AGC-- 2551

REON

ROCKET ENGINE OPERATIONS - NUCLEAR

REPORT NO. 2551

TO

AEC-NASA SPACE NUCLEAR PROPULSION OFFICE

AN EXPERIMENTAL INVESTIGATION OF HEAT TRANSFER
TO HYDROGEN AT NEAR CRITICAL TEMPERATURES AND
SUPERCRITICAL PRESSURES FLOW TURBULENTLY IN
STRAIGHT AND CURVED TUBES

MASTER

NERVA PROGRAM CONTRACT SNP-1 MAY 1963

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ABSTRACT

An experimental non-burnout study of heat transfer to hydrogen at near-critical temperatures flowing turbulently in resistance-heated straight and curved channels was made to evaluate the applicability of earlier heat transfer correlations to nozzle design. Coolant passage geometry was simulated by bending stainless-steel test sections to a contour typical of a rocket nozzle throat. The fluid was heated asymmetrically by chemically-milling the tube wall to reduce the metal thickness on one side. Heat fluxes up to $14.5 \text{ Btu/in}^2\text{sec}$ and wall-to-bulk temperature ratios up to 18.5 were achieved. Correlating equations were generated for the straight and curved tube geometries with fluid properties evaluated at the bulk temperature. However, analysis of the data indicates this simple correlation approach does not adequately express the data. A comparison of these equations with earlier correlations showed that the equation generated from straight tube tests was the most conservative and that generated from curved tube data was in general the most optimistic.

W. D. Stinnett
NERVA Technical Systems Manager
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FOREWORD

This report is in partial fulfillment of SNP-1 Contract Task Item 1.4 which states in part: "Perform heat transfer tests with liquid hydrogen to better define nozzle heat transfer conditions. Continue scale-model hot bleed port heat transfer tests with hot GN_2 to better define the nozzle design criteria. Continue the general components heat-transfer-analysis and bleed port program."

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SECTION I
SUMMARY

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I. SUMMARY

This report describes the results of heat transfer experiments that were conducted on cryogenic (i.e., initially liquid) hydrogen flowing turbulently in resistance-heated stainless steel test sections. Both straight and curved channels of circular cross-section were employed, the latter being limited to simulating a single contour considered typical of a coolant passage in a rocket nozzle throat region. Power was generated non-uniformly around the flow passage circumference by chemically-milling one side of the tube wall. The heat flux generated at the simulated hot-gas side of the tube (thick side) was thus approximately four to five times greater than that of the opposite side of the tube (thin side).

Inlet mass velocities ranged from 5.78 to 1768 lbm/ft²sec. Local values of the pressure and bulk temperature ranged from 418 to 850 psia and 50.9 to 290°R respectively, while local velocities ranging from 5.7 to 1095 ft/sec were obtained. This was a non-burnout study in which the heat flux imposed was limited by the maximum permissible outer-wall tube temperature. The highest outer wall temperature measured was 1925°R and the maximum inner-wall temperature was computed as 1098°R. The maximum local heat flux was 14.5 Btu/in.²sec, and the highest value of the wall-to-bulk temperature ratio obtained was 18.5.

Heat transfer to hydrogen flowing turbulently in straight asymmetrically-heated tubes of circular cross-section was correlated within +46% and -25% by equation (20) as shown in the following, with fluid properties evaluated at the bulk temperature

$$St_b = 0.017 Pr_b^{0.96} Re_b^{-0.14} (T_w/T_b)^{-0.8}$$

Flow in curved tubes of circular cross-section was correlated within +42% and -25% by equation (22) as shown in the following, with properties evaluated at the bulk temperature

$$St_b = 0.0346 Pr_b^{-0.3} Re_b^{-0.17} (T_w/T_b)^{-0.7}$$

Data scatter was appreciable, and it is apparent that the lumped parameter approach of the above equation form does not adequately correlate hydrogen heat transfer data in the region between the critical and transposed critical temperatures. A comparison of these equations with earlier correlations indicated that the equation generated from straight tube tests was the most conservative and the equation generated from curved tube data was in general the most optimistic.

SECTION II
INTRODUCTION

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II. INTRODUCTION

A. PREVIOUS INVESTIGATIONS

In recent years considerable effort has been devoted to determining the liquid-side coefficient characterizing heat transfer to hydrogen over a wide range of pressures, flow velocities, and bulk and wall temperatures. A number of studies (References 1 through 4) have utilized gaseous hydrogen pre-chilled with liquid nitrogen or liquid hydrogen. Minimum bulk temperatures obtainable in this manner are considerably above the near-critical region in which the physical properties of hydrogen change markedly with small temperature variations. The results of such studies, however, would appear directly applicable to those regions of the coolant passage which are characterized by high bulk temperatures.

Wright and Walters in a limited program at AiResearch (Ref. 1) used helium at ambient temperatures in a countercurrent heat exchanger to heat normal gaseous hydrogen at 700 psia which had been prechilled with liquid hydrogen to about 100°R. The range of test variables was small because of the experimental technique. Their data, with fluid properties evaluated at the bulk temperature, were correlated within ±20% by the equation

$$\text{Nu}_b = 0.0202 \text{ Re}_b^{0.8} \text{ Pr}_b^{1/3} (T_w/T_b)^{-0.575} \left(1 + \frac{6}{L/D}\right) \quad (1)$$

McCarthy and Wolf at Rocketdyne (Ref. 2) investigated forced-convection heat-transfer to gaseous normal hydrogen prechilled with liquid nitrogen. Using an electrically-heated tube, heat fluxes up to 14.8 Btu/in.² sec were achieved at pressures from 64 to 1345 psia for bulk temperatures between 599 to 729°R. Wall-to-bulk temperature ratios varied from 1.5 to 2.8. These data were represented within ±8% by the equation

$$\text{Nu}_b = 0.023 \text{ Re}_b^{0.8} \text{ Pr}_b^{0.4} (T_w/T_b)^{-0.30} \quad (2)$$

(1) C. C. Wright and H. H. Walters, Single Tube Heat Transfer Tests - Gaseous and Liquid Hydrogen, WADC TR 59-423 (August 1959).

(2) J. R. McCarthy and H. Wolf, "Forced Convection Heat Transfer to Gaseous Hydrogen at High Heat Flux and High Pressure in a Smooth, Round, Electrically-Heated Tube," ARS Journal, 30(4), 423 (1960).

with fluid properties evaluated at the bulk temperature. Later work (Ref. 3) again using chilled gaseous hydrogen, was conducted at low pressures (32-252 psia) in which the bulk temperature ranged from 193 to 670°R and the T_w/T_b ratio varied from 2.3 to 11.09. These data, under well-developed flow conditions, were correlated with an average deviation of $\pm 10\%$ by the expression

$$Nu_b = 0.025 Re_b^{0.8} Pr_b^{0.4} (T_w/T_b)^{-0.55} \quad (3)$$

again with fluid properties evaluated at the bulk temperatures.

Fowler and Warner, (Ref. 4) using gaseous hydrogen at pressures from 40 to 100 psia and at wall-to-bulk temperature ratios between 1.17 and 2.47, presented the following correlation with properties evaluated at the film temperature

$$Nu_f = 0.023 \frac{D V_b \rho_f}{\mu_f}^{0.8} Pr_f^{0.4} \quad (4)$$

Investigations of cryogenic (i.e., initially-liquid) hydrogen include work at JPL (Ref. 5), AiResearch (Ref. 1), NASA (Ref. 6) and Aerojet (References 7 and 8). Of these latter studies, only the NASA (Ref. 6) and Aerojet (Ref. 8) studies were concerned with pressures considerably above atmospheric.

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- (3) J. R. McCarthy and H. Wolf, The Heat Transfer Characteristics of Gaseous Hydrogen and Helium, Research Report No. RR-60-12, Rocketdyne (December 1960).
- (4) J. M. Fowler and C. F. Warner, "Measurements of the Heat Transfer Coefficients for Hydrogen Flowing in a Heated Tube," ARS Journal, 30(3), 266 (1960).
- (5) W. B. Powell, Heat Transfer to Fluids in the Region of the Critical Temperature, JPL Progress Report No. 20-285, 1 April 1956.
- (6) R. C. Hendricks, R. W. Graham, Y. Y. Hsu, and A. A. Madeiros, "Correlation of Hydrogen Heat Transfer in Boiling and Supercritical Pressure States," ARS Journal, 32(2), 244-51 (1962).
- (7) T. C. Core, J. F. Harkee, B. Misra, and K. Sato, Heat Transfer Studies, Contract AF 33(616)-5289, Aerojet-General Corporation, Azusa, California, (September 1959).
- (8) W. R. Thompson and E. L. Geery, Heat Transfer to Cryogenic Hydrogen at Supercritical Pressures, AFFTC-TR-61-52 (Aerojet Report No. 1842), July 1960.

Considerable analytical and experimental work on heat transfer to hydrogen at both subcritical and supercritical pressures has been reported by Hendricks, Graham, Hsu, and Madeiros. (Ref. 6). The temperature-entropy chart for hydrogen was divided into five regions with correlation schemes presented specific to each region. Their Region 3 (supercritical pressure, near-gas hydrogen), extending from the critical pressure to about 880 psia and from 90 to over 250°R, corresponds most closely with the test conditions reported herein. In these studies it was proposed that in the region of the transposed critical temperature (82°R at 700 psia), heat transfer to hydrogen may be characterized by a pseudo-density phenomena akin to boiling at subcritical pressures. It was also stated that at higher pressures it may be possible to correlate using conventional empirical pipe flow equations, but extrapolation to regions not tested carries the inherent possibility that a change in mechanism may invalidate the extrapolation.

This conclusion substantiates earlier Aerojet results (Ref. 8) sponsored by the Rocket Development Division at Edwards Air Force Base. In this program, tests were conducted at pressures between 684 and 1344 psia, with inlet bulk temperatures between 55 and 102°R. No effect of pressure upon the pipe-flow correlation was noted. In this work, the test data were found to fall into two different regimes, differing primarily in the exponent of the wall-to-bulk temperature ratio. Heat transfer in the "A" regime was correlated by an equation (based on properties evaluated at the bulk temperature) over a bulk Reynolds number range of 3×10^5 to 2×10^6 (assuming an exponent of 0.8 for the Reynolds modulus):

$$Nu_b = 0.028 Re_b^{0.8} Pr_b^{0.4} (T_w/T_b)^{-0.64} \quad (5)$$

However, considerable data scatter resulting from instrumentation problems at low temperatures and high pressures was evident.

In a number of tests, heat transfer rates characterized by the "A" regime correlation would suddenly be characterized by a higher heat transfer coefficient; this second regime was termed the "B" correlation.

$$Nu_b = 0.0217 Re_b^{0.8} Pr_b^{0.4} (T_w/T_b)^{-0.34} \quad (6)$$

Scatter was considerably less and the data were represented within $\pm 30\%$ by equation (6). It was not possible to pinpoint the cause for the shift from "A" to "B". It has since been suggested (see Ref. 3) that the onset of a resonant vibration, triggered by some transient variation in test conditions, may have changed the mechanism from that characterized by the "A" correlation to the highest heat transfer coefficient (at $T_w/T_b = 2.5$) predicted by the "B" correlation. As the apparatus was not instrumented to measure high frequency vibration, it was impossible to either verify or disprove this hypothesis.

Equation (6) was suggested as the best correlating equation for conditions of high heat flux and high T_w/T_b ratios. This equation is in close agreement with Equation (2), a relationship also obtained for high heat fluxes, and was considered to be the best correlating equation except at low heat fluxes and low wall-to-bulk temperature ratios where equation (5) was deemed preferable.

More recently, Szetala (Ref. 9) has stated that the empirical pipe flow equations are inadequate to permit a satisfactory prediction of liquid-side heat transfer coefficients for cryogenic hydrogen flowing turbulently through a tube subjected to high heat flux, particularly in the critical region, because of the large variations in thermodynamic and transport properties. It was indicated by a graphical presentation of experimental data, involving the conventional dimensionless parameters evaluated at the arithmetic mean temperature, that such a technique did not correlate the data satisfactorily. While Szetala did not present a correlation, a visual "best-fit" line through these data as presented in Figure 2 of Reference (9) gives the equation

$$Nu_f = 0.025 Re_f^{0.8} Pr_f^{0.4} \quad (7)$$

in which properties are evaluated at the arithmetic mean film temperature and the bulk velocity is employed in the Reynolds modulus. This is essentially the same correlation as Equation (4), considering the error inherent in reading a small-scale graph. The over-all scatter in the data of (Ref. 9) is of the order of $+80\%$ and -50% .

(9) E. J. Szetala, "Heat Transfer to Hydrogen Including Effects of Varying Fluid Properties," ARS Journal, 32(8), 1289 (1962).

B. ANALYSIS OF EXPERIMENTAL STUDIES

In conventional experimental determination of the heat transfer characteristics of rocket propellants for use as regenerative coolants, straight tubular test sections of circular uniform cross-section, resistance-heated by passing an electric current through the tube, are employed. However, a comparison of the heat transfer coefficients obtained in such single-tube laboratory tests with those computed from the calculated heat flux and measured bulk temperature rise as obtained in actual engine firings show that the laboratory data, for equivalent coolant parameters, are usually conservative to a significant degree. Several factors have been hypothesized by investigators in the field to explain this divergence: (1) the nozzle cooling passage is a curved channel rather than straight, (particularly in the throat region), (2) the nozzle tube is subjected to heating over only a portion of its outer surface, (3) the surface characteristics of a rocket coolant passage are different from those of the commercial tubing commonly used as test sections, (4) nozzle tubing is usually characterized by a constantly changing flow area with the minimum cross-section at the throat, (5) in many cases the cross-sectional configuration of the coolant passage is non-circular, and (6) the resistance-heated test section approaches the axial uniform heat flux case quite closely whereas the rocket coolant passage is subject to a steep heat flux gradient both upstream and downstream of the throat.

An evaluation of these hypotheses leads to the following general conclusions:

1. In a rocket nozzle the most critical heat transfer area is usually the throat region. Forming the nozzle throat results in a coolant flow passage in which there is a continual change in direction of the flow path. The resulting effect of fluid momentum forces on the boundary layer thickness may be such as to considerably enhance the heat transfer coefficient on that wall of the channel concave with respect to the fluid ("swept side") while simultaneously resulting in a thickening of the boundary layer on the wall convex with respect to the fluid path ("unswept" side).

2. Similarly, it would appear possible that high heat input over only a fraction of the total surface area of the coolant passage could result in different velocity and temperature profiles within the tube on the heated and unheated walls, and thus a change in the local heat transfer coefficients on opposite sides of the tube. Such effects would be maximized for a fluid in the region of its critical temperature where thermodynamic and transport properties vary rapidly with small changes in temperature. Such variation in fluid properties could be expected to be significant not only at high wall-to-bulk temperature ratios (radial variation in properties) but also for large increases in enthalpy at high heat fluxes (axial variation in properties).

3. Nozzle coolant passages are typically fabricated by a stretch-forming and bending process in which, it appears, the surface roughness of the inner wall changes significantly along the tube axis. Commercial tubing on the other hand, is drawn through a die and, while surface characteristics will vary from lot to lot depending on the condition of the die, axial variation in surface roughness for a short section is negligible.

4. In a nozzle coolant passage of variable cross-section both the linear and mass velocities of the fluid are changing constantly whereas in a typical test section of constant I.D. the mass velocity is constant while the linear velocity increases as the fluid density decreases. If local heat transfer coefficients only are calculated and correlated in terms of local dimensionless parameters, no error is introduced. However, averaged coefficients over a significant tube length can be misleading for fluids which exhibit large velocity changes.

5. Flattening of the coolant passage could result in a change in velocity and temperature profiles as compared to flow in a tube of equivalent circular cross-section. Such an effect would be enhanced, of course, by the degree of flattening.

6. The steep axial heat-flux gradient could be postulated to prevent the establishment of a fully-stabilized thermal boundary layer as compared to the uniform axial heat flux case.

Lacking a complete understanding of the physical mechanisms involved in heat transfer to hydrogen in the near-critical region, and considering the departure from the simple experimental tube geometry to that characterizing a nozzle coolant passage, it becomes apparent that the design of the nozzle from the standpoint of estimating the liquid-side coefficient must be substantiated by experiments which more closely simulate actual test conditions, particularly in regions where heat transfer is most critical, i.e., the nozzle throat. Of the six factors discussed above, the effect of tube curvature and one-sided heat input were considered of sufficient significance to warrant immediate investigation. Since their effect on the generalized correlations presented above cannot be estimated before hand, it is evident that an approach more closely simulating actual engine design parameters would permit a more realistic evaluation of the design. It was thus the objective of the current program to evaluate heat transfer to initially-liquid hydrogen in a tube of circular cross-section curved to a contour simulating a possible NERVA nozzle, using asymmetrically-heated test sections, and with test conditions limited to approaching the actual design point as closely as possible utilizing existing available apparatus.

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SECTION III
DESIGN OF EXPERIMENT

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III. DESIGN OF EXPERIMENT

A. SCOPE OF INVESTIGATION

The objective of this test program was to determine experimentally, within the limitations of existing test equipment, liquid-side heat transfer coefficients for hydrogen under the following test conditions:

Tube geometry:	Asymmetrically-heated test sections of circular cross-section, both straight and curved to simulate a typical rocket nozzle throat contour
Bulk temperature:	60 - 100°R
Pressure:	700 psia (limited testing at 400 psia)
Velocity:	up to 700 ft/sec
Heat flux:	Maximum obtainable short of tube burnout

This program was not a parametric investigation to establish a generalized correlation over a wide range of test variables, but rather a program to study heat transfer to hydrogen over a range of variables restricted to simulating the design condition in the nozzle throat section of a typical rocket nozzle coolant passage.

Forty-four test runs were completed, employing both straight and curved asymmetrically-heated test sections of circular cross-section. Test conditions achieved were:

Bulk temperature:	53.4 - 290°R
Pressure:	468 - 850 psia
Mass velocity:	0.04 - 12.0 lmb/in. ² sec
Velocity:	50.8 - 1095 ft/sec
Heat flux:	0.05 - 14.5 Btu/in. ² sec
Wall-to-bulk temperature ratios:	1.18 - 18.5

The test program attained the requested objectives with the exception that only a few data points at velocities over 500 ft/sec were obtained. This restriction was a result of the limited flow capabilities of the existing heat transfer loop. Three factors interact to restrict the mass velocity using this apparatus:

- (1) The capacity of the high-pressure tank is 50 gal of liquid hydrogen with a maximum weight flow rate of about 0.2 lbm/sec.
- (2) Approximately one to two minutes are required to attain an initial steady-state operation at a given power input, with approximately 30 seconds required to increase the power input and again achieve steady-state operation.
- (3) Practical problems of fabricating and instrumenting a test section limits the size of the tube to a minimum O.D. of 3/16 in.

Thus any test is a compromise involving these three factors. Use of large flow area test sections is desirable as the more closely simulate actual coolant passages and can be more accurately instrumented; however, the run time and tank capacity restrictions limit the mass velocity that can be achieved to relatively low values. Reduction in tube diameter to the minimum size tube increases the mass velocity (and heat flux) that can be achieved, but raises the problem of scaling the resulting data to the full size coolant passage.

B. TEST SECTION DESIGN

A test section designed to simulate an actual rocket nozzle coolant passage should be curved to approximate the nozzle contour and include the axial change in coolant flow area representative of the actual nozzle. Further, the test should be conducted with the application of heat to only that area of the tube which is exposed to hot gases in a rocket nozzle and in a manner programmed to simulate the heat flux profile incident on the coolant tube. Such a test would thus simulate the tube geometry, heat flux magnitude and pattern, and wall temperatures as well as fluid conditions and should have an approximately one-to-one correlation with engine test results. However, no heat transfer program employing such a complex test section is known to have been conducted. Rather, conventional test sections as generally used for evaluating the heat transfer characteristics of propellants consist of straight tubes of uniform wall thickness and cross-sectional flow area which are resistance-heated by either dc or ac current. In such tests, the distribution of current around the circumference of the tube, and consequently the wall temperature and the incident heat flux at any axial position, does not vary. Thus normal boundary layer development is promoted with no evaluation of fluid momentum forces through the possibility of curvature.

Several years ago, as part of the Titan II developmental program, the first steps toward an evaluation of tube geometry on heat transfer were made at the Azusa Heat Transfer Laboratory. Uniform wall-thickness tubes were bent to conform to the contour of a nozzle coolant passage, and tested as resistance-heated test sections. While this technique did permit an evaluation of the effect of tube curvature on the liquid-side coefficient on the simulated hot-gas side, it was soon found that only relatively low temperatures could be attained at this point as the opposite (or concave) side of the tube ran considerably hotter. Typical inner-wall temperature profiles for such a curved uniform-wall thickness test section are shown in Figure 1 for a test of this type of test section as conducted for the NERVA program using liquid hydrogen as the coolant. Such tests are obviously limited by the outer-wall temperature on the inner side of the curve. For example the outer tube wall temperatures corresponding to inner-wall temperatures plotted for Data Point 11 in Figure 1 at the throat position were 1113°F for the outside (hot-gas) side and 1650°R

Figure 1

EFFECT OF CURVATURE OF UNIFORM WALL-THICKNESS STAINLESS STEEL TUBE (RESISTANCE-HEATED) ON THE AXIAL WALL TEMPERATURE PROFILE

for the inside (backside) of the curved tube, showing that the outer surface of the tube on the inner portion of the curve is approaching the preset upper temperature limit of 2000°R , while the point of interest on the opposite side is still relatively cold. Attempts to increase the heat flux invariably result in burning out the tube along the inner curve. While the effects of fluid momentum forces on the "hot-gas" side are simulated at relatively low heat fluxes and a low wall temperature, a high heat flux and high wall temperature are produced on the backside of the tube. The velocity and temperature profiles within such a tube could thus be expected to differ from those developed in a nozzle coolant passage.

This result for tests with curved uniform-wall thickness tubes is primarily attributed to two factors. Of most importance is the effect of forces within the fluid itself. In flow around a bend, the momentum of the fluid imposes a "scouring" action on the outside of the bend radius. The subsequent reduction in the boundary layer thickness results in enhanced heat transfer and low wall temperatures. Conversely, on the inside of the curve, thickening of the boundary layer could be expected, resulting in a reduced rate of heat transfer and high wall temperatures.

The second factor which contributes to the temperature profile described above is a result of the effect of geometry on the flow of current in the metal tube wall. For most test section materials, and specifically for the case of stainless-steel, the electrical resistance is a strong function of the metal temperature. The distribution of the current through the tube wall is therefore a function of both the metal temperature and the dimensions of the metal. A resistance-heated tube may be considered as an infinite number of small conductors forming the walls of a channel. As a parallel circuit, the potential difference between the ends of the section (the voltage drop) is constant. The current flow through each small conductor will be the same only when the conductor elements have the same length-to-area cross-section ratio, and are at the same temperature, i.e., the resistivity is constant. Bending a tube, however, changes the current path through the tube; most of the current, rather than following the longer elements around the outside portion of the bend, seeks the shortest path, (the inside wall of the bend radius). Coupled with this effect

of variation in path length is the corresponding thinning of the outer wall, reducing the metal cross-sectional area and further increasing the resistance to current flow on the outside of the bend. More ohmic heat is thus generated on the inside of the bend, raising the metal temperature. Since the resistivity of stainless increases with temperature, this tends to limit the maldistribution of current, resulting in an equilibrium condition dependent on the variation in the liquid-side heat-transfer coefficient both radially and axially.

The cumulative effect of these factors is contrary to that desired for simulating flow with heat transfer in a nozzle coolant-passage. It is readily apparent that to simulate the heat input condition characterizing the throat region of a nozzle coolant passage, some means of eliminating, or significantly reducing, the heat input on the inside curve of the tube is required. A partially-heated test section, or tube with heat applied from one side only would, of course, be the ultimate solution of this problem. However, the problem of fabricating and testing a longitudinally-split tube, one-half of which is current-carrying and which is both electrically-isolated and hydraulically-sealed from the non-current carrying portion, appears insurmountable from a practical standpoint. The remaining approach is to heat asymmetrically with most of the power being generated over only a portion of the tube's surface. A technique reported by Hines (Ref. 10) has been successfully employed over a limited range of test conditions. In this method a heavy layer of copper was plated to one side of a rectangular stainless steel channel. Hydraulic integrity was assured by the continuous steel surface, while most of the heat-generating current (up to 98%) passed through the copper. The greatest limitation to this technique lies in the problem of maintaining the steel-copper bond over a wide range of temperatures. The differences in the coefficients of thermal expansion for stainless steel and copper are such that the copper tends to separate from the base metal.

A technique developed at the Azusa Heat Transfer Laboratory appears to provide asymmetric heating without serious problems in either fabrication or testing, and at a low test section cost. In essence this method consists simply of chemically-milling a heavy-walled tube to obtain a thickness variation on

(10) W. S. Hines, "Heat Transfer to RP-1 Kerosene in Turbulent Flow Under Asymmetric Heating Conditions," A.I.Ch.E. Preprint No. 24, Fifth National Heat Transfer Conference, Houston, Texas,

opposite sides of the tube of about 5:1. The proper masking of the tube, either straight or curved, permits the etchant to dissolve the metal at a known rate over any desired area. Neglecting the effect of temperature on the resistivity of the tube material, a wall thickness ratio of 5:1 results in a corresponding distribution of the current, and consequently the heat generated, on opposite sides of the tube.

A test of a section curved identically to that used in the test shown in Figure 1 but asymmetrically heated gave the following results for the throat position (D-95-LC-28-4):

	<u>Outside of Curve</u> <u>(hot-gas side)</u>	<u>Inside of Curve</u> <u>(nozzle tube cold side)</u>
Outer wall temperature, $^{\circ}\text{R}$	1752	683
Inner wall temperature, $^{\circ}\text{R}$	1078	623
Local heat flux, $\text{Btu/in.}^2\text{sec}$	8.50	2.23

It is apparent that the variable wall-thickness technique offers a comparatively simple solution to the problem of studying heat transfer to flow in resistance-heated curved channels. The metal temperature on the inside of the curve is reduced below the temperature of the simulated "hot-gas" side and the heat flux is similarly reduced several fold as compared to the results for uniform wall-thickness tubes as shown in Figure 1. Thus high heat inputs and high surface temperatures may be generated on the hot-gas side of the curved test section to more rigorously simulate a coolant passage in the nozzle throat region.

This method, as originally developed for this program, was employed successfully for both straight and curved tubes. As eventually used, the fabrication of test sections to provide asymmetric heating was accomplished as follows: heavy-walled (0.049 in.) stainless steel tubing was bent (after filling with Cerrobend) to the desired radius. After annealing for stress-relief, the tube was then chemically-milled (Anadite, Inc., South Gate, Calif.) to give a wall thickness on the etched side of about 0.011 in. It was then prepared for use as a test section as described in a following section.

In order to evaluate the effect of tube curvature as well as to compare the effect of asymmetric heating with uniform heating, it was necessary to test four basic geometric configurations.

- Phase A: Curved (NERVA contour) uniform wall-thickness constant flow area test sections
- Phase B: Straight asymmetrically-heated, constant flow area test sections
- Phase C: Curved (NERVA contour) asymmetrically-heated, constant flow area test sections
- Phase D: Combination straight and curved asymmetrically-heated, constant flow area test sections

In addition, the effect of internal cable inserts affixed to the inner wall of a curved asymmetrically-heated test section on heat transfer was studied.

- Phase E: Straight and curved asymmetrically-heated, constant flow area test sections, two cable inserts to increase the mass velocity by reducing the flow area.

In the last phase of the experimental work, heat transfer at off-design conditions ($P = 400$ psia, low flow rate) was investigated. The point of major interest in this portion of the work was the effect of the reverse curve in the coolant passage in the nozzle entry zone on the "hot-gas" side heat transfer coefficient.

- Phase F: Combination straight and curved, uniform wall-thickness, constant flow area test section, off-design operating conditions.

The geometries investigated are shown in Figures 2 through 8 and are tabulated in Table 1. Four test section designs were utilized in the Phase A study, as illustrated in Figures 2 and 3. Test sections CU-1 and CU-2, identical except for the inner tube diameter, were instrumented axially to determine wall temperatures longitudinally around the bend. Test sections CU-3 and CU-4 were instrumented to determine the outer wall temperature profile around the tube circumference in the plane of the simulated throat.

The chemical milling technique to give a tube with a wall thickness variation of approximately 4.5:1 on opposite sides of the tube was first applied to a straight section, as shown in Figure 4 for test section SA-1 (Phase B). The successful fabrication of this tube was followed by milling a curved heavy-wall (0.049 in.) tube to give test section CA-1, as shown in Figure 5 (Phase C). Combining the straight and curved test sections into a two-element test section

Figure 3
Curved Uniform-Wall Thickness Test
Section (CU-3, 4)

Figure 4
Straight Asymmetrically-Heated Test
Section (SA-1)

Figure 5
Curved Asymmetrically-Heated Test
Section (CA-1)

Figure 6

Straight and Curved Combined Asymmetrically-Heated Test Section (SCA-1,2,3)

Figure 7

Curved Asymmetrically-Heated Test Section
With and Without Cable Insert

Figure 8

Straight and Curved Uniform-Wall Thickness
Test Section (SCU-1)

TABLE 1
TEST SECTION GEOMETRY

Type	Code	I. D. / Wall Thickness (es)	Test Nos.	Figure No.
Curved, uniform-wall thickness (Phase A)	CU-1	0.218/0.016	4,6,8	2
	CU-2	0.1555/0.016	12	2
	CU-3	0.1555/0.016	13-21	3
	CU-4	0.1555/0.016	22	3
Straight, asymmetric-wall thickness (Phase B)	SA-1	0.2144/0.049 0.011	23,24	4
	SA-2 ⁽¹⁾	0.152/0.049 0.011	32	6
	SA-3 ⁽²⁾	0.152/0.049 0.011	34	6
Curved, asymmetric-	CA-1	0.152/0.049 0.011	25-28	5
	CA-2 ⁽³⁾	0.152/0.049 0.011	29-31	6
	CA-3 ⁽⁴⁾	0.152/0.049 0.011	33	6
Straight and curved	SCA-1	0.152/0.049 0.011	(5)	6
	SCA-2	0.152/0.049 0.011	35-37	6
	SCA-3	0.152/0.049 0.011	38-40	6
Curved, asymmetric-	CAI-1 ⁽⁶⁾	0.152/0.049 0.011	41	7
	CAI-2 ⁽⁷⁾	0.152/0.049 0.011	42	7
	CAI-3 ⁽⁸⁾	0.152/0.049 0.011	43	7
Straight and curved combined, uniform wall thickness (Phase F)	SCU-1	0.2088/0.020	44,46,47	8

TABLE 1 (cont.)

- NOTES:
- (1) SA-2 is straight section of Tube SCA-1 tested alone.
 - (2) SA-3 is straight section of Tube SCA-2 tested alone.
 - (3) CA-2 is curved section of Tube SCA-1 tested alone.
 - (4) CA-3 is curved section of Tube SCA-2 tested alone.
 - (5) SCA-1 not tested as two-element test section.
 - (6) No cable insert.
 - (7) Twisted strand cable insert, 0.077 in. O.D., fastened to back-side of tube.
 - (8) Twisted strand cable insert, 0.100 in. O.D., fastened to back-side of tube.

provided the tube design shown in Figure 6. The straight and curved lengths could be heated either separately or together, using a separate power supply to heat the straight (preheater) section independently of the downstream throat simulation section (Phase D).

A variation of the curved asymmetrically-heated test section is shown in Figure 7. In these tests, the effect on heat transfer resulting from inserting cables of two diameters into the test section was evaluated. The use of this technique permitted an increase in the mass and linear velocities for the same weight flow rate (Phase E).

In the last experimental portion of the program (Phase F), the effect of lower pressure and low flow rates was examined to provide insight on heat transfer at off-design conditions, i.e., during the start-up and shut-down transients. The heat transfer coefficient in the region of the reverse bend upstream of the nozzle entrance was of particular interest. The test section design for the Phase F study is shown in Figure 8.

C. EXPERIMENTAL APPARATUS

The experimental determination of the heat transfer characteristics of cryogenic hydrogen flowing turbulently in test sections of various geometries at the nominal design pressure of 700 psia, and an off-design pressure of 400 psia was performed using stainless-steel tubes, some of uniform wall-thickness and some chemically-milled to give an asymmetrical heat input when resistance heated. Tests were conducted using a single-pass gas-pressurized blowdown loop located in a semi-enclosed test bay in Azusa (Bay 2, Bldg. 167) (Ref. 11).

The 50-gal-capacity vacuum-jacketed working vessel consisted of a tank of austenitic stainless steel, designed for a working pressure of 2200 psi at a temperature of 36°R, enclosed in a mild-steel outer jacket. The annulus between the inner sphere and the shell was filled with an evacuated powder insulation to reduce heat transfer to the inner sphere by radiation. Gaseous hydrogen was used to pressurize the liquid hydrogen and propel it from the storage vessel through the system, the level of pressure for the test fluid being controlled

(11) W. R. Thompson and E. L. Geery, loc. cit., Figure 1.

by regulating the pressure of the pressurizing gas. The volumetric flow rate of the test fluid was metered by a sharp-edged orifice, and controlled by a flow regulator and a back-pressure control valve. The test fluid after being metered, passed through a fluid mixing chamber, the test section, a second fluid mixing chamber, and then through the back pressure control valve into the vent system. The flow components upstream of the back pressure control valve were enclosed in a tubular steel housing mounted directly above the storage vessel, as shown in Figure 9. This enclosure was provided with its own vacuum system, independent of that used to maintain the vacuum in the storage vessel annulus. The heat transfer system was located in front of the test bay under a sheet metal hood. Accumulation of hydrogen gas through leakage in the test bay area was minimized by constant circulation of air through this hood by means of a 3500-cfm explosive proof exhaust blower. Figure 10 is a view of the installation.

A complete description of the various components and instrumentation comprising the test loop is contained in Appendix A.

Figure 9

Test System Enclosure and Flow System

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Figure 10

Side View of Test Apparatus

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SECTION IV
EXPERIMENTAL PROGRAM

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IV. EXPERIMENTAL PROGRAM

A. TEST PROCEDURE

1. Tank Filling Procedure

Prior to filling the tank, all gases which contribute to condensation were evacuated from the storage tank, flow line, and transfer line (fill hose), by alternately vacuum-pumping and purging with helium gas. The purge-evacuation cycle was repeated three times to insure that a minimum of gases, such as air or water vapor, would be present to freeze and possibly clog the system. Components exposed only to ambient temperature, such as the gas pressurization system, were purged with gaseous hydrogen.

During the filling and actual testing, the exhaust fan located over the tank hood was operated continuously to aid in rapid removal of any hydrogen gas leaking from the system. A leak detector, consisting of a thermal-conductivity cell calibrated to give a 10 mv output for a 4% mixture of helium in nitrogen, was operated continuously during filling and test operations. Since the thermal conductivities of hydrogen and helium are somewhat comparable, this system was believed adequate for a calibration. An alarm system on a millivolt recorder was actuated when the cell output reached 4.5 mv; this corresponded to a concentration of approximately 2% contaminant in air, well below the lower explosive limit of 4% vol hydrogen in air.

The tank and associated equipment were electrically grounded to the water-supply lines in the test bay. During filling the transfer line and supply trailer were similarly grounded.

To maintain an inert atmosphere, the vent line on the system was purged by a constant flow of nitrogen introduced at the bottom of the vent line. This nitrogen purge prevented the possible mixing of hydrogen and air inside the vent line.

A mobile storage trailer was used for inplant storage of liquid hydrogen. During the fill operation this storage trailer was parked approximately 12 feet from the working tank and transfer was effected through a flexible vacuum-jacketed transfer line. With the tank vent open, the transfer hose was purged with nitrogen, evacuated and purged with helium, and the transfer started. When the transfer line was chilled, the fill valve on the storage tank and the tank vent valve were opened, and the liquid hydrogen was then transferred into the storage tank. Because of the thickness of the storage tank wall (1-1/4 in.), transfer was conducted at low flow rates over a relatively long period of time, with several halts during the filling operation to permit the system to achieve thermal equilibrium. The slow rate of transfer also minimized the entrainment of liquid in the vented gas. Transfer was achieved at tank pressures ranging from 5 to 15 psig, reducing the loss of fluid through flashing on expanding to a lower pressure. Following the filling of the tank, the fill valves on the tank and the mobile trailer were secured, and the bypass line to the tank was opened. This permitted entrained liquid in the transfer hose to be vented. The transfer hose was then flushed with nitrogen to aid in warming the hose and removing residual hydrogen. The hose was then disconnected from the trailer and the trailer removed. The hose was purged with a flow of nitrogen to insure the absence of any hydrogen gas which might have leaked past the tank fill valve during a test.

2. Test Operation

It was found that the best cool-down technique consisted of pressurizing the system to the desired operating pressure, and initiating flow by reducing the pressure on the back-pressure control valve. A very low rate of flow through the system resulted in the rapid achievement of liquid flow in the system, and the test could be started. The desired flow rate was achieved at the desired operating pressure by adjusting the dome pressures on the back-pressure control valve and on the tank pressurization valve. When flow was established, power was applied to the test section at

discrete current levels. Upon achieving equilibrium at each respective power level, as evidenced by the stabilization of the wall-temperature thermocouples, all the recorder charts were marked to indicate a data point. Manual switching was required to permit recording the individual voltage drops along the test section, and the thermocouples along the length of the test section. Voltage drops and thermocouple outputs were recorded sequentially at each power level. Following the recording of data at a particular power level, the power was increased and additional data taken at the next power level. The test was terminated when the predetermined upper limit in wall temperature was achieved (about 2000°R). In the event where the tank fluid was expended prior to the achievement of this wall temperature, the test was suspended, the tank refilled, and the test continued until the limiting wall temperature was reached.

It was necessary to make repeated fills of the tank at the highest mass flow rates. For a tank load of approximately 30 lb of fuel and a flow rate of 0.2 lb/sec, the test duration was approximately 2.5 minutes, thus limiting the number of test points achieved with one fill to approximately three.

Following the expulsion of fuel from the tank the pressurizing gas was shut-off, and the high pressure gas in the tank vented through a by-pass valve on the tank pressurization line.

The back-pressure control valve was designed for operation at temperatures down to -65°F, however it was necessary to provide a flow of water over the vent line leading to the back-pressure valve and the valve itself for satisfactory operation of the control valve

B. SPECIAL TESTS

The special test section designs shown in Figures 6 and 8 (SCA-2, SCA-3, and SCU-1) required that power be applied at different levels to different parts of essentially the same test section. This was accomplished by using three electrodes. Since the individual generators were excited separately with a floating ground, the negative pole of each generator could be connected to the center electrode with the positive poles connected to the outer electrodes. By separately exciting each system, it was possible to apply power at different levels to each portion of the test section. In the two-step heat input tests conducted in this program, the power supplied to the upstream length of test section (termed a "preheater") was maintained at a steady predetermined level while power was supplied to the downstream length, (or test section), in increasing discrete levels. Data for each section was recorded as described earlier. It is necessary to presume in such tests on these configurations that good head balances are obtained, and that the local bulk temperature at the preheater outlet - test section inlet can be calculated, based on the power input to the preheater section; since obviously there was no provision for measuring the bulk fluid temperature leaving the preheater and entering the test section.

Three special tests (D-95-IC-41 through 43) were conducted to determine the effect of inserting cables lengthwise in the flow path of a curved tube. The first test of a curved tube without a cable was followed by two tests using the same test section with two different diameter cables successively inserted into the tube and held in contact with the side of the curve convex with respect to the fluid (i.e., the inside of the curve). The cables themselves were Teflon coated to prevent possible electrical contact with the current-carrying tube wall. The results of these tests indicated that the Teflon coating technique was adequate to prevent electrical shorting to the test section.

C. METHOD OF CALCULATION

Strip-chart data as obtained in the test bay were hand-reduced and the resulting raw information was entered as input to the Azusa IBM 7090 computer. The program employed the equations summarized below. A tabulation of the data in terms of the basic overall test parameters and local values for each power level (Data Point) is presented as Appendix B. This includes a listing of the nomenclature employed in the computer printout.

1. Fluid Properties

The thermodynamic and transport properties of parahydrogen employed were those established in both the Sacramento and Azusa plants as of December 1962. These were, except for specific heat, the interim standard property values as distributed by NBS Boulder Laboratories. The specific volume and enthalpy data were those reported by Roder and Goodwin (Ref. 12). Thermal conductivity and viscosity were those given by Rogers, Zeigler and McWilliams (References 13 and 14). Since there was no interim standard for specific heat, provisional data generated by the Lewis Research Center (Ref 15) were employed.

2. Energy Balance

An energy balance on the system is the primary means of estimating the accuracy of some of the measured test variables (current, voltage drop, flow rate, and bulk temperatures and pressures). The electrical energy supplied to the test section, Q_p , is equal to the enthalpy change of the fluid Q_s plus any losses or gains, Q_L :

(12) H. M. Roder and R. D. Goodwin, Provisional Thermodynamic Functions for Para-Hydrogen, NBS Technical Note 130, December 1961.

(13) J. D. Rogers, R. K. Zeigler, and P. McWilliams, Hydrogen Transport Property Correlations, LA-2527, Los Alamos Scientific Laboratory, May 29, 1961.

(14) J. D. Rogers, R. K. Zeigler, and P. McWilliams, Hydrogen Transport Property Correlations, Part II, LA-2719, Los Alamos Scientific Laboratory, September 17, 1962.

(15) Private communication, Lewis Research Center, NASA.

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temperature drop across the metal is great enough to require the use of computational techniques which permit the electrical resistivity and thermal conductivity to be a function of temperature. A widely-used method of computing inner-wall temperatures from outer-wall measurements, as derived by Kreith and Summerfield (Ref. 17), assumes that ρ_m and k_m are linear functions of temperature. While this is true for stainless steel at above-ambient temperatures, it is not the case for temperatures approaching those of liquid hydrogen.

The equation describing steady-state, two-dimensional thermal conduction with internal heat generation in a solid having temperature-dependent properties (not necessarily linear in form) has been derived in Appendix B. The finite difference solution of the equation, as applied to a line of symmetry of the tube cross-section, requires a knowledge only of the outer-wall temperature and the incremental voltage drop. This equation was included in the computer Heat Transfer Analysis program as a sub-routine to determine the inner wall temperature. The electrical resistivity data for Type 347 stainless steel at above-ambient temperatures (Ref. 18) and at low-temperatures (Ref 19) were included. High temperature metal thermal conductivity data (Ref. 20) and data for the cryogenic region (Ref 21) were similarly employed.

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- (17) F. Kreith and M. Summerfield, Investigation of Heat Transfer at High Heat-Flux Densities, Experimental Study with Water of Friction Drop and Forced Convection With and Without Surface Boiling in Tubes, JPL Progress Report No. 4-68, April 1948.
 - (18) Allegheny Ludlum Blue Sheet B123 Ed1, 10M-656-GPC.
 - (19) Personal Communication from S. L. Ames, Research Center, Allegheny Ludlum Steel Corporation, April 24, 1962.
 - (20) I. B. Fieldhouse, "Thermal Conductivity of Aircraft Structure and Reactor Materials," Thermodynamic and Transport Properties of Gases, Liquids and Solids, Symposium in Thermal Properties, Purdue University, February 23-26, 1959.
 - (21) D. B. Chelton and D. B. Mann, "Cryogenic Data Book," UCRL-3421, University of California Radiation Laboratory, Livermore, California, 1956.

4. Local Bulk Temperature

The calculation of the local bulk temperature was based on the change in enthalpy of the test fluid from the test section inlet to that point on the tube where outer-wall temperatures were measured. It was assumed that the electrical energy input was proportional to the tube length. Because of the often large variation in velocity as a result of the fluid density change, the energy loss due to change in momentum was included in the calculation of local bulk temperature.

5. Local Heat Flux

Heat flux is usually defined as the power input per unit area of wetted surface.

$$Q/A_{avg} = \frac{0.9480 EI}{\pi L D_1} \times 10^{-3} \quad (9)$$

where

$$Q/A_{avg} = \text{Average heat flux, Btu/in.}^2\text{.sec} \quad (9a)$$

$$L = \text{Heated length, in.}$$

$$D_1 = \text{Inside tube diameter, in.}$$

However, for an asymmetrically-heated tube, circumferential variation in current flow and thus power generation are such as to make the average heat flux of only academic interest.

The calculation of the local heat flux from the inner wall of the test section to the test fluid as described in Appendix B permits two methods for calculating the local heat flux. The particular technique employed in computer analysis was Equation (6) of Appendix B.

6. Heat Transfer Coefficient

Local heat transfer coefficients were determined from Newton's Law of Cooling

$$Q/A_{\text{local}} = h_{\text{local}} (T_w - T_b)_{\text{local}} \quad (10)$$

where

$$Q/A_{\text{local}} = \text{local heat-flux, Btu/in}^2\text{sec}$$

$$T_w = \text{computer local inner-wall temperature, } ^\circ\text{R} \quad (10a)$$

$$T_b = \text{computed local mean mixed bulk temperature, } ^\circ\text{R}$$

$$h_{\text{local}} = \text{local heat transfer coefficient, Btu/in}^2\text{sec}^\circ\text{R}$$

7. Static Pressure

The local bulk pressure was computed assuming a linear decrease in pressure from the measured inlet pressure.

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SECTION V
RESULTS AND DISCUSSION

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V. RESULTS AND DISCUSSION

A. SUMMARY OF TEST PARAMETERS

A total of forty-four heat transfer tests were conducted in this program, using stainless steel test sections of both uniform wall-thickness and chemically milled to generate heat asymmetrically. Heat transfer to hydrogen flowing turbulently in straight tubes and in tubes curved to simulate a nozzle throat contour was investigated.

Forty-one of these tests were conducted to evaluate the effect of geometry on heat transfer to cryogenic hydrogen at a nominal pressure of 700 psi and at Reynolds numbers ranging from 10^6 to 6×10^6 . Two of these tests, D-95-IC-9 and 10, employed a curved tube of uniform wall thickness and non-uniform flow area, i.e., a tapered flow path. However, the data obtained could not be adequately analyzed and are not included in this report. In addition, three special tests, D-95-IC-41, 42, and 43, were conducted in a curved asymmetrically-heated tube with, and without a cable insert. Cables of two different diameters were inserted into the tube and held in contact with the inside wall of the curve. The data obtained, however, appeared to be specific to this geometry and were not included in the correlations reported herein.

Three tests were conducted at bulk temperatures ranging from 6p to 300°R and pressures ranging from 400 to 700 psi in curved uniform wall-thickness tubes. In these tests the Reynolds number ranged from 2.5×10^4 to 11.7×10^5 .

The test data analyzed and correlated for this report were divided into two groups, based on the geometry of the test section. Data obtained using curved tubes, both asymmetrically-heated and of uniform-wall thickness. Only one curvature was studied.

A tabulation of the range of test variables for the data included in the correlations are presented as Tables II and III for the tests in straight and curved tubes respectively. The test data analyzed are included as Appendix C.

TABLE II

RANGE OF LOCAL TEST VARIABLES FOR STRAIGHT
ASYMMETRICALLY-HEATED TEST SECTIONS

<u>Parameter</u>	<u>Test Numbers, Series D-95-LC</u>			
Test Section Code	<u>SA-1</u>	<u>SA-1</u>	<u>SA-3</u>	<u>35A - 37A</u>
D_i , in.	0.215	0.152	0.152	0.152
L_{heated}/D_i	18.6 - 27.9	13.2 - 26.3	13.2 - 26.3	13.2 - 26.3
P_b , psia	670 - 767	608 - 766	682 - 768	725 - 825
T_b , °R	54.2 - 75.6	53.4 - 70.5	57.3 - 85.7	54.5 - 71.6
T_w , °R	68 - 1098	339 - 1098	193 - 910	270 - 1057
T_w/T_b	1.18 - 15.7	5.7 - 18.5	3.36 - 13.8	4.78 - 16.8
G , lbm/ft ² -sec	407 - 429	911 - 1555	1327 - 1736	865 - 918
V , ft/sec	101 - 147	226 - 429	386 - 594	211 - 269
$Re \times 10^{-6}$	1.04 - 2.16	1.64 - 3.67	3.00 - 6.20	1.45 - 2.56
Q/A , Btu/in ² sec	0.36 - 3.7	5.6 - 8.3	5.8 - 11.2	3.3 - 6.6

TABLE III

RANGE OF LOCAL TEST VARIABLES FOR CURVED TUBES OF UNIFORM WALL-THICKNESS
AND FOR CURVED ASYMMETRICALLY-HEATED TEST SECTIONS

<u>Parameter</u>	<u>Test Numbers, Series D-95-IC</u>				
	<u>4-6</u>	<u>8-22</u>	<u>26-33</u>	<u>35B-40B</u>	<u>44-46</u>
Test Section Code	CU-1	CU-2 & 4	CA-1 & 2	SCA-2 & 3	SCU-1
D_1 , in.	0.218	0.156	0.152	0.152	0.209
L_{heated}/D_1	9.2	12.8	12.3	46.0	16.7
P_b , psia	705 - 737	468 - 776	614 - 850	602 - 728	418 - 746
T_b , °R	63.0 - 72.2	58.0 - 69.9	54.2 - 187.8	132 - 163	82.0 - 290
T_w , °R	222 - 466	153 - 699	115 - 646	190 - 1000	190 - 1047
T_w/T_b	3.3 - 6.9	2.5 - 10.3	2.1 - 7.4	1.4 - 6.7	1.4 - 9.2
G , lbm/ft ² -sec	172 - 210	606 - 847	865 - 1739	803 - 917	5.68 - 183
V , ft/sec	52 - 57	170 - 231	214 - 555	852 - 1095	8.3 - 108
$Re \times 10^{-6}$	0.67 - 0.75	1.54 - 2.15	1.50 - 5.85	3.96 - 4.67	0.025 - 1.18
Q/A , Btu/in. ² -sec	1.04 - 1.58	2.12 - 7.3	2.52 - 14.5	2.92 - 14.3	0.048 - 3.68

B. HEAT TRANSFER CORRELATIONS

1. Analytical Approach

Application of dimensional analysis employing lumped parameters to heat transfer by convection results in the following: The heat flux Q/A is considered to depend on the velocity V , the density ρ , the viscosity μ , the thermal conductivity k , the coefficient of thermal expansion β , and the specific heat of the fluid C_p , as well as the characteristic dimension D , of the solid-fluid interface and the temperature difference ΔT_f between the fluid and the surface. Assuming that Q/A can be related to the variables by a simple exponential series, a general equation can be derived:

$$\frac{Q}{C_p \rho V A \Delta T_f} = \frac{h}{C_p \rho V} = C \left(\frac{V D \rho}{\mu} \right)^a \left(\frac{C_p \mu}{k} \right)^b \left(\frac{g_c \beta \Delta T_f D^3 \rho^2}{\mu^2} \right)^c \left(\frac{L}{D} \right)^d \quad (11)$$

By employing the familiar dimensionless parameters, this can be simplified to:

$$St = K Re^a Pr^b Gr^c (L/D)^d \quad (12)$$

The same equation can also be deduced from considerations of the boundary layer.

For forced convection flow, the effects of natural convection are usually negligible and the Grashof number Gr can normally be omitted. However, if the Reynolds number is small and β near the critical state is large, then the term can be of significance. Elimination of the Grashof number results in

$$St = K Re^a Pr^b (L/D)^d \quad (13)$$

For well-developed turbulent flow, heat-transfer data obtained by numerous investigators for a variety of fluids are well represented by:

$$St = 0.023 Re^{-0.2} Pr^{-0.6} \quad (14)$$

This form is equivalent to the familiar Dittus-Boelter (McAdams) equation:

$$Nu = 0.023 Re^{0.8} Pr^{0.4} \quad (15)$$

It should be noted that this equation form is applicable only where the physical properties of the fluid do not change markedly. Sieder and Tate (Ref. 22) noted that for viscous oils it was necessary to introduce a correction factor to allow for the relatively large change in viscosity between the cold bulk fluid and the hot film, giving the equation

$$St = 0.027 Re^{-0.2} Pr^{-0.6} (\mu/\mu_w)^{0.14} \quad (16)$$

It should be noted at this point that the traditional empirical correlations discussed above are based on over simplifications of complex phenomena, and can therefore be applied successfully only to relatively simple systems. As pointed out by Smith (Ref. 23), the common dimensionless groups, such as St, Nu, Re, Pr and others, are ratios of lumped parameters proportional to energy or momentum fluxes, and thus are themselves lumped parameters. In their definitions implicit assumptions regarding the distributions of velocity, momentum, and temperature are made. When these basic assumptions as to the shape of the velocity, momentum and temperature profiles are not valid, correction factors, such as the Sieder-Tate viscosity ratio term or the wall-to-bulk temperature ratio, are required in an attempt to allow for deviation from the idealized distribution of the reference parameters.

(22) E. N. Sieder and G. E. Tate, "Heat Transfer and Pressure Drop of Liquids in Tubes," Ind. Eng. Chem. 28, 1429 (1936).

(23) Julian C. Smith, "Fluid Friction and Heat Transfer in Cylindrical Pipes: Relationship between Lumped and Distributed Parameters," Can. Jour. Chem. Eng., Vol. 39, 106-112, June 1961

For liquids and gases at state conditions reasonably removed from the critical region, the lumped parameter approach (with and without such correction factors) with its implicit assumptions as to the form of the distributed parameter profiles, provides a correlating technique adequate for most engineering purposes. For fluids in the region of their critical temperature, however, the thermodynamic and transport properties change rapidly and non-monotonically with temperature. This is illustrated in Table IV, which gives, for typical assumed temperatures, the change in individual lumped properties axially along a tube and radially across the tube cross-section. The variation of the Prandtl number and the thermal diffusivity with temperature are shown in Figure 11, illustrating the non-monotonic nature of these parameters.

It is obvious that a tremendous difference exists in the distributed property values between those at the hot wall and those in the cold core of the fluid. It follows that the shape of the characterizing profiles across the tube diameter may well bear little resemblance to the classical profiles for the steady fully-developed flow of a constant-viscosity fluid. Qualitatively, then, it appears that the conventional approach to correlation of data for heat transfer to hydrogen in the region of its critical temperature will be satisfactory only when the correction factors employed adequately allow for the differences between the shapes of the developing temperature, velocity, and momentum profiles, and those of the reference profiles.

