NUREG-0573

# ANALYSIS OF ECC BYPASS DATA


Office of Nuclear Regulatory Research
U. S. Nuclear Regulatory Commission

NUREG-0573
R 2

# ANALYSIS OF ECC BYPASS DATA

W. D. Beckner
J. N. Reyes, Jr. R. Anderson

Manuscript Completed: June 1979
Date Published: July 1979

Division of Reactor Safety Research
Office of Nuclear Regulatory Research
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

TABLE OF CONTENTS



APPENDICES



LIST OF TABLES

LIST OF TABLES

(continued)

## LIST OF TABLES
(continued)



## LIST OF FIGURES

## LIST OF FIGURES

(continued)

LIST OF FIGURES

(continued)

LIST OF FIGURES

(continued)

## ABSTRACT

Data from small scale tests investigating the delivery of emergency core cooling water into the lower plenum of a pressurized water reactor during a loss-of-coolant accident have been analyzed. A statistical analysis of data trends has been performed and the data represented in correlational form. The effects of test pressure are well understood and all pressure effects observed are accounted for by steam properties. Uncertainty exists concerning how to extrapolate these small scale test results to full scale. However, small scale tests indicate that a constant momentum flux scaling of the hydraulics may be more appropriate than the traditional J* scaling. Evidence also exists which suggests that condensation effects may be increasing in importance as scale size increases.

## NOMENCLATURE

| | |
|---|---|
| $C$ | Steam or air flow for 100% bypass w/o condensation |
| $C_p$ | Specific heat of ECC fluid |
| $F$ | Condensation efficiency (constant) |
| $F_f$ | Condensation efficiency (function of pressure and injection rate) |
| $g$ | Gravitational acceleration |
| $h_{fg}$ | Heat of vaporization |
| $J_g^*$ or $j_g^*$ | Dimensionless steam or air flow up |
| $J_g^*$ (Condensed) | Effective amount of steam condensed |
| $J_g^*{}_{,T}$ (Cond) | Theoretical amount of steam condensed |
| $J_g^*$ (100%) | Steam or air flow for 100% bypass |
| $J_\ell^*$ or $j_\ell^*$ | Dimensionless ECC flow down |
| $(J_\ell^*)_{in}$ | ECC injection rate |
| $M$ | Slope of data ($J_g^{*\frac{1}{2}}$ vs. $J_\ell^{*\frac{1}{2}}$) w/o condensation |
| $M_f$ | Slope of data ($J_g^{*\frac{1}{2}}$ vs. $J_\ell^{*\frac{1}{2}}$) |
| $s$ | Characteristic dimension of test facility |
| $V_g$ | Superficial gas velocity up |
| $V_\ell$ | Superficial liquid velocity down |
| $T_s$ | Saturation temperature |
| $T_\ell$ | ECC temperature |
| $\rho_\ell$ | Liquid density |
| $\rho_g$ | Gas density |

# ANALYSIS OF ECC BYPASS DATA

## 1.0 INTRODUCTION

In the event of a major break in a large coolant pipe of a pressurized water reactor (PWR), high temperature (300°C) cooling water under a pressure of 15 MPa would rapidly escape from the reactor vessel in the form of a mixture of water and steam. Safety systems are installed on all PWRs in the United States to mitigate the consequences of this type of event. Emergency core coolant systems (ECCS) are designed to refill the vessel with water and provide long term cooling of the core. The loss-of-coolant accident (LOCA) is the "Design Basis Accident" for PWRs and detailed analyses are required by the U.S. Nuclear Regulatory Commission (NRC) to show that the ECCS will perform its intended function of adequately cooling the core. One part of the ECCS is a series of accumulators which hold large volumes of cooling water under pressure. These passive systems start injecting ECC water prior to the "end of blowdown," when the vessel pressure is between 4.1 and 1.4 MPa depending on the particular reactor design, while fluid (mostly steam at this point) is still calculated to be escaping from the reactor vessel. This initial injection of ECC water is a complex process involving the mixing of cold (ambient) ECC fluid with escaping steam (i.e., direct contact condensation of steam and countercurrent flow of ECC fluid into the vessel against the outward flow of steam or explusion of the ECC fluid by the escaping steam).

Figure 1 is a schematic of a typical PWR system and illustrates the flow through the system during a cold leg break LOCA. Steam or a two-phase mixture of steam and water flows up the annular downcomer region (termed reverse core

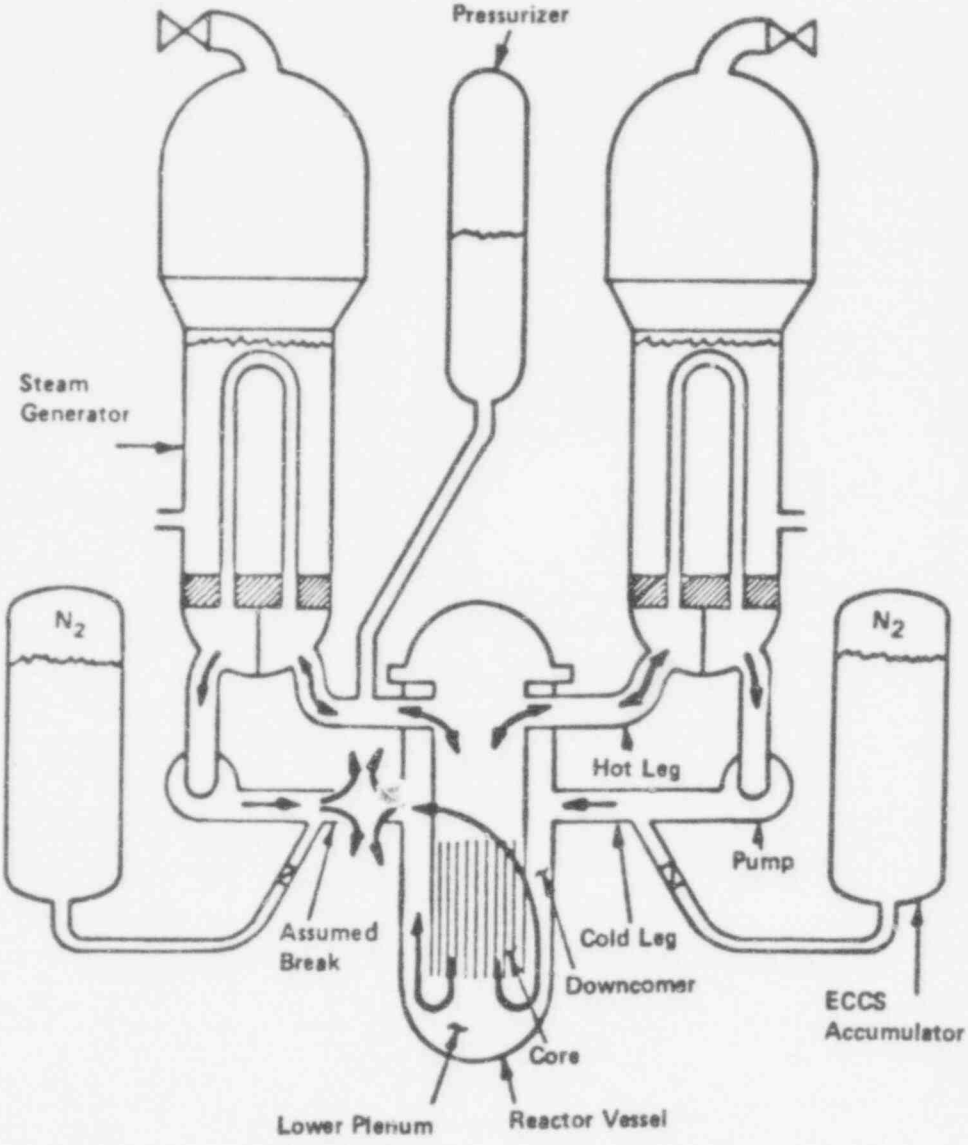


FIGURE 1–POTENTIAL FLOW PATHS FOR A COLD LEG BREAK IN A PWR.

steam since flow is in the opposite direction of normal operation) and escapes through the broken cold leg. ECC fluid is injected in the remaining intact cold legs (or directly in the annulus in some designs) and flows toward the annulus. Once in the annulus, the ECC may flow by gravity down the annulus or be swept out the break by the escaping upward flow of steam. This loss of ECC fluid to the break is referred to as "ECC Bypass." Another barrier to ECC penetration occurs due to the annulus walls which are still at the original operating temperature of approximately 300°C. As ECC fluid contacts the superheated annulus walls, steam is produced which combines in a synergistic manner with reverse core steam and may further impede ECC penetration ("hot wall delay").

## 2.0 EXPERIMENTAL PROGRAMS

Extensive test programs have been conducted in 1/15[1,2] and 2/15[3] scale models of a PWR vessel and downcomer at Battelle Columbus Laboratories (BCL) and in 1/30[4] and 1/15[5] scale models at Creare, Inc. as shown in Figure 2. Tests measuring the time averaged simulated ECC penetration rate to the lower plenum (LP) against constant steam upflow (steady state tests), tests measuring the instantaneous lower plenum filling behavior against constant steam upflow (lower plenum filling tests), tests measuring the time and rate of LP filling with constant steam flow and superheated vessel walls (hot wall delay tests), and tests measuring the LP filling behavior with transient (usually decreasing) steam flow with or w/o hot walls (ramped transients) have been conducted. The results of the more simple "steady state" tests have been used to form models or correlations to analyze the "hot wall delay" and

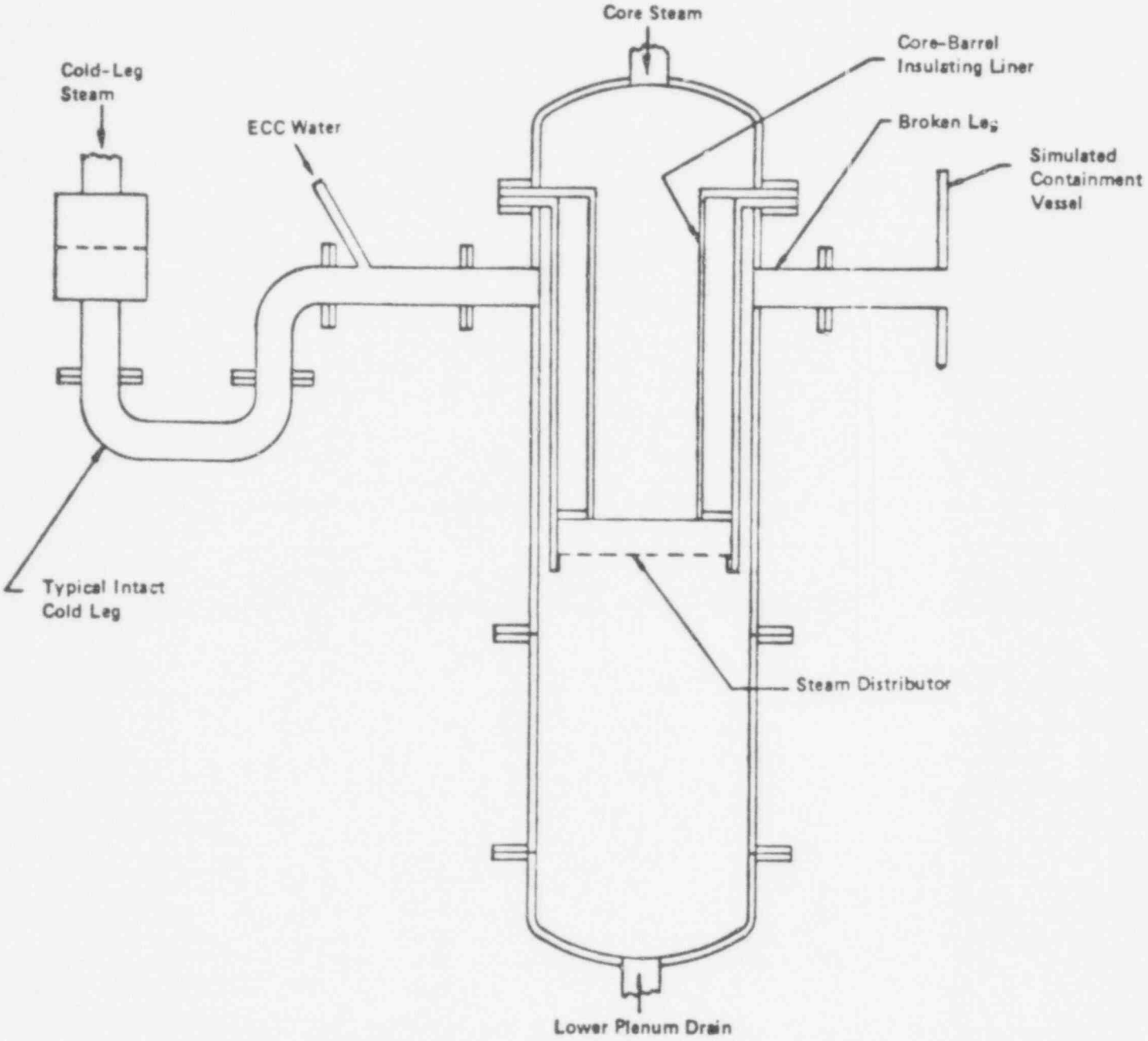


FIGURE 2–SCHEMATIC OF TYPICAL SCALED VESSEL MODEL.

"ramped transient" tests. An overview of these tests and the analyses has been previously presented.[6]

## 3.0 ANALYSIS OF DATA

The "steady state" tests are analyzed in detail herein in order to better understand the trends of the data and hopefully gain insight about the important parameters governing the phenomenon. The steady state tests have been used since they form the basis for the analysis of transient hot wall delay tests and because only the steady state tests allow a systematic variation of each important test parameter (ECC injection rate, temperature, system pressure, steam flow) independent of other parameters.

Semiempirical correlations have been constructed by obtaining numerical "best fits" to data, but including functional dependencies based on physical reasoning where possible. These correlations are necessary to form a shorthand representation of the data, to obtain an understanding of the dependence of the phenomena on test conditions for use in more fundamental analyses, and to extrapolate or scale the data to conditions other than those tested. The word "scale" is used to mean the extension to physical sizes and test conditions (such as pressure) other than those tested. Scaling is necessary since tests to date have been limited to small scale (2/15 scale or less) and test pressures between atmospheric and about 0.50 MPa.

The confidence with which one can use these semiempirical correlations to extrapolate to conditions not tested is a function of the degree of physical basis behind the model, the range of conditions tested compared to the range

of extrapolation, and the consequences of any error caused by improper scaling. For example, consider an observed effect of pressure which can be explained in terms of steam properties. If the variation of steam properties over the range tested is large compared to the additional variation at pressures of interest in describing the LOCA and the sensitivity of the phenomenon to pressure is decreasing as pressure increases, then higher pressure tests may not be required. Indeed, this work will show that the benefit of higher pressure tests may be minimal. This information should be of use in policy decisions concerning the need for high pressure tests. In contrast, the uncertainty due to physical size is shown to be large.

Pressure (gas density) and physical size scaling have traditionally been performed using steam and water velocities expressed in terms of the dimensionless Wallis parameters

$$j_g^* = \sqrt{\frac{\rho_g V_g^2}{g\, s\, (\rho_\ell - \rho_g)}}$$

$$j_\ell^* = \sqrt{\frac{\rho_\ell V_\ell^2}{g\, s\, (\rho_\ell - \rho_g)}} \qquad (1)$$

where "$j_g^*$" is the upward flow of steam and "$j_\ell^*$" is the downward flow of liquid. "s" is some dimension of the test geometry. Wallis[7] has shown both by theory and analysis of data from air-water tests in small tubes that the following relationship describes the flooding curve:

$$j_g^{*1/2} + M\, j_\ell^{*1/2} = C. \qquad (2)$$

The Wallis parameter indicates that the upward gas momentum flux required to bypass water increases as the physical size of the facility increases (because of the "s" term). This relationship has been shown to break down for large tubes (5-25cm) where the momentum flux required for bypass becomes scale size independent.[8] Thus, uncertainty in physical size scaling is introduced. The functional form of the Wallis equation (the square root of water flow down is a linear function of the square root of gas flow up) has been shown to hold for a wide variety of geometries, test fluids, and even when condensation occurs.

Steady state ECC penetration tests in scale models of reactor vessels (annular geometry) using steam and subcooled water also show a similar dependence of water flow down on steam flow upward. Data are linear on a square root plot but the intercept (C, the steam flow for 100% bypass) and the slope (M) are a function of test variables as shown in Figures 3A and 3B. As the subcooling and injection rate of the ECC fluid increase, more steam is required for bypass due to condensation of steam and the slope decreases to almost a threshold relationship (a small decrease in steam flow results in a transition from no water penetration to high penetration).

Researchers at Creare, Inc. first proposed to modify the Wallis equation to account for condensation occurring in tests with steam and water.[9]

$$\{J_g^* - J_g^* \text{ (Condensed)}\}^{\frac{1}{2}} + M_f J_\ell^{*\frac{1}{2}} = C \qquad (3)$$

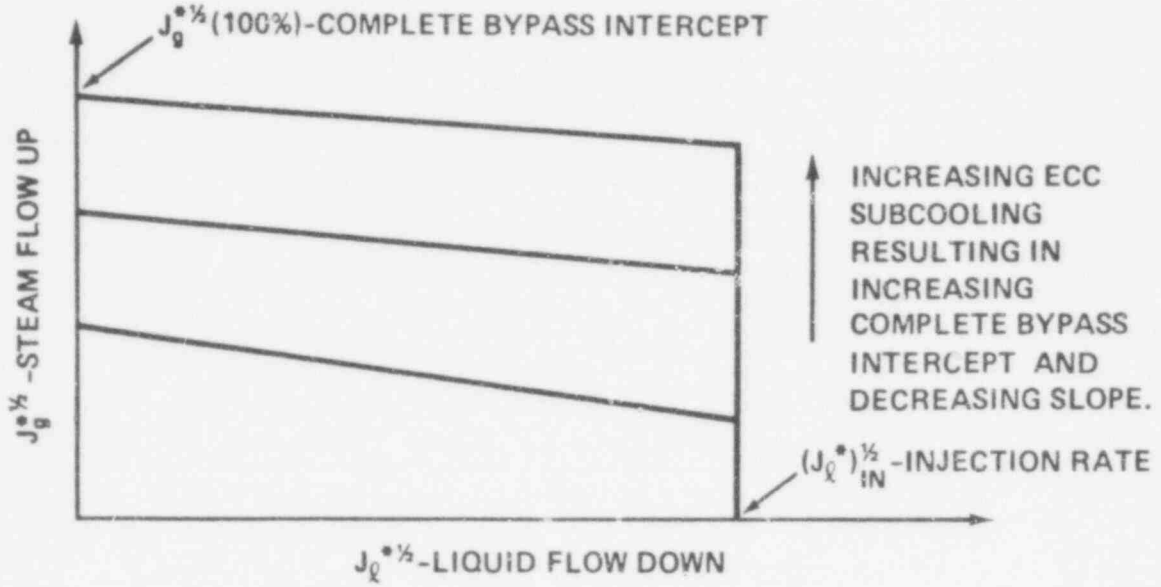


FIGURE 3A – EFFECT OF VARYING ECC FLUID SUBCOOLING.

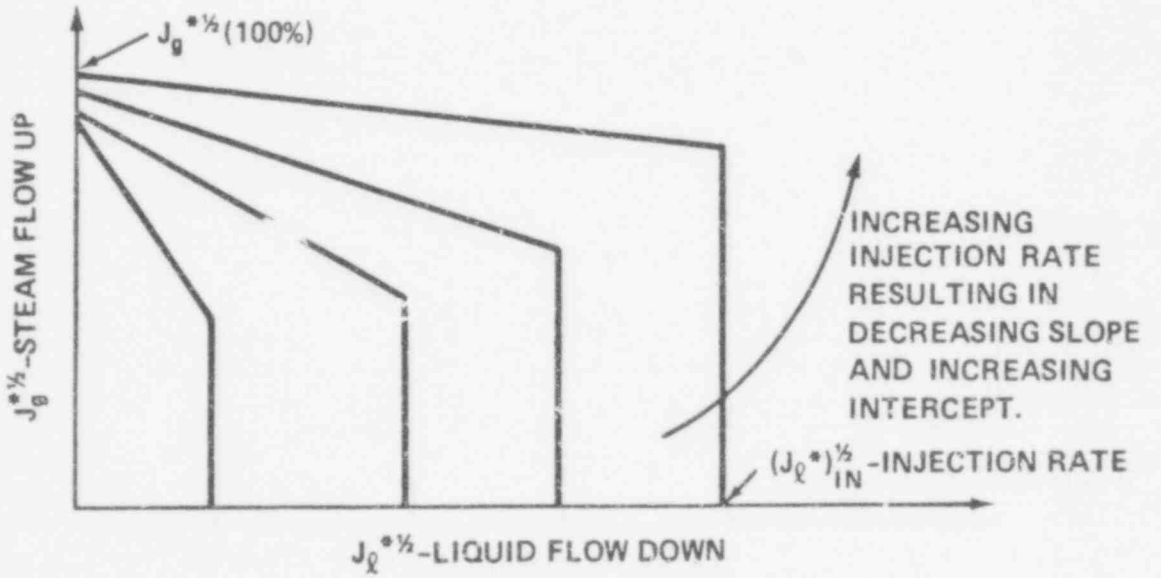


FIGURE 3B – EFFECT OF VARYING ECC FLUID INJECTION RATE.

Here the upper case "$J^*$" indicates that "W," the annulus circumference is used as the characteristic dimension since tests have shown that the previously used annulus hydraulic diameter (2 x gap) does not correlate data from tests with varying gap sizes.[10] The "modified" Wallis correlation reduces the steam available to cause bypass by subtracting an "effective" amount of condensed steam. The amount of steam condensed is equal to a condensation efficiency ($F_f$) times the amount of steam that could be theoretically condensed by the injected liquid (thermal equilibrium).

$$J_g^* \text{ (Condensed)} = F_f \, J_{g,T}^* \text{ (Cond)}$$

$$= F_f \, \frac{C_p (T_s - T_\ell)}{h_{fg}} \sqrt{\frac{\rho_\ell}{\rho_g}} \, (J_\ell^*)_{in} \qquad (4)$$

Both the condensation efficiency ($F_f$) and the slope ($M_f$) were complex functions of the rate of ECC injection, $(J_\ell^*)_{in}$, based purely on empirical findings. The condensation efficiency also contained an empirical deperdence on pressure. "C" was an empirically obtained constant. Battelle Columbus Laboratories (BCL) constructed a similar correlation, but removed the pressure dependency from the "$F_f$" term, claiming slightly better data correlation without the term.[11]

BCL has concentrated their efforts on comparing data from 1/15 and 2/15 scale facilities to test the adequacy of the correlations to scale the physical size. Two correlations have been used, one similar to the Creare modified Wallis correlation and one which effectively removed the scale effect from the Wallis

parameter. Neither correlation proved superior. BCL postulated that the two facilities tested may be in a transition region between Wallis scaling of steam flow and scale independent steam flow. BCL subsequently introduced an I* parameter (with some physical basis) to perform this transition.[12] BCL has found that the "$F_f$," "$M_f$" and "C" terms all appear to change with scale, but the uncertainties in these empirical terms are larger than the apparent scale effect. Thus the data previously available from the small range in scale sizes have produced little insight into physical size scaling.

The correlations available to date have been less than satisfactory due to the complex nature of the functional dependencies with no basis other than empiricism, the uncertainty whether the condensation efficiency depends on pressure (or other parameters), and the uncertainty in the empirical coefficients and functions. The poor correlational results have been the result of two factors. Data with saturated water have been available only at atmospheric pressure. Due to a lack of saturated water data at other pressures, a systematic independent variation of pressure and subcooling was not possible. Thus it was difficult to empirically separate condensation ($F_f$) and hydraulic (C) effects. Data near 100% bypass were also not readily available due to the difficulty of conducting the test or due to steam supply or other facility limitations. The result was that the slope ($M_f$) and the intercept (function of C and $F_f$) had large uncertainties.

Creare has recently obtained 1/15 scale data from tests with saturated water at pressures up to 0.44 MPa[13,14]. In addition, tests were carefully run to obtain data near 100% bypass. Two significant results were obtained: 1) data

from saturated water tests at different pressures are similar indicating that $J_g^*$ (or any parameter containing momentum flux) correctly correlates gas density effects, as shown in Figure 4; and 2) no effect of injection rate was observed for saturated water (similar to air-water tests), as shown in Figure 5. Creare went on to note that the current correlations which specify the slope to be a function of injection rate do not produce the correct trend for saturated water where the slope is independent of injection rate. They suggested that the slope should be a function of the thermodynamic ratio (fraction of steam which could be theoretically condensed) which would provide the correct limiting behavior for saturated water and still provide an effect of injection rate on the slope for subcooled water tests.

PCL has also expanded their data base to obtain data at higher bypass in the 2/15 scale vessel which allows better definition of the bypass curves. Data with lower ECC subcooling were also obtained and air-water tests in both the 1/15 and 2/15 scale vessels have been performed.[15,16]

## 3.1 STATISTICAL ANALYSIS

We have performed a detailed systematic statistical analysis of this new, more complete data set in order to obtain an understanding of the data trends and obtain an accurate correlation of the data. The data analysis was divided into three steps: A "housecleaning" of the data, a "graphical" analysis, and a "numerical regression" analysis. The graphical analysis was performed to observe data trends external to any "Black Box" numerical routine and to obtain correlation functional forms for later use in a regression analysis.

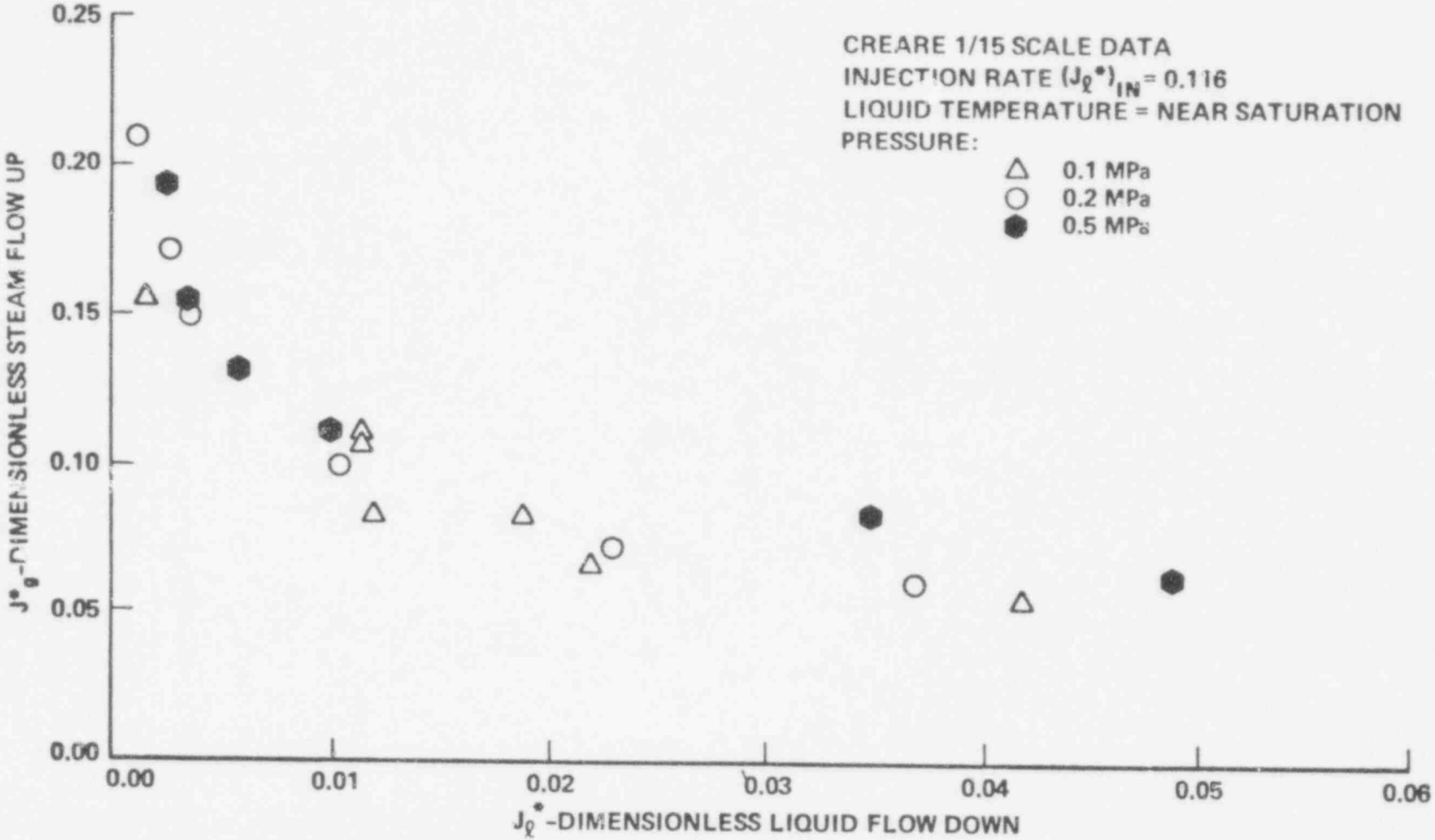


FIGURE 4 – CREARE 1/15 SCALE DATA SHOWING A NEGLIGIBLE EFFECT OF PRESSURE FOR SATURATED LIQUID.

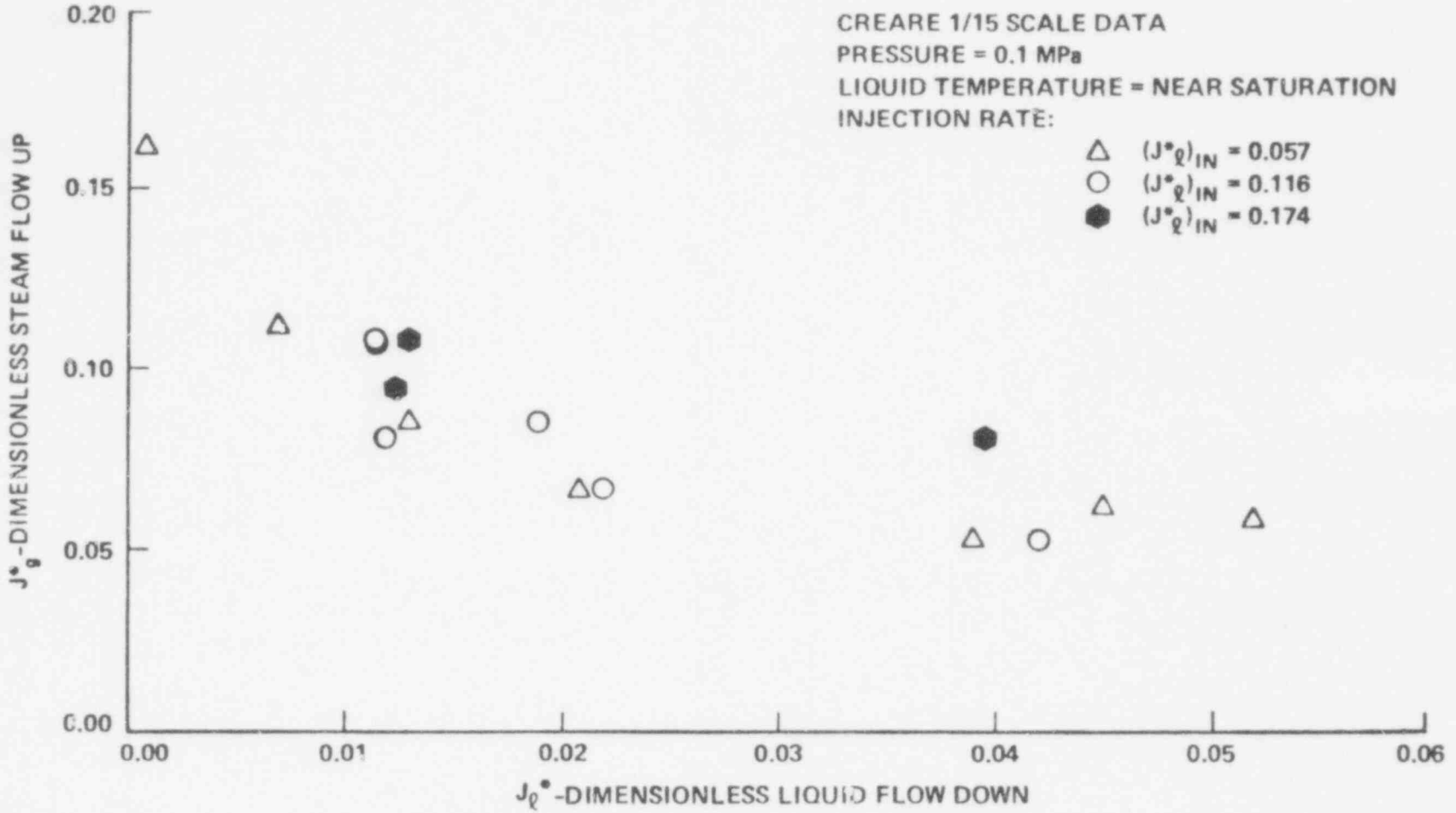


FIGURE 5 – CREARE 1/15 SCALE DATA SHOWING A NEGLIGIBLE EFFECT OF INJECTION RATE FOR SATURATED LIQUID.

The graphical phase consisted of data plotting and simple linear least square curve fitting with one independent variable.

### 3.2 DATA "HOUSECLEANING"

Data were grouped into sets with nearly similar test conditions to form penetration curves for a given ECC flow, pressure and ECC temperature. Plots were made to check data consistency. Data were excluded from the sets for several reasons:

1. Data clearly deviating from the norm (isolated anomalous points).

2. Data outside the linear region (data with very high or very low penetration rates).

3. Data with actual test conditions far from those in the set.

4. Unbalanced data sets (sets with too little data or too small a range to form a well defined curve)

Data excluded for the latter two reasons could mislead the graphical analysis where the data were treated as sets. However, these data were placed back in the overall set for the regression analysis where the data were not treated as separate sets.

3.3 GRAPHICAL ANALYSIS

Data sets were plotted in the form $J_g^{*1/2}$ versus $J_\ell^{*1/2}$ and linear least square fits were obtained using the following equation:

$$J_g^{*\frac{1}{2}} + M_f J_\ell^{*\frac{1}{2}} = J_g^{*} (100\%)^{\frac{1}{2}}$$

Thus, the slope ($M_f$) and intercept or 100% bypass point, $J_g^*(100\%)^{1/2}$, were determined for each set of conditions. Statistical data concerning the linearity of the data sets and uncertainties in the slopes and intercepts were also obtained. These results were examined to determine how $M_f$ and $J_g^*(100\%)^{1/2}$ vary with test conditions.

The existing correlation predicts the intercept ($J_\ell^* = 0.$) to be

$$J_g^* (100\%) = C^2 + F_f J_{g,T}^* (\text{Cond}) \qquad (5)$$

as shown by equations 3 and 4. Figures 6A, 7A, 8A and 9A are plots of $J_g^*(100\%)$ versus $J_{g,T}$ (Cond) for Creare 1/30[4,17] and 1/15[13,14] scale data and BCL 1/15[2,15,16] and 2/15[3,15] scale data. The zero intercept of these plots can be used to determine "C" and the slope to determine $F_f$, the condensation efficiency. It should be noted that no apparent effect of pressure or injection rate is present in these plots, indicating that the condensation efficiency is not a function of these variables as previously postulated. Thus $F_f$ is a constant and will now be simply "F". This is consistent with Creare's previous observation.[13]

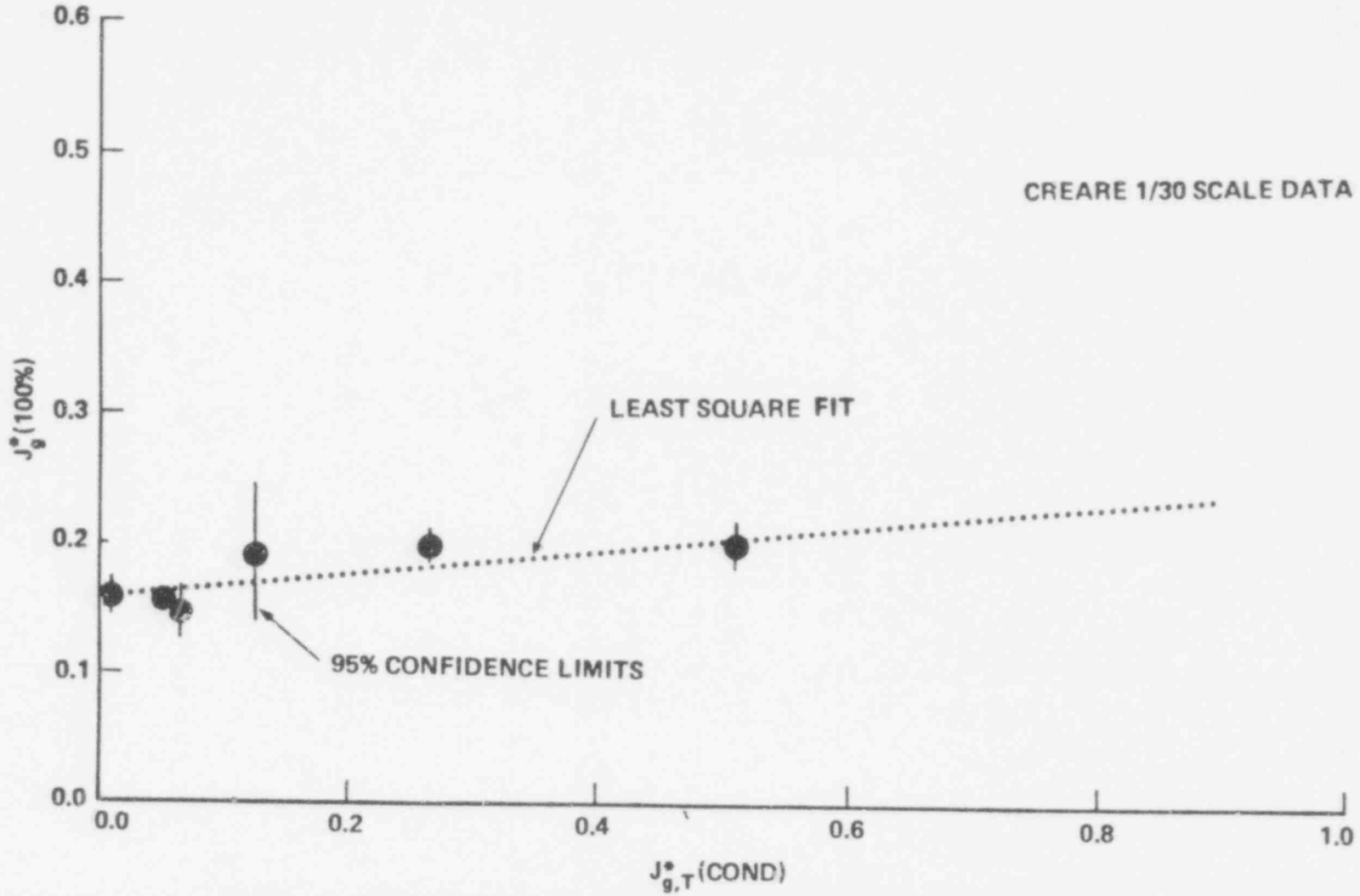


FIGURE 6A – PLOT OF STEAM FLOW REQUIRED FOR 100% BYPASS VERSUS THE AMOUNT OF STEAM THAT COULD THEORETICALLY BE CONDENSED.

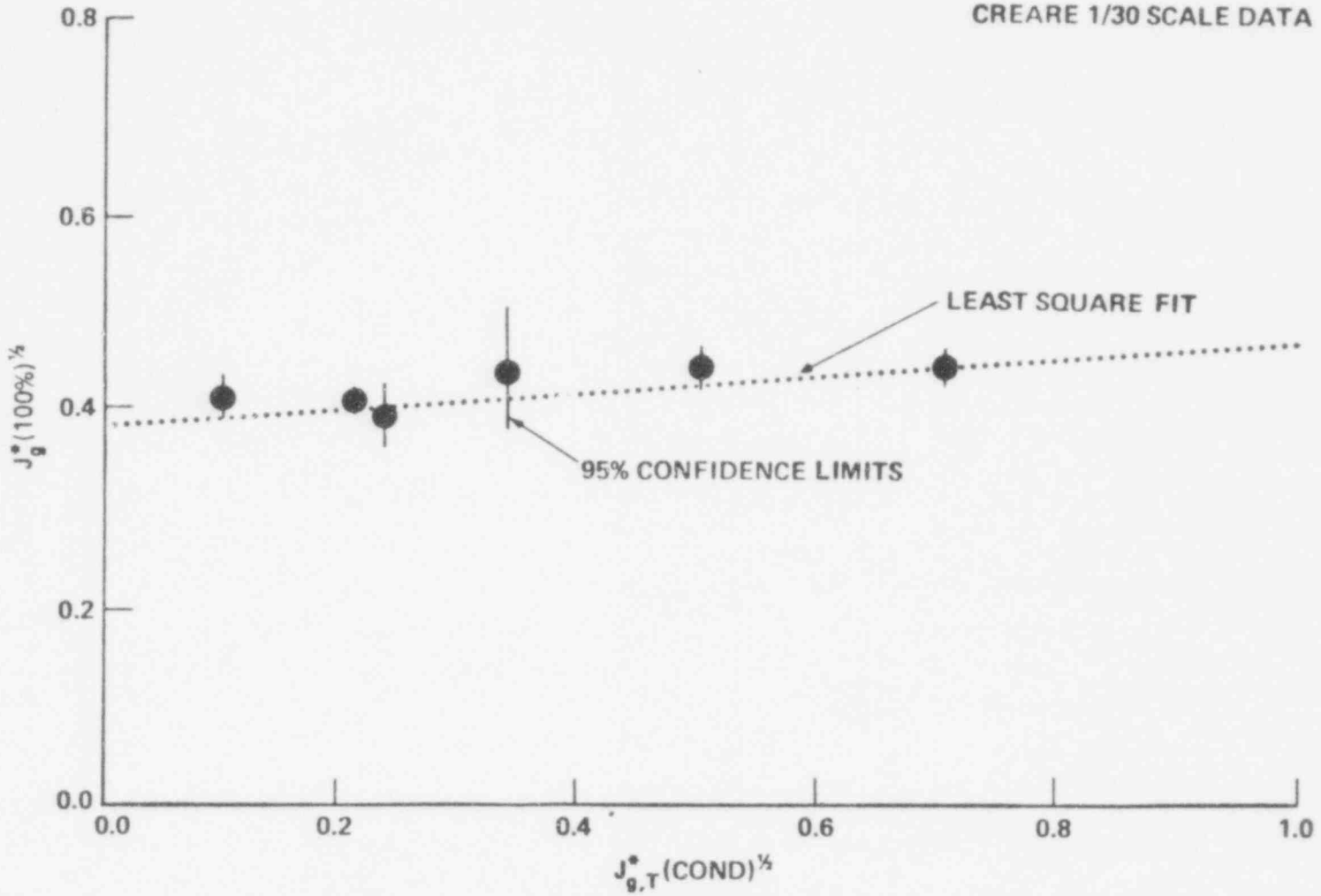


FIGURE 68 – PLOT OF THE SQUARE ROOT OF THE STEAM REQUIRED FOR 100% BYPASS VERSUS THE SQUARE ROOT OF THE AMOUNT OF STEAM THAT THEORETICALLY COULD BE CONDENSED.

