	211230.6006	0.562	0.559	0.565
	63-67	1600-1702	372	0.623	7.832	374.976	0.012	0.575	0.010	0.479	0.000	0.000	7.809	373.897	4419.452	211604.4976	0.624	0.621	0.627
	60-63	1524-1600	371	0.431	8.870	424.708	0.008	0.383	0.007	0.335	0.000	0.000	8.854	423.932	4428.306	212028.4294	0.432	0.430	0.434
	57-60	1448-1524	370	0.418	9.073	434.405	0.008	0.383	0.007	0.335	0.000	0.000	9.055	433.556	4437.361	212461.9851	0.419	0.417	0.421
	53-57	1346-1448	369	0.399	12.490	598.022	0.010	0.479	0.009	0.431	0.000	0.000	12.47	597.067	4449.831	213059.0519	0.4	0.398	0.402
*	46-53	1168-1346	368	0.291	25.759	1233.344	0.015	0.718	0.015	0.718	6.299	301.594	19.43	930.313	4469.261	213989.3653	0.465	0.463	0.467
	43-46	1092-1168	367	0.530	7.317	350.359	0.006	0.287	0.006	0.287	0.000	0.000	7.304	349.717	4476.565	214339.0827	0.531	0.528	0.534
	37-43	940-1092	366	0.407	18.493	885.471	0.011	0.527	0.012	0.575	0.000	0.000	18.46	883.870	4495.025	215222.9522	0.407	0.405	0.409
*	25-37	635-940	365	0.262	46.008	2202.861	0.017	0.814	0.021	1.005	4.320	206.829	41.65	1994.213	4536.675	217217.1649	0.331	0.329	0.333
	13-25	330-635	364	0.255	46.418	2222.505	0.011	0.527	0.018	0.862	0.000	0.000	46.38	2220.686	4583.055	219437.8512	0.256	0.255	0.257
*	0-13	0-330	363	0.070	62.813	3007.518	0.005	0.239	0.011	0.527	3.927	188.041	58.87	2818.711	4641.925	222256.562	0.128	0.127	0.129

Table A-120 Energy Balance Results for RBHT Test 1617C for Time Period 1620 to 1770 seconds

Results for RBHT Test 1617 Valid Time Period 1620 to 1770 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1740.5739	5.4908	0.00E+00	0.00E+00	0.00E+00	1.24E-02	5.62E-03
0.25	6.35	1837.2725	5.7958	0.00E+00	0.00E+00	0.00E+00	1.24E-02	5.62E-03
0.50	12.70	1933.971	6.1008	7.56E-03	7.57E-02	3.44E-02	1.23E-02	5.58E-03
0.75	19.05	2030.6696	6.4059	2.44E-02	2.44E-01	1.11E-01	1.21E-02	5.49E-03
1.00	25.40	2127.3681	6.7109	4.20E-02	4.21E-01	1.91E-01	1.19E-02	5.39E-03
1.25	31.75	2224.0667	7.016	6.04E-02	6.05E-01	2.75E-01	1.17E-02	5.28E-03
1.50	38.10	2320.7652	7.321	7.97E-02	7.98E-01	3.62E-01	1.14E-02	5.18E-03
1.75	44.45	2417.4638	7.6261	9.98E-02	1.00E+00	4.53E-01	1.12E-02	5.06E-03
2.00	50.80	2514.1623	7.9311	1.21E-01	1.21E+00	5.48E-01	1.09E-02	4.95E-03
2.25	57.15	2610.8609	8.2361	1.42E-01	1.43E+00	6.47E-01	1.06E-02	4.82E-03
2.50	63.50	2707.5594	8.5412	1.65E-01	1.65E+00	7.50E-01	1.04E-02	4.70E-03
2.75	69.85	2804.258	8.8462	1.88E-01	1.89E+00	8.56E-01	1.01E-02	4.57E-03
3.00	76.20	2900.9565	9.1513	2.12E-01	2.13E+00	9.66E-01	9.77E-03	4.43E-03
3.25	82.55	2997.6551	9.4563	2.37E-01	2.38E+00	1.08E+00	9.46E-03	4.29E-03
3.50	88.90	3094.3536	9.7614	2.63E-01	2.64E+00	1.20E+00	9.14E-03	4.14E-03
3.75	95.25	3191.0522	10.066	2.90E-01	2.91E+00	1.32E+00	8.80E-03	3.99E-03
4.00	101.60	3287.7507	10.371	3.17E-01	3.18E+00	1.44E+00	8.47E-03	3.84E-03
4.25	107.95	3384.4493	10.676	3.46E-01	3.46E+00	1.57E+00	8.11E-03	3.68E-03
4.50	114.30	3481.1478	10.982	3.75E-01	3.76E+00	1.70E+00	7.75E-03	3.52E-03
4.75	120.65	3577.8464	11.287	4.05E-01	4.05E+00	1.84E+00	7.38E-03	3.35E-03
5.00	127.00	3674.5449	11.592	4.35E-01	4.36E+00	1.98E+00	7.00E-03	3.18E-03
5.25	133.35	3771.2435	11.897	4.67E-01	4.68E+00	2.12E+00	6.61E-03	3.00E-03
5.50	139.70	3867.942	12.202	4.99E-01	5.00E+00	2.27E+00	6.21E-03	2.82E-03
5.75	146.05	3964.6406	12.507	5.32E-01	5.34E+00	2.42E+00	5.80E-03	2.63E-03
6.00	152.40	4061.3391	12.812	5.66E-01	5.68E+00	2.57E+00	5.38E-03	2.44E-03
6.25	158.75	4158.0377	13.117	6.01E-01	6.03E+00	2.73E+00	4.94E-03	2.24E-03
6.50	165.10	4254.7362	13.422	6.37E-01	6.38E+00	2.90E+00	4.50E-03	2.04E-03
6.75	171.45	4351.4348	13.727	6.73E-01	6.75E+00	3.06E+00	4.05E-03	1.84E-03
7.00	177.80	4448.1333	14.032	7.11E-01	7.12E+00	3.23E+00	3.59E-03	1.63E-03
7.25	184.15	4544.8319	14.337	7.49E-01	7.50E+00	3.40E+00	3.11E-03	1.41E-03
7.50	190.50	4641.5304	14.642	7.88E-01	7.89E+00	3.58E+00	2.63E-03	1.19E-03
7.75	196.85	4738.229	14.947	8.27E-01	8.29E+00	3.76E+00	2.14E-03	9.71E-04
8.00	203.20	4834.9275	15.252	8.68E-01	8.70E+00	3.95E+00	1.64E-03	7.42E-04
8.25	209.55	4931.6261	15.557	9.09E-01	9.11E+00	4.13E+00	1.12E-03	5.10E-04
8.50	215.90	5028.3246	15.862	9.52E-01	9.54E+00	4.33E+00	6.00E-04	2.72E-04
8.75	222.25	5125.0232	16.167	9.95E-01	9.97E+00	4.52E+00	6.70E-05	3.04E-05
9.00	228.60	5221.7217	16.472	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
9.25	234.95	4931.6261	15.557	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
9.50	241.30	4641.5304	14.642	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
9.75	247.65	4351.4348	13.727	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
10.00	254.00	4061.3391	12.812	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
10.25	260.35	3771.2435	11.897	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
10.50	266.70	3481.1478	10.982	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
10.75	273.05	3191.0522	10.066	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
11.00	279.40	2900.9565	9.1513	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
11.25	285.75	2610.8609	8.2361	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
11.50	292.10	2320.7652	7.321	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
11.75	298.45	2030.6696	6.4059	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00
12.00	304.80	1740.5739	5.4908	1.00E+00	1.00E+01	4.55E+00	0.00E+00	0.00E+00

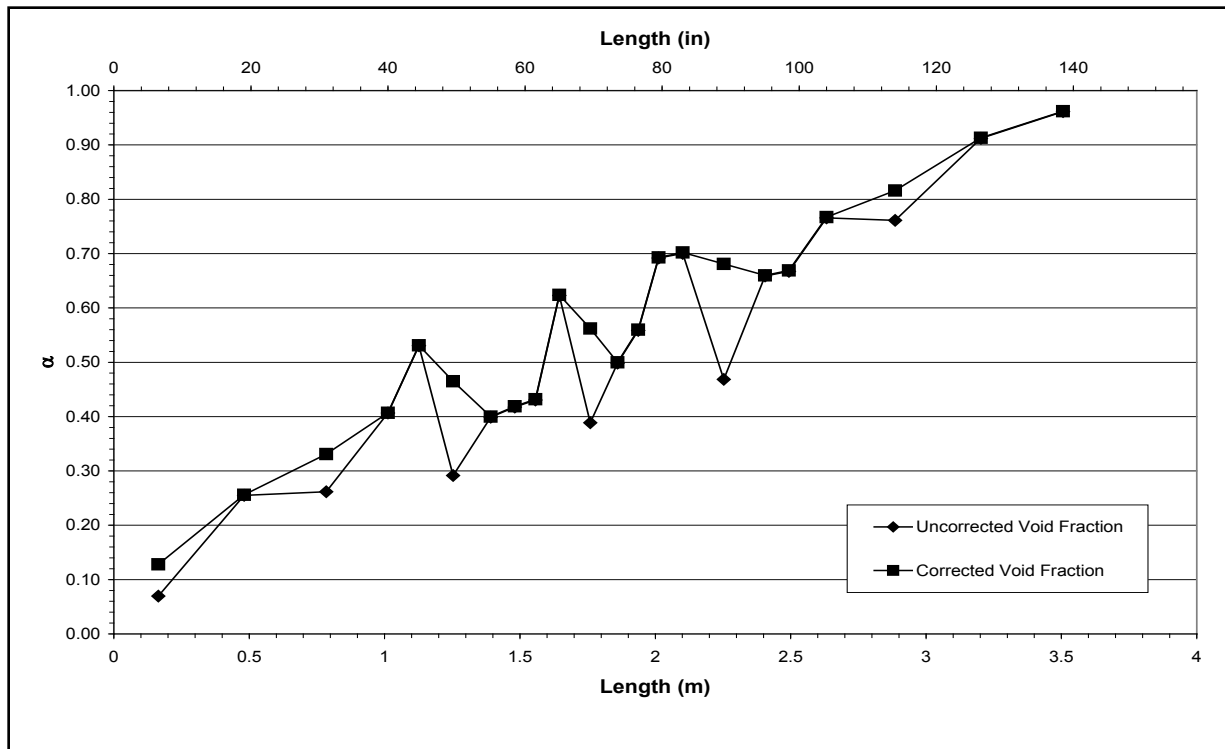


Figure A-300 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1617C for Time Period 1620 to 1770 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-A

Test Conditions

Date: 6/20/2003

Steady-state time window: 3050 – 3161 seconds

Inlet flow rate: 2.540 cm/sec (1.000 in./sec)

Inlet mass flow rate: 0.117 kg/sec (0.258 lbm/sec)

Inlet flow temperature: 381.3 K (226.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 81.19 kW

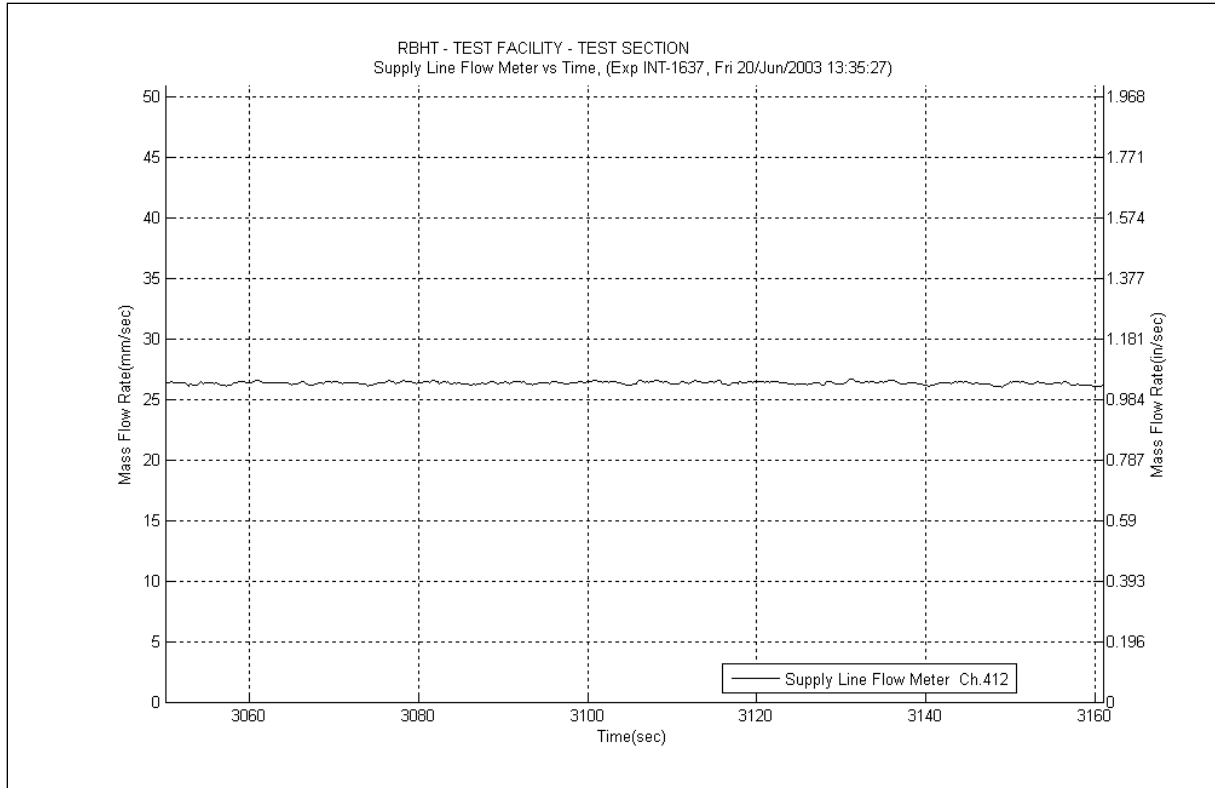


Figure A-301 Inlet Flow Plot for Experiment 1637A

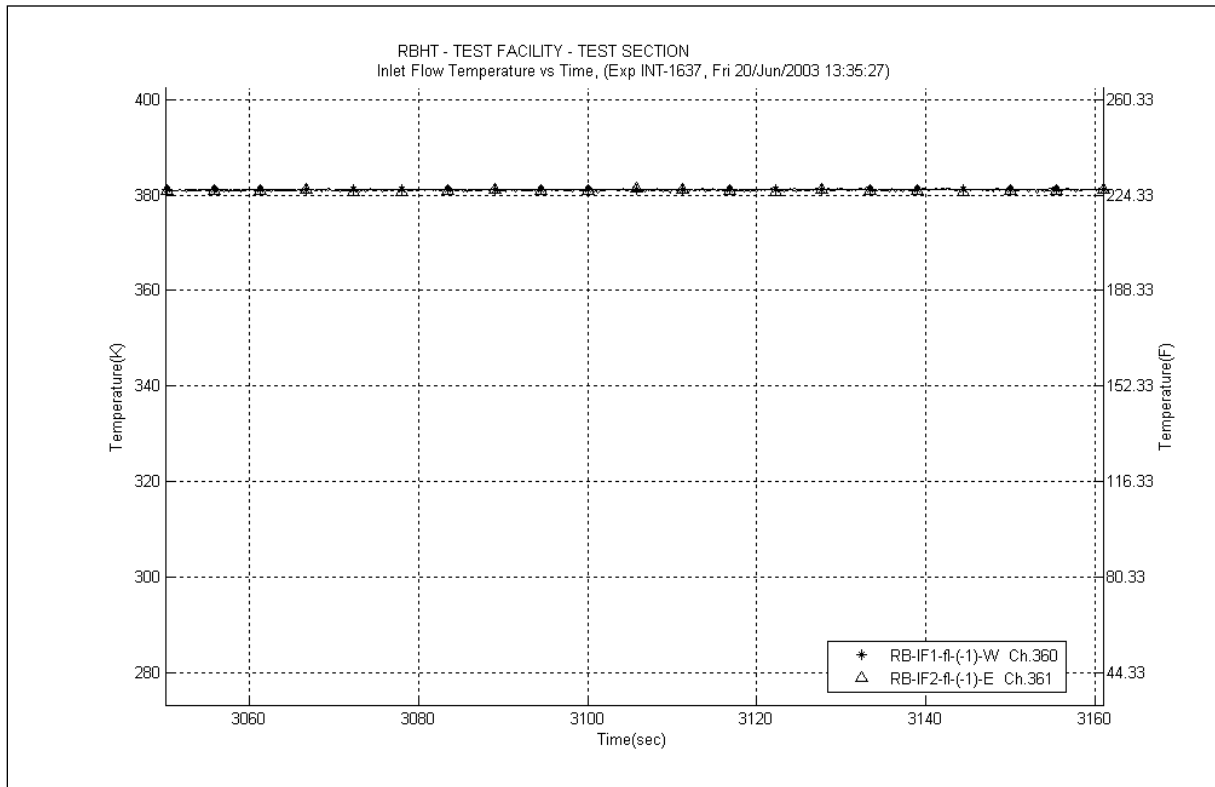


Figure A-302 Inlet Temperature Plot for Experiment 1637A

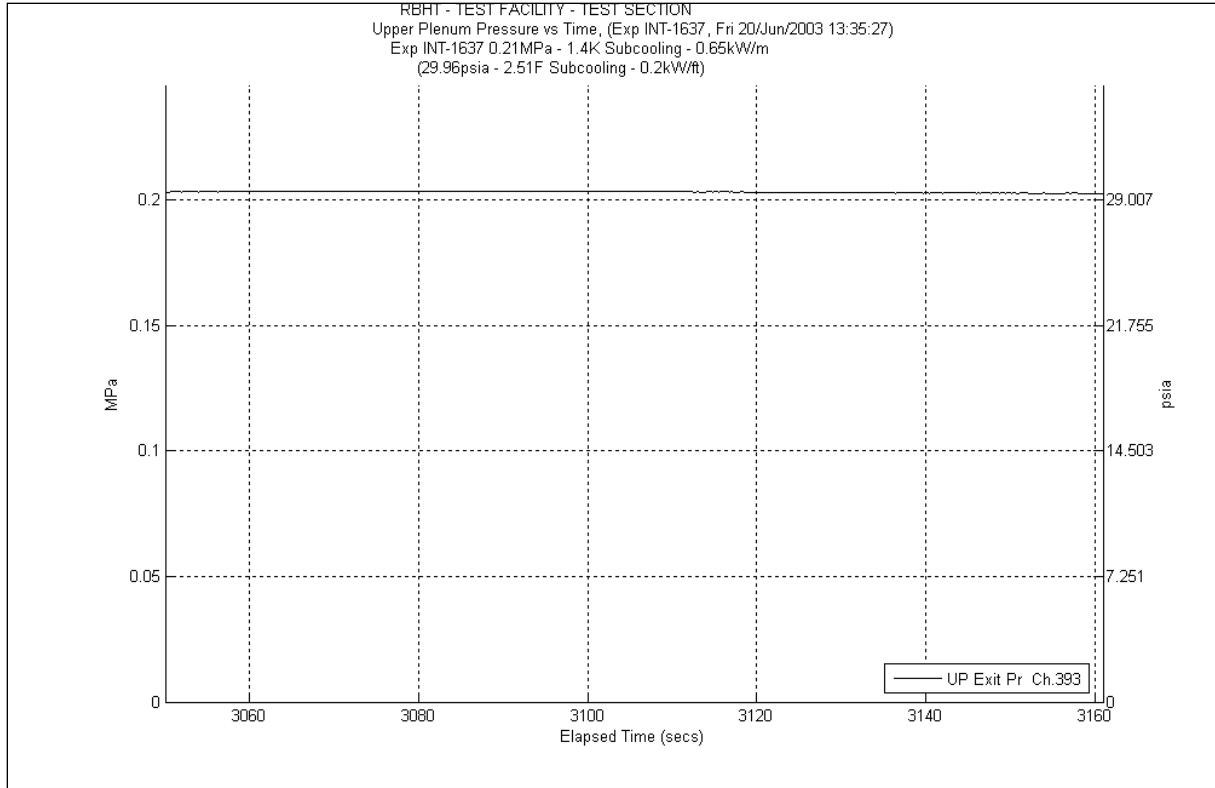


Figure A-303 System Pressure Plot for Experiment 1637A

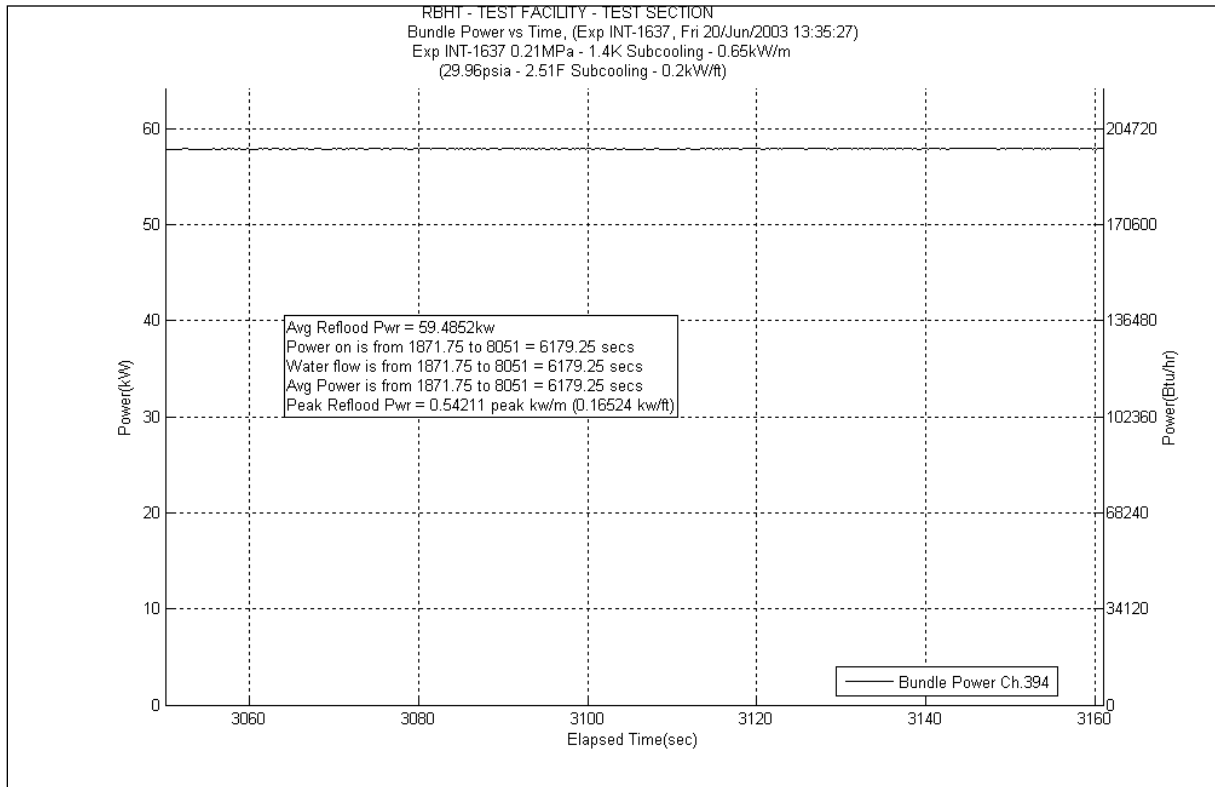


Figure A-304 Bundle Power Plot for Experiment 1637A

Table A-121 Data Results for RBHT Test 1637A for Time Period 3050 to 3161 seconds

Results for RBHT Test 1637
Valid Time Period 3050 to 3161 seconds
Collapsed Liquid Level = 75.314 inches = 1912.97 mm
(Z_{OS}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lb/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.749	14.339	686.545	0.747	35.767	0.163	7.804	0.000	0.000	13.43	643.032	4333.43	207485.7421	0.765	0.761	0.769
*	120-133	3048-3378	383	0.739	17.600	842.702	0.830	39.741	0.291	13.933	0.689	32.999	15.79	756.029	4349.22	208241.7713	0.766	0.762	0.770
*	108-120	2743-3048	382	0.678	20.077	961.312	0.695	33.277	0.363	17.381	4.579	219.264	14.44	691.391	4363.66	208933.1623	0.768	0.764	0.772
	100-108	2540-2743	381	0.753	10.262	491.348	0.418	20.014	0.265	12.688	0.000	0.000	9.578	458.597	4373.238	209391.7594	0.769	0.765	0.773
	97-100	2464-2540	380	0.666	5.199	248.907	0.147	7.038	0.096	4.597	0.000	0.000	4.953	237.151	4378.191	209628.9103	0.682	0.679	0.685
	93-97	2362-2464	379	0.673	6.803	325.742	0.187	8.954	0.125	5.985	0.000	0.000	6.488	310.647	4384.679	209939.5574	0.688	0.685	0.691
*	85-93	2159-2362	378	0.495	20.965	1003.832	0.346	16.567	0.240	11.491	8.259	395.466	12.12	580.309	4396.799	210519.8661	0.708	0.704	0.712
	81-85	2057-2159	377	0.716	5.905	282.724	0.159	7.613	0.115	5.506	0.000	0.000	5.631	269.614	4402.43	210789.4798	0.729	0.725	0.733
	78-81	1981-2057	376	0.673	5.089	243.685	0.114	5.458	0.084	4.022	0.000	0.000	4.892	234.230	4407.322	211023.71	0.686	0.683	0.689
	75-78	1905-1981	375	0.642	5.578	267.059	0.109	5.219	0.082	3.926	0.000	0.000	5.385	257.835	4412.707	211281.5452	0.654	0.651	0.657
	72-75	1829-1905	374	0.526	7.385	353.592	0.104	4.980	0.080	3.830	0.000	0.000	7.199	344.690	4419.906	211626.2352	0.538	0.535	0.541
*	67-72	1702-1829	373	0.431	14.770	707.183	0.162	7.757	0.130	6.224	4.118	197.163	10.36	496.039	4430.266	212122.2747	0.601	0.598	0.604
	63-67	1600-1702	372	0.653	7.208	345.137	0.119	5.698	0.100	4.788	0.000	0.000	6.985	334.444	4437.251	212456.7183	0.664	0.661	0.667
	60-63	1524-1600	371	0.482	8.076	386.663	0.084	4.022	0.073	3.495	0.000	0.000	7.915	378.972	4445.166	212835.6905	0.492	0.490	0.494
	57-60	1448-1524	370	0.458	8.439	404.069	0.079	3.783	0.071	3.399	0.000	0.000	8.287	396.784	4453.453	213232.4742	0.468	0.466	0.470
	53-57	1346-1448	369	0.425	11.939	571.665	0.097	4.644	0.092	4.405	0.000	0.000	11.75	562.593	4465.203	213795.0672	0.434	0.432	0.436
*	46-53	1168-1346	368	0.329	24.409	1168.692	0.150	7.182	0.152	7.278	4.777	228.707	19.33	925.525	4484.533	214720.5926	0.468	0.466	0.470
	43-46	1092-1168	367	0.494	7.878	377.214	0.056	2.681	0.062	2.969	0.000	0.000	7.755	371.311	4492.288	215091.904	0.502	0.499	0.505
	37-43	940-1092	366	0.397	18.805	900.391	0.096	4.597	0.118	5.650	0.000	0.000	18.59	890.094	4510.878	215981.9979	0.403	0.401	0.405
*	25-37	635-940	365	0.225	48.308	2313.016	0.128	6.129	0.214	10.246	0.366	17.541	47.6	2279.100	4558.478	218261.0982	0.236	0.235	0.237
	13-25	330-635	364	0.067	58.176	2785.467	0.048	2.298	0.082	3.926	0.000	0.000	58.03	2778.491	4616.508	221039.5895	0.069	0.066	0.072
*	0-13	0-330	363	0.042	64.688	3097.284	0.004	0.192	0.000	0.000	-0.496	-23.743	65.18	3120.835	4681.688	224160.4246	0.034	0.032	0.036

Table A-122 Energy Balance Results for RBHT Test 1637A for Time Period 3050 to 3161 seconds

Results for RBHT Test 1637 Valid Time Period 3050 to 3161 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2618.9511	8.2617	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
0.25	6.35	2764.4483	8.7206	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
0.50	12.70	2909.9456	9.1796	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
0.75	19.05	3055.4429	9.6386	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.00	25.40	3200.9402	10.098	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.25	31.75	3346.4375	10.557	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.50	38.10	3491.9348	11.016	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.75	44.45	3637.432	11.475	1.71E-03	1.16E-01	5.25E-02	8.35E-02	3.79E-02
2.00	50.80	3782.9293	11.934	6.38E-03	4.31E-01	1.95E-01	8.31E-02	3.77E-02
2.25	57.15	3928.4266	12.393	1.12E-02	7.58E-01	3.44E-01	8.27E-02	3.75E-02
2.50	63.50	4073.9239	12.851	1.63E-02	1.10E+00	4.98E-01	8.23E-02	3.73E-02
2.75	69.85	4219.4212	13.31	2.15E-02	1.45E+00	6.57E-01	8.19E-02	3.71E-02
3.00	76.20	4364.9184	13.769	2.69E-02	1.81E+00	8.23E-01	8.14E-02	3.69E-02
3.25	82.55	4510.4157	14.228	3.24E-02	2.19E+00	9.94E-01	8.09E-02	3.67E-02
3.50	88.90	4655.913	14.687	3.82E-02	2.58E+00	1.17E+00	8.05E-02	3.65E-02
3.75	95.25	4801.4103	15.146	4.41E-02	2.98E+00	1.35E+00	8.00E-02	3.63E-02
4.00	101.60	4946.9076	15.605	5.02E-02	3.39E+00	1.54E+00	7.94E-02	3.60E-02
4.25	107.95	5092.4048	16.064	5.66E-02	3.82E+00	1.73E+00	7.89E-02	3.58E-02
4.50	114.30	5237.9021	16.523	6.30E-02	4.26E+00	1.93E+00	7.84E-02	3.56E-02
4.75	120.65	5383.3994	16.982	6.97E-02	4.71E+00	2.14E+00	7.78E-02	3.53E-02
5.00	127.00	5528.8967	17.441	7.66E-02	5.17E+00	2.35E+00	7.72E-02	3.50E-02
5.25	133.35	5674.394	17.9	8.36E-02	5.65E+00	2.56E+00	7.67E-02	3.48E-02
5.50	139.70	5819.8913	18.359	9.08E-02	6.14E+00	2.78E+00	7.61E-02	3.45E-02
5.75	146.05	5965.3885	18.818	9.82E-02	6.64E+00	3.01E+00	7.54E-02	3.42E-02
6.00	152.40	6110.8858	19.277	1.06E-01	7.15E+00	3.24E+00	7.48E-02	3.39E-02
6.25	158.75	6256.3831	19.736	1.14E-01	7.68E+00	3.48E+00	7.41E-02	3.36E-02
6.50	165.10	6401.8804	20.195	1.22E-01	8.21E+00	3.72E+00	7.35E-02	3.33E-02
6.75	171.45	6547.3777	20.654	1.30E-01	8.76E+00	3.98E+00	7.28E-02	3.30E-02
7.00	177.80	6692.8749	21.113	1.38E-01	9.32E+00	4.23E+00	7.21E-02	3.27E-02
7.25	184.15	6838.3722	21.572	1.47E-01	9.90E+00	4.49E+00	7.14E-02	3.24E-02
7.50	190.50	6983.8695	22.031	1.55E-01	1.05E+01	4.76E+00	7.07E-02	3.21E-02
7.75	196.85	7129.3668	22.49	1.64E-01	1.11E+01	5.03E+00	6.99E-02	3.17E-02
8.00	203.20	7274.8641	22.949	1.73E-01	1.17E+01	5.31E+00	6.92E-02	3.14E-02
8.25	209.55	7420.3614	23.408	1.82E-01	1.23E+01	5.59E+00	6.84E-02	3.10E-02
8.50	215.90	7565.8586	23.867	1.92E-01	1.30E+01	5.88E+00	6.76E-02	3.07E-02
8.75	222.25	7711.3559	24.326	2.01E-01	1.36E+01	6.17E+00	6.68E-02	3.03E-02
9.00	228.60	7856.8532	24.785	2.11E-01	1.43E+01	6.47E+00	6.60E-02	2.99E-02
9.25	234.95	7420.3614	23.408	2.21E-01	1.49E+01	6.76E+00	6.52E-02	2.96E-02
9.50	241.30	6983.8695	22.031	2.30E-01	1.55E+01	7.04E+00	6.44E-02	2.92E-02
9.75	247.65	6547.3777	20.654	2.38E-01	1.61E+01	7.30E+00	6.37E-02	2.89E-02
10.00	254.00	6110.8858	19.277	2.46E-01	1.66E+01	7.55E+00	6.31E-02	2.86E-02
10.25	260.35	5674.394	17.9	2.54E-01	1.71E+01	7.77E+00	6.24E-02	2.83E-02
10.50	266.70	5237.9021	16.523	2.60E-01	1.76E+01	7.98E+00	6.19E-02	2.81E-02
10.75	273.05	4801.4103	15.146	2.67E-01	1.80E+01	8.17E+00	6.13E-02	2.78E-02
11.00	279.40	4364.9184	13.769	2.73E-01	1.84E+01	8.35E+00	6.09E-02	2.76E-02
11.25	285.75	3928.4266	12.393	2.78E-01	1.88E+01	8.51E+00	6.04E-02	2.74E-02
11.50	292.10	3491.9348	11.016	2.82E-01	1.91E+01	8.66E+00	6.00E-02	2.72E-02
11.75	298.45	3055.4429	9.6386	2.87E-01	1.94E+01	8.78E+00	5.97E-02	2.71E-02
12.00	304.80	2618.9511	8.2617	2.90E-01	1.96E+01	8.89E+00	5.94E-02	2.69E-02

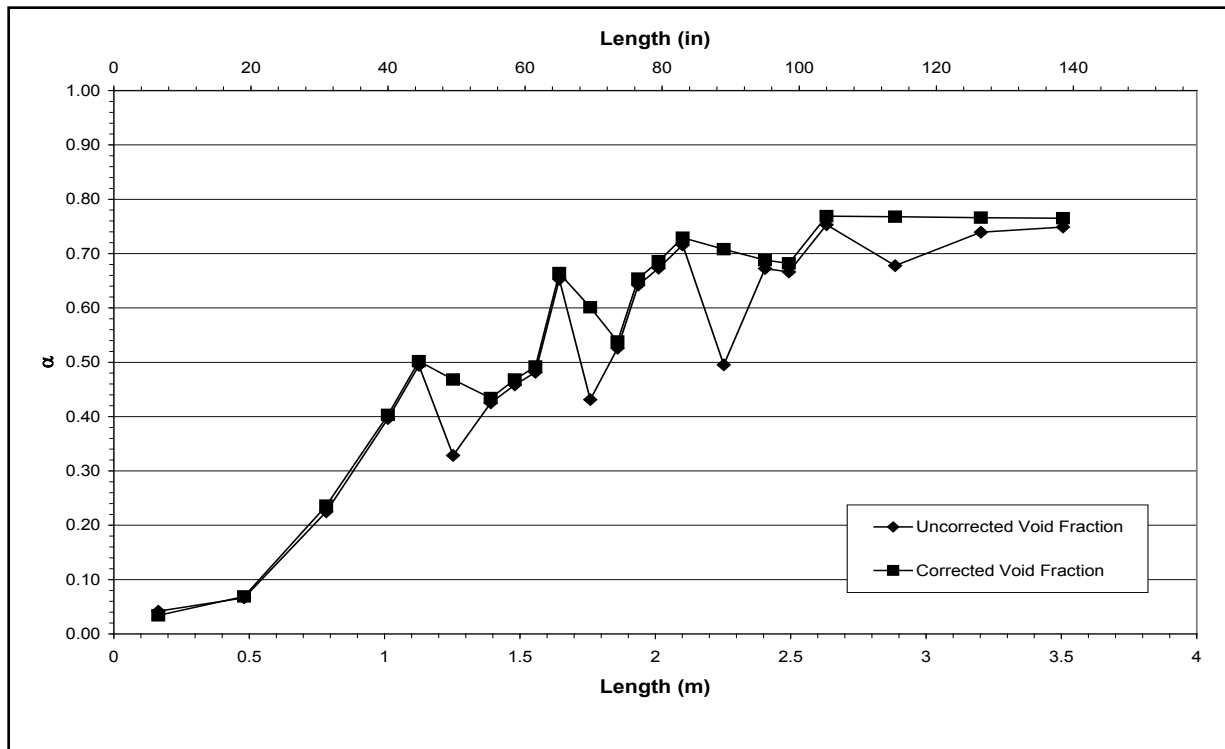


Figure A-305 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637A for Time Period 3050 to 3161 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-B

Test Conditions

Date: 6/20/2003

Steady-state time window: 3400 – 3491 seconds

Inlet flow rate: 2.543 cm/sec (1.001 in./sec)

Inlet mass flow rate: 0.117 kg/sec (0.259 lbm/sec)

Inlet flow temperature: 381.3 K (226.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 81.19 kW

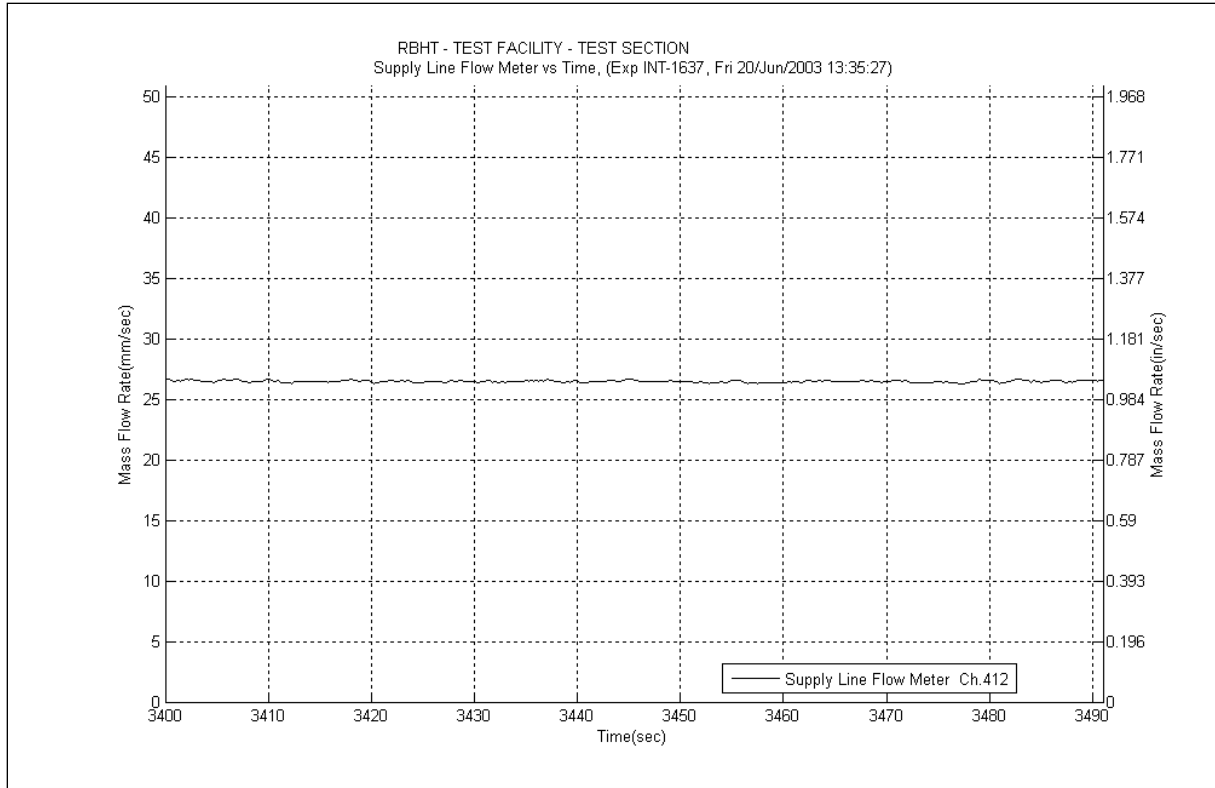


Figure A-306 Inlet Flow Plot for Experiment 1637B

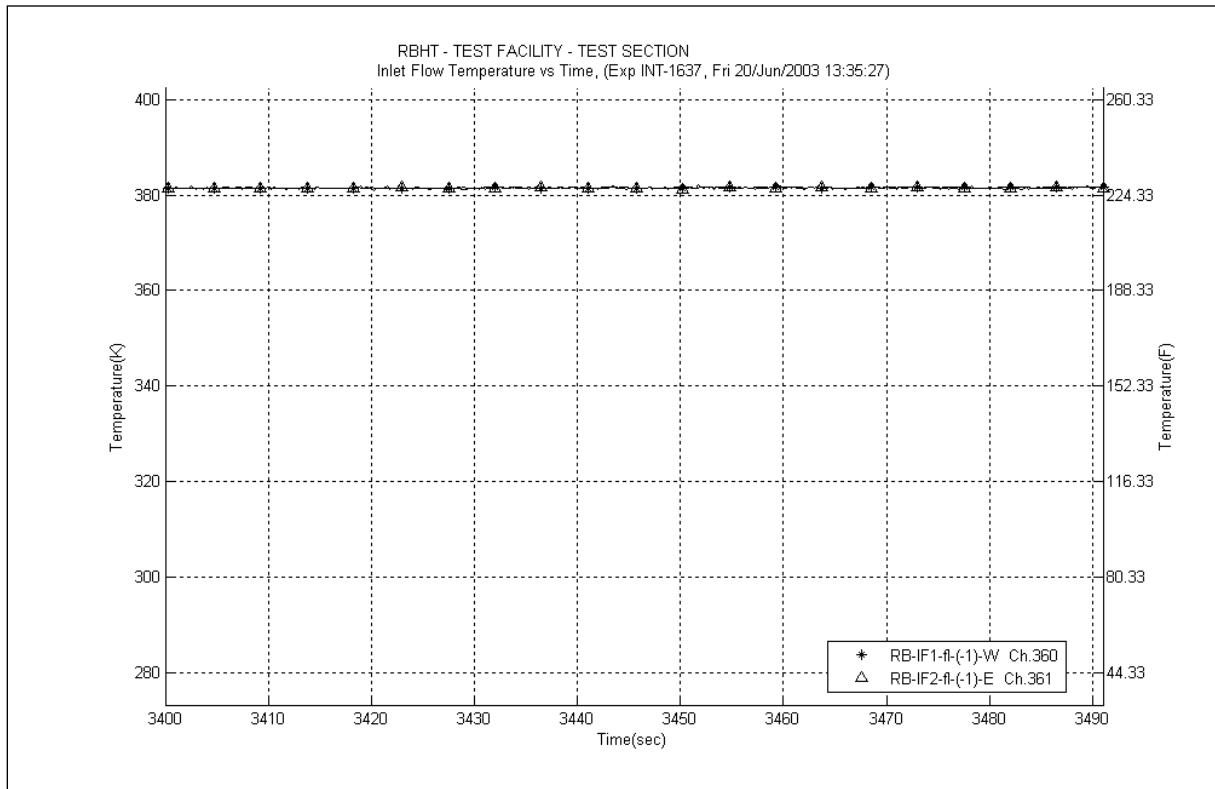


Figure A-307 Inlet Temperature Plot for Experiment 1637B

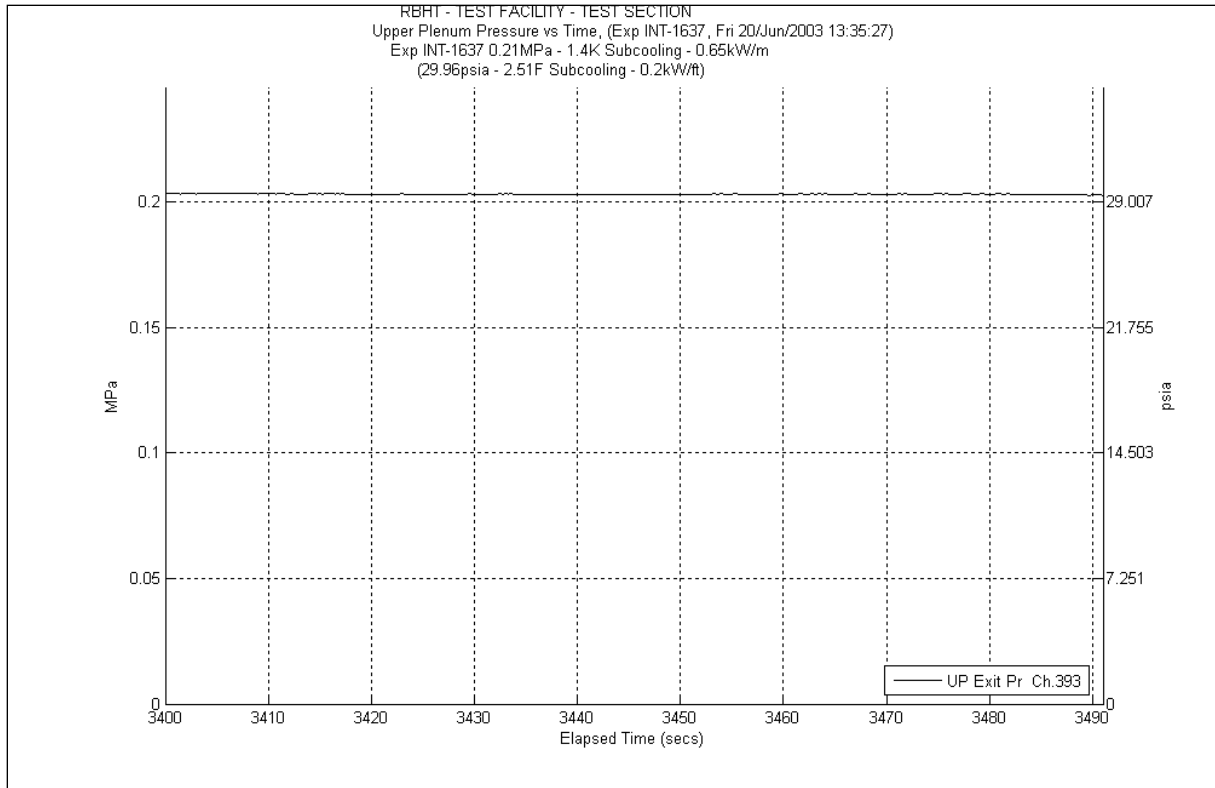


Figure A-308 System Pressure Plot for Experiment 1637B

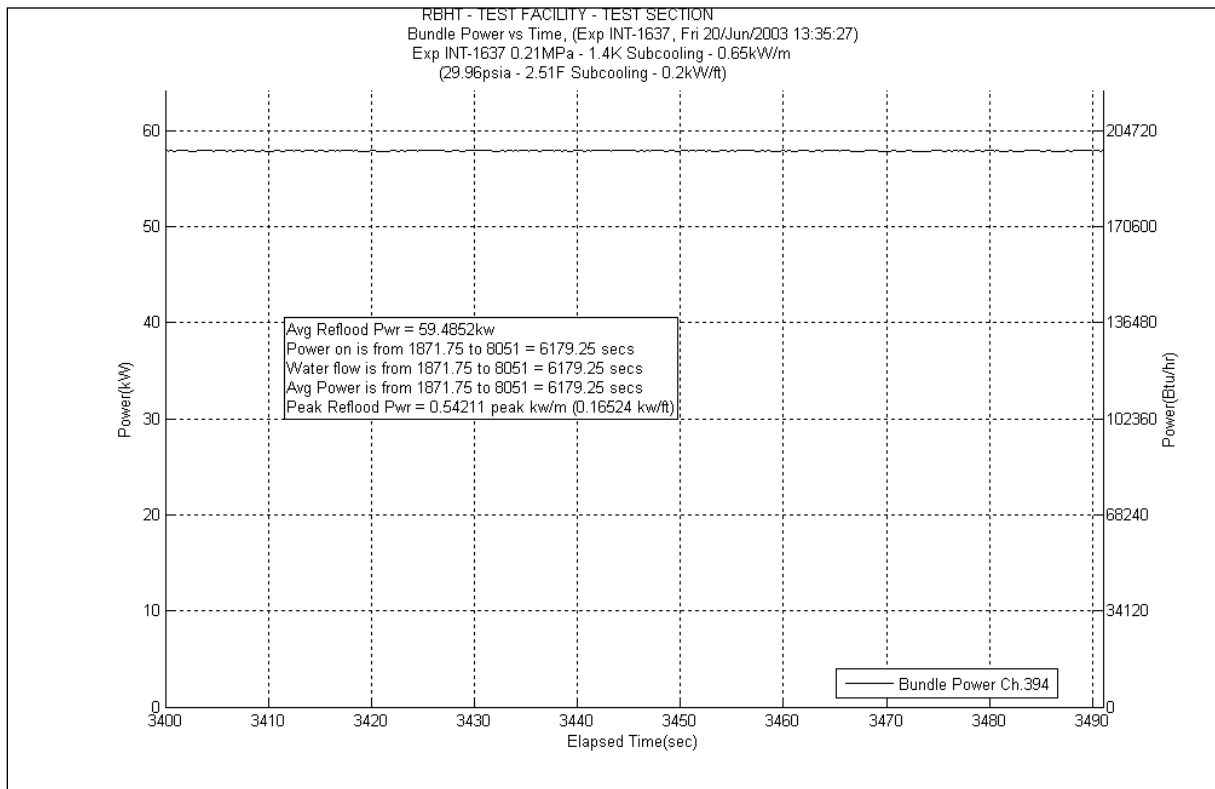


Figure A-309 Bundle Power Plot for Experiment 1637B

Table A-123 Data Results for RBHT Test 1637B for Time Period 3400 to 3491 seconds

Results for RBHT Test 1637
Valid Time Period 3400 to 3491 seconds
Collapsed Liquid Level = 75.294 inches = 1912.48 mm
(Z_{OSI}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft ²)	$\Delta P_{unconnected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lb/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.744	14.598	698.978	0.753	36.054	0.164	7.852	0.000	0.000	13.68	655.002	4333.68	207497.7122	0.761	0.757	0.765
*	120-133	3048-3378	383	0.735	17.922	858.119	0.836	40.028	0.292	13.981	0.624	29.886	16.17	774.224	4349.85	208271.9359	0.76	0.756	0.764
*	108-120	2743-3048	382	0.667	20.737	992.891	0.701	33.564	0.365	17.476	4.741	226.999	14.93	714.852	4364.78	208986.7881	0.76	0.756	0.764
	100-108	2540-2743	381	0.744	10.646	509.749	0.421	20.158	0.267	12.784	0.000	0.000	9.956	476.696	4374.736	209463.484	0.76	0.756	0.764
	97-100	2464-2540	380	0.647	5.500	263.329	0.148	7.086	0.097	4.644	0.000	0.000	5.251	251.419	4379.987	209714.9032	0.663	0.660	0.666
	93-97	2362-2464	379	0.661	7.047	337.429	0.189	9.049	0.126	6.033	0.000	0.000	6.733	322.378	4386.72	210037.281	0.676	0.673	0.679
*	85-93	2159-2362	378	0.488	21.277	1018.752	0.350	16.758	0.242	11.587	8.145	389.988	12.54	600.418	4399.26	210637.6994	0.698	0.695	0.701
	81-85	2057-2159	377	0.707	6.087	291.427	0.161	7.709	0.116	5.554	0.000	0.000	5.809	278.136	4405.069	210915.8358	0.72	0.716	0.724
	78-81	1981-2057	376	0.659	5.318	254.626	0.115	5.506	0.085	4.070	0.000	0.000	5.114	244.860	4410.183	211160.6955	0.672	0.669	0.675
	75-78	1905-1981	375	0.639	5.630	269.545	0.110	5.267	0.083	3.974	0.000	0.000	5.434	260.181	4415.617	211420.8768	0.651	0.648	0.654
	72-75	1829-1905	374	0.514	7.567	362.295	0.105	5.027	0.081	3.878	0.000	0.000	7.376	353.165	4422.993	211774.0415	0.526	0.523	0.529
*	67-72	1702-1829	373	0.424	14.952	715.886	0.163	7.804	0.130	6.224	4.049	193.848	10.61	508.010	4433.603	212282.0511	0.591	0.588	0.594
	63-67	1600-1702	372	0.645	7.369	352.846	0.121	5.794	0.101	4.836	0.000	0.000	7.148	342.248	4440.751	212624.2992	0.656	0.653	0.659
	60-63	1524-1600	371	0.472	8.221	393.626	0.085	4.070	0.073	3.495	0.000	0.000	8.058	385.819	4448.809	213010.1183	0.483	0.481	0.485
	57-60	1448-1524	370	0.446	8.637	413.518	0.080	3.830	0.071	3.399	0.000	0.000	8.484	406.216	4457.293	213416.3344	0.455	0.453	0.457
	53-57	1346-1448	369	0.415	12.158	582.108	0.099	4.740	0.092	4.405	0.000	0.000	11.96	572.648	4469.253	213988.9822	0.424	0.422	0.426
*	46-53	1168-1346	368	0.323	24.627	1179.136	0.152	7.278	0.153	7.326	4.752	227.516	19.57	937.017	4488.823	214925.9989	0.462	0.460	0.464
	43-46	1092-1168	367	0.491	7.925	379.452	0.057	2.729	0.062	2.969	0.000	0.000	7.801	373.514	4496.624	215299.5128	0.499	0.497	0.501
	37-43	940-1092	366	0.388	19.080	913.569	0.098	4.692	0.119	5.698	0.000	0.000	18.85	902.543	4515.474	216202.0556	0.395	0.393	0.397
*	25-37	635-940	365	0.221	48.563	2325.201	0.132	6.320	0.215	10.294	0.696	33.316	47.52	2275.270	4562.994	218477.3254	0.237	0.236	0.238
	13-25	330-635	364	0.077	57.501	2753.141	0.051	2.442	0.091	4.357	0.000	0.000	57.34	2745.454	4620.334	221222.7793	0.08	0.076	0.084
*	0-13	0-330	363	0.042	64.678	3096.786	0.004	0.192	0.000	0.000	-0.126	-6.046	64.8	3102.641	4685.134	224325.42	0.04	0.038	0.042

Table A-124 Energy Balance Results for RBHT Test 1637B for Time Period 3400 to 3491 seconds

Results for RBHT Test 1637 Valid Time Period 3400 to 3491 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2620.3506	8.2661	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
0.25	6.35	2765.9257	8.7253	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
0.50	12.70	2911.5007	9.1845	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
0.75	19.05	3057.0757	9.6438	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
1.00	25.40	3202.6508	10.103	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
1.25	31.75	3348.2258	10.562	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
1.50	38.10	3493.8008	11.021	0.00E+00	0.00E+00	0.00E+00	8.40E-02	3.81E-02
1.75	44.45	3639.3759	11.481	2.46E-03	1.67E-01	7.58E-02	8.38E-02	3.80E-02
2.00	50.80	3784.9509	11.94	7.10E-03	4.83E-01	2.19E-01	8.34E-02	3.78E-02
2.25	57.15	3930.5259	12.399	1.19E-02	8.11E-01	3.68E-01	8.30E-02	3.77E-02
2.50	63.50	4076.101	12.858	1.69E-02	1.15E+00	5.22E-01	8.26E-02	3.75E-02
2.75	69.85	4221.676	13.318	2.21E-02	1.50E+00	6.82E-01	8.22E-02	3.73E-02
3.00	76.20	4367.251	13.777	2.75E-02	1.87E+00	8.47E-01	8.17E-02	3.71E-02
3.25	82.55	4512.8261	14.236	3.30E-02	2.24E+00	1.02E+00	8.13E-02	3.69E-02
3.50	88.90	4658.4011	14.695	3.88E-02	2.63E+00	1.19E+00	8.08E-02	3.66E-02
3.75	95.25	4803.9762	15.154	4.47E-02	3.04E+00	1.38E+00	8.03E-02	3.64E-02
4.00	101.60	4949.5512	15.614	5.08E-02	3.45E+00	1.57E+00	7.98E-02	3.62E-02
4.25	107.95	5095.1262	16.073	5.71E-02	3.88E+00	1.76E+00	7.92E-02	3.59E-02
4.50	114.30	5240.7013	16.532	6.35E-02	4.32E+00	1.96E+00	7.87E-02	3.57E-02
4.75	120.65	5386.2763	16.991	7.02E-02	4.77E+00	2.16E+00	7.81E-02	3.54E-02
5.00	127.00	5531.8513	17.451	7.70E-02	5.23E+00	2.37E+00	7.76E-02	3.52E-02
5.25	133.35	5677.4264	17.91	8.40E-02	5.71E+00	2.59E+00	7.70E-02	3.49E-02
5.50	139.70	5823.0014	18.369	9.12E-02	6.20E+00	2.81E+00	7.64E-02	3.46E-02
5.75	146.05	5968.5764	18.828	9.86E-02	6.70E+00	3.04E+00	7.58E-02	3.44E-02
6.00	152.40	6114.1515	19.288	1.06E-01	7.21E+00	3.27E+00	7.51E-02	3.41E-02
6.25	158.75	6259.7265	19.747	1.14E-01	7.74E+00	3.51E+00	7.45E-02	3.38E-02
6.50	165.10	6405.3015	20.206	1.22E-01	8.28E+00	3.75E+00	7.38E-02	3.35E-02
6.75	171.45	6550.8766	20.665	1.30E-01	8.83E+00	4.00E+00	7.31E-02	3.32E-02
7.00	177.80	6696.4516	21.124	1.38E-01	9.39E+00	4.26E+00	7.24E-02	3.28E-02
7.25	184.15	6842.0266	21.584	1.47E-01	9.96E+00	4.52E+00	7.17E-02	3.25E-02
7.50	190.50	6987.6017	22.043	1.55E-01	1.06E+01	4.79E+00	7.10E-02	3.22E-02
7.75	196.85	7133.1767	22.502	1.64E-01	1.12E+01	5.06E+00	7.02E-02	3.19E-02
8.00	203.20	7278.7517	22.961	1.73E-01	1.18E+01	5.33E+00	6.95E-02	3.15E-02
8.25	209.55	7424.3268	23.421	1.82E-01	1.24E+01	5.62E+00	6.87E-02	3.12E-02
8.50	215.90	7569.9018	23.88	1.92E-01	1.30E+01	5.91E+00	6.79E-02	3.08E-02
8.75	222.25	7715.4769	24.339	2.01E-01	1.37E+01	6.20E+00	6.71E-02	3.04E-02
9.00	228.60	7861.0519	24.798	2.11E-01	1.43E+01	6.50E+00	6.63E-02	3.01E-02
9.25	234.95	7424.3268	23.421	2.21E-01	1.50E+01	6.80E+00	6.55E-02	2.97E-02
9.50	241.30	6987.6017	22.043	2.30E-01	1.56E+01	7.07E+00	6.47E-02	2.94E-02
9.75	247.65	6550.8766	20.665	2.38E-01	1.62E+01	7.34E+00	6.40E-02	2.90E-02
10.00	254.00	6114.1515	19.288	2.46E-01	1.67E+01	7.58E+00	6.34E-02	2.87E-02
10.25	260.35	5677.4264	17.91	2.53E-01	1.72E+01	7.81E+00	6.27E-02	2.85E-02
10.50	266.70	5240.7013	16.532	2.60E-01	1.77E+01	8.02E+00	6.22E-02	2.82E-02
10.75	273.05	4803.9762	15.154	2.66E-01	1.81E+01	8.21E+00	6.16E-02	2.80E-02
11.00	279.40	4367.251	13.777	2.72E-01	1.85E+01	8.39E+00	6.12E-02	2.77E-02
11.25	285.75	3930.5259	12.399	2.77E-01	1.88E+01	8.55E+00	6.07E-02	2.75E-02
11.50	292.10	3493.8008	11.021	2.82E-01	1.92E+01	8.69E+00	6.03E-02	2.74E-02
11.75	298.45	3057.0757	9.6438	2.86E-01	1.94E+01	8.81E+00	6.00E-02	2.72E-02
12.00	304.80	2620.3506	8.2661	2.90E-01	1.97E+01	8.93E+00	5.97E-02	2.71E-02

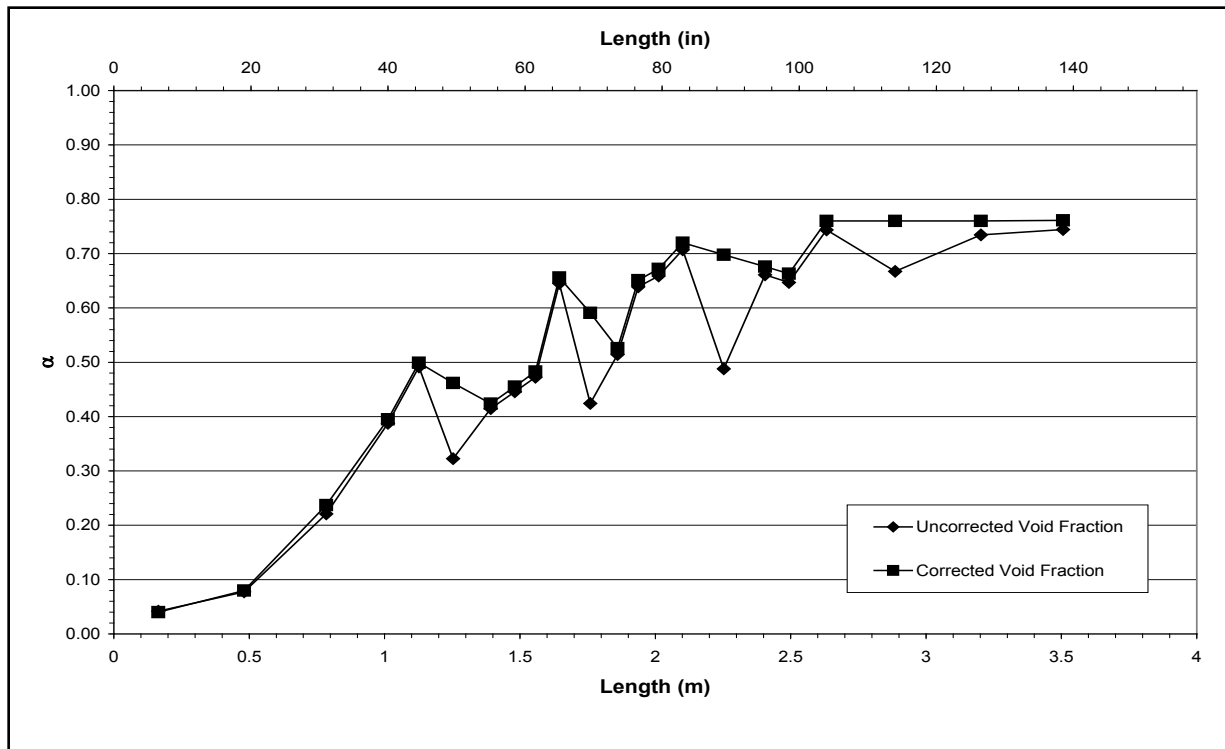


Figure A-310 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637B for Time Period 3400 to 3491 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-C

Test Conditions

Date: 6/20/2003

Steady-state time window: 3722 – 3805 seconds

Inlet flow rate: 2.540 cm/sec (1.000 in./sec)

Inlet mass flow rate: 0.117 kg/sec (0.258 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

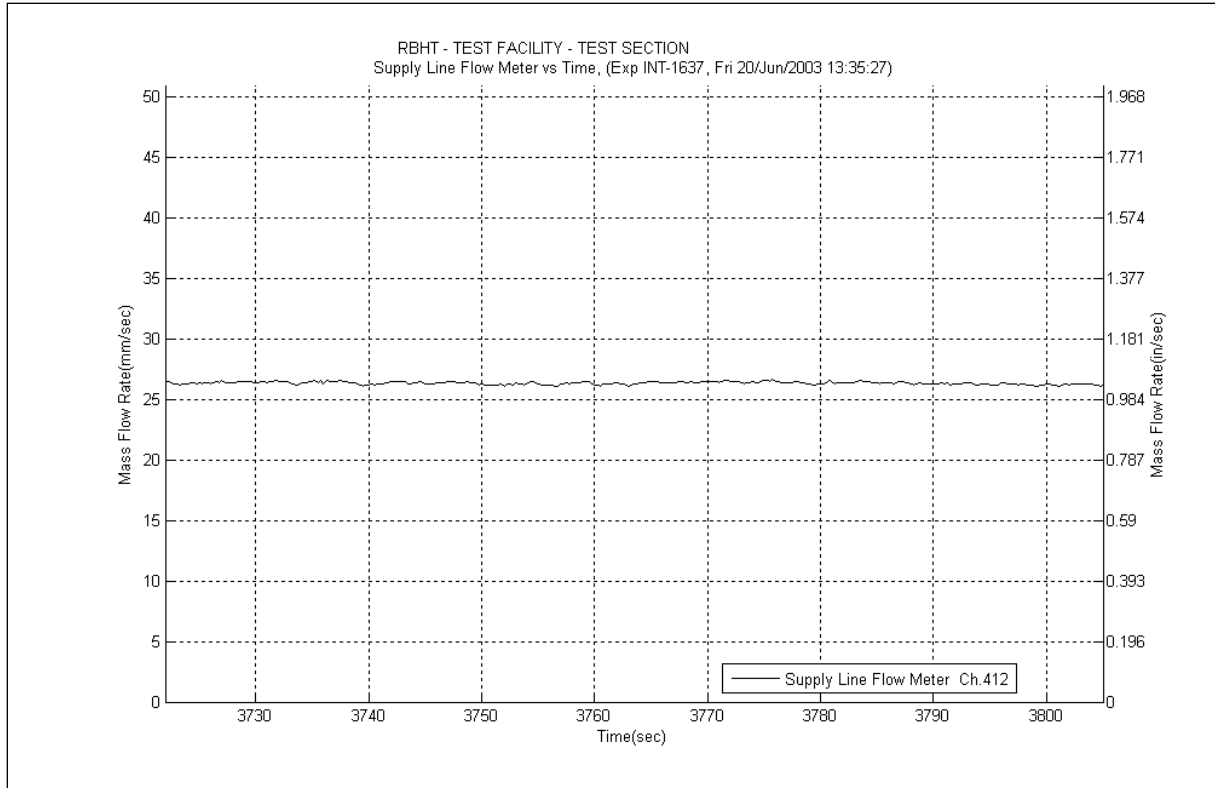


Figure A-311 Inlet Flow Plot for Experiment 1637C

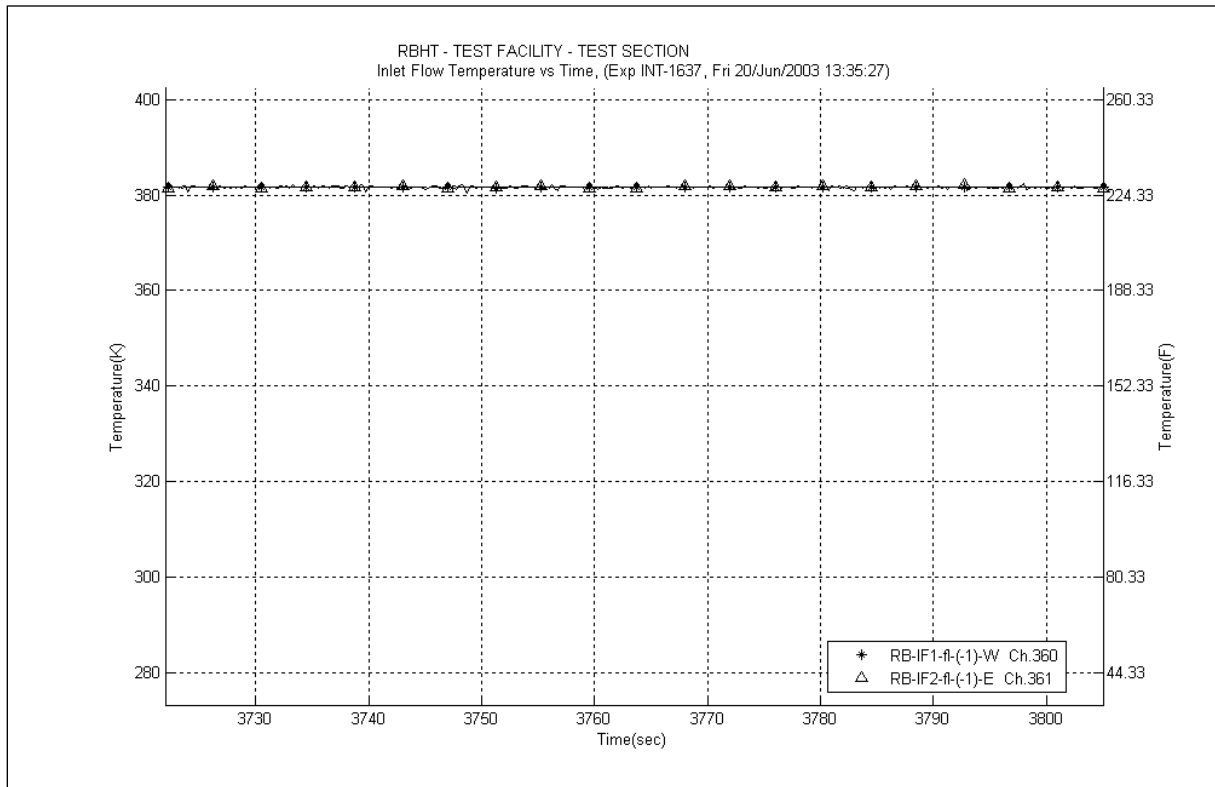


Figure A-312 Inlet Temperature Plot for Experiment 1637C

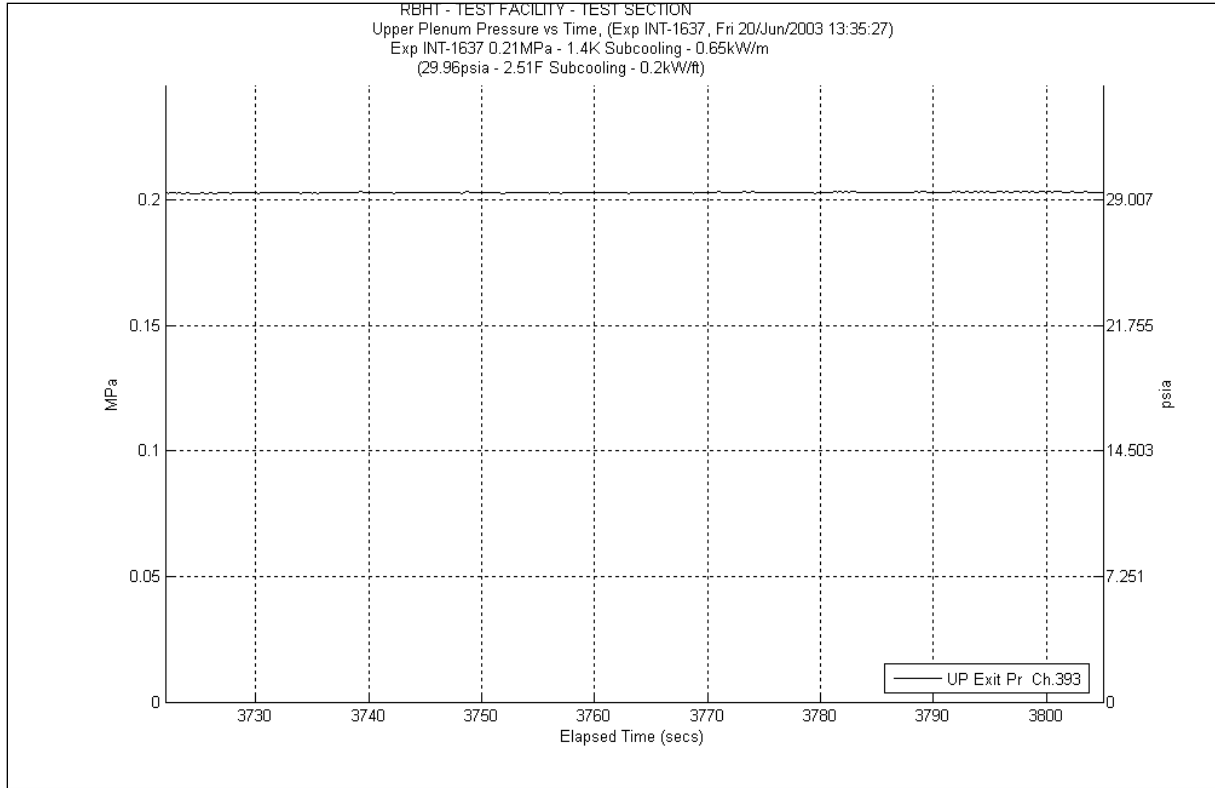


Figure A-313 System Pressure Plot for Experiment 1637C

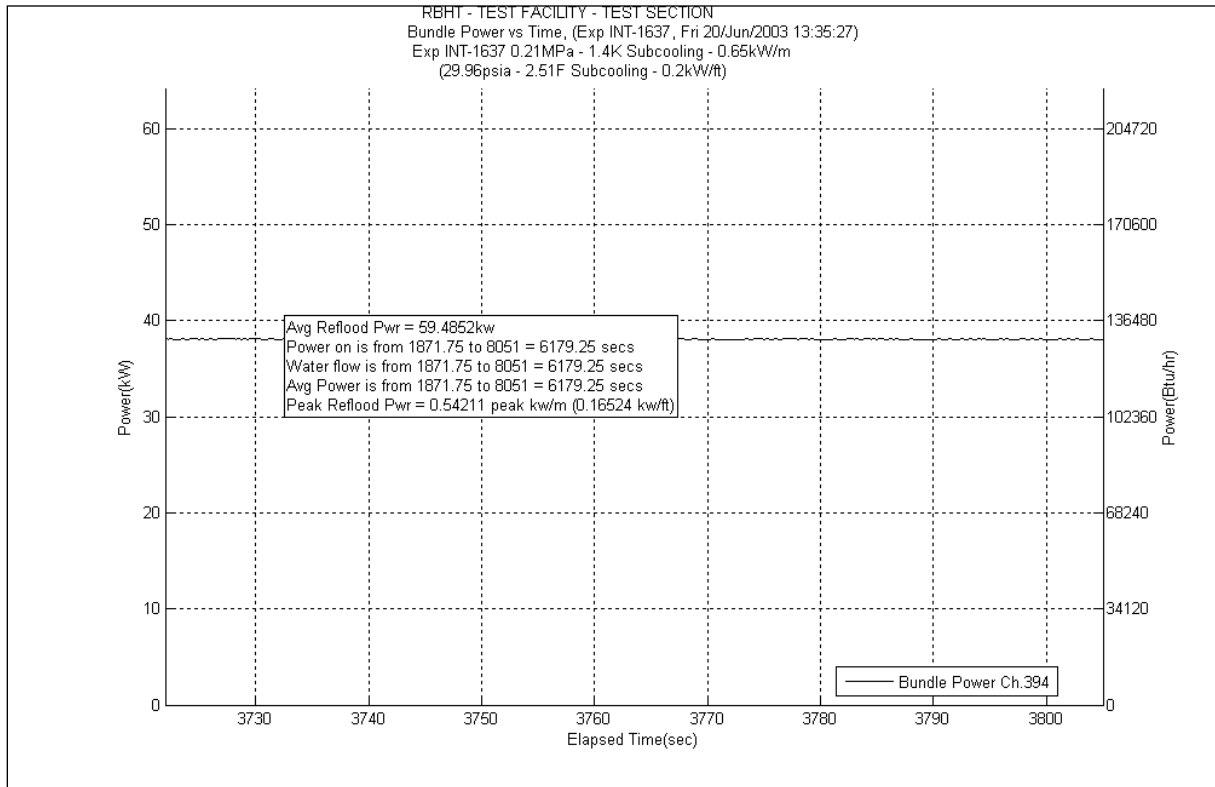


Figure A-314 Bundle Power Plot for Experiment 1637C

Table A-125 Data Results for RBHT Test 1637C for Time Period 3722 to 3805 seconds

Results for RBHT Test 1637
Valid Time Period 3722 to 3805 seconds
Collapsed Liquid Level = 90.719 inches = 2304.25 mm
(Z_{csl}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lb/ft ²)	$\Delta P_{unconnected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lb/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.602	22.752	1089.371	0.536	25.664	0.108	5.171	0.000	0.000	22.1	1058.154	4342.1	207900.8639	0.613	0.610	0.616
*	120-133	3048-3378	383	0.644	24.019	1150.043	0.597	28.585	0.194	9.289	-2.462	-117.874	25.69	1230.044	4367.79	209130.9077	0.619	0.616	0.622
*	108-120	2743-3048	382	0.545	28.356	1357.673	0.501	23.988	0.242	11.587	4.693	224.682	22.92	1097.415	4390.71	210228.3232	0.632	0.629	0.635
	100-108	2540-2743	381	0.627	15.497	741.995	0.301	14.412	0.177	8.475	0.000	0.000	15.01	718.683	4405.72	210947.0059	0.639	0.636	0.642
	97-100	2464-2540	380	0.487	7.993	382.685	0.106	5.075	0.064	3.064	0.000	0.000	7.822	374.519	4413.542	211321.5252	0.498	0.496	0.500
	93-97	2362-2464	379	0.525	9.862	472.201	0.135	6.464	0.083	3.974	0.000	0.000	9.64	461.566	4423.182	211783.0909	0.536	0.533	0.539
*	85-93	2159-2362	378	0.399	24.985	1196.294	0.249	11.922	0.160	7.661	7.306	349.818	17.27	826.892	4440.452	212609.983	0.584	0.581	0.587
	81-85	2057-2159	377	0.624	7.821	374.479	0.114	5.458	0.077	3.687	0.000	0.000	7.629	365.278	4448.081	212975.2614	0.633	0.630	0.636
	78-81	1981-2057	376	0.542	7.130	341.407	0.081	3.878	0.056	2.681	0.000	0.000	6.992	334.779	4455.073	213310.0402	0.551	0.548	0.554
	75-78	1905-1981	375	0.496	7.858	376.220	0.077	3.687	0.055	2.633	0.000	0.000	7.721	369.683	4462.794	213679.7237	0.504	0.501	0.507
	72-75	1829-1905	374	0.355	10.044	480.905	0.073	3.495	0.053	2.538	0.000	0.000	9.913	474.637	4472.707	214154.3606	0.364	0.362	0.366
*	67-72	1702-1829	373	0.385	15.980	765.121	0.114	5.458	0.086	4.118	1.090	52.184	14.69	703.361	4487.397	214857.7216	0.434	0.432	0.436
	63-67	1600-1702	372	0.498	10.433	499.554	0.083	3.974	0.067	3.208	0.000	0.000	10.28	492.209	4497.677	215349.9307	0.505	0.502	0.508
	60-63	1524-1600	371	0.354	10.070	482.148	0.058	2.777	0.048	2.298	0.000	0.000	9.959	476.839	4507.636	215826.7701	0.361	0.359	0.363
	57-60	1448-1524	370	0.337	10.324	494.332	0.054	2.586	0.047	2.250	0.000	0.000	10.22	489.336	4517.856	216316.1064	0.344	0.342	0.346
	53-57	1346-1448	369	0.321	14.110	675.604	0.066	3.160	0.061	2.921	0.000	0.000	13.98	669.366	4531.836	216985.4724	0.327	0.325	0.329
*	46-53	1168-1346	368	0.239	27.675	1325.098	0.098	4.692	0.101	4.836	3.226	154.474	24.25	1161.096	4556.086	218146.5686	0.333	0.331	0.335
	43-46	1092-1168	367	0.333	10.387	497.316	0.035	1.676	0.041	1.963	0.000	0.000	10.31	493.645	4566.396	218640.214	0.338	0.336	0.340
	37-43	940-1092	366	0.235	23.827	1140.843	0.057	2.729	0.079	3.783	0.000	0.000	23.69	1134.283	4590.086	219774.4973	0.24	0.239	0.241
*	25-37	635-940	365	0.072	57.854	2770.050	0.061	2.921	0.120	5.746	4.493	215.111	53.18	2546.272	4643.266	222320.7694	0.147	0.146	0.148
	13-25	330-635	364	0.053	59.001	2825.003	0.004	0.192	0.000	0.000	0.000	0.000	58.98	2823.978	4702.246	225144.747	0.053	0.050	0.056
*	0-13	0-330	363	0.042	64.699	3097.781	0.004	0.192	0.000	0.000	-0.995	-47.665	65.69	3145.254	4767.936	228290.001	0.027	0.026	0.028

Table A-126 Energy Balance Results for RBHT Test 1637C for Time Period 3722 to 3805 seconds

Results for RBHT Test 1637 Valid Time Period 3722 to 3805 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1743.1497	5.4989	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
0.25	6.35	1839.9914	5.8044	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
0.50	12.70	1936.833	6.1099	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
0.75	19.05	2033.6747	6.4154	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.00	25.40	2130.5163	6.7209	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.25	31.75	2227.358	7.0264	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.50	38.10	2324.1997	7.3319	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.75	44.45	2421.0413	7.6373	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
2.00	50.80	2517.883	7.9428	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
2.25	57.15	2614.7246	8.2483	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
2.50	63.50	2711.5663	8.5538	3.35E-03	2.26E-01	1.03E-01	8.33E-02	3.78E-02
2.75	69.85	2808.4079	8.8593	6.82E-03	4.61E-01	2.09E-01	8.30E-02	3.77E-02
3.00	76.20	2905.2496	9.1648	1.04E-02	7.04E-01	3.19E-01	8.27E-02	3.75E-02
3.25	82.55	3002.0912	9.4703	1.41E-02	9.54E-01	4.33E-01	8.24E-02	3.74E-02
3.50	88.90	3098.9329	9.7758	1.80E-02	1.21E+00	5.51E-01	8.21E-02	3.72E-02
3.75	95.25	3195.7745	10.081	2.19E-02	1.48E+00	6.72E-01	8.17E-02	3.71E-02
4.00	101.60	3292.6162	10.387	2.60E-02	1.76E+00	7.97E-01	8.14E-02	3.69E-02
4.25	107.95	3389.4578	10.692	3.02E-02	2.04E+00	9.26E-01	8.11E-02	3.68E-02
4.50	114.30	3486.2995	10.998	3.45E-02	2.33E+00	1.06E+00	8.07E-02	3.66E-02
4.75	120.65	3583.1411	11.303	3.90E-02	2.63E+00	1.19E+00	8.03E-02	3.64E-02
5.00	127.00	3679.9828	11.609	4.35E-02	2.94E+00	1.33E+00	7.99E-02	3.63E-02
5.25	133.35	3776.8244	11.914	4.82E-02	3.26E+00	1.48E+00	7.96E-02	3.61E-02
5.50	139.70	3873.6661	12.22	5.30E-02	3.58E+00	1.63E+00	7.91E-02	3.59E-02
5.75	146.05	3970.5077	12.525	5.80E-02	3.92E+00	1.78E+00	7.87E-02	3.57E-02
6.00	152.40	4067.3494	12.831	6.30E-02	4.26E+00	1.93E+00	7.83E-02	3.55E-02
6.25	158.75	4164.191	13.136	6.82E-02	4.61E+00	2.09E+00	7.79E-02	3.53E-02
6.50	165.10	4261.0327	13.442	7.35E-02	4.97E+00	2.25E+00	7.74E-02	3.51E-02
6.75	171.45	4357.8743	13.747	7.89E-02	5.33E+00	2.42E+00	7.70E-02	3.49E-02
7.00	177.80	4454.716	14.053	8.44E-02	5.71E+00	2.59E+00	7.65E-02	3.47E-02
7.25	184.15	4551.5577	14.358	9.01E-02	6.09E+00	2.76E+00	7.61E-02	3.45E-02
7.50	190.50	4648.3993	14.664	9.59E-02	6.48E+00	2.94E+00	7.56E-02	3.43E-02
7.75	196.85	4745.241	14.969	1.02E-01	6.88E+00	3.12E+00	7.51E-02	3.41E-02
8.00	203.20	4842.0826	15.275	1.08E-01	7.29E+00	3.31E+00	7.46E-02	3.38E-02
8.25	209.55	4938.9243	15.58	1.14E-01	7.71E+00	3.50E+00	7.41E-02	3.36E-02
8.50	215.90	5035.7659	15.886	1.20E-01	8.13E+00	3.69E+00	7.35E-02	3.34E-02
8.75	222.25	5132.6076	16.191	1.27E-01	8.56E+00	3.88E+00	7.30E-02	3.31E-02
9.00	228.60	5229.4492	16.497	1.33E-01	9.00E+00	4.08E+00	7.25E-02	3.29E-02
9.25	234.95	4938.9243	15.58	1.40E-01	9.43E+00	4.28E+00	7.19E-02	3.26E-02
9.50	241.30	4648.3993	14.664	1.46E-01	9.84E+00	4.46E+00	7.14E-02	3.24E-02
9.75	247.65	4357.8743	13.747	1.51E-01	1.02E+01	4.64E+00	7.09E-02	3.22E-02
10.00	254.00	4067.3494	12.831	1.57E-01	1.06E+01	4.80E+00	7.05E-02	3.20E-02
10.25	260.35	3776.8244	11.914	1.61E-01	1.09E+01	4.95E+00	7.01E-02	3.18E-02
10.50	266.70	3486.2995	10.998	1.66E-01	1.12E+01	5.09E+00	6.97E-02	3.16E-02
10.75	273.05	3195.7745	10.081	1.70E-01	1.15E+01	5.22E+00	6.94E-02	3.15E-02
11.00	279.40	2905.2496	9.1648	1.74E-01	1.18E+01	5.34E+00	6.90E-02	3.13E-02
11.25	285.75	2614.7246	8.2483	1.78E-01	1.20E+01	5.44E+00	6.87E-02	3.12E-02
11.50	292.10	2324.1997	7.3319	1.81E-01	1.22E+01	5.54E+00	6.85E-02	3.11E-02
11.75	298.45	2033.6747	6.4154	1.83E-01	1.24E+01	5.62E+00	6.83E-02	3.10E-02
12.00	304.80	1743.1497	5.4989	1.86E-01	1.26E+01	5.69E+00	6.81E-02	3.09E-02

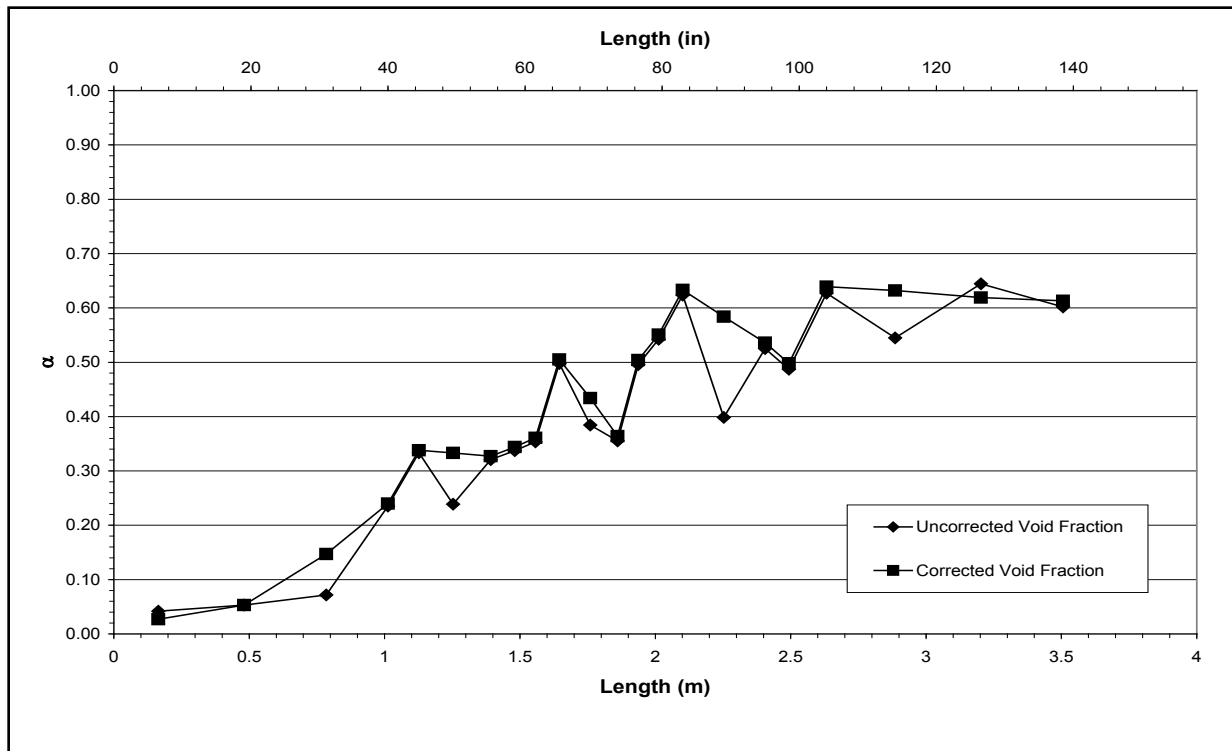


Figure A-315 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637C for Time Period 3722 to 3805 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-D

Test Conditions

Date: 6/20/2003

Steady-state time window: 4090 – 4172 seconds

Inlet flow rate: 2.540 cm/sec (1.000 in./sec)

Inlet mass flow rate: 0.117 kg/sec (0.258 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

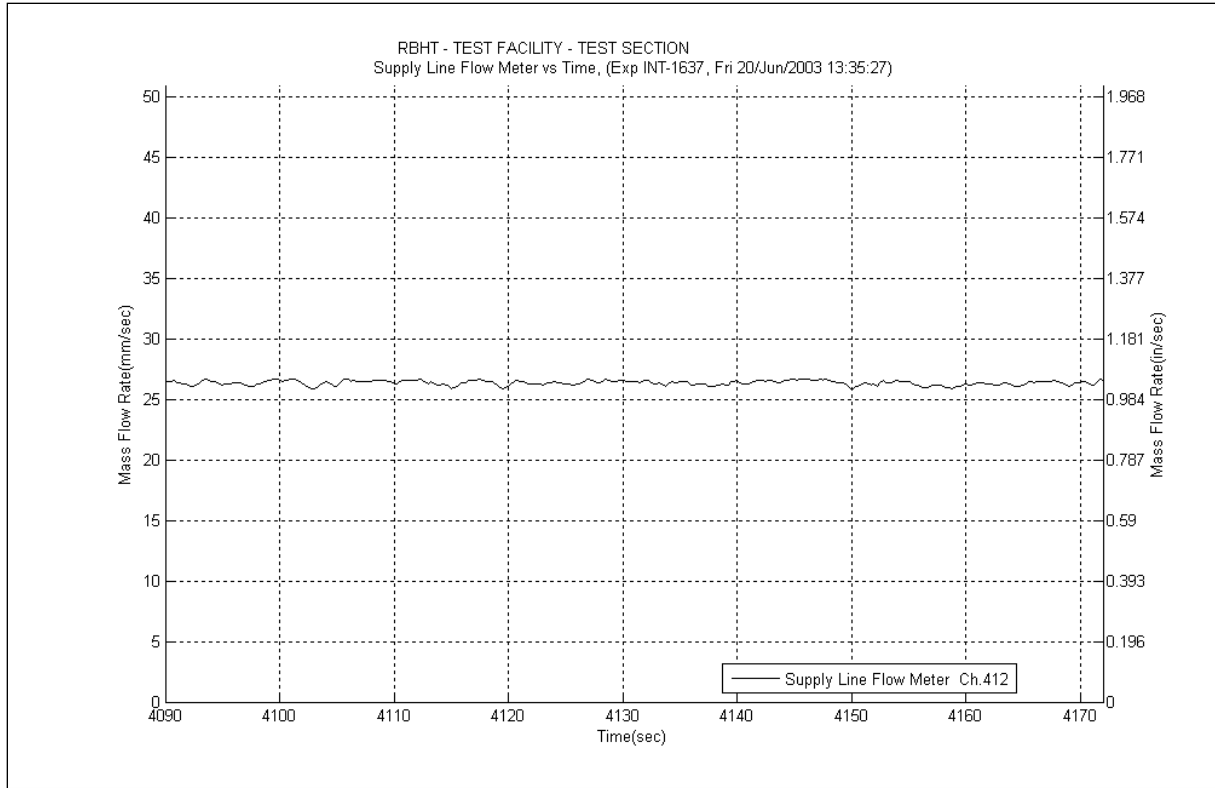


Figure A-316 Inlet Flow Plot for Experiment 1637D

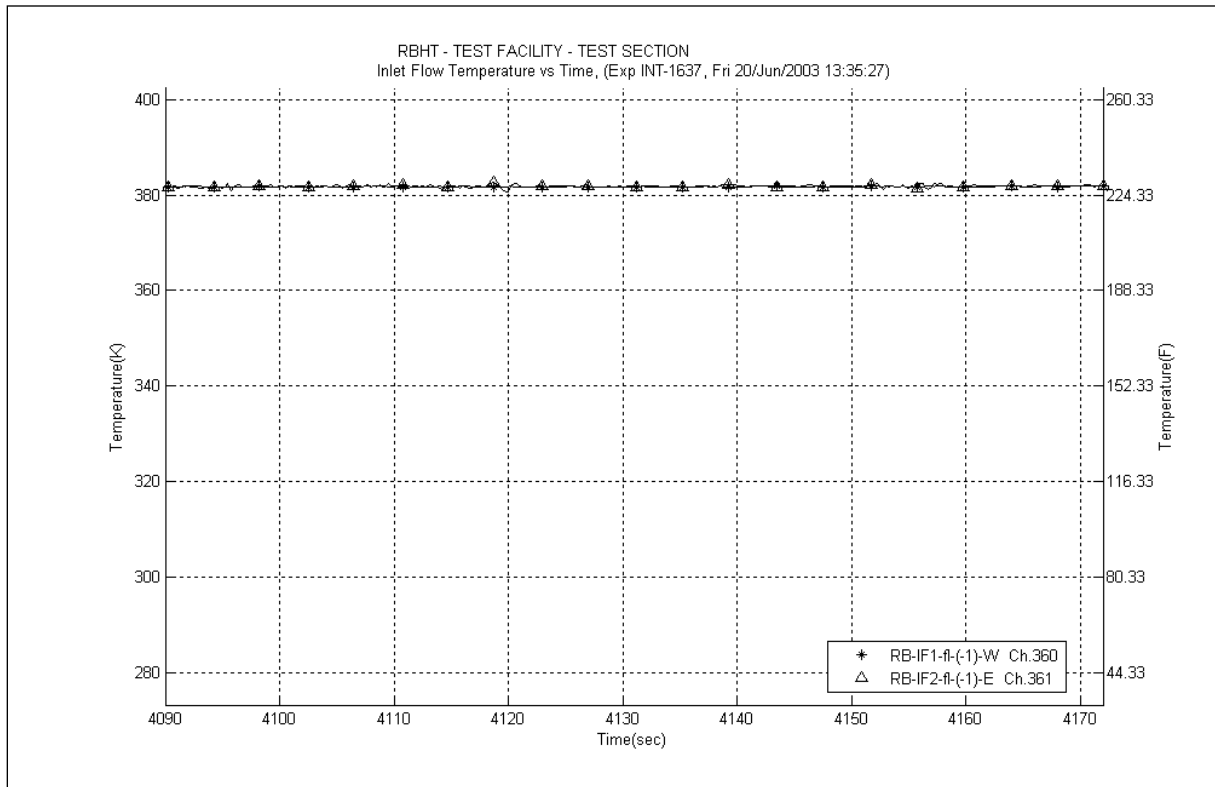


Figure A-317 Inlet Temperature Plot for Experiment 1637D

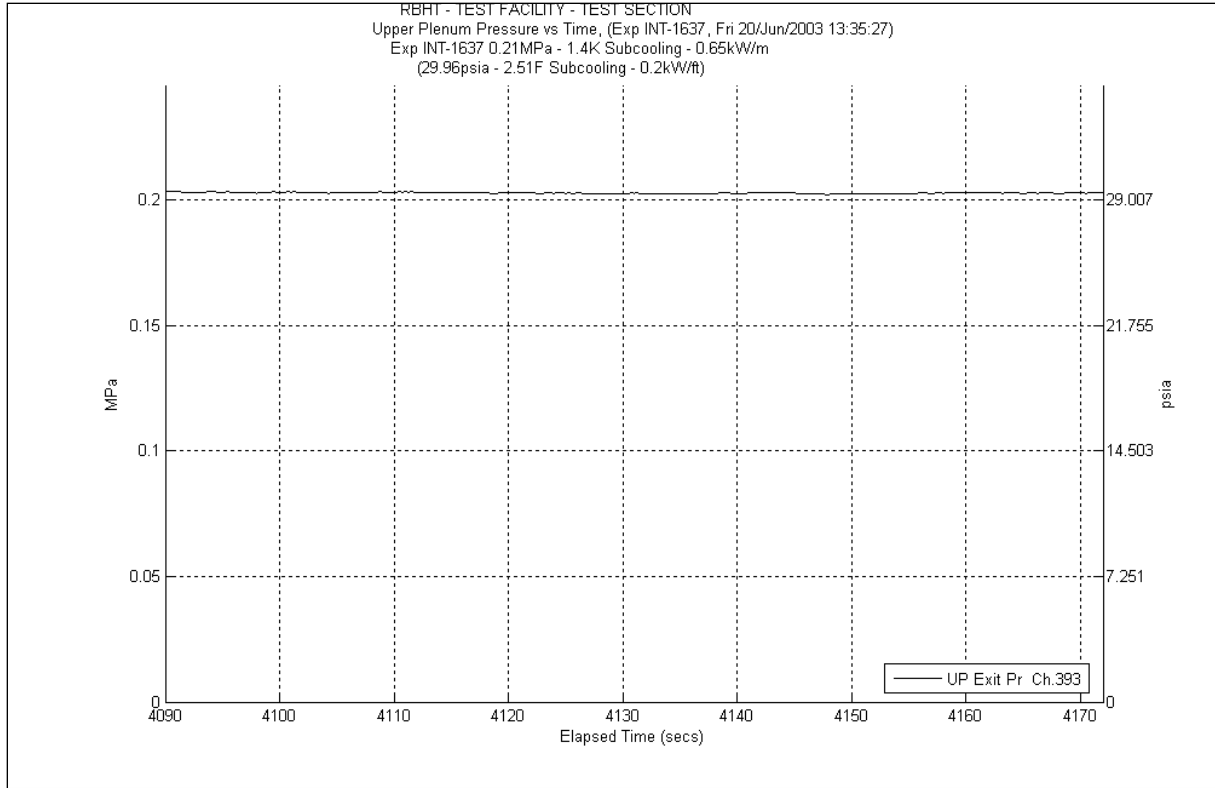


Figure A-318 System Pressure Plot for Experiment 1637D

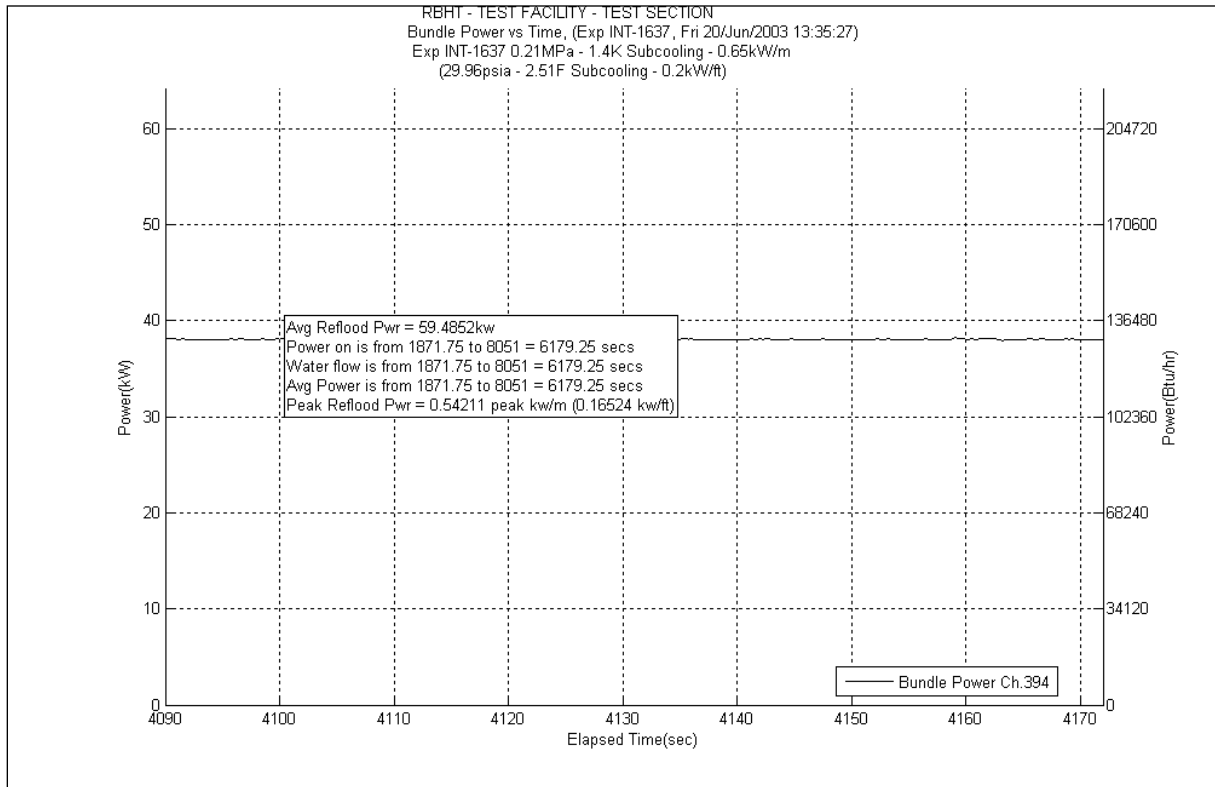


Figure A-319 Bundle Power Plot for Experiment 1637D

Table A-127 Data Results for RBHT Test 1637D for Time Period 4090 to 4172 seconds

Results for RBHT Test 1637
Valid Time Period 4090 to 4172 seconds
Collapsed Liquid Level = 90.691 inches = 2303.56 mm
(Z_{csl}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lb/ft^2)	$\Delta P_{unconnected}$ (Pa)	ΔP_{fric} (lb/ft^2)	ΔP_{fric} (Pa)	ΔP_{acc} (lb/ft^2)	ΔP_{acc} (Pa)	ΔP_{grid} (lb/ft^2)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft^2)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft^2)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.602	22.752	1089.371	0.537	25.712	0.108	5.171	0.000	0.000	22.1	1058.154	4342.1	207900.8639	0.613	0.610	0.616
*	120-133	3048-3378	383	0.643	24.092	1153.524	0.597	28.585	0.193	9.241	-2.478	-118.654	25.78	1234.353	4367.88	209135.2169	0.618	0.615	0.621
*	108-120	2743-3048	382	0.545	28.356	1357.673	0.501	23.988	0.241	11.539	4.444	212.760	23.17	1109.386	4391.05	210244.6025	0.628	0.625	0.631
	100-108	2540-2743	381	0.622	15.725	752.936	0.301	14.412	0.177	8.475	0.000	0.000	15.24	729.695	4406.29	210974.2976	0.633	0.630	0.636
	97-100	2464-2540	380	0.489	7.961	381.193	0.106	5.075	0.064	3.064	0.000	0.000	7.789	372.939	4414.079	211347.2369	0.5	0.498	0.503
	93-97	2362-2464	379	0.522	9.935	475.683	0.135	6.464	0.083	3.974	0.000	0.000	9.711	464.965	4423.79	211812.2021	0.532	0.529	0.535
*	85-93	2159-2362	378	0.400	24.928	1193.558	0.249	11.922	0.160	7.661	7.159	342.774	17.36	831.201	4441.15	212643.4034	0.582	0.579	0.585
	81-85	2057-2159	377	0.623	7.837	375.225	0.114	5.458	0.077	3.687	0.000	0.000	7.645	366.045	4448.795	213009.4479	0.632	0.629	0.635
	78-81	1981-2057	376	0.521	7.463	357.322	0.081	3.878	0.056	2.681	0.000	0.000	7.321	350.531	4456.116	213359.9793	0.53	0.527	0.533
	75-78	1905-1981	375	0.518	7.515	359.808	0.077	3.687	0.055	2.633	0.000	0.000	7.382	353.452	4463.498	213713.4314	0.526	0.523	0.529
	72-75	1829-1905	374	0.352	10.091	483.142	0.073	3.495	0.053	2.538	0.000	0.000	9.958	476.792	4473.456	214190.223	0.361	0.359	0.363
*	67-72	1702-1829	373	0.383	16.011	766.613	0.114	5.458	0.086	4.118	1.081	51.760	14.73	705.276	4488.186	214895.4991	0.433	0.431	0.435
	63-67	1600-1702	372	0.497	10.444	500.051	0.083	3.974	0.066	3.160	0.000	0.000	10.29	492.688	4498.476	215388.187	0.504	0.501	0.507
	60-63	1524-1600	371	0.349	10.148	485.878	0.058	2.777	0.048	2.298	0.000	0.000	10.04	480.718	4508.516	215868.9048	0.356	0.354	0.358
	57-60	1448-1524	370	0.339	10.304	493.337	0.054	2.586	0.047	2.250	0.000	0.000	10.2	488.379	4518.716	216357.2834	0.345	0.343	0.347
	53-57	1346-1448	369	0.319	14.157	677.842	0.066	3.160	0.061	2.921	0.000	0.000	14.02	671.281	4532.736	217028.5646	0.325	0.323	0.327
*	46-53	1168-1346	368	0.240	27.613	1322.114	0.099	4.740	0.101	4.836	3.113	149.048	24.3	1163.490	4557.036	218192.0548	0.332	0.330	0.334
	43-46	1092-1168	367	0.333	10.387	497.316	0.035	1.676	0.041	1.963	0.000	0.000	10.31	493.645	4567.346	218685.7003	0.338	0.336	0.340
	37-43	940-1092	366	0.237	23.785	1138.854	0.058	2.777	0.079	3.783	0.000	0.000	23.64	1131.889	4590.986	219817.5896	0.241	0.240	0.242
*	25-37	635-940	365	0.071	57.869	2770.796	0.062	2.969	0.123	5.889	4.624	221.412	53.06	2540.526	4644.046	222358.116	0.148	0.147	0.149
	13-25	330-635	364	0.055	58.866	2818.538	0.004	0.192	0.000	0.000	0.000	0.000	58.84	2817.274	4702.886	225175.3903	0.056	0.053	0.059
*	0-13	0-330	363	0.042	64.693	3097.552	0.004	0.192	0.000	0.000	-0.931	-44.562	65.62	3141.902	4768.506	228317.2928	0.028	0.027	0.029

Table A-128 Energy Balance Results for RBHT Test 1637D for Time Period 4090 to 4172 seconds

Results for RBHT Test 1637 Valid Time Period 4090 to 4172 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1742.3316	5.4963	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
0.25	6.35	1839.1278	5.8017	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
0.50	12.70	1935.924	6.107	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
0.75	19.05	2032.7202	6.4124	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.00	25.40	2129.5164	6.7177	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.25	31.75	2226.3126	7.0231	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.50	38.10	2323.1088	7.3284	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
1.75	44.45	2419.905	7.6338	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
2.00	50.80	2516.7012	7.9391	0.00E+00	0.00E+00	0.00E+00	8.36E-02	3.79E-02
2.25	57.15	2613.4974	8.2445	2.43E-04	1.64E-02	7.46E-03	8.36E-02	3.79E-02
2.50	63.50	2710.2936	8.5498	3.59E-03	2.42E-01	1.10E-01	8.33E-02	3.78E-02
2.75	69.85	2807.0898	8.8552	7.05E-03	4.77E-01	2.16E-01	8.31E-02	3.77E-02
3.00	76.20	2903.886	9.1605	1.06E-02	7.19E-01	3.26E-01	8.28E-02	3.75E-02
3.25	82.55	3000.6822	9.4659	1.44E-02	9.70E-01	4.40E-01	8.24E-02	3.74E-02
3.50	88.90	3097.4784	9.7712	1.82E-02	1.23E+00	5.57E-01	8.21E-02	3.73E-02
3.75	95.25	3194.2746	10.077	2.21E-02	1.50E+00	6.79E-01	8.18E-02	3.71E-02
4.00	101.60	3291.0708	10.382	2.62E-02	1.77E+00	8.03E-01	8.15E-02	3.69E-02
4.25	107.95	3387.867	10.687	3.04E-02	2.05E+00	9.32E-01	8.11E-02	3.68E-02
4.50	114.30	3484.6632	10.993	3.47E-02	2.35E+00	1.06E+00	8.07E-02	3.66E-02
4.75	120.65	3581.4594	11.298	3.92E-02	2.65E+00	1.20E+00	8.04E-02	3.65E-02
5.00	127.00	3678.2556	11.603	4.37E-02	2.95E+00	1.34E+00	8.00E-02	3.63E-02
5.25	133.35	3775.0518	11.909	4.84E-02	3.27E+00	1.48E+00	7.96E-02	3.61E-02
5.50	139.70	3871.848	12.214	5.32E-02	3.60E+00	1.63E+00	7.92E-02	3.59E-02
5.75	146.05	3968.6442	12.519	5.81E-02	3.93E+00	1.78E+00	7.88E-02	3.57E-02
6.00	152.40	4065.4404	12.825	6.32E-02	4.27E+00	1.94E+00	7.84E-02	3.55E-02
6.25	158.75	4162.2366	13.13	6.83E-02	4.62E+00	2.10E+00	7.79E-02	3.53E-02
6.50	165.10	4259.0328	13.435	7.36E-02	4.98E+00	2.26E+00	7.75E-02	3.51E-02
6.75	171.45	4355.829	13.741	7.90E-02	5.34E+00	2.42E+00	7.70E-02	3.49E-02
7.00	177.80	4452.6252	14.046	8.46E-02	5.72E+00	2.59E+00	7.66E-02	3.47E-02
7.25	184.15	4549.4214	14.351	9.02E-02	6.10E+00	2.77E+00	7.61E-02	3.45E-02
7.50	190.50	4646.2176	14.657	9.60E-02	6.49E+00	2.94E+00	7.56E-02	3.43E-02
7.75	196.85	4743.0138	14.962	1.02E-01	6.89E+00	3.12E+00	7.51E-02	3.41E-02
8.00	203.20	4839.81	15.268	1.08E-01	7.29E+00	3.31E+00	7.46E-02	3.38E-02
8.25	209.55	4936.6062	15.573	1.14E-01	7.71E+00	3.50E+00	7.41E-02	3.36E-02
8.50	215.90	5033.4024	15.878	1.20E-01	8.13E+00	3.69E+00	7.36E-02	3.34E-02
8.75	222.25	5130.1986	16.184	1.27E-01	8.56E+00	3.88E+00	7.30E-02	3.31E-02
9.00	228.60	5226.9948	16.489	1.33E-01	9.00E+00	4.08E+00	7.25E-02	3.29E-02
9.25	234.95	4936.6062	15.573	1.40E-01	9.44E+00	4.28E+00	7.20E-02	3.26E-02
9.50	241.30	4646.2176	14.657	1.46E-01	9.84E+00	4.46E+00	7.15E-02	3.24E-02
9.75	247.65	4355.829	13.741	1.51E-01	1.02E+01	4.64E+00	7.10E-02	3.22E-02
10.00	254.00	4065.4404	12.825	1.57E-01	1.06E+01	4.80E+00	7.05E-02	3.20E-02
10.25	260.35	3775.0518	11.909	1.62E-01	1.09E+01	4.95E+00	7.01E-02	3.18E-02
10.50	266.70	3484.6632	10.993	1.66E-01	1.12E+01	5.09E+00	6.98E-02	3.16E-02
10.75	273.05	3194.2746	10.077	1.70E-01	1.15E+01	5.22E+00	6.94E-02	3.15E-02
11.00	279.40	2903.886	9.1605	1.74E-01	1.18E+01	5.34E+00	6.91E-02	3.13E-02
11.25	285.75	2613.4974	8.2445	1.78E-01	1.20E+01	5.44E+00	6.88E-02	3.12E-02
11.50	292.10	2323.1088	7.3284	1.81E-01	1.22E+01	5.54E+00	6.85E-02	3.11E-02
11.75	298.45	2032.7202	6.4124	1.83E-01	1.24E+01	5.62E+00	6.83E-02	3.10E-02
12.00	304.80	1742.3316	5.4963	1.86E-01	1.26E+01	5.69E+00	6.81E-02	3.09E-02

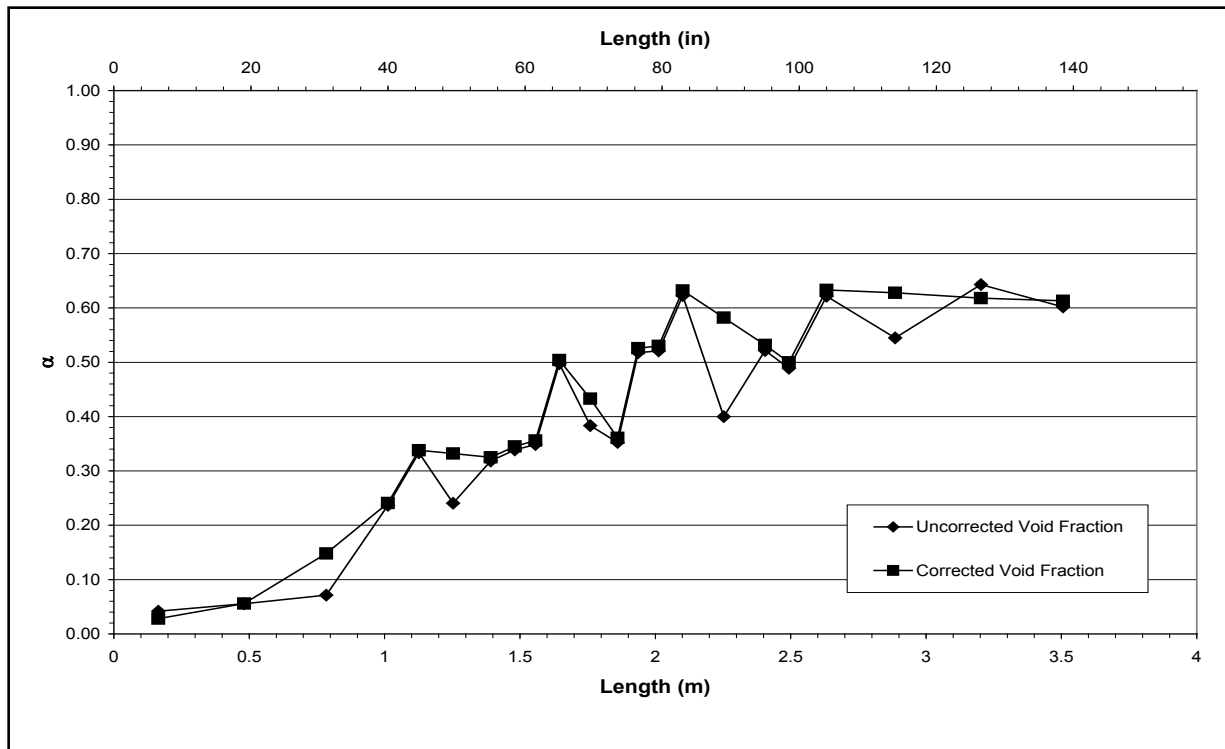


Figure A-320 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637D for Time Period 4090 to 4172 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-E

Test Conditions

Date: 6/20/2003

Steady-state time window: 4667 – 4838 seconds

Inlet flow rate: 1.778 cm/sec (0.700 in./sec)

Inlet mass flow rate: 0.082 kg/sec (0.180 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

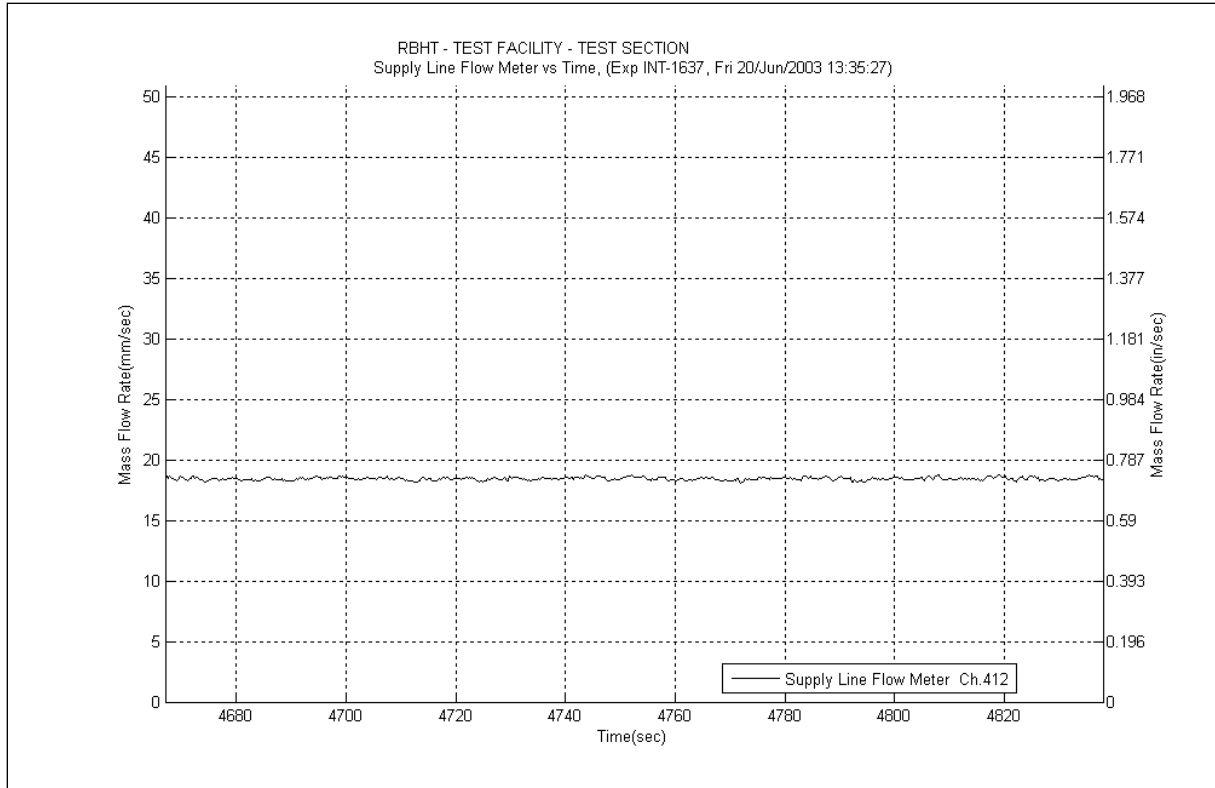


Figure A-321 Inlet Flow Plot for Experiment 1637E

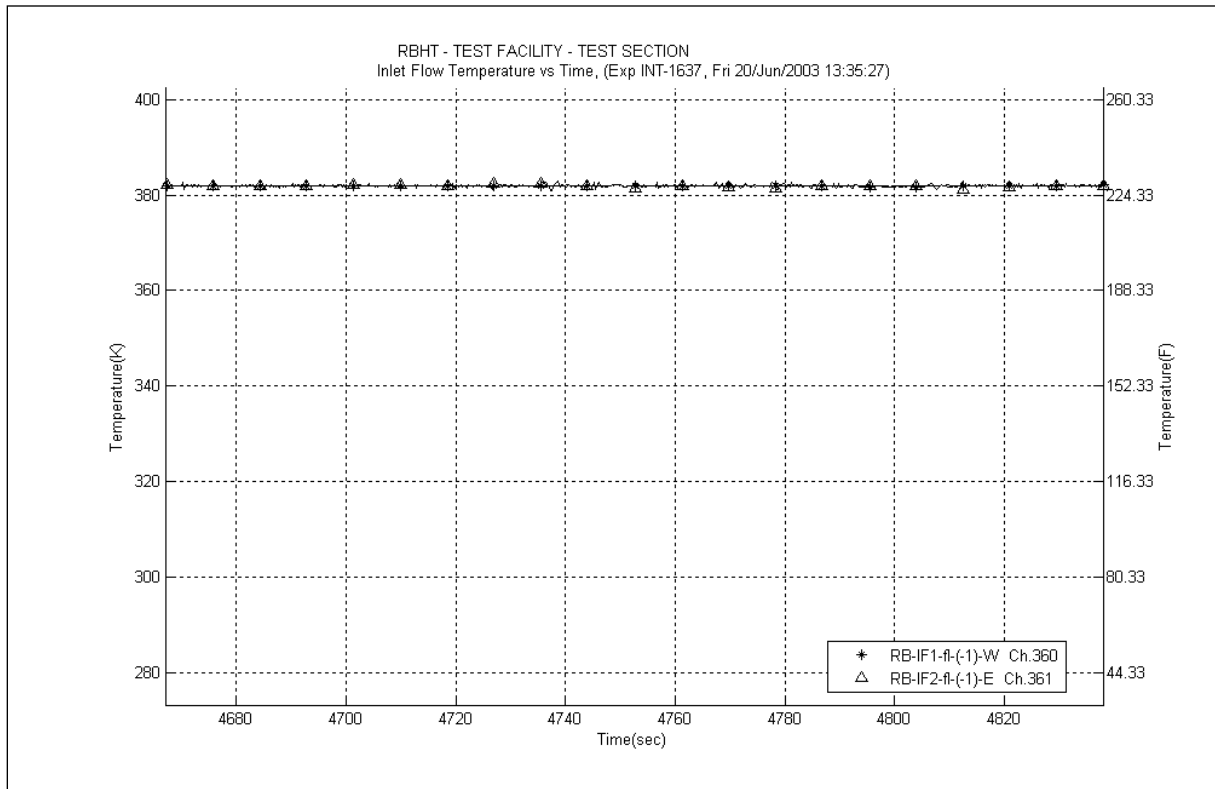


Figure A-322 Inlet Temperature Plot for Experiment 1637E

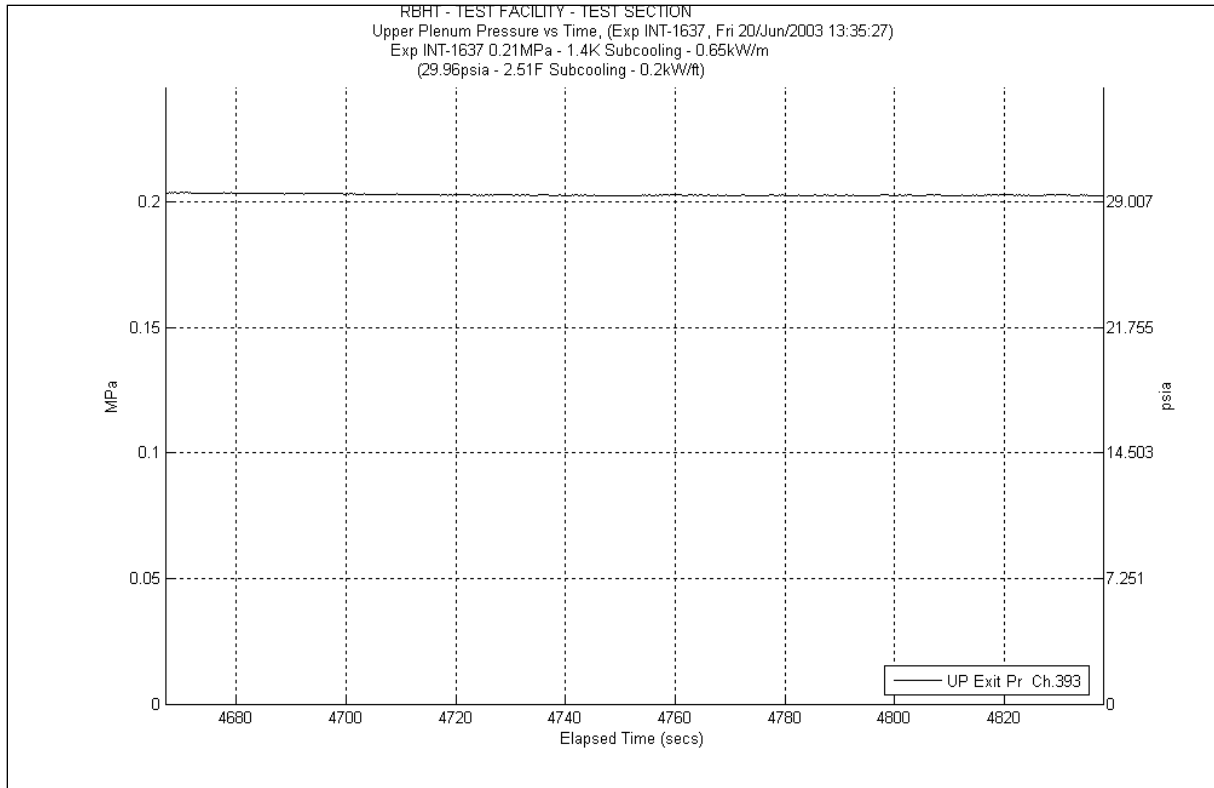


Figure A-323 System Pressure Plot for Experiment 1637E

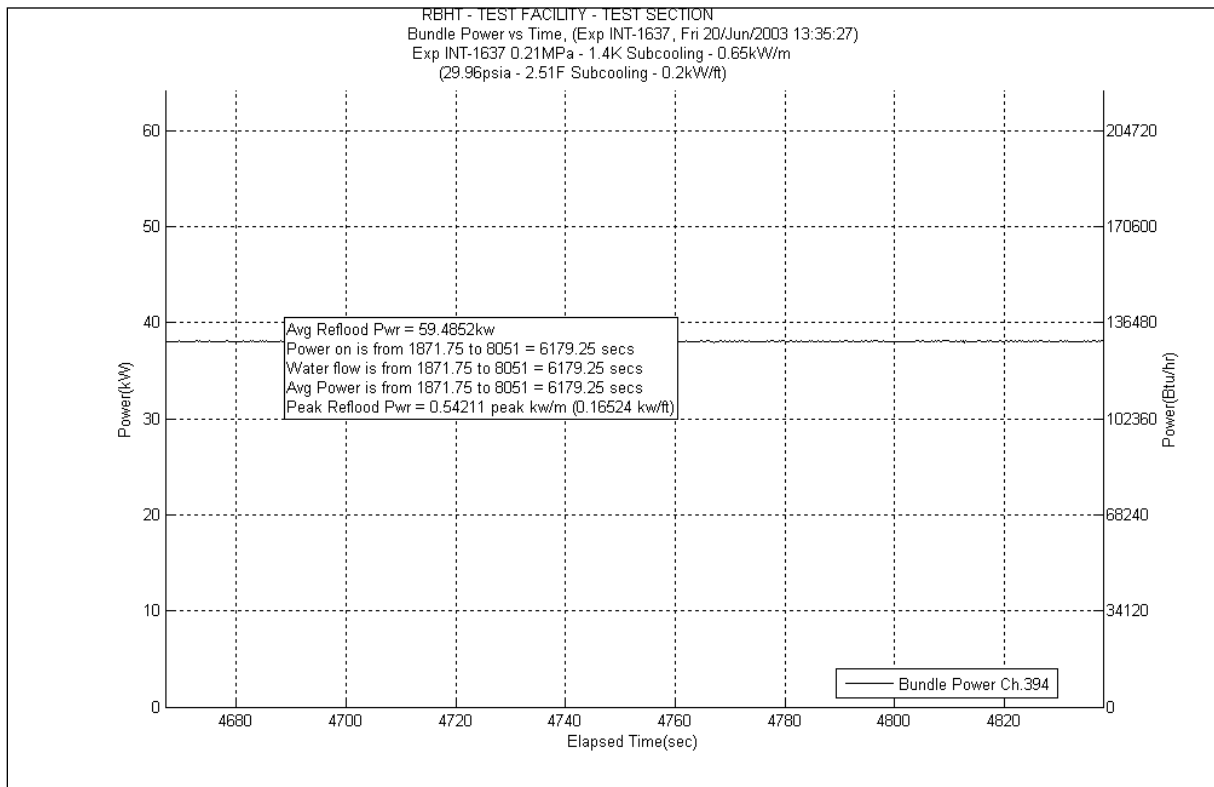


Figure A-324 Bundle Power Plot for Experiment 1637E

Table A-129 Data Results for RBHT Test 1637E for Time Period 4667 to 4838 seconds