Since the bulk of the current test data were obtained over a relatively limited span of test parameters and for only two basic geometries, the initial approach to correlation was made assuming that the conventional relationships, (corrected as noted above) could be used, anticipating, however, that appreciable data scatter could be expected. This correlation as originally derived took the form

$$St_{ref} = K Pr_{ref}^{a_1} Re_{ref}^{a_2} (1 + D/R_c)^{a_3} \frac{(\dot{w}/A)^2}{\rho P g_c} e^{a_4 D/L} (T_w/T_b)^{a_5} \quad (17)$$

TABLE IV

TYPICAL VARIATION IN HYDROGEN PROPERTIES WITH TEMPERATURE AT 700 PSIA

AXIAL PROPERTY VARIATION (based on assumed average or "mixing-cup" temperatures)

	<u>Inlet</u>	<u>Outlet</u>	<u>Inlet/Outlet Ratio</u>
Bulk Temperature, °R	55	99	--
Density, lbm/ft ³	4.10	2.05	2.0
Viscosity x 10 ⁶ , lbm/ft-sec	7.25	2.50	2.9
Thermal conductivity x 10 ² , Btu/ft-hr °R	6.69	5.48	1.22
Specific heat, Btu/lbm °R	3.32	4.82	0.689

RADIAL PROPERTY VARIATION (based on assumed local wall and bulk temperatures)

	<u>Wall</u>	<u>Bulk</u>	<u>Wall/Bulk Ratio</u>
Temperature, °R	1500	90	16.7
Density, lbm/ft ³	0.0744	2.05	0.036
Viscosity x 10 ⁶ , lbm/ft-sec	0.00121	2.50	0.00484
Thermal conductivity x 10 ² , Btu/ft-hr °R	0.2466	5.48	0.045
Specific Heat, Btu/lbm °R	3.48	4.82	0.722

in which the bracketed term to the a_3 power was included in an attempt to allow for tube curvature, and the following term allowed for entrance length effects. The subscript "ref" refers to the reference temperature selected. Equation (17) was later modified as discussed below.

2. Computer Regression Analysis

During the initial phases of the experimental study, correlation of the data was based on the "visual best fit" line obtained from graphical presentations.

This approach was later superseded by a computer regression analysis. The Azusa IBM 7090 computer was programmed to compute a five-variable least-square regression analysis based on the form of Equation (17) with the option of deleting those terms included to permit evaluation of the effect of the two specific geometric variables, i.e., heated length (entrance length effect) and tube curvature.

The correlation program permitted a selection of any reference temperature ranging from the local bulk temperature to the local wall temperature for the evaluation of the thermodynamic and transport properties. In addition to deriving the exponents of the dimensionless parameters (a_1 through a_5) and the coefficient of the Equation (K), the standard errors associated with each exponent and the regression coefficient of the equation were computed. By comparing the standard error terms and the regression coefficient for various reference temperatures, it could readily be ascertained which reference temperature permits the best characterization of the data for the particular form of the basic equation being evaluated.

Expressing Equation (17) in logarithmic form, the equation solved by the computer is as follows:

$$y = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + a_4 X_4 + a_5 X_5 \quad (18)$$

Figure 11

Thermal Diffusivity and Prandtl Number
For Para-hydrogen at 700 PSI

where:

$$\begin{aligned}
 y &= \log St_{\text{ref}} \\
 a_0 &= \log K \\
 X_1 &= \log Pr_{\text{ref}} \\
 X_2 &= \log Re_{\text{ref}} \\
 &\hspace{15em} (18a)
 \end{aligned}$$

$$X_3 = \frac{(\dot{w}/A)^2}{\rho P g_c} \log (1 + D/R_c)$$

$$X_4 = D/L$$

$$X_5 = \log (T_w/T_b)$$

In initial correlation attempts, it was not demonstrated that the X_3 and X_4 terms adequately characterize the data. These terms were subsequently deleted from the initial analysis attempts. The equation was thereby reduced to the following three dependent variable form:

$$y = a_0 + a_1 X_1 + a_2 X_2 + a_5 X_5 \quad (19)$$

$$\text{where } y = St_{\text{ref}} = \left(\frac{h}{(\dot{w}/A) C_{p \text{ ref}}} \right) \left(\frac{\rho b}{\rho_{\text{ref}}} \right) \quad (19a)$$

$$X_1 = Pr_{\text{ref}} = \left(\frac{C_p \mu}{k} \right)_{\text{ref}} \quad (19b)$$

$$X_2 = Re_{\text{ref}} = \left(\frac{\dot{w} D}{A \mu_{\text{ref}}} \right) \left(\frac{\rho b}{\rho_{\text{ref}}} \right) \quad (19c)$$

$$T_{\text{ref}} = b_w T_w + (1 + b_w) T_b \quad (19d)$$

The value of b_w could be varied from 1 to 0, resulting in a reference temperature T_{ref} ranging from the local wall temperature ($b_w = 1$) to the local bulk temperature ($b_w = 0$).

Computer output consisted of the following terms:

$$b_w, 10^{a_0}, a_1, a_2, a_3, a_4, a_5$$

with the following standard error terms for each computed value of "a" being presented in addition to the regression coefficient R^2

$$\frac{SEa_0}{a_0}, \frac{SEa_1}{a_1}, \frac{SEa_2}{a_2}, \frac{SEa_3}{a_3}, \frac{SEa_4}{a_4}, \frac{SEa_5}{a_5}, R^2$$

The data included in the correlations presented herein are included as Appendix D of this report. In this tabulation both the input data and the dimensionless parameters for the specific reference temperature are included as determined by the value selected for b_w .

3. Bulk Temperature Correlation for Straight Tubes

The computer-derived equation which best represented the test data obtained using straight asymmetrically-heated tubes is:

$$St_b = 0.017 Pr_b^{0.96} Re_b^{-0.14} (T_w/T_b)^{-0.8} \quad (20)$$

The regression coefficient for this equation ($R^2 = 0.689$) indicates a relatively poor data-fit, as is evidenced by the visual presentation of the data in Figure 12. In preparing this graphical presentation, it was apparent that heated length-to-diameter effect was present; an attempt was made to characterize this effect by including the expression $e^{a_4 D/L}$ term to characterize the effect of length-to-diameter. The basic correlating equation then took the form:

Figure 12

Heat Transfer to Hydrogen in Straight
Asymmetrically-Heated Tubes
(Fluid Properties Evaluated at the Bulk Temperature)

$$St_{ref} = K Pr_{ref}^{a_1} Re_{ref}^{a_2} e^{a_4 D/L} (T_w/T_b)^{a_5} \quad (21)$$

However, the four-variable least-squares regression analysis using this equation was unsatisfactory, indicating the assumed exponential form did not adequately describe the effect of L/D . Using an alternate approach (Ref. 24), the effect of sharp-edged entries can be accommodated by including the following term in the correlating equation the the case of turbulent flow

$$1 + (D/L)^{0.7}$$

Although this helped in reducing the spread in the data for L/D values of 18 or greater, it did not adequately normalize the data for an L/D of 13.

Recognizing the limitations of this correlation form in properly characterizing the data, particularly in the region of the critical and transposed critical temperature, as discussed earlier, it is of interest to determine what effect Prandtl number has on the heat transfer results. In Figure 13 the straight-tube heat-transfer data, normalized in the form of conventional Colburn equation with an L/D correction, are plotted as a function of Prandtl number. It is not readily apparent from this plot how the exponent of the Prandtl number (the slope of a line which best characterizes the data) was computer-analyzed as 0.96. For a constant Prandtl number of approximately 1.3 (for local bulk temperature ranging from 55 to 60°R at 700 psi), the heat transfer coefficient apparently can vary by a factor of approximately 2, indicating that the Prandtl number cannot adequately correlate the data when the local bulk temperature is in the region of the the critical temperature.

(24) W. H. McAdams, Heat Transmission, Third Edition, Page 226, McGraw-Hill.

The form of the results shown in Figure 13 may result from several factors. The Prandtl number is defined as the ratio of the molecular diffusivities of momentum and thermal energy, i.e., the ratio of the kinematic viscosity to the thermal diffusivity

$$\text{Pr} = \frac{\nu}{D_H} = \frac{\mu/\rho}{K/C_p\rho}$$

Most of the heat transfer data were obtained in the bulk temperature region near the critical and transposed critical temperatures (60 and 82°R), where the specific heat rises abruptly to a maximum and then decreases rapidly. An error of a few degrees in computing the local bulk temperature introduces a significant error in the value of C_p .

A more fundamental explanation for the inability of the Prandtl number to characterize the heat transfer process may lie in the definition itself. The function of the Prandtl number is to correct the shape of the temperature profile to that of the velocity profile for the non-isothermal case where heat is being added or removed from the fluid, as pointed out by Smith (Ref. 25). Since both the momentum and thermal diffusivity terms are lumped parameters evaluated at a mean temperature and give no insight as to the actual distribution of the point values across the cross-section of the coolant passage.

In conclusion, a pipe flow correlation with fluid properties evaluated at the bulk temperature has been developed. Excessive data scatter, however, indicates that this format is inadequate and that a more basic approach is required.

(25) J. C. Smith, op. cit.

Figure 13

Forced Convection Heat Transfer to Hydrogen
 in Straight Asymmetrically-Heated Tubes
 Plotted as a Function of Prandtl Number
 (Fluid Properties Evaluated at the Bulk Temperature)

4. Bulk Temperature Correlation for Curved Tubes

Data obtained in this test program for heat transfer to hydrogen flowing turbulently both in curved tubes of uniform wall thickness and in curved asymmetrically-heated tubes. This procedure was based on the conclusion that curvature could contribute to differences in the heat transfer process that could not be reconciled by the simple form of equation 19. The test data analyzed were for that point on the curved tube which would generally correspond to the throat region in a rocket nozzle. This region is of particular interest since it is generally characterized as the region of highest heat flux and the highest wall temperature. The data included in this analysis are for only the outside of the curve, concave to the flow path (the side of the tube which is swept by the momentum of the fluid). These data were again correlated based on the form of Equation (19). The computed three-variable least-squares solution of these data resulted in the following equation as best representing the test data.

$$St_b = 0.0346 Pr_b^{-0.3} Re_b^{-0.17} (T_w/T_b)^{-0.7} \quad (22)$$

The regression coefficient R^2 for this equation was 0.92, which indicates a reasonable data-fit. This is also evident in the graphical representation of this equation presented in Figure 14 as a function of Reynolds number.

The Prandtl number versus the heat transfer coefficient (normalized for the effect of velocity) plot was not prepared for these data; however, a relationship similar to that of Figure 13 exists. This is evident in Figure 14 where a large variation in the value of the $St_b Pr_b^{0.3} (T_w/T_b)^{0.7}$ parameter is shown for essentially the same Reynolds number.

As in the case of the straight tube data, a large variation in the heat transfer coefficient occurs in the region of the constant maximum Prandtl number, indicating the Prandtl number to be insensitive to the heat transfer coefficient in the region of the critical temperature. This is

Figure 14

Heat Transfer to Hydrogen in Both
Asymmetric and Uniform Wall Thickness
Curved Tubes with 4.38 in. Bend Radius
(Fluid Properties Evaluated at the Bulk Temperature)

illustrated in a different way in Figure 15, which shows the normalized experimental heat transfer coefficient plotted against bulk temperature. While data scatter is appreciable at the lower temperatures, a definite pattern is evident. From the critical temperature the ordinate parameter decreases to a minimum about 72°R , rises to a maximum about $110\text{-}120^{\circ}\text{R}$ and then decreases to a constant value at temperatures above 160°F . Based on this plot for data obtained at a simulated throat location, the heat transfer coefficient is at a minimum bulk temperatures of $70\text{-}80^{\circ}\text{F}$ and is maximized at $110\text{-}120^{\circ}\text{R}$. Reference to Figure 11 shows that in the temperature range of 50 to 120°R the shape of the normalized heat transfer curve strongly resembles that for the thermal diffusivity rather than that for the Prandtl number. This suggests that the Prandtl number per se evaluated at bulk temperature cannot characterize the data for temperatures ranging from 50 to 140°R , and that perhaps a modified parameter in which the effect of the thermal diffusivity is accentuated would improve the correlation. Another approach would be to curve-fit the data for those temperature ranges where the Prandtl number varies linearly with temperature.

5. Correlation at Reference Temperatures Other than Bulk

Regression analyses were made for both the straight and curved tubes cases using the five, four, and three-variable forms of Equation (18) for the wall and film reference temperatures as well as the bulk temperature. In no case, however, were the standard error terms and regression coefficients significantly improved for the non-bulk reference temperatures. Alteration of the computer program to delete the T_w/T_b ratio to give an equation of the form presented by Taylor and Kirchgessner (Ref. 26).

$$\text{St}_{\text{ref}} = K \text{Pr}_{\text{ref}}^{a_1} \text{Re}_{\text{ref}}^{a_2} \quad (23)$$

has not yet been attempted.

(26) M. F. Taylor and T. A. Kirchgessner, "Measurements of Heat Transfer and Friction Coefficients for Helium Flowing in a Tube at Surface Temperatures up to 5900°R ," ARS Journ. Vol. 30(9), 830, 1960.

Figure 15

Variation in Heat Transfer with
Local Bulk Temperature in Curved
Tubes with 4.38 in. Bend Radius

C. COMPARISON OF HEAT TRANSFER CORRELATIONS

1. Comparison Between Straight and Curved Tube Bulk Correlations

The results reported above for heat transfer to hydrogen flowing turbulently in both straight and curved channels show that the conventional pipe-flow correlations, as modified by the wall-to-bulk temperature ratio and with fluid properties evaluated at the bulk temperature, do not adequately correlate the test data.

In this program, the computer regression-analysis of the test data gave for heat transfer in straight tubes the Equation (20) as shown in the following.

$$St_b = 0.017 Pr_b^{0.96} Re_b^{-0.14} (T_w/T_b)^{-0.8}$$

with a regression coefficient of 0.689. When plotted as a function of Reynolds number (Figure 12), this equation expresses the data within +46 and -25%. The exponent of the Reynolds modulus is -0.14, closely approaching the conventional exponent of -0.2. However, the Prandtl number exponent is 0.96 as compared to the conventional value of -0.6. This has been discussed above with reference to Figure 13.

For heat transfer in curved tubes, no significant difference was determined between the coefficients found for the outside wall of the curve, whether the tube was asymmetrically-heated or of uniform wall thickness, as normalized by the wall-to-bulk temperature ratio. The chemical-milling technique thus offers no advantage in studying flow in straight tubes but does aid in the attainment of high wall temperatures and high heat fluxes on the outside wall of a curved tube. These conclusions, of course, apply only to the ranges of variables studied. It is possible that, for example, tests with different geometries, lower Reynolds numbers, etc., may result in a condition in which the developing boundary layer on one side of the tube influences the development of the boundary on the diametrically opposite wall.

The bulk temperature correlation arrived at by the least-squares regression analysis of the curved-tube test data is Equation (22) as shown in the following.

$$St_b = 0.0346 Pr_b^{-0.3} Re_b^{-0.17} (T_w/T_b)^{-0.7}$$

with a regression coefficient of 0.92. The data are expressed within +42 and -25%. This equation is quite similar to that previously derived (Ref. 27) and given as Equation (5) in this report. Expressed in a form equivalent to Equation (22), this is

$$St_b = 0.028 Pr_b^{-0.6} Re_b^{-0.2} (T_w/T_b)^{-0.64}$$

The equations developed in this program for heat transfer in straight and in curved tubes (Equations 20 and 22) are compared with each other in Figure 16 for a given pressure and Reynolds number as a function of the wall-to-bulk temperature ratio and at two bulk temperatures. The heat transfer coefficient at the simulated throat is always higher than that predicted for a straight tube and increases with increasing bulk temperature and the wall-to-bulk temperature ratio.

The most significant difference between these two equations (other than in the coefficient K) lies in the exponent of the Prandtl number. This difference is attributed to the range of bulk temperatures obtained for each respective test geometry. For the case of the straight tube data, the bulk temperature varied from only 53 to 86°R. The regression analysis which results in a Prandtl number exponent of 0.96 is necessarily extremely sensitive to this narrow temperature span, as shown in Figure 11. However, for the case of the data obtained using curved tubes, the bulk temperature ranged from 54 to 290°R (Figure 15), resulting in the determination of an exponent of -0.3, characteristic of the overall trend of the Prandtl number with temperature over this much wider temperature span. This divergence points up the problem of correlating data obtained primarily in the critical region.

(27) W. R. Thompson and E. L. Geery, loc. cit.

2. Comparison of Straight and Curved Tube Correlations with Earlier Bulk Correlations

The relative value of the heat transfer coefficient predicted by the straight-tube correlation (Equation 20) as compared to that computed by Equation (5) (Regime "A" of Ref. 8) is shown in Figure 17 for the same state parameters. At T_w/T_b ratios below 8, Equation (20) predicts a higher h than Equation (5) for bulk temperatures between 60 and 80°R. At higher values of T_w/T_b , the coefficient ratio drops below 1.0 for a T_b of 80°R but remains above 1.35 for a bulk temperature of 60°R.

The curved tube correlation (Equation 22) is compared similarly with Equation (6) (Regime "B" of Ref. 8) in Figure 18. The Regime "B" equation is optimistic at a T_w/T_b ratio of 8 for a bulk temperature of 80°R but is conservative at a bulk temperature of 60°R until a wall-to-bulk temperature ratio of 15 is reached.

The current correlations as presented herein are compared with the Regime "A" and "B" equations (Equations 5 and 6) as well as that presented by Rocketdyne (Ref. 28) (Equation 3) in Figures 19 through 21. Assuming a value of 1.0 for the Prandtl number, the bulk Nusselt numbers are computed for wall-to-bulk temperature ratios of 5, 10, and 20 and plotted as a function of the Reynolds modulus.

For a T_w/T_b ratio of 5 (Figure 19), Equation (22) predicts the highest coefficient and Equation (20) the lowest, with the other equations falling in between. At the higher Reynolds numbers, Equations (20), (5), and (3) become essentially the same. For a T_w/T_b ratio of 10 (Figure 20), the plot is similar except that Equations (22) and (6) are essentially the same over the entire span of the plot. At the highest value of the wall-to-bulk temperature ratio, Figure 21, Equation (6) is found to be the most optimistic followed by Equations (22), (3), (5), and (20) in that order.

(28) J. R. McCarthy and H. Wolf, loc. cit.

Figure 16

Comparison of Computed Heat Transfer Coefficients
for Curved Tube Test Section with Straight
Asymmetrically-Heated Test Sections

Figure 17

Comparison of Computed Heat Transfer Coefficients
for Straight Asymmetrically-Heated Test Sections
With a Reference Equation

Figure 18

Comparison of Computed Heat Transfer Coefficients
 for Curved Tube Test Sections
 With a Reference Design Equation

Figure 19

Comparison of Heat Transfer Correlations
 Over a Range of Reynolds Number at a Prandtl
 Number of 1.0 and a Wall-to-Bulk Temperature Ratio of 5

Figure 20

Comparison of Heat Transfer Correlations Over a Range of Reynolds Number at a Prandtl Number of 1.0 and a Wall-to-Bulk Temperature Ratio of 10

Figure No. 21

Comparison of Heat Transfer Correlations Over a Range of Reynolds Number at a Prandtl Number of 1.0 and a Wall-to-Bulk Temperature Ratio of 20

SECTION VI
CONCLUSIONS AND RECOMMENDATIONS

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Heat transfer to cryogenic hydrogen at nominal pressures of 700 and 400 psi has been studied experimentally in a non-burnout program using straight test sections asymmetrically-heated and curved test sections of both asymmetric and uniform wall thickness. Heat fluxes up to $14.5 \text{ Btu/in.}^2\text{-sec}$ were achieved. Wall-to-bulk temperature ratios ranged between 1.18 and 18.5. Local bulk temperatures varied from 53.4 to 290°R while the maximum inner-wall metal temperature was 1098°R . The test sections simulating a coolant passage in the nozzle throat region were curved to a bend radius of 4.38 in. All test sections were of circular cross-section and constant flow area.

The analysis of the 260 test data points assumed the applicability of the conventional heat transfer correlation form in which the Stanton and Reynolds numbers are modified by the Prandtl number and the wall-to-bulk temperature ratio. Two correlating equations of this type, based on test section geometry differences, were generated by means of a computer least-squares regression analysis of the test data.

1. Straight Tubing

A computer regression analysis of 140 steady-state straight-tube data points gave Equation (20) which correlates the data within +46 and -25%, and is shown in the following.

$$St_b = 0.017 Pr_b^{0.96} Re_b^{-0.14} (T_w/T_b)^{-0.8}$$

2. Curved Tubing

The regression analysis of 120 steady-state data points for the throat location on curved test sections gave Equation (22) which correlates the data within +42 and -25% as shown in the following.

$$St_b = 0.0346 Pr_b^{-0.3} Re_b^{-0.17} (T_w/T_b)^{-0.7}$$

Lacking a parametric study of curvature, the effect of bend radius could not be normalized with the test results for rectilinear heat transfer in developing a generalized correlation.

The scatter in the test data, as indicated by the deviation from the computer-analyzed best-fit line as shown by the plots of the dimensionless parameters given in Figures 12 and 14, is excessive. It appears justifiable to conclude that correlation on a bulk temperature basis in terms of the conventional lumped parameter approach, as shown above, does not adequately express the data. This is in agreement with the conclusions reached by Szetala (Ref. 29) and Benser and Graham (Ref. 30). Although instrumentation errors undoubtedly contribute to this data scatter, it is felt that the inability of the correlation form to express the data within more acceptable limits is attributed primarily to other factors in the analysis. A limited evaluation of these factors suggests that the manner in which the local transport and thermodynamic properties vary radially and axially for high heat flux inputs and high wall-to-bulk temperature potentials is the basic reason for the poor fit of the test data in the lumped parameter correlation. In other words, in this near-critical temperature range, the Prandtl number and the wall-to-bulk temperature ratio do not adequately correct the form of the actual velocity and temperature profiles to the idealized form for which the lumped parameter correlation applies.

A comparison of the two correlation equations generated in this program with several earlier expressions indicates that, in general, the straight-tube equation predicts a more conservative heat transfer coefficient than the earlier correlations, while the curved-tube equation predicts a higher coefficient. Both the bulk temperature level and the wall-to-bulk temperature ratio exert a strong effect on the relative value of the heat transfer coefficients as computed by these equations.

(29) E. J. Szetala, op. cit.

(30) W. A. Benser and R. W. Graham, "Hydrogen Convective Cooling of Rocket Nozzles," ASME Paper No. 62-AV-22, June 26-28, 1962.

B. RECOMMENDATIONS

The results of the present experimental study and data analysis have shown that conventional correlational techniques only partially express the data. Further effort to reduce the uncertainties inherent in the correlations presented is warranted. It is felt that the following approaches deserve consideration:

1. Dimensional Analysis

Based on dimensional analysis, the approach would be to continue the development of semi-empirical correlation equations using all the hydrogen test data available. This approach would include the alteration of the computer program to provide a more flexible format for analyzing large masses of data, as dictated by the findings of a preliminary desk analysis. This approach would typically attempt to normalize the test data by modifying the basic correlation equation form by adding correction factors such as would account for variations in fluid properties (e.g., thermal diffusivity, density, viscosity, etc.) and in fluid dynamical forces.

2. Boundary Layer Analysis

Based on an analysis of fluid macrostructure as influenced by high heating rates and temperature potentials, the approach would be to develop mathematical models to relate fluid properties, system geometry, and heat transfer parameters. This effort thus would consist basically of an analysis of the boundary layer as affected by high temperature gradients, fluid dynamics, and changes in physical properties.

APPENDIX A

HEAT TRANSFER SYSTEM

APPENDIX A

HEAT TRANSFER SYSTEM

The heat transfer system for the experimental determination of the liquid-side heat transfer coefficient consisted basically of a single-pass gas-pressurized blowdown loop. The basic elements were the high-pressure working tank, the gas pressurization and vent systems, the test section housing, the flow system, test section, power supply, and the necessary instrumentation. These are described in detail in the following sections.

I. CRYOGENIC TANK

The test-fluid reservoir consisted of a spherical stainless steel tank, designed and fabricated to conform to the American Society of Mechanical Engineers "Code for Unfired Pressure Vessels," suspended within a mild steel outer jacket. The annular space between the inner tank and outer shell was filled with a dry powder (Perlite) and evacuated to a pressure of 10 microns Hg. This pressure was maintained by a continuously-operated vacuum pump.

The inner tank contained four ports for filling, venting, pressurizing, and discharge. The fill port, located at the bottom of the tank, was connected to a modified hand-operated vacuum-jacketed fill valve with a Teflon seal. The vent port on the tank was unbaffled and connected to a 2 in. air-operated vent valve. The vent valve was by-passed by both a pressure relief valve and a burst diaphragm to guard against over-pressurization. The gas pressurization line terminated inside the top of the tank in a diffuser designed to reduce splashing and turbulence through impingement of the pressurizing gas on the surface of the test fluid. A discharge line housing extended from the top almost to the bottom of the tank. The discharge line itself extended into the

tank inside this housing. A screen positioned around the inlet to the discharge line minimized vortexing of the test fluid, and inclusion of hot gas in the discharged fluid.

II. PRESSURIZATION SYSTEM

The fluid was expelled from the tank at the desired rate by adjusting the back pressure on the fluid flow line and the tank pressure. Gas for pressurization was obtained from a bank of standard cylinders containing hydrogen gas at pressures up to 2400 psi. The cylinders were manifolded together and connected to the test installation by a high-pressure transfer line. The pressurization line included a shutoff valve and dome-loaded gas regulator. The dome pressure of the regulator was controlled by a hand-operated pneumatic loader using nitrogen as the pressurizing gas.

III. VENT SYSTEM

The 2 in. vent line from the tank connected to a 6 in. vent stack that extended approximately 20 ft above the roof of the test bay. The discharge opening of the vent stack was closed by a spring-loaded flapper valve. The expended test fluid from the back-pressure control valve was also vented into this stack.

The vent line was purged constantly during testing using nitrogen gas introduced at the lowest point in the system, thus minimizing back-diffusion of air into the vent stack. The vent valve on the tank was primarily used during the filling operation, and could be actuated to vent the tank in case of an emergency shut-down during test.

IV. TEST SECTION HOUSING

The test-fluid line was protected from the ambient atmosphere by a tubular steel housing, located directly above the cryogenic tank, which was evacuated during the test. This housing, shown in Figure 9 of the main text, enclosed the test fluid line and associated control, power and instrumentation components. It was composed of two sections: (a) a bolted-in-place power and instrumentation feed-through section (3-ft section of 12-in. dia mild steel pipe) and (b) the clamp-mounted easily-removable bonnet (50 in. section of 10 in. dia mild steel) enclosing the test section itself.

The feed-through section incorporated all the instrumentation, power, vacuum, and control lines to the test section and the fluid discharge line. This section was attached to the tank by a bolted flange, and to the upper bonnet section by a V-clamp flange. Three 8 in. dia access O-ring sealed access ports with cover plates and held in place by V-clamps were provided to permit entry and adjustment of the components located within. Electrical power was supplied into the housing by means of electrically-insulated O-ring sealed feed-throughs. The test fluid discharge line and all pressure lines discharged through this section.

The upper section of the housing (the bonnet) was connected to the feed-through section at its lower end, and to the vent stack on the upper end. A vacuum-supported burst diaphragm was incorporated within the flanges connecting the bonnet to the elbow, which in turn was connected to the vent stack.

During testing, the entire housing was evacuated by a separate mechanical vacuum pump system, independent of the tank vacuum pump system. During static tests a vacuum of approximately 200 microns Hg was routinely obtained, indicating satisfactory sealing of all connections to the atmosphere.

The bonnet could be readily elevated by a chain hoist mounted on the roof of the test bay to permit work on the interior of the enclosure without removing or disconnecting any fluid or instrumentation lines.

Since it was important that the test-section housing be leak-tight to air and that heat leakage to the system be minimized, all feedthrough seals were either high vacuum double-seal units or hermetically sealed glass-to-metal instrumentation feedthroughs. Shafts running from components within the housing to outside actuators incorporated low-thermal-conductivity blocks to reduce heat input to the test fluid line.

V. FLOW SYSTEM

The flow system consisted of those components used to control, meter, or add heat to the test fluid after being expelled from the storage tank. These included a flow-shutoff valve in the line leaving the storage tank, a differential-pressure-operated flow regulator, a sharp-edge orifice for metering flow, the

test section(s), and the back-pressure control valve. With the exception of the latter unit, all components were housed within the evacuated test section housing.

The flow-shutoff valve was a ball valve designed for service in liquid hydrogen at pressures up to 3000 psi. It was remotely actuated by the operator on one of the access-port covers external of the test section feed-through section. The actuation shaft passed through the cover plate and incorporated a low-heat-leak thermal block and a double universal joint to permit the position of the valve to shift due to line thermal expansion and contraction without affecting the actuation.

Control of flow exclusively by means of back-pressure control valve was not considered adequate to ensure a constant flow rate, and so a flow regulator modified for high pressure cryogenic service was employed. This regulator consisted basically of two orifices in series, an upstream orifice which was manually adjusted externally, and a second orifice whose effective area was self-regulating by means of a spring-loaded piston. In operation, a variation in the pressure drop across the first orifice resulted in a movement of the piston to maintain the drop constant, by varying its position across the second orifice. Since the pressure drop across an orifice is a function of the mass flow rate for a non-compressible fluid, maintaining a fixed pressure drop maintains a fixed mass flow rate.

Early in the test program considerable difficulty was experienced in maintaining the desired flow through the system, and it became apparent that the flow regulator was not functioning properly at the desired flow rate. The self-regulating feature of the spring-loaded piston was eliminated with no detrimental effects on the operation of the flow system.

A sharp-edged orifice meter mounted upstream of the test section was used to meter the flow of test fluid. The orifice design was based on the recommendation of the ASME Committee on Flowmeters^(A-1), and consisted of accurately

(A-1) "Fluid Meters, Their Theory and Applications," ASME Research Committee on Fluid Meters, 1959.

machined orifice plates welded into sections of tubing equipped with pressure taps at the proper locations. Fluid densities used in calculating mass flow were determined from measurements of the fluid pressure upstream of the orifice, and temperature at a mixing chamber immediately downstream of the orifice meter. The orifice coefficients were obtained from water flow tests of the orifices.

VI. TEST SECTION

The test section consisted of the heated tube, plus the temperature mixing stations at the inlet and outlet to the test section. The test section was electrically isolated from the fluid lines by thin flat Mylar gaskets bolted between a flat-faced flange on the test section itself and the mating flange with a raised compression ring of a semicircular cross section. The Mylar served both as the pressure seal material and as the electrical insulator. The flange bolts were electrically insulated by micarta washers. The electrodes for applying the electrical power to the test section were 1/2 in. thick bars of copper, silver soldered to the tube. The heated length of the test section was defined by the spacing of the electrodes. Pressure taps were affixed to the test section through the electrode. The electrode was drilled, and a short length of a 1/2 in. stainless steel tube was silver soldered in the electrode. The pressure tap hole was drilled through the test section tube wall with the short length of tubing serving as a drill guide. A length of coiled 1/8 in. tubing was then welded to the test section electrode. The pressure tap lines were approximately two feet long inside the test section housing to minimize heat leak, and insure a hot gas leg to prevent temperature perturbations on the pressure pickups. A Teflon Chevron type seal was used to electrically insulate the pressure pickup lines from the test section housing.

A special test section design employed in this program consisted of a chemically-milled tube with three electrodes silver-soldered to the tube such that the straight length of tubing served as a preheater section and the curved portion of the tube served as the test section, as shown in Figures 6 and 8 of the main text. Power was supplied to the two portions of the tube from separate power supplies regulated independently, permitting individual control of the

power supplied to each section. In this test section design no measurement of the temperature of the fluid leaving the preheater and entering the test section was possible.

VII. POWER SUPPLY

Electrical power for heating the test section was supplied by five separately-excited motor-generator sets rated at 90 kw each. The generators could be used in series to supply high-current power to the test section, or could be used separately to heat different sections through two different bus bar systems to the test bay.

VIII. INSTRUMENTATION

The instrumentation for this program is shown in Figure A-1, a schematic indicating the components and location of the instrumentation. This sketch shows the test section as consisting of a preheated section followed by the test section as discussed earlier under test section design. All measured parameters were recorded on self-balancing potentiometer millivolt recorders. Chron pens operated simultaneously marked the charts where steady-state readings were taken.

1. Bulk-Fluid Temperature

Bulk-fluid temperature sensors were open-grid, platinum resistance thermometers procured specifically for low temperature service. The transducer was mounted in the test fluid line with the sensing bulb located in mixing chambers located after the orifice meter and after the test section. Since the transducer was mounted within the test section enclosure it was necessary that the units be properly sealed for operation at working pressures up to 2000 psi, in an evacuated enclosure.

The resistance of each transducer was measured by passing a fixed current through the transducer element and recording the resulting voltage drop. Since this voltage drop is proportional to the resistance of the element, the system could be calibrated with known resistances. Readout of the voltage drop was facilitated by a special recording circuit. In order to effectively use a

Figure A-1

Instrumentation Schematic for Liquid Side Heat Transfer Tests

10 mv null-balance recorder, the output signal of the transducer was biased and fed to the recorder. The recording system was designed for an output of 30 ohms per mv. The recorder for recording the inlet bulk fluid temperature was a 10 mv recorder with an extended span, permitting readings at 2 mv intervals, 0-2, 2-4, 4-6, 6-8 and 8-10 mv in discrete steps. With chart paper ruled to 100 divisions, a reading of 0.02 mv was possible, corresponding to a resistance of 0.6 ohms.

2. Test-Section Wall Temperature

The use of direct current to resistance-heat the test section necessitates the electrical insulation of the wall temperature thermocouples from the current-carrying tube as the IR drop through the heating current cannot be feasibly isolated from that thermally-generated. In these tests thermocouples were insulated from the wall by a thin layer of mica. The thermocouple junction was prepared by discharge-welding 40 gauge chromel-alumel wire to form the hot junction. This junction was positioned on the tube over a thin (0.0005 in.) sheet of mica and held in place by wrapping the junction and the lead wires with glass string. Properly made, the thermocouple and mica could be held in good physical contact with the tube wall by this method. The mica layer eliminated the IR drop resulting from the heating current in the thermocouple emf output, leaving only the thermally-generated emf produced by the Seebeck effect. However, the introduction of the mica insulation decreases transient response and increases the possibility of reading erroneously-low wall temperatures through possible air gaps or other high thermal-resistance films. For steady-state measurements, however thermocouples prepared in this manner have, in general, performed quite satisfactorily.

The outputs of the thermocouples were recorded on null-balance 0-10 mv recorders with range selection switches extending the range to 0-20 and 0-50 mv full scale. Multiple thermocouple readings were made by sequential switching in the control room, using an enclosed silver contact switch. A reference cold junction of melting ice was used for all thermocouples.

3. Pressure

Pressure was sensed by standard reluctance-type pressure transducers, located outside the test section enclosure. The transducer was isolated from

the test fluid by a hot gas leg, which, in the case of pressures sensed on the test section, incorporated a Teflon electrical insulator. The output of the transducers was recorded on standard null-balance millivolt instruments.

4. Power

Power as delivered to the test section was determined by measuring the current flowing in the circuit and the total voltage drop across the resistance element. In addition, voltage taps located at intervals along the heated length permitted measurement of voltage drops for specific lengths of test section. This technique permitted the determination of local heat fluxes. The current was measured using a 4000 ampere current shunt. Voltage was measured by recording the output of a voltage divider network on a null-balance recorder.

APPENDIX B

Technical Memorandum 183-62-35

TWO-DIMENSIONAL CONDUCTION IN A
HEAT GENERATING SOLID

Advanced Research Division
Aerojet-General Corporation
Azusa, California

TM 183-62-35
DATE 5 October 1962
W.O.

ADVANCED RESEARCH
DIVISION

TECHNICAL MEMORANDUM

PREPARED BY: J. O. Sane

ABSTRACT

TWO-DIMENSIONAL CONDUCTION IN A HEAT GENERATING SOLID

The equation describing steady-state, two-dimensional conduction with internal heat generation in a solid having temperature-dependent properties is derived. The finite difference form of the equation is applied to a line of symmetry. Application to the problem of deriving inner-wall temperatures and heat fluxes in a heat transfer test section is demonstrated.

APPROVED:

DEPARTMENT HEAD

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TWO-DIMENSIONAL CONDUCTION IN A HEAT GENERATING SOLID

The flowing of a coolant through a resistance heated tube is a classical heat transfer experiment. It is usually desired to determine the heat transfer coefficient, h , from the inside wall of the tube to the coolant. The coefficient is defined as:

$$h = \frac{(q/A)_i}{T_i - T_c}.$$

The heat flux and inner wall temperature can be determined from temperature and voltage gradient measurements on the outside wall of the tube. The analytical problem of deriving the inner wall temperature and heat flux from these measurements can be formulated as follows:

Consider a resistance heated tube of symmetrical cross section. Current flows through the tube wall in the z direction and heat is generated within the wall.

Assuming that the resultant temperature distribution is two-dimensional, $T = T(r, \theta)$, and considering a differential element of area,

$$q_{in} = k(lr d\theta) \frac{\partial T}{\partial r} + k(l dr) \frac{\partial T}{r \partial \theta},$$

$$q_{generated} = \frac{CE^2}{R} = \frac{CE^2 r dr d\theta}{\rho l},$$

$$q_{out} = k(l r d\theta) \frac{\partial T}{\partial r} - \frac{\partial}{\partial r} \left[k(l r d\theta) \frac{\partial T}{\partial r} \right] dr + k(l dr) \frac{\partial T}{r \partial \theta} - \frac{\partial}{\partial \theta} \left[k(l dr) \frac{\partial T}{r \partial \theta} \right] d\theta.$$

At steady state,

$$q_{IN} + q_{GEN.} = q_{OUT}$$

$$\frac{CE^2 r dr d\theta}{\rho l} = - \frac{\partial}{\partial r} \left[k(l r d\theta) \frac{\partial T}{\partial r} \right] dr - \frac{\partial}{\partial \theta} \left[k(l dr) \frac{\partial T}{r \partial \theta} \right] d\theta.$$

Note $k = k(T) \Rightarrow k(r)$

$$\therefore (1) \quad \frac{-CE^2}{\rho k l^2} = \frac{\partial^2 T}{\partial r^2} + \frac{1}{r} \frac{\partial T}{\partial r} + \frac{1}{k} \frac{\partial T}{\partial r} \frac{\partial k}{\partial r} + \frac{1}{r^2} \frac{\partial^2 T}{\partial \theta^2} + \frac{1}{k r^2} \frac{\partial T}{\partial \theta} \frac{\partial k}{\partial \theta}.$$

Equation (1) describes steady-state, two-dimensional heat conduction in a resistance heated solid. Electrical resistivity and thermal conductivity, ρ and k , are regarded as arbitrary functions of temperature.

At the line of symmetry $\frac{\partial T}{\partial \theta} = 0$.

Equation (1) thus becomes

$$\frac{-CE^2}{\rho k l^2} = \frac{\partial^2 T}{\partial r^2} + \frac{1}{r} \frac{\partial T}{\partial r} + \frac{1}{k} \frac{\partial T}{\partial r} \frac{\partial k}{\partial r} + \frac{1}{r^2} \frac{\partial^2 T}{\partial \theta^2}.$$

If $\frac{\partial^2 T}{\partial \theta^2}$ is assumed to be a constant independent of r at $\theta = \frac{\pi}{2}$, the ordinary equation:

$$(2) \quad \frac{-CE^2}{\rho k l^2} = \frac{d^2 T}{dr^2} + \frac{dT}{r dr} + \frac{1}{k} \frac{dT}{dr} \frac{dk}{dr} + \frac{C'}{r^2}$$

then relates $T = T(r)$ at $\theta = \frac{\pi}{2}$.

Consider a circular cross section. For this case $T = T(r)$, and the derivation is as follows.

For an annular element of width dr ,

$$q_{out} = k(2\pi r l) \frac{dT}{dr}.$$

$$q_{in} = k(2\pi r l) \frac{dT}{dr} + \frac{d}{dr} \left[k(2\pi r l) \frac{dT}{dr} \right] dr.$$

$$q_{generated} = \frac{CE^2}{R} = CE^2 \left(\frac{2\pi r dr}{\rho l} \right)$$

Balance: $0 = \frac{d}{dr} \left[k(2\pi r l) \frac{dT}{dr} \right] dr + CE^2 \left(\frac{2\pi r dr}{\rho l} \right).$

This reduces to:

$$\frac{-CE^2r}{\rho l^2} = \frac{d}{dr} \left(kr \frac{dT}{dr} \right)$$

Expanding, noting that $k = k(T) \neq k(r)$, yields:

$$(3) \quad \frac{-CE^2}{\rho k l^2} = \frac{d^2T}{dr^2} + \frac{1}{r} \frac{dT}{dr} + \frac{1}{k} \frac{dT}{dr} \frac{dk}{dr}.$$

Where $k = k(T) \quad ; \quad \rho = \rho(T)$

Comparing Equations (2) and (3) it is seen that Equation (2) is merely the one-dimensional equation corrected for conduction in the θ direction along the line: $\theta = \frac{\pi}{2}$.

Substitution of the finite difference expressions:

$$\frac{dT}{dr} \approx \frac{T_{n-1} - T_n}{\Delta r}$$

$$\frac{dk}{dr} \approx \frac{k_{n-1} - k_n}{\Delta r}$$

and $\frac{d^2T}{dr^2} \approx \frac{T_{n+1} - 2T_n + T_{n-1}}{(\Delta r)^2}$

into Equation (2) yields the corresponding finite difference equation:

$$(4) \quad T_{n+1} = T_n - (T_{n-1} - T_n) \left[\frac{\Delta r}{r_n} + \frac{k_{n-1} - k_n}{k_n} + 1 \right] - (\Delta r)^2 \left[\frac{CE^2}{k_n \rho_n l^2} + \frac{C'}{r_n^2} \right]$$

For the case of a coolant flowing through a resistance heated tube, the outer surface of which is insulated, the boundary conditions applied to Equation (4) are:

$$(a) \quad T = T_o \quad @ \quad r = r_o$$

and $(b) \quad \frac{dT}{dr} = 0 \quad @ \quad r = r_o$

Equation (4) can thus be used to determine temperature distribution $T = T(r)$ on a line of symmetry or in a circular cross section. The constant C' must be estimated (preferably from outer wall temperature measurements) for the former case; it is zero for the latter case.

The heat flux from the inner wall to the coolant can be derived for a circular cross section as:

$$(q/A)_i = \frac{\text{total generation}}{\text{inner area}} = \frac{r_i \int_{r_i}^{r_o} dq_{GEN.}}{2\pi r_i l} = \frac{r_i \int_{r_i}^{r_o} CE^2 \left(\frac{2\pi r}{\rho l} \right) dr}{2\pi r_i l}$$

$$(5) \quad (q/A)_i = \frac{CE^2}{r_i l^2} \int_{r_i}^{r_o} \frac{r dr}{\rho} \Rightarrow \frac{CE^2 \Delta r}{r_i l^2} \sum_{n=0}^{n=N} \left(\frac{r}{\rho} \right)_n$$

or

$$(6) \quad (q/A)_i = k_i \left(\frac{dT}{dr} \right)_i \Rightarrow k_N \left(\frac{T_{N-1} - T_N}{\Delta r} \right)$$

Equation (6) is also applicable to the two-dimensional case.

Values of the inner wall temperature calculated for an actual data point by the approximate method of Bernardo and Eian, by the approximate method of Kreith and Summerfield, and by Equation (4) are presented on Page 6.

Basis: Stainless steel tube with a wall thickness of 0.049 in. Measured outer wall temperature = 1390°F . Calculated $q/A_{(\text{local})} = 13.9 \text{ Btu/in}^2\text{sec}$.

Inner Wall Temp $^{\circ}\text{F}$	Method of Calculation
-110	E. Bernardo and C. S. Eian, "Heat-Transfer Tests of Aqueous Ethylene Glycol Solutions in an Electrically Heated Tube," NACA ARR No. E5F07, August 1945.
200	F. Kreith and M. Summerfield, "Investigation of Heat Transfer at High Heat-Flux Densities Experimental Study with Water of Friction Drop and Forced Convection with and Without Surface Boiling in Tubes," JPL Progress Report No. 4-68, April 1948.
320	Equation 4, 112 increments on Clary DE60 Desk Computer.

Inherent in the Bernardo and Eian method are the assumptions of constant k and ρ . The Kreith and Summerfield method involves the assumption that k and ρ are linear functions of temperature. As noted above, the use of Equation (4) requires no assumptions concerning k and ρ .

NOMENCLATURE

A	=	inside heated area of test section
C	=	conversion factor, $0.948 \times 10^{-3} \frac{\text{BTU/sec}}{\text{watt}}$
C'	=	constant value of $\frac{\partial^2 T}{\partial \theta^2}$ along the line: $\theta = \frac{\pi}{2}$.
E	=	voltage drop across test section, volts
h	=	film heat transfer coefficient, $\text{BTU/in}^2\text{-sec-}^\circ\text{F}$
k	=	thermal conductivity of test section material, $\text{BTU/in-sec-}^\circ\text{F}$
l	=	length of test section, inches
q	=	heat transfer rate, BTU/sec
r	=	radius, cylindrical coordinate, inches
R	=	resistance of test section increment, ohms
T	=	temperature, $^\circ\text{F}$
Z	=	cylindrical coordinate, inches
Δr	=	width of finite-difference increment, inches
θ	=	cylindrical coordinate, radians
ρ	=	electrical resistivity of test section material, ohm-inches

Subscripts

b	=	bulk property of coolant fluid
i	=	inner wall of test section
n	=	n^{th} increment of finite difference solution
N	=	number of final increment in finite difference solution
O	=	outer wall of test section

APPENDIX C

COMPUTER HEAT TRANSFER DATA ANALYSIS

PRINTOUT SYMBOLS
COMPUTER HEAT TRANSFER DATA ANALYSIS
OVER-ALL TEST PARAMETERS

AF	Cross-sectional flow area of tube, ft^2	(Note 1)
D	Inside equivalent diameter of tube, ft	(Note 1)
L	Total heated length of tube, in.	(Note 1)
DEL R	Incremental wall thickness used in inner-wall temperature calculation, in.	(Note 1)
PB-IN	Fluid pressure at test section inlet, psia	(Note 2)
PB-OUT	Fluid pressure at test section outlet, psia	(Note 2)
TB-IN	Fluid temperature at test section inlet, $^{\circ}\text{R}$	(Note 2)
TB-OUT	Fluid Temperature at test section outlet, $^{\circ}\text{R}$	(Note 2)
W	Mass rate of flow, lbm/sec	(Note 3)
QP	Electrical power input, Btu/sec	(Note 4)
HT BAL	Heat balance, percent	(Note 5)
G	Fluid mass velocity, $\text{lbm/ft}^2\text{-sec}$	(Note 6)

LOCAL TEST PARAMETERS

DATA PT	Data recorded at a given power level under steady-state conditions	
STA	Thermocouple station (see appropriate sketch of test section)	
PB	Local fluid pressure at thermocouple station, psia	(Note 7)
TB	Local fluid temperature at thermocouple station, $^{\circ}\text{R}$	(Note 8)
T_W	Measured outside wall temperature, $^{\circ}\text{R}$	(Note 2)
TI	Calculated inside wall temperature, $^{\circ}\text{R}$	(Note 9)

Q/A	Local heat flux, $\text{Btu/in}^2\text{-sec}$	(Note 9)
H	Local heat transfer coefficient, $\frac{Q/A}{\Delta T_F}$, $\text{Btu/in}^2\text{-sec-}^\circ\text{R}$	
ΔT_F	Film temperature drop, $T_1 - T_B$, $^\circ\text{R}$	
VS	Local fluid velocity, ft/sec	

DIMENSIONLESS PARAMETERS

NU	Nusselt number evaluated at fluid temperature, T_B
PR	Prandtl number evaluated at fluid temperature, T_B
RE	Reynolds number evaluated at fluid temperature, T_B
T_I/T_B	Inner wall to bulk temperature ratio
$NU/PR^{1/4}$	Ratio of Nusselt number to Prandtl number raised to the 0.4 power
(I)	Properties evaluated at inner wall temperature, T_I
(F)	Properties evaluated at average film temperature, $T_F = (T_I + T_B)/2$
T_I/T_F	Inner wall to film temperature ratio

NOTES

- Note 1. Based on measured dimensions
- Note 2. Measured quantity
- Note 3. Based on measured pressure drop across a flat-plate orifice and density evaluated at inlet temperature and pressure.
- Note 4. Based on measured current and over-all voltage drop.
- Note 5. Based on $\frac{100(Q_P - Q_S)}{Q_P}$. Q_S is the sensible energy gain of the fluid ($Q_S = W(\Delta H)$, where ΔH is the difference in enthalpy between the outlet and inlet state conditions.)
- Note 6. Computed as $G = W/AF$
- Note 7. Linear interpolation between PB-IN and PB-OUT
- Note 8. Based on TE-IN plus the temperature rise computed from a linear interpolation of heat input and correcting for changes in kinetic energy.
- Note 9. Computer solution of finite-difference equations for heat transfer in a power-generating solid, based on TW and local voltage drop across station (see TM 183-62-35 and TM 183-63-2)

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-4

AF = 0.259E-03

D = 0.182E 01

L = 0.505E 01

DEL R = 0.200E-03

DATA POINTS

POINT	PB IN	PB OUT	TB IN	TB OUT	W	QP	HT BAL	G
1	7.375E 02	7.361E 02	5.820E 01	6.780E 01	4.860E-02	2.379E 00	2.492E 01	1.875E 02
2	7.355E 02	7.338E 02	5.870E 01	7.480E 01	4.682E 02	4.020E 00	2.286E 01	1.806E 02
3	7.375E 02	7.356E 02	5.980E 01	8.280E 01	4.466E-02	5.554E 00	1.910E 01	1.723E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-4

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.372E 02	6.117E 01	1.650E 02	1.213E 02	5.803E-01	9.655E-03	6.010E 01	4.914E 01	
2	7.369E 02	6.367E 01	1.940E 02	1.563E 02	5.679E-01	6.132E-03	9.261E 01	5.083E 01	
3	7.367E 02	6.609E 01	1.640E 02	1.200E 02	5.807E-01	1.077E-02	5.392E 01	5.272E 01	
4	7.364E 02	6.843E 01	1.660E 02	1.225E 02	5.798E-01	1.072E-02	5.409E 01	5.486E 01	
5	7.372E 02	6.117E 01	2.130E 02	1.782E 02	5.595E-01	4.781E-03	1.170E 02	4.914E 01	
6	7.369E 02	6.367E 01	2.640E 02	2.346E 02	5.381E-01	3.148E-03	1.709E 02	5.083E 01	
7	7.367E 02	6.609E 01	2.360E 02	2.039E 02	5.498E-01	3.989E-03	1.378E 02	5.272E 01	
8	7.364E 02	6.843E 01	2.460E 02	2.149E 02	5.455E-01	3.723E-03	1.465E 02	5.486E 01	

LOCAL TEST PARAMETERS

TEST D 95-4

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.351E 02	6.362E 01	2.510E 02	1.893E 02	1.059E 00	8.425E-03	1.257E 02	4.897E 01	
2	7.348E 02	6.776E 01	2.790E 02	2.225E 02	1.037E 00	6.705E-03	1.547E 02	5.227E 01	
3	7.345E 02	7.167E 01	2.950E 02	2.409E 02	1.025E 00	6.058E-03	1.692E 02	5.623E 01	
4	7.341E 02	7.542E 01	3.000E 02	2.466E 02	1.022E 00	5.967E-03	1.712E 02	6.105E 01	
5	7.351E 02	6.362E 01	3.590E 02	3.120E 02	9.795E-01	3.944E-03	2.484E 02	4.897E 01	
6	7.348E 02	6.776E 01	4.470E 02	4.062E 02	9.216E-01	2.723E-03	3.384E 02	5.227E 01	
7	7.345E 02	7.167E 01	4.750E 02	4.356E 02	9.043E-01	2.485E-03	3.639E 02	5.623E 01	
8	7.341E 02	7.542E 01	4.740E 02	4.346E 02	9.049E-01	2.520E-03	3.591E 02	6.105E 01	

LOCAL TEST PARAMETERS

TEST D 95-4

DATA POINT 3

STA	MB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.371E 02	6.652E 01	4.310E 02	3.650E 02	1.462E 00	4.897E 03	2.985E 02	4.879E 01
2	7.367E 02	7.222E 01	4.620E 02	3.989E 02	1.431E 00	4.382E 03	3.266E 02	5.416E 01
3	7.364E 02	7.753E 01	4.770E 02	4.150E 02	1.417E 00	4.198E 03	3.375E 02	6.110E 01
4	7.360E 02	8.269E 01	4.450E 02	3.804E 02	1.448E 00	4.864E 03	2.977E 02	6.949E 01
5	7.371E 02	6.652E 01	6.230E 02	5.704E 02	1.294E 00	2.568E 03	5.039E 02	4.879E 01
6	7.367E 02	7.222E 01	7.680E 02	7.230E 02	1.193E 00	1.833E 03	6.508E 02	5.416E 01
7	7.364E 02	7.753E 01	7.560E 02	7.104E 02	1.201E 00	1.897E 03	6.329E 02	6.110E 01
8	7.360E 02	8.269E 01	7.010E 02	6.527E 02	1.238E 00	2.171E 03	5.700E 02	6.949E 01

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-6

AF = 0.259E-03 D = 0.182E-01 L = 0.505E 01 DEL R = 0.200E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.065E 02	7.045E 02	5.066E 01	7.480E 01	5.443E-02	5.476E 00	7.662E 00	2.100E 02
2	7.055E 02	7.033E 02	5.150E 01	7.770E 01	5.338E-02	5.976E 00	6.596E 00	2.059E 02
3	7.055E 02	7.033E 02	5.294E 01	8.080E 01	5.129E-02	6.371E 00	6.837E 00	1.979E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-6

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.061E 02	5.746E 01	3.590E 02	3.005E 02	1.213E 00	4.991E-03	2.430E 02	5.281E 01
2	7.057E 02	6.300E 01	4.020E 02	3.343E 02	1.461E 00	5.387E-03	2.713E 02	5.696E 01
3	7.053E 02	6.777E 01	4.000E 02	3.380E 02	1.339E 00	4.957E-03	2.702E 02	6.157E 01
4	7.049E 02	7.222E 01	4.230E 02	3.451E 02	1.707E 00	6.256E-03	2.729E 02	6.737E 01
5	7.061E 02	5.746E 01	5.240E 02	4.777E 02	1.085E 00	2.581E-03	4.202E 02	5.281E 01
6	7.057E 02	6.300E 01	6.590E 02	6.095E 02	1.242E 00	2.272E-03	5.465E 02	5.696E 01
7	7.053E 02	6.777E 01	6.760E 02	6.315E 02	1.126E 00	1.997E-03	5.638E 02	6.157E 01
8	7.049E 02	7.222E 01	6.430E 02	5.832E 02	1.484E 00	2.905E-03	5.110E 02	6.737E 01

LOCAL TEST PARAMETERS

TEST D95-6

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.050E 02	5.884E 01	4.320E 02	3.609E 02	1.574E 00	5.212E-03	3.020E 02	5.274E 01
2	7.046E 02	6.470E 01	4.330E 02	3.659E 02	1.488E 00	4.940E-03	3.012E 02	5.734E 01
3	7.042E 02	6.986E 01	4.650E 02	3.965E 02	1.553E 00	4.753E-03	3.267E 02	6.287E 01
4	7.037E 02	7.470E 01	4.800E 02	4.136E 02	1.520E 00	4.484E-03	3.389E 02	7.009E 01
5	7.050E 02	5.884E 01	6.350E 02	5.791E 02	1.384E 00	2.661E-03	5.202E 02	5.274E 01
6	7.046E 02	6.470E 01	7.670E 02	7.211E 02	1.216E 00	1.853E-03	6.564E 02	5.734E 01
7	7.042E 02	6.986E 01	7.670E 02	7.180E 02	1.297E 00	2.002E-03	6.481E 02	6.287E 01
8	7.037E 02	7.470E 01	7.150E 02	6.639E 02	1.319E 00	2.239E-03	5.892E 02	7.009E 01