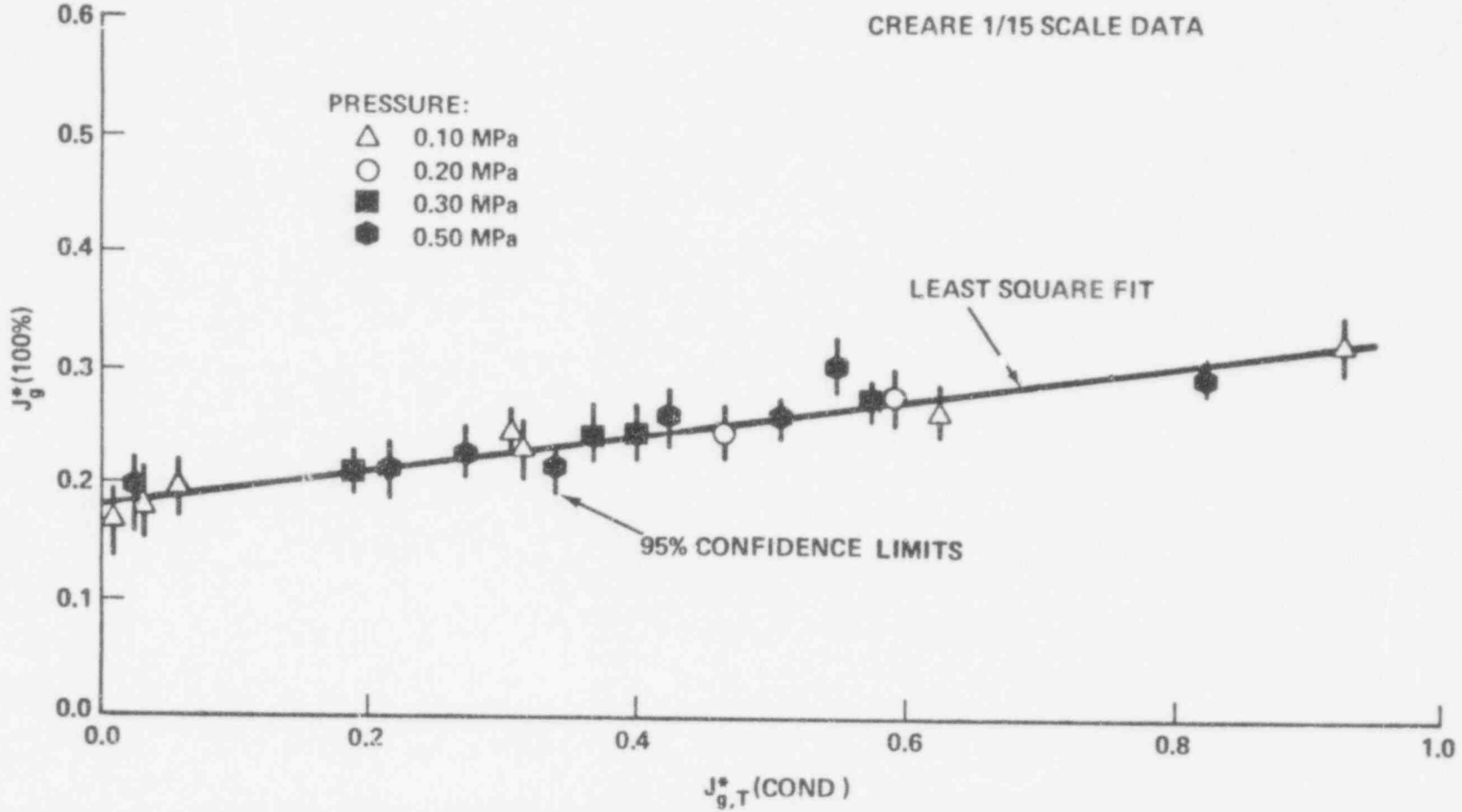


FIGURE 7A – PLOT OF STEAM FLOW REQUIRED FOR 100% BYPASS VERSUS THE AMOUNT OF STEAM THAT THEORETICALLY COULD BE CONDENSED.

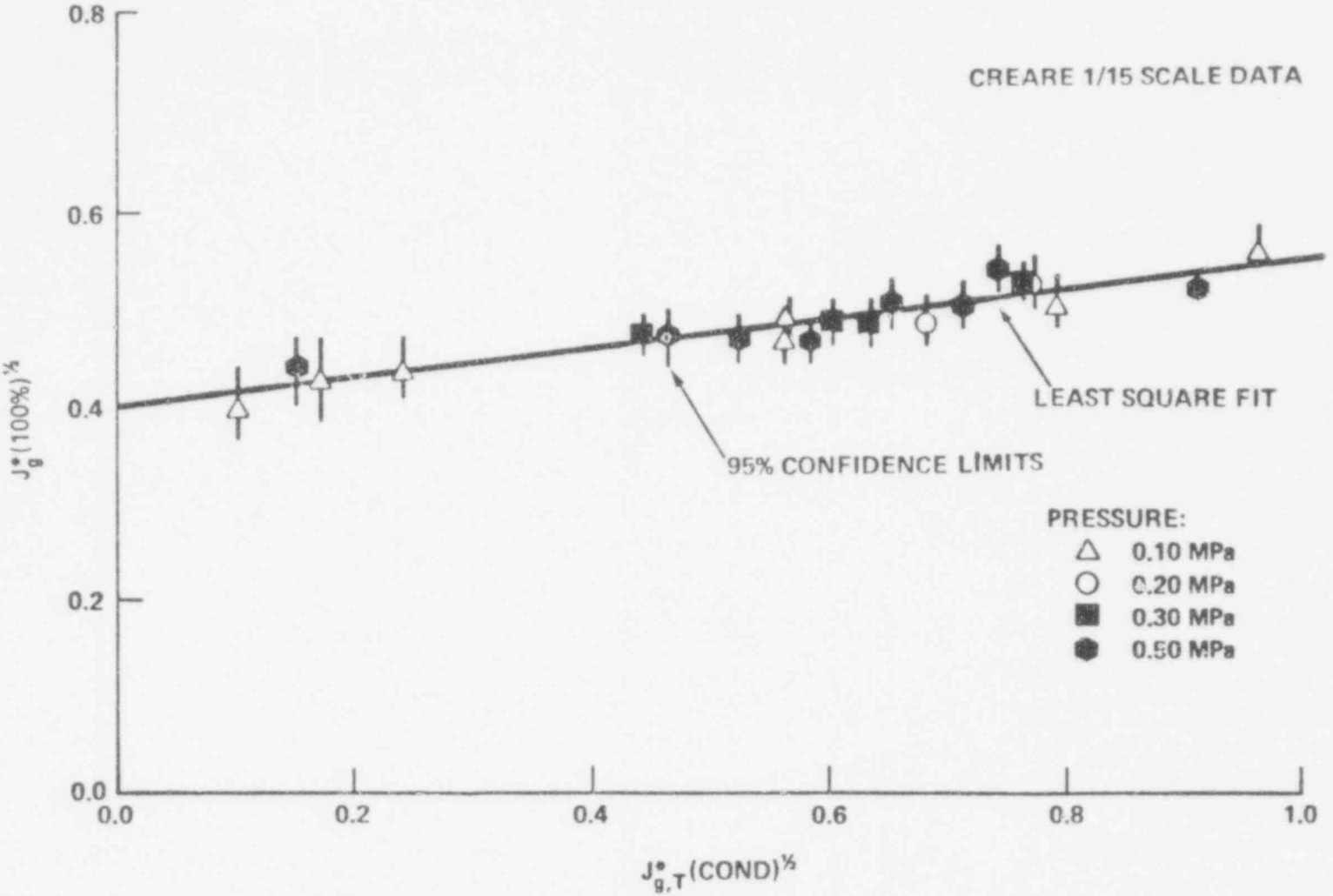


FIGURE 7B – PLOT OF THE SQUARE ROOT OF THE STEAM FLOW REQUIRED FOR 100% BYPASS VERSUS THE SQUARE ROOT OF THE AMOUNT OF STEAM THAT THEORETICALLY COULD BE CONDENSED.

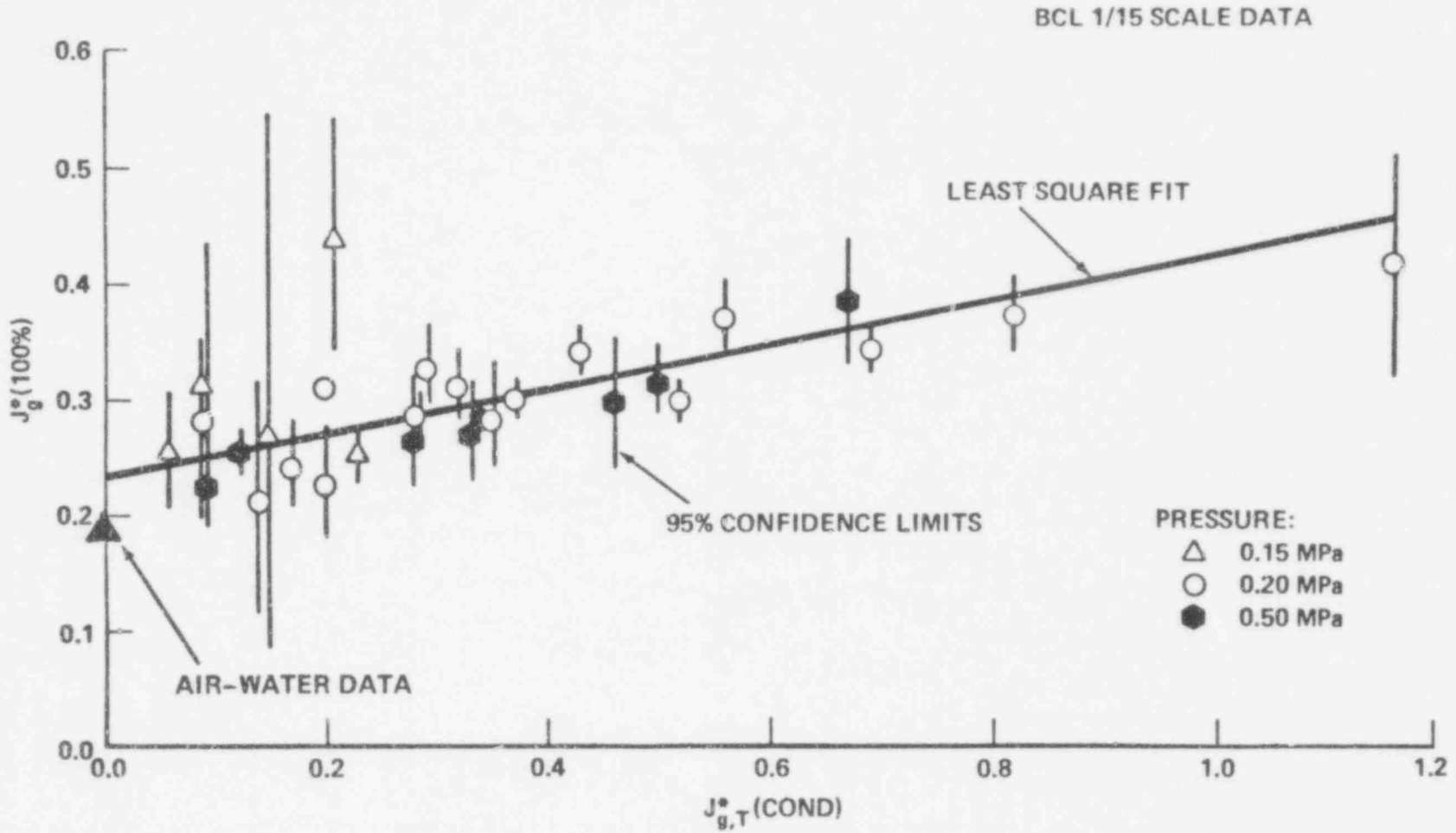


FIGURE 8A – PLOT OF THE STEAM FLOW REQUIRED FOR 100% BYPASS VERSUS THE AMOUNT OF STEAM THAT COULD THEORETICALLY BE CONDENSED.

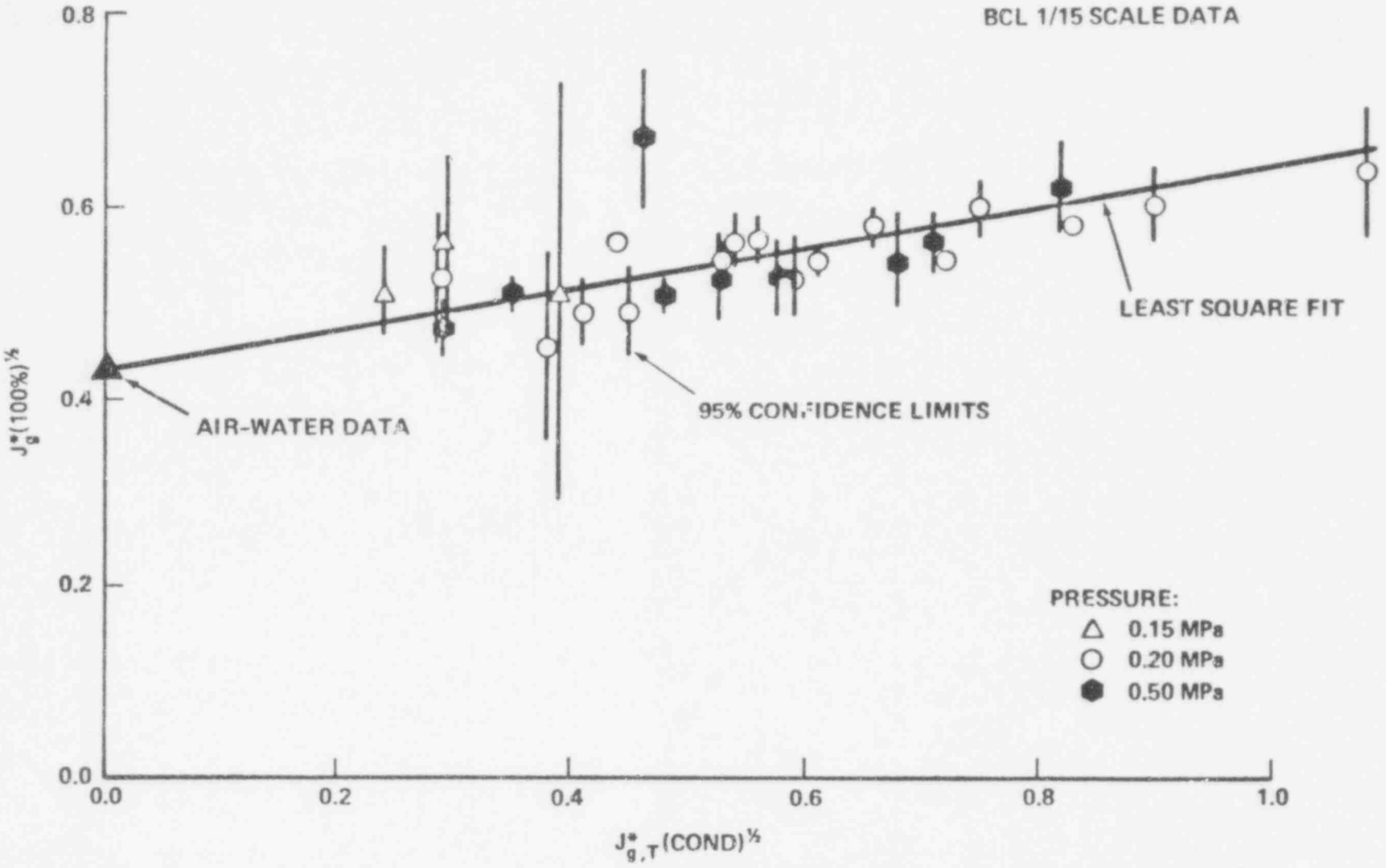


FIGURE 8B – PLOT OF THE SQUARE ROOT OF THE STEAM REQUIRED FOR 100% BYPASS VERSUS THE SQUARE ROOT OF THE AMOUNT OF STEAM THAT THEORETICALLY COULD BE CONDENSED.

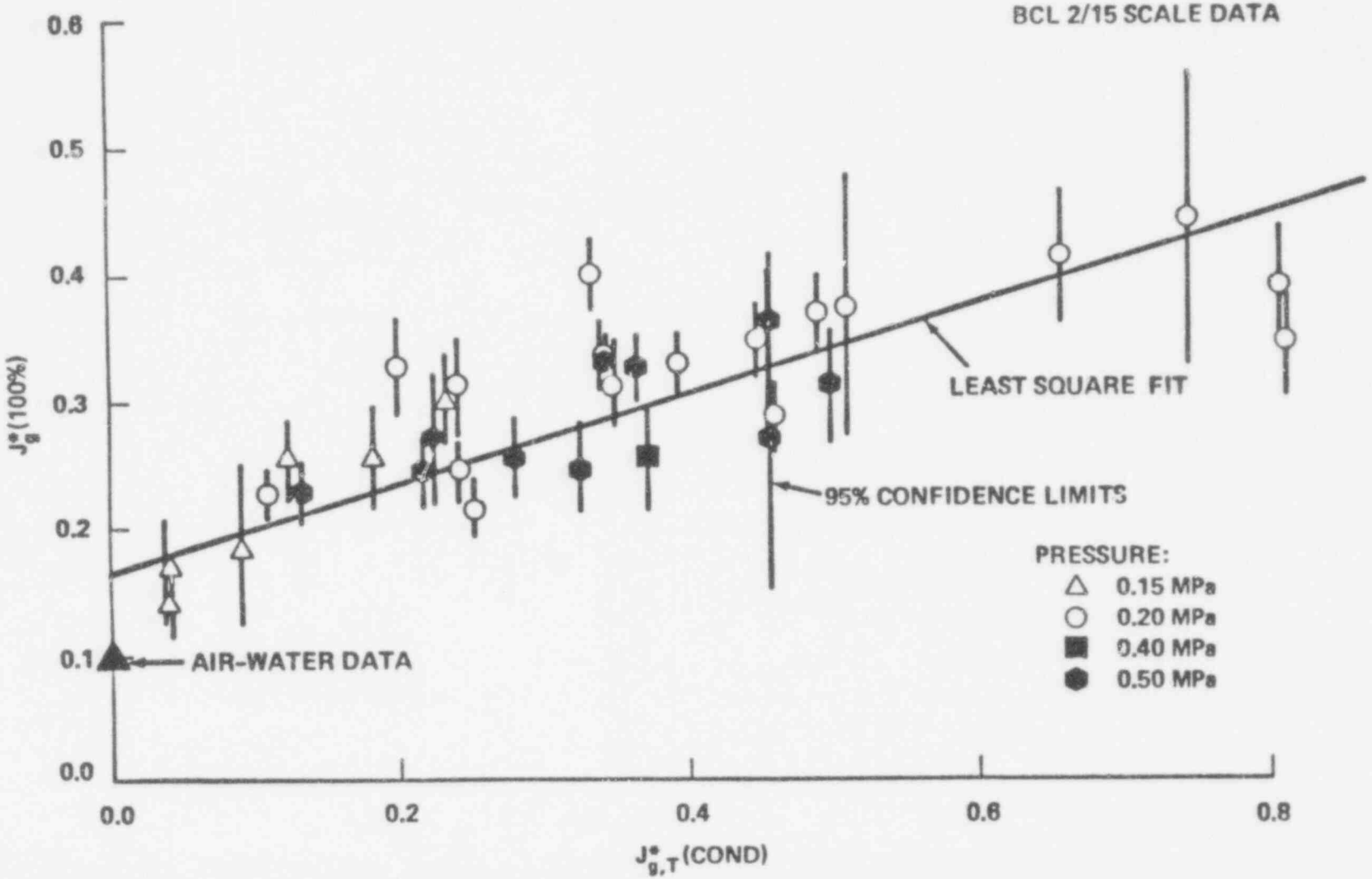


FIGURE 9A – PLOT OF THE STEAM FLOW REQUIRED FOR 100% BYPASS VERSUS THE AMOUNT OF STEAM THAT THEORETICALLY COULD BE CONDENSED.

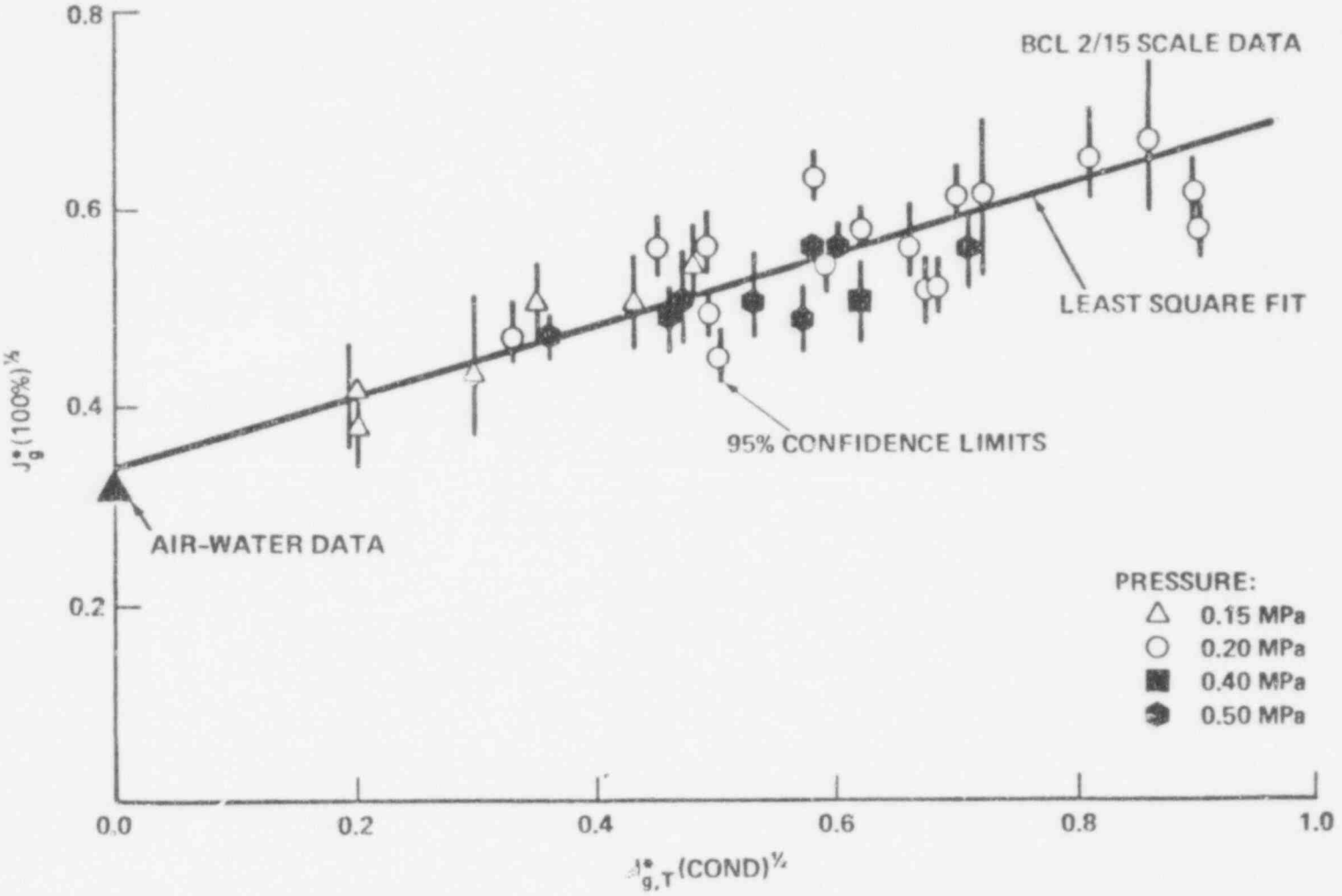


FIGURE 9B – PLOT OF THE SQUARE ROOT OF THE STEAM REQUIRED FOR 100% BYPASS VERSUS THE SQUARE ROOT OF THE AMOUNT OF STEAM THAT THEORETICALLY COULD BE CONDENSED.

The BCL data (Figures 8A and 9A) indicate, however, that the plots may not be linear as indicated by equation 5 and that the steam-water data do not appear to approach the air-water data in the limit of low subcooling. Therefore the intercepts were replotted in the form $J_g^*\ (100\%)^{1/2}$ versus $J_{g,T}^*\ (\text{Cond})^{1/2}$ as shown in Figures 6B, 7B, 8B, and 9B. Statistically, the linearity of the BCL plots was improved and the steam-water data are now consistent with the air-water data (previously these air-water data were thought to be anomalous and disregarded). The linearity of the Creare data was also very slightly improved by the second graph.

The second plots suggest a change in the correlation to

$$J_g^*(100\%)^{1/2} = C + F\ J_{g,T}^*(\text{Cond})^{1/2} \qquad (6)$$

or

$$J_g^{*1/2} - F\ J_{g,T}^*(\text{Cond})^{1/2} + M_f\ J_\ell^{*\ 1/2} = C \qquad (7)$$

which can be compared with the previous correlation of equations 3 and 4.

The slope of the data ($M_f$) has also been examined. Figures 10-13 show that the slope of the data is a strong function of $J_{g,T}^*(\text{Cond})$ and not only a function of $(J_\ell^*)_{in}$ as previously postulated. This is consistent with Creare's[13] findings, but we have used $J_{g,T}^*\ (\text{Cond})$ rather than

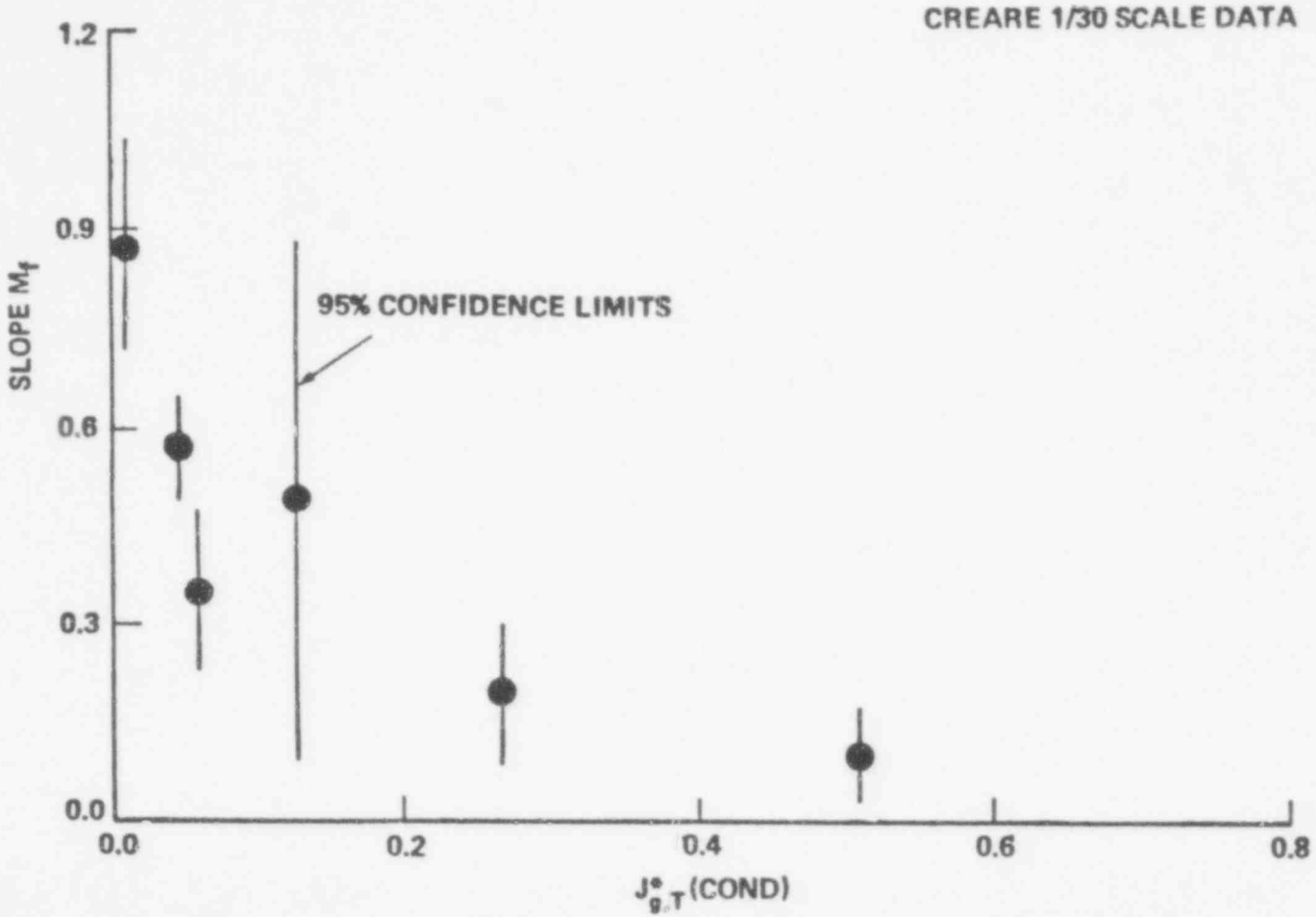


FIGURE 10 – PLOT OF THE SLOPE OF THE PENETRATION CURVES VERSUS THE AMOUNT OF STEAM THAT COULD THEORETICALLY BE CONDENSED.

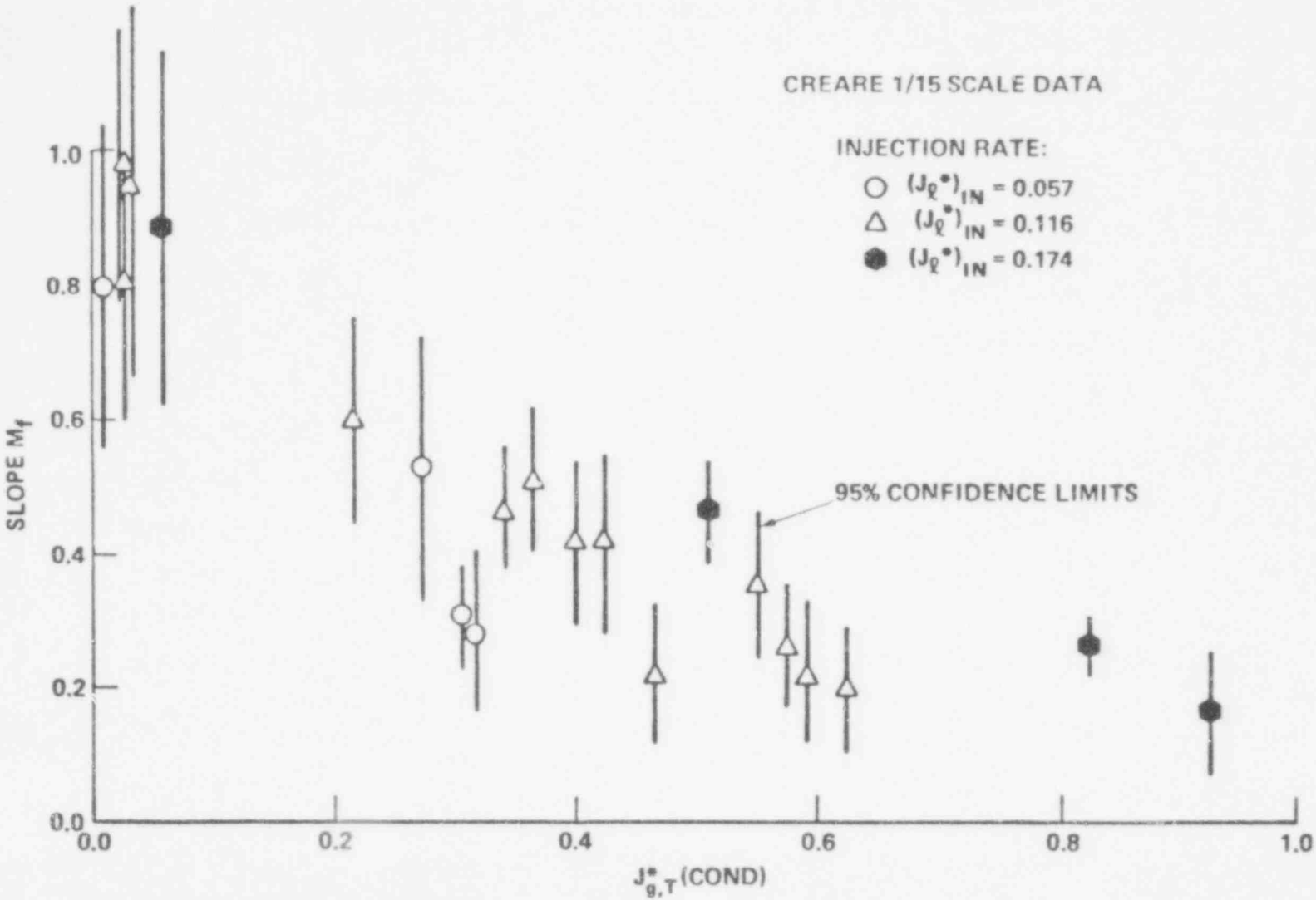


FIGURE 11 – PLOT OF THE SLOPE OF THE PENETRATION CURVES VERSUS THE AMOUNT OF STEAM THAT THEORETICALLY COULD BE CONDENSED.

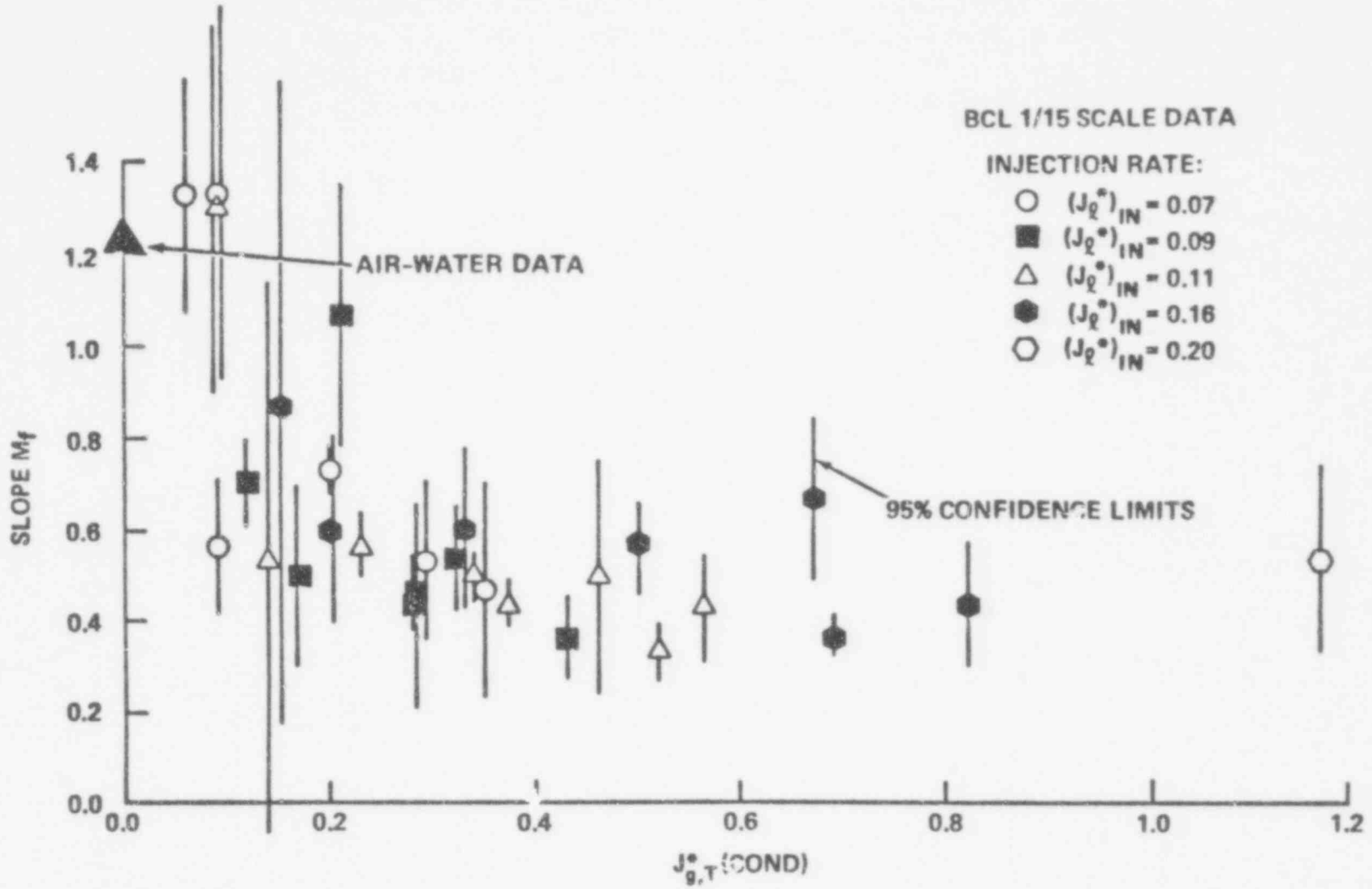


FIGURE 12 – PLOT OF THE SLOPE OF THE PENETRATION CURVES VERSUS THE AMOUNT OF STEAM THAT THEORETICALLY COULD BE CONDENSED.

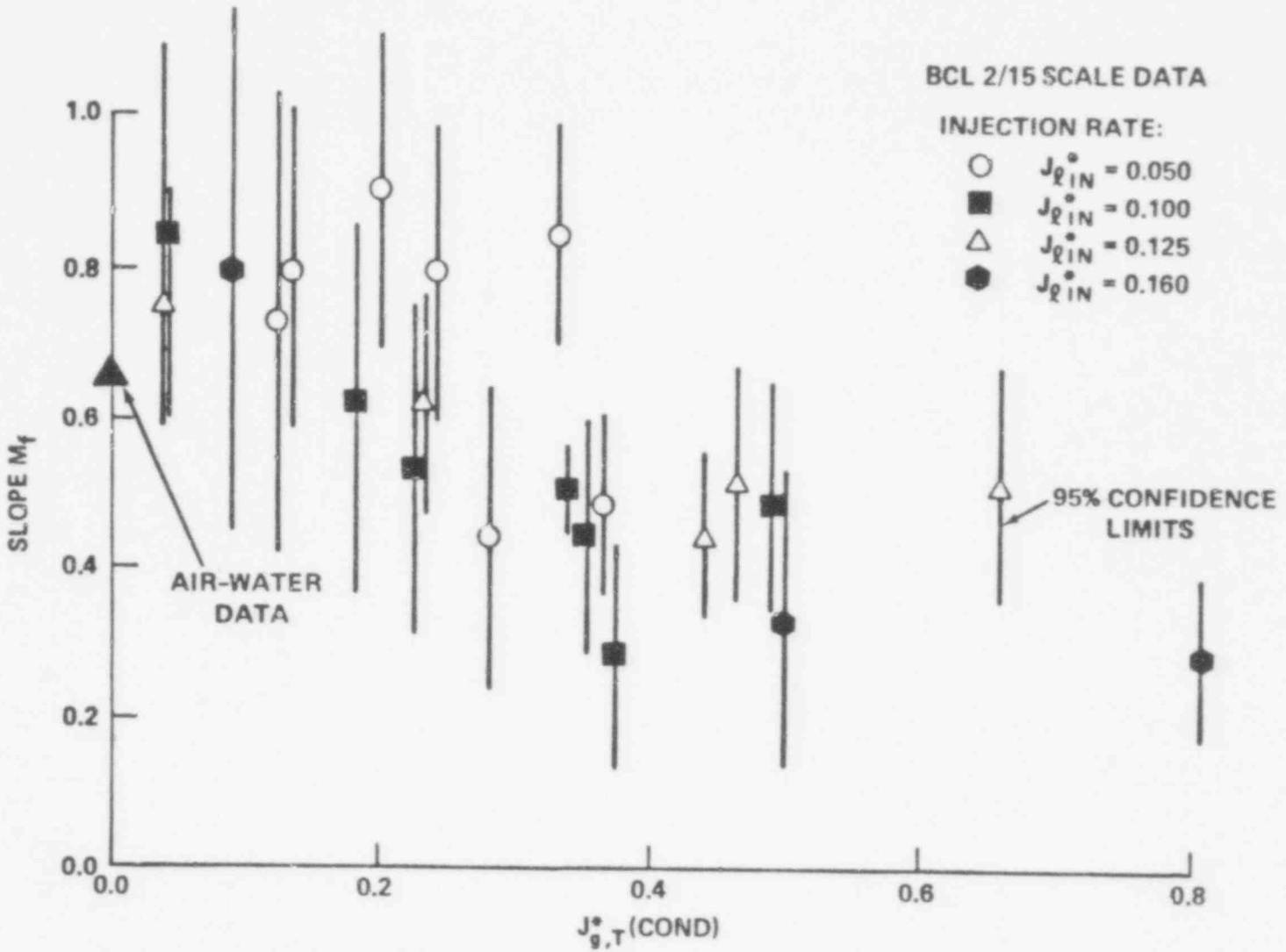


FIGURE 13 – PLOT OF THE SLOPE OF THE PENETRATION CURVES VERSUS THE AMOUNT OF STEAM THAT THEORETICALLY COULD BE CONDENSED.