Results for RBHT Test 1637
Valid Time Period 4667 to 4838 seconds
Collapsed Liquid Level = 86.247 inches = 2190.66 mm
(Z_{OSV}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lbf/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.638	20.701	991.151	0.370	17.716	0.076	3.639	0.000	0.000	20.25	969.575	4340.25	207812.2854	0.646	0.643	0.649
*	120-133	3048-3378	383	0.664	22.658	1084.895	0.412	19.727	0.135	6.464	-1.539	-73.664	23.65	1132.368	4363.9	208944.6535	0.65	0.647	0.653
*	108-120	2743-3048	382	0.564	27.146	1299.735	0.346	16.567	0.169	8.092	5.311	254.270	21.32	1020.807	4385.22	209965.4606	0.658	0.655	0.661
	100-108	2540-2743	381	0.654	14.380	688.534	0.208	9.959	0.124	5.937	0.000	0.000	14.04	672.239	4399.26	210637.6994	0.662	0.659	0.665
	97-100	2464-2540	380	0.507	7.681	367.765	0.073	3.495	0.045	2.155	0.000	0.000	7.561	362.023	4406.821	210999.722	0.515	0.512	0.518
	93-97	2362-2464	379	0.542	9.525	456.039	0.093	4.453	0.058	2.777	0.000	0.000	9.369	448.590	4416.19	211448.3122	0.549	0.546	0.552
*	85-93	2159-2362	378	0.413	24.403	1168.444	0.173	8.283	0.112	5.363	7.558	361.901	16.56	792.897	4432.75	212241.2092	0.601	0.598	0.604
	81-85	2057-2159	377	0.647	7.328	350.856	0.080	3.830	0.054	2.586	0.000	0.000	7.194	344.451	4439.944	212585.6598	0.654	0.651	0.657
	78-81	1981-2057	376	0.557	6.907	330.715	0.057	2.729	0.039	1.867	0.000	0.000	6.81	326.065	4446.754	212911.7243	0.563	0.560	0.566
	75-78	1905-1981	375	0.542	7.130	341.407	0.054	2.586	0.038	1.819	0.000	0.000	7.036	336.885	4453.79	213248.6098	0.548	0.545	0.551
	72-75	1829-1905	374	0.401	9.338	447.087	0.052	2.490	0.037	1.772	0.000	0.000	9.244	442.605	4463.034	213691.2149	0.407	0.405	0.409
*	67-72	1702-1829	373	0.385	15.964	764.375	0.081	3.878	0.060	2.873	2.323	111.240	13.5	646.383	4476.534	214337.5984	0.48	0.478	0.482
	63-67	1600-1702	372	0.548	9.390	449.574	0.060	2.873	0.047	2.250	0.000	0.000	9.278	444.233	4485.812	214781.8314	0.553	0.550	0.556
	60-63	1524-1600	371	0.373	9.763	467.477	0.042	2.011	0.034	1.628	0.000	0.000	9.682	463.577	4495.494	215245.4081	0.378	0.376	0.380
	57-60	1448-1524	370	0.365	9.893	473.693	0.040	1.915	0.033	1.580	0.000	0.000	9.819	470.136	4505.313	215715.5443	0.37	0.368	0.372
	53-57	1346-1448	369	0.347	13.565	649.495	0.049	2.346	0.043	2.059	0.000	0.000	13.47	644.947	4518.783	216360.4914	0.352	0.350	0.354
*	46-53	1168-1346	368	0.279	26.216	1255.225	0.075	3.591	0.071	3.399	4.090	195.827	21.98	1052.408	4540.763	217412.8994	0.395	0.393	0.397
	43-46	1092-1168	367	0.435	8.798	421.227	0.028	1.341	0.029	1.389	0.000	0.000	8.738	418.378	4549.501	217831.2771	0.439	0.437	0.441
	37-43	940-1092	366	0.302	21.750	1041.380	0.048	2.298	0.055	2.633	0.000	0.000	21.64	1036.129	4571.141	218867.4059	0.305	0.303	0.307
*	25-37	635-940	365	0.162	52.240	2501.251	0.065	3.112	0.100	4.788	1.155	55.288	50.92	2438.063	4622.061	221305.4685	0.183	0.182	0.184
	13-25	330-635	364	0.059	58.643	2807.846	0.025	1.197	0.040	1.915	0.000	0.000	58.56	2803.868	4680.621	224109.3364	0.06	0.057	0.063
*	0-13	0-330	363	0.043	64.610	3093.554	0.002	0.096	0.000	0.000	-0.852	-40.784	65.46	3134.242	4746.081	227243.578	0.03	0.029	0.032

Table A-130 Energy Balance Results for RBHT Test 1637E for Time Period 4667 to 4838 seconds

Results for RBHT Test 1637 Valid Time Period 4667 to 4838 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1742.2308	5.496	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
0.25	6.35	1839.0214	5.8013	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
0.50	12.70	1935.812	6.1067	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
0.75	19.05	2032.6026	6.412	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
1.00	25.40	2129.3932	6.7173	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
1.25	31.75	2226.1838	7.0227	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
1.50	38.10	2322.9744	7.328	0.00E+00	0.00E+00	0.00E+00	5.85E-02	2.65E-02
1.75	44.45	2419.765	7.6333	2.02E-03	9.54E-02	4.33E-02	5.84E-02	2.65E-02
2.00	50.80	2516.5556	7.9387	6.45E-03	3.05E-01	1.38E-01	5.81E-02	2.64E-02
2.25	57.15	2613.3462	8.244	1.11E-02	5.23E-01	2.37E-01	5.79E-02	2.63E-02
2.50	63.50	2710.1368	8.5493	1.58E-02	7.48E-01	3.39E-01	5.76E-02	2.61E-02
2.75	69.85	2806.9274	8.8547	2.08E-02	9.83E-01	4.46E-01	5.73E-02	2.60E-02
3.00	76.20	2903.718	9.16	2.59E-02	1.22E+00	5.56E-01	5.70E-02	2.59E-02
3.25	82.55	3000.5086	9.4653	3.12E-02	1.48E+00	6.69E-01	5.67E-02	2.57E-02
3.50	88.90	3097.2992	9.7707	3.67E-02	1.73E+00	7.87E-01	5.64E-02	2.56E-02
3.75	95.25	3194.0898	10.076	4.23E-02	2.00E+00	9.08E-01	5.60E-02	2.54E-02
4.00	101.60	3290.8804	10.381	4.82E-02	2.28E+00	1.03E+00	5.57E-02	2.53E-02
4.25	107.95	3387.671	10.687	5.42E-02	2.56E+00	1.16E+00	5.54E-02	2.51E-02
4.50	114.30	3484.4616	10.992	6.03E-02	2.85E+00	1.29E+00	5.50E-02	2.49E-02
4.75	120.65	3581.2522	11.297	6.67E-02	3.15E+00	1.43E+00	5.46E-02	2.48E-02
5.00	127.00	3678.0428	11.603	7.32E-02	3.46E+00	1.57E+00	5.42E-02	2.46E-02
5.25	133.35	3774.8334	11.908	7.99E-02	3.78E+00	1.71E+00	5.38E-02	2.44E-02
5.50	139.70	3871.624	12.213	8.67E-02	4.10E+00	1.86E+00	5.34E-02	2.42E-02
5.75	146.05	3968.4146	12.519	9.38E-02	4.43E+00	2.01E+00	5.30E-02	2.41E-02
6.00	152.40	4065.2052	12.824	1.01E-01	4.77E+00	2.17E+00	5.26E-02	2.39E-02
6.25	158.75	4161.9958	13.129	1.08E-01	5.12E+00	2.32E+00	5.22E-02	2.37E-02
6.50	165.10	4258.7864	13.435	1.16E-01	5.48E+00	2.49E+00	5.17E-02	2.35E-02
6.75	171.45	4355.577	13.74	1.24E-01	5.85E+00	2.65E+00	5.13E-02	2.33E-02
7.00	177.80	4452.3676	14.045	1.32E-01	6.22E+00	2.82E+00	5.08E-02	2.31E-02
7.25	184.15	4549.1582	14.351	1.40E-01	6.60E+00	3.00E+00	5.03E-02	2.28E-02
7.50	190.50	4645.9488	14.656	1.48E-01	6.99E+00	3.17E+00	4.99E-02	2.26E-02
7.75	196.85	4742.7394	14.961	1.56E-01	7.39E+00	3.35E+00	4.94E-02	2.24E-02
8.00	203.20	4839.53	15.267	1.65E-01	7.80E+00	3.54E+00	4.89E-02	2.22E-02
8.25	209.55	4936.3206	15.572	1.74E-01	8.21E+00	3.72E+00	4.84E-02	2.19E-02
8.50	215.90	5033.1112	15.877	1.83E-01	8.64E+00	3.92E+00	4.78E-02	2.17E-02
8.75	222.25	5129.9018	16.183	1.92E-01	9.07E+00	4.11E+00	4.73E-02	2.15E-02
9.00	228.60	5226.6924	16.488	2.01E-01	9.51E+00	4.31E+00	4.68E-02	2.12E-02
9.25	234.95	4936.3206	15.572	2.10E-01	9.94E+00	4.51E+00	4.62E-02	2.10E-02
9.50	241.30	4645.9488	14.656	2.19E-01	1.03E+01	4.69E+00	4.57E-02	2.07E-02
9.75	247.65	4355.577	13.74	2.27E-01	1.07E+01	4.87E+00	4.52E-02	2.05E-02
10.00	254.00	4065.2052	12.824	2.35E-01	1.11E+01	5.03E+00	4.48E-02	2.03E-02
10.25	260.35	3774.8334	11.908	2.42E-01	1.14E+01	5.18E+00	4.44E-02	2.01E-02
10.50	266.70	3484.4616	10.992	2.48E-01	1.17E+01	5.32E+00	4.40E-02	2.00E-02
10.75	273.05	3194.0898	10.076	2.54E-01	1.20E+01	5.45E+00	4.37E-02	1.98E-02
11.00	279.40	2903.718	9.16	2.60E-01	1.23E+01	5.56E+00	4.33E-02	1.97E-02
11.25	285.75	2613.3462	8.244	2.64E-01	1.25E+01	5.67E+00	4.31E-02	1.95E-02
11.50	292.10	2322.9744	7.328	2.69E-01	1.27E+01	5.77E+00	4.28E-02	1.94E-02
11.75	298.45	2032.6026	6.412	2.73E-01	1.29E+01	5.85E+00	4.26E-02	1.93E-02
12.00	304.80	1742.2308	5.496	2.76E-01	1.31E+01	5.92E+00	4.24E-02	1.92E-02

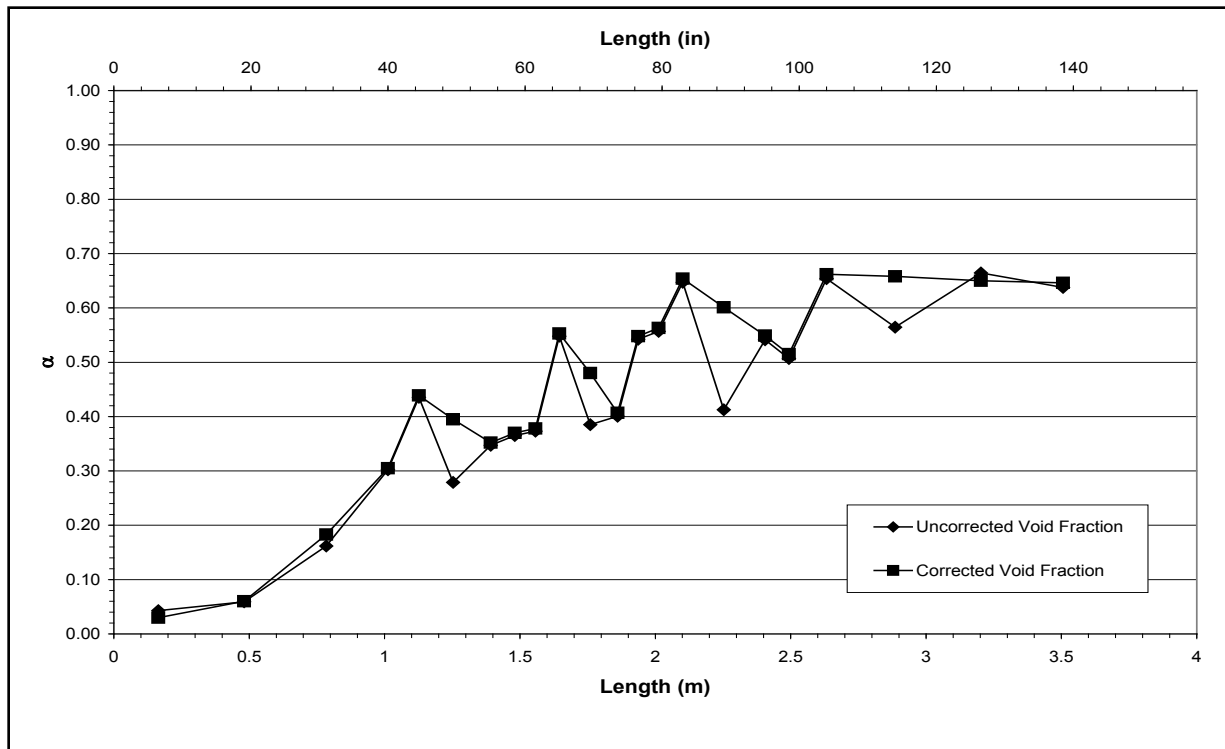


Figure A-325 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637E for Time Period 4667 to 4838 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-F

Test Conditions

Date: 6/20/2003

Steady-state time window: 5096 – 5300 seconds

Inlet flow rate: 1.265 cm/sec (0.498 in./sec)

Inlet mass flow rate: 0.058 kg/sec (0.128 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

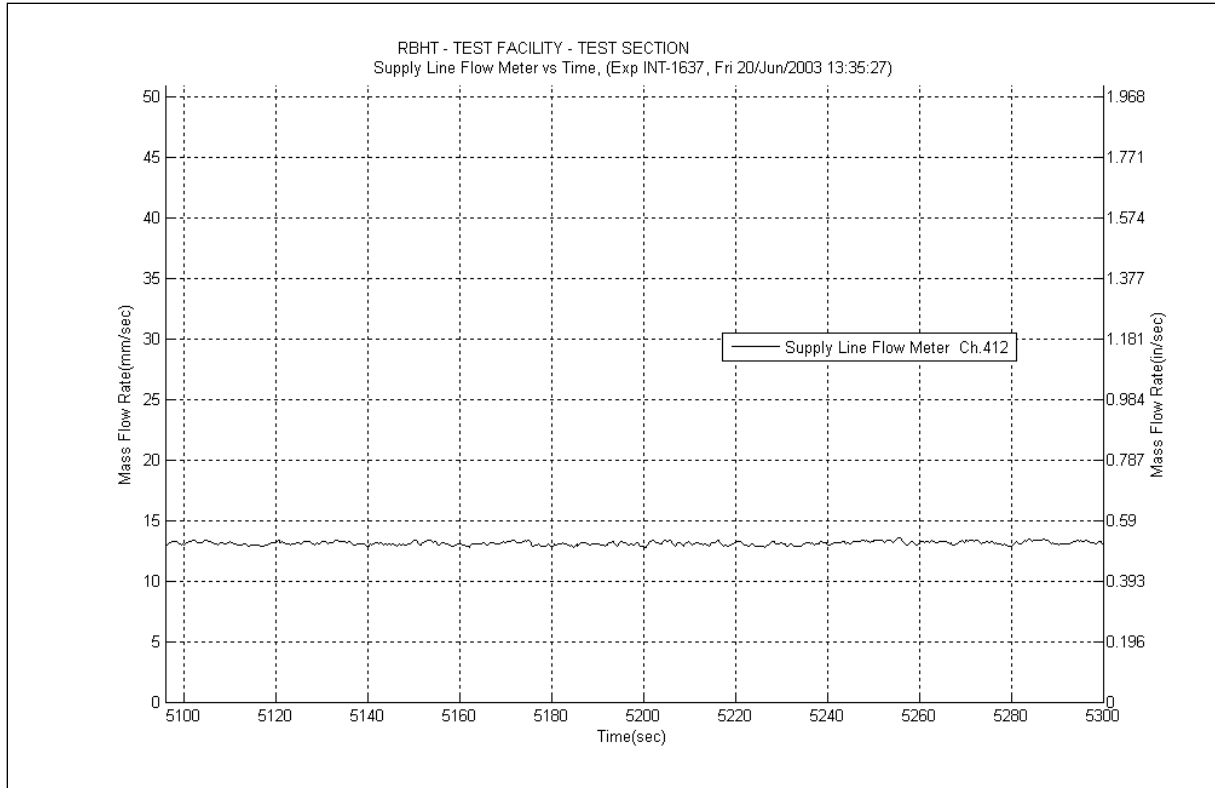


Figure A-326 Inlet Flow Plot for Experiment 1637F

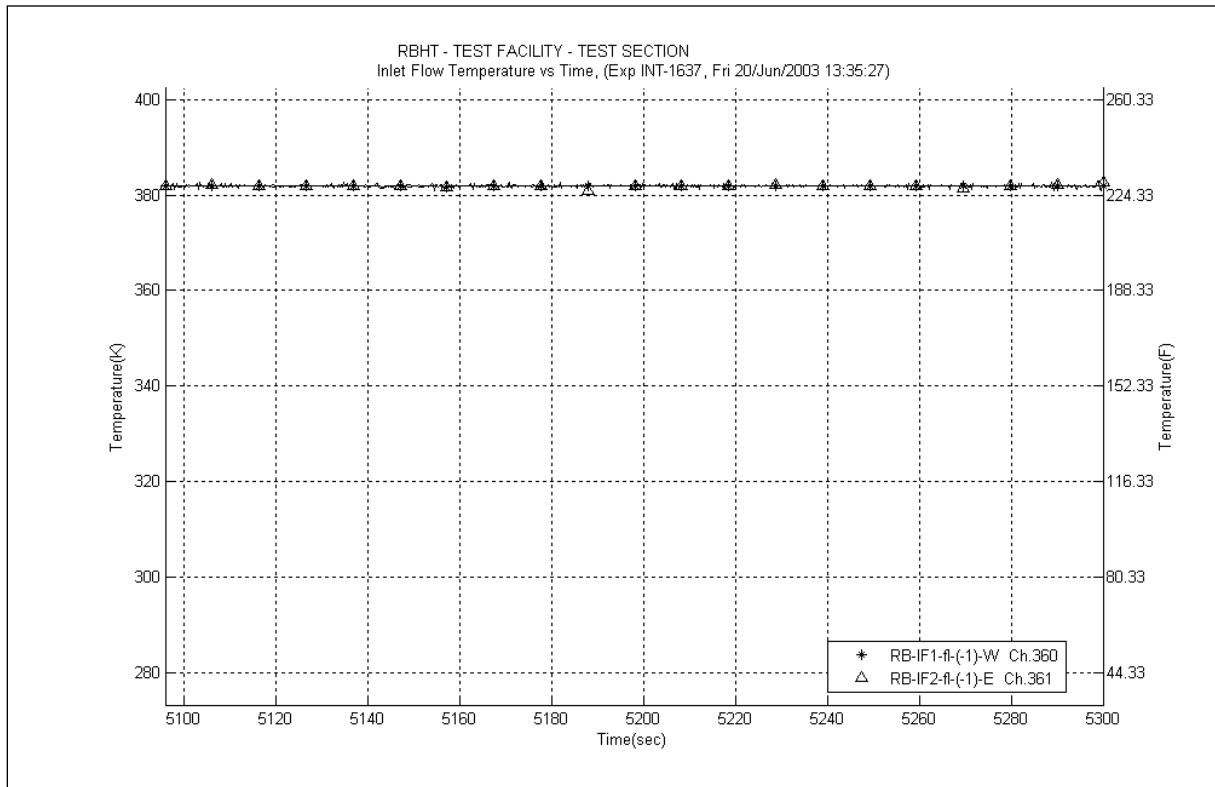


Figure A-327 Inlet Temperature Plot for Experiment 1637F

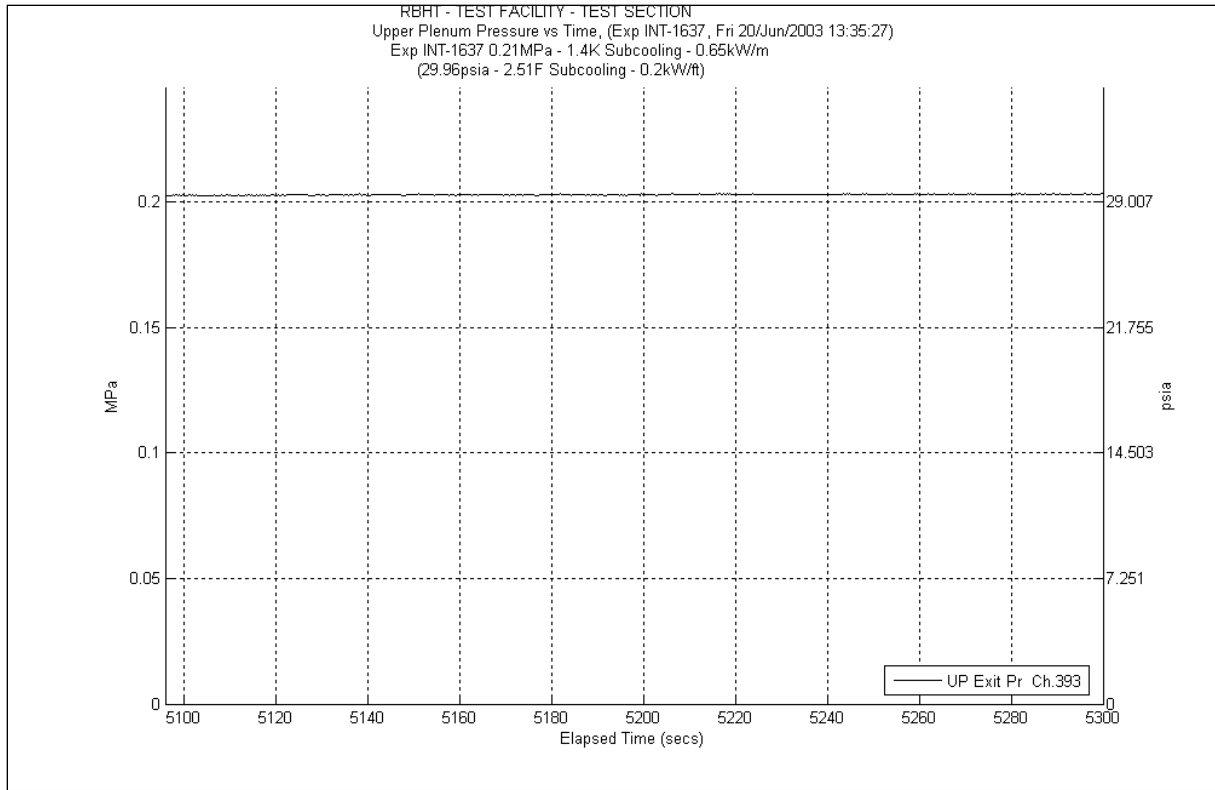


Figure A-328 System Pressure Plot for Experiment 1637F

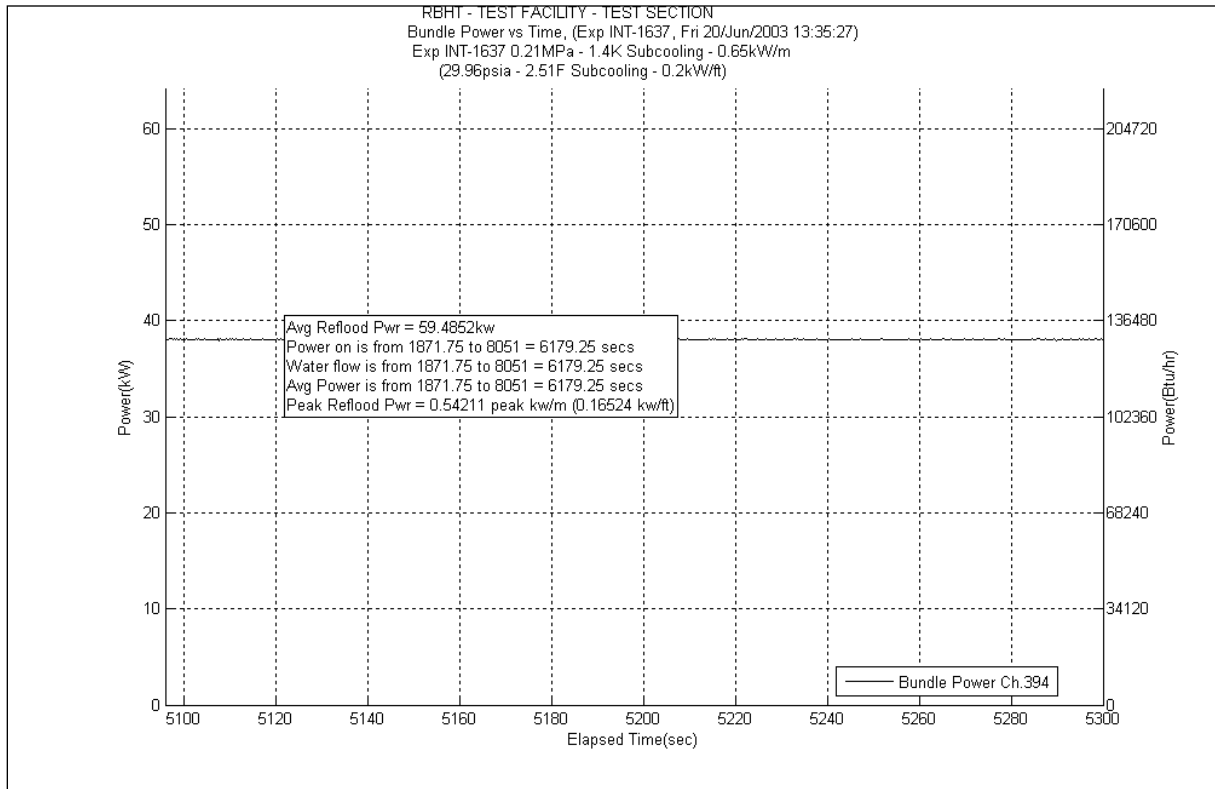


Figure A-329 Bundle Power Plot for Experiment 1637F

Table A-131 Data Results for RBHT Test 1637F for Time Period 5096 to 5300 seconds

Results for RBHT Test 1637
Valid Time Period 5096 to 5300 seconds
Collapsed Liquid Level = 83.201 inches = 2113.30 mm
(Z_{CSV}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.668	18.976	908.596	0.260	12.449	0.054	2.586	0.000	0.000	18.65	892.967	4338.65	207735.677	0.673	0.670	0.676
*	120-133	3048-3378	383	0.681	21.563	1032.428	0.289	13.837	0.096	4.597	-0.802	-38.414	21.98	1052.408	4360.63	208788.0851	0.674	0.671	0.677
*	108-120	2743-3048	382	0.580	26.164	1252.739	0.242	11.587	0.120	5.746	5.632	269.661	20.17	965.745	4380.8	209753.8299	0.676	0.673	0.679
	100-108	2540-2743	381	0.672	13.643	653.225	0.146	6.991	0.088	4.213	0.000	0.000	13.4	641.595	4394.2	210395.4253	0.677	0.674	0.680
	97-100	2464-2540	380	0.521	7.463	357.322	0.051	2.442	0.032	1.532	0.000	0.000	7.375	353.117	4401.575	210748.5422	0.527	0.524	0.530
	93-97	2362-2464	379	0.551	9.327	446.590	0.065	3.112	0.042	2.011	0.000	0.000	9.218	441.360	4410.793	211189.9024	0.556	0.553	0.559
*	85-93	2159-2362	378	0.422	24.030	1150.540	0.121	5.794	0.080	3.830	7.679	367.650	16.15	773.266	4426.943	211963.1686	0.611	0.608	0.614
	81-85	2057-2159	377	0.662	7.032	336.683	0.056	2.681	0.038	1.819	0.000	0.000	6.934	332.002	4433.877	212295.1703	0.666	0.663	0.669
	78-81	1981-2057	376	0.610	6.081	291.178	0.040	1.915	0.028	1.341	0.000	0.000	6.011	287.808	4439.888	212582.9785	0.614	0.611	0.617
	75-78	1905-1981	375	0.522	7.447	356.576	0.038	1.819	0.027	1.293	0.000	0.000	7.378	353.261	4447.266	212936.239	0.526	0.523	0.529
	72-75	1829-1905	374	0.427	8.922	427.194	0.036	1.724	0.027	1.293	0.000	0.000	8.858	424.123	4456.124	213360.3623	0.431	0.429	0.433
*	67-72	1702-1829	373	0.389	15.860	759.401	0.057	2.729	0.043	2.059	2.970	142.225	12.79	612.388	4468.914	213972.7508	0.507	0.504	0.510
	63-67	1600-1702	372	0.580	8.735	418.243	0.042	2.011	0.033	1.580	0.000	0.000	8.658	414.547	4477.572	214387.2981	0.583	0.580	0.586
	60-63	1524-1600	371	0.391	9.493	454.547	0.030	1.436	0.024	1.149	0.000	0.000	9.437	451.846	4487.009	214839.1441	0.394	0.392	0.396
	57-60	1448-1524	370	0.384	9.597	459.520	0.028	1.341	0.024	1.149	0.000	0.000	9.545	457.017	4496.554	215296.1611	0.387	0.385	0.389
	53-57	1346-1448	369	0.366	13.181	631.094	0.035	1.676	0.030	1.436	0.000	0.000	13.11	627.710	4509.664	215923.8713	0.369	0.367	0.371
*	46-53	1168-1346	368	0.289	25.858	1238.068	0.055	2.633	0.050	2.394	4.763	228.034	20.99	1005.007	4530.654	216928.8779	0.423	0.421	0.425
	43-46	1092-1168	367	0.474	8.200	392.631	0.021	1.005	0.021	1.005	0.000	0.000	8.156	390.511	4538.81	217319.3893	0.476	0.474	0.478
	37-43	940-1092	366	0.337	20.649	988.664	0.037	1.772	0.039	1.867	0.000	0.000	20.57	984.897	4559.38	218304.2862	0.34	0.338	0.342
*	25-37	635-940	365	0.202	49.757	2382.392	0.054	2.586	0.071	3.399	1.442	69.057	48.19	2307.350	4607.57	220611.6357	0.227	0.226	0.228
	13-25	330-635	364	0.112	55.340	2649.699	0.025	1.197	0.054	2.586	0.000	0.000	55.24	2644.905	4662.81	223256.5411	0.113	0.112	0.114
*	0-13	0-330	363	0.044	64.548	3090.570	0.001	0.048	0.000	0.000	0.877	41.986	63.67	3048.536	4726.48	226305.0771	0.057	0.054	0.060

Table A-132 Energy Balance Results for RBHT Test 1637F for Time Period 5096 to 5300 seconds

Results for RBHT Test 1637 Valid Time Period 5096 to 5300 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1744.4411	5.503	0.00E+00	0.00E+00	0.00E+00	4.16E-02	1.89E-02
0.25	6.35	1841.3545	5.8087	0.00E+00	0.00E+00	0.00E+00	4.16E-02	1.89E-02
0.50	12.70	1938.2679	6.1144	0.00E+00	0.00E+00	0.00E+00	4.16E-02	1.89E-02
0.75	19.05	2035.1813	6.4201	0.00E+00	0.00E+00	0.00E+00	4.16E-02	1.89E-02
1.00	25.40	2132.0947	6.7258	0.00E+00	0.00E+00	0.00E+00	4.16E-02	1.89E-02
1.25	31.75	2229.0081	7.0316	9.11E-04	3.07E-02	1.39E-02	4.16E-02	1.89E-02
1.50	38.10	2325.9215	7.3373	6.66E-03	2.24E-01	1.02E-01	4.14E-02	1.88E-02
1.75	44.45	2422.8349	7.643	1.27E-02	4.26E-01	1.93E-01	4.11E-02	1.87E-02
2.00	50.80	2519.7483	7.9487	1.89E-02	6.35E-01	2.88E-01	4.09E-02	1.85E-02
2.25	57.15	2616.6617	8.2544	2.54E-02	8.54E-01	3.87E-01	4.06E-02	1.84E-02
2.50	63.50	2713.5751	8.5602	3.21E-02	1.08E+00	4.90E-01	4.03E-02	1.83E-02
2.75	69.85	2810.4885	8.8659	3.91E-02	1.31E+00	5.96E-01	4.00E-02	1.82E-02
3.00	76.20	2907.4019	9.1716	4.63E-02	1.56E+00	7.06E-01	3.97E-02	1.80E-02
3.25	82.55	3004.3153	9.4773	5.37E-02	1.81E+00	8.20E-01	3.94E-02	1.79E-02
3.50	88.90	3101.2287	9.783	6.14E-02	2.07E+00	9.38E-01	3.91E-02	1.77E-02
3.75	95.25	3198.1421	10.089	6.94E-02	2.34E+00	1.06E+00	3.88E-02	1.76E-02
4.00	101.60	3295.0555	10.394	7.76E-02	2.61E+00	1.18E+00	3.84E-02	1.74E-02
4.25	107.95	3391.9689	10.7	8.60E-02	2.89E+00	1.31E+00	3.81E-02	1.73E-02
4.50	114.30	3488.8823	11.006	9.47E-02	3.19E+00	1.45E+00	3.77E-02	1.71E-02
4.75	120.65	3585.7957	11.312	1.04E-01	3.49E+00	1.58E+00	3.73E-02	1.69E-02
5.00	127.00	3682.7091	11.617	1.13E-01	3.80E+00	1.72E+00	3.69E-02	1.68E-02
5.25	133.35	3779.6225	11.923	1.22E-01	4.11E+00	1.87E+00	3.66E-02	1.66E-02
5.50	139.70	3876.5359	12.229	1.32E-01	4.44E+00	2.01E+00	3.62E-02	1.64E-02
5.75	146.05	3973.4493	12.535	1.42E-01	4.77E+00	2.16E+00	3.57E-02	1.62E-02
6.00	152.40	4070.3627	12.84	1.52E-01	5.11E+00	2.32E+00	3.53E-02	1.60E-02
6.25	158.75	4167.2761	13.146	1.62E-01	5.46E+00	2.48E+00	3.49E-02	1.58E-02
6.50	165.10	4264.1895	13.452	1.73E-01	5.82E+00	2.64E+00	3.44E-02	1.56E-02
6.75	171.45	4361.1029	13.757	1.84E-01	6.19E+00	2.81E+00	3.40E-02	1.54E-02
7.00	177.80	4458.0163	14.063	1.95E-01	6.56E+00	2.98E+00	3.35E-02	1.52E-02
7.25	184.15	4554.9296	14.369	2.06E-01	6.94E+00	3.15E+00	3.31E-02	1.50E-02
7.50	190.50	4651.843	14.675	2.18E-01	7.33E+00	3.33E+00	3.26E-02	1.48E-02
7.75	196.85	4748.7564	14.98	2.30E-01	7.73E+00	3.51E+00	3.21E-02	1.45E-02
8.00	203.20	4845.6698	15.286	2.42E-01	8.14E+00	3.69E+00	3.16E-02	1.43E-02
8.25	209.55	4942.5832	15.592	2.54E-01	8.56E+00	3.88E+00	3.11E-02	1.41E-02
8.50	215.90	5039.4966	15.897	2.67E-01	8.98E+00	4.07E+00	3.05E-02	1.38E-02
8.75	222.25	5136.41	16.203	2.80E-01	9.41E+00	4.27E+00	3.00E-02	1.36E-02
9.00	228.60	5233.3234	16.509	2.93E-01	9.86E+00	4.47E+00	2.95E-02	1.34E-02
9.25	234.95	4942.5832	15.592	3.06E-01	1.03E+01	4.67E+00	2.89E-02	1.31E-02
9.50	241.30	4651.843	14.675	3.18E-01	1.07E+01	4.85E+00	2.84E-02	1.29E-02
9.75	247.65	4361.1029	13.757	3.29E-01	1.11E+01	5.02E+00	2.79E-02	1.27E-02
10.00	254.00	4070.3627	12.84	3.40E-01	1.14E+01	5.19E+00	2.75E-02	1.25E-02
10.25	260.35	3779.6225	11.923	3.50E-01	1.18E+01	5.34E+00	2.71E-02	1.23E-02
10.50	266.70	3488.8823	11.006	3.59E-01	1.21E+01	5.48E+00	2.67E-02	1.21E-02
10.75	273.05	3198.1421	10.089	3.67E-01	1.24E+01	5.61E+00	2.64E-02	1.20E-02
11.00	279.40	2907.4019	9.1716	3.75E-01	1.26E+01	5.72E+00	2.60E-02	1.18E-02
11.25	285.75	2616.6617	8.2544	3.82E-01	1.29E+01	5.83E+00	2.57E-02	1.17E-02
11.50	292.10	2325.9215	7.3373	3.88E-01	1.31E+01	5.93E+00	2.55E-02	1.16E-02
11.75	298.45	2035.1813	6.4201	3.94E-01	1.32E+01	6.01E+00	2.53E-02	1.15E-02
12.00	304.80	1744.4411	5.503	3.98E-01	1.34E+01	6.08E+00	2.51E-02	1.14E-02

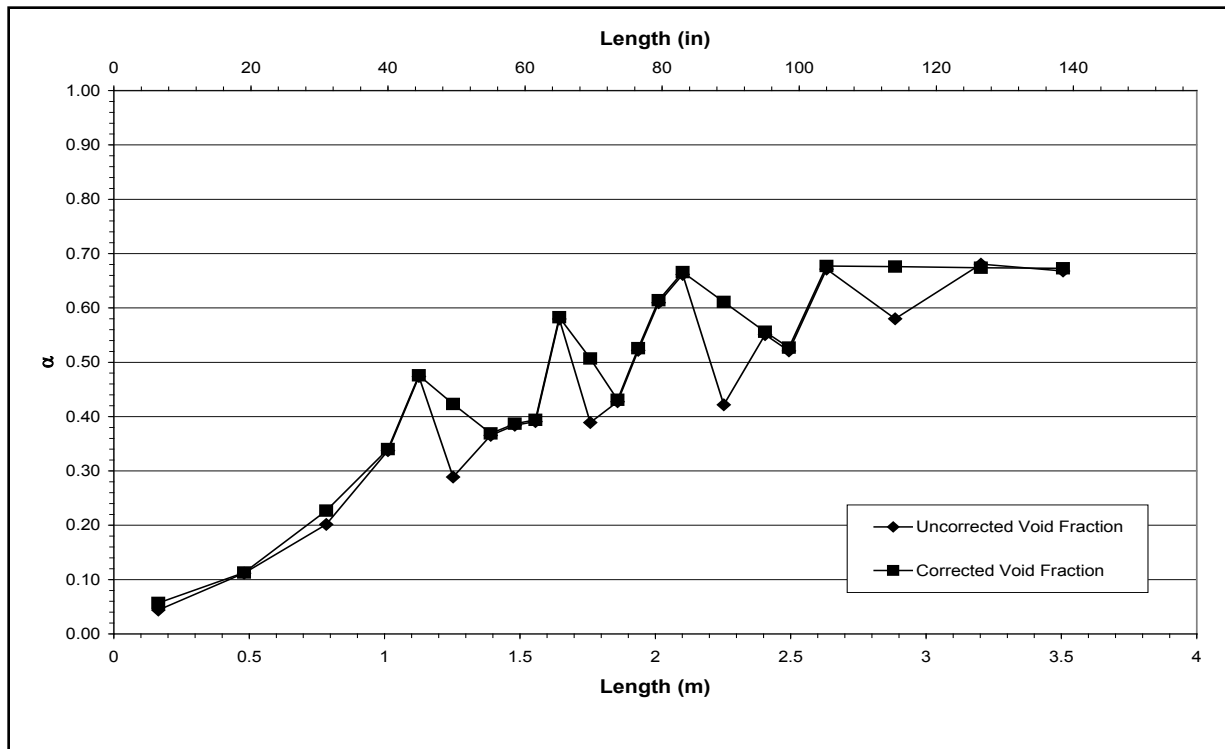


Figure A-330 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637F for Time Period 5096 to 5300 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-G

Test Conditions

Date: 6/20/2003

Steady-state time window: 5576 – 5705 seconds

Inlet flow rate: 1.257 cm/sec (0.495 in./sec)

Inlet mass flow rate: 0.058 kg/sec (0.127 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

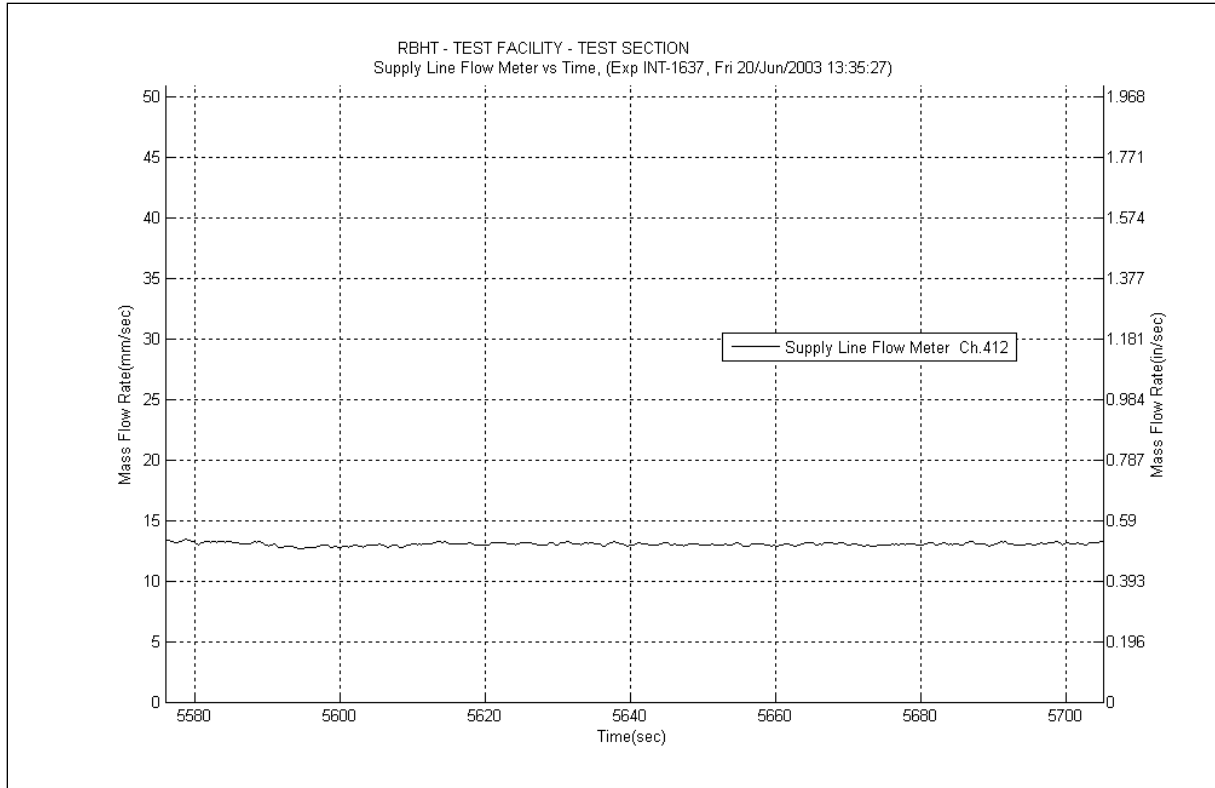


Figure A-331 Inlet Flow Plot for Experiment 1637G

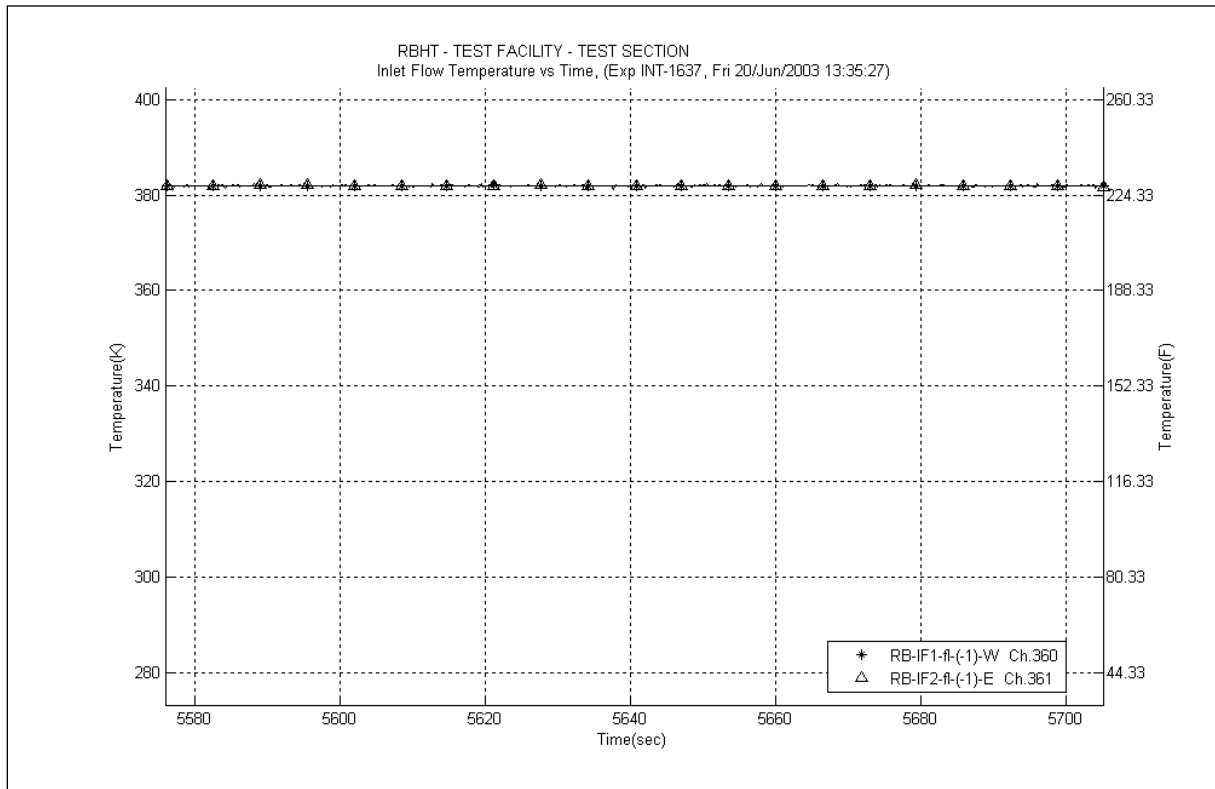


Figure A-332 Inlet Temperature Plot for Experiment 1637G

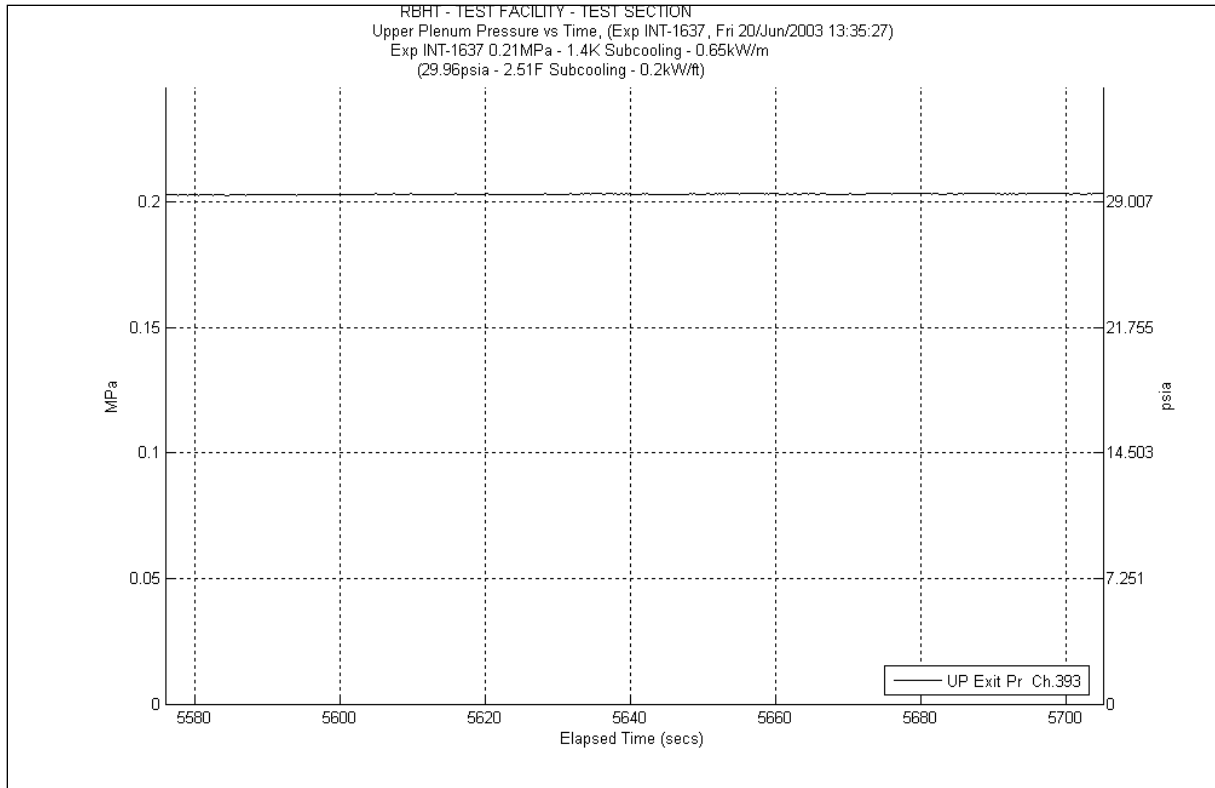


Figure A-333 System Pressure Plot for Experiment 1637G

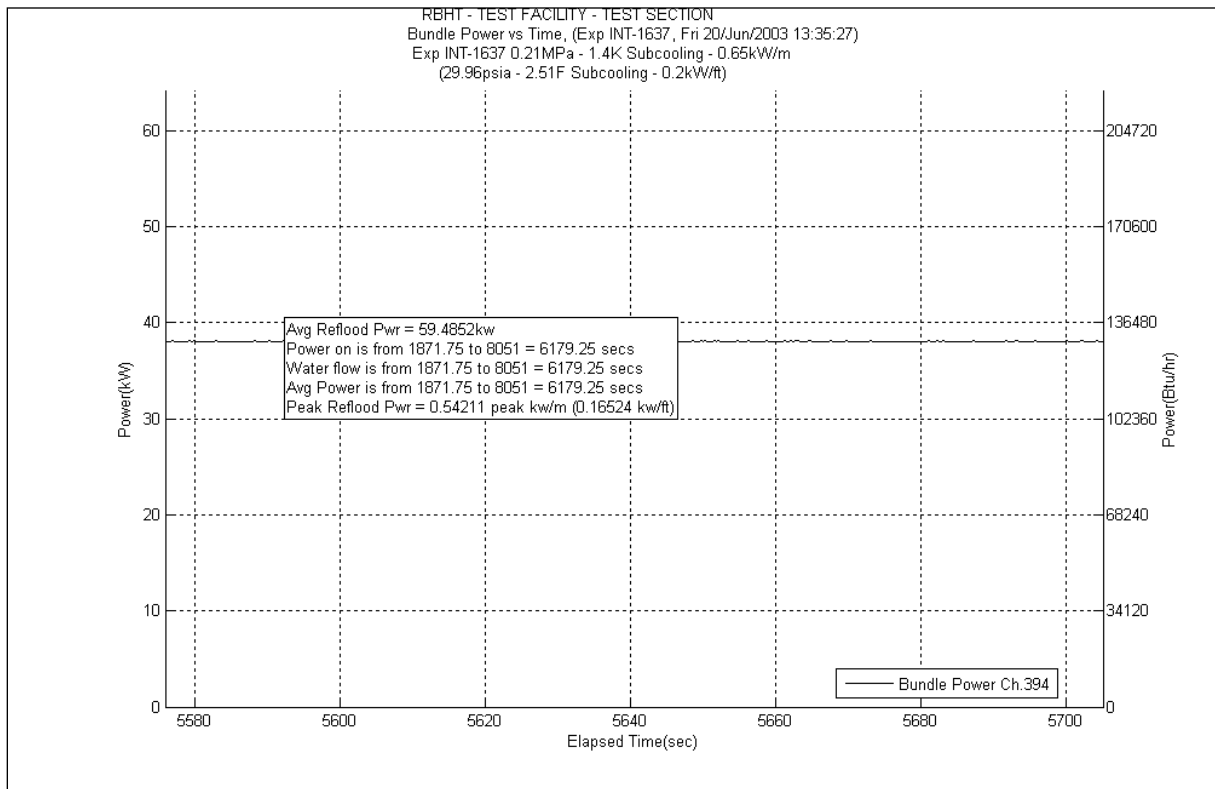


Figure A-334 Bundle Power Plot for Experiment 1637G

Table A-133 Data Results for RBHT Test 1637G for Time Period 5576 to 5705 seconds

Results for RBHT Test 1637
Valid Time Period 5576 to 5705 seconds
Collapsed Liquid Level = 83.077 inches = 2110.17 mm
(Z_{CSV}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.668	18.987	909.094	0.258	12.353	0.054	2.586	0.000	0.000	18.67	893.924	4338.67	207736.6346	0.673	0.670	0.676
*	120-133	3048-3378	383	0.680	21.620	1035.163	0.287	13.742	0.096	4.597	-0.733	-35.104	21.97	1051.929	4360.64	208788.5639	0.674	0.671	0.677
*	108-120	2743-3048	382	0.578	26.289	1258.707	0.240	11.491	0.119	5.698	5.810	278.167	20.12	963.351	4380.76	209751.9147	0.677	0.674	0.680
	100-108	2540-2743	381	0.673	13.596	650.987	0.144	6.895	0.087	4.166	0.000	0.000	13.36	639.680	4394.12	210391.5949	0.678	0.675	0.681
	97-100	2464-2540	380	0.520	7.473	357.819	0.051	2.442	0.032	1.532	0.000	0.000	7.388	353.739	4401.508	210745.3342	0.526	0.523	0.529
	93-97	2362-2464	379	0.555	9.239	442.363	0.065	3.112	0.041	1.963	0.000	0.000	9.128	437.051	4410.636	211182.3852	0.561	0.558	0.564
*	85-93	2159-2362	378	0.421	24.050	1151.535	0.120	5.746	0.079	3.783	7.801	373.529	16.05	768.478	4426.686	211950.8633	0.614	0.611	0.617
	81-85	2057-2159	377	0.662	7.021	336.186	0.055	2.633	0.038	1.819	0.000	0.000	6.926	331.619	4433.612	212282.482	0.667	0.664	0.670
	78-81	1981-2057	376	0.608	6.113	292.670	0.040	1.915	0.028	1.341	0.000	0.000	6.042	289.293	4439.654	212571.7745	0.612	0.609	0.615
	75-78	1905-1981	375	0.525	7.400	354.338	0.038	1.819	0.027	1.293	0.000	0.000	7.332	351.058	4446.986	212922.8326	0.529	0.526	0.532
	72-75	1829-1905	374	0.432	8.849	423.713	0.036	1.724	0.026	1.245	0.000	0.000	8.782	420.484	4455.768	213343.317	0.436	0.434	0.438
*	67-72	1702-1829	373	0.386	15.949	763.629	0.057	2.729	0.043	2.059	3.149	150.761	12.7	608.079	4468.468	213951.3962	0.511	0.508	0.514
	63-67	1600-1702	372	0.582	8.694	416.253	0.042	2.011	0.033	1.580	0.000	0.000	8.613	412.393	4477.081	214363.7889	0.585	0.582	0.588
	60-63	1524-1600	371	0.395	9.426	451.314	0.030	1.436	0.024	1.149	0.000	0.000	9.367	448.494	4486.448	214812.2833	0.399	0.397	0.401
	57-60	1448-1524	370	0.382	9.634	461.261	0.028	1.341	0.023	1.101	0.000	0.000	9.579	458.645	4496.027	215270.9282	0.385	0.383	0.387
*	53-57	1346-1448	369	0.371	13.072	625.872	0.035	1.676	0.030	1.436	0.000	0.000	13	622.443	4509.027	215893.3716	0.374	0.372	0.376
	46-53	1168-1346	368	0.282	26.117	1250.501	0.054	2.586	0.050	2.394	5.253	251.527	20.76	993.994	4529.787	216887.3657	0.429	0.427	0.431
	43-46	1092-1168	367	0.481	8.091	387.409	0.021	1.005	0.020	0.958	0.000	0.000	8.046	385.245	4537.833	217272.6103	0.483	0.481	0.485
	37-43	940-1092	366	0.336	20.685	990.405	0.036	1.724	0.039	1.867	0.000	0.000	20.6	986.333	4558.433	218258.9436	0.339	0.337	0.341
*	25-37	635-940	365	0.205	49.518	2370.954	0.053	2.538	0.070	3.352	1.105	52.927	48.29	2312.138	4606.723	220571.0812	0.225	0.224	0.226
	13-25	330-635	364	0.110	55.475	2656.164	0.025	1.197	0.054	2.586	0.000	0.000	55.38	2651.609	4662.103	223222.6898	0.111	0.110	0.112
*	0-13	0-330	363	0.044	64.548	3090.570	0.001	0.048	0.000	0.000	0.807	38.635	63.74	3051.888	4725.843	226274.5774	0.056	0.053	0.059

Table A-134 Energy Balance Results for RBHT Test 1637G for Time Period 5576 to 5705 seconds

Results for RBHT Test 1637 Valid Time Period 5576 to 5705 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1743.8004	5.5009	0.00E+00	0.00E+00	0.00E+00	4.14E-02	1.88E-02
0.25	6.35	1840.6782	5.8066	0.00E+00	0.00E+00	0.00E+00	4.14E-02	1.88E-02
0.50	12.70	1937.556	6.1122	0.00E+00	0.00E+00	0.00E+00	4.14E-02	1.88E-02
0.75	19.05	2034.4338	6.4178	0.00E+00	0.00E+00	0.00E+00	4.14E-02	1.88E-02
1.00	25.40	2131.3116	6.7234	0.00E+00	0.00E+00	0.00E+00	4.14E-02	1.88E-02
1.25	31.75	2228.1894	7.029	1.10E-03	3.67E-02	1.67E-02	4.13E-02	1.87E-02
1.50	38.10	2325.0672	7.3346	6.88E-03	2.30E-01	1.04E-01	4.11E-02	1.86E-02
1.75	44.45	2421.945	7.6402	1.29E-02	4.31E-01	1.96E-01	4.08E-02	1.85E-02
2.00	50.80	2518.8228	7.9458	1.92E-02	6.41E-01	2.91E-01	4.06E-02	1.84E-02
2.25	57.15	2615.7006	8.2514	2.57E-02	8.59E-01	3.90E-01	4.03E-02	1.83E-02
2.50	63.50	2712.5784	8.557	3.25E-02	1.09E+00	4.92E-01	4.00E-02	1.81E-02
2.75	69.85	2809.4562	8.8626	3.95E-02	1.32E+00	5.98E-01	3.97E-02	1.80E-02
3.00	76.20	2906.334	9.1682	4.68E-02	1.56E+00	7.08E-01	3.94E-02	1.79E-02
3.25	82.55	3003.2118	9.4738	5.43E-02	1.81E+00	8.22E-01	3.91E-02	1.77E-02
3.50	88.90	3100.0896	9.7795	6.20E-02	2.07E+00	9.40E-01	3.88E-02	1.76E-02
3.75	95.25	3196.9674	10.085	7.00E-02	2.34E+00	1.06E+00	3.85E-02	1.74E-02
4.00	101.60	3293.8452	10.391	7.83E-02	2.61E+00	1.19E+00	3.81E-02	1.73E-02
4.25	107.95	3390.723	10.696	8.68E-02	2.90E+00	1.31E+00	3.78E-02	1.71E-02
4.50	114.30	3487.6008	11.002	9.55E-02	3.19E+00	1.45E+00	3.74E-02	1.70E-02
4.75	120.65	3584.4786	11.307	1.05E-01	3.49E+00	1.58E+00	3.70E-02	1.68E-02
5.00	127.00	3681.3564	11.613	1.14E-01	3.80E+00	1.72E+00	3.67E-02	1.66E-02
5.25	133.35	3778.2342	11.919	1.23E-01	4.12E+00	1.87E+00	3.63E-02	1.64E-02
5.50	139.70	3875.112	12.224	1.33E-01	4.44E+00	2.01E+00	3.59E-02	1.63E-02
5.75	146.05	3971.9897	12.53	1.43E-01	4.77E+00	2.17E+00	3.54E-02	1.61E-02
6.00	152.40	4068.8675	12.836	1.53E-01	5.11E+00	2.32E+00	3.50E-02	1.59E-02
6.25	158.75	4165.7453	13.141	1.64E-01	5.46E+00	2.48E+00	3.46E-02	1.57E-02
6.50	165.10	4262.6231	13.447	1.74E-01	5.82E+00	2.64E+00	3.41E-02	1.55E-02
6.75	171.45	4359.5009	13.752	1.85E-01	6.19E+00	2.81E+00	3.37E-02	1.53E-02
7.00	177.80	4456.3787	14.058	1.96E-01	6.56E+00	2.98E+00	3.32E-02	1.51E-02
7.25	184.15	4553.2565	14.364	2.08E-01	6.94E+00	3.15E+00	3.28E-02	1.49E-02
7.50	190.50	4650.1343	14.669	2.20E-01	7.34E+00	3.33E+00	3.23E-02	1.46E-02
7.75	196.85	4747.0121	14.975	2.32E-01	7.73E+00	3.51E+00	3.18E-02	1.44E-02
8.00	203.20	4843.8899	15.28	2.44E-01	8.14E+00	3.69E+00	3.13E-02	1.42E-02
8.25	209.55	4940.7677	15.586	2.56E-01	8.55E+00	3.88E+00	3.08E-02	1.40E-02
8.50	215.90	5037.6455	15.892	2.69E-01	8.98E+00	4.07E+00	3.02E-02	1.37E-02
8.75	222.25	5134.5233	16.197	2.82E-01	9.41E+00	4.27E+00	2.97E-02	1.35E-02
9.00	228.60	5231.4011	16.503	2.95E-01	9.85E+00	4.47E+00	2.92E-02	1.32E-02
9.25	234.95	4940.7677	15.586	3.08E-01	1.03E+01	4.66E+00	2.86E-02	1.30E-02
9.50	241.30	4650.1343	14.669	3.20E-01	1.07E+01	4.85E+00	2.81E-02	1.28E-02
9.75	247.65	4359.5009	13.752	3.32E-01	1.11E+01	5.02E+00	2.76E-02	1.25E-02
10.00	254.00	4068.8675	12.836	3.42E-01	1.14E+01	5.18E+00	2.72E-02	1.23E-02
10.25	260.35	3778.2342	11.919	3.52E-01	1.18E+01	5.33E+00	2.68E-02	1.22E-02
10.50	266.70	3487.6008	11.002	3.61E-01	1.21E+01	5.48E+00	2.64E-02	1.20E-02
10.75	273.05	3196.9674	10.085	3.70E-01	1.24E+01	5.60E+00	2.61E-02	1.18E-02
11.00	279.40	2906.334	9.1682	3.78E-01	1.26E+01	5.72E+00	2.57E-02	1.17E-02
11.25	285.75	2615.7006	8.2514	3.85E-01	1.28E+01	5.83E+00	2.54E-02	1.15E-02
11.50	292.10	2325.0672	7.3346	3.91E-01	1.31E+01	5.92E+00	2.52E-02	1.14E-02
11.75	298.45	2034.4338	6.4178	3.97E-01	1.32E+01	6.01E+00	2.50E-02	1.13E-02
12.00	304.80	1743.8004	5.5009	4.01E-01	1.34E+01	6.08E+00	2.48E-02	1.12E-02

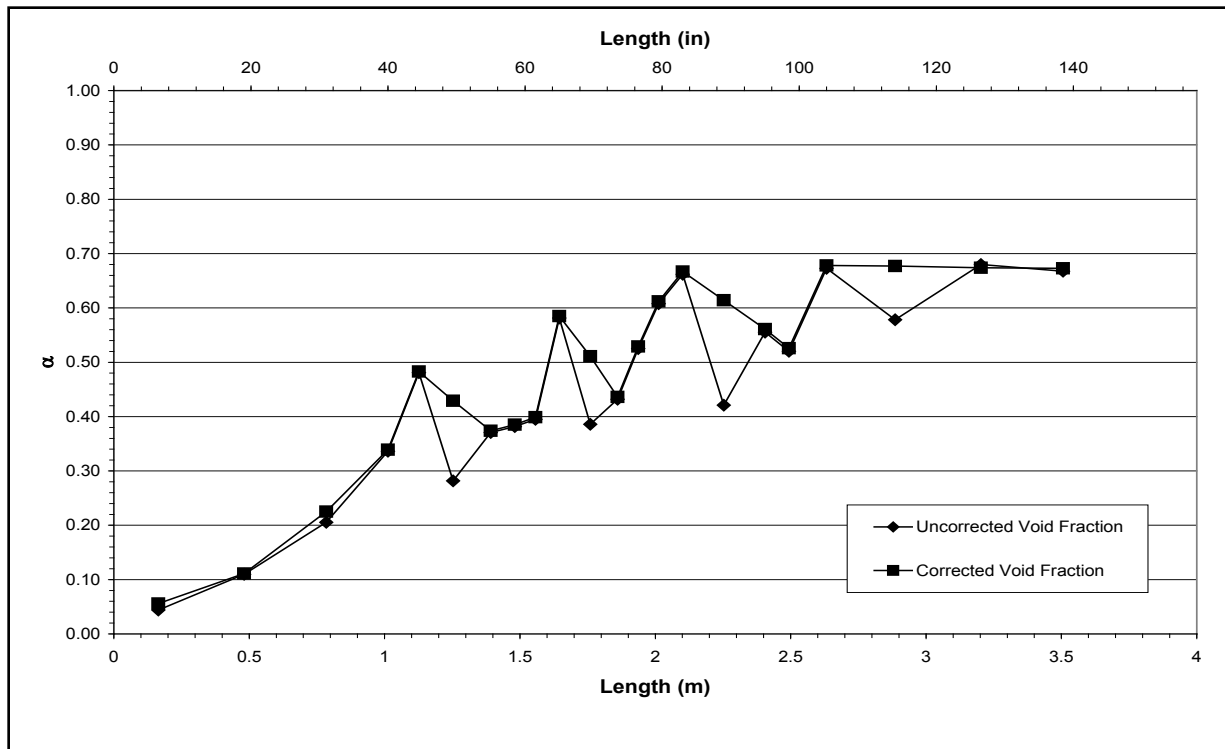


Figure A-335 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637G for Time Period 5576 to 5705 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-H

Test Conditions

Date: 6/20/2003

Steady-state time window: 5905 – 6100 seconds

Inlet flow rate: 0.759 cm/sec (0.299 in./sec)

Inlet mass flow rate: 0.035 kg/sec (0.077 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

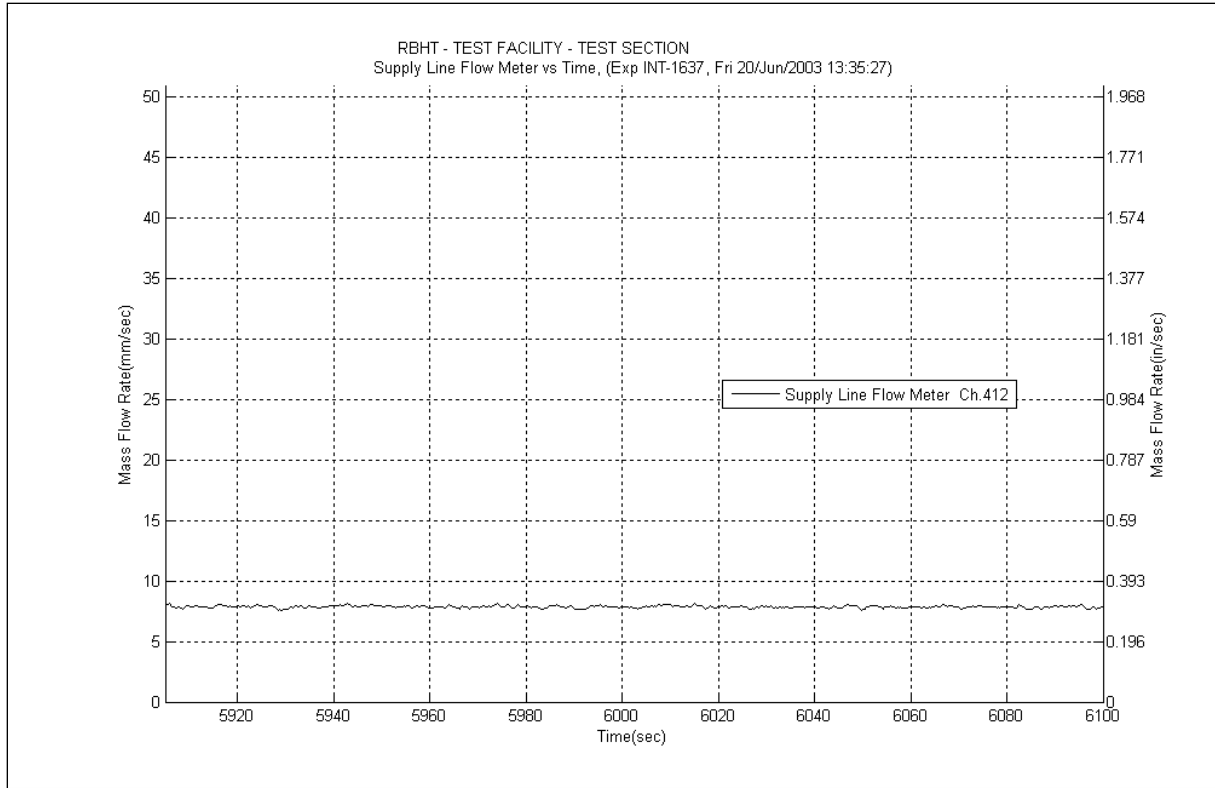


Figure A-336 Inlet Flow Plot for Experiment 1637H

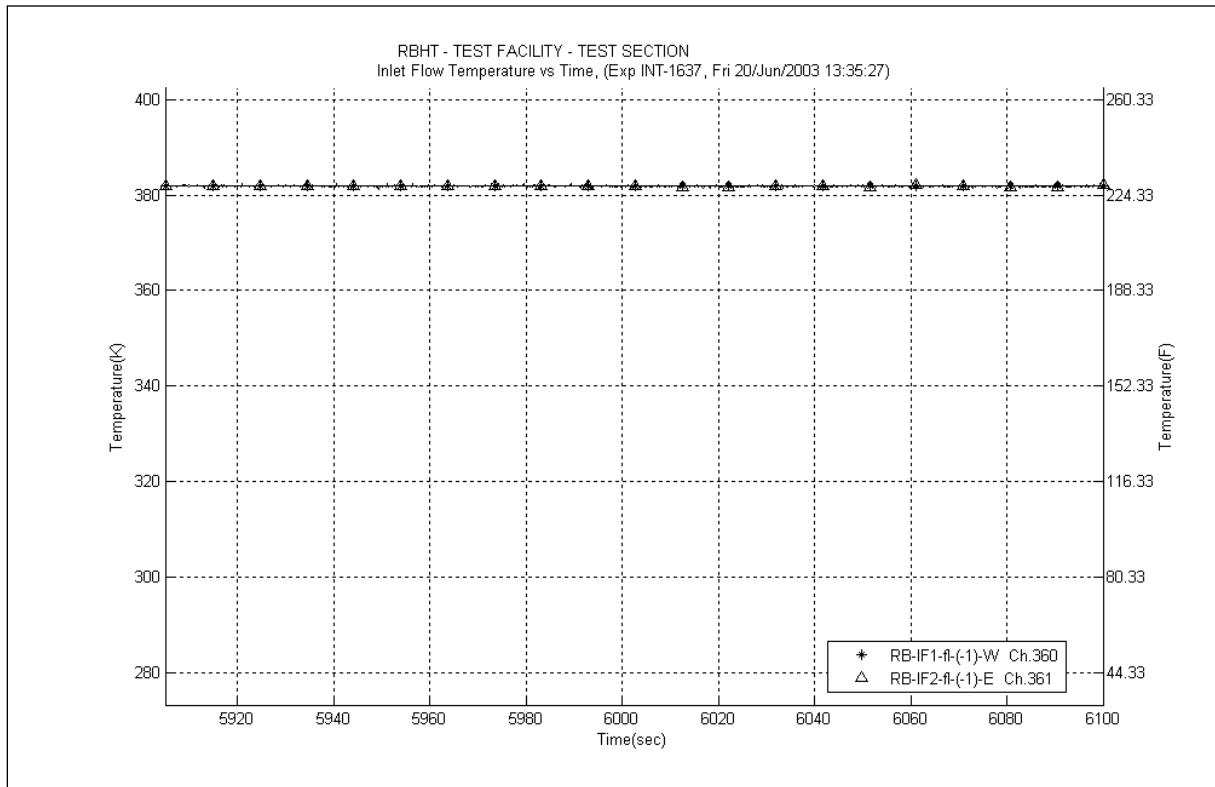


Figure A-337 Inlet Temperature Plot for Experiment 1637H

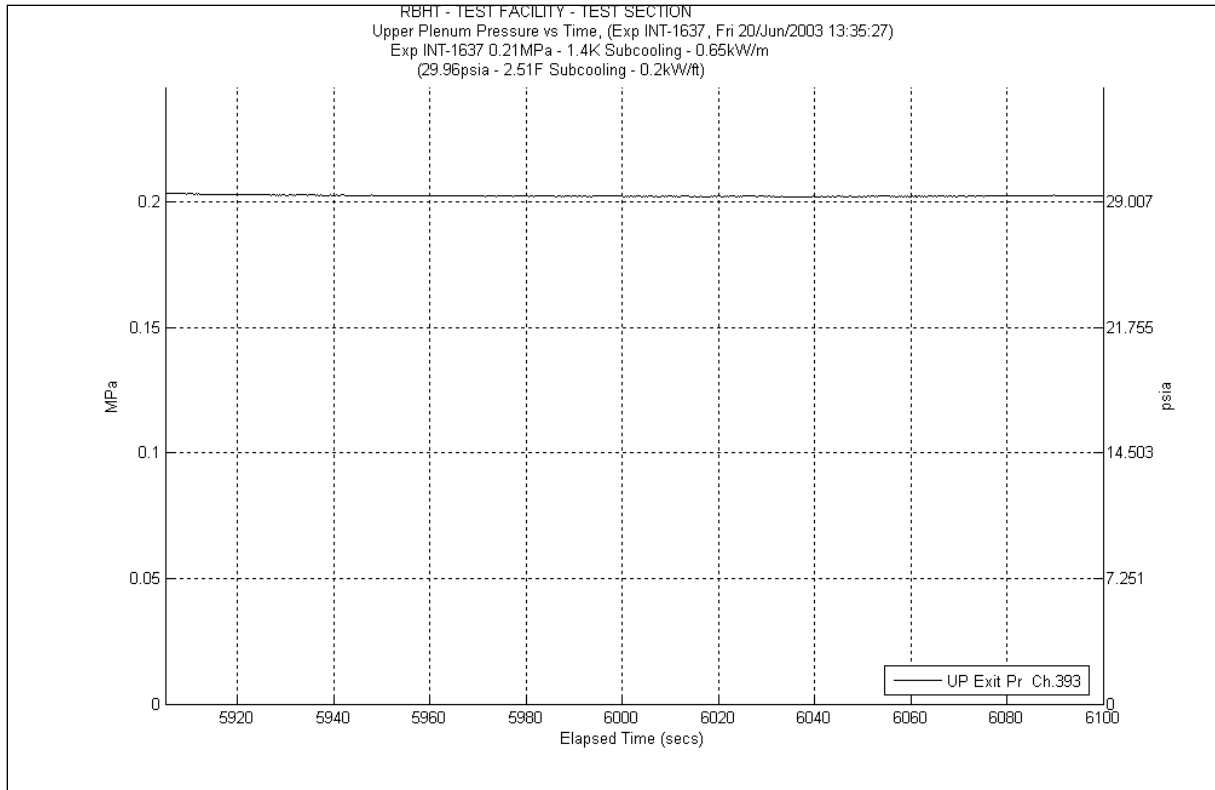


Figure A-338 System Pressure Plot for Experiment 1637H

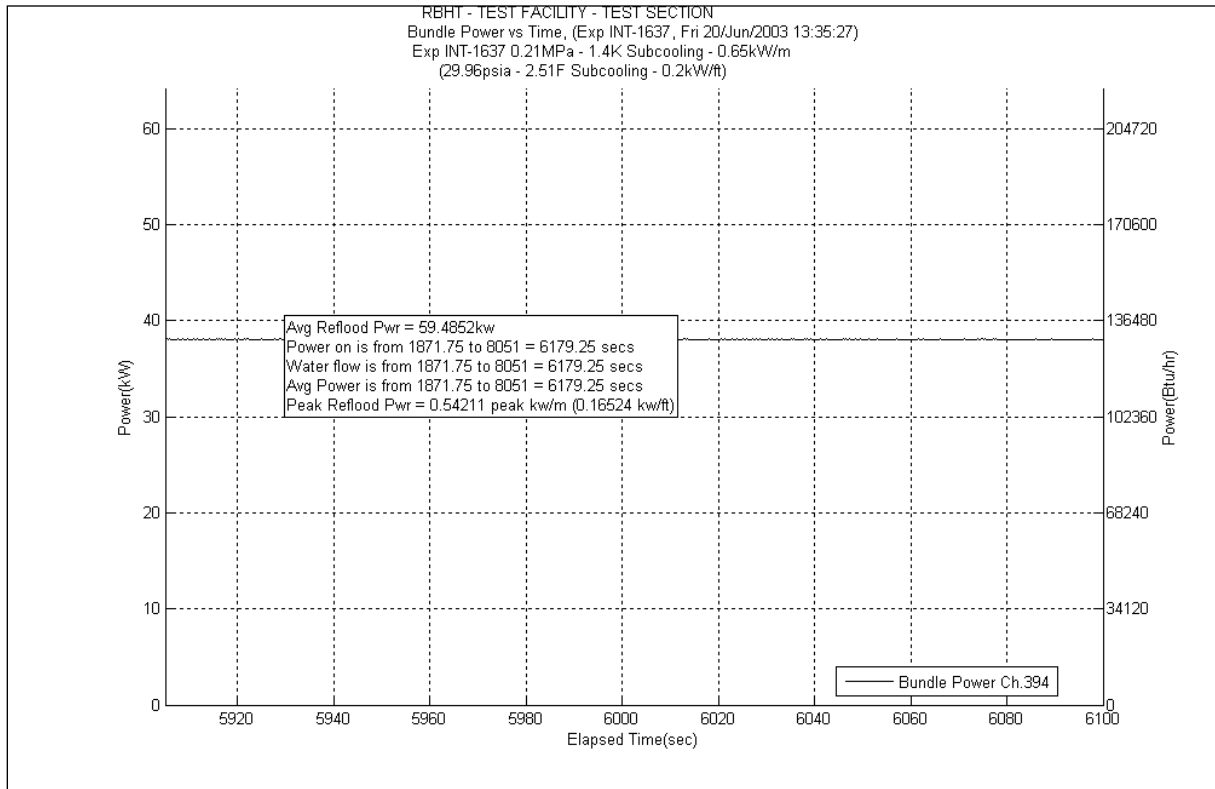


Figure A-339 Bundle Power Plot for Experiment 1637H

Table A-135 Data Results for RBHT Test 1637H for Time Period 5905 to 6100 seconds

Results for RBHT Test 1637
Valid Time Period 5905 to 6100 seconds
Collapsed Liquid Level = 79.385 inches = 2016.38 mm
(Z_{lev}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.706	16.774	803.165	0.154	7.374	0.032	1.532	0.000	0.000	16.58	793.855	4336.58	207636.5649	0.71	0.706	0.714
*	120-133	3048-3378	383	0.701	20.155	965.042	0.171	8.188	0.058	2.777	0.096	4.612	19.83	949.465	4356.41	208586.0304	0.706	0.702	0.710
*	108-120	2743-3048	382	0.594	25.312	1211.959	0.143	6.847	0.072	3.447	6.357	304.389	18.74	897.276	4375.15	209483.3064	0.699	0.696	0.702
	100-108	2540-2743	381	0.692	12.781	611.947	0.085	4.070	0.053	2.538	0.000	0.000	12.64	605.206	4387.79	210088.5129	0.696	0.693	0.699
	97-100	2464-2540	380	0.538	7.193	344.391	0.030	1.436	0.019	0.910	0.000	0.000	7.141	341.913	4394.931	210430.4258	0.542	0.539	0.545
	93-97	2362-2464	379	0.565	9.031	432.416	0.038	1.819	0.025	1.197	0.000	0.000	8.966	429.294	4403.897	210859.7202	0.568	0.565	0.571
*	85-93	2159-2362	378	0.429	23.728	1136.118	0.071	3.399	0.048	2.298	7.989	382.531	15.62	747.890	4419.517	211607.6098	0.624	0.621	0.627
	81-85	2057-2159	377	0.677	6.710	321.266	0.033	1.580	0.023	1.101	0.000	0.000	6.651	318.452	4426.168	211926.0614	0.68	0.677	0.683
	78-81	1981-2057	376	0.622	5.884	281.729	0.023	1.101	0.017	0.814	0.000	0.000	5.844	279.812	4432.012	212205.8736	0.625	0.622	0.628
	75-78	1905-1981	375	0.541	7.151	342.402	0.022	1.053	0.016	0.766	0.000	0.000	7.108	340.333	4439.12	212546.2065	0.544	0.541	0.547
	72-75	1829-1905	374	0.461	8.403	402.329	0.021	1.005	0.016	0.766	0.000	0.000	8.362	400.375	4447.482	212946.5812	0.463	0.461	0.465
*	67-72	1702-1829	373	0.389	15.871	759.899	0.033	1.580	0.026	1.245	3.702	177.244	12.11	579.830	4459.592	213526.4111	0.534	0.531	0.537
	63-67	1600-1702	372	0.602	8.273	396.112	0.025	1.197	0.020	0.958	0.000	0.000	8.226	393.863	4467.818	213920.2741	0.604	0.601	0.607
	60-63	1524-1600	371	0.410	9.197	440.373	0.017	0.814	0.014	0.670	0.000	0.000	9.164	438.775	4476.982	214359.0487	0.412	0.410	0.414
	57-60	1448-1524	370	0.400	9.353	447.833	0.017	0.814	0.014	0.670	0.000	0.000	9.319	446.196	4486.301	214805.2449	0.402	0.400	0.404
	53-57	1346-1448	369	0.384	12.796	612.693	0.021	1.005	0.018	0.862	0.000	0.000	12.75	610.473	4499.051	215415.7181	0.386	0.384	0.388
*	46-53	1168-1346	368	0.295	25.619	1226.630	0.032	1.532	0.030	1.436	5.337	255.522	20.22	968.139	4519.271	216383.8569	0.444	0.442	0.446
	43-46	1092-1168	367	0.500	7.795	373.236	0.012	0.575	0.012	0.575	0.000	0.000	7.77	372.030	4527.041	216755.8865	0.501	0.498	0.504
	37-43	940-1092	366	0.368	19.703	943.408	0.022	1.053	0.024	1.149	0.000	0.000	19.65	940.847	4546.691	217696.7336	0.369	0.367	0.371
*	25-37	635-940	365	0.239	47.451	2271.988	0.034	1.628	0.043	2.059	2.814	134.757	44.56	2133.544	4591.251	219830.2778	0.285	0.284	0.286
	13-25	330-635	364	0.199	49.892	2388.857	0.019	0.910	0.037	1.772	0.000	0.000	49.82	2385.394	4641.071	222215.6722	0.2	0.199	0.201
*	0-13	0-330	363	0.047	64.361	3081.618	0.007	0.335	0.011	0.527	3.613	172.988	60.73	2907.768	4701.801	225123.4402	0.1	0.095	0.105

Table A-136 Energy Balance Results for RBHT Test 1637H for Time Period 5905 to 6100 seconds

Results for RBHT Test 1637 Valid Time Period 5905 to 6100 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1743.4322	5.4998	0.00E+00	0.00E+00	0.00E+00	2.50E-02	1.13E-02
0.25	6.35	1840.2895	5.8053	0.00E+00	0.00E+00	0.00E+00	2.50E-02	1.13E-02
0.50	12.70	1937.1469	6.1109	0.00E+00	0.00E+00	0.00E+00	2.50E-02	1.13E-02
0.75	19.05	2034.0042	6.4164	0.00E+00	0.00E+00	0.00E+00	2.50E-02	1.13E-02
1.00	25.40	2130.8615	6.722	8.43E-03	1.70E-01	7.71E-02	2.48E-02	1.12E-02
1.25	31.75	2227.7189	7.0275	1.76E-02	3.55E-01	1.61E-01	2.45E-02	1.11E-02
1.50	38.10	2324.5762	7.333	2.72E-02	5.48E-01	2.49E-01	2.43E-02	1.10E-02
1.75	44.45	2421.4336	7.6386	3.72E-02	7.50E-01	3.40E-01	2.40E-02	1.09E-02
2.00	50.80	2518.2909	7.9441	4.76E-02	9.60E-01	4.35E-01	2.38E-02	1.08E-02
2.25	57.15	2615.1483	8.2497	5.84E-02	1.18E+00	5.34E-01	2.35E-02	1.07E-02
2.50	63.50	2712.0056	8.5552	6.96E-02	1.40E+00	6.37E-01	2.32E-02	1.05E-02
2.75	69.85	2808.8629	8.8608	8.12E-02	1.64E+00	7.43E-01	2.29E-02	1.04E-02
3.00	76.20	2905.7203	9.1663	9.32E-02	1.88E+00	8.53E-01	2.26E-02	1.03E-02
3.25	82.55	3002.5776	9.4718	1.06E-01	2.13E+00	9.67E-01	2.23E-02	1.01E-02
3.50	88.90	3099.435	9.7774	1.19E-01	2.39E+00	1.08E+00	2.20E-02	9.98E-03
3.75	95.25	3196.2923	10.083	1.32E-01	2.66E+00	1.21E+00	2.17E-02	9.83E-03
4.00	101.60	3293.1497	10.388	1.45E-01	2.93E+00	1.33E+00	2.13E-02	9.68E-03
4.25	107.95	3390.007	10.694	1.60E-01	3.22E+00	1.46E+00	2.10E-02	9.52E-03
4.50	114.30	3486.8644	11	1.74E-01	3.51E+00	1.59E+00	2.06E-02	9.35E-03
4.75	120.65	3583.7217	11.305	1.89E-01	3.81E+00	1.73E+00	2.02E-02	9.18E-03
5.00	127.00	3680.579	11.611	2.04E-01	4.12E+00	1.87E+00	1.99E-02	9.01E-03
5.25	133.35	3777.4364	11.916	2.20E-01	4.43E+00	2.01E+00	1.95E-02	8.83E-03
5.50	139.70	3874.2937	12.222	2.36E-01	4.76E+00	2.16E+00	1.91E-02	8.65E-03
5.75	146.05	3971.1511	12.527	2.53E-01	5.09E+00	2.31E+00	1.87E-02	8.46E-03
6.00	152.40	4068.0084	12.833	2.69E-01	5.43E+00	2.47E+00	1.82E-02	8.27E-03
6.25	158.75	4164.8658	13.138	2.87E-01	5.78E+00	2.62E+00	1.78E-02	8.08E-03
6.50	165.10	4261.7231	13.444	3.04E-01	6.14E+00	2.79E+00	1.74E-02	7.88E-03
6.75	171.45	4358.5804	13.749	3.23E-01	6.51E+00	2.95E+00	1.69E-02	7.67E-03
7.00	177.80	4455.4378	14.055	3.41E-01	6.88E+00	3.12E+00	1.64E-02	7.46E-03
7.25	184.15	4552.2951	14.361	3.60E-01	7.26E+00	3.30E+00	1.60E-02	7.24E-03
7.50	190.50	4649.1525	14.666	3.80E-01	7.66E+00	3.47E+00	1.55E-02	7.03E-03
7.75	196.85	4746.0098	14.972	3.99E-01	8.05E+00	3.65E+00	1.50E-02	6.80E-03
8.00	203.20	4842.8672	15.277	4.19E-01	8.46E+00	3.84E+00	1.45E-02	6.57E-03
8.25	209.55	4939.7245	15.583	4.40E-01	8.88E+00	4.03E+00	1.40E-02	6.34E-03
8.50	215.90	5036.5818	15.888	4.61E-01	9.30E+00	4.22E+00	1.35E-02	6.10E-03
8.75	222.25	5133.4392	16.194	4.82E-01	9.73E+00	4.41E+00	1.29E-02	5.86E-03
9.00	228.60	5230.2965	16.499	5.04E-01	1.02E+01	4.61E+00	1.24E-02	5.61E-03
9.25	234.95	4939.7245	15.583	5.26E-01	1.06E+01	4.81E+00	1.18E-02	5.37E-03
9.50	241.30	4649.1525	14.666	5.46E-01	1.10E+01	4.99E+00	1.13E-02	5.14E-03
9.75	247.65	4358.5804	13.749	5.65E-01	1.14E+01	5.17E+00	1.09E-02	4.93E-03
10.00	254.00	4068.0084	12.833	5.83E-01	1.18E+01	5.33E+00	1.04E-02	4.73E-03
10.25	260.35	3777.4364	11.916	5.99E-01	1.21E+01	5.48E+00	1.00E-02	4.54E-03
10.50	266.70	3486.8644	11	6.14E-01	1.24E+01	5.62E+00	9.63E-03	4.37E-03
10.75	273.05	3196.2923	10.083	6.28E-01	1.27E+01	5.75E+00	9.28E-03	4.21E-03
11.00	279.40	2905.7203	9.1663	6.41E-01	1.29E+01	5.87E+00	8.96E-03	4.06E-03
11.25	285.75	2615.1483	8.2497	6.53E-01	1.32E+01	5.97E+00	8.66E-03	3.93E-03
11.50	292.10	2324.5762	7.333	6.63E-01	1.34E+01	6.07E+00	8.40E-03	3.81E-03
11.75	298.45	2034.0042	6.4164	6.72E-01	1.36E+01	6.15E+00	8.18E-03	3.71E-03
12.00	304.80	1743.4322	5.4998	6.80E-01	1.37E+01	6.23E+00	7.98E-03	3.62E-03

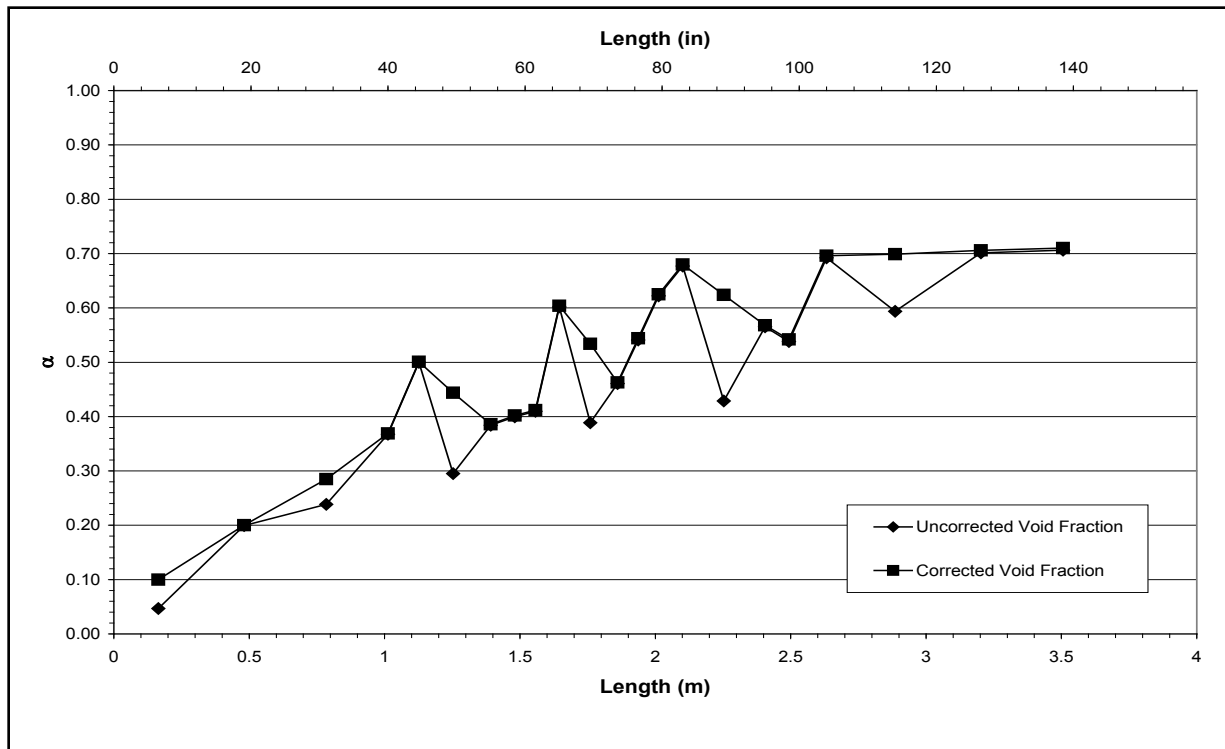


Figure A-340 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637H for Time Period 5905 to 6100 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-I

Test Conditions

Date: 6/20/2003

Steady-state time window: 6307 – 6467 seconds

Inlet flow rate: 0.765 cm/sec (0.301 in./sec)

Inlet mass flow rate: 0.035 kg/sec (0.078 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

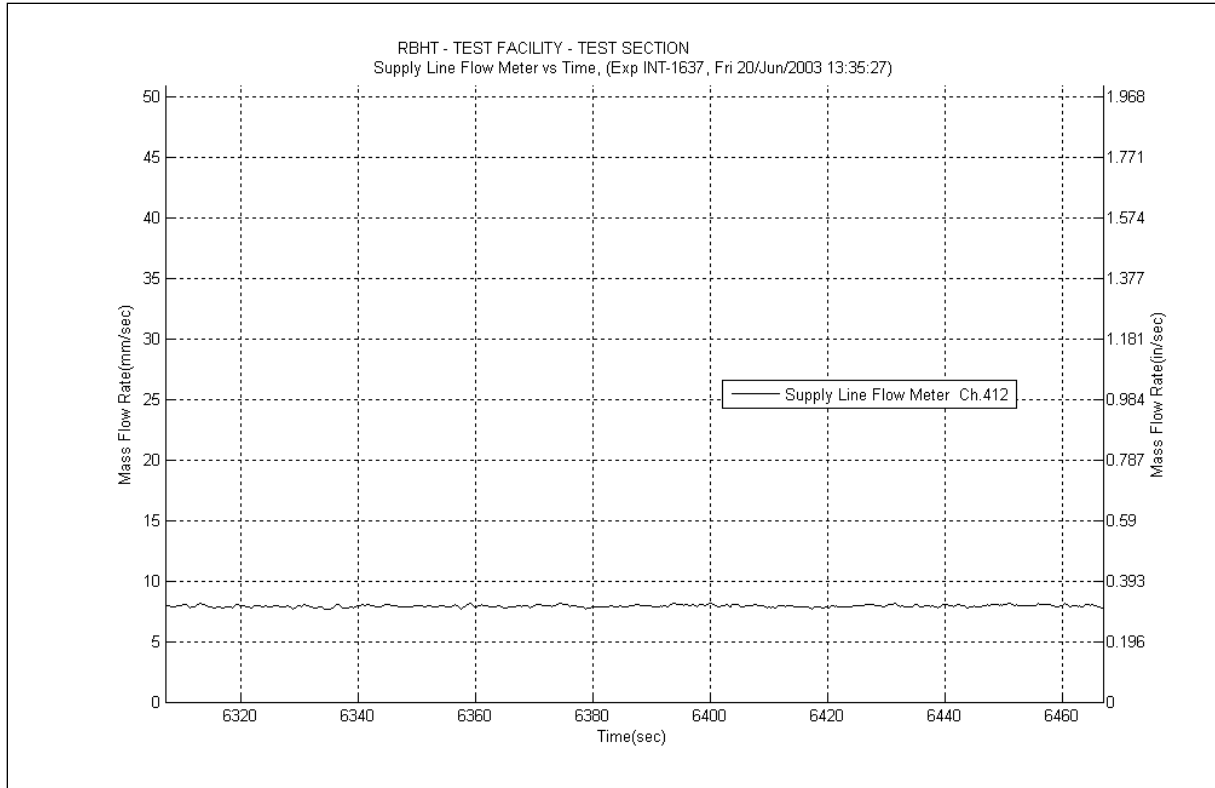


Figure A-341 Inlet Flow Plot for Experiment 16371

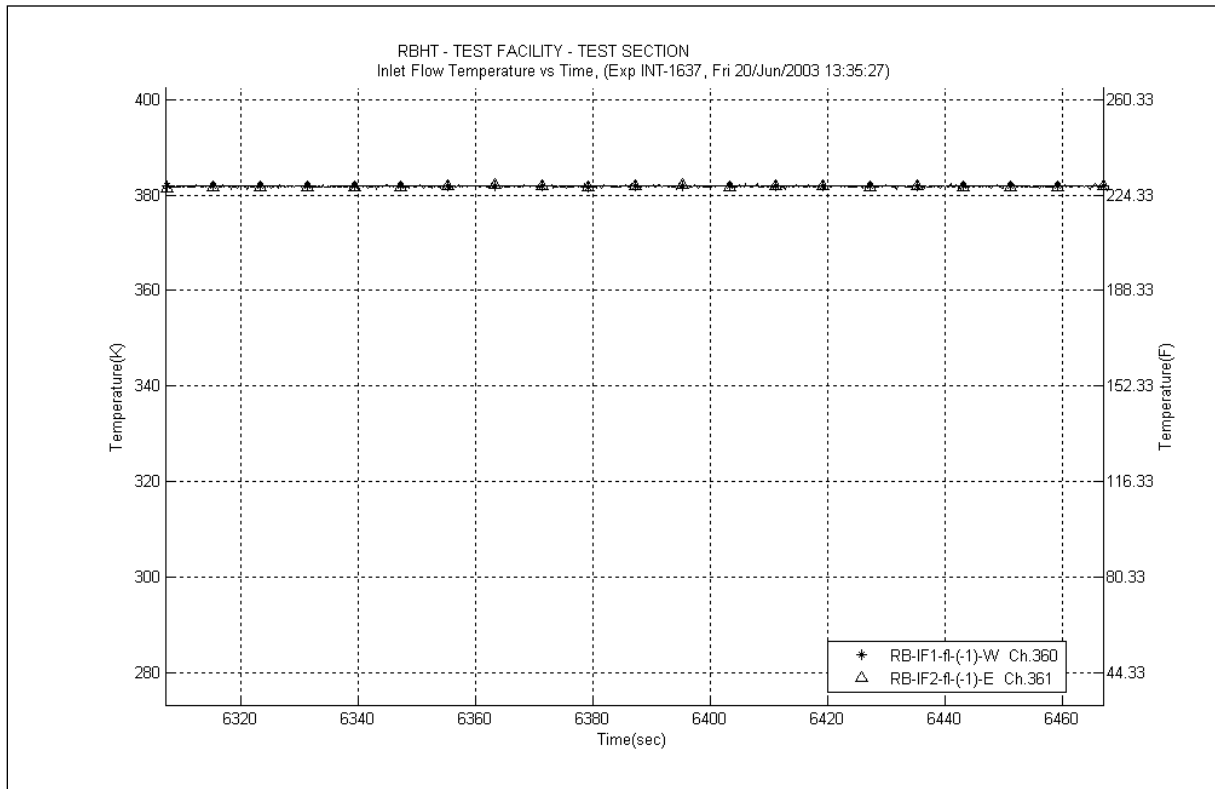


Figure A-342 Inlet Temperature Plot for Experiment 16371

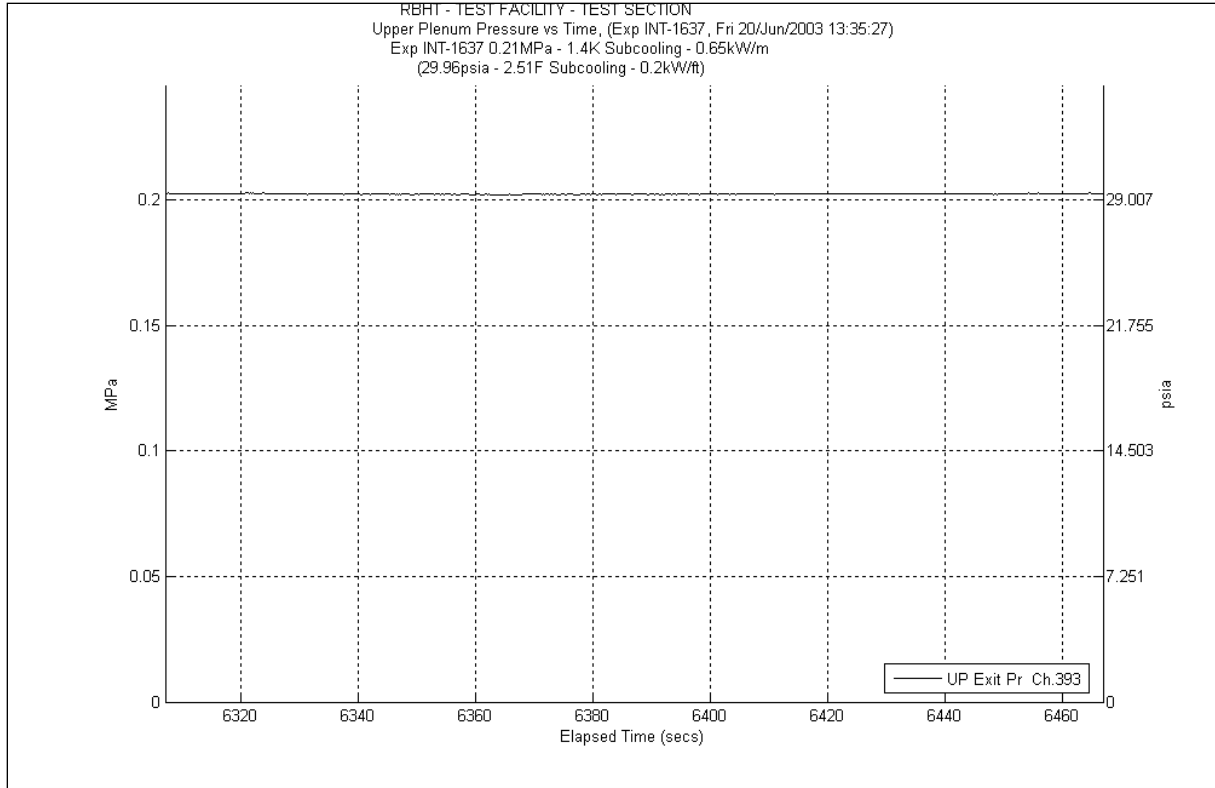


Figure A-343 System Pressure Plot for Experiment 1637I

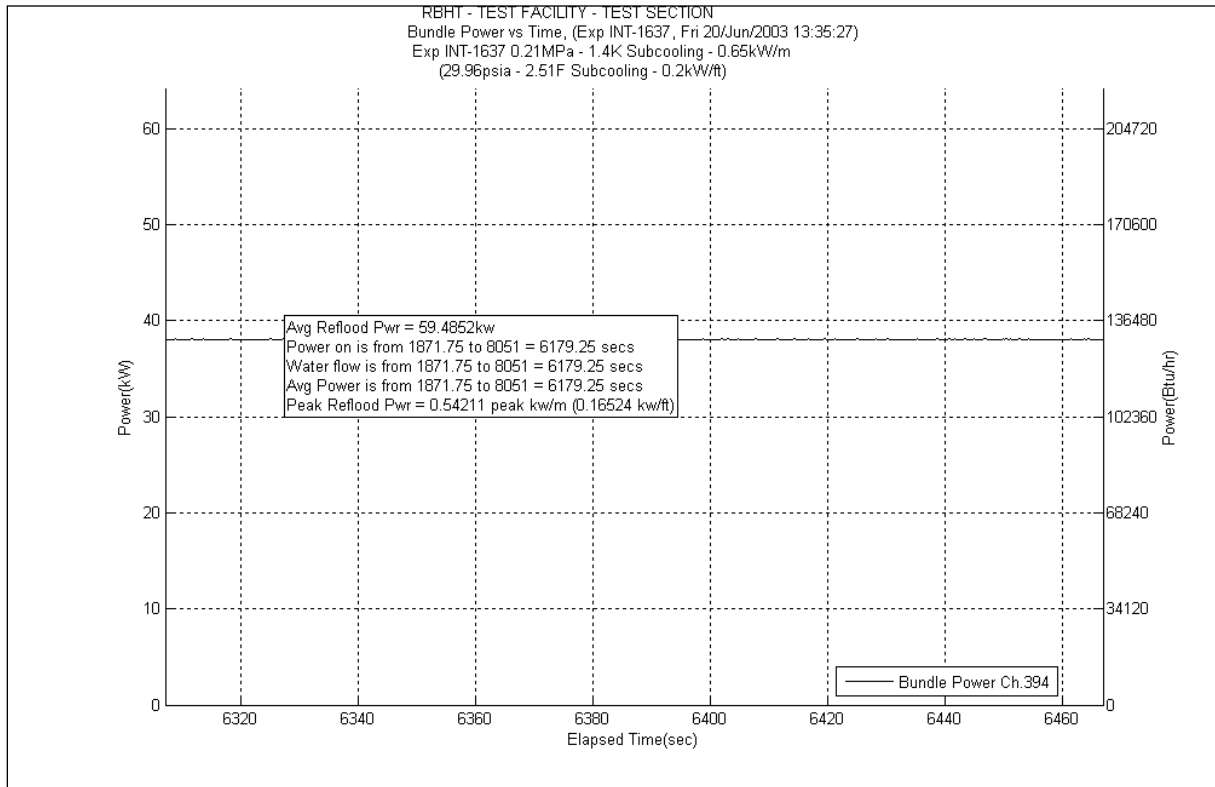


Figure A-344 Bundle Power Plot for Experiment 1637I

Table A-137 Data Results for RBHT Test 16371 for Time Period 6307 to 6467 seconds

Results for RBHT Test 1637
Valid Time Period 6307 to 6467 seconds
Collapsed Liquid Level = 79.398 inches = 2016.71 mm
(Z_{sev}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft^2)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lb/ft^2)	ΔP_{fic} (Pa)	ΔP_{accel} (lb/ft^2)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft^2)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft^2)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft^2)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.709	16.603	794.960	0.155	7.421	0.033	1.580	0.000	0.000	16.41	785.715	4336.41	207628.4253	0.713	0.709	0.717
*	120-133	3048-3378	383	0.702	20.150	964.793	0.173	8.283	0.058	2.777	0.179	8.576	19.74	945.156	4356.15	208573.5815	0.708	0.704	0.712
*	108-120	2743-3048	382	0.596	25.208	1206.986	0.144	6.895	0.073	3.495	6.131	293.574	18.86	903.022	4375.01	209476.6032	0.697	0.694	0.700
	100-108	2540-2743	381	0.689	12.931	619.158	0.086	4.118	0.053	2.538	0.000	0.000	12.79	612.388	4387.8	210088.9917	0.692	0.689	0.695
	97-100	2464-2540	380	0.535	7.240	346.629	0.030	1.436	0.019	0.910	0.000	0.000	7.186	344.068	4394.986	210433.0592	0.539	0.536	0.542
	93-97	2362-2464	379	0.567	9.000	430.924	0.039	1.867	0.025	1.197	0.000	0.000	8.935	427.810	4403.921	210860.8693	0.57	0.567	0.573
*	85-93	2159-2362	378	0.428	23.749	1137.113	0.071	3.399	0.048	2.298	7.990	382.568	15.64	748.847	4419.561	211609.7165	0.623	0.620	0.626
	81-85	2057-2159	377	0.675	6.762	323.753	0.033	1.580	0.023	1.101	0.000	0.000	6.705	321.037	4426.266	211930.7536	0.677	0.674	0.680
	78-81	1981-2057	376	0.628	5.801	277.751	0.023	1.101	0.017	0.814	0.000	0.000	5.757	275.647	4432.023	212206.4003	0.63	0.627	0.633
	75-78	1905-1981	375	0.541	7.151	342.402	0.022	1.053	0.016	0.766	0.000	0.000	7.112	340.524	4439.135	212546.9247	0.543	0.540	0.546
	72-75	1829-1905	374	0.466	8.325	398.599	0.021	1.005	0.016	0.766	0.000	0.000	8.284	396.640	4447.419	212943.5647	0.468	0.466	0.470
*	67-72	1702-1829	373	0.391	15.824	757.661	0.034	1.628	0.026	1.245	3.734	178.789	12.03	575.999	4459.449	213519.5642	0.537	0.534	0.540
	63-67	1600-1702	372	0.603	8.242	394.620	0.025	1.197	0.020	0.958	0.000	0.000	8.196	392.427	4467.645	213911.9908	0.605	0.602	0.608
	60-63	1524-1600	371	0.416	9.099	435.649	0.018	0.862	0.015	0.718	0.000	0.000	9.061	433.843	4476.706	214345.8338	0.418	0.416	0.420
	57-60	1448-1524	370	0.396	9.405	450.320	0.017	0.814	0.014	0.670	0.000	0.000	9.373	448.782	4486.079	214794.6154	0.398	0.396	0.400
	53-57	1346-1448	369	0.386	12.755	610.704	0.021	1.005	0.018	0.862	0.000	0.000	12.71	608.558	4498.789	215403.1735	0.388	0.386	0.390
*	46-53	1168-1346	368	0.292	25.723	1231.603	0.033	1.580	0.030	1.436	5.650	270.503	20.01	958.084	4518.799	216361.2575	0.45	0.448	0.452
	43-46	1092-1168	367	0.509	7.645	366.025	0.013	0.622	0.012	0.575	0.000	0.000	7.617	364.704	4526.416	216725.9614	0.511	0.508	0.514
	37-43	940-1092	366	0.376	19.454	931.473	0.022	1.053	0.024	1.149	0.000	0.000	19.4	928.877	4545.816	217654.8384	0.377	0.375	0.379
*	25-37	635-940	365	0.235	47.701	2283.924	0.034	1.628	0.043	2.059	3.254	155.790	44.37	2124.447	4590.186	219779.2854	0.288	0.287	0.289
	13-25	330-635	364	0.198	50.012	2394.576	0.020	0.958	0.037	1.772	0.000	0.000	49.94	2391.140	4640.126	222170.4254	0.198	0.197	0.199
*	0-13	0-330	363	0.046	64.382	3082.613	0.007	0.335	0.010	0.479	3.575	171.158	60.79	2910.641	4700.916	225081.0662	0.099	0.094	0.104

Table A-138 Energy Balance Results for RBHT Test 1637I for Time Period 6307 to 6467 seconds

Results for RBHT Test 1637 Valid Time Period 6307 to 6467 seconds								
Elevation	Elevation	q _w	q _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1744.0696	5.5018	0.00E+00	0.00E+00	0.00E+00	2.52E-02	1.14E-02
0.25	6.35	1840.9623	5.8074	0.00E+00	0.00E+00	0.00E+00	2.52E-02	1.14E-02
0.50	12.70	1937.8551	6.1131	0.00E+00	0.00E+00	0.00E+00	2.52E-02	1.14E-02
0.75	19.05	2034.7478	6.4188	0.00E+00	0.00E+00	0.00E+00	2.52E-02	1.14E-02
1.00	25.40	2131.6406	6.7244	8.11E-03	1.65E-01	7.48E-02	2.50E-02	1.13E-02
1.25	31.75	2228.5334	7.0301	1.72E-02	3.50E-01	1.59E-01	2.47E-02	1.12E-02
1.50	38.10	2325.4261	7.3357	2.67E-02	5.44E-01	2.47E-01	2.45E-02	1.11E-02
1.75	44.45	2422.3189	7.6414	3.67E-02	7.45E-01	3.38E-01	2.42E-02	1.10E-02
2.00	50.80	2519.2116	7.947	4.70E-02	9.55E-01	4.33E-01	2.40E-02	1.09E-02
2.25	57.15	2616.1044	8.2527	5.77E-02	1.17E+00	5.32E-01	2.37E-02	1.08E-02
2.50	63.50	2712.9971	8.5583	6.88E-02	1.40E+00	6.35E-01	2.34E-02	1.06E-02
2.75	69.85	2809.8899	8.864	8.04E-02	1.63E+00	7.41E-01	2.31E-02	1.05E-02
3.00	76.20	2906.7826	9.1697	9.23E-02	1.88E+00	8.52E-01	2.28E-02	1.04E-02
3.25	82.55	3003.6754	9.4753	1.05E-01	2.13E+00	9.65E-01	2.25E-02	1.02E-02
3.50	88.90	3100.5681	9.781	1.17E-01	2.39E+00	1.08E+00	2.22E-02	1.01E-02
3.75	95.25	3197.4609	10.087	1.31E-01	2.65E+00	1.20E+00	2.19E-02	9.92E-03
4.00	101.60	3294.3537	10.392	1.44E-01	2.93E+00	1.33E+00	2.15E-02	9.77E-03
4.25	107.95	3391.2464	10.698	1.58E-01	3.22E+00	1.46E+00	2.12E-02	9.61E-03
4.50	114.30	3488.1392	11.004	1.72E-01	3.51E+00	1.59E+00	2.08E-02	9.44E-03
4.75	120.65	3585.0319	11.309	1.87E-01	3.81E+00	1.73E+00	2.04E-02	9.27E-03
5.00	127.00	3681.9247	11.615	2.02E-01	4.12E+00	1.87E+00	2.01E-02	9.10E-03
5.25	133.35	3778.8174	11.921	2.18E-01	4.43E+00	2.01E+00	1.97E-02	8.92E-03
5.50	139.70	3875.7102	12.226	2.34E-01	4.76E+00	2.16E+00	1.93E-02	8.74E-03
5.75	146.05	3972.6029	12.532	2.50E-01	5.09E+00	2.31E+00	1.89E-02	8.55E-03
6.00	152.40	4069.4957	12.838	2.67E-01	5.43E+00	2.46E+00	1.84E-02	8.36E-03
6.25	158.75	4166.3885	13.143	2.84E-01	5.78E+00	2.62E+00	1.80E-02	8.17E-03
6.50	165.10	4263.2812	13.449	3.02E-01	6.14E+00	2.79E+00	1.76E-02	7.97E-03
6.75	171.45	4360.174	13.754	3.20E-01	6.51E+00	2.95E+00	1.71E-02	7.76E-03
7.00	177.80	4457.0667	14.06	3.38E-01	6.88E+00	3.12E+00	1.66E-02	7.55E-03
7.25	184.15	4553.9595	14.366	3.57E-01	7.27E+00	3.30E+00	1.62E-02	7.33E-03
7.50	190.50	4650.8522	14.671	3.76E-01	7.66E+00	3.47E+00	1.57E-02	7.12E-03
7.75	196.85	4747.745	14.977	3.96E-01	8.05E+00	3.65E+00	1.52E-02	6.89E-03
8.00	203.20	4844.6377	15.283	4.16E-01	8.46E+00	3.84E+00	1.47E-02	6.66E-03
8.25	209.55	4941.5305	15.588	4.37E-01	8.88E+00	4.03E+00	1.42E-02	6.43E-03
8.50	215.90	5038.4232	15.894	4.57E-01	9.30E+00	4.22E+00	1.36E-02	6.19E-03
8.75	222.25	5135.316	16.2	4.79E-01	9.73E+00	4.42E+00	1.31E-02	5.95E-03
9.00	228.60	5232.2088	16.505	5.00E-01	1.02E+01	4.62E+00	1.26E-02	5.70E-03
9.25	234.95	4941.5305	15.588	5.22E-01	1.06E+01	4.81E+00	1.20E-02	5.46E-03
9.50	241.30	4650.8522	14.671	5.42E-01	1.10E+01	5.00E+00	1.15E-02	5.23E-03
9.75	247.65	4360.174	13.754	5.60E-01	1.14E+01	5.17E+00	1.11E-02	5.02E-03
10.00	254.00	4069.4957	12.838	5.78E-01	1.18E+01	5.33E+00	1.06E-02	4.82E-03
10.25	260.35	3778.8174	11.921	5.94E-01	1.21E+01	5.48E+00	1.02E-02	4.63E-03
10.50	266.70	3488.1392	11.004	6.10E-01	1.24E+01	5.62E+00	9.82E-03	4.46E-03
10.75	273.05	3197.4609	10.087	6.24E-01	1.27E+01	5.75E+00	9.47E-03	4.30E-03
11.00	279.40	2906.7826	9.1697	6.36E-01	1.29E+01	5.87E+00	9.15E-03	4.15E-03
11.25	285.75	2616.1044	8.2527	6.48E-01	1.32E+01	5.98E+00	8.86E-03	4.02E-03
11.50	292.10	2325.4261	7.3357	6.58E-01	1.34E+01	6.07E+00	8.60E-03	3.90E-03
11.75	298.45	2034.7478	6.4188	6.67E-01	1.36E+01	6.16E+00	8.37E-03	3.80E-03
12.00	304.80	1744.0696	5.5018	6.75E-01	1.37E+01	6.23E+00	8.17E-03	3.71E-03

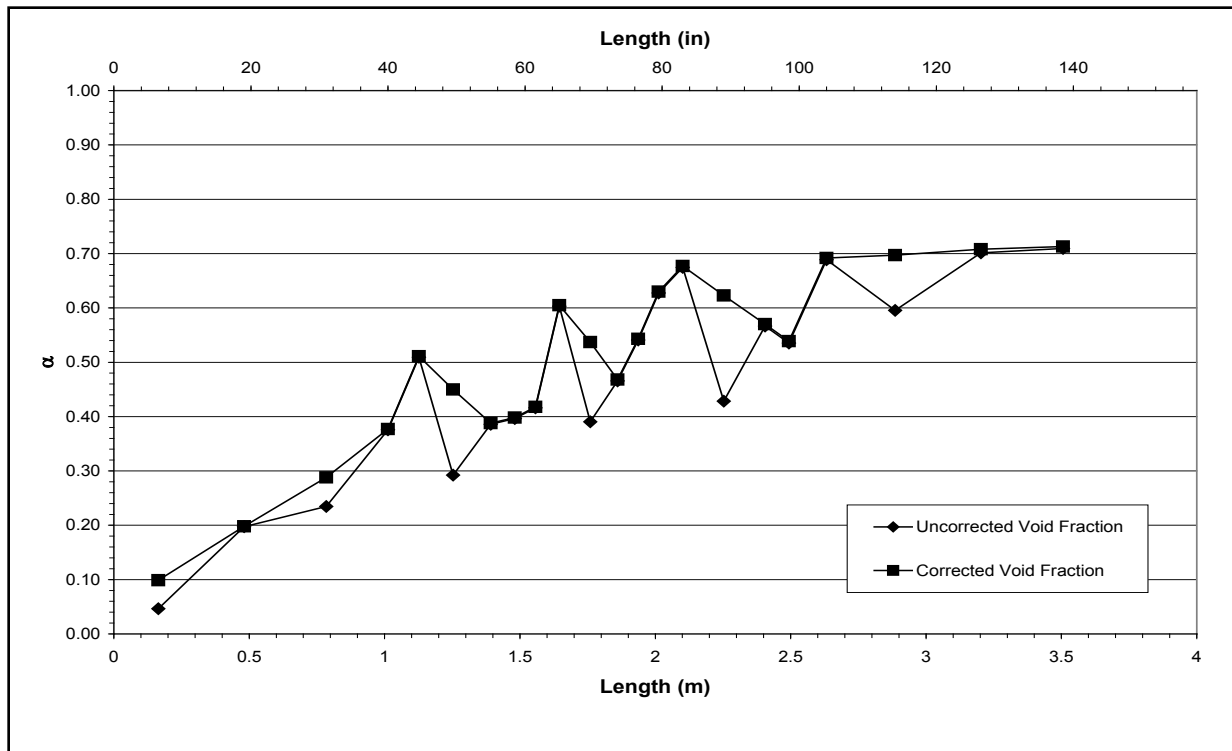


Figure A-345 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637I for Time Period 6307 to 6467 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-J

Test Conditions

Date: 6/20/2003

Steady-state time window: 6805 – 6960 seconds

Inlet flow rate: 0.508 cm/sec (0.200 in./sec)

Inlet mass flow rate: 0.024 kg/sec (0.052 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