LOCAL TEST PARAMETERS

TEST D95-6

DATA POINT 3

STA	F	TB	TW	TI	O/A	H	DEL	TF	VS
1	7.050E 02	6.075E 01	4.990E 02	4.284E 02	1.629E 00	4.432E-03	3.677E 02	5.202E 01	
2	7.046E 02	6.632E 01	5.340E 02	4.666E 02	1.580E 00	3.953E-03	3.997E 02	5.718E 01	
3	7.042E 02	7.247E 01	5.520E 02	4.837E 02	1.616E 00	3.931E-03	4.112E 02	6.387E 01	
4	7.037E 02	7.763E 01	5.100E 02	4.390E 02	1.647E 00	4.557E-03	3.614E 02	7.254E 01	
5	7.050E 02	6.075E 01	7.380E 02	6.838E 02	1.414E 00	2.269E-03	6.230E 02	5.202E 01	
6	7.046E 02	6.632E 01	8.690E 02	8.219E 02	1.309E 00	1.734E-03	7.550E 02	5.718E 01	
7	7.042E 02	7.247E 01	8.560E 02	8.066E 02	1.363E 00	1.857E-03	7.342E 02	6.387E 01	
8	7.037E 02	7.763E 01	7.930E 02	7.303E 02	1.405E 00	2.152E-03	6.527E 02	7.254E 01	

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-8

AF = 0.132E-03

D = 0.130E-01

L = 0.497E 01

DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	1.310E 03	1.295E 03	5.510E 01	6.910E 01	1.073E-01	4.487E 00	-3.426E 00	8.139E 02
2	1.310E 03	1.294E 03	5.510E 01	7.000E 01	1.074E-01	4.487E 00	-1.088E 01	8.152E 02
3	7.895E 02	7.635E 02	4.990E 01	7.270E 01	1.068E-01	8.681E 00	-1.274E 00	8.100E 02
4	7.895E 02	7.550E 02	4.990E 01	8.080E 01	1.063E 01	1.288E 01	5.986E-01	8.066E 02
5	7.555E 02	7.335E 02	4.680E 01	8.500E 01	1.076E-01	1.544E 01	-5.873E 00	8.167E 02
6	8.255E 02	7.785E 02	4.810E 01	9.020E 01	1.072E-01	1.657E 01	-8.521E 00	8.133E 02
7	8.465E 02	7.925E 02	4.810E 01	1.017E 02	9.965E-02	1.970E 01	-1.009E 01	7.561E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-8

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	1.308E 03	5.807E 01	2.270E 02	9.153E 01	1.871E 00	5.591E-02	3.346E 01	1.883E 02	
2	1.305E 03	6.088E 01	4.650E 02	3.940E 02	1.630E 00	4.892E-03	3.331E 02	1.928E 02	
3	1.302E 03	6.362E 01	2.260E 02	8.956E 01	1.869E 00	7.203E-02	2.595E 01	1.974E 02	
4	1.299E 03	6.619E 01	2.310E 02	9.911E 01	1.884E 00	5.724E-02	3.292E 01	2.020E 02	
5	1.308E 03	5.807E 01	2.380E 02	1.116E 02	1.887E 00	3.528E-02	5.349E 01	1.883E 02	
6	1.305E 03	6.088E 01	2.800E 02	1.749E 02	1.851E 00	1.624E-02	1.140E 02	1.928E 02	
7	1.302E 03	6.362E 01	2.730E 02	1.652E 02	1.862E 00	1.833E-02	1.016E 02	1.974E 02	
8	1.299E 03	6.619E 01	2.660E 02	1.552E 02	1.868E 00	2.099E-02	8.902E 01	2.020E 02	

LOCAL TEST PARAMETERS

TEST D95-8

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	1.307E 03	5.807E 01	2.290E 02	9.538E 01	1.874E 00	5.022E-02	3.731E 01	1.886E 02	
2	1.304E 03	6.088E 01	4.630E 02	3.918E 02	1.632E 00	4.931E-03	3.309E 02	1.931E 02	
3	1.301E 03	6.362E 01	2.260E 02	8.956E 01	1.869E 00	7.203E-02	2.595E 01	1.977E 02	
4	1.298E 03	6.619E 01	2.300E 02	9.726E 01	1.879E 00	6.049E-02	3.107E 01	2.024E 02	
5	1.307E 03	5.807E 01	2.380E 02	1.116E 02	1.887E 00	3.528E-02	5.349E 01	1.886E 02	
6	1.304E 03	6.088E 01	2.800E 02	1.749E 02	1.851E 00	1.624E-02	1.140E 02	1.931E 02	
7	1.301E 03	6.362E 01	2.720E 02	1.638E 02	1.863E 00	1.860E-02	1.002E 02	1.977E 02	
8	1.298E 03	6.619E 01	2.660E 02	1.552E 02	1.868E 00	2.099E-02	8.902E 01	2.024E 02	

LOCAL TEST PARAMETERS

TEST D95-8

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.844E 02	5.537E 01	3.550E 02	1.475E 02	3.776E 00	4.100E-02	9.208E 01	1.961E 02
2	7.792E 02	6.037E 01	4.790E 02	3.585E 02	2.753E 00	9.234E-03	2.981E 02	2.078E 02

TEMPURE VALUE 0.938929E 01 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

		TEMPURE VALUE	0.938929E 01	SMALLER THAN	TABLE FOR RESISTIVITY			
3	7.740E 02	6.474E 01	3.660E 02	4.837E 02	1.616E 00	9.234E-03	2.981E 02	2.078E 02
4	7.687E 02	6.873E 01	3.710E 02	1.743E 02	3.752E 00	3.555E-02	1.055E 02	2.345E 02
5	7.844E 02	5.537E 01	3.680E 02	1.694E 02	3.759E 00	3.296E-02	1.140E 02	1.961E 02
6	7.792E 02	6.037E 01	4.470E 02	3.204E 02	2.813E 00	1.082E-02	2.600E 02	2.078E 02
7	7.740E 02	6.474E 01	4.650E 02	2.013E 02	5.492E 00	4.021E-02	1.366E 02	2.202E 02
8	7.687E 02	6.873E 01	4.470E 02	2.824E 02	3.591E 00	1.681E-02	2.137E 02	2.345E 02

LOCAL TEST PARAMETERS

TEST D95-8

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.828E 02	5.779E 01	5.240E 02	2.593E 02	5.892E 00	2.924E-02	2.015E 02	2.003E 02
2	7.758E 02	6.459E 01	5.550E 02	2.788E 02	6.273E 00	2.929E-02	2.142E 02	2.186E 02
3	7.689E 02	7.045E 01	5.940E 02	3.477E 02	5.823E 00	2.100E-02	2.773E 02	2.405E 02
4	7.619E 02	7.592E 01	5.750E 02	3.501E 02	5.291E 00	1.930E-02	2.742E 02	2.692E 02
5	7.828E 02	5.779E 01	6.310E 02	4.034E 02	5.525E 00	1.599E-02	3.456E 02	2.003E 02
6	7.758E 02	6.459E 01	6.810E 02	4.468E 02	5.824E 00	1.524E-02	3.822E 02	2.186E 02
7	7.689E 02	7.045E 01	8.080E 02	6.158E 02	5.125E 00	9.397E-03	5.454E 02	2.405E 02
8	7.619E 02	7.592E 01	7.180E 02	5.281E 02	4.846E 00	1.072E-02	4.522E 02	2.692E 02

LOCAL TEST PARAMETERS

TEST D95-8

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.512E 02	5.657E 01	7.200E 02	4.422E 02	6.986E 00	1.811E-02	3.856E 02	2.014E 02	2.014E 02
2	7.468E 02	6.461E 01	6.030E 02	2.200E 02	8.532E 00	5.490E-02	1.554E 02	2.237E 02	2.237E 02
3	7.424E 02	7.133E 01	7.720E 02	4.805E 02	7.515E 00	1.836E-02	4.092E 02	2.514E 02	2.514E 02
4	7.379E 02	7.758E 01	6.550E 02	3.947E 02	6.350E 00	2.003E-02	3.171E 02	2.895E 02	2.895E 02
5	7.512E 02	5.657E 01	8.050E 02	5.529E 02	6.644E 00	1.339E-02	4.963E 02	2.014E 02	2.014E 02
6	7.468E 02	6.461E 01	9.460E 02	6.945E 02	7.085E 00	1.125E-02	6.299E 02	2.237E 02	2.237E 02
7	7.424E 02	7.133E 01	1.023E 03	7.991E 02	6.557E 00	9.009E-03	7.278E 02	2.514E 02	2.514E 02
8	7.379E 02	7.758E 01	8.350E 02	6.228E 02	5.715E 00	1.048E-02	5.452E 02	2.895E 02	2.895E 02

LOCAL TEST PARAMETERS

TEST D95-8

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	8.163E 02	5.841E 01	8.600E 02	5.955E 02	7.141E 00	1.330E-02	5.371E 02	2.021E 02	2.021E 02
2	8.069E 02	6.693E 01	6.160E 02	2.168E 02	8.914E 00	5.948E-02	1.499E 02	2.254E 02	2.254E 02
3	7.974E 02	7.435E 01	7.540E 02	4.561E 02	7.608E 00	1.993E-02	3.817E 02	2.553E 02	2.553E 02
4	7.880E 02	8.115E 01	7.420E 02	4.399E 02	7.648E 00	2.132E-02	3.588E 02	2.964E 02	2.964E 02
5	8.163E 02	5.841E 01	8.480E 02	5.801E 02	7.190E 00	1.378E-02	5.217E 02	2.021E 02	2.021E 02
6	8.069E 02	6.693E 01	9.680E 02	7.081E 02	7.383E 00	1.151E-02	6.412E 02	2.254E 02	2.254E 02
7	7.974E 02	7.435E 01	1.023E 03	7.988E 02	6.565E 00	9.061E-03	7.245E 02	2.553E 02	2.553E 02
8	7.880E 02	8.115E 01	9.610E 02	7.229E 02	6.769E 00	1.055E-02	6.417E 02	2.964E 02	2.964E 02

LOCAL TEST PARAMETERS

TEST D95-8

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	8.360E 02	6.099E 01	1.199E 03	9.458E 02	7.945E 00	8.979E-03	8.848E 02	1.930E 02	1.930E 02
2	8.251E 02	7.122E 01	6.770E 02	1.527E 02	1.117E 01	1.370E-01	8.150E 01	2.224E 02	2.224E 02
3	8.142E 02	8.037E 01	9.280E 02	3.773E 02	1.454E 01	4.896E-02	2.969E 02	2.649E 02	2.649E 02
4	8.034E 02	8.880E 01	8.870E 02	6.033E 02	7.734E 00	1.503E-02	5.145E 02	3.200E 02	3.200E 02
5	8.360E 02	6.099E 01	1.184E 03	9.275E 02	7.996E 00	9.227E-03	8.665E 02	1.930E 02	1.930E 02
6	8.251E 02	7.122E 01	1.542E 03	1.321E 03	7.920E 00	6.337E-03	1.250E 03	2.224E 02	2.224E 02
7	8.142E 02	8.037E 01	1.255E 03	8.608E 02	1.238E 01	1.586E-02	7.804E 02	2.649E 02	2.649E 02
8	8.034E 02	8.880E 01	1.127E 03	9.024E 02	6.873E 00	8.447E-03	8.136E 02	3.200E 02	3.200E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-12

AF = 0.132E-03

D = 0.130E-01

L = 0.497E 01

DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	4.595E 02	4.561E 02	5.350E 01	6.250E 01	8.272E-02	3.089E 00	1.806E 00	6.276E 02
2	4.695E 02	4.650E 02	5.390E 01	6.780E 01	7.988E-02	4.794E 00	-7.818E 00	6.061E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-12

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.582E 02	5.756E 01	1.730E 02	4.792E 01	1.216E 00	-1.261E-01	-9.642E 00	1.685E 02
2	4.582E 02	5.756E 01	2.190E 02	1.324E 02	1.316E 00	1.757E-02	7.488E 01	1.685E 02

LOCAL TEST PARAMETERS

TEST D 95-12

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.677E 02	6.015E 01	2.770E 02	1.526E 02	2.116E 00	2.289E-02	9.246E 01	1.704E 02
2	4.677E 02	6.015E 01	4.120E 02	3.236E 02	1.933E 00	7.336E-03	2.635E 02	1.704E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-13

AF = 0.132E-03

D = 0.130E-01

L = 0.497E 01

DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	C
1	6.595E 02	6.445E 02	5.22CE 01	7.000E 01	1.033E-01	6.079E 00	-1.804E 01	7.841E 02
2	6.505E 02	6.295E 02	5.07CE 01	7.330E 01	1.050E-01	8.787E 00	-9.365E 00	7.970E 02
3	6.465E 02	6.20CE 02	5.50CE 01	7.800E 01	1.022E-01	1.142E 01	6.382E 00	7.755E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-13

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.536E 02	5.931E 01	2.740E 02	1.058E 02	2.596E 00	5.582E-02	4.650E 01	2.046E 02
2	6.536E 02	5.931E 01	3.800E 02	2.610E 02	2.471E 00	1.225E-02	2.017E 02	2.046E 02

LOCAL TEST PARAMETERS

TEST D 95-13

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.422E 02	6.070E 01	4.010E 02	2.084E 02	3.891E 00	2.634E-02	1.477E 02	2.129E 02
2	6.422E 02	6.070E 01	6.100E 02	4.703E 02	3.407E 00	8.318E-03	4.096E 02	2.129E 02

LOCAL TEST PARAMETERS

TEST D 95-13

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.360E 02	6.648E 01	5.000E 02	2.485E 02	5.511E 00	3.028E-02	1.820E 02	2.284E 02
2	6.360E 02	6.648E 01	8.380E 02	6.721E 02	4.508E 00	7.444E-03	6.057E 02	2.284E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-14

AF = 0.132E-03 D = 0.130E-01 L = 0.497E 01 DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	6.705E 02	6.505E 02	4.770E 01	7.090E 01	1.077E-01	8.546E 00	-8.693E 00	8.169E 02
2	6.695E 02	6.460E 02	4.750E 01	7.400E 01	1.070E-01	1.019E 01	-7.845E 00	8.118E 02
3	6.705E 02	6.475E 02	4.820E 01	7.400E 01	1.065E-01	1.014E 01	-5.809E 00	8.082E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-14

DATA POINT 1

STA	PB	TB	Tw	TI	Q/A	H	DEL TF	VS
1	6.626E 02	5.801E 01	3.730E 02	1.775E 02	3.748E 00	3.138E-02	1.195E 02	2.087E 02
2	6.626E 02	5.801E 01	5.510E 02	4.092E 02	3.357E 00	9.558E-03	3.512E 02	2.087E 02

LOCAL TEST PARAMETERS

TEST D 95-14

DATA POINT 2

STA	PB	TB	Tw	TI	Q/A	H	DEL TF	VS
1	6.602E 02	5.969E 01	4.560E 02	2.433E 02	4.546E 00	2.476E-02	1.836E 02	2.127E 02
2	6.602E 02	5.969E 01	4.480E 02	2.316E 02	4.570E 00	2.658E-02	1.720E 02	2.127E 02

LOCAL TEST PARAMETERS

TEST D 95-14

DATA POINT 3

STA	PB	TB	Tw	TI	Q/A	H	DEL TF	VS
1	6.614E 02	6.015E 01	7.290E 02	5.801E 02	3.849E 00	7.403E-03	5.199E 02	2.131E 02
2	6.614E 02	6.015E 01	7.090E 02	5.567E 02	3.894E 00	7.841E-03	4.966E 02	2.131E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-15

AF = 0.132E-03

D = 0.130E-01

L = 0.497E 01

DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	6.895E 02	6.610E 02	4.750E 01	7.770E 01	1.068E-01	1.208E 01	-6.655E 00	8.103E 02
2	6.845E 02	6.550E 02	4.760E 01	7.780E 01	1.082E-01	1.239E 01	-6.101E 00	8.208E 02
3	6.845E 02	6.550E 02	4.780E 01	7.850E 01	1.069E-01	1.252E 01	-6.485E 00	8.109E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-15

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.782E 02	6.164E 01	5.550E 02	3.196E 02	5.444E 00	2.110E-02	2.580E 02	2.172E 02
2	6.782E 02	6.164E 01	9.270E 02	7.721E 02	4.395E 00	6.186E-03	7.105E 02	2.172E 02

LOCAL TEST PARAMETERS

TEST D 95-15

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.728E 02	6.182E 01	5.650E 02	3.241E 02	5.597E 00	2.134E-02	2.623E 02	2.209E 02
2	6.728E 02	6.182E 01	9.610E 02	8.058E 02	4.471E 00	6.010E-03	7.440E 02	2.209E 02

LOCAL TEST PARAMETERS

TEST D 95-15

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.728E 02	6.225E 01	5.780E 02	3.373E 02	5.641E 00	2.051E-02	2.750E 02	2.196E 02
2	6.728E 02	6.225E 01	9.890E 02	8.354E 02	4.483E 00	5.798E-03	7.731E 02	2.196E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-16

AF = 0.132E-03 D = 0.130E-01 L = 0.497E 01 DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	6.925E 02	6.675E 02	4.740E 01	7.510E 01	1.079E-01	1.075E 01	-7.116E 00	8.187E 02
2	6.925E 02	6.675E 02	4.740E 01	7.540E 01	1.066E-01	1.065E 01	-8.338E 00	8.086E 02
3	6.905E 02	6.620E 02	4.790E 01	7.770E 01	1.066E-01	1.107E 01	-1.508E 01	8.091E 02
4	6.895E 02	6.590E 02	4.810E 01	7.570E 01	1.065E-01	1.281E 01	9.656E 00	8.082E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-16

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.826E 02	6.021E 01	4.830E 02	2.629E 02	4.830E 00	2.383E-02	2.027E 02	2.149E 02
2	6.826E 02	6.021E 01	7.490E 02	5.916E 02	4.104E 00	7.723E-03	5.314E 02	2.149E 02

LOCAL TEST PARAMETERS

TEST D 95-16

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.826E 02	6.021E 01	4.780E 02	2.596E 02	4.775E 00	2.395E-02	1.994E 02	2.123E 02
2	6.826E 02	6.021E 01	7.560E 02	6.022E 02	4.027E 00	7.431E-03	5.419E 02	2.123E 02

LOCAL TEST PARAMETERS

TEST D 95-16

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.792E 02	6.095E 01	5.410E 02	3.401E 02	4.655E 00	1.668E-02	2.791E 02	2.148E 02
2	6.792E 02	6.095E 01	9.140E 02	7.813E 02	3.757E 00	5.216E-03	7.204E 02	2.148E 02

LOCAL TEST PARAMETERS

TEST D 95-16

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
-----	----	----	----	----	-----	---	--------	----

1	6.774E 02	6.279E 01	6.020E 02	3.593E 02	5.774E 00	1.947E-02	2.965E 02	2.204E 02
2	6.774E 02	6.279E 01	1.032E 03	8.787E 02	4.559E 00	5.588E-03	8.159E 07	2.204E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-17

AF = 0.132E-03 D = 0.130E-01 L = 0.497E 01 DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.105E 02	6.820E 02	4.840E 01	7.850E 01	1.071E-01	1.185E 01	-8.480E 00	8.125E 02
2	7.065E 02	6.750E 02	4.840E 01	8.080E 01	1.063E-01	1.319E 01	-7.026E 00	8.064E 02
3	7.065E 02	6.745E 02	4.840E 01	8.100E 01	1.062E-01	1.335E 01	-6.560E 00	8.060E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-17

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.992E 02	6.215E 01	5.380E 02	3.056E 02	5.317E 00	2.184E-02	2.435E 02	2.180E 02
2	6.992E 02	6.215E 01	8.840E 02	7.280E 02	4.340E 00	6.518E-03	6.659E 02	2.180E 02

LOCAL TEST PARAMETERS

TEST D 95-17

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.940E 02	6.348E 01	6.120E 02	3.628E 02	5.953E 00	1.989E-02	2.993E 02	2.211E 02
2	6.940E 02	6.348E 01	1.048E 03	8.911E 02	4.693E 00	5.671E-03	8.277E 02	2.211E 02

LOCAL TEST PARAMETERS

TEST D 95-17

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.938E 02	6.363E 01	6.250E 02	3.757E 02	5.996E 00	1.921E-02	3.121E 02	2.215E 02
2	6.938E 02	6.363E 01	1.070E 03	9.138E 02	4.719E 00	5.551E-03	8.501E 02	2.215E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-18

AF = 0.132E-03

D = 0.130E-01

L = 0.497E 01

DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.045E 02	6.725E 02	4.800E 01	8.080E 01	1.049E-01	1.356E 01	-3.774E 00	7.956E 02
2	7.045E 02	6.705E 02	4.820E 01	8.400E 01	1.024E-01	1.458E 01	-5.762E 00	7.772E 02
3	7.025E 02	6.680E 02	4.830E 01	8.350E 01	1.037E-01	1.450E 01	-5.855E 00	7.868E 02
4	7.085E 02	6.710E 02	4.890E 01	8.920E 01	9.747E-02	1.616E 01	-5.281E 00	7.396E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-18

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.918E 02	6.370E 01	6.530E 02	4.038E 02	6.093E 00	1.792E-02	3.401E 02	2.190E 02
2	6.918E 02	6.370E 01	1.109E 03	9.530E 02	4.788E 00	5.384E-03	8.893E 02	2.190E 02

LOCAL TEST PARAMETERS

TEST D 95-18

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.910E 02	6.507E 01	7.360E 02	4.821E 02	6.472E 00	1.552E-02	4.170E 02	2.188E 02
2	6.910E 02	6.507E 01	1.278E 03	1.126E 03	4.989E 00	4.702E-03	1.061E 03	2.188E 02

LOCAL TEST PARAMETERS

TEST D 95-18

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.888E 02	6.486E 01	7.270E 02	4.747E 02	6.404E 00	1.563E-02	4.098E 02	2.209E 02
2	6.888E 02	6.486E 01	1.252E 03	1.100E 03	4.958E 00	4.792E-03	1.035E 03	2.209E 02

LOCAL TEST PARAMETERS

TEST D 95-18

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
-----	----	----	----	----	-----	---	--------	----

1	6.936E 02	6.773E 01	8.640E 02	6.028E 02	7.070E 00	1.321E-02	5.351E 02	2.178E 02
2	6.936E 02	6.773E 01	1.483E 03	1.328E 03	5.485E 00	4.352E-03	1.260E 03	2.178E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-19

AF = 0.132E-03

D = 0.130E-01

L = 0.497E 01

DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	6.995E 02	6.680E 02	4.820E 01	8.430E 01	9.840E-02	1.402E 01	-6.995E 00	7.466E 02
2	6.975E 02	6.655E 02	4.810E 01	8.400E 01	9.940E-02	1.406E 01	-7.076E 00	7.542E 02
3	6.905E 02	6.590E 02	4.780E 01	8.080E 01	1.056E-01	1.353E 01	-6.564E 00	8.016E 02
4	6.935E 02	6.590E 02	4.810E 01	8.350E 01	1.025E-01	1.450E 01	-5.933E 00	7.778E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-19

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.870E 02	6.507E 01	7.420E 02	5.003E 02	6.185E 00	1.421E-02	4.352E 02	2.104E 02
2	6.870E 02	6.507E 01	1.248E 03	1.099E 03	4.847E 00	4.689E-03	1.034E 03	2.104E 02

LOCAL TEST PARAMETERS

TEST D 95-19

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.848E 02	6.490E 01	7.380E 02	4.946E 02	6.221E 00	1.448E-02	4.297E 02	2.121E 02
2	6.848E 02	6.490E 01	1.250E 03	1.101E 03	4.855E 00	4.688E-03	1.036E 03	2.121E 02

LOCAL TEST PARAMETERS

TEST D 95-19

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.780E 02	6.335E 01	6.610E 02	4.151E 02	6.039E 00	1.717E-02	3.518E 02	2.204E 02
2	6.780E 02	6.335E 01	1.111E 03	9.559E 02	4.766E 00	5.340E-03	8.926E 02	2.204E 02

LOCAL TEST PARAMETERS

TEST D 95-19

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
-----	----	----	----	----	-----	---	--------	----

1	6.798E 02	6.482E 01	7.470E 02	4.969E 02	6.409E 00	1.483E-02	4.321E 02	2.189E 02
2	6.798E 02	6.482E 01	1.254E 03	1.100E 03	5.020E 00	4.851E-03	1.035E 03	2.189E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-20

AF = 0.132E-03

D = 0.130E-01

L = 0.497E 01

DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.135E 02	6.835E 02	5.500E 01	8.080E 01	1.055E-01	1.131E 01	-4.819E 00	8.002E 02
2	7.155E 02	6.865E 02	5.430E 01	8.100E 01	1.028E-01	1.139E 01	-3.962E 00	7.797E 02
3	7.115E 02	6.750E 02	5.110E 01	8.720E 01	9.691E-02	1.572E 01	2.659E 00	7.353E 02
4	7.115E 02	6.745E 02	4.880E 01	8.740E 01	1.003E-01	1.577E 01	-5.241E 00	7.607E 02
5	7.155E 02	6.765E 02	4.890E 01	9.000E 01	9.760E-02	1.650E 01	-5.051E 00	7.405E 02
6	7.125E 02	6.735E 02	4.900E 01	9.000E 01	9.785E-02	1.650E 01	-5.428E 00	7.424E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-20

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.016E 02	6.656E 01	5.000E 02	2.718E 02	5.064E 00	2.467E-02	2.052E 02	2.300E 02
2	7.016E 02	6.656E 01	8.090E 02	6.523E 02	4.207E 00	7.183E-03	5.857E 02	2.300E 02

LOCAL TEST PARAMETERS

TEST D 95-20

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.040E 02	6.641E 01	5.150E 02	2.888E 02	5.087E 00	2.287E-02	2.224E 02	2.233E 02
2	7.040E 02	6.641E 01	8.350E 02	6.802E 02	4.209E 00	6.857E-03	6.138E 02	2.233E 02

LOCAL TEST PARAMETERS

TEST D 95-20

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.970E 02	6.883E 01	8.140E 02	5.519E 02	6.925E 00	1.433E-02	4.831E 02	2.209E 02
2	6.970E 02	6.883E 01	1.394E 03	1.237E 03	5.370E 00	4.595E-03	1.169E 03	2.209E 02

LOCAL TEST PARAMETERS

TEST D 95-20

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	V
-----	----	----	----	----	-----	---	--------	---

1	6.968E 02	6.692E 01	8.210E 02	5.603E 02	6.913E 00	1.401E-02	4.934E 02	2.205E 02
2	6.968E 02	6.692E 01	1.390E 03	1.233E 03	5.389E 00	4.623E-03	1.166E 03	2.205E 02

LOCAL TEST PARAMETERS

TEST D 95-20

DATA POINT 5

STA	PB	TB	Tw	TI	Q/A	H	DEL TF	VS
1	7.001E 02	6.804E 01	8.750E 02	6.086E 02	7.242E 00	1.340E-02	5.406E 02	2.187E 02
2	7.001E 02	6.804E 01	1.394E 03	1.225E 03	5.799E 00	5.014E-03	1.157E 03	2.187E 02

LOCAL TEST PARAMETERS

TEST D 95-20

DATA POINT 6

STA	PB	TB	Tw	TI	Q/A	H	DEL TF	VS
1	6.971E 02	6.806E 01	8.750E 02	6.086E 02	7.242E 00	1.340E-02	5.406E 02	2.196E 02
2	6.971E 02	6.806E 01	1.396E 03	1.227E 03	5.796E 00	5.002E-03	1.159E 03	2.196E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-21

AF = 0.132E-03

D = 0.130E-01

L = 0.497E 01

DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	CP	HT LAL	G
1	7.085E 02	6.770E 02	4.850E 01	7.850E 01	1.103E 01	1.283E 01	-3.470E 00	9.372E 02
2	7.055E 02	6.690E 02	4.870E 01	8.240E 01	1.082E 01	1.460E 01	-4.617E 00	9.211E 02
3	7.055E 02	6.685E 02	4.920E 01	8.360E 01	1.077E 01	1.476E 01	-6.598E 00	9.172E 02
4	7.005E 02	6.635E 02	4.870E 01	9.160E 01	9.242E-02	1.660E 01	-4.409E 00	7.012E 02
5	6.855E 02	6.500E 02	4.870E 01	8.620E 01	9.770E-02	1.515E 01	5.292E 00	7.413E 02
6	6.815E 02	6.460E 02	4.900E 01	8.700E 01	9.626E-02	1.523E 01	-5.582E 00	7.303E 02
7	7.155E 02	6.775E 02	5.080E 01	9.320E 01	9.556E-02	1.585E 01	-1.294E 01	7.250E 02
8	7.155E 02	6.770E 02	5.220E 01	9.110E 01	9.525E-02	1.585E 01	-4.203E 00	7.227E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-21

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.960E 02	6.272E 01	5.710E 02	3.233E 02	5.767E 00	2.214E-02	2.605E 02	2.268E 02
2	6.960E 02	6.272E 01	9.500E 02	7.877E 02	4.648E 00	6.411E-03	7.250E 02	2.268E 02

LOCAL TEST PARAMETERS

TEST D 95-21

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.910E 02	6.472E 01	6.900E 02	4.267E 02	6.541E 00	1.807E-02	3.620E 02	2.298E 02
2	6.910E 02	6.472E 01	1.187E 03	1.027E 03	5.082E 00	5.284E-03	9.618E 02	2.298E 02

LOCAL TEST PARAMETERS

TEST D 95-21

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.908E 02	6.522E 01	7.130E 02	4.503E 02	6.612E 00	1.717E-02	3.851E 02	2.305E 02
2	6.908E 02	6.522E 01	1.212E 03	1.051E 03	5.147E 00	5.221E-03	9.859E 02	2.305E 02

LOCAL TEST PARAMETERS

TEST D 95-21

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	V
-----	----	----	----	----	-----	---	--------	---

1	6.858E 02	6.870E 01	9.240E 02	6.616E 02	7.305E 00	1.232E-02	5.929E 02	2.112E 02
2	6.858E 02	6.870E 01	1.559E 03	1.402E 03	5.725E 00	4.295E-03	1.333E 03	2.112E 02

LOCAL TEST PARAMETERS

TEST D 95-21

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.714E 02	6.643E 01	8.080E 02	5.536E 02	6.711E 00	1.377E-02	4.872E 02	2.151E 02
2	6.714E 02	6.643E 01	1.365E 03	1.211E 03	5.239E 00	4.579E-03	1.144E 03	2.151E 02

LOCAL TEST PARAMETERS

TEST D 95-21

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.674E 02	6.689E 01	8.170E 02	5.624E 02	6.747E 00	1.362E-02	4.955E 02	2.141E 02
2	6.674E 02	6.689E 01	1.394E 03	1.241E 03	5.245E 00	4.466E-03	1.174E 03	2.141E 02

LOCAL TEST PARAMETERS

TEST D 95-21

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.004E 02	6.900E 01	8.730E 02	6.251E 02	6.754E 00	1.214E-02	5.561E 02	2.181E 02
2	7.004E 02	6.900E 01	1.477E 03	1.328E 03	5.281E 00	4.195E-03	1.259E 03	2.181E 02

LOCAL TEST PARAMETERS

TEST D 95-21

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.002E 02	6.993E 01	8.620E 02	6.112E 02	6.794E 00	1.255E-02	5.413E 02	2.214E 02
2	7.002E 02	6.993E 01	1.468E 03	1.318E 03	5.294E 00	4.242E-03	1.248E 03	2.214E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-22

AF = 0.132E-03

D = 0.130E-01

L = 0.500E 01

DEL R = 0.199E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.155E 02	7.041E 02	5.570E 01	7.270E 01	1.023E-01	6.016E 00	-1.586E 01	7.758E 02
2	7.095E 02	6.936E 02	5.480E 01	7.700E 01	1.084E-01	8.524E 00	-1.791E 01	8.228E 02
3	7.085E 02	6.926E 02	5.400E 01	7.650E 01	1.043E-01	8.561E 00	-1.292E 01	7.911E 02
4	7.065E 02	6.871E 02	5.250E 01	7.860E 01	1.040E-01	1.049E 01	-7.405E 00	7.888E 02
5	7.065E 02	6.876E 02	5.200E 01	7.900E 01	1.025E-01	1.049E 01	-9.294E 00	7.777E 02
6	7.185E 02	7.006E 02	4.880E 01	7.690E 01	1.116E-01	1.044E 01	-1.669E 01	8.471E 02
7	7.145E 02	6.906E 02	4.850E 01	8.080E 01	1.062E-01	1.300E 01	-6.758E 00	8.061E 02
8	7.115E 02	6.817E 02	4.870E 01	8.680E 01	1.038E-01	1.543E 01	-8.984E 00	7.875E 02
9	7.115E 02	6.817E 02	4.870E 01	8.710E 01	1.042E-01	1.561E 01	-9.138E 00	7.904E 02
10	7.145E 02	6.897E 02	4.800E 01	8.400E 01	1.064E-01	1.317E 01	-2.015E 01	8.074E 02
11	6.835E 02	6.532E 02	4.780E 01	9.020E 01	1.032E-01	1.575E 01	-2.156E 01	7.827E 02
12	7.105E 02	6.772E 02	4.810E 01	9.420E 01	1.003E-01	1.714E 01	-1.700E 01	7.609E 02
13	7.105E 02	6.772E 02	4.850E 01	9.440E 01	1.003E-01	1.716E 01	-1.670E 01	7.608E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.109E 02	6.242E 01	2.980E 02	1.538E 02	2.514E 00	2.751E-02	9.138E 01	2.083E 02
2	7.109E 02	6.242E 01	3.630E 02	2.318E 02	2.636E 00	1.557E-02	1.693E 02	2.083E 02

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.031E 02	6.371E 01	4.010E 02	2.224E 02	3.650E 00	2.300E-02	1.587E 02	2.257E 02
2	7.031E 02	6.371E 01	5.460E 02	3.917E 02	3.632E 00	1.108E-02	3.280E 02	2.257E 02

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.021E 02	6.345E 01	4.040E 02	2.260E 02	3.655E 00	2.249E-02	1.625E 02	2.162E 02
2	7.021E 02	6.345E 01	5.460E 02	3.911E 02	3.645E 00	1.113E-02	3.276E 02	2.162E 02

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
-----	----	----	----	----	-----	---	--------	----

1	6.987E 02	6.414E 01	4.960E 02	2.909E 02	4.585E 00	2.022E-02	2.268E 02	2.181E 02
2	6.987E 02	6.414E 01	7.380E 02	5.708E 02	4.327E 00	8.540E-03	5.067E 02	2.181E 02

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.989E 02	6.395E 01	5.040E 02	3.015E 02	4.570E 00	1.924E-02	2.376E 02	2.143E 02
2	6.989E 02	6.395E 01	7.450E 02	5.791E 02	4.310E 00	8.366E-03	5.151E 02	2.143E 02

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.113E 02	6.075E 01	4.930E 02	2.906E 02	4.518E 00	1.965E-02	2.299E 02	2.223E 02
2	7.113E 02	6.075E 01	6.910E 02	5.177E 02	4.375E 00	9.573E-03	4.570E 02	2.223E 02

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.049E 02	6.350E 01	6.400E 02	4.075E 02	5.665E 00	1.647E-02	3.440E 02	2.203E 02
2	7.049E 02	6.350E 01	1.003E 03	8.297E 02	5.072E 00	6.620E-03	7.662E 02	2.203E 02

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	6.996E 02	6.620E 01	8.180E 02	5.696E 02	6.592E 00	1.309E-02	5.034E 02	2.251E 02	
2	6.996E 02	6.620E 01	1.276E 03	1.098E 03	5.830E 00	5.652E-03	1.032E 03	2.251E 02	

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	6.996E 02	6.628E 01	8.260E 02	5.759E 02	6.662E 00	1.307E-02	5.096E 02	2.262E 02	
2	6.996E 02	6.628E 01	1.280E 03	1.100E 03	5.909E 00	5.718E-03	1.033E 03	2.262E 02	

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.046E 02	6.331E 01	6.500E 02	4.161E 02	5.726E 00	1.623E-02	3.528E 02	2.201E 02	
2	7.046E 02	6.331E 01	9.880E 02	8.092E 02	5.196E 00	6.966E-03	7.458E 02	2.201E 02	

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 11

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	6.714E 02	6.577E 01	8.390E 02	5.876E 02	6.737E 00	1.291E-02	5.218E 02	2.244E 02	
2	6.714E 02	6.577E 01	1.297E 03	1.115E 03	5.981E 00	5.697E-03	1.050E 03	2.244E 02	

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 12

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.972E 02	6.787E 01	9.540E 02	6.987E 02	7.213E 00	1.143E-02	6.309E 02	2.243E 02
2	6.972E 02	6.787E 01	1.445E 03	1.259E 03	6.476E 00	5.437E-03	1.191E 03	2.243E 02

LOCAL TEST PARAMETERS

TEST D 95-22

DATA POINT 13

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.972E 02	6.811E 01	9.500E 02	6.928E 02	7.251E 00	1.161E-02	6.247E 02	2.252E 02
2	6.972E 02	6.811E 01	1.447E 03	1.261E 03	6.492E 00	5.445E-03	1.192E 03	2.252E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-23

AF = 0.251E-03

D = 0.179E-01

L = 0.800E 01

DEL R = 0.490E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.675E 02	7.665E 02	5.780E 01	6.110E 01	1.020E-01	8.578E-01	-3.515E 01	4.065E 02
2	7.675E 02	7.665E 02	5.540E 01	5.960E 01	1.020E-01	1.337E 00	-5.043E 00	4.066E 02
3	7.675E 02	7.665E 02	5.390E 01	6.000E 01	1.042E-01	2.093E 00	1.784E 00	4.152E 02
4	7.675E 02	7.665E 02	5.250E 01	6.110E 01	1.041E-01	2.858E 00	-1.406E 00	4.150E 02
5	7.675E 02	7.655E 02	5.180E 01	6.380E 01	1.051E-01	4.025E 00	-4.197E 00	4.187E 02
6	6.825E 02	6.805E 02	4.780E 01	5.960E 01	1.068E-01	3.916E 00	2.682E-01	4.255E 02
7	6.825E 02	6.795E 02	4.790E 01	6.480E 01	1.055E-01	5.822E 00	-2.639E 00	4.207E 02
8	6.825E 02	6.795E 02	4.850E 01	6.530E 01	1.054E-01	5.874E 00	-2.438E 00	4.201E 02
9	7.075E 02	7.045E 02	4.780E 01	7.110E 01	1.061E-01	7.618E 00	-1.658E 01	4.231E 02
10	7.075E 02	7.045E 02	4.810E 01	7.180E 01	1.061E-01	7.711E 00	-1.843E 01	4.229E 02
11	7.075E 02	7.040E 02	4.850E 01	7.330E 01	1.057E-01	8.516E 00	-1.415E 01	4.214E 02
12	6.745E 02	6.705E 02	4.730E 01	7.330E 01	1.064E-01	8.940E 00	-1.622E 01	4.243E 02
13	6.745E 02	6.695E 02	4.740E 01	7.650E 01	1.070E-01	1.065E 01	-1.399E 01	4.264E 02
14	6.745E 02	6.695E 02	4.800E 01	7.720E 01	1.050E-01	1.075E 01	-1.276E 01	4.184E 02
15	7.055E 02	7.005E 02	4.750E 01	7.750E 01	1.070E-01	1.075E 01	-1.449E 01	4.264E 02
16	7.055E 02	6.996E 02	4.740E 01	7.920E 01	1.077E-01	1.189E 01	-1.217E 01	4.294E 02
17	7.035E 02	6.966E 02	4.780E 01	8.350E 01	1.069E-01	1.386E 01	-1.171E 01	4.259E 02
18	7.035E 02	6.967E 02	4.800E 01	8.380E 01	1.069E-01	1.392E 01	-1.200E 01	4.262E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.670E 02	5.913E 01	1.400E 02	7.547E 01	2.367E-01	1.449E-02	1.634E 01	1.030E 02
2	7.670E 02	5.913E 01	9.600E 01	9.123E 01	5.700E-02	1.776E-03	3.210E 01	1.030E 02

TEMPURE VALUE 0.190595E 02 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
3	7.667E 02	5.975E 01	1.170E 02	8.956E 01	1.869E 00	1.776E-03	3.210E 01	1.030E 02
4	7.667E 02	5.975E 01	6.000E 01	5.195E 01	5.859E-02	-7.511E-03	-7.800E 00	1.030E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.670E 02	5.751E 01	1.630E 02	6.823E 01	3.577E-01	3.335E-02	1.072E 01	1.010E 02
2	7.670E 02	5.751E 01	9.700E 01	8.953E 01	8.895E-02	2.778E-03	3.202E 01	1.010E 02
3	7.667E 02	5.845E 01	1.560E 02	5.201E 01	3.478E-01	-5.404E-02	-6.436E 00	1.021E 02
4	7.667E 02	5.845E 01	6.200E 01	4.938E 01	9.117E-02	-1.006E-02	-9.067E 00	1.021E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.670E 02	5.710E 01	2.050E 02	7.568E 01	5.532E-01	2.979E-02	1.857E 01	1.027E 02
2	7.670E 02	5.710E 01	1.020E 02	9.038E 01	1.421E-01	4.271E-03	3.328E 01	1.027E 02
3	7.667E 02	5.867E 01	2.110E 02	8.800E 01	5.583E-01	1.903E-02	2.933E 01	1.046E 02
4	7.667E 02	5.867E 01	7.100E 01	5.298E 01	1.451E-01	-2.554E-02	-5.682E 00	1.046E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.670E 02	5.703E 01	2.560E 02	1.079E 02	7.663E-01	1.507E-02	5.086E 01	1.026E 02
2	7.670E 02	5.703E 01	1.080E 02	9.231E 01	1.984E-01	5.623E-03	3.528E 01	1.026E 02
3	7.667E 02	5.906E 01	2.700E 02	1.320E 02	7.658E-01	1.049E-02	7.297E 01	1.051E 02
4	7.667E 02	5.906E 01	8.200E 01	6.009E 01	2.019E-01	1.959E-01	1.031E 00	1.051E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.665E 02	5.805E 01	3.220E 02	1.351E 02	1.103E 00	1.432E-02	7.703E 01	1.046E 02
2	7.665E 02	5.805E 01	1.160E 02	9.349E 01	2.944E-01	8.305E-03	3.544E 01	1.046E 02
3	7.660E 02	6.086E 01	3.710E 02	2.115E 02	1.077E 00	7.151E-03	1.507E 02	1.085E 02
4	7.660E 02	6.086E 01	9.900E 01	7.182E 01	2.977E-01	2.717E-02	1.096E 01	1.085E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.815E 02	5.421E 01	3.160E 02	1.336E 02	1.068E 00	1.344E-02	7.942E 01	1.037E 02

2	6.815E 02	5.421E 01	1.130E 02	9.077E 01	2.844E-01	7.779E-03	3.656E 01	1.037E 02
3	6.810E 02	5.702E 01	3.530E 02	1.926E 02	1.050E 00	7.741E-03	1.356E 02	1.070E 02
4	6.810E 02	5.702E 01	9.700E 01	7.025E 01	2.874E-01	2.173E-02	1.323E 01	1.070E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.810E 02	5.712E 01	4.750E 02	2.599E 02	1.597E 00	7.875E-03	2.028E 02	1.059E 02
2	6.810E 02	5.712E 01	1.390E 02	1.082E 02	4.554E-01	8.913E-03	5.109E 01	1.059E 02
3	6.802E 02	6.102E 01	5.790E 02	3.943E 02	1.494E 00	4.483E-03	3.333E 02	1.117E 02
4	6.802E 02	6.102E 01	1.350E 02	1.033E 02	4.568E-01	1.081E-02	4.226E 01	1.117E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.810E 02	5.772E 01	4.760E 02	2.613E 02	1.596E 00	7.839E-03	2.036E 02	1.065E 02
2	6.810E 02	5.772E 01	1.400E 02	1.094E 02	4.551E-01	8.800E-03	5.171E 01	1.065E 02
3	6.802E 02	6.155E 01	5.770E 02	3.919E 02	1.496E 00	4.529E-03	3.303E 02	1.124E 02
4	6.802E 02	6.155E 01	1.380E 02	1.070E 02	4.558E-01	1.003E-02	4.544E 01	1.124E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.060E 02	5.952E 01	6.110E 02	3.525E 02	2.092E 00	7.141E-03	2.930E 02	1.094E 02
2	7.060E 02	5.952E 01	1.630E 02	1.244E 02	6.317E-01	9.733E-03	6.491E 01	1.094E 02
3	7.052E 02	6.428E 01	8.010E 02	5.937E 02	1.868E 00	3.529E-03	5.294E 02	1.170E 02
4	7.052E 02	6.428E 01	1.820E 02	1.471E 02	6.226E-01	7.521E-03	8.278E 01	1.170E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.060E 02	5.990E 01	6.720E 02	4.257E 02	2.067E 00	5.651E-03	3.658E 02	1.099E 02
2	7.060E 02	5.990E 01	1.710E 02	1.331E 02	6.435E-01	8.791E-03	7.320E 01	1.099E 02
3	7.052E 02	6.466E 01	8.360E 02	6.311E 02	1.879E 00	3.317E-03	5.664E 02	1.177E 02
4	7.052E 02	6.466E 01	1.900E 02	1.555E 02	6.339E-01	6.981E-03	9.080E 01	1.177E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 11

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.058E 02	6.123E 01	7.380E 02	4.754E 02	2.272E 00	5.485E-03	4.142E 02	1.115E 02
2	7.058E 02	6.123E 01	1.900E 02	1.504E 02	7.212E-01	8.091E-03	8.913E 01	1.115E 02
3	7.049E 02	6.631E 01	8.780E 02	6.530E 02	2.096E 00	3.573E-03	5.867E 02	1.204E 02
4	7.049E 02	6.631E 01	2.200E 02	1.851E 02	7.041E-01	5.930E-03	1.187E 02	1.204E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 12

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.725E 02	6.074E 01	8.020E 02	5.363E 02	2.369E 00	4.982E-03	4.756E 02	1.125E 02
2	6.725E 02	6.074E 01	1.950E 02	1.529E 02	7.765E-01	8.427E-03	9.215E 01	1.125E 02
3	6.715E 02	6.589E 01	9.890E 02	7.704E 02	2.146E 00	3.045E-03	7.045E 02	1.219E 02
4	6.715E 02	6.589E 01	2.360E 02	2.001E 02	7.521E-01	5.602E-03	1.342E 02	1.219E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 13

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.720E 02	6.279E 01	1.057E 03	7.904E 02	2.674E 00	3.675E-03	7.276E 02	1.165E 02
2	6.720E 02	6.279E 01	2.570E 02	2.137E 02	9.471E-01	6.278E-03	1.509E 02	1.165E 02
3	6.707E 02	6.857E 01	1.137E 03	8.892E 02	2.579E 00	3.143E-03	8.206E 02	1.290E 02
4	6.707E 02	6.857E 01	3.250E 02	2.886E 02	9.011E-01	4.096E-03	2.200E 02	1.290E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 14

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.720E 02	6.355E 01	1.059E 03	7.873E 02	2.725E 00	3.765E-03	7.238E 02	1.156E 02
2	6.720E 02	6.355E 01	2.630E 02	2.196E 02	9.612E-01	6.160E-03	1.560E 02	1.156E 02
3	6.707E 02	6.941E 01	1.156E 03	9.072E 02	2.609E 00	3.114E-03	8.378E 02	1.288E 02
4	6.707E 02	6.941E 01	3.370E 02	3.007E 02	9.109E-01	3.938E-03	2.313E 02	1.288E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 15

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.030E 02	6.312E 01	9.540E 02	6.558E 02	2.842E 00	4.796E-03	5.926E 02	1.160E 02
2	7.030E 02	6.312E 01	2.360E 02	1.890E 02	9.715E-01	7.715E-03	1.259E 02	1.160E 02
3	7.017E 02	6.914E 01	1.143E 03	8.939E 02	2.598E 00	3.150E-03	8.248E 02	1.286E 02
4	7.017E 02	6.914E 01	3.100E 02	2.720E 02	9.200E-01	4.536E-03	2.028E 02	1.286E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 16

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
-----	----	----	----	----	-----	---	--------	----

1	7.025E 02	6.435E 01	1.187E 03	9.089E 02	2.940E 00	3.482E-03	8.445E 02	1.190E 02
2	7.025E 02	6.435E 01	3.040E 02	2.594E 02	1.062E 00	5.446E-03	1.951E 02	1.190E 02
3	7.011E 02	7.068E 01	1.231E 03	9.630E 02	2.888E 00	3.237E-03	8.923E 02	1.336E 02
4	7.011E 02	7.068E 01	3.690E 02	3.300E 02	1.014E 00	3.909E-03	2.593E 02	1.336E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 17

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.080E 02	6.694E 01	1.337E 03	1.028E 03	3.446E 00	3.586E-03	9.611E 02	1.229E 02
2	7.080E 02	6.694E 01	3.810E 02	3.336E 02	1.242E 00	4.658E-03	2.667E 02	1.229E 02
3	7.023E 02	7.413E 01	1.367E 03	1.065E 03	3.410E 00	3.442E-03	9.909E 02	1.430E 02
4	7.023E 02	7.413E 01	4.640E 02	4.221E 02	1.173E 00	3.371E-03	3.480E 02	1.430E 02

LOCAL TEST PARAMETERS

TEST D 95-23

DATA POINT 18

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.081E 02	6.714E 01	1.333E 03	1.020E 03	3.486E 00	3.659E-03	9.527E 02	1.234E 02
2	7.081E 02	6.714E 01	3.770E 02	3.288E 02	1.258E 00	4.807E-03	2.617E 02	1.234E 02
3	7.024E 02	7.433E 01	1.371E 03	1.067E 03	3.440E 00	3.466E-03	9.925E 02	1.438E 02
4	7.024E 02	7.433E 01	4.690E 02	4.270E 02	1.181E 00	3.348E-03	3.527E 02	1.438E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-24

AF = 0.251E-03 D = 0.179E-01 L = 0.800E 01 DEL R = 0.490E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT DAI	G
1	6.805E 02	6.790E 02	5.200E 01	6.220E 01	1.047E-01	2.266E 00	-5.974E 01	4.173E 02
2	6.805E 02	6.788E 02	5.070E 01	6.250E 01	1.043E-01	3.028E 00	-3.614E 01	4.157E 02
3	6.805E 02	6.785E 02	5.000E 01	6.490E 01	1.050E-01	4.276E 00	-2.542E 01	4.184E 02
4	6.795E 02	6.768E 02	4.910E 01	6.750E 01	1.068E-01	5.747E 00	-2.096E 01	4.255E 02
5	6.785E 02	6.748E 02	4.890E 01	7.250E 01	1.055E-01	8.031E 00	-1.700E 01	4.204E 02
6	6.785E 02	6.740E 02	4.890E 01	7.520E 01	1.047E-01	9.392E 00	-1.420E 01	4.174E 02
7	6.875E 02	6.838E 02	4.720E 01	7.090E 01	1.072E-01	7.828E 00	-1.710E 01	4.274E 02
8	6.875E 02	6.820E 02	4.740E 01	7.800E 01	1.045E-01	1.128E 01	-1.090E 01	4.165E 02
9	6.875E 02	6.810E 02	4.740E 01	7.960E 01	1.060E-01	1.236E 01	-9.846E 00	4.227E 02
10	6.765E 02	6.705E 02	4.710E 01	7.700E 01	1.075E-01	1.124E 01	-1.162E 01	4.286E 02
11	6.765E 02	6.698E 02	4.710E 01	7.990E 01	1.060E-01	1.251E 01	-1.161E 01	4.225E 02
12	6.765E 02	6.688E 02	4.740E 01	8.340E 01	1.030E-01	1.394E 01	-1.020E 01	4.105E 02
13	6.765E 02	6.686E 02	4.720E 01	8.120E 01	1.067E-01	1.349E 01	-9.419E 00	4.253E 02
14	6.675E 02	6.685E 02	4.780E 01	8.500E 01	1.028E-01	1.476E 01	-9.036E 00	4.098E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.797E 02	5.552E 01	2.180E 02	8.535E 01	6.031E-01	2.021E-02	2.984E 01	1.032E 02
2	6.797E 02	5.552E 01	9.900E 01	8.583E 01	1.555E-01	5.129E-03	3.031E 01	1.032E 02
3	6.794E 02	5.716E 01	2.170E 02	8.330E 01	6.024E-01	2.304E-02	2.615E 01	1.051E 02
4	6.794E 02	5.716E 01	7.400E 01	5.517E 01	1.581E-01	-7.957E-02	-1.986E 00	1.051E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 2

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STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.796E 02	5.554E 01	2.640E 02	1.088E 02	8.135E-01	1.528E-02	5.323E 01	1.028E 02
2	6.796E 02	5.554E 01	1.060E 02	8.882E 01	2.121E-01	6.372E-03	3.328E 01	1.028E 02
3	6.792E 02	5.773E 01	2.770E 02	1.315E 02	8.136E-01	1.103E-02	7.379E 01	1.055E 02
4	6.792E 02	5.773E 01	8.400E 02	8.361E 02	1.325E-01	1.702E-04	7.784E 02	1.055E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.795E 02	5.672E 01	3.500E 02	1.650E 02	1.171E 00	1.082E-02	1.083E 02	1.049E 02
2	6.795E 02	5.672E 01	1.170E 02	9.287E 01	3.159E-01	8.737E-03	3.615E 01	1.049E 02
3	6.790E 02	5.969E 01	4.000E 02	2.385E 02	1.136E 00	6.351E-03	1.788E 02	1.091E 02
4	6.790E 02	5.969E 01	1.030E 02	7.495E 01	3.188E-01	2.088E-02	1.527E 01	1.091E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.781E 02	5.785E 01	4.640E 02	2.480E 02	1.584E 00	8.328E-03	1.901E 02	1.081E 02
2	6.781E 02	5.785E 01	1.350E 02	1.038E 02	4.502E-01	9.800E-03	4.594E 01	1.081E 02
3	6.775E 02	6.160E 01	5.700E 02	3.861E 02	1.480E 00	4.561E-03	3.245E 02	1.140E 02
4	6.775E 02	6.160E 01	1.310E 02	9.880E 01	4.512E-01	1.213E-02	3.720E 01	1.140E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.766E 02	6.085E 01	6.980E 02	4.398E 02	2.190E 00	5.779E-03	3.789E 02	1.115E 02
2	6.766E 02	6.085E 01	1.750E 02	1.349E 02	6.888E-01	9.304E-03	7.404E 01	1.115E 02
3	6.757E 02	6.554E 01	9.130E 02	7.089E 02	1.940E 00	3.016E-03	6.434E 02	1.199E 02
4	6.757E 02	6.554E 01	2.040E 02	1.690E 02	6.733E-01	6.510E-03	1.034E 02	1.199E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.762E 02	6.257E 01	8.460E 02	5.683E 02	2.525E 00	4.993E-03	5.057E 02	1.135E 02
2	6.762E 02	6.257E 01	2.120E 02	1.691E 02	8.348E-01	7.834E-03	1.065E 02	1.135E 02
3	6.751E 02	6.788E 01	1.055E 03	8.301E 02	2.270E 00	2.978E-03	7.622E 02	1.243E 02
4	6.751E 02	6.788E 01	2.640E 02	2.281E 02	8.019E-01	5.004E-03	1.602E 02	1.243E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.856E 02	5.915E 01	6.580E 02	4.009E 02	2.138E 00	6.255E-03	3.418E 02	1.104E 02
2	6.856E 02	5.915E 01	1.770E 02	1.393E 02	6.560E-01	8.187E-03	8.013E 01	1.104E 02
3	6.847E 02	6.400E 01	8.670E 02	6.635E 02	1.894E 00	3.159E-03	5.995E 02	1.184E 02
4	6.847E 02	6.400E 01	1.890E 02	1.534E 02	6.499E-01	7.269E-03	8.941E 01	1.184E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.847E 02	6.396E 01	1.035E 03	7.352E 02	2.961E 00	4.412E-03	6.713E 02	1.153E 02
2	6.847E 02	6.396E 01	2.750E 02	2.299E 02	1.021E 00	6.156E-03	1.659E 02	1.153E 02
3	6.834E 02	7.006E 01	1.200E 03	9.421E 02	2.750E 00	3.153E-03	8.720E 02	1.290E 02
4	6.834E 02	7.006E 01	6.110E 02	5.839E 02	8.168E-01	1.590E-03	5.139E 02	1.290E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.842E 02	6.498E 01	1.129E 03	8.164E 02	3.209E 00	4.270E-03	7.514E 02	1.191E 02
2	6.842E 02	6.498E 01	3.290E 02	2.842E 02	1.108E 00	5.054E-03	2.192E 02	1.191E 02
3	6.826E 02	7.146E 01	1.266E 03	9.882E 02	3.031E 00	3.306E-03	9.167E 02	1.352E 02
4	6.826E 02	7.146E 01	5.680E 02	5.360E 02	9.448E-01	2.034E-03	4.645E 02	1.352E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.735E 02	6.319E 01	1.059E 03	7.702E 02	2.889E 00	4.086E-03	7.070E 02	1.178E 02
2	6.735E 02	6.319E 01	2.800E 02	2.361E 02	1.004E 00	5.809E-03	1.729E 02	1.178E 02