$J_{g,T}^*$ (Cond)/$J_g^*$ (100%) as suggested by Creare. The statistical dependence of slope on $J_{g,T}^*$ (Cond) is as good as the Creare dependence and results in a much simpler correlation. Dependence of slope on injection rate (in addition to that contained in $J_{g,T}^*$ (Cond)) is shown in Figures 10-13 (most obvious in Creare 1/15 scale). Thus a new form for the slope is proposed

$$M_f = M - Z\, J_{g,T}^*\,(\text{Cond})\, \exp\left(-a \sqrt{(J_\ell^*)_{in}}\right) \qquad (8)$$

where "M" is the slope for saturated water, "Z" indicates the effect of condensation on the slope and the exponential accounts for the secondary injection rate dependency. It is recommended that the exponential <u>not</u> be used in general since it only provides a minor improvement to the correlation at the expense of a more complicated correlation. The exponent is used herein only in order to get as accurate a representation of the data as possible for later scaling analyses.

A new correlation is proposed based on observation of data trends

$$J_g^{*1/2} - F\, J_{g,T}^*\,(\text{Cond})^{1/2} + \left\{M - Z\, J_{g,T}^*(\text{Cond})\, \exp\left(-a\sqrt{(J_\ell^*)_{in}}\right)\right\} J_\ell^{*1/2} = C \qquad (9)$$

where "F", "M", "Z", "C" and "a" are empirically determined constants.

This correlational form is simpler than previous forms (when the exponential is not used) and better represents data trends. The observed dependence of slope on condensation is included and the condensation efficiency is now a

constant. The condensation effect has also been removed from the square root radical containing the steam flow. This change has the most impact on conclusions about size scaling as will be shown later.

A second correlation form was also used for completeness.

$$\left\{J_g^* - F\, J_{g,T}^*\,(\text{Cond})\right\}^{1/2} + \left\{M - Z\, J_{g,T}^*\,(\text{Cond})\, \exp\left(-a\sqrt{(J_\ell^*)_{in}}\right)\right\} J_\ell^{*1/2} = C \qquad (10)$$

Equation 10 is similar to the traditional formulation of equation 3 with improved slope dependency and a constant condensation efficiency.

## 3.4 NUMERICAL REGRESSION ANALYSIS

The correlational forms of equations 9 and 10 were used in a numerical regression routine to determine the empirical constants. These constants were also obtained from the previous graphical analysis and were used as starting values for the regression iteration. The regression analysis treats each point separately and is not subject to error caused by deviation of the actual test conditions from those assumed for the individual sets. Thus more accurate determination of the constants can be obtained. The numerical regression, however, is only as good as the correlational form used. Thus the need to perform both analyses.

The "blind" use of any numerical regression routine with a complicated equation such as equation 9 or 10 is dangerous and there is no guarantee

that the "correct" solution will be found. Indeed, seemingly convergent solutions that provide a good fit to the data have been found that produced totally unrealistic values for the coefficients. We have conducted an extensive effort to ensure the reliability of the numerical analysis or at least to recognize when the results are unreliable. This work is not discussed herein since it would be more appropriate for a mathematical discussion. Results from the analysis of the 1/30 scale data have not been used since this data set failed two basic criteria: 1) The results should be reasonable when compared with the previous graphical analysis and 2) The results should be relatively independent of solution technique (e.g., choice of dependent variable, iteration technique, etc.). Tables 1 and 2 list the results of the regression analysis for all data sets except the 1/30 scale set. The results shown in Tables 1 and 2 for the 1/30 scale set are from the graphical analysis.

## 4.0 CORRELATIONAL RESULTS

### 4.1 PRESSURE SCALING

The scaling of pressure effects appears to be well understood. Steam properties have adequately accounted for all pressure effects which have been observed. While the range of pressures analyzed appears small (<0.50 MPa), the change in steam properties over the range analyzed is large compared to the change at pressures of interest. Figure 14 shows the effect of pressure over the range analyzed and an extrapolation of the 2/15 scale correlation (equation 9) to 4.08 MPa (accumulator set point) and 1.72 MPa (ECC penetration not expected above this point). Since all observed pressure effects have been explained in terms of steam properties, a high degree of confidence can

TABLE 1

ECC BYPASS DATA CORRELATION

USING EQUATION #10
(TRADITIONAL FORMULATION)

| COEFFICIENT | BCL 2/15 STEAM | BCL 2/15 STEAM AND AIR | BCL 2/15 AIR | BCL 1/15 STEAM | BCL 1/15 STEAM AND AIR | BCL 1/15 AIR | CREARE 1/15 STEAM | CREARE* 1/30 STEAM |
|---|---|---|---|---|---|---|---|---|
| C | 0.455 ±.010 | 0.439 ±.011 | 0.318 ±0.007 | .523 ±.012 | .452 ±.008 | .440 ±.010 | 0.434 ±0.011 | 0.400 ±0.021 |
| F | 0.297 ±.015 | 0.328 ±.014 | - | .119 ±.013 | .172 ±.012 | - | 0.146 ±0.019 | 0.091 ±0.070 |
| M | 0.987 ±.078 | 1.085 ±.086 | 0.668 ±0.038 | 1.182 ±.086 | 1.133 ±.073 | 1.194 ±.072 | 1.009 ±0.094 | - |
| Z | 11.87 ±2.77 | 23.32 ±3.96 | - | 19.132 ±2.043 | 42.858 ±3.011 | - | 9.07 ±1.54 | - |
| a | 9.5 | 11.0 | - | 8.0 | 10.0 | - | 6.0 | - |

*From Graphical Analysis

Error Bars are for 95% Confidence Limits (Two Standard Errors)

TABLE 2

ECC BYPASS DATA CORRELATION

USING EQUATION #9
(MODIFIED FORMULATION)

| COEFFICIENT | BCL 2/15 STEAM | BCL 2/15 STEAM AND AIR | BCL 2/15 AIR | BCL 1/15 STEAM | BCL 1/15 STEAM AND AIR | BCL 1/15 AIR | CREARE 1/15 STEAM | CREARE* 1/30 STEAM |
|---|---|---|---|---|---|---|---|---|
| C | 0.328 ±.012 | 0.323 ±.010 | 0.318 ±0.007 | .417 ±.013 | .429 ±.007 | .440 ±.010 | 0.401 ±0.017 | 0.385 ±0.029 |
| F | 0.382 ±.022 | 0.391 ±.018 | - | .233 ±.019 | .222 ±.014 | - | 0.155 ±0.027 | 0.094 ±0.070 |
| M | 0.666 ±.053 | 0.659 ±.048 | 0.668 ±0.038 | .877 ±.059 | 1.009 ±.052 | 1.194 ±.072 | 0.916 ±0.091 | - |
| Z | 4.052 ±1.289 | 4.456 ±1.350 | - | 16.908 ±2.223 | 15.444 ±1.663 | - | 5.33 ±0.91 | - |
| a | 7.5 | 8.0 | - | 9.0 | 8.0 | - | 4.5 | - |

*From Graphical Analysis

Error Bars are 95% Confidence Limits (Two Standard Errors)

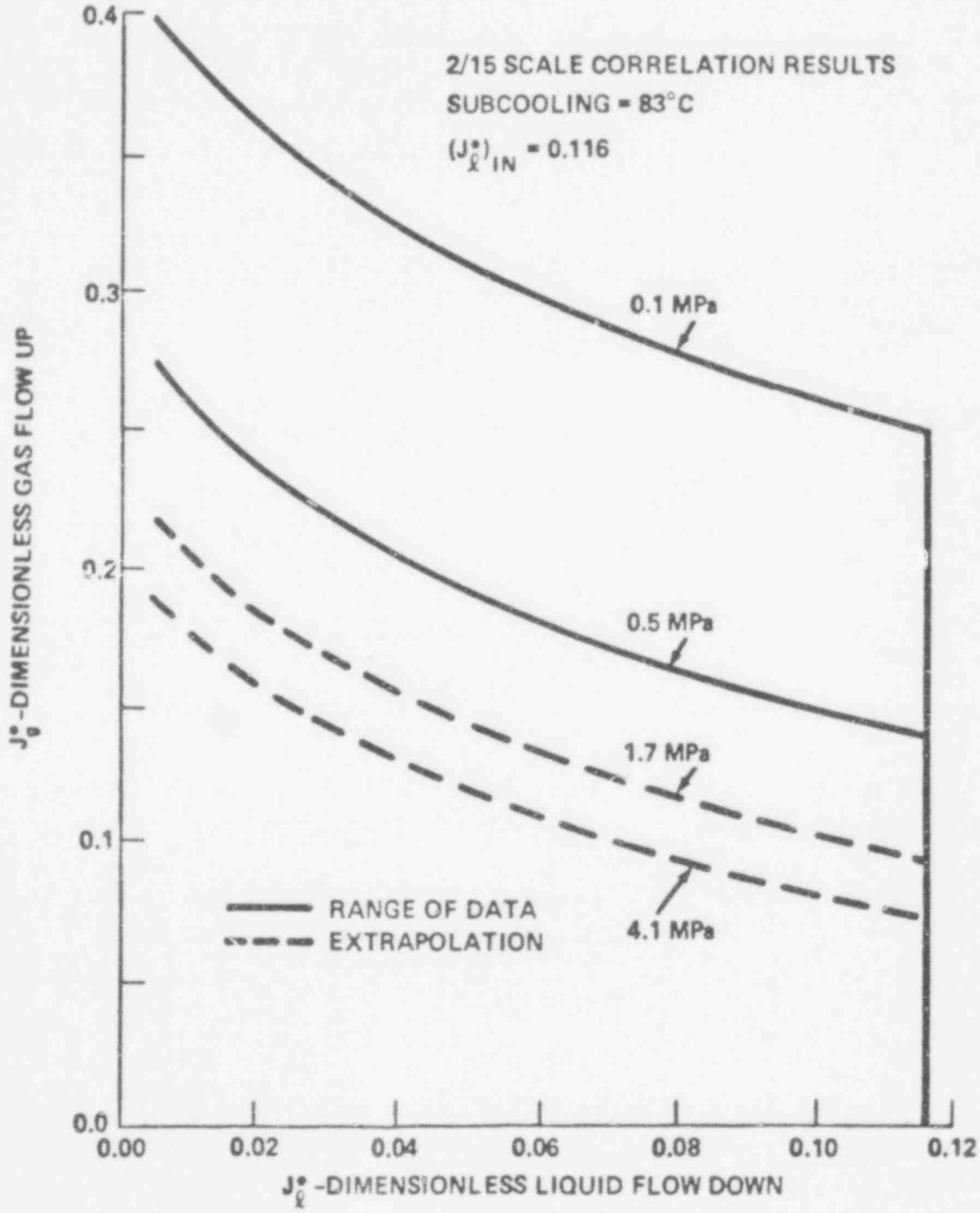


FIGURE 14 – EFFECT OF PRESSURE ON ECC PENETRATION.

be placed on this pressure extrapolation. In addition, the effect of condensation decreases as pressure increases so that any error caused by the extrapolation will be minimized.

## 4.2 PHYSICAL SIZE SCALING

The scaling of physical size is not well advanced, primarily due to the small size of the test facilities. Air-water flooding tests indicate that the Wallis correlation (equation 2) scales flooding in tubes with a diameter less than about 5 cm. For larger tubes, however, this relationship breaks down and the critical gas momentum flux for flooding becomes constant (scale size independent). The geometry of the apparatus also influences the flooding process as observed in tubes with different inlet conditions[7] and comparisons between a flat downcomer (unrolled) and an annular facility.[9] Thus several phenomena should be recognized that may be encountered in the analysis of steam-water data in annuli - a potential change in the size scaling for larger systems and the need to analyze geometrically similar facilities to study scale effects.

Test data from four facilities have been compared in order to study scaling of size - BCL 1/15[2,15,16] and 2/15[3,15] scale and Creare 1/30[4,17] and 1/15[13,14] scale data. These data sets have been used since they are the most geometrically similar data sets available. The BCL vessels are identical and utilize a 60°-120°-60°-120° cold leg arrangement. Both Creare vessels also have four cold legs but a symmetrical spacing is used. Analysis of BCL data with both types of cold leg arrangements has been performed which indicates that this difference produces a small effect which may explain small

differences observed between the BCL and Creare 1/15 scale data. BCL and Creare also have different operating procedures. Creare simply allows the lower plenum to fill while BCL (in most cases) drains the lower plenum to obtain an average filling rate over a longer time period. The latter procedure results in smaller data uncertainty but the former procedure more nearly represents the actual PWR conditions. BCL data obtained using both operating procedures have been compared and found to yield nearly similar results. These differences are presented to illustrate that while no significant differences are known, the facilities do have differences which could influence the scaling analysis.

Figure 15 and 16 are plots of the 100% bypass point without condensation ($C^2$) for the four data sets found using regression analysis with equations 9 and 10. The traditional form (Figure 15) would indicate that "C" is constant with scale. However, Figure 15 shows a large amount of data scatter and an inconsistency between the steam-water and air-water data. Figure 16 shows the constants determined using the modified formulation of equation 9. This equation results in less scatter and consistency between air-water and steam-water data. However, the lower value of "C" determined from the 2/15 scale data suggests a transition to K* scaling. This breaking down of J* scaling for steam-water tests was not observed in previous analysis efforts but arose due to the charged correlational form suggested by the 2/15 scale air-water data.

Figures 17 and 18 illustrate the empirically determined condensation efficiency (F). A general trend toward increasing condensation effects as

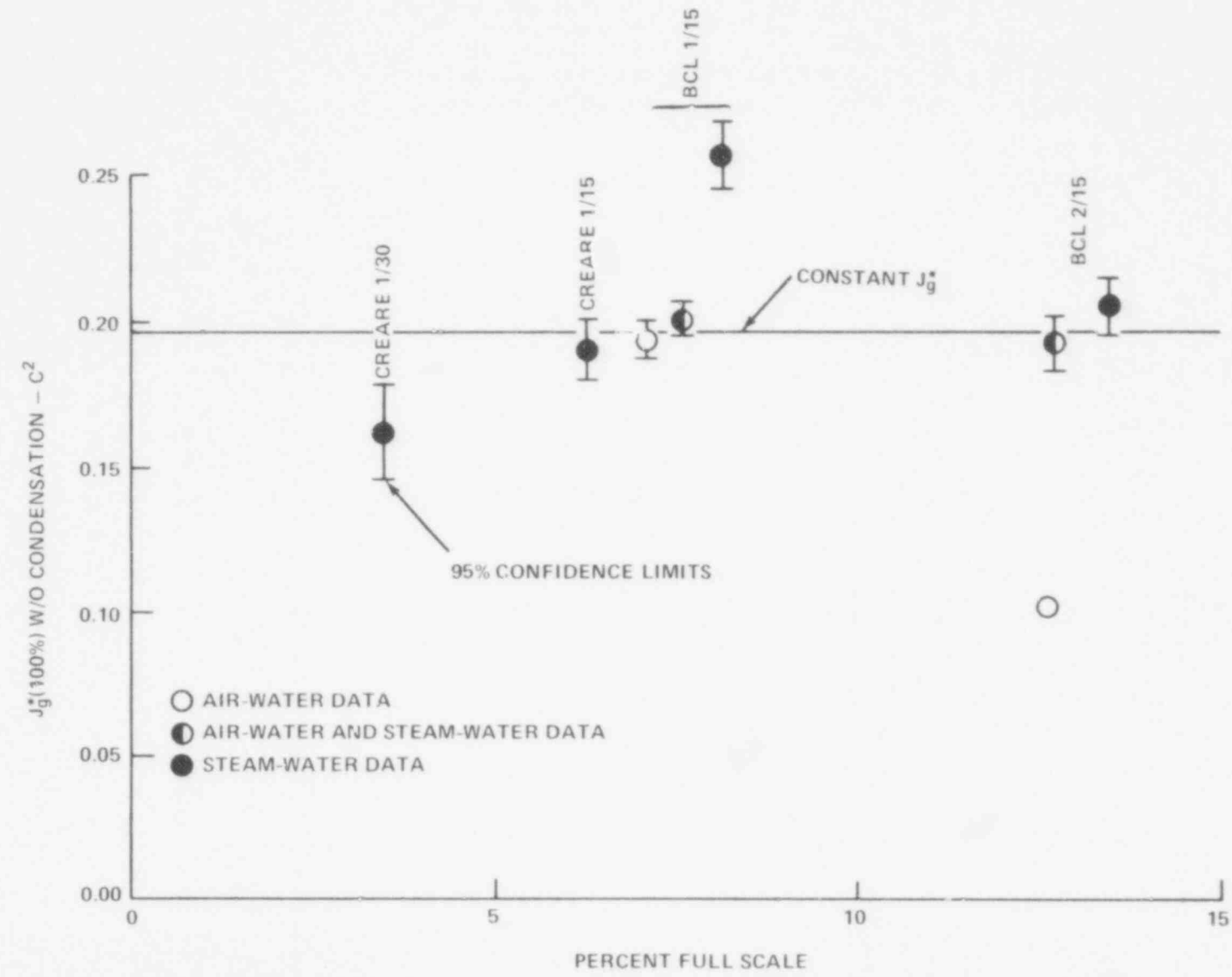


Figure 15 – Empirically Determined Gas Flow for 100% Bypass w/o Condensation as a Function of Scale Size Using the Traditional Formulation of Equation #10.

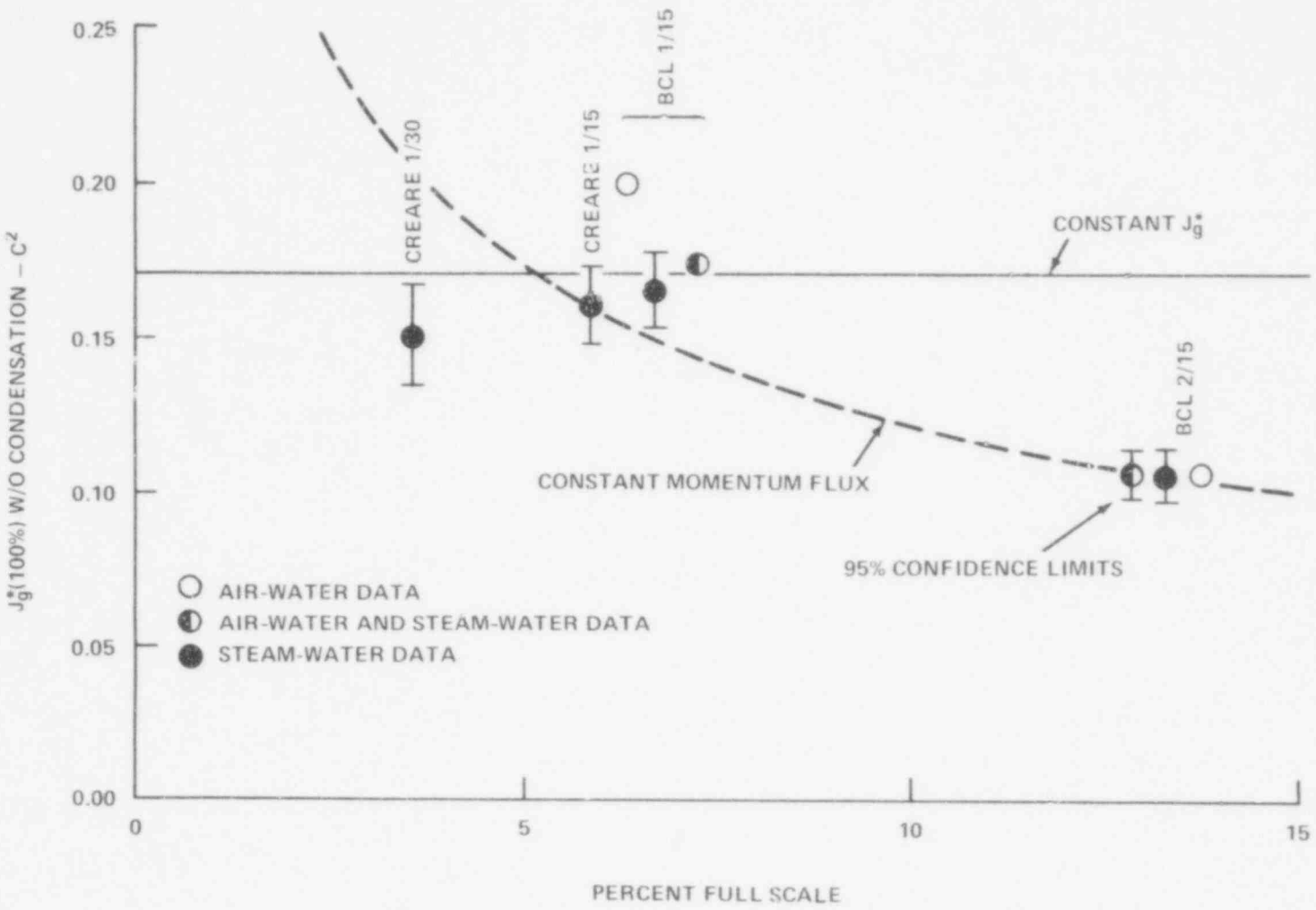


Figure 16 - Empirically Determined Gas Flow for 100% Bypass w/o Condensation as a Function of Scale Size Using the Modified Formulation of Equation #9.

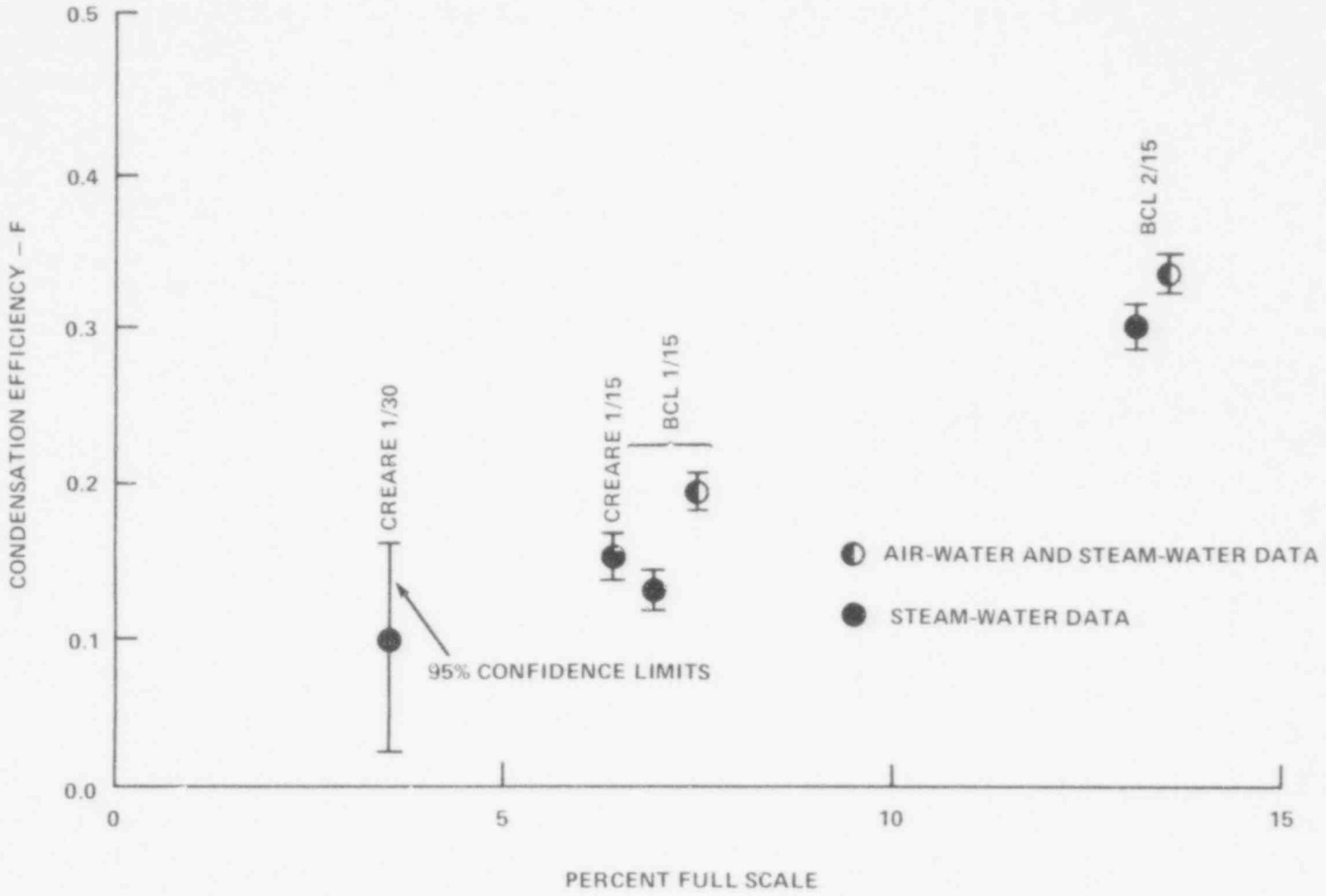


Figure 17 – Empirically Determined Condensation Efficiency as a Function of Scale Size Using the Traditional Formulation of Equation #10.

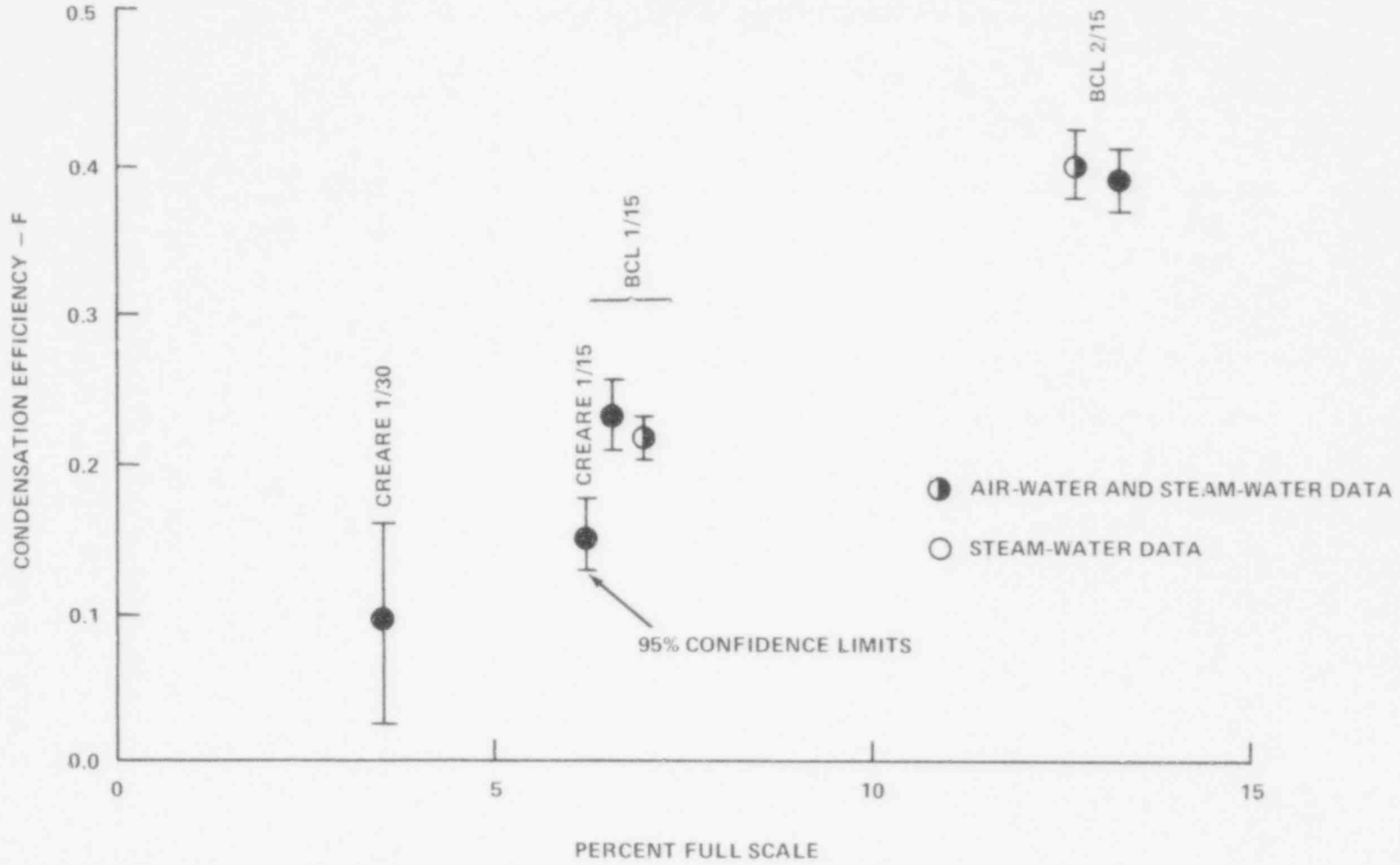


Figure 18 – Empirically Determined Condensation Efficiency as a Function of Scale Size Using the Modified Formulation of Equation #9.

scale size increases is indicated by both functional forms. This effect would offset any decrease in the hydraulic flooding point (C) and may explain why only a small difference between 1/15 and 2/15 data was previously observed.

Figures 19 and 20 show the slope of the penetration curve without condensation (M). Trends with scale can not be determined due to difficulties with the 1/30 scale data. However, the modified formulation of equation 10 again shows better consistency between air-water and steam-water data. Figures 21 and 22 show the effect of condensation on the slope (Z and a). These plots show trends opposite that for the F term. It is reasonable to assume that as the process approaches equilibrium at the 100% bypass point (F increasing), the effect of condensation on the slope will decrease.

## 5.0 CONCLUSIONS

A large volume of ECC bypass data has been statistically analyzed to observe data trends as a function of test parameters and facility. These trends have been represented in correlational form. Qualitatively, all 1/30, 1/15 and 2/15 scale data behave in a similar manner. The use of a modified Wallis correlation to account for condensation seems to adequately represent the data and observed effects of ECC temperature, injection rate and pressure are accounted for using steam and water properties.

While the data trends at a given scale size are well understood, differences in behavior at varying facility sizes were encountered. Evidence exists that J* scaling of the hydraulics may be breaking down at 2/15 scale and that a constant momentum flux scaling may be more appropriate at larger scale. This

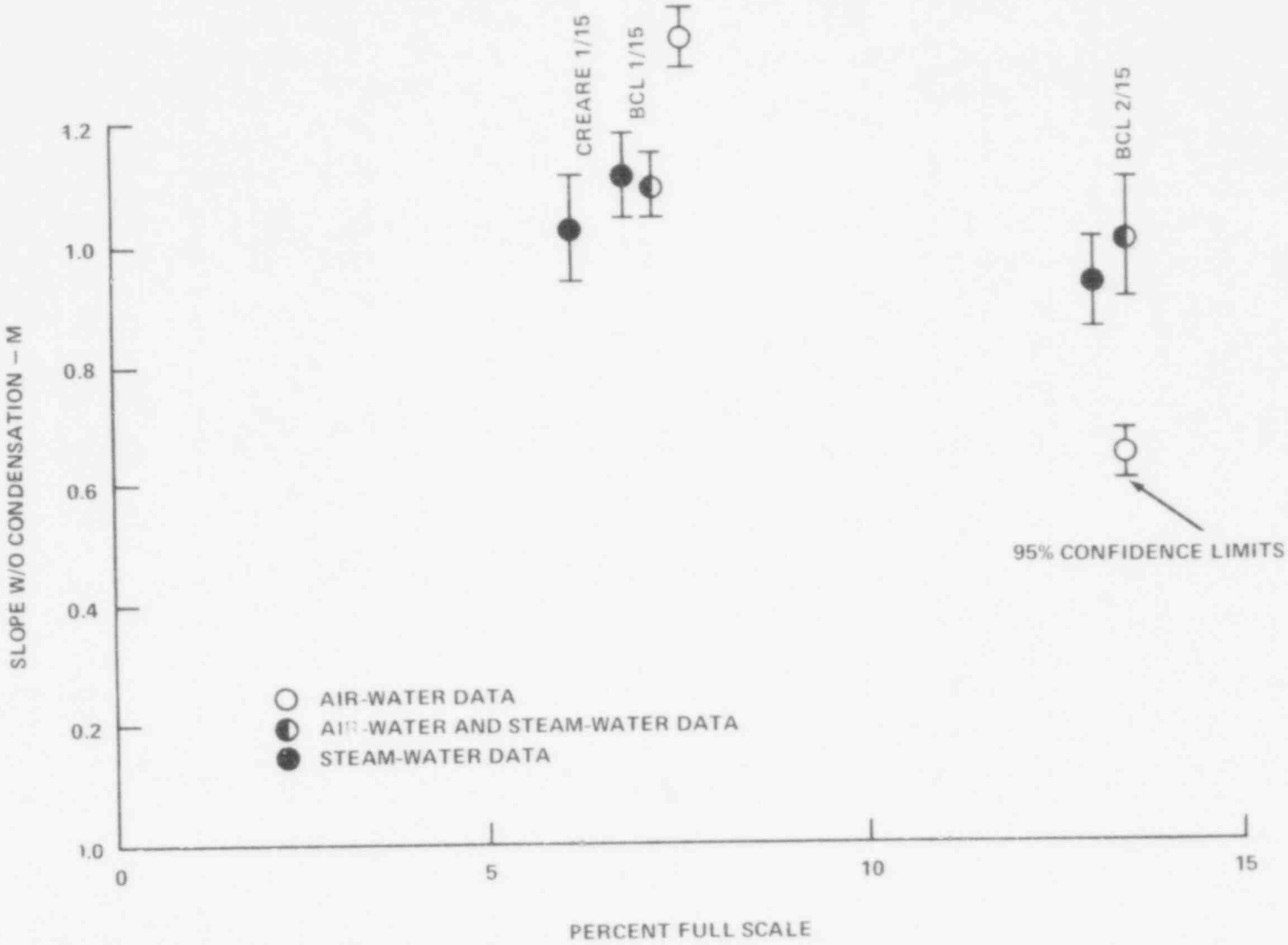


Figure 19 – Empirically Determined Slope w/o Condensation as a Function of Scale Size Using the Traditional Formulation of Equation #10.

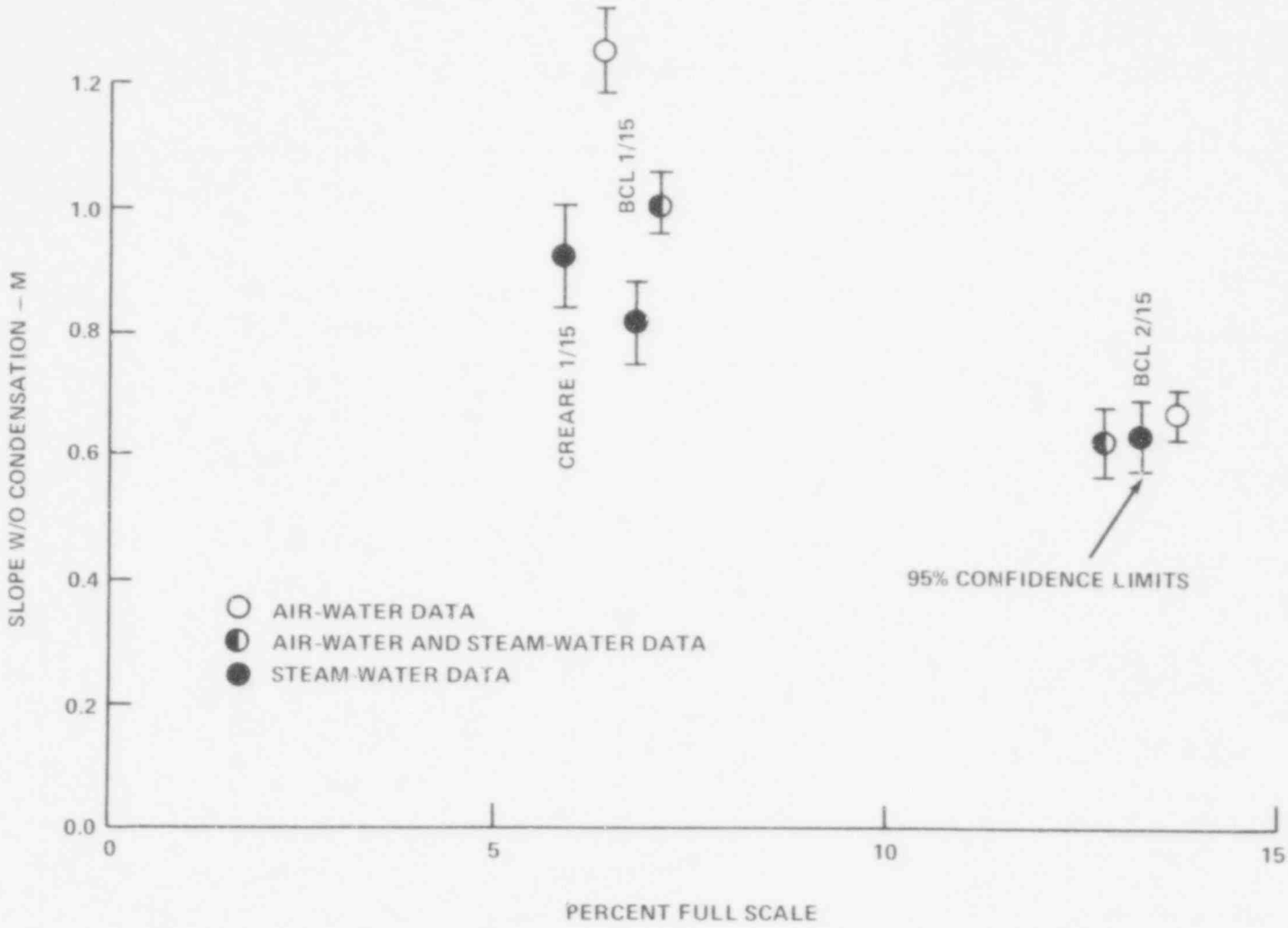


Figure 20 – Empirically Determined Slope w/o Condensation as a Function of Scale Size Using the Modified Formulation of Equation #9.

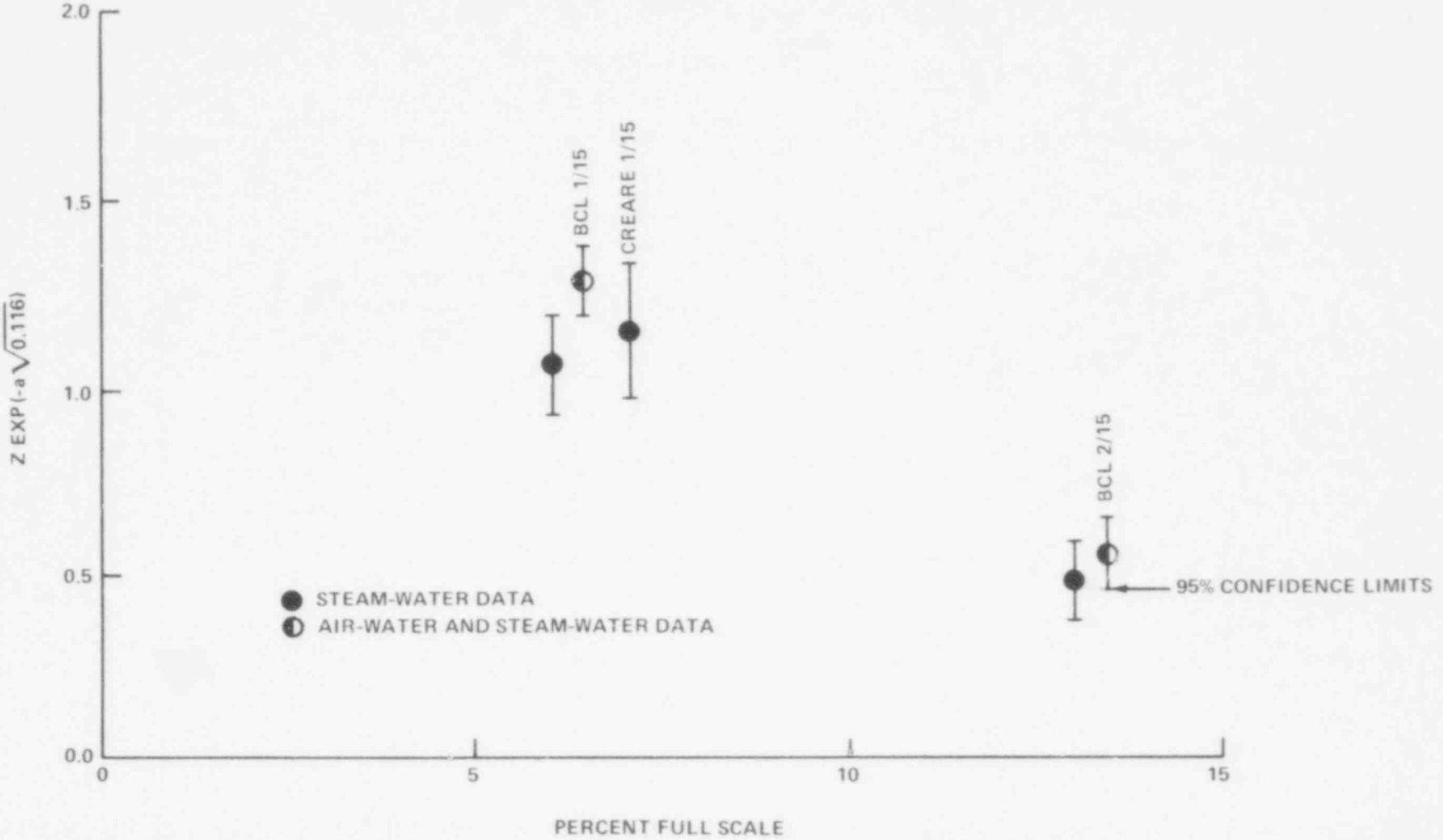


Figure 21 -- Empirically Determined Influence of Condensation on Slope as a Function of Scale Size Using the Traditional Formulation of Equation #10.