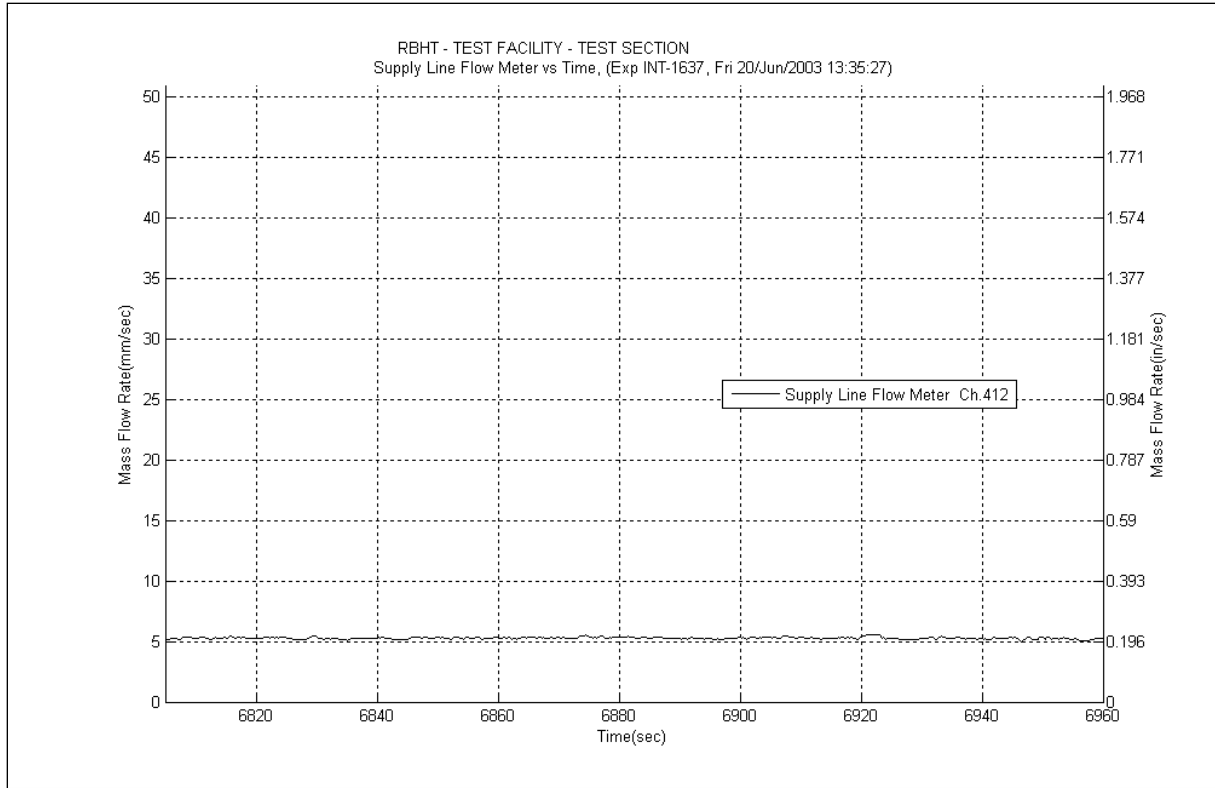


Figure A-346 Inlet Flow Plot for Experiment 1637J

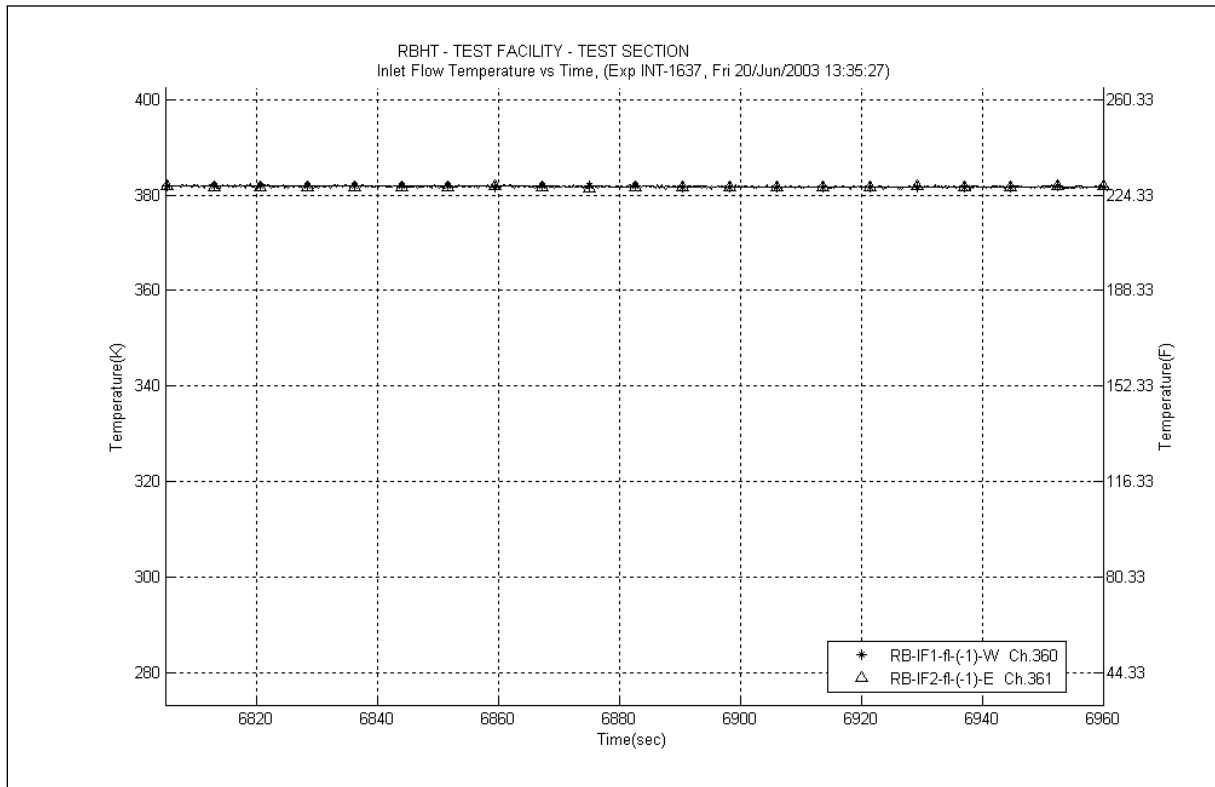


Figure A-347 Inlet Temperature Plot for Experiment 1637J

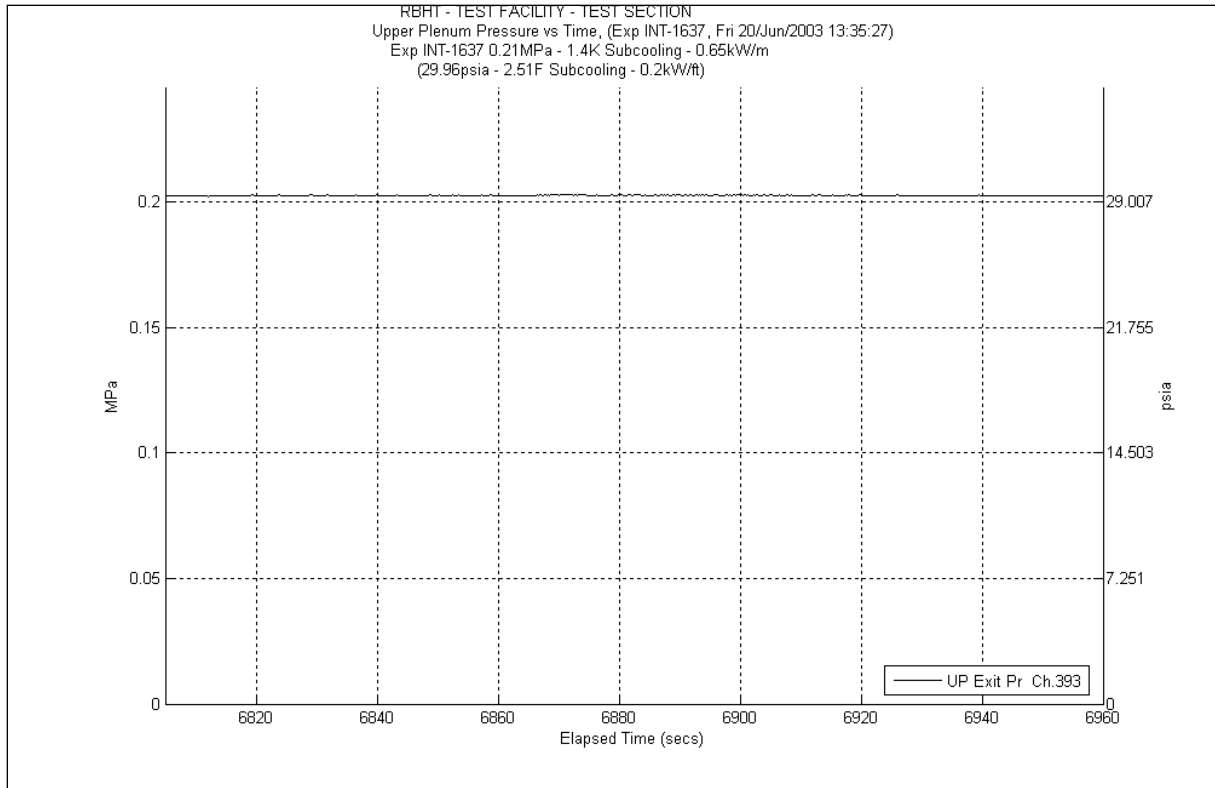


Figure A-348 System Pressure Plot for Experiment 1637J

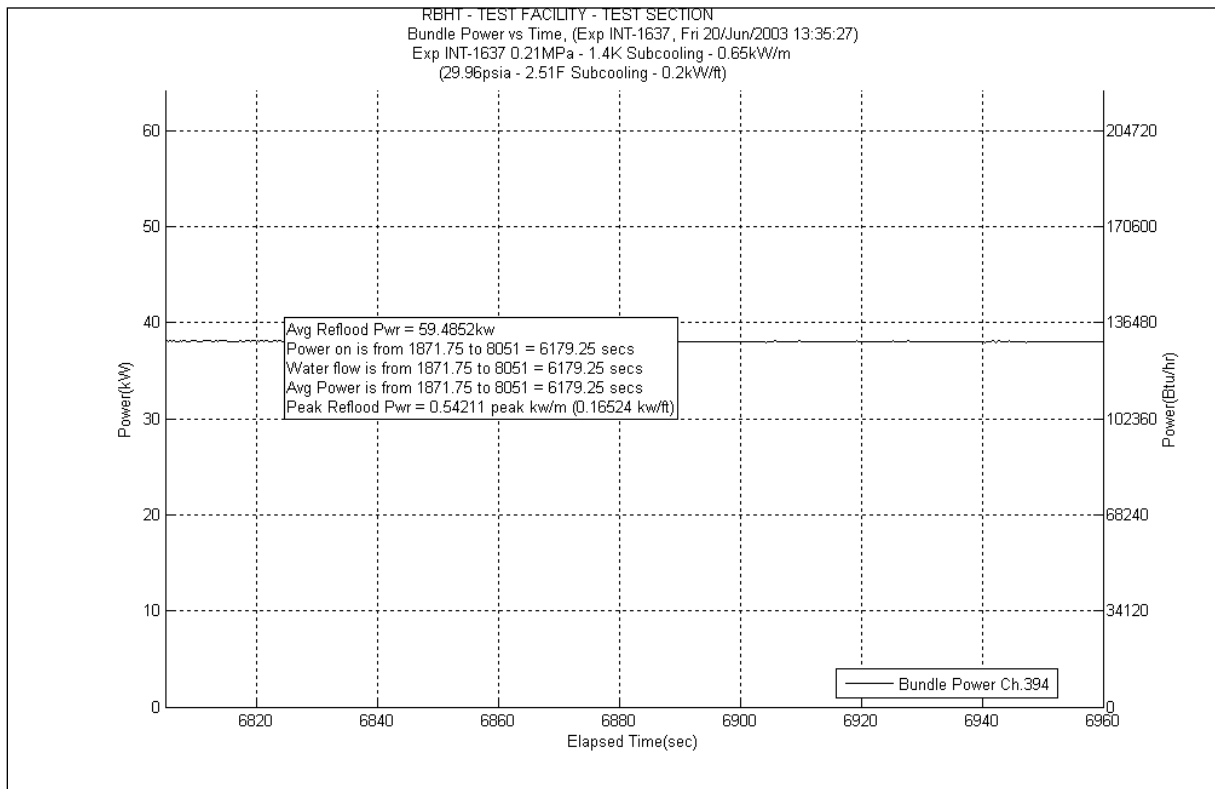


Figure A-349 Bundle Power Plot for Experiment 1637J

Table A-139 Data Results for RBHT Test 1637J for Time Period 6805 to 6960 seconds

Results for RBHT Test 1637
Valid Time Period 6805 to 6960 seconds
Collapsed Liquid Level = 76.872 inches = 1952.54 mm
(Z_{lev}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.755	13.980	669.387	0.082	3.926	0.010	0.479	0.000	0.000	13.89	665.057	4333.89	207507.767	0.757	0.753	0.761
*	120-133	3048-3378	383	0.726	18.467	884.228	0.105	5.027	0.039	1.867	1.023	49.005	17.3	828.328	4351.19	208336.0955	0.744	0.740	0.748
*	108-120	2743-3048	382	0.611	24.268	1161.979	0.092	4.405	0.048	2.298	6.508	311.625	17.62	843.650	4368.81	209179.7456	0.717	0.713	0.721
	100-108	2540-2743	381	0.702	12.391	593.298	0.056	2.681	0.035	1.676	0.000	0.000	12.29	588.448	4381.1	209768.1939	0.704	0.700	0.708
	97-100	2464-2540	380	0.556	6.918	331.212	0.020	0.958	0.013	0.622	0.000	0.000	6.885	329.656	4387.985	210097.8495	0.558	0.555	0.561
	93-97	2362-2464	379	0.575	8.823	422.470	0.025	1.197	0.017	0.814	0.000	0.000	8.78	420.389	4396.765	210518.2382	0.577	0.574	0.580
*	85-93	2159-2362	378	0.433	23.547	1127.415	0.046	2.202	0.032	1.532	8.239	394.464	15.23	729.216	4411.995	211247.4545	0.633	0.630	0.636
	81-85	2057-2159	377	0.688	6.492	310.822	0.021	1.005	0.015	0.718	0.000	0.000	6.454	309.019	4418.449	211556.4737	0.689	0.686	0.692
	78-81	1981-2057	376	0.632	5.733	274.518	0.015	0.718	0.011	0.527	0.000	0.000	5.704	273.109	4424.153	211829.5826	0.634	0.631	0.637
	75-78	1905-1981	375	0.547	7.053	337.678	0.015	0.718	0.011	0.527	0.000	0.000	7.023	336.263	4431.176	212165.8457	0.549	0.546	0.552
	72-75	1829-1905	374	0.482	8.070	386.414	0.014	0.670	0.011	0.527	0.000	0.000	8.041	385.005	4439.217	212550.8508	0.484	0.482	0.486
*	67-72	1702-1829	373	0.388	15.892	760.893	0.022	1.053	0.017	0.814	4.213	201.700	11.64	557.326	4450.857	213108.177	0.551	0.548	0.554
	63-67	1600-1702	372	0.618	7.941	380.198	0.016	0.766	0.013	0.622	0.000	0.000	7.909	378.685	4458.766	213486.862	0.619	0.616	0.622
	60-63	1524-1600	371	0.425	8.964	429.184	0.011	0.527	0.010	0.479	0.000	0.000	8.939	428.002	4467.705	213914.8636	0.426	0.424	0.428
	57-60	1448-1524	370	0.406	9.249	442.860	0.011	0.527	0.009	0.431	0.000	0.000	9.228	441.839	4476.933	214356.7026	0.408	0.406	0.410
	53-57	1346-1448	369	0.398	12.500	598.520	0.013	0.622	0.012	0.575	0.000	0.000	12.47	597.067	4489.403	214953.7694	0.4	0.398	0.402
*	46-53	1168-1346	368	0.293	25.691	1230.111	0.021	1.005	0.020	0.958	6.050	289.695	19.6	938.453	4509.003	215892.2225	0.461	0.459	0.463
	43-46	1092-1168	367	0.521	7.468	357.570	0.008	0.383	0.008	0.383	0.000	0.000	7.448	356.612	4516.451	216248.8346	0.522	0.519	0.525
	37-43	940-1092	366	0.398	18.774	898.899	0.015	0.718	0.016	0.766	0.000	0.000	18.74	897.276	4535.191	217146.1106	0.399	0.397	0.401
*	25-37	635-940	365	0.253	46.532	2227.975	0.023	1.101	0.029	1.389	4.030	192.969	42.45	2032.517	4577.641	219178.6275	0.319	0.317	0.321
	13-25	330-635	364	0.238	47.477	2273.231	0.014	0.670	0.024	1.149	0.000	0.000	47.42	2270.482	4625.061	221449.1093	0.239	0.238	0.240
*	0-13	0-330	363	0.058	63.587	3044.568	0.006	0.287	0.012	0.575	4.139	198.183	59.43	2845.524	4684.491	224294.633	0.119	0.118	0.120

Table A-140 Energy Balance Results for RBHT Test 1637J for Time Period 6805 to 6960 seconds

Results for RBHT Test 1637 Valid Time Period 6805 to 6960 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1742.8185	5.4978	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.58E-03
0.25	6.35	1839.6418	5.8033	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.58E-03
0.50	12.70	1936.465	6.1087	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.58E-03
0.75	19.05	2033.2883	6.4142	1.13E-02	1.52E-01	6.91E-02	1.65E-02	7.50E-03
1.00	25.40	2130.1115	6.7196	2.43E-02	3.29E-01	1.49E-01	1.63E-02	7.40E-03
1.25	31.75	2226.9348	7.025	3.80E-02	5.14E-01	2.33E-01	1.61E-02	7.29E-03
1.50	38.10	2323.758	7.3305	5.23E-02	7.08E-01	3.21E-01	1.58E-02	7.19E-03
1.75	44.45	2420.5813	7.6359	6.73E-02	9.09E-01	4.12E-01	1.56E-02	7.07E-03
2.00	50.80	2517.4045	7.9413	8.28E-02	1.12E+00	5.08E-01	1.53E-02	6.95E-03
2.25	57.15	2614.2278	8.2468	9.89E-02	1.34E+00	6.07E-01	1.51E-02	6.83E-03
2.50	63.50	2711.051	8.5522	1.16E-01	1.56E+00	7.09E-01	1.48E-02	6.71E-03
2.75	69.85	2807.8743	8.8576	1.33E-01	1.80E+00	8.16E-01	1.45E-02	6.57E-03
3.00	76.20	2904.6975	9.1631	1.51E-01	2.04E+00	9.26E-01	1.42E-02	6.44E-03
3.25	82.55	3001.5208	9.4685	1.70E-01	2.29E+00	1.04E+00	1.39E-02	6.30E-03
3.50	88.90	3098.344	9.7739	1.89E-01	2.55E+00	1.16E+00	1.36E-02	6.15E-03
3.75	95.25	3195.1673	10.079	2.08E-01	2.82E+00	1.28E+00	1.32E-02	6.00E-03
4.00	101.60	3291.9905	10.385	2.29E-01	3.09E+00	1.40E+00	1.29E-02	5.85E-03
4.25	107.95	3388.8138	10.69	2.50E-01	3.38E+00	1.53E+00	1.25E-02	5.69E-03
4.50	114.30	3485.637	10.996	2.71E-01	3.67E+00	1.66E+00	1.22E-02	5.52E-03
4.75	120.65	3582.4603	11.301	2.94E-01	3.97E+00	1.80E+00	1.18E-02	5.36E-03
5.00	127.00	3679.2835	11.607	3.17E-01	4.28E+00	1.94E+00	1.14E-02	5.18E-03
5.25	133.35	3776.1068	11.912	3.40E-01	4.60E+00	2.08E+00	1.10E-02	5.01E-03
5.50	139.70	3872.93	12.217	3.64E-01	4.92E+00	2.23E+00	1.06E-02	4.82E-03
5.75	146.05	3969.7533	12.523	3.89E-01	5.25E+00	2.38E+00	1.02E-02	4.64E-03
6.00	152.40	4066.5765	12.828	4.14E-01	5.60E+00	2.54E+00	9.80E-03	4.44E-03
6.25	158.75	4163.3998	13.134	4.40E-01	5.95E+00	2.70E+00	9.37E-03	4.25E-03
6.50	165.10	4260.223	13.439	4.66E-01	6.30E+00	2.86E+00	8.92E-03	4.05E-03
6.75	171.45	4357.0463	13.745	4.93E-01	6.67E+00	3.03E+00	8.47E-03	3.84E-03
7.00	177.80	4453.8695	14.05	5.21E-01	7.04E+00	3.20E+00	8.01E-03	3.63E-03
7.25	184.15	4550.6928	14.355	5.49E-01	7.43E+00	3.37E+00	7.53E-03	3.42E-03
7.50	190.50	4647.516	14.661	5.78E-01	7.82E+00	3.55E+00	7.05E-03	3.20E-03
7.75	196.85	4744.3393	14.966	6.08E-01	8.22E+00	3.73E+00	6.56E-03	2.97E-03
8.00	203.20	4841.1625	15.272	6.38E-01	8.62E+00	3.91E+00	6.05E-03	2.75E-03
8.25	209.55	4937.9858	15.577	6.69E-01	9.04E+00	4.10E+00	5.54E-03	2.51E-03
8.50	215.90	5034.809	15.883	7.00E-01	9.46E+00	4.29E+00	5.02E-03	2.28E-03
8.75	222.25	5131.6323	16.188	7.32E-01	9.90E+00	4.49E+00	4.48E-03	2.03E-03
9.00	228.60	5228.4555	16.494	7.64E-01	1.03E+01	4.69E+00	3.94E-03	1.79E-03
9.25	234.95	4937.9858	15.577	7.96E-01	1.08E+01	4.88E+00	3.41E-03	1.54E-03
9.50	241.30	4647.516	14.661	8.27E-01	1.12E+01	5.07E+00	2.90E-03	1.32E-03
9.75	247.65	4357.0463	13.745	8.55E-01	1.16E+01	5.24E+00	2.43E-03	1.10E-03
10.00	254.00	4066.5765	12.828	8.81E-01	1.19E+01	5.40E+00	1.99E-03	9.01E-04
10.25	260.35	3776.1068	11.912	9.06E-01	1.22E+01	5.56E+00	1.57E-03	7.13E-04
10.50	266.70	3485.637	10.996	9.29E-01	1.26E+01	5.70E+00	1.19E-03	5.41E-04
10.75	273.05	3195.1673	10.079	9.50E-01	1.28E+01	5.82E+00	8.41E-04	3.81E-04
11.00	279.40	2904.6975	9.1631	9.69E-01	1.31E+01	5.94E+00	5.20E-04	2.36E-04
11.25	285.75	2614.2278	8.2468	9.86E-01	1.33E+01	6.05E+00	2.31E-04	1.05E-04
11.50	292.10	2323.758	7.3305	1.00E+00	1.35E+01	6.13E+00	0.00E+00	0.00E+00
11.75	298.45	2033.2883	6.4142	1.00E+00	1.35E+01	6.13E+00	0.00E+00	0.00E+00
12.00	304.80	1742.8185	5.4978	1.00E+00	1.35E+01	6.13E+00	0.00E+00	0.00E+00

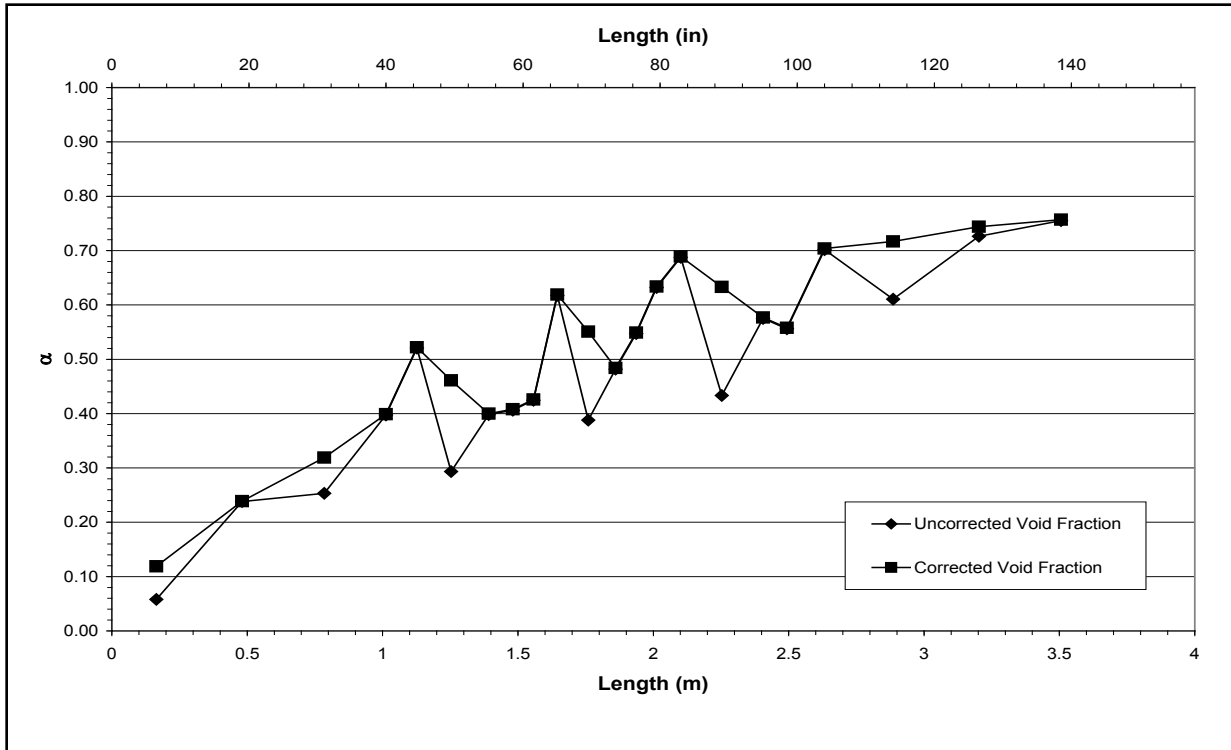


Figure A-350: Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637J for Time Period 6805 to 6960 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-K

Test Conditions

Date: 6/20/2003

Steady-state time window: 6990 – 7110 seconds

Inlet flow rate: 0.508 cm/sec (0.200 in./sec)

Inlet mass flow rate: 0.024 kg/sec (0.052 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

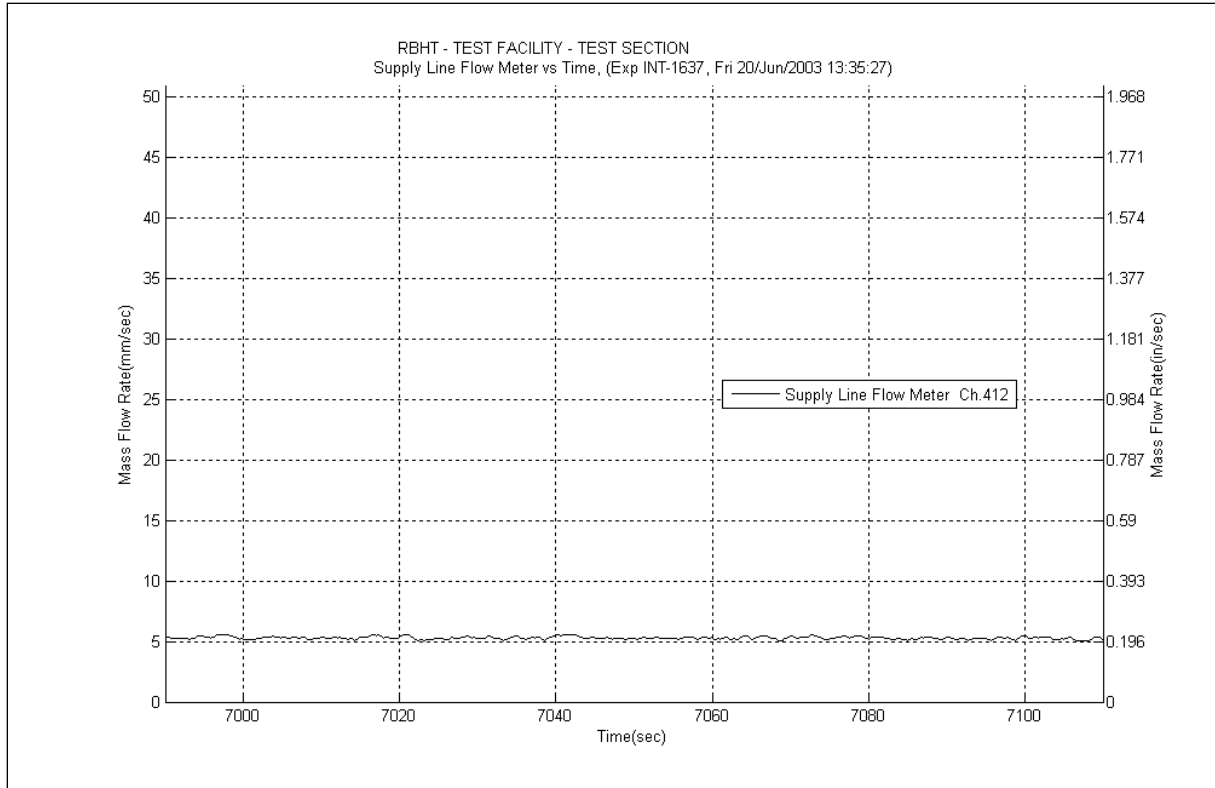


Figure A-351 Inlet Flow Plot for Experiment 1637K

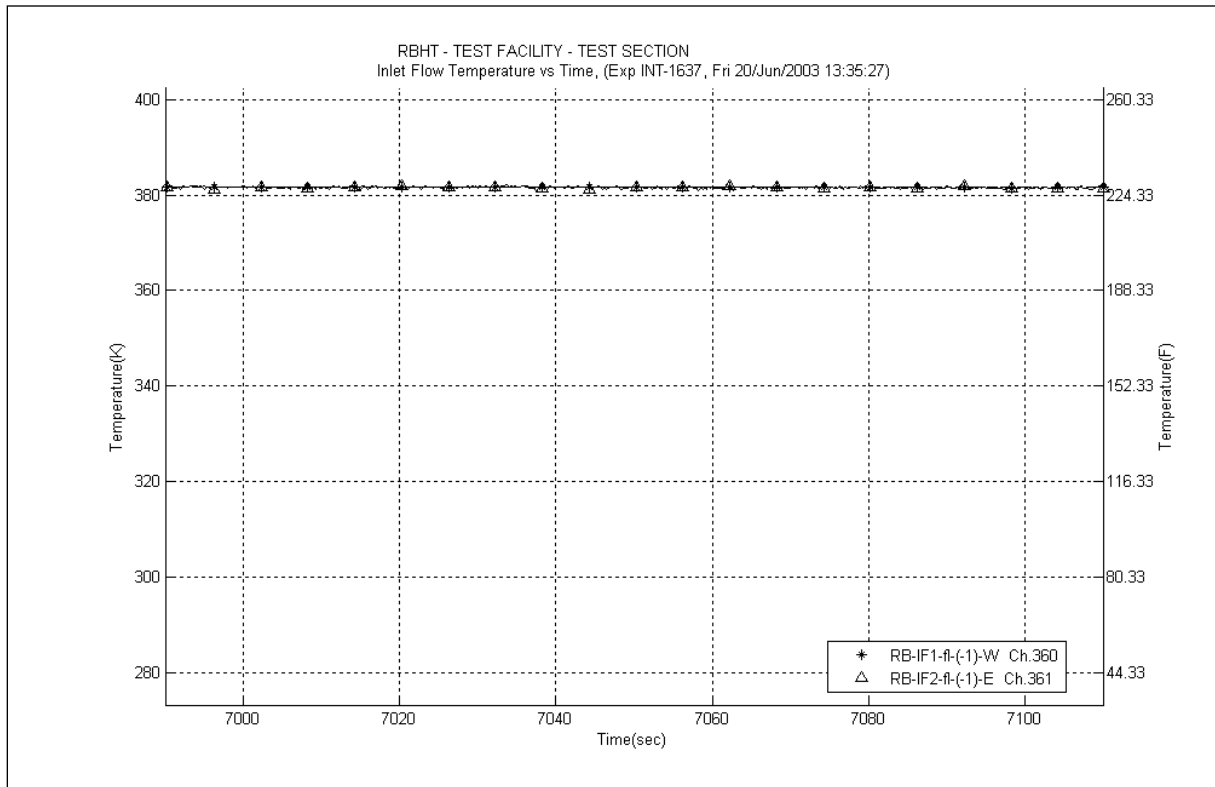


Figure A-352 Inlet Temperature Plot for Experiment 1637K

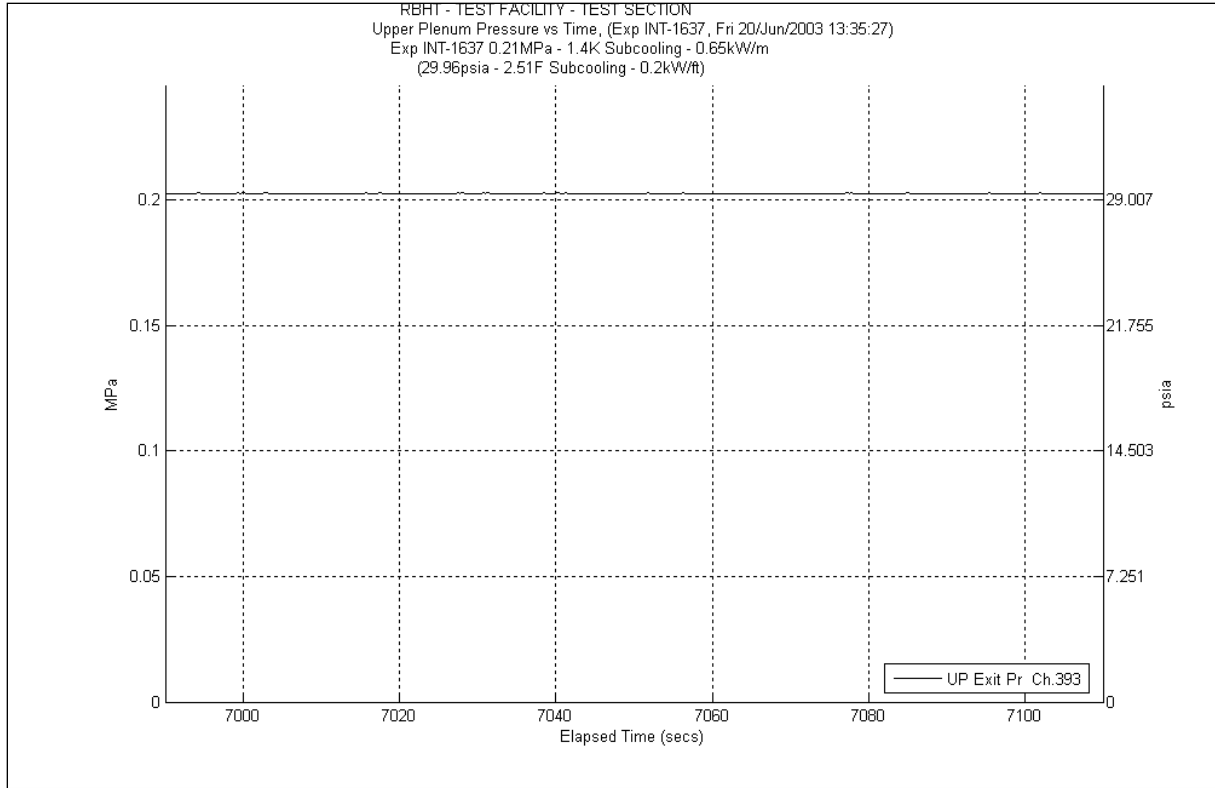


Figure A-353 System Pressure Plot for Experiment 1637K

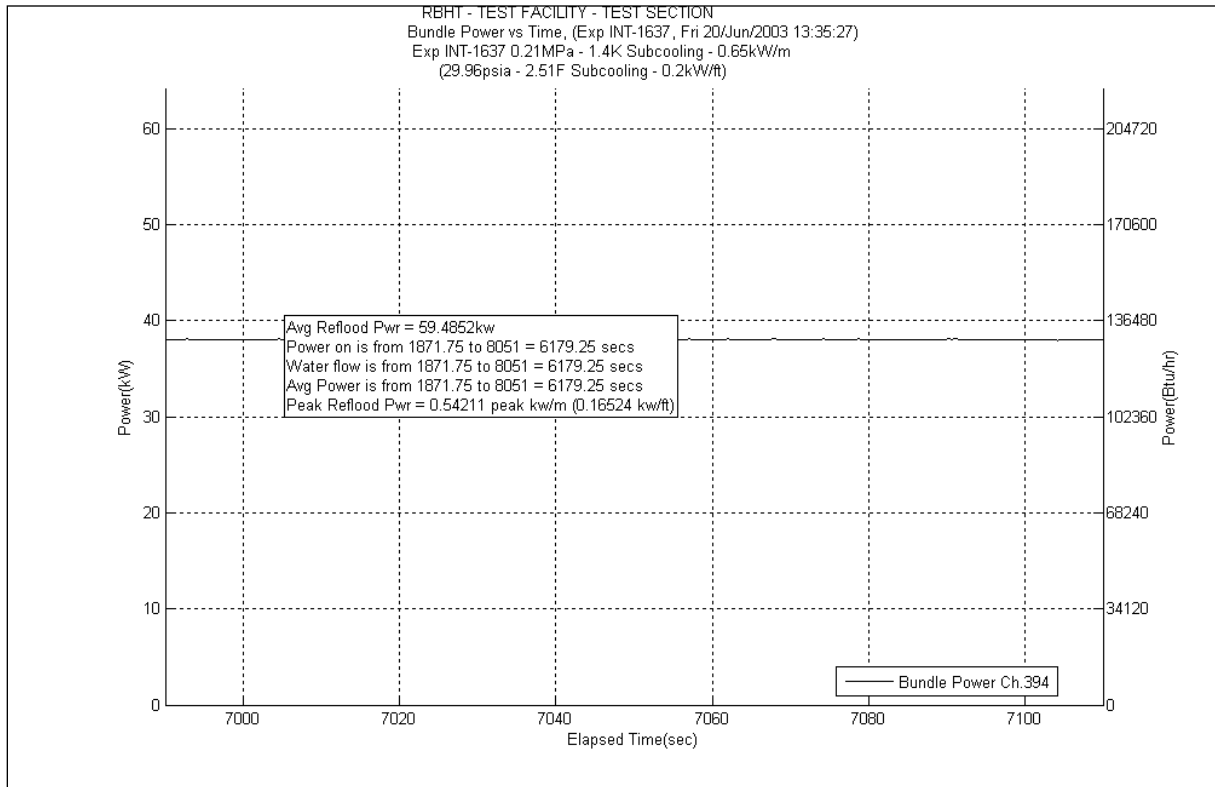


Figure A-354 Bundle Power Plot for Experiment 1637K

Table A-141 Data Results for RBHT Test 1637K for Time Period 6990 to 7110 seconds

Results for RBHT Test 1637
Valid Time Period 6990 to 7110 seconds
Collapsed Liquid Level = 77.068 inches = 1957.54 mm
(Z_{sev}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lb/ft^2)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lb/ft^2)	ΔP_{fic} (Pa)	ΔP_{accel} (lb/ft^2)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft^2)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft^2)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft^2)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.755	13.980	669.387	0.083	3.974	0.012	0.575	0.000	0.000	13.88	664.578	4333.88	207507.2882	0.757	0.753	0.761
*	120-133	3048-3378	383	0.727	18.431	882.487	0.105	5.027	0.039	1.867	0.977	46.785	17.31	828.807	4351.19	208336.0955	0.744	0.740	0.748
*	108-120	2743-3048	382	0.610	24.294	1163.222	0.093	4.453	0.048	2.298	6.513	311.863	17.64	844.608	4368.83	209180.7032	0.717	0.713	0.721
	100-108	2540-2743	381	0.701	12.412	594.293	0.056	2.681	0.035	1.676	0.000	0.000	12.32	589.885	4381.15	209770.588	0.703	0.699	0.707
	97-100	2464-2540	380	0.551	6.995	334.942	0.020	0.958	0.013	0.622	0.000	0.000	6.96	333.247	4388.11	210103.8345	0.553	0.550	0.556
	93-97	2362-2464	379	0.576	8.813	421.973	0.025	1.197	0.017	0.814	0.000	0.000	8.77	419.910	4396.88	210523.7444	0.578	0.575	0.581
*	85-93	2159-2362	378	0.433	23.573	1128.659	0.047	2.250	0.032	1.532	8.264	395.660	15.23	729.216	4412.11	211252.9607	0.633	0.630	0.636
	81-85	2057-2159	377	0.687	6.497	311.071	0.021	1.005	0.015	0.718	0.000	0.000	6.459	309.259	4418.569	211562.2193	0.689	0.686	0.692
	78-81	1981-2057	376	0.634	5.697	272.778	0.015	0.718	0.011	0.527	0.000	0.000	5.671	271.529	4424.24	211833.7482	0.636	0.633	0.639
	75-78	1905-1981	375	0.546	7.079	338.921	0.015	0.718	0.011	0.527	0.000	0.000	7.053	337.699	4431.293	212171.4477	0.547	0.544	0.550
	72-75	1829-1905	374	0.478	8.133	389.398	0.014	0.670	0.011	0.527	0.000	0.000	8.107	388.165	4439.4	212559.6129	0.48	0.478	0.482
*	67-72	1702-1829	373	0.391	15.808	756.915	0.022	1.053	0.017	0.814	4.009	191.976	11.76	563.072	4451.16	213122.6847	0.547	0.544	0.550
	63-67	1600-1702	372	0.613	8.034	384.674	0.016	0.766	0.013	0.622	0.000	0.000	8.004	383.234	4459.164	213505.9183	0.615	0.612	0.618
	60-63	1524-1600	371	0.423	8.995	430.676	0.011	0.527	0.010	0.479	0.000	0.000	8.97	429.486	4468.134	213935.4042	0.424	0.422	0.426
	57-60	1448-1524	370	0.408	9.223	441.617	0.011	0.527	0.009	0.431	0.000	0.000	9.199	440.450	4477.333	214375.8547	0.409	0.407	0.411
	53-57	1346-1448	369	0.396	12.557	601.255	0.013	0.622	0.012	0.575	0.000	0.000	12.53	599.940	4489.863	214975.7943	0.397	0.395	0.399
*	46-53	1168-1346	368	0.295	25.624	1226.878	0.021	1.005	0.020	0.958	5.883	281.674	19.7	943.241	4509.563	215919.0354	0.458	0.456	0.460
	43-46	1092-1168	367	0.518	7.510	359.559	0.008	0.383	0.008	0.383	0.000	0.000	7.492	358.719	4517.055	216277.7543	0.519	0.516	0.522
	37-43	940-1092	366	0.394	18.888	904.369	0.015	0.718	0.016	0.766	0.000	0.000	18.85	902.543	4535.905	217180.2971	0.395	0.393	0.397
*	25-37	635-940	365	0.252	46.621	2232.203	0.023	1.101	0.029	1.389	3.959	189.535	42.61	2040.178	4578.515	219220.4749	0.316	0.314	0.318
	13-25	330-635	364	0.237	47.566	2277.458	0.014	0.670	0.025	1.197	0.000	0.000	47.51	2274.791	4626.025	221495.2659	0.237	0.236	0.238
*	0-13	0-330	363	0.057	63.634	3046.806	0.006	0.287	0.012	0.575	4.136	198.027	59.48	2847.918	4685.505	224343.1836	0.119	0.118	0.120

Table A-142 Energy Balance Results for RBHT Test 1637K for Time Period 6990 to 7110 seconds

Results for RBHT Test 1637 Valid Time Period 6990 to 7110 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1741.829	5.4947	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.60E-03
0.25	6.35	1838.5973	5.8	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.60E-03
0.50	12.70	1935.3656	6.1052	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.60E-03
0.75	19.05	2032.1338	6.4105	1.08E-02	1.46E-01	6.64E-02	1.66E-02	7.51E-03
1.00	25.40	2128.9021	6.7158	2.39E-02	3.23E-01	1.47E-01	1.63E-02	7.42E-03
1.25	31.75	2225.6704	7.021	3.75E-02	5.08E-01	2.30E-01	1.61E-02	7.31E-03
1.50	38.10	2322.4387	7.3263	5.18E-02	7.01E-01	3.18E-01	1.59E-02	7.20E-03
1.75	44.45	2419.207	7.6316	6.67E-02	9.03E-01	4.09E-01	1.56E-02	7.09E-03
2.00	50.80	2515.9752	7.9368	8.21E-02	1.11E+00	5.05E-01	1.54E-02	6.97E-03
2.25	57.15	2612.7435	8.2421	9.82E-02	1.33E+00	6.03E-01	1.51E-02	6.85E-03
2.50	63.50	2709.5118	8.5473	1.15E-01	1.56E+00	7.06E-01	1.48E-02	6.72E-03
2.75	69.85	2806.2801	8.8526	1.32E-01	1.79E+00	8.12E-01	1.45E-02	6.59E-03
3.00	76.20	2903.0483	9.1579	1.50E-01	2.03E+00	9.22E-01	1.42E-02	6.46E-03
3.25	82.55	2999.8166	9.4631	1.69E-01	2.28E+00	1.04E+00	1.39E-02	6.32E-03
3.50	88.90	3096.5849	9.7684	1.88E-01	2.54E+00	1.15E+00	1.36E-02	6.17E-03
3.75	95.25	3193.3532	10.074	2.08E-01	2.81E+00	1.27E+00	1.33E-02	6.02E-03
4.00	101.60	3290.1215	10.379	2.28E-01	3.09E+00	1.40E+00	1.29E-02	5.87E-03
4.25	107.95	3386.8897	10.684	2.49E-01	3.37E+00	1.53E+00	1.26E-02	5.71E-03
4.50	114.30	3483.658	10.989	2.70E-01	3.66E+00	1.66E+00	1.22E-02	5.54E-03
4.75	120.65	3580.4263	11.295	2.93E-01	3.96E+00	1.80E+00	1.18E-02	5.37E-03
5.00	127.00	3677.1946	11.6	3.15E-01	4.27E+00	1.94E+00	1.15E-02	5.20E-03
5.25	133.35	3773.9628	11.905	3.39E-01	4.59E+00	2.08E+00	1.11E-02	5.02E-03
5.50	139.70	3870.7311	12.21	3.63E-01	4.91E+00	2.23E+00	1.07E-02	4.84E-03
5.75	146.05	3967.4994	12.516	3.87E-01	5.24E+00	2.38E+00	1.03E-02	4.66E-03
6.00	152.40	4064.2677	12.821	4.12E-01	5.59E+00	2.53E+00	9.84E-03	4.46E-03
6.25	158.75	4161.036	13.126	4.38E-01	5.94E+00	2.69E+00	9.41E-03	4.27E-03
6.50	165.10	4257.8042	13.432	4.65E-01	6.29E+00	2.85E+00	8.97E-03	4.07E-03
6.75	171.45	4354.5725	13.737	4.92E-01	6.66E+00	3.02E+00	8.51E-03	3.86E-03
7.00	177.80	4451.3408	14.042	5.19E-01	7.03E+00	3.19E+00	8.05E-03	3.65E-03
7.25	184.15	4548.1091	14.347	5.48E-01	7.42E+00	3.36E+00	7.58E-03	3.44E-03
7.50	190.50	4644.8773	14.653	5.76E-01	7.81E+00	3.54E+00	7.10E-03	3.22E-03
7.75	196.85	4741.6456	14.958	6.06E-01	8.20E+00	3.72E+00	6.60E-03	3.00E-03
8.00	203.20	4838.4139	15.263	6.36E-01	8.61E+00	3.91E+00	6.10E-03	2.77E-03
8.25	209.55	4935.1822	15.568	6.66E-01	9.03E+00	4.09E+00	5.59E-03	2.53E-03
8.50	215.90	5031.9505	15.874	6.98E-01	9.45E+00	4.29E+00	5.06E-03	2.30E-03
8.75	222.25	5128.7187	16.179	7.30E-01	9.88E+00	4.48E+00	4.53E-03	2.05E-03
9.00	228.60	5225.487	16.484	7.62E-01	1.03E+01	4.68E+00	3.98E-03	1.81E-03
9.25	234.95	4935.1822	15.568	7.94E-01	1.08E+01	4.88E+00	3.45E-03	1.57E-03
9.50	241.30	4644.8773	14.653	8.24E-01	1.12E+01	5.06E+00	2.95E-03	1.34E-03
9.75	247.65	4354.5725	13.737	8.52E-01	1.15E+01	5.24E+00	2.48E-03	1.12E-03
10.00	254.00	4064.2677	12.821	8.79E-01	1.19E+01	5.40E+00	2.03E-03	9.22E-04
10.25	260.35	3773.9628	11.905	9.03E-01	1.22E+01	5.55E+00	1.62E-03	7.35E-04
10.50	266.70	3483.658	10.989	9.26E-01	1.25E+01	5.69E+00	1.24E-03	5.62E-04
10.75	273.05	3193.3532	10.074	9.47E-01	1.28E+01	5.82E+00	8.89E-04	4.03E-04
11.00	279.40	2903.0483	9.1579	9.66E-01	1.31E+01	5.94E+00	5.69E-04	2.58E-04
11.25	285.75	2612.7435	8.2421	9.83E-01	1.33E+01	6.04E+00	2.80E-04	1.27E-04
11.50	292.10	2322.4387	7.3263	9.99E-01	1.35E+01	6.14E+00	2.01E-05	9.12E-06
11.75	298.45	2032.1338	6.4105	1.00E+00	1.35E+01	6.14E+00	0.00E+00	0.00E+00
12.00	304.80	1741.829	5.4947	1.00E+00	1.35E+01	6.14E+00	0.00E+00	0.00E+00

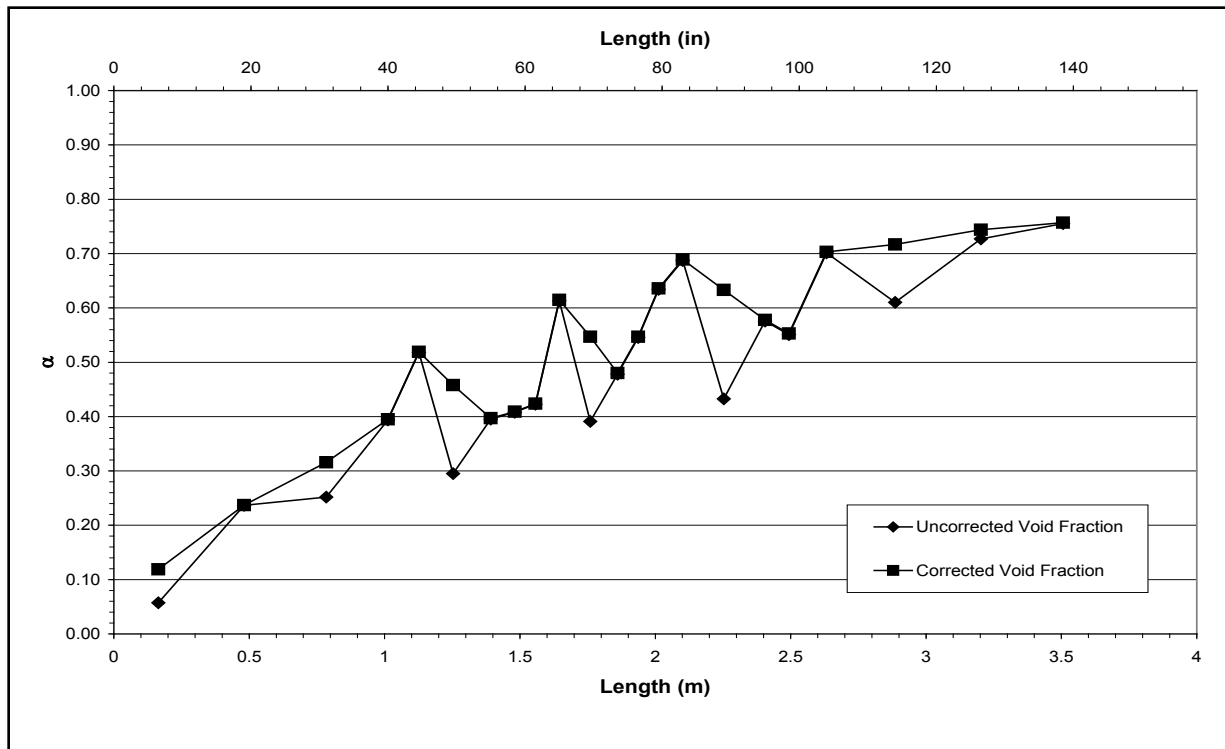


Figure A-355 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637K for Time Period 6990 to 7110 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-L

Test Conditions

Date: 6/20/2003

Steady-state time window: 7170 – 7270 seconds

Inlet flow rate: 0.508 cm/sec (0.200 in./sec)

Inlet mass flow rate: 0.024 kg/sec (0.052 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

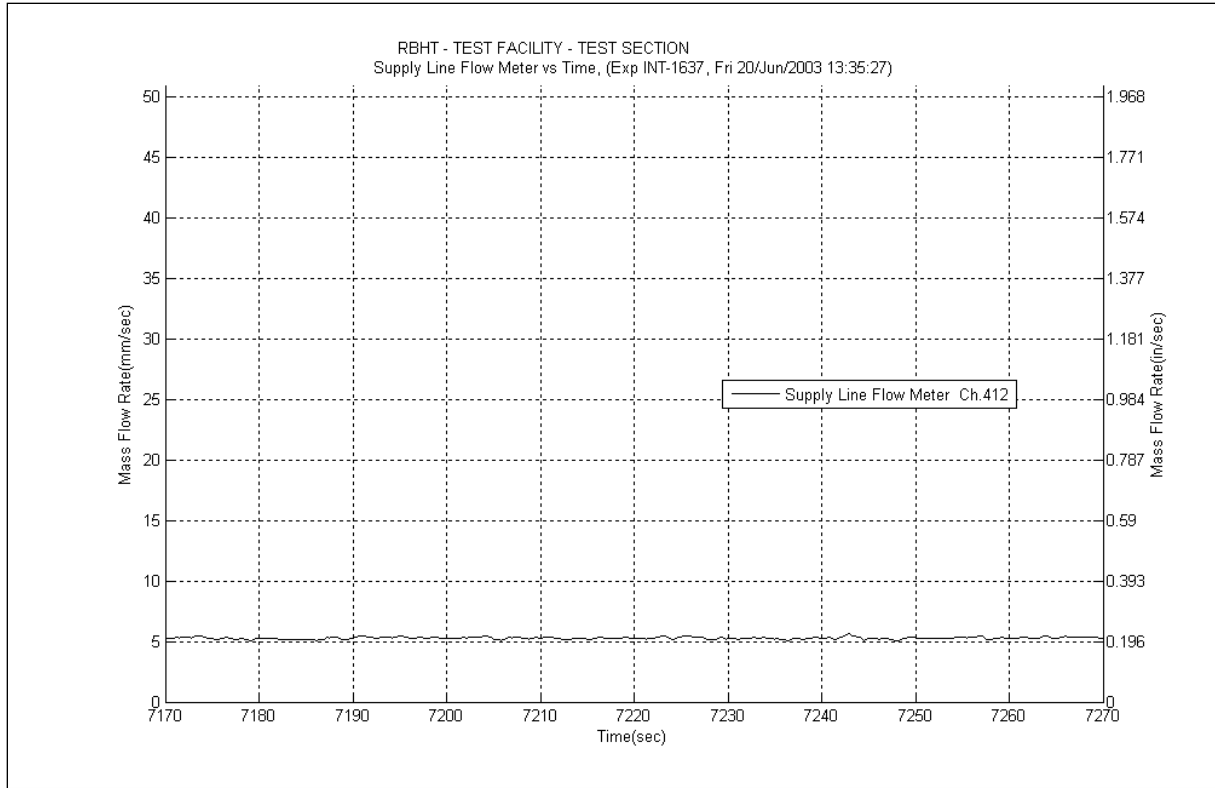


Figure A-356 Inlet Flow Plot for Experiment 1637L

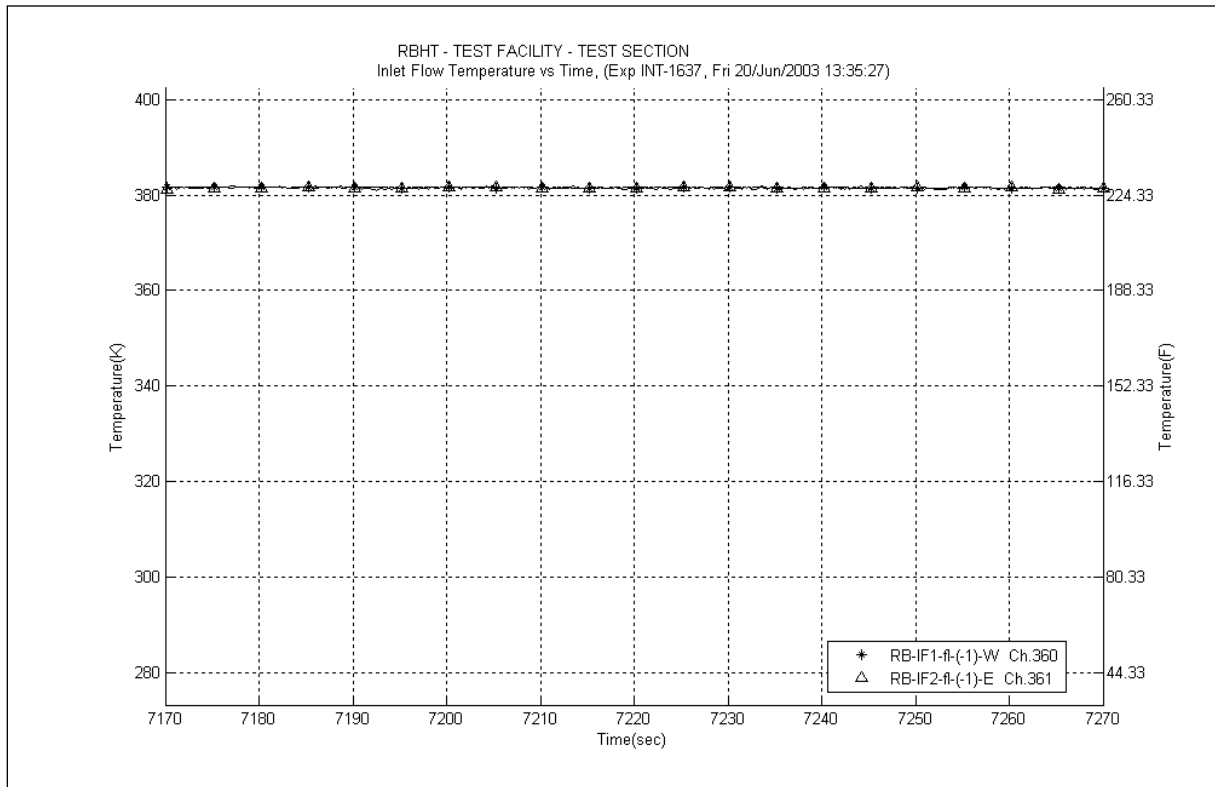


Figure A-357 Inlet Temperature Plot for Experiment 1637L

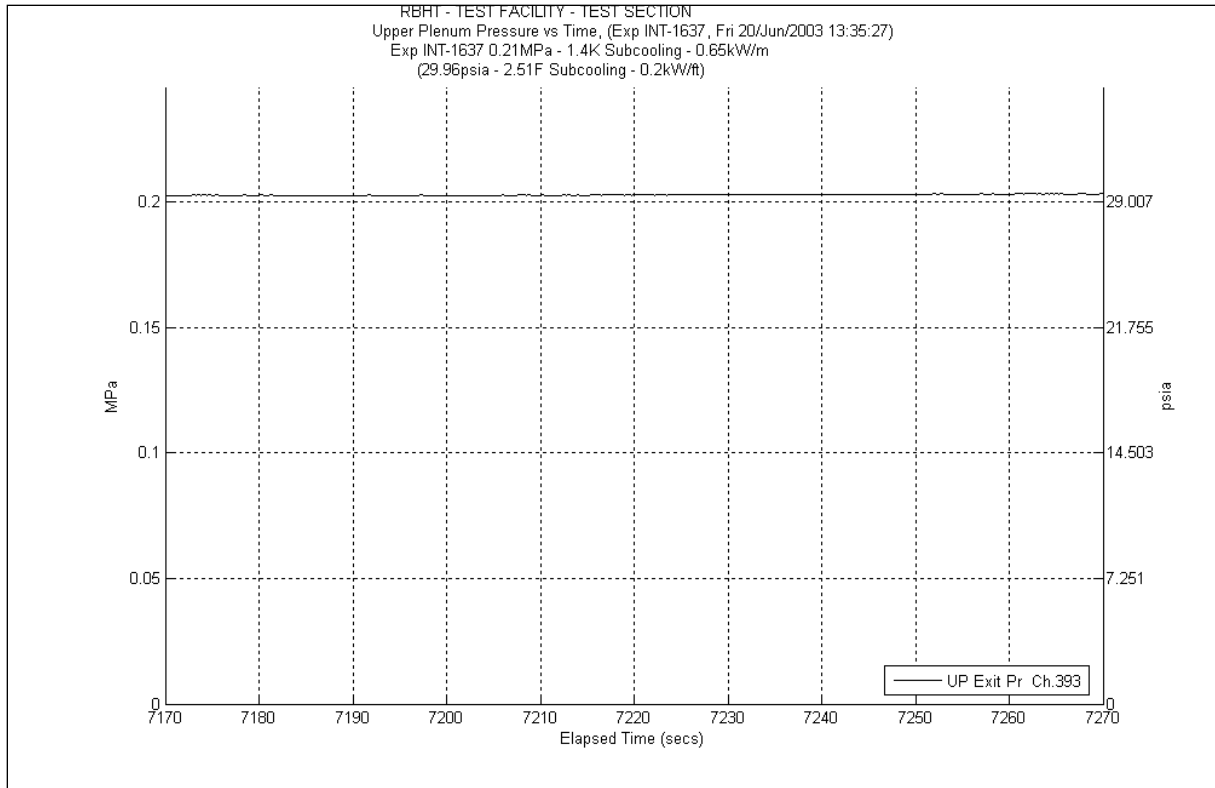


Figure A-358 System Pressure Plot for Experiment 1637L

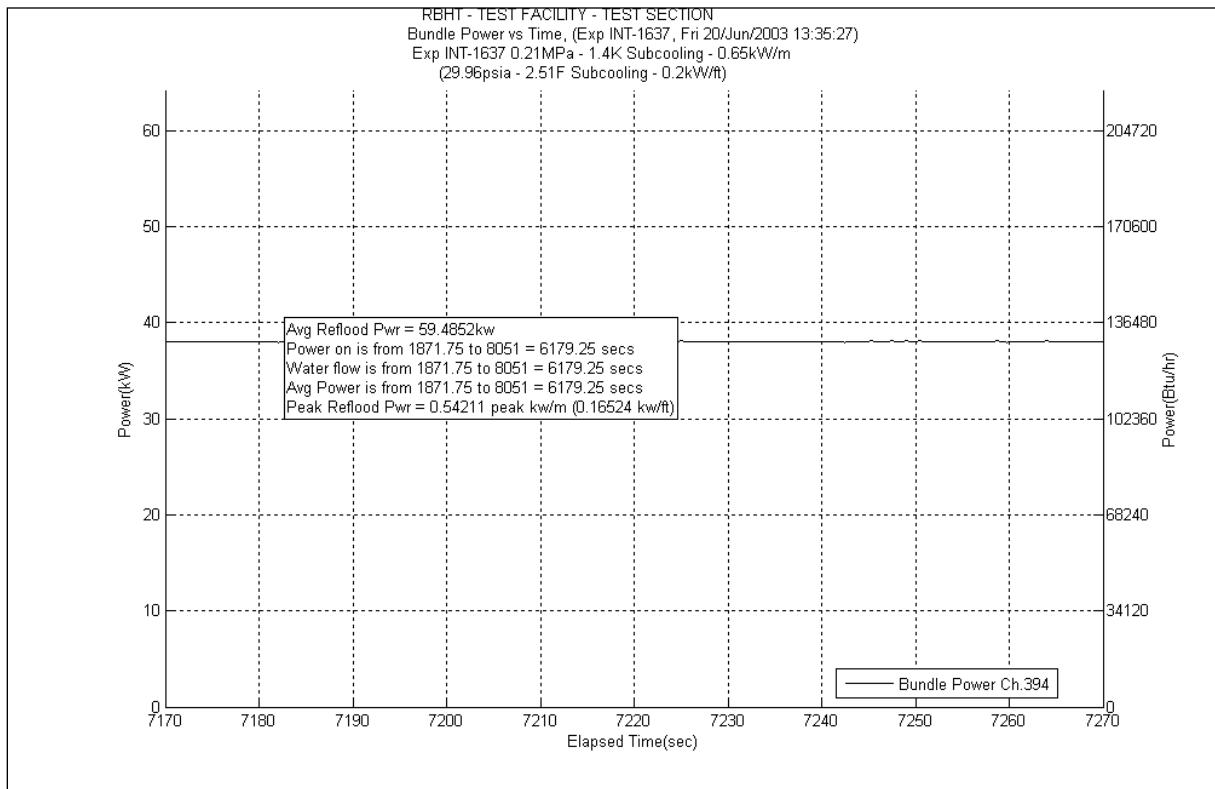


Figure A-359 Bundle Power Plot for Experiment 1637L

Table A-143 Data Results for RBHT Test 1637L for Time Period 7170 to 7270 seconds

Results for RBHT Test 1637
Valid Time Period 7170 to 7270 seconds
Collapsed Liquid Level = 77,000 inches = 1955.81 mm
(Z_{sev}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.758	13.804	660.933	0.082	3.926	0.011	0.527	0.000	0.000	13.71	656.438	4333.71	207499.1486	0.76	0.756	0.764
*	120-133	3048-3378	383	0.727	18.405	881.244	0.105	5.027	0.039	1.867	1.121	53.682	17.14	820.668	4350.85	208319.8162	0.746	0.742	0.750
*	108-120	2743-3048	382	0.610	24.320	1164.465	0.092	4.405	0.048	2.298	6.610	316.506	17.57	841.256	4368.42	209161.0723	0.718	0.714	0.722
	100-108	2540-2743	381	0.702	12.391	593.298	0.056	2.681	0.035	1.676	0.000	0.000	12.29	588.448	4380.71	209749.5206	0.704	0.700	0.708
	97-100	2464-2540	380	0.549	7.027	336.434	0.020	0.958	0.013	0.622	0.000	0.000	6.992	334.779	4387.702	210084.2994	0.551	0.548	0.554
	93-97	2362-2464	379	0.570	8.933	427.692	0.025	1.197	0.017	0.814	0.000	0.000	8.885	425.416	4396.587	210509.7155	0.572	0.569	0.575
*	85-93	2159-2362	378	0.435	23.495	1124.929	0.046	2.202	0.032	1.532	8.017	383.838	15.4	737.356	4411.987	211247.0714	0.629	0.626	0.632
	81-85	2057-2159	377	0.685	6.549	313.558	0.021	1.005	0.015	0.718	0.000	0.000	6.512	311.796	4418.499	211558.8677	0.686	0.683	0.689
	78-81	1981-2057	376	0.637	5.661	271.037	0.015	0.718	0.011	0.527	0.000	0.000	5.63	269.566	4424.129	211828.4335	0.639	0.636	0.642
	75-78	1905-1981	375	0.546	7.073	338.672	0.015	0.718	0.011	0.527	0.000	0.000	7.044	337.269	4431.173	212165.7021	0.548	0.545	0.551
	72-75	1829-1905	374	0.477	8.143	389.896	0.014	0.670	0.011	0.527	0.000	0.000	8.118	388.692	4439.291	212554.394	0.479	0.477	0.481
*	67-72	1702-1829	373	0.393	15.751	754.180	0.022	1.053	0.017	0.814	3.992	191.156	11.72	561.157	4451.011	213115.5506	0.549	0.546	0.552
	63-67	1600-1702	372	0.617	7.956	380.944	0.016	0.766	0.013	0.622	0.000	0.000	7.923	379.355	4458.934	213494.9059	0.619	0.616	0.622
	60-63	1524-1600	371	0.423	8.995	430.676	0.011	0.527	0.010	0.479	0.000	0.000	8.972	429.582	4467.906	213924.4875	0.424	0.422	0.426
	57-60	1448-1524	370	0.408	9.229	441.865	0.011	0.527	0.009	0.431	0.000	0.000	9.205	440.738	4477.111	214365.2253	0.409	0.407	0.411
	53-57	1346-1448	369	0.398	12.500	598.520	0.013	0.622	0.012	0.575	0.000	0.000	12.47	597.067	4489.581	214962.2921	0.399	0.397	0.401
*	46-53	1168-1346	368	0.290	25.821	1236.327	0.021	1.005	0.020	0.958	6.220	297.827	19.56	936.538	4509.141	215898.8299	0.462	0.460	0.464
	43-46	1092-1168	367	0.523	7.432	355.830	0.008	0.383	0.008	0.383	0.000	0.000	7.414	354.984	4516.555	216253.8142	0.524	0.521	0.527
	37-43	940-1092	366	0.391	18.966	908.099	0.015	0.718	0.016	0.766	0.000	0.000	18.93	906.373	4535.485	217160.1874	0.392	0.390	0.394
*	25-37	635-940	365	0.250	46.745	2238.170	0.023	1.101	0.028	1.341	4.024	192.678	42.67	2043.051	4578.155	219203.238	0.315	0.313	0.317
	13-25	330-635	364	0.237	47.540	2276.215	0.014	0.670	0.024	1.149	0.000	0.000	47.49	2273.833	4625.645	221477.0714	0.238	0.237	0.239
*	0-13	0-330	363	0.057	63.670	3048.547	0.006	0.287	0.012	0.575	4.182	200.246	59.47	2847.439	4685.115	224324.5103	0.119	0.118	0.120

Table A-144 Energy Balance Results for RBHT Test 1637L for Time Period 7170 to 7270 seconds

Results for RBHT Test 1637 Valid Time Period 7170 to 7270 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1742.8251	5.4979	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.58E-03
0.25	6.35	1839.6487	5.8033	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.58E-03
0.50	12.70	1936.4723	6.1087	0.00E+00	0.00E+00	0.00E+00	1.67E-02	7.58E-03
0.75	19.05	2033.2959	6.4142	1.06E-02	1.44E-01	6.52E-02	1.65E-02	7.50E-03
1.00	25.40	2130.1196	6.7196	2.37E-02	3.20E-01	1.45E-01	1.63E-02	7.40E-03
1.25	31.75	2226.9432	7.0251	3.74E-02	5.05E-01	2.29E-01	1.61E-02	7.30E-03
1.50	38.10	2323.7668	7.3305	5.17E-02	6.98E-01	3.17E-01	1.59E-02	7.19E-03
1.75	44.45	2420.5904	7.6359	6.66E-02	9.00E-01	4.08E-01	1.56E-02	7.08E-03
2.00	50.80	2517.414	7.9414	8.22E-02	1.11E+00	5.03E-01	1.53E-02	6.96E-03
2.25	57.15	2614.2376	8.2468	9.83E-02	1.33E+00	6.02E-01	1.51E-02	6.84E-03
2.50	63.50	2711.0613	8.5522	1.15E-01	1.55E+00	7.04E-01	1.48E-02	6.71E-03
2.75	69.85	2807.8849	8.8577	1.32E-01	1.79E+00	8.11E-01	1.45E-02	6.58E-03
3.00	76.20	2904.7085	9.1631	1.50E-01	2.03E+00	9.20E-01	1.42E-02	6.44E-03
3.25	82.55	3001.5321	9.4685	1.69E-01	2.28E+00	1.03E+00	1.39E-02	6.30E-03
3.50	88.90	3098.3557	9.774	1.88E-01	2.54E+00	1.15E+00	1.36E-02	6.16E-03
3.75	95.25	3195.1793	10.079	2.08E-01	2.81E+00	1.27E+00	1.32E-02	6.01E-03
4.00	101.60	3292.003	10.385	2.28E-01	3.08E+00	1.40E+00	1.29E-02	5.85E-03
4.25	107.95	3388.8266	10.69	2.49E-01	3.36E+00	1.53E+00	1.26E-02	5.69E-03
4.50	114.30	3485.6502	10.996	2.71E-01	3.66E+00	1.66E+00	1.22E-02	5.53E-03
4.75	120.65	3582.4738	11.301	2.93E-01	3.96E+00	1.79E+00	1.18E-02	5.36E-03
5.00	127.00	3679.2974	11.607	3.16E-01	4.26E+00	1.93E+00	1.14E-02	5.19E-03
5.25	133.35	3776.121	11.912	3.39E-01	4.58E+00	2.08E+00	1.10E-02	5.01E-03
5.50	139.70	3872.9447	12.217	3.63E-01	4.90E+00	2.22E+00	1.06E-02	4.83E-03
5.75	146.05	3969.7683	12.523	3.88E-01	5.24E+00	2.38E+00	1.02E-02	4.64E-03
6.00	152.40	4066.5919	12.828	4.13E-01	5.58E+00	2.53E+00	9.81E-03	4.45E-03
6.25	158.75	4163.4155	13.134	4.39E-01	5.93E+00	2.69E+00	9.38E-03	4.25E-03
6.50	165.10	4260.2391	13.439	4.66E-01	6.29E+00	2.85E+00	8.93E-03	4.05E-03
6.75	171.45	4357.0627	13.745	4.93E-01	6.65E+00	3.02E+00	8.48E-03	3.85E-03
7.00	177.80	4453.8864	14.05	5.20E-01	7.03E+00	3.19E+00	8.02E-03	3.64E-03
7.25	184.15	4550.71	14.356	5.49E-01	7.41E+00	3.36E+00	7.54E-03	3.42E-03
7.50	190.50	4647.5336	14.661	5.78E-01	7.80E+00	3.54E+00	7.06E-03	3.20E-03
7.75	196.85	4744.3572	14.966	6.07E-01	8.20E+00	3.72E+00	6.57E-03	2.98E-03
8.00	203.20	4841.1808	15.272	6.37E-01	8.60E+00	3.90E+00	6.06E-03	2.75E-03
8.25	209.55	4938.0044	15.577	6.68E-01	9.02E+00	4.09E+00	5.55E-03	2.52E-03
8.50	215.90	5034.8281	15.883	6.99E-01	9.44E+00	4.28E+00	5.03E-03	2.28E-03
8.75	222.25	5131.6517	16.188	7.31E-01	9.87E+00	4.48E+00	4.49E-03	2.04E-03
9.00	228.60	5228.4753	16.494	7.64E-01	1.03E+01	4.68E+00	3.95E-03	1.79E-03
9.25	234.95	4938.0044	15.577	7.96E-01	1.07E+01	4.87E+00	3.41E-03	1.55E-03
9.50	241.30	4647.5336	14.661	8.26E-01	1.12E+01	5.06E+00	2.91E-03	1.32E-03
9.75	247.65	4357.0627	13.745	8.54E-01	1.15E+01	5.23E+00	2.44E-03	1.11E-03
10.00	254.00	4066.5919	12.828	8.81E-01	1.19E+01	5.39E+00	1.99E-03	9.05E-04
10.25	260.35	3776.121	11.912	9.05E-01	1.22E+01	5.54E+00	1.58E-03	7.18E-04
10.50	266.70	3485.6502	10.996	9.28E-01	1.25E+01	5.68E+00	1.20E-03	5.44E-04
10.75	273.05	3195.1793	10.079	9.49E-01	1.28E+01	5.81E+00	8.49E-04	3.85E-04
11.00	279.40	2904.7085	9.1631	9.68E-01	1.31E+01	5.93E+00	5.30E-04	2.40E-04
11.25	285.75	2614.2376	8.2468	9.86E-01	1.33E+01	6.04E+00	2.39E-04	1.08E-04
11.50	292.10	2323.7668	7.3305	1.00E+00	1.35E+01	6.12E+00	0.00E+00	0.00E+00
11.75	298.45	2033.2959	6.4142	1.00E+00	1.35E+01	6.12E+00	0.00E+00	0.00E+00
12.00	304.80	1742.8251	5.4979	1.00E+00	1.35E+01	6.12E+00	0.00E+00	0.00E+00

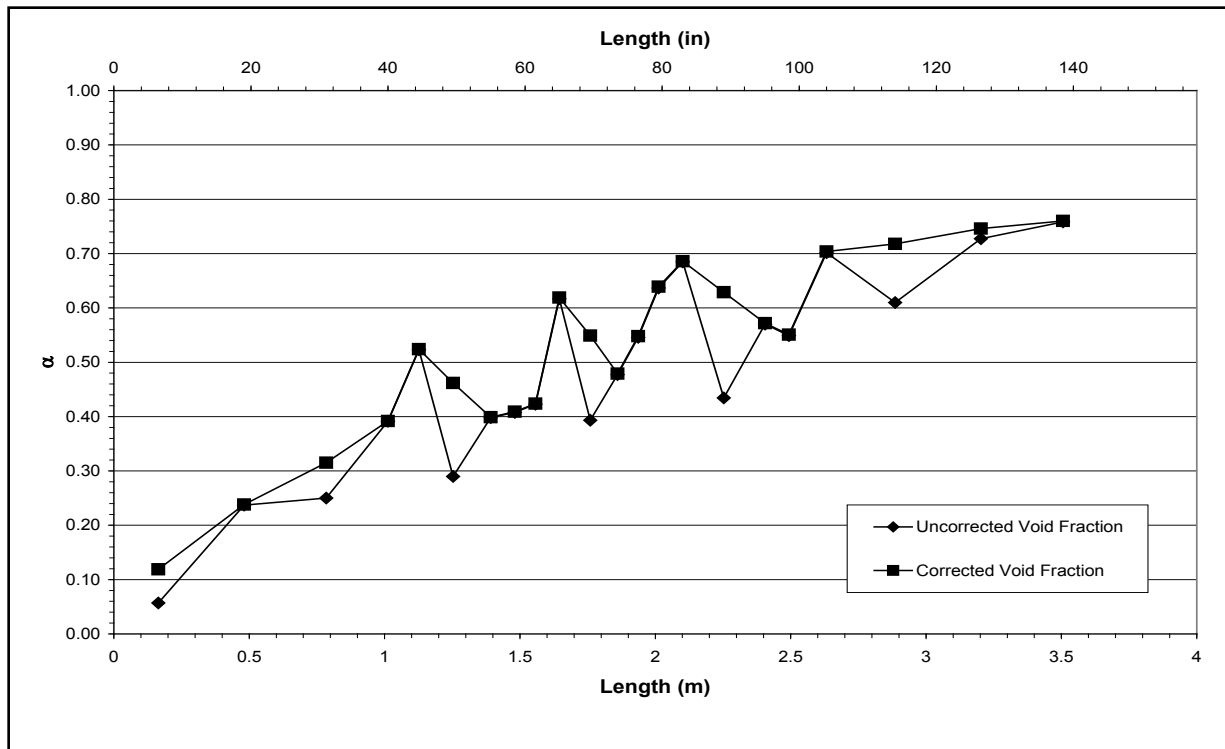


Figure A-360 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637L for Time Period 7170 to 7270 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-M

Test Conditions

Date: 6/20/2003

Steady-state time window: 7378 – 7589 seconds

Inlet flow rate: 0.376 cm/sec (0.148 in./sec)

Inlet mass flow rate: 0.017 kg/sec (0.038 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

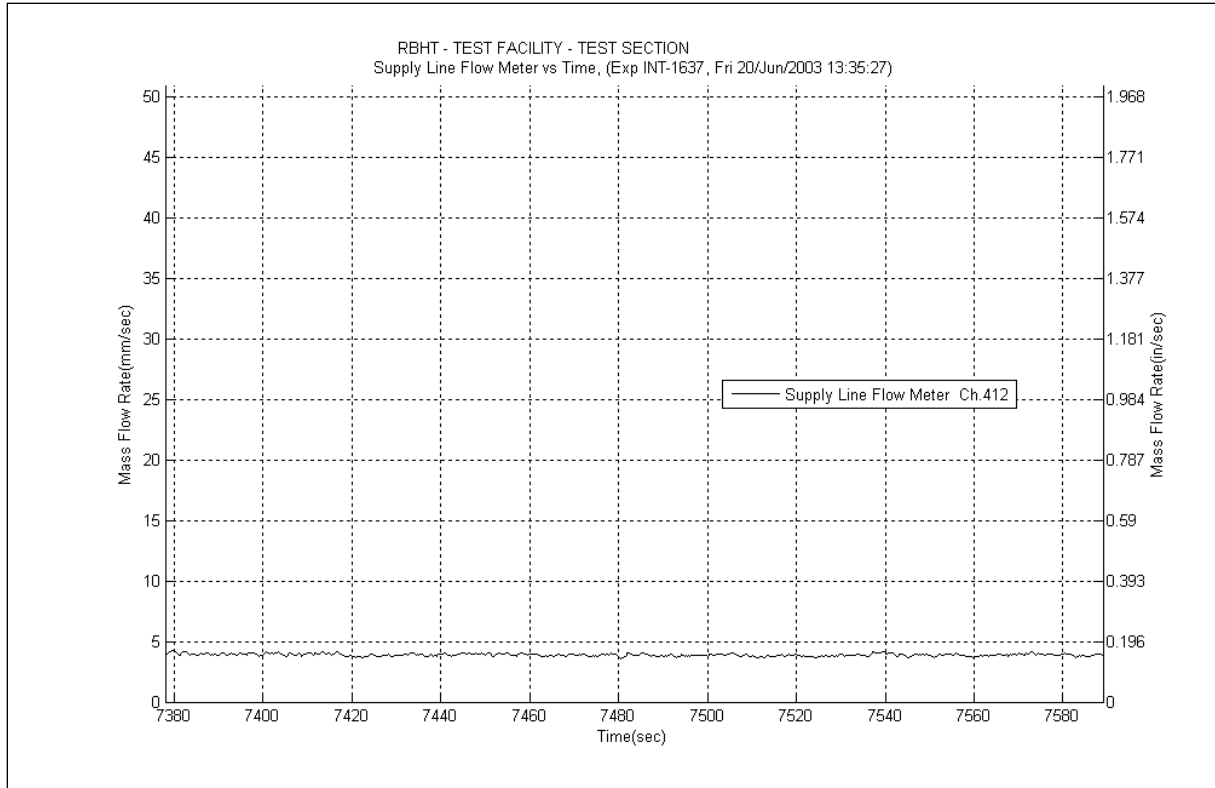


Figure A-361 Inlet Flow Plot for Experiment 1637M

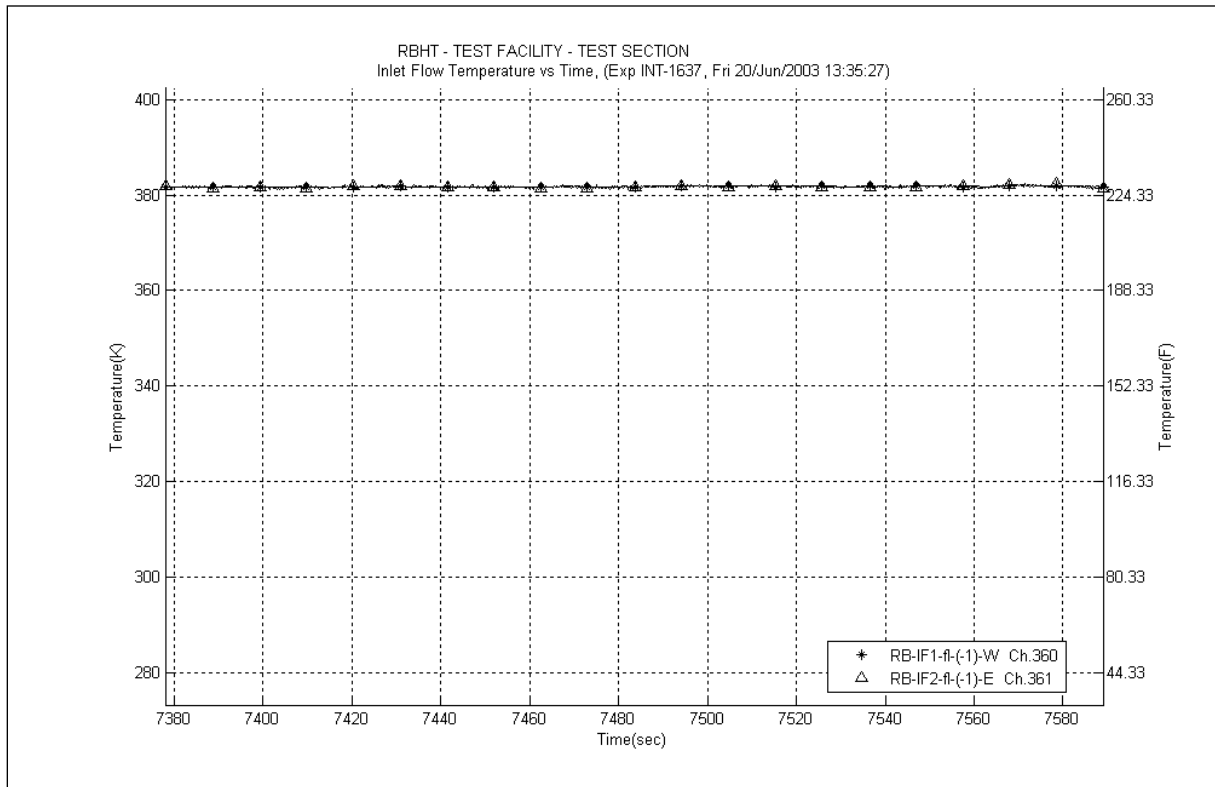


Figure A-362 Inlet Temperature Plot for Experiment 1637M

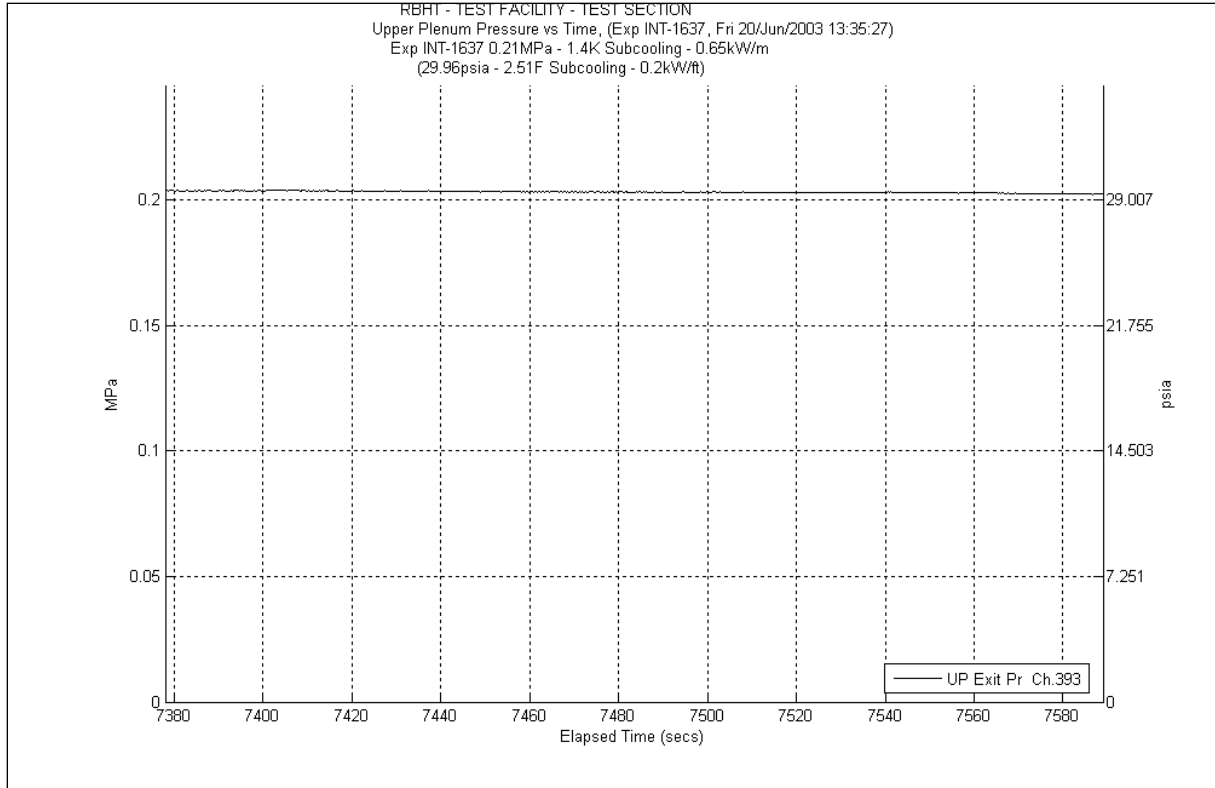


Figure A-363 System Pressure Plot for Experiment 1637M

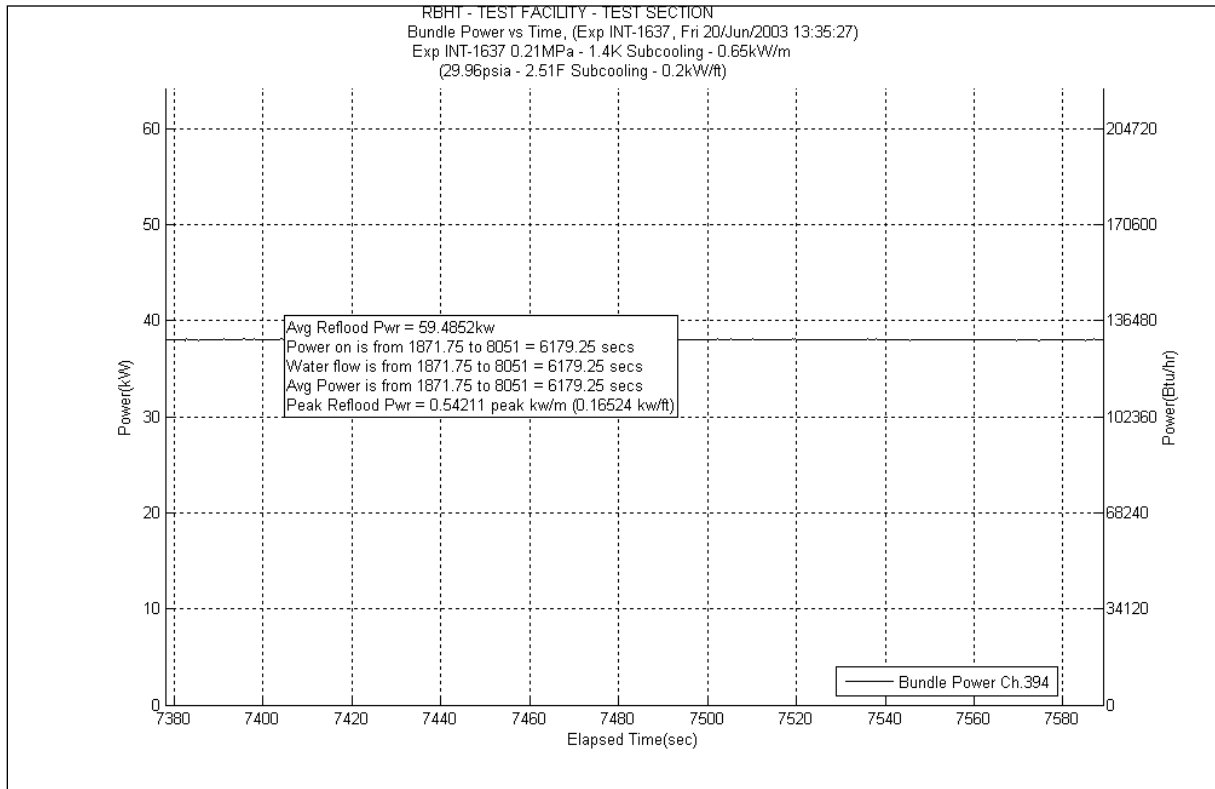


Figure A-364 Bundle Power Plot for Experiment 1637M

Table A-145 Data Results for RBHT Test 1637M for Time Period 7378 to 7589 seconds

Results for RBHT Test 1637

Valid Time Period 7378 to 7589 seconds

Collapsed Liquid Level = 72.519 inches = 1841.98 mm

(Z_{sv}) Onset of Significant Void = 6.5 inches = 165 mm

($Z_{2\phi}$) Two-Phase Level (Dryout) = 139.50 inches = 3543.30 mm

(S) Level Swell = 1.988

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.863	7.806	373.733	0.029	1.389	0.000	0.000	0.000	0.000	7.772	372.125	4327.772	207214.8356	0.864	0.860	0.868
*	120-133	3048-3378	383	0.795	13.830	662.176	0.034	1.628	0.000	0.000	2.236	107.052	11.56	553.496	4339.332	207768.3314	0.829	0.825	0.833
*	108-120	2743-3048	382	0.660	21.199	1015.022	0.032	1.532	0.000	0.000	6.117	292.892	15.05	720.598	4354.382	208488.9292	0.758	0.754	0.762
	100-108	2540-2743	381	0.722	11.550	553.015	0.035	1.676	0.016	0.766	0.000	0.000	11.5	550.623	4365.882	209039.5522	0.723	0.719	0.727
	97-100	2464-2540	380	0.597	6.284	300.876	0.013	0.622	0.009	0.431	0.000	0.000	6.261	299.778	4372.143	209339.3305	0.598	0.595	0.601
	93-97	2362-2464	379	0.601	8.294	397.107	0.018	0.862	0.012	0.575	0.000	0.000	8.262	395.587	4380.405	209734.9172	0.602	0.599	0.605
*	85-93	2159-2362	378	0.441	23.240	1112.744	0.033	1.580	0.024	1.149	8.543	409.048	14.64	700.967	4395.045	210435.8841	0.648	0.645	0.651
	81-85	2057-2159	377	0.692	6.403	306.595	0.015	0.718	0.011	0.527	0.000	0.000	6.376	305.285	4401.421	210741.1686	0.693	0.690	0.696
	78-81	1981-2057	376	0.641	5.588	267.556	0.011	0.527	0.008	0.383	0.000	0.000	5.565	266.454	4406.986	211007.6223	0.643	0.640	0.646
	75-78	1905-1981	375	0.550	7.006	335.440	0.011	0.527	0.008	0.383	0.000	0.000	6.983	334.348	4413.969	211341.9701	0.552	0.549	0.555
	72-75	1829-1905	374	0.499	7.811	373.982	0.010	0.479	0.008	0.383	0.000	0.000	7.791	373.035	4421.76	2111715.0052	0.5	0.498	0.503
*	67-72	1702-1829	373	0.391	15.824	757.661	0.016	0.766	0.013	0.622	4.465	213.789	11.33	542.483	4433.09	212257.4885	0.564	0.561	0.567
	63-67	1600-1702	372	0.626	7.764	371.744	0.012	0.575	0.010	0.479	0.000	0.000	7.74	370.593	4440.83	212628.0817	0.627	0.624	0.630
	60-63	1524-1600	371	0.428	8.907	426.448	0.008	0.383	0.007	0.335	0.000	0.000	8.889	425.608	4449.719	213053.6893	0.429	0.427	0.431
	57-60	1448-1524	370	0.413	9.151	438.135	0.008	0.383	0.007	0.335	0.000	0.000	9.135	437.386	4458.854	213491.0754	0.414	0.412	0.416
	53-57	1346-1448	369	0.402	12.417	594.541	0.010	0.479	0.009	0.431	0.000	0.000	12.4	593.715	4471.254	214084.7906	0.403	0.401	0.405
*	46-53	1168-1346	368	0.290	25.806	1235.581	0.015	0.718	0.015	0.718	6.456	309.099	19.32	925.047	4490.574	215009.8372	0.468	0.466	0.470
	43-46	1092-1168	367	0.533	7.276	348.370	0.006	0.287	0.006	0.287	0.000	0.000	7.261	347.659	4497.835	215357.4957	0.534	0.531	0.537
	37-43	940-1092	366	0.405	18.545	887.958	0.011	0.527	0.012	0.575	0.000	0.000	18.52	886.742	4516.355	216244.2381	0.406	0.404	0.408
*	25-37	635-940	365	0.260	46.122	2208.331	0.017	0.814	0.021	1.005	4.404	210.863	41.68	1995.649	4558.035	218239.8872	0.331	0.329	0.333
	13-25	330-635	364	0.256	46.376	2220.516	0.010	0.479	0.018	0.862	0.000	0.000	46.33	2218.292	4604.365	220458.1795	0.256	0.255	0.257
*	0-13	0-330	363	0.068	62.896	3011.497	0.005	0.239	0.011	0.527	4.040	193.456	58.84	2817.274	4663.205	223275.4538	0.128	0.127	0.129

Table A-146 Energy Balance Results for RBHT Test 1637M for Time Period 7378 to 7589 seconds

Results for RBHT Test 1637 Valid Time Period 7378 to 7589 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1743.5295	5.5001	0.00E+00	0.00E+00	0.00E+00	1.23E-02	5.59E-03
0.25	6.35	1840.3922	5.8056	0.00E+00	0.00E+00	0.00E+00	1.23E-02	5.59E-03
0.50	12.70	1937.255	6.1112	6.84E-03	6.81E-02	3.09E-02	1.23E-02	5.56E-03
0.75	19.05	2034.1177	6.4168	2.38E-02	2.37E-01	1.07E-01	1.20E-02	5.46E-03
1.00	25.40	2130.9805	6.7223	4.15E-02	4.13E-01	1.87E-01	1.18E-02	5.36E-03
1.25	31.75	2227.8432	7.0279	6.01E-02	5.98E-01	2.71E-01	1.16E-02	5.26E-03
1.50	38.10	2324.706	7.3335	7.95E-02	7.91E-01	3.59E-01	1.14E-02	5.15E-03
1.75	44.45	2421.5687	7.639	9.97E-02	9.93E-01	4.50E-01	1.11E-02	5.04E-03
2.00	50.80	2518.4315	7.9446	1.21E-01	1.20E+00	5.45E-01	1.08E-02	4.92E-03
2.25	57.15	2615.2942	8.2501	1.43E-01	1.42E+00	6.44E-01	1.06E-02	4.80E-03
2.50	63.50	2712.157	8.5557	1.65E-01	1.65E+00	7.47E-01	1.03E-02	4.67E-03
2.75	69.85	2809.0197	8.8613	1.89E-01	1.88E+00	8.53E-01	1.00E-02	4.54E-03
3.00	76.20	2905.8825	9.1668	2.13E-01	2.12E+00	9.62E-01	9.71E-03	4.40E-03
3.25	82.55	3002.7452	9.4724	2.38E-01	2.37E+00	1.08E+00	9.40E-03	4.26E-03
3.50	88.90	3099.608	9.7779	2.64E-01	2.63E+00	1.19E+00	9.07E-03	4.12E-03
3.75	95.25	3196.4707	10.083	2.91E-01	2.90E+00	1.31E+00	8.74E-03	3.97E-03
4.00	101.60	3293.3335	10.389	3.19E-01	3.17E+00	1.44E+00	8.40E-03	3.81E-03
4.25	107.95	3390.1962	10.695	3.47E-01	3.46E+00	1.57E+00	8.05E-03	3.65E-03
4.50	114.30	3487.059	11	3.77E-01	3.75E+00	1.70E+00	7.69E-03	3.49E-03
4.75	120.65	3583.9217	11.306	4.07E-01	4.05E+00	1.84E+00	7.32E-03	3.32E-03
5.00	127.00	3680.7845	11.611	4.38E-01	4.36E+00	1.98E+00	6.94E-03	3.15E-03
5.25	133.35	3777.6472	11.917	4.69E-01	4.67E+00	2.12E+00	6.54E-03	2.97E-03
5.50	139.70	3874.51	12.222	5.02E-01	5.00E+00	2.27E+00	6.14E-03	2.79E-03
5.75	146.05	3971.3727	12.528	5.35E-01	5.33E+00	2.42E+00	5.73E-03	2.60E-03
6.00	152.40	4068.2355	12.834	5.70E-01	5.67E+00	2.57E+00	5.31E-03	2.41E-03
6.25	158.75	4165.0982	13.139	6.05E-01	6.02E+00	2.73E+00	4.88E-03	2.21E-03
6.50	165.10	4261.961	13.445	6.41E-01	6.38E+00	2.89E+00	4.43E-03	2.01E-03
6.75	171.45	4358.8237	13.75	6.77E-01	6.74E+00	3.06E+00	3.98E-03	1.81E-03
7.00	177.80	4455.6865	14.056	7.15E-01	7.12E+00	3.23E+00	3.52E-03	1.60E-03
7.25	184.15	4552.5492	14.361	7.53E-01	7.50E+00	3.40E+00	3.04E-03	1.38E-03
7.50	190.50	4649.412	14.667	7.92E-01	7.89E+00	3.58E+00	2.56E-03	1.16E-03
7.75	196.85	4746.2747	14.972	8.33E-01	8.29E+00	3.76E+00	2.07E-03	9.37E-04
8.00	203.20	4843.1375	15.278	8.73E-01	8.70E+00	3.94E+00	1.56E-03	7.09E-04
8.25	209.55	4940.0002	15.584	9.15E-01	9.11E+00	4.13E+00	1.05E-03	4.76E-04
8.50	215.90	5036.863	15.889	9.58E-01	9.53E+00	4.32E+00	5.24E-04	2.38E-04
8.75	222.25	5133.7257	16.195	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
9.00	228.60	5230.5885	16.5	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
9.25	234.95	4940.0002	15.584	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
9.50	241.30	4649.412	14.667	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
9.75	247.65	4358.8237	13.75	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
10.00	254.00	4068.2355	12.834	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
10.25	260.35	3777.6472	11.917	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
10.50	266.70	3487.059	11	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
10.75	273.05	3196.4707	10.083	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
11.00	279.40	2905.8825	9.1668	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
11.25	285.75	2615.2942	8.2501	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
11.50	292.10	2324.706	7.3335	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
11.75	298.45	2034.1177	6.4168	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00
12.00	304.80	1743.5295	5.5001	1.00E+00	9.96E+00	4.52E+00	0.00E+00	0.00E+00

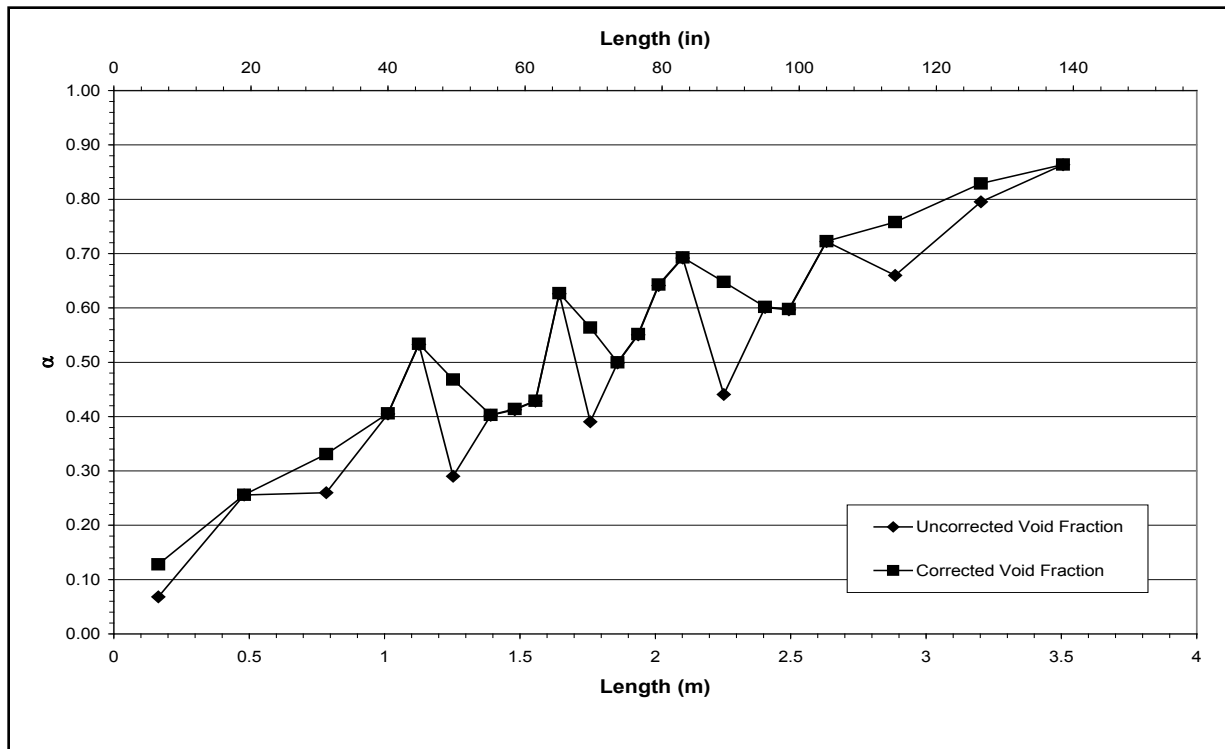


Figure A-365 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637M for Time Period 7378 to 7589 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1637-N

Test Conditions

Date: 6/20/2003

Steady-state time window: 7790 – 7937 seconds

Inlet flow rate: 0.381 cm/sec (0.150 in./sec)

Inlet mass flow rate: 0.018 kg/sec (0.039 lbm/sec)

Inlet flow temperature: 381.8 K (227.6 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.04 kW

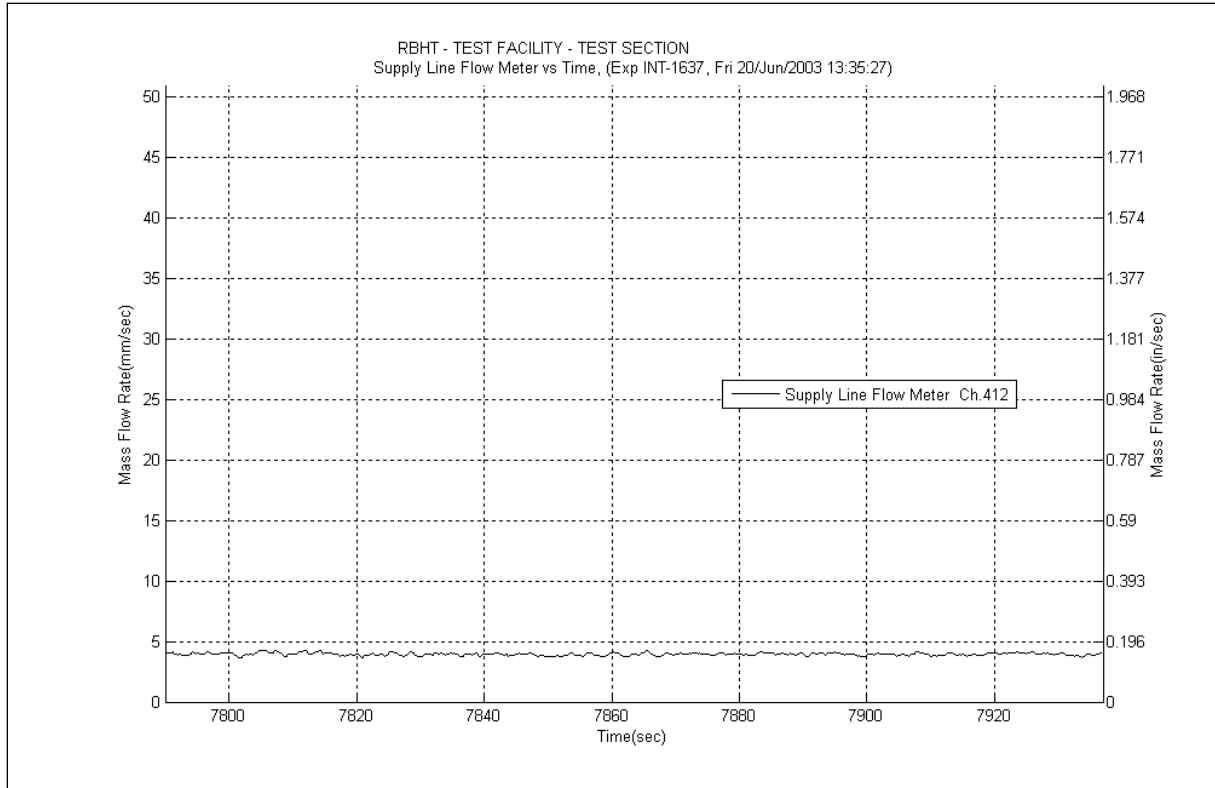


Figure A-366 Inlet Flow Plot for Experiment 1637N

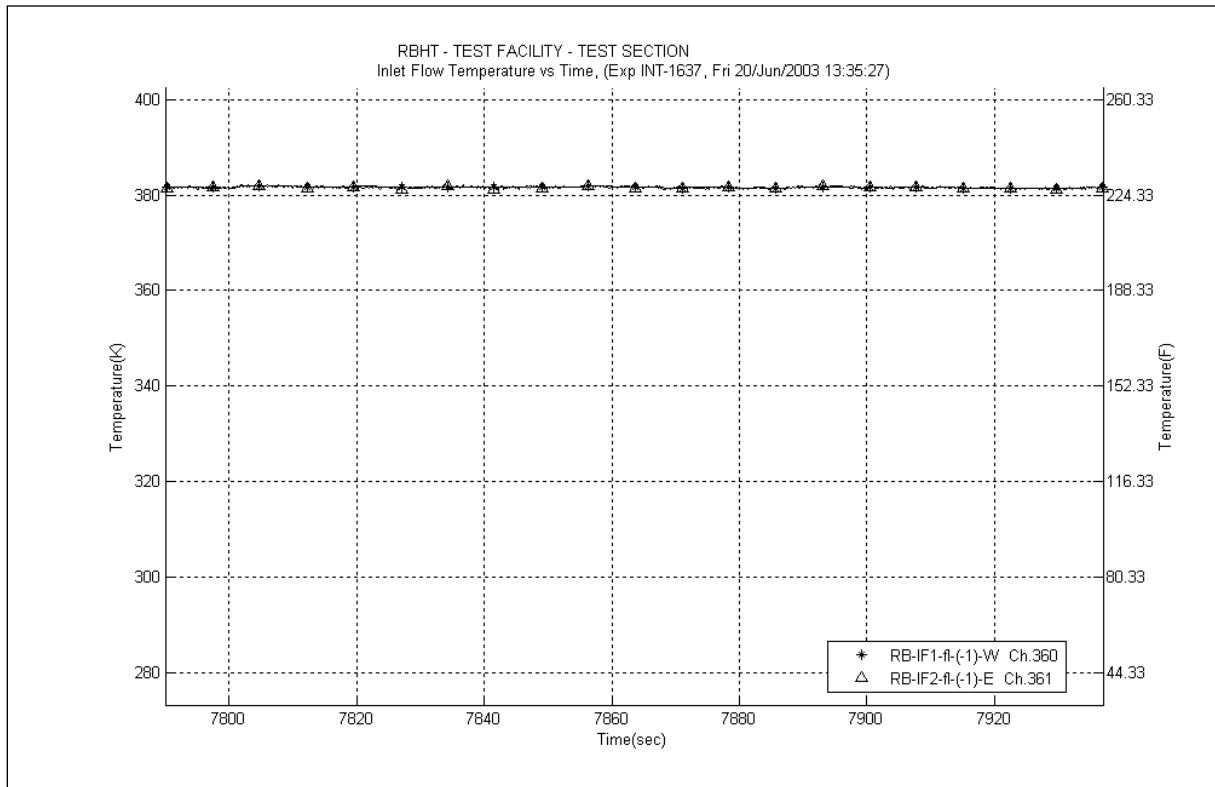


Figure A-367 Inlet Temperature Plot for Experiment 1637N

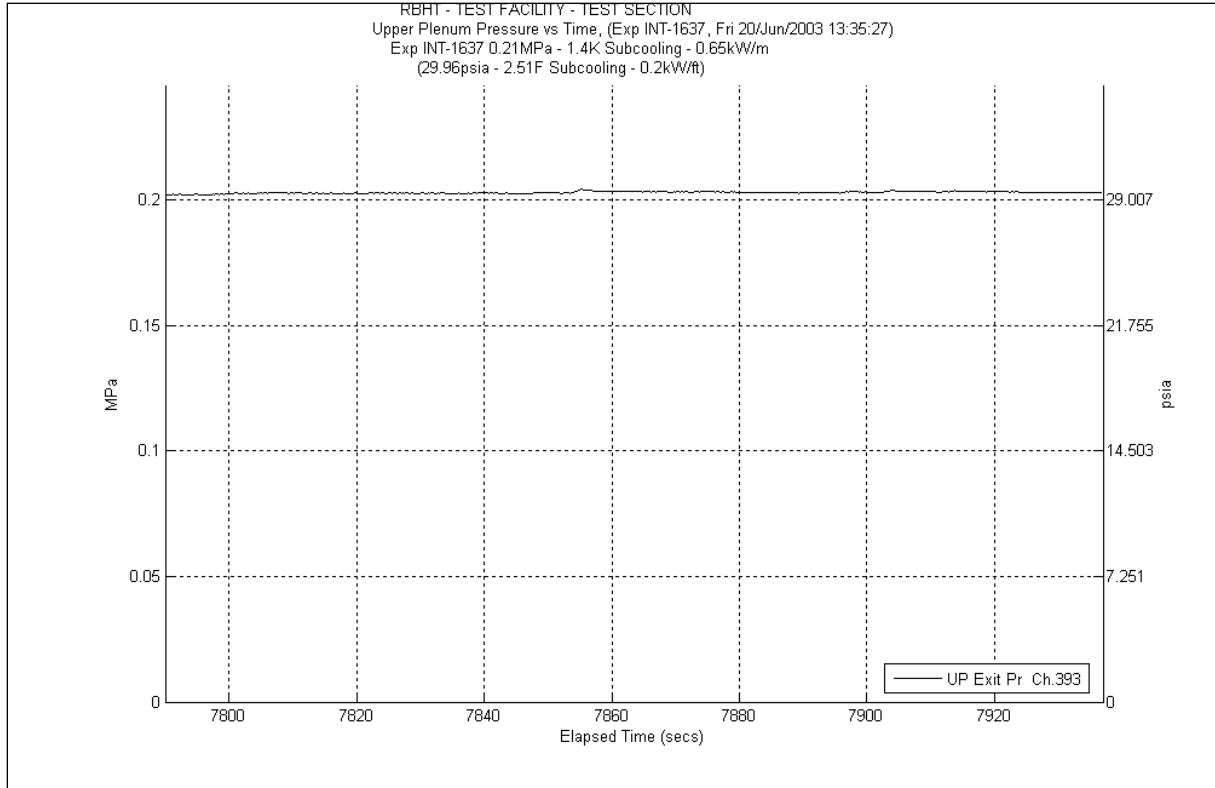


Figure A-368 System Pressure Plot for Experiment 1637N

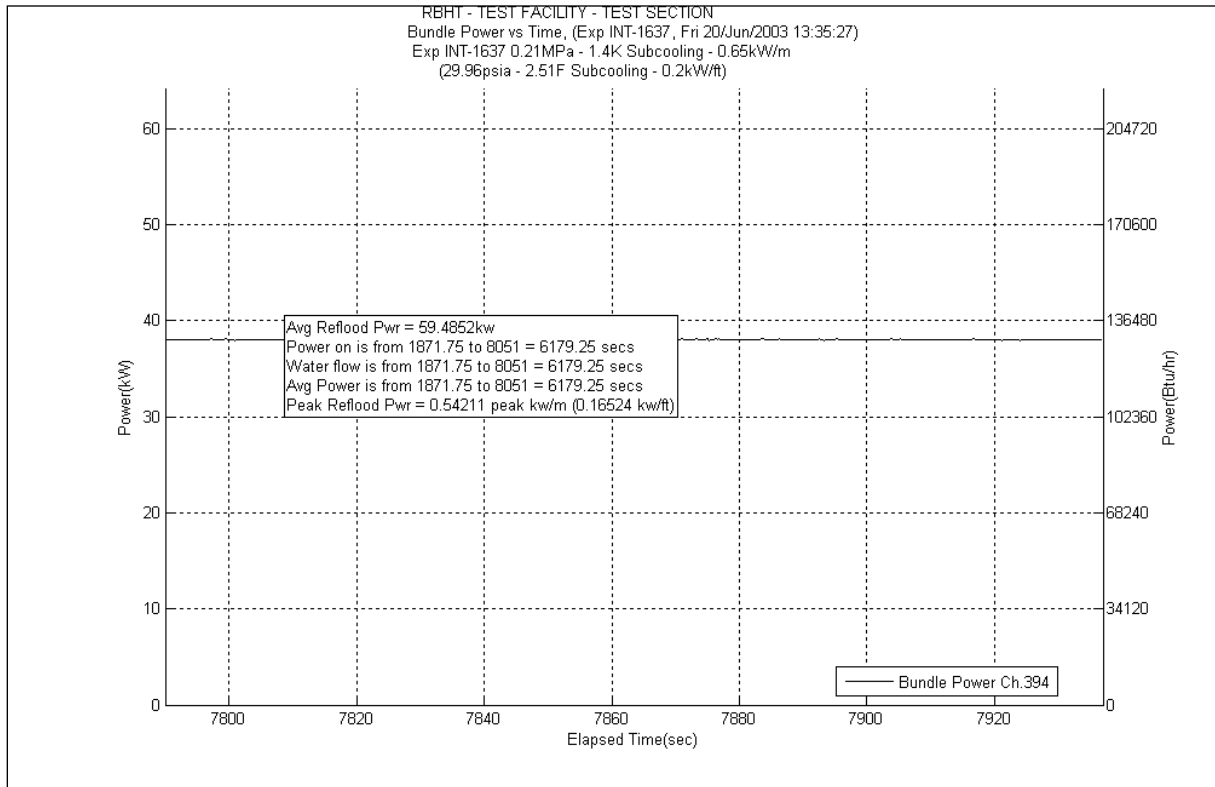


Figure A-369 Bundle Power Plot for Experiment 1637N

Table A-147 Data Results for RBHT Test 1637N for Time Period 7790 to 7937 seconds

Results for RBHT Test 1637

Valid Time Period 7790 to 7937 seconds

Collapsed Liquid Level = 65.604 inches = 1666.35 mm

(Z_{sv}) Onset of Significant Void = 6.5 inches = 165 mm

($Z_{2\phi}$) Two-Phase Level (Dryout) = 120.90 inches = 3070.86 mm

(S) Level Swell = 1.909

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.992	0.436	20.887	0.030	1.436	0.000	0.000	0.000	0.000	0.408	19.535	4320.408	206862.2454	0.993	0.988	0.998
*	120-133	3048-3378	383	0.967	2.202	105.431	0.035	1.676	0.000	0.000	-1.679	-80.392	3.846	184.147	4324.254	207046.3929	0.943	0.938	0.948
*	108-120	2743-3048	382	0.853	9.192	440.125	0.033	1.580	0.000	0.000	-0.602	-28.815	9.761	467.359	4334.015	207513.752	0.843	0.839	0.847
	100-108	2540-2743	381	0.792	8.637	413.518	0.037	1.772	0.020	0.958	0.000	0.000	8.578	410.717	4342.593	207924.4689	0.794	0.790	0.798
	97-100	2464-2540	380	0.694	4.767	228.268	0.014	0.670	0.010	0.479	0.000	0.000	4.744	227.144	4347.337	208151.6128	0.695	0.692	0.698
	93-97	2362-2464	379	0.679	6.673	319.525	0.018	0.862	0.013	0.622	0.000	0.000	6.639	317.877	4353.976	208469.4899	0.68	0.677	0.683
*	85-93	2159-2362	378	0.484	21.438	1026.460	0.034	1.628	0.024	1.149	7.640	365.808	13.74	657.875	4367.716	209127.3646	0.669	0.666	0.672
	81-85	2057-2159	377	0.657	7.125	341.159	0.016	0.766	0.012	0.575	0.000	0.000	7.097	339.806	4374.813	209467.1708	0.658	0.655	0.661
	78-81	1981-2057	376	0.599	6.248	299.136	0.011	0.527	0.008	0.383	0.000	0.000	6.225	298.055	4381.038	209765.2254	0.6	0.597	0.603
	75-78	1905-1981	375	0.512	7.603	364.035	0.011	0.527	0.008	0.383	0.000	0.000	7.582	363.028	4388.62	210128.2535	0.513	0.510	0.516
	72-75	1829-1905	374	0.452	8.538	408.794	0.010	0.479	0.008	0.383	0.000	0.000	8.518	407.844	4397.138	210536.0975	0.453	0.451	0.455
*	67-72	1702-1829	373	0.361	16.598	794.711	0.016	0.766	0.013	0.622	3.909	187.158	12.66	606.164	4409.798	211142.2616	0.512	0.509	0.515
	63-67	1600-1702	372	0.571	8.917	426.946	0.012	0.575	0.010	0.479	0.000	0.000	8.893	425.799	4418.691	211568.0607	0.572	0.569	0.575
	60-63	1524-1600	371	0.386	9.566	458.028	0.008	0.383	0.007	0.335	0.000	0.000	9.545	457.017	4428.236	212025.0777	0.387	0.385	0.389
	57-60	1448-1524	370	0.380	9.660	462.504	0.008	0.383	0.007	0.335	0.000	0.000	9.642	461.661	4437.878	212486.7392	0.381	0.379	0.383
	53-57	1346-1448	369	0.369	13.103	627.364	0.010	0.479	0.009	0.431	0.000	0.000	13.08	626.274	4450.958	213113.0129	0.37	0.368	0.372
*	46-53	1168-1346	368	0.267	26.642	1275.615	0.016	0.766	0.015	0.718	5.811	278.222	20.8	995.909	4471.758	214108.9223	0.428	0.426	0.430
	43-46	1092-1168	367	0.484	8.034	384.674	0.006	0.287	0.006	0.287	0.000	0.000	8.02	384.000	4479.778	214492.9219	0.485	0.483	0.487
	37-43	940-1092	366	0.369	19.672	941.916	0.011	0.527	0.012	0.575	0.000	0.000	19.64	940.368	4499.418	215433.2902	0.369	0.367	0.371
*	25-37	635-940	365	0.260	46.138	2209.077	0.017	0.814	0.021	1.005	3.190	152.716	42.91	2054.542	4542.328	217487.832	0.311	0.309	0.313
	13-25	330-635	364	0.253	46.569	2229.716	0.011	0.527	0.018	0.862	0.000	0.000	46.52	2227.390	4588.848	219715.2216	0.253	0.252	0.254
*	0-13	0-330	363	0.068	62.948	3013.983	0.005	0.239	0.011	0.527	3.982	190.676	58.95	2822.541	4647.798	222537.7627	0.127	0.126	0.128

Table A-148 Energy Balance Results for RBHT Test 1637N for Time Period 7790 to 7937 seconds

Results for RBHT Test 1637 Valid Time Period 7790 to 7937 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1743.6499	5.5005	0.00E+00	0.00E+00	0.00E+00	1.25E-02	5.68E-03
0.25	6.35	1840.5194	5.806	0.00E+00	0.00E+00	0.00E+00	1.25E-02	5.68E-03
0.50	12.70	1937.3888	6.1116	6.43E-03	6.54E-02	2.97E-02	1.24E-02	5.65E-03
0.75	19.05	2034.2583	6.4172	2.31E-02	2.35E-01	1.06E-01	1.22E-02	5.55E-03
1.00	25.40	2131.1277	6.7228	4.05E-02	4.12E-01	1.87E-01	1.20E-02	5.45E-03
1.25	31.75	2227.9972	7.0284	5.88E-02	5.98E-01	2.71E-01	1.18E-02	5.35E-03
1.50	38.10	2324.8666	7.334	7.79E-02	7.92E-01	3.59E-01	1.16E-02	5.24E-03
1.75	44.45	2421.736	7.6395	9.78E-02	9.95E-01	4.51E-01	1.13E-02	5.13E-03
2.00	50.80	2518.6055	7.9451	1.19E-01	1.21E+00	5.47E-01	1.10E-02	5.01E-03
2.25	57.15	2615.4749	8.2507	1.40E-01	1.42E+00	6.46E-01	1.08E-02	4.89E-03
2.50	63.50	2712.3444	8.5563	1.62E-01	1.65E+00	7.49E-01	1.05E-02	4.76E-03
2.75	69.85	2809.2138	8.8619	1.86E-01	1.89E+00	8.56E-01	1.02E-02	4.63E-03
3.00	76.20	2906.0832	9.1674	2.10E-01	2.13E+00	9.67E-01	9.90E-03	4.49E-03
3.25	82.55	3002.9527	9.473	2.34E-01	2.38E+00	1.08E+00	9.59E-03	4.35E-03
3.50	88.90	3099.8221	9.7786	2.60E-01	2.64E+00	1.20E+00	9.27E-03	4.21E-03
3.75	95.25	3196.6916	10.084	2.86E-01	2.91E+00	1.32E+00	8.94E-03	4.06E-03
4.00	101.60	3293.561	10.39	3.14E-01	3.19E+00	1.45E+00	8.60E-03	3.90E-03
4.25	107.95	3390.4305	10.695	3.42E-01	3.47E+00	1.58E+00	8.25E-03	3.74E-03
4.50	114.30	3487.2999	11.001	3.70E-01	3.77E+00	1.71E+00	7.89E-03	3.58E-03
4.75	120.65	3584.1693	11.307	4.00E-01	4.07E+00	1.85E+00	7.52E-03	3.41E-03
5.00	127.00	3681.0388	11.612	4.30E-01	4.38E+00	1.99E+00	7.14E-03	3.24E-03
5.25	133.35	3777.9082	11.918	4.62E-01	4.70E+00	2.13E+00	6.74E-03	3.06E-03
5.50	139.70	3874.7777	12.223	4.94E-01	5.02E+00	2.28E+00	6.34E-03	2.88E-03
5.75	146.05	3971.6471	12.529	5.27E-01	5.36E+00	2.43E+00	5.93E-03	2.69E-03
6.00	152.40	4068.5165	12.834	5.60E-01	5.70E+00	2.59E+00	5.51E-03	2.50E-03
6.25	158.75	4165.386	13.14	5.95E-01	6.05E+00	2.74E+00	5.07E-03	2.30E-03
6.50	165.10	4262.2554	13.446	6.30E-01	6.41E+00	2.91E+00	4.63E-03	2.10E-03
6.75	171.45	4359.1249	13.751	6.66E-01	6.78E+00	3.07E+00	4.18E-03	1.90E-03
7.00	177.80	4455.9943	14.057	7.03E-01	7.15E+00	3.25E+00	3.72E-03	1.69E-03
7.25	184.15	4552.8638	14.362	7.41E-01	7.54E+00	3.42E+00	3.24E-03	1.47E-03
7.50	190.50	4649.7332	14.668	7.80E-01	7.93E+00	3.60E+00	2.76E-03	1.25E-03
7.75	196.85	4746.6026	14.973	8.19E-01	8.33E+00	3.78E+00	2.27E-03	1.03E-03
8.00	203.20	4843.4721	15.279	8.59E-01	8.74E+00	3.96E+00	1.76E-03	8.00E-04
8.25	209.55	4940.3415	15.585	9.00E-01	9.16E+00	4.15E+00	1.25E-03	5.67E-04
8.50	215.90	5037.211	15.89	9.42E-01	9.58E+00	4.35E+00	7.25E-04	3.29E-04
8.75	222.25	5134.0804	16.196	9.85E-01	1.00E+01	4.54E+00	1.90E-04	8.64E-05
9.00	228.60	5230.9498	16.501	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
9.25	234.95	4940.3415	15.585	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
9.50	241.30	4649.7332	14.668	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
9.75	247.65	4359.1249	13.751	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
10.00	254.00	4068.5165	12.834	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
10.25	260.35	3777.9082	11.918	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
10.50	266.70	3487.2999	11.001	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
10.75	273.05	3196.6916	10.084	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
11.00	279.40	2906.0832	9.1674	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
11.25	285.75	2615.4749	8.2507	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
11.50	292.10	2324.8666	7.334	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
11.75	298.45	2034.2583	6.4172	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00
12.00	304.80	1743.6499	5.5005	1.00E+00	1.02E+01	4.61E+00	0.00E+00	0.00E+00