3	6.720E 02	6.921E 01	1.187E 03	9.298E 02	2.728E 00	3.170E-03	8.606E 02	1.313E 02
4	6.720E 02	6.921E 01	3.370E 02	2.986E 02	9.638E-01	4.207E-03	2.293E 02	1.313E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 11

STA	PB	TB	Tw	TI	Q/A	H	DEL TF	VS
1	6.731E 02	6.483E 01	1.189E 03	8.866E 02	3.187E 00	3.878E-03	8.218E 02	1.192E 02
2	6.731E 02	6.483E 01	3.280E 02	2.822E 02	1.130E 00	5.199E-03	2.174E 02	1.192E 02
3	6.715E 02	7.140E 01	1.288E 03	1.009E 03	3.065E 00	3.268E-03	9.379E 02	1.358E 02
4	6.715E 02	7.140E 01	5.610E 02	5.281E 02	9.671E-01	2.118E-03	4.567E 02	1.358E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 12

STA	PB	TB	Tw	TI	Q/A	H	DEL TF	VS
1	6.726E 02	6.709E 01	1.358E 03	1.045E 03	3.512E 00	3.590E-03	9.784E 02	1.205E 02
2	6.726E 02	6.709E 01	4.170E 02	3.711E 02	1.243E 00	4.089E-03	3.040E 02	1.205E 02
3	6.707E 02	7.420E 01	1.386E 03	1.080E 03	3.478E 00	3.458E-03	1.006E 03	1.413E 02
4	6.707E 02	7.420E 01	5.030E 02	4.619E 02	1.173E 00	3.027E-03	3.877E 02	1.413E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 13

STA	PB	TB	Tw	TI	Q/A	H	DEL TF	VS
1	6.725E 02	6.595E 01	1.322E 03	1.019E 03	3.368E 00	3.536E-03	9.526E 02	1.223E 02
2	6.725E 02	6.595E 01	3.850E 02	3.392E 02	1.205E 00	4.408E-03	2.733E 02	1.223E 02
3	6.706E 02	7.275E 01	1.352E 03	1.056E 03	3.333E 00	3.391E-03	9.828E 02	1.412E 02
4	6.706E 02	7.275E 01	4.540E 02	4.128E 02	1.149E 00	3.379E-03	3.400E 02	1.412E 02

LOCAL TEST PARAMETERS

TEST D 95-24

DATA POINT 14

STA	PB	TB	Tw	TI	Q/A	H	DEL TF	VS
1	6.725E 02	6.819E 01	1.400E 03	1.073E 03	3.721E 00	3.702E-03	1.005E 03	1.229E 02
2	6.725E 02	6.819E 01	4.180E 02	3.688E 02	1.334E 00	4.437E-03	3.006E 02	1.229E 02
3	6.705E 02	7.561E 01	1.420E 03	1.098E 03	3.696E 00	3.615E-03	1.023E 03	1.465E 02
4	6.705E 02	7.561E 01	5.030E 02	4.588E 02	1.259E 00	3.286E-03	3.832E 02	1.465E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-25

AF = 0.126E-03

D = 0.127E-01

L = 0.500E 01

DEL R = 0.490E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.345E 02	7.175E 02	5.440E 01	5.930E 01	1.078E-01	1.460E 00	-1.728E 01	8.553E 02
2	7.345E 02	7.175E 02	5.220E 01	5.900E 01	1.085E-01	1.827E 00	-2.769E 01	8.614E 02
3	7.345E 02	7.175E 02	5.220E 01	6.100E 01	1.068E-01	2.787E 00	-9.834E 00	8.472E 02
4	7.405E 02	7.175E 02	5.190E 01	6.400E 01	1.040E-01	3.698E 00	-1.517E 01	8.254E 02
5	7.405E 02	7.175E 02	5.190E 01	6.400E 01	1.041E-01	3.820E 00	-1.152E 01	8.258E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-25

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.277E 02	5.620E 01	2.830E 02	1.276E 02	8.929E-01	1.251E-02	7.138E 01	2.111E 02	
2	7.277E 02	5.620E 01	1.040E 02	9.125E 01	1.873E-01	5.342E-03	3.506E 01	2.111E 02	

LOCAL TEST PARAMETERS

TEST D 95-25

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.277E 02	5.454E 01	3.300E 02	1.442E 02	1.153E 00	1.286E-02	8.968E 01	2.090E 02	
2	7.277E 02	5.454E 01	1.140E 02	9.828E 01	2.467E-01	5.642E-03	4.374E 01	2.090E 02	

LOCAL TEST PARAMETERS

TEST D 95-25

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.277E 02	5.572E 01	4.290E 02	1.943E 02	1.665E 00	1.201E-02	1.386E 02	2.080E 02	
2	7.277E 02	5.572E 01	2.350E 02	2.216E 02	3.423E-01	2.064E-03	1.658E 02	2.080E 02	

LOCAL TEST PARAMETERS

TEST D 95-25

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
-----	----	----	----	----	-----	---	-----	----	----

1	7.313E 02	5.659E 01	5.265E 02	2.346E 02	2.235E 00	1.255E-02	1.780E 02	2.045E 02
2	7.313E 02	5.659E 01	1.710E 02	1.463E 02	5.107E-01	5.692E-03	8.972E 01	2.045E 02

LOCAL TEST PARAMETERS

TEST D 95-25

DATA POINT 5

	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.313E 02	5.674E 01	5.290E 02	2.385E 02	2.232E 00	1.228E-02	1.817E 02	2.049E 02
2	7.313E 02	5.674E 01	1.700E 02	1.452E 02	5.111E-01	5.779E-03	8.845E 01	2.049E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-26

AF = 0.126E-03 D = 0.127E-01 L = 0.500E 01 DEL R = 0.490E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.515E 02	7.285E 02	4.890E 01	6.460E 01	1.106E-01	4.894E 00	-1.666E 01	8.775E 02
2	7.540E 02	7.285E 02	4.890E 01	6.870E 01	1.095E-01	6.649E 00	-1.344E 01	8.687E 02
3	7.539E 02	7.245E 02	4.890E 01	7.280E 01	1.093E-01	8.545E 00	-1.186E 01	8.675E 02
4	7.539E 02	7.245E 02	4.920E 01	7.310E 01	1.091E-01	8.664E 00	-1.086E 01	8.660E 02
5	7.539E 02	7.245E 02	5.020E 01	7.350E 01	1.090E-01	8.719E 00	-8.887E 00	8.647E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-26

DATA POINT 1

STA	PV	TB	TW	TI	Q/A	H	DEL TI	VS
1	7.423E 02	5.507E 01	6.570E 02	2.447E 02	3.235E 01	1.705E-02	1.96E 02	2.13
2	7.423E 02	5.507E 01	2.040E 02	1.705E 02	7.560E-01	6.67E-03	1.154E 01	2.13

LOCAL TEST PARAMETERS

TEST D 95-26

DATA POINT 2

STA	PB	TI	TW	TI	Q/A	H	DEL TI	VS
1	7.438E 02	5.710E 01	8.050E 02	3.127E 02	4.95E 01	1.579E-02	2.55E 02	2.13
2	7.438E 02	5.710E 01	2.500E 02	2.007E 02	1.55E 00	6.758E-03	1.516E 02	2.13

LOCAL TEST PARAMETERS

TEST D 95-26

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TI	VS
1	7.421E 02	5.921E 01	7.990E 02	3.927E 02	5.720E 00	1.716E-02	3.137E 02	2.214
2	7.421E 02	5.921E 01	5.170E 02	2.663E 02	1.457E 00	7.036E-03	2.071E 02	2.214

LOCAL TEST PARAMETERS

TEST D 95-26

DATA POINT 4

STA	PB	TI	TW	TI	Q/A	H	DEL TI	VS
-----	----	----	----	----	-----	---	--------	----

1	7.421E 02	5.959E 01	1.003E 03	3.830E 02	5.839E 00	1.806E-02	3.234E 02	2.221E 02
2	7.421E 02	5.959E 01	3.220E 02	2.707E 02	1.485E 00	7.033E-03	2.111E 02	2.221E 02

LOCAL TEST PARAMETERS

TEST D 95-26

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.421E 02	6.043E 01	9.960E 02	3.960E 02	5.670E 00	1.689E-02	3.356E 02	2.242E 02
2	7.421E 02	6.043E 01	3.170E 02	2.669E 02	1.440E 00	6.977E-03	2.065E 02	2.242E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST ID 95-7

AF = 0.126E-13 U = 0.127E-01 L = 1.5E-1 GLL = 0.001

TEST POINTS

POINT	PB-IN	PB-OUT	TS-IN	TS-OUT	TS-OUT	TS-OUT	TS-OUT	TS-OUT	TS-OUT
1	7.515E 02	7.225E 02	5.430E 01	5.7E 01	1.07E-1	1.07E-1	1.07E-1	1.07E-1	1.07E-1
2	7.515E 02	7.125E 02	5.33E 01	5.6E 01	1.0E-1	1.1E-1	1.1E-1	1.1E-1	1.1E-1
3	7.515E 02	7.105E 02	5.33E 01	5.6E 01	1.0E-1	1.14E-1	1.14E-1	1.14E-1	1.14E-1

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-27

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.399E 02	6.336E 01	9.960E 02	3.960E 02	5.670E 00	1.704E-02	3.327E 02	2.309E 02
2	7.399E 02	6.336E 01	3.320E 02	2.835E 02	1.425E 00	6.471E-03	2.202E 02	2.309E 02

LOCAL TEST PARAMETERS

TEST D 95-27

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.359E 02	6.583E 01	1.335E 03	6.204E 02	7.678E 00	1.385E-02	5.545E 02	2.419E 02
2	7.359E 02	6.583E 01	4.470E 02	3.847E 02	2.039E 00	6.394E-03	3.189E 02	2.419E 02

LOCAL TEST PARAMETERS

TEST D 95-27

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.351E 02	6.541E 01	1.327E 03	5.823E 02	7.935E 00	1.535E-02	5.169E 02	2.395E 02
2	7.351E 02	6.541E 01	4.520E 02	3.884E 02	2.088E 00	6.466E-03	3.230E 02	2.395E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-28

AF = 0.126E-03 D = 0.127E-01 L = 0.500E 01 DIL R = 0.490 -

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QF	PL BAL	
1	7.225E 02	6.805E 02	5.480E 01	8.590E 01	1.063E-01	1.117E 00	-7.47E 01	
2	7.175E 02	6.685E 02	5.360E 01	8.990E 01	1.078E-01	1.080E 01	-6.519E 01	
3	7.145E 02	6.655E 02	5.300E 01	8.960E 01	1.093E-01	1.102E 01	-6.382E 01	
4	6.945E 02	6.605E 02	5.000E 01	9.540E 01	9.543E-02	1.330E 01	-4.530E 01	
5	6.945E 02	6.555E 02	4.950E 01	9.920E 01	9.497E-02	1.439E 01	-4.617E 01	
6	6.945E 02	6.555E 02	4.940E 01	9.900E 01	9.494E-02	1.495E 01	-4.622E 01	
7	6.945E 02	6.555E 02	4.940E 01	1.012E 02	9.362E-02	1.552E 01	-3.917E 01	
8	6.945E 02	6.535E 02	4.940E 01	9.650E 01	9.811E-02	1.462E 01	-4.112E 01	
9	6.905E 02	6.455E 02	4.900E 01	9.300E 01	1.032E-01	1.387E 01	-4.642E 01	

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-28

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.057E 02	6.394E 01	1.077E 03	5.433E 02	5.307E 00	1.107E-02	4.793E 02	2.320E 02
2	7.057E 02	6.394E 01	3.230E 02	2.747E 02	1.402E 00	6.650E-03	2.108E 02	2.320E 02

LOCAL TEST PARAMETERS

TEST D 95-28

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.979E 02	6.493E 01	1.360E 03	7.358E 02	6.877E 00	1.025E-02	6.709E 02	2.398E 02
2	6.979E 02	6.493E 01	4.690E 02	4.140E 02	1.829E 00	5.238E-03	3.491E 02	2.398E 02

LOCAL TEST PARAMETERS

TEST D 95-28

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.949E 02	6.464E 01	1.392E 03	7.850E 02	6.791E 00	9.427E-03	7.204E 02	2.422E 02
2	6.949E 02	6.464E 01	4.810E 02	4.268E 02	1.814E 00	5.008E-03	3.622E 02	2.422E 02

LOCAL TEST PARAMETERS

TEST D 95-28

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
-----	----	----	----	----	-----	---	--------	----

1	6.809E 02	6.602E 01	1.752E 03	1.078E 03	8.502E 00	8.399E-03	1.012E 03	2.173E 02
2	6.809E 02	6.602E 01	6.830E 02	6.227E 02	2.227E 00	4.000E-03	5.567E 02	2.173E 02

LOCAL TEST PARAMETERS

TEST D 95-28

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.789E 02	6.677E 01	1.932E 03	1.237E 03	9.301E 00	7.951E-03	1.170E 03	2.195E 02
2	6.789E 02	6.677E 01	7.650E 02	7.017E 02	2.434E 00	3.833E-03	6.349E 02	2.195E 02

LOCAL TEST PARAMETERS

TEST D 95-28

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.789E 02	6.729E 01	1.956E 03	1.253E 03	9.463E 00	7.978E-03	1.186E 03	2.215E 02
2	6.789E 02	6.729E 01	7.780E 02	7.141E 02	2.473E 00	3.823E-03	6.468E 02	2.215E 02

LOCAL TEST PARAMETERS

TEST D 95-28

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.789E 02	6.799E 01	2.018E 03	1.290E 03	9.977E 00	8.167E-03	1.222E 03	2.217E 02
2	6.789E 02	6.799E 01	8.230E 02	7.577E 02	2.582E 00	3.744E-03	6.897E 02	2.217E 02

LOCAL TEST PARAMETERS

TEST D 95-28

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	6.781E 02	6.651E 01	1.802E 03	1.020E 03	9.871E 00	1.035E-02	9.540E 02	2.257E 02	
2	6.781E 02	6.651E 01	7.490E 02	6.831E 02	2.512E 00	4.074E-03	6.166E 02	2.257E 02	

LOCAL TEST PARAMETERS

TEST D 95-28

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	6.725E 02	6.486E 01	1.661E 03	1.015E 03	7.933E 00	8.353E-03	9.498E 02	2.312E 02	
2	6.725E 02	6.486E 01	6.870E 02	6.323E 02	2.027E 00	3.571E-03	5.674E 02	2.312E 02	

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-29

AF = 0.126E-03 D = 0.127E-01 L = 0.504E 01 DEL R = 0.490E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	6.195E 02	5.879E 02	6.080E 01	7.050E 01	9.799E-02	3.262E 00	-3.679E 01	7.777E 02
2	6.295E 02	5.909E 02	4.960E 01	5.610E 01	1.184E-01	3.617E 00	3.590E 01	9.395E 02
3	6.295E 02	5.904E 02	4.890E 01	6.020E 01	1.174E-01	4.495E 00	4.475E 00	9.318E 02
4	8.045E 02	7.615E 02	5.010E 01	6.730E 01	1.194E-01	6.078E 00	-1.452E 01	9.479E 02
5	8.145E 02	7.745E 02	5.040E 01	7.270E 01	1.082E-01	7.693E 00	1.273E 01	8.589E 02
6	7.945E 02	7.480E 02	5.010E 01	7.230E 01	1.180E-01	8.030E 00	-1.829E 01	9.368E 02
7	6.725E 02	5.934E 02	5.220E 01	6.730E 01	1.633E-01	7.864E 00	-2.052E 01	1.296E 03
8	7.295E 02	6.909E 02	4.860E 01	6.540E 01	1.153E-01	4.976E 00	-3.053E 01	9.150E 02
9	5.695E 02	4.924E 02	5.290E 01	6.380E 01	1.691E-01	5.390E 00	-3.527E 01	1.342E 03
10	5.695E 02	4.948E 02	5.530E 01	6.540E 01	1.628E-01	5.563E 00	-2.715E 01	1.292E 03

TEST SECTION

TEMPTURE VALUE 0.135770E 02 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

1 6.067E 02 TEMPTURE VALUE 0.135770E 02 SMALLER THAN TABLE FOR RESISTIVITY
6.408E 01 1.750E 02 5.433E 02 5.307E 00 3.571E-03 5.674E 02 2.312E 02

LOCAL TEST PARAMETERS

TEST D 95-29

DATA POINT 2

STA PB TB TW TI Q/A H DEL TF VS
1 6.317E 02 5.397E 01 4.290E 02 7.392E 01 1.912E 00 9.584E-02 1.995E 01 2.303E 02

LOCAL TEST PARAMETERS

TEST D 95-29

DATA POINT 3

STA PB TB TW TI Q/A H DEL TF VS
1 6.137E 02 5.421E 01 5.010E 02 1.151E 02 2.521E 00 4.140E-02 6.089E 01 2.297E 02

LOCAL TEST PARAMETERS

TEST D 95-29

DATA POINT 4

STA PB TB TW TI Q/A H DEL TF VS
1 7.871E 02 5.713E 01 6.110E 02 1.231E 02 3.382E 00 5.124E-02 6.600E 01 2.335E 02

LOCAL TEST PARAMETERS

TEST D 95-29

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.983E 02	5.985E 01	7.446E 02	1.813E 02	4.427E 00	3.646E-02	1.214E 02	2.179E 02

LOCAL TEST PARAMETERS

TEST D 95-29

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.757E 02	5.924E 01	7.565E 02	1.591E 02	4.604E 00	4.610E-02	9.987E 01	2.372E 02

LOCAL TEST PARAMETERS

TEST D 95-29

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.405E 02	5.829E 01	7.313E 02	1.511E 02	4.395E 00	4.737E-02	9.279E 01	3.341E 02

TEMPURE VALUE -0.519508E 02 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

TEMPURE VALUE -0.519508E 02 SMALLER THAN TABLE FOR RESISTIVITY

1	7.139E 02	5.477E 01	4.100E 02	1.020E 03	9.871E 00	4.737E-02	9.279E 01	3.341E 02
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LOCAL TEST PARAMETERS

TEST D 95-29

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	5.383E 02	5.681E 01	5.670E 02	1.870E 02	2.843E 00	2.184E-02	1.302E 02	3.477E 02

LOCAL TEST PARAMETERS

TEST D 95-29

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	5.393E 02	5.913E 01	5.825E 02	1.869E 02	2.975E 00	2.328E-02	1.278E 02	3.469E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-30

AF = 0.126E-03 D = 0.127E-01 L = 0.504E 01 DEL R = 0.490E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	6.725E 02	6.299E 02	5.390E 01	7.280E 01	1.132E-01	8.461E 00	-5.652E 00	8.986E 02
2	6.575E 02	5.749E 02	5.170E 01	6.530E 01	1.724E-01	4.966E 00	-7.623E 01	1.368E 03

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-30

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.553E 02	6.249E 01	7.570E 02	1.847E 02	4.536E 00	3.712E-02	1.222E 02	2.456E 02
2	6.553E 02	6.249E 01	2.390E 02	1.936E 02	1.125E 00	8.579E-03	1.311E 02	2.456E 02

LOCAL TEST PARAMETERS

TEST D 95-30

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.241E 02	5.561E 01	6.770E 02	4.628E 02	1.866E 00	4.583E-03	4.072E 02	3.421E 02
2	6.241E 02	5.561E 01	1.960E 02	1.760E 02	4.563E-01	3.791E-03	1.204E 02	3.421E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-31

AF = 0.126E-03

D = 0.127E-01

L = 0.504E 01

DEL R = 0.490E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	6.535E 02	5.385E 02	5.460E 01	7.370E 01	1.103E-01	7.804E 00	-2.800E 01	8.754E 02
2	6.535E 02	4.985E 02	5.150E 01	6.560E 01	1.768E-01	7.052E 00	-3.836E 01	1.403E 03
3	6.535E 02	4.985E 02	5.240E 01	6.680E 01	1.698E-01	7.739E 00	-2.978E 01	1.348E 03
4	7.595E 02	6.305E 02	5.320E 01	7.440E 01	1.171E-01	8.006E 00	-2.845E 01	9.296E 02
5	7.205E 02	5.605E 02	4.820E 01	7.700E 01	1.179E-01	9.173E 00	-6.155E 01	9.353E 02
6	7.105E 02	5.445E 02	4.770E 01	7.130E 01	1.233E-01	9.015E 00	-2.903E 01	9.788E 02
7	7.195E 02	5.585E 02	4.800E 01	7.580E 01	1.125E-01	1.037E 01	-2.915E 01	8.925E 02
8	6.325E 02	4.565E 02	4.820E 01	6.770E 01	1.547E-01	9.568E 00	-3.010E 01	1.228E 03
9	6.385E 02	4.495E 02	5.020E 01	6.910E 01	1.523E-01	9.863E 00	-3.190E 01	1.209E 03
10	6.945E 02	5.325E 02	4.840E 01	7.640E 01	1.149E-01	1.110E 01	-3.069E 01	9.120E 02
11	6.925E 02	5.325E 02	4.830E 01	7.800E 01	1.122E-01	1.178E 01	-3.006E 01	8.903E 02
12	6.175E 02	4.235E 02	4.770E 01	6.880E 01	1.558E-01	1.104E 01	-3.483E 01	1.236E 03
13	6.175E 02	4.265E 02	4.770E 01	6.950E 01	1.527E-01	1.127E 01	-3.645E 01	1.212E 03
14	6.175E 02	4.265E 02	4.840E 01	7.110E 01	1.480E-01	1.173E 01	-4.159E 01	1.175E 03

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.070E 02	6.265E 01	7.220E 02	3.103E 02	3.502E 00	1.414E-02	2.476E 02	2.432E 02
2	6.070E 02	6.265E 01	2.310E 02	1.969E 02	8.396E-01	6.254E-03	1.343E 02	2.432E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	5.908E 02	5.681E 01	6.700E 02	2.915E 02	3.138E 00	1.337E-02	2.347E 02	3.585E 02
2	5.908E 02	5.681E 01	1.960E 02	1.620E 02	7.558E-01	7.182E-03	1.052E 02	3.585E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	5.908E 02	5.826E 01	6.520E 02	1.995E 02	3.536E 00	2.504E-02	1.412E 02	3.512E 02
2	5.908E 02	5.826E 01	2.120E 02	1.761E 02	8.385E-01	7.117E-03	1.178E 02	3.512E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
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1	7.073E 02	6.172E 01	7.700E 02	3.385E 02	3.754E 00	1.356E-02	2.768E 02	2.474E 02
2	7.073E 02	6.172E 01	2.500E 02	2.147E 02	9.092E-01	5.944E-03	1.530E 02	2.474E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.557E 02	5.882E 01	8.470E 02	2.574E 02	5.080E 00	2.558E-02	1.986E 02	2.422E 02
2	6.557E 02	5.882E 01	2.960E 02	2.518E 02	1.234E 00	6.396E-03	1.930E 02	2.422E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.433E 02	5.786E 01	8.530E 02	3.747E 02	4.311E 00	1.361E-02	3.168E 02	2.506E 02
2	6.433E 02	5.786E 01	2.830E 02	2.444E 02	1.058E 00	5.672E-03	1.866E 02	2.506E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.543E 02	6.027E 01	9.200E 02	3.685E 02	5.060E 00	1.642E-02	3.082E 02	2.362E 02
2	6.543E 02	6.027E 01	3.560E 02	3.161E 02	1.212E 00	4.736E-03	2.559E 02	2.362E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	5.613E 02	5.664E 01	8.880E 02	3.984E 02	4.491E 00	1.314E-02	3.418E 02	3.154E 02
2	5.613E 02	5.664E 01	2.730E 02	2.310E 02	1.127E 00	6.463E-03	1.744E 02	3.154E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	5.620E 02	5.856E 01	1.140E 03	7.646E 02	3.943E 00	5.585E-03	7.060E 02	3.193E 02
2	5.620E 02	5.856E 01	2.860E 02	2.454E 02	1.116E 00	5.973E-03	1.869E 02	3.193E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.289E 02	6.090E 01	1.039E 03	4.889E 02	5.370E 00	1.255E-02	4.280E 02	2.451E 02
2	6.289E 02	6.090E 01	3.840E 02	3.415E 02	1.329E 00	4.738E-03	2.806E 02	2.451E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 11

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.277E 02	6.166E 01	1.147E 03	6.060E 02	5.540E 00	1.018E-02	5.443E 02	2.421E 02
2	6.277E 02	6.166E 01	4.370E 02	3.944E 02	1.393E 00	4.186E-03	3.327E 02	2.421E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 12

STA	Pd	TB	TW	TI	Q/A	H	DEL TF	VS
1	5.390E 02	5.723E 01	9.440E 02	4.625E 02	4.556E 00	1.124E-02	4.053E 02	3.222E 02
2	5.390E 02	5.723E 01	3.150E 02	2.756E 02	1.139E 00	5.215E-03	2.183E 02	3.222E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 13

STA	PP	TB	TW	TI	Q/A	H	DEL TF	VS
1	5.402E 02	5.754E 01	9.750E 02	4.497E 02	5.005E 00	1.276E-02	3.921E 02	3.170E 02
2	5.402E 02	5.754E 01	3.310E 02	2.886E 02	1.250E 00	5.408E-03	2.310E 02	3.170E 02

LOCAL TEST PARAMETERS

TEST D 95-31

DATA POINT 14

STA	Pd	TB	TW	TI	Q/A	H	DEL TF	VS
1	5.402E 02	5.863E 01	1.033E 03	4.467E 02	5.672E 00	1.461E-02	3.881E 02	3.128E 02
2	5.402E 02	5.863E 01	3.600E 02	3.134E 02	1.418E 00	5.578E-03	2.548E 02	3.128E 02

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LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-32

AF = 0.126E-03

D = 0.127E-01

L = 0.503E 01

DEL R = 0.490E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	6.922E 02	6.775E 02	4.840E 01	6.710E 01	1.186E-01	5.894E 00	-3.165E 01	9.415E 02
2	7.012E 02	6.645E 02	4.860E 01	7.610E 01	1.065E-01	9.401E 00	-2.323E 01	8.456E 02
3	6.862E 02	6.725E 02	4.480E 01	6.520E 01	1.175E-01	5.825E 00	-3.435E 01	9.325E 02
4	6.912E 02	6.575E 02	4.450E 01	6.620E 01	1.148E-01	8.395E 00	1.974E 00	9.114E 02
5	6.892E 02	6.565E 02	4.460E 01	7.340E 01	1.148E-01	9.783E 00	-2.458E 01	9.110E 02
6	6.892E 02	6.535E 02	4.570E 01	7.940E 01	1.154E-01	1.081E 01	-4.459E 01	9.161E 02
7	7.243E 02	6.875E 02	4.430E 01	7.070E 01	1.151E-01	8.391E 00	-2.538E 01	9.136E 02
8	7.243E 02	6.845E 02	4.360E 01	7.350E 01	1.148E-01	9.906E 00	-2.357E 01	9.114E 02
9	7.212E 02	6.825E 02	4.330E 01	7.840E 01	1.164E-01	1.045E 01	-4.746E 01	9.236E 02
10	7.223E 02	6.815E 02	4.380E 01	7.650E 01	1.156E-01	1.158E 01	-2.118E 01	9.175E 02
11	7.212E 02	6.745E 02	4.430E 01	7.820E 01	1.151E-01	1.238E 01	-2.060E 01	9.136E 02
12	7.664E 02	7.325E 02	4.530E 01	6.210E 01	1.620E-01	5.841E 00	-4.177E 01	1.286E 03
13	7.664E 02	7.305E 02	4.510E 01	6.650E 01	1.572E-01	7.744E 00	4.083E 01	1.248E 03
14	7.684E 02	7.235E 02	4.520E 01	6.920E 01	1.582E-01	9.805E 00	-3.069E 01	1.256E 03
15	7.413E 02	6.835E 02	4.420E 01	6.880E 01	1.602E-01	1.055E 01	-2.619E 01	1.271E 03
16	7.844E 02	6.255E 02	4.380E 01	6.570E 01	1.893E-01	1.051E 01	-2.590E 01	1.502E 03
17	7.613E 02	6.900E 02	4.430E 01	7.500E 01	1.449E-01	1.306E 01	-2.380E 01	1.150E 03
18	6.962E 02	6.155E 02	4.890E 01	7.030E 01	1.840E-01	1.277E 01	-1.824E 01	1.461E 03
19	7.583E 02	7.075E 02	4.450E 01	7.140E 01	1.444E-01	1.091E 01	-2.313E 01	1.146E 03
20	7.543E 02	7.025E 02	4.370E 01	7.200E 01	1.472E-01	1.158E 01	-2.469E 01	1.168E 03
21	6.962E 02	6.235E 02	4.360E 01	6.650E 01	1.868E-01	1.205E 01	-1.869E 01	1.482E 03
22	6.982E 02	6.235E 02	4.430E 01	6.770E 01	1.856E-01	1.193E 01	-2.531E 01	1.473E 03
23	6.711E 02	5.925E 02	4.700E 01	6.740E 01	1.959E-01	1.207E 01	-1.995E 01	1.555E 03
24	7.413E 02	6.825E 02	5.470E 01	7.230E 01	1.494E-01	1.206E 01	1.257E 01	1.186E 03
25	7.583E 02	7.065E 02	4.730E 01	6.520E 01	1.398E-01	1.224E 01	3.335E 01	1.110E 03
26	7.583E 02	6.985E 02	4.420E 01	7.200E 01	1.553E-01	1.210E 01	-2.455E 01	1.233E 03
27	7.042E 02	6.245E 02	4.380E 01	6.800E 01	1.913E-01	1.263E 01	-2.594E 01	1.518E 03
28	6.962E 02	6.195E 02	4.480E 01	6.700E 01	1.935E-01	1.179E 01	-2.505E 01	1.536E 03

29	7.563E 02	6.895E 02	4.530E 01	7.400E 01	1.567E-01	1.210E 01	-3.557E 01	1.244E 03
30	7.884E 02	7.345E 02	4.620E 01	7.920E 01	1.325E-01	1.370E 01	-2.033E 01	1.052E 03

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.863E 02	5.527E 01	9.220E 02	6.029E 02	3.072E 00	5.609E-03	5.477E 02	2.319E 02
2	6.833E 02	5.824E 01	9.040E 02	5.787E 02	3.102E 00	5.960E-03	5.205E 02	2.402E 02
3	6.804E 02	6.098E 01	8.820E 02	5.488E 02	3.140E 00	6.436E-03	4.878E 02	2.499E 02
4	6.863E 02	5.527E 01	1.950E 02	1.565E 02	8.476E-01	8.374E-03	1.012E 02	2.319E 02
5	6.833E 02	5.824E 01	2.100E 02	1.739E 02	8.376E-01	7.243E-03	1.156E 02	2.402E 02
6	6.804E 02	6.098E 01	1.950E 02	1.565E 02	8.476E-01	8.875E-03	9.551E 01	2.499E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.864E 02	6.008E 01	1.290E 03	7.987E 02	5.383E 00	7.288E-03	7.386E 02	2.214E 02
2	6.791E 02	6.454E 01	1.344E 03	8.747E 02	5.270E 00	6.505E-03	8.101E 02	2.369E 02
3	6.718E 02	6.844E 01	1.248E 03	7.380E 02	5.477E 00	8.181E-03	6.695E 02	2.550E 02
4	6.864E 02	6.008E 01	2.880E 02	2.291E 02	1.600E 00	9.467E-03	1.690E 02	2.214E 02
5	6.791E 02	6.454E 01	3.530E 02	3.023E 02	1.527E 00	6.422E-03	2.378E 02	2.369E 02
6	6.718E 02	6.844E 01	3.050E 02	2.487E 02	1.580E 00	8.767E-03	1.803E 02	2.550E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.807E 02	5.222E 01	6.880E 02	2.871E 02	3.335E 00	1.420E-02	2.349E 02	2.227E 02
2	6.779E 02	5.542E 01	6.560E 02	2.339E 02	3.374E 00	1.890E-02	1.785E 02	2.304E 02
3	6.752E 02	5.832E 01	6.760E 02	2.677E 02	3.358E 00	1.603E-02	2.094E 02	2.386E 02

4	6.807E 02	5.222E 01	1.970E 02	1.606E 02	8.099E-01	7.474E-03	1.084E 02	2.227E 02
5	6.779E 02	5.542E 01	2.100E 02	1.755E 02	8.014E-01	6.672E-03	1.201E 02	2.304E 02
6	6.752E 02	5.832E 01	1.920E 02	1.548E 02	8.129E-01	8.429E-03	9.644E 01	2.386E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.776E 02	5.512E 01	1.014E 03	5.313E 02	4.708E 00	9.886E-03	4.762E 02	2.245E 02
2	6.709E 02	5.942E 01	1.088E 03	6.414E 02	4.532E 00	7.787E-03	5.819E 02	2.372E 02
3	6.642E 02	6.317E 01	1.060E 03	6.003E 02	4.596E 00	8.556E-03	5.372E 02	2.510E 02

TEMPURE VALUE -0.172852E 03 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

4	6.776E 02	5.512E 01	2.510E 02	0.	0.	8.556E-03	5.372E 02	2.510E 02
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TEMPURE VALUE -0.109343E 02 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

5	6.709E 02	5.942E 01	3.000E 02	0.	0.	8.556E-03	5.372E 02	2.510E 02
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TEMPURE VALUE -0.105124E 03 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

TEMPTURE VALUE -0.105124E 03 SMALLER THAN TABLE FOR RESISTIVITY

6 6.642E 02 6.317E 01 2.670E 02 0. 0. 8.556E-03 5.372E 02 2.510E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.760E 02	5.663E 01	1.272E 03	7.306E 02	5.840E 00	8.664E-03	6.740E 02	2.283E 02
2	6.695E 02	6.140E 01	1.348E 03	8.414E 02	5.664E 00	7.261E-03	7.800E 02	2.440E 02
3	6.630E 02	6.554E 01	1.255E 03	7.051E 02	5.882E 00	9.197E-03	6.396E 02	2.610E 02
4	6.760E 02	5.663E 01	3.050E 02	2.444E 02	1.696E 00	9.037E-03	1.877E 02	2.283E 02
5	6.695E 02	6.140E 01	3.790E 02	3.271E 02	1.609E 00	6.057E-03	2.657E 02	2.440E 02
6	6.630E 02	6.554E 01	3.230E 02	2.649E 02	1.675E 00	8.402E-03	1.994E 02	2.610E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.748E 02	5.843E 01	1.350E 03	7.597E 02	6.515E 00	9.290E-03	7.012E 02	2.348E 02
2	6.677E 02	6.336E 01	1.445E 03	8.998E 02	6.286E 00	7.515E-03	8.364E 02	2.528E 02
3	6.606E 02	6.765E 01	1.464E 03	9.269E 02	6.244E 00	7.268E-03	8.592E 02	2.733E 02
4	6.748E 02	5.843E 01	3.520E 02	2.892E 02	1.876E 00	8.130E-03	2.308E 02	2.348E 02
5	6.677E 02	6.336E 01	4.330E 02	3.784E 02	1.773E 00	5.629E-03	3.150E 02	2.528E 02
6	6.606E 02	6.765E 01	3.620E 02	3.004E 02	1.864E 00	8.006E-03	2.328E 02	2.733E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
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1	7.094E 02	5.500E 01	1.066E 03	5.780E 02	4.868E 00	9.307E-03	5.230E 02	2.234E 02
2	7.021E 02	5.938E 01	1.044E 03	5.445E 02	4.924E 00	1.015E-02	4.851E 02	2.359E 02
3	6.948E 02	6.321E 01	1.083E 03	6.036E 02	4.825E 00	8.929E-03	5.404E 02	2.494E 02
4	7.094E 02	5.500E 01	2.500E 02	1.962E 02	1.355E 00	9.597E-03	1.412E 02	2.234E 02
5	7.021E 02	5.938E 01	2.910E 02	2.434E 02	1.315E 00	7.146E-03	1.840E 02	2.359E 02
6	6.948E 02	6.321E 01	2.620E 02	2.103E 02	1.343E 00	9.135E-03	1.471E 02	2.494E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.082E 02	5.618E 01	1.234E 03	6.667E 02	5.999E 00	9.825E-03	6.105E 02	2.257E 02
2	7.003E 02	6.110E 01	1.319E 03	7.938E 02	5.788E 00	7.900E-03	7.327E 02	2.411E 02
3	6.924E 02	6.540E 01	1.241E 03	6.775E 02	5.980E 00	9.771E-03	6.121E 02	2.578E 02
4	7.082E 02	5.618E 01	2.940E 02	2.309E 02	1.727E 00	9.885E-03	1.747E 02	2.257E 02
5	7.003E 02	6.110E 01	3.630E 02	3.090E 02	1.644E 00	6.631E-03	2.479E 02	2.411E 02
6	6.924E 02	6.540E 01	3.100E 02	2.495E 02	1.708E 00	9.277E-03	1.841E 02	2.578E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.056E 02	5.642E 01	1.280E 03	6.915E 02	6.318E 00	9.948E-03	6.351E 02	2.295E 02
2	6.979E 02	6.150E 01	1.310E 03	7.374E 02	6.239E 00	9.231E-03	6.759E 02	2.458E 02
3	6.902E 02	6.588E 01	1.386E 03	8.497E 02	6.055E 00	7.724E-03	7.838E 02	2.635E 02
4	7.056E 02	5.642E 01	3.170E 02	2.531E 02	1.819E 00	9.251E-03	1.967E 02	2.295E 02
5	6.979E 02	6.150E 01	3.870E 02	3.315E 02	1.730E 00	6.407E-03	2.700E 02	2.458E 02
6	6.902E 02	6.588E 01	3.270E 02	2.646E 02	1.806E 00	9.089E-03	1.987E 02	2.635E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.058E 02	5.802E 01	1.529E 03	9.624E 02	6.715E 00	7.426E-03	9.044E 02	2.322E 02
2	6.977E 02	6.341E 01	1.555E 03	9.993E 02	6.660E 00	7.116E-03	9.359E 02	2.510E 02
3	6.896E 02	6.810E 01	1.422E 03	8.051E 02	6.971E 00	9.458E-03	7.370E 02	2.725E 02
4	7.058E 02	5.802E 01	3.710E 02	3.045E 02	2.029E 00	8.230E-03	2.465E 02	2.322E 02
5	6.977E 02	6.341E 01	4.550E 02	3.969E 02	1.913E 00	5.735E-03	3.335E 02	2.510E 02
6	6.896E 02	6.810E 01	3.810E 02	3.157E 02	2.014E 00	8.134E-03	2.476E 02	2.725E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA PCINT 11

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.023E 02	5.922E 01	1.661E 03	1.098E 03	6.996E 00	6.734E-03	1.039E 03	2.354E 02
2	6.931E 02	6.477E 01	1.628E 03	1.052E 03	7.064E 00	7.155E-03	9.872E 02	2.557E 02
3	6.838E 02	6.953E 01	1.474E 03	8.263E 02	7.427E 00	9.815E-03	7.567E 02	2.800E 02
4	7.023E 02	5.922E 01	4.080E 02	3.405E 02	2.138E 00	7.603E-03	2.812E 02	2.354E 02
5	6.931E 02	6.477E 01	4.600E 02	3.975E 02	2.062E 00	6.197E-03	3.328E 02	2.557E 02
6	6.838E 02	6.953E 01	4.000E 02	3.315E 02	2.150E 00	8.207E-03	2.620E 02	2.800E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 12

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.527E 02	5.092E 01	6.300E 02	1.952E 02	3.358E 00	2.327E-02	1.443E 02	3.001E 02
2	7.460E 02	5.342E 01	6.250E 02	1.856E 02	3.347E 00	2.533E-02	1.322E 02	3.075E 02
3	7.392E 02	5.577E 01	6.040E 02	1.417E 02	3.317E 00	3.862E-02	8.589E 01	3.152E 02
4	7.527E 02	5.092E 01	1.820E 02	1.436E 02	8.073E-01	8.713E-03	9.265E 01	3.001E 02
5	7.460E 02	5.342E 01	1.970E 02	1.612E 02	7.979E-01	7.406E-03	1.077E 02	3.075E 02
6	7.392E 02	5.577E 01	1.810E 02	1.424E 02	8.079E-01	9.328E-03	8.661E 01	3.152E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 13

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.519E 02	5.260E 01	7.780E 02	2.508E 02	4.440E 00	2.240E-02	1.982E 02		2.958E 02
2	7.448E 02	5.580E 01	7.740E 02	2.434E 02	4.434E 00	2.364E-02	1.876E 02		3.057E 02
3	7.376E 02	5.877E 01	7.540E 02	2.045E 02	4.445E 00	3.050E-02	1.458E 02		3.169E 02
4	7.519E 02	5.260E 01	2.110E 02	1.622E 02	1.113E 00	1.016E-02	1.096E 02		2.958E 02
5	7.448E 02	5.580E 01	2.330E 02	1.882E 02	1.094E 00	8.259E-03	1.324E 02		3.057E 02
6	7.376E 02	5.877E 01	2.130E 02	1.646E 02	1.111E 00	1.050E-02	1.058E 02		3.169E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 14

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.503E 02	5.442E 01	9.480E 02	3.198E 02	5.721E 00	2.156E-02	2.654E 02		3.030E 02
2	7.413E 02	5.825E 01	9.600E 02	3.414E 02	5.694E 00	2.011E-02	2.831E 02		3.164E 02
3	7.324E 02	6.168E 01	9.390E 02	3.032E 02	5.749E 00	2.380E-02	2.416E 02		3.317E 02
4	7.503E 02	5.442E 01	2.490E 02	1.890E 02	1.498E 00	1.113E-02	1.346E 02		3.030E 02
5	7.413E 02	5.825E 01	2.820E 02	2.278E 02	1.462E 00	8.620E-03	1.696E 02		3.164E 02
6	7.324E 02	6.168E 01	2.560E 02	1.974E 02	1.490E 00	1.098E-02	1.357E 02		3.317E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 15

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.180E 02	5.412E 01	1.031E 03	3.927E 02	6.082E 00	1.796E-02	3.386E 02		3.076E 02
2	7.065E 02	5.818E 01	1.055E 03	4.339E 02	6.014E 00	1.601E-02	3.757E 02		3.225E 02
3	6.950E 02	6.178E 01	1.023E 03	3.787E 02	6.094E 00	1.923E-02	3.170E 02		3.398E 02
4	7.180E 02	5.412E 01	2.600E 02	1.959E 02	1.634E 00	1.152E-02	1.418E 02		3.076E 02
5	7.065E 02	5.818E 01	2.900E 02	2.314E 02	1.598E 00	9.222E-03	1.733E 02		3.225E 02
6	6.950E 02	6.178E 01	2.650E 02	2.020E 02	1.628E 00	1.161E-02	1.402E 02		3.398E 02

LOCAL TEST PARAMETERS

DATA POINT 16

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.203E 02	5.278E 01	9.940E 02	3.264E 02	6.167E 00	2.254E-02	2.736E 02	3.585E 02	
2	6.887E 02	5.638E 01	9.810E 02	3.019E 02	6.208E 00	2.528E-02	2.456E 02	3.743E 02	
3	6.571E 02	5.966E 01	9.920E 02	3.227E 02	6.174E 00	2.347E-02	2.630E 02	3.937E 02	
4	7.203E 02	5.278E 01	2.520E 02	1.862E 02	1.643E 00	1.232E-02	1.334E 02	3.585E 02	
5	6.887E 02	5.638E 01	2.860E 02	2.268E 02	1.603E 00	9.405E-03	1.704E 02	3.743E 02	
6	6.571E 02	5.966E 01	2.620E 02	1.984E 02	1.631E 00	1.176E-02	1.387E 02	3.937E 02	

TEMPTURE VALUE 0.103971E 01 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

TEMPTURE VALUE 0.103971E 01 SMALLER THAN TABLE FOR RESISTIVITY
0. 1.176E-02 1.387E 02 3.937E 02

TEMPTURE VALUE -0.198781E 03 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

TEMPTURE VALUE -0.198781E 03 SMALLER THAN TABLE FOR RESISTIVITY
0. 1.176E-02 1.387E 02 3.937E 02

TEMPTURE VALUE -0.259051E 02 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

TEMPTURE VALUE - 0.259051E 02 SMALLER THAN TABLE FOR RESISTIVITY

3	7.042E 02	6.672E 01	8.640E 02	0.	0.	1.176E-02	1.387E 02	3.437E 02
4	7.325E 02	5.735E 01	3.350E 02	2.654E 02	2.026E 00	9.739E-03	2.080E 02	2.872E 02
5	7.183E 02	6.235E 01	4.100E 02	3.496E 02	1.921E 00	6.689E-03	2.872E 02	3.077E 02
6	7.042E 02	6.672E 01	3.440E 02	2.758E 02	2.013E 00	9.629E-03	2.090E 02	3.311E 02

TEMPTURE VALUE - 0.150602E 03 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

TEMPTURE VALUE - 0.150602E 03 SMALLER THAN TABLE FOR RESISTIVITY

1	6.636E 02	5.804E 01	7.860E 02	0.	0.	9.629E-03	2.090E 02	3.311E 02
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TEMPTURE VALUE - 0.807864E 01 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

TEMPTURE VALUE - 0.807864E 01 SMALLER THAN TABLE FOR RESISTIVITY

2	6.476E 02	6.179E 01	7.810E 02	0.	0.	9.629E-03	2.090E 02	3.311E 02
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TEMPTURE VALUE - 0.131187E 03 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

TEMPTURE VALUE - 0.131187E 03 SMALLER THAN TABLE FOR RESISTIVITY

3	6.315E 02	6.499E 01	7.980E 02	0.	0.	9.629E-03	2.090E 02	3.311E 02
4	6.636E 02	5.804E 01	3.940E 02	3.353E 02	1.839E 00	6.632E-03	2.773E 02	3.732E 02
5	6.476E 02	6.179E 01	3.540E 02	2.909E 02	1.891E 00	8.255E-03	2.291E 02	3.957E 02
6	6.315E 02	6.499E 01	3.140E 02	2.450E 02	1.946E 00	1.081E-02	1.800E 02	4.192E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 19

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.378E 02	5.559E 01	1.120E 03	4.671E 02	6.497E 00	1.579E-02	4.115E 02	2.804E 02
2	7.277E 02	6.012E 01	1.213E 03	6.206E 02	6.184E 00	1.103E-02	5.604E 02	2.970E 02
3	7.176E 02	6.403E 01	1.186E 03	5.772E 02	6.265E 00	1.221E-02	5.132E 02	3.142E 02
4	7.378E 02	5.559E 01	2.670E 02	1.972E 02	1.797E 00	1.269E-02	1.416E 02	2.804E 02
5	7.277E 02	6.012E 01	3.170E 02	2.562E 02	1.733E 00	8.837E-03	1.961E 02	2.970E 02
6	7.176E 02	6.403E 01	2.860E 02	2.201E 02	1.772E 00	1.135E-02	1.561E 02	3.142E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 20

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.334E 02	5.542E 01	1.195E 03	5.181E 02	6.910E 00	1.493E-02	4.627E 02	2.857E 02
2	7.231E 02	6.011E 01	1.274E 03	6.483E 02	6.659E 00	1.132E-02	5.881E 02	3.032E 02
3	7.128E 02	6.417E 01	1.220E 03	5.603E 02	6.826E 00	1.376E-02	4.962E 02	3.217E 02
4	7.334E 02	5.542E 01	2.850E 02	2.118E 02	1.952E 00	1.249E-02	1.563E 02	2.857E 02
5	7.231E 02	6.011E 01	3.350E 02	2.706E 02	1.882E 00	8.944E-03	2.104E 02	3.032E 02
6	7.128E 02	6.417E 01	2.970E 02	2.262E 02	1.935E 00	1.194E-02	1.621E 02	3.217E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 21

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.669E 02	5.337E 01	1.029E 03	3.388E 02	6.466E 00	2.265E-02	2.854E 02	3.589E 02
2	6.524E 02	5.727E 01	1.055E 03	3.860E 02	6.398E 00	1.946E-02	3.287E 02	3.760E 02
3	6.380E 02	6.079E 01	1.033E 03	3.462E 02	6.462E 00	2.264E-02	2.854E 02	3.968E 02
4	6.669E 02	5.337E 01	2.670E 02	2.001E 02	1.728E 00	1.177E-02	1.468E 02	3.589E 02
5	6.524E 02	5.727E 01	3.000E 02	2.392E 02	1.686E 00	9.265E-03	1.819E 02	3.760E 02
6	6.380E 02	6.079E 01	2.700E 02	2.037E 02	1.724E 00	1.206E-02	1.430E 02	3.968E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 22

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	6.680E 02	5.391E 01	1.092E 03	3.595E 02	7.026E 00	2.299E-02	3.056E 02	3.586E 02	
2	6.532E 02	5.774E 01	1.141E 03	4.480E 02	6.909E 00	1.770E-02	3.902E 02	3.758E 02	
3	6.383E 02	6.117E 01	1.148E 03	4.602E 02	6.887E 00	1.726E-02	3.991E 02	3.966E 02	
4	6.680E 02	5.391E 01	2.800E 02	2.079E 02	1.905E 00	1.237E-02	1.540E 02	3.586E 02	
5	6.532E 02	5.774E 01	3.230E 02	2.587E 02	1.546E 00	9.156E-03	2.010E 02	3.758E 02	
6	6.383E 02	6.117E 01	2.330E 02	2.236E 02	1.386E 00	1.161E-02	1.624E 02	3.966E 02	

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 23

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	6.394E 02	5.559E 01	1.083E 03	3.425E 02	7.048E 00	2.456E-02	2.869E 02	3.076E 02	
2	6.237E 02	5.911E 01	1.122E 03	4.144E 02	6.949E 00	1.956E-02	3.553E 02	4.073E 02	
3	6.081E 02	6.223E 01	1.120E 03	4.108E 02	6.956E 00	1.996E-02	3.486E 02	4.288E 02	
4	6.394E 02	5.559E 01	2.830E 02	2.115E 02	1.900E 00	1.219E-02	1.559E 02	3.876E 02	
5	6.237E 02	5.911E 01	3.240E 02	2.599E 02	1.845E 00	9.189E-03	2.007E 02	4.073E 02	
6	6.081E 02	6.223E 01	2.850E 02	2.140E 02	1.597E 00	1.251E-02	1.517E 02	4.288E 02	

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 24

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.176E 02	6.400E 01	1.216E 03	4.913E 02	7.412E 00	1.735E-02	4.273E 02	3.251E 02	
2	7.059E 02	6.775E 01	1.337E 03	6.930E 02	7.008E 00	1.121E-02	6.253E 02	3.475E 02	
3	6.942E 02	7.118E 01	1.293E 03	6.221E 02	7.140E 00	1.296E-02	5.509E 02	3.744E 02	
4	7.176E 02	6.400E 01	3.040E 02	2.289E 02	2.072E 00	1.256E-02	1.649E 02	3.251E 02	

5	7.059E 02	6.775E 01	3.700E 02	3.052E 02	1.976E 00	8.322E-03	2.375E 02	3.475E 02
6	6.942E 02	7.118E 01	3.230E 02	2.514E 02	2.044E 00	1.134E-02	1.802E 02	3.744E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA PCINT 25

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.374E 02	5.917E 01	1.322E 03	6.332E 02	7.394E 00	1.288E-02	5.741E 02	2.834E 02
2	7.271E 02	6.386E 01	1.428E 03	8.014E 02	7.086E 00	9.607E-03	7.375E 02	3.027E 02
3	7.168E 02	6.800E 01	1.348E 03	6.757E 02	7.313E 00	1.203E-02	6.077E 02	3.250E 02
4	7.374E 02	5.917E 01	3.240E 02	2.492E 02	2.135E 00	1.124E-02	1.900E 02	2.834E 02
5	7.271E 02	6.386E 01	4.000E 02	3.357E 02	2.023E 00	7.442E-03	2.718E 02	3.027E 02
6	7.168E 02	6.800E 01	3.470E 02	2.759E 02	2.100E 00	1.010E-02	2.079E 02	3.250E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 26

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.342E 02	5.568E 01	1.206E 03	4.654E 02	7.537E 00	1.840E-02	4.097E 02	3.022E 02
2	7.223E 02	6.029E 01	1.310E 03	6.426E 02	7.156E 00	1.229E-02	5.823E 02	3.207E 02
3	7.104E 02	6.428E 01	1.259E 03	5.578E 02	7.322E 00	1.484E-02	4.935E 02	3.402E 02
4	7.342E 02	5.568E 01	2.950E 02	2.172E 02	2.104E 00	1.303E-02	1.615E 02	3.022E 02
5	7.223E 02	6.029E 01	3.470E 02	2.785E 02	2.026E 00	9.285E-03	2.183E 02	3.207E 02
6	7.104E 02	6.428E 01	3.090E 02	2.342E 02	2.083E 00	1.226E-02	1.699E 02	3.402E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 27

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.720E 02	5.372E 01	1.269E 03	5.823E 02	7.219E 00	1.366E-02	5.285E 02	3.686E 02
2	6.562E 02	5.771E 01	1.182E 03	4.304E 02	7.520E 00	2.018E-02	3.727E 02	3.869E 02