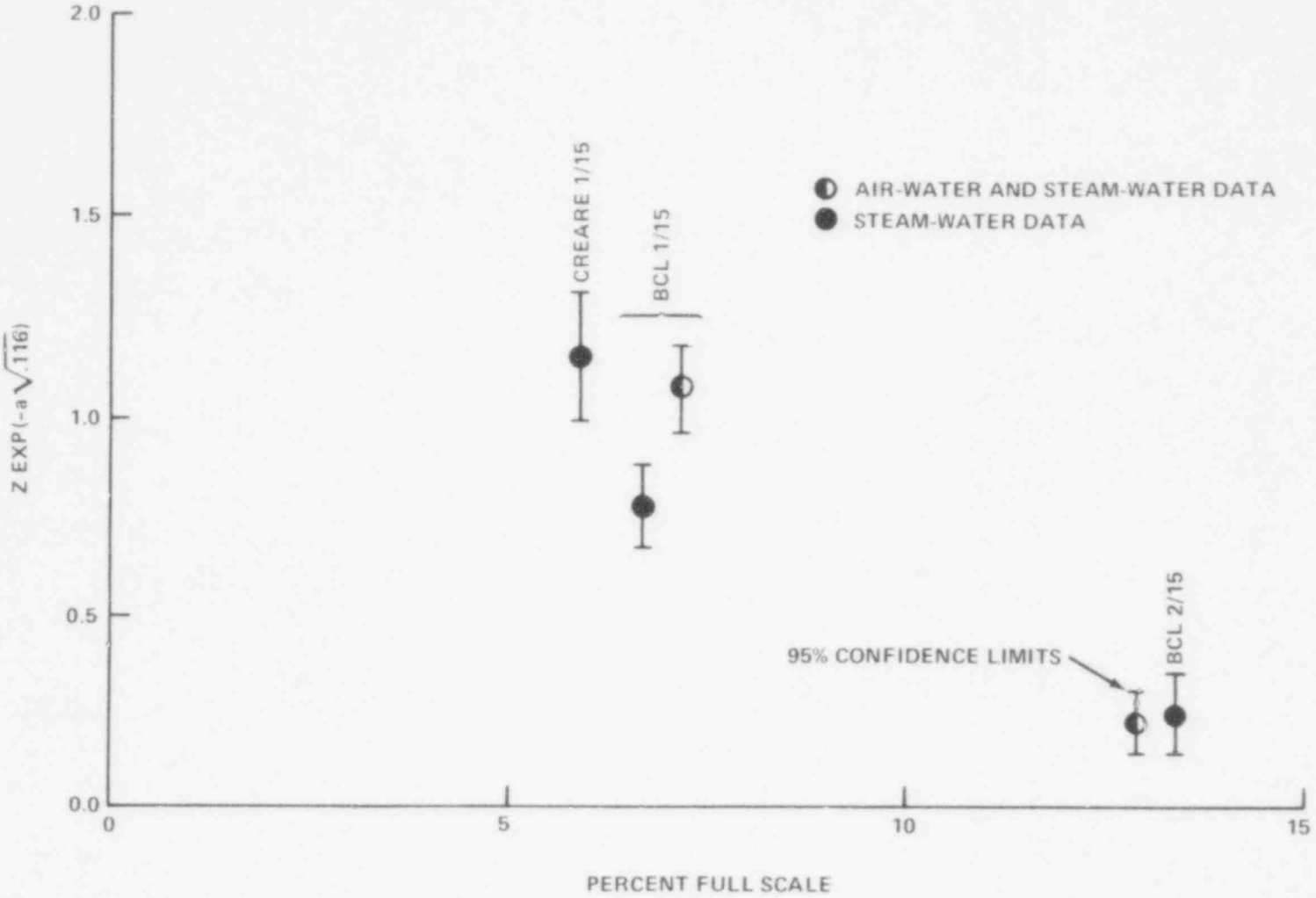


Figure 22 – Empirically Determined Influence of Condensation on Slope as a Function of Scale Size Using the Modified Formulation of Equation #9.

conclusion is primarily based on a modification of the traditional equation suggested by 2/15 scale air-water test results. Additional air-water and low subcooling steam-water tests are planned at BCL to confirm these results. An increasing effect of condensation as scale size increases was noted. This effect would tend to offset any change in hydraulic scaling. This may explain why only a small difference between 1/15 and 2/15 scale data (compared on a J* basis) was previously observed.

The findings here support the conservative use by NRC of a constant momentum flux to scale the hydraulics of ECC bypass to full scale licensing calculations. The scaling of condensation effects are also uncertain but a trend of an increasing effect of condensation with increasing scale has been identified. Pressure scaling seems well understood and the effect of pressure on the hydraulics and condensation can adequately be accounted for through the use of steam and water properties.

## REFERENCES


1. Flanigan, L. F., Cudnik, R. A. and Denning, R. S.; EXPERIMENTAL STUDIES OF ECC DELIVERY IN A 1/15-SCALE TRANSPARENT VESSEL MODEL; Battelle Columbus Laboratories, BMI-1941, November 1975.

2. Cudnik, R. A., Flanigan, L. F.,Wooton, R. O., Denning, R. S.; PENETRATION BEHAVIOR IN A 1/15 - SCALE MODEL OF A FOUR-LOOP PRESSURIZED WATER REACTOR; BMI-NUREG-1973, June 1977.

3. Cudnik, R. A., et al.; BASELINE PLENUM FILLING BEHAVIOR IN A 2/15 -SCALE MODEL OF A FOUR LOOP PRESSURIZED WATER REACTOR; NUREG/CR-0069, April 1978.

4. Crowley, C. J., Block, J. A. and Rothe, P. H.; AN EVALUATION OF ECC PENETRATION DATA USING TWO SCALING PARAMETERS; Creare TN-233, September 1976.

5. Crowley, C. J., Block, J. A. and Cary, C. N.; DOWNCOMER EFFECTS IN A 1/15-SCALE PWR GEOMETRY - Experimental Data Report; NUREG-0281, May 1977.

6. Beckner, W. D.; AN OVERVIEW OF NRC's STEAM-WATER MIXING RESEARCH; Nuclear Safety, 20(3), May-June 1979.

7. Wallis, G. B.; ONE DIMENSIONAL TWO-PHASE FLOW; McGraw-Hill, 1969.

8. Richter, H. J. and Lovell, T. W.; Final Report on Contract AT (49-24)-0329 - THE EFFECT OF SCALE ON TWO-PHASE COUNTERCURRENT FLOW FLOODING IN VERTICAL TUBES; Dartmouth College, August 1977.

9. Block, J. A., Rothe, P. H., Fanning, M. J., Crowley, C. J. and Wallis, G. B.; ANALYSIS OF ECC DELIVERY; Creare TN-231, April 1976.

10. Crowley, C. J. and Block, J.A.; ECC Delivery Study - Experimental Results and Discussions; Creare TN-217, October 1975.

11. Carbiener, W. A., et al.; STEAM-WATER MIXING AND SYSTEM HYDRODYNAMICS PROGRAM: Quarterly Progress Report, July 1 through September 30, 1977; BMI-NUREG-1987, December 1977.

12. Carbiener, W. A., et al.; STEAM-WATER MIXING AND SYSTEM HYDRODYNAMICS PROGRAM: Quarterly Progress Report, October 1, 1977 - December 31, 1977; NUREG/CR-0034, March 1978.

13. Rothe, P. H. and Crowley, C. J.; SCALING OF PRESSURE AND SUBCOOLING FOR COUNTERCURRENT FLOW: Quarterly Progress Report, April 1, 1978 - June 30, 1978; NUREG/CR-0464 (TN-285), November 1978.

REFERENCES (Cont'd)

14. Rothe, P. H., Crowley, C. J. and Block, J. A.,; PROGRESS ON ECC BYPASS SCALING: Quarterly Progress Report, October 1, 1977 - December 31, 1977; Creare TN-272 (NUREG/CR-0048), March 1978.

15. Collier, R. P. et al.; STEAM-WATER MIXING AND SYSTEM HYDRODYNAMICS PROGRAM: Quarterly Progress Report April 1, 1978 - June 30, 1978; NUREG/CR-0526 December 1978.

16. Cundink, R. A. et. al.; STEAM-WATER MIXING AND SYSTEM HYDRODYNAMICS PROGRAM: QUARTERLY PROGRESS REPORT January 1 - March 31, 1978; NUREG/CR-0147; June 1978.

17. Crowley, C. J., Rothe, P. H. and Cary, C. N.; FIRST QUARTER FY 79 PROGRESS REPORT ON REFILL EFFECTS PROGRAM; NUREG/CR-0719, April 1979.

# APPENDIX A

## BCL 2/15 SCALE NON-LINEAR LEAST SQUARES STATISTICS

## BCL 2/15 SCALE DATA LISTING

TABLE A-1 8:23 TUESDAY, JULY 31, 1979

DCL 2/15 SCALE AIR-WATER DATA STATISTICS

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SJG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE | F VALUE | PR > F | R-SQUARE | C.V. |
|---|---|---|---|---|---|---|---|
| MODEL | 1 | 0.08191118 | 0.08191118 | 1205.22 | 0.0001 | 0.968655 | 4.0440 |
| ERROR | 39 | 0.00265058 | 0.00006796 | | STD DEV | | SJG MEAN |
| CORRECTED TOTAL | 40 | 0.08456176 | | | 0.00824400 | | 0.20385541 |

| SOURCE | DF | TYPE I SS | F VALUE | PR > F | DF | TYPE IV SS | F VALUE | PR > F |
|---|---|---|---|---|---|---|---|---|
| SJLD | 1 | 0.08191118 | 1205.22 | 0.0001 | 1 | 0.08191118 | 1205.22 | 0.0001 |

| PARAMETER | ESTIMATE | T FOR H0: PARAMETER=0 | PR > \|T\| | STD ERROR OF ESTIMATE |
|---|---|---|---|---|
| INTERCEPT | 0.31783908 | 90.12 | 0.0001 | 0.00352670 |
| SJLD | -0.66800552 | -34.72 | 0.0001 | 0.01924183 |



6824G2

TABLE A-2

BCL 2/15 SCALE STEAM-WATER AND AIR-WATER DATA STATISTICS
(USING MODIFIED EQUATION #9 AND A=8.0)

NON-LINEAR LEAST SQUARES SUMMARY STATISTICS DEPENDENT VARIABLE JG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE |
|---|---|---|---|
| REGRESSION | 4 | 18.09765286 | 4.52441321 |
| RESIDUAL | 455 | 0.18683909 | 0.00041064 |
| UNCORRECTED TOTAL | 459 | 18.28449195 | |
| (CORRECTED TOTAL) | 458 | 2.50849744 | |

| PARAMETER | ESTIMATE | ASYMPTOTIC STD. ERROR | ASYMPTOTIC 95 % CONFIDENCE INTERVAL LOWER | UPPER |
|---|---|---|---|---|
| F | 0.39125053 | 0.00901785 | 0.37352845 | 0.40897261 |
| C | 0.32265750 | 0.00501310 | 0.31280566 | 0.33250934 |
| Z | 4.45608799 | 0.67504000 | 3.12938496 | 5.78269103 |
| M | 0.65891119 | 0.02412355 | 0.61150307 | 0.70631931 |

ASYMPTOTIC CORRELATION MATRIX OF THE PARAMETERS

| | F | C | Z | M |
|---|---|---|---|---|
| F | 1.000000 | -0.786873 | -0.646934 | -0.259468 |
| C | -0.786873 | 1.000000 | 0.555965 | 0.610607 |
| Z | -0.646934 | 0.555965 | 1.000000 | 0.726019 |
| M | -0.259468 | 0.610607 | 0.726019 | 1.000000 |

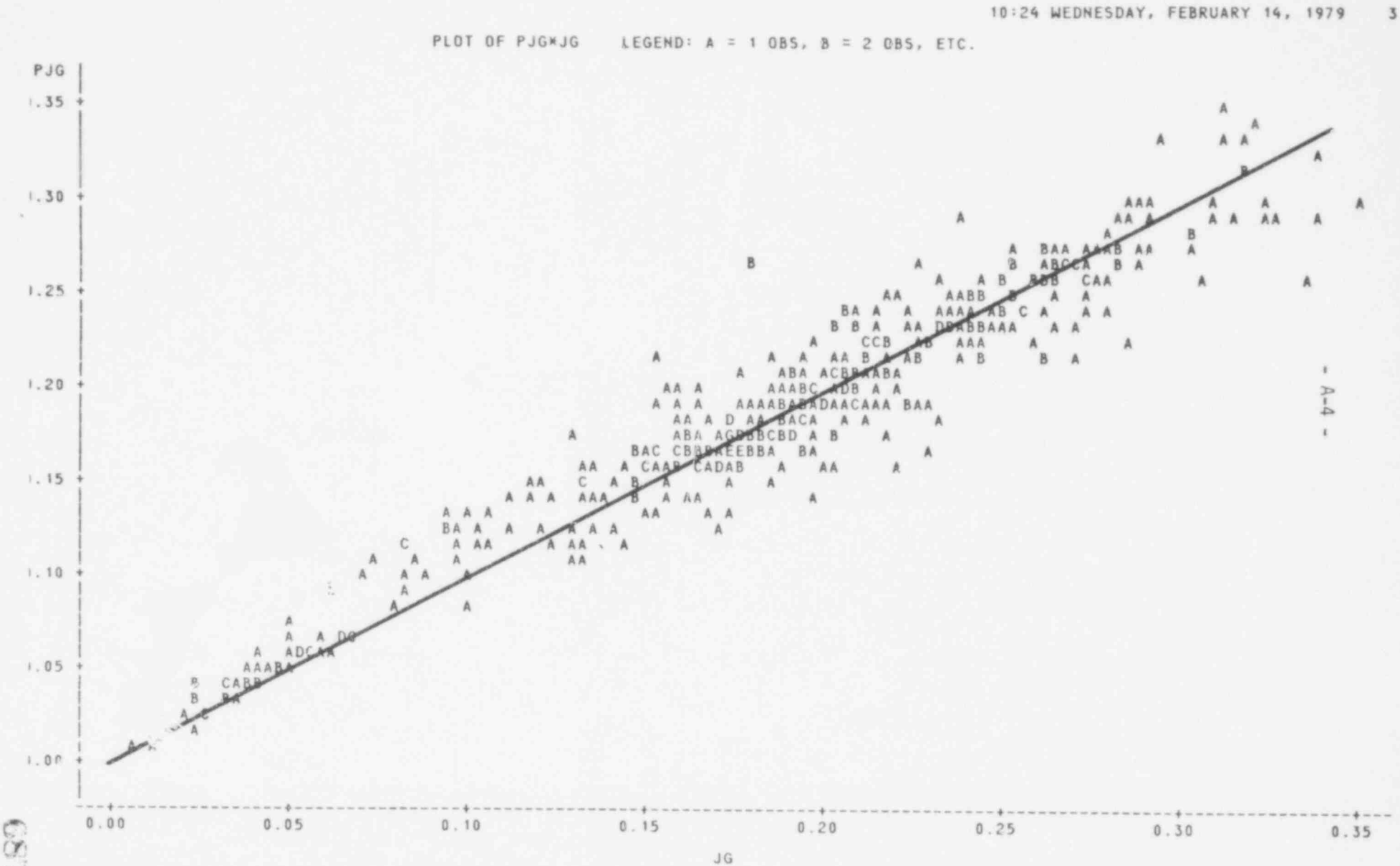


Figure A-1--Comparison of BCL 2/15 Scale Steam-Water and Air-Water Data with Correlation Using the Modified Formulation of Equation #9 and a=8.0.

TABLE A-3

BCL 2/15 SCALE STEAM-WATER DATA STATISTICS
(USING MODIFIED EQUATION #9 AND A=7.5)

NON-LINEAR LEAST SQUARES SUMMARY STATISTICS DEPENDENT VARIABLE JG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE |
|---|---|---|---|
| REGRESSION | 4 | 18.00839922 | 4.50209981 |
| RESIDUAL | 414 | 0.18607271 | 0.00044945 |
| UNCORRECTED TOTAL | 418 | 18.19447193 | |
| (CORRECTED TOTAL) | 417 | 1.59157339 | |

| PARAMETER | ESTIMATE | ASYMPTOTIC STD. ERROR | ASYMPTOTIC 95 % CONFIDENCE INTERVAL LOWER | UPPER |
|---|---|---|---|---|
| F | 0.38205258 | 0.01101241 | 0.36040505 | 0.40370011 |
| C | 0.32805052 | 0.00608352 | 0.31609190 | 0.34000913 |
| Z | 4.05238513 | 0.64452115 | 2.78542414 | 5.31934611 |
| M | 0.66637463 | 0.02675599 | 0.61377930 | 0.71896996 |

ASYMPTOTIC CORRELATION MATRIX OF THE PARAMETERS

| | F | C | Z | M |
|---|---|---|---|---|
| F | 1.000000 | -0.841704 | -0.643932 | -0.272806 |
| C | -0.841704 | 1.000000 | 0.586413 | 0.574262 |
| Z | -0.643932 | 0.586413 | 1.000000 | 0.751135 |
| M | -0.272806 | 0.574262 | 0.751135 | 1.000000 |

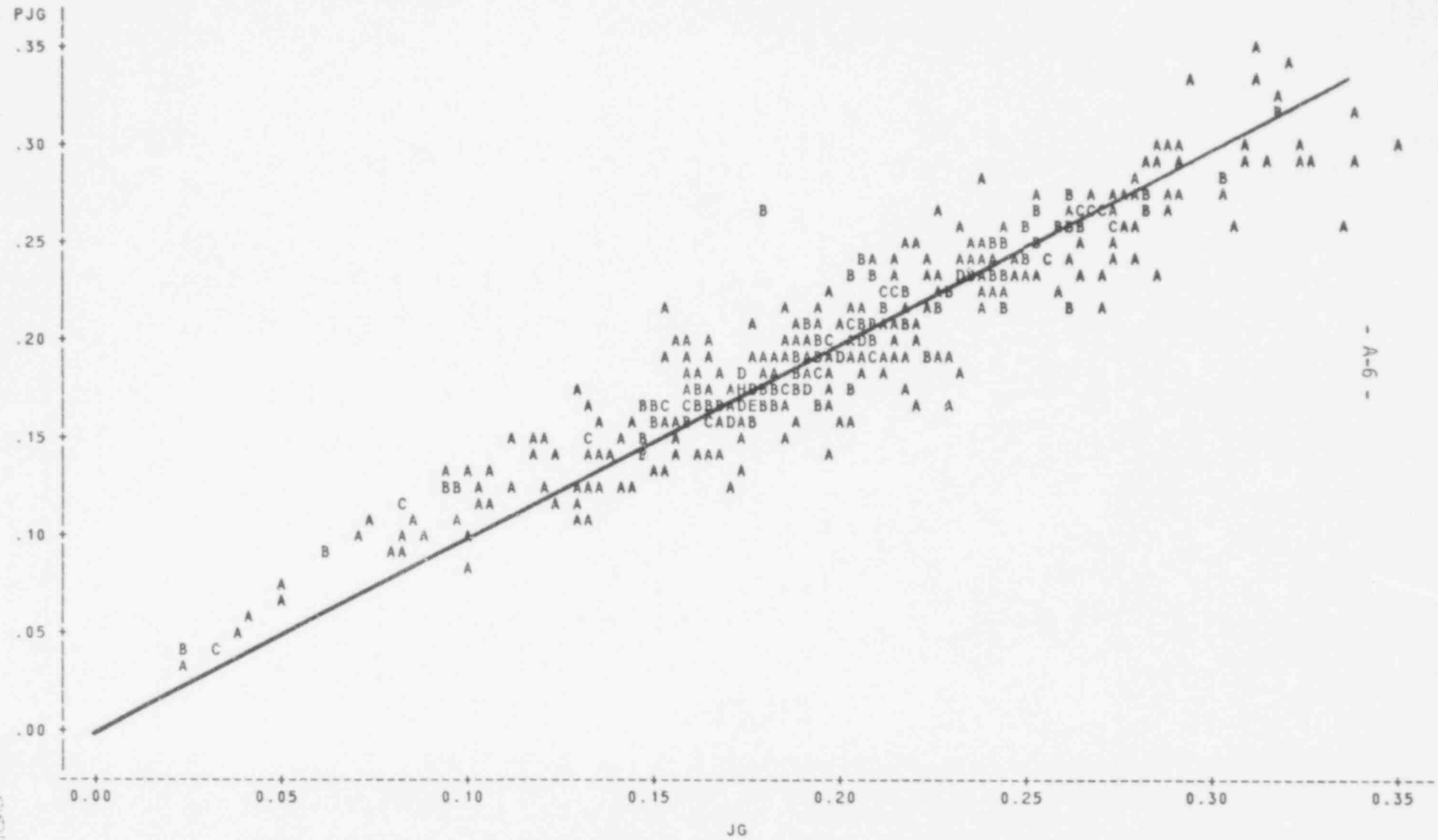


Figure A-2—Comparison of BCL 2/15 Scale Steam-Water Data with Correlation Using the Modified Formulation of Equation #9 and a=7.5.

BCL 2/15 SCALE STEAM-WATER AND AIR-WATER DATA STATISTICS
(USING TRADITIONAL EQUATION #10 AND A=11.0)

NON-LINEAR LEAST SQUARES SUMMARY STATISTICS DEPENDENT VARIABLE JG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE |
|---|---|---|---|
| REGRESSION | 4 | 18.01665578 | 4.50416394 |
| RESIDUAL | 455 | 0.26783617 | 0.00058865 |
| UNCORRECTED TOTAL | 459 | 18.28449195 | |
| (CORRECTED TOTAL) | 458 | 2.50849744 | |

| PARAMETER | ESTIMATE | ASYMPTOTIC STD. ERROR | ASYMPTOTIC 95 % CONFIDENCE INTERVAL LOWER | UPPER |
|---|---|---|---|---|
| F | 0.32758084 | 0.00681666 | 0.31418460 | 0.34097708 |
| C | 0.43902623 | 0.00551726 | 0.42818358 | 0.44986887 |
| Z | 23.32098470 | 1.98218416 | 19.42555401 | 27.21641539 |
| M | 1.08518542 | 0.04308676 | 1.00051039 | 1.16986044 |

ASYMPTOTIC CORRELATION MATRIX OF THE PARAMETERS

| | F | C | Z | M |
|---|---|---|---|---|
| F | 1.000000 | 0.101535 | -0.296514 | 0.423307 |
| C | 0.101535 | 1.000000 | -0.014737 | 0.724708 |
| Z | -0.296514 | -0.014737 | 1.000000 | 0.392857 |
| M | 0.423307 | 0.724708 | 0.392857 | 1.000000 |

9:17 MONDAY, FEBRUARY 5, 1979

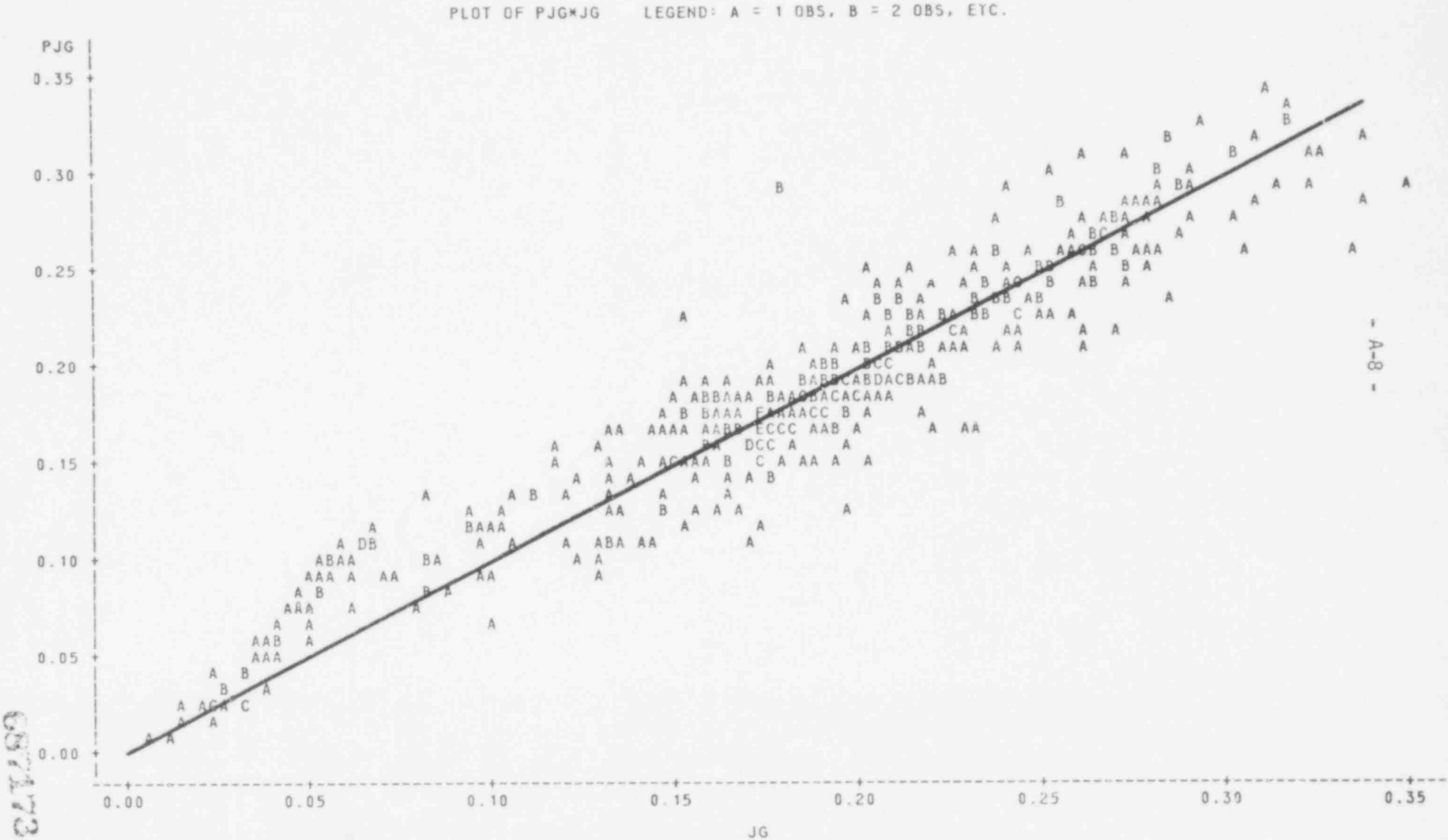


Figure A-3—Comparison of BCL 2/15 Scale Steam-Water and Air-Water Data with Correlation Using the Traditional Formulation of Equation #10 and a=11.0.

TABLE A-5

BCL 2/15 SCALE STEAM-WATER DATA STATISTICS
(USING TRADITIONAL EQUATION #10 AND A=9.5)

NON-LINEAR LEAST SQUARES SUMMARY STATISTICS DEPENDENT VARIABLE JG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE |
|---|---|---|---|
| REGRESSION | 4 | 17.98454568 | 4.49613642 |
| RESIDUAL | 414 | 0.20992624 | 0.00050707 |
| UNCORRECTED TOTAL | 418 | 18.19447193 | |
| (CORRECTED TOTAL) | 417 | 1.59157339 | |

| PARAMETER | ESTIMATE | ASYMPTOTIC STD. ERROR | ASYMPTOTIC 95 % CONFIDENCE INTERVAL LOWER | UPPER |
|---|---|---|---|---|
| F | 0.29701637 | 0.00734107 | 0.28258573 | 0.31144701 |
| C | 0.45456492 | 0.00489618 | 0.44494031 | 0.46418954 |
| Z | 11.86612393 | 1.38514118 | 9.14329654 | 14.58895133 |
| M | 0.98717457 | 0.03912455 | 0.91026587 | 1.06408326 |

ASYMPTOTIC CORRELATION MATRIX OF THE PARAMETERS

| | F | C | Z | M |
|---|---|---|---|---|
| F | 1.000000 | -0.006741 | -0.352304 | 0.345334 |
| C | -0.006741 | 1.000000 | -0.004881 | 0.632893 |
| Z | -0.352304 | -0.004881 | 1.000000 | 0.476767 |
| M | 0.345334 | 0.632893 | 0.476767 | 1.000000 |

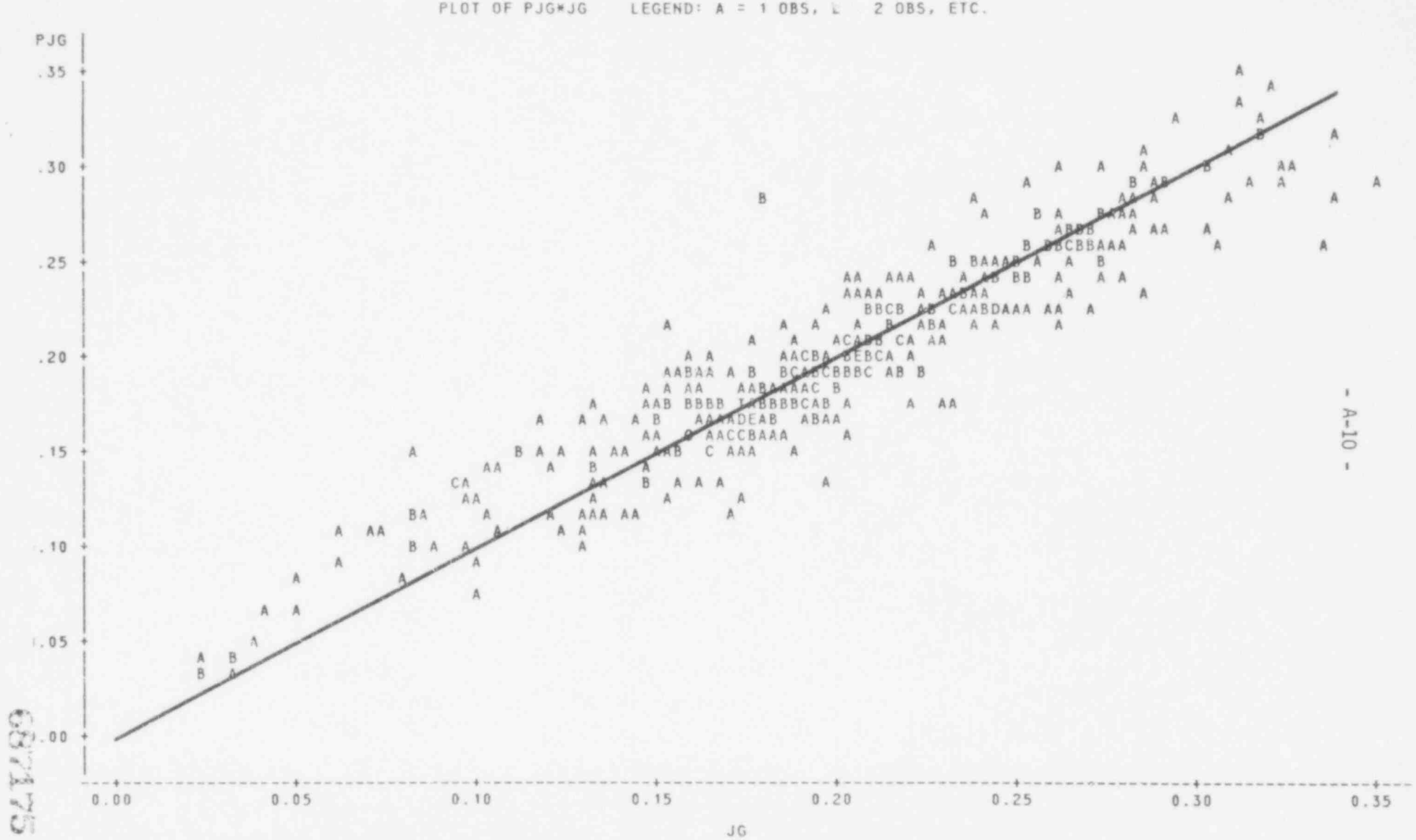




Figure A-4—Comparison of BCL 2/15 Scale Steam-Water data with Correlation Using the Traditional Formulation of Equation #10 and a=9.5.

TABLE A-6

BCL 2/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX B)
(REFERENCE NUREG/CR-0526 TABLE A-1)

SET=31

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0340655 | 0.106718 | 0.0365367 | 76.20 | 176.38 | 0.131381 |
| 2 | 0.0268717 | 0.117481 | 0.0370126 | 75.44 | 175.39 | 0.132917 |
| 3 | 0.0161450 | 0.135292 | 0.0370126 | 77.64 | 176.49 | 0.132108 |
| 4 | 0.0158155 | 0.145433 | 0.0367930 | 75.59 | 173.72 | 0.130759 |
| 5 | 0.0105803 | 0.153945 | 0.0367014 | 75.56 | 173.30 | 0.130140 |
| 6 | 0.0050339 | 0.159528 | 0.0366282 | 76.81 | 173.93 | 0.129436 |
| 7 | 0.0116237 | 0.173476 | 0.0367381 | 76.75 | 173.88 | 0.129831 |
| 8 | 0.0066813 | 0.184422 | 0.0368113 | 76.36 | 172.92 | 0.129655 |
| 9 | 0.0060223 | 0.177174 | 0.0368845 | 75.09 | 171.47 | 0.129756 |
| 10 | 0.0074501 | 0.169852 | 0.0368479 | 74.99 | 171.18 | 0.129482 |
| 11 | 0.0071023 | 0.161065 | 0.0369028 | 74.30 | 170.25 | 0.129484 |
| 12 | 0.0108365 | 0.147776 | 0.0367198 | 76.15 | 171.63 | 0.128520 |
| 13 | 0.0125023 | 0.132528 | 0.0367930 | 75.40 | 171.05 | 0.128888 |
| 14 | 0.0262310 | 0.124254 | 0.0368845 | 74.27 | 170.12 | 0.129344 |

SET=32

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 15 | 0.0559583 | 0.160260 | 0.0794252 | 74.07 | 170.64 | 0.279697 |
| 16 | 0.0498993 | 0.171298 | 0.0792971 | 74.71 | 170.82 | 0.278509 |
| 17 | 0.0306059 | 0.179352 | 0.0792422 | 75.04 | 170.72 | 0.277626 |
| 18 | 0.0226615 | 0.186381 | 0.0794252 | 74.09 | 169.76 | 0.278223 |
| 19 | 0.0612150 | 0.188083 | 0.0793520 | 74.34 | 169.58 | 0.277270 |
| 20 | 0.0199707 | 0.192056 | 0.0792788 | 74.55 | 169.58 | 0.276678 |
| 21 | 0.0289584 | 0.206883 | 0.0795351 | 72.92 | 168.29 | 0.278092 |
| 22 | 0.0213802 | 0.197437 | 0.0788029 | 76.76 | 172.19 | 0.275764 |
| 23 | 0.0139667 | 0.223558 | 0.0795351 | 73.26 | 169.30 | 0.279202 |
| 24 | 0.0244920 | 0.216182 | 0.0796449 | 72.81 | 189.39 | 0.313594 |
| 25 | 0.0299835 | 0.181732 | 0.0792056 | 74.94 | 172.03 | 0.279788 |
| 26 | 0.0380377 | 0.168845 | 0.0788944 | 76.68 | 174.02 | 0.279143 |
| 27 | 0.0479224 | 0.161816 | 0.0792788 | 74.71 | 172.52 | 0.281215 |
| 28 | 0.0658429 | 0.149405 | 0.0790225 | 76.06 | 174.15 | 0.280784 |

BCL 2/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX B)
(REFERENCE NUREG/CR-0526 TABLE A-1)

SET=33

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 29 | 0.0477210 | 0.204503 | 0.0793886 | 73.16 | 225.72 | 0.371780 |
| 30 | 0.0598023 | 0.203277 | 0.0788761 | 75.52 | 226.79 | 0.366098 |
| 31 | 0.0390628 | 0.216237 | 0.0791873 | 73.93 | 222.06 | 0.363185 |
| 32 | 0.0313198 | 0.226030 | 0.0783086 | 76.84 | 225.22 | 0.358269 |
| 33 | 0.0272561 | 0.245286 | 0.0785283 | 75.34 | 224.18 | 0.360659 |
| 34 | 0.0106535 | 0.263848 | 0.0788212 | 73.28 | 222.29 | 0.363257 |
| 35 | 0.0264690 | 0.254018 | 0.0787846 | 72.70 | 222.57 | 0.364790 |
| 36 | 0.0255537 | 0.233846 | 0.0783269 | 74.48 | 224.44 | 0.361934 |
| 37 | 0.0358045 | 0.225645 | 0.0784917 | 73.10 | 224.24 | 0.365298 |
| 38 | 0.0638843 | 0.201428 | 0.0781805 | 73.56 | 225.01 | 0.364116 |

SET=34

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 39 | 0.103386 | 0.170840 | 0.120300 | 72.84 | 166.32 | 0.415898 |
| 40 | 0.083452 | 0.175490 | 0.119586 | 74.51 | 169.04 | 0.416116 |
| 41 | 0.048325 | 0.193666 | 0.119586 | 74.33 | 169.87 | 0.418594 |
| 42 | 0.030624 | 0.207505 | 0.119952 | 73.82 | 169.61 | 0.420476 |
| 43 | 0.036830 | 0.215157 | 0.120355 | 72.75 | 168.84 | 0.422617 |
| 44 | 0.027604 | 0.209262 | 0.118598 | 76.62 | 172.86 | 0.416965 |
| 45 | 0.042651 | 0.211807 | 0.120776 | 71.99 | 168.84 | 0.426015 |
| 46 | 0.063866 | 0.187882 | 0.120044 | 73.28 | 170.12 | 0.423396 |
| 47 | 0.099231 | 0.177174 | 0.119971 | 73.36 | 171.79 | 0.427092 |
| 48 | 0.114919 | 0.166850 | 0.120026 | 73.63 | 173.84 | 0.431703 |
| 49 | 0.107505 | 0.151034 | 0.120264 | 73.26 | 173.10 | 0.431652 |
| 50 | 0.088797 | 0.222112 | 0.139630 | 78.82 | 179.07 | 0.502394 |
| 51 | 0.025718 | 0.252865 | 0.142303 | 74.46 | 173.89 | 0.509514 |
| 52 | 0.027183 | 0.250265 | 0.140838 | 76.95 | 173.76 | 0.496817 |
| 53 | 0.024455 | 0.270566 | 0.141735 | 75.34 | 174.39 | 0.506377 |
| 54 | 0.028391 | 0.273568 | 0.141955 | 74.79 | 171.99 | 0.501760 |
| 55 | 0.029581 | 0.253926 | 0.141388 | 75.93 | 171.93 | 0.496341 |
| 56 | 0.035567 | 0.249515 | 0.141955 | 74.97 | 171.06 | 0.498532 |
| 57 | 0.047831 | 0.244408 | 0.142760 | 73.39 | 170.12 | 0.503193 |
| 58 | 0.049973 | 0.213784 | 0.144481 | 70.18 | 166.49 | 0.508069 |

TABLE A-6

BCL 2/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX B)
(REFERENCE NUREG/CR-0526 TABLE A-1)

SET=35

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 59 | 0.0888523 | 0.156855 | 0.0982427 | 71.99 | 170.64 | 0.350227 |
| 60 | 0.0881201 | 0.165367 | 0.0972909 | 75.04 | 173.82 | 0.347049 |
| 61 | 0.0726524 | 0.175160 | 0.0969431 | 76.10 | 174.69 | 0.345450 |
| 62 | 0.0492953 | 0.193941 | 0.0982427 | 72.55 | 171.15 | 0.350105 |
| 63 | 0.0301849 | 0.202910 | 0.0979315 | 73.45 | 171.37 | 0.347597 |
| 64 | 0.0301483 | 0.203222 | 0.0974190 | 74.84 | 172.34 | 0.344943 |
| 65 | 0.0338093 | 0.211917 | 0.0978034 | 73.8[illegible] | 171.00 | 0.345665 |
| 66 | 0.0182500 | 0.214333 | 0.0975105 | 74.52 | 171.15 | 0.343516 |
| 67 | 0.0328208 | 0.201904 | 0.0977485 | 73.64 | 169.85 | 0.343488 |
| 68 | 0.0553725 | 0.180908 | 0.0978766 | 73.08 | 170.64 | 0.346674 |
| 69 | 0.0831228 | 0.165257 | 0.0969980 | 74.68 | 171.39 | 0.341874 |
| 70 | 0.0764049 | 0.182848 | 0.0969614 | 74.75 | 171.66 | 0.342145 |
| 71 | 0.0503386 | 0.189182 | 0.0961377 | 76.98 | 173.99 | 0.339524 |
| 72 | 0.0340289 | 0.213765 | 0.0967783 | 75.20 | 172.67 | 0.342623 |
| 73 | 0.0151999 | 0.231594 | 0.0968332 | 74.81 | 172.61 | 0.343466 |
| 74 | 0.0166209 | 0.250833 | 0.0963939 | 76.18 | 173.96 | 0.341903 |
| 75 | 0.0054549 | 0.278272 | 0.0965953 | 75.44 | 173.19 | 0.342535 |
| 76 | 0.0088962 | 0.265330 | 0.0965221 | 75.74 | 173.26 | 0.341830 |
| 77 | 0.0095186 | 0.245396 | 0.0967966 | 74.84 | 172.34 | 0.342740 |
| 78 | 0.0420099 | 0.207780 | 0.0965953 | 75.31 | 172.57 | 0.341562 |
| 79 | 0.0475929 | 0.200549 | 0.0975105 | 72.74 | 169.73 | 0.344225 |
| 80 | 0.0764049 | 0.176734 | 0.0974556 | 72.80 | 169.88 | 0.344214 |
| 81 | 0.0824089 | 0.159491 | 0.0968882 | 74.29 | 171.64 | 0.342756 |
| 82 | 0.0922570 | 0.142468 | 0.0970163 | 73.94 | 171.62 | 0.343866 |

SET=36

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 83 | 0.0897492 | 0.128794 | 0.0964122 | 75.91 | 114.61 | 0.225643 |
| 84 | 0.0437672 | 0.146751 | 0.0963756 | 76.12 | 114.61 | 0.225289 |
| 85 | 0.0570383 | 0.166374 | 0.0958082 | 77.57 | 116.03 | 0.224905 |
| 86 | 0.0378913 | 0.175856 | 0.0950394 | 79.63 | 117.90 | 0.224156 |
| 87 | 0.0287022 | 0.198481 | 0.0959729 | 77.02 | 115.83 | 0.225593 |
| 88 | 0.0221490 | 0.181805 | 0.0962658 | 75.81 | 114.42 | 0.225054 |
| 89 | 0.0501373 | 0.157093 | 0.0960095 | 75.50 | 114.14 | 0.224301 |
| 90 | 0.0775398 | 0.132345 | 0.0952407 | 76.58 | 115.32 | 0.223436 |