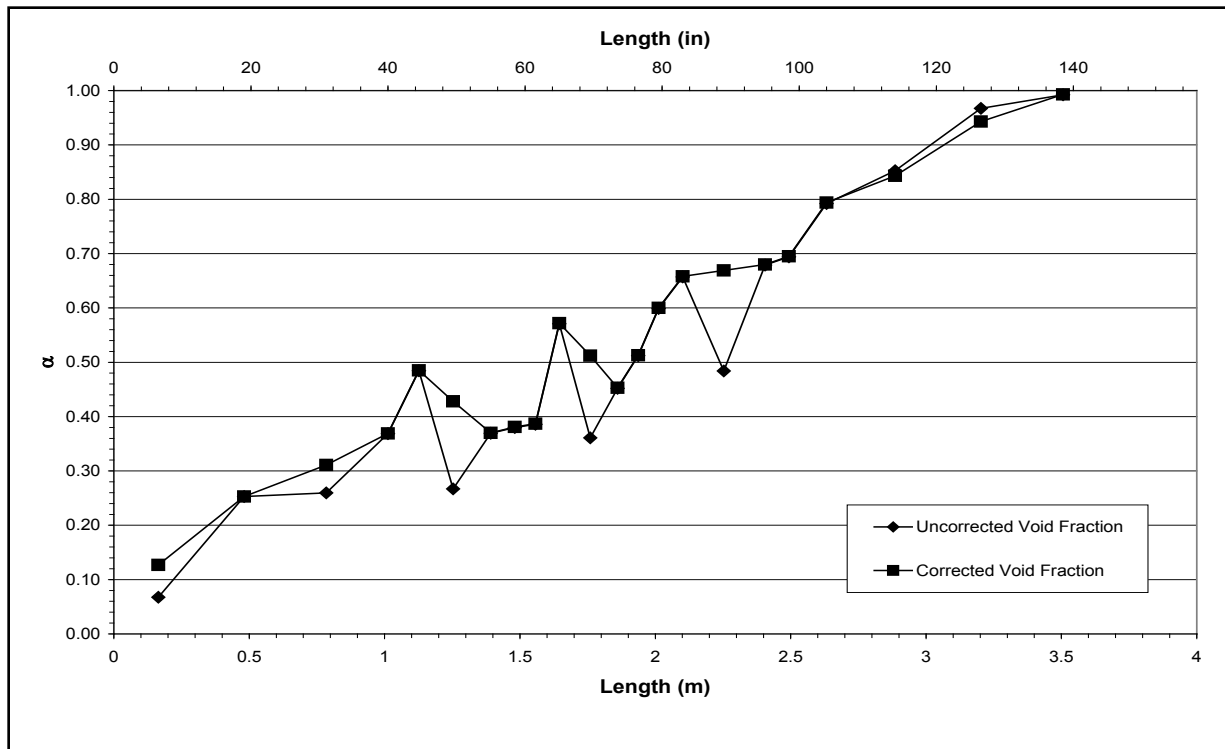


Figure A-370 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1637N for Time Period 7790 to 7937 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1647-A

Test Conditions

Date: 6/24/2003

Steady-state time window: 2835 – 2919 seconds

Inlet flow rate: 2.537 cm/sec (0.999 in./sec)

Inlet mass flow rate: 0.118 kg/sec (0.260 lbm/sec)

Inlet flow temperature: 369.5 K (205.4 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 80.95 kW

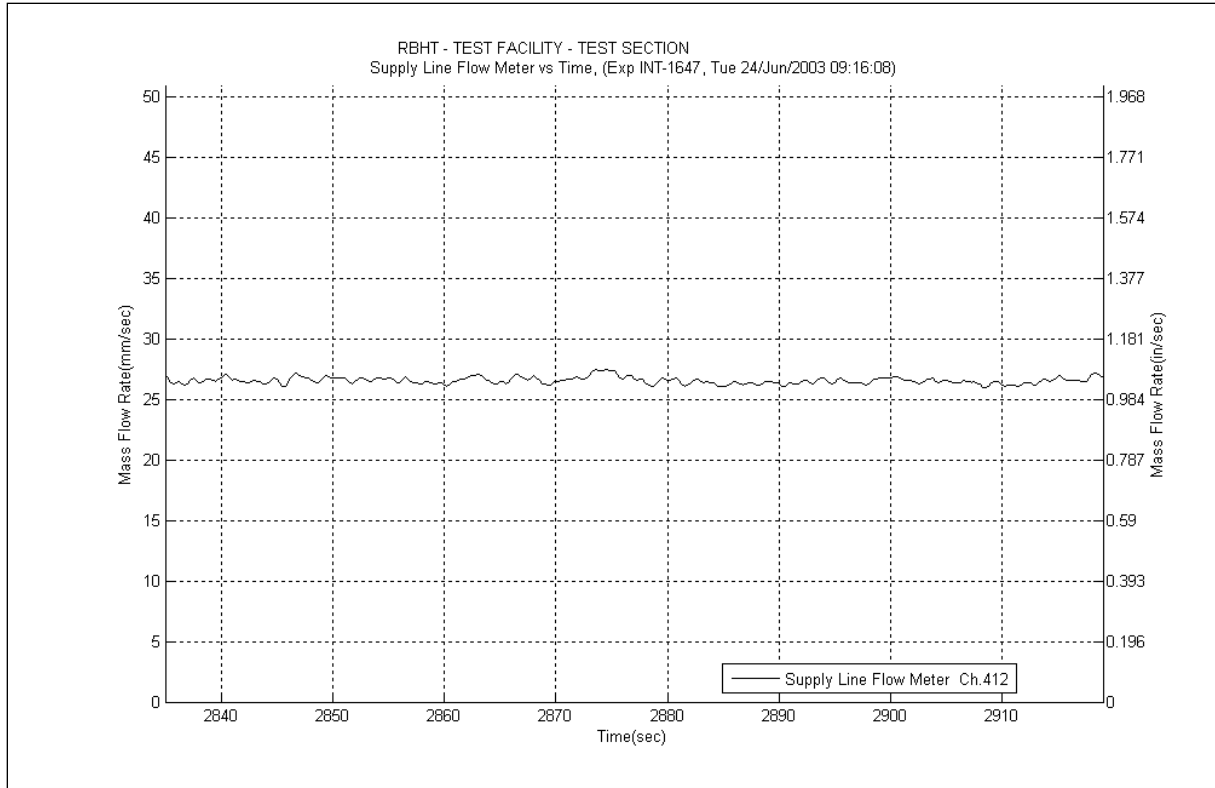


Figure A-371 Inlet Flow Plot for Experiment 1647A

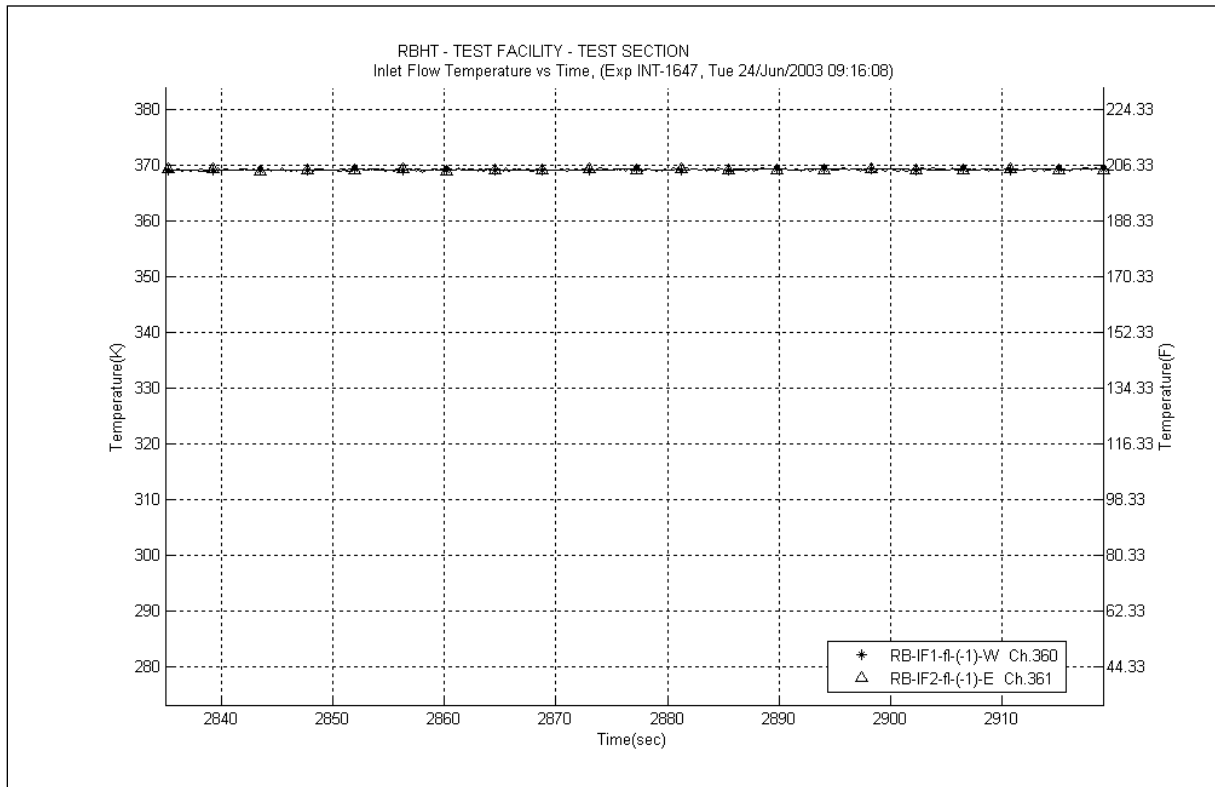


Figure A-372 Inlet Temperature Plot for Experiment 1647A

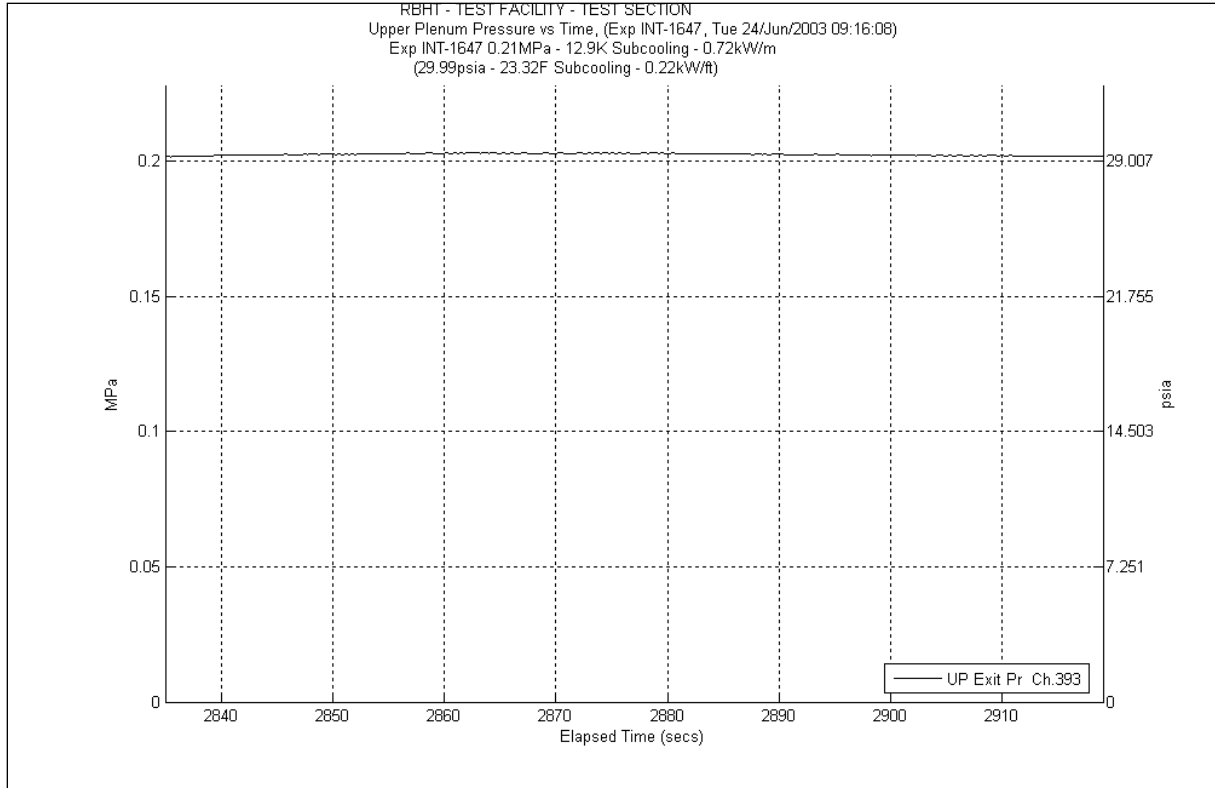


Figure A-373 System Pressure Plot for Experiment 1647A

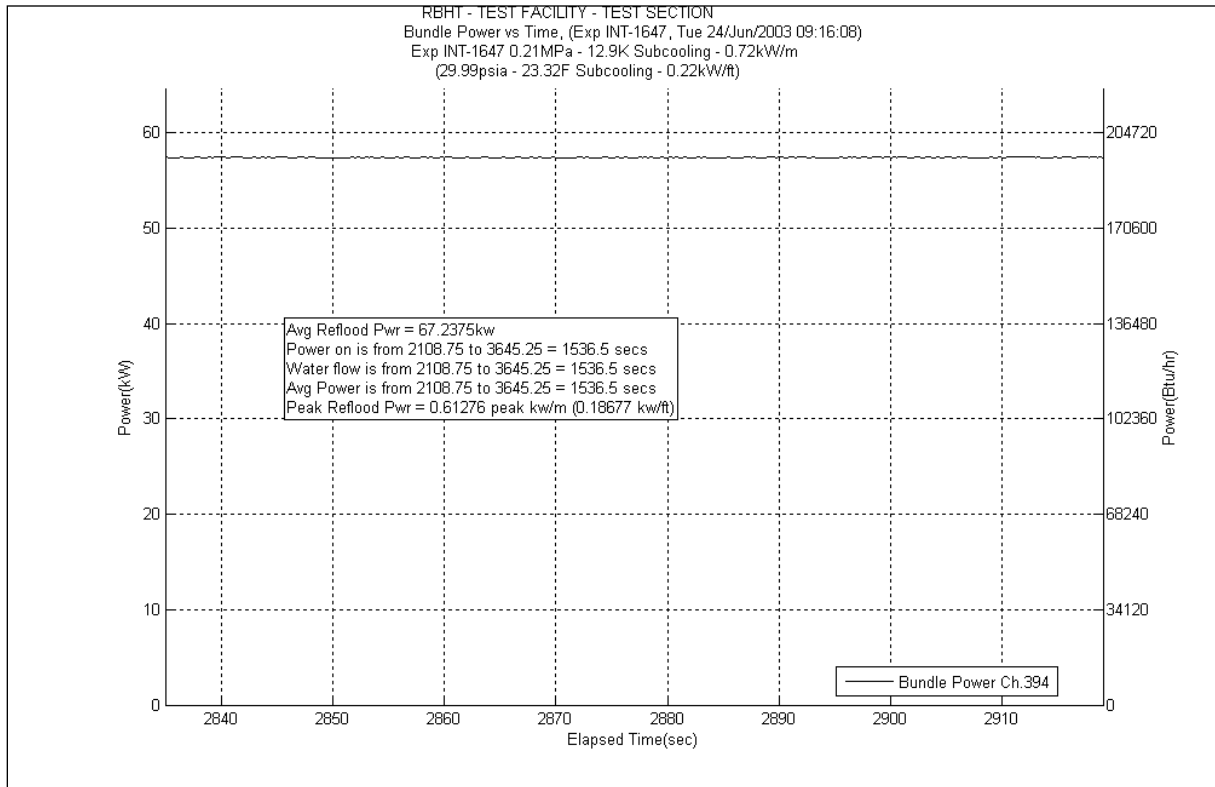


Figure A-374 Bundle Power Plot for Experiment 1647A

Table A-149 Data Results for RBHT Test 1647A for Time Period 2835 to 2919 seconds

Results for RBHT Test 1647
Valid Time Period 2835 to 2919 seconds
Collapsed Liquid Level = 84.610 inches = 2149.08 mm
(Z_{OSL}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.718	16.136	772.580	0.704	33.708	0.164	7.852	0.000	0.000	15.26	730.653	4335.26	207573.363	0.733	0.729	0.737
*	120-133	3048-3378	383	0.712	19.428	930.229	0.779	37.299	0.292	13.981	0.417	19.978	17.94	858.972	4353.2	208432.3348	0.734	0.730	0.738
*	108-120	2743-3048	382	0.641	22.404	1072.711	0.647	30.979	0.364	17.428	5.023	240.504	16.37	783.800	4369.57	209216.1346	0.737	0.733	0.741
	100-108	2540-2743	381	0.723	11.508	551.026	0.385	18.434	0.267	12.784	0.000	0.000	10.85	519.501	4380.42	209735.6354	0.739	0.735	0.743
	97-100	2464-2540	380	0.612	6.050	289.687	0.134	6.416	0.096	4.597	0.000	0.000	5.82	278.663	4386.24	210014.2985	0.626	0.623	0.629
	93-97	2362-2464	379	0.611	8.086	387.160	0.170	8.140	0.126	6.033	0.000	0.000	7.786	372.796	4394.026	210387.0941	0.625	0.622	0.628
*	85-93	2159-2362	378	0.457	22.570	1080.668	0.311	14.891	0.241	11.539	7.718	369.550	14.3	684.688	4408.326	211071.7818	0.656	0.653	0.659
	81-85	2057-2159	377	0.674	6.777	324.499	0.141	6.751	0.116	5.554	0.000	0.000	6.516	311.988	4414.842	211383.7696	0.686	0.683	0.689
	78-81	1981-2057	376	0.549	7.027	336.434	0.100	4.788	0.084	4.022	0.000	0.000	6.839	327.453	4421.681	211711.2227	0.561	0.558	0.564
	75-78	1905-1981	375	0.546	7.079	338.921	0.094	4.501	0.083	3.974	0.000	0.000	6.901	330.422	4428.582	212041.6443	0.557	0.554	0.560
	72-75	1829-1905	374	0.425	8.958	428.935	0.089	4.261	0.081	3.878	0.000	0.000	8.785	420.628	4437.367	212462.2724	0.436	0.434	0.438
*	67-72	1702-1829	373	0.405	15.461	740.255	0.136	6.512	0.130	6.224	2.425	116.088	12.77	611.431	4450.137	213073.7032	0.508	0.505	0.511
	63-67	1600-1702	372	0.571	8.912	426.697	0.098	4.692	0.100	4.788	0.000	0.000	8.712	417.133	4458.849	213490.836	0.581	0.578	0.584
	60-63	1524-1600	371	0.401	9.332	446.838	0.067	3.208	0.073	3.495	0.000	0.000	9.189	439.972	4468.038	213930.8077	0.41	0.408	0.412
	57-60	1448-1524	370	0.379	9.675	463.250	0.062	2.969	0.071	3.399	0.000	0.000	9.539	456.730	4477.577	214387.5375	0.388	0.386	0.390
	53-57	1346-1448	369	0.350	13.503	646.511	0.074	3.543	0.092	4.405	0.000	0.000	13.33	638.244	4490.907	215025.7813	0.358	0.356	0.360
*	46-53	1168-1346	368	0.251	27.239	1304.211	0.104	4.980	0.153	7.326	3.132	149.962	23.85	1141.944	4514.757	216167.7255	0.344	0.342	0.346
	43-46	1092-1168	367	0.323	10.542	504.776	0.034	1.628	0.062	2.969	0.000	0.000	10.44	499.870	4525.197	216667.5953	0.33	0.328	0.332
	37-43	940-1092	366	0.141	26.782	1282.329	0.047	2.250	0.119	5.698	0.000	0.000	26.61	1274.094	4551.807	217941.689	0.146	0.145	0.147
*	25-37	635-940	365	0.058	58.731	2812.073	0.038	1.819	0.056	2.681	2.297	109.999	56.34	2697.574	4608.147	220639.2627	0.096	0.091	0.101
	13-25	330-635	364	0.045	59.500	2848.874	0.004	0.192	0.000	0.000	0.000	0.000	59.48	2847.918	4667.627	223487.1803	0.045	0.043	0.047
*	0-13	0-330	363	0.035	65.135	3118.668	0.004	0.192	0.000	0.000	-0.829	-39.705	65.96	3158.182	4733.587	226645.3621	0.023	0.022	0.024

Table A-150 Energy Balance Results for RBHT Test 1647A for Time Period 2835 to 2919 seconds

Results for RBHT Test 1647 Valid Time Period 2835 to 2919 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2611.7973	8.2391	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
0.25	6.35	2756.8972	8.6968	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
0.50	12.70	2901.997	9.1546	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
0.75	19.05	3047.0969	9.6123	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
1.00	25.40	3192.1967	10.07	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
1.25	31.75	3337.2966	10.528	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
1.50	38.10	3482.3964	10.985	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
1.75	44.45	3627.4963	11.443	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
2.00	50.80	3772.5961	11.901	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
2.25	57.15	3917.696	12.359	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
2.50	63.50	4062.7959	12.816	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
2.75	69.85	4207.8957	13.274	0.00E+00	0.00E+00	0.00E+00	8.42E-02	3.82E-02
3.00	76.20	4352.9956	13.732	3.55E-03	2.42E-01	1.10E-01	8.39E-02	3.81E-02
3.25	82.55	4498.0954	14.19	9.07E-03	6.18E-01	2.80E-01	8.35E-02	3.79E-02
3.50	88.90	4643.1953	14.647	1.48E-02	1.01E+00	4.56E-01	8.30E-02	3.76E-02
3.75	95.25	4788.2951	15.105	2.07E-02	1.41E+00	6.38E-01	8.25E-02	3.74E-02
4.00	101.60	4933.395	15.563	2.67E-02	1.82E+00	8.25E-01	8.20E-02	3.72E-02
4.25	107.95	5078.4948	16.02	3.30E-02	2.24E+00	1.02E+00	8.15E-02	3.69E-02
4.50	114.30	5223.5947	16.478	3.94E-02	2.68E+00	1.22E+00	8.09E-02	3.67E-02
4.75	120.65	5368.6945	16.936	4.60E-02	3.13E+00	1.42E+00	8.04E-02	3.64E-02
5.00	127.00	5513.7944	17.394	5.28E-02	3.59E+00	1.63E+00	7.98E-02	3.62E-02
5.25	133.35	5658.8942	17.851	5.98E-02	4.07E+00	1.85E+00	7.92E-02	3.59E-02
5.50	139.70	5803.9941	18.309	6.69E-02	4.56E+00	2.07E+00	7.86E-02	3.56E-02
5.75	146.05	5949.0939	18.767	7.42E-02	5.05E+00	2.29E+00	7.80E-02	3.54E-02
6.00	152.40	6094.1938	19.225	8.18E-02	5.57E+00	2.52E+00	7.73E-02	3.51E-02
6.25	158.75	6239.2936	19.682	8.94E-02	6.09E+00	2.76E+00	7.67E-02	3.48E-02
6.50	165.10	6384.3935	20.14	9.73E-02	6.63E+00	3.01E+00	7.60E-02	3.45E-02
6.75	171.45	6529.4933	20.598	1.05E-01	7.18E+00	3.26E+00	7.54E-02	3.42E-02
7.00	177.80	6674.5932	21.055	1.14E-01	7.73E+00	3.51E+00	7.47E-02	3.39E-02
7.25	184.15	6819.693	21.513	1.22E-01	8.31E+00	3.77E+00	7.40E-02	3.35E-02
7.50	190.50	6964.7929	21.971	1.31E-01	8.89E+00	4.03E+00	7.32E-02	3.32E-02
7.75	196.85	7109.8927	22.429	1.39E-01	9.49E+00	4.31E+00	7.25E-02	3.29E-02
8.00	203.20	7254.9926	22.886	1.48E-01	1.01E+01	4.58E+00	7.17E-02	3.25E-02
8.25	209.55	7400.0924	23.344	1.58E-01	1.07E+01	4.86E+00	7.10E-02	3.22E-02
8.50	215.90	7545.1923	23.802	1.67E-01	1.14E+01	5.15E+00	7.02E-02	3.18E-02
8.75	222.25	7690.2921	24.26	1.76E-01	1.20E+01	5.44E+00	6.94E-02	3.15E-02
9.00	228.60	7835.392	24.717	1.86E-01	1.27E+01	5.74E+00	6.86E-02	3.11E-02
9.25	234.95	7400.0924	23.344	1.96E-01	1.33E+01	6.04E+00	6.78E-02	3.07E-02
9.50	241.30	6964.7929	21.971	2.05E-01	1.39E+01	6.32E+00	6.70E-02	3.04E-02
9.75	247.65	6529.4933	20.598	2.13E-01	1.45E+01	6.58E+00	6.63E-02	3.01E-02
10.00	254.00	6094.1938	19.225	2.21E-01	1.50E+01	6.82E+00	6.56E-02	2.98E-02
10.25	260.35	5658.8942	17.851	2.28E-01	1.55E+01	7.04E+00	6.50E-02	2.95E-02
10.50	266.70	5223.5947	16.478	2.35E-01	1.60E+01	7.25E+00	6.44E-02	2.92E-02
10.75	273.05	4788.2951	15.105	2.41E-01	1.64E+01	7.45E+00	6.39E-02	2.90E-02
11.00	279.40	4352.9956	13.732	2.47E-01	1.68E+01	7.62E+00	6.34E-02	2.88E-02
11.25	285.75	3917.696	12.359	2.52E-01	1.72E+01	7.78E+00	6.30E-02	2.86E-02
11.50	292.10	3482.3964	10.985	2.57E-01	1.75E+01	7.92E+00	6.26E-02	2.84E-02
11.75	298.45	3047.0969	9.6123	2.61E-01	1.78E+01	8.05E+00	6.23E-02	2.82E-02
12.00	304.80	2611.7973	8.2391	2.64E-01	1.80E+01	8.16E+00	6.20E-02	2.81E-02

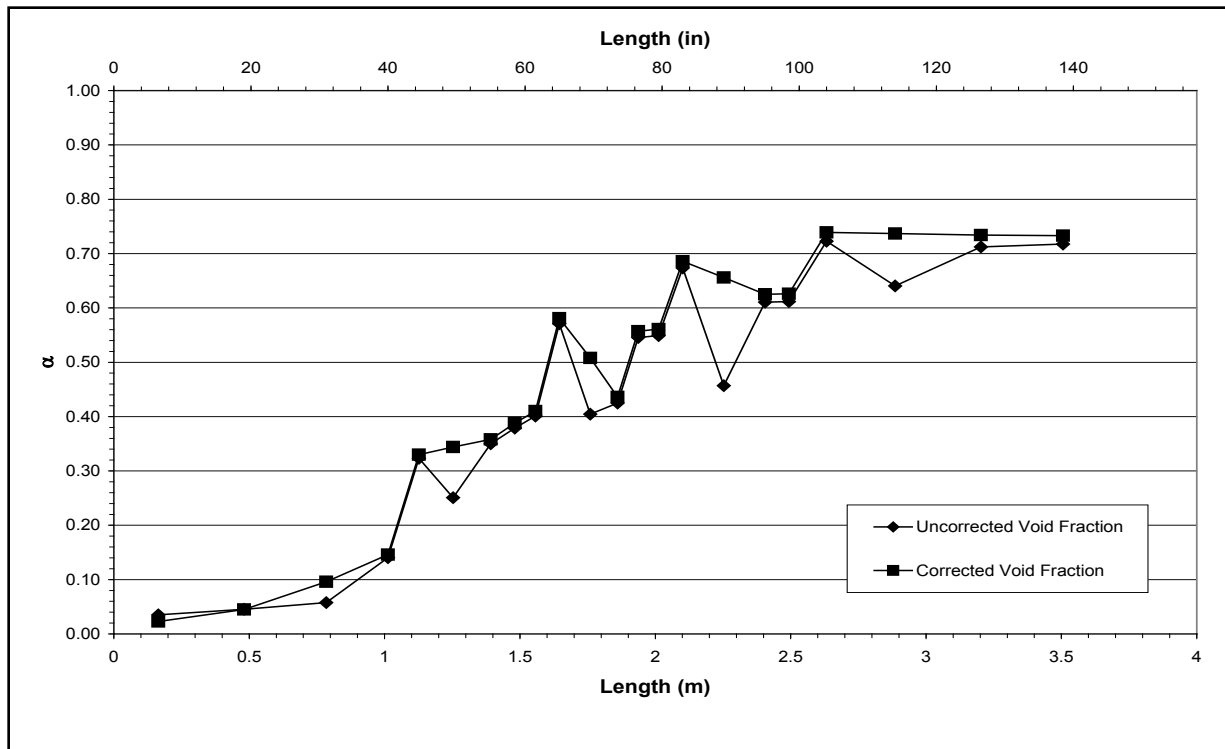


Figure A-375 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1647A for Time Period 2835 to 2919 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1647-B

Test Conditions

Date: 6/24/2003

Steady-state time window: 3030 – 3132 seconds

Inlet flow rate: 2.543 cm/sec (1.001 in./sec)

Inlet mass flow rate: 0.119 kg/sec (0.262 lbm/sec)

Inlet flow temperature: 369.5 K (205.4 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 80.95 kW

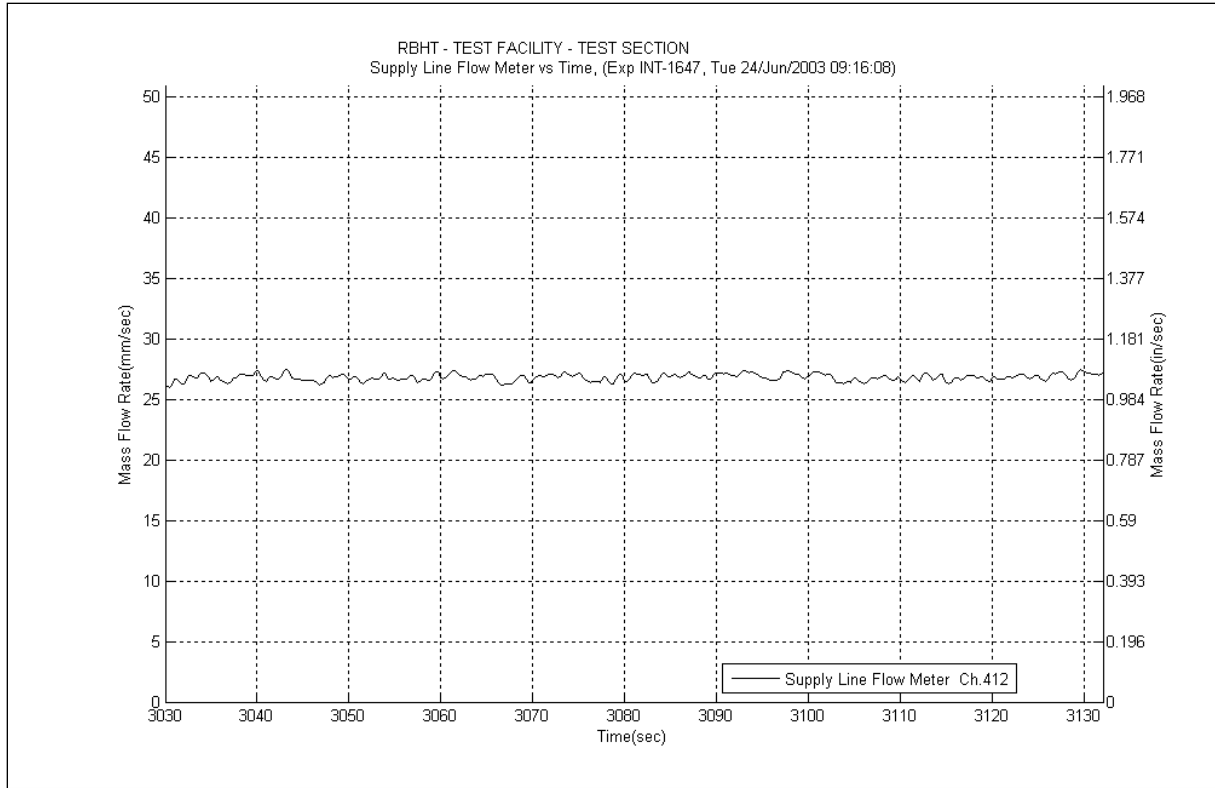


Figure A-376 Inlet Flow Plot for Experiment 1647B

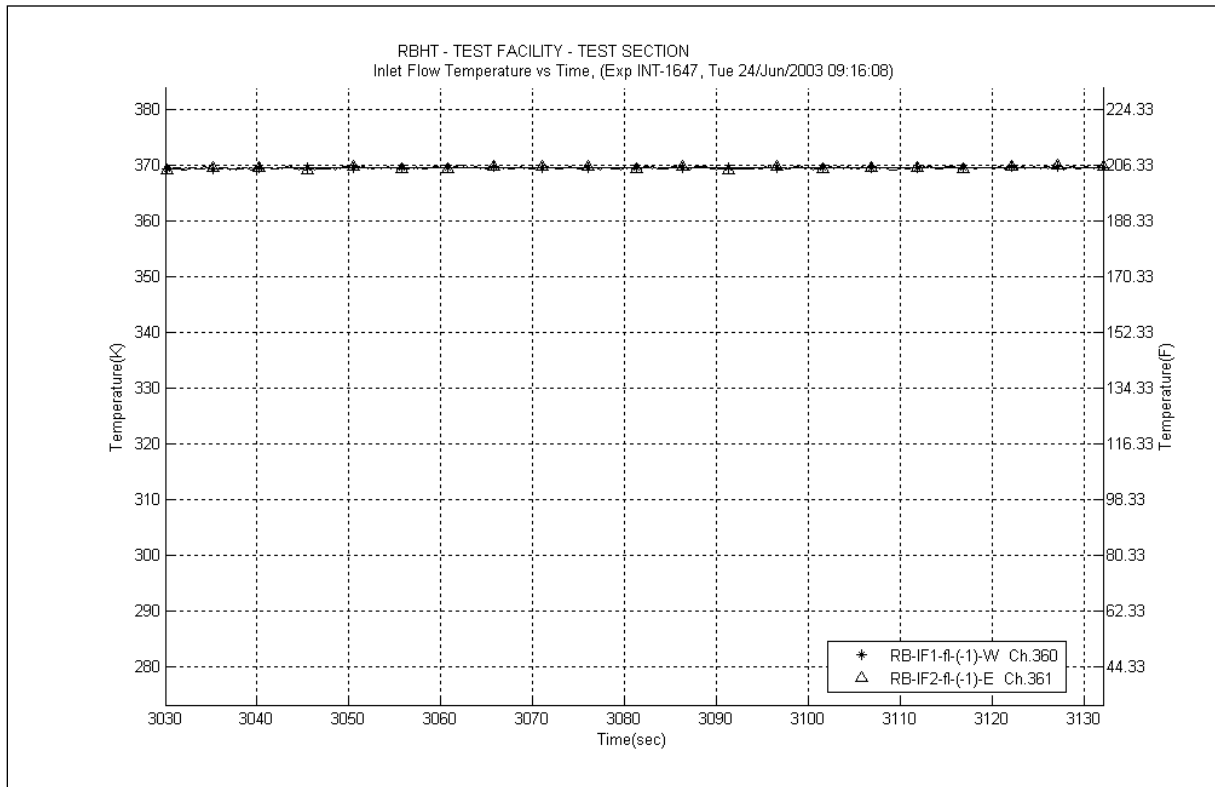


Figure A-377 Inlet Temperature Plot for Experiment 1647B

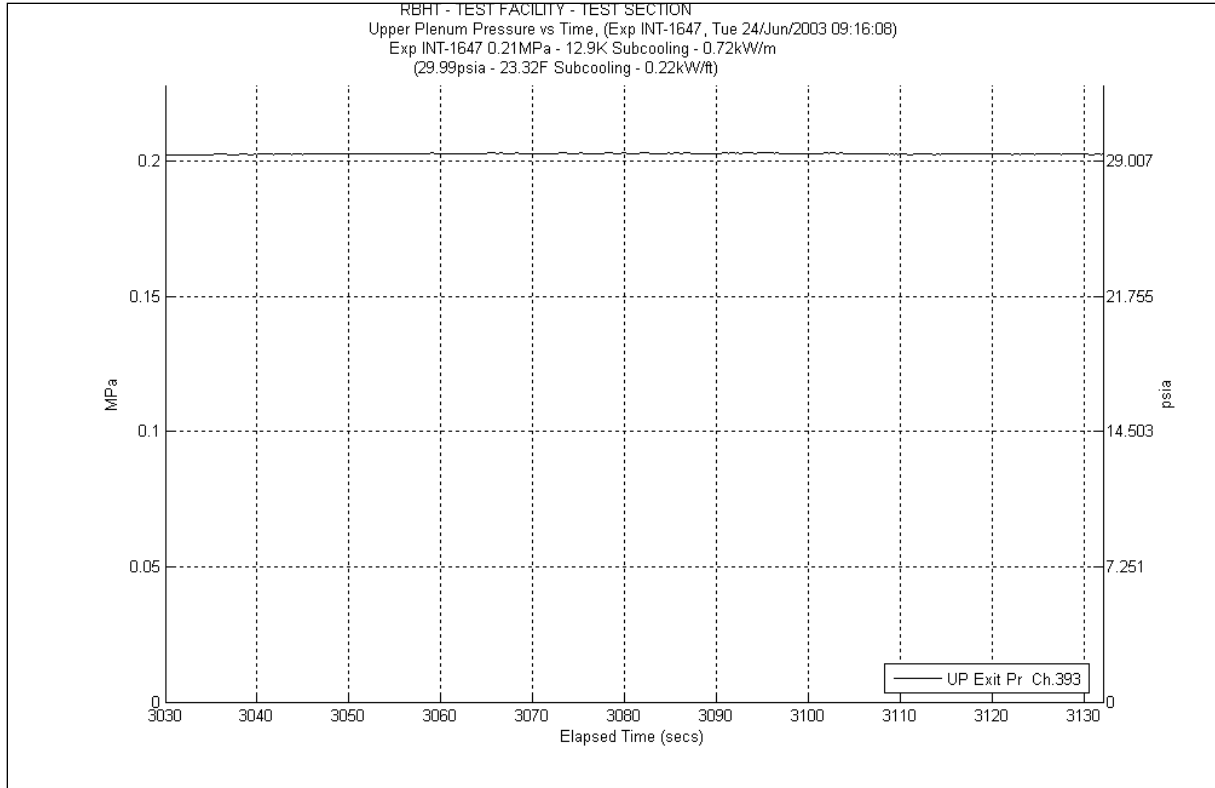


Figure A-378 System Pressure Plot for Experiment 1647B

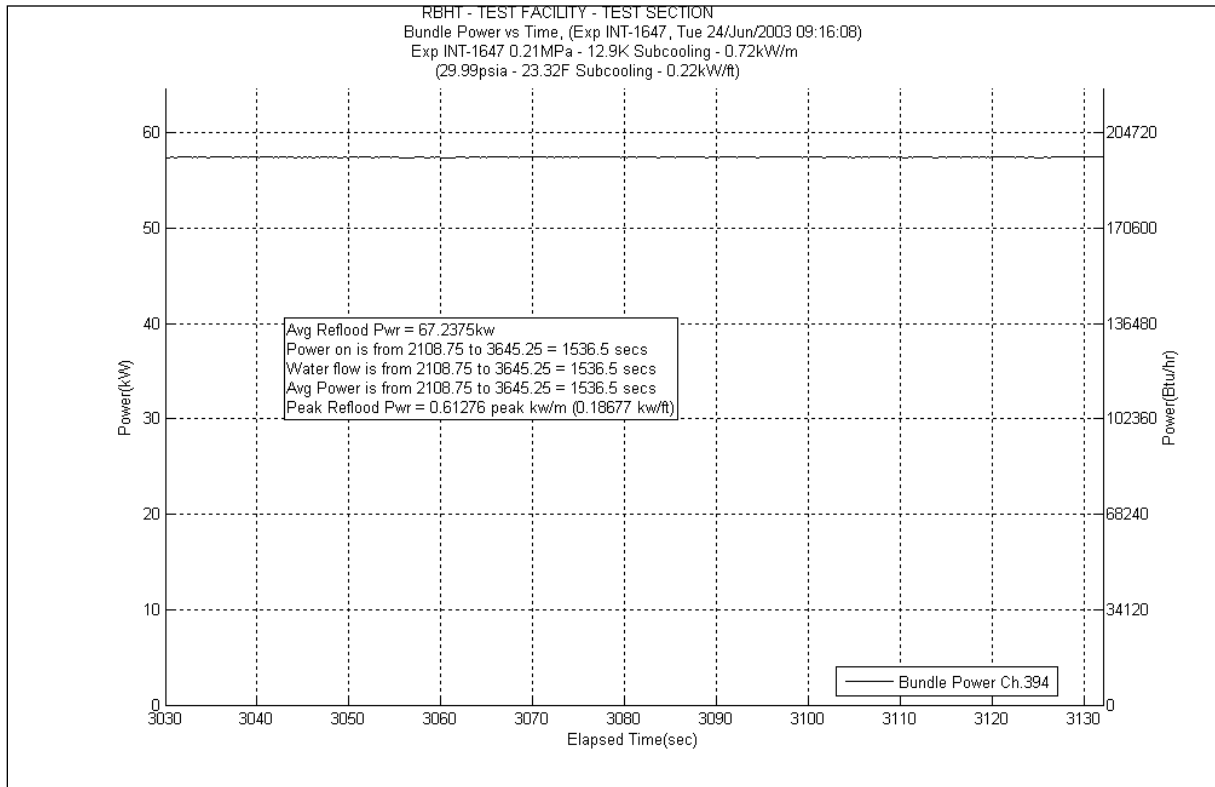


Figure A-379 Bundle Power Plot for Experiment 1647B

Table A-151 Data Results for RBHT Test 1647B for Time Period 3030 to 3132 seconds

Results for RBHT Test 1647
Valid Time Period 3030 to 3132 seconds
Collapsed Liquid Level = 84.299 inches = 2141.18 mm
(Z_{OSL}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lbf/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.718	16.120	771.834	0.713	34.139	0.165	7.900	0.000	0.000	15.24	729.695	4335.24	207572.4054	0.733	0.729	0.737
*	120-133	3048-3378	383	0.712	19.423	929.981	0.788	37.730	0.295	14.125	0.270	12.930	18.07	865.196	4353.31	208437.6016	0.732	0.728	0.736
*	108-120	2743-3048	382	0.632	22.934	1098.074	0.655	31.362	0.368	17.620	5.131	245.661	16.78	803.431	4370.09	209241.0323	0.731	0.727	0.735
	100-108	2540-2743	381	0.714	11.888	569.178	0.389	18.625	0.269	12.880	0.000	0.000	11.23	537.695	4381.32	209778.7276	0.73	0.726	0.734
	97-100	2464-2540	380	0.598	6.263	299.882	0.136	6.512	0.097	4.644	0.000	0.000	6.028	288.622	4387.348	210067.3498	0.613	0.610	0.616
	93-97	2362-2464	379	0.607	8.169	391.139	0.172	8.235	0.127	6.081	0.000	0.000	7.866	376.626	4395.214	210443.9759	0.621	0.618	0.624
*	85-93	2159-2362	378	0.449	22.882	1095.587	0.315	15.082	0.244	11.683	7.843	375.516	14.48	693.306	4409.694	211137.282	0.652	0.649	0.655
	81-85	2057-2159	377	0.669	6.871	328.975	0.143	6.847	0.117	5.602	0.000	0.000	6.609	316.441	4416.303	211453.7226	0.682	0.679	0.685
	78-81	1981-2057	376	0.541	7.151	342.402	0.101	4.836	0.085	4.070	0.000	0.000	6.962	333.342	4423.265	211787.065	0.553	0.550	0.556
	75-78	1905-1981	375	0.532	7.291	349.116	0.095	4.549	0.083	3.974	0.000	0.000	7.108	340.333	4430.373	212127.3978	0.544	0.541	0.547
	72-75	1829-1905	374	0.439	8.735	418.243	0.090	4.309	0.082	3.926	0.000	0.000	8.56	409.855	4438.933	212337.2528	0.45	0.448	0.452
*	67-72	1702-1829	373	0.398	15.632	748.461	0.138	6.607	0.132	6.320	2.562	122.666	12.8	612.867	4451.733	213150.1201	0.507	0.504	0.510
	63-67	1600-1702	372	0.554	9.275	444.103	0.100	4.788	0.101	4.836	0.000	0.000	9.073	434.418	4460.806	213584.5377	0.563	0.560	0.566
	60-63	1524-1600	371	0.394	9.436	451.812	0.068	3.256	0.074	3.543	0.000	0.000	9.292	444.903	4470.098	214029.4411	0.403	0.401	0.405
	57-60	1448-1524	370	0.372	9.779	468.223	0.063	3.016	0.072	3.447	0.000	0.000	9.64	461.566	4479.738	214491.0067	0.381	0.379	0.383
	53-57	1346-1448	369	0.344	13.632	652.727	0.075	3.591	0.093	4.453	0.000	0.000	13.46	644.468	4493.198	215135.475	0.352	0.350	0.354
*	46-53	1168-1346	368	0.248	27.353	1309.682	0.106	5.075	0.154	7.374	2.973	142.361	24.12	1154.872	4517.318	216290.3468	0.336	0.334	0.338
	43-46	1092-1168	367	0.315	10.677	511.241	0.035	1.676	0.063	3.016	0.000	0.000	10.57	506.094	4527.888	216796.4411	0.321	0.319	0.323
	37-43	940-1092	366	0.153	26.398	1263.928	0.048	2.298	0.120	5.746	0.000	0.000	26.22	1255.420	4554.108	218051.8614	0.158	0.157	0.159
*	25-37	635-940	365	0.056	58.809	2815.803	0.039	1.867	0.059	2.825	2.761	132.210	55.95	2678.900	4610.058	220730.7618	0.102	0.101	0.103
	13-25	330-635	364	0.046	59.484	2848.128	0.004	0.192	0.000	0.000	0.000	0.000	59.46	2846.960	4669.518	223577.7219	0.046	0.044	0.048
*	0-13	0-330	363	0.035	65.135	3118.668	0.004	0.192	0.000	0.000	-0.819	-39.226	65.95	3157.703	4735.468	226735.4249	0.023	0.022	0.024

Table A-152 Energy Balance Results for RBHT Test 1647B for Time Period 3030 to 3132 seconds

Results for RBHT Test 1647 Valid Time Period 3030 to 3132 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2612.0543	8.2399	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
0.25	6.35	2757.1684	8.6977	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
0.50	12.70	2902.2826	9.1555	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
0.75	19.05	3047.3967	9.6132	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
1.00	25.40	3192.5108	10.071	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
1.25	31.75	3337.625	10.529	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
1.50	38.10	3482.7391	10.987	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
1.75	44.45	3627.8532	11.444	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
2.00	50.80	3772.9673	11.902	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
2.25	57.15	3918.0815	12.36	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
2.50	63.50	4063.1956	12.818	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
2.75	69.85	4208.3097	13.275	0.00E+00	0.00E+00	0.00E+00	8.51E-02	3.86E-02
3.00	76.20	4353.4238	13.733	3.68E-03	2.53E-01	1.15E-01	8.48E-02	3.84E-02
3.25	82.55	4498.538	14.191	9.15E-03	6.29E-01	2.85E-01	8.43E-02	3.82E-02
3.50	88.90	4643.6521	14.649	1.48E-02	1.02E+00	4.61E-01	8.38E-02	3.80E-02
3.75	95.25	4788.7662	15.107	2.06E-02	1.42E+00	6.43E-01	8.33E-02	3.78E-02
4.00	101.60	4933.8804	15.564	2.66E-02	1.83E+00	8.31E-01	8.28E-02	3.76E-02
4.25	107.95	5078.9945	16.022	3.28E-02	2.26E+00	1.02E+00	8.23E-02	3.73E-02
4.50	114.30	5224.1086	16.48	3.92E-02	2.69E+00	1.22E+00	8.17E-02	3.71E-02
4.75	120.65	5369.2227	16.938	4.57E-02	3.14E+00	1.43E+00	8.12E-02	3.68E-02
5.00	127.00	5514.3369	17.395	5.24E-02	3.61E+00	1.64E+00	8.06E-02	3.66E-02
5.25	133.35	5659.451	17.853	5.93E-02	4.08E+00	1.85E+00	8.00E-02	3.63E-02
5.50	139.70	5804.5651	18.311	6.64E-02	4.57E+00	2.07E+00	7.94E-02	3.60E-02
5.75	146.05	5949.6793	18.769	7.37E-02	5.07E+00	2.30E+00	7.88E-02	3.57E-02
6.00	152.40	6094.7934	19.226	8.11E-02	5.58E+00	2.53E+00	7.82E-02	3.55E-02
6.25	158.75	6239.9075	19.684	8.87E-02	6.10E+00	2.77E+00	7.75E-02	3.52E-02
6.50	165.10	6385.0216	20.142	9.65E-02	6.64E+00	3.01E+00	7.69E-02	3.49E-02
6.75	171.45	6530.1358	20.6	1.05E-01	7.19E+00	3.26E+00	7.62E-02	3.46E-02
7.00	177.80	6675.2499	21.058	1.13E-01	7.75E+00	3.52E+00	7.55E-02	3.42E-02
7.25	184.15	6820.364	21.515	1.21E-01	8.32E+00	3.78E+00	7.48E-02	3.39E-02
7.50	190.50	6965.4782	21.973	1.30E-01	8.91E+00	4.04E+00	7.41E-02	3.36E-02
7.75	196.85	7110.5923	22.431	1.38E-01	9.51E+00	4.31E+00	7.33E-02	3.33E-02
8.00	203.20	7255.7064	22.889	1.47E-01	1.01E+01	4.59E+00	7.26E-02	3.29E-02
8.25	209.55	7400.8205	23.346	1.56E-01	1.07E+01	4.87E+00	7.18E-02	3.26E-02
8.50	215.90	7545.9347	23.804	1.65E-01	1.14E+01	5.16E+00	7.10E-02	3.22E-02
8.75	222.25	7691.0488	24.262	1.75E-01	1.20E+01	5.45E+00	7.02E-02	3.18E-02
9.00	228.60	7836.1629	24.72	1.84E-01	1.27E+01	5.75E+00	6.94E-02	3.15E-02
9.25	234.95	7400.8205	23.346	1.94E-01	1.33E+01	6.05E+00	6.86E-02	3.11E-02
9.50	241.30	6965.4782	21.973	2.03E-01	1.39E+01	6.32E+00	6.78E-02	3.08E-02
9.75	247.65	6530.1358	20.6	2.11E-01	1.45E+01	6.58E+00	6.71E-02	3.04E-02
10.00	254.00	6094.7934	19.226	2.19E-01	1.51E+01	6.83E+00	6.65E-02	3.01E-02
10.25	260.35	5659.451	17.853	2.26E-01	1.55E+01	7.05E+00	6.58E-02	2.99E-02
10.50	266.70	5224.1086	16.48	2.33E-01	1.60E+01	7.26E+00	6.53E-02	2.96E-02
10.75	273.05	4788.7662	15.107	2.39E-01	1.64E+01	7.45E+00	6.47E-02	2.94E-02
11.00	279.40	4353.4238	13.733	2.45E-01	1.68E+01	7.63E+00	6.43E-02	2.91E-02
11.25	285.75	3918.0815	12.36	2.50E-01	1.72E+01	7.79E+00	6.38E-02	2.90E-02
11.50	292.10	3482.7391	10.987	2.54E-01	1.75E+01	7.93E+00	6.34E-02	2.88E-02
11.75	298.45	3047.3967	9.6132	2.58E-01	1.78E+01	8.06E+00	6.31E-02	2.86E-02
12.00	304.80	2612.0543	8.2399	2.62E-01	1.80E+01	8.17E+00	6.28E-02	2.85E-02

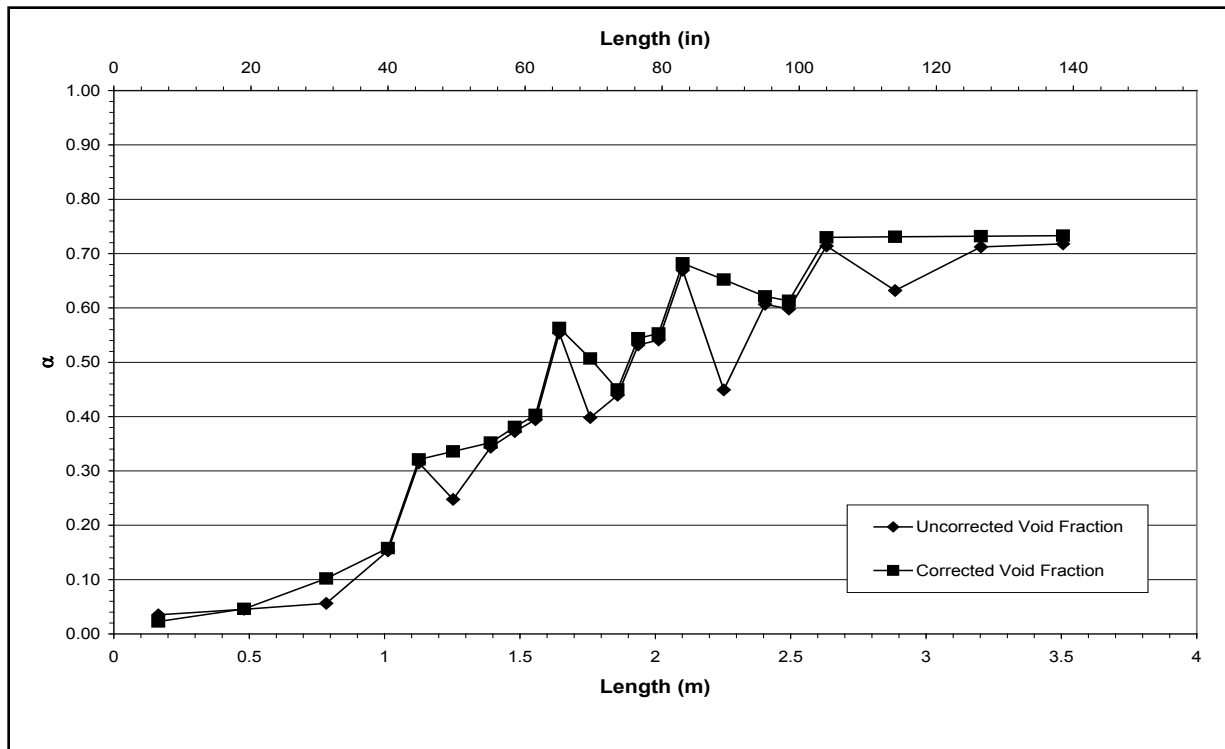


Figure A-380 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1647B for Time Period 3030 to 3132 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1647-C

Test Conditions

Date: 6/24/2003

Steady-state time window: 3525 – 3616 seconds

Inlet flow rate: 2.540 cm/sec (1.000 in./sec)

Inlet mass flow rate: 0.118 kg/sec (0.260 lbm/sec)

Inlet flow temperature: 369.9 K (206.1 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 53.82 kW

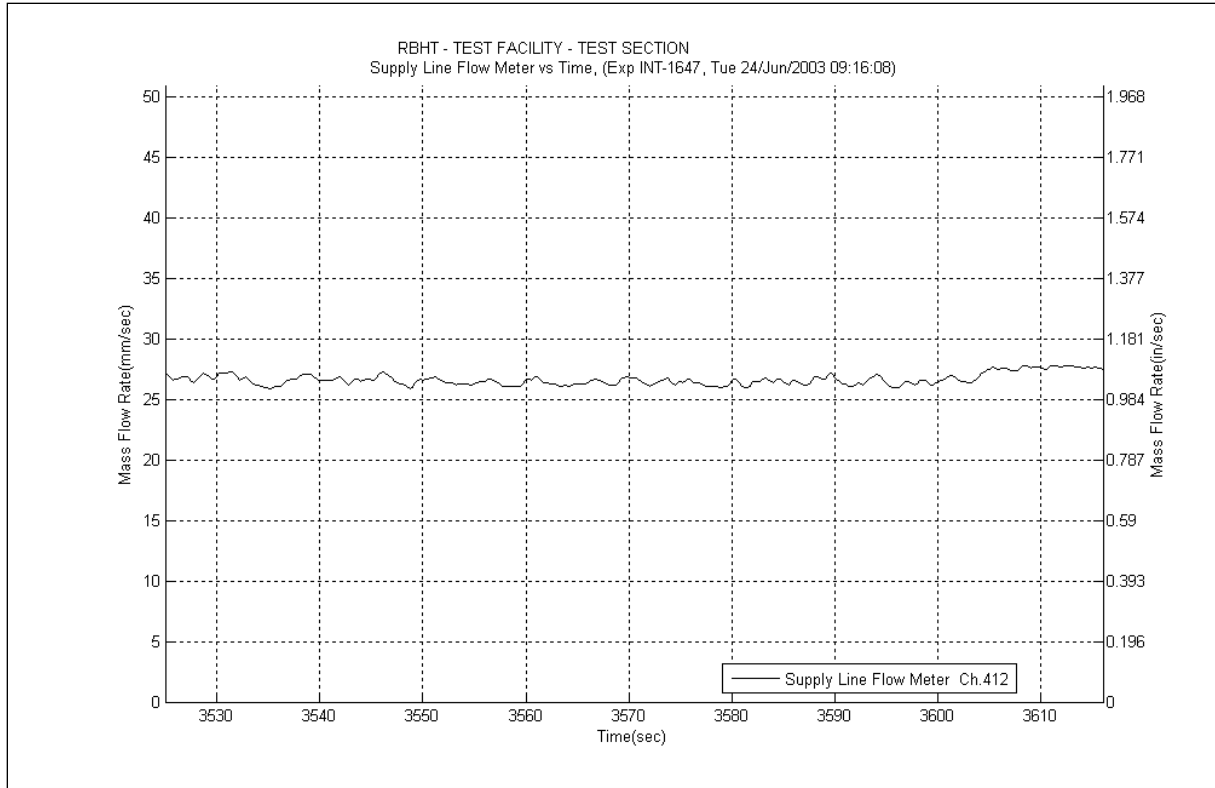


Figure A-381 Inlet Flow Plot for Experiment 1647C

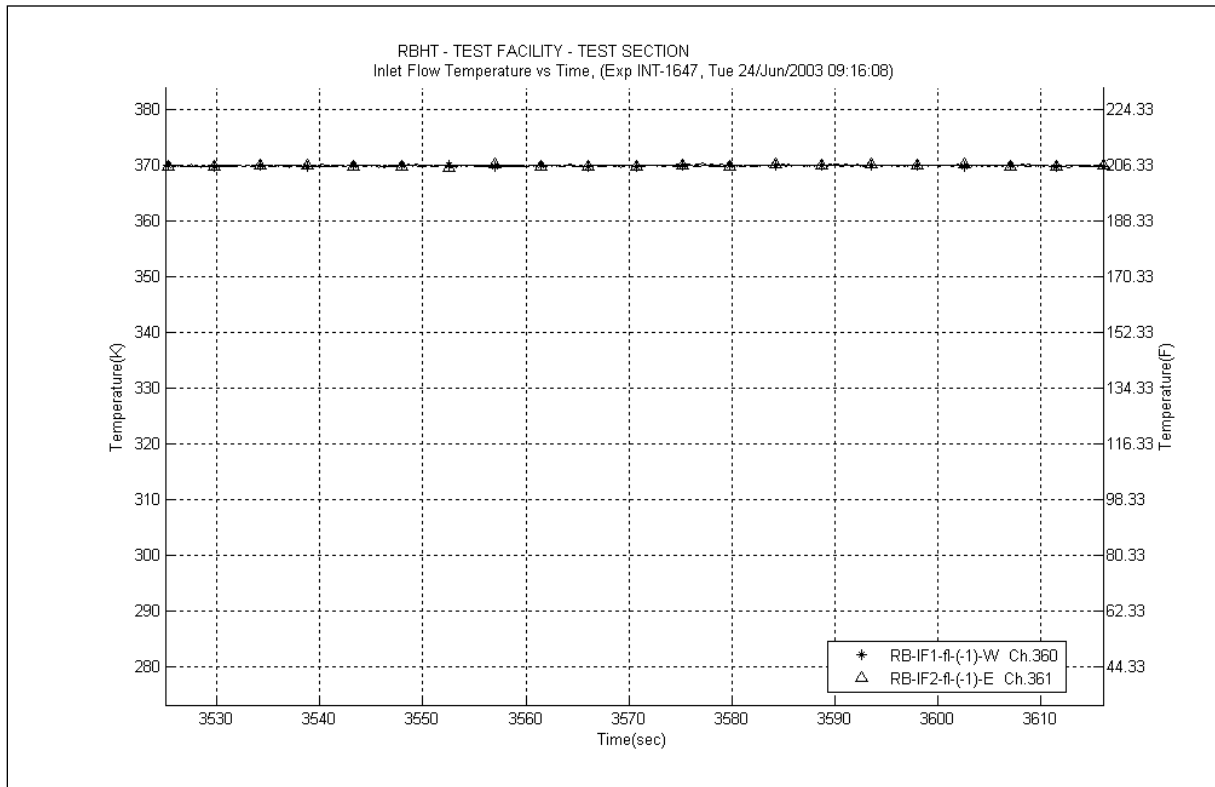


Figure A-382 Inlet Temperature Plot for Experiment 1647C

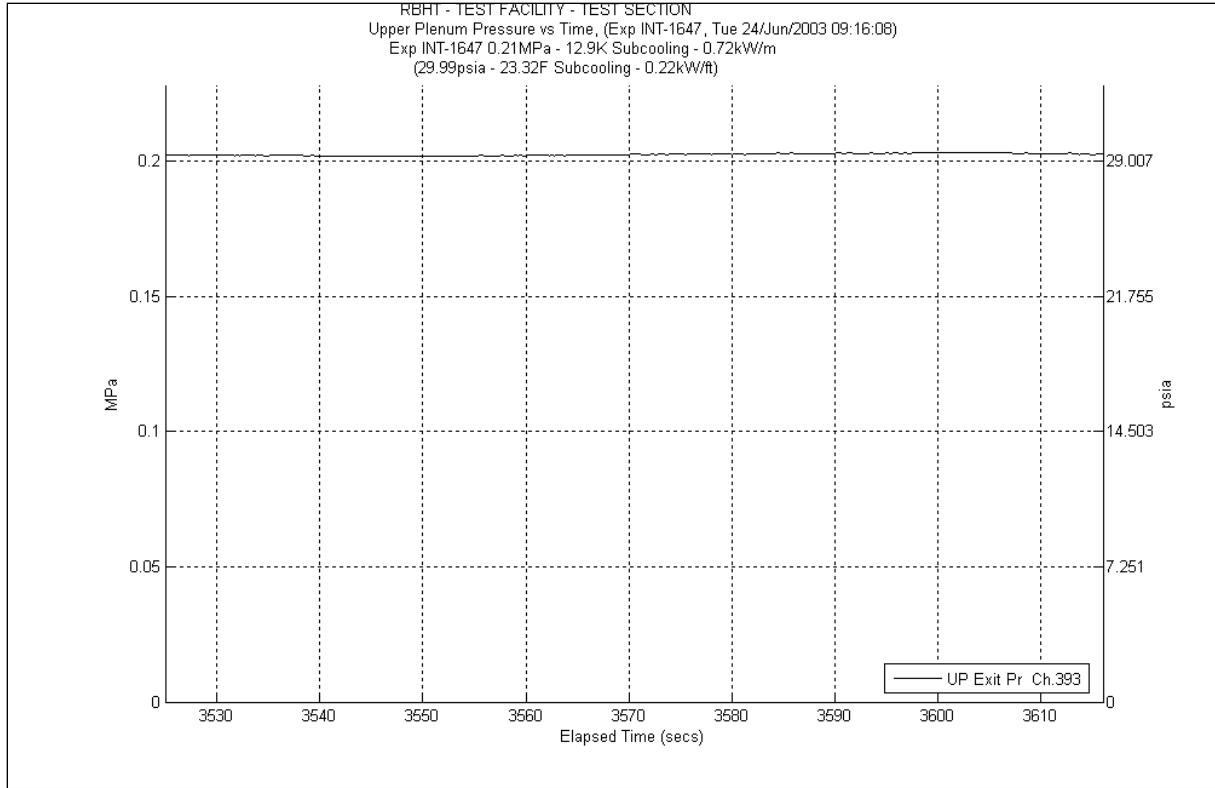


Figure A-383 System Pressure Plot for Experiment 1647C

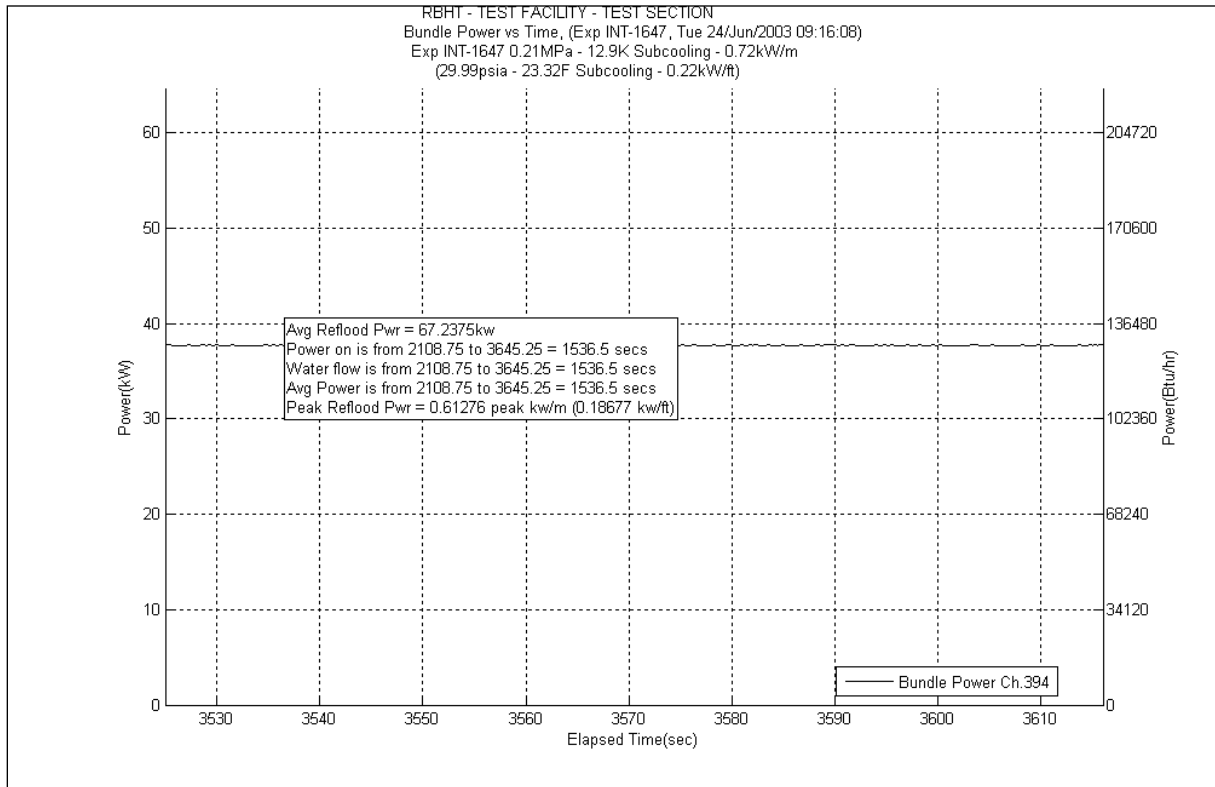


Figure A-384 Bundle Power Plot for Experiment 1647C

Table A-153 Data Results for RBHT Test 1647C for Time Period 3525 to 3616 seconds

Results for RBHT Test 1647
Valid Time Period 3525 to 3616 seconds
Collapsed Liquid Level = 100.811 inches = 2560.61 mm
(Z_{OSV}) Onset of Significant Void = 49.5 inches = 1257 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lb/ft ²)	$\Delta P_{unconnected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lb/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.542	26.174	1253.236	0.492	23.557	0.109	5.219	0.000	0.000	25.56	1223.819	4345.56	208066.5296	0.552	0.549	0.555
*	120-133	3048-3378	383	0.611	26.232	1255.971	0.543	25.999	0.195	9.337	-4.376	-209.547	29.87	1430.183	4375.43	209496.7129	0.558	0.555	0.561
*	108-120	2743-3048	382	0.494	31.555	1510.846	0.449	21.498	0.243	11.635	3.933	188.297	26.93	1289.415	4402.36	210786.1282	0.568	0.565	0.571
	100-108	2540-2743	381	0.562	18.187	870.800	0.264	12.640	0.178	8.523	0.000	0.000	17.74	849.396	4420.1	211635.524	0.573	0.570	0.576
	97-100	2464-2540	380	0.430	8.875	424.956	0.091	4.357	0.064	3.064	0.000	0.000	8.715	417.276	4428.815	212052.8004	0.441	0.439	0.443
	93-97	2362-2464	379	0.456	11.306	541.328	0.115	5.506	0.084	4.022	0.000	0.000	11.1	531.471	4439.915	212584.2713	0.465	0.463	0.467
*	85-93	2159-2362	378	0.365	26.387	1263.431	0.208	9.959	0.161	7.709	5.128	245.545	20.89	1000.219	4460.805	213584.4898	0.497	0.495	0.499
	81-85	2057-2159	377	0.521	9.961	476.926	0.092	4.405	0.077	3.687	0.000	0.000	9.79	468.748	4470.595	214033.2375	0.529	0.526	0.532
	78-81	1981-2057	376	0.393	9.457	452.806	0.064	3.064	0.056	2.681	0.000	0.000	9.334	446.914	4479.929	214500.1519	0.401	0.399	0.403
	75-78	1905-1981	375	0.374	9.758	467.228	0.060	2.873	0.055	2.633	0.000	0.000	9.641	461.614	4489.57	214961.7654	0.381	0.379	0.383
	72-75	1829-1905	374	0.279	11.238	538.096	0.056	2.681	0.054	2.586	0.000	0.000	11.12	532.428	4500.69	215494.1939	0.286	0.285	0.287
*	67-72	1702-1829	373	0.311	17.886	856.378	0.083	3.974	0.087	4.166	0.116	5.546	17.6	842.693	4518.29	216336.8864	0.322	0.320	0.324
	63-67	1600-1702	372	0.352	13.461	644.521	0.057	2.729	0.067	3.208	0.000	0.000	13.33	638.244	4531.62	216975.1302	0.358	0.356	0.360
	60-63	1524-1600	371	0.245	11.763	563.210	0.037	1.772	0.049	2.346	0.000	0.000	11.68	559.241	4543.3	217534.3716	0.25	0.249	0.251
	57-60	1448-1524	370	0.225	12.069	577.881	0.032	1.532	0.047	2.250	0.000	0.000	11.99	574.084	4555.29	218108.4559	0.23	0.229	0.231
	53-57	1346-1448	369	0.142	17.829	853.643	0.034	1.628	0.061	2.921	0.000	0.000	17.73	848.917	4573.02	218957.3729	0.146	0.145	0.147
*	46-53	1168-1346	368	0.064	34.022	1628.958	0.032	1.532	0.101	4.836	1.079	51.639	32.81	1570.951	4605.83	220528.3241	0.097	0.092	0.102
	43-46	1092-1168	367	0.048	14.832	710.167	0.001	0.048	0.000	0.000	0.000	0.000	14.83	710.064	4620.66	221238.3883	0.048	0.046	0.050
	37-43	940-1092	366	0.048	29.654	1419.837	0.002	0.096	0.000	0.000	0.000	0.000	29.64	1419.171	4650.3	222657.5591	0.048	0.046	0.050
*	25-37	635-940	365	0.043	59.666	2856.831	0.004	0.192	0.000	0.000	0.212	10.159	59.45	2846.481	4709.75	225504.0404	0.046	0.044	0.048
	13-25	330-635	364	0.043	59.635	2855.340	0.004	0.192	0.000	0.000	0.000	0.000	59.61	2854.142	4769.36	228358.1825	0.043	0.041	0.045
*	0-13	0-330	363	0.035	65.130	3118.420	0.004	0.192	0.000	0.000	-0.914	-43.784	66.04	3162.012	4835.4	231520.1947	0.022	0.021	0.023

Table A-154 Energy Balance Results for RBHT Test 1647C for Time Period 3525 to 3616 seconds

Results for RBHT Test 1647 Valid Time Period 3525 to 3616 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1736.6375	5.4783	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
0.25	6.35	1833.1174	5.7827	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
0.50	12.70	1929.5973	6.0871	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
0.75	19.05	2026.0771	6.3914	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
1.00	25.40	2122.557	6.6958	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
1.25	31.75	2219.0369	7.0001	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
1.50	38.10	2315.5167	7.3045	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
1.75	44.45	2411.9966	7.6088	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
2.00	50.80	2508.4765	7.9132	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
2.25	57.15	2604.9563	8.2175	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
2.50	63.50	2701.4362	8.5219	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
2.75	69.85	2797.916	8.8262	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
3.00	76.20	2894.3959	9.1306	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
3.25	82.55	2990.8758	9.4349	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
3.50	88.90	3087.3556	9.7393	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
3.75	95.25	3183.8355	10.044	0.00E+00	0.00E+00	0.00E+00	8.45E-02	3.83E-02
4.00	101.60	3280.3154	10.348	2.64E-03	1.80E-01	8.17E-02	8.43E-02	3.82E-02
4.25	107.95	3376.7952	10.652	6.78E-03	4.63E-01	2.10E-01	8.40E-02	3.81E-02
4.50	114.30	3473.2751	10.957	1.10E-02	7.53E-01	3.42E-01	8.36E-02	3.79E-02
4.75	120.65	3569.755	11.261	1.54E-02	1.05E+00	4.77E-01	8.32E-02	3.77E-02
5.00	127.00	3666.2348	11.565	1.99E-02	1.36E+00	6.17E-01	8.28E-02	3.76E-02
5.25	133.35	3762.7147	11.87	2.45E-02	1.68E+00	7.60E-01	8.25E-02	3.74E-02
5.50	139.70	3859.1945	12.174	2.93E-02	2.00E+00	9.06E-01	8.21E-02	3.72E-02
5.75	146.05	3955.6744	12.478	3.41E-02	2.33E+00	1.06E+00	8.16E-02	3.70E-02
6.00	152.40	4052.1543	12.783	3.91E-02	2.67E+00	1.21E+00	8.12E-02	3.68E-02
6.25	158.75	4148.6341	13.087	4.42E-02	3.02E+00	1.37E+00	8.08E-02	3.66E-02
6.50	165.10	4245.114	13.392	4.94E-02	3.38E+00	1.53E+00	8.03E-02	3.64E-02
6.75	171.45	4341.5939	13.696	5.48E-02	3.74E+00	1.70E+00	7.99E-02	3.62E-02
7.00	177.80	4438.0737	14	6.02E-02	4.11E+00	1.87E+00	7.94E-02	3.60E-02
7.25	184.15	4534.5536	14.305	6.58E-02	4.49E+00	2.04E+00	7.90E-02	3.58E-02
7.50	190.50	4631.0335	14.609	7.15E-02	4.88E+00	2.21E+00	7.85E-02	3.56E-02
7.75	196.85	4727.5133	14.913	7.73E-02	5.28E+00	2.39E+00	7.80E-02	3.54E-02
8.00	203.20	4823.9932	15.218	8.32E-02	5.69E+00	2.58E+00	7.75E-02	3.51E-02
8.25	209.55	4920.473	15.522	8.93E-02	6.10E+00	2.77E+00	7.70E-02	3.49E-02
8.50	215.90	5016.9529	15.826	9.55E-02	6.52E+00	2.96E+00	7.65E-02	3.47E-02
8.75	222.25	5113.4328	16.131	1.02E-01	6.95E+00	3.15E+00	7.59E-02	3.44E-02
9.00	228.60	5209.9126	16.435	1.08E-01	7.39E+00	3.35E+00	7.54E-02	3.42E-02
9.25	234.95	4920.473	15.522	1.15E-01	7.82E+00	3.55E+00	7.48E-02	3.39E-02
9.50	241.30	4631.0335	14.609	1.20E-01	8.22E+00	3.73E+00	7.43E-02	3.37E-02
9.75	247.65	4341.5939	13.696	1.26E-01	8.61E+00	3.90E+00	7.39E-02	3.35E-02
10.00	254.00	4052.1543	12.783	1.31E-01	8.96E+00	4.06E+00	7.34E-02	3.33E-02
10.25	260.35	3762.7147	11.87	1.36E-01	9.30E+00	4.22E+00	7.30E-02	3.31E-02
10.50	266.70	3473.2751	10.957	1.41E-01	9.60E+00	4.36E+00	7.26E-02	3.29E-02
10.75	273.05	3183.8355	10.044	1.45E-01	9.88E+00	4.48E+00	7.23E-02	3.28E-02
11.00	279.40	2894.3959	9.1306	1.49E-01	1.01E+01	4.60E+00	7.20E-02	3.26E-02
11.25	285.75	2604.9563	8.2175	1.52E-01	1.04E+01	4.71E+00	7.17E-02	3.25E-02
11.50	292.10	2315.5167	7.3045	1.55E-01	1.06E+01	4.80E+00	7.14E-02	3.24E-02
11.75	298.45	2026.0771	6.3914	1.58E-01	1.08E+01	4.89E+00	7.12E-02	3.23E-02
12.00	304.80	1736.6375	5.4783	1.60E-01	1.09E+01	4.96E+00	7.10E-02	3.22E-02

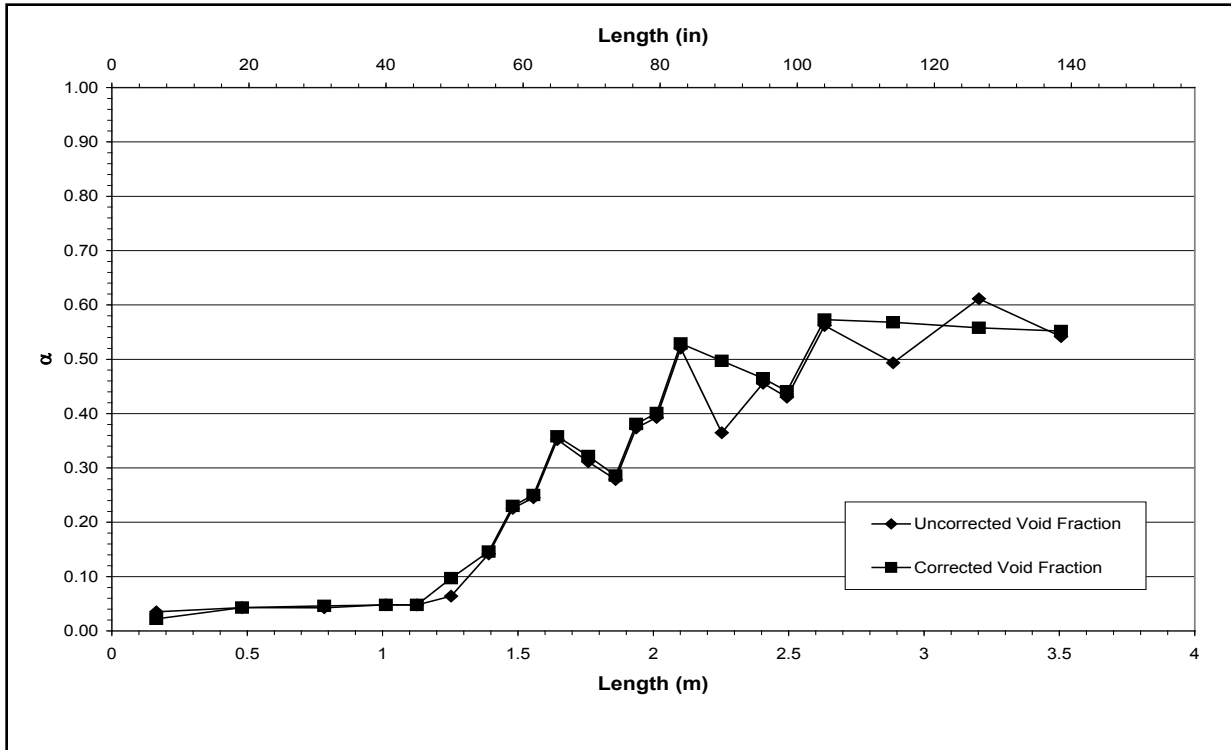


Figure A-385 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1647C for Time Period 3525 to 3616 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1648-A

Test Conditions

Date: 6/24/2003

Steady-state time window: 909 – 987 seconds

Inlet flow rate: 2.532 cm/sec (0.997 in./sec)

Inlet mass flow rate: 0.117 kg/sec (0.259 lbm/sec)

Inlet flow temperature: 370.5 K (207.3 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.12 kW

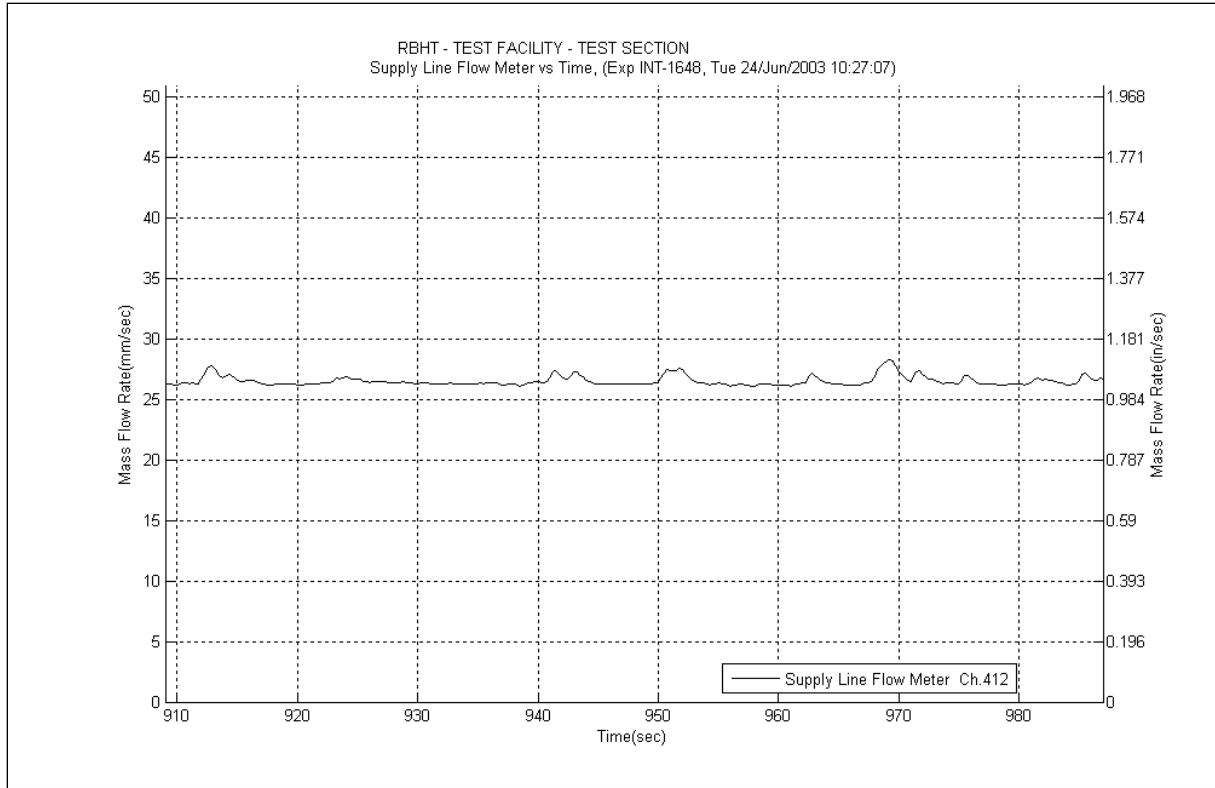


Figure A-386 Inlet Flow Plot for Experiment 1648A

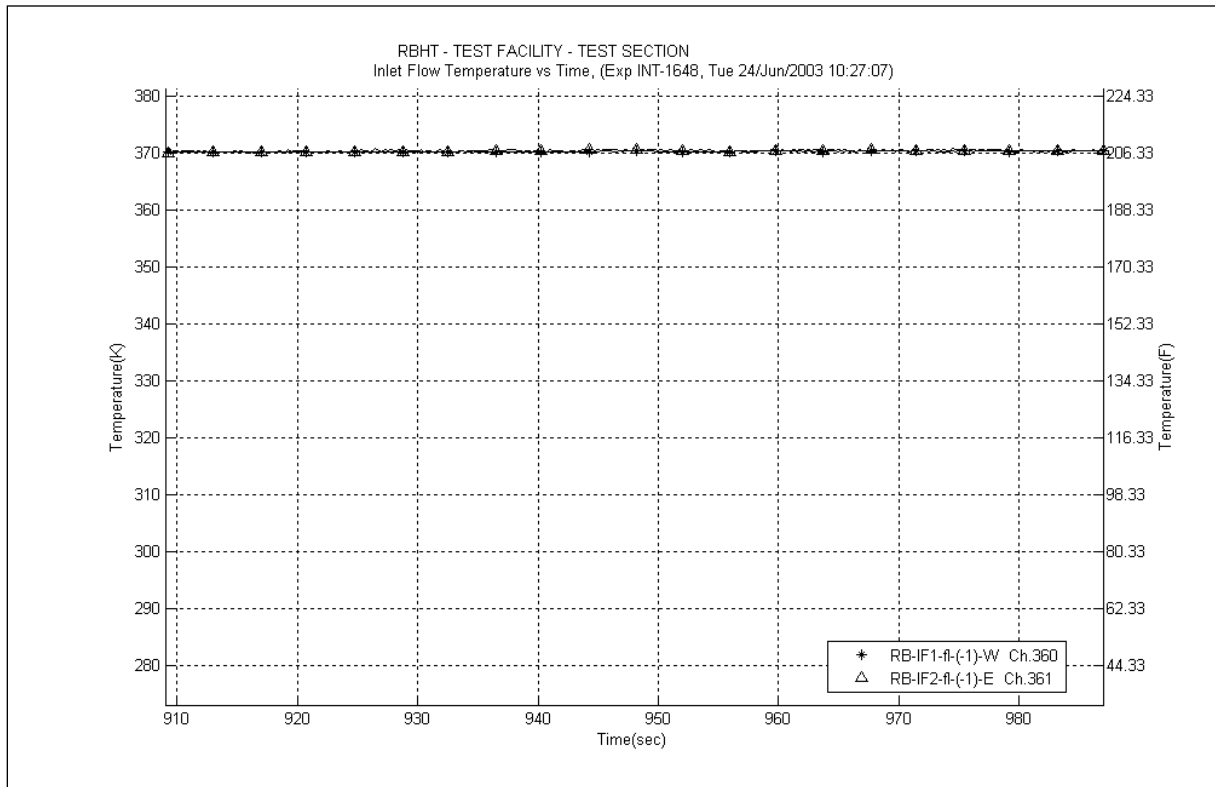


Figure A-387 Inlet Temperature Plot for Experiment 1648A

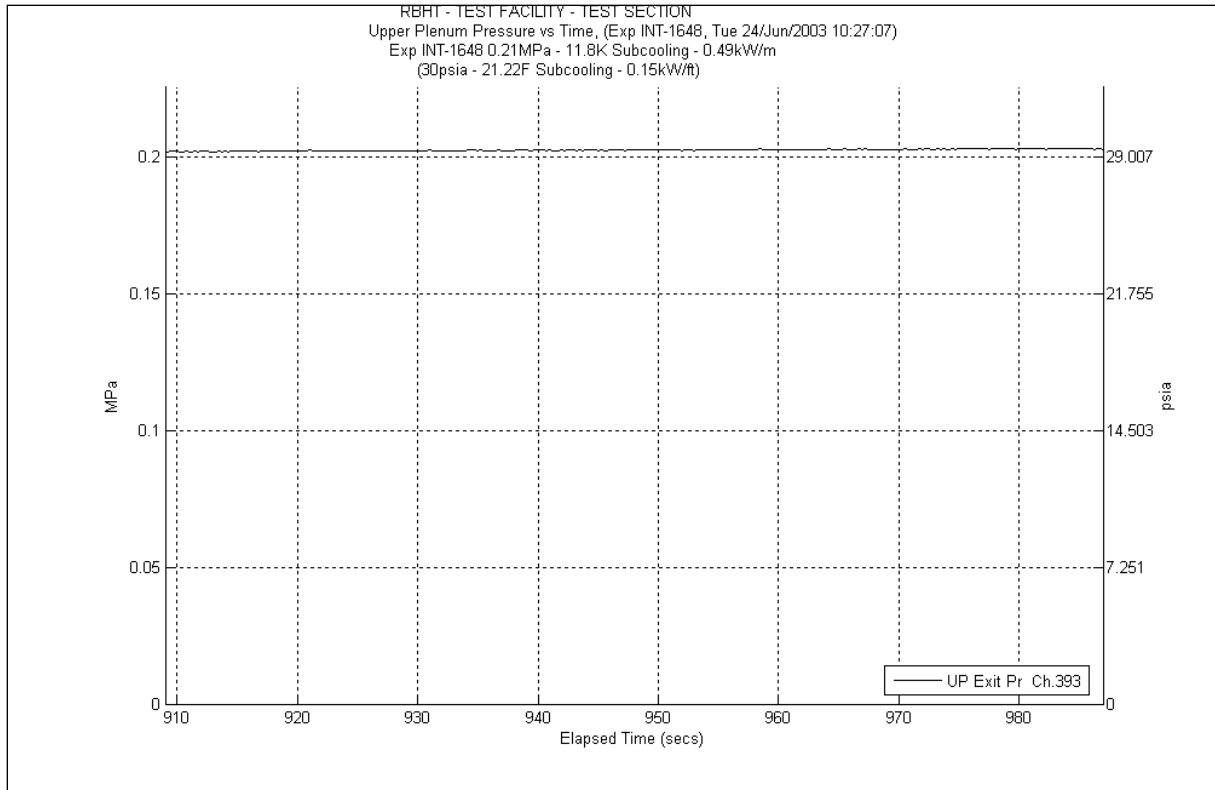


Figure A-388 System Pressure Plot for Experiment 1648A

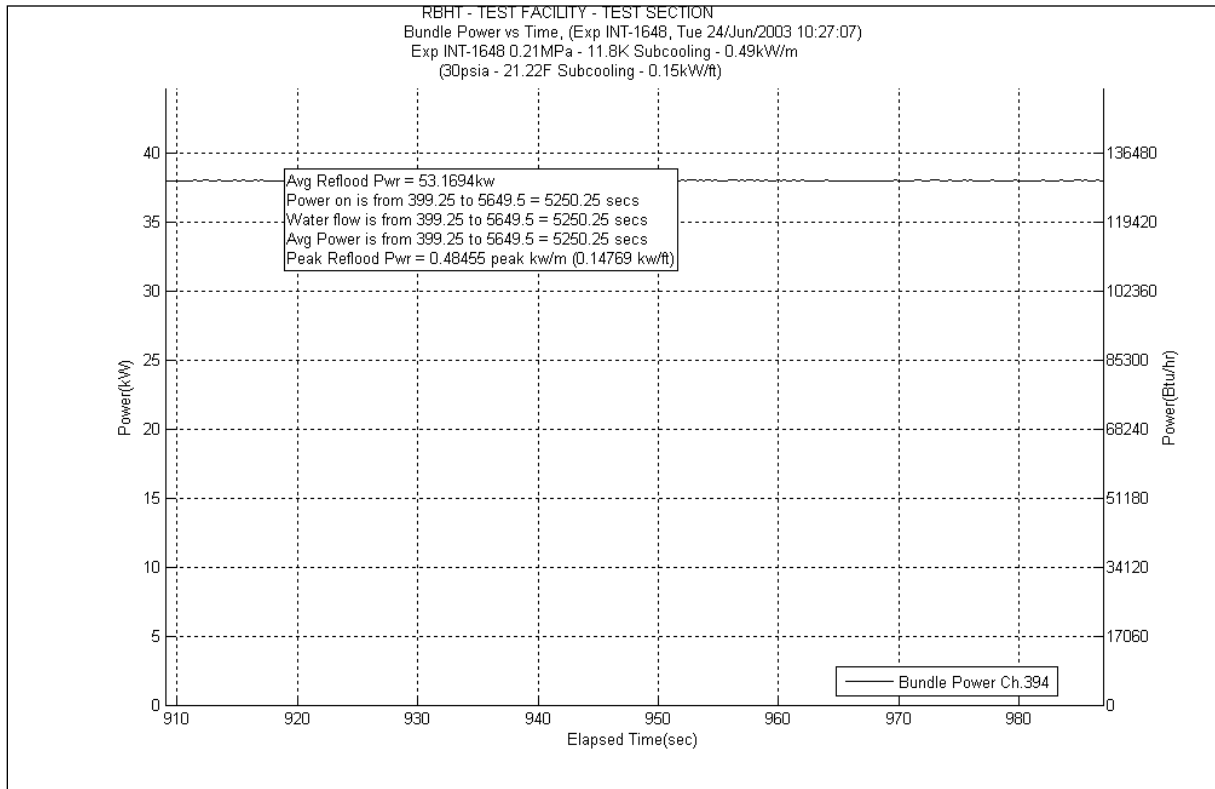


Figure A-389 Bundle Power Plot for Experiment 1648A

Table A-155 Data Results for RBHT Test 1648A for Time Period 909 to 987 seconds

Results for RBHT Test 1648
Valid Time Period 909 to 987 seconds
Collapsed Liquid Level = 100.811 inches = 2560.59 mm
(Z_{OSV}) Onset of Significant Void = 49.5 inches = 1257 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\sigma_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{fic} (Pa)	ΔP_{acc1} (lbf/ft ²)	ΔP_{acc1} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\sigma_{corrected}$	σ_{min}	σ_{max}
	133-144	3378-3658	384	0.540	26.260	1257.339	0.493	23.581	0.109	5.209	0.000	0.000	0.000	25.65	1228.129	4345.65	208070.8388	0.551	0.548	0.554
*	120-133	3048-3378	383	0.608	26.482	1267.957	0.544	26.047	0.194	9.303	-4.176	-199.971	29.92	1432.577	4375.57	209503.4161	0.557	0.554	0.559	
*	108-120	2743-3048	382	0.495	31.472	1506.867	0.450	21.556	0.243	11.611	3.879	185.722	26.9	1287.979	4402.47	210791.395	0.568	0.565	0.571	
	100-108	2540-2743	381	0.563	18.144	868.736	0.266	12.712	0.177	8.494	0.000	0.000	17.7	847.481	4420.17	211638.8756	0.574	0.571	0.577	
	97-100	2464-2540	380	0.434	8.812	421.898	0.092	4.395	0.064	3.074	0.000	0.000	8.653	414.308	4428.823	212053.1834	0.444	0.442	0.447	
	93-97	2362-2464	379	0.460	11.215	536.977	0.116	5.549	0.084	4.005	0.000	0.000	11.01	527.162	4439.833	212580.3451	0.470	0.467	0.472	
*	85-93	2159-2362	378	0.363	26.445	1266.191	0.210	10.031	0.161	7.685	5.315	254.481	20.76	993.994	4460.593	213574.3392	0.500	0.498	0.503	
	81-85	2057-2159	377	0.522	9.922	475.086	0.093	4.474	0.077	3.682	0.000	0.000	9.749	466.785	4470.342	214041.1238	0.531	0.528	0.533	
	78-81	1981-2057	376	0.392	9.479	453.875	0.065	3.117	0.056	2.691	0.000	0.000	9.355	447.920	4479.697	214489.0436	0.399	0.397	0.401	
	75-78	1905-1981	375	0.376	9.717	463.264	0.061	2.912	0.055	2.631	0.000	0.000	9.598	459.555	4489.295	214948.5983	0.384	0.382	0.386	
	72-75	1829-1905	374	0.277	11.269	539.563	0.056	2.704	0.054	2.570	0.000	0.000	11.16	534.344	4500.455	215482.942	0.284	0.282	0.285	
*	67-72	1702-1829	373	0.316	17.769	850.808	0.084	4.037	0.087	4.149	-0.041	-1.986	17.64	844.608	4518.095	216327.5498	0.321	0.319	0.322	
	63-67	1600-1702	372	0.351	13.473	645.093	0.058	2.793	0.067	3.198	0.000	0.000	13.34	638.723	4531.435	216966.2724	0.358	0.356	0.359	
	60-63	1524-1600	371	0.253	11.640	557.317	0.038	1.829	0.049	2.328	0.000	0.000	11.55	553.017	4542.985	217519.2893	0.259	0.257	0.260	
	57-60	1448-1524	370	0.231	11.989	574.027	0.033	1.592	0.047	2.268	0.000	0.000	11.9	569.775	4554.885	218089.0644	0.236	0.235	0.237	
	53-57	1346-1448	369	0.150	17.663	845.686	0.036	1.732	0.061	2.930	0.000	0.000	17.56	840.777	4572.445	218929.8417	0.154	0.154	0.155	
*	46-53	1168-1346	368	0.066	33.966	1626.323	0.038	1.798	0.102	4.869	1.177	56.364	32.65	1563.290	4605.095	220493.1321	0.102	0.101	0.102	
	43-46	1092-1168	367	0.048	14.840	710.540	0.004	0.194	0.014	0.656	0.000	0.000	14.82	709.585	4619.915	221202.7175	0.049	0.046	0.051	
	37-43	940-1092	366	0.049	29.646	1419.439	0.002	0.089	0.000	0.000	0.000	0.000	29.63	1418.692	4649.545	222621.4095	0.049	0.046	0.051	
*	25-37	635-940	365	0.042	59.680	2857.503	0.004	0.178	0.000	0.000	0.236	11.323	59.44	2846.002	4708.985	225467.412	0.046	0.044	0.048	
	13-25	330-635	364	0.043	59.642	2855.688	0.004	0.178	0.000	0.000	0.000	0.000	59.62	2854.621	4768.605	228322.0329	0.043	0.041	0.045	
*	0-13	0-330	363	0.035	65.134	3118.643	0.004	0.192	0.000	0.000	-0.910	-43.561	66.04	3162.012	4834.645	231484.0451	0.022	0.020	0.023	

Table A-156 Energy Balance Results for RBHT Test 1648A for Time Period 909 to 987 seconds

Results for RBHT Test 1648 Valid Time Period 909 to 987 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1742.1167	5.4956	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
0.25	6.35	1838.901	5.8009	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
0.50	12.70	1935.6853	6.1063	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
0.75	19.05	2032.4695	6.4116	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
1.00	25.40	2129.2538	6.7169	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
1.25	31.75	2226.038	7.0222	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
1.50	38.10	2322.8223	7.3275	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
1.75	44.45	2419.6066	7.6328	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
2.00	50.80	2516.3908	7.9381	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
2.25	57.15	2613.1751	8.2434	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
2.50	63.50	2709.9594	8.5488	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
2.75	69.85	2806.7436	8.8541	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
3.00	76.20	2903.5279	9.1594	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
3.25	82.55	3000.3122	9.4647	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
3.50	88.90	3097.0964	9.77	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
3.75	95.25	3193.8807	10.075	0.00E+00	0.00E+00	0.00E+00	8.41E-02	3.81E-02
4.00	101.60	3290.6649	10.381	4.03E-03	2.73E-01	1.24E-01	8.38E-02	3.80E-02
4.25	107.95	3387.4492	10.686	8.20E-03	5.57E-01	2.53E-01	8.34E-02	3.78E-02
4.50	114.30	3484.2335	10.991	1.25E-02	8.48E-01	3.85E-01	8.31E-02	3.77E-02
4.75	120.65	3581.0177	11.297	1.69E-02	1.15E+00	5.21E-01	8.27E-02	3.75E-02
5.00	127.00	3677.802	11.602	2.14E-02	1.46E+00	6.61E-01	8.23E-02	3.73E-02
5.25	133.35	3774.5863	11.907	2.61E-02	1.77E+00	8.04E-01	8.19E-02	3.72E-02
5.50	139.70	3871.3705	12.213	3.09E-02	2.10E+00	9.51E-01	8.15E-02	3.70E-02
5.75	146.05	3968.1548	12.518	3.58E-02	2.43E+00	1.10E+00	8.11E-02	3.68E-02
6.00	152.40	4064.939	12.823	4.08E-02	2.77E+00	1.26E+00	8.07E-02	3.66E-02
6.25	158.75	4161.7233	13.128	4.59E-02	3.12E+00	1.42E+00	8.02E-02	3.64E-02
6.50	165.10	4258.5076	13.434	5.12E-02	3.48E+00	1.58E+00	7.98E-02	3.62E-02
6.75	171.45	4355.2918	13.739	5.66E-02	3.84E+00	1.74E+00	7.93E-02	3.60E-02
7.00	177.80	4452.0761	14.044	6.21E-02	4.22E+00	1.91E+00	7.89E-02	3.58E-02
7.25	184.15	4548.8604	14.35	6.77E-02	4.60E+00	2.09E+00	7.84E-02	3.56E-02
7.50	190.50	4645.6446	14.655	7.34E-02	4.99E+00	2.26E+00	7.79E-02	3.53E-02
7.75	196.85	4742.4289	14.96	7.93E-02	5.39E+00	2.44E+00	7.74E-02	3.51E-02
8.00	203.20	4839.2131	15.266	8.53E-02	5.79E+00	2.63E+00	7.69E-02	3.49E-02
8.25	209.55	4935.9974	15.571	9.14E-02	6.21E+00	2.82E+00	7.64E-02	3.47E-02
8.50	215.90	5032.7817	15.876	9.76E-02	6.63E+00	3.01E+00	7.59E-02	3.44E-02
8.75	222.25	5129.5659	16.182	1.04E-01	7.06E+00	3.20E+00	7.54E-02	3.42E-02
9.00	228.60	5226.3502	16.487	1.10E-01	7.50E+00	3.40E+00	7.48E-02	3.39E-02
9.25	234.95	4935.9974	15.571	1.17E-01	7.93E+00	3.60E+00	7.43E-02	3.37E-02
9.50	241.30	4645.6446	14.655	1.23E-01	8.34E+00	3.78E+00	7.38E-02	3.35E-02
9.75	247.65	4355.2918	13.739	1.28E-01	8.72E+00	3.96E+00	7.33E-02	3.33E-02
10.00	254.00	4064.939	12.823	1.34E-01	9.08E+00	4.12E+00	7.29E-02	3.30E-02
10.25	260.35	3774.5863	11.907	1.39E-01	9.41E+00	4.27E+00	7.24E-02	3.29E-02
10.50	266.70	3484.2335	10.991	1.43E-01	9.72E+00	4.41E+00	7.21E-02	3.27E-02
10.75	273.05	3193.8807	10.075	1.47E-01	1.00E+01	4.54E+00	7.17E-02	3.25E-02
11.00	279.40	2903.5279	9.1594	1.51E-01	1.03E+01	4.66E+00	7.14E-02	3.24E-02
11.25	285.75	2613.1751	8.2434	1.55E-01	1.05E+01	4.76E+00	7.11E-02	3.23E-02
11.50	292.10	2322.8223	7.3275	1.58E-01	1.07E+01	4.86E+00	7.08E-02	3.21E-02
11.75	298.45	2032.4695	6.4116	1.60E-01	1.09E+01	4.94E+00	7.06E-02	3.20E-02
12.00	304.80	1742.1167	5.4956	1.63E-01	1.11E+01	5.01E+00	7.04E-02	3.19E-02

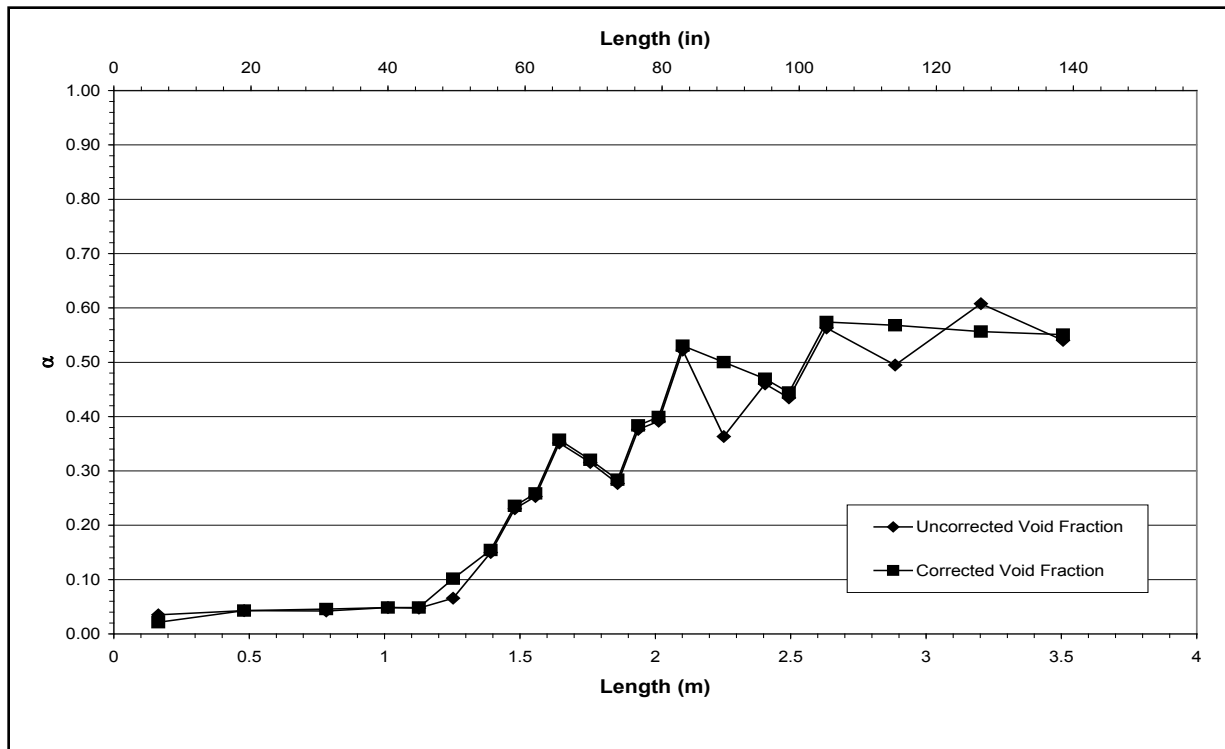


Figure A-390 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1648A for Time Period 909 to 987 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1648-B

Test Conditions

Date: 6/24/2003

Steady-state time window: 1458 – 1545 seconds

Inlet flow rate: 2.014 cm/sec (0.793 in./sec)

Inlet mass flow rate: 0.093 kg/sec (0.206 lbm/sec)

Inlet flow temperature: 370.5 K (207.3 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.12 kW

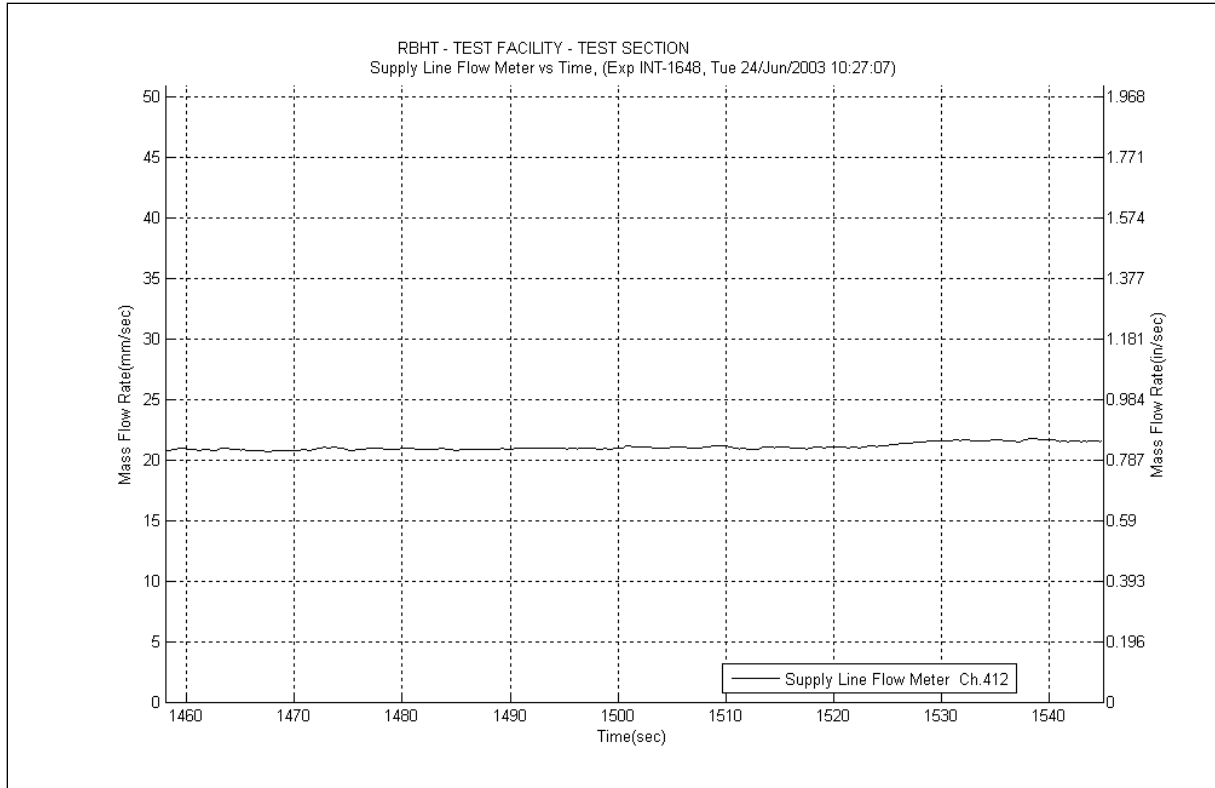


Figure A-391 Inlet Flow Plot for Experiment 1648B

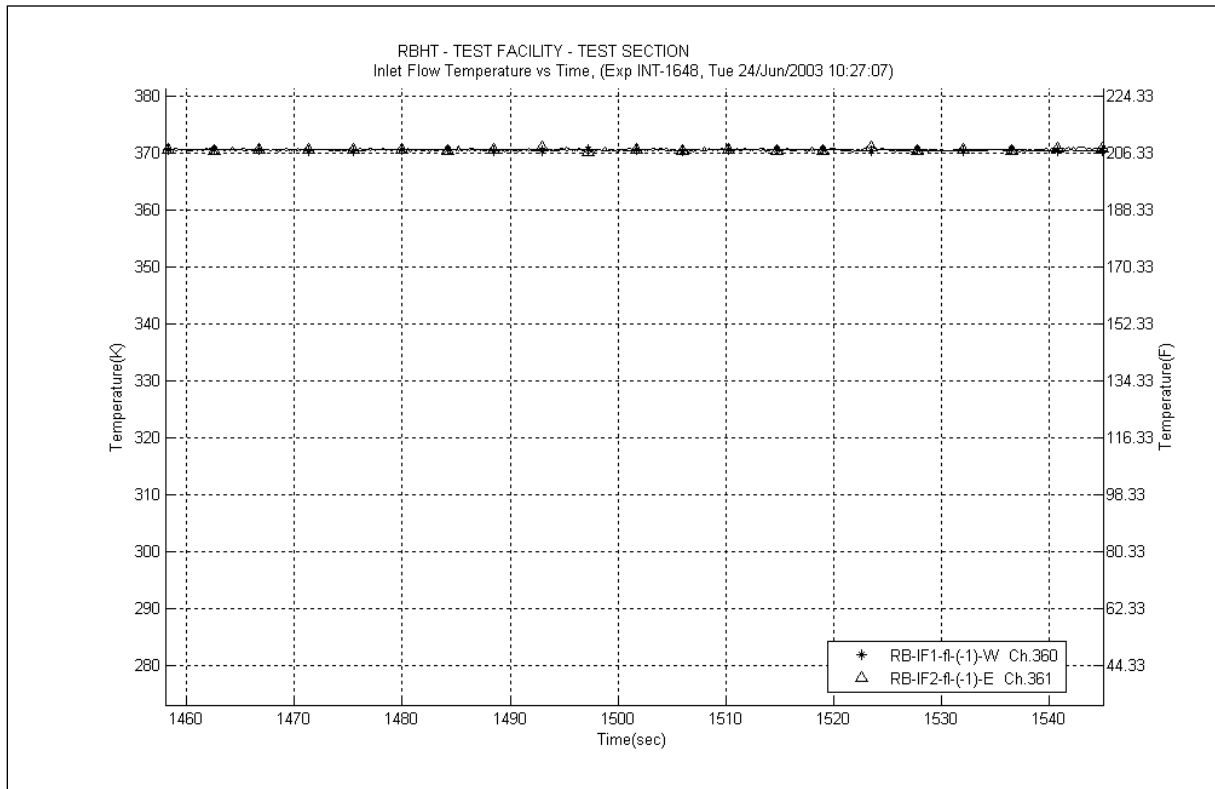


Figure A-392 Inlet Temperature Plot for Experiment 1648B

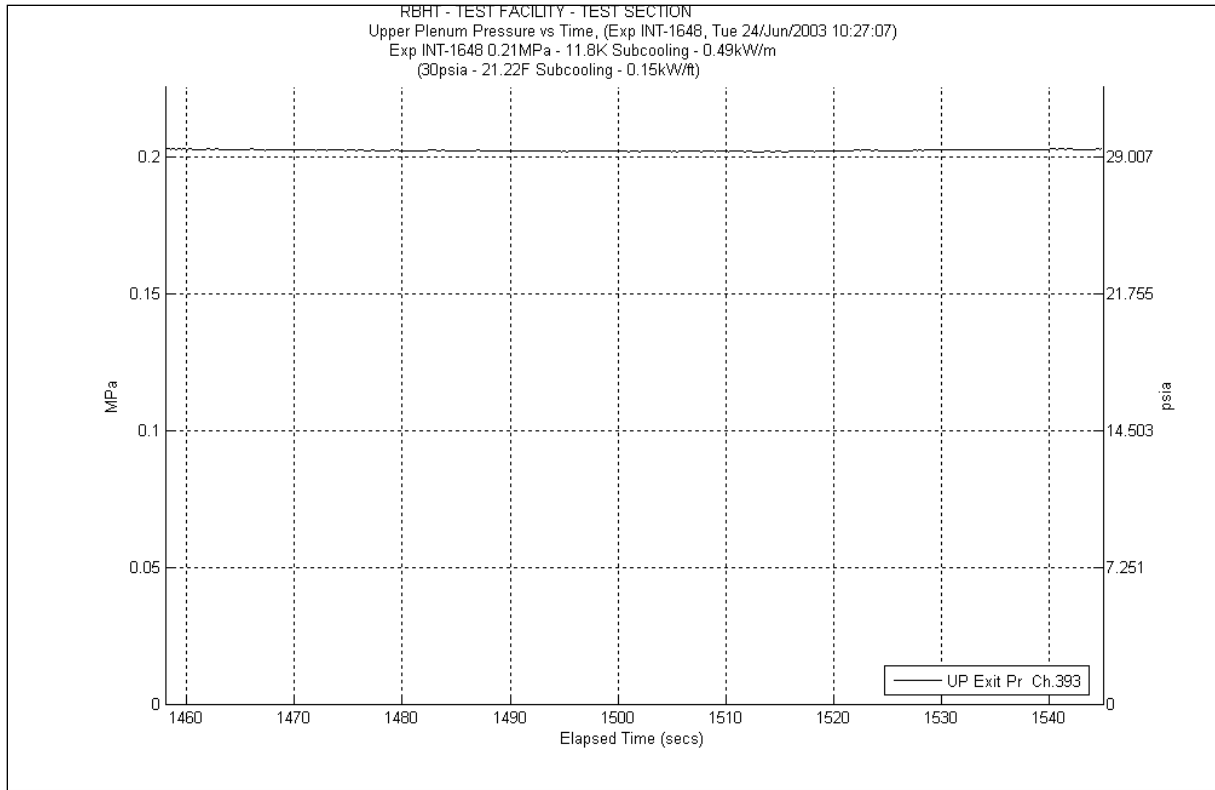


Figure A-393 System Pressure Plot for Experiment 1648B

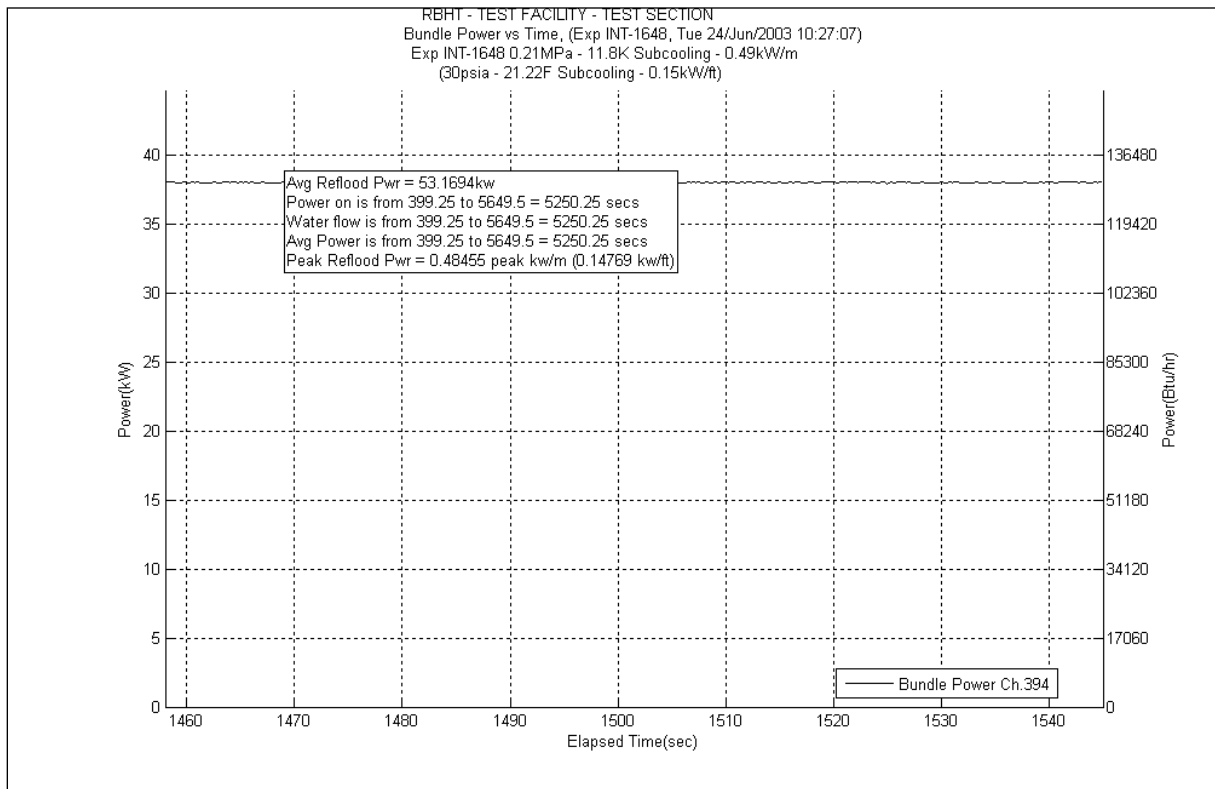


Figure A-394 Bundle Power Plot for Experiment 1648B

Table A-157 Data Results for RBHT Test 1648B for Time Period 1458 to 1545 seconds

Results for RBHT Test 1648
Valid Time Period 1458 to 1545 seconds
Collapsed Liquid Level = 96.344 inches = 2447.15 mm
(Z_{csv}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acccl} (lbf/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.575	24.289	1162.973	0.397	19.008	0.087	4.166	0.000	0.000	23.8	1139.550	4343.8	207982.2604	0.583	0.580	0.586
*	120-133	3048-3378	383	0.625	25.307	1211.710	0.440	21.067	0.155	7.421	-3.048	-145.934	27.76	1329.156	4371.56	209311.4163	0.589	0.586	0.592
*	108-120	2743-3048	382	0.515	30.225	1447.189	0.366	17.524	0.193	9.241	4.696	224.854	24.97	1195.570	4396.53	210506.9863	0.599	0.596	0.602
	100-108	2540-2743	381	0.596	16.790	803.911	0.217	10.390	0.141	6.751	0.000	0.000	16.42	786.194	4412.95	211293.1801	0.605	0.602	0.608
	97-100	2464-2540	380	0.455	8.486	406.307	0.076	3.639	0.051	2.442	0.000	0.000	8.359	400.231	4421.309	211693.4112	0.463	0.461	0.465
	93-97	2362-2464	379	0.488	10.631	509.003	0.096	4.597	0.067	3.208	0.000	0.000	10.46	500.827	4431.769	212194.2387	0.496	0.494	0.498
*	85-93	2159-2362	378	0.382	25.691	1230.111	0.175	8.379	0.128	6.129	6.158	294.866	19.23	920.737	4450.999	213114.976	0.537	0.534	0.540
	81-85	2057-2159	377	0.571	8.912	426.697	0.079	3.783	0.061	2.921	0.000	0.000	8.769	419.862	4459.768	213534.838	0.578	0.575	0.581
	78-81	1981-2057	376	0.431	8.870	424.708	0.056	2.681	0.045	2.155	0.000	0.000	8.766	419.718	4468.534	213954.5563	0.437	0.435	0.439
	75-78	1905-1981	375	0.421	9.026	432.168	0.053	2.538	0.044	2.107	0.000	0.000	8.925	427.331	4477.459	214381.8876	0.427	0.425	0.429
	72-75	1829-1905	374	0.316	10.652	509.998	0.049	2.346	0.043	2.059	0.000	0.000	10.56	505.616	4488.019	214887.5031	0.322	0.320	0.324
*	67-72	1702-1829	373	0.358	16.660	797.695	0.075	3.591	0.069	3.304	0.276	13.225	16.24	777.575	4504.259	215665.0785	0.374	0.372	0.376
	63-67	1600-1702	372	0.422	12.017	575.395	0.054	2.586	0.053	2.538	0.000	0.000	11.91	570.254	4516.169	216235.3324	0.427	0.425	0.429
	60-63	1524-1600	371	0.299	10.922	522.928	0.037	1.772	0.039	1.867	0.000	0.000	10.84	519.022	4527.009	216754.3544	0.304	0.302	0.306
	57-60	1448-1524	370	0.299	10.922	522.928	0.033	1.580	0.038	1.819	0.000	0.000	10.85	519.501	4537.859	217273.8551	0.304	0.302	0.306
	53-57	1346-1448	369	0.265	15.263	730.806	0.039	1.867	0.049	2.346	0.000	0.000	15.17	726.343	4553.029	218000.1986	0.269	0.268	0.270
*	46-53	1168-1346	368	0.177	29.934	1433.265	0.053	2.538	0.081	3.878	0.640	30.660	29.16	1396.188	4582.189	219396.3869	0.198	0.197	0.199
	43-46	1092-1168	367	0.123	13.669	654.468	0.016	0.766	0.033	1.580	0.000	0.000	13.62	652.129	4595.809	220048.516	0.126	0.125	0.127
	37-43	940-1092	366	0.054	29.472	1411.134	0.017	0.814	0.060	2.873	0.000	0.000	29.39	1407.201	4625.199	221455.7168	0.057	0.054	0.060
*	25-37	635-940	365	0.045	59.495	2848.626	0.002	0.096	0.000	0.000	0.343	16.413	59.15	2832.117	4684.349	224287.834	0.051	0.048	0.054
	13-25	330-635	364	0.044	59.552	2851.361	0.002	0.096	0.000	0.000	0.000	0.000	59.53	2850.312	4743.879	227138.1457	0.044	0.042	0.046
*	0-13	0-330	363	0.036	65.093	3116.679	0.003	0.144	0.000	0.000	-0.900	-43.083	65.99	3159.618	4809.869	230297.7639	0.022	0.021	0.023

Table A-158 Energy Balance Results for RBHT Test 1648B for Time Period 1458 to 1545 seconds