3	6.403E 02	6.130E 01	1.169E 03	4.065E 02	7.568E 00	2.192E-02	3.452E 02	4.092E 02
4	6.720E 02	5.372E 01	2.930E 02	2.155E 02	2.089E 00	1.291E-02	1.618E 02	3.686E 02
5	6.562E 02	5.771E 01	3.290E 02	2.584E 02	2.035E 00	1.014E-02	2.007E 02	3.869E 02
6	6.403E 02	6.130E 01	3.010E 02	2.253E 02	2.076E 00	1.266E-02	1.640E 02	4.092E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 28

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.652E 02	5.386E 01	1.051E 03	3.082E 02	6.930E 00	2.724E-02	2.544E 02	3.739E 02
2	6.500E 02	5.753E 01	1.081E 03	3.653E 02	6.854E 00	2.227E-02	3.078E 02	3.910E 02
3	6.347E 02	6.082E 01	1.070E 03	3.448E 02	6.886E 00	2.425E-02	2.840E 02	4.116E 02
4	6.652E 02	5.386E 01	2.800E 02	2.101E 02	1.851E 00	1.185E-02	1.562E 02	3.739E 02
5	6.500E 02	5.753E 01	3.110E 02	2.468E 02	1.809E 00	9.556E-03	1.893E 02	3.910E 02
6	6.347E 02	6.082E 01	2.850E 02	2.161E 02	1.844E 00	1.187E-02	1.553E 02	4.116E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 29

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.293E 02	5.647E 01	1.487E 03	8.000E 02	7.867E 00	1.058E-02	7.435E 02	3.078E 02
2	7.161E 02	6.092E 01	1.398E 03	6.558E 02	8.139E 00	1.368E-02	5.949E 02	3.268E 02
3	7.028E 02	6.483E 01	1.390E 03	6.423E 02	8.166E 00	1.414E-02	5.775E 02	3.473E 02
4	7.293E 02	5.647E 01	3.320E 02	2.486E 02	2.393E 00	1.246E-02	1.921E 02	3.078E 02
5	7.161E 02	6.092E 01	4.030E 02	3.306E 02	2.277E 00	8.442E-03	2.697E 02	3.268E 02
6	7.028E 02	6.483E 01	3.490E 02	2.687E 02	2.365E 00	1.160E-02	2.039E 02	3.473E 02

LOCAL TEST PARAMETERS

TEST D 95-32

DATA POINT 30

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
-----	----	----	----	----	-----	---	--------	----

1	7.666E 02	6.034E 01	1.607E 03	9.384E 02	8.022E 00	9.136E-03	8.781E 02	2.707E 02
2	7.559E 02	6.573E 01	1.650E 03	1.002E 03	7.917E 00	8.453E-03	9.366E 02	2.920E 02
3	7.452E 02	7.050E 01	1.498E 03	7.690E 02	8.324E 00	1.192E-02	6.985E 02	3.180E 02
4	7.666E 02	6.034E 01	3.760E 02	2.953E 02	2.457E 00	1.046E-02	2.350E 02	2.707E 02
5	7.559E 02	6.573E 01	4.590E 02	3.886E 02	2.319E 00	7.184E-03	3.228E 02	2.920E 02
6	7.452E 02	7.050E 01	3.850E 02	3.056E 02	2.443E 00	1.039E-02	2.351E 02	3.180E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST 95-33

AF = 0.126E-03

D = 0.127E-01

L = 0.512E 01

DEL R = 0.490E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	C
1	7.365E 02	6.595E 02	6.350E 01	7.190E 01	2.212E-01	7.569E 00	-1.673E 01	1.755E 03
2	7.605E 02	6.685E 02	6.680E 01	7.570E 01	2.121E-01	9.698E 00	-6.895E-02	1.683E 03
3	7.805E 02	6.835E 02	6.710E 01	7.980E 01	2.124E-01	1.204E 01	-1.614E 01	1.685E 03
4	7.695E 02	6.625E 02	6.060E 01	7.780E 01	2.191E-01	1.458E 01	-2.438E 01	1.739E 03
5	9.075E 02	7.675E 02	6.630E 01	9.140E 01	2.052E-01	2.190E 01	-1.350E 01	1.628E 03
6	8.375E 02	6.885E 02	7.620E 01	1.050E 02	1.624E-01	2.289E 01	-7.390E 00	1.289E 03

TEST SECTION

LOCAL TEST PARAMETERS

TEST 95-33

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.046E 02	6.686E 01	8.010E 02	2.579E 02	4.619E 00	2.418E-02	1.910E 02	5.067E 02

LOCAL TEST PARAMETERS

TEST 95-33

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.224E 02	7.094E 01	9.420E 02	2.732E 02	5.950E 00	2.942E-02	2.023E 02	5.203E 02

LOCAL TEST PARAMETERS

TEST 95-33

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.403E 02	7.226E 01	1.103E 03	3.174E 02	7.446E 00	3.038E-02	2.451E 02	5.290E 02

LOCAL TEST PARAMETERS

TEST 95-33

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.252E 02	6.747E 01	1.257E 03	3.472E 02	9.057E 00	3.237E-02	2.798E 02	5.030E 02

LOCAL TEST PARAMETERS

TEST 95-33

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	8.495E 02	7.692E 01	1.680E 03	4.650E 02	1.378E 01	3.550E-02	3.881E 02	5.239E 02

LOCAL TEST PARAMETERS

TEST 95-33

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.758E 02	8.776E 01	1.849E 03	6.458E 02	1.446E 01	2.591E-02	5.580E 02	5.549E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-34

AF = 0.126E-03 D = 0.127E-01 L = 0.492E 01 DEL R = 0.490E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.495E 02	6.445E 02	5.640E 01	6.690E 01	2.227E-01	6.996E 00	-3.113E 01	1.768E 03
2	7.675E 02	6.635E 02	5.200E 01	6.590E 01	2.188E-01	8.975E 00	-2.069E 01	1.736E 03
3	7.755E 02	6.665E 02	5.670E 01	7.120E 01	2.074E-01	1.151E 01	-8.147E 00	1.646E 03
4	7.835E 02	6.635E 02	5.020E 01	7.160E 01	2.069E-01	1.463E 01	-1.559E 01	1.642E 03
5	8.185E 02	6.885E 02	6.980E 01	8.970E 01	1.672E-01	1.703E 01	-3.353E 00	1.327E 03
6	7.815E 02	6.625E 02	4.900E 01	7.460E 01	1.870E-01	1.680E 01	-1.142E 01	1.484E 03
7	7.775E 02	6.575E 02	5.080E 01	7.460E 01	1.899E-01	1.659E 01	-9.482E 00	1.507E 03

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-34

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.085E 02	6.015E 01	7.536E 02	1.841E 02	4.506E 00	3.635E-02	1.239E 02	4.606E 02
2	6.872E 02	6.179E 01	7.650E 02	2.079E 02	4.531E 00	3.101E-02	1.461E 02	4.736E 02
3	6.658E 02	6.335E 01	7.580E 02	1.934E 02	4.528E 00	3.480E-02	1.301E 02	4.880E 02

LOCAL TEST PARAMETERS

TEST D 95-34

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.269E 02	5.731E 01	8.910E 02	1.928E 02	5.802E 00	4.282E-02	1.355E 02	4.340E 02
2	7.058E 02	5.981E 01	9.110E 02	2.363E 02	5.821E 00	3.297E-02	1.765E 02	4.507E 02
3	6.846E 02	6.200E 01	9.153E 02	2.452E 02	5.838E 00	3.187E-02	1.832E 02	4.669E 02

LOCAL TEST PARAMETERS

TEST D 95-34

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.330E 02	6.287E 01	1.105E 03	2.987E 02	7.602E 00	3.224E-02	2.358E 02	4.418E 02
2	7.108E 02	6.568E 01	1.137E 03	3.619E 02	7.524E 00	2.540E-02	2.962E 02	4.644E 02
3	6.887E 02	6.811E 01	1.133E 03	3.542E 02	7.539E 00	2.635E-02	2.861E 02	4.891E 02

LOCAL TEST PARAMETERS

TEST D 95-34

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.367E 02	5.926E 01	1.358E 03	4.159E 02	9.807E 00	2.750E-02	3.566E 02	4.199E 02
2	7.123E 02	6.309E 01	1.458E 03	6.029E 02	9.412E 00	1.743E-02	5.399E 02	4.451E 02
3	6.879E 02	6.653E 01	1.354E 03	4.073E 02	9.826E 00	2.883E-02	3.408E 02	4.744E 02

LOCAL TEST PARAMETERS

TEST D 95-34

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.678E 02	7.839E 01	1.714E 03	7.715E 02	1.125E 01	1.624E-02	6.931E 02	4.653E 02
2	7.413E 02	8.222E 01	1.806E 03	9.290E 02	1.094E 01	1.292E-02	8.467E 02	5.254E 02
3	7.149E 02	8.574E 01	1.718E 03	7.790E 02	1.124E 01	1.621E-02	6.933E 02	5.938E 02

LOCAL TEST PARAMETERS

TEST D 95-34

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.351E 02	6.048E 01	1.656E 03	7.580E 02	1.058E 01	1.517E-02	6.975E 02	3.858E 02
2	7.109E 02	6.517E 01	1.712E 03	8.524E 02	1.039E 01	1.320E-02	7.873E 02	4.154E 02
3	6.867E 02	6.916E 01	1.682E 03	8.020E 02	1.049E 01	1.432E-02	7.329E 02	4.508E 02

LOCAL TEST PARAMETERS

TEST D 95-34

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.307E 02	6.150E 01	1.612E 03	6.514E 02	1.101E 01	1.867E-02	5.899E 02	3.973E 02
2	7.063E 02	6.596E 01	1.761E 03	9.096E 02	1.049E 01	1.243E-02	8.436E 02	4.278E 02
3	6.819E 02	6.971E 01	1.685E 03	7.817E 02	1.074E 01	1.509E-02	7.120E 02	4.639E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-35

AF = 0.126E-03

D = 0.127E-01

L = 0.512E 01

DEL R = 0.245E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.855E 02	7.325E 02	5.570E 01	8.560E 01	9.607E-02	9.954E 00	-2.422E 01	7.625E 02
2	8.765E 02	7.035E 02	4.950E 01	7.820E 01	1.104E-01	1.016E 01	-1.913E 01	8.761E 02
3	8.745E 02	6.945E 02	4.840E 01	8.460E 01	1.109E-01	1.205E 01	-3.470E 01	8.799E 02
4	8.705E 02	6.855E 02	4.790E 01	8.820E 01	1.108E-01	1.575E 01	-1.760E 01	8.792E 02
5	7.725E 02	6.825E 02	4.780E 01	9.590E 01	1.105E-01	1.909E 01	-2.008E 01	8.773E 02
6	7.725E 02	6.785E 02	4.760E 01	1.000E 02	1.109E-01	2.065E 01	-2.184E 01	8.803E 02
7	7.600E 02	6.675E 02	4.980E 01	9.490E 01	1.105E-01	2.013E 01	-9.543E 00	8.768E 02
8	7.590E 02	6.595E 02	4.860E 01	9.620E 01	1.138E-01	2.161E 01	-1.069E 01	9.033E 02
9	7.590E 02	6.555E 02	4.820E 01	1.048E 02	1.106E-01	2.352E 01	-1.711E 01	8.779E 02

PREHEATER

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.804E 02	6.203E 01	7.690E 02	3.915E 02	3.364E 00	1.021E-02	3.295E 02	1.995E 02
2	7.778E 02	6.492E 01	8.230E 02	4.685E 02	3.263E 00	8.085E-03	4.036E 02	2.075E 02
3	7.751E 02	6.765E 01	8.320E 02	4.811E 02	3.246E 00	7.850E-03	4.135E 02	2.163E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	8.250E 02	5.684E 01	7.230E 02	2.702E 02	3.841E 00	1.800E-02	2.134E 02	2.138E 02
2	7.982E 02	6.012E 01	7.740E 02	3.524E 02	3.733E 00	1.277E-02	2.923E 02	2.231E 02
3	7.713E 02	6.302E 01	7.830E 02	3.662E 02	3.712E 00	1.224E-02	3.032E 02	2.328E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	8.238E 02	5.574E 01	7.280E 02	2.998E 02	3.682E 00	1.509E-02	2.441E 02	2.124E 02
2	7.973E 02	5.902E 01	7.710E 02	3.667E 02	3.587E 00	1.166E-02	3.077E 02	2.211E 02
3	7.709E 02	6.199E 01	7.780E 02	3.772E 02	3.572E 00	1.133E-02	3.152E 02	2.307E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	8.213E 02	5.524E 01	7.200E 02	2.868E 02	3.692E 00	1.595E-02	2.315E 02	2.113E 02
2	7.957E 02	5.860E 01	7.540E 02	3.408E 02	3.622E 00	1.283E-02	2.822E 02	2.198E 02
3	7.701E 02	6.157E 01	7.690E 02	3.637E 02	3.592E 00	1.189E-02	3.021E 02	2.294E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.627E 02	5.467E 01	7.140E 02	2.883E 02	3.623E 00	1.551E-02	2.336E 02	2.118E 02
2	7.577E 02	5.780E 01	7.540E 02	3.511E 02	3.544E 00	1.209E-02	2.933E 02	2.190E 02
3	7.526E 02	6.069E 01	7.650E 02	3.677E 02	3.520E 00	1.147E-02	3.070E 02	2.276E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.616E 02	5.447E 01	7.280E 02	3.107E 02	3.599E 00	1.405E-02	2.563E 02	2.121E 02
2	7.559E 02	5.768E 01	7.740E 02	3.811E 02	3.500E 00	1.082E-02	3.234E 02	2.196E 02
3	7.502E 02	6.057E 01	7.760E 02	3.840E 02	3.496E 00	1.081E-02	3.235E 02	2.282E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.500E 02	5.621E 01	7.010E 02	3.079E 02	3.359E 00	1.335E-02	2.517E 02	2.155E 02
2	7.449E 02	5.910E 01	7.270E 02	3.475E 02	3.305E 00	1.146E-02	2.884E 02	2.233E 02
3	7.397E 02	6.183E 01	7.330E 02	3.564E 02	3.294E 00	1.118E-02	2.946E 02	2.316E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.471E 02	5.501E 01	6.980E 02	3.017E 02	3.376E 00	1.369E-02	2.467E 02	2.194E 02	
2	7.409E 02	5.797E 01	7.240E 02	3.416E 02	3.321E 00	1.171E-02	2.836E 02	2.268E 02	
3	7.347E 02	6.071E 01	7.320E 02	3.535E 02	3.307E 00	1.129E-02	2.928E 02	2.355E 02	

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.502E 02	5.484E 01	7.070E 02	3.097E 02	3.403E 00	1.335E-02	2.549E 02	2.127E 02	
2	7.456E 02	5.789E 01	7.310E 02	3.464E 02	3.352E 00	1.162E-02	2.885E 02	2.200E 02	
3	7.411E 02	6.070E 01	7.380E 02	3.569E 02	3.340E 00	1.128E-02	2.962E 02	2.285E 02	

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.559E 02	1.391E 02	6.270E 02	2.513E 02	3.062E 00	2.729E-02	1.122E 02	7.239E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.275E 02	1.370E 02	5.810E 02	2.063E 02	2.925E 00	4.220E-02	6.930E 01	8.515E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.238E 02	1.386E 02	9.220E 02	3.660E 02	5.165E 00	2.271E-02	2.274E 02	8.729E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.201E 02	1.421E 02	1.133E 03	4.994E 02	6.409E 00	1.794E-02	3.573E 02	9.062E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.206E 02	1.448E 02	1.504E 03	7.658E 02	8.522E 00	1.372E-02	6.210E 02	9.255E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.172E 02	1.463E 02	1.639E 03	8.316E 02	9.691E 00	1.414E-02	6.853E 02	9.449E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.068E 02	1.453E 02	1.584E 03	7.881E 02	9.381E 00	1.460E-02	6.427E 02	9.478E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.999E 02	1.457E 02	1.678E 03	8.331E 02	1.023E 01	1.488E-02	6.874E 02	9.891E 02

LOCAL TEST PARAMETERS

TEST D 95-35

DATA POINT 9

STA	PB	TB	Tw	TI	Q/A	H	DEL TF	VS
1	7.030E 02	1.486E 02	1.887E 03	1.000E 03	1.147E 01	1.347E-02	8.517E 02	9.810E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-36

AF = 0.126E-03

D = 0.127E-01

L = 0.512E 01

DEL R = 0.245E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.595E 02	6.855E 02	4.790E 01	7.860E 01	1.155E-01	1.152E 01	-2.094E 01	9.167E 02
2	7.595E 02	6.825E 02	4.730E 01	8.140E 01	1.157E-01	1.285E 01	-2.355E 01	9.185E 02
3	7.595E 02	6.735E 02	4.720E 01	8.370E 01	1.155E-01	1.534E 01	-1.337E 01	9.167E 02
4	7.645E 02	6.725E 02	4.730E 01	8.500E 01	1.115E-01	1.772E 01	1.289E 00	8.851E 02
5	7.775E 02	6.855E 02	4.810E 01	9.290E 01	1.116E-01	2.023E 01	-5.943E 00	8.854E 02
6	7.775E 02	6.825E 02	4.720E 01	9.400E 01	1.125E-01	2.091E 01	-7.681E 00	8.931E 02
7	7.775E 02	6.745E 02	4.660E 01	9.800E 01	1.108E-01	2.284E 01	-7.133E 00	8.791E 02
8	7.775E 02	6.725E 02	4.660E 01	1.059E 02	1.090E-01	2.367E 01	-1.750E 01	8.652E 02
9	7.765E 02	6.605E 02	4.670E 01	1.061E 02	1.118E-01	2.604E 01	-1.058E 01	8.874E 02

PREHEATER

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.439E 02	5.602E 01	9.530E 02	4.402E 02	4.880E 00	1.270E-02	3.841E 02	2.251E 02
2	7.358E 02	5.970E 01	1.005E 03	5.211E 02	4.741E 00	1.027E-02	4.614E 02	2.358E 02
3	7.276E 02	6.298E 01	1.010E 03	5.288E 02	4.728E 00	1.015E-02	4.658E 02	2.469E 02

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.439E 02	5.550E 01	9.680E 02	4.638E 02	4.846E 00	1.187E-02	4.083E 02	2.243E 02
2	7.358E 02	5.917E 01	1.031E 03	5.605E 02	4.676E 00	9.327E-03	5.013E 02	2.346E 02
3	7.276E 02	6.253E 01	1.035E 03	5.665E 02	4.666E 00	9.259E-03	5.039E 02	2.458E 02

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.439E 02	5.634E 01	9.820E 02	4.812E 02	4.846E 00	1.141E-02	4.249E 02	2.259E 02
2	7.358E 02	6.040E 01	1.055E 03	5.922E 02	4.655E 00	8.752E-03	5.318E 02	2.380E 02
3	7.276E 02	6.400E 01	1.057E 03	5.952E 02	4.650E 00	8.754E-03	5.312E 02	2.504E 02

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.489E 02	5.714E 01	1.010E 03	5.000E 02	4.986E 00	1.126E-02	4.429E 02	2.198E 02	
2	7.408E 02	6.136E 01	1.101E 03	6.378E 02	4.754E 00	8.247E-03	5.764E 02	2.323E 02	
3	7.326E 02	6.519E 01	1.101E 03	6.378E 02	4.754E 00	8.303E-03	5.726E 02	2.459E 02	

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.619E 02	5.794E 01	1.041E 03	5.147E 02	5.204E 00	1.139E-02	4.568E 02	2.212E 02	
2	7.538E 02	6.216E 01	1.124E 03	6.415E 02	4.985E 00	8.605E-03	5.793E 02	2.339E 02	
3	7.456E 02	6.599E 01	1.118E 03	6.326E 02	5.000E 00	8.825E-03	5.666E 02	2.477E 02	

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.619E 02	5.712E 01	1.044E 03	5.194E 02	5.195E 00	1.124E-02	4.623E 02	2.212E 02	
2	7.538E 02	6.142E 01	1.126E 03	6.445E 02	4.980E 00	8.542E-03	5.831E 02	2.337E 02	
3	7.456E 02	6.532E 01	1.122E 03	6.385E 02	4.990E 00	8.705E-03	5.732E 02	2.474E 02	

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.619E 02	5.683E 01	1.061E 03	5.459E 02	5.149E 00	1.053E-02	4.891E 02	2.170E 02	
2	7.538E 02	6.121E 01	1.146E 03	6.739E 02	4.932E 00	8.050E-03	6.127E 02	2.295E 02	
3	7.456E 02	6.512E 01	1.139E 03	6.636E 02	4.949E 00	8.269E-03	5.985E 02	2.428E 02	

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.619E 02	5.722E 01	1.104E 03	5.895E 02	5.242E 00	9.848E-03	5.323E 02	2.145E 02
2	7.538E 02	6.176E 01	1.195E 03	7.249E 02	5.016E 00	7.564E-03	6.631E 02	2.273E 02
3	7.456E 02	6.582E 01	1.186E 03	7.118E 02	5.037E 00	7.797E-03	6.460E 02	2.414E 02

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.609E 02	5.709E 01	1.107E 03	5.871E 02	5.300E 00	10.000E-03	5.300E 02	2.197E 02
2	7.528E 02	6.162E 01	1.203E 03	7.302E 02	5.059E 00	7.568E-03	6.686E 02	2.329E 02
3	7.446E 02	6.561E 01	1.201E 03	7.273E 02	5.064E 00	7.653E-03	6.617E 02	2.470E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.054E 02	1.411E 02	5.820E 02	1.901E 02	3.022E 00	6.174E-02	4.895E 01	9.563E 02

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.042E 02	1.422E 02	6.850E 02	2.132E 02	3.840E 00	5.411E-02	7.098E 01	9.696E 02

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.005E 02	1.457E 02	8.320E 02	2.789E 02	4.871E 00	3.658E-02	1.332E 02	1.003E 03

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.030E 02	1.496E 02	1.033E 03	3.955E 02	6.154E 00	2.503E-02	2.459E 02	9.972E 02

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.160E 02	1.526E 02	1.297E 03	5.972E 02	7.501E 00	1.687E-02	4.446E 02	1.003E 03

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.147E 02	1.530E 02	1.346E 03	6.229E 02	7.874E 00	1.676E-02	4.699E 02	1.017E 03

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.114E 02	1.553E 02	1.529E 03	7.120E 02	9.406E 00	1.690E-02	5.567E 02	1.024E 03

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.106E 02	1.570E 02	1.668E 03	8.935E 02	9.437E 00	1.281E-02	7.365E 02	1.023E 03

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.050E 02	1.583E 02	1.808E 03	9.311E 02	1.106E 01	1.431E-02	7.727E 02	1.068E 03

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-37

AF = 0.126E-03

D = 0.127E-01

L = 0.512E 01

DEL R = 0.245E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.645E 02	6.695E 02	4.370E 01	9.200E 01	1.139E-01	2.102E 01	-9.133E 00	9.040E 02
2	7.645E 02	6.625E 02	4.350E 01	9.570E 01	1.125E-01	2.284E 01	8.440E 00	8.931E 02
3	7.645E 02	6.605E 02	4.360E 01	9.940E 01	1.128E-01	2.425E 01	1.013E 01	8.951E 02
4	7.785E 02	6.695E 02	4.740E 01	9.550E 01	1.115E-01	2.322E 01	1.259E-02	8.852E 02
5	7.825E 02	6.635E 02	4.740E 01	1.072E 02	1.089E-01	2.702E 01	4.570E 00	8.647E 02
6	7.775E 02	6.485E 02	4.740E 01	1.102E 02	1.092E-01	2.931E 01	1.950E 00	8.670E 02

PREHEATER

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.450E 02	5.714E 01	1.445E 03	8.955E 02	6.387E 00	7.618E-03	8.383E 02	2.247E 02
2	7.348E 02	6.261E 01	1.527E 03	1.011E 03	6.211E 00	6.550E-03	9.484E 02	2.416E 02
3	7.247E 02	6.737E 01	1.440E 03	8.883E 02	6.398E 00	7.794E-03	8.209E 02	2.610E 02

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.450E 02	5.725E 01	1.483E 03	9.374E 02	6.435E 00	7.311E-03	8.801E 02	2.222E 02
2	7.348E 02	6.280E 01	1.559E 03	1.044E 03	6.277E 00	6.400E-03	9.808E 02	2.394E 02
3	7.247E 02	6.764E 01	1.449E 03	8.886E 02	6.512E 00	7.932E-03	8.210E 02	2.591E 02

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.450E 02	5.743E 01	1.504E 03	9.525E 02	6.548E 00	7.315E-03	8.951E 02	2.232E 02
2	7.348E 02	6.297E 01	1.579E 03	1.057E 03	6.392E 00	6.428E-03	9.943E 02	2.405E 02
3	7.247E 02	6.790E 01	1.466E 03	8.980E 02	6.634E 00	7.992E-03	8.301E 02	2.608E 02

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.590E 02	5.959E 01	1.377E 03	8.312E 02	6.186E 00	8.018E 03	7.706E 02	2.261E 02
2	7.488E 02	6.467E 01	1.458E 03	9.468E 02	6.005E 00	6.808E 03	8.821E 02	2.425E 02
3	7.387E 02	6.912E 01	1.390E 03	8.501E 02	6.155E 00	7.881E 03	7.810E 02	2.519E 02

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.630E 02	5.990E 01	1.436E 03	9.086E 02	6.130E 00	7.222E 03	8.487E 02	2.215E 02
2	7.528E 02	6.506E 01	1.504E 03	1.003E 03	5.989E 00	6.382E 03	9.384E 02	2.379E 02
3	7.427E 02	6.967E 01	1.428E 03	8.972E 02	6.147E 00	7.423E 03	8.276E 02	2.578E 02

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 6

STA	PP	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.580E 02	6.115E 01	1.462E 03	9.210E 02	6.335E 00	7.368E 03	8.599E 02	2.259E 02
2	7.478E 02	6.670E 01	1.540E 03	1.030E 03	6.173E 00	6.407E 03	9.634E 02	2.452E 02
3	7.377E 02	7.162E 01	1.458E 03	9.154E 02	6.344E 00	7.519E 03	8.437E 02	2.691E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.959E 02	1.519E 02	1.042E 03	2.791E 02	7.139E 00	5.615E-02	1.272E 02	1.048E 03

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.930E 02	1.541E 02	1.178E 03	3.953E 02	7.861E 00	3.260E-02	2.411E 02	1.058E 03

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.921E 02	1.556E 02	1.301E 03	4.738E 02	8.717E 00	2.739E-02	3.182E 02	1.074E 03

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.041E 02	1.544E 02	1.331E 03	5.723E 02	8.167E 00	1.954E-02	4.180E 02	1.035E 03

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.039E 02	1.592E 02	1.688E 03	8.095E 02	1.062E 01	1.632E-02	6.503E 02	1.049E 03

LOCAL TEST PARAMETERS

TEST D95-37

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.948E 02	1.629E 02	1.772E 03	8.544E 02	1.136E 01	1.642E-02	6.915E 02	1.095E 03

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-38

AF = 0.126E-03

D = 0.127E-01

L = 0.445E 01

DEL R = 0.245E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.525E 02	6.445E 02	5.340E 01	7.980E 01	1.084E-01	1.221E 01	-2.540E 00	8.606E 02
2	7.535E 02	6.425E 02	4.970E 01	7.910E 01	1.114E-01	1.306E 01	-4.553E 00	8.839E 02
3	7.525E 02	6.445E 02	4.940E 01	8.210E 01	1.123E-01	1.551E 01	-1.140E 00	8.916E 02
4	7.525E 02	6.235E 02	4.940E 01	8.760E 01	1.101E-01	1.905E 01	1.131E 00	8.737E 02
5	7.475E 02	6.165E 02	4.760E 01	8.710E 01	1.122E-01	1.849E 01	-5.865E 00	8.903E 02
6	7.475E 02	6.065E 02	4.700E 01	8.900E 01	1.127E-01	2.052E 01	-2.731E 00	8.946E 02
7	7.425E 02	6.045E 02	4.680E 01	9.290E 01	1.134E-01	2.161E 01	-8.626E 00	8.998E 02
8	7.495E 02	6.015E 02	4.730E 01	9.300E 01	1.120E-01	2.262E 01	-2.204E 00	8.892E 02
9	7.525E 02	6.015E 02	4.840E 01	1.003E 02	1.072E-01	2.454E 01	-3.008E 00	8.511E 02

PRLHEATER

LOCAL TEST PARAMETERS

TEST D95 38

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.370E 02	5.871E 01	5.690E 02	9.893E 01	3.196E 00	7.946E-02	4.022E 01	2.184E 02	
2	7.288E 02	6.121E 01	5.890E 02	1.484E 02	3.279E 00	3.760E-02	8.721E 01	2.262E 02	
3	7.207E 02	6.356E 01	6.110E 02	1.932E 02	3.265E 00	2.518E-02	1.296E 02	2.342E 02	

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.380E 02	5.532E 01	5.700E 02	1.018E 02	3.208E 00	6.903E-02	4.647E 01	2.157E 02	
2	7.298E 02	5.798E 01	5.870E 02	1.440E 02	3.277E 00	3.810E-02	8.601E 01	2.225E 02	
3	7.217E 02	6.048E 01	6.090E 02	1.894E 02	3.267E 00	2.535E-02	1.289E 02	2.306E 02	

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.370E 02	5.510E 01	5.720E 02	1.073E 02	3.222E 00	6.171E-02	5.221E 01	2.172E 02	
2	7.288E 02	5.776E 01	5.900E 02	1.506E 02	3.279E 00	3.531E-02	9.287E 01	2.239E 02	
3	7.207E 02	6.026E 01	6.090E 02	1.894E 02	3.267E 00	2.530E-02	1.291E 02	2.320E 02	

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.370E 02	5.510E 01	5.730E 02	1.100E 02	3.228E 00	5.880E-02	5.489E 01	2.128E 02
2	7.288E 02	5.784E 01	5.870E 02	1.440E 02	3.277E 00	3.804E-02	8.615E 01	2.196E 02
3	7.207E 02	6.034E 01	6.070E 02	1.855E 02	3.266E 00	2.609E-02	1.252E 02	2.275E 02

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.320E 02	5.315E 01	5.350E 02	5.492E 01	2.601E 00	1.471E 00	1.769E 00	2.128E 02
2	7.238E 02	5.572E 01	5.480E 02	9.949E 01	3.029E 00	6.921E-02	4.377E 01	2.188E 02
3	7.157E 02	5.822E 01	5.610E 02	1.324E 02	3.091E 00	4.164E-02	7.422E 01	2.255E 02

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.928E 02	5.309E 01	5.410E 02	5.781E 01	2.687E 00	5.699E-01	4.715E 00	2.151E 02
2	6.641E 02	5.591E 01	5.570E 02	1.097E 02	3.097E 00	5.761E-02	5.375E 01	2.228E 02
3	6.353E 02	5.841E 01	5.730E 02	1.477E 02	3.142E 00	3.520E-02	8.927E 01	2.312E 02

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.890E 02	5.282E 01	5.410E 02	7.807E 01	2.885E 00	1.142E-01	2.526E 01	2.159E 02
2	6.608E 02	5.555E 01	5.550E 02	1.180E 02	3.067E 00	4.908E-02	6.248E 01	2.233E 02
3	6.327E 02	5.797E 01	5.660E 02	1.437E 02	3.095E 00	3.609E-02	8.576E 01	2.312E 02

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 5

STA	PI	TR	TW	TI	Q/A	H	DEL TF	VS
1	6.921E 02	5.332E 01	5.440E 02	6.933E 01	2.853E 00	1.723E-01	1.551E 01	2.143E 02
2	6.619E 02	5.605E 01	5.570E 02	1.097E 02	3.097E 00	5.776E-02	5.361E 01	2.219E 02
3	6.317E 02	5.855E 01	5.730E 02	1.477E 02	3.142E 00	3.525E-02	8.912E 01	2.305E 02

LOCAL TEST PARAMETERS

TEST D95-36

DATA POINT 9

STA	PI	TR	TW	TI	Q/A	H	DEL TF	VS
1	6.939E 02	5.457E 01	5.550E 02	7.103E 01	2.939E 00	1.786E-01	1.646E 01	2.077E 02
2	6.631E 02	5.738E 01	5.730E 02	1.235E 02	3.208E 00	4.851E-02	6.614E 01	2.157E 02
3	6.323E 02	5.988E 01	5.880E 02	1.576E 02	3.237E 00	3.314E-02	9.767E 01	2.251E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.903E 02	1.300E 02	8.160E 02	1.893E 02	5.236E 00	8.841E-02	5.922E 01	8.236E 02

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.904E 02	1.302E 02	8.570E 02	1.313E 02	5.783E 00	5.444E 00	1.062E 00	8.476E 02

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.903E 02	1.320E 02	1.092E 03	3.068E 02	7.538E 00	4.313E-02	1.748E 02	8.703E 02

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.835E 02	1.349E 02	1.405E 03	4.737E 02	1.007E 01	2.971E-02	3.388E 02	8.869E 02

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.778E 02	1.335E 02	1.365E 03	4.335E 02	9.875E 00	3.291E-02	3.001E 02	8.976E 02

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.065E 02	1.339E 02	1.504E 03	4.635E 02	1.149E 01	3.486E-02	3.296E 02	9.955E 02

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.045E 02	1.342E 02	1.648E 03	6.336E 02	1.184E 01	2.370E-02	4.994E 02	1.007E 03

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.015E 02	1.353E 02	1.746E 03	7.032E 02	1.255E 01	2.211E-02	5.678E 02	1.010E 03

LOCAL TEST PARAMETERS

TEST D95-38

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.015E 02	1.383E 02	1.925E 03	8.513E 02	1.370E 01	1.921E-02	7.130E 02	9.946E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-39

AF = 0.126E-03 D = 0.127E-01 L = 0.445E 01 DEL R = 0.245E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.805E 02	6.535E 02	4.760E 01	8.690E 01	1.121E-01	1.700E 01	-1.076E 01	8.899E 02
2	7.815E 02	6.485E 02	4.690E 01	9.020E 01	1.119E-01	1.913E 01	-9.247E 00	8.877E 02
3	7.795E 02	6.365E 02	4.820E 01	9.330E 01	1.130E-01	2.125E 01	-6.416E 00	8.966E 02
4	7.765E 02	6.185E 02	5.010E 01	9.380E 01	1.175E-01	2.339E 01	-5.789E-01	9.326E 02
5	7.805E 02	6.205E 02	4.690E 01	1.042E 02	1.116E-01	2.595E 01	-9.067E 00	8.854E 02
6	7.845E 02	6.205E 02	4.750E 01	1.120E 02	1.075E-01	2.763E 01	-1.023E 01	8.534E 02
7	7.995E 02	6.215E 02	4.830E 01	1.252E 02	1.011E-01	3.042E 01	-9.742E 00	8.026E 02

PREHEATER

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.631E 02	5.916E 01	1.214E 03	5.124E 02	7.265E 00	1.603E-02	4.532E 02	2.258E 02
2	7.539E 02	6.408E 01	1.303E 03	6.603E 02	6.969E 00	1.169E-02	5.962E 02	2.413E 02
3	7.447E 02	6.838E 01	1.302E 03	6.587E 02	6.972E 00	1.181E-02	5.903E 02	2.591E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.641E 02	5.862E 01	1.231E 03	5.331E 02	7.284E 00	1.535E-02	4.744E 02	2.236E 02
2	7.549E 02	6.362E 01	1.329E 03	6.941E 02	6.964E 00	1.105E-02	6.305E 02	2.391E 02
3	7.457E 02	6.807E 01	1.322E 03	6.830E 02	6.986E 00	1.136E-02	6.149E 02	2.569E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.621E 02	5.968E 01	1.248E 03	5.536E 02	7.302E 00	1.478E-02	4.939E 02	2.291E 02
2	7.529E 02	6.453E 01	1.337E 03	6.993E 02	7.015E 00	1.105E-02	6.347E 02	2.448E 02
3	7.437E 02	6.890E 01	1.331E 03	6.897E 02	7.033E 00	1.133E-02	6.208E 02	2.636E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.591E 02	6.072E 01	1.195E 03	4.791E 02	7.348E 00	1.757E-02	4.184E 02	2.416E 02
2	7.499E 02	6.526E 01	1.280E 03	6.231E 02	7.041E 00	1.262E-02	5.579E 02	2.577E 02
3	7.407E 02	6.940E 01	1.259E 03	5.886E 02	7.110E 00	1.369E-02	5.192E 02	2.770E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.631E 02	5.885E 01	1.214E 03	4.949E 02	7.431E 00	1.704E-02	4.360E 02	2.238E 02
2	7.539E 02	6.393E 01	1.320E 03	6.722E 02	7.066E 00	1.162E-02	6.083E 02	2.395E 02
3	7.447E 02	6.838E 01	1.310E 03	6.562E 02	7.097E 00	1.207E-02	5.878E 02	2.578E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.671E 02	5.977E 01	1.237E 03	5.088E 02	7.580E 00	1.688E-02	4.490E 02	2.180E 02
2	7.579E 02	6.492E 01	1.339E 03	6.797E 02	7.233E 00	1.177E-02	6.147E 02	2.340E 02
3	7.487E 02	6.945E 01	1.341E 03	6.829E 02	7.227E 00	1.178E-02	6.134E 02	2.527E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.782E 02	6.119E 01	1.195E 03	4.429E 02	7.562E 00	2.007E-02	3.817E 02	2.080E 02
2	7.669E 02	6.650E 01	1.310E 03	6.405E 02	7.249E 00	1.263E-02	5.740E 02	2.245E 02
3	7.557E 02	7.135E 01	1.335E 03	6.809E 02	7.170E 00	1.176E-02	6.096E 02	2.452E 02

TEST SECTION

TEMPTURE VALUE 0.907034E 01 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

1 7.088E 02 TEMPTURE VALUE 0.907034E 01 SMALLER THAN TABLE FOR RESISTIVITY
1.354E 02 7.330E 02 5.124E 02 7.265E 00 1.176E-02 6.096E 02 2.452E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.078E 02	1.371E 02	9.110E 02	9.666E 01	6.060E 00	-1.500E-01	-4.039E 01	8.886E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.026E 02	1.384E 02	1.044E 03	1.072E 02	7.395E 00	-2.371E-01	-3.119E 01	9.163E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.947E 02	1.385E 02	1.208E 03	1.961E 02	9.471E 00	1.643E-01	5.764E 01	9.641E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.980E 02	1.424E 02	1.533E 03	5.315E 02	1.122E 01	2.885E-02	3.890E 02	9.448E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.007E 02	1.455E 02	1.643E 03	5.539E 02	1.254E 01	3.072E-02	4.083E 02	9.322E 02

LOCAL TEST PARAMETERS

TEST D95-39

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.044E 02	1.509E 02	1.897E 03	7.517E 02	1.432E 01	2.384E-02	6.008E 02	9.121E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-40

AF = 0.126E-03 D = 0.127E-01 L = 0.445E 01 DEL R = 0.245E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.655E 02	6.675E 02	4.930E 01	8.530E 01	1.093E-01	1.415E 01	-1.873E 01	8.678E 02
2	7.2615E 02	6.2585E 02	4.810E 01	8.660E 01	1.130E-01	1.625E 01	-1.475E 01	8.968E 02
3	7.655E 02	6.545E 02	4.750E 01	9.160E 01	1.121E-01	1.874E 01	-1.475E 01	8.900E 02
4	7.2635E 02	6.415E 02	4.700E 01	9.650E 01	1.126E-01	2.191E 01	-1.193E 01	8.937E 02
5	7.655E 02	6.305E 02	4.680E 01	1.023E 02	1.127E-01	2.433E 01	-1.360E 01	8.944E 02

PREHEATER

LOCAL TEST PARAMETERS

TEST D95-40

DATA POINT 1

STA	PB	TR	TW	TI	Q/A	H	DEL TF	VS
1	7.539E 02	5.774E 01	8.350E 02	2.322E 02	5.071E 00	2.906E-02	1.745E 02	2.167E 02
2	7.477E 02	6.157E 01	8.800E 02	3.157E 02	5.037E 00	1.982E-02	2.541E 02	2.279E 02
3	7.416E 02	6.492E 01	9.720E 02	4.664E 02	4.827E 00	1.202E-02	4.015E 02	2.393E 02
4	7.539E 02	5.774E 01	6.150E 02	5.871E 02	1.002E 00	1.893E-03	5.293E 02	2.167E 02
5	7.477E 02	6.157E 01	6.560E 02	6.293E 02	9.785E-01	1.724E-03	5.677E 02	2.279E 02
6	7.416E 02	6.492E 01	6.470E 02	6.200E 02	9.836E-01	1.772E-03	5.551E 02	2.393E 02

LOCAL TEST PARAMETERS

TEST D95-40

DATA POINT 2

STA	PB	TR	TW	TI	Q/A	H	DEL TF	VS
1	7.499E 02	5.654E 01	8.300E 02	2.221E 02	5.078E 00	3.067E-02	1.656E 02	2.212E 02
2	7.437E 02	6.037E 01	9.150E 02	3.751E 02	4.953E 00	1.574E-02	3.148E 02	2.322E 02
3	7.376E 02	6.380E 01	9.550E 02	4.397E 02	4.861E 00	1.293E-02	3.759E 02	2.435E 02
4	7.499E 02	5.654E 01	6.160E 02	5.881E 02	1.001E 00	1.883E-03	5.316E 02	2.212E 02
5	7.437E 02	6.037E 01	6.560E 02	6.293E 02	9.785E-01	1.720E-03	5.689E 02	2.322E 02
6	7.376E 02	6.380E 01	6.500E 02	6.231E 02	9.819E-01	1.756E-03	5.593E 02	2.435E 02

LOCAL TEST PARAMETERS

TEST D95-40

DATA POINT 3

STA	PB	TR	TW	TI	Q/A	H	DEL TF	VS
1	7.539E 02	5.629E 01	8.570E 02	2.340E 02	5.283E 00	2.972E-02	1.779E 02	2.167E 02
2	7.477E 02	6.016E 01	9.570E 02	4.114E 02	5.120E 00	1.458E-02	3.513E 02	2.279E 02
3	7.416E 02	6.377E 01	1.001E 03	4.818E 02	5.011E 00	1.198E-02	4.182E 02	2.409E 02

4	7.539E 02	5.625E 01	6.030E 02	5.732E 02	1.061E 00	2.052E-03	5.170E 02	2.186E 02
5	7.477E 02	6.016E 01	6.480E 02	6.197E 02	1.034E 00	1.848E-03	5.595E 02	2.296E 02
6	7.416E 02	6.367E 01	6.370E 02	6.083E 02	1.040E 00	1.910E-03	5.447E 02	2.409E 02

LOCAL TEST PARAMETERS

TEST D95-40

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.519E 02	5.591E 01	8.660E 02	2.518E 02	5.307E 00	2.709E-02	1.959E 02	2.188E 02
2	7.457E 02	5.981E 01	9.550E 02	4.081E 02	5.125E 00	1.471E-02	3.483E 02	2.297E 02
3	7.396E 02	6.341E 01	9.990E 02	4.787E 02	5.017E 00	1.208E-02	4.153E 02	2.412E 02
4	7.519E 02	5.591E 01	5.900E 02	5.598E 02	1.069E 00	2.121E-03	5.039E 02	2.188E 02
5	7.457E 02	5.981E 01	6.400E 02	6.114E 02	1.038E 00	1.882E-03	5.516E 02	2.297E 02
6	7.396E 02	6.341E 01	6.330E 02	6.042E 02	1.042E 00	1.928E-03	5.408E 02	2.412E 02

LOCAL TEST PARAMETERS

TEST D95-40

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.539E 02	5.586E 01	8.780E 02	2.547E 02	5.410E 00	2.720E-02	1.989E 02	2.188E 02
2	7.477E 02	5.992E 01	9.660E 02	4.099E 02	5.230E 00	1.494E-02	3.500E 02	2.301E 02
3	7.416E 02	6.360E 01	9.700E 02	4.165E 02	5.218E 00	1.479E-02	3.529E 02	2.419E 02
4	7.539E 02	5.586E 01	5.910E 02	5.601E 02	1.095E 00	2.172E-03	5.042E 02	2.188E 02
5	7.477E 02	5.992E 01	6.380E 02	6.086E 02	1.065E 00	1.942E-03	5.487E 02	2.301E 02
6	7.416E 02	6.360E 01	6.290E 02	5.994E 02	1.071E 00	1.999E-03	5.358E 02	2.419E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-40

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.133E 02	1.447E 02	7.540E 02	1.133E 02	4.779E 00	-1.521E-01	-3.142E 01	9.240E 02

LOCAL TEST PARAMETERS

TEST D95-40

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.077E 02	1.454E 02	9.110E 02	1.317E 02	6.306E 00	-4.595E-01	-1.372E 01	9.690E 02

LOCAL TEST PARAMETERS

TEST D95-40

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.091E 02	1.478E 02	1.105E 03	2.066E 02	8.254E 00	1.404E-01	5.880E 01	9.793E 02

LOCAL TEST PARAMETERS

TEST D95-40

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.035E 02	1.500E 02	1.422E 03	4.564E 02	1.045E 01	3.412E-02	3.063E 02	1.010E 03

LOCAL TEST PARAMETERS

TEST D95-40

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.013E 02	1.521E 02	1.595E 03	5.514E 02	1.189E 01	2.978E-02	3.993E 02	1.031E 03

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-41

AF = 0.126E-03

D = 0.127E-01

L = 0.927E 01

DEL R = 0.490E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	6.945E 02	6.485E 02	6.020E 01	7.380E 01	9.843E-02	7.306E 00	1.735E 01	7.812E 02
2	7.015E 02	6.425E 02	6.020E 01	7.900E 01	9.954E-02	9.959E 00	1.051E 01	7.900E 02
3	6.945E 02	6.385E 02	6.020E 01	7.980E 01	1.004E-01	1.147E 01	1.744E 01	7.966E 02
4	6.945E 02	6.325E 02	6.020E 01	8.260E 01	1.004E-01	1.295E 01	1.457E 01	7.966E 02
5	6.945E 02	6.325E 02	6.020E 01	8.280E 01	1.004E-01	1.302E 01	1.416E 01	7.966E 02
6	6.865E 02	6.245E 02	5.700E 01	8.480E 01	9.921E-02	1.414E 01	5.895E 00	7.874E 02
7	6.785E 02	6.110E 02	5.700E 01	8.410E 01	1.076E-01	1.445E 01	1.292E 00	8.537E 02
8	7.045E 02	6.785E 02	5.700E 01	8.150E 01	7.625E-02	9.006E 00	7.190E 00	6.051E 02
9	7.045E 02	6.785E 02	5.700E 01	8.180E 01	7.625E-02	9.145E 00	7.301E 00	6.051E 02
10	7.375E 02	7.005E 02	5.650E 01	8.180E 01	8.148E-02	9.007E 00	4.832E-01	6.467E 02
11	7.375E 02	6.935E 02	5.650E 01	8.480E 01	8.393E-02	1.083E 01	2.292E 00	6.661E 02
12	7.405E 02	6.935E 02	5.650E 01	8.900E 01	7.929E-02	1.317E 01	1.159E 01	6.293E 02
13	7.395E 02	6.935E 02	5.650E 01	8.920E 01	7.929E-02	1.351E 01	1.322E 01	6.293E 02
14	7.405E 02	6.945E 02	5.650E 01	8.760E 01	8.038E-02	1.179E 01	4.625E 00	6.380E 02
15	7.815E 02	6.585E 02	5.930E 01	7.780E 01	1.626E-01	1.751E 01	2.069E 01	1.291E 03
16	7.715E 02	6.505E 02	5.930E 01	8.380E 01	1.494E-01	2.072E 01	1.419E 01	1.186E 03

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	6.783E 02	6.668E 01	5.450E 02	2.119E 02	2.530E 00	1.743E-02	1.452E 02	2.272E 02	
2	6.708E 02	6.934E 01	5.420E 02	2.715E 02	2.132E 00	1.055E-02	2.021E 02	2.401E 02	
3	6.634E 02	7.176E 01	5.210E 02	1.820E 02	2.477E 00	2.247E-02	1.102E 02	2.543E 02	
4	6.559E 02	7.411E 01	5.330E 02	2.031E 02	2.479E 00	1.922E-02	1.290E 02	2.710E 02	

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	6.807E 02	6.872E 01	7.140E 02	3.250E 02	3.315E 00	1.293E-02	2.563E 02	2.386E 02	
2	6.711E 02	7.207E 01	6.960E 02	3.564E 02	2.907E 00	1.022E-02	2.843E 02	2.579E 02	
3	6.616E 02	7.520E 01	6.600E 02	2.366E 02	3.394E 00	2.102E-02	1.614E 02	2.813E 02	
4	6.520E 02	7.817E 01	6.720E 02	2.571E 02	3.392E 00	1.896E-02	1.789E 02	3.083E 02	

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	6.747E 02	6.981E 01	8.250E 02	4.255E 02	3.617E 00	1.017E-02	3.557E 02	2.466E 02	
2	6.657E 02	7.356E 01	7.820E 02	3.884E 02	3.484E 00	1.107E-02	3.149E 02	2.708E 02	
3	6.566E 02	7.700E 01	7.350E 02	2.651E 02	3.931E 00	2.090E-02	1.881E 02	2.994E 02	
4	6.476E 02	8.028E 01	7.430E 02	2.788E 02	3.914E 00	1.972E-02	1.985E 02	3.323E 02	

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.726E 02	7.090E 01	9.420E 02	5.392E 02	3.855E 00	8.231E-03	4.683E 02	2.530E 02
2	6.626E 02	7.497E 01	8.500E 02	4.278E 02	3.852E 00	1.092E-02	3.529E 02	2.816E 02
3	6.526E 02	7.879E 01	8.020E 02	2.794E 02	4.484E 00	2.235E-02	2.006E 02	3.166E 02
4	6.425E 02	8.247E 01	8.120E 02	2.968E 02	4.479E 00	2.089E-02	2.144E 02	3.564E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.726E 02	7.090E 01	9.480E 02	5.911E 02	3.455E 00	6.642E-03	5.202E 02	2.530E 02
2	6.626E 02	7.504E 01	8.530E 02	4.185E 02	3.961E 00	1.153E-02	3.435E 02	2.822E 02
3	6.526E 02	7.887E 01	8.140E 02	2.938E 02	4.515E 00	2.101E-02	2.150E 02	3.174E 02
4	6.425E 02	8.254E 01	8.230E 02	3.093E 02	4.503E 00	1.986E-02	2.267E 02	3.572E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.646E 02	6.942E 01	1.124E 03	7.390E 02	4.010E 00	5.989E-03	6.696E 02	2.431E 02
2	6.546E 02	7.403E 01	9.140E 02	4.407E 02	4.414E 00	1.204E-02	3.666E 02	2.729E 02
3	6.446E 02	7.825E 01	8.500E 02	2.882E 02	4.909E 00	2.338E-02	2.100E 02	3.102E 02
4	6.345E 02	8.231E 01	8.630E 02	3.112E 02	4.896E 00	2.139E-02	2.289E 02	3.538E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.547E 02	6.872E 01	1.082E 03	6.896E 02	4.009E 00	6.458E-03	6.208E 02	2.610E 02
2	6.438E 02	7.309E 01	9.040E 02	4.253E 02	4.436E 00	1.260E-02	3.522E 02	2.910E 02
3	6.328E 02	7.700E 01	8.450E 02	2.652E 02	5.009E 00	2.662E-02	1.882E 02	3.275E 02
4	6.219E 02	8.075E 01	8.560E 02	2.854E 02	4.985E 00	2.436E-02	2.047E 02	3.709E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.953E 02	6.786E 01	7.480E 02	4.244E 02	2.861E 00	8.026E-03	3.565E 02	1.785E 02
2	6.911E 02	7.200E 01	6.920E 02	3.699E 02	2.763E 00	9.274E-03	2.979E 02	1.948E 02
3	6.869E 02	7.591E 01	6.470E 02	2.607E 02	3.138E 00	1.698E-02	1.848E 02	2.151E 02
4	6.827E 02	7.958E 01	6.550E 02	2.736E 02	3.124E 00	1.610E-02	1.940E 02	2.388E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.953E 02	6.794E 01	7.690E 02	4.531E 02	2.831E 00	7.349E-03	3.852E 02	1.787E 02
2	6.911E 02	7.216E 01	7.030E 02	3.853E 02	2.744E 00	8.764E-03	3.131E 02	1.955E 02
3	6.869E 02	7.614E 01	6.550E 02	2.636E 02	3.192E 00	1.703E-02	1.874E 02	2.164E 02
4	6.827E 02	7.989E 01	6.600E 02	2.717E 02	3.183E 00	1.660E-02	1.918E 02	2.408E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.244E 02	6.697E 01	6.890E 02	3.459E 02	2.921E 00	1.047E-02	2.790E 02	1.855E 02
2	7.185E 02	7.103E 01	6.590E 02	3.487E 02	2.621E 00	9.439E-03	2.776E 02	2.007E 02

3	7.125E 02	7.486E 01	6.190E 02	2.207E 02	3.123E 00	2.142E-02	1.458E 02	2.195E 02
4	7.065E 02	7.845E 01	6.290E 02	2.379E 02	3.108E 00	1.949E-02	1.594E 02	2.416E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 11

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.220E 02	6.853E 01	8.330E 02	4.595E 02	3.418E 00	8.742E-03	3.910E 02	1.966E 02
2	7.149E 02	7.306E 01	7.560E 02	3.422E 02	3.590E 00	1.334E-02	2.692E 02	2.164E 02
3	7.077E 02	7.744E 01	7.090E 02	2.439E 02	3.812E 00	2.290E-02	1.665E 02	2.421E 02
4	7.006E 02	8.150E 01	7.190E 02	2.614E 02	3.804E 00	2.114E-02	1.799E 02	2.717E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 12

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.239E 02	7.142E 01	1.126E 03	7.711E 02	3.718E 00	5.314E-03	6.997E 02	1.962E 02
2	7.163E 02	7.712E 01	8.850E 02	3.320E 02	4.966E 00	1.949E-02	2.549E 02	2.251E 02
3	7.087E 02	8.244E 01	8.180E 02	2.595E 02	4.777E 00	2.699E-02	1.770E 02	2.607E 02
4	7.011E 02	8.767E 01	8.310E 02	2.831E 02	4.746E 00	2.428E-02	1.955E 02	3.010E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 13

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.233E 02	7.181E 01	1.144E 03	7.873E 02	3.765E 00	5.262E-03	7.155E 02	1.978E 02
2	7.158E 02	7.759E 01	8.850E 02	3.403E 02	4.906E 00	1.867E-02	2.627E 02	2.279E 02
3	7.084E 02	8.298E 01	8.230E 02	2.367E 02	4.938E 00	3.212E-02	1.537E 02	2.646E 02
4	7.009E 02	8.837E 01	8.330E 02	2.559E 02	4.949E 00	2.954E-02	1.675E 02	3.063E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 14

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.243E 02	6.994E 01	9.650E 02	6.017E 02	3.540E 00	6.658E-03	5.317E 02	1.930E 02
2	7.168E 02	7.509E 01	8.110E 02	3.903E 02	3.759E 00	1.193E-02	3.152E 02	2.170E 02
3	7.094E 02	7.986E 01	7.600E 02	2.620E 02	4.192E 00	2.301E-02	1.822E 02	2.466E 02
4	7.019E 02	8.439E 01	7.650E 02	2.708E 02	4.181E 00	2.242E-02	1.865E 02	2.805E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 15