TABLE A-6

BCL 2/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX B)
(REFERENCE NUREG/CR-0526 TABLE A-1)

SET=37

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 91 | 0.0887974 | 0.222112 | 0.139630 | 78.82 | 179.07 | 0.502394 |
| 92 | 0.0257185 | 0.252865 | 0.142303 | 74.46 | 173.89 | 0.509514 |
| 93 | 0.0271829 | 0.250265 | 0.140838 | 76.95 | 173.76 | 0.496817 |
| 94 | 0.0244554 | 0.270566 | 0.141735 | 75.34 | 174.39 | 0.506377 |
| 95 | 0.0283910 | 0.273568 | 0.141955 | 74.79 | 171.99 | 0.501760 |
| 96 | 0.0295808 | 0.253926 | 0.141388 | 75.93 | 171.93 | 0.496341 |
| 97 | 0.0355665 | 0.249515 | 0.141955 | 74.97 | 171.06 | 0.498532 |
| 98 | 0.0478309 | 0.244408 | 0.142760 | 73.39 | 170.12 | 0.503193 |
| 99 | 0.0499725 | 0.213784 | 0.144481 | 70.18 | 166.49 | 0.508069 |

SET=38

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 100 | 0.0140 | 0.1845 | 0.0638 | 18.08 | 49.43 | 0.119347 |
| 101 | 0.0086 | 0.2194 | 0.0638 | 17.63 | 48.58 | 0.118573 |
| 102 | 0.0056 | 0.2168 | 0.0635 | 19.34 | 54.19 | 0.126506 |
| 103 | 0.0082 | 0.2287 | 0.0635 | 18.20 | 51.09 | 0.122426 |
| 104 | 0.0031 | 0.2129 | 0.0635 | 18.26 | 51.56 | 0.123378 |
| 105 | 0.0043 | 0.2022 | 0.0635 | 18.20 | 51.39 | 0.123145 |
| 106 | 0.0057 | 0.1881 | 0.0635 | 17.65 | 50.94 | 0.123688 |
| 107 | 0.0205 | 0.1636 | 0.0636 | 17.63 | 51.48 | 0.125257 |
| 108 | 0.0226 | 0.1394 | 0.0636 | 18.72 | 58.24 | 0.138096 |
| 109 | 0.0371 | 0.1429 | 0.0633 | [illegible] | 50.66 | 0.124552 |

SET=39

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 110 | 0.0108365 | 0.177668 | 0.0667948 | 28.47 | 110.50 | 0.229781 |
| 111 | 0.0341388 | 0.182848 | 0.0666484 | 30.08 | 114.38 | 0.231780 |
| 112 | 0.0273293 | 0.197126 | 0.0665236 | 31.54 | 117.40 | 0.232908 |
| 113 | 0.0135091 | 0.208494 | 0.0667582 | 28.94 | 113.46 | 0.234152 |
| 114 | 0.0211971 | 0.186035 | 0.0667216 | 29.86 | 116.05 | 0.236166 |
| 115 | 0.0221856 | 0.177650 | 0.0669412 | 28.07 | 113.08 | 0.237100 |
| 116 | 0.0512905 | 0.152242 | 0.0668863 | 29.65 | 117.42 | 0.240273 |
| 117 | 0.0614681 | 0.132473 | 0.0670145 | 29.15 | 116.99 | 0.241612 |
| 118 | 0.0422000 | 0.172900 | 0.0639000 | 29.75 | 121.03 | 0.236260 |
| 119 | 0.0558000 | 0.131300 | 0.0638000 | 29.86 | 122.15 | 0.237695 |
| 120 | 0.0372000 | 0.172900 | 0.0641000 | 29.06 | 121.61 | 0.240550 |
| 121 | 0.0318000 | 0.192600 | 0.0642000 | 29.16 | 121.71 | 0.240768 |
| 122 | 0.0214000 | 0.217900 | 0.0640000 | 29.31 | 122.12 | 0.240295 |
| 123 | 0.0077000 | 0.243000 | 0.0639000 | 28.46 | 120.38 | 0.239513 |
| 124 | 0.0075000 | 0.261300 | 0.0638000 | 29.32 | 122.14 | 0.239548 |

TABLE A-6

BCL 2/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX B)
(REFERENCE NUREG/CR-0526 TABLE A-1)

SET=39

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 125 | 0.0045 | 0.2864 | 0.0637 | 30.14 | 123.79 | 0.239546 |
| 126 | 0.0072 | 0.2716 | 0.0636 | 29.28 | 122.36 | 0.239368 |

SET=40

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 127 | 0.0852096 | 0.219110 | 0.0907011 | 30.30 | 173.60 | 0.477240 |
| 128 | 0.0569467 | 0.232674 | 0.0900423 | 31.31 | 175.71 | 0.472818 |
| 129 | 0.0550613 | 0.241827 | 0.0927146 | 32.14 | 176.22 | 0.482802 |
| 130 | 0.0408750 | 0.260443 | 0.0904631 | 31.94 | 174.41 | 0.467492 |
| 131 | 0.0731283 | 0.238129 | 0.0965587 | 30.96 | 175.61 | 0.509204 |
| 132 | 0.0556105 | 0.274098 | 0.0965587 | 30.94 | 175.56 | 0.509200 |
| 133 | 0.0256452 | 0.303753 | 0.0963024 | 32.82 | 178.89 | 0.504521 |
| 134 | 0.0138935 | 0.315669 | 0.0959363 | 35.61 | 183.65 | 0.498188 |
| 135 | 0.0129599 | 0.288212 | 0.0964122 | 30.84 | 174.63 | 0.506439 |
| 136 | 0.0299103 | 0.288157 | 0.0967966 | 27.68 | 168.18 | 0.512978 |
| 137 | 0.0273476 | 0.268442 | 0.0967051 | 28.69 | 169.95 | 0.509967 |
| 138 | 0.0457000 | 0.240100 | 0.0958000 | 28.08 | 168.17 | 0.504544 |
| 139 | 0.0670000 | 0.241200 | 0.0957000 | 29.19 | 170.68 | 0.503083 |
| 140 | 0.0155000 | 0.281700 | 0.0959000 | 29.09 | 170.32 | 0.503814 |
| 141 | 0.0309000 | 0.263900 | 0.0961000 | 27.56 | 167.07 | 0.506871 |
| 142 | 0.0196000 | 0.278400 | 0.0961000 | 29.01 | 169.93 | 0.504305 |
| 143 | 0.0138000 | 0.324100 | 0.0962000 | 27.93 | 167.63 | 0.506188 |
| 144 | 0.0131000 | 0.349600 | 0.0960000 | 27.77 | 167.31 | 0.505418 |

SET=41

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 145 | 0.0892550 | 0.154494 | 0.0970895 | 28.48 | 109.92 | 0.332194 |
| 146 | 0.0539630 | 0.179444 | 0.0971078 | 28.43 | 109.32 | 0.330693 |
| 147 | 0.0287571 | 0.192147 | 0.0970163 | 29.72 | 112.66 | 0.334040 |
| 148 | 0.0129233 | 0.204979 | 0.0968515 | 32.07 | 118.25 | 0.338751 |
| 149 | 0.0103423 | 0.218506 | 0.0965770 | 33.09 | 120.97 | 0.340939 |
| 150 | 0.0204649 | 0.216529 | 0.0969614 | 30.37 | 119.00 | 0.349373 |
| 151 | 0.0162731 | 0.204155 | 0.0969065 | 29.20 | 116.70 | 0.348261 |
| 152 | 0.0222771 | 0.194911 | 0.0969065 | 27.44 | 109.98 | 0.337098 |
| 153 | 0.0619074 | 0.174959 | 0.0970712 | 28.36 | 110.47 | 0.334400 |
| 154 | 0.0436000 | 0.187700 | 0.0966000 | 29.62 | 123.96 | 0.366499 |
| 155 | 0.0718000 | 0.179300 | 0.0966000 | 28.51 | 121.88 | 0.366316 |
| 156 | 0.0443000 | 0.191900 | 0.0965000 | 29.70 | 125.62 | 0.370592 |
| 157 | 0.0339000 | 0.211900 | 0.0968000 | 29.64 | 125.20 | 0.370824 |
| 158 | 0.0311000 | 0.244900 | 0.0969000 | 30.45 | 126.45 | 0.370591 |

BCL 2/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX B)
(REFERENCE NUREG/CR-0526 TABLE A-1)

SET=41

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 159 | 0.0067 | 0.2646 | 0.0970 | 29.92 | 125.48 | 0.370918 |
| 160 | 0.0066 | 0.2815 | 0.0968 | 30.29 | 126.16 | 0.370198 |

SET=42

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 161 | [illegible] | 0.2587 | 0.0624 | 29.07 | 172.22 | 0.331575 |
| 162 | 0. | 0.2032 | 0.0624 | 27.25 | 168.49 | 0.333539 |
| 163 | 0.0[illegible]0 | 0.1746 | 0.0628 | 29.31 | 173.01 | 0.334048 |
| 164 | 0.0534 | 0.2087 | 0.0627 | 27.74 | 169.71 | 0.334992 |
| 165 | 0.0413 | 0.2080 | 0.0626 | 27.96 | 170.10 | 0.334090 |
| 166 | 0.0183 | 0.2635 | 0.0628 | 27.94 | 170.17 | 0.335398 |
| 167 | 0.0134 | 0.2805 | 0.0629 | 27.88 | 169.93 | 0.335769 |
| 168 | 0.0088 | 0.3061 | 0.0630 | 28.53 | 171.27 | 0.335612 |
| 169 | 0.0090 | 0.3351 | 0.0630 | 27.94 | 170.07 | 0.336269 |

SET=43

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 170 | 0.0356215 | 0.161230 | 0.0401062 | 30.79 | 170.16 | 0.205422 |
| 171 | 0.0346330 | 0.150595 | 0.0403075 | 29.60 | 167.90 | 0.207194 |
| 172 | 0.0355482 | 0.154109 | 0.0403807 | 30.17 | 169.07 | 0.207309 |
| 173 | 0.0338459 | 0.169010 | 0.0403807 | 29.70 | 168.15 | 0.207578 |
| 174 | 0.0289768 | 0.176808 | 0.0403441 | 29.40 | 167.54 | 0.207541 |
| 175 | 0.0278418 | 0.186070 | 0.0396668 | 29.95 | 171.34 | 0.207029 |
| 176 | 0.0203551 | 0.205876 | 0.0394838 | 29.95 | 168.62 | 0.202802 |
| 177 | 0.0096650 | 0.215669 | 0.0394655 | 32.17 | 172.87 | 0.201525 |
| 178 | 0.0135640 | 0.227146 | 0.0395204 | 31.71 | 171.93 | 0.201955 |
| 179 | 0.0110928 | 0.229508 | 0.0375069 | 33.97 | 175.04 | 0.189440 |

SET=44

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 180 | 0.114369 | 0.233535 | 0.127970 | 29.57 | 177.42 | 0.695408 |
| 181 | 0.098334 | 0.247245 | 0.127256 | 29.73 | 170.87 | 0.664456 |
| 182 | 0.096632 | 0.255757 | 0.126707 | 30.61 | 172.99 | 0.661448 |
| 183 | 0.076387 | 0.265221 | 0.126634 | 32.51 | 176.66 | 0.657833 |
| 184 | 0.057075 | 0.277723 | 0.127476 | 33.16 | 177.93 | 0.661314 |
| 185 | 0.033608 | 0.292422 | 0.126872 | 33.57 | 175.72 | 0.646580 |
| 186 | 0.097500 | 0.202900 | 0.123100 | 29.78 | 171.34 | 0.644057 |

BCL 2/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX B)
(REFERENCE NUREG/CR-0526 TABLE A-1)

SET=44

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 187 | 0.0[illegible] | 0.2376 | 0.1237 | 29.38 | 171.93 | 0.653212 |
| 188 | 0.0623 | 0.2747 | 0.1238 | 28.33 | 170.11 | 0.657022 |
| 189 | 0.0409 | 0.2921 | 0.1236 | 29.51 | 172.44 | 0.653379 |
| 190 | 0.0221 | 0.3394 | 0.1234 | 29.45 | 172.25 | 0.652173 |

SET=45

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 191 | 0.066081 | 0.180359 | 0.122295 | 30.86 | 109.48 | 0.402624 |
| 192 | 0.083342 | 0.201849 | 0.122442 | 29.03 | 111.05 | 0.419778 |
| 193 | 0.025792 | 0.208182 | 0.122186 | 32.30 | 117.56 | 0.423563 |
| 194 | 0.032327 | 0.225059 | 0.122057 | 34.01 | 122.02 | 0.429536 |
| 195 | 0.028830 | 0.234596 | 0.121801 | 35.82 | 127.50 | 0.438009 |
| 196 | 0.020776 | 0.242541 | 0.121453 | 36.49 | 129.16 | 0.438933 |
| 197 | 0.014388 | 0.263189 | 0.120447 | 38.96 | 132.99 | 0.435756 |
| 198 | 0.006901 | 0.237745 | 0.121197 | 35.51 | 127.60 | 0.437812 |
| 199 | 0.022442 | 0.221911 | 0.121234 | 35.41 | 130.04 | 0.446860 |
| 200 | 0.117811 | 0.198883 | 0.126524 | 30.76 | 117.40 | 0.447303 |
| 201 | 0.033718 | 0.222881 | 0.125810 | 33.61 | 122.00 | 0.444927 |
| 202 | 0.021106 | 0.243987 | 0.125316 | 35.28 | 125.44 | 0.446272 |
| 203 | 0.035457 | 0.241406 | 0.126194 | 31.06 | 117.44 | 0.444432 |
| 204 | 0.029691 | 0.223760 | 0.126176 | 29.53 | 113.87 | 0.440320 |
| 205 | 0.057716 | 0.207157 | 0.126249 | 29.25 | 112.60 | 0.437450 |
| 206 | 0.094600 | 0.184331 | 0.125535 | 31.19 | 115.77 | 0.435042 |
| 207 | 0.114040 | 0.169449 | 0.125755 | 30.28 | 113.64 | 0.433266 |
| 208 | 0.108200 | 0.159700 | 0.119500 | 29.56 | 122.74 | 0.449310 |
| 209 | 0.107300 | 0.164800 | 0.119000 | 30.08 | 123.98 | 0.448574 |
| 210 | 0.081100 | 0.208500 | 0.120600 | 28.38 | 122.41 | 0.460219 |
| 211 | 0.042200 | 0.231600 | 0.120900 | 29.72 | 125.06 | 0.462093 |
| 212 | 0.016500 | 0.265600 | 0.121000 | 30.11 | 125.94 | 0.463126 |
| 213 | 0.009100 | 0.309800 | 0.121500 | 29.48 | 124.47 | 0.463809 |
| 21[illegible] | 0.008800 | 0.337400 | 0.121200 | 30.47 | 126.38 | 0.463139 |

BCL 2/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX B)
(REFERENCE NUREG/CR-0526 TABLE A-1)

SET=46

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 215 | 0.133022 | 0.271865 | 0.155592 | 30.40 | 166.00 | 0.781728 |
| 216 | 0.135329 | 0.242632 | 0.155354 | 29.78 | 173.71 | 0.824054 |
| 217 | 0.089328 | 0.274867 | 0.155281 | 30.10 | 174.28 | 0.822579 |
| 218 | 0.083745 | 0.301867 | 0.154421 | 31.90 | 177.41 | 0.812174 |
| 219 | 0.070108 | 0.324236 | 0.153267 | 34.53 | 182. | 0.799619 |
| 220 | 0.014314 | 0.328720 | 0.152206 | 37.02 | 186.1 | 0.787672 |
| 221 | 0.028409 | 0.321215 | 0.153084 | 35.27 | 183.29 | 0.796674 |
| 222 | 0.066410 | 0.308256 | 0.154402 | 31.95 | 177.23 | 0.810707 |
| 223 | 0.080981 | 0.302416 | 0.155208 | 30.02 | 173.69 | 0.820346 |
| 224 | 0.123998 | 0.274373 | 0.154201 | 32.00 | 177.09 | 0.808467 |
| 225 | 0.139832 | 0.255647 | 0.154036 | 30.90 | 175.28 | 0.811483 |

SET=47

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 226 | 0.0859967 | 0.163903 | 0.0972176 | 59.15 | 173.92 | 0.384370 |
| 227 | 0.0867655 | 0.178272 | 0.0971078 | 59.30 | 173.19 | 0.381908 |
| 228 | 0.0766429 | 0.191122 | 0.0969980 | 59.77 | 173.34 | 0.380513 |
| 229 | 0.0801391 | 0.189182 | 0.0974373 | 58.08 | 170.87 | 0.381465 |
| 230 | 0.0568918 | 0.187351 | 0.0971261 | 59.57 | 172.21 | 0.379077 |
| 231 | 0.0695222 | 0.191488 | 0.0972543 | 59.12 | 171.48 | 0.379203 |
| 232 | 0.0530661 | 0.192733 | 0.0970163 | 60.35 | 172.27 | 0.376668 |
| 233 | 0.0546586 | 0.199780 | 0.0970163 | 60.49 | 172.31 | 0.376380 |
| 234 | 0.0358777 | 0.204210 | 0.0966685 | 61.51 | 173.05 | 0.373943 |
| 235 | 0.0511441 | 0.196614 | 0.0969980 | 60.18 | 171.99 | 0.376441 |
| 236 | 0.0739337 | 0.197474 | 0.0974190 | 58.59 | 170.06 | 0.378161 |
| 237 | 0.0860882 | 0.192770 | 0.0977302 | 57.14 | 168.37 | 0.379668 |
| 238 | 0.0794252 | 0.183745 | 0.0973824 | 58.56 | 170.03 | 0.378036 |
| 239 | 0.0895662 | 0.175947 | 0.0975837 | 57.71 | 169.23 | 0.379413 |
| 240 | 0.0881018 | 0.168918 | 0.0976204 | 57.55 | 169.25 | 0.380054 |

SET=48.1

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 241 | 0.0566 | 0.1299 | 0.0979 | 17.17 | 48.81 | 0.184899 |
| 242 | 0.0503 | 0.1406 | 0.0981 | 17.47 | 48.11 | 0.181265 |
| 243 | 0.0156 | 0.1648 | 0.0980 | 18.53 | 50.87 | 0.186680 |
| 244 | 0.0236 | 0.1755 | 0.0979 | 17.72 | 47.95 | 0.179196 |
| 245 | 0.0224 | 0.2026 | 0.0977 | 18.07 | 48.60 | 0.179736 |
| 246 | 0.0076 | 0.2120 | 0.0975 | 19.24 | 51.89 | 0.186413 |
| 247 | 0.0059 | 0.2204 | 0.0973 | 20.25 | 54.27 | 0.190329 |

BCL 2/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX B)
(REFERENCE NUREG/CR-0526 TABLE A-1)

SET=48.2

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 248 | 0.0908 | 0.1295 | 0.1215 | 16.71 | 46.44 | 0.220894 |
| 249 | 0.0769 | 0.1228 | 0.1217 | 17.16 | 47.48 | 0.223642 |
| 250 | 0.0514 | 0.1543 | 0.1220 | 16.63 | 45.60 | 0.218241 |
| 251 | 0.0548 | 0.1723 | 0.1221 | 17.45 | 47.95 | 0.224972 |
| 252 | 0.0292 | 0.1946 | 0.1217 | 19.39 | 53.74 | 0.240174 |
| 253 | 0.0232 | 0.1955 | 0.1215 | 19.48 | 54.01 | 0.240504 |
| 254 | 0.0118 | 0.2216 | 0.1211 | 20.60 | 57.11 | 0.247451 |
| 255 | 0.0077 | 0.2375 | 0.1207 | 21.69 | 59.85 | 0.252799 |
| 256 | 0.0648 | 0.1699 | 0.1110 | 18.36 | 51.26 | 0.213910 |
| 257 | 0.0491 | 0.1979 | 0.1106 | 19.64 | 54.89 | 0.221714 |
| 258 | 0.0195 | 0.2316 | 0.1099 | 20.95 | 58.46 | 0.228214 |
| 259 | 0.0063 | 0.2612 | 0.1095 | 21.51 | 59.92 | 0.230434 |

SET=48.4

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 260 | 0.0089 | 0.1118 | 0.0969 | 19.82 | 15.12 | 0.0532987 |
| 261 | 0.0154 | 0.1333 | 0.0968 | 19.82 | 14.82 | 0.0521872 |
| 262 | 0.0059 | 0.1501 | 0.0966 | 20.79 | 17.37 | 0.0597991 |
| 263 | 0.0086 | 0.1029 | 0.0964 | 18.24 | 10.60 | 0.0385246 |
| 264 | 0.0068 | 0.0831 | 0.0959 | 17.49 | 8.57 | 0.0315497 |
| 265 | 0.0510 | 0.0507 | 0.0975 | 17.54 | 11.51 | 0.0430272 |
| 266 | 0.0405 | 0.0513 | 0.0973 | 17.96 | 10.97 | 0.0405101 |
| 267 | 0.0825 | 0.0235 | 0.0974 | 16.94 | 8.32 | 0.0315388 |
| 268 | 0.0744 | 0.0387 | 0.0973 | 17.18 | 8.94 | 0.0336501 |
| 269 | 0.0839 | 0.0335 | 0.0972 | 16.79 | 8.17 | 0.0310250 |

SET=48.5

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 270 | 0.0056 | 0.1163 | 0.1135 | 20.73 | 20.03 | 0.0811212 |
| 271 | 0.0201 | 0.0862 | 0.1139 | 18.34 | 13.40 | 0.0574066 |
| 272 | 0.0219 | 0.0695 | 0.1137 | 17.98 | 11.43 | 0.0492995 |
| 273 | 0.0222 | 0.0627 | 0.1141 | 17.24 | 7.92 | 0.0349056 |
| 274 | 0.0438 | 0.0417 | 0.1142 | 16.37 | 4.62 | 0.0208383 |
| 275 | 0.0924 | 0.0246 | 0.1139 | 16.87 | 5.51 | 0.0244687 |
| 276 | 0.0840 | 0.0334 | 0.1137 | 17.12 | 6.46 | 0.0284565 |
| 277 | 0.0890 | 0.0246 | 0.1135 | 16.95 | 6.55 | 0.0289261 |

BCL 2/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX B)
(REFERENCE NUREG/CR-0526 TABLE A-1)

SET=48.6

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 278 | 0.0151 | 0.1131 | 0.1588 | 21.62 | 22.08 | 0.122873 |
| 279 | 0.0377 | 0.0967 | 0.1591 | 19.90 | 17.86 | 0.103191 |
| 280 | 0.0359 | 0.0892 | 0.1596 | 19.02 | 15.33 | 0.090596 |
| 281 | 0.0314 | 0.0731 | 0.1537 | 19.30 | 15.37 | 0.086927 |
| 282 | 0.0390 | 0.0619 | 0.1551 | 18.70 | 13.28 | 0.076827 |
| 283 | 0.1028 | 0.0310 | 0.1494 | 17.49 | 9.37 | 0.053739 |

TABLE A-7

BCL 2/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE A-2)

SET=93

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.1095 | 0.1804 | 0.1204 | 28.63 | 204.25 | 0.763749 |
| 2 | 0.1055 | 0.1803 | 0.1196 | 27.79 | 201.84 | 0.759384 |
| 3 | 0.0998 | 0.2821 | 0.1199 | 28.65 | 204.08 | 0.759716 |
| 4 | 0.1071 | 0.2895 | 0.1200 | 27.98 | 202.59 | 0.762518 |
| 5 | 0.0893 | 0.2532 | 0.1194 | 30.57 | 207.61 | 0.748464 |
| 6 | 0.0679 | 0.2853 | 0.1198 | 27.88 | 202.17 | 0.760839 |
| 7 | 0.0730 | 0.2842 | 0.1198 | 27.68 | 201.62 | 0.761122 |
| 8 | 0.0141 | 0.3438 | 0.1183 | 28.99 | 196.74 | 0.718962 |
| 9 | 0.0428 | 0.3182 | 0.1185 | 29.80 | 200.53 | 0.725404 |
| 10 | 0.0702 | 0.3274 | 0.1190 | 28.78 | 199.15 | 0.734368 |
| 11 | 0.0430 | 0.3191 | 0.1189 | 29.32 | 200.22 | 0.731820 |
| 12 | 0.0337 | 0.3187 | 0.1187 | 29.52 | 200.74 | 0.730348 |
| 13 | 0.0293 | 0.3127 | 0.1187 | 29.22 | 200.20 | 0.731590 |

SET=94

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 14 | 0.0488 | 0.1597 | 0.0636 | 29.08 | 122.75 | 0.240840 |
| 15 | 0.0240 | 0.1640 | 0.0636 | 29.05 | 122.59 | 0.240633 |
| 16 | 0.0478 | 0.1701 | 0.0635 | 29.12 | 122.63 | 0.240084 |
| 17 | 0.0295 | 0.1730 | 0.0634 | 29.13 | 122.35 | 0.239123 |
| 18 | 0.0536 | 0.1730 | 0.0615 | 28.63 | 121.23 | 0.231551 |
| 19 | 0.0484 | 0.1725 | 0.0617 | 28.92 | 123.12 | 0.234906 |
| 20 | 0.0311 | 0.1725 | 0.0617 | 28.80 | 122.88 | 0.234868 |
| 21 | 0.0416 | 0.1734 | 0.0617 | 28.65 | 122.57 | 0.234802 |
| 22 | 0.0279 | 0.1892 | 0.0627 | 29.38 | 124.47 | 0.239699 |
| 23 | 0.0197 | 0.1921 | 0.0630 | 29.73 | 125.09 | 0.240816 |
| 24 | 0.0154 | 0.1943 | 0.0629 | 29.44 | 124.49 | 0.240291 |
| 25 | 0.0202 | 0.1951 | 0.0629 | 29.31 | 124.22 | 0.240226 |
| 26 | 0.0226 | 0.1958 | 0.0625 | 29.19 | 123.68 | 0.238081 |
| 27 | 0.0175 | 0.2048 | 0.0630 | 28.49 | 122.54 | 0.240268 |
| 28 | 0.0172 | 0.2050 | 0.0629 | 29.37 | 124.35 | 0.240266 |
| 29 | 0.0164 | 0.2054 | 0.0627 | 29.68 | 125.08 | 0.239823 |
| 30 | 0.0139 | 0.2080 | 0.0626 | 29.47 | 124.65 | 0.239347 |
| 31 | 0.0223 | 0.2012 | 0.0625 | 29.48 | 124.97 | 0.239543 |

BCL 2/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE A-2)

SET=95

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 32 | 0.0485 | 0.2288 | 0.1210 | 29.06 | 123.41 | 0.460802 |
| 33 | 0.0182 | 0.2273 | 0.1211 | 29.98 | 125.60 | 0.463118 |
| 34 | 0.0331 | 0.2324 | 0.1209 | 29.00 | 123.69 | 0.461876 |
| 35 | 0.0212 | 0.2317 | 0.1206 | 29.44 | 124.79 | 0.461827 |
| 36 | 0.0260 | 0.2341 | 0.1209 | 29.08 | 124.05 | 0.462672 |
| 37 | 0.1039 | 0.1749 | 0.1210 | 28.92 | 123.62 | 0.462545 |
| 38 | 0.1083 | 0.1723 | 0.1205 | 29.45 | 124.61 | 0.460711 |
| 39 | 0.0938 | 0.1627 | 0.1203 | 29.55 | 124.72 | 0.459682 |
| 40 | 0.0953 | 0.1935 | 0.1206 | 29.23 | 124.16 | 0.460912 |
| 41 | 0.0878 | 0.1934 | 0.1206 | 28.71 | 122.99 | 0.460106 |
| 42 | 0.0502 | 0.1867 | 0.1201 | 29.79 | 125.21 | 0.459121 |
| 43 | 0.1004 | 0.1851 | 0.1201 | 29.60 | 124.72 | 0.458584 |
| 44 | 0.0592 | 0.1878 | 0.1201 | 29.21 | 123.92 | 0.458249 |
| 45 | 0.0965 | 0.1911 | 0.1199 | 29.06 | 123.41 | 0.456612 |

SET=96

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 46 | 0.0483 | 0.0806 | 0.0633 | 29.41 | 38.93 | 0.075654 |
| 47 | 0.0394 | 0.0831 | 0.0633 | 29.19 | 38.38 | 0.074826 |
| 48 | 0.0405 | 0.0837 | 0.0632 | 28.95 | 42.88 | 0.083764 |
| 49 | 0.0350 | 0.0834 | 0.0631 | 29.15 | 53.79 | 0.104600 |
| 50 | 0.0386 | 0.0829 | 0.0632 | 29.63 | 59.08 | 0.114264 |
| 51 | 0.0297 | 0.0961 | 0.0632 | 29.48 | 62.07 | 0.120309 |
| 52 | 0.0353 | 0.0962 | 0.0632 | 29.58 | 61.98 | 0.119960 |
| 53 | 0.0269 | 0.0955 | 0.0632 | 29.45 | 62.01 | 0.120245 |
| 54 | 0.0288 | 0.0948 | 0.0632 | 29.11 | 61.51 | 0.119873 |
| 55 | 0.0299 | 0.0939 | 0.0631 | 29.30 | 62.60 | 0.121464 |
| 56 | 0.0140 | 0.1474 | 0.0626 | 29.35 | 61.60 | 0.118489 |
| 57 | 0.0078 | 0.1478 | 0.0624 | 29.58 | 62.48 | 0.119397 |
| 58 | 0.0075 | 0.1515 | 0.0608 | 29.59 | 62.30 | 0.115983 |
| 59 | 0.0086 | 0.1606 | 0.0624 | 29.59 | 63.30 | 0.120946 |
| 60 | 0.0064 | 0.1599 | 0.0624 | 29.51 | 62.93 | 0.120379 |

BCL 2/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE A-2)

SET=97

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 61 | 0.0929 | 0.0996 | 0.1211 | 29.90 | 40.13 | 0.148139 |
| 62 | 0.0944 | 0.1000 | 0.1210 | 30.32 | 58.31 | 0.213786 |
| 63 | 0.0640 | 0.1010 | 0.1210 | 30.16 | 65.53 | 0.240805 |
| 64 | 0.0786 | 0.1029 | 0.1211 | 29.93 | 69.20 | 0.255341 |
| 65 | 0.0965 | 0.1047 | 0.1210 | 30.16 | 71.83 | 0.263956 |
| 66 | 0.0675 | 0.1333 | 0.1208 | 30.94 | 73.92 | 0.268226 |
| 67 | 0.0552 | 0.1334 | 0.1206 | 31.35 | 74.86 | 0.269656 |
| 68 | 0.0666 | 0.1339 | 0.1208 | 30.78 | 74.54 | 0.271079 |
| 69 | 0.0311 | 0.1287 | 0.1203 | 31.71 | 75.30 | 0.269241 |
| 70 | 0.0535 | 0.1206 | 0.1202 | 31.32 | 75.40 | 0.270812 |
| 71 | 0.0153 | 0.1646 | 0.1210 | 29.20 | 70.20 | 0.261579 |
| 72 | 0.0175 | 0.1571 | 0.1204 | 31.29 | 73.85 | 0.265796 |
| 73 | 0.0167 | 0.1580 | 0.1202 | 30.95 | 73.14 | 0.264041 |
| 74 | 0.0202 | 0.1597 | 0.1192 | 30.86 | 73.98 | 0.265183 |
| 75 | 0.0191 | 0.1590 | 0.0910 | 30.18 | 72.26 | 0.199644 |

TABLE A-7 7:54 MONDAY, JULY 30, 1979 1

BCL 2/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX C)

SET=98

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0564 | 0.2142 | 0.0645 | 33.00 | 175.93 | 0.331539 |
| 2 | 0.0201 | 0.2474 | 0.0641 | 35.57 | 179.90 | 0.326226 |
| 3 | 0.0048 | 0.2613 | 0.0639 | 38.20 | 183.22 | 0.321205 |
| 4 | 0.0051 | 0.2769 | 0.0637 | 40.65 | 186.14 | 0.316722 |
| 5 | 0.0078 | 0.2623 | 0.0641 | 31.77 | 171.55 | 0.326570 |
| 6 | 0.0701 | 0.1534 | 0.0689 | 30.99 | 174.47 | 0.360836 |
| 7 | 0.0515 | 0.2082 | 0.0687 | 31.58 | 175.59 | 0.359174 |
| 8 | 0.0266 | 0.2372 | 0.0687 | 30.76 | 174.10 | 0.360178 |
| 9 | 0.0097 | 0.2591 | 0.0686 | 30.33 | 173.38 | 0.360341 |
| 10 | 0.0074 | 0.2689 | 0.0680 | 31.15 | 174.42 | 0.355233 |

SET=99

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 11 | 0.0873 | 0.1532 | 0.0985 | 30.63 | 173.33 | 0.515065 |
| 12 | 0.0321 | 0.2667 | 0.0982 | 31.76 | 174.71 | 0.509584 |
| 13 | 0.0032 | 0.2931 | 0.0981 | 30.83 | 172.46 | 0.508972 |
| 14 | 0.0264 | 0.2909 | 0.0982 | 29.40 | 169.53 | 0.511168 |
| 15 | 0.0328 | 0.2663 | 0.0990 | 30.65 | 172.56 | 0.515235 |

SET=100

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 16 | 0.1308 | 0.2567 | 0.1561 | 31.66 | 175.61 | 0.815319 |
| 17 | 0.0898 | 0.2629 | 0.1565 | 29.55 | 171.40 | 0.821828 |
| 18 | 0.0963 | 0.2827 | 0.1558 | 31.52 | 174.46 | 0.809966 |
| 19 | 0.0222 | 0.2962 | 0.1542 | 33.11 | 176.38 | 0.793499 |
| 20 | 0.0251 | 0.3130 | 0.1544 | 32.80 | 174.33 | 0.788477 |

SET=101

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 21 | 0.0757 | 0.1991 | 0.0941 | 72.51 | 235.56 | 0.461653 |
| 22 | 0.0542 | 0.2176 | 0.0940 | 72.30 | 234.90 | 0.460444 |
| 23 | 0.0514 | 0.2274 | 0.0927 | 76.25 | 237.82 | 0.449325 |
| 24 | 0.0380 | 0.2431 | 0.0994 | 76.53 | 237.49 | 0.480374 |
| 25 | 0.0441 | 0.2056 | 0.1000 | 72.11 | 232.45 | 0.485274 |

TABLE A-7

BCL 2/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0069 APPENDIX C)

SET=102

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 26 | 0.0484 | 0.1744 | 0.0916 | 77.28 | 175.16 | 0.325130 |
| 27 | 0.0527 | 0.1747 | 0.0912 | 78.02 | 175.84 | 0.323638 |
| 28 | 0.0646 | 0.1773 | 0.0913 | 77.64 | 175.39 | 0.323843 |
| 29 | 0.0564 | 0.1774 | 0.0913 | 77.04 | 174.84 | 0.323906 |
| 30 | 0.0501 | 0.1748 | 0.0903 | 78.08 | 175.69 | 0.320065 |
| 31 | 0.0579 | 0.1906 | 0.0903 | 78.17 | 175.57 | 0.319688 |
| 32 | 0.0328 | 0.1962 | 0.0895 | 79.29 | 176.49 | 0.316574 |
| 33 | 0.0152 | 0.2068 | 0.0712 | 79.98 | 176.82 | 0.251377 |

SET=103

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 34 | 0.0757 | 0.1200 | 0.0927 | 77.41 | 118.18 | 0.221838 |
| 35 | 0.0762 | 0.1354 | 0.0921 | 78.43 | 119.21 | 0.221075 |
| 36 | 0.0337 | 0.1496 | 0.0910 | 80.58 | 121.42 | 0.219912 |
| 37 | 0.0533 | 0.1464 | 0.0910 | 80.50 | 121.55 | 0.220242 |
| 38 | 0.0534 | 0.1471 | 0.0909 | 79.91 | 121.36 | 0.220352 |
| 39 | 0.0381 | 0.1639 | 0.0904 | 80.56 | 122.20 | 0.219889 |
| 40 | 0.0541 | 0.1630 | 0.0903 | 80.78 | 122.98 | 0.220789 |
| 41 | 0.0347 | 0.1716 | 0.0901 | 83.12 | 118.51 | 0.209702 |
| 42 | 0.0187 | 0.1737 | 0.0893 | 83.98 | 119.42 | 0.208511 |
| 43 | 0.0268 | 0.1804 | 0.0892 | 84.23 | 120.03 | 0.209074 |
| 44 | 0.0239 | 0.1745 | 0.0901 | 81.98 | 118.57 | 0.211057 |
| 45 | 0.0274 | 0.1734 | 0.0898 | 81.79 | 118.91 | 0.211168 |

TABLE A-7

BCL 2/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE A-2)

SET=104

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0487 | 0.2103 | 0.0627 | 30.87 | 208.47 | 0.393012 |
| 2 | 0.0428 | 0.2301 | 0.0625 | 30.62 | 207.17 | 0.390679 |
| 3 | 0.0373 | 0.2343 | 0.0625 | 30.39 | 206.55 | 0.390775 |
| 4 | 0.0253 | 0.2388 | 0.0624 | 30.61 | 206.80 | 0.389412 |
| 5 | 0.0316 | 0.2148 | 0.0620 | 28.37 | 202.21 | 0.390895 |
| 6 | 0.0567 | 0.2043 | 0.0623 | 28.15 | 201.42 | 0.392564 |
| 7 | 0.0428 | 0.2123 | 0.0620 | 28.35 | 201.74 | 0.390105 |
| 8 | 0.0462 | 0.1984 | 0.0616 | 28.54 | 201.84 | 0.386668 |
| 9 | 0.0491 | 0.2112 | 0.0619 | 28.94 | 202.51 | 0.387515 |
| 10 | 0.0107 | 0.2614 | 0.0627 | 28.83 | 198.97 | 0.386293 |
| 11 | 0.0159 | 0.2593 | 0.0624 | 30.27 | 201.57 | 0.381391 |
| 12 | 0.0113 | 0.2702 | 0.0624 | 29.85 | 200.68 | 0.381995 |
| 13 | 0.0161 | 0.2745 | 0.0625 | 29.95 | 201.30 | 0.383238 |
| 14 | 0.0088 | 0.2808 | 0.0625 | 29.70 | 200.67 | 0.383418 |
| 15 | 0.0030 | 0.2836 | 0.0625 | 29.50 | 200.23 | 0.383691 |

TABLE A-8

BCL 2/15 SCALE STEADY STATE AIR-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE A-3)

SET=48.7

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0712 | 0.0154 | 0.0633 | 14.72 | 0 | 0 |
| 2 | 0.0670 | 0.0200 | 0.0633 | 14.87 | 0 | 0 |
| 3 | 0.0541 | 0.0260 | 0.0632 | 15.32 | 0 | 0 |
| 4 | 0.0403 | 0.0340 | 0.0632 | 15.79 | 0 | 0 |
| 5 | 0.0353 | 0.0351 | 0.0632 | 15.95 | 0 | 0 |
| 6 | 0.0315 | 0.0385 | 0.0631 | 16.38 | 0 | 0 |
| 7 | 0.0231 | 0.0430 | 0.0631 | 17.12 | 0 | 0 |
| 8 | 0.0198 | 0.0464 | 0.0630 | 17.82 | 0 | 0 |
| 9 | 0.0147 | 0.0497 | 0.0629 | 19.02 | 0 | 0 |
| 10 | 0.0128 | 0.0546 | 0.0629 | 20.16 | 0 | 0 |

SET=48.8

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 11 | 0.0081 | 0.0687 | 0.0977 | 29.03 | 0 | 0 |
| 12 | 0.0092 | 0.0651 | 0.0979 | 27.23 | 0 | 0 |
| 13 | 0.0108 | 0.0584 | 0.0981 | 25.57 | 0 | 0 |
| 14 | 0.0132 | 0.0565 | 0.0984 | 23.24 | 0 | 0 |
| 15 | 0.0157 | 0.0537 | 0.0985 | [illegible].99 | 0 | 0 |
| 16 | 0.0227 | 0.0472 | 0.0987 | 19.67 | 0 | 0 |
| 17 | 0.0308 | 0.0407 | 0.0989 | 17.74 | 0 | 0 |
| 18 | 0.0489 | 0.0229 | 0.0990 | 16.15 | 0 | 0 |
| 19 | 0.0647 | 0.0256 | 0.0991 | 15.48 | 0 | 0 |
| 20 | 0.1032 | 0.0131 | 0.0992 | 14.70 | 0 | 0 |

SET=48.9

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 21 | 0.0571 | 0.0258 | 0.1217 | 16.25 | 0 | 0 |
| 22 | 0.0484 | 0.0331 | 0.1216 | 16.74 | 0 | 0 |
| 23 | 0.0366 | 0.0392 | 0.1213 | 18.15 | 0 | 0 |
| 24 | 0.0252 | 0.0419 | 0.1209 | 20.54 | 0 | 0 |
| 25 | 0.0175 | 0.0532 | 0.1204 | 23.58 | 0 | 0 |
| 26 | 0.0137 | 0.0533 | 0.1199 | 26.12 | 0 | 0 |
| 27 | 0.0110 | 0.0638 | 0.1192 | 29.30 | 0 | 0 |
| 28 | 0.0100 | 0.0669 | 0.1187 | 31.42 | 0 | 0 |
| 29 | 0.0090 | 0.0647 | 0.1184 | 32.90 | 0 | 0 |
| 30 | 0.0095 | 0.0691 | 0.1181 | 34.10 | 0 | 0 |

BCL 2/15 SCALE STEADY STATE AIR-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE A-3)

SET=48.91

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 31 | 0.0106 | 0.0642 | 0.1547 | 35.48 | 0 | 0 |
| 32 | 0.0126 | 0.0622 | 0.1557 | 33.50 | 0 | 0 |
| 33 | 0.0133 | 0.0586 | 0.1568 | 31.18 | 0 | 0 |
| 34 | 0.0154 | 0.0562 | 0.1577 | 29.22 | 0 | 0 |
| 35 | 0.0174 | 0.0538 | 0.1584 | 27.64 | 0 | 0 |
| 36 | 0.0236 | 0.0486 | 0.1598 | 24.70 | 0 | 0 |
| 37 | 0.0333 | 0.0418 | 0.1612 | 21.39 | 0 | 0 |
| 38 | 0.0490 | 0.0333 | 0.1626 | 18.25 | 0 | 0 |
| 39 | 0.0730 | 0.0232 | 0.1634 | 16.31 | 0 | 0 |
| 40 | 0.0838 | 0.0136 | 0.1637 | 15.63 | 0 | 0 |
| 41 | 0.1099 | 0.0073 | 0.1640 | 15.14 | 0 | 0 |

