PREDICTION OF FLOW DEPTH AND SEDIMENT DISCHARGE IN OPEN CHANNELS

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ABSTRACT

In recent years attempts have been made to develop numerical models for unsteady flows in channels with sediment transport. This work was conducted to analyze two essential ingredients of any numerical model: the relationship between the hydraulic variables (slope, depth, and velocity), and the predictor of sediment concentration.

A data base containing 7027 records (5263 laboratory records and 1764 field records) in 77 data files was assembled and is provided (Appendix B). The data base was used to examine existing relationships and to develop new ones. Six existing hydraulic relationships are reworked and examined. Detailed statistical analyses are provided for 13 existing techniques for predicting sediment concentration.

Relying heavily on statistical analysis of dimensionless groups, new relationships have been developed. The new hydraulic relationship solves for flow depth for upper and lower regime flow separately and then provides a method for determining which flow regime one might expect. The new method for predicting sediment transport, which is easy to use, appears to be more accurate than the 13 existing methods, and suggests that complex procedures for calculating concentration are not warranted.

A four-point implicit finite difference scheme has been presented to demonstrate the feasibility of applying the new hydraulic and sediment relationships to a numerical solution of the differential equations.

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CHAPTER 1

INTRODUCTION

In the design and analysis of channels, one is often faced with the problem of determining the depth of flow and sediment concentration which occur in a channel with given bed slope, water discharge, and bed-material properties. The most fundamental problem can be stated as: given steady uniform flow, what depth and concentration can be expected? A more complex question is: given a nonsteady inflow discharge and concentration, what will be the time history of depth and concentration along the channel? This latter question requires solution of a set of differential equations which will include the possibility of scour and deposition along the channel. This report primarily focuses on the former question, but with a view toward ultimate solution of the latter. Only sand-bed channels are considered.

1.1 Differential Equations

The problem of modeling scour and deposition in unsteady nonuniform flows in a wide straight channel with a sand bed can be reduced to solving three partial differential equations with two constitutive relations, for a total of five unknowns. The equations can be written in different forms with different sets of unknowns. One possible set of unknown quantities consists of the mean flow velocity (u), the flow depth (h), the mean sediment concentration (C), the friction slope (S), and the bed elevation (z) relative to some horizontal datum, which are all functions of the distance x along the channel and time t. The width is presently assumed to be constant and the flow and bed conditions uniform across the width. There are of course many field situations where this is not true, but this additional complexity will be set aside in this report.

The three conservation equations to be solved are (see Fig. 1.1), the momentum equation (Ponce et al., 1979)

$$\frac{\partial z}{\partial x} + \frac{\partial h}{\partial x} + \frac{u}{g}\frac{\partial u}{\partial x} + \frac{1}{g}\frac{\partial u}{\partial t} = -S \tag{1.1}$$

the continuity equation for water

$$\frac{\partial (hu)}{\partial x} + \frac{\partial h}{\partial t} = 0 \tag{1.2}$$

and, the continuity equation for sediment

$$(1 - \lambda)\frac{\rho_s}{\rho}\frac{\partial z}{\partial t} + \frac{\partial (Cuh)}{\partial x} + \frac{\partial (Ch)}{\partial t} = 0 \tag{1.3}$$

where λ = the porosity of bed sediment and ρ_s = mass density of sediment particles. Because there are five dependent variables, but only three equations so far, two more relations are needed for closure. These are the equation for the friction slope as a function of flow and sediment characteristics

$$S = \text{function of } (u,h,t,\ldots) \tag{1.4}$$

and the sediment concentration relationship

$$C = \text{function of } (u,h,t,\ldots) \tag{1.5}$$

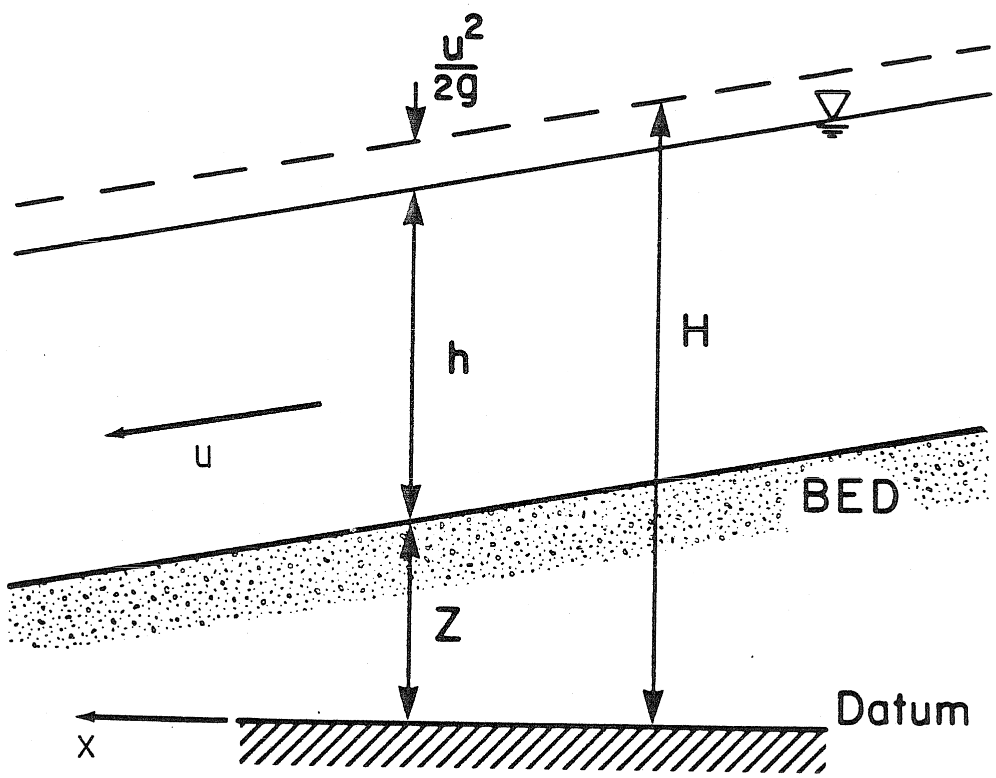

Figure 1.1 Definition sketch for equations of motion.

1.2 Previous Research

Probably the most widely used model for solving these equations is the Hydrologic Engineering Center (1976), HEC-6 model. The ingredients of the HEC-6 are generally considered the current state-of-the-art, although more recent work, such as that of Ponce et al. (1979) and Soni (1980) has brought about improvements which are not yet widely used in general engineering practice. The model of Chang (1976), for example, is founded on basically the same principles as the HEC-6 and shares some of the problems, although more recently improvements have been made on this model (Chang and Hill, 1981).

Since the HEC-6 represents a state-of-the-art model, it is worthwhile to discuss some problems that one might encounter for situations involving rapidly changing flows:

(1) The "standard step method" (see e.g. Henderson, 1966) is used to solve for the hydraulic parameters. This technique is, strictly speaking, applicable only to steady nonuniform flow. The technique assumes that the $\partial u/\partial t$ and $\partial h/\partial t$ terms in Eqs. 1.1 and 1.2, respectively, are small and can be eliminated.

(2) The hydraulic equations and the sediment equations are not coupled. For each step, first the hydraulic variables are solved, and then the sediment discharge and bed changes are calculated. Thus $\partial z/\partial x$ in Eq. 1.1 is taken as the initial value at the beginning of the time step.

(3) The slope is defined by a Manning equation, and values of Manning n must be known or estimated at each cross-section.

(4) The user is offered a choice of three sediment relationships (i.e. Eq. 1.5), but it is not clear what accuracy each provides, or why one should be selected over another.

(5) Time is not included in any of the sediment transport relationships. Therefore, disregarding armoring, every flow

> is assumed to be carrying the equilibrium concentration for a comparable steady, uniform flow, without any time lag for particle settling or resuspension or adjustment during transients or non-uniformities.

Despite its flaws, the HEC-6 model is very general in its capability of accepting complicated geometry and flow obstructions such as bridges. As such, it is tempting to apply it to a wide variety of channels and flow situations. It is the writer's belief that engineering models such as HEC-6 should be applied with great care to modeling applications involving rapidly varying flows, and that the results should be viewed with considerable skepticism.

1.3 Scope of Study

Having considered the problems involved in formulating a numerical model, we return to the problem of the formulation of the hydraulic and sediment concentration relationships. Solutions to the differential equations are meaningless without adequate formulations of these relationships. Rather than formulate these relationships as represented by Eqs.1.4 and 1.5, a different approach will be taken, which will be more useful for steady uniform flow, and can be applied as an approximation for the unsteady case. For the uniform case, the assumption will be made that slope and unit discharge, $q = uh$, are known and one wishes to find depth and concentration.

In order to examine previous definitions of these relationships a large data base of both field and laboratory data was needed. The establishment of such a data base is discussed in Chapter 2. In Chapter

3 six existing formulations of the hydraulic relationship are analyzed to answer the question: can they be used to determine depth, given slope and unit discharge? The data base was then used to develop a new formulation of the hydraulic relationship, which is presented in Chapter 4. The data base was also used to examine existing definitions of Eq. 1.5 (Chapter 5) and to develop a new definition of this relationship (Chapter 6). Chapter 7 discusses solutions to the set of differential equations which utilize the new formulations, and presents recommendations for future work. A summary of the study and conclusions are presented in Chapter 8.

CHAPTER 2

DEVELOPMENT OF A DATA BASE

The analyses presented in this report required the establishment of the large data base of both laboratory and field data which is presented in Appendix B. The initial thought was that the data compendium of Peterson and Howells (1973) could be used to supply the required data. Unfortunately, in working with this data compendium, the writer discovered a significant number of errors. Furthermore, additional data were needed, particularly good field data.

Peterson and Howells (1973) are to be commended for taking the first step toward the development of a computerized data base. The task of locating data and reducing it to a common set of variables and units requires long hours of tedious work. The data collection of Peterson and Howells is essentially an update of the data collection of Johnson (1943). However, before any data set can be used with total satisfaction, all of the errors must be eliminated.

A careful, item-by-item check suggests that four types of errors were made in the preparation of the Peterson and Howells (1973) compendium:

(1) Incorrect individual entries -- these entries usually have incorrectly ordered digits or misplaced decimal points.

(2) Conversion errors -- errors made in converting the data to a standard format, typically involving conversion of transport rates to sediment concentrations.

(3) Misinterpretation of data -- this error usually involved whole columns of data, and probably occurred as a result of confusing notation in the data source.

(4) Source errors -- errors originating from incorrect original publication of data, discovered by checks on internal consistency.

Also encountered were omissions of entries such as bed form and the gradation parameter (geometric standard deviation of bed particle size), which could be determined from the original data sources, even though they were not explicitly stated.

The following is a description of some of the apparent errors that were encountered. In the data of Sato, Kikkawa, and Ashida (1958) the grain size given in centimeters was read as millimeters. Therefore the values of the median sediment size given by Peterson and Howells must all be multiplied by 10 to obtain the correct values for this data set. The Straub (1954,1958) data set contains 3 concentration values which are a factor of 10 too high. For the data sets of Abdel-Aal and of Kalkanis (Abdel-Aal, 1969), and Vanoni and Hwang (1967), the values given for discharge are really flow velocity, and the slope and depth entries are interchanged. An incorrect interpretation of the transport rate of the Williams (1970) data as being given in dry unit weight per time instead of submerged weight resulted in an error of about 60 percent in the sediment concentration readings. The transport rate for the Indian Canal data (Chaudhry, Smith, and Vigil, 1970), given in metric tons, was read as English short tons, causing a 12 percent error in sediment concentration.

In the development of a new data base from the Peterson and Howells (1973) compendium, a few sets of data where omitted, while many others were added. The sets were omitted either because the data were not applicable (one set of data was for transport of sludge), or because important variables were unavailable (one set contained no slope measurements). The sets that were added included newer data (e.g. Willis, 1979) and a large quantity of field data, such as the Colorado River data (U.S. Bureau of Reclamation, 1958) and the Rio Grande (Nordin and Beverage, 1965) data.

At this point it is worthwhile to define a few terms related to sediment transport, as used in this report.

Sediment concentration is the ratio of the sediment discharge to the discharge of the water-sediment mixture, both expressed in terms of mass per unit time, usually given as parts per million (ppm). For practical reasons, the density of the water-sediment mixture is taken to be approximately equivalent to the density of the water. This approximation will cause errors of less than one percent for concentrations less than 16,000 ppm. In this thesis, the concentration is used as a depth- and time-averaged (i.e. mean) value, unless specified otherwise.

Sediment load or total sediment load is the material being transported. The sediment load can be divided into wash load and bed-material load. The wash load is the fine material of sizes which are not found in appreciable quantities on the bed, and is not considered to be dependent on the local hydraulics of the flow. As a practical definition, the wash load is considered to be the fraction of the sediment load finer than 0.062 mm. The bed-material load is the material of sizes which are found in appreciable quantities on the bed. The bed-material load can be conceptually divided into the bed load (that portion of the load that moves near the bed) and the suspended load (that portion of the load that moves in suspension), although the division is not precise.

Sediment transport rate is equivalent to the sediment discharge, which is expressed as mass per unit time.

The concentrations given in the data set and predicted by the transport formulas are for the bed-material load, including both bed load and suspended load. From this point onward the term concentration will refer to the bed-material-load concentration. Under field conditions this quantity is very difficult to measure; often the bed load portion is left unmeasured and must be estimated. In some cases, such as for some of the data of Mahmood et al. (1979), the estimated portion of the load may represent 80 percent of the concentration. In the case of the NEDECO (1973) data, the sampling procedure included material as fine as 0.05 mm, instead of the usual cutoff of 0.062 mm. Neither of these data sets was used in the analyses of sediment transport formulas.

Ten variables, including bed form codes, are given for each observation. Bed form classifications are as given by Vanoni (1975, p. 160). Actual flume measurements, without adjustment for sidewall roughness, are given in the tables. (Sidewall corrections for laboratory data have been used in the analyses that follow.)

While great care has been taken to reduce all data sets to common variables, in some cases it was not possible to achieve complete consistency between data sets. Space limitations do not permit a detailed account of all of the procedures and assumptions that were used to reduce each data set to common terms. Potential users of the data base are urged to consult the original sources of the data.

The data tabulations and description of the entries are given in Appendix B. The references for the data have been compiled separately from the literature references.

CHAPTER 3

REVIEW OF METHODS FOR CALCULATING FLOW DEPTH IN SAND-BED CHANNELS

The problem of determining the velocity and depth of flow for a given discharge of a river has long been a subject of interest to hydraulic engineers, and more recently to numerical modelers. A numerical model requires a logical scheme, whereby stage and velocity can be predicted for a channel of given dimensions, bed material, bed slope, discharge, and water temperature. For certain ranges of these parameters, multiple values of sediment discharge and flow depth may be possible, as discussed by Kennedy and Brooks (1965). However, the engineer is often faced with the problem of designing a channel to accommodate a given discharge with a given bed slope and an unknown sediment discharge. Therefore, this chapter considers the problem where sediment discharge is assumed to be unknown, and explores possible solutions for uniform flow depth as a function of discharge, bed slope, and bed-sediment and fluid properties. Later, the development of a model will require adaptation of such a relationship for unsteady, nonuniform flows.

3.1 Statement of Purpose

A technique is sought, whereby an engineer can directly calculate the uniform or normal flow depth of a channel with a given unit discharge, and which can also be used in a numerical model for unsteady, nonuniform flows. Such a technique should:

1. Agree with experiences gained in both the laboratory and the field;

2. Include confidence limits or some statistical analysis of the input data to indicate expected errors;

3. Be easily adaptable to computer modeling applications which may require thousands or millions of depth of flow calculations;

4. Provide solutions for a wide range of independent variables.

Six techniques for predicting friction factor (which relates velocity to shear velocity) are examined for their usefulness as stage predictors in a moveable-bed river model. Each technique has been rearranged so that given unit discharge and slope, along with other independent variables, one can directly determine flow depth. The six schemes are those of Alam, Cheyer and Kennedy (1966); Chu and Mostafa (1979); Einstein and Barbarossa (1952); Engelund (1967); Garde and Ranga Raju (1977); and White, Paris and Bettess (1979). Although each technique has provided an important contribution to the field, none satisfies all of the criteria listed above. Therefore, a new technique is presented which does satisfy the four criteria.

The reader is referred to the report of the ASCE Task Force (1963) for an excellent historical review of the problem of predicting friction factors in open channels. Reviews of many friction factor predictors can be found in Vanoni (1975), Garde and Ranga Raju (1977), and Jansen, et al. (1979). It will be assumed that the the reader has some familiarity with these techniques.

3.2 General Form of Velocity Equations

Strickler (1923) listed 22 velocity formulas for open channels, whereby, as of 1914, stage could be predicted. Most of these equations are power laws relating mean flow velocity to different powers of hydraulic radius and hydraulic slope. Two formulas remain in wide useage today, the one attributed to Manning, $v=r^{2/3}S^{1/2}/n$ (metric units), and the Chezy equation, $v=C\sqrt{rS}$, where v is mean velocity, r is hydraulic radius, S is the slope of the hydraulic grade line, and n and C are known as the "Manning" and "Chezy" coefficients, respectively. Both of these empirical equations have dimensional coefficients which must be estimated for a given application.

A more modern formulation is based on dimensional analysis and the concept that the mean shear stress, $\tau = \rho grs$, in which ρ is the density of the fluid, and g is gravitational acceleration, is proportional to $\frac{1}{2}\rho V^2$. This gives the Darcy-Weisbach equation:

$$v = \sqrt{\frac{8}{f}}\sqrt{grS} = \sqrt{\frac{8}{f}}\,u_* \qquad (3.1)$$

where u_* is known as the shear velocity. This equation is conceptually sound, and f is dimensionless.

A dimensionally consistent Manning-type equation can be created by defining friction factor in the following manner:

$$\frac{v}{u_*} = \sqrt{\frac{8}{f}} = a\left(\frac{r}{k_s}\right)^{1/6} \qquad (3.2)$$

where a is a coefficient of proportionality and k_s is a measure of bed roughness. If Eq. 3.2 holds, then Manning's n (metric units) can be defined by

$$n = \frac{k_s^{1/6}}{a\sqrt{g}} \qquad (3.3)$$

After comparing the Manning and Darcy-Weisbach equations, the ASCE Task Force (1963) concluded that:

"At the present (1961) state of knowledge, if applied with judgement, both n and f are probably equally effective in the solution of practical problems."

This comment suggests that Eq. 3.2 may form a reasonable definition of friction factor, in many practical situations.

3.3 Fixed-Bed Friction Factors

Friction factors for turbulent flow in fixed-bed channels have their roots in the classic sand-roughened pipe experiments conducted by Nikuradse (1933). The fixed-bed concept may be generalized to include some rivers with gravel beds, which, although not strictly fixed, do not form dunes or bars in the manner of sand bed streams. The ASCE Task Force (1963) has reviewed this topic in some detail, and only a brief discussion, pertinent to the later derivations, is given here.

For high bed Reynolds numbers ($u_* k_s/\nu$), the data of Nikuradse, based on experiments with sand-roughened pipes give

$$\frac{1}{\sqrt{f}} = 2 \log \frac{2r}{k_s} + 1.74 = 2 \log \frac{14.8r}{k_s} \qquad (3.4)$$

Here, pipe flow is analagous to channel flow with diameter replaced by 4 times the hydraulic radius. As discussed by the writer (1981), these data are the basis for the fully rough region of the Moody pipe friction diagram. The transitional region between smooth and fully rough conditions is defined by the magnitude of the bed Reynolds number:

$$\sqrt{10} < \frac{u_* k_s}{\nu} < 100 \qquad (3.5)$$

As illustrated in Fig. 3.1, rough conditions include most flow depths one might encounter in gravel-bed channels.

Friction factors for bed Reynolds numbers less than 100 can be obtained from the diagram or equations given by the writer (1981), based on Nikuradse data; or from the Moody diagram (Streeter, 1971) or the Colebrook-White transition function, upon which it is based. The Nikuradse data show that friction factor decreases and then increases as Reynolds number decreases, while the Colebrook-White data show a corresponding steady increase in f, through the transition region. Therefore, the value of friction factor for a channel with a transitional Reynolds number cannot be determined with certainty.

An earlier equation, proposed by Strickler (1923), is based on data from gravel-bed rivers and fixed-bed channels. The equation, now known as the Manning-Strickler equation, is equivalent to Eq. 3.2 with a = 7.66 and with k_s defined as the mean gravel-particle size. The Manning-Strickler equation and the Nikuradse Eq. 3.4 are plotted in Fig. 3.2, along with the mean values of the fully rough Nikuradse data. Figure 3.2 shows that for the range of relative roughness used by

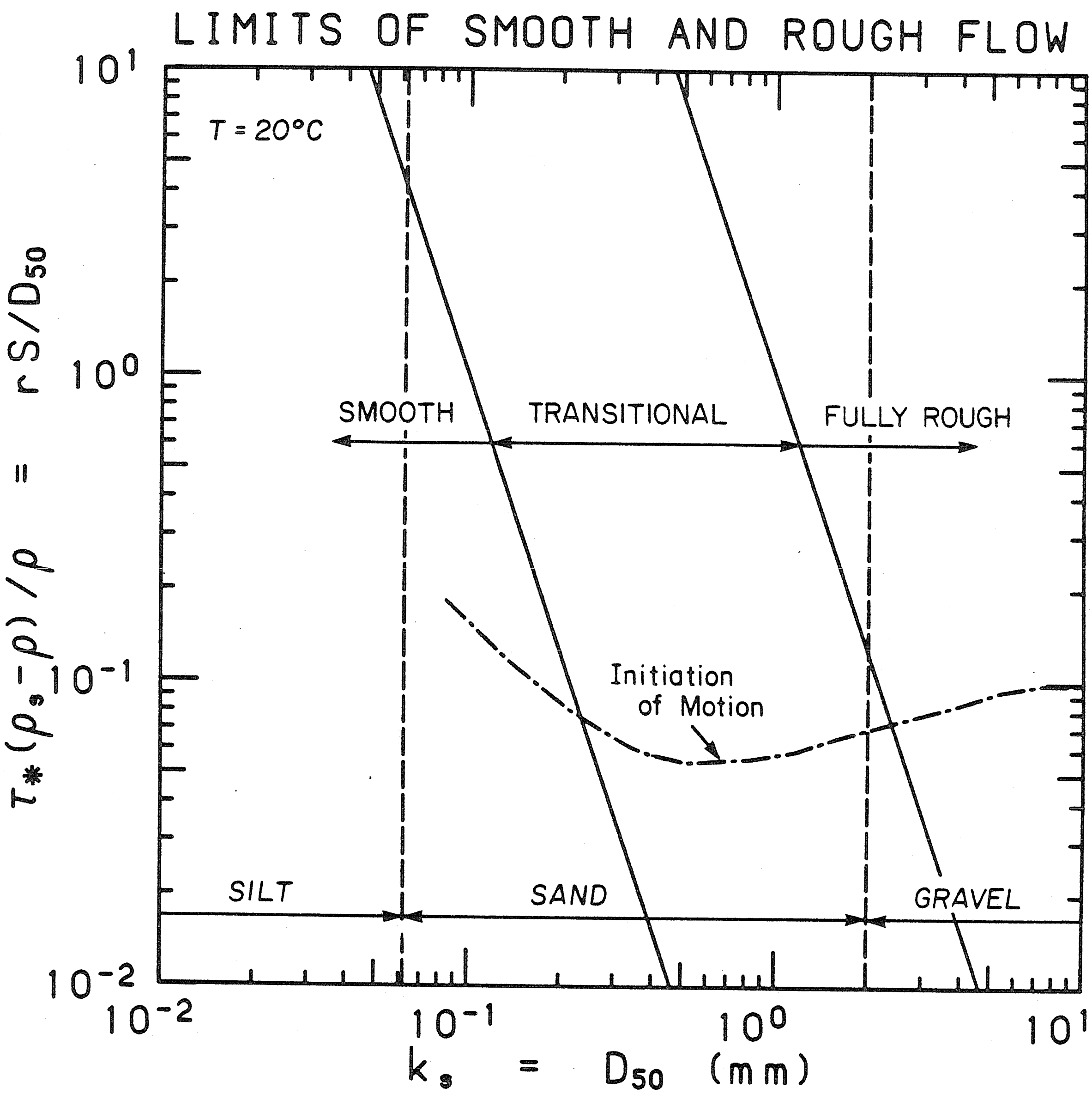

Figure 3.1 Limits of smooth and fully rough flow, and initiation of motion from the Shields diagram in Vanoni (1975), based on T = 20° C, $\nu = 10^{-6}$ m^2/s.

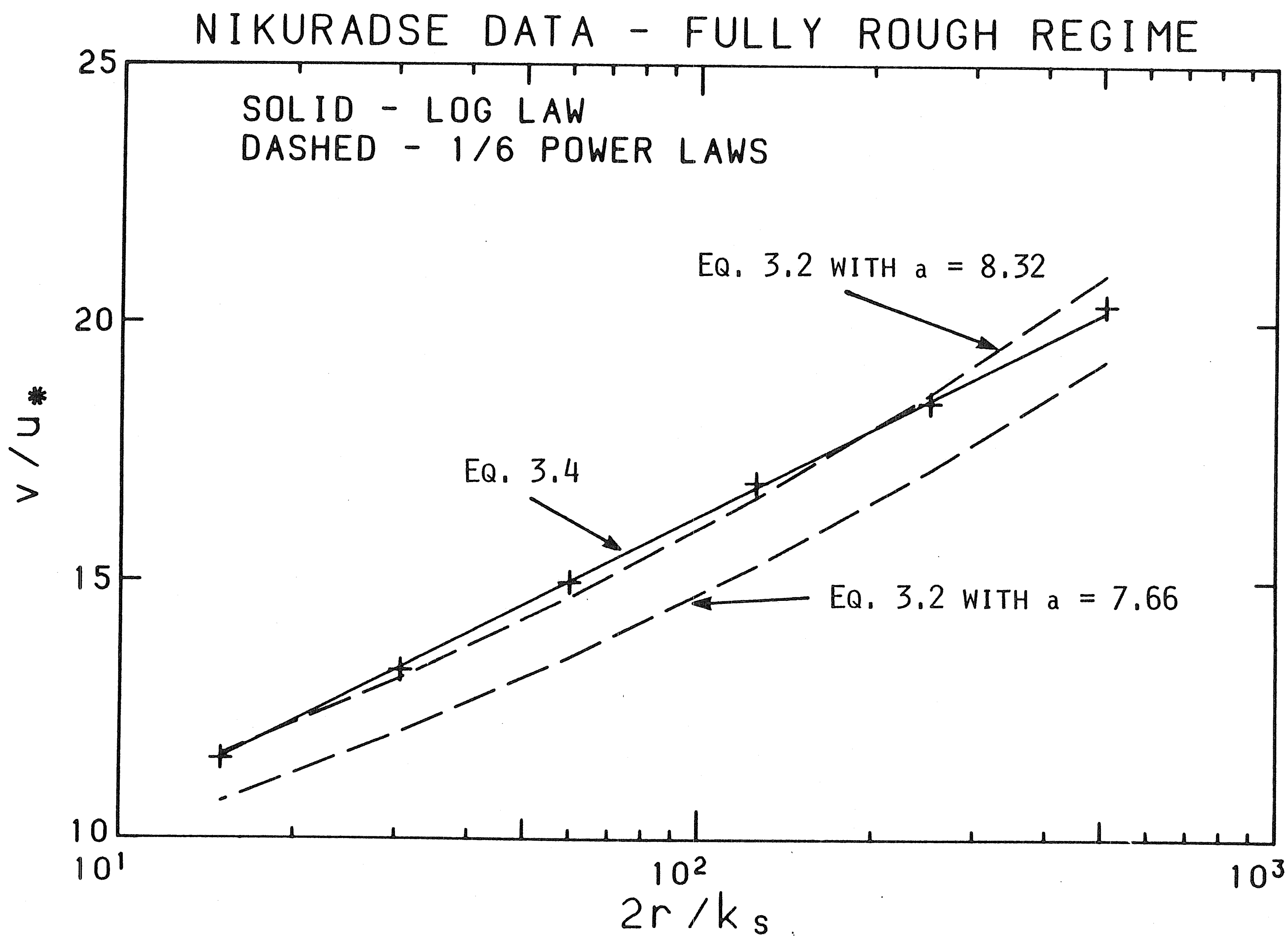

Figure 3.2 Comparison of semilogarithmic and power law resistance equations, with Nikuradse (1933) data in the fully rough regime (+).

Nikuradse, the semilogarithmic Eq. 3.4 is almost identical to the power law, Eq. 3.2, with a = 8.32.

Field data for very low values of relative roughness, r/k_s (e.g. flow over boulders) of Limerinos (1970) suggest that the semi-logarithmic form may be more appropriate than a simple power law, when one considers such extreme values of relative roughness. However, for low values of relative roughness, experiments of Bayazit (1976) of flow over hemispheres, suggest that the semi-logarithmic Eq. 3.4 is correct only when k_s is replaced by 2.5 times the diameter of the hemispheres. Therefore, whether due to the uncertainty in determining k_s, or to the differences between pipe and open channel resistance, it seems that a power law, such as Eq. 3.2, will give results of accuracy equivalent to Eq. 3.4, in many cases.

3.4 Existing Stage-Discharge Predictors

The six techniques discussed here have been reworked to directly answer the question: given unit discharge, slope, bed-material properties, and temperature, what will be the depth of flow, or hydraulic radius? The techniques have been selected on the basis of the following criteria: (1) they seem reasonable to the writer or have achieved some degree of acceptance, (2) they are dimensionally consistent, and (3) they are self-contained. The third criterion eliminates those techniques which require a knowledge of bed form, but do not specify how one would determine the bed form for a particular flow condition.

Garde and Ranga Raju (1977) have considered stage-discharge, or friction factor predictors in two categories, those that divide resistance into grain resistance and form resistance, and those that do not. The divided approach assumes that friction factor, $f = f' + f''$, where f' is for flat-bed grain resistance and f'' is for the added resistance of bed forms. The quantity f' is usually determined from one of the fixed-bed relations previously discussed, by assuming either $S = S' + S''$ or $r = r' + r''$, and then replacing f by f' and S by S' or r by r' in the appropriate diagram or equations. While the divided and non-divided approaches represent different conceptualizations of the problem, the writer does not feel that either technique is clearly superior or more valid than the other. Therefore, here both the divided resistance approach and the singular approach are considered together.

At this point a few words about notation are worthwhile. Since none of the techniques discussed deal with channel width, it has been assumed that they apply to wide channels, for which hydraulic radius and mean flow depth are equivalent. For consistency, hydraulic radius has been substituted for flow depth in those cases where flow depth was used in the original analysis. Unit discharge is therefore defined as $q = vr$. For laboratory flume data, the sidewall correction of Vanoni and Brooks (1957) has been used to define a bed hydraulic radius which is equivalent to the mean depth of an infinitely wide channel with the same slope, velocity, and bed friction factor as the flume. Therefore, the subscript b, sometimes used on r and f to indicate that a sidewall correction has been performed, has been omitted. Finally, with the exception of a few definitions, unique to individual authors, all notation has been converted to a common convention.

3.4.1 Alam, Cheyer and Kennedy Analysis (1965)

This technique is a divided-resistance approach, which assumes $S = S' + S''$. The technique is similar to the more recent Alam and Kennedy (1969) version, except for the manner in which the grain friction factor is determined. The earlier technique is discussed here because the grain resistance is determined from a standard Moody diagram, and can easily be expressed in equation form, by the Colebrook-White equation. The diagrams for determining f'' for the two versions are nearly identical, therefore the discussion of the earlier analysis could be adapted to apply to the later version.

Using dimensional analysis, Alam, Cheyer and Kennedy (1966) created a diagram based on the following relations:

$$f'' = \text{funct}\left(\frac{r}{D_{50}}\ ,\ \frac{V}{\sqrt{gD_{50}}}\right) \tag{3.6}$$

and the Colebrook-White equation,

$$\frac{1}{\sqrt{f'}} = -2\ \log\left(\frac{D_{50}}{14.8r} + \frac{2.51}{\sqrt{f'}\ R}\right) \tag{3.7}$$

where $R = 4q/\nu$ is Reynolds number.

A diagram (Fig. 3.3) can be constructed whereby, given q, S, R, g, and D_{50} one can determine r/D_{50} and f'' directly. Taking the product of the independent dimensionless groups in Eq. 3.6, and defining $q_* =$

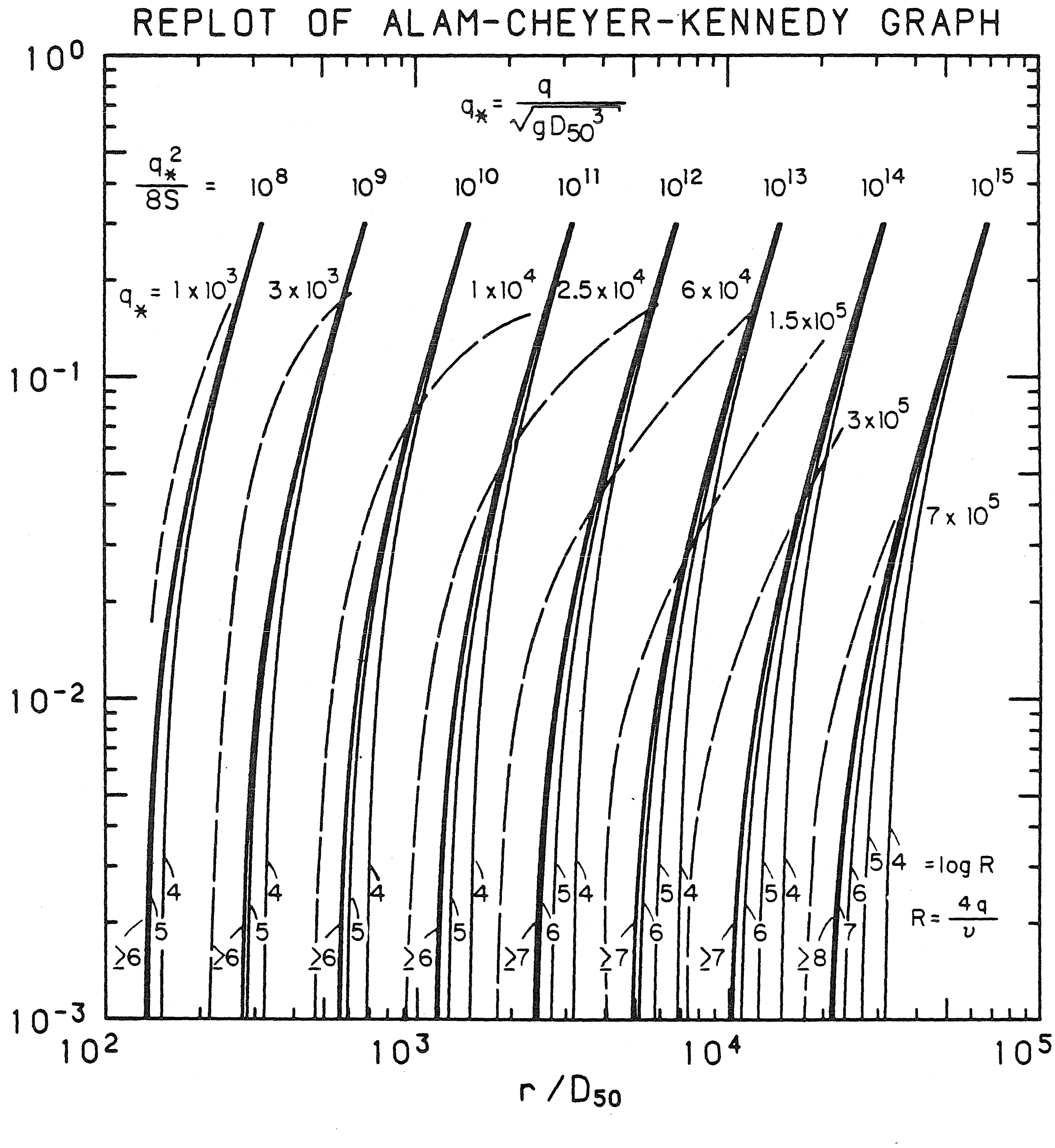

Figure 3.3 Replot of Alam, Cheyer and Kennedy (1966) diagram for determining f". Solid lines were determined from Eqs. 3.7 and 3.9. Dashed lines are from the original diagram in the form of Eq. 3.8.

$q/\sqrt{gD_{50}^3}$, yields

$$f'' = \text{funct}\left(q_*, \frac{r}{D_{50}}\right) \tag{3.8}$$

while the definition of friction factor yields

$$f'' = \frac{8S}{q_*^2}\left(\frac{r}{D_{50}}\right)^3 - f' \tag{3.9}$$

Figure 3.3 was created from Eqs. 3.8 and 3.9, where the relation described by Eq. 3.8 was taken from the Alam, Cheyer and Kennedy (1966, Fig. 3.12) diagram.

For the purposes at hand, there are several problems with the application of Fig. 3.3. 1) Computer coding would be difficult, and the resulting algorithm would undoubtedly be computationally slow. 2) For large and small values of q_* on the diagram, the curves of constant q_* and constant $q_*^2/8S$ are nearly parallel, suggesting that there are virtually no solutions in these regions.* 3) For large rivers, such as the Mississippi, q_* may be larger than any values found on Fig. 3.3, which has exactly the same range of applicability as the original diagram of Alam, Cheyer and Kennedy.

3.4.2 Chu and Mostafa Analysis (1979)

The technique presented by Chu and Mostafa (1979) is essentially a mathematical expression of the graphical technique presented by Mostafa and McDermid (1971). The newer analysis allows a straightforward adaptation of the technique to numerical modeling applications. The analysis is based on the definition of a dimensionless Manning

*As f'' approaches 0, q_* and $q_*^2/8S$ are no longer independent.

coefficient, C_M, which is equivalent to the inverse of the Manning-Strickler a in Eq. 3.2, with $k_s = D_{50}$.

Using nonlinear curve fitting techniques, Chu and Mostafa (1979) developed the following equations

$$C_M = 0.037\left(\frac{D_{50}}{\delta}\right)^{0.583} \cdot F^{-[0.228(\frac{D_{50}}{\delta}) + 0.785]} + 0.122 \qquad \text{(3.10a)}$$

$$\ldots\text{for } \frac{D_{50}}{\delta} < 5$$

and

$$C_M = 0.077\ F^{-1.02} \qquad \ldots\text{for } \frac{D_{50}}{\delta} > 5 \qquad \text{(3.10b)}$$

where $F = v/\sqrt{gr}$ = Froude number and $\delta = 11.6\nu/u_*$ = thickness of the laminar sublayer. A detailed description of the data used to derive the equations is not available. However, from Mostafa and McDermid (1971, Figs. 2-F.12 and 2-F.13), the diagram corresponding to Eq. 3.10a shows about 100 measurements from 4 rivers and 44 runs from one set of laboratory data, while the diagram corresponding to Eq. 3.10b shows 28 measurements on gravel-bed canals from Lane and Carlson (1953). The range of applicability of Eqs. 3.10 is apparently $0.122 < C_M < 0.45$ and $0.15 < F < 1.0$.

The following equations can be determined from the definitions of C_M and δ, with $R_g = \sqrt{gD_{50}^3}/\nu$:

$$C_M F^{10/9} = q_*^{1/9}\, S^{1/2} = \alpha \qquad \text{(3.11a)}$$

and

$$\frac{D_{50}}{\delta} F^{1/3} = \frac{q_*^{1/3} R_g S^{1/2}}{11.6} = \beta \qquad \text{(3.11b)}$$

where α and β are dimensionless groupings of q, S, D_{50}, ν and g, as defined here. By combining Eqs. 3.10a and 3.11b, one can obtain an equation for C_M in terms of F and β, and, along with Eq. 3.11a, one has a set of equations which define F and C_M in terms of α and β. Figure 3.4 was developed in this manner, and can be used to determine F and C_M, when D_{50}/δ is less than five.

An expression for F, for values of $D_{50}/\delta > 5$, can be determined by combining Eqs. 3.10b and 3.11a. In principle, the resulting equation,

$$F = 1.666\ q_*^{1.220}\ S^{5.488} \times 10^{12} \tag{3.12}$$

in conjunction with Fig. 3.4, should complete the theory.

In reality, a simple example shows that this is not the case. To illustrate the point, we can consider the example where S = 0.0005, D_{50} = 0.24 mm, T = 20° C and q = 1 m^2/s. The calculated values of the right sides of Eqs. 3.11a and 3.11b are 0.08 and 1.00, respectively, and from Fig. 3.4, F = 0.31 and C_M = 0.30, and from Eq. 3.11b, D_{50}/δ = 1.5. Now, if we assume that we are considering a uniform river-flow problem, we may wish to increase the unit discharge, while holding all other independent variables constant. If q is increased to 8 m^2/s, then the values of Eqs. 3.11a and 3.11b are increased to 0.10 and 2.00, respectively. An inspection of Fig. 3.4 indicates that no solution is available. We may suspect that Eq. 3.12 will now be applicable. However, substitution into this equation gives Froude number, F = 16.7, an unreasonable value, and calculation of D_{50}/δ indicates that this equation is not applicable either. This example illustrates a typical

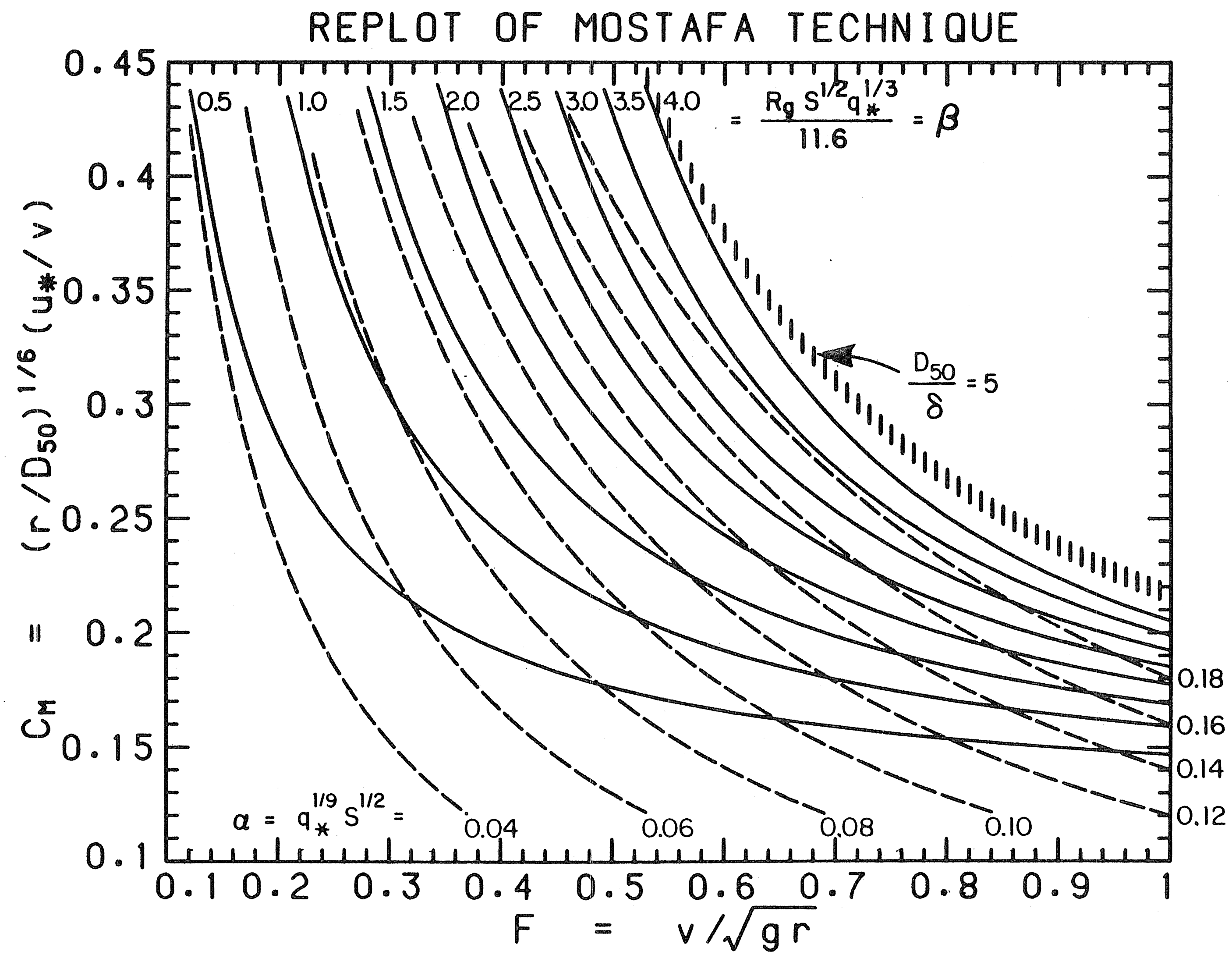

Figure 3.4 Replot of Chu and Mostafa (1979) diagram for determining the dimensionless Manning coefficient, C_M.

problem one might encounter for Froude numbers less than 0.5, since, in this region of Fig. 3.4, the solid and dashed curves are nearly parallel (this point was mentioned briefly in Vanoni, 1975, p.145).

3.4.3 Einstein and Barbarossa Analysis (1952)

The concept of a form-resistance diagram was developed by Einstein and Barbarossa (1952). Although the technique is now nearly 30 years old, it is still probably the most widely quoted of any existing techniques. The technique uses the divided hydraulic radius approach, i.e. $r = r' + r''$, $u_*' = \sqrt{gr'S}$.

When the grain roughness produces fully rough conditions, r' can be determined from the Manning-Strickler equation, in the form

$$\frac{V}{u_*'} = a\left(\frac{r'}{D_{65}}\right)^{1/6} = \sqrt{\frac{8}{f'}} \qquad (3.13)$$

where a = 7.66. For those cases where grain roughness does not produce fully rough conditions, Einstein and Barbarossa presented a semilogarithmic equation with a term which must be determined graphically. This equation is in agreement with the Nikuradse (1933) data and may be replaced by the equations given by the writer (1981) which do not rely on any graphically determined terms. The simple form of Eq. 3.2 allows a clean analysis of the technique, while the semilogarithmic equation does not. Therefore, further discussion of the technique is restricted to fully rough conditions. This restriction is not too serious, since both equations yield similar values of r', for most field conditions, even when the flow is not strictly fully rough.

The Einstein-Barbarossa (1952) diagram, is of the form

$$f'' = \text{funct}\left[\frac{D_{65}}{D_{35}}\left(\frac{\rho}{\rho_s-\rho}\right)S \cdot \frac{r'}{D_{65}}\right] \tag{3.14a}$$

and from Eq. 3.13 and the fact that $r'' = r - r'$, one can derive

$$f'' = \frac{8}{a^2}\left[\left(\frac{D_{50}}{D_{65}}\right)^{3/2} \frac{q_*}{a\sqrt{S}} \cdot \left(\frac{r'}{D_{65}}\right)^{-2} - \left(\frac{r'}{D_{65}}\right)^{-1/3}\right] \tag{3.14b}$$

Figure 3.5 was created from Eqs. 3.14a and 3.14b.

As discharge varies, for a given channel with uniform flow (constant slope), the solution will move along the solid lines on Fig. 3.5. The diagram indicates that as discharge decreases, f'' increases monotonically. When f'' is about 0.17, regardless of any other variables, the dimensionless grain-shear stress $\tau'_{*s} = \rho r'S/(\rho_s-\rho)D_{35} =$ 0.062, which is sometimes taken as the critical value for initiation of motion. Below this value f'' continues to increase as discharge is decreased, indicating high resistance, apparently from residual bedforms. Beyond the critical shear stress, about a twenty-fold increase in unit discharge causes the form resistance to steadily decrease to almost nothing, suggesting $f = f'$. A later comparison shows that for some channels this variation in f'' is too exaggerated.

3.4.4 Engelund Analysis (1967)

In principle, this technique is based on the divided slope approach, but in actualization, the divided hydraulic radius is used. The analysis is based on the assumption that S'' is the direct result of expansion losses that occur as a fluid flows over dunes. Furthermore,

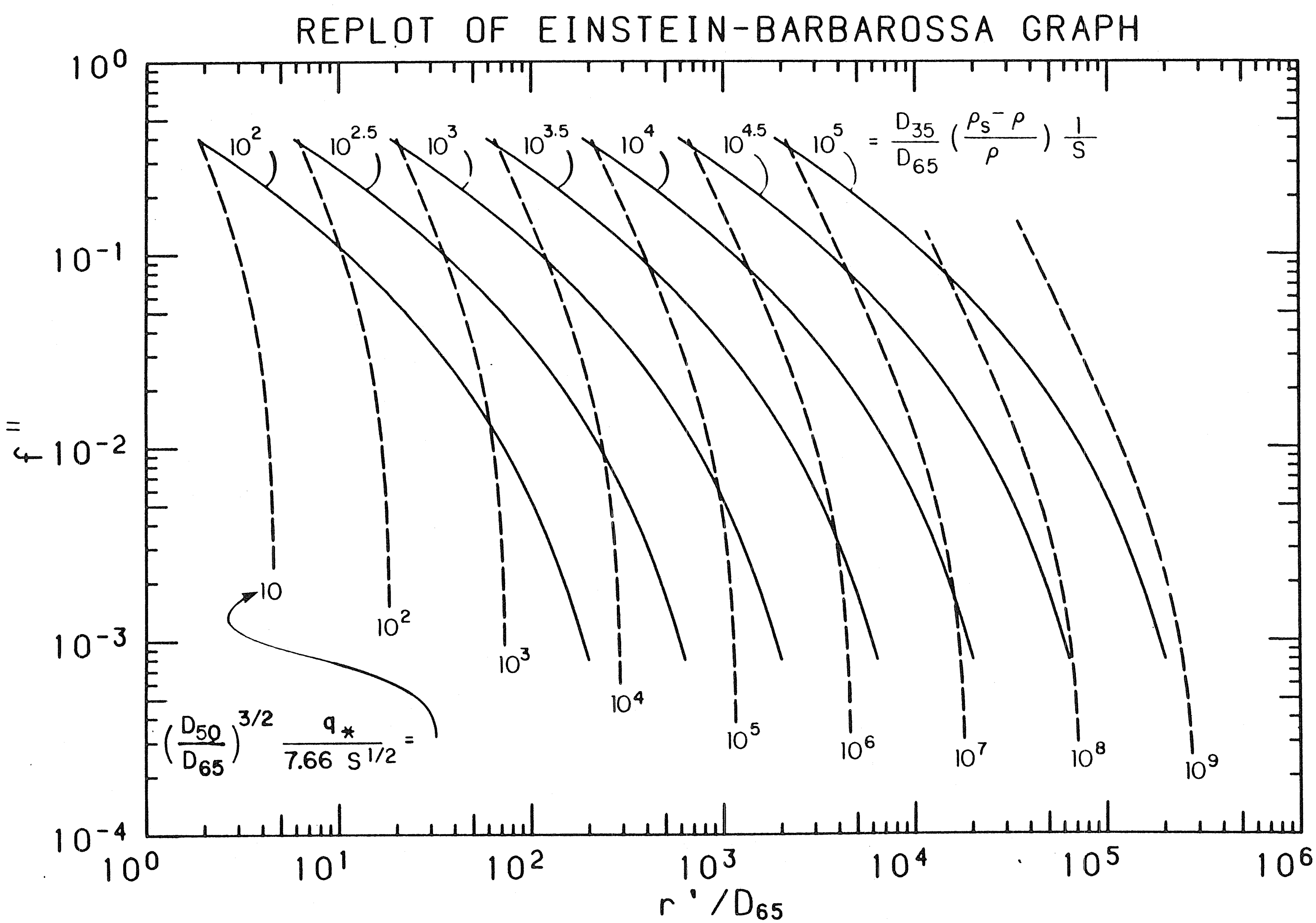

Figure 3.5 Replot of Einstein and Barbarossa (1952) diagram for determining f".

it is assumed that rS' = r'S, thereby converting to a divided hydraulic radius approach. Definition of S' in such a manner is not in agreement with the concept of S' as defined in the introduction to the discussion of the various techniques. Verification of the analysis is based on laboratory data from runs using four different sands, published by Guy et al. (1966). In all, 148 runs are published (for these 4 sands), but it appears that about half this number were actually used by Engelund (1967).

The quantity r' is defined by

$$\frac{V}{u_*'} = 6 + 2.5 \ln \frac{r'}{2D_{65}} = 5.76 \log \frac{5.51r'}{D_{65}} \qquad (3.15)$$

which agrees with the fully rough Nikuradse data and gives nearly the same results as Eq. 3.4. Once r' is determined, it is possible to determine τ_* by the empirical formulas for the lower flow regime (ripples and dunes):

$$\tau_* = 1.581\sqrt{\tau_*' - 0.06} \qquad (3.16a)$$

and for the upper flow regime (plane bed, standing waves and antidunes):

$$\tau_* = \begin{cases} \tau_*' & \text{for } \tau_*' < 1 \qquad (3.16b) \\ (1.425\tau_*'^{\,-1.8} - 0.425)^{-1/1.8} & \text{...for } \tau_*' > 1 \qquad (3.16c) \end{cases}$$

Equations 3.16a and 3.16b are given by the author, while Eq. 3.16c was developed from the author's diagram (Engelund, 1967, p. 289). The equations for upper and lower flow regimes plot as discontinuous line segments with the transition occuring at about $\tau_*' = 0.55$.

Equations 3.16a-c can be represented in the general form

$$\tau_* = f\left[\frac{D_{65}}{D_{50}} \left(\frac{\rho}{\rho_s - \rho}\right) S \cdot \frac{r'}{D_{65}}\right] \qquad (3.17a)$$

Also, rearrangement of Eq. 3.15 yields

$$\tau_* = \frac{\left(\frac{\rho}{\rho_s - \rho}\right) q_* \sqrt{\frac{D_{50}}{D_{65}} S}}{\sqrt{\frac{r'}{D_{65}}} \left[6 + 2.5 \ln\left(\frac{1}{2} \frac{r'}{D_{65}}\right)\right]} \qquad (3.17b)$$

As for previous techniques, the desired graphical representation (Fig. 3.6) of the technique is now possible. Using Fig. 3.6, it is possible to directly determine τ_* and r'/D_{65}.

Equations 3.16a-c are easy to program and have been compared with three sets of data in Figs. 3.7a-c. Data of Guy et al. (1966) are shown in Fig. 3.7a, which includes almost all of the data used in the original analysis, plus additional data. Here, sands with fall diameter (not sieve diameter) D_{50} values of 0.19, 0.27, 0.28, 0.45 and 0.93 mm are plotted. Field data from the Mississippi River at Tarbert Landing, LA (Toffaletti, 1968), D_{50} about 0.25 mm, and laboratory data of Williams (1970), D_{50} = 1.35 mm, are plotted in Figs. 3.7b and 3.7c, respectively. (Note - Although Williams used many channel widths in his experiments, only data from the two widest channels are shown in Fig. 3.7c.)

The diagrams which comprise Fig. 3.7 suggest that more refinement of this technique would be necessary before general application could be recommended. Figure 3.7a shows that a few measurements in the chute-and-pool bed clas have strongly influenced the vertical asymptote on the upper curve. Figure 3.7b suggests that more work is necessary in

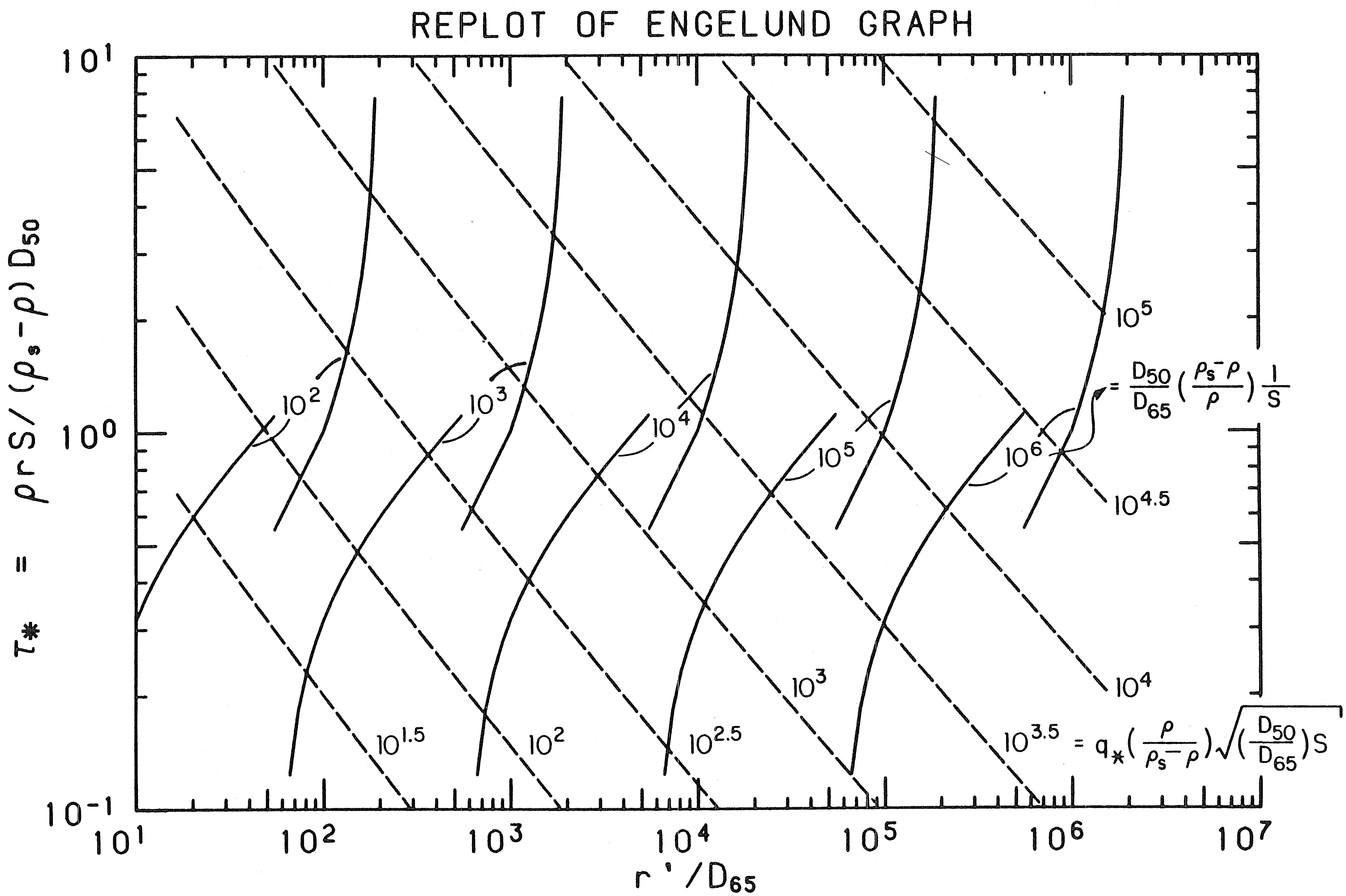

Figure 3.6 Replot of Engelund (1967) diagram for determining τ_*.

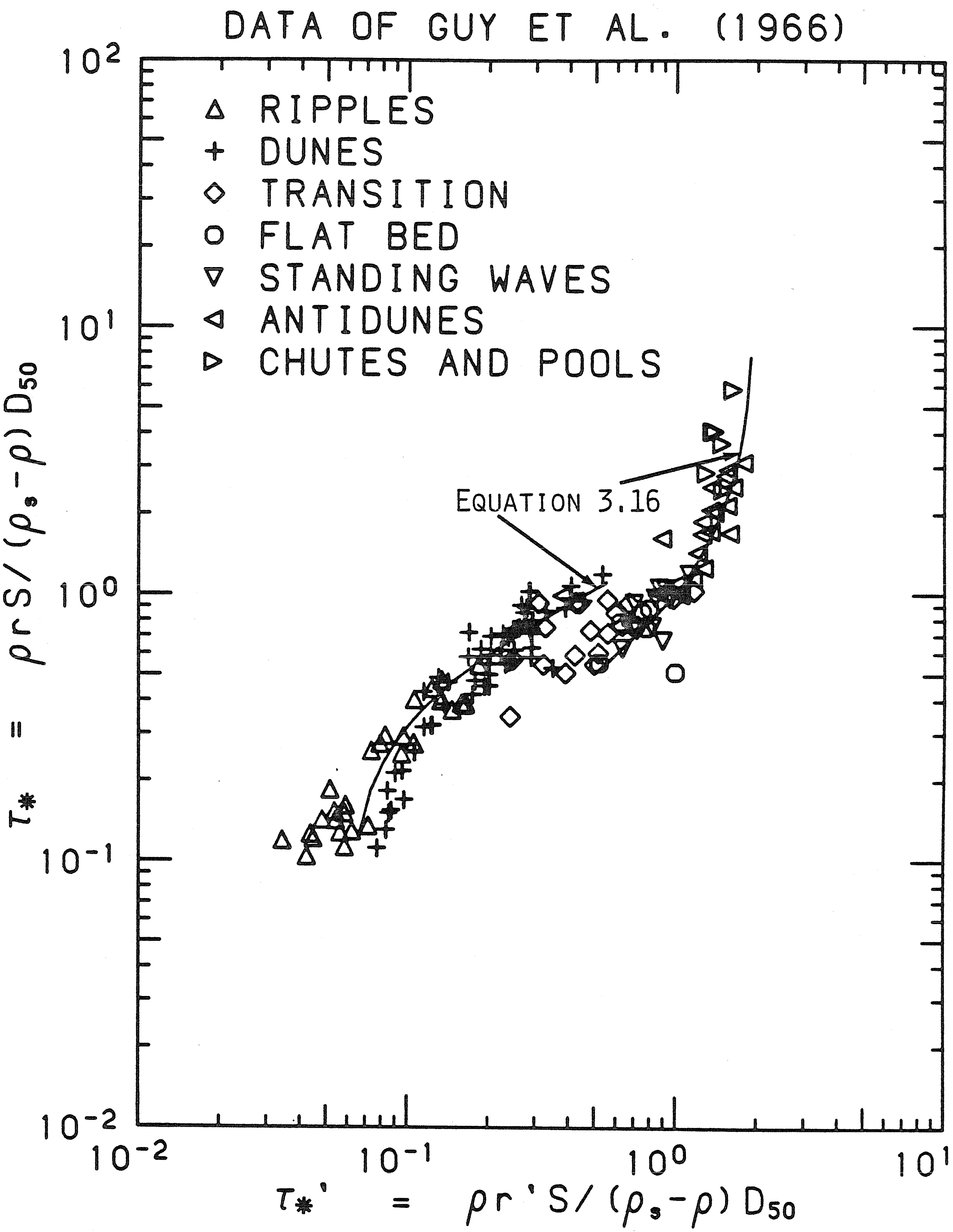

Figure 3.7a Comparison of Engelund technique with data of Guy et al. (1966).

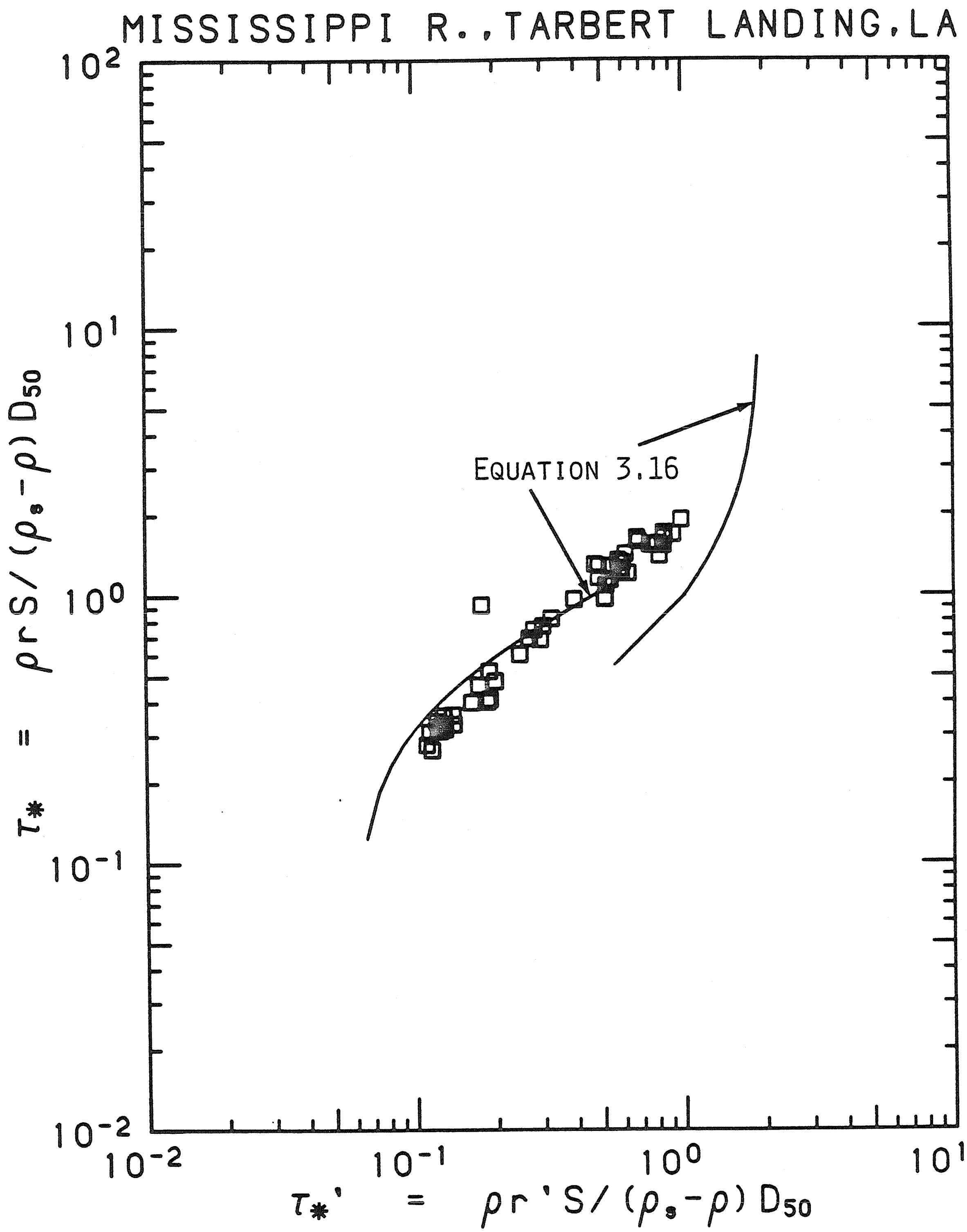

Figure 3.7b Comparison of Engelund technique with data for the Mississippi River, Tarbert Landing, Louisiana.

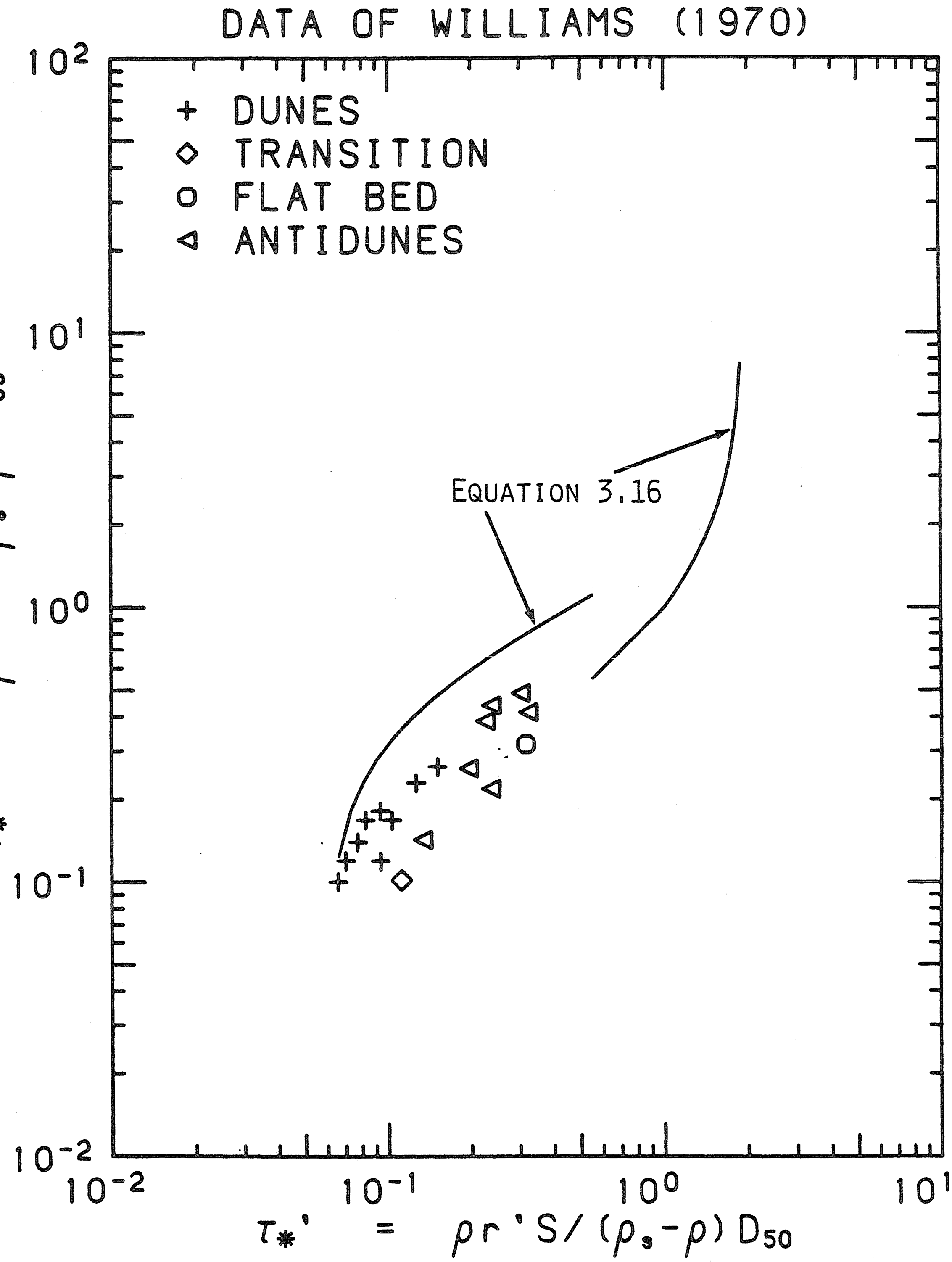

Figure 3.7c Comparison of Engelund technique with data of Williams (1970).

defining the transition region. The coarse sand data of Williams (1970), plotted in Fig. 3.7c, imply that the inclusion of some other variable may be necessary for certain ranges of data.

3.4.5 Garde and Ranga Raju Analysis (1970)

The original analysis for this technique was given by Garde and Ranga Raju (1966), later revised by Ranga Raju (1970), and summarized by Garde and Ranga Raju (1977). It is the revised version which is considered here. The technique does not employ the concept of divided resistance. In fact, the technique does not even require the calculation of a friction factor, per se.

Ranga Raju (1970) graphically presented a function of the form

$$K_1 F_R = K_1 q \sqrt{\frac{\rho}{(\rho_s - \rho) g r^3}} = f[K_2 (\frac{r}{D_{50}})^{1/3} S (\frac{\rho}{\rho_s - \rho})] \qquad (3.18)$$

where K_1 and K_2 are functions of mean particle size and F_R, as defined here, is a modified Froude number. By multiplying the independent variable in Eq. 3.18 by the dependent variable raised to the 2/9 power, a relation represented by

$$K_1 F_R = f[(K_2 S)(K_1 q_*)^{2/9} (\frac{\rho}{\rho_s - \rho})^{10/9}] \qquad (3.19)$$

can be determined, which is plotted in Fig. 3.8.

Like the Engelund (1967) analysis, Fig. 3.8 suggests that an upper and a lower regime exist, separated by a transition zone. However, in contrast to the Engelund technique, in Fig. 3.8, the transition occurs as a continuous function. For a given bed material and slope, Froude

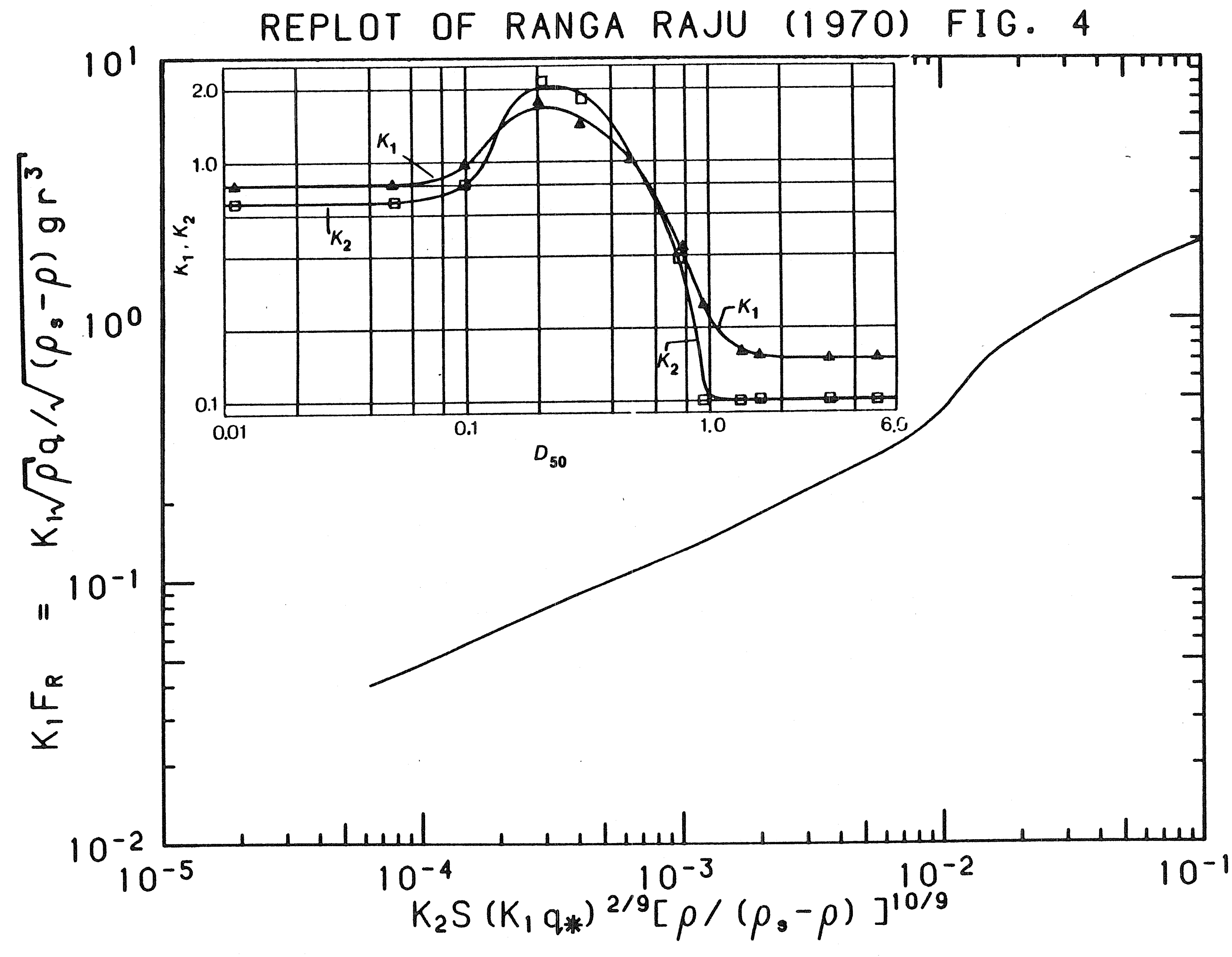

Figure 3.8 Replot of Ranga Raju (1970) diagram for determining densimetric Froude number, F_R.

number is a weak function of unit discharge, i.e. going to about the 0.10 power of unit discharge for both the upper and lower regimes. Therefore, for either of these regimes, a ten-fold increase in unit discharge causes only a 26 percent rise in Froude number.

Although Garde and Ranga Raju (1977) have not provided a rigorous statistical analysis of the data they used, they have given some indication of the expected accuracy of their technique. For 90 percent of the plotted data, they have stated that mean velocity was predicted to within 30 percent accuracy. Although a large body of data was used in the analysis, this is not an independent check of the technique, but merely a statement of the observed errors.

If the technique is to be adapted to numerical modelling applications, a specific function must be fitted to the curve in Fig. 3.8. The curve can be very closely approximated by three straight lines which, after rearranging, are represented by

$$V = b \frac{\sqrt{K_2}}{K_1} \left(\frac{r}{D_{50}}\right)^{1/6} \sqrt{grS} \qquad (3.20)$$

$$\text{where } b = \begin{cases} 3.46 & \text{....for } K_1F_R \leq 0.33 \qquad (3.20a) \\ 3.46 + 6.73 \log(3K_1F_R) & \text{....for } 1 > K_1F_R > 0.33 \qquad (3.20b) \\ 6.67 & \text{....for } K_1F_R \geq 1 \qquad (3.20c) \end{cases}$$

Equation 3.20 is similar to the Manning-Strickler Eq. 3.2, with the constant, a, replaced by a function of D_{50}. For D_{50} > 1.5 mm, Eq. 3.20c (upper flow regime) gives a = 13.2 (in Eq. 3.2), which is not too close to the value of a = 7.66 given by Strickler (1923).

If we consider only the lower regime, for a given channel, i.e. bed material and slope fixed (assuming uniform flow), two facts about Eq. 3.20a are evident. First, Manning's n is constant, and not a function of discharge. Second, transition begins when a certain Froude number is reached. This Froude number is not a function of slope, and depends only on K_1, a function of D_{50}. The analysis presented in the next chapter suggests that Froude number varies slightly within a flow regime and that the transition is somewhat different than indicated here. Nevertheless, the work of Garde and Ranga Raju have provided important clues for the development of the new technique.

3.4.6 White, Paris and Bettess Analysis (1979)

As originally presented, this technique does not utilize the divided resistance concept, however, like the Engelund (1967) analysis, the dimensionless shear stress can be related to a dimensionless grain shear-stress. White, Paris and Bettess (1979) have provided both graphical and equational representations of their technique, as well as a statistical analysis of the errors.

The authors have given two versions of their technique; one using D_{35} of the parent bed material and one using D_{65} of the surface material. The former has greater accuracy and is more compatible with the other techniques discussed in this paper, and is therefore discussed here. For this version, a dimensionless grain size is defined by

$$D_{gr} = D_{35}\left[\frac{g(\rho_s-\rho)}{\rho\nu^2}\right]^{1/3} \qquad (3.21)$$

which, in turn, is used to define the quantities

$$n = \begin{cases} 0 & \text{... for } D_{gr} \geq 60 \\ 1.0 - 0.56 \log D_{gr} & \text{... for } 1 \leq D_{gr} \leq 60 \end{cases} \qquad (3.22a)$$

$$\text{and } A = \begin{cases} 0.17 & \text{... for } D_{gr} \geq 60 \\ 0.23\, D_{gr}^{-1/2} + 0.14 & \text{... for } 1 \leq D_{gr} < 60 \end{cases} \qquad (3.22b)$$

Utilizing a divided slope approach, it is possible to define a grain shear-velocity by

$$u_*' = \frac{V}{\sqrt{32}\,\log\,(10r/D_{35})} \qquad (3.23)$$

and the corresponding dimensionless grain shear-stress as

$$\tau_*' = \frac{\rho u_*'^{\,2}}{gD_{35}(\rho_s-\rho)} = \frac{\rho r S'}{D_{35}(\rho_s-\rho)} \qquad (3.24)$$

The dimensionless mean shear-stress is then $\tau_* = (u_*/u_*')^2\tau_*'$. Using this definition, the White, Paris and Bettess (1979) method can be represented by

$$\tau_*' = \left[\frac{B(\sqrt{\tau_*} - A) + A}{\tau_*^{n/2}}\right]^{\frac{2}{1-n}} \qquad (3.25)$$

where

$$B = 1.0 - 0.76[1.0 - e^{-(\log D_{gr})^{1.7}}] \qquad (3.25a)$$

whereby, for a given value of D_{gr}, τ_*' is a continuous function of τ_*.

It is possible to present an analysis similar to the one given for the Engelund technique, relating hydraulic radius to unit discharge and slope. However the resulting diagram (analagous to Fig. 3.6), due to the added variable D_{gr}, would be too confusing to be of much use. It is more appropriate to examine a specific example, as in Fig. 3.9. The data in Fig. 3.9, D_{50} = 0.45 mm and D_{gr} = 10.1, represent a portion of the data plotted in Fig. 3.7a. While the Engelund (1967) technique (see Fig. 3.7a) predicts reasonably well over the whole range of data, the White, Paris and Bettess (1979) technique (Fig. 3.9) does a better job in the dune range, but is otherwise a poor predictor. Comparisons with other sets of field and laboratory data verify the hypothesis that the present technique gives reasonable results only for flow over dunes. Under no circumstances does the technique describe upper and lower flow regimes.

The behavior displayed in Fig. 3.9 is partially explained by an examination of the way in which the technique was originally derived. The key lies in the empirical expression Eq. 3.25a, which was derived from a plot of average values of B, defined by a rearrangement of Eq. 3.25, against 47 values of D_{gr}. The average values of B were determined from 837 laboratory experiments with sand, collected from 16 investigators. Only Froude numbers less than or equal to 0.8 were used. The fact that average values were used would tend to reduce the scatter, while the fact that only low Froude numbers were used explains why only the lower flow regime is described. In testing the technique with an extended data set (also Froude numbers less than or equal to 0.8), the authors have stated that 89 percent of the total calculated friction factors were within a factor of two, while 44 percent were within 0.80 and 1.25 of the observed value.

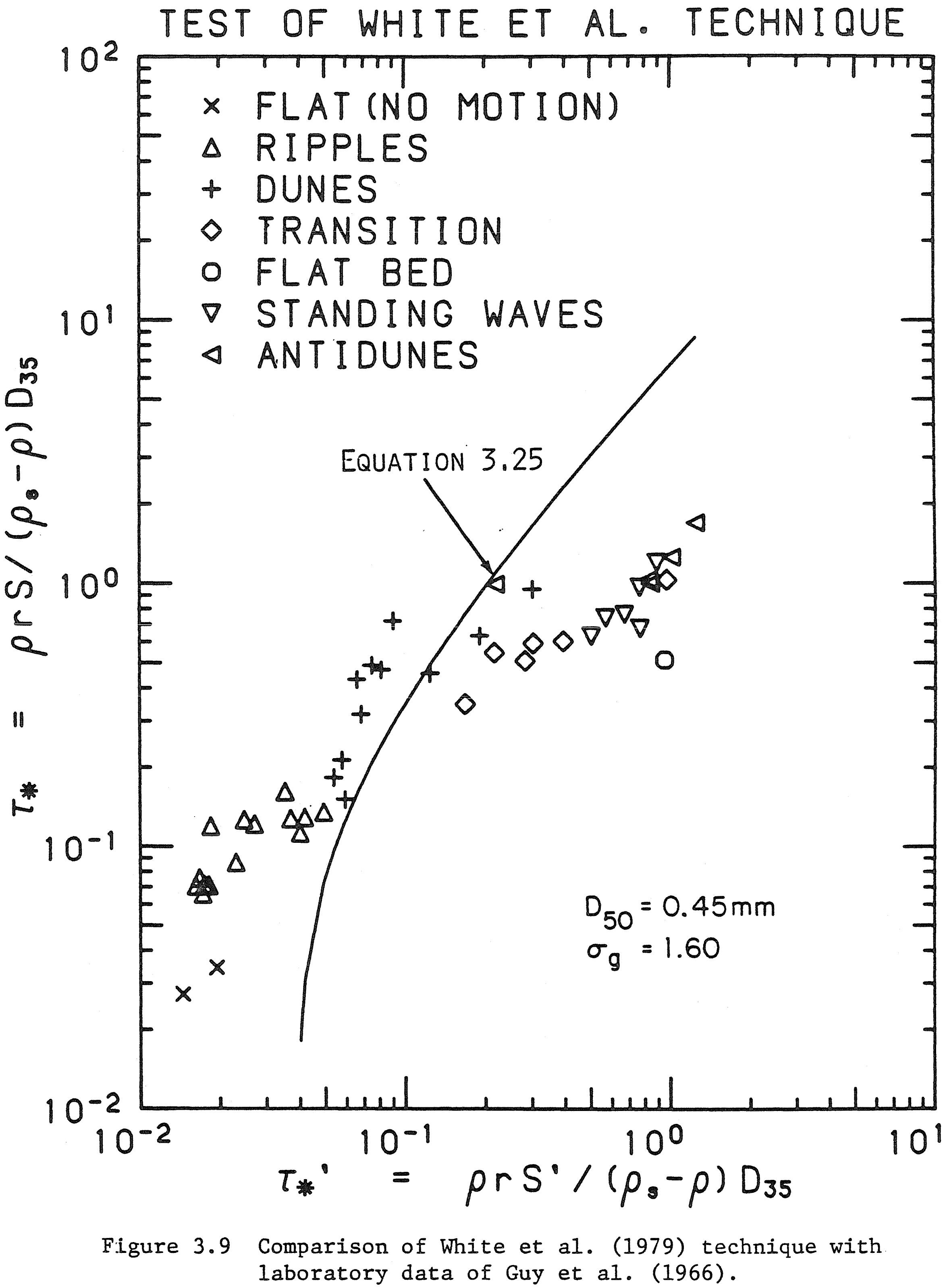

Figure 3.9 Comparison of White et al. (1979) technique with laboratory data of Guy et al. (1966).

3.5 Summary

In this chapter, six stage-discharge predictors have been discussed. Each technique provides some insight into the processes involved, and yet, no technique appears to provide a totally satisfactory analytical tool for the numerical modeller. The relation between shear stress and grain shear stress as defined by Engelund (1967) is perhaps the most satisfactory.

In Chapter 4, a new technique is proposed, which the writer believes does provide such a tool. Near the end of the chapter, a comparison is given for the proposed method and the techniques that have just been discussed.

The assumption was made in the analysis of the six techniques that they apply to wide channels, or that sidewall effects have been removed. Under this assumption the hydraulic radius, r, and mean flow depth, d, are equivalent. Alam, Cheyer, and Kennedy (1965); Einstein and Barbarossa (1952); and Garde and Ranga Raju (1970) actually used r in their analyses, while the others used mean flow depth, d, which was called r in the analysis.

CHAPTER 4

A PROPOSED METHOD FOR CALCULATING FLOW DEPTH IN SAND-BED CHANNELS

The foregoing analysis of available techniques indicates that none of those that are described satisfy the four desired attributes established in Chapter 3. Nevertheless, each of the analyses is useful and has provided inspiration for the derivation that follows. The proposed technique is easy to use and requires no iteration or graphical interpolation for wide channels. For laboratory channels q = vr rather than q = vd, therefore, for some applications iteration may be required.

4.1 Dimensional Analysis

The particle sizes of most river sands are approximately log-normally distributed, by weight, therefore the sand can be described by two measures of grain size, D_{50} and σ_g, and its specific gravity, ρ_s. Adding the flow variables and the fluid variables gives

$$r = f(q,\ S,\ g,\ \rho,\ \nu,\ \rho_s,\ D_{50},\ \sigma_g) \tag{4.1}$$

Using the π-theorem, the 9 variables in Eq. 4.1 can be arranged into 6 dimensionless groups in the form

$$\frac{rS}{D_{50}} = \frac{(\rho_s-\rho)}{\rho}\,\tau_* = f\left(q_*,\ S,\ \sigma_g,\ R,\ \frac{\rho_s-\rho}{\rho}\right) \tag{4.2}$$

where $q_* = q/\sqrt{gD_{50}^3}$ and $R = 4q/\nu$.

Since we are primarily interested in fully rough flow, R is expected to be of secondary importance. Preliminary tests on large bodies of data have verified this conclusion. Furthermore, since only sand is under consideration, $(\rho_s - \rho)/\rho$ will be constant, and can be put aside. Therefore, Eq. 4.2 can be reduced to

$$\frac{(\rho_s-\rho)}{\rho} \tau_* = f(q_*, S, \sigma_g) \quad (4.3)$$

4.2 Formulation of a Pair of Equations

We are now ready to develop a specific relationship which can be generally described by Eq. 4.3. It is assumed that, to a first approximation, the flow resistance in a channel will be determined by the largest scale of bed roughness. Then, for flow over a dune bed, we might expect friction factor to be defined by a semilogarithmic equation similar to Eq. 3.4, but with k_s replaced by a measure of equivalent dune roughness, k_d. As shown in Fig. 3.2, this equation can be approximated by the power law, Eq. 3.2. Replacement of k_s in Eq. 3.2 by k_d, after considerable rearrangement, yields

$$(\frac{\rho_s-\rho}{\rho})\tau_* = a^{-0.6}(\frac{k_d S}{D_{50}})^{0.1}(q_* S)^{0.6} \quad (4.4)$$

If the particle sizes of a bed material are log-normally distributed, by weight, then any given size fraction can be related to the mean size, D_{50}, by

$$D_s = \sigma_g^{z} D_{50} \quad (4.5)$$

where z is the number of standard deviations from the mean and the subscript "s" refers the percent by weight of particles which are smaller than the given size. For example, if z=1, since the distribution is log-normal, $D_s = D_{84}$, and 84 percent of the particles in a sample, by weight, are finer than D_{84}. We can now define a dimensionless shear stress based on this particle size by $\tau_{*s} = \tau_* / \sigma_g^{\,z}$. For non-uniform bed materials, we can replace τ_* in Eq. 4.4 by τ_{*s}, thereby normalizing the bed shear-stress by some particle diameter other than D_{50}.

One variable appears in Eq. 4.4, k_d, the measure of dune roughness, which is not included in the independent variables listed in Eq. 4.1. Therefore, k_d should, in fact, be a dependent variable. Since this variable appears in the equation raised to the 0.1 power, only large changes in k_d will be important, and an exact definition is not a critical factor in obtaining sufficient accuracy in the prediction of τ_*. Assuming that k_d/D_{50} is proportional to the product of undetermined powers of q_* and S, upon substituion into Eq. 4.4 (also recalling the definition of τ_{*s}), yields

$$\left(\frac{\rho_s - \rho}{\rho}\right)\tau_* = w(q_* S)^x \, S^y \, \sigma_g^{\,z} \tag{4.6}$$

where w, x, y and z are constants to be fitted empirically. If the dependence of k_d/D_{50} on q_* and S is fairly weak, x is expected to be approximately equal to 0.6 and y is expected to be approximately equal to 0.1.

It is possible to represent Eq. 4.6 in a reasonably simple diagram by rearranging it as (with $\tau_{*s} = \tau_*/\sigma_g^z$)

$$\left(\frac{\rho_s-\rho}{\rho}\right)\tau_{*s} = w(q_* S^{1+\frac{y}{x}})^x \qquad (4.7)$$

which can be represented by a straight line on a log-log plotting scale. Lower regime (ripple and dune) data, from laboratory flumes, rivers and canals, gathered from 22 sources, were used to fit the coefficients. By taking the logarithms of both sides of Eq. 4.6, the coefficients w, x, y and z were determined by multiple regression. The data and the best fit line are shown in Fig. 4.1. Because nearly 900 runs were used in the analysis, only every third point is plotted. The values of w, x, y and z are 0.3724, 0.6539, 0.09188 and 0.1050, respectively, with a multiple correlation coefficient, R = 0.992, indicting excellent agreement.

A similar analysis can be performed for the flat bed regime. In this case, the largest roughness scale of the bed should be some measure of the bed material. Therefore, k_d in Eq. 4.4 will be replaced by some D_s, and we can again derive an equation with the form of Eq. 4.6. The coefficients will take on new values, and this time the values of x and y should be almost identical to 0.6 and 0.1, respectively. Furthermore, if the Strickler equation is approximately correct with the value a=8.32 (see Fig. 3.2), then w should be about 0.28.

A regression analysis identical to the one performed for dune and ripple data was performed for flat bed or upper regime data. This data includes flat beds, before and after initiation of motion, standing waves and antidunes. The same 22 data sources have again been used,

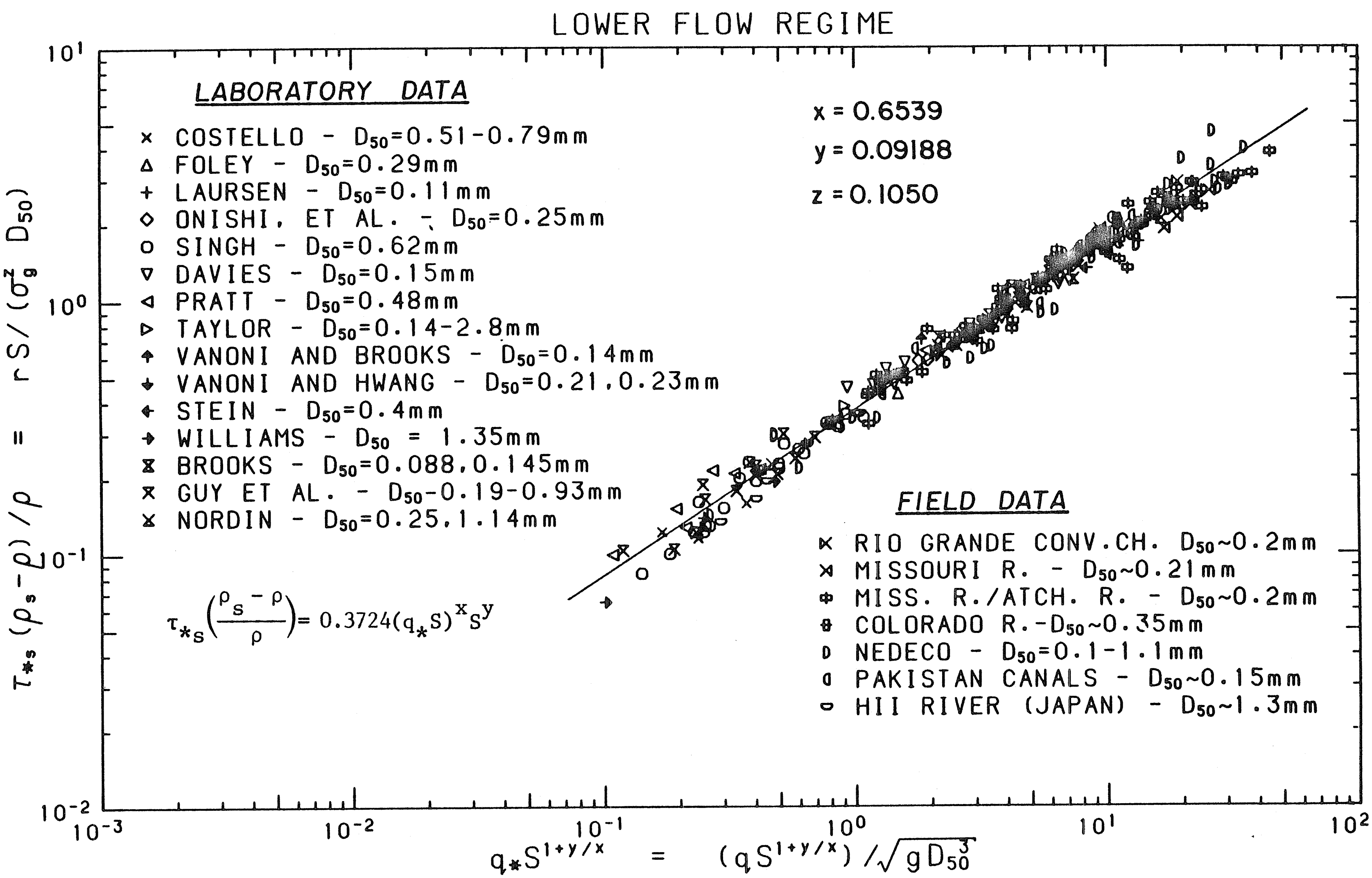

Figure 4.1 Relationship between dimensionless shear stress, τ_{*s} and q_* and S, for lower flow regime (dune and ripple bed forms).

although not all contain data for these bed classes. The values of w, x, y and z are now 0.2836, 0.6248, 0.08750 and 0.08013, respectively, with a cross-correlation coefficient, R = 0.999. Note that, indeed, w, x, and y are close in value to 0.28, 0.6, and 0.1, respectively. The data and best fit line are plotted in Fig. 4.2.

An error analysis of the regression procedure is given, by data source, in Table 4.1. The errors are quite small, especially when one considers the accuracy of the data. For example, Guy et al. (1966) have indicated that errors in slope measurements may be as high as 15-20 percent, while errors in depth measurements may be on the order of 5 percent. This range of errors is probably typical of many of the data sets.

The data used in this analysis were selected from a pool of data collected from over 70 sources which was assembled in connection with this study. The 22 sources that were finally used in the analysis were selected because they covered a wide range of the desired variables, and because the data seemed to be carefully collected and documented. Only laboratory data with bed form observations have been included. For field data, this restriction would have been too limiting, and where bed form was not given, only observed flows which could logically be assumed to have dune beds were selected. The ranges of important variables are given in Table 4.2. Since only sand beds are being considered, median particle-sizes were generally limited to values between 0.062 mm to 2.0 mm, although a few runs at 2.8 mm were included. To avoid samples with large amounts of gravel or fine material, geometric standard deviations

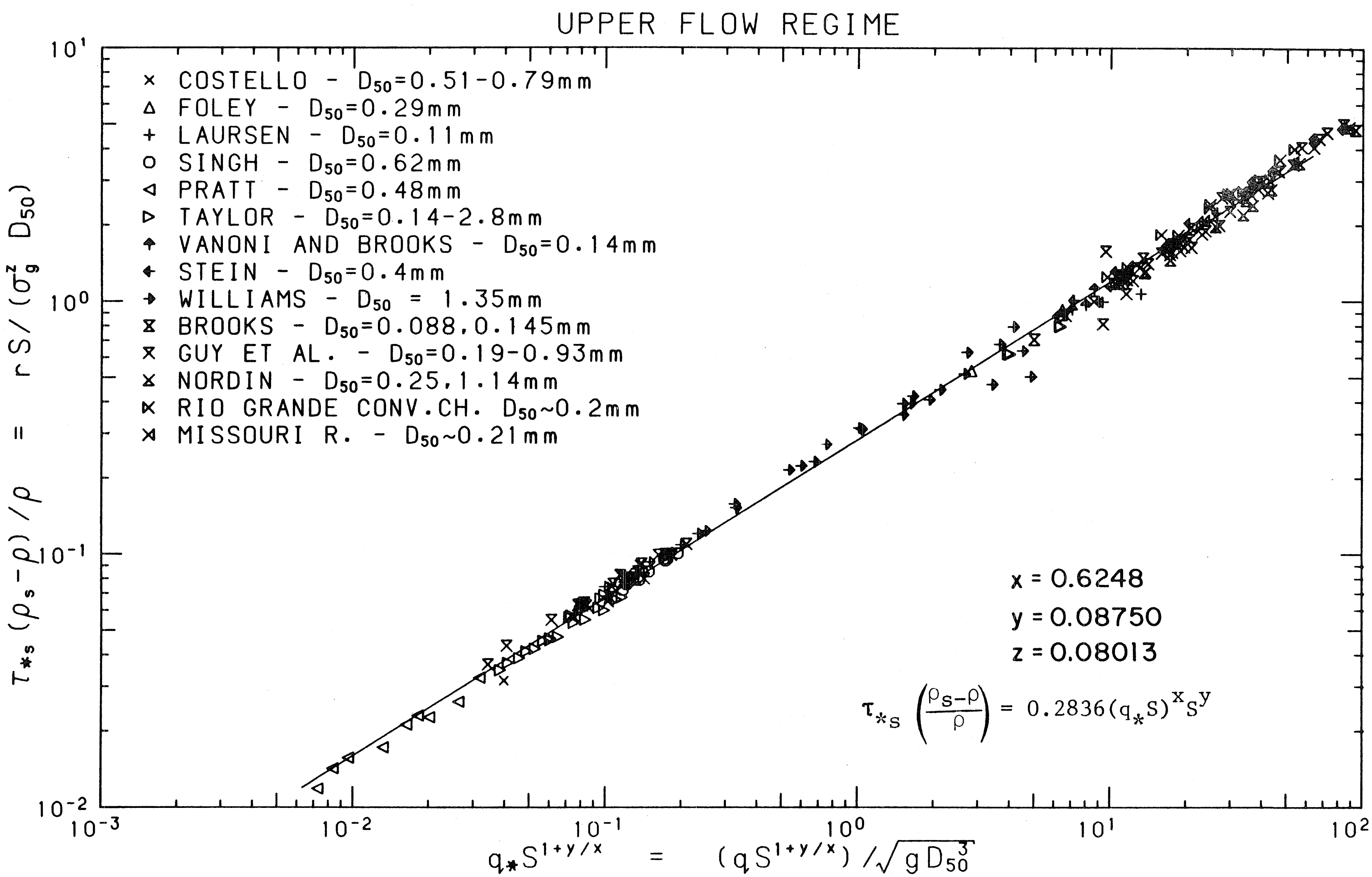

Figure 4.2 Relationship between τ_{*s} and q_* and S, for upper flow regime (dune and ripple bed forms)

Table 4.1

Error Analysis of New Method for Laboratory and Field Data

Source	Lower Regime: Number of Records	Lower Regime: Average % Error in τ_*	Lower Regime: Standard Deviation of Errors	Upper Regime: Number of Records	Upper Regime: Average % Error in τ_*	Upper Regime: Standard Deviation of Errors
Laboratory Data						
1 Costello (1974)	8	12.6%	12.7%	8	-2.6%	9.2%
2 Foley (1975)	1	12.5	-	3	1.1	1.9
3 Laursen (1958)	10	0.1	10.0	1	32.8	-
4 Onishi, Jain, & Kennedy (1972)	12	-0.8	6.9	0	-	-
5 Singh (1960)	62	6.9	11.0	12	0.1	2.2
6 Davies (1971)	34	-1.4	10.7	0	-	-
7 Pratt (1970)	37	-6.7	7.6	9	5.1	4.9
8 Taylor (1971)	12	0.0	7.0	25	5.5	5.0
9 Vanoni & Brooks (1957)	12	7.3	9.8	3	3.0	4.2
10 Vanoni & Hwang (1967)	6	-1.0	5.9	0	-	-
11 Stein (1965)	20	2.5	13.9	24	-2.6	5.6
12 Williams (1970)	14	15.0	7.9	29	-1.9	13.2
13 Brooks (1957)	2	-6.7	0.7	2	7.2	2.7
14 Guy, Simons, & Richardson (1966)	97	-1.0	9.9	65	0.3	9.9
15 Nordin (1976)	17	-0.9	8.5	13	6.0	7.0
Field Data						
16 Rio Grande Conveyance Channel, New Mexico	9	-6.4	6.7	12	-9.5	3.9
17 Mississippi & Atchafalaya Rivers[1]	233	0.6	11.8	0	-	-
18 Colorado River at Taylor's Ferry, AZ	30	-6.8	4.5	0	-	-
19 Missouri River near Omaha, Nebraska	11	22.0	5.0	1	-3.7	-
20 NEDECO[2] - So. Amer. river data	96	6.7	17.6	0	-	-
21 ACOP[3] - Pakistan Canals	148	-3.6	7.4	0	-	-
22 Hii River, Japan, 5 stations	23	6.0	9.3	0	-	-
All sources	894	0.7	12.1	207	0.4	9.5

[1]Mississippi River at Tarbert Landing, LA, and at St. Louis, MO, and the Atchafalaya River at Simmespot, LA.

[2]Data collected by Netherlands Engineering Consultant (NEDECO) on the Rio Magdelena and the Canal del Dique, Columbia, S.A., 10 stations each.

[3]ACOP - Alluvial Channels Observation Project data from 14 study reaches on 5 canals.

Table 4.2
Range of Data Used in Analysis

Variable	Minimum	Maximum
Median particle size, D_{50} (mm)	0.088	2.8
Unit discharge, $q(m^3/s/m)$ [Discharge $Q(m^3/s)$]	0.012 [0.0032]	40 [22,000]
Slope, S	3.0×10^{-6}	3.7×10^{-2}
Hydraulic radius, r (m)	0.025	17
Temperature, T (°C)	0	63
Also:		
Width-to-depth ratio, w/d	Greater than or equal to 4	
Geometric standard deviation of particle sizes, σ_g	Less than or equal to 5	

were restricted to values between 1 and 5, with no exceptions.

The present analysis was undertaken to develop a means of predicting hydraulic radius, which for wide channels is equivalent to mean depth. To avoid sidewall effects in laboratory data, only experiments with width to depth ratios, w/d, greater than 4 were considered. The sidewall correction suggested by Vanoni and Brooks (1957) was used to calculate the hydraulic radius of the bed, which is equivalent to the mean depth of a flow in a wide channel with the same slope, mean velocity, and bed friction factor. For most of the field data, only mean depth, and not hydraulic radius, was available. For consistency, mean depth was used in place of hydraulic radius for all field data, but w/d was restricted to values greater than 20, i.e. wide channels. Values of both hydraulic radius and mean depth were published for the Mississippi River at St. Louis, by Jordan (1965). A comparison of 56 measurements made during the years 1950 through 1954 indicates that hydraulic radius was 3.8 percent lower than mean depth, with a standard deviation of less than 1 percent. Therefore, the two are very closely correlated, and the difference is within the factor of uncertainty of the analysis.

The difference between the upper and the lower regime is illustrated in Fig. 4.3. Best fit lines are shown for each regime, with a one standard deviation error range indicated by dashed lines. In order to draw the two lines on the same plot, a best fit of the upper regime data was performed on the data after they were reduced to two dimensionless groups, using the regression coefficients for the lower

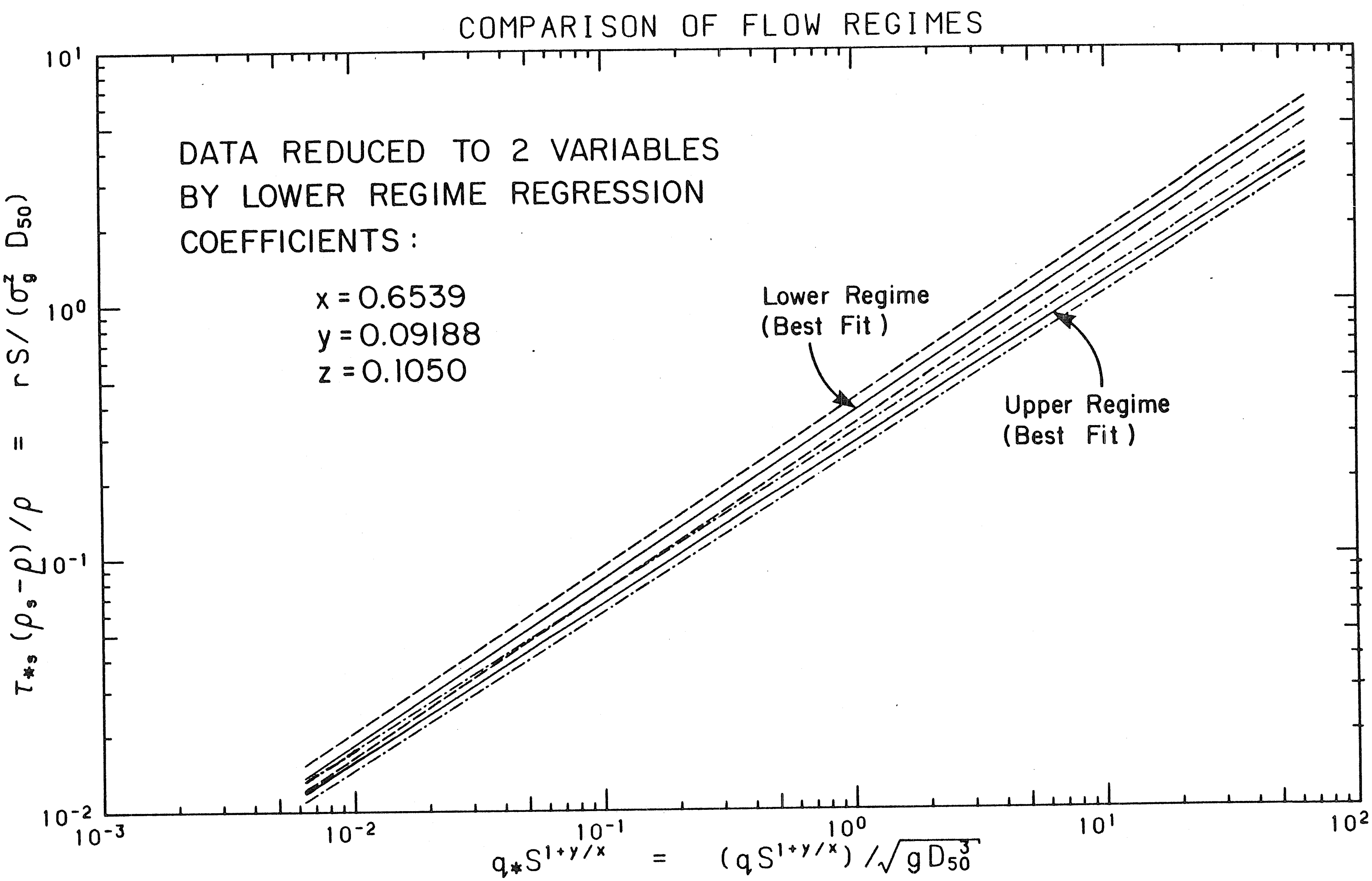

Figure 4.3 Comparison of flow regimes - solid lines represent best fit lines of data reduced to two variables by means of the lower regime values of the exponents x, y and z, dashed lines represent one standard deviation error bars.

regime, in the form of Eq. 4.7. The resulting upper regime line in Fig. 3.3 has only a slightly lower correlation coefficient than the line shown in Fig. 3.2. For a value of 10 on the abscissa of Fig. 3.3, a channel with a given slope would have an r value, in the lower regime, 36 percent larger than in the upper regime. At a value of 0.1 on the abscissa this difference would be only 18 percent.

4.3 Determination of Flow Regime

So far, for a given set of independent variables, there are two possible solutions for r, one for the upper regime, and one for the lower regime. A way of deciding which flow regime to expect is needed. From the dimensional analysis, neglecting $(\rho_s-\rho)/\rho$, the flow regime should be determinate given four independent dimensionless groups. These groups need not be the same as those used in Eq. 4.2. For a given flow regime, the mean velocity and hydraulic radius can be calculated, and can therefore be used in the new dimensionless groups.

Deformation of the bed must be a function of the forces on the particles which make up the bed. After consideration of many possible dimensionless groups, the following four were selected as indicators of flow regime:

$$F_g, \frac{D_{50}}{\delta}, S, \sigma_g$$

F_g is the grain Froude number, defined as $\sqrt{\rho}\, v/\sqrt{(\rho_s-\rho)g\, D_{50}}$, representing the square root of the ratio of drag forces on a particle to its weight. The second parameter, D_{50}/δ, is the ratio of the mean grain size to the thickness of the laminar sublayer, and is defined by $u'_* D_{50}/11.6\nu$. The variable u'_* , the shear velocity, is assumed to be equivalent to u_* as defined by Eq. 4.6 with the upper regime coefficients, for a flow with a given slope and unit discharge. Of the final two dimensionless parameters, only slope has been used in the actual analysis, since the effects of σ_g are believed to be small, and few data are available on its impact on transition.

The flow regime relationship between F_g and S is illustrated in Fig. 4.4. The first point that is immediately obvious from Fig. 4.4 is that beyond a slope of S = 0.006, only upper regime flow exists. For lower values of slope, an approximate dividing line can be defined by

$$F_g = F_g' = 1.74\ S^{-1/3} \qquad (4.8)$$

The overlap along this line indicates that an additional variable will be needed to improve the definition of the transition zone.

In Fig. 4.5, values of F_g/F_g' for transition data with $S < 0.006$ are plotted against D_{50}/δ . Division of F_g by F_g' eliminates the bias that would be introduced by slope alone. Included with the data sets used previously is the set of data of Hill et al. (1969) which was collected for the purpose of defining the transition between the flow regimes. To include all of this data, it was necessary to wave the requirement that width-to-depth ratio be larger than four, which was adhered to for all other data sets. The transition region can be defined by the equations

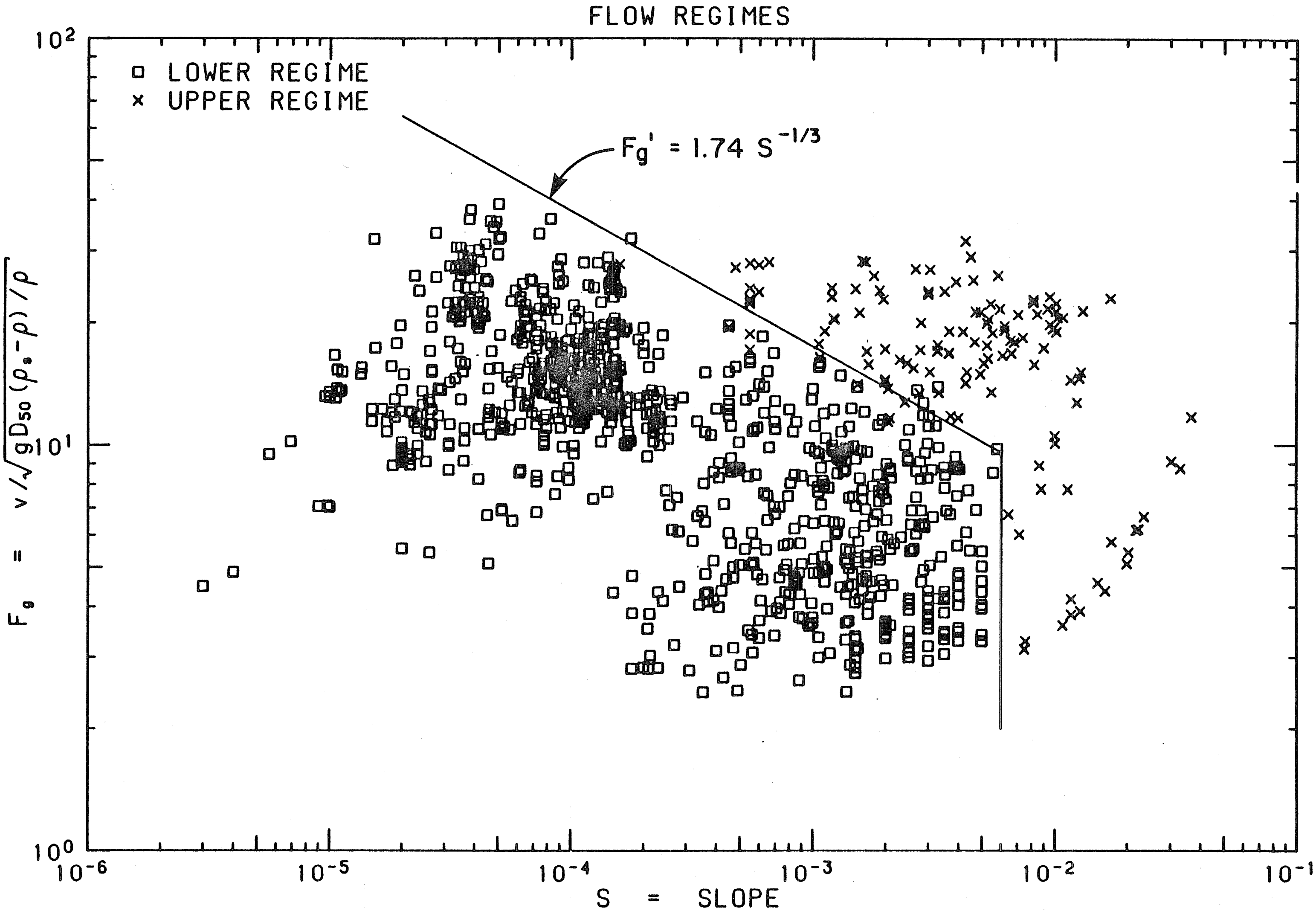

Figure 4.4 Determination of flow regimes - grain Froude number, F_g, plotted against slope, S. This diagram generally agrees with the more detailed diagrams given by Vanoni (1974).

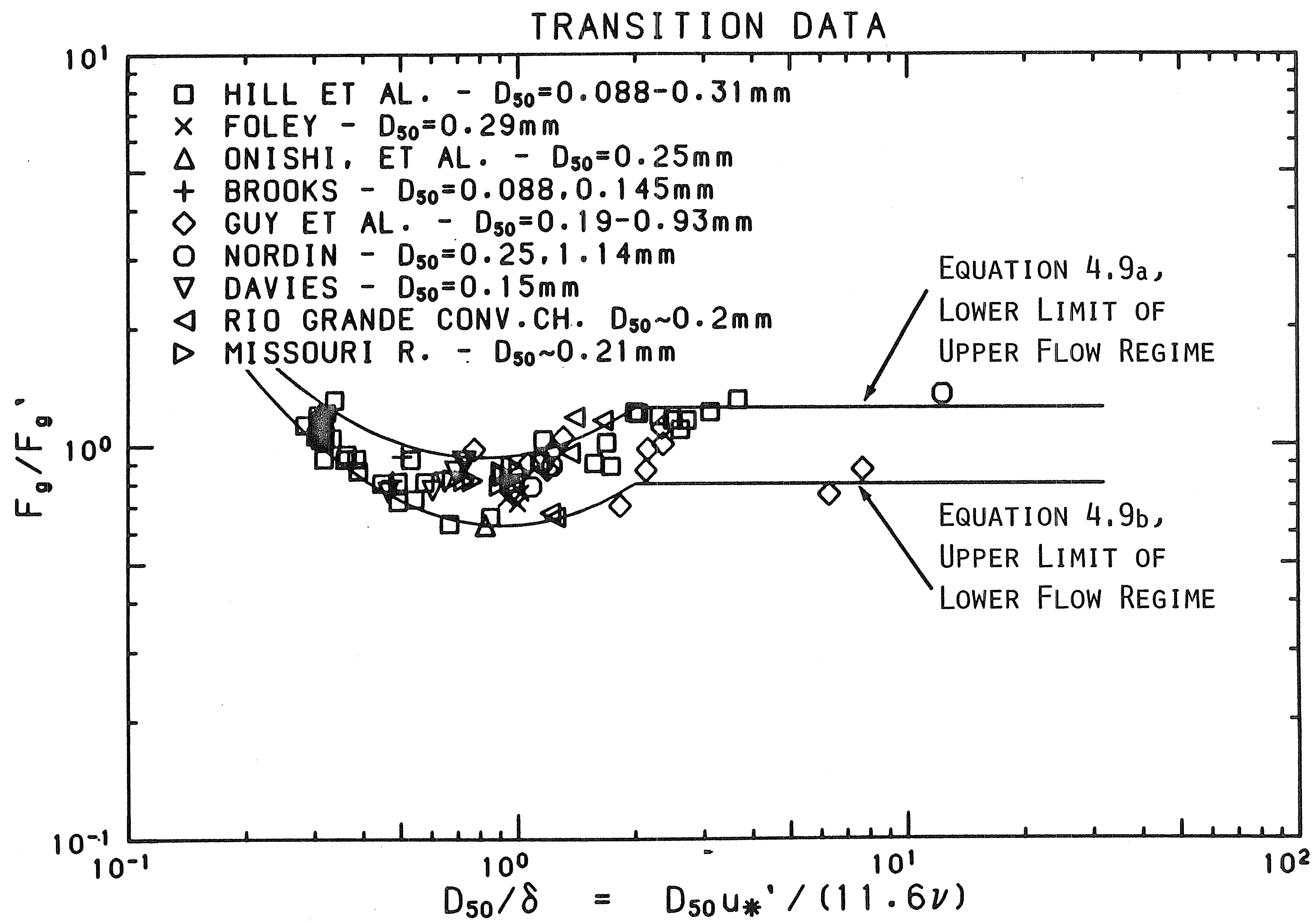

Figure 4.5 Viscous effects on the transition from lower flow regime to upper flow regime.

for the lower limit of the upper flow regime:

$$\log \frac{F_g}{F_g'} = \begin{cases} -0.02469 + 0.1517 \log \frac{D_{50}}{\delta} + 0.8381(\log \frac{D_{50}}{\delta})^2 & \ldots\text{for } \frac{D_{50}}{\delta} < 2 \\ \log 1.25 & \ldots\text{for } \frac{D_{50}}{\delta} \geq 2 \end{cases} \quad (4.9a)$$

and, for the upper limit of the lower flow regime:

$$\log \frac{F_g}{F_g'} = \begin{cases} -0.2026 + 0.07026 \log \frac{D_{50}}{\delta} + 0.9330(\log \frac{D_{50}}{\delta})^2 & \ldots\text{for } \frac{D_{50}}{\delta} < 2 \\ \log 0.8 & \ldots\text{for } \frac{D_{50}}{\delta} \geq 2 \end{cases} \quad (4.9b)$$

Between these values lies the transition regime. The value $D_{50}/\delta = 0.2$ is the lower limit of all data used in the present analysis.

By using Figs. 4.4 and 4.5 and the equations for mean shear stress for the upper and lower flow regimes, it is possible to determine which flow regime will exist for a set of independent variables. To do this it is necessary to calculate F_g' from Eq. 4.8, D_{50}/δ, and values of F_g from Eq. 4.6, using regression coefficients for both the upper and lower regimes. It is now possible to locate two points on Fig. 4.5, one for the upper regime and one for the lower regime. Three conditions are possible. The most likely condition is that only one of the two points will fall in its correct zone, in which case this flow regime is expected. A second possibility is that neither point will fall in the correct region, in which case neither solution is valid. This condition will be clarified later. Finally, for some low values of D_{50}/δ, both points will lie in their correct region of the diagram, in which case multiple solutions are possible. As formulated, this condition will be rare since, in general, the ratio of upper and lower regime values of F_g will be less than the width of the transition zone.

To facilitate calculation of the mean velocities at which transition will take place for a particular channel with uniform flow, a final transition diagram was created (Fig. 4.6). By using the resistance equation for upper regime flow, it is possible to eliminate flow variables as input in the definition of the transition zone. Using channel variables combined with Eq. 4.9a, and, assuming transition takes place with an approximately constant value of D_{50}/δ, Eq. 4.9b. The resulting diagram, Fig. 4.6, can be used to determine the the maximum flow velocity in the lower regime and the minimum velocity in the upper regime, given values of D_{50}, σ_g, S and temperature. The variable R_g in Fig. 4.6 is the grain Reynolds number, $\sqrt{gD_{50}^3}/\nu$.

4.4 Verification of Proposed Method

A method has been described which can be used either graphically or numerically to determine a rating curve or to determine depth of flow for a specific condition. It now remains to be tested for some data which have not been used in the developement of the technique.

Dawdy (1961) presented data for several rivers with discontinuous rating curves, of which four sets are shown in Figs. 4.7a-d. Given S, D_{50} and σ_g, and assuming water temperature = 20° C, it is possible to derive average rating curves for the upper and lower regimes, and define an approximate transition zone, from the preceding analysis. Given the fact that the input data are of only one or two digit accuracy, the

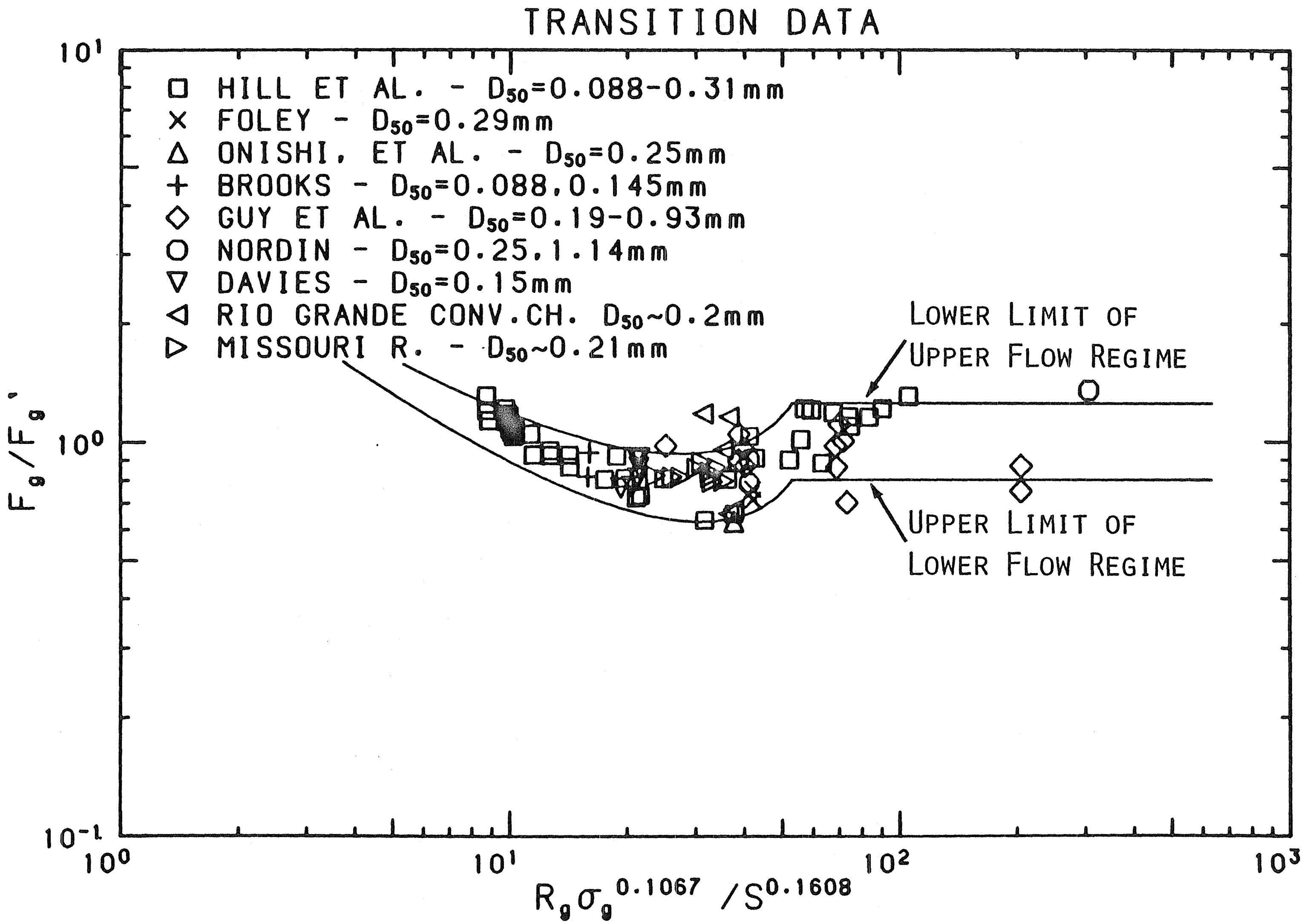

Figure 4.6 Replot of Fig. 4.5, defining the viscous effects in terms of the desired independent variables.

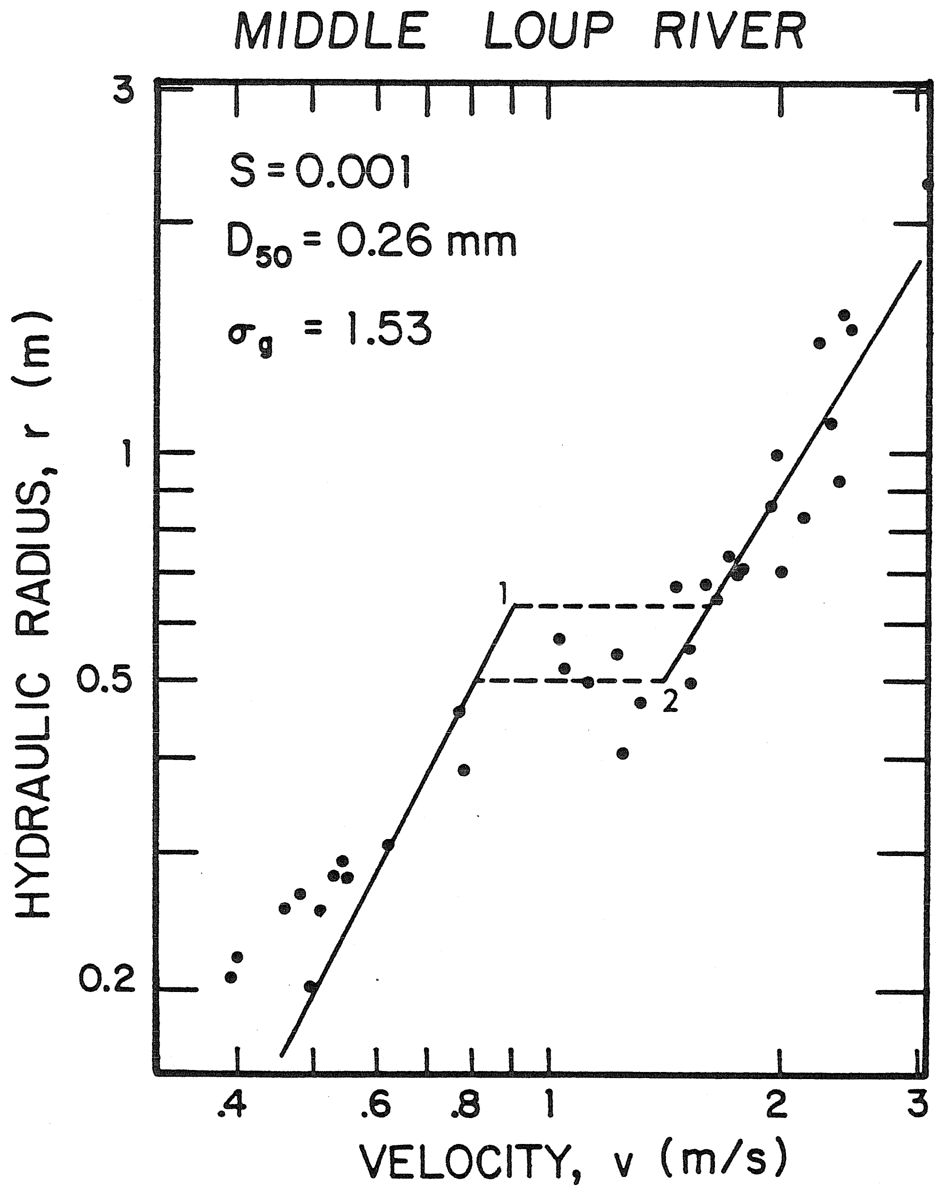

Figure 4.7a Rating curves determined by the new technique, from average bed slope and average D_{50} and σ_g, for data plots of Dawdy (1961) for Middle Loup River at St. Paul, Nebraska.