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.381E 02	6.899E 01	8.950E 02	1.729E 02	5.841E 00	5.619E-02	1.040E 02	3.811E 02

TEMPURE VALUE 0.187895E 02 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

TEMPURE VALUE 0.187895E 02 SMALLER THAN TABLE FOR RESISTIVITY

2	7.182E 02	7.274E 01	8.940E 02	4.339E 02	6.014E 00	5.619E-02	1.040E 02	3.811E 02
3	6.983E 02	7.610E 01	8.780E 02	1.263E 02	5.618E 00	1.119E-01	5.021E 01	4.567E 02
4	6.784E 02	7.907E 01	9.120E 02	2.108E 02	5.943E 00	4.511E-02	1.317E 02	5.042E 02

LOCAL TEST PARAMETERS

TEST D95-41

DATA POINT 16

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
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1 7.288E 02 7.133E 01 1.131E 03 4.871E 02 6.443E 00 1.549E-02 4.158E 02 3.679E 02

		TEMPURE VALUE	0.163082E 02	SMALLER THAN	TABLE FOR THERMAL CONDUCTIVITY			
2	7.092E 02	7.594E 01	1.038E 03	3.019E 02	6.206E 00	1.549E-02	4.158E 02	3.679E 02
3	6.897E 02	8.000E 01	1.007E 03	1.422E 02	6.877E 00	1.105E-01	6.222E 01	4.698E 02
4	6.701E 02	8.375E 01	1.040E 03	2.258E 02	7.186E 00	5.058E-02	1.421E 02	5.330E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-42

AF = 0.937E-04

D = 0.625E-02

L = 0.927E 01

DEL R = 0.245E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.005E 02	6.225E 02	5.480E 01	7.850E 01	7.917E-02	5.644E 00	-5.020E 01	8.449E 02
2	7.005E 02	6.115E 02	5.510E 01	8.210E 01	8.089E-02	7.161E 00	-4.404E 01	8.633E 02
3	7.005E 02	6.145E 02	5.890E 01	8.840E 01	7.550E-02	9.092E 00	-2.239E 01	8.058E 02
4	6.685E 02	5.865E 02	5.520E 01	8.570E 01	8.082E-02	1.042E 01	-1.707E 01	8.625E 02
5	6.885E 02	5.725E 02	5.320E 01	8.680E 01	8.309E-02	1.178E 01	-1.664E 01	8.867E 02
6	6.945E 02	5.665E 02	5.260E 01	9.100E 01	8.187E-02	1.369E 01	-1.292E 01	8.737E 02
7	6.885E 02	5.505E 02	5.240E 01	9.410E 01	8.268E-02	1.528E 01	-1.203E 01	8.824E 02
8	6.945E 02	5.405E 02	5.380E 01	9.860E 01	8.212E-02	1.677E 01	-9.823E 00	8.765E 02
9	7.225E 02	5.715E 02	4.960E 01	7.940E 01	1.103E-01	1.160E 01	-2.928E 01	1.177E 03
10	7.225E 02	5.665E 02	4.930E 01	8.110E 01	1.104E-01	1.221E 01	-3.379E 01	1.178E 03
11	7.345E 02	5.765E 02	4.960E 01	8.840E 01	1.017E-01	1.605E 01	-1.694E 01	1.085E 03
12	7.345E 02	5.565E 02	5.020E 01	9.110E 01	1.024E-01	1.788E 01	-1.469E 01	1.093E 03
13	7.345E 02	5.465E 02	5.110E 01	9.180E 01	1.029E-01	1.801E 01	-1.608E 01	1.098E 03

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-42

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.730E 02	6.207E 01	4.450E 02	1.603E 02	2.004E 00	2.040E-02	9.823E 01	2.282E 02
2	6.604E 02	6.488E 01	4.400E 02	1.508E 02	2.006E 00	2.334E-02	8.594E 01	2.396E 02
3	6.477E 02	6.746E 01	4.300E 02	1.155E 02	2.057E 00	4.284E-02	4.802E 01	2.524E 02
4	6.351E 02	6.980E 01	4.340E 02	1.245E 02	2.060E 00	3.769E-02	5.466E 01	2.668E 02

LOCAL TEST PARAMETERS

TEST D95-42

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.691E 02	6.385E 01	5.210E 02	1.871E 02	2.502E 00	2.031E-02	1.232E 02	2.399E 02
2	6.547E 02	6.713E 01	5.170E 02	1.799E 02	2.506E 00	2.223E-02	1.127E 02	2.556E 02
3	6.403E 02	7.002E 01	5.050E 02	1.120E 02	2.668E 00	6.360E-02	4.195E 01	2.732E 02
4	6.259E 02	7.276E 01	5.120E 02	1.286E 02	2.689E 00	4.816E-02	5.584E 01	2.950E 02

LOCAL TEST PARAMETERS

TEST D95-42

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.702E 02	6.921E 01	6.580E 02	2.640E 02	3.263E 00	1.675E-02	1.948E 02	2.470E 02
2	6.562E 02	7.312E 01	6.300E 02	2.162E 02	3.309E 00	2.313E-02	1.430E 02	2.726E 02
3	6.423E 02	7.671E 01	6.070E 02	1.637E 02	3.379E 00	3.886E-02	8.695E 01	3.041E 02
4	6.284E 02	7.999E 01	6.150E 02	1.800E 02	3.365E 00	3.364E-02	1.000E 02	3.397E 02

LOCAL TEST PARAMETERS

TEST D95-42

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.396E 02	6.700E 01	7.240E 02	2.685E 02	3.863E 00	1.917E-02	2.015E 02	2.563E 02
2	6.263E 02	7.122E 01	6.950E 02	2.164E 02	3.915E 00	2.696E-02	1.452E 02	2.832E 02
3	6.130E 02	7.497E 01	6.650E 02	1.667E 02	3.888E 00	4.240E-02	9.171E 01	3.163E 02
4	5.998E 02	7.848E 01	6.780E 02	1.937E 02	3.880E 00	3.366E-02	1.153E 02	3.565E 02

LOCAL TEST PARAMETERS

TEST D95-42

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.476E 02	6.672E 01	7.590E 02	2.604E 02	4.264E 00	2.201E-02	1.937E 02	2.612E 02
2	6.288E 02	7.132E 01	7.240E 02	1.935E 02	4.318E 00	3.533E-02	1.222E 02	2.915E 02
3	6.100E 02	7.539E 01	7.360E 02	1.966E 02	4.421E 00	3.649E-02	1.212E 02	3.300E 02
4	5.913E 02	7.906E 01	7.350E 02	1.945E 02	4.420E 00	3.828E-02	1.155E 02	3.802E 02

TEMPTURE VALUE 0.353314E 01 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

1	6.493E 02	6.830E 01	7.180E 02	7.390E 02	4.010E 00	3.828E-02	1.155E 02	3.802E 02
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TEMPTURE VALUE -0.579589E 02 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

TEMPTURE VALUE -0.579589E 02 SMALLER THAN TABLE FOR RESISTIVITY

2 6.153E 02 TEMPTURE VALUE -0.811662E 02 SMALLER THAN TABLE FOR RESISTIVITY
7.747E 01 7.480E 02 3.699E 02 2.763E 00 3.828E-02 1.155E 02 3.802E 02

TEMPTURE VALUE -0.365252E 01 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

3 5.903E 02 TEMPTURE VALUE -0.365252E 01 SMALLER THAN TABLE FOR RESISTIVITY
8.271E 01 7.200E 02 2.607E 02 3.138E 00 3.828E-02 1.155E 02 3.802E 02

TEMPTURE VALUE 0.109469E 02 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

4 5.654E 02 TEMPTURE VALUE 0.109469E 02 SMALLER THAN TABLE FOR RESISTIVITY
8.910E 01 7.160E 02 2.736E 02 3.124E 00 3.828E-02 1.155E 02 3.802E 02

LOCAL TEST PARAMETERS

TEST D95-42

DATA PCINT 9

STA	PP	T _B	T _w	T _I	Q/A	H	DEL T _H	VS
1	6.692E 02	6.124E 01	7.080E 02	1.585E 02	4.326E 00	4.446E-02	9.730E 01	3.145E 02
2	6.448E 02	6.538E 01	6.860E 02	1.009E 02	4.168E 00	1.175E-01	3.548E 01	3.385E 02
3	6.204E 02	6.890E 01	7.010E 02	1.864E 02	4.129E 00	3.515E-02	1.175E 02	3.670E 02
4	5.959E 02	7.194E 01	7.200E 02	2.240E 02	4.108E 00	2.702E-02	1.521E 02	4.014E 02

LOCAL TEST PARAMETERS

TEST D95-42

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.675E 02	6.157E 01	7.890E 02	2.871E 02	4.373E 00	1.939E-02	2.255E 02	3.165E 02
2	6.422E 02	6.578E 01	7.780E 02	2.677E 02	4.402E 00	2.180E-02	2.019E 02	3.416E 02
3	6.170E 02	6.946E 01	7.560E 02	7.873E 01	4.486E 00	4.837E-01	9.274E 00	3.726E 02
4	5.917E 02	7.250E 01	7.620E 02	9.984E 01	4.811E 00	1.760E-01	2.734E 01	4.106E 02

LOCAL TEST PARAMETERS

TEST D95-42

DATA POINT 11

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.788E 02	6.585E 01	9.610E 02	4.858E 02	4.574E 00	1.089E-02	4.200E 02	3.108E 02
2	6.532E 02	7.116E 01	9.260E 02	4.318E 02	4.659E 00	1.292E-02	3.606E 02	3.506E 02

TEMPURE VALUE 0.177207E 02 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

3	6.276E 02	7.577E 01	8.850E 02	2.439E 02	3.812E 00	1.292E-02	3.606E 02	3.506E 02
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TEMPURE VALUE 0.597159E 01 SMALLER THAN TABLE FOR THERMAL CONDUCTIVITY

4	6.021E 02	7.983E 01	8.950E 02	2.614E 02	3.804E 00	1.292E-02	3.606E 02	3.506E 02
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LOCAL TEST PARAMETERS

TEST D95-42

DATA POINT 12

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.717E 02	6.754E 01	1.082E 03	4.772E 02	6.018E 00	1.469E-02	4.097E 02	3.237E 02
2	6.429E 02	7.309E 01	1.005E 03	3.444E 02	6.251E 00	2.304E-02	2.713E 02	3.726E 02
3	6.141E 02	7.786E 01	1.001E 03	2.736E 02	6.719E 00	3.432E-02	1.958E 02	4.370E 02
4	5.853E 02	8.207E 01	1.004E 03	2.797E 02	6.709E 00	3.394E-02	1.976E 02	5.227E 02

LOCAL TEST PARAMETERS

TEST D95-42

DATA POINT 13

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.682E 02	6.813E 01	1.085E 03	4.978E 02	5.862E 00	1.364E-02	4.297E 02	3.295E 02
2	6.378E 02	7.360E 01	1.009E 03	3.694E 02	6.097E 00	2.061E-02	2.958E 02	3.807E 02
3	6.073E 02	7.829E 01	9.620E 02	1.411E 02	6.822E 00	1.086E-01	6.283E 01	4.479E 02
4	5.769E 02	8.227E 01	9.640E 02	1.469E 02	6.848E 00	1.060E-01	6.458E 01	5.384E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-43

AF = 0.715E-04

D = 0.433E-02

L = 0.927E 01

DEL R = 0.245E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.505E 02	4.815E 02	4.940E 01	8.240E 01	8.087E-02	1.324E 01	-4.771E 00	1.131E 03
2	7.665E 02	4.895E 02	4.940E 01	9.740E 01	7.311E-02	1.634E 01	-8.589E 00	1.022E 03
3	7.745E 02	4.895E 02	4.950E 01	1.050E 02	7.001E-02	1.737E 01	-1.037E 01	9.792E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-43

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.556E 02	6.627E 01	7.770E 02	1.358E 02	5.021E 00	7.226E-02	6.948E 01	3.293E 02
2	6.121E 02	7.143E 01	7.610E 02	8.700E 01	4.645E 00	2.984E-01	1.556E 01	3.763E 02
3	5.686E 02	7.526E 01	7.860E 02	2.366E 02	4.676E 00	2.898E-02	1.614E 02	4.453E 02
4	5.250E 02	7.838E 01	7.890E 02	2.424E 02	4.670E 00	2.848E-02	1.640E 02	5.382E 02

LOCAL TEST PARAMETERS

TEST D95-43

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.688E 02	7.088E 01	9.760E 02	3.369E 02	5.983E 00	2.249E-02	2.660E 02	3.253E 02
2	6.240E 02	7.729E 01	9.210E 02	2.298E 02	6.108E 00	4.005E-02	1.525E 02	3.987E 02
3	5.791E 02	8.252E 01	8.950E 02	2.129E 02	5.935E 00	4.552E-02	1.304E 02	5.030E 02
4	5.343E 02	8.768E 01	9.110E 02	2.467E 02	5.915E 00	3.719E-02	1.591E 02	6.430E 02

LOCAL TEST PARAMETERS

TEST D95-43

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	6.740E 02	7.286E 01	1.059E 03	4.138E 02	6.300E 00	1.848E-02	3.409E 02	3.253E 02
2	6.278E 02	7.973E 01	9.700E 02	2.464E 02	6.553E 00	3.931E-02	1.667E 02	4.099E 02
3	5.817E 02	8.583E 01	9.450E 02	2.547E 02	6.236E 00	3.693E-02	1.689E 02	5.284E 02
4	5.356E 02	9.208E 01	9.740E 02	3.115E 02	6.162E 00	2.809E-02	2.194E 02	6.844E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D 95-44

AF = 0.238E-03 D = 0.174E-01 L = 0.782E 01 DEL R = 0.200E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.445E 02	7.432E 02	1.174E 02	1.560E 02	2.169E-03	2.954E-01	2.697E-01	9.107E 00
2	7.445E 02	7.432E 02	1.195E 02	2.580E 02	2.101E-03	1.068E 00	-1.054E-01	8.821E 00
3	7.445E 02	7.432E 02	1.244E 02	2.740E 02	1.986E-03	1.079E 00	-2.100E 00	8.339E 00
4	7.445E 02	7.432E 02	1.255E 02	2.840E 02	1.934E-03	1.104E 00	-3.517E 00	8.120E 00
5	7.445E 02	7.432E 02	1.261E 02	3.010E 02	2.011E-03	1.280E 00	-3.215E 00	8.444E 00
6	7.445E 02	7.432E 02	1.266E 02	3.200E 02	1.994E-03	1.470E 00	7.697E-01	8.369E 00
7	7.445E 02	7.432E 02	1.275E 02	3.310E 02	1.964E-03	1.524E 00	4.996E-01	8.244E 00
8	7.445E 02	7.432E 02	1.287E 02	3.700E 02	1.932E-03	2.081E 00	1.440E 01	8.111E 00
9	7.445E 02	7.432E 02	1.300E 02	4.110E 02	1.916E-03	2.071E 00	6.023E-01	8.042E 00
10	4.185E 02	4.180E 02	1.402E 02	2.750E 02	1.403E-03	6.880E-01	7.857E-01	5.889E 00
11	4.185E 02	4.180E 02	1.429E 02	3.150E 02	1.373E-03	8.906E-01	1.805E 00	5.766E 00
12	4.185E 02	4.180E 02	1.456E 02	3.590E 02	1.374E-03	1.086E 00	-1.309E 00	5.766E 00
13	4.185E 02	4.180E 02	1.472E 02	4.210E 02	1.363E-03	1.428E 00	1.410E 00	5.723E 00
14	4.185E 02	4.180E 02	1.493E 02	4.570E 02	1.354E-03	1.597E 00	1.648E 00	5.686E 00

15	4.185E 02	4.180E 02	1.510E 02	4.720E 02	1.350E-03	1.628E 00	2.069E 01	1.291E 03
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TEMPTURE VALUE 0.472000E 03 LARGER THAN TABLE

TEST SECTION

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.442E 02	1.261E 02	2.090E 02	2.055E 02	4.635E-02	5.839E-04	7.939E 01	7.710E 00
2	7.439E 02	1.336E 02	1.940E 02	1.903E 02	4.805E-02	8.475E-04	5.669E 01	8.347E 00
3	7.437E 02	1.411E 02	1.920E 02	1.880E 02	5.073E-02	1.080E-03	4.696E 01	8.977E 00
4	7.434E 02	1.486E 02	1.970E 02	1.932E 02	4.884E-02	1.094E-03	4.466E 01	9.589E 00
5	7.442E 02	1.261E 02	2.290E 02	2.263E 02	3.811E-02	3.806E-04	1.001E 02	7.710E 00
6	7.439E 02	1.336E 02	2.480E 02	2.435E 02	6.614E-02	6.017E-04	1.099E 02	8.347E 00
7	7.437E 02	1.411E 02	2.420E 02	2.386E 02	4.953E-02	5.079E-04	9.751E 01	8.977E 00
8	7.434E 02	1.486E 02	2.430E 02	2.394E 02	5.268E-02	5.801E-04	9.080E 01	9.589E 00

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 2

STA	PR	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.442E 02	1.532E 02	6.780E 02	6.678E 02	2.105E-01	4.092E-04	5.145E 02	9.640E 00
2	7.439E 02	1.810E 02	5.000E 02	4.893E 02	2.007E-01	6.509E-04	3.083E 02	1.172E 01
3	7.437E 02	2.076E 02	4.440E 02	4.342E 02	1.791E-01	7.905E-04	2.266E 02	1.362E 01
4	7.434E 02	2.331E 02	4.570E 02	4.468E 02	1.877E-01	8.779E-04	2.138E 02	1.541E 01
5	7.442E 02	1.532E 02	7.670E 02	7.598E 02	1.548E-01	2.552E-04	6.066E 02	9.640E 00
6	7.439E 02	1.810E 02	6.610E 02	6.486E 02	2.522E-01	5.393E-04	4.677E 02	1.172E 01
7	7.437E 02	2.076E 02	5.940E 02	5.850E 02	1.774E-01	4.701E-04	3.774E 02	1.362E 01
8	7.434E 02	2.331E 02	5.970E 02	5.883E 02	1.716E-01	4.831E-04	3.552E 02	1.541E 01

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.442E 02	1.607E 02	7.170E 02	7.071E 02	2.086E-01	3.819E-04	5.463E 02	9.653E 00	
2	7.439E 02	1.901E 02	5.280E 02	5.176E 02	1.976E-01	6.034E-04	3.275E 02	1.170E 01	
3	7.437E 02	2.181E 02	4.620E 02	4.523E 02	1.795E-01	7.667E-04	2.342E 02	1.358E 01	
4	7.434E 02	2.449E 02	4.790E 02	4.691E 02	1.850E-01	8.255E-04	2.241E 02	1.534E 01	
5	7.442E 02	1.607E 02	8.060E 02	7.988E 02	1.585E-01	2.485E-04	6.380E 02	9.653E 00	
6	7.439E 02	1.901E 02	6.890E 02	6.764E 02	2.606E-01	5.358E-04	4.863E 02	1.170E 01	
7	7.437E 02	2.181E 02	6.160E 02	6.070E 02	1.803E-01	4.636E-04	3.888E 02	1.358E 01	
8	7.434E 02	2.449E 02	6.180E 02	6.093E 02	1.735E-01	4.760E-04	3.644E 02	1.534E 01	

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.442E 02	1.637E 02	7.490E 02	7.390E 02	2.127E-01	3.696E-04	5.753E 02	9.605E 00	
2	7.439E 02	1.944E 02	5.470E 02	5.363E 02	2.061E-01	6.030E-04	3.419E 02	1.168E 01	
3	7.437E 02	2.235E 02	4.730E 02	4.616E 02	2.116E-01	8.886E-04	2.381E 02	1.357E 01	
4	7.434E 02	2.516E 02	4.900E 02	4.795E 02	1.968E-01	8.638E-04	2.279E 02	1.535E 01	
5	7.442E 02	1.637E 02	8.410E 02	8.339E 02	1.594E-01	2.379E-04	6.702E 02	9.605E 00	
6	7.439E 02	1.944E 02	7.110E 02	6.986E 02	2.598E-01	5.153E-04	5.042E 02	1.168E 01	
7	7.437E 02	2.235E 02	6.290E 02	6.197E 02	1.860E-01	4.694E-04	3.962E 02	1.357E 01	
8	7.434E 02	2.516E 02	6.310E 02	6.221E 02	1.790E-01	4.832E-04	3.705E 02	1.535E 01	

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.442E 02	1.687E 02	8.790E 02	8.678E 02	2.545E-01	3.640E-04	6.991E 02	1.034E 01	
2	7.439E 02	2.025E 02	6.110E 02	5.991E 02	2.366E-01	5.965E-04	3.966E 02	1.269E 01	
3	7.437E 02	2.346E 02	5.200E 02	5.083E 02	2.215E-01	8.092E-04	2.737E 02	1.484E 01	
4	7.434E 02	2.655E 02	5.380E 02	5.261E 02	2.288E-01	8.779E-04	2.606E 02	1.687E 01	
5	7.442E 02	1.687E 02	9.960E 02	9.880E 02	1.900E-01	2.319E-04	8.194E 02	1.034E 01	
6	7.439E 02	2.025E 02	7.900E 02	7.806E 02	2.046E-01	3.539E-04	5.781E 02	1.269E 01	
7	7.437E 02	2.346E 02	6.860E 02	6.756E 02	2.144E-01	4.862E-04	4.410E 02	1.484E 01	
8	7.434E 02	2.655E 02	6.890E 02	6.792E 02	2.022E-01	4.887E-04	4.138E 02	1.687E 01	

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.442E 02	1.758E 02	1.078E 03	1.066E 03	3.021E-01	3.395E-04	8.900E 02	1.075E 01
2	7.439E 02	2.144E 02	7.000E 02	6.855E 02	3.010E-01	6.390E-04	4.711E 02	1.337E 01
3	7.437E 02	2.508E 02	5.810E 02	5.679E 02	2.573E-01	8.117E-04	3.170E 02	1.577E 01
4	7.434E 02	2.862E 02	6.040E 02	5.909E 02	2.590E-01	8.500E-04	3.047E 02	1.805E 01
5	7.442E 02	1.758E 02	1.209E 03	1.200E 03	2.270E-01	2.215E-04	1.024E 03	1.075E 01
6	7.439E 02	2.144E 02	9.160E 02	9.004E 02	3.597E-01	5.244E-04	6.860E 02	1.337E 01
7	7.437E 02	2.508E 02	7.690E 02	7.575E 02	2.469E-01	4.873E-04	5.067E 02	1.577E 01
8	7.434E 02	2.862E 02	7.770E 02	7.664E 02	2.291E-01	4.772E-04	4.802E 02	1.805E 01

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.442E 02	1.792E 02	1.131E 03	1.119E 03	3.010E-01	3.202E-04	9.399E 02	1.083E 01
2	7.439E 02	2.196E 02	7.330E 02	7.190E 02	2.958E-01	5.922E-04	4.994E 02	1.351E 01
3	7.437E 02	2.577E 02	6.010E 02	5.881E 02	2.544E-01	7.699E-04	3.304E 02	1.597E 01
4	7.434E 02	2.948E 02	6.220E 02	6.090E 02	2.599E-01	8.274E-04	3.142E 02	1.833E 01
5	7.442E 02	1.792E 02	1.257E 03	1.248E 03	2.274E-01	2.126E-04	1.069E 03	1.083E 01
6	7.439E 02	2.196E 02	9.460E 02	9.306E 02	3.592E-01	5.053E-04	7.110E 02	1.351E 01
7	7.437E 02	2.577E 02	7.870E 02	7.757E 02	2.457E-01	4.743E-04	5.180E 02	1.597E 01
8	7.434E 02	2.948E 02	7.920E 02	7.812E 02	2.364E-01	4.862E-04	4.863E 02	1.833E 01

LOCAL TEST PARAMETERS

TEST L 95-44

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
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1	7.442E 02	1.998E 02	1.512E 03	1.498E 03	4.034E-01	3.107E-04	1.298E 03	1.201E 01
2	7.439E 02	2.535E 02	9.680E 02	9.514E 02	3.911E-01	5.604E-04	6.979E 02	1.544E 01
3	7.437E 02	3.050E 02	7.420E 02	7.252E 02	3.575E-01	8.509E-04	4.201E 02	1.865E 01
4	7.434E 02	3.568E 02	7.290E 02	7.127E 02	3.436E-01	9.655E-04	3.559E 02	2.183E 01
5	7.442E 02	1.998E 02	1.688E 03	1.678E 03	3.041E-01	2.057E-04	1.478E 03	1.201E 01
6	7.439E 02	2.535E 02	1.278E 03	1.260E 03	4.715E-01	4.683E-04	1.007E 03	1.544E 01
7	7.437E 02	3.050E 02	9.940E 02	9.804E 02	3.254E-01	4.819E-04	6.753E 02	1.865E 01
8	7.434E 02	3.568E 02	9.940E 02	9.807E 02	3.173E-01	5.086E-04	6.239E 02	2.183E 01

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.442E 02	2.012E 02	1.557E 03	1.544E 03	3.934E-01	2.931E-04	1.342E 03	1.200E 01
2	7.439E 02	2.550E 02	9.790E 02	9.626E 02	3.892E-01	5.501E-04	7.076E 02	1.541E 01
3	7.437E 02	3.068E 02	7.560E 02	7.403E 02	3.359E-01	7.749E-04	4.335E 02	1.860E 01
4	7.434E 02	3.589E 02	7.780E 02	7.620E 02	3.470E-01	8.609E-04	4.030E 02	2.177E 01
5	7.442E 02	2.012E 02	1.699E 03	1.689E 03	3.033E-01	2.038E-04	1.488E 03	1.200E 01
6	7.439E 02	2.550E 02	1.280E 03	1.262E 03	4.754E-01	4.720E-04	1.007E 03	1.541E 01
7	7.437E 02	3.068E 02	9.920E 02	9.785E 02	3.221E-01	4.795E-04	6.717E 02	1.860E 01
8	7.434E 02	3.589E 02	9.940E 02	9.807E 02	3.173E-01	5.103E-04	6.218E 02	2.177E 01

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.184E 02	1.752E 02	5.560E 02	5.492E 02	1.313E-01	3.510E-04	3.740E 02	1.318E 01
2	4.183E 02	2.022E 02	4.800E 02	4.731E 02	1.292E-01	4.771E-04	2.709E 02	1.537E 01
3	4.182E 02	2.276E 02	4.350E 02	4.284E 02	1.211E-01	6.030E-04	2.007E 02	1.741E 01
4	4.181E 02	2.521E 02	4.520E 02	4.455E 02	1.200E-01	6.206E-04	1.934E 02	1.934E 01
5	4.184E 02	1.752E 02	6.060E 02	5.977E 02	1.653E-01	3.912E-04	4.225E 02	1.318E 01
6	4.183E 02	2.022E 02	5.960E 02	5.903E 02	1.134E-01	2.922E-04	3.881E 02	1.537E 01
7	4.182E 02	2.276E 02	5.450E 02	5.393E 02	1.090E-01	3.495E-04	3.117E 02	1.741E 01
8	4.181E 02	2.521E 02	5.460E 02	5.375E 02	1.639E-01	5.741E-04	2.854E 02	1.934E 01

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 11

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.184E 02	1.884E 02	7.380E 02	7.289E 02	1.940E-01	3.589E-04	5.405E 02	1.396E 01	
2	4.183E 02	2.227E 02	5.980E 02	5.894E 02	1.697E-01	4.628E-04	3.667E 02	1.667E 01	
3	4.182E 02	2.551E 02	5.170E 02	5.087E 02	1.572E-01	6.198E-04	2.536E 02	1.917E 01	
4	4.181E 02	2.866E 02	5.460E 02	5.374E 02	1.657E-01	6.609E-04	2.507E 02	2.159E 01	
5	4.184E 02	1.884E 02	8.050E 02	7.991E 02	1.295E-01	2.121E-04	6.107E 02	1.396E 01	
6	4.183E 02	2.227E 02	7.920E 02	7.821E 02	2.154E-01	3.850E-04	5.594E 02	1.667E 01	
7	4.182E 02	2.551E 02	6.570E 02	6.495E 02	1.531E-01	3.883E-04	3.944E 02	1.917E 01	
8	4.181E 02	2.866E 02	6.590E 02	6.512E 02	1.592E-01	4.367E-04	3.646E 02	2.159E 01	

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 12

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.184E 02	2.002E 02	9.390E 02	9.299E 02	2.124E-01	2.910E-04	7.297E 02	1.490E 01	
2	4.183E 02	2.409E 02	7.090E 02	6.991E 02	2.081E-01	4.542E-04	4.581E 02	1.808E 01	
3	4.182E 02	2.796E 02	5.940E 02	5.845E 02	1.870E-01	6.134E-04	3.049E 02	2.105E 01	
4	4.181E 02	3.178E 02	6.250E 02	6.153E 02	1.944E-01	6.534E-04	2.975E 02	2.396E 01	
5	4.184E 02	2.002E 02	1.014E 03	1.007E 03	1.619E-01	2.006E-04	8.071E 02	1.490E 01	
6	4.183E 02	2.409E 02	8.730E 02	8.614E 02	2.625E-01	4.231E-04	6.205E 02	1.808E 01	
7	4.182E 02	2.796E 02	7.500E 02	7.415E 02	1.814E-01	3.926E-04	4.619E 02	2.105E 01	
8	4.181E 02	3.178E 02	7.520E 02	7.437E 02	1.772E-01	4.159E-04	4.259E 02	2.396E 01	

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 13

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.184E 02	2.180E 02	1.269E 03	1.253E 03	2.869E-01	2.758E-04	1.040E 03	1.617E 01	

2	4.183E 02	2.701E 02	9.260E 02	9.139E 02	2.798E-01	4.345E-04	6.438E 02	2.017E 01
3	4.182E 02	3.207E 02	7.360E 02	7.244E 02	2.464E-01	6.105E-04	4.037E 02	2.399E 01
4	4.181E 02	3.721E 02	7.780E 02	7.663E 02	2.524E-01	6.403E-04	3.942E 02	2.785E 01
5	4.184E 02	2.180E 02	1.403E 03	1.395E 03	2.167E-01	1.841E-04	1.177E 03	1.617E 01
6	4.183E 02	2.701E 02	1.161E 03	1.147E 03	3.468E-01	3.953E-04	8.773E 02	2.017E 01
7	4.182E 02	3.207E 02	9.430E 02	9.328E 02	2.375E-01	3.880E-04	6.121E 02	2.399E 01
8	4.181E 02	3.721E 02	9.440E 02	9.340E 02	2.327E-01	4.141E-04	5.619E 02	2.785E 01

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 14

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.184E 02	2.279E 02	1.449E 03	1.438E 03	3.184E-01	2.632E-04	1.210E 03	1.683E 01	
2	4.183E 02	2.859E 02	1.029E 03	1.016E 03	3.133E-01	4.291E-04	7.302E 02	2.122E 01	
3	4.182E 02	3.430E 02	8.100E 02	7.975E 02	2.745E-01	6.039E-04	4.545E 02	2.550E 01	
4	4.181E 02	4.016E 02	8.460E 02	8.335E 02	2.787E-01	6.454E-04	4.319E 02	2.985E 01	
5	4.184E 02	2.279E 02	1.599E 03	1.591E 03	2.418E-01	1.774E-04	1.363E 03	1.683E 01	
6	4.183E 02	2.859E 02	1.293E 03	1.279E 03	3.798E-01	3.824E-04	9.930E 02	2.122E 01	
7	4.182E 02	3.430E 02	1.044E 03	1.033E 03	2.612E-01	3.784E-04	6.903E 02	2.550E 01	
8	4.181E 02	4.016E 02	1.047E 03	1.037E 03	2.555E-01	4.025E-04	6.349E 02	2.985E 01	

LOCAL TEST PARAMETERS

TEST D 95-44

DATA POINT 15

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.184E 02	2.020E 02	1.469E 03	1.458E 03	3.276E-01	2.610E-04	1.256E 03	1.479E 01	
2	4.183E 02	2.387E 02	1.060E 03	1.047E 03	3.154E-01	3.901E-04	8.084E 02	1.760E 01	
3	4.182E 02	2.724E 02	8.260E 02	8.134E 02	2.779E-01	5.137E-04	5.410E 02	2.015E 01	
4	4.181E 02	3.041E 02	8.620E 02	8.492E 02	2.874E-01	5.272E-04	5.451E 02	2.253E 01	
5	4.184E 02	2.020E 02	1.612E 03	1.604E 03	2.429E-01	1.733E-04	1.402E 03	1.479E 01	
6	4.183E 02	2.387E 02	1.333E 03	1.319E 03	3.884E-01	3.596E-04	1.080E 03	1.760E 01	
7	4.182E 02	2.724E 02	1.073E 03	1.062E 03	2.637E-01	3.338E-04	7.899E 02	2.015E 01	
8	4.181E 02	3.041E 02	1.075E 03	1.065E 03	2.565E-01	3.373E-04	7.605E 02	2.253E 01	

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-46

AF = 0.238E-03 D = 0.174E-01 L = 0.782E 01 DEL R = 0.200E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	7.355E 02	7.325E 02	5.570E 01	1.070E 02	3.187E-02	8.264E 00	1.425E 01	1.338E 02
2	7.375E 02	7.325E 02	5.630E 01	1.170E 02	3.246E-02	1.018E 01	1.748E 01	1.363E 02
3	7.375E 02	7.325E 02	7.220E 01	1.405E 02	3.126E-02	1.339E 01	3.463E 01	1.312E 02
4	7.365E 02	7.325E 02	8.210E 01	1.630E 02	2.878E-02	1.334E 01	3.288E 01	1.208E 02
5	7.485E 02	7.395E 02	5.630E 01	1.268E 02	3.324E-02	1.271E 01	2.319E 01	1.396E 02
6	7.485E 02	7.395E 02	5.550E 01	1.370E 02	3.356E-02	1.458E 01	2.360E 01	1.409E 02
7	7.485E 02	7.395E 02	5.560E 01	1.520E 02	3.354E-02	1.634E 01	2.122E 01	1.408E 02
8	7.485E 02	7.395E 02	5.530E 01	1.510E 02	3.394E-02	1.665E 01	2.232E 01	1.425E 02
9	7.485E 02	7.395E 02	5.540E 01	1.665E 02	3.304E-02	1.767E 01	1.872E 01	1.387E 02
10	7.485E 02	7.395E 02	5.540E 01	1.690E 02	3.357E-02	1.823E 01	1.830E 01	1.409E 02
11	7.485E 02	7.395E 02	5.500E 01	1.720E 02	3.399E-02	1.836E 01	1.567E 01	1.427E 02
12	7.485E 02	7.425E 02	5.630E 01	1.210E 02	3.183E-02	1.120E 01	2.258E 01	1.336E 02
13	7.485E 02	7.425E 02	5.730E 01	1.220E 02	3.253E-02	1.139E 01	2.206E 01	1.366E 02
14	7.425E 02	7.355E 02	5.890E 01	1.087E 02	4.356E-02	1.148E 01	1.718E 01	1.829E 02
15	7.425E 02	7.355E 02	6.900E 01	1.190E 02	4.032E-02	1.158E 01	2.417E 01	1.693E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.348E 02	7.132E 01	4.600E 02	3.725E 02	1.590E 00	5.278E-03	3.012E 02	4.137E 01	
2	7.342E 02	8.195E 01	4.900E 02	4.018E 02	1.632E 00	5.103E-03	3.199E 02	5.307E 01	
3	7.337E 02	9.234E 01	5.340E 02	4.519E 02	1.554E 00	4.322E-03	3.595E 02	6.803E 01	
4	7.331E 02	1.039E 02	5.460E 02	4.625E 02	1.588E 00	4.427E-03	3.586E 02	8.495E 01	
5	7.348E 02	7.132E 01	4.740E 02	4.092E 02	1.194E 00	3.534E-03	3.379E 02	4.137E 01	
6	7.342E 02	8.195E 01	6.310E 02	5.236E 02	2.124E 00	4.809E-03	4.416E 02	5.307E 01	
7	7.337E 02	9.234E 01	7.480E 02	6.789E 02	1.460E 00	2.489E-03	5.865E 02	6.803E 01	
8	7.331E 02	1.039E 02	7.010E 02	6.298E 02	1.468E 00	2.792E-03	5.259E 02	8.495E 01	

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.363E 02	7.458E 01	6.650E 02	5.999E 02	1.319E 00	2.512E-03	5.253E 02	4.511E 01	
2	7.354E 02	8.708E 01	6.370E 02	5.325E 02	2.073E 00	4.655E-03	4.454E 02	6.128E 01	
3	7.344E 02	1.004E 02	6.370E 02	5.383E 02	1.960E 00	4.476E-03	4.379E 02	8.133E 01	
4	7.335E 02	1.156E 02	6.530E 02	5.584E 02	1.895E 00	4.280E-03	4.428E 02	1.031E 02	
5	7.363E 02	7.458E 01	7.050E 02	6.319E 02	1.509E 00	2.708E-03	5.573E 02	4.511E 01	
6	7.354E 02	8.708E 01	8.540E 02	7.366E 02	2.586E 00	3.981E-03	6.496E 02	6.128E 01	
7	7.344E 02	1.004E 02	8.910E 02	8.129E 02	1.762E 00	2.473E-03	7.125E 02	8.133E 01	
8	7.335E 02	1.156E 02	8.170E 02	7.377E 02	1.729E 00	2.780E-03	6.221E 02	1.031E 02	

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.363E 02	9.329E 01	9.920E 02	8.716E 02	2.823E 00	3.627E-03	7.783E 02	6.784E 01	
2	7.354E 02	1.132E 02	8.280E 02	7.050E 02	2.676E 00	4.521E-03	5.918E 02	9.581E 01	
3	7.344E 02	1.359E 02	7.510E 02	6.344E 02	2.445E 00	4.904E-03	4.985E 02	1.250E 02	
4	7.335E 02	1.597E 02	7.330E 02	6.239E 02	2.270E 00	4.889E-03	4.642E 02	1.532E 02	
5	7.363E 02	9.329E 01	9.750E 02	8.831E 02	2.149E 00	2.720E-03	7.898E 02	6.784E 01	
6	7.354E 02	1.132E 02	1.170E 03	1.046E 03	3.138E 00	3.365E-03	9.325E 02	9.581E 01	
7	7.344E 02	1.359E 02	1.018E 03	9.254E 02	2.206E 00	2.794E-03	7.894E 02	1.250E 02	
8	7.335E 02	1.597E 02	8.970E 02	8.068E 02	2.037E 00	3.147E-03	6.471E 02	1.532E 02	

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.356E 02	1.062E 02	9.680E 02	8.480E 02	2.784E 00	3.752E-03	7.418E 02	7.931E 01	
2	7.348E 02	1.301E 02	8.650E 02	7.457E 02	2.643E 00	4.293E-03	6.155E 02	1.084E 02	
3	7.340E 02	1.558E 02	7.560E 02	6.434E 02	2.370E 00	4.860E-03	4.876E 02	1.367E 02	
4	7.333E 02	1.810E 02	7.560E 02	6.454E 02	2.327E 00	5.010E-03	4.644E 02	1.630E 02	
5	7.356E 02	1.062E 02	1.065E 03	9.834E 02	1.986E 00	2.264E-03	8.772E 02	7.931E 01	
6	7.348E 02	1.301E 02	1.237E 03	1.121E 03	3.022E 00	3.051E-03	9.904E 02	1.084E 02	
7	7.340E 02	1.558E 02	1.018E 03	9.288E 02	2.125E 00	2.749E-03	7.730E 02	1.367E 02	
8	7.333E 02	1.810E 02	9.180E 02	8.270E 02	2.075E 00	3.212E-03	6.459E 02	1.630E 02	

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.464E 02	7.817E 01	7.870E 02	6.649E 02	2.604E 00	4.438E-03	5.867E 02	4.976E 01	
2	7.447E 02	9.357E 01	7.670E 02	6.441E 02	2.596E 00	4.716E-03	5.505E 02	7.163E 01	
3	7.430E 02	1.112E 02	7.770E 02	6.612E 02	2.461E 00	4.475E-03	5.500E 02	9.789E 01	
4	7.412E 02	1.312E 02	7.620E 02	6.516E 02	2.330E 00	4.478E-03	5.204E 02	1.254E 02	
5	7.464E 02	7.817E 01	8.200E 02	7.323E 02	1.912E 00	2.924E-03	6.541E 02	4.976E 01	
6	7.447E 02	9.357E 01	1.055E 03	9.261E 02	3.099E 00	3.723E-03	8.326E 02	7.163E 01	
7	7.430E 02	1.112E 02	1.055E 03	9.653E 02	2.170E 00	2.541E-03	8.541E 02	9.789E 01	
8	7.412E 02	1.312E 02	9.360E 02	8.478E 02	2.027E 00	2.829E-03	7.166E 02	1.254E 02	

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.464E 02	8.019E 01	9.410E 02	8.139E 02	2.911E 00	3.968E-03	7.337E 02	5.274E 01
2	7.447E 02	9.808E 01	9.320E 02	8.056E 02	2.883E 00	4.074E-03	7.075E 02	7.917E 01
3	7.430E 02	1.191E 02	8.880E 02	7.629E 02	2.796E 00	4.343E-03	6.438E 02	1.099E 02
4	7.412E 02	1.426E 02	8.360E 02	7.176E 02	2.586E 00	4.497E-03	5.750E 02	1.413E 02
5	7.464E 02	8.019E 01	9.600E 02	8.866E 02	1.710E 00	2.121E-03	8.064E 02	5.274E 01
6	7.447E 02	9.808E 01	1.265E 03	1.196E 03	1.829E 00	1.667E-03	1.098E 03	7.917E 01
7	7.430E 02	1.191E 02	1.267E 03	1.131E 03	3.546E 00	3.503E-03	1.012E 03	1.099E 02
8	7.412E 02	1.426E 02	1.020E 03	9.774E 02	1.024E 00	1.226E-03	8.348E 02	1.413E 02

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.464E 02	8.279E 01	1.206E 03	1.079E 03	3.247E 00	3.259E-03	9.963E 02	5.619E 01
2	7.447E 02	1.034E 02	1.007E 03	8.662E 02	3.311E 00	4.340E-03	7.628E 02	8.706E 01
3	7.430E 02	1.281E 02	9.770E 02	8.444E 02	3.083E 00	4.304E-03	7.163E 02	1.221E 02
4	7.412E 02	1.549E 02	8.350E 02	7.024E 02	2.889E 00	5.276E-03	5.475E 02	1.566E 02
5	7.464E 02	8.279E 01	1.341E 03	1.252E 03	2.411E 00	2.062E-03	1.169E 03	5.619E 01
6	7.447E 02	1.034E 02	1.470E 03	1.373E 03	2.764E 00	2.178E-03	1.269E 03	8.706E 01
7	7.430E 02	1.281E 02	1.356E 03	1.251E 03	2.859E 00	2.547E-03	1.123E 03	1.221E 02
8	7.412E 02	1.549E 02	1.485E 03	1.406E 03	2.258E 00	1.805E-03	1.251E 03	1.566E 02

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
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1	7.464E 02	8.280E 01	1.216E 03	1.090E 03	3.235E 00	3.212E-03	1.007E 03	5.688E 01
2	7.447E 02	1.036E 02	1.089E 03	9.581E 02	3.192E 00	3.735E-03	8.546E 02	8.836E 01
3	7.430E 02	1.285E 02	9.770E 02	8.435E 02	3.101E 00	4.337E-03	7.150E 02	1.241E 02
4	7.412E 02	1.555E 02	8.820E 02	7.545E 02	2.842E 00	4.745E-03	5.989E 02	1.592E 02
5	7.464E 02	8.280E 01	1.352E 03	1.261E 03	2.467E 00	2.094E-03	1.179E 03	5.688E 01
6	7.447E 02	1.036E 02	1.485E 03	1.390E 03	2.703E 00	2.101E-03	1.287E 03	8.836E 01
7	7.430E 02	1.285E 02	1.358E 03	1.255E 03	2.806E 00	2.491E-03	1.126E 03	1.241E 02
8	7.412E 02	1.555E 02	1.066E 03	9.592E 02	2.589E 00	3.221E-03	8.037E 02	1.592E 02

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.464E 02	8.493E 01	1.379E 03	1.252E 03	3.469E 00	2.972E-03	1.167E 03	5.832E 01
2	7.447E 02	1.083E 02	1.094E 03	9.490E 02	3.536E 00	4.206E-03	8.407E 02	9.285E 01
3	7.430E 02	1.363E 02	1.049E 03	9.100E 02	3.328E 00	4.302E-03	7.737E 02	1.309E 02
4	7.412E 02	1.659E 02	9.220E 02	7.872E 02	3.055E 00	4.917E-03	6.214E 02	1.673E 02
5	7.464E 02	8.493E 01	1.567E 03	1.478E 03	2.608E 00	1.871E-03	1.393E 03	5.832E 01
6	7.447E 02	1.083E 02	1.614E 03	1.518E 03	2.876E 00	2.041E-03	1.409E 03	9.285E 01
7	7.430E 02	1.363E 02	1.449E 03	1.342E 03	3.004E 00	2.491E-03	1.206E 03	1.309E 02
8	7.412E 02	1.659E 02	1.120E 03	1.006E 03	2.822E 00	3.358E-03	8.402E 02	1.673E 02

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.464E 02	8.532E 01	1.384E 03	1.253E 03	3.573E 00	3.059E-03	1.168E 03	5.982E 01
2	7.447E 02	1.091E 02	1.113E 03	9.654E 02	3.627E 00	4.237E-03	8.562E 02	9.562E 01
3	7.430E 02	1.377E 02	1.057E 03	9.134E 02	3.448E 00	4.446E-03	7.757E 02	1.348E 02
4	7.412E 02	1.677E 02	9.330E 02	7.937E 02	3.171E 00	5.066E-03	6.260E 02	1.722E 02
5	7.464E 02	8.532E 01	1.599E 03	1.509E 03	2.668E 00	1.874E-03	1.424E 03	5.982E 01
6	7.447E 02	1.091E 02	1.735E 03	1.647E 03	2.746E 00	1.786E-03	1.538E 03	9.562E 01
7	7.430E 02	1.377E 02	1.449E 03	1.344E 03	2.951E 00	2.447E-03	1.206E 03	1.348E 02
8	7.412E 02	1.677E 02	1.124E 03	1.009E 03	2.862E 00	3.403E-03	8.410E 02	1.722E 02

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 11

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.464E 02	8.492E 01	1.375E 03	1.244E 03	3.584E 00	3.093E-03	1.159E 03	5.799E 01
2	7.447E 02	1.086E 02	1.113E 03	9.628E 02	3.688E 00	4.318E-03	8.542E 02	9.598E 01
3	7.430E 02	1.369E 02	1.055E 03	9.104E 02	3.470E 00	4.487E-03	7.735E 02	1.353E 02
4	7.412E 02	1.666E 02	9.370E 02	7.971E 02	3.189E 00	5.059E-03	6.305E 02	1.731E 02
5	7.464E 02	8.492E 01	1.578E 03	1.487E 03	2.682E 00	1.913E-03	1.402E 03	5.999E 01
6	7.447E 02	1.086E 02	1.650E 03	1.556E 03	2.851E 00	1.970E-03	1.447E 03	9.598E 01
7	7.430E 02	1.369E 02	1.551E 03	1.451E 03	2.922E 00	2.224E-03	1.314E 03	1.353E 02
8	7.412E 02	1.666E 02	1.174E 03	1.064E 03	2.782E 00	3.100E-03	8.975E 02	1.731E 02

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 12

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.471E 02	7.669E 01	7.010E 02	5.870E 02	2.334E 00	4.573E-03	5.103E 02	4.600E 01
2	7.460E 02	9.083E 01	6.460E 02	5.318E 02	2.272E 00	5.153E-03	4.410E 02	6.451E 01
3	7.448E 02	1.065E 02	7.220E 02	6.151E 02	2.213E 00	4.350E-03	5.087E 02	8.687E 01
4	7.437E 02	1.243E 02	7.390E 02	6.414E 02	2.042E 00	3.949E-03	5.170E 02	1.109E 02
5	7.471E 02	7.669E 01	7.310E 02	6.482E 02	1.729E 00	3.026E-03	5.715E 02	4.600E 01
6	7.460E 02	9.083E 01	8.340E 02	7.036E 02	2.841E 00	4.636E-03	6.128E 02	6.451E 01
7	7.448E 02	1.065E 02	9.590E 02	8.733E 02	1.991E 00	2.597E-03	7.668E 02	8.687E 01
8	7.437E 02	1.243E 02	8.860E 02	8.044E 02	1.835E 00	2.698E-03	6.801E 02	1.109E 02

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 13

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	7.471E 02	7.730E 01	7.490E 02	6.399E 02	2.288E 00	4.066E-03	5.626E 02	4.768E 01

2	7.460E 02	9.136E 01	6.850E 02	5.739E 02	2.256E 00	4.675E-03	4.826E 02	6.671E 01
3	7.448E 02	1.070E 02	7.140E 02	6.094E 02	2.157E 00	4.293E-03	5.025E 02	8.954E 01
4	7.437E 02	1.249E 02	7.190E 02	6.177E 02	2.096E 00	4.253E-03	4.929E 02	1.141E 02
5	7.471E 02	7.730E 01	7.830E 02	7.024E 02	1.727E 00	2.763E-03	6.251E 02	4.768E 01
6	7.460E 02	9.136E 01	8.860E 02	7.579E 02	2.860E 00	4.291E-03	6.665E 02	6.671E 01
7	7.448E 02	1.070E 02	9.450E 02	8.523E 02	1.911E 00	2.530E-03	7.553E 02	8.954E 01
8	7.437E 02	1.249E 02	8.740E 02	7.898E 02	1.884E 00	2.834E-03	6.649E 02	1.141E 02

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 14

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.409E 02	7.398E 01	7.660E 02	6.565E 02	2.317E 00	3.978E-03	5.825E 02	5.950E 01	
2	7.395E 02	8.460E 01	6.290E 02	5.163E 02	2.224E 00	5.151E-03	4.317E 02	7.700E 01	
3	7.382E 02	9.538E 01	5.850E 02	4.777E 02	2.073E 00	5.423E-03	3.823E 02	9.846E 01	
4	7.368E 02	1.074E 02	6.050E 02	4.385E 02	2.078E 00	5.313E-03	3.911E 02	1.223E 02	
5	7.409E 02	7.398E 01	8.250E 02	7.485E 02	1.674E 00	2.482E-03	6.745E 02	5.950E 01	
6	7.395E 02	8.460E 01	8.140E 02	6.882E 02	2.717E 00	4.501E-03	6.036E 02	7.700E 01	
7	7.382E 02	9.538E 01	7.620E 02	6.769E 02	1.805E 00	3.104E-03	5.815E 02	9.846E 01	
8	7.368E 02	1.074E 02	7.430E 02	6.554E 02	1.839E 00	3.356E-03	5.480E 02	1.223E 02	

LOCAL TEST PARAMETERS

TEST D95-46

DATA POINT 15

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	7.409E 02	8.345E 01	7.830E 02	6.542E 02	2.737E 00	4.795E-03	5.708E 02	6.914E 01	
2	7.395E 02	9.517E 01	6.410E 02	5.128E 02	2.539E 00	6.080E-03	4.176E 02	9.053E 01	
3	7.382E 02	1.084E 02	5.810E 02	4.605E 02	2.319E 00	6.586E-03	3.521E 02	1.146E 02	
4	7.368E 02	1.230E 02	5.940E 02	4.763E 02	2.281E 00	6.456E-03	3.533E 02	1.397E 02	
5	7.409E 02	8.345E 01	8.450E 02	7.630E 02	1.809E 00	2.662E-03	6.796E 02	6.914E 01	
6	7.395E 02	9.517E 01	8.300E 02	7.230E 02	2.751E 00	4.521E-03	6.084E 02	9.053E 01	
7	7.382E 02	1.084E 02	7.510E 02	6.541E 02	1.832E 00	3.296E-03	5.557E 02	1.146E 02	
8	7.368E 02	1.230E 02	7.190E 02	5.330E 02	1.785E 00	3.500E-03	5.100E 02	1.397E 02	

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TEST D95-47A

AF = 0.238E-03 D = 0.174E-01 L = 0.782E 01 DEL R = 0.200E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	4.485E 02	4.465E 02	5.320E 01	8.900E 01	3.163E-02	7.956E 00	2.214E 01	1.328E 02
2	4.485E 02	4.465E 02	5.320E 01	9.000E 01	3.199E-02	8.113E 00	2.108E 01	1.343E 02
3	4.485E 02	4.465E 02	5.320E 01	9.500E 01	3.127E-02	8.834E 00	2.200E 01	1.313E 02
4	4.485E 02	4.465E 02	5.320E 01	9.500E 01	3.163E-02	8.916E 00	2.182E 01	1.328E 02
5	4.485E 02	4.465E 02	5.320E 01	1.010E 02	3.252E-02	1.025E 01	2.287E 01	1.365E 02
6	4.485E 02	4.465E 02	5.320E 01	1.170E 02	3.163E-02	1.241E 01	2.395E 01	1.328E 02
7	4.485E 02	4.465E 02	5.450E 01	1.260E 02	3.272E-02	1.405E 01	2.464E 01	1.374E 02
8	4.485E 02	4.465E 02	6.120E 01	1.500E 02	3.036E-02	1.403E 01	1.907E 01	1.275E 02
9	4.255E 02	4.175E 02	5.320E 01	1.780E 02	3.100E-02	1.816E 01	1.450E 01	1.302E 02

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-47A

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.480E 02	6.632E 01	5.220E 02	4.463E 02	1.424E 00	3.748E-03	3.800E 02	4.456E 01	
2	4.477E 02	7.312E 01	6.120E 02	5.344E 02	1.526E 00	3.308E-03	4.613E 02	6.163E 01	
3	4.473E 02	8.054E 01	5.910E 02	5.161E 02	1.458E 00	3.347E-03	4.356E 02	8.460E 01	
4	4.469E 02	9.078E 01	6.160E 02	5.518E 02	1.269E 00	2.752E-03	4.610E 02	1.124E 02	
5	4.480E 02	6.632E 01	5.410E 02	4.823E 02	1.117E 00	2.686E-03	4.160E 02	4.456E 01	
6	4.477E 02	7.312E 01	8.080E 02	7.178E 02	1.953E 00	3.029E-03	6.447E 02	6.163E 01	
7	4.473E 02	8.054E 01	7.510E 02	6.841E 02	1.415E 00	2.345E-03	6.036E 02	8.460E 01	
8	4.469E 02	9.078E 01	7.470E 02	6.828E 02	1.355E 00	2.289E-03	5.921E 02	1.124E 02	

LOCAL TEST PARAMETERS

TEST D95-47A

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.480E 02	6.640E 01	5.340E 02	4.586E 02	1.428E 00	3.642E-03	3.922E 02	4.520E 01	
2	4.477E 02	7.320E 01	6.180E 02	5.379E 02	1.580E 00	3.400E-03	4.647E 02	6.258E 01	
3	4.473E 02	8.078E 01	5.980E 02	5.209E 02	1.507E 00	3.425E-03	4.401E 02	8.625E 01	
4	4.469E 02	9.125E 01	6.250E 02	5.550E 02	1.389E 00	2.994E-03	4.638E 02	1.149E 02	
5	4.480E 02	6.640E 01	5.550E 02	4.951E 02	1.148E 00	2.677E-03	4.287E 02	4.520E 01	
6	4.477E 02	7.320E 01	8.260E 02	7.330E 02	2.031E 00	3.079E-03	6.598E 02	6.258E 01	
7	4.473E 02	8.078E 01	7.650E 02	6.964E 02	1.460E 00	2.372E-03	6.156E 02	8.625E 01	
8	4.469E 02	9.125E 01	7.580E 02	6.942E 02	1.355E 00	2.248E-03	6.029E 02	1.149E 02	