# APPENDIX B

## BCL 1/15 SCALE NON-LINEAR LEAST SQUARES STATISTICS

## BCL 1/15 SCALE DATA LISTING

BCL 1/15 SCALE AIR-WATER DATA STATISTICS

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: SJG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE | F VALUE | PR > F | R-SQUARE | C.V. |
|---|---|---|---|---|---|---|---|
| MODEL | 1 | 2.00845256 | 2.00845256 | 1092.90 | 0.0001 | 0.820557 | 14.4342 |
| ERROR | 239 | 0.43921861 | 0.00183773 | | STD DEV | | SJG MEAN |
| CORRECTED TOTAL | 240 | 2.44767117 | | | 0.04286881 | | 0.29699413 |

| SOURCE | DF | TYPE I SS | F VALUE | PR > F | DF | TYPE IV SS | F VALUE | PR > F |
|---|---|---|---|---|---|---|---|---|
| SJLD | 1 | 2.00845256 | 1092.90 | 0.0001 | 1 | 2.00845256 | 1092.90 | 0.0001 |

| PARAMETER | ESTIMATE | T FOR H0: PARAMETER=0 | PR > \|T\| | STD ERROR OF ESTIMATE |
|---|---|---|---|---|
| INTERCEPT | 0.44044937 | 85.63 | 0.0001 | 0.00514350 |
| SJLD | -1.19371990 | -33.06 | 0.0001 | 0.03610680 |

TABLE 5-2

BCL 1/15 SCALE STEAM-WATER AND AIR-WATER DATA STATISTICS
(USING MODIFIED EQUATION #9 AND A=8.0)

NON-LINEAR LEAST SQUARES SUMMARY STATISTICS DEPENDENT VARIABLE JG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE |
|---|---|---|---|
| REGRESSION | 4 | 14.62223958 | 3.65555989 |
| RESIDUAL | 499 | 0.31800682 | 0.00063729 |
| UNCORRECTED TOTAL | 503 | 14.94024640 | |
| (CORRECTED TOTAL) | 502 | 3.26461056 | |

| PARAMETER | ESTIMATE | ASYMPTOTIC STD. ERROR | ASYMPTOTIC 95 % CONFIDENCE INTERVAL LOWER | UPPER |
|---|---|---|---|---|
| F | 0.22178498 | 0.00722135 | 0.20759675 | 0.23597320 |
| C | 0.42926838 | 0.00326267 | 0.42285802 | 0.43567875 |
| Z | 15.44425446 | 0.83134995 | 13.81085144 | 17.07765747 |
| M | 1.00900028 | 0.02585281 | 0.95820572 | 1.05979484 |

ASYMPTOTIC CORRELATION MATRIX OF THE PARAMETERS

| | F | C | Z | M |
|---|---|---|---|---|
| F | 1.000000 | -0.336459 | -0.669180 | -0.050862 |
| C | -0.336459 | 1.000000 | 0.388971 | 0.688895 |
| Z | -0.669180 | 0.388971 | 1.000000 | 0.614112 |
| M | -0.050862 | 0.688895 | 0.614112 | 1.000000 |

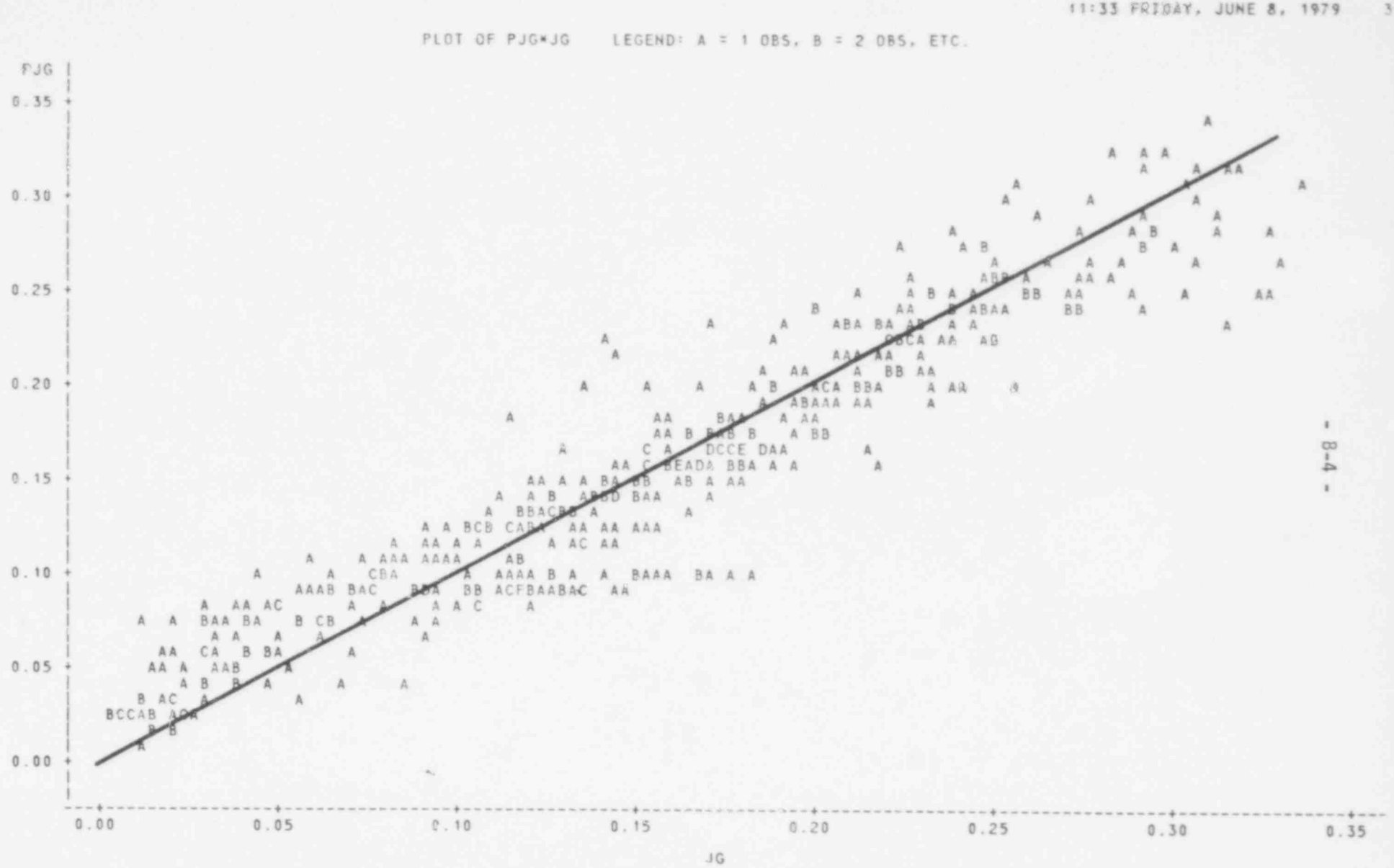


Figure B-1—Comparison of BCL 1/15 Scale Steam-Water and Air-Water Data with Correlation Using the Modified Formulation of Equation #9 and a=8.0.

BCL 1/15 SCALE STEAM-WATER DATA STATISTICS
(USING MODIFIED EQUATION #9 AND A=9.0)

NON-LINEAR LEAST SQUARES SUMMARY STATISTICS DEPENDENT VARIABLE JG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE |
|---|---|---|---|
| REGRESSION | 4 | 11.72058190 | 2.93014547 |
| RESIDUAL | 258 | 0.16314442 | 0.00063234 |
| UNCORRECTED TOTAL | 262 | 11.88372632 | |
| (CORRECTED TOTAL) | 261 | 1.19094167 | |

| PARAMETER | ESTIMATE | ASYMPTOTIC STD. ERROR | ASYMPTOTIC 95 % CONFIDENCE INTERVAL LOWER | UPPER |
|---|---|---|---|---|
| F | 0.23271483 | 0.00966385 | 0.21368451 | 0.25174515 |
| C | 0.41654788 | 0.00660348 | 0.40354412 | 0.42955163 |
| Z | 16.90760147 | 1.11153266 | 14.71874134 | 19.09646159 |
| M | 0.87704560 | 0.02934019 | 0.81926811 | 0.93482310 |

ASYMPTOTIC CORRELATION MATRIX OF THE PARAMETERS

| | F | C | Z | M |
|---|---|---|---|---|
| F | 1.000000 | -0.689731 | -0.243529 | 0.082243 |
| C | -0.689731 | 1.000000 | 0.037348 | 0.352191 |
| Z | -0.243529 | 0.037348 | 1.000000 | 0.614995 |
| M | 0.082243 | 0.352191 | 0.614995 | 1.000000 |

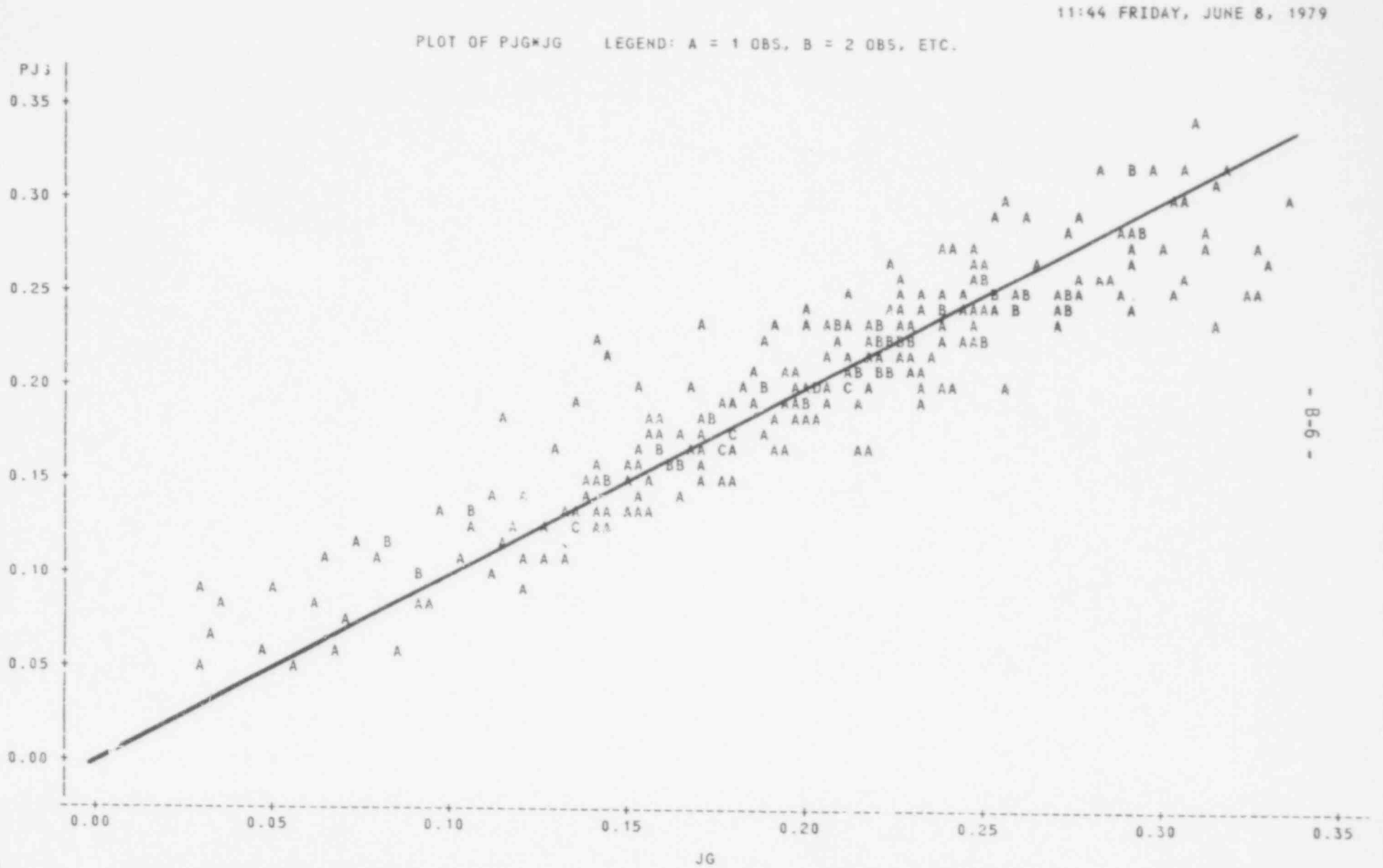


Figure B-2—Comparison of BCL 1/15 Scale Steam-Water Data with Correlation Using the Modified Formulation of Equation #9 and a=9.0.

BCL 1/15 SCALE STEAM-WATER AND AIR-WATER DATA STATISTICS
(USING TRADITIONAL EQUATION #10 AND A=10.0)

NON-LINEAR LEAST SQUARES SUMMARY STATISTICS DEPENDENT VARIABLE JG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE |
|---|---|---|---|
| REGRESSION | 4 | 14.49954119 | 3.62488530 |
| RESIDUAL | 499 | 0.44070520 | 0.00088318 |
| UNCORRECTED TOTAL | 503 | 14.94024640 | |
| (CORRECTED TOTAL) | 502 | 3.26461056 | |

| PARAMETER | ESTIMATE | ASYMPTOTIC STD. ERROR | ASYMPTOTIC 95 % CONFIDENCE INTERVAL LOWER | UPPER |
|---|---|---|---|---|
| F | 0.17184211 | 0.00597810 | 0.16009659 | 0.18358764 |
| C | 0.45184353 | 0.00405799 | 0.44387055 | 0.45981651 |
| Z | 42.85847951 | 1.50525603 | 39.90101289 | 45.81594613 |
| M | 1.13250363 | 0.03672443 | 1.06034895 | 1.20465831 |

ASYMPTOTIC CORRELATION MATRIX OF THE PARAMETERS

| | F | C | Z | M |
|---|---|---|---|---|
| F | 1.000000 | 0.096316 | -0.275669 | 0.282636 |
| C | 0.096316 | 1.000000 | 0.238467 | 0.755308 |
| Z | -0.275669 | 0.238467 | 1.000000 | 0.607207 |
| M | 0.282636 | 0.755308 | 0.607207 | 1.000000 |

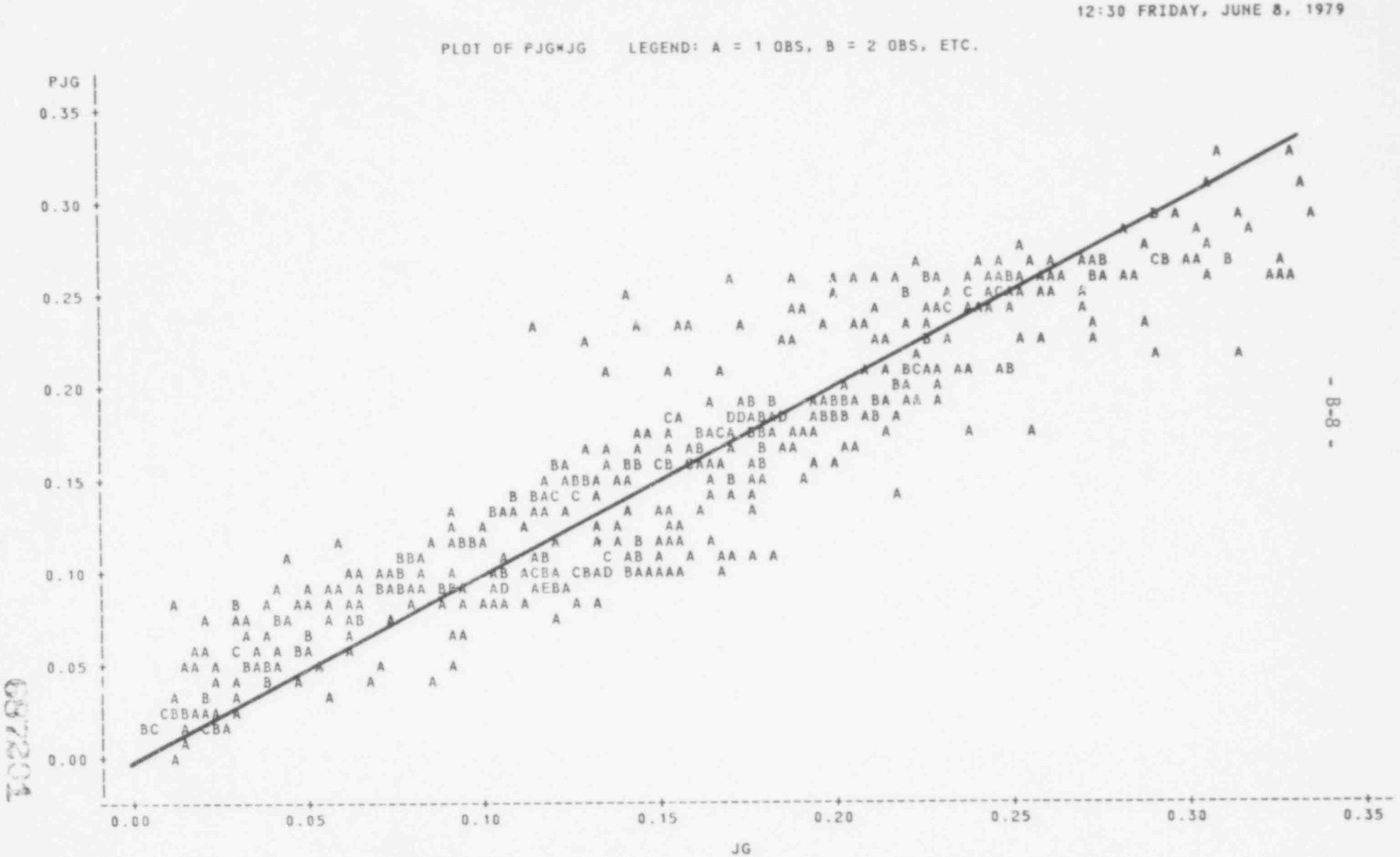


Figure B-3—Comparison of BCL 1/15 Scale Steam-Water and Air-Water Data with Correlation Using the Traditional Formulation of Equation #10 and a=10.0.

BCL 1/15 SCALE STEAM-WATER DATA STATISTICS
(USING TRADITIONAL EQUATION #10 AND A=8.0)

NON-LINEAR LEAST SQUARES SUMMARY STATISTICS DEPENDENT VARIABLE JG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE |
|---|---|---|---|
| REGRESSION | 4 | 11.70150963 | 2.92537741 |
| RESIDUAL | 258 | 0.18221669 | 0.00070627 |
| UNCORRECTED TOTAL | 262 | 11.88372632 | |
| (CORRECTED TOTAL) | 261 | 1.19094167 | |

| PARAMETER | ESTIMATE | ASYMPTOTIC STD. ERROR | ASYMPTOTIC 95 % CONFIDENCE INTERVAL LOWER | UPPER |
|---|---|---|---|---|
| F | 0.11901036 | 0.00651287 | 0.10618503 | 0.13183569 |
| C | 0.52280045 | 0.00594304 | 0.51109725 | 0.53450365 |
| Z | 19.13199593 | 1.02140079 | 17.12062591 | 21.14336595 |
| M | 1.18245117 | 0.04301118 | 1.09775240 | 1.26714995 |

ASYMPTOTIC CORRELATION MATRIX OF THE PARAMETERS

| | F | C | Z | M |
|---|---|---|---|---|
| F | 1.000000 | -0.067089 | -0.159182 | 0.242747 |
| C | -0.067089 | 1.000000 | -0.027721 | 0.593903 |
| Z | -0.159182 | -0.027721 | 1.000000 | 0.641495 |
| M | 0.242747 | 0.593903 | 0.641495 | 1.000000 |

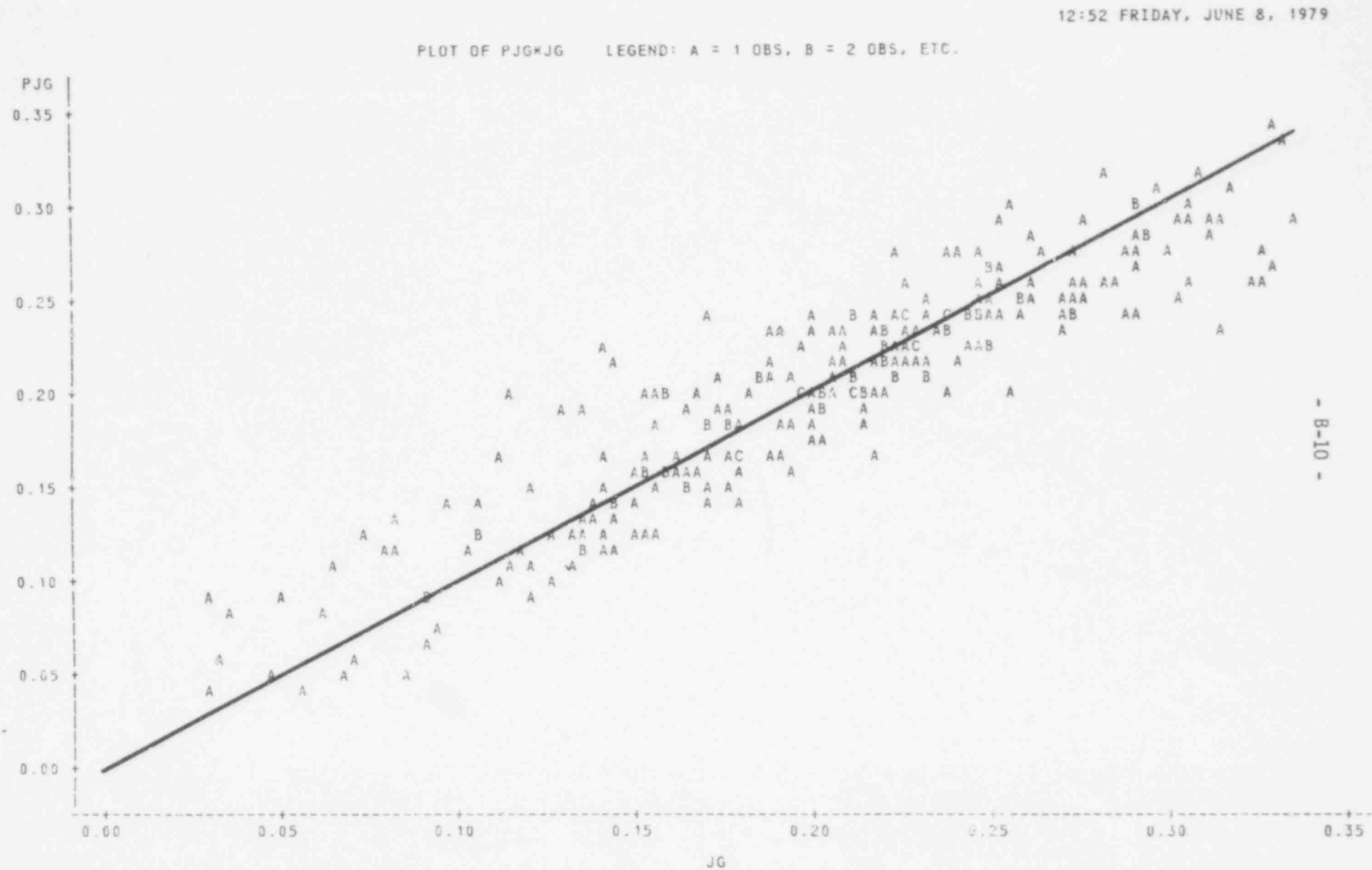


Figure B-4—Comparison of BCL 1/15 Scale Steam-Water Data with Correlation Using the Traditional Formulation of Equation #10 and a=8.0.

TABLE B-6

BCL 1/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE BMI-NUREG-1973 TABLE C-8)

SET=1

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0733647 | 0.165342 | 0.0813155 | 73.04 | 164.70 | 0.278055 |
| 2 | 0.0298157 | 0.202205 | 0.0813155 | 73.24 | 165.88 | 0.279718 |
| 3 | 0.0341525 | 0.197687 | 0.0813155 | 73.14 | 165.79 | 0.279731 |
| 4 | 0.0341525 | 0.212143 | 0.0813155 | 74.34 | 165.88 | 0.277931 |
| 5 | 0.0706541 | 0.162812 | 0.0863751 | 73.42 | 161.43 | 0.288847 |
| 6 | 0.0310806 | 0.181785 | 0.0869172 | 75.02 | 160.97 | 0.287157 |
| 7 | 0.0287315 | 0.202566 | 0.0872786 | 75.32 | 160.23 | 0.286534 |

SET=2

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 8 | 0.0571016 | 0.112215 | 0.0899892 | 73.54 | 64.82 | 0.120751 |
| 9 | 0.0780629 | 0.093242 | 0.0899892 | 72.94 | 64.00 | 0.119644 |
| 10 | 0.0388507 | 0.125768 | 0.0899892 | 74.54 | 65.01 | 0.120403 |
| 11 | 0.0318034 | 0.134803 | 0.0898085 | 74.54 | 66.49 | 0.122897 |
| 12 | 0.0233104 | 0.156849 | 0.0899892 | 73.74 | 63.81 | 0.118730 |
| 13 | 0.0146368 | 0.175641 | 0.0898085 | 74.64 | 68.18 | 0.125948 |

SET=3

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 14 | 0.0838453 | 0.114565 | 0.0887243 | 73.14 | 117.86 | 0.216979 |
| 15 | 0.0791471 | 0.135164 | 0.0887243 | 73.94 | 119.74 | 0.219411 |
| 16 | 0.0675822 | 0.155403 | 0.0883628 | 73.64 | 121.95 | 0.222940 |
| 17 | 0.0706541 | 0.153957 | 0.0881821 | 73.14 | 123.54 | 0.226046 |
| 18 | 0.0711962 | 0.136429 | 0.0870979 | 73.55 | 110.16 | 0.198608 |
| 19 | 0.0327069 | 0.217383 | 0.0869172 | 75.05 | 113.53 | 0.202494 |

SET=4

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 20 | 0.0563787 | 0.119263 | 0.0690278 | 74.14 | 60.54 | 0.0862064 |
| 21 | 0.0375858 | 0.135345 | 0.0681243 | 74.24 | 67.87 | 0.0953237 |
| 22 | 0.0218648 | 0.151608 | 0.0684857 | 75.34 | 65.00 | 0.0911985 |
| 23 | 0.0229490 | 0.164257 | 0.0688471 | 74.24 | 59.51 | 0.0844689 |
| 24 | 0.0099386 | 0.176364 | 0.0692085 | 74.74 | 56.51 | 0.0803993 |

BCL 1/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE BMI-NUREG-1973 TABLE C-8)

SET=5

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 25 | 0.0520419 | 0.187748 | 0.0563787 | 28.65 | 166.87 | 0.292096 |
| 26 | 0.0365016 | 0.225515 | 0.0563787 | 28.55 | 167.06 | 0.292868 |
| 27 | 0.0173473 | 0.253704 | 0.0563787 | 28.05 | 165.93 | 0.293106 |
| 28 | 0.0144561 | 0.251175 | 0.0563787 | 28.35 | 165.95 | 0.291803 |
| 29 | 0.0072280 | 0.264727 | 0.0563787 | 28.35 | 165.15 | 0.290397 |

SET=6

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 30 | 0.0401156 | 0.172027 | 0.0571016 | 29.35 | 118.00 | 0.207040 |
| 31 | 0.0511384 | 0.156306 | 0.0569209 | 28.95 | 122.18 | 0.214960 |
| 32 | 0.0366823 | 0.174196 | 0.0571016 | 29.65 | 117.62 | 0.205473 |
| 33 | 0.0258403 | 0.198229 | 0.0571016 | 28.85 | 109.98 | 0.194399 |
| 34 | 0.0198771 | 0.206722 | 0.0571016 | 28.95 | 108.18 | 0.190933 |
| 35 | 0.0166245 | 0.219552 | 0.0571016 | 28.55 | 107.36 | 0.190623 |
| 36 | 0.0128298 | 0.230575 | 0.0571016 | 28.75 | 107.77 | 0.190777 |
| 37 | 0.0099386 | 0.236176 | 0.0571016 | 29.05 | 109.39 | 0.192783 |

SET=7

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 38 | 0.0652331 | 0.167510 | 0.0834839 | 28.35 | 107.95 | 0.281076 |
| 39 | 0.0652331 | 0.179075 | 0.0833032 | 28.45 | 115.16 | 0.298747 |
| 40 | 0.0630647 | 0.176184 | 0.0834839 | 28.35 | 107.95 | 0.281076 |
| 41 | 0.0310806 | 0.198952 | 0.0833032 | 28.85 | 110.98 | 0.286180 |
| 42 | 0.0229490 | 0.218648 | 0.0833032 | 28.45 | 110.16 | 0.285776 |
| 43 | 0.0184315 | 0.228045 | 0.0833032 | 28.55 | 100.36 | 0.259960 |
| 44 | 0.0155403 | 0.227141 | 0.0833032 | 28.65 | 110.57 | 0.285977 |

SET=8

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 45 | 0.0670401 | 0.229129 | 0.0825804 | 28.43 | 167.02 | 0.429652 |
| 46 | 0.0565595 | 0.243224 | 0.0825804 | 28.23 | 166.90 | 0.430649 |
| 47 | 0.0493314 | 0.258222 | 0.0825804 | 28.63 | 167.53 | 0.429667 |
| 48 | 0.0079508 | 0.277376 | 0.0825804 | 28.63 | 167.53 | 0.429667 |
| 49 | 0.0108421 | 0.291652 | 0.0825804 | 29.13 | 168.55 | 0.429077 |
| 50 | 0.0764366 | 0.218829 | 0.0831225 | 28.80 | 168.08 | 0.432804 |
| 51 | 0.0444525 | 0.263101 | 0.0831225 | 29.50 | 169.31 | 0.431492 |
| 52 | 0.0240332 | 0.291110 | 0.0831225 | 28.90 | 166.88 | 0.429074 |
| 53 | 0.0140947 | 0.294724 | 0.0831225 | 29.60 | 169.02 | 0.430127 |

BCL 1/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE BMI-NUREG-1973 TABLE C-8)

SET=8

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 54 | 0.0140947 | 0.294724 | 0.0831225 | 30.10 | 171.72 | 0.433862 |
| 55 | 0.0531261 | 0.270690 | 0.0831225 | 29.10 | 171.39 | 0.439365 |
| 56 | 0.0724611 | 0.246115 | 0.0831225 | 28.50 | 171.56 | 0.443759 |
| 57 | 0.0737261 | 0.238887 | 0.0814962 | 27.88 | 163.69 | 0.419063 |
| 58 | 0.0417420 | 0.276834 | 0.0814962 | 29.48 | 170.57 | 0.426323 |
| 59 | 0.0189736 | 0.298699 | 0.0814962 | 30.08 | 171.78 | 0.4 643 |
| 60 | 0.0097579 | 0.310987 | 0.0814962 | 30.58 | 172.78 | 0.425097 |
| 61 | 0.0160824 | 0.312432 | 0.0814962 | 30.38 | 172.72 | 0.426150 |

SET=9

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 62 | 0.0992049 | 0.205638 | 0.109505 | 27.43 | 160.26 | 0.555158 |
| 63 | 0.0876400 | 0.219190 | 0.109505 | 28.53 | 164.02 | 0.558658 |
| 64 | 0.0814962 | 0.244669 | 0.109505 | 28.03 | 163.39 | 0.560759 |
| 65 | 0.0402963 | 0.283881 | 0.109505 | 27.43 | 162.46 | 0.562779 |
| 66 | 0.0059631 | 0.317492 | 0.109505 | 28.33 | 164.51 | 0.562024 |
| 67 | 0.0149982 | 0.307192 | 0.109505 | 28.13 | 165.30 | 0.566446 |

SET=10

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 68 | 0.0914348 | 0.178894 | 0.108601 | 28.85 | 109.98 | 0.369727 |
| 69 | 0.0999277 | 0.169678 | 0.108601 | 29.25 | 110.80 | 0.370285 |
| 70 | 0.0730033 | 0.194073 | 0.108601 | 29.55 | 111.42 | 0.370727 |
| 71 | 0.0558366 | 0.204192 | 0.108601 | 29.85 | 112.03 | 0.371141 |
| 72 | 0.0478858 | 0.215576 | 0.108601 | 29.65 | 111.62 | 0.370853 |
| 73 | 0.0178894 | 0.238887 | 0.108601 | 29.35 | 112.00 | 0.373747 |
| 74 | 0.0101193 | 0.260210 | 0.108601 | 28.65 | 110.57 | 0.372824 |

SET=11

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 75 | 0.0375858 | 0.175822 | 0.0892664 | 30.32 | 70.94 | 0.191880 |
| 76 | 0.0124684 | 0.207083 | 0.0903506 | 30.02 | 62.80 | 0.172663 |
| 77 | 0.0561980 | 0.140043 | 0.0880014 | 29.64 | 60.86 | 0.163874 |
| 78 | 0.0634261 | 0.121070 | 0.0880014 | 28.44 | 57.48 | 0.157548 |
| 79 | 0.0184315 | 0.171485 | 0.0880014 | 29.94 | 61.62 | 0.165203 |
| 80 | 0.0243947 | 0.160824 | 0.0880014 | 29.54 | 59.22 | 0.159690 |
| 81 | 0.0103000 | 0.184677 | 0.0880014 | 30.54 | 61.72 | 0.164066 |
| 82 | 0.0072230 | 0.198048 | 0.0878207 | 32.14 | 65.57 | 0.170164 |

BCL 1/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE BMI-NUREG-1973 TABLE C-8)

SET=12

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 83 | 0.0254789 | 0.224069 | 0.0892664 | 30.92 | 113.27 | 0.303805 |
| 84 | 0.0572823 | 0.191182 | 0.0883628 | 28.52 | 117.46 | 0.322880 |
| 85 | 0.0056017 | 0.251717 | 0.0896278 | 29.22 | 106.84 | 0.294801 |
| 86 | 0.0744489 | 0.158656 | 0.0889050 | 28.44 | 113.11 | 0.313208 |
| 87 | 0.0805927 | 0.150885 | 0.0889050 | 28.24 | 112.31 | 0.311938 |
| 88 | 0.0677629 | 0.180340 | 0.0887243 | 28.24 | 115.27 | 0.319508 |
| 89 | 0.0377665 | 0.213589 | 0.0883628 | 28.44 | 118.39 | 0.325829 |
| 90 | 0.0240332 | 0.223708 | 0.0881821 | 29.54 | 123.28 | 0.333113 |
| 91 | 0.0316227 | 0.221178 | 0.0878207 | 28.64 | 123.57 | 0.336982 |

TABLE B-6

BCL 1/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE B-1)

SET=343

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0506 | 0.2692 | 0.0914 | 31.16 | 166.62 | 0.456060 |
| 2 | 0.0537 | 0.2515 | 0.0939 | 30.04 | 165.00 | 0.471340 |
| 3 | 0.0502 | 0.2390 | 0.0923 | 31.49 | 168.10 | 0.462541 |
| 4 | 0.0456 | 0.2441 | 0.0922 | 31.67 | 168.58 | 0.462225 |
| 5 | 0.0479 | 0.2581 | 0.0916 | 31.40 | 168.18 | 0.459817 |
| 6 | 0.0207 | 0.2906 | 0.0906 | 29.59 | 165.87 | 0.460150 |
| 7 | 0.0175 | 0.3271 | 0.0908 | 29.57 | 165.80 | 0.461105 |
| 8 | 0.0636 | 0.2216 | 0.0912 | 28.75 | 163.79 | 0.463088 |
| 9 | 0.0726 | 0.2299 | 0.0908 | 30.95 | 168.12 | 0.458476 |
| 10 | 0.0752 | 0.2271 | 0.0906 | 31.36 | 168.91 | 0.457022 |
| 11 | 0.0506 | 0.2463 | 0.0906 | 31.57 | 169.35 | 0.456900 |
| 12 | 0.0448 | 0.2331 | 0.0904 | 32.94 | 171.84 | 0.454221 |
| 13 | 0.0525 | 0.2514 | 0.0906 | 30.50 | 167.56 | 0.458823 |
| 14 | 0.0267 | 0.2506 | 0.0904 | 32.75 | 171.60 | 0.454716 |
| 15 | 0.0335 | 0.2834 | 0.0907 | 30.29 | 167.28 | 0.459926 |
| 16 | 0.0325 | 0.3063 | 0.0906 | 31.04 | 168.68 | 0.458417 |
| 17 | 0.0256 | 0.3304 | 0.0906 | 31.24 | 169.13 | 0.458372 |

SET=344

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 18 | 0.0549 | 0.1421 | 0.0623 | 30.75 | 167.37 | 0.314042 |
| 19 | 0.0460 | 0.2046 | 0.0621 | 29.11 | 164.21 | 0.314448 |
| 20 | 0.0367 | 0.2115 | 0.0620 | 29.88 | 165.80 | 0.313443 |
| 21 | 0.0443 | 0.2200 | 0.0614 | 32.66 | 170.79 | 0.307751 |
| 22 | 0.0320 | 0.2387 | 0.0614 | 32.82 | 171.04 | 0.307554 |
| 23 | 0.0202 | 0.2749 | 0.0620 | 28.56 | 163.07 | 0.314329 |
| 24 | 0.0211 | 0.2609 | 0.0614 | 31.89 | 169.42 | 0.308430 |
| 25 | 0.0205 | 0.3224 | 0.0617 | 29.73 | 165.48 | 0.311998 |
| 26 | 0.0195 | 0.3253 | 0.0615 | 30.64 | 167.19 | 0.310153 |

SET=345

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 27 | 0.0741 | 0.2029 | 0.0936 | 42.76 | 165.95 | 0.405978 |
| 28 | 0.0657 | 0.2139 | 0.0933 | 43.61 | 167.42 | 0.404820 |
| 29 | 0.0555 | 0.2223 | 0.0930 | 45.05 | 169.60 | 0.403102 |
| 30 | 0.0644 | 0.2207 | 0.0929 | 44.32 | 168.80 | 0.403595 |
| 31 | 0.0296 | 0.2277 | 0.0932 | 42.72 | 166.80 | 0.406477 |
| 32 | 0.0276 | 0.2743 | 0.0931 | 43.02 | 167.31 | 0.406059 |
| 33 | 0.0243 | 0.2888 | 0.0928 | 44.54 | 169.60 | 0.404210 |

TABLE B-6

BCL 1/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE B-1)

SET=346

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 34 | 0.0628 | 0.1941 | 0.0950 | 30.80 | 130.07 | 0.371894 |
| 35 | 0.0298 | 0.2302 | 0.0952 | 29.54 | 127.70 | 0.372518 |
| 36 | 0.0499 | 0.2131 | 0.0958 | 26.00 | 120.62 | 0.374060 |
| 37 | 0.0279 | 0.2462 | 0.0950 | 30.73 | 130.15 | 0.372487 |
| 38 | 0.0159 | 0.2740 | 0.0953 | 28.09 | 124.82 | 0.372473 |
| 39 | 0.0196 | 0.2904 | 0.0951 | 29.06 | 126.81 | 0.372145 |
| 40 | 0.0223 | 0.3155 | 0.0949 | 30.01 | 128.86 | 0.372182 |

SET=347

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 41 | 0.0827 | 0.1699 | 0.0949 | 59.42 | 165.93 | 0.357269 |
| 42 | 0.0787 | 0.1780 | 0.0949 | 59.39 | 165.90 | 0.357282 |
| 43 | 0.0572 | 0.1997 | 0.0949 | 59.07 | 165.72 | 0.357725 |
| 44 | 0.0517 | 0.2030 | 0.0952 | 57.13 | 163.65 | 0.359498 |
| 45 | 0.0556 | 0.2007 | 0.0950 | 58.63 | 165.41 | 0.358533 |
| 46 | 0.0294 | 0.2224 | 0.0952 | 57.18 | 163.81 | 0.359714 |
| 47 | 0.0231 | 0.2512 | 0.0953 | 58.65 | 163.29 | 0.355053 |
| 48 | 0.0272 | 0.2493 | 0.0948 | 58.74 | 165.94 | 0.358685 |

SET=348

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 49 | 0.0831 | 0.1715 | 0.0946 | 72.69 | 165.48 | 0.325685 |
| 50 | 0.0717 | 0.1803 | 0.0945 | 73.34 | 166.07 | 0.325253 |
| 51 | 0.0628 | 0.1880 | 0.0942 | 74.39 | 167.13 | 0.324302 |
| 52 | 0.0364 | 0.2108 | 0.0945 | 72.14 | 165.08 | 0.325616 |
| 53 | 0.0342 | 0.2163 | 0.0943 | 73.28 | 166.32 | 0.325168 |
| 54 | 0.0198 | 0.2199 | 0.0941 | 74.59 | 167.41 | 0.324126 |

SET=349

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 55 | 0.0771 | 0.1320 | 0.0952 | 29.74 | 87.91 | 0.255702 |
| 56 | 0.0786 | 0.1506 | 0.0952 | 28.94 | 86.36 | 0.254156 |
| 57 | 0.0497 | 0.1633 | 0.0952 | 29.06 | 86.61 | 0.254439 |
| 58 | 0.0420 | 0.1903 | 0.0951 | 29.85 | 88.33 | 0.256247 |
| 59 | 0.0324 | 0.2009 | 0.0952 | 29.37 | 87.45 | 0.255737 |
| 60 | 0.0212 | 0.2393 | 0.0951 | 29.80 | 88.33 | 0.256431 |
| 61 | 0.0206 | 0.2564 | 0.0949 | 31.21 | 91.11 | 0.258751 |

BCL 1/15 SCALE STEADY STATE STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE B-1)