Results for RBHT Test 1648 Valid Time Period 1458 to 1545 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1744.1686	5.5021	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
0.25	6.35	1841.0668	5.8078	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
0.50	12.70	1937.9651	6.1134	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
0.75	19.05	2034.8633	6.4191	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
1.00	25.40	2131.7616	6.7248	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
1.25	31.75	2228.6599	7.0305	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
1.50	38.10	2325.5581	7.3361	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
1.75	44.45	2422.4564	7.6418	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
2.00	50.80	2519.3546	7.9475	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
2.25	57.15	2616.2529	8.2532	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
2.50	63.50	2713.1511	8.5588	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
2.75	69.85	2810.0494	8.8645	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
3.00	76.20	2906.9476	9.1702	0.00E+00	0.00E+00	0.00E+00	6.69E-02	3.03E-02
3.25	82.55	3003.8459	9.4758	2.70E-03	1.46E-01	6.62E-02	6.67E-02	3.03E-02
3.50	88.90	3100.7441	9.7815	7.49E-03	4.05E-01	1.84E-01	6.64E-02	3.01E-02
3.75	95.25	3197.6424	10.087	1.24E-02	6.73E-01	3.05E-01	6.61E-02	3.00E-02
4.00	101.60	3294.5407	10.393	1.75E-02	9.49E-01	4.30E-01	6.57E-02	2.98E-02
4.25	107.95	3391.4389	10.699	2.28E-02	1.23E+00	5.59E-01	6.54E-02	2.97E-02
4.50	114.30	3488.3372	11.004	2.82E-02	1.53E+00	6.92E-01	6.50E-02	2.95E-02
4.75	120.65	3585.2354	11.31	3.38E-02	1.83E+00	8.28E-01	6.46E-02	2.93E-02
5.00	127.00	3682.1337	11.616	3.95E-02	2.13E+00	9.68E-01	6.43E-02	2.91E-02
5.25	133.35	3779.0319	11.921	4.53E-02	2.45E+00	1.11E+00	6.39E-02	2.90E-02
5.50	139.70	3875.9302	12.227	5.13E-02	2.78E+00	1.26E+00	6.35E-02	2.88E-02
5.75	146.05	3972.8284	12.533	5.75E-02	3.11E+00	1.41E+00	6.31E-02	2.86E-02
6.00	152.40	4069.7267	12.838	6.38E-02	3.45E+00	1.57E+00	6.26E-02	2.84E-02
6.25	158.75	4166.6249	13.144	7.03E-02	3.80E+00	1.72E+00	6.22E-02	2.82E-02
6.50	165.10	4263.5232	13.45	7.69E-02	4.16E+00	1.89E+00	6.18E-02	2.80E-02
6.75	171.45	4360.4215	13.755	8.37E-02	4.53E+00	2.05E+00	6.13E-02	2.78E-02
7.00	177.80	4457.3197	14.061	9.06E-02	4.90E+00	2.22E+00	6.08E-02	2.76E-02
7.25	184.15	4554.218	14.367	9.77E-02	5.28E+00	2.40E+00	6.04E-02	2.74E-02
7.50	190.50	4651.1162	14.672	1.05E-01	5.68E+00	2.57E+00	5.99E-02	2.72E-02
7.75	196.85	4748.0145	14.978	1.12E-01	6.08E+00	2.76E+00	5.94E-02	2.69E-02
8.00	203.20	4844.9127	15.284	1.20E-01	6.48E+00	2.94E+00	5.89E-02	2.67E-02
8.25	209.55	4941.811	15.589	1.28E-01	6.90E+00	3.13E+00	5.84E-02	2.65E-02
8.50	215.90	5038.7092	15.895	1.35E-01	7.32E+00	3.32E+00	5.78E-02	2.62E-02
8.75	222.25	5135.6075	16.201	1.43E-01	7.75E+00	3.52E+00	5.73E-02	2.60E-02
9.00	228.60	5232.5057	16.506	1.52E-01	8.20E+00	3.72E+00	5.68E-02	2.57E-02
9.25	234.95	4941.811	15.589	1.60E-01	8.63E+00	3.91E+00	5.62E-02	2.55E-02
9.50	241.30	4651.1162	14.672	1.67E-01	9.03E+00	4.10E+00	5.57E-02	2.53E-02
9.75	247.65	4360.4215	13.755	1.74E-01	9.42E+00	4.27E+00	5.52E-02	2.51E-02
10.00	254.00	4069.7267	12.838	1.81E-01	9.78E+00	4.43E+00	5.48E-02	2.49E-02
10.25	260.35	3779.0319	11.921	1.87E-01	1.01E+01	4.59E+00	5.44E-02	2.47E-02
10.50	266.70	3488.3372	11.004	1.93E-01	1.04E+01	4.73E+00	5.40E-02	2.45E-02
10.75	273.05	3197.6424	10.087	1.98E-01	1.07E+01	4.85E+00	5.37E-02	2.43E-02
11.00	279.40	2906.9476	9.1702	2.03E-01	1.10E+01	4.97E+00	5.33E-02	2.42E-02
11.25	285.75	2616.2529	8.2532	2.07E-01	1.12E+01	5.08E+00	5.31E-02	2.41E-02
11.50	292.10	2325.5581	7.3361	2.11E-01	1.14E+01	5.17E+00	5.28E-02	2.39E-02
11.75	298.45	2034.8633	6.4191	2.14E-01	1.16E+01	5.26E+00	5.26E-02	2.38E-02
12.00	304.80	1744.1686	5.5021	2.17E-01	1.18E+01	5.33E+00	5.24E-02	2.38E-02

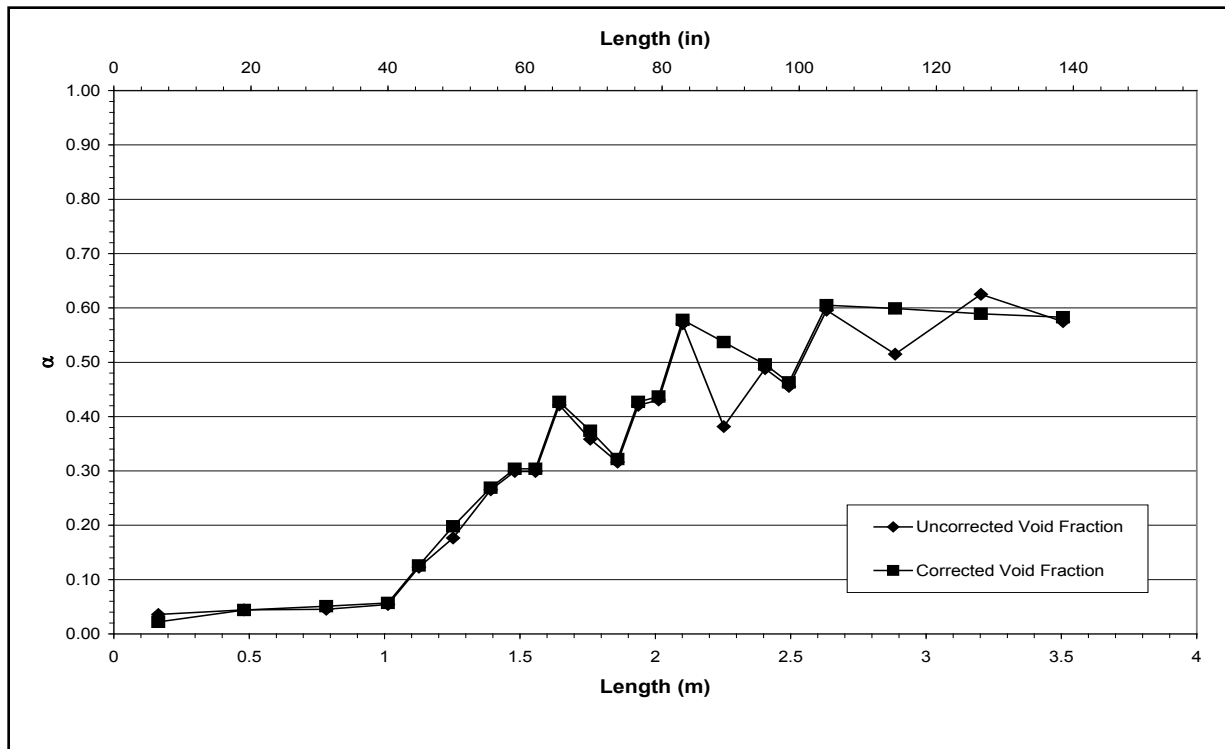


Figure A-395 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1648B for Time Period 1458 to 1545 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1648-C

Test Conditions

Date: 6/24/2003

Steady-state time window: 1734 – 1800 seconds

Inlet flow rate: 2.027 cm/sec (0.798 in./sec)

Inlet mass flow rate: 0.094 kg/sec (0.207 lbm/sec)

Inlet flow temperature: 370.5 K (207.3 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.12 kW

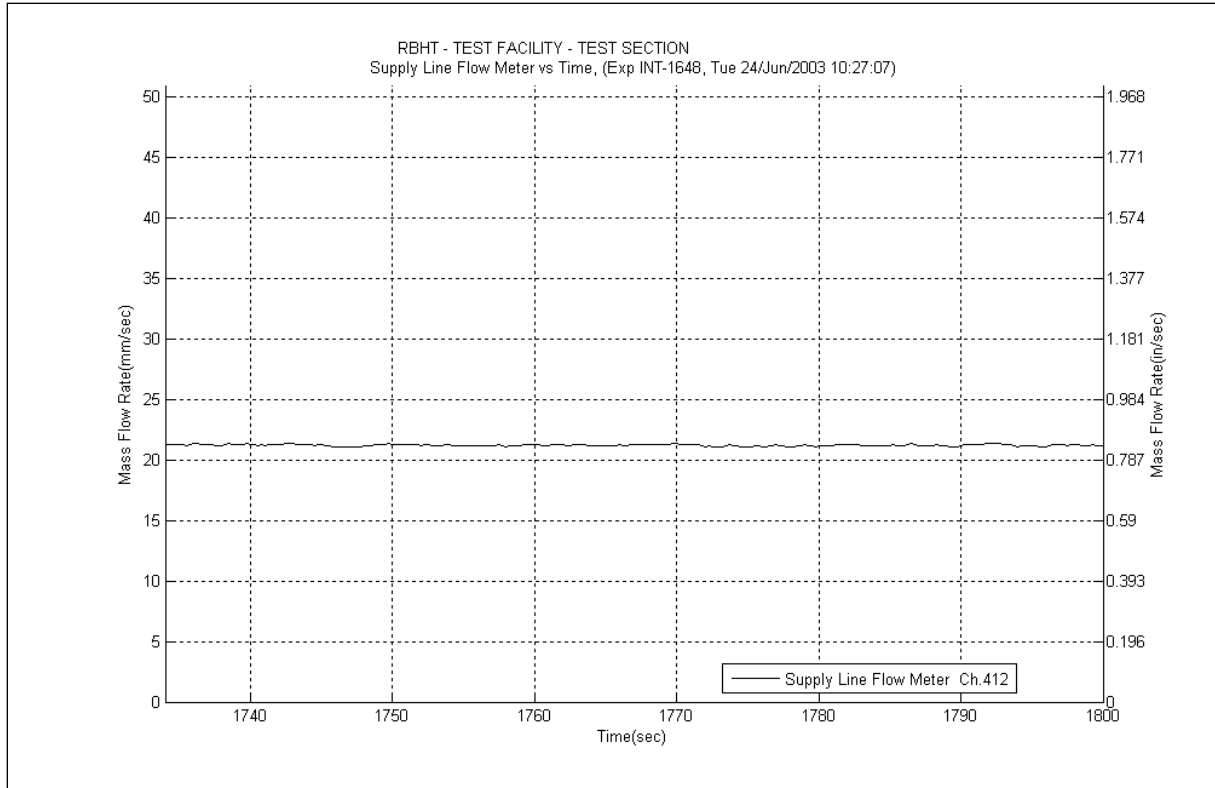


Figure A-396 Inlet Flow Plot for Experiment 1648C

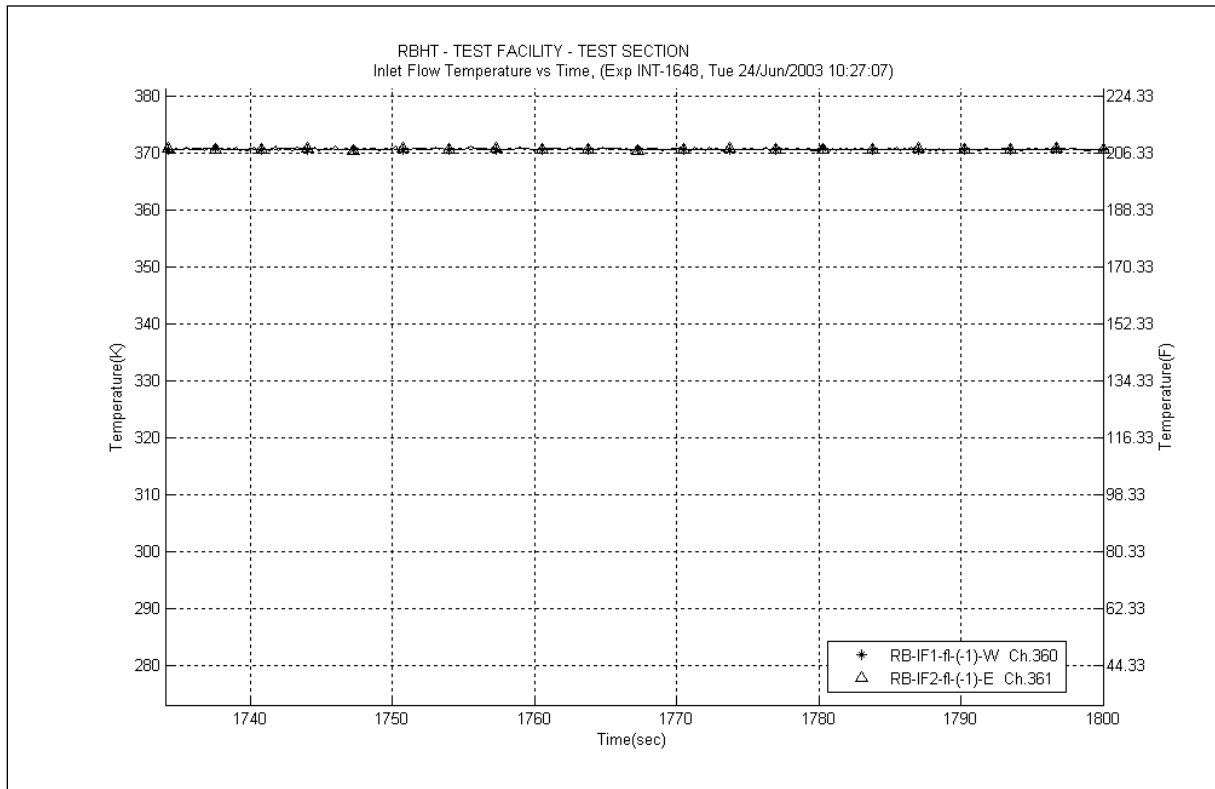


Figure A-397 Inlet Temperature Plot for Experiment 1648C

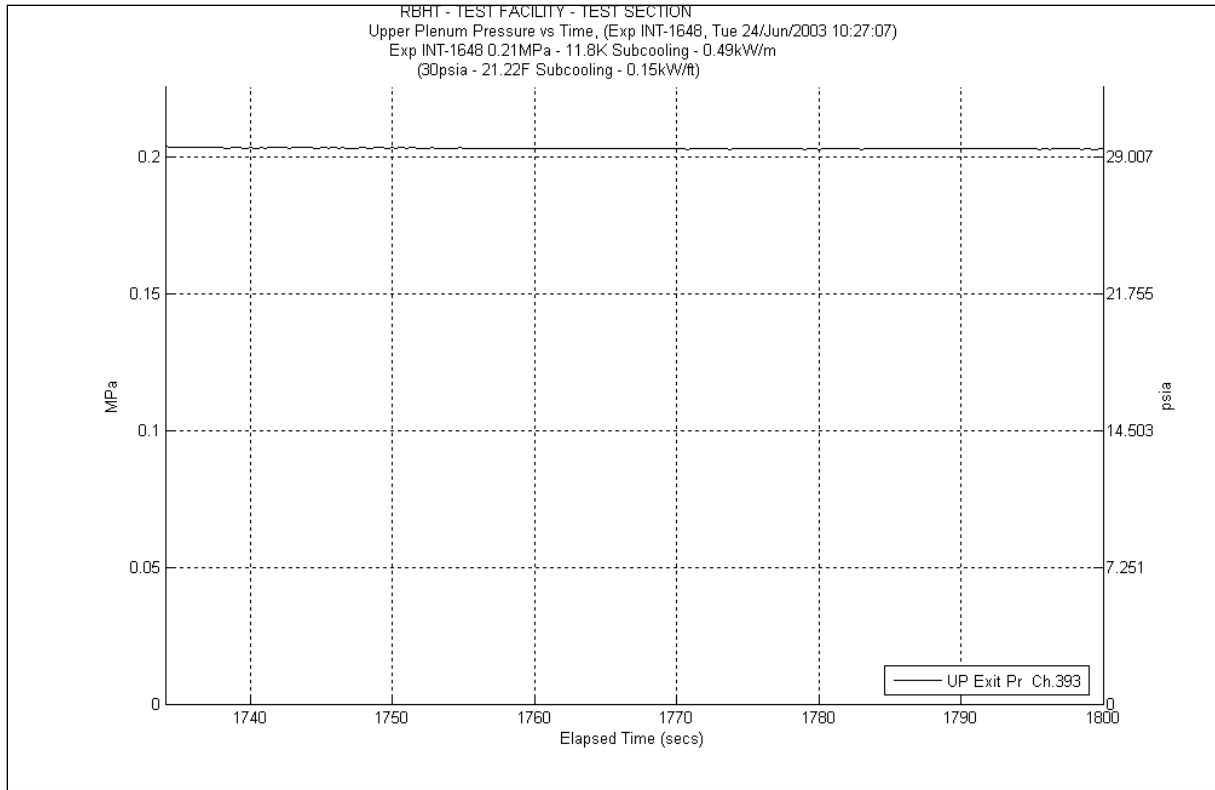


Figure A-398 System Pressure Plot for Experiment 1648C

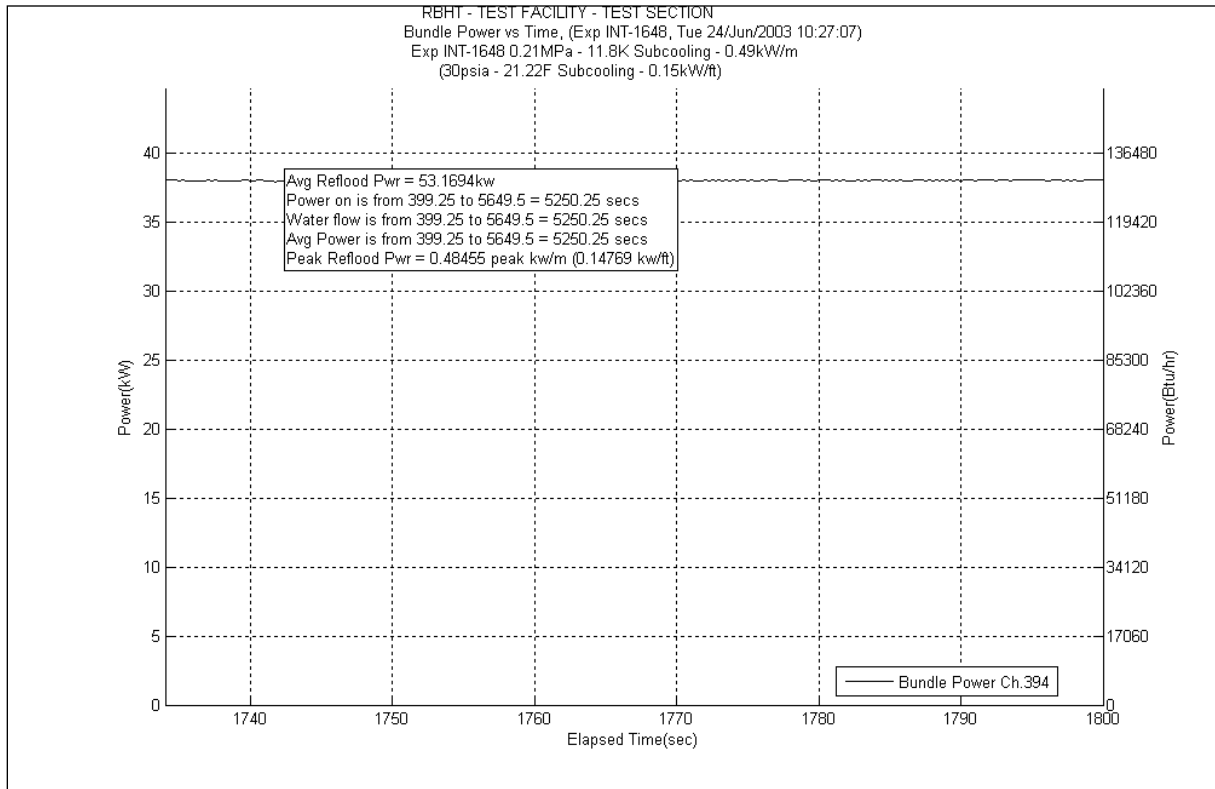


Figure A-399 Bundle Power Plot for Experiment 1648C

Table A-159 Data Results for RBHT Test 1648C for Time Period 1734 to 1800 seconds

Results for RBHT Test 1648
Valid Time Period 1734 to 1800 seconds
Collapsed Liquid Level = 96.434 inches = 2449.41 mm
(Z_{csl}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lb/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lb/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.574	24.352	1165.957	0.399	19.104	0.087	4.166	0.000	0.000	23.86	1142.423	4343.86	207985.1332	0.582	0.579	0.585
*	120-133	3048-3378	383	0.628	25.105	1202.013	0.441	21.115	0.155	7.421	-3.281	-157.116	27.79	1330.592	4371.65	209315.7255	0.588	0.585	0.591
*	108-120	2743-3048	382	0.517	30.101	1441.222	0.367	17.572	0.194	9.289	4.640	222.142	24.9	1192.218	4396.55	210507.9439	0.6	0.597	0.603
	100-108	2540-2743	381	0.598	16.717	800.430	0.218	10.438	0.142	6.799	0.000	0.000	16.35	782.842	4412.9	211290.7861	0.606	0.603	0.609
	97-100	2464-2540	380	0.454	8.507	407.302	0.076	3.639	0.051	2.442	0.000	0.000	8.376	401.045	4421.276	211691.8311	0.462	0.460	0.464
	93-97	2362-2464	379	0.489	10.620	508.506	0.096	4.597	0.067	3.208	0.000	0.000	10.45	500.349	4431.726	212192.1798	0.497	0.495	0.499
*	85-93	2159-2362	378	0.381	25.702	1230.608	0.176	8.427	0.128	6.129	6.108	292.443	19.29	923.610	4451.016	213115.79	0.536	0.533	0.539
	81-85	2057-2159	377	0.568	8.984	430.178	0.079	3.783	0.062	2.969	0.000	0.000	8.838	423.166	4459.854	213538.9557	0.574	0.571	0.577
	78-81	1981-2057	376	0.436	8.782	420.481	0.056	2.681	0.045	2.155	0.000	0.000	8.677	415.457	4468.531	213954.4127	0.443	0.441	0.445
	75-78	1905-1981	375	0.422	9.000	430.924	0.053	2.538	0.044	2.107	0.000	0.000	8.9	426.134	4477.431	214380.547	0.429	0.427	0.431
	72-75	1829-1905	374	0.318	10.620	508.506	0.049	2.346	0.043	2.059	0.000	0.000	10.53	504.179	4487.961	214884.7261	0.324	0.322	0.326
*	67-72	1702-1829	373	0.356	16.728	800.927	0.075	3.591	0.069	3.304	0.404	19.330	16.18	774.703	4504.141	215659.4286	0.377	0.375	0.379
	63-67	1600-1702	372	0.424	11.960	572.659	0.054	2.586	0.053	2.538	0.000	0.000	11.85	567.381	4515.991	216226.8097	0.429	0.427	0.431
	60-63	1524-1600	371	0.298	10.932	523.425	0.037	1.772	0.039	1.867	0.000	0.000	10.85	519.501	4526.841	216746.3105	0.303	0.301	0.305
	57-60	1448-1524	370	0.297	10.953	524.420	0.033	1.580	0.038	1.819	0.000	0.000	10.88	520.937	4537.721	217267.2477	0.302	0.300	0.304
	53-57	1346-1448	369	0.262	15.331	734.038	0.039	1.867	0.049	2.346	0.000	0.000	15.24	729.695	4552.961	217996.9428	0.266	0.265	0.267
*	46-53	1168-1346	368	0.178	29.898	1431.524	0.053	2.538	0.081	3.878	0.534	25.568	29.23	1399.540	4582.191	219396.4827	0.196	0.195	0.197
	43-46	1092-1168	367	0.122	13.679	654.965	0.016	0.766	0.033	1.580	0.000	0.000	13.62	652.129	4595.811	220048.6118	0.125	0.124	0.126
	37-43	940-1092	366	0.054	29.472	1411.134	0.017	0.814	0.059	2.825	0.000	0.000	29.39	1407.201	4625.201	221455.8126	0.057	0.054	0.060
*	25-37	635-940	365	0.045	59.495	2848.626	0.002	0.096	0.000	0.000	0.343	16.413	59.15	2832.117	4684.351	224287.9298	0.051	0.048	0.054
	13-25	330-635	364	0.044	59.552	2851.361	0.002	0.096	0.000	0.000	0.000	0.000	59.53	2850.312	4743.881	227138.2415	0.045	0.043	0.047
*	0-13	0-330	363	0.036	65.093	3116.679	0.003	0.144	0.000	0.000	-0.900	-43.083	65.99	3159.618	4809.871	230297.8596	0.022	0.021	0.023

Table A-160 Energy Balance Results for RBHT Test 1648C for Time Period 1734 to 1800 seconds

Results for RBHT Test 1648 Valid Time Period 1734 to 1800 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1743.1022	5.4987	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
0.25	6.35	1839.9413	5.8042	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
0.50	12.70	1936.7803	6.1097	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
0.75	19.05	2033.6193	6.4152	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
1.00	25.40	2130.4583	6.7207	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
1.25	31.75	2227.2973	7.0262	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
1.50	38.10	2324.1363	7.3317	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
1.75	44.45	2420.9753	7.6371	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
2.00	50.80	2517.8143	7.9426	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
2.25	57.15	2614.6534	8.2481	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
2.50	63.50	2711.4924	8.5536	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
2.75	69.85	2808.3314	8.8591	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
3.00	76.20	2905.1704	9.1646	0.00E+00	0.00E+00	0.00E+00	6.73E-02	3.05E-02
3.25	82.55	3002.0094	9.4701	2.45E-03	1.33E-01	6.02E-02	6.72E-02	3.05E-02
3.50	88.90	3098.8484	9.7755	7.21E-03	3.91E-01	1.77E-01	6.68E-02	3.03E-02
3.75	95.25	3195.6874	10.081	1.21E-02	6.58E-01	2.98E-01	6.65E-02	3.02E-02
4.00	101.60	3292.5265	10.387	1.72E-02	9.33E-01	4.23E-01	6.62E-02	3.00E-02
4.25	107.95	3389.3655	10.692	2.24E-02	1.22E+00	5.52E-01	6.58E-02	2.99E-02
4.50	114.30	3486.2045	10.997	2.78E-02	1.51E+00	6.84E-01	6.55E-02	2.97E-02
4.75	120.65	3583.0435	11.303	3.33E-02	1.81E+00	8.20E-01	6.51E-02	2.95E-02
5.00	127.00	3679.8825	11.608	3.90E-02	2.11E+00	9.59E-01	6.47E-02	2.93E-02
5.25	133.35	3776.7215	11.914	4.48E-02	2.43E+00	1.10E+00	6.43E-02	2.92E-02
5.50	139.70	3873.5605	12.219	5.07E-02	2.75E+00	1.25E+00	6.39E-02	2.90E-02
5.75	146.05	3970.3996	12.525	5.69E-02	3.09E+00	1.40E+00	6.35E-02	2.88E-02
6.00	152.40	4067.2386	12.83	6.31E-02	3.43E+00	1.55E+00	6.31E-02	2.86E-02
6.25	158.75	4164.0776	13.136	6.96E-02	3.78E+00	1.71E+00	6.26E-02	2.84E-02
6.50	165.10	4260.9166	13.441	7.61E-02	4.13E+00	1.88E+00	6.22E-02	2.82E-02
6.75	171.45	4357.7556	13.747	8.29E-02	4.50E+00	2.04E+00	6.17E-02	2.80E-02
7.00	177.80	4454.5946	14.052	8.97E-02	4.87E+00	2.21E+00	6.13E-02	2.78E-02
7.25	184.15	4551.4336	14.358	9.68E-02	5.25E+00	2.38E+00	6.08E-02	2.76E-02
7.50	190.50	4648.2726	14.663	1.04E-01	5.65E+00	2.56E+00	6.03E-02	2.74E-02
7.75	196.85	4745.1117	14.969	1.11E-01	6.04E+00	2.74E+00	5.98E-02	2.71E-02
8.00	203.20	4841.9507	15.274	1.19E-01	6.45E+00	2.93E+00	5.93E-02	2.69E-02
8.25	209.55	4938.7897	15.58	1.26E-01	6.86E+00	3.11E+00	5.88E-02	2.67E-02
8.50	215.90	5035.6287	15.885	1.34E-01	7.29E+00	3.30E+00	5.83E-02	2.64E-02
8.75	222.25	5132.4677	16.191	1.42E-01	7.72E+00	3.50E+00	5.78E-02	2.62E-02
9.00	228.60	5229.3067	16.496	1.50E-01	8.16E+00	3.70E+00	5.72E-02	2.60E-02
9.25	234.95	4938.7897	15.58	1.58E-01	8.58E+00	3.89E+00	5.67E-02	2.57E-02
9.50	241.30	4648.2726	14.663	1.66E-01	8.99E+00	4.08E+00	5.62E-02	2.55E-02
9.75	247.65	4357.7556	13.747	1.73E-01	9.38E+00	4.25E+00	5.57E-02	2.53E-02
10.00	254.00	4067.2386	12.83	1.79E-01	9.73E+00	4.41E+00	5.53E-02	2.51E-02
10.25	260.35	3776.7215	11.914	1.85E-01	1.01E+01	4.57E+00	5.48E-02	2.49E-02
10.50	266.70	3486.2045	10.997	1.91E-01	1.04E+01	4.70E+00	5.45E-02	2.47E-02
10.75	273.05	3195.6874	10.081	1.96E-01	1.07E+01	4.83E+00	5.41E-02	2.45E-02
11.00	279.40	2905.1704	9.1646	2.01E-01	1.09E+01	4.95E+00	5.38E-02	2.44E-02
11.25	285.75	2614.6534	8.2481	2.05E-01	1.11E+01	5.06E+00	5.35E-02	2.43E-02
11.50	292.10	2324.1363	7.3317	2.09E-01	1.14E+01	5.15E+00	5.32E-02	2.41E-02
11.75	298.45	2033.6193	6.4152	2.13E-01	1.15E+01	5.24E+00	5.30E-02	2.40E-02
12.00	304.80	1743.1022	5.4987	2.16E-01	1.17E+01	5.31E+00	5.28E-02	2.40E-02

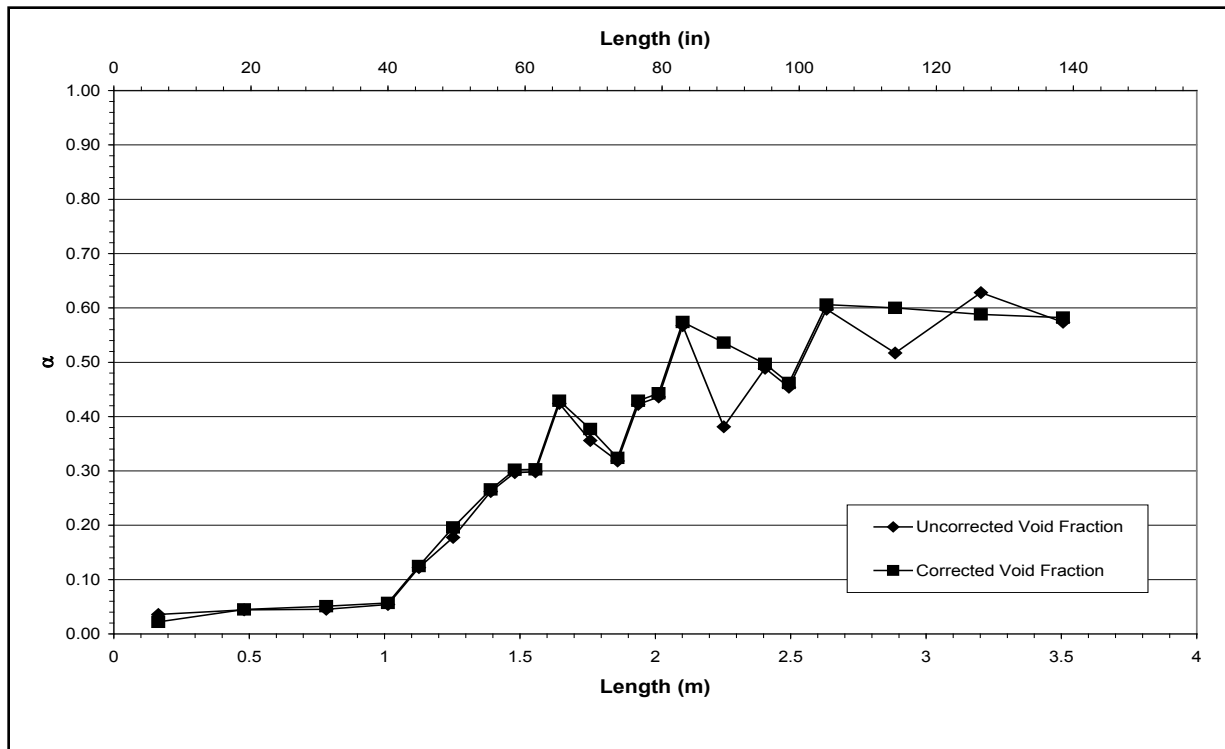


Figure A-400 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1648C for Time Period 1734 to 1800 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1648-D

Test Conditions

Date: 6/24/2003

Steady-state time window: 2040 – 2133 seconds

Inlet flow rate: 1.529 cm/sec (0.602 in./sec)

Inlet mass flow rate: 0.071 kg/sec (0.156 lbm/sec)

Inlet flow temperature: 370.5 K (207.3 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.12 kW

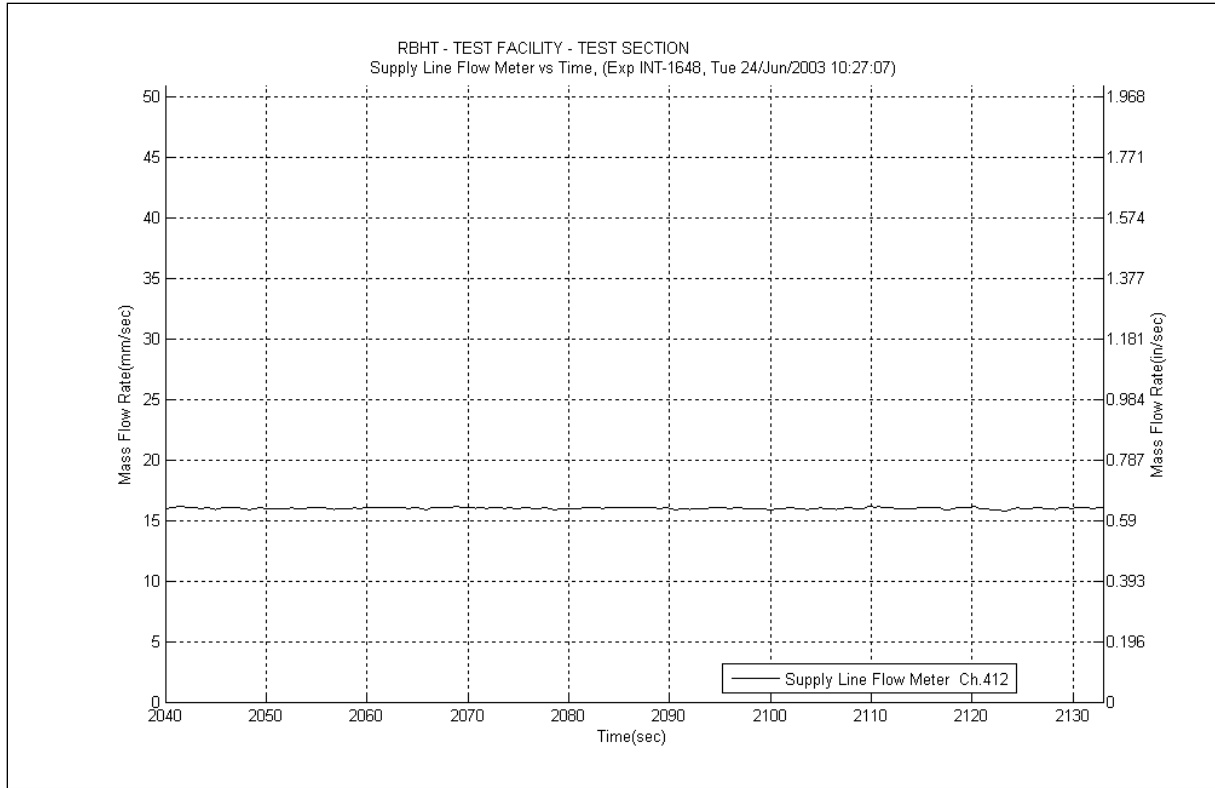


Figure A-401 Inlet Flow Plot for Experiment 1648D

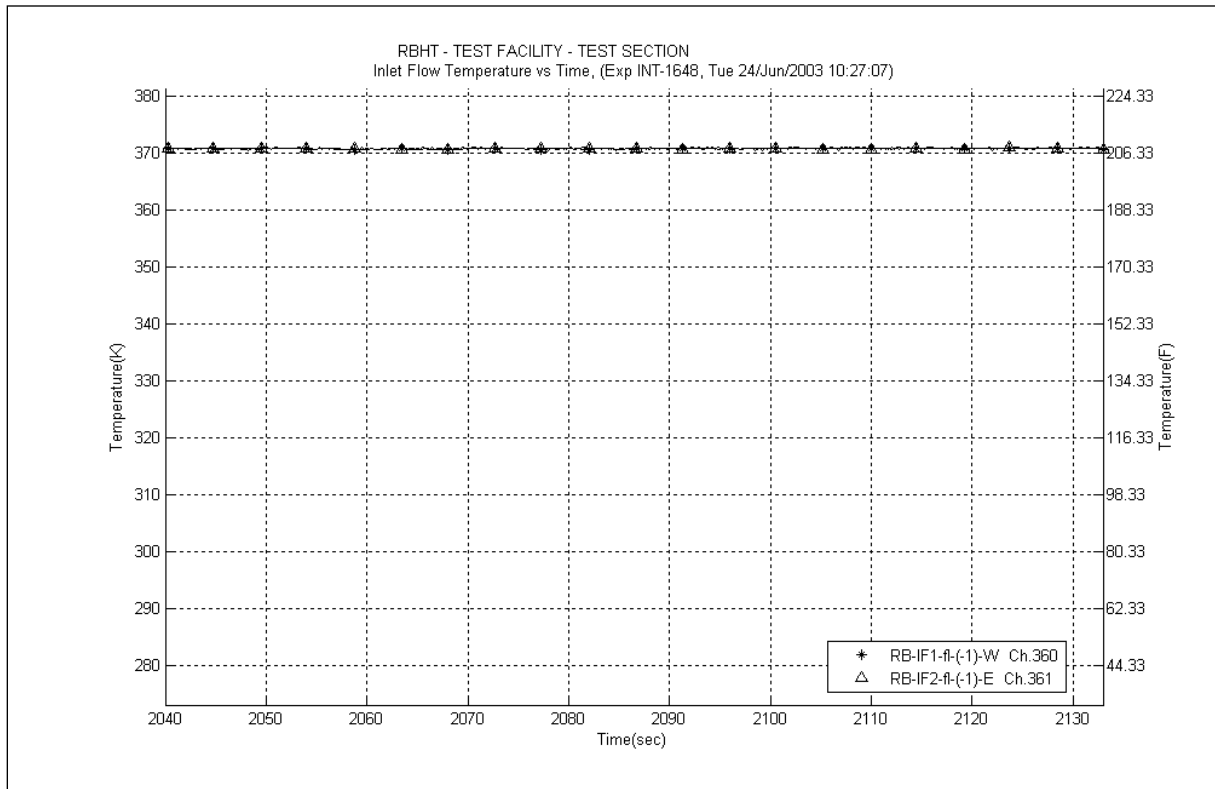


Figure A-402 Inlet Temperature Plot for Experiment 1648D

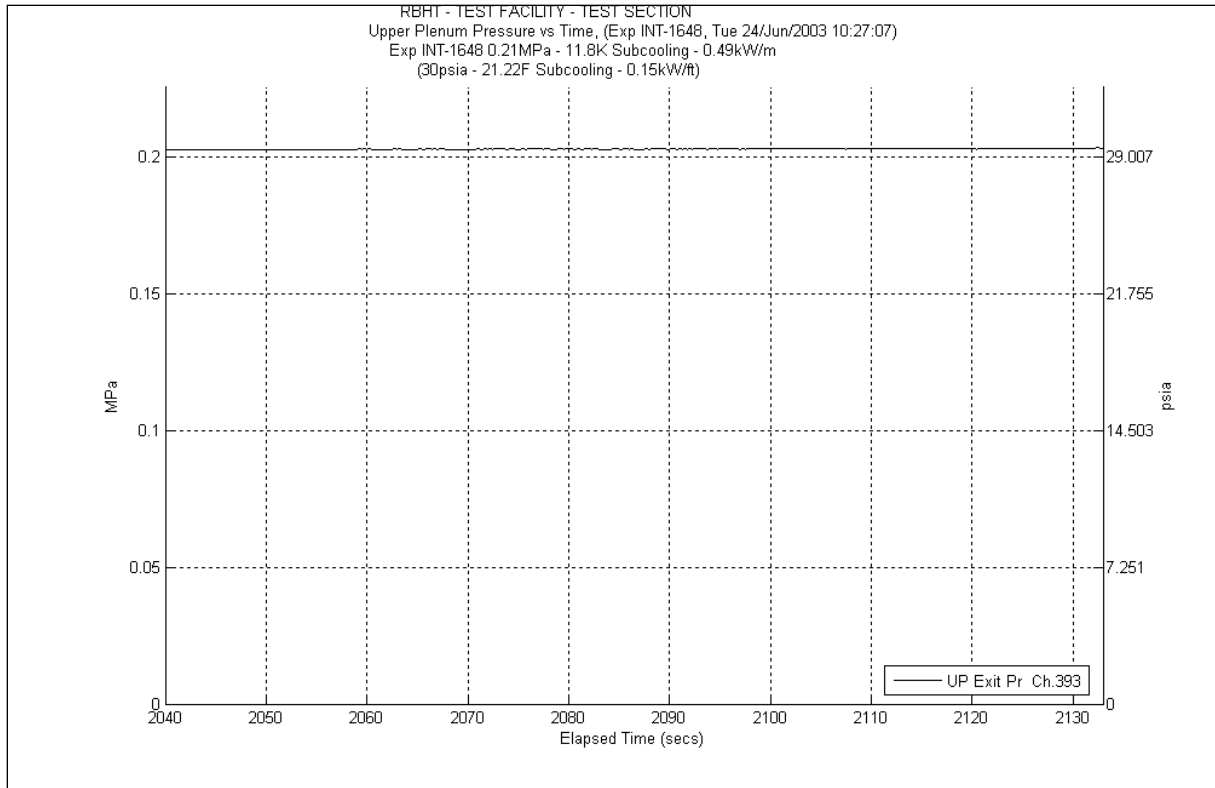


Figure A-403 System Pressure Plot for Experiment 1648D

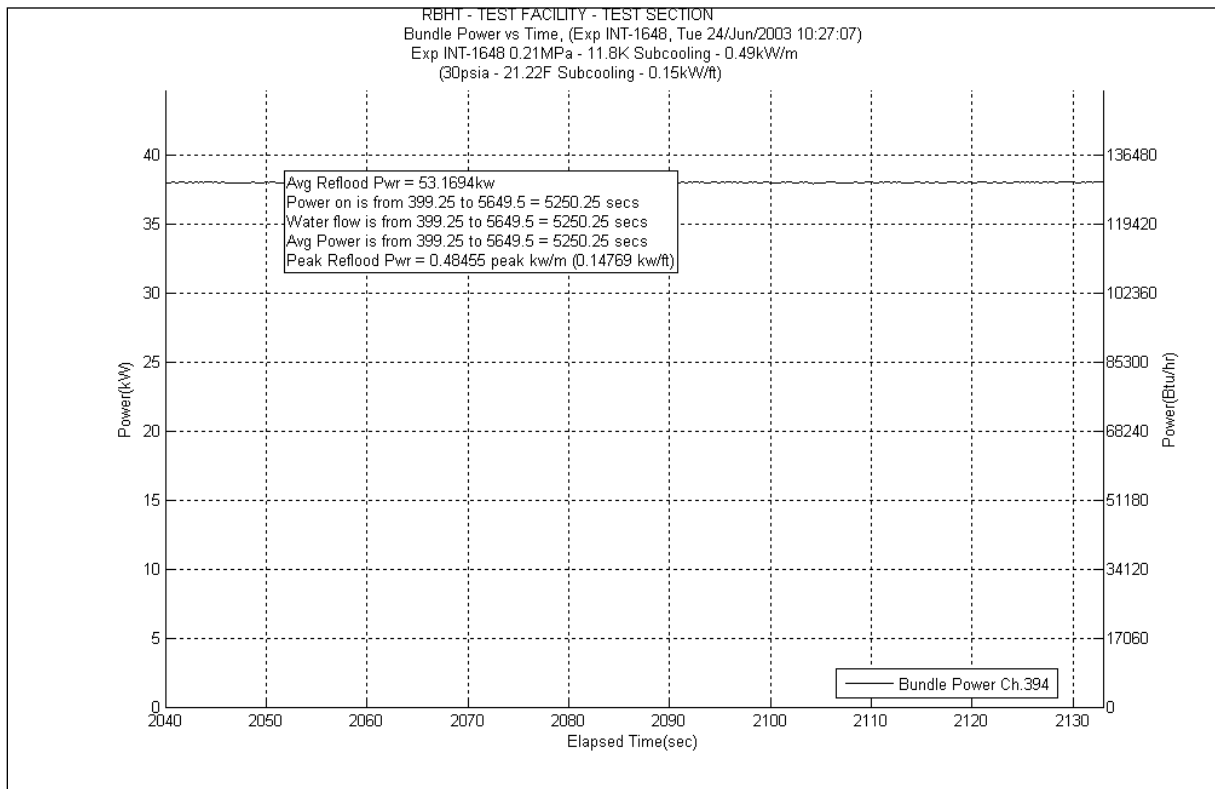


Figure A-404 Bundle Power Plot for Experiment 1648D

Table A-161 Data Results for RBHT Test 1648D for Time Period 2040 to 2133 seconds

Results for RBHT Test 1648
Valid Time Period 2040 to 2133 seconds
Collapsed Liquid Level = 91.781 inches = 2331.23 mm
(Z_{OSV}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.614	22.035	1055.056	0.303	14.508	0.066	3.160	0.000	0.000	21.66	1037.086	4341.66	207879.7966	0.621	0.618	0.624
*	120-133	3048-3378	383	0.648	23.765	1137.859	0.336	16.088	0.118	5.650	-2.079	-99.538	25.39	1215.680	4367.05	209095.4763	0.624	0.621	0.627
*	108-120	2743-3048	382	0.533	29.083	1392.485	0.280	13.406	0.147	7.038	5.606	268.400	23.05	1103.640	4390.1	210199.1163	0.63	0.627	0.633
	100-108	2540-2743	381	0.626	15.523	743.239	0.167	7.996	0.107	5.123	0.000	0.000	15.24	729.695	4405.34	210928.8114	0.633	0.630	0.636
	97-100	2464-2540	380	0.473	8.205	392.880	0.058	2.777	0.039	1.867	0.000	0.000	8.104	388.022	4413.444	211316.833	0.48	0.478	0.482
	93-97	2362-2464	379	0.514	10.096	483.391	0.074	3.543	0.051	2.442	0.000	0.000	9.969	477.318	4423.413	211794.1513	0.52	0.517	0.523
*	85-93	2159-2362	378	0.395	25.156	1204.499	0.136	6.512	0.097	4.644	6.933	331.977	17.99	861.366	4441.403	212655.5171	0.567	0.564	0.570
	81-85	2057-2159	377	0.608	8.138	389.647	0.062	2.969	0.047	2.250	0.000	0.000	8.026	384.287	4449.429	213039.804	0.614	0.611	0.617
	78-81	1981-2057	376	0.468	8.283	396.609	0.044	2.107	0.034	1.628	0.000	0.000	8.204	392.810	4457.633	213432.6137	0.473	0.471	0.475
	75-78	1905-1981	375	0.469	8.278	396.361	0.042	2.011	0.033	1.580	0.000	0.000	8.2	392.618	4465.833	213825.2318	0.474	0.472	0.476
	72-75	1829-1905	374	0.355	10.044	480.905	0.040	1.915	0.032	1.532	0.000	0.000	9.967	477.223	4475.8	214302.4543	0.36	0.358	0.362
*	67-72	1702-1829	373	0.370	16.354	783.024	0.061	2.921	0.052	2.490	1.301	62.282	14.94	715.331	4490.74	215017.7853	0.425	0.423	0.427
	63-67	1600-1702	372	0.485	10.703	512.484	0.044	2.107	0.040	1.915	0.000	0.000	10.61	508.010	4501.35	215525.7948	0.489	0.487	0.491
	60-63	1524-1600	371	0.336	10.340	495.078	0.031	1.484	0.029	1.389	0.000	0.000	10.27	491.730	4511.62	216017.5251	0.34	0.338	0.342
	57-60	1448-1524	370	0.328	10.475	501.543	0.029	1.389	0.029	1.389	0.000	0.000	10.41	498.433	4522.03	216515.9586	0.332	0.330	0.334
	53-57	1346-1448	369	0.304	14.453	692.015	0.035	1.676	0.037	1.772	0.000	0.000	14.38	688.518	4536.41	217204.4767	0.308	0.306	0.310
*	46-53	1168-1346	368	0.227	28.091	1344.991	0.051	2.442	0.061	2.921	2.839	135.919	25.14	1203.710	4561.55	218408.1863	0.308	0.306	0.310
	43-46	1092-1168	367	0.306	10.813	517.706	0.018	0.862	0.025	1.197	0.000	0.000	10.77	515.670	4572.32	218923.8567	0.309	0.307	0.311
	37-43	940-1092	366	0.200	24.918	1193.061	0.028	1.341	0.048	2.298	0.000	0.000	24.83	1188.867	4597.15	220112.7235	0.203	0.202	0.204
*	25-37	635-940	365	0.056	58.814	2816.052	0.028	1.341	0.055	2.633	4.201	201.167	54.53	2610.910	4651.68	222723.6339	0.125	0.124	0.126
	13-25	330-635	364	0.047	59.401	2844.150	0.001	0.048	0.000	0.000	0.000	0.000	59.38	2843.130	4711.06	225566.7635	0.047	0.045	0.049
*	0-13	0-330	363	0.036	65.052	3114.690	0.001	0.048	0.000	0.000	-0.859	-41.146	65.91	3155.788	4776.97	228722.5513	0.023	0.022	0.024

Table A-162 Energy Balance Results for RBHT Test 1648D for Time Period 2040 to 2133 seconds

Results for RBHT Test 1648								
Valid Time Period 2040 to 2133 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1743.8796	5.5012	0.00E+00	0.00E+00	0.00E+00	5.08E-02	2.30E-02
0.25	6.35	1840.7618	5.8068	0.00E+00	0.00E+00	0.00E+00	5.08E-02	2.30E-02
0.50	12.70	1937.644	6.1124	0.00E+00	0.00E+00	0.00E+00	5.08E-02	2.30E-02
0.75	19.05	2034.5262	6.4181	0.00E+00	0.00E+00	0.00E+00	5.08E-02	2.30E-02
1.00	25.40	2131.4084	6.7237	0.00E+00	0.00E+00	0.00E+00	5.08E-02	2.30E-02
1.25	31.75	2228.2906	7.0293	0.00E+00	0.00E+00	0.00E+00	5.08E-02	2.30E-02
1.50	38.10	2325.1728	7.3349	0.00E+00	0.00E+00	0.00E+00	5.08E-02	2.30E-02
1.75	44.45	2422.055	7.6405	0.00E+00	0.00E+00	0.00E+00	5.08E-02	2.30E-02
2.00	50.80	2518.9372	7.9462	0.00E+00	0.00E+00	0.00E+00	5.08E-02	2.30E-02
2.25	57.15	2615.8194	8.2518	0.00E+00	0.00E+00	0.00E+00	5.08E-02	2.30E-02
2.50	63.50	2712.7016	8.5574	7.51E-04	3.08E-02	1.40E-02	5.07E-02	2.30E-02
2.75	69.85	2809.5838	8.863	6.47E-03	2.65E-01	1.20E-01	5.04E-02	2.29E-02
3.00	76.20	2906.466	9.1687	1.24E-02	5.08E-01	2.30E-01	5.01E-02	2.27E-02
3.25	82.55	3003.3482	9.4743	1.85E-02	7.59E-01	3.44E-01	4.98E-02	2.26E-02
3.50	88.90	3100.2304	9.7799	2.48E-02	1.02E+00	4.62E-01	4.95E-02	2.25E-02
3.75	95.25	3197.1126	10.086	3.13E-02	1.29E+00	5.83E-01	4.92E-02	2.23E-02
4.00	101.60	3293.9948	10.391	3.81E-02	1.56E+00	7.08E-01	4.88E-02	2.22E-02
4.25	107.95	3390.877	10.697	4.50E-02	1.85E+00	8.37E-01	4.85E-02	2.20E-02
4.50	114.30	3487.7592	11.002	5.21E-02	2.14E+00	9.70E-01	4.81E-02	2.18E-02
4.75	120.65	3584.6414	11.308	5.94E-02	2.44E+00	1.11E+00	4.77E-02	2.17E-02
5.00	127.00	3681.5236	11.614	6.69E-02	2.75E+00	1.25E+00	4.74E-02	2.15E-02
5.25	133.35	3778.4058	11.919	7.47E-02	3.06E+00	1.39E+00	4.70E-02	2.13E-02
5.50	139.70	3875.288	12.225	8.26E-02	3.39E+00	1.54E+00	4.66E-02	2.11E-02
5.75	146.05	3972.1702	12.53	9.07E-02	3.72E+00	1.69E+00	4.62E-02	2.09E-02
6.00	152.40	4069.0524	12.836	9.90E-02	4.06E+00	1.84E+00	4.57E-02	2.07E-02
6.25	158.75	4165.9346	13.142	1.08E-01	4.41E+00	2.00E+00	4.53E-02	2.06E-02
6.50	165.10	4262.8168	13.447	1.16E-01	4.77E+00	2.16E+00	4.49E-02	2.03E-02
6.75	171.45	4359.699	13.753	1.25E-01	5.14E+00	2.33E+00	4.44E-02	2.01E-02
7.00	177.80	4456.5812	14.059	1.34E-01	5.51E+00	2.50E+00	4.39E-02	1.99E-02
7.25	184.15	4553.4634	14.364	1.44E-01	5.89E+00	2.67E+00	4.35E-02	1.97E-02
7.50	190.50	4650.3456	14.67	1.53E-01	6.29E+00	2.85E+00	4.30E-02	1.95E-02
7.75	196.85	4747.2278	14.975	1.63E-01	6.69E+00	3.03E+00	4.25E-02	1.93E-02
8.00	203.20	4844.11	15.281	1.73E-01	7.09E+00	3.22E+00	4.20E-02	1.90E-02
8.25	209.55	4940.9922	15.587	1.83E-01	7.51E+00	3.40E+00	4.15E-02	1.88E-02
8.50	215.90	5037.8744	15.892	1.93E-01	7.93E+00	3.60E+00	4.10E-02	1.86E-02
8.75	222.25	5134.7566	16.198	2.04E-01	8.36E+00	3.79E+00	4.04E-02	1.83E-02
9.00	228.60	5231.6388	16.504	2.15E-01	8.80E+00	3.99E+00	3.99E-02	1.81E-02
9.25	234.95	4940.9922	15.587	2.25E-01	9.23E+00	4.19E+00	3.93E-02	1.78E-02
9.50	241.30	4650.3456	14.67	2.35E-01	9.64E+00	4.37E+00	3.88E-02	1.76E-02
9.75	247.65	4359.699	13.753	2.44E-01	1.00E+01	4.55E+00	3.84E-02	1.74E-02
10.00	254.00	4069.0524	12.836	2.53E-01	1.04E+01	4.71E+00	3.79E-02	1.72E-02
10.25	260.35	3778.4058	11.919	2.61E-01	1.07E+01	4.86E+00	3.75E-02	1.70E-02
10.50	266.70	3487.7592	11.002	2.69E-01	1.10E+01	5.00E+00	3.71E-02	1.68E-02
10.75	273.05	3197.1126	10.086	2.76E-01	1.13E+01	5.13E+00	3.68E-02	1.67E-02
11.00	279.40	2906.466	9.1687	2.82E-01	1.16E+01	5.25E+00	3.65E-02	1.65E-02
11.25	285.75	2615.8194	8.2518	2.88E-01	1.18E+01	5.35E+00	3.62E-02	1.64E-02
11.50	292.10	2325.1728	7.3349	2.93E-01	1.20E+01	5.45E+00	3.59E-02	1.63E-02
11.75	298.45	2034.5262	6.4181	2.97E-01	1.22E+01	5.53E+00	3.57E-02	1.62E-02
12.00	304.80	1743.8796	5.5012	3.01E-01	1.24E+01	5.60E+00	3.55E-02	1.61E-02

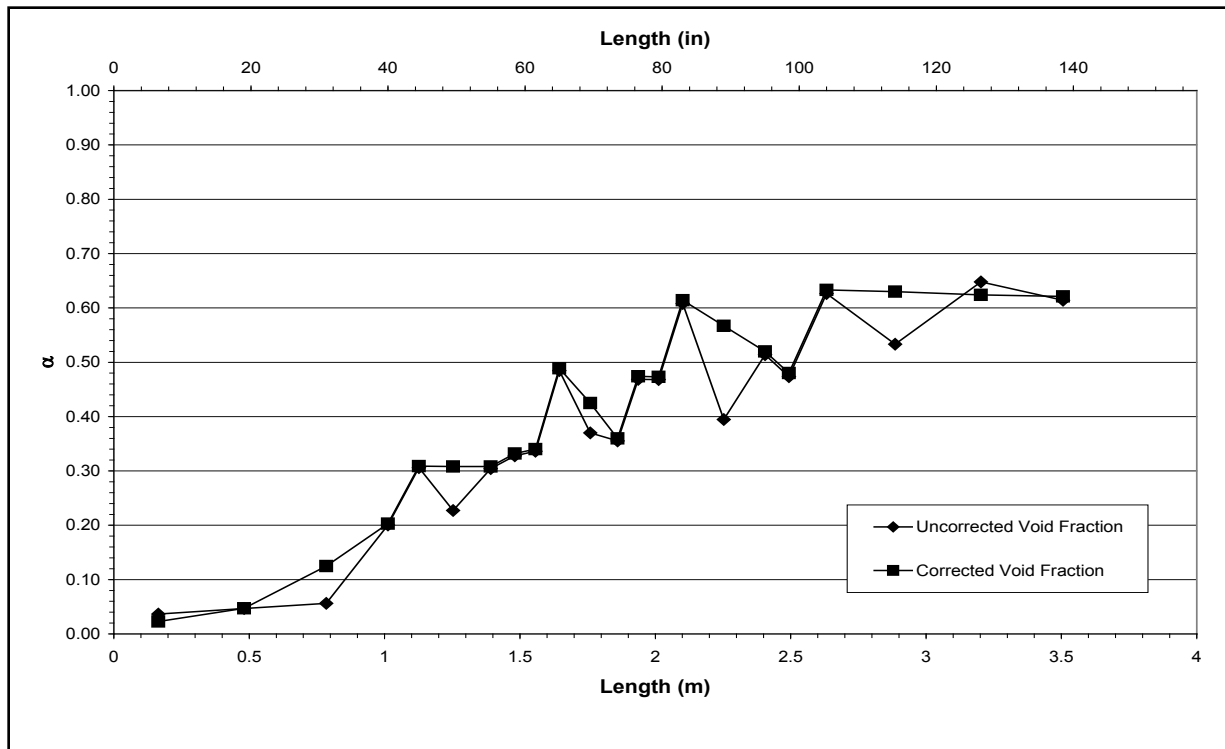


Figure A-405 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1648D for Time Period 2040 to 2133 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1648-E

Test Conditions

Date: 6/24/2003

Steady-state time window: 2313 – 2470 seconds

Inlet flow rate: 1.521 cm/sec (0.599 in./sec)

Inlet mass flow rate: 0.071 kg/sec (0.156 lbm/sec)

Inlet flow temperature: 370.5 K (207.3 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.12 kW

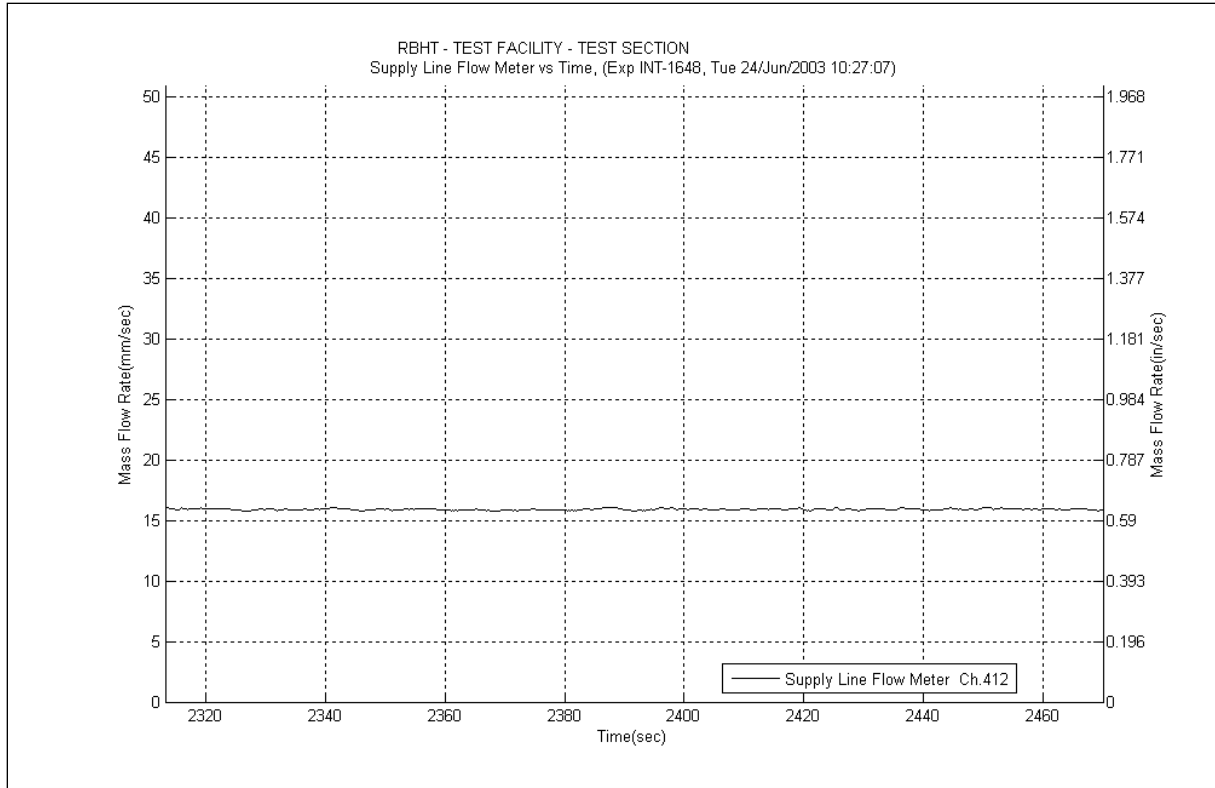


Figure A-406 Inlet Flow Plot for Experiment 1648E

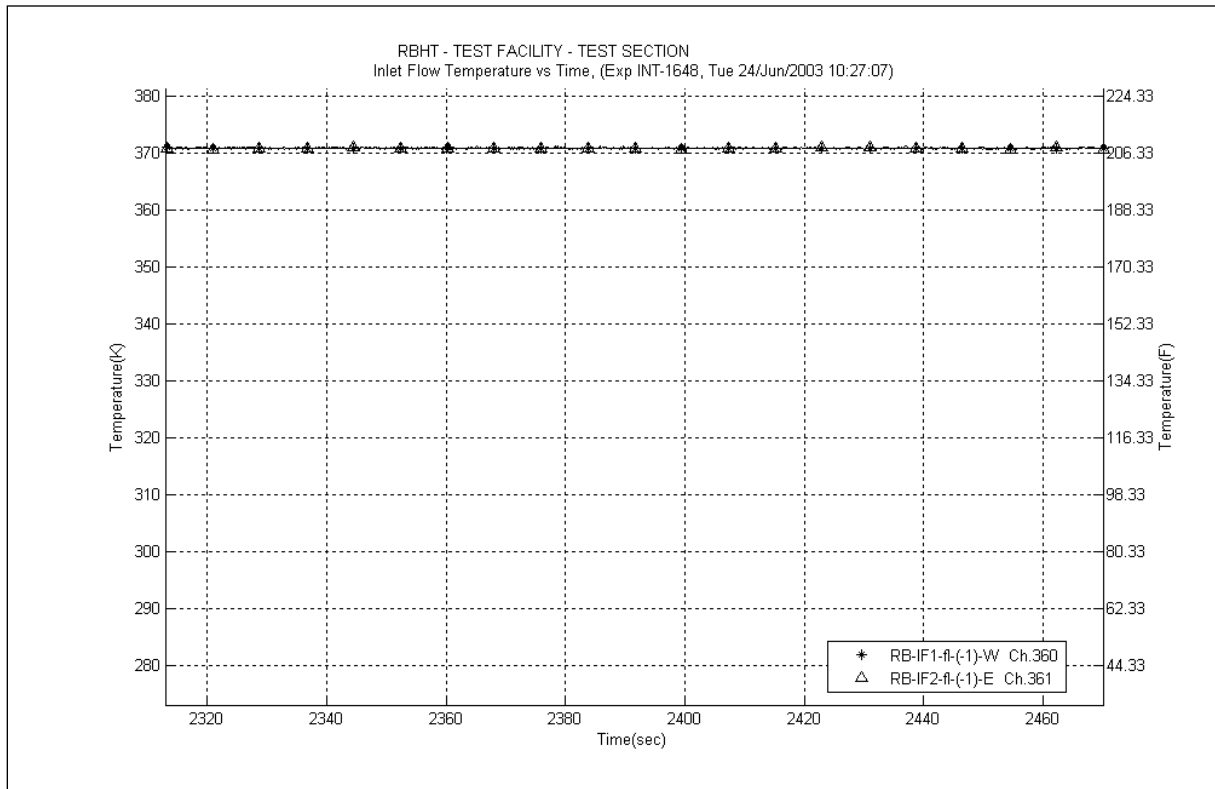


Figure A-407 Inlet Temperature Plot for Experiment 1648E

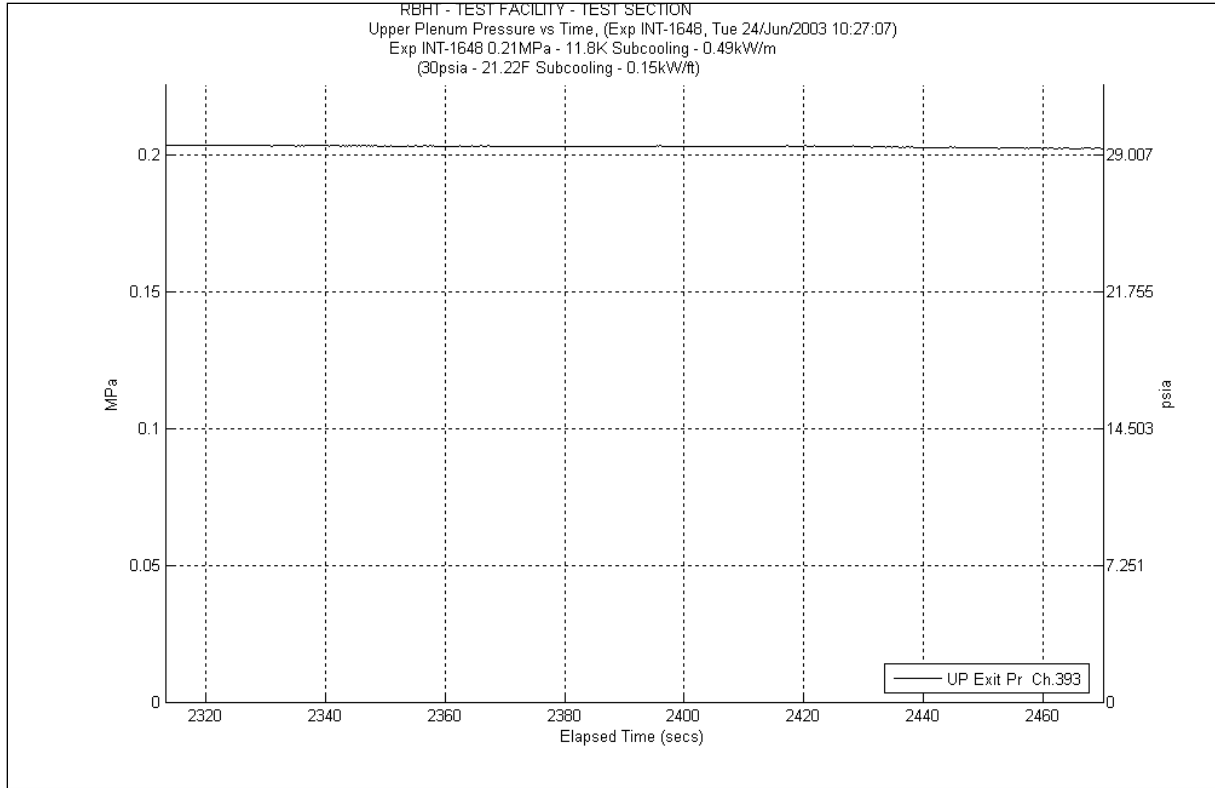


Figure A-408 System Pressure Plot for Experiment 1648E

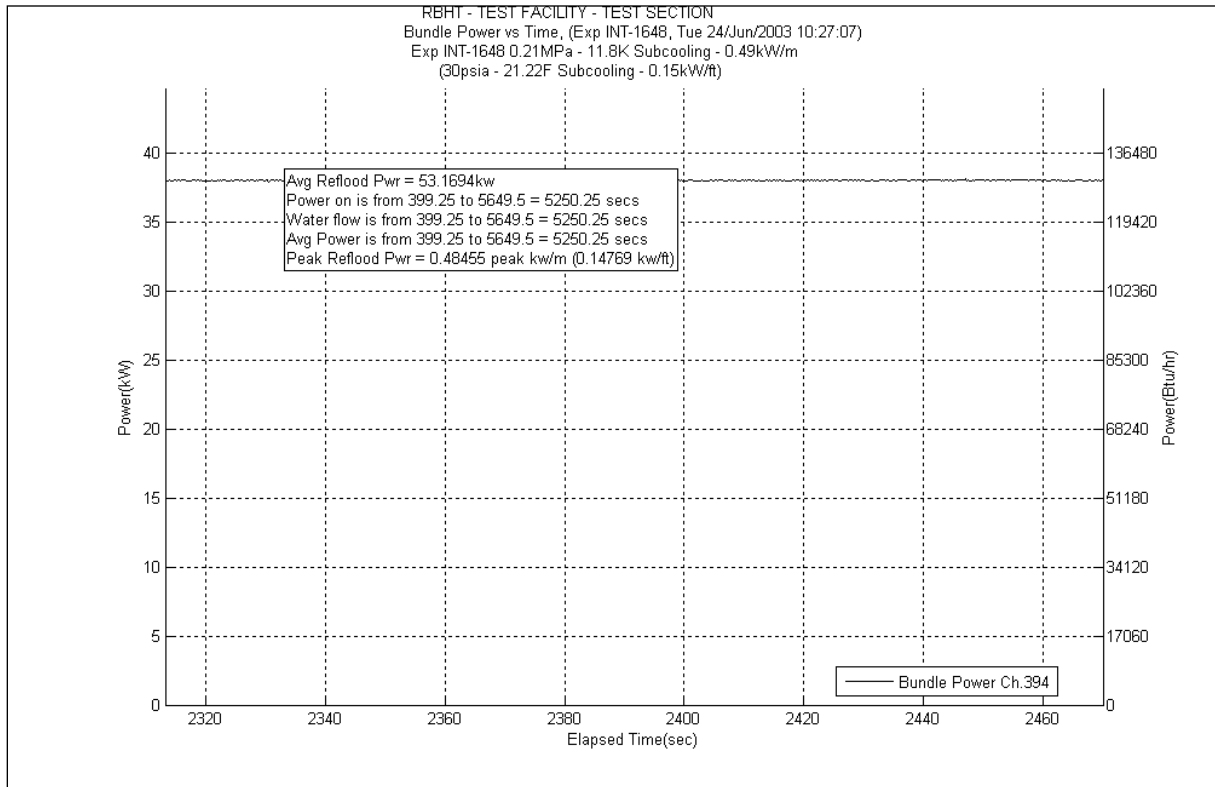


Figure A-409 Bundle Power Plot for Experiment 1648E

Table A-163 Data Results for RBHT Test 1648E for Time Period 2313 to 2470 seconds

Results for RBHT Test 1648
Valid Time Period 2313 to 2470 seconds
Collapsed Liquid Level = 91.548 inches = 2325.31 mm
(Z_{OSV}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.614	22.035	1055.056	0.301	14.412	0.065	3.112	0.000	0.000	21.66	1037.086	4341.66	207879.7966	0.621	0.618	0.624
*	120-133	3048-3378	383	0.649	23.728	1136.118	0.334	15.992	0.117	5.602	-2.073	-99.240	25.35	1213.765	4367.01	209093.5611	0.624	0.621	0.627
*	108-120	2743-3048	382	0.537	28.849	1381.295	0.278	13.311	0.146	6.991	5.475	262.142	22.95	1098.852	4389.96	210192.413	0.632	0.629	0.635
	100-108	2540-2743	381	0.629	15.429	738.763	0.166	7.948	0.107	5.123	0.000	0.000	15.15	725.386	4405.11	210917.7989	0.635	0.632	0.638
	97-100	2464-2540	380	0.475	8.174	391.388	0.058	2.777	0.039	1.867	0.000	0.000	8.073	386.537	4413.183	211304.3362	0.482	0.480	0.484
	93-97	2362-2464	379	0.518	10.018	479.661	0.074	3.543	0.050	2.394	0.000	0.000	9.891	473.584	4423.074	211777.9199	0.524	0.521	0.527
*	85-93	2159-2362	378	0.395	25.120	1202.759	0.136	6.512	0.096	4.597	7.028	336.509	17.86	855.141	4440.934	212633.0612	0.57	0.567	0.573
	81-85	2057-2159	377	0.611	8.081	386.912	0.062	2.969	0.046	2.202	0.000	0.000	7.969	381.558	4448.903	213014.619	0.616	0.613	0.619
	78-81	1981-2057	376	0.461	8.403	402.329	0.044	2.107	0.034	1.628	0.000	0.000	8.325	398.603	4457.228	213413.2221	0.466	0.464	0.468
	75-78	1905-1981	375	0.469	8.278	396.361	0.042	2.011	0.033	1.580	0.000	0.000	8.203	392.762	4465.431	213805.9839	0.473	0.471	0.475
	72-75	1829-1905	374	0.359	9.982	477.921	0.039	1.867	0.032	1.532	0.000	0.000	9.905	474.254	4475.336	214280.2378	0.364	0.362	0.366
*	67-72	1702-1829	373	0.376	16.203	775.813	0.061	2.921	0.052	2.490	1.190	56.987	14.9	713.416	4490.236	214993.6537	0.426	0.424	0.428
	63-67	1600-1702	372	0.484	10.719	513.230	0.044	2.107	0.040	1.915	0.000	0.000	10.63	508.967	4500.866	215502.6208	0.488	0.486	0.490
	60-63	1524-1600	371	0.340	10.288	492.591	0.031	1.484	0.029	1.389	0.000	0.000	10.22	489.336	4511.086	215991.957	0.344	0.342	0.346
	57-60	1448-1524	370	0.329	10.449	500.300	0.028	1.341	0.028	1.341	0.000	0.000	10.39	497.476	4521.476	216489.4329	0.333	0.331	0.335
	53-57	1346-1448	369	0.306	14.411	690.026	0.034	1.628	0.037	1.772	0.000	0.000	14.34	686.603	4535.816	217176.0358	0.31	0.308	0.312
*	46-53	1168-1346	368	0.228	28.080	1344.494	0.050	2.394	0.061	2.921	2.949	141.215	25.02	1197.964	4560.836	218373.9998	0.312	0.310	0.314
	43-46	1092-1168	367	0.311	10.740	514.225	0.018	0.862	0.025	1.197	0.000	0.000	10.69	511.840	4571.526	218885.8398	0.313	0.311	0.315
	37-43	940-1092	366	0.206	24.746	1184.855	0.028	1.341	0.048	2.298	0.000	0.000	24.67	1181.206	4596.196	220067.0457	0.208	0.207	0.209
*	25-37	635-940	365	0.058	58.685	2809.835	0.028	1.341	0.056	2.681	4.251	203.521	54.35	2602.292	4650.546	222669.3377	0.128	0.127	0.129
	13-25	330-635	364	0.047	59.396	2843.901	0.001	0.048	0.000	0.000	0.000	0.000	59.37	2842.651	4709.916	225511.9885	0.047	0.045	0.049
*	0-13	0-330	363	0.036	65.057	3114.938	0.001	0.048	0.000	0.000	-0.854	-40.897	65.91	3155.788	4775.826	228667.7763	0.023	0.022	0.024

Table A-164 Energy Balance Results for RBHT Test 1648E for Time Period 2313 to 2470 seconds

Results for RBHT Test 1648 Valid Time Period 2313 to 2470 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1743.8938	5.5012	0.00E+00	0.00E+00	0.00E+00	5.05E-02	2.29E-02
0.25	6.35	1840.7768	5.8069	0.00E+00	0.00E+00	0.00E+00	5.05E-02	2.29E-02
0.50	12.70	1937.6598	6.1125	0.00E+00	0.00E+00	0.00E+00	5.05E-02	2.29E-02
0.75	19.05	2034.5428	6.4181	0.00E+00	0.00E+00	0.00E+00	5.05E-02	2.29E-02
1.00	25.40	2131.4258	6.7237	0.00E+00	0.00E+00	0.00E+00	5.05E-02	2.29E-02
1.25	31.75	2228.3088	7.0294	0.00E+00	0.00E+00	0.00E+00	5.05E-02	2.29E-02
1.50	38.10	2325.1918	7.335	0.00E+00	0.00E+00	0.00E+00	5.05E-02	2.29E-02
1.75	44.45	2422.0748	7.6406	0.00E+00	0.00E+00	0.00E+00	5.05E-02	2.29E-02
2.00	50.80	2518.9577	7.9462	0.00E+00	0.00E+00	0.00E+00	5.05E-02	2.29E-02
2.25	57.15	2615.8407	8.2519	0.00E+00	0.00E+00	0.00E+00	5.05E-02	2.29E-02
2.50	63.50	2712.7237	8.5575	1.06E-03	4.33E-02	1.96E-02	5.05E-02	2.29E-02
2.75	69.85	2809.6067	8.8631	6.81E-03	2.78E-01	1.26E-01	5.02E-02	2.28E-02
3.00	76.20	2906.4897	9.1687	1.28E-02	5.20E-01	2.36E-01	4.99E-02	2.26E-02
3.25	82.55	3003.3727	9.4744	1.89E-02	7.71E-01	3.50E-01	4.96E-02	2.25E-02
3.50	88.90	3100.2557	9.78	2.53E-02	1.03E+00	4.67E-01	4.92E-02	2.23E-02
3.75	95.25	3197.1387	10.086	3.18E-02	1.30E+00	5.88E-01	4.89E-02	2.22E-02
4.00	101.60	3294.0217	10.391	3.86E-02	1.57E+00	7.13E-01	4.86E-02	2.20E-02
4.25	107.95	3390.9047	10.697	4.55E-02	1.86E+00	8.42E-01	4.82E-02	2.19E-02
4.50	114.30	3487.7876	11.002	5.27E-02	2.15E+00	9.74E-01	4.78E-02	2.17E-02
4.75	120.65	3584.6706	11.308	6.00E-02	2.45E+00	1.11E+00	4.75E-02	2.15E-02
5.00	127.00	3681.5536	11.614	6.76E-02	2.76E+00	1.25E+00	4.71E-02	2.14E-02
5.25	133.35	3778.4366	11.919	7.53E-02	3.07E+00	1.39E+00	4.67E-02	2.12E-02
5.50	139.70	3875.3196	12.225	8.33E-02	3.40E+00	1.54E+00	4.63E-02	2.10E-02
5.75	146.05	3972.2026	12.531	9.15E-02	3.73E+00	1.69E+00	4.59E-02	2.08E-02
6.00	152.40	4069.0856	12.836	9.98E-02	4.07E+00	1.85E+00	4.55E-02	2.06E-02
6.25	158.75	4165.9686	13.142	1.08E-01	4.42E+00	2.01E+00	4.50E-02	2.04E-02
6.50	165.10	4262.8516	13.447	1.17E-01	4.78E+00	2.17E+00	4.46E-02	2.02E-02
6.75	171.45	4359.7346	13.753	1.26E-01	5.14E+00	2.33E+00	4.41E-02	2.00E-02
7.00	177.80	4456.6176	14.059	1.35E-01	5.52E+00	2.50E+00	4.37E-02	1.98E-02
7.25	184.15	4553.5005	14.364	1.45E-01	5.90E+00	2.68E+00	4.32E-02	1.96E-02
7.50	190.50	4650.3835	14.67	1.54E-01	6.29E+00	2.85E+00	4.27E-02	1.94E-02
7.75	196.85	4747.2665	14.976	1.64E-01	6.69E+00	3.03E+00	4.22E-02	1.92E-02
8.00	203.20	4844.1495	15.281	1.74E-01	7.10E+00	3.22E+00	4.17E-02	1.89E-02
8.25	209.55	4941.0325	15.587	1.84E-01	7.51E+00	3.41E+00	4.12E-02	1.87E-02
8.50	215.90	5037.9155	15.892	1.95E-01	7.94E+00	3.60E+00	4.07E-02	1.85E-02
8.75	222.25	5134.7985	16.198	2.05E-01	8.37E+00	3.80E+00	4.01E-02	1.82E-02
9.00	228.60	5231.6815	16.504	2.16E-01	8.80E+00	3.99E+00	3.96E-02	1.80E-02
9.25	234.95	4941.0325	15.587	2.27E-01	9.24E+00	4.19E+00	3.91E-02	1.77E-02
9.50	241.30	4650.3835	14.67	2.37E-01	9.64E+00	4.37E+00	3.86E-02	1.75E-02
9.75	247.65	4359.7346	13.753	2.46E-01	1.00E+01	4.55E+00	3.81E-02	1.73E-02
10.00	254.00	4069.0856	12.836	2.55E-01	1.04E+01	4.71E+00	3.76E-02	1.71E-02
10.25	260.35	3778.4366	11.919	2.63E-01	1.07E+01	4.86E+00	3.72E-02	1.69E-02
10.50	266.70	3487.7876	11.002	2.70E-01	1.10E+01	5.00E+00	3.69E-02	1.67E-02
10.75	273.05	3197.1387	10.086	2.77E-01	1.13E+01	5.13E+00	3.65E-02	1.66E-02
11.00	279.40	2906.4897	9.1687	2.84E-01	1.16E+01	5.25E+00	3.62E-02	1.64E-02
11.25	285.75	2615.8407	8.2519	2.89E-01	1.18E+01	5.35E+00	3.59E-02	1.63E-02
11.50	292.10	2325.1918	7.335	2.95E-01	1.20E+01	5.45E+00	3.56E-02	1.62E-02
11.75	298.45	2034.5428	6.4181	2.99E-01	1.22E+01	5.53E+00	3.54E-02	1.61E-02
12.00	304.80	1743.8938	5.5012	3.03E-01	1.24E+01	5.60E+00	3.52E-02	1.60E-02

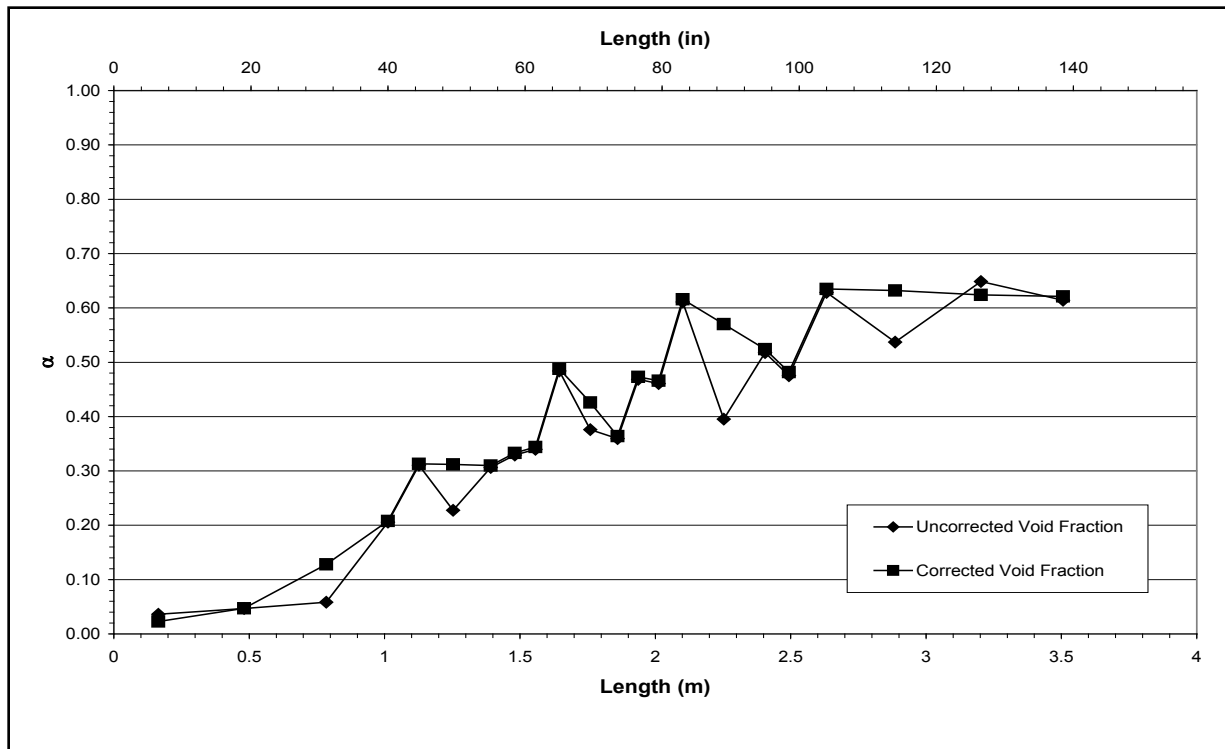


Figure A-410 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1648E for Time Period 2313 to 2470 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1648-F

Test Conditions

Date: 6/24/2003

Steady-state time window: 2709 – 2862 seconds

Inlet flow rate: 1.008 cm/sec (0.397 in./sec)

Inlet mass flow rate: 0.047 kg/sec (0.103 lbm/sec)

Inlet flow temperature: 370.5 K (207.3 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.12 kW

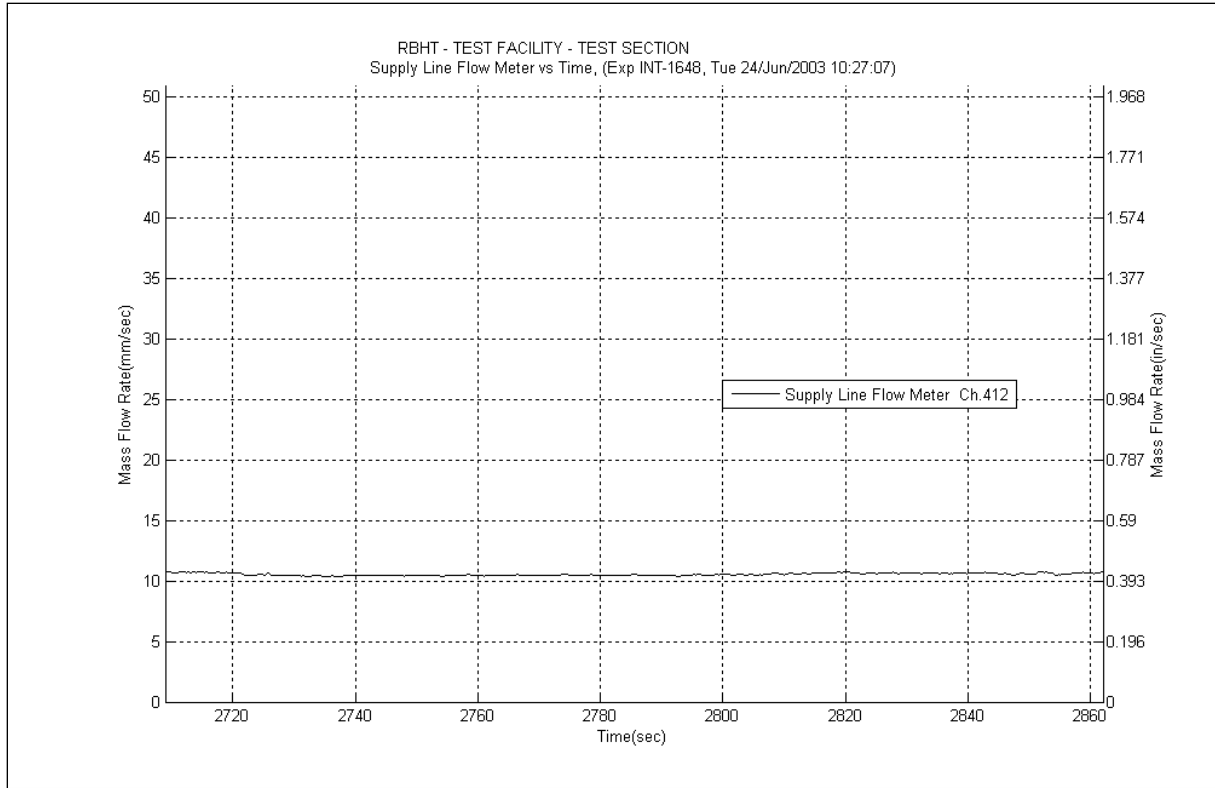


Figure A-411 Inlet Flow Plot for Experiment 1648F

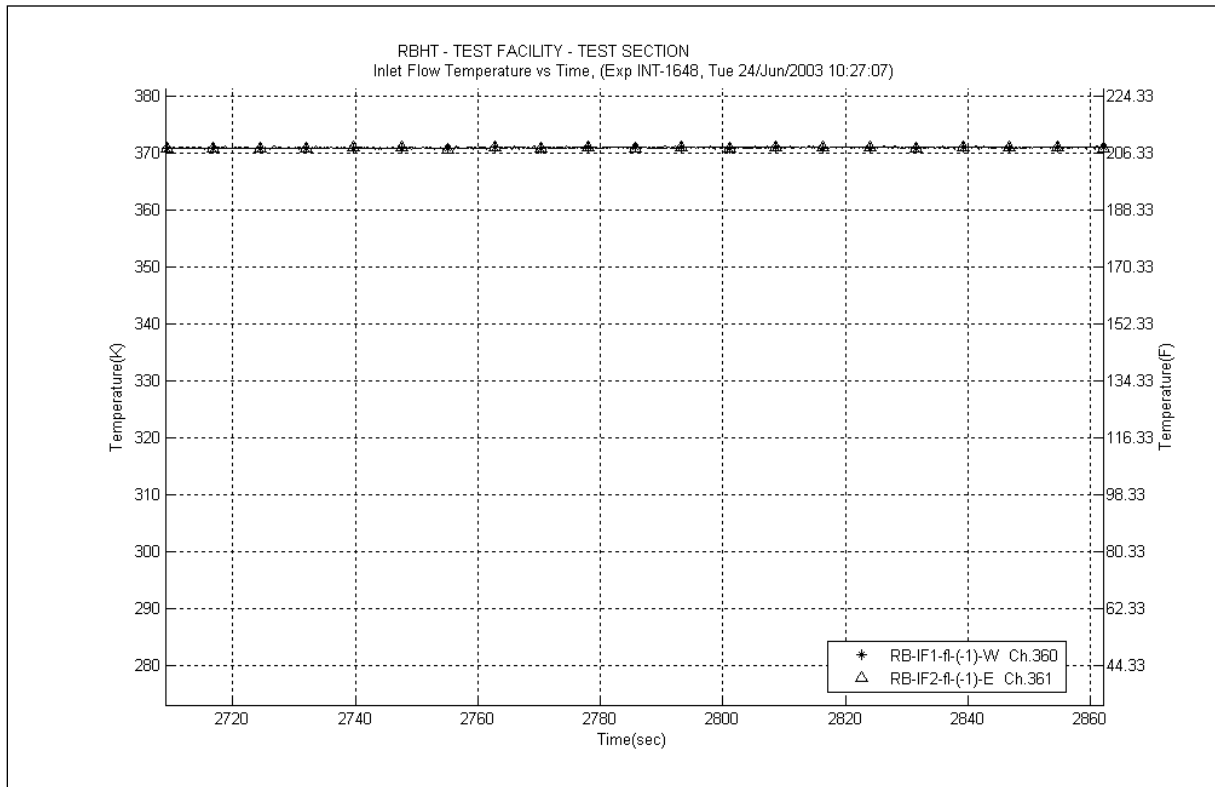


Figure A-412 Inlet Temperature Plot for Experiment 1648F

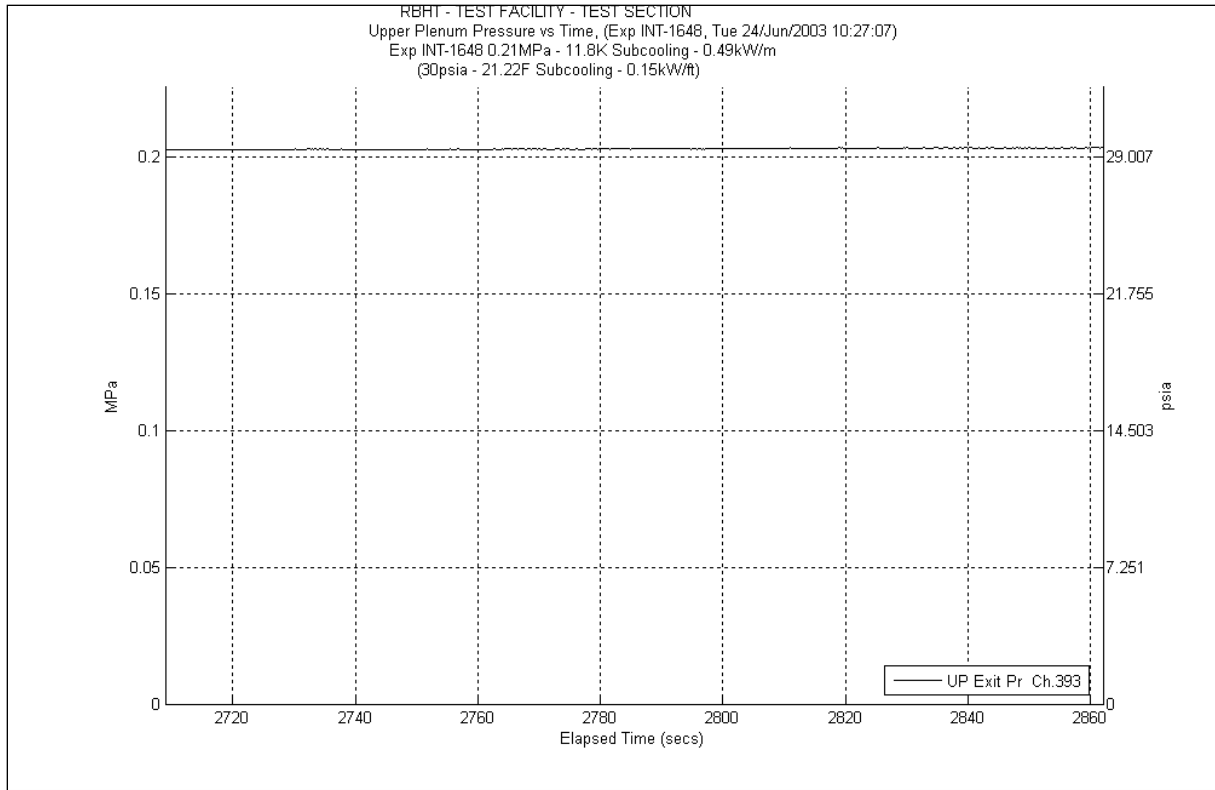


Figure A-413 System Pressure Plot for Experiment 1648F

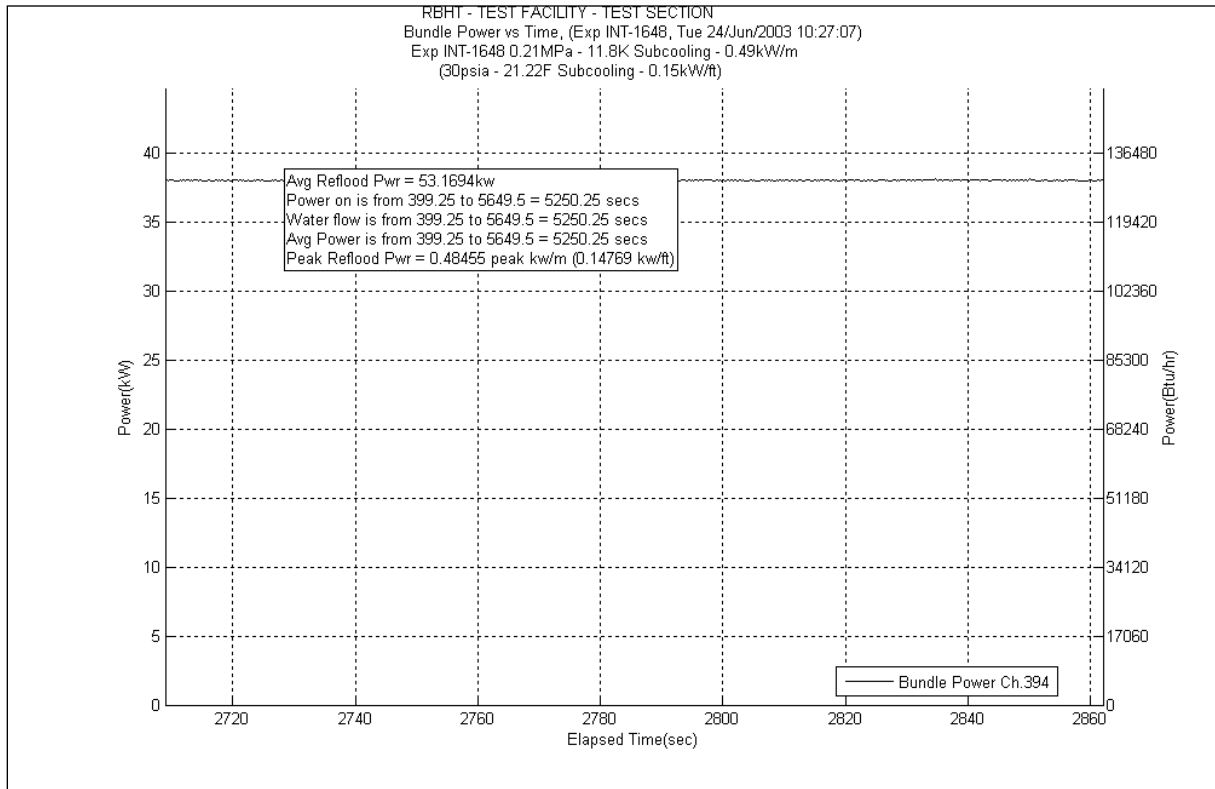


Figure A-414 Bundle Power Plot for Experiment 1648F

Table A-165 Data Results for RBHT Test 1648F for Time Period 2709 to 2862 seconds

Results for RBHT Test 1648
Valid Time Period 2709 to 2862 seconds
Collapsed Liquid Level = 86.596 inches = 2199.55 mm
(Z_{OSI}) Onset of Significant Void = 19 inches = 482.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lbf/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.663	19.272	922.770	0.201	9.624	0.043	2.059	0.000	0.000	19.02	910.682	4339.02	207753.3927	0.667	0.664	0.670
*	120-133	3048-3378	383	0.671	22.212	1063.510	0.223	10.677	0.077	3.687	-0.648	-31.033	22.56	1080.179	4361.58	208833.5713	0.666	0.663	0.669
*	108-120	2743-3048	382	0.558	27.530	1318.136	0.185	8.858	0.097	4.644	6.288	301.064	20.96	1003.570	4382.54	209837.1415	0.664	0.661	0.667
	100-108	2540-2743	381	0.658	14.209	680.328	0.111	5.315	0.071	3.399	0.000	0.000	14.02	671.281	4396.56	210508.4227	0.662	0.659	0.665
	97-100	2464-2540	380	0.501	7.780	372.490	0.039	1.867	0.026	1.245	0.000	0.000	7.714	369.348	4404.274	210877.771	0.505	0.502	0.508
	93-97	2362-2464	379	0.540	9.556	457.531	0.049	2.346	0.033	1.580	0.000	0.000	9.471	453.474	4413.745	211331.2449	0.544	0.541	0.547
*	85-93	2159-2362	378	0.410	24.528	1174.412	0.091	4.357	0.064	3.064	7.613	364.517	16.76	802.473	4430.505	212133.718	0.597	0.594	0.600
	81-85	2057-2159	377	0.646	7.359	352.348	0.042	2.011	0.031	1.484	0.000	0.000	7.286	348.856	4437.791	212482.5736	0.649	0.646	0.652
	78-81	1981-2057	376	0.491	7.935	379.949	0.030	1.436	0.022	1.053	0.000	0.000	7.882	377.392	4445.673	212859.9658	0.494	0.492	0.496
	75-78	1905-1981	375	0.500	7.795	373.236	0.028	1.341	0.022	1.053	0.000	0.000	7.741	370.641	4453.414	213230.6068	0.503	0.500	0.506
	72-75	1829-1905	374	0.414	9.125	436.892	0.027	1.293	0.021	1.005	0.000	0.000	9.076	434.561	4462.49	213665.1681	0.417	0.415	0.419
*	67-72	1702-1829	373	0.378	16.141	772.829	0.042	2.011	0.035	1.676	2.594	124.195	13.47	644.947	4475.96	214310.1151	0.481	0.479	0.483
	63-67	1600-1702	372	0.542	9.514	455.541	0.031	1.484	0.027	1.293	0.000	0.000	9.455	452.708	4485.415	214762.823	0.545	0.542	0.548
	60-63	1524-1600	371	0.371	9.800	469.218	0.022	1.053	0.019	0.910	0.000	0.000	9.755	467.072	4495.17	215229.8949	0.374	0.372	0.376
	57-60	1448-1524	370	0.362	9.940	475.931	0.020	0.958	0.019	0.910	0.000	0.000	9.896	473.823	4505.066	215703.7179	0.365	0.363	0.367
	53-57	1346-1448	369	0.338	13.747	658.198	0.025	1.197	0.024	1.149	0.000	0.000	13.69	655.481	4518.756	216359.1986	0.341	0.339	0.343
*	46-53	1168-1346	368	0.271	26.502	1268.902	0.038	1.819	0.041	1.963	4.163	199.305	22.26	1065.815	4541.016	217425.0131	0.388	0.386	0.390
	43-46	1092-1168	367	0.432	8.844	423.465	0.014	0.670	0.017	0.814	0.000	0.000	8.812	421.921	4549.828	217846.9339	0.434	0.432	0.436
	37-43	940-1092	366	0.299	21.833	1045.358	0.024	1.149	0.032	1.532	0.000	0.000	21.77	1042.353	4571.598	218889.2871	0.301	0.299	0.303
*	25-37	635-940	365	0.151	52.910	2533.327	0.031	1.484	0.057	2.729	1.632	78.124	51.19	2450.990	4622.788	221340.2775	0.178	0.177	0.179
	13-25	330-635	364	0.055	58.887	2819.533	0.011	0.527	0.018	0.862	0.000	0.000	58.84	2817.274	4681.628	224157.5518	0.056	0.053	0.059
*	0-13	0-330	363	0.038	64.953	3109.965	0.001	0.048	0.000	0.000	-0.668	-31.985	65.62	3141.902	4747.248	227299.4543	0.028	0.027	0.029

Table A-166 Energy Balance Results for RBHT Test 1648F for Time Period 2709 to 2862 seconds

Results for RBHT Test 1648 Valid Time Period 2709 to 2862 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1744.6543	5.5036	0.00E+00	0.00E+00	0.00E+00	3.35E-02	1.52E-02
0.25	6.35	1841.5795	5.8094	0.00E+00	0.00E+00	0.00E+00	3.35E-02	1.52E-02
0.50	12.70	1938.5047	6.1152	0.00E+00	0.00E+00	0.00E+00	3.35E-02	1.52E-02
0.75	19.05	2035.43	6.4209	0.00E+00	0.00E+00	0.00E+00	3.35E-02	1.52E-02
1.00	25.40	2132.3552	6.7267	0.00E+00	0.00E+00	0.00E+00	3.35E-02	1.52E-02
1.25	31.75	2229.2805	7.0324	0.00E+00	0.00E+00	0.00E+00	3.35E-02	1.52E-02
1.50	38.10	2326.2057	7.3382	0.00E+00	0.00E+00	0.00E+00	3.35E-02	1.52E-02
1.75	44.45	2423.1309	7.6439	6.93E-04	1.87E-02	8.49E-03	3.34E-02	1.52E-02
2.00	50.80	2520.0562	7.9497	8.45E-03	2.29E-01	1.04E-01	3.32E-02	1.51E-02
2.25	57.15	2616.9814	8.2555	1.65E-02	4.47E-01	2.03E-01	3.29E-02	1.49E-02
2.50	63.50	2713.9066	8.5612	2.49E-02	6.73E-01	3.05E-01	3.26E-02	1.48E-02
2.75	69.85	2810.8319	8.867	3.36E-02	9.07E-01	4.11E-01	3.23E-02	1.47E-02
3.00	76.20	2907.7571	9.1727	4.25E-02	1.15E+00	5.22E-01	3.20E-02	1.45E-02
3.25	82.55	3004.6824	9.4785	5.18E-02	1.40E+00	6.35E-01	3.17E-02	1.44E-02
3.50	88.90	3101.6076	9.7842	6.14E-02	1.66E+00	7.53E-01	3.14E-02	1.42E-02
3.75	95.25	3198.5328	10.09	7.13E-02	1.93E+00	8.74E-01	3.11E-02	1.41E-02
4.00	101.60	3295.4581	10.396	8.15E-02	2.20E+00	9.99E-01	3.07E-02	1.39E-02
4.25	107.95	3392.3833	10.702	9.20E-02	2.49E+00	1.13E+00	3.04E-02	1.38E-02
4.50	114.30	3489.3085	11.007	1.03E-01	2.78E+00	1.26E+00	3.00E-02	1.36E-02
4.75	120.65	3586.2338	11.313	1.14E-01	3.08E+00	1.40E+00	2.97E-02	1.35E-02
5.00	127.00	3683.159	11.619	1.25E-01	3.39E+00	1.54E+00	2.93E-02	1.33E-02
5.25	133.35	3780.0842	11.925	1.37E-01	3.70E+00	1.68E+00	2.89E-02	1.31E-02
5.50	139.70	3877.0095	12.23	1.49E-01	4.03E+00	1.83E+00	2.85E-02	1.29E-02
5.75	146.05	3973.9347	12.536	1.61E-01	4.36E+00	1.98E+00	2.81E-02	1.27E-02
6.00	152.40	4070.86	12.842	1.74E-01	4.70E+00	2.13E+00	2.76E-02	1.25E-02
6.25	158.75	4167.7852	13.148	1.87E-01	5.05E+00	2.29E+00	2.72E-02	1.23E-02
6.50	165.10	4264.7104	13.453	2.00E-01	5.41E+00	2.45E+00	2.68E-02	1.21E-02
6.75	171.45	4361.6357	13.759	2.14E-01	5.78E+00	2.62E+00	2.63E-02	1.19E-02
7.00	177.80	4458.5609	14.065	2.28E-01	6.15E+00	2.79E+00	2.58E-02	1.17E-02
7.25	184.15	4555.4861	14.371	2.42E-01	6.53E+00	2.96E+00	2.54E-02	1.15E-02
7.50	190.50	4652.4114	14.676	2.56E-01	6.92E+00	3.14E+00	2.49E-02	1.13E-02
7.75	196.85	4749.3366	14.982	2.71E-01	7.32E+00	3.32E+00	2.44E-02	1.11E-02
8.00	203.20	4846.2619	15.288	2.86E-01	7.73E+00	3.51E+00	2.39E-02	1.08E-02
8.25	209.55	4943.1871	15.594	3.01E-01	8.15E+00	3.70E+00	2.34E-02	1.06E-02
8.50	215.90	5040.1123	15.899	3.17E-01	8.57E+00	3.89E+00	2.29E-02	1.04E-02
8.75	222.25	5137.0376	16.205	3.33E-01	9.00E+00	4.08E+00	2.23E-02	1.01E-02
9.00	228.60	5233.9628	16.511	3.49E-01	9.44E+00	4.28E+00	2.18E-02	9.88E-03
9.25	234.95	4943.1871	15.594	3.65E-01	9.87E+00	4.48E+00	2.12E-02	9.63E-03
9.50	241.30	4652.4114	14.676	3.80E-01	1.03E+01	4.66E+00	2.07E-02	9.41E-03
9.75	247.65	4361.6357	13.759	3.95E-01	1.07E+01	4.84E+00	2.03E-02	9.19E-03
10.00	254.00	4070.86	12.842	4.08E-01	1.10E+01	5.00E+00	1.98E-02	8.99E-03
10.25	260.35	3780.0842	11.925	4.20E-01	1.14E+01	5.15E+00	1.94E-02	8.80E-03
10.50	266.70	3489.3085	11.007	4.32E-01	1.17E+01	5.29E+00	1.90E-02	8.63E-03
10.75	273.05	3198.5328	10.09	4.42E-01	1.19E+01	5.42E+00	1.87E-02	8.47E-03
11.00	279.40	2907.7571	9.1727	4.52E-01	1.22E+01	5.54E+00	1.84E-02	8.32E-03
11.25	285.75	2616.9814	8.2555	4.60E-01	1.24E+01	5.64E+00	1.81E-02	8.19E-03
11.50	292.10	2326.2057	7.3382	4.68E-01	1.26E+01	5.74E+00	1.78E-02	8.08E-03
11.75	298.45	2035.43	6.4209	4.75E-01	1.28E+01	5.82E+00	1.76E-02	7.97E-03
12.00	304.80	1744.6543	5.5036	4.81E-01	1.30E+01	5.89E+00	1.74E-02	7.88E-03

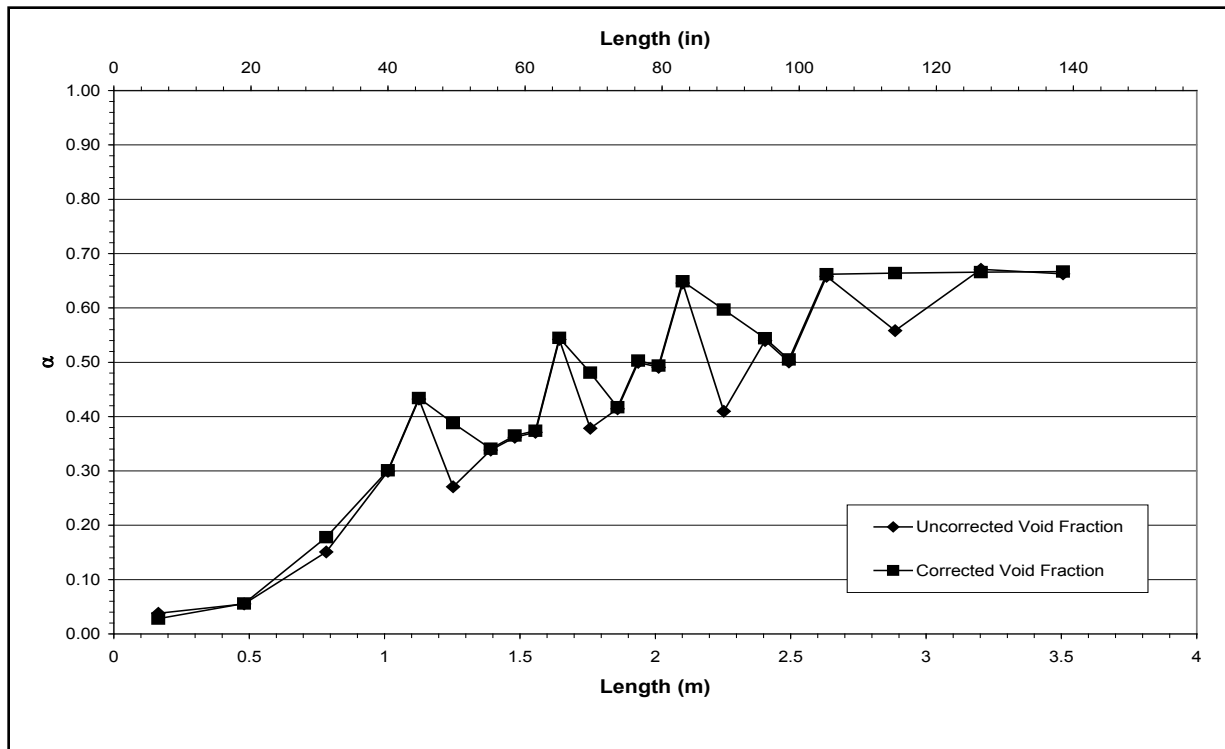


Figure A-415 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1648F for Time Period 2709 to 2862 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1648-G

Test Conditions

Date: 6/24/2003

Steady-state time window: 3285 – 3465 seconds

Inlet flow rate: 0.505 cm/sec (0.199 in./sec)

Inlet mass flow rate: 0.024 kg/sec (0.052 lbm/sec)

Inlet flow temperature: 370.5 K (207.3 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.12 kW

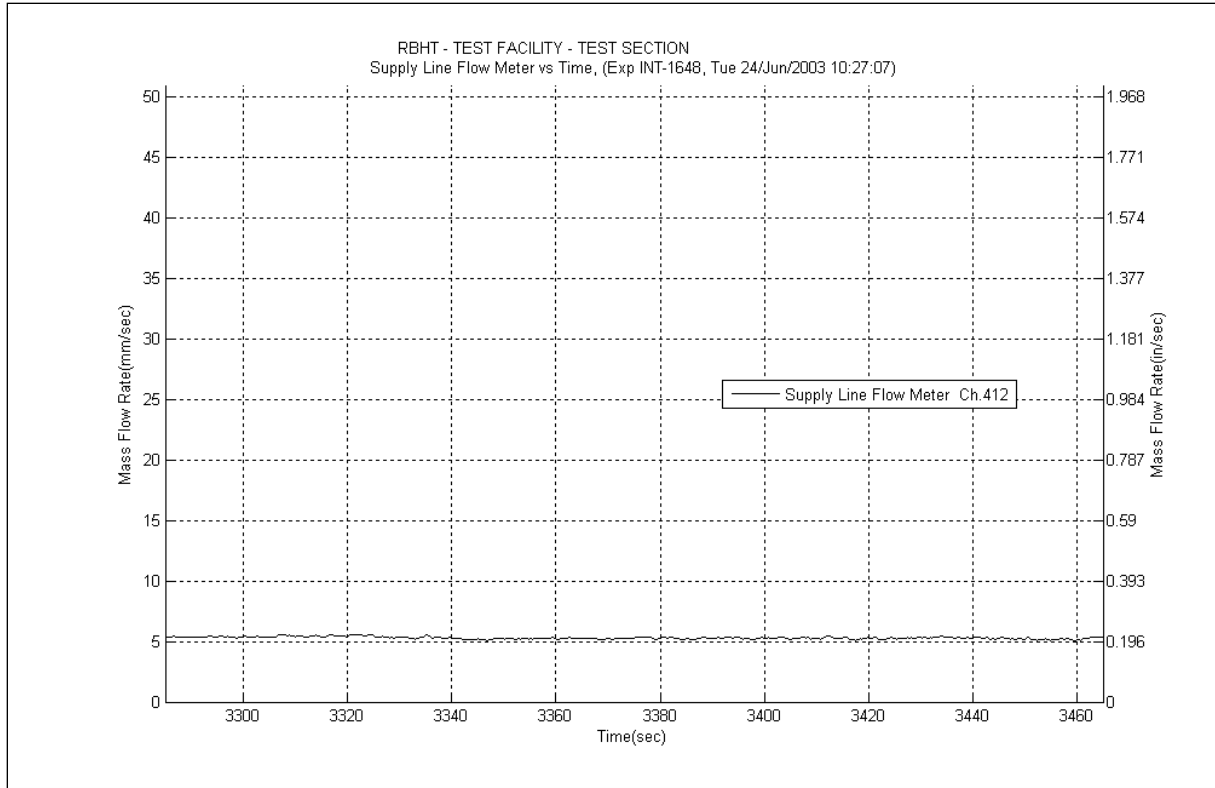


Figure A-416 Inlet Flow Plot for Experiment 1648G

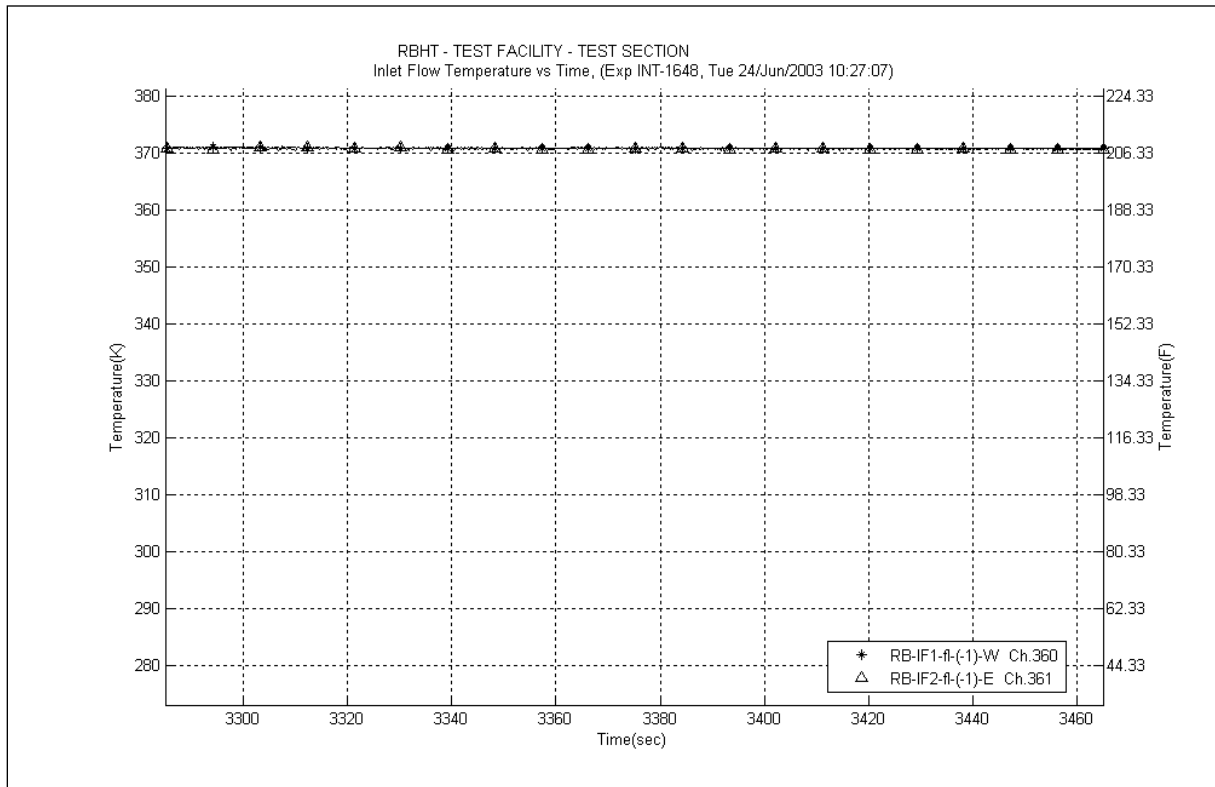


Figure A-417 Inlet Temperature Plot for Experiment 1648G

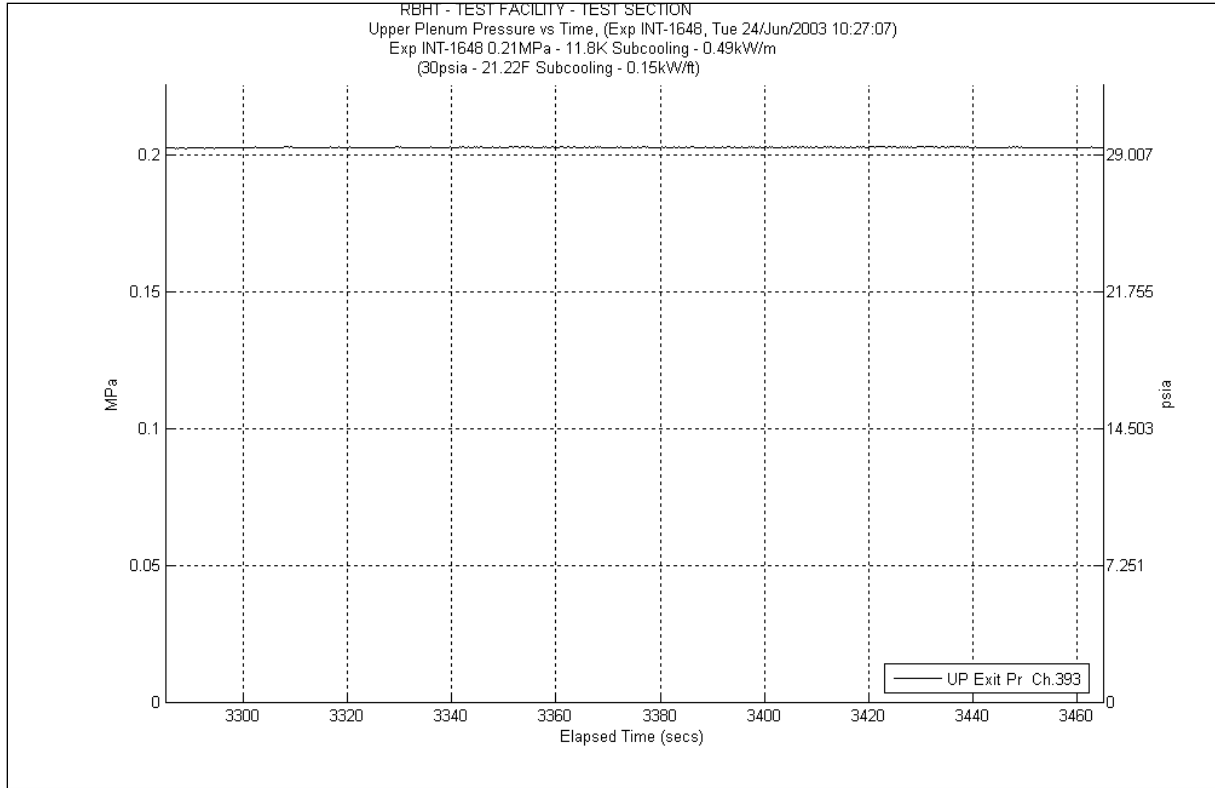


Figure A-418 System Pressure Plot for Experiment 1648G

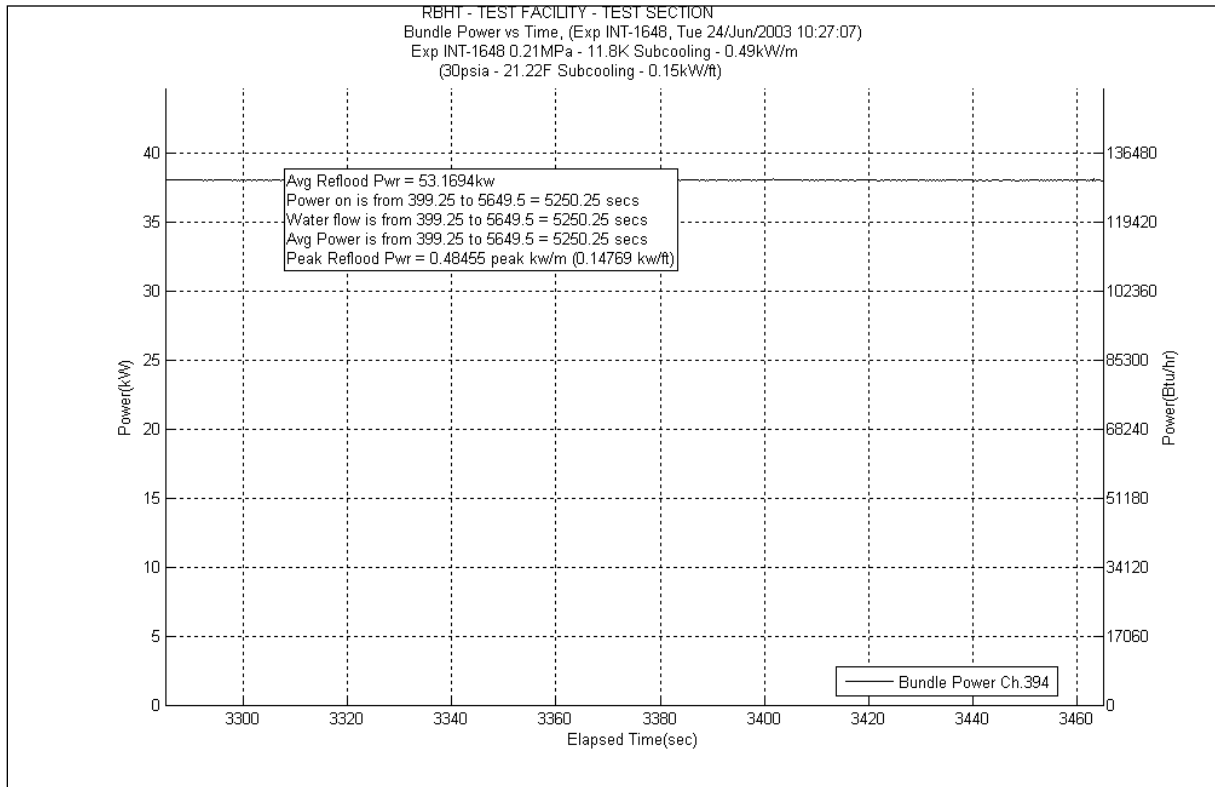


Figure A-419 Bundle Power Plot for Experiment 1648G

Table A-167 Data Results for RBHT Test 1648G for Time Period 3285 to 3465 seconds