LOCAL TEST PARAMETERS

TEST D95-47A

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.480E 02	6.742E 01	5.420E 02	4.595E 02	1.566E 00	3.994E-03	3.921E 02		4.598E 01
2	4.477E 02	7.492E 01	6.700E 02	5.847E 02	1.727E 00	3.388E-03	5.098E 02		6.649E 01
3	4.473E 02	8.429E 01	6.740E 02	5.935E 02	1.635E 00	3.210E-03	5.092E 02		9.419E 01
4	4.469E 02	9.711E 01	6.680E 02	5.935E 02	1.510E 00	3.043E-03	4.964E 02		1.263E 02
5	4.480E 02	6.742E 01	5.620E 02	4.976E 02	1.238E 00	2.878E-03	4.302E 02		4.598E 01
6	4.477E 02	7.492E 01	8.980E 02	7.997E 02	2.217E 00	3.059E-03	7.248E 02		6.649E 01
7	4.473E 02	8.429E 01	8.600E 02	7.889E 02	1.583E 00	2.247E-03	7.046E 02		9.419E 01
8	4.469E 02	9.711E 01	8.000E 02	7.315E 02	1.484E 00	2.340E-03	6.344E 02		1.263E 02

LOCAL TEST PARAMETERS

TEST D95-47A

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.480E 02	6.742E 01	5.580E 02	4.762E 02	1.565E 00	3.829E-03	4.088E 02		4.651E 01
2	4.477E 02	7.484E 01	6.810E 02	5.967E 02	1.716E 00	3.288E-03	5.219E 02		6.702E 01
3	4.473E 02	8.422E 01	6.730E 02	5.917E 02	1.650E 00	3.251E-03	5.075E 02		9.507E 01
4	4.469E 02	9.695E 01	6.660E 02	5.957E 02	1.424E 00	2.855E-03	4.988E 02		1.274E 02
5	4.480E 02	6.742E 01	5.790E 02	5.151E 02	1.239E 00	2.767E-03	4.477E 02		4.651E 01
6	4.477E 02	7.484E 01	9.140E 02	8.172E 02	2.200E 00	2.964E-03	7.424E 02		6.702E 01
7	4.473E 02	8.422E 01	8.580E 02	7.861E 02	1.599E 00	2.278E-03	7.019E 02		9.507E 01
8	4.469E 02	9.695E 01	7.960E 02	7.280E 02	1.470E 00	2.330E-03	6.310E 02		1.274E 02

LOCAL TEST PARAMETERS

TEST D95-47A

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.480E 02	6.851E 01	6.340E 02	5.431E 02	1.805E 00	3.803E-03	4.746E 02	5.015E 01	
2	4.477E 02	7.695E 01	7.680E 02	6.752E 02	1.972E 00	3.296E-03	5.982E 02	7.570E 01	
3	4.473E 02	8.867E 01	7.410E 02	6.455E 02	2.001E 00	3.594E-03	5.568E 02	1.100E 02	
4	4.469E 02	1.043E 02	6.980E 02	6.151E 02	1.702E 00	3.332E-03	5.109E 02	1.479E 02	
5	4.480E 02	6.851E 01	6.600E 02	5.877E 02	1.459E 00	2.811E-03	5.192E 02	5.015E 01	
6	4.477E 02	7.695E 01	1.053E 03	1.008E 03	1.102E 00	1.184E-03	9.308E 02	7.570E 01	
7	4.473E 02	8.867E 01	9.440E 02	8.645E 02	1.836E 00	2.366E-03	7.759E 02	1.100E 02	
8	4.469E 02	1.043E 02	8.290E 02	7.536E 02	1.655E 00	2.549E-03	6.493E 02	1.479E 02	

LOCAL TEST PARAMETERS

TEST D95-47A

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.480E 02	7.101E 01	7.580E 02	6.516E 02	2.243E 00	3.863E-03	5.806E 02	5.524E 01	
2	4.477E 02	8.281E 01	9.110E 02	8.063E 02	2.373E 00	3.280E-03	7.235E 02	9.103E 01	
3	4.473E 02	1.008E 02	8.750E 02	7.753E 02	2.225E 00	3.298E-03	6.745E 02	1.360E 02	
4	4.469E 02	1.227E 02	7.630E 02	6.683E 02	2.005E 00	3.674E-03	5.456E 02	1.824E 02	
5	4.480E 02	7.101E 01	7.950E 02	7.118E 02	1.794E 00	2.799E-03	6.408E 02	5.524E 01	
6	4.477E 02	8.281E 01	1.276E 03	1.163E 03	2.981E 00	2.760E-03	1.080E 03	9.103E 01	
7	4.473E 02	1.008E 02	1.113E 03	1.025E 03	2.181E 00	2.360E-03	9.243E 02	1.360E 02	
8	4.469E 02	1.227E 02	8.980E 02	8.123E 02	1.938E 00	2.811E-03	6.895E 02	1.824E 02	

LOCAL TEST PARAMETERS

TEST D95-47A

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.480E 02	7.278E 01	8.980E 02	7.858E 02	2.525E 00	3.542E-03	7.130E 02	6.260E 01	
2	4.477E 02	8.700E 01	9.890E 02	8.762E 02	2.643E 00	3.349E-03	7.892E 02	1.060E 02	
3	4.473E 02	1.084E 02	9.210E 02	8.136E 02	2.445E 00	3.468E-03	7.052E 02	1.581E 02	
4	4.469E 02	1.333E 02	7.880E 02	6.837E 02	2.233E 00	4.058E-03	5.503E 02	2.102E 02	
5	4.480E 02	7.278E 01	9.610E 02	8.715E 02	2.081E 00	2.605E-03	7.987E 02	6.260E 01	
6	4.477E 02	8.700E 01	1.411E 03	1.293E 03	3.281E 00	2.721E-03	1.206E 03	1.060E 02	
7	4.473E 02	1.084E 02	1.176E 03	1.085E 03	2.316E 00	2.372E-03	9.765E 02	1.581E 02	
8	4.469E 02	1.333E 02	9.350E 02	8.414E 02	2.148E 00	3.033E-03	7.081E 02	2.102E 02	

LOCAL TEST PARAMETERS

TEST D95-47A

DATA POINT 8

STA	PR	TB	TW	TI	Q/A	H	DEL	TF	VS
-----	----	----	----	----	-----	---	-----	----	----

1	4.480E 02	7.784E 01	1.033E 03	9.140E 02	2.840E 00	3.397E-03	8.361E 02	7.324E 01
2	4.477E 02	9.698E 01	9.940E 02	8.794E 02	2.690E 00	3.438E-03	7.825E 02	1.221E 02
3	4.473E 02	1.225E 02	9.230E 02	8.150E 02	2.460E 00	3.552E-03	6.925E 02	1.746E 02
4	4.469E 02	1.499E 02	7.990E 02	6.923E 02	2.294E 00	4.229E-03	5.425E 02	2.248E 02
5	4.480E 02	7.784E 01	1.124E 03	1.033E 03	2.268E 00	2.374E-03	9.551E 02	7.324E 01
6	4.477E 02	9.698E 01	1.415E 03	1.296E 03	3.313E 00	2.765E-03	1.199E 03	1.221E 02
7	4.473E 02	1.225E 02	1.159E 03	1.065E 03	2.364E 00	2.507E-03	9.428E 02	1.746E 02
8	4.469E 02	1.499E 02	9.500E 02	8.542E 02	2.213E 00	3.142E-03	7.043E 02	2.248E 02

LOCAL TEST PARAMETERS

TEST D95- 47A

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.236E 02	7.632E 01	1.229E 03	1.102E 03	3.274E 00	3.191E-03	1.026E 03	7.519E 01
2	4.221E 02	1.016E 02	1.259E 03	1.131E 03	3.350E 00	3.255E-03	1.029E 03	1.436E 02
3	4.206E 02	1.355E 02	1.201E 03	1.076E 03	3.194E 00	3.396E-03	9.405E 02	2.154E 02
4	4.190E 02	1.700E 02	1.075E 03	9.508E 02	3.015E 00	3.861E-03	7.808E 02	2.814E 02
5	4.236E 02	7.632E 01	1.356E 03	1.264E 03	2.514E 00	2.117E-03	1.187E 03	7.519E 01
6	4.221E 02	1.016E 02	1.737E 03	1.643E 03	2.917E 00	1.892E-03	1.542E 03	1.436E 02
7	4.206E 02	1.355E 02	1.536E 03	1.429E 03	3.108E 00	2.403E-03	1.293E 03	2.154E 02
8	4.190E 02	1.700E 02	1.242E 03	1.132E 03	2.852E 00	2.963E-03	9.624E 02	2.814E 02

LIQUID SIDE HEAT TRANSFER TEST DATA

OVERALL TEST PARAMETERS

TLST D95-47B

AF = 0.238E-03 D = 0.174E-01 L = 0.782E 01 DEL R = 0.200E-03

DATA POINTS

POINT	PB-IN	PB-OUT	TB-IN	TB-OUT	W	QP	HT BAL	G
1	4.395E 02	4.345E 02	5.150E 01	8.200E 01	3.284E-02	6.787E 00	1.702E 01	1.379E 02
2	4.395E 02	4.345E 02	5.260E 01	7.250E 01	3.275E-02	6.815E 00	4.797E 01	1.375E 02
3	4.385E 02	4.245E 02	5.320E 01	1.085E 02	3.246E-02	7.942E 00	-1.133E 01	1.363E 02
4	4.385E 02	4.255E 02	5.450E 01	1.200E 02	3.182E-02	8.710E 00	-1.180E 01	1.336E 02
5	4.385E 02	4.245E 02	6.060E 01	1.360E 02	3.011E-02	9.225E 00	-8.677E 00	1.264E 02
6	4.315E 02	4.195E 02	5.100E 01	1.222E 02	3.304E-02	1.135E 01	5.225E 00	1.387E 02
7	4.315E 02	4.175E 02	5.060E 01	1.310E 02	3.226E-02	1.243E 01	7.815E 00	1.354E 02
8	4.315E 02	4.175E 02	5.100E 01	1.390E 02	3.272E-02	1.363E 01	8.865E 00	1.374E 02
9	4.315E 02	4.175E 02	5.150E 01	1.410E 02	3.263E-02	1.380E 01	9.132E 00	1.370E 02
10	4.335E 02	4.175E 02	5.160E 01	1.700E 02	3.107E-02	1.589E 01	6.397E 00	1.304E 02
11	4.335E 02	4.145E 02	5.290E 01	1.800E 02	3.282E-02	1.712E 01	2.457E 00	1.378E 02
12	4.335E 02	4.145E 02	5.290E 01	1.780E 02	3.265E-02	1.733E 01	5.444E 00	1.371E 02
13	4.335E 02	4.145E 02	5.260E 01	1.880E 02	3.239E-02	1.827E 01	4.701E 00	1.360E 02

PREHEATER

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.388E 02	5.564E 01	1.660E 02	1.343E 02	3.517E-01	4.473E-03	7.862E 01	3.611E 01
2	4.380E 02	5.923E 01	1.920E 02	1.640E 02	3.445E-01	3.289E-03	1.047E 02	3.854E 01
3	4.373E 02	6.236E 01	2.100E 02	1.840E 02	3.395E-01	2.792E-03	1.216E 02	4.136E 01

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.388E 02	5.658E 01	1.660E 02	1.341E 02	3.531E-01	4.554E-03	7.754E 01	3.657E 01
2	4.380E 02	6.010E 01	1.920E 02	1.638E 02	3.459E-01	3.335E-03	1.037E 02	3.914E 01
3	4.373E 02	6.307E 01	2.100E 02	1.839E 02	3.409E-01	2.822E-03	1.208E 02	4.205E 01

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.358E 02	5.703E 01	3.530E 02	3.443E 02	1.478E-01	5.145E-04	2.873E 02	3.656E 01
2	4.330E 02	6.039E 01	4.980E 02	4.909E 02	1.341E-01	3.114E-04	4.305E 02	3.914E 01
3	4.303E 02	6.320E 01	5.850E 02	5.785E 02	1.276E-01	2.476E-04	5.153E 02	4.202E 01

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL TI	VS
1	4.358E 02	5.825E 01	3.530E 02	3.442E 02	1.495E-01	5.220E-04	2.860E 02	3.662E 01
2	4.330E 02	6.145E 01	4.980E 02	4.908E 02	1.357E-01	3.160E-04	4.293E 02	3.930E 01
3	4.303E 02	6.427E 01	5.850E 02	5.784E 02	1.291E-01	2.511E-04	5.142E 02	4.245E 01

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.358E 02	6.357E 01	3.530E 02	3.444E 02	1.461E-01	5.200E-04	2.809E 02	3.922E 01
2	4.330E 02	6.607E 01	4.980E 02	4.909E 02	1.325E-01	3.118E-04	4.249E 02	4.262E 01
3	4.303E 02	6.826E 01	5.850E 02	5.786E 02	1.260E-01	2.470E-04	5.103E 02	4.706E 01

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.298E 02	5.436E 01	3.090E 02	3.018E 02	1.169E-01	4.723E-04	2.474E 02	3.574E 01
2	4.280E 02	5.733E 01	3.900E 02	3.838E 02	1.104E-01	3.382E-04	3.264E 02	3.750E 01
3	4.263E 02	5.998E 01	4.590E 02	4.533E 02	1.054E-01	2.679E-04	3.933E 02	3.959E 01

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.298E 02	5.404E 01	3.090E 02	3.017E 02	1.184E-01	4.782E-04	2.477E 02	3.473E 01
2	4.280E 02	5.708E 01	3.900E 02	3.837E 02	1.119E-01	3.427E-04	3.266E 02	3.646E 01
3	4.263E 02	5.990E 01	4.590E 02	4.532E 02	1.068E-01	2.716E-04	3.933E 02	3.858E 01

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.298E 02	5.436E 01	3.090E 02	3.017E 02	1.176E-01	4.753E-04	2.474E 02	3.540E 01	
2	4.280E 02	5.733E 01	3.900E 02	3.837E 02	1.112E-01	3.406E-04	3.264E 02	3.714E 01	
3	4.263E 02	6.006E 01	4.590E 02	4.533E 02	1.061E-01	2.699E-04	3.932E 02	3.928E 01	

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 9

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.298E 02	5.478E 01	3.090E 02	3.017E 02	1.184E-01	4.797E-04	2.469E 02	3.552E 01	
2	4.280E 02	5.775E 01	3.900E 02	3.837E 02	1.119E-01	3.434E-04	3.259E 02	3.729E 01	
3	4.263E 02	6.041E 01	4.590E 02	4.532E 02	1.068E-01	2.719E-04	3.928E 02	3.948E 01	

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.315E 02	5.504E 01	3.090E 02	3.016E 02	1.200E-01	4.867E-04	2.466E 02	3.394E 01	
2	4.295E 02	5.816E 01	3.900E 02	3.836E 02	1.134E-01	3.485E-04	3.254E 02	3.577E 01	
3	4.275E 02	6.090E 01	4.590E 02	4.532E 02	1.082E-01	2.758E-04	3.923E 02	3.800E 01	

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 11

STA	PB	TP	TA	TI	Q/A	H	DEL	TF	VS
1	4.315E 02	5.618E 01	2.900E 02	2.822E 02	1.233E-01	5.455E-04	2.260E 02	3.520E 01	
2	4.295E 02	5.907E 01	3.930E 02	3.865E 02	1.147E-01	3.503E-04	3.274E 02	3.520E 01	
3	4.275E 02	6.157E 01	4.560E 02	4.501E 02	1.099E-01	2.828E-04	3.885E 02	4.077E 01	

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 12

STA	PB	TP	TA	TI	Q/A	H	DEL	TF	VS
1	4.315E 02	5.618E 01	2.900E 02	2.822E 02	1.233E-01	5.455E-04	2.260E 02	3.520E 01	
2	4.295E 02	5.907E 01	3.930E 02	3.865E 02	1.147E-01	3.503E-04	3.274E 02	3.520E 01	
3	4.275E 02	6.165E 01	4.560E 02	4.501E 02	1.099E-01	2.828E-04	3.884E 02	4.062E 01	

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 13

STA	PB	TP	TA	TI	Q/A	H	DEL	TF	VS
1	4.315E 02	5.596E 01	2.900E 02	2.822E 02	1.233E-01	5.449E-04	2.262E 02	3.520E 01	
2	4.295E 02	5.885E 01	3.930E 02	3.865E 02	1.147E-01	3.501E-04	3.277E 02	3.520E 01	
3	4.275E 02	6.151E 01	4.590E 02	4.531E 02	1.096E-01	2.800E-04	3.916E 02	4.077E 01	

TEST SECTION

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 1

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.360E 02	7.127E 01	4.930E 02	4.474E 02	8.521E-01	2.266E-03	3.761E 02	5.968E 01
2	4.357E 02	7.509E 01	3.430E 02	2.922E 02	8.381E-01	3.861E-03	2.171E 02	7.281E 01
3	4.353E 02	7.970E 01	3.230E 02	2.714E 02	8.278E-01	4.317E-03	1.917E 02	8.824E 01
4	4.349E 02	8.541E 01	3.410E 02	2.900E 02	8.394E-01	4.103E-03	2.046E 02	1.056E 02
5	4.360E 02	7.127E 01	5.260E 02	4.858E 02	7.623E-01	1.839E-03	4.145E 02	5.968E 01
6	4.357E 02	7.509E 01	4.550E 02	3.915E 02	1.158E 00	3.660E-03	3.164E 02	7.281E 01
7	4.353E 02	7.970E 01	4.360E 02	3.900E 02	8.314E-01	2.679E-03	3.103E 02	8.824E 01
8	4.349E 02	8.541E 01	4.210E 02	3.758E 02	8.078E-01	2.781E-03	2.904E 02	1.056E 02

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 2

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.360E 02	7.135E 01	4.930E 02	4.474E 02	8.521E-01	2.266E-03	3.760E 02	5.980E 01
2	4.357E 02	7.526E 01	3.430E 02	2.922E 02	8.381E-01	3.863E-03	2.169E 02	7.318E 01
3	4.353E 02	7.994E 01	3.230E 02	2.764E 02	7.507E-01	3.821E-03	1.965E 02	8.879E 01
4	4.349E 02	8.572E 01	3.410E 02	2.900E 02	8.394E-01	4.109E-03	2.043E 02	1.062E 02
5	4.360E 02	7.135E 01	5.260E 02	4.863E 02	7.514E-01	1.811E-03	4.150E 02	5.980E 01
6	4.357E 02	7.526E 01	4.550E 02	3.915E 02	1.158E 00	3.662E-03	3.162E 02	7.318E 01
7	4.353E 02	7.994E 01	4.360E 02	3.881E 02	8.667E-01	2.813E-03	3.081E 02	8.879E 01
8	4.349E 02	8.572E 01	4.210E 02	3.746E 02	8.292E-01	2.870E-03	2.889E 02	1.062E 02

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 3

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.268E 02	7.203E 01	5.780E 02	5.192E 02	1.140E 00	2.550E-03	4.472E 02	6.250E 01	
2	4.262E 02	7.718E 01	3.860E 02	3.276E 02	1.007E 00	4.023E-03	2.504E 02	8.111E 01	
3	4.257E 02	8.390E 01	3.620E 02	3.075E 02	9.185E-01	4.109E-03	2.235E 02	1.026E 02	
4	4.251E 02	9.226E 01	3.710E 02	3.133E 02	9.796E-01	4.432E-03	2.210E 02	1.260E 02	
5	4.268E 02	7.203E 01	6.320E 02	5.840E 02	9.595E-01	1.874E-03	5.120E 02	6.280E 01	
6	4.262E 02	7.718E 01	4.900E 02	4.138E 02	1.414E 00	4.192E-03	3.366E 02	8.111E 01	
7	4.257E 02	8.390E 01	4.530E 02	3.973E 02	1.016E 00	3.243E-03	3.134E 02	1.026E 02	
8	4.251E 02	9.226E 01	4.360E 02	3.827E 02	9.613E-01	3.309E-03	2.905E 02	1.260E 02	

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 4

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.270E 02	7.309E 01	6.830E 02	6.172E 02	1.345E 00	2.472E-03	5.441E 02	6.527E 01	
2	4.267E 02	7.942E 01	4.390E 02	3.744E 02	1.165E 00	3.950E-03	2.949E 02	8.670E 01	
3	4.263E 02	8.802E 01	4.370E 02	3.789E 02	1.047E 00	3.598E-03	2.909E 02	1.120E 02	
4	4.259E 02	9.848E 01	4.140E 02	3.522E 02	1.093E 00	4.308E-03	2.537E 02	1.387E 02	
5	4.270E 02	7.309E 01	7.570E 02	7.056E 02	1.094E 00	1.729E-03	6.325E 02	6.527E 01	
6	4.267E 02	7.942E 01	5.580E 02	4.714E 02	1.655E 00	4.223E-03	3.920E 02	8.670E 01	
7	4.263E 02	8.802E 01	5.050E 02	4.407E 02	1.204E 00	3.414E-03	3.527E 02	1.120E 02	
8	4.259E 02	9.848E 01	4.960E 02	4.352E 02	1.134E 00	3.367E-03	3.367E 02	1.387E 02	

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 5

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.268E 02	7.435E 01	7.160E 02	6.468E 02	1.439E 00	2.514E-03	5.724E 02	6.596E 01	
2	4.262E 02	8.232E 01	4.550E 02	3.841E 02	1.290E 00	4.275E-03	3.018E 02	9.059E 01	
3	4.257E 02	9.318E 01	4.260E 02	3.619E 02	1.143E 00	4.253E-03	2.688E 02	1.189E 02	
4	4.251E 02	1.060E 02	4.300E 02	3.664E 02	1.138E 00	4.370E-03	2.604E 02	1.480E 02	
5	4.268E 02	7.435E 01	7.930E 02	7.383E 02	1.184E 00	1.784E-03	6.639E 02	6.596E 01	
6	4.262E 02	8.232E 01	5.850E 02	4.944E 02	1.755E 00	4.259E-03	4.120E 02	9.059E 01	
7	4.257E 02	9.318E 01	5.220E 02	4.588E 02	1.192E 00	3.259E-03	3.656E 02	1.189E 02	
8	4.251E 02	1.060E 02	5.090E 02	4.469E 02	1.165E 00	3.419E-03	3.409E 02	1.480E 02	

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 6

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.233E 02	7.381E 01	9.410E 02	8.537E 02	2.011E 00	2.578E-03	7.799E 02	7.107E 01
2	4.224E 02	8.358E 01	5.640E 02	4.730E 02	1.744E 00	4.478E-03	3.894E 02	1.043E 02
3	4.214E 02	9.741E 01	5.290E 02	4.433E 02	1.617E 00	4.676E-03	3.459E 02	1.429E 02
4	4.205E 02	1.138E 02	5.150E 02	4.333E 02	1.533E 00	4.797E-03	3.195E 02	1.824E 02
5	4.233E 02	7.381E 01	1.069E 03	1.004E 03	1.588E 00	1.707E-03	9.302E 02	7.107E 01
6	4.224E 02	8.358E 01	7.220E 02	6.122E 02	2.273E 00	4.299E-03	5.286E 02	1.043E 02
7	4.214E 02	9.741E 01	6.230E 02	5.406E 02	1.629E 00	3.676E-03	4.432E 02	1.429E 02
8	4.205E 02	1.138E 02	5.990E 02	5.221E 02	1.503E 00	3.681E-03	4.083E 02	1.824E 02

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 7

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.229E 02	7.529E 01	1.012E 03	9.200E 02	2.185E 00	2.587E-03	8.447E 02	7.474E 01
2	4.215E 02	8.755E 01	6.160E 02	5.178E 02	1.930E 00	4.485E-03	4.302E 02	1.136E 02
3	4.202E 02	1.046E 02	5.720E 02	4.800E 02	1.769E 00	4.710E-03	3.755E 02	1.570E 02
4	4.188E 02	1.241E 02	5.500E 02	4.623E 02	1.670E 00	4.939E-03	3.382E 02	2.011E 02
5	4.229E 02	7.529E 01	1.158E 03	1.092E 03	1.681E 00	1.654E-03	1.016E 03	7.474E 01
6	4.215E 02	8.755E 01	7.850E 02	6.688E 02	2.478E 00	4.263E-03	5.813E 02	1.136E 02
7	4.202E 02	1.046E 02	6.720E 02	5.894E 02	1.674E 00	3.454E-03	4.848E 02	1.570E 02
8	4.188E 02	1.241E 02	6.430E 02	5.633E 02	1.592E 00	3.625E-03	4.392E 02	2.011E 02

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 8

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
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1	4.229E 02	7.623E 01	1.079E 03	9.833E 02	2.338E 00	2.578E-03	9.070E 02	7.921E 01
2	4.215E 02	9.061E 01	6.680E 02	5.645E 02	2.087E 00	4.403E-03	4.739E 02	1.237E 02
3	4.202E 02	1.101E 02	6.220E 02	5.265E 02	1.883E 00	4.520E-03	4.165E 02	1.723E 02
4	4.188E 02	1.319E 02	5.940E 02	5.004E 02	1.820E 00	4.939E-03	3.685E 02	2.205E 02
5	4.229E 02	7.623E 01	1.242E 03	1.171E 03	1.867E 00	1.706E-03	1.094E 03	7.921E 01
6	4.215E 02	9.061E 01	8.510E 02	7.272E 02	2.720E 00	4.273E-03	6.366E 02	1.237E 02
7	4.202E 02	1.101E 02	7.240E 02	6.314E 02	1.924E 00	3.691E-03	5.213E 02	1.723E 02
8	4.188E 02	1.319E 02	7.000E 02	6.151E 02	1.746E 00	3.614E-03	4.832E 02	2.205E 02

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 9

STA	PB	TR	TW	TI	Q/A	H	DEL	TF	VS
1	4.229E 02	7.650E 01	1.103E 03	1.009E 03	2.330E 00	2.500E-03	9.320E 02	7.989E 01	
2	4.215E 02	9.127E 01	6.810E 02	5.798E 02	2.054E 00	4.204E-03	4.886E 02	1.251E 02	
3	4.202E 02	1.113E 02	6.350E 02	5.393E 02	1.899E 00	4.437E-03	4.281E 02	1.745E 02	
4	4.188E 02	1.335E 02	6.030E 02	5.103E 02	1.810E 00	4.804E-03	3.768E 02	2.233E 02	
5	4.229E 02	7.650E 01	1.274E 03	1.202E 03	1.905E 00	1.692E-03	1.126E 03	7.989E 01	
6	4.215E 02	9.127E 01	8.720E 02	7.456E 02	2.804E 00	4.285E-03	6.544E 02	1.251E 02	
7	4.202E 02	1.113E 02	7.420E 02	6.496E 02	1.938E 00	3.599E-03	5.383E 02	1.745E 02	
8	4.188E 02	1.335E 02	7.070E 02	6.194E 02	1.807E 00	3.719E-03	4.858E 02	2.233E 02	

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 10

STA	PB	TB	TW	TI	Q/A	H	DEL	TF	VS
1	4.236E 02	8.051E 01	1.261E 03	1.160E 03	2.656E 00	2.461E-03	1.079E 03	8.869E 01	
2	4.221E 02	1.018E 02	8.080E 02	6.979E 02	2.378E 00	3.989E-03	5.961E 02	1.442E 02	
3	4.206E 02	1.284E 02	7.420E 02	6.366E 02	2.204E 00	4.337E-03	5.082E 02	2.017E 02	
4	4.190E 02	1.560E 02	7.000E 02	5.956E 02	2.140E 00	4.868E-03	4.396E 02	2.558E 02	
5	4.236E 02	8.051E 01	1.472E 03	1.398E 03	2.121E 00	1.611E-03	1.317E 03	8.869E 01	
6	4.221E 02	1.018E 02	1.023E 03	8.879E 02	3.203E 00	4.074E-03	7.861E 02	1.442E 02	
7	4.206E 02	1.284E 02	8.550E 02	7.571E 02	2.165E 00	3.443E-03	6.287E 02	2.017E 02	
8	4.190E 02	1.560E 02	8.230E 02	7.279E 02	2.074E 00	3.626E-03	5.719E 02	2.558E 02	

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 11

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.229E 02	8.071E 01	1.316E 03	1.210E 03	2.836E 00	2.511E-03	1.129E 03	9.453E 01
2	4.208E 02	1.027E 02	8.530E 02	7.347E 02	2.604E 00	4.121E-03	6.320E 02	1.552E 02
3	4.187E 02	1.302E 02	7.810E 02	6.681E 02	2.404E 00	4.469E-03	5.379E 02	2.177E 02
4	4.166E 02	1.584E 02	7.360E 02	6.246E 02	2.320E 00	4.976E-03	4.663E 02	2.764E 02
5	4.229E 02	8.071E 01	1.536E 03	1.457E 03	2.295E 00	1.667E-03	1.376E 03	9.453E 01
6	4.208E 02	1.027E 02	1.085E 03	9.431E 02	3.449E 00	4.104E-03	8.404E 02	1.552E 02
7	4.187E 02	1.302E 02	9.040E 02	7.987E 02	2.380E 00	3.561E-03	6.685E 02	2.177E 02
8	4.166E 02	1.584E 02	8.590E 02	7.554E 02	2.293E 00	3.841E-03	5.970E 02	2.764E 02

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 12

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.229E 02	8.118E 01	1.333E 03	1.225E 03	2.904E 00	2.538E-03	1.144E 03	9.552E 01
2	4.208E 02	1.038E 02	8.680E 02	7.498E 02	2.620E 00	4.056E-03	6.460E 02	1.569E 02
3	4.187E 02	1.319E 02	7.940E 02	6.802E 02	2.438E 00	4.446E-03	5.484E 02	2.201E 02
4	4.166E 02	1.606E 02	7.470E 02	6.354E 02	2.339E 00	4.926E-03	4.747E 02	2.794E 02
5	4.229E 02	8.118E 01	1.559E 03	1.479E 03	2.359E 00	1.688E-03	1.397E 03	9.552E 01
6	4.208E 02	1.038E 02	1.109E 03	9.659E 02	3.514E 00	4.076E-03	8.620E 02	1.569E 02
7	4.187E 02	1.319E 02	9.280E 02	8.148E 02	2.582E 00	3.781E-03	6.829E 02	2.201E 02
8	4.166E 02	1.606E 02	8.770E 02	7.674E 02	2.444E 00	4.028E-03	6.068E 02	2.794E 02

LOCAL TEST PARAMETERS

TEST D95-47B

DATA POINT 13

STA	PB	TB	TW	TI	Q/A	H	DEL TF	VS
1	4.229E 02	8.276E 01	1.388E 03	1.278E 03	3.037E 00	2.542E-03	1.195E 03	9.963E 01

2	4.208E 02	1.081E 02	9.130E 02	7.877E 02	2.835E 00	4.171E-03	6.796E 02	1.056E 02
3	4.187E 02	1.384E 02	8.330E 02	7.126E 02	2.627E 00	4.574E-03	5.742E 02	2.17E 02
4	4.166E 02	1.688E 02	7.810E 02	6.601E 02	2.572E 00	5.234E-03	4.913E 02	2.720E 02
5	4.229E 02	8.276E 01	1.559E 03	1.475E 03	2.468E 00	1.773E-03	1.392E 03	2.463E 01
6	4.208E 02	1.081E 02	1.109E 03	9.556E 02	3.760E 00	4.437E 02	8.475E 02	1.55E 02
7	4.187E 02	1.384E 02	9.280E 02	8.066E 02	2.766E 00	4.140E-03	6.682E 02	2.517E 02
8	4.166E 02	1.688E 02	8.770E 02	7.603E 02	2.600E 00	4.396E-03	5.915E 02	2.730E 02

1401 MESSAGE FOLLOWS

* * * NEXT JOB WANTS TEAR-OFF - IN 1 COPIES (OR PARTS) * * *

\$ID MCKITTRICK F3020413 027 C2050416PM 2015 05-28-63 030099 11.017

8458 LINES CUPUT THIS JOB.

APPENDIX D
COMPUTER REGRESSION ANALYSIS

HEAT TRANSFER CORRELATION DATA

Printout Symbols

B_w	Bulk modulus for evaluating reference temperature, $R_{ref} = T_w B_w + (1 - B_w) T_b$
H	Local heat transfer coefficient, Btu/in. ² -sec-°R
TW	Local inside wall temperature, °R
P-INF	Local fluid pressure, psia
W	Mass rate of flow, lb/sec
T-INF	Local fluid temperature, °R
D	Inside diameter of tube, in.
L	Heated length of tube to station, in.
RC	Radius of curvature of tube, in.
REF	Reynolds number evaluated at reference temperature, $\frac{D \rho V}{\mu_{ref}} (\rho_{ref}/\rho_b)$
STF	Stanton number evaluated at reference temperature, $\frac{h}{C_p \rho V} (\rho_b/\rho_{ref})$
PRF	Prandtl number evaluated at reference temperature, $(C_p \mu/k)_{ref}$
TW/T-INF	Local wall-to-bulk temperature ratio

Regression Curve Print Out

X_1, X_2, X_5	Variables evaluated in analysis (see Equation 19 in text).
X_1	Prandtl number
X_2	Reynolds number
X_5	Temperature ratio, $T_w/T-INF$
Case number..., "Title"	- Denotes data incorporated in analysis, and date of analysis.
BW	Bulk modulus for evaluating reference temperature $BW = 0 ; T_{ref} = \text{Local bulk temperature, } T_b$ $BW = 1 ; T_{ref} = \text{Local wall temperature, } T_w$

10-A0	Coefficient of equation
A1	Exponent of variable X1
A2	Exponent of variable X2
A5	Exponent of variable X5
SE A0/A0	Standard error for coefficient of the equation
SEA1/A1	Standard error for Prandtl number exponent
SEA2/A2	Standard error for Reynolds number exponent
SEA5/A5	Standard error for wall-to-bulk temperature ratio
R2	Regression coefficient of equation.

H E A T T R A N S F E R C O R R E L A T I O N D A T A

FOR X1, X2, X5

CASE NUMBER D95LC - SA TEST DATA

3-20-63

BL = 0.

H	Th	P-INF	W	T-INF	D	L	RL	ReF	STF	PRF	TW/T-INF
3.335E-02	6.823E 01	7.670E 02	1.020E-01	5.751E 01	2.150E-01	4.000E 00	0.	1.043E 06	3.412E-03	1.299E 00	1.186E 00
2.979E-02	7.568E 01	7.670E 02	1.042E-01	5.710E 01	2.150E-01	4.000E 00	0.	1.053E 06	3.017E-03	1.298E 00	1.325E 00
1.507E-02	1.079E 02	7.670E 02	1.041E-01	5.703E 01	2.150E-01	4.000E 00	0.	1.050E 06	1.531E-03	1.298E 00	1.892E 00
1.432E-02	1.351E 02	7.665E 02	1.051E-01	5.805E 01	2.150E-01	4.000E 00	0.	1.093E 06	1.401E-03	1.299E 00	2.327E 00
1.344E-02	1.336E 02	6.815E 02	1.068E-01	5.421E 01	2.150E-01	4.000E 00	0.	1.038E 06	1.376E-03	1.307E 00	2.464E 00
7.875E-03	7.599E 02	6.810E 02	1.055E-01	5.712E 01	2.150E-01	4.000E 00	0.	1.121E 06	7.462E-04	1.319E 00	4.550E 00
7.839E-03	2.613E 02	6.810E 02	1.054E-01	5.772E 01	2.150E-01	4.000E 00	0.	1.141E 06	7.303E-04	1.320E 00	4.527E 00
7.141E-03	3.525E 02	7.060E 02	1.061E-01	5.952E 01	2.150E-01	4.000E 00	0.	1.196E 06	6.392E-04	1.313E 00	5.922E 00
5.651E-03	4.257E 02	7.060E 02	1.061E-01	5.990E 01	2.150E-01	4.000E 00	0.	1.211E 06	5.005E-04	1.313E 00	7.107E 00
5.485E-03	4.754E 02	7.058E 02	1.057E-01	6.123E 01	2.150E-01	4.000E 00	0.	1.259E 06	4.675E-04	1.319E 00	7.764E 00
4.982E-03	5.363E 02	6.725E 02	1.064E-01	6.074E 01	2.150E-01	4.000E 00	0.	1.277E 06	4.179E-04	1.326E 00	8.829E 00
3.675E-03	7.904E 02	6.720E 02	1.070E-01	6.279E 01	2.150E-01	4.000E 00	0.	1.378E 06	2.905E-04	1.316E 00	1.259E 01
3.765E-03	7.873E 02	6.720E 02	1.050E-01	6.355E 01	2.150E-01	4.000E 00	0.	1.388E 06	2.978E-04	1.309E 00	1.239E 01
4.796E-03	6.558E 02	7.030E 02	1.070E-01	6.312E 01	2.150E-01	4.000E 00	0.	1.359E 06	3.848E-04	1.307E 00	1.039E 01
3.482E-03	9.089E 02	7.025E 02	1.077E-01	6.435E 01	2.150E-01	4.000E 00	0.	1.427E 06	2.697E-04	1.296E 00	1.412E 01
3.237E-03	9.630E 02	7.011E 02	1.077E-01	7.068E 01	2.150E-01	6.000E 00	0.	1.798E 06	2.194E-04	1.216E 00	1.362E 01
3.586E-03	1.028E 03	7.080E 02	1.069E-01	6.694E 01	2.150E-01	4.000E 00	0.	1.545E 06	2.656E-04	1.266E 00	1.536E 01
3.442E-03	1.065E 03	7.023E 02	1.069E-01	7.413E 01	2.150E-01	6.000E 00	0.	2.032E 06	2.215E-04	1.161E 00	1.437E 01
3.659E-03	1.020E 03	7.081E 02	1.069E-01	6.714E 01	2.150E-01	4.000E 00	0.	1.556E 06	2.698E-04	1.264E 00	1.519E 01
3.466E-03	1.067E 03	7.024E 02	1.069E-01	7.433E 01	2.150E-01	6.000E 00	0.	2.046E 06	2.225E-04	1.158E 00	1.435E 01
8.328E-03	2.480E 02	6.781E 02	1.068E-01	5.785E 01	2.150E-01	4.000E 00	0.	1.163E 06	7.613E-04	1.321E 00	4.287E 00
5.779E-03	4.398E 02	6.766E 02	1.055E-01	6.085E 01	2.150E-01	4.000E 00	0.	1.267E 06	4.885E-04	1.326E 00	7.228E 00
4.993E-03	5.683E 02	6.762E 02	1.047E-01	6.257E 01	2.150E-01	4.000E 00	0.	1.333E 06	4.067E-04	1.317E 00	9.083E 00
6.255E-03	4.009E 02	6.856E 02	1.072E-01	5.915E 01	2.150E-01	4.000E 00	0.	1.211E 06	5.525E-04	1.318E 00	6.778E 00
4.412E-03	7.352E 02	6.847E 02	1.045E-01	6.396E 01	2.150E-01	4.000E 00	0.	1.387E 06	3.505E-04	1.303E 00	1.149E 01
4.270E-03	3.164E 02	6.842E 02	1.060E-01	6.498E 01	2.150E-01	4.000E 00	0.	1.459E 06	3.270E-04	1.292E 00	1.256E 01
4.086E-03	7.702E 02	6.735E 02	1.075E-01	6.319E 01	2.150E-01	4.000E 00	0.	1.402E 06	3.187E-04	1.312E 00	1.219E 01
3.878E-03	8.866E 02	6.731E 02	1.060E-01	6.483E 01	2.150E-01	4.000E 00	0.	1.466E 06	2.955E-04	1.295E 00	1.368E 01
3.590E-03	1.045E 03	6.726E 02	1.030E-01	6.709E 01	2.150E-01	4.000E 00	0.	1.549E 06	2.676E-04	1.268E 00	1.558E 01
3.458E-03	1.080E 03	6.707E 02	1.030E-01	7.420E 01	2.150E-01	6.000E 00	0.	2.048E 06	2.245E-04	1.161E 00	1.456E 01
3.536E-03	1.019E 03	6.725E 02	1.067E-01	6.595E 01	2.150E-01	4.000E 00	0.	1.538E 06	2.613E-04	1.280E 00	1.545E 01
3.391E-03	1.056E 03	6.706E 02	1.067E-01	7.275E 01	2.150E-01	6.000E 00	0.	2.005E 06	2.179E-04	1.183E 00	1.452E 01
3.702E-03	1.073E 03	6.725E 02	1.028E-01	6.819E 01	2.150E-01	4.000E 00	0.	1.613E 06	2.697E-04	1.254E 00	1.574E 01

3.615E-03	1.098E 03	6.705E 02	1.028E-01	7.561E 01	2.150E-01	6.000E 00	0.	2.156E 06	2.309E-04	1.135E 00	1.452E 01
8.664E-03	7.306E 02	6.760E 02	1.148E-01	5.663E 01	1.520E-01	2.000E 00	0.	1.697E 06	3.832E-04	1.318E 00	1.290E 01
7.261E-03	8.414E 02	6.695E 02	1.148E-01	6.140E 01	1.520E-01	3.000E 00	0.	1.989E 06	2.774E-04	1.326E 00	1.370E 01
9.197E-03	7.051E 02	6.630E 02	1.148E-01	6.554E 01	1.520E-01	4.000E 00	0.	2.317E 06	3.175E-04	1.286E 00	1.076E 01
9.825E-03	6.667E 02	7.082E 02	1.148E-01	5.618E 01	1.520E-01	2.000E 00	0.	1.643E 06	4.491E-04	1.310E 00	1.187E 01
7.900E-03	7.938E 02	7.003E 02	1.148E-01	6.110E 01	1.520E-01	3.000E 00	0.	1.925E 06	3.109E-04	1.321E 00	1.299E 01
9.771E-03	6.775E 02	6.924E 02	1.148E-01	6.540E 01	1.520E-01	4.000E 00	0.	2.243E 06	3.459E-04	1.285E 00	1.036E 01
7.426E-03	9.624E 02	7.058E 02	1.156E-01	5.802E 01	1.520E-01	2.000E 00	0.	1.752E 06	3.188E-04	1.315E 00	1.659E 01
7.116E-03	9.993E 02	6.977E 02	1.156E-01	6.341E 01	1.520E-01	3.000E 00	0.	2.097E 06	2.624E-04	1.306E 00	1.576E 01
9.458E-03	8.051E 02	6.896E 02	1.156E-01	6.810E 01	1.520E-01	4.000E 00	0.	2.500E 06	3.123E-04	1.255E 00	1.182E 01
6.734E-03	1.098E 03	7.023E 02	1.151E-01	5.922E 01	1.520E-01	2.000E 00	0.	1.815E 06	2.805E-04	1.315E 00	1.854E 01
7.155E-03	1.052E 03	6.931E 02	1.151E-01	6.477E 01	1.520E-01	3.000E 00	0.	2.198E 06	2.561E-04	1.293E 00	1.624E 01
9.815E-03	8.263E 02	6.838E 02	1.151E-01	6.953E 01	1.520E-01	4.000E 00	0.	2.644E 06	3.149E-04	1.234E 00	1.188E 01
1.579E-02	4.671E 02	7.378E 02	1.444E-01	5.559E 01	1.520E-01	2.000E 00	0.	1.997E 06	5.938E-04	1.303E 00	8.403E 00
1.103E-02	6.206E 02	7.277E 02	1.444E-01	6.012E 01	1.520E-01	3.000E 00	0.	2.305E 06	3.633E-04	1.308E 00	1.032E 01
1.221E-02	5.772E 02	7.176E 02	1.444E-01	6.403E 01	1.520E-01	4.000E 00	0.	2.636E 06	3.606E-04	1.296E 00	9.015E 00
1.493E-02	5.181E 02	7.334E 02	1.472E-01	5.542E 01	1.520E-01	2.000E 00	0.	2.030E 06	5.521E-04	1.303E 00	9.349E 00
1.132E-02	6.483E 02	7.231E 02	1.472E-01	6.011E 01	1.520E-01	3.000E 00	0.	2.356E 06	3.647E-04	1.309E 00	1.079E 01
1.376E-02	5.603E 02	7.128E 02	1.472E-01	6.417E 01	1.520E-01	4.000E 00	0.	2.710E 06	3.960E-04	1.296E 00	8.731E 00
2.265E-02	3.388E 02	6.669E 02	1.868E-01	5.337E 01	1.520E-01	2.000E 00	0.	2.512E 06	6.759E-04	1.309E 00	6.348E 00
1.946E-02	3.860E 02	6.524E 02	1.868E-01	5.727E 01	1.520E-01	3.000E 00	0.	2.859E 06	5.114E-04	1.324E 00	6.740E 00
2.264E-02	3.462E 02	6.380E 02	1.868E-01	6.079E 01	1.520E-01	4.000E 00	0.	3.245E 06	5.293E-04	1.333E 00	5.695E 00
2.456E-02	3.425E 02	6.394E 02	1.959E-01	5.559E 01	1.520E-01	2.000E 00	0.	2.865E 06	6.441E-04	1.319E 00	6.161E 00
1.956E-02	4.144E 02	6.237E 02	1.959E-01	5.911E 01	1.520E-01	3.000E 00	0.	3.246E 06	4.567E-04	1.328E 00	7.011E 00
1.996E-02	4.108E 02	6.081E 02	1.959E-01	6.223E 01	1.520E-01	4.000E 00	0.	3.669E 06	4.188E-04	1.330E 00	6.601E 00
1.840E-02	4.654E 02	7.342E 02	1.553E-01	5.568E 01	1.520E-01	2.000E 00	0.	2.158E 06	6.405E-04	1.304E 00	8.358E 00
1.229E-02	6.426E 02	7.223E 02	1.553E-01	6.029E 01	1.520E-01	3.000E 00	0.	2.501E 06	3.728E-04	1.310E 00	1.066E 01
1.484E-02	5.578E 02	7.104E 02	1.553E-01	6.428E 01	1.520E-01	4.000E 00	0.	2.875E 06	4.031E-04	1.295E 00	8.678E 00
9.136E-03	9.384E 02	7.666E 02	1.325E-01	6.034E 01	1.520E-01	2.000E 00	0.	2.078E 06	3.348E-04	1.297E 00	1.555E 01
8.453E-03	1.002E 03	7.559E 02	1.325E-01	6.573E 01	1.520E-01	3.000E 00	0.	2.486E 06	2.705E-04	1.267E 00	1.524E 01
1.192E-02	7.690E 02	7.452E 02	1.325E-01	7.050E 01	1.520E-01	4.000E 00	0.	2.961E 06	3.432E-04	1.213E 00	1.091E 01
4.282E-02	1.928E 02	7.269E 02	2.188E-01	5.731E 01	1.520E-01	2.000E 00	0.	3.205E 06	1.005E-03	1.309E 00	3.364E 00
3.297E-02	2.363E 02	7.058E 02	2.188E-01	5.981E 01	1.520E-01	3.000E 00	0.	3.507E 06	7.124E-04	1.313E 00	3.951E 00
3.187E-02	2.452E 02	6.846E 02	2.188E-01	6.200E 01	1.520E-01	4.000E 00	0.	3.825E 06	6.361E-04	1.319E 00	3.955E 00
3.224E-02	2.987E 02	7.330E 02	2.074E-01	6.287E 01	1.520E-01	2.000E 00	0.	3.602E 06	6.894E-04	1.301E 00	4.751E 00
2.540E-02	3.619E 02	7.108E 02	2.074E-01	6.568E 01	1.520E-01	3.000E 00	0.	4.029E 06	5.017E-04	1.279E 00	5.510E 00
2.635E-02	3.542E 02	6.887E 02	2.074E-01	6.811E 01	1.520E-01	4.000E 00	0.	4.491E 06	4.845E-04	1.255E 00	5.200E 00
2.750E-02	4.159E 02	7.367E 02	2.069E-01	5.926E 01	1.520E-01	2.000E 00	0.	3.198E 06	6.514E-04	1.306E 00	7.018E 00
1.743E-02	6.029E 02	7.123E 02	2.069E-01	6.309E 01	1.520E-01	3.000E 00	0.	3.673E 06	3.658E-04	1.305E 00	9.556E 00
1.624E-02	7.715E 02	7.678E 02	1.672E-01	7.839E 01	1.520E-01	2.000E 00	0.	4.793E 06	3.424E-04	1.067E 00	9.842E 00
1.292E-02	9.290E 02	7.413E 02	1.672E-01	8.222E 01	1.520E-01	3.000E 00	0.	5.547E 06	2.668E-04	9.812E-01	1.130E 01
1.621E-02	7.790E 02	7.149E 02	1.672E-01	8.574E 01	1.520E-01	4.000E 00	0.	6.205E 06	3.448E-04	8.843E-01	9.086E 00
1.517E-02	7.580E 02	7.351E 02	1.870E-01	6.048E 01	1.520E-01	2.000E 00	0.	3.005E 06	3.833E-04	1.308E 00	1.253E 01

1.3201-02	8.524E 02	7.109L 02	1.870L-01	6.517L 01	1.520F-01	3.0 00 00	0.	3.567 06	2.323E-04	1.285 00	1.308E 01
1.432-02	3.020E 02	6.867-02	1.870L-01	6.916E 01	1.520E-01	4.000F 00	0.	4.221 06	2.55E-04	1.240L 00	1.160E 01
1.867-02	5.514E 02	7.507F 02	1.899E-01	6.150E 01	1.520E-01	2.000L 00	0.	3.160 06	4.493E-04	1.309L 00	1.059E 01
1.243-02	9.096L 02	7.063 02	1.899E-01	6.596F 01	1.520E-01	3.000 00	0.	3.739 06	2.657E-04	1.275-00	1.379E 01
1.509F-02	7.817E 02	6.815F 02	1.899E-01	6.971E 01	1.520E-01	4.000 00	0.	4.402 06	2.719E-04	1.231L 00	1.121E 01
1.800E-02	2.702E 02	5.250F 02	1.104E-01	5.648F 01	1.520E-01	2.000L 00	0.	1.436 06	9.114E-04	1.281-00	4.784E 00
1.277-02	3.524F 02	7.982E 02	1.104 -01	6.012E 01	1.520E-01	3.000 00	0.	1.667 06	5.768E-04	1.28 00	5.862L 00
1.224F-02	7.662E 02	7.713L 02	1.104E-01	6.302L 01	1.520E-01	4.000F 00	0.	1.876 06	5.047E-04	1.277L 00	5.811L 00
1.595E-02	2.568E 02	2.213F 02	1.108E-01	5.524L 01	1.520E-01	2.000 00	0.	1.452 06	5.789E-04	1.283L 00	5.192E 00
1.283L-02	3.408F 02	7.957F 02	1.108E-01	5.60F 01	1.520E-01	3.000F 00	0.	1.621 06	6.011E-04	1.289 00	5.816F 00
1.189 -02	2.637F 02	7.701F 02	1.108E-01	6.157E 01	1.520E-01	4.000 00	0.	1.801 06	5.051E-04	1.235L 00	5.907L 00
1.551-02	2.883L 02	7.627F 02	1.105E-01	5.467E 01	1.520E-01	2.000F 00	0.	1.438 06	7.435E-04	1.296L 00	5.273F 00
1.209E-02	3.511E 02	7.577 02	1.105E-01	6.780E 01	1.520E-01	3.000E 00	0.	1.614 06	5.611E-04	1.301F 00	6.074F 00
1.147F-02	3.677E 02	7.526 02	1.105E-01	6.089E 01	1.520E-01	4.000 00	0.	1.737 06	4.934E-04	1.304F 00	6.059F 00
1.405L-02	2.107 02	7.616L 02	1.109E-01	5.447F 01	1.520E-01	2.000L 00	0.	1.465 06	7.194E-04	1.296L 00	5.704E 00
1.082F-02	3.811L 02	7.559F 02	1.109E-01	6.768F 01	1.520E-01	3.000E 00	0.	1.616 06	5.050E-04	1.302E 00	6.607E 00
1.081 -02	3.840E 02	7.502E 02	1.109E-01	6.057F 01	1.520E-01	4.000E 00	0.	1.770 06	4.645E-04	1.304F 00	6.340L 00
1.335E-02	3.079L 02	7.500 02	1.105E-01	5.621E 01	1.520E-01	2.000 00	0.	1.546 06	6.494E-04	1.301F 00	5.478E 00
1.146E-02	3.47F 02	7.449F 02	1.105E-01	5.910L 01	1.520E-01	3.000L 00	0.	1.691 06	5.133E-04	1.304E 00	5.880E 00
1.270L-02	4.402L 02	7.439F 02	1.155E-01	5.602E 01	1.520E-01	2.000 00	0.	1.613 06	5.921E-04	1.302E 00	7.858E 00
1.027E-02	5.211L 02	7.356L 02	1.155E-01	5.970E 01	1.520E-01	3.000 00	0.	1.811 06	4.304E-04	1.303E 00	8.729E 00
1.015F-02	5.288E 02	7.276E 02	1.155E-01	6.238E 01	1.520E-01	4.000L 00	0.	2.021 06	3.771E-04	1.301L 00	8.396E 00
1.187L-02	4.638E 02	7.409L 02	1.157E-01	5.550E 01	1.520E-01	2.000 00	0.	1.591 06	5.606E-04	1.301L 00	8.357E 00
9.327F-02	5.605L 02	7.358F 02	1.157E-01	5.517E 01	1.520E-01	3.000 00	0.	1.784 06	3.953E-03	1.306F 00	9.473E 00
9.259E-02	5.665F 02	7.276F 02	1.157E-01	6.253E 01	1.520E-01	4.000 00	0.	1.935 06	3.763E-03	1.304L 00	9.060F 00
1.141 -02	4.612L 02	7.439L 02	1.155E-01	5.634E 01	1.520E-01	2.000 00	0.	1.628 06	5.270E-04	1.305E 00	8.541E 00
8.752 -03	5.422E 02	7.35E 02	1.155E-01	6.040E 01	1.520E-01	3.000 00	0.	1.850 06	3.591E-04	1.307L 00	9.805F 00
8.754F-03	5.521E 02	7.276F 02	1.155E-01	6.400E 01	1.520E-01	4.000 00	0.	2.091 06	3.259E-04	1.293L 00	9.300E 00
1.126L-02	5.000F 02	7.489F 02	1.115E-01	5.714E 01	1.520E-01	2.000 00	0.	1.605 06	5.262E-04	1.303F 00	8.750E 00
8.247F-03	5.378E 02	7.40E 02	1.115E-01	6.136E 01	1.520E-01	3.000L 00	0.	1.835 06	3.421E-04	1.307E 00	1.039E 01
8.303L-03	6.378L 02	7.326 02	1.115E-01	6.519E 01	1.520E-01	4.000 00	0.	2.092 06	3.135E-04	1.280F 00	9.784E 00
1.139L-02	5.147E 02	7.619L 02	1.116E-01	6.794E 01	1.520E-01	2.000 00	0.	1.633 06	5.266E-04	1.300E 00	8.883E 00
8.605L-03	6.414E 02	7.538E 02	1.116E-01	6.216F 01	1.520E-01	3.000 00	0.	1.808 06	3.535E-04	1.298L 00	1.032E 01
8.825L-03	6.326E 02	7.456F 02	1.116E-01	6.599E 01	1.520E-01	4.000 00	0.	2.130 06	3.507E-04	1.267E 00	9.586E 00
1.124L-02	5.194E 02	7.619L 02	1.125E-01	5.712E 01	1.520E-01	2.000 00	0.	1.606 06	5.272E-04	1.300E 00	9.093F 00
8.542F-03	6.445F 02	7.538F 02	1.125E-01	6.142F 01	1.520E-01	3.000 00	0.	1.839 06	3.542E-04	1.302E 00	1.049E 01
8.705L-03	6.385F 02	7.456F 02	1.125E-01	6.532E 01	1.520E-01	4.000L 00	0.	2.099 06	3.281E-04	1.275E 00	9.775E 00
1.053 -02	5.459E 02	7.619L 02	1.108E-01	5.683E 01	1.520E-01	2.000 00	0.	1.569 06	5.076E-04	1.294F 00	9.606E 00
8.050L-03	6.739F 02	7.538E 02	1.108E-01	6.121E 01	1.520E-01	3.000 00	0.	1.800 06	3.406E-04	1.303F 00	1.101E 01
8.269E-03	6.636E 02	7.456E 02	1.108E-01	6.512E 01	1.520E-01	4.000 00	0.	2.053 06	3.178E-04	1.277L 00	1.019E 01
9.848E-03	5.895E 02	7.619E 02	1.090E-01	5.722E 01	1.520E-01	2.000 00	0.	1.561 06	4.755E-04	1.300E 00	1.030E 01
7.564E-03	7.249E 02	7.538E 02	1.090E-01	6.176E 01	1.520E-01	3.000 00	0.	1.801 06	3.211E-04	1.300E 00	1.174E 01
7.797F-03	7.118L 02	7.456L 02	1.090E-01	6.582E 01	1.520E-01	4.000E 00	0.	2.068 06	3.002E-04	1.269F 00	1.081E 01