SET=350

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 62 | 0.1264 | 0.1868 | 0.1905 | 30.79 | 168.97 | 0.968911 |
| 63 | 0.1213 | 0.2123 | 0.1911 | 27.80 | 162.98 | 0.979605 |
| 64 | 0.1171 | 0.2330 | 0.1904 | 30.53 | 168.52 | 0.969351 |
| 65 | 0.0842 | 0.2707 | 0.1905 | 30.21 | 167.96 | 0.971027 |
| 66 | 0.0407 | 0.2870 | 0.1895 | 32.45 | 171.98 | 0.959092 |
| 67 | 0.0304 | 0.3342 | 0.1905 | 28.57 | 164.69 | 0.975250 |
| 68 | 0.0254 | 0.3159 | 0.1898 | 30.41 | 168.37 | 0.967073 |

SET=351

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 69 | 0.1533 | 0.1160 | 0.2368 | 29.79 | 167.60 | 1.21172 |
| 70 | 0.1555 | 0.1568 | 0.2370 | 28.44 | 164.84 | 1.21679 |
| 71 | 0.1497 | 0.1734 | 0.2364 | 29.80 | 167.50 | 1.20949 |
| 72 | 0.1553 | 0.1983 | 0.2366 | 28.89 | 165.75 | 1.21323 |
| 73 | 0.1406 | 0.2320 | 0.2363 | 29.29 | 166.54 | 1.21029 |
| 74 | 0.1346 | 0.2333 | 0.2361 | 29.68 | 167.35 | 1.20825 |
| 75 | 0.0781 | 0.3033 | 0.2359 | 28.82 | 165.62 | 1.20995 |
| 76 | 0.0309 | 0.3067 | 0.2341 | 33.06 | 173.49 | 1.18569 |

TABLE B-7

BCL 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0147 TABLE C-1)

SET=13

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0570 | 0.1718 | 0.0699 | 31.51 | 175.12 | 0.364817 |
| 2 | 0.0457 | 0.1999 | 0.0689 | 32.55 | 176.94 | 0.358297 |
| 3 | 0.0126 | 0.2222 | 0.0651 | 31.41 | 174.77 | 0.339550 |
| 4 | 0.0115 | 0.2418 | 0.0666 | 30.01 | 172.44 | 0.349529 |

SET=14

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 5 | 0.0828 | 0.2006 | 0.1088 | 30.26 | 173.87 | 0.573687 |
| 6 | 0.0485 | 0.2279 | 0.1010 | 31.64 | 176.39 | 0.530016 |
| 7 | 0.0116 | 0.2529 | 0.0924 | 31.97 | 176.74 | 0.483685 |
| 8 | 0.0017 | 0.2831 | 0.0935 | 30.34 | 173.91 | 0.492566 |

SET=15

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 9 | 0.1270 | 0.1861 | 0.1583 | 32.68 | 177.27 | 0.823323 |
| 10 | 0.0548 | 0.2757 | 0.1577 | 33.47 | 178.39 | 0.816950 |
| 11 | 0.0167 | 0.2922 | 0.1567 | 31.95 | 175.36 | 0.814090 |
| 12 | 0.0178 | 0.2926 | 0.1564 | 31.89 | 175.40 | 0.813374 |
| 13 | 0.0239 | 0.3041 | 0.1564 | 32.23 | 175.95 | 0.812212 |
| 14 | 0.0028 | 0.3286 | 0.1552 | 30.81 | 174.69 | 0.815864 |

SET=16

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 15 | 0.1055 | 0.2259 | 0.1337 | 34.64 | 181.01 | 0.692486 |
| 16 | 0.0543 | 0.2480 | 0.1337 | 35.32 | 182.25 | 0.691426 |
| 17 | 0.0334 | 0.2728 | 0.1338 | 32.22 | 176.91 | 0.698731 |
| 18 | 0.0115 | 0.2969 | 0.1329 | 32.27 | 176.88 | 0.693451 |
| 19 | 0.0016 | 0.3313 | 0.1328 | 31.64 | 176.20 | 0.696142 |

TABLE B-7

BCL 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0147 TABLE C-1)

SET=17

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 20 | 0.1353 | 0.1883 | 0.2270 | 32.00 | 176.07 | 1.18329 |
| 21 | 0.1797 | 0.2161 | 0.2229 | 34.18 | 179.86 | 1.15377 |
| 22 | 0.1633 | 0.1578 | 0.2256 | 33.33 | 178.21 | 1.16963 |
| 23 | 0.1874 | 0.1284 | 0.2250 | 33.26 | 178.08 | 1.16672 |
| 24 | 0.1283 | 0.2399 | 0.2228 | 33.47 | 177.90 | 1.15102 |
| 25 | 0.0810 | 0.2741 | 0.2201 | 35.11 | 180.88 | 1.13258 |
| 26 | 0.0190 | 0.3101 | 0.2183 | 35.01 | 180.71 | 1.12364 |
| 27 | 0.0047 | 0.3569 | 0.2186 | 31.61 | 174.99 | 1.13850 |

SET=18

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 28 | 0.0753 | 0.1448 | 0.0980 | 71.55 | 230.84 | 0.473860 |
| 29 | 0.0522 | 0.1903 | 0.0966 | 73.06 | 232.32 | 0.465883 |
| 30 | 0.0569 | 0.2083 | 0.0963 | 74.63 | 233.83 | 0.463201 |
| 31 | 0.0402 | 0.2334 | 0.0955 | 73.88 | 232.95 | 0.459616 |
| 32 | 0.0152 | 0.2394 | 0.0942 | 75.43 | 235.71 | 0.454653 |
| 33 | 0.0172 | 0.2477 | 0.0952 | 74.78 | 235.18 | 0.460156 |
| 34 | 0.0041 | 0.2545 | 0.0932 | 76.45 | 237.33 | 0.450310 |

SET=19

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 35 | 0.1176 | 0.1341 | 0.1393 | 74.54 | 234.31 | 0.671753 |
| 36 | 0.1170 | 0.1527 | 0.1396 | 73.20 | 233.20 | 0.675258 |
| 37 | 0.1180 | 0.1675 | 0.1392 | 72.56 | 233.25 | 0.676015 |
| 38 | 0.0500 | 0.2110 | 0.1367 | 73.44 | 234.54 | 0.664094 |
| 39 | 0.0553 | 0.2391 | 0.1361 | 71.32 | 232.65 | 0.673924 |
| 40 | 0.0442 | 0.2512 | 0.1368 | 73.67 | 234.59 | 0.663829 |
| 41 | 0.0327 | 0.2460 | 0.1358 | 74.65 | 235.52 | 0.657840 |
| 42 | 0.0200 | 0.2608 | 0.1347 | 75.11 | 236.05 | 0.652254 |

SET=20

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 43 | 0.0984 | 0.1405 | 0.1400 | 74.09 | 173.26 | 0.500524 |
| 44 | 0.0860 | 0.1586 | 0.1386 | 76.52 | 176.07 | 0.496616 |
| 45 | 0.0639 | 0.1766 | 0.1385 | 77.18 | 177.47 | 0.498360 |
| 46 | 0.0383 | 0.2109 | 0.1378 | 74.92 | 175.81 | 0.497521 |
| 47 | 0.0190 | 0.2273 | 0.1369 | 75.93 | 177.53 | 0.496241 |

TABLE B-7

BCL 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0147 TABLE C-1)

SET=21

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 48 | 0.0799 | 0.1541 | 0.0957 | 74.53 | 174.66 | 0.344032 |
| 49 | 0.0203 | 0.2100 | 0.0937 | 76.84 | 177.96 | 0.338731 |
| 50 | 0.0147 | 0.2237 | 0.0947 | 77.76 | 179.60 | 0.343737 |

SET=22

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 51 | 0.0815 | 0.1168 | 0.0955 | 75.30 | 118.96 | 0.232797 |
| 52 | 0.0573 | 0.1374 | 0.0950 | 76.02 | 119.41 | 0.231505 |
| 53 | 0.0490 | 0.1513 | 0.0949 | 76.42 | 119.28 | 0.230489 |
| 54 | 0.0049 | 0.2191 | 0.0915 | 79.14 | 120.56 | 0.221263 |

SET=23

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 55 | 0.1218 | 0.0922 | 0.1401 | 74.00 | 117.37 | 0.339485 |
| 56 | 0.0819 | 0.1454 | 0.1366 | 76.56 | 119.71 | 0.332702 |
| 57 | 0.0300 | 0.1791 | 0.1361 | 76.21 | 121.99 | 0.338464 |
| 58 | 0.0172 | 0.1950 | 0.1339 | 76.45 | 119.21 | 0.324965 |
| 59 | 0.0144 | 0.2093 | 0.1345 | 76.67 | 122.21 | 0.334222 |

SET=25

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 60 | 0.0595 | 0.0283 | 0.0683 | 30.64 | 43.69 | 0.0900107 |
| 61 | 0.0511 | 0.0643 | 0.0649 | 31.93 | 46.79 | 0.0899886 |
| 62 | 0.0430 | 0.0833 | 0.0641 | 31.83 | 47.82 | 0.0909585 |
| 63 | 0.0281 | 0.0974 | 0.0627 | 32.04 | 46.89 | 0.0869952 |
| 64 | 0.0217 | 0.1218 | 0.0640 | 30.52 | 41.57 | 0.0803867 |
| 65 | 0.0167 | 0.1402 | 0.0674 | 29.52 | 40.55 | 0.0837715 |
| 66 | 0.0074 | 0.1588 | 0.0636 | 30.69 | 41.88 | 0.0802880 |

SET=26

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 67 | 0.0410 | 0.1045 | 0.1062 | 33.99 | 49.08 | 0.150364 |
| 68 | 0.0536 | 0.1319 | 0.1086 | 30.48 | 44.30 | 0.147446 |
| 69 | 0.0201 | 0.1518 | 0.1031 | 31.38 | 47.01 | 0.144705 |
| 70 | 0.0125 | 0.1661 | 0.0976 | 32.28 | 47.72 | 0.137374 |

BCL 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0147 TABLE C-1)

SET=27

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 71 | 0.1365 | 0.0460 | 0.1581 | 31.95 | 44.33 | 0.207636 |
| 72 | 0.1361 | 0.0664 | 0.1586 | 31.65 | 44.89 | 0.211781 |
| 73 | 0.1396 | 0.0856 | 0.1585 | 31.85 | 45.35 | 0.213238 |
| 74 | 0.0439 | 0.1068 | 0.1579 | 31.27 | 44.81 | 0.211567 |
| 75 | 0.0574 | 0.1250 | 0.1576 | 30.09 | 41.30 | 0.197870 |
| 76 | 0.0365 | 0.1436 | 0.1567 | 30.50 | 41.54 | 0.196735 |
| 77 | 0.0294 | 0.1429 | 0.1566 | 30.55 | 41.12 | 0.194485 |
| 78 | 0.0296 | 0.1428 | 0.1562 | 30.65 | 40.90 | 0.192679 |
| 79 | 0.0377 | 0.1422 | 0.1560 | 29.91 | 38.96 | 0.185241 |
| 80 | 0.0290 | 0.1389 | 0.1555 | 30.72 | 40.23 | 0.188488 |

SET=28

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 81 | 0.1189 | 0.0296 | 0.1595 | 23.20 | 28.41 | 0.154052 |
| 82 | 0.1339 | 0.0547 | 0.1595 | 23.81 | 30.09 | 0.161351 |
| 83 | 0.0877 | 0.0715 | 0.1586 | 23.60 | 29.08 | 0.155647 |
| 84 | 0.0771 | 0.0918 | 0.1581 | 22.98 | 27.18 | 0.146689 |
| 85 | 0.0559 | 0.0911 | 0.1580 | 22.77 | 26.37 | 0.142790 |

SET=29

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 86 | 0.0819 | 0.0315 | 0.0965 | 22.26 | 26.93 | 0.0899339 |
| 87 | 0.0601 | 0.0603 | 0.0958 | 22.34 | 25.93 | 0.0858337 |
| 88 | 0.0386 | 0.0791 | 0.0948 | 23.77 | 28.09 | 0.0895907 |
| 89 | 0.0354 | 0.1035 | 0.0940 | 22.45 | 23.89 | 0.0774313 |

SET=30

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 90 | 0.0541 | 0.0349 | 0.0643 | 22.10 | 23.65 | 0.0527897 |
| 91 | 0.0498 | 0.0489 | 0.0648 | 23.12 | 26.92 | 0.0593924 |
| 92 | 0.0313 | 0.0727 | 0.0658 | 22.15 | 26.07 | 0.0594910 |
| 93 | 0.0292 | 0.0837 | 0.0657 | 24.12 | 31.34 | 0.0688395 |
| 94 | 0.0210 | 0.1069 | 0.0657 | 21.97 | 25.63 | 0.0586033 |
| 95 | 0.0145 | 0.1130 | 0.0649 | 23.16 | 27.21 | 0.0600802 |

TABLE B-8

BCL 1/15 SCALE STEADY STATE AIR-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE B-2)

SET=352

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0222 | 0.0120 | 0.0265 | 14.58 | 0 | 0 |
| 2 | 0.0232 | 0.0204 | 0.0271 | 14.85 | 0 | 0 |
| 3 | 0.0216 | 0.0296 | 0.0269 | 15.42 | 0 | 0 |
| 4 | 0.0117 | 0.0444 | 0.0267 | 16.35 | 0 | 0 |
| 5 | 0.0100 | 0.0578 | 0.0262 | 17.20 | 0 | 0 |
| 6 | 0.0087 | 0.0851 | 0.0248 | 18.81 | 0 | 0 |
| 7 | 0.0042 | 0.1077 | 0.0240 | 21.53 | 0 | 0 |
| 8 | 0.0032 | 0.1258 | 0.0228 | 23.51 | 0 | 0 |
| 9 | 0.0017 | 0.1448 | 0.0197 | 26.03 | 0 | 0 |

SET=353

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 10 | 0.0331 | 0.0303 | 0.0473 | 14.73 | 0 | 0 |
| 11 | 0.0334 | 0.0425 | 0.0472 | 15.09 | 0 | 0 |
| 12 | 0.0313 | 0.0495 | 0.0469 | 15.77 | 0 | 0 |
| 13 | 0.0225 | 0.0605 | 0.0466 | 16.88 | 0 | 0 |
| 14 | 0.0249 | 0.0627 | 0.0463 | 17.71 | 0 | 0 |
| 15 | 0.0123 | 0.0776 | 0.0456 | 19.26 | 0 | 0 |
| 16 | 0.0095 | 0.0904 | 0.0448 | 21.11 | 0 | 0 |
| 17 | 0.0195 | 0.0986 | 0.0438 | 22.49 | 0 | 0 |

SET=354

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 18 | 0.0165 | 0.1057 | 0.0424 | 24.36 | 0 | 0 |
| 19 | 0.0163 | 0.1171 | 0.0412 | 25.48 | 0 | 0 |
| 20 | 0.0148 | 0.1293 | 0.0395 | 26.93 | 0 | 0 |
| 21 | 0.0142 | 0.1258 | 0.0385 | 27.93 | 0 | 0 |
| 22 | 0.0127 | 0.1421 | 0.0373 | 29.21 | 0 | 0 |
| 23 | 0.0126 | 0.1490 | 0.0362 | 29.99 | 0 | 0 |
| 24 | 0.0145 | 0.1359 | 0.0490 | 31.35 | 0 | 0 |
| 25 | 0.0123 | 0.1589 | 0.0453 | 33.84 | 0 | 0 |
| 26 | 0.0112 | 0.1777 | 0.0404 | 36.85 | 0 | 0 |

BCL 1/15 SCALE STEADY STATE AIR-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE B-2)

SET=355

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 27 | 0.0519 | 0.0369 | 0.0635 | 14.94 | 0 | 0 |
| 28 | 0.0224 | 0.0570 | 0.0637 | 17.99 | 0 | 0 |
| 29 | 0.0110 | 0.0781 | 0.0610 | 20.58 | 0 | 0 |
| 30 | 0.0095 | 0.0991 | 0.0644 | 24.98 | 0 | 0 |
| 31 | 0.0130 | 0.1190 | 0.0594 | 28.15 | 0 | 0 |

SET=356

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 32 | 0.0157 | 0.1353 | 0.0635 | 32.36 | 0 | 0 |
| 33 | 0.0142 | 0.1485 | 0.0583 | 35.01 | 0 | 0 |
| 34 | 0.0136 | 0.1563 | 0.0611 | 37.54 | 0 | 0 |
| 35 | 0.0128 | 0.1710 | 0.0617 | 40.41 | 0 | 0 |
| 36 | 0.0118 | 0.1809 | 0.0590 | 42.33 | 0 | 0 |

SET=357

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 37 | 0.0763 | 0.0269 | 0.0943 | 15.01 | 0 | 0 |
| 38 | 0.0359 | 0.0460 | 0.0938 | 18.13 | 0 | 0 |
| 39 | 0.0762 | 0.0212 | 0.0941 | 14.84 | 0 | 0 |
| 40 | 0.0429 | 0.0339 | 0.0937 | 16.76 | 0 | 0 |
| 41 | 0.0254 | 0.0431 | 0.0934 | 19.77 | 0 | 0 |
| 42 | 0.0132 | 0.0647 | 0.0928 | 23.13 | 0 | 0 |
| 43 | 0.0124 | 0.0814 | 0.0920 | 26.58 | 0 | 0 |
| 44 | 0.0209 | 0.0939 | 0.0915 | 29.37 | 0 | 0 |

SET=358

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 45 | 0.0181 | 0.1062 | 0.0912 | 32.79 | 0 | 0 |
| 46 | 0.0160 | 0.1226 | 0.0904 | 36.19 | 0 | 0 |
| 47 | 0.0157 | 0.1344 | 0.0901 | 38.88 | 0 | 0 |
| 48 | 0.0145 | 0.1436 | 0.0896 | 41.70 | 0 | 0 |
| 49 | 0.0131 | 0.1493 | 0.0893 | 44.32 | 0 | 0 |
| 50 | 0.0135 | 0.1681 | 0.0888 | 47.34 | 0 | 0 |
| 51 | 0.0127 | 0.1681 | 0.0885 | 49.47 | 0 | 0 |

TABLE B-8

BCL 1/15 SCALE STEADY STATE AIR-WATER DATA LISTING

(REFERENCE NUREG/CR-0526 TABLE B-2)

SET=359

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 52 | 0.0884 | 0.0158 | 0.1192 | 15.09 | 0 | 0 |
| 53 | 0.0772 | 0.0230 | 0.1190 | 15.64 | 0 | 0 |
| 54 | 0.0634 | 0.0296 | 0.1186 | 16.86 | 0 | 0 |
| 55 | 0.0379 | 0.0422 | 0.1179 | 20.09 | 0 | 0 |
| 56 | 0.0238 | 0.0635 | 0.1166 | 25.56 | 0 | 0 |

SET=360

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 57 | 0.0221 | 0.0872 | 0.1154 | 32.32 | 0 | 0 |
| 58 | 0.0137 | 0.1117 | 0.1141 | 38.70 | 0 | 0 |
| 59 | 0.0155 | 0.1297 | 0.1131 | 43.80 | 0 | 0 |
| 60 | 0.0141 | 0.1332 | 0.1122 | 46.04 | 0 | 0 |
| 61 | 0.0133 | 0.1524 | 0.1113 | 50.17 | 0 | 0 |

SET=361

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 62 | 0.0914 | 0.0148 | 0.1550 | 33.30 | 0 | 0 |
| 63 | 0.0771 | 0.0228 | 0.1534 | 34.42 | 0 | 0 |
| 64 | 0.0464 | 0.0304 | 0.1542 | 36.38 | 0 | 0 |
| 65 | 0.0319 | 0.0496 | 0.1570 | 40.10 | 0 | 0 |
| 66 | 0.0152 | 0.0744 | 0.1547 | 38.75 | 0 | 0 |
| 67 | 0.0095 | 0.0940 | 0.1542 | 42.47 | 0 | 0 |

SET=362

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 68 | 0.0140 | 0.1133 | 0.1536 | 49.76 | 0 | 0 |
| 69 | 0.0163 | 0.1175 | 0.1521 | 53.90 | 0 | 0 |
| 70 | 0.0048 | 0.1212 | 0.1510 | 55.70 | 0 | 0 |
| 71 | 0.0040 | 0.1251 | 0.1563 | 56.04 | 0 | 0 |
| 72 | 0.0068 | 0.1329 | 0.1560 | 56.71 | 0 | 0 |
| 73 | 0.0043 | 0.1214 | 0.1562 | 55.52 | 0 | 0 |

TABLE B-9

BCL 1/15 SCALE PLENUM FILLING AIR-WATER DATA LISTING

(REFERENCE NUREG/CR-0147 TABLE C-2)

SET=49

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0389 | 0.0229 | 0.0663 | 16.71 | 0 | 0 |
| 2 | 0.0313 | 0.0315 | 0.0665 | 17.83 | 0 | 0 |
| 3 | 0.0258 | 0.0417 | 0.0665 | 19.77 | 0 | 0 |
| 4 | 0.0198 | 0.0498 | 0.0664 | 21.34 | 0 | 0 |
| 5 | 0.0150 | 0.0631 | 0.0662 | 23.85 | 0 | 0 |
| 6 | 0.0119 | 0.0769 | 0.0660 | 26.12 | 0 | 0 |

SET=50

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 7 | 0.0704 | 0.0226 | 0.0942 | 15.98 | 0 | 0 |
| 8 | 0.0438 | 0.0379 | 0.0935 | 18.57 | 0 | 0 |
| 9 | 0.0415 | 0.0370 | 0.0935 | 19.55 | 0 | 0 |
| 10 | 0.0234 | 0.0548 | 0.0931 | 22.94 | 0 | 0 |
| 11 | 0.0156 | 0.0694 | 0.0926 | 27.10 | 0 | 0 |
| 12 | 0.0112 | 0.0792 | 0.0920 | 30.13 | 0 | 0 |

SET=51

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 13 | 0.0800 | 0.0213 | 0.1577 | 18.15 | 0 | 0 |
| 14 | 0.0509 | 0.0389 | 0.1574 | 22.49 | 0 | 0 |
| 15 | 0.0381 | 0.0517 | 0.1568 | 26.76 | 0 | 0 |
| 16 | 0.0309 | 0.0612 | 0.1559 | 30.63 | 0 | 0 |
| 17 | 0.0232 | 0.0735 | 0.1550 | 35.61 | 0 | 0 |
| 18 | 0.0180 | 0.0795 | 0.1543 | 38.97 | 0 | 0 |

TABLE B-10

BCL 1/15 SCALE MIXTURE OF STEADY STATE AND PLENUM FILLING AIR-WATER DATA

(REFERENCE NUREG/CR-0525)

SET=87

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0170 | 0.0874 | 0.0217 | 32.13 | 0 | 0 |
| 2 | 0.0164 | 0.1071 | 0.0219 | 30.12 | 0 | 0 |
| 3 | 0.0160 | 0.1147 | 0.0221 | 30.34 | 0 | 0 |
| 4 | 0.0157 | 0.1166 | 0.0219 | 30.30 | 0 | 0 |
| 5 | 0.0022 | 0.1194 | 0.0219 | 30.58 | 0 | 0 |
| 6 | 0.0026 | 0.1218 | 0.0230 | 30.86 | 0 | 0 |
| 7 | 0.0022 | 0.1227 | 0.0222 | 29.57 | 0 | 0 |
| 8 | 0.0018 | 0.1304 | 0.0239 | 29.92 | 0 | 0 |
| 9 | 0.0016 | 0.1341 | 0.0237 | 30.16 | 0 | 0 |
| 10 | 0.0011 | 0.1459 | 0.0236 | 30.54 | 0 | 0 |
| 11 | 0.0006 | 0.1516 | 0.0236 | 30.61 | 0 | 0 |
| 12 | 0.0005 | 0.1520 | 0.0234 | 30.54 | 0 | 0 |
| 13 | 0.0005 | 0.1528 | 0.0229 | 30.87 | 0 | 0 |
| 14 | 0.0009 | 0.1431 | 0.0226 | 29.82 | 0 | 0 |
| 15 | 0.0002 | 0.1643 | 0.0221 | 32.80 | 0 | 0 |

SET=88

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 16 | 0.1256 | 0.0122 | 0.1522 | 31.42 | 0 | 0 |
| 17 | 0.0883 | 0.0195 | 0.1516 | 32.95 | 0 | 0 |
| 18 | 0.0245 | 0.0645 | 0.1527 | 30.98 | 0 | 0 |
| 19 | 0.0181 | 0.0693 | 0.1524 | 33.79 | 0 | 0 |
| 20 | 0.0091 | 0.0985 | 0.1486 | 45.22 | 0 | 0 |
| 21 | 0.0079 | 0.1007 | 0.1532 | 47.61 | 0 | 0 |
| 22 | 0.0049 | 0.1140 | 0.1526 | 54.09 | 0 | 0 |
| 23 | 0.0046 | 0.1176 | 0.1522 | 55.50 | 0 | 0 |
| 24 | 0.0041 | 0.1266 | 0.1539 | 58.65 | 0 | 0 |
| 25 | 0.0027 | 0.1403 | 0.1528 | 63.75 | 0 | 0 |
| 26 | 0.0024 | 0.1492 | 0.1536 | 67.41 | 0 | 0 |
| 27 | 0.0011 | 0.1625 | 0.1538 | 73.97 | 0 | 0 |
| 28 | 0.0015 | 0.1539 | 0.1550 | 71.40 | 0 | 0 |
| 29 | 0.0007 | 0.1766 | 0.1512 | 77.98 | 0 | 0 |
| 30 | 0.0009 | 0.1670 | 0.1535 | 74.97 | 0 | 0 |

BCL 1/15 SCALE MIXTURE OF STEADY STATE AND PLENUM FILLING AIR-WATER DATA

(REFERENCE NUREG/CR-0525)

SET=89

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 31 | 0.0002 | 0.1929 | 0.1162 | 71.51 | 0 | 0 |
| 32 | 0.0007 | 0.1780 | 0.1174 | 67.14 | 0 | 0 |
| 33 | 0.0003 | 0.1801 | 0.1171 | 68.04 | 0 | 0 |
| 34 | 0.0005 | 0.1761 | 0.1177 | 66.40 | 0 | 0 |
| 35 | 0.0009 | 0.1820 | 0.1167 | 66.87 | 0 | 0 |
| 36 | 0.0007 | 0.1870 | 0.1162 | 68.34 | 0 | 0 |
| 37 | 0.0005 | 0.1839 | 0.1164 | 67.37 | 0 | 0 |
| 38 | 0.0013 | 0.1617 | 0.1184 | 59.60 | 0 | 0 |
| 39 | 0.0011 | 0.1685 | 0.1179 | 62.02 | 0 | 0 |
| 40 | 0.0006 | 0.1710 | 0.1158 | 62.69 | 0 | 0 |
| 41 | 0.0008 | 0.1703 | 0.1158 | 62.52 | 0 | 0 |
| 42 | 0.0014 | 0.1608 | 0.1167 | 58.85 | 0 | 0 |
| 43 | 0.0019 | 0.1499 | 0.1174 | 55.38 | 0 | 0 |
| 44 | 0.0026 | 0.1348 | 0.1161 | 50.21 | 0 | 0 |
| 45 | 0.0055 | 0.1066 | 0.1168 | 40.40 | 0 | 0 |
| 46 | 0.0058 | 0.1078 | 0.1151 | 41.41 | 0 | 0 |
| 47 | 0.0085 | 0.0942 | 0.1157 | 36.73 | 0 | 0 |
| 48 | 0.0347 | 0.0480 | 0.1160 | 30.11 | 0 | 0 |
| 49 | 0.0169 | 0.0893 | 0.1146 | 38.17 | 0 | 0 |
| 50 | 0.0257 | 0.0417 | 0.1169 | 29.59 | 0 | 0 |
| 51 | 0.0281 | 0.0383 | 0.1170 | 29.06 | 0 | 0 |
| 52 | 0.0354 | 0.0288 | 0.1168 | 29.39 | 0 | 0 |
| 53 | 0.0577 | 0.0192 | 0.1168 | 28.97 | 0 | 0 |

SET=90

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 54 | 0.0003 | 0.1708 | 0.0877 | 54.47 | 0 | 0 |
| 55 | 0.0002 | 0.1729 | 0.0911 | 56.47 | 0 | 0 |
| 56 | 0.0001 | 0.1764 | 0.0907 | 57.62 | 0 | 0 |
| 57 | 0.0007 | 0.1621 | 0.0915 | 53.06 | 0 | 0 |
| 58 | 0.0001 | 0.1768 | 0.0906 | 57.61 | 0 | 0 |
| 59 | 0.0003 | 0.1739 | 0.0908 | 56.29 | 0 | 0 |
| 60 | 0.0005 | 0.1723 | 0.0910 | 55.08 | 0 | 0 |
| 61 | 0.0007 | 0.1687 | 0.0911 | 54.13 | 0 | 0 |
| 62 | 0.0019 | 0.1535 | 0.0920 | 49.44 | 0 | 0 |
| 63 | 0.0024 | 0.1454 | 0.0924 | 47.32 | 0 | 0 |
| 64 | 0.0040 | 0.1333 | 0.0899 | 42.50 | 0 | 0 |
| 65 | 0.0036 | 0.1303 | 0.0900 | 41.91 | 0 | 0 |
| 66 | .0036 | 0.1242 | 0.0903 | 39.90 | 0 | 0 |
| 67 | 0.0049 | 0.1215 | 0.0903 | 38.74 | 0 | 0 |
| 68 | 0.0169 | 0.1214 | 0.0904 | 38.84 | 0 | 0 |
| 69 | 0.0170 | 0.1182 | 0.0905 | 38.12 | 0 | 0 |
| 70 | 0.0164 | 0.1173 | 0.0906 | 37.85 | 0 | 0 |
| 71 | 0.0170 | 0.0944 | 0.0916 | 31.48 | 0 | 0 |

BCL 1/15 SCALE MIXTURE OF STEADY STATE AND PLENUM FILLING AIR-WATER DATA

(REFERENCE NUREG/CR-0525)

SET=90

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 72 | 0.0404 | 0.0311 | 0.0975 | 18.45 | 0 | 0 |
| 73 | 0.0369 | 0.0297 | 0.0918 | 30.24 | 0 | 0 |
| 74 | 0.0483 | 0.0243 | 0.0919 | 29.23 | 0 | 0 |
| 75 | 0.0606 | 0.0201 | 0.0918 | 29.51 | 0 | 0 |

SET=91

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 76 | 0.0002 | 0.1836 | 0.0590 | 48.55 | 0 | 0 |
| 77 | 0.0003 | 0.1845 | 0.0587 | 49.70 | 0 | 0 |
| 78 | 0.0003 | 0.1839 | 0.0586 | 49.78 | 0 | 0 |
| 79 | 0.0003 | 0.1798 | 0.0605 | 49.57 | 0 | 0 |
| 80 | 0.0003 | 0.1839 | 0.0604 | 50.47 | 0 | 0 |
| 81 | 0.0001 | 0.2016 | 0.0595 | 55.07 | 0 | 0 |
| 82 | 0.0001 | 0.2009 | 0.0607 | 55.69 | 0 | 0 |
| 83 | 0.0001 | 0.1817 | 0.0607 | 48.80 | 0 | 0 |
| 84 | 0.0004 | 0.1721 | 0.0604 | 46.36 | 0 | 0 |
| 85 | 0.0005 | 0.1700 | 0.0605 | 45.43 | 0 | 0 |
| 86 | 0.0007 | 0.1655 | 0.0606 | 44.24 | 0 | 0 |
| 87 | 0.0011 | 0.1526 | 0.0605 | 40.82 | 0 | 0 |
| 88 | 0.0012 | 0.1594 | 0.0602 | 42.60 | 0 | 0 |
| 89 | 0.0023 | 0.1453 | 0.0604 | 38.74 | 0 | 0 |
| 90 | 0.0023 | 0.1409 | 0.0604 | 38.09 | 0 | 0 |
| 91 | 0.0033 | 0.1373 | 0.0605 | 36.45 | 0 | 0 |
| 92 | 0.0034 | 0.1318 | 0.0604 | 35.00 | 0 | 0 |
| 93 | 0.0037 | 0.1297 | 0.0604 | 34.58 | 0 | 0 |
| 94 | 0.0046 | 0.1266 | 0.0604 | 33.73 | 0 | 0 |
| 95 | 0.0054 | 0.1233 | 0.0604 | 32.77 | 0 | 0 |
| 96 | 0.0058 | 0.1191 | 0.0605 | 31.65 | 0 | 0 |
| 97 | 0.0152 | 0.1193 | 0.0604 | 31.17 | 0 | 0 |
| 98 | 0.0161 | 0.1185 | 0.0604 | 31.69 | 0 | 0 |
| 99 | 0.0153 | 0.1151 | 0.0604 | 31.20 | 0 | 0 |
| 100 | 0.0057 | 0.1143 | 0.0603 | 31.30 | 0 | 0 |
| 101 | 0.0162 | 0.0758 | 0.0608 | 29.59 | 0 | 0 |
| 102 | 0.0136 | 0.0767 | 0.0608 | 29.63 | 0 | 0 |
| 103 | 0.0352 | 0.0175 | 0.0606 | 30.20 | 0 | 0 |

BCL 1/15 SCALE MIXTURE OF STEADY STATE AND PLENUM FILLING AIR-WATER DATA

(REFERENCE NUREG/CR-0525)

SET=92

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 104 | 0.0780 | 0.0026 | 0.1521 | 29.93 | 0 | 0 |
| 105 | 0.0761 | 0.0053 | 0.1531 | 29.92 | 0 | 0 |
| 106 | 0.0699 | 0.0078 | 0.1531 | 29.88 | 0 | 0 |
| 107 | 0.0683 | 0.0091 | 0.1533 | 29.37 | 0 | 0 |
| 108 | 0.0645 | 0.0110 | 0.1533 | 29.79 | 0 | 0 |
| 109 | 0.0579 | 0.0127 | 0.1528 | 30.20 | 0 | 0 |
| 110 | 0.0421 | 0.0156 | 0.1533 | 29.19 | 0 | 0 |
| 111 | 0.0392 | 0.0177 | 0.1533 | 28.73 | 0 | 0 |
| 112 | 0.0359 | 0.0196 | 0.1532 | 29.20 | 0 | 0 |
| 113 | 0.0228 | 0.0309 | 0.1532 | 29.56 | 0 | 0 |
| 114 | 0.0199 | 0.0397 | 0.1531 | 29.40 | 0 | 0 |
| 115 | 0.0192 | 0.0472 | 0.1529 | 30.13 | 0 | 0 |
| 116 | 0.0174 | 0.0569 | 0.1532 | 31.28 | 0 | 0 |
| 117 | 0.0166 | 0.0652 | 0.1534 | 30.32 | 0 | 0 |
| 118 | 0.0152 | 0.0773 | 0.1527 | 32.10 | 0 | 0 |
| 119 | 0.0153 | 0.0905 | 0.1530 | 35.72 | 0 | 0 |
| 120 | 0.0076 | 0.0904 | 0.1526 | 35.66 | 0 | 0 |
| 121 | 0.0145 | 0.1040 | 0.1530 | 39.81 | 0 | 0 |
| 122 | 0.0057 | 0.1044 | 0.1528 | 39.64 | 0 | 0 |
| 123 | 0.0144 | 0.1152 | 0.1532 | 43.00 | 0 | 0 |
| 124 | 0.0049 | 0.1151 | 0.1530 | 42.88 | 0 | 0 |
| 125 | 0.0140 | 0.1260 | 0.1534 | 46.70 | 0 | 0 |
| 126 | 0.0028 | 0.1257 | 0.1533 | 46.67 | 0 | 0 |
| 127 | 0.0781 | 0.0034 | 0.1509 | 27.90 | 0 | 0 |
| 128 | 0.0787 | 0.0050 | 0.1533 | 29.23 | 0 | 0 |
| 129 | 0.0756 | 0.0069 | 0.1506 | 29.52 | 0 | 0 |
| 130 | 0.0723 | 0.0094 | 0.1517 | 29.28 | 0 | 0 |
| 131 | 0.0712 | 0.0119 | 0.1514 | 29.42 | 0 | 0 |
| 132 | 0.0697 | 0.0136 | 0.1529 | 29.40 | 0 | 0 |
| 133 | 0.0657 | 0.0159 | 0.1523 | 29.80 | 0 | 0 |
| 134 | 0.0632 | 0.0180 | 0.1519 | 29.27 | 0 | 0 |
| 135 | 0.0626 | 0.0203 | 0.1537 | 28.98 | 0 | 0 |
| 136 | 0.0216 | 0.0307 | 0.1530 | 30.86 | 0 | 0 |
| 137 | 0.0189 | 0.0409 | 0.1530 | 30.65 | 0 | 0 |
| 138 | 0.0184 | 0.0506 | 0.1525 | 32.09 | 0 | 0 |
| 139 | 0.0164 | 0.0593 | 0.1532 | 33.82 | 0 | 0 |
| 140 | 0.0172 | 0.0693 | 0.1526 | 34.85 | 0 | 0 |
| 141 | 0.0161 | 0.0770 | 0.1517 | 36.64 | 0 | 0 |
| 142 | 0.0171 | 0.0901 | 0.1536 | 40.49 | 0 | 0 |
| 143 | 0.0063 | 0.0907 | 0.1531 | 40.89 | 0 | 0 |
| 144 | 0.0170 | 0.1031 | 0.1536 | 44.39 | 0 | 0 |
| 145 | 0.0053 | 0.1029 | 0.1515 | 42.74 | 0 | 0 |
| 146 | 0.0191 | 0.1057 | 0.1537 | 44.57 | 0 | 0 |
| 147 | 0.0176 | 0.1070 | 0.1535 | 45.61 | 0 | 0 |
| 148 | 0.0050 | 0.1080 | 0.1534 | 44.95 | 0 | 0 |
| 149 | 0.0107 | 0.1171 | 0.1553 | 47.53 | 0 | 0 |
| 150 | 0.0038 | 0.1167 | 0.1540 | 47.30 | 0 | 0 |

# APPENDIX C

## CREARE 1/15 SCALE NON-LINEAR LEAST SQUARES STATISTICS

## CREARE 1/15 SCALE DATA LISTING

CREARE 1/15 SCALE STEAM-WATER DATA STATISTICS
(USING MODIFIED EQUATION #9 AND A=4.5)

NON-LINEAR LEAST SQUARES SUMMARY STATISTICS DEPENDENT VARIABLE JG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE |
|---|---|---|---|
| REGRESSION | 4 | 7.95744724 | 1.98936181 |
| RESIDUAL | 218 | 0.08110449 | 0.00037204 |
| UNCORRECTED TOTAL | 222 | 8.03355173 | |
| (CORRECTED TOTAL) | 221 | 0.69546682 | |

| PARAMETER | ESTIMATE | ASYMPTOTIC STD. ERROR | ASYMPTOTIC 95 % CONFIDENCE INTERVAL LOWER | UPPER |
|---|---|---|---|---|
| F | 0.15499909 | 0.01335326 | 0.12968075 | 0.18131742 |
| C | 0.40108991 | 0.00878840 | 0.38376860 | 0.41841122 |
| Z | 5.33189935 | 0.45467757 | 4.43576192 | 6.22803677 |
| M | 0.91617966 | 0.04968834 | 0.81824745 | 1.01411187 |

ASYMPTOTIC CORRELATION MATRIX OF THE PARAMETERS

| | F | C | Z | M |
|---|---|---|---|---|
| F | 1.000000 | -0.939879 | -0.765485 | -0.659999 |
| C | -0.939879 | 1.000000 | 0.770962 | 0.768252 |
| Z | -0.765485 | 0.770962 | 1.000000 | 0.939026 |
| M | -0.659999 | 0.768252 | 0.939026 | 1.000000 |

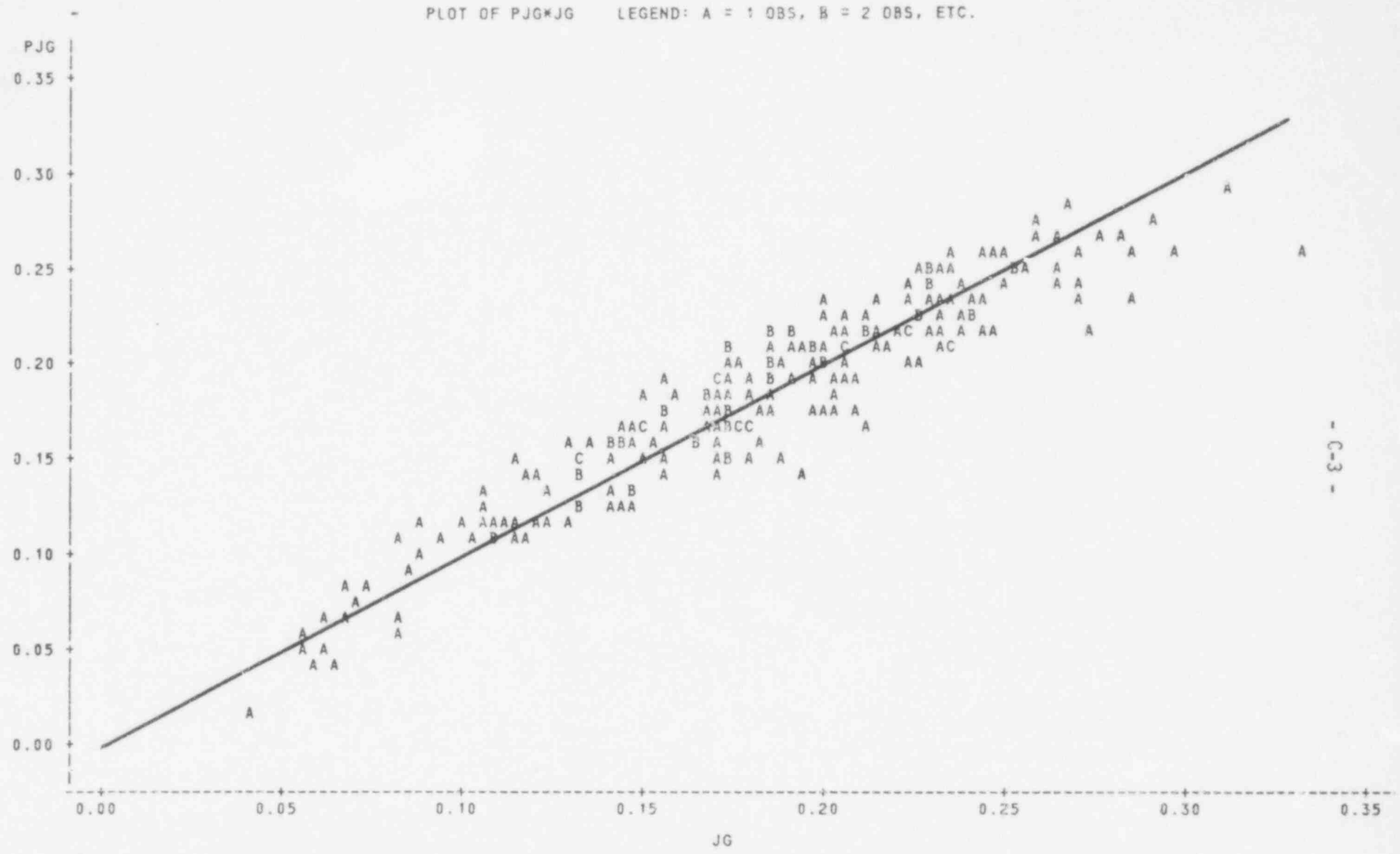


Figure C-1—Comparison of Creare 1/15 Scale Plenum Filling Steam-Water Data with Correlation Using the Modified Formulation of Equation #9 and a=4.5.