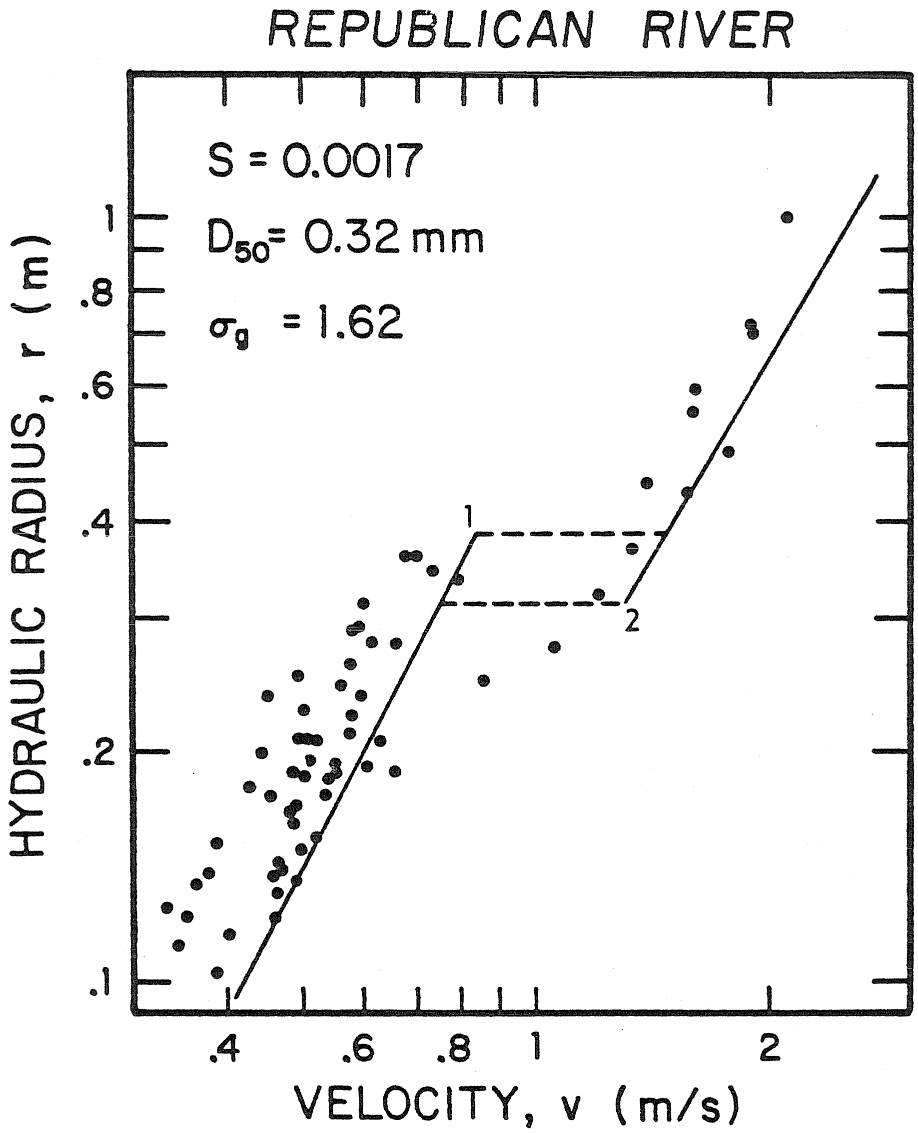

Figure 4.7b Rating curves determined by the new technique, from average bed slope and average D_{50} and σ_g, for data plots of Dawdy (1961) for Republican River at Stratton, Nebraska.

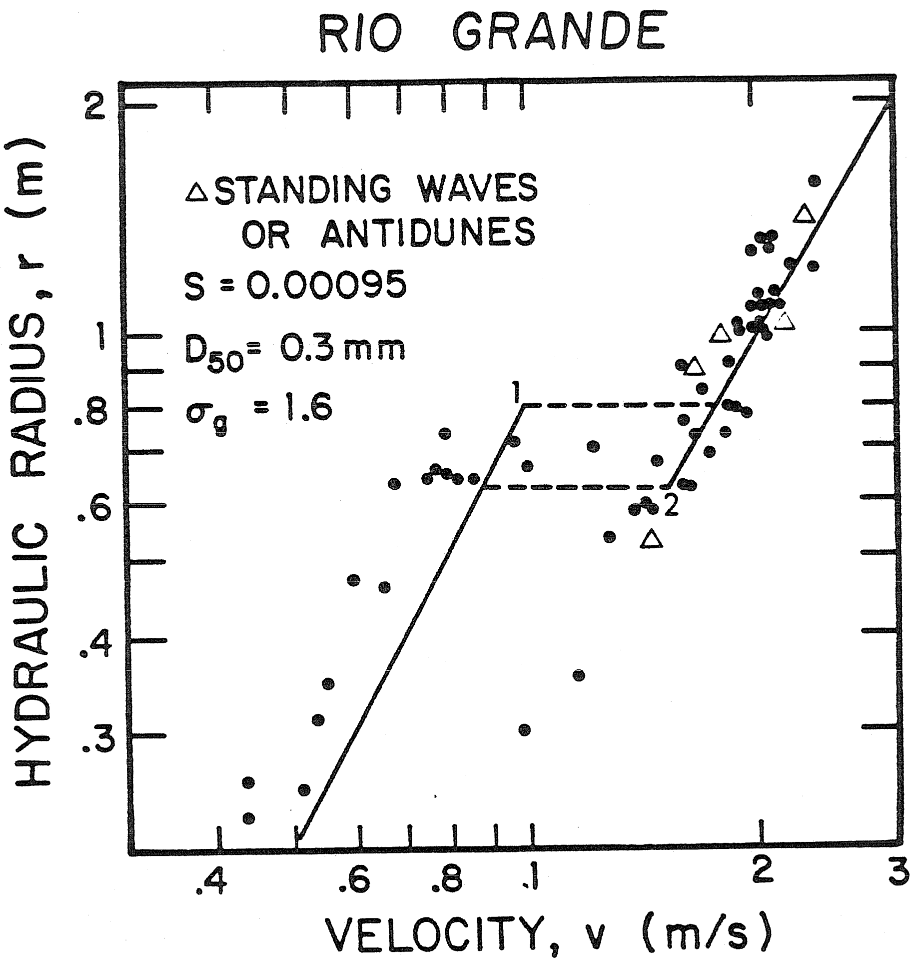

Figure 4.7c Rating curves determined by the new technique, from average bed slope and average D_{50} and σ_g, for data plots of Dawdy (1961) for Rio Grande near Bernalillo, New Mexico.

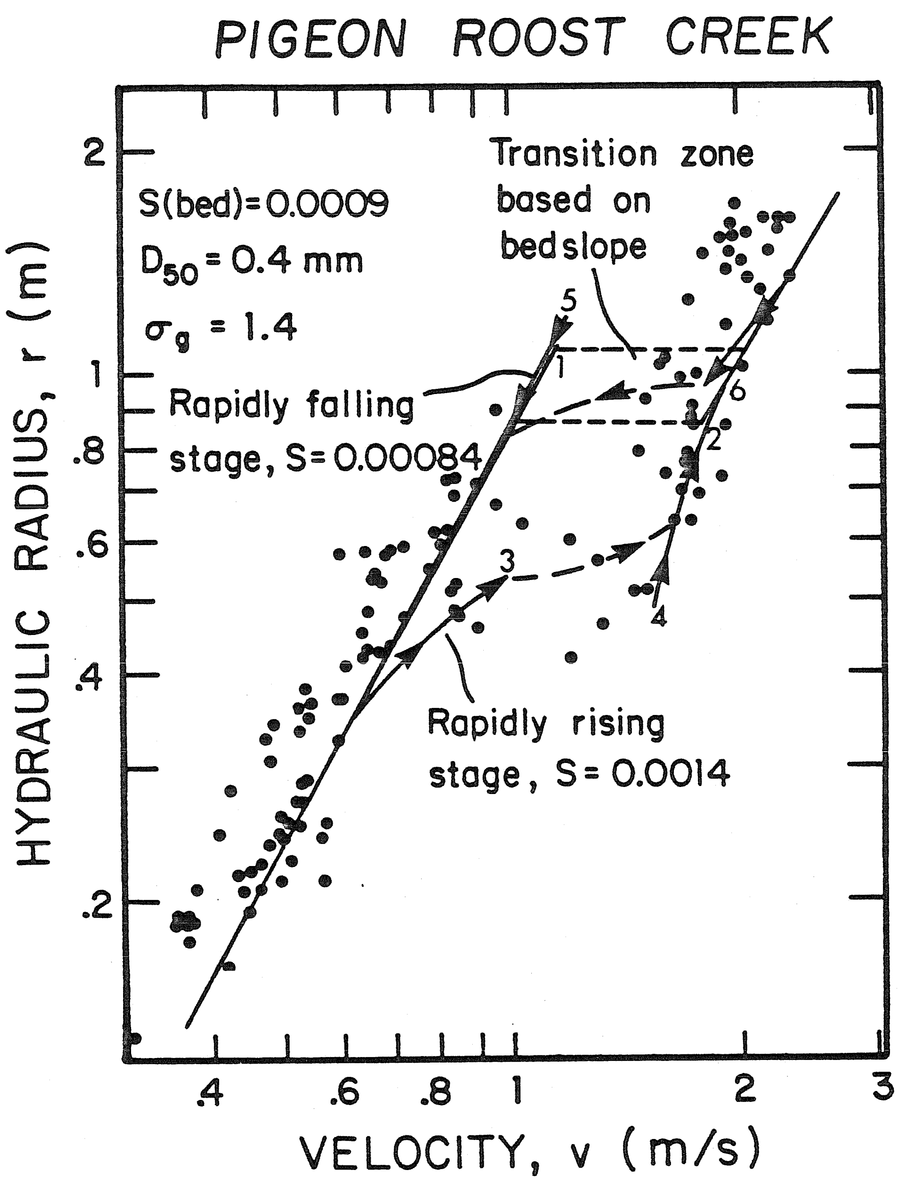

Figure 4.7d Rating curves determined by the new technique, from average bed slope and average D_{50} and σ_g, for data plots of Dawdy (1961) for Pigeon Roost Creek near Byhalia, Mississippi.

curves shown in Fig. 4.7 are quite reasonable. At 20° C, viscous effects are not important, and the location of the transition zone is based only on the slope, which is taken to equal the bed slope, and D_{50}(marked as points 1 and 2 on the diagrams). This method works reasonably well, except on Pigeon Roost Creek (Fig. 4.7d).

In an examination of discontinuous rating curves on Pigeon Roost Creek, Colby (1960) did some energy slope calculations. He found that on a nearby station with a bed slope of 0.0011 (compared to 0.0009 for the station in Fig. 4.7d), the energy slope rose to 0.0017 during a rapid rise in stage, and decreased to 0.00103 during a rapid gage-height recession. If the station under consideration underwent proportional changes in energy slope, then, by Eq. 4.9b, during a rapidly rising stage the transition zone would be defined by points 3 and 4 (Fig. 4.7d). The transition zone for the falling stage would be defined by points 5 and 6. Dashed lines indicate hypothetical paths of transition. These "dynamic" transitions fit the data much better than the uniform flow transition.

The depth of flow during transition has not been discussed, and yet in a numerical model one is required to calculate flow depth for all conditions. According to Eqs. 4.9a and 4.9b, the depth of flow at the lower limit of the upper flow regime, and the depth at the upper limit of the lower regime will be approximately the same. A reasonable estimate of flow depth during a gradual transition may be the average of the two depths. Alternatively, one might suspect that transition will take place along a line of constant depth, as indicated by the dashed lines of Figs. 4.7a-c. In this case, during a gradual rise in discharge, the depth would reach the upper limit of the lower regime and remain constant during transition, and for a gradual decrease in discharge, the depth would reach the lower limit of the upper regime and remain constant. During a rapid transition, not only will the energy slope vary, but a certain amount of time will be required for the growth and decay of bed forms. Clearly more data are needed before we can fully understand the exact nature of the transition.

Figure 4.8 is a plot of predicted mean depth as a function of measured mean depth for the Sacramento River at Butte City (USGS station 11389000), for data given by Nakato (1981). The range of flow conditions prove to be well within the lower regime, and therefore the lower regime equation has been used. The mean error is 4.8 percent, with a standard deviation of 6.0 percent. The data range is: S = 0.000099 to 0.000288, D_{50} = 0.40 to 6.3 mm and σ_g = 1.40 to 9.53, with the grain parameters ranging beyond the limits used in the development of the technique. Data are also available for the Sacramento River at Colusa, but sidewall effects are too significant for the technique to produce reasonable results.

4.5 Comparison of Stage-Discharge Predictors

A rigorous statistical comparison of techniques is not given here; instead some sample calculations for two rivers are presented in Table 4.3. The two channels are the Rio Grande Conveyance Channel and the

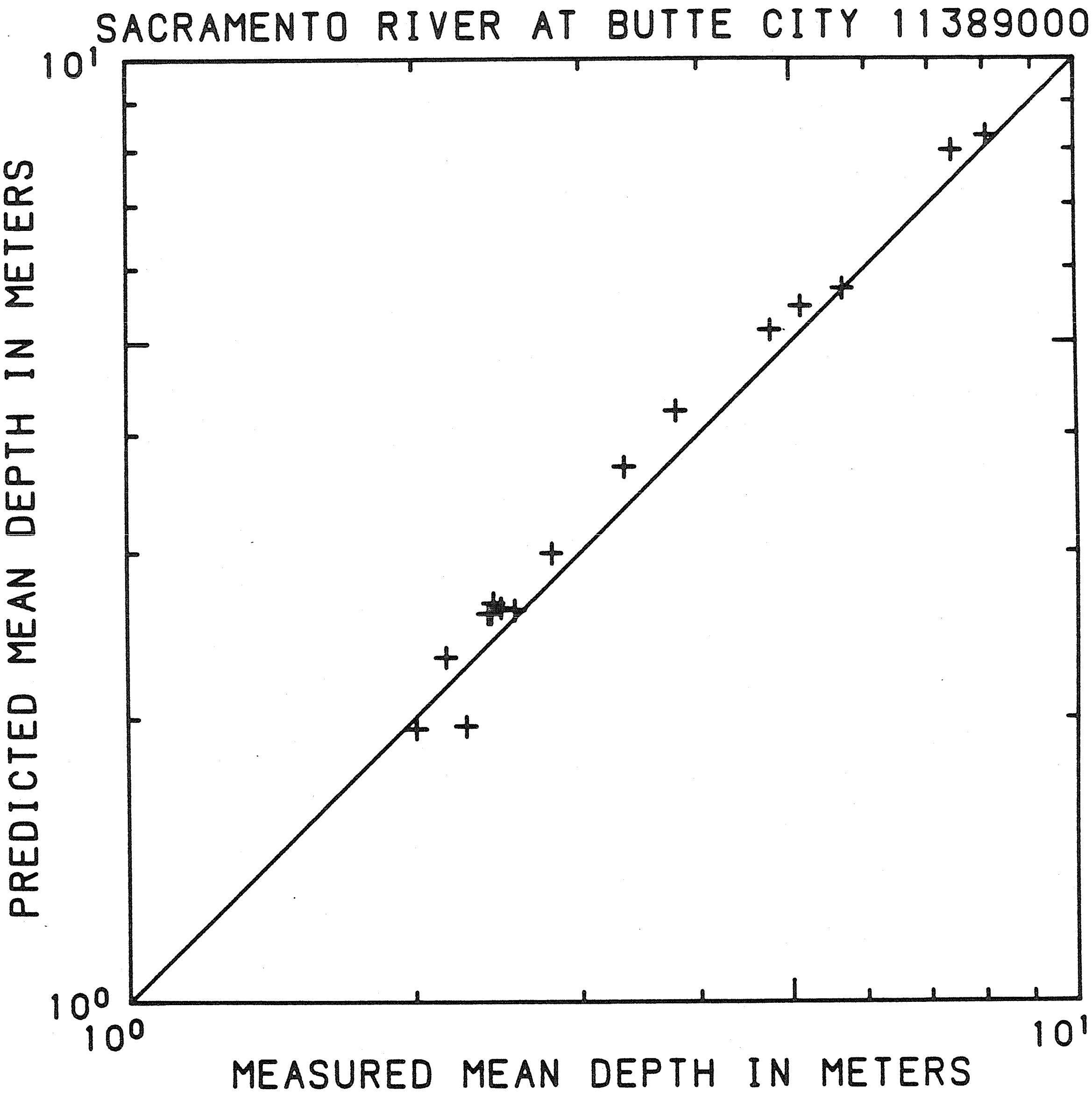

Figure 4.8 Comparison of predicted vs. actual mean depth in the Sacramento River at Butte City, data given by Nakato (1981).

Table 4.3

Comparison of Stage-Discharge Predictors

q Unit Discharge m^2/s	d Mean Depth[1] m	S x 1000 Slope	D_{50} Median Bed Size mm	σ_g Geometric Standard Deviation Bed Mat'l	T Temp. °C	Predicted Mean Depth[1], m (% Error)						
						Alam et al.	Chu, Mostafa	Einstein, Barbarossa	Engelund	Garde Ranga Raju	White et al.	New Method[2]
Rio Grande Conveyance Channel												
0.225	0.403	0.50	0.25	1.48	20	0.50(25%)	0.36(-10%)	0.47(18%)	0.35(-13%)	0.46(14%)	0.39(-1%)	0.41(2%)
0.693	0.769	0.55	0.19	1.40	11	0.61(-21%)	0.58(-25%)	0.57(-26%)	0.55(-29%)	0.80(4%)	0.79(3%)	0.82(7%)
2.01	1.19	0.60	0.23	1.36	13	0.99(-17%)	1.29(10%)	0.94(-21%)	1.13(-5%)	1.60(34%)	1.52(28%)	1.10(-7%)
Mississippi River, Tarbert Landing, LA												
4.74	7.59	0.0183	0.31	1.66	21	NS[3]	NS	17(124%)	8.2 (8%)	7.1 (-7%)	7.4 (-3%)	7.1 (-7%)
10.4	10.7	0.0266	0.25	1.81	24	NS	NS	17(59%)	11 (4%)	11 (4%)	12 (8%)	11 (1%)
26.0	16.7	0.0382	0.30	1.63	18	NS	NS	19(14%)	12 (-26%)	18 (6%)	19 (17%)	18 (7%)

1. For the channels under consideration, it is assumed that d = r.
2. The Rio Grande record at q = 2.01 m^2/s is an upper regime flow, all others are lower regime.
3. NS: No solution for the given combination of independent variables.

Mississippi River at Tarbert Landing, Louisiana. The former is a channel with typical depths of 1 meter, and the latter with typical depths of 10 to 20 meters. For both channels, the lowest, highest, and median discharges of the available record are given.

The results are considerably varied. Both the Alam-Cheyer-Kennedy and Chu-Mostafa techniques were not applicable to the deeper river. The poorest results were obtained from the Einstein-Barbarossa technique. The Engelund technique gave good results, except when the wrong flow regime was predicted, as for the second Rio Grande and third Mississippi values. The Garde-Ranga Raju and White-Paris-Bettess techniques did very well, except for the last Rio Grande flow, which had a flat bed.

4.6 Summary and Conclusions

An analysis of existing schemes for predicting flow depth in sand bed streams and rivers has indicated that no existing technique satisfies the criteria established in the introduction to this paper. A new technique has been presented which does satisfy these criteria. The technique solves for flow depths and mean velocities for the upper and lower flow regimes and determines limits of the mean velocity for each regime.

For wide channels, with d = r, flow depth for the lower flow regime can be determined from:

$$\frac{rS}{D_{50}} = 0.3724\ (q_* S)^{0.6539}\ S^{0.09188}\ \sigma_g^{0.1050} \qquad (4.10a)$$

and for the upper flow regime, from:

$$\frac{rS}{D_{50}} = 0.2836\ (q_* S)^{0.6248}\ S^{0.08750}\ \sigma_g^{0.08013} \qquad (4.10b)$$

Either equation can be rearranged into a dimensionally consistent power law equation which can be directly substituted for a Manning equation in a numerical model. For flow situations involving both regimes, a transition mechanism is required. The nature of this mechanism has not as yet been explored.

Neglecting viscous effects, the upper and lower transitional velocities can be determined from the slope and the median grain size. For slopes greater than 0.006, only upper regime flow is expected. For slopes less than 0.006, the maximum velocity of the lower regime can be determined from $F_g = 0.8F_g'$, and the minimum velocity of the upper regime from $F_g = 1.25F_g'$, where F_g' is from Eq. 4.8.

When temperature effects are important the transition values of F_g must be determined from Eqs. 4.9a and 4.9b or Fig. 4.5. For a given S, Rg, and σ_g, F_g can also be determined from Fig. 4.6. Depending on the ratio of the median grain size to the thickness of the laminar sublayer, any change in temperature may either increase, decrease or have no influence on the transitional velocities. The maximum temperature effect is about a 25 percent change in the velocities of the limits of the flow regimes.

A review of the extensive literature on alluvial channels suggests that, in spite of the volume, little is known about the transition from the lower flow regime to the upper flow regime. Carefully collected data are needed to better understand both slowly varying and rapidly varying transitions. Although the new technique includes a definition of the transition limits, the writer feels that more information is needed to improve the definition of these limits.

CHAPTER 5

AN ANALYSIS OF METHODS FOR PREDICTING SEDIMENT CONCENTRATION

Having considered the problem of predicting flow depth in a channel, attention is now turned to the problem of predicting sediment concentration. Throughout this century dozens of techniques, or "sediment transport formulas," have been proposed. Early efforts were hampered by a poor understanding of the mechanics of turbulence and sediment entrainment, poor data, and the absence of computers. While the mechanics are still not well understood, at least it is possible to readily analyze the large amounts of data that are now available. In this chapter, 13 techniques for predicting sediment concentration in a channel are analyzed using both field and laboratory data.

In the discussion that follows, the wash load or fine-material load is not considered. Therefore the bed-material load is taken to be equivalent to the total load, which can be divided into a bed load and a suspended load.

5.1 Selection of Available Techniques

The available techniques for calculating sediment concentration are widely varied. They range from simple equations to complicated procedures involving many calculations. The techniques selected for analysis in this chapter likewise cover a wide range of computational expediency.

Probably the most computationally complex procedure is still the Einstein (1950) total load function. To begin the procedure, the bed material is divided into size fractions. An integration over the flow depth is required for each size fraction. The integrand is the product of the suspended load equation (Vanoni, 1975, p. 76):

$$\frac{C(y)}{C_a} = \left(\frac{d-y}{y}\,\frac{a}{d-a}\right)^z \tag{5.1}$$

where C_a is a reference concentration at elevation a, and the velocity distribution (Vanoni, 1975, p. 75):

$$v(y) = \frac{2.3u_*}{k}\log\frac{y}{d} + v_{max} \tag{5.2}$$

where k = von Karman's constant and has a mean value of 0.4 for clear water.

Einstein (1950) uses the values $z = w_i/0.4u_*'$ and $a = 2D_{si}$, where w_i and D_{si} are the fall velocity and mean grain diameter, respectively, of a size fraction.* The reference concentration is determined from the empirical "bed load function" which relates a dimensionless bed load transport rate to a dimensionless grain shear stress. A full decription of the procedure, including the various correction factors, is given by Vanoni (1975, pp. 195-201).

Several investigators have attempted to modify or adapt either all or parts of the Einstein (1950) procedure. In the development of his procedure, Toffaleti (1968) used many of Einstein's concepts and a large amount of newer data. Engelund and Fredsoe (1976) derived an analytical bed load equation and used Einstein integrals for the suspended load.

*In this case u_*' can be defined from Eq. 3.13.

These techniques are appealing because they rely on what is known of the mechanics of the processes involved. However, our current understanding of the processes is still incomplete, and the derivations of these techniques include various assumptions.

Other investigators have relied heavily on dimensional analysis. This approach usually avoids the problem of dividing the bed-material load into a bed load component and a suspended load component. Typically sediment concentration or a dimensionless transport rate is related to several other dimensionless parameters. One of these parameters usually varies strongly with discharge and can therefore be considered as the principal variable. Examples of principal variables are the mobility number of Ackers and White (1973), a parameter combining shear stress and grain shear stress, and the unit stream power used by Yang (1973), vS/w, where w is particle fall velocity.

When the formulation of a technique is based primarily on dimensional analysis the data base becomes extremely important. A technique would be useless if it were based on faulty or insufficient data. Although large amounts of data are now available, the quality of the data is not uniform, primarily because of the difficulty involved in making sediment concentration measurements.

In this chapter 13 techniques were selected for analysis. It is hoped that the presentation here will complement the excellent appraisal of 15 methods given by White, Milli, and Crabbe (1973). Eight of the 10 best methods as appraised by White, Milli, and Crabbe (1973) have been included here. Of the best ten methods, the two that have not been included here are a modified version of the Bishop, Simons and Richardson (1965) technique (which has been included) and the bed load portion of the Einstein (1950) procedure, which has not been considered apart from the total load procedure. Also included are three newer methods, plus two other techniques which have achieved some degree of acceptance. A list of the 13 techniques is given in Table 5.1.

5.2 Method of Analysis

One of the most important aspects of an appraisal of existing techniques is the data base. For this analysis approximately 1000 records from 31 sets of laboratory and field data have been selected from the larger data bank. Data sets with sand bed channels were selected on the basis of accuracy and range of important parameters. After performing a sidewall correction (Vanoni and Brooks, 1957) on all records, the data were filtered to remove various biases, thus leaving the approximately 1000 records.

The data sets used and ranges of important variables are listed in Tables 5.2a and 5.2b. The numerical filters or restrictions on the ranges of certain parameters are given in Table 5.3. More explanation of why some of these filters were selected is given in the next chapter, section 6.2.

The number of records for each data set listed in Tables 5.2a and 5.2b is the number available for analysis. For some formulas, certain combinations of variables may be beyond the explicitly defined range of

Table 5.1

Methods of Predicting Sediment Concentration
Analyzed in this Report

Investigator	Date	Graded Sediment	Bed Load and Suspended Load Separate	Dimensional Homogeneity
Ackers and White	1973	No	No	Yes
Bagnold	1966	No	Yes	Yes
Bishop, Simons, and Richardson	1965	Yes	No	Yes
Einstein	1950	Yes	Yes	Yes
Engelund and Fredsoe	1976	No	Yes	Yes
Engelund and Hansen	1967	No	No	Yes
Graf	1968	No	No	Yes
Laursen	1958	Yes	No	Yes
Ranga Raju, Garde, and Bhardwaj	1981	No	No	Yes
Rottner	1959	No	No	Yes
Shen and Hung	1971	No	No	No
Toffaleti	1968	Yes	Yes	No
Yang	1973	No	No	Yes

Table 5.2a

Range of Laboratory Variables

Source	Code	No.	Velocity(m) Min.	Velocity(m) Max.	Depth(m) Min.	Depth(m) Max.	Slope X 1000 Min.	Slope X 1000 Max.	D_{50} Min.	D_{50} Max.	Concentration(ppm) Minimum	Concentration(ppm) Maximum
Barton & Lin (1955)	BAL	26	0.226	1.093	0.091	0.256	0.440	2.100	0.180	0.180	19.00	3776.00
Brooks (1957)	BRO	6	0.373	0.617	0.047	0.060	2.400	3.500	0.088	0.145	1200.00	5300.00
Costello (1974)	COS	11	0.403	0.503	0.140	0.156	0.450	1.010	0.600	0.790	10.95	102.08
Davies (1971)	DAV	69	0.244	0.792	0.076	0.305	0.248	2.670	0.150	0.150	11.30	1760.00
Foley (1975)	FOL	9	0.388	0.806	0.035	0.047	3.740	10.540	0.290	0.290	845.34	10254.39
Guy et al.(1966)	GUY1	27	0.317	1.445	0.149	0.332	0.430	5.820	0.190	0.190	29.00	26600.00
Guy et al.(1966)	GUY2	47	0.318	1.505	0.091	0.344	0.450	8.200	0.270	0.280	12.00	28700.00
Nordin (1976)	NOR1	22	0.561	2.017	0.238	0.585	0.470	4.490	0.250	0.250	73.00	17200.00
Nordin (1976)	NOR2	11	0.524	1.843	0.256	0.359	0.740	5.770	1.140	1.140	33.00	2920.00
Onishi et al.(1976)	OJK	14	0.338	0.585	0.075	0.135	1.090	2.670	0.250	0.250	66.79	3355.67
Pratt (1970)	PRA	25	0.254	0.701	0.076	0.305	0.282	2.870	0.479	0.479	11.63	560.00
Singh (1960)	SIN	20	0.277	0.442	0.076	0.104	1.000	3.000	0.620	0.620	35.70	454.00
Stein (1965)	STE	44	0.514	1.841	0.091	0.302	2.010	16.950	0.399	0.399	640.00	39293.00
Straub (1954,58)	STR	21	0.356	0.835	0.035	0.222	0.950	7.347	0.163	0.191	423.00	12600.00
Taylor (1971)	TAY	12	0.390	0.878	0.079	0.143	1.010	2.090	0.228	0.228	100.27	2269.74
Vanoni, Brooks(1957)	VAB	14	0.234	0.771	0.062	0.169	0.700	2.800	0.137	0.137	37.00	3000.00
Vanoni, Hwang (1967)	VAH	6	0.319	0.558	0.176	0.238	0.642	1.303	0.206	0.206	31.00	1490.00
Williams (1970)	WLM	5	0.539	0.669	0.204	0.222	0.912	2.140	1.349	1.349	31.13	196.10
Willis (1972)	WLS	77	0.358	1.572	0.104	0.302	0.269	2.040	0.100	0.100	102.00	19399.99
Znamenskaya (1963)	ZNA	14	0.224	0.925	0.040	0.123	1.660	8.000	0.180	0.800	150.00	3240.00
All Laboratory Data		480	0.224	2.017	0.035	0.585	0.269	16.950	0.088	1.349	10.95	39263.00

Table 5.2b

Range of Field Variables

River	Code	No.	Velocity(m) Min.	Velocity(m) Max.	Depth(m) Min.	Depth(m) Max.	Slope X 1000 Min.	Slope X 1000 Max.	D_{50} Min.	D_{50} Max.	Concentration(ppm) Minimum	Concentration(ppm) Maximum
Atchafalaya River	ATC	63	0.574	2.028	6.401	14.752	0.010	0.051	0.086	0.303	12.52	567.34
Colorado River	COL	30	0.663	1.001	1.134	3.139	0.147	0.333	0.273	0.400	78.30	412.70
Hii River, Japan	HII	22	0.630	0.803	0.202	0.493	0.840	1.660	1.330	1.440	116.31	552.86
Middle Loup River	MID	38	0.593	1.125	0.247	0.412	0.928	1.572	0.215	0.436	437.76	2444.00
Miss. R., St. Louis	COE1	111	0.621	2.423	4.663	17.282	0.025	0.134	0.163	1.129	11.70	511.71
Miss. R., Tarbert	COE2	53	0.625	1.609	6.736	16.429	0.018	0.043	0.165	0.346	12.07	261.68
Mountain Creek	MOU	75	0.366	0.652	0.108	0.272	1.360	1.790	0.899	0.899	26.76	686.10
Niobrara River	NIO	40	0.625	1.271	0.398	0.588	1.136	1.799	0.212	0.359	392.00	2750.00
Red River	RED	29	0.407	1.140	2.999	7.376	0.066	0.082	0.094	0.217	20.92	499.75
Rio Grande Conv. Ch.	RGC	8	0.805	1.518	0.923	1.512	0.530	0.800	0.180	0.280	674.00	2695.00
RioGrande,Bernalillo	RGR	50	0.441	2.384	0.305	1.463	0.740	0.930	0.197	0.424	315.00	5830.00
All Field Data		519	0.366	2.423	0.108	17.282	0.010	1.799	0.086	1.440	11.70	5830.00

Table 5.3

Restrictions on Input Data

Parameter	Symbol	Restriction	Reason
Median grain size, mm	D_{50}	$0.062 \le D_{50} \le 2.0$	Sand only
Geometric standard deviation of bed particles	σ_g	$\sigma_g < 5$	Eliminate bimodal distributions
Width to depth ratio	w/d	$w/d > 4$ (Lab Data)	Reduce sidewall effects
Relative roughness	r/D_{50}	$r/D_{50} > 100$	Eliminate shallow water effects
Concentration, ppm	C	$C > 10$	Accuracy problems associated with low concentration

the technique. In other cases, certain combinations of variables will lead to non-definable expressions, such as a negative number raised to a non-integer power. Furthermore, calculated concentrations lower than 1 ppm are not included in statistical analyses. Therefore, for some formulas the actual number of records given in the analyses may be considerably less than that indicated in Tables 5.2a and 5.2b.

Some formulas require separate calculations for individual bed-material size fractions. In these cases the bed material has been divided into 5 size fractions based on the values of D_{50} and σ_g, and the assumption that the size distribution of the bed particles is log-normal. Divisions were located at the 6.7, 31.0, 69.0, and 93.3 percentile values.

Selection of a technique for analysis of a transport formula is not a simple matter. After consideration of a number of possible analysis variables, the ratio of calculated to observed concentration was selected. This variable was also used by White, Milli, and Crabbe (1973) in their appraisal of formulas.

It was found that for a given formula, the ratio of the calculated to the observed concentration is nearly log-normally distributed for many data sets. Figures 5.1a and 5.1b are log-probability plots of this ratio for the Yang (1973) technique. On this type of graph a log-normal distribution plots as a straight line.

A parameter that is log-normally distributed can be described by its geometric mean and geometric standard deviation. The geometric mean and geometric standard deviation are the antilogs of the mean and

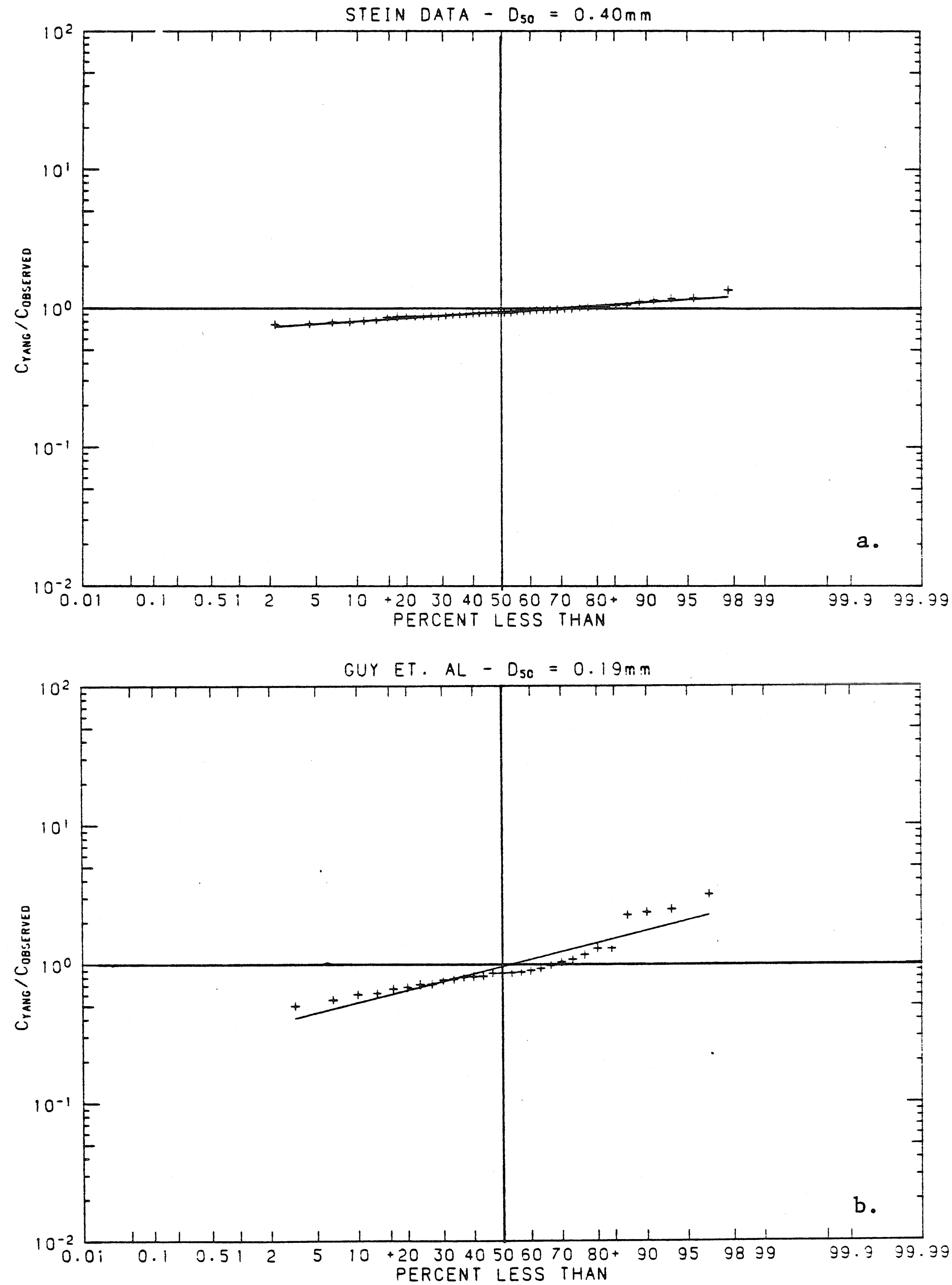

Figure 5.1 Typical error distributions for the Yang (1973) technique.

standard deviation, respectively, of the logarithms of the values of the parameter. If a parameter is log-normally distributed its median value will be equivalent to its geometric mean. Furthermore, the eighty-fourth percentile value can be determined by the product of the geometric mean and the geometric standard deviation, and the sixteenth percentile value will be the quotient of the geometric mean divided by the geometric standard deviation.

For the ratio of calculated to observed concentration, geometric mean and geometric standard deviation values of 1 would indicate perfect agreement. The geometric standard deviation will be greater than or equal to 1, while the geometric mean can be greater than or less than 1, depending on whether the formula tends to over-predict or under-predict.

For each formula, two tables of statistics are given, one for laboratory data and one for field data. Each table gives the geometric mean and geometric standard deviation (abbreviated Geo.Mean and Geo.S.D., respectively) for the ratio of calculated to observed values of concentration for each data set. The data sets are listed by the codes in Tables 5.2a and 5.2b. The tables include estimates of the sixteenth and eighty-fourth percentile values, calculated from the geometric mean and geometric standard deviation, assuming a log-normal distribution. The minimum, median, and maximum values of the ratio are also given for each data set. The last line in each table gives the statistics for all of the data included in the table.

The analysis of each formula includes two plots of the ratio of calculated to observed concentration versus observed concentration, one for lab data and one for field data. Each data set is plotted with a different plotting symbol. Dashed lines show the geometric mean value of the plotted data, and dash-dotted lines show the approximate sixteenth and eighty-fourth percentile values.

5.3 Appraisal of Existing Techniques

The following is an analysis of the 13 techniques for predicting sediment concentration listed in Table 5.1. For each technique, a brief summary is presented along with the figures and tables which can be used to evaluate the performance of the technique. The summaries do not include complete descriptions of all techniques. In conjunction with the reviews of methods given by Vanoni (1975) and White, Milli, and Crabbe (1973), however, the reader can obtain a complete understanding of the workings of all the techniques discussed here. (Page number references for the latter report refer to the first volume, unless otherwise specified.)

The equations give the mean concentration in terms of mass per unit mass, i.e. mass of sediment to mass of water-sediment mixture, with the exception of the technique of Shen and Hung (1971). This technique, which is not dimensionally homogeneous, is given in its original form where concentration is given in ppm by mass. To convert to parts per million, all other concentrations must be multiplied by 1,000,000.

5.3.1 Ackers and White Technique (1973)

The Ackers and White (1973) method is based on a combination of grain shear stress and shear stress. The basic concentration equation is

$$C = c \frac{\rho_s}{\rho} \frac{D_{50}}{r} \left(\frac{v}{u_*}\right)^n \left[\frac{F_{gr}}{A} - 1\right]^m \tag{5.3}$$

where F_{gr} is the mobility number defined by

$$F_{gr} = \frac{u_*^n \, u_*'^{\,1-n}}{\sqrt{gD_{50}\left(\frac{\rho_s - \rho}{\rho}\right)}} \tag{5.4}$$

and u_*' is given by

$$u_*' = \frac{v}{\sqrt{32} \log \frac{10r}{D_{50}}} \tag{5.5}$$

The quantities n, A, m, and c are functions of D_{gr} which is defined by

$$D_{gr} = \left[\sqrt{\frac{\rho_s - \rho}{\rho}} \, R_g\right]^{2/3} \tag{5.6}$$

where $R_g = \sqrt{gD_{50}^3}/\nu$ is the grain Reynolds number.

When $D_{gr} > 60$ the four coefficients are:

$n = 0.0$

$A = 0.17$

$m = 1.5$

$c = 0.025$

and for $60 \geq D_{gr} \geq 1$:

$n = 1 - 0.56 \log D_{gr}$

$A = \frac{0.23}{\sqrt{D_{gr}}} + 0.14$

$$m = \frac{9.66}{D_{gr}} + 1.34$$

$$\log c = 2.86 \log D_{gr} - (\log D_{gr})^2 - 3.53$$

The results of the analysis for laboratory data are given in Fig. 5.2a and Table 5.4a, and for field data, the results are given in Fig. 5.2b and Table 5.4b.

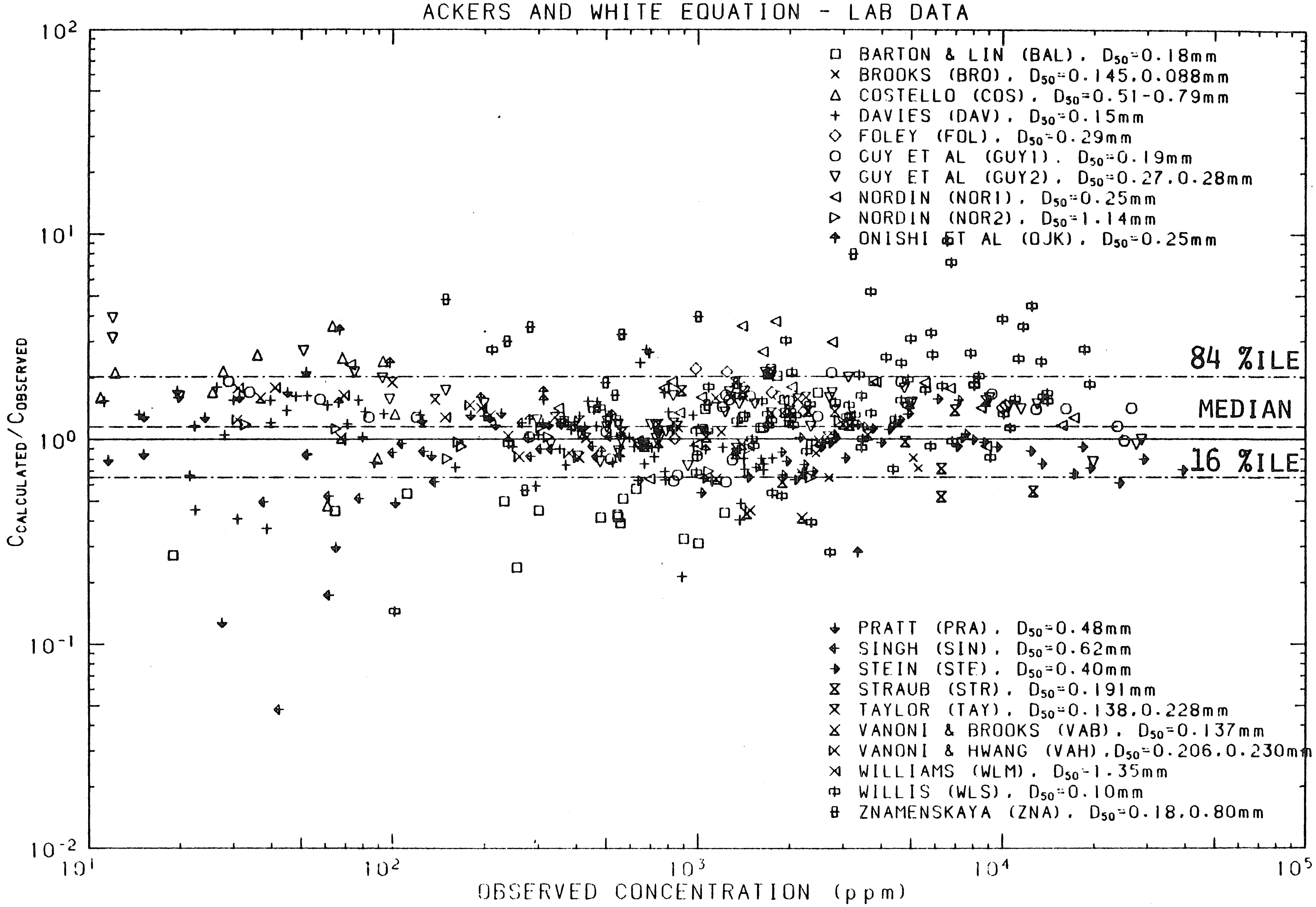

Figure 5.2a Ratio of concentration calculated by the Ackers and White (1973) technique to observed concentration as a function of observed concentration, for laboratory data.

Table 5.4a

Ratio of Predicted to Observed Conc. for Ackers and White Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	26	0.719	2.035	0.237	0.353	0.513	1.464	2.199
BRO	6	0.881	1.276	0.649	0.690	0.810	1.124	1.336
COS	11	1.699	1.735	0.474	0.979	2.117	2.948	3.561
DAV	69	0.986	1.579	0.214	0.625	0.926	1.557	2.730
FOL	9	1.588	1.253	1.005	1.267	1.609	1.990	2.203
GUY1	27	1.236	1.412	0.618	0.875	1.397	1.745	2.106
GUY2	47	1.347	1.429	0.741	0.943	1.352	1.925	3.919
NOR1	22	1.659	1.546	0.640	1.073	1.766	2.505	3.745
NOR2	11	0.950	1.227	0.649	0.774	0.971	1.165	1.234
OJK	14	1.226	1.745	0.281	0.702	1.252	2.138	3.415
PRA	25	1.034	1.782	0.128	0.580	1.210	1.843	2.131
SIN	19	0.652	2.110	0.048	0.309	0.861	1.375	1.203
STE	44	0.881	1.288	0.548	0.684	0.914	1.134	1.570
STR	21	1.104	1.379	0.524	0.801	1.169	1.523	1.719
TAY	12	1.361	1.255	0.956	1.085	1.276	1.707	1.887
VAB	14	0.880	1.510	0.414	0.583	0.941	1.330	1.593
VAH	6	0.883	1.455	0.450	0.607	0.824	1.286	1.468
WLM	5	1.569	1.140	1.282	1.376	1.638	1.788	1.788
WLS	77	1.487	1.889	0.145	0.787	1.464	2.808	9.277
ZNA	14	2.161	1.944	0.564	1.111	1.867	4.200	7.966
All	479	1.150	1.758	0.048	0.654	1.180	2.022	9.277

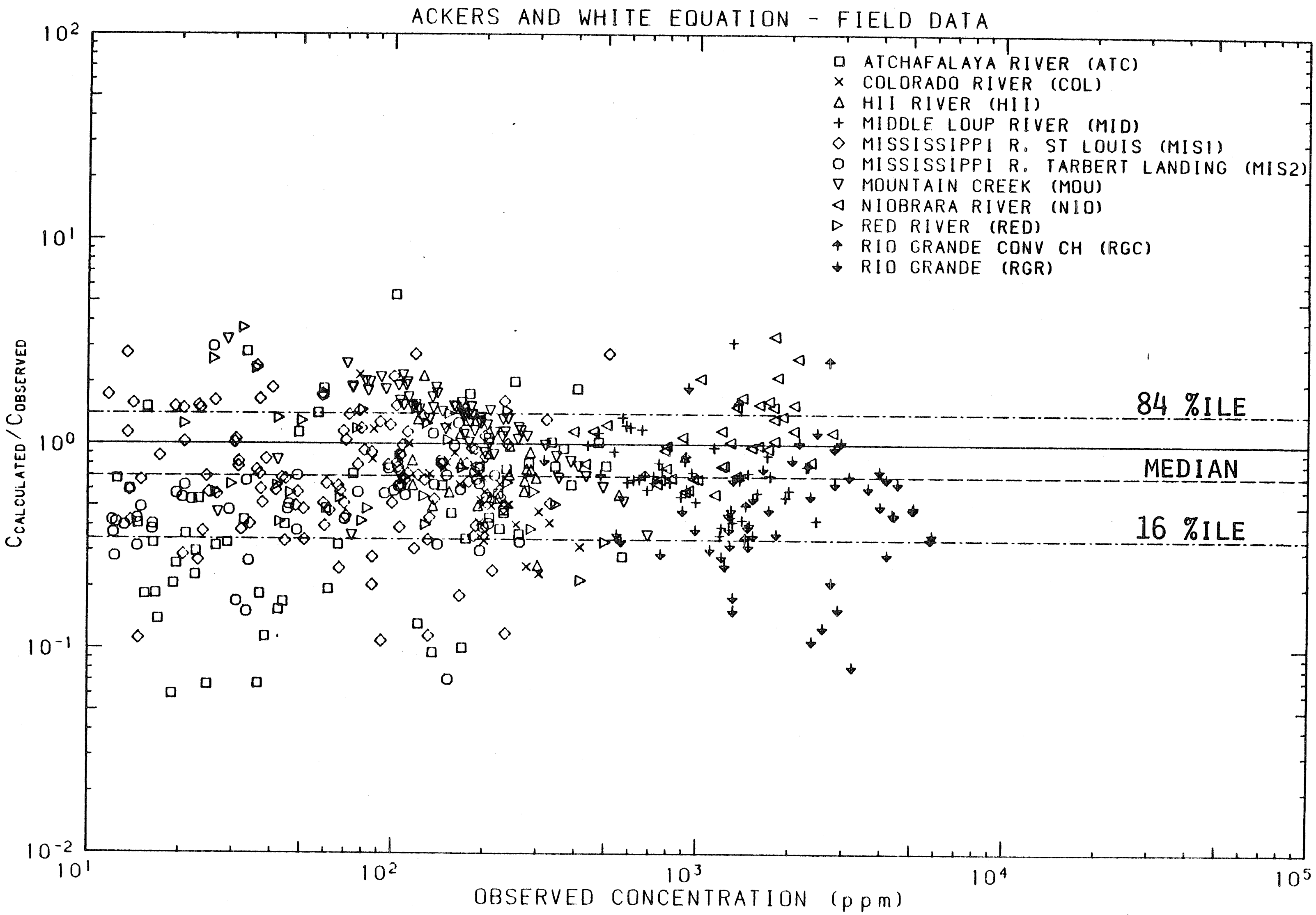

Figure 5.2b Ratio of concentration calculated by the Ackers and White (1973) technique to observed concentration as a function of observed concentration, for field data.

Table 5.4b

Ratio of Predicted to Observed Conc. for Ackers and White Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	63	0.461	2.618	0.060	0.176	0.459	1.207	5.348
COL	30	0.591	1.608	0.232	0.367	0.566	0.950	2.172
HII	22	0.719	1.503	0.256	0.478	0.683	1.081	2.148
MID	38	0.718	1.500	0.359	0.478	0.676	1.077	3.152
MIS1	111	0.701	1.971	0.109	0.356	0.704	1.382	2.768
MIS2	53	0.519	1.770	0.071	0.293	0.547	0.919	2.983
MOU	75	1.253	1.498	0.356	0.836	1.327	1.877	3.226
NIO	40	1.072	1.521	0.570	0.705	1.021	1.631	3.380
RED	29	0.795	1.931	0.217	0.412	0.633	1.535	3.692
RGC	8	0.852	1.789	0.348	0.477	0.784	1.525	2.543
RGR	50	0.427	1.846	0.083	0.231	0.457	0.789	1.897
All	519	0.694	2.027	0.060	0.343	0.701	1.407	5.348

5.3.2 Bagnold Technique (1966)

The total load equation can be expressed in terms of concentration as

$$C = \left(\frac{\rho_s - \rho}{\rho_s}\right) \frac{u_*^2}{gr} \left[\frac{e_b}{t_g \psi_o} + 0.01 \frac{v}{w_m}\right] \qquad (5.7)$$

where e_b is the bed load transport efficiency, $t_g \psi_o$ is a measure of dynamic friction, and w_m is the mean fall velocity of the bed particles. The quantities e_b and $t_g \psi_o$ can be evaluated from the graphs given by Bagnold (1966) or the equations given by White, Milli, and Crabbe (1973, pp 22-26).

The results of the analysis for laboratory data are given in Fig. 5.3a and Table 5.5a, and for field data, the results are given in Fig. 5.3b and Table 5.5b.

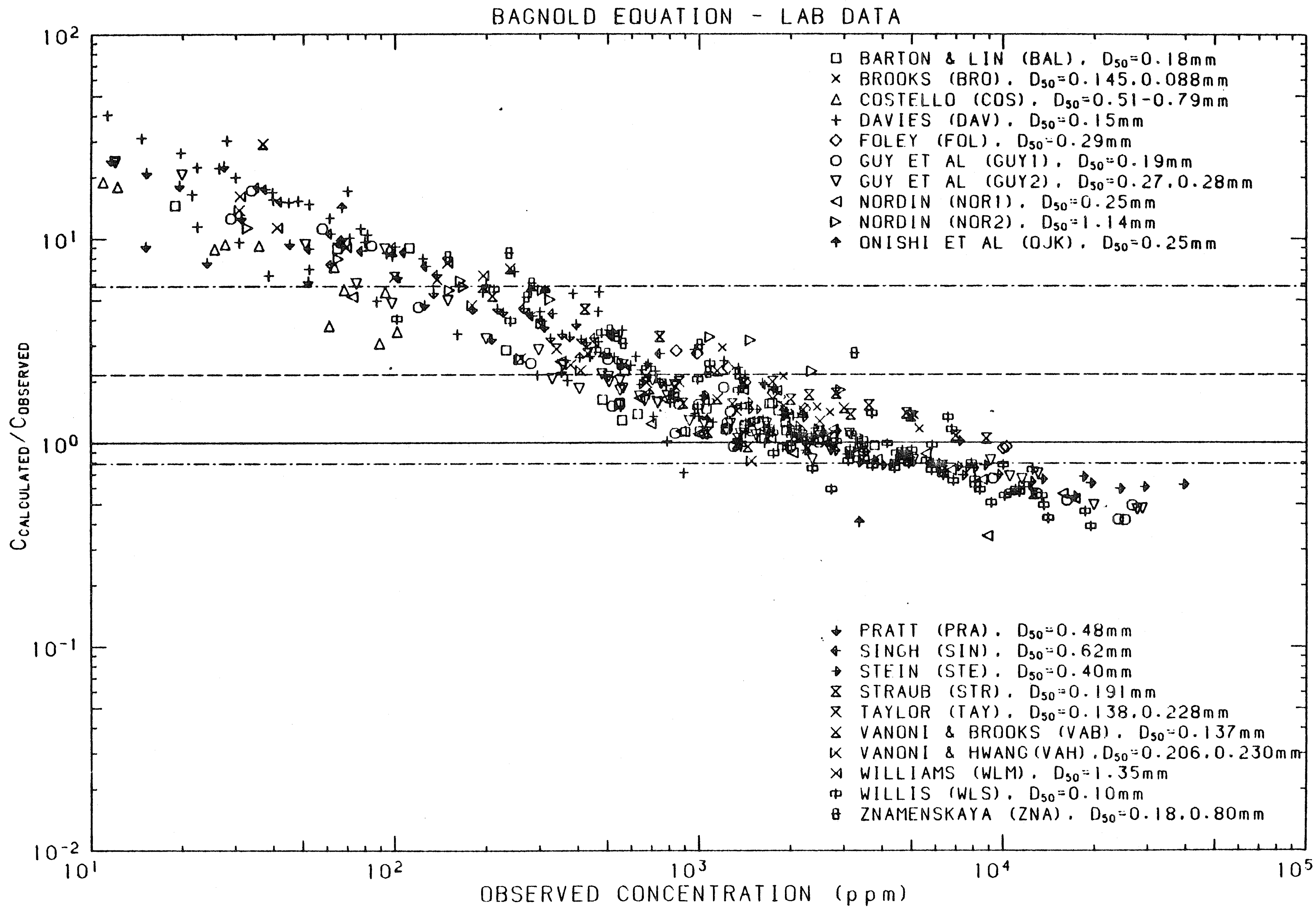

Figure 5.3a **Ratio of concentration calculated by the Bagnold (1966) technique to observed concentration as a function of observed concentration, for laboratory data.**

Table 5.5a

Ratio of Predicted to Observed Concentration for Bagnold Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	26	1.836	2.040	0.968	0.900	1.436	3.747	14.537
BRO	6	1.654	1.363	1.170	1.213	1.405	2.255	2.914
COS	11	7.099	1.795	3.068	3.955	7.251	12.742	18.960
DAV	69	4.371	2.822	0.711	1.549	2.856	12.337	40.504
FOL	9	1.723	1.463	0.940	1.177	1.750	2.521	2.813
GUY1	27	1.556	2.773	0.418	0.561	1.171	4.315	17.180
GUY2	47	1.851	2.561	0.469	0.723	1.688	4.739	24.087
NOR1	22	1.132	1.755	0.349	0.645	1.105	1.987	5.187
NOR2	11	4.636	1.681	1.811	2.758	5.591	7.794	11.208
OJK	14	3.517	2.443	0.409	1.439	3.428	8.591	14.187
PRA	25	6.186	1.975	2.416	3.132	4.752	12.218	24.259
SIN	20	6.410	1.767	2.725	3.627	6.633	11.329	17.856
STE	44	0.938	1.378	0.547	0.681	0.873	1.292	1.931
STR	21	1.371	1.595	0.562	0.860	1.376	2.187	4.512
TAY	12	2.191	1.785	0.932	1.227	1.970	3.912	6.472
VAB	14	2.607	2.586	0.955	1.008	1.637	6.742	29.216
VAH	6	3.013	2.352	0.813	1.281	2.409	7.089	13.817
WLM	5	9.620	1.371	6.587	7.017	9.036	13.187	16.137
WLS	77	0.992	1.677	0.390	0.591	0.953	1.664	5.643
ZNA	14	3.322	1.740	0.967	1.909	3.025	5.781	8.486
All	480	2.155	2.718	0.349	0.793	1.693	5.857	40.504

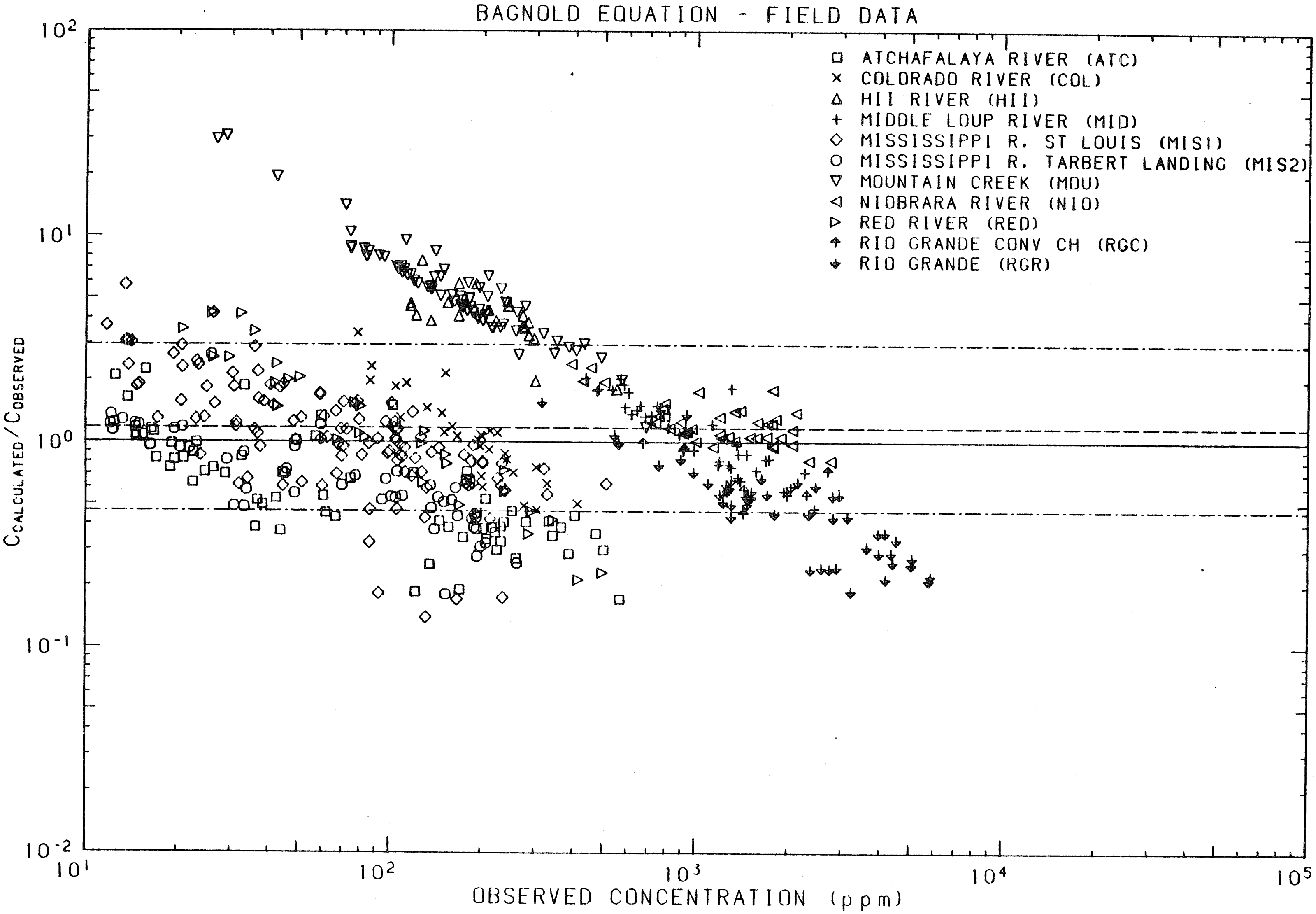

Figure 5.3b Ratio of concentration calculated by the Bagnold (1966) technique to observed concentration as a function of observed concentration, for field data.

Table 5.5b

Ratio of Predicted to Observed Concentration for Bagnold Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	63	0.579	1.793	0.172	0.323	0.532	1.039	2.245
COL	30	1.057	1.615	0.468	0.654	1.061	1.706	3.382
HII	22	4.032	1.361	1.808	2.964	4.102	5.486	7.553
MID	38	1.103	1.490	0.478	0.740	1.144	1.643	2.057
MIS1	111	1.065	1.886	0.141	0.565	1.041	2.009	5.764
MIS2	53	0.645	1.676	0.182	0.385	0.599	1.080	2.656
MOU	75	5.306	1.669	1.182	3.179	4.995	8.856	30.725
NIO	40	1.248	1.286	0.815	0.971	1.172	1.605	2.394
RED	29	1.135	2.266	0.215	0.501	1.101	2.571	4.234
RGC	8	0.741	1.324	0.455	0.559	0.728	0.981	0.998
RGR	50	0.467	1.627	0.190	0.287	0.514	0.760	1.567
All	519	1.173	2.537	0.141	0.462	1.059	2.975	30.725

5.3.3 Bishop, Simons, and Richardson Technique (1965)

White, Milli, and Crabbe (1973) have evaluated both the original version of this technique and a modified version. Although the modified version tested slightly better, it is the original version that is evaluated here.

The development of the technique was based on a modification of the probabilistic approach used by Einstein (1950) to develop his bed load function. Here the total load transport rate, rather than just the bed load transport rate, is related to a dimensionless grain shear stress. A complete description of the application of the technique is given by White, Milli, and Crabbe (1973).

The results of the analysis for laboratory data are given in Fig. 5.4a and Table 5.6a, and the results for field data are given in Fig. 5.4b and Table 5.6b.

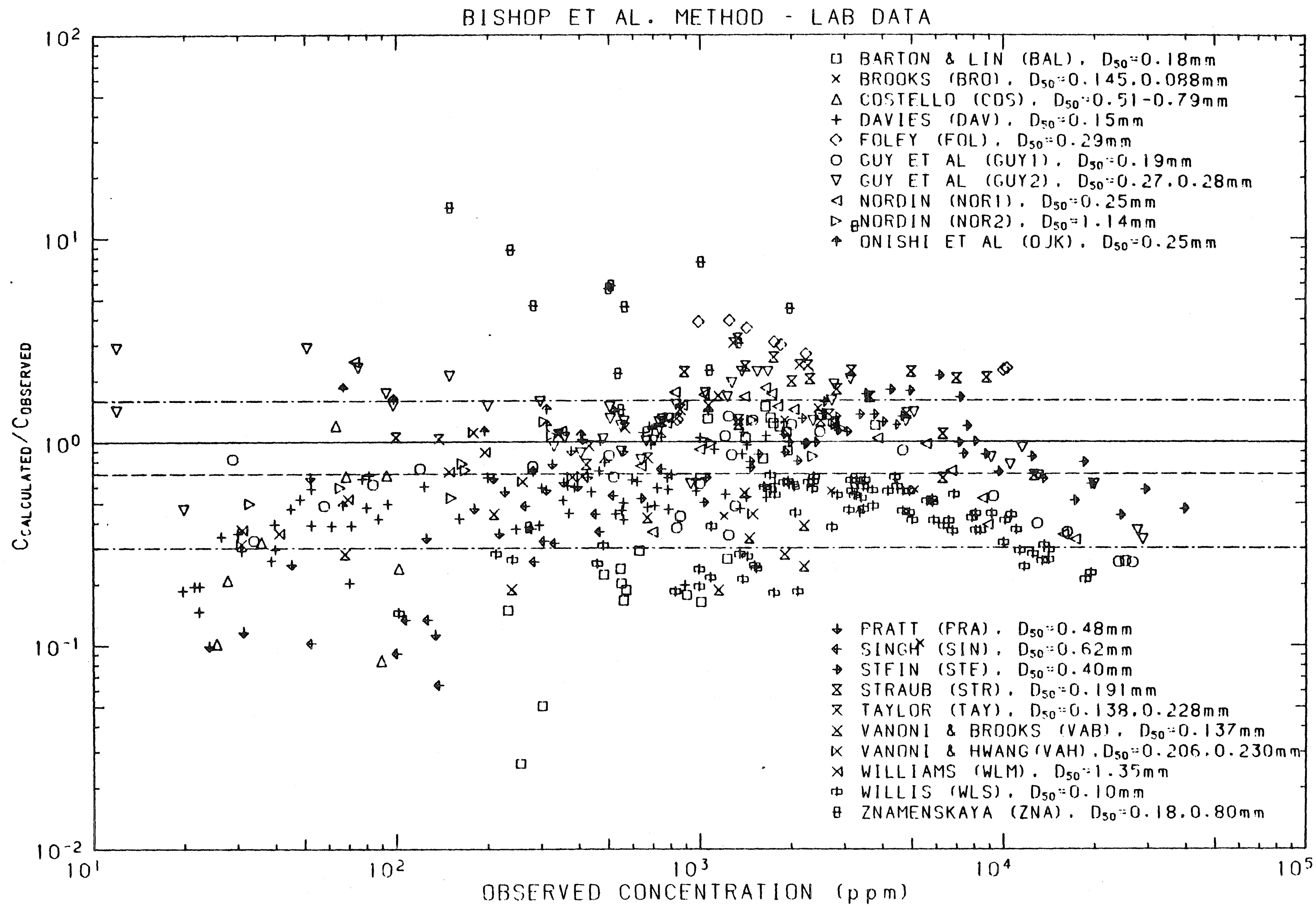

Figure 5.4a Ratio of concentration calculated by the Bishop, Simons, and Richardson (1965) technique to observed concentration as a function of observed concentration, for laboratory data.

Table 5.6a

Ratio of Predicted to Observed Conc. for Bishop et al. Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	23	0.402	3.110	0.026	0.129	0.292	1.250	1.488
BRO	6	0.547	2.387	0.102	0.229	0.570	1.307	1.455
COS	8	0.306	2.419	0.084	0.126	0.239	0.739	1.201
DAV	66	0.508	1.592	0.147	0.319	0.523	0.809	1.185
FOL	9	2.740	1.395	1.276	1.965	2.969	3.821	3.915
GUY1	27	0.606	1.679	0.255	0.361	0.622	1.018	1.330
GUY2	47	1.232	1.619	0.331	0.760	1.292	1.994	2.887
NOR1	22	0.994	1.808	0.331	0.549	1.128	1.797	2.476
NOR2	11	0.841	1.383	0.497	0.608	0.847	1.163	1.273
OJK	14	1.030	1.507	0.444	0.683	1.080	1.552	1.832
PRA	18	0.444	2.046	0.099	0.217	0.580	0.908	1.027
SIN	14	0.248	2.069	0.064	0.120	0.318	0.513	0.736
STE	44	0.972	1.471	0.436	0.661	0.991	1.429	2.108
STR	21	1.522	1.486	0.662	1.025	1.655	2.262	2.586
TAY	12	1.480	1.579	0.831	0.938	1.169	2.337	3.205
VAB	12	0.406	1.929	0.187	0.210	0.336	0.782	1.683
VAH	6	0.596	1.479	0.315	0.403	0.638	0.882	1.113
WLM	5	0.534	1.433	0.355	0.373	0.523	0.766	0.890
WLS	77	0.397	1.498	0.144	0.265	0.438	0.595	0.684
ZNA	14	3.998	2.464	0.381	1.622	4.584	9.851	14.094
All	456	0.695	2.300	0.026	0.302	0.666	1.599	14.094

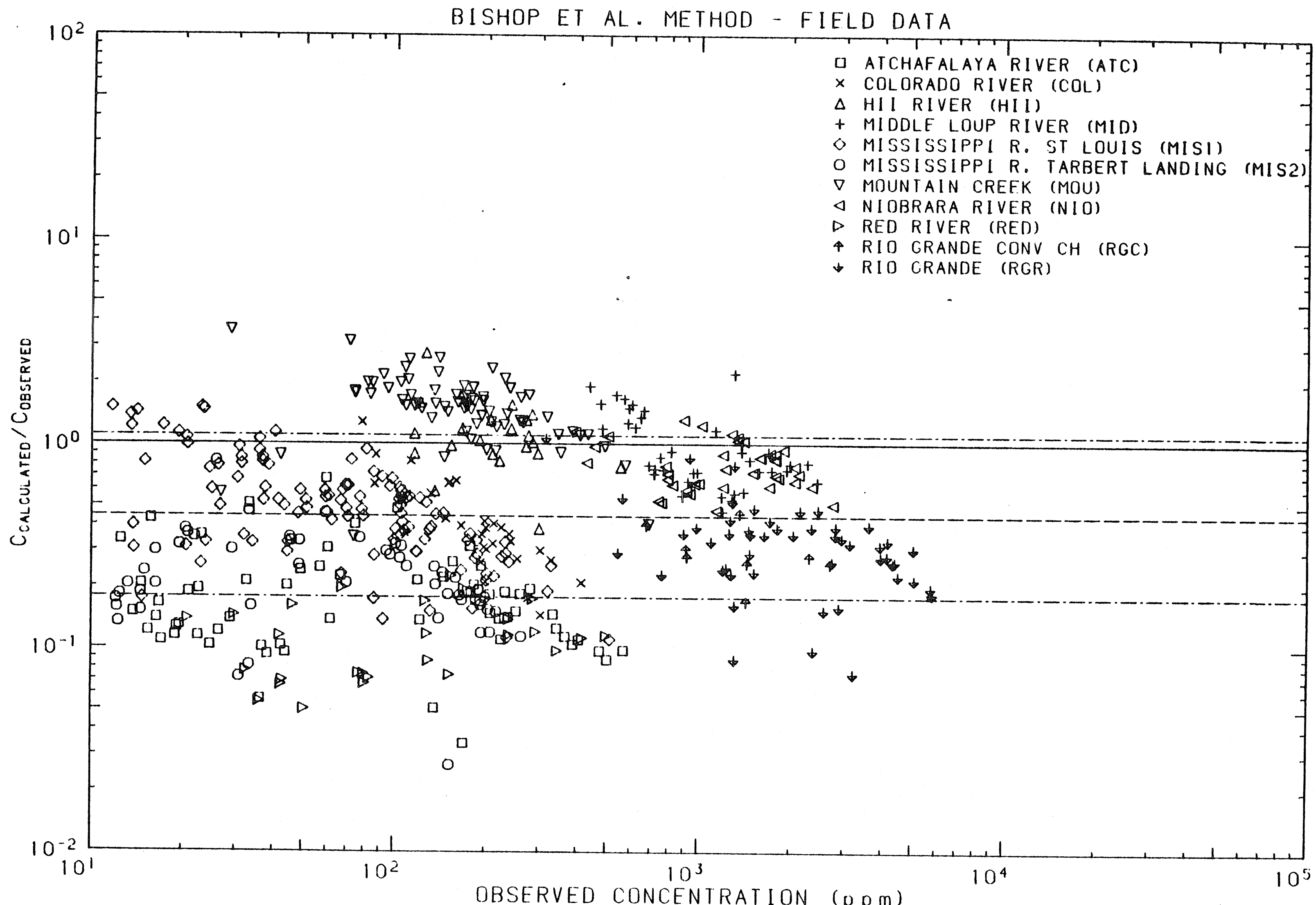

Figure 5.4b Ratio of concentration calculated by the Bishop, Simons, and Richardson (1965) technique to observed concentration as a function of observed concentration, for field data.

Table 5.6b

Ratio of Predicted to Observed Conc. for Bishop et al. Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	63	0.163	1.716	0.034	0.095	0.148	0.279	0.675
COL	30	0.394	1.617	0.146	0.244	0.368	0.637	1.275
HII	22	1.075	1.474	0.384	0.729	1.035	1.585	2.767
MID	38	0.928	1.484	0.469	0.626	0.811	1.378	2.225
MIS1	111	0.472	1.760	0.111	0.268	0.493	0.830	1.504
MIS2	53	0.211	1.692	0.027	0.125	0.205	0.356	0.824
MOU	75	1.454	1.476	0.351	0.985	1.531	2.146	3.593
NIO	40	0.777	1.292	0.474	0.601	0.762	1.004	1.317
RED	27	0.106	1.509	0.050	0.071	0.115	0.160	0.228
RGC	8	0.291	1.323	0.170	0.220	0.281	0.385	0.458
RGR	50	0.307	1.654	0.076	0.186	0.329	0.508	1.069
All	517	0.443	2.488	0.027	0.178	0.454	1.102	3.593

5.3.4 Einstein Technique (1950)

A thumbnail sketch of this technique is given in section 5.1, which is briefly reviewed here. The bed-load transport rate is calculated from the grain shear stress for each size fraction of the bed material. The suspended load for each size fraction can then be calculated by integration of the product of Eqs. 5.1 and 5.2, over the depth. The total load concentration is the sum of the concentrations for each size fraction.

The details of the technique are given by Vanoni (1975, pp. 195-201). Analytical representations of the various graphical factors are given by White, Milli, and Crabbe (1973, pp. 15-18).

The results of the analysis for laboratory data are given in Fig. 5.5a and Table 5.7a, and the results for field data are given in Fig. 5.5b and Table 5.7b.

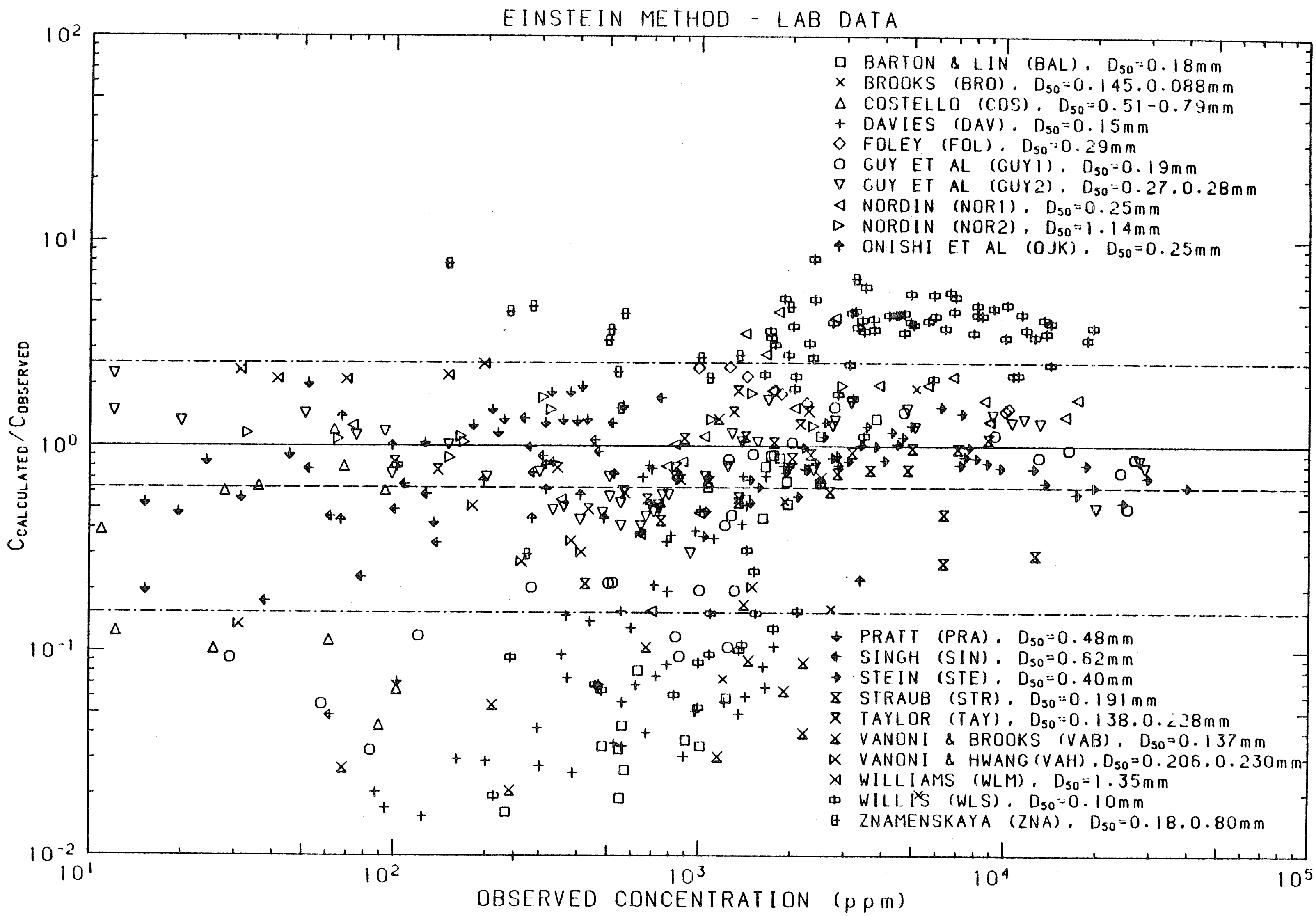

Figure 5.5a Ratio of concentration calculated by the Einstein (1950) technique to observed concentration as a function of observed concentration, for laboratory data.

Table 5.7a

Ratio of Predicted to Observed Concentration for Einstein Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	21	0.174	4.900	0.016	0.036	0.446	0.854	1.362
BRO	6	0.233	4.532	0.020	0.051	0.161	1.058	1.908
COS	11	0.260	2.991	0.044	0.087	0.391	0.777	1.204
DAV	46	0.098	3.381	0.005	0.029	0.074	0.330	0.802
FOL	9	1.683	1.429	0.698	1.178	1.795	2.405	2.422
GUY1	26	0.340	2.935	0.033	0.116	0.412	0.997	1.547
GUY2	47	0.816	1.607	0.302	0.507	0.769	1.311	2.230
NOR1	22	1.305	2.205	0.157	0.592	1.394	2.877	4.518
NOR2	11	1.313	1.276	0.878	1.029	1.257	1.676	1.968
OJK	14	0.595	1.520	0.222	0.391	0.578	0.905	1.388
PRA	22	0.914	2.218	0.071	0.412	1.267	2.028	2.015
SIN	18	0.590	2.318	0.049	0.255	0.742	1.367	1.715
STE	44	0.811	1.368	0.364	0.593	0.810	1.109	1.554
STR	21	0.661	1.609	0.214	0.411	0.764	1.063	1.114
TAY	12	0.884	1.512	0.494	0.585	0.784	1.337	1.859
VAB	12	0.091	3.377	0.021	0.027	0.064	0.308	1.358
VAH	6	0.273	1.515	0.136	0.181	0.275	0.414	0.513
WLM	5	2.261	1.068	2.117	2.117	2.223	2.415	2.519
WLS	77	1.689	4.571	0.020	0.369	3.585	7.717	8.182
ZNA	14	2.997	2.160	0.298	1.388	3.265	6.474	7.737
All	444	0.628	4.059	0.005	0.155	0.797	2.551	8.182

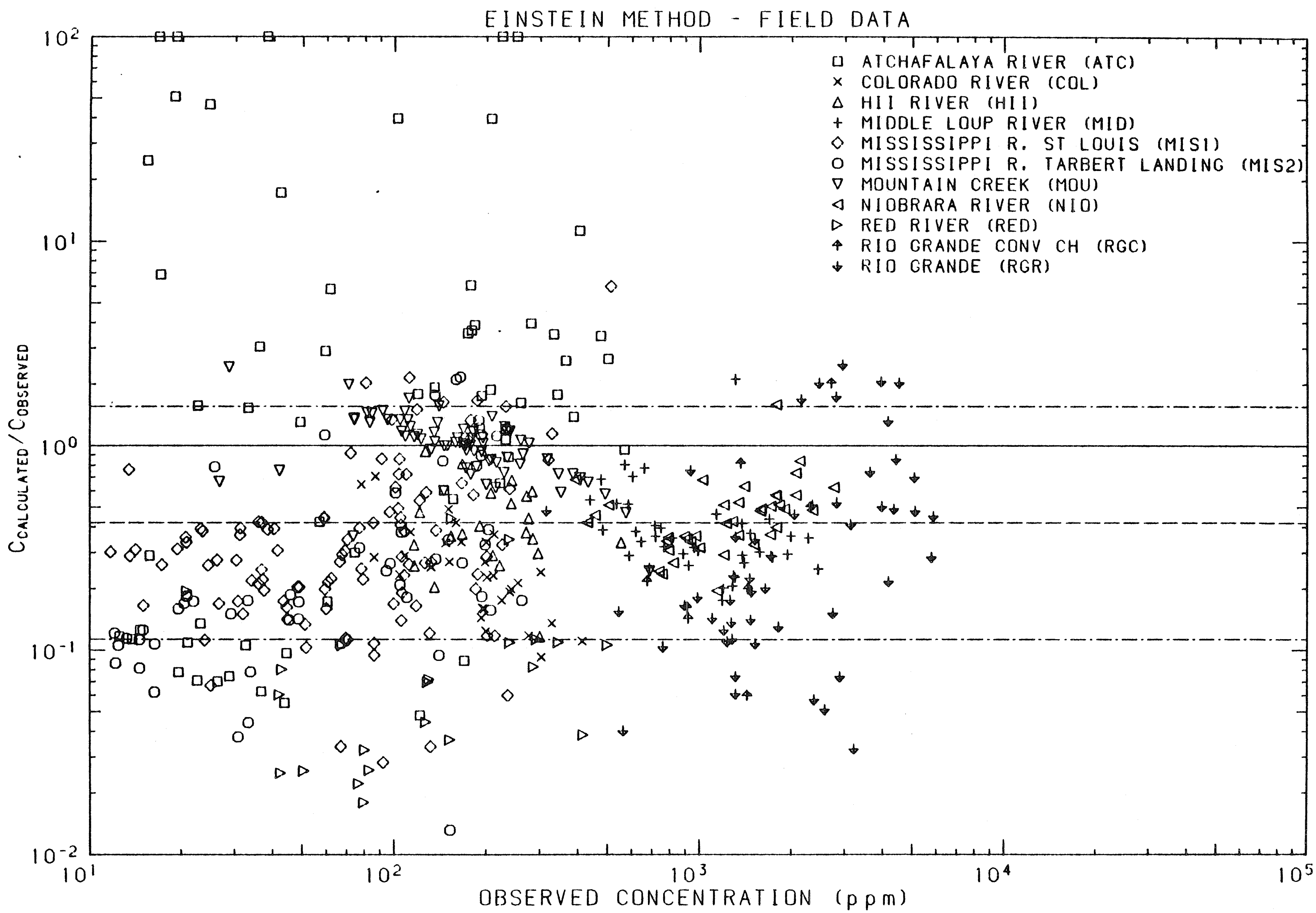

Figure 5.5b **Ratio of concentration calculated by the Einstein (1950) technique to observed concentration as a function of observed concentration, for field data.**

Table 5.7b

Ratio of Predicted to Observed Concentration for Einstein Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	62	1.521	10.121	0.048	0.150	1.571	15.395	233.312
COL	30	0.240	1.640	0.093	0.146	0.234	0.394	0.708
HII	22	0.393	1.586	0.117	0.248	0.370	0.624	0.940
MID	38	0.374	1.578	0.176	0.237	0.355	0.591	2.119
MIS1	106	0.315	2.447	0.028	0.129	0.289	0.772	6.002
MIS2	52	0.241	2.948	0.013	0.082	0.182	0.710	2.167
MOU	75	0.973	1.434	0.245	0.679	1.026	1.395	2.427
NIO	40	0.442	1.465	0.196	0.302	0.427	0.648	1.591
RED	23	0.075	2.718	0.018	0.028	0.072	0.204	1.045
RGC	8	0.291	2.835	0.060	0.103	0.201	0.826	2.027
RGR	50	0.279	2.988	0.033	0.094	0.226	0.835	2.500
All	506	0.420	3.719	0.013	0.113	0.373	1.562	233.312

5.3.5 Engelund and Fredsoe Technique (1976)

This technique utilizes an analytical expression for the bed-load transport rate plus the Einstein (1950) integrals for calculation of the suspended load transport rate.

The first step in the procedure is the calculation of u_*' from Eq. 3.15, from which $\tau_*' = \rho u_*'^2/g(\rho_s-\rho)D_{50}$ can be determined. Given τ_*', the quantity p can be determined from

$$p = \left[1 + \frac{0.51\,\frac{\pi}{6}}{\tau_*' - 0.05}\right]^{-1/4} \qquad (5.8)$$

Then, the dimensionless bed load transport rate is given by

$$\Phi_B = 5p\left(\sqrt{\tau_*'} - 0.7\sqrt{0.05}\right) \qquad (5.9)$$

Next, the volumetric bed concentration is determined from

$$c_b = \frac{0.65}{(1 + 1/\lambda_b)^3} \qquad (5.10)$$

where

$$\lambda_b = \left[\frac{\tau_*' - 0.05 - 0.51\,\frac{\pi}{6}\,p}{0.027\,\frac{\rho_s}{\rho}\,\tau_*'}\right]^{1/2} \qquad (5.11)$$

Finally, the suspended load transport rate is determined from

$$\Phi_s = 11.6\sqrt{\tau_*'}\;c_b\;2\left[I_1 \ln\frac{12r}{D_s} + I_2\right] \qquad (5.12)$$

where D_s is the fall diameter, and I_1 and I_2 are the Einstein integrals, which are given both graphically and analytically by Vanoni (1975, pp. 196-198). And the total concentration, by mass is given by

$$C = \frac{\rho_s}{\rho q}\sqrt{\left(\frac{\rho_s-\rho}{\rho}\right) g\, D_s^3}\;(\Phi_B + \Phi_s) \qquad (5.13)$$

Although the writer believes that the equations presented here are correct, Eqs. 5.8 and 5.12 are slightly altered from their original presentation. The changes are suggested by a careful review of the derivation given by Engelund and Fredsoe (1976).

For analysis purposes, the fall diameter has been taken to be equivalent to D_{50}.

The results of the analysis for laboratory data are given in Fig. 5.6a and Table 5.8a, and for field data, the results are given in Fig. 5.6b and Table 5.8b.

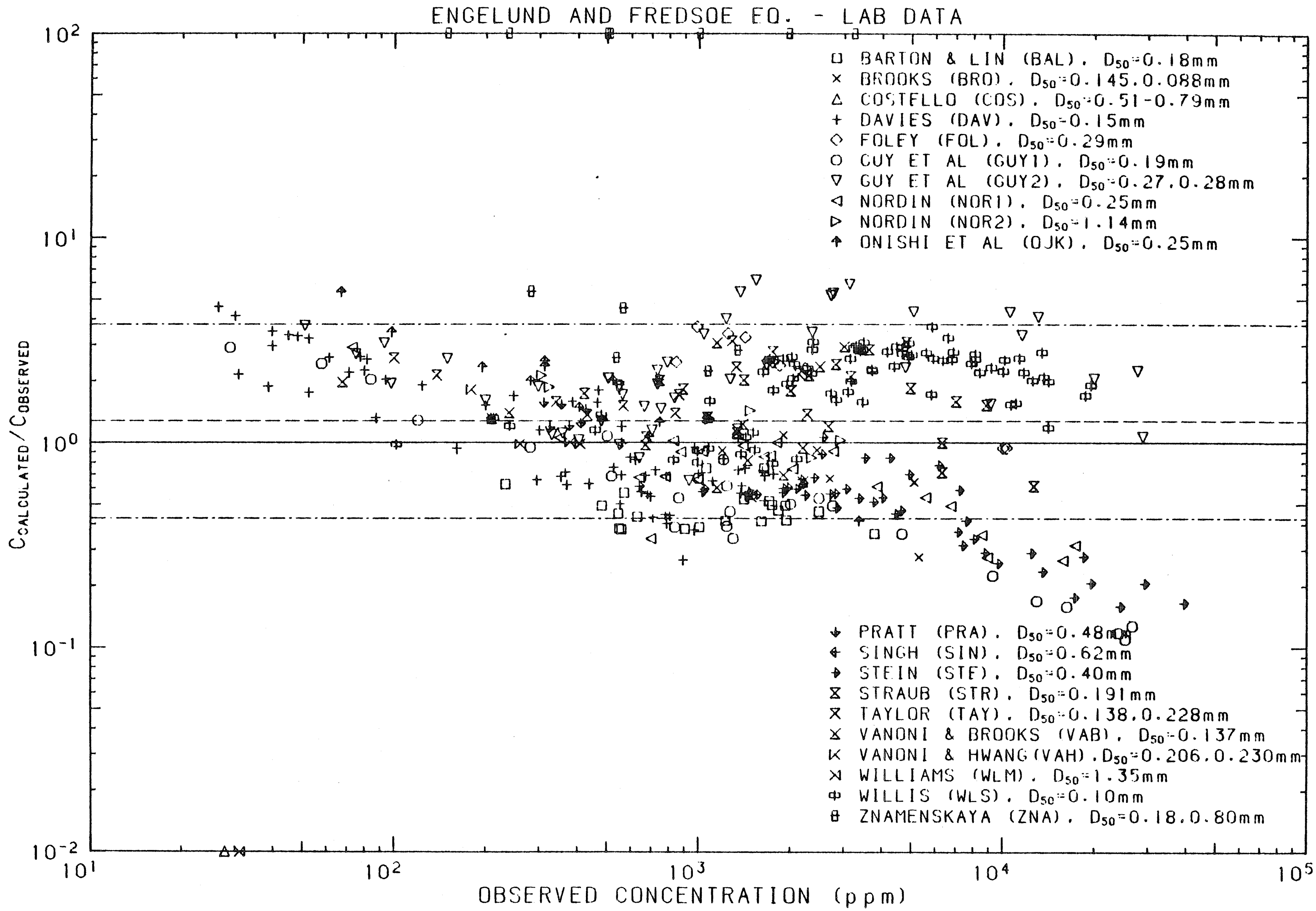

Figure 5.6a Ratio of concentration calculated by the Engelund and Fredsoe (1976) technique to observed concentration as a function of observed concentration, for laboratory data.

Table 5.8a

Ratio of Predicted to Observed Conc. for Engelund and Fredsoe Eq. - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	21	0.475	1.228	0.361	0.387	0.463	0.583	0.751
BRO	6	0.691	1.567	0.277	0.441	0.667	1.083	1.089
COS	0	1.000	1.000	0.000	1.000	1.089	1.000	0.000
DAV	61	1.042	2.005	0.268	0.520	0.756	2.090	4.601
FOL	9	2.198	1.616	0.942	1.360	2.465	3.553	3.671
GUY1	26	0.500	2.388	0.110	0.209	0.502	1.194	2.899
GUY2	44	2.206	1.748	0.653	1.262	2.055	3.857	6.192
NOR1	22	0.675	1.719	0.267	0.393	0.683	1.160	2.911
NOR2	6	1.364	1.374	0.844	0.992	1.309	1.874	2.122
OJK	13	1.754	1.824	0.417	0.961	2.004	3.198	5.434
PRA	8	1.306	1.152	1.002	1.134	1.249	1.505	1.574
SIN	1	2.030	1.000	2.030	2.030	2.030	2.030	2.030
STE	44	0.464	1.600	0.159	0.290	0.560	0.742	1.064
STR	21	1.617	1.520	0.614	1.064	1.787	2.457	3.086
TAY	12	1.776	1.354	1.066	1.311	1.580	2.405	3.126
VAB	13	1.255	1.715	0.604	0.732	1.230	2.153	3.064
VAH	5	0.995	1.462	0.546	0.681	0.990	1.455	1.814
WLM	0	1.000	1.000	0.000	1.000	1.814	1.000	0.000
WLS	77	1.952	1.499	0.790	1.303	2.231	2.926	3.686
ZNA	13	39.289	11.446	1.911	3.432	155.198	449.703	1290.333
All	402	1.274	2.972	0.110	0.429	1.210	3.785	1290.333

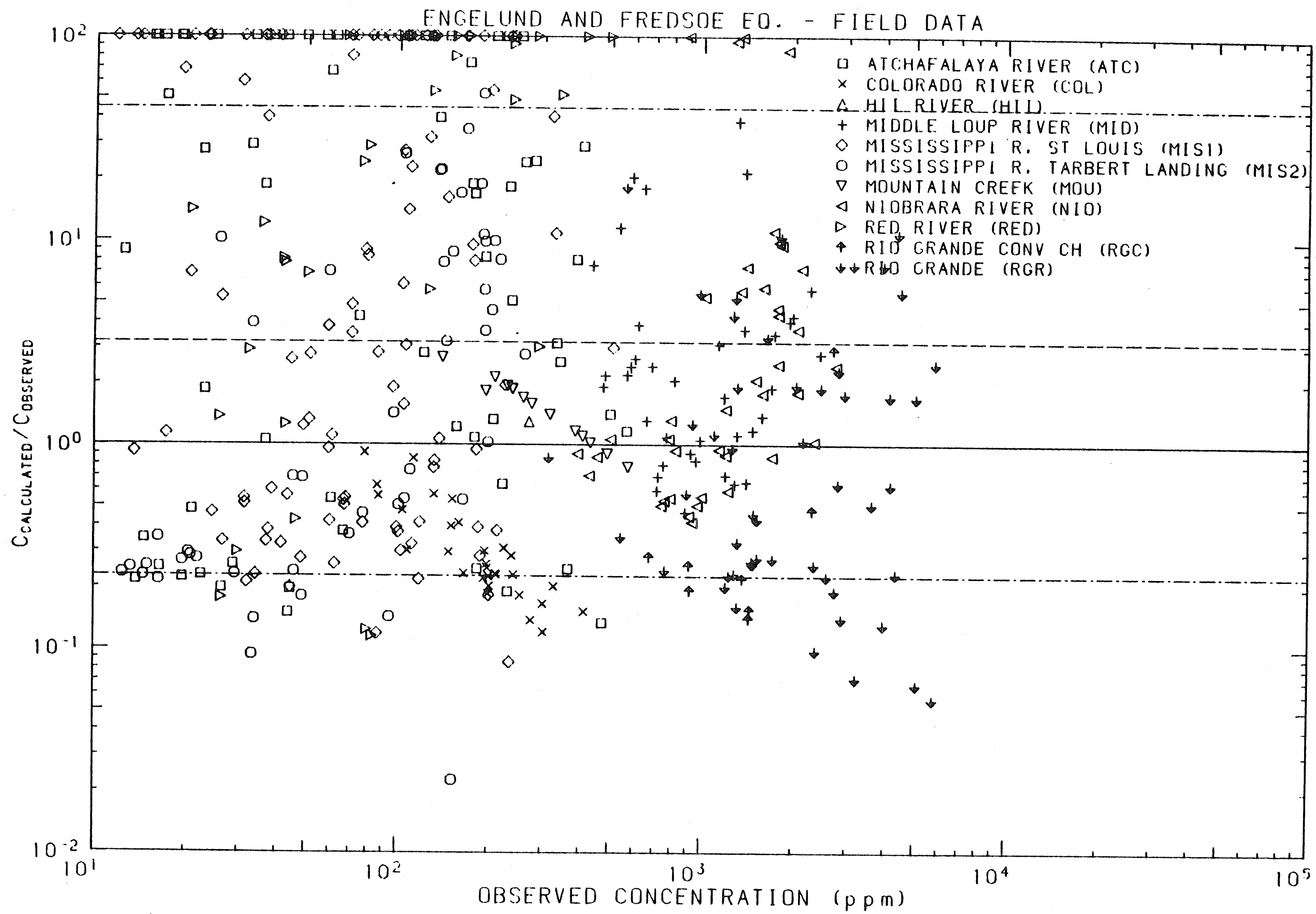

Figure 5.6b **Ratio of concentration calculated by the Engelund and Fredsoe (1976) technique to observed concentration as a function of observed concentration, for field data.**

Table 5.8b

Ratio of Predicted to Observed Conc. for Engelund and Fredsoe Eq. - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	63	10.406	20.421	0.134	0.510	8.888	212.514	2252.931
COL	30	0.291	1.673	0.121	0.174	0.248	0.487	0.914
HII	1	1.293	1.000	1.293	1.293	1.293	1.293	1.293
MID	38	2.333	2.953	0.465	0.790	2.060	6.888	38.363
MIS1	102	9.964	25.624	0.086	0.389	3.783	255.309	5788.821
MIS2	48	1.395	6.763	0.023	0.206	0.694	9.433	52.154
MOU	14	1.483	1.415	0.777	1.048	1.586	2.098	2.679
NIO	40	2.528	4.796	0.417	0.527	1.491	12.125	148.858
RED	29	14.133	14.651	0.115	0.965	14.074	207.068	2167.521
RGC	8	0.314	2.492	0.142	0.126	0.221	0.783	2.911
RGR	50	0.750	4.354	0.057	0.172	0.574	3.266	18.183
All	423	3.179	14.026	0.023	0.227	1.694	44.591	5788.821

5.3.6 Engelund and Hansen Technique (1967)

This technique is one of the simplest to use of all the methods analyzed. Yet it is one of the most effective. The technique can be reduced to the single equation:

$$C = 0.05 \left(\frac{\rho_s}{\rho_s - \rho}\right)\left(\frac{vS}{\sqrt{\left(\frac{\rho_s - \rho}{\rho}\right) g\, D_{50}}}\right) \tau_*^{1/2} \tag{5.14}$$

where $\tau_* = \rho r s / (\rho_s - \rho) D_{50}$.

The results of the analysis for laboratory data are given in Fig. 5.7a and Table 5.9a, and the results for field data are given in Fig. 5.7b and Table 5.9b.

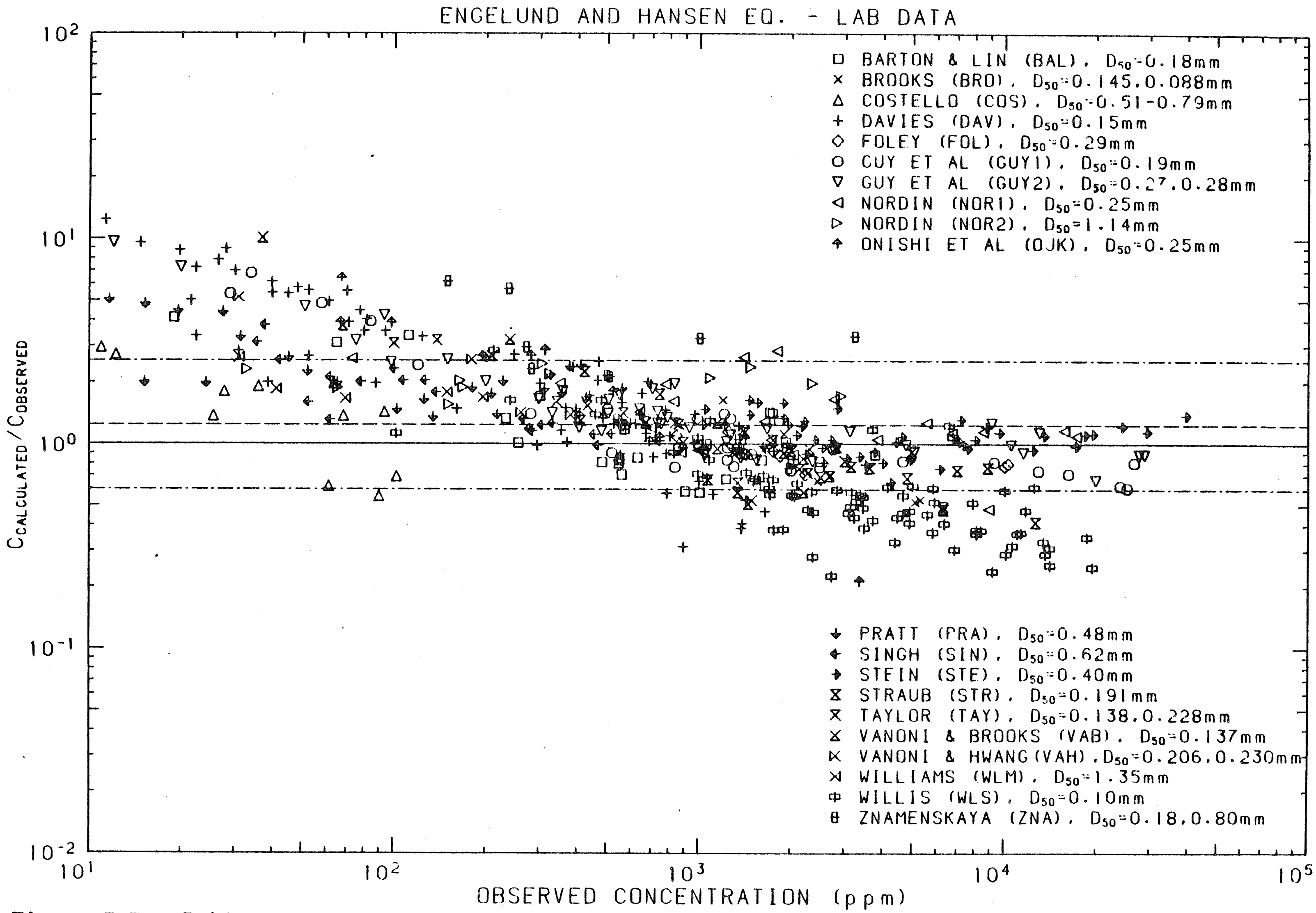

Figure 5.7a **Ratio of concentration calculated by the Engelund and Hansen (1967) technique to observed concentration as a function of observed concentration, for laboratory data.**

Table 5.9a

Ratio of Predicted to Observed Conc. for Engelund and Hansen Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	26	1.081	1.660	0.578	0.651	0.897	1.794	4.132
BRO	6	0.784	1.513	0.520	0.518	0.657	1.186	1.635
COS	11	1.380	1.728	0.553	0.799	1.431	2.384	2.950
DAV	69	1.960	2.386	0.315	0.822	1.768	4.676	12.380
FOL	9	0.931	1.213	0.706	0.767	0.890	1.129	1.329
GUY1	27	1.199	1.967	0.608	0.610	0.903	2.359	6.768
GUY2	47	1.503	1.849	0.663	0.813	1.251	2.779	9.620
NOR1	22	1.305	1.508	0.481	0.865	1.164	1.967	2.846
NOR2	11	2.024	1.143	1.555	1.771	2.031	2.313	2.458
OJK	14	1.775	2.307	0.215	0.769	1.806	4.095	6.412
PRA	25	2.225	1.465	1.362	1.519	2.001	3.260	5.004
SIN	20	1.626	1.463	0.985	1.112	1.323	2.378	3.794
STE	44	1.087	1.240	0.648	0.877	1.087	1.348	1.638
STR	21	0.816	1.478	0.414	0.552	0.765	1.206	2.247
TAY	12	1.330	1.584	0.717	0.839	1.268	2.107	3.197
VAB	14	1.360	2.252	0.509	0.604	0.949	3.063	10.073
VAH	6	1.622	2.006	0.530	0.808	1.387	3.253	5.183
WLM	5	1.899	1.185	1.666	1.602	1.788	2.251	2.645
WLS	77	0.549	1.639	0.227	0.335	0.523	0.900	2.857
ZNA	14	1.965	1.933	0.761	1.017	2.123	3.798	6.186
All	480	1.236	2.064	0.215	0.599	1.151	2.552	12.380

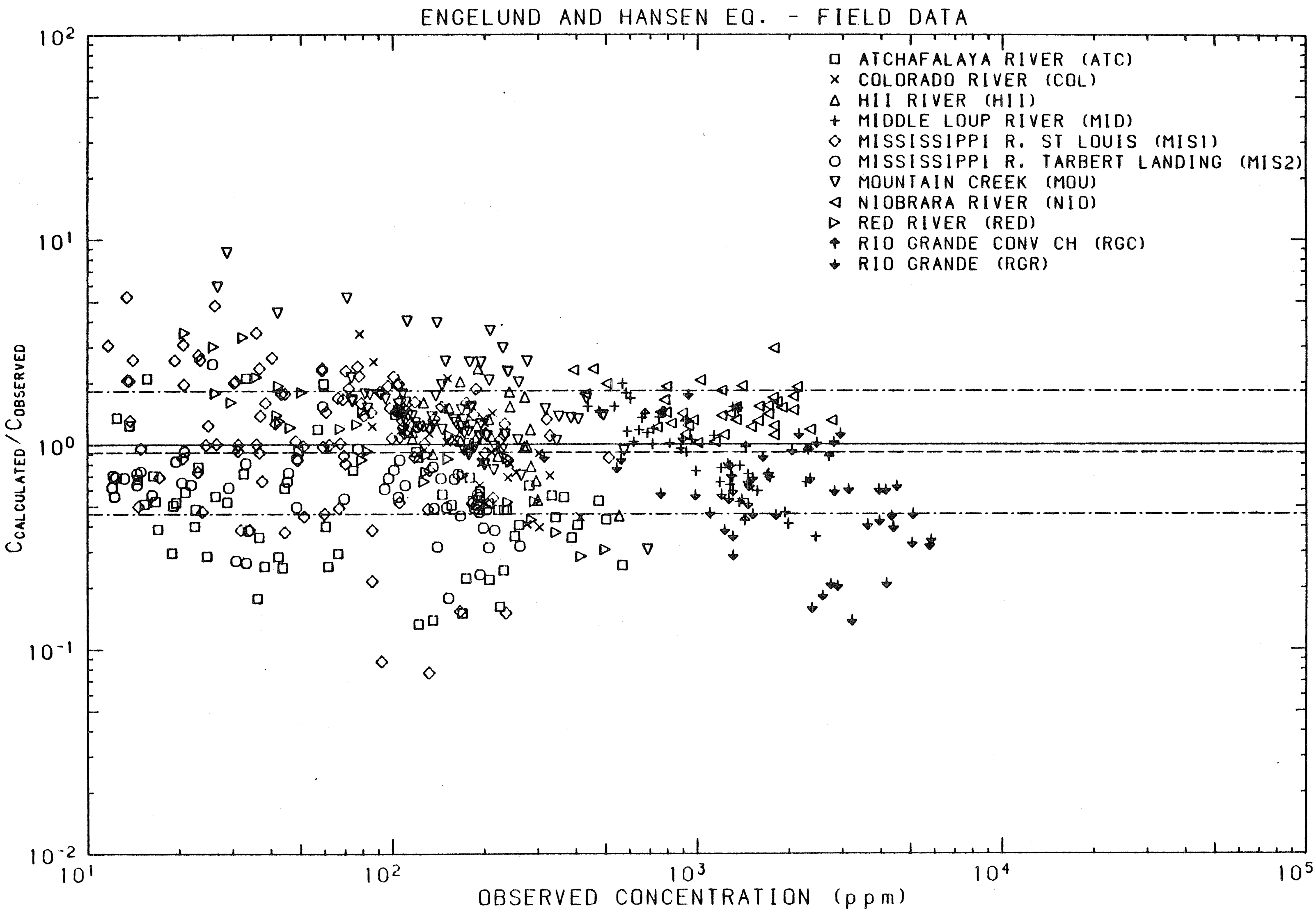

Figure 5.7b **Ratio of concentration calculated by the Engelund and Hansen (1967) technique to observed concentration as a function of observed concentration, for field data.**

Table 5.9b

Ratio of Predicted to Observed Conc. for Engelund and Hansen Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	63	0.484	1.869	0.133	0.259	0.506	0.905	2.114
COL	30	0.981	1.659	0.395	0.591	0.979	1.627	3.462
HII	22	1.107	1.501	0.450	0.738	1.069	1.663	2.339
MID	38	0.937	1.533	0.356	0.611	1.005	1.436	1.986
MIS1	111	1.125	2.056	0.077	0.547	1.235	2.312	5.286
MIS2	53	0.576	1.543	0.178	0.373	0.618	0.889	2.478
MOU	75	1.528	1.674	0.308	0.913	1.379	2.558	8.655
NIO	40	1.497	1.266	1.016	1.183	1.429	1.895	2.947
RED	29	1.035	1.933	0.285	0.535	1.108	2.000	3.532
RGC	8	1.024	1.463	0.427	0.700	0.971	1.499	1.490
RGR	50	0.529	1.714	0.139	0.309	0.579	0.907	1.759
All	519	0.916	1.997	0.077	0.459	0.998	1.830	8.655

5.3.7 Graf Technique (1968)

Like the method of Engelund and Hansen (1967), the Graf* method is very easy to use. However, the test results for the latter method are much less favorable than for the former method. Likewise, the Graf technique can be reduced to a single equation:

$$C = 10.39 \left(\frac{\rho_s}{\rho_s - \rho}\right)\left(\frac{u_* D_{50}}{q}\right) \tau_*^{2.02} \tag{5.15}$$

As White, Milli, and Crabbe (1973) have indicated, Graf was not specific about which grain diameter should be used. As suggested by Eq. 5.15 D_{50} has been used here.

The results of the analysis for laboratory data are given in Fig. 5.8a and Table 5.10a, and the results for field data are given in Fig. 5.8b and Table 5.10b.

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*The technique developed by Graf in 1968 is described in Graf, 1971.

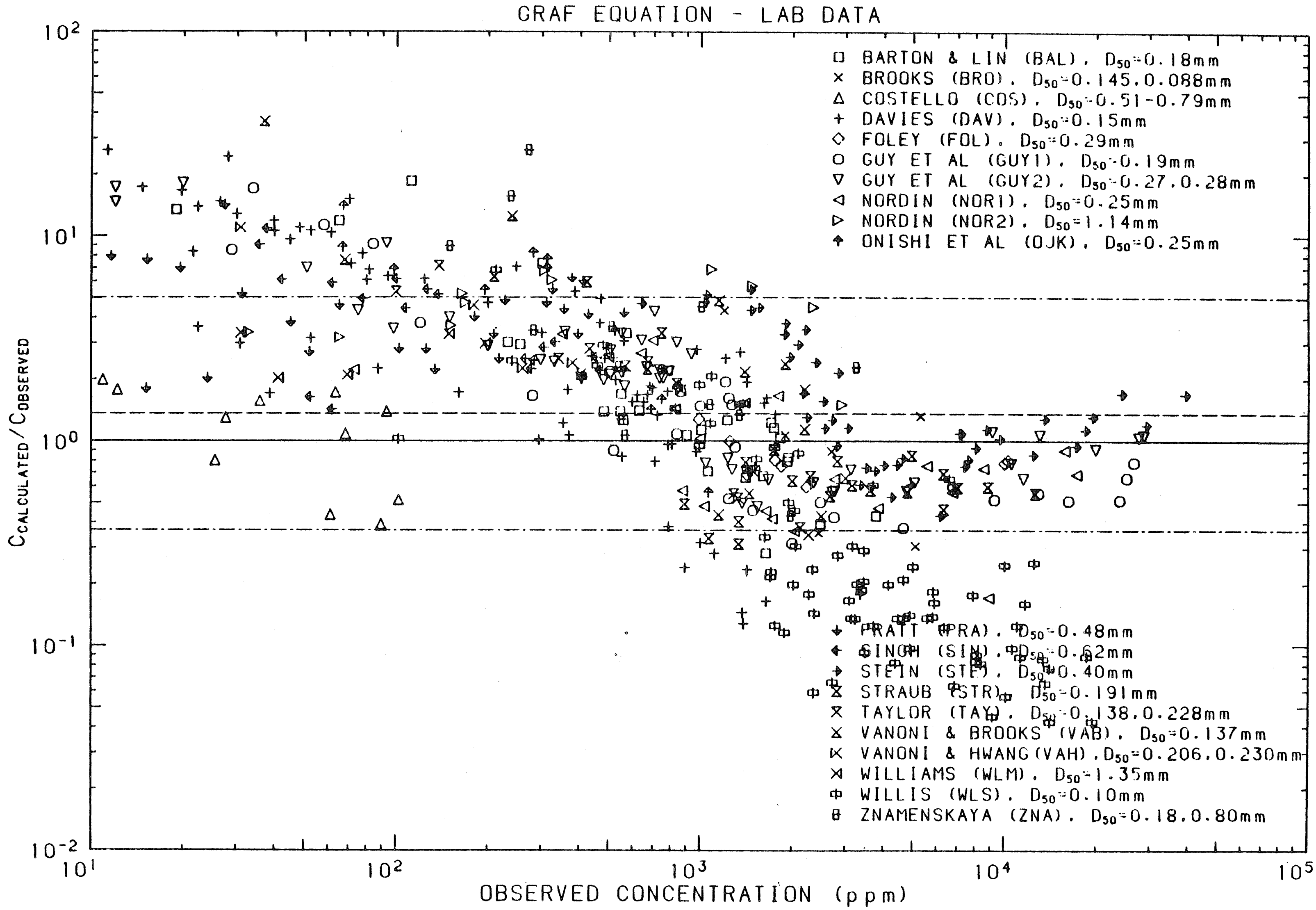


Figure 5.8a Ratio of concentration calculated by the Graf (1968) technique to observed concentration as a function of observed concentration, for laboratory data.

Table 5.10a

Ratio of Predicted to Observed Concentration for Graf Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	26	1.550	2.861	0.284	0.542	1.232	4.435	18.573
BRO	6	0.919	2.413	0.308	0.381	0.892	2.218	4.337
COS	11	1.027	1.762	0.392	0.583	1.299	1.810	1.990
DAV	69	2.600	3.560	0.129	0.730	2.531	9.257	26.242
FOL	9	0.897	1.388	0.599	0.646	0.805	1.245	1.848
GUY1	27	1.264	2.983	0.317	0.424	0.934	3.770	17.051
GUY2	47	1.852	2.550	0.479	0.726	2.029	4.723	18.148
NOR1	22	0.901	2.159	0.172	0.417	0.735	1.945	3.318
NOR2	11	4.359	1.524	1.505	2.860	4.727	6.642	6.886
OJK	14	3.120	3.217	0.179	0.970	3.433	10.036	14.016
PRA	25	4.231	1.599	1.818	2.646	4.243	6.764	14.209
SIN	20	3.591	1.737	1.426	2.067	2.863	6.237	10.864
STE	44	1.447	1.981	0.433	0.731	1.161	2.866	5.490
STR	21	0.702	1.943	0.315	0.362	0.598	1.364	5.971
TAY	12	1.554	2.641	0.349	0.589	1.902	4.104	7.150
VAB	14	2.368	3.622	0.431	0.654	2.177	8.577	36.395
VAH	6	2.743	2.289	0.714	1.198	2.262	6.277	10.974
WLM	5	2.706	1.249	2.034	2.166	3.007	3.380	3.380
WLS	77	0.248	3.121	0.043	0.079	0.188	0.773	6.833
ZNA	14	2.948	2.881	0.432	1.023	2.305	8.493	26.385
All	480	1.360	3.696	0.043	0.368	1.503	5.028	36.395

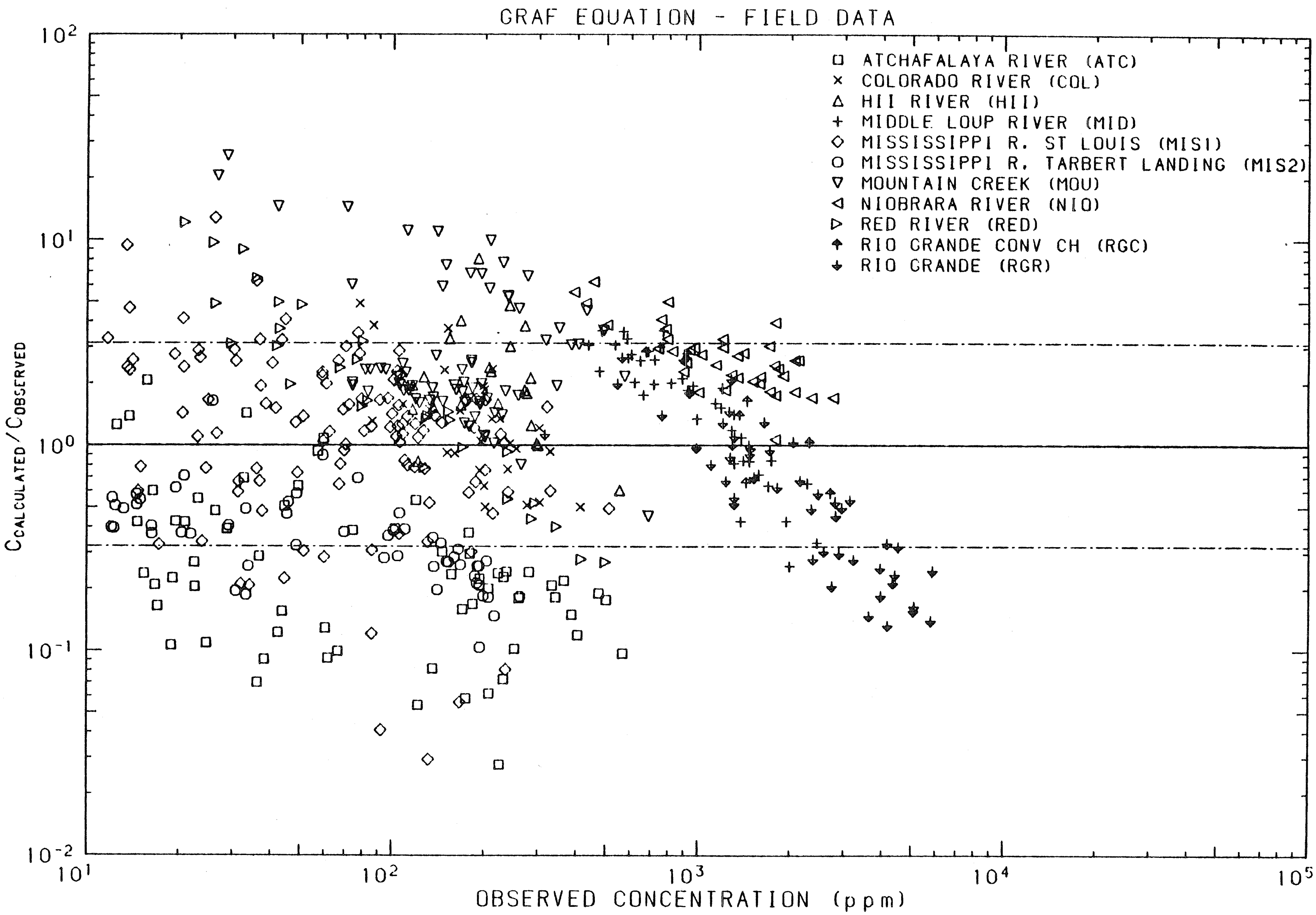


Figure 5.8b Ratio of concentration calculated by the Graf (1968) technique to observed concentration as a function of observed concentration, for field data.

Table 5.10b

Ratio of Predicted to Observed Concentration for Graf Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	63	0.235	2.392	0.028	0.098	0.224	0.561	2.069
COL	30	1.265	1.809	0.501	0.699	1.213	2.288	4.887
HII	22	1.980	1.809	0.605	1.094	1.844	3.581	8.077
MID	38	1.490	2.022	0.258	0.737	1.854	3.013	3.607
MIS1	111	1.076	2.728	0.029	0.394	1.224	2.935	12.743
MIS2	53	0.347	1.624	0.104	0.214	0.363	0.564	1.644
MOU	75	2.682	2.148	0.453	1.249	2.017	5.762	25.596
NIO	40	2.643	1.430	1.068	1.848	2.582	3.780	6.215
RED	29	1.806	2.829	0.270	0.638	1.644	5.109	12.079
RGC	8	1.445	1.807	0.585	0.800	1.400	2.610	2.842
RGR	50	0.570	2.245	0.133	0.254	0.583	1.279	2.664
All	519	1.005	3.124	0.028	0.322	1.235	3.140	25.596

5.3.8 Laursen Technique (1958)

For the Laursen (1958) method, the particle size distribution is divided into n size fractions, p_i, which have mean size D_{si} and fall velocity w_i. The concentration is calculated from

$$c = 0.01 \sum_{i=1}^{n} p_i \left(\frac{D_{si}}{r}\right)^{7/6} \left[\frac{v^2}{58\ Y_c\ D_{si}\ g\left(\frac{\rho_s - \rho}{\rho}\right)} \left(\frac{D_{50}}{r}\right)^{1/3} - 1\right] \cdot f\left(\frac{u_*}{w_i}\right) \quad (5.16)$$

The value of Y_c is obtained from

$$Y_c = \begin{cases} 0.04 \ \ldots\ldots \ D_{si}/\delta > 0.1 \\ 0.08 \ \ldots\ldots \ 0.1 \geq D_{si}/\delta > 0.03 \\ 0.03 \ \ldots\ldots \ D_{si}/\delta \leq 0.03 \end{cases} \quad (5.17)$$

where $\delta = 11.6\nu/u_*$ is the thickness of the laminar sublayer.

The function $f(u_*/w_i)$ was given graphically by Laursen (1958). For this analysis, the following equation was fitted to the curve:

$$f\left(\frac{u_*}{w_i}\right) = \begin{cases} 3.988 + 0.250X \ \ldots\ldots \ \frac{u_*}{w_i} > 200 \\ -2.430 + 8.271X - 3.370X^2 + 0.476X^3 \ldots 200 \geq \frac{u_*}{w_i} > 20 \\ 0.785 + 2.220X \ \ldots\ldots \ 20 \geq \frac{u_*}{w_i} > 2.8 \\ 1.162 + 0.767X + 1.014X^2 + 0.784X^3 \ldots 2.8 \geq \frac{u_*}{w_i} > 0.2 \\ 1.025 + 0.245X \ \ldots\ldots \ \frac{u_*}{w_i} \leq 0.2 \end{cases} \quad (5.18)$$

where $X = \log(u_*/w_i)$.

The results of the analysis for laboratory data are given in Fig. 5.9a and Table 5.11a, and for field data, the results are given in Fig. 5.9b and Table 5.11b.

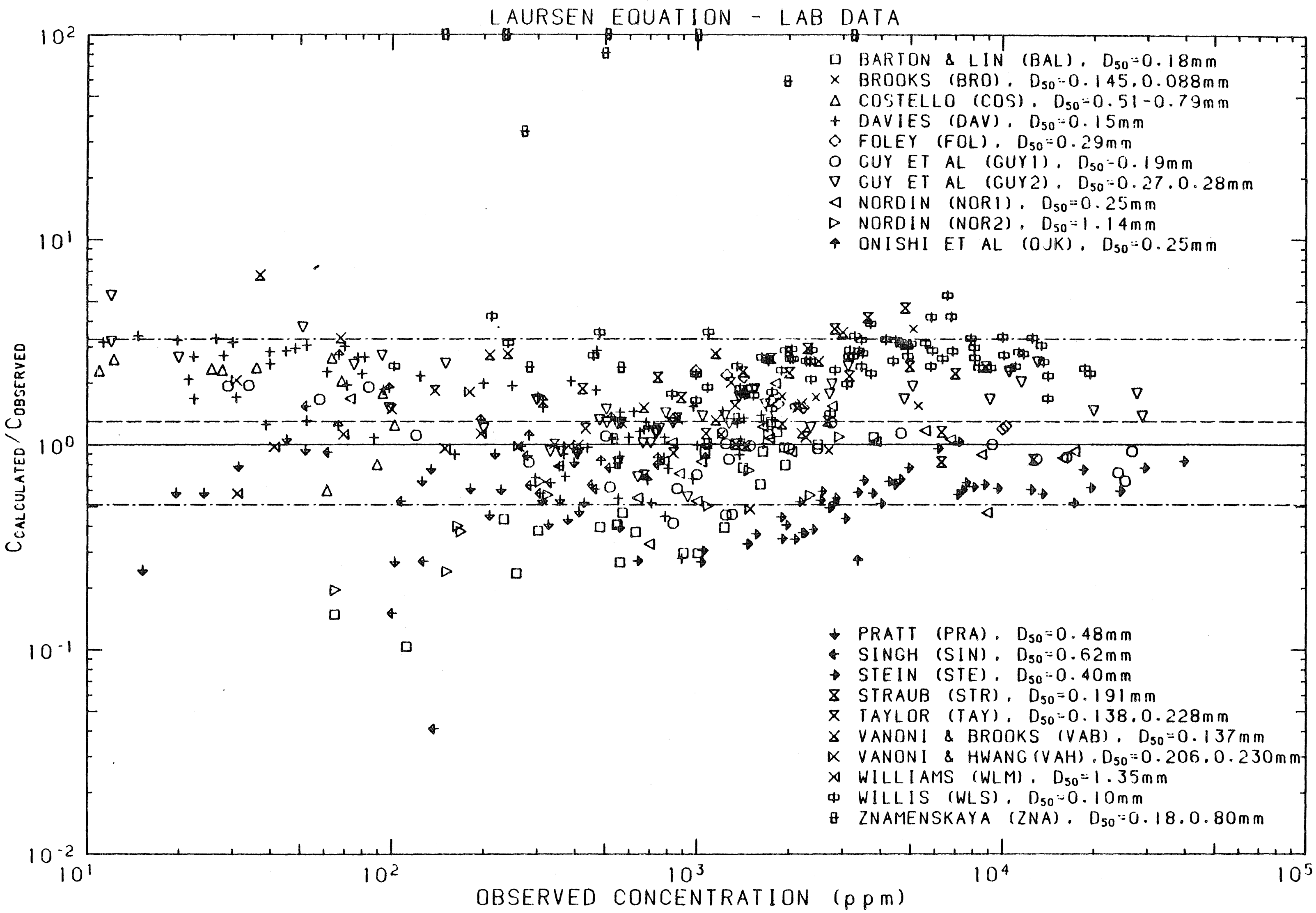


Figure 5.9a Ratio of concentration calculated by the Laursen (1958) technique to observed concentration as a function of observed concentration, for laboratory data.

Table 5.11a

Ratio of Predicted to Observed Concentration for Laursen Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	25	0.505	1.931	0.104	0.262	0.434	0.976	1.288
BRO	6	1.607	1.536	0.937	1.047	1.544	2.469	3.654
COS	11	1.738	1.619	0.598	1.073	2.298	2.814	2.637
DAV	69	1.439	1.723	0.280	0.835	1.346	2.479	3.402
FOL	9	1.630	1.262	1.193	1.292	1.580	2.056	2.279
GUY1	27	0.924	1.502	0.414	0.615	0.956	1.388	1.944
GUY2	47	1.539	1.536	0.556	1.002	1.458	2.363	5.336
NOR1	22	0.925	1.536	0.328	0.603	0.922	1.421	1.987
NOR2	10	0.478	1.633	0.195	0.293	0.503	0.781	1.091
OJK	14	1.090	1.693	0.274	0.644	1.110	1.845	2.732
PRA	21	0.562	1.451	0.245	0.387	0.584	0.816	1.068
SIN	15	0.524	2.362	0.041	0.222	0.637	1.238	1.540
STE	44	0.526	1.377	0.268	0.382	0.574	0.724	1.035
STR	21	1.884	1.644	0.821	1.146	2.160	3.098	4.627
TAY	12	1.276	1.329	0.709	0.960	1.282	1.695	2.007
VAB	14	2.111	1.673	0.988	1.262	1.849	3.531	6.698
VAH	6	1.098	1.605	0.486	0.684	0.983	1.762	2.064
WLM	5	0.929	1.280	0.578	0.726	0.979	1.190	1.135
WLS	77	2.599	1.286	1.412	2.020	2.645	3.344	5.328
ZNA	14	16.793	9.401	0.811	1.786	33.648	157.865	249.272
All	469	1.296	2.532	0.041	0.512	1.250	3.281	249.272

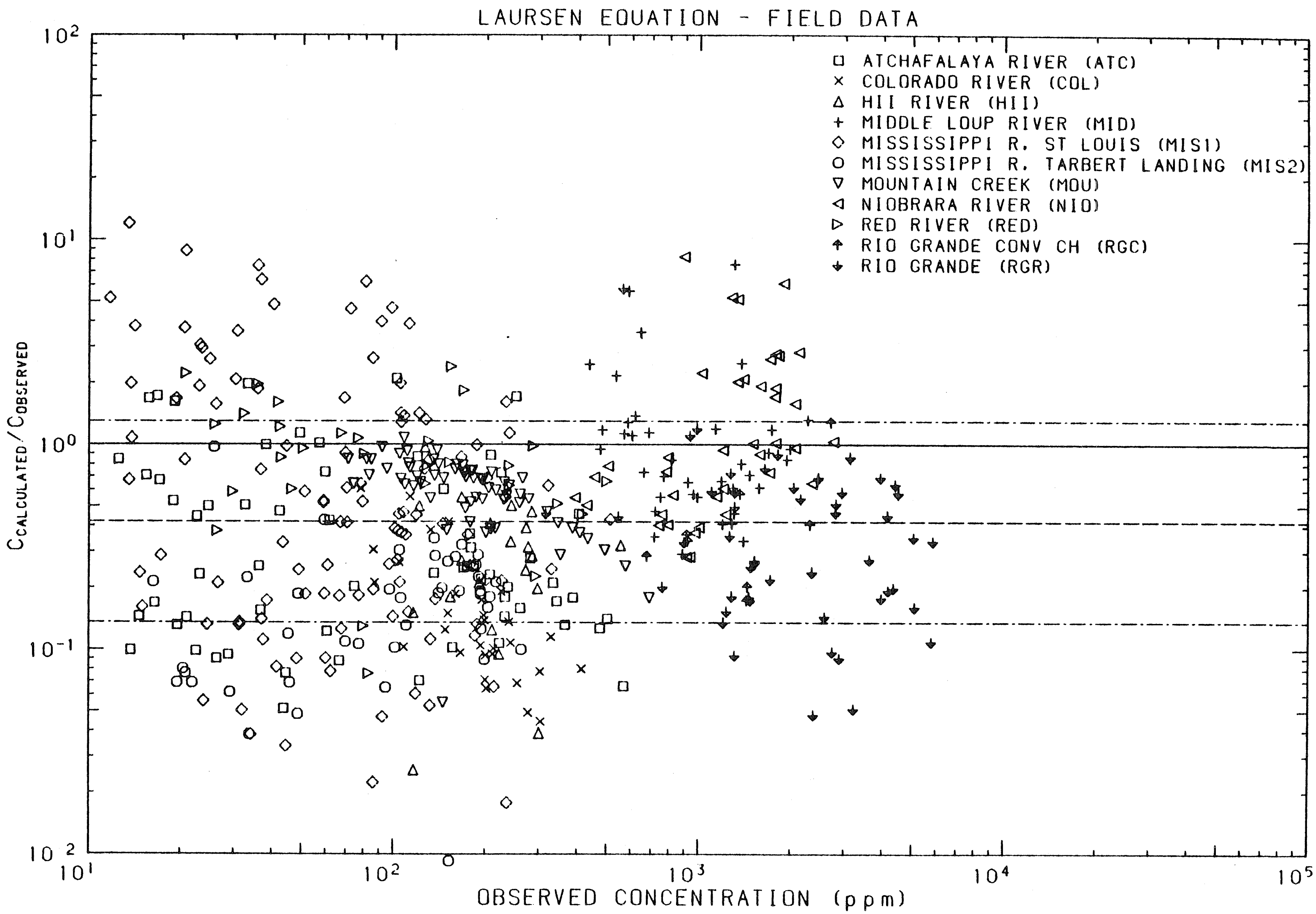


Figure 5.9b **Ratio of concentration calculated by the Laursen (1958) technique to observed concentration as a function of observed concentration, for field data.**

Table 5.11b

Ratio of Predicted to Observed Concentration for Laursen Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	63	0.294	2.622	0.051	0.112	0.236	0.770	2.104
COL	30	0.138	1.942	0.044	0.071	0.115	0.268	0.610
HII	21	0.239	2.326	0.026	0.103	0.286	0.556	0.970
MID	38	0.935	2.061	0.293	0.454	0.840	1.927	7.601
MIS1	111	0.487	4.191	0.018	0.116	0.431	2.040	11.999
MIS2	42	0.146	2.172	0.009	0.067	0.181	0.317	0.973
MOU	71	0.575	1.551	0.055	0.371	0.654	0.892	1.077
NIO	40	1.079	2.385	0.284	0.453	0.894	2.574	8.260
RED	29	0.775	2.154	0.077	0.360	0.863	1.670	2.406
RGC	8	0.372	1.800	0.173	0.207	0.338	0.670	1.284
RGR	50	0.331	2.383	0.048	0.139	0.338	0.788	5.786
All	503	0.420	3.098	0.009	0.135	0.457	1.300	11.999

5.3.9 Ranga Raju, Garde, and Bhardwaj Technique (1981)

This is the most recently developed technique discussed. According to this method, the dimensionless transport rate, Φ, is determined from

$$\Phi = 60\ \tau_*'\left(\frac{\tau_o'}{\tau_o'}\right)^{-3m} \qquad (5.19)$$

in the range

$$0.05 \leq \tau_*'\left(\frac{r'}{r}\right)^{-m} \leq 1.0 \qquad (5.20)$$

The quantity r' is defined from

$$r' = \left[\frac{vD_{50}^{1/6}}{7.66\ \sqrt{gS}}\right]^{3/2} \qquad (5.21)$$

which is the Strickler equation.