0.000E-03	5.871E 02	7.609E 02	1.118E-01	5.709E 01	1.520E-01	2.000E 00	0.	1.596 06	4.721E-04	1.300E 00	1.028E 01
7.568E-03	7.302E 02	7.528E 02	1.118E-01	6.162E 01	1.520E-01	3.000E 00	0.	1.841 06	3.141E-04	1.301E 00	1.185E 01
7.653E-03	7.273E 02	7.446E 02	1.118E-01	6.561E 01	1.520E-01	4.000E 00	0.	2.108 06	2.823E-04	1.272E 00	1.109E 01
7.618E-03	8.955E 02	7.450E 02	1.139E-01	5.714E 01	1.520E-01	2.000E 00	0.	1.643 06	3.490E-04	1.304E 00	1.567E 01
6.550E-03	1.011E 03	7.348E 02	1.139E-01	6.261E 01	1.520E-01	3.000E 00	0.	1.959 06	2.570E-04	1.302E 00	1.615E 01
7.794E-03	8.883E 02	7.247E 02	1.139E-01	6.737E 01	1.520E-01	4.000E 00	0.	2.320 06	2.729E-04	1.259E 00	1.319E 01
7.311E-03	9.374E 02	7.450E 02	1.125E-01	5.725E 01	1.520E-01	2.000E 00	0.	1.628 06	3.280E-04	1.305E 00	1.637E 01
6.400E-03	1.044E 03	7.348E 02	1.125E-01	6.280E 01	1.520E-01	3.000E 00	0.	1.947 06	2.531E-04	1.300E 00	1.662E 01
7.932E-03	8.884E 02	7.247E 02	1.125E-01	6.764E 01	1.520E-01	4.000E 00	0.	2.314 06	2.795E-04	1.256E 00	1.314E 01
7.315E-03	9.525E 02	7.450E 02	1.128E-01	5.743E 01	1.520E-01	2.000E 00	0.	1.641 06	3.356E-04	1.305E 00	1.659E 01
6.428E-03	1.057E 03	7.348E 02	1.128E-01	6.297E 01	1.520E-01	3.000E 00	0.	1.963 06	2.525E-04	1.299E 00	1.679E 01
7.992E-03	8.980E 02	7.247E 02	1.128E-01	6.790E 01	1.520E-01	4.000E 00	0.	2.342 06	2.703E-04	1.253E 00	1.323E 01
8.018E-03	8.312E 02	7.590E 02	1.115E-01	5.959E 01	1.520E-01	2.000E 00	0.	1.717 06	3.548E-04	1.298E 00	1.395E 01
6.808E-03	9.468E 02	7.488E 02	1.115E-01	6.467E 01	1.520E-01	3.000E 00	0.	2.031 06	2.631E-04	1.281E 00	1.464E 01
7.881E-03	8.501E 02	7.387E 02	1.115E-01	6.912E 01	1.520E-01	4.000E 00	0.	2.337 06	2.751E-04	1.234E 00	1.230E 01
7.222E-03	9.086E 02	7.630E 02	1.089E-01	5.990E 01	1.520E-01	2.000E 00	0.	1.689 06	3.255E-04	1.296E 00	1.517E 01
6.383E-03	1.003E 03	7.528E 02	1.089E-01	6.506E 01	1.520E-01	3.000E 00	0.	2.003 06	2.513E-04	1.276E 00	1.542E 01
7.420E-03	8.972E 02	7.427E 02	1.089E-01	6.967E 01	1.520E-01	4.000E 00	0.	2.368 06	2.633E-04	1.226E 00	1.288E 01
7.368E-03	9.210E 02	7.580E 02	1.092E-01	6.115E 01	1.520E-01	2.000E 00	0.	1.765 06	3.178E-04	1.302E 00	1.506E 01
6.407E-03	1.030E 03	7.478E 02	1.092E-01	6.670E 01	1.520E-01	3.000E 00	0.	2.131 06	2.419E-04	1.260E 00	1.544E 01
7.519E-03	9.154E 02	7.377E 02	1.092E-01	7.162E 01	1.520E-01	4.000E 00	0.	2.560 06	2.559E-04	1.197E 00	1.278E 01

REGRESSION CURVE PRINT OUT

FOR X1, X2, X5

CASE NUMBER D95LC - SA TEST DATA 3-20-63

BW	10-A0	A1	A2	A5
0.	1.708747E-02	9.658466E-01	-1.433957E-01	-8.376436E-01

SEA0/A0	SEA1/A1	SEA2/A2	SEA5/A5	R2
5.362394E-01	5.741482E-01	8.079774E-02	5.260370E-02	6.892201E-01

HEAT TRANSFER CORRELATION DATA

FOR X1, X2, X5

TEST C95L0 THROAT REGION - TEST DATA

3-26-63

PR = 1.00

H	TW	P-INF	X	T-INF	D	L	PC	PEF	STF	PRF	TW/T-INF
6.7051-03	2.225E 02	7.348E 02	4.682E-02	6.776E 01	2.180E-01	2.000E 00	4.390E 00	1.661E 05	7.878E-03	7.092E-01	3.284E 00
4.3321-03	2.939E 02	7.367E 02	4.466E-02	7.222E 01	2.180E-01	2.000E 00	4.390E 00	6.430E 04	9.265E-03	7.698E-01	5.523E 00
5.3871-03	3.342E 02	7.057E 02	5.443E-02	6.300E 01	2.180E-01	2.000E 00	4.390E 00	3.732E 04	9.031E-03	8.151E-01	5.306E 00
4.9401-03	3.659E 02	7.046E 02	5.398E-02	6.470E 01	2.130E-01	2.000E 00	4.380E 00	7.558E 04	9.281E-03	7.916E-01	5.655E 00
3.353E-03	4.666E 02	7.046E 02	5.129E-02	6.692E 01	2.180E-01	2.000E 00	4.380E 00	5.064E 04	1.002E-02	7.381E-01	6.973E 00
2.229E-02	2.708E 02	7.758E 02	1.069E-01	6.459E 01	1.560E-01	2.000E 00	4.380E 00	3.532E 05	9.495E-03	7.998E-01	4.316E 00
2.289E-02	1.526E 02	4.677E 02	7.088E-02	6.015E 01	1.560E-01	2.000E 00	4.380E 00	5.018E 05	1.029E-02	5.545E-01	2.537E 00
2.624E-02	2.034E 02	6.422E 02	1.050E-01	6.070E 01	1.560E-01	2.000E 00	4.380E 00	4.800E 05	8.287E-03	6.951E-01	3.433E 00
3.078E-02	2.485E 02	6.390E 02	1.022E-01	6.643E 01	1.560E-01	2.000E 00	4.390E 00	3.771E 05	1.026E-02	7.911E-01	3.738E 00
3.138E-02	1.775E 02	6.626E 02	1.077E-01	5.801E 01	1.560E-01	2.000E 00	4.380E 00	6.392E 05	8.925E-03	5.751E-01	3.060E 00
2.476E-02	2.433E 02	6.692E 02	1.070E-01	5.969E 01	1.560E-01	2.000E 00	4.380E 00	3.752E 05	9.563E-03	7.759E-01	4.076E 00
2.110E-02	1.136E 02	6.732E 02	1.068E-01	6.164E 01	1.560E-01	2.000E 00	4.380E 00	2.469E 05	9.198E-03	8.210E-01	5.185E 00
2.134E-02	3.241E 02	6.729E 02	1.092E-01	6.132E 01	1.560E-01	2.000E 00	4.380E 00	2.437E 05	9.352E-03	8.209E-01	5.243E 00
2.051E-02	3.373E 02	6.728E 02	1.069E-01	6.225E 01	1.560E-01	2.000E 00	4.380E 00	2.267E 05	9.439E-03	8.185E-01	5.418E 00
2.383E-02	2.629E 02	6.826E 02	1.079E-01	6.021E 01	1.560E-01	2.000E 00	4.380E 00	3.416E 05	8.486E-03	8.008E-01	4.366E 00
2.375E-02	2.596E 02	6.326E 02	1.066E-01	6.021E 01	1.560E-01	2.000E 00	4.380E 00	3.443E 05	8.526E-03	7.972E-01	4.312E 00
1.658E-02	3.401E 02	6.792E 02	1.066E-01	6.095E 01	1.560E-01	2.000E 00	4.380E 00	2.203E 05	7.859E-03	8.172E-01	5.580E 00
1.047E-02	2.593E 02	6.774E 02	1.065E-01	6.279E 01	1.560E-01	2.000E 00	4.380E 00	2.060E 05	9.680E-03	7.985E-01	5.722E 00
2.184E-02	3.056E 02	6.992E 02	1.071E-01	6.215E 01	1.560E-01	2.000E 00	4.380E 00	2.748E 05	8.773E-03	8.201E-01	4.917E 00
1.988E-02	3.628E 02	6.940E 02	1.063E-01	6.348E 01	1.560E-01	2.000E 00	4.390E 00	2.080E 05	9.750E-03	7.945E-01	5.715E 00
1.021E-02	2.757E 02	6.939E 02	1.062E-01	6.363E 01	1.560E-01	2.000E 00	4.380E 00	1.965E 05	9.837E-03	7.863E-01	5.904E 00
1.792E-02	4.039E 02	6.918E 02	1.049E-01	6.370E 01	1.560E-01	2.000E 00	4.380E 00	1.722E 05	1.017E-02	7.704E-01	6.339E 00
1.552E-02	4.021E 02	6.910E 02	1.024E-01	6.507E 01	1.560E-01	2.000E 00	4.380E 00	1.287E 05	1.094E-02	7.308E-01	7.409E 00
1.563E-02	4.747E 02	6.888E 02	1.037E-01	6.436E 01	1.560E-01	2.000E 00	4.380E 00	1.329E 05	1.074E-02	7.348E-01	7.319E 00
1.321E-02	6.029E 02	6.936E 02	9.747E-02	6.773E 01	1.560E-01	2.000E 00	4.380E 00	8.959E 04	1.195E-02	6.921E-01	8.900E 00
1.421E-02	5.003E 02	6.870E 02	9.840E-02	6.597E 01	1.560E-01	2.000E 00	4.380E 00	1.160E 05	1.096E-02	7.214E-01	7.689E 00
1.448E-02	4.046E 02	6.848E 02	9.940E-02	6.490E 01	1.560E-01	2.000E 00	4.380E 00	1.183E 05	1.095E-02	7.245E-01	7.621E 00
1.717E-02	4.151E 02	6.780E 02	1.056E-01	6.335E 01	1.560E-01	2.000E 00	4.380E 00	1.626E 05	1.021E-02	7.647E-01	6.552E 00
1.483E-02	4.969E 02	6.798E 02	1.025E-01	6.482E 01	1.560E-01	2.000E 00	4.380E 00	1.298E 05	1.101E-02	7.235E-01	7.666E 00
2.467E-02	2.712E 02	7.016E 02	1.055E-01	6.656E 01	1.560E-01	2.000E 00	4.380E 00	3.545E 05	8.263E-03	8.054E-01	4.084E 00
2.287E-02	2.888E 02	7.040E 02	1.029E-01	6.641E 01	1.560E-01	2.000E 00	4.380E 00	3.116E 05	8.076E-03	8.163E-01	4.349E 00
1.433E-02	5.513E 02	6.970E 02	9.691E-02	6.883E 01	1.560E-01	2.000E 00	4.380E 00	1.053E 05	1.159E-02	7.039E-01	8.018E 00
1.401E-02	5.603E 02	6.958E 02	1.003E-01	6.692E 01	1.560E-01	2.000E 00	4.380E 00	1.026E 05	1.153E-02	7.019E-01	8.373E 00

1.347	-2	6.056E-02	7.001E-02	5.760E-02	6.904E-01	1.560E-01	2.000E-00	4.380E-00	8.947E-04	1.208E-02	6.908E-01	8.945E-00
1.347	-02	6.056E-02	6.971E-02	5.785E-02	6.876E-01	1.560E-01	2.000E-00	4.380E-00	8.948E-04	1.208E-02	6.909E-01	8.942E-00
1.807	-02	4.267E-02	6.910E-02	1.082E-01	6.472E-01	1.560E-01	2.000E-00	4.380E-00	1.649E-05	1.047E-02	7.579E-01	6.593E-00
1.717	-02	4.515E-02	6.903E-02	1.77E-01	6.522E-01	1.560E-01	2.000E-00	4.380E-00	1.515E-05	1.057E-02	7.469E-01	6.904E-00
1.232	-2	6.617E-02	6.958E-02	7.242E-02	6.870E-01	1.560E-01	2.000E-00	4.380E-00	7.401E-04	1.280E-02	6.811E-01	9.630E-00
1.377	-02	5.530E-02	6.714E-02	5.770E-02	6.643E-01	1.560E-01	2.000E-00	4.380E-00	7.860E-04	1.188E-02	7.044E-01	8.334E-00
1.362	-2	5.624E-02	6.674E-02	5.626E-02	6.689E-01	1.560E-01	2.000E-00	4.380E-00	9.518E-04	1.207E-02	7.024E-01	8.408E-00
1.214	-02	6.251E-02	7.024E-02	5.556E-02	6.900E-01	1.560E-01	2.000E-00	4.380E-00	8.552E-04	1.128E-02	6.876E-01	9.059E-00
1.255	-02	6.112E-02	7.002E-02	5.525E-02	6.993E-01	1.560E-01	2.000E-00	4.380E-00	8.297E-04	1.123E-02	6.903E-01	8.740E-00
2.751	-02	1.531E-02	7.109E-02	1.023E-01	6.242E-01	1.560E-01	2.000E-00	4.380E-00	8.727E-05	6.423E-03	5.059E-01	2.464E-00
2.300	-02	2.224E-02	7.031E-02	1.054E-01	6.371E-01	1.560E-01	2.000E-00	4.380E-00	4.906E-05	6.572E-03	7.166E-01	3.491E-00
2.249	-2	2.262E-02	7.021E-02	1.043E-01	6.345E-01	1.560E-01	2.000E-00	4.380E-00	4.571E-05	6.797E-03	7.256E-01	3.562E-00
2.022	-02	2.908E-02	6.987E-02	1.405E-01	6.414E-01	1.560E-01	2.000E-00	4.380E-00	2.385E-05	7.700E-03	8.179E-01	4.535E-00
1.924	-2	3.017E-02	6.989E-02	1.425E-01	6.395E-01	1.560E-01	2.000E-00	4.380E-00	2.761E-05	7.751E-03	8.206E-01	4.715E-00
1.965	-02	2.906E-02	7.113E-02	1.116E-01	6.075E-01	1.560E-01	2.000E-00	4.380E-00	3.038E-05	7.208E-03	8.159E-01	4.784E-00
1.647	-02	4.075E-02	7.049E-02	1.062E-01	6.350E-01	1.560E-01	2.000E-00	4.380E-00	1.736E-05	9.231E-03	7.673E-01	6.417E-00
1.379	-02	5.690E-02	6.996E-02	1.382E-01	6.620E-01	1.560E-01	2.000E-00	4.380E-00	1.024E-05	1.070E-02	6.996E-01	8.604E-00
1.307	-2	5.759E-02	6.996E-02	1.424E-01	6.628E-01	1.560E-01	2.000E-00	4.380E-00	1.011E-05	1.075E-02	6.981E-01	8.689E-00
1.573	-02	4.161E-02	7.046E-02	1.064E-01	6.331E-01	1.560E-01	2.000E-00	4.380E-00	1.676E-05	9.346E-03	7.625E-01	6.572E-00
1.271	-2	5.876E-02	6.714E-02	1.032E-01	6.577E-01	1.560E-01	2.000E-00	4.380E-00	3.300E-04	1.137E-02	6.962E-01	8.934E-00
1.143	-02	6.967E-02	6.972E-02	1.003E-01	6.787E-01	1.560E-01	2.000E-00	4.380E-00	7.303E-04	1.164E-02	6.750E-01	1.029E-01
1.171	-02	6.929E-02	6.972E-02	1.003E-01	6.811E-01	1.560E-01	2.000E-00	4.380E-00	7.439E-04	1.167E-02	6.759E-01	1.017E-01
1.706	-02	2.447E-02	7.423E-02	1.106E-01	5.507E-01	1.520E-01	2.000E-00	4.380E-00	4.059E-05	5.251E-03	7.577E-01	4.443E-00
1.579	-02	2.122E-02	7.438E-02	1.095E-01	5.710E-01	1.520E-01	2.000E-00	4.380E-00	2.717E-05	6.545E-03	8.136E-01	5.480E-00
1.716	-02	3.021E-02	7.421E-02	1.090E-01	5.221E-01	1.520E-01	2.000E-00	4.380E-00	1.906E-05	8.653E-03	7.725E-01	6.636E-00
1.306	-02	2.830E-02	7.421E-02	1.091E-01	5.359E-01	1.520E-01	2.000E-00	4.380E-00	1.994E-05	8.800E-03	7.777E-01	6.427E-00
1.689	-02	2.960E-02	7.421E-02	1.090E-01	6.043E-01	1.520E-01	2.000E-00	4.380E-00	1.327E-05	8.486E-03	7.709E-01	6.553E-00
4.140	-02	1.151E-02	6.137E-02	1.174E-01	5.421E-01	1.520E-01	2.000E-00	4.380E-00	1.474E-06	6.465E-03	5.213E-01	2.123E-00
4.737	-02	1.511E-02	6.425E-02	1.623E-01	5.822E-01	1.520E-01	2.000E-00	4.380E-00	1.297E-06	7.532E-03	5.084E-01	2.592E-00
3.712	-02	1.847E-02	6.553E-02	1.132E-01	6.249E-01	1.520E-01	2.000E-00	4.380E-00	6.783E-05	9.273E-03	6.039E-01	2.956E-00
3.237	-02	3.472E-02	7.252E-02	2.191E-01	6.747E-01	1.520E-01	2.000E-00	4.380E-00	5.182E-05	6.274E-03	8.054E-01	5.146E-00
3.550	-02	4.650E-02	8.495E-02	2.052E-01	7.692E-01	1.520E-01	2.000E-00	4.380E-00	3.930E-05	8.068E-03	7.308E-01	6.045E-00
2.571	-02	6.458E-02	7.753E-02	1.624E-01	8.776E-01	1.520E-01	2.000E-00	4.380E-00	2.251E-05	8.737E-03	6.818E-01	7.359E-00
4.270	-02	2.063E-02	7.275E-02	1.104E-01	1.370E-02	1.520E-01	2.000E-00	4.380E-00	2.177E-06	2.916E-03	6.634E-01	1.506E-00
1.794	-2	4.394E-02	7.201E-02	1.108E-01	1.421E-02	1.520E-01	2.000E-00	4.380E-00	5.118E-05	3.054E-03	7.205E-01	3.514E-00
1.414	-02	2.316E-02	7.172E-02	1.109E-01	1.463E-02	1.520E-01	2.000E-00	4.380E-00	2.320E-05	3.966E-03	6.582E-01	5.684E-00
1.460	-02	7.881E-02	7.068E-02	1.105E-01	1.453E-02	1.520E-01	2.000E-00	4.380E-00	2.577E-05	3.922E-03	6.628E-01	5.424E-00
1.488	-02	3.331E-02	6.999E-02	1.138E-01	1.457E-02	1.520E-01	2.000E-00	4.380E-00	2.361E-05	4.096E-03	6.584E-01	5.718E-00
1.347	-02	1.007E-03	7.030E-02	1.106E-01	1.486E-02	1.520E-01	2.000E-00	4.380E-00	1.737E-05	4.452E-03	6.471E-01	6.729E-00
6.174	-02	1.201E-02	7.034E-02	1.155E-01	1.411E-02	1.520E-01	2.000E-00	4.380E-00	2.674E-06	3.750E-03	6.102E-01	1.347E-00
5.411	-02	2.132E-02	7.042E-02	1.157E-01	1.422E-02	1.520E-01	2.000E-00	4.380E-00	2.217E-06	3.476E-03	6.907E-01	1.499E-00
3.658	-02	2.782E-02	7.005E-02	1.155E-01	1.457E-02	1.520E-01	2.000E-00	4.380E-00	1.441E-06	2.883E-03	8.127E-01	1.914E-00
2.538	-02	3.955E-02	7.030E-02	1.115E-01	1.496E-02	1.520E-01	2.000E-00	4.380E-00	8.041E-05	2.988E-03	7.742E-01	2.644E-00

1.690E-02	7.120E-02	7.114E-02	1.108E-01	1.553E-02	1.520E-01	7.000E-00	4.380E-00	3.222E-05	3.760E-03	6.727E-01	4.585E-00
1.431E-02	3.311E-02	7.050E-02	1.118E-01	1.583E-02	1.520E-01	7.000E-00	4.380E-00	2.131E-05	4.050E-03	6.510E-01	5.882E-00
5.615E-02	2.791E-02	6.959E-02	1.139E-01	1.519E-02	1.520E-01	7.000E-00	4.380E-00	1.496E-06	4.265E-03	8.138E-01	1.837E-00
3.260E-02	3.253E-02	6.930E-02	1.125E-01	1.541E-02	1.520E-01	7.000E-00	4.380E-00	8.421E-05	3.718E-03	7.751E-01	2.565E-00
2.739E-02	4.733E-02	6.921E-02	1.128E-01	1.556E-02	1.520E-01	7.000E-00	4.380E-00	6.358E-05	3.833E-03	7.351E-01	3.045E-00
1.954E-02	5.723E-02	7.041E-02	1.115E-01	1.554E-02	1.520E-01	7.000E-00	4.380E-00	4.623E-05	3.438E-03	6.988E-01	3.683E-00
1.632E-02	8.095E-02	7.039E-02	1.089E-01	1.592E-02	1.520E-01	7.000E-00	4.380E-00	2.643E-05	4.088E-03	6.606E-01	5.085E-00
1.642E-02	8.544E-02	6.948E-02	1.092E-01	1.623E-02	1.520E-01	7.000E-00	4.380E-00	2.435E-05	4.224E-03	6.565E-01	5.245E-00
4.313E-02	8.068E-02	6.903E-02	1.123E-01	1.320E-02	1.520E-01	7.000E-00	4.380E-00	1.051E-06	4.406E-03	8.211E-01	2.324E-00
2.971E-02	4.737E-02	6.835E-02	1.101E-01	1.349E-02	1.520E-01	7.000E-00	4.380E-00	5.137E-05	5.098E-03	7.356E-01	3.511E-00
3.201E-02	4.335E-02	6.778E-02	1.122E-01	1.335E-02	1.520E-01	7.000E-00	4.380E-00	6.025E-05	5.050E-03	7.556E-01	3.247E-00
2.370E-02	6.336E-02	6.045E-02	1.134E-01	1.342E-02	1.520E-01	7.000E-00	4.380E-00	3.329E-05	5.478E-03	6.884E-01	4.721E-00
2.211E-02	7.032E-02	6.015E-02	1.120E-01	1.353E-02	1.520E-01	7.000E-00	4.380E-00	2.803E-05	5.703E-03	6.763E-01	5.197E-00
1.921E-02	8.513E-02	6.015E-02	1.072E-01	1.383E-02	1.520E-01	7.000E-00	4.380E-00	2.008E-05	6.134E-03	6.583E-01	6.155E-00
2.885E-02	5.315E-02	6.980E-02	1.116E-01	1.424E-02	1.520E-01	7.000E-00	4.380E-00	4.678E-05	5.220E-03	7.058E-01	3.732E-00
3.412E-02	4.564E-02	7.035E-02	1.126E-01	1.500E-02	1.520E-01	7.000E-00	4.380E-00	6.448E-05	4.778E-03	7.433E-01	3.043E-00
2.978E-02	5.514E-02	7.013E-02	1.127E-01	1.520E-02	1.520E-01	7.000E-00	4.380E-00	4.830E-05	5.120E-03	7.038E-01	3.628E-00
8.475E-04	1.903E-02	7.439E-02	2.169E-03	1.336E-02	2.090E-01	3.500E-00	4.380E-00	3.374E-04	5.567E-03	6.018E-01	1.424E-00
6.509E-04	4.893E-02	7.439E-02	2.101E-03	1.810E-02	2.090E-01	3.500E-00	4.380E-00	9.741E-03	8.063E-03	7.246E-01	2.703E-00
6.034E-04	5.176E-02	7.439E-02	1.986E-03	1.901E-02	2.090E-01	3.500E-00	4.380E-00	8.880E-03	7.999E-03	7.129E-01	2.723E-00
6.030E-04	5.363E-02	7.439E-02	1.934E-03	1.944E-02	2.090E-01	3.500E-00	4.380E-00	8.368E-03	8.344E-03	7.062E-01	2.759E-00
5.965E-04	5.991E-02	7.439E-02	2.011E-03	2.025E-02	2.090E-01	3.500E-00	4.380E-00	7.615E-03	8.537E-03	6.914E-01	2.959E-00
6.370E-04	6.855E-02	7.439E-02	1.994E-03	2.144E-02	2.090E-01	3.500E-00	4.380E-00	6.454E-03	9.979E-03	6.760E-01	3.197E-00
5.604E-04	9.514E-02	7.439E-02	1.932E-03	2.535E-02	2.090E-01	3.500E-00	4.380E-00	4.336E-03	1.056E-02	6.493E-01	3.753E-00
5.501E-04	9.626E-02	7.439E-02	1.916E-03	2.550E-02	2.090E-01	3.500E-00	4.380E-00	4.243E-03	1.051E-02	6.487E-01	3.775E-00
4.771E-04	4.721E-02	4.183E-02	1.402E-03	2.022E-02	2.090E-01	3.500E-00	4.380E-00	7.793E-03	7.544E-03	7.485E-01	2.340E-00
4.628E-04	5.894E-02	4.163E-02	1.373E-03	2.227E-02	2.090E-01	3.500E-00	4.380E-00	5.906E-03	8.649E-03	7.041E-01	2.647E-00
4.542E-04	6.991E-02	4.183E-02	1.374E-03	2.409E-02	2.090E-01	3.500E-00	4.380E-00	4.852E-03	9.346E-03	6.810E-01	2.902E-00
4.345E-04	9.139E-02	4.183E-02	1.363E-03	2.701E-02	2.090E-01	3.500E-00	4.380E-00	3.471E-03	1.052E-02	6.557E-01	3.384E-00
4.291E-04	1.016E-03	4.183E-02	1.354E-03	2.859E-02	2.090E-01	3.500E-00	4.380E-00	3.057E-03	1.097E-02	6.481E-01	3.554E-00
4.166E-04	1.047E-03	4.183E-02	1.350E-03	2.901E-02	2.090E-01	3.500E-00	4.380E-00	2.943E-03	1.085E-02	6.452E-01	3.609E-00
5.103E-03	4.018E-02	7.342E-02	3.187E-02	8.125E-01	2.090E-01	3.500E-00	4.380E-00	5.993E-04	1.115E-02	7.684E-01	4.903E-00
4.655E-03	5.325E-02	7.354E-02	3.246E-02	8.708E-01	2.090E-01	3.500E-00	0.	4.388E-04	1.233E-02	7.079E-01	6.115E-00
4.716E-03	6.441E-02	7.447E-02	3.324E-02	9.357E-01	2.090E-01	3.500E-00	4.380E-00	3.829E-04	1.288E-02	6.828E-01	6.884E-00
4.074E-03	8.056E-02	7.447E-02	3.356E-02	9.808E-01	2.090E-01	3.500E-00	4.380E-00	2.936E-04	1.267E-02	6.602E-01	8.214E-00
4.340E-03	8.662E-02	7.447E-02	3.354E-02	1.034E-02	2.090E-01	3.500E-00	4.380E-00	2.859E-04	1.322E-02	6.547E-01	8.377E-00
3.735E-03	9.581E-02	7.447E-02	3.394E-02	1.036E-02	2.090E-01	3.500E-00	4.380E-00	2.455E-04	1.237E-02	6.489E-01	9.248E-00
4.206E-03	9.490E-02	7.447E-02	3.304E-02	1.083E-02	2.090E-01	3.500E-00	4.380E-00	2.621E-04	1.313E-02	6.494E-01	8.763E-00
4.237E-03	9.654E-02	7.447E-02	3.357E-02	1.091E-02	2.090E-01	3.500E-00	4.380E-00	2.621E-04	1.307E-02	6.485E-01	8.849E-00
4.318E-03	9.628E-02	7.447E-02	3.399E-02	1.086E-02	2.090E-01	3.500E-00	4.380E-00	2.645E-04	1.323E-02	6.487E-01	8.866E-00
5.153E-03	5.318E-02	7.460E-02	3.183E-02	9.083E-01	2.090E-01	3.500E-00	4.380E-00	4.702E-04	1.274E-02	7.077E-01	5.855E-00
4.675E-03	5.739E-02	7.460E-02	3.253E-02	9.136E-01	2.090E-01	3.500E-00	4.380E-00	4.302E-04	1.213E-02	6.970E-01	6.282E-00
5.151E-03	5.163E-02	7.395E-02	4.356E-02	8.460E-01	2.090E-01	3.500E-00	4.380E-00	5.830E-04	1.041E-02	7.135E-01	6.103E-00
6.080E-03	5.128E-02	7.395E-02	4.032E-02	9.517E-01	2.090E-01	3.500E-00	4.380E-00	6.933E-04	1.037E-02	7.148E-01	5.388E-00

HEAT TRANSFER CORRELATION DATA

FOR X1, X2, X5

TEST D95LC THRCAT REGION - TEST DATA

3-26-63

DW = 0.

H	TV	P-INF	W	T-INF	D	L	RC	RFF	STF	PRF	TW/T-INF
6.705E-03	2.225E 02	7.348E 02	4.682E-02	6.776E 01	2.180E-01	2.000E 00	4.380E 00	6.688E 05	1.173E-03	1.252E 00	3.284E 00
4.382E-03	3.999E 02	7.367E 02	4.466E-02	7.222E 01	2.180E-01	2.000E 00	4.380E 00	7.475E 05	7.413E-04	1.187E 00	5.523E 00
5.387E-03	3.343E 02	7.057E 02	5.443E-02	6.300E 01	2.180E-01	2.000E 00	4.380E 00	6.754E 05	8.810E-04	1.307E 00	5.306E 00
4.940E-03	3.657E 02	7.046E 02	5.338E-02	6.470E 01	2.180E-01	2.000E 00	4.380E 00	7.025E 05	7.919E-04	1.292E 00	5.655E 00
3.953E-03	4.666E 02	7.046E 02	5.129E-02	6.692E 01	2.180E-01	2.000E 00	4.380E 00	7.300E 05	6.283E-04	1.267E 00	6.973E 00
2.929E-02	2.739E 02	7.758E 02	1.063E-01	6.459E 01	1.560E-01	2.000E 00	4.380E 00	1.853E 06	1.273E-03	1.274E 00	4.316E 00
2.289E-02	1.526E 02	4.677E 02	7.988E-02	6.015E 01	1.560E-01	2.000E 00	4.380E 00	1.542E 06	1.182E-03	1.350E 00	2.537E 00
2.634E-02	2.091E 02	6.422E 02	1.050E-01	6.070E 01	1.560E-01	2.000E 00	4.380E 00	1.775E 06	1.155E-03	1.331E 00	3.433E 00
3.028E-02	2.485E 02	6.360E 02	1.022E-01	6.648E 01	1.560E-01	2.000E 00	4.380E 00	2.150E 06	1.181E-03	1.276E 00	3.738E 00
3.138E-02	1.775E 02	6.626E 02	1.077E-01	5.801E 01	1.560E-01	2.000E 00	4.380E 00	1.642E 06	1.475E-03	1.324E 00	3.060E 00
2.476E-02	2.433E 02	6.602E 02	1.070E-01	5.969E 01	1.560E-01	2.000E 00	4.380E 00	1.726E 06	1.116E-03	1.323E 00	4.076E 00
2.110E-02	2.196E 02	6.782E 02	1.068E-01	6.164E 01	1.560E-01	2.000E 00	4.380E 00	1.815E 06	9.081E-04	1.323E 00	5.185E 00
2.134E-02	3.241E 02	6.728E 02	1.082E-01	6.182E 01	1.560E-01	2.000E 00	4.380E 00	1.858E 06	8.989E-04	1.323E 00	5.243E 00
2.051E-02	3.373E 02	6.728E 02	1.063E-01	6.225E 01	1.560E-01	2.000E 00	4.380E 00	1.863E 06	8.652E-04	1.320E 00	5.418E 00
2.383E-02	2.629E 02	6.826E 02	1.079E-01	6.021E 01	1.560E-01	2.000E 00	4.380E 00	1.743E 06	1.064E-03	1.320E 00	4.366E 00
2.325E-02	2.596E 02	6.826E 02	1.066E-01	6.021E 01	1.560E-01	2.000E 00	4.380E 00	1.722E 06	1.082E-03	1.320E 00	4.312E 00
1.668E-02	3.401E 02	6.792E 02	1.066E-01	6.095E 01	1.560E-01	2.000E 00	4.380E 00	1.769E 06	7.329E-04	1.326E 00	5.580E 00
1.947E-02	3.591E 02	6.774E 02	1.065E-01	6.279E 01	1.560E-01	2.000E 00	4.380E 00	1.883E 06	8.165E-04	1.315E 00	5.722E 00
2.184E-02	3.056E 02	6.992E 02	1.071E-01	6.215E 01	1.560E-01	2.000E 00	4.380E 00	1.822E 06	9.400E-04	1.315E 00	4.917E 00
1.988E-02	3.622E 02	6.940E 02	1.063E-01	6.348E 01	1.560E-01	2.000E 00	4.380E 00	1.899E 06	8.318E-04	1.306E 00	5.715E 00
1.921E-02	3.757E 02	6.938E 02	1.062E-01	6.363E 01	1.560E-01	2.000E 00	4.380E 00	1.908E 06	8.015E-04	1.305E 00	5.904E 00
1.792E-02	4.038E 02	6.918E 02	1.049E-01	6.370E 01	1.560E-01	2.000E 00	4.380E 00	1.892E 06	7.546E-04	1.305E 00	6.339E 00
1.552E-02	4.821E 02	6.910E 02	1.024E-01	6.507E 01	1.560E-01	2.000E 00	4.380E 00	1.939E 06	6.493E-04	1.290E 00	7.409E 00
1.563E-02	4.747E 02	6.888E 02	1.037E-01	6.486E 01	1.560E-01	2.000E 00	4.380E 00	1.953E 06	6.475E-04	1.293E 00	7.319E 00
1.371E-02	6.028E 02	6.936E 02	9.747E-02	6.773E 01	1.560E-01	2.000E 00	4.380E 00	2.027E 06	5.483E-04	1.259E 00	8.900E 00
1.421E-02	5.003E 02	6.870E 02	9.840E-02	6.507E 01	1.560E-01	2.000E 00	4.380E 00	1.870E 06	6.168E-04	1.290E 00	7.689E 00
1.448E-02	4.946E 02	6.848E 02	9.940E-02	6.490E 01	1.560E-01	2.000E 00	4.380E 00	1.881E 06	6.234E-04	1.293E 00	7.621E 00
1.717E-02	4.151E 02	6.780E 02	1.056E-01	6.335E 01	1.560E-01	2.000E 00	4.380E 00	1.903E 06	7.168E-04	1.310E 00	6.552E 00
1.483E-02	4.963E 02	6.798E 02	1.025E-01	6.482E 01	1.560E-01	2.000E 00	4.380E 00	1.943E 06	6.179E-04	1.294E 00	7.666E 00
2.467E-02	2.719E 02	7.016E 02	1.055E-01	6.656E 01	1.560E-01	2.000E 00	4.380E 00	2.086E 06	9.775E-04	1.271E 00	4.084E 00
2.287E-02	2.888E 02	7.040E 02	1.028E-01	6.641E 01	1.560E-01	2.000E 00	4.380E 00	2.018E 06	9.349E-04	1.272E 00	4.349E 00
1.433E-02	5.519E 02	6.970E 02	9.691E-02	6.383E 01	1.560E-01	2.000E 00	4.380E 00	2.092E 06	5.863E-04	1.244E 00	8.018E 00
1.401E-02	5.603E 02	6.968E 02	1.003E-01	6.692E 01	1.560E-01	2.000E 00	4.380E 00	2.018E 06	5.770E-04	1.268E 00	8.373E 00

1.340E-02	6.086E 02	7.001E 02	9.760E-02	6.804E 01	1.560E-01	2.000E 00	4.380E 00	2.040E 06	5.544E-04	1.255E 00	8.945E 00
1.340E-02	6.086E 02	6.971E 02	9.785E-02	6.806E 01	1.560E-01	2.000E 00	4.380E 00	2.053E 06	5.515E-04	1.255E 00	8.942E 00
1.807E-02	4.267E 02	6.910E 02	1.082E-01	6.472E 01	1.560E-01	2.000E 00	4.380E 00	2.023E 06	7.208E-04	1.294E 00	6.593E 00
1.717E-02	4.503E 02	6.908E 02	1.077E-01	6.522E 01	1.560E-01	2.000E 00	4.380E 00	2.050E 06	6.807E-04	1.288E 00	6.904E 00
1.232E-02	6.616E 02	6.858E 02	9.242E-02	6.870E 01	1.560E-01	2.000E 00	4.380E 00	2.010E 06	5.253E-04	1.247E 00	9.630E 00
1.377E-02	5.536E 02	6.714E 02	9.770E-02	6.643E 01	1.560E-01	2.000E 00	4.380E 00	1.980E 06	5.775E-04	1.275E 00	8.334E 00
1.362E-02	5.624E 02	6.674E 02	9.626E-02	6.689E 01	1.560E-01	2.000E 00	4.380E 00	1.992E 06	5.718E-04	1.270E 00	8.408E 00
1.214E-02	6.251E 02	7.004E 02	9.556E-02	6.900E 01	1.560E-01	2.000E 00	4.380E 00	2.068E 06	5.034E-04	1.242E 00	9.059E 00
1.255E-02	6.112E 02	7.002E 02	9.525E-02	6.993E 01	1.560E-01	2.000E 00	4.380E 00	2.136E 06	5.126E-04	1.227E 00	8.740E 00
2.751E-02	1.538E 02	7.109E 02	1.023E-01	6.242E 01	1.560E-01	2.000E 00	4.380E 00	1.741E 06	1.242E-03	1.310E 00	2.464E 00
2.300E-02	2.224E 02	7.031E 02	1.084E-01	6.371E 01	1.560E-01	2.000E 00	4.380E 00	1.938E 06	9.450E-04	1.302E 00	3.491E 00
2.249E-02	2.260E 02	7.021E 02	1.043E-01	6.345E 01	1.560E-01	2.000E 00	4.380E 00	1.850E 06	9.655E-04	1.305E 00	3.562E 00
2.022E-02	2.909E 02	6.987E 02	1.040E-01	6.414E 01	1.560E-01	2.000E 00	4.380E 00	1.894E 06	8.546E-04	1.299E 00	4.535E 00
1.924E-02	3.015E 02	6.989E 02	1.025E-01	6.395E 01	1.560E-01	2.000E 00	4.380E 00	1.854E 06	8.287E-04	1.301E 00	4.715E 00
1.965E-02	2.906E 02	7.113E 02	1.116E-01	6.075E 01	1.560E-01	2.000E 00	4.380E 00	1.799E 06	8.495E-04	1.317E 00	4.784E 00
1.647E-02	4.075E 02	7.049E 02	1.062E-01	6.350E 01	1.560E-01	2.000E 00	4.380E 00	1.883E 06	6.951E-04	1.304E 00	6.417E 00
1.309E-02	5.696E 02	6.996E 02	1.038E-01	6.620E 01	1.560E-01	2.000E 00	4.380E 00	2.030E 06	5.307E-04	1.275E 00	8.604E 00
1.307E-02	5.759E 02	6.996E 02	1.042E-01	6.628E 01	1.560E-01	2.000E 00	4.380E 00	2.044E 06	5.269E-04	1.274E 00	8.689E 00
1.623E-02	4.161E 02	7.046E 02	1.064E-01	6.331E 01	1.560E-01	2.000E 00	4.380E 00	1.874E 06	6.866E-04	1.305E 00	6.572E 00
1.291E-02	5.876E 02	6.714E 02	1.032E-01	6.577E 01	1.560E-01	2.000E 00	4.380E 00	2.041E 06	5.203E-04	1.283E 00	8.934E 00
1.143E-02	6.987E 02	6.972E 02	1.003E-01	6.787E 01	1.560E-01	2.000E 00	4.380E 00	2.090E 06	4.608E-04	1.257E 00	1.029E 01
1.161E-02	6.928E 02	6.972E 02	1.003E-01	6.811E 01	1.560E-01	2.000E 00	4.380E 00	2.108E 06	4.657E-04	1.254E 00	1.017E 01
1.706E-02	2.447E 02	7.423E 02	1.106E-01	5.507E 01	1.520E-01	2.000E 00	4.380E 00	1.502E 06	8.524E-04	1.301E 00	4.443E 00
1.679E-02	3.129E 02	7.438E 02	1.095E-01	5.710E 01	1.520E-01	2.000E 00	4.380E 00	1.579E 06	8.004E-04	1.305E 00	5.480E 00
1.716E-02	3.929E 02	7.421E 02	1.093E-01	5.921E 01	1.520E-01	2.000E 00	4.380E 00	1.681E 06	7.733E-04	1.304E 00	6.636E 00
1.806E-02	3.830E 02	7.421E 02	1.091E-01	5.959E 01	1.520E-01	2.000E 00	4.380E 00	1.698E 06	8.072E-04	1.304E 00	6.427E 00
1.689E-02	3.960E 02	7.421E 02	1.090E-01	6.043E 01	1.520E-01	2.000E 00	4.380E 00	1.741E 06	7.371E-04	1.305E 00	6.553E 00
4.140E-02	1.151E 02	6.137E 02	1.174E-01	5.421E 01	1.520E-01	2.000E 00	4.380E 00	1.669E 06	1.870E-03	1.313E 00	2.123E 00
4.737E-02	1.511E 02	6.405E 02	1.633E-01	5.829E 01	1.520E-01	2.000E 00	4.380E 00	2.603E 06	1.371E-03	1.327E 00	2.592E 00
3.712E-02	1.847E 02	6.553E 02	1.132E-01	6.249E 01	1.520E-01	2.000E 00	4.380E 00	2.059E 06	1.385E-03	1.321E 00	2.956E 00
3.237E-02	3.472E 02	7.252E 02	2.191E-01	6.747E 01	1.520E-01	2.000E 00	4.380E 00	4.477E 06	5.881E-04	1.258E 00	5.146E 00
3.550E-02	4.650E 02	8.495E 02	2.052E-01	7.692E 01	1.520E-01	2.000E 00	4.380E 00	5.129E 06	6.669E-04	1.076E 00	6.045E 00
2.591E-02	6.458E 02	7.758E 02	1.624E-01	8.776E 01	1.520E-01	2.000E 00	4.380E 00	5.850E 06	5.899E-04	8.554E-01	7.359E 00
4.220E-02	2.063E 02	7.275E 02	1.104E-01	1.370E 02	1.520E-01	7.000E 00	4.380E 00	4.356E 06	2.022E-03	4.932E-01	1.506E 00
1.794E-02	4.994E 02	7.201E 02	1.108E-01	1.421E 02	1.520E-01	7.000E 00	4.380E 00	4.308E 06	8.607E-04	4.931E-01	3.514E 00
1.414E-02	8.316E 02	7.172E 02	1.109E-01	1.463E 02	1.520E-01	7.000E 00	4.380E 00	4.252E 06	6.786E-04	4.962E-01	5.684E 00
1.460E-02	7.881E 02	7.068E 02	1.105E-01	1.453E 02	1.520E-01	7.000E 00	4.380E 00	4.262E 06	7.047E-04	4.949E-01	5.424E 00
1.488E-02	8.331E 02	6.999E 02	1.138E-01	1.457E 02	1.520E-01	7.000E 00	4.380E 00	4.390E 06	6.983E-04	4.951E-01	5.718E 00
1.347E-02	1.000E 03	7.030E 02	1.106E-01	1.486E 02	1.520E-01	7.000E 00	4.380E 00	4.221E 06	6.498E-04	4.982E-01	6.729E 00
6.174E-02	1.901E 02	7.054E 02	1.155E-01	1.411E 02	1.520E-01	7.000E 00	4.380E 00	4.524E 06	2.849E-03	4.914E-01	1.347E 00
5.411E-02	2.132E 02	7.042E 02	1.157E-01	1.422E 02	1.520E-01	7.000E 00	4.380E 00	4.515E 06	2.494E-03	4.922E-01	1.499E 00
3.658E-02	2.789E 02	7.005E 02	1.155E-01	1.457E 02	1.520E-01	7.000E 00	4.380E 00	4.455E 06	1.691E-03	4.951E-01	1.914E 00
2.503E-02	3.955E 02	7.030E 02	1.115E-01	1.496E 02	1.520E-01	7.000E 00	4.380E 00	4.240E 06	1.198E-03	4.992E-01	2.644E 00

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1.431E-02	9.311E 02	7.050E 02	1.118E-01	1.583E 02	1.520E-01	7.000E 00	4.380E 00	4.117E 06	6.779E-04	5.137E-01	5.882E 00
5.615E-02	2.791E 02	6.959E 02	1.139E-01	1.519E 02	1.520E-01	7.000E 00	4.380E 00	4.301E 06	2.629E-03	5.033E-01	1.837E 00
3.260E-02	3.953E 02	6.930E 02	1.125E-01	1.541E 02	1.520E-01	7.000E 00	4.380E 00	4.216E 06	1.543E-03	5.076E-01	2.565E 00
2.739E-02	4.738E 02	6.921E 02	1.128E-01	1.556E 02	1.520E-01	7.000E 00	4.380E 00	4.205E 06	1.292E-03	5.104E-01	3.045E 00
1.954E-02	5.723E 02	7.041E 02	1.115E-01	1.554E 02	1.520E-01	7.000E 00	4.380E 00	4.150E 06	9.305E-04	5.088E-01	3.683E 00
1.632E-02	8.095E 02	7.039E 02	1.089E-01	1.592E 02	1.520E-01	7.000E 00	4.380E 00	3.999E 06	7.933E-04	5.153E-01	5.085E 00
1.642E-02	8.544E 02	6.948E 02	1.092E-01	1.629E 02	1.520E-01	7.000E 00	4.380E 00	3.962E 06	7.925E-04	5.249E-01	5.245E 00
4.313E-02	3.068E 02	6.903E 02	1.123E-01	1.320E 02	1.520E-01	7.000E 00	4.380E 00	4.552E 06	2.033E-03	4.935E-01	2.324E 00
2.971E-02	4.737E 02	6.835E 02	1.101E-01	1.349E 02	1.520E-01	7.000E 00	4.380E 00	4.428E 06	1.439E-03	4.915E-01	3.511E 00
3.291E-02	4.335E 02	6.778E 02	1.122E-01	1.335E 02	1.520E-01	7.000E 00	4.380E 00	4.541E 06	1.562E-03	4.924E-01	3.247E 00
2.370E-02	6.336E 02	6.045E 02	1.134E-01	1.342E 02	1.520E-01	7.000E 00	4.380E 00	4.673E 06	1.133E-03	4.923E-01	4.721E 00
2.211E-02	7.032E 02	6.015E 02	1.120E-01	1.353E 02	1.520E-01	7.000E 00	4.380E 00	4.599E 06	1.072E-03	4.926E-01	5.197E 00
1.921E-02	8.513E 02	6.015E 02	1.072E-01	1.383E 02	1.520E-01	7.000E 00	4.380E 00	4.351E 06	9.752E-04	4.946E-01	6.155E 00
2.885E-02	5.315E 02	6.980E 02	1.116E-01	1.424E 02	1.520E-01	7.000E 00	4.380E 00	4.358E 06	1.380E-03	4.923E-01	3.732E 00
3.412E-02	4.564E 02	7.035E 02	1.126E-01	1.500E 02	1.520E-01	7.000E 00	4.380E 00	4.275E 06	1.616E-03	4.996E-01	3.043E 00
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6.034E-04	5.176E 02	7.439E 02	1.986E-03	1.901E 02	2.090E-01	3.500E 00	4.380E 00	4.736E 04	2.827E-03	6.010E-01	2.723E 00
6.030E-04	5.363E 02	7.439E 02	1.934E-03	1.944E 02	2.090E-01	3.500E 00	4.380E 00	4.547E 04	2.864E-03	6.172E-01	2.759E 00
5.965E-04	5.991E 02	7.439E 02	2.011E-03	2.025E 02	2.090E-01	3.500E 00	4.380E 00	4.605E 04	2.666E-03	6.467E-01	2.959E 00
6.390E-04	6.855E 02	7.439E 02	1.994E-03	2.144E 02	2.090E-01	3.500E 00	4.380E 00	4.399E 04	2.814E-03	6.845E-01	3.197E 00
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4.771E-04	4.731E 02	4.183E 02	1.403E-03	2.022E 02	2.090E-01	3.500E 00	4.380E 00	3.301E 04	3.172E-03	7.592E-01	2.340E 00
4.628E-04	5.894E 02	4.183E 02	1.373E-03	2.227E 02	2.090E-01	3.500E 00	4.380E 00	3.014E 04	3.012E-03	8.115E-01	2.647E 00
4.542E-04	6.991E 02	4.183E 02	1.374E-03	2.409E 02	2.090E-01	3.500E 00	4.380E 00	2.852E 04	2.881E-03	8.391E-01	2.902E 00
4.345E-04	9.139E 02	4.183E 02	1.363E-03	2.701E 02	2.090E-01	3.500E 00	4.380E 00	2.610E 04	2.741E-03	8.546E-01	3.384E 00
4.291E-04	1.016E 03	4.183E 02	1.354E-03	2.859E 02	2.090E-01	3.500E 00	4.380E 00	2.492E 04	2.721E-03	8.556E-01	3.554E 00
4.166E-04	1.047E 03	4.183E 02	1.350E-03	2.901E 02	2.090E-01	3.500E 00	4.380E 00	2.460E 04	2.649E-03	8.553E-01	3.609E 00
5.103E-03	4.018E 02	7.342E 02	3.187E-02	8.195E 01	2.090E-01	3.500E 00	4.380E 00	7.711E 05	1.037E-03	9.884E-01	4.903E 00
4.655E-03	5.325E 02	7.354E 02	3.246E-02	8.708E 01	2.090E-01	3.500E 00	0.	8.772E 05	9.865E-04	8.589E-01	6.115E 00
4.716E-03	6.441E 02	7.447E 02	3.324E-02	9.357E 01	2.090E-01	3.500E 00	4.380E 00	9.547E 05	1.055E-03	7.532E-01	6.884E 00
4.074E-03	8.056E 02	7.447E 02	3.356E-02	9.808E 01	2.090E-01	3.500E 00	4.380E 00	9.848E 05	9.529E-04	6.948E-01	8.214E 00
4.340E-03	8.662E 02	7.447E 02	3.354E-02	1.034E 02	2.090E-01	3.500E 00	4.380E 00	9.959E 05	1.085E-03	6.332E-01	8.377E 00
3.735E-03	9.581E 02	7.447E 02	3.394E-02	1.036E 02	2.090E-01	3.500E 00	4.380E 00	1.008E 06	9.253E-04	6.310E-01	9.248E 00
4.206E-03	9.490E 02	7.447E 02	3.304E-02	1.083E 02	2.090E-01	3.500E 00	4.380E 00	9.910E 05	1.124E-03	5.873E-01	8.763E 00
4.237E-03	9.654E 02	7.447E 02	3.357E-02	1.091E 02	2.090E-01	3.500E 00	4.380E 00	1.009E 06	1.123E-03	5.805E-01	8.849E 00
4.318E-03	9.628E 02	7.447E 02	3.399E-02	1.086E 02	2.090E-01	3.500E 00	4.380E 00	1.020E 06	1.125E-03	5.848E-01	8.866E 00
5.153E-03	5.318E 02	7.460E 02	3.183E-02	9.083E 01	2.090E-01	3.500E 00	4.380E 00	8.954E 05	1.166E-03	7.928E-01	5.855E 00
4.675E-03	5.739E 02	7.460E 02	3.253E-02	9.136E 01	2.090E-01	3.500E 00	4.380E 00	9.183E 05	1.041E-03	7.854E-01	6.282E 00
5.151E-03	5.163E 02	7.395E 02	4.356E-02	8.460E 01	2.090E-01	3.500E 00	4.380E 00	1.116E 06	7.899E-04	6.182E-01	6.103E 00
6.080E-03	5.128E 02	7.395E 02	4.032E-02	9.517E 01	2.090E-01	3.500E 00	4.380E 00	1.176E 06	1.145E-03	7.282E-01	5.388E 00

REGRESSION CURVE PRINT OUT

FOR X1, X2, X5

TEST D95LC THROAT REGION - TEST DATA

3-26-63

BW	10-A0	A1	A2	A5
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1.000000E 00	1.719654E-02	-4.699142E-02	-1.237031E-01	4.311183E-01
0.	3.465056E-02	-2.994688E-01	-1.746161E-01	-6.900344E-01

SFA0/A0	SEA1/A1	SEA2/A2	SEA5/A5	R2
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1.186640E-01	2.536101E-01	1.717849E-02	5.476561E-02	5.742166E-01
5.870820E-02	3.558336E-02	9.760333E-03	3.144636E-02	9.241610E-01

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