Results for RBHT Test 1648
Valid Time Period 3285 to 3465 seconds
Collapsed Liquid Level = 79.867 inches = 2028.62 mm
(Z_{lev}) Onset of Significant Void = 6.5 inches = 165 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.747	14.432	691.021	0.086	4.118	0.020	0.958	0.000	0.000	14.32	685.645	4334.32	207528.3555	0.749	0.745	0.753
*	120-133	3048-3378	383	0.714	19.340	926.002	0.106	5.075	0.039	1.867	1.345	64.397	17.85	854.663	4352.17	208383.0181	0.736	0.732	0.740
*	108-120	2743-3048	382	0.593	25.395	1215.937	0.091	4.357	0.049	2.346	7.065	338.292	18.19	870.942	4370.36	209253.96	0.708	0.704	0.712
	100-108	2540-2743	381	0.692	12.791	612.445	0.055	2.633	0.035	1.676	0.000	0.000	12.7	608.079	4383.06	209862.0392	0.694	0.691	0.697
	97-100	2464-2540	380	0.533	7.276	348.370	0.019	0.910	0.013	0.622	0.000	0.000	7.242	346.749	4390.302	210208.7881	0.535	0.532	0.538
	93-97	2362-2464	379	0.564	9.068	434.157	0.025	1.197	0.017	0.814	0.000	0.000	9.024	432.071	4399.326	210640.8595	0.566	0.563	0.569
*	85-93	2159-2362	378	0.424	23.952	1146.811	0.045	2.155	0.032	1.532	8.095	387.573	15.78	755.550	4415.106	211396.41	0.62	0.617	0.623
	81-85	2057-2159	377	0.673	6.793	325.245	0.021	1.005	0.015	0.718	0.000	0.000	6.754	323.383	4421.86	211719.7932	0.675	0.672	0.678
	78-81	1981-2057	376	0.517	7.530	360.554	0.015	0.718	0.011	0.527	0.000	0.000	7.501	359.150	4429.361	212078.943	0.518	0.515	0.521
	75-78	1905-1981	375	0.530	7.317	350.359	0.014	0.670	0.011	0.527	0.000	0.000	7.29	349.047	4436.651	212427.9901	0.532	0.529	0.535
	72-75	1829-1905	374	0.469	8.268	395.863	0.013	0.622	0.011	0.527	0.000	0.000	8.241	394.581	4444.892	212822.5713	0.471	0.469	0.473
*	67-72	1702-1829	373	0.382	16.058	768.850	0.021	1.005	0.017	0.814	3.960	189.595	12.06	577.436	4456.952	213400.0072	0.535	0.532	0.538
	63-67	1600-1702	372	0.598	8.346	399.593	0.016	0.766	0.013	0.622	0.000	0.000	8.312	397.981	4465.264	213797.9879	0.6	0.597	0.603
	60-63	1524-1600	371	0.401	9.338	447.087	0.011	0.527	0.010	0.479	0.000	0.000	9.315	446.005	4474.579	214243.9925	0.402	0.400	0.404
	57-60	1448-1524	370	0.390	9.509	455.293	0.010	0.479	0.009	0.431	0.000	0.000	9.485	454.144	4484.064	214698.1367	0.391	0.389	0.393
	53-57	1346-1448	369	0.374	13.009	622.888	0.013	0.622	0.012	0.575	0.000	0.000	12.98	621.486	4497.044	215319.6225	0.375	0.373	0.377
*	46-53	1168-1346	368	0.288	25.878	1239.063	0.020	0.958	0.020	0.958	5.548	265.657	20.29	971.490	4517.334	216291.1129	0.442	0.440	0.444
	43-46	1092-1168	367	0.507	7.676	367.516	0.008	0.383	0.008	0.383	0.000	0.000	7.657	366.619	4524.991	216657.732	0.508	0.505	0.511
	37-43	940-1092	366	0.365	19.792	947.636	0.013	0.622	0.016	0.766	0.000	0.000	19.76	946.114	4544.751	217603.8459	0.366	0.364	0.368
*	25-37	635-940	365	0.227	48.184	2307.049	0.020	0.958	0.029	1.389	2.525	120.884	45.61	2183.819	4590.361	219787.6644	0.268	0.267	0.269
	13-25	330-635	364	0.169	51.762	2478.374	0.011	0.527	0.025	1.197	0.000	0.000	51.71	2475.888	4642.071	222263.5525	0.17	0.169	0.171
*	0-13	0-330	363	0.042	64.647	3095.294	0.003	0.144	0.003	0.144	2.891	138.401	61.75	2956.606	4703.821	225220.1584	0.085	0.081	0.089

Table A-168 Energy Balance Results for RBHT Test 1648G for Time Period 3285 to 3465 seconds

Results for RBHT Test 1648 Valid Time Period 3285 to 3465 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1745.281	5.5056	0.00E+00	0.00E+00	0.00E+00	1.68E-02	7.61E-03
0.25	6.35	1842.2411	5.8115	0.00E+00	0.00E+00	0.00E+00	1.68E-02	7.61E-03
0.50	12.70	1939.2011	6.1173	0.00E+00	0.00E+00	0.00E+00	1.68E-02	7.61E-03
0.75	19.05	2036.1612	6.4232	0.00E+00	0.00E+00	0.00E+00	1.68E-02	7.61E-03
1.00	25.40	2133.1213	6.7291	3.31E-03	4.49E-02	2.03E-02	1.67E-02	7.59E-03
1.25	31.75	2230.0813	7.035	1.70E-02	2.30E-01	1.04E-01	1.65E-02	7.48E-03
1.50	38.10	2327.0414	7.3408	3.12E-02	4.24E-01	1.92E-01	1.63E-02	7.37E-03
1.75	44.45	2424.0014	7.6467	4.61E-02	6.25E-01	2.84E-01	1.60E-02	7.26E-03
2.00	50.80	2520.9615	7.9526	6.16E-02	8.35E-01	3.79E-01	1.57E-02	7.14E-03
2.25	57.15	2617.9215	8.2584	7.77E-02	1.05E+00	4.78E-01	1.55E-02	7.02E-03
2.50	63.50	2714.8816	8.5643	9.44E-02	1.28E+00	5.81E-01	1.52E-02	6.89E-03
2.75	69.85	2811.8417	8.8702	1.12E-01	1.52E+00	6.87E-01	1.49E-02	6.76E-03
3.00	76.20	2908.8017	9.176	1.30E-01	1.76E+00	7.97E-01	1.46E-02	6.63E-03
3.25	82.55	3005.7618	9.4819	1.48E-01	2.01E+00	9.11E-01	1.43E-02	6.48E-03
3.50	88.90	3102.7218	9.7878	1.67E-01	2.27E+00	1.03E+00	1.40E-02	6.34E-03
3.75	95.25	3199.6819	10.094	1.87E-01	2.54E+00	1.15E+00	1.36E-02	6.19E-03
4.00	101.60	3296.6419	10.399	2.07E-01	2.81E+00	1.28E+00	1.33E-02	6.03E-03
4.25	107.95	3393.602	10.705	2.28E-01	3.10E+00	1.40E+00	1.30E-02	5.87E-03
4.50	114.30	3490.5621	11.011	2.50E-01	3.39E+00	1.54E+00	1.26E-02	5.71E-03
4.75	120.65	3587.5221	11.317	2.72E-01	3.69E+00	1.67E+00	1.22E-02	5.54E-03
5.00	127.00	3684.4822	11.623	2.95E-01	4.00E+00	1.81E+00	1.18E-02	5.37E-03
5.25	133.35	3781.4422	11.929	3.18E-01	4.32E+00	1.96E+00	1.14E-02	5.19E-03
5.50	139.70	3878.4023	12.235	3.42E-01	4.64E+00	2.10E+00	1.10E-02	5.01E-03
5.75	146.05	3975.3623	12.541	3.67E-01	4.97E+00	2.26E+00	1.06E-02	4.82E-03
6.00	152.40	4072.3224	12.846	3.92E-01	5.32E+00	2.41E+00	1.02E-02	4.63E-03
6.25	158.75	4169.2825	13.152	4.18E-01	5.67E+00	2.57E+00	9.77E-03	4.43E-03
6.50	165.10	4266.2425	13.458	4.44E-01	6.02E+00	2.73E+00	9.33E-03	4.23E-03
6.75	171.45	4363.2026	13.764	4.71E-01	6.39E+00	2.90E+00	8.88E-03	4.03E-03
7.00	177.80	4460.1626	14.07	4.99E-01	6.76E+00	3.07E+00	8.41E-03	3.82E-03
7.25	184.15	4557.1227	14.376	5.27E-01	7.15E+00	3.24E+00	7.94E-03	3.60E-03
7.50	190.50	4654.0827	14.682	5.56E-01	7.54E+00	3.42E+00	7.45E-03	3.38E-03
7.75	196.85	4751.0428	14.988	5.85E-01	7.94E+00	3.60E+00	6.96E-03	3.16E-03
8.00	203.20	4848.0029	15.293	6.15E-01	8.35E+00	3.79E+00	6.46E-03	2.93E-03
8.25	209.55	4944.9629	15.599	6.46E-01	8.76E+00	3.97E+00	5.94E-03	2.70E-03
8.50	215.90	5041.923	15.905	6.77E-01	9.19E+00	4.17E+00	5.42E-03	2.46E-03
8.75	222.25	5138.883	16.211	7.09E-01	9.62E+00	4.36E+00	4.88E-03	2.21E-03
9.00	228.60	5235.8431	16.517	7.42E-01	1.01E+01	4.56E+00	4.34E-03	1.97E-03
9.25	234.95	4944.9629	15.599	7.73E-01	1.05E+01	4.76E+00	3.80E-03	1.72E-03
9.50	241.30	4654.0827	14.682	8.04E-01	1.09E+01	4.94E+00	3.30E-03	1.50E-03
9.75	247.65	4363.2026	13.764	8.32E-01	1.13E+01	5.12E+00	2.82E-03	1.28E-03
10.00	254.00	4072.3224	12.846	8.58E-01	1.16E+01	5.28E+00	2.38E-03	1.08E-03
10.25	260.35	3781.4422	11.929	8.83E-01	1.20E+01	5.43E+00	1.97E-03	8.93E-04
10.50	266.70	3490.5621	11.011	9.06E-01	1.23E+01	5.57E+00	1.59E-03	7.19E-04
10.75	273.05	3199.6819	10.094	9.26E-01	1.26E+01	5.70E+00	1.24E-03	5.60E-04
11.00	279.40	2908.8017	9.176	9.46E-01	1.28E+01	5.82E+00	9.13E-04	4.14E-04
11.25	285.75	2617.9215	8.2584	9.63E-01	1.31E+01	5.92E+00	6.23E-04	2.82E-04
11.50	292.10	2327.0414	7.3408	9.78E-01	1.33E+01	6.02E+00	3.64E-04	1.65E-04
11.75	298.45	2036.1612	6.4232	9.92E-01	1.35E+01	6.10E+00	1.34E-04	6.09E-05
12.00	304.80	1745.281	5.5056	1.00E+00	1.36E+01	6.15E+00	0.00E+00	0.00E+00

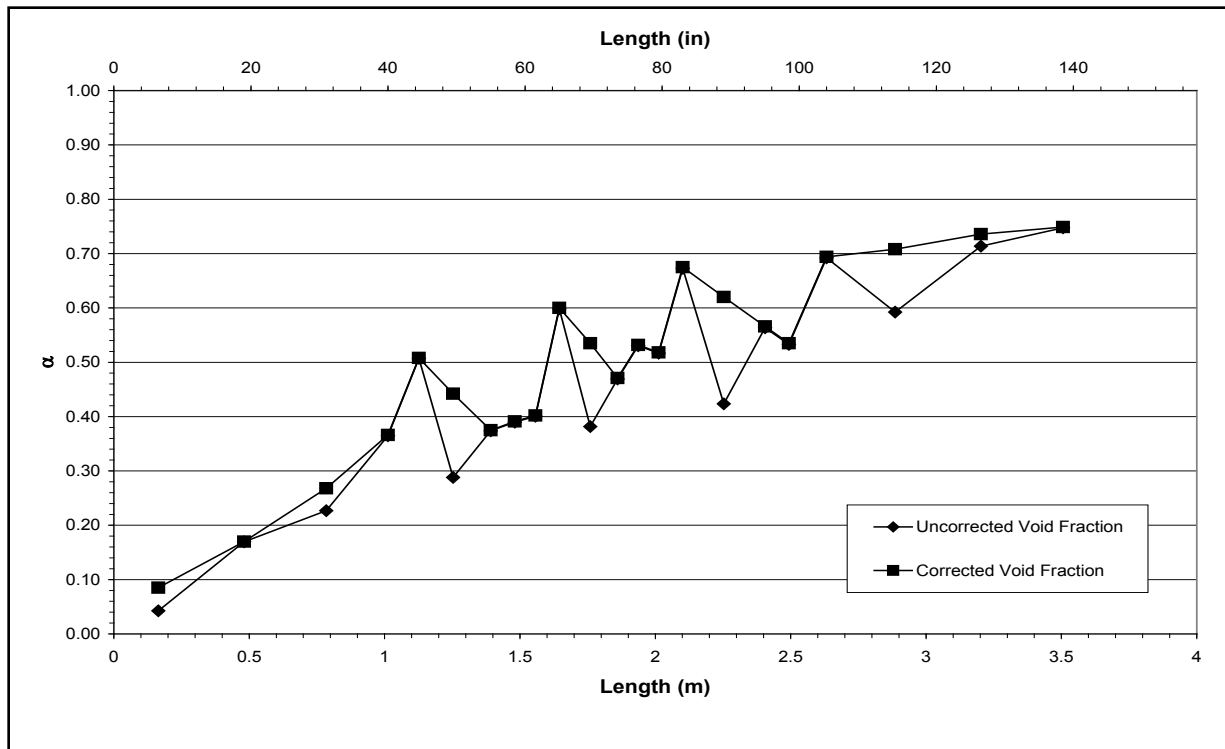


Figure A-420 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1648G for Time Period 3285 to 3465 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1648-H

Test Conditions

Date: 6/24/2003

Steady-state time window: 4005 – 4080 seconds

Inlet flow rate: 0.384 cm/sec (0.151 in./sec)

Inlet mass flow rate: 0.018 kg/sec (0.039 lbm/sec)

Inlet flow temperature: 370.5 K (207.3 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.12 kW

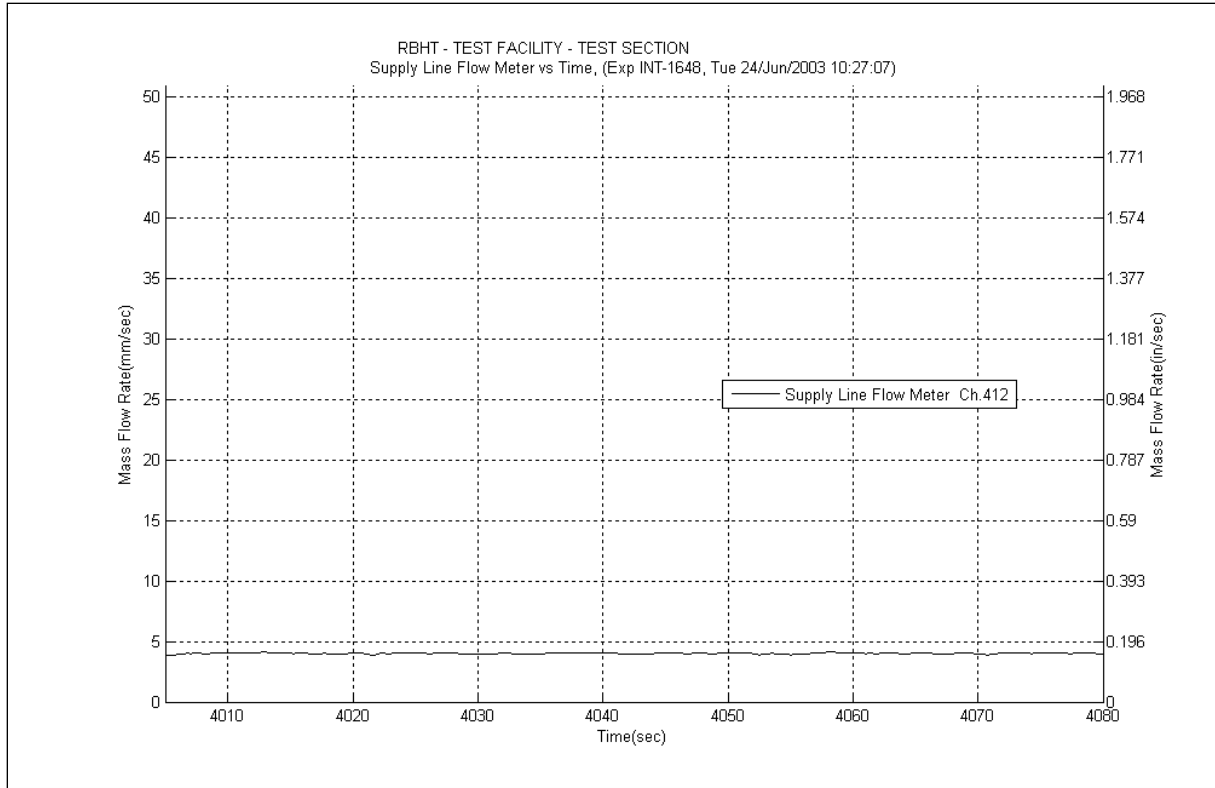


Figure A-421 Inlet Flow Plot for Experiment 1648H

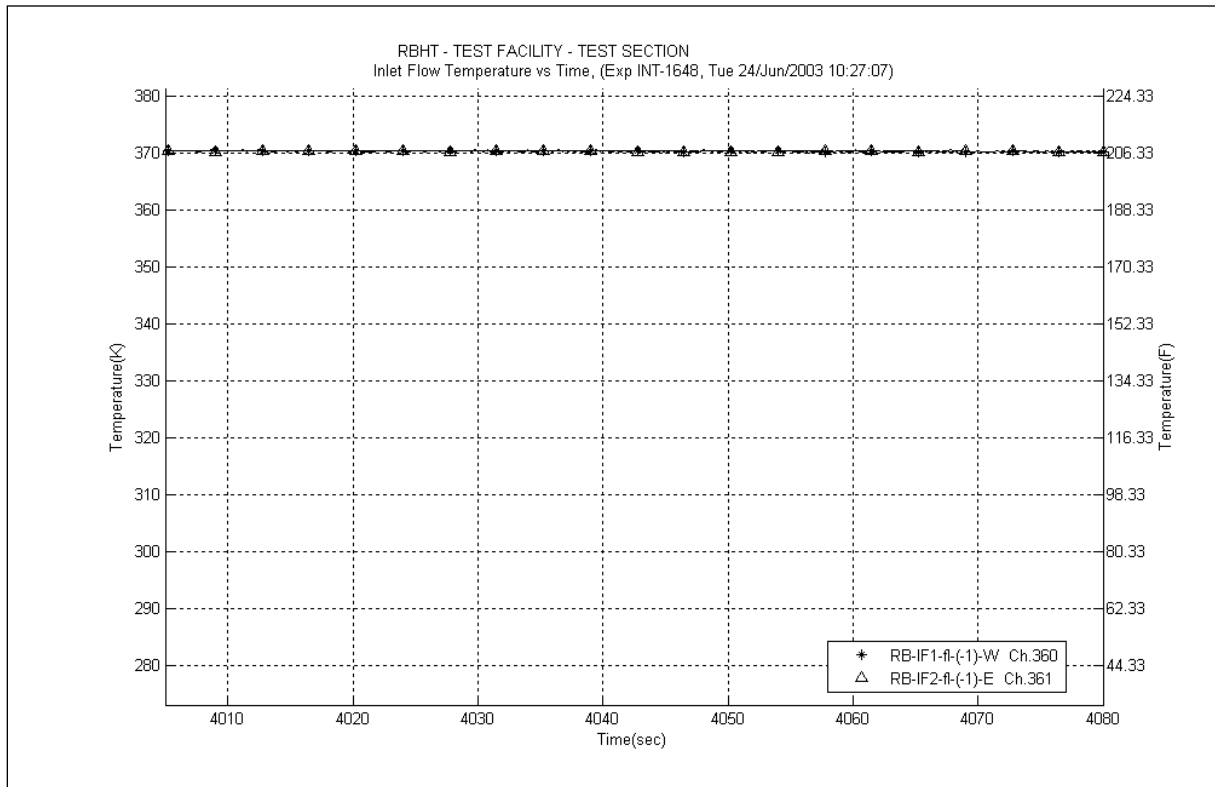


Figure A-422 Inlet Temperature Plot for Experiment 1648H

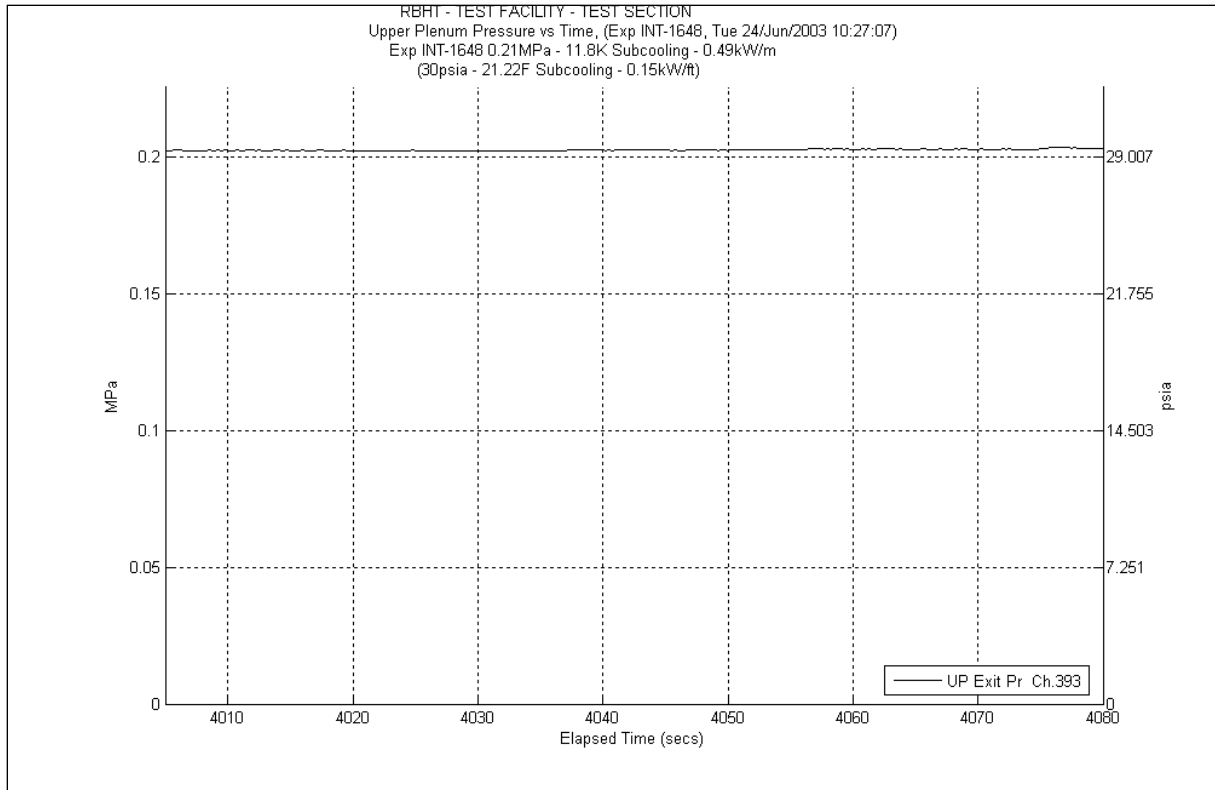


Figure A-423 System Pressure Plot for Experiment 1648H

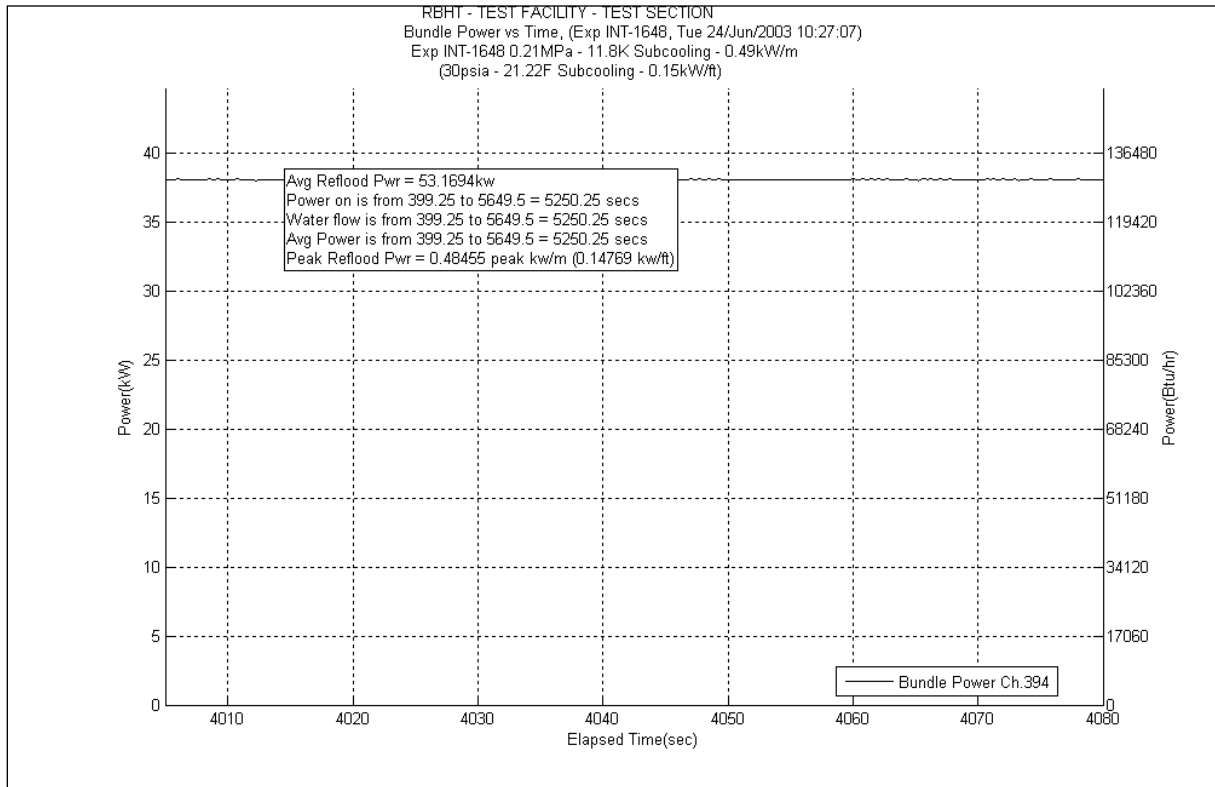


Figure A-424 Bundle Power Plot for Experiment 1648H

Table A-169 Data Results for RBHT Test 1648H for Time Period 4005 to 4080 seconds

Results for RBHT Test 1648

Valid Time Period 4005 to 4080 seconds

Collapsed Liquid Level = 69.0923 inches = 1754.94 mm

(Z_{OSV}) Onset of Significant Void = 6.5 inches = 165 mm

($Z_{2\phi}$) Two-Phase Level (Dryout) = 124.70 inches = 3167.38 mm

(S) Level Swell = 1.924

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.985	0.831	39.785	0.031	1.484	0.000	0.000	0.000	0.000	0.798	38.208	4320.798	206880.9187	0.986	0.981	0.991
*	120-133	3048-3378	383	0.947	3.604	172.569	0.036	1.724	0.000	0.000	-1.213	-58.071	4.781	228.916	4325.579	207109.8342	0.929	0.924	0.934
*	108-120	2743-3048	382	0.769	14.396	689.280	0.049	2.346	0.002	0.096	2.845	136.215	11.5	550.623	4337.079	207660.4571	0.815	0.811	0.819
	100-108	2540-2743	381	0.757	10.096	483.391	0.038	1.819	0.027	1.293	0.000	0.000	10.03	480.239	4347.109	208140.6961	0.759	0.755	0.763
	97-100	2464-2540	380	0.674	5.074	242.939	0.014	0.670	0.010	0.479	0.000	0.000	5.047	241.652	4352.156	208382.3478	0.676	0.673	0.679
	93-97	2362-2464	379	0.660	7.068	338.424	0.018	0.862	0.013	0.622	0.000	0.000	7.034	336.790	4359.19	208719.1375	0.661	0.658	0.664
*	85-93	2159-2362	378	0.459	22.492	1076.938	0.034	1.628	0.024	1.149	8.964	429.214	13.47	644.947	4372.66	209364.0846	0.676	0.673	0.679
	81-85	2057-2159	377	0.689	6.461	309.331	0.016	0.766	0.012	0.575	0.000	0.000	6.432	307.966	4379.092	209672.0504	0.69	0.687	0.693
	78-81	1981-2057	376	0.526	7.385	353.592	0.011	0.527	0.009	0.431	0.000	0.000	7.364	352.590	4386.456	210024.6406	0.527	0.524	0.530
	75-78	1905-1981	375	0.543	7.115	340.661	0.011	0.527	0.008	0.383	0.000	0.000	7.095	339.710	4393.551	210364.351	0.545	0.542	0.548
	72-75	1829-1905	374	0.485	8.019	383.928	0.010	0.479	0.008	0.383	0.000	0.000	7.998	382.946	4401.549	210747.2973	0.487	0.485	0.489
*	67-72	1702-1829	373	0.380	16.094	770.591	0.016	0.766	0.013	0.622	4.345	208.046	11.72	561.157	4413.269	211308.4539	0.548	0.545	0.551
	63-67	1600-1702	372	0.609	8.117	388.652	0.012	0.575	0.010	0.479	0.000	0.000	8.094	387.543	4421.363	211695.9967	0.61	0.607	0.613
	60-63	1524-1600	371	0.418	9.062	433.908	0.008	0.383	0.007	0.335	0.000	0.000	9.044	433.029	4430.407	212129.0258	0.419	0.417	0.421
	57-60	1448-1524	370	0.401	9.338	447.087	0.008	0.383	0.007	0.335	0.000	0.000	9.318	446.148	4439.725	212575.174	0.402	0.400	0.404
	53-57	1346-1448	369	0.384	12.802	612.942	0.010	0.479	0.009	0.431	0.000	0.000	12.78	611.910	4452.505	213187.0837	0.385	0.383	0.387
*	46-53	1168-1346	368	0.284	26.034	1246.522	0.015	0.718	0.015	0.718	6.124	293.227	19.88	951.860	4472.385	214138.9432	0.453	0.451	0.455
	43-46	1092-1168	367	0.520	7.473	357.819	0.006	0.287	0.006	0.287	0.000	0.000	7.458	357.091	4479.843	214496.0342	0.521	0.518	0.524
	37-43	940-1092	366	0.388	19.065	912.823	0.010	0.479	0.012	0.575	0.000	0.000	19.04	911.640	4498.883	215407.6743	0.389	0.387	0.391
*	25-37	635-940	365	0.238	47.462	2272.485	0.016	0.766	0.022	1.053	3.834	183.565	43.59	2087.100	4542.473	217494.7747	0.3	0.299	0.302
	13-25	330-635	364	0.211	49.144	2353.050	0.009	0.431	0.019	0.910	0.000	0.000	49.1	2350.921	4591.573	219845.6953	0.212	0.211	0.213
*	0-13	0-330	363	0.046	64.392	3083.110	0.003	0.144	0.006	0.287	4.043	193.585	60.34	2889.095	4651.913	222734.79	0.106	0.105	0.107

Table A-170 Energy Balance Results for RBHT Test 1648H for Time Period 4005 to 4080 seconds

Results for RBHT Test 1648 Valid Time Period 4005 to 4080 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1747.7312	5.5133	0.00E+00	0.00E+00	0.00E+00	1.27E-02	5.77E-03
0.25	6.35	1844.8274	5.8196	0.00E+00	0.00E+00	0.00E+00	1.27E-02	5.77E-03
0.50	12.70	1941.9235	6.1259	0.00E+00	0.00E+00	0.00E+00	1.27E-02	5.77E-03
0.75	19.05	2039.0197	6.4322	6.77E-04	6.96E-03	3.16E-03	1.27E-02	5.77E-03
1.00	25.40	2136.1159	6.7385	1.79E-02	1.84E-01	8.36E-02	1.25E-02	5.67E-03
1.25	31.75	2233.2121	7.0448	3.60E-02	3.70E-01	1.68E-01	1.23E-02	5.56E-03
1.50	38.10	2330.3082	7.3511	5.48E-02	5.64E-01	2.56E-01	1.20E-02	5.46E-03
1.75	44.45	2427.4044	7.6574	7.45E-02	7.66E-01	3.47E-01	1.18E-02	5.34E-03
2.00	50.80	2524.5006	7.9637	9.49E-02	9.76E-01	4.43E-01	1.15E-02	5.22E-03
2.25	57.15	2621.5968	8.27	1.16E-01	1.19E+00	5.42E-01	1.12E-02	5.10E-03
2.50	63.50	2718.693	8.5763	1.38E-01	1.42E+00	6.45E-01	1.10E-02	4.97E-03
2.75	69.85	2815.7891	8.8826	1.61E-01	1.66E+00	7.51E-01	1.07E-02	4.84E-03
3.00	76.20	2912.8853	9.1889	1.85E-01	1.90E+00	8.62E-01	1.04E-02	4.71E-03
3.25	82.55	3009.9815	9.4952	2.09E-01	2.15E+00	9.76E-01	1.01E-02	4.56E-03
3.50	88.90	3107.0777	9.8015	2.34E-01	2.41E+00	1.09E+00	9.74E-03	4.42E-03
3.75	95.25	3204.1738	10.108	2.61E-01	2.68E+00	1.22E+00	9.41E-03	4.27E-03
4.00	101.60	3301.27	10.414	2.87E-01	2.96E+00	1.34E+00	9.07E-03	4.11E-03
4.25	107.95	3398.3662	10.72	3.15E-01	3.24E+00	1.47E+00	8.72E-03	3.95E-03
4.50	114.30	3495.4624	11.027	3.44E-01	3.53E+00	1.60E+00	8.35E-03	3.79E-03
4.75	120.65	3592.5585	11.333	3.73E-01	3.83E+00	1.74E+00	7.98E-03	3.62E-03
5.00	127.00	3689.6547	11.639	4.03E-01	4.14E+00	1.88E+00	7.60E-03	3.45E-03
5.25	133.35	3786.7509	11.946	4.34E-01	4.46E+00	2.02E+00	7.21E-03	3.27E-03
5.50	139.70	3883.8471	12.252	4.65E-01	4.79E+00	2.17E+00	6.80E-03	3.09E-03
5.75	146.05	3980.9433	12.558	4.98E-01	5.12E+00	2.32E+00	6.39E-03	2.90E-03
6.00	152.40	4078.0394	12.864	5.31E-01	5.46E+00	2.48E+00	5.97E-03	2.71E-03
6.25	158.75	4175.1356	13.171	5.65E-01	5.81E+00	2.64E+00	5.53E-03	2.51E-03
6.50	165.10	4272.2318	13.477	6.00E-01	6.17E+00	2.80E+00	5.09E-03	2.31E-03
6.75	171.45	4369.328	13.783	6.36E-01	6.54E+00	2.97E+00	4.64E-03	2.10E-03
7.00	177.80	4466.4241	14.09	6.72E-01	6.91E+00	3.14E+00	4.17E-03	1.89E-03
7.25	184.15	4563.5203	14.396	7.10E-01	7.30E+00	3.31E+00	3.70E-03	1.68E-03
7.50	190.50	4660.6165	14.702	7.48E-01	7.69E+00	3.49E+00	3.21E-03	1.46E-03
7.75	196.85	4757.7127	15.009	7.87E-01	8.09E+00	3.67E+00	2.72E-03	1.23E-03
8.00	203.20	4854.8088	15.315	8.26E-01	8.50E+00	3.85E+00	2.21E-03	1.00E-03
8.25	209.55	4951.905	15.621	8.67E-01	8.92E+00	4.04E+00	1.70E-03	7.69E-04
8.50	215.90	5049.0012	15.927	9.08E-01	9.34E+00	4.24E+00	1.17E-03	5.31E-04
8.75	222.25	5146.0974	16.234	9.50E-01	9.77E+00	4.43E+00	6.36E-04	2.89E-04
9.00	228.60	5243.1936	16.54	9.93E-01	1.02E+01	4.63E+00	9.03E-05	4.10E-05
9.25	234.95	4951.905	15.621	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00
9.50	241.30	4660.6165	14.702	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00
9.75	247.65	4369.328	13.783	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00
10.00	254.00	4078.0394	12.864	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00
10.25	260.35	3786.7509	11.946	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00
10.50	266.70	3495.4624	11.027	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00
10.75	273.05	3204.1738	10.108	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00
11.00	279.40	2912.8853	9.1889	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00
11.25	285.75	2621.5968	8.27	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00
11.50	292.10	2330.3082	7.3511	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00
11.75	298.45	2039.0197	6.4322	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00
12.00	304.80	1747.7312	5.5133	1.00E+00	1.03E+01	4.67E+00	0.00E+00	0.00E+00

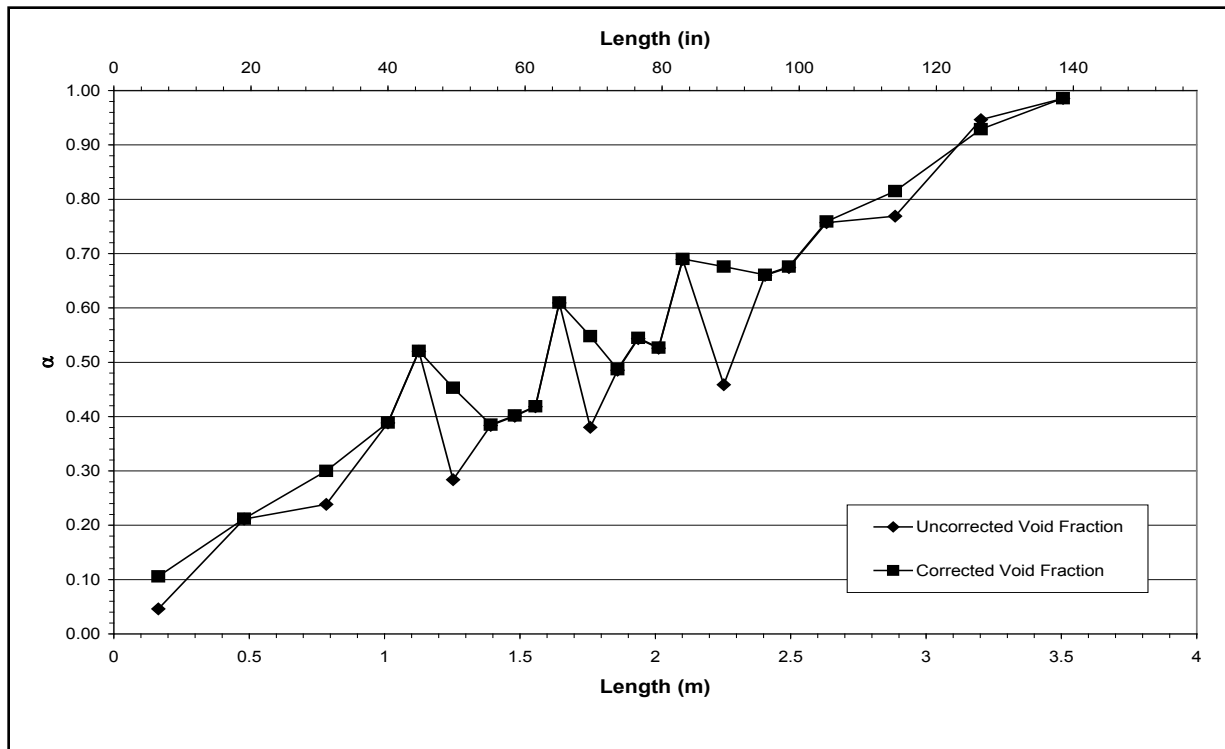


Figure A-425 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1648H for Time Period 4005 to 4080 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1648-I

Test Conditions

Date: 6/24/2003

Steady-state time window: 4380 – 4440 seconds

Inlet flow rate: 0.376 cm/sec (0.148 in./sec)

Inlet mass flow rate: 0.018 kg/sec (0.039 lbm/sec)

Inlet flow temperature: 370.5 K (207.3 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.12 kW

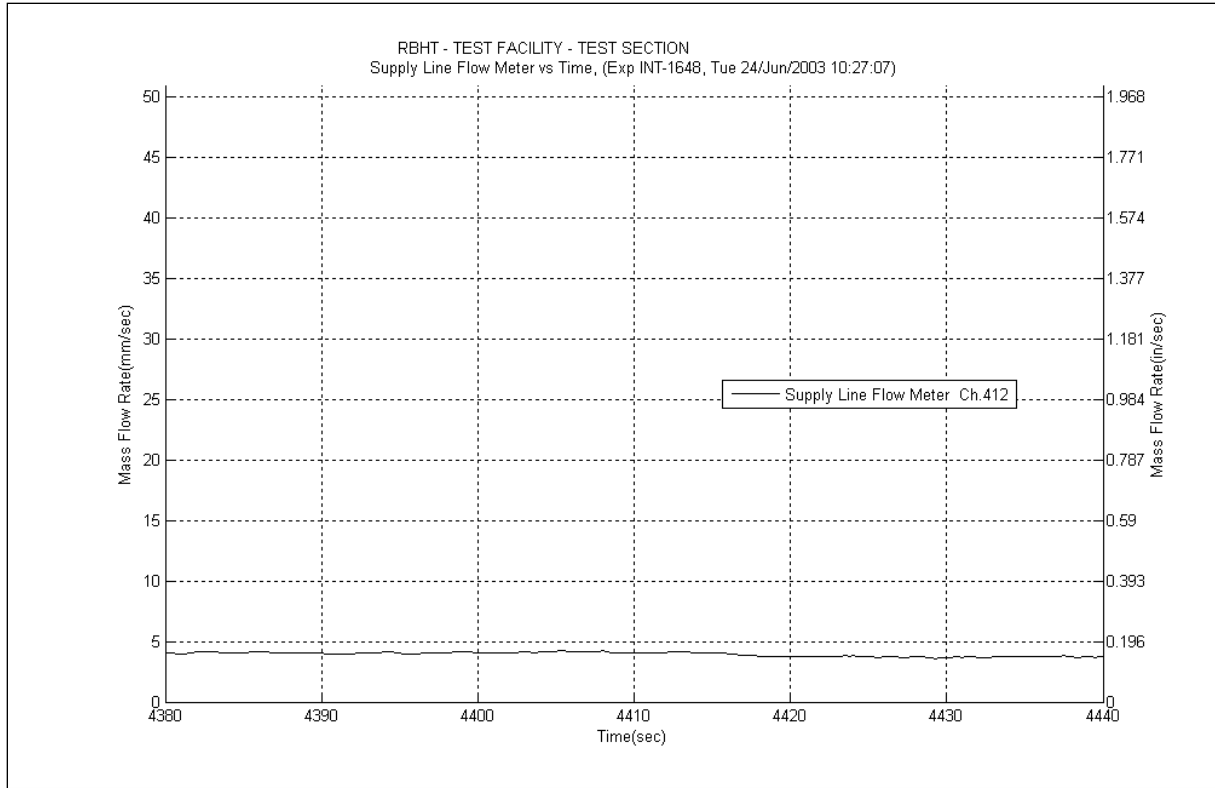


Figure A-426 Inlet Flow Plot for Experiment 1648I

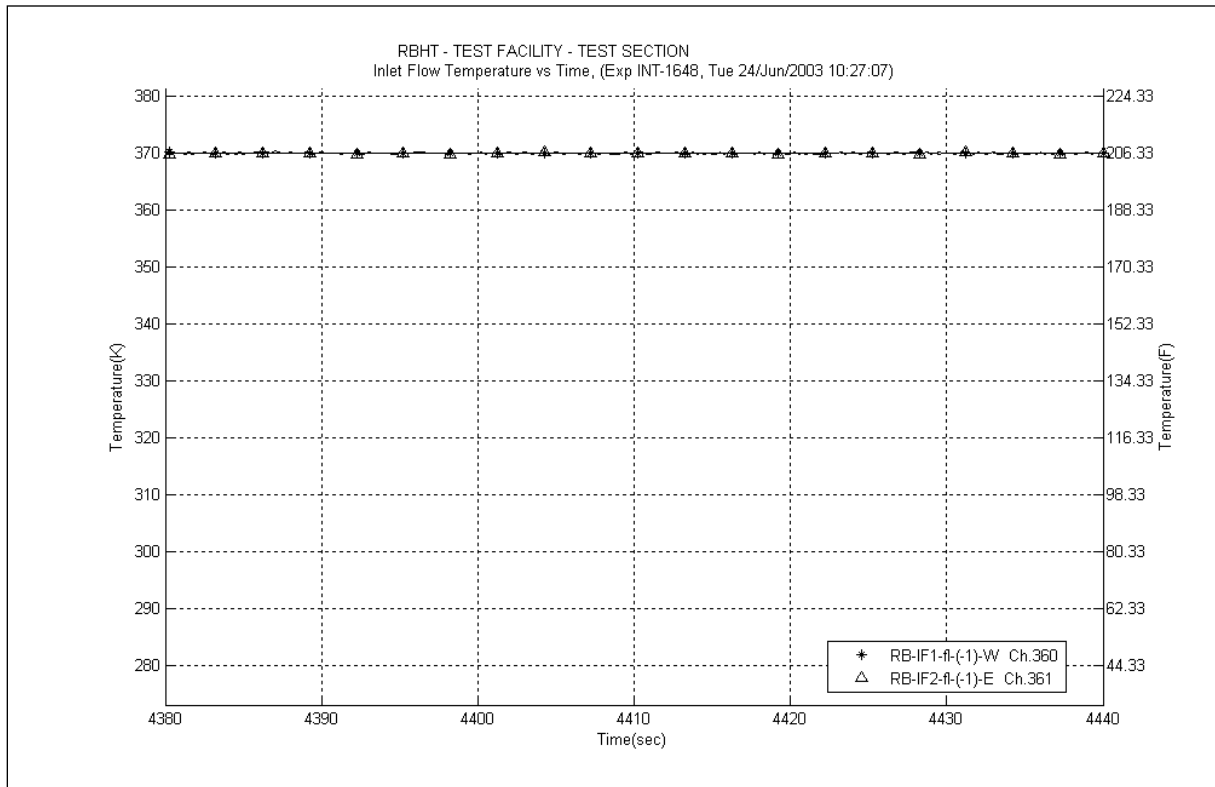


Figure A-427 Inlet Temperature Plot for Experiment 1648I

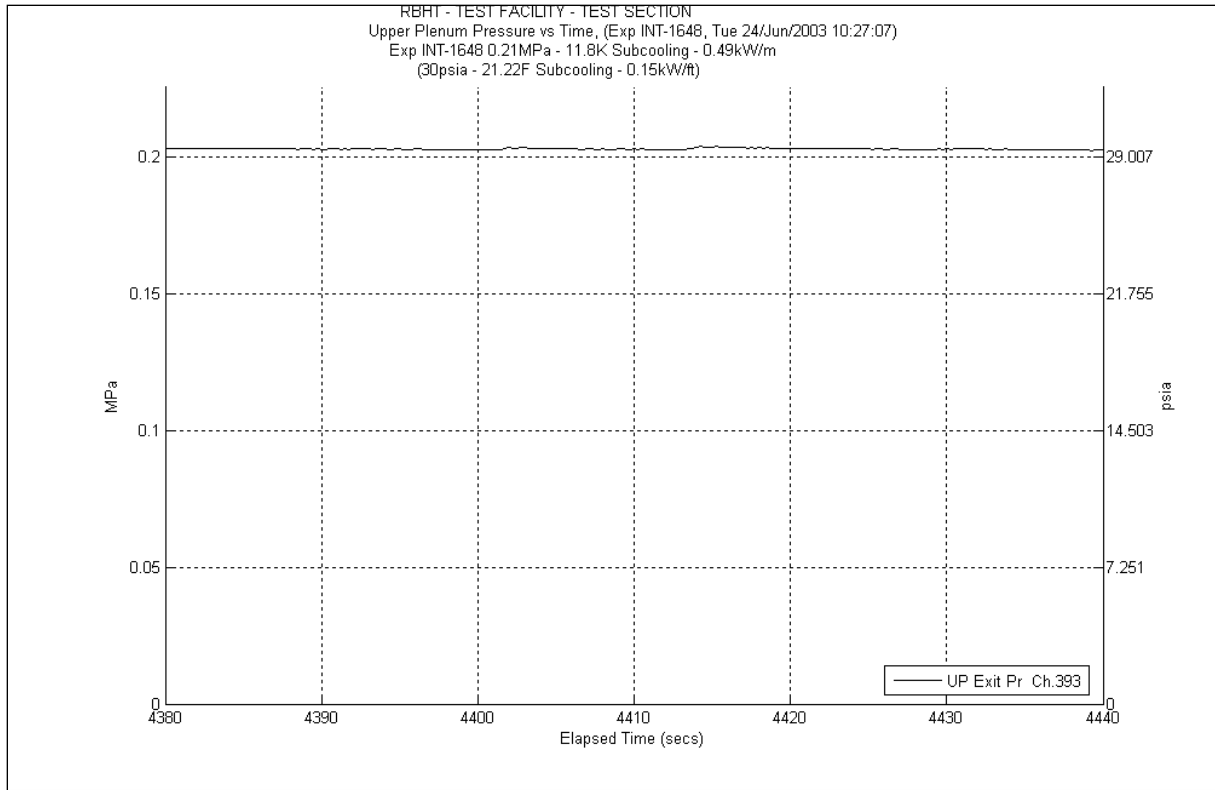


Figure A-428 System Pressure Plot for Experiment 1648I

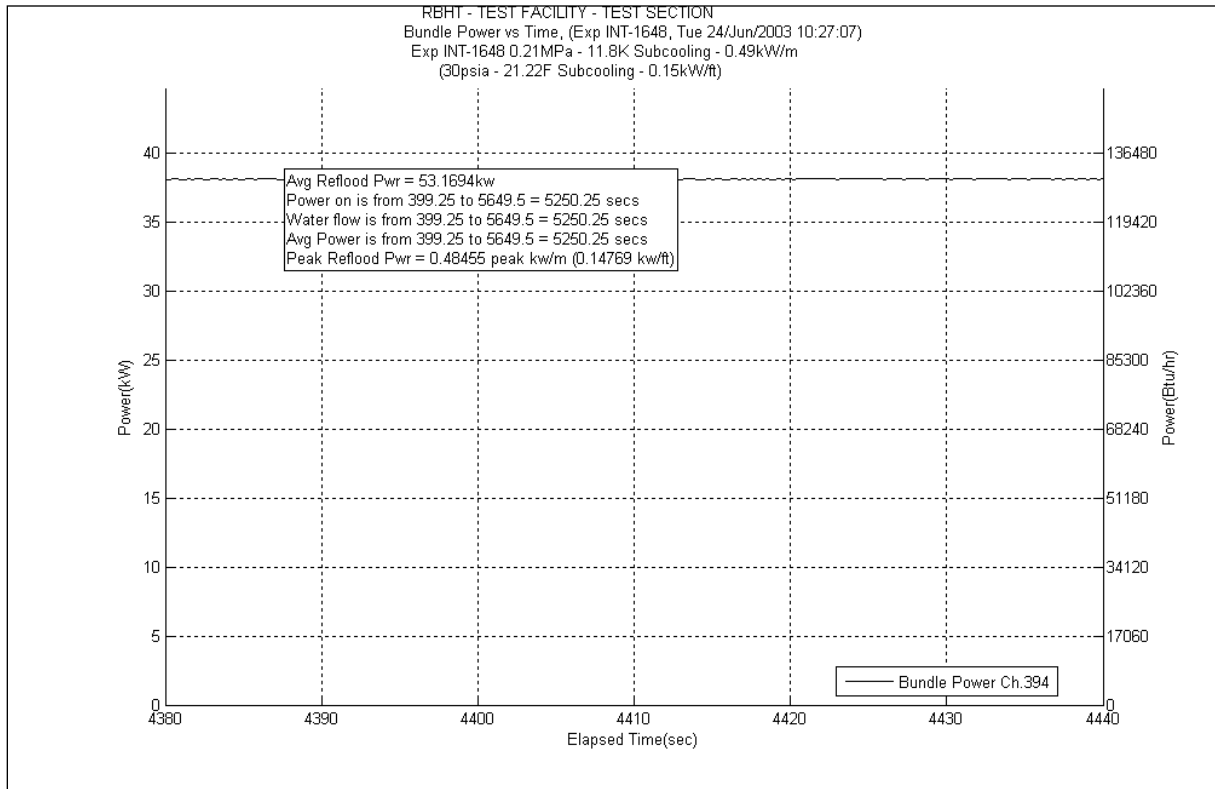


Figure A-429 Bundle Power Plot for Experiment 1648I

Table A-171 Data Results for RBHT Test 1648I for Time Period 4380 to 4440 seconds

Results for RBHT Test 1648I

Valid Time Period 4380 to 4440 seconds

Collapsed Liquid Level = 67.063 inches = 1703.40 mm

(Z_{GSV}) Onset of Significant Void = 6.5 inches = 165 mm

(Z_{2θ}) Two-Phase Level (Dryout) = 118.60 inches = 3012.44 mm

(S) Level Swell = 1.885

Grids	Elevation (in)	Elevation (mm)	Chan.	α _{uncorrected}	ΔP _{uncorrected} (lbf/ft ²)	ΔP _{uncorrected} (Pa)	ΔP _{inic} (lbf/ft ²)	ΔP _{inic} (Pa)	ΔP _{accel} (lbf/ft ²)	ΔP _{accel} (Pa)	ΔP _{grid} (lbf/ft ²)	ΔP _{grid} (Pa)	ΔP _{corrected} (lbf/ft ²)	ΔP _{corrected} (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	α _{corrected}	α _{min}	α _{max}
	133-144	3378-3658	384	0.979	1.189	56.943	0.030	1.436	0.000	0.000	0.000	0.000	1.158	55.445	4321.158	206898.1556	0.98	0.975	0.985
*	120-133	3048-3378	383	0.980	1.345	64.402	0.035	1.676	0.000	0.000	-3.203	-153.357	4.513	216.084	4325.671	207114.2392	0.933	0.928	0.938
*	108-120	2743-3048	382	0.873	7.889	377.711	0.032	1.532	0.000	0.000	-2.113	-101.187	9.97	477.366	4335.641	207591.6053	0.84	0.836	0.844
	100-108	2540-2743	381	0.792	8.647	414.016	0.037	1.772	0.024	1.149	0.000	0.000	8.581	410.860	4344.222	208002.4658	0.793	0.789	0.797
	97-100	2464-2540	380	0.689	4.851	232.247	0.014	0.670	0.010	0.479	0.000	0.000	4.825	231.022	4349.047	208233.4881	0.69	0.687	0.693
	93-97	2362-2464	379	0.691	6.424	307.590	0.018	0.862	0.012	0.575	0.000	0.000	6.391	306.003	4355.438	208539.4908	0.692	0.689	0.695
*	85-93	2159-2362	378	0.494	21.017	1006.319	0.033	1.580	0.024	1.149	8.190	392.159	12.77	611.431	4368.208	209150.9217	0.693	0.690	0.696
	81-85	2057-2159	377	0.692	6.409	306.844	0.015	0.718	0.011	0.527	0.000	0.000	6.378	305.380	4374.586	209456.3019	0.693	0.690	0.696
	78-81	1981-2057	376	0.530	7.323	350.608	0.011	0.527	0.008	0.383	0.000	0.000	7.299	349.478	4381.885	209805.7799	0.531	0.528	0.534
	75-78	1905-1981	375	0.539	7.177	343.645	0.010	0.479	0.008	0.383	0.000	0.000	7.155	342.583	4389.04	210148.3632	0.541	0.538	0.544
	72-75	1829-1905	374	0.488	7.977	381.939	0.010	0.479	0.008	0.383	0.000	0.000	7.957	380.983	4396.997	210529.3464	0.489	0.487	0.491
*	67-72	1702-1829	373	0.381	16.063	769.099	0.016	0.766	0.013	0.622	4.414	211.342	11.62	556.369	4408.617	211085.715	0.553	0.550	0.556
	63-67	1600-1702	372	0.615	8.003	383.182	0.011	0.527	0.010	0.479	0.000	0.000	7.978	381.989	4416.595	211467.7037	0.616	0.613	0.619
	60-63	1524-1600	371	0.412	9.156	438.384	0.008	0.383	0.007	0.335	0.000	0.000	9.136	437.434	4425.731	211905.1377	0.413	0.411	0.415
	57-60	1448-1524	370	0.399	9.358	448.082	0.008	0.383	0.007	0.335	0.000	0.000	9.342	447.297	4435.073	212352.4351	0.4	0.398	0.402
	53-57	1346-1448	369	0.392	12.630	604.736	0.009	0.431	0.009	0.431	0.000	0.000	12.61	603.770	4447.683	212956.2051	0.393	0.391	0.395
*	46-53	1168-1346	368	0.280	26.164	1252.739	0.015	0.718	0.015	0.718	6.534	312.849	19.6	938.453	4467.283	213894.6581	0.461	0.459	0.463
	43-46	1092-1168	367	0.528	7.359	352.348	0.006	0.287	0.006	0.287	0.000	0.000	7.345	351.680	4474.628	214246.3386	0.528	0.525	0.531
	37-43	940-1092	366	0.386	19.127	915.807	0.010	0.479	0.012	0.575	0.000	0.000	19.1	914.513	4493.728	215160.8515	0.387	0.385	0.389
*	25-37	635-940	365	0.245	47.072	2253.836	0.015	0.718	0.021	1.005	3.436	164.533	43.6	2087.579	4537.328	217248.4307	0.3	0.299	0.302
	13-25	330-635	364	0.213	49.046	2348.326	0.009	0.431	0.018	0.862	0.000	0.000	49	2346.133	4586.328	219594.5633	0.213	0.212	0.214
*	0-13	0-330	363	0.048	64.288	3078.137	0.003	0.144	0.006	0.287	3.989	191.005	60.29	2886.701	4646.618	222481.264	0.107	0.106	0.108

Table A-172 Energy Balance Results for RBHT Test 1648I for Time Period 4380 to 4440 seconds

Results for RBHT Test 1648 Valid Time Period 4380 to 4440 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1749.3849	5.5186	0.00E+00	0.00E+00	0.00E+00	1.25E-02	5.67E-03
0.25	6.35	1846.5729	5.8251	0.00E+00	0.00E+00	0.00E+00	1.25E-02	5.67E-03
0.50	12.70	1943.761	6.1317	0.00E+00	0.00E+00	0.00E+00	1.25E-02	5.67E-03
0.75	19.05	2040.949	6.4383	8.47E-04	8.55E-03	3.88E-03	1.25E-02	5.66E-03
1.00	25.40	2138.1371	6.7449	1.84E-02	1.86E-01	8.43E-02	1.23E-02	5.56E-03
1.25	31.75	2235.3251	7.0515	3.68E-02	3.71E-01	1.68E-01	1.20E-02	5.46E-03
1.50	38.10	2332.5132	7.3581	5.60E-02	5.65E-01	2.56E-01	1.18E-02	5.35E-03
1.75	44.45	2429.7012	7.6647	7.60E-02	7.67E-01	3.48E-01	1.15E-02	5.24E-03
2.00	50.80	2526.8893	7.9713	9.69E-02	9.78E-01	4.43E-01	1.13E-02	5.12E-03
2.25	57.15	2624.0773	8.2778	1.19E-01	1.20E+00	5.42E-01	1.10E-02	5.00E-03
2.50	63.50	2721.2654	8.5844	1.41E-01	1.42E+00	6.45E-01	1.07E-02	4.87E-03
2.75	69.85	2818.4534	8.891	1.64E-01	1.66E+00	7.52E-01	1.04E-02	4.74E-03
3.00	76.20	2915.6415	9.1976	1.88E-01	1.90E+00	8.62E-01	1.01E-02	4.60E-03
3.25	82.55	3012.8295	9.5042	2.13E-01	2.15E+00	9.76E-01	9.83E-03	4.46E-03
3.50	88.90	3110.0176	9.8108	2.39E-01	2.41E+00	1.09E+00	9.51E-03	4.31E-03
3.75	95.25	3207.2056	10.117	2.66E-01	2.68E+00	1.22E+00	9.18E-03	4.16E-03
4.00	101.60	3304.3937	10.424	2.93E-01	2.96E+00	1.34E+00	8.84E-03	4.01E-03
4.25	107.95	3401.5817	10.731	3.21E-01	3.24E+00	1.47E+00	8.48E-03	3.85E-03
4.50	114.30	3498.7698	11.037	3.50E-01	3.53E+00	1.60E+00	8.12E-03	3.68E-03
4.75	120.65	3595.9578	11.344	3.80E-01	3.83E+00	1.74E+00	7.75E-03	3.51E-03
5.00	127.00	3693.1459	11.65	4.11E-01	4.14E+00	1.88E+00	7.36E-03	3.34E-03
5.25	133.35	3790.3339	11.957	4.42E-01	4.46E+00	2.02E+00	6.97E-03	3.16E-03
5.50	139.70	3887.522	12.263	4.74E-01	4.79E+00	2.17E+00	6.57E-03	2.98E-03
5.75	146.05	3984.71	12.57	5.08E-01	5.12E+00	2.32E+00	6.15E-03	2.79E-03
6.00	152.40	4081.8981	12.877	5.41E-01	5.46E+00	2.48E+00	5.73E-03	2.60E-03
6.25	158.75	4179.0861	13.183	5.76E-01	5.81E+00	2.64E+00	5.30E-03	2.40E-03
6.50	165.10	4276.2742	13.49	6.12E-01	6.17E+00	2.80E+00	4.85E-03	2.20E-03
6.75	171.45	4373.4622	13.796	6.48E-01	6.54E+00	2.97E+00	4.40E-03	1.99E-03
7.00	177.80	4470.6503	14.103	6.85E-01	6.92E+00	3.14E+00	3.93E-03	1.78E-03
7.25	184.15	4567.8383	14.41	7.23E-01	7.30E+00	3.31E+00	3.46E-03	1.57E-03
7.50	190.50	4665.0264	14.716	7.62E-01	7.69E+00	3.49E+00	2.97E-03	1.35E-03
7.75	196.85	4762.2144	15.023	8.02E-01	8.09E+00	3.67E+00	2.48E-03	1.12E-03
8.00	203.20	4859.4025	15.329	8.42E-01	8.50E+00	3.85E+00	1.97E-03	8.94E-04
8.25	209.55	4956.5905	15.636	8.84E-01	8.92E+00	4.04E+00	1.46E-03	6.60E-04
8.50	215.90	5053.7786	15.943	9.26E-01	9.34E+00	4.24E+00	9.31E-04	4.22E-04
8.75	222.25	5150.9666	16.249	9.68E-01	9.77E+00	4.43E+00	3.95E-04	1.79E-04
9.00	228.60	5248.1547	16.556	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
9.25	234.95	4956.5905	15.636	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
9.50	241.30	4665.0264	14.716	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
9.75	247.65	4373.4622	13.796	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
10.00	254.00	4081.8981	12.877	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
10.25	260.35	3790.3339	11.957	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
10.50	266.70	3498.7698	11.037	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
10.75	273.05	3207.2056	10.117	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
11.00	279.40	2915.6415	9.1976	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
11.25	285.75	2624.0773	8.2778	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
11.50	292.10	2332.5132	7.3581	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
11.75	298.45	2040.949	6.4383	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00
12.00	304.80	1749.3849	5.5186	1.00E+00	1.01E+01	4.58E+00	0.00E+00	0.00E+00

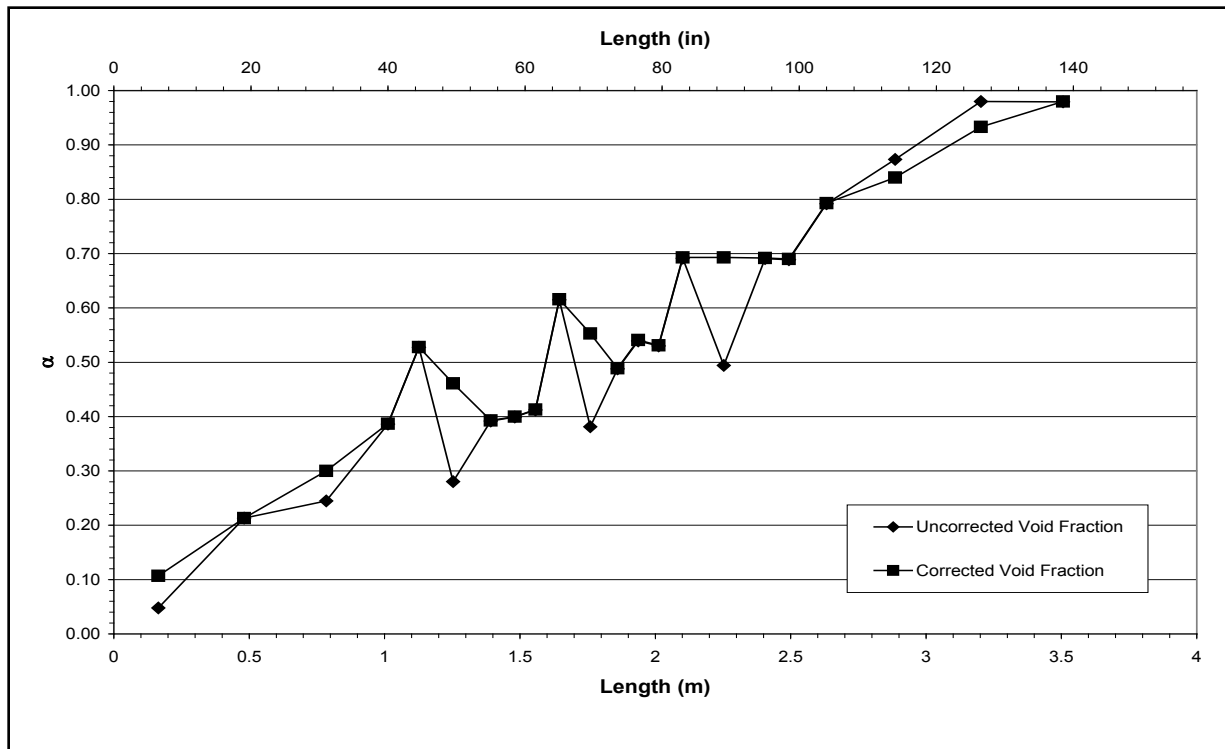


Figure A-430 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1648I for Time Period 4380 to 4440 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1648-J

Test Conditions

Date: 6/24/2003

Steady-state time window: 5510 – 5660 seconds

Inlet flow rate: 0.381 cm/sec (0.150 in./sec)

Inlet mass flow rate: 0.018 kg/sec (0.039 lbm/sec)

Inlet flow temperature: 370.5 K (207.3 °F)

Upper plenum pressure: 202.7 kPa (29.4 psia)

Bundle power: 54.12 kW

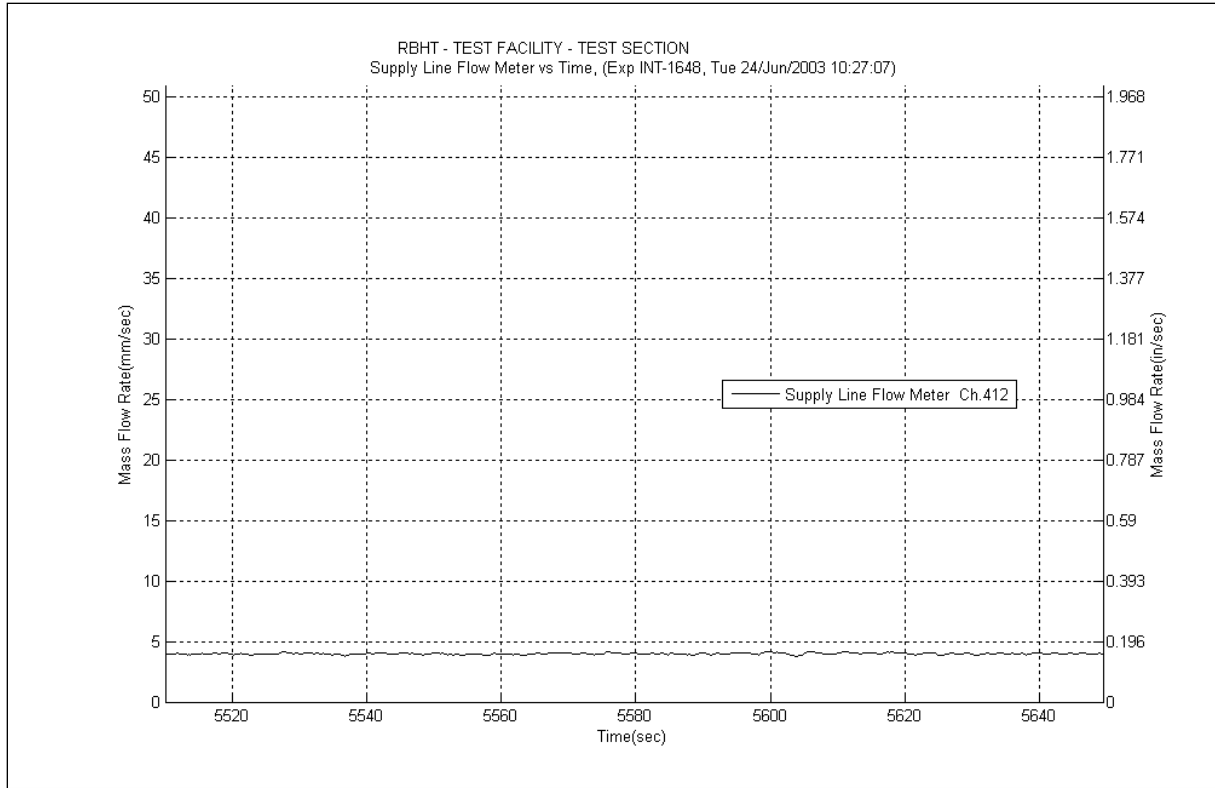


Figure A-431 Inlet Flow Plot for Experiment 1648J

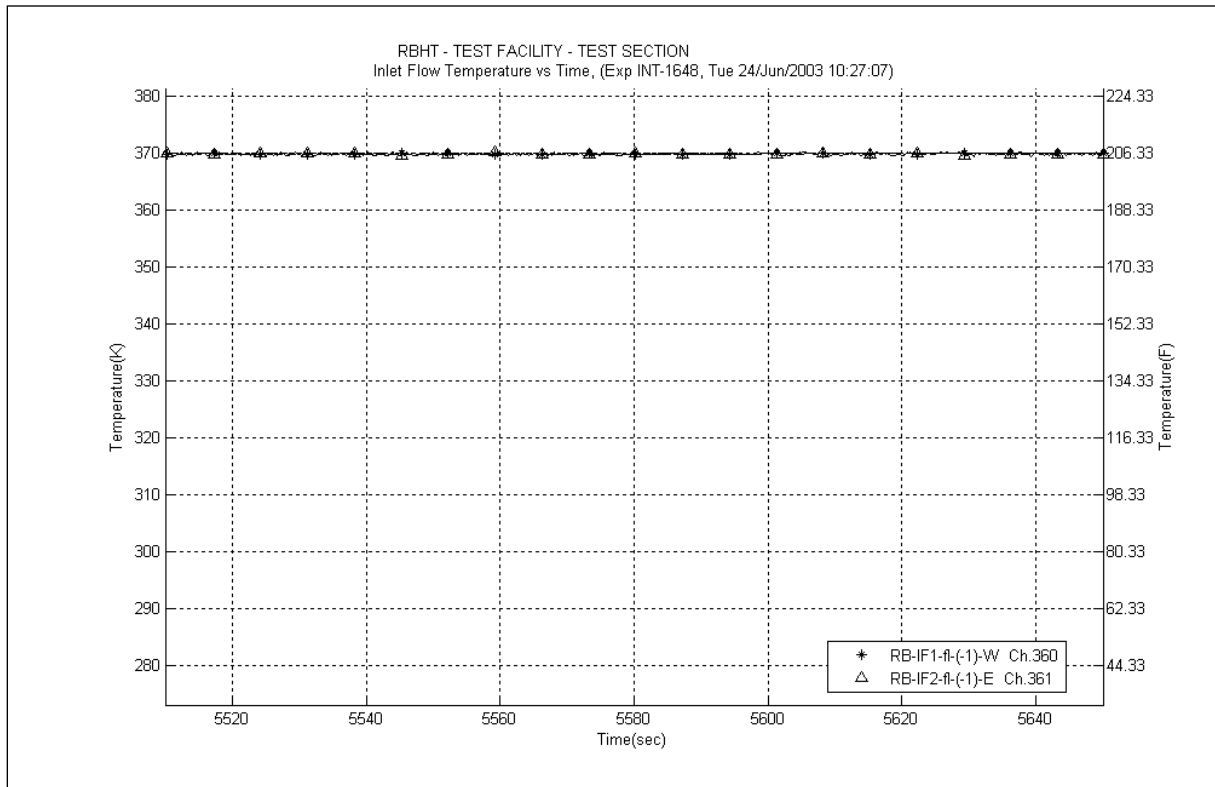


Figure A-432 Inlet Temperature Plot for Experiment 1648J

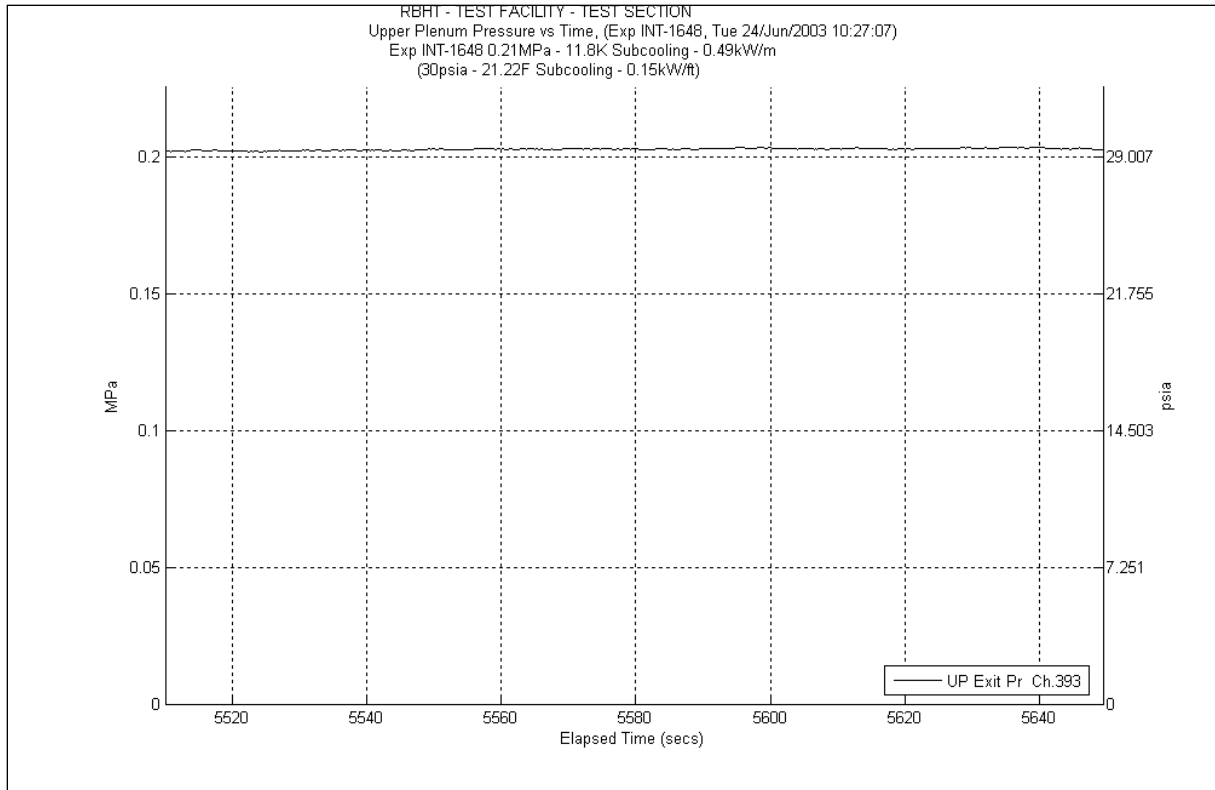


Figure A-433 System Pressure Plot for Experiment 1648J

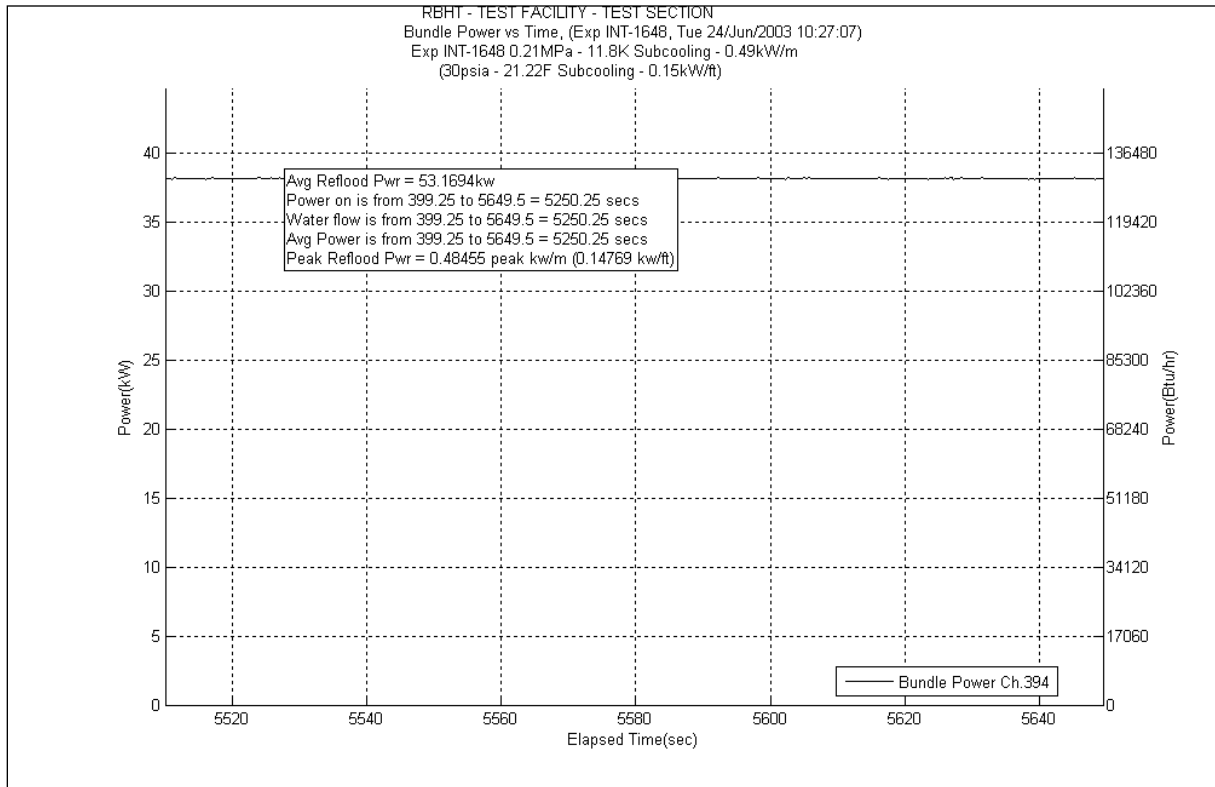


Figure A-434 Bundle Power Plot for Experiment 1648J

Table A-173 Data Results for RBHT Test 1648J for Time Period 5510 to 5660 seconds

Results for RBHT Test 1648

Valid Time Period 5510 to 5660 seconds

Collapsed Liquid Level = 66.686 inches = 1693.82 mm

(Z_{OSV}) Onset of Significant Void = 6.5 inches = 165 mm

(Z_{2φ}) Two-Phase Level (Dryout) = 117.40 inches = 2981.96 mm

(S) Level Swell = 1.879

Grids	Elevation (in)	Elevation (mm)	Chan.	α _{uncorrected}	ΔP _{uncorrected} (lbf/ft ²)	ΔP _{uncorrected} (Pa)	ΔP _{inic} (lbf/ft ²)	ΔP _{inic} (Pa)	ΔP _{accel} (lbf/ft ²)	ΔP _{accel} (Pa)	ΔP _{grid} (lbf/ft ²)	ΔP _{grid} (Pa)	ΔP _{corrected} (lbf/ft ²)	ΔP _{corrected} (Pa)	P _{local} (lbf/ft ²)	P _{local} (Pa)	α _{corrected}	α _{min}	α _{max}
	133-144	3378-3658	384	0.990	0.571	27.352	0.030	1.436	0.000	0.000	0.000	0.000	0.54	25.855	4320.54	206868.5656	0.991	0.986	0.996
*	120-133	3048-3378	383	0.977	1.558	74.597	0.036	1.724	0.000	0.000	-2.274	-108.880	3.796	181.753	4324.336	207050.319	0.944	0.939	0.949
*	108-120	2743-3048	382	0.888	6.980	334.196	0.033	1.580	0.000	0.000	-2.387	-114.298	9.334	446.914	4333.67	207497.2334	0.85	0.846	0.854
	100-108	2540-2743	381	0.802	8.231	394.123	0.038	1.819	0.027	1.293	0.000	0.000	8.166	390.990	4341.836	207888.2235	0.803	0.799	0.807
	97-100	2464-2540	380	0.697	4.726	226.279	0.014	0.670	0.010	0.479	0.000	0.000	4.701	225.085	4346.537	208113.3086	0.698	0.695	0.701
	93-97	2362-2464	379	0.692	6.398	306.347	0.018	0.862	0.013	0.622	0.000	0.000	6.368	304.901	4352.905	208418.2101	0.693	0.690	0.696
*	85-93	2159-2362	378	0.501	20.737	992.891	0.034	1.628	0.024	1.149	7.999	382.993	12.68	607.122	4365.585	209025.3318	0.695	0.692	0.698
	81-85	2057-2159	377	0.695	6.341	303.611	0.016	0.766	0.012	0.575	0.000	0.000	6.313	302.268	4371.898	209327.5998	0.696	0.693	0.699
	78-81	1981-2057	376	0.532	7.286	348.867	0.011	0.527	0.008	0.383	0.000	0.000	7.264	347.802	4379.162	209675.402	0.534	0.531	0.537
	75-78	1905-1981	375	0.542	7.136	341.656	0.011	0.527	0.008	0.383	0.000	0.000	7.117	340.764	4386.279	210016.1658	0.543	0.540	0.546
	72-75	1829-1905	374	0.480	8.102	387.906	0.010	0.479	0.008	0.383	0.000	0.000	8.082	386.968	4394.361	210403.134	0.481	0.479	0.483
*	67-72	1702-1829	373	0.384	16.001	766.115	0.016	0.766	0.013	0.622	4.232	202.612	11.74	562.114	4406.101	210965.2482	0.548	0.545	0.551
	63-67	1600-1702	372	0.614	8.029	384.425	0.012	0.575	0.010	0.479	0.000	0.000	8.007	383.377	4414.108	211348.6255	0.614	0.611	0.617
	60-63	1524-1600	371	0.420	9.042	432.914	0.008	0.383	0.007	0.335	0.000	0.000	9.022	431.976	4423.13	211780.6011	0.421	0.419	0.423
	57-60	1448-1524	370	0.401	9.338	447.087	0.008	0.383	0.007	0.335	0.000	0.000	9.317	446.100	4432.447	212226.7015	0.402	0.400	0.404
	53-57	1346-1448	369	0.388	12.713	608.715	0.010	0.479	0.009	0.431	0.000	0.000	12.69	607.600	4445.137	212834.302	0.389	0.387	0.391
*	46-53	1168-1346	368	0.287	25.935	1241.798	0.015	0.718	0.015	0.718	6.145	294.248	19.76	946.114	4464.897	213780.4158	0.456	0.454	0.458
	43-46	1092-1168	367	0.523	7.437	356.078	0.006	0.287	0.006	0.287	0.000	0.000	7.421	355.319	4472.318	214135.7352	0.524	0.521	0.527
	37-43	940-1092	366	0.381	19.278	923.018	0.010	0.479	0.012	0.575	0.000	0.000	19.25	921.695	4491.568	215057.4302	0.382	0.380	0.384
*	25-37	635-940	365	0.243	47.202	2260.052	0.015	0.718	0.022	1.053	3.375	161.604	43.79	2096.676	4535.358	217154.1066	0.297	0.296	0.298
	13-25	330-635	364	0.212	49.134	2352.553	0.009	0.431	0.019	0.910	0.000	0.000	49.09	2350.442	4584.448	219504.5484	0.212	0.211	0.213
*	0-13	0-330	363	0.046	64.423	3084.602	0.003	0.144	0.006	0.287	4.074	195.077	60.34	2889.095	4644.788	222393.6432	0.106	0.105	0.107

Table A-174 Energy Balance Results for RBHT Test 1648J for Time Period 5510 to 5660 seconds

Results for RBHT Test 1648								
Valid Time Period 5510 to 5660 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	1749.4291	5.5187	0.00E+00	0.00E+00	0.00E+00	1.26E-02	5.73E-03
0.25	6.35	1846.6196	5.8253	0.00E+00	0.00E+00	0.00E+00	1.26E-02	5.73E-03
0.50	12.70	1943.8101	6.1319	0.00E+00	0.00E+00	0.00E+00	1.26E-02	5.73E-03
0.75	19.05	2041.0006	6.4385	1.65E-04	1.68E-03	7.64E-04	1.26E-02	5.73E-03
1.00	25.40	2138.1911	6.7451	1.76E-02	1.79E-01	8.13E-02	1.24E-02	5.63E-03
1.25	31.75	2235.3816	7.0517	3.58E-02	3.65E-01	1.66E-01	1.22E-02	5.52E-03
1.50	38.10	2332.5721	7.3583	5.48E-02	5.59E-01	2.54E-01	1.19E-02	5.41E-03
1.75	44.45	2429.7626	7.6649	7.46E-02	7.61E-01	3.45E-01	1.17E-02	5.30E-03
2.00	50.80	2526.9531	7.9715	9.52E-02	9.72E-01	4.41E-01	1.14E-02	5.18E-03
2.25	57.15	2624.1436	8.278	1.17E-01	1.19E+00	5.40E-01	1.12E-02	5.06E-03
2.50	63.50	2721.3341	8.5846	1.39E-01	1.42E+00	6.43E-01	1.09E-02	4.93E-03
2.75	69.85	2818.5246	8.8912	1.62E-01	1.65E+00	7.50E-01	1.06E-02	4.80E-03
3.00	76.20	2915.7151	9.1978	1.86E-01	1.90E+00	8.60E-01	1.03E-02	4.66E-03
3.25	82.55	3012.9056	9.5044	2.11E-01	2.15E+00	9.75E-01	9.97E-03	4.52E-03
3.50	88.90	3110.0961	9.811	2.36E-01	2.41E+00	1.09E+00	9.65E-03	4.38E-03
3.75	95.25	3207.2866	10.118	2.62E-01	2.68E+00	1.21E+00	9.32E-03	4.23E-03
4.00	101.60	3304.4771	10.424	2.89E-01	2.95E+00	1.34E+00	8.97E-03	4.07E-03
4.25	107.95	3401.6676	10.731	3.17E-01	3.24E+00	1.47E+00	8.62E-03	3.91E-03
4.50	114.30	3498.8581	11.037	3.46E-01	3.53E+00	1.60E+00	8.26E-03	3.75E-03
4.75	120.65	3596.0486	11.344	3.75E-01	3.83E+00	1.74E+00	7.89E-03	3.58E-03
5.00	127.00	3693.2391	11.651	4.06E-01	4.14E+00	1.88E+00	7.50E-03	3.40E-03
5.25	133.35	3790.4296	11.957	4.37E-01	4.46E+00	2.02E+00	7.11E-03	3.22E-03
5.50	139.70	3887.6201	12.264	4.69E-01	4.79E+00	2.17E+00	6.71E-03	3.04E-03
5.75	146.05	3984.8106	12.57	5.02E-01	5.12E+00	2.32E+00	6.29E-03	2.85E-03
6.00	152.40	4082.0011	12.877	5.35E-01	5.46E+00	2.48E+00	5.87E-03	2.66E-03
6.25	158.75	4179.1916	13.184	5.70E-01	5.81E+00	2.64E+00	5.43E-03	2.46E-03
6.50	165.10	4276.3821	13.49	6.05E-01	6.17E+00	2.80E+00	4.99E-03	2.26E-03
6.75	171.45	4373.5726	13.797	6.41E-01	6.54E+00	2.97E+00	4.54E-03	2.06E-03
7.00	177.80	4470.7632	14.103	6.78E-01	6.92E+00	3.14E+00	4.07E-03	1.85E-03
7.25	184.15	4567.9537	14.41	7.15E-01	7.30E+00	3.31E+00	3.60E-03	1.63E-03
7.50	190.50	4665.1442	14.717	7.54E-01	7.69E+00	3.49E+00	3.11E-03	1.41E-03
7.75	196.85	4762.3347	15.023	7.93E-01	8.09E+00	3.67E+00	2.62E-03	1.19E-03
8.00	203.20	4859.5252	15.33	8.33E-01	8.50E+00	3.86E+00	2.11E-03	9.58E-04
8.25	209.55	4956.7157	15.636	8.74E-01	8.92E+00	4.05E+00	1.59E-03	7.23E-04
8.50	215.90	5053.9062	15.943	9.15E-01	9.34E+00	4.24E+00	1.07E-03	4.85E-04
8.75	222.25	5151.0967	16.25	9.58E-01	9.78E+00	4.43E+00	5.33E-04	2.42E-04
9.00	228.60	5248.2872	16.556	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
9.25	234.95	4956.7157	15.636	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
9.50	241.30	4665.1442	14.717	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
9.75	247.65	4373.5726	13.797	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
10.00	254.00	4082.0011	12.877	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
10.25	260.35	3790.4296	11.957	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
10.50	266.70	3498.8581	11.037	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
10.75	273.05	3207.2866	10.118	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
11.00	279.40	2915.7151	9.1978	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
11.25	285.75	2624.1436	8.278	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
11.50	292.10	2332.5721	7.3583	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
11.75	298.45	2041.0006	6.4385	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00
12.00	304.80	1749.4291	5.5187	1.00E+00	1.02E+01	4.63E+00	0.00E+00	0.00E+00

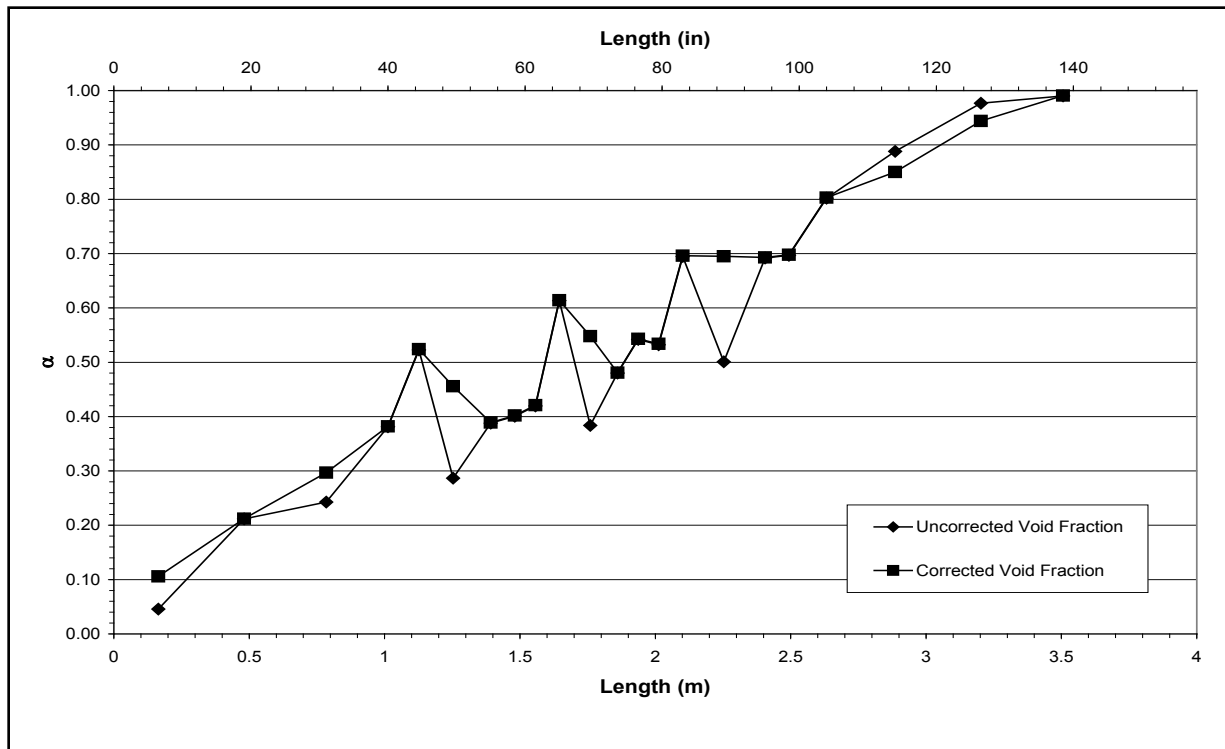


Figure A-435 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1648J for Time Period 5510 to 5660 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1651-A

Test Conditions

Date: 7/1/2003

Steady-state time window: 2985 – 3060 seconds

Inlet flow rate: 3.071 cm/sec (1.209 in./sec)

Inlet mass flow rate: 0.145 kg/sec (0.320 lbm/sec)

Inlet flow temperature: 348.2 K (167.0 °F)

Upper plenum pressure: 271.7 kPa (39.4 psia)

Bundle power: 72.27 kW

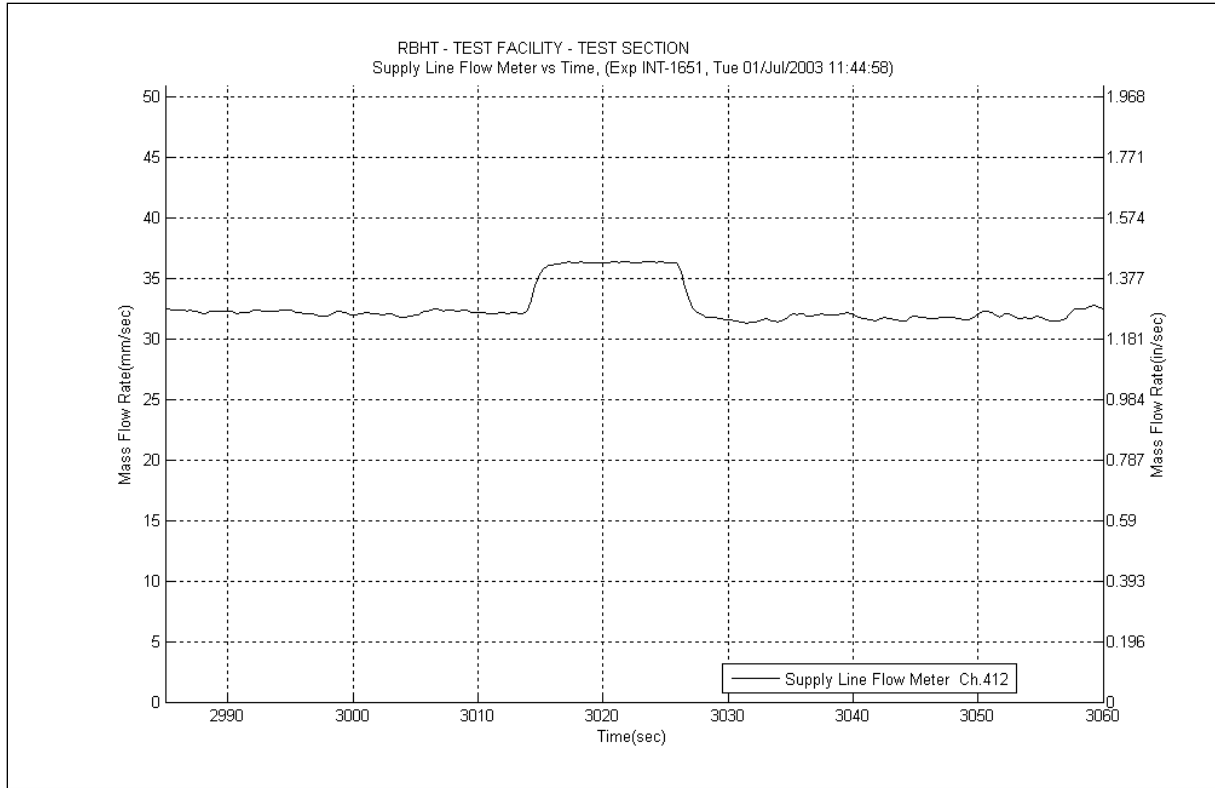


Figure A-436 Inlet Flow Plot for Experiment 1651A

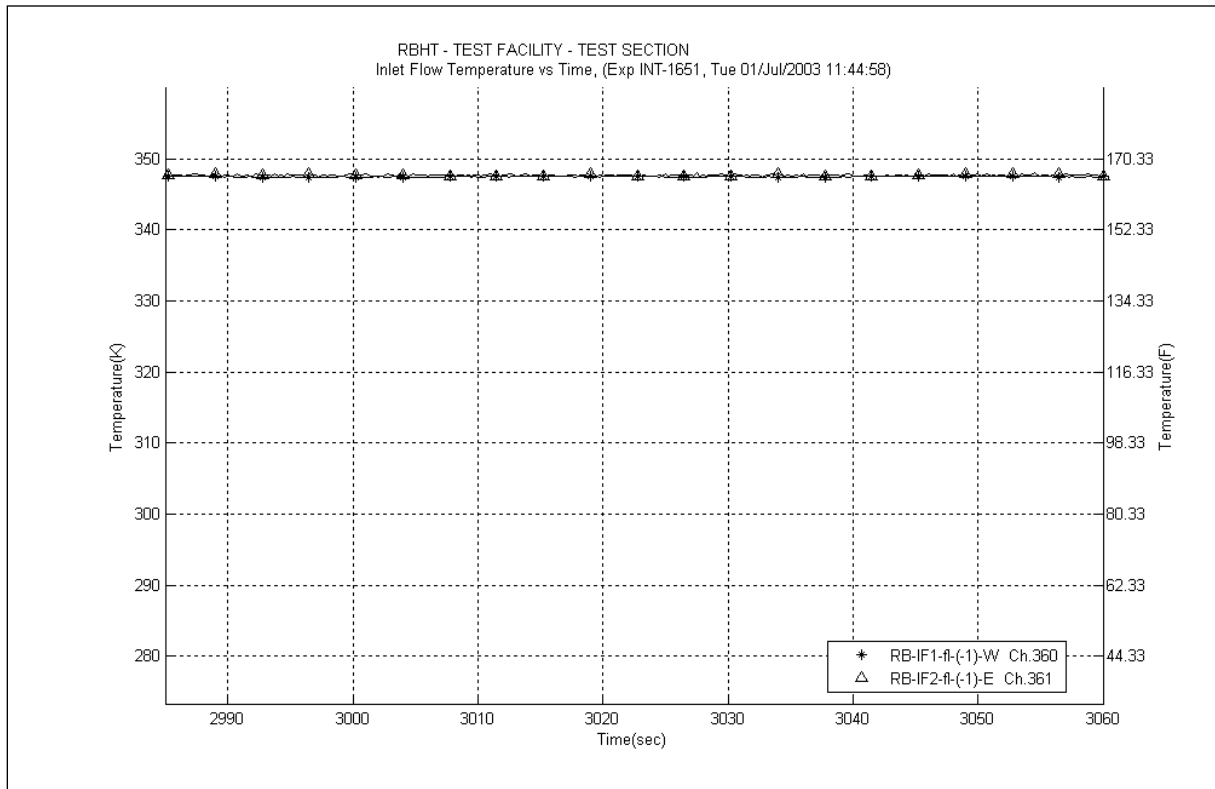


Figure A-437 Inlet Temperature Plot for Experiment 1651A

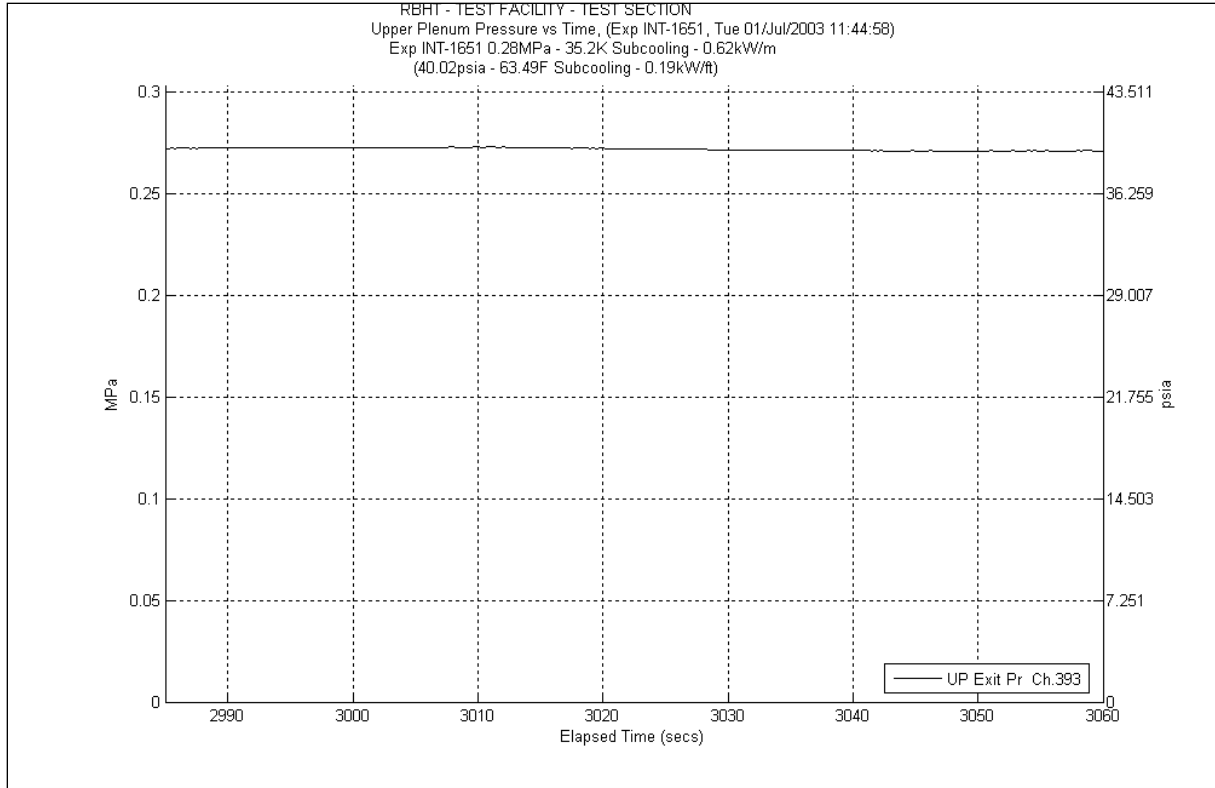


Figure A-438 System Pressure Plot for Experiment 1651A

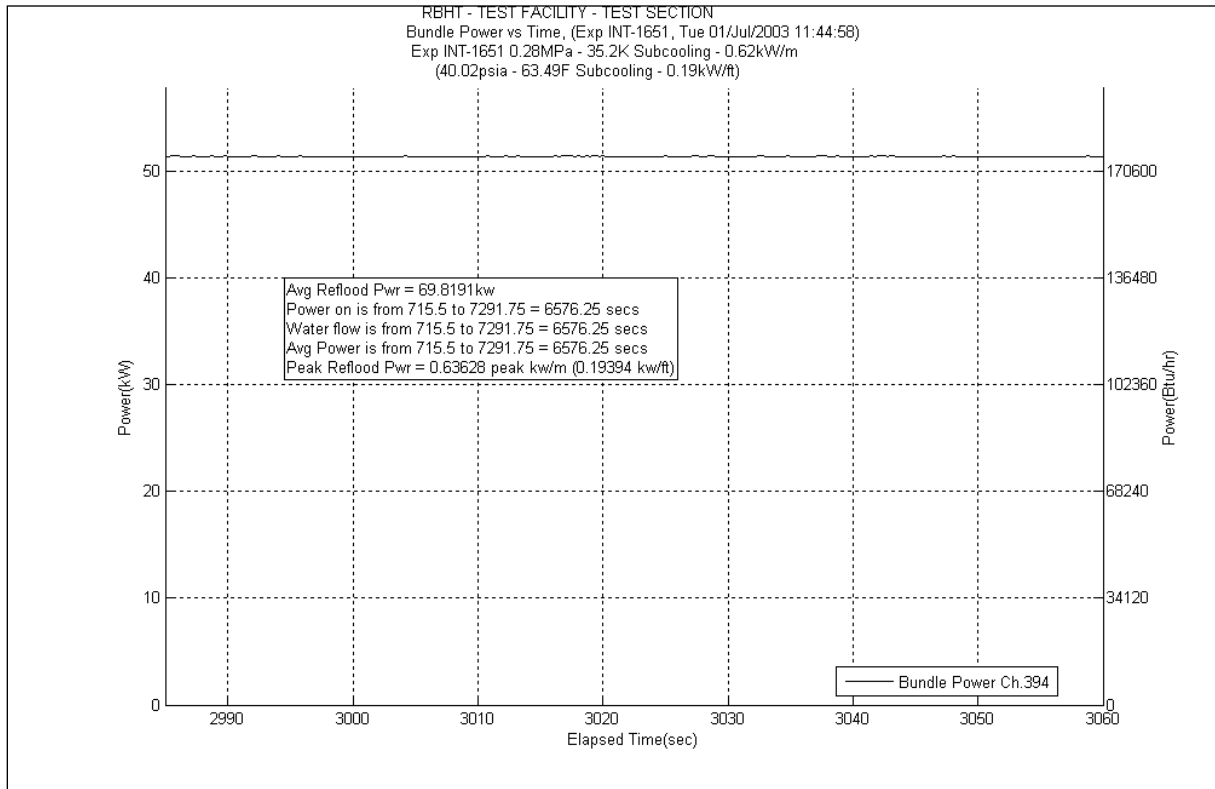


Figure A-439 Bundle Power Plot for Experiment 1651A

Table A-175 Data Results for RBHT Test 1651A for Time Period 2985 to 3060 seconds

Results for RBHT Test 1651
Valid Time Period 2985 to 3060 seconds
Collapsed Liquid Level = 116.760 inches = 2965.71 mm
(Z_{osv}) Onset of Significant Void = 58.5 inches = 1486 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.466	30.526	1461.612	0.481	23.030	0.139	6.655	0.000	0.000	29.9	1431.620	5789.9	277221.9	0.477	0.475	0.479
*	120-133	3048-3378	383	0.541	30.973	1482.996	0.513	24.563	0.248	11.874	-5.738	-274.736	35.95	1721.295	5825.85	278943.1952	0.467	0.465	0.469
*	108-120	2743-3048	382	0.423	35.943	1720.962	0.397	19.008	0.310	14.843	0.916	43.860	34.32	1643.250	5860.17	280586.4457	0.449	0.447	0.451
	100-108	2540-2743	381	0.429	23.708	1135.124	0.211	10.103	0.227	10.869	0.000	0.000	23.26	1113.695	5883.43	281700.1404	0.44	0.438	0.442
	97-100	2464-2540	380	0.320	10.589	507.014	0.066	3.160	0.082	3.926	0.000	0.000	10.44	499.870	5893.87	282200.0103	0.33	0.328	0.332
	93-97	2362-2464	379	0.322	14.090	674.609	0.077	3.687	0.107	5.123	0.000	0.000	13.9	665.536	5907.77	282865.5459	0.331	0.329	0.333
*	85-93	2159-2362	378	0.177	34.198	1637.413	0.113	5.410	0.205	9.815	0.940	45.011	32.94	1577.176	5940.71	284442.7216	0.207	0.206	0.208
	81-85	2057-2159	377	0.077	19.174	918.045	0.031	1.484	0.098	4.692	0.000	0.000	19.04	911.640	5959.75	285354.3617	0.083	0.079	0.087
	78-81	1981-2057	376	0.060	14.645	701.215	0.010	0.479	0.047	2.250	0.000	0.000	14.58	698.094	5974.33	286052.4558	0.064	0.061	0.067
	75-78	1905-1981	375	0.063	14.598	698.978	0.001	0.048	0.000	0.000	0.000	0.000	14.59	698.573	5988.92	286751.0288	0.063	0.060	0.066
	72-75	1829-1905	374	0.061	14.624	700.221	0.001	0.048	0.000	0.000	0.000	0.000	14.62	700.009	6003.54	287451.0381	0.061	0.058	0.064
*	67-72	1702-1829	373	0.043	24.850	1189.828	0.002	0.096	0.000	0.000	0.228	10.921	24.62	1178.812	6028.16	288629.85	0.051	0.048	0.054
	63-67	1600-1702	372	0.042	19.911	953.355	0.002	0.096	0.000	0.000	0.000	0.000	19.9	952.817	6048.06	289582.6672	0.042	0.040	0.044
	60-63	1524-1600	371	0.019	15.284	731.800	0.001	0.048	0.000	0.000	0.000	0.000	15.28	731.610	6063.34	290314.2775	0.019	0.018	0.020
	57-60	1448-1524	370	0.055	14.728	705.194	0.001	0.048	0.000	0.000	0.000	0.000	14.72	704.797	6078.06	291019.0749	0.055	0.052	0.058
	53-57	1346-1448	369	0.042	19.896	952.609	0.002	0.096	0.000	0.000	0.000	0.000	19.89	952.338	6097.95	291971.4132	0.042	0.040	0.044
*	46-53	1168-1346	368	0.042	34.826	1667.500	0.003	0.144	0.000	0.000	-0.187	-8.931	35.01	1676.288	6132.96	293647.701	0.037	0.035	0.039
	43-46	1092-1168	367	0.031	15.097	722.849	0.001	0.048	0.000	0.000	0.000	0.000	15.09	722.513	6148.05	294370.214	0.031	0.029	0.033
	37-43	940-1092	366	0.032	30.173	1444.703	0.003	0.144	0.000	0.000	0.000	0.000	30.16	1444.069	6178.21	295814.2826	0.032	0.030	0.034
*	25-37	635-940	365	0.026	60.700	2906.314	0.006	0.287	0.000	0.000	0.234	11.187	60.46	2894.840	6238.67	298709.1229	0.03	0.029	0.032
	13-25	330-635	364	0.027	60.627	2902.833	0.006	0.287	0.000	0.000	0.000	0.000	60.6	2901.544	6299.27	301610.6665	0.027	0.026	0.028
*	0-13	0-330	363	0.020	66.189	3169.146	0.006	0.287	0.000	0.000	-0.387	-18.530	66.57	3187.389	6365.84	304798.0552	0.014	0.013	0.015

Table A-176 Energy Balance Results for RBHT Test 1651A for Time Period 2985 to 3060 seconds

Results for RBHT Test 1651 Valid Time Period 2985 to 3060 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2335.7704	7.3684	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
0.25	6.35	2465.5354	7.7777	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
0.50	12.70	2595.3004	8.1871	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
0.75	19.05	2725.0654	8.5964	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
1.00	25.40	2854.8305	9.0058	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
1.25	31.75	2984.5955	9.4151	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
1.50	38.10	3114.3605	9.8245	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
1.75	44.45	3244.1255	10.234	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
2.00	50.80	3373.8905	10.643	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
2.25	57.15	3503.6556	11.053	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
2.50	63.50	3633.4206	11.462	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
2.75	69.85	3763.1856	11.871	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
3.00	76.20	3892.9506	12.281	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
3.25	82.55	4022.7156	12.69	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
3.50	88.90	4152.4807	13.099	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
3.75	95.25	4282.2457	13.509	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
4.00	101.60	4412.0107	13.918	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
4.25	107.95	4541.7757	14.327	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
4.50	114.30	4671.5407	14.737	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
4.75	120.65	4801.3058	15.146	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
5.00	127.00	4931.0708	15.555	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
5.25	133.35	5060.8358	15.965	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
5.50	139.70	5190.6008	16.374	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
5.75	146.05	5320.3659	16.783	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
6.00	152.40	5450.1309	17.193	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
6.25	158.75	5579.8959	17.602	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
6.50	165.10	5709.6609	18.012	0.00E+00	0.00E+00	0.00E+00	1.05E-01	4.74E-02
6.75	171.45	5839.4259	18.421	3.86E-03	2.47E-01	1.12E-01	1.04E-01	4.73E-02
7.00	177.80	5969.191	18.83	9.92E-03	6.34E-01	2.88E-01	1.04E-01	4.70E-02
7.25	184.15	6098.956	19.24	1.61E-02	1.03E+00	4.67E-01	1.03E-01	4.67E-02
7.50	190.50	6228.721	19.649	2.24E-02	1.43E+00	6.51E-01	1.02E-01	4.64E-02
7.75	196.85	6358.486	20.058	2.89E-02	1.85E+00	8.38E-01	1.02E-01	4.61E-02
8.00	203.20	6488.251	20.468	3.55E-02	2.27E+00	1.03E+00	1.01E-01	4.58E-02
8.25	209.55	6618.0161	20.877	4.22E-02	2.70E+00	1.22E+00	1.00E-01	4.54E-02
8.50	215.90	6747.7811	21.286	4.91E-02	3.14E+00	1.42E+00	9.94E-02	4.51E-02
8.75	222.25	6877.5461	21.696	5.60E-02	3.58E+00	1.63E+00	9.87E-02	4.48E-02
9.00	228.60	7007.3111	22.105	6.32E-02	4.04E+00	1.83E+00	9.80E-02	4.44E-02
9.25	234.95	6618.0161	20.877	7.02E-02	4.49E+00	2.04E+00	9.72E-02	4.41E-02
9.50	241.30	6228.721	19.649	7.67E-02	4.91E+00	2.23E+00	9.66E-02	4.38E-02
9.75	247.65	5839.4259	18.421	8.29E-02	5.30E+00	2.41E+00	9.59E-02	4.35E-02
10.00	254.00	5450.1309	17.193	8.87E-02	5.68E+00	2.57E+00	9.53E-02	4.32E-02
10.25	260.35	5060.8358	15.965	9.41E-02	6.02E+00	2.73E+00	9.47E-02	4.30E-02
10.50	266.70	4671.5407	14.737	9.91E-02	6.34E+00	2.88E+00	9.42E-02	4.27E-02
10.75	273.05	4282.2457	13.509	1.04E-01	6.63E+00	3.01E+00	9.37E-02	4.25E-02
11.00	279.40	3892.9506	12.281	1.08E-01	6.90E+00	3.13E+00	9.33E-02	4.23E-02
11.25	285.75	3503.6556	11.053	1.12E-01	7.14E+00	3.24E+00	9.29E-02	4.21E-02
11.50	292.10	3114.3605	9.8245	1.15E-01	7.36E+00	3.34E+00	9.25E-02	4.20E-02
11.75	298.45	2725.0654	8.5964	1.18E-01	7.55E+00	3.43E+00	9.22E-02	4.18E-02
12.00	304.80	2335.7704	7.3684	1.21E-01	7.72E+00	3.50E+00	9.20E-02	4.17E-02

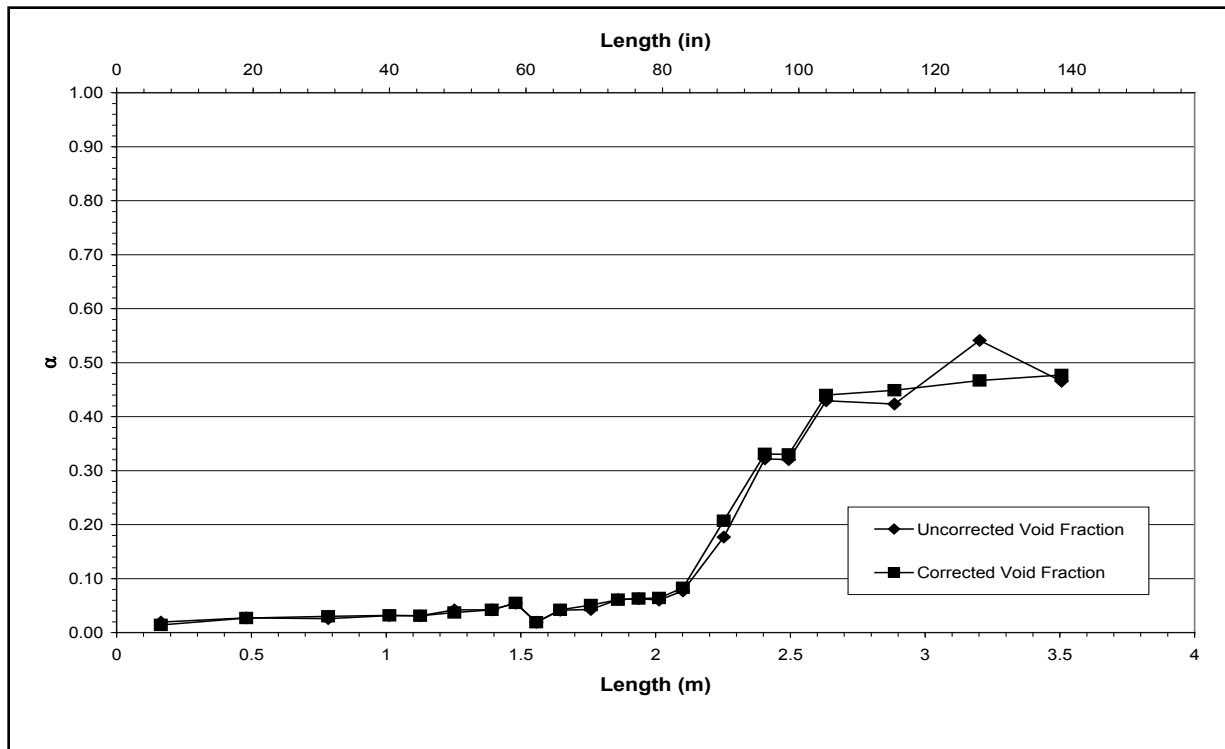


Figure A-440 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1651A for Time Period 2985 to 3060 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1651-B

Test Conditions

Date: 7/1/2003

Steady-state time window: 3270 – 3322 seconds

Inlet flow rate: 3.048 cm/sec (1.200 in./sec)

Inlet mass flow rate: 0.144 kg/sec (0.317 lbm/sec)

Inlet flow temperature: 348.2 K (167.0 °F)

Upper plenum pressure: 271.7 kPa (39.4 psia)

Bundle power: 72.27 kW

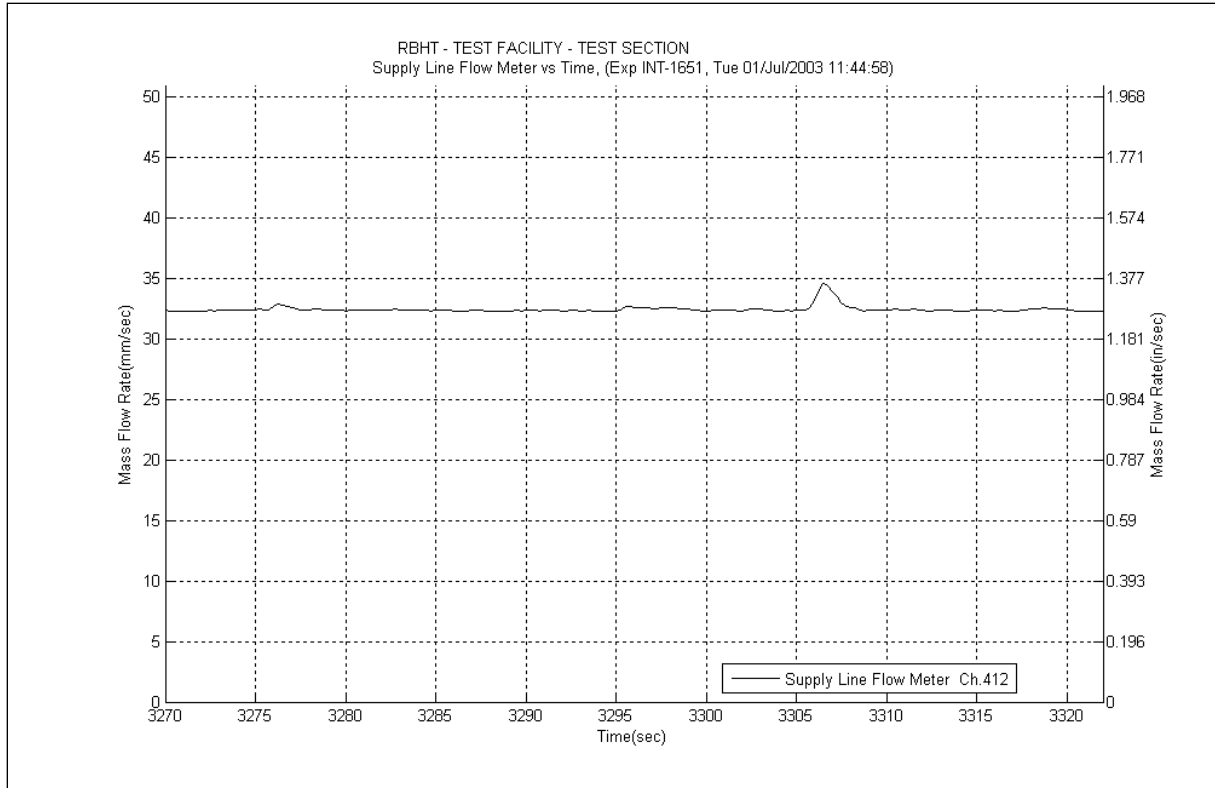


Figure A-441 Inlet Flow Plot for Experiment 1651B

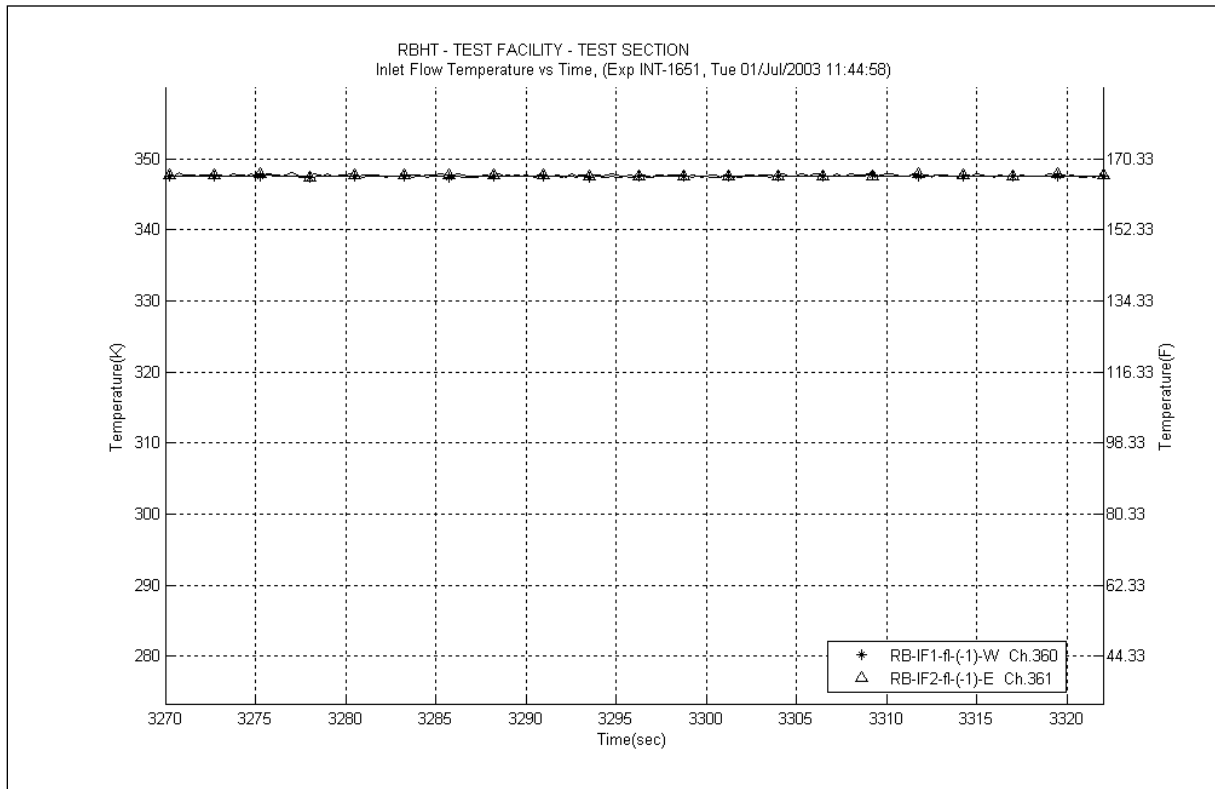


Figure A-442 Inlet Temperature Plot for Experiment 1651B

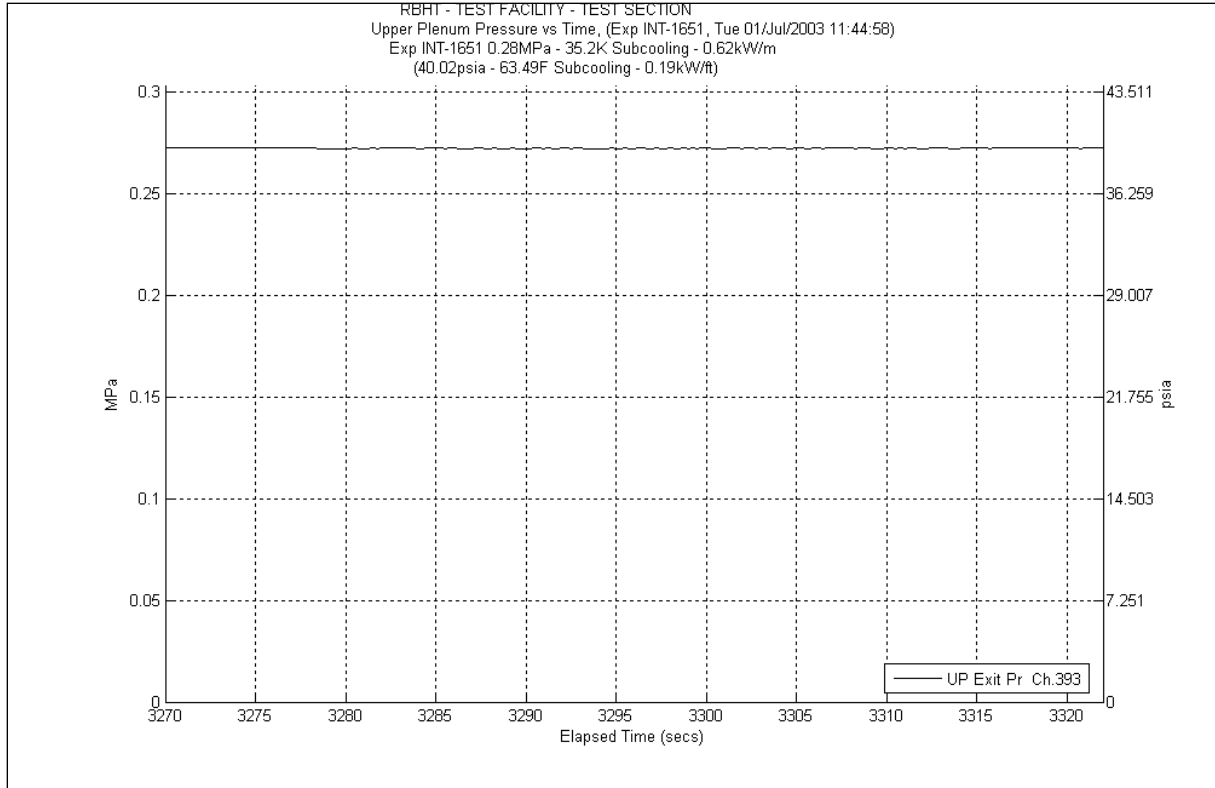


Figure A-443 System Pressure Plot for Experiment 1651B

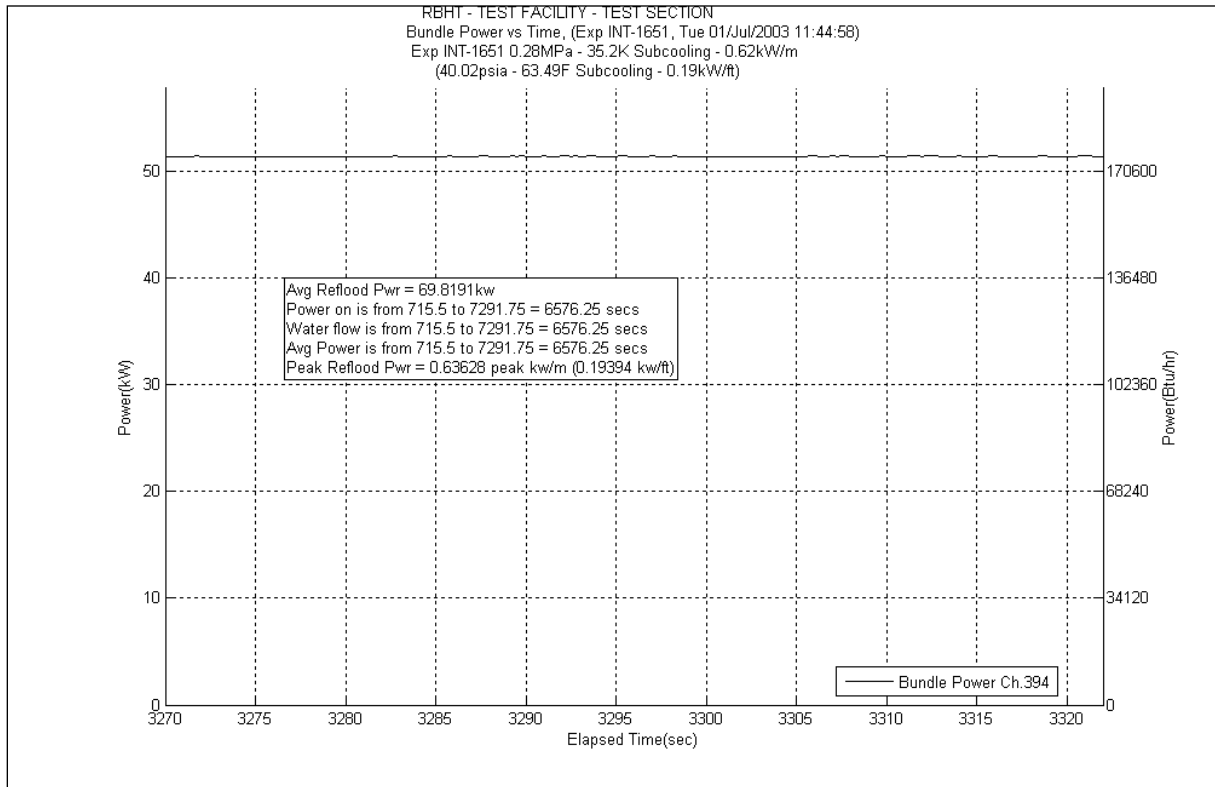


Figure A-444 Bundle Power Plot for Experiment 1651B

Table A-177 Data Results for RBHT Test 1651B for Time Period 3270 to 3322 seconds