TABLE C-2

CREARE 1/15 SCALE STEAM-WATER DATA STATISTICS
(USING TRADITIONAL EQUATION #10 AND A=6.0)

NON-LINEAR LEAST SQUARES SUMMARY STATISTICS DEPENDENT VARIABLE JG

| SOURCE | DF | SUM OF SQUARES | MEAN SQUARE |
|---|---|---|---|
| REGRESSION | 4 | 7.95968955 | 1.98992239 |
| RESIDUAL | 218 | 0.07886218 | 0.00036175 |
| UNCORRECTED TOTAL | 222 | 8.03855173 | |
| (CORRECTED TOTAL) | 221 | 0.69546682 | |

| PARAMETER | ESTIMATE | ASYMPTOTIC STD. ERROR | ASYMPTOTIC 95 % CONFIDENCE INTERVAL LOWER | UPPER |
|---|---|---|---|---|
| F | 0.14629665 | 0.00977250 | 0.12703574 | 0.16555756 |
| C | 0.43380450 | 0.00537595 | 0.42320882 | 0.44440013 |
| Z | 9.06974992 | 0.77228171 | 7.54763714 | 10.59186269 |
| M | 1.00924209 | 0.04760944 | 0.91540724 | 1.10307695 |

ASYMPTOTIC CORRELATION MATRIX OF THE PARAMETERS

| | F | C | Z | M |
|---|---|---|---|---|
| F | 1.000000 | -0.761258 | -0.669664 | -0.409971 |
| C | -0.761258 | 1.000000 | 0.623973 | 0.663074 |
| Z | -0.669664 | 0.623973 | 1.000000 | 0.873446 |
| M | -0.409971 | 0.663074 | 0.873446 | 1.000000 |

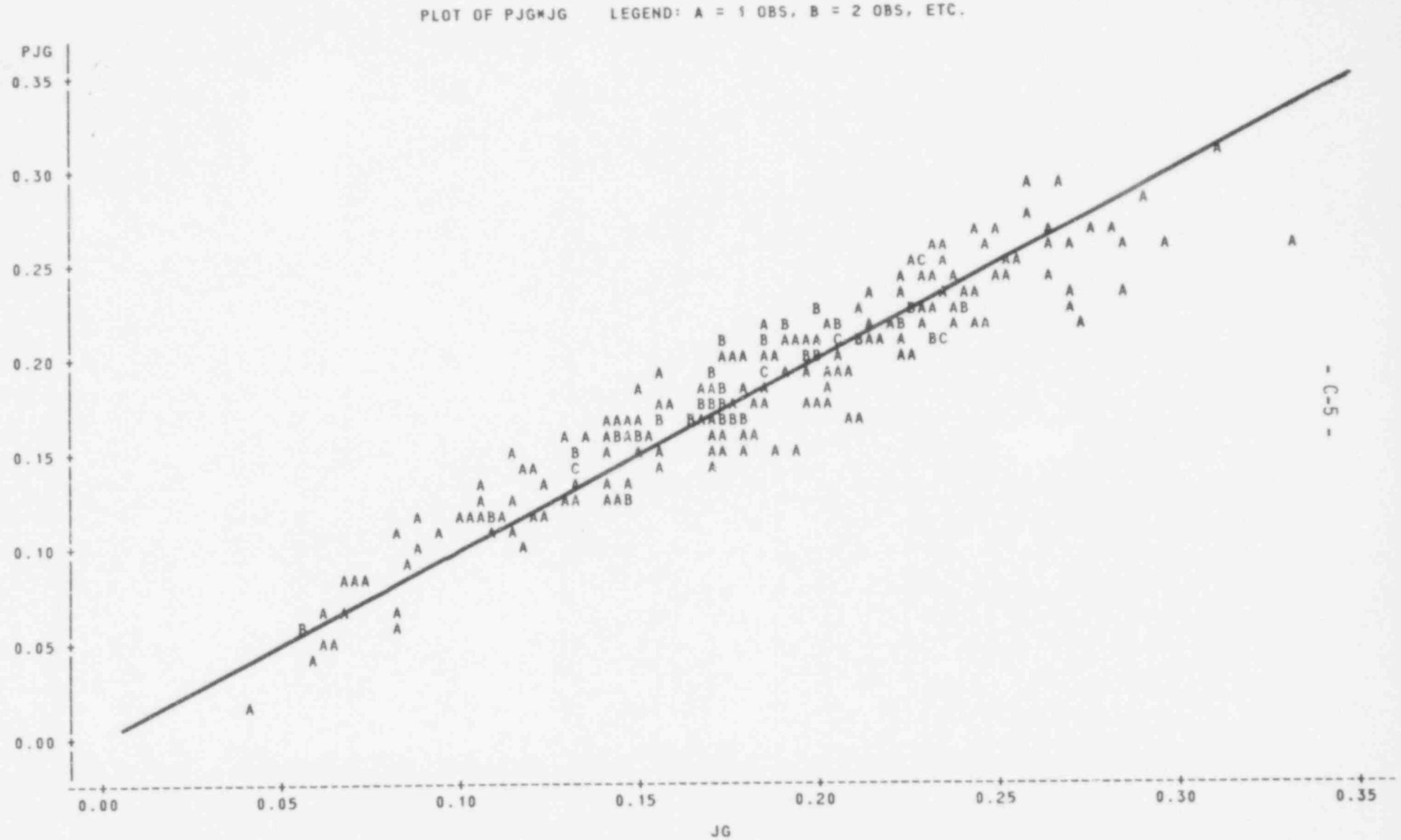




Figure C-2—Comparison of Creare 1/15 Scale Plenum Filling Steam-Water Data with Correlation Using the Traditional Formulation of Equation #10 and a=6.0.

TABLE C-3

CREARE 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-285 TABLES B-1 TO B-5)

SET=52

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0931 | 0.1730 | 0.1157 | 26.8 | 163 | 0.602585 |
| 2 | 0.0899 | 0.1964 | 0.1157 | 33.1 | 175 | 0.590800 |
| 3 | 0.0117 | 0.2286 | 0.1157 | 34.8 | 177 | 0.584821 |
| 4 | 0.0538 | 0.2137 | 0.1157 | 32.2 | 172 | 0.587596 |
| 5 | 0.0569 | 0.2234 | 0.1157 | 32.4 | 171 | 0.582627 |
| 6 | 0.0738 | 0.2067 | 0.1157 | 29.3 | 168 | 0.597702 |
| 7 | 0.0615 | 0.2477 | 0.1157 | 29.7 | 168 | 0.594227 |
| 8 | 0.0123 | 0.2647 | 0.1157 | 30.5 | 169 | 0.590971 |
| 9 | 0.0050 | 0.2639 | 0.1157 | 30.7 | 170 | 0.592800 |
| 10 | 0.0050 | 0.2477 | 0.1157 | 31.5 | 173 | 0.596625 |
| 11 | 0.0273 | 0.2403 | 0.1157 | 31.7 | 173 | 0.595003 |
| 12 | 0.0738 | 0.2073 | 0.1157 | 29.1 | 168 | 0.599465 |
| 13 | 0.0463 | 0.2256 | 0.1157 | 29.7 | 168 | 0.594227 |
| 14 | 0.0715 | 0.2358 | 0.1157 | 30.0 | 169 | 0.595187 |
| 15 | 0.0866 | 0.2358 | 0.1157 | 30.0 | 169 | 0.595187 |
| 16 | 0.0874 | 0.2179 | 0.1157 | 28.5 | 166 | 0.597659 |

SET=53

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 17 | 0.0084 | 0.2411 | 0.1157 | 31.7 | 137 | 0.471188 |
| 18 | 0.0474 | 0.2020 | 0.1157 | 31.0 | 134 | 0.465316 |
| 19 | 0.0559 | 0.2020 | 0.1157 | 31.0 | 134 | 0.465316 |
| 20 | 0.0283 | 0.2236 | 0.1157 | 30.5 | 134 | 0.468581 |
| 21 | 0.0127 | 0.2209 | 0.1157 | 31.3 | 137 | 0.473767 |
| 22 | 0.0028 | 0.2486 | 0.1157 | 31.5 | 138 | 0.475920 |
| 23 | 0.0985 | 0.1876 | 0.1157 | 29.9 | 132 | 0.465548 |
| 24 | 0.0246 | 0.1876 | 0.1157 | 29.9 | 132 | 0.465548 |
| 25 | 0.0318 | 0.2096 | 0.1157 | 31.2 | 134 | 0.464031 |
| 26 | 0.0914 | 0.1832 | 0.1157 | 28.1 | 132 | 0.478144 |
| 27 | 0.0592 | 0.1832 | 0.1157 | 28.1 | 132 | 0.478144 |
| 28 | 0.0175 | 0.1965 | 0.1157 | 30.7 | 133 | 0.463779 |
| 29 | 0.0331 | 0.1965 | 0.1157 | 30.7 | 133 | 0.463779 |
| 30 | 0.0621 | 0.1965 | 0.1157 | 30.7 | 136 | 0.474240 |
| 31 | 0.0223 | 0.1965 | 0.1157 | 30.7 | 136 | 0.474240 |

TABLE C-3

CREARE 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-285 TABLES B-1 TO B-5)

SET=54

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 32 | 0.0079 | 0.2296 | 0.1157 | 43.63 | 191 | 0.572604 |
| 33 | 0.0079 | 0.2290 | 0.1158 | 45.88 | 196 | 0.575522 |
| 34 | 0.0978 | 0.1867 | 0.1157 | 43.30 | 191 | 0.574477 |
| 35 | 0.0054 | 0.2350 | 0.1157 | 43.55 | 191 | 0.573056 |
| 36 | 0.0623 | 0.2140 | 0.1157 | 42.40 | 190 | 0.576654 |
| 37 | 0.0376 | 0.2320 | 0.1157 | 40.64 | 187 | 0.577990 |
| 38 | 0.0003 | 0.2822 | 0.1158 | 44.92 | 193 | 0.571890 |
| 39 | 0.0001 | 0.2772 | 0.1157 | 43.42 | 191 | 0.573793 |
| 40 | 0.0003 | 0.2641 | 0.1157 | 43.48 | 191 | 0.573453 |

SET=55

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 41 | 0.0357 | 0.2094 | 0.1158 | 43.8 | 134 | 0.401398 |
| 42 | 0.0968 | 0.1462 | 0.1157 | 38.9 | 126 | 0.396845 |
| 43 | 0.0401 | 0.1727 | 0.1158 | 44.2 | 132 | 0.393364 |
| 44 | 0.0011 | 0.2451 | 0.1158 | 49.0 | 139 | 0.396766 |
| 45 | 0.0596 | 0.1707 | 0.1158 | 44.7 | 134 | 0.397902 |
| 46 | 0.0511 | 0.1707 | 0.1158 | 44.7 | 134 | 0.397902 |
| 47 | 0.0036 | 0.2047 | 0.1158 | 45.3 | 134 | 0.395628 |
| 48 | 0.0111 | 0.1852 | 0.1158 | 45.9 | 135 | 0.396331 |
| 49 | 0.0129 | 0.1747 | 0.1158 | 46.3 | 136 | 0.397780 |
| 50 | 0.0984 | 0.1401 | 0.1158 | 44.3 | 133 | 0.396462 |
| 51 | 0.0567 | 0.1401 | 0.1158 | 44.3 | 133 | 0.396462 |
| 52 | 0.0609 | 0.1549 | 0.1158 | 45.3 | 135 | 0.398580 |
| 53 | 0.0291 | 0.1549 | 0.1158 | 45.3 | 135 | 0.398580 |
| 54 | 0.0878 | 0.1482 | 0.1158 | 44.5 | 133 | 0.395695 |
| 55 | 0.0930 | 0.1045 | 0.1158 | 44.9 | 134 | 0.397139 |
| 56 | 0.0181 | 0.1717 | 0.1158 | 46.1 | 136 | 0.398521 |
| 57 | 0.0019 | 0.2305 | 0.1158 | 49.1 | 141 | 0.402122 |
| 58 | 0.0046 | 0.2744 | 0.1158 | 45.1 | 135 | 0.399339 |
| 59 | 0.0181 | 0.1700 | 0.1158 | 45.1 | 133 | 0.393423 |
| 60 | 0.0254 | 0.1700 | 0.1158 | 45.1 | 133 | 0.393423 |

CREARE 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-285 TABLES B-1 TO B-5)

SET=56

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 61 | 0.0187 | 0.1677 | 0.1158 | 47.2 | 126 | 0.365493 |
| 62 | 0.0777 | 0.1445 | 0.1157 | 40.0 | 115 | 0.357883 |
| 63 | 0.0349 | 0.1465 | 0.1158 | 47.7 | 126 | 0.363841 |
| 64 | 0.0011 | 0.2113 | 0.1158 | 50.4 | 129 | 0.363788 |
| 65 | 0.0248 | 0.1746 | 0.1157 | 42.7 | 121 | 0.366126 |
| 66 | 0.0214 | 0.1746 | 0.1157 | 42.7 | 121 | 0.366126 |
| 67 | 0.0030 | 0.2397 | 0.1153 | 45.3 | 126 | 0.372008 |
| 68 | 0.1001 | 0.1069 | 0.1157 | 42.9 | 121 | 0.365391 |
| 69 | 0.0702 | 0.1415 | 0.1158 | 43.5 | 122 | 0.366533 |
| 70 | 0.0357 | 0.1415 | 0.1158 | 43.5 | 122 | 0.366533 |
| 71 | 0.0136 | 0.1564 | 0.1158 | 44.5 | 123 | 0.365944 |
| 72 | 0.0254 | 0.1564 | 0.1158 | 44.5 | 123 | 0.365944 |
| 73 | 0.0343 | 0.1507 | 0.1157 | 43.1 | 122 | 0.367674 |
| 74 | 0.0303 | 0.1507 | 0.1157 | 43.1 | 122 | 0.367674 |
| 75 | 0.0028 | 0.2054 | 0.1158 | 45.1 | 124 | 0.366800 |
| 76 | 0.0716 | 0.1231 | 0.1157 | 43.1 | 120 | 0.361647 |
| 77 | 0.0007 | 0.2694 | 0.1153 | 47.1 | 125 | 0.362923 |

SET=57

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 78 | 0.0106 | 0.1301 | 0.1158 | 51.3 | 73 | 0.204304 |
| 79 | 0.0127 | 0.1153 | 0.1158 | 47.3 | 67 | 0.194173 |
| 80 | 0.0235 | 0.1052 | 0.1158 | 47.3 | 67 | 0.194173 |
| 81 | 0.0005 | 0.2048 | 0.1158 | 55.1 | 78 | 0.211691 |
| 82 | 0.0038 | 0.1363 | 0.1158 | 48.2 | 65 | 0.186856 |
| 83 | 0.0032 | 0.1670 | 0.1158 | 49.2 | 66 | 0.188063 |
| 84 | 0.0030 | 0.1581 | 0.1158 | 43.9 | 57 | 0.170576 |

SET=58

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 85 | 0.0695 | 0.2065 | 0.1158 | 68.5 | 222 | 0.548668 |
| 86 | 0.0654 | 0.2279 | 0.1158 | 67.1 | 220 | 0.548575 |
| 87 | 0.0025 | 0.2540 | 0.1158 | 68.5 | 221 | 0.546197 |
| 88 | 0.0009 | 0.2714 | 0.1158 | 65.5 | 219 | 0.551778 |
| 89 | 0.0009 | 0.2849 | 0.1158 | 64.5 | 218 | 0.552904 |
| 90 | 0.0009 | 0.2973 | 0.1158 | 63.9 | 217 | 0.552584 |
| 91 | 0.0005 | 0.3321 | 0.1158 | 66.5 | 219 | 0.548195 |
| 92 | 0.0766 | 0.1206 | 0.1158 | 66.9 | 220 | 0.549279 |
| 93 | 0.1025 | 0.1724 | 0.1158 | 67.5 | 222 | 0.552149 |
| 94 | 0.0511 | 0.2346 | 0.1158 | 66.3 | 220 | 0.551411 |
| 95 | 0.0073 | 0.2370 | 0.1158 | 65.9 | 218 | 0.547822 |

TABLE C-3

CREARE 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-285 TABLES B-1 TO B-5)

SET=59

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 96 | 0.0915 | 0.1717 | 0.1158 | 65.9 | 169 | 0.424688 |
| 97 | 0.0432 | 0.1717 | 0.1158 | 65.9 | 169 | 0.424688 |
| 98 | 0.0538 | 0.1439 | 0.1158 | 64.3 | 167 | 0.424121 |
| 99 | 0.0932 | 0.1314 | 0.1158 | 64.3 | 168 | 0.426661 |
| 100 | 0.0967 | 0.1176 | 0.1158 | 64.3 | 169 | 0.429200 |
| 101 | 0.0384 | 0.2005 | 0.1158 | 66.1 | 170 | 0.426645 |
| 102 | 0.0171 | 0.2005 | 0.1158 | 66.1 | 170 | 0.426645 |
| 103 | 0.0198 | 0.1860 | 0.1158 | 65.7 | 169 | 0.425243 |
| 104 | 0.0345 | 0.1860 | 0.1158 | 65.7 | 169 | 0.425243 |
| 105 | 0.0075 | 0.1860 | 0.1158 | 65.7 | 169 | 0.425243 |
| 106 | 0.0034 | 0.1995 | 0.1158 | 66.9 | 168 | 0.419450 |
| 107 | 0.0094 | 0.1995 | 0.1158 | 66.9 | 168 | 0.419450 |
| 108 | 0.0162 | 0.1772 | 0.1158 | 65.3 | 168 | 0.423839 |
| 109 | 0.0714 | 0.1734 | 0.1158 | 64.5 | 168 | 0.426091 |
| 110 | 0.0511 | 0.1734 | 0.1158 | 64.5 | 168 | 0.426091 |
| 111 | 0.0698 | 0.1780 | 0.1158 | 64.7 | 167 | 0.422991 |
| 112 | 0.0503 | 0.1780 | 0.1158 | 64.7 | 167 | 0.422991 |
| 113 | 0.0121 | 0.2324 | 0.1158 | 64.3 | 167 | 0.424121 |
| 114 | 0.0092 | 0.2324 | 0.1158 | 64.3 | 167 | 0.424121 |
| 115 | 0.0073 | 0.2449 | 0.1158 | 64.3 | 167 | 0.424121 |
| 116 | 0.0011 | 0.2703 | 0.1158 | 65.5 | 168 | 0.423282 |
| 117 | 0.0017 | 0.2849 | 0.1158 | 66.3 | 170 | 0.426091 |

SET=60

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 118 | 0.0229 | 0.1475 | 0.1158 | 62.5 | 133 | 0.341922 |
| 119 | 0.0814 | 0.1242 | 0.1158 | 64.7 | 132 | 0.334341 |
| 120 | 0.0361 | 0.1329 | 0.1158 | 62.3 | 130 | 0.334670 |
| 121 | 0.0108 | 0.1742 | 0.1158 | 63.8 | 131 | 0.333812 |
| 122 | 0.0023 | 0.2120 | 0.1158 | 67.5 | 134 | 0.333279 |
| 123 | 0.0915 | 0.1155 | 0.1158 | 65.1 | 132 | 0.333456 |
| 124 | 0.0268 | 0.1807 | 0.1158 | 63.3 | 134 | 0.342614 |
| 125 | 0.0133 | 0.1807 | 0.1158 | 63.3 | 134 | 0.342614 |
| 126 | 0.0820 | 0.1205 | 0.1158 | 61.7 | 133 | 0.343821 |
| 127 | 0.0498 | 0.1205 | 0.1158 | 61.7 | 133 | 0.343821 |
| 128 | 0.0820 | 0.0890 | 0.1158 | 63.9 | 136 | 0.346320 |
| 129 | 0.0919 | 0.1027 | 0.1158 | 63.9 | 135 | 0.343773 |
| 130 | 0.0308 | 0.1450 | 0.1158 | 63.9 | 135 | 0.343773 |
| 131 | 0.0262 | 0.1450 | 0.1158 | 63.9 | 135 | 0.343773 |
| 132 | 0.0005 | 0.2003 | 0.1158 | 66.9 | 140 | 0.349541 |
| 133 | 0.0511 | 0.1319 | 0.1158 | 64.5 | 135 | 0.342395 |
| 134 | 0.0372 | 0.1319 | 0.1158 | 64.5 | 135 | 0.342395 |
| 135 | 0.0030 | 0.1853 | 0.1158 | 66.9 | 136 | 0.339555 |

CREARE 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-285 TABLES B-1 TO B-5)

SET=61

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 136 | 0.1003 | 0.0691 | 0.1158 | 63.9 | 84 | 0.213903 |
| 137 | 0.0260 | 0.1460 | 0.1158 | 65.7 | 85 | 0.213880 |
| 138 | 0.0175 | 0.1314 | 0.1158 | 65.2 | 87 | 0.219633 |
| 139 | 0.0484 | 0.1190 | 0.1158 | 64.5 | 86 | 0.218118 |
| 140 | 0.0021 | 0.1852 | 0.1158 | 69.3 | 91 | 0.223785 |
| 141 | 0.0086 | 0.1768 | 0.1158 | 64.0 | 85 | 0.216304 |

SET=62

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 142 | 0.0231 | 0.0721 | 0.1157 | 31.5 | 6 | 0.0206922 |
| 143 | 0.0372 | 0.0622 | 0.1157 | 31.0 | 6 | 0.0208350 |
| 144 | 0.0106 | 0.1001 | 0.1157 | 33.1 | 8 | 0.0270080 |
| 145 | 0.0011 | 0.2121 | 0.1157 | 36.7 | 16 | 0.0516705 |
| 146 | 0.0036 | 0.1492 | 0.1157 | 35.0 | 14 | 0.0461432 |
| 147 | 0.0025 | 0.1730 | 0.1157 | 36.1 | 13 | 0.0422809 |

SET=63

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 148 | 0.1021 | 0.0407 | 0.1158 | 67.1 | 10 | 0.0249352 |
| 149 | 0.0349 | 0.0813 | 0.1158 | 68.1 | 7 | 0.0173440 |
| 150 | 0.0492 | 0.0630 | 0.1158 | 67.9 | 8 | 0.0198468 |
| 151 | 0.0098 | 0.1086 | 0.1158 | 67.9 | 11 | 0.0272893 |
| 152 | 0.0036 | 0.1567 | 0.1158 | 68.9 | 12 | 0.0295836 |
| 153 | 0.0025 | 0.1935 | 0.1158 | 72.0 | 9 | 0.0217718 |
| 154 | 0.0061 | 0.1337 | 0.1158 | 70.3 | 8 | 0.0195525 |

SET=63.1

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 155 | 0.0520 | 0.0584 | 0.0578 | 14.9 | 2 | 0.0047543 |
| 156 | 0.0212 | 0.0701 | 0.0578 | 15.0 | 2 | 0.0047406 |
| 157 | 0.0071 | 0.1145 | 0.0578 | 15.8 | 5 | 0.0115897 |
| 158 | 0.0007 | 0.1644 | 0.0578 | 17.0 | 9 | 0.0202150 |
| 159 | 0.0131 | 0.0868 | 0.0578 | 15.3 | 4 | 0.0094008 |
| 160 | 0.0451 | 0.0637 | 0.0578 | 14.8 | 0 | 0.0000000 |
| 161 | 0.0389 | 0.0546 | 0.0578 | 14.9 | 0 | 0.0000000 |

TABLE C-3

CREARE 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-285 TABLES B-1 TO B-5)

SET=63.2

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 162 | 0.0117 | 0.1089 | 0.1157 | 17.1 | 7 | 0.0313934 |
| 163 | 0.0420 | 0.0566 | 0.1157 | 15.9 | 5 | 0.0231365 |
| 164 | 0.0121 | 0.0830 | 0.1157 | 16.5 | 5 | 0.0227709 |
| 165 | 0.0192 | 0.0857 | 0.1157 | 15.7 | 5 | 0.0232628 |
| 166 | 0.0117 | 0.1098 | 0.1157 | 17.3 | 6 | 0.0267744 |
| 167 | 0.0013 | 0.1557 | 0.1157 | 19.1 | 14 | 0.0598704 |
| 168 | 0.0221 | 0.0686 | 0.1157 | 15.7 | 4 | 0.0186102 |

SET=63.3

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 169 | 0.0129 | 0.1104 | 0.1736 | 17.3 | 8 | 0.0535643 |
| 170 | 0.0123 | 0.0932 | 0.1736 | 17.0 | 4 | 0.0269844 |
| 171 | 0.0019 | 0.1802 | 0.1736 | 19.5 | 12 | 0.0763153 |
| 172 | 0.0094 | 0.1322 | 0.1736 | 18.1 | 8 | 0.0525331 |
| 173 | 0.0395 | 0.0809 | 0.1736 | 16.1 | 2 | 0.0138115 |
| 174 | 0.0005 | 0.1839 | 0.1736 | 19.8 | 13 | 0.0821339 |
| 175 | 0.0011 | 0.1682 | 0.1736 | 19.4 | 12 | 0.0764842 |
| 176 | 0.0027 | 0.1487 | 0.1736 | 19.1 | 14 | 0.0898315 |

SET=64

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 177 | 0.0520 | 0.1713 | 0.0578 | 15.1 | 135 | 0.319078 |
| 178 | 0.0079 | 0.1929 | 0.0578 | 15.2 | 135 | 0.318174 |
| 179 | 0.0202 | 0.1799 | 0.0578 | 15.3 | 135 | 0.317278 |
| 180 | 0.0484 | 0.1773 | 0.0578 | 15.0 | 133 | 0.315250 |
| 181 | 0.0621 | 0.1641 | 0.0578 | 14.9 | 133 | 0.316158 |
| 182 | 0.0569 | 0.1683 | 0.0578 | 15.0 | 132 | 0.312880 |
| 183 | 0.0054 | 0.2240 | 0.0578 | 15.5 | 133 | 0.310837 |

SET=65

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 184 | 0.0754 | 0.2234 | 0.1157 | 15.6 | 132 | 0.615827 |
| 185 | 0.0314 | 0.2343 | 0.1157 | 15.9 | 132 | 0.610804 |
| 186 | 0.0025 | 0.2429 | 0.1157 | 16.0 | 132 | 0.609160 |
| 187 | 0.0783 | 0.1918 | 0.1157 | 15.4 | 131 | 0.614563 |
| 188 | 0.0895 | 0.1906 | 0.1157 | 15.6 | 133 | 0.620493 |
| 189 | 0.0069 | 0.2365 | 0.1157 | 15.6 | 132 | 0.615827 |
| 190 | 0.0123 | 0.2279 | 0.1157 | 15.9 | 133 | 0.615431 |

CREARE 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-285 TABLES B-1 TO B-5)

SET=65

| OBS | JLD | JG | JLI | PRESSURE | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 191 | 0.0106 | 0.2285 | 0.1157 | 16.3 | 133 | 0.608891 |
| 192 | 0.0329 | 0.2157 | 0.1157 | 16.8 | 134 | 0.605551 |
| 193 | 0.0530 | 0.2240 | 0.1157 | 15.5 | 135 | 0.631568 |
| 194 | 0.0057 | 0.2510 | 0.1157 | 15.7 | 135 | 0.628095 |
| 195 | 0.0621 | 0.2369 | 0.1157 | 15.1 | 132 | 0.624515 |
| 196 | 0.1022 | 0.1726 | 0.1157 | 14.9 | 130 | 0.618589 |
| 197 | 0.0244 | 0.2319 | 0.1157 | 15.8 | 130 | 0.603184 |

TABLE C-3

CREARE 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-272 TABLE A-1)

SET=66

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.0093 | 0.1715 | 0.0579 | 66.88 | 219 | 0.273427 |
| 2 | 0.0189 | 0.1501 | 0.0579 | 66.58 | 220 | 0.275207 |
| 3 | 0.0373 | 0.1414 | 0.0579 | 66.02 | 219 | 0.274952 |
| 4 | 0.0021 | 0.2121 | 0.0579 | 69.08 | 223 | 0.274573 |
| 5 | 0.0029 | 0.1914 | 0.0579 | 70.43 | 224 | 0.273518 |

SET=67

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 6 | 0.0024 | 0.2677 | 0.1738 | 69.17 | 223 | 0.823731 |
| 7 | 0.1116 | 0.1866 | 0.1738 | 68.86 | 222 | 0.821622 |
| 8 | 0.1315 | 0.1416 | 0.1738 | 67.01 | 220 | 0.823811 |
| 9 | 0.1467 | 0.1023 | 0.1738 | 65.79 | 219 | 0.826572 |
| 10 | 0.0973 | 0.2027 | 0.1738 | 67.49 | 221 | 0.825020 |
| 11 | 0.0454 | 0.2249 | 0.1738 | 68.41 | 222 | 0.823942 |
| 12 | 0.0288 | 0.2330 | 0.1738 | 68.73 | 222 | 0.822290 |
| 13 | 0.0037 | 0.2584 | 0.1738 | 68.55 | 222 | 0.823218 |

SET=68

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 14 | 0.1206 | 0.2542 | 0.1736 | 16.14 | 135 | 0.931280 |
| 15 | 0.02[illegible] | 0.2911 | 0.1736 | 17.91 | 140 | 0.923511 |
| 16 | 0.0014 | 0.3123 | 0.1736 | 18.35 | 141 | 0.920451 |
| 17 | 0.1426 | 0.1778 | 0.1736 | 15.69 | 133 | 0.928707 |
| 18 | 0.0376 | 0.2599 | 0.1736 | 16.68 | 136 | 0.924996 |
| 19 | 0.0903 | 0.2547 | 0.1736 | 16.29 | 135 | 0.927583 |

SET=69

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 20 | 0.0027 | 0.2289 | 0.0579 | 16.10 | 135 | 0.310937 |
| 21 | 0.0162 | 0.2072 | 0.0579 | 15.75 | 134 | 0.311565 |
| 22 | 0.0237 | 0.2039 | 0.0579 | 15.48 | 133 | 0.311547 |
| 23 | 0.0012 | 0.2398 | 0.0579 | 16.65 | 136 | 0.308748 |

CREARE 1/15 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-272 TABLE A-1)

SET=70

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 24 | 0.0396 | 0.1764 | 0.1738 | 68.96 | 137 | 0.506721 |
| 25 | 0.1101 | 0.1285 | 0.1738 | 68.45 | 137 | 0.508341 |
| 26 | 0.0164 | 0.2014 | 0.1738 | 70.04 | 139 | 0.510694 |
| 27 | 0.0058 | 0.2272 | 0.1738 | 70.14 | 139 | 0.510381 |
| 28 | 0.1467 | 0.0590 | 0.1738 | 66.03 | 134 | 0.504965 |
| 29 | 0.0507 | 0.1542 | 0.1738 | 68.18 | 137 | 0.505489 |

# APPENDIX D

## CREARE 1/30 SCALE DATA LISTING

CREARE 1/30 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-233 TABLE A-1)

SET=77

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.042 | 0.290 | 0.102 | 15.9 | 144 | 0.587432 |
| 2 | 0.051 | 0.291 | 0.102 | 16.0 | 144 | 0.585850 |
| 3 | 0.012 | 0.286 | 0.102 | 16.9 | 147 | 0.584146 |
| 4 | 0.005 | 0.277 | 0.102 | 17.7 | 149 | 0.580435 |
| 5 | 0.109 | 0.254 | 0.102 | 16.1 | 145 | 0.588340 |

SET=78

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 6 | 0.115 | 0.287 | 0.148 | 16.7 | 144 | 0.834548 |
| 7 | 0.058 | 0.294 | 0.148 | 16.1 | 142 | 0.836008 |
| 8 | 0.077 | 0.298 | 0.148 | 15.9 | 141 | 0.834594 |
| 9 | 0.052 | 0.300 | 0.148 | 16.2 | 142 | 0.833785 |
| 10 | 0.006 | 0.300 | 0.148 | 16.7 | 144 | 0.834548 |
| 11 | 0.070 | 0.302 | 0.148 | 16.3 | 142 | 0.831581 |
| 12 | 0.102 | 0.294 | 0.148 | 15.7 | 140 | 0.833198 |
| 13 | 0.112 | 0.278 | 0.148 | 16.7 | 144 | 0.834548 |
| 14 | 0.115 | 0.277 | 0.148 | 15.7 | 140 | 0.833198 |

SET=79

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 15 | 0.120 | 0.294 | 0.195 | 15.4 | 152 | 1.20182 |
| 16 | 0.122 | 0.306 | 0.195 | 15.8 | 153 | 1.19646 |
| 17 | 0.009 | 0.314 | 0.195 | 17.0 | 157 | 1.18970 |
| 18 | 0.122 | 0.304 | 0.195 | 17.2 | 158 | 1.19127 |
| 19 | 0.131 | 0.310 | 0.195 | 16.7 | 157 | 1.19884 |
| 20 | 0.102 | 0.310 | 0.195 | 17.2 | 158 | 1.19127 |
| 21 | 0.015 | 0.317 | 0.195 | 17.2 | 158 | 1.19127 |

SET=80

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 22 | 0.010 | 0.[illegible]4 | 0.046 | 17.7 | 73 | 0.128247 |
| 23 | 0.040 | 0.101 | 0.046 | 15.2 | 66 | 0.123795 |
| 24 | 0.021 | 0.140 | 0.046 | 15.5 | 67 | 0.124619 |
| 25 | 0.010 | 0.146 | 0.046 | 16.2 | 69 | 0.125925 |
| 26 | 0.027 | 0.136 | 0.046 | 15.6 | 67 | 0.124275 |
| 27 | 0.027 | 0.143 | 0.046 | 15.9 | 68 | 0.125101 |

CREARE 1/30 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-233 TABLE A-1)

SET=81

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 28 | 0.028 | 0.168 | 0.102 | 17.0 | 69 | 0.273496 |
| 29 | 0.036 | 0.158 | 0.102 | 15.5 | 65 | 0.268081 |
| 30 | 0.034 | 0.164 | 0.102 | 15.2 | 64 | 0.266185 |
| 31 | 0.031 | 0.171 | 0.102 | 15.8 | 66 | 0.269971 |
| 32 | 0.005 | 0.181 | 0.102 | 16.0 | 66 | 0.268515 |

SET=82

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 33 | 0.006 | 0.183 | 0.195 | 16.7 | 68 | 0.519243 |
| 34 | 0.101 | 0.177 | 0.195 | 16.4 | 66 | 0.507915 |
| 35 | 0.093 | 0.183 | 0.195 | 16.2 | 66 | 0.510602 |
| 36 | 0.038 | 0.184 | 0.195 | 16.6 | 67 | 0.512930 |
| 37 | 0.004 | 0.207 | 0.195 | 16.8 | 68 | 0.517912 |
| 38 | 0.153 | 0.168 | 0.195 | 15.5 | 64 | 0.504623 |

SET=83

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 39 | 0.019 | 0.084 | 0.046 | 15.2 | 1 | 0.0018757 |
| 40 | 0.023 | 0.069 | 0.046 | 14.9 | 1 | 0.0018918 |
| 41 | 0.036 | 0.060 | 0.046 | 14.9 | 1 | 0.0018918 |
| 42 | 0.008 | 0.098 | 0.046 | 16.5 | 6 | 0.0108639 |
| 43 | 0.012 | 0.093 | 0.046 | 16.7 | 7 | 0.0126091 |
| 44 | 0.006 | 0.116 | 0.046 | 17.8 | 10 | 0.0175256 |
| 45 | 0.002 | 0.141 | 0.046 | 20.7 | 18 | 0.0295637 |

SET=84

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 46 | 0.024 | 0.098 | 0.102 | 18.7 | 12 | 0.0456546 |
| 47 | 0.027 | 0.096 | 0.102 | 18.3 | 11 | 0.0422410 |
| 48 | 0.043 | 0.083 | 0.102 | 17.4 | 9 | 0.0353185 |
| 49 | 0.055 | 0.072 | 0.102 | 16.3 | 5 | 0.0201802 |
| 50 | 0.011 | 0.111 | 0.102 | 19.4 | 14 | 0.0524287 |
| 51 | 0.003 | 0.142 | 0.102 | 24.0 | 26 | 0.0888542 |

CREARE 1/30 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE TN-233 TABLE A-1)

SET=85

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 52 | 0.079 | 0.096 | 0.148 | 20.0 | 16 | 0.085809 |
| 53 | 0.018 | 0.105 | 0.148 | 19.5 | 15 | 0.081327 |
| 54 | 0.065 | 0.096 | 0.148 | 18.1 | 11 | 0.061581 |
| 55 | 0.013 | 0.102 | 0.148 | 19.1 | 13 | 0.071114 |
| 56 | 0.085 | 0.080 | 0.148 | 16.7 | 7 | 0.040568 |
| 57 | 0.082 | 0.086 | 0.148 | 17.7 | 10 | 0.056523 |
| 58 | 0.102 | 0.068 | 0.148 | 15.4 | 2 | 0.012002 |
| 59 | 0.148 | 0.057 | 0.148 | 14.9 | 1 | 0.006087 |
| 60 | 0.005 | 0.140 | 0.148 | 24.5 | 27 | 0.132703 |

SET=86

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 61 | 0.071 | 0.112 | 0.195 | 20.5 | 17 | 0.118857 |
| 62 | 0.009 | 0.125 | 0.195 | 22.5 | 22 | 0.147779 |
| 63 | 0.107 | 0.131 | 0.195 | 18.1 | 11 | 0.081137 |
| 64 | 0.008 | 0.121 | 0.195 | 22.1 | 21 | 0.142154 |
| 65 | 0.012 | 0.119 | 0.195 | 21.3 | 19 | 0.130671 |
| 66 | 0.140 | 0.122 | 0.195 | 18.1 | 11 | 0.081137 |
| 67 | 0.162 | 0.114 | 0.195 | 17.5 | 9 | 0.067354 |
| 68 | 0.011 | 0.121 | 0.195 | 21.3 | 19 | 0.130671 |

TABLE D-1

CREARE 1/30 SCALE PLENUM FILLING STEAM-WATER DATA LISTING

(REFERENCE NUREG/CR-0719 TABLE B-1)

SET=86.1

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 1 | 0.002 | 0.181 | 0.116 | 14.7 | 0 | 0.00000000 |
| 2 | 0.003 | 0.142 | 0.116 | 14.7 | 0 | 0.00000000 |
| 3 | 0.054 | 0.079 | 0.116 | 14.7 | 1 | 0.00479852 |
| 4 | 0.036 | 0.094 | 0.116 | 14.7 | 1 | 0.00479852 |
| 5 | 0.021 | 0.112 | 0.116 | 14.7 | 1 | 0.00479852 |

SET=86.2

| OBS | JLD | JG | JLI | PRESS | DELTAT | JGTCOND |
|---|---|---|---|---|---|---|
| 6 | 0.021 | 0.110 | 0.116 | 65 | 0.7 | 0.00177255 |
| 7 | 0.085 | 0.077 | 0.116 | 65 | 0.7 | 0.00177255 |
| 8 | 0.005 | 0.152 | 0.116 | 65 | 0.0 | 0.00000000 |
| 9 | 0.007 | 0.150 | 0.116 | 65 | 0.7 | 0.00177255 |
| 10 | 0.014 | 0.129 | 0.116 | 65 | 0.7 | 0.00177255 |
| 11 | 0.007 | 0.140 | 0.116 | 65 | 0.7 | 0 00177255 |

NRC FORM 335 (7-77)

U.S. NUCLEAR REGULATORY COMMISSION

# BIBLIOGRAPHIC DATA SHEET

1. REPORT NUMBER *(Assigned by DDC)*: NUREG-0573

4. TITLE AND SUBTITLE *(Add Volume No., if appropriate)*: Analysis of ECC Bypass Data

2. *(Leave blank)*

3. RECIPIENT'S ACCESSION NO.

7. AUTHOR(S): Beckner, W. D.; Reyes, José. N. Jr.; Anderson, R.

5. DATE REPORT COMPLETED: MONTH June YEAR 1979

9. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS *(Include Zip Code)*

Office of Nuclear Regulatory Research
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

DATE REPORT ISSUED: MONTH July YEAR 1979

6. *(Leave blank)*

8. *(Leave blank)*

12. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS *(Include Zip Code)*

10. PROJECT/TASK/WORK UNIT NO.

11. CONTRACT NO.

13. TYPE OF REPORT: Technical Report

PERIOD COVERED *(Inclusive dates)*

15. SUPPLEMENTARY NOTES

14. *(Leave blank)*

16. ABSTRACT *(200 words or less)*

Data from small scale tests investigating the delivery of emergency core cooling water into the lower plenum of a pressurized water reactor have been analyzed. A statistical analysis of data trends has been performed and the data represented in correlational form. The effects of test pressure are well understood and all pressure effects observed are accounted for by steam properties. Uncertainty exists concerning how to extrapolate these small scale test results to full scale. However, small scale tests indicate that a constant momentum flux scaling of the hydraulics may be more appropriate than the traditional $J^*$ scaling. Evidence also exists which suggests that condensation effects may be increasing in importance as scale size increases.

17. KEY WORDS AND DOCUMENT ANALYSIS

ECC Bypass
LOCA

17a. DESCRIPTORS



17b. IDENTIFIERS/OPEN-ENDED TERMS

18. AVAILABILITY STATEMENT: Public availability

19. SECURITY CLASS *(This report)*: unclassified

20. SECURITY CLASS *(This page)*

21. NO. OF PAGES

22. PRICE $