The exponent m is given by

$$m = \begin{cases} 0 \ \ldots\ldots\ldots\ldots\ldots & \dfrac{u_*}{w} \leq 0.5 \\ 0.2\dfrac{u_*}{w} - 0.10 \ \ldots\ldots & \dfrac{u_*}{w} > 0.5 \end{cases} \qquad (5.22)$$

The concentration can be determined from

$$C = \frac{\rho_s}{\rho q}\sqrt{\left(\frac{\rho_s-\rho}{\rho}\right) g D_{50}^3}\ \Phi \qquad (5.23)$$

Equation 5.23 is slightly altered from the authors' equation by the removal of a factor of $\sqrt{g}$ from the right side. As written here, Eq. 5.23 is dimensionless and conforms with the standard definition of Φ. The writer believes that there was a typesetting error in the original publication.

The results of the analysis for laboratory data are given in Fig. 5.10a and Table 5.12a, and for field data, the results are given in Fig. 5.10b and Table 5.12b.

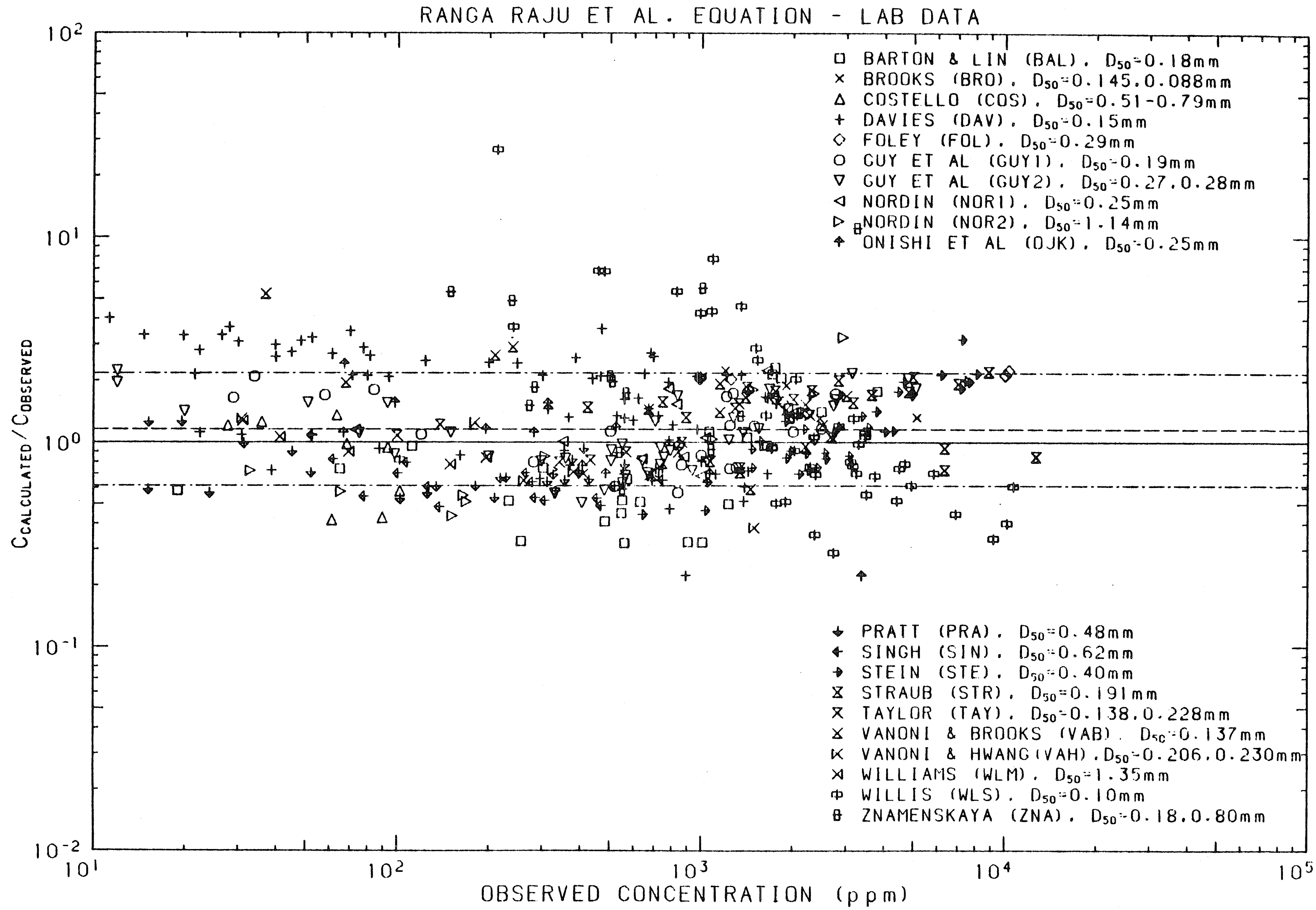


Figure 5.10a Ratio of concentration calculated by the Ranga Raju, Garde, and Bhardwaj (1981) technique to observed concentration as a function of observed concentration, for laboratory data.

Table 5.12a

Ratio of Predicted to Observed Conc. for Ranga Raju et al. Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	26	0.782	1.847	0.323	0.423	0.744	1.444	2.312
BRO	5	1.499	1.318	1.039	1.137	1.322	1.976	2.233
COS	8	0.817	1.573	0.418	0.519	0.944	1.286	1.358
DAV	69	1.608	1.832	0.224	0.878	1.959	2.946	4.035
FOL	9	1.706	1.281	0.974	1.331	1.795	2.185	2.233
GUY1	20	1.138	1.468	0.569	0.775	1.134	1.671	2.094
GUY2	40	1.067	1.480	0.507	0.721	0.981	1.580	2.236
NOR1	12	1.168	1.448	0.685	0.807	1.057	1.692	2.238
NOR2	11	0.908	1.820	0.438	0.499	0.736	1.652	3.249
OJK	14	0.967	1.729	0.224	0.559	1.119	1.671	2.413
PRA	22	0.723	1.276	0.530	0.567	0.672	0.923	1.267
SIN	16	0.631	1.234	0.484	0.512	0.608	0.779	1.084
STE	34	1.143	1.570	0.445	0.728	1.131	1.795	3.180
STR	21	1.362	1.456	0.711	0.935	1.576	1.983	2.203
TAY	12	1.061	1.293	0.685	0.820	1.003	1.372	1.539
VAB	14	1.671	1.646	0.590	1.015	1.529	2.750	5.292
VAH	6	0.769	1.519	0.383	0.507	0.705	1.169	1.315
WLM	5	0.961	1.192	0.784	0.806	0.903	1.145	1.278
WLS	45	1.237	2.664	0.290	0.464	0.939	3.296	26.822
ZNA	14	2.087	2.223	0.591	0.939	1.741	4.640	11.093
All	403	1.160	1.882	0.224	0.616	1.115	2.182	26.822

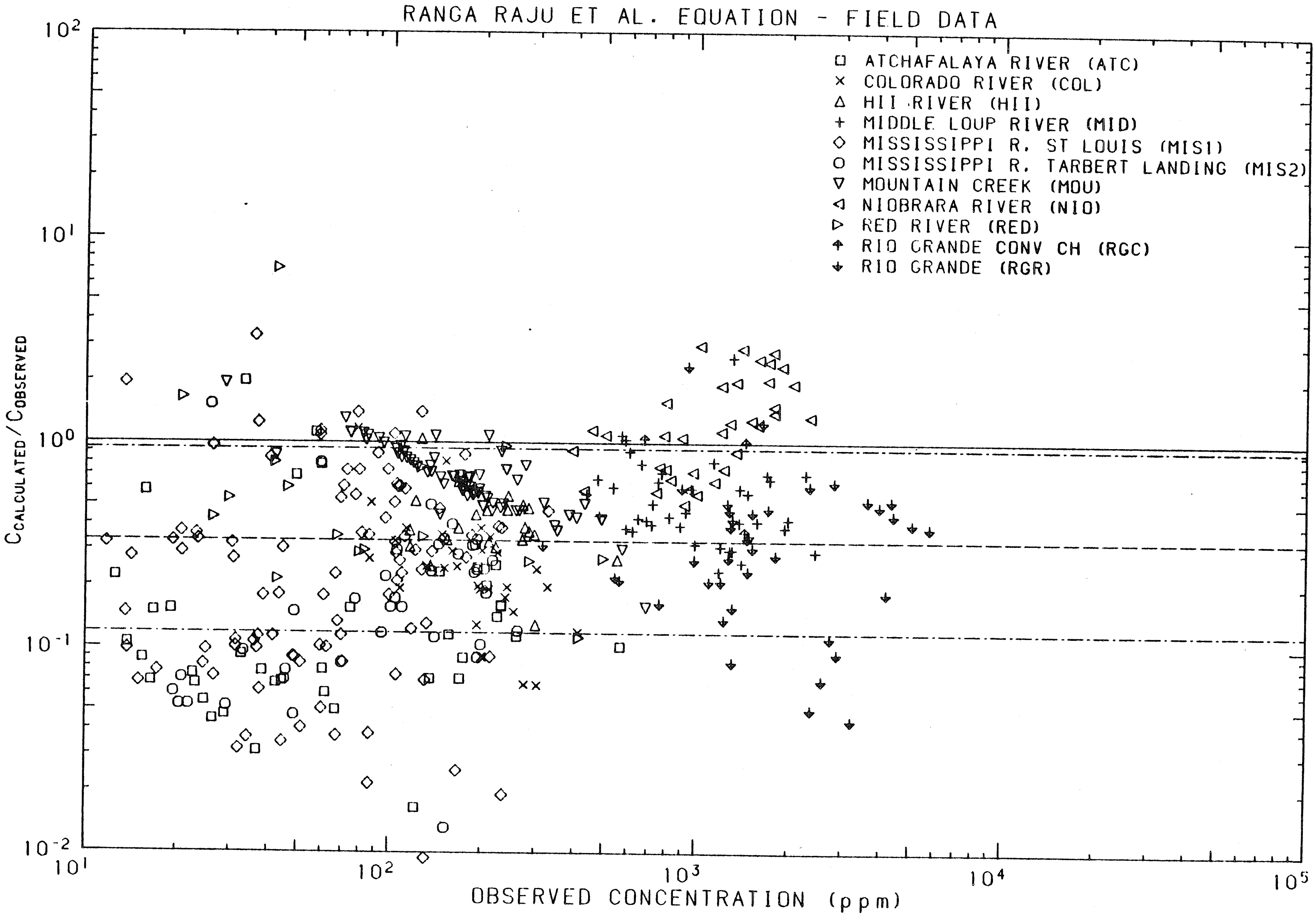


Figure 5.10b Ratio of concentration calculated by the Ranga Raju, Garde, and Bhardwaj (1981) technique to observed concentration as a function of observed concentration, for field data.

Table 5.12b

Ratio of Predicted to Observed Conc. for Ranga Raju et al. Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	39	0.125	2.635	0.017	0.047	0.102	0.328	1.986
COL	30	0.228	1.888	0.066	0.121	0.242	0.431	1.172
HII	22	0.389	1.477	0.129	0.264	0.372	0.575	1.042
MID	38	0.515	1.585	0.238	0.325	0.443	0.817	2.610
MIS1	96	0.218	3.121	0.009	0.070	0.270	0.679	3.301
MIS2	39	0.159	2.398	0.013	0.066	0.171	0.381	1.528
MOU	73	0.667	1.449	0.158	0.460	0.674	0.967	1.933
NIO	35	1.195	1.693	0.502	0.706	1.154	2.022	2.982
RED	16	0.505	2.534	0.113	0.199	0.352	1.279	7.059
RGC	3	0.732	1.623	0.369	0.451	1.013	1.189	1.050
RGR	39	0.288	2.229	0.045	0.129	0.316	0.642	2.372
All	430	0.333	2.813	0.009	0.118	0.381	0.936	7.059

5.3.10 Rottner Technique (1959)

The Rottner (1959) technique is a simple equation which was based on dimensional analysis. Concentration is a function of a relative roughness, D_{50}/r, and a modified Froude number, F_D, in the form:

$$C = \frac{\rho_s}{\rho F_D}\left\{\left[0.667\left(\frac{D_{50}}{r}\right)^{2/3} + 0.140\right] F_D - 0.778\left(\frac{D_{50}}{r}\right)^{2/3}\right\}^3 \qquad (5.24)$$

where $F_D = \dfrac{v}{\sqrt{\left(\dfrac{\rho_s-\rho}{\rho}\right) g\, r}}$

The results of the analysis for laboratory data are given in Fig. 5.11a and Table 5.13a, and for field data, the results are given in Fig. 5.11b and Table 5.13b.

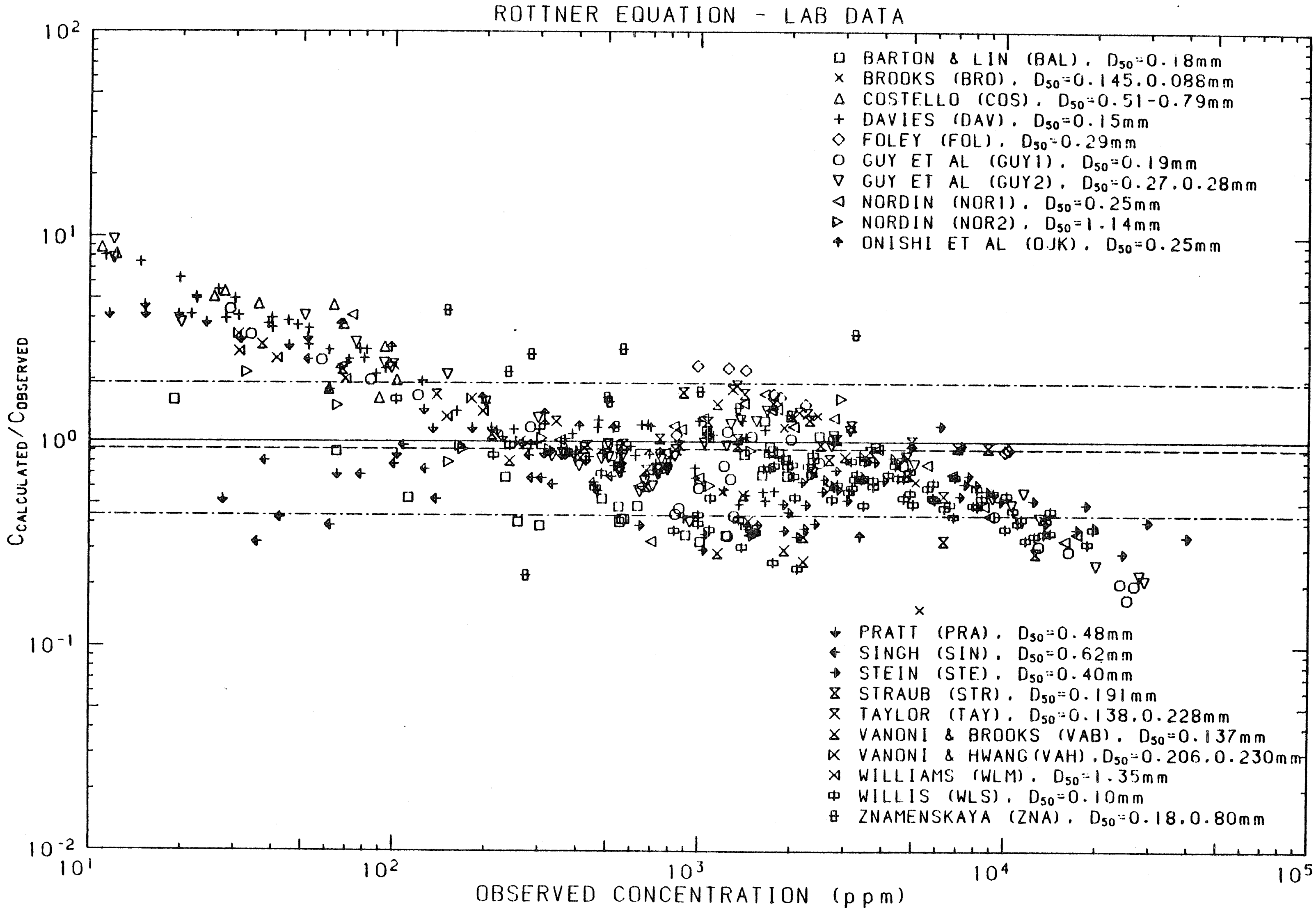


Figure 5.11a **Ratio of concentration calculated by the Rottner (1959) technique to observed concentration as a function of observed concentration, for laboratory data.**

Table 5.13a

Ratio of Predicted to Observed Concentration for Rottner Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	26	0.644	1.558	0.326	0.413	0.672	1.004	1.596
BRO	6	0.611	2.020	0.153	0.302	0.598	1.235	1.340
COS	11	3.835	1.737	1.627	2.209	4.614	6.660	8.771
DAV	69	1.505	2.155	0.428	0.698	1.172	3.242	8.052
FOL	9	1.525	1.433	0.899	1.064	1.644	2.186	2.340
GUY1	27	0.735	2.272	0.171	0.323	0.773	1.670	4.413
GUY2	47	0.979	2.165	0.210	0.452	0.850	2.119	9.599
NOR1	22	0.898	1.834	0.327	0.490	0.927	1.647	4.122
NOR2	11	1.028	1.438	0.612	0.715	0.921	1.478	2.174
OJK	14	1.251	1.755	0.347	0.713	1.169	2.195	3.731
PRA	25	1.451	1.978	0.522	0.734	1.134	2.870	4.623
SIN	20	0.724	1.574	0.323	0.460	0.679	1.140	2.508
STE	44	0.531	1.420	0.286	0.374	0.518	0.754	1.198
STR	21	0.938	1.572	0.286	0.597	1.003	1.474	1.736
TAY	12	1.281	1.407	0.729	0.910	1.255	1.804	2.365
VAB	14	0.707	2.106	0.263	0.336	0.607	1.490	2.982
VAH	6	1.072	1.940	0.384	0.553	0.866	2.080	3.345
WLM	5	1.925	1.348	1.325	1.428	2.020	2.594	2.749
WLS	77	0.549	1.396	0.242	0.393	0.564	0.766	1.613
ZNA	14	1.581	1.992	0.224	0.793	1.567	3.149	4.370
All	480	0.920	2.101	0.153	0.438	0.847	1.932	9.599

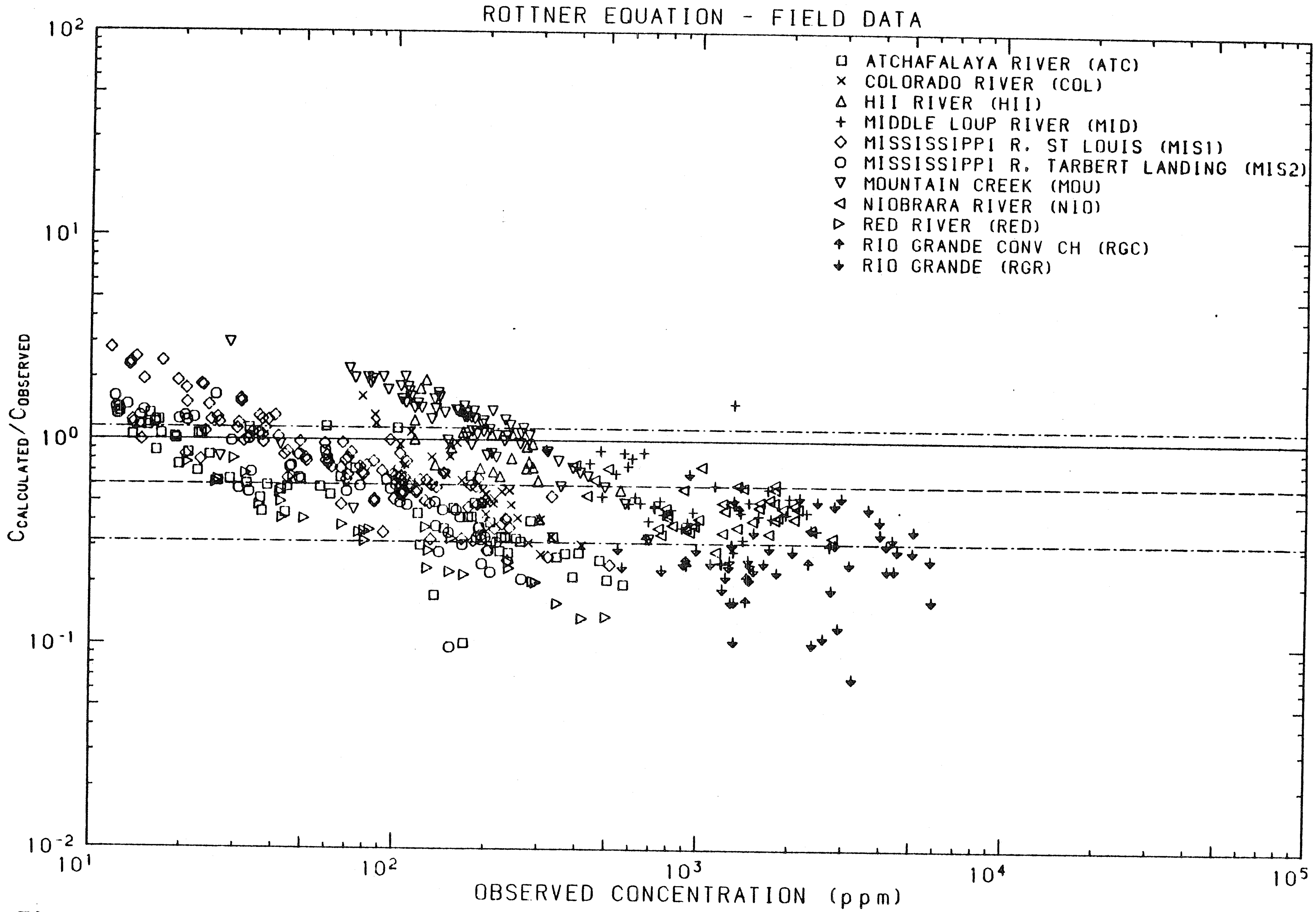


Figure 5.11b Ratio of concentration calculated by the Rottner (1959) technique to observed concentration as a function of observed concentration, for field data.

Table 5.13b

Ratio of Predicted to Observed Concentration for Rottner Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	63	0.526	1.787	0.102	0.294	0.539	0.939	1.362
COL	30	0.606	1.553	0.277	0.390	0.545	0.941	1.634
HII	22	0.892	1.425	0.413	0.626	0.816	1.272	1.963
MID	38	0.503	1.441	0.253	0.349	0.474	0.725	1.525
MIS1	111	0.778	1.676	0.248	0.464	0.749	1.305	2.792
MIS2	53	0.611	1.893	0.097	0.323	0.595	1.158	1.652
MOU	75	1.187	1.475	0.331	0.805	1.241	1.751	2.980
NIO	40	0.464	1.257	0.289	0.369	0.460	0.584	0.764
RED	29	0.347	1.644	0.136	0.211	0.359	0.570	0.805
RGC	8	0.271	1.332	0.166	0.203	0.256	0.361	0.466
RGR	50	0.271	1.623	0.070	0.167	0.263	0.439	0.908
All	519	0.603	1.904	0.070	0.317	0.596	1.149	2.980

5.3.11 Shen and Hung Technique (1971)

Shen and Hung (1971) developed a single equation using advanced curve fitting techniques. The equation does not use dimensionless parameters and the units are in the English system. The equation for C in ppm by mass is:

$$\log C = a_o + a_1 X + a_2 X^2 + a_3 X^3 \quad (5.25)$$

where

$$X = v^{a_4}\ S^{a_5}\ w^{a_6} \quad (5.26)$$

The quantities v and w are the flow velocity and fall velocity of the median sediment particle, respectively, in ft/s. The coefficients are:

$$a_o = -107404.46$$

$$a_1 = 324214.75$$

$$a_2 = -326309.59$$

$$a_3 = 109503.87$$

$$a_4 = 0.00750189$$

$$a_5 = 0.00428802$$

$$a_6 = -0.00239974$$

which have been rounded to 8 significant figures.

The results of the analysis for laboratory data are given in Fig. 5.12a and Table 5.14a, and for field data, the results are given in Fig. 5.12b and Table 5.14b.

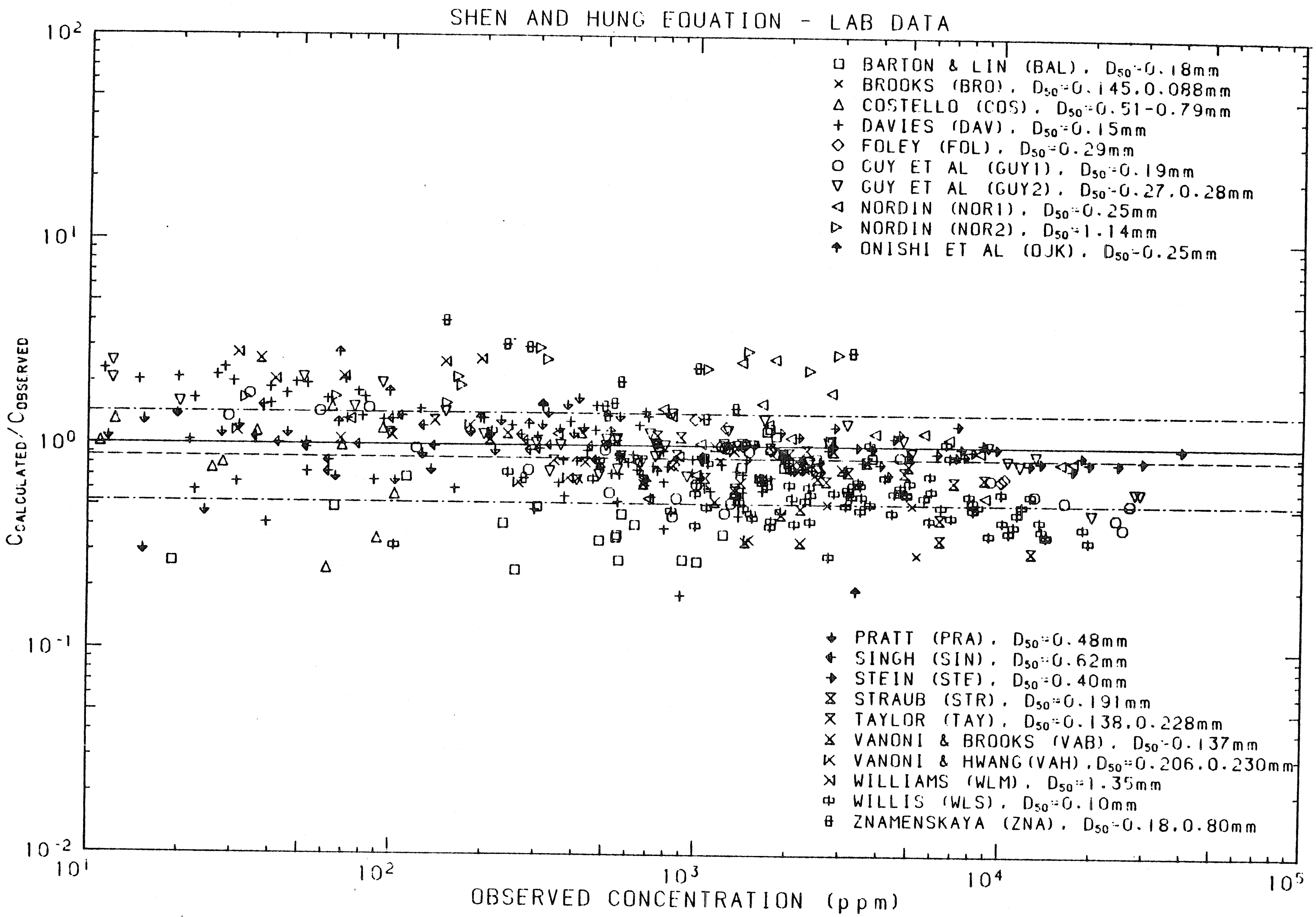


Figure 5.12a **Ratio of concentration calculated by the Shen and Hung (1971) technique to observed concentration as a function of observed concentration, for laboratory data.**

Table 5.14a

Ratio of Predicted to Observed Conc. for Shen and Hung Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	26	0.536	1.658	0.245	0.323	0.495	0.889	1.221
BRO	6	0.599	1.472	0.296	0.407	0.521	0.881	0.936
COS	11	0.797	1.720	0.247	0.463	0.984	1.371	1.520
DAV	69	0.966	1.682	0.186	0.574	0.861	1.624	2.353
FOL	9	0.916	1.247	0.685	0.735	0.928	1.143	1.347
GUY1	27	0.774	1.485	0.404	0.522	0.771	1.150	1.746
GUY2	47	1.027	1.391	0.468	0.738	1.009	1.429	2.497
NOR1	22	1.133	1.488	0.552	0.761	1.101	1.685	2.657
NOR2	11	2.226	1.246	1.588	1.787	2.350	2.773	2.977
OJK	14	1.018	1.843	0.197	0.553	1.175	1.877	2.794
PRA	25	1.039	1.461	0.303	0.711	1.145	1.518	1.698
SIN	20	1.039	1.185	0.732	0.877	1.005	1.231	1.542
STE	44	0.910	1.152	0.703	0.790	0.899	1.048	1.273
STR	21	0.741	1.424	0.306	0.520	0.753	1.055	1.151
TAY	12	0.899	1.180	0.673	0.762	0.850	1.061	1.307
VAB	14	0.727	1.688	0.341	0.431	0.665	1.227	2.607
VAH	6	0.737	1.520	0.351	0.485	0.692	1.120	1.248
WLM	5	2.411	1.124	2.063	2.145	2.534	2.711	2.782
WLS	77	0.551	1.309	0.291	0.421	0.566	0.721	1.175
ZNA	14	1.740	1.648	0.690	1.056	1.555	2.869	4.029
All	480	0.866	1.656	0.186	0.523	0.858	1.435	4.029

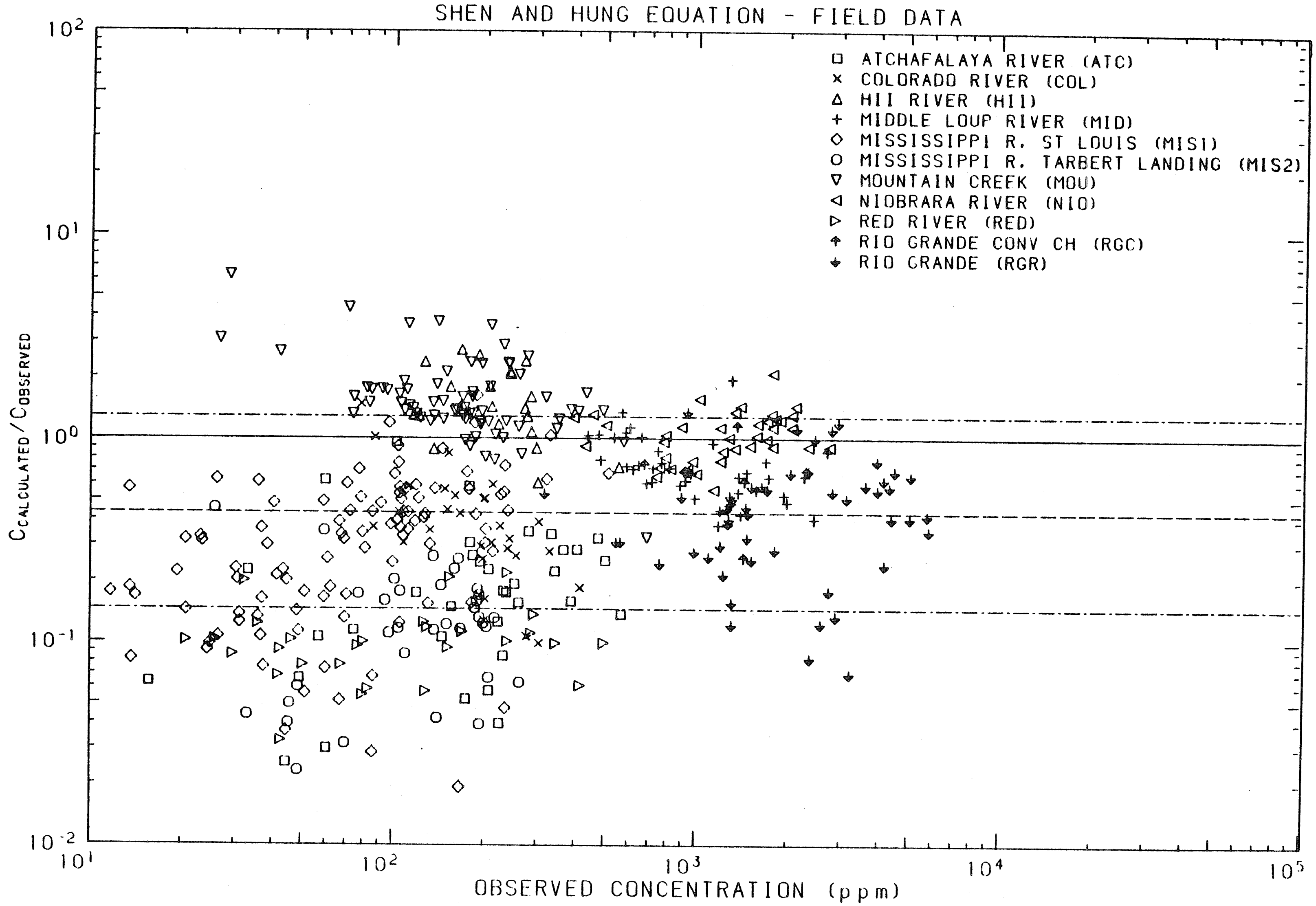


Figure 5.12b **Ratio of concentration calculated by the Shen and Hung (1971) technique to observed concentration as a function of observed concentration, for field data.**

Table 5.14b

Ratio of Predicted to Observed Conc. for Shen and Hung Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	35	0.161	2.271	0.025	0.071	0.175	0.366	0.959
COL	30	0.347	1.844	0.099	0.188	0.354	0.640	1.475
HII	22	1.441	1.490	0.605	0.967	1.400	2.148	2.710
MID	38	0.698	1.418	0.376	0.492	0.677	0.990	1.951
MIS1	100	0.280	2.339	0.019	0.120	0.333	0.654	1.619
MIS2	34	0.112	2.019	0.023	0.055	0.122	0.225	0.455
MOU	75	1.516	1.547	0.327	0.980	1.398	2.345	6.290
NIO	40	1.013	1.317	0.559	0.769	1.005	1.334	2.089
RED	28	0.096	1.499	0.033	0.064	0.099	0.144	0.219
RGC	8	0.667	1.492	0.260	0.447	0.693	0.996	1.153
RGR	50	0.399	1.927	0.070	0.207	0.431	0.768	1.353
All	460	0.432	2.973	0.019	0.145	0.511	1.284	6.290

5.3.12 Toffaleti Technique (1968)

Toffaleti (1968) used the Einstein (1950) method as an inspiration for the development of this technique. Since the technique is quite complex, a full description is not given here. Full descriptions of the method can be found in Vanoni (1975, pp. 209-213) and White, Milli, and Crabbe (1973, pp. 35-41).

The principal similarity between the Einstein and Toffaleti techniques is the use of an empirical equation to determine a bed load concentration from which the suspended load concentration can be determined. For the Toffaleti technique, the suspended zone is divided into an upper, middle, and lower zone. For each zone the integral of the product of the concentration equation and the velocity equation has been replaced by an explicit function. These functions were developed for the English system of measurement, and are not dimensionally homogeneous.

Large amounts of field and laboratory data were used to determine the empirical coefficients. Much of the data used in the analysis here were actually used by Toffaleti (1968) in the original development of the technique. The Mississippi River and Atchafalaya River data were in fact obtained from this source.

The results of the analysis for laboratory data are given in Fig. 5.13a and Table 5.15a, and the results for field data are given in Fig. 5.13b and Table 5.15b.

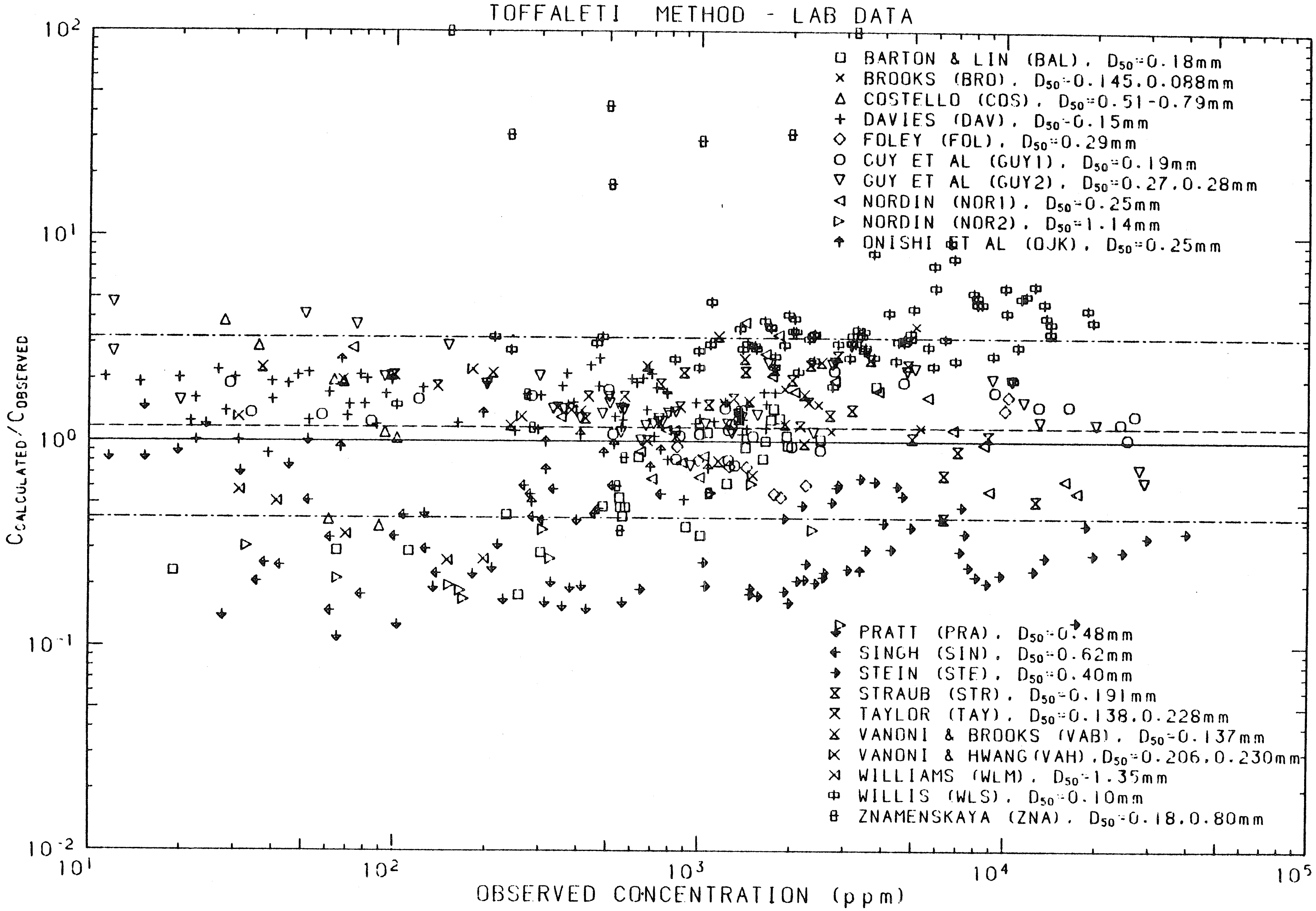


Figure 5.13a Ratio of concentration calculated by the Toffaleti (1968) technique to observed concentration as a function of observed concentration, for laboratory data.

Table 5.15a

Ratio of Predicted to Observed Concentration for Toffaleti Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	26	0.614	1.854	0.178	0.331	0.531	1.139	1.857
BRO	6	1.648	1.478	1.123	1.115	1.512	2.435	3.641
COS	8	1.291	2.207	0.385	0.585	1.105	2.850	3.833
DAV	69	1.533	1.328	0.522	1.154	1.547	2.035	2.540
FOL	9	0.830	1.452	0.535	0.572	0.757	1.205	1.656
GUY1	27	1.273	1.321	0.765	0.964	1.245	1.682	2.210
GUY2	47	1.599	1.521	0.634	1.051	1.430	2.432	4.683
NOR1	22	1.274	1.774	0.565	0.718	1.138	2.260	3.792
NOR2	11	0.276	1.607	0.130	0.171	0.268	0.443	0.621
OJK	14	0.907	1.721	0.235	0.527	0.911	1.562	2.484
PRA	25	0.326	2.229	0.111	0.146	0.226	0.727	1.483
SIN	20	0.362	1.525	0.149	0.237	0.413	0.553	0.610
STE	44	0.298	1.523	0.133	0.195	0.274	0.453	0.664
STR	21	1.411	1.663	0.423	0.848	1.427	2.347	2.610
TAY	12	1.468	1.230	1.008	1.193	1.477	1.805	2.089
VAB	13	1.746	1.491	0.803	1.171	1.990	2.604	3.256
VAH	6	1.323	1.413	0.687	0.937	1.324	1.870	2.240
WLM	5	0.374	1.382	0.263	0.270	0.353	0.517	0.577
WLS	77	3.445	1.392	1.502	2.474	3.226	4.797	9.367
ZNA	14	6.065	7.915	0.367	0.766	1.687	48.002	123.929
All	476	1.166	2.749	0.111	0.424	1.312	3.206	123.929

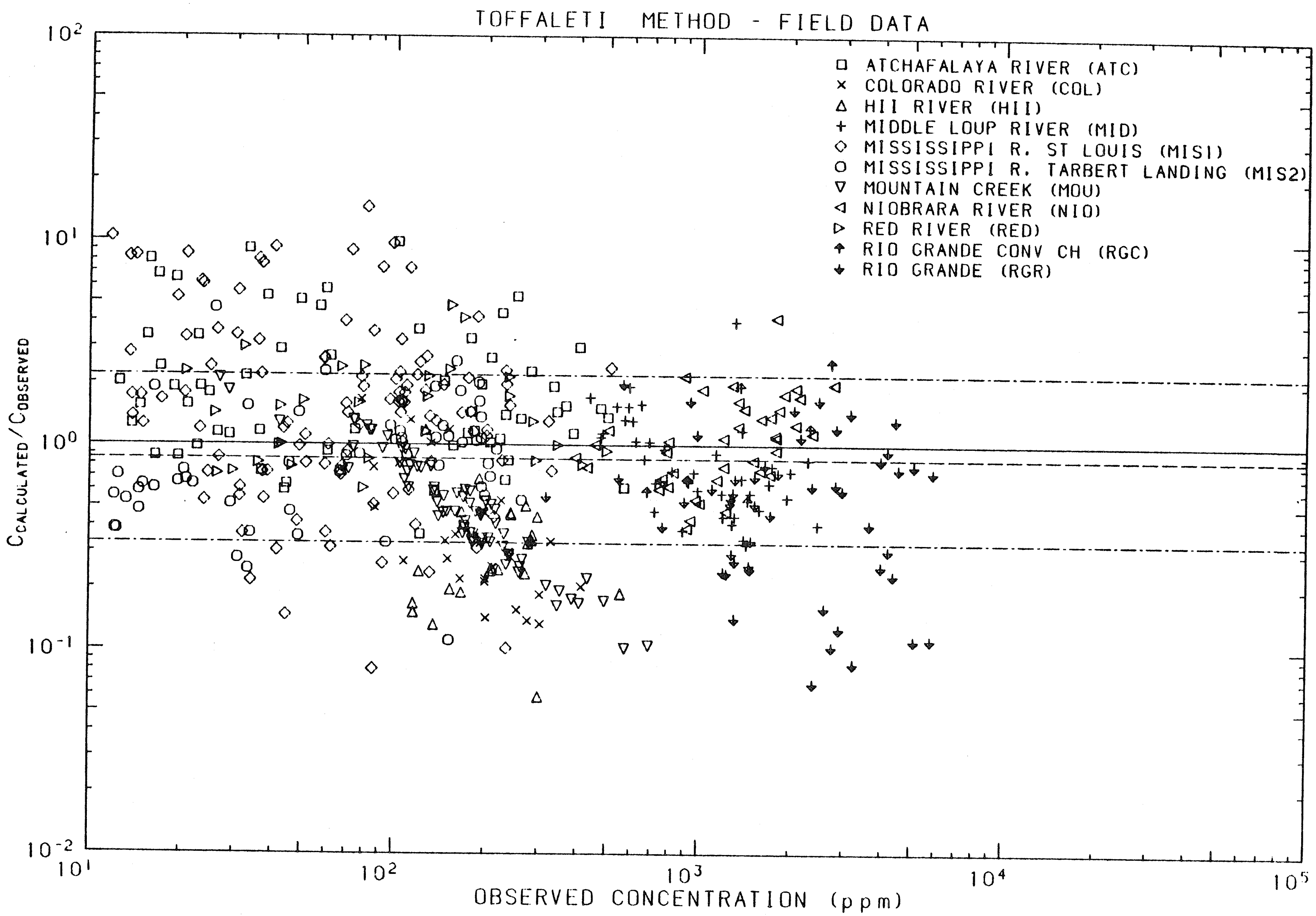


Figure 5.13b Ratio of concentration calculated by the Toffaleti (1968) technique to observed concentration as a function of observed concentration, for field data.

Table 5.15b

Ratio of Predicted to Observed Concentration for Toffaleti Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	63	1.761	2.166	0.365	0.813	1.543	3.814	9.800
COL	30	0.358	1.966	0.134	0.182	0.301	0.704	1.666
HII	22	0.283	1.861	0.059	0.152	0.245	0.526	1.182
MID	38	0.817	1.682	0.348	0.486	0.745	1.375	4.028
MIS1	111	1.461	2.806	0.080	0.521	1.559	4.101	14.510
MIS2	53	0.809	1.919	0.111	0.422	0.808	1.554	4.649
MOU	75	0.483	1.866	0.102	0.259	0.471	0.902	2.107
NIO	40	1.042	1.650	0.393	0.632	1.047	1.720	4.194
RED	29	1.418	1.714	0.612	0.827	1.429	2.430	4.801
RGC	8	0.856	1.910	0.329	0.448	0.676	1.635	2.536
RGR	50	0.465	2.304	0.069	0.202	0.551	1.071	1.996
All	519	0.854	2.572	0.059	0.332	0.816	2.196	14.510

5.3.13 <u>Yang Technique (1973)</u>

This technique is based primarily on dimensional analysis. The principal variable is the dimensionless unit stream power, vS/w. Concentration is obtained from

$$\log C = a_1 + a_2 \log\left(\frac{vS}{w} - \frac{v_{cr}S}{w}\right) \tag{5.27}$$

where

$$a_1 = -0.565 - 0.286 \log \frac{wD_{50}}{\nu} - 0.457 \log \frac{u_*}{w}$$

$$a_2 = 1.799 - 0.409 \log \frac{wD_{50}}{\nu} - 0.314 \log \frac{u_*}{w}$$

and w is fall velocity.

The critical velocity is determined from

$$v_{cr} = \begin{cases} 2.05 \; \dots\dots\dots\dots\dots\dots\dots\dots & \dfrac{u_*D_{50}}{\nu} \geq 70 \\ \dfrac{2.5}{\log\left(\dfrac{u_*D_{50}}{\nu}\right) - 0.06} \; \dots\dots\dots & 1.2 < \dfrac{u_*D_{50}}{\nu} < 70 \end{cases} \tag{5.28}$$

As written here, the concentration is given in mass per unit mass. To convert to ppm, 6 should be added to the right side of Eq. 5.27.

The results of the analysis for laboratory data are given in Fig. 5.14a and Table 5.16a, and for field data, the results are given in Fig. 5.14b and Table 5.16b.

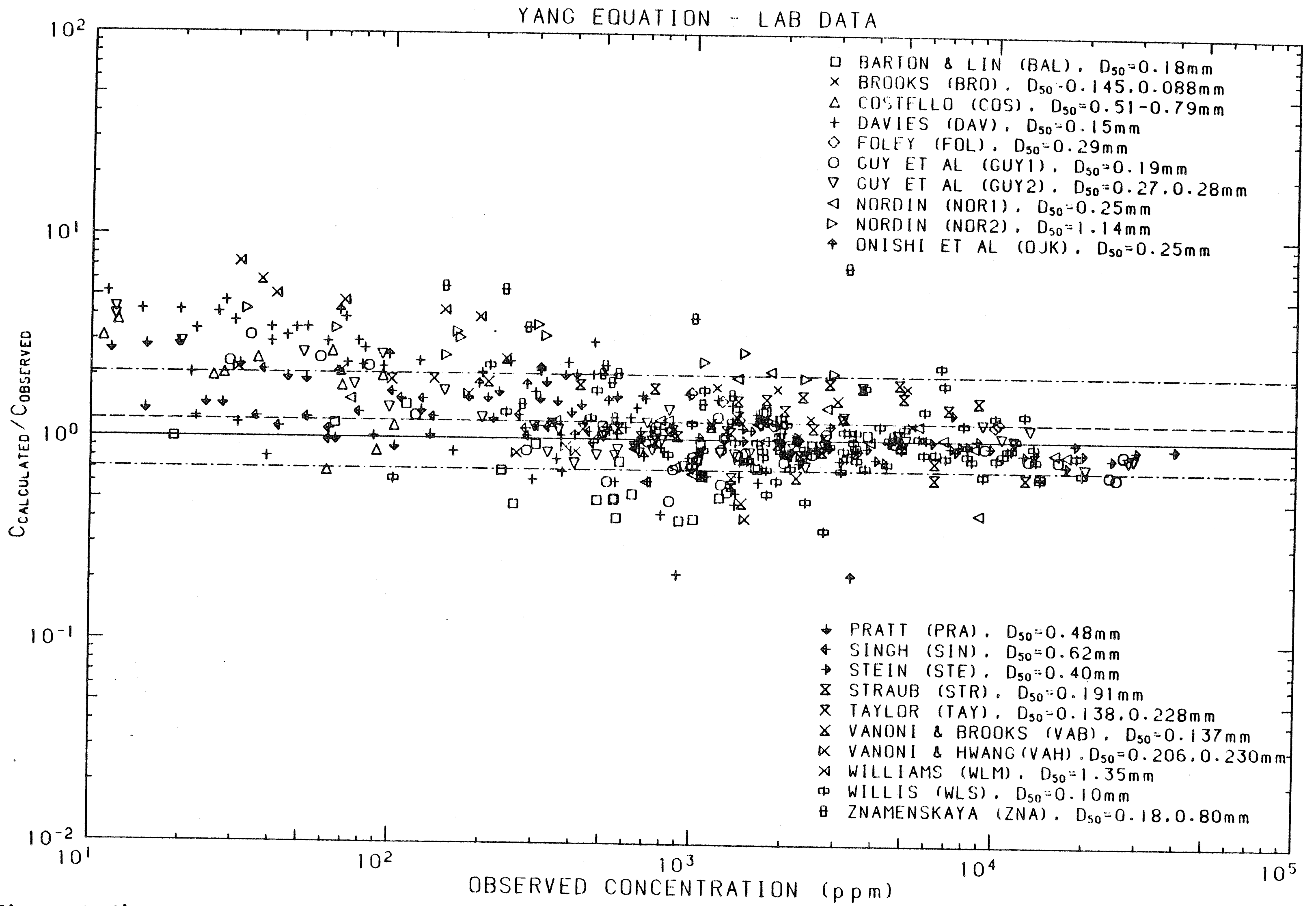


Figure 5.14a Ratio of concentration calculated by the Yang (1973) technique to observed concentration as a function of observed concentration, for laboratory data.

Table 5.16a

Ratio of Predicted to Observed Concentration for Yang Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	26	0.766	1.499	0.398	0.511	0.778	1.148	1.462
BRO	6	1.446	1.255	1.037	1.152	1.275	1.815	1.815
COS	11	1.827	1.653	0.688	1.105	2.014	3.019	3.735
DAV	69	1.486	1.957	0.217	0.759	1.385	2.909	5.158
FOL	9	1.258	1.164	1.007	1.081	1.225	1.464	1.698
GUY1	27	0.979	1.585	0.499	0.618	0.865	1.551	3.162
GUY2	47	1.137	1.511	0.734	0.753	1.011	1.718	4.285
NOR1	22	1.019	1.440	0.434	0.708	0.993	1.468	2.174
NOR2	11	2.915	1.249	2.024	2.334	3.120	3.640	4.266
OJK	14	1.351	2.027	0.214	0.666	1.550	2.738	4.194
PRA	25	1.649	1.347	0.909	1.225	1.590	2.222	2.896
SIN	20	1.245	1.213	0.958	1.027	1.157	1.510	2.150
STE	44	0.943	1.124	0.759	0.839	0.928	1.060	1.353
STR	21	1.198	1.519	0.596	0.789	1.429	1.820	1.904
TAY	12	1.165	1.281	0.844	0.909	1.108	1.492	1.956
VAB	14	1.347	1.795	0.490	0.751	1.163	2.418	5.968
VAH	6	1.004	1.707	0.411	0.588	0.873	1.713	2.204
WLM	5	4.955	1.238	3.966	4.004	4.730	6.132	7.329
WLS	77	0.945	1.369	0.359	0.690	0.906	1.294	2.299
ZNA	14	2.462	1.781	1.093	1.383	2.102	4.384	7.110
All	480	1.215	1.710	0.214	0.711	1.094	2.078	7.329

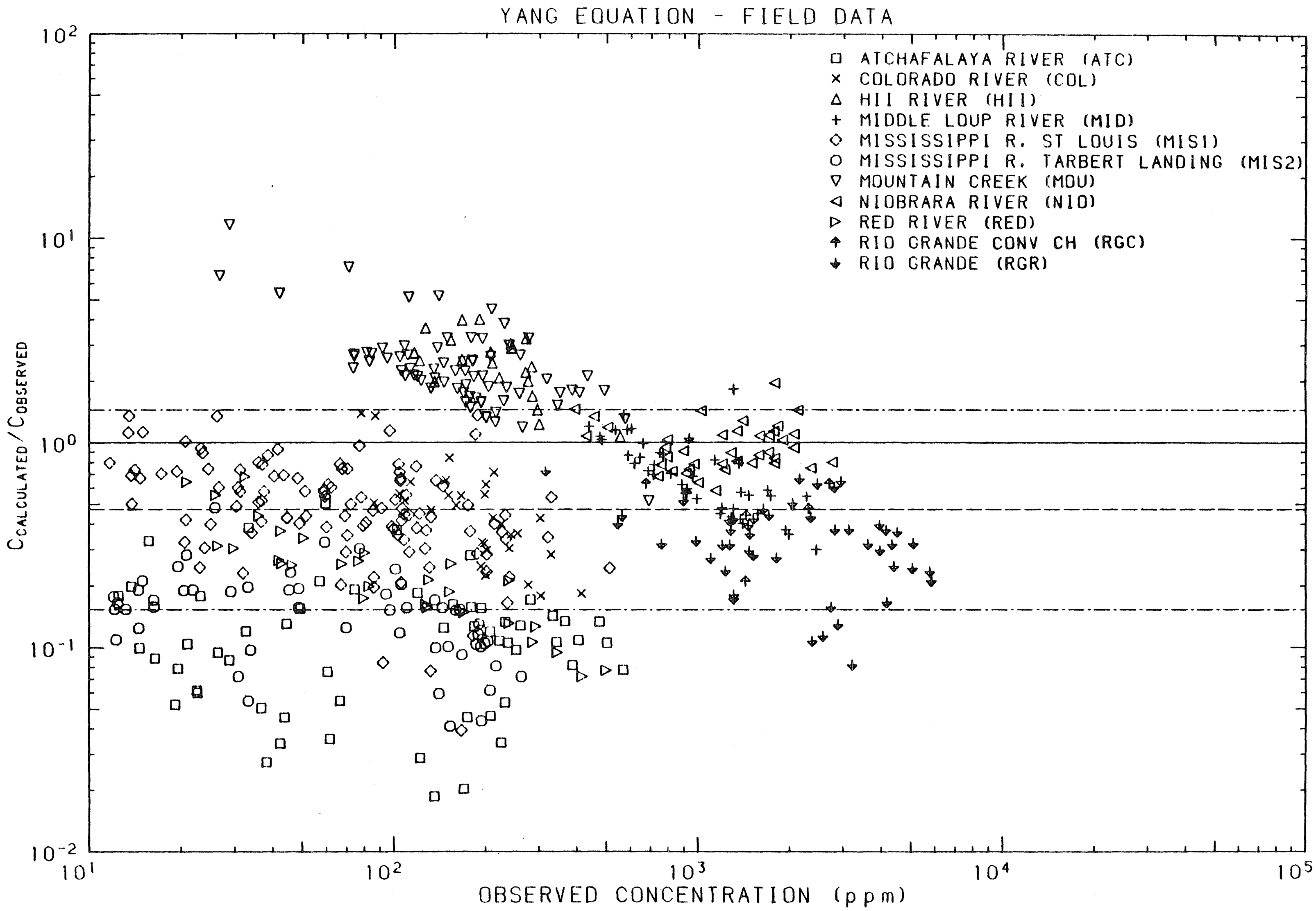


Figure 5.14b **Ratio of concentration calculated by the Yang (1973) technique to observed concentration as a function of observed concentration, for field data.**

Table 5.16b

Ratio of Predicted to Observed Concentration for Yang Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	57	0.099	2.045	0.019	0.049	0.106	0.203	0.505
COL	30	0.437	1.657	0.179	0.264	0.428	0.724	1.390
HII	22	2.395	1.410	1.066	1.699	2.504	3.376	4.003
MID	38	0.685	1.512	0.301	0.453	0.685	1.036	1.829
MIS1	111	0.468	1.791	0.039	0.261	0.488	0.838	1.361
MIS2	53	0.139	1.638	0.041	0.085	0.154	0.228	0.480
MOU	75	2.286	1.566	0.519	1.460	2.130	3.579	11.646
NIO	40	0.951	1.293	0.583	0.735	0.897	1.229	1.955
RED	29	0.223	1.760	0.072	0.126	0.253	0.392	0.683
RGC	8	0.509	1.452	0.211	0.351	0.565	0.740	0.793
RGR	50	0.325	1.650	0.082	0.197	0.332	0.536	1.054
All	513	0.471	3.077	0.019	0.153	0.477	1.451	11.646

5.4 Discussion

In the analysis of the 13 techniques, thousands of statistics are presented and over 10,000 points are plotted in the 26 graphs. This mountain of information is somewhat overwhelming. However, all of the information has been provided for a purpose.

The figures help identify trends in the data that are not evident from the tables. For example, the Bagnold (1966) relation displays a distinctive trend in Fig. 5.3a. The trend suggests that, for the laboratory data, the predicted concentration tends to be near 1000 ppm regardless of the observed concentration. Similar but less distinctive trends are observed for the Graf (1968) equation (Fig. 5.8a) and the Rottner (1959) equation (Fig. 5.11a). Of course, excessive scatter in the figures also clearly indicates the poor performance of a technique.

The tables have been presented in an effort to evaluate the behavior of the techniques under various combinations of conditions. For example, the Yang (1973) equation tends to over-predict for the two sets of data with coarse sand, the Williams data and the Nordin data (WLM and NOR2, respectively, in Table 5.16a). On the other hand, it tends to under predict for deep river data such as the Atchafalaya River and the Mississippi River (ATC and MIS2, respectively, in Table 5.16b). Analogous behaviour can be seen for many of the techniques.

A comparison of all the techniques, including the proposed new method is given in Table 6.4 near the end of the next chapter.

In general, the newer methods which were fitted to large amounts of data have performed the best. Of the methods discussed here, the Ackers and White (1973) performed best for the laboratory data, while Engelund and Hansen (1967) did slightly better for the field data.

CHAPTER 6

A NEW METHOD FOR PREDICTING SEDIMENT CONCENTRATION

In the previous chapter, 13 methods for predicting mean sediment concentration in a channel were analyzed. Each method exhibited considerable scatter. The best methods gave reasonable results for the laboratory data, but were less satisfactory for the field data. Probably only a limited amount of field data were available when the various techniques were being developed.

In this chapter, a new equation for predicting mean sediment concentration is proposed. It is based solely on dimensional analysis and a best fit of the available data used in the analysis of existing techniques. The form of the equation has been intentionally kept as simple and easy to use as possible, under the assumption that a certain amount of scatter is inevitable and cannot be eliminated by increasing the complexity of the relationship or the analysis.

6.1 Expected Scatter in Sediment Concentration

To illustrate the amount of expected scatter, the top ten available discharge records for the Atchafalaya River at Simmesport, Louisiana have been analyzed. The observations, made between 1961 and 1965, have a maximum discharge of 14,200 m^3/s and a minimum discharge of 10,200 m^3/s. Figure 6.1 shows the velocity, depth and bed-material

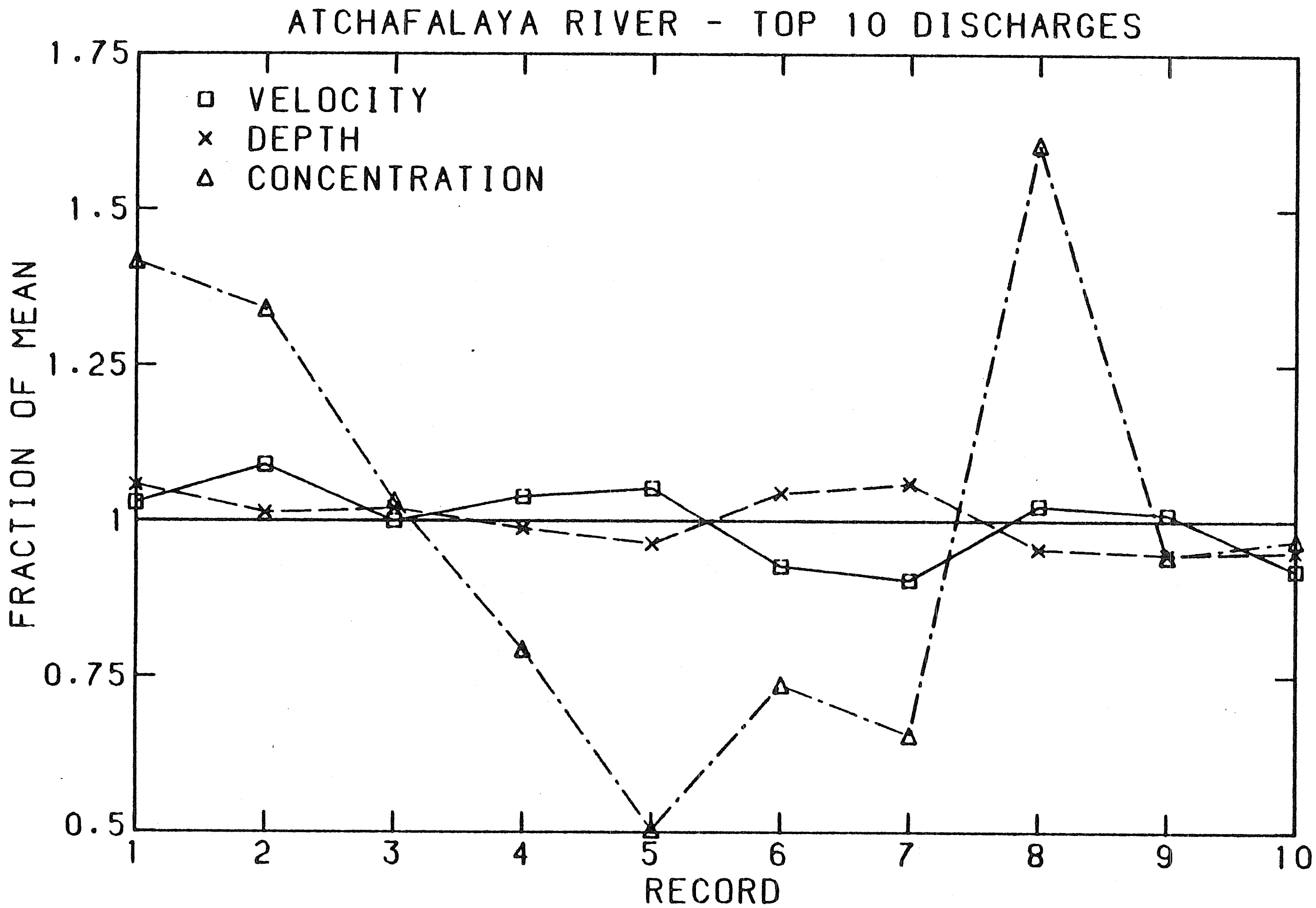


Figure 6.1 Velocity, depth, and bed-material sediment concentration fluctuations, plotted as fraction of the respective mean values, for the ten highest discharge observations, 1961 to 1965.

concentration, plotted as fraction of the respective mean values, for the ten records. The scatter in the sediment concentration is much larger than the fluctuations in velocity and depth. In fact, the range in the sediment concentration is greater than a factor of three.

The statistics of some of the hydraulic and sediment variables for the ten observations are given in Table 6.1. The fluctuations in concentration, C, expressed as standard deviation as percent of the mean, are larger than the fluctuations in any of the other variables. For the narrow range of conditions, concentration is shown to be virtually uncorrelated with any of the given variables, with the exception of a weak, probably spurious, negative correlation with σ_g.

Large fluctuations in sediment concentration over a narrow range of hydraulic and bed-material conditions are not unique to the Atchafalaya River. Therefore, the best that can be hoped for in predicting concentration from cross-sectional averaged hydraulic and bed material properties, is an accurate estimate of the expected value and an indication of the range of variations of concentration.

6.2 Width and Depth Effects

For the laboratory data, a sidewall correction has been used to adjust the hydraulic radius to eliminate the effects of the flume walls. If sediment concentration is correlated with velocity, however, the sidewall correction will be of little use. The laboratory experiments of Williams (1970), conducted in flumes with different widths, have been

TABLE 6.1

Atchafalaya River at Simmesport, Louisiana
Top Ten Observations Ranked by Discharge
1961 through 1965

Variable	Mean	Standard Deviation	Standard Deviation as % of Mean	R^2 Correlation between Concentration, C, and Given Variable
v (m/s)	1.86	0.110	5.89	0.04
w (m)	467	15.7	3.35	0.04
d (m)	13.9	0.597	4.29	0
$S \times 10^5$	4.79	0.261	5.45	0
D_{50} (mm)	0.216	0.0415	19.2	0
σ_g	1.57	0.176	11.2	0.19
T (°C)	17.4	2.81	16.2	0
C (ppm)	353	119	33.7	1

used to examine the possible sidewall effects, plus effects of errors induced by very shallow depths.

The results of all Williams (1970) experiments with concentrations greater than 10 parts per million by weight are plotted in Fig. 6.2a. The dimensionless group plotted along the abscissa was determined from the analysis which follows later in this chapter. The data plotted in Fig. 6.2a exhibit a large amount of scatter. In Fig. 6.2b only width-to-depth ratios greater than four have been plotted, and the scatter has been greatly reduced. In Fig.6.2c, the restriction that d/D_{50} be greater than 50 has been added, resulting in a greater reduction of scatter.

Throughout this report a width-to-depth ratio of 4 has been used as the lower limit in all analyses. Also, the relative roughness, defined by r/D_{50} was limited to values greater than 100. These restrictions, along with a lower limit of 10 ppm for concentration, reduced the Williams (1970) data from 177 observations to 5 observations for the purposes of this report.

6.3 Critical Velocity

The "critical" shear stress at which motion begins on the bed can be determined from a Shields diagram, such as given by Vanoni (1975, p. 96). By combining the Shields diagram with the analysis presented in Chapter 4, the critical velocity of a channel can be determined.

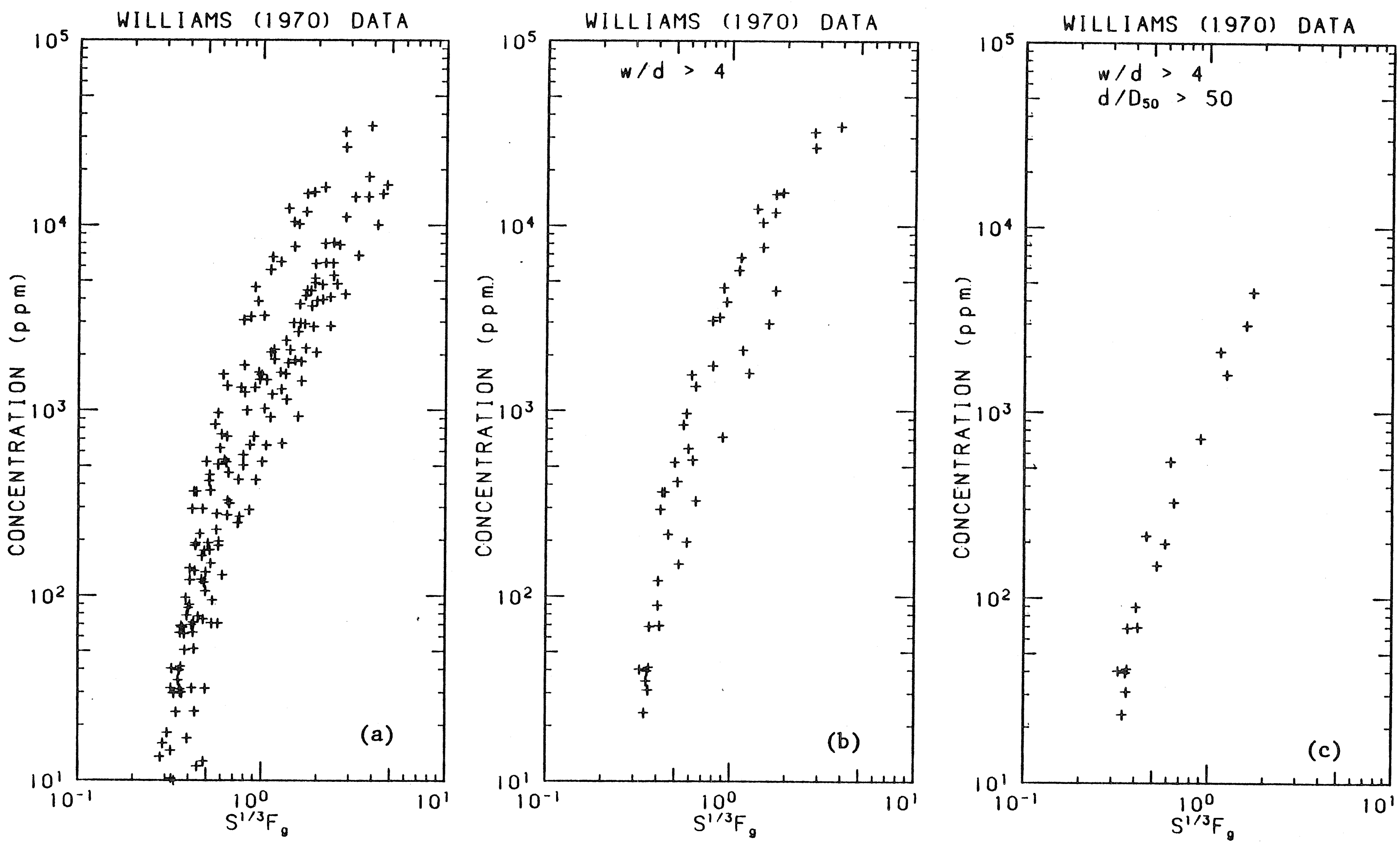


Figure 6.2 Williams (1970) data showing the effects of low values of w/d and d/D_{50} on sediment concentration.

The Shields diagram has the form

$$\tau_* = f\left(\frac{u_* D_{50}}{\nu}\right) \tag{6.1}$$

which can easily be transformed into the form

$$\tau_* = f(R_g) \tag{6.2}$$

The transformed Shields curve, plotted in Fig. 6.3, can be approximated by

$$\tau_{*_o} = 0.22Y + 0.06(10)^{-7.7Y} \tag{6.3}$$

$$\text{where } Y = \left(\sqrt{\frac{\rho_s - \rho}{\rho}}\, R_g\right)^{-0.6}$$

The original Shields data (Vanoni, 1965) are also plotted in Fig. 6.3.

Gessler (1971) has suggested that the Shields Diagram as given by Vanoni (1975) is for dune covered beds. If this is the case, then the lower regime Eq. 4.10a should be useful in relating shear stress to velocity. Rearrangement of Eq. 4.10a for critical conditions gives an equation for the grain Froude number:

$$F_{g_o} = 4.596\, \tau_{*_o}^{\;0.5293}\, S^{-0.1405}\, \sigma_g^{-0.1606} \tag{6.4}$$

from which velocity can be determined, where $F_g = v/\sqrt{gD_{50}(\rho_s - \rho)/\rho}$.

Given slope, water temperature, and bed-material properties, it is possible to determine the critical grain Froude number, and hence velocity, from Eqs. 6.3 and 6.4.

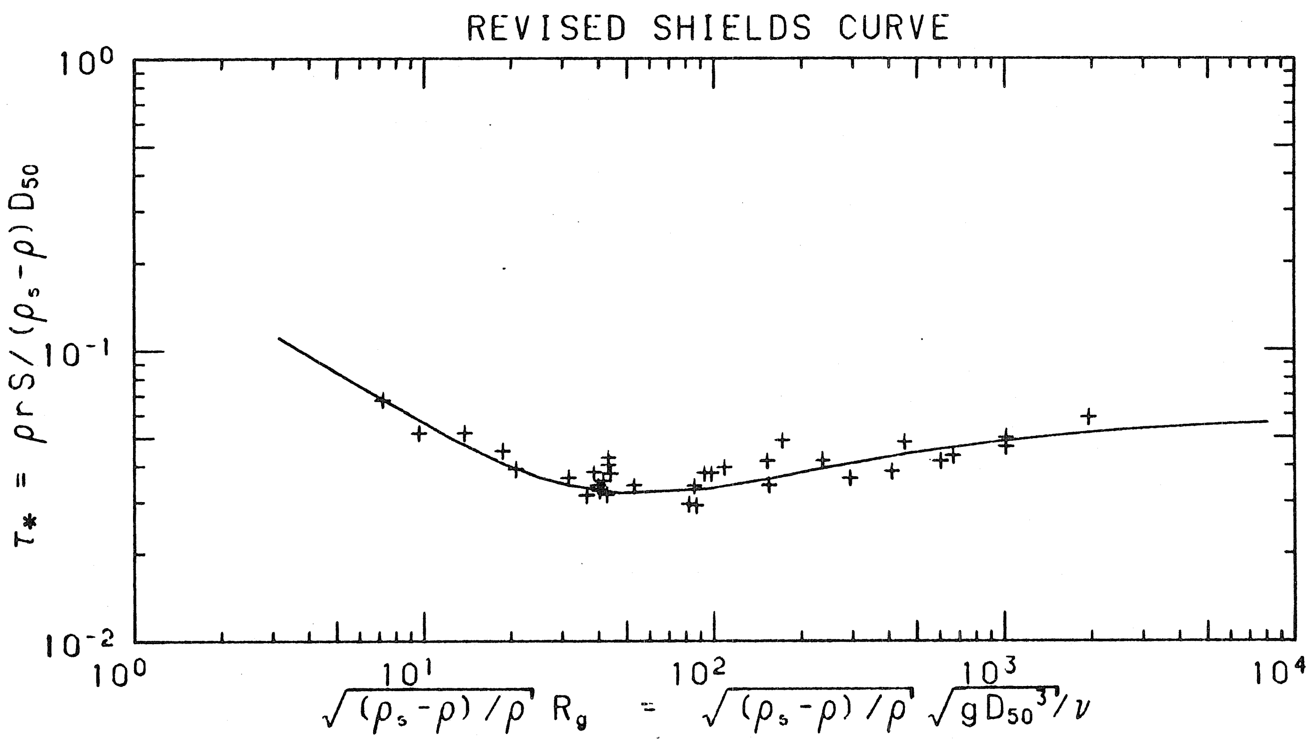


Figure 6.3 Revised Shields curve, data from Vanoni (1965).

6.4 Dimensional Analysis

Here a dimensional analysis is presented which is analagous to the one presented in Chapter 4. In this case the dependent variable is sediment concentration instead of hydraulic radius.

If Eq. 4.1 is correct then a relationship for sediment concentration should have the general form

$$C = f(q, S, g, \rho, \nu, \rho_s, D_{50}, \sigma_g) \tag{6.5}$$

The eight independent variables can be rearranged into five dimensionless groups:

$$C = f\left(q_*, S, \sigma_g, R, \frac{\rho_s - \rho}{\rho}\right) \tag{6.6}$$

From the analysis in Chapter 4, given the independent dimensionless groups in Eq. 6.6, multiple values of flow depth are possible. It is logical to assume that multiple values of sediment concentration are also possible. From the method in Chapter 4, q* can be used to calculate F_g, the grain Froude number and r/D_{50}, the relative roughness. It is therefore assumed that for a given discharge, q, either r and v are known or can be calculated from the method in Chapter 4. Also, the Reynolds number, R, can be combined with other dimensionless groups to produce the grain Reynolds number, R_g. Now Eq. 6.6 can be replaced by

$$C = f\left(F_g, \frac{r}{D_{50}}, S, \sigma_g, R_g, \frac{\rho_s - \rho}{\rho}\right) \tag{6.7}$$

where the following definitions apply:

Grain Froude number, $F_g = \dfrac{V}{\sqrt{\left(\frac{\rho_s - \rho}{\rho}\right) g D_{50}}}$

Grain Reynolds number, $R_g = \dfrac{\sqrt{g D_{50}^3}}{\nu}$

In Eq. 6.7, F_g, r/D_{50} and S cannot all be specified independently, but all three have been used in the analysis to avoid the multiple value problem discussed in Chapter 4.

During the course of the investigation, it was noticed that the field data tended to have slightly higher sediment concentrations than laboratory data for similar ranges of dimensionless groups. To compensate for such a disparity, a dummy variable was used to flag field data and allow for a different sediment concentration for a field observation with the same dimensionless parameters as a laboratory observation. A possible cause for this disparity is discussed in section 6.5.

Multiple regression analysis was used to develop an equation with the general form of Eq. 6.7. The resulting equation is:

$$C = 7115 c_F \left(F_g - F_{go}\right)^{1.978} S^{0.6601} \left(\frac{r}{D_{50}}\right)^{-0.3301} \qquad (6.8)$$

where c_F is the coefficient for field data given by

$c_F = 1$ ....for laboratory data, and

$c_F = 1.268$ ...for field data.

F_{g_o} is the critical grain Froude number determined from Eq. 6.3 and

Eq. 6.4. For identical independent dimensionless groups, the concentration for field data is on the average 26.8 percent higher than for lab data. The multiple correlation coefficient, R = 0.955 (R^2 = 0.912).

The parameters on the right side of Eq. 6.7, and its specific definition, Eq. 6.8, were arrived at through an iterative procedure. An attempt was made to combine the best features of the Ackers and White (1973), Engelund and Hansen (1967), and Yang (1973) techniques. Both Engelund and Hansen (1967) and Yang (1973) used the product of velocity and slope in their relationships. In each case the effect of slope seemed too great. Both Ackers and White (1973) and Yang (1973) effectively have critical velocity terms (the term A in the Ackers and White relationship acts like a critical value of their mobility number). From the present analysis, the most successful combination resulting in Eq. 6.8 was a velocity minus critical velocity term $(F_g - F_{g_o})$, slope, and a depth term (r/D_{50}).

The data set used in the analysis is identical to the set of data used to examine the existing relationships. The data sources are listed in Tables 5.2a and 5.2b, and the restrictions or filters imposed on certain parameters are given in Table 5.3.

All dimensionless groups in Eq. 6.7 are independently required for the calculation of concentration, with the exception of $(\rho_s - \rho)/\rho$, which is a constant for sand-bed channels. If F_g and r/D_{50} are not known (i.e. if velocity and depth are not known independent of discharge) they can be determined if q_* is known, by the method proposed in Chapter 4.

However, some of the dimensionless groups enter only in the definition of the critical grain Froude number.

A simple rearrangement of Eq. 6.8 allows a reasonable graphical representation of the analysis. The approximation of Eq. 68 by:

$$C = 7100c_F \left(S^{1/3}F_g - S^{1/3}F_{go}\right)^2 \left(\frac{r}{D_{50}}\right)^{-1/3} \qquad (6.9)$$

allows sediment concentration to be plotted as a function of grain Froude number times slope to the 1/3 power. The predicted concentration cannot, however, be plotted as a line since both the critical grain Froude number and the relative roughness will vary with each observation. For most data sets these variations will not be too large and therefore plots of each data set should show little scatter. Plots of this type are shown in Figs. 6.4a-t for laboratory data, and in Figs. 6.5a-k for field data.

A statistical analysis of the ratio of predicted concentration to observed concentration is given in Tables 6.2 and 6.3 The individual ratios for laboratory data are plotted in Fig. 6.6a and for field data in Fig. 6.6b. The results seem quite reasonable when one considers the amount of scatter in the source data, as illustrated by Fig. 6.1.

6.5 Effects of a Nonrectangular Cross-Section

One principle difference between laboratory and field observations is that the laboratory channels tend to be much more rectangular in cross-section than river channels. For irregular channels, the

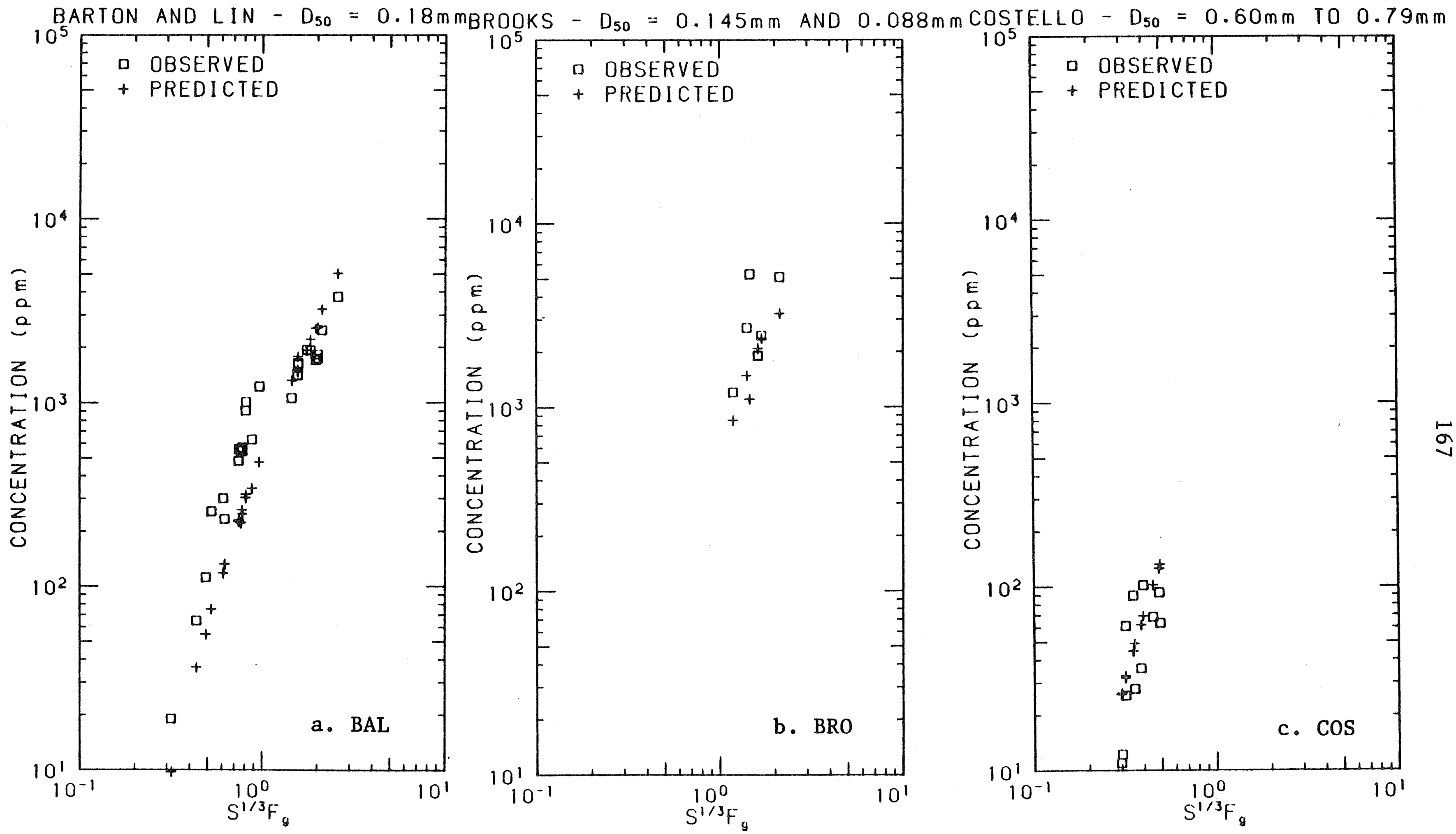


Figure 6.4 Laboratory sediment concentration as observed and as predicted by Eq. 6.9, as a function of $S^{1/3}F_g$, where $F_g = v/\sqrt{gD_{50}(\rho_s-\rho)/\rho}$. Data set codes from Table 5.1 are given in the lower right corner of each plot.

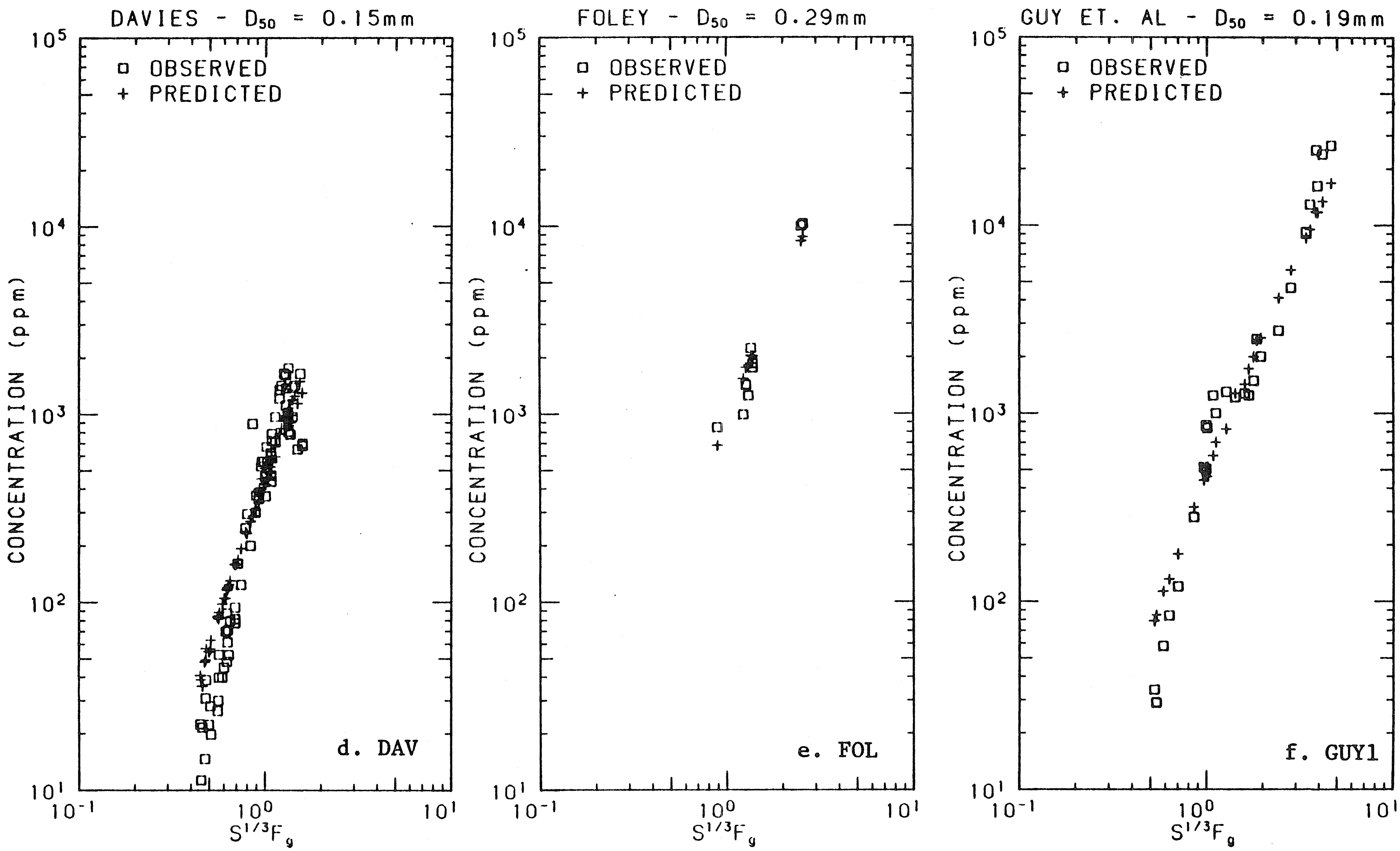
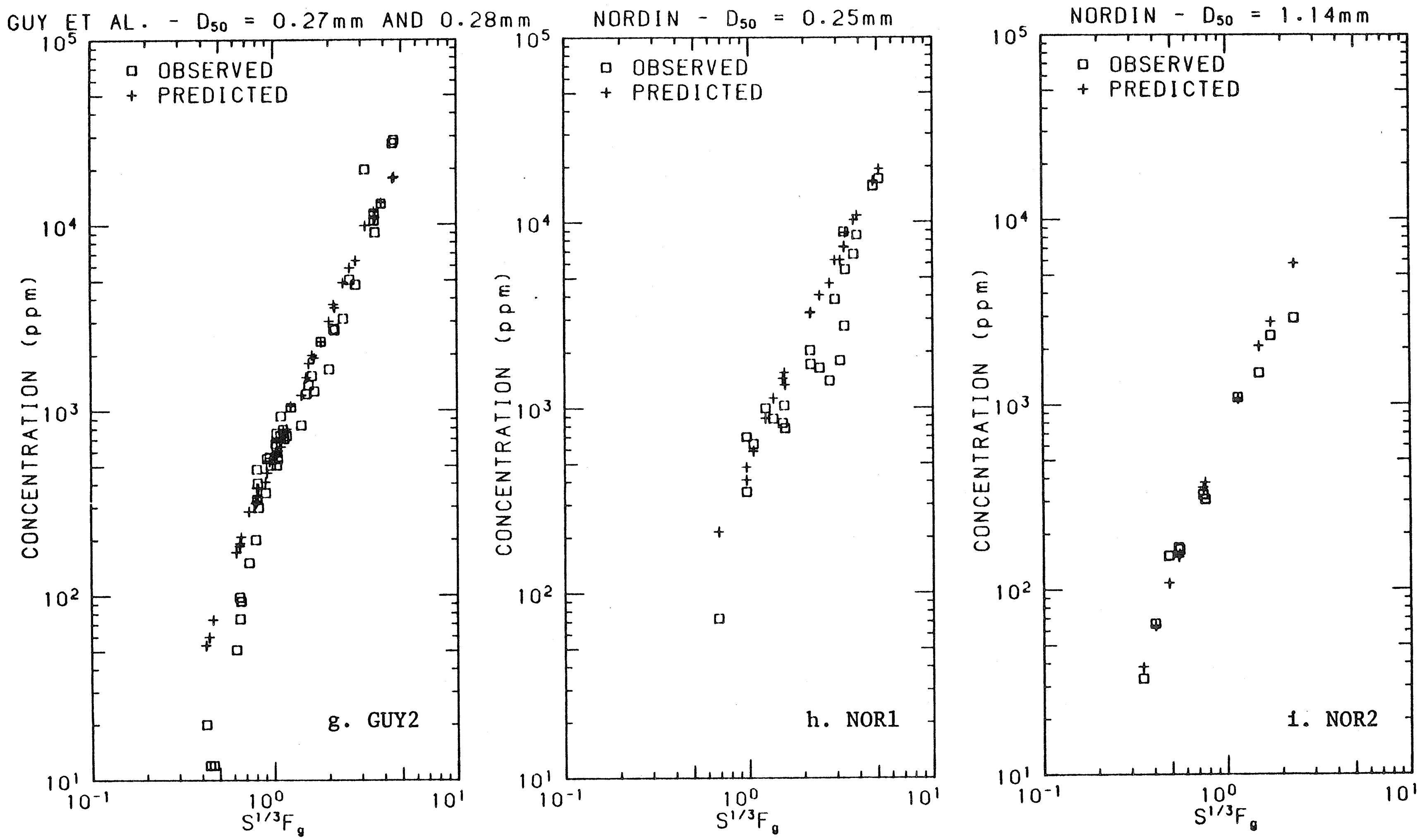


Figure 6.4 continued



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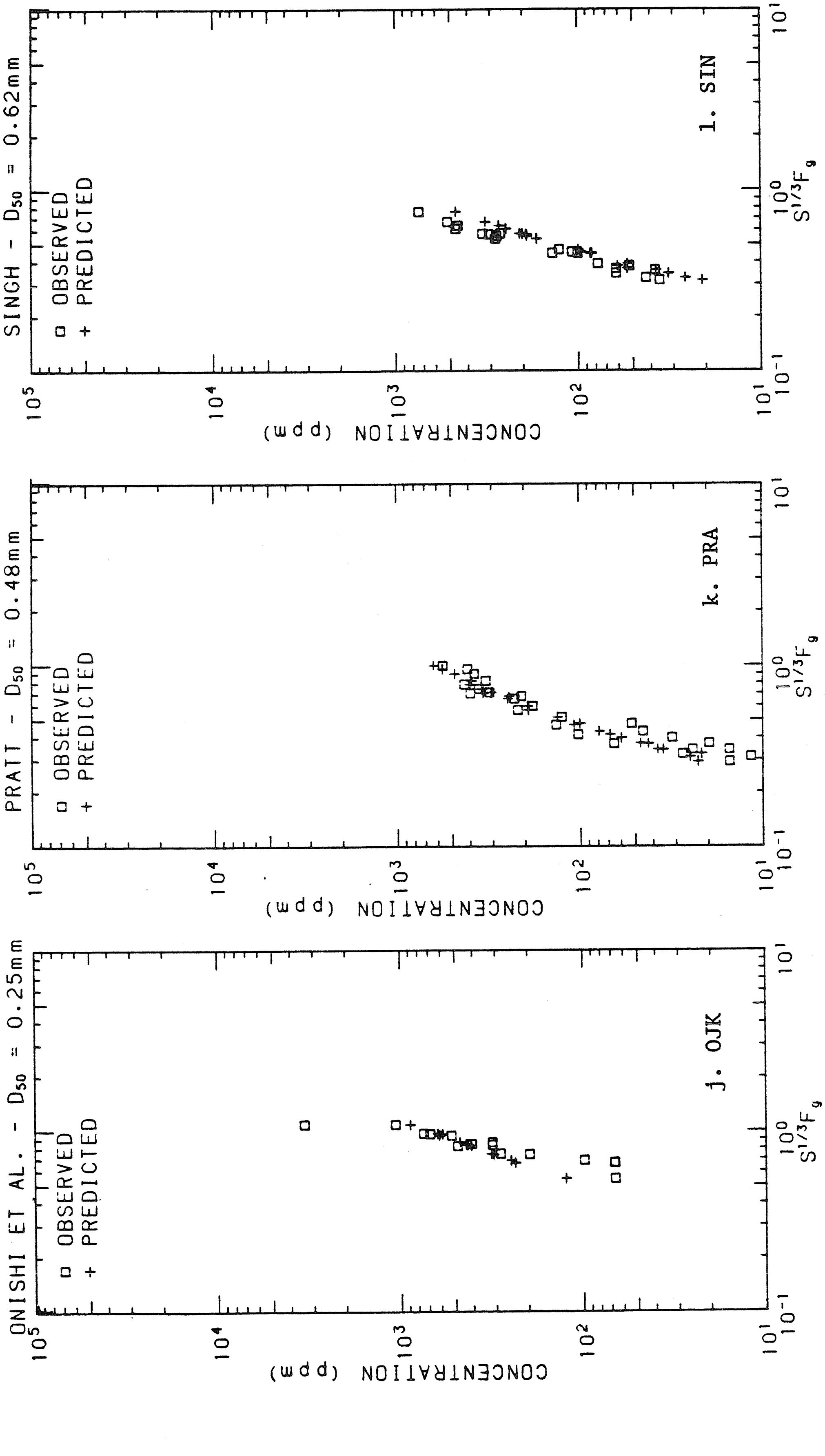

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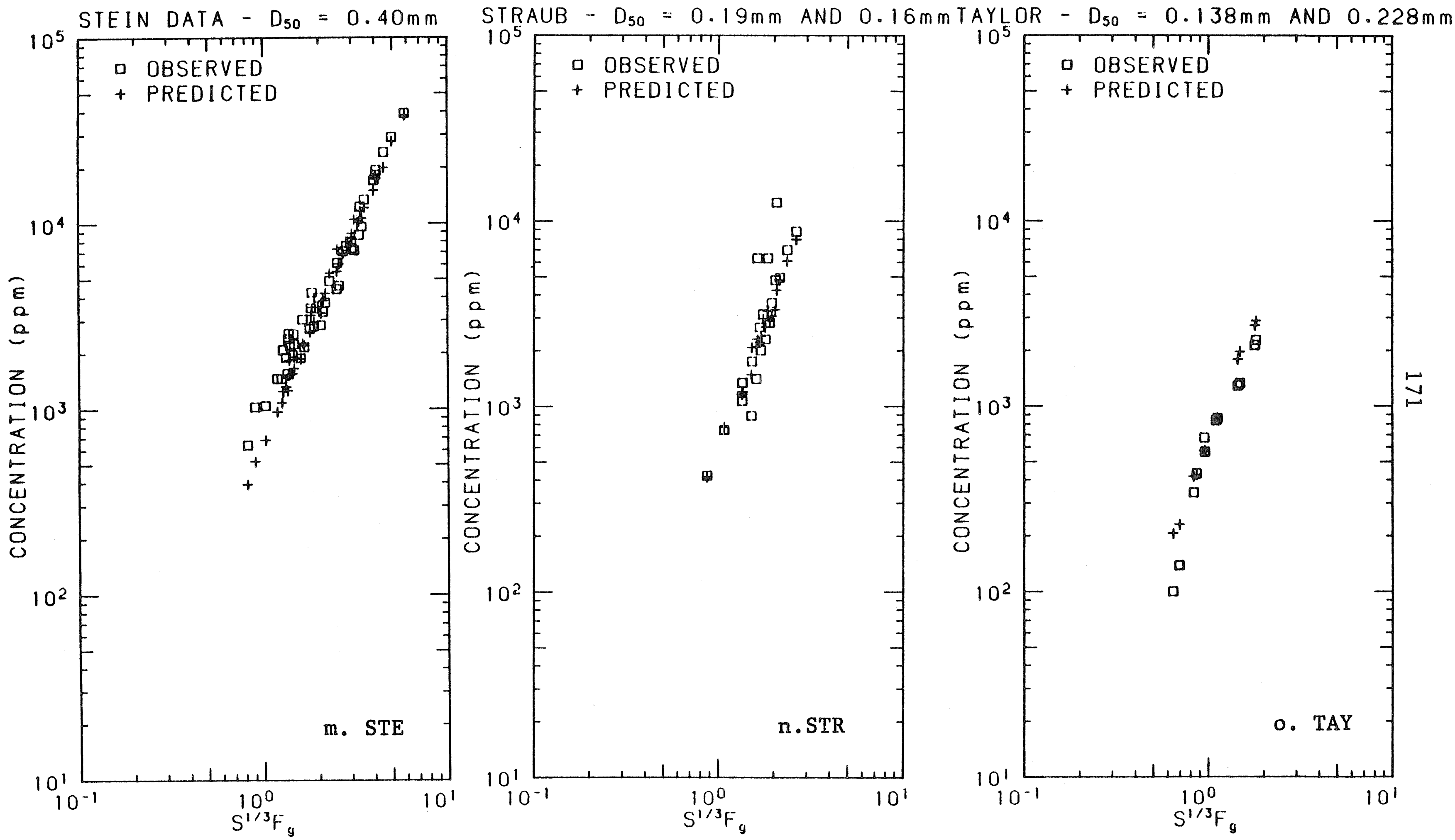

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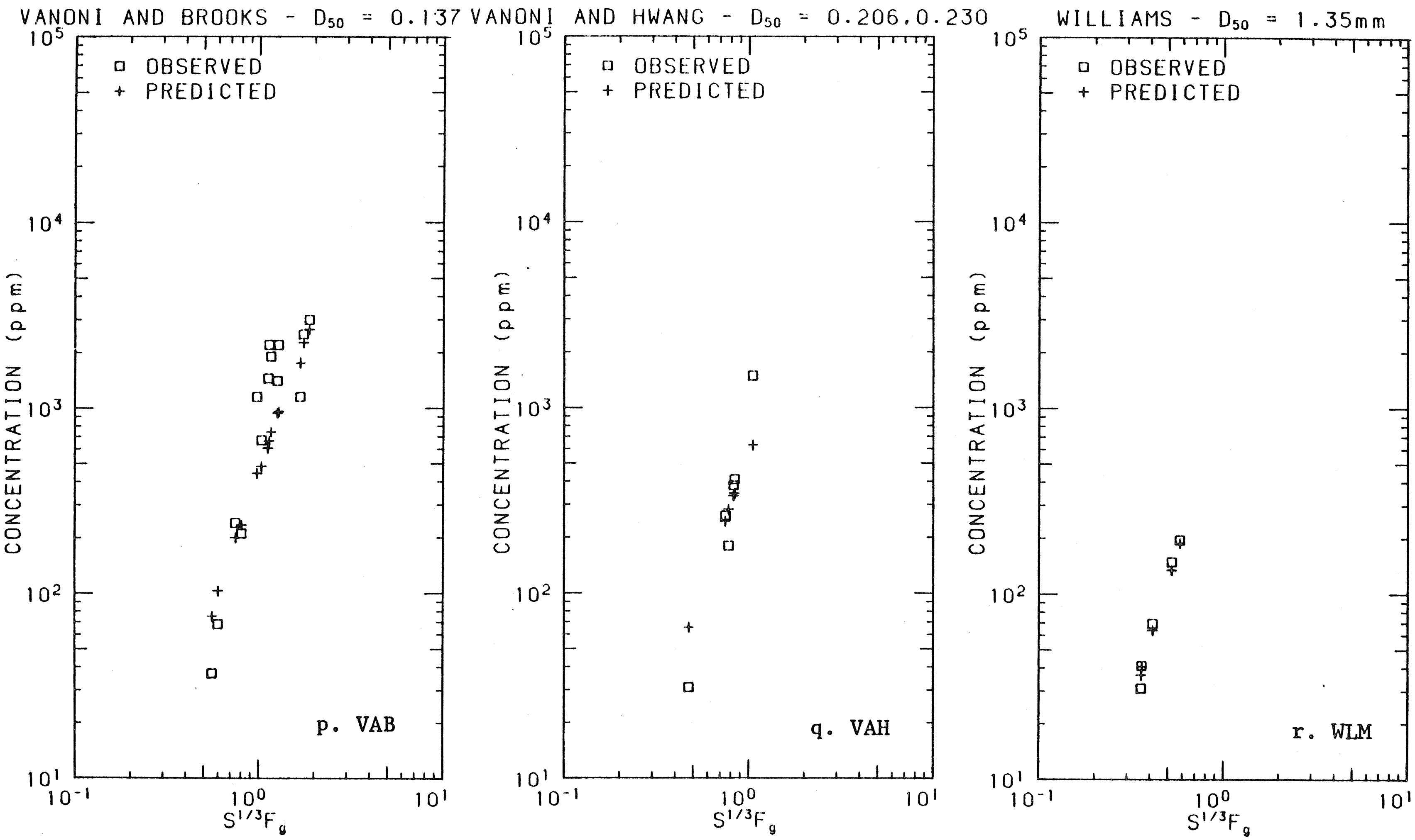

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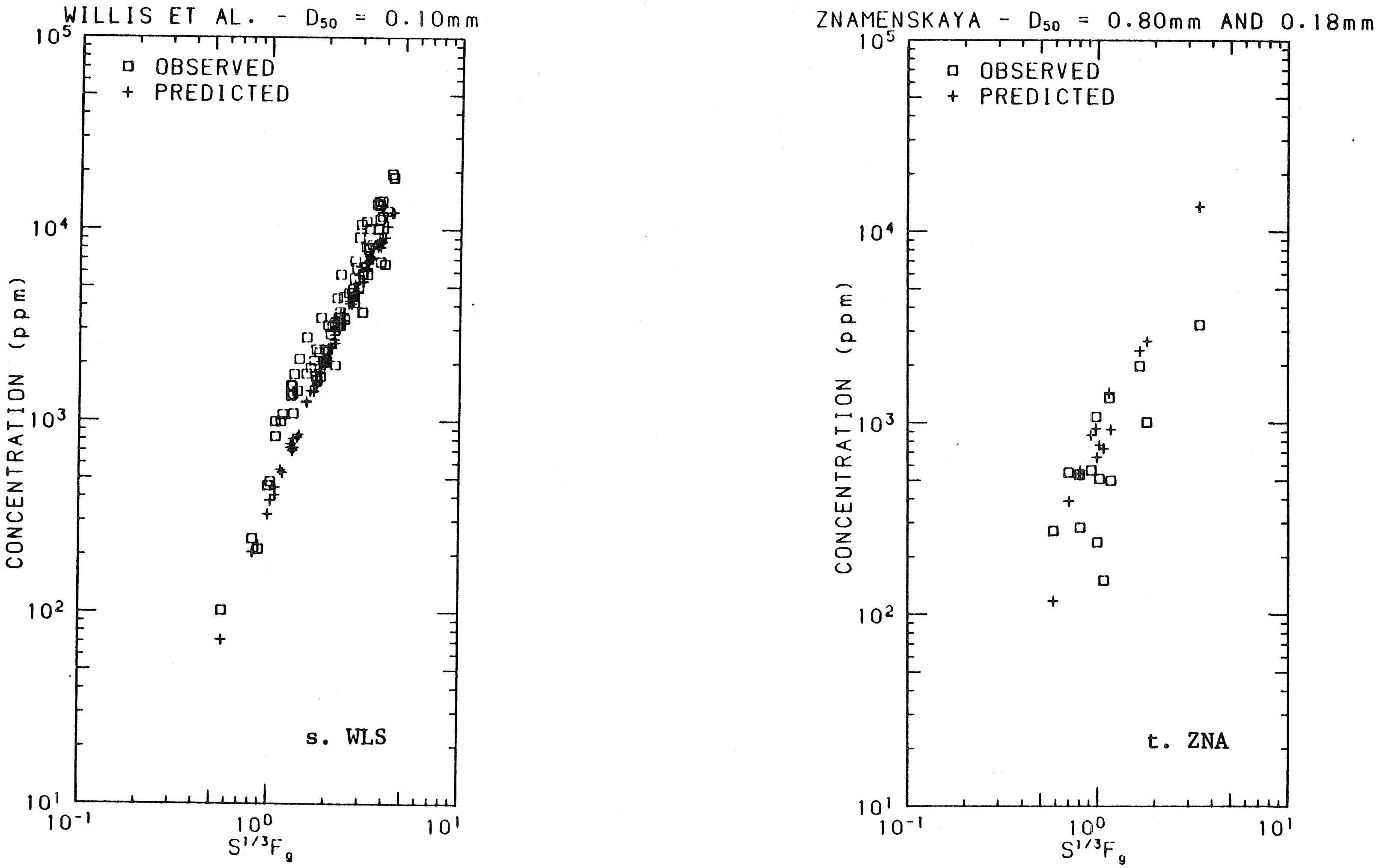

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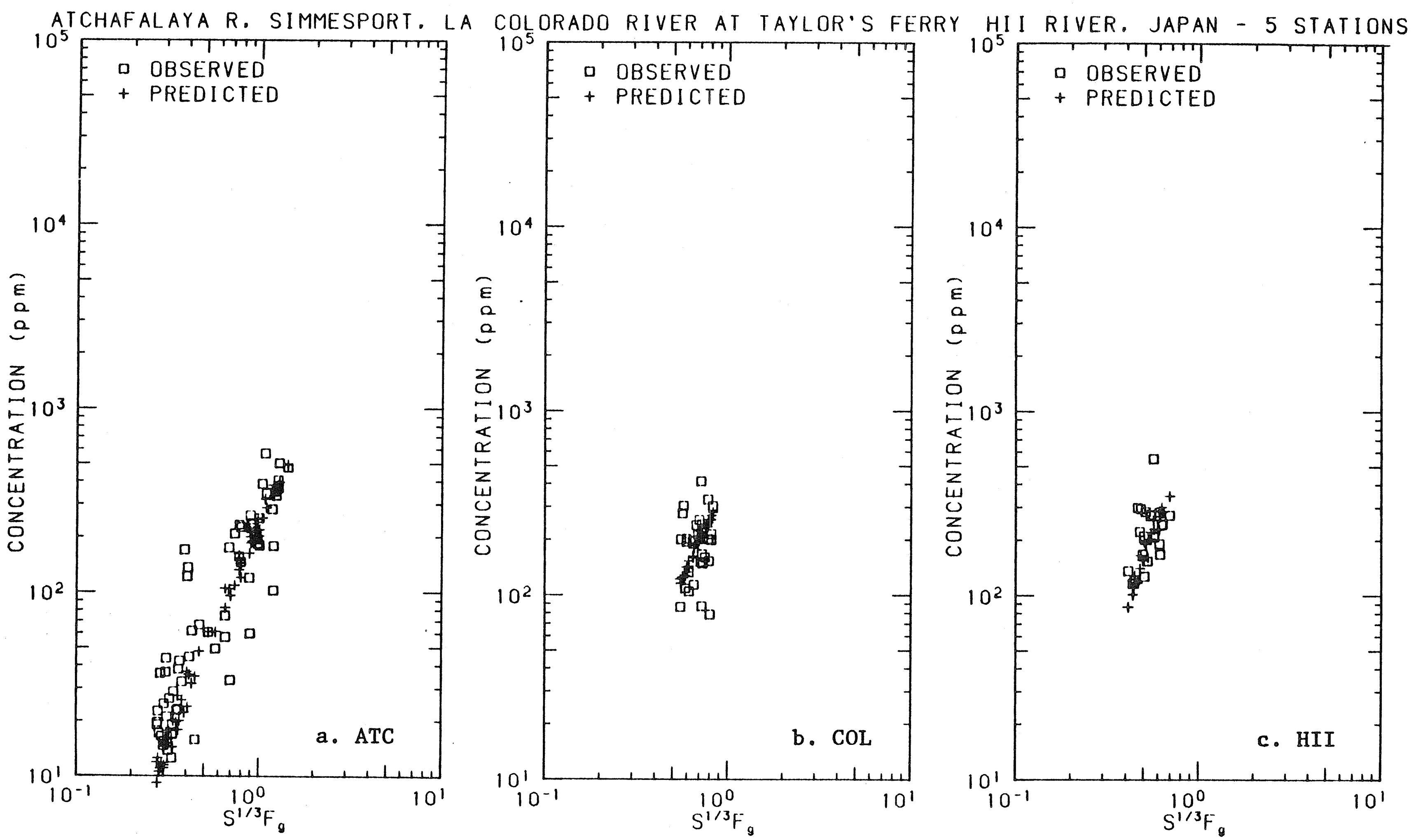


Figure 6.5 Field sediment concentration as observed and as predicted by Eq. 6.9, as a function of $S^{1/3}F_g$, where $F_g = v/\sqrt{gD_{50}(\rho_s-\rho)/\rho}$. Data set codes from Table 5.2 are given in the lower right corner of each plot.

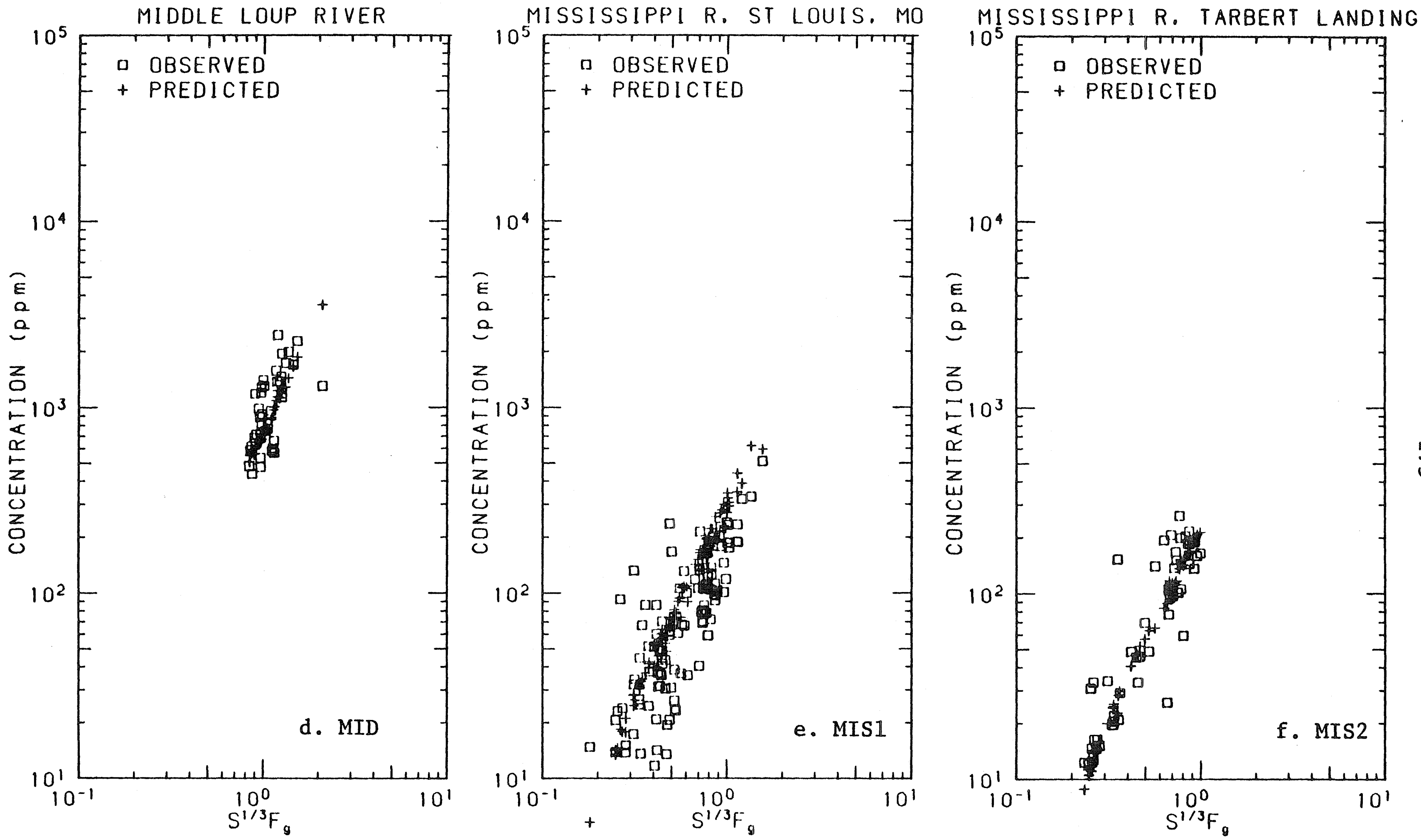
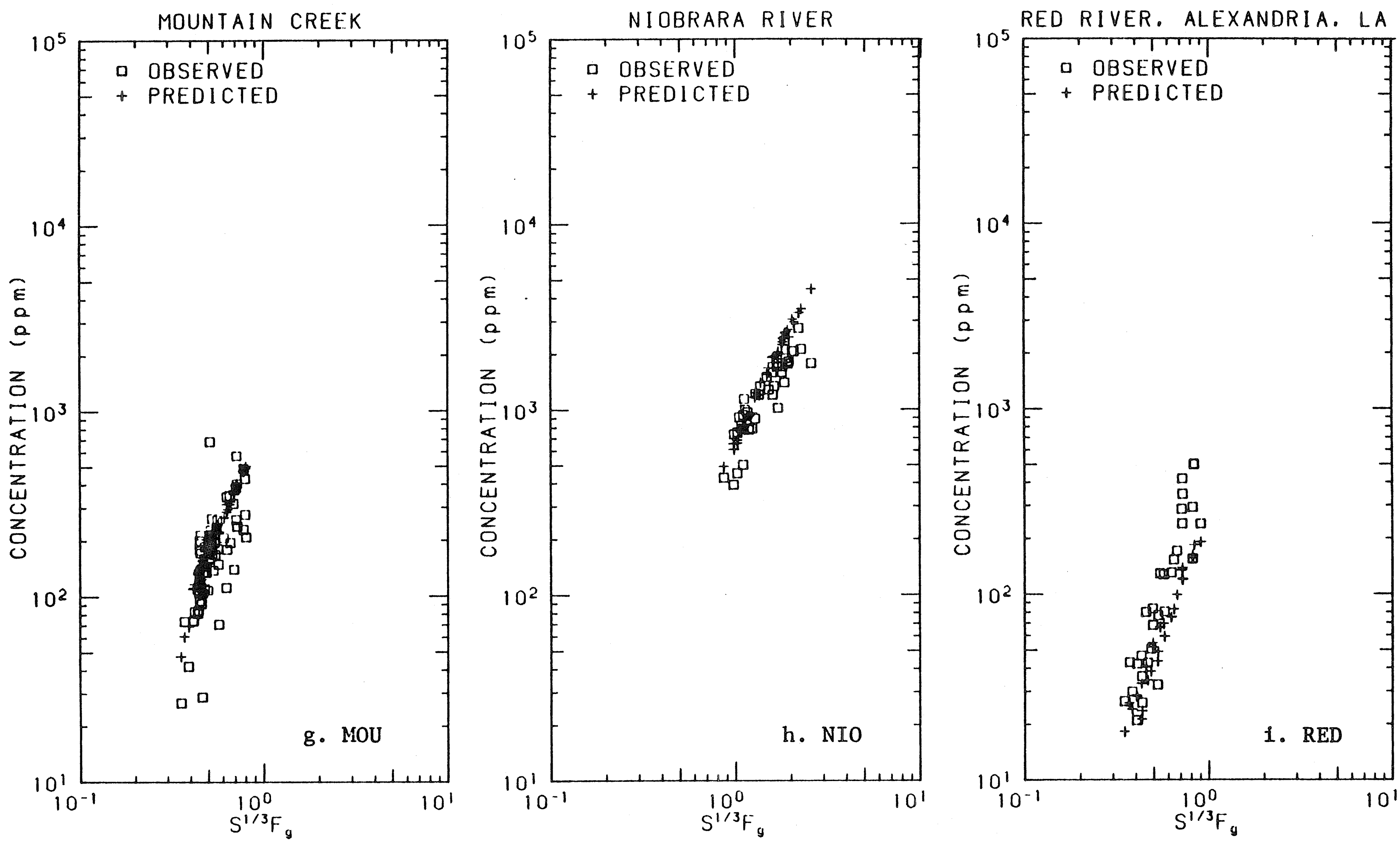


Figure 6.5 continued



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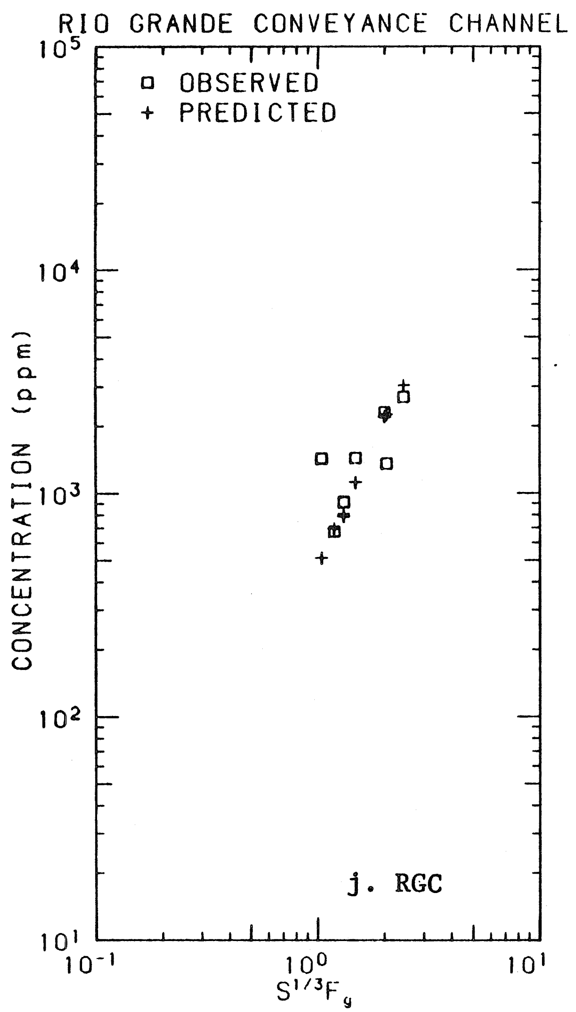


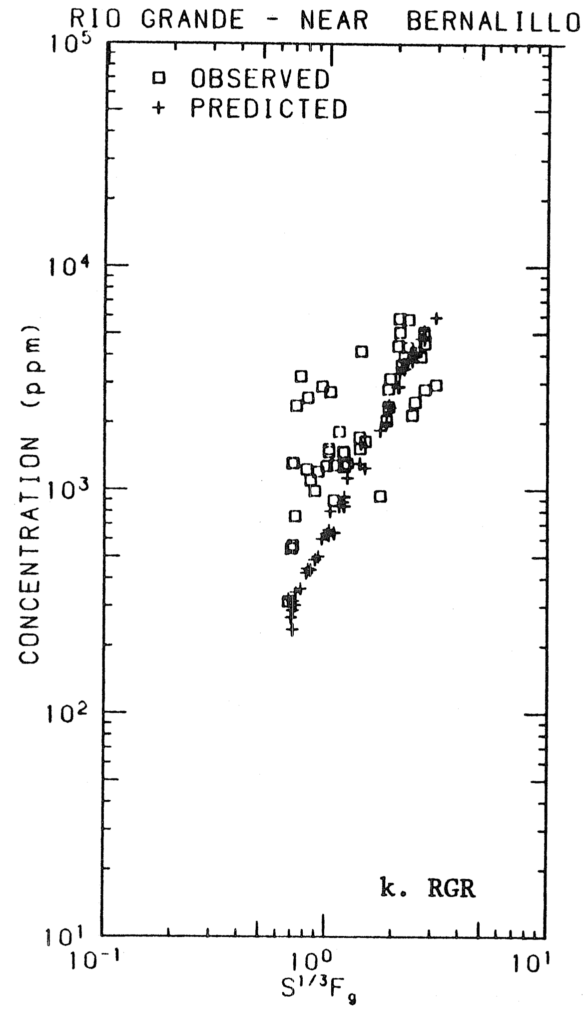


Figure 6.5 continued

Table 6.2

Ratio of Predicted to Observed Concentration for Proposed Method - Lab Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
BAL	26	0.667	1.718	0.293	0.388	0.542	1.145	1.486
BRO	6	0.615	1.712	0.209	0.359	0.635	1.054	1.092
COS	11	1.278	1.715	0.499	0.745	1.497	2.191	2.364
DAV	69	1.213	1.670	0.325	0.727	1.103	2.026	3.428
FOL	9	1.069	1.261	0.803	0.847	1.101	1.348	1.554
GUY1	27	0.994	1.605	0.467	0.619	1.024	1.595	2.921
GUY2	47	1.256	1.627	0.496	0.772	1.147	2.043	6.178
NOR1	22	1.537	1.571	0.584	0.978	1.526	2.415	3.477
NOR2	11	1.102	1.288	0.713	0.856	1.090	1.420	1.976
OJK	14	1.177	1.800	0.263	0.654	1.126	2.119	3.491
PRA	25	1.205	1.446	0.647	0.833	1.128	1.742	2.384
SIN	20	0.695	1.236	0.516	0.562	0.625	0.859	1.157
STE	44	0.901	1.264	0.508	0.713	0.916	1.139	1.406
STR	21	0.888	1.470	0.335	0.604	0.943	1.306	1.667
TAY	12	1.232	1.272	0.856	0.968	1.220	1.507	2.053
VAB	14	0.738	1.769	0.301	0.417	0.723	1.305	2.028
VAH	6	0.995	1.664	0.422	0.598	0.879	1.656	2.109
WLM	5	0.986	1.099	0.903	0.897	0.962	1.083	1.178
WLS	77	0.761	1.304	0.404	0.584	0.777	0.992	1.433
ZNA	14	1.542	1.925	0.431	0.801	1.502	2.969	4.902
All	480	1.000	1.638	0.209	0.610	0.967	1.638	6.178

Table 6.3

Ratio of Predicted to Observed Concentration for Proposed Method - Field Data

Data Set	Number	Geo.Mean	Geo.S.D.	Minimum	16 %ile	Median	84 %ile	Maximum
ATC	63	0.812	1.792	0.131	0.453	0.821	1.455	3.336
COL	30	1.026	1.585	0.409	0.647	0.951	1.627	3.286
HII	22	0.883	1.435	0.394	0.615	0.932	1.267	1.607
MID	38	0.908	1.453	0.504	0.625	0.854	1.319	2.721
MIS1	111	1.405	1.740	0.199	0.807	1.553	2.444	3.590
MIS2	53	0.917	1.608	0.149	0.570	0.950	1.475	3.427
MOU	75	1.238	1.463	0.289	0.846	1.218	1.812	4.304
NIO	40	1.230	1.295	0.706	0.950	1.210	1.592	2.518
RED	29	0.642	1.394	0.332	0.461	0.622	0.895	1.370
RGC	8	0.890	1.501	0.358	0.593	0.886	1.336	1.661
RGR	50	0.608	1.917	0.112	0.317	0.657	1.166	2.005
All	519	1.000	1.746	0.112	0.573	1.029	1.746	4.304

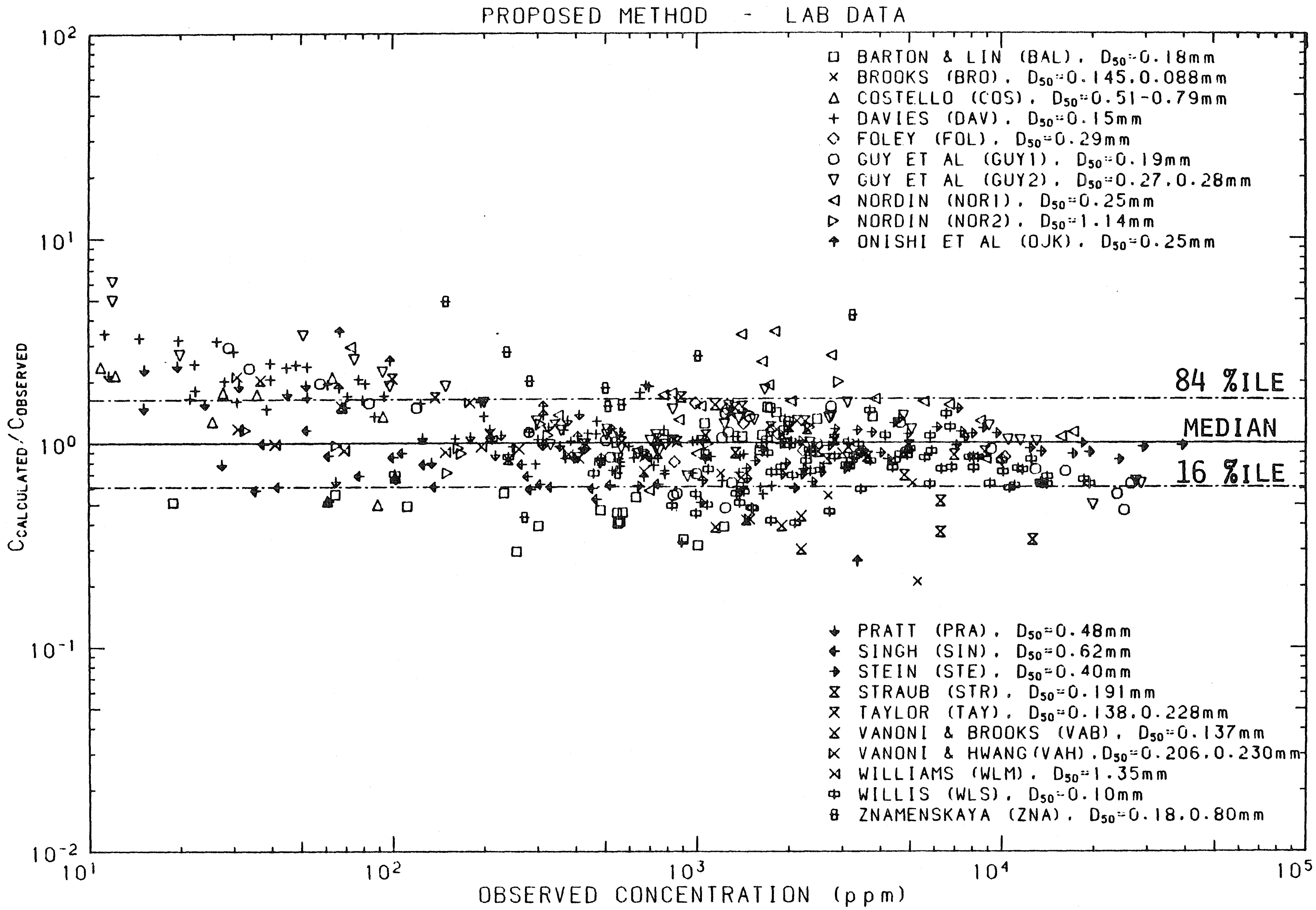


Figure 6.6a Ratio of concentration calculated from Eq. 6.8 or Eq. 6.9 technique to observed concentration as a function of observed concentration, for laboratory data.