Results for RBHT Test 1651
Valid Time Period 3270 to 3322 seconds
Collapsed Liquid Level = 116.823 inches = 2967.31 mm
(Z_{osv}) Onset of Significant Void = 58.5 inches = 1486 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.465	30.537	1462.109	0.478	22.887	0.138	6.607	0.000	0.000	29.91	1432.098	5789.91	277222.3788	0.476	0.474	0.478
*	120-133	3048-3378	383	0.540	31.067	1487.472	0.511	24.467	0.246	11.779	-5.690	-272.463	36	1723.689	5825.91	278946.0681	0.467	0.465	0.469
*	108-120	2743-3048	382	0.422	36.011	1724.194	0.396	18.961	0.307	14.699	0.868	41.539	34.44	1648.996	5860.35	280595.0641	0.447	0.445	0.449
	100-108	2540-2743	381	0.427	23.806	1139.848	0.211	10.103	0.225	10.773	0.000	0.000	23.36	1118.483	5883.71	281713.5469	0.438	0.436	0.440
	97-100	2464-2540	380	0.320	10.600	507.511	0.066	3.160	0.081	3.878	0.000	0.000	10.45	500.349	5894.16	282213.8956	0.329	0.327	0.331
	93-97	2362-2464	379	0.316	14.209	680.328	0.078	3.735	0.106	5.075	0.000	0.000	14.02	671.281	5908.18	282885.1768	0.325	0.323	0.327
*	85-93	2159-2362	378	0.171	34.458	1649.846	0.114	5.458	0.204	9.768	1.050	50.262	33.09	1584.358	5941.27	284469.5345	0.203	0.202	0.204
	81-85	2057-2159	377	0.076	19.205	919.537	0.032	1.532	0.097	4.644	0.000	0.000	19.07	913.077	5960.34	285382.611	0.082	0.078	0.086
	78-81	1981-2057	376	0.060	14.650	701.464	0.011	0.527	0.056	2.681	0.000	0.000	14.58	698.094	5974.92	286080.7052	0.064	0.061	0.067
	75-78	1905-1981	375	0.063	14.598	698.978	0.001	0.048	0.000	0.000	0.000	0.000	14.59	698.573	5989.51	286779.2781	0.063	0.060	0.066
	72-75	1829-1905	374	0.061	14.635	700.718	0.001	0.048	0.000	0.000	0.000	0.000	14.63	700.488	6004.14	287479.7663	0.061	0.058	0.064
*	67-72	1702-1829	373	0.043	24.860	1190.326	0.002	0.096	0.000	0.000	0.228	10.939	24.63	1179.291	6028.77	288659.057	0.051	0.048	0.054
	63-67	1600-1702	372	0.041	19.922	953.852	0.002	0.096	0.000	0.000	0.000	0.000	19.91	953.296	6048.68	289612.3529	0.041	0.039	0.043
	60-63	1524-1600	371	0.018	15.300	732.546	0.001	0.048	0.000	0.000	0.000	0.000	15.29	732.089	6063.97	290344.442	0.018	0.017	0.019
	57-60	1448-1524	370	0.054	14.733	705.443	0.001	0.048	0.000	0.000	0.000	0.000	14.73	705.276	6078.7	291049.7182	0.054	0.051	0.057
	53-57	1346-1448	369	0.042	19.896	952.609	0.002	0.096	0.000	0.000	0.000	0.000	19.89	952.338	6098.59	292002.0565	0.042	0.040	0.044
*	46-53	1168-1346	368	0.042	34.832	1667.749	0.003	0.144	0.000	0.000	-0.181	-8.682	35.01	1676.288	6133.6	293678.3443	0.037	0.035	0.039
	43-46	1092-1168	367	0.031	15.102	723.097	0.001	0.048	0.000	0.000	0.000	0.000	15.09	722.513	6148.69	294400.8574	0.031	0.029	0.033
	37-43	940-1092	366	0.031	30.184	1445.200	0.003	0.144	0.000	0.000	0.000	0.000	30.17	1444.547	6178.86	295845.4048	0.031	0.029	0.033
*	25-37	635-940	365	0.026	60.694	2906.066	0.006	0.287	0.000	0.000	0.218	10.459	60.47	2895.319	6239.33	298740.7239	0.029	0.028	0.030
	13-25	330-635	364	0.027	60.627	2902.833	0.006	0.287	0.000	0.000	0.000	0.000	60.6	2901.544	6299.93	301642.2675	0.027	0.026	0.028
*	0-13	0-330	363	0.020	66.189	3169.146	0.006	0.287	0.000	0.000	-0.387	-18.530	66.57	3187.389	6366.5	304829.6562	0.014	0.013	0.015

Table A-178 Energy Balance Results for RBHT Test 1651B for Time Period 3270 to 3322 seconds

Results for RBHT Test 1651 Valid Time Period 3270 to 3322 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2334.8251	7.3654	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
0.25	6.35	2464.5376	7.7746	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
0.50	12.70	2594.2501	8.1837	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
0.75	19.05	2723.9626	8.5929	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
1.00	25.40	2853.6751	9.0021	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
1.25	31.75	2983.3876	9.4113	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
1.50	38.10	3113.1001	9.8205	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
1.75	44.45	3242.8126	10.23	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
2.00	50.80	3372.5251	10.639	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
2.25	57.15	3502.2376	11.048	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
2.50	63.50	3631.9501	11.457	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
2.75	69.85	3761.6626	11.866	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
3.00	76.20	3891.3751	12.276	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
3.25	82.55	4021.0876	12.685	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
3.50	88.90	4150.8001	13.094	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
3.75	95.25	4280.5126	13.503	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
4.00	101.60	4410.2251	13.912	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
4.25	107.95	4539.9376	14.322	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
4.50	114.30	4669.6501	14.731	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
4.75	120.65	4799.3626	15.14	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
5.00	127.00	4929.0751	15.549	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
5.25	133.35	5058.7877	15.958	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
5.50	139.70	5188.5002	16.367	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
5.75	146.05	5318.2127	16.777	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
6.00	152.40	5447.9252	17.186	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
6.25	158.75	5577.6377	17.595	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
6.50	165.10	5707.3502	18.004	0.00E+00	0.00E+00	0.00E+00	1.04E-01	4.71E-02
6.75	171.45	5837.0627	18.413	4.67E-03	2.96E-01	1.34E-01	1.03E-01	4.69E-02
7.00	177.80	5966.7752	18.823	1.08E-02	6.84E-01	3.10E-01	1.03E-01	4.66E-02
7.25	184.15	6096.4877	19.232	1.70E-02	1.08E+00	4.90E-01	1.02E-01	4.63E-02
7.50	190.50	6226.2002	19.641	2.34E-02	1.48E+00	6.73E-01	1.01E-01	4.60E-02
7.75	196.85	6355.9127	20.05	2.99E-02	1.90E+00	8.60E-01	1.01E-01	4.57E-02
8.00	203.20	6485.6252	20.459	3.65E-02	2.32E+00	1.05E+00	1.00E-01	4.54E-02
8.25	209.55	6615.3377	20.869	4.33E-02	2.75E+00	1.25E+00	9.93E-02	4.50E-02
8.50	215.90	6745.0502	21.278	5.02E-02	3.19E+00	1.44E+00	9.86E-02	4.47E-02
8.75	222.25	6874.7627	21.687	5.72E-02	3.63E+00	1.65E+00	9.79E-02	4.44E-02
9.00	228.60	7004.4752	22.096	6.44E-02	4.09E+00	1.85E+00	9.71E-02	4.40E-02
9.25	234.95	6615.3377	20.869	7.14E-02	4.53E+00	2.06E+00	9.64E-02	4.37E-02
9.50	241.30	6226.2002	19.641	7.81E-02	4.96E+00	2.25E+00	9.57E-02	4.34E-02
9.75	247.65	5837.0627	18.413	8.43E-02	5.35E+00	2.43E+00	9.50E-02	4.31E-02
10.00	254.00	5447.9252	17.186	9.01E-02	5.72E+00	2.59E+00	9.44E-02	4.28E-02
10.25	260.35	5058.7877	15.958	9.56E-02	6.07E+00	2.75E+00	9.39E-02	4.26E-02
10.50	266.70	4669.6501	14.731	1.01E-01	6.38E+00	2.90E+00	9.34E-02	4.23E-02
10.75	273.05	4280.5126	13.503	1.05E-01	6.68E+00	3.03E+00	9.29E-02	4.21E-02
11.00	279.40	3891.3751	12.276	1.10E-01	6.95E+00	3.15E+00	9.24E-02	4.19E-02
11.25	285.75	3502.2376	11.048	1.13E-01	7.19E+00	3.26E+00	9.20E-02	4.17E-02
11.50	292.10	3113.1001	9.8205	1.17E-01	7.41E+00	3.36E+00	9.17E-02	4.16E-02
11.75	298.45	2723.9626	8.5929	1.20E-01	7.60E+00	3.45E+00	9.14E-02	4.14E-02
12.00	304.80	2334.8251	7.3654	1.22E-01	7.76E+00	3.52E+00	9.11E-02	4.13E-02

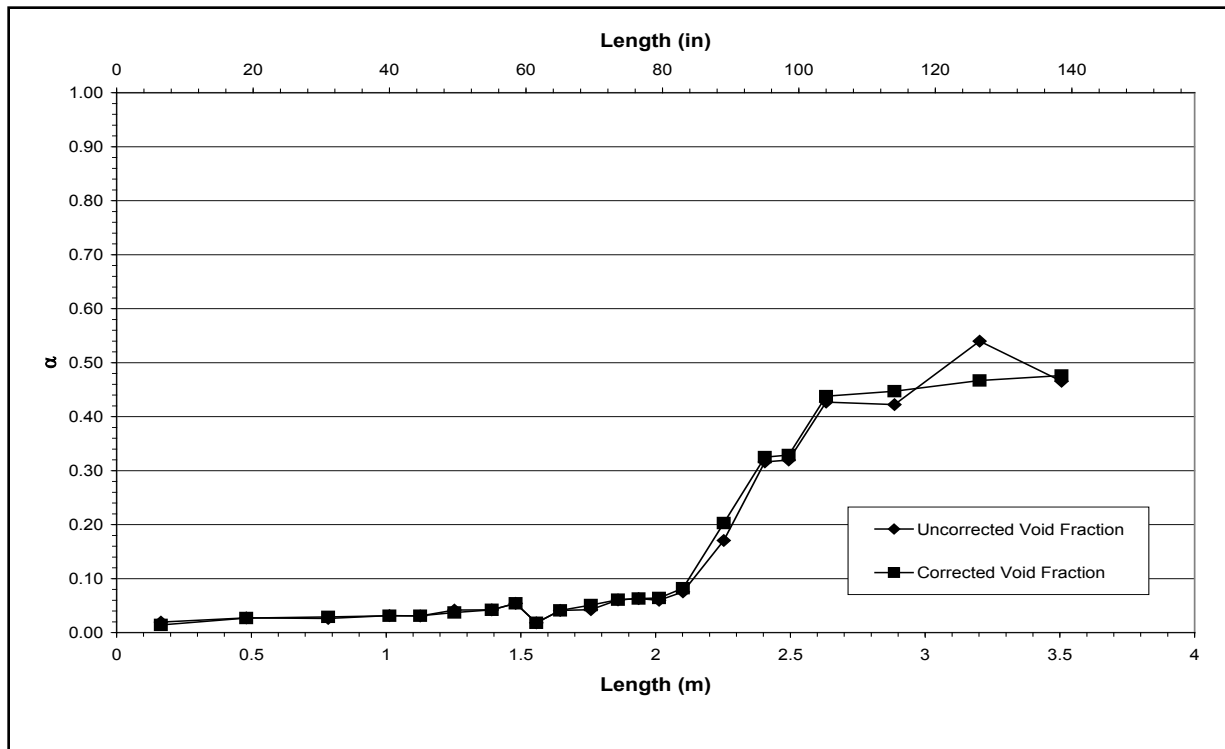


Figure A-445 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1651B for Time Period 3270 to 3322 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1651-C

Test Conditions

Date: 7/1/2003

Steady-state time window: 3520 – 3610 seconds

Inlet flow rate: 3.028 cm/sec (1.192 in./sec)

Inlet mass flow rate: 0.143 kg/sec (0.315 lbm/sec)

Inlet flow temperature: 348.2 K (167.0 °F)

Upper plenum pressure: 271.7 kPa (39.4 psia)

Bundle power: 72.27 kW

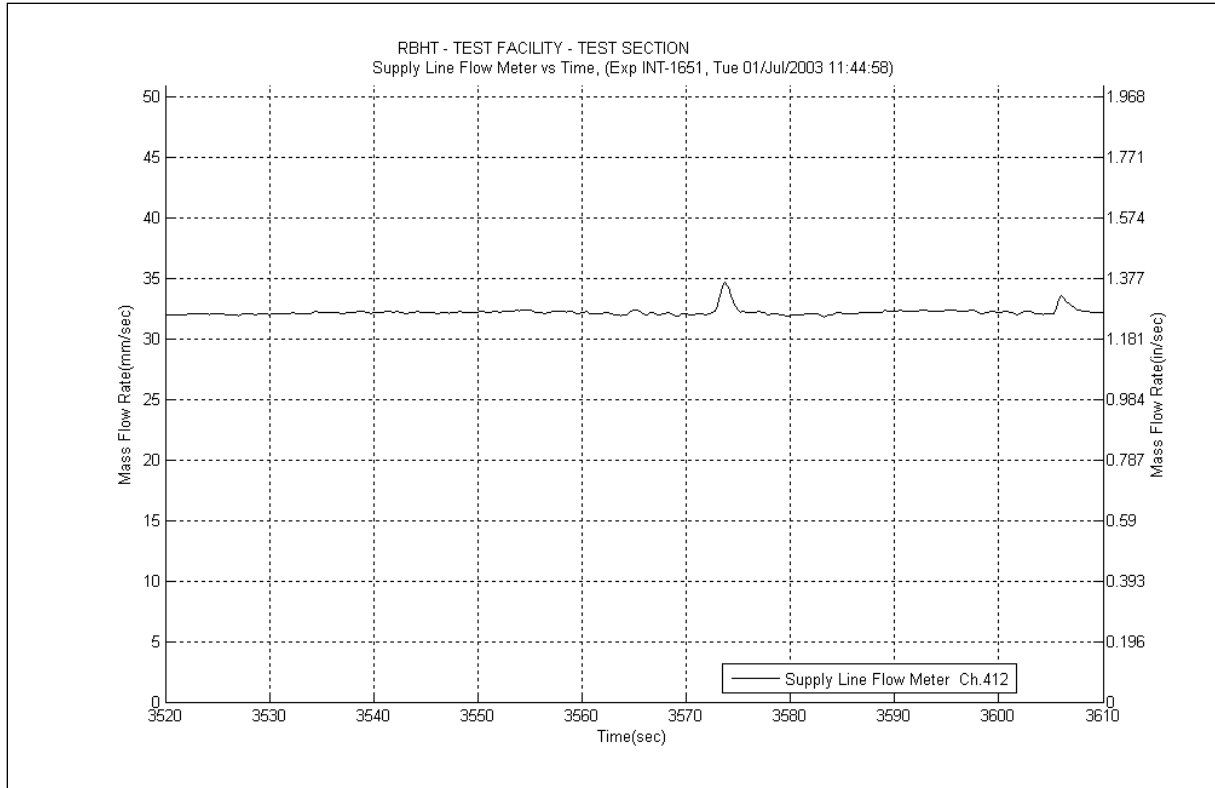


Figure A-446 Inlet Flow Plot for Experiment 1651C

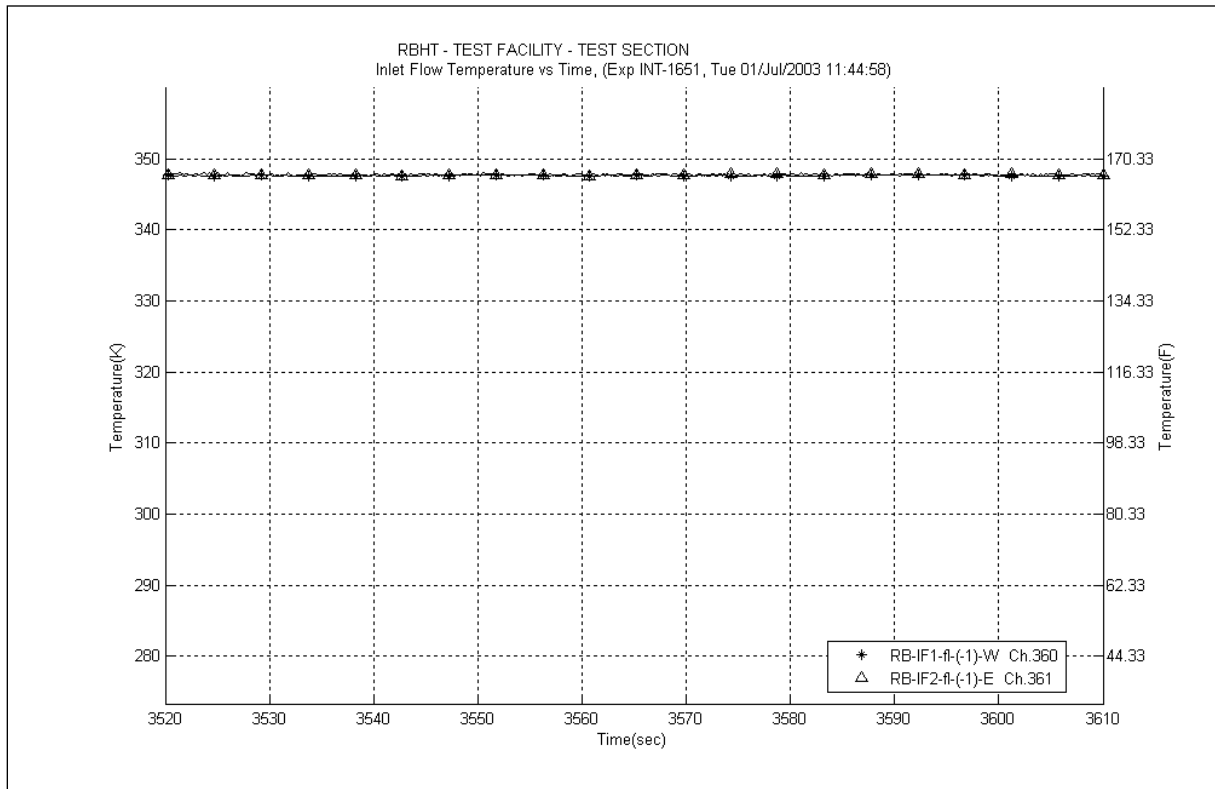


Figure A-447 Inlet Temperature Plot for Experiment 1651C

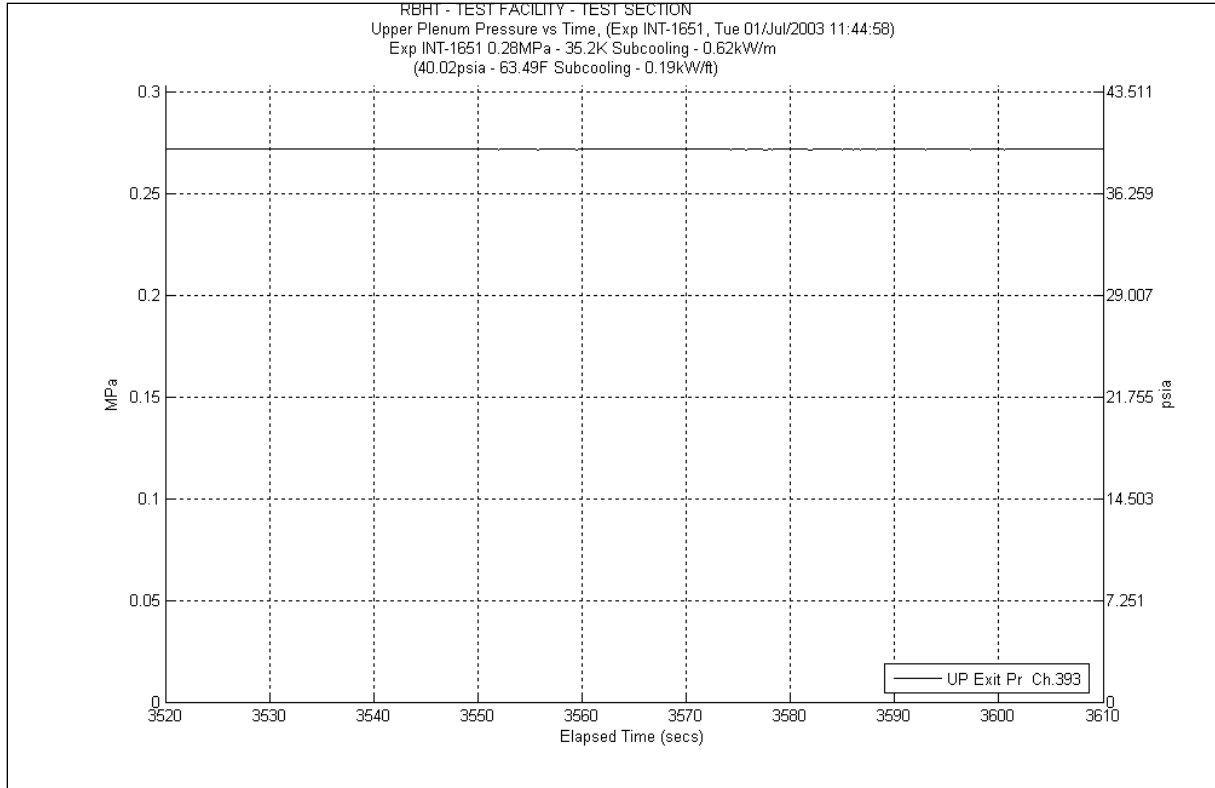


Figure A-448 System Pressure Plot for Experiment 1651C

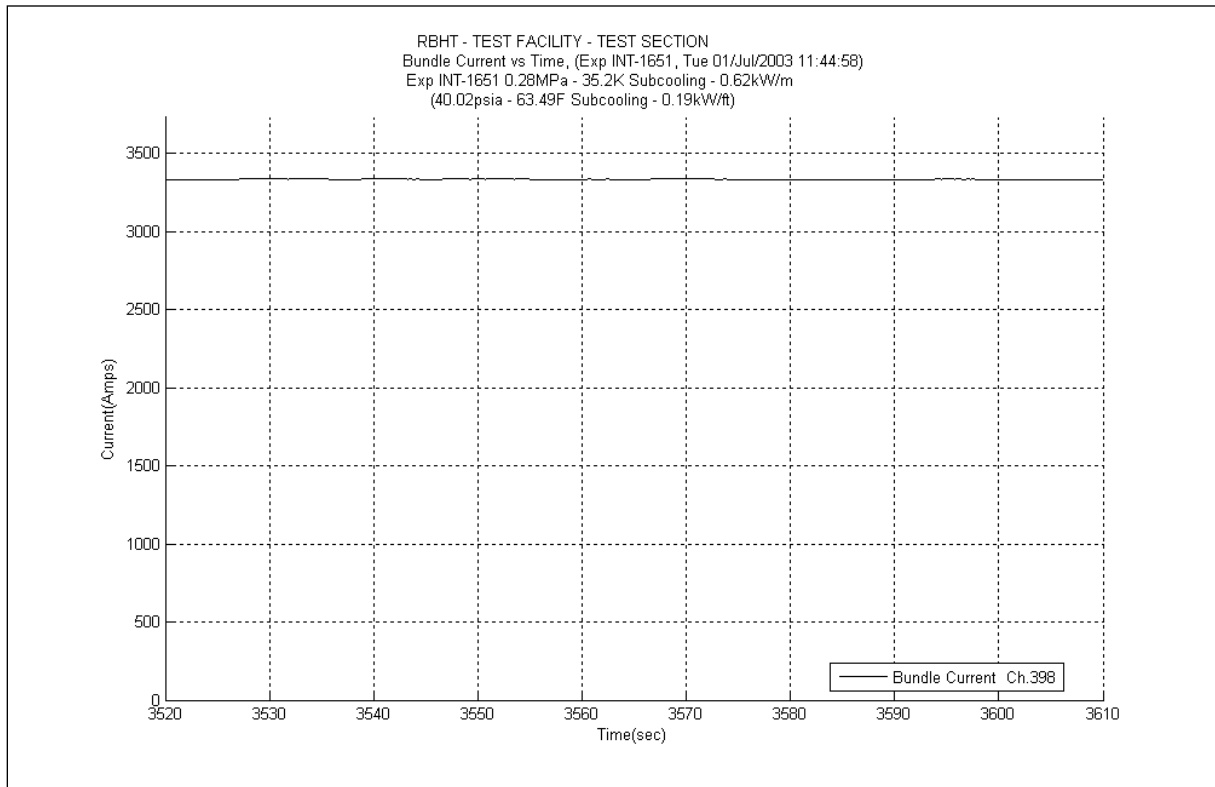


Figure A-449 Bundle Power Plot for Experiment 1651C

Table A-179 Data Results for RBHT Test 1651C for Time Period 3520 to 3610 seconds

Results for RBHT Test 1651
Valid Time Period 3520 to 3610 seconds
Collapsed Liquid Level = 116.333 inches = 2954.87 mm
(Z_{OSL}) Onset of Significant Void = 58.5 inches = 1486 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{acccl} (lbf/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.467	30.464	1458.628	0.477	22.839	0.137	6.560	0.000	0.000	29.84	1428.747	5789.84	277219.0272	0.478	0.476	0.480
*	120-133	3048-3378	383	0.539	31.124	1490.207	0.510	24.419	0.244	11.683	-5.550	-265.753	35.92	1719.859	5825.76	278938.886	0.468	0.466	0.470
*	108-120	2743-3048	382	0.425	35.860	1716.983	0.395	18.913	0.305	14.603	0.790	37.823	34.37	1645.644	5860.13	280584.5305	0.448	0.446	0.450
	100-108	2540-2743	381	0.428	23.765	1137.859	0.211	10.103	0.223	10.677	0.000	0.000	23.32	1116.568	5883.45	281701.098	0.439	0.437	0.441
	97-100	2464-2540	380	0.325	10.511	503.284	0.067	3.208	0.081	3.878	0.000	0.000	10.36	496.039	5893.81	282197.1375	0.335	0.333	0.337
	93-97	2362-2464	379	0.324	14.043	672.371	0.078	3.735	0.105	5.027	0.000	0.000	13.85	663.142	5907.66	282860.2791	0.333	0.331	0.335
*	85-93	2159-2362	378	0.183	33.949	1625.477	0.116	5.554	0.202	9.672	0.741	35.470	32.89	1574.782	5940.55	284435.0607	0.208	0.207	0.209
	81-85	2057-2159	377	0.077	19.174	918.045	0.034	1.628	0.097	4.644	0.000	0.000	19.04	911.640	5959.59	285346.7008	0.083	0.079	0.087
	78-81	1981-2057	376	0.060	14.640	700.967	0.012	0.575	0.066	3.160	0.000	0.000	14.56	697.137	5974.15	286043.8374	0.065	0.062	0.068
	75-78	1905-1981	375	0.063	14.593	698.729	0.001	0.048	0.000	0.000	0.000	0.000	14.59	698.573	5988.74	286742.4103	0.063	0.060	0.066
	72-75	1829-1905	374	0.061	14.624	700.221	0.001	0.048	0.000	0.000	0.000	0.000	14.62	700.009	6003.36	287442.4197	0.061	0.058	0.064
*	67-72	1702-1829	373	0.043	24.845	1189.580	0.002	0.096	0.000	0.000	0.213	10.193	24.63	1179.291	6027.99	288621.7104	0.051	0.048	0.054
	63-67	1600-1702	372	0.041	19.916	953.603	0.002	0.096	0.000	0.000	0.000	0.000	19.91	953.296	6047.9	289575.0063	0.041	0.039	0.043
	60-63	1524-1600	371	0.018	15.294	732.298	0.001	0.048	0.000	0.000	0.000	0.000	15.29	732.089	6063.19	290307.0954	0.019	0.018	0.020
	57-60	1448-1524	370	0.054	14.733	705.443	0.001	0.048	0.000	0.000	0.000	0.000	14.73	705.276	6077.92	291012.3716	0.054	0.051	0.057
	53-57	1346-1448	369	0.043	19.890	952.360	0.002	0.096	0.000	0.000	0.000	0.000	19.88	951.860	6097.8	291964.2311	0.043	0.041	0.045
*	46-53	1168-1346	368	0.042	34.821	1667.252	0.003	0.144	0.000	0.000	-0.182	-8.701	35	1675.809	6132.8	293640.0401	0.037	0.035	0.039
	43-46	1092-1168	367	0.031	15.097	722.849	0.001	0.048	0.000	0.000	0.000	0.000	15.09	722.513	6147.89	294362.5532	0.031	0.029	0.033
	37-43	940-1092	366	0.032	30.163	1444.206	0.003	0.144	0.000	0.000	0.000	0.000	30.15	1443.590	6178.04	295806.143	0.032	0.030	0.034
*	25-37	635-940	365	0.026	60.689	2905.817	0.006	0.287	0.000	0.000	0.233	11.168	60.45	2894.362	6238.49	298700.5045	0.03	0.029	0.032
	13-25	330-635	364	0.027	60.627	2902.833	0.006	0.287	0.000	0.000	0.000	0.000	60.6	2901.544	6299.09	301602.0481	0.027	0.026	0.028
*	0-13	0-330	363	0.020	66.189	3169.146	0.006	0.287	0.000	0.000	-0.387	-18.530	66.57	3187.389	6365.66	304789.4368	0.014	0.013	0.015

Table A-180 Energy Balance Results for RBHT Test 1651C for Time Period 3520 to 3610 seconds

Results for RBHT Test 1651 Valid Time Period 3520 to 3610 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2331.6988	7.3555	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
0.25	6.35	2461.2376	7.7641	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
0.50	12.70	2590.7765	8.1728	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
0.75	19.05	2720.3153	8.5814	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
1.00	25.40	2849.8541	8.9901	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
1.25	31.75	2979.3929	9.3987	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
1.50	38.10	3108.9318	9.8073	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
1.75	44.45	3238.4706	10.216	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
2.00	50.80	3368.0094	10.625	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
2.25	57.15	3497.5482	11.033	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
2.50	63.50	3627.087	11.442	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
2.75	69.85	3756.6259	11.851	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
3.00	76.20	3886.1647	12.259	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
3.25	82.55	4015.7035	12.668	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
3.50	88.90	4145.2423	13.076	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
3.75	95.25	4274.7812	13.485	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
4.00	101.60	4404.32	13.894	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
4.25	107.95	4533.8588	14.302	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
4.50	114.30	4663.3976	14.711	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
4.75	120.65	4792.9365	15.12	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
5.00	127.00	4922.4753	15.528	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
5.25	133.35	5052.0141	15.937	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
5.50	139.70	5181.5529	16.346	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
5.75	146.05	5311.0918	16.754	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
6.00	152.40	5440.6306	17.163	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
6.25	158.75	5570.1694	17.571	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
6.50	165.10	5699.7082	17.98	0.00E+00	0.00E+00	0.00E+00	1.03E-01	4.67E-02
6.75	171.45	5829.247	18.389	5.60E-03	3.53E-01	1.60E-01	1.02E-01	4.65E-02
7.00	177.80	5958.7859	18.797	1.17E-02	7.40E-01	3.36E-01	1.02E-01	4.62E-02
7.25	184.15	6088.3247	19.206	1.80E-02	1.14E+00	5.15E-01	1.01E-01	4.59E-02
7.50	190.50	6217.8635	19.615	2.44E-02	1.54E+00	6.98E-01	1.01E-01	4.56E-02
7.75	196.85	6347.4023	20.023	3.10E-02	1.95E+00	8.85E-01	9.98E-02	4.53E-02
8.00	203.20	6476.9412	20.432	3.76E-02	2.37E+00	1.08E+00	9.92E-02	4.50E-02
8.25	209.55	6606.48	20.841	4.44E-02	2.80E+00	1.27E+00	9.85E-02	4.47E-02
8.50	215.90	6736.0188	21.249	5.14E-02	3.24E+00	1.47E+00	9.77E-02	4.43E-02
8.75	222.25	6865.5576	21.658	5.85E-02	3.69E+00	1.67E+00	9.70E-02	4.40E-02
9.00	228.60	6995.0965	22.067	6.57E-02	4.14E+00	1.88E+00	9.63E-02	4.37E-02
9.25	234.95	6606.48	20.841	7.28E-02	4.59E+00	2.08E+00	9.55E-02	4.33E-02
9.50	241.30	6217.8635	19.615	7.94E-02	5.01E+00	2.27E+00	9.49E-02	4.30E-02
9.75	247.65	5829.247	18.389	8.57E-02	5.40E+00	2.45E+00	9.42E-02	4.27E-02
10.00	254.00	5440.6306	17.163	9.16E-02	5.77E+00	2.62E+00	9.36E-02	4.25E-02
10.25	260.35	5052.0141	15.937	9.70E-02	6.12E+00	2.78E+00	9.30E-02	4.22E-02
10.50	266.70	4663.3976	14.711	1.02E-01	6.44E+00	2.92E+00	9.25E-02	4.20E-02
10.75	273.05	4274.7812	13.485	1.07E-01	6.73E+00	3.05E+00	9.20E-02	4.17E-02
11.00	279.40	3886.1647	12.259	1.11E-01	7.00E+00	3.17E+00	9.16E-02	4.15E-02
11.25	285.75	3497.5482	11.033	1.15E-01	7.24E+00	3.28E+00	9.12E-02	4.14E-02
11.50	292.10	3108.9318	9.8073	1.18E-01	7.46E+00	3.38E+00	9.08E-02	4.12E-02
11.75	298.45	2720.3153	8.5814	1.21E-01	7.65E+00	3.47E+00	9.05E-02	4.11E-02
12.00	304.80	2331.6988	7.3555	1.24E-01	7.81E+00	3.54E+00	9.03E-02	4.09E-02

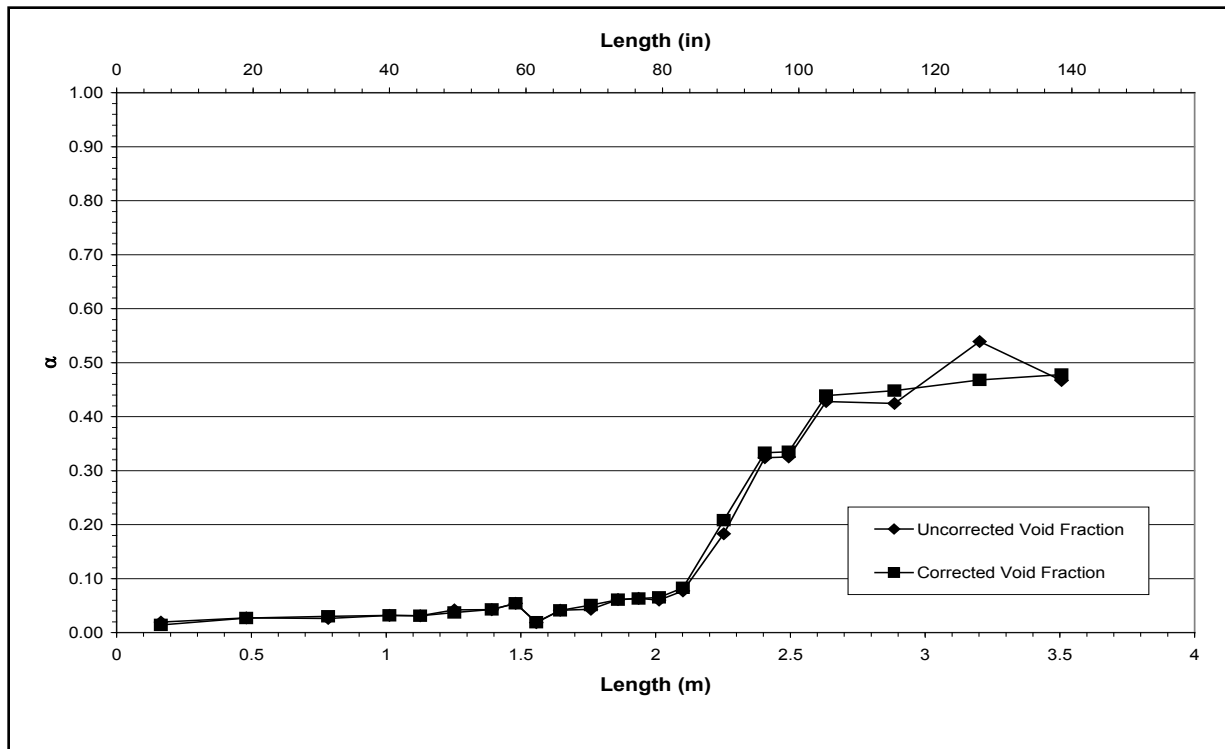


Figure A-450 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1651C for Time Period 3520 to 3610 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1651-D

Test Conditions

Date: 7/1/2003

Steady-state time window: 4050 – 4125 seconds

Inlet flow rate: 2.530 cm/sec (0.996 in./sec)

Inlet mass flow rate: 0.119 kg/sec (0.263 lbm/sec)

Inlet flow temperature: 348.2 K (167.0 °F)

Upper plenum pressure: 271.7 kPa (39.4 psia)

Bundle power: 72.27 kW

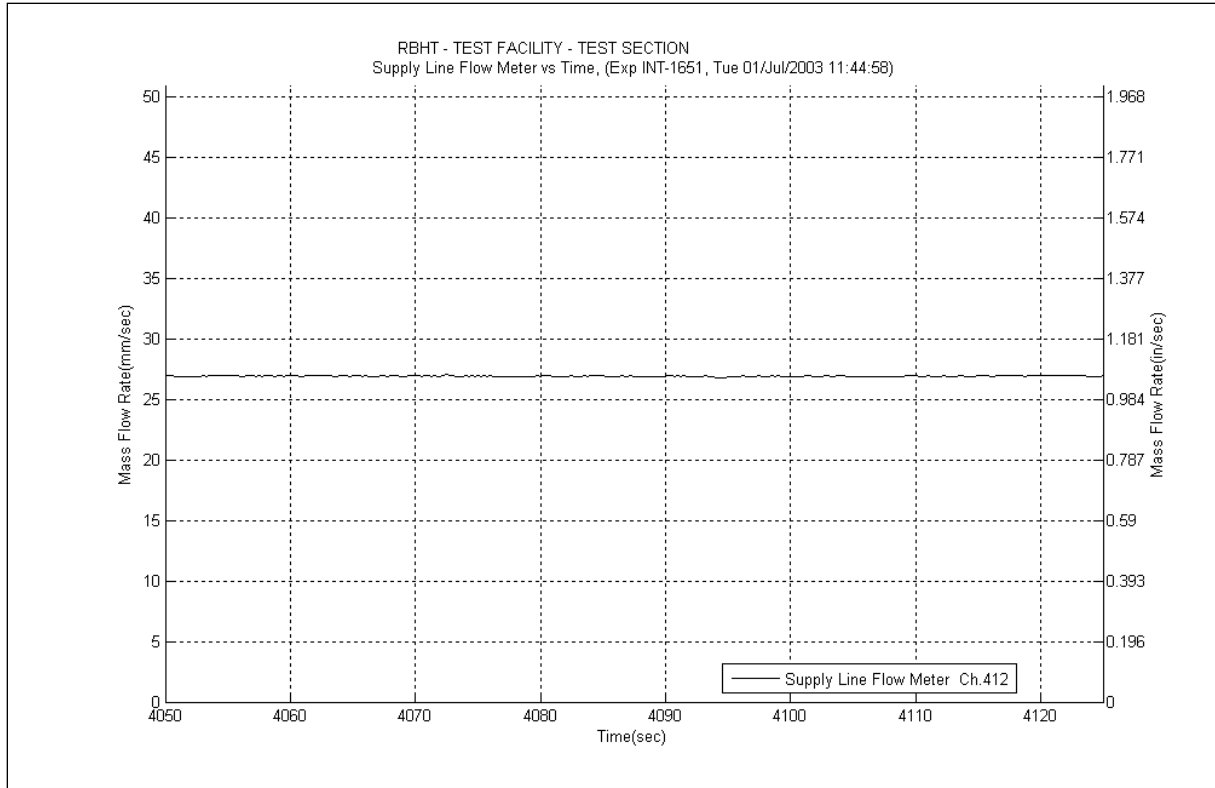


Figure A-451 Inlet Flow Plot for Experiment 1651D

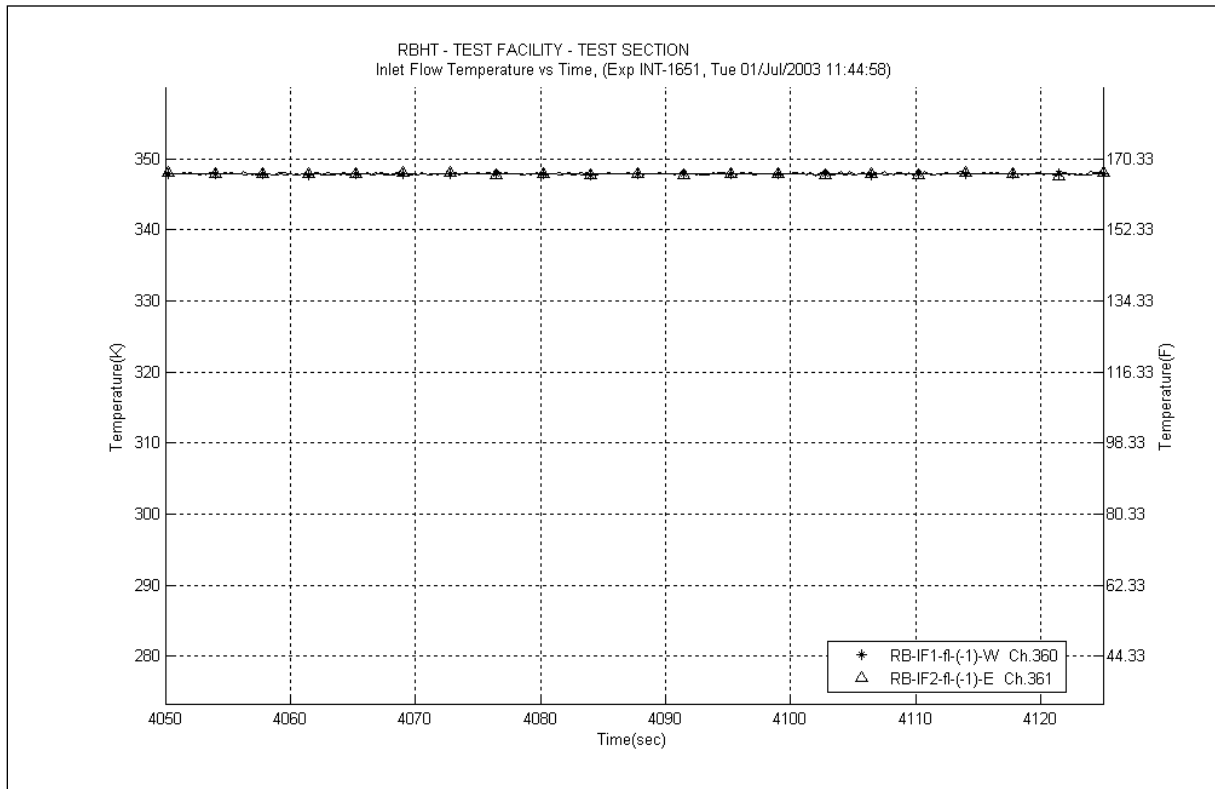


Figure A-452 Inlet Temperature Plot for Experiment 1651D

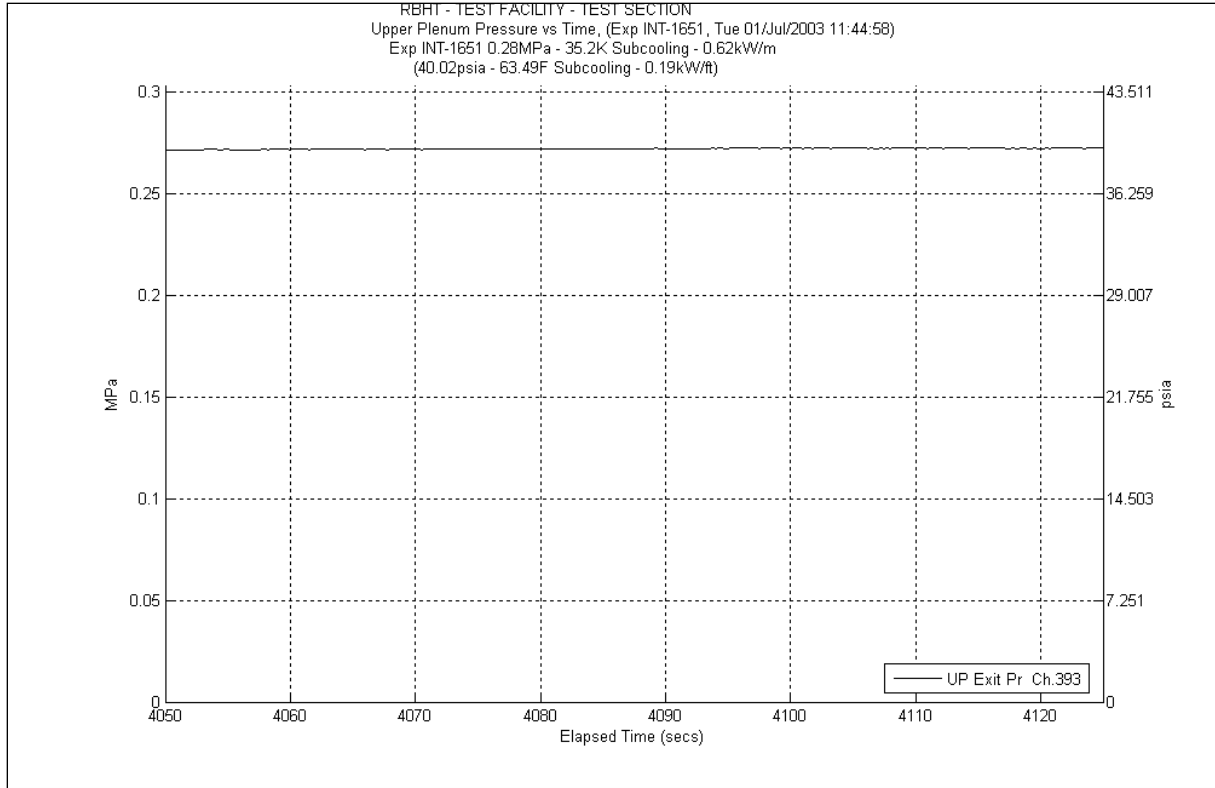


Figure A-453 System Pressure Plot for Experiment 1651D

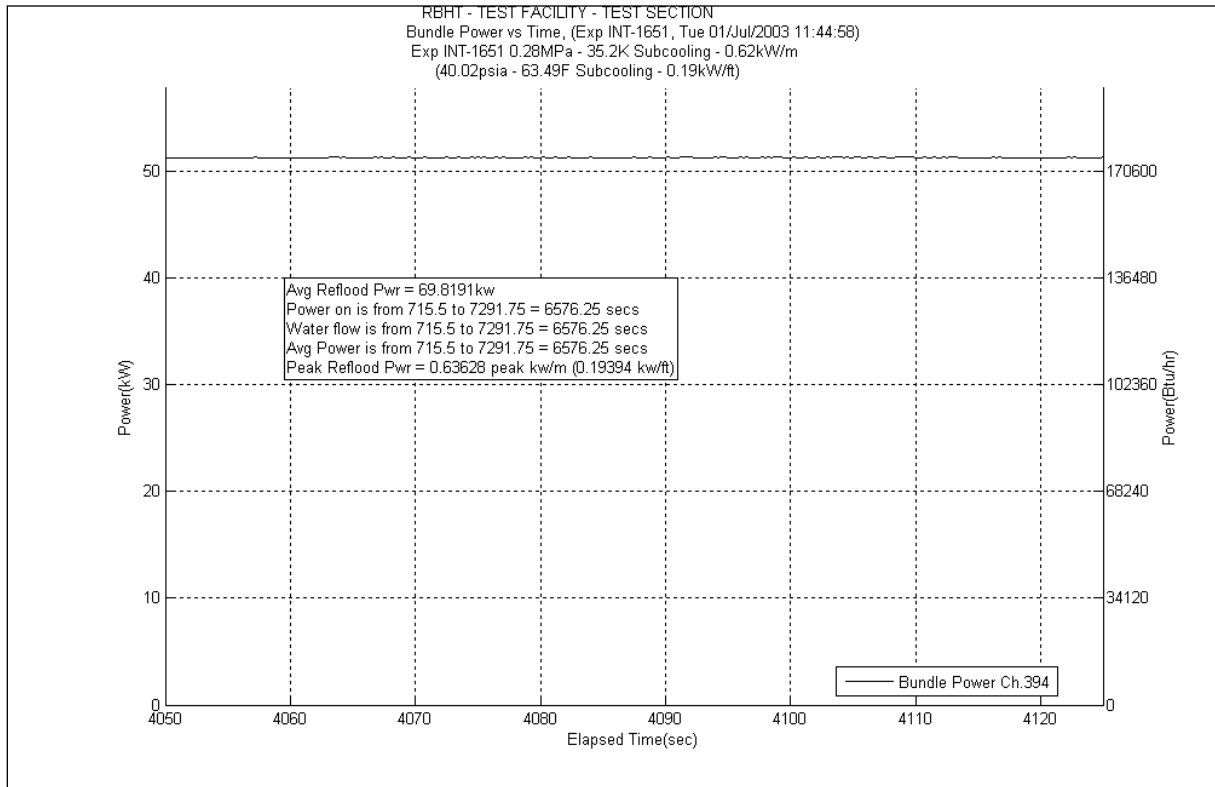


Figure A-454 Bundle Power Plot for Experiment 1651D

Table A-181 Data Results for RBHT Test 1651D for Time Period 4050 to 4125 seconds

Results for RBHT Test 1651
Valid Time Period 4050 to 4125 seconds
Collapsed Liquid Level = 111.074 inches = 2821.27 mm
(Z_{OSV}) Onset of Significant Void = 58.5 inches = 1486 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lbf/ft ²)	$\Delta P_{unconnected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lbf/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.510	28.008	1341.012	0.428	20.493	0.115	5.506	0.000	0.000	27.46	1314.792	5787.46	277105.0722	0.519	0.516	0.522
*	120-133	3048-3378	383	0.583	28.174	1348.970	0.463	22.169	0.205	9.815	-5.094	-243.911	32.6	1560.896	5820.06	278665.9686	0.517	0.514	0.520
*	108-120	2743-3048	382	0.463	33.440	1601.109	0.369	17.668	0.255	12.209	2.446	117.108	30.37	1454.123	5850.43	280120.092	0.513	0.510	0.516
	100-108	2540-2743	381	0.501	20.737	992.891	0.206	9.863	0.187	8.954	0.000	0.000	20.34	973.884	5870.77	281093.9764	0.51	0.507	0.513
	97-100	2464-2540	380	0.377	9.712	464.990	0.068	3.256	0.068	3.256	0.000	0.000	9.574	458.406	5880.344	281552.382	0.385	0.383	0.387
	93-97	2362-2464	379	0.390	12.672	606.725	0.083	3.974	0.088	4.213	0.000	0.000	12.5	598.503	5892.844	282150.8852	0.398	0.396	0.400
*	85-93	2159-2362	378	0.293	29.389	1407.155	0.138	6.607	0.169	8.092	3.142	150.442	25.94	1242.014	5918.784	283392.899	0.376	0.374	0.378
	81-85	2057-2159	377	0.346	13.581	650.241	0.054	2.586	0.081	3.878	0.000	0.000	13.44	643.511	5932.224	284036.4097	0.353	0.351	0.355
	78-81	1981-2057	376	0.222	12.126	580.616	0.034	1.628	0.059	2.825	0.000	0.000	12.03	575.999	5944.254	284612.4092	0.228	0.227	0.229
	75-78	1905-1981	375	0.133	13.508	646.759	0.027	1.293	0.058	2.777	0.000	0.000	13.42	642.553	5957.674	285254.9622	0.138	0.137	0.139
	72-75	1829-1905	374	0.071	14.469	692.761	0.020	0.958	0.057	2.729	0.000	0.000	14.39	688.997	5972.064	285943.9591	0.076	0.072	0.080
*	67-72	1702-1829	373	0.051	24.653	1180.379	0.017	0.814	0.062	2.969	0.214	10.234	24.36	1166.363	5996.424	287110.3222	0.062	0.059	0.065
	63-67	1600-1702	372	0.047	19.797	947.884	0.001	0.048	0.000	0.000	0.000	0.000	19.79	947.550	6016.214	288057.8725	0.047	0.045	0.049
	60-63	1524-1600	371	0.024	15.201	727.822	0.001	0.048	0.000	0.000	0.000	0.000	15.19	727.301	6031.404	288785.1736	0.025	0.024	0.026
	57-60	1448-1524	370	0.059	14.661	701.961	0.001	0.048	0.000	0.000	0.000	0.000	14.65	701.446	6046.054	289486.6194	0.059	0.056	0.062
	53-57	1346-1448	369	0.047	19.802	948.133	0.001	0.048	0.000	0.000	0.000	0.000	19.79	947.550	6065.844	290434.1696	0.047	0.045	0.049
*	46-53	1168-1346	368	0.046	34.681	1660.538	0.002	0.096	0.000	0.000	-0.171	-8.185	34.85	1668.627	6100.694	292102.7966	0.041	0.039	0.043
	43-46	1092-1168	367	0.035	15.035	719.865	0.001	0.048	0.000	0.000	0.000	0.000	15.03	719.640	6115.724	292822.4369	0.035	0.033	0.037
	37-43	940-1092	366	0.036	30.049	1438.735	0.002	0.096	0.000	0.000	0.000	0.000	30.04	1438.323	6145.764	294260.7598	0.036	0.034	0.038
*	25-37	635-940	365	0.028	60.559	2899.601	0.004	0.192	0.000	0.000	0.245	11.751	60.31	2887.658	6206.074	297148.4181	0.032	0.030	0.034
	13-25	330-635	364	0.028	60.559	2899.601	0.004	0.192	0.000	0.000	0.000	0.000	60.54	2898.671	6266.614	300047.0888	0.028	0.027	0.029
*	0-13	0-330	363	0.020	66.163	3167.903	0.004	0.192	0.000	0.000	-0.381	-18.241	66.54	3185.952	6333.154	303233.0411	0.014	0.013	0.015

Table A-182 Energy Balance Results for RBHT Test 1651D for Time Period 4050 to 4125 seconds

Results for RBHT Test 1651 Valid Time Period 4050 to 4125 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2334.8096	7.3653	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
0.25	6.35	2464.5213	7.7745	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
0.50	12.70	2594.2329	8.1837	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
0.75	19.05	2723.9446	8.5929	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
1.00	25.40	2853.6562	9.0021	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
1.25	31.75	2983.3678	9.4112	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
1.50	38.10	3113.0795	9.8204	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
1.75	44.45	3242.7911	10.23	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
2.00	50.80	3372.5028	10.639	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
2.25	57.15	3502.2144	11.048	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
2.50	63.50	3631.9261	11.457	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
2.75	69.85	3761.6377	11.866	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
3.00	76.20	3891.3494	12.276	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
3.25	82.55	4021.061	12.685	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
3.50	88.90	4150.7726	13.094	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
3.75	95.25	4280.4843	13.503	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
4.00	101.60	4410.1959	13.912	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
4.25	107.95	4539.9076	14.321	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
4.50	114.30	4669.6192	14.731	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
4.75	120.65	4799.3309	15.14	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
5.00	127.00	4929.0425	15.549	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
5.25	133.35	5058.7542	15.958	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
5.50	139.70	5188.4658	16.367	0.00E+00	0.00E+00	0.00E+00	8.61E-02	3.91E-02
5.75	146.05	5318.1775	16.777	8.27E-04	4.36E-02	1.98E-02	8.61E-02	3.90E-02
6.00	152.40	5447.8891	17.186	7.53E-03	3.97E-01	1.80E-01	8.55E-02	3.88E-02
6.25	158.75	5577.6007	17.595	1.44E-02	7.59E-01	3.44E-01	8.49E-02	3.85E-02
6.50	165.10	5707.3124	18.004	2.14E-02	1.13E+00	5.12E-01	8.43E-02	3.82E-02
6.75	171.45	5837.024	18.413	2.86E-02	1.51E+00	6.84E-01	8.37E-02	3.80E-02
7.00	177.80	5966.7357	18.822	3.60E-02	1.90E+00	8.60E-01	8.31E-02	3.77E-02
7.25	184.15	6096.4473	19.232	4.35E-02	2.29E+00	1.04E+00	8.24E-02	3.74E-02
7.50	190.50	6226.159	19.641	5.11E-02	2.70E+00	1.22E+00	8.17E-02	3.71E-02
7.75	196.85	6355.8706	20.05	5.90E-02	3.11E+00	1.41E+00	8.11E-02	3.68E-02
8.00	203.20	6485.5823	20.459	6.70E-02	3.53E+00	1.60E+00	8.04E-02	3.65E-02
8.25	209.55	6615.2939	20.868	7.51E-02	3.96E+00	1.80E+00	7.97E-02	3.61E-02
8.50	215.90	6745.0056	21.278	8.35E-02	4.40E+00	2.00E+00	7.90E-02	3.58E-02
8.75	222.25	6874.7172	21.687	9.19E-02	4.85E+00	2.20E+00	7.82E-02	3.55E-02
9.00	228.60	7004.4288	22.096	1.01E-01	5.30E+00	2.41E+00	7.75E-02	3.51E-02
9.25	234.95	6615.2939	20.868	1.09E-01	5.74E+00	2.61E+00	7.68E-02	3.48E-02
9.50	241.30	6226.159	19.641	1.17E-01	6.17E+00	2.80E+00	7.61E-02	3.45E-02
9.75	247.65	5837.024	18.413	1.25E-01	6.57E+00	2.98E+00	7.54E-02	3.42E-02
10.00	254.00	5447.8891	17.186	1.32E-01	6.94E+00	3.15E+00	7.48E-02	3.39E-02
10.25	260.35	5058.7542	15.958	1.38E-01	7.28E+00	3.30E+00	7.43E-02	3.37E-02
10.50	266.70	4669.6192	14.731	1.44E-01	7.60E+00	3.45E+00	7.37E-02	3.34E-02
10.75	273.05	4280.4843	13.503	1.50E-01	7.90E+00	3.58E+00	7.32E-02	3.32E-02
11.00	279.40	3891.3494	12.276	1.55E-01	8.16E+00	3.70E+00	7.28E-02	3.30E-02
11.25	285.75	3502.2144	11.048	1.59E-01	8.40E+00	3.81E+00	7.24E-02	3.28E-02
11.50	292.10	3113.0795	9.8204	1.64E-01	8.62E+00	3.91E+00	7.21E-02	3.27E-02
11.75	298.45	2723.9446	8.5929	1.67E-01	8.81E+00	4.00E+00	7.17E-02	3.25E-02
12.00	304.80	2334.8096	7.3653	1.70E-01	8.98E+00	4.07E+00	7.15E-02	3.24E-02

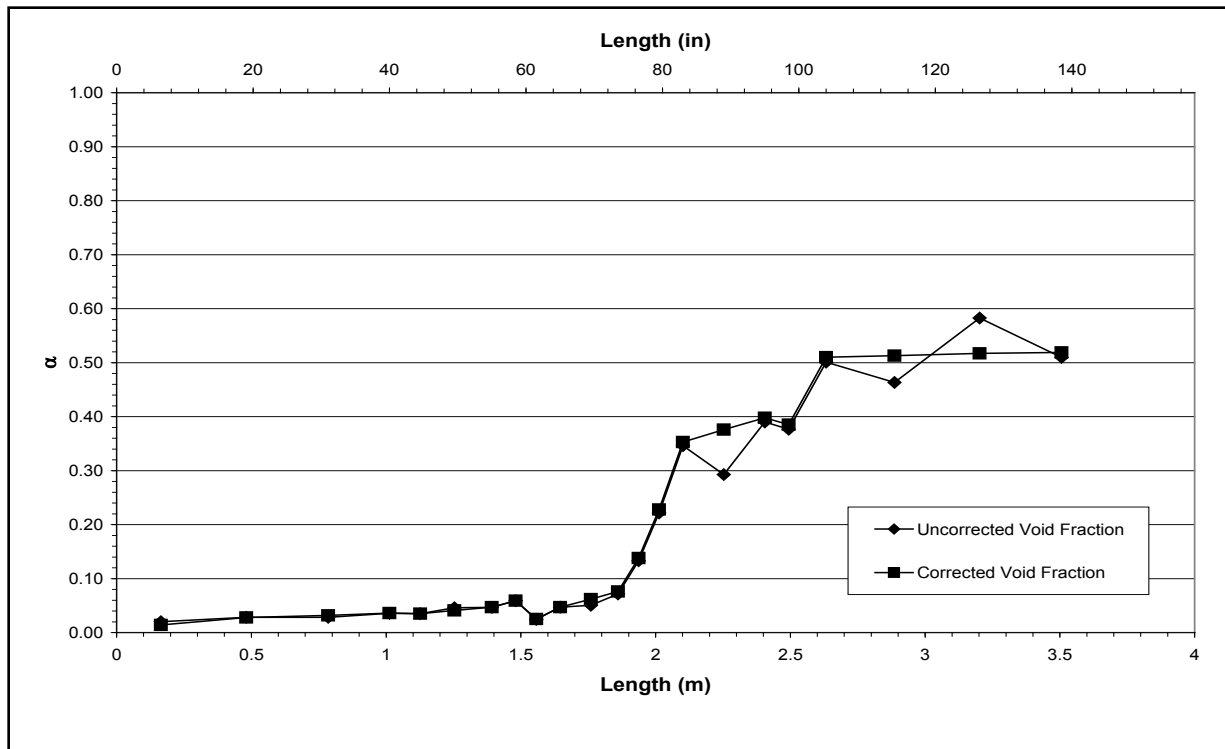


Figure A-455 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1651D for Time Period 4050 to 4125 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1651-E

Test Conditions

Date: 7/1/2003

Steady-state time window: 4770 – 4845 seconds

Inlet flow rate: 2.517 cm/sec (0.991 in./sec)

Inlet mass flow rate: 0.119 kg/sec (0.262 lbm/sec)

Inlet flow temperature: 348.2 K (167.0 °F)

Upper plenum pressure: 271.7 kPa (39.4 psia)

Bundle power: 72.27 kW

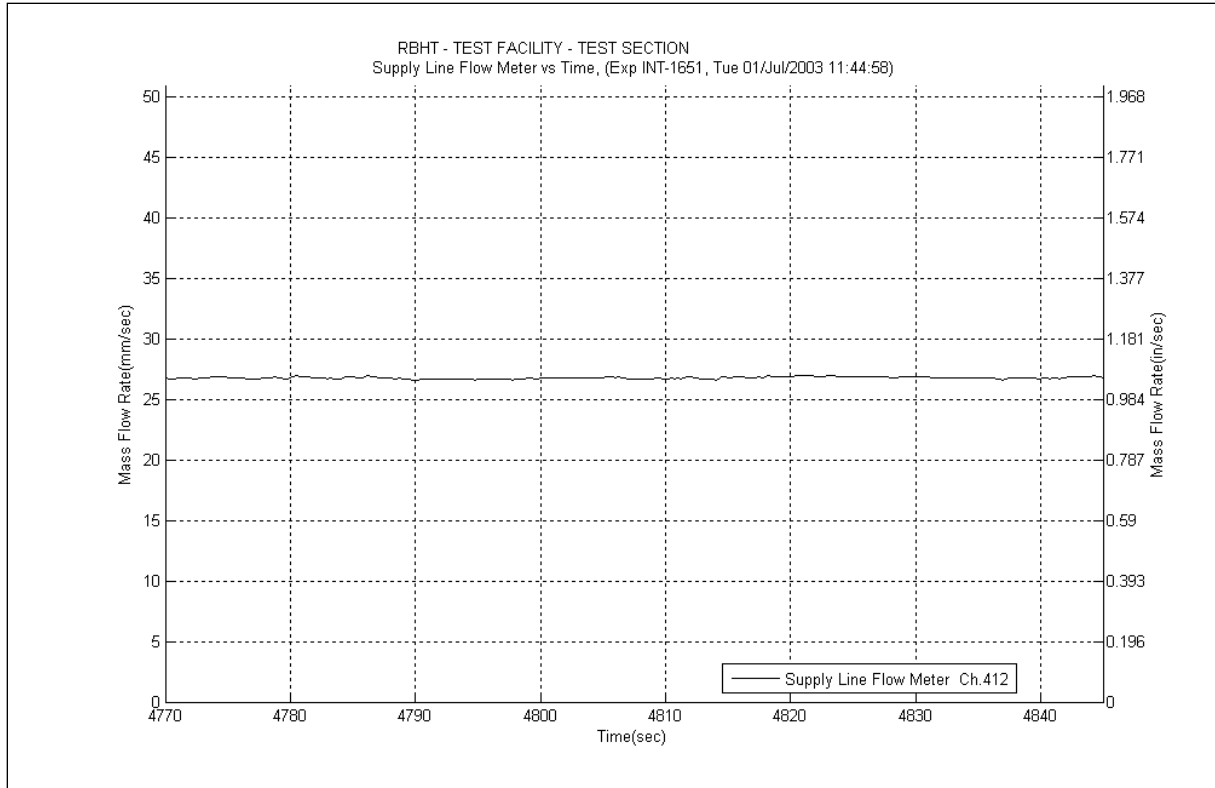


Figure A-456 Inlet Flow Plot for Experiment 1651E

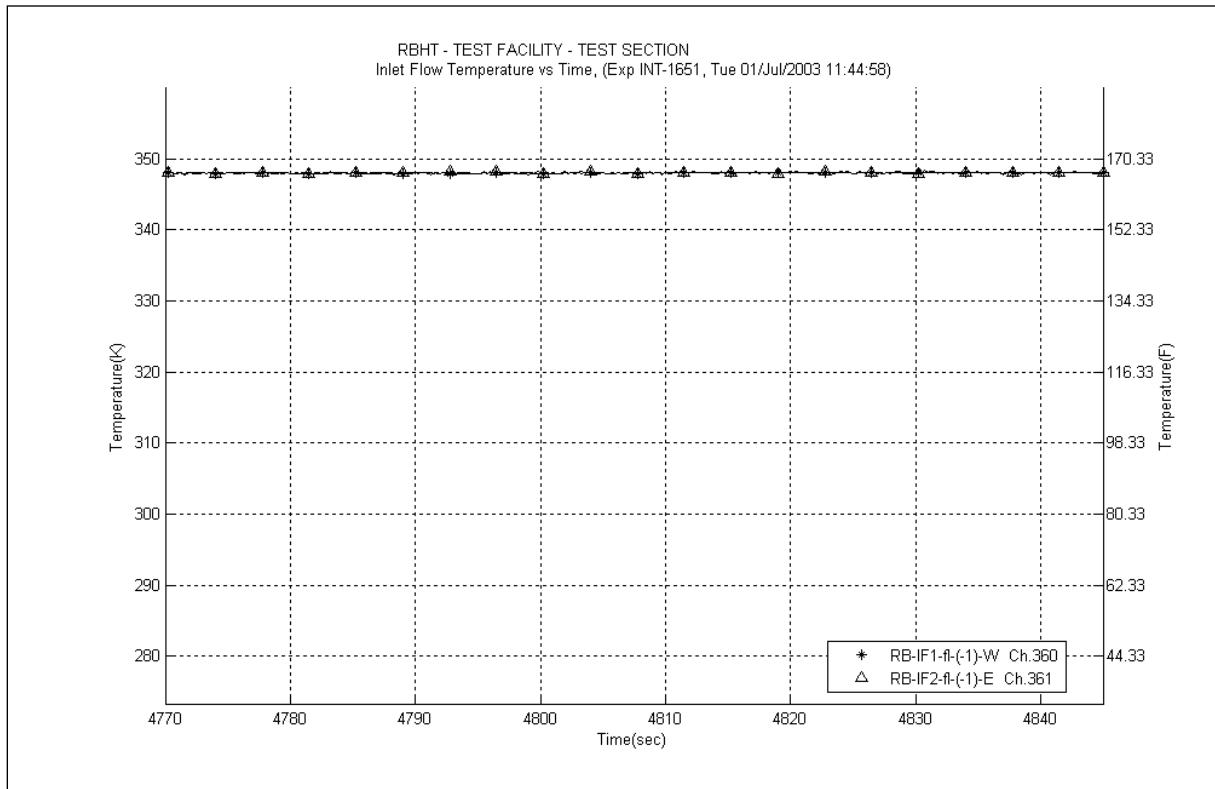


Figure A-457 Inlet Temperature Plot for Experiment 1651E

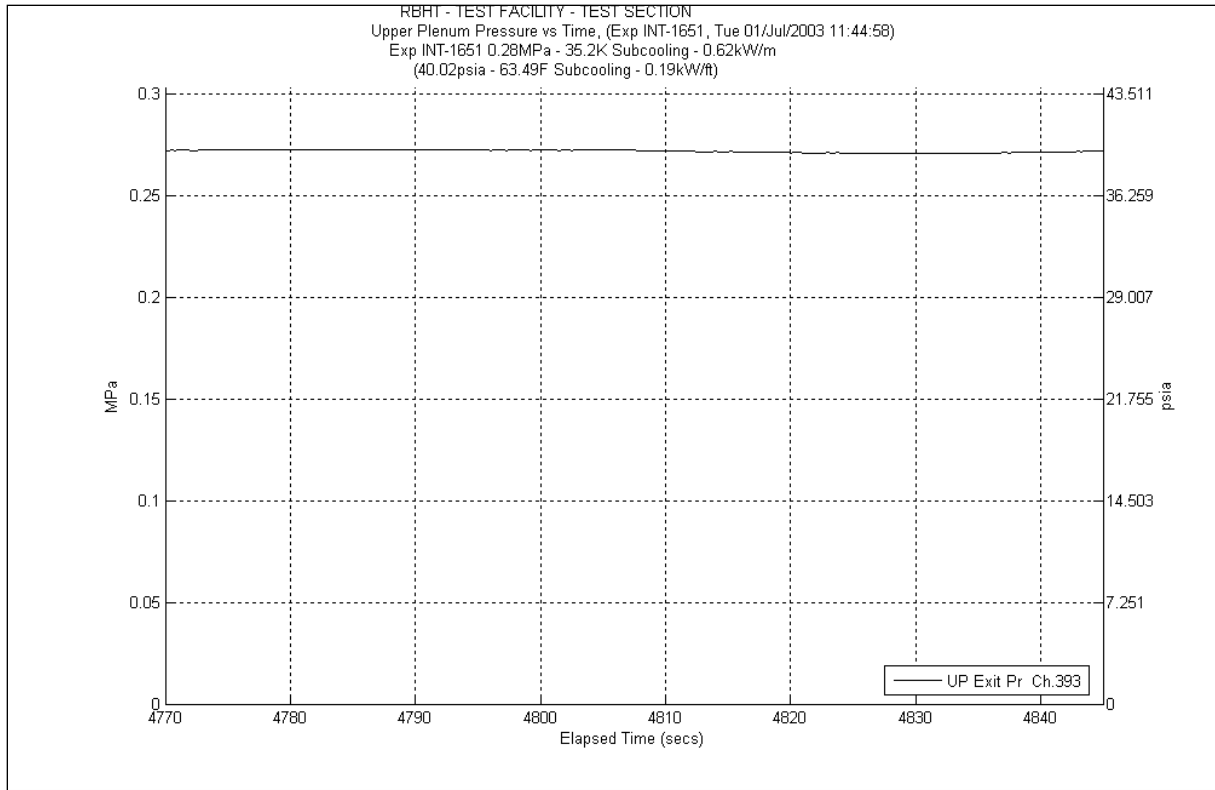


Figure A-458 System Pressure Plot for Experiment 1651E

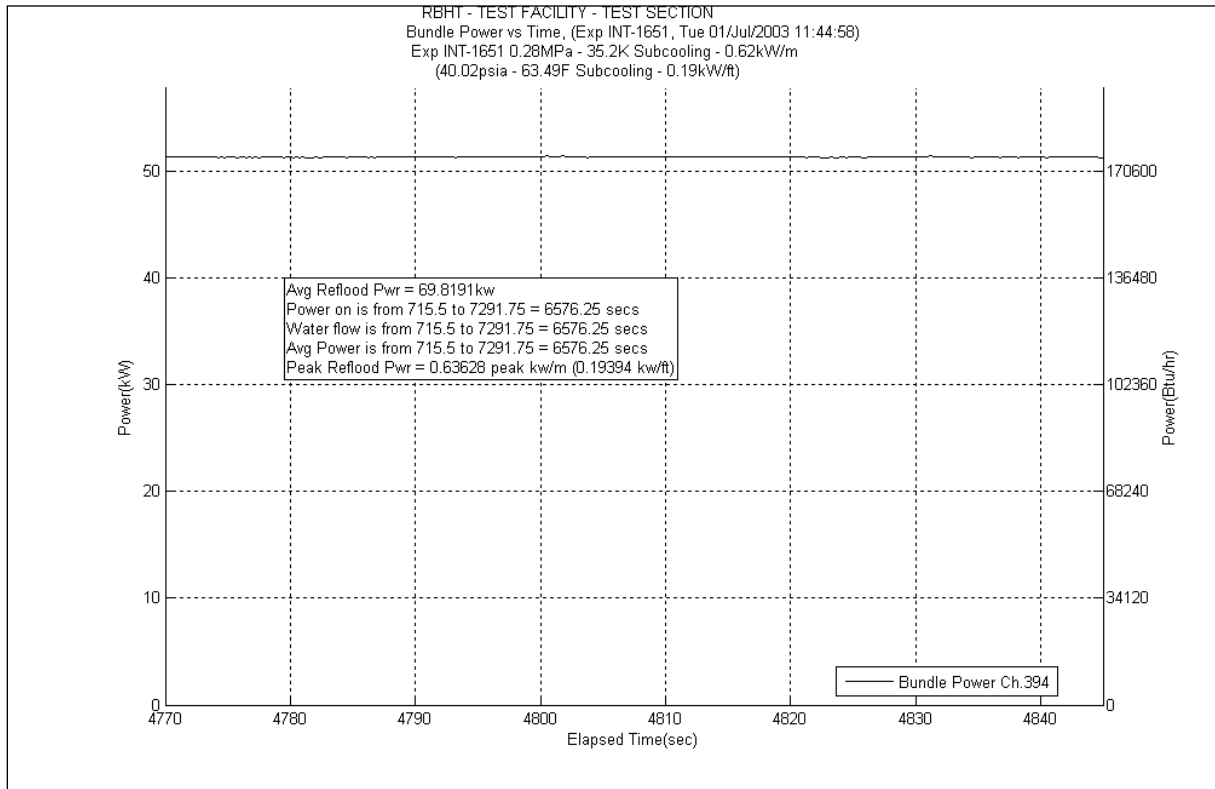


Figure A-459 Bundle Power Plot for Experiment 1651E

Table A-183: Data Results for RBHT Test 1651 for Time Period 4770 to 4845 seconds

Table A-183 Data Results for RBHT Test 1651E for Time Period 4770 to 4845 seconds

Results for RBHT Test 1651
Valid Time Period 4770 to 4845 seconds
Collapsed Liquid Level = 110.781 inches = 2813.83 mm
(Z_{OSV}) Onset of Significant Void = 58.5 inches = 1486 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lb/ft ²)	$\Delta P_{unconnected}$ (Pa)	ΔP_{fric} (lb/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lb/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lb/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lb/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lb/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.511	27.961	1338.775	0.427	20.445	0.114	5.458	0.000	0.000	27.41	1312.398	5787.41	277102.6782	0.52	0.517	0.523
*	120-133	3048-3378	383	0.584	28.111	1345.986	0.462	22.121	0.203	9.720	-5.034	-241.005	32.48	1555.151	5819.89	278657.8289	0.519	0.516	0.522
*	108-120	2743-3048	382	0.468	33.159	1587.681	0.368	17.620	0.254	12.162	2.397	114.789	30.14	1443.111	5850.03	280100.9399	0.516	0.513	0.519
	100-108	2540-2743	381	0.506	20.540	983.442	0.206	9.863	0.186	8.906	0.000	0.000	20.14	964.308	5870.17	281065.2482	0.515	0.512	0.518
	97-100	2464-2540	380	0.381	9.639	461.509	0.068	3.256	0.067	3.208	0.000	0.000	9.502	454.958	5879.672	281520.2064	0.39	0.388	0.392
	93-97	2362-2464	379	0.397	12.537	600.260	0.083	3.974	0.088	4.213	0.000	0.000	12.36	591.800	5892.032	282112.0064	0.405	0.403	0.407
*	85-93	2159-2362	378	0.298	29.171	1396.712	0.139	6.655	0.168	8.044	3.274	156.757	25.59	1225.256	5917.622	283337.2622	0.384	0.382	0.386
	81-85	2057-2159	377	0.357	13.368	640.046	0.055	2.633	0.080	3.830	0.000	0.000	13.23	633.456	5930.852	283970.718	0.363	0.361	0.365
	78-81	1981-2057	376	0.242	11.804	565.200	0.034	1.628	0.059	2.825	0.000	0.000	11.71	560.678	5942.562	284531.3958	0.248	0.247	0.249
	75-78	1905-1981	375	0.158	13.113	627.861	0.028	1.341	0.057	2.729	0.000	0.000	13.03	623.880	5955.592	285155.2755	0.164	0.163	0.165
	72-75	1829-1905	374	0.082	14.308	685.053	0.021	1.005	0.056	2.681	0.000	0.000	14.23	681.336	5969.822	285836.6116	0.087	0.083	0.091
*	67-72	1702-1829	373	0.052	24.622	1178.887	0.018	0.862	0.068	3.256	0.316	15.110	24.22	1159.660	5994.042	286996.2714	0.067	0.064	0.070
	63-67	1600-1702	372	0.048	19.787	947.387	0.001	0.048	0.000	0.000	0.000	0.000	19.78	947.071	6013.822	287943.3429	0.048	0.046	0.050
	60-63	1524-1600	371	0.026	15.180	726.827	0.001	0.048	0.000	0.000	0.000	0.000	15.18	726.822	6029.002	288670.1652	0.026	0.025	0.027
	57-60	1448-1524	370	0.059	14.656	701.713	0.001	0.048	0.000	0.000	0.000	0.000	14.65	701.446	6043.652	289371.611	0.059	0.056	0.062
	53-57	1346-1448	369	0.047	19.797	947.884	0.001	0.048	0.000	0.000	0.000	0.000	19.79	947.550	6063.442	290319.1613	0.047	0.045	0.049
*	46-53	1168-1346	368	0.046	34.671	1660.041	0.002	0.096	0.000	0.000	-0.171	-8.203	34.84	1668.148	6098.282	291987.3094	0.041	0.039	0.043
	43-46	1092-1168	367	0.035	15.029	719.616	0.001	0.048	0.000	0.000	0.000	0.000	15.02	719.161	6113.302	292706.4709	0.035	0.033	0.037
	37-43	940-1092	366	0.036	30.054	1438.984	0.002	0.096	0.000	0.000	0.000	0.000	30.04	1438.323	6143.342	294144.7938	0.036	0.034	0.038
*	25-37	635-940	365	0.028	60.559	2899.601	0.004	0.192	0.000	0.000	0.245	11.751	60.31	2887.658	6203.652	297032.4521	0.032	0.030	0.034
	13-25	330-635	364	0.028	60.559	2899.601	0.004	0.192	0.000	0.000	0.000	0.000	60.54	2898.671	6264.192	299931.1229	0.028	0.027	0.029
*	0-13	0-330	363	0.020	66.168	3168.151	0.004	0.192	0.000	0.000	-0.376	-17.993	66.54	3185.952	6330.732	303117.0752	0.014	0.013	0.015

Table A-184 Energy Balance Results for RBHT Test 1651E for Time Period 4770 to 4845 seconds

Results for RBHT Test 1651 Valid Time Period 4770 to 4845 seconds								
Elevation	Elevation	q _w	q _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2335.0711	7.3661	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
0.25	6.35	2464.7972	7.7754	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
0.50	12.70	2594.5234	8.1846	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
0.75	19.05	2724.2496	8.5938	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
1.00	25.40	2853.9758	9.0031	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
1.25	31.75	2983.7019	9.4123	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
1.50	38.10	3113.4281	9.8215	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
1.75	44.45	3243.1543	10.231	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
2.00	50.80	3372.8804	10.64	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
2.25	57.15	3502.6066	11.049	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
2.50	63.50	3632.3328	11.458	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
2.75	69.85	3762.059	11.868	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
3.00	76.20	3891.7851	12.277	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
3.25	82.55	4021.5113	12.686	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
3.50	88.90	4151.2375	13.095	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
3.75	95.25	4280.9636	13.505	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
4.00	101.60	4410.6898	13.914	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
4.25	107.95	4540.416	14.323	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
4.50	114.30	4670.1422	14.732	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
4.75	120.65	4799.8683	15.142	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
5.00	127.00	4929.5945	15.551	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
5.25	133.35	5059.3207	15.96	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
5.50	139.70	5189.0468	16.369	0.00E+00	0.00E+00	0.00E+00	8.57E-02	3.89E-02
5.75	146.05	5318.773	16.778	1.63E-03	8.56E-02	3.88E-02	8.56E-02	3.88E-02
6.00	152.40	5448.4992	17.188	8.37E-03	4.39E-01	1.99E-01	8.50E-02	3.85E-02
6.25	158.75	5578.2254	17.597	1.53E-02	8.01E-01	3.63E-01	8.44E-02	3.83E-02
6.50	165.10	5707.9515	18.006	2.23E-02	1.17E+00	5.31E-01	8.38E-02	3.80E-02
6.75	171.45	5837.6777	18.415	2.96E-02	1.55E+00	7.03E-01	8.32E-02	3.77E-02
7.00	177.80	5967.4039	18.825	3.70E-02	1.94E+00	8.78E-01	8.25E-02	3.74E-02
7.25	184.15	6097.13	19.234	4.45E-02	2.33E+00	1.06E+00	8.19E-02	3.71E-02
7.50	190.50	6226.8562	19.643	5.22E-02	2.74E+00	1.24E+00	8.12E-02	3.68E-02
7.75	196.85	6356.5824	20.052	6.01E-02	3.15E+00	1.43E+00	8.05E-02	3.65E-02
8.00	203.20	6486.3085	20.462	6.81E-02	3.57E+00	1.62E+00	7.99E-02	3.62E-02
8.25	209.55	6616.0347	20.871	7.63E-02	4.00E+00	1.81E+00	7.91E-02	3.59E-02
8.50	215.90	6745.7609	21.28	8.47E-02	4.44E+00	2.01E+00	7.84E-02	3.56E-02
8.75	222.25	6875.4871	21.689	9.32E-02	4.88E+00	2.22E+00	7.77E-02	3.52E-02
9.00	228.60	7005.2132	22.098	1.02E-01	5.34E+00	2.42E+00	7.70E-02	3.49E-02
9.25	234.95	6616.0347	20.871	1.11E-01	5.79E+00	2.63E+00	7.62E-02	3.46E-02
9.50	241.30	6226.8562	19.643	1.19E-01	6.21E+00	2.82E+00	7.55E-02	3.43E-02
9.75	247.65	5837.6777	18.415	1.26E-01	6.60E+00	2.99E+00	7.49E-02	3.40E-02
10.00	254.00	5448.4992	17.188	1.33E-01	6.97E+00	3.16E+00	7.43E-02	3.37E-02
10.25	260.35	5059.3207	15.96	1.40E-01	7.32E+00	3.32E+00	7.37E-02	3.34E-02
10.50	266.70	4670.1422	14.732	1.46E-01	7.64E+00	3.47E+00	7.32E-02	3.32E-02
10.75	273.05	4280.9636	13.505	1.51E-01	7.93E+00	3.60E+00	7.27E-02	3.30E-02
11.00	279.40	3891.7851	12.277	1.57E-01	8.20E+00	3.72E+00	7.23E-02	3.28E-02
11.25	285.75	3502.6066	11.049	1.61E-01	8.44E+00	3.83E+00	7.19E-02	3.26E-02
11.50	292.10	3113.4281	9.8215	1.65E-01	8.66E+00	3.93E+00	7.15E-02	3.24E-02
11.75	298.45	2724.2496	8.5938	1.69E-01	8.85E+00	4.01E+00	7.12E-02	3.23E-02
12.00	304.80	2335.0711	7.3661	1.72E-01	9.02E+00	4.09E+00	7.09E-02	3.22E-02

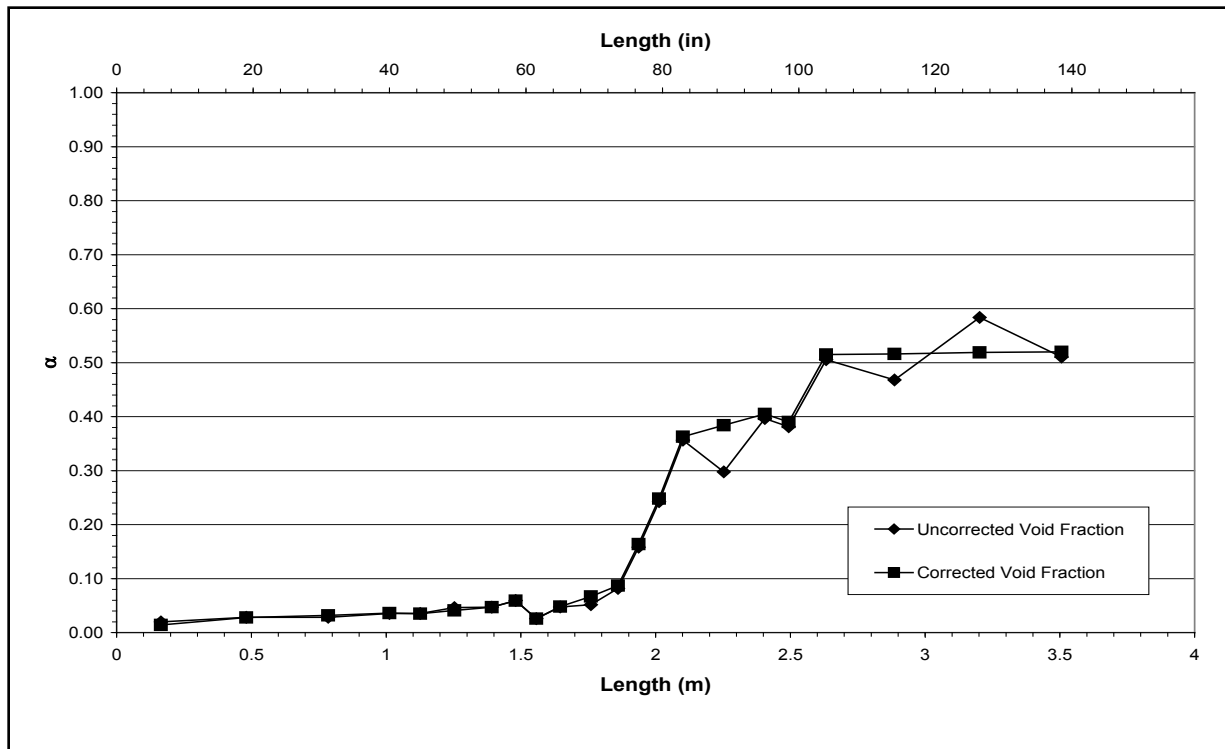


Figure A-460 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1651E for Time Period 4770 to 4845 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1651-F

Test Conditions

Date: 7/1/2003

Steady-state time window: 5030 – 5100 seconds

Inlet flow rate: 2.042 cm/sec (0.804 in./sec)

Inlet mass flow rate: 0.097 kg/sec (0.213 lbm/sec)

Inlet flow temperature: 348.2 K (167.0 °F)

Upper plenum pressure: 271.7 kPa (39.4 psia)

Bundle power: 72.27 kW

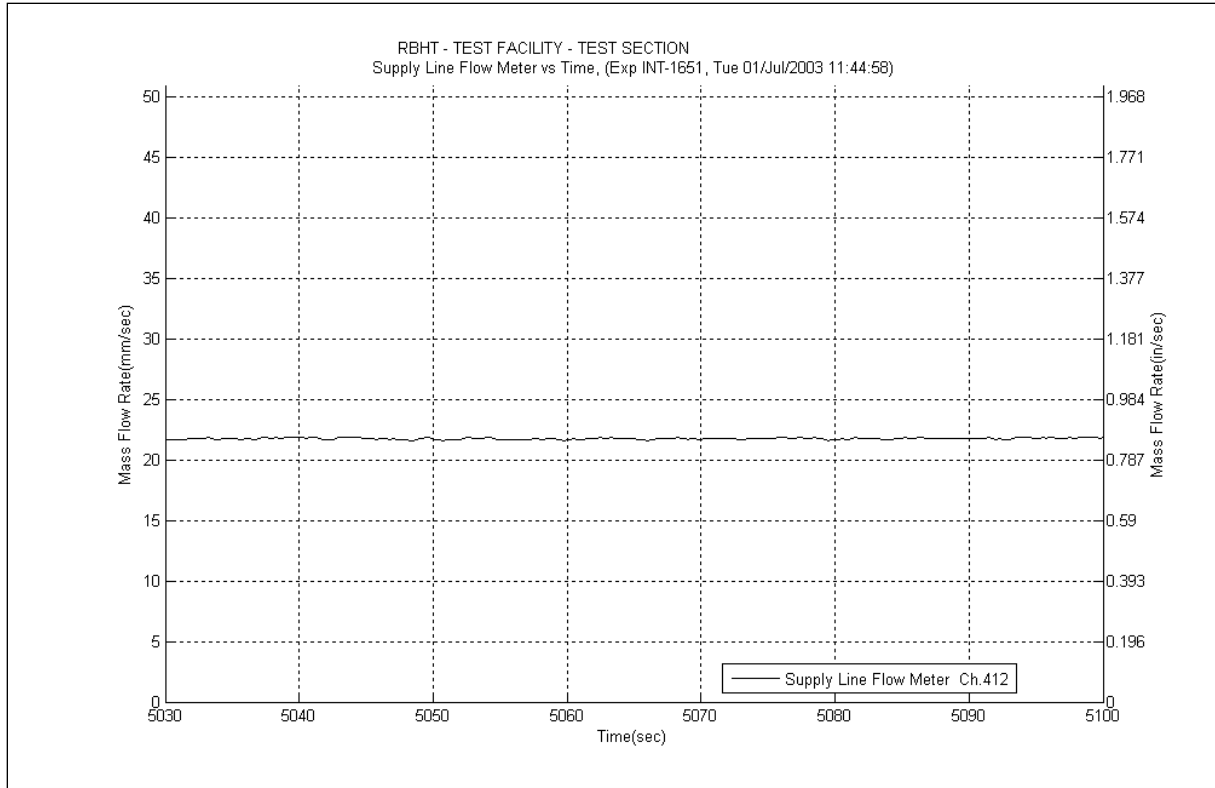


Figure A-461 Inlet Flow Plot for Experiment 1651F

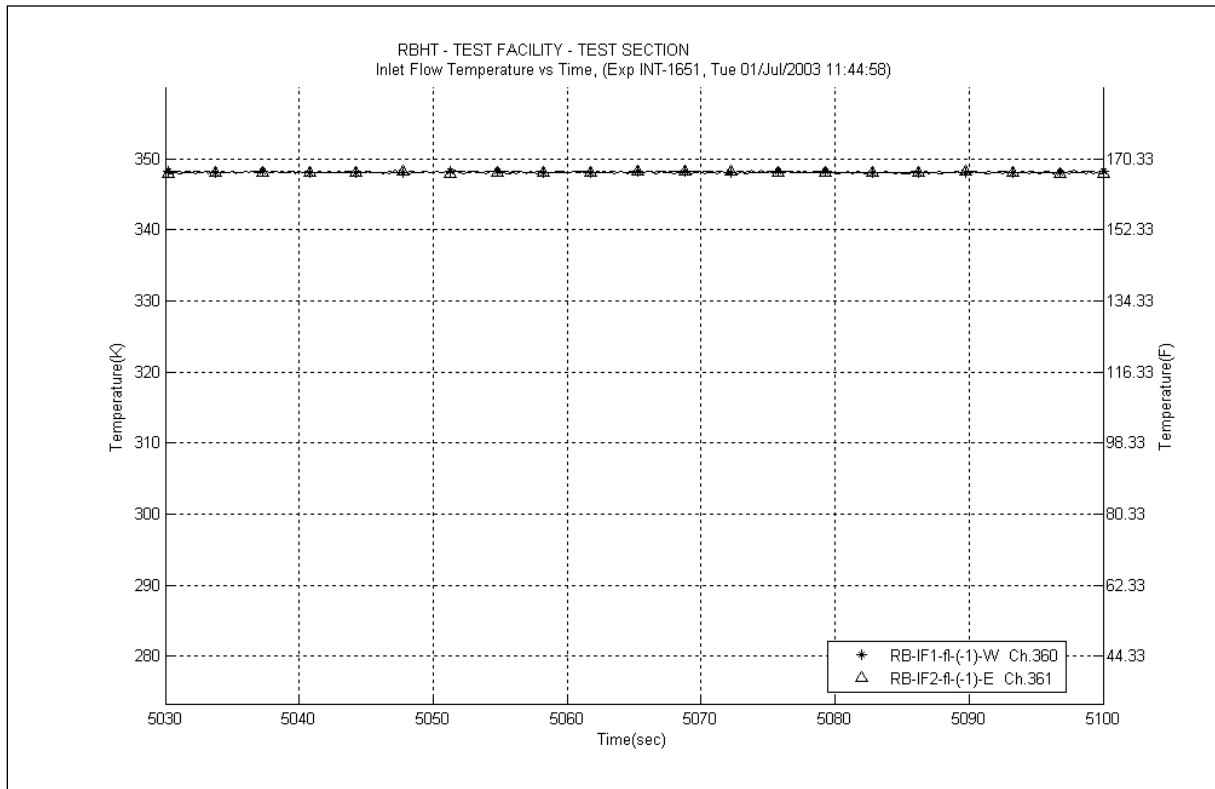


Figure A-462 Inlet Temperature Plot for Experiment 1651F

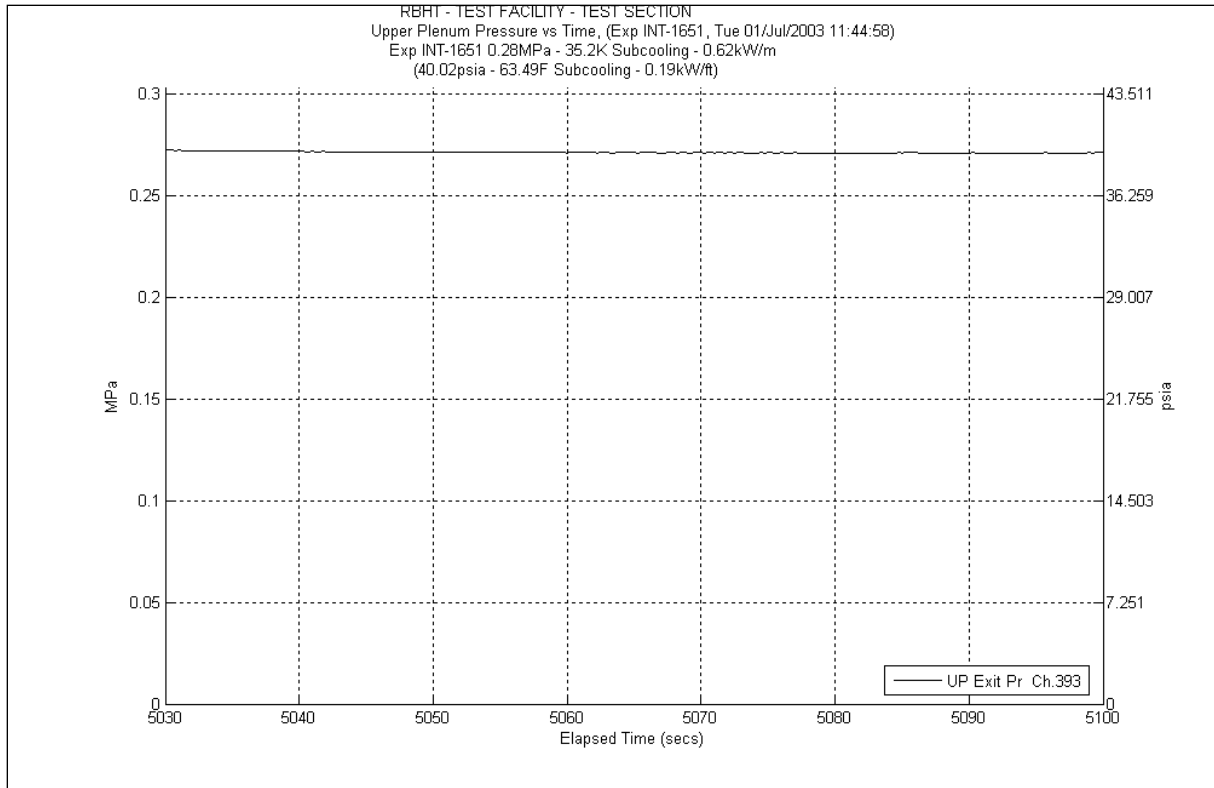


Figure A-463 System Pressure Plot for Experiment 1651F

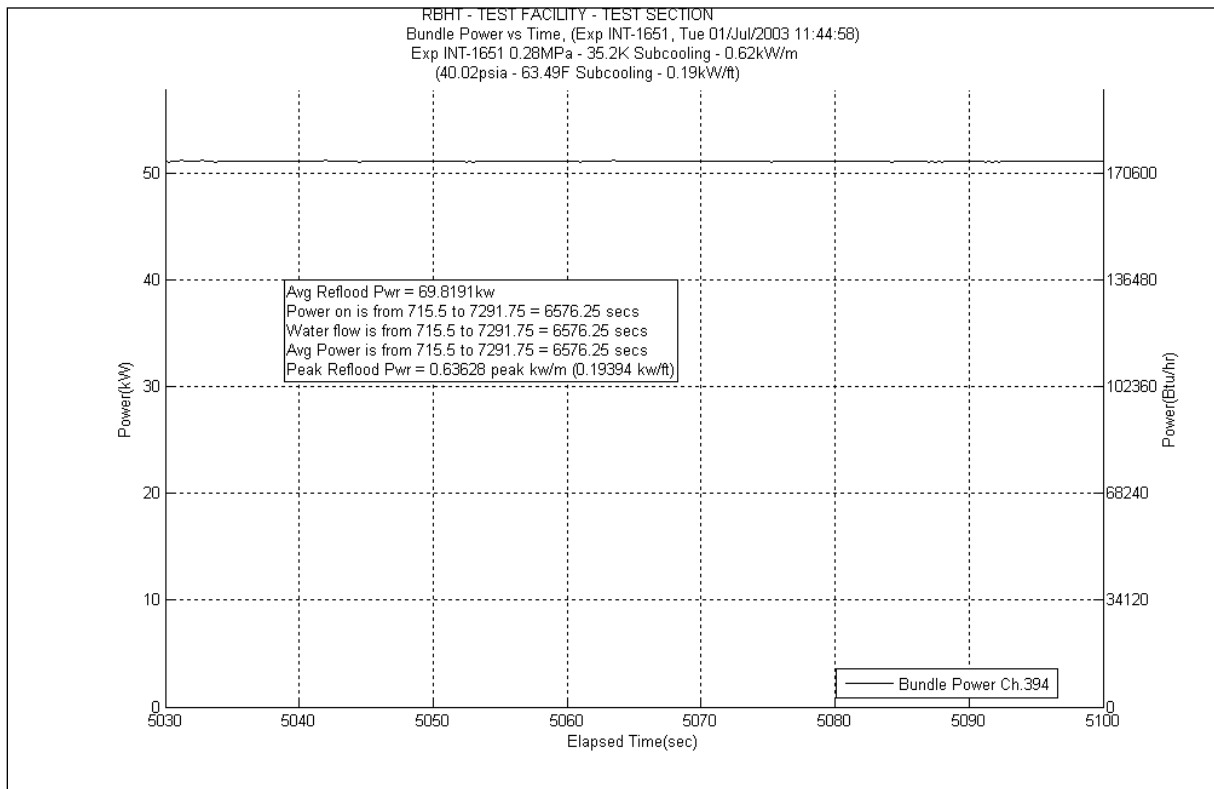


Figure A-464 Bundle Power Plot for Experiment 1651F

Table A-185 Data Results for RBHT Test 1651F for Time Period 4959 to 5100 seconds

Results for RBHT Test 1651
Valid Time Period 4959 to 5100 seconds
Collapsed Liquid Level = 105.572 inches = 2681.53 mm
(Z_{cvs}) Onset of Significant Void = 55 inches = 1397 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fic} (lbf/ft ²)	ΔP_{fic} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.556	25.349	1213.700	0.365	17.476	0.092	4.405	0.000	0.000	24.88	1191.261	5784.88	276981.5411	0.564	0.561	0.567
*	120-133	3048-3378	383	0.609	26.403	1264.177	0.398	19.056	0.165	7.900	-3.650	-174.768	29.49	1411.989	5814.37	278393.5299	0.563	0.560	0.566
*	108-120	2743-3048	382	0.496	31.414	1504.132	0.322	15.417	0.206	9.863	3.526	168.847	27.36	1310.004	5841.73	279703.5337	0.561	0.558	0.564
	100-108	2540-2743	381	0.552	18.628	891.936	0.185	8.858	0.150	7.182	0.000	0.000	18.29	875.730	5860.02	280579.2636	0.56	0.557	0.563
	97-100	2464-2540	380	0.415	9.119	436.643	0.063	3.016	0.054	2.586	0.000	0.000	9	430.922	5869.02	281010.1859	0.422	0.420	0.424
	93-97	2362-2464	379	0.441	11.617	556.248	0.078	3.735	0.071	3.399	0.000	0.000	11.47	549.187	5880.49	281559.3725	0.448	0.446	0.450
*	85-93	2159-2362	378	0.347	27.146	1299.735	0.136	6.512	0.136	6.512	4.274	204.618	22.6	1082.094	5903.09	282641.4663	0.456	0.454	0.458
	81-85	2057-2159	377	0.458	11.264	539.339	0.058	2.777	0.065	3.112	0.000	0.000	11.14	533.386	5914.23	283174.8524	0.464	0.462	0.466
	78-81	1981-2057	376	0.343	10.236	490.105	0.039	1.867	0.048	2.298	0.000	0.000	10.14	485.506	5924.37	283660.3582	0.349	0.347	0.351
	75-78	1905-1981	375	0.309	10.771	515.717	0.035	1.676	0.047	2.250	0.000	0.000	10.69	511.840	5935.06	284172.1981	0.314	0.312	0.316
	72-75	1829-1905	374	0.251	11.669	558.734	0.030	1.436	0.045	2.155	0.000	0.000	11.59	554.932	5946.65	284727.1303	0.256	0.255	0.257
*	67-72	1702-1829	373	0.191	21.017	1006.319	0.041	1.963	0.073	3.495	-0.677	-32.395	21.58	1033.256	5968.23	285760.3862	0.169	0.168	0.170
	63-67	1600-1702	372	0.078	19.153	917.051	0.023	1.101	0.057	2.729	0.000	0.000	19.07	913.077	5987.3	286673.4627	0.082	0.078	0.086
	60-63	1524-1600	371	0.032	15.076	721.854	0.010	0.479	0.041	1.963	0.000	0.000	15.02	719.161	6002.32	287392.6242	0.036	0.034	0.038
	57-60	1448-1524	370	0.066	14.557	696.988	0.004	0.192	0.018	0.862	0.000	0.000	14.53	695.700	6016.85	288088.3243	0.067	0.064	0.070
	53-57	1346-1448	369	0.053	19.678	942.165	0.001	0.048	0.000	0.000	0.000	0.000	19.67	941.805	6036.52	289030.129	0.053	0.050	0.056
*	46-53	1168-1346	368	0.051	34.489	1651.338	0.001	0.048	0.000	0.000	-0.162	-7.761	34.65	1659.051	6071.17	290689.1799	0.047	0.045	0.049
	43-46	1092-1168	367	0.040	14.957	716.135	0.001	0.048	0.000	0.000	0.000	0.000	14.95	715.810	6086.12	291404.9897	0.04	0.038	0.042
	37-43	940-1092	366	0.039	29.934	1433.265	0.001	0.048	0.000	0.000	0.000	0.000	29.92	1432.577	6116.04	292837.567	0.039	0.037	0.041
*	25-37	635-940	365	0.031	60.367	2890.400	0.003	0.144	0.000	0.000	0.224	10.738	60.14	2879.519	6176.18	295717.0857	0.035	0.033	0.037
	13-25	330-635	364	0.030	60.461	2894.876	0.003	0.144	0.000	0.000	0.000	0.000	60.44	2893.883	6236.62	298610.9684	0.03	0.029	0.032
*	0-13	0-330	363	0.021	66.121	3165.913	0.003	0.144	0.000	0.000	-0.362	-17.310	66.48	3183.079	6303.1	301794.0479	0.015	0.014	0.016

Table A-186 Energy Balance Results for RBHT Test 1651F for Time Period 4959 to 5100 seconds

Results for RBHT Test 1651 Valid Time Period 4959 to 5100 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2327.6329	7.3427	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
0.25	6.35	2456.9458	7.7506	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
0.50	12.70	2586.2588	8.1585	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
0.75	19.05	2715.5717	8.5665	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
1.00	25.40	2844.8847	8.9744	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
1.25	31.75	2974.1976	9.3823	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
1.50	38.10	3103.5105	9.7902	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
1.75	44.45	3232.8235	10.198	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
2.00	50.80	3362.1364	10.606	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
2.25	57.15	3491.4494	11.014	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
2.50	63.50	3620.7623	11.422	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
2.75	69.85	3750.0752	11.83	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
3.00	76.20	3879.3882	12.238	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
3.25	82.55	4008.7011	12.646	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
3.50	88.90	4138.0141	13.054	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
3.75	95.25	4267.327	13.462	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
4.00	101.60	4396.6399	13.87	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
4.25	107.95	4525.9529	14.277	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
4.50	114.30	4655.2658	14.685	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
4.75	120.65	4784.5788	15.093	0.00E+00	0.00E+00	0.00E+00	6.96E-02	3.15E-02
5.00	127.00	4913.8917	15.501	3.40E-03	1.45E-01	6.56E-02	6.93E-02	3.14E-02
5.25	133.35	5043.2046	15.909	1.11E-02	4.71E-01	2.14E-01	6.88E-02	3.12E-02
5.50	139.70	5172.5176	16.317	1.90E-02	8.07E-01	3.66E-01	6.82E-02	3.10E-02
5.75	146.05	5301.8305	16.725	2.70E-02	1.15E+00	5.22E-01	6.77E-02	3.07E-02
6.00	152.40	5431.1435	17.133	3.53E-02	1.50E+00	6.82E-01	6.71E-02	3.04E-02
6.25	158.75	5560.4564	17.541	4.38E-02	1.86E+00	8.45E-01	6.65E-02	3.02E-02
6.50	165.10	5689.7693	17.949	5.25E-02	2.23E+00	1.01E+00	6.59E-02	2.99E-02
6.75	171.45	5819.0823	18.357	6.13E-02	2.61E+00	1.18E+00	6.53E-02	2.96E-02
7.00	177.80	5948.3952	18.765	7.04E-02	3.00E+00	1.36E+00	6.47E-02	2.93E-02
7.25	184.15	6077.7081	19.173	7.97E-02	3.39E+00	1.54E+00	6.40E-02	2.90E-02
7.50	190.50	6207.0211	19.58	8.92E-02	3.80E+00	1.72E+00	6.34E-02	2.87E-02
7.75	196.85	6336.334	19.988	9.88E-02	4.21E+00	1.91E+00	6.27E-02	2.84E-02
8.00	203.20	6465.647	20.396	1.09E-01	4.63E+00	2.10E+00	6.20E-02	2.81E-02
8.25	209.55	6594.9599	20.804	1.19E-01	5.06E+00	2.29E+00	6.13E-02	2.78E-02
8.50	215.90	6724.2728	21.212	1.29E-01	5.49E+00	2.49E+00	6.06E-02	2.75E-02
8.75	222.25	6853.5858	21.62	1.40E-01	5.94E+00	2.69E+00	5.98E-02	2.71E-02
9.00	228.60	6982.8987	22.028	1.50E-01	6.39E+00	2.90E+00	5.91E-02	2.68E-02
9.25	234.95	6594.9599	20.804	1.61E-01	6.84E+00	3.10E+00	5.84E-02	2.65E-02
9.50	241.30	6207.0211	19.58	1.71E-01	7.26E+00	3.29E+00	5.77E-02	2.62E-02
9.75	247.65	5819.0823	18.357	1.80E-01	7.65E+00	3.47E+00	5.70E-02	2.59E-02
10.00	254.00	5431.1435	17.133	1.89E-01	8.03E+00	3.64E+00	5.64E-02	2.56E-02
10.25	260.35	5043.2046	15.909	1.97E-01	8.37E+00	3.80E+00	5.59E-02	2.53E-02
10.50	266.70	4655.2658	14.685	2.04E-01	8.69E+00	3.94E+00	5.54E-02	2.51E-02
10.75	273.05	4267.327	13.462	2.11E-01	8.98E+00	4.07E+00	5.49E-02	2.49E-02
11.00	279.40	3879.3882	12.238	2.17E-01	9.25E+00	4.19E+00	5.44E-02	2.47E-02
11.25	285.75	3491.4494	11.014	2.23E-01	9.49E+00	4.30E+00	5.40E-02	2.45E-02
11.50	292.10	3103.5105	9.7902	2.28E-01	9.71E+00	4.40E+00	5.37E-02	2.44E-02
11.75	298.45	2715.5717	8.5665	2.33E-01	9.90E+00	4.49E+00	5.34E-02	2.42E-02
12.00	304.80	2327.6329	7.3427	2.36E-01	1.01E+01	4.56E+00	5.31E-02	2.41E-02

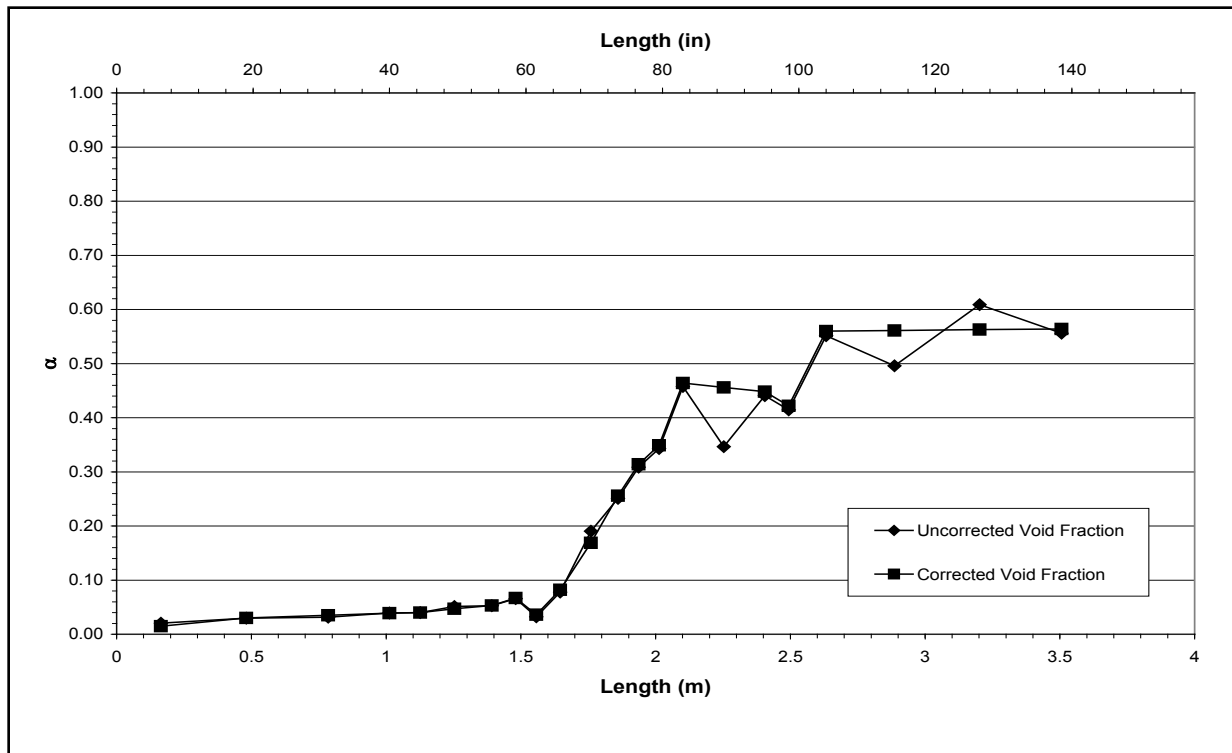


Figure A-465 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1651F for Time Period 4959 to 5100 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1651-G

Test Conditions

Date: 7/1/2003

Steady-state time window: 5280 – 5379 seconds

Inlet flow rate: 2.024 cm/sec (0.797 in./sec)

Inlet mass flow rate: 0.096 kg/sec (0.211 lbm/sec)

Inlet flow temperature: 348.2 K (167.0 °F)

Upper plenum pressure: 271.7 kPa (39.4 psia)

Bundle power: 72.27 kW

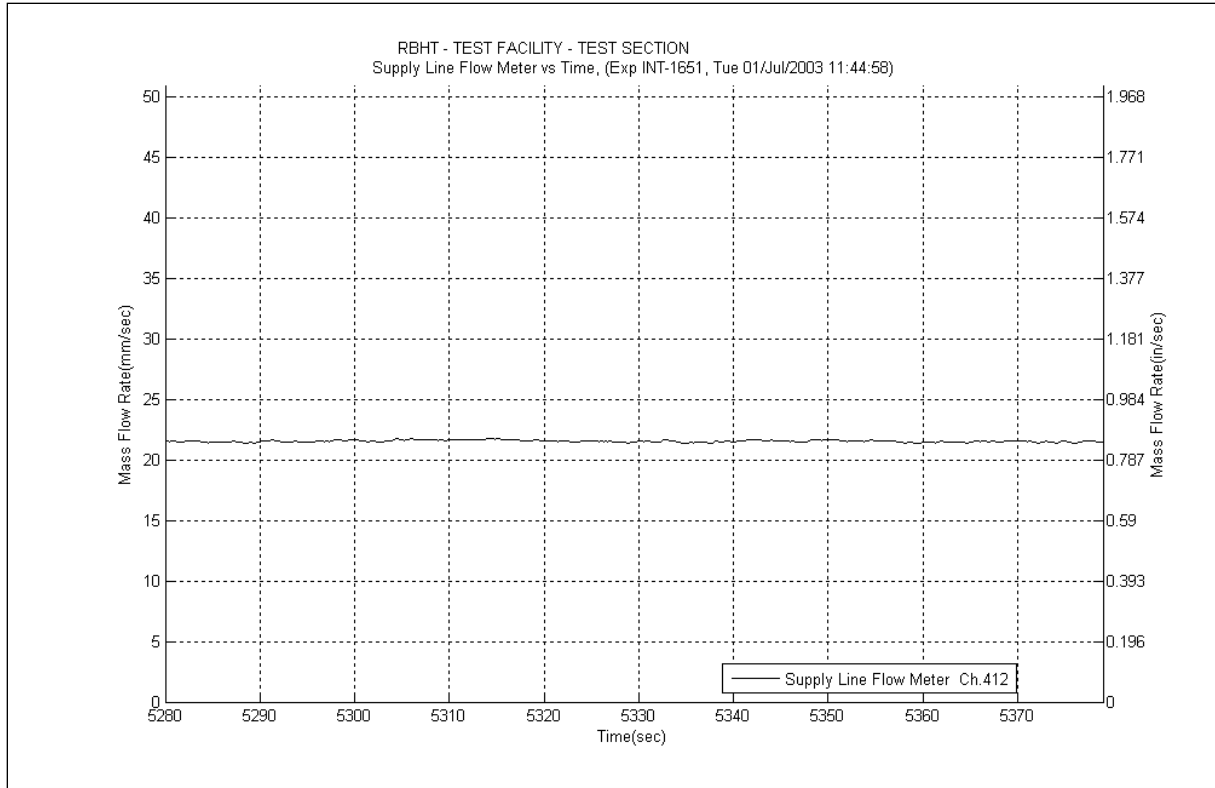


Figure A-466 Inlet Flow Plot for Experiment 1651G

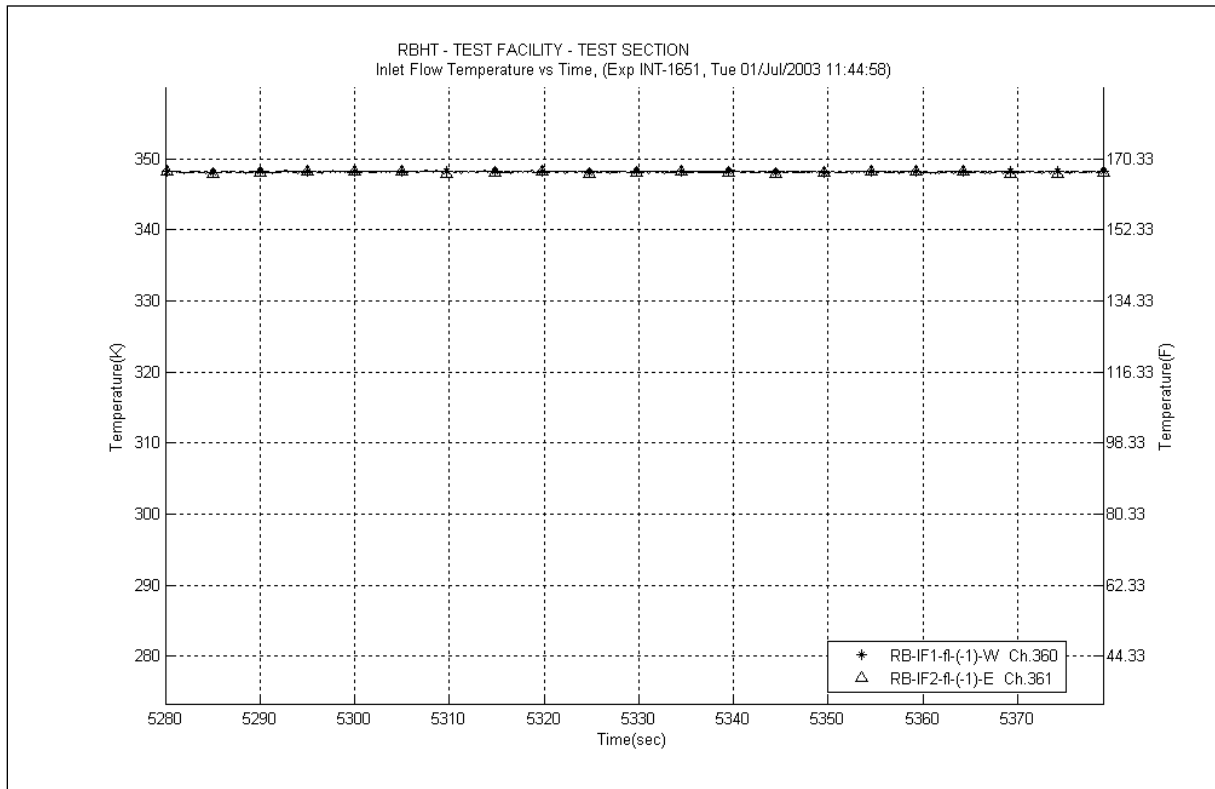


Figure A-467 Inlet Temperature Plot for Experiment 1651G

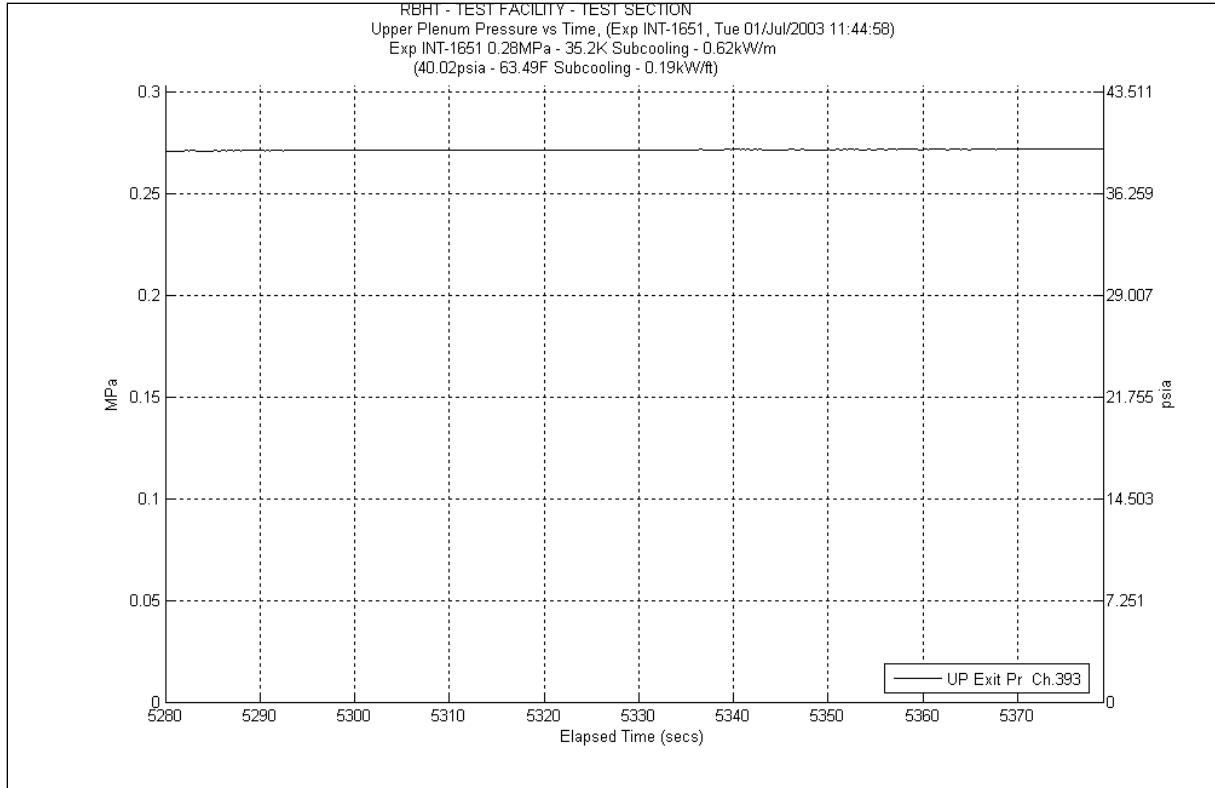


Figure A-468 System Pressure Plot for Experiment 1651G

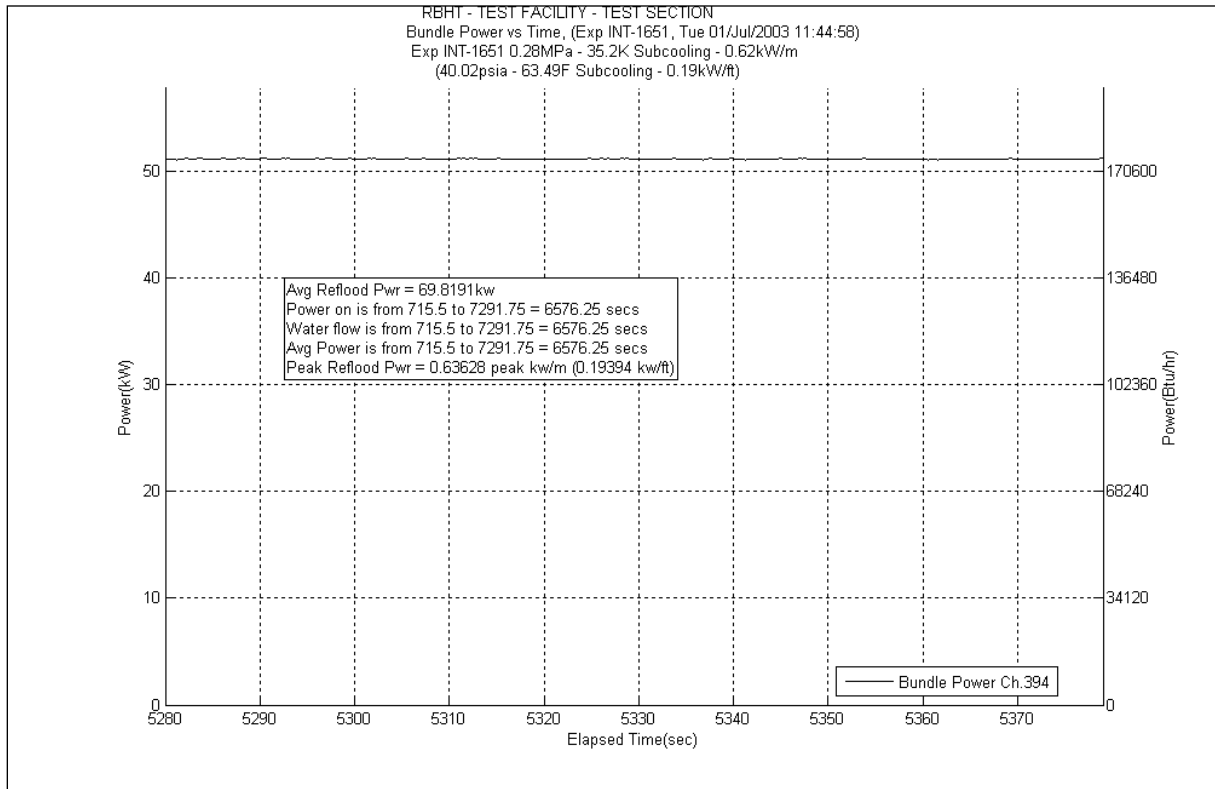


Figure A-469 Bundle Power Plot for Experiment 1651G

Table A-187 Data Results for RBHT Test 1651G for Time Period 5280 to 5379 seconds