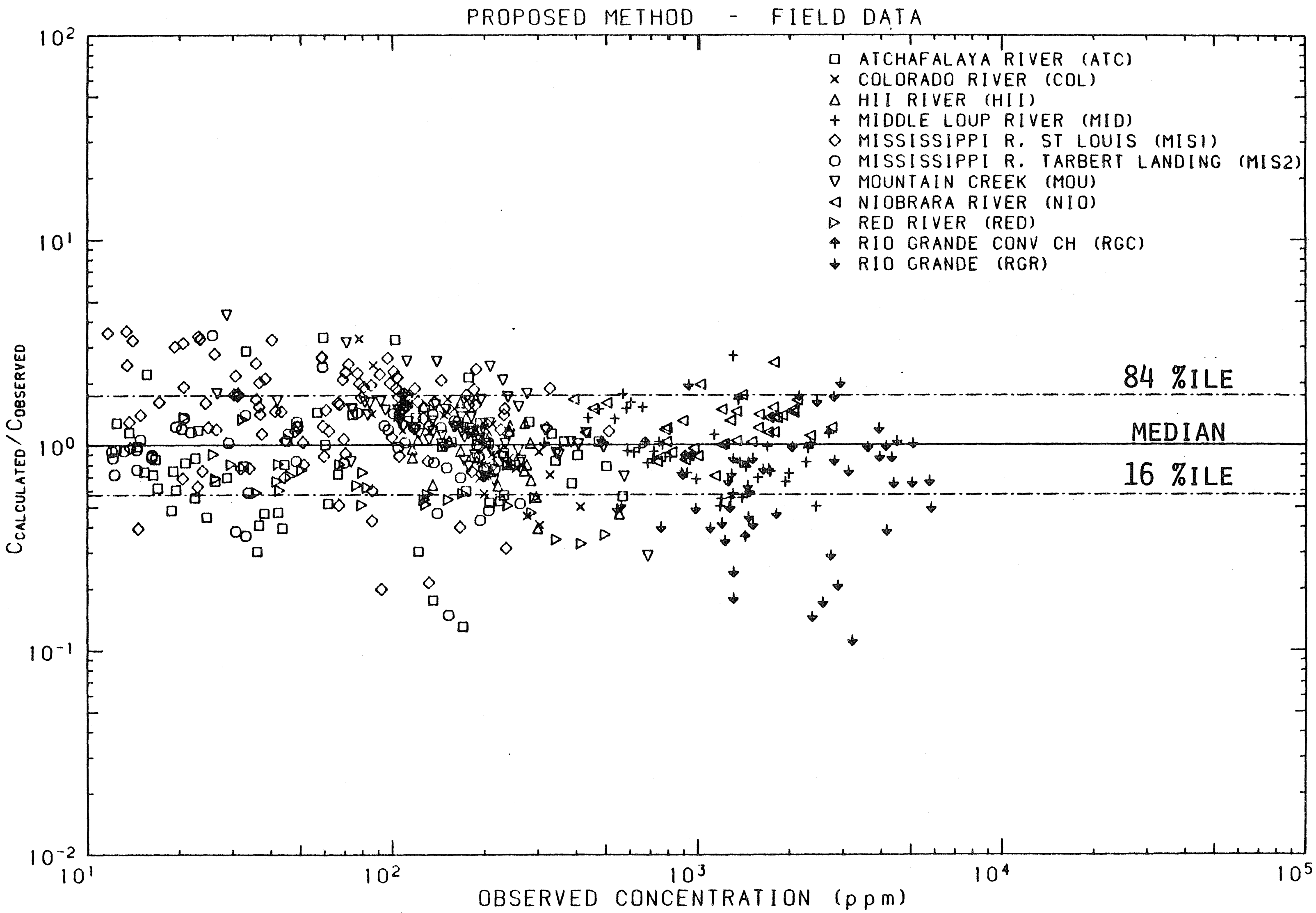


Figure 6.6b Ratio of concentration calculated from Eq. 6.8 or Eq. 6.9 technique to observed concentration as a function of observed concentration, for field data.

concentration computed from cross-sectional averaged hydraulic variables will be different from concentration calculated from local hydraulic properties and integrated over the cross-section. The analysis that follows was undertaken to explore the possible connection between the observed difference in laboratory and field observations of sediment concentration and the existence of irreglular river cross-sections.

The problem is illustrated schematically in Fig. 6.7. In the derivation that follows, the subscript "i" is used to indicate values of velocity, depth, and concentration for the i^{th} element in the cross-section. All non-subscripted representations of these variables refer to cross-sectionally averaged values. The derivation that follows assumes that for a given channel the slope and bed-material properties are constant.

For a river with dunes, a depth-velocity relationship at any point in the cross-section should behave like Eq. 4.10a with r replaced by the local depth, d_i. Rearranging and incorporating slope, gravity and bed-material properties in the constant yields an expression for the local velocity:

$$v_i = a_1 \, d_i^{b_1} \qquad (6.10)$$

where b_1 = 0.53, approximately.

If the flow velocity is considerably larger than the critical velocity, then a similar treatment of the concentration Eq. 6.8 yields:

$$C_i = a_2 \, v_i^{b_2} \, d_i^{b_3} \qquad (6.11)$$

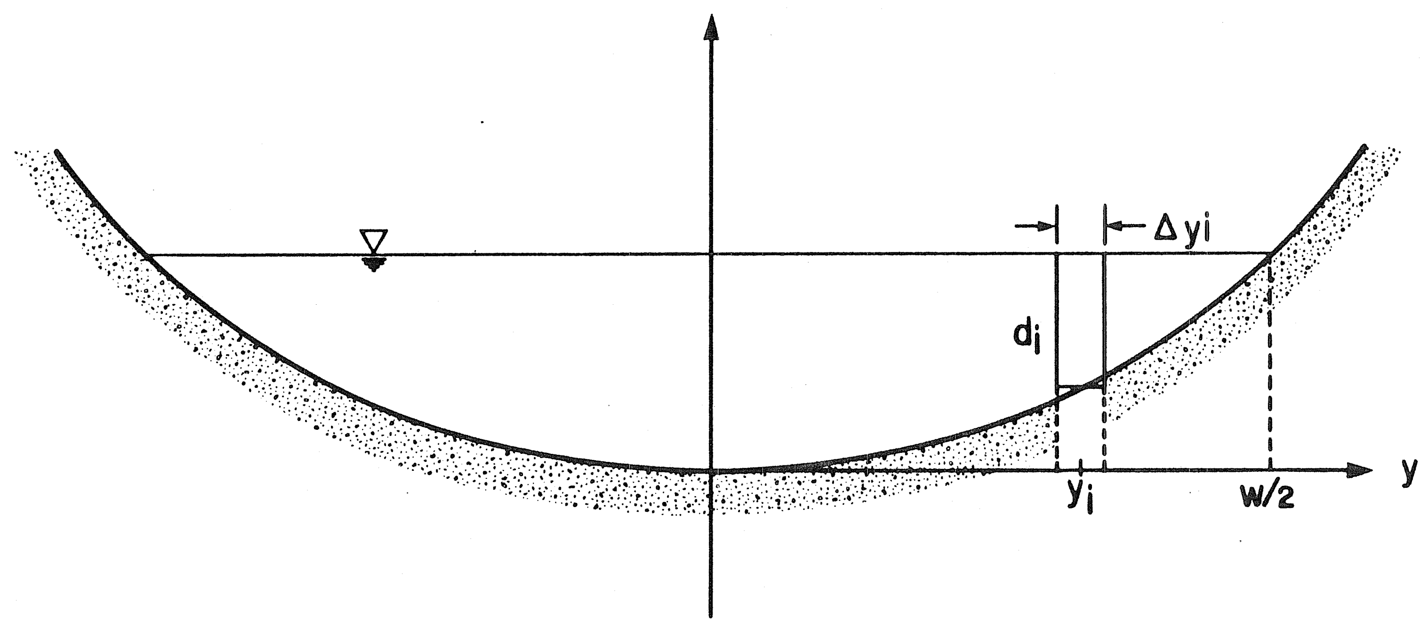


Figure 6.7 Idealized nonrectangular channel.

where b_2 = 2.0 and b_3 = −0.33, approximately. Here the critical velocity term has been neglected. Omission of the critical velocity term from Eq. 6.11 will cause an over-estimation of the local concentration, particularly near the sides of the cross-section. For rivers where a significant transport rate exists, such as many shown in Figs. 6.5a-j, this error will be small.

In order to explore the effect of an irregular cross-section, a certain cross-sectional shape is required. Leopold and Maddock (1953) have shown that relationships of the following form exist for most rivers:

$$w = aQ^b \tag{6.12}$$

and

$$d = cQ^f \tag{6.13}$$

For observations at a station, they found the average values to be b = 0.26 and f = 0.40.

Elimination of Q from Eqs. 6.12 and 6.13 yields

$$d = Aw^B \tag{6.14}$$

where A is a general coefficient and B = f/b, and has the average value B = 1.54.

One cross-sectional depth distribution which satisfies Eq. 6.14 is

$$d_i = \left(\frac{B+1}{B}\right)A\left[w^B - (2y)^B\right] \quad \text{for } y > 0 \tag{6.15}$$

If B=2, then Eq. 6.15 provides for a parabolic cross-section. However, the actual shape of the cross-section is less important than the integral properties of the depth distribution. Therefore, Eq. 6.15 should be satisfactory, since when integrated over the cross-section it satisfies Eq. 6.14.

The mean sediment concentration in the section can be calculated from

$$C = \frac{2 \sum_{i=1}^{n} C_i v_i d_i \, \Delta y_i}{2 \sum_{i=1}^{n} v_i d_i \, \Delta y_i} \tag{6.16}$$

Substituting Eqs. 6.10 and 6.11, and dividing by the concentration calculated from the mean depth gives

$$\frac{C}{C(d)} = \frac{\sum_{i=1}^{n} d_i^{\,1+b_1+b_1b_2+b_3} \, \Delta y_i}{d^{b_1b_2+b_3} \sum_{i=1}^{n} d_i^{\,1+b_1} \, \Delta y_i} \tag{6.17}$$

Substituting Eq. 6.15 gives

$$\frac{C}{C(d)} = \left[\left(\frac{B+1}{B}\right)\frac{A}{d}\right]^{b_1b_2+b_3} \frac{\int_0^{w/2} \left[w^B - (2y)^B\right]^{1+b_1+b_1b_2+b_3} dy}{\int_0^{w/2} \left[w^B - (2y)^B\right]^{1+b_1} dy} \tag{6.18}$$

The use of the transformation u = 2y/w gives

$$\frac{C}{C(d)} = \left[\left(\frac{B+1}{B}\right)\frac{Aw^B}{d}\right]^{b_1b_2+b_3} \frac{\int_0^{1} (1 - u^B)^{1+b_1+b_1b_2+b_3} du}{\int_0^{1} (1 - u^B)^{1+b_1} du} \tag{6.19}$$

Finally, recalling Eq. 6.14, Eq. 6.19 can be reduced to

$$\frac{C}{C(d)} = \left(\frac{B+1}{B}\right)^{b_1b_2+b_3} \frac{\int_0^{1} (1 - u^B)^{1+b_1+b_1b_2+b_3} du}{\int_0^{1} (1 - u^B)^{1+b_1} du} \tag{6.20}$$

Simpson's Rule was used to calculate the integrals in Eq. 6.20 for a range of B values. From these values, C/C(d) has been calculated and is plotted in Fig. 6.8. The average value of B = 1.53 from Leopold and Maddock (1953) yields C/C(d) = 1.43, which should be compared with the observed correction for field data, c_F = 1.268. These values are reasonably close, especially when one recalls that the omission of the critical velocity term from Eq. 6.11 will tend to cause an over-estimation of C/C(d).

The analysis presented here suggests that the irregularity of river cross-sections could indeed be responsible for the observed higher values of field measurements of sediment concentration over laboratory measurements. Figure 6.8 shows that the amount of this factor will change from river to river based on the specific channel shapes. From the available data, the value c_F = 1.268 seems to be a reasonable average value of this multiplicative factor.

6.6 Comparison with Existing Methods

A statistical comparison of available methods for calculating sediment concentration is given in Table 6.4. The table gives the geometric mean and geometric standard deviation of the ratio of computed to observed sediment concentration for both laboratory and field observations. A graphical display of the statistics is presented in Fig. 6.9. The comparison is somewhat unfair in that the proposed method was fitted to the same data used to make the comparison. Of course,

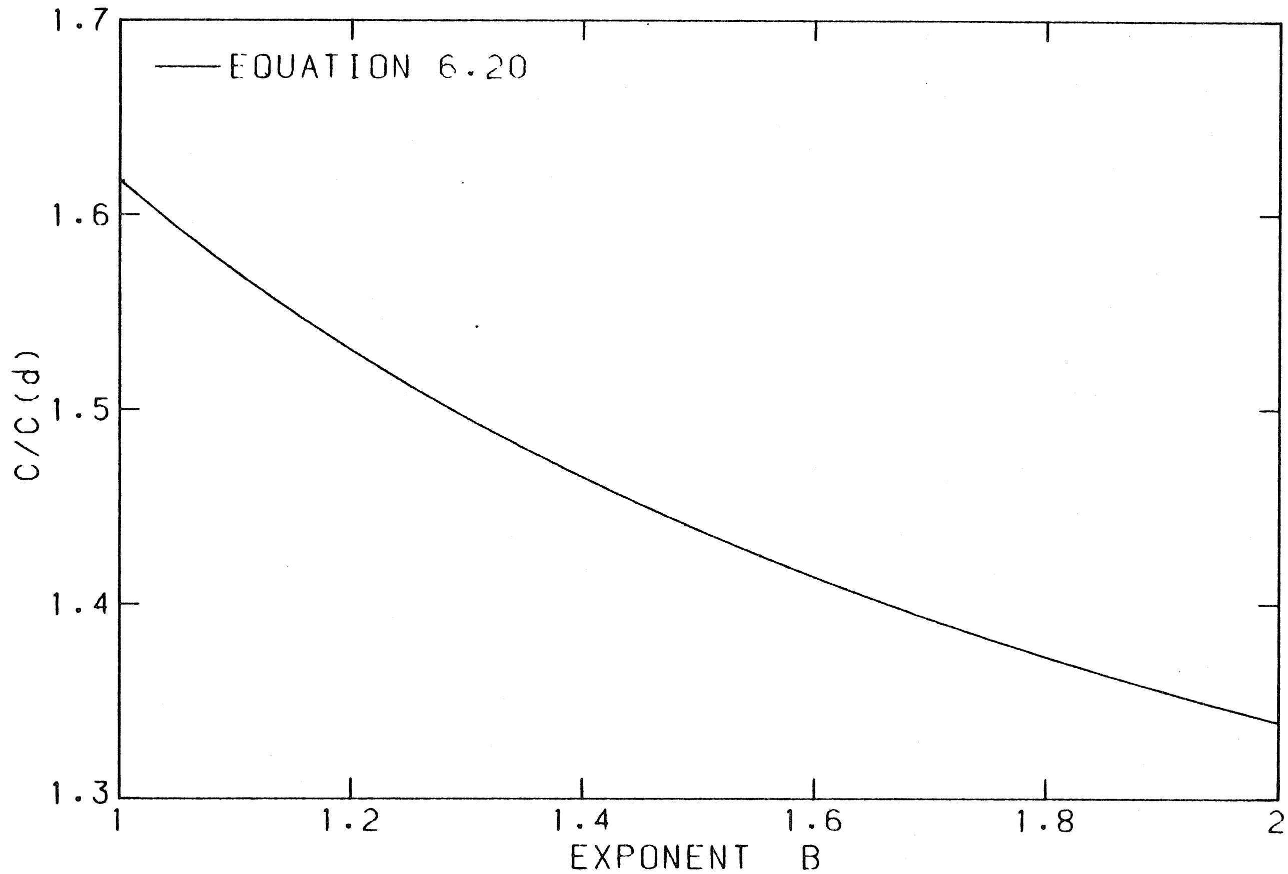


Figure 6.8 Ratio of cross-sectionally integrated concentration to concentration calculated from mean depth, as a function of the value of exponent B in Eq. 6.14.

Table 6.4

Geometric Mean and Geometric Standard Deviation of the Ratio of Predicted to Observed Concentration for All Methods, for Laboratory and Field Conditions

Investigator	Number	Laboratory Mean	Laboratory S.D.	Field Mean	Field S.D.
Ackers and White (1973)	998	1.150	1.758	0.694	2.027
Bagnold (1966)	999	2.155	2.718	1.173	2.537
Bishop et al. (1965)	973	0.695	2.300	0.443	2.488
Einstein (1950)	950	0.628	4.059	0.420	3.719
Engelund and Fredsoe (1976)	825	1.274	2.972	3.179	14.026
Engelund and Hansen (1967)	999	1.236	2.064	0.916	1.997
Graf (1971)	999	1.360	3.696	1.005	3.124
Laursen (1958)	972	1.296	2.532	0.420	3.098
Ranga Raju et al. (1981)	833	1.160	1.882	0.333	2.813
Rottner (1959)	999	0.920	2.101	0.603	1.904
Shen and Hung (1971)	940	0.866	1.656	0.432	2.973
Toffaleti (1968)	995	1.166	2.749	0.854	2.572
Yang (1973)	993	1.215	1.710	0.471	3.077
Brownlie (1981)	999	1.000	1.638	1.000	1.746

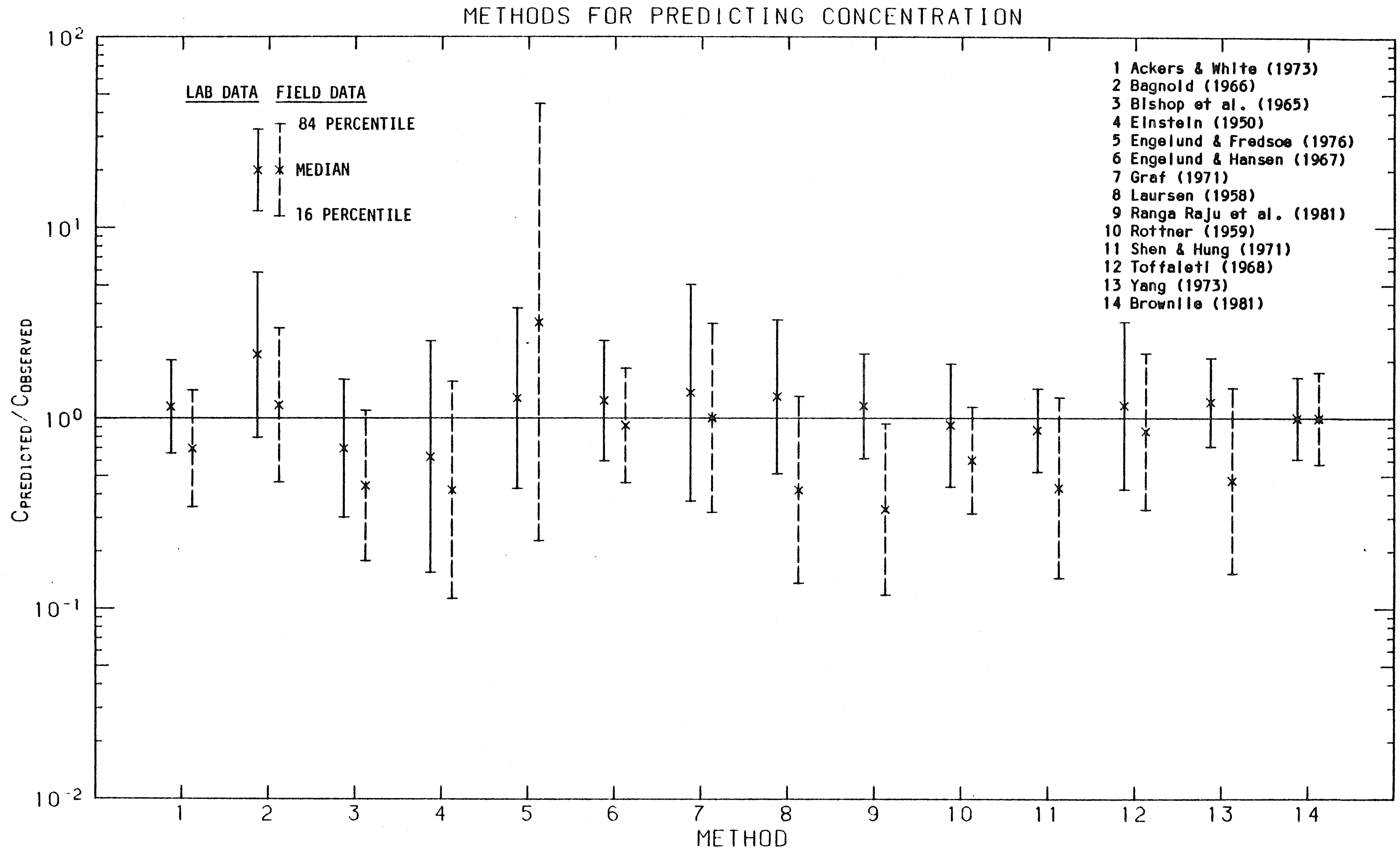


Figure 6.9. Comparison of methods for predicting sediment concentration. Median and 16 and 84 percentile values are based on the approximation of a log-normal distribution of errors.

some of these data were also used in the derivation of many of the existing methods.

The geometric mean and geometric standard deviation were calculated by taking the antilogs of the mean and standard deviation, respectively, of the logarithms of ratios of computed to observed concentration. As shown in Chapter 5, the errors tend to be log normally distributed, and therefore these two parameters provide a good description of the distribution. Approximtely 68 percent of the data can be found to lie in a range from the geometric mean divided by the geometric standard deviation to the geometric mean times the geometric standard deviation.

6.7 Summary

A method has been proposed for the calculation of the mean bed-material concentration in a channel. For the convenience of the reader, the necessary equations are repeated here. The method assumes that the bed-material properties, slope, and water temperature are known. The method also requires hydraulic radius and mean velocity, which if not known, can be calculated if the unit discharge is known, from the procedure described in Chapter 4.

First, critical shear stress is determined either from Fig. 6.3 or from Eq. 6.3:

$$\tau_{*o} = 0.22Y + 0.06(10)^{-7.7Y} \qquad (6.3)$$

$$\text{where } Y = \left(\sqrt{\frac{\rho_s-\rho}{\rho}}\, R_g\right)^{-0.6}$$

Next, the critical grain Froude number is determined from Eq. 6.4:

$$F_{g_o} = 4.596\ \tau_{*_o}^{\ 0.5293}\ S^{-0.1405}\ \sigma_g^{-0.1606} \qquad (6.4)$$

Finally, the bed-material concentration, in parts per million by weight, is determined from Eq. 6.8:

$$C = 7115 c_F \left(F_g - F_{go}\right)^{1.978} S^{0.6601} \left(\frac{r}{D_{50}}\right)^{-0.3301} \qquad (6.8)$$

where c_F = 1 for laboratory conditions and c_F = 1.268 for field conditions.

In the derivation of Eq. 6.8 concentration in parts per million by mass has been taken to be equivalent to concentration measured as milligrams per liter. For concentrations less than 16,000 ppm, this approximation will result in an error of less than 1 percent. The range of concentration for the input data used to develop Eq. 6.8 was from 10 ppm to 40,000 ppm. The ranges of the values of other parameters are given in Table 5.2a and 5.2b, and restrictions on the input data are summarized in Table 5.3.

CHAPTER 7

RECOMMENDATIONS FOR NUMERICAL MODEL DEVELOPMENT

A numerical solution to the set of Eqs. 1.1 through 1.5 is presented in this chapter. The proposed solution is not yet a working model, but rather a test of the possibility of using the new relations for flow depth and sediment concentration to define Eqs. 1.4 and 1.5, respectively. Later in the chapter recommendations are given for further development of the solution techniques.

7.1 Solutions to the Differential Equations

Implicit finite difference solutions to the set of Eqs. 1.1 through 1.5 have been given by Cunge and Perdreau (1973), Liggett and Cunge (1975), and Ponce et al. (1979). These solutions have been primarily concerned with the simplified case where time derivatives in the momentum and continuity equations, Eqs. 1.1 and 1.2, respectively, are neglected. The problem being attacked here is different in that the full equations are to be solved.

Equations 1.1 through 1.3 can be rearranged in the form

$$-\frac{\partial H}{\partial x} - \frac{1}{g}\frac{\partial u}{\partial t} = S \tag{7.1}$$

$$\frac{\partial q}{\partial x} + \frac{\partial h}{\partial t} = 0 \tag{7.2}$$

$$\frac{\partial q_s}{\partial x} + \frac{\partial h_s}{\partial t} = 0 \tag{7.3}$$

where

$$H = z + h + \frac{u^2}{2g}$$

$$S = \frac{fu^2}{8gh}$$

$$q = uh$$

$$q_s = Cuh$$

$$h_s = (1 - \lambda)\frac{\rho_s}{\rho} z + Ch$$

Equations 7.1, 7.2, and 7.3 each have the general form

$$\frac{\partial f_1}{\partial x} + \frac{\partial f_2}{\partial t} + f_3 = 0 \qquad (7.4)$$

where f_1, f_2, and f_3 are functions of h, z, and u.

Using the standard finite difference representation, sometimes attributed to Preissmann (1965), the terms in Eq. 7.4 can be approximated by

$$\frac{\partial f_1}{\partial x} \cong \frac{1}{\Delta x}\left(f_{1_{j+1}} - f_{1_j}\right) + \frac{\theta}{\Delta x}\left(\Delta f_{1_{j+1}} - \Delta f_{1_j}\right) \qquad (7.5)$$

$$\frac{\partial f_2}{\partial t} \cong \frac{1}{2\Delta t}\left(\Delta f_{2_{j+1}} + \Delta f_{2_j}\right) \qquad (7.6)$$

$$f_3 \cong \frac{1}{2}\left(f_{3_{j+1}} + f_{3_j}\right) + \frac{\theta}{2}\left(\Delta f_{3_{j+1}} + \Delta f_{3_j}\right) \qquad (7.7)$$

where $0 \le \theta \le 1$ is a weighting coefficient, and the delta (Δ) in front of functions f_1, f_2, and f_3 refers to the change in the value of the function over a time step, as illustrated in Fig. 7.1. The incremental value of any function at any point can be represented as shown here for the function f_1

$$\Delta f_{1_j} = \left(\frac{\partial f_1}{\partial h}\right)_j \Delta h + \left(\frac{\partial f_1}{\partial z}\right)_j \Delta z + \left(\frac{\partial f_1}{\partial u}\right)_j \Delta u \qquad (7.8)$$

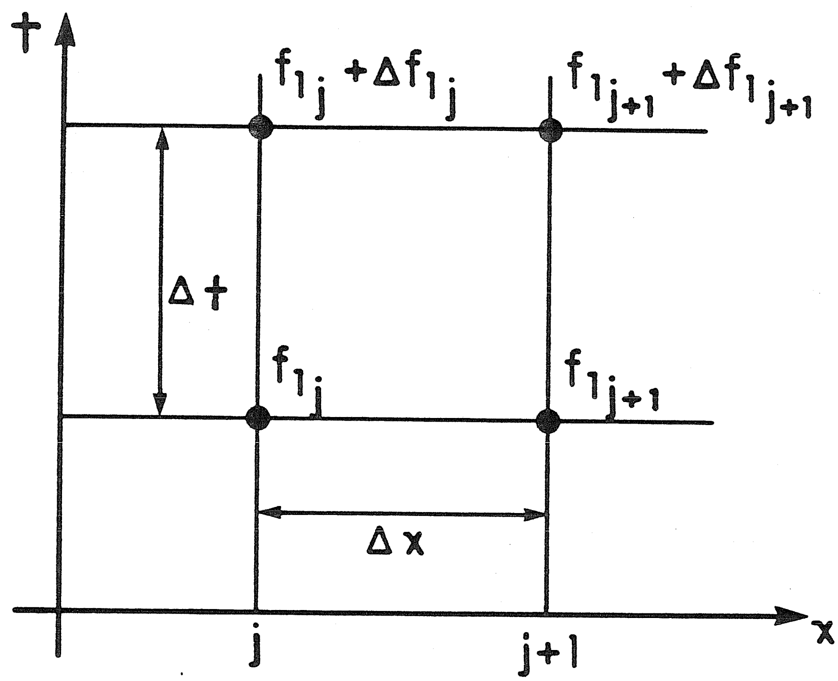


Figure 7.1 Definition sketch for four-point implicit finite difference scheme.

Given expressions for the friction factor, f, and the concentration, C, a set of linear finite difference equations can be established and solved for the incremental values Δh, Δz, and Δu at all points along the channel. Here the solution of the finite difference equations was accomplished through the use of Gauss elimination with pivitol condensation and back substitution (McCracken and Dorn, 1968).

A definition of f for the lower flow regime can be obtained by a rearrangement of Eq. 4.10a, and for the upper flow regime by a rearrangement of Eq. 4.10b. Rearrangements of Eqs. 4.10a and 4.10b solving for several dimensionless quantities are given in Table 7.1. When flows are entirely in one flow regime or the other, the definition of f is therefore easily accomplished. However, for situations involving both flow regimes, a transition mechanism will be required. Such a mechanism has not yet been developed.

The concentration can be determined from Eq. 6.8 after first determining the critical grain Froude number from Eqs. 6.3 and 6.4. Equation 6.8 gives an equilibrium solution for steady flow conditions. If a sudden change in flow conditions occurs, a non-equilibrium value of concentration may exist. Dobbins (1944) has developed a transient solution for the sediment concentration profile after a change in turbulence intensity. The first eigenvalue of the transient solution given by Dobbins (1944) has been used to adjust the equilibrium value of concentration. The resulting equation provides for an exponential decay or growth from one equilibrium condition to another.

Using this approximation, the concentration at point j, C_j, can be

Table 7.1

Rearrangement of Flow Depth Predictors
Equation 4.10a and Equation 4.10b

<u>Regime</u>

<u>Relative Roughness</u>

Lower $$\frac{r}{D_{50}} = 0.05761(s-1)^{0.9447} F_g^{1.889} S^{-0.7345} \sigma_g^{0.3034} \qquad (7.9a)$$

Upper $$\frac{r}{D_{50}} = 0.03478(s-1)^{0.8326} F_g^{1.665} S^{-0.7668} \sigma_g^{0.2136} \qquad (7.9b)$$

<u>Slope</u>

Lower $$S = 0.02054(s-1)^{1.286} F_g^{2.572} \left(\frac{r}{D_{50}}\right)^{-1.361} \sigma_g^{0.4130} \qquad (7.10a)$$

Upper $$S = 0.01252(s-1)^{1.086} F_g^{2.172} \left(\frac{r}{D_{50}}\right)^{-1.304} \sigma_g^{0.2785} \qquad (7.10b)$$

<u>Grain Froude</u>

Lower $$F_g = \frac{v}{\sqrt{(s-1)gD_{50}}} = 4.530(s-1)^{-0.5} S^{0.3888} \left(\frac{r}{D_{50}}\right)^{0.5293} \sigma_g^{-0.1606} \qquad (7.11a)$$

Upper $$F_g = \frac{v}{\sqrt{(s-1)gD_{50}}} = 7.515(s-1)^{-0.5} S^{0.4605} \left(\frac{r}{D_{50}}\right)^{0.6001} \sigma_g^{-0.1283} \qquad (7.11b)$$

Table 7.1

-Continued-

Regime

Friction Factor

Lower $$f = \frac{8grS}{v^2} = 0.164(s-1)^{0.286} F_g^{0.572} \left(\frac{r}{D_{50}}\right)^{-0.361} \sigma_g^{0.413} \qquad (7.12a)$$

Upper $$f = \frac{8grS}{v^2} = 0.100(s-1)^{0.086} F_g^{0.172} \left(\frac{r}{D_{50}}\right)^{-0.304} \sigma_g^{0.279} \qquad (7.12b)$$

Froude Number

Lower $$F = \frac{v}{\sqrt{gr}} = 4.53 \; S^{0.389} \left(\frac{r}{D_{50}}\right)^{0.0293} \sigma_g^{-0.161} \qquad (7.13a)$$

Upper $$F = \frac{v}{\sqrt{gr}} = 7.52 \; S^{0.461} \left(\frac{r}{D_{50}}\right)^{0.100} \sigma_g^{-0.128} \qquad (7.13b)$$

Notes:

1. For use with the differential equations velocity "v" should be replaced by the x component of velocity "u," and "r" should be replaced by "d".
2. $s = \rho_s/\rho$ = specific gravity.
3. For statistical reasons three or four significant figures are retained in the coefficients and exponents, although the accuracy of the computed results cannot be considered to be more than about two significant figures.

determined from the equilibrium concentration at j, C_{ej}, (from Eq. 6.8) and the concentration at upstream point j + 1, C_{j+1}, from

$$C_j = C_{ej} + e^{-\varepsilon(\alpha^2+\beta^2)t}\left(C_{j+1} - C_{ej}\right) \qquad (7.14)$$

where $\beta = \frac{w}{2\varepsilon}$

and $2\cot(h\alpha) = \frac{\alpha}{\beta} - \frac{\beta}{\alpha}$

and w is the fall velocity of the particles and ε is the turbulent diffusion coefficient. The concentration at the top of the reach is neccesarily assumed to be at equilibrium. In test runs the adjustment of the equilibrium concentration in this manner had only a small (on the order of 10 percent) influence on the concentration. When the equilibrium value of concentration changes abruptly from one location to another, the effect may be much greater.

In developing Eq. 7.14, only the first eigenvalue of the Dobbins (1944) solution was used. This simplification will be valid for large enough time steps. However, more research is needed both experimentally and analytically to verify the use of Eq. 7.14.

For the test runs, the boundary conditions consisted of one downstream condition and two upstream conditions. The downstream condition is a constant water surface elevation, expressed in finite difference form as

$$\Delta h_1 + \Delta z_1 = 0 \qquad (7.15)$$

The upstream conditions are

$$u_n \Delta h_n + h_n \Delta u_n = \Delta q - \Delta h_n \Delta u_n \qquad (7.16)$$

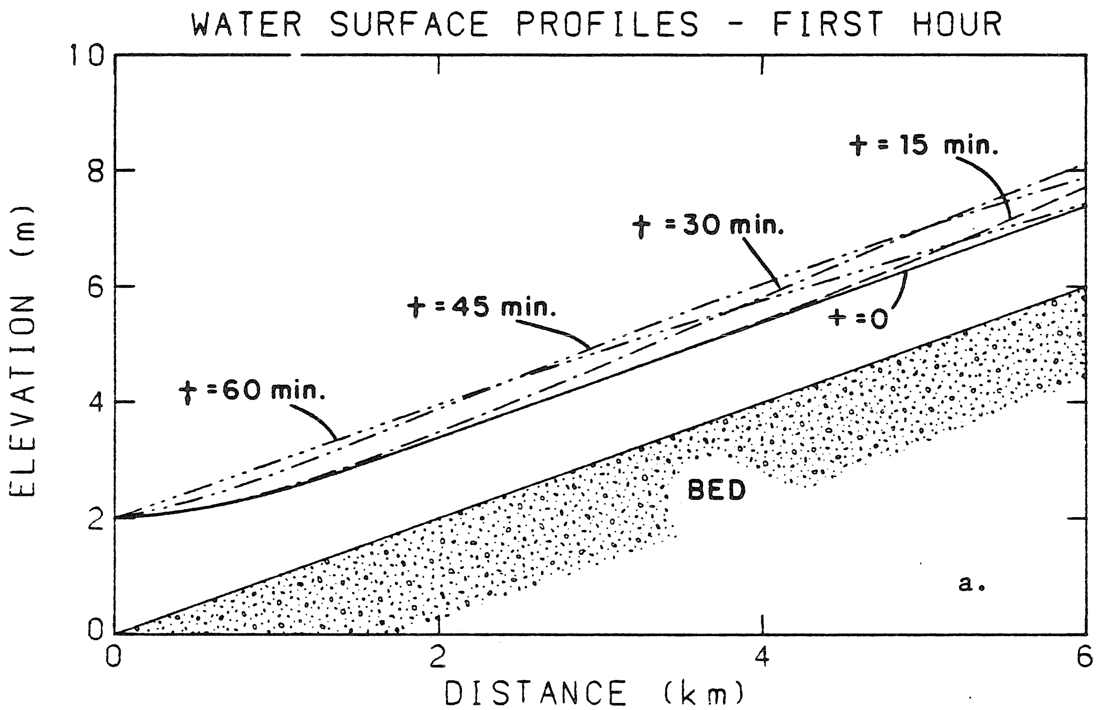
$$\Delta z_n = 0 \qquad (7.17)$$

The term Δq in Eq. 7.16 is the change in the inflow over a time step for some given inflow hydrograph. Since the quantities Δh_n and Δu_n appear as a product on the right side of Eq. 7.16, an iterative procedure is required to solve for the upstream depth and velocity. This second order correction, applied only at the upstream boundary, allows for an exact representation of the inflow hydrograph. Equation 7.17 implies that the bed at the upstream end of the reach is fixed, which agrees with the assumption that the inflow concentration is at equilibrium.

Some test results are shown in Figs. 7.2 through 7.5. Water surface elevations at 15 minute intervals along a 6 kilometer test reach are shown in Fig. 7.2. The inflowing flood wave has a duration of 1 hour. The channel has a bed slope of 0.001 and a uniform sand bed with a particle size of D_{50} =0.4 mm. The model parameters are as follows: Δx = 100 meters, Δt = 9 seconds and the weighting factor for the implicit scheme, θ = 0.5. The initial condition is derived from a steady-state backwater calculation.

The passage of the flood wave through the reach is illustrated in Fig. 7.3. The figure illustrates how the wave is attenuated by friction losses as it passes through the reach. Although the bed elevation is not fixed, its changes are imperceptible on this time scale.

An unusual aspect of this type of numerical simulation is the ability to examine hysteresis effects. The term "hysteresis" in hydraulic applications refers to situations where properties such as flow depth or sediment concentration have different values for a given discharge during rising and falling stages. Figure 7.5 shows how the



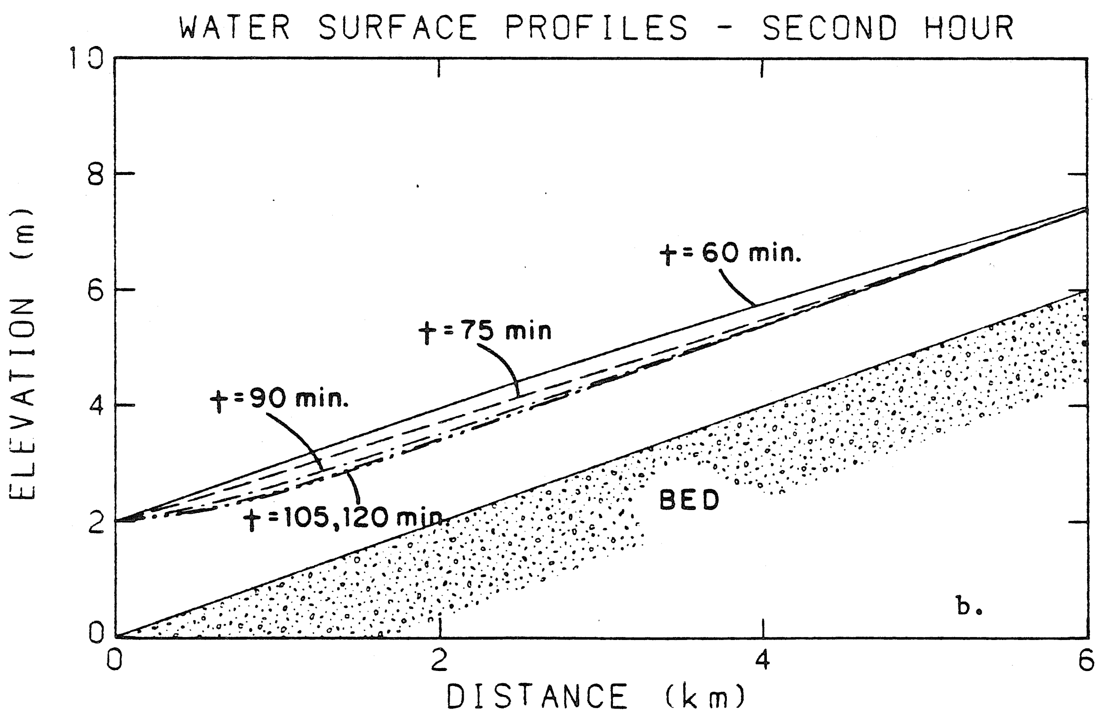


Figure 7.2 Water surface profiles for model test reach for: (a) t = 0 to 60 minutes, and (b) t = 60 to 120 minutes.

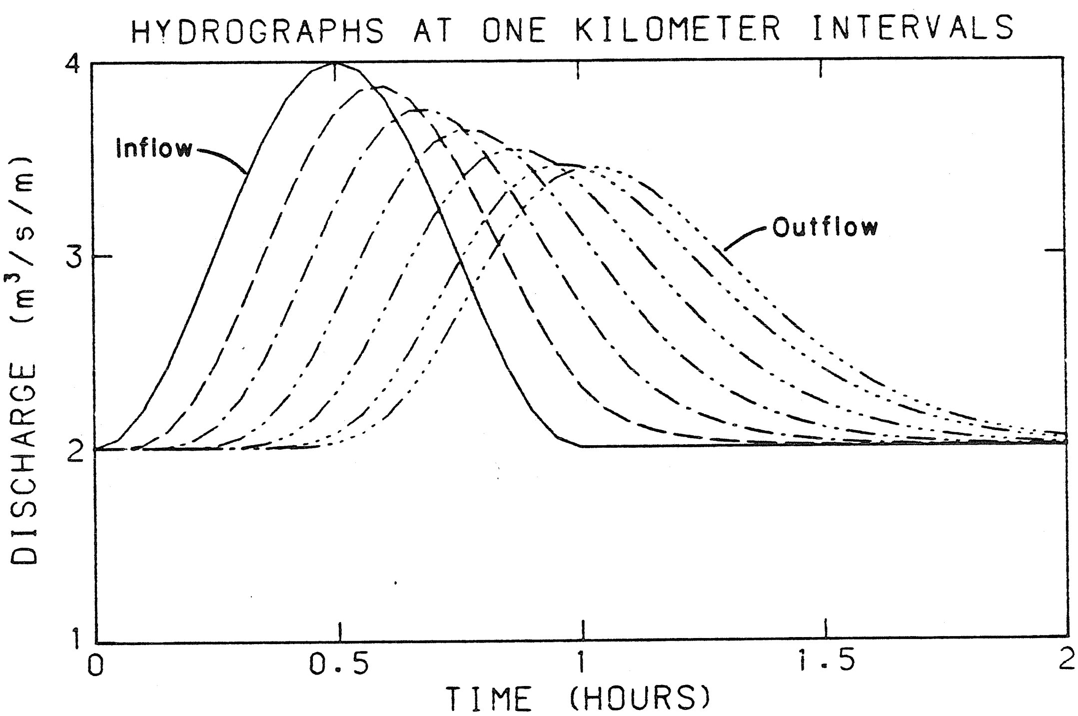


Figure 7.3 Attenuation of inflow hydrograph; hydrographs shown at a one kilometer interval.

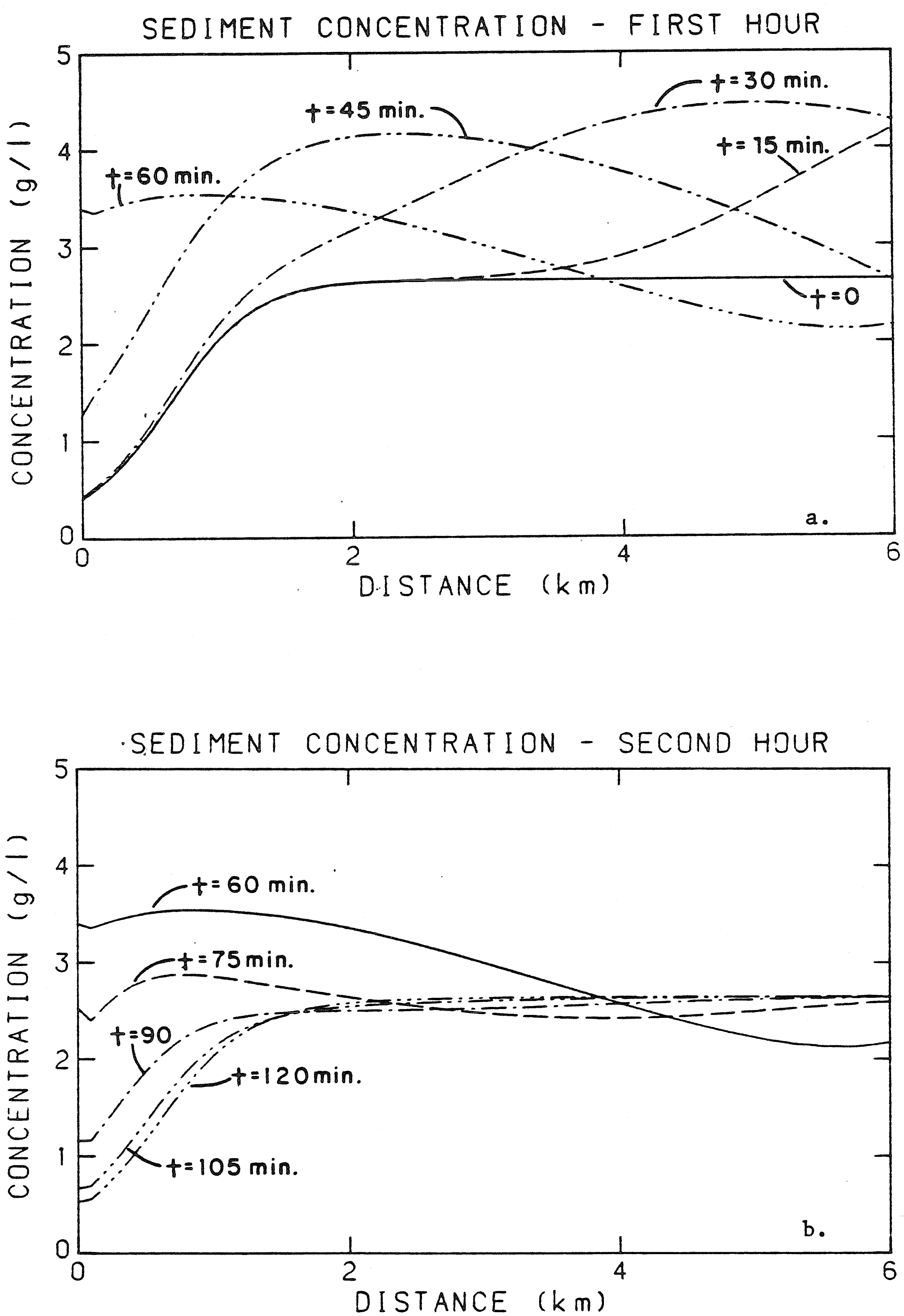


Figure 7.4 Sediment concentrations along test reach for: (a) t = 0 to 60 minutes, and (b) t = 60 to 120 minutes.

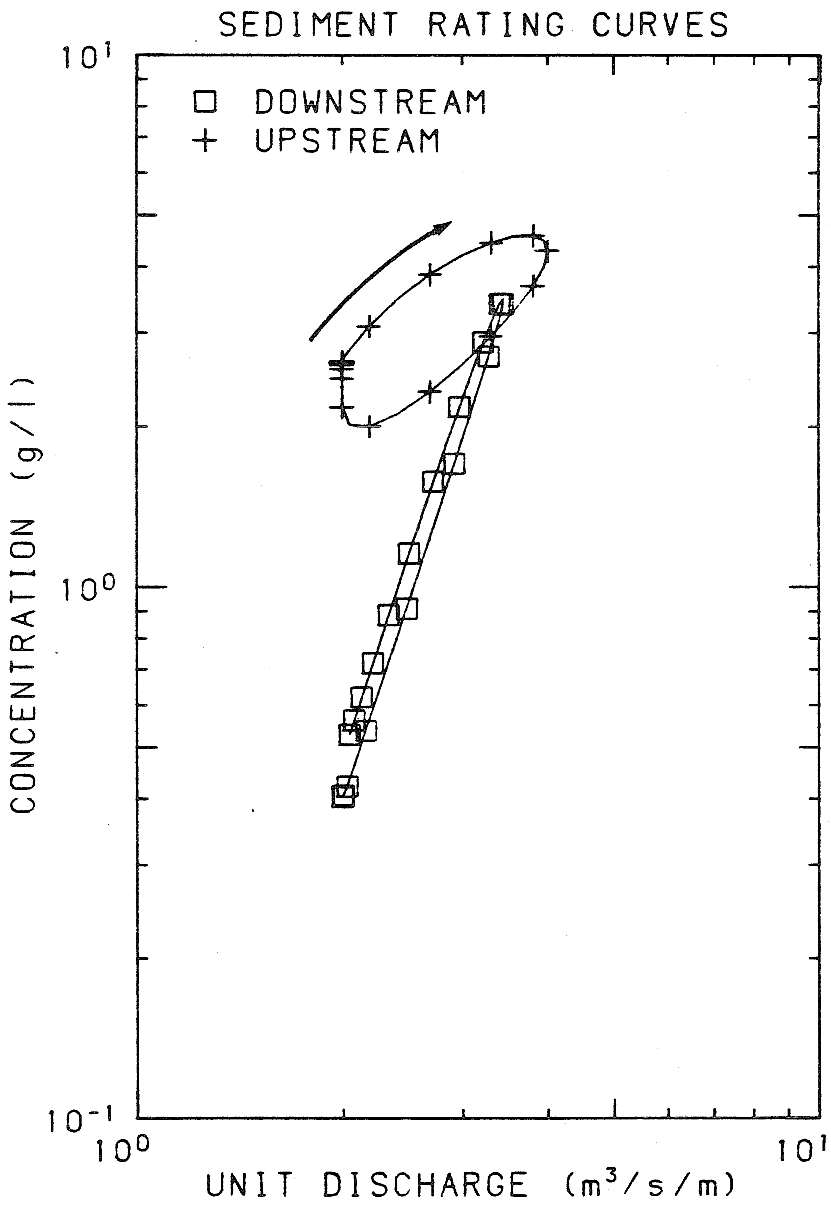


Figure 7.5 Sediment concentration rating curves.

sediment concentration may be higher during the rising limb of a flood wave than during the falling limb, for a given discharge. The effect is very noticeable at the top of the channel reach, and negligible at the downstream end where flow depth is controlled by the boundary condition.

7.2 Recommendations for Future Work

In Chapter 1 five problems that one might encounter when applying the HEC-6 model to situations involving rapidly changing flows were discussed. All five of these problems have been addressed to some extent in this report. The first two points involved simplifications to the basic differential equations which have been avoided in the implicit solution. The third point dealt with the definition of slope or friction factor, and was considered in Chapters 3 and 4. The fourth point concerned the selection of a concentration relationship and was addressed in Chapters 5 and 6. The final point dealt with the fact that sediment concentration would not always be at an equilibrium value. While this point has been addressed to some extent, clearly more work is needed, as mentioned previously. Additional improvements are discussed here.

Probably the most important next step in the development of the model would be the implementation of a function describing the transition between the upper and lower flow regimes. Static or slowly changing transition was discussed in Section 4.3. "Static" transition refers to a steady flow in the transition regime. During an actual transition, the time scale of bed form changes may be significantly longer than the time scale of the changes in the hydraulic variables.

One approach to the development of a function which describes the transition from one flow regime to the other would be to describe the behavior of the effective bed roughness, k_d in Eq. 4.4. Gee (1973) and Wijbenga and Klaassen (1981) have performed experiments on the transient behaviour of dunes. Allen (1978) and Fredsoe (1979) have presented analytical expressions for the transition from one dune height to another. Wijbenga and Klaassen (1981) have suggested that the present theoretical expressions are not totally satisfactory.

More work is needed both analytically and experimentally on the behaviour of dunes during transition. If an analytical expression were developed, there would still be the problem of adapting it to numerical modeling applications.

Another aspect of the problem which requires more research is the phenomenon of armoring or grain sorting. Gessler (1971) proposed a probabilistic approach to the bed armoring process which may provide a satisfactory mechanism in a numerical model. This method allows for an increase in the median particle size of the bed material as the bed undergoes degradation. This method has been adapted for use in the HEC-6 model, but little work has been done which would verify its accuracy.

7.3 Discussion

The regression procedure used to develop the flow depth equation was based on the assumption that errors occur in the depth measurements, and that discharge and slope are known accurately. The resulting errors are on the order of 10 percent in the prediction of depth. The values of the exponents of Eqs. 4.10a and 4.10b are such that when they are rearranged to solve for other variables, as done in Table 7.1, different values of error can be expected. If one considers that velocity and depth are known accurately, then errors in predicting observed slope may be on the order of 33 percent.

The depth predictor and concentration predictor were developed with the notion of solving the equations using the set of initial conditions and boundary conditions as prescribed in the example given here. The initial conditions are based on a backwater calculation which utilized the flow depth predictor to obtain the normal depth (asymptotic upstream condition). Accuracy problems associated with the predictor of flow depth, as discussed above, may cause an ill-conditioned system with other sets of boundary conditions and initial conditions.

If the relationship between depth, slope, and velocity is known for a particular river station, then the coefficients and exponents given in Table 7.1 can and should be adjusted to satisfy that relationship. As is, the coefficients represent values fitted to a large body of data, which can be adjusted for any particular river as suggested by the errors given in Table 4.1.

For the lower regime, f can be expressed as:

$$f = 0.390\ S^{0.222}\left(\frac{r}{D_{50}}\right)^{-0.0586} \sigma_g^{0.322} \qquad (7.17)$$

indicating that f is nearly constant for a given slope and bed material. (A value of x = 0.667 in Fig. 4.1 would have produced a constant f.) For the upper regime, Manning n (metric units) can be expressed as:

$$n = 0.133\ \frac{D_{50}^{0.100}}{\sqrt{g}}\ r^{0.0667} S^{0.0390}\ \sigma_g^{0.128} \qquad (7.18)$$

indicating that n is nearly constant for a given slope and bed material. (A value of x = 0.6 in Fig. 4.2 would have produced a constant n.)*

So far the discussion has been confined to the one-dimensional problem. To model real river systems lateral and perhaps even vertical dimensions will need to be considered as well as the longitudinal dimension. The additional complications will include meandering and changes in channel width. In future pursuits, the writer's approach would be first to develop a satisfactory one-dimensional model and then increase its sophistication to include the second and third dimensions.

For applications involving rapidly varying flow conditions, it may be necessary to abandon the computational simplifications inherent in many engineering river models such as the HEC-6 model. The techniques presented in this chapter appear to have promise for the future development of a numerical model for unsteady flow conditions. However, a river is in fact a complex system, and it is the writer's belief that the development of a reliable, widely applicable river model is still somewhat in the future.

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*Note: for upper regime $f = 0.141 S^{0.088} (\frac{r}{D_{50}})^{-0.200} \sigma_g^{0.256}$.

CHAPTER 8

SUMMARY AND CONCLUSIONS

8.1 Summary

In recent years attempts have been made to numerically model unsteady flows in channels with sediment transport. The HEC-6 program is the most widely used engineering model. The HEC-6 program is useful in the analysis of slowly varying processes, such as long-term reservoir sedimentation, but less useful when rapidly varying processes are important.

The present research has been undertaken to study two elements which are fundamental to the development of an accurate model for unsteady flows in sand-bed channels. These elements are the relation between the hydraulic variables (energy slope, depth, and velocity) and the predictor of sediment concentration. The following approach has been used to study these relationships:

1. The large data base given in Appendix B has been created to analyze both the hydraulic relationship and the sediment relationship. The data base contains 7027 records (5263 laboratory records and 1764 field records) in 79 data files.
2. An examination of existing techniques for prediction of flow depth has suggested that a wide ranging solution which can easily be adapted to numerical modeling applications does not exist.

3. Relying heavily on dimensional analysis, a new relationship (Chapter 3) has been developed. The proposed new method solves for flow depth for upper regime flow and lower regime flow and provides a method for determining which flow regime one might expect. A statistical analysis indicates that the one standard deviation errors in predicting flow depth are 9.5 percent for upper regime and 12.1 percent for lower regime, as shown in Table 4.1. More work is needed to define a function describing the transition between lower and upper regime. Table 7.1 contains rearrangements of the equations.
4. A graphical and statistical analysis has been presented for 13 existing methods for predicting sediment concentration. Several methods performed reasonably well in the prediction of laboratory concentrations, but most drastically underestimated the concentration for field conditions. The Ackers and White (1973) and the Engelund and Hansen (1967) methods provided the best results when analyzed with a carefully screened data set containing about 1000 records.
5. A new method for predicting concentration has been developed, which is easy to use and more accurate. The new method, based on dimensional analysis, suggests that complicated procedures, such as those required for the Einstein (1950) procedure, are not warranted. The geometric standard deviation of the ratio of predicted to observed concentration is 1.64 for laboratory data and 1.75 for field data. No other method had both of these indicators under two. The method is summarized in Section 6.7.

6. A four-point implicit finite difference scheme has been presented to demonstrate the feasibility of applying the new hydraulic and sediment relationships to a numerical solution of the differential equations. A proposed time lag has been included to provide for non-equilibrium values of sediment concentration.

A discussion of the general purpose HEC-6 model was presented in Chapter 1. Five possible problems associated with the model were discussed, each of which can be related to a simplification or an approximation involved in solving the basic set of one-dimensional equations (Eqs. 1.1 to 1.5). A new model has not been presented which would replace the HEC-6. Instead, the intention of this work was to pursue a course of research which would ultimately lead to an improved solution of the one-dimensional equations. Problems such as bank erosion and meandering, which are not treated by the HEC-6 program, have not been considered here.

It is hoped that the present work will lay the foundation for the future development of an accurate model for engineering applications. As discussed in Section 7.3, there are still several problems to be resolved before a satisfactory general purpose model can be developed.

8.2 Conclusions

1. None of the existing methods for prediction of friction factor adequately predict uniform flow depth from given unit discharge, bed slope, and bed-material properties, for a wide range of data.

2. For depth calculations of engineering design accuracy, it is satisfactory to classify bed-form regimes simply as either lower regime (dunes and ripples) or upper regime (flat bed and antidunes).
3. Flow depth can be predicted to an accuracy on the order of 10 percent for either regime by the method proposed here.
4. Given slope and bed-material properties, friction factor, f, varies only slightly for the lower regime, while Manning n varies slightly for the upper regime. This implies that the measure of bed-form roughness is nearly proportional to the depth for the lower regime.
5. Transition between flow regimes, for a constant slope, appears to take place over a narrow range of depth.
6. Neglecting viscous effects, transition values of velocity can be determined from slope and median bed-particle size.
7. Of the 13 existing techniques for predicting sediment concentration, the Ackers and White (1973) and the Engelund and Hansen (1967) methods give the most satisfactory results for a wide range of lab and field data (see Fig. 6.9). This conclusion is in agreement with the results of the White, Milli, and Crabbe (1973) comparison.
8. Large scatter in the data causes an inevitable accuracy problem in the prediction of sediment concentration. In the laboratory data, the scatter may be partly the result of differences between experimental techniques. In the field data, the scatter is probably a result of short sampling times compared to the time

scales of the large scale turbulent and sediment concentration fluctuations.

9. The proposed new technique for predicting sediment concentration is easy to use and at least as good or better than any of the other techniques tested. The geometric standard deviation of the ratio of predicted to observed concentration is 1.64 for the available lab data and 1.75 for the available field data.

10. The methods for predicting sediment concentration that give the best results, including the new method, are fairly simple regression equations, while in general the more complex procedures give poorer results, within the range of data tested.

11. The HEC-6 program has the capability of using either the Laursen or Toffaleti technique for predicting sediment transport, or a user defined rating curve. Figure 6.9 suggests that the performance of the model could be improved by simply using the proposed new method.

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LIST OF SYMBOLS

A,c,m,n	Coefficients in Ackers and White (1973) technique.
A,B,n	Coefficients in Eq. 3.25.
A,B	Coefficients in Eq. 6.14.
a	Coefficient in Manning-Strickler equation.
$a_o \ldots a_6$	Coefficients.
b	Coefficient in Eq. 3.20.
$b_1 \ldots b_3$	Coefficients in Eq. 6.10 and Eq. 6.11.
C	Chezy coefficient.
C	Mean sediment concentration (see p. 9).
C_a	Reference concentration at elevation a in Eq. 5.1.
c_b	Volumetric bed concentration in Eq. 5.10.
C_e	Equilibrium concentration.
c_f	Coefficient for field data, Eq. 6.8.
C_M	Dimensionless Manning coefficient.
D	Pipe diameter.
d	Mean flow depth.
D_{gr}	Dimensionless particle size, Eq. 5.6.
D_s	Arbitrary particle-size diameter.
D_{si}	Mean particle diameter of size fraction P_i.
D_{35}, D_{50} D_{65}, D_{84}	Particle sizes in a distribution, for which 35, 50, 65, and 84 percent, by weight, respectively, are finer.
e_b	Bagnold bed load transport efficiency.
F	Froude number, $v/\sqrt{gr}$.

f, f', f''	Friction factor, friction factor due to grain resistance, and due to form resistance, respectively.
$f_1 \ldots f_3$	General functions.
F_D, F_R	Modified Froude Number, see pp. 36, 133.
F_g	Grain Froude number, see p. 164.
F_{go}	Critical grain Froude number, see p. 164.
F_{gr}	Mobility Number, defined by Eq. 5.4.
g	Gravitational acceleration.
H	$z + h + u^2/2g$
h	Flow depth.
h_s	$(1 - \lambda)\rho_s z + Ch$
I_1, I_2	Einstein integrals in Eq. 5.12.
i, j	Integer indices.
K_1, K_2	Coefficients determined from Fig. 3.8.
k	von Karman's constant.
k_d	Measure of bed-form roughness.
k_s	Roughness height.
m	Ranga Raju et al. parameter in Eq. 5.22.
n	Manning coefficient.
P_i	Size fraction of bed material.
Q	Water discharge.
q	Discharge per unit width.
q_s	Sediment discharge per unit width.
q_*	Dimensionless unit discharge, $q/\sqrt{gD_{50}^3}$.
R	Reynolds number, $4rv/\nu$.
r, r', r''	Hydraulic radius, hydraulic radius due to grain resistance, and due to form resistance, respectively.

R_g	Grain Reynolds number, see p. 164.
S, S', S''	Slope, slope due to grain resistance, and due to form resistance, respectively.
s	Specific gravity of bed particles.
T	Temperature.
$t_g \psi_o$	Bagnold measure of dynamic friction.
u	Component of velocity in x-direction, averaged over depth.
u_*, u_*'	Shear velocity and shear velocity due to grain resistance.
V, v	Mean flow velocity.
v_{cr}	Critical velocity for Yang (1973) technique.
w	Channel width.
w	Fall velocity of median sediment particle.
w, x, y, z	Coefficients in Eq. 4.6.
w_i	Fall velocity for size fraction P .
w_m	Mean fall velocity of bed particles.
Y_c	Laursen parameter in Eq. 5.17.
z	Bed elevation.
α, β	Dimensionless groups defined by Eq. 3.11.
δ	Laminar sublayer thickness, $11.6\ \nu/u_*'$.
Δf	Change in a function over a discrete time step.
Δh	Change in depth over a discrete time step.
Δq	Change in discharge over a discrete time step.
Δt	Time step
Δu	Change in velocity over a discrete time step.
Δx	Space step.

Δy_i	Width of i^{th} element of a cross-section.
Δz	Change in bed elevation over a discrete time step.
ε	Turbulent diffusion coefficient.
θ	Weighting factor for the implicit scheme.
λ	Porosity of bed sediment.
ν	Kinematic viscosity.
Φ	Dimensionless transport rate.
Φ_B	Dimensionless bed load transport rate.
Φ_s	Dimensionless suspended transport rate.
ρ	Density of water.
ρ_s	Density of sediment.
σ_g	Geometric standard deviation of bed-particle sizes.
τ	Mean shear stress.
τ_*, τ_*'	Dimensionless shear stress, and dimensionless shear stress due to grain resistance, see pp. 28-36.
τ_{*o}	Critical dimensionless shear stress for initiation of motion.
τ_{*s}	Dimensionless shear stress based on D_s, see p. 46.

Re-Examination of Nikuradse Roughness Data

By William R. Brownlie,[1] A. M. ASCE

Introduction

Two sets of flow resistance data are commonly used in the evaluation of friction factors for pipes and open channels. The data compiled by Colebrook and White for commercial pipes were used by Moody to construct his well known friction factor diagram (3, Fig. 5.32). A similar diagram based on the data of Nikuradse (1) for sand-roughened pipes appears in most texts of fluid mechanics (2, Fig. 108 and 3, Fig. 5.31), however, with a much more limited range of relative roughness and Reynolds number than the Moody diagram. While the Colebrook and White data are appropriate for commercial pipe applications, the Nikuradse data, with its sand roughness, may be more applicable for problems involving open channels with uniform-sand beds for which grain friction factor is required. This note describes an inconsistency in the original presentation of some of the Nikuradse data and provides a Moody-type diagram with some engineering applications for a range of the data believed to be valid. The data are reviewed here because they appear in many classical texts of fluid mechanics for engineers (e.g., 2, 3).

Original Data

The experiments reported by Nikuradse were conducted using pipes with diameters of 2.474 cm, 4.94 cm, and 9.94 cm. Roughness was created by gluing uniform sands to the pipes. In all, five sands were used, with mean diameters ranging from 0.01 cm–0.16 cm, to give six values of relative roughness (grain diameter over pipe diameter). Uniformity of sand grains was created by sieving, resulting in a typical geometric standard deviation of 1.02 for the grain-size distributions. Measurements in the pipes were taken using an approach length of approximately 40 pipe diam.

The data has traditionally been presented graphically in two different forms following the original presentation of Nikuradse (1). In the Moody-type form, friction factor is plotted against Reynolds number on a log-log scale with a different curve and set of data points for each of the six values of relative roughness. In the alternate form, by transforming the plotting coordinates, the

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six curves are collapsed to one curve as in Fig. 1.

Fig. 1 shows data from 90 runs randomly selected from the 362 that are published. The figure also shows the Colebrook transition function upon which the Moody diagram is based. Since the equivalent sand roughness of the Colebrook and White data was calibrated to the Nikuradse data in the fully rough regime, the two curves converge to the same asymptote on the right side of Fig. 1.

An inconsistency in the original data presentation can be seen by comparing the two plot types (1, Figs. 9 and 11) with the data tables. The data in the tables cover the range of parameters shown in Fig. 1; however, all points plotted on the original diagram do not appear in the tables. Conversely, all of the data in the tables are not shown in the original diagram, but they do conform closely to the curve in Fig. 1. On the other hand, the Moody-type diagram shows data with Reynolds numbers as low as 500 whereas the lowest Reynolds

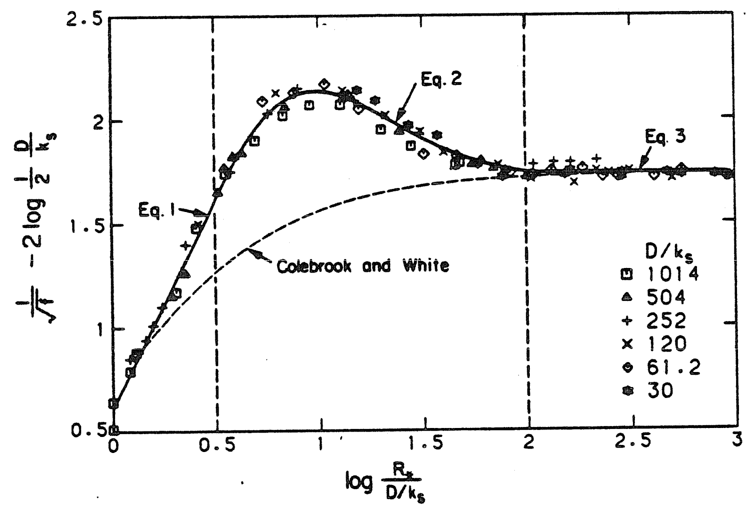

FIG. 1.—Comparison between Nikuradse Resistance Data and Colebrook and White Transition Function (about 25 percent of Published Data are Shown)

number given in the tables is 4,300. Furthermore, the two diagrams are consistent only for Reynolds numbers greater than 10,000. Finally, the unpublished data are somewhat suspect because they show a smooth transition from turbulent to laminar flow occurring at a Reynolds number of about 2,000, for all given values of relative roughness. Such a condition seems unlikely due to the nature of the physical transition.

Flow Resistance Chart

The Moody-type flow resistance chart shown in Fig. 2 was derived from the curve fitted to the data points in Fig. 1. Although there are inconsistencies in the original diagrams, the experiments appear to have been carefully conducted and the data in the tables are reasonable. Reynolds numbers lower than 10,000 have been omitted.

It is hoped that Fig. 2 will be a useful and accurate tool for engineers. The chart can be used for side-wall corrections as well as for separating total resistance into grain resistance and form resistance. For open channel flow calculations, pipe diameter D should be replaced by $4r$ in which r = hydraulic radius.

Fig. 2 is based on three equations which apply to different domains along the abscissa of Fig. 1:

$$\frac{1}{\sqrt{f}} - 2\log\frac{1}{2}\frac{D}{k_s} = 0.705 + 2\log\frac{R_* k_s}{D} \dots \quad \text{for} \quad \log\frac{R_* k_s}{D} < 0.5 \qquad (1)$$

$$\frac{1}{\sqrt{f}} - 2\log\frac{1}{2}\frac{D}{k_s} = \sum_{i=0}^{6} A_i\left(\log\frac{R_* k_s}{D}\right)^i \dots \quad \text{for} \quad 0.5 \le \log\frac{R_* k_s}{D} \le 2.0 \qquad (2)$$

$$\frac{1}{\sqrt{f}} - 2\log\frac{1}{2}\frac{D}{k_s} = 1.74 \dots \quad \text{for} \quad \log\frac{R_* k_s}{D} > 2.0 \qquad (3)$$

in which $R_* = \sqrt{f/8}\,R$; f = friction factor; D = pipe diameter; k_s = the sand grain roughness (equivalent to grain diameter); R = Reynolds number;

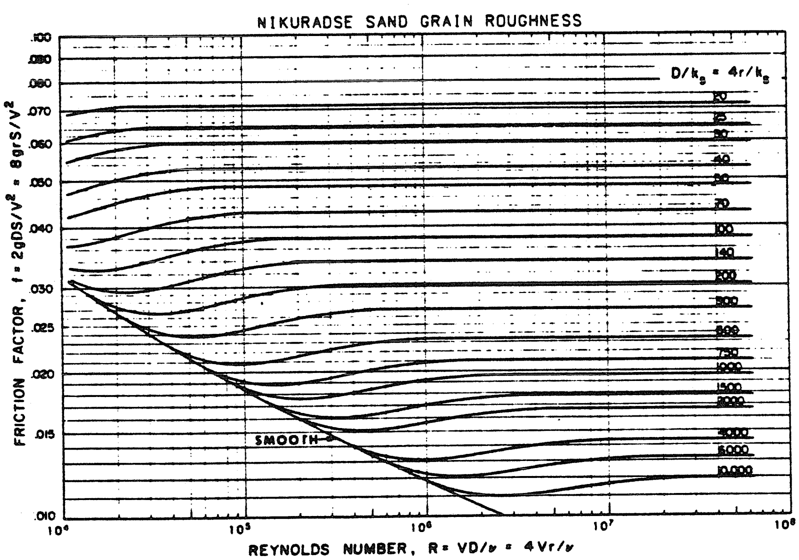

FIG. 2.—Friction Factor Diagram, for Pipes of Diameter, *D*, or Channels of Hydraulic Radius, *r*

and A_i = empirical constants. Eq. 1 is for smooth pipes, and relative roughness can be removed by factoring both sides of the equation. Eq. 2 was fitted by the writer to the transition data from the smooth to the rough regime, with the coefficients A_0 through A_6 defined as 1.3376, −4.3218, 19.454, −26.480, 16.509, −4.9407, 0.57864, respectively. Eq. 3 describes the fully rough regime where friction factor is a function of relative roughness only.

SIDE-WALL CORRECTION

Fig. 2 can be used to perform a side-wall correction for flow at a given R, in flumes with a known friction factor, f, and roughness, k_s, using a procedure analogous to the smooth-wall procedure described by Vanoni and Brooks (4). From the derivation given in Ref. 4, the following equations can be obtained:

$$R_w = \frac{R}{f} f_w \quad (4)$$

$$r_w = \frac{r}{f} f_w \quad (5)$$

$$f_b = f + \frac{p_w}{p_b}(f - f_w) \quad (6)$$

$$r_b = \frac{r}{f} f_b \quad (7)$$

in which p = wetted perimeter; the subscript b denotes bed, and the subscript w denotes wall.

The procedue for using Fig. 2 to calculate r_w and r_b is as follows:

1. Plot Eq. 4 on Fig. 2 as a straight line with a slope of 1 in log units, and an intercept of $0.01R/f$ at $f = 0.01$. The desired values of f_w and R_w will lie on this line.
2. Pick a trial value of r_w and compute 4 r_w/k_{sw} and determine f_w from Fig. 2.
3. Compute a new value of r_w from Eq. 5, return to step 2. The solution should converge after two or three interations.
4. The quantities f_b and r_b can now be calculated directly from Eqs. 6 and 7.

FORM AND GRAIN RESISTANCE

In some open channel flow problems it is often desirable to separate grain resistance from bed-form resistance. Two procedures are possible for separating the bed shear stress into its two components. Either the slope may be broken into components or the hydraulic radius of the bed may be broken into components. Vanoni and Brooks (4) have presented a graphical solution of the Einstein-Barbarosa approach which divides the hydraulic radius into two components. Fig. 2 could also be used to carry out this procedure by applying a technique similar to that of the side-wall correction procedure just described. However, a more convenient and perhaps more conceptually reasonable approach is to divide the energy slope into two components.

The following equations can be used with Fig. 2 to perform this procedure:

$$S' = \frac{f'_b V^2}{8gr_b} \quad (8)$$

$$S'' = S - S' \quad (9)$$

$$f''_b = f - f'_b \quad (10)$$

in which S' and f'_b = the energy slope and bed friction factor, respectively, resulting from grain resistance; and S'' and f''_b = those quantities resulting from form drag, for a flow with a given velocity and bed hydraulic radius. The quantity f'_b can be determined directly from Fig. 2, given R_b and $4r_b/k_s$. The remaining quantities can be calculated from Eqs. 8, 9, and 10.

Acknowledgements

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Appendix.—References

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APPENDIX B

DATA BASE

A listing of the data set is given in this appendix. The data is listed according to a standard format, and the number of digits given does not reflect the accuracy of the measurements. In some cases conversion from one system of measurement to another has created a large number of nonzero digits in individual entries. Where no data are available, a value of negative one (-1) is given.

The following information is provided, in a format similar to the format used by Peterson and Howells (1973):

Discharge	Water discharge in liters per second.
Width	Channel width in meters, taken as the top width for field channels, unless only a portion of the cross section was measured, in which case the width of the measured area is given.
Slope	Energy slope times 1000.
D_{50}	Median particle size of the bed material in millimeters.
Gradation	Geometric standard deviation of bed-particle size, $0.5(D_{84}/D_{50} + D_{50}/D_{16})$.
Spec. Grav.	Specific gravity of bed particles.
Conc.	Concentration of the bed-material load (does not include wash load), in ppm by mass.
Temp.	Temperature in degrees Celsius.

BF Bed form, according to the definition given in Vanoni (1975, p. 160), given by the code:

0 Not observed
1 Plane bed near of before initiation of motion.
2 Ripples
3 Dunes
4 Transition
5 Plane bed
6 Standing waves
7 Antidunes
8 Chute-pool

LABORATORY DATA

Data Code	Investigator(s)	Number of Records	Running Total	Page
ABA	Abdel-Aal, F. M. (1969)	10	10	1B
BAL	Barton, J.R., Lin, P. N. (1955)	28	38	2B
BEN	Government of West Bengal (1965)	18	56	3B
BOY	Bogardi, J., Yen, C. H. (1936)	48	104	4B
BRO	Brooks, N. H., (1957)[1]	21	125	5B
CAS	Casey, H. J. (1935)	92	217	6B
CHY	Chyn, S.D. (1935)	32	249	8B
COS	Costello, W. R. (1974)	28	277	9B
DAV	Davies, T. R. (1971)	79	356	10B
EAC	Einstein, H. A., Chien, N. (1955)	16	372	12B
EPA	E. Pakistan Water and Power (1967)	68	440	13B
EPB	Gov. of E. Pakistan (1966,1968,1969)	56	496	15B
FOL	Foley, M. (1975)	12	508	17B
FRA	Franco, J. J. (1968)	19	527	18B
GIB	Gibbs, C. H., Niell, C. R. (1972)	9	536	19B
GIL	Gilbert, G. K. (1914)	889	1425	20B
GKA	Gilbert, G. K. (1914) Energy Slope	125	1550	37B
GKB	Gilbert, G. K. (1914) Uniform Flows	62	1612	40B
GUY	Guy, H. P., et al. (1966)	339	1951	42B
HIL	Hill, H. M., et al. (1969)	46	1997	49B
HPY	Ho, P. (1939)	80	2077	50B
JOR	Jorissen, A. L. (1938)[2]	26	2103	52B
KAH	Kalinske, A., Hsia, C. (1945)	9	2112	53B
KAL	Kalkanis, G. (1957)[3]	23	2135	54B
KEN	Kennedy, J. F. (1961)	41	2176	55B
KNB	Kennedy, J. F., Brooks, N. H. (1965)	9	2185	56B
LAU	Laursen, E. M. (1958)	24	2209	57B
MAV	Mavis, F. T., et al. (1937)	293	2502	58B
MCD	MacDougal, C. H. (1933)[2]	74	2576	64B
MPR	Meyer-Peter, E., Muller, R. (1948)	135	2711	66B
MUT	Mutter, D.G. (1971)	28	2739	69B
NEI	Neill, C. R. (1967)	51	2790	70B
NOM	Nomicos G. (1957)[1]	30	2820	71B
NOR	Nordin. C. F. (1976)	62	2882	72B
OBR	O'Brien, M. P. (1936)	83	2965	74B
OJK	Onishi, Y., et al. (1972)	14	2979	76B
PAI	Paintal, A.S. (1971)	96	3075	77B
PRA	Pratt, C. J. (1970)	60	3135	79B
SAT	Sato, S., et al. (1958)	243	3378	81B

LABORATORY DATA
-CONTINUED-

Data Code	Investigator(s)	Number of Records	Running Total	Page
SIN	Singh, B. (1960)	305	3683	86B
SON	Soni, J. P. (1980)	23	3706	92B
STE	Stein, R. A. (1965)	56	3762	93B
STR	Straub, L. G. (1954, 1958)	24	3786	95B
TAY	Taylor, B. D. (1971)	39	3825	96B
VAB	Vanoni, V. A., Brooks, N. H. (1957)	15	3840	97B
VAH	Vanoni, V. A., Hwang, L.S. (1965)[4]	16	3856	98B
WIL	Willis, J. C. (1979)	32	3888	99B
WLM	Williams, G. P. (1970)	177	4065	100B
WLS	Willis, J. C., et al. (1972)	96	4161	104B
WSA	US Waterways Exp. Sta. (1935A)	330	4491	106B
WSB	US Waterways Exp. Sta. (1936A)	102	4593	112B
WSL	US Waterways Exp. Sta. (1936C)	298	4891	114B
WSS	US Waterways Exp. Sta. (1936B)	313	5204	120B
WTT	US Waterways Exp. Sta. (1935B)	23	5227	126B
ZNA	Znamenskaya, N. S. (1963)	36	5263	127B

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1. Data source: Vanoni and Brooks (1957).

2. Original reference does not contain data, actual data source: Johnson (1943).

3. Data source: Abdel-Aal (1969).

4. Data source: Vanoni and Hwang (1967).

FIELD DATA

Data Code	River and Investigator(s)	Number of Records	Running Total	Page
ACP	ACOP Canal Mahmood, K., et al. (1979)	151	5414	128
AMC	American Canal Simons, D. B. (1957)	11	5425	131
ATC	Atchafalaya River Toffaleti, F. B. (1968)	72	5497	132
CHI	Canal Data Chitale, S. V. (1966)	32	5529	134
CHO	Chop Canals Chaudhry, et al. (1970)	33	5562	135
CHP	Chop Canals Chaudhry, et al. (1970)	33	5595	136
COL	Colorado River U. S. Bureau of Reclamation (1958)	131	5726	137
HII	HII River Shinohara, K., Tsubaki, T. (1959)	38	5764	140
LEO	River Data Leopold, L. B. (1969)[1]	72	5836	141
MID	Middle Loup River Hubbell, D., Matejka, D. (1959)	38	5874	143
MIS	Mississippi River Toffaleti, F. B. (1968)	165	6039	144
MOR	Missouri River Shen, H. W., et al. (1978)	25	6064	147
MOU	Mountain Creek Einstein, H. A. (1944)	100	6164	148

FIELD DATA
-CONTINUED-

Data Code	River and Investigator(s)	Number of Records	Running Total	Page
NED	Rio Magdelena and Canal del Dique NEDCO (1973)	113	6277	150
NIO	Niobrara River Colby, B.R., Hembree, C. H. (1955)	40	6317	153
NSR	North Saskatchewan Riv. & Elbow Riv. Samide, G. W. (1971)	55	6372	154
OAK	Oak Creek, Oregon Milhous, R. T. (1973)	17	6389	155
POR	Portugal Rivers[1] Da Cunha, L. V. (1969)	219	6608	156
RED	Red River Toffaleti, F. B. (1968)	30	6638	160
RGC	Rio Grande Conveyance Channel Culbertson, J. K., et al. (1976)	33	6671	161
RGR	Rio Grande River Nordin, C.F., Beverage, C.P. (1965)	293	6964	162
RIO	Rio Grande near Bernalillo, N.M. Toffaleti, F. B. (1968)	38	7002	168
SNK	Snake and Clearwater River Seitz, H. R. (1976)	21	7023	169
TRI	Trinity River Knott, J. M. (1974)	4	7027	170

1. Data Source: Peterson and Howells (1973).

LABORATORY DATA

ABA - DATA OF ABDEL-AAL, F.M. (1969)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	35.554	0.305	0.1311	2.5000	0.105	1.27	2.65	6600.0000	23.00	0
2	35.820	0.305	0.1402	2.2000	0.105	1.27	2.65	4300.0000	23.00	0
3	28.381	0.305	0.1189	2.3000	0.105	1.27	2.65	7000.0000	23.00	0
4	27.517	0.305	0.1311	1.7000	0.105	1.27	2.65	4500.0000	23.00	0
5	24.847	0.305	0.1189	2.1000	0.105	1.27	2.65	4700.0000	23.00	0
6	21.407	0.305	0.1280	2.0000	0.105	1.27	2.65	2750.0000	23.00	0
7	17.618	0.305	0.1036	2.2000	0.105	1.27	2.65	2750.0000	23.00	0
8	14.923	0.305	0.0945	1.8000	0.105	1.27	2.65	2700.0000	23.00	0
9	12.997	0.305	0.0933	2.1000	0.105	1.27	2.65	2200.0000	23.00	0
10	10.703	0.305	0.0914	1.9000	0.105	1.27	2.65	1200.0000	23.00	0

BAL - DATA OF BARTON, J.R. AND LIN, P.N. (1955)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	126.006	1.219	0.2377	0.8800	0.180	1.26	2.65	550.0000	14.30	2
2	99.106	1.219	0.1920	0.8660	0.180	1.26	2.65	482.0000	20.40	2
3	113.264	1.219	0.2103	0.8800	0.180	1.26	2.65	546.0000	17.90	2
4	155.738	1.219	0.2560	0.8800	0.180	1.26	2.65	630.0000	22.90	2
5	87.780	1.219	0.1981	0.8100	0.180	1.26	2.65	233.0000	21.30	2
6	56.632	1.219	0.1554	0.8800	0.180	1.26	2.65	256.0000	19.00	2
7	42.474	1.219	0.1402	0.8700	0.180	1.26	2.65	65.0000	20.30	2
8	55.499	1.219	0.2012	0.4400	0.180	1.26	2.65	19.0000	22.20	2
9	76.453	1.219	0.1372	1.5000	0.180	1.26	2.65	1226.0000	20.80	2
10	53.800	1.219	0.1219	1.5800	0.180	1.26	2.65	571.0000	21.60	2
11	37.943	1.219	0.1097	1.6100	0.180	1.26	2.65	302.0000	19.30	2
12	209.538	1.219	0.2103	1.5600	0.180	1.26	2.65	1941.0000	22.80	5
13	254.844	1.219	0.2286	1.6700	0.180	1.26	2.65	1827.0000	21.80	5
14	189.717	1.219	0.1859	1.6600	0.180	1.26	2.65	1926.0000	22.50	5
15	25.484	1.219	0.0914	1.6000	0.180	1.26	2.65	112.0000	22.90	2
16	257.675	1.219	0.2316	1.7000	0.180	1.26	2.65	1743.0000	20.20	5
17	209.538	1.219	0.1981	1.8300	0.180	1.26	2.65	1706.0000	26.20	5
18	229.360	1.219	0.2377	1.2400	0.180	1.26	2.65	1610.0000	24.60	5
19	201.044	1.219	0.2103	1.2500	0.180	1.26	2.65	1411.0000	24.70	5
20	59.464	1.219	0.1219	1.3500	0.180	1.26	2.65	1008.0000	24.30	2
21	74.754	1.219	0.1463	1.1600	0.180	1.26	2.65	903.0000	23.40	2
22	164.233	1.219	0.1829	1.2100	0.180	1.26	2.65	1061.0000	25.30	5
23	118.927	1.219	0.1250	1.2900	0.180	1.26	2.65	1641.0000	26.40	5
24	117.511	1.219	0.2225	0.8200	0.180	1.26	2.65	560.0000	26.00	2
25	203.875	1.219	0.3139	0.6100	0.180	1.26	2.65	561.0000	26.50	2
26	250.597	1.219	0.4206	0.6500	0.180	1.26	2.65	333.0000	25.40	2
27	203.875	1.219	0.1707	1.6000	0.180	1.26	2.65	2479.0000	25.70	5
28	215.202	1.219	0.1615	2.1000	0.180	1.26	2.65	3775.9958	26.10	5

BEN - DATA OF GOVT. OF W. BENGAL (1965)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	0.878	0.457	0.0137	1.0000	0.315	1.26	2.65	3.8000	29.00	0
2	1.161	0.457	0.0165	1.0000	0.315	1.26	2.65	3.9000	29.00	0
3	1.444	0.457	0.0183	1.0000	0.315	1.26	2.65	6.4000	29.00	0
4	1.586	0.457	0.0198	1.0000	0.315	1.26	2.65	15.5000	29.00	0
5	1.671	0.457	0.0213	1.0000	0.315	1.26	2.65	19.7000	29.00	0
6	2.095	0.457	0.0287	0.5000	0.315	1.26	2.65	2.4000	31.00	0
7	2.662	0.457	0.0329	0.5000	0.315	1.26	2.65	3.9000	31.00	0
8	3.143	0.457	0.0351	0.5000	0.315	1.26	2.65	5.2000	31.00	0
9	3.256	0.457	0.0363	0.5000	0.315	1.26	2.65	7.3000	31.00	0
10	3.539	0.457	0.0378	0.5000	0.315	1.26	2.65	10.2000	31.00	0
11	9.769	0.457	0.0878	0.2000	0.315	1.26	2.65	0.2000	24.00	0
12	13.450	0.457	0.1085	0.2000	0.315	1.26	2.65	0.7000	24.00	0
13	15.999	0.457	0.1234	0.2000	0.315	1.26	2.65	1.0000	24.00	0
14	16.706	0.457	0.1268	0.2000	0.315	1.26	2.65	1.1000	24.00	0
15	17.556	0.457	0.1347	0.2000	0.315	1.26	2.65	1.1000	24.00	0
16	18.689	0.457	0.1463	0.2000	0.315	1.26	2.65	1.3000	24.00	0
17	19.538	0.457	0.1512	0.2000	0.315	1.26	2.65	1.8000	24.00	0
18	21.520	0.457	0.1597	0.2000	0.315	1.26	2.65	2.6000	24.00	0

BOY - DATA OF BOGARDI, J. AND YEN, C.H. (1936)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	42.304	0.823	0.0521	23.2000	10.339	1.18	2.63	84.5960	11.00	0
2	41.483	0.823	0.0591	24.3000	10.339	1.18	2.63	307.5229	9.50	0
3	43.607	0.823	0.0604	24.8000	10.339	1.18	2.63	457.9319	10.00	0
4	37.943	0.823	0.0536	24.2000	10.339	1.18	2.63	120.1390	13.00	0
5	54.423	0.823	0.0780	19.0000	10.339	1.18	2.63	65.0700	13.80	0
6	62.352	0.823	0.0887	20.5000	10.339	1.18	2.63	228.8750	14.00	0
7	57.057	0.823	0.0826	20.8000	10.339	1.18	2.63	93.0110	14.00	0
8	58.897	0.823	0.0863	17.6000	10.339	1.18	2.63	86.0030	14.50	0
9	58.048	0.823	0.0829	17.7000	10.339	1.18	2.63	72.3180	15.00	0
10	61.587	0.823	0.0920	17.5000	10.339	1.18	2.63	202.9930	15.00	0
11	61.304	0.823	0.0887	17.5000	10.339	1.18	2.63	132.4580	14.50	0
12	63.853	0.823	0.0924	17.7000	10.339	1.18	2.63	193.3950	14.80	0
13	64.221	0.823	0.0896	17.6000	10.339	1.18	2.63	140.9040	17.00	0
14	49.525	0.823	0.0704	19.0000	10.339	1.18	2.63	129.1370	17.00	0
15	55.358	0.823	0.0756	19.4000	10.339	1.18	2.63	293.1270	17.00	0
16	46.665	0.823	0.0628	21.8000	10.339	1.18	2.63	414.7998	17.20	0
17	22.511	0.300	0.0704	20.0000	10.339	1.18	2.63	1010.0608	19.60	0
18	19.821	0.300	0.0838	15.5000	10.339	1.18	2.63	49.1630	19.30	0
19	29.024	0.300	0.0960	11.9000	10.339	1.18	2.63	13.8830	19.10	0
20	40.209	0.300	0.1292	13.2000	10.339	1.18	2.63	41.6260	19.20	0
21	30.723	0.823	0.0506	14.8000	6.849	1.11	2.61	32.1110	19.00	0
22	22.879	0.823	0.0402	14.3000	6.849	1.11	2.61	6.5420	19.00	0
23	43.748	0.823	0.0628	15.8000	6.849	1.11	2.61	407.0730	19.00	0
24	30.468	0.823	0.0469	17.2000	6.849	1.11	2.61	88.8760	19.00	0
25	36.952	0.823	0.0536	17.7000	6.849	1.11	2.61	421.1768	19.20	0
26	25.768	0.823	0.0402	19.9000	6.849	1.11	2.61	97.6950	20.00	0
27	25.711	0.823	0.0399	19.7000	6.849	1.11	2.61	85.0760	20.00	0
28	36.443	0.823	0.0500	20.2000	6.849	1.11	2.61	937.2148	20.00	0
29	25.258	0.823	0.0387	19.8000	6.849	1.11	2.61	85.9290	20.00	0
30	25.994	0.823	0.0393	22.9000	6.849	1.11	2.61	773.4438	20.00	0
31	21.152	0.823	0.0351	22.3000	6.849	1.11	2.61	148.2840	20.00	0
32	22.851	0.823	0.0357	22.8000	6.849	1.11	2.61	224.7950	19.50	0
33	42.162	0.823	0.0616	15.5000	6.849	1.11	2.61	109.9730	19.90	0
34	49.779	0.823	0.0738	14.5000	6.849	1.11	2.61	362.1938	19.80	0
35	35.820	0.823	0.0555	15.3000	6.849	1.11	2.61	40.4530	19.80	0
36	43.182	0.823	0.0616	15.9000	6.849	1.11	2.61	119.7450	19.60	0
37	27.467	0.300	0.0866	10.9000	6.849	1.11	2.61	263.1548	21.60	0
38	15.659	0.300	0.0567	14.1000	6.849	1.11	2.61	117.4960	21.60	0
39	65.920	0.300	0.1966	11.4000	15.191	1.11	2.64	13.6540	22.00	0
40	47.288	0.300	0.1362	14.3000	15.191	1.11	2.64	6.8170	22.50	0
41	51.394	0.300	0.1375	12.5000	15.191	1.11	2.64	30.5400	21.80	0
42	49.270	0.300	0.1298	11.2000	15.191	1.11	2.64	55.4600	21.00	0
43	38.566	0.300	0.1030	16.0000	15.191	1.11	2.64	79.2740	21.20	0
44	45.589	0.300	0.1143	18.6000	15.191	1.11	2.64	141.6860	20.80	0
45	31.459	0.300	0.0856	18.6000	15.191	1.11	2.64	102.7800	19.60	0
46	39.189	0.300	0.0942	20.9000	15.191	1.11	2.64	706.4280	19.80	0
47	33.130	0.300	0.0905	17.7000	15.191	1.11	2.64	187.1110	19.80	0
48	25.031	0.300	0.0722	19.5000	15.191	1.11	2.64	26.8950	20.00	0

BRO - DATA OF BROOKS, N.H. (1957)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	12.317	0.267	0.0741	2.5000	0.145	1.11	2.65	1950.0000	22.00	5
2	12.176	0.267	0.0719	2.4000	0.145	1.11	2.65	2450.0000	12.50	5
3	7.928	0.267	0.0549	3.1000	0.145	1.11	2.65	1900.0000	26.00	4
4	9.769	0.267	0.0594	2.4000	0.145	1.11	2.65	2450.0000	21.00	5
5	12.317	0.267	0.0741	2.1000	0.145	1.11	2.65	2150.0000	31.50	5
6	10.618	0.267	0.0732	2.3000	0.145	1.11	2.65	1500.0000	27.50	4
7	8.070	0.267	0.0747	2.6000	0.145	1.11	2.65	1100.0000	27.50	2
8	5.663	0.267	0.0762	2.0000	0.145	1.11	2.65	200.0000	24.00	2
9	5.805	0.267	0.0472	3.3000	0.145	1.11	2.65	2700.0000	26.00	4
10	10.477	0.267	0.0914	2.2000	0.145	1.11	2.65	720.0000	26.00	2
11	6.088	0.267	0.0600	3.5000	0.145	1.11	2.65	1200.0000	26.50	2
12	12.317	0.267	0.0719	2.2500	0.088	1.17	2.65	4850.0000	25.00	5
13	12.317	0.267	0.0719	2.2000	0.088	1.17	2.65	4900.0000	25.00	5
14	9.203	0.267	0.0576	2.4500	0.088	1.17	2.65	5100.0000	25.00	5
15	7.504	0.267	0.0689	2.8000	0.088	1.17	2.65	4000.0000	25.00	2
16	5.663	0.267	0.0570	3.3000	0.088	1.17	2.65	5300.0000	25.00	2
17	5.663	0.267	0.0850	1.3000	0.088	1.17	2.65	190.0000	25.00	2
18	5.663	0.267	0.0704	2.3500	0.088	1.17	2.65	1350.0000	25.00	2
19	9.344	0.267	0.0866	2.4000	0.088	1.17	2.65	3600.0000	25.00	2
20	14.724	0.267	0.0853	1.8500	0.088	1.17	2.65	3450.0000	25.20	5
21	7.504	0.267	0.0856	2.1500	0.088	1.17	2.65	1750.0000	25.00	2

CAS - DATA OF CASEY, H.J. (1935)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	6.003	0.400	0.0335	4.9900	2.460	1.16	2.65	1.6000	-1.00	0
2	6.909	0.400	0.0360	4.9900	2.460	1.16	2.65	4.6000	-1.00	0
3	6.711	0.400	0.0354	4.9400	2.460	1.16	2.65	4.7000	-1.00	0
4	7.617	0.400	0.0384	4.9100	2.460	1.16	2.65	81.6000	-1.00	0
5	9.174	0.400	0.0427	4.9600	2.460	1.16	2.65	661.5000	-1.00	0
6	10.590	0.400	0.0466	5.0500	2.460	1.16	2.65	714.8999	-1.00	0
7	12.487	0.400	0.0515	4.9800	2.460	1.16	2.65	422.8999	-1.00	0
8	14.696	0.400	0.0582	5.0000	2.460	1.16	2.65	959.8999	-1.00	0
9	18.802	0.400	0.0677	5.0900	2.460	1.16	2.65	1266.2998	-1.00	0
10	11.100	0.400	0.0472	5.0600	2.460	1.16	2.65	445.7998	-1.00	0
11	9.373	0.400	0.0415	5.0200	2.460	1.16	2.65	84.1000	-1.00	0
12	8.013	0.400	0.0378	5.0900	2.460	1.16	2.65	391.3999	-1.00	0
13	6.173	0.400	0.0323	4.9800	2.460	1.16	2.65	98.3000	-1.00	0
14	4.757	0.400	0.0271	4.9600	2.460	1.16	2.65	76.7000	-1.00	0
15	9.288	0.400	0.0530	2.5000	2.460	1.16	2.65	3.0000	-1.00	0
16	11.100	0.400	0.0582	2.5100	2.460	1.16	2.65	2.5000	-1.00	0
17	12.289	0.400	0.0628	2.5000	2.460	1.16	2.65	8.4000	-1.00	0
18	14.413	0.400	0.0668	2.5000	2.460	1.16	2.65	40.5000	-1.00	0
19	15.291	0.400	0.0738	2.5100	2.460	1.16	2.65	79.9000	-1.00	0
20	16.593	0.400	0.0771	2.4500	2.460	1.16	2.65	109.0000	-1.00	0
21	17.386	0.400	0.0796	2.4800	2.460	1.16	2.65	113.8000	-1.00	0
22	18.802	0.400	0.0835	2.4800	2.460	1.16	2.65	135.6000	-1.00	0
23	19.991	0.400	0.0872	2.4900	2.460	1.16	2.65	166.7000	-1.00	0
24	21.888	0.400	0.0920	2.5100	2.460	1.16	2.65	216.7000	-1.00	0
25	23.191	0.400	0.0951	2.5600	2.460	1.16	2.65	228.7000	-1.00	0
26	25.003	0.400	0.0981	2.9000	2.460	1.16	2.65	313.8999	-1.00	0
27	17.811	0.400	0.0789	2.4000	2.460	1.16	2.65	123.5000	-1.00	0
28	17.697	0.400	0.0796	2.5300	2.460	1.16	2.65	119.8000	-1.00	0
29	20.189	0.400	0.0887	2.4900	2.460	1.16	2.65	173.4000	-1.00	0
30	22.993	0.400	0.0960	2.5200	2.460	1.16	2.65	245.9000	-1.00	0
31	24.408	0.400	0.0985	2.5000	2.460	1.16	2.65	427.2998	-1.00	0
32	32.705	0.400	0.1219	2.5000	2.460	1.16	2.65	222.6000	-1.00	0
33	41.285	0.400	0.1378	2.5000	2.460	1.16	2.65	565.3999	-1.00	0
34	22.596	0.400	0.1170	1.2500	2.460	1.16	2.65	1.6000	-1.00	0
35	26.306	0.400	0.1283	1.3000	2.460	1.16	2.65	6.0000	-1.00	0
36	29.590	0.400	0.1387	1.3000	2.460	1.16	2.65	9.2000	-1.00	0
37	31.997	0.400	0.1475	1.2300	2.460	1.16	2.65	8.7000	-1.00	0
38	34.999	0.400	0.1567	1.2000	2.460	1.16	2.65	8.0000	-1.00	0
39	38.510	0.400	0.1655	1.1900	2.460	1.16	2.65	10.3000	-1.00	0
40	44.003	0.400	0.1759	1.2000	2.460	1.16	2.65	18.7000	-1.00	0
41	47.486	0.400	0.1826	1.2300	2.460	1.16	2.65	29.6000	-1.00	0
42	48.902	0.400	0.1875	1.1900	2.460	1.16	2.65	29.0000	-1.00	0
43	52.498	0.400	0.1942	1.2500	2.460	1.16	2.65	47.0000	-1.00	0
44	56.009	0.400	0.2063	1.2900	2.460	1.16	2.65	59.3000	-1.00	0
45	57.793	0.400	0.2192	1.2800	2.460	1.16	2.65	54.7000	-1.00	0
46	49.185	0.400	0.1871	1.4000	2.460	1.16	2.65	31.0000	-1.00	0
47	40.492	0.400	0.1814	1.2500	2.460	1.16	2.65	9.5000	-1.00	0
48	29.788	0.400	0.1448	1.2600	2.460	1.16	2.65	2.4000	-1.00	0
49	21.209	0.400	0.1167	1.2100	2.460	1.16	2.65	0.0190	-1.00	0
50	1.671	0.400	0.0131	5.0600	1.000	2.81	2.65	43.1000	-1.00	0
51	2.294	0.400	0.0168	5.0400	1.000	2.81	2.65	140.8000	-1.00	0
52	2.832	0.400	0.0192	5.0000	1.000	2.81	2.65	259.7000	-1.00	0
53	3.851	0.400	0.0235	4.8100	1.000	2.81	2.65	776.5000	-1.00	0
54	6.230	0.400	0.0317	5.0000	1.000	2.81	2.65	1824.2000	-1.00	0
55	12.487	0.400	0.0497	4.9700	1.000	2.81	2.65	2721.9968	-1.00	0

CAS - DATA OF CASEY, H.J. (1935)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	4.191	0.400	0.0244	5.1900	1.000	2.81	2.65	458.7998	-1.00	0
57	3.200	0.400	0.0204	4.9800	1.000	2.81	2.65	377.5000	-1.00	0
58	1.699	0.400	0.0137	5.0200	1.000	2.81	2.65	214.8000	-1.00	0
59	0.804	0.400	0.0091	5.0900	1.000	2.81	2.65	65.1000	-1.00	0
60	1.897	0.400	0.0158	2.5500	1.000	2.81	2.65	38.4000	-1.00	0
61	2.379	0.400	0.0183	2.5100	1.000	2.81	2.65	103.3000	-1.00	0
62	2.832	0.400	0.0207	2.5500	1.000	2.81	2.65	81.2000	-1.00	0
63	3.624	0.400	0.0247	2.5500	1.000	2.81	2.65	151.3000	-1.00	0
64	4.219	0.400	0.0287	2.5200	1.000	2.81	2.65	201.9000	-1.00	0
65	5.352	0.400	0.0335	2.4800	1.000	2.81	2.65	322.2000	-1.00	0
66	6.230	0.400	0.0363	2.4800	1.000	2.81	2.65	372.2998	-1.00	0
67	10.307	0.400	0.0512	2.3100	1.000	2.81	2.65	489.7000	-1.00	0
68	12.601	0.400	0.0600	2.4600	1.000	2.81	2.65	697.0000	-1.00	0
69	19.396	0.400	0.0835	2.3600	1.000	2.81	2.65	767.0999	-1.00	0
70	11.213	0.400	0.0549	2.6600	1.000	2.81	2.65	1022.5999	-1.00	0
71	6.371	0.400	0.0387	2.4900	1.000	2.81	2.65	112.7000	-1.00	0
72	4.559	0.400	0.0320	2.4800	1.000	2.81	2.65	36.1000	-1.00	0
73	3.370	0.400	0.0271	2.4800	1.000	2.81	2.65	10.4000	-1.00	0
74	2.152	0.400	0.0207	2.5400	1.000	2.81	2.65	9.1000	-1.00	0
75	3.964	0.400	0.0317	1.2000	1.000	2.81	2.65	10.5000	-1.00	0
76	4.870	0.400	0.0360	1.2100	1.000	2.81	2.65	15.1000	-1.00	0
77	6.145	0.400	0.0415	1.2500	1.000	2.81	2.65	42.5000	-1.00	0
78	7.645	0.400	0.0482	1.2700	1.000	2.81	2.65	64.9000	-1.00	0
79	9.401	0.400	0.0561	1.2500	1.000	2.81	2.65	82.9000	-1.00	0
80	11.043	0.400	0.0655	1.2900	1.000	2.81	2.65	96.2000	-1.00	0
81	13.988	0.400	0.0796	1.2100	1.000	2.81	2.65	117.2000	-1.00	0
82	16.706	0.400	0.0887	1.3100	1.000	2.81	2.65	109.0000	-1.00	0
83	19.198	0.400	0.0985	1.2500	1.000	2.81	2.65	156.5000	-1.00	0
84	21.010	0.400	0.1085	1.2300	1.000	2.81	2.65	129.6000	-1.00	0
85	12.204	0.400	0.0735	1.2500	1.000	2.81	2.65	46.1000	-1.00	0
86	12.063	0.400	0.0735	1.2600	1.000	2.81	2.65	46.7000	-1.00	0
87	25.909	0.400	0.1210	1.3000	1.000	2.81	2.65	195.4000	-1.00	0
88	29.902	0.400	0.1301	1.8500	1.000	2.81	2.65	314.2000	-1.00	0
89	15.914	0.400	0.0911	1.2000	1.000	2.81	2.65	45.5000	-1.00	0
90	11.298	0.400	0.0704	1.2500	1.000	2.81	2.65	33.0000	-1.00	0
91	9.061	0.400	0.0616	1.2000	1.000	2.81	2.65	19.3000	-1.00	0
92	5.748	0.400	0.0472	1.1900	1.000	2.81	2.65	10.0000	-1.00	0

CHY - DATA OF CHYN, S.D. (1935)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	12.289	0.610	0.0539	1.5200	0.790	1.58	2.65	138.5000	22.50	5
2	13.677	0.610	0.0564	1.5700	0.790	1.58	2.65	169.0000	21.20	2
3	15.319	0.610	0.0610	1.6100	0.790	1.58	2.65	192.7000	20.20	2
4	18.858	0.610	0.0698	1.5700	0.790	1.58	2.65	211.5000	18.90	2
5	35.961	0.610	0.1006	2.0000	0.790	1.58	2.65	345.0000	18.50	3
6	15.007	0.610	0.0567	1.8500	0.790	1.58	2.65	292.2000	18.40	2
7	15.121	0.610	0.0521	2.4700	0.790	1.58	2.65	575.2000	21.00	2
8	14.781	0.610	0.0469	3.0000	0.790	1.58	2.65	750.5999	22.20	2
9	15.715	0.610	0.0591	1.4600	0.790	1.58	2.65	243.0000	22.20	2
10	15.574	0.610	0.0631	1.2000	0.790	1.58	2.65	174.7000	21.80	5
11	15.347	0.610	0.0549	2.0000	0.790	1.58	2.65	476.5000	21.80	2
12	15.319	0.610	0.0552	1.8100	0.790	1.58	2.65	371.8999	22.40	2
13	19.311	0.610	0.0628	2.3800	0.840	1.23	2.65	349.8999	22.40	2
14	18.717	0.610	0.0634	2.0600	0.840	1.23	2.65	327.5000	24.80	2
15	18.830	0.610	0.0701	1.5000	0.840	1.23	2.65	184.0000	23.90	2
16	19.000	0.610	0.0728	1.3300	0.840	1.23	2.65	166.3000	25.00	2
17	18.915	0.610	0.0735	1.1000	0.840	1.23	2.65	123.2000	23.00	2
18	12.544	0.610	0.0506	1.5900	0.840	1.23	2.65	135.7000	24.70	2
19	15.489	0.610	0.0582	1.6300	0.840	1.23	2.65	217.0000	27.00	2
20	18.915	0.610	0.0680	1.6900	0.840	1.23	2.65	249.3000	26.00	3
21	22.341	0.610	0.0780	1.6800	0.840	1.23	2.65	317.2000	26.60	3
22	29.873	0.610	0.0890	1.7800	0.840	1.23	2.65	303.7998	26.50	3
23	19.085	0.610	0.0607	2.4700	0.590	2.42	2.65	718.7000	23.60	2
24	19.142	0.610	0.0652	1.9100	0.590	2.42	2.65	519.0999	23.60	2
25	19.000	0.610	0.0689	1.4500	0.590	2.42	2.65	249.4000	27.00	2
26	18.830	0.610	0.0713	1.2900	0.590	2.42	2.65	186.9000	26.90	2
27	18.717	0.610	0.0725	1.1100	0.590	2.42	2.65	99.4000	25.50	2
28	15.545	0.610	0.0579	1.6000	0.590	2.42	2.65	277.3999	24.50	2
29	12.657	0.610	0.0503	1.6300	0.590	2.42	2.65	168.7000	25.00	2
30	19.057	0.610	0.0664	1.6100	0.590	2.42	2.65	290.8999	24.00	2
31	22.370	0.610	0.0753	1.6300	0.590	2.42	2.65	326.8999	24.60	2
32	30.638	0.610	0.0908	1.6600	0.590	2.42	2.65	308.5999	24.80	3

COS - DATA OF COSTELLO, W.R. (1974)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	39.000	0.915	0.1480	0.4700	0.510	1.08	2.65	0.0940	31.00	2
2	42.500	0.915	0.1495	0.5600	0.510	1.08	2.65	1.6790	31.00	2
3	44.400	0.915	0.1525	0.5400	0.510	1.08	2.65	4.3070	31.00	2
4	48.400	0.915	0.1530	0.6100	0.510	1.08	2.65	6.7870	30.00	4
5	46.400	0.915	0.1475	0.5900	0.510	1.08	2.65	2.7610	31.00	4
6	56.000	0.915	0.1515	0.6800	0.510	1.08	2.65	8.7250	30.00	4
7	60.100	0.915	0.1470	0.7700	0.510	1.08	2.65	12.9260	30.00	4
8	46.400	0.915	0.1585	0.3700	0.600	1.09	2.65	0.4730	31.00	1
9	50.500	0.915	0.1600	0.4000	0.600	1.09	2.65	6.2690	31.00	1
10	53.900	0.915	0.1595	0.4200	0.600	1.09	2.65	5.2800	31.00	4
11	59.900	0.915	0.1520	0.5400	0.600	1.09	2.65	27.8010	31.00	4
12	65.300	0.915	0.1470	0.7600	0.600	1.09	2.65	68.4080	31.00	3
13	66.700	0.915	0.1450	0.9000	0.600	1.09	2.65	63.4740	31.00	3
14	50.300	0.915	0.1580	0.3700	0.660	1.05	2.65	5.4030	28.00	1
15	53.000	0.915	0.1635	0.3900	0.660	1.05	2.65	5.1620	29.00	1
16	56.300	0.915	0.1525	0.4500	0.660	1.05	2.65	10.9540	28.00	4
17	58.300	0.915	0.1535	0.4900	0.660	1.05	2.65	61.1780	28.00	4
18	46.900	0.915	0.1580	0.2900	0.660	1.05	2.65	0.8190	29.00	1
19	60.300	0.915	0.1460	0.6900	0.660	1.05	2.65	35.9320	29.00	4
20	64.400	0.915	0.1405	1.0100	0.660	1.05	2.65	93.1620	29.00	3
21	50.300	0.915	0.1540	0.2200	0.790	1.08	2.66	0.7460	27.00	1
22	52.600	0.915	0.1610	0.3400	0.790	1.08	2.66	2.1050	27.00	1
23	56.300	0.915	0.1590	0.4600	0.790	1.08	2.66	4.6810	27.00	1
24	59.900	0.915	0.1520	0.5000	0.790	1.08	2.66	12.2360	27.00	4
25	60.300	0.915	0.1470	0.5100	0.790	1.08	2.66	25.5990	27.00	4
26	58.300	0.915	0.1550	0.4800	0.790	1.08	2.66	5.3680	27.00	4
27	62.700	0.915	0.1400	0.7700	0.790	1.08	2.66	102.0800	28.00	3
28	66.500	0.915	0.1560	0.6100	0.790	1.08	2.66	89.4770	28.00	3

DAV - DATA OF DAVIES, T.R. (1971)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	47.005	1.372	0.1524	0.3580	0.150	1.17	2.65	3.9000	21.00	0
2	50.969	1.372	0.1524	0.4130	0.150	1.17	2.65	3.9000	23.00	0
3	54.084	1.372	0.1524	0.4900	0.150	1.17	2.65	6.7000	21.50	0
4	57.198	1.372	0.1524	0.5530	0.150	1.17	2.65	11.3000	20.00	0
5	62.861	1.372	0.1524	0.6000	0.150	1.17	2.65	19.8000	21.00	0
6	60.596	1.372	0.1524	0.5350	0.150	1.17	2.65	14.7000	20.00	0
7	66.259	1.372	0.1524	0.6550	0.150	1.17	2.65	26.5000	21.00	0
8	69.940	1.372	0.1524	0.8100	0.150	1.17	2.65	61.3000	19.00	0
9	68.242	1.372	0.1524	0.7150	0.150	1.17	2.65	39.8000	19.00	0
10	66.826	1.372	0.1524	0.6550	0.150	1.17	2.65	30.1000	19.50	0
11	70.224	1.372	0.1524	0.7000	0.150	1.17	2.65	45.0000	18.00	0
12	70.790	1.372	0.1524	0.7600	0.150	1.17	2.65	48.3000	18.00	0
13	71.923	1.372	0.1524	0.7800	0.150	1.17	2.65	52.5000	17.00	0
14	73.905	1.372	0.1524	0.7500	0.150	1.17	2.65	80.0000	16.00	0
15	75.887	1.372	0.1524	0.8400	0.150	1.17	2.65	77.5000	17.00	0
16	77.019	1.372	0.1524	0.8050	0.150	1.17	2.65	81.5000	16.00	0
17	79.002	1.372	0.1524	0.9190	0.150	1.17	2.65	124.0000	16.00	0
18	85.514	1.372	0.1524	1.0300	0.150	1.17	2.65	200.0000	15.00	0
19	89.195	1.372	0.1524	1.0800	0.150	1.17	2.65	301.0000	13.00	0
20	94.292	1.372	0.1524	1.1200	0.150	1.17	2.65	527.0000	15.00	0
21	99.389	1.372	0.1524	1.1800	0.150	1.17	2.65	670.0000	12.00	0
22	104.486	1.372	0.1524	1.1700	0.150	1.17	2.65	620.0000	12.00	0
23	107.034	1.372	0.1524	1.1500	0.150	1.17	2.65	722.0000	13.00	0
24	110.149	1.372	0.1524	1.0600	0.150	1.17	2.65	783.0000	14.00	0
25	152.906	1.372	0.1524	0.9200	0.150	1.17	2.65	1425.0000	18.00	0
26	147.526	1.372	0.1524	0.7500	0.150	1.17	2.65	1375.0000	15.00	0
27	140.164	1.372	0.1524	0.8600	0.150	1.17	2.65	1113.0000	17.00	0
28	159.136	1.372	0.1524	0.7500	0.150	1.17	2.65	1386.0000	15.00	0
29	165.649	1.372	0.1524	0.8900	0.150	1.17	2.65	1646.0000	18.00	0
30	95.425	1.372	0.3048	0.1100	0.150	1.17	2.65	0.8000	16.00	0
31	110.999	1.372	0.3048	0.1670	0.150	1.17	2.65	0.9000	20.00	0
32	118.361	1.372	0.3048	0.1570	0.150	1.17	2.65	2.3000	20.00	0
33	127.422	1.372	0.3048	0.2630	0.150	1.17	2.65	7.1000	20.00	2
34	137.616	1.372	0.3048	0.3350	0.150	1.17	2.65	21.6000	10.00	2
35	146.394	1.372	0.3048	0.2560	0.150	1.17	2.65	22.5000	17.00	2
36	152.906	1.372	0.3048	0.2750	0.150	1.17	2.65	30.9000	14.00	2
37	159.136	1.372	0.3048	0.2480	0.150	1.17	2.65	38.7000	20.00	2
38	229.360	1.372	0.3048	0.4600	0.150	1.17	2.65	890.0000	18.00	2
39	165.649	1.372	0.3048	0.3550	0.150	1.17	2.65	52.6000	20.50	2
40	176.975	1.372	0.3048	0.3900	0.150	1.17	2.65	87.4000	20.00	2
41	191.133	1.372	0.3048	0.4600	0.150	1.17	2.65	161.0000	18.50	2
42	208.972	1.372	0.3048	0.4950	0.150	1.17	2.65	295.0000	18.00	2
43	222.847	1.372	0.3048	0.5650	0.150	1.17	2.65	370.0000	19.50	2
44	227.094	1.372	0.3048	0.5900	0.150	1.17	2.65	354.0000	20.00	2
45	234.456	1.372	0.3048	0.6960	0.150	1.17	2.65	366.0000	22.00	3
46	234.456	1.372	0.3048	0.8550	0.150	1.17	2.65	438.0000	20.50	3
47	246.915	1.372	0.3048	0.6300	0.150	1.17	2.65	553.0000	26.00	3
48	263.622	1.372	0.3048	0.6990	0.150	1.17	2.65	709.0000	28.00	3
49	271.550	1.372	0.3048	0.5660	0.150	1.17	2.65	786.0000	26.50	3
50	282.594	1.372	0.3048	1.0000	0.150	1.17	2.65	779.0000	25.00	3
51	293.070	1.372	0.3048	0.8300	0.150	1.17	2.65	805.0000	25.00	4
52	302.981	1.372	0.3048	0.8750	0.150	1.17	2.65	969.0000	27.00	4
53	314.307	1.372	0.3048	0.9450	0.150	1.17	2.65	650.0000	28.00	4
54	322.802	1.372	0.3048	1.0400	0.150	1.17	2.65	681.0000	28.00	4
55	322.802	1.372	0.3048	1.0400	0.150	1.17	2.65	696.0000	29.00	4

DAV - DATA OF DAVIES, T.R. (1971)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	52.101	1.372	0.1646	0.4400	0.150	1.17	2.65	5.4000	21.00	2
57	55.782	1.372	0.1646	0.4700	0.150	1.17	2.65	7.1000	21.50	2
58	61.729	1.372	0.1646	0.5250	0.150	1.17	2.65	9.9000	16.00	2
59	67.675	1.372	0.1646	0.5610	0.150	1.17	2.65	22.4000	18.00	2
60	72.772	1.372	0.1646	0.6500	0.150	1.17	2.65	39.9000	17.00	2
61	78.435	1.372	0.1646	0.7300	0.150	1.17	2.65	71.2000	18.50	2
62	83.249	1.372	0.1646	0.7900	0.150	1.17	2.65	93.9000	20.00	2
63	104.486	1.372	0.1646	1.1500	0.150	1.17	2.65	559.0000	20.00	2
64	107.034	1.372	0.1524	1.1300	0.150	1.17	2.65	597.0000	20.50	2
65	142.996	1.372	0.1524	0.8700	0.150	1.17	2.65	1000.0000	22.50	4
66	25.484	1.372	0.0762	1.1000	0.150	1.17	2.65	28.1000	20.00	2
67	41.341	1.372	0.0762	1.9400	0.150	1.17	2.65	466.0000	20.00	2
68	33.413	1.372	0.0762	1.7800	0.150	1.17	2.65	248.0000	16.00	2
69	37.943	1.372	0.0762	2.0000	0.150	1.17	2.65	386.0000	16.50	2
70	28.599	1.372	0.0762	1.3700	0.150	1.17	2.65	70.2000	15.00	2
71	44.456	1.372	0.0762	2.6700	0.150	1.17	2.65	1350.0000	15.50	2
72	39.926	1.372	0.0762	1.9000	0.150	1.17	2.65	560.0000	18.50	0
73	42.757	1.372	0.0762	2.2000	0.150	1.17	2.65	470.0000	14.00	0
74	43.890	1.372	0.0762	2.3600	0.150	1.17	2.65	970.0000	15.00	0
75	45.306	1.372	0.0762	2.5100	0.150	1.17	2.65	1210.0000	14.50	0
76	46.863	1.372	0.0762	2.4400	0.150	1.17	2.65	1420.0000	14.00	0
77	48.420	1.372	0.0762	2.4500	0.150	1.17	2.65	1650.0000	13.50	0
78	49.836	1.372	0.0762	2.4100	0.150	1.17	2.65	1620.0000	13.50	0
79	51.535	1.372	0.0762	2.4000	0.150	1.17	2.65	1760.0000	14.50	3

EAC - DATA OF EINSTEIN AND CHIEN (1955)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	79.287	0.307	0.1381	14.1000	1.300	1.11	2.65	5500.0000	22.22	0
2	74.473	0.307	0.1195	19.3000	1.300	1.11	2.65	11055.0000	17.22	0
3	74.473	0.307	0.1164	20.9000	1.300	1.11	2.65	14420.0000	19.44	0
4	74.190	0.307	0.1152	23.7000	1.300	1.11	2.65	22271.0000	22.78	0
5	73.907	0.307	0.1085	25.8000	1.300	1.11	2.65	35970.0000	18.33	0
6	82.968	0.307	0.1423	14.3000	0.940	1.17	2.65	2543.0000	26.11	0
7	82.402	0.307	0.1414	14.2000	0.940	1.17	2.65	12667.0000	20.00	0
8	81.269	0.307	0.1387	14.0000	0.940	1.17	2.65	4240.0000	20.28	0
9	80.137	0.307	0.1341	15.3000	0.940	1.17	2.65	9384.0000	23.33	0
10	79.570	0.307	0.1283	17.3000	0.940	1.17	2.65	14640.0000	26.11	0
11	78.438	0.307	0.1332	13.1000	0.274	1.22	2.65	8234.0000	21.39	0
12	78.155	0.307	0.1320	12.4000	0.274	1.22	2.65	17050.0000	21.67	0
13	77.305	0.307	0.1332	12.8000	0.274	1.22	2.65	20384.0000	21.67	0
14	77.305	0.307	0.1241	17.0000	0.274	1.22	2.65	25860.0000	20.56	0
15	77.305	0.307	0.1241	16.7000	0.274	1.22	2.65	41027.0000	18.89	0
16	75.040	0.307	0.1192	18.7000	0.274	1.22	2.65	52238.0000	17.78	0

EPA - DATA OF E. PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY (1967)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	64.560	1.219	0.1524	0.3300	0.440	1.69	2.65	0.0	24.50	0
2	122.891	1.219	0.3048	0.1370	0.440	1.69	2.65	0.0	24.00	0
3	98.823	1.219	0.2545	0.1520	0.440	1.69	2.65	0.0	20.50	0
4	137.616	1.219	0.3048	0.1820	0.440	1.69	2.65	0.0	21.00	0
5	62.295	1.219	0.1780	0.1970	0.440	1.69	2.65	0.0	23.00	0
6	112.698	1.219	0.2100	1.1360	0.440	1.69	2.65	32.0000	25.00	0
7	144.978	1.219	0.2432	1.7100	0.440	1.69	2.65	71.0000	25.50	0
8	134.784	1.219	0.2289	1.6060	0.440	1.69	2.65	48.0000	25.00	0
9	128.271	1.219	0.2216	1.2420	0.440	1.69	2.65	38.0000	26.00	0
10	187.169	1.219	0.3118	1.1830	0.440	1.69	2.65	75.0000	27.00	0
11	153.473	1.219	0.2499	1.3300	0.440	1.69	2.65	73.0000	29.00	0
12	141.580	1.219	0.3048	0.6800	0.440	1.69	2.65	0.0	31.00	0
13	169.896	1.219	0.3048	0.7000	0.440	1.69	2.65	38.0000	30.00	0
14	198.212	1.219	0.3048	1.5000	0.440	1.69	2.65	71.0000	31.00	0
15	226.528	1.219	0.3048	2.4600	0.440	1.69	2.65	163.0000	31.00	0
16	237.854	1.219	0.3048	2.8200	0.440	1.69	2.65	122.0000	31.00	0
17	254.844	1.219	0.3048	3.3000	0.440	1.69	2.65	172.0000	30.00	0
18	84.948	1.219	0.1524	0.6000	0.440	1.69	2.65	54.0000	25.50	0
19	99.106	1.219	0.1524	1.6500	0.440	1.69	2.65	46.0000	25.00	0
20	113.264	1.219	0.1524	3.0500	0.440	1.69	2.65	116.0000	26.00	0
21	127.422	1.219	0.1981	3.0600	0.440	1.69	2.65	231.0000	25.50	0
22	141.580	1.219	0.2103	3.1200	0.440	1.69	2.65	103.0000	25.50	0
23	169.896	1.219	0.2347	3.4500	0.440	1.69	2.65	125.0000	27.00	0
24	184.054	1.219	0.2256	3.5000	0.440	1.69	2.65	334.0000	28.00	0
25	223.696	1.219	0.2819	3.6800	0.440	1.69	2.65	332.0000	26.50	0
26	240.686	1.219	0.3048	3.6500	0.440	1.69	2.65	830.0000	29.00	0
27	254.844	1.219	0.2996	3.8000	0.440	1.69	2.65	854.0000	30.50	0
28	20.104	0.381	0.1524	0.5300	0.160	1.42	2.65	0.0	34.00	0
29	17.839	0.381	0.1524	0.2300	0.160	1.42	2.65	0.0	25.50	0
30	18.405	0.381	0.1524	0.3800	0.160	1.42	2.65	0.0	25.50	0
31	18.689	0.381	0.1524	0.6100	0.160	1.42	2.65	0.0	27.00	0
32	18.405	0.381	0.1524	0.4600	0.160	1.42	2.65	0.0	27.00	0
33	18.122	0.381	0.1524	0.3800	0.160	1.42	2.65	0.0	26.00	0
34	18.405	0.381	0.1524	0.3800	0.160	1.42	2.65	0.0	25.50	0
35	18.405	0.381	0.1524	0.3800	0.160	1.42	2.65	0.0	25.50	0
36	17.556	0.381	0.1494	0.5300	0.160	1.42	2.65	0.0	26.00	0
37	17.556	0.381	0.1433	0.6900	0.160	1.42	2.65	0.0	25.50	0
38	17.839	0.381	0.1372	0.9100	0.160	1.42	2.65	0.0	26.00	0
39	18.122	0.381	0.1311	1.1000	0.160	1.42	2.65	0.0	26.00	0
40	17.839	0.381	0.1280	1.1000	0.160	1.42	2.65	0.0	25.50	0
41	17.839	0.381	0.1158	1.5000	0.160	1.42	2.65	0.0	25.50	0
42	17.556	0.381	0.1524	0.4100	0.160	1.42	2.65	68.5000	25.50	0
43	17.273	0.381	0.1472	0.5200	0.160	1.42	2.65	60.0000	25.50	0
44	17.273	0.381	0.1420	0.6500	0.160	1.42	2.65	70.0000	25.50	0
45	17.556	0.381	0.1372	0.9300	0.160	1.42	2.65	57.0000	21.50	0
46	16.990	0.381	0.1320	1.0000	0.160	1.42	2.65	87.0000	21.50	0
47	17.273	0.381	0.1271	1.3000	0.160	1.42	2.65	89.0000	21.00	0
48	17.273	0.381	0.1219	1.5000	0.160	1.42	2.65	65.0000	25.50	0
49	17.556	0.381	0.1143	1.7300	0.160	1.42	2.65	238.0000	25.50	0
50	17.273	0.381	0.1015	1.9000	0.160	1.42	2.65	413.0000	25.50	0
51	17.556	0.381	0.0884	2.1000	0.160	1.42	2.65	507.0000	25.50	0
52	23.785	0.381	0.0884	1.8000	0.160	1.42	2.65	1016.9988	26.00	0
53	22.653	0.381	0.1494	1.6000	0.160	1.42	2.65	826.0000	30.00	0
54	22.653	0.381	0.1551	1.1000	0.160	1.42	2.65	834.0000	30.00	0
55	22.653	0.381	0.1570	1.0000	0.160	1.42	2.65	590.0000	29.50	0

EPA - DATA OF E. PAKISTAN WATER AND POWER DEVELOPMENT AUTHORITY (1967)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	22.653	0.381	0.1442	1.1000	0.160	1.42	2.65	1043.9988	30.50	0
57	22.653	0.381	0.1646	1.0300	0.160	1.42	2.65	958.0000	30.00	0
58	22.653	0.381	0.1603	1.0200	0.160	1.42	2.65	693.0000	29.50	0
59	22.653	0.381	0.1533	1.1000	0.160	1.42	2.65	729.0000	29.50	0
60	22.653	0.381	0.1241	1.3000	0.160	1.42	2.65	1351.0000	29.50	0
61	22.653	0.381	0.1177	2.8000	0.160	1.42	2.65	1195.0000	30.00	0
62	22.653	0.381	0.1314	1.9000	0.160	1.42	2.65	1044.9988	33.00	0
63	22.653	0.381	0.1585	1.3000	0.160	1.42	2.65	525.0000	30.00	0
64	16.990	0.381	0.1542	0.7700	0.160	1.42	2.65	183.0000	29.00	0
65	15.574	0.381	0.1527	0.4600	0.160	1.42	2.65	0.0	29.50	0
66	15.574	0.381	0.1570	0.3200	0.160	1.42	2.65	0.0	29.50	0
67	14.866	0.381	0.1585	0.2500	0.160	1.42	2.65	0.0	30.00	0
68	14.158	0.381	0.1573	0.2900	0.160	1.42	2.65	0.0	30.00	0

EPB - DATA OF THE GOVT. OF EAST PAKISTAN (1966,1968,1969)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	56.632	1.219	0.1478	1.0000	0.150	1.43	2.66	270.0000	28.00	0
2	59.464	1.219	0.1524	0.8200	0.150	1.43	2.66	167.0000	28.90	0
3	87.780	1.219	0.1524	1.2500	0.150	1.43	2.66	645.0000	29.50	0
4	99.106	1.219	0.1524	1.3500	0.150	1.43	2.66	1125.0000	29.50	0
5	107.601	1.219	0.1524	1.2000	0.150	1.43	2.66	887.0000	29.60	0
6	92.027	1.219	0.2042	0.8300	0.150	1.43	2.66	360.0000	31.20	0
7	87.780	1.219	0.2042	0.7800	0.150	1.43	2.66	258.0000	30.20	0
8	49.270	1.219	0.1524	0.6700	0.150	1.43	2.66	45.0000	28.80	0
9	118.927	1.219	0.1524	1.2500	0.150	1.43	2.66	1082.9988	27.80	0
10	141.580	1.219	0.1524	1.6000	0.150	1.43	2.66	1809.9988	27.70	0
11	93.443	1.219	0.3048	0.2000	0.150	1.43	2.66	63.0000	29.50	0
12	138.748	1.219	0.3048	0.4500	0.150	1.43	2.66	143.0000	28.10	0
13	120.343	1.219	0.3048	0.3300	0.150	1.43	2.66	39.0000	27.30	0
14	135.917	1.219	0.3048	0.3500	0.150	1.43	2.66	66.0000	26.70	0
15	155.738	1.219	0.3048	0.6700	0.150	1.43	2.66	432.0000	28.70	0
16	150.924	1.219	0.2987	0.6000	0.150	1.43	2.66	331.0000	28.80	0
17	175.559	1.219	0.3018	0.7100	0.150	1.43	2.66	806.0000	28.80	0
18	192.549	1.219	0.3048	0.6700	0.150	1.43	2.66	966.0000	29.40	0
19	203.875	1.219	0.3048	0.7600	0.150	1.43	2.66	890.0000	29.70	0
20	232.191	1.219	0.3048	0.5000	0.150	1.43	2.66	572.0000	29.50	0
21	16.990	0.381	0.1381	0.7700	0.250	1.68	2.64	218.0000	26.00	2
22	16.990	0.381	0.1262	1.0000	0.250	1.68	2.64	622.0000	26.20	2
23	19.821	0.381	0.1189	2.4000	0.250	1.68	2.64	526.0000	26.10	3
24	18.689	0.381	0.1061	2.6000	0.250	1.68	2.64	1400.0000	25.50	3
25	20.529	0.381	0.1676	0.7200	0.250	1.68	2.64	113.0000	29.00	2
26	20.529	0.381	0.1463	0.9200	0.250	1.68	2.64	148.0000	28.90	2
27	21.803	0.381	0.1128	2.6000	0.250	1.68	2.64	852.0000	29.10	3
28	48.420	0.381	0.1481	2.0000	0.250	1.68	2.64	1330.9988	25.00	5
29	26.051	0.381	0.1524	1.1000	0.250	1.68	2.64	383.0000	24.90	3
30	24.069	0.381	0.1524	0.8500	0.250	1.68	2.64	157.0000	26.30	3
31	30.864	0.381	0.1548	2.2000	0.250	1.68	2.64	344.0000	24.80	3
32	39.076	0.381	0.1402	2.6000	0.250	1.68	2.64	491.0000	26.10	3
33	42.191	0.381	0.1439	3.0000	0.250	1.68	2.64	1278.0000	11.20	3
34	19.821	0.381	0.1097	2.8000	0.250	1.68	2.64	692.0000	26.00	3
35	70.790	1.219	0.3048	0.0470	0.330	1.27	2.64	93.4000	28.20	5
36	84.948	1.219	0.3048	0.0580	0.330	1.27	2.64	81.5000	27.90	5
37	99.106	1.219	0.3048	0.2460	0.330	1.27	2.64	63.0000	27.80	5
38	113.264	1.219	0.3036	0.2640	0.330	1.27	2.64	63.0000	28.90	2
39	127.422	1.219	0.3030	0.2620	0.330	1.27	2.64	83.5000	29.10	3
40	141.580	1.219	0.3048	0.3430	0.330	1.27	2.64	171.0000	29.80	3
41	155.738	1.219	0.3078	0.7550	0.330	1.27	2.64	107.0000	29.70	3
42	169.896	1.219	0.3078	0.7770	0.330	1.27	2.64	134.0000	29.70	3
43	198.212	1.219	0.3261	1.0700	0.330	1.27	2.64	110.0000	29.30	3
44	212.370	1.219	0.3383	1.4340	0.330	1.27	2.64	275.0000	29.30	3
45	226.528	1.219	0.3536	1.6540	0.330	1.27	2.64	300.0000	29.70	3
46	254.844	1.219	0.3871	2.2600	0.330	1.27	2.64	228.0000	29.90	3
47	113.264	1.219	0.2612	0.4200	0.250	1.53	2.64	115.0000	28.70	2
48	127.422	1.219	0.2627	0.5000	0.250	1.53	2.64	125.0000	31.00	2
49	141.580	1.219	0.2548	0.7000	0.250	1.53	2.64	208.0000	20.80	2
50	155.738	1.219	0.2591	0.9200	0.250	1.53	2.64	204.0000	19.70	3
51	169.896	1.219	0.2731	1.0500	0.250	1.53	2.64	272.0000	19.10	3
52	198.212	1.219	0.2865	1.8000	0.250	1.53	2.64	470.0000	19.30	3
53	212.370	1.219	0.3078	2.2000	0.250	1.53	2.64	680.0000	19.30	3
54	226.528	1.219	0.3383	2.3000	0.250	1.53	2.64	583.0000	19.10	3
55	240.686	1.219	0.3231	2.4000	0.250	1.53	2.64	496.0000	25.40	3

EPB - DATA OF THE GOVT. OF EAST PAKISTAN (1966,1968,1969)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	254.844	1.219	0.3261	2.6000	0.250	1.53	2.64	504.0000	23.70	3

FOL - DATA OF FOLEY, M. (1975)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	5.741	0.267	0.0384	3.8100	0.290	1.37	2.65	1424.7368	22.00	4
2	7.536	0.267	0.0473	4.0200	0.290	1.37	2.65	1755.0078	22.40	7
3	7.533	0.267	0.0471	4.0100	0.290	1.37	2.65	1848.1128	22.00	0
4	5.691	0.267	0.0374	4.3700	0.290	1.37	2.65	2232.3350	22.00	0
5	3.705	0.267	0.0358	3.9400	0.290	1.37	2.65	845.3428	22.40	2
6	6.681	0.267	0.0438	3.9100	0.290	1.37	2.65	1250.2979	23.20	4
7	6.681	0.267	0.0459	3.7400	0.290	1.37	2.65	989.8188	23.00	4
8	7.501	0.267	0.0349	10.5400	0.290	1.37	2.65	10254.3867	22.00	0
9	7.501	0.267	0.0353	10.2100	0.290	1.37	2.65	9999.1836	22.00	0
10	5.626	0.267	0.0305	9.9900	0.290	1.37	2.65	9001.5781	22.40	7
11	5.671	0.267	0.0295	9.9500	0.290	1.37	2.65	8285.6992	22.40	7
12	5.626	0.267	0.0315	10.6300	0.290	1.37	2.65	11692.7773	22.40	0

FRA - DATA OF FRANCO, J.J. (1968)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	52.951	0.914	0.1588	1.1960	0.230	1.33	2.67	39.9790	4.44	2
2	52.951	0.914	0.1606	1.1090	0.230	1.33	2.67	39.9790	4.44	2
3	52.951	0.914	0.1594	1.0900	0.230	1.33	2.67	39.9790	15.56	2
4	52.951	0.914	0.1588	0.9380	0.230	1.33	2.67	39.9790	26.67	2
5	52.951	0.914	0.1469	1.4970	0.230	1.33	2.67	94.9490	4.44	2
6	52.951	0.914	0.1439	1.3220	0.230	1.33	2.67	94.9490	15.56	2
7	52.951	0.914	0.1405	1.1750	0.230	1.33	2.67	94.9490	26.67	2
8	52.951	0.914	0.1390	1.6930	0.230	1.33	2.67	166.3390	4.44	2
9	52.951	0.914	0.1350	1.5270	0.230	1.33	2.67	166.3390	15.56	2
10	52.951	0.914	0.1335	1.2580	0.230	1.33	2.67	166.3390	26.67	2
11	52.951	0.914	0.1286	1.3080	0.230	1.33	2.67	166.3390	26.67	2
12	35.961	0.914	0.1405	0.3080	2.200	2.29	1.30	57.8150	4.44	5
13	35.961	0.914	0.1417	0.3420	2.200	2.29	1.30	57.8150	26.67	5
14	35.961	0.914	0.1344	0.3410	2.200	2.29	1.30	100.9130	4.44	5
15	35.961	0.914	0.1350	0.4440	2.200	2.29	1.30	100.9130	26.67	5
16	35.961	0.914	0.1497	0.2410	2.200	2.29	1.30	24.1770	4.44	5
17	35.961	0.914	0.1457	0.2300	2.200	2.29	1.30	24.1770	26.67	5
18	35.961	0.914	0.1308	0.4810	2.200	2.29	1.30	193.4170	4.44	5
19	35.961	0.914	0.1256	0.6040	2.200	2.29	1.30	193.4170	26.67	5

GIB - DATA OF GIBBS, C.H. AND NEILL, C.R. (1972)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	169.896	1.219	0.1768	4.6500	4.374	2.35	2.65	1109.0000	24.00	3
2	169.896	1.219	0.1768	4.6500	4.374	2.35	2.65	1136.0000	24.00	3
3	169.896	1.219	0.1768	4.6500	4.374	2.35	2.65	1100.0000	24.00	3
4	158.570	1.219	0.1737	2.9000	4.374	2.35	2.65	400.5000	24.00	3
5	158.570	1.219	0.1737	2.9000	4.374	2.35	2.65	360.3999	24.00	3
6	158.570	1.219	0.1737	2.9000	4.374	2.35	2.65	362.2998	24.00	3
7	198.212	1.219	0.1707	5.0000	4.374	2.35	2.65	1500.0000	24.00	3
8	198.212	1.219	0.1707	5.0000	4.374	2.35	2.65	1777.0000	24.00	3
9	198.212	1.219	0.1707	5.0000	4.374	2.35	2.65	1481.0000	24.00	3

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 1 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	2.633	0.201	0.0253	12.2000	0.305	1.06	2.65	9680.0000	-1.00	0
2	5.154	0.201	0.0384	6.9000	0.305	1.06	2.65	3580.0000	-1.00	5
3	5.154	0.201	0.0290	15.9000	0.305	1.06	2.65	18300.0000	-1.00	7
4	15.432	0.201	0.0866	5.6000	0.305	1.06	2.65	3790.0000	-1.00	5
5	5.154	0.305	0.0415	5.4000	0.305	1.06	2.65	1940.0000	-1.00	3
6	10.279	0.305	0.0533	4.2000	0.305	1.06	2.65	1900.0000	-1.00	4
7	20.784	0.305	0.0805	4.4000	0.305	1.06	2.65	2480.0000	-1.00	5
8	5.154	0.402	0.0323	6.3000	0.305	1.06	2.65	2330.0000	-1.00	3
9	5.154	0.402	0.0277	7.5000	0.305	1.06	2.65	3390.0000	-1.00	3
10	5.154	0.402	0.0229	7.3000	0.305	1.06	2.65	3390.0000	-1.00	3
11	5.154	0.402	0.0253	8.0000	0.305	1.06	2.65	4270.0000	-1.00	3
12	5.154	0.402	0.0265	9.9000	0.305	1.06	2.65	7270.0000	-1.00	4
13	5.154	0.402	0.0241	11.1000	0.305	1.06	2.65	9790.0000	-1.00	7
14	5.154	0.402	0.0186	13.7000	0.305	1.06	2.65	13900.0000	-1.00	7
15	5.154	0.402	0.0183	14.1000	0.305	1.06	2.65	14200.0000	-1.00	7
16	10.279	0.402	0.0594	2.7000	0.305	1.06	2.65	786.9998	-1.00	3
17	10.279	0.402	0.0399	5.0000	0.305	1.06	2.65	3890.0000	-1.00	4
18	10.279	0.402	0.0351	5.8000	0.305	1.06	2.65	4190.0000	-1.00	0
19	10.279	0.402	0.0341	6.7000	0.305	1.06	2.65	4230.0000	-1.00	0
20	10.279	0.402	0.0341	8.4000	0.305	1.06	2.65	6760.0000	-1.00	0
21	10.279	0.402	0.0396	10.3000	0.305	1.06	2.65	7050.0000	-1.00	4
22	10.279	0.402	0.0351	11.8000	0.305	1.06	2.65	12500.0000	-1.00	7
23	10.279	0.402	0.0323	11.4000	0.305	1.06	2.65	12700.0000	-1.00	7
24	10.279	0.402	0.0271	14.3000	0.305	1.06	2.65	17200.0000	-1.00	7
25	10.279	0.402	0.0296	15.5000	0.305	1.06	2.65	20200.0000	-1.00	7
26	20.784	0.402	0.0814	3.5000	0.305	1.06	2.65	1830.0000	-1.00	3
27	20.784	0.402	0.0631	4.9000	0.305	1.06	2.65	4000.0000	-1.00	5
28	20.784	0.402	0.0604	5.1000	0.305	1.06	2.65	4220.0000	-1.00	5
29	20.784	0.402	0.0579	7.3000	0.305	1.06	2.65	6800.0000	-1.00	7
30	10.279	0.597	0.0570	3.6000	0.305	1.06	2.65	820.0000	-1.00	3
31	10.279	0.597	0.0360	4.1000	0.305	1.06	2.65	1940.0000	-1.00	0
32	10.279	0.597	0.0393	5.5000	0.305	1.06	2.65	1940.0000	-1.00	0
33	10.279	0.597	0.0326	5.9000	0.305	1.06	2.65	3160.0000	-1.00	0
34	10.279	0.597	0.0296	7.8000	0.305	1.06	2.65	5740.0000	-1.00	0
35	10.279	0.597	0.0256	9.5000	0.305	1.06	2.65	8410.0000	-1.00	7
36	10.279	0.597	0.0223	11.0000	0.305	1.06	2.65	12400.0000	-1.00	7
37	10.279	0.597	0.0235	11.7000	0.305	1.06	2.65	13200.0000	-1.00	7
38	10.279	0.597	0.0229	11.8000	0.305	1.06	2.65	13200.0000	-1.00	7
39	10.279	0.597	0.0219	13.8000	0.305	1.06	2.65	18000.0000	-1.00	7
40	10.279	0.597	0.0232	15.0000	0.305	1.06	2.65	19800.0000	-1.00	7
41	10.279	0.597	0.0204	15.9000	0.305	1.06	2.65	21600.0000	-1.00	7
42	10.279	0.597	0.0210	17.3000	0.305	1.06	2.65	25700.0000	-1.00	7
43	10.279	0.597	0.0213	17.7000	0.305	1.06	2.65	27500.0000	-1.00	7
44	20.784	0.597	0.0893	1.8000	0.305	1.06	2.65	385.0000	-1.00	0
45	20.784	0.597	0.0549	3.6000	0.305	1.06	2.65	1560.0000	-1.00	0
46	20.784	0.597	0.0475	4.5000	0.305	1.06	2.65	3780.0000	-1.00	0
47	20.784	0.597	0.0463	5.0000	0.305	1.06	2.65	3610.0000	-1.00	5
48	20.784	0.597	0.0445	5.5000	0.305	1.06	2.65	5050.0000	-1.00	5
49	20.784	0.597	0.0433	7.9000	0.305	1.06	2.65	7450.0000	-1.00	4
50	20.784	0.597	0.0411	7.5000	0.305	1.06	2.65	8020.0000	-1.00	0
51	20.784	0.597	0.0393	9.4000	0.305	1.06	2.65	9470.0000	-1.00	7
52	20.784	0.597	0.0411	9.8000	0.305	1.06	2.65	10900.0000	-1.00	7
53	20.784	0.597	0.0396	10.1000	0.305	1.06	2.65	13400.0000	-1.00	7
54	31.686	0.597	0.0652	4.4000	0.305	1.06	2.65	2920.0000	-1.00	5
55	31.686	0.597	0.0631	3.9000	0.305	1.06	2.65	3180.0000	-1.00	5

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 2 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	31.686	0.597	0.0613	5.7000	0.305	1.06	2.65	4980.0000	-1.00	5
57	31.686	0.597	0.0597	5.9000	0.305	1.06	2.65	5650.0000	-1.00	5
58	31.686	0.597	0.0555	6.3000	0.305	1.06	2.65	6310.0000	-1.00	5
59	31.686	0.597	0.0570	6.0000	0.305	1.06	2.65	6750.0000	-1.00	4
60	31.686	0.597	0.0503	8.1000	0.305	1.06	2.65	7540.0000	-1.00	4
61	31.686	0.597	0.0546	7.9000	0.305	1.06	2.65	9190.0000	-1.00	7
62	31.686	0.597	0.0536	10.2000	0.305	1.06	2.65	10900.0000	-1.00	7
63	2.633	0.070	0.0585	8.5000	0.375	1.13	2.65	1520.0000	-1.00	4
64	2.633	0.070	0.0561	9.4000	0.375	1.13	2.65	2540.0000	-1.00	4
65	2.633	0.070	0.0530	10.1000	0.375	1.13	2.65	3070.0000	-1.00	5
66	2.633	0.070	0.0445	14.9000	0.375	1.13	2.65	7590.0000	-1.00	5
67	5.154	0.070	0.1109	7.3000	0.375	1.13	2.65	780.0000	-1.00	3
68	5.154	0.070	0.0866	11.2000	0.375	1.13	2.65	3500.0000	-1.00	5
69	5.154	0.070	0.0701	15.5000	0.375	1.13	2.65	6000.0000	-1.00	0
70	5.154	0.070	0.0707	15.5000	0.375	1.13	2.65	6210.0000	-1.00	4
71	2.633	0.134	0.0415	7.3000	0.375	1.13	2.65	2010.0000	-1.00	3
72	2.633	0.134	0.0335	9.0000	0.375	1.13	2.65	4180.0000	-1.00	5
73	2.633	0.134	0.0283	11.8000	0.375	1.13	2.65	6830.0000	-1.00	4
74	2.633	0.134	0.0213	16.2000	0.375	1.13	2.65	12900.0000	-1.00	7
75	2.633	0.134	0.0219	23.1000	0.375	1.13	2.65	20100.0000	-1.00	7
76	2.633	0.134	0.0207	23.8000	0.375	1.13	2.65	24300.0000	-1.00	7
77	5.154	0.134	0.0591	5.0000	0.375	1.13	2.65	1650.0000	-1.00	4
78	5.154	0.134	0.0539	7.5000	0.375	1.13	2.65	3110.0000	-1.00	5
79	5.154	0.134	0.0445	9.8000	0.375	1.13	2.65	5240.0000	-1.00	4
80	5.154	0.134	0.0424	17.3000	0.375	1.13	2.65	14750.0000	-1.00	7
81	2.633	0.201	0.0271	7.5000	0.375	1.13	2.65	1930.0000	-1.00	3
82	2.633	0.201	0.0244	8.4000	0.375	1.13	2.65	3490.0000	-1.00	3
83	2.633	0.201	0.0183	12.3000	0.375	1.13	2.65	6450.0000	-1.00	5
84	2.633	0.201	0.0180	13.2000	0.375	1.13	2.65	5700.0000	-1.00	4
85	2.633	0.201	0.0177	14.1000	0.375	1.13	2.65	8350.0000	-1.00	4
86	2.633	0.201	0.0152	14.7000	0.375	1.13	2.65	10630.0000	-1.00	4
87	2.633	0.201	0.0171	16.3000	0.375	1.13	2.65	12900.0000	-1.00	4
88	2.633	0.201	0.0165	20.1000	0.375	1.13	2.65	15600.0000	-1.00	4
89	2.633	0.201	0.0149	20.9000	0.375	1.13	2.65	20100.0000	-1.00	7
90	2.633	0.201	0.0177	21.7000	0.375	1.13	2.65	21600.0000	-1.00	7
91	2.633	0.201	0.0113	29.6000	0.375	1.13	2.65	35300.0000	-1.00	7
92	5.154	0.201	0.0558	3.6000	0.375	1.13	2.65	870.0000	-1.00	3
93	5.154	0.201	0.0558	3.7000	0.375	1.13	2.65	930.0000	-1.00	3
94	5.154	0.201	0.0418	6.8000	0.375	1.13	2.65	3000.0000	-1.00	0
95	5.154	0.201	0.0344	6.6000	0.375	1.13	2.65	4170.0000	-1.00	0
96	5.154	0.201	0.0335	7.2000	0.375	1.13	2.65	4660.0000	-1.00	0
97	5.154	0.201	0.0326	8.1000	0.375	1.13	2.65	4170.0000	-1.00	5
98	5.154	0.201	0.0344	9.8000	0.375	1.13	2.65	8150.0000	-1.00	0
99	5.154	0.201	0.0308	10.6000	0.375	1.13	2.65	8340.0000	-1.00	0
100	5.154	0.201	0.0341	11.7000	0.375	1.13	2.65	9500.0000	-1.00	0
101	5.154	0.201	0.0326	13.2000	0.375	1.13	2.65	10700.0000	-1.00	4
102	5.154	0.201	0.0314	13.6000	0.375	1.13	2.65	10700.0000	-1.00	4
103	5.154	0.201	0.0277	15.1000	0.375	1.13	2.65	17100.0000	-1.00	7
104	5.154	0.201	0.0250	20.0000	0.375	1.13	2.65	20400.0000	-1.00	7
105	5.154	0.201	0.0253	18.8000	0.375	1.13	2.65	21700.0000	-1.00	7
106	5.154	0.201	0.0235	20.5000	0.375	1.13	2.65	23100.0000	-1.00	7
107	5.154	0.201	0.0351	21.9000	0.375	1.13	2.65	27000.0000	-1.00	7
108	5.154	0.201	0.0293	24.6000	0.375	1.13	2.65	30800.0000	-1.00	7
109	5.154	0.201	0.0250	27.9000	0.375	1.13	2.65	32800.0000	-1.00	7
110	10.279	0.201	0.0674	5.1000	0.375	1.13	2.65	2820.0000	-1.00	4

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 3 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	10.279	0.201	0.0646	6.8000	0.375	1.13	2.65	4090.0000	-1.00	4
112	10.279	0.201	0.0625	6.9000	0.375	1.13	2.65	4380.0000	-1.00	4
113	10.279	0.201	0.0616	7.5000	0.375	1.13	2.65	5250.0000	-1.00	5
114	10.279	0.201	0.0573	8.0000	0.375	1.13	2.65	6230.0000	-1.00	5
115	10.279	0.201	0.0543	9.8000	0.375	1.13	2.65	7500.0000	-1.00	4
116	10.279	0.201	0.0576	9.9000	0.375	1.13	2.65	8850.0000	-1.00	7
117	10.279	0.201	0.0582	11.4000	0.375	1.13	2.65	10100.0000	-1.00	7
118	10.279	0.201	0.0539	15.4000	0.375	1.13	2.65	14400.0000	-1.00	7
119	10.279	0.201	0.0472	14.3000	0.375	1.13	2.65	14800.0000	-1.00	7
120	10.279	0.201	0.0482	16.6000	0.375	1.13	2.65	16200.0000	-1.00	7
121	15.432	0.201	0.1439	2.1000	0.375	1.13	2.65	380.0000	-1.00	3
122	15.432	0.201	0.1119	2.3000	0.375	1.13	2.65	1040.0000	-1.00	3
123	15.432	0.201	0.0914	4.5000	0.375	1.13	2.65	2270.0000	-1.00	4
124	15.432	0.201	0.0890	6.3000	0.375	1.13	2.65	3820.0000	-1.00	4
125	15.432	0.201	0.0786	7.4000	0.375	1.13	2.65	4400.0000	-1.00	4
126	15.432	0.201	0.0792	7.2000	0.375	1.13	2.65	5180.0000	-1.00	5
127	15.432	0.201	0.0671	8.7000	0.375	1.13	2.65	6860.0000	-1.00	0
128	15.432	0.201	0.0689	8.9000	0.375	1.13	2.65	7000.0000	-1.00	4
129	15.432	0.201	0.0701	10.0000	0.375	1.13	2.65	8550.0000	-1.00	7
130	15.432	0.201	0.0704	13.2000	0.375	1.13	2.65	11000.0000	-1.00	7
131	5.154	0.305	0.0323	6.1000	0.375	1.13	2.65	2040.0000	-1.00	3
132	5.154	0.305	0.0311	6.1000	0.375	1.13	2.65	2230.0000	-1.00	0
133	5.154	0.305	0.0223	9.7000	0.375	1.13	2.65	5430.0000	-1.00	4
134	5.154	0.305	0.0247	11.5000	0.375	1.13	2.65	7560.0000	-1.00	4
135	5.154	0.305	0.0223	12.9000	0.375	1.13	2.65	9890.0000	-1.00	5
136	5.154	0.305	0.0183	18.7000	0.375	1.13	2.65	19000.0000	-1.00	7
137	5.154	0.305	0.0204	21.4000	0.375	1.13	2.65	22500.0000	-1.00	7
138	5.154	0.305	0.0201	24.3000	0.375	1.13	2.65	30400.0000	-1.00	7
139	5.154	0.305	0.0213	26.3000	0.375	1.13	2.65	35300.0000	-1.00	7
140	10.279	0.305	0.1448	0.4400	0.375	1.13	2.65	0.0	-1.00	3
141	10.279	0.305	0.0985	1.6000	0.375	1.13	2.65	165.0000	-1.00	3
142	10.279	0.305	0.0978	1.6000	0.375	1.13	2.65	170.0000	-1.00	3
143	10.279	0.305	0.0826	3.1000	0.375	1.13	2.65	660.0000	-1.00	3
144	10.279	0.305	0.0744	2.3000	0.375	1.13	2.65	860.0000	-1.00	3
145	10.279	0.305	0.0683	3.3000	0.375	1.13	2.65	922.9998	-1.00	3
146	10.279	0.305	0.0634	2.9000	0.375	1.13	2.65	893.9998	-1.00	3
147	10.279	0.305	0.0774	3.1000	0.375	1.13	2.65	990.0000	-1.00	3
148	10.279	0.305	0.0588	4.4000	0.375	1.13	2.65	1890.0000	-1.00	0
149	10.279	0.305	0.0536	5.5000	0.375	1.13	2.65	2430.0000	-1.00	0
150	10.279	0.305	0.0500	5.4000	0.375	1.13	2.65	2720.0000	-1.00	0
151	10.279	0.305	0.0469	7.8000	0.375	1.13	2.65	4470.0000	-1.00	5
152	10.279	0.305	0.0457	6.5000	0.375	1.13	2.65	5350.0000	-1.00	5
153	10.279	0.305	0.0366	10.0000	0.375	1.13	2.65	7680.0000	-1.00	7
154	10.279	0.305	0.0326	15.1000	0.375	1.13	2.65	14900.0000	-1.00	7
155	10.279	0.305	0.0393	16.6000	0.375	1.13	2.65	20000.0000	-1.00	7
156	10.279	0.305	0.0341	17.8000	0.375	1.13	2.65	21200.0000	-1.00	7
157	15.432	0.305	0.0591	7.9000	0.375	1.13	2.65	6930.0000	-1.00	5
158	15.432	0.305	0.0509	8.3000	0.375	1.13	2.65	7580.0000	-1.00	4
159	15.432	0.305	0.0479	11.6000	0.375	1.13	2.65	10800.0000	-1.00	7
160	15.432	0.305	0.0515	13.1000	0.375	1.13	2.65	12900.0000	-1.00	7
161	15.432	0.305	0.0439	16.3000	0.375	1.13	2.65	19800.0000	-1.00	7
162	20.784	0.305	0.2256	0.1200	0.375	1.13	2.65	0.0	-1.00	3
163	20.784	0.305	0.1524	1.5000	0.375	1.13	2.65	207.0000	-1.00	0
164	20.784	0.305	0.1515	1.8000	0.375	1.13	2.65	230.9998	-1.00	0
165	20.784	0.305	0.1018	2.7000	0.375	1.13	2.65	840.9998	-1.00	0

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 4 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
166	20.784	0.305	0.0814	3.8000	0.375	1.13	2.65	1800.0000	-1.00	0
167	20.784	0.305	0.0780	4.9000	0.375	1.13	2.65	2600.0000	-1.00	0
168	20.784	0.305	0.0783	4.5000	0.375	1.13	2.65	2600.0000	-1.00	4
169	20.784	0.305	0.0783	5.0000	0.375	1.13	2.65	2760.0000	-1.00	0
170	20.784	0.305	0.0799	5.3000	0.375	1.13	2.65	2880.0000	-1.00	4
171	20.784	0.305	0.0783	4.4000	0.375	1.13	2.65	2980.0000	-1.00	4
172	20.784	0.305	0.0735	5.4000	0.375	1.13	2.65	3940.0000	-1.00	0
173	20.784	0.305	0.0722	6.8000	0.375	1.13	2.65	4900.0000	-1.00	4
174	20.784	0.305	0.0631	9.2000	0.375	1.13	2.65	9040.0000	-1.00	5
175	5.154	0.402	0.0384	4.0000	0.375	1.13	2.65	1220.0000	-1.00	3
176	5.154	0.402	0.0247	8.0000	0.375	1.13	2.65	2720.0000	-1.00	3
177	5.154	0.402	0.0186	9.8000	0.375	1.13	2.65	3300.0000	-1.00	3
178	5.154	0.402	0.0192	11.2000	0.375	1.13	2.65	6600.0000	-1.00	4
179	5.154	0.402	0.0174	11.8000	0.375	1.13	2.65	5240.0000	-1.00	4
180	5.154	0.402	0.0171	12.2000	0.375	1.13	2.65	8340.0000	-1.00	5
181	5.154	0.402	0.0162	14.1000	0.375	1.13	2.65	10900.0000	-1.00	4
182	5.154	0.402	0.0125	16.6000	0.375	1.13	2.65	13200.0000	-1.00	4
183	5.154	0.402	0.0155	17.1000	0.375	1.13	2.65	15700.0000	-1.00	4
184	5.154	0.402	0.0116	17.7000	0.375	1.13	2.65	15500.0000	-1.00	4
185	5.154	0.402	0.0137	18.8000	0.375	1.13	2.65	18000.0000	-1.00	7
186	5.154	0.402	0.0177	21.1000	0.375	1.13	2.65	22300.0000	-1.00	7
187	5.154	0.402	0.0113	23.2000	0.375	1.13	2.65	27500.0000	-1.00	7
188	5.154	0.402	0.0119	24.6000	0.375	1.13	2.65	29400.0000	-1.00	7
189	10.279	0.402	0.0671	2.5000	0.375	1.13	2.65	650.0000	-1.00	3
190	10.279	0.402	0.0600	2.6000	0.375	1.13	2.65	810.0000	-1.00	3
191	10.279	0.402	0.0497	4.3000	0.375	1.13	2.65	1650.0000	-1.00	3
192	10.279	0.402	0.0497	4.4000	0.375	1.13	2.65	1700.0000	-1.00	3
193	10.279	0.402	0.0399	4.7000	0.375	1.13	2.65	2140.0000	-1.00	3
194	10.279	0.402	0.0390	6.6000	0.375	1.13	2.65	2140.0000	-1.00	3
195	10.279	0.402	0.0378	6.9000	0.375	1.13	2.65	2430.0000	-1.00	3
196	10.279	0.402	0.0332	8.2000	0.375	1.13	2.65	3700.0000	-1.00	3
197	10.279	0.402	0.0299	10.7000	0.375	1.13	2.65	8700.0000	-1.00	0
198	10.279	0.402	0.0302	12.0000	0.375	1.13	2.65	10100.0000	-1.00	0
199	10.279	0.402	0.0244	12.8000	0.375	1.13	2.65	13200.0000	-1.00	7
200	10.279	0.402	0.0219	13.3000	0.375	1.13	2.65	12700.0000	-1.00	7
201	10.279	0.402	0.0299	13.7000	0.375	1.13	2.65	13000.0000	-1.00	7
202	10.279	0.402	0.0280	15.4000	0.375	1.13	2.65	15800.0000	-1.00	7
203	10.279	0.402	0.0250	16.3000	0.375	1.13	2.65	16800.0000	-1.00	7
204	15.432	0.402	0.0631	4.7000	0.375	1.13	2.65	1910.0000	-1.00	3
205	15.432	0.402	0.0503	5.3000	0.375	1.13	2.65	3080.0000	-1.00	3
206	15.432	0.402	0.0463	6.0000	0.375	1.13	2.65	3370.0000	-1.00	3
207	15.432	0.402	0.0424	7.6000	0.375	1.13	2.65	5500.0000	-1.00	0
208	15.432	0.402	0.0430	7.6000	0.375	1.13	2.65	5640.0000	-1.00	5
209	15.432	0.402	0.0451	7.5000	0.375	1.13	2.65	6800.0000	-1.00	5
210	15.432	0.402	0.0482	8.4000	0.375	1.13	2.65	6730.0000	-1.00	4
211	15.432	0.402	0.0430	9.8000	0.375	1.13	2.65	9510.0000	-1.00	7
212	15.432	0.402	0.0323	12.8000	0.375	1.13	2.65	14100.0000	-1.00	7
213	20.784	0.402	0.0814	3.1000	0.375	1.13	2.65	1350.0000	-1.00	0
214	20.784	0.402	0.0689	4.1000	0.375	1.13	2.65	1880.0000	-1.00	4
215	20.784	0.402	0.0668	5.0000	0.375	1.13	2.65	2650.0000	-1.00	4
216	20.784	0.402	0.0594	5.0000	0.375	1.13	2.65	2700.0000	-1.00	4
217	20.784	0.402	0.0628	5.3000	0.375	1.13	2.65	3030.0000	-1.00	4
218	20.784	0.402	0.0607	5.8000	0.375	1.13	2.65	4330.0000	-1.00	5
219	20.784	0.402	0.0530	8.7000	0.375	1.13	2.65	6200.0000	-1.00	5
220	20.784	0.402	0.0518	6.7000	0.375	1.13	2.65	6550.0000	-1.00	5

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 5 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
221	20.784	0.402	0.0524	7.8000	0.375	1.13	2.65	6450.0000	-1.00	5
222	20.784	0.402	0.0503	8.5000	0.375	1.13	2.65	6930.0000	-1.00	4
223	20.784	0.402	0.0527	9.0000	0.375	1.13	2.65	8040.0000	-1.00	4
224	20.784	0.402	0.0515	9.6000	0.375	1.13	2.65	8560.0000	-1.00	7
225	20.784	0.402	0.0506	9.2000	0.375	1.13	2.65	8770.0000	-1.00	7
226	10.279	0.597	0.0494	3.1000	0.375	1.13	2.65	760.0000	-1.00	3
227	10.279	0.597	0.0317	6.5000	0.375	1.13	2.65	1750.0000	-1.00	0
228	10.279	0.597	0.0335	6.2000	0.375	1.13	2.65	2430.0000	-1.00	0
229	10.279	0.597	0.0213	5.9000	0.375	1.13	2.65	3500.0000	-1.00	0
230	10.279	0.597	0.0265	7.7000	0.375	1.13	2.65	4240.0000	-1.00	0
231	10.279	0.597	0.0244	9.2000	0.375	1.13	2.65	4280.0000	-1.00	5
232	10.279	0.597	0.0180	10.1000	0.375	1.13	2.65	5740.0000	-1.00	4
233	10.279	0.597	0.0207	10.3000	0.375	1.13	2.65	7100.0000	-1.00	0
234	10.279	0.597	0.0238	10.7000	0.375	1.13	2.65	6610.0000	-1.00	4
235	10.279	0.597	0.0189	12.1000	0.375	1.13	2.65	9340.0000	-1.00	4
236	10.279	0.597	0.0192	14.5000	0.375	1.13	2.65	13300.0000	-1.00	7
237	10.279	0.597	0.0134	14.8000	0.375	1.13	2.65	14300.0000	-1.00	7
238	10.279	0.597	0.0152	16.2000	0.375	1.13	2.65	17200.0000	-1.00	7
239	10.279	0.597	0.0183	20.0000	0.375	1.13	2.65	24200.0000	-1.00	7
240	15.432	0.597	0.0402	5.4000	0.375	1.13	2.65	3440.0000	-1.00	0
241	15.432	0.597	0.0387	7.0000	0.375	1.13	2.65	4720.0000	-1.00	5
242	15.432	0.597	0.0396	6.9000	0.375	1.13	2.65	4660.0000	-1.00	0
243	15.432	0.597	0.0384	7.1000	0.375	1.13	2.65	4660.0000	-1.00	0
244	15.432	0.597	0.0277	7.8000	0.375	1.13	2.65	6480.0000	-1.00	0
245	15.432	0.597	0.0338	8.0000	0.375	1.13	2.65	5770.0000	-1.00	4
246	15.432	0.597	0.0351	9.8000	0.375	1.13	2.65	6090.0000	-1.00	4
247	15.432	0.597	0.0302	11.2000	0.375	1.13	2.65	9300.0000	-1.00	4
248	15.432	0.597	0.0290	16.0000	0.375	1.13	2.65	17100.0000	-1.00	7
249	20.784	0.597	0.0783	2.3000	0.375	1.13	2.65	370.0000	-1.00	3
250	20.784	0.597	0.0597	2.8000	0.375	1.13	2.65	1870.0000	-1.00	0
251	20.784	0.597	0.0521	4.4000	0.375	1.13	2.65	1800.0000	-1.00	0
252	20.784	0.597	0.0491	5.4000	0.375	1.13	2.65	4020.0000	-1.00	0
253	20.784	0.597	0.0424	6.4000	0.375	1.13	2.65	4710.0000	-1.00	0
254	20.784	0.597	0.0451	5.6000	0.375	1.13	2.65	4960.0000	-1.00	0
255	20.784	0.597	0.0457	10.5000	0.375	1.13	2.65	11500.0000	-1.00	7
256	20.784	0.597	0.0445	13.9000	0.375	1.13	2.65	16400.0000	-1.00	7
257	20.784	0.597	0.0378	14.5000	0.375	1.13	2.65	16800.0000	-1.00	7
258	31.686	0.597	0.1237	1.9000	0.375	1.13	2.65	205.0000	-1.00	3
259	31.686	0.597	0.1143	1.8000	0.375	1.13	2.65	425.9998	-1.00	3
260	31.686	0.597	0.1027	3.2000	0.375	1.13	2.65	960.0000	-1.00	3
261	31.686	0.597	0.0698	2.8000	0.375	1.13	2.65	1760.0000	-1.00	4
262	31.686	0.597	0.0960	5.9000	0.375	1.13	2.65	3500.0000	-1.00	0
263	31.686	0.597	0.0643	6.1000	0.375	1.13	2.65	3470.0000	-1.00	5
264	31.686	0.597	0.0573	6.5000	0.375	1.13	2.65	4000.0000	-1.00	5
265	31.686	0.597	0.0573	7.2000	0.375	1.13	2.65	6020.0000	-1.00	5
266	31.686	0.597	0.0561	7.3000	0.375	1.13	2.65	7250.0000	-1.00	0
267	31.686	0.597	0.0570	9.1000	0.375	1.13	2.65	10000.0000	-1.00	4
268	31.686	0.597	0.0536	10.0000	0.375	1.13	2.65	9780.0000	-1.00	0
269	31.686	0.597	0.0442	13.1000	0.375	1.13	2.65	13200.0000	-1.00	7
270	2.633	0.134	0.0491	6.4000	0.506	1.12	2.65	1210.0000	-1.00	3
271	2.633	0.134	0.0430	8.5000	0.506	1.12	2.65	2000.0000	-1.00	4
272	2.633	0.134	0.0399	9.4000	0.506	1.12	2.65	3570.0000	-1.00	5
273	2.633	0.134	0.0372	10.1000	0.506	1.12	2.65	4550.0000	-1.00	5
274	2.633	0.134	0.0357	12.6000	0.506	1.12	2.65	7200.0000	-1.00	5
275	2.633	0.134	0.0338	14.5000	0.506	1.12	2.65	9900.0000	-1.00	5

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 6 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
276	2.633	0.134	0.0338	15.9000	0.506	1.12	2.65	13300.0000	-1.00	5
277	2.633	0.134	0.0305	17.1000	0.506	1.12	2.65	12900.0000	-1.00	5
278	5.154	0.134	0.0716	6.1000	0.506	1.12	2.65	1880.0000	-1.00	3
279	5.154	0.134	0.0710	7.0000	0.506	1.12	2.65	2720.0000	-1.00	4
280	5.154	0.134	0.0512	13.3000	0.506	1.12	2.65	7360.0000	-1.00	5
281	5.154	0.134	0.0536	13.2000	0.506	1.12	2.65	8300.0000	-1.00	5
282	5.154	0.134	0.0524	13.8000	0.506	1.12	2.65	9100.0000	-1.00	5
283	5.154	0.134	0.0466	15.2000	0.506	1.12	2.65	9900.0000	-1.00	5
284	5.154	0.134	0.0421	21.6000	0.506	1.12	2.65	18800.0000	-1.00	7
285	2.633	0.201	0.0329	5.4000	0.506	1.12	2.65	1330.0000	-1.00	3
286	2.633	0.201	0.0256	7.9000	0.506	1.12	2.65	3260.0000	-1.00	3
287	2.633	0.201	0.0235	9.8000	0.506	1.12	2.65	3800.0000	-1.00	3
288	2.633	0.201	0.0238	9.7000	0.506	1.12	2.65	5700.0000	-1.00	3
289	2.633	0.201	0.0229	10.5000	0.506	1.12	2.65	5700.0000	-1.00	3
290	2.633	0.201	0.0235	10.5000	0.506	1.12	2.65	6450.0000	-1.00	3
291	2.633	0.201	0.0223	11.1000	0.506	1.12	2.65	6080.0000	-1.00	4
292	2.633	0.201	0.0201	13.6000	0.506	1.12	2.65	8350.0000	-1.00	5
293	2.633	0.201	0.0192	15.6000	0.506	1.12	2.65	13300.0000	-1.00	5
294	2.633	0.201	0.0168	19.8000	0.506	1.12	2.65	18200.0000	-1.00	7
295	2.633	0.201	0.0152	23.8000	0.506	1.12	2.65	23200.0000	-1.00	7
296	2.633	0.201	0.0158	25.2000	0.506	1.12	2.65	28100.0000	-1.00	7
297	5.154	0.201	0.0725	2.3000	0.506	1.12	2.65	420.0000	-1.00	3
298	5.154	0.201	0.0415	5.4000	0.506	1.12	2.65	1880.0000	-1.00	3
299	5.154	0.201	0.0378	6.4000	0.506	1.12	2.65	3100.0000	-1.00	3
300	5.154	0.201	0.0402	7.6000	0.506	1.12	2.65	3500.0000	-1.00	3
301	5.154	0.201	0.0387	7.2000	0.506	1.12	2.65	3500.0000	-1.00	3
302	5.154	0.201	0.0357	9.4000	0.506	1.12	2.65	5400.0000	-1.00	4
303	5.154	0.201	0.0293	11.6000	0.506	1.12	2.65	7600.0000	-1.00	5
304	5.154	0.201	0.0335	11.6000	0.506	1.12	2.65	8700.0000	-1.00	5
305	5.154	0.201	0.0283	15.7000	0.506	1.12	2.65	15100.0000	-1.00	5
306	5.154	0.201	0.0189	22.4000	0.506	1.12	2.65	22000.0000	-1.00	7
307	10.279	0.201	0.0735	4.4000	0.506	1.12	2.65	2140.0000	-1.00	3
308	10.279	0.201	0.0677	6.4000	0.506	1.12	2.65	3110.0000	-1.00	4
309	10.279	0.201	0.0643	7.0000	0.506	1.12	2.65	3300.0000	-1.00	4
310	10.279	0.201	0.0649	6.1000	0.506	1.12	2.65	3700.0000	-1.00	4
311	10.279	0.201	0.0658	6.3000	0.506	1.12	2.65	3400.0000	-1.00	4
312	10.279	0.201	0.0646	6.6000	0.506	1.12	2.65	3700.0000	-1.00	4
313	10.279	0.201	0.0625	6.7000	0.506	1.12	2.65	3800.0000	-1.00	4
314	10.279	0.201	0.0567	8.7000	0.506	1.12	2.65	5250.0000	-1.00	5
315	10.279	0.201	0.0530	9.9000	0.506	1.12	2.65	7600.0000	-1.00	5
316	10.279	0.201	0.0509	10.4000	0.506	1.12	2.65	8100.0000	-1.00	5
317	10.279	0.201	0.0512	10.8000	0.506	1.12	2.65	8750.0000	-1.00	4
318	10.279	0.201	0.0527	10.7000	0.506	1.12	2.65	9150.0000	-1.00	0
319	10.279	0.201	0.0500	10.8000	0.506	1.12	2.65	9250.0000	-1.00	0
320	10.279	0.201	0.0530	11.9000	0.506	1.12	2.65	11800.0000	-1.00	5
321	10.279	0.201	0.0512	12.3000	0.506	1.12	2.65	11800.0000	-1.00	5
322	10.279	0.201	0.0491	14.1000	0.506	1.12	2.65	13000.0000	-1.00	4
323	10.279	0.201	0.0503	20.8000	0.506	1.12	2.65	23800.0000	-1.00	7
324	15.432	0.201	0.1759	1.9000	0.506	1.12	2.65	182.0000	-1.00	3
325	15.432	0.201	0.0951	5.4000	0.506	1.12	2.65	2330.0000	-1.00	3
326	15.432	0.201	0.0878	5.1000	0.506	1.12	2.65	2920.0000	-1.00	0
327	15.432	0.201	0.0866	5.6000	0.506	1.12	2.65	3040.0000	-1.00	0
328	15.432	0.201	0.0847	5.7000	0.506	1.12	2.65	3080.0000	-1.00	4
329	15.432	0.201	0.0878	5.8000	0.506	1.12	2.65	3000.0000	-1.00	4
330	15.432	0.201	0.0924	6.0000	0.506	1.12	2.65	2660.0000	-1.00	0

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 7 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
331	15.432	0.201	0.0939	6.0000	0.506	1.12	2.65	3040.0000	-1.00	4
332	15.432	0.201	0.0914	5.7000	0.506	1.12	2.65	3400.0000	-1.00	4
333	15.432	0.201	0.0777	7.8000	0.506	1.12	2.65	4900.0000	-1.00	4
334	15.432	0.201	0.0792	8.2000	0.506	1.12	2.65	5700.0000	-1.00	4
335	15.432	0.201	0.0680	9.6000	0.506	1.12	2.65	7400.0000	-1.00	4
336	15.432	0.201	0.0680	9.8000	0.506	1.12	2.65	7600.0000	-1.00	4
337	15.432	0.201	0.0695	9.9000	0.506	1.12	2.65	7700.0000	-1.00	4
338	15.432	0.201	0.0738	10.1000	0.506	1.12	2.65	8400.0000	-1.00	5
339	15.432	0.201	0.0689	11.2000	0.506	1.12	2.65	9800.0000	-1.00	5
340	15.432	0.201	0.0728	11.2000	0.506	1.12	2.65	9900.0000	-1.00	5
341	15.432	0.201	0.0677	12.1000	0.506	1.12	2.65	10500.0000	-1.00	5
342	15.432	0.201	0.0713	15.3000	0.506	1.12	2.65	12700.0000	-1.00	7
343	20.784	0.201	0.0997	6.2000	0.506	1.12	2.65	3080.0000	-1.00	4
344	20.784	0.201	0.0969	6.2000	0.506	1.12	2.65	3150.0000	-1.00	4
345	20.784	0.201	0.0975	5.8000	0.506	1.12	2.65	3220.0000	-1.00	4
346	20.784	0.201	0.0802	9.9000	0.506	1.12	2.65	7700.0000	-1.00	4
347	20.784	0.201	0.0844	10.4000	0.506	1.12	2.65	7900.0000	-1.00	4
348	5.154	0.305	0.0357	5.4000	0.506	1.12	2.65	1470.0000	-1.00	3
349	5.154	0.305	0.0354	5.7000	0.506	1.12	2.65	2140.0000	-1.00	3
350	5.154	0.305	0.0335	7.3000	0.506	1.12	2.65	3100.0000	-1.00	3
351	5.154	0.305	0.0326	7.5000	0.506	1.12	2.65	3300.0000	-1.00	3
352	5.154	0.305	0.0329	7.4000	0.506	1.12	2.65	3500.0000	-1.00	3
353	5.154	0.305	0.0198	16.8000	0.506	1.12	2.65	16300.0000	-1.00	5
354	5.154	0.305	0.0189	18.5000	0.506	1.12	2.65	18800.0000	-1.00	5
355	5.154	0.305	0.0155	20.7000	0.506	1.12	2.65	22100.0000	-1.00	7
356	5.154	0.305	0.0198	22.4000	0.506	1.12	2.65	24800.0000	-1.00	7
357	10.279	0.305	0.0994	1.9000	0.506	1.12	2.65	185.0000	-1.00	3
358	10.279	0.305	0.0838	2.4000	0.506	1.12	2.65	563.9998	-1.00	3
359	10.279	0.305	0.0674	4.2000	0.506	1.12	2.65	1800.0000	-1.00	3
360	10.279	0.305	0.0570	4.4000	0.506	1.12	2.65	2340.0000	-1.00	3
361	10.279	0.305	0.0500	5.2000	0.506	1.12	2.65	2920.0000	-1.00	3
362	10.279	0.305	0.0518	6.5000	0.506	1.12	2.65	3940.0000	-1.00	0
363	10.279	0.305	0.0433	7.3000	0.506	1.12	2.65	4500.0000	-1.00	4
364	10.279	0.305	0.0436	7.0000	0.506	1.12	2.65	4600.0000	-1.00	4
365	10.279	0.305	0.0430	7.3000	0.506	1.12	2.65	4400.0000	-1.00	4
366	10.279	0.305	0.0439	8.2000	0.506	1.12	2.65	5600.0000	-1.00	4
367	10.279	0.305	0.0405	8.3000	0.506	1.12	2.65	5900.0000	-1.00	4
368	10.279	0.305	0.0411	9.5000	0.506	1.12	2.65	8200.0000	-1.00	5
369	10.279	0.305	0.0375	9.3000	0.506	1.12	2.65	8400.0000	-1.00	5
370	10.279	0.305	0.0405	9.7000	0.506	1.12	2.65	8300.0000	-1.00	5
371	10.279	0.305	0.0369	10.9000	0.506	1.12	2.65	10100.0000	-1.00	5
372	10.279	0.305	0.0405	10.9000	0.506	1.12	2.65	10100.0000	-1.00	5
373	10.279	0.305	0.0347	12.5000	0.506	1.12	2.65	12800.0000	-1.00	5
374	10.279	0.305	0.0347	12.6000	0.506	1.12	2.65	14000.0000	-1.00	5
375	10.279	0.305	0.0351	13.8000	0.506	1.12	2.65	14300.0000	-1.00	5
376	15.432	0.305	0.0643	5.1000	0.506	1.12	2.65	3110.0000	-1.00	3
377	15.432	0.305	0.0628	5.3000	0.506	1.12	2.65	3700.0000	-1.00	3
378	15.432	0.305	0.0588	6.1000	0.506	1.12	2.65	4150.0000	-1.00	4
379	15.432	0.305	0.0576	6.2000	0.506	1.12	2.65	4050.0000	-1.00	4
380	15.432	0.305	0.0588	6.2000	0.506	1.12	2.65	4600.0000	-1.00	4
381	15.432	0.305	0.0536	8.3000	0.506	1.12	2.65	6900.0000	-1.00	0
382	15.432	0.305	0.0533	8.8000	0.506	1.12	2.65	6900.0000	-1.00	5
383	15.432	0.305	0.0509	10.2000	0.506	1.12	2.65	9600.0000	-1.00	5
384	15.432	0.305	0.0527	10.5000	0.506	1.12	2.65	9900.0000	-1.00	5
385	15.432	0.305	0.0497	10.9000	0.506	1.12	2.65	10700.0000	-1.00	5

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 8 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
386	15.432	0.305	0.0488	10.0000	0.506	1.12	2.65	11000.0000	-1.00	5
387	15.432	0.305	0.0506	11.2000	0.506	1.12	2.65	10700.0000	-1.00	5
388	15.432	0.305	0.0488	11.2000	0.506	1.12	2.65	10900.0000	-1.00	5
389	15.432	0.305	0.0451	12.8000	0.506	1.12	2.65	13300.0000	-1.00	5
390	15.432	0.305	0.0415	15.0000	0.506	1.12	2.65	17200.0000	-1.00	4
391	20.784	0.305	0.1765	1.3000	0.506	1.12	2.65	84.0000	-1.00	3
392	20.784	0.305	0.1737	1.6000	0.506	1.12	2.65	113.0000	-1.00	3
393	20.784	0.305	0.1637	1.4000	0.506	1.12	2.65	135.0000	-1.00	3
394	20.784	0.305	0.1423	2.7000	0.506	1.12	2.65	670.0000	-1.00	3
395	20.784	0.305	0.1259	3.2000	0.506	1.12	2.65	670.0000	-1.00	3
396	20.784	0.305	0.0981	3.4000	0.506	1.12	2.65	1950.0000	-1.00	3
397	20.784	0.305	0.0707	5.8000	0.506	1.12	2.65	3800.0000	-1.00	4
398	20.784	0.305	0.0735	5.8000	0.506	1.12	2.65	3900.0000	-1.00	4
399	20.784	0.305	0.0796	5.7000	0.506	1.12	2.65	5300.0000	-1.00	4
400	20.784	0.305	0.0759	6.1000	0.506	1.12	2.65	3700.0000	-1.00	4
401	20.784	0.305	0.0710	5.9000	0.506	1.12	2.65	4600.0000	-1.00	4
402	20.784	0.305	0.0674	8.1000	0.506	1.12	2.65	6350.0000	-1.00	4
403	20.784	0.305	0.0591	9.9000	0.506	1.12	2.65	8500.0000	-1.00	0
404	20.784	0.305	0.0619	10.1000	0.506	1.12	2.65	8700.0000	-1.00	5
405	20.784	0.305	0.0570	11.5000	0.506	1.12	2.65	11100.0000	-1.00	5
406	20.784	0.305	0.0607	12.9000	0.506	1.12	2.65	12800.0000	-1.00	4
407	31.686	0.305	0.0951	5.7000	0.506	1.12	2.65	3600.0000	-1.00	4
408	31.686	0.305	0.0930	6.6000	0.506	1.12	2.65	3850.0000	-1.00	4
409	31.686	0.305	0.0780	11.7000	0.506	1.12	2.65	10600.0000	-1.00	5
410	31.686	0.305	0.0771	12.2000	0.506	1.12	2.65	11000.0000	-1.00	5
411	5.154	0.402	0.0302	6.6000	0.506	1.12	2.65	2000.0000	-1.00	3
412	5.154	0.402	0.0305	7.0000	0.506	1.12	2.65	1510.0000	-1.00	3
413	5.154	0.402	0.0274	8.4000	0.506	1.12	2.65	2520.0000	-1.00	3
414	5.154	0.402	0.0232	9.8000	0.506	1.12	2.65	4100.0000	-1.00	3
415	5.154	0.402	0.0204	11.4000	0.506	1.12	2.65	5800.0000	-1.00	4
416	5.154	0.402	0.0204	12.4000	0.506	1.12	2.65	8300.0000	-1.00	4
417	5.154	0.402	0.0168	16.4000	0.506	1.12	2.65	11200.0000	-1.00	5
418	5.154	0.402	0.0122	20.8000	0.506	1.12	2.65	19200.0000	-1.00	4
419	5.154	0.402	0.0149	22.3000	0.506	1.12	2.65	23300.0000	-1.00	7
420	5.154	0.402	0.0171	21.0000	0.506	1.12	2.65	24400.0000	-1.00	7
421	5.154	0.402	0.0155	22.9000	0.506	1.12	2.65	25200.0000	-1.00	7
422	5.154	0.402	0.0137	23.4000	0.506	1.12	2.65	27200.0000	-1.00	7
423	10.279	0.402	0.0530	3.2000	0.506	1.12	2.65	850.0000	-1.00	3
424	10.279	0.402	0.0518	3.5000	0.506	1.12	2.65	860.0000	-1.00	3
425	10.279	0.402	0.0543	5.6000	0.506	1.12	2.65	2520.0000	-1.00	3
426	10.279	0.402	0.0387	5.6000	0.506	1.12	2.65	2560.0000	-1.00	3
427	10.279	0.402	0.0375	7.2000	0.506	1.12	2.65	3700.0000	-1.00	3
428	10.279	0.402	0.0372	7.9000	0.506	1.12	2.65	5000.0000	-1.00	3
429	10.279	0.402	0.0366	8.9000	0.506	1.12	2.65	5800.0000	-1.00	4
430	10.279	0.402	0.0323	10.7000	0.506	1.12	2.65	8300.0000	-1.00	5
431	10.279	0.402	0.0317	12.3000	0.506	1.12	2.65	10800.0000	-1.00	5
432	10.279	0.402	0.0305	12.7000	0.506	1.12	2.65	11400.0000	-1.00	5
433	10.279	0.402	0.0296	13.2000	0.506	1.12	2.65	12600.0000	-1.00	5
434	10.279	0.402	0.0259	13.3000	0.506	1.12	2.65	12500.0000	-1.00	5
435	10.279	0.402	0.0274	14.6000	0.506	1.12	2.65	15000.0000	-1.00	4
436	10.279	0.402	0.0271	14.4000	0.506	1.12	2.65	15300.0000	-1.00	4
437	15.432	0.402	0.0567	5.6000	0.506	1.12	2.65	2340.0000	-1.00	3
438	15.432	0.402	0.0524	6.2000	0.506	1.12	2.65	3550.0000	-1.00	3
439	15.432	0.402	0.0463	6.9000	0.506	1.12	2.65	5100.0000	-1.00	3
440	15.432	0.402	0.0463	8.3000	0.506	1.12	2.65	6200.0000	-1.00	4

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 9 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
441	15.432	0.402	0.0430	8.5000	0.506	1.12	2.65	7650.0000	-1.00	5
442	15.432	0.402	0.0402	11.0000	0.506	1.12	2.65	10300.0000	-1.00	5
443	15.432	0.402	0.0360	13.7000	0.506	1.12	2.65	13600.0000	-1.00	4
444	20.784	0.402	0.1268	1.6000	0.506	1.12	2.65	215.9998	-1.00	3
445	20.784	0.402	0.0988	2.0000	0.506	1.12	2.65	670.0000	-1.00	3
446	20.784	0.402	0.0890	3.5000	0.506	1.12	2.65	1400.0000	-1.00	3
447	20.784	0.402	0.0640	5.1000	0.506	1.12	2.65	2600.0000	-1.00	3
448	20.784	0.402	0.0652	5.0000	0.506	1.12	2.65	2800.0000	-1.00	3
449	20.784	0.402	0.0576	5.5000	0.506	1.12	2.65	3600.0000	-1.00	0
450	20.784	0.402	0.0567	6.5000	0.506	1.12	2.65	5050.0000	-1.00	4
451	20.784	0.402	0.0357	7.5000	0.506	1.12	2.65	5400.0000	-1.00	0
452	20.784	0.402	0.0558	7.3000	0.506	1.12	2.65	5800.0000	-1.00	0
453	20.784	0.402	0.0509	8.7000	0.506	1.12	2.65	7650.0000	-1.00	5
454	20.784	0.402	0.0497	10.5000	0.506	1.12	2.65	10900.0000	-1.00	5
455	20.784	0.402	0.0454	11.5000	0.506	1.12	2.65	12100.0000	-1.00	5
456	20.784	0.402	0.0436	13.7000	0.506	1.12	2.65	14800.0000	-1.00	4
457	10.279	0.597	0.0430	3.5000	0.506	1.12	2.65	992.9998	-1.00	3
458	10.279	0.597	0.0323	5.9000	0.506	1.12	2.65	1555.9998	-1.00	3
459	10.279	0.597	0.0344	7.1000	0.506	1.12	2.65	2480.0000	-1.00	3
460	10.279	0.597	0.0305	9.0000	0.506	1.12	2.65	3890.0000	-1.00	4
461	10.279	0.597	0.0271	9.9000	0.506	1.12	2.65	5830.0000	-1.00	4
462	10.279	0.597	0.0244	10.9000	0.506	1.12	2.65	7480.0000	-1.00	4
463	10.279	0.597	0.0238	12.1000	0.506	1.12	2.65	8750.0000	-1.00	5
464	10.279	0.597	0.0204	14.1000	0.506	1.12	2.65	12050.0000	-1.00	5
465	10.279	0.597	0.0192	16.3000	0.506	1.12	2.65	15840.0000	-1.00	4
466	10.279	0.597	0.0195	16.7000	0.506	1.12	2.65	17000.0000	-1.00	4
467	10.279	0.597	0.0204	18.5000	0.506	1.12	2.65	19750.0000	-1.00	4
468	10.279	0.597	0.0186	19.3000	0.506	1.12	2.65	22100.0000	-1.00	4
469	10.279	0.597	0.0183	20.3000	0.506	1.12	2.65	22100.0000	-1.00	4
470	15.432	0.597	0.0451	5.6000	0.506	1.12	2.65	1950.0000	-1.00	3
471	15.432	0.597	0.0387	7.0000	0.506	1.12	2.65	3600.0000	-1.00	3
472	15.432	0.597	0.0344	7.9000	0.506	1.12	2.65	5100.0000	-1.00	3
473	15.432	0.597	0.0351	9.2000	0.506	1.12	2.65	6500.0000	-1.00	4
474	15.432	0.597	0.0305	10.7000	0.506	1.12	2.65	8900.0000	-1.00	5
475	15.432	0.597	0.0299	11.0000	0.506	1.12	2.65	10700.0000	-1.00	5
476	15.432	0.597	0.0287	13.4000	0.506	1.12	2.65	13600.0000	-1.00	4
477	15.432	0.597	0.0287	13.8000	0.506	1.12	2.65	15600.0000	-1.00	4
478	15.432	0.597	0.0244	15.8000	0.506	1.12	2.65	17200.0000	-1.00	4
479	15.432	0.597	0.0216	18.5000	0.506	1.12	2.65	20800.0000	-1.00	7
480	20.784	0.597	0.0594	4.4000	0.506	1.12	2.65	1640.0000	-1.00	3
481	20.784	0.597	0.0637	4.0000	0.506	1.12	2.65	1850.0000	-1.00	3
482	20.784	0.597	0.0539	3.7000	0.506	1.12	2.65	2360.0000	-1.00	3
483	20.784	0.597	0.0521	4.9000	0.506	1.12	2.65	2640.0000	-1.00	3
484	20.784	0.597	0.0491	6.1000	0.506	1.12	2.65	3180.0000	-1.00	3
485	20.784	0.597	0.0533	5.8000	0.506	1.12	2.65	3400.0000	-1.00	3
486	20.784	0.597	0.0472	6.1000	0.506	1.12	2.65	3500.0000	-1.00	3
487	20.784	0.597	0.0472	6.0000	0.506	1.12	2.65	4200.0000	-1.00	4
488	20.784	0.597	0.0442	6.9000	0.506	1.12	2.65	5350.0000	-1.00	4
489	20.784	0.597	0.0448	7.5000	0.506	1.12	2.65	4600.0000	-1.00	3
490	20.784	0.597	0.0424	9.2000	0.506	1.12	2.65	8000.0000	-1.00	4
491	20.784	0.597	0.0357	11.7000	0.506	1.12	2.65	11600.0000	-1.00	5
492	20.784	0.597	0.0344	12.2000	0.506	1.12	2.65	12500.0000	-1.00	5
493	20.784	0.597	0.0323	13.1000	0.506	1.12	2.65	14500.0000	-1.00	4
494	20.784	0.597	0.0320	15.3000	0.506	1.12	2.65	16100.0000	-1.00	7
495	31.686	0.597	0.0677	5.3000	0.506	1.12	2.65	2840.0000	-1.00	3

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 10 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
496	31.686	0.597	0.0625	6.0000	0.506	1.12	2.65	3640.0000	-1.00	0
497	31.686	0.597	0.0616	6.4000	0.506	1.12	2.65	4100.0000	-1.00	5
498	31.686	0.597	0.0549	5.5000	0.506	1.12	2.65	4260.0000	-1.00	5
499	31.686	0.597	0.0597	6.5000	0.506	1.12	2.65	4420.0000	-1.00	0
500	31.686	0.597	0.0607	7.9000	0.506	1.12	2.65	4400.0000	-1.00	5
501	31.686	0.597	0.0585	7.1000	0.506	1.12	2.65	4570.0000	-1.00	5
502	31.686	0.597	0.0543	7.8000	0.506	1.12	2.65	6800.0000	-1.00	5
503	31.686	0.597	0.0521	7.8000	0.506	1.12	2.65	8000.0000	-1.00	5
504	31.686	0.597	0.0506	9.7000	0.506	1.12	2.65	10400.0000	-1.00	5
505	31.686	0.597	0.0463	10.3000	0.506	1.12	2.65	11400.0000	-1.00	5
506	2.633	0.201	0.0235	8.0000	0.786	1.13	2.65	2010.0000	-1.00	3
507	2.633	0.201	0.0235	9.4000	0.786	1.13	2.65	3070.0000	-1.00	3
508	2.633	0.201	0.0229	11.9000	0.786	1.13	2.65	4940.0000	-1.00	4
509	2.633	0.201	0.0232	13.9000	0.786	1.13	2.65	7600.0000	-1.00	4
510	2.633	0.201	0.0192	16.8000	0.786	1.13	2.65	8000.0000	-1.00	5
511	2.633	0.201	0.0177	18.3000	0.786	1.13	2.65	11000.0000	-1.00	5
512	2.633	0.201	0.0186	18.8000	0.786	1.13	2.65	13600.0000	-1.00	5
513	2.633	0.201	0.0192	19.8000	0.786	1.13	2.65	17100.0000	-1.00	5
514	2.633	0.201	0.0171	22.5000	0.786	1.13	2.65	17800.0000	-1.00	5
515	2.633	0.201	0.0171	24.7000	0.786	1.13	2.65	23500.0000	-1.00	5
516	5.154	0.201	0.0506	3.9000	0.786	1.13	2.65	1180.0000	-1.00	3
517	5.154	0.201	0.0448	7.7000	0.786	1.13	2.65	2720.0000	-1.00	3
518	5.154	0.201	0.0411	8.2000	0.786	1.13	2.65	3300.0000	-1.00	3
519	5.154	0.201	0.0375	9.5000	0.786	1.13	2.65	4500.0000	-1.00	4
520	5.154	0.201	0.0320	11.0000	0.786	1.13	2.65	5800.0000	-1.00	4
521	5.154	0.201	0.0329	12.6000	0.786	1.13	2.65	9100.0000	-1.00	5
522	5.154	0.201	0.0329	14.0000	0.786	1.13	2.65	10300.0000	-1.00	5
523	5.154	0.201	0.0274	19.5000	0.786	1.13	2.65	16100.0000	-1.00	5
524	5.154	0.201	0.0274	21.0000	0.786	1.13	2.65	21000.0000	-1.00	5
525	5.154	0.201	0.0274	22.6000	0.786	1.13	2.65	23500.0000	-1.00	5
526	5.154	0.201	0.0283	22.8000	0.786	1.13	2.65	24700.0000	-1.00	5
527	5.154	0.201	0.0274	23.9000	0.786	1.13	2.65	26000.0000	-1.00	5
528	15.432	0.201	0.1414	1.9000	0.786	1.13	2.65	510.9998	-1.00	3
529	15.432	0.201	0.1295	2.0000	0.786	1.13	2.65	595.9998	-1.00	3
530	15.432	0.201	0.1164	5.1000	0.786	1.13	2.65	1130.0000	-1.00	3
531	15.432	0.201	0.0981	5.7000	0.786	1.13	2.65	1900.0000	-1.00	0
532	15.432	0.201	0.0963	6.4000	0.786	1.13	2.65	2300.0000	-1.00	0
533	15.432	0.201	0.0814	8.1000	0.786	1.13	2.65	4150.0000	-1.00	4
534	15.432	0.201	0.0722	9.6000	0.786	1.13	2.65	6000.0000	-1.00	5
535	15.432	0.201	0.0661	12.5000	0.786	1.13	2.65	9400.0000	-1.00	5
536	15.432	0.201	0.0643	14.2000	0.786	1.13	2.65	11100.0000	-1.00	5
537	15.432	0.201	0.0616	15.5000	0.786	1.13	2.65	13100.0000	-1.00	5
538	15.432	0.201	0.0637	15.8000	0.786	1.13	2.65	13500.0000	-1.00	5
539	15.432	0.201	0.0582	15.7000	0.786	1.13	2.65	14100.0000	-1.00	5
540	15.432	0.201	0.0539	16.5000	0.786	1.13	2.65	15000.0000	-1.00	5
541	15.432	0.201	0.0597	19.8000	0.786	1.13	2.65	21400.0000	-1.00	5
542	5.154	0.305	0.0335	6.9000	0.786	1.13	2.65	1840.0000	-1.00	3
543	5.154	0.305	0.0305	8.4000	0.786	1.13	2.65	3100.0000	-1.00	3
544	5.154	0.305	0.0287	10.6000	0.786	1.13	2.65	4270.0000	-1.00	4
545	5.154	0.305	0.0302	10.8000	0.786	1.13	2.65	5200.0000	-1.00	4
546	5.154	0.305	0.0268	11.4000	0.786	1.13	2.65	5400.0000	-1.00	4
547	5.154	0.305	0.0262	13.4000	0.786	1.13	2.65	9300.0000	-1.00	4
548	5.154	0.305	0.0250	13.9000	0.786	1.13	2.65	9500.0000	-1.00	5
549	5.154	0.305	0.0216	15.7000	0.786	1.13	2.65	10900.0000	-1.00	5
550	5.154	0.305	0.0201	18.3000	0.786	1.13	2.65	15500.0000	-1.00	5

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 11 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
551	5.154	0.305	0.0213	20.9000	0.786	1.13	2.65	19000.0000	-1.00	5
552	5.154	0.305	0.0201	23.3000	0.786	1.13	2.65	21100.0000	-1.00	5
553	5.154	0.305	0.0189	25.5000	0.786	1.13	2.65	24400.0000	-1.00	5
554	5.154	0.305	0.0195	27.5000	0.786	1.13	2.65	29500.0000	-1.00	5
555	10.279	0.305	0.1274	0.3700	0.786	1.13	2.65	0.0	-1.00	3
556	10.279	0.305	0.0881	1.8000	0.786	1.13	2.65	198.9998	-1.00	3
557	10.279	0.305	0.0872	1.8000	0.786	1.13	2.65	185.0000	-1.00	3
558	10.279	0.305	0.0768	2.5000	0.786	1.13	2.65	550.0000	-1.00	3
559	10.279	0.305	0.0683	3.5000	0.786	1.13	2.65	1170.0000	-1.00	3
560	10.279	0.305	0.0698	4.2000	0.786	1.13	2.65	1170.0000	-1.00	3
561	10.279	0.305	0.0607	5.7000	0.786	1.13	2.65	2240.0000	-1.00	3
562	10.279	0.305	0.0518	6.5000	0.786	1.13	2.65	2700.0000	-1.00	3
563	10.279	0.305	0.0500	8.0000	0.786	1.13	2.65	3400.0000	-1.00	4
564	10.279	0.305	0.0415	11.4000	0.786	1.13	2.65	8350.0000	-1.00	5
565	10.279	0.305	0.0366	13.2000	0.786	1.13	2.65	10900.0000	-1.00	5
566	10.279	0.305	0.0354	14.4000	0.786	1.13	2.65	12600.0000	-1.00	5
567	10.279	0.305	0.0357	14.9000	0.786	1.13	2.65	13700.0000	-1.00	5
568	10.279	0.305	0.0351	16.5000	0.786	1.13	2.65	16500.0000	-1.00	5
569	10.279	0.305	0.0314	17.5000	0.786	1.13	2.65	17600.0000	-1.00	5
570	10.279	0.305	0.0302	19.5000	0.786	1.13	2.65	22300.0000	-1.00	5
571	10.279	0.305	0.0299	21.0000	0.786	1.13	2.65	25000.0000	-1.00	5
572	15.432	0.305	0.0732	5.3000	0.786	1.13	2.65	2000.0000	-1.00	0
573	15.432	0.305	0.0735	5.5000	0.786	1.13	2.65	2050.0000	-1.00	0
574	15.432	0.305	0.0570	7.8000	0.786	1.13	2.65	4300.0000	-1.00	4
575	15.432	0.305	0.0506	11.1000	0.786	1.13	2.65	9300.0000	-1.00	5
576	15.432	0.305	0.0494	12.6000	0.786	1.13	2.65	10900.0000	-1.00	5
577	15.432	0.305	0.0415	15.8000	0.786	1.13	2.65	14800.0000	-1.00	5
578	15.432	0.305	0.0415	16.1000	0.786	1.13	2.65	16600.0000	-1.00	5
579	15.432	0.305	0.0427	16.2000	0.786	1.13	2.65	18200.0000	-1.00	5
580	15.432	0.305	0.0415	17.4000	0.786	1.13	2.65	20000.0000	-1.00	5
581	15.432	0.305	0.0415	19.1000	0.786	1.13	2.65	22000.0000	-1.00	5
582	20.784	0.305	0.1469	2.1000	0.786	1.13	2.65	295.9998	-1.00	3
583	20.784	0.305	0.1253	3.2000	0.786	1.13	2.65	745.0000	-1.00	3
584	20.784	0.305	0.1250	3.8000	0.786	1.13	2.65	1030.0000	-1.00	3
585	20.784	0.305	0.0869	6.1000	0.786	1.13	2.65	985.9998	-1.00	3
586	20.784	0.305	0.0762	6.1000	0.786	1.13	2.65	3200.0000	-1.00	3
587	20.784	0.305	0.0735	7.5000	0.786	1.13	2.65	4000.0000	-1.00	5
588	20.784	0.305	0.0671	8.3000	0.786	1.13	2.65	5200.0000	-1.00	4
589	20.784	0.305	0.0628	9.8000	0.786	1.13	2.65	8200.0000	-1.00	5
590	20.784	0.305	0.0604	10.9000	0.786	1.13	2.65	9100.0000	-1.00	5
591	20.784	0.305	0.0594	11.9000	0.786	1.13	2.65	9300.0000	-1.00	5
592	20.784	0.305	0.0576	13.9000	0.786	1.13	2.65	12700.0000	-1.00	5
593	20.784	0.305	0.0564	14.6000	0.786	1.13	2.65	14100.0000	-1.00	5
594	20.784	0.305	0.0533	17.3000	0.786	1.13	2.65	17000.0000	-1.00	5
595	20.784	0.305	0.0494	17.6000	0.786	1.13	2.65	18140.0000	-1.00	5
596	10.279	0.402	0.0427	3.0000	0.786	1.13	2.65	970.0000	-1.00	3
597	10.279	0.402	0.0521	3.4000	0.786	1.13	2.65	1020.0000	-1.00	3
598	10.279	0.402	0.0469	6.8000	0.786	1.13	2.65	2350.0000	-1.00	3
599	10.279	0.402	0.0378	10.0000	0.786	1.13	2.65	5400.0000	-1.00	3
600	10.279	0.402	0.0393	10.5000	0.786	1.13	2.65	5700.0000	-1.00	3
601	10.279	0.402	0.0326	12.5000	0.786	1.13	2.65	9200.0000	-1.00	0
602	10.279	0.402	0.0338	12.5000	0.786	1.13	2.65	9680.0000	-1.00	5
603	10.279	0.402	0.0274	15.4000	0.786	1.13	2.65	14100.0000	-1.00	5
604	10.279	0.402	0.0287	15.7000	0.786	1.13	2.65	14700.0000	-1.00	5
605	10.279	0.402	0.0271	16.7000	0.786	1.13	2.65	16000.0000	-1.00	5

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 12 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
606	10.279	0.402	0.0268	18.9000	0.786	1.13	2.65	20900.0000	-1.00	5
607	10.279	0.402	0.0265	19.1000	0.786	1.13	2.65	21900.0000	-1.00	5
608	20.784	0.402	0.1079	3.4000	0.786	1.13	2.65	770.0000	-1.00	3
609	20.784	0.402	0.0927	3.7000	0.786	1.13	2.65	1130.0000	-1.00	3
610	20.784	0.402	0.0692	5.2000	0.786	1.13	2.65	2200.0000	-1.00	3
611	20.784	0.402	0.0756	5.8000	0.786	1.13	2.65	2400.0000	-1.00	3
612	20.784	0.402	0.0704	6.1000	0.786	1.13	2.65	2400.0000	-1.00	3
613	20.784	0.402	0.0616	6.2000	0.786	1.13	2.65	2650.0000	-1.00	0
614	20.784	0.402	0.0613	5.5000	0.786	1.13	2.65	3320.0000	-1.00	0
615	20.784	0.402	0.0695	7.0000	0.786	1.13	2.65	3050.0000	-1.00	0
616	20.784	0.402	0.0585	7.8000	0.786	1.13	2.65	3800.0000	-1.00	0
617	20.784	0.402	0.0552	6.7000	0.786	1.13	2.65	4160.0000	-1.00	0
618	20.784	0.402	0.0500	10.0000	0.786	1.13	2.65	8200.0000	-1.00	5
619	20.784	0.402	0.0512	9.9000	0.786	1.13	2.65	9100.0000	-1.00	5
620	20.784	0.402	0.0475	11.5000	0.786	1.13	2.65	9600.0000	-1.00	5
621	20.784	0.402	0.0463	11.7000	0.786	1.13	2.65	9400.0000	-1.00	5
622	5.154	0.201	0.0381	12.0000	1.710	1.34	2.65	4400.0000	-1.00	3
623	5.154	0.201	0.0357	12.7000	1.710	1.34	2.65	4400.0000	-1.00	0
624	5.154	0.201	0.0351	14.3000	1.710	1.34	2.65	5700.0000	-1.00	4
625	5.154	0.201	0.0351	14.8000	1.710	1.34	2.65	6000.0000	-1.00	0
626	5.154	0.201	0.0347	15.6000	1.710	1.34	2.65	5900.0000	-1.00	0
627	10.279	0.201	0.0610	10.4000	1.710	1.34	2.65	3360.0000	-1.00	4
628	10.279	0.201	0.0600	12.7000	1.710	1.34	2.65	4400.0000	-1.00	4
629	10.279	0.201	0.0610	12.6000	1.710	1.34	2.65	4600.0000	-1.00	0
630	10.279	0.201	0.0564	12.9000	1.710	1.34	2.65	4700.0000	-1.00	0
631	20.784	0.201	0.1134	10.3000	1.710	1.34	2.65	2290.0000	-1.00	3
632	20.784	0.201	0.1180	10.9000	1.710	1.34	2.65	2360.0000	-1.00	3
633	31.686	0.201	0.1713	5.6000	1.710	1.34	2.65	1490.0000	-1.00	3
634	5.154	0.305	0.0287	11.1000	1.710	1.34	2.65	3700.0000	-1.00	0
635	5.154	0.305	0.0265	11.2000	1.710	1.34	2.65	3700.0000	-1.00	0
636	5.154	0.305	0.0247	18.0000	1.710	1.34	2.65	8800.0000	-1.00	0
637	5.154	0.305	0.0235	18.0000	1.710	1.34	2.65	9100.0000	-1.00	0
638	5.154	0.305	0.0283	19.4000	1.710	1.34	2.65	9700.0000	-1.00	0
639	10.279	0.305	0.0844	2.2000	1.710	1.34	2.65	240.0000	-1.00	3
640	10.279	0.305	0.0738	2.5000	1.710	1.34	2.65	210.0000	-1.00	3
641	10.279	0.305	0.0655	4.4000	1.710	1.34	2.65	700.0000	-1.00	0
642	10.279	0.305	0.0634	4.4000	1.710	1.34	2.65	700.0000	-1.00	0
643	10.279	0.305	0.0509	8.7000	1.710	1.34	2.65	2230.0000	-1.00	4
644	10.279	0.305	0.0344	18.3000	1.710	1.34	2.65	9700.0000	-1.00	4
645	10.279	0.305	0.0351	23.0000	1.710	1.34	2.65	15000.0000	-1.00	4
646	20.784	0.305	0.1362	1.9000	1.710	1.34	2.65	91.0000	-1.00	3
647	20.784	0.305	0.1399	1.8000	1.710	1.34	2.65	137.0000	-1.00	3
648	20.784	0.305	0.1228	2.9000	1.710	1.34	2.65	273.9998	-1.00	3
649	20.784	0.305	0.1241	2.6000	1.710	1.34	2.65	410.0000	-1.00	3
650	20.784	0.305	0.1106	4.6000	1.710	1.34	2.65	980.0000	-1.00	3
651	20.784	0.305	0.0924	4.8000	1.710	1.34	2.65	980.0000	-1.00	3
652	20.784	0.305	0.0917	4.7000	1.710	1.34	2.65	1200.0000	-1.00	3
653	20.784	0.305	0.0988	7.3000	1.710	1.34	2.65	2060.0000	-1.00	3
654	20.784	0.305	0.0994	7.4000	1.710	1.34	2.65	2110.0000	-1.00	3
655	20.784	0.305	0.0832	8.4000	1.710	1.34	2.65	2210.0000	-1.00	3
656	20.784	0.305	0.0719	11.9000	1.710	1.34	2.65	4200.0000	-1.00	4
657	20.784	0.305	0.0680	12.3000	1.710	1.34	2.65	4700.0000	-1.00	0
658	20.784	0.305	0.0570	14.6000	1.710	1.34	2.65	6660.0000	-1.00	0
659	20.784	0.305	0.0576	14.9000	1.710	1.34	2.65	7000.0000	-1.00	0
660	31.686	0.305	0.1158	5.2000	1.710	1.34	2.65	1530.0000	-1.00	0

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 13 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
661	31.686	0.305	0.1237	5.9000	1.710	1.34	2.65	1530.0000	-1.00	0
662	10.279	0.402	0.0399	6.7000	1.710	1.34	2.65	1950.0000	-1.00	3
663	10.279	0.402	0.0393	7.3000	1.710	1.34	2.65	1950.0000	-1.00	3
664	10.279	0.402	0.0296	17.8000	1.710	1.34	2.65	8650.0000	-1.00	0
665	20.784	0.402	0.0728	6.0000	1.710	1.34	2.65	1590.0000	-1.00	3
666	20.784	0.402	0.0604	11.0000	1.710	1.34	2.65	4140.0000	-1.00	0
667	20.784	0.402	0.0643	11.2000	1.710	1.34	2.65	4140.0000	-1.00	0
668	31.686	0.402	0.0988	5.8000	1.710	1.34	2.65	1510.0000	-1.00	3
669	31.686	0.402	0.0966	6.2000	1.710	1.34	2.65	1570.0000	-1.00	3
670	5.154	0.201	0.0360	12.9000	3.170	1.13	2.65	2130.0000	-1.00	5
671	5.154	0.201	0.0393	13.1000	3.170	1.13	2.65	2230.0000	-1.00	5
672	5.154	0.201	0.0311	25.1000	3.170	1.13	2.65	10700.0000	-1.00	5
673	5.154	0.201	0.0323	25.0000	3.170	1.13	2.65	10700.0000	-1.00	5
674	10.279	0.201	0.0631	11.2000	3.170	1.13	2.65	2530.0000	-1.00	5
675	10.279	0.201	0.0622	11.3000	3.170	1.13	2.65	2530.0000	-1.00	5
676	10.279	0.201	0.0536	18.9000	3.170	1.13	2.65	7300.0000	-1.00	0
677	10.279	0.201	0.0518	19.6000	3.170	1.13	2.65	6900.0000	-1.00	0
678	20.784	0.201	0.1055	9.7000	3.170	1.13	2.65	1730.0000	-1.00	3
679	20.784	0.201	0.1036	10.0000	3.170	1.13	2.65	1750.0000	-1.00	3
680	5.154	0.305	0.0274	13.6000	3.170	1.13	2.65	1320.0000	-1.00	5
681	5.154	0.305	0.0238	24.9000	3.170	1.13	2.65	8050.0000	-1.00	5
682	5.154	0.305	0.0244	25.3000	3.170	1.13	2.65	8250.0000	-1.00	5
683	10.279	0.305	0.0488	8.5000	3.170	1.13	2.65	950.0000	-1.00	5
684	10.279	0.305	0.0491	9.1000	3.170	1.13	2.65	970.0000	-1.00	5
685	10.279	0.305	0.0390	16.5000	3.170	1.13	2.65	4760.0000	-1.00	5
686	10.279	0.305	0.0396	17.0000	3.170	1.13	2.65	4960.0000	-1.00	5
687	10.279	0.305	0.0427	16.8000	3.170	1.13	2.65	5200.0000	-1.00	5
688	20.784	0.305	0.0817	7.7000	3.170	1.13	2.65	1230.0000	-1.00	3
689	20.784	0.305	0.0808	7.7000	3.170	1.13	2.65	1230.0000	-1.00	3
690	20.784	0.305	0.0661	15.2000	3.170	1.13	2.65	4850.0000	-1.00	3
691	20.784	0.305	0.0643	16.0000	3.170	1.13	2.65	5250.0000	-1.00	3
692	31.686	0.305	0.1006	8.0000	3.170	1.13	2.65	1660.0000	-1.00	3
693	31.686	0.305	0.1045	8.5000	3.170	1.13	2.65	1710.0000	-1.00	3
694	10.279	0.402	0.0354	11.6000	3.170	1.13	2.65	2040.0000	-1.00	5
695	10.279	0.402	0.0360	12.1000	3.170	1.13	2.65	2040.0000	-1.00	5
696	10.279	0.402	0.0347	20.5000	3.170	1.13	2.65	6700.0000	-1.00	4
697	10.279	0.402	0.0329	20.7000	3.170	1.13	2.65	6900.0000	-1.00	4
698	20.784	0.402	0.0646	8.3000	3.170	1.13	2.65	1260.0000	-1.00	3
699	20.784	0.402	0.0637	8.5000	3.170	1.13	2.65	1280.0000	-1.00	3
700	20.784	0.402	0.0655	8.6000	3.170	1.13	2.65	1280.0000	-1.00	3
701	20.784	0.402	0.0536	14.8000	3.170	1.13	2.65	5000.0000	-1.00	0
702	20.784	0.402	0.0549	15.8000	3.170	1.13	2.65	5050.0000	-1.00	0
703	31.686	0.402	0.0838	7.4000	3.170	1.13	2.65	1700.0000	-1.00	3
704	31.686	0.402	0.0878	8.4000	3.170	1.13	2.65	1700.0000	-1.00	3
705	31.686	0.402	0.0866	8.4000	3.170	1.13	2.65	1880.0000	-1.00	3
706	10.279	0.201	0.0604	11.1000	4.938	1.13	2.65	1020.0000	-1.00	0
707	10.279	0.201	0.0567	14.4000	4.938	1.13	2.65	2400.0000	-1.00	0
708	10.279	0.201	0.0585	14.8000	4.938	1.13	2.65	2600.0000	-1.00	0
709	10.279	0.201	0.0533	18.2000	4.938	1.13	2.65	4750.0000	-1.00	0
710	10.279	0.201	0.0533	19.0000	4.938	1.13	2.65	4860.0000	-1.00	0
711	10.279	0.201	0.0488	25.6000	4.938	1.13	2.65	9730.0000	-1.00	0
712	10.279	0.201	0.0482	27.0000	4.938	1.13	2.65	10000.0000	-1.00	0
713	20.784	0.201	0.1137	6.8000	4.938	1.13	2.65	445.0000	-1.00	0
714	20.784	0.201	0.1109	7.0000	4.938	1.13	2.65	505.0000	-1.00	0
715	20.784	0.201	0.1042	9.5000	4.938	1.13	2.65	1230.0000	-1.00	0

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 14 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
716	20.784	0.201	0.0981	11.9000	4.938	1.13	2.65	2350.0000	-1.00	0
717	20.784	0.201	0.0988	11.9000	4.938	1.13	2.65	2350.0000	-1.00	0
718	20.784	0.201	0.0890	17.1000	4.938	1.13	2.65	5050.0000	-1.00	0
719	20.784	0.201	0.0796	24.3000	4.938	1.13	2.65	9900.0000	-1.00	0
720	20.784	0.201	0.0805	23.5000	4.938	1.13	2.65	10300.0000	-1.00	0
721	31.686	0.201	0.1701	6.2000	4.938	1.13	2.65	346.9998	-1.00	0
722	31.686	0.201	0.1402	9.8000	4.938	1.13	2.65	1580.0000	-1.00	0
723	31.686	0.201	0.1375	10.2000	4.938	1.13	2.65	1640.0000	-1.00	0
724	31.686	0.201	0.1262	13.5000	4.938	1.13	2.65	3060.0000	-1.00	0
725	31.686	0.201	0.1253	13.2000	4.938	1.13	2.65	3370.0000	-1.00	0
726	31.686	0.201	0.1140	19.7000	4.938	1.13	2.65	6520.0000	-1.00	0
727	31.686	0.201	0.1152	19.5000	4.938	1.13	2.65	6600.0000	-1.00	0
728	31.686	0.201	0.1079	24.0000	4.938	1.13	2.65	9700.0000	-1.00	0
729	10.279	0.305	0.0436	12.7000	4.938	1.13	2.65	970.0000	-1.00	5
730	10.279	0.305	0.0424	14.8000	4.938	1.13	2.65	2000.0000	-1.00	5
731	10.279	0.305	0.0415	16.1000	4.938	1.13	2.65	2430.0000	-1.00	5
732	10.279	0.305	0.0430	16.2000	4.938	1.13	2.65	2600.0000	-1.00	5
733	10.279	0.305	0.0402	17.6000	4.938	1.13	2.65	3300.0000	-1.00	5
734	10.279	0.305	0.0393	20.9000	4.938	1.13	2.65	4910.0000	-1.00	5
735	10.279	0.305	0.0347	27.4000	4.938	1.13	2.65	9740.0000	-1.00	0
736	20.784	0.305	0.0829	7.8000	4.938	1.13	2.65	515.0000	-1.00	5
737	20.784	0.305	0.0756	8.6000	4.938	1.13	2.65	960.0000	-1.00	5
738	20.784	0.305	0.0756	9.5000	4.938	1.13	2.65	1200.0000	-1.00	5
739	20.784	0.305	0.0765	9.7000	4.938	1.13	2.65	1250.0000	-1.00	5
740	20.784	0.305	0.0716	12.7000	4.938	1.13	2.65	2400.0000	-1.00	5
741	20.784	0.305	0.0652	16.9000	4.938	1.13	2.65	4800.0000	-1.00	5
742	20.784	0.305	0.0579	23.0000	4.938	1.13	2.65	9380.0000	-1.00	0
743	20.784	0.305	0.0582	23.7000	4.938	1.13	2.65	9930.0000	-1.00	0
744	10.279	0.402	0.0351	19.0000	4.938	1.13	2.65	2380.0000	-1.00	0
745	10.279	0.402	0.0317	19.7000	4.938	1.13	2.65	2480.0000	-1.00	0
746	10.279	0.402	0.0329	22.5000	4.938	1.13	2.65	4900.0000	-1.00	0
747	10.279	0.402	0.0320	23.4000	4.938	1.13	2.65	4800.0000	-1.00	0
748	10.279	0.402	0.0283	30.2000	4.938	1.13	2.65	9400.0000	-1.00	0
749	10.279	0.402	0.0296	31.0000	4.938	1.13	2.65	10700.0000	-1.00	0
750	31.686	0.305	0.1186	6.4000	4.938	1.13	2.65	315.0000	-1.00	5
751	31.686	0.305	0.1088	6.6000	4.938	1.13	2.65	770.0000	-1.00	0
752	31.686	0.305	0.1094	6.7000	4.938	1.13	2.65	790.0000	-1.00	0
753	31.686	0.305	0.0988	9.7000	4.938	1.13	2.65	1610.0000	-1.00	0
754	31.686	0.305	0.0994	9.0000	4.938	1.13	2.65	1640.0000	-1.00	0
755	31.686	0.305	0.0939	12.2000	4.938	1.13	2.65	3180.0000	-1.00	0
756	31.686	0.305	0.0936	13.1000	4.938	1.13	2.65	3220.0000	-1.00	0
757	31.686	0.305	0.0838	17.8000	4.938	1.13	2.65	6600.0000	-1.00	0
758	31.686	0.305	0.0768	20.4000	4.938	1.13	2.65	9500.0000	-1.00	0
759	31.686	0.305	0.0771	22.1000	4.938	1.13	2.65	9700.0000	-1.00	0
760	20.784	0.402	0.0640	8.2000	4.938	1.13	2.65	460.0000	-1.00	0
761	20.784	0.402	0.0640	8.2000	4.938	1.13	2.65	530.0000	-1.00	0
762	20.784	0.402	0.0591	10.8000	4.938	1.13	2.65	1180.0000	-1.00	0
763	20.784	0.402	0.0610	11.4000	4.938	1.13	2.65	1250.0000	-1.00	0
764	20.784	0.402	0.0588	14.1000	4.938	1.13	2.65	2450.0000	-1.00	0
765	20.784	0.402	0.0521	18.2000	4.938	1.13	2.65	4900.0000	-1.00	0
766	20.784	0.402	0.0497	24.4000	4.938	1.13	2.65	9690.0000	-1.00	0
767	31.686	0.402	0.0905	7.1000	4.938	1.13	2.65	380.0000	-1.00	0
768	31.686	0.402	0.0823	9.0000	4.938	1.13	2.65	1530.0000	-1.00	0
769	31.686	0.402	0.0796	10.7000	4.938	1.13	2.65	1860.0000	-1.00	0
770	31.686	0.402	0.0756	13.1000	4.938	1.13	2.65	3050.0000	-1.00	0

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 15 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
771	31.686	0.402	0.0747	14.0000	4.938	1.13	2.65	3300.0000	-1.00	0
772	31.686	0.402	0.0701	18.3000	4.938	1.13	2.65	6260.0000	-1.00	0
773	31.686	0.402	0.0613	21.7000	4.938	1.13	2.65	9100.0000	-1.00	0
774	31.686	0.402	0.0616	22.6000	4.938	1.13	2.65	9560.0000	-1.00	0
775	10.279	0.201	0.0561	14.9000	7.010	1.12	2.65	930.0000	-1.00	0
776	10.279	0.201	0.0561	15.8000	7.010	1.12	2.65	1070.0000	-1.00	0
777	10.279	0.201	0.0558	18.0000	7.010	1.12	2.65	1850.0000	-1.00	0
778	10.279	0.201	0.0527	18.4000	7.010	1.12	2.65	2090.0000	-1.00	0
779	10.279	0.201	0.0509	24.3000	7.010	1.12	2.65	5000.0000	-1.00	0
780	10.279	0.201	0.0527	24.7000	7.010	1.12	2.65	5250.0000	-1.00	0
781	20.784	0.201	0.1052	9.0000	7.010	1.12	2.65	432.9998	-1.00	0
782	20.784	0.201	0.1061	9.5000	7.010	1.12	2.65	505.9998	-1.00	0
783	20.784	0.201	0.1015	11.0000	7.010	1.12	2.65	990.0000	-1.00	0
784	20.784	0.201	0.1049	11.9000	7.010	1.12	2.65	1040.0000	-1.00	0
785	20.784	0.201	0.0975	15.0000	7.010	1.12	2.65	2500.0000	-1.00	0
786	20.784	0.201	0.0945	15.1000	7.010	1.12	2.65	2500.0000	-1.00	0
787	20.784	0.201	0.0881	20.2000	7.010	1.12	2.65	5050.0000	-1.00	0
788	20.784	0.201	0.0762	26.9000	7.010	1.12	2.65	10100.0000	-1.00	0
789	20.784	0.201	0.0771	29.2000	7.010	1.12	2.65	10400.0000	-1.00	0
790	31.686	0.201	0.1530	7.4000	7.010	1.12	2.65	350.0000	-1.00	0
791	31.686	0.201	0.1554	8.1000	7.010	1.12	2.65	315.0000	-1.00	0
792	31.686	0.201	0.1533	8.9000	7.010	1.12	2.65	350.0000	-1.00	0
793	31.686	0.201	0.1433	10.3000	7.010	1.12	2.65	820.0000	-1.00	0
794	31.686	0.201	0.1347	12.6000	7.010	1.12	2.65	1640.0000	-1.00	0
795	31.686	0.201	0.1332	12.8000	7.010	1.12	2.65	1670.0000	-1.00	0
796	31.686	0.201	0.1362	13.3000	7.010	1.12	2.65	1670.0000	-1.00	0
797	31.686	0.201	0.1192	16.5000	7.010	1.12	2.65	3200.0000	-1.00	0
798	31.686	0.201	0.1213	16.3000	7.010	1.12	2.65	3330.0000	-1.00	0
799	31.686	0.201	0.1195	16.2000	7.010	1.12	2.65	3440.0000	-1.00	0
800	31.686	0.201	0.1036	23.1000	7.010	1.12	2.65	6600.0000	-1.00	0
801	31.686	0.201	0.1018	23.8000	7.010	1.12	2.65	6600.0000	-1.00	0
802	20.784	0.305	0.0707	5.8000	0.506	1.12	2.65	3800.9961	-1.00	4
803	20.784	0.305	0.0735	5.8000	0.506	1.12	2.65	2910.9961	-1.00	4
804	20.784	0.305	0.0591	9.9000	0.506	1.12	2.65	8515.9961	-1.00	0
805	26.136	0.305	0.0823	5.8000	0.506	1.12	2.65	3806.9971	-1.00	4
806	26.136	0.305	0.0860	6.2000	0.506	1.12	2.65	3768.9966	-1.00	4
807	26.136	0.305	0.0710	10.9000	0.506	1.12	2.65	10215.9961	-1.00	0
808	31.686	0.305	0.0951	5.7000	0.506	1.12	2.65	3612.9954	-1.00	4
809	31.686	0.305	0.0930	6.6000	0.506	1.12	2.65	3833.9966	-1.00	0
810	20.784	0.366	0.0677	5.1000	0.506	1.12	2.65	3367.9954	-1.00	4
811	20.784	0.366	0.0655	6.0000	0.506	1.12	2.65	3391.9971	-1.00	4
812	20.784	0.366	0.0527	10.5000	0.506	1.12	2.65	9886.9961	-1.00	4
813	20.784	0.366	0.0533	10.7000	0.506	1.12	2.65	10151.9961	-1.00	4
814	26.136	0.366	0.0707	6.5000	0.506	1.12	2.65	3883.9966	-1.00	4
815	26.136	0.366	0.0640	10.6000	0.506	1.12	2.65	9851.9961	-1.00	4
816	26.136	0.366	0.0613	10.1000	0.506	1.12	2.65	9947.9922	-1.00	4
817	28.911	0.366	0.0762	5.7000	0.506	1.12	2.65	3665.9961	-1.00	4
818	28.911	0.366	0.0799	5.4000	0.506	1.12	2.65	3786.9971	-1.00	4
819	28.911	0.366	0.0600	12.0000	0.506	1.12	2.65	10877.9922	-1.00	5
820	31.686	0.366	0.0820	6.2000	0.506	1.12	2.65	3502.9954	-1.00	4
821	31.686	0.366	0.0820	6.1000	0.506	1.12	2.65	3691.9971	-1.00	4
822	31.686	0.366	0.0683	10.0000	0.506	1.12	2.65	9688.9961	-1.00	5
823	31.686	0.366	0.0704	10.3000	0.506	1.12	2.65	10492.9922	-1.00	5
824	20.784	0.427	0.0607	6.3000	0.506	1.12	2.65	3607.9954	-1.00	4
825	20.784	0.427	0.0597	5.9000	0.506	1.12	2.65	3631.9971	-1.00	4

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 16 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
826	20.784	0.427	0.0482	10.4000	0.506	1.12	2.65	10463.9961	-1.00	5
827	20.784	0.427	0.0460	10.7000	0.506	1.12	2.65	10632.9922	-1.00	5
828	26.136	0.427	0.0716	5.1000	0.506	1.12	2.65	2888.9966	-1.00	4
829	26.136	0.427	0.0722	5.7000	0.506	1.12	2.65	2983.9966	-1.00	4
830	26.136	0.427	0.0536	10.3000	0.506	1.12	2.65	10521.9961	-1.00	5
831	26.136	0.427	0.0533	10.4000	0.506	1.12	2.65	11095.9961	-1.00	5
832	28.911	0.427	0.0756	5.8000	0.506	1.12	2.65	3095.9961	-1.00	0
833	28.911	0.427	0.0552	10.3000	0.506	1.12	2.65	10566.9961	-1.00	5
834	28.911	0.427	0.0549	10.8000	0.506	1.12	2.65	10583.9961	-1.00	5
835	31.686	0.427	0.0774	5.7000	0.506	1.12	2.65	3297.9954	-1.00	0
836	31.686	0.427	0.0704	6.1000	0.506	1.12	2.65	3991.9971	-1.00	0
837	31.686	0.427	0.0649	9.7000	0.506	1.12	2.65	9735.9961	-1.00	5
838	31.686	0.427	0.0655	10.1000	0.506	1.12	2.65	9798.9961	-1.00	5
839	31.686	0.427	0.0619	10.7000	0.506	1.12	2.65	9530.9961	-1.00	5
840	20.784	0.488	0.0582	6.0000	0.506	1.12	2.65	3343.9966	-1.00	0
841	20.784	0.488	0.0369	11.4000	0.506	1.12	2.65	12051.9961	-1.00	5
842	20.784	0.488	0.0372	11.2000	0.506	1.12	2.65	12917.9922	-1.00	5
843	26.136	0.488	0.0710	4.5000	0.506	1.12	2.65	2850.0000	-1.00	3
844	26.136	0.488	0.0616	4.6000	0.506	1.12	2.65	2640.0000	-1.00	3
845	26.136	0.488	0.0683	5.0000	0.506	1.12	2.65	2543.9998	-1.00	3
846	26.136	0.488	0.0491	10.5000	0.506	1.12	2.65	11420.9961	-1.00	5
847	26.136	0.488	0.0491	10.7000	0.506	1.12	2.65	10885.0000	-1.00	5
848	28.911	0.488	0.0741	3.9000	0.506	1.12	2.65	2300.0000	-1.00	0
849	28.911	0.488	0.0744	4.7000	0.506	1.12	2.65	2351.9998	-1.00	0
850	28.911	0.488	0.0707	5.1000	0.506	1.12	2.65	2525.0000	-1.00	0
851	28.911	0.488	0.0515	10.6000	0.506	1.12	2.65	10738.9961	-1.00	0
852	31.686	0.488	0.0692	4.9000	0.506	1.12	2.65	2603.9966	-1.00	4
853	31.686	0.488	0.0713	4.7000	0.506	1.12	2.65	2950.9961	-1.00	4
854	31.686	0.488	0.0710	5.5000	0.506	1.12	2.65	2887.9954	-1.00	4
855	31.686	0.488	0.0573	9.9000	0.506	1.12	2.65	10540.9961	-1.00	0
856	20.784	0.549	0.0530	6.1000	0.506	1.12	2.65	3320.0000	-1.00	3
857	20.784	0.549	0.0530	6.0000	0.506	1.12	2.65	3415.9961	-1.00	3
858	20.784	0.549	0.0418	10.4000	0.506	1.12	2.65	9982.9922	-1.00	5
859	20.784	0.549	0.0396	10.6000	0.506	1.12	2.65	9815.0000	-1.00	5
860	26.136	0.549	0.0628	5.3000	0.506	1.12	2.65	2773.9966	-1.00	3
861	26.136	0.549	0.0622	5.8000	0.506	1.12	2.65	2696.9971	-1.00	3
862	26.136	0.549	0.0479	10.4000	0.506	1.12	2.65	9910.0000	-1.00	5
863	26.136	0.549	0.0463	10.4000	0.506	1.12	2.65	10196.9961	-1.00	5
864	28.911	0.549	0.0683	5.1000	0.506	1.12	2.65	2403.9998	-1.00	3
865	28.911	0.549	0.0692	5.2000	0.506	1.12	2.65	2507.9998	-1.00	3
866	28.911	0.549	0.0686	5.7000	0.506	1.12	2.65	2525.0000	-1.00	3
867	28.911	0.549	0.0472	10.0000	0.506	1.12	2.65	10635.9961	-1.00	5
868	28.911	0.549	0.0482	10.1000	0.506	1.12	2.65	10445.0000	-1.00	5
869	31.686	0.549	0.0732	4.2000	0.506	1.12	2.65	2050.9998	-1.00	3
870	31.686	0.549	0.0741	4.7000	0.506	1.12	2.65	2350.9998	-1.00	3
871	31.686	0.549	0.0488	10.5000	0.506	1.12	2.65	12007.9922	-1.00	5
872	31.686	0.549	0.0509	10.5000	0.506	1.12	2.65	11802.9922	-1.00	5
873	20.784	0.597	0.0448	6.1000	0.506	1.12	2.65	4040.9961	-1.00	4
874	20.784	0.597	0.0445	6.9000	0.506	1.12	2.65	4137.9922	-1.00	4
875	20.784	0.597	0.0357	10.5000	0.506	1.12	2.65	11305.9961	-1.00	5
876	20.784	0.597	0.0375	10.9000	0.506	1.12	2.65	10896.9961	-1.00	5
877	20.784	0.597	0.0372	11.2000	0.506	1.12	2.65	11642.9922	-1.00	0
878	26.136	0.597	0.0536	6.2000	0.506	1.12	2.65	3691.9971	-1.00	4
879	26.136	0.597	0.0436	10.2000	0.506	1.12	2.65	10043.9961	-1.00	0
880	28.911	0.597	0.0591	5.0000	0.506	1.12	2.65	2922.9954	-1.00	4

GIL - DATA OF GILBERT, G.K. (1914)
(SHEET 17 OF 17)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
881	28.911	0.597	0.0610	5.7000	0.506	1.12	2.65	2975.0000	-1.00	4
882	28.911	0.597	0.0588	5.4000	0.506	1.12	2.65	3423.9966	-1.00	4
883	28.911	0.597	0.0430	10.9000	0.506	1.12	2.65	11603.9961	-1.00	4
884	28.911	0.597	0.0439	10.9000	0.506	1.12	2.65	11551.9961	-1.00	4
885	31.686	0.597	0.0652	4.5000	0.506	1.12	2.65	2587.9954	-1.00	3
886	31.686	0.597	0.0677	5.7000	0.506	1.12	2.65	2666.9971	-1.00	4
887	31.686	0.597	0.0668	5.2000	0.506	1.12	2.65	2776.9971	-1.00	4
888	31.686	0.597	0.0457	10.0000	0.506	1.12	2.65	10825.0000	-1.00	5
889	31.686	0.597	0.0448	10.0000	0.506	1.12	2.65	10903.9961	-1.00	5

GKA - GILBERT, G.K. (1914) - ENERGY SLOPE
(SHEET 1 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	2.633	0.201	0.0253	12.2785	0.305	1.06	2.65	9680.0000	-1.00	0
2	15.432	0.201	0.0866	5.6000	0.305	1.06	2.65	3790.0000	-1.00	5
3	5.154	0.305	0.0415	5.6364	0.305	1.06	2.65	1940.0000	-1.00	3
4	5.154	0.402	0.0323	6.4008	0.305	1.06	2.65	2330.0000	-1.00	3
5	5.154	0.402	0.0277	7.6732	0.305	1.06	2.65	3390.0000	-1.00	3
6	5.154	0.402	0.0253	8.0000	0.305	1.06	2.65	4270.0000	-1.00	3
7	5.154	0.402	0.0241	11.1000	0.305	1.06	2.65	9790.0000	-1.00	7
8	10.279	0.402	0.0594	3.3832	0.305	1.06	2.65	787.0000	-1.00	3
9	10.279	0.402	0.0399	4.9552	0.305	1.06	2.65	3890.0000	-1.00	4
10	10.279	0.402	0.0396	10.4798	0.305	1.06	2.65	7050.0000	-1.00	4
11	20.784	0.402	0.0814	3.5000	0.305	1.06	2.65	1830.0000	-1.00	3
12	20.784	0.402	0.0631	4.8669	0.305	1.06	2.65	4000.0000	-1.00	5
13	10.279	0.597	0.0570	4.7719	0.305	1.06	2.65	820.0000	-1.00	3
14	10.279	0.597	0.0393	6.2052	0.305	1.06	2.65	1940.0000	-1.00	0
15	10.279	0.597	0.0326	6.0043	0.305	1.06	2.65	3160.0000	-1.00	0
16	10.279	0.597	0.0296	7.8000	0.305	1.06	2.65	5740.0000	-1.00	0
17	10.279	0.597	0.0256	9.3405	0.305	1.06	2.65	8410.0000	-1.00	7
18	20.784	0.597	0.0893	1.8000	0.305	1.06	2.65	385.0000	-1.00	0
19	20.784	0.597	0.0463	4.8077	0.305	1.06	2.65	3610.0000	-1.00	5
20	20.784	0.597	0.0445	4.5408	0.305	1.06	2.65	5050.0000	-1.00	5
21	31.686	0.597	0.0652	4.4462	0.305	1.06	2.65	2920.0000	-1.00	5
22	31.686	0.597	0.0613	6.2921	0.305	1.06	2.65	4980.0000	-1.00	5
23	5.154	0.201	0.0558	3.3542	0.375	1.13	2.65	870.0000	-1.00	3
24	5.154	0.201	0.0558	3.7000	0.375	1.13	2.65	930.0000	-1.00	3
25	15.432	0.201	0.1439	1.8604	0.375	1.13	2.65	390.0000	-1.00	3
26	15.432	0.201	0.0914	4.5431	0.375	1.13	2.65	2270.0000	-1.00	4
27	10.279	0.305	0.1448	0.3053	0.375	1.13	2.65	0.0	-1.00	3
28	10.279	0.305	0.0985	1.7757	0.375	1.13	2.65	165.0000	-1.00	3
29	10.279	0.305	0.0978	1.6876	0.375	1.13	2.65	170.0000	-1.00	3
30	10.279	0.305	0.0826	2.7823	0.375	1.13	2.65	660.0000	-1.00	3
31	10.279	0.305	0.0588	4.3139	0.375	1.13	2.65	1890.0000	-1.00	0
32	10.279	0.305	0.0536	5.2009	0.375	1.13	2.65	2430.0000	-1.00	0
33	20.784	0.305	0.1524	1.4134	0.375	1.13	2.65	207.0000	-1.00	0
34	20.784	0.305	0.1515	1.4545	0.375	1.13	2.65	231.0000	-1.00	0
35	20.784	0.305	0.1018	2.5898	0.375	1.13	2.65	841.0000	-1.00	0
36	20.784	0.305	0.0814	3.7758	0.375	1.13	2.65	1800.0000	-1.00	0
37	20.784	0.305	0.0780	4.8979	0.375	1.13	2.65	2600.0000	-1.00	0
38	10.279	0.402	0.0671	2.1882	0.375	1.13	2.65	650.0000	-1.00	3
39	10.279	0.402	0.0600	3.7084	0.375	1.13	2.65	810.0000	-1.00	3
40	10.279	0.402	0.0497	4.7576	0.375	1.13	2.65	1650.0000	-1.00	3
41	10.279	0.402	0.0497	5.3152	0.375	1.13	2.65	1700.0000	-1.00	3
42	15.432	0.402	0.0631	5.5867	0.375	1.13	2.65	1910.0000	-1.00	3
43	15.432	0.402	0.0503	5.2285	0.375	1.13	2.65	3080.0000	-1.00	3
44	15.432	0.402	0.0463	5.5938	0.375	1.13	2.65	3370.0000	-1.00	3
45	20.784	0.402	0.0814	3.1991	0.375	1.13	2.65	1350.0000	-1.00	0
46	10.279	0.597	0.0494	4.2991	0.375	1.13	2.65	760.0000	-1.00	3
47	20.784	0.597	0.0783	2.8947	0.375	1.13	2.65	370.0000	-1.00	3
48	20.784	0.597	0.0597	3.5587	0.375	1.13	2.65	1870.0000	-1.00	0
49	20.784	0.597	0.0491	5.4438	0.375	1.13	2.65	4020.0000	-1.00	0
50	31.686	0.597	0.1237	2.0697	0.375	1.13	2.65	205.0000	-1.00	3
51	31.686	0.597	0.1143	2.6080	0.375	1.13	2.65	426.0000	-1.00	3
52	31.686	0.597	0.1027	3.5677	0.375	1.13	2.65	960.0000	-1.00	3
53	5.154	0.201	0.0725	2.7949	0.506	1.12	2.65	420.0000	-1.00	3
54	5.154	0.201	0.0335	11.2902	0.506	1.12	2.65	8700.0000	-1.00	5
55	5.154	0.201	0.0283	13.3764	0.506	1.12	2.65	15100.0000	-1.00	5

GKA - GILBERT, G.K. (1914) - ENERGY SLOPE
(SHEET 2 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	15.432	0.201	0.1759	1.5441	0.506	1.12	2.65	182.0000	-1.00	3
57	10.279	0.305	0.0994	1.7236	0.506	1.12	2.65	185.0000	-1.00	3
58	10.279	0.305	0.0838	2.5606	0.506	1.12	2.65	564.0000	-1.00	3
59	10.279	0.305	0.0674	4.2000	0.506	1.12	2.65	1800.0000	-1.00	3
60	10.279	0.305	0.0518	6.4332	0.506	1.12	2.65	3940.0000	-1.00	0
61	20.784	0.305	0.1765	1.1172	0.506	1.12	2.65	84.0000	-1.00	3
62	20.784	0.305	0.1737	1.1452	0.506	1.12	2.65	113.0000	-1.00	3
63	20.784	0.305	0.1637	1.5784	0.506	1.12	2.65	135.0000	-1.00	3
64	20.784	0.305	0.1423	1.8643	0.506	1.12	2.65	670.0000	-1.00	3
65	20.784	0.305	0.1259	2.7425	0.506	1.12	2.65	670.0000	-1.00	3
66	5.154	0.402	0.0302	6.6000	0.506	1.12	2.65	2000.0000	-1.00	3
67	10.279	0.402	0.0530	3.2554	0.506	1.12	2.65	850.0000	-1.00	3
68	10.279	0.402	0.0518	3.2912	0.506	1.12	2.65	860.0000	-1.00	3
69	10.279	0.402	0.0543	5.5416	0.506	1.12	2.65	2520.0000	-1.00	3
70	20.784	0.402	0.1268	1.7733	0.506	1.12	2.65	216.0000	-1.00	3
71	10.279	0.597	0.0430	4.1199	0.506	1.12	2.65	993.0000	-1.00	3
72	10.279	0.597	0.0344	7.1523	0.506	1.12	2.65	2480.0000	-1.00	3
73	20.784	0.597	0.0594	4.3175	0.506	1.12	2.65	1640.0000	-1.00	3
74	20.784	0.597	0.0637	4.7320	0.506	1.12	2.65	1850.0000	-1.00	3
75	20.784	0.597	0.0491	6.1350	0.506	1.12	2.65	3180.0000	-1.00	3
76	20.784	0.597	0.0533	5.5753	0.506	1.12	2.65	3400.0000	-1.00	3
77	20.784	0.597	0.0442	6.9858	0.506	1.12	2.65	5350.0000	-1.00	4
78	31.686	0.597	0.0625	5.8599	0.506	1.12	2.65	3640.0000	-1.00	0
79	31.686	0.597	0.0616	6.4913	0.506	1.12	2.65	4100.0000	-1.00	5
80	31.686	0.597	0.0549	4.7641	0.506	1.12	2.65	4260.0000	-1.00	5
81	31.686	0.597	0.0607	8.1847	0.506	1.12	2.65	4400.0000	-1.00	5
82	31.686	0.597	0.0585	6.7557	0.506	1.12	2.65	4570.0000	-1.00	5
83	15.432	0.201	0.1414	2.7668	0.786	1.13	2.65	511.0000	-1.00	3
84	15.432	0.201	0.1295	2.5793	0.786	1.13	2.65	596.0000	-1.00	3
85	15.432	0.201	0.1164	5.7201	0.786	1.13	2.65	1130.0000	-1.00	3
86	15.432	0.201	0.0981	5.8463	0.786	1.13	2.65	1900.0000	-1.00	0
87	10.279	0.305	0.0881	1.6339	0.786	1.13	2.65	199.0000	-1.00	3
88	10.279	0.305	0.0872	1.8825	0.786	1.13	2.65	185.0000	-1.00	3
89	10.279	0.305	0.0768	3.0210	0.786	1.13	2.65	550.0000	-1.00	3
90	10.279	0.305	0.0683	2.9913	0.786	1.13	2.65	1170.0000	-1.00	3
91	10.279	0.305	0.0698	5.1229	0.786	1.13	2.65	1170.0000	-1.00	3
92	10.279	0.305	0.0607	5.5077	0.786	1.13	2.65	2240.0000	-1.00	3
93	10.279	0.305	0.0302	22.7180	0.786	1.13	2.65	22300.0000	-1.00	5
94	10.279	0.305	0.0299	24.3484	0.786	1.13	2.65	25000.0000	-1.00	5
95	15.432	0.305	0.0732	5.3000	0.786	1.13	2.65	2000.0000	-1.00	0
96	20.784	0.305	0.1469	1.8448	0.786	1.13	2.65	296.0000	-1.00	3
97	20.784	0.305	0.1253	2.4410	0.786	1.13	2.65	745.0000	-1.00	3
98	20.784	0.305	0.1250	2.8914	0.786	1.13	2.65	1030.0000	-1.00	3
99	10.279	0.402	0.0427	3.2880	0.786	1.13	2.65	970.0000	-1.00	3
100	10.279	0.402	0.0521	3.7181	0.786	1.13	2.65	1020.0000	-1.00	3
101	10.279	0.402	0.0469	6.0149	0.786	1.13	2.65	2350.0000	-1.00	3
102	20.784	0.402	0.1079	2.9299	0.786	1.13	2.65	770.0000	-1.00	3
103	20.784	0.402	0.0927	3.4367	0.786	1.13	2.65	1130.0000	-1.00	3
104	20.784	0.402	0.0692	5.3432	0.786	1.13	2.65	2200.0000	-1.00	3
105	20.784	0.402	0.0756	5.5407	0.786	1.13	2.65	2400.0000	-1.00	3
106	20.784	0.402	0.0704	6.1663	0.786	1.13	2.65	2400.0000	-1.00	3
107	20.784	0.402	0.0695	7.0949	0.786	1.13	2.65	3050.0000	-1.00	0
108	20.784	0.402	0.0585	8.2283	0.786	1.13	2.65	3800.0000	-1.00	0
109	20.784	0.402	0.0500	10.0000	0.786	1.13	2.65	8200.0000	-1.00	5
110	20.784	0.402	0.0512	10.1051	0.786	1.13	2.65	9100.0000	-1.00	5

GKA - GILBERT, G.K. (1914) - ENERGY SLOPE
(SHEET 3 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	10.279	0.305	0.0844	2.2807	1.710	1.34	2.65	240.0000	-1.00	3
112	10.279	0.305	0.0655	4.5176	1.710	1.34	2.65	700.0000	-1.00	0
113	10.279	0.305	0.0634	4.1274	1.710	1.34	2.65	700.0000	-1.00	0
114	10.279	0.305	0.0509	8.6151	1.710	1.34	2.65	2230.0000	-1.00	4
115	10.279	0.305	0.0344	16.6472	1.710	1.34	2.65	9700.0000	-1.00	4
116	10.279	0.305	0.0351	23.6764	1.710	1.34	2.65	15000.0000	-1.00	4
117	20.784	0.305	0.1399	1.7173	1.710	1.34	2.65	137.0000	-1.00	3
118	20.784	0.305	0.1228	3.0489	1.710	1.34	2.65	274.0000	-1.00	3
119	20.784	0.305	0.1241	2.9759	1.710	1.34	2.65	410.0000	-1.00	3
120	20.784	0.305	0.1106	4.4050	1.710	1.34	2.65	980.0000	-1.00	3
121	20.784	0.305	0.0917	5.2409	1.710	1.34	2.65	1200.0000	-1.00	3
122	20.784	0.305	0.0832	8.3645	1.710	1.34	2.65	2210.0000	-1.00	3
123	20.784	0.305	0.0680	12.6054	1.710	1.34	2.65	4700.0000	-1.00	0
124	20.784	0.305	0.0570	13.9764	1.710	1.34	2.65	6660.0000	-1.00	0
125	20.784	0.305	0.0576	15.1957	1.710	1.34	2.65	7000.0000	-1.00	0

GKB - GILBERT, G.K. (1914) - UNIFORM FLOWS ONLY
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	5.154	0.402	0.0277	7.6732	0.305	1.06	2.65	3390.0000	-1.00	3
2	5.154	0.402	0.0253	8.0000	0.305	1.06	2.65	4270.0000	-1.00	3
3	5.154	0.402	0.0241	11.1000	0.305	1.06	2.65	9790.0000	-1.00	7
4	10.279	0.402	0.0594	3.3832	0.305	1.06	2.65	787.0000	-1.00	3
5	10.279	0.402	0.0399	4.9552	0.305	1.06	2.65	3890.0000	-1.00	4
6	10.279	0.402	0.0396	10.4798	0.305	1.06	2.65	7050.0000	-1.00	4
7	20.784	0.305	0.0780	4.8979	0.375	1.13	2.65	2600.0000	-1.00	0
8	10.279	0.402	0.0671	2.1882	0.375	1.13	2.65	650.0000	-1.00	3
9	10.279	0.402	0.0600	3.7084	0.375	1.13	2.65	810.0000	-1.00	3
10	10.279	0.402	0.0497	4.7576	0.375	1.13	2.65	1650.0000	-1.00	3
11	10.279	0.402	0.0497	5.3152	0.375	1.13	2.65	1700.0000	-1.00	3
12	15.432	0.402	0.0631	5.5867	0.375	1.13	2.65	1910.0000	-1.00	3
13	15.432	0.402	0.0503	5.2285	0.375	1.13	2.65	3080.0000	-1.00	3
14	15.432	0.402	0.0463	5.5938	0.375	1.13	2.65	3370.0000	-1.00	3
15	20.784	0.402	0.0814	3.1991	0.375	1.13	2.65	1350.0000	-1.00	0
16	10.279	0.597	0.0494	4.2991	0.375	1.13	2.65	760.0000	-1.00	3
17	20.784	0.597	0.0783	2.8947	0.375	1.13	2.65	370.0000	-1.00	3
18	20.784	0.597	0.0597	3.5587	0.375	1.13	2.65	1870.0000	-1.00	0
19	20.784	0.597	0.0491	5.4438	0.375	1.13	2.65	4020.0000	-1.00	0
20	31.686	0.597	0.1237	2.0697	0.375	1.13	2.65	205.0000	-1.00	3
21	31.686	0.597	0.1143	2.6080	0.375	1.13	2.65	426.0000	-1.00	3
22	31.686	0.597	0.1027	3.5677	0.375	1.13	2.65	960.0000	-1.00	3
23	5.154	0.201	0.0725	2.7949	0.506	1.12	2.65	420.0000	-1.00	3
24	5.154	0.201	0.0335	11.2902	0.506	1.12	2.65	8700.0000	-1.00	5
25	5.154	0.201	0.0283	13.3764	0.506	1.12	2.65	15100.0000	-1.00	5
26	15.432	0.201	0.1759	1.5441	0.506	1.12	2.65	182.0000	-1.00	3
27	10.279	0.305	0.0994	1.7236	0.506	1.12	2.65	185.0000	-1.00	3
28	10.279	0.305	0.0838	2.5606	0.506	1.12	2.65	564.0000	-1.00	3
29	10.279	0.305	0.0674	4.2000	0.506	1.12	2.65	1800.0000	-1.00	3
30	10.279	0.305	0.0518	6.4332	0.506	1.12	2.65	3940.0000	-1.00	0
31	20.784	0.305	0.1765	1.1172	0.506	1.12	2.65	84.0000	-1.00	3
32	20.784	0.305	0.1737	1.1452	0.506	1.12	2.65	113.0000	-1.00	3
33	20.784	0.305	0.1637	1.5784	0.506	1.12	2.65	135.0000	-1.00	3
34	20.784	0.305	0.1423	1.8643	0.506	1.12	2.65	670.0000	-1.00	3
35	20.784	0.305	0.1259	2.7425	0.506	1.12	2.65	670.0000	-1.00	3
36	5.154	0.402	0.0302	6.6000	0.506	1.12	2.65	2000.0000	-1.00	3
37	10.279	0.402	0.0530	3.2554	0.506	1.12	2.65	850.0000	-1.00	3
38	10.279	0.402	0.0518	3.2912	0.506	1.12	2.65	860.0000	-1.00	3
39	10.279	0.402	0.0543	5.5416	0.506	1.12	2.65	2520.0000	-1.00	3
40	20.784	0.402	0.1268	1.7733	0.506	1.12	2.65	216.0000	-1.00	3
41	10.279	0.597	0.0430	4.1199	0.506	1.12	2.65	993.0000	-1.00	3
42	10.279	0.597	0.0344	7.1523	0.506	1.12	2.65	2480.0000	-1.00	3
43	20.784	0.597	0.0594	4.3175	0.506	1.12	2.65	1640.0000	-1.00	3
44	20.784	0.597	0.0637	4.7320	0.506	1.12	2.65	1850.0000	-1.00	3
45	20.784	0.597	0.0491	6.1350	0.506	1.12	2.65	3180.0000	-1.00	3
46	20.784	0.597	0.0533	5.5753	0.506	1.12	2.65	3400.0000	-1.00	3
47	20.784	0.597	0.0442	6.9858	0.506	1.12	2.65	5350.0000	-1.00	4
48	31.686	0.597	0.0625	5.8599	0.506	1.12	2.65	3640.0000	-1.00	0
49	31.686	0.597	0.0616	6.4913	0.506	1.12	2.65	4100.0000	-1.00	5
50	31.686	0.597	0.0549	4.7641	0.506	1.12	2.65	4260.0000	-1.00	5
51	31.686	0.597	0.0607	8.1847	0.506	1.12	2.65	4400.0000	-1.00	5
52	31.686	0.597	0.0585	6.7557	0.506	1.12	2.65	4570.0000	-1.00	5
53	15.432	0.201	0.1414	2.7668	0.786	1.13	2.65	511.0000	-1.00	3
54	15.432	0.201	0.1295	2.5793	0.786	1.13	2.65	596.0000	-1.00	3
55	15.432	0.201	0.1164	5.7201	0.786	1.13	2.65	1130.0000	-1.00	3

GKB - GILBERT, G.K. (1914) - UNIFORM FLOWS ONLY
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	15.432	0.201	0.0981	5.8463	0.786	1.13	2.65	1900.0000	-1.00	0
57	10.279	0.305	0.0881	1.6339	0.786	1.13	2.65	199.0000	-1.00	3
58	10.279	0.305	0.0872	1.8825	0.786	1.13	2.65	185.0000	-1.00	3
59	10.279	0.305	0.0768	3.0210	0.786	1.13	2.65	550.0000	-1.00	3
60	10.279	0.305	0.0683	2.9913	0.786	1.13	2.65	1170.0000	-1.00	3
61	10.279	0.305	0.0698	5.1229	0.786	1.13	2.65	1170.0000	-1.00	3
62	10.279	0.305	0.0607	5.5077	0.786	1.13	2.65	2240.0000	-1.00	3

GUY - DATA OF GUY H.P., SIMONS, D.B. AND RICHARDSON, E.V. (1966)
(SHEET 1 OF 7)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	184.620	2.438	0.2865	0.0550	0.190	1.30	2.65	0.0	18.60	1
2	84.665	2.438	0.1463	0.1000	0.190	1.30	2.65	0.0	17.50	1
3	189.151	2.438	0.3231	0.1500	0.190	1.30	2.65	0.2000	12.30	2
4	84.665	2.438	0.1311	0.1600	0.190	1.30	2.65	0.0	17.80	1
5	56.632	2.438	0.0914	0.1700	0.190	1.30	2.65	0.0	19.20	1
6	182.638	2.438	0.2835	0.1800	0.190	1.30	2.65	0.3000	19.20	2
7	84.665	2.438	0.1280	0.1800	0.190	1.30	2.65	0.0	18.00	1
8	252.296	2.438	0.3048	0.2800	0.190	1.30	2.65	3.7000	17.00	2
9	96.841	2.438	0.1768	0.3400	0.190	1.30	2.65	1.0000	13.60	2
10	300.716	2.438	0.3109	0.4300	0.190	1.30	2.65	29.0000	18.10	2
11	115.529	2.438	0.1676	0.5700	0.190	1.30	2.65	4.0000	18.10	2
12	358.763	2.438	0.3139	0.5800	0.190	1.30	2.65	120.0000	16.40	2
13	84.665	2.438	0.1341	0.6200	0.190	1.30	2.65	2.0000	18.10	2
14	386.230	2.438	0.2896	0.6600	0.190	1.30	2.65	280.9998	18.20	3
15	419.360	2.438	0.2835	0.7000	0.190	1.30	2.65	518.9998	18.30	3
16	127.139	2.438	0.1646	0.7900	0.190	1.30	2.65	34.0000	18.00	2
17	471.744	2.438	0.3231	0.8300	0.190	1.30	2.65	835.9998	17.40	3
18	143.845	2.438	0.1707	0.8400	0.190	1.30	2.65	58.0000	19.10	2
19	147.243	2.438	0.1676	0.9200	0.190	1.30	2.65	84.0000	12.30	2
20	579.628	2.438	0.3322	0.9900	0.190	1.30	2.65	1300.0000	18.90	3
21	622.385	2.438	0.2713	1.0000	0.190	1.30	2.65	1240.0000	19.30	4
22	626.350	2.438	0.2621	1.0600	0.190	1.30	2.65	1490.0000	19.40	4
23	618.421	2.438	0.2408	1.1200	0.190	1.30	2.65	2000.0000	19.30	5
24	198.212	2.438	0.1585	1.2700	0.190	1.30	2.65	502.9998	16.60	3
25	621.819	2.438	0.3109	1.3000	0.190	1.30	2.65	1270.0000	19.70	3
26	230.492	2.438	0.1859	1.3000	0.190	1.30	2.65	860.9998	15.30	3
27	273.532	2.438	0.2073	1.4000	0.190	1.30	2.65	1240.0000	18.00	3
28	212.936	2.438	0.1585	1.4700	0.190	1.30	2.65	998.9998	18.50	3
29	626.916	2.438	0.2195	1.5600	0.190	1.30	2.65	2750.0000	18.80	4
30	330.731	2.438	0.1554	1.7000	0.190	1.30	2.65	2480.0000	19.10	5
31	232.757	2.438	0.1494	1.9400	0.190	1.30	2.65	1210.0000	18.60	3
32	628.332	2.438	0.2042	1.9600	0.190	1.30	2.65	4650.0000	19.10	7
33	627.482	2.438	0.1951	3.0000	0.190	1.30	2.65	9240.0000	18.90	7
34	628.332	2.438	0.1951	3.5000	0.190	1.30	2.65	12900.0000	18.70	7
35	632.296	2.438	0.1859	3.9000	0.190	1.30	2.65	16200.0000	18.80	7
36	627.765	2.438	0.1829	4.6000	0.190	1.30	2.65	23900.0000	18.50	7
37	456.737	2.438	0.1524	5.4200	0.190	1.30	2.65	25200.0000	18.70	7
38	622.952	2.438	0.1768	5.8200	0.190	1.30	2.65	26600.0000	17.90	7
39	440.031	2.438	0.1554	8.4500	0.190	1.30	2.65	35500.0000	16.80	8
40	618.421	2.438	0.1981	9.5000	0.190	1.30	2.65	47300.0000	17.30	8
41	172.444	2.438	0.2926	0.0700	0.270	1.56	2.65	0.0	14.50	1
42	172.444	2.438	0.2774	0.1800	0.270	1.56	2.65	0.5000	15.80	2
43	279.196	2.438	0.3018	0.4600	0.270	1.56	2.65	12.0000	16.00	2
44	346.871	2.438	0.2865	0.6500	0.270	1.56	2.65	98.0000	16.00	2
45	385.664	2.438	0.2835	0.8400	0.270	1.56	2.65	200.0000	18.30	3
46	441.163	2.438	0.3109	1.0800	0.270	1.56	2.65	357.9998	16.90	3
47	144.695	2.438	0.1463	1.2600	0.270	1.56	2.65	93.0000	13.90	2
48	314.024	2.438	0.2286	1.2600	0.270	1.56	2.65	550.0000	15.30	3
49	504.024	2.438	0.3292	1.3000	0.270	1.56	2.65	638.9998	18.10	3
50	618.421	2.438	0.2560	1.3800	0.270	1.56	2.65	1270.0000	17.80	4
51	544.516	2.438	0.3444	1.4000	0.270	1.56	2.65	930.9998	17.40	3
52	610.209	2.438	0.3139	1.6300	0.270	1.56	2.65	832.9998	16.80	3
53	443.995	2.438	0.2865	1.6700	0.270	1.56	2.65	703.9998	14.80	3
54	616.156	2.438	0.2256	1.6700	0.270	1.56	2.65	1670.0000	18.50	5
55	191.133	2.438	0.1402	1.8500	0.270	1.56	2.65	752.9998	14.20	3