Results for RBHT Test 1651
Valid Time Period 5280 to 5379 seconds
Collapsed Liquid Level = 104.856 inches = 2663.33 mm
(Z_{osv}) Onset of Significant Void = 55 inches = 1397 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{unconnected}$	$\Delta P_{unconnected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.567	24.715	1183.363	0.363	17.381	0.091	4.357	0.000	0.000	24.25	1161.096	5784.25	276951.3766	0.575	0.572	0.578
*	120-133	3048-3378	383	0.617	25.873	1238.814	0.396	18.961	0.163	7.804	-3.386	-162.114	28.7	1374.163	5812.95	278325.5399	0.575	0.572	0.578
*	108-120	2743-3048	382	0.502	31.015	1484.985	0.320	15.322	0.204	9.768	3.921	187.718	26.57	1272.178	5839.52	279597.7184	0.574	0.571	0.577
	100-108	2540-2743	381	0.565	18.078	865.578	0.184	8.810	0.149	7.134	0.000	0.000	17.74	849.396	5857.26	280447.1141	0.573	0.570	0.576
	97-100	2464-2540	380	0.425	8.953	428.686	0.062	2.969	0.054	2.586	0.000	0.000	8.833	422.926	5866.093	280870.0404	0.433	0.431	0.435
	93-97	2362-2464	379	0.452	11.389	545.307	0.077	3.687	0.070	3.352	0.000	0.000	11.24	538.174	5877.333	281408.2145	0.459	0.457	0.461
*	85-93	2159-2362	378	0.360	26.585	1272.880	0.135	6.464	0.135	6.464	4.385	209.938	21.93	1050.014	5899.263	282458.2286	0.472	0.470	0.474
	81-85	2057-2159	377	0.479	10.818	517.955	0.058	2.777	0.065	3.112	0.000	0.000	10.69	511.840	5909.953	282970.0685	0.485	0.483	0.487
	78-81	1981-2057	376	0.360	9.971	477.423	0.039	1.867	0.047	2.250	0.000	0.000	9.884	473.248	5919.837	283443.317	0.365	0.363	0.367
	75-78	1905-1981	375	0.333	10.397	497.813	0.035	1.676	0.046	2.202	0.000	0.000	10.31	493.645	5930.147	283936.9624	0.338	0.336	0.340
	72-75	1829-1905	374	0.266	11.441	547.794	0.031	1.484	0.045	2.155	0.000	0.000	11.36	543.920	5941.507	284480.8821	0.271	0.270	0.272
*	67-72	1702-1829	373	0.232	19.937	954.598	0.042	2.011	0.073	3.495	-0.778	-37.242	20.6	986.333	5962.107	285467.2154	0.206	0.205	0.207
	63-67	1600-1702	372	0.138	17.901	857.124	0.024	1.149	0.056	2.681	0.000	0.000	17.81	852.747	5979.917	286319.9628	0.142	0.141	0.143
	60-63	1524-1600	371	0.049	14.822	709.670	0.011	0.527	0.041	1.963	0.000	0.000	14.76	706.713	5994.677	287026.6754	0.052	0.049	0.055
	57-60	1448-1524	370	0.070	14.484	693.507	0.005	0.239	0.024	1.149	0.000	0.000	14.45	691.870	6009.127	287718.5451	0.072	0.068	0.076
	53-57	1346-1448	369	0.055	19.641	940.424	0.001	0.048	0.000	0.000	0.000	0.000	19.63	939.889	6028.757	288658.4346	0.055	0.052	0.058
*	46-53	1168-1346	368	0.053	34.437	1648.851	0.001	0.048	0.000	0.000	-0.154	-7.375	34.59	1656.178	6063.347	290314.6126	0.048	0.046	0.050
	43-46	1092-1168	367	0.041	14.936	715.140	0.001	0.048	0.000	0.000	0.000	0.000	14.93	714.852	6078.277	291029.4649	0.042	0.040	0.044
	37-43	940-1092	366	0.040	29.914	1432.270	0.001	0.048	0.000	0.000	0.000	0.000	29.9	1431.620	6108.177	292461.0846	0.04	0.038	0.042
*	25-37	635-940	365	0.032	60.357	2889.903	0.002	0.096	0.000	0.000	0.235	11.246	60.12	2878.561	6168.297	295339.6456	0.035	0.033	0.037
	13-25	330-635	364	0.030	60.461	2894.876	0.002	0.096	0.000	0.000	0.000	0.000	60.44	2893.883	6228.737	298233.5283	0.03	0.029	0.032
*	0-13	0-330	363	0.021	66.116	3165.665	0.003	0.144	0.000	0.000	-0.367	-17.558	66.48	3183.079	6295.217	301416.6078	0.015	0.014	0.016

Table A-188 Energy Balance Results for RBHT Test 1651G for Time Period 5280 to 5379 seconds

Results for RBHT Test 1651 Valid Time Period 5280 to 5379 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2326.4808	7.339	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
0.25	6.35	2455.7298	7.7468	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
0.50	12.70	2584.9787	8.1545	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
0.75	19.05	2714.2276	8.5622	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
1.00	25.40	2843.4766	8.9699	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
1.25	31.75	2972.7255	9.3777	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
1.50	38.10	3101.9744	9.7854	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
1.75	44.45	3231.2234	10.193	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
2.00	50.80	3360.4723	10.601	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
2.25	57.15	3489.7213	11.009	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
2.50	63.50	3618.9702	11.416	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
2.75	69.85	3748.2191	11.824	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
3.00	76.20	3877.4681	12.232	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
3.25	82.55	4006.717	12.639	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
3.50	88.90	4135.9659	13.047	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
3.75	95.25	4265.2149	13.455	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
4.00	101.60	4394.4638	13.863	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
4.25	107.95	4523.7127	14.27	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
4.50	114.30	4652.9617	14.678	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
4.75	120.65	4782.2106	15.086	0.00E+00	0.00E+00	0.00E+00	6.89E-02	3.13E-02
5.00	127.00	4911.4595	15.494	4.46E-03	1.88E-01	8.53E-02	6.86E-02	3.11E-02
5.25	133.35	5040.7085	15.901	1.22E-02	5.15E-01	2.34E-01	6.81E-02	3.09E-02
5.50	139.70	5169.9574	16.309	2.01E-02	8.50E-01	3.86E-01	6.75E-02	3.06E-02
5.75	146.05	5299.2063	16.717	2.83E-02	1.19E+00	5.42E-01	6.70E-02	3.04E-02
6.00	152.40	5428.4553	17.124	3.66E-02	1.55E+00	7.02E-01	6.64E-02	3.01E-02
6.25	158.75	5557.7042	17.532	4.52E-02	1.91E+00	8.65E-01	6.58E-02	2.99E-02
6.50	165.10	5686.9532	17.94	5.39E-02	2.28E+00	1.03E+00	6.52E-02	2.96E-02
6.75	171.45	5816.2021	18.348	6.29E-02	2.66E+00	1.20E+00	6.46E-02	2.93E-02
7.00	177.80	5945.451	18.755	7.20E-02	3.04E+00	1.38E+00	6.40E-02	2.90E-02
7.25	184.15	6074.7	19.163	8.14E-02	3.44E+00	1.56E+00	6.33E-02	2.87E-02
7.50	190.50	6203.9489	19.571	9.09E-02	3.84E+00	1.74E+00	6.27E-02	2.84E-02
7.75	196.85	6333.1978	19.979	1.01E-01	4.25E+00	1.93E+00	6.20E-02	2.81E-02
8.00	203.20	6462.4468	20.386	1.11E-01	4.67E+00	2.12E+00	6.13E-02	2.78E-02
8.25	209.55	6591.6957	20.794	1.21E-01	5.10E+00	2.31E+00	6.06E-02	2.75E-02
8.50	215.90	6720.9446	21.202	1.31E-01	5.54E+00	2.51E+00	5.99E-02	2.72E-02
8.75	222.25	6850.1936	21.609	1.42E-01	5.98E+00	2.71E+00	5.92E-02	2.68E-02
9.00	228.60	6979.4425	22.017	1.53E-01	6.44E+00	2.92E+00	5.84E-02	2.65E-02
9.25	234.95	6591.6957	20.794	1.63E-01	6.89E+00	3.12E+00	5.77E-02	2.62E-02
9.50	241.30	6203.9489	19.571	1.73E-01	7.30E+00	3.31E+00	5.70E-02	2.59E-02
9.75	247.65	5816.2021	18.348	1.82E-01	7.70E+00	3.49E+00	5.64E-02	2.56E-02
10.00	254.00	5428.4553	17.124	1.91E-01	8.07E+00	3.66E+00	5.58E-02	2.53E-02
10.25	260.35	5040.7085	15.901	1.99E-01	8.41E+00	3.82E+00	5.52E-02	2.50E-02
10.50	266.70	4652.9617	14.678	2.07E-01	8.73E+00	3.96E+00	5.47E-02	2.48E-02
10.75	273.05	4265.2149	13.455	2.14E-01	9.02E+00	4.09E+00	5.42E-02	2.46E-02
11.00	279.40	3877.4681	12.232	2.20E-01	9.29E+00	4.21E+00	5.38E-02	2.44E-02
11.25	285.75	3489.7213	11.009	2.26E-01	9.53E+00	4.32E+00	5.34E-02	2.42E-02
11.50	292.10	3101.9744	9.7854	2.31E-01	9.75E+00	4.42E+00	5.30E-02	2.40E-02
11.75	298.45	2714.2276	8.5622	2.36E-01	9.94E+00	4.51E+00	5.27E-02	2.39E-02
12.00	304.80	2326.4808	7.339	2.39E-01	1.01E+01	4.58E+00	5.24E-02	2.38E-02

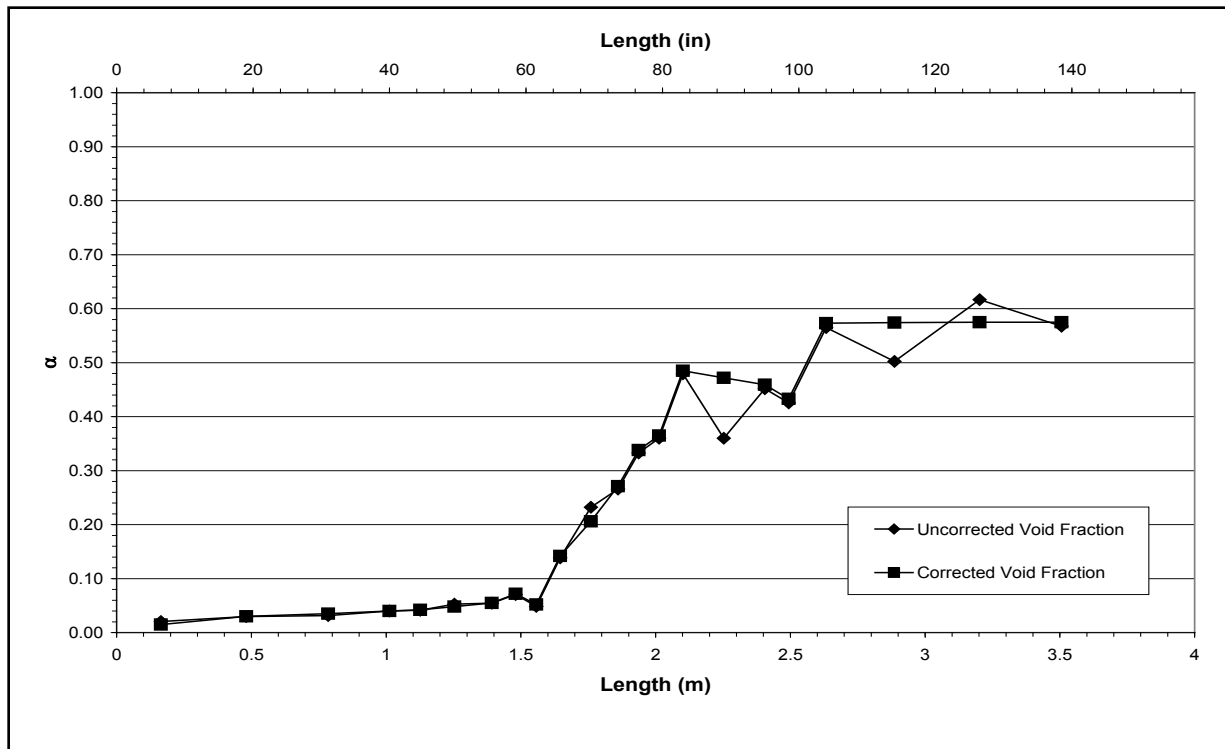


Figure A-470 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1651G for Time Period 5280 to 5379 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1651-H

Test Conditions

Date: 7/1/2003

Steady-state time window: 1590 – 1650 seconds

Inlet flow rate: 1.509 cm/sec (0.594 in./sec)

Inlet mass flow rate: 0.071 kg/sec (0.157 lbm/sec)

Inlet flow temperature: 348.2 K (167.0 °F)

Upper plenum pressure: 271.7 kPa (39.4 psia)

Bundle power: 72.27 kW

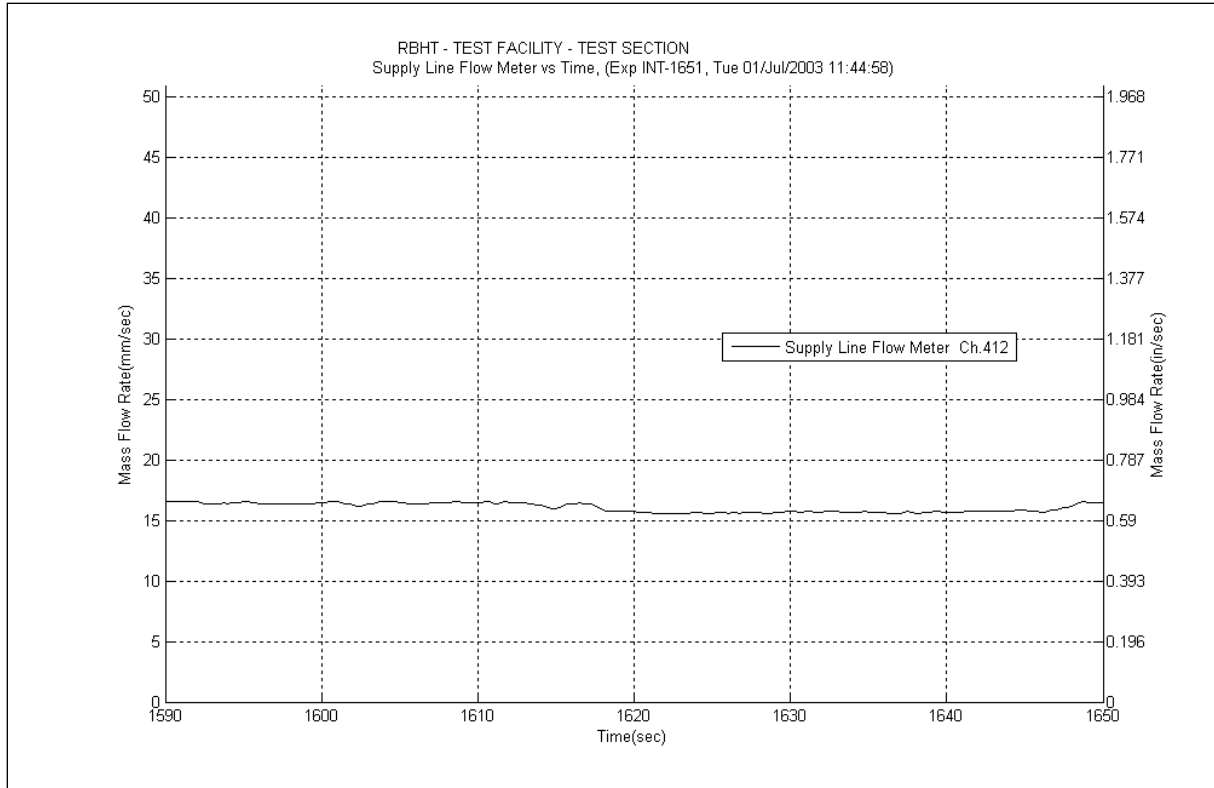


Figure A-471 Inlet Flow Plot for Experiment 1651H

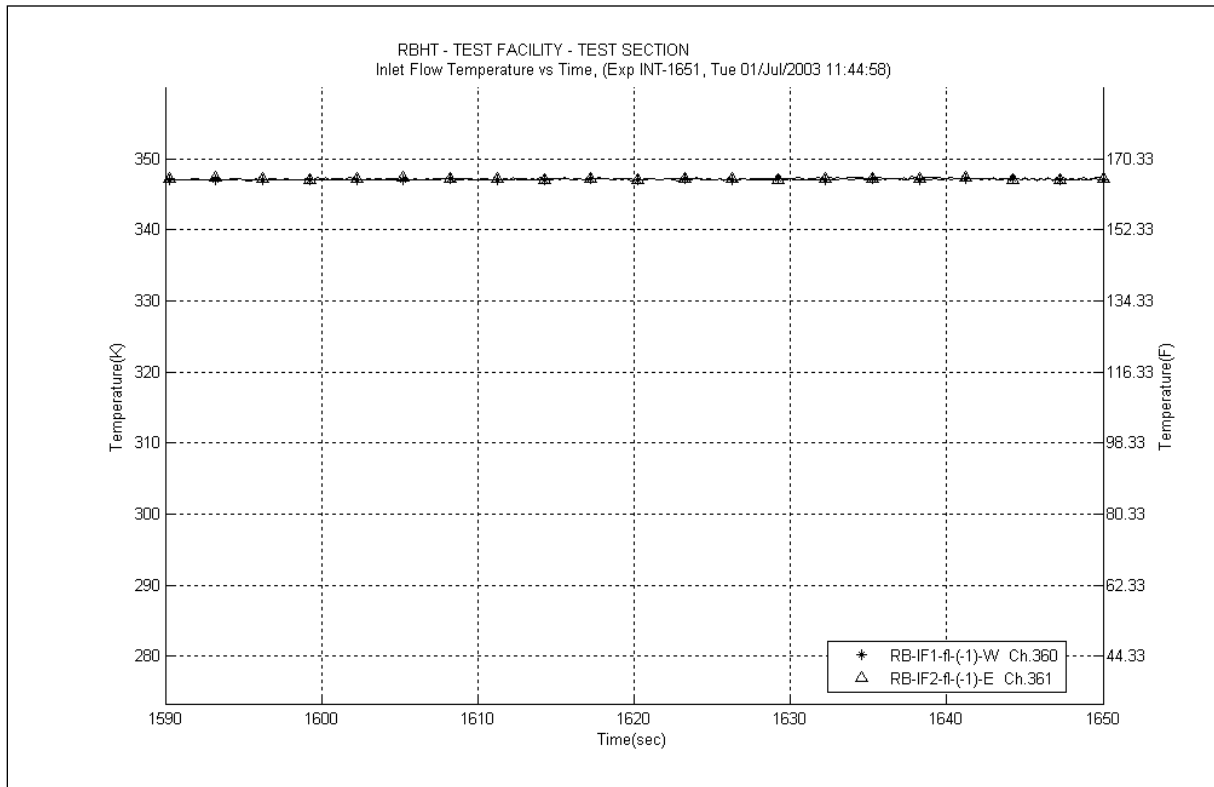


Figure A-472 Inlet Temperature Plot for Experiment 1651H

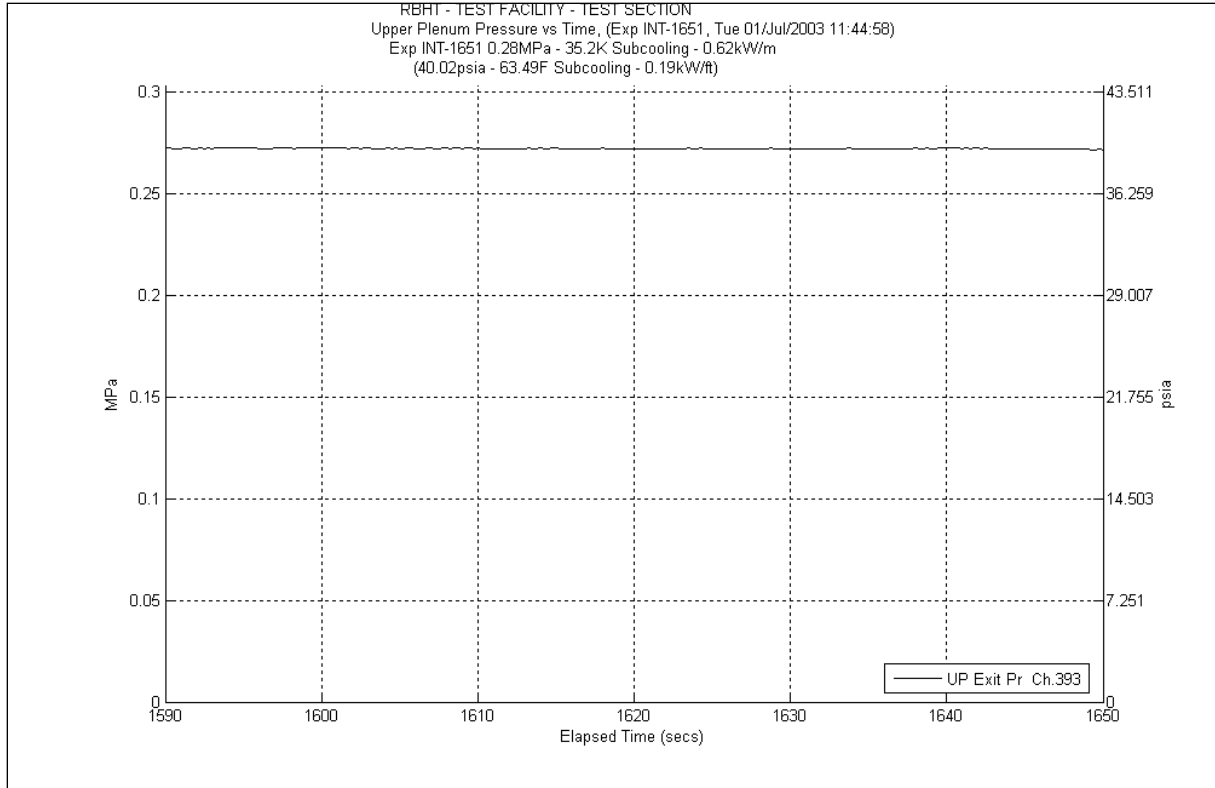


Figure A-473 System Pressure Plot for Experiment 1651H

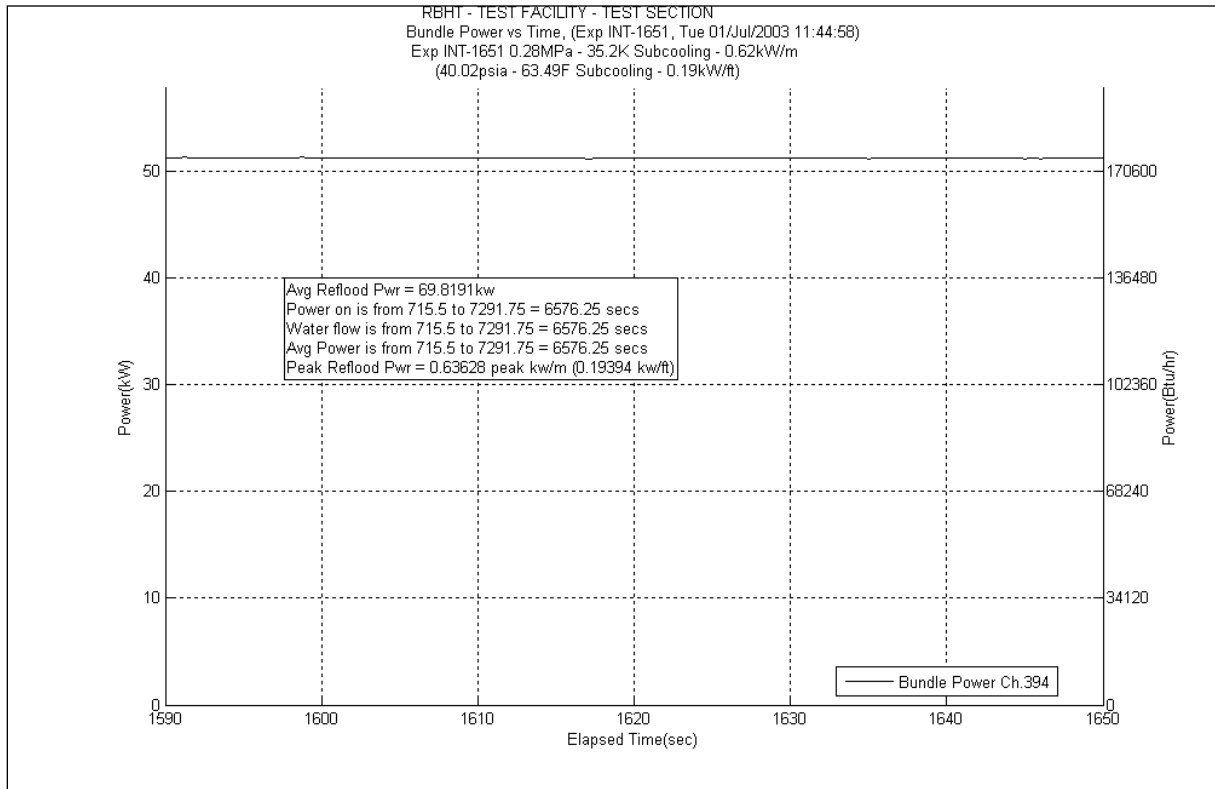


Figure A-474 Bundle Power Plot for Experiment 1651H

Table A-189 Data Results for RBHT Test 1651H for Time Period 1590 to 1650 seconds

Results for RBHT Test 1651
Valid Time Period 1590 to 1650 seconds
Collapsed Liquid Level = 97.834 inches = 2484.98 mm
(Z_{OSV}) Onset of Significant Void = 44.5 inches = 1130 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.623	21.558	1032.179	0.284	13.598	0.068	3.256	0.000	0.000	21.2	1015.061	5781.2	276805.3418	0.629	0.626	0.632
*	120-133	3048-3378	383	0.650	23.656	1132.637	0.311	14.891	0.122	5.841	-1.977	-94.678	25.2	1206.582	5806.4	278011.9242	0.627	0.624	0.630
*	108-120	2743-3048	382	0.539	28.761	1377.068	0.255	12.209	0.152	7.278	4.824	230.958	23.53	1126.622	5829.93	279138.5467	0.622	0.619	0.625
	100-108	2540-2743	381	0.614	16.037	767.856	0.148	7.086	0.111	5.315	0.000	0.000	15.77	755.072	5845.7	279893.6183	0.62	0.617	0.623
	97-100	2464-2540	380	0.461	8.403	402.329	0.051	2.442	0.040	1.915	0.000	0.000	8.31	397.885	5854.01	280291.5033	0.467	0.465	0.469
	93-97	2362-2464	379	0.495	10.501	502.786	0.064	3.064	0.052	2.490	0.000	0.000	10.38	496.997	5864.39	280788.5003	0.5	0.498	0.503
*	85-93	2159-2362	378	0.393	25.203	1206.737	0.115	5.506	0.101	4.836	5.687	272.306	19.3	924.089	5883.69	281712.5893	0.535	0.532	0.538
	81-85	2057-2159	377	0.566	9.016	431.670	0.051	2.442	0.048	2.298	0.000	0.000	8.916	426.900	5892.606	282139.4897	0.571	0.568	0.574
	78-81	1981-2057	376	0.413	9.140	437.638	0.035	1.676	0.035	1.676	0.000	0.000	9.064	433.987	5901.67	282573.4763	0.418	0.416	0.420
	75-78	1905-1981	375	0.418	9.073	434.405	0.033	1.580	0.034	1.628	0.000	0.000	9.001	430.970	5910.671	283004.4465	0.422	0.420	0.424
	72-75	1829-1905	374	0.316	10.662	510.495	0.030	1.436	0.034	1.628	0.000	0.000	10.59	507.052	5921.261	283511.4984	0.32	0.318	0.322
*	67-72	1702-1829	373	0.318	17.720	848.421	0.044	2.107	0.054	2.586	0.792	37.904	16.83	805.825	5938.091	284317.3232	0.352	0.350	0.354
	63-67	1600-1702	372	0.380	12.874	616.423	0.030	1.436	0.042	2.011	0.000	0.000	12.8	612.867	5950.891	284930.1905	0.384	0.382	0.386
	60-63	1524-1600	371	0.279	11.228	537.599	0.019	0.910	0.031	1.484	0.000	0.000	11.18	535.301	5962.071	285465.4917	0.283	0.282	0.284
	57-60	1448-1524	370	0.236	11.908	570.173	0.016	0.766	0.030	1.436	0.000	0.000	11.86	567.860	5973.931	286033.3516	0.239	0.238	0.240
	53-57	1346-1448	369	0.140	17.865	855.383	0.017	0.814	0.038	1.819	0.000	0.000	17.81	852.747	5991.741	286886.099	0.143	0.142	0.144
*	46-53	1168-1346	368	0.063	34.063	1630.948	0.016	0.766	0.053	2.538	1.154	55.256	32.84	1572.388	6024.581	288458.4866	0.096	0.091	0.101
	43-46	1092-1168	367	0.050	14.796	708.427	0.000	0.000	0.000	0.000	0.000	0.000	14.79	708.149	6039.371	289166.6356	0.05	0.048	0.053
	37-43	940-1092	366	0.047	29.711	1422.572	0.001	0.048	0.000	0.000	0.000	0.000	29.7	1422.044	6069.071	290588.6792	0.046	0.044	0.048
*	25-37	635-940	365	0.037	60.014	2873.492	0.001	0.048	0.000	0.000	0.183	8.768	59.83	2864.676	6128.901	293453.355	0.04	0.038	0.042
	13-25	330-635	364	0.033	60.274	2885.924	0.001	0.048	0.000	0.000	0.000	0.000	60.25	2884.785	6189.151	296338.1405	0.033	0.031	0.035
*	0-13	0-330	363	0.022	66.028	3161.437	0.001	0.048	0.000	0.000	-0.353	-16.902	66.38	3178.291	6255.531	299516.432	0.016	0.015	0.017

Table A-190 Energy Balance Results for RBHT Test 1651H for Time Period 1590 to 1650 seconds

Results for RBHT Test 1651 Valid Time Period 1590 to 1650 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2333.2631	7.3604	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
0.25	6.35	2462.8888	7.7694	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
0.50	12.70	2592.5146	8.1783	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
0.75	19.05	2722.1403	8.5872	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
1.00	25.40	2851.766	8.9961	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
1.25	31.75	2981.3917	9.405	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
1.50	38.10	3111.0175	9.8139	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
1.75	44.45	3240.6432	10.223	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
2.00	50.80	3370.2689	10.632	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
2.25	57.15	3499.8947	11.041	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
2.50	63.50	3629.5204	11.45	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
2.75	69.85	3759.1461	11.858	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
3.00	76.20	3888.7718	12.267	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
3.25	82.55	4018.3976	12.676	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
3.50	88.90	4148.0233	13.085	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
3.75	95.25	4277.649	13.494	0.00E+00	0.00E+00	0.00E+00	5.14E-02	2.33E-02
4.00	101.60	4407.2748	13.903	2.37E-03	7.44E-02	3.37E-02	5.13E-02	2.33E-02
4.25	107.95	4536.9005	14.312	1.17E-02	3.68E-01	1.67E-01	5.08E-02	2.30E-02
4.50	114.30	4666.5262	14.721	2.13E-02	6.70E-01	3.04E-01	5.03E-02	2.28E-02
4.75	120.65	4796.1519	15.13	3.12E-02	9.81E-01	4.45E-01	4.98E-02	2.26E-02
5.00	127.00	4925.7777	15.539	4.13E-02	1.30E+00	5.89E-01	4.93E-02	2.23E-02
5.25	133.35	5055.4034	15.948	5.18E-02	1.63E+00	7.38E-01	4.87E-02	2.21E-02
5.50	139.70	5185.0291	16.357	6.24E-02	1.96E+00	8.90E-01	4.82E-02	2.19E-02
5.75	146.05	5314.6549	16.765	7.34E-02	2.31E+00	1.05E+00	4.76E-02	2.16E-02
6.00	152.40	5444.2806	17.174	8.46E-02	2.66E+00	1.21E+00	4.70E-02	2.13E-02
6.25	158.75	5573.9063	17.583	9.61E-02	3.02E+00	1.37E+00	4.64E-02	2.11E-02
6.50	165.10	5703.532	17.992	1.08E-01	3.39E+00	1.54E+00	4.58E-02	2.08E-02
6.75	171.45	5833.1578	18.401	1.20E-01	3.77E+00	1.71E+00	4.52E-02	2.05E-02
7.00	177.80	5962.7835	18.81	1.32E-01	4.16E+00	1.89E+00	4.46E-02	2.02E-02
7.25	184.15	6092.4092	19.219	1.45E-01	4.55E+00	2.06E+00	4.39E-02	1.99E-02
7.50	190.50	6222.0349	19.628	1.58E-01	4.96E+00	2.25E+00	4.33E-02	1.96E-02
7.75	196.85	6351.6607	20.037	1.71E-01	5.37E+00	2.44E+00	4.26E-02	1.93E-02
8.00	203.20	6481.2864	20.446	1.84E-01	5.79E+00	2.63E+00	4.19E-02	1.90E-02
8.25	209.55	6610.9121	20.855	1.98E-01	6.22E+00	2.82E+00	4.12E-02	1.87E-02
8.50	215.90	6740.5379	21.264	2.12E-01	6.66E+00	3.02E+00	4.05E-02	1.84E-02
8.75	222.25	6870.1636	21.672	2.26E-01	7.11E+00	3.22E+00	3.98E-02	1.80E-02
9.00	228.60	6999.7893	22.081	2.41E-01	7.56E+00	3.43E+00	3.90E-02	1.77E-02
9.25	234.95	6610.9121	20.855	2.55E-01	8.01E+00	3.63E+00	3.83E-02	1.74E-02
9.50	241.30	6222.0349	19.628	2.68E-01	8.43E+00	3.82E+00	3.76E-02	1.71E-02
9.75	247.65	5833.1578	18.401	2.81E-01	8.83E+00	4.00E+00	3.70E-02	1.68E-02
10.00	254.00	5444.2806	17.174	2.93E-01	9.20E+00	4.17E+00	3.64E-02	1.65E-02
10.25	260.35	5055.4034	15.948	3.03E-01	9.54E+00	4.33E+00	3.58E-02	1.62E-02
10.50	266.70	4666.5262	14.721	3.14E-01	9.86E+00	4.47E+00	3.53E-02	1.60E-02
10.75	273.05	4277.649	13.494	3.23E-01	1.02E+01	4.60E+00	3.48E-02	1.58E-02
11.00	279.40	3888.7718	12.267	3.31E-01	1.04E+01	4.73E+00	3.44E-02	1.56E-02
11.25	285.75	3499.8947	11.041	3.39E-01	1.07E+01	4.84E+00	3.40E-02	1.54E-02
11.50	292.10	3111.0175	9.8139	3.46E-01	1.09E+01	4.93E+00	3.36E-02	1.52E-02
11.75	298.45	2722.1403	8.5872	3.52E-01	1.11E+01	5.02E+00	3.33E-02	1.51E-02
12.00	304.80	2333.2631	7.3604	3.57E-01	1.12E+01	5.10E+00	3.30E-02	1.50E-02

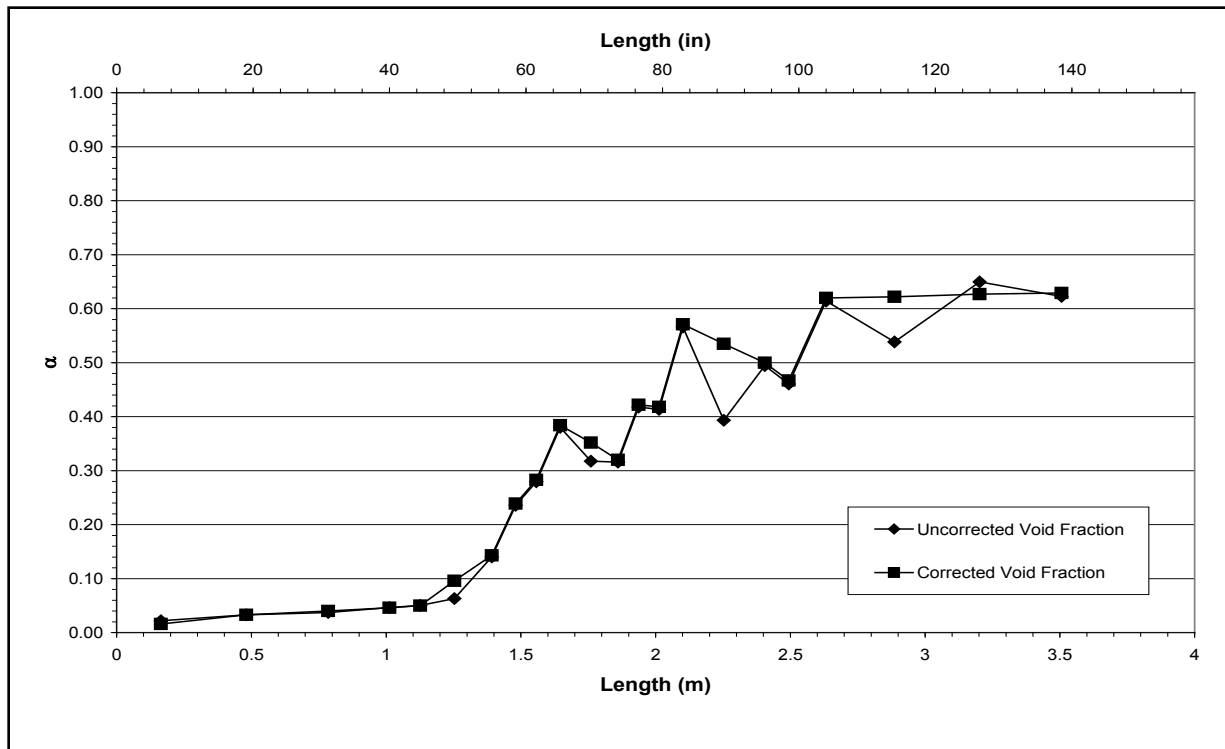


Figure A-475 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1651H for Time Period 1590 to 1650 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1651-I

Test Conditions

Date: 7/1/2003

Steady-state time window: 2415 – 2505 seconds

Inlet flow rate: 1.524 cm/sec (0.600 in./sec)

Inlet mass flow rate: 0.072 kg/sec (0.158 lbm/sec)

Inlet flow temperature: 348.2 K (167.0 °F)

Upper plenum pressure: 271.7 kPa (39.4 psia)

Bundle power: 72.27 kW

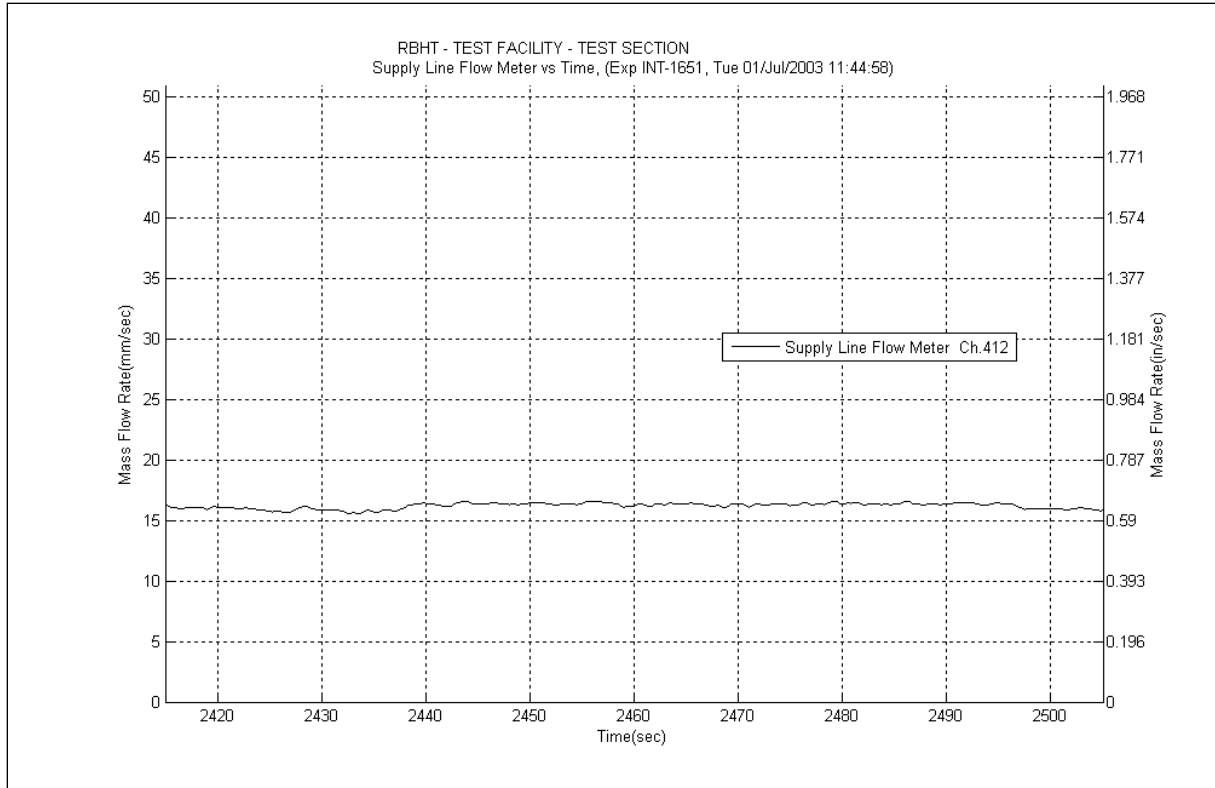


Figure A-476 Inlet Flow Plot for Experiment 16511

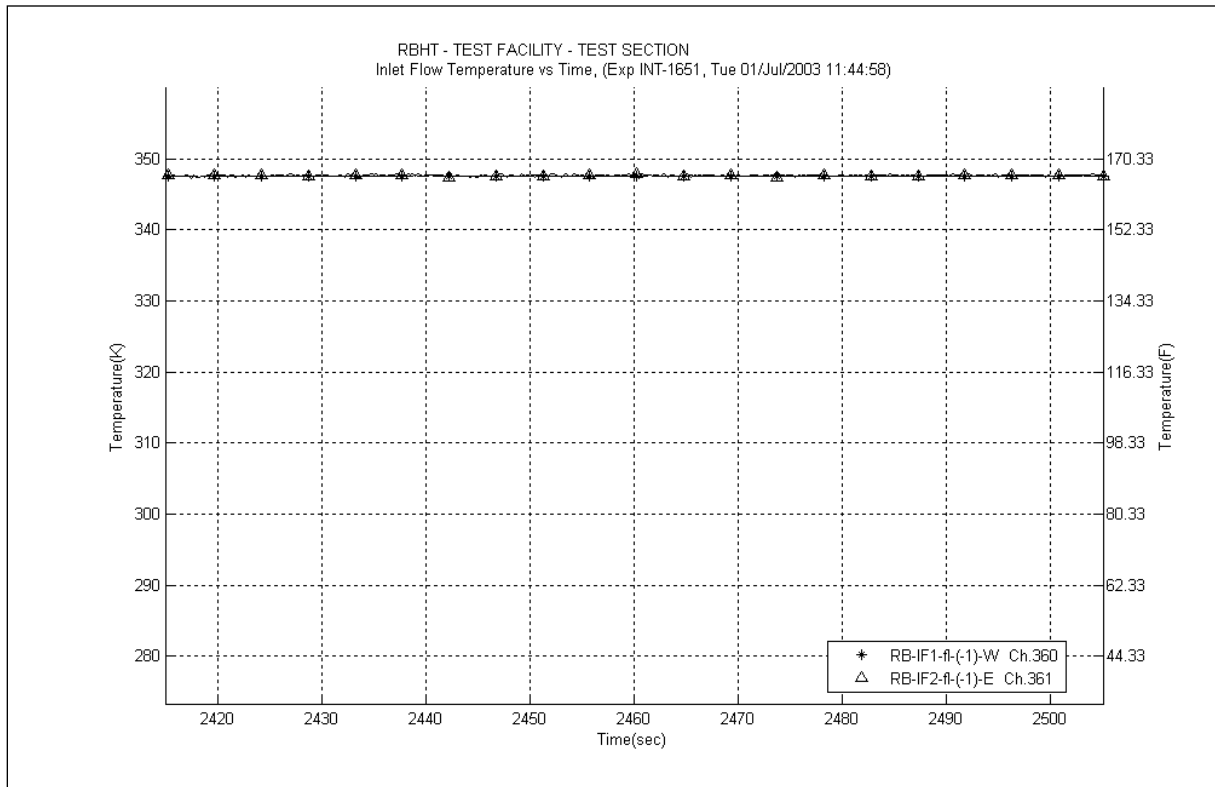


Figure A-477 Inlet Temperature Plot for Experiment 16511

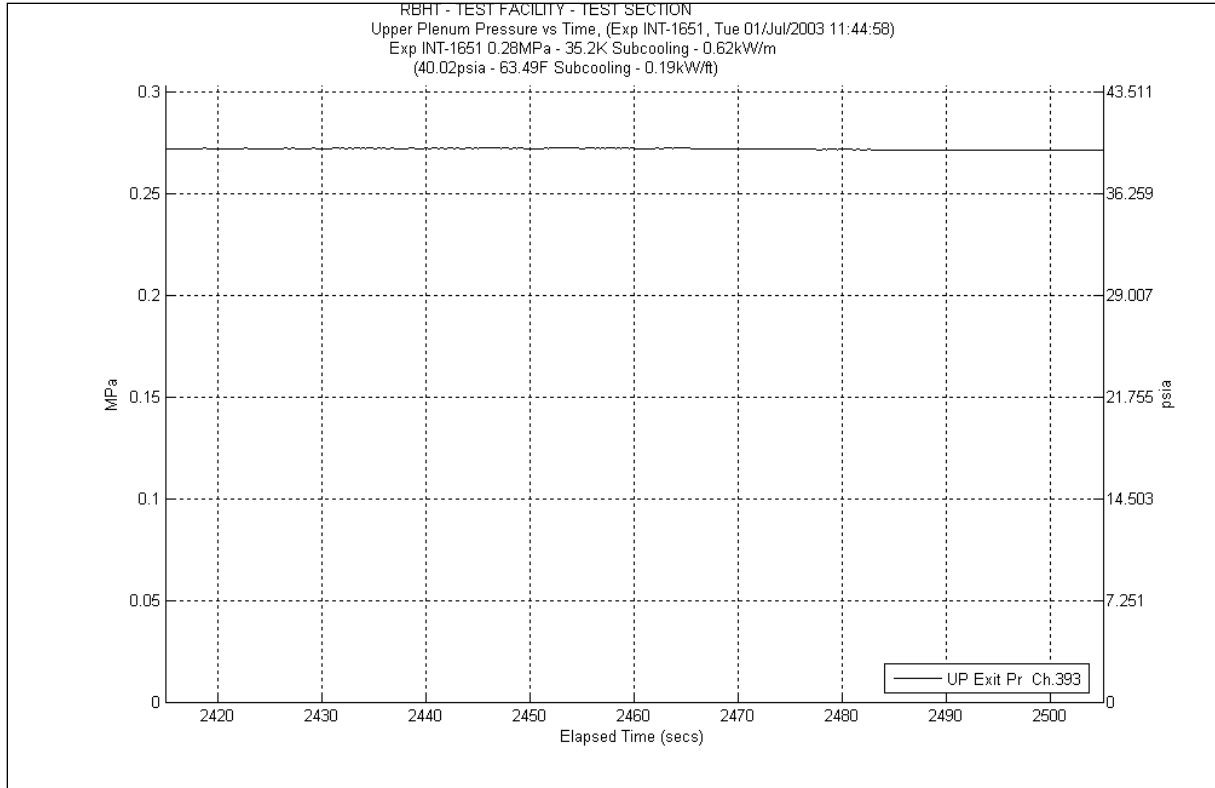


Figure A-478 System Pressure Plot for Experiment 1651I

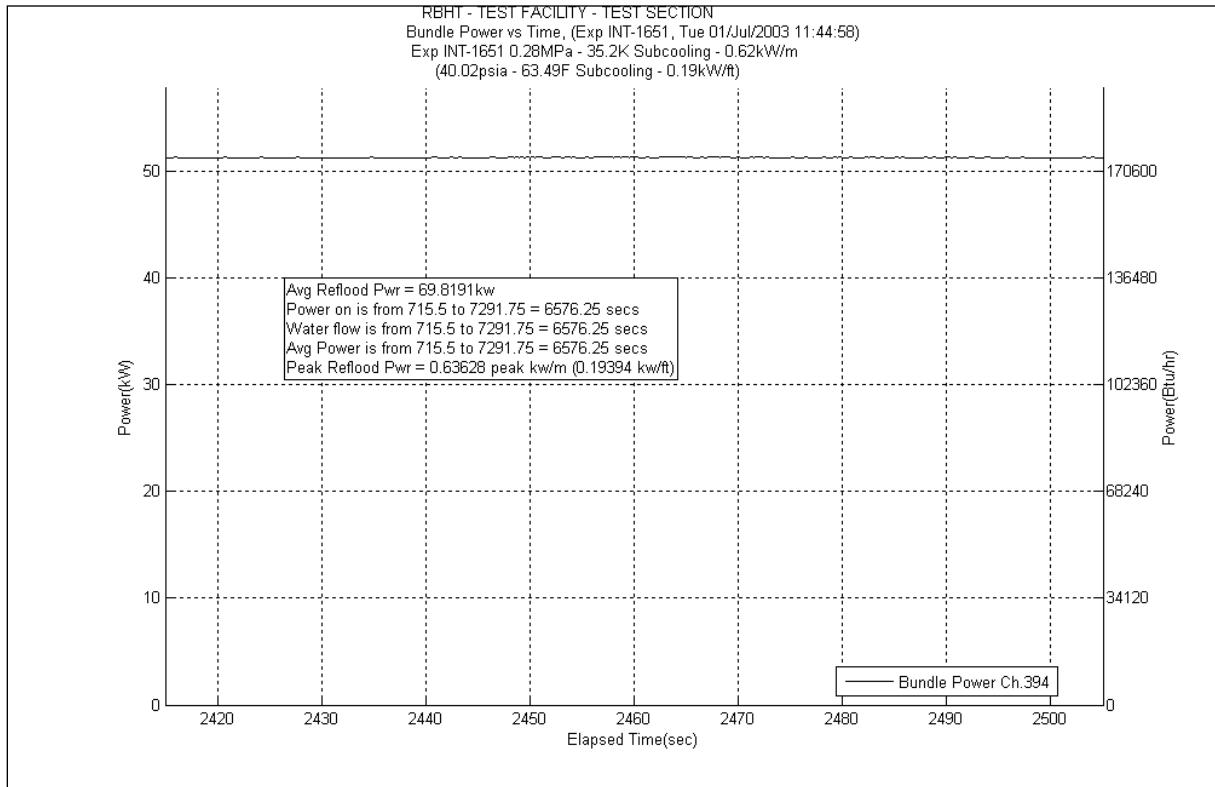


Figure A-479 Bundle Power Plot for Experiment 1651I

Table A-191 Data Results for RBHT Test 16511 for Time Period 2415 to 2505 seconds

Results for RBHT Test 16511
Valid Time Period 2415 to 2505 seconds
Collapsed Liquid Level = 97.502 inches = 2476.54 mm
(Z_{OSL}) Onset of Significant Void = 44.5 inches = 1130 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{accel} (lbf/ft ²)	ΔP_{accel} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.629	21.194	1014.773	0.286	13.694	0.069	3.304	0.000	0.000	20.83	997.346	5780.83	276787.6261	0.635	0.632	0.638
*	120-133	3048-3378	383	0.647	23.806	1139.848	0.314	15.034	0.123	5.889	-1.461	-69.942	24.83	1188.867	5805.66	277976.4929	0.632	0.629	0.635
*	108-120	2743-3048	382	0.540	28.688	1373.587	0.257	12.305	0.153	7.326	4.978	238.346	23.3	1115.610	5828.96	279092.1028	0.626	0.623	0.629
	100-108	2540-2743	381	0.617	15.928	762.634	0.150	7.182	0.112	5.363	0.000	0.000	15.66	749.805	5844.62	279841.9077	0.623	0.620	0.626
	97-100	2464-2540	380	0.468	8.283	396.609	0.051	2.442	0.041	1.963	0.000	0.000	8.19	392.139	5852.81	280234.047	0.474	0.472	0.476
	93-97	2362-2464	379	0.498	10.433	499.554	0.064	3.064	0.053	2.538	0.000	0.000	10.31	493.645	5863.12	280727.6924	0.503	0.500	0.506
*	85-93	2159-2362	378	0.393	25.208	1206.986	0.116	5.554	0.102	4.884	5.810	278.205	19.18	918.343	5882.3	281646.0358	0.538	0.535	0.541
	81-85	2057-2159	377	0.568	8.969	429.432	0.051	2.442	0.049	2.346	0.000	0.000	8.868	424.602	5891.168	282070.6379	0.573	0.570	0.576
	78-81	1981-2057	376	0.416	9.094	435.400	0.035	1.676	0.036	1.724	0.000	0.000	9.018	431.784	5900.186	282502.422	0.421	0.419	0.423
	75-78	1905-1981	375	0.420	9.042	432.914	0.033	1.580	0.035	1.676	0.000	0.000	8.972	429.582	5909.158	282932.0037	0.424	0.422	0.426
	72-75	1829-1905	374	0.318	10.631	509.003	0.030	1.436	0.034	1.628	0.000	0.000	10.56	505.616	5919.718	283437.6192	0.322	0.320	0.324
*	67-72	1702-1829	373	0.323	17.590	842.205	0.045	2.155	0.055	2.633	0.730	34.943	16.76	802.473	5936.478	284240.0923	0.354	0.352	0.356
	63-67	1600-1702	372	0.384	12.807	613.191	0.030	1.436	0.042	2.011	0.000	0.000	12.73	609.516	5949.208	284849.608	0.387	0.385	0.389
	60-63	1524-1600	371	0.283	11.166	534.615	0.020	0.958	0.031	1.484	0.000	0.000	11.11	531.950	5960.318	285381.5576	0.286	0.285	0.287
	57-60	1448-1524	370	0.249	11.706	560.475	0.017	0.814	0.030	1.436	0.000	0.000	11.65	557.805	5971.968	285939.3626	0.252	0.251	0.253
	53-57	1346-1448	369	0.155	17.548	840.215	0.017	0.814	0.039	1.867	0.000	0.000	17.49	837.426	5989.458	286776.7883	0.158	0.157	0.159
*	46-53	1168-1346	368	0.065	34.001	1627.964	0.016	0.766	0.053	2.538	1.382	66.158	32.55	1558.502	6022.008	288335.2907	0.104	0.103	0.105
	43-46	1092-1168	367	0.050	14.796	708.427	0.000	0.000	0.000	0.000	0.000	0.000	14.79	708.149	6036.798	289043.4397	0.051	0.048	0.054
	37-43	940-1092	366	0.047	29.706	1422.324	0.001	0.048	0.000	0.000	0.000	0.000	29.7	1422.044	6066.498	290465.4833	0.047	0.045	0.049
*	25-37	635-940	365	0.037	60.009	2873.243	0.001	0.048	0.000	0.000	0.188	8.998	59.82	2864.197	6126.318	293329.6803	0.04	0.038	0.042
	13-25	330-635	364	0.033	60.269	2885.676	0.001	0.048	0.000	0.000	0.000	0.000	60.25	2884.785	6186.568	296214.4658	0.033	0.031	0.035
*	0-13	0-330	363	0.022	66.033	3161.686	0.002	0.096	0.000	0.000	-0.349	-16.701	66.38	3178.291	6252.948	299392.7572	0.016	0.015	0.017

Table A-192 Energy Balance Results for RBHT Test 1651I for Time Period 2415 to 2505 seconds

Results for RBHT Test 1651 Valid Time Period 2415 to 2505 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2329.5308	7.3487	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
0.25	6.35	2458.9492	7.7569	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
0.50	12.70	2588.3676	8.1652	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
0.75	19.05	2717.7859	8.5734	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
1.00	25.40	2847.2043	8.9817	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
1.25	31.75	2976.6227	9.39	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
1.50	38.10	3106.0411	9.7982	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
1.75	44.45	3235.4595	10.206	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
2.00	50.80	3364.8778	10.615	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
2.25	57.15	3494.2962	11.023	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
2.50	63.50	3623.7146	11.431	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
2.75	69.85	3753.133	11.84	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
3.00	76.20	3882.5513	12.248	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
3.25	82.55	4011.9697	12.656	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
3.50	88.90	4141.3881	13.064	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
3.75	95.25	4270.8065	13.473	0.00E+00	0.00E+00	0.00E+00	5.18E-02	2.35E-02
4.00	101.60	4400.2249	13.881	2.14E-03	6.77E-02	3.07E-02	5.17E-02	2.35E-02
4.25	107.95	4529.6432	14.289	1.14E-02	3.61E-01	1.64E-01	5.13E-02	2.32E-02
4.50	114.30	4659.0616	14.697	2.09E-02	6.63E-01	3.01E-01	5.08E-02	2.30E-02
4.75	120.65	4788.48	15.106	3.07E-02	9.73E-01	4.41E-01	5.03E-02	2.28E-02
5.00	127.00	4917.8984	15.514	4.07E-02	1.29E+00	5.86E-01	4.97E-02	2.26E-02
5.25	133.35	5047.3168	15.922	5.10E-02	1.62E+00	7.34E-01	4.92E-02	2.23E-02
5.50	139.70	5176.7351	16.33	6.16E-02	1.95E+00	8.86E-01	4.87E-02	2.21E-02
5.75	146.05	5306.1535	16.739	7.24E-02	2.30E+00	1.04E+00	4.81E-02	2.18E-02
6.00	152.40	5435.5719	17.147	8.35E-02	2.65E+00	1.20E+00	4.75E-02	2.16E-02
6.25	158.75	5564.9903	17.555	9.49E-02	3.01E+00	1.37E+00	4.69E-02	2.13E-02
6.50	165.10	5694.4086	17.963	1.07E-01	3.38E+00	1.53E+00	4.63E-02	2.10E-02
6.75	171.45	5823.827	18.372	1.19E-01	3.76E+00	1.71E+00	4.57E-02	2.07E-02
7.00	177.80	5953.2454	18.78	1.31E-01	4.15E+00	1.88E+00	4.51E-02	2.04E-02
7.25	184.15	6082.6638	19.188	1.43E-01	4.54E+00	2.06E+00	4.44E-02	2.02E-02
7.50	190.50	6212.0822	19.596	1.56E-01	4.94E+00	2.24E+00	4.38E-02	1.99E-02
7.75	196.85	6341.5005	20.005	1.69E-01	5.36E+00	2.43E+00	4.31E-02	1.95E-02
8.00	203.20	6470.9189	20.413	1.82E-01	5.78E+00	2.62E+00	4.24E-02	1.92E-02
8.25	209.55	6600.3373	20.821	1.96E-01	6.21E+00	2.82E+00	4.17E-02	1.89E-02
8.50	215.90	6729.7557	21.229	2.09E-01	6.64E+00	3.01E+00	4.10E-02	1.86E-02
8.75	222.25	6859.174	21.638	2.24E-01	7.09E+00	3.22E+00	4.03E-02	1.83E-02
9.00	228.60	6988.5924	22.046	2.38E-01	7.55E+00	3.42E+00	3.95E-02	1.79E-02
9.25	234.95	6600.3373	20.821	2.52E-01	7.99E+00	3.62E+00	3.88E-02	1.76E-02
9.50	241.30	6212.0822	19.596	2.65E-01	8.41E+00	3.82E+00	3.81E-02	1.73E-02
9.75	247.65	5823.827	18.372	2.78E-01	8.81E+00	4.00E+00	3.75E-02	1.70E-02
10.00	254.00	5435.5719	17.147	2.89E-01	9.18E+00	4.16E+00	3.69E-02	1.67E-02
10.25	260.35	5047.3168	15.922	3.00E-01	9.52E+00	4.32E+00	3.63E-02	1.65E-02
10.50	266.70	4659.0616	14.697	3.10E-01	9.84E+00	4.46E+00	3.58E-02	1.62E-02
10.75	273.05	4270.8065	13.473	3.19E-01	1.01E+01	4.60E+00	3.53E-02	1.60E-02
11.00	279.40	3882.5513	12.248	3.28E-01	1.04E+01	4.72E+00	3.49E-02	1.58E-02
11.25	285.75	3494.2962	11.023	3.35E-01	1.06E+01	4.83E+00	3.45E-02	1.56E-02
11.50	292.10	3106.0411	9.7982	3.42E-01	1.09E+01	4.93E+00	3.41E-02	1.55E-02
11.75	298.45	2717.7859	8.5734	3.48E-01	1.10E+01	5.01E+00	3.38E-02	1.53E-02
12.00	304.80	2329.5308	7.3487	3.54E-01	1.12E+01	5.09E+00	3.35E-02	1.52E-02

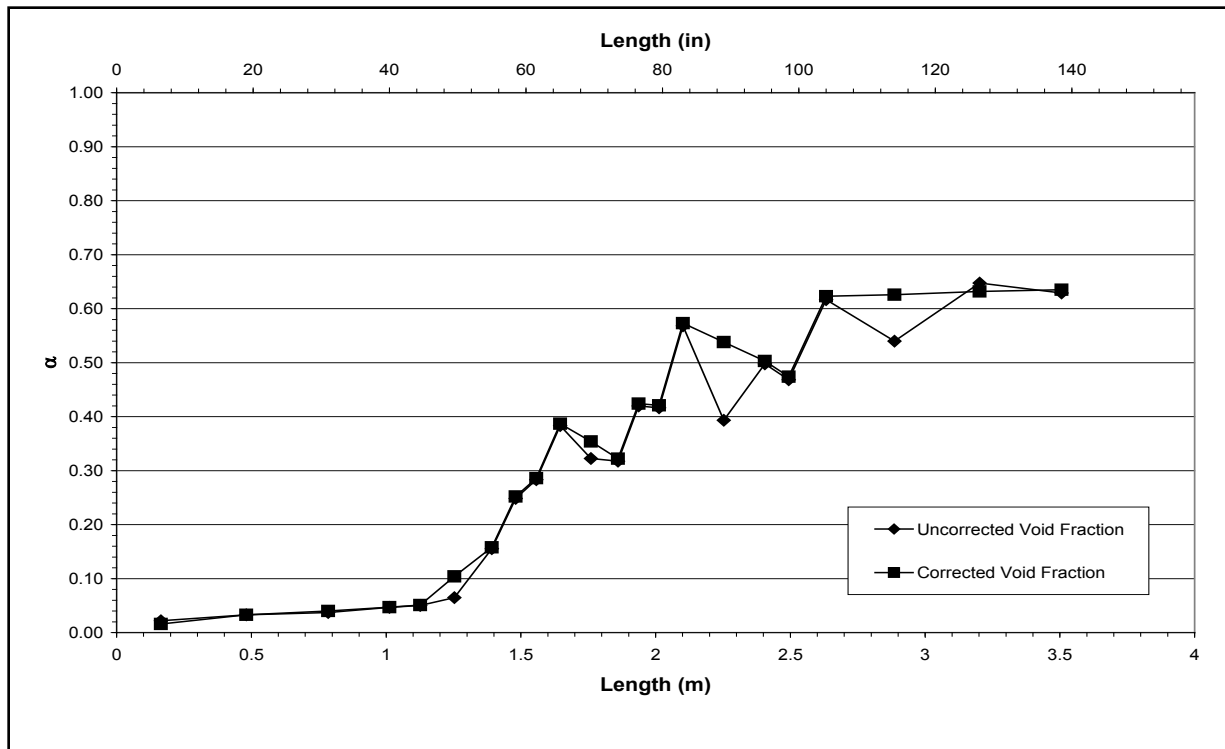


Figure A-480 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1651I for Time Period 2415 to 2505 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1651-J

Test Conditions

Date: 7/1/2003

Steady-state time window: 5960 – 6257 seconds

Inlet flow rate: 1.019 cm/sec (0.401 in./sec)

Inlet mass flow rate: 0.048 kg/sec (0.106 lbm/sec)

Inlet flow temperature: 348.2 K (167.0 °F)

Upper plenum pressure: 271.7 kPa (39.4 psia)

Bundle power: 72.27 kW

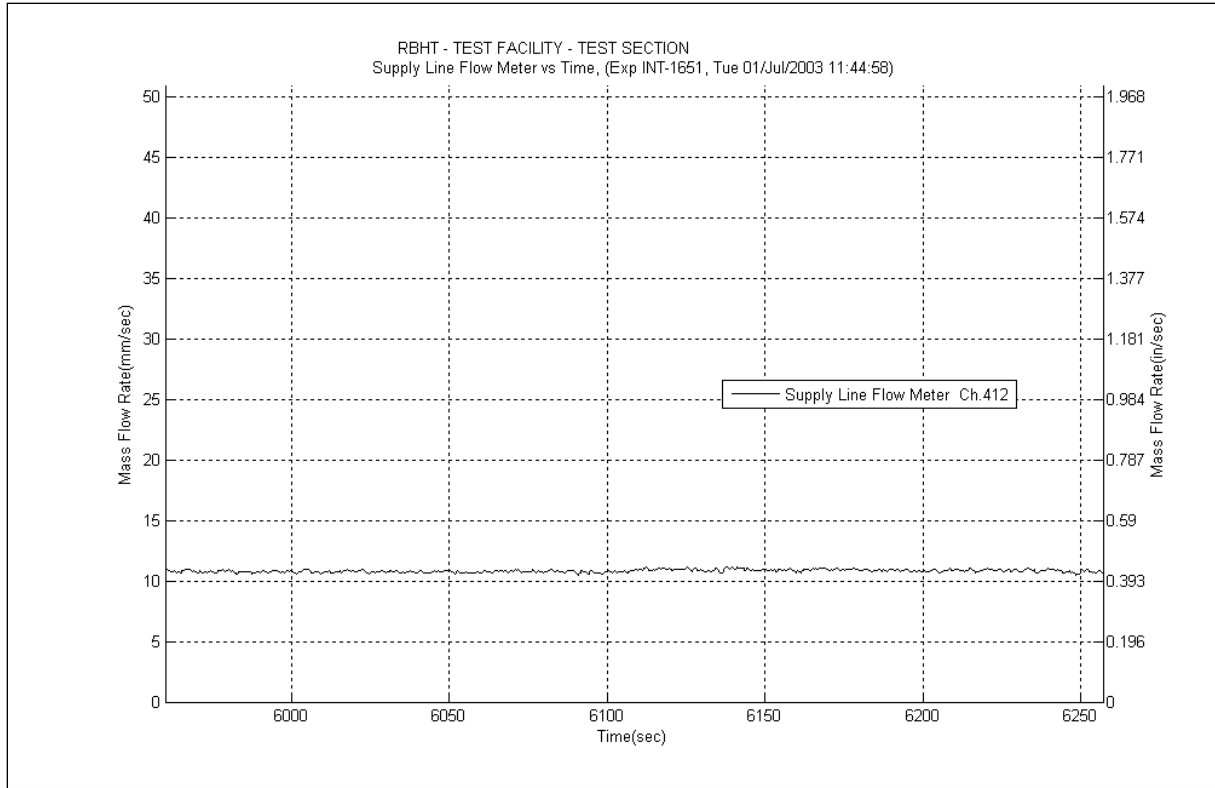


Figure A-481 Inlet Flow Plot for Experiment 1651J

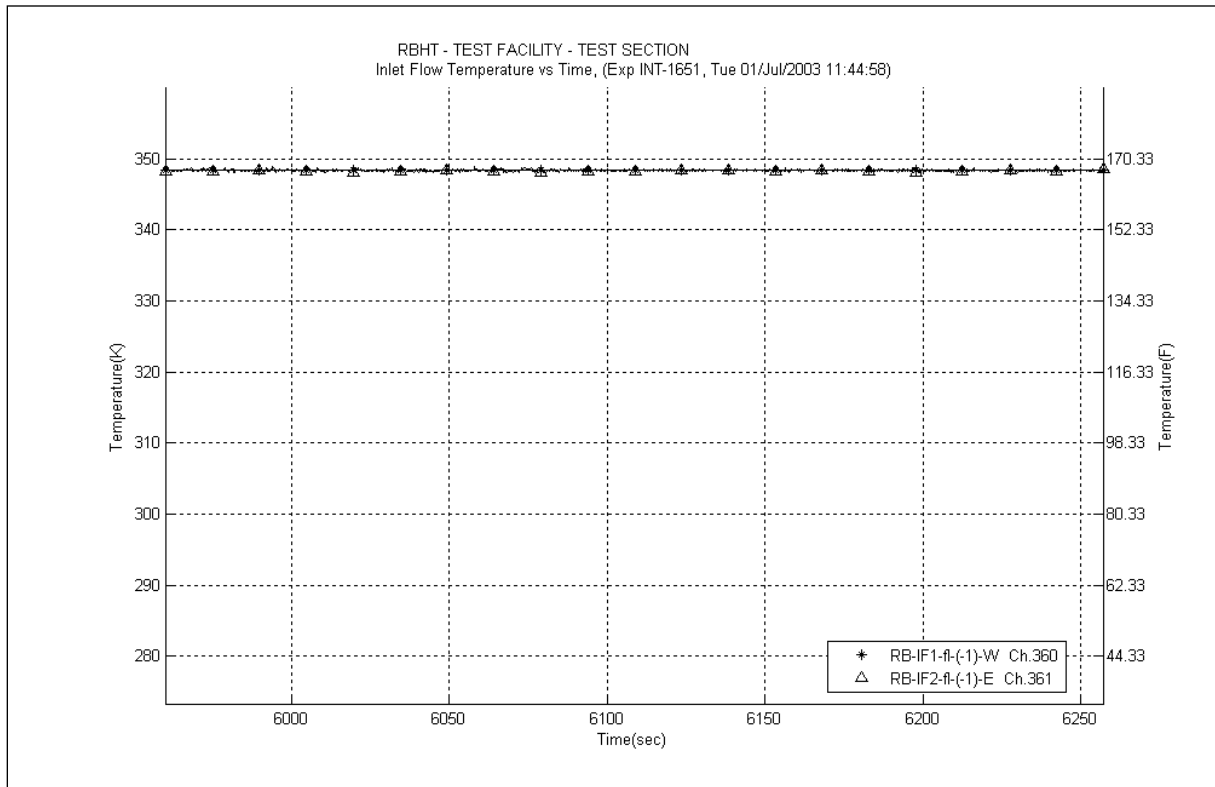


Figure A-482 Inlet Temperature Plot for Experiment 1651J

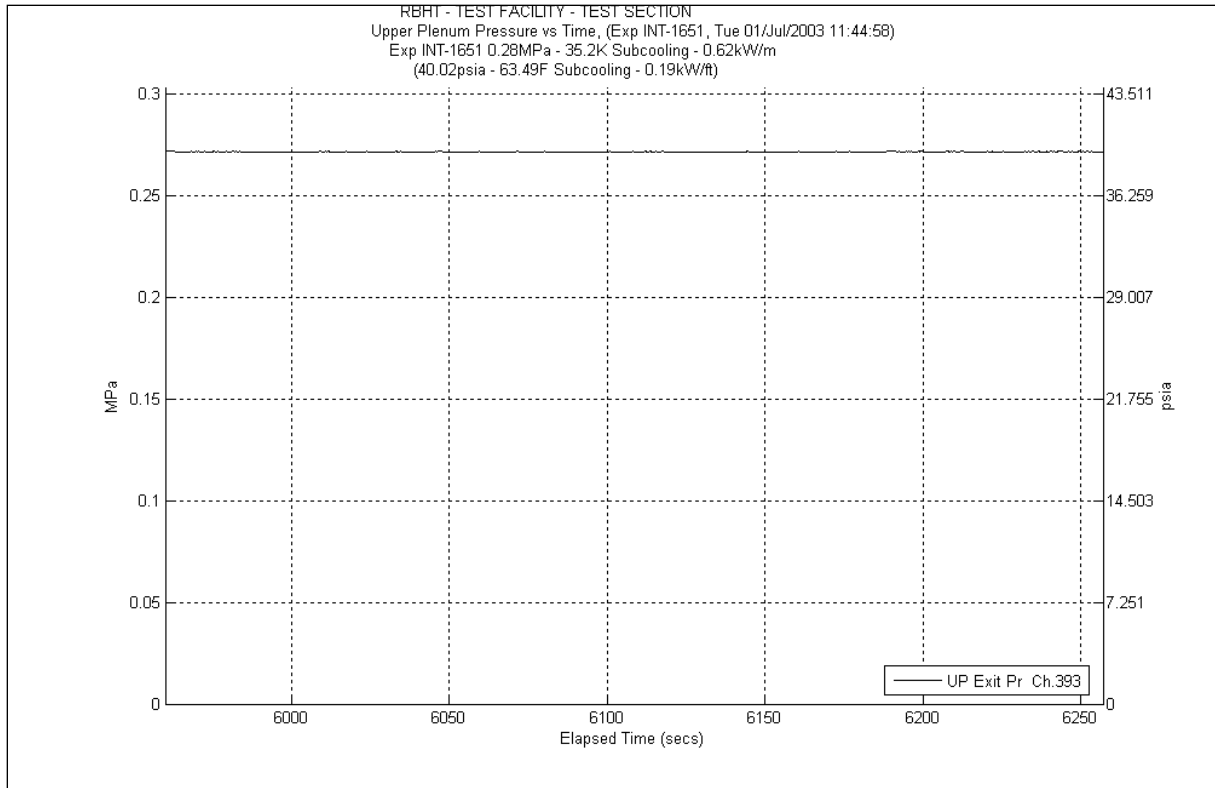


Figure A-483 System Pressure Plot for Experiment 1651J

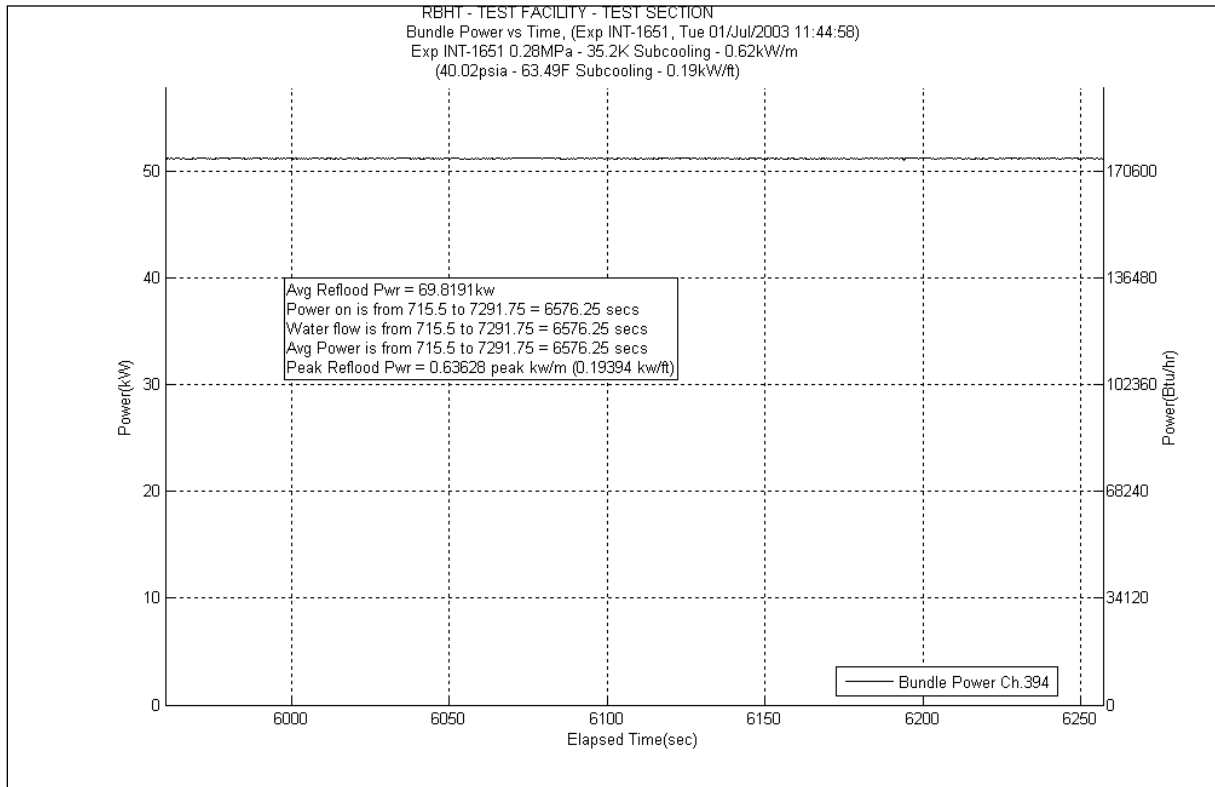


Figure A-484 Bundle Power Plot for Experiment 1651J

Table A-193 Data Results for RBHT Test 1651J for Time Period 5960 to 6257 seconds

Results for RBHT Test 1651
Valid Time Period 5960 to 6257 seconds
Collapsed Liquid Level = 89.163 inches = 2264.74 mm
(Z_{OSI}) Onset of Significant Void = 31 inches = 787.5 mm

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acc} (lbf/ft ²)	ΔP_{acc} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.695	17.413	833.750	0.202	9.672	0.046	2.202	0.000	0.000	17.16	821.625	276611.9055	276611.9055	0.7	0.697	0.704
*	120-133	3048-3378	383	0.685	21.267	1018.254	0.222	10.629	0.082	3.926	0.363	17.366	20.6	986.333	277598.2388	277598.2388	0.695	0.692	0.698
*	108-120	2743-3048	382	0.580	26.154	1252.242	0.183	8.762	0.103	4.932	6.258	299.616	19.61	938.932	278537.1707	278537.1707	0.685	0.682	0.688
	100-108	2540-2743	381	0.676	13.456	644.273	0.107	5.123	0.075	3.591	0.000	0.000	13.27	635.371	279172.5417	279172.5417	0.681	0.678	0.684
	97-100	2464-2540	380	0.513	7.582	363.041	0.037	1.772	0.027	1.293	0.000	0.000	7.515	359.820	279532.3618	279532.3618	0.518	0.515	0.521
	93-97	2362-2464	379	0.542	9.509	455.293	0.047	2.250	0.035	1.676	0.000	0.000	9.423	451.176	279983.5375	279983.5375	0.546	0.543	0.549
*	85-93	2159-2362	378	0.420	24.081	1153.027	0.085	4.070	0.068	3.256	7.018	336.046	16.91	809.655	280793.1926	280793.1926	0.593	0.590	0.596
	81-85	2057-2159	377	0.636	7.556	361.797	0.038	1.819	0.033	1.580	0.000	0.000	7.483	358.288	281151.4806	281151.4806	0.64	0.637	0.643
	78-81	1981-2057	376	0.476	8.159	390.642	0.027	1.293	0.024	1.149	0.000	0.000	8.104	388.022	281539.5022	281539.5022	0.48	0.478	0.482
	75-78	1905-1981	375	0.503	7.738	370.500	0.026	1.245	0.023	1.101	0.000	0.000	7.687	368.056	281907.5577	281907.5577	0.506	0.503	0.509
	72-75	1829-1905	374	0.407	9.234	442.114	0.024	1.149	0.023	1.101	0.000	0.000	9.183	439.684	282347.2421	282347.2421	0.41	0.408	0.412
*	67-72	1702-1829	373	0.373	16.281	779.543	0.037	1.772	0.037	1.772	2.227	106.634	13.98	669.366	283016.6081	283016.6081	0.462	0.460	0.464
	63-67	1600-1702	372	0.510	10.184	487.618	0.026	1.245	0.028	1.341	0.000	0.000	10.12	484.548	283501.1563	283501.1563	0.513	0.510	0.516
	60-63	1524-1600	371	0.359	9.987	478.169	0.018	0.862	0.021	1.005	0.000	0.000	9.946	476.217	283977.3733	283977.3733	0.361	0.359	0.363
	57-60	1448-1524	370	0.339	10.304	493.337	0.016	0.766	0.020	0.958	0.000	0.000	10.26	491.251	284468.6248	284468.6248	0.341	0.339	0.343
	53-57	1346-1448	369	0.322	14.079	674.112	0.020	0.958	0.026	1.245	0.000	0.000	14.03	671.760	285140.3848	285140.3848	0.324	0.322	0.326
*	46-53	1168-1346	368	0.226	28.153	1347.975	0.028	1.341	0.043	2.059	3.312	158.581	24.77	1185.994	286326.3788	286326.3788	0.318	0.316	0.320
	43-46	1092-1168	367	0.311	10.740	514.225	0.009	0.431	0.018	0.862	0.000	0.000	10.71	512.798	286839.1763	286839.1763	0.313	0.311	0.315
	37-43	940-1092	366	0.141	26.761	1281.335	0.012	0.575	0.034	1.628	0.000	0.000	26.7	1278.403	288117.5792	288117.5792	0.143	0.142	0.144
*	25-37	635-940	365	0.048	59.318	2840.171	0.010	0.479	0.016	0.766	2.632	126.031	56.66	2712.895	290830.4745	290830.4745	0.091	0.086	0.096
	13-25	330-635	364	0.038	59.936	2869.762	0.001	0.048	0.000	0.000	0.000	0.000	59.91	2868.506	293698.9807	293698.9807	0.038	0.036	0.040
*	0-13	0-330	363	0.023	65.935	3156.962	0.001	0.048	0.000	0.000	-0.266	-12.759	66.2	3169.673	296868.6537	296868.6537	0.019	0.018	0.020

Table A-194 Energy Balance Results for RBHT Test 1651J for Time Period 5960 to 6257 seconds

Results for RBHT Test 1651 Valid Time Period 5960 to 6257 seconds								
Elevation	Elevation	q'' _w	q'' _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2333.6816	7.3618	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
0.25	6.35	2463.3306	7.7708	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
0.50	12.70	2592.9796	8.1797	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
0.75	19.05	2722.6286	8.5887	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
1.00	25.40	2852.2776	8.9977	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
1.25	31.75	2981.9265	9.4067	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
1.50	38.10	3111.5755	9.8157	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
1.75	44.45	3241.2245	10.225	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
2.00	50.80	3370.8735	10.634	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
2.25	57.15	3500.5225	11.043	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
2.50	63.50	3630.1714	11.452	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
2.75	69.85	3759.8204	11.861	0.00E+00	0.00E+00	0.00E+00	3.47E-02	1.57E-02
3.00	76.20	3889.4694	12.27	7.79E-03	1.65E-01	7.50E-02	3.44E-02	1.56E-02
3.25	82.55	4019.1184	12.679	2.00E-02	4.25E-01	1.93E-01	3.40E-02	1.54E-02
3.50	88.90	4148.7674	13.088	3.27E-02	6.93E-01	3.14E-01	3.35E-02	1.52E-02
3.75	95.25	4278.4164	13.497	4.57E-02	9.70E-01	4.40E-01	3.31E-02	1.50E-02
4.00	101.60	4408.0653	13.906	5.92E-02	1.25E+00	5.69E-01	3.26E-02	1.48E-02
4.25	107.95	4537.7143	14.315	7.30E-02	1.55E+00	7.03E-01	3.21E-02	1.46E-02
4.50	114.30	4667.3633	14.724	8.72E-02	1.85E+00	8.40E-01	3.16E-02	1.44E-02
4.75	120.65	4797.0123	15.133	1.02E-01	2.16E+00	9.81E-01	3.11E-02	1.41E-02
5.00	127.00	4926.6613	15.542	1.17E-01	2.48E+00	1.13E+00	3.06E-02	1.39E-02
5.25	133.35	5056.3102	15.95	1.32E-01	2.81E+00	1.27E+00	3.01E-02	1.36E-02
5.50	139.70	5185.9592	16.359	1.48E-01	3.14E+00	1.43E+00	2.95E-02	1.34E-02
5.75	146.05	5315.6082	16.768	1.65E-01	3.49E+00	1.58E+00	2.90E-02	1.31E-02
6.00	152.40	5445.2572	17.177	1.81E-01	3.84E+00	1.74E+00	2.84E-02	1.29E-02
6.25	158.75	5574.9062	17.586	1.98E-01	4.21E+00	1.91E+00	2.78E-02	1.26E-02
6.50	165.10	5704.5551	17.995	2.16E-01	4.57E+00	2.07E+00	2.72E-02	1.23E-02
6.75	171.45	5834.2041	18.404	2.34E-01	4.95E+00	2.25E+00	2.66E-02	1.21E-02
7.00	177.80	5963.8531	18.813	2.52E-01	5.34E+00	2.42E+00	2.59E-02	1.18E-02
7.25	184.15	6093.5021	19.222	2.70E-01	5.74E+00	2.60E+00	2.53E-02	1.15E-02
7.50	190.50	6223.1511	19.631	2.90E-01	6.14E+00	2.79E+00	2.46E-02	1.12E-02
7.75	196.85	6352.8	20.04	3.09E-01	6.55E+00	2.97E+00	2.40E-02	1.09E-02
8.00	203.20	6482.449	20.449	3.29E-01	6.98E+00	3.16E+00	2.33E-02	1.06E-02
8.25	209.55	6612.098	20.858	3.49E-01	7.41E+00	3.36E+00	2.26E-02	1.02E-02
8.50	215.90	6741.747	21.267	3.70E-01	7.84E+00	3.56E+00	2.18E-02	9.91E-03
8.75	222.25	6871.396	21.676	3.91E-01	8.29E+00	3.76E+00	2.11E-02	9.58E-03
9.00	228.60	7001.0449	22.085	4.12E-01	8.75E+00	3.97E+00	2.04E-02	9.24E-03
9.25	234.95	6612.098	20.858	4.33E-01	9.19E+00	4.17E+00	1.96E-02	8.91E-03
9.50	241.30	6223.1511	19.631	4.53E-01	9.62E+00	4.36E+00	1.90E-02	8.60E-03
9.75	247.65	5834.2041	18.404	4.72E-01	1.00E+01	4.54E+00	1.83E-02	8.30E-03
10.00	254.00	5445.2572	17.177	4.89E-01	1.04E+01	4.71E+00	1.77E-02	8.03E-03
10.25	260.35	5056.3102	15.95	5.06E-01	1.07E+01	4.86E+00	1.71E-02	7.77E-03
10.50	266.70	4667.3633	14.724	5.21E-01	1.10E+01	5.01E+00	1.66E-02	7.54E-03
10.75	273.05	4278.4164	13.497	5.34E-01	1.13E+01	5.14E+00	1.61E-02	7.32E-03
11.00	279.40	3889.4694	12.27	5.47E-01	1.16E+01	5.27E+00	1.57E-02	7.12E-03
11.25	285.75	3500.5225	11.043	5.59E-01	1.18E+01	5.37E+00	1.53E-02	6.94E-03
11.50	292.10	3111.5755	9.8157	5.69E-01	1.21E+01	5.47E+00	1.49E-02	6.78E-03
11.75	298.45	2722.6286	8.5887	5.78E-01	1.23E+01	5.56E+00	1.46E-02	6.64E-03
12.00	304.80	2333.6816	7.3618	5.86E-01	1.24E+01	5.64E+00	1.44E-02	6.52E-03

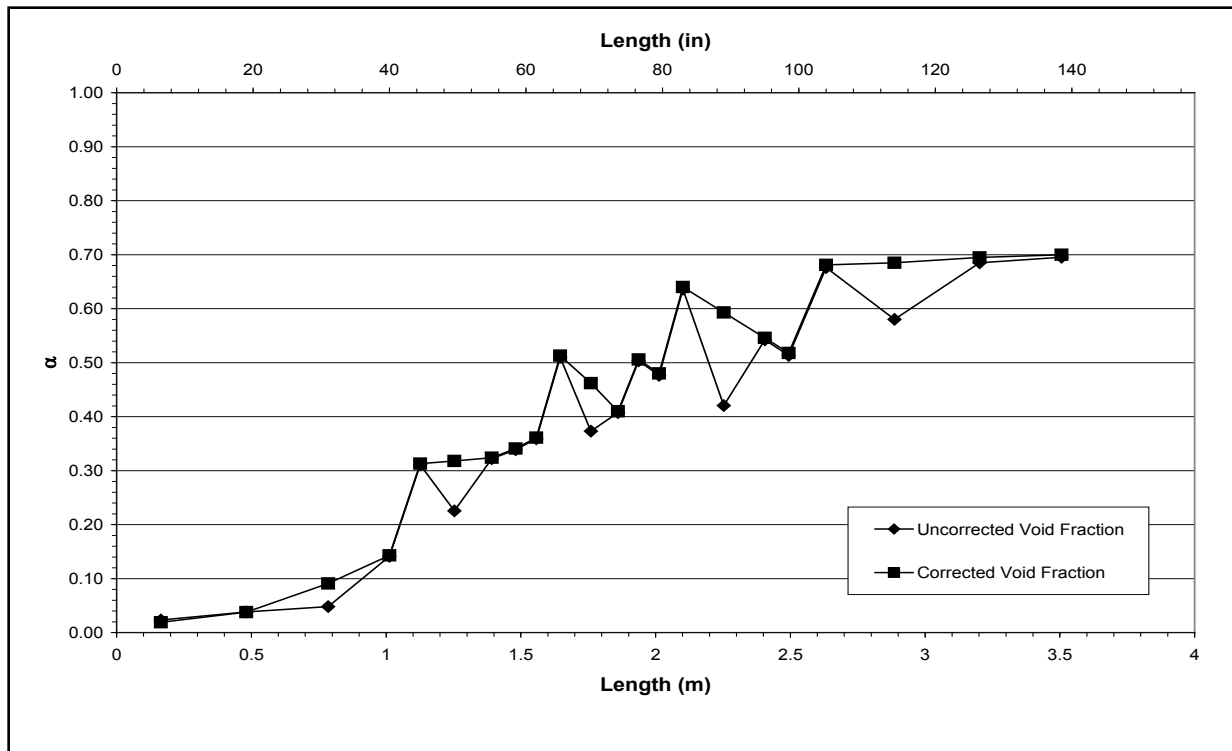


Figure A-485 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1651J for Time Period 5960 to 6257 seconds

RBHT Two-Phase Mixture Level and Uncovery Test INT-1651-K

Test Conditions

Date: 7/1/2003

Steady-state time window: 6600 – test end seconds

Inlet flow rate: 0.650 cm/sec (0.256 in./sec)

Inlet mass flow rate: 0.031 kg/sec (0.068 lbm/sec)

Inlet flow temperature: 348.2 K (167.0 °F)

Upper plenum pressure: 271.7 kPa (39.4 psia)

Bundle power: 72.27 kW

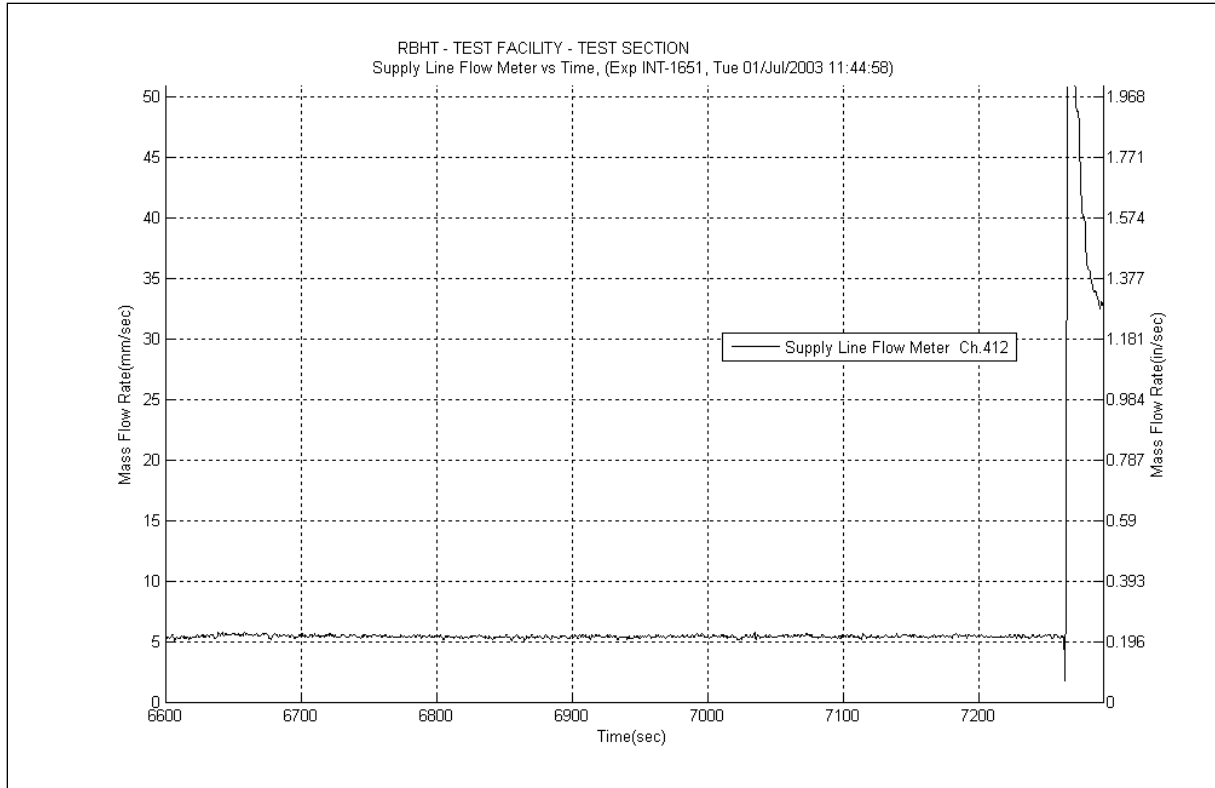


Figure A-486 Inlet Flow Plot for Experiment 1651K

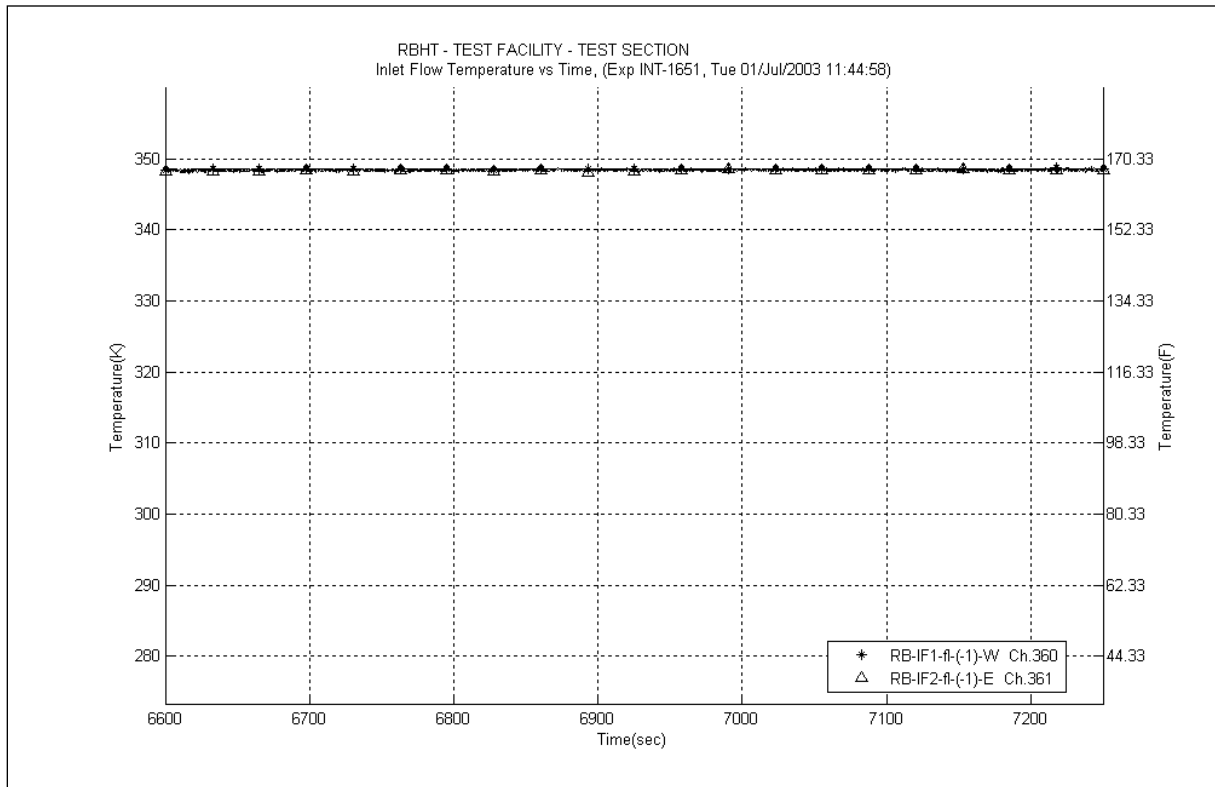


Figure A-487 Inlet Temperature Plot for Experiment 1651K

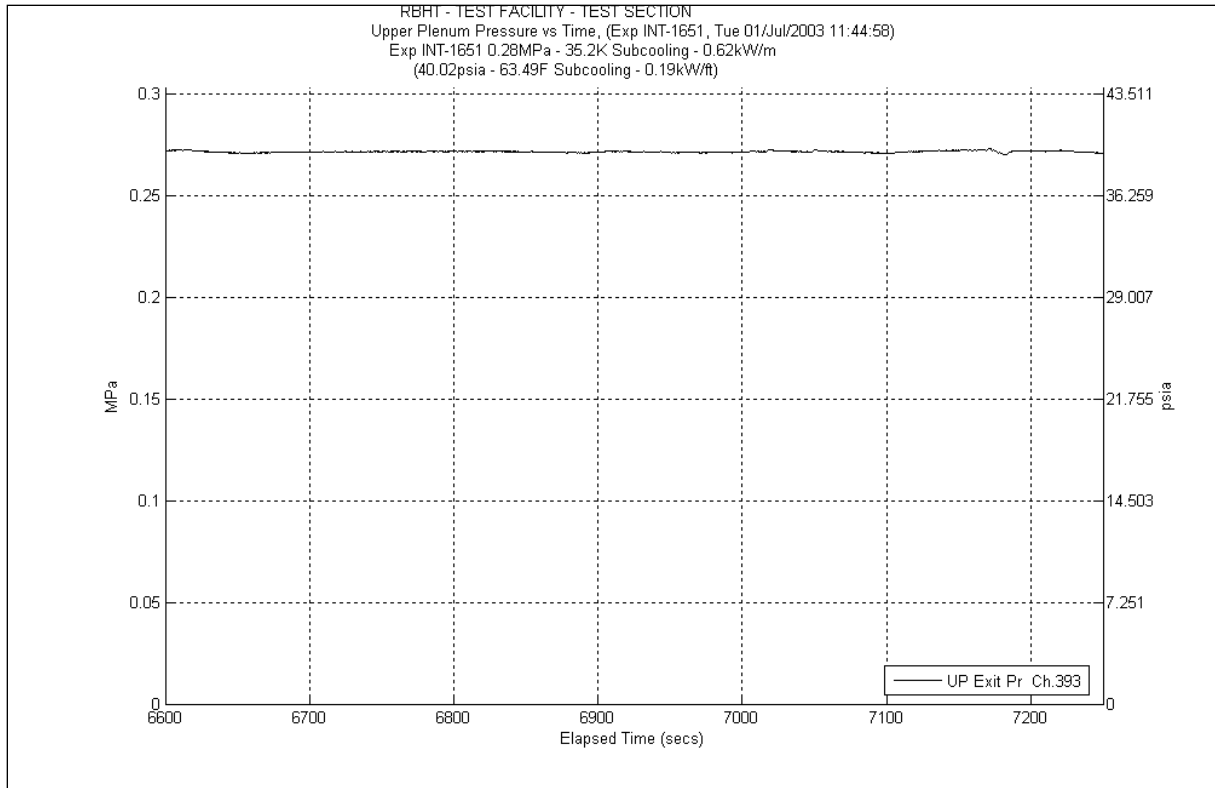


Figure A-488 System Pressure Plot for Experiment 1651K

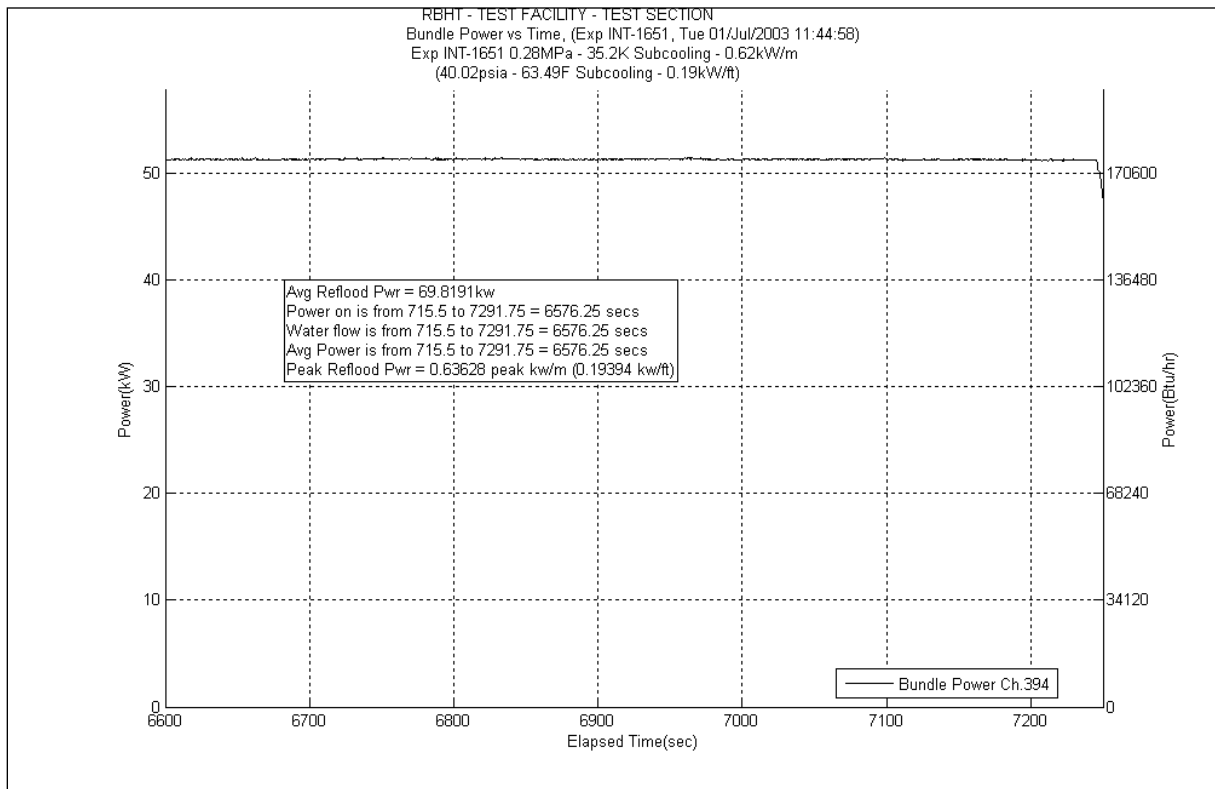


Figure A-489 Bundle Power Plot for Experiment 1651K

Table A-195 Data Results for RBHT Test 1651K for Time Period 6600 seconds to Test End

Results for RBHT Test 1651
 Valid Time Period 6600 to 9999 seconds
 Collapsed Liquid Level = 74.096 inches = 1882.04 mm
 (Z_{GSV}) Onset of Significant Void = 19 inches = 482.5 mm
 ($Z_{2\phi}$) Two-Phase Level (Dryout) = 124.70 inches = 3167.38 mm
 (S) Level Swell = 2.0121

Grids	Elevation (in)	Elevation (mm)	Chan.	$\alpha_{uncorrected}$	$\Delta P_{uncorrected}$ (lbf/ft ²)	$\Delta P_{uncorrected}$ (Pa)	ΔP_{fric} (lbf/ft ²)	ΔP_{fric} (Pa)	ΔP_{acccl} (lbf/ft ²)	ΔP_{acccl} (Pa)	ΔP_{grid} (lbf/ft ²)	ΔP_{grid} (Pa)	$\Delta P_{corrected}$ (lbf/ft ²)	$\Delta P_{corrected}$ (Pa)	P_{local} (lbf/ft ²)	P_{local} (Pa)	$\alpha_{corrected}$	α_{min}	α_{max}
	133-144	3378-3658	384	0.914	4.923	235.728	0.121	5.794	0.028	1.341	0.000	0.000	4.772	228.485	5764.772	276018.7649	0.916	0.911	0.921
*	120-133	3048-3378	383	0.860	9.467	453.303	0.138	6.607	0.051	2.442	0.677	32.436	8.601	411.818	5773.373	276430.583	0.873	0.869	0.877
*	108-120	2743-3048	382	0.720	17.424	834.248	0.116	5.554	0.063	3.016	3.835	183.603	13.41	642.074	5786.783	277072.6572	0.785	0.781	0.789
	100-108	2540-2743	381	0.738	10.880	520.938	0.069	3.304	0.046	2.202	0.000	0.000	10.76	515.192	5797.543	277587.8488	0.741	0.737	0.745
	97-100	2464-2540	380	0.641	5.588	267.556	0.024	1.149	0.017	0.814	0.000	0.000	5.543	265.400	5803.086	277853.2491	0.644	0.641	0.647
	93-97	2362-2464	379	0.640	7.478	358.067	0.030	1.436	0.022	1.053	0.000	0.000	7.425	355.511	5810.511	278208.76	0.643	0.640	0.646
*	85-93	2159-2362	378	0.465	22.227	1064.256	0.056	2.681	0.042	2.011	8.049	385.410	14.08	674.154	5824.591	278882.914	0.661	0.658	0.664
	81-85	2057-2159	377	0.678	6.699	320.769	0.025	1.197	0.020	0.958	0.000	0.000	6.652	318.499	5831.243	279201.4135	0.68	0.677	0.683
	78-81	1981-2057	376	0.520	7.473	357.819	0.018	0.862	0.015	0.718	0.000	0.000	7.437	356.085	5838.68	279557.4989	0.523	0.520	0.526
	75-78	1905-1981	375	0.541	7.156	342.651	0.017	0.814	0.014	0.670	0.000	0.000	7.121	340.955	5845.801	279898.4543	0.543	0.540	0.546
	72-75	1829-1905	374	0.486	8.008	383.431	0.016	0.766	0.014	0.670	0.000	0.000	7.976	381.893	5853.777	280280.3472	0.488	0.486	0.490
*	67-72	1702-1829	373	0.387	15.907	761.639	0.025	1.197	0.023	1.101	3.919	187.651	11.94	571.690	5865.717	280852.0374	0.54	0.537	0.543
	63-67	1600-1702	372	0.591	8.507	407.302	0.018	0.862	0.017	0.814	0.000	0.000	8.467	405.402	5874.184	281257.4396	0.592	0.589	0.595
	60-63	1524-1600	371	0.409	9.208	440.871	0.013	0.622	0.013	0.622	0.000	0.000	9.18	439.541	5883.364	281696.9803	0.411	0.409	0.413
	57-60	1448-1524	370	0.388	9.540	456.785	0.012	0.575	0.012	0.575	0.000	0.000	9.514	455.333	5892.878	282152.5131	0.389	0.387	0.391
	53-57	1346-1448	369	0.381	12.859	615.677	0.014	0.670	0.016	0.766	0.000	0.000	12.83	614.304	5905.708	282766.8168	0.382	0.380	0.384
*	46-53	1168-1346	368	0.281	26.133	1251.247	0.021	1.005	0.027	1.293	5.625	269.319	20.46	979.630	5926.168	283746.4469	0.437	0.435	0.439
	43-46	1092-1168	367	0.490	7.941	380.198	0.008	0.383	0.011	0.527	0.000	0.000	7.922	379.307	5934.09	284125.7543	0.491	0.489	0.493
	37-43	940-1092	366	0.348	20.322	972.999	0.013	0.622	0.021	1.005	0.000	0.000	20.28	971.012	5954.37	285096.7659	0.349	0.347	0.351
*	25-37	635-940	365	0.210	49.254	2358.272	0.015	0.718	0.037	1.772	0.082	3.904	49.12	2351.878	6003.49	287448.6441	0.212	0.211	0.213
	13-25	330-635	364	0.074	57.698	2762.590	0.002	0.096	0.003	0.144	0.000	0.000	57.68	2761.733	6061.17	290210.3773	0.074	0.070	0.078
*	0-13	0-330	363	0.028	65.644	3143.037	0.000	0.000	0.000	0.000	0.654	31.299	64.99	3111.738	6126.16	293322.1152	0.037	0.035	0.039

Table A-196 Energy Balance Results for RBHT Test 1651K for Time Period 6600 seconds to test end

Results for RBHT Test 1651 Valid Time Period 6600 to 9999 seconds								
Elevation	Elevation	q" _w	q" _w	x	J _g	J _g	J _f	J _f
(in)	(mm)	BTU/hr-ft ²	KW/m ²		(ft/sec)	(m/sec)	(ft/sec)	(m/sec)
0.00	0.00	2258.2977	7.124	0.00E+00	0.00E+00	0.00E+00	2.21E-02	1.00E-02
0.25	6.35	2383.7586	7.5197	0.00E+00	0.00E+00	0.00E+00	2.21E-02	1.00E-02
0.50	12.70	2509.2196	7.9155	0.00E+00	0.00E+00	0.00E+00	2.21E-02	1.00E-02
0.75	19.05	2634.6806	8.3113	0.00E+00	0.00E+00	0.00E+00	2.21E-02	1.00E-02
1.00	25.40	2760.1416	8.7071	0.00E+00	0.00E+00	0.00E+00	2.21E-02	1.00E-02
1.25	31.75	2885.6026	9.1028	0.00E+00	0.00E+00	0.00E+00	2.21E-02	1.00E-02
1.50	38.10	3011.0636	9.4986	0.00E+00	0.00E+00	0.00E+00	2.21E-02	1.00E-02
1.75	44.45	3136.5245	9.8944	0.00E+00	0.00E+00	0.00E+00	2.21E-02	1.00E-02
2.00	50.80	3261.9855	10.29	0.00E+00	0.00E+00	0.00E+00	2.21E-02	1.00E-02
2.25	57.15	3387.4465	10.686	1.56E-02	2.11E-01	9.59E-02	2.18E-02	9.88E-03
2.50	63.50	3512.9075	11.082	3.23E-02	4.38E-01	1.99E-01	2.14E-02	9.71E-03
2.75	69.85	3638.3685	11.477	4.97E-02	6.73E-01	3.05E-01	2.10E-02	9.54E-03
3.00	76.20	3763.8294	11.873	6.76E-02	9.16E-01	4.16E-01	2.06E-02	9.36E-03
3.25	82.55	3889.2904	12.269	8.62E-02	1.17E+00	5.30E-01	2.02E-02	9.17E-03
3.50	88.90	4014.7514	12.665	1.05E-01	1.43E+00	6.47E-01	1.98E-02	8.98E-03
3.75	95.25	4140.2124	13.061	1.25E-01	1.70E+00	7.69E-01	1.94E-02	8.78E-03
4.00	101.60	4265.6734	13.456	1.46E-01	1.97E+00	8.94E-01	1.89E-02	8.58E-03
4.25	107.95	4391.1343	13.852	1.67E-01	2.26E+00	1.02E+00	1.84E-02	8.36E-03
4.50	114.30	4516.5953	14.248	1.88E-01	2.55E+00	1.16E+00	1.80E-02	8.15E-03
4.75	120.65	4642.0563	14.644	2.10E-01	2.85E+00	1.29E+00	1.75E-02	7.93E-03
5.00	127.00	4767.5173	15.039	2.33E-01	3.16E+00	1.43E+00	1.70E-02	7.70E-03
5.25	133.35	4892.9783	15.435	2.57E-01	3.48E+00	1.58E+00	1.65E-02	7.46E-03
5.50	139.70	5018.4393	15.831	2.81E-01	3.80E+00	1.72E+00	1.59E-02	7.22E-03
5.75	146.05	5143.9002	16.227	3.05E-01	4.13E+00	1.88E+00	1.54E-02	6.97E-03
6.00	152.40	5269.3612	16.623	3.30E-01	4.48E+00	2.03E+00	1.48E-02	6.72E-03
6.25	158.75	5394.8222	17.018	3.56E-01	4.83E+00	2.19E+00	1.42E-02	6.46E-03
6.50	165.10	5520.2832	17.414	3.83E-01	5.19E+00	2.35E+00	1.37E-02	6.20E-03
6.75	171.45	5645.7442	17.81	4.10E-01	5.55E+00	2.52E+00	1.31E-02	5.92E-03
7.00	177.80	5771.2051	18.206	4.37E-01	5.93E+00	2.69E+00	1.24E-02	5.65E-03
7.25	184.15	5896.6661	18.601	4.66E-01	6.31E+00	2.86E+00	1.18E-02	5.36E-03
7.50	190.50	6022.1271	18.997	4.95E-01	6.70E+00	3.04E+00	1.12E-02	5.07E-03
7.75	196.85	6147.5881	19.393	5.24E-01	7.10E+00	3.22E+00	1.05E-02	4.78E-03
8.00	203.20	6273.0491	19.789	5.54E-01	7.51E+00	3.41E+00	9.86E-03	4.47E-03
8.25	209.55	6398.51	20.185	5.85E-01	7.93E+00	3.60E+00	9.18E-03	4.17E-03
8.50	215.90	6523.971	20.58	6.16E-01	8.35E+00	3.79E+00	8.49E-03	3.85E-03
8.75	222.25	6649.432	20.976	6.48E-01	8.78E+00	3.98E+00	7.78E-03	3.53E-03
9.00	228.60	6774.893	21.372	6.81E-01	9.23E+00	4.18E+00	7.06E-03	3.20E-03
9.25	234.95	6398.51	20.185	7.13E-01	9.66E+00	4.38E+00	6.36E-03	2.88E-03
9.50	241.30	6022.1271	18.997	7.43E-01	1.01E+01	4.57E+00	5.69E-03	2.58E-03
9.75	247.65	5645.7442	17.81	7.71E-01	1.05E+01	4.74E+00	5.06E-03	2.30E-03
10.00	254.00	5269.3612	16.623	7.98E-01	1.08E+01	4.90E+00	4.48E-03	2.03E-03
10.25	260.35	4892.9783	15.435	8.22E-01	1.11E+01	5.05E+00	3.93E-03	1.78E-03
10.50	266.70	4516.5953	14.248	8.45E-01	1.15E+01	5.19E+00	3.43E-03	1.56E-03
10.75	273.05	4140.2124	13.061	8.66E-01	1.17E+01	5.32E+00	2.96E-03	1.34E-03
11.00	279.40	3763.8294	11.873	8.85E-01	1.20E+01	5.44E+00	2.54E-03	1.15E-03
11.25	285.75	3387.4465	10.686	9.02E-01	1.22E+01	5.55E+00	2.16E-03	9.79E-04
11.50	292.10	3011.0636	9.4986	9.18E-01	1.24E+01	5.64E+00	1.81E-03	8.23E-04
11.75	298.45	2634.6806	8.3113	9.32E-01	1.26E+01	5.73E+00	1.51E-03	6.86E-04
12.00	304.80	2258.2977	7.124	9.44E-01	1.28E+01	5.80E+00	1.25E-03	5.67E-04

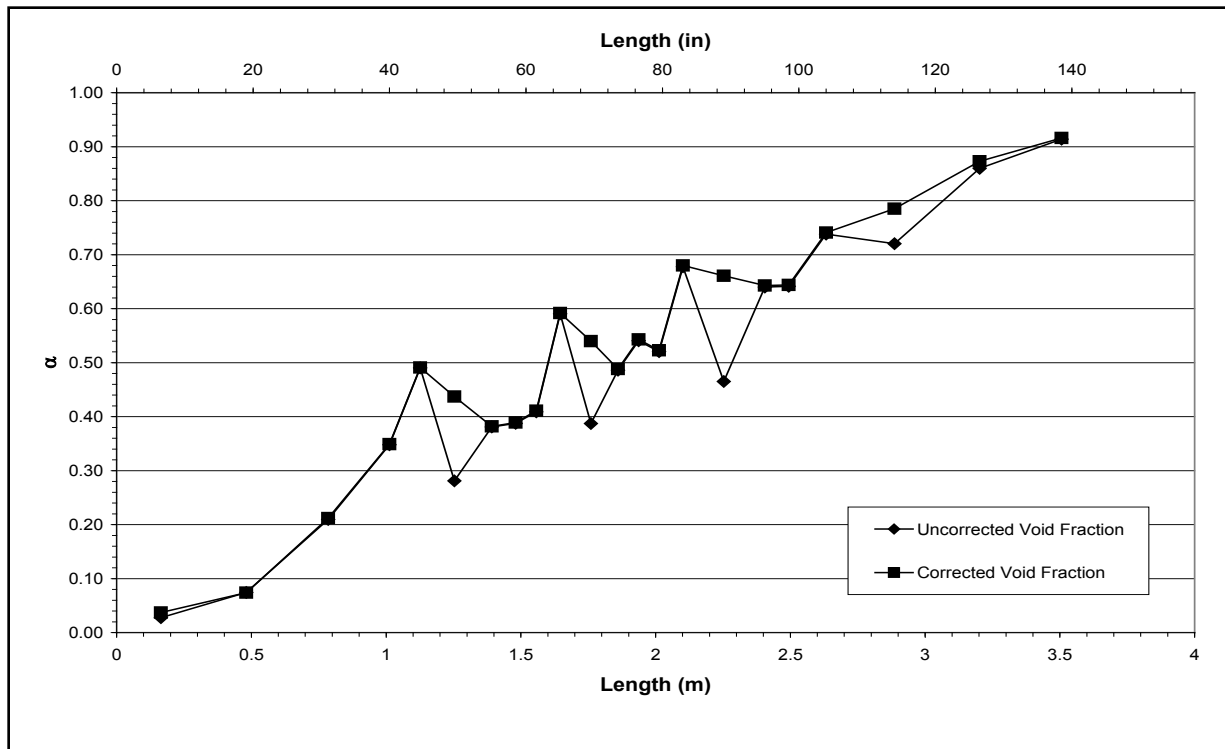


Figure A-490 Void Fraction Comparison Plot Before and After Applying Corrections for Experiment 1651K for Time Period 6600 seconds to Test End

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(See instructions on the reverse)

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L.E. Hochreiter, F-B. Cheung, T. F. Lin, D.J. Miller, B.R. Lowery

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K. Tien, NRC Project Manager

11. ABSTRACT (200 words or less)

A series of two-phase level swell and uncovery experiments have been performed in the US Nuclear Regulatory Commission/ Penn State Rod Bundle Heat Transfer Test (RBHT) Facility. A total of 75 experiments were performed in a quasi-steady state manner in which the inlet flooding rate into the RBHT rod bundle was slowly decreased in steps and the two-phase mixture level in the bundle was allowed to decrease. In several of the experiments the top region of the rod bundle became uncovered and the heater rod temperatures were significantly above the saturation temperature. The range of conditions investigated in the experiments were: pressure, 0.138 to 0.414 Mpa (20 to 60 psia); Inlet subcooling 11.1 to 69.4 degrees K (20 to 125 degrees F); Inlet injection temperature 334 to 393 degrees K (142 to 247 degrees F); Peak linear power 0.492 to 1.31 kw/m (0.15 to 0.4 kw/ft); and Inlet flooding rate 2.54 to 40.64 mm/s (0.1 to 1.6 in/s). A one-dimensional energy balance was used to calculate the saturation location in the bundle as well as the local fluid quality. The resulting calculations were used to estimate the single and two-phase friction and acceleration pressure drop components such that the differential pressure measurements could be corrected and used to estimate the local void fraction distribution along the heated bundle. The two-phase mixture level or dryout locations were also determined from the heater rod thermocouple response as the local heat transfer changed from boiling to steam cooling. The resulting data can be used to assess the void fraction models and heat transfer models in the NRC advanced safety analysis computer codes.

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heat transfer enhancement, mixing vane, super heated steam, reactor safety, reactor systems codes, reflood heat transfer, rod bundle, spacer grid, thermal hydraulics, two-phase mixture, friction and acceleration pressure drop, void fraction.

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