GUY - DATA OF GUY H.P., SIMONS, D.B. AND RICHARDSON, E.V. (1966)
(SHEET 2 OF 7)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	617.005	2.438	0.1920	2.8000	0.270	1.56	2.65	4760.0000	13.60	7
57	614.173	2.438	0.1798	4.9300	0.270	1.56	2.65	9080.0000	15.90	7
58	614.740	2.438	0.1676	8.1300	0.270	1.56	2.65	28700.0000	10.20	7
59	436.349	2.438	0.1372	9.5200	0.270	1.56	2.65	35600.0000	11.00	8
60	604.546	2.438	0.1829	10.2200	0.270	1.56	2.65	35800.0000	10.80	8
61	187.169	2.438	0.3078	0.0700	0.280	1.67	2.65	0.0	13.90	1
62	219.732	2.438	0.3048	0.1100	0.280	1.67	2.65	0.0	11.90	1
63	219.732	2.438	0.3078	0.2300	0.280	1.67	2.65	2.7000	10.90	2
64	117.795	2.438	0.1798	0.4100	0.280	1.67	2.65	1.0000	15.10	2
65	303.831	2.438	0.3048	0.4500	0.280	1.67	2.65	12.0000	16.50	2
66	381.133	2.438	0.3048	0.6300	0.280	1.67	2.65	75.0000	16.40	2
67	303.831	2.438	0.2621	0.6900	0.280	1.67	2.65	51.0000	14.60	2
68	139.315	2.438	0.1798	0.7300	0.280	1.67	2.65	20.0000	14.90	2
69	445.694	2.438	0.3231	0.9000	0.280	1.67	2.65	330.0000	17.60	3
70	359.613	2.438	0.2682	1.0000	0.280	1.67	2.65	405.0000	16.70	3
71	203.592	2.438	0.1737	1.0800	0.280	1.67	2.65	150.0000	16.00	2
72	243.801	2.438	0.1890	1.1600	0.280	1.67	2.65	297.9998	15.60	3
73	513.652	2.438	0.3200	1.2000	0.280	1.67	2.65	505.9998	15.60	3
74	430.120	2.438	0.2804	1.3100	0.280	1.67	2.65	663.9998	15.80	3
75	577.363	2.438	0.3261	1.3100	0.280	1.67	2.65	731.9998	16.50	3
76	280.328	2.438	0.1981	1.3400	0.280	1.67	2.65	562.9998	14.90	3
77	487.884	2.438	0.3109	1.3400	0.280	1.67	2.65	548.9998	15.80	3
78	623.518	2.438	0.2774	1.3400	0.280	1.67	2.65	1230.0000	15.60	4
79	283.443	2.438	0.1981	1.3600	0.280	1.67	2.65	505.0000	14.70	3
80	432.668	2.438	0.2682	1.3600	0.280	1.67	2.65	732.9998	15.20	3
81	338.659	2.438	0.1859	1.4100	0.280	1.67	2.65	1040.0000	14.70	3
82	443.995	2.438	0.1951	1.4200	0.280	1.67	2.65	1370.0000	14.50	4
83	155.738	2.438	0.1341	1.5000	0.280	1.67	2.65	480.0000	14.10	3
84	422.475	2.438	0.1829	1.5300	0.280	1.67	2.65	1540.0000	12.70	5
85	364.427	2.438	0.2286	1.5800	0.280	1.67	2.65	788.9998	13.00	3
86	622.385	2.438	0.2499	1.7200	0.280	1.67	2.65	2350.0000	15.70	4
87	618.704	2.438	0.2195	1.9900	0.280	1.67	2.65	2710.0000	14.70	5
88	445.127	2.438	0.1676	2.2900	0.280	1.67	2.65	2760.0000	15.10	5
89	444.561	2.438	0.1585	2.7800	0.280	1.67	2.65	3120.0000	15.40	5
90	439.181	2.438	0.1524	3.2800	0.280	1.67	2.65	5060.0000	15.00	7
91	616.156	2.438	0.1768	4.7000	0.280	1.67	2.65	10500.0000	10.80	7
92	438.048	2.438	0.1311	5.3300	0.280	1.67	2.65	11500.0000	15.10	7
93	604.263	2.438	0.1707	5.9300	0.280	1.67	2.65	13000.0000	10.20	7
94	603.980	2.438	0.1646	8.1500	0.280	1.67	2.65	27600.0000	10.90	7
95	236.155	2.438	0.0914	8.2000	0.280	1.67	2.65	19900.0000	11.60	7
96	432.102	2.438	0.1219	9.3000	0.280	1.67	2.65	36100.0000	11.10	8
97	605.396	2.438	0.1737	10.0700	0.280	1.67	2.65	42400.0000	11.50	8
98	111.565	2.438	0.1859	0.1500	0.450	1.60	2.65	0.0	10.20	1
99	52.101	2.438	0.1067	0.1900	0.450	1.60	2.65	0.0	9.00	1
100	176.125	2.438	0.2987	0.2000	0.450	1.60	2.65	0.7000	12.00	2
101	144.695	2.438	0.2469	0.2100	0.450	1.60	2.65	1.2000	12.00	2
102	143.562	2.438	0.2438	0.2300	0.450	1.60	2.65	0.7000	11.00	2
103	102.504	2.438	0.1768	0.3100	0.450	1.60	2.65	0.4000	11.30	2
104	223.696	2.438	0.2499	0.3600	0.450	1.60	2.65	9.4000	11.00	2
105	223.696	2.438	0.2591	0.3900	0.450	1.60	2.65	10.0000	11.50	2
106	108.733	2.438	0.1676	0.4000	0.450	1.60	2.65	1.4000	12.00	2
107	222.281	2.438	0.2438	0.4200	0.450	1.60	2.65	23.0000	9.00	2
108	224.546	2.438	0.2286	0.4700	0.450	1.60	2.65	27.0000	11.00	2
109	55.216	2.438	0.1067	0.4900	0.450	1.60	2.65	4.7000	11.50	2
110	224.829	2.438	0.2103	0.5700	0.450	1.60	2.65	92.0000	10.00	3

GUY - DATA OF GUY H.P., SIMONS, D.B. AND RICHARDSON, E.V. (1966)
(SHEET 3 OF 7)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	108.450	2.438	0.1554	0.6000	0.450	1.60	2.65	7.6000	12.00	2
112	225.962	2.438	0.2134	0.7800	0.450	1.60	2.65	267.9998	11.50	3
113	55.216	2.438	0.1006	0.8800	0.450	1.60	2.65	16.0000	10.50	2
114	110.432	2.438	0.1402	0.8800	0.450	1.60	2.65	42.0000	9.50	2
115	55.216	2.438	0.0884	1.0600	0.450	1.60	2.65	1.0000	11.70	2
116	120.060	2.438	0.1250	1.1200	0.450	1.60	2.65	207.9999	18.00	3
117	343.190	2.438	0.2926	1.1400	0.450	1.60	2.65	380.0000	16.00	3
118	383.398	2.438	0.3048	1.2400	0.450	1.60	2.65	553.9998	15.70	3
119	139.032	2.438	0.1280	1.8900	0.450	1.60	2.65	377.9998	17.00	3
120	230.492	2.438	0.1859	1.9300	0.450	1.60	2.65	507.9998	16.40	3
121	377.735	2.438	0.1981	2.4700	0.450	1.60	2.65	855.9998	16.00	3
122	247.199	2.438	0.1890	2.8900	0.450	1.60	2.65	916.9998	17.00	3
123	606.245	2.438	0.2469	3.0100	0.450	1.60	2.65	2460.0000	19.00	3
124	584.442	2.438	0.1676	3.6400	0.450	1.60	2.65	3960.0000	19.00	6
125	409.166	2.438	0.1036	3.6600	0.450	1.60	2.65	4580.0000	17.00	5
126	316.856	2.438	0.1219	3.6600	0.450	1.60	2.65	4230.0000	16.00	4
127	128.555	2.438	0.0914	3.6900	0.450	1.60	2.65	1850.0000	17.40	3
128	420.492	2.438	0.1341	4.3200	0.450	1.60	2.65	4750.0000	17.50	6
129	223.980	2.438	0.1006	4.3600	0.450	1.60	2.65	4100.0000	18.00	4
130	89.195	2.438	0.0579	4.4600	0.450	1.60	2.65	1370.0000	19.00	4
131	612.192	2.438	0.1646	4.6600	0.450	1.60	2.65	4340.0000	18.70	6
132	150.924	2.438	0.0823	4.9200	0.450	1.60	2.65	3550.0000	17.20	4
133	158.003	2.438	0.0762	4.9400	0.450	1.60	2.65	4610.0000	17.00	4
134	238.987	2.438	0.0853	5.4600	0.450	1.60	2.65	5690.0000	17.50	6
135	283.726	2.438	0.0823	6.0700	0.450	1.60	2.65	6810.0000	16.00	6
136	605.396	2.438	0.1524	6.1900	0.450	1.60	2.65	6230.0000	19.00	6
137	534.323	2.438	0.1311	6.2000	0.450	1.60	2.65	5570.0000	18.50	4
138	423.607	2.438	0.1128	6.5600	0.450	1.60	2.65	6180.0000	18.00	7
139	158.003	2.438	0.0853	8.6200	0.450	1.60	2.65	9630.0000	18.90	7
140	306.662	2.438	0.0853	8.9800	0.450	1.60	2.65	15100.0000	19.40	7
141	380.284	2.438	0.0945	9.8600	0.450	1.60	2.65	11400.0000	20.00	7
142	606.528	2.438	0.1311	10.1000	0.450	1.60	2.65	11500.0000	18.50	7
143	228.227	2.438	0.3078	0.1300	0.930	1.54	2.65	0.0	19.80	1
144	279.762	2.438	0.3078	0.2200	0.930	1.54	2.65	0.0	19.30	1
145	305.813	2.438	0.3109	0.2200	0.930	1.54	2.65	0.0	19.00	1
146	335.828	2.438	0.3078	0.2800	0.930	1.54	2.65	2.8000	22.70	1
147	308.927	2.438	0.3139	0.2800	0.930	1.54	2.65	0.4000	19.60	1
148	341.491	2.438	0.3078	0.3000	0.930	1.54	2.65	0.4000	20.50	1
149	380.000	2.438	0.3078	0.3700	0.930	1.54	2.65	21.0000	18.00	3
150	411.431	2.438	0.3170	0.3700	0.930	1.54	2.65	28.0000	20.70	3
151	130.820	2.438	0.1524	0.4300	0.930	1.54	2.65	0.0	18.90	1
152	127.139	2.438	0.1494	0.4300	0.930	1.54	2.65	0.0	19.00	1
153	143.279	2.438	0.1554	0.5000	0.930	1.54	2.65	-1.0000	18.90	1
154	153.473	2.438	0.1524	0.5400	0.930	1.54	2.65	4.2000	16.80	1
155	460.135	2.438	0.3200	0.5900	0.930	1.54	2.65	65.0000	19.70	3
156	144.412	2.438	0.1494	0.6200	0.930	1.54	2.65	-1.0000	19.20	1
157	176.975	2.438	0.1585	0.6400	0.930	1.54	2.65	26.0000	16.70	1
158	161.684	2.438	0.1494	0.6800	0.930	1.54	2.65	15.0000	19.30	1
159	209.822	2.438	0.1768	0.7100	0.930	1.54	2.65	63.0000	17.40	3
160	200.477	2.438	0.1646	0.8000	0.930	1.54	2.65	73.0000	19.50	3
161	477.124	2.438	0.3170	1.1200	0.930	1.54	2.65	140.0000	19.40	3
162	216.334	2.438	0.1615	1.3000	0.930	1.54	2.65	200.9998	17.10	3
163	476.558	2.438	0.3048	1.3600	0.930	1.54	2.65	210.9998	19.20	3
164	231.625	2.438	0.1707	1.4500	0.930	1.54	2.65	252.9999	19.00	3
165	464.665	2.438	0.2835	1.8300	0.930	1.54	2.65	307.9998	17.50	3

GUY - DATA OF GUY H.P., SIMONS, D.B. AND RICHARDSON, E.V. (1966)
(SHEET 4 OF 7)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
166	195.380	2.438	0.1402	1.9200	0.930	1.54	2.65	450.0000	19.00	3
167	639.375	2.438	0.3383	2.7500	0.930	1.54	2.65	600.9998	18.00	3
168	253.711	2.438	0.1676	3.0400	0.930	1.54	2.65	518.9998	17.30	3
169	631.446	2.438	0.3170	3.1300	0.930	1.54	2.65	536.9998	19.10	3
170	285.991	2.438	0.1798	3.3900	0.930	1.54	2.65	821.9998	18.30	3
171	642.490	2.438	0.3109	3.5600	0.930	1.54	2.65	1080.0000	18.90	3
172	629.181	2.438	0.2804	3.9300	0.930	1.54	2.65	1180.0000	18.30	3
173	317.139	2.438	0.1737	4.3000	0.930	1.54	2.65	1490.0000	17.40	3
174	628.332	2.438	0.2713	4.3700	0.930	1.54	2.65	1900.0000	18.50	3
175	625.500	2.438	0.2499	5.8700	0.930	1.54	2.65	2750.0000	18.40	4
176	320.537	2.438	0.1494	6.0000	0.930	1.54	2.65	2620.0000	18.50	4
177	466.081	2.438	0.1829	6.5000	0.930	1.54	2.65	3110.0000	17.30	4
178	632.296	2.438	0.2073	7.1000	0.930	1.54	2.65	4020.0000	19.30	4
179	624.934	2.438	0.1615	9.2000	0.930	1.54	2.65	6140.0000	18.20	4
180	442.862	2.438	0.1554	9.4000	0.930	1.54	2.65	5090.0000	18.00	4
181	443.711	2.438	0.1341	11.2000	0.930	1.54	2.65	9480.0000	21.70	4
182	578.778	2.438	0.1341	11.6000	0.930	1.54	2.65	7320.0000	20.40	6
183	439.747	2.438	0.1158	12.3000	0.930	1.54	2.65	10200.0000	19.60	6
184	584.158	2.438	0.1341	12.6000	0.930	1.54	2.65	7000.0000	21.00	6
185	591.238	2.438	0.1311	12.8000	0.930	1.54	2.65	7010.0000	20.50	6
186	411.714	2.438	0.3383	0.8400	0.470	1.54	2.65	180.9998	13.10	3
187	271.550	2.438	0.2286	0.4200	0.470	1.54	2.65	23.0000	11.50	3
188	432.102	2.438	0.3749	0.5200	0.470	1.54	2.65	59.0000	11.50	3
189	603.697	2.438	0.4054	1.7300	0.470	1.54	2.65	585.0000	11.00	3
190	201.327	2.438	0.2377	0.4700	0.470	1.54	2.65	6.0000	12.70	2
191	195.947	2.438	0.2316	0.4600	0.470	1.54	2.65	1.6000	17.00	2
192	197.079	2.438	0.2286	0.4600	0.470	1.54	2.65	2.3000	19.10	2
193	201.044	2.438	0.2256	0.4900	0.470	1.54	2.65	2.5000	18.30	2
194	197.362	2.438	0.1829	0.5300	0.470	1.54	2.65	37.0000	17.10	2
195	200.477	2.438	0.1829	0.6500	0.470	1.54	2.65	31.0000	18.50	2
196	203.875	2.438	0.1890	0.7200	0.470	1.54	2.65	99.0000	14.70	3
197	202.176	2.438	0.1920	0.9000	0.470	1.54	2.65	106.0000	18.50	3
198	201.610	2.438	0.1768	1.1700	0.470	1.54	2.65	195.0000	18.00	3
199	231.059	2.438	0.1951	2.4800	0.470	1.54	2.65	428.9998	23.20	3
200	229.643	2.438	0.1890	2.3600	0.470	1.54	2.65	545.0000	13.10	3
201	226.811	2.438	0.1676	2.2200	0.470	1.54	2.65	577.9998	16.00	3
202	232.191	2.438	0.1859	2.2200	0.470	1.54	2.65	661.9998	20.70	3
203	231.625	2.438	0.1981	2.1500	0.470	1.54	2.65	533.9998	21.00	3
204	240.403	2.438	0.1920	2.0300	0.470	1.54	2.65	462.9998	20.00	3
205	233.324	2.438	0.1951	2.0400	0.470	1.54	2.65	625.0000	21.20	3
206	226.811	2.438	0.1737	2.3500	0.470	1.54	2.65	570.9998	17.20	3
207	248.048	2.438	0.1981	1.9900	0.470	1.54	2.65	638.9998	19.10	3
208	235.306	2.438	0.1615	2.0100	0.470	1.54	2.65	760.9998	18.60	3
209	319.971	2.438	0.2469	2.3700	0.470	1.54	2.65	480.0000	13.50	3
210	441.163	2.438	0.2774	2.0000	0.470	1.54	2.65	587.9998	16.20	3
211	434.934	2.438	0.2804	2.4000	0.470	1.54	2.65	656.9998	16.60	3
212	434.934	2.438	0.2743	2.4200	0.470	1.54	2.65	1100.0000	22.10	3
213	434.934	2.438	0.2865	2.3700	0.470	1.54	2.65	765.0000	18.50	3
214	435.783	2.438	0.2652	2.5900	0.470	1.54	2.65	760.9998	21.30	3
215	432.668	2.438	0.2743	2.3300	0.470	1.54	2.65	806.9998	20.10	3
216	435.500	2.438	0.2438	1.8000	0.470	1.54	2.65	1640.0000	18.70	3
217	326.200	2.438	0.2195	3.2000	0.470	1.54	2.65	1510.0000	20.30	3
218	434.934	2.438	0.1981	3.2600	0.470	1.54	2.65	2920.0000	21.70	4
219	604.546	2.438	0.1890	3.4200	0.470	1.54	2.65	3290.0000	21.10	5
220	603.697	2.438	0.1859	3.5500	0.470	1.54	2.65	3390.0000	23.20	5

GUY - DATA OF GUY H.P., SIMONS, D.B. AND RICHARDSON, E.V. (1966)
(SHEET 5 OF 7)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
221	232.757	2.438	0.0975	5.3100	0.470	1.54	2.65	5250.0000	21.40	5
222	233.890	2.438	0.0975	5.5000	0.470	1.54	2.65	5680.0000	20.20	5
223	230.492	2.438	0.0914	6.4000	0.470	1.54	2.65	6310.0000	20.20	5
224	438.898	2.438	0.1311	5.7000	0.470	1.54	2.65	5360.0000	21.20	7
225	442.012	2.438	0.1250	5.7800	0.470	1.54	2.65	5480.0000	21.20	7
226	441.729	2.438	0.1280	5.7100	0.470	1.54	2.65	5160.0000	21.60	7
227	439.464	2.438	0.1372	5.7500	0.470	1.54	2.65	5130.0000	23.00	7
228	432.385	2.438	0.1189	6.4300	0.470	1.54	2.65	7140.0000	21.80	7
229	604.546	2.438	0.1676	6.3400	0.470	1.54	2.65	4480.0000	10.70	6
230	601.148	2.438	0.1646	6.2200	0.470	1.54	2.65	4490.0000	24.50	6
231	590.955	2.438	0.1615	6.4600	0.470	1.54	2.65	4390.0000	22.70	6
232	603.414	2.438	0.1676	6.5100	0.470	1.54	2.65	5760.0000	21.00	6
233	434.934	2.438	0.1250	7.4000	0.470	1.54	2.65	7100.0000	15.00	7
234	440.031	2.438	0.1311	7.3400	0.470	1.54	2.65	8280.0000	22.40	7
235	447.393	2.438	0.1341	8.2100	0.470	1.54	2.65	17700.0000	19.00	7
236	592.937	2.438	0.1615	7.4000	0.470	1.54	2.65	6760.0000	23.50	6
237	606.528	2.438	0.1554	7.9000	0.470	1.54	2.65	8440.0000	13.30	5
238	602.281	2.438	0.1524	8.0600	0.470	1.54	2.65	16100.0000	19.60	7
239	340.075	2.438	0.1128	9.6000	0.470	1.54	2.65	8960.0000	19.50	7
240	25.768	0.610	0.1554	0.1400	0.320	1.57	2.65	0.0	10.00	1
241	24.918	0.610	0.1585	0.1700	0.320	1.57	2.65	0.0	23.40	1
242	37.094	0.610	0.1646	1.1200	0.320	1.57	2.65	55.0000	10.50	2
243	37.094	0.610	0.1646	0.8600	0.320	1.57	2.65	61.0000	27.80	2
244	44.173	0.610	0.1737	1.1000	0.320	1.57	2.65	91.0000	14.70	2
245	44.456	0.610	0.1707	1.0300	0.320	1.57	2.65	117.0000	33.80	3
246	53.234	0.610	0.1707	1.3900	0.320	1.57	2.65	225.9998	10.20	3
247	53.234	0.610	0.1798	1.1800	0.320	1.57	2.65	167.9999	27.20	3
248	64.560	0.610	0.1768	1.4700	0.320	1.57	2.65	455.0000	14.30	3
249	64.844	0.610	0.1920	2.1400	0.320	1.57	2.65	786.9998	34.30	3
250	75.604	0.610	0.2164	2.0100	0.320	1.57	2.65	853.9998	13.10	3
251	74.754	0.610	0.2012	2.1000	0.320	1.57	2.65	718.9998	33.10	3
252	88.629	0.610	0.1768	1.8400	0.320	1.57	2.65	906.9998	12.40	4
253	88.629	0.610	0.1951	1.6600	0.320	1.57	2.65	1150.0000	33.90	4
254	98.540	0.610	0.2256	1.7200	0.320	1.57	2.65	705.9998	12.10	4
255	98.540	0.610	0.2225	2.6100	0.320	1.57	2.65	1150.0000	32.80	4
256	98.540	0.610	0.1829	1.8900	0.320	1.57	2.65	1410.0000	11.90	4
257	99.106	0.610	0.2195	1.9400	0.320	1.57	2.65	1820.0000	26.90	4
258	128.838	0.610	0.1676	5.6600	0.320	1.57	2.65	5600.0000	12.70	7
259	128.838	0.610	0.1707	4.1700	0.320	1.57	2.65	4340.0000	28.40	5
260	135.350	0.610	0.1798	7.1000	0.320	1.57	2.65	5180.0000	7.00	7
261	135.350	0.610	0.1707	4.9300	0.320	1.57	2.65	5530.0000	23.50	7
262	150.641	0.610	0.2042	4.5600	0.320	1.57	2.65	3960.0000	7.90	5
263	150.075	0.610	0.1829	4.0800	0.320	1.57	2.65	5250.0000	23.80	7
264	161.401	0.610	0.1829	8.6500	0.320	1.57	2.65	12300.0000	12.50	7
265	161.401	0.610	0.1829	7.3000	0.320	1.57	2.65	8780.0000	31.70	7
266	187.735	0.610	0.1920	8.3500	0.320	1.57	2.65	26100.0000	11.40	7
267	188.018	0.610	0.1890	6.3500	0.320	1.57	2.65	21000.0000	26.70	7
268	192.266	0.610	0.1890	9.7000	0.320	1.57	2.65	29600.0000	12.90	7
269	193.115	0.610	0.1859	6.5600	0.320	1.57	2.65	20800.0000	27.90	7
270	190.000	0.610	0.1981	16.2000	0.320	1.57	2.65	49300.0000	14.50	8
271	31.714	0.610	0.1524	0.2500	0.330	1.25	2.65	0.0	20.20	1
272	28.316	0.610	0.1524	0.8700	0.330	1.25	2.65	6.6000	20.00	2
273	31.714	0.610	0.1494	0.8800	0.330	1.25	2.65	47.0000	20.00	2
274	39.926	0.610	0.1585	1.0200	0.330	1.25	2.65	142.0000	20.10	3
275	47.854	0.610	0.1494	2.1300	0.330	1.25	2.65	460.0000	20.00	3

GUY - DATA OF GUY H.P., SIMONS, D.B. AND RICHARDSON, E.V. (1966)
(SHEET 6 OF 7)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
276	55.499	0.610	0.1585	2.4000	0.330	1.25	2.65	731.9998	20.00	3
277	93.160	0.610	0.1494	2.7000	0.330	1.25	2.65	2210.0000	20.00	4
278	113.547	0.610	0.1554	2.9000	0.330	1.25	2.65	3090.0000	20.00	5
279	74.188	0.610	0.1585	3.2000	0.330	1.25	2.65	1960.0000	19.80	3
280	120.060	0.610	0.1554	3.5000	0.330	1.25	2.65	3280.0000	20.00	5
281	125.157	0.610	0.1524	6.2000	0.330	1.25	2.65	4990.0000	20.30	7
282	131.953	0.610	0.1524	8.0000	0.330	1.25	2.65	7110.0000	20.00	7
283	152.906	0.610	0.1585	9.1000	0.330	1.25	2.65	18400.0000	20.30	7
284	171.029	0.610	0.1585	11.4000	0.330	1.25	2.65	18400.0000	19.90	7
285	30.015	0.610	0.1524	0.2200	0.330	2.07	2.65	0.0	18.30	1
286	35.395	0.610	0.1524	0.2700	0.330	2.07	2.65	0.0	18.50	1
287	29.732	0.610	0.1524	0.2900	0.330	2.07	2.65	3.5000	20.50	2
288	30.015	0.610	0.1554	0.4700	0.330	2.07	2.65	12.0000	22.50	2
289	41.341	0.610	0.1585	0.6300	0.330	2.07	2.65	85.0000	22.60	2
290	55.216	0.610	0.1524	0.9700	0.330	2.07	2.65	506.9998	22.10	3
291	47.854	0.610	0.1463	1.1700	0.330	2.07	2.65	451.9998	23.40	3
292	59.747	0.610	0.1554	1.2000	0.330	2.07	2.65	1030.0000	24.10	3
293	69.657	0.610	0.1585	1.4300	0.330	2.07	2.65	1520.0000	23.00	3
294	65.693	0.610	0.1615	1.6300	0.330	2.07	2.65	1220.0000	23.20	3
295	74.188	0.610	0.1585	1.8800	0.330	2.07	2.65	2790.0000	22.10	4
296	94.575	0.610	0.1585	3.4300	0.330	2.07	2.65	4320.0000	21.90	4
297	113.264	0.610	0.1554	4.3300	0.330	2.07	2.65	5100.0000	21.80	5
298	130.254	0.610	0.1494	4.4700	0.330	2.07	2.65	7900.0000	21.60	6
299	152.340	0.610	0.1494	6.9500	0.330	2.07	2.65	15100.0000	19.60	7
300	182.921	0.610	0.1585	9.1000	0.330	2.07	2.65	22500.0000	19.60	7
301	171.029	0.610	0.1554	9.8000	0.330	2.07	2.65	14600.0000	19.60	7
302	30.015	0.610	0.1859	0.1600	0.540	1.52	2.65	0.0	15.90	1
303	31.714	0.610	0.1829	0.1900	0.540	1.52	2.65	0.0	17.40	1
304	34.262	0.610	0.1890	0.2600	0.540	1.52	2.65	0.6000	16.90	2
305	45.022	0.610	0.1798	0.3800	0.540	1.52	2.65	17.0000	18.00	2
306	69.374	0.610	0.2195	1.7000	0.540	1.52	2.65	386.9998	18.60	3
307	88.346	0.610	0.2469	2.0100	0.540	1.52	2.65	407.9998	19.20	3
308	134.218	0.610	0.2195	3.3800	0.540	1.52	2.65	2620.0000	20.20	4
309	108.167	0.610	0.2377	3.5100	0.540	1.52	2.65	1200.0000	18.90	3
310	108.167	0.610	0.2560	3.3100	0.540	1.52	2.65	1050.0000	18.70	3
311	104.486	0.610	0.2682	2.4800	0.540	1.52	2.65	720.0000	23.30	3
312	108.733	0.610	0.2591	2.9300	0.540	1.52	2.65	903.9998	21.50	3
313	108.450	0.610	0.2621	2.9400	0.540	1.52	2.65	1100.0000	22.40	3
314	106.751	0.610	0.2195	1.9800	0.540	1.52	2.65	520.9998	25.00	4
315	96.841	0.610	0.2195	3.8800	0.540	1.52	2.65	1250.0000	20.60	3
316	135.067	0.610	0.2713	3.9900	0.540	1.52	2.65	1790.0000	19.30	4
317	135.350	0.610	0.2499	3.6600	0.540	1.52	2.65	1970.0000	24.30	4
318	135.917	0.610	0.2652	3.7700	0.540	1.52	2.65	1950.0000	22.20	4
319	137.049	0.610	0.2134	3.3900	0.540	1.52	2.65	2960.0000	22.30	5
320	108.167	0.610	0.2316	4.0800	0.540	1.52	2.65	1200.0000	21.50	4
321	117.795	0.610	0.2195	4.3300	0.540	1.52	2.65	1520.0000	17.70	4
322	150.924	0.610	0.1951	4.8600	0.540	1.52	2.65	2690.0000	20.30	5
323	196.513	0.610	0.2256	5.5100	0.540	1.52	2.65	3330.0000	21.70	6
324	197.929	0.610	0.2286	5.5000	0.540	1.52	2.65	4350.0000	22.50	6
325	197.079	0.610	0.2286	5.3700	0.540	1.52	2.65	4710.0000	23.70	6
326	197.929	0.610	0.2225	6.2800	0.540	1.52	2.65	7640.0000	24.00	6
327	180.373	0.610	0.2195	5.6500	0.540	1.52	2.65	3350.0000	18.10	6
328	211.804	0.610	0.2012	7.6800	0.540	1.52	2.65	5690.0000	19.90	6
329	215.768	0.610	0.2164	5.2000	0.540	1.52	2.65	3330.0000	22.60	6
330	214.352	0.610	0.2316	5.0800	0.540	1.52	2.65	3400.0000	22.50	6

GUY - DATA OF GUY H.P., SIMONS, D.B. AND RICHARDSON, E.V. (1966)
(SHEET 7 OF 7)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
331	214.918	0.610	0.2103	7.9000	0.540	1.52	2.65	9730.0000	23.30	6
332	214.918	0.610	0.2134	9.0000	0.540	1.52	2.65	22300.0000	23.70	7
333	221.431	0.610	0.2042	9.8000	0.540	1.52	2.65	5600.0000	23.50	6
334	221.997	0.610	0.2012	10.7500	0.540	1.52	2.65	10300.0000	25.00	7
335	222.564	0.610	0.1981	13.0500	0.540	1.52	2.65	15800.0000	25.10	7
336	223.413	0.610	0.1981	11.7500	0.540	1.52	2.65	9180.0000	22.50	7
337	221.714	0.610	0.1981	13.6500	0.540	1.52	2.65	21800.0000	22.30	7
338	222.564	0.610	0.2073	19.2800	0.540	1.52	2.65	50000.0000	24.00	7
339	221.997	0.610	0.1951	14.3800	0.540	1.52	2.65	26000.0000	16.90	7

HIL - DATA OF HILL, H.M., SRINIVASAN, V.S., AND UNNY, T.E. JR. (1969)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	114.769	0.610	0.2487	0.7900	0.088	1.66	2.65	-1.0000	27.78	4
2	113.523	0.610	0.2420	0.7420	0.088	1.66	2.65	-1.0000	27.78	4
3	112.560	0.610	0.2387	0.7600	0.088	1.66	2.65	-1.0000	27.78	4
4	112.843	0.610	0.2490	0.7690	0.088	1.66	2.65	-1.0000	27.78	4
5	114.401	0.610	0.2560	0.7920	0.088	1.66	2.65	-1.0000	27.78	4
6	90.416	0.610	0.1954	0.8900	0.088	1.66	2.65	-1.0000	27.78	4
7	88.462	0.610	0.1932	0.9120	0.088	1.66	2.65	-1.0000	27.78	4
8	90.671	0.610	0.2039	0.9100	0.088	1.66	2.65	-1.0000	27.78	4
9	90.048	0.610	0.1984	0.8690	0.088	1.66	2.65	-1.0000	27.78	4
10	92.710	0.610	0.2067	0.8450	0.088	1.66	2.65	-1.0000	27.78	4
11	71.472	0.610	0.1588	1.0060	0.088	1.66	2.65	-1.0000	27.78	4
12	80.817	0.610	0.1701	0.9420	0.088	1.66	2.65	-1.0000	27.78	4
13	77.645	0.610	0.1631	1.0630	0.088	1.66	2.65	-1.0000	27.78	4
14	79.996	0.610	0.1698	0.9970	0.088	1.66	2.65	-1.0000	27.78	4
15	76.513	0.610	0.1652	0.9980	0.088	1.66	2.65	-1.0000	27.78	4
16	98.543	0.610	0.2347	0.6890	0.088	1.66	2.65	-1.0000	32.22	4
17	106.755	0.610	0.2323	0.7590	0.088	1.66	2.65	-1.0000	32.22	4
18	94.012	0.610	0.2277	0.7160	0.088	1.66	2.65	-1.0000	37.78	4
19	95.145	0.610	0.2262	0.7380	0.088	1.66	2.65	-1.0000	37.78	4
20	89.199	0.610	0.2134	0.6940	0.088	1.66	2.65	-1.0000	43.33	4
21	89.199	0.610	0.2277	0.6830	0.088	1.66	2.65	-1.0000	43.33	4
22	82.119	0.610	0.2188	0.6250	0.088	1.66	2.65	-1.0000	54.44	4
23	85.234	0.610	0.2380	0.5210	0.088	1.66	2.65	-1.0000	65.56	4
24	112.702	0.610	0.2262	1.1620	0.088	1.66	2.65	-1.0000	23.33	4
25	114.684	0.610	0.2371	0.9790	0.088	1.66	2.65	-1.0000	22.22	4
26	121.763	0.610	0.2533	0.8370	0.088	1.66	2.65	-1.0000	21.67	4
27	110.719	0.610	0.2469	0.8330	0.150	1.51	2.65	-1.0000	22.22	4
28	107.605	0.610	0.2268	1.0410	0.150	1.51	2.65	-1.0000	21.67	4
29	92.313	0.610	0.2316	0.8750	0.150	1.51	2.65	-1.0000	26.67	4
30	107.321	0.610	0.2329	0.7630	0.150	1.51	2.65	-1.0000	32.22	4
31	90.898	0.610	0.2387	0.6530	0.150	1.51	2.65	-1.0000	43.33	4
32	116.949	0.610	0.2377	0.9000	0.150	1.51	2.65	-1.0000	65.56	4
33	105.622	0.610	0.2463	0.9330	0.150	1.51	2.65	-1.0000	54.44	4
34	86.933	0.610	0.2289	0.7370	0.150	1.51	2.65	-1.0000	54.44	4
35	93.163	0.610	0.1789	1.1150	0.150	1.51	2.65	-1.0000	65.56	4
36	108.454	0.610	0.2027	2.0100	0.310	1.32	2.65	-1.0000	23.89	4
37	108.737	0.610	0.1823	2.0830	0.310	1.32	2.65	-1.0000	27.22	4
38	95.711	0.610	0.1768	1.8370	0.310	1.32	2.65	-1.0000	32.22	4
39	123.745	0.610	0.2033	2.4710	0.310	1.32	2.65	-1.0000	43.33	4
40	115.817	0.610	0.1734	2.5490	0.310	1.32	2.65	-1.0000	54.44	4
41	116.666	0.610	0.1637	2.6040	0.310	1.32	2.65	-1.0000	65.56	4
42	118.365	0.610	0.1804	2.4940	0.310	1.32	2.65	-1.0000	38.06	4
43	115.817	0.610	0.1765	2.3150	0.310	1.32	2.65	-1.0000	48.89	4
44	104.773	0.610	0.1606	2.6780	0.310	1.32	2.65	-1.0000	32.22	4
45	118.365	0.610	0.1786	2.6040	0.310	1.32	2.65	-1.0000	30.00	4
46	117.232	0.610	0.1814	2.4360	0.310	1.32	2.65	-1.0000	42.78	4

HPY - DATA OF HO, PANG-YUNG (1939)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	50.402	0.399	0.2176	1.0600	3.130	2.24	2.49	0.1000	15.60	0
2	68.695	0.399	0.2624	1.0500	3.130	2.24	2.49	0.4500	15.70	0
3	30.949	0.399	0.1417	1.2600	3.130	2.24	2.49	0.7300	15.30	0
4	43.890	0.399	0.1826	1.2700	3.130	2.24	2.49	1.1100	15.30	0
5	53.008	0.399	0.2103	1.2500	3.130	2.24	2.49	1.5500	15.40	0
6	67.788	0.399	0.2463	1.2800	3.130	2.24	2.49	2.8900	15.50	0
7	19.821	0.399	0.1039	1.7100	3.130	2.24	2.49	0.9700	15.30	0
8	33.441	0.399	0.1420	1.7000	3.130	2.24	2.49	0.5400	15.20	0
9	52.186	0.399	0.1914	1.7000	3.130	2.24	2.49	4.5400	15.20	0
10	64.504	0.399	0.2225	1.6500	3.130	2.24	2.49	8.7800	15.30	0
11	68.610	0.399	0.2246	1.6400	3.130	2.24	2.49	8.6300	14.90	0
12	19.198	0.399	0.0796	3.3500	3.130	2.24	2.49	24.1000	15.00	0
13	34.744	0.399	0.1167	3.3600	3.130	2.24	2.49	66.7000	15.00	0
14	48.703	0.399	0.1433	3.3600	3.130	2.24	2.49	249.0000	15.10	0
15	72.008	0.399	0.1786	3.4000	3.130	2.24	2.49	441.0000	15.10	0
16	55.952	0.399	0.2216	1.2700	4.360	1.59	2.70	0.0890	15.80	0
17	65.240	0.399	0.2463	1.2800	4.360	1.59	2.70	0.1900	15.80	0
18	37.745	0.399	0.1551	1.6700	4.360	1.59	2.70	0.2600	15.70	0
19	49.100	0.399	0.1844	1.6900	4.360	1.59	2.70	0.6600	15.70	0
20	56.547	0.399	0.2030	1.6700	4.360	1.59	2.70	0.9700	15.60	0
21	64.107	0.399	0.2188	1.6700	4.360	1.59	2.70	1.7900	15.60	0
22	16.140	0.399	0.0732	3.3500	4.360	1.59	2.70	3.0900	15.40	0
23	29.250	0.399	0.1055	3.3400	4.360	1.59	2.70	12.8000	15.50	0
24	42.644	0.399	0.1353	3.3500	4.360	1.59	2.70	65.6000	15.50	0
25	54.338	0.399	0.1625	3.3400	4.360	1.59	2.70	73.5000	15.60	0
26	63.060	0.399	0.1771	3.3600	4.360	1.59	2.70	104.5000	15.70	0
27	64.447	0.399	0.2231	1.6900	6.280	1.49	2.66	0.1600	16.00	0
28	30.241	0.399	0.1061	3.3400	6.280	1.49	2.66	1.1200	15.50	0
29	44.399	0.399	0.1381	3.3500	6.280	1.49	2.66	5.9000	15.50	0
30	53.885	0.399	0.1612	3.3300	6.280	1.49	2.66	6.8000	14.90	0
31	65.042	0.399	0.1798	3.3500	6.280	1.49	2.66	18.2000	15.00	0
32	33.045	0.399	0.1021	5.0200	6.280	1.49	2.66	5.0700	14.70	0
33	50.148	0.399	0.1353	5.0400	6.280	1.49	2.66	87.2000	14.60	0
34	64.051	0.399	0.1576	5.0200	6.280	1.49	2.66	74.4000	14.70	0
35	14.639	0.399	0.0963	1.0000	2.010	1.99	2.45	2.7200	12.80	0
36	25.513	0.399	0.1329	1.0200	2.010	1.99	2.45	14.3000	13.50	0
37	36.952	0.399	0.1716	1.0100	2.010	1.99	2.45	14.4000	14.20	0
38	49.496	0.399	0.2063	1.0300	2.010	1.99	2.45	57.3000	14.40	0
39	62.861	0.399	0.2493	1.0400	2.010	1.99	2.45	71.9000	14.50	0
40	23.672	0.399	0.1204	1.2500	2.010	1.99	2.45	16.1000	14.70	0
41	39.246	0.399	0.1658	1.2600	2.010	1.99	2.45	67.8000	14.80	0
42	48.958	0.399	0.1978	1.2600	2.010	1.99	2.45	101.0000	15.00	0
43	63.060	0.399	0.2259	1.2500	2.010	1.99	2.45	122.0000	15.20	0
44	13.648	0.399	0.0823	1.6700	2.010	1.99	2.45	4.8700	15.10	0
45	25.541	0.399	0.1189	1.6600	2.010	1.99	2.45	104.0000	15.10	0
46	37.802	0.399	0.1484	1.6600	2.010	1.99	2.45	211.0000	15.10	0
47	52.186	0.399	0.1969	1.6800	2.010	1.99	2.45	178.0000	15.20	0
48	63.145	0.399	0.2249	1.6700	2.010	1.99	2.45	199.0000	15.30	0
49	30.241	0.399	0.1094	3.3300	6.010	1.39	2.66	1.3000	10.80	0
50	44.796	0.399	0.1448	3.3500	6.010	1.39	2.66	6.4300	11.00	0
51	53.687	0.399	0.1658	3.3400	6.010	1.39	2.66	7.0300	11.50	0
52	65.042	0.399	0.1740	3.3300	6.010	1.39	2.66	19.6000	11.70	0
53	33.045	0.399	0.1003	5.0000	6.010	1.39	2.66	7.1300	12.20	0
54	50.148	0.399	0.1350	5.0000	6.010	1.39	2.66	115.0000	12.60	0
55	64.051	0.399	0.1570	5.0100	6.010	1.39	2.66	169.0000	12.90	0

HPY - DATA OF HO, PANG-YUNG (1939)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	6.003	0.399	0.0506	1.0000	1.400	1.96	2.64	8.1600	13.50	0
57	12.827	0.399	0.0844	1.0000	1.400	1.96	2.64	111.0000	13.50	0
58	23.700	0.399	0.1247	0.9900	1.400	1.96	2.64	138.0000	13.60	0
59	41.653	0.399	0.1896	1.0000	1.400	1.96	2.64	205.0000	13.60	0
60	6.003	0.399	0.0509	1.0000	1.400	1.96	2.64	24.5000	28.50	0
61	12.827	0.399	0.0856	1.0100	1.400	1.96	2.64	168.0000	29.30	0
62	23.700	0.399	0.1268	1.0000	1.400	1.96	2.64	248.0000	30.70	0
63	41.653	0.399	0.2027	1.0000	1.400	1.96	2.64	317.0000	31.60	0
64	3.398	0.399	0.0363	1.0000	1.400	1.96	2.64	40.3000	41.00	0
65	6.003	0.399	0.0527	1.0000	1.400	1.96	2.64	131.0000	42.70	0
66	12.827	0.399	0.0866	1.0100	1.400	1.96	2.64	298.0000	43.60	0
67	23.700	0.399	0.1274	1.0200	1.400	1.96	2.64	351.0000	44.40	0
68	41.653	0.399	0.2176	1.0000	1.400	1.96	2.64	393.0000	44.00	0
69	6.003	0.399	0.0500	1.0000	1.400	1.96	2.64	7.3500	2.00	0
70	12.827	0.399	0.0841	1.0000	1.400	1.96	2.64	95.5000	1.60	0
71	23.700	0.399	0.1210	0.9900	1.400	1.96	2.64	116.0000	1.50	0
72	41.653	0.399	0.1835	1.0000	1.400	1.96	2.64	153.0000	2.20	0
73	5.890	0.399	0.0485	1.0000	1.400	1.96	2.64	8.3000	5.50	0
74	12.686	0.399	0.0823	1.0000	1.400	1.96	2.64	104.0000	5.80	0
75	23.729	0.399	0.1234	0.9900	1.400	1.96	2.64	124.0000	6.40	0
76	41.653	0.399	0.1841	1.0000	1.400	1.96	2.64	174.0000	7.00	0
77	6.003	0.399	0.0509	1.0000	1.400	1.96	2.64	8.1600	11.70	0
78	12.827	0.399	0.0860	1.0000	1.400	1.96	2.64	107.0000	11.80	0
79	23.700	0.399	0.1231	1.0100	1.400	1.96	2.64	141.0000	12.00	0
80	41.653	0.399	0.1859	0.9900	1.400	1.96	2.64	200.0000	12.30	0

JOR - DATA OF JORISSEN, A.L. (1938)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	18.490	0.610	0.0756	1.1300	0.600	1.80	2.67	95.8000	22.20	5
2	24.805	0.610	0.0924	1.1200	0.600	1.80	2.67	147.5000	22.20	5
3	29.052	0.610	0.0966	1.1300	0.600	1.80	2.67	143.5000	22.20	2
4	35.650	0.610	0.1049	1.1200	0.600	1.80	2.67	165.4000	22.80	2
5	10.873	0.610	0.0524	1.6700	0.600	1.80	2.67	128.1000	20.50	5
6	18.037	0.610	0.0701	1.6700	0.600	1.80	2.67	263.7998	20.50	2
7	23.134	0.610	0.0856	1.6500	0.600	1.80	2.67	249.6000	19.40	2
8	32.648	0.610	0.0991	1.6500	0.600	1.80	2.67	306.7000	19.40	2
9	3.285	0.610	0.0204	3.3200	0.600	1.80	2.67	588.0999	18.90	5
10	5.380	0.610	0.0290	3.3100	0.600	1.80	2.67	738.7998	18.90	2
11	8.325	0.610	0.0360	3.3300	0.600	1.80	2.67	781.5000	19.40	2
12	12.742	0.610	0.0460	3.3300	0.600	1.80	2.67	748.2998	18.90	2
13	17.018	0.610	0.0756	1.1100	0.910	1.53	2.67	95.6000	22.80	5
14	19.227	0.610	0.0786	1.1200	0.910	1.53	2.67	135.9000	22.80	5
15	22.171	0.610	0.0829	1.1300	0.910	1.53	2.67	146.7000	23.30	2
16	33.413	0.610	0.0975	1.1200	0.910	1.53	2.67	174.9000	23.30	2
17	34.206	0.610	0.0991	1.1200	0.910	1.53	2.67	187.2000	22.80	2
18	9.854	0.610	0.0445	1.6800	0.910	1.53	2.67	113.5000	20.00	5
19	16.253	0.610	0.0619	1.6500	0.910	1.53	2.67	259.5999	21.10	2
20	19.623	0.610	0.0674	1.6700	0.910	1.53	2.67	335.7000	21.60	2
21	22.341	0.610	0.0732	1.6600	0.910	1.53	2.67	352.2000	21.60	3
22	27.551	0.610	0.0811	1.6700	0.910	1.53	2.67	357.8999	21.60	3
23	4.559	0.610	0.0265	3.3300	0.910	1.53	2.67	802.7000	20.50	5
24	4.785	0.610	0.0277	3.3200	0.910	1.53	2.67	1134.3999	20.50	2
25	9.118	0.610	0.0390	3.3100	0.910	1.53	2.67	1056.8999	20.50	2
26	11.298	0.610	0.0469	3.3200	0.910	1.53	2.67	779.2000	20.00	5

KAH - DATA OF KALINSKE, A.A. AND HSIA, C.H. (1945)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	19.821	0.686	0.1128	0.2500	0.011	3.75	2.67	6400.0000	15.00	2
2	35.678	0.686	0.1494	0.2500	0.011	3.75	2.67	12900.0000	15.00	2
3	55.216	0.686	0.2012	0.2500	0.011	3.75	2.67	16700.0000	15.00	2
4	28.599	0.686	0.1097	0.5000	0.011	3.75	2.67	19500.0000	15.00	4
5	51.252	0.686	0.1585	0.5000	0.011	3.75	2.67	22400.0000	15.00	4
6	73.622	0.686	0.1951	0.5000	0.011	3.75	2.67	22700.0000	15.00	4
7	37.377	0.686	0.1067	1.0000	0.011	3.75	2.67	33600.0000	15.00	4
8	76.453	0.686	0.1707	1.0000	0.011	3.75	2.67	68100.0000	15.00	4
9	90.611	0.686	0.1585	1.3000	0.011	3.75	2.67	111000.0000	15.00	5

KAL - DATA OF KALKANIS,G. (1957)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	18.751	0.305	0.2347	0.3900	0.033	1.63	2.65	0.0	22.00	0
2	28.561	0.305	0.2402	0.8700	0.033	1.63	2.65	0.0	22.00	0
3	34.291	0.305	0.2444	0.9400	0.033	1.63	2.65	11200.0000	22.00	0
4	15.743	0.305	0.1314	0.7700	0.033	1.63	2.65	6230.0000	22.00	0
5	24.816	0.305	0.2039	0.8500	0.033	1.63	2.65	26500.0000	22.00	0
6	18.847	0.305	0.1561	0.8000	0.033	1.63	2.65	61780.0000	22.00	0
7	9.025	0.305	0.1012	0.9200	0.033	1.63	2.65	0.0	22.00	0
8	12.332	0.305	0.1021	0.8200	0.033	1.63	2.65	30750.0000	22.00	0
9	13.478	0.305	0.1036	0.9600	0.033	1.63	2.65	37600.0000	22.00	0
10	15.766	0.305	0.1061	0.7900	0.033	1.63	2.65	18090.0000	22.00	0
11	31.571	0.305	0.1878	0.8500	0.033	1.63	2.65	68750.0000	22.00	0
12	27.914	0.305	0.1890	0.6800	0.033	1.63	2.65	42200.0000	22.00	0
13	13.728	0.305	0.1231	0.9100	0.033	1.63	2.65	32900.0000	22.00	0
14	12.569	0.305	0.1137	1.0200	0.022	2.35	2.65	57100.0000	22.00	0
15	12.991	0.305	0.1128	0.9800	0.022	2.35	2.65	63370.0000	22.00	0
16	13.243	0.305	0.1198	1.0200	0.022	2.35	2.65	63900.0000	22.00	0
17	12.985	0.305	0.1155	1.2300	0.022	2.35	2.65	63700.0000	22.00	0
18	20.048	0.305	0.1798	0.6900	0.022	2.35	2.65	39200.0000	22.00	0
19	20.365	0.305	0.1768	0.7500	0.022	2.35	2.65	45100.0000	22.00	0
20	18.066	0.305	0.1768	0.5700	0.022	2.35	2.65	40900.0000	22.00	0
21	12.832	0.305	0.1771	0.2300	0.013	1.83	2.65	14230.0000	22.00	0
22	12.832	0.305	0.1771	0.2400	0.013	1.83	2.65	13850.0000	22.00	0
23	12.832	0.305	0.1771	0.2400	0.013	1.83	2.65	13270.0000	22.00	0

KEN - DATA OF KENNEDY, J.F. (1961)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	5.674	0.267	0.0226	20.8000	0.549	1.14	2.65	15300.0000	26.30	0
2	6.962	0.267	0.0256	21.4000	0.549	1.14	2.65	16200.0000	25.70	0
3	14.172	0.267	0.0375	27.2000	0.549	1.14	2.65	35900.0000	27.00	0
4	6.045	0.267	0.0451	5.6000	0.549	1.14	2.65	1680.0000	24.50	0
5	8.127	0.267	0.0457	8.1000	0.549	1.14	2.65	3810.0000	24.80	0
6	9.465	0.267	0.0448	10.9000	0.549	1.14	2.65	7040.0000	25.20	0
7	10.183	0.267	0.0457	12.5000	0.549	1.14	2.65	8790.0000	24.30	0
8	13.107	0.267	0.0485	14.0000	0.549	1.14	2.65	10400.0000	25.30	0
9	13.156	0.267	0.0469	13.4000	0.549	1.14	2.65	11300.0000	24.70	0
10	12.884	0.267	0.0445	15.4000	0.549	1.14	2.65	10600.0000	24.60	0
11	15.560	0.267	0.0448	18.7000	0.549	1.14	2.65	18500.0000	24.90	0
12	13.231	0.267	0.0747	5.5000	0.549	1.14	2.65	1860.0000	25.00	0
13	21.010	0.267	0.0728	11.0000	0.549	1.14	2.65	7110.0000	25.20	0
14	22.125	0.267	0.1055	6.7000	0.549	1.14	2.65	2170.0000	25.00	0
15	6.095	0.267	0.0479	3.2000	0.233	1.47	2.65	730.0000	27.20	0
16	7.507	0.267	0.0460	3.8000	0.233	1.47	2.65	2350.0000	25.00	0
17	8.226	0.267	0.0448	4.8000	0.233	1.47	2.65	2030.0000	25.60	0
18	9.390	0.267	0.0469	7.3000	0.233	1.47	2.65	7400.0000	25.70	0
19	9.341	0.267	0.0451	6.6000	0.233	1.47	2.65	6300.0000	28.50	0
20	10.158	0.267	0.0466	9.5000	0.233	1.47	2.65	11000.0000	27.00	0
21	12.388	0.267	0.0463	16.0000	0.233	1.47	2.65	34700.0000	28.00	0
22	12.289	0.267	0.0719	2.6000	0.233	1.47	2.65	2440.0000	30.10	0
23	13.255	0.267	0.0765	2.6000	0.233	1.47	2.65	1520.0000	25.40	0
24	17.567	0.267	0.0780	4.2000	0.233	1.47	2.65	4030.0000	24.70	0
25	17.616	0.267	0.0753	4.5000	0.233	1.47	2.65	4700.0000	25.10	0
26	20.267	0.267	0.0756	6.5000	0.233	1.47	2.65	9820.0000	25.20	0
27	21.952	0.267	0.0789	9.4000	0.233	1.47	2.65	20200.0000	24.50	0
28	21.853	0.267	0.1055	2.6000	0.233	1.47	2.65	1870.0000	26.50	0
29	19.367	0.851	0.0442	3.4000	0.233	1.47	2.65	490.0000	24.50	0
30	25.454	0.851	0.0469	4.2000	0.233	1.47	2.65	2070.0000	25.10	0
31	30.750	0.851	0.0451	6.8000	0.233	1.47	2.65	9270.0000	27.30	0
32	32.015	0.851	0.0451	8.2000	0.233	1.47	2.65	10900.0000	24.40	0
33	48.378	0.851	0.0594	8.8000	0.233	1.47	2.65	15400.0000	23.60	0
34	56.678	0.851	0.0664	22.9000	0.233	1.47	2.65	58500.0000	24.50	0
35	24.347	0.851	0.0695	2.6000	0.233	1.47	2.65	550.0000	26.00	0
36	42.449	0.851	0.0768	2.1000	0.233	1.47	2.65	1170.0000	24.20	0
37	55.413	0.851	0.0771	3.4000	0.233	1.47	2.65	3570.0000	26.60	0
38	70.116	0.851	0.0783	7.1000	0.233	1.47	2.65	15000.0000	24.50	0
39	69.405	0.851	0.1021	2.5000	0.233	1.47	2.65	1620.0000	23.00	0
40	69.800	0.851	0.1085	1.7000	0.233	1.47	2.65	1700.0000	25.40	0
41	94.068	0.851	0.1061	3.2000	0.233	1.47	2.65	5150.0000	24.60	0

KNB - DATA OF KENNEDY, J.F. AND BROOKS, N.H. (1965)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	39.526	0.851	0.1676	0.5600	0.142	1.38	2.65	14.0000	19.50	3
2	39.763	0.851	0.1344	1.4500	0.142	1.38	2.65	390.0000	18.40	3
3	39.842	0.851	0.1137	2.0600	0.142	1.38	2.65	1420.0000	18.40	3
4	39.526	0.851	0.1052	1.9800	0.142	1.38	2.65	1130.0000	25.10	3
5	39.526	0.851	0.1036	1.6000	0.142	1.38	2.65	980.0000	25.30	3
6	39.526	0.851	0.0774	2.5000	0.142	1.38	2.65	1710.0000	25.30	5
7	39.605	0.851	0.0716	1.9800	0.142	1.38	2.65	1570.0000	25.70	5
8	39.605	0.851	0.0710	2.0700	0.142	1.38	2.65	1410.0000	25.20	5
9	39.842	0.851	0.0695	2.2100	0.142	1.38	2.65	1740.0000	25.40	5

LAU - DATA OF LAURSEN, E.M. (1958)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	89.903	0.914	0.1725	1.0100	0.040	2.23	2.65	83400.0000	22.90	2
2	68.298	0.914	0.1408	1.1700	0.040	2.23	2.65	82000.0000	22.90	2
3	109.356	0.914	0.2054	0.8600	0.040	2.23	2.65	58400.0000	22.90	2
4	86.477	0.914	0.1457	1.0700	0.040	2.23	2.65	97000.0000	22.90	4
5	125.270	0.914	0.1722	1.1400	0.040	2.23	2.65	83400.0000	22.90	4
6	56.632	0.914	0.1652	0.8100	0.040	2.23	2.65	30300.0000	22.90	2
7	27.438	0.914	0.1158	0.7600	0.040	2.23	2.65	7300.0000	22.90	2
8	136.285	0.914	0.2021	1.0000	0.040	2.23	2.65	96100.0000	22.90	4
9	80.531	0.914	0.1710	1.2200	0.110	1.20	2.65	2250.0000	20.60	2
10	86.760	0.914	0.2289	0.5500	0.110	1.20	2.65	290.0000	21.80	2
11	104.854	0.914	0.2829	0.4300	0.110	1.20	2.65	140.0000	22.80	2
12	181.902	0.914	0.2825	1.0100	0.110	1.20	2.65	2700.0000	24.00	2
13	83.844	0.914	0.1567	1.5200	0.110	1.20	2.65	4240.0000	21.30	2
14	74.811	0.914	0.1579	1.4400	0.110	1.20	2.65	3130.0000	21.60	2
15	59.775	0.914	0.1625	1.0600	0.110	1.20	2.65	660.0000	23.30	2
16	111.112	0.914	0.2304	0.9200	0.110	1.20	2.65	1560.0000	21.60	2
17	134.388	0.914	0.3033	0.5800	0.110	1.20	2.65	610.0000	26.50	2
18	50.176	0.914	0.1161	1.8600	0.110	1.20	2.65	2720.0000	24.90	2
19	28.259	0.914	0.0948	1.6000	0.110	1.20	2.65	550.0000	26.40	2
20	41.540	0.914	0.1164	1.5000	0.110	1.20	2.65	1030.0000	21.50	2
21	104.090	0.914	0.2210	0.8000	0.110	1.20	2.65	1310.0000	23.70	2
22	24.437	0.914	0.0762	2.1000	0.110	1.20	2.65	1430.0000	19.80	2
23	134.727	0.914	0.1439	1.2000	0.110	1.20	2.65	5150.0000	22.80	5
24	132.491	0.914	0.2161	1.0700	0.110	1.20	2.65	3050.0000	23.20	2

MAV - DATA OF MAVIS, F.T., LIU, T. AND SOUCEK, E. (1937)
(SHEET 1 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	64.589	0.819	0.1213	1.7500	4.180	1.23	2.66	1.2000	29.50	0
2	73.338	0.819	0.1289	2.2500	4.180	1.23	2.66	1.3000	29.50	0
3	77.869	0.819	0.1329	2.1500	4.180	1.23	2.66	1.3000	29.50	0
4	48.250	0.819	0.0945	1.9000	4.180	1.23	2.66	1.3000	27.20	0
5	54.084	0.819	0.1006	2.2500	4.180	1.23	2.66	0.8000	27.20	0
6	57.396	0.819	0.1061	2.1500	4.180	1.23	2.66	0.7000	27.20	0
7	58.133	0.819	0.1079	2.0000	4.180	1.23	2.66	1.3000	27.20	0
8	62.012	0.819	0.1097	2.1000	4.180	1.23	2.66	1.2000	27.20	0
9	64.560	0.819	0.1106	1.8500	4.180	1.23	2.66	2.3000	27.20	0
10	69.091	0.819	0.1158	2.2500	4.180	1.23	2.66	4.5000	27.00	0
11	74.754	0.819	0.1213	3.1000	4.180	1.23	2.66	6.3000	27.00	0
12	23.276	0.819	0.0503	4.0000	4.180	1.23	2.66	4.5000	27.00	0
13	25.541	0.819	0.0527	4.0000	4.180	1.23	2.66	4.0000	27.00	0
14	28.033	0.819	0.0567	4.0000	4.180	1.23	2.66	6.8000	27.00	0
15	31.459	0.819	0.0600	3.8000	4.180	1.23	2.66	4.2000	27.00	0
16	34.574	0.819	0.0640	3.5000	4.180	1.23	2.66	13.9000	27.00	0
17	38.227	0.819	0.0674	4.8000	4.180	1.23	2.66	18.9000	27.00	0
18	40.322	0.819	0.0716	4.3000	4.180	1.23	2.66	38.3000	27.00	0
19	41.341	0.819	0.0716	4.6000	4.180	1.23	2.66	49.2000	27.00	0
20	43.663	0.819	0.0768	4.2000	4.180	1.23	2.66	49.1000	27.00	0
21	48.477	0.819	0.0783	4.5000	4.180	1.23	2.66	131.1000	27.00	0
22	53.970	0.819	0.0814	4.2000	4.180	1.23	2.66	140.6000	27.00	0
23	53.970	0.819	0.0823	4.5000	4.180	1.23	2.66	150.7000	26.50	0
24	59.095	0.819	0.0869	4.5000	4.180	1.23	2.66	255.7000	26.50	0
25	19.028	0.819	0.0317	10.0000	4.180	1.23	2.66	23.1000	29.00	0
26	20.642	0.819	0.0326	8.0000	4.180	1.23	2.66	62.1000	30.00	0
27	23.021	0.819	0.0357	6.4000	4.180	1.23	2.66	125.7000	29.00	0
28	23.361	0.819	0.0360	7.5000	4.180	1.23	2.66	263.3999	30.30	0
29	24.663	0.819	0.0387	7.3000	4.180	1.23	2.66	252.8000	30.30	0
30	25.258	0.819	0.0369	6.3000	4.180	1.23	2.66	233.3000	29.00	0
31	25.343	0.819	0.0396	4.0000	4.180	1.23	2.66	256.0999	30.00	0
32	28.033	0.819	0.0418	7.4000	4.180	1.23	2.66	311.5000	30.50	0
33	29.364	0.819	0.0418	7.3000	4.180	1.23	2.66	242.3000	30.50	0
34	33.781	0.819	0.0643	1.7500	4.180	1.23	2.66	80.4000	30.50	0
35	14.668	0.819	0.0302	9.7500	4.180	1.23	2.66	5.8000	26.50	0
36	16.537	0.819	0.0335	10.0000	4.180	1.23	2.66	29.5000	26.50	0
37	17.924	0.819	0.0341	9.5000	4.180	1.23	2.66	50.1000	26.50	0
38	18.547	0.819	0.0347	9.8000	4.180	1.23	2.66	127.3000	26.50	0
39	18.802	0.819	0.0354	9.5000	4.180	1.23	2.66	96.6000	26.50	0
40	18.887	0.819	0.0354	9.8000	4.180	1.23	2.66	132.8000	26.50	0
41	20.529	0.819	0.0366	10.0000	4.180	1.23	2.66	274.0000	26.50	0
42	23.729	0.819	0.0399	9.6500	4.180	1.23	2.66	427.0000	26.50	0
43	27.212	0.819	0.0454	9.0000	4.180	1.23	2.66	667.5000	26.50	0
44	33.413	0.819	0.0497	8.8000	4.180	1.23	2.66	615.5999	26.50	0
45	34.715	0.819	0.0799	1.2500	3.120	1.25	2.66	0.9000	29.00	0
46	38.142	0.819	0.0841	1.4500	3.120	1.25	2.66	1.1000	29.00	0
47	40.605	0.819	0.0875	1.4500	3.120	1.25	2.66	2.2000	29.00	0
48	43.748	0.819	0.0914	1.5000	3.120	1.25	2.66	1.9000	29.00	0
49	48.477	0.819	0.0951	1.2500	3.120	1.25	2.66	2.8000	29.00	0
50	50.402	0.819	0.1009	1.4000	3.120	1.25	2.66	6.6000	29.00	0
51	53.659	0.819	0.1076	1.7500	3.120	1.25	2.66	12.3000	29.00	0
52	57.510	0.819	0.1097	1.7000	3.120	1.25	2.66	5.7000	29.00	0
53	59.180	0.819	0.1106	1.7000	3.120	1.25	2.66	8.3000	29.00	0
54	64.277	0.819	0.1155	2.0000	3.120	1.25	2.66	12.5000	29.00	0
55	65.750	0.819	0.1183	2.2500	3.120	1.25	2.66	22.8000	29.50	0

MAV - DATA OF MAVIS, F.T., LIU, T. AND SOUCEK, E. (1937)
(SHEET 2 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	70.082	0.819	0.1213	2.2500	3.120	1.25	2.66	25.5000	29.50	0
57	71.923	0.819	0.1222	2.2500	3.120	1.25	2.66	23.9000	29.50	0
58	28.797	0.819	0.0661	2.5000	3.120	1.25	2.66	2.9000	29.00	0
59	30.581	0.819	0.0692	2.0000	3.120	1.25	2.66	2.0000	28.50	0
60	34.545	0.819	0.0732	2.2000	3.120	1.25	2.66	4.0000	28.50	0
61	37.179	0.819	0.0762	2.2000	3.120	1.25	2.66	6.6000	28.50	0
62	39.557	0.819	0.0792	1.9500	3.120	1.25	2.66	9.0000	28.50	0
63	43.125	0.819	0.0832	2.3000	3.120	1.25	2.66	25.1000	28.50	0
64	44.966	0.819	0.0850	1.8000	3.120	1.25	2.66	38.8000	28.50	0
65	46.438	0.819	0.0869	2.2000	3.120	1.25	2.66	47.9000	28.50	0
66	48.449	0.819	0.0893	2.2000	3.120	1.25	2.66	51.4000	28.50	0
67	48.703	0.819	0.0908	2.5000	3.120	1.25	2.66	61.7000	28.50	0
68	51.507	0.819	0.0914	2.4000	3.120	1.25	2.66	65.9000	28.50	0
69	56.519	0.819	0.0960	2.4000	3.120	1.25	2.66	83.7000	28.50	0
70	58.897	0.819	0.0994	2.1000	3.120	1.25	2.66	84.2000	28.50	0
71	62.295	0.819	0.1021	2.0000	3.120	1.25	2.66	94.9000	28.50	0
72	65.863	0.819	0.1064	2.5000	3.120	1.25	2.66	162.6000	29.00	0
73	72.942	0.819	0.1091	2.4500	3.120	1.25	2.66	186.8000	29.00	0
74	20.359	0.819	0.0433	5.0000	3.120	1.25	2.66	11.3000	28.50	0
75	21.917	0.819	0.0512	4.0000	3.120	1.25	2.66	2.8000	28.50	0
76	22.313	0.819	0.0494	4.5000	3.120	1.25	2.66	2.7000	28.50	0
77	23.474	0.819	0.0466	5.0000	3.120	1.25	2.66	41.6000	28.50	0
78	24.776	0.819	0.0491	5.0000	3.120	1.25	2.66	69.6000	28.50	0
79	24.975	0.819	0.0536	4.2000	3.120	1.25	2.66	4.5000	28.50	0
80	25.513	0.819	0.0500	5.0000	3.120	1.25	2.66	85.5000	28.50	0
81	27.551	0.819	0.0539	4.8000	3.120	1.25	2.66	128.3000	28.50	0
82	29.109	0.819	0.0555	4.8000	3.120	1.25	2.66	149.4000	28.50	0
83	30.723	0.819	0.0567	4.8500	3.120	1.25	2.66	160.7000	28.50	0
84	33.130	0.819	0.0591	4.9500	3.120	1.25	2.66	229.1000	28.50	0
85	35.395	0.819	0.0610	4.9500	3.120	1.25	2.66	276.2000	28.70	0
86	37.802	0.819	0.0628	4.8500	3.120	1.25	2.66	311.5000	28.70	0
87	41.624	0.819	0.0661	4.8000	3.120	1.25	2.66	309.7998	28.70	0
88	45.107	0.819	0.0701	4.6000	3.120	1.25	2.66	359.0999	29.00	0
89	9.656	0.819	0.0244	9.4000	3.120	1.25	2.66	15.8000	27.00	0
90	10.364	0.819	0.0262	9.4000	3.120	1.25	2.66	15.7000	27.50	0
91	11.185	0.819	0.0262	9.1000	3.120	1.25	2.66	94.5000	27.00	0
92	11.185	0.819	0.0268	9.1000	3.120	1.25	2.66	142.1000	27.00	0
93	11.553	0.819	0.0268	9.0000	3.120	1.25	2.66	61.0000	27.50	0
94	12.402	0.819	0.0280	9.4000	3.120	1.25	2.66	280.0000	27.00	0
95	13.365	0.819	0.0302	9.5000	3.120	1.25	2.66	242.4000	27.50	0
96	14.469	0.819	0.0314	9.5500	3.120	1.25	2.66	379.3999	27.00	0
97	14.639	0.819	0.0305	9.0000	3.120	1.25	2.66	581.0000	27.00	0
98	14.753	0.819	0.0305	9.0000	3.120	1.25	2.66	329.7998	27.50	0
99	15.659	0.819	0.0320	9.0000	3.120	1.25	2.66	528.0999	27.50	0
100	16.310	0.819	0.0332	8.5500	3.120	1.25	2.66	546.3999	27.00	0
101	16.848	0.819	0.0317	8.8000	3.120	1.25	2.66	704.0000	27.50	0
102	17.103	0.819	0.0341	9.2000	3.120	1.25	2.66	721.2000	27.50	0
103	18.717	0.819	0.0347	9.2000	3.120	1.25	2.66	729.5999	27.00	0
104	19.283	0.819	0.0366	9.0000	3.120	1.25	2.66	681.7998	27.50	0
105	25.541	0.819	0.0671	1.6500	2.030	1.29	2.66	1.3000	29.50	0
106	28.344	0.819	0.0719	1.8500	2.030	1.29	2.66	1.2000	29.50	0
107	31.261	0.819	0.0762	1.6500	2.030	1.29	2.66	3.0000	29.50	0
108	33.356	0.819	0.0823	1.5500	2.030	1.29	2.66	11.0000	29.50	0
109	37.717	0.819	0.0853	2.0000	2.030	1.29	2.66	10.5000	30.00	0
110	42.106	0.819	0.0893	2.0500	2.030	1.29	2.66	30.9000	30.00	0

MAV - DATA OF MAVIS, F.T., LIU, T. AND SOUCEK, E. (1937)
(SHEET 3 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	43.323	0.819	0.0924	2.2500	2.030	1.29	2.66	30.7000	30.00	0
112	46.778	0.819	0.0985	1.9500	2.030	1.29	2.66	37.7000	30.00	0
113	49.100	0.819	0.0975	1.7500	2.030	1.29	2.66	71.8000	30.00	0
114	50.686	0.819	0.1061	1.7500	2.030	1.29	2.66	48.9000	30.00	0
115	54.367	0.819	0.1045	1.9500	2.030	1.29	2.66	81.5000	30.00	0
116	58.303	0.819	0.1079	1.8500	2.030	1.29	2.66	102.9000	30.00	0
117	62.522	0.819	0.1103	2.2500	2.030	1.29	2.66	139.0000	30.00	0
118	63.343	0.819	0.1128	1.8000	2.030	1.29	2.66	164.8000	30.00	0
119	65.410	0.819	0.1155	2.2500	2.030	1.29	2.66	211.9000	30.50	0
120	20.303	0.819	0.0539	2.6000	2.030	1.29	2.66	2.0000	30.50	0
121	24.663	0.819	0.0585	2.5000	2.030	1.29	2.66	1.8000	30.50	0
122	26.136	0.819	0.0616	2.5000	2.030	1.29	2.66	5.3000	30.50	0
123	27.042	0.819	0.0634	2.5000	2.030	1.29	2.66	27.8000	29.50	0
124	28.599	0.819	0.0652	2.5000	2.030	1.29	2.66	20.6000	30.50	0
125	30.383	0.819	0.0677	2.5000	2.030	1.29	2.66	35.2000	30.50	0
126	32.563	0.819	0.0722	2.5000	2.030	1.29	2.66	63.1000	30.50	0
127	35.225	0.819	0.0753	2.5000	2.030	1.29	2.66	92.1000	30.50	0
128	36.584	0.819	0.0762	2.5000	2.030	1.29	2.66	119.0000	29.50	0
129	37.943	0.819	0.0780	2.7000	2.030	1.29	2.66	114.1000	30.00	0
130	40.492	0.819	0.0802	2.5000	2.030	1.29	2.66	155.7000	30.20	0
131	40.973	0.819	0.0802	2.8500	2.030	1.29	2.66	170.8000	30.50	0
132	42.191	0.819	0.0835	2.6000	2.030	1.29	2.66	195.2000	30.50	0
133	45.107	0.819	0.0841	2.6000	2.030	1.29	2.66	182.5000	30.30	0
134	44.739	0.819	0.0829	2.9000	2.030	1.29	2.66	320.3999	30.50	0
135	45.674	0.819	0.0832	2.5000	2.030	1.29	2.66	325.2998	30.50	0
136	10.109	0.819	0.0262	4.9000	2.030	1.29	2.66	4.7000	30.00	0
137	11.978	0.819	0.0299	5.0000	2.030	1.29	2.66	21.2000	30.00	0
138	12.487	0.819	0.0311	5.0000	2.030	1.29	2.66	30.9000	29.50	0
139	13.195	0.819	0.0317	5.0000	2.030	1.29	2.66	108.3000	29.50	0
140	13.875	0.819	0.0335	4.3000	2.030	1.29	2.66	62.5000	30.00	0
141	14.469	0.819	0.0329	5.0000	2.030	1.29	2.66	190.6000	29.50	0
142	15.177	0.819	0.0332	4.7000	2.030	1.29	2.66	256.0999	29.50	0
143	15.602	0.819	0.0360	4.8000	2.030	1.29	2.66	209.0000	30.00	0
144	15.602	0.819	0.0366	5.0000	2.030	1.29	2.66	300.2000	30.00	0
145	17.301	0.819	0.0390	5.0000	2.030	1.29	2.66	441.2998	30.00	0
146	17.386	0.819	0.0378	4.8500	2.030	1.29	2.66	495.0999	29.50	0
147	19.368	0.819	0.0408	4.8500	2.030	1.29	2.66	465.3999	29.50	0
148	19.765	0.819	0.0411	4.8000	2.030	1.29	2.66	606.8999	29.50	0
149	20.982	0.819	0.0430	5.0000	2.030	1.29	2.66	645.2000	29.50	0
150	23.757	0.819	0.0463	5.0000	2.030	1.29	2.66	798.7998	29.50	0
151	6.003	0.819	0.0171	10.1000	2.030	1.29	2.66	40.1000	28.50	0
152	6.654	0.819	0.0180	10.0000	2.030	1.29	2.66	198.1000	28.50	0
153	7.079	0.819	0.0189	9.8000	2.030	1.29	2.66	215.4000	28.50	0
154	7.702	0.819	0.0210	10.0000	2.030	1.29	2.66	327.7998	28.50	0
155	7.787	0.819	0.0204	10.0000	2.030	1.29	2.66	468.7000	27.50	0
156	8.608	0.819	0.0213	10.0000	2.030	1.29	2.66	933.0000	28.50	0
157	9.231	0.819	0.0226	10.0000	2.030	1.29	2.66	1070.0999	27.50	0
158	9.571	0.819	0.0226	9.8000	2.030	1.29	2.66	1131.2998	27.50	0
159	10.137	0.819	0.0244	10.0000	2.030	1.29	2.66	1487.5999	27.50	0
160	14.611	0.819	0.0488	1.3500	1.410	1.24	2.66	2.8000	26.00	0
161	16.253	0.819	0.0515	1.3500	1.410	1.24	2.66	6.3000	26.00	0
162	18.235	0.819	0.0549	1.3500	1.410	1.24	2.66	11.1000	26.00	0
163	19.878	0.819	0.0579	1.5500	1.410	1.24	2.66	25.4000	26.00	0
164	22.200	0.819	0.0610	1.8000	1.410	1.24	2.66	52.2000	26.00	0
165	24.012	0.819	0.0634	1.3500	1.410	1.24	2.66	90.6000	26.00	0

MAV - DATA OF MAVIS, F.T., LIU, T. AND SOUCEK, E. (1937)
(SHEET 4 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
166	25.711	0.819	0.0671	1.7500	1.410	1.24	2.66	105.4000	26.00	0
167	27.410	0.819	0.0686	1.8000	1.410	1.24	2.66	142.9000	26.00	0
168	30.072	0.819	0.0732	1.7500	1.410	1.24	2.66	222.0000	26.00	0
169	31.233	0.819	0.0756	1.9000	1.410	1.24	2.66	323.2998	26.00	0
170	33.243	0.819	0.0762	2.0000	1.410	1.24	2.66	334.8999	26.00	0
171	35.537	0.819	0.0814	1.9000	1.410	1.24	2.66	401.5000	26.00	0
172	12.091	0.819	0.0393	1.8000	1.410	1.24	2.66	12.6000	25.50	0
173	13.365	0.819	0.0402	2.1000	1.410	1.24	2.66	31.7000	25.50	0
174	15.092	0.819	0.0427	2.4000	1.410	1.24	2.66	63.8000	25.50	0
175	16.537	0.819	0.0454	2.3500	1.410	1.24	2.66	125.4000	25.50	0
176	18.235	0.819	0.0479	2.4000	1.410	1.24	2.66	209.8000	25.50	0
177	18.632	0.819	0.0488	2.4000	1.410	1.24	2.66	217.2000	25.50	0
178	20.359	0.819	0.0506	2.5000	1.410	1.24	2.66	253.8000	25.50	0
179	21.945	0.819	0.0546	2.5000	1.410	1.24	2.66	359.7998	26.00	0
180	22.568	0.819	0.0549	2.5000	1.410	1.24	2.66	354.3999	26.00	0
181	23.927	0.819	0.0561	2.5000	1.410	1.24	2.66	400.0999	26.00	0
182	24.975	0.819	0.0585	2.5000	1.410	1.24	2.66	417.8999	26.00	0
183	25.937	0.819	0.0591	2.5000	1.410	1.24	2.66	411.8999	26.00	0
184	28.033	0.819	0.0625	2.5000	1.410	1.24	2.66	461.7998	26.00	0
185	29.449	0.819	0.0640	2.5000	1.410	1.24	2.66	550.5999	25.50	0
186	4.842	0.819	0.0177	5.0500	1.410	1.24	2.66	42.0000	26.00	0
187	6.739	0.819	0.0210	5.0500	1.410	1.24	2.66	113.1000	26.00	0
188	7.419	0.819	0.0223	5.0000	1.410	1.24	2.66	231.6000	26.00	0
189	7.702	0.819	0.0223	5.0000	1.410	1.24	2.66	334.0000	26.00	0
190	8.268	0.819	0.0223	4.9000	1.410	1.24	2.66	402.8999	26.00	0
191	9.401	0.819	0.0271	4.9000	1.410	1.24	2.66	558.7000	26.00	0
192	9.996	0.819	0.0268	4.9000	1.410	1.24	2.66	535.7000	26.00	0
193	10.845	0.819	0.0268	5.0000	1.410	1.24	2.66	587.2000	26.00	0
194	11.610	0.819	0.0293	4.9000	1.410	1.24	2.66	723.8999	26.00	0
195	12.742	0.819	0.0290	5.0000	1.410	1.24	2.66	781.8999	26.00	0
196	13.592	0.819	0.0302	5.0000	1.410	1.24	2.66	874.0999	25.50	0
197	14.385	0.819	0.0320	5.0000	1.410	1.24	2.66	944.7000	25.50	0
198	2.180	0.819	0.0091	10.0000	1.410	1.24	2.66	138.4000	26.50	0
199	2.662	0.819	0.0094	9.9000	1.410	1.24	2.66	655.7000	27.00	0
200	3.143	0.819	0.0107	9.8000	1.410	1.24	2.66	128.3000	26.50	0
201	3.483	0.819	0.0116	9.5000	1.410	1.24	2.66	290.0000	27.00	0
202	3.596	0.819	0.0116	8.8000	1.410	1.24	2.66	729.3999	27.00	0
203	4.191	0.819	0.0134	9.4000	1.410	1.24	2.66	760.0999	27.00	0
204	5.323	0.819	0.0149	9.9000	1.410	1.24	2.66	1359.0999	27.00	0
205	5.550	0.819	0.0125	9.2000	1.410	1.24	2.66	1129.5999	27.00	0
206	6.439	0.819	0.0180	9.7000	1.410	1.24	2.66	2361.8999	27.00	0
207	42.276	0.819	0.0917	2.4000	3.730	1.30	2.66	1.0000	23.00	0
208	47.854	0.819	0.1006	2.6000	3.730	1.30	2.66	1.8000	23.00	0
209	53.744	0.819	0.1052	2.2500	3.730	1.30	2.66	2.3000	23.00	0
210	58.897	0.819	0.1122	1.8500	3.730	1.30	2.66	2.9000	23.00	0
211	63.711	0.819	0.1158	1.8000	3.730	1.30	2.66	4.1000	23.00	0
212	28.797	0.819	0.0652	2.7000	3.730	1.30	2.66	1.4000	22.50	0
213	32.592	0.819	0.0710	2.9000	3.730	1.30	2.66	1.3000	22.50	0
214	37.660	0.819	0.0762	3.3500	3.730	1.30	2.66	2.3000	22.50	0
215	42.021	0.819	0.0823	3.1000	3.730	1.30	2.66	3.2000	22.50	0
216	45.107	0.819	0.0850	3.0000	3.730	1.30	2.66	4.1000	22.50	0
217	48.505	0.819	0.0908	2.7000	3.730	1.30	2.66	3.8000	22.50	0
218	49.128	0.819	0.0911	2.6000	3.730	1.30	2.66	8.3000	22.50	0
219	51.648	0.819	0.0981	2.5000	3.730	1.30	2.66	11.0000	22.50	0
220	53.857	0.819	0.0945	2.6500	3.730	1.30	2.66	33.5000	22.50	0

MAV - DATA OF MAVIS, F.T., LIU, T. AND SOUCEK, E. (1937)
(SHEET 5 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
221	57.765	0.819	0.1036	2.6000	3.730	1.30	2.66	31.7000	22.50	0
222	63.881	0.819	0.1088	2.7500	3.730	1.30	2.66	44.8000	22.50	0
223	19.765	0.819	0.0421	5.1000	3.730	1.30	2.66	4.1000	24.00	0
224	22.455	0.819	0.0466	5.0000	3.730	1.30	2.66	7.2000	24.00	0
225	25.909	0.819	0.0524	5.0000	3.730	1.30	2.66	17.7000	24.00	0
226	28.033	0.819	0.0533	5.4000	3.730	1.30	2.66	25.3000	24.00	0
227	30.893	0.819	0.0561	5.3500	3.730	1.30	2.66	39.7000	22.50	0
228	34.574	0.819	0.0607	5.1000	3.730	1.30	2.66	74.5000	22.50	0
229	36.896	0.819	0.0649	5.0000	3.730	1.30	2.66	81.2000	22.50	0
230	40.577	0.819	0.0680	5.0000	3.730	1.30	2.66	139.6000	22.50	0
231	43.323	0.819	0.0707	5.0000	3.730	1.30	2.66	199.5000	22.50	0
232	47.203	0.819	0.0741	4.6000	3.730	1.30	2.66	241.9000	22.50	0
233	49.553	0.819	0.0762	4.8000	3.730	1.30	2.66	285.2000	22.50	0
234	10.902	0.819	0.0253	10.0000	3.730	1.30	2.66	4.7000	24.50	0
235	11.610	0.819	0.0253	10.0000	3.730	1.30	2.66	7.0000	24.50	0
236	13.054	0.819	0.0277	10.0000	3.730	1.30	2.66	14.8000	24.50	0
237	13.507	0.819	0.0283	10.0000	3.730	1.30	2.66	26.3000	24.50	0
238	14.045	0.819	0.0296	10.0000	3.730	1.30	2.66	29.4000	24.50	0
239	15.291	0.819	0.0305	10.0000	3.730	1.30	2.66	79.3000	24.50	0
240	16.083	0.819	0.0314	9.7000	3.730	1.30	2.66	154.0000	24.50	0
241	17.075	0.819	0.0335	10.0000	3.730	1.30	2.66	228.2000	24.50	0
242	17.216	0.819	0.0332	10.0000	3.730	1.30	2.66	261.7998	24.50	0
243	18.009	0.819	0.0344	10.0000	3.730	1.30	2.66	286.0000	24.50	0
244	19.198	0.819	0.0357	10.0000	3.730	1.30	2.66	443.0000	24.50	0
245	19.538	0.819	0.0347	10.0000	3.730	1.30	2.66	458.2000	24.50	0
246	20.303	0.819	0.0378	10.0000	3.730	1.30	2.66	550.7998	24.50	0
247	21.407	0.819	0.0396	10.0000	3.730	1.30	2.66	761.3999	24.50	0
248	18.066	0.819	0.0549	1.6500	1.680	1.36	2.66	1.9000	26.50	0
249	19.708	0.819	0.0579	1.7000	1.680	1.36	2.66	5.2000	26.50	0
250	21.662	0.819	0.0610	1.9500	1.680	1.36	2.66	7.0000	26.50	0
251	23.842	0.819	0.0637	1.8500	1.680	1.36	2.66	12.8000	26.50	0
252	25.230	0.819	0.0668	1.8000	1.680	1.36	2.66	24.0000	26.50	0
253	27.438	0.819	0.0698	1.9000	1.680	1.36	2.66	45.0000	26.50	0
254	29.307	0.819	0.0722	1.9000	1.680	1.36	2.66	67.3000	26.50	0
255	31.997	0.819	0.0759	2.3500	1.680	1.36	2.66	84.3000	26.50	0
256	33.130	0.819	0.0786	2.3500	1.680	1.36	2.66	122.2000	26.50	0
257	35.395	0.819	0.0792	2.2500	1.680	1.36	2.66	208.7000	26.50	0
258	37.943	0.819	0.0838	2.2500	1.680	1.36	2.66	280.0000	26.50	0
259	39.982	0.819	0.0856	2.3500	1.680	1.36	2.66	306.3999	26.50	0
260	40.775	0.819	0.0917	2.2000	1.680	1.36	2.66	390.5999	26.50	0
261	12.629	0.819	0.0399	2.4500	1.680	1.36	2.66	2.7000	27.00	0
262	14.894	0.819	0.0427	2.5000	1.680	1.36	2.66	6.8000	27.00	0
263	15.942	0.819	0.0463	2.4500	1.680	1.36	2.66	19.1000	27.00	0
264	17.839	0.819	0.0488	2.4500	1.680	1.36	2.66	22.6000	27.00	0
265	19.623	0.819	0.0518	2.5000	1.680	1.36	2.66	34.4000	27.00	0
266	21.577	0.819	0.0546	2.5000	1.680	1.36	2.66	37.4000	27.00	0
267	23.474	0.819	0.0573	2.5000	1.680	1.36	2.66	83.9000	27.00	0
268	26.249	0.819	0.0604	2.5000	1.680	1.36	2.66	113.7000	26.50	0
269	27.438	0.819	0.0637	2.4000	1.680	1.36	2.66	262.5999	26.50	0
270	29.505	0.819	0.0649	2.5000	1.680	1.36	2.66	303.2000	26.50	0
271	31.431	0.819	0.0661	2.5000	1.680	1.36	2.66	322.3999	26.50	0
272	32.733	0.819	0.0689	2.5000	1.680	1.36	2.66	405.7998	26.50	0
273	6.994	0.819	0.0235	5.0000	1.680	1.36	2.66	24.3000	23.50	0
274	7.702	0.819	0.0241	5.0000	1.680	1.36	2.66	17.6000	23.50	0
275	8.665	0.819	0.0244	5.0000	1.680	1.36	2.66	43.0000	24.00	0

MAV - DATA OF MAVIS, F.T., LIU, T. AND SOUCEK, E. (1937)
(SHEET 6 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
276	8.778	0.819	0.0250	5.0000	1.680	1.36	2.66	69.5000	24.00	0
277	9.033	0.819	0.0259	5.0000	1.680	1.36	2.66	100.9000	24.00	0
278	10.052	0.819	0.0271	5.0000	1.680	1.36	2.66	166.8000	24.00	0
279	11.015	0.819	0.0283	5.0000	1.680	1.36	2.66	220.3000	24.00	0
280	11.553	0.819	0.0305	5.0000	1.680	1.36	2.66	350.2000	24.00	0
281	12.487	0.819	0.0314	5.0000	1.680	1.36	2.66	455.8999	24.00	0
282	13.365	0.819	0.0314	5.0000	1.680	1.36	2.66	635.8999	24.00	0
283	14.186	0.819	0.0341	4.5000	1.680	1.36	2.66	628.2000	23.50	0
284	15.942	0.819	0.0347	4.8000	1.680	1.36	2.66	875.7998	23.50	0
285	3.653	0.819	0.0119	9.9000	1.680	1.36	2.66	46.5000	23.50	0
286	5.097	0.819	0.0152	10.0000	1.680	1.36	2.66	297.8999	23.50	0
287	5.465	0.819	0.0162	10.0000	1.680	1.36	2.66	258.5999	24.00	0
288	5.720	0.819	0.0177	9.7000	1.680	1.36	2.66	530.2998	24.00	0
289	6.173	0.819	0.0180	10.0000	1.680	1.36	2.66	639.5999	24.00	0
290	6.173	0.819	0.0174	10.0000	1.680	1.36	2.66	875.7000	24.00	0
291	6.909	0.819	0.0183	10.0000	1.680	1.36	2.66	1201.7000	24.00	0
292	7.702	0.819	0.0183	10.0000	1.680	1.36	2.66	1531.0999	24.00	0
293	9.089	0.819	0.0213	10.0000	1.680	1.36	2.66	2227.5999	24.00	0

MCD - DATA OF MACDOUGAL, C.H. (1933)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	3.794	0.610	0.0195	3.3300	0.660	1.29	2.65	411.5000	-1.00	0
2	6.399	0.610	0.0276	3.3300	0.660	1.29	2.65	729.0999	-1.00	0
3	8.608	0.610	0.0336	3.3300	0.660	1.29	2.65	919.7000	-1.00	0
4	10.024	0.610	0.0373	3.3300	0.660	1.29	2.65	399.7998	-1.00	0
5	12.912	0.610	0.0440	3.3300	0.660	1.29	2.65	1171.5000	-1.00	0
6	13.422	0.610	0.0450	3.3300	0.660	1.29	2.65	1168.2998	-1.00	0
7	17.329	0.610	0.0530	3.3300	0.660	1.29	2.65	1236.7998	-1.00	0
8	16.876	0.610	0.0520	3.3300	0.660	1.29	2.65	1030.7000	-1.00	0
9	17.273	0.610	0.0530	3.3300	0.660	1.29	2.65	919.5000	-1.00	0
10	17.499	0.610	0.0540	3.3300	0.660	1.29	2.65	994.0000	-1.00	0
11	20.671	0.610	0.0600	3.3300	0.660	1.29	2.65	902.5999	-1.00	0
12	9.967	0.610	0.0360	3.3300	0.660	1.29	2.65	885.5000	-1.00	0
13	21.633	0.610	0.0620	3.3300	0.660	1.29	2.65	1130.5999	-1.00	0
14	13.365	0.610	0.0450	3.3300	0.660	1.29	2.65	1018.5999	-1.00	0
15	9.231	0.610	0.0404	1.6700	0.660	1.29	2.65	177.7000	-1.00	0
16	10.080	0.610	0.0410	1.6700	0.660	1.29	2.65	232.3000	-1.00	0
17	15.461	0.610	0.0550	1.6700	0.660	1.29	2.65	373.5999	-1.00	0
18	15.461	0.610	0.0560	1.6700	0.660	1.29	2.65	434.0000	-1.00	0
19	21.860	0.610	0.0740	1.6700	0.660	1.29	2.65	491.2998	-1.00	0
20	26.900	0.610	0.0865	1.6700	0.660	1.29	2.65	615.7998	-1.00	0
21	24.182	0.610	0.0815	1.6700	0.660	1.29	2.65	484.7998	-1.00	0
22	15.517	0.610	0.0607	1.1100	0.660	1.29	2.65	216.2000	-1.00	0
23	17.669	0.610	0.0658	1.1100	0.660	1.29	2.65	241.3000	-1.00	0
24	22.483	0.610	0.0780	1.1100	0.660	1.29	2.65	201.8000	-1.00	0
25	30.581	0.610	0.1006	1.1100	0.660	1.29	2.65	230.8000	-1.00	0
26	36.811	0.610	0.1256	1.1100	0.660	1.29	2.65	252.0000	-1.00	0
27	18.009	0.610	0.0649	1.1100	0.660	1.29	2.65	165.2000	-1.00	0
28	8.835	0.610	0.0326	3.3300	0.940	1.63	2.65	556.3999	-1.00	0
29	14.894	0.610	0.0469	3.3300	0.940	1.63	2.65	970.0999	-1.00	0
30	13.592	0.610	0.0430	3.3300	0.940	1.63	2.65	682.5000	-1.00	0
31	15.857	0.610	0.0491	3.3300	0.940	1.63	2.65	985.7998	-1.00	0
32	9.401	0.610	0.0344	3.3300	0.940	1.63	2.65	646.2000	-1.00	0
33	14.328	0.610	0.0552	1.6700	0.940	1.63	2.65	234.1000	-1.00	0
34	18.066	0.610	0.0634	1.6700	0.940	1.63	2.65	300.0999	-1.00	0
35	13.025	0.610	0.0488	1.6700	0.940	1.63	2.65	145.2000	-1.00	0
36	24.748	0.610	0.0765	1.6700	0.940	1.63	2.65	330.0000	-1.00	0
37	39.642	0.610	0.1119	1.6700	0.940	1.63	2.65	324.2998	-1.00	0
38	33.696	0.610	0.0969	1.6700	0.940	1.63	2.65	299.3999	-1.00	0
39	13.931	0.610	0.0576	1.1100	0.940	1.63	2.65	68.7000	-1.00	0
40	18.009	0.610	0.0686	1.1100	0.940	1.63	2.65	71.5000	-1.00	0
41	22.936	0.610	0.0826	1.1100	0.940	1.63	2.65	117.5000	-1.00	0
42	32.677	0.610	0.1024	1.1100	0.940	1.63	2.65	142.0000	-1.00	0
43	43.154	0.610	0.1283	1.1100	0.940	1.63	2.65	204.5000	-1.00	0
44	44.909	0.610	0.1317	1.1100	0.940	1.63	2.65	163.4000	-1.00	0
45	48.137	0.610	0.1359	1.1100	0.940	1.63	2.65	179.2000	-1.00	0
46	48.137	0.610	0.1402	1.1100	0.940	1.63	2.65	230.5000	-1.00	0
47	40.209	0.610	0.1210	1.1100	0.940	1.63	2.65	173.1000	-1.00	0
48	58.897	0.610	0.1463	1.1100	0.940	1.63	2.65	151.2000	-1.00	0
49	14.101	0.610	0.0445	3.3300	1.260	1.71	2.65	372.0000	-1.00	0
50	19.991	0.610	0.0564	3.3300	1.260	1.71	2.65	537.2998	-1.00	0
51	28.882	0.610	0.0695	3.3300	1.260	1.71	2.65	1318.2000	-1.00	0
52	24.069	0.610	0.0674	3.3300	1.260	1.71	2.65	948.0000	-1.00	0
53	18.009	0.610	0.0546	3.3300	1.260	1.71	2.65	784.0000	-1.00	0
54	17.839	0.610	0.0533	3.3300	1.260	1.71	2.65	688.2998	-1.00	0
55	22.936	0.610	0.0655	3.3300	1.260	1.71	2.65	923.2998	-1.00	0

MCD - DATA OF MACDOUGAL, C.H. (1933)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	24.352	0.610	0.0695	3.3300	1.260	1.71	2.65	818.0000	-1.00	0
57	23.332	0.610	0.0664	3.3300	1.260	1.71	2.65	896.8999	-1.00	0
58	19.765	0.610	0.0680	1.6700	1.260	1.71	2.65	223.1000	-1.00	0
59	22.426	0.610	0.0783	1.6700	1.260	1.71	2.65	128.1000	-1.00	0
60	24.635	0.610	0.0835	1.6700	1.260	1.71	2.65	182.2000	-1.00	0
61	32.337	0.610	0.0985	1.6700	1.260	1.71	2.65	201.3000	-1.00	0
62	39.359	0.610	0.1097	1.6700	1.260	1.71	2.65	256.2998	-1.00	0
63	44.230	0.610	0.1234	1.6700	1.260	1.71	2.65	286.0999	-1.00	0
64	46.721	0.610	0.1256	1.6700	1.260	1.71	2.65	292.5999	-1.00	0
65	51.705	0.610	0.1286	1.6700	1.260	1.71	2.65	281.7998	-1.00	0
66	37.943	0.610	0.1100	1.6700	1.260	1.71	2.65	243.9000	-1.00	0
67	32.280	0.610	0.0963	1.6700	1.260	1.71	2.65	174.2000	-1.00	0
68	27.013	0.610	0.0866	1.6700	1.260	1.71	2.65	196.0000	-1.00	0
69	26.164	0.610	0.0884	1.6700	1.260	1.71	2.65	185.1000	-1.00	0
70	39.812	0.610	0.1244	1.1100	1.260	1.71	2.65	123.5000	-1.00	0
71	45.022	0.610	0.1335	1.1100	1.260	1.71	2.65	132.8000	-1.00	0
72	54.367	0.610	0.1448	1.1100	1.260	1.71	2.65	126.1000	-1.00	0
73	60.030	0.610	0.1509	1.1100	1.260	1.71	2.65	122.6000	-1.00	0
74	63.994	0.610	0.1591	1.1100	1.260	1.71	2.65	142.2000	-1.00	0

MPR - DATA OF MEYER-PETER, E. AND MULLER, R. (1948)
(SHEET 1 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	1640.940	1.999	0.3868	10.7000	28.650	1.00	2.68	1105.5000	-1.00	0
2	1640.940	1.999	0.4438	6.5380	28.650	1.00	2.68	28.7140	-1.00	0
3	1640.940	1.999	0.3972	9.1990	28.650	1.00	2.68	603.0000	-1.00	0
4	1640.940	1.999	0.3987	9.2780	28.650	1.00	2.68	598.2139	-1.00	0
5	1640.940	1.999	0.3987	9.2290	28.650	1.00	2.68	596.6179	-1.00	0
6	1640.940	1.999	0.3990	9.1480	28.650	1.00	2.68	617.3569	-1.00	0
7	1640.940	1.999	0.3975	9.1570	28.650	1.00	2.68	603.0000	-1.00	0
8	1640.940	1.999	0.3682	13.7300	28.650	1.00	2.68	2333.8328	-1.00	0
9	1640.940	1.999	0.4127	8.2040	28.650	1.00	2.68	303.0950	-1.00	0
10	1640.940	1.999	0.4182	7.6070	28.650	1.00	2.68	194.6190	-1.00	0
11	1640.940	1.999	0.4545	5.6130	28.650	1.00	2.68	19.1430	-1.00	0
12	1640.940	1.999	0.3423	17.6900	28.650	1.00	2.68	5103.1563	-1.00	0
13	3270.780	1.999	0.5971	12.1900	28.650	1.00	2.68	2589.0698	-1.00	0
14	3270.780	1.999	0.6529	8.4830	28.650	1.00	2.68	1175.6899	-1.00	0
15	3270.780	1.999	0.6940	7.0700	28.650	1.00	2.68	585.4519	-1.00	0
16	3270.780	1.999	0.7218	5.9150	28.650	1.00	2.68	295.1189	-1.00	0
17	3270.780	1.999	0.7288	5.7830	28.650	1.00	2.68	295.1189	-1.00	0
18	3270.780	1.999	0.8345	3.5200	28.650	1.00	2.68	9.5710	-1.00	0
19	3270.780	1.999	0.8531	3.4460	28.650	1.00	2.68	7.9760	-1.00	0
20	3270.780	1.999	0.5998	12.4100	28.650	1.00	2.68	2589.0698	-1.00	0
21	4613.805	1.999	0.8013	10.8700	28.650	1.00	2.68	1829.7378	-1.00	0
22	4482.699	1.999	0.7812	10.6700	28.650	1.00	2.68	1896.7378	-1.00	0
23	4577.844	1.999	0.8605	7.3850	28.650	1.00	2.68	834.3088	-1.00	0
24	4553.773	1.999	0.8525	7.3690	28.650	1.00	2.68	834.3088	-1.00	0
25	4582.938	1.999	0.9080	5.7820	28.650	1.00	2.68	421.1418	-1.00	0
26	4608.711	1.999	0.9254	5.7470	28.650	1.00	2.68	416.3560	-1.00	0
27	4599.930	1.999	0.9735	4.7900	28.650	1.00	2.68	208.9760	-1.00	0
28	4599.930	1.999	0.9607	5.0210	28.650	1.00	2.68	207.3810	-1.00	0
29	4599.930	1.999	1.0921	3.1710	28.650	1.00	2.68	6.3810	-1.00	0
30	4599.930	1.999	1.0921	3.2470	28.650	1.00	2.68	6.3810	-1.00	0
31	1640.940	1.999	0.3508	17.6720	28.650	1.00	2.68	5171.7578	-1.00	0
32	3270.780	1.999	0.8227	3.8950	28.650	1.00	2.68	9.5710	-1.00	0
33	21.690	0.354	0.0600	22.7000	5.210	1.00	2.68	6896.1953	-1.00	0
34	21.690	0.354	0.0710	9.6400	5.210	1.00	2.68	598.2139	-1.00	0
35	21.690	0.354	0.0668	12.6700	5.210	1.00	2.68	1743.5950	-1.00	0
36	21.690	0.354	0.0610	17.6000	5.210	1.00	2.68	4085.3979	-1.00	0
37	21.690	0.354	0.0576	22.2600	5.210	1.00	2.68	6999.8945	-1.00	0
38	60.794	0.354	0.1362	11.2000	5.210	1.00	2.68	2536.4280	-1.00	0
39	60.794	0.354	0.1475	8.8800	5.210	1.00	2.68	1467.6189	-1.00	0
40	60.794	0.354	0.1603	6.2200	5.210	1.00	2.68	631.7129	-1.00	0
41	60.794	0.354	0.1600	6.3300	5.210	1.00	2.68	631.7129	-1.00	0
42	60.823	0.354	0.1750	4.6700	5.210	1.00	2.68	223.3330	-1.00	0
43	60.823	0.354	0.1981	3.1900	5.210	1.00	2.68	19.1430	-1.00	0
44	60.823	0.354	0.1951	3.2900	5.210	1.00	2.68	19.1430	-1.00	0
45	43.352	0.354	0.1454	3.7200	5.210	1.00	2.68	27.1190	-1.00	0
46	43.352	0.354	0.1009	13.0700	5.210	1.00	2.68	3568.5469	-1.00	0
47	43.352	0.354	0.1301	5.6200	5.210	1.00	2.68	312.6658	-1.00	0
48	82.088	0.354	0.1817	9.8300	5.210	1.00	2.68	1883.9758	-1.00	0
49	82.088	0.354	0.2131	5.3800	5.210	1.00	2.68	467.4038	-1.00	0
50	82.088	0.354	0.2484	3.1800	5.210	1.00	2.68	46.2620	-1.00	0
51	67.505	0.500	0.1999	2.6800	2.690	1.99	2.68	68.5950	-1.00	0
52	60.709	0.500	0.1853	2.6960	2.690	1.99	2.68	60.6190	-1.00	0
53	54.112	0.500	0.1713	2.7510	2.690	1.99	2.68	44.6670	-1.00	0
54	43.890	0.500	0.1490	2.7430	2.690	1.99	2.68	14.3570	-1.00	0
55	34.999	0.500	0.1274	2.7470	2.690	1.99	2.68	4.1000	-1.00	0

MPR - DATA OF MEYER-PETER, E. AND MULLER, R. (1948)
(SHEET 2 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	28.005	0.500	0.1128	2.7910	2.690	1.99	2.68	1.1330	-1.00	0
57	20.388	0.500	0.0924	2.7450	2.690	1.99	2.68	0.0	-1.00	0
58	15.206	0.500	0.0777	2.7550	2.690	1.99	2.68	0.0	-1.00	0
59	60.709	0.500	0.1844	2.7730	2.690	1.99	2.68	61.8950	-1.00	0
60	90.583	0.500	0.2429	2.7300	2.690	1.99	2.68	309.4758	-1.00	0
61	60.709	0.500	0.1847	2.7490	2.690	1.99	2.68	114.8570	-1.00	0
62	90.583	0.500	0.2417	2.7650	2.690	1.99	2.68	382.8569	-1.00	0
63	85.005	0.500	0.2298	2.8220	2.690	1.99	2.68	384.4519	-1.00	0
64	74.811	0.500	0.2112	2.7670	2.690	1.99	2.68	287.1428	-1.00	0
65	67.788	0.500	0.1993	2.7590	2.690	1.99	2.68	218.5480	-1.00	0
66	60.709	0.500	0.1850	2.7270	2.690	1.99	2.68	181.8570	-1.00	0
67	50.006	0.500	0.1631	2.7210	2.690	1.99	2.68	87.7380	-1.00	0
68	40.010	0.500	0.1405	2.7360	2.690	1.99	2.68	46.2620	-1.00	0
69	60.709	0.500	0.1841	2.7120	2.690	1.99	2.68	161.1190	-1.00	0
70	41.086	0.500	0.1402	2.7310	1.950	2.40	2.68	141.9760	-1.00	0
71	62.097	0.500	0.1875	2.7090	3.330	1.94	2.68	59.0240	-1.00	0
72	43.097	0.500	0.1472	2.6590	3.330	1.94	2.68	6.6680	-1.00	0
73	92.593	0.500	0.2438	2.8070	3.330	1.94	2.68	221.7380	-1.00	0
74	50.006	0.500	0.1637	2.6680	3.330	1.94	2.68	11.1670	-1.00	0
75	19.991	0.649	0.0628	2.8250	1.110	2.10	2.68	296.7139	-1.00	0
76	36.698	0.649	0.0908	3.2500	1.110	2.10	2.68	770.5000	-1.00	0
77	14.498	0.649	0.0515	2.3550	1.110	2.10	2.68	102.0950	-1.00	0
78	26.504	0.649	0.0753	2.6720	1.110	2.10	2.68	526.4280	-1.00	0
79	28.599	0.649	0.0765	3.0380	1.110	2.10	2.68	735.4038	-1.00	0
80	58.501	0.649	0.1317	4.0660	1.110	2.10	2.68	1091.1418	-1.00	0
81	2.605	0.649	0.0098	16.0000	1.110	2.10	2.68	4905.3516	-1.00	0
82	1.189	0.299	0.0104	16.5000	1.110	2.10	2.68	6033.1836	-1.00	0
83	0.595	0.149	0.0101	19.9200	1.110	2.10	2.68	6489.4180	-1.00	0
84	0.991	0.149	0.0140	20.7000	1.110	2.10	2.68	9571.4219	-1.00	0
85	149.990	1.999	0.1102	2.4040	1.500	2.70	2.68	580.6658	-1.00	0
86	99.984	1.999	0.0780	2.5000	1.500	2.70	2.68	245.6670	-1.00	0
87	99.984	1.999	0.0786	2.5500	1.500	2.70	2.68	282.3569	-1.00	0
88	69.997	1.999	0.0564	2.5900	1.500	2.70	2.68	129.2140	-1.00	0
89	120.003	1.999	0.0945	2.4400	1.500	2.70	2.68	394.0239	-1.00	0
90	224.999	1.999	0.1497	2.4200	1.500	2.70	2.68	695.5229	-1.00	0
91	180.005	1.999	0.1228	2.6500	1.500	2.70	2.68	741.7849	-1.00	0
92	329.994	1.999	0.2039	2.4800	1.500	2.70	2.68	566.3088	-1.00	0
93	329.994	1.999	0.2030	2.4100	1.500	2.70	2.68	639.6899	-1.00	0
94	329.994	1.999	0.2067	2.3900	1.500	2.70	2.68	626.9280	-1.00	0
95	329.994	1.999	0.1984	2.7500	1.500	2.70	2.68	775.2849	-1.00	0
96	329.994	1.999	0.1978	2.6100	1.500	2.70	2.68	713.0708	-1.00	0
97	259.997	1.999	0.1655	2.4500	1.500	2.70	2.68	730.6189	-1.00	0
98	259.997	1.999	0.1701	2.2500	1.500	2.70	2.68	548.7610	-1.00	0
99	149.990	1.999	0.1149	2.4000	1.500	2.70	2.68	381.2620	-1.00	0
100	190.000	1.999	0.1350	2.3500	1.500	2.70	2.68	476.9758	-1.00	0
101	159.985	1.999	0.0866	8.2700	4.000	2.56	2.68	2252.4758	-1.00	0
102	219.987	1.999	0.1079	8.0100	4.000	2.56	2.68	3016.5940	-1.00	0
103	219.987	1.999	0.1061	8.1100	4.000	2.56	2.68	2928.8550	-1.00	0
104	250.002	1.999	0.1061	8.1000	4.000	2.56	2.68	3177.7119	-1.00	0
105	194.984	1.999	0.0991	8.1300	4.000	2.56	2.68	2651.2839	-1.00	0
106	139.994	1.999	0.0856	8.1900	4.000	2.56	2.68	1936.6189	-1.00	0
107	99.984	1.999	0.0680	8.1200	4.000	2.56	2.68	1186.8560	-1.00	0
108	549.981	1.999	0.4901	0.5000	0.340	1.66	2.68	31.9050	-1.00	0
109	299.979	1.999	0.3520	0.4200	0.340	1.66	2.68	14.3570	-1.00	0
110	399.992	1.999	0.3999	0.4800	0.340	1.66	2.68	35.0950	-1.00	0

MPR - DATA OF MEYER-PETER, E. AND MULLER, R. (1948)
(SHEET 3 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	199.996	1.999	0.2850	0.4000	0.340	1.66	2.68	6.3810	-1.00	0
112	349.986	1.999	0.3719	0.4500	0.340	1.66	2.68	25.5240	-1.00	0
113	180.005	1.999	0.1911	1.0030	1.000	1.38	2.68	94.1190	-1.00	0
114	139.994	1.999	0.1521	1.0430	1.000	1.38	2.68	95.7140	-1.00	0
115	99.984	1.999	0.1119	1.0740	1.000	1.38	2.68	108.4760	-1.00	0
116	10.000	0.354	0.0769	1.7500	5.200	1.00	1.25	424.8008	-1.00	0
117	10.000	0.354	0.0633	3.2600	5.200	1.00	1.25	2725.8059	-1.00	0
118	10.000	0.354	0.0582	4.2700	5.200	1.00	1.25	4814.4023	-1.00	0
119	5.000	0.354	0.0333	6.9700	5.200	1.00	1.25	9699.6172	-1.00	0
120	21.610	0.354	0.1169	2.8000	5.200	1.00	1.25	2285.1968	-1.00	0
121	5.000	0.354	0.0460	2.1700	5.200	1.00	1.25	212.4000	-1.00	0
122	10.000	0.354	0.0821	1.2800	5.200	1.00	1.25	106.2000	-1.00	0
123	10.000	0.354	0.0508	6.3800	5.200	1.00	1.25	10673.1133	-1.00	0
124	21.610	0.354	0.0978	3.9100	5.200	1.00	1.25	5045.4453	-1.00	0
125	2.080	0.354	0.0237	5.7200	5.200	1.00	1.25	2127.4080	-1.00	0
126	1.080	0.354	0.0133	7.9100	5.200	1.00	1.25	4097.2266	-1.00	0
127	0.780	0.354	0.0079	10.6300	5.200	1.00	1.25	5673.0859	-1.00	0
128	2.140	0.354	0.0550	18.4000	5.200	1.00	4.22	2948.3860	-1.00	0
129	2.140	0.354	0.0575	16.0100	5.200	1.00	4.22	758.7759	-1.00	0
130	2.140	0.354	0.0528	22.7000	5.200	1.00	4.22	9452.1797	-1.00	0
131	6.080	0.354	0.1422	8.2300	5.200	1.00	4.22	1121.6909	-1.00	0
132	6.080	0.354	0.1174	16.5400	5.200	1.00	4.22	18618.5352	-1.00	0
133	6.080	0.354	0.1242	12.6800	5.200	1.00	4.22	9385.5742	-1.00	0
134	8.210	0.354	0.1984	5.7800	5.200	1.00	4.22	220.3840	-1.00	0
135	8.210	0.354	0.1659	11.0200	5.200	1.00	4.22	7063.5977	-1.00	0

MUT - DATA OF MUTTER, D.G. (1971)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	14.158	1.219	0.0536	1.3700	0.260	1.34	2.65	33.0000	32.22	2
2	17.839	1.219	0.0290	3.6000	0.260	1.34	2.65	483.0000	28.33	2
3	10.477	1.219	0.0344	2.0000	0.260	1.34	2.65	32.0000	28.33	2
4	26.334	1.219	0.1018	0.8000	0.260	1.34	2.65	12.0000	29.44	2
5	13.592	1.219	0.0640	0.8000	0.260	1.34	2.65	5.0000	28.33	2
6	13.592	1.219	0.0625	1.1000	0.260	1.34	2.65	6.0000	29.44	2
7	9.344	1.219	0.0585	0.9000	0.260	1.34	2.65	11.0000	27.22	2
8	9.344	1.219	0.0604	0.7500	0.260	1.34	2.65	3.0000	27.78	2
9	9.344	1.219	0.0607	0.7500	0.260	1.34	2.65	2.0000	30.56	2
10	11.326	1.219	0.0649	0.9000	0.260	1.34	2.65	2.0000	28.33	2
11	11.326	1.219	0.0549	1.0500	0.260	1.34	2.65	5.0000	28.33	2
12	16.990	1.219	0.0704	0.9000	0.260	1.34	2.65	5.0000	28.33	2
13	17.273	1.219	0.0750	0.8000	0.260	1.34	2.65	16.0000	27.78	2
14	21.237	1.219	0.0856	0.8000	0.260	1.34	2.65	28.0000	28.33	2
15	21.237	1.219	0.0853	1.1500	0.260	1.34	2.65	53.0000	27.78	2
16	21.237	1.219	0.0850	0.9000	0.260	1.34	2.65	13.0000	30.00	2
17	14.158	1.219	0.0616	0.9500	0.260	1.34	2.65	37.0000	28.89	2
18	16.990	1.219	0.0527	3.8000	0.260	1.34	2.65	835.0000	27.78	2
19	16.990	1.219	0.0323	7.0000	0.260	1.34	2.65	6250.0000	27.78	5
20	17.556	1.219	0.0183	6.6000	0.260	1.34	2.65	2260.0000	28.89	5
21	17.556	1.219	0.0472	3.8000	0.260	1.34	2.65	1184.0000	28.89	2
22	14.158	1.219	0.0524	4.8000	0.260	1.34	2.65	501.0000	26.11	2
23	14.158	1.219	0.0344	7.0500	0.260	1.34	2.65	5987.9883	25.56	5
24	12.742	1.219	0.0165	6.4000	0.260	1.34	2.65	555.0000	25.56	2
25	12.742	1.219	0.0216	5.3000	0.260	1.34	2.65	1850.0000	25.56	2
26	11.326	1.219	0.0323	5.7000	0.260	1.34	2.65	2127.0000	25.56	2
27	11.326	1.219	0.0134	6.8000	0.260	1.34	2.65	2865.9958	26.11	5
28	14.158	1.219	0.0402	7.5000	0.260	1.34	2.65	10630.0000	25.56	5

NEI - DATA OF NEILL, C.R. (1967)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	28.084	0.890	0.0518	4.5000	6.187	1.13	2.54	0.0	20.00	1
2	34.526	0.890	0.0579	5.5000	6.187	1.13	2.54	0.0	20.00	1
3	54.350	0.890	0.0853	4.3000	6.187	1.13	2.54	0.0	20.00	1
4	58.685	0.890	0.0884	3.7000	6.187	1.13	2.54	0.0	20.00	1
5	64.054	0.890	0.1006	4.0000	6.187	1.13	2.54	0.0	20.00	1
6	77.911	0.890	0.1173	3.7000	6.187	1.13	2.54	0.0	20.00	1
7	90.857	0.890	0.1341	2.4000	6.187	1.13	2.54	0.0	20.00	1
8	105.064	0.890	0.1463	2.4000	6.187	1.13	2.54	0.0	20.00	1
9	102.586	0.890	0.1646	2.0000	6.187	1.13	2.54	0.0	20.00	1
10	18.170	0.890	0.0305	17.0000	8.473	1.12	2.52	0.0	20.00	1
11	37.168	0.890	0.0610	8.5000	8.473	1.12	2.52	0.0	20.00	1
12	80.947	0.890	0.1219	6.6000	8.473	1.12	2.52	0.0	20.00	1
13	121.419	0.890	0.1829	4.1000	8.473	1.12	2.52	0.0	20.00	1
14	29.735	0.890	0.0366	27.0000	19.995	1.15	2.52	0.0	20.00	1
15	47.039	0.890	0.0518	19.7000	19.995	1.15	2.52	0.0	20.00	1
16	52.863	0.890	0.0610	14.6000	19.995	1.15	2.52	0.0	20.00	1
17	80.245	0.890	0.0884	11.6000	19.995	1.15	2.52	0.0	20.00	1
18	108.493	0.890	0.1128	10.7000	19.995	1.15	2.52	0.0	20.00	1
19	132.816	0.890	0.1463	7.5000	19.995	1.15	2.52	0.0	20.00	1
20	174.200	0.890	0.1737	7.5000	19.995	1.15	2.52	0.0	20.00	1
21	31.915	0.890	0.0640	3.3000	4.999	1.00	2.49	0.0	20.00	1
22	51.541	0.890	0.0975	3.1000	4.999	1.00	2.49	0.0	20.00	1
23	63.261	0.890	0.1128	2.8000	4.999	1.00	2.49	0.0	20.00	1
24	68.556	0.890	0.1265	2.8000	4.999	1.00	2.49	0.0	20.00	1
25	75.825	0.890	0.1372	2.4000	4.999	1.00	2.49	0.0	20.00	1
26	98.208	0.890	0.1768	1.8000	4.999	1.00	2.49	0.0	20.00	1
27	58.007	0.914	0.1450	1.5100	20.201	1.10	1.36	0.0	18.00	1
28	25.003	0.914	0.6100	4.0000	20.201	1.10	1.36	0.0	18.00	1
29	76.009	0.914	0.1700	1.4700	20.201	1.10	1.36	0.0	18.00	1
30	58.007	0.914	0.1440	1.8000	20.201	1.10	1.36	0.0	18.00	1
31	89.011	0.914	0.1440	3.2000	20.201	1.10	1.36	0.0	18.00	1
32	44.005	0.914	0.1440	9.0000	12.551	1.10	1.40	0.0	18.00	1
33	72.009	0.914	0.1440	2.1200	12.551	1.10	1.40	0.0	18.00	1
34	25.003	0.914	0.1440	3.0000	6.590	1.10	1.40	0.0	18.00	1
35	57.007	0.914	0.1440	1.3700	6.590	1.10	1.40	0.0	18.00	1
36	19.002	0.914	0.1460	1.8000	3.450	1.12	1.41	0.0	18.00	1
37	40.005	0.914	0.1460	6.5000	3.450	1.12	1.41	0.0	18.00	1
38	23.003	0.914	0.1440	2.4000	3.450	1.12	1.41	0.0	18.00	1
39	28.003	0.914	0.1440	3.7000	3.450	1.12	1.41	0.0	18.00	1
40	40.005	0.914	0.1440	6.5000	16.001	1.83	1.40	0.0	18.00	1
41	82.010	0.914	0.1440	2.7000	16.001	1.83	1.40	0.0	18.00	1
42	52.006	0.914	0.1440	1.2000	16.001	2.27	1.40	0.0	18.00	1
43	76.009	0.914	0.1440	2.3000	16.001	2.27	1.40	0.0	18.00	1
44	19.002	0.914	0.1440	1.8000	13.001	2.76	1.40	0.0	18.00	1
45	71.008	0.914	0.1440	2.0000	13.001	2.76	1.40	0.0	18.00	1
46	25.003	0.914	0.1440	3.0000	13.001	2.48	1.40	0.0	18.00	1
47	71.008	0.914	0.1440	2.0000	13.001	2.48	1.40	0.0	18.00	1
48	66.008	0.914	0.1440	1.8000	6.000	1.00	2.59	0.0	18.00	1
49	89.011	0.914	0.1440	3.2000	6.000	1.00	2.59	0.0	18.00	1
50	82.010	0.914	0.1440	2.8000	9.000	1.00	2.52	0.0	18.00	1
51	99.012	0.914	0.1440	4.1000	9.000	1.00	2.52	0.0	18.00	1

NOM - DATA OF NOMICOS (1957)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	8.665	0.267	0.0866	2.5000	0.091	1.16	2.65	3640.0000	25.00	2
2	8.665	0.267	0.0866	2.4500	0.091	1.16	2.65	3380.0000	25.00	2
3	12.261	0.267	0.0744	2.0000	0.091	1.16	2.65	4600.0000	25.00	2
4	14.413	0.267	0.0783	2.0600	0.091	1.16	2.65	6920.0000	25.00	5
5	14.413	0.267	0.0777	2.0600	0.091	1.16	2.65	8080.0000	25.00	5
6	14.413	0.267	0.0777	2.5800	0.148	1.16	2.65	3610.0000	25.00	5
7	12.317	0.267	0.0735	2.1000	0.145	1.30	2.65	1850.0000	25.00	5
8	7.617	0.267	0.0738	2.7000	0.145	1.30	2.65	1200.0000	25.00	2
9	5.465	0.267	0.0735	2.1000	0.145	1.30	2.65	230.0000	25.00	2
10	12.346	0.267	0.0710	2.5000	0.137	1.38	2.65	2300.0000	24.30	5
11	10.958	0.267	0.0680	2.2500	0.137	1.38	2.65	3300.0000	24.00	5
12	8.297	0.267	0.0722	2.7500	0.137	1.38	2.65	2000.0000	24.10	6
13	4.814	0.267	0.0735	2.0000	0.152	1.76	2.65	300.0000	26.00	2
14	5.097	0.267	0.0735	2.1000	0.152	1.76	2.65	590.0000	25.60	2
15	5.465	0.267	0.0735	2.4000	0.152	1.76	2.65	820.0000	25.50	2
16	5.861	0.267	0.0735	2.6000	0.152	1.76	2.65	1150.0000	25.00	2
17	6.201	0.267	0.0735	2.7500	0.152	1.76	2.65	1800.0000	25.00	2
18	7.164	0.267	0.0735	2.7000	0.152	1.76	2.65	2500.0000	25.00	2
19	8.268	0.267	0.0735	2.4000	0.152	1.76	2.65	3400.0000	25.00	2
20	9.259	0.267	0.0735	2.2500	0.152	1.76	2.65	2900.0000	25.00	6
21	10.137	0.267	0.0735	2.1000	0.152	1.76	2.65	3300.0000	25.00	6
22	10.958	0.267	0.0735	2.0000	0.152	1.76	2.65	3200.0000	25.00	5
23	12.317	0.267	0.0735	2.2500	0.152	1.76	2.65	3400.0000	25.00	5
24	15.885	0.267	0.0735	3.9000	0.152	1.76	2.65	5600.0000	25.00	5
25	12.317	0.267	0.0732	2.4000	0.145	1.30	2.65	3240.0000	15.30	5
26	12.317	0.267	0.0735	2.3000	0.145	1.30	2.65	2140.0000	25.00	5
27	12.317	0.267	0.0738	2.2000	0.145	1.30	2.65	1660.0000	38.00	5
28	5.465	0.267	0.0738	2.3500	0.145	1.30	2.65	310.0000	15.00	2
29	5.465	0.267	0.0735	2.1000	0.145	1.30	2.65	220.0000	25.00	2
30	5.465	0.267	0.0732	1.9000	0.145	1.30	2.65	110.0000	35.60	2

NOR - DATA OF NORDIN,C.F.,JR. (1976)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	1321.971	2.380	0.8530	0.6300	0.250	1.44	2.65	285.0000	20.10	2
2	1350.970	2.380	0.7380	0.7800	0.250	1.44	2.65	808.0000	19.40	3
3	812.982	2.380	0.5460	0.9700	0.250	1.44	2.65	698.0000	16.70	3
4	1987.957	2.380	0.8200	0.7900	0.250	1.44	2.65	1449.9988	21.70	3
5	2001.957	2.380	0.8320	0.7100	0.250	1.44	2.65	698.0000	10.20	3
6	1942.958	2.380	0.7590	1.5700	0.250	1.44	2.65	1809.9988	22.30	4
7	1998.956	2.380	0.5460	1.5000	0.250	1.44	2.65	1399.9988	21.70	5
8	2043.955	2.380	0.4790	1.6500	0.250	1.44	2.65	2759.9978	20.20	5
9	1959.957	2.380	0.4570	1.6000	0.250	1.44	2.65	8869.9883	21.40	7
10	1378.970	2.380	0.3380	3.0500	0.250	1.44	2.65	8519.9883	22.60	7
11	1364.970	2.380	0.3110	4.4900	0.250	1.44	2.65	15699.9883	23.20	7
12	1370.969	2.380	0.3930	1.2000	0.250	1.44	2.65	1639.9988	24.80	5
13	843.982	2.380	0.2380	3.0000	0.250	1.44	2.65	5559.9922	22.80	7
14	1072.977	2.380	0.7190	0.5000	0.250	1.44	2.65	164.0000	23.70	3
15	280.994	2.380	0.3200	0.3200	0.250	1.44	2.65	0.8000	22.70	2
16	426.991	2.380	0.3200	0.4700	0.250	1.44	2.65	73.0000	21.70	2
17	556.988	2.380	0.3080	1.1100	0.250	1.44	2.65	996.0000	20.60	3
18	699.985	2.380	0.3260	0.8900	0.250	1.44	2.65	873.0000	21.30	4
19	813.982	2.380	0.3350	0.9300	0.250	1.44	2.65	1030.0000	21.70	4
20	1018.977	2.380	0.3290	1.2200	0.250	1.44	2.65	1719.9988	21.80	5
21	1148.974	2.380	0.3170	1.8900	0.250	1.44	2.65	3839.9978	21.20	5
22	1272.972	2.380	0.3110	2.6600	0.250	1.44	2.65	6729.9922	21.80	7
23	1564.966	2.380	0.3260	4.2700	0.250	1.44	2.65	17199.9883	21.70	7
24	1011.977	2.380	0.3290	1.2300	0.250	1.44	2.65	2039.9988	20.90	5
25	497.989	2.380	0.3290	1.2000	0.250	1.44	2.65	639.0000	20.40	3
26	843.982	2.380	0.6130	0.2900	0.250	1.44	2.65	54.5000	21.30	2
27	1022.977	2.380	0.6160	0.6800	0.250	1.44	2.65	435.0000	21.20	3
28	1192.974	2.380	0.6130	0.9300	0.250	1.44	2.65	765.0000	21.30	3
29	1343.970	2.380	0.6310	0.8300	0.250	1.44	2.65	872.0000	20.90	3
30	1532.967	2.380	0.6370	0.8900	0.250	1.44	2.65	1080.0000	21.30	4
31	1710.962	2.380	0.6190	0.7700	0.250	1.44	2.65	1100.0000	21.60	4
32	1890.959	2.380	0.6370	0.7000	0.250	1.44	2.65	1210.0000	22.00	4
33	2055.955	2.380	0.6220	0.8200	0.250	1.44	2.65	1749.9988	22.20	4
34	2213.952	2.380	0.5970	0.8600	0.250	1.44	2.65	1339.9988	22.40	5
35	1515.967	2.380	0.6550	0.8600	0.250	1.44	2.65	1080.0000	20.90	3
36	1029.977	2.380	0.6190	0.5100	0.250	1.44	2.65	258.0000	21.60	3
37	1024.978	2.380	0.8260	0.1400	0.250	1.44	2.65	17.8000	21.10	2
38	1292.971	2.380	0.8470	0.2000	0.250	1.44	2.65	56.6000	21.20	3
39	1533.966	2.380	0.8600	0.5200	0.250	1.44	2.65	356.0000	21.10	3
40	1806.960	2.380	0.8350	0.6300	0.250	1.44	2.65	736.0000	21.40	3
41	2089.954	2.380	0.8170	0.8300	0.250	1.44	2.65	831.0000	20.90	3
42	1531.966	2.380	0.8530	0.5500	0.250	1.44	2.65	380.0000	21.00	3
43	481.989	2.380	0.3290	1.0200	0.250	1.44	2.65	351.0000	20.80	3
44	2075.954	2.380	0.5270	1.7900	0.250	1.44	2.65	1799.9988	21.00	5
45	1377.969	2.380	0.5850	1.0600	0.250	1.44	2.65	778.0000	20.90	3
46	730.984	2.380	0.3350	1.2200	0.250	1.44	2.65	827.0000	20.70	4
47	345.992	2.380	0.2560	1.5600	1.140	1.53	2.65	152.0000	17.40	3
48	372.992	2.380	0.2990	0.7400	1.140	1.53	2.65	33.0000	20.10	3
49	378.992	2.380	0.2870	0.9900	1.140	1.53	2.65	65.5000	19.80	3
50	461.990	2.380	0.3090	1.7300	1.140	1.53	2.65	165.0000	20.30	3
51	463.990	2.380	0.3110	1.6700	1.140	1.53	2.65	169.0000	20.00	3
52	564.988	2.380	0.3140	2.6100	1.140	1.53	2.65	307.0000	19.80	3
53	565.988	2.380	0.3190	2.5200	1.140	1.53	2.65	325.0000	18.30	3
54	1136.975	2.380	0.3590	5.7700	1.140	1.53	2.65	2349.9988	19.90	3
55	705.984	2.380	0.3150	4.7100	1.140	1.53	2.65	1090.0000	18.20	3

NOR - DATA OF NORDIN,C.F.,JR. (1976)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	832.982	2.380	0.3010	5.5400	1.140	1.53	2.65	1479.9988	21.00	3
57	1355.970	2.380	0.3090	5.2000	1.140	1.53	2.65	2919.9978	21.50	4
58	743.983	2.380	0.6070	0.3900	1.140	1.53	2.65	2.9000	22.30	3
59	919.980	2.380	0.6190	0.6800	1.140	1.53	2.65	26.9000	21.60	3
60	1135.975	2.380	0.6120	1.1300	1.140	1.53	2.65	64.3000	21.20	3
61	1351.970	2.380	0.6150	1.7600	1.140	1.53	2.65	181.0000	25.60	3
62	1605.965	2.380	0.6300	2.5400	1.140	1.53	2.65	412.0000	24.00	3

OBR - DATA OF OBRIEN, M.P. (1936)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	19.595	0.914	0.0893	1.1500	0.360	1.51	2.57	20.1000	-1.00	0
2	18.972	0.914	0.0920	1.4900	0.360	1.51	2.57	34.1000	-1.00	0
3	24.833	0.914	0.0963	2.0200	0.360	1.51	2.57	87.7000	-1.00	0
4	24.578	0.914	0.0914	0.8300	0.360	1.51	2.57	78.6000	18.90	0
5	24.550	0.914	0.0997	1.5100	0.360	1.51	2.57	76.1000	-1.00	0
6	31.431	0.914	0.1027	1.7600	0.360	1.51	2.57	255.1000	-1.00	0
7	31.431	0.914	0.0966	0.6300	0.360	1.51	2.57	340.5000	19.40	0
8	31.431	0.914	0.1027	1.8600	0.360	1.51	2.57	205.8000	-1.00	0
9	37.094	0.914	0.1073	1.6900	0.360	1.51	2.57	385.3999	-1.00	0
10	37.943	0.914	0.1103	2.6100	0.360	1.51	2.57	336.8999	17.80	0
11	38.227	0.914	0.1116	2.3000	0.360	1.51	2.57	158.3000	-1.00	0
12	43.040	0.914	0.1170	1.5800	0.360	1.51	2.57	263.5999	-1.00	0
13	40.775	0.914	0.1109	1.5200	0.360	1.51	2.57	385.8999	-1.00	0
14	43.040	0.914	0.1097	2.2700	0.360	1.51	2.57	502.5999	-1.00	0
15	57.481	0.914	0.1152	3.0800	0.360	1.51	2.57	1039.5999	17.20	0
16	57.481	0.914	0.1161	2.3000	0.360	1.51	2.57	1039.5999	-1.00	0
17	42.474	0.914	0.1173	2.6300	0.360	1.51	2.57	213.7000	18.30	0
18	42.474	0.914	0.1091	1.1400	0.360	1.51	2.57	270.7000	-1.00	0
19	42.474	0.914	0.1030	1.3100	0.360	1.51	2.57	504.8999	-1.00	0
20	42.474	0.914	0.1073	0.9200	0.360	1.51	2.57	447.0000	-1.00	0
21	37.660	0.914	0.0972	1.5500	0.360	1.51	2.57	510.2000	17.80	0
22	31.148	0.914	0.0966	1.6500	0.360	1.51	2.57	290.2000	17.20	0
23	31.148	0.914	0.1052	1.1500	0.360	1.51	2.57	290.2000	-1.00	0
24	31.431	0.914	0.1143	3.2300	0.360	1.51	2.57	287.5999	-1.00	0
25	26.617	0.914	0.0899	1.3800	0.360	1.51	2.57	183.3000	15.00	0
26	26.617	0.914	0.0893	1.4600	0.360	1.51	2.57	180.5000	-1.00	0
27	26.617	0.914	0.0884	2.1500	0.360	1.51	2.57	163.4000	-1.00	0
28	23.361	0.914	0.0936	1.6900	0.360	1.51	2.57	48.6000	15.00	0
29	23.361	0.914	0.0933	1.4600	0.360	1.51	2.57	105.4000	-1.00	0
30	23.361	0.914	0.0933	2.0800	0.360	1.51	2.57	96.7000	-1.00	0
31	19.113	0.914	0.0975	0.5700	0.360	1.51	2.57	17.0000	-1.00	0
32	19.113	0.914	0.0963	0.6900	0.360	1.51	2.57	21.4000	11.60	0
33	19.113	0.914	0.0954	0.9400	0.360	1.51	2.57	40.5000	-1.00	0
34	101.371	0.914	0.3078	0.8600	0.360	1.51	2.57	1.9000	-1.00	0
35	99.389	0.914	0.3127	0.8900	0.360	1.51	2.57	1.9000	-1.00	0
36	99.389	0.914	0.3127	0.8600	0.360	1.51	2.57	1.9000	-1.00	0
37	126.289	0.914	0.3188	0.8700	0.360	1.51	2.57	30.5000	-1.00	0
38	126.289	0.914	0.3082	1.1400	0.360	1.51	2.57	30.5000	12.50	0
39	124.874	0.914	0.3097	1.0700	0.360	1.51	2.57	40.3000	-1.00	0
40	112.414	0.914	0.3167	0.5500	0.360	1.51	2.57	4.0000	11.10	0
41	112.414	0.914	0.3194	0.5000	0.360	1.51	2.57	10.3000	-1.00	0
42	112.414	0.914	0.3173	0.5000	0.360	1.51	2.57	10.3000	-1.00	0
43	112.414	0.914	0.3255	0.2900	0.360	1.51	2.57	14.7000	-1.00	0
44	111.565	0.914	0.3173	0.7500	0.360	1.51	2.57	14.8000	-1.00	0
45	110.999	0.914	0.3185	0.4600	0.360	1.51	2.57	14.9000	-1.00	0
46	110.432	0.914	0.3237	0.5500	0.360	1.51	2.57	14.9000	-1.00	0
47	152.623	0.914	0.3191	0.6700	0.360	1.51	2.57	64.7000	11.10	0
48	151.491	0.914	0.3161	0.3100	0.360	1.51	2.57	65.2000	-1.00	0
49	150.075	0.914	0.3173	0.5700	0.360	1.51	2.57	65.8000	-1.00	0
50	150.075	0.914	0.3161	0.4700	0.360	1.51	2.57	66.5000	-1.00	0
51	150.075	0.914	0.3170	0.9400	0.360	1.51	2.57	65.8000	-1.00	0
52	140.730	0.914	0.3173	0.7500	0.360	1.51	2.57	69.9000	11.40	0
53	139.881	0.914	0.3200	0.7900	0.360	1.51	2.57	41.9000	-1.00	0
54	139.881	0.914	0.3182	0.4700	0.360	1.51	2.57	41.9000	-1.00	0
55	139.032	0.914	0.3146	0.8100	0.360	1.51	2.57	42.2000	-1.00	0

OBR - DATA OF OBRIEN, M.P. (1936)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	138.748	0.914	0.3155	0.6200	0.360	1.51	2.57	42.3000	-1.00	0
57	139.032	0.914	0.3121	0.5000	0.360	1.51	2.57	53.9000	-1.00	0
58	118.927	0.914	0.3167	0.6200	0.360	1.51	2.57	13.3000	11.70	0
59	118.927	0.914	0.3231	0.6600	0.360	1.51	2.57	18.0000	-1.00	0
60	118.927	0.914	0.3179	0.7900	0.360	1.51	2.57	18.0000	-1.00	0
61	116.662	0.914	0.3179	0.6600	0.360	1.51	2.57	18.3000	-1.00	0
62	118.927	0.914	0.3158	0.5400	0.360	1.51	2.57	18.0000	-1.00	0
63	118.927	0.914	0.3213	0.5700	0.360	1.51	2.57	18.0000	-1.00	0
64	116.662	0.914	0.3197	0.5000	0.360	1.51	2.57	25.2000	-1.00	0
65	102.504	0.914	0.3271	0.3300	0.360	1.51	2.57	4.8000	11.70	0
66	103.353	0.914	0.3170	0.4700	0.360	1.51	2.57	6.7000	-1.00	0
67	102.504	0.914	0.3231	0.4400	0.360	1.51	2.57	6.8000	-1.00	0
68	102.504	0.914	0.3210	0.4300	0.360	1.51	2.57	6.8000	-1.00	0
69	102.504	0.914	0.3158	0.5700	0.360	1.51	2.57	6.8000	-1.00	0
70	102.504	0.914	0.3170	0.4300	0.360	1.51	2.57	7.5000	-1.00	0
71	102.504	0.914	0.3191	0.2900	0.360	1.51	2.57	7.5000	-1.00	0
72	107.034	0.914	0.1582	1.6700	0.360	1.51	2.57	886.8999	10.00	0
73	105.335	0.914	0.1582	2.0000	0.360	1.51	2.57	901.2000	-1.00	0
74	85.797	0.914	0.1606	1.5000	0.360	1.51	2.57	423.5999	9.40	0
75	84.665	0.914	0.1637	2.7300	0.360	1.51	2.57	527.0999	-1.00	0
76	84.665	0.914	0.1615	0.7900	0.360	1.51	2.57	518.2000	-1.00	0
77	61.446	0.914	0.1561	1.3400	0.360	1.51	2.57	164.3000	8.90	0
78	61.446	0.914	0.1606	1.3400	0.360	1.51	2.57	164.3000	-1.00	0
79	61.163	0.914	0.1652	1.8900	0.360	1.51	2.57	165.1000	-1.00	0
80	60.879	0.914	0.1615	1.1400	0.360	1.51	2.57	165.9000	-1.00	0
81	60.879	0.914	0.1622	1.8200	0.360	1.51	2.57	146.0000	-1.00	0
82	119.210	0.914	0.1433	2.1900	0.360	1.51	2.57	1332.5000	8.90	0
83	119.493	0.914	0.1372	2.8100	0.360	1.51	2.57	1329.2998	-1.00	0

OJK - DATA OF ONISHI, JAIN AND KENNEDY (1972)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	34.434	0.914	0.1021	1.5400	0.250	1.41	2.65	67.1800	28.50	3
2	45.691	0.914	0.1009	1.9350	0.250	1.41	2.65	744.5269	20.00	3
3	51.540	0.914	0.0963	1.6540	0.250	1.41	2.65	1063.9919	21.80	4
4	51.540	0.914	0.0963	1.6540	0.250	1.41	2.65	3355.6670	21.80	4
5	39.582	0.914	0.1076	1.6300	0.250	1.41	2.65	195.6070	25.50	3
6	39.406	0.914	0.1003	1.8400	0.250	1.41	2.65	485.1580	21.00	3
7	30.166	0.914	0.0814	2.5400	0.250	1.41	2.65	313.0530	21.00	3
8	30.134	0.914	0.0750	2.5600	0.250	1.41	2.65	523.8169	21.00	3
9	27.123	0.914	0.0771	2.6700	0.250	1.41	2.65	313.5608	21.00	3
10	24.122	0.914	0.0756	2.5600	0.250	1.41	2.65	282.0549	24.00	3
11	53.273	0.914	0.1225	1.4650	0.250	1.41	2.65	406.1328	24.00	3
12	50.115	0.914	0.1332	1.2200	0.250	1.41	2.65	98.2910	26.00	3
13	39.320	0.914	0.1271	1.0900	0.250	1.41	2.65	66.7910	25.00	3
14	65.250	0.914	0.1353	1.5600	0.250	1.41	2.65	688.1868	25.00	3

PAI - DATA OF PAINTAL, A.S. (1971)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	70.790	0.914	0.0960	8.4600	22.200	1.07	2.65	0.0710	-1.00	0
2	84.948	0.914	0.1052	8.8000	22.200	1.07	2.65	0.0740	-1.00	0
3	99.106	0.914	0.1143	8.7400	22.200	1.07	2.65	0.0390	-1.00	0
4	110.432	0.914	0.1250	8.8200	22.200	1.07	2.65	0.0290	-1.00	0
5	130.254	0.914	0.1320	8.9100	22.200	1.07	2.65	0.0120	-1.00	0
6	141.580	0.914	0.1466	8.7500	22.200	1.07	2.65	0.0580	-1.00	0
7	155.738	0.914	0.1494	8.8700	22.200	1.07	2.65	0.1550	-1.00	0
8	169.896	0.914	0.1585	9.1010	22.200	1.07	2.65	0.1710	-1.00	0
9	184.054	0.914	0.1631	9.1400	22.200	1.07	2.65	0.3960	-1.00	0
10	198.212	0.914	0.1707	9.1500	22.200	1.07	2.65	0.3740	-1.00	0
11	215.202	0.914	0.1829	9.0500	22.200	1.07	2.65	0.6320	-1.00	0
12	226.528	0.914	0.1865	9.1200	22.200	1.07	2.65	0.7060	-1.00	0
13	254.844	0.914	0.2027	9.1200	22.200	1.07	2.65	1.5720	-1.00	0
14	133.085	0.914	0.1433	10.3000	22.200	1.57	2.65	0.8800	-1.00	0
15	127.422	0.914	0.1433	8.6000	22.200	1.57	2.65	1.0090	-1.00	0
16	155.738	0.914	0.1585	8.6000	22.200	1.57	2.65	1.2140	-1.00	0
17	184.054	0.914	0.1646	9.2500	22.200	1.57	2.65	1.1440	-1.00	0
18	215.202	0.914	0.1844	9.1000	22.200	1.57	2.65	2.1600	-1.00	0
19	240.686	0.914	0.1996	9.1000	22.200	1.57	2.65	3.5330	-1.00	0
20	130.254	0.914	0.1433	8.8000	22.200	1.57	2.65	1.6830	-1.00	0
21	184.054	0.914	0.1753	9.4300	22.200	1.57	2.65	8.9950	-1.00	0
22	240.686	0.914	0.1920	9.5000	22.200	1.57	2.65	25.1270	-1.00	0
23	107.601	0.914	0.1387	7.9000	22.200	2.73	2.65	1.7910	-1.00	0
24	134.784	0.914	0.1570	8.8500	22.200	2.73	2.65	1.6830	-1.00	0
25	158.570	0.914	0.1753	8.7800	22.200	2.73	2.65	4.7670	-1.00	0
26	189.717	0.914	0.1859	8.3300	22.200	2.73	2.65	1.9520	-1.00	0
27	218.033	0.914	0.2012	8.5600	22.200	2.73	2.65	6.7610	-1.00	0
28	232.191	0.914	0.2134	8.2500	22.200	2.73	2.65	21.3250	-1.00	0
29	101.938	0.914	0.1311	0.4900	22.200	2.73	2.65	6.3040	-1.00	0
30	130.254	0.914	0.1554	9.0000	22.200	2.73	2.65	10.4470	-1.00	0
31	155.738	0.914	0.1707	9.4100	22.200	2.73	2.65	12.3780	-1.00	0
32	215.202	0.914	0.1890	10.0000	22.200	2.73	2.65	35.1280	-1.00	0
33	56.632	0.914	0.0811	4.8700	7.950	1.10	2.65	0.1890	-1.00	0
34	26.051	0.914	0.0536	4.7000	7.950	1.10	2.65	0.0040	-1.00	0
35	56.632	0.914	0.0856	4.6800	7.950	1.10	2.65	0.0610	-1.00	0
36	36.811	0.914	0.0677	4.9000	7.950	1.10	2.65	0.0390	-1.00	0
37	70.790	0.914	0.0975	4.8000	7.950	1.10	2.65	0.5740	-1.00	0
38	26.051	0.914	0.0439	4.8700	7.950	1.10	2.65	0.0050	-1.00	0
39	42.474	0.914	0.0652	4.8000	7.950	1.10	2.65	0.0120	-1.00	0
40	73.622	0.914	0.1067	3.5200	7.950	1.10	2.65	0.1850	-1.00	0
41	84.948	0.914	0.1085	4.5300	7.950	1.10	2.65	0.2220	-1.00	0
42	46.721	0.914	0.0765	4.5300	7.950	1.10	2.65	0.0060	-1.00	0
43	60.879	0.914	0.0896	4.5500	7.950	1.10	2.65	0.0250	-1.00	0
44	79.285	0.914	0.1030	5.2000	7.950	1.10	2.65	1.6690	-1.00	0
45	90.611	0.914	0.1122	5.2000	7.950	1.10	2.65	5.0060	-1.00	0
46	101.938	0.914	0.1225	4.7000	7.950	1.10	2.65	1.5500	-1.00	0
47	90.611	0.914	0.1158	4.5000	7.950	1.10	2.65	0.2020	-1.00	0
48	31.148	0.914	0.0460	5.7200	7.950	1.10	2.65	0.0070	-1.00	0
49	101.938	0.914	0.1244	5.2900	7.950	1.10	2.65	16.0560	-1.00	0
50	118.927	0.914	0.1335	5.3500	7.950	1.10	2.65	15.8910	-1.00	0
51	29.732	0.914	0.0573	4.7800	7.950	1.10	2.65	0.0060	-1.00	0
52	26.051	0.914	0.0533	4.8700	7.950	1.10	2.65	0.0010	-1.00	0
53	76.453	0.914	0.0853	9.6000	7.950	1.10	2.65	98.8790	-1.00	0
54	87.780	0.914	0.0933	9.6000	7.950	1.10	2.65	353.0940	-1.00	0
55	77.869	0.914	0.0866	9.6000	7.950	1.10	2.65	61.5010	-1.00	0

PAI - DATA OF PAINTAL, A.S. (1971)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	24.352	0.914	0.0427	8.6000	7.950	1.10	2.65	0.0260	-1.00	0
57	25.484	0.914	0.0463	8.1000	7.950	1.10	2.65	0.0100	-1.00	0
58	28.316	0.914	0.0488	8.0300	7.950	1.10	2.65	0.0080	-1.00	0
59	28.316	0.914	0.0530	7.9000	7.950	1.10	2.65	0.0110	-1.00	0
60	14.158	0.914	0.0287	8.6000	7.950	1.10	2.65	0.0010	-1.00	0
61	27.750	0.914	0.0439	8.5800	7.950	1.10	2.65	0.0660	-1.00	0
62	42.474	0.914	0.0922	2.3200	7.950	1.10	2.65	0.0030	-1.00	0
63	36.811	0.914	0.0814	2.5100	7.950	1.10	2.65	0.0040	-1.00	0
64	28.316	0.914	0.0789	2.0700	7.950	1.10	2.65	0.0	-1.00	0
65	38.227	0.914	0.0866	2.2600	7.950	1.10	2.65	0.0010	-1.00	0
66	45.306	0.914	0.1006	2.7400	7.950	1.10	2.65	0.0050	-1.00	0
67	70.790	0.914	0.1198	1.8400	2.500	1.08	2.65	40.0460	-1.00	0
68	58.897	0.914	0.1091	1.3400	2.500	1.08	2.65	2.5030	-1.00	0
69	43.323	0.914	0.0954	1.3800	2.500	1.08	2.65	0.1920	-1.00	0
70	29.307	0.914	0.0826	1.1700	2.500	1.08	2.65	0.0320	-1.00	0
71	81.408	0.914	0.1222	1.6300	2.500	1.08	2.65	74.2880	-1.00	0
72	60.596	0.914	0.1006	1.4400	2.500	1.08	2.65	0.6860	-1.00	0
73	63.711	0.914	0.1122	1.9100	2.500	1.08	2.65	21.7140	-1.00	0
74	76.453	0.914	0.1219	2.1000	2.500	1.08	2.65	108.7670	-1.00	0
75	84.948	0.914	0.1292	2.0200	2.500	1.08	2.65	153.9550	-1.00	0
76	56.632	0.914	0.1018	1.7200	2.500	1.08	2.65	16.6860	-1.00	0
77	79.285	0.914	0.1228	2.0000	2.500	1.08	2.65	162.0910	-1.00	0
78	38.227	0.914	0.0823	1.5300	2.500	1.08	2.65	0.0920	-1.00	0
79	63.711	0.914	0.1134	1.5200	2.500	1.08	2.65	10.8870	-1.00	0
80	104.769	0.914	0.1582	1.5800	2.500	1.08	2.65	119.4160	-1.00	0
81	87.780	0.914	0.1481	1.4000	2.500	1.08	2.65	83.1060	-1.00	0
82	116.096	0.914	0.1673	1.6300	2.500	1.08	2.65	227.9040	-1.00	0
83	130.254	0.914	0.1783	2.0000	2.500	1.08	2.65	348.2258	-1.00	0
84	96.274	0.914	0.1481	1.8700	2.500	1.08	2.65	180.9920	-1.00	0
85	16.140	0.914	0.0421	1.4000	2.500	1.08	2.65	0.0020	-1.00	0
86	18.405	0.914	0.0497	1.4500	2.500	1.08	2.65	0.0100	-1.00	0
87	22.653	0.914	0.0570	1.5900	2.500	1.08	2.65	0.0140	-1.00	0
88	28.316	0.914	0.0701	1.8600	2.500	1.08	2.65	0.3870	-1.00	0
89	16.990	0.914	0.0421	1.6700	2.500	1.08	2.65	0.0020	-1.00	0
90	22.653	0.914	0.0607	1.8900	2.500	1.08	2.65	0.0100	-1.00	0
91	33.979	0.914	0.0671	1.5300	2.500	1.08	2.65	0.0200	-1.00	0
92	38.510	0.914	0.0832	1.6200	2.500	1.08	2.65	0.4630	-1.00	0
93	26.051	0.914	0.0671	1.8500	2.500	1.08	2.65	0.2660	-1.00	0
94	16.990	0.914	0.0460	2.1300	2.500	1.08	2.65	0.0120	-1.00	0
95	25.484	0.914	0.0576	2.1600	2.500	1.08	2.65	0.1450	-1.00	0
96	15.857	0.914	0.0393	2.0500	2.500	1.08	2.65	0.0020	-1.00	0

PRA - DATA OF PRATT, C.J. (1970)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	210.388	1.372	0.3048	0.5820	0.478	1.11	2.65	52.2000	26.00	2
2	75.321	1.372	0.3048	0.0287	0.478	1.11	2.65	0.0	16.00	1
3	89.762	1.372	0.3048	0.0406	0.478	1.11	2.65	0.0	23.00	1
4	100.522	1.372	0.3048	0.0524	0.478	1.11	2.65	0.0	22.50	1
5	111.565	1.372	0.3048	0.0612	0.478	1.11	2.65	0.0	22.00	1
6	118.502	1.372	0.3048	0.2687	0.478	1.11	2.65	0.7700	25.50	2
7	111.565	1.372	0.3048	0.2135	0.478	1.11	2.65	0.5060	28.00	2
8	103.637	1.372	0.3048	0.1790	0.478	1.11	2.65	0.2800	27.00	2
9	129.970	1.372	0.3048	0.2080	0.478	1.11	2.65	1.3700	27.00	2
10	141.297	1.372	0.3048	0.2120	0.478	1.11	2.65	2.9000	28.00	2
11	152.057	1.372	0.3048	0.2410	0.478	1.11	2.65	4.7200	27.00	2
12	164.799	1.372	0.3048	0.2815	0.478	1.11	2.65	15.2100	30.00	2
13	177.258	1.372	0.3048	0.3610	0.478	1.11	2.65	24.2000	28.00	2
14	239.553	1.372	0.3048	1.1200	0.478	1.11	2.65	209.0000	29.50	3
15	255.693	1.372	0.3048	1.6530	0.478	1.11	2.65	326.0000	32.00	3
16	267.586	1.372	0.3048	1.8750	0.478	1.11	2.65	377.0000	33.00	3
17	280.611	1.372	0.3048	1.9520	0.478	1.11	2.65	411.0000	30.50	3
18	293.070	1.372	0.3048	1.9560	0.478	1.11	2.65	560.0000	30.00	3
19	33.979	1.372	0.1524	0.0591	0.478	1.11	2.65	0.0	22.00	1
20	41.624	1.372	0.1524	0.0865	0.478	1.11	2.65	0.0	22.50	1
21	49.270	1.372	0.1524	0.1213	0.478	1.11	2.65	0.0	23.00	1
22	56.774	1.372	0.1524	0.5650	0.478	1.11	2.65	2.8900	23.00	2
23	52.951	1.372	0.1524	0.5060	0.478	1.11	2.65	1.5400	22.50	2
24	49.270	1.372	0.1524	0.4280	0.478	1.11	2.65	0.5820	23.00	2
25	45.306	1.372	0.1524	0.3530	0.478	1.11	2.65	0.2780	23.50	2
26	62.578	1.372	0.1524	0.6960	0.478	1.11	2.65	7.7200	20.50	2
27	68.100	1.372	0.1524	0.6030	0.478	1.11	2.65	11.6300	23.00	2
28	71.781	1.372	0.1524	0.6750	0.478	1.11	2.65	15.2700	22.00	2
29	75.604	1.372	0.1524	0.7340	0.478	1.11	2.65	19.6200	22.00	2
30	78.860	1.372	0.1524	0.8010	0.478	1.11	2.65	31.3600	21.50	2
31	84.240	1.372	0.1524	0.8400	0.478	1.11	2.65	45.2200	21.50	3
32	91.036	1.372	0.1524	1.1450	0.478	1.11	2.65	125.7000	22.50	3
33	95.000	1.372	0.1524	1.5430	0.478	1.11	2.65	180.8000	23.00	3
34	98.540	1.372	0.1524	1.8420	0.478	1.11	2.65	227.7000	21.00	3
35	102.079	1.372	0.1524	2.0900	0.478	1.11	2.65	311.5000	21.00	3
36	105.477	1.372	0.1524	2.1680	0.478	1.11	2.65	355.7998	21.00	3
37	109.300	1.372	0.1524	2.3120	0.478	1.11	2.65	427.3989	21.00	3
38	109.300	1.372	0.4572	0.0187	0.478	1.11	2.65	0.0	24.00	1
39	127.988	1.372	0.4572	0.0218	0.478	1.11	2.65	0.0	23.00	1
40	146.960	1.372	0.4572	0.0295	0.478	1.11	2.65	0.0	21.50	1
41	154.888	1.372	0.4572	0.1083	0.478	1.11	2.65	0.1200	20.00	2
42	162.534	1.372	0.4572	0.1300	0.478	1.11	2.65	0.2620	22.00	2
43	170.179	1.372	0.4572	0.1336	0.478	1.11	2.65	0.1460	20.00	2
44	177.400	1.372	0.4572	0.1322	0.478	1.11	2.65	0.3070	19.50	2
45	190.425	1.372	0.4572	0.1457	0.478	1.11	2.65	0.6320	19.50	2
46	210.671	1.372	0.4572	0.1888	0.478	1.11	2.65	1.7300	21.00	3
47	242.668	1.372	0.4572	0.2285	0.478	1.11	2.65	4.0700	25.50	3
48	278.346	1.372	0.4572	0.3595	0.478	1.11	2.65	13.7800	35.00	3
49	314.307	1.372	0.4572	0.4300	0.478	1.11	2.65	23.4500	32.50	3
50	354.516	1.372	0.4572	0.5830	0.478	1.11	2.65	61.8000	29.50	3
51	373.205	1.372	0.4572	0.6850	0.478	1.11	2.65	56.4500	29.50	3
52	15.121	1.372	0.0762	0.0991	0.478	1.11	2.65	0.0	17.00	1
53	18.887	1.372	0.0762	0.1475	0.478	1.11	2.65	0.0	17.00	1
54	22.709	1.372	0.0762	1.3800	0.478	1.11	2.65	3.2700	19.00	2
55	26.504	1.372	0.0762	1.4280	0.478	1.11	2.65	27.5000	17.50	2

PRA - DATA OF PRATT, C.J. (1970)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	30.553	1.372	0.0762	1.3670	0.478	1.11	2.65	65.2000	18.50	2
57	34.007	1.372	0.0762	1.4080	0.478	1.11	2.65	102.4000	18.50	3
58	37.745	1.372	0.0762	1.4920	0.478	1.11	2.65	134.5000	21.00	3
59	41.596	1.372	0.0762	1.9670	0.478	1.11	2.65	218.1000	23.00	3
60	45.391	1.372	0.0762	2.8700	0.478	1.11	2.65	395.7000	18.00	3

SAT - DATA OF SATO, S., KIKKAWA, H. AND ASHIDA (1958)
(SHEET 1 OF 5)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	42.998	0.780	0.2502	0.2400	1.038	1.00	2.65	0.0	11.96	0
2	59.999	0.780	0.2387	0.6000	1.038	1.00	2.65	25.6870	11.38	0
3	59.999	0.780	0.2140	1.0400	1.038	1.00	2.65	204.6620	11.38	0
4	49.998	0.780	0.2216	0.4000	1.038	1.00	2.65	11.6430	11.96	0
5	49.998	0.780	0.1929	0.4400	1.038	1.00	2.65	66.8770	11.96	0
6	69.997	0.780	0.2813	0.3600	1.038	1.00	2.65	9.7540	9.47	0
7	69.997	0.780	0.2393	0.5800	1.038	1.00	2.65	61.8380	9.47	0
8	79.998	0.780	0.3341	0.2200	1.038	1.00	2.65	2.6820	10.00	0
9	79.998	0.780	0.3106	0.4200	1.038	1.00	2.65	23.8590	10.00	0
10	79.998	0.780	0.2682	0.9000	1.038	1.00	2.65	174.0800	10.00	0
11	99.995	0.780	0.3499	0.4600	1.038	1.00	2.65	26.4310	9.47	0
12	99.995	0.780	0.2963	0.7200	1.038	1.00	2.65	72.4250	9.47	0
13	109.996	0.780	0.3706	0.3200	1.038	1.00	2.65	30.9450	10.00	0
14	109.996	0.780	0.3798	0.4600	1.038	1.00	2.65	48.4250	10.00	0
15	119.995	0.780	0.3780	0.4100	1.038	1.00	2.65	41.3790	17.28	0
16	119.995	0.780	0.3271	1.1000	1.038	1.00	2.65	211.3080	17.28	0
17	129.996	0.780	0.3530	0.5600	1.038	1.00	2.65	82.5980	5.29	0
18	139.994	0.780	0.3962	0.4200	1.038	1.00	2.65	45.1610	5.29	0
19	139.994	0.780	0.3755	0.4400	1.038	1.00	2.65	44.1070	5.29	0
20	139.994	0.780	0.3432	1.1600	1.038	1.00	2.65	127.3380	5.29	0
21	149.995	0.780	0.3892	0.3800	1.038	1.00	2.65	24.2170	5.29	0
22	149.995	0.780	0.3597	0.6800	1.038	1.00	2.65	117.9490	5.29	0
23	159.994	0.780	0.3728	1.3800	1.038	1.00	2.65	162.0400	5.50	0
24	169.995	0.780	0.4136	0.4800	1.038	1.00	2.65	40.2110	5.92	0
25	169.995	0.780	0.3740	0.8600	1.038	1.00	2.65	78.5730	5.92	0
26	179.993	0.780	0.4243	0.5400	1.038	1.00	2.65	63.6210	5.50	0
27	179.993	0.780	0.4179	0.9400	1.038	1.00	2.65	125.8290	5.50	0
28	189.995	0.780	0.4365	0.5600	1.038	1.00	2.65	63.3360	2.56	0
29	189.995	0.780	0.4133	0.9900	1.038	1.00	2.65	144.0710	2.56	0
30	199.993	0.780	0.4374	0.7600	1.038	1.00	2.65	116.4450	6.36	0
31	119.995	0.780	0.3487	0.4200	1.038	1.00	2.65	27.3710	7.03	0
32	129.996	0.780	0.3435	0.4900	1.038	1.00	2.65	33.0690	6.14	0
33	129.996	0.780	0.3234	0.9500	1.038	1.00	2.65	104.4060	6.14	0
34	129.996	0.780	0.3082	1.6300	1.038	1.00	2.65	402.0408	6.14	0
35	139.994	0.780	0.3688	0.4800	1.038	1.00	2.65	49.9370	9.73	0
36	139.994	0.780	0.3508	1.2200	1.038	1.00	2.65	182.1130	9.73	0
37	27.999	0.780	0.1137	1.1750	2.210	1.00	2.65	0.0	7.26	0
38	74.998	0.780	0.1728	1.2100	2.210	1.00	2.65	79.7320	7.97	0
39	74.998	0.780	0.1774	1.2150	2.210	1.00	2.65	77.3600	7.97	0
40	74.998	0.780	0.1777	1.2100	2.210	1.00	2.65	74.0200	7.97	0
41	99.995	0.780	0.2295	0.8850	2.210	1.00	2.65	49.9740	8.21	0
42	99.995	0.780	0.2268	0.9200	2.210	1.00	2.65	34.0780	8.21	0
43	99.995	0.780	0.2210	0.9350	2.210	1.00	2.65	23.6680	8.21	0
44	124.995	0.780	0.2374	1.2950	2.210	1.00	2.65	134.1910	8.46	0
45	124.995	0.780	0.2515	1.4300	2.210	1.00	2.65	143.9730	8.46	0
46	149.995	0.780	0.3112	1.1350	2.210	1.00	2.65	88.2380	8.70	0
47	149.995	0.780	0.3164	1.1500	2.210	1.00	2.65	107.0240	8.70	0
48	149.995	0.780	0.3237	1.0200	2.210	1.00	2.65	65.0660	8.70	0
49	174.993	0.780	0.3264	1.3200	2.210	1.00	2.65	105.4020	10.00	0
50	174.993	0.780	0.3185	1.3000	2.210	1.00	2.65	91.3240	10.00	0
51	174.993	0.780	0.3578	1.6500	2.210	1.00	2.65	136.8930	10.00	0
52	199.993	0.780	0.3670	1.1450	2.210	1.00	2.65	62.6710	8.70	0
53	199.993	0.780	0.3746	1.1150	2.210	1.00	2.65	79.8270	8.70	0
54	199.993	0.780	0.4017	1.2050	2.210	1.00	2.65	67.7940	8.70	0
55	224.993	0.780	0.3712	1.2350	2.210	1.00	2.65	116.8010	8.46	0

SAT - DATA OF SATO, S., KIKKAWA, H. AND ASHIDA (1958)
(SHEET 2 OF 5)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	249.991	0.780	0.4243	2.0500	2.210	1.00	2.65	147.8780	8.46	0
57	99.995	0.780	0.2185	0.8500	2.210	1.00	2.65	50.1220	6.80	0
58	99.995	0.780	0.2198	0.8600	2.210	1.00	2.65	55.9360	6.80	0
59	99.995	0.780	0.2274	0.7400	2.210	1.00	2.65	45.8380	6.80	0
60	124.995	0.780	0.2701	0.8300	2.210	1.00	2.65	35.8780	7.49	0
61	124.995	0.780	0.2761	0.7700	2.210	1.00	2.65	51.8030	7.49	0
62	124.995	0.780	0.2822	0.7200	2.210	1.00	2.65	55.0430	7.49	0
63	124.995	0.780	0.2466	1.0600	2.210	1.00	2.65	67.1800	7.03	0
64	124.995	0.780	0.2557	1.0200	2.210	1.00	2.65	94.7480	7.03	0
65	124.995	0.780	0.2612	1.0900	2.210	1.00	2.65	91.7570	7.03	0
66	199.993	0.780	0.3356	2.0850	2.210	1.00	2.65	202.3960	6.80	0
67	199.993	0.780	0.3648	1.6000	2.210	1.00	2.65	158.8850	6.80	0
68	49.998	0.780	0.1326	1.3350	2.210	1.00	2.65	20.3990	7.26	0
69	49.998	0.780	0.1244	1.2950	2.210	1.00	2.65	12.2830	7.26	0
70	49.998	0.780	0.1283	1.2800	2.210	1.00	2.65	23.3480	7.26	0
71	99.995	0.780	0.2463	0.6650	2.210	1.00	2.65	10.3400	6.36	0
72	299.988	0.780	0.4042	2.2000	2.210	1.00	2.65	312.0659	7.26	0
73	299.988	0.780	0.4743	2.6200	2.210	1.00	2.65	292.3999	7.26	0
74	299.988	0.780	0.4682	2.6500	2.210	1.00	2.65	267.7148	7.26	0
75	274.991	0.780	0.4441	2.1300	2.210	1.00	2.65	227.5530	6.58	0
76	274.991	0.780	0.4663	1.9700	2.210	1.00	2.65	256.2129	6.58	0
77	274.991	0.780	0.4212	2.2200	2.210	1.00	2.65	226.5590	6.58	0
78	324.988	0.780	0.4679	1.3900	2.210	1.00	2.65	226.7600	8.96	0
79	324.988	0.780	0.4679	2.7400	2.210	1.00	2.65	278.1438	8.96	0
80	324.988	0.780	0.4730	3.0300	2.210	1.00	2.65	426.4119	8.96	0
81	349.988	0.780	0.4862	1.6700	2.210	1.00	2.65	277.5398	11.38	0
82	349.988	0.780	0.5148	1.8000	2.210	1.00	2.65	291.7869	11.38	0
83	99.995	0.780	0.2201	1.0000	2.210	1.00	2.65	118.5600	18.81	0
84	99.995	0.780	0.2417	0.9000	2.210	1.00	2.65	31.0580	18.81	0
85	99.995	0.780	0.2499	0.6500	2.210	1.00	2.65	9.1150	18.81	0
86	99.995	0.780	0.2210	1.0300	2.210	1.00	2.65	73.5490	18.81	0
87	79.998	0.780	0.2219	0.8900	2.210	1.00	2.65	31.8000	18.03	0
88	79.998	0.780	0.2012	0.9700	2.210	1.00	2.65	15.4900	18.03	0
89	79.998	0.780	0.1899	1.1200	2.210	1.00	2.65	93.3410	18.03	0
90	79.998	0.780	0.2106	0.8200	2.210	1.00	2.65	9.0720	18.03	0
91	89.997	0.780	0.2411	0.7100	2.210	1.00	2.65	5.4710	20.43	0
92	89.997	0.780	0.2307	0.8100	2.210	1.00	2.65	14.4970	20.43	0
93	89.997	0.780	0.2201	0.9400	2.210	1.00	2.65	38.4540	20.43	0
94	89.997	0.780	0.2124	1.0800	2.210	1.00	2.65	75.3740	20.43	0
95	69.997	0.780	0.2128	0.7000	2.210	1.00	2.65	2.8320	18.81	0
96	69.997	0.780	0.2146	0.7500	2.210	1.00	2.65	5.3400	18.81	0
97	69.997	0.780	0.1954	0.9100	2.210	1.00	2.65	23.7120	18.81	0
98	69.997	0.780	0.1811	1.3200	2.210	1.00	2.65	47.5680	18.81	0
99	91.996	0.780	0.2563	0.6000	2.620	1.00	2.65	0.0	25.92	0
100	149.995	0.780	0.2944	1.0800	2.620	1.00	2.65	12.8030	30.26	0
101	149.995	0.780	0.2832	1.2000	2.620	1.00	2.65	48.8560	30.26	0
102	149.995	0.780	0.2783	1.4000	2.620	1.00	2.65	85.1840	30.26	0
103	149.995	0.780	0.2624	1.5400	2.620	1.00	2.65	117.1320	30.26	0
104	149.995	0.780	0.2612	1.6500	2.620	1.00	2.65	126.7560	30.26	0
105	99.995	0.780	0.2280	0.9800	2.620	1.00	2.65	4.2450	29.11	0
106	99.995	0.780	0.2219	1.2100	2.620	1.00	2.65	17.1290	29.11	0
107	99.995	0.780	0.2149	1.4600	2.620	1.00	2.65	60.1580	29.11	0
108	99.995	0.780	0.2060	1.5400	2.620	1.00	2.65	67.6340	29.11	0
109	99.995	0.780	0.1963	1.6500	2.620	1.00	2.65	63.5370	29.11	0
110	124.995	0.780	0.2874	1.0400	2.620	1.00	2.65	16.5440	29.11	0

SAT - DATA OF SATO, S., KIKKAWA, H. AND ASHIDA (1958)
(SHEET 3 OF 5)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	124.995	0.780	0.2725	0.9000	2.620	1.00	2.65	8.7960	29.11	0
112	124.995	0.780	0.2350	1.5500	2.620	1.00	2.65	36.3520	29.11	0
113	124.995	0.780	0.2112	2.0700	2.620	1.00	2.65	86.3010	29.11	0
114	124.995	0.780	0.2033	2.5200	2.620	1.00	2.65	87.7690	29.11	0
115	174.993	0.780	0.3487	1.1400	2.620	1.00	2.65	67.5120	29.11	0
116	174.993	0.780	0.3246	1.2900	2.620	1.00	2.65	49.2650	29.11	0
117	174.993	0.780	0.3179	1.3800	2.620	1.00	2.65	71.5340	29.11	0
118	174.993	0.780	0.2926	1.4600	2.620	1.00	2.65	95.4360	29.11	0
119	174.993	0.780	0.2923	2.0500	2.620	1.00	2.65	132.9600	29.11	0
120	199.993	0.780	0.4048	1.0300	2.620	1.00	2.65	27.5470	26.94	0
121	199.993	0.780	0.3853	1.0200	2.620	1.00	2.65	46.0330	26.94	0
122	199.993	0.780	0.3679	1.3000	2.620	1.00	2.65	62.4440	26.94	0
123	199.993	0.780	0.3362	1.6800	2.620	1.00	2.65	91.6140	26.94	0
124	224.993	0.780	0.3978	0.9600	2.620	1.00	2.65	37.0130	25.42	0
125	224.993	0.780	0.3828	1.0700	2.620	1.00	2.65	49.6900	25.42	0
126	224.993	0.780	0.3661	1.3400	2.620	1.00	2.65	72.8510	25.42	0
127	249.991	0.780	0.4234	0.9900	2.620	1.00	2.65	38.7680	25.42	0
128	249.991	0.780	0.4127	1.4200	2.620	1.00	2.65	56.6200	25.42	0
129	249.991	0.780	0.4093	1.8400	2.620	1.00	2.65	85.9890	25.42	0
130	274.991	0.780	0.4450	1.3500	2.620	1.00	2.65	71.5060	24.93	0
131	274.991	0.780	0.4471	1.5200	2.620	1.00	2.65	104.1080	24.93	0
132	274.991	0.780	0.4435	1.8200	2.620	1.00	2.65	139.5940	24.93	0
133	274.991	0.780	0.4398	2.5600	2.620	1.00	2.65	237.9360	24.93	0
134	299.988	0.780	0.4846	1.5100	2.620	1.00	2.65	144.0780	26.94	0
135	299.988	0.780	0.4670	1.8800	2.620	1.00	2.65	220.0900	26.94	0
136	299.988	0.780	0.4718	2.0600	2.620	1.00	2.65	159.2240	26.94	0
137	299.988	0.780	0.4721	2.4500	2.620	1.00	2.65	372.3328	26.94	0
138	324.988	0.780	0.5063	1.3500	2.620	1.00	2.65	107.4370	26.94	0
139	324.988	0.780	0.5127	1.2700	2.620	1.00	2.65	90.1900	24.93	0
140	324.988	0.780	0.4779	1.9800	2.620	1.00	2.65	159.0900	24.93	0
141	324.988	0.780	0.4718	2.3000	2.620	1.00	2.65	213.9050	24.93	0
142	224.993	0.780	0.4292	1.0100	2.620	1.00	2.65	62.4530	16.54	0
143	224.993	0.780	0.4072	1.6200	2.620	1.00	2.65	117.5500	16.54	0
144	224.993	0.780	0.3816	2.4300	2.620	1.00	2.65	139.1700	16.54	0
145	224.993	0.780	0.3810	2.9300	2.620	1.00	2.65	499.6829	16.54	0
146	249.991	0.780	0.4301	0.8400	2.620	1.00	2.65	61.6830	17.65	0
147	249.991	0.780	0.4142	1.9500	2.620	1.00	2.65	160.6040	17.65	0
148	249.991	0.780	0.3984	2.9400	2.620	1.00	2.65	315.6670	17.65	0
149	199.993	0.780	0.3807	1.1200	2.620	1.00	2.65	44.3750	17.28	0
150	199.993	0.780	0.3661	1.3600	2.620	1.00	2.65	57.0520	17.28	0
151	199.993	0.780	0.3447	1.6600	2.620	1.00	2.65	162.1740	17.28	0
152	199.993	0.780	0.3353	2.6800	2.620	1.00	2.65	267.6438	17.28	0
153	174.993	0.780	0.3481	1.0600	2.620	1.00	2.65	76.8770	12.26	0
154	174.993	0.780	0.3292	1.4800	2.620	1.00	2.65	121.5310	12.26	0
155	174.993	0.780	0.3197	1.9400	2.620	1.00	2.65	159.1080	12.26	0
156	199.993	0.780	0.4023	0.8200	2.620	1.00	2.65	36.8640	11.67	0
157	199.993	0.780	0.3923	1.0500	2.620	1.00	2.65	32.4630	11.67	0
158	199.993	0.780	0.3844	1.2100	2.620	1.00	2.65	58.6170	11.67	0
159	199.993	0.780	0.3749	1.5600	2.620	1.00	2.65	76.1630	11.67	0
160	199.993	0.780	0.3780	1.7800	2.620	1.00	2.65	175.0890	11.67	0
161	81.997	0.780	0.1807	1.4100	3.760	1.00	2.65	0.0	20.01	0
162	149.995	0.780	0.2877	1.3800	3.760	1.00	2.65	13.0420	20.01	0
163	149.995	0.780	0.2771	1.6000	3.760	1.00	2.65	35.0070	20.01	0
164	149.995	0.780	0.3054	1.2000	3.760	1.00	2.65	3.7090	20.01	0
165	199.993	0.780	0.3767	1.0800	3.760	1.00	2.65	14.6160	20.01	0

SAT - DATA OF SATO, S., KIKKAWA, H. AND ASHIDA (1958)
(SHEET 4 OF 5)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
166	199.993	0.780	0.3499	1.3300	3.760	1.00	2.65	41.1480	20.01	0
167	199.993	0.780	0.3292	1.6200	3.760	1.00	2.65	61.4920	20.01	0
168	199.993	0.780	0.3194	1.9700	3.760	1.00	2.65	114.2480	20.01	0
169	249.991	0.780	0.4033	1.3200	3.760	1.00	2.65	72.1710	20.43	0
170	249.991	0.780	0.3920	1.5600	3.760	1.00	2.65	95.3660	20.43	0
171	249.991	0.780	0.4054	1.5200	3.760	1.00	2.65	51.4880	21.71	0
172	249.991	0.780	0.3932	1.9500	3.760	1.00	2.65	76.3320	21.71	0
173	249.991	0.780	0.3871	2.1100	3.760	1.00	2.65	151.1210	21.71	0
174	249.991	0.780	0.3703	2.0700	3.760	1.00	2.65	124.9390	21.71	0
175	249.991	0.780	0.3767	2.2000	3.760	1.00	2.65	153.3810	21.71	0
176	299.988	0.780	0.4700	1.2400	3.760	1.00	2.65	40.4460	18.81	0
177	299.988	0.780	0.4624	1.4000	3.760	1.00	2.65	79.6380	18.81	0
178	299.988	0.780	0.4429	1.5200	3.760	1.00	2.65	115.0510	18.81	0
179	299.988	0.780	0.4295	1.7000	3.760	1.00	2.65	130.1610	18.81	0
180	299.988	0.780	0.3990	2.8400	3.760	1.00	2.65	162.7490	18.81	0
181	349.988	0.780	0.4703	1.6000	3.760	1.00	2.65	61.0000	21.71	0
182	349.988	0.780	0.4538	2.1200	3.760	1.00	2.65	152.6980	21.71	0
183	349.988	0.780	0.4410	2.4000	3.760	1.00	2.65	181.9620	21.71	0
184	349.988	0.780	0.4389	2.4400	3.760	1.00	2.65	200.1440	21.71	0
185	349.988	0.780	0.4258	2.4400	3.760	1.00	2.65	244.1430	21.71	0
186	399.986	0.780	0.5185	1.9400	3.760	1.00	2.65	187.7150	21.71	0
187	399.986	0.780	0.5047	2.5600	3.760	1.00	2.65	298.4189	21.71	0
188	324.988	0.780	0.4630	1.2800	3.760	1.00	2.65	71.1740	21.27	0
189	324.988	0.780	0.4273	1.6800	3.760	1.00	2.65	100.8610	21.27	0
190	324.988	0.780	0.4276	2.5100	3.760	1.00	2.65	111.5480	21.27	0
191	274.991	0.780	0.4414	1.3700	3.760	1.00	2.65	44.3950	22.14	0
192	274.991	0.780	0.4282	1.5900	3.760	1.00	2.65	80.5440	22.14	0
193	274.991	0.780	0.4292	1.6500	3.760	1.00	2.65	166.2280	22.14	0
194	274.991	0.780	0.4164	1.7200	3.760	1.00	2.65	118.1920	22.14	0
195	274.991	0.780	0.4093	1.6200	3.760	1.00	2.65	120.0220	22.14	0
196	224.993	0.780	0.3993	0.9000	3.760	1.00	2.65	7.4950	19.61	0
197	224.993	0.780	0.3767	1.0700	3.760	1.00	2.65	15.4580	19.61	0
198	224.993	0.780	0.3703	1.1700	3.760	1.00	2.65	37.3710	19.61	0
199	224.993	0.780	0.3487	1.1800	3.760	1.00	2.65	61.3220	19.61	0
200	224.993	0.780	0.3405	1.5900	3.760	1.00	2.65	51.5870	19.61	0
201	174.993	0.780	0.3335	0.9500	3.760	1.00	2.65	6.1670	21.71	0
202	174.993	0.780	0.3203	1.0300	3.760	1.00	2.65	15.6250	21.71	0
203	174.993	0.780	0.3072	1.1300	3.760	1.00	2.65	46.5050	21.71	0
204	174.993	0.780	0.2923	1.6200	3.760	1.00	2.65	68.7070	21.71	0
205	174.993	0.780	0.2786	1.8800	3.760	1.00	2.65	100.5860	21.71	0
206	174.993	0.780	0.3292	1.2100	3.760	1.00	2.65	2.5680	22.14	0
207	174.993	0.780	0.3313	0.9800	3.760	1.00	2.65	8.4320	22.14	0
208	174.993	0.780	0.3075	1.4900	3.760	1.00	2.65	24.0080	22.14	0
209	174.993	0.780	0.2862	1.5000	3.760	1.00	2.65	52.3510	22.14	0
210	199.993	0.780	0.3776	0.9500	3.760	1.00	2.65	3.3980	24.44	0
211	199.993	0.780	0.3658	1.0700	3.760	1.00	2.65	7.1290	24.44	0
212	199.993	0.780	0.3533	1.1800	3.760	1.00	2.65	13.1450	24.44	0
213	81.997	0.780	0.1939	1.6900	4.580	1.00	2.65	0.0	27.47	0
214	127.997	0.780	0.2539	1.2500	4.580	1.00	2.65	0.0	27.47	0
215	149.995	0.780	0.2530	1.8300	4.580	1.00	2.65	8.6150	27.47	0
216	149.995	0.780	0.2463	1.8000	4.580	1.00	2.65	5.4050	27.47	0
217	149.995	0.780	0.2466	1.8000	4.580	1.00	2.65	7.7670	27.47	0
218	174.993	0.780	0.2899	1.7100	4.580	1.00	2.65	19.3260	29.68	0
219	174.993	0.780	0.2890	1.7700	4.580	1.00	2.65	15.3980	29.68	0
220	174.993	0.780	0.2899	1.7300	4.580	1.00	2.65	17.9570	29.68	0

SAT - DATA OF SATO, S., KIKKAWA, H. AND ASHIDA (1958)
(SHEET 5 OF 5)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
221	174.993	0.780	0.2798	1.8800	4.580	1.00	2.65	44.5380	29.68	0
222	174.993	0.780	0.2792	1.9100	4.580	1.00	2.65	49.0240	29.68	0
223	174.993	0.780	0.2755	1.8700	4.580	1.00	2.65	48.3600	29.68	0
224	199.993	0.780	0.3118	1.7800	4.580	1.00	2.65	26.0680	26.94	0
225	199.993	0.780	0.3133	1.7600	4.580	1.00	2.65	23.8200	26.94	0
226	199.993	0.780	0.3118	1.8000	4.580	1.00	2.65	25.2910	26.94	0
227	199.993	0.780	0.2941	1.9600	4.580	1.00	2.65	35.0810	26.94	0
228	199.993	0.780	0.2963	1.9500	4.580	1.00	2.65	51.2460	26.94	0
229	199.993	0.780	0.2947	1.8400	4.580	1.00	2.65	61.1530	26.94	0
230	224.993	0.780	0.3231	2.1000	4.580	1.00	2.65	84.1160	29.11	0
231	224.993	0.780	0.3216	2.0800	4.580	1.00	2.65	54.2050	29.11	0
232	224.993	0.780	0.3179	1.9100	4.580	1.00	2.65	56.0820	29.11	0
233	249.991	0.780	0.3542	2.0500	4.580	1.00	2.65	93.1690	23.97	0
234	249.991	0.780	0.3691	1.9500	4.580	1.00	2.65	52.3150	23.97	0
235	249.991	0.780	0.3700	1.9500	4.580	1.00	2.65	67.5170	23.97	0
236	274.991	0.780	0.3655	2.1400	4.580	1.00	2.65	97.1020	21.71	0
237	274.991	0.780	0.3682	2.0200	4.580	1.00	2.65	92.6610	21.71	0
238	274.991	0.780	0.3661	2.0300	4.580	1.00	2.65	79.7300	21.71	0
239	299.988	0.780	0.3932	2.3200	4.580	1.00	2.65	130.9080	23.50	0
240	299.988	0.780	0.3938	2.0500	4.580	1.00	2.65	101.4960	23.50	0
241	299.988	0.780	0.3816	2.0500	4.580	1.00	2.65	85.8080	23.50	0
242	349.988	0.780	0.4228	2.1800	4.580	1.00	2.65	89.1970	23.50	0
243	502.982	0.780	0.4209	1.9000	4.580	1.00	2.65	76.1340	23.50	0

SIN - DATA OF SINGH, B. (1960)
(SHEET 1 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	13.592	0.750	0.0567	1.0000	0.620	1.16	2.64	0.0	14.20	1
2	18.066	0.750	0.0661	1.0000	0.620	1.16	2.64	0.0	13.80	1
3	24.296	0.750	0.0853	1.0000	0.620	1.16	2.64	52.5000	14.60	2
4	23.305	0.750	0.0844	1.0000	0.620	1.16	2.64	61.9000	14.60	2
5	7.589	0.753	0.0326	1.5000	0.620	1.16	2.64	31.0000	14.00	5
6	12.601	0.753	0.0451	1.5000	0.620	1.16	2.64	111.7000	14.00	5
7	14.838	0.753	0.0588	1.5000	0.620	1.16	2.64	69.7000	14.20	2
8	15.150	0.753	0.0704	1.5000	0.620	1.16	2.64	42.4000	14.20	2
9	16.594	0.753	0.0796	1.5000	0.620	1.16	2.64	35.7000	14.20	2
10	20.870	0.753	0.0917	1.5000	0.620	1.16	2.64	61.9000	14.20	2
11	24.183	0.753	0.1021	1.5000	0.620	1.16	2.64	37.8000	14.20	2
12	26.788	0.753	0.1042	1.5000	0.620	1.16	2.64	78.0000	14.20	2
13	5.324	0.753	0.0242	2.0000	0.620	1.16	2.64	0.0	14.50	1
14	5.777	0.753	0.0255	2.0000	0.620	1.16	2.64	8.7000	14.50	2
15	7.985	0.753	0.0314	2.0000	0.620	1.16	2.64	107.1000	14.50	2
16	9.260	0.753	0.0344	2.0000	0.620	1.16	2.64	141.7000	13.50	2
17	11.836	0.753	0.0424	2.0000	0.620	1.16	2.64	214.4000	13.50	2
18	13.819	0.753	0.0503	2.0000	0.620	1.16	2.64	167.0000	13.30	2
19	16.820	0.753	0.0649	2.0000	0.620	1.16	2.64	120.5000	13.30	2
20	20.785	0.753	0.0765	2.0000	0.620	1.16	2.64	107.7000	13.30	2
21	23.899	0.753	0.0896	2.0000	0.620	1.16	2.64	100.5000	13.30	2
22	26.448	0.753	0.0988	2.0000	0.620	1.16	2.64	137.9000	13.30	2
23	28.090	0.753	0.1003	2.0000	0.620	1.16	2.64	126.9000	13.40	2
24	3.964	0.753	0.0180	2.5000	0.620	1.16	2.64	0.0	13.50	1
25	4.786	0.753	0.0210	2.5000	0.620	1.16	2.64	82.2000	13.50	2
26	7.136	0.753	0.0281	2.5000	0.620	1.16	2.64	141.0000	13.50	2
27	10.137	0.753	0.0384	2.5000	0.620	1.16	2.64	260.0000	12.70	2
28	12.148	0.753	0.0518	2.5000	0.620	1.16	2.64	185.1000	12.70	2
29	14.555	0.753	0.0582	2.5000	0.620	1.16	2.64	162.4000	12.70	2
30	18.491	0.753	0.0585	2.5000	0.620	1.16	2.64	226.1000	12.90	2
31	21.153	0.753	0.0686	2.5000	0.620	1.16	2.64	278.5999	13.20	2
32	21.549	0.753	0.0722	2.5000	0.620	1.16	2.64	284.2998	13.20	2
33	23.418	0.753	0.0735	2.5000	0.620	1.16	2.64	266.0999	14.40	2
34	27.382	0.753	0.0869	2.5000	0.620	1.16	2.64	306.0000	14.70	3
35	3.341	0.753	0.0158	3.0000	0.620	1.16	2.64	0.0	14.40	1
36	3.823	0.753	0.0171	3.0000	0.620	1.16	2.64	31.4000	14.40	2
37	5.607	0.753	0.0231	3.0000	0.620	1.16	2.64	210.0000	14.40	2
38	7.221	0.753	0.0269	3.0000	0.620	1.16	2.64	249.0000	14.40	2
39	9.769	0.753	0.0354	3.0000	0.620	1.16	2.64	338.0999	14.60	2
40	12.658	0.753	0.0436	3.0000	0.620	1.16	2.64	308.2000	14.60	2
41	14.187	0.753	0.0494	3.0000	0.620	1.16	2.64	308.2000	14.60	3
42	17.471	0.753	0.0582	3.0000	0.620	1.16	2.64	352.0000	13.00	3
43	20.162	0.753	0.0674	3.0000	0.620	1.16	2.64	332.0000	13.00	3
44	22.993	0.753	0.0719	3.0000	0.620	1.16	2.64	468.0000	13.50	3
45	26.561	0.753	0.0799	3.0000	0.620	1.16	2.64	454.0000	13.50	3
46	2.973	0.753	0.0142	3.5000	0.620	1.16	2.64	0.0	14.10	1
47	3.426	0.753	0.0152	3.5000	0.620	1.16	2.64	41.6000	14.10	5
48	4.644	0.753	0.0200	3.5000	0.620	1.16	2.64	204.5000	14.10	2
49	5.833	0.753	0.0231	3.5000	0.620	1.16	2.64	336.0000	14.20	2
50	7.192	0.753	0.0277	3.5000	0.620	1.16	2.64	500.0000	14.20	2
51	9.260	0.753	0.0351	3.5000	0.620	1.16	2.64	437.0000	14.20	2
52	11.893	0.753	0.0405	3.5000	0.620	1.16	2.64	426.0000	14.20	2
53	14.696	0.753	0.0463	3.5000	0.620	1.16	2.64	562.0000	14.20	2
54	17.868	0.753	0.0555	3.5000	0.620	1.16	2.64	573.0000	14.20	2
55	22.002	0.753	0.0664	3.5000	0.620	1.16	2.64	518.0000	14.20	2

SIN - DATA OF SINGH, B. (1960)
(SHEET 2 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	2.690	0.753	0.0123	4.0000	0.620	1.16	2.64	0.0	15.80	1
57	3.426	0.753	0.0147	4.0000	0.620	1.16	2.64	160.0000	15.80	5
58	4.757	0.753	0.0190	4.0000	0.620	1.16	2.64	379.0000	15.80	2
59	6.060	0.753	0.0225	4.0000	0.620	1.16	2.64	430.0000	15.80	2
60	7.985	0.753	0.0303	4.0000	0.620	1.16	2.64	580.0000	15.80	2
61	10.647	0.753	0.0347	4.0000	0.620	1.16	2.64	515.0000	15.60	2
62	13.479	0.753	0.0418	4.0000	0.620	1.16	2.64	680.0000	15.60	2
63	17.698	0.753	0.0515	4.0000	0.620	1.16	2.64	723.0000	15.80	2
64	20.983	0.753	0.0570	4.0000	0.620	1.16	2.64	837.0000	15.80	2
65	23.899	0.753	0.0661	4.0000	0.620	1.16	2.64	745.0000	15.80	2
66	2.690	0.753	0.0119	5.0000	0.620	1.16	2.64	0.0	16.50	1
67	3.823	0.753	0.0153	5.0000	0.620	1.16	2.64	414.0000	16.50	2
68	5.493	0.753	0.0212	5.0000	0.620	1.16	2.64	665.0000	16.50	2
69	7.674	0.753	0.0255	5.0000	0.620	1.16	2.64	685.0000	16.50	2
70	9.543	0.753	0.0311	5.0000	0.620	1.16	2.64	766.0000	16.50	2
71	11.893	0.753	0.0360	5.0000	0.620	1.16	2.64	822.0000	16.50	2
72	14.583	0.753	0.0415	5.0000	0.620	1.16	2.64	870.0000	16.50	2
73	17.217	0.753	0.0451	5.0000	0.620	1.16	2.64	990.0000	16.50	2
74	22.427	0.753	0.0539	5.0000	0.620	1.16	2.64	1162.0000	16.50	2
75	9.543	0.491	0.0591	1.0000	0.620	1.16	2.64	0.0	16.30	1
76	11.582	0.491	0.0695	1.0000	0.620	1.16	2.64	0.0	16.30	2
77	14.781	0.491	0.0802	1.0000	0.620	1.16	2.64	42.0000	16.30	2
78	17.500	0.491	0.0954	1.0000	0.620	1.16	2.64	66.5000	16.30	2
79	21.832	0.491	0.1091	1.0000	0.620	1.16	2.64	108.5000	16.10	2
80	24.777	0.491	0.1247	1.0000	0.620	1.16	2.64	126.1000	16.10	2
81	4.106	0.491	0.0304	1.5000	0.620	1.16	2.64	0.0	16.50	1
82	5.692	0.491	0.0369	1.5000	0.620	1.16	2.64	18.0000	16.50	2
83	7.051	0.491	0.0454	1.5000	0.620	1.16	2.64	115.1000	16.50	2
84	9.260	0.491	0.0607	1.5000	0.620	1.16	2.64	94.0000	16.70	2
85	11.695	0.491	0.0741	1.5000	0.620	1.16	2.64	64.0000	16.70	2
86	14.611	0.491	0.0835	1.5000	0.620	1.16	2.64	92.0000	16.70	2
87	18.066	0.491	0.0954	1.5000	0.620	1.16	2.64	87.6000	16.70	2
88	21.946	0.491	0.1049	1.5000	0.620	1.16	2.64	187.0000	16.90	3
89	25.712	0.491	0.1155	1.5000	0.620	1.16	2.64	232.0000	16.90	3
90	5.607	0.491	0.0372	1.5000	0.620	1.16	2.64	0.0	13.40	1
91	7.476	0.491	0.0433	1.5000	0.620	1.16	2.64	108.8000	13.40	2
92	9.316	0.491	0.0616	1.5000	0.620	1.16	2.64	141.5060	13.40	2
93	11.638	0.491	0.0792	1.5000	0.620	1.16	2.64	47.8000	13.40	2
94	15.036	0.491	0.0847	1.5000	0.620	1.16	2.64	103.5000	13.40	2
95	17.755	0.491	0.0985	1.5000	0.620	1.16	2.64	115.5000	14.00	2
96	21.804	0.491	0.1073	1.5000	0.620	1.16	2.64	167.8000	14.00	2
97	24.919	0.491	0.1170	1.5000	0.620	1.16	2.64	201.0000	14.00	2
98	21.238	0.491	0.1061	1.5000	0.620	1.16	2.64	201.0000	14.60	2
99	18.208	0.491	0.0985	1.5000	0.620	1.16	2.64	129.7000	14.60	2
100	14.923	0.491	0.0863	1.5000	0.620	1.16	2.64	94.5000	14.60	2
101	12.148	0.491	0.0820	1.5000	0.620	1.16	2.64	71.0000	14.60	2
102	9.458	0.491	0.0649	1.5000	0.620	1.16	2.64	88.6000	14.40	2
103	7.900	0.491	0.0533	1.5000	0.620	1.16	2.64	115.8000	14.40	2
104	6.230	0.491	0.0500	1.5000	0.620	1.16	2.64	94.0000	14.40	2
105	5.493	0.491	0.0482	1.5000	0.620	1.16	2.64	34.4000	14.40	2
106	6.201	0.491	0.0430	1.5000	0.620	1.16	2.64	65.5000	15.60	2
107	4.219	0.491	0.0287	2.0000	0.620	1.16	2.64	0.0	17.00	1
108	6.116	0.491	0.0366	2.0000	0.620	1.16	2.64	124.1000	17.00	2
109	7.730	0.491	0.0427	2.0000	0.620	1.16	2.64	220.0000	17.00	2
110	10.279	0.491	0.0588	2.0000	0.620	1.16	2.64	248.0000	16.80	0

SIN - DATA OF SINGH, B. (1960)
(SHEET 3 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	12.884	0.491	0.0649	2.0000	0.620	1.16	2.64	192.0000	16.80	0
112	14.753	0.491	0.0710	2.0000	0.620	1.16	2.64	290.0999	16.80	0
113	17.132	0.491	0.0838	2.0000	0.620	1.16	2.64	238.0000	16.80	0
114	21.577	0.491	0.0957	2.0000	0.620	1.16	2.64	323.0000	17.20	0
115	25.400	0.491	0.1094	2.0000	0.620	1.16	2.64	295.0000	17.20	3
116	4.984	0.491	0.0399	2.0000	0.620	1.16	2.64	158.0000	13.40	2
117	6.003	0.491	0.0445	2.0000	0.620	1.16	2.64	118.6000	13.40	2
118	8.099	0.491	0.0552	2.0000	0.620	1.16	2.64	174.1000	13.40	2
119	10.534	0.491	0.0649	2.0000	0.620	1.16	2.64	149.5000	13.40	2
120	12.912	0.491	0.0732	2.0000	0.620	1.16	2.64	181.5000	13.40	2
121	14.215	0.491	0.0780	2.0000	0.620	1.16	2.64	234.0000	13.40	0
122	17.755	0.491	0.0832	2.0000	0.620	1.16	2.64	203.0000	13.40	0
123	21.804	0.491	0.0963	2.0000	0.620	1.16	2.64	326.0000	13.40	0
124	24.239	0.491	0.1082	2.0000	0.620	1.16	2.64	316.0000	13.40	3
125	21.776	0.491	0.0994	2.0000	0.620	1.16	2.64	284.0000	13.40	0
126	18.123	0.491	0.0881	2.0000	0.620	1.16	2.64	220.0000	13.40	0
127	14.328	0.491	0.0814	2.0000	0.620	1.16	2.64	189.2000	13.40	0
128	13.592	0.491	0.0750	2.0000	0.620	1.16	2.64	150.2000	13.20	2
129	10.024	0.491	0.0658	2.0000	0.620	1.16	2.64	126.2000	13.20	2
130	7.815	0.491	0.0558	2.0000	0.620	1.16	2.64	125.2000	14.10	2
131	6.909	0.491	0.0503	2.0000	0.620	1.16	2.64	117.2000	14.10	2
132	5.409	0.491	0.0445	2.0000	0.620	1.16	2.64	124.5000	14.10	2
133	2.718	0.491	0.0201	2.5000	0.620	1.16	2.64	0.0	17.30	1
134	3.908	0.491	0.0255	2.5000	0.620	1.16	2.64	123.5000	17.30	5
135	5.550	0.491	0.0320	2.5000	0.620	1.16	2.64	231.8000	17.30	2
136	8.127	0.491	0.0433	2.5000	0.620	1.16	2.64	308.7000	17.30	2
137	10.421	0.491	0.0506	2.5000	0.620	1.16	2.64	394.0000	17.30	0
138	12.799	0.491	0.0588	2.5000	0.620	1.16	2.64	431.0000	17.30	0
139	16.112	0.491	0.0680	2.5000	0.620	1.16	2.64	578.0000	17.40	0
140	19.255	0.491	0.0863	2.5000	0.620	1.16	2.64	496.0000	17.40	0
141	21.294	0.491	0.0887	2.5000	0.620	1.16	2.64	502.0000	17.30	0
142	26.080	0.491	0.1018	2.5000	0.620	1.16	2.64	583.0000	17.30	3
143	3.936	0.491	0.0267	2.5000	0.620	1.16	2.64	51.5000	14.10	5
144	5.550	0.491	0.0366	2.5000	0.620	1.16	2.64	265.0000	14.10	2
145	7.362	0.491	0.0433	2.5000	0.620	1.16	2.64	262.0000	14.10	2
146	9.883	0.491	0.0506	2.5000	0.620	1.16	2.64	333.0000	14.10	2
147	12.176	0.491	0.0564	2.5000	0.620	1.16	2.64	402.0000	14.10	2
148	2.718	0.491	0.0187	3.0000	0.620	1.16	2.64	0.0	17.40	1
149	3.908	0.491	0.0240	3.0000	0.620	1.16	2.64	144.6000	17.40	5
150	5.833	0.491	0.0317	3.0000	0.620	1.16	2.64	369.0000	17.40	2
151	7.362	0.491	0.0375	3.0000	0.620	1.16	2.64	339.0000	17.40	2
152	8.863	0.491	0.0445	3.0000	0.620	1.16	2.64	363.0000	17.40	2
153	13.394	0.491	0.0558	3.0000	0.620	1.16	2.64	555.0000	17.40	2
154	15.574	0.491	0.0637	3.0000	0.620	1.16	2.64	512.0000	17.40	2
155	19.624	0.491	0.0747	3.0000	0.620	1.16	2.64	608.0000	17.40	2
156	22.200	0.491	0.0835	3.0000	0.620	1.16	2.64	583.0000	17.40	2
157	26.505	0.491	0.0975	3.0000	0.620	1.16	2.64	556.0000	17.40	2
158	4.219	0.491	0.0308	3.0000	0.620	1.16	2.64	247.0000	14.70	2
159	5.352	0.491	0.0341	3.0000	0.620	1.16	2.64	342.0000	14.70	2
160	8.155	0.491	0.0433	3.0000	0.620	1.16	2.64	243.0000	14.70	2
161	9.458	0.491	0.0482	3.0000	0.620	1.16	2.64	458.0000	14.70	2
162	11.978	0.491	0.0536	3.0000	0.620	1.16	2.64	526.0000	14.70	2
163	2.718	0.491	0.0173	3.5000	0.620	1.16	2.64	215.0000	17.20	5
164	4.304	0.491	0.0263	3.5000	0.620	1.16	2.64	365.0000	17.20	2
165	6.031	0.491	0.0314	3.5000	0.620	1.16	2.64	426.0000	17.20	2

SIN - DATA OF SINGH, B. (1960)
(SHEET 4 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
166	7.730	0.491	0.0366	3.5000	0.620	1.16	2.64	479.0000	17.20	2
167	10.251	0.491	0.0463	3.5000	0.620	1.16	2.64	564.0000	17.10	2
168	12.799	0.491	0.0524	3.5000	0.620	1.16	2.64	655.0000	17.10	2
169	15.376	0.491	0.0604	3.5000	0.620	1.16	2.64	756.0000	17.10	2
170	19.114	0.491	0.0725	3.5000	0.620	1.16	2.64	940.0000	17.00	2
171	22.710	0.491	0.0817	3.5000	0.620	1.16	2.64	833.0000	17.00	2
172	26.278	0.491	0.0920	3.5000	0.620	1.16	2.64	846.0000	17.00	2
173	2.690	0.491	0.0186	3.5000	0.620	1.16	2.64	132.0000	14.70	5
174	4.276	0.491	0.0259	3.5000	0.620	1.16	2.64	321.0000	14.70	2
175	6.031	0.491	0.0323	3.5000	0.620	1.16	2.64	395.0000	14.70	2
176	7.929	0.491	0.0393	3.5000	0.620	1.16	2.64	486.0000	14.70	2
177	9.514	0.491	0.0463	3.5000	0.620	1.16	2.64	626.0000	14.70	2
178	2.690	0.491	0.0173	4.0000	0.620	1.16	2.64	273.0000	17.30	5
179	4.474	0.491	0.0257	4.0000	0.620	1.16	2.64	425.0000	17.30	2
180	6.230	0.491	0.0317	4.0000	0.620	1.16	2.64	558.0000	17.30	2
181	8.325	0.491	0.0372	4.0000	0.620	1.16	2.64	585.0000	17.30	2
182	10.591	0.491	0.0451	4.0000	0.620	1.16	2.64	692.0000	17.40	2
183	12.771	0.491	0.0512	4.0000	0.620	1.16	2.64	745.0000	17.40	2
184	15.518	0.491	0.0585	4.0000	0.620	1.16	2.64	885.0000	17.40	2
185	19.227	0.491	0.0701	4.0000	0.620	1.16	2.64	1075.0000	17.40	2
186	23.503	0.491	0.0802	4.0000	0.620	1.16	2.64	1105.0000	17.40	2
187	2.633	0.491	0.0177	4.0000	0.620	1.16	2.64	198.0000	15.40	5
188	4.531	0.491	0.0274	4.0000	0.620	1.16	2.64	456.0000	15.40	2
189	5.522	0.491	0.0311	4.0000	0.620	1.16	2.64	484.0000	15.40	2
190	5.040	0.253	0.0634	1.0000	0.620	1.16	2.64	0.0	18.00	1
191	6.286	0.253	0.0732	1.0000	0.620	1.16	2.64	19.1000	18.00	2
192	7.674	0.253	0.0826	1.0000	0.620	1.16	2.64	22.8000	18.10	2
193	9.883	0.253	0.1094	1.0000	0.620	1.16	2.64	32.4000	18.10	2
194	11.497	0.253	0.1250	1.0000	0.620	1.16	2.64	65.2000	18.10	2
195	13.989	0.253	0.1369	1.0000	0.620	1.16	2.64	77.0000	18.10	2
196	17.698	0.253	0.1625	1.0000	0.620	1.16	2.64	109.0000	18.10	2
197	21.238	0.253	0.1887	1.0000	0.620	1.16	2.64	148.2000	18.10	2
198	23.786	0.253	0.2042	1.0000	0.620	1.16	2.64	181.1000	18.10	2
199	12.431	0.253	0.1289	1.0000	0.620	1.16	2.64	64.8000	15.50	3
200	14.442	0.253	0.1442	1.0000	0.620	1.16	2.64	81.5000	16.00	3
201	17.613	0.253	0.1676	1.0000	0.620	1.16	2.64	83.8000	16.00	3
202	3.993	0.253	0.0466	1.5000	0.620	1.16	2.64	0.0	18.40	1
203	5.550	0.253	0.0585	1.5000	0.620	1.16	2.64	141.8000	18.40	2
204	7.476	0.253	0.0732	1.5000	0.620	1.16	2.64	148.8000	18.40	2
205	9.571	0.253	0.0917	1.5000	0.620	1.16	2.64	155.6000	18.50	0
206	12.148	0.253	0.1109	1.5000	0.620	1.16	2.64	197.0000	18.50	0
207	14.951	0.253	0.1250	1.5000	0.620	1.16	2.64	174.0000	18.50	0
208	17.075	0.253	0.1451	1.5000	0.620	1.16	2.64	211.0000	18.50	0
209	21.719	0.253	0.1579	1.5000	0.620	1.16	2.64	205.0000	18.50	0
210	24.154	0.253	0.1737	1.5000	0.620	1.16	2.64	252.0000	18.40	3
211	5.947	0.253	0.0643	1.5000	0.620	1.16	2.64	135.3000	16.30	2
212	7.476	0.253	0.0744	1.5000	0.620	1.16	2.64	198.0000	16.30	0
213	9.628	0.253	0.0924	1.5000	0.620	1.16	2.64	179.0000	16.30	0
214	12.318	0.253	0.1152	1.5000	0.620	1.16	2.64	187.0000	16.30	3
215	14.413	0.253	0.1283	1.5000	0.620	1.16	2.64	210.0000	16.30	3
216	18.434	0.253	0.1664	1.5000	0.620	1.16	2.64	238.0000	16.30	3
217	21.662	0.253	0.1804	1.5000	0.620	1.16	2.64	206.0000	16.30	3
218	24.409	0.253	0.1987	1.5000	0.620	1.16	2.64	250.0000	16.30	3
219	21.294	0.253	0.1844	1.5000	0.620	1.16	2.64	207.0000	16.30	3
220	18.463	0.253	0.1728	1.5000	0.620	1.16	2.64	177.5000	15.90	3

SIN - DATA OF SINGH, B. (1960)
(SHEET 5 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
221	14.300	0.253	0.1295	1.5000	0.620	1.16	2.64	238.5000	15.90	3
222	12.063	0.253	0.1177	1.5000	0.620	1.16	2.64	164.0000	15.90	0
223	9.911	0.253	0.0954	1.5000	0.620	1.16	2.64	174.0000	15.90	0
224	7.957	0.253	0.0799	1.5000	0.620	1.16	2.64	211.0000	15.90	0
225	6.031	0.253	0.0701	1.5000	0.620	1.16	2.64	113.9000	15.90	0
226	2.718	0.253	0.0360	2.0000	0.620	1.16	2.64	0.0	18.40	1
227	4.134	0.253	0.0460	2.0000	0.620	1.16	2.64	122.8000	18.30	2
228	5.692	0.253	0.0561	2.0000	0.620	1.16	2.64	196.1000	18.30	2
229	7.249	0.253	0.0671	2.0000	0.620	1.16	2.64	195.2000	18.30	0
230	10.081	0.253	0.0844	2.0000	0.620	1.16	2.64	384.0000	18.30	0
231	12.799	0.253	0.1039	2.0000	0.620	1.16	2.64	332.0000	18.30	0
232	15.291	0.253	0.1231	2.0000	0.620	1.16	2.64	323.0000	18.30	0
233	17.783	0.253	0.1378	2.0000	0.620	1.16	2.64	373.0000	18.40	0
234	21.351	0.253	0.1579	2.0000	0.620	1.16	2.64	419.0000	18.40	0
235	24.013	0.253	0.1682	2.0000	0.620	1.16	2.64	393.0000	18.40	3
236	3.964	0.253	0.0491	2.0000	0.620	1.16	2.64	115.8000	16.00	2
237	5.550	0.253	0.0579	2.0000	0.620	1.16	2.64	192.0000	16.00	2
238	7.900	0.253	0.0722	2.0000	0.620	1.16	2.64	276.0000	16.00	0
239	12.318	0.253	0.1027	2.0000	0.620	1.16	2.64	308.5000	16.00	0
240	14.951	0.253	0.1219	2.0000	0.620	1.16	2.64	335.0000	16.50	3
241	18.010	0.253	0.1378	2.0000	0.620	1.16	2.64	350.0000	16.50	3
242	21.408	0.253	0.1628	2.0000	0.620	1.16	2.64	392.0000	16.50	3
243	24.296	0.253	0.1777	2.0000	0.620	1.16	2.64	414.0000	16.50	3
244	21.266	0.253	0.1670	2.0000	0.620	1.16	2.64	376.0000	16.50	3
245	17.953	0.253	0.1460	2.0000	0.620	1.16	2.64	372.0000	16.50	3
246	15.178	0.253	0.1286	2.0000	0.620	1.16	2.64	322.0000	16.50	3
247	13.366	0.253	0.1134	2.0000	0.620	1.16	2.64	342.0000	15.60	0
248	7.702	0.253	0.0753	2.0000	0.620	1.16	2.64	224.0000	15.60	0
249	5.720	0.253	0.0579	2.0000	0.620	1.16	2.64	177.3000	15.60	0
250	4.616	0.253	0.0527	2.0000	0.620	1.16	2.64	123.2000	15.60	0
251	2.690	0.253	0.0341	2.5000	0.620	1.16	2.64	75.5000	18.90	5
252	3.993	0.253	0.0448	2.5000	0.620	1.16	2.64	158.5000	18.90	2
253	5.720	0.253	0.0555	2.5000	0.620	1.16	2.64	264.0000	19.30	2
254	7.561	0.253	0.0658	2.5000	0.620	1.16	2.64	417.0000	19.30	0
255	9.543	0.253	0.0786	2.5000	0.620	1.16	2.64	532.0000	19.30	0
256	11.582	0.253	0.0927	2.5000	0.620	1.16	2.64	404.0000	19.20	0
257	14.498	0.253	0.1109	2.5000	0.620	1.16	2.64	500.0000	19.20	0
258	17.500	0.253	0.1332	2.5000	0.620	1.16	2.64	500.0000	19.20	0
259	21.492	0.253	0.1554	2.5000	0.620	1.16	2.64	550.0999	19.20	0
260	24.154	0.253	0.1676	2.5000	0.620	1.16	2.64	560.0000	19.20	3
261	4.049	0.253	0.0472	2.5000	0.620	1.16	2.64	95.2000	15.40	0
262	5.635	0.253	0.0561	2.5000	0.620	1.16	2.64	256.0000	15.40	0
263	8.070	0.253	0.0701	2.5000	0.620	1.16	2.64	410.0000	15.40	0
264	10.279	0.253	0.0856	2.5000	0.620	1.16	2.64	494.0000	15.40	0
265	11.836	0.253	0.0969	2.5000	0.620	1.16	2.64	475.0000	15.40	0
266	15.036	0.253	0.1125	2.5000	0.620	1.16	2.64	515.0000	15.40	3
267	4.191	0.253	0.0421	3.0000	0.620	1.16	2.64	182.0000	19.20	2
268	5.947	0.253	0.0533	3.0000	0.620	1.16	2.64	417.0000	19.20	0
269	7.674	0.253	0.0640	3.0000	0.620	1.16	2.64	539.0000	19.20	0
270	9.260	0.253	0.0765	3.0000	0.620	1.16	2.64	602.0000	19.20	0
271	13.054	0.253	0.0978	3.0000	0.620	1.16	2.64	613.0000	19.20	0
272	14.640	0.253	0.1070	3.0000	0.620	1.16	2.64	682.0000	19.20	0
273	18.010	0.253	0.1271	3.0000	0.620	1.16	2.64	587.0000	19.20	0
274	23.928	0.253	0.1655	3.0000	0.620	1.16	2.64	592.0000	19.00	3
275	4.531	0.253	0.0466	3.0000	0.620	1.16	2.64	191.0000	15.70	2

SIN - DATA OF SINGH, B. (1960)
(SHEET 6 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
276	5.890	0.253	0.0570	3.0000	0.620	1.16	2.64	358.0000	15.70	2
277	7.815	0.253	0.0668	3.0000	0.620	1.16	2.64	512.0000	15.70	2
278	9.599	0.253	0.0789	3.0000	0.620	1.16	2.64	578.0000	15.70	2
279	12.205	0.253	0.0933	3.0000	0.620	1.16	2.64	670.0000	13.50	2
280	4.191	0.253	0.0418	4.0000	0.620	1.16	2.64	415.0000	19.00	2
281	6.230	0.253	0.0527	4.0000	0.620	1.16	2.64	592.0000	18.50	2
282	7.730	0.253	0.0631	4.0000	0.620	1.16	2.64	781.0000	18.50	2
283	9.231	0.253	0.0707	4.0000	0.620	1.16	2.64	837.0000	18.00	2
284	12.516	0.253	0.0853	4.0000	0.620	1.16	2.64	911.0000	17.80	2
285	15.065	0.253	0.0985	4.0000	0.620	1.16	2.64	1070.0000	17.80	3
286	18.689	0.253	0.1113	4.0000	0.620	1.16	2.64	909.0000	17.50	3
287	21.719	0.253	0.1372	4.0000	0.620	1.16	2.64	872.0000	17.50	3
288	4.219	0.253	0.0393	5.0000	0.620	1.16	2.64	655.0000	17.20	2
289	5.692	0.253	0.0469	5.0000	0.620	1.16	2.64	630.0000	17.40	2
290	7.164	0.253	0.0573	5.0000	0.620	1.16	2.64	950.0000	17.40	2
291	7.476	0.253	0.0588	5.0000	0.620	1.16	2.64	1010.0000	17.40	2
292	9.345	0.253	0.0655	5.0000	0.620	1.16	2.64	1195.0000	17.40	2
293	12.148	0.253	0.0774	5.0000	0.620	1.16	2.64	1288.0000	17.40	3
294	15.376	0.253	0.0893	5.0000	0.620	1.16	2.64	1400.0000	17.40	3
295	17.840	0.253	0.0997	5.0000	0.620	1.16	2.64	1490.0000	17.40	3
296	6.173	0.253	0.0457	7.0000	0.620	1.16	2.64	1380.0000	17.40	0
297	7.985	0.253	0.0549	7.0000	0.620	1.16	2.64	1578.0000	17.40	0
298	9.486	0.253	0.0610	7.0000	0.620	1.16	2.64	1685.0000	17.40	0
299	7.872	0.253	0.0488	10.0000	0.620	1.16	2.64	2680.0000	17.40	0
300	10.222	0.253	0.0518	10.0000	0.620	1.16	2.64	2460.0000	17.40	0
301	15.404	0.253	0.0701	10.0000	0.620	1.16	2.64	-1.0000	17.40	0
302	9.628	0.253	0.0457	12.0000	0.620	1.16	2.64	3880.0000	17.40	0
303	10.760	0.253	0.0518	12.0000	0.620	1.16	2.64	3960.0000	17.40	0
304	7.929	0.253	0.0427	14.0000	0.620	1.16	2.64	5750.0000	17.40	0
305	9.288	0.253	0.0457	14.0000	0.620	1.16	2.64	6830.0000	17.40	5

SON - DATA OF SONI, J.P. (1980)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	4.000	0.200	0.0500	3.5600	0.320	1.30	2.65	1640.0000	29.00	0
2	4.000	0.200	0.0520	3.3000	0.320	1.30	2.65	1590.0000	27.50	0
3	4.000	0.200	0.0530	3.6000	0.320	1.30	2.65	1560.0000	28.00	0
4	7.100	0.200	0.0860	2.2500	0.320	1.30	2.65	1200.0000	30.50	0
5	7.100	0.200	0.0750	3.3800	0.320	1.30	2.65	2200.0000	29.00	0
6	7.100	0.200	0.0850	2.6300	0.320	1.30	2.65	1240.0000	30.00	0
7	7.100	0.200	0.0720	4.2700	0.320	1.30	2.65	2560.0000	30.00	0
8	7.100	0.200	0.0750	3.6300	0.320	1.30	2.65	1600.0000	27.50	0
9	7.100	0.200	0.0920	2.1200	0.320	1.30	2.65	1400.0000	28.50	0
10	7.100	0.200	0.0620	6.5200	0.320	1.30	2.65	8200.0000	29.50	0
11	7.100	0.200	0.0580	4.8200	0.320	1.30	2.65	6000.0000	28.00	0
12	5.000	0.200	0.0740	2.0700	0.320	1.30	2.65	720.0000	29.50	0
13	6.000	0.200	0.0850	2.3500	0.320	1.30	2.65	940.0000	28.00	0
14	8.000	0.200	0.0985	2.5000	0.320	1.30	2.65	1360.0000	31.50	0
15	9.000	0.200	0.1000	2.2500	0.320	1.30	2.65	1200.0000	28.00	0
16	1.400	0.200	0.0320	3.7200	0.320	1.30	2.65	310.0000	28.50	0
17	5.000	0.200	0.0585	3.5000	0.320	1.30	2.65	2100.0000	29.00	0
18	6.000	0.200	0.0680	3.3000	0.320	1.30	2.65	2300.0000	29.50	0
19	1.400	0.200	0.0220	6.5800	0.320	1.30	2.65	2600.0000	27.00	0
20	3.000	0.200	0.0350	6.5000	0.320	1.30	2.65	5530.0000	29.00	0
21	4.000	0.200	0.0430	6.7000	0.320	1.30	2.65	6300.0000	28.00	0
22	5.000	0.200	0.0520	7.0000	0.320	1.30	2.65	8520.0000	28.00	0
23	6.000	0.200	0.0570	6.9000	0.320	1.30	2.65	9200.0000	27.50	0

STE - DATA OF STEIN, R.A. (1965)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	151.774	1.219	0.1829	3.5200	0.399	1.50	2.65	2089.0000	21.10	3
2	114.680	1.219	0.1829	2.8500	0.399	1.50	2.65	1029.0000	20.50	3
3	199.911	1.219	0.1829	3.2100	0.399	1.50	2.65	3045.0000	22.20	3
4	240.403	1.219	0.1829	3.3100	0.399	1.50	2.65	4000.0000	23.30	5
5	284.009	1.219	0.1829	5.0800	0.399	1.50	2.65	7093.9922	23.90	7
6	328.465	1.219	0.1829	7.3600	0.399	1.50	2.65	13460.9922	23.30	7
7	368.108	1.219	0.1829	10.7900	0.399	1.50	2.65	24230.0000	22.80	7
8	156.304	1.219	0.3048	0.6100	0.399	1.50	2.65	93.0000	22.80	3
9	198.212	1.219	0.3048	1.6800	0.399	1.50	2.65	476.0000	21.60	3
10	240.403	1.219	0.3048	2.6000	0.399	1.50	2.65	945.0000	22.80	3
11	282.027	1.219	0.3048	2.9000	0.399	1.50	2.65	1770.0000	20.00	3
12	282.877	1.219	0.3048	2.9800	0.399	1.50	2.65	1506.0000	20.50	3
13	325.634	1.219	0.2987	3.0000	0.399	1.50	2.65	1885.0000	24.40	3
14	328.465	1.219	0.3109	3.0100	0.399	1.50	2.65	1961.0000	21.10	3
15	368.108	1.219	0.3048	3.2700	0.399	1.50	2.65	2256.0000	22.20	3
16	410.582	1.219	0.3018	3.2800	0.399	1.50	2.65	2832.9958	22.20	3
17	453.056	1.219	0.3048	2.2600	0.399	1.50	2.65	2691.9968	22.20	5
18	481.372	1.219	0.3048	2.5100	0.399	1.50	2.65	2935.9958	23.30	5
19	282.594	1.219	0.3018	2.9000	0.399	1.50	2.65	1554.0000	22.20	3
20	156.304	1.219	0.2438	2.0100	0.399	1.50	2.65	640.0000	21.10	3
21	198.495	1.219	0.2438	2.9800	0.399	1.50	2.65	1461.0000	21.10	3
22	240.969	1.219	0.2438	2.9700	0.399	1.50	2.65	1958.0000	21.10	3
23	282.877	1.219	0.2438	2.8500	0.399	1.50	2.65	2166.0000	21.10	3
24	325.634	1.219	0.2438	2.6900	0.399	1.50	2.65	2800.9958	24.40	3
25	368.108	1.219	0.2438	2.6100	0.399	1.50	2.65	3351.9968	23.30	5
26	410.582	1.219	0.2469	3.2700	0.399	1.50	2.65	4422.9883	22.80	7
27	453.056	1.219	0.2438	4.1700	0.399	1.50	2.65	7361.9922	22.20	7
28	481.372	1.219	0.2469	5.2400	0.399	1.50	2.65	9615.0000	22.20	7
29	302.981	1.219	0.2438	2.8600	0.399	1.50	2.65	2705.0000	22.20	3
30	263.905	1.219	0.2469	2.4900	0.399	1.50	2.65	2237.0000	22.20	3
31	177.824	1.219	0.2438	2.6700	0.399	1.50	2.65	1045.0000	22.20	3
32	114.680	1.219	0.1250	3.8700	0.399	1.50	2.65	2532.0000	22.20	3
33	140.730	1.219	0.1219	3.7000	0.399	1.50	2.65	3505.9958	22.20	5
34	169.330	1.219	0.1219	4.2700	0.399	1.50	2.65	4910.0000	25.00	7
35	200.194	1.219	0.1219	6.6100	0.399	1.50	2.65	7178.9922	24.40	7
36	226.245	1.219	0.1219	10.1300	0.399	1.50	2.65	18331.9922	23.90	7
37	254.561	1.219	0.1219	13.0300	0.399	1.50	2.65	29165.0000	23.90	7
38	280.611	1.219	0.1250	16.9500	0.399	1.50	2.65	39292.9883	25.50	7
39	311.476	1.219	0.3658	2.5400	0.399	1.50	2.65	942.0000	26.60	3
40	285.991	1.219	0.3353	2.5600	0.399	1.50	2.65	1013.0000	26.60	3
41	233.890	1.219	0.2743	3.1000	0.399	1.50	2.65	1458.0000	26.10	3
42	181.789	1.219	0.2103	3.4800	0.399	1.50	2.65	1897.0000	26.60	3
43	156.304	1.219	0.1798	3.9500	0.399	1.50	2.65	2205.0000	28.30	3
44	130.537	1.219	0.1524	3.8700	0.399	1.50	2.65	2391.0000	25.50	3
45	78.152	1.219	0.0914	4.0300	0.399	1.50	2.65	2558.0000	25.50	3
46	393.592	1.219	0.2134	5.5300	0.399	1.50	2.65	8685.9922	26.60	7
47	314.307	1.219	0.1829	5.2400	0.399	1.50	2.65	8011.9922	27.20	7
48	111.282	1.219	0.0975	3.9800	0.399	1.50	2.65	4242.9883	26.60	5
49	238.421	1.219	0.1494	5.2900	0.399	1.50	2.65	7563.9922	27.20	7
50	133.651	1.219	0.0914	4.9100	0.399	1.50	2.65	6140.9922	26.60	7
51	282.310	1.219	0.1494	9.8000	0.399	1.50	2.65	19421.9922	26.60	7
52	261.640	1.219	0.1494	6.7900	0.399	1.50	2.65	12370.9922	25.50	7
53	430.403	1.219	0.2103	7.0500	0.399	1.50	2.65	17115.0000	25.00	5
54	356.781	1.219	0.2164	3.6500	0.399	1.50	2.65	4615.0000	26.60	7
55	319.971	1.219	0.2164	3.0400	0.399	1.50	2.65	3750.0000	26.60	5

STE - DATA OF STEIN, R.A. (1965)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	453.056	1.219	0.3048	2.5900	0.399	1.50	2.65	3045.0000	28.90	5

STR - DATA OF STRAUB, L.G. (1954,1958)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	8.013	0.305	0.0631	2.9800	0.191	1.40	2.65	746.0000	-1.00	2
2	8.013	0.305	0.0738	2.5360	0.191	1.40	2.65	423.0000	-1.00	2
3	8.013	0.305	0.0762	2.6420	0.191	1.40	2.65	417.0000	-1.00	2
4	8.013	0.305	0.0469	3.4390	0.191	1.40	2.65	1748.0000	-1.00	2
5	8.013	0.305	0.0430	4.0430	0.191	1.40	2.65	3150.0000	-1.00	7
6	8.013	0.305	0.0396	5.8900	0.191	1.40	2.65	4960.9922	_.00	7
7	8.013	0.305	0.0369	6.3090	0.191	1.40	2.65	6992.9883	-1.00	7
8	8.013	0.305	0.0347	7.3470	0.191	1.40	2.65	8803.9922	-1.00	7
9	8.013	0.305	0.0427	6.5740	0.191	1.40	2.65	12600.0000	-1.00	7
10	24.040	0.914	0.0482	4.6200	0.191	1.40	2.65	6300.0000	-1.00	7
11	56.660	0.914	0.0884	2.3700	0.191	1.40	2.65	2670.0000	-1.00	7
12	112.981	0.914	0.1689	1.0800	0.191	1.40	2.65	1340.0000	-1.00	7
13	141.863	0.914	0.2030	0.9500	0.191	1.40	2.65	1070.0000	-1.00	7
14	169.896	0.914	0.2353	0.5600	0.191	1.40	2.65	890.0000	-1.00	7
15	169.896	0.914	0.2225	1.0240	0.191	1.40	2.65	890.0000	-1.00	7
16	24.040	0.914	0.0418	4.4400	0.191	1.40	2.65	6300.0000	-1.00	7
17	112.981	0.914	0.1716	1.1600	0.191	1.40	2.65	1340.0000	-1.00	7
18	169.896	0.914	0.2387	0.7800	0.191	1.40	2.65	890.0000	-1.00	7
19	14.158	0.305	0.0747	2.3500	0.163	1.35	2.65	1410.0000	30.00	2
20	14.158	0.305	0.0725	2.5600	0.163	1.35	2.65	2006.0000	23.90	2
21	14.158	0.305	0.0707	2.8200	0.163	1.35	2.65	2300.0000	17.20	2
22	14.158	0.305	0.0704	3.2400	0.163	1.35	2.65	2822.0000	11.10	2
23	14.158	0.305	0.0686	3.2600	0.163	1.35	2.65	3620.0000	5.83	2
24	14.158	0.305	0.0680	3.6200	0.163	1.35	2.65	4798.9922	1.67	2

TAY - DATA OF TAYLOR, B.D. (1971)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	47.436	0.851	0.1810	0.5600	0.228	1.52	2.65	2.8130	22.40	2
2	47.436	0.851	0.1810	0.5000	0.228	1.52	2.65	4.0470	37.80	2
3	47.378	0.851	0.1600	0.8900	0.228	1.52	2.65	13.9790	22.90	2
4	47.419	0.851	0.1620	0.7600	0.228	1.52	2.65	8.4120	37.90	2
5	47.455	0.851	0.1430	1.2800	0.228	1.52	2.65	138.5680	23.00	2
6	47.455	0.851	0.1430	1.0100	0.228	1.52	2.65	1002.7058	38.10	2
7	47.269	0.851	0.1240	1.6000	0.228	1.52	2.65	432.0220	23.20	2
8	47.202	0.851	0.1230	1.4100	0.228	1.52	2.65	341.7830	37.80	2
9	47.576	0.851	0.1160	1.7700	0.228	1.52	2.65	566.5969	22.90	2
10	47.490	0.851	0.1190	1.8700	0.228	1.52	2.65	673.6929	38.30	3
11	47.167	0.851	0.1040	2.0900	0.228	1.52	2.65	861.5859	23.20	3
12	47.262	0.851	0.1060	2.0800	0.228	1.52	2.65	838.2439	38.40	3
13	47.459	0.851	0.0806	2.0500	0.228	1.52	2.65	1289.4458	23.00	5
14	47.405	0.851	0.0788	2.0800	0.228	1.52	2.65	1331.1238	38.00	5
15	3.726	0.267	0.0610	0.3500	0.215	1.42	2.65	0.1840	21.00	1
16	3.726	0.267	0.0610	0.3200	0.215	1.42	2.65	0.7370	35.60	1
17	3.465	0.267	0.0610	0.3200	0.215	1.42	2.65	0.0490	20.50	1
18	3.465	0.267	0.0610	0.2900	0.215	1.42	2.65	0.1430	36.40	1
19	3.221	0.267	0.0610	0.2800	0.215	1.42	2.65	0.0030	20.50	1
20	3.221	0.267	0.0610	0.2500	0.215	1.42	2.65	0.0100	35.60	1
21	8.076	0.267	0.0602	3.2600	2.810	1.11	2.61	0.2150	20.60	1
22	8.076	0.267	0.0602	3.3000	2.810	1.11	2.61	0.0510	35.50	1
23	8.557	0.267	0.0602	3.6500	2.810	1.11	2.61	1.0560	20.50	1
24	8.557	0.267	0.0602	3.7200	2.810	1.11	2.61	0.5490	34.60	1
25	7.835	0.267	0.0602	3.0800	2.810	1.11	2.61	0.0500	20.50	1
26	7.835	0.267	0.0602	3.0900	2.810	1.11	2.61	0.0230	35.40	1
27	3.701	0.267	0.0606	0.3900	0.357	1.23	2.65	0.0470	22.00	1
28	3.701	0.267	0.0606	0.3000	0.191	1.26	2.65	1.6500	63.00	1
29	3.297	0.267	0.0606	0.2700	0.248	1.27	2.65	0.0250	49.00	1
30	4.962	0.267	0.0610	0.8100	1.070	1.14	2.65	0.0530	22.00	1
31	4.962	0.267	0.0610	0.8400	1.070	1.14	2.65	0.0360	42.00	1
32	5.450	0.267	0.0610	0.9800	1.070	1.14	2.65	2.0600	22.00	1
33	5.450	0.267	0.0610	1.0200	1.070	1.14	2.65	1.1250	42.00	1
34	5.206	0.267	0.0610	0.9000	1.070	1.14	2.65	0.4230	22.00	1
35	5.206	0.267	0.0610	0.9300	1.070	1.14	2.65	0.2550	42.00	1
36	84.004	0.851	0.1140	1.9800	0.228	1.52	2.65	2131.1680	24.50	5
37	83.674	0.851	0.1120	1.9900	0.228	1.52	2.65	2269.7410	38.90	5
38	12.216	0.267	0.0783	1.8700	0.138	1.25	2.65	965.8098	48.00	5
39	12.216	0.267	0.0783	1.9100	0.138	1.25	2.65	925.6418	33.00	5

VAB - DATA OF VANONI, V.A. AND BROOKS, N.H. (1957)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	14.441	0.850	0.0725	1.4100	0.137	1.38	2.65	37.0000	23.40	2
2	17.414	0.850	0.0741	2.0400	0.137	1.38	2.65	240.0000	24.50	2
3	20.246	0.850	0.0732	2.8000	0.137	1.38	2.65	1150.0000	25.20	2
4	24.210	0.850	0.0732	2.7800	0.137	1.38	2.65	1900.0000	25.50	2
5	26.334	0.850	0.0722	2.7700	0.137	1.38	2.65	2200.0000	22.40	2
6	28.316	0.850	0.0759	2.4600	0.137	1.38	2.65	1400.0000	27.40	2
7	33.130	0.850	0.0920	2.0100	0.137	1.38	2.65	2200.0000	18.90	2
8	33.130	0.850	0.0619	2.7600	0.137	1.38	2.65	3000.0000	18.90	5
9	39.076	0.850	0.0710	2.0500	0.137	1.38	2.65	2500.0000	23.50	5
10	34.262	0.850	0.1649	0.3900	0.137	1.38	2.65	3.3000	24.60	2
11	43.607	0.850	0.1609	0.7000	0.137	1.38	2.65	68.0000	23.40	2
12	52.951	0.850	0.1673	1.0500	0.137	1.38	2.65	210.0000	21.90	2
13	63.145	0.850	0.1634	1.2200	0.137	1.38	2.65	670.0000	25.20	2
14	75.037	0.850	0.1686	1.0200	0.137	1.38	2.65	1450.0000	20.70	2
15	108.733	0.850	0.1658	1.0700	0.137	1.38	2.65	1150.0000	24.90	5

VAH - DATA OF VANONI, V.A. AND HWANG (1965)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	5.522	0.267	0.0756	2.3000	0.230	1.43	2.65	120.0000	22.00	2
2	4.842	0.267	0.0738	2.0000	0.230	1.43	2.65	62.0000	21.20	2
3	3.681	0.267	0.0735	1.2000	0.230	1.43	2.65	1.0000	22.00	2
4	7.362	0.267	0.0735	2.8000	0.230	1.43	2.65	488.0000	22.60	2
5	5.720	0.267	0.0738	2.7000	0.230	1.43	2.65	265.0000	25.50	2
6	6.541	0.267	0.0732	2.9000	0.230	1.43	2.65	417.0000	21.70	2
7	8.098	0.267	0.0713	2.7000	0.230	1.43	2.65	619.0000	21.90	2
8	4.304	0.267	0.0704	1.5900	0.230	1.43	2.65	7.0000	21.00	2
9	7.447	0.267	0.0735	2.8600	0.230	1.43	2.65	448.0000	20.90	2
10	63.994	1.100	0.1823	0.6420	0.206	1.46	2.65	31.0000	19.80	2
11	87.496	1.100	0.1795	1.0550	0.206	1.46	2.65	180.0000	20.10	2
12	108.167	1.100	0.1762	1.3030	0.206	1.46	2.65	1490.0000	20.70	2
13	91.177	1.100	0.1795	1.1160	0.206	1.46	2.65	380.0000	21.00	2
14	95.425	1.100	0.1838	1.1000	0.206	1.46	2.65	410.0000	19.20	2
15	121.759	1.100	0.2377	0.8090	0.206	1.46	2.65	261.0000	18.80	2
16	185.470	1.100	0.3706	0.4550	0.206	1.46	2.65	61.0000	20.00	2

WLL - DATA OF WILLIS, J.C. (1979)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	17.273	0.360	0.1128	1.6200	0.540	1.12	2.65	540.0000	16.39	0
2	19.538	0.360	0.1097	2.8400	0.540	1.12	2.65	1299.9988	17.78	0
3	23.502	0.360	0.1067	3.0900	0.540	1.12	2.65	1969.9988	20.00	0
4	28.316	0.360	0.1067	4.4300	0.540	1.12	2.65	3009.9978	18.33	0
5	31.148	0.360	0.1036	5.7700	0.540	1.12	2.65	3879.9978	18.06	0
6	35.678	0.360	0.1097	7.1300	0.540	1.12	2.65	4329.9922	21.11	0
7	47.288	0.360	0.1097	7.9200	0.540	1.12	2.65	6669.9922	26.67	0
8	46.438	0.360	0.1158	8.5800	0.540	1.12	2.65	5689.9922	25.83	0
9	33.979	0.360	0.1067	7.9900	0.540	1.12	2.65	4589.9922	25.56	0
10	25.484	0.360	0.1067	5.1100	0.540	1.12	2.65	2619.9978	25.56	0
11	19.255	0.360	0.1189	2.9200	0.540	1.12	2.65	910.0000	25.00	0
12	21.520	0.360	0.1463	1.4000	0.540	1.12	2.65	510.0000	25.56	0
13	28.599	0.360	0.1280	3.4300	0.540	1.12	2.65	1180.0000	25.56	0
14	48.137	0.360	0.1250	6.1800	0.540	1.12	2.65	5369.9922	25.56	0
15	36.811	0.360	0.1341	4.2400	0.540	1.12	2.65	3159.9978	25.56	0
16	37.943	0.360	0.1219	5.7400	0.540	1.12	2.65	6049.9922	32.22	0
17	35.961	0.360	0.1433	4.3700	0.540	1.12	2.65	2599.9978	37.78	0
18	35.678	0.360	0.1219	5.5900	0.540	1.12	2.65	2609.9978	37.78	0
19	27.750	0.360	0.1372	3.3900	0.540	1.12	2.65	1729.9988	36.67	0
20	20.671	0.360	0.1402	1.4500	0.540	1.12	2.65	630.0000	37.78	0
21	17.556	0.360	0.1494	0.8640	0.540	1.12	2.65	320.0000	37.78	0
22	17.839	0.360	0.1463	0.8310	0.540	1.12	2.65	15.0000	18.33	0
23	24.069	0.360	0.1433	1.8500	0.540	1.12	2.65	640.0000	18.06	0
24	35.395	0.360	0.1280	4.2400	0.540	1.12	2.65	2879.9978	18.89	0
25	45.872	0.360	0.1494	6.0400	0.540	1.12	2.65	5469.9922	18.06	0
26	35.395	0.360	0.1372	3.7800	0.540	1.12	2.65	2119.9988	11.39	0
27	27.467	0.360	0.1372	2.5000	0.540	1.12	2.65	1080.0000	10.83	0
28	20.104	0.360	0.1494	1.1700	0.540	1.12	2.65	170.0000	11.39	0
29	16.423	0.360	0.1372	1.1500	0.540	1.12	2.65	15.0000	11.67	0
30	23.785	0.360	0.1341	1.8600	0.540	1.12	2.65	560.0000	21.39	0
31	31.431	0.360	0.1280	4.0500	0.540	1.12	2.65	1659.9988	22.22	0
32	40.492	0.360	0.1219	5.9700	0.540	1.12	2.65	4009.9978	21.67	0

WLM - DATA OF WILLIAMS, G.P. (1970)
(SHEET 1 OF 4)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	1.048	0.076	0.0308	5.2900	1.349	1.20	2.65	368.6799	21.11	5
2	1.161	0.076	0.0317	6.4000	1.349	1.20	2.65	740.7549	26.11	5
3	1.387	0.076	0.0326	8.4000	1.349	1.20	2.65	1326.7068	24.17	5
4	1.416	0.076	0.0290	13.2000	1.349	1.20	2.65	3243.0000	21.39	7
5	1.642	0.076	0.0296	16.6000	1.349	1.20	2.65	6345.7617	22.22	7
6	1.812	0.076	0.0283	21.3000	1.349	1.20	2.65	10154.4766	23.61	7
7	2.492	0.076	0.0302	26.2000	1.349	1.20	2.65	16086.3203	24.44	7
8	3.115	0.076	0.0927	2.7200	1.349	1.20	2.65	31.5880	18.33	3
9	3.256	0.076	0.0924	2.5800	1.349	1.20	2.65	51.4760	22.78	3
10	3.455	0.076	0.0914	2.9500	1.349	1.20	2.65	74.3660	24.72	3
11	3.370	0.076	0.0896	3.1000	1.349	1.20	2.65	117.8760	24.72	3
12	3.823	0.076	0.0927	3.7100	1.349	1.20	2.65	226.8760	23.89	3
13	4.134	0.076	0.0924	4.3500	1.349	1.20	2.65	271.9238	21.94	3
14	4.587	0.076	0.0933	5.9500	1.349	1.20	2.65	571.9578	20.83	3
15	5.522	0.076	0.0914	9.4200	1.349	1.20	2.65	1220.9099	20.00	4
16	6.145	0.076	0.0930	13.1000	1.349	1.20	2.65	1802.8528	20.28	7
17	6.711	0.076	0.0936	13.3000	1.349	1.20	2.65	1867.9128	19.72	7
18	7.419	0.076	0.0927	17.7000	1.349	1.20	2.65	3659.3308	20.83	7
19	7.645	0.076	0.0890	17.4000	1.349	1.20	2.65	3908.3789	10.56	7
20	7.928	0.076	0.0917	20.8000	1.349	1.20	2.65	4779.9297	20.83	7
21	7.928	0.076	0.0875	20.5000	1.349	1.20	2.65	6273.6523	18.61	7
22	9.061	0.076	0.0893	19.7000	1.349	1.20	2.65	8063.2617	19.72	7
23	9.571	0.076	0.0911	22.2000	1.349	1.20	2.65	7843.2695	20.83	7
24	12.742	0.076	0.0924	28.8000	1.349	1.20	2.65	14256.0469	19.44	5
25	15.291	0.076	0.0936	35.0000	1.349	1.20	2.65	16562.9375	19.72	5
26	5.805	0.076	0.1545	2.3700	1.349	1.20	2.65	11.9270	23.33	5
27	6.088	0.076	0.1527	2.7100	1.349	1.20	2.65	31.4240	23.89	3
28	6.484	0.076	0.1530	2.8800	1.349	1.20	2.65	70.8080	24.17	3
29	6.824	0.076	0.1524	3.6300	1.349	1.20	2.65	129.2250	20.83	3
30	7.532	0.076	0.1527	4.8500	1.349	1.20	2.65	246.7380	20.28	3
31	8.551	0.076	0.1530	6.5100	1.349	1.20	2.65	421.8660	21.11	3
32	9.146	0.076	0.1518	7.6300	1.349	1.20	2.65	647.4368	21.11	3
33	10.760	0.076	0.1539	10.4000	1.349	1.20	2.65	1144.6670	20.28	3
34	12.176	0.076	0.1530	12.3000	1.349	1.20	2.65	1442.5308	18.33	7
35	12.119	0.076	0.1567	15.8000	1.349	1.20	2.65	2164.8870	22.78	7
36	13.025	0.076	0.1509	21.2000	1.349	1.20	2.65	3972.6218	23.06	7
37	16.140	0.076	0.1497	18.8000	1.349	1.20	2.65	4808.9531	17.22	7
38	19.510	0.076	0.1500	23.8000	1.349	1.20	2.65	6882.7813	17.50	7
39	21.718	0.076	0.1433	30.9000	1.349	1.20	2.65	10067.0430	15.00	5
40	8.835	0.076	0.2140	2.5000	1.349	1.20	2.65	7.9610	15.56	3
41	8.778	0.076	0.2146	2.3400	1.349	1.20	2.65	12.7030	17.78	3
42	9.854	0.076	0.2176	3.0000	1.349	1.20	2.65	70.6320	13.33	3
43	12.176	0.076	0.2213	5.3900	1.349	1.20	2.65	290.3018	15.00	3
44	15.715	0.076	0.2167	7.9300	1.349	1.20	2.65	663.1619	18.33	3
45	17.471	0.076	0.2137	10.1000	1.349	1.20	2.65	926.0708	16.94	3
46	19.113	0.076	0.2109	14.6000	1.349	1.20	2.65	2059.0479	17.22	4
47	20.954	0.076	0.2091	18.3000	1.349	1.20	2.65	2852.0608	16.39	7
48	23.276	0.076	0.2070	22.5000	1.349	1.20	2.65	4250.5352	16.67	7
49	1.557	0.152	0.0308	3.8300	1.349	1.20	2.65	34.8630	20.28	5
50	1.812	0.152	0.0308	4.8100	1.349	1.20	2.65	363.9529	21.94	5
51	2.039	0.152	0.0311	5.5800	1.349	1.20	2.65	414.6689	26.39	5
52	2.124	0.152	0.0311	6.1700	1.349	1.20	2.65	837.3459	21.94	5
53	2.350	0.152	0.0317	7.5800	1.349	1.20	2.65	1358.2278	26.67	7
54	2.548	0.152	0.0296	11.7000	1.349	1.20	2.65	3202.9639	22.78	7
55	2.945	0.152	0.0299	16.2000	1.349	1.20	2.65	5741.5625	23.61	7

WLM - DATA OF WILLIAMS, G.P. (1970)
(SHEET 2 OF 4)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	3.738	0.152	0.0305	20.2000	1.349	1.20	2.65	10431.7266	24.17	7
57	4.162	0.152	0.0299	21.7000	1.349	1.20	2.65	11818.5117	24.17	5
58	5.437	0.152	0.0265	30.3000	1.349	1.20	2.65	26542.4258	8.06	5
59	6.598	0.152	0.0250	36.7000	1.349	1.20	2.65	34575.2344	8.06	5
60	6.088	0.152	0.0893	1.7700	1.349	1.20	2.65	29.9280	20.83	3
61	6.739	0.152	0.0933	1.8300	1.349	1.20	2.65	77.8630	20.28	3
62	7.589	0.152	0.0939	2.5100	1.349	1.20	2.65	174.7880	19.72	3
63	8.495	0.152	0.0914	3.7400	1.349	1.20	2.65	523.3408	18.89	3
64	9.259	0.152	0.0878	5.5300	1.349	1.20	2.65	999.6150	18.61	3
65	10.703	0.152	0.0896	7.9500	1.349	1.20	2.65	1457.1299	17.78	7
66	11.326	0.152	0.0896	9.0100	1.349	1.20	2.65	1885.3149	17.50	7
67	13.648	0.152	0.0936	12.0000	1.349	1.20	2.65	2963.6179	18.33	7
68	15.121	0.152	0.0936	13.6000	1.349	1.20	2.65	4169.1836	18.06	7
69	16.706	0.152	0.0951	14.9000	1.349	1.20	2.65	5169.4297	17.50	7
70	17.613	0.152	0.0914	16.5000	1.349	1.20	2.65	7986.2617	18.06	7
71	21.237	0.152	0.0872	17.9000	1.349	1.20	2.65	11084.5430	10.28	5
72	27.183	0.152	0.0914	23.4000	1.349	1.20	2.65	18365.2148	11.94	5
73	10.534	0.152	0.1503	1.2300	1.349	1.20	2.65	10.0320	22.22	3
74	11.213	0.152	0.1524	1.6100	1.349	1.20	2.65	50.6960	26.39	3
75	11.610	0.152	0.1500	1.9100	1.349	1.20	2.65	71.5640	26.11	3
76	12.459	0.152	0.1542	2.2700	1.349	1.20	2.65	122.2560	26.67	3
77	13.082	0.152	0.1530	2.6000	1.349	1.20	2.65	176.0440	26.11	3
78	13.818	0.152	0.1524	3.0000	1.349	1.20	2.65	186.1790	25.28	3
79	16.140	0.152	0.1503	4.5800	1.349	1.20	2.65	505.7310	24.72	3
80	19.255	0.152	0.1539	6.3900	1.349	1.20	2.65	1021.9539	26.11	3
81	22.370	0.152	0.1561	9.3100	1.349	1.20	2.65	1570.3499	26.39	7
82	23.729	0.152	0.1500	11.1000	1.349	1.20	2.65	2656.7378	11.11	7
83	24.352	0.152	0.1536	14.1000	1.349	1.20	2.65	2932.9468	26.39	7
84	26.277	0.152	0.1463	14.1000	1.349	1.20	2.65	4881.3555	9.72	7
85	35.395	0.152	0.1570	14.4000	1.349	1.20	2.65	5343.2266	11.39	7
86	48.137	0.152	0.1350	23.0000	1.349	1.20	2.65	14761.5547	8.89	5
87	16.282	0.152	0.2134	1.1500	1.349	1.20	2.65	7.8330	16.11	3
88	17.556	0.152	0.2140	1.2700	1.349	1.20	2.65	16.9370	18.61	3
89	18.689	0.152	0.2179	1.4500	1.349	1.20	2.65	23.5930	23.06	3
90	20.529	0.152	0.2167	2.1100	1.349	1.20	2.65	94.4320	23.89	3
91	24.663	0.152	0.2140	3.2400	1.349	1.20	2.65	267.4280	23.89	3
92	30.015	0.152	0.2201	4.5600	1.349	1.20	2.65	526.9019	13.89	3
93	36.528	0.152	0.2115	9.5100	1.349	1.20	2.65	1835.5850	12.50	7
94	46.721	0.152	0.2112	13.5000	1.349	1.20	2.65	4102.4922	11.94	7
95	3.256	0.305	0.0283	4.0700	1.349	1.20	2.65	121.0810	13.89	5
96	3.596	0.305	0.0305	4.1100	1.349	1.20	2.65	293.8599	18.61	5
97	4.021	0.305	0.0305	4.9500	1.349	1.20	2.65	527.4500	19.17	5
98	4.474	0.305	0.0311	5.9000	1.349	1.20	2.65	965.9929	21.11	5
99	4.361	0.305	0.0308	7.5100	1.349	1.20	2.65	1562.6699	12.50	7
100	4.700	0.305	0.0290	10.8000	1.349	1.20	2.65	3069.9658	11.94	7
101	5.408	0.305	0.0308	12.8000	1.349	1.20	2.65	4635.5469	17.50	7
102	6.230	0.305	0.0302	15.1000	1.349	1.20	2.65	6747.3594	15.56	7
103	6.598	0.305	0.0287	19.9000	1.349	1.20	2.65	12371.9531	23.61	7
104	8.268	0.305	0.0296	22.2000	1.349	1.20	2.65	14808.2227	24.72	7
105	11.326	0.305	0.0287	33.1000	1.349	1.20	2.65	32172.6406	19.17	5
106	11.468	0.305	0.0905	1.1000	1.349	1.20	2.65	15.8880	21.39	5
107	12.459	0.305	0.0957	1.2000	1.349	1.20	2.65	18.1340	22.78	3
108	12.459	0.305	0.0954	1.3600	1.349	1.20	2.65	31.5880	19.72	5
109	12.402	0.305	0.0896	1.6200	1.349	1.20	2.65	62.8760	18.61	3
110	12.799	0.305	0.0896	1.8200	1.349	1.20	2.65	97.3720	16.39	3

WLM - DATA OF WILLIAMS, G.P. (1970)
(SHEET 3 OF 4)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	13.309	0.305	0.0914	2.0000	1.349	1.20	2.65	140.1910	18.33	3
112	14.101	0.305	0.0924	2.1000	1.349	1.20	2.65	186.5750	17.22	3
113	14.243	0.305	0.0927	2.1100	1.349	1.20	2.65	191.8840	17.78	3
114	14.498	0.305	0.0899	2.3600	1.349	1.20	2.65	294.0769	17.22	3
115	15.007	0.305	0.0896	2.7200	1.349	1.20	2.65	449.2019	17.78	3
116	15.602	0.305	0.0884	3.1800	1.349	1.20	2.65	509.1558	16.11	3
117	16.140	0.305	0.0878	3.9700	1.349	1.20	2.65	722.4729	16.11	3
118	18.405	0.305	0.0875	5.0900	1.349	1.20	2.65	1251.2678	15.83	3
119	20.982	0.305	0.0905	5.5700	1.349	1.20	2.65	1330.3230	12.22	3
120	21.520	0.305	0.0893	5.9400	1.349	1.20	2.65	1469.7808	20.28	7
121	21.520	0.305	0.0902	5.9200	1.349	1.20	2.65	1608.6309	21.94	7
122	22.483	0.305	0.0933	6.4300	1.349	1.20	2.65	1555.9548	15.56	3
123	24.352	0.305	0.0936	7.2100	1.349	1.20	2.65	2059.0479	21.67	7
124	29.732	0.305	0.0988	8.2400	1.349	1.20	2.65	2382.6150	23.61	7
125	31.714	0.305	0.0978	10.9000	1.349	1.20	2.65	3742.4729	25.00	7
126	36.811	0.305	0.0988	12.9000	1.349	1.20	2.65	6196.9414	20.28	7
127	55.782	0.305	0.0985	16.2000	1.349	1.20	2.65	14240.8672	19.72	5
128	21.747	0.305	0.1533	1.0600	1.349	1.20	2.65	14.5450	18.89	3
129	23.927	0.305	0.1551	1.3700	1.349	1.20	2.65	61.8320	21.11	3
130	22.511	0.305	0.1478	1.3300	1.349	1.20	2.65	67.0160	26.11	3
131	24.522	0.305	0.1539	1.4400	1.349	1.20	2.65	85.5950	22.78	3
132	25.626	0.305	0.1576	1.7200	1.349	1.20	2.65	136.2270	23.61	3
133	27.183	0.305	0.1561	1.8400	1.349	1.20	2.65	163.5440	23.33	3
134	27.127	0.305	0.1530	2.1600	1.349	1.20	2.65	192.3640	17.78	3
135	29.732	0.305	0.1576	2.5100	1.349	1.20	2.65	276.9910	18.61	3
136	31.148	0.305	0.1536	3.1400	1.349	1.20	2.65	460.9458	20.83	3
137	37.377	0.305	0.1554	4.1600	1.349	1.20	2.65	649.3018	20.83	3
138	46.438	0.305	0.1481	8.4200	1.349	1.20	2.65	2118.6868	18.89	7
139	52.951	0.305	0.1463	11.8000	1.349	1.20	2.65	4431.8984	18.89	7
140	70.507	0.305	0.1454	11.3000	1.349	1.20	2.65	6253.6328	19.17	7
141	33.130	0.305	0.2121	0.8100	1.349	1.20	2.65	10.2730	21.94	3
142	35.112	0.305	0.2167	0.7900	1.349	1.20	2.65	29.6640	16.11	3
143	37.377	0.305	0.2143	1.3100	1.349	1.20	2.65	62.9800	21.39	3
144	40.209	0.305	0.2182	1.7800	1.349	1.20	2.65	105.6710	20.56	3
145	46.438	0.305	0.2155	2.7200	1.349	1.20	2.65	315.4480	18.89	3
146	63.994	0.305	0.2118	4.5400	1.349	1.20	2.65	917.9158	18.89	7
147	79.002	0.305	0.1966	9.5500	1.349	1.20	2.65	2832.1138	20.00	7
148	6.796	0.610	0.0299	4.8900	1.349	1.20	2.65	364.6228	26.67	4
149	8.268	0.610	0.0277	5.6900	1.349	1.20	2.65	624.0598	25.56	4
150	9.911	0.610	0.0277	8.1600	1.349	1.20	2.65	1750.1909	25.00	4
151	10.194	0.610	0.0271	11.7000	1.349	1.20	2.65	3889.3140	26.67	7
152	14.724	0.610	0.0283	17.2000	1.349	1.20	2.65	7671.9375	26.67	7
153	18.122	0.610	0.0302	23.4000	1.349	1.20	2.65	15121.1367	26.11	5
154	24.238	0.610	0.0875	1.1800	1.349	1.20	2.65	40.2910	23.89	3
155	25.484	0.610	0.0893	1.5400	1.349	1.20	2.65	68.6350	25.56	3
156	28.316	0.610	0.0872	2.1000	1.349	1.20	2.65	216.2000	28.33	3
157	33.413	0.610	0.0884	3.3000	1.349	1.20	2.65	540.9358	28.33	3
158	47.854	0.610	0.0881	7.1400	1.349	1.20	2.65	2132.1499	28.33	7
159	62.578	0.610	0.0893	11.3000	1.349	1.20	2.65	4472.1406	24.72	7
160	44.173	0.610	0.1457	1.0600	1.349	1.20	2.65	23.4280	23.61	3
161	48.420	0.610	0.1494	0.9700	1.349	1.20	2.65	39.4350	26.39	3
162	49.836	0.610	0.1512	1.3700	1.349	1.20	2.65	89.2060	26.67	3
163	62.861	0.610	0.1512	2.8100	1.349	1.20	2.65	326.9429	24.72	3
164	73.055	0.610	0.1472	4.4500	1.349	1.20	2.65	722.2629	26.11	3
165	90.894	0.610	0.1494	6.4300	1.349	1.20	2.65	1603.6208	26.67	7

WLM - DATA OF WILLIAMS, G.P. (1970)
(SHEET 4 OF 4)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
166	96.841	0.610	0.1378	8.7700	1.349	1.20	2.65	2965.1509	26.11	7
167	63.428	0.610	0.2109	0.6000	1.349	1.20	2.65	13.4430	22.50	3
168	72.772	0.610	0.2076	0.8000	1.349	1.20	2.65	30.0450	26.67	3
169	77.586	0.610	0.2167	1.4700	1.349	1.20	2.65	77.0260	25.28	3
170	79.568	0.610	0.2134	1.7200	1.349	1.20	2.65	133.7280	27.78	3
171	101.938	0.610	0.2140	2.8000	1.349	1.20	2.65	423.2488	27.78	3
172	129.687	0.610	0.2012	5.6000	1.349	1.20	2.65	1303.7639	27.22	7
173	142.458	1.189	0.2225	0.9600	1.349	1.20	2.65	31.1250	28.06	3
174	141.353	1.189	0.2149	0.9120	1.349	1.20	2.65	41.2210	25.00	3
175	150.188	1.189	0.2158	1.1500	1.349	1.20	2.65	69.4550	28.61	3
176	157.918	1.189	0.2115	1.9100	1.349	1.20	2.65	149.3590	27.50	3
177	162.336	1.189	0.2042	2.1400	1.349	1.20	2.65	196.1000	26.11	3

WLS - DATA OF WILLIS, J.C., COLEMAN, N.L. AND ELLIS, W.M. (1972)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	339.792	1.219	0.2560	1.4800	0.100	1.30	2.65	3699.9978	30.00	5
2	339.792	1.219	0.3018	0.9230	0.100	1.30	2.65	1950.0000	30.56	5
3	339.792	1.219	0.2103	1.4400	0.100	1.30	2.65	14039.9883	30.00	7
4	339.792	1.219	0.3048	0.6920	0.100	1.30	2.65	2190.0000	28.33	5
5	199.345	1.219	0.1951	1.0200	0.100	1.30	2.65	2829.9978	28.33	5
6	197.079	1.219	0.2743	0.9620	0.100	1.30	2.65	2100.0000	21.67	3
7	197.079	1.219	0.3353	0.5190	0.100	1.30	2.65	582.0000	20.56	3
8	169.896	1.219	0.3353	0.4420	0.100	1.30	2.65	198.0000	22.22	3
9	226.528	1.219	0.3200	0.6540	0.100	1.30	2.65	1260.0000	23.33	3
10	254.844	1.219	0.3048	0.5000	0.100	1.30	2.65	1739.9988	22.22	3
11	283.160	1.219	0.2835	0.6540	0.100	1.30	2.65	1709.9988	22.78	5
12	311.476	1.219	0.2865	0.6920	0.100	1.30	2.65	2019.9988	24.17	5
13	368.108	1.219	0.2896	0.8850	0.100	1.30	2.65	3389.9978	23.89	5
14	396.424	1.219	0.2896	1.1500	0.100	1.30	2.65	5000.0000	23.06	5
15	424.740	1.219	0.2804	1.8700	0.100	1.30	2.65	6779.9922	25.56	5
16	453.056	1.219	0.2774	1.1000	0.100	1.30	2.65	8369.9922	26.11	5
17	453.056	1.219	0.3048	1.1900	0.100	1.30	2.65	5469.9922	22.78	5
18	424.740	1.219	0.3048	0.8270	0.100	1.30	2.65	3969.9978	25.83	5
19	396.424	1.219	0.3170	0.7120	0.100	1.30	2.65	2919.9978	25.00	5
20	368.108	1.219	0.3078	0.4420	0.100	1.30	2.65	2249.9988	24.44	5
21	339.792	1.219	0.3078	0.4620	0.100	1.30	2.65	1599.9988	25.83	5
22	311.476	1.219	0.3048	0.5380	0.100	1.30	2.65	1289.9988	26.11	5
23	283.160	1.219	0.3200	0.4810	0.100	1.30	2.65	1360.0000	25.00	3
24	254.844	1.219	0.3658	0.5190	0.100	1.30	2.65	912.0000	26.67	3
25	227.661	1.219	0.3749	0.5380	0.100	1.30	2.65	577.0000	26.94	3
26	193.681	1.219	0.3780	0.3460	0.100	1.30	2.65	159.0000	27.78	3
27	141.580	1.219	0.3048	0.3080	0.100	1.30	2.65	87.0000	26.67	3
28	169.896	1.219	0.3170	0.4620	0.100	1.30	2.65	293.0000	26.67	3
29	193.681	1.219	0.3139	0.6350	0.100	1.30	2.65	736.9988	25.28	3
30	198.212	1.219	0.3139	0.6150	0.100	1.30	2.65	783.9988	25.83	3
31	226.528	1.219	0.2987	0.7690	0.100	1.30	2.65	1429.9988	23.89	3
32	253.711	1.219	0.2621	0.7500	0.100	1.30	2.65	1630.0000	25.00	3
33	283.160	1.219	0.2713	0.6730	0.100	1.30	2.65	1699.9988	25.56	5
34	311.476	1.219	0.2743	0.7680	0.100	1.30	2.65	3089.9978	26.39	5
35	339.792	1.219	0.2743	0.8080	0.100	1.30	2.65	3709.9978	24.72	5
36	368.108	1.219	0.2713	0.9810	0.100	1.30	2.65	4889.9922	23.33	5
37	396.424	1.219	0.2743	1.1300	0.100	1.30	2.65	5889.9922	23.89	5
38	424.740	1.219	0.2713	1.9800	0.100	1.30	2.65	6589.9922	24.17	5
39	453.056	1.219	0.2682	1.2900	0.100	1.30	2.65	11299.9805	21.11	5
40	447.393	1.219	0.2438	1.6700	0.100	1.30	2.65	18599.9883	24.44	7
41	480.239	1.219	0.2896	1.5000	0.100	1.30	2.65	11699.9805	22.22	5
42	479.106	1.219	0.2499	1.3800	0.100	1.30	2.65	19399.9883	23.06	5
43	422.475	1.219	0.2377	1.2100	0.100	1.30	2.65	14099.9922	24.44	5
44	396.424	1.219	0.2408	1.4000	0.100	1.30	2.65	13399.9805	17.50	5
45	366.975	1.219	0.2438	1.1300	0.100	1.30	2.65	8099.9922	21.94	5
46	338.659	1.219	0.2469	1.0800	0.100	1.30	2.65	6349.9922	21.67	5
47	311.476	1.219	0.2438	1.1200	0.100	1.30	2.65	4659.9922	22.22	5
48	283.160	1.219	0.2438	0.8070	0.100	1.30	2.65	3229.9978	21.39	5
49	254.844	1.219	0.2377	0.5380	0.100	1.30	2.65	2359.9988	21.67	5
50	226.528	1.219	0.2377	0.5380	0.100	1.30	2.65	2719.9978	20.83	3
51	169.896	1.219	0.2865	0.7300	0.100	1.30	2.65	829.0000	21.94	3
52	199.345	1.219	0.2865	0.8840	0.100	1.30	2.65	1749.9988	22.22	3
53	226.528	1.219	0.2469	0.7880	0.100	1.30	2.65	2060.0000	19.44	3
54	141.580	1.219	0.2896	0.7120	0.100	1.30	2.65	213.0000	20.83	3
55	114.397	1.219	0.2621	0.2690	0.100	1.30	2.65	102.0000	21.11	3

WLS - DATA OF WILLIS, J.C., COLEMAN, N.L. AND ELLIS, W.M. (1972)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	141.580	1.219	0.2591	0.7110	0.100	1.30	2.65	458.0000	21.39	3
57	169.896	1.219	0.2591	1.0000	0.100	1.30	2.65	1379.9988	23.06	3
58	226.528	1.219	0.2286	0.9800	0.100	1.30	2.65	2040.0000	26.39	3
59	254.844	1.219	0.2408	0.8260	0.100	1.30	2.65	2339.9988	25.56	5
60	283.160	1.219	0.2316	0.8460	0.100	1.30	2.65	3139.9978	26.11	5
61	212.936	1.219	0.2286	0.5760	0.100	1.30	2.65	1760.0000	25.56	3
62	311.476	1.219	0.2347	1.1000	0.100	1.30	2.65	4149.9922	25.28	5
63	339.792	1.219	0.2316	1.2900	0.100	1.30	2.65	5829.9922	21.11	5
64	169.896	1.219	0.1768	0.8270	0.100	1.30	2.65	2280.0000	23.89	5
65	113.264	1.219	0.1981	0.8080	0.100	1.30	2.65	994.0000	23.61	3
66	126.856	1.219	0.1951	0.9620	0.100	1.30	2.65	1530.0000	23.89	3
67	78.152	1.219	0.1463	1.2100	0.100	1.30	2.65	993.0000	26.11	3
68	83.815	1.219	0.1433	1.3200	0.100	1.30	2.65	1350.0000	24.44	3
69	126.856	1.219	0.1372	1.2700	0.100	1.30	2.65	3159.9978	24.17	5
70	141.580	1.219	0.1280	1.0200	0.100	1.30	2.65	4379.9922	24.17	7
71	169.896	1.219	0.1311	1.7600	0.100	1.30	2.65	10999.9883	25.00	7
72	126.856	1.219	0.1036	1.7500	0.100	1.30	2.65	10599.9883	25.56	7
73	113.264	1.219	0.1097	1.4200	0.100	1.30	2.65	5809.9922	24.72	7
74	99.672	1.219	0.1189	1.3300	0.100	1.30	2.65	3449.9978	23.89	5
75	84.948	1.219	0.1433	1.3800	0.100	1.30	2.65	1089.9988	22.50	3
76	84.948	1.219	0.1676	0.9810	0.100	1.30	2.65	480.0000	22.50	3
77	169.896	1.219	0.1615	1.0800	0.100	1.30	2.65	3279.9978	21.11	5
78	183.488	1.219	0.1585	1.1200	0.100	1.30	2.65	4459.9922	21.11	7
79	198.212	1.219	0.1494	1.1200	0.100	1.30	2.65	6849.9922	21.67	7
80	211.804	1.219	0.1524	1.1200	0.100	1.30	2.65	9129.9922	21.67	7
81	211.804	1.219	0.1890	1.0600	0.100	1.30	2.65	3449.9978	22.22	5
82	226.528	1.219	0.1829	1.1000	0.100	1.30	2.65	4659.9922	22.22	7
83	240.120	1.219	0.1859	1.1900	0.100	1.30	2.65	5589.9922	22.22	7
84	254.844	1.219	0.1829	1.5400	0.100	1.30	2.65	7859.9922	23.06	7
85	269.568	1.219	0.1768	1.2300	0.100	1.30	2.65	10099.9883	21.67	7
86	283.160	1.219	0.1798	1.4400	0.100	1.30	2.65	13599.9883	21.67	7
87	311.476	1.219	0.2103	1.8100	0.100	1.30	2.65	10000.0000	22.78	7
88	113.264	1.219	0.2316	0.5770	0.100	1.30	2.65	241.0000	22.22	3
89	141.580	1.219	0.2316	0.8650	0.100	1.30	2.65	1080.0000	22.22	3
90	156.304	1.219	0.2286	0.8650	0.100	1.30	2.65	1509.9988	21.11	3
91	198.212	1.219	0.2073	0.6150	0.100	1.30	2.65	1889.9988	22.22	3
92	226.528	1.219	0.2134	0.7500	0.100	1.30	2.65	2370.0000	21.67	3
93	254.844	1.219	0.2103	0.8080	0.100	1.30	2.65	3479.9978	22.50	5
94	283.160	1.219	0.2103	0.9810	0.100	1.30	2.65	4889.9922	22.78	5
95	311.476	1.219	0.2042	1.2100	0.100	1.30	2.65	8079.9922	23.06	7
96	339.792	1.219	0.2134	2.0400	0.100	1.30	2.65	12479.9805	24.17	7

WSA - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1935A)
(SHEET 1 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	8.127	0.736	0.0344	1.0000	0.420	1.94	2.65	7.5000	27.00	5
2	8.721	0.736	0.0360	1.0000	0.420	1.94	2.65	17.5000	27.00	5
3	9.854	0.736	0.0387	1.0000	0.420	1.94	2.65	40.1000	27.00	5
4	11.100	0.736	0.0427	1.0000	0.420	1.94	2.65	49.4000	27.00	5
5	12.317	0.736	0.0475	1.0000	0.420	1.94	2.65	51.9000	27.00	5
6	13.875	0.736	0.0506	1.0000	0.420	1.94	2.65	72.4000	27.00	5
7	15.121	0.736	0.0549	1.0000	0.420	1.94	2.65	88.6000	27.00	5
8	16.848	0.736	0.0570	1.0000	0.420	1.94	2.65	101.2000	27.00	5
9	18.434	0.736	0.0628	1.0000	0.420	1.94	2.65	90.9000	27.00	2
10	20.388	0.736	0.0652	1.0000	0.420	1.94	2.65	129.9000	27.00	2
11	21.577	0.736	0.0692	1.0000	0.420	1.94	2.65	115.7000	27.00	2
12	23.361	0.736	0.0732	1.0000	0.420	1.94	2.65	112.1000	27.00	2
13	26.475	0.736	0.0768	1.0000	0.420	1.94	2.65	154.1000	27.00	2
14	28.316	0.736	0.0841	1.0000	0.420	1.94	2.65	106.5000	27.00	2
15	29.732	0.736	0.0887	1.0000	0.420	1.94	2.65	121.8000	27.00	2
16	31.572	0.736	0.0920	1.0000	0.420	1.94	2.65	109.9000	27.00	2
17	32.847	0.736	0.0945	1.0000	0.420	1.94	2.65	127.0000	27.00	2
18	35.678	0.736	0.0981	1.0000	0.420	1.94	2.65	171.5000	27.00	2
19	3.794	0.736	0.0189	1.5000	0.420	1.94	2.65	8.0000	27.00	5
20	4.785	0.736	0.0216	1.5000	0.420	1.94	2.65	31.9000	27.00	5
21	6.145	0.736	0.0259	1.5000	0.420	1.94	2.65	79.2000	27.00	5
22	6.824	0.736	0.0274	1.5000	0.420	1.94	2.65	84.7000	27.00	5
23	7.560	0.736	0.0302	1.5000	0.420	1.94	2.65	84.6000	27.00	5
24	8.891	0.736	0.0329	1.5000	0.420	1.94	2.65	119.9000	27.00	2
25	9.571	0.736	0.0360	1.5000	0.420	1.94	2.65	124.0000	27.00	2
26	10.335	0.736	0.0381	1.5000	0.420	1.94	2.65	111.9000	27.00	2
27	11.043	0.736	0.0405	1.5000	0.420	1.94	2.65	124.0000	27.00	2
28	11.779	0.736	0.0418	1.5000	0.420	1.94	2.65	137.0000	27.00	2
29	13.082	0.736	0.0448	1.5000	0.420	1.94	2.65	169.9000	27.00	2
30	13.875	0.736	0.0466	1.5000	0.420	1.94	2.65	210.7000	27.00	2
31	14.894	0.736	0.0485	1.5000	0.420	1.94	2.65	233.0000	27.00	2
32	15.914	0.736	0.0503	1.5000	0.420	1.94	2.65	233.4000	27.00	2
33	17.188	0.736	0.0533	1.5000	0.420	1.94	2.65	239.1000	27.00	2
34	18.349	0.736	0.0558	1.5000	0.420	1.94	2.65	210.7000	27.00	2
35	19.283	0.736	0.0579	1.5000	0.420	1.94	2.65	216.3000	27.00	2
36	21.152	0.736	0.0622	1.5000	0.420	1.94	2.65	223.1000	27.00	2
37	22.171	0.736	0.0643	1.5000	0.420	1.94	2.65	232.1000	27.00	2
38	23.049	0.736	0.0661	1.5000	0.420	1.94	2.65	243.0000	27.00	2
39	23.644	0.736	0.0664	1.5000	0.420	1.94	2.65	275.5999	27.00	2
40	24.918	0.736	0.0692	1.5000	0.420	1.94	2.65	289.5999	27.00	2
41	25.541	0.736	0.0725	1.5000	0.420	1.94	2.65	187.1000	27.00	2
42	30.185	0.736	0.0783	1.5000	0.420	1.94	2.65	288.5000	27.00	2
43	31.289	0.736	0.0823	1.5000	0.420	1.94	2.65	250.1000	27.00	2
44	3.285	0.736	0.0162	2.0000	0.420	1.94	2.65	9.2000	27.00	5
45	4.304	0.736	0.0192	2.0000	0.420	1.94	2.65	60.1000	27.00	5
46	5.210	0.736	0.0213	2.0000	0.420	1.94	2.65	122.7000	27.00	5
47	6.286	0.736	0.0247	2.0000	0.420	1.94	2.65	135.7000	27.00	5
48	7.306	0.736	0.0265	2.0000	0.420	1.94	2.65	200.0000	27.00	2
49	8.410	0.736	0.0302	2.0000	0.420	1.94	2.65	188.3000	27.00	2
50	9.401	0.736	0.0329	2.0000	0.420	1.94	2.65	168.4000	27.00	2
51	10.279	0.736	0.0354	2.0000	0.420	1.94	2.65	287.2998	27.00	2
52	11.326	0.736	0.0378	2.0000	0.420	1.94	2.65	336.0000	27.00	2
53	11.836	0.736	0.0399	2.0000	0.420	1.94	2.65	239.3000	27.00	2
54	14.300	0.736	0.0430	2.0000	0.420	1.94	2.65	361.5999	27.00	2
55	16.225	0.736	0.0482	2.0000	0.420	1.94	2.65	307.7998	27.00	2

WSA - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1935A)
(SHEET 2 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	18.349	0.736	0.0543	2.0000	0.420	1.94	2.65	257.2000	27.00	2
57	20.812	0.736	0.0573	2.0000	0.420	1.94	2.65	327.7000	27.00	2
58	22.228	0.736	0.0604	2.0000	0.420	1.94	2.65	352.0000	27.00	2
59	24.352	0.736	0.0637	2.0000	0.420	1.94	2.65	405.0999	27.00	2
60	27.098	0.736	0.0671	2.0000	0.420	1.94	2.65	368.5000	27.00	2
61	7.560	0.736	0.0363	1.0000	0.445	1.57	2.65	24.2000	27.00	5
62	8.920	0.736	0.0399	1.0000	0.445	1.57	2.65	37.6000	27.00	5
63	11.043	0.736	0.0460	1.0000	0.445	1.57	2.65	74.4000	27.00	5
64	13.309	0.736	0.0524	1.0000	0.445	1.57	2.65	91.5000	27.00	5
65	15.857	0.736	0.0588	1.0000	0.445	1.57	2.65	105.6000	27.00	2
66	21.039	0.736	0.0722	1.0000	0.445	1.57	2.65	101.3000	27.00	2
67	23.616	0.736	0.0777	1.0000	0.445	1.57	2.65	103.1000	27.00	2
68	25.484	0.736	0.0823	1.0000	0.445	1.57	2.65	115.9000	27.00	2
69	28.174	0.736	0.0872	1.0000	0.445	1.57	2.65	104.8000	27.00	2
70	30.779	0.736	0.0927	1.0000	0.445	1.57	2.65	149.4000	27.00	2
71	33.413	0.736	0.0978	1.0000	0.445	1.57	2.65	144.0000	27.00	2
72	36.811	0.736	0.1070	1.0000	0.445	1.57	2.65	165.4000	27.00	2
73	40.492	0.736	0.1167	1.0000	0.445	1.57	2.65	213.5000	27.00	2
74	6.428	0.736	0.0296	1.5000	0.445	1.57	2.65	56.8000	27.00	5
75	8.410	0.736	0.0347	1.5000	0.445	1.57	2.65	159.3000	27.00	5
76	11.666	0.736	0.0427	1.5000	0.445	1.57	2.65	172.2000	27.00	2
77	13.478	0.736	0.0479	1.5000	0.445	1.57	2.65	171.7000	27.00	2
78	21.520	0.736	0.0664	1.5000	0.445	1.57	2.65	198.0000	27.00	2
79	23.672	0.736	0.0713	1.5000	0.445	1.57	2.65	141.5000	27.00	2
80	26.136	0.736	0.0765	1.5000	0.445	1.57	2.65	223.7000	27.00	2
81	29.449	0.736	0.0826	1.5000	0.445	1.57	2.65	326.7000	27.00	2
82	34.715	0.736	0.0939	1.5000	0.445	1.57	2.65	264.7998	27.00	2
83	39.359	0.736	0.1021	1.5000	0.445	1.57	2.65	205.8000	27.00	2
84	41.341	0.736	0.1100	1.5000	0.445	1.57	2.65	135.5000	27.00	2
85	51.422	0.736	0.1259	1.5000	0.445	1.57	2.65	392.5000	27.00	2
86	4.247	0.736	0.0219	2.0000	0.445	1.57	2.65	7.1000	27.00	5
87	5.295	0.736	0.0250	2.0000	0.445	1.57	2.65	212.8000	27.00	5
88	6.824	0.736	0.0280	2.0000	0.445	1.57	2.65	214.1000	27.00	2
89	8.127	0.736	0.0314	2.0000	0.445	1.57	2.65	243.5000	27.00	2
90	10.732	0.736	0.0390	2.0000	0.445	1.57	2.65	133.3000	27.00	2
91	12.912	0.736	0.0445	2.0000	0.445	1.57	2.65	238.1000	27.00	2
92	15.574	0.736	0.0503	2.0000	0.445	1.57	2.65	273.7000	27.00	2
93	18.689	0.736	0.0588	2.0000	0.445	1.57	2.65	322.5999	27.00	2
94	21.237	0.736	0.0640	2.0000	0.445	1.57	2.65	392.7998	27.00	2
95	23.219	0.736	0.0680	2.0000	0.445	1.57	2.65	394.7000	27.00	2
96	26.164	0.736	0.0716	2.0000	0.445	1.57	2.65	311.8999	27.00	2
97	28.259	0.736	0.0756	2.0000	0.445	1.57	2.65	273.5999	27.00	2
98	30.581	0.736	0.0805	2.0000	0.445	1.57	2.65	520.7000	27.00	3
99	35.055	0.736	0.0875	2.0000	0.445	1.57	2.65	411.7000	27.00	3
100	36.754	0.736	0.0920	2.0000	0.445	1.57	2.65	296.5000	27.00	3
101	5.267	0.705	0.0290	1.0000	0.475	1.46	2.65	2.8000	17.50	5
102	5.861	0.705	0.0305	1.0000	0.475	1.46	2.65	1.4000	16.00	5
103	6.654	0.705	0.0329	1.0000	0.475	1.46	2.65	8.8000	16.20	5
104	7.362	0.705	0.0357	1.0000	0.475	1.46	2.65	8.0000	16.40	5
105	8.466	0.705	0.0384	1.0000	0.475	1.46	2.65	17.2000	16.40	5
106	9.373	0.705	0.0415	1.0000	0.475	1.46	2.65	31.1000	16.50	5
107	11.298	0.705	0.0469	1.0000	0.475	1.46	2.65	51.6000	16.80	2
108	16.621	0.705	0.0850	1.0000	0.475	1.46	2.65	5.3000	17.00	2
109	20.642	0.705	0.0985	1.0000	0.475	1.46	2.65	15.5000	17.00	2
110	24.635	0.705	0.1024	1.0000	0.475	1.46	2.65	49.7000	16.80	2

WSA - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1935A)
(SHEET 3 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	29.732	0.705	0.1128	1.0000	0.475	1.46	2.65	67.7000	17.00	2
112	35.678	0.705	0.1244	1.0000	0.475	1.46	2.65	105.4000	17.00	3
113	41.058	0.705	0.1335	1.0000	0.475	1.46	2.65	85.2000	17.00	3
114	48.732	0.705	0.1451	1.0000	0.475	1.46	2.65	109.5000	17.00	3
115	55.924	0.705	0.1679	1.0000	0.475	1.46	2.65	159.0000	17.00	3
116	64.192	0.705	0.1899	1.0000	0.475	1.46	2.65	144.9000	17.00	3
117	4.984	0.705	0.0265	1.5000	0.475	1.46	2.65	5.8000	19.00	5
118	5.522	0.705	0.0280	1.5000	0.475	1.46	2.65	15.8000	19.20	5
119	5.946	0.705	0.0302	1.5000	0.475	1.46	2.65	58.8000	19.40	5
120	6.796	0.705	0.0320	1.5000	0.475	1.46	2.65	73.0000	19.50	5
121	7.079	0.705	0.0332	1.5000	0.475	1.46	2.65	65.9000	19.00	5
122	7.787	0.705	0.0354	1.5000	0.475	1.46	2.65	97.4000	19.00	2
123	9.769	0.705	0.0591	1.5000	0.475	1.46	2.65	14.9000	19.00	2
124	12.742	0.705	0.0692	1.5000	0.475	1.46	2.65	13.7000	19.00	2
125	16.423	0.705	0.0759	1.5000	0.475	1.46	2.65	58.6000	18.50	2
126	20.388	0.705	0.0792	1.5000	0.475	1.46	2.65	100.1000	18.50	3
127	24.352	0.705	0.0856	1.5000	0.475	1.46	2.65	112.6000	19.00	3
128	29.165	0.705	0.0963	1.5000	0.475	1.46	2.65	195.0000	18.50	3
129	34.687	0.705	0.1183	1.5000	0.475	1.46	2.65	186.6000	18.50	3
130	41.766	0.705	0.1344	1.5000	0.475	1.46	2.65	291.7998	18.50	3
131	3.143	0.705	0.0171	2.0000	0.475	1.46	2.65	2.7000	16.70	5
132	3.681	0.705	0.0186	2.0000	0.475	1.46	2.65	7.9000	16.70	5
133	4.247	0.705	0.0201	2.0000	0.475	1.46	2.65	20.6000	16.80	5
134	5.238	0.705	0.0238	2.0000	0.475	1.46	2.65	133.6000	16.80	5
135	5.833	0.705	0.0268	2.0000	0.475	1.46	2.65	194.9000	16.20	2
136	7.107	0.705	0.0387	2.0000	0.475	1.46	2.65	106.7000	16.20	2
137	7.957	0.705	0.0433	2.0000	0.475	1.46	2.65	98.9000	16.00	2
138	9.004	0.705	0.0475	2.0000	0.475	1.46	2.65	68.0000	16.10	2
139	9.203	0.705	0.0494	2.0000	0.475	1.46	2.65	82.4000	10.80	2
140	11.610	0.705	0.0543	2.0000	0.475	1.46	2.65	27.6000	16.10	2
141	17.867	0.705	0.0655	2.0000	0.475	1.46	2.65	195.9000	16.00	3
142	21.803	0.705	0.0668	2.0000	0.475	1.46	2.65	248.8000	15.80	3
143	26.334	0.705	0.0704	2.0000	0.475	1.46	2.65	425.2000	16.00	3
144	31.997	0.705	0.0847	2.0000	0.475	1.46	2.65	417.3999	16.00	3
145	38.255	0.705	0.1003	2.0000	0.475	1.46	2.65	382.5999	16.00	3
146	6.314	0.705	0.0323	1.0000	0.432	1.77	2.65	4.6000	16.90	5
147	7.079	0.705	0.0344	1.0000	0.432	1.77	2.65	16.4000	16.60	5
148	8.976	0.705	0.0402	1.0000	0.432	1.77	2.65	58.5000	16.50	5
149	10.760	0.705	0.0448	1.0000	0.432	1.77	2.65	67.8000	16.50	5
150	12.601	0.705	0.0509	1.0000	0.432	1.77	2.65	62 5000	16.50	5
151	14.611	0.705	0.0777	1.0000	0.432	1.77	2.65	18.0000	16.50	2
152	16.140	0.705	0.0844	1.0000	0.432	1.77	2.65	14.5000	16.90	2
153	17.981	0.705	0.0933	1.0000	0.432	1.77	2.65	11.3000	17.00	2
154	22.115	0.705	0.1070	1.0000	0.432	1.77	2.65	14.5000	17.00	2
155	27.467	0.705	0.1183	1.0000	0.432	1.77	2.65	22.3000	17.00	3
156	33.979	0.705	0.1292	1.0000	0.432	1.77	2.65	37.8000	17.50	3
157	42.049	0.705	0.1396	1.0000	0.432	1.77	2.65	64.5000	17.50	3
158	47.571	0.705	0.1484	1.0000	0.432	1.77	2.65	66.8000	17.80	3
159	55.499	0.705	0.1606	1.0000	0.432	1.77	2.65	116.6000	17.90	3
160	3.681	0.705	0.0201	1.5000	0.432	1.77	2.65	39.7000	17.30	5
161	5.069	0.705	0.0247	1.5000	0.432	1.77	2.65	28.8000	17.20	5
162	5.805	0.705	0.0268	1.5000	0.432	1.77	2.65	50.2000	17.20	5
163	7.164	0.705	0.0299	1.5000	0.432	1.77	2.65	85.5000	17.20	5
164	7.928	0.705	0.0341	1.5000	0.432	1.77	2.65	147.2000	17.10	2
165	9.061	0.705	0.0585	1.5000	0.432	1.77	2.65	3.2000	17.00	2

WSA - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1935A)
(SHEET 4 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
166	10.760	0.705	0.0661	1.5000	0.432	1.77	2.65	8.1000	17.00	2
167	12.176	0.705	0.0710	1.5000	0.432	1.77	2.65	21.6000	17.00	2
168	13.790	0.705	0.0735	1.5000	0.432	1.77	2.65	48.6000	16.80	2
169	16.423	0.705	0.0783	1.5000	0.432	1.77	2.65	56.6000	16.80	3
170	19.255	0.705	0.0860	1.5000	0.432	1.77	2.65	69.7000	16.00	3
171	23.361	0.705	0.0963	1.5000	0.432	1.77	2.65	66.2000	16.00	3
172	28.316	0.705	0.1039	1.5000	0.432	1.77	2.65	107.1000	16.10	3
173	4.106	0.705	0.0201	2.0000	0.432	1.77	2.65	14.3000	15.30	5
174	4.814	0.705	0.0223	2.0000	0.432	1.77	2.65	78.7000	15.30	5
175	5.267	0.705	0.0238	2.0000	0.432	1.77	2.65	116.3000	15.30	5
176	6.399	0.705	0.0271	2.0000	0.432	1.77	2.65	196.0000	15.30	2
177	9.061	0.705	0.0539	2.0000	0.432	1.77	2.65	25.8000	15.30	2
178	10.194	0.705	0.0591	2.0000	0.432	1.77	2.65	123.0000	15.40	2
179	13.224	0.705	0.0664	2.0000	0.432	1.77	2.65	110.3000	15.60	2
180	16.848	0.705	0.0735	2.0000	0.432	1.77	2.65	133.3000	15.60	3
181	20.303	0.705	0.0802	2.0000	0.432	1.77	2.65	195.3000	15.60	3
182	24.069	0.705	0.0875	2.0000	0.432	1.77	2.65	173.2000	15.60	3
183	7.900	0.705	0.0366	1.0000	0.400	1.66	2.65	25.8000	15.90	5
184	9.033	0.705	0.0399	1.0000	0.400	1.66	2.65	35.5000	16.00	2
185	20.671	0.705	0.1027	1.0000	0.400	1.66	2.65	1.4000	16.00	2
186	23.502	0.705	0.1106	1.0000	0.400	1.66	2.65	6.2000	16.10	2
187	28.571	0.705	0.1228	1.0000	0.400	1.66	2.65	20.4000	16.10	2
188	34.687	0.705	0.1359	1.0000	0.400	1.66	2.65	30.3000	16.20	2
189	39.642	0.705	0.1475	1.0000	0.400	1.66	2.65	41.9000	16.20	2
190	47.429	0.705	0.1591	1.0000	0.400	1.66	2.65	75.5000	16.00	3
191	51.450	0.705	0.1676	1.0000	0.400	1.66	2.65	75.9000	16.00	3
192	58.869	0.705	0.1704	1.0000	0.400	1.66	2.65	149.6000	16.00	3
193	3.993	0.705	0.0216	1.5000	0.400	1.66	2.65	21.9000	15.80	5
194	5.040	0.705	0.0244	1.5000	0.400	1.66	2.65	69.4000	15.80	5
195	6.173	0.705	0.0280	1.5000	0.400	1.66	2.65	94.5000	15.80	5
196	7.022	0.705	0.0308	1.5000	0.400	1.66	2.65	116.3000	15.80	2
197	15.177	0.705	0.0792	1.5000	0.400	1.66	2.65	30.7000	15.50	2
198	18.009	0.705	0.0872	1.5000	0.400	1.66	2.65	56.7000	15.50	2
199	22.653	0.705	0.0985	1.5000	0.400	1.66	2.65	69.5000	15.50	3
200	27.467	0.705	0.1079	1.5000	0.400	1.66	2.65	92.4000	15.50	3
201	33.271	0.705	0.1183	1.5000	0.400	1.66	2.65	80.6000	15.50	3
202	39.359	0.705	0.1268	1.5000	0.400	1.66	2.65	123.7000	15.60	3
203	46.721	0.705	0.1359	1.5000	0.400	1.66	2.65	164.1000	15.80	3
204	3.624	0.705	0.0186	2.0000	0.400	1.66	2.65	8.0000	15.60	5
205	4.219	0.705	0.0201	2.0000	0.400	1.66	2.65	20.7000	15.60	5
206	4.870	0.705	0.0226	2.0000	0.400	1.66	2.65	59.8000	15.80	5
207	9.769	0.705	0.0576	2.0000	0.400	1.66	2.65	11.9000	16.00	2
208	12.799	0.705	0.0677	2.0000	0.400	1.66	2.65	52.4000	16.00	2
209	15.432	0.705	0.0762	2.0000	0.400	1.66	2.65	71.8000	16.10	2
210	19.255	0.705	0.0826	2.0000	0.400	1.66	2.65	127.2000	16.20	3
211	23.219	0.705	0.0902	2.0000	0.400	1.66	2.65	130.6000	16.30	3
212	28.033	0.705	0.0988	2.0000	0.400	1.66	2.65	159.2000	16.40	3
213	33.668	0.705	0.1079	2.0000	0.400	1.66	2.65	237.3000	16.50	3
214	39.926	0.705	0.1140	2.0000	0.400	1.66	2.65	238.1000	16.60	3
215	11.525	0.736	0.0710	1.0000	0.320	1.31	2.65	7.9000	18.00	2
216	14.271	0.736	0.0747	1.0000	0.320	1.31	2.65	12.8000	18.00	2
217	15.970	0.736	0.0856	1.0000	0.320	1.31	2.65	3.8000	18.00	2
218	18.490	0.736	0.0942	1.0000	0.320	1.31	2.65	9.9000	18.00	2
219	20.897	0.736	0.1000	1.0000	0.320	1.31	2.65	13.1000	18.00	2
220	23.587	0.736	0.1079	1.0000	0.320	1.31	2.65	6.5000	18.00	2

WSA - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1935A)
(SHEET 5 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
221	26.532	0.736	0.1146	1.0000	0.320	1.31	2.65	9.2000	18.00	2
222	29.619	0.736	0.1192	1.0000	0.320	1.31	2.65	15.4000	18.00	2
223	31.855	0.736	0.1244	1.0000	0.320	1.31	2.65	15.3000	18.00	2
224	34.461	0.736	0.1311	1.0000	0.320	1.31	2.65	18.6000	18.00	2
225	37.094	0.736	0.1353	1.0000	0.320	1.31	2.65	21.3000	18.00	2
226	38.821	0.736	0.1439	1.0000	0.320	1.31	2.65	29.8000	18.00	2
227	41.936	0.736	0.1497	1.0000	0.320	1.31	2.65	26.9000	18.00	2
228	44.315	0.736	0.1600	1.0000	0.320	1.31	2.65	23.4000	18.00	2
229	9.259	0.736	0.0573	1.5000	0.320	1.31	2.65	6.6000	20.00	2
230	10.024	0.736	0.0622	1.5000	0.320	1.31	2.65	6.1000	20.00	2
231	11.893	0.736	0.0686	1.5000	0.320	1.31	2.65	2.5000	20.00	2
232	13.224	0.736	0.0710	1.5000	0.320	1.31	2.65	11.5000	20.90	2
233	15.999	0.736	0.0789	1.5000	0.320	1.31	2.65	9.5000	20.00	2
234	19.057	0.736	0.0872	1.5000	0.320	1.31	2.65	24.0000	20.00	2
235	22.738	0.736	0.0948	1.5000	0.320	1.31	2.65	28.1000	20.00	2
236	26.617	0.736	0.1024	1.5000	0.320	1.31	2.65	32.0000	20.00	2
237	30.298	0.736	0.1113	1.5000	0.320	1.31	2.65	34.2000	20.00	2
238	33.413	0.736	0.1146	1.5000	0.320	1.31	2.65	62.0000	20.00	2
239	35.763	0.736	0.1216	1.5000	0.320	1.31	2.65	53.6000	20.00	2
240	38.170	0.736	0.1259	1.5000	0.320	1.31	2.65	67.8000	20.00	2
241	39.642	0.736	0.1298	1.5000	0.320	1.31	2.65	69.9000	20.00	2
242	42.474	0.736	0.1359	1.5000	0.320	1.31	2.65	49.5000	20.00	2
243	46.580	0.736	0.1420	1.5000	0.320	1.31	2.65	70.6000	20.00	2
244	5.946	0.736	0.0366	2.0000	0.320	1.31	2.65	41.0000	23.00	2
245	7.872	0.736	0.0454	2.0000	0.320	1.31	2.65	27.0000	23.00	2
246	9.571	0.736	0.0533	2.0000	0.320	1.31	2.65	25.5000	23.00	2
247	11.893	0.736	0.0631	2.0000	0.320	1.31	2.65	43.5000	23.00	2
248	14.441	0.736	0.0728	2.0000	0.320	1.31	2.65	33.7000	23.00	2
249	16.310	0.736	0.0774	2.0000	0.320	1.31	2.65	42.9000	23.00	2
250	18.717	0.736	0.0814	2.0000	0.320	1.31	2.65	61.8000	23.00	2
251	21.010	0.736	0.0850	2.0000	0.320	1.31	2.65	66.7000	23.00	2
252	23.729	0.736	0.0924	2.0000	0.320	1.31	2.65	62.9000	23.00	2
253	26.249	0.736	0.0969	2.0000	0.320	1.31	2.65	63.8000	23.00	2
254	28.316	0.736	0.1009	2.0000	0.320	1.31	2.65	96.8000	23.00	2
255	31.572	0.736	0.1045	2.0000	0.320	1.31	2.65	84.9000	23.00	2
256	34.630	0.736	0.1088	2.0000	0.320	1.31	2.65	116.9000	23.00	2
257	37.094	0.736	0.1119	2.0000	0.320	1.31	2.65	149.4000	23.00	3
258	38.708	0.736	0.1137	2.0000	0.320	1.31	2.65	115.6000	23.00	3
259	41.115	0.736	0.1173	2.0000	0.320	1.31	2.65	156.2000	23.00	3
260	5.833	0.736	0.0290	1.0000	0.286	1.47	2.65	5.2000	27.00	5
261	7.136	0.736	0.0338	1.0000	0.286	1.47	2.65	25.6000	27.00	5
262	10.279	0.736	0.0680	1.0000	0.286	1.47	2.65	2.9000	27.00	2
263	11.326	0.736	0.0728	1.0000	0.286	1.47	2.65	5.4000	27.00	2
264	11.779	0.736	0.0756	1.0000	0.286	1.47	2.65	7.8000	27.00	2
265	13.393	0.736	0.0860	1.0000	0.286	1.47	2.65	4.6000	27.00	2
266	16.706	0.736	0.0930	1.0000	0.286	1.47	2.65	9.1000	27.00	2
267	19.028	0.736	0.1018	1.0000	0.286	1.47	2.65	12.8000	27.00	2
268	21.379	0.736	0.1085	1.0000	0.286	1.47	2.65	11.4000	27.00	2
269	24.125	0.736	0.1146	1.0000	0.286	1.47	2.65	15.1000	27.00	2
270	26.815	0.736	0.1210	1.0000	0.286	1.47	2.65	19.3000	27.00	2
271	3.681	0.736	0.0177	1.5000	0.286	1.47	2.65	8.2000	27.00	2
272	3.709	0.736	0.0335	1.5000	0.286	1.47	2.65	8.1000	27.00	2
273	7.447	0.736	0.0503	1.5000	0.286	1.47	2.65	12.3000	27.00	2
274	10.647	0.736	0.0634	1.5000	0.286	1.47	2.65	22.9000	27.00	2
275	14.300	0.736	0.0735	1.5000	0.286	1.47	2.65	21.3000	27.00	2

WSA - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1935A)
(SHEET 6 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
276	17.697	0.736	0.0863	1.5000	0.286	1.47	2.65	36.1000	27.00	2
277	21.039	0.736	0.0914	1.5000	0.286	1.47	2.65	42.0000	27.00	2
278	25.399	0.736	0.1036	1.5000	0.286	1.47	2.65	38.4000	27.00	2
279	28.996	0.736	0.1122	1.5000	0.286	1.47	2.65	43.1000	27.00	2
280	2.775	0.736	0.0149	2.0000	0.286	1.47	2.65	87.8000	27.00	5
281	3.794	0.736	0.0186	2.0000	0.286	1.47	2.65	64.2000	27.00	2
282	5.267	0.736	0.0375	2.0000	0.286	1.47	2.65	5.7000	27.00	2
283	6.569	0.736	0.0454	2.0000	0.286	1.47	2.65	9.3000	27.00	2
284	8.070	0.736	0.0518	2.0000	0.286	1.47	2.65	22.6000	27.00	2
285	9.344	0.736	0.0576	2.0000	0.286	1.47	2.65	9.8000	27.00	2
286	12.516	0.736	0.0658	2.0000	0.286	1.47	2.65	48.7000	27.00	2
287	15.800	0.736	0.0741	2.0000	0.286	1.47	2.65	61.7000	27.00	2
288	19.142	0.736	0.0853	2.0000	0.286	1.47	2.65	85.9000	27.00	2
289	23.162	0.736	0.0899	2.0000	0.286	1.47	2.65	85.4000	27.00	3
290	26.985	0.736	0.0942	2.0000	0.286	1.47	2.65	159.1000	27.00	3
291	32.450	0.736	0.1055	2.0000	0.286	1.47	2.65	194.2000	27.00	3
292	3.964	0.705	0.0229	1.0000	0.180	1.41	2.65	7.3510	16.90	5
293	4.672	0.705	0.0250	1.0000	0.180	1.41	2.65	6.2380	17.00	5
294	12.034	0.705	0.0841	1.0000	0.180	1.41	2.65	2.4220	18.00	2
295	14.300	0.705	0.0945	1.0000	0.180	1.41	2.65	4.0760	18.00	2
296	22.653	0.705	0.1164	1.0000	0.180	1.41	2.65	36.0210	18.00	2
297	32.705	0.705	0.1356	1.0000	0.180	1.41	2.65	92.6710	18.00	2
298	43.182	0.705	0.1646	1.0000	0.180	1.41	2.65	168.7190	18.20	2
299	62.210	0.705	0.1838	1.0000	0.180	1.41	2.65	387.8770	18.00	3
300	10.930	0.705	0.0671	1.5000	0.180	1.41	2.65	29.3290	16.50	2
301	17.981	0.705	0.0902	1.5000	0.180	1.41	2.65	85.9000	16.80	2
302	25.484	0.705	0.1137	1.5000	0.180	1.41	2.65	84.6220	16.80	2
303	35.537	0.705	0.1463	1.5000	0.180	1.41	2.65	154.9930	16.90	2
304	49.128	0.705	0.1804	1.5000	0.180	1.41	2.65	323.8818	16.90	2
305	63.371	0.705	0.2085	1.5000	0.180	1.41	2.65	385.3699	17.00	3
306	4.531	0.705	0.0390	2.0000	0.180	1.41	2.65	25.7300	17.50	2
307	5.748	0.705	0.0454	2.0000	0.180	1.41	2.65	30.4190	17.50	2
308	8.013	0.705	0.0561	2.0000	0.180	1.41	2.65	18.1840	17.60	2
309	13.167	0.705	0.0817	2.0000	0.180	1.41	2.65	88.5320	17.80	2
310	22.936	0.705	0.1082	2.0000	0.180	1.41	2.65	259.2019	18.00	2
311	31.997	0.705	0.1244	2.0000	0.180	1.41	2.65	382.5288	18.20	3
312	49.779	0.705	0.1356	2.0000	0.180	1.41	2.65	587.1858	18.20	3
313	29.449	0.705	0.0738	3.0000	4.100	1.47	2.65	0.9900	19.20	5
314	35.112	0.705	0.0823	3.0000	4.100	1.47	2.65	4.9800	19.40	5
315	40.775	0.705	0.0930	3.0000	4.100	1.47	2.65	7.1470	19.60	5
316	47.996	0.705	0.1042	3.0000	4.100	1.47	2.65	9.7150	19.80	5
317	55.018	0.705	0.1152	3.0000	4.100	1.47	2.65	7.9450	19.90	5
318	62.861	0.705	0.1353	3.0000	4.100	1.47	2.65	94.1100	19.80	3
319	27.183	0.705	0.0683	4.0000	4.100	1.47	2.65	8.5760	18.50	5
320	32.988	0.705	0.0768	4.0000	4.100	1.47	2.65	20.3190	18.20	5
321	38.227	0.705	0.0838	4.0000	4.100	1.47	2.65	125.7890	18.10	5
322	43.890	0.705	0.0920	4.0000	4.100	1.47	2.65	160.0220	18.20	3
323	48.279	0.705	0.0997	4.0000	4.100	1.47	2.65	196.7830	18.30	3
324	26.759	0.705	0.0646	4.5000	4.100	1.47	2.65	5.4450	19.20	5
325	31.431	0.705	0.0707	4.5000	4.100	1.47	2.65	30.5970	19.50	5
326	34.545	0.705	0.0771	4.5000	4.100	1.47	2.65	66.6440	19.60	5
327	40.492	0.705	0.0860	4.5000	4.100	1.47	2.65	157.6170	20.00	3
328	47.288	0.705	0.0957	4.5000	4.100	1.47	2.65	245.2790	20.00	3
329	55.160	0.705	0.1070	4.5000	4.100	1.47	2.65	275.7878	20.00	3
330	63.031	0.705	0.1219	4.5000	4.100	1.47	2.65	201.5840	20.00	3

WSB - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936A)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	15.744	0.704	0.0646	1.0000	0.950	1.44	2.65	6.1000	15.10	0
2	18.264	0.704	0.0707	1.0000	0.950	1.44	2.65	19.0000	14.80	0
3	20.642	0.704	0.0765	1.0000	0.950	1.44	2.65	20.2000	14.70	0
4	23.247	0.704	0.0829	1.0000	0.950	1.44	2.65	55.1000	14.60	0
5	26.079	0.704	0.0887	1.0000	0.950	1.44	2.65	81.8000	14.60	0
6	29.590	0.704	0.0963	1.0000	0.950	1.44	2.65	66.3000	14.60	0
7	32.847	0.704	0.1039	1.0000	0.950	1.44	2.65	86.8000	14.80	0
8	32.847	0.704	0.1045	1.0000	0.950	1.44	2.65	106.9000	14.90	0
9	32.847	0.704	0.1052	1.0000	0.950	1.44	2.65	89.7000	15.00	0
10	36.669	0.704	0.1097	1.0000	0.950	1.44	2.65	126.8000	15.40	0
11	39.359	0.704	0.1186	1.0000	0.950	1.44	2.65	101.5000	15.50	0
12	45.022	0.704	0.1439	1.0000	0.950	1.44	2.65	77.7000	16.00	0
13	49.015	0.704	0.1551	1.0000	0.950	1.44	2.65	84.1000	16.30	0
14	53.376	0.704	0.1618	1.0000	0.950	1.44	2.65	83.6000	16.40	0
15	58.246	0.704	0.1759	1.0000	0.950	1.44	2.65	94.3000	16.50	0
16	62.550	0.704	0.1948	1.0000	0.950	1.44	2.65	123.5000	16.70	0
17	62.380	0.704	0.1966	1.0000	0.950	1.44	2.65	100.0000	15.10	0
18	58.557	0.704	0.1817	1.0000	0.950	1.44	2.65	81.7000	15.30	0
19	54.084	0.704	0.1698	1.0000	0.950	1.44	2.65	74.0000	15.80	0
20	48.732	0.704	0.1506	1.0000	0.950	1.44	2.65	55.8000	16.80	0
21	45.306	0.704	0.1439	1.0000	0.950	1.44	2.65	61.8000	17.20	0
22	39.501	0.704	0.1201	1.0000	0.950	1.44	2.65	132.5000	16.20	0
23	36.811	0.704	0.1109	1.0000	0.950	1.44	2.65	93.9000	16.20	0
24	32.422	0.704	0.1061	1.0000	0.950	1.44	2.65	81.5000	16.40	0
25	29.703	0.704	0.0985	1.0000	0.950	1.44	2.65	77.7000	15.70	0
26	26.051	0.704	0.0911	1.0000	0.950	1.44	2.65	82.2000	15.70	0
27	23.219	0.704	0.0838	1.0000	0.950	1.44	2.65	43.3000	15.70	0
28	23.219	0.704	0.0838	1.0000	0.950	1.44	2.65	57.0000	15.40	0
29	20.699	0.704	0.0783	1.0000	0.950	1.44	2.65	58.5000	15.40	0
30	20.756	0.704	0.0783	1.0000	0.950	1.44	2.65	63.1000	15.50	0
31	18.264	0.704	0.0698	1.0000	0.950	1.44	2.65	61.8000	15.40	0
32	18.264	0.704	0.0698	1.0000	0.950	1.44	2.65	50.3000	15.40	0
33	15.772	0.704	0.0619	1.0000	0.950	1.44	2.65	28.1000	15.60	0
34	9.882	0.704	0.0411	1.5000	0.950	1.44	2.65	15.6000	15.80	0
35	12.204	0.704	0.0469	1.5000	0.950	1.44	2.65	74.3000	15.90	0
36	15.829	0.704	0.0546	1.5000	0.950	1.44	2.65	148.8000	15.90	0
37	19.396	0.704	0.0640	1.5000	0.950	1.44	2.65	164.3000	15.70	0
38	21.237	0.704	0.0677	1.5000	0.950	1.44	2.65	209.8000	15.80	0
39	23.474	0.704	0.0713	1.5000	0.950	1.44	2.65	175.8000	16.00	0
40	23.502	0.704	0.0722	1.5000	0.950	1.44	2.65	188.6000	16.10	0
41	25.768	0.704	0.0771	1.5000	0.950	1.44	2.65	192.5000	16.30	0
42	29.590	0.704	0.0875	1.5000	0.950	1.44	2.65	195.3000	16.50	0
43	32.422	0.704	0.0945	1.5000	0.950	1.44	2.65	192.5000	16.70	0
44	36.528	0.704	0.1030	1.5000	0.950	1.44	2.65	217.9000	16.40	0
45	39.642	0.704	0.1094	1.5000	0.950	1.44	2.65	222.5000	16.40	0
46	44.456	0.704	0.1198	1.5000	0.950	1.44	2.65	266.2998	16.60	0
47	44.456	0.704	0.1207	1.5000	0.950	1.44	2.65	228.3000	16.70	0
48	48.477	0.704	0.1305	1.5000	0.950	1.44	2.65	218.7000	16.80	0
49	52.923	0.704	0.1350	1.5000	0.950	1.44	2.65	234.7000	17.10	0
50	57.623	0.704	0.1451	1.5000	0.950	1.44	2.65	245.9000	16.50	0
51	62.040	0.704	0.1646	1.5000	0.950	1.44	2.65	223.7000	16.50	0
52	62.210	0.704	0.1646	1.5000	0.950	1.44	2.65	286.3999	16.60	0
53	62.380	0.704	0.1643	1.5000	0.950	1.44	2.65	233.3000	17.30	0
54	57.000	0.704	0.1545	1.5000	0.950	1.44	2.65	283.8999	17.60	0
55	57.000	0.704	0.1579	1.5000	0.950	1.44	2.65	226.6000	17.70	0

WSB - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936A)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	52.470	0.704	0.1500	1.5000	0.950	1.44	2.65	261.2000	17.90	0
57	48.420	0.704	0.1375	1.5000	0.950	1.44	2.65	179.5000	18.00	0
58	44.456	0.704	0.1262	1.5000	0.950	1.44	2.65	123.8000	18.20	0
59	40.067	0.704	0.1177	1.5000	0.950	1.44	2.65	150.6000	18.40	0
60	36.244	0.704	0.1079	1.5000	0.950	1.44	2.65	212.4000	18.20	0
61	36.244	0.704	0.1082	1.5000	0.950	1.44	2.65	144.0000	18.20	0
62	31.572	0.704	0.0981	1.5000	0.950	1.44	2.65	118.4000	18.20	0
63	28.174	0.704	0.0902	1.5000	0.950	1.44	2.65	209.1000	18.40	0
64	28.174	0.704	0.0902	1.5000	0.950	1.44	2.65	151.6000	18.50	0
65	25.513	0.704	0.0805	1.5000	0.950	1.44	2.65	139.7000	18.70	0
66	23.219	0.704	0.0753	1.5000	0.950	1.44	2.65	244.9000	18.70	0
67	23.219	0.704	0.0753	1.5000	0.950	1.44	2.65	162.8000	18.70	0
68	21.237	0.704	0.0695	1.5000	0.950	1.44	2.65	129.9000	17.40	0
69	19.255	0.704	0.0643	1.5000	0.950	1.44	2.65	179.5000	17.50	0
70	19.255	0.704	0.0643	1.5000	0.950	1.44	2.65	183.2000	17.50	0
71	15.800	0.704	0.0549	1.5000	0.950	1.44	2.65	82.5000	17.40	0
72	12.176	0.704	0.0448	1.5000	0.950	1.44	2.65	119.1000	17.30	0
73	9.911	0.704	0.0378	1.5000	0.950	1.44	2.65	49.4000	17.30	0
74	9.911	0.704	0.0393	2.0000	0.950	1.44	2.65	59.1000	15.00	0
75	12.827	0.704	0.0466	2.0000	0.950	1.44	2.65	150.3000	15.00	0
76	15.857	0.704	0.0530	2.0000	0.950	1.44	2.65	262.5999	14.90	0
77	19.510	0.704	0.0607	2.0000	0.950	1.44	2.65	272.7998	14.80	0
78	21.520	0.704	0.0634	2.0000	0.950	1.44	2.65	342.7998	14.40	0
79	23.219	0.704	0.0674	2.0000	0.950	1.44	2.65	298.8999	14.30	0
80	25.626	0.704	0.0747	2.0000	0.950	1.44	2.65	259.3999	14.30	0
81	29.449	0.704	0.0820	2.0000	0.950	1.44	2.65	271.7998	14.30	0
82	32.422	0.704	0.0884	2.0000	0.950	1.44	2.65	278.7998	14.30	0
83	36.584	0.704	0.0960	2.0000	0.950	1.44	2.65	270.2000	14.30	0
84	40.095	0.704	0.1045	2.0000	0.950	1.44	2.65	279.2998	13.90	0
85	44.116	0.704	0.1100	2.0000	0.950	1.44	2.65	229.4000	14.00	0
86	48.619	0.704	0.1195	2.0000	0.950	1.44	2.65	361.7000	14.20	0
87	48.619	0.704	0.1195	2.0000	0.950	1.44	2.65	379.0000	14.30	0
88	53.206	0.704	0.1332	2.0000	0.950	1.44	2.65	298.0999	13.90	0
89	57.623	0.704	0.1509	2.0000	0.950	1.44	2.65	365.3999	13.90	0
90	62.550	0.704	0.1655	2.0000	0.950	1.44	2.65	310.0000	13.90	0
91	62.550	0.704	0.1673	2.0000	0.950	1.44	2.65	288.0999	13.90	0
92	55.160	0.704	0.1542	2.0000	0.950	1.44	2.65	318.7998	13.90	0
93	47.911	0.704	0.1369	2.0000	0.950	1.44	2.65	175.9000	14.00	0
94	41.086	0.704	0.1167	2.0000	0.950	1.44	2.65	232.8000	14.30	0
95	35.112	0.704	0.1036	2.0000	0.950	1.44	2.65	181.5000	14.50	0
96	28.911	0.704	0.0875	2.0000	0.950	1.44	2.65	165.6000	14.50	0
97	23.644	0.704	0.0732	2.0000	0.950	1.44	2.65	280.0000	14.50	0
98	19.311	0.704	0.0625	2.0000	0.950	1.44	2.65	268.2000	14.50	0
99	15.659	0.704	0.0509	2.0000	0.950	1.44	2.65	218.6000	14.50	0
100	12.204	0.704	0.0424	2.0000	0.950	1.44	2.65	152.2000	14.50	0
101	9.882	0.704	0.0354	2.0000	0.950	1.44	2.65	103.6000	14.60	0
102	6.881	0.704	0.0283	2.0000	0.950	1.44	2.65	103.8000	14.80	0

WSL - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936C)
(SHEET 1 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	8.042	0.305	0.0936	0.5000	0.960	1.90	1.85	12.1000	29.50	0
2	9.826	0.305	0.1064	0.5000	0.960	1.90	1.85	16.3000	29.70	0
3	14.467	0.305	0.1378	0.5000	0.960	1.90	1.85	29.1000	30.00	0
4	16.817	0.305	0.1512	0.5000	0.960	1.90	1.85	31.0000	30.00	0
5	19.479	0.305	0.1673	0.5000	0.960	1.90	1.85	59.2000	29.40	0
6	22.169	0.305	0.1838	0.5000	0.960	1.90	1.85	79.0000	29.50	0
7	24.717	0.305	0.1972	0.5000	0.960	1.90	1.85	107.0000	29.50	0
8	27.322	0.305	0.2115	0.5000	0.960	1.90	1.85	136.0000	29.50	0
9	4.785	0.305	0.0539	1.0000	0.960	1.90	1.85	9.0000	29.30	0
10	6.286	0.305	0.0643	1.0000	0.960	1.90	1.85	71.4000	29.20	0
11	8.240	0.305	0.0756	1.0000	0.960	1.90	1.85	130.7000	27.60	0
12	10.703	0.305	0.0917	1.0000	0.960	1.90	1.85	188.3000	27.70	0
13	12.881	0.305	0.1042	1.0000	0.960	1.90	1.85	203.4000	27.80	0
14	15.713	0.305	0.1192	1.0000	0.960	1.90	1.85	304.5999	27.80	0
15	18.657	0.305	0.1353	1.0000	0.960	1.90	1.85	353.7998	27.00	0
16	20.951	0.305	0.1524	1.0000	0.960	1.90	1.85	363.7998	26.90	0
17	25.765	0.305	0.1670	1.0000	0.960	1.90	1.85	401.3999	26.80	0
18	3.440	0.305	0.0390	1.5000	0.960	1.90	1.85	22.7000	25.20	0
19	4.644	0.305	0.0479	1.5000	0.960	1.90	1.85	154.9000	26.60	0
20	6.088	0.305	0.0561	1.5000	0.960	1.90	1.85	315.3999	26.50	0
21	7.560	0.305	0.0655	1.5000	0.960	1.90	1.85	327.2998	26.60	0
22	9.089	0.305	0.0744	1.5000	0.960	1.90	1.85	396.3999	26.60	0
23	10.703	0.305	0.0826	1.5000	0.960	1.90	1.85	433.2000	25.60	0
24	12.204	0.305	0.0911	1.5000	0.960	1.90	1.85	453.2000	25.70	0
25	14.127	0.305	0.1009	1.5000	0.960	1.90	1.85	545.7000	25.80	0
26	15.939	0.305	0.1113	1.5000	0.960	1.90	1.85	656.7998	26.00	0
27	7.475	0.305	0.0881	0.5000	0.833	1.85	1.85	1.5000	25.50	0
28	9.089	0.305	0.1000	0.5000	0.833	1.85	1.85	6.2000	25.50	0
29	10.757	0.305	0.1113	0.5000	0.833	1.85	1.85	10.9000	25.50	0
30	12.572	0.305	0.1234	0.5000	0.833	1.85	1.85	23.1000	25.50	0
31	15.231	0.305	0.1399	0.5000	0.833	1.85	1.85	56.7000	25.50	0
32	17.638	0.305	0.1554	0.5000	0.833	1.85	1.85	67.4000	25.50	0
33	20.130	0.305	0.1707	0.5000	0.833	1.85	1.85	155.2000	24.30	0
34	22.961	0.305	0.1856	0.5000	0.833	1.85	1.85	133.3000	24.30	0
35	25.482	0.305	0.1969	0.5000	0.833	1.85	1.85	113.5000	23.00	0
36	28.228	0.305	0.2109	0.5000	0.833	1.85	1.85	156.7000	23.00	0
37	31.060	0.305	0.2249	0.5000	0.833	1.85	1.85	152.5000	22.90	0
38	34.030	0.305	0.2356	0.5000	0.833	1.85	1.85	117.7000	23.00	0
39	34.030	0.305	0.2387	0.5000	0.833	1.85	1.85	179.2000	22.50	0
40	2.611	0.305	0.0369	1.0000	0.833	1.85	1.85	1.4000	25.40	0
41	3.556	0.305	0.0442	1.0000	0.833	1.85	1.85	6.3000	25.70	0
42	4.502	0.305	0.0518	1.0000	0.833	1.85	1.85	35.5000	25.70	0
43	5.607	0.305	0.0591	1.0000	0.833	1.85	1.85	96.9000	25.80	0
44	6.937	0.305	0.0683	1.0000	0.833	1.85	1.85	156.2000	25.40	0
45	8.183	0.305	0.0756	1.0000	0.833	1.85	1.85	175.3000	25.50	0
46	9.596	0.305	0.0838	1.0000	0.833	1.85	1.85	257.8999	25.50	0
47	11.295	0.305	0.0936	1.0000	0.833	1.85	1.85	254.8000	25.70	0
48	12.938	0.305	0.1033	1.0000	0.833	1.85	1.85	315.5000	25.70	0
49	14.806	0.305	0.1146	1.0000	0.833	1.85	1.85	390.5000	25.60	0
50	17.128	0.305	0.1283	1.0000	0.833	1.85	1.85	360.3999	25.50	0
51	2.993	0.305	0.0354	1.5000	0.833	1.85	1.85	136.8000	25.90	0
52	4.106	0.305	0.0415	1.5000	0.833	1.85	1.85	279.2998	26.00	0
53	5.522	0.305	0.0500	1.5000	0.833	1.85	1.85	365.0999	26.00	0
54	7.249	0.305	0.0607	1.5000	0.833	1.85	1.85	392.7998	26.00	0
55	8.778	0.305	0.0689	1.5000	0.833	1.85	1.85	546.8999	25.40	0

WSL - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936C)
(SHEET 2 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	10.703	0.305	0.0799	1.5000	0.833	1.85	1.85	588.5999	25.50	0
57	12.258	0.305	0.0881	1.5000	0.833	1.85	1.85	616.5999	25.70	0
58	14.183	0.305	0.0985	1.5000	0.833	1.85	1.85	733.5999	26.00	0
59	4.927	0.305	0.0646	0.5000	1.230	2.02	1.74	9.7000	15.00	0
60	8.636	0.305	0.0917	0.5000	1.230	2.02	1.74	33.1000	14.90	0
61	11.043	0.305	0.1097	0.5000	1.230	2.02	1.74	45.8000	15.70	0
62	13.079	0.305	0.1253	0.5000	1.230	2.02	1.74	54.3000	15.70	0
63	15.939	0.305	0.1420	0.5000	1.230	2.02	1.74	94.9000	15.80	0
64	18.969	0.305	0.1634	0.5000	1.230	2.02	1.74	98.9000	16.00	0
65	21.659	0.305	0.1783	0.5000	1.230	2.02	1.74	101.2000	16.00	0
66	24.632	0.305	0.1948	0.5000	1.230	2.02	1.74	99.7000	19.30	0
67	28.030	0.305	0.2112	0.5000	1.230	2.02	1.74	133.0000	19.60	0
68	2.775	0.305	0.0378	1.0000	1.230	2.02	1.74	11.8000	20.90	0
69	4.191	0.305	0.0488	1.0000	1.230	2.02	1.74	35.8000	20.90	0
70	5.154	0.305	0.0558	1.0000	1.230	2.02	1.74	57.0000	21.00	0
71	6.456	0.305	0.0649	1.0000	1.230	2.02	1.74	126.7000	21.00	0
72	7.844	0.305	0.0735	1.0000	1.230	2.02	1.74	173.5000	21.00	0
73	9.398	0.305	0.0826	1.0000	1.230	2.02	1.74	190.3000	21.00	0
74	11.411	0.305	0.0948	1.0000	1.230	2.02	1.74	265.0000	21.00	0
75	13.079	0.305	0.1055	1.0000	1.230	2.02	1.74	296.5999	20.90	0
76	15.146	0.305	0.1170	1.0000	1.230	2.02	1.74	277.0000	21.00	0
77	17.893	0.305	0.1320	1.0000	1.230	2.02	1.74	272.5000	21.00	0
78	20.866	0.305	0.1451	1.0000	1.230	2.02	1.74	334.5000	21.00	0
79	2.180	0.305	0.0299	1.5000	1.230	2.02	1.74	27.7000	22.00	0
80	2.973	0.305	0.0351	1.5000	1.230	2.02	1.74	69.1000	22.10	0
81	3.908	0.305	0.0415	1.5000	1.230	2.02	1.74	182.2000	22.20	0
82	5.238	0.305	0.0506	1.5000	1.230	2.02	1.74	293.3999	22.30	0
83	6.569	0.305	0.0591	1.5000	1.230	2.02	1.74	362.5000	22.30	0
84	8.070	0.305	0.0677	1.5000	1.230	2.02	1.74	438.7000	22.60	0
85	9.766	0.305	0.0771	1.5000	1.230	2.02	1.74	495.2998	22.40	0
86	11.833	0.305	0.0875	1.5000	1.230	2.02	1.74	548.2000	22.40	0
87	13.844	0.305	0.0975	1.5000	1.230	2.02	1.74	718.7998	22.60	0
88	12.513	0.305	0.1253	0.5000	3.107	1.92	1.35	9.0000	25.60	0
89	14.806	0.305	0.1375	0.5000	3.107	1.92	1.35	4.9000	25.80	0
90	17.185	0.305	0.1545	0.5000	3.107	1.92	1.35	48.1000	25.70	0
91	19.535	0.305	0.1686	0.5000	3.107	1.92	1.35	88.9000	25.70	0
92	22.338	0.305	0.1823	0.5000	3.107	1.92	1.35	94.7000	25.70	0
93	25.482	0.305	0.1981	0.5000	3.107	1.92	1.35	126.1000	25.80	0
94	28.738	0.305	0.2143	0.5000	3.107	1.92	1.35	132.4000	25.80	0
95	32.589	0.305	0.2350	0.5000	3.107	1.92	1.35	215.7000	26.10	0
96	8.382	0.305	0.0829	1.0000	3.107	1.92	1.35	101.6000	26.90	0
97	10.474	0.305	0.0960	1.0000	3.107	1.92	1.35	197.4000	26.90	0
98	12.683	0.305	0.1094	1.0000	3.107	1.92	1.35	282.5999	26.70	0
99	15.090	0.305	0.1231	1.0000	3.107	1.92	1.35	300.8999	26.60	0
100	17.581	0.305	0.1347	1.0000	3.107	1.92	1.35	362.5999	26.60	0
101	20.526	0.305	0.1503	1.0000	3.107	1.92	1.35	371.2998	26.70	0
102	2.710	0.305	0.0439	0.5000	0.970	2.04	1.35	40.0000	12.50	0
103	3.500	0.305	0.0518	0.5000	0.970	2.04	1.35	90.0000	13.50	0
104	4.616	0.305	0.0631	0.5000	0.970	2.04	1.35	160.8000	13.50	0
105	5.918	0.305	0.0753	0.5000	0.970	2.04	1.35	162.2000	13.50	0
106	7.051	0.305	0.0847	0.5000	0.970	2.04	1.35	252.0000	13.50	0
107	8.268	0.305	0.0948	0.5000	0.970	2.04	1.35	291.0999	13.50	0
108	9.486	0.305	0.1079	0.5000	0.970	2.04	1.35	386.5000	13.50	0
109	11.352	0.305	0.1222	0.5000	0.970	2.04	1.35	240.8000	13.50	0
110	13.249	0.305	0.1381	0.5000	0.970	2.04	1.35	288.0999	13.60	0

WSL - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936C)
(SHEET 3 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	15.231	0.305	0.1554	0.5000	0.970	2.04	1.35	213.4000	13.70	0
112	1.441	0.305	0.0238	1.0000	0.970	2.04	1.35	332.2998	10.90	0
113	2.211	0.305	0.0317	1.0000	0.970	2.04	1.35	501.2998	11.00	0
114	3.355	0.305	0.0418	1.0000	0.970	2.04	1.35	634.5000	11.20	0
115	4.757	0.305	0.0515	1.0000	0.970	2.04	1.35	813.2000	11.50	0
116	6.428	0.305	0.0637	1.0000	0.970	2.04	1.35	776.2000	11.70	0
117	8.070	0.305	0.0741	1.0000	0.970	2.04	1.35	832.2000	11.80	0
118	11.043	0.305	0.0917	1.0000	0.970	2.04	1.35	820.2998	11.90	0
119	8.665	0.305	0.0997	0.5000	3.002	1.63	1.32	3.2000	23.10	0
120	10.644	0.305	0.1152	0.5000	3.002	1.63	1.32	5.0000	23.00	0
121	12.881	0.305	0.1292	0.5000	3.002	1.63	1.32	13.7000	23.00	0
122	15.005	0.305	0.1430	0.5000	3.002	1.63	1.32	57.2000	23.20	0
123	17.355	0.305	0.1558	0.5000	3.002	1.63	1.32	82.2000	22.60	0
124	19.790	0.305	0.1692	0.5000	3.002	1.63	1.32	99.9000	22.40	0
125	23.245	0.305	0.1862	0.5000	3.002	1.63	1.32	95.4000	22.60	0
126	27.237	0.305	0.2079	0.5000	3.002	1.63	1.32	174.4000	22.60	0
127	30.833	0.305	0.2280	0.5000	3.002	1.63	1.32	176.9000	22.60	0
128	4.927	0.305	0.0588	1.0000	3.002	1.63	1.32	5.4000	23.00	0
129	6.569	0.305	0.0686	1.0000	3.002	1.63	1.32	86.3000	23.00	0
130	7.928	0.305	0.0786	1.0000	3.002	1.63	1.32	247.9000	23.00	0
131	9.344	0.305	0.0881	1.0000	3.002	1.63	1.32	247.8000	23.00	0
132	11.043	0.305	0.0978	1.0000	3.002	1.63	1.32	313.2000	23.10	0
133	12.938	0.305	0.1094	1.0000	3.002	1.63	1.32	368.0000	23.20	0
134	14.948	0.305	0.1207	1.0000	3.002	1.63	1.32	397.7998	23.30	0
135	17.128	0.305	0.1326	1.0000	3.002	1.63	1.32	414.7998	23.30	0
136	2.914	0.305	0.0460	0.5000	1.463	1.53	1.32	45.8000	23.30	0
137	3.964	0.305	0.0558	0.5000	1.463	1.53	1.32	135.4000	24.00	0
138	5.267	0.305	0.0668	0.5000	1.463	1.53	1.32	317.8999	24.30	0
139	6.796	0.305	0.0802	0.5000	1.463	1.53	1.32	410.5999	24.00	0
140	8.183	0.305	0.0920	0.5000	1.463	1.53	1.32	361.7998	24.10	0
141	9.882	0.305	0.1052	0.5000	1.463	1.53	1.32	323.7998	24.10	0
142	11.890	0.305	0.1186	0.5000	1.463	1.53	1.32	371.8999	24.10	0
143	14.467	0.305	0.1350	0.5000	1.463	1.53	1.32	475.3999	24.20	0
144	16.675	0.305	0.1478	0.5000	1.463	1.53	1.32	433.5999	24.20	0
145	1.603	0.305	0.0259	1.0000	1.463	1.53	1.32	125.7000	23.00	0
146	2.211	0.305	0.0323	1.0000	1.463	1.53	1.32	395.2998	23.00	0
147	2.968	0.305	0.0390	1.0000	1.463	1.53	1.32	821.5000	23.00	0
148	3.993	0.305	0.0469	1.0000	1.463	1.53	1.32	829.8999	23.00	0
149	5.352	0.305	0.0564	1.0000	1.463	1.53	1.32	819.2998	23.00	0
150	6.626	0.305	0.0658	1.0000	1.463	1.53	1.32	878.5000	22.90	0
151	8.268	0.305	0.0762	1.0000	1.463	1.53	1.32	918.7998	22.90	0
152	9.936	0.305	0.0866	1.0000	1.463	1.53	1.32	921.5999	23.00	0
153	11.635	0.305	0.0960	1.0000	1.463	1.53	1.32	827.0999	23.00	0
154	10.927	0.305	0.1173	0.5000	2.238	2.30	1.31	73.8000	14.90	0
155	13.249	0.305	0.1311	0.5000	2.238	2.30	1.31	149.3000	14.90	0
156	15.571	0.305	0.1454	0.5000	2.238	2.30	1.31	250.0000	15.00	0
157	18.119	0.305	0.1603	0.5000	2.238	2.30	1.31	277.3999	15.00	0
158	21.036	0.305	0.1774	0.5000	2.238	2.30	1.31	285.7000	15.10	0
159	23.698	0.305	0.1917	0.5000	2.238	2.30	1.31	369.5000	15.30	0
160	6.541	0.305	0.0689	1.0000	2.238	2.30	1.31	404.5000	15.00	0
161	8.070	0.305	0.0799	1.0000	2.238	2.30	1.31	623.0000	15.00	0
162	9.712	0.305	0.0896	1.0000	2.238	2.30	1.31	752.3999	14.30	0
163	11.779	0.305	0.1039	1.0000	2.238	2.30	1.31	840.7000	14.30	0
164	13.645	0.305	0.1155	1.0000	2.238	2.30	1.31	761.5999	14.40	0
165	15.797	0.305	0.1253	1.0000	2.238	2.30	1.31	728.0000	14.50	0

WSL - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936C)
(SHEET 4 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
166	2.888	0.305	0.0439	0.5000	1.129	1.88	1.31	98.6000	13.60	0
167	4.219	0.305	0.0570	0.5000	1.129	1.88	1.31	136.8000	13.30	0
168	5.692	0.305	0.0710	0.5000	1.129	1.88	1.31	187.7000	13.00	0
169	7.249	0.305	0.0872	0.5000	1.129	1.88	1.31	184.4000	13.00	0
170	8.835	0.305	0.1030	0.5000	1.129	1.88	1.31	258.0999	13.50	0
171	10.644	0.305	0.1155	0.5000	1.129	1.88	1.31	260.2998	13.50	0
172	12.572	0.305	0.1305	0.5000	1.129	1.88	1.31	226.8000	13.40	0
173	14.523	0.305	0.1433	0.5000	1.129	1.88	1.31	236.8000	13.20	0
174	1.603	0.305	0.0253	1.0000	1.129	1.88	1.31	359.2000	14.00	0
175	2.234	0.305	0.0320	1.0000	1.129	1.88	1.31	503.5999	11.50	0
176	3.214	0.305	0.0396	1.0000	1.129	1.88	1.31	768.3999	13.30	0
177	4.276	0.305	0.0485	1.0000	1.129	1.88	1.31	707.2000	12.30	0
178	5.635	0.305	0.0582	1.0000	1.129	1.88	1.31	845.2000	13.00	0
179	7.419	0.305	0.0701	1.0000	1.129	1.88	1.31	704.7998	13.00	0
180	9.826	0.305	0.0838	1.0000	1.129	1.88	1.31	886.0999	13.10	0
181	11.635	0.305	0.0960	1.0000	1.129	1.88	1.31	925.7000	13.20	0
182	13.334	0.305	0.1045	1.0000	1.129	1.88	1.31	861.5999	13.20	0
183	13.136	0.305	0.1116	1.0000	4.093	1.58	1.26	259.3999	11.10	0
184	16.364	0.305	0.1295	1.0000	4.093	1.58	1.26	632.0000	11.20	0
185	3.738	0.305	0.0552	0.5000	1.165	2.08	1.26	41.1000	15.30	0
186	5.012	0.305	0.0668	0.5000	1.165	2.08	1.26	143.9000	15.40	0
187	6.428	0.305	0.0777	0.5000	1.165	2.08	1.26	239.1000	15.30	0
188	7.928	0.305	0.0902	0.5000	1.165	2.08	1.26	379.7998	15.40	0
189	9.656	0.305	0.1027	0.5000	1.165	2.08	1.26	442.2000	15.40	0
190	11.833	0.305	0.1173	0.5000	1.165	2.08	1.26	520.5000	15.50	0
191	2.124	0.305	0.0311	1.0000	1.165	2.08	1.26	545.7000	16.20	0
192	3.186	0.305	0.0402	1.0000	1.165	2.08	1.26	925.3999	15.60	0
193	4.191	0.305	0.0479	1.0000	1.165	2.08	1.26	914.0000	16.10	0
194	5.720	0.305	0.0588	1.0000	1.165	2.08	1.26	1030.8999	17.00	0
195	7.390	0.305	0.0698	1.0000	1.165	2.08	1.26	1125.0999	17.90	0
196	9.089	0.305	0.0808	1.0000	1.165	2.08	1.26	1280.7998	17.80	0
197	5.493	0.305	0.1021	0.1000	2.444	2.32	1.11	43.6000	18.60	0
198	6.881	0.305	0.1213	0.1000	2.444	2.32	1.11	137.3000	18.90	0
199	8.520	0.305	0.1384	0.1000	2.444	2.32	1.11	245.4000	19.10	0
200	10.474	0.305	0.1609	0.1000	2.444	2.32	1.11	354.7998	19.10	0
201	12.881	0.305	0.1859	0.1000	2.444	2.32	1.11	377.5000	19.00	0
202	2.189	0.305	0.0469	0.3000	2.444	2.32	1.11	172.7000	19.70	0
203	3.021	0.305	0.0594	0.3000	2.444	2.32	1.11	304.5000	19.80	0
204	3.993	0.305	0.0719	0.3000	2.444	2.32	1.11	476.5000	19.90	0
205	5.069	0.305	0.0850	0.3000	2.444	2.32	1.11	698.5000	19.50	0
206	6.343	0.305	0.1006	0.3000	2.444	2.32	1.11	677.3999	19.60	0
207	7.475	0.305	0.1155	0.3000	2.444	2.32	1.11	643.7998	19.80	0
208	9.143	0.305	0.1369	0.3000	2.444	2.32	1.11	523.5000	19.90	0
209	11.182	0.305	0.1576	0.3000	2.444	2.32	1.11	642.0999	19.90	0
210	2.347	0.305	0.0567	0.1000	1.287	1.79	1.11	111.2000	16.00	0
211	3.214	0.305	0.0704	0.1000	1.287	1.79	1.11	158.8000	15.70	0
212	4.049	0.305	0.0829	0.1000	1.287	1.79	1.11	227.2000	15.50	0
213	5.040	0.305	0.0975	0.1000	1.287	1.79	1.11	290.0000	15.70	0
214	6.258	0.305	0.1137	0.1000	1.287	1.79	1.11	342.2998	16.00	0
215	7.504	0.305	0.1289	0.1000	1.287	1.79	1.11	364.2998	16.10	0
216	9.174	0.305	0.1481	0.1000	1.287	1.79	1.11	406.5000	16.00	0
217	11.128	0.305	0.1689	0.1000	1.287	1.79	1.11	423.3999	15.30	0
218	1.325	0.305	0.0332	0.3000	1.287	1.79	1.11	289.2000	15.70	0
219	2.081	0.305	0.0451	0.3000	1.287	1.79	1.11	641.7998	15.70	0
220	2.914	0.305	0.0582	0.3000	1.287	1.79	1.11	661.5999	15.70	0

WSL - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936C)
(SHEET 5 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
221	3.908	0.305	0.0719	0.3000	1.287	1.79	1.11	593.2000	15.50	0
222	5.154	0.305	0.0875	0.3000	1.287	1.79	1.11	687.0000	15.50	0
223	6.258	0.305	0.1006	0.3000	1.287	1.79	1.11	753.0000	15.60	0
224	7.475	0.305	0.1158	0.3000	1.287	1.79	1.11	674.0999	15.70	0
225	8.920	0.305	0.1323	0.3000	1.287	1.79	1.11	637.0000	16.00	0
226	10.644	0.305	0.1518	0.3000	1.287	1.79	1.11	687.5999	16.20	0
227	2.585	0.305	0.0616	0.1000	3.215	1.82	1.07	282.7998	13.00	0
228	3.653	0.305	0.0768	0.1000	3.215	1.82	1.07	855.3999	13.50	0
229	4.870	0.305	0.0942	0.1000	3.215	1.82	1.07	706.2998	13.50	0
230	6.088	0.305	0.1116	0.1000	3.215	1.82	1.07	885.7998	13.60	0
231	7.419	0.305	0.1274	0.1000	3.215	1.82	1.07	692.8999	13.70	0
232	8.920	0.305	0.1454	0.1000	3.215	1.82	1.07	775.5000	13.60	0
233	1.150	0.305	0.0314	0.3000	3.215	1.82	1.07	821.5999	14.60	0
234	1.696	0.305	0.0405	0.3000	3.215	1.82	1.07	1775.5999	13.20	0
235	2.512	0.305	0.0530	0.3000	3.215	1.82	1.07	1921.0000	13.30	0
236	3.384	0.305	0.0658	0.3000	3.215	1.82	1.07	1764.7998	13.00	0
237	4.502	0.305	0.0799	0.3000	3.215	1.82	1.07	1847.0999	13.10	0
238	5.720	0.305	0.0960	0.3000	3.215	1.82	1.07	1597.0000	13.00	0
239	7.164	0.305	0.1137	0.3000	3.215	1.82	1.07	1336.7000	13.00	0
240	9.033	0.305	0.1359	0.3000	3.215	1.82	1.07	1399.0000	13.00	0
241	1.495	0.305	0.0418	0.1000	0.835	1.98	1.07	122.1000	12.00	0
242	2.189	0.305	0.0536	0.1000	0.835	1.98	1.07	263.5999	12.20	0
243	2.968	0.305	0.0661	0.1000	0.835	1.98	1.07	317.8999	12.10	0
244	3.908	0.305	0.0796	0.1000	0.835	1.98	1.07	577.2000	12.00	0
245	5.012	0.305	0.0963	0.1000	0.835	1.98	1.07	548.0999	11.00	0
246	6.201	0.305	0.1122	0.1000	0.835	1.98	1.07	609.5999	10.70	0
247	7.504	0.305	0.1274	0.1000	0.835	1.98	1.07	596.0999	10.70	0
248	9.033	0.305	0.1457	0.1000	0.835	1.98	1.07	546.7998	10.50	0
249	0.714	0.305	0.0223	0.3000	0.835	1.98	1.07	642.5000	9.70	0
250	1.195	0.305	0.0326	0.3000	0.835	1.98	1.07	1022.7998	10.20	0
251	1.753	0.305	0.0421	0.3000	0.835	1.98	1.07	1193.7998	10.80	0
252	2.489	0.305	0.0530	0.3000	0.835	1.98	1.07	1085.7998	11.00	0
253	3.412	0.305	0.0661	0.3000	0.835	1.98	1.07	978.5999	11.00	0
254	4.616	0.305	0.0811	0.3000	0.835	1.98	1.07	1093.2000	11.00	0
255	5.692	0.305	0.0945	0.3000	0.835	1.98	1.07	1039.2998	11.10	0
256	2.441	0.305	0.0579	0.1000	3.504	2.06	1.05	407.7998	11.80	0
257	3.214	0.305	0.0698	0.1000	3.504	2.06	1.05	842.8999	12.00	0
258	4.078	0.305	0.0838	0.1000	3.504	2.06	1.05	967.0999	11.30	0
259	5.182	0.305	0.1003	0.1000	3.504	2.06	1.05	1028.5000	11.90	0
260	6.484	0.305	0.1180	0.1000	3.504	2.06	1.05	971.5000	11.00	0
261	7.928	0.305	0.1350	0.1000	3.504	2.06	1.05	886.7000	10.50	0
262	2.016	0.305	0.0445	0.3000	3.504	2.06	1.05	1543.7000	15.50	0
263	2.537	0.305	0.0515	0.3000	3.504	2.06	1.05	1907.0999	13.70	0
264	3.157	0.305	0.0616	0.3000	3.504	2.06	1.05	1947.5999	10.00	0
265	3.766	0.305	0.0716	0.3000	3.504	2.06	1.05	1940.5000	10.00	0
266	4.474	0.305	0.0796	0.3000	3.504	2.06	1.05	1737.5999	10.00	0
267	5.380	0.305	0.0914	0.3000	3.504	2.06	1.05	1791.5999	10.00	0
268	1.195	0.305	0.0354	0.1000	1.235	1.54	1.05	236.2000	13.70	0
269	1.892	0.305	0.0494	0.1000	1.235	1.54	1.05	439.5000	13.40	0
270	2.560	0.305	0.0634	0.1000	1.235	1.54	1.05	519.2000	14.00	0
271	3.440	0.305	0.0762	0.1000	1.235	1.54	1.05	604.3999	14.30	0
272	4.616	0.305	0.0948	0.1000	1.235	1.54	1.05	649.5999	14.50	0
273	5.607	0.305	0.1106	0.1000	1.235	1.54	1.05	651.7000	14.50	0
274	0.660	0.305	0.0213	0.3000	1.235	1.54	1.05	250.3000	14.00	0
275	1.195	0.305	0.0320	0.3000	1.235	1.54	1.05	1223.0000	14.00	0

WSL - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936C)
(SHEET 6 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
276	1.892	0.305	0.0442	0.3000	1.235	1.54	1.05	1351.8999	14.00	0
277	2.585	0.305	0.0546	0.3000	1.235	1.54	1.05	1364.7998	14.00	0
278	3.440	0.305	0.0671	0.3000	1.235	1.54	1.05	1410.0999	14.00	0
279	4.502	0.305	0.0823	0.3000	1.235	1.54	1.05	1217.3999	14.00	0
280	1.424	0.305	0.0451	0.1000	2.951	2.56	1.03	504.2998	14.20	0
281	2.418	0.305	0.0622	0.1000	2.951	2.56	1.03	1709.2000	13.90	0
282	3.103	0.305	0.0728	0.1000	2.951	2.56	1.03	2419.2998	14.60	0
283	3.738	0.305	0.0832	0.1000	2.951	2.56	1.03	3181.9968	14.20	0
284	4.644	0.305	0.0966	0.1000	2.951	2.56	1.03	2889.4968	14.20	0
285	1.034	0.305	0.0302	0.3000	2.951	2.56	1.03	3643.3960	14.90	0
286	1.478	0.305	0.0378	0.3000	2.951	2.56	1.03	5600.8945	15.30	0
287	1.996	0.305	0.0463	0.3000	2.951	2.56	1.03	4500.7930	14.20	0
288	2.684	0.305	0.0573	0.3000	2.951	2.56	1.03	4436.1914	14.30	0
289	1.034	0.305	0.0344	0.1000	1.110	1.73	1.03	1355.0999	11.20	0
290	1.639	0.305	0.0460	0.1000	1.110	1.73	1.03	1313.7998	12.40	0
291	2.302	0.305	0.0582	0.1000	1.110	1.73	1.03	1346.3999	13.00	0
292	3.129	0.305	0.0716	0.1000	1.110	1.73	1.03	1590.5999	12.00	0
293	3.964	0.305	0.0850	0.1000	1.110	1.73	1.03	1875.2998	12.90	0
294	0.714	0.305	0.0244	0.3000	1.110	1.73	1.03	1835.2000	9.70	0
295	1.150	0.305	0.0317	0.3000	1.110	1.73	1.03	3418.2959	11.30	0
296	1.696	0.305	0.0408	0.3000	1.110	1.73	1.03	3417.2969	12.20	0
297	2.302	0.305	0.0503	0.3000	1.110	1.73	1.03	4323.9922	12.60	0
298	3.075	0.305	0.0622	0.3000	1.110	1.73	1.03	3765.5959	13.00	0

WSS - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936B)
(SHEET 1 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	8.665	0.305	0.0841	1.0000	0.354	1.15	2.65	34.9000	20.50	2
2	8.665	0.305	0.0908	1.0000	0.354	1.15	2.65	17.5000	20.40	2
3	8.665	0.305	0.0960	1.0000	0.354	1.15	2.65	11.6000	20.40	2
4	8.665	0.305	0.0985	1.0000	0.354	1.15	2.65	18.9000	20.30	2
5	8.665	0.305	0.1033	1.0000	0.354	1.15	2.65	5.8000	20.00	2
6	23.417	0.305	0.1673	1.0000	0.354	1.15	2.65	68.9000	20.20	2
7	23.417	0.305	0.1716	1.0000	0.354	1.15	2.65	68.4000	20.20	2
8	23.417	0.305	0.1728	1.0000	0.354	1.15	2.65	56.5000	20.20	2
9	23.417	0.305	0.1734	1.0000	0.354	1.15	2.65	39.8000	20.20	2
10	23.417	0.305	0.1737	1.0000	0.354	1.15	2.65	47.9000	20.20	2
11	38.765	0.305	0.2573	1.0000	0.354	1.15	2.65	25.7000	20.00	2
12	38.765	0.305	0.2667	1.0000	0.354	1.15	2.65	13.0000	20.00	2
13	38.765	0.305	0.2688	1.0000	0.354	1.15	2.65	18.5000	20.00	2
14	38.765	0.305	0.2661	1.0000	0.354	1.15	2.65	23.4000	20.00	2
15	38.765	0.305	0.2676	1.0000	0.354	1.15	2.65	26.3000	20.00	2
16	8.665	0.305	0.0741	1.0000	0.472	1.10	2.65	71.3000	21.60	2
17	8.665	0.305	0.0747	1.0000	0.472	1.10	2.65	94.6000	21.60	2
18	8.665	0.305	0.0753	1.0000	0.472	1.10	2.65	77.1000	21.60	2
19	8.665	0.305	0.0765	1.0000	0.472	1.10	2.65	82.9000	21.60	2
20	8.665	0.305	0.0783	1.0000	0.472	1.10	2.65	80.0000	22.00	2
21	23.417	0.305	0.1518	1.0000	0.472	1.10	2.65	87.2000	21.90	3
22	23.417	0.305	0.1628	1.0000	0.472	1.10	2.65	108.7000	21.90	3
23	23.417	0.305	0.1634	1.0000	0.472	1.10	2.65	82.9000	21.90	3
24	23.417	0.305	0.1652	1.0000	0.472	1.10	2.65	74.3000	21.90	3
25	23.417	0.305	0.1640	1.0000	0.472	1.10	2.65	73.7000	21.90	3
26	38.765	0.305	0.2280	1.0000	0.472	1.10	2.65	68.6000	22.10	3
27	38.765	0.305	0.2441	1.0000	0.472	1.10	2.65	108.0000	22.30	3
28	38.765	0.305	0.2569	1.0000	0.472	1.10	2.65	89.4000	22.30	3
29	38.765	0.305	0.2569	1.0000	0.472	1.10	2.65	63.1000	22.40	3
30	38.765	0.305	0.2551	1.0000	0.472	1.10	2.65	36.7000	22.30	3
31	8.665	0.305	0.0765	1.0000	0.649	1.10	2.65	50.9000	18.60	5
32	8.665	0.305	0.0768	1.0000	0.649	1.10	2.65	46.6000	18.50	5
33	8.665	0.305	0.0765	1.0000	0.649	1.10	2.65	37.8000	18.60	5
34	8.665	0.305	0.0768	1.0000	0.649	1.10	2.65	42.2000	18.60	5
35	8.665	0.305	0.0765	1.0000	0.649	1.10	2.65	37.8000	18.60	5
36	23.417	0.305	0.1497	1.0000	0.649	1.10	2.65	120.6000	20.00	3
37	23.417	0.305	0.1692	1.0000	0.649	1.10	2.65	137.8000	20.00	3
38	23.417	0.305	0.1743	1.0000	0.649	1.10	2.65	103.4000	20.10	3
39	23.417	0.305	0.1759	1.0000	0.649	1.10	2.65	112.0000	20.30	3
40	38.765	0.305	0.2271	1.0000	0.649	1.10	2.65	101.5000	20.50	3
41	38.765	0.305	0.2615	1.0000	0.649	1.10	2.65	75.5000	20.60	3
42	38.765	0.305	0.2685	1.0000	0.649	1.10	2.65	77.4000	20.70	3
43	38.765	0.305	0.2691	1.0000	0.649	1.10	2.65	45.2000	20.70	3
44	38.765	0.305	0.2710	1.0000	0.649	1.10	2.65	62.4000	20.80	3
45	8.665	0.305	0.0756	1.0000	0.919	1.10	2.65	20.4000	21.00	5
46	8.665	0.305	0.0759	1.0000	0.919	1.10	2.65	18.9000	21.00	5
47	8.665	0.305	0.0759	1.0000	0.919	1.10	2.65	20.4000	21.00	5
48	8.665	0.305	0.0762	1.0000	0.919	1.10	2.65	20.4000	21.00	5
49	8.665	0.305	0.0762	1.0000	0.919	1.10	2.65	26.2000	21.00	5
50	23.417	0.305	0.1515	1.0000	0.919	1.10	2.65	73.7000	21.30	3
51	23.417	0.305	0.1713	1.0000	0.919	1.10	2.65	29.1000	21.00	3
52	23.417	0.305	0.1713	1.0000	0.919	1.10	2.65	28.0000	21.00	3
53	23.417	0.305	0.1707	1.0000	0.919	1.10	2.65	54.4000	21.00	3
54	23.417	0.305	0.1725	1.0000	0.919	1.10	2.65	59.2000	21.00	3
55	23.417	0.305	0.1737	1.0000	0.919	1.10	2.65	92.1000	20.00	3

WSS - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936B)
(SHEET 2 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	38.765	0.305	0.2252	1.0000	0.919	1.10	2.65	75.8000	20.00	3
57	38.765	0.305	0.2600	1.0000	0.919	1.10	2.65	75.8000	20.00	3
58	38.765	0.305	0.2676	1.0000	0.919	1.10	2.65	57.6000	20.00	3
59	38.765	0.305	0.2707	1.0000	0.919	1.10	2.65	47.2000	19.80	3
60	38.765	0.305	0.2688	1.0000	0.919	1.10	2.65	57.6000	19.90	3
61	8.665	0.305	0.0750	1.0000	0.850	1.21	2.65	41.2000	19.10	5
62	8.665	0.305	0.0747	1.0000	0.850	1.21	2.65	41.0000	19.00	5
63	8.665	0.305	0.0741	1.0000	0.850	1.21	2.65	40.9000	19.00	5
64	8.665	0.305	0.0741	1.0000	0.850	1.21	2.65	41.6000	19.00	5
65	8.665	0.305	0.0750	1.0000	0.850	1.21	2.65	61.7000	19.00	5
66	23.474	0.305	0.1494	1.0000	0.850	1.21	2.65	108.5000	19.50	3
67	23.474	0.305	0.1527	1.0000	0.850	1.21	2.65	119.2000	19.50	3
68	23.474	0.305	0.1579	1.0000	0.850	1.21	2.65	195.5000	19.50	3
69	23.474	0.305	0.1615	1.0000	0.850	1.21	2.65	190.1000	19.50	3
70	23.474	0.305	0.1612	1.0000	0.850	1.21	2.65	193.3000	19.50	3
71	23.474	0.305	0.1606	1.0000	0.850	1.21	2.65	60.7000	19.50	3
72	23.474	0.305	0.1603	1.0000	0.850	1.21	2.65	195.5000	19.50	3
73	23.474	0.305	0.1606	1.0000	0.850	1.21	2.65	60.7000	19.50	3
74	38.765	0.305	0.2307	1.0000	0.850	1.21	2.65	84.2000	19.20	3
75	38.765	0.305	0.2579	1.0000	0.850	1.21	2.65	50.1000	19.20	3
76	38.765	0.305	0.2594	1.0000	0.850	1.21	2.65	81.6000	19.20	3
77	38.765	0.305	0.2612	1.0000	0.850	1.21	2.65	79.0000	19.20	3
78	38.765	0.305	0.2618	1.0000	0.850	1.21	2.65	33.8000	19.20	3
79	8.665	0.305	0.0738	1.0000	0.783	1.34	2.65	34.9000	19.50	5
80	8.665	0.305	0.0744	1.0000	0.783	1.34	2.65	40.6000	19.50	5
81	8.665	0.305	0.0744	1.0000	0.783	1.34	2.65	29.1000	19.50	5
82	8.665	0.305	0.0747	1.0000	0.783	1.34	2.65	41.2000	19.50	5
83	8.665	0.305	0.0759	1.0000	0.783	1.34	2.65	47.4000	19.50	5
84	23.417	0.305	0.1497	1.0000	0.783	1.34	2.65	107.1000	19.50	3
85	23.417	0.305	0.1652	1.0000	0.783	1.34	2.65	104.4000	19.50	3
86	23.417	0.305	0.1692	1.0000	0.783	1.34	2.65	94.1000	19.20	3
87	23.417	0.305	0.1698	1.0000	0.783	1.34	2.65	96.4000	19.20	3
88	38.765	0.305	0.2234	1.0000	0.783	1.34	2.65	98.9000	19.40	3
89	38.765	0.305	0.2643	1.0000	0.783	1.34	2.65	93.7000	19.60	3
90	38.765	0.305	0.2606	1.0000	0.783	1.34	2.65	80.7000	19.60	3
91	38.765	0.305	0.2737	1.0000	0.783	1.34	2.65	45.2000	19.80	3
92	38.765	0.305	0.2713	1.0000	0.783	1.34	2.65	74.1000	19.80	3
93	8.665	0.305	0.0741	1.0000	0.692	1.47	2.65	69.8000	19.60	5
94	8.665	0.305	0.0735	1.0000	0.692	1.47	2.65	78.6000	19.60	5
95	8.665	0.305	0.0741	1.0000	0.692	1.47	2.65	65.5000	20.00	5
96	8.665	0.305	0.0741	1.0000	0.692	1.47	2.65	98.9000	20.00	5
97	8.665	0.305	0.0741	1.0000	0.692	1.47	2.65	42.2000	20.00	5
98	23.417	0.305	0.1484	1.0000	0.692	1.47	2.65	116.3000	20.10	3
99	23.417	0.305	0.1588	1.0000	0.692	1.47	2.65	130.8000	20.20	3
100	23.417	0.305	0.1643	1.0000	0.692	1.47	2.65	213.2000	20.20	3
101	23.417	0.305	0.1622	1.0000	0.692	1.47	2.65	151.8000	20.30	3
102	23.417	0.305	0.1637	1.0000	0.692	1.47	2.65	106.6000	20.50	3
103	38.765	0.305	0.2222	1.0000	0.692	1.47	2.65	111.5000	20.60	3
104	38.765	0.305	0.2633	1.0000	0.692	1.47	2.65	65.5000	20.60	3
105	38.765	0.305	0.2664	1.0000	0.692	1.47	2.65	75.5000	20.40	3
106	38.765	0.305	0.2633	1.0000	0.692	1.47	2.65	58.5000	20.40	3
107	8.665	0.305	0.0747	1.0000	1.203	1.18	2.65	3.5000	20.80	5
108	8.665	0.305	0.0744	1.0000	1.203	1.18	2.65	6.3000	20.80	5
109	8.665	0.305	0.0753	1.0000	1.203	1.18	2.65	10.2000	20.80	5
110	8.665	0.305	0.0756	1.0000	1.203	1.18	2.65	11.2000	20.80	5

WSS - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936B)
(SHEET 3 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	8.665	0.305	0.0756	1.0000	1.203	1.18	2.65	10.5000	20.90	5
112	23.417	0.305	0.1539	1.0000	1.203	1.18	2.65	53.5000	21.00	3
113	23.417	0.305	0.1539	1.0000	1.203	1.18	2.65	42.7000	21.00	3
114	23.417	0.305	0.1542	1.0000	1.203	1.18	2.65	84.0000	21.00	3
115	23.417	0.305	0.1561	1.0000	1.203	1.18	2.65	96.9000	21.00	3
116	23.417	0.305	0.1597	1.0000	1.203	1.18	2.65	61.7000	21.00	3
117	23.417	0.305	0.1628	1.0000	1.203	1.18	2.65	42.6000	20.80	3
118	38.765	0.305	0.2295	1.0000	1.203	1.18	2.65	59.1000	20.60	3
119	38.765	0.305	0.2341	1.0000	1.203	1.18	2.65	59.7000	20.60	3
120	38.765	0.305	0.2371	1.0000	1.203	1.18	2.65	63.7000	20.50	3
121	38.765	0.305	0.2417	1.0000	1.203	1.18	2.65	82.9000	21.10	3
122	38.765	0.305	0.2438	1.0000	1.203	1.18	2.65	68.9000	21.00	3
123	8.665	0.305	0.0753	1.0000	1.132	1.32	2.65	30.3000	19.80	5
124	8.665	0.305	0.0756	1.0000	1.132	1.32	2.65	35.9000	19.80	5
125	8.665	0.305	0.0759	1.0000	1.132	1.32	2.65	47.9000	19.80	5
126	8.665	0.305	0.0756	1.0000	1.132	1.32	2.65	35.9000	19.70	5
127	8.665	0.305	0.0756	1.0000	1.132	1.32	2.65	17.9000	19.70	5
128	23.417	0.305	0.1542	1.0000	1.132	1.32	2.65	70.0000	19.80	3
129	23.417	0.305	0.1558	1.0000	1.132	1.32	2.65	92.7000	19.80	3
130	23.417	0.305	0.1585	1.0000	1.132	1.32	2.65	88.5000	19.80	3
131	23.417	0.305	0.1612	1.0000	1.132	1.32	2.65	88.5000	19.80	3
132	23.417	0.305	0.1612	1.0000	1.132	1.32	2.65	48.7000	19.90	3
133	38.765	0.305	0.2228	1.0000	1.132	1.32	2.65	66.7000	19.80	3
134	38.765	0.305	0.2277	1.0000	1.132	1.32	2.65	82.9000	19.80	3
135	38.765	0.305	0.2429	1.0000	1.132	1.32	2.65	115.0000	19.60	3
136	38.765	0.305	0.2542	1.0000	1.132	1.32	2.65	47.2000	19.60	3
137	38.765	0.305	0.2585	1.0000	1.132	1.32	2.65	83.9000	19.50	3
138	8.665	0.305	0.0759	1.0000	1.132	1.32	2.65	27.6000	22.30	5
139	8.665	0.305	0.0762	1.0000	1.132	1.32	2.65	29.1000	22.00	5
140	8.665	0.305	0.0759	1.0000	1.132	1.32	2.65	32.0000	22.00	5
141	8.665	0.305	0.0759	1.0000	1.132	1.32	2.65	23.3000	22.00	5
142	8.665	0.305	0.0759	1.0000	1.132	1.32	2.65	17.5000	22.00	5
143	23.417	0.305	0.1527	1.0000	1.132	1.32	2.65	63.0000	22.00	3
144	23.417	0.305	0.1567	1.0000	1.132	1.32	2.65	105.5000	22.20	3
145	23.417	0.305	0.1582	1.0000	1.132	1.32	2.65	65.7000	22.20	3
146	23.417	0.305	0.1600	1.0000	1.132	1.32	2.65	105.5000	22.20	3
147	23.417	0.305	0.1640	1.0000	1.132	1.32	2.65	57.1000	22.20	3
148	38.765	0.305	0.2271	1.0000	1.132	1.32	2.65	68.9000	22.40	3
149	38.765	0.305	0.2292	1.0000	1.132	1.32	2.65	95.6000	22.40	3
150	38.765	0.305	0.2429	1.0000	1.132	1.32	2.65	111.5000	22.40	3
151	38.765	0.305	0.2588	1.0000	1.132	1.32	2.65	45.2000	22.40	3
152	38.765	0.305	0.2606	1.0000	1.132	1.32	2.65	58.5000	22.40	3
153	8.665	0.305	0.0741	1.0000	0.982	1.44	2.65	17.5000	19.90	5
154	8.665	0.305	0.0750	1.0000	0.982	1.44	2.65	24.7000	19.90	5
155	8.665	0.305	0.0747	1.0000	0.982	1.44	2.65	30.6000	19.80	5
156	8.665	0.305	0.0753	1.0000	0.982	1.44	2.65	30.6000	19.80	5
157	8.665	0.305	0.0753	1.0000	0.982	1.44	2.65	30.6000	19.80	5
158	23.417	0.305	0.1521	1.0000	0.982	1.44	2.65	93.7000	19.60	3
159	23.417	0.305	0.1512	1.0000	0.982	1.44	2.65	124.4000	19.80	3
160	23.417	0.305	0.1573	1.0000	0.982	1.44	2.65	137.8000	19.80	3
161	23.417	0.305	0.1597	1.0000	0.982	1.44	2.65	120.1000	19.80	3
162	23.417	0.305	0.1585	1.0000	0.982	1.44	2.65	148.6000	19.80	3
163	38.765	0.305	0.2262	1.0000	0.982	1.44	2.65	78.0000	19.90	3
164	38.765	0.305	0.2326	1.0000	0.982	1.44	2.65	88.8000	19.90	3
165	38.765	0.305	0.2374	1.0000	0.982	1.44	2.65	112.9000	19.90	3

WSS - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936B)
(SHEET 4 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
166	38.765	0.305	0.2405	1.0000	0.982	1.44	2.65	126.2000	19.90	3
167	38.765	0.305	0.2405	1.0000	0.982	1.44	2.65	135.9000	20.00	3
168	8.665	0.305	0.0750	1.0000	0.937	1.30	2.65	11.6000	20.60	5
169	8.665	0.305	0.0753	1.0000	0.937	1.30	2.65	34.9000	20.60	5
170	8.665	0.305	0.0756	1.0000	0.937	1.30	2.65	32.0000	20.60	5
171	8.665	0.305	0.0753	1.0000	0.937	1.30	2.65	26.2000	20.60	5
172	8.665	0.305	0.0753	1.0000	0.937	1.30	2.65	23.3000	20.60	5
173	23.417	0.305	0.1521	1.0000	0.937	1.30	2.65	68.9000	21.00	3
174	23.417	0.305	0.1524	1.0000	0.937	1.30	2.65	88.8000	21.00	3
175	23.417	0.305	0.1628	1.0000	0.937	1.30	2.65	74.3000	21.00	3
176	23.417	0.305	0.1640	1.0000	0.937	1.30	2.65	100.7000	21.00	3
177	23.417	0.305	0.1634	1.0000	0.937	1.30	2.65	83.5000	20.80	3
178	38.765	0.305	0.2252	1.0000	0.937	1.30	2.65	77.7000	20.80	3
179	38.765	0.305	0.2338	1.0000	0.937	1.30	2.65	103.4000	20.80	3
180	38.765	0.305	0.2393	1.0000	0.937	1.30	2.65	157.7000	21.00	3
181	38.765	0.305	0.2429	1.0000	0.937	1.30	2.65	135.0000	21.00	3
182	38.765	0.305	0.2399	1.0000	0.937	1.30	2.65	42.6000	21.00	3
183	8.665	0.305	0.0753	1.0000	0.956	1.53	2.65	24.7000	21.10	5
184	8.665	0.305	0.0753	1.0000	0.956	1.53	2.65	30.6000	21.10	5
185	8.665	0.305	0.0753	1.0000	0.956	1.53	2.65	24.7000	21.10	5
186	8.665	0.305	0.0753	1.0000	0.956	1.53	2.65	24.7000	21.00	5
187	8.665	0.305	0.0753	1.0000	0.956	1.53	2.65	17.5000	21.00	5
188	23.417	0.305	0.1518	1.0000	0.956	1.53	2.65	89.9000	21.00	3
189	23.417	0.305	0.1597	1.0000	0.956	1.53	2.65	102.3000	20.80	3
190	23.417	0.305	0.1600	1.0000	0.956	1.53	2.65	61.9000	20.80	3
191	23.417	0.305	0.1612	1.0000	0.956	1.53	2.65	73.7000	20.80	3
192	23.417	0.305	0.1622	1.0000	0.956	1.53	2.65	88.3000	21.00	3
193	38.765	0.305	0.2292	1.0000	0.956	1.53	2.65	69.9000	21.00	3
194	38.765	0.305	0.2393	1.0000	0.956	1.53	2.65	86.5000	21.00	3
195	38.765	0.305	0.2499	1.0000	0.956	1.53	2.65	112.9000	21.00	3
196	38.765	0.305	0.2499	1.0000	0.956	1.53	2.65	131.7000	21.00	3
197	38.765	0.305	0.2444	1.0000	0.956	1.53	2.65	45.5000	21.00	3
198	8.665	0.305	0.0759	1.0000	0.956	1.53	2.65	18.9000	24.30	5
199	8.665	0.305	0.0762	1.0000	0.956	1.53	2.65	40.7000	24.30	5
200	8.665	0.305	0.0765	1.0000	0.956	1.53	2.65	36.4000	24.30	5
201	8.665	0.305	0.0771	1.0000	0.956	1.53	2.65	68.4000	24.40	5
202	8.665	0.305	0.0771	1.0000	0.956	1.53	2.65	68.4000	24.40	5
203	23.417	0.305	0.1533	1.0000	0.956	1.53	2.65	79.7000	24.30	3
204	23.417	0.305	0.1594	1.0000	0.956	1.53	2.65	88.8000	24.30	3
205	23.417	0.305	0.1631	1.0000	0.956	1.53	2.65	121.1000	24.30	3
206	23.417	0.305	0.1622	1.0000	0.956	1.53	2.65	102.3000	24.30	3
207	23.417	0.305	0.1625	1.0000	0.956	1.53	2.65	102.3000	24.50	3
208	38.765	0.305	0.2274	1.0000	0.956	1.53	2.65	88.5000	24.50	3
209	38.765	0.305	0.2377	1.0000	0.956	1.53	2.65	83.3000	24.60	3
210	38.765	0.305	0.2466	1.0000	0.956	1.53	2.65	104.4000	24.60	3
211	38.765	0.305	0.2460	1.0000	0.956	1.53	2.65	109.3000	24.60	3
212	38.765	0.305	0.2493	1.0000	0.956	1.53	2.65	82.9000	24.60	3
213	8.665	0.305	0.0750	1.0000	0.934	1.63	2.65	11.6000	21.00	5
214	8.665	0.305	0.0753	1.0000	0.934	1.63	2.65	17.5000	21.00	5
215	8.665	0.305	0.0756	1.0000	0.934	1.63	2.65	30.6000	21.00	5
216	8.665	0.305	0.0753	1.0000	0.934	1.63	2.65	30.6000	21.00	5
217	8.665	0.305	0.0753	1.0000	0.934	1.63	2.65	24.7000	21.00	5
218	23.417	0.305	0.1524	1.0000	0.934	1.63	2.65	89.9000	20.90	3
219	23.417	0.305	0.1536	1.0000	0.934	1.63	2.65	101.7000	20.90	3
220	23.417	0.305	0.1533	1.0000	0.934	1.63	2.65	129.2000	20.90	3

WSS - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936B)
(SHEET 5 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
221	23.417	0.305	0.1582	1.0000	0.934	1.63	2.65	75.9000	21.00	3
222	23.417	0.305	0.1597	1.0000	0.934	1.63	2.65	111.4000	21.00	3
223	38.765	0.305	0.2252	1.0000	0.934	1.63	2.65	75.5000	21.00	3
224	38.765	0.305	0.2301	1.0000	0.934	1.63	2.65	78.0000	21.00	3
225	38.765	0.305	0.2393	1.0000	0.934	1.63	2.65	126.5000	21.00	3
226	38.765	0.305	0.2475	1.0000	0.934	1.63	2.65	126.5000	21.00	3
227	38.765	0.305	0.2448	1.0000	0.934	1.63	2.65	86.5000	21.00	3
228	8.665	0.305	0.0756	1.0000	0.908	1.75	2.65	24.7000	22.30	5
229	8.665	0.305	0.0765	1.0000	0.908	1.75	2.65	36.4000	22.20	5
230	8.665	0.305	0.0765	1.0000	0.908	1.75	2.65	46.6000	22.60	5
231	8.665	0.305	0.0762	1.0000	0.908	1.75	2.65	36.4000	22.60	5
232	8.665	0.305	0.0762	1.0000	0.908	1.75	2.65	30.6000	22.60	5
233	23.417	0.305	0.1509	1.0000	0.908	1.75	2.65	75.4000	22.60	3
234	23.417	0.305	0.1530	1.0000	0.908	1.75	2.65	102.8000	22.60	3
235	23.417	0.305	0.1554	1.0000	0.908	1.75	2.65	78.1000	22.70	3
236	23.417	0.305	0.1539	1.0000	0.908	1.75	2.65	91.5000	22.80	3
237	23.417	0.305	0.1548	1.0000	0.908	1.75	2.65	64.6000	22.80	3
238	38.765	0.305	0.2295	1.0000	0.908	1.75	2.65	83.6000	22.80	3
239	38.765	0.305	0.2307	1.0000	0.908	1.75	2.65	108.0000	22.80	3
240	38.765	0.305	0.2356	1.0000	0.908	1.75	2.65	71.6000	22.50	3
241	38.765	0.305	0.2393	1.0000	0.908	1.75	2.65	109.3000	22.50	3
242	38.765	0.305	0.2481	1.0000	0.908	1.75	2.65	111.9000	22.40	3
243	8.665	0.305	0.0750	1.0000	0.908	1.75	2.65	29.1000	22.40	5
244	8.665	0.305	0.0756	1.0000	0.908	1.75	2.65	30.6000	22.40	5
245	8.665	0.305	0.0753	1.0000	0.908	1.75	2.65	30.6000	22.40	5
246	8.665	0.305	0.0753	1.0000	0.908	1.75	2.65	24.7000	22.40	5
247	8.665	0.305	0.0753	1.0000	0.908	1.75	2.65	18.9000	22.40	5
248	23.417	0.305	0.1527	1.0000	0.908	1.75	2.65	96.9000	22.40	3
249	23.417	0.305	0.1554	1.0000	0.908	1.75	2.65	84.5000	22.40	3
250	23.417	0.305	0.1576	1.0000	0.908	1.75	2.65	106.6000	22.40	3
251	23.417	0.305	0.1591	1.0000	0.908	1.75	2.65	80.2000	22.20	3
252	38.765	0.305	0.2268	1.0000	0.908	1.75	2.65	88.5000	22.20	3
253	38.765	0.305	0.2326	1.0000	0.908	1.75	2.65	118.7000	22.20	3
254	38.765	0.305	0.2374	1.0000	0.908	1.75	2.65	91.4000	22.20	3
255	38.765	0.305	0.2368	1.0000	0.908	1.75	2.65	121.0000	22.20	3
256	38.765	0.305	0.2478	1.0000	0.908	1.75	2.65	83.5000	22.30	3
257	8.665	0.305	0.0762	1.0000	0.703	1.29	2.65	58.2000	22.50	3
258	8.665	0.305	0.0765	1.0000	0.703	1.29	2.65	69.8000	22.50	3
259	8.665	0.305	0.0771	1.0000	0.703	1.29	2.65	64.0000	22.50	3
260	8.665	0.305	0.0771	1.0000	0.703	1.29	2.65	109.1000	22.60	3
261	8.665	0.305	0.0768	1.0000	0.703	1.29	2.65	75.7000	22.60	3
262	23.417	0.305	0.1506	1.0000	0.703	1.29	2.65	138.9000	22.60	3
263	23.417	0.305	0.1640	1.0000	0.703	1.29	2.65	132.4000	22.60	3
264	23.417	0.305	0.1701	1.0000	0.703	1.29	2.65	141.1000	20.80	3
265	23.417	0.305	0.1725	1.0000	0.703	1.29	2.65	88.3000	20.80	3
266	23.417	0.305	0.1743	1.0000	0.703	1.29	2.65	141.8000	20.80	3
267	38.765	0.305	0.2274	1.0000	0.703	1.29	2.65	84.2000	20.80	3
268	38.765	0.305	0.2368	1.0000	0.703	1.29	2.65	108.6000	20.90	3
269	38.765	0.305	0.2551	1.0000	0.703	1.29	2.65	57.9000	20.80	3
270	38.765	0.305	0.2640	1.0000	0.703	1.29	2.65	76.4000	20.80	3
271	38.765	0.305	0.2643	1.0000	0.703	1.29	2.65	115.1000	20.80	3
272	8.665	0.305	0.0747	1.0000	0.547	1.60	2.65	59.7000	21.20	5
273	8.665	0.305	0.0747	1.0000	0.547	1.60	2.65	59.7000	21.20	5
274	8.665	0.305	0.0744	1.0000	0.547	1.60	2.65	72.8000	21.20	3
275	8.665	0.305	0.0744	1.0000	0.547	1.60	2.65	59.7000	21.20	3

WSS - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1936B)
(SHEET 6 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
276	8.665	0.305	0.0747	1.0000	0.547	1.60	2.65	53.8000	21.20	3
277	23.417	0.305	0.1472	1.0000	0.547	1.60	2.65	137.8000	21.50	3
278	23.417	0.305	0.1588	1.0000	0.547	1.60	2.65	138.9000	21.50	3
279	23.417	0.305	0.1634	1.0000	0.547	1.60	2.65	150.7000	21.50	3
280	23.417	0.305	0.1628	1.0000	0.547	1.60	2.65	137.8000	21.60	3
281	23.417	0.305	0.1637	1.0000	0.547	1.60	2.65	150.7000	21.60	3
282	38.765	0.305	0.2252	1.0000	0.547	1.60	2.65	87.2000	21.50	3
283	38.765	0.305	0.2414	1.0000	0.547	1.60	2.65	96.6000	21.50	3
284	38.765	0.305	0.2582	1.0000	0.547	1.60	2.65	87.2000	21.50	3
285	38.765	0.305	0.2813	1.0000	0.547	1.60	2.65	99.2000	21.50	3
286	8.665	0.305	0.0750	1.0000	0.685	1.61	2.65	55.3000	21.50	5
287	8.665	0.305	0.0750	1.0000	0.685	1.61	2.65	77.1000	21.50	5
288	8.665	0.305	0.0753	1.0000	0.685	1.61	2.65	65.5000	21.60	5
289	8.665	0.305	0.0771	1.0000	0.685	1.61	2.65	52.4000	21.60	5
290	8.665	0.305	0.0768	1.0000	0.685	1.61	2.65	55.3000	21.60	5
291	23.417	0.305	0.1506	1.0000	0.685	1.61	2.65	102.8000	21.60	3
292	23.417	0.305	0.1676	1.0000	0.685	1.61	2.65	111.4000	21.60	3
293	23.417	0.305	0.1756	1.0000	0.685	1.61	2.65	164.2000	21.70	3
294	23.417	0.305	0.1698	1.0000	0.685	1.61	2.65	183.0000	21.60	3
295	38.765	0.305	0.2265	1.0000	0.685	1.61	2.65	82.6000	21.80	3
296	38.765	0.305	0.2429	1.0000	0.685	1.61	2.65	89.4000	21.80	3
297	38.765	0.305	0.2603	1.0000	0.685	1.61	2.65	87.2000	21.90	3
298	38.765	0.305	0.2633	1.0000	0.685	1.61	2.65	105.4000	21.90	3
299	38.765	0.305	0.2676	1.0000	0.685	1.61	2.65	121.0000	21.90	3
300	8.665	0.305	0.0744	1.0000	0.455	1.77	2.65	55.3000	23.50	5
301	8.665	0.305	0.0735	1.0000	0.455	1.77	2.65	59.7000	23.50	5
302	8.665	0.305	0.0741	1.0000	0.455	1.77	2.65	68.4000	23.50	5
303	8.665	0.305	0.0735	1.0000	0.455	1.77	2.65	68.4000	23.50	5
304	8.665	0.305	0.0732	1.0000	0.455	1.77	2.65	66.9000	23.50	5
305	23.417	0.305	0.1518	1.0000	0.455	1.77	2.65	92.1000	23.80	3
306	23.417	0.305	0.1533	1.0000	0.455	1.77	2.65	170.7000	23.80	3
307	23.417	0.305	0.1618	1.0000	0.455	1.77	2.65	141.1000	23.80	3
308	23.417	0.305	0.1594	1.0000	0.455	1.77	2.65	137.8000	24.00	3
309	23.417	0.305	0.1576	1.0000	0.455	1.77	2.65	92.1000	24.00	3
310	38.765	0.305	0.2234	1.0000	0.455	1.77	2.65	70.9000	24.00	3
311	38.765	0.305	0.2371	1.0000	0.455	1.77	2.65	120.7000	24.00	3
312	38.765	0.305	0.2524	1.0000	0.455	1.77	2.65	131.4000	24.20	3
313	38.765	0.305	0.2566	1.0000	0.455	1.77	2.65	119.7000	24.40	3

WTT - DATA OF U.S. WATERWAYS EXPERIMENT STATION (1935B)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	6.569	0.305	0.0610	1.0000	0.500	1.86	2.65	76.3080	15.98	0
2	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	125.8540	13.02	0
3	6.569	0.305	0.0610	1.0000	0.500	1.86	2.65	66.4000	16.70	0
4	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	174.2930	19.18	0
5	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	160.5690	20.51	0
6	6.569	0.305	0.0610	1.0000	0.500	1.86	2.65	74.9770	21.55	0
7	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	236.7140	23.03	0
8	6.569	0.305	0.0610	1.0000	0.500	1.86	2.65	68.3300	24.02	0
9	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	251.9300	25.23	0
10	6.569	0.305	0.0610	1.0000	0.500	1.86	2.65	77.0500	25.03	0
11	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	265.9910	24.35	0
12	6.569	0.305	0.0610	1.0000	0.500	1.86	2.65	75.3860	24.00	0
13	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	287.0498	24.06	0
14	6.569	0.305	0.0610	1.0000	0.500	1.86	2.65	75.1500	24.00	0
15	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	267.7598	23.02	0
16	6.569	0.305	0.0610	1.0000	0.500	1.86	2.65	82.1830	23.52	0
17	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	231.1670	24.03	0
18	6.569	0.305	0.0610	1.0000	0.500	1.86	2.65	65.2670	23.10	0
19	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	278.3398	24.00	0
20	6.569	0.305	0.0610	1.0000	0.500	1.86	2.65	80.5800	25.00	0
21	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	277.7798	25.50	0
22	6.569	0.305	0.0610	1.0000	0.500	1.86	2.65	89.0400	25.50	0
23	23.870	0.305	0.1524	1.0000	0.500	1.86	2.65	272.5198	25.72	0

ZNA - DATA OF ZNAMENSKAYA, N.S. (1963)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	20.000	0.500	0.0730	2.2600	0.800	1.60	2.65	250.0000	-1.00	3
2	20.500	0.500	0.0710	2.3200	0.800	1.60	2.65	480.7000	-1.00	3
3	17.000	0.500	0.0540	3.2100	0.800	1.60	2.65	1175.0000	-1.00	3
4	17.500	0.500	0.0440	6.6000	0.800	1.60	2.65	2290.0000	-1.00	6
5	37.200	0.500	0.1340	3.0000	0.800	1.60	2.65	269.0000	-1.00	3
6	37.200	0.500	0.1200	3.2000	0.800	1.60	2.65	538.0000	-1.00	3
7	37.200	0.500	0.1060	4.0300	0.800	1.60	2.65	1075.0000	-1.00	3
8	37.200	0.500	0.0950	4.7000	0.800	1.60	2.65	1344.0000	-1.00	3
9	60.900	0.500	0.1900	2.0000	0.800	1.60	2.65	164.0000	-1.00	3
10	60.900	0.500	0.2040	3.3000	0.800	1.60	2.65	328.0000	-1.00	3
11	60.900	0.500	0.1790	2.7000	0.800	1.60	2.65	657.0000	-1.00	3
12	60.900	0.500	0.1600	4.1000	0.800	1.60	2.65	984.0000	-1.00	3
13	60.900	0.500	0.1530	5.2000	0.800	1.60	2.65	1313.0000	-1.00	3
14	35.400	0.500	0.1340	1.4900	0.800	1.60	2.65	565.0000	-1.00	3
15	36.400	0.500	0.1230	2.5000	0.800	1.60	2.65	550.0000	-1.00	3
16	35.400	0.500	0.1120	3.0800	0.800	1.60	2.65	283.0000	-1.00	3
17	35.400	0.500	0.0970	3.0000	0.800	1.60	2.65	565.0000	-1.00	3
18	36.600	0.500	0.0860	4.3600	0.800	1.60	2.65	1090.0000	-1.00	6
19	36.600	0.500	0.0750	3.6000	0.800	1.60	2.65	1365.0000	-1.00	6
20	19.400	0.500	0.0808	1.1800	0.800	1.60	2.65	129.0000	-1.00	3
21	19.500	0.500	0.0795	1.3300	0.800	1.60	2.65	256.0000	-1.00	3
22	20.000	0.500	0.0740	2.1200	0.800	1.60	2.65	500.0000	-1.00	3
23	20.000	0.500	0.0600	3.1000	0.800	1.60	2.65	1000.0000	-1.00	3
24	20.000	0.500	0.0580	4.4000	0.800	1.60	2.65	2000.0000	-1.00	3
25	20.000	0.500	0.0500	6.2000	0.800	1.60	2.65	3000.0000	-1.00	6
26	19.800	0.500	0.0680	1.5000	0.800	1.60	2.65	126.0000	-1.00	3
27	10.500	0.500	0.0580	3.2500	0.180	3.30	2.65	238.0000	-1.00	3
28	9.800	0.500	0.0500	2.8000	0.180	3.30	2.65	510.0000	-1.00	3
29	29.400	0.500	0.1320	1.4800	0.180	3.30	2.65	85.0000	-1.00	3
30	29.800	0.500	0.1410	1.5300	0.180	3.30	2.65	168.0000	-1.00	3
31	30.000	0.500	0.1220	1.6600	0.180	3.30	2.65	150.0000	-1.00	3
32	30.000	0.500	0.1150	1.8000	0.180	3.30	2.65	500.0000	-1.00	3
33	29.800	0.500	0.0920	3.5000	0.180	3.30	2.65	1007.0000	-1.00	6
34	30.400	0.500	0.0860	2.0700	0.180	3.30	2.65	1975.0000	-1.00	5
35	18.500	0.500	0.0400	8.0000	0.180	3.30	2.65	3240.0000	-1.00	7
36	9.200	0.500	0.0820	2.7900	0.180	3.30	2.65	272.0000	-1.00	3

FIELD DATA

ACP - ACOP CANAL DATA OF MAHMOOD, ET AL.(1979)
(SHEET 1 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	54736.465	35.662	2.1946	0.0892	0.124	1.22	2.65	560.0000	16.00	0
2	51904.777	35.662	2.1946	0.0861	0.136	1.28	2.65	386.0000	17.50	0
3	51876.465	35.357	2.1946	0.0856	0.123	1.22	2.65	422.0000	17.00	0
4	54368.348	35.357	2.1946	0.0853	0.129	1.25	2.65	367.0000	18.00	0
5	52924.188	35.357	2.1641	0.0853	0.132	1.27	2.65	153.0000	18.00	0
6	85205.375	47.854	2.1031	0.1315	0.168	1.21	2.65	322.0000	21.00	0
7	90415.688	49.378	2.1336	0.1533	0.173	1.22	2.65	517.0000	21.00	0
8	79173.875	46.939	2.4384	0.0952	0.142	1.23	2.65	383.0000	21.00	0
9	55161.219	35.966	2.2250	0.0848	0.112	1.25	2.65	298.0000	22.00	0
10	72661.000	46.634	2.3165	0.1155	0.150	1.23	2.65	142.0000	24.50	0
11	56293.891	35.966	2.2860	0.0756	0.138	1.34	2.65	184.0000	24.00	0
12	81524.188	49.073	2.1336	0.1522	0.182	1.24	2.65	399.0000	20.00	0
13	70395.625	46.634	2.3165	0.1160	0.144	1.25	2.65	323.0000	29.00	0
14	86338.063	49.378	2.1641	0.1465	0.170	1.22	2.65	1007.0000	29.00	0
15	55642.602	35.662	2.3470	0.0766	0.113	1.32	2.65	511.0000	28.00	0
16	71924.750	46.634	2.3165	0.1124	0.148	1.23	2.65	796.0000	28.00	0
17	85318.625	49.073	2.1641	0.1466	0.172	1.22	2.65	-1.0000	28.00	0
18	74841.375	46.634	2.2860	0.1071	0.152	1.20	2.65	304.0000	28.40	0
19	75322.750	46.330	2.2860	0.1040	0.161	1.18	2.65	240.0000	28.00	0
20	72661.000	46.634	2.3470	0.1123	0.156	1.19	2.65	310.0000	29.00	0
21	74218.438	46.634	2.2860	0.1136	0.155	1.17	2.65	333.0000	27.50	0
22	75832.500	46.330	2.3470	0.1052	0.162	1.17	2.65	-1.0000	28.00	0
23	74105.188	46.634	2.2250	0.1155	0.142	1.24	2.65	233.0000	32.00	0
24	78550.938	46.634	2.3165	0.1067	0.149	1.20	2.65	385.0000	31.50	3
25	75860.813	46.634	2.3165	0.1145	0.148	1.23	2.65	351.0000	31.00	0
26	77276.625	46.634	2.2555	0.1091	0.147	1.22	2.65	577.0000	31.00	0
27	77106.750	46.330	2.2555	0.1083	0.149	1.22	2.65	289.0000	31.00	0
28	73595.438	46.634	2.2555	0.1107	0.145	1.23	2.65	335.0000	31.00	0
29	83308.125	49.073	2.0726	0.1445	0.179	1.25	2.65	122.0000	32.00	0
30	87499.000	49.378	2.1946	0.1435	0.176	1.23	2.65	328.0000	32.00	0
31	58332.703	35.966	2.4689	0.0872	0.122	1.25	2.65	166.0000	29.00	0
32	67705.563	46.634	2.1641	0.1104	0.147	1.24	2.65	372.0000	36.00	0
33	52131.313	35.662	2.2860	0.0753	0.110	1.25	2.65	156.0000	32.00	0
34	75690.875	49.073	2.1641	0.1479	0.193	1.25	2.65	98.0000	34.00	0
35	52131.313	49.073	1.4326	0.1478	0.140	1.20	2.65	445.0000	31.00	0
36	56803.602	46.330	1.9202	0.1088	0.144	1.25	2.65	225.0000	30.00	0
37	47827.152	46.330	1.7983	0.1080	0.169	1.25	2.65	215.0000	31.60	0
38	44004.379	48.768	1.3411	0.1446	0.177	1.20	2.65	94.0000	31.00	0
39	29591.102	35.662	1.6764	0.0854	0.085	1.31	2.65	103.0000	31.00	0
40	49639.430	46.634	1.6764	0.1099	0.147	1.19	2.65	36.0000	30.00	0
41	84016.063	49.378	2.1641	0.1456	0.167	1.29	2.65	56.0000	31.00	3
42	70027.563	47.244	2.1641	0.1156	0.153	1.19	2.65	48.0000	30.40	3
43	67110.875	46.939	2.1336	0.1121	0.152	1.24	2.65	54.0000	30.00	0
44	70424.000	46.634	2.1946	0.1153	0.143	1.25	2.65	82.0000	30.00	0
45	52414.480	35.662	2.5298	0.0763	0.117	1.18	2.65	128.0000	28.00	3
46	61730.723	35.662	2.5298	0.0735	0.127	1.20	2.65	79.0000	29.00	0
47	67847.125	46.634	2.1336	0.1243	0.159	1.19	2.65	146.0000	25.00	0
48	70395.625	46.634	2.1641	0.1005	0.142	1.25	2.65	346.0000	25.00	3
49	70707.125	46.634	2.1641	0.0993	0.146	1.25	2.65	366.0000	25.00	3
50	69178.000	46.939	2.1641	0.1023	0.164	1.24	2.65	262.0000	25.00	0
51	65921.563	46.634	2.1641	0.1067	0.151	1.26	2.65	290.0000	25.00	3
52	80193.250	49.073	2.0422	0.1475	0.178	1.23	2.65	69.0000	25.00	3
53	71301.813	46.634	2.1031	0.1043	0.211	1.38	2.65	79.0000	24.00	3
54	68130.313	46.025	2.0726	0.1273	0.149	1.21	2.65	529.0000	21.20	3
55	52471.117	35.357	2.2860	0.0884	0.123	1.23	2.65	869.0000	23.60	5

ACP - ACOP CANAL DATA OF MAHMOOD, ET AL.(1979)
(SHEET 2 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	50602.199	35.662	2.2250	0.0742	0.128	1.23	2.65	54.0000	24.00	5
57	51423.395	35.662	2.3165	0.0702	0.114	1.22	2.65	76.0000	23.00	5
58	48620.027	35.662	2.3165	0.0715	0.116	1.26	2.65	32.0000	23.00	0
59	52272.898	35.357	2.2555	0.0730	0.121	1.27	2.65	58.0000	23.00	0
60	54141.813	35.357	2.2555	0.0674	0.112	1.25	2.65	61.0000	21.00	0
61	86536.250	49.682	2.1641	0.1544	0.207	1.30	2.65	71.0000	16.50	3
62	89481.188	49.682	2.1641	0.1539	0.185	1.29	2.65	104.0000	16.00	0
63	86253.063	49.682	2.2250	0.1543	0.186	1.25	2.65	167.0000	17.00	3
64	79598.625	50.597	2.1336	0.1543	0.191	1.25	2.65	279.0000	16.00	0
65	56888.547	47.244	2.0422	0.1481	0.145	1.21	2.65	-1.0000	16.00	4
66	68781.625	47.244	2.2250	0.1472	0.155	1.16	2.65	845.0000	16.00	3
67	68838.250	47.854	2.1946	0.1476	0.152	1.18	2.65	410.0000	15.00	3
68	63769.543	47.549	2.1641	0.1504	0.156	1.17	2.65	110.0000	16.00	0
69	68923.188	124.968	1.4630	0.0451	0.195	1.50	2.65	5.0000	18.60	0
70	136317.250	127.406	1.7678	0.0859	0.133	1.42	2.65	34.0000	27.70	0
71	146624.625	126.492	1.7069	0.0873	0.198	1.60	2.65	48.0000	30.00	0
72	279798.750	135.941	2.3165	0.1122	0.293	1.37	2.65	123.0000	27.70	4
73	363333.438	128.016	2.7737	0.0931	0.260	1.38	2.65	265.0000	26.40	0
74	450804.188	131.978	3.0175	0.1487	0.199	1.39	2.65	-1.0000	26.60	0
75	458081.625	131.369	3.0480	0.1500	0.226	1.47	2.65	-1.0000	27.20	0
76	297157.000	128.321	2.5603	0.0965	0.154	1.16	2.65	2083.0000	25.00	0
77	291267.063	128.626	2.5908	0.0996	0.176	1.33	2.65	115.0000	22.70	0
78	297411.875	129.235	2.6213	0.0978	0.187	1.36	2.65	229.0000	19.40	0
79	110124.188	125.578	1.8593	0.0862	0.241	1.44	2.65	19.0000	17.20	0
80	207619.125	126.187	2.1641	0.0988	0.273	1.41	2.65	49.0000	13.90	0
81	222089.000	128.016	2.2555	0.1038	0.226	1.42	2.65	97.0000	12.20	0
82	233104.250	140.208	2.0726	0.0978	0.206	1.34	2.65	268.0000	12.40	5
83	179557.125	124.358	2.0422	0.1123	0.223	1.39	2.65	52.0000	21.10	0
84	41880.613	99.060	1.0058	0.0982	0.163	1.28	2.65	-1.0000	15.60	0
85	29477.836	93.269	0.7620	0.0882	0.152	1.46	2.65	16.0000	16.70	0
86	27495.656	86.258	0.9144	0.1418	0.128	1.59	2.65	15.0000	18.30	0
87	28769.918	85.649	0.9144	0.1240	0.154	1.56	2.65	13.0000	17.80	0
88	75605.938	88.392	1.4630	0.0915	0.092	1.32	2.65	-1.0000	23.90	0
89	78919.000	99.670	1.3411	0.1042	0.167	1.50	2.65	88.0000	25.50	0
90	77984.563	94.183	1.4326	0.1419	0.142	1.37	2.65	-1.0000	24.40	0
91	85290.313	88.392	1.4630	0.1293	0.164	1.53	2.65	132.0000	26.00	0
92	80561.375	100.279	1.3716	0.0908	0.175	1.64	2.65	-1.0000	25.00	0
93	74303.375	94.793	1.4935	0.1424	0.146	1.29	2.65	77.0000	26.10	0
94	90528.938	88.392	1.5240	0.1370	0.148	1.55	2.65	183.0000	27.80	0
95	94266.750	88.392	1.4630	0.1370	0.084	1.27	2.65	190.0000	27.80	5
96	92794.313	100.889	1.4021	0.1058	0.154	1.52	2.65	106.0000	26.70	4
97	151240.250	90.221	1.8898	0.1518	0.116	1.29	2.65	188.0000	28.90	0
98	166871.125	90.526	1.8898	0.1133	0.179	1.36	2.65	319.0000	28.30	0
99	391055.625	92.050	3.6576	0.1500	0.157	1.34	2.65	342.0000	30.00	0
100	380578.438	101.498	2.8956	0.1050	0.182	1.34	2.65	57.0000	30.00	0
101	183832.938	91.135	2.1946	0.1376	0.173	1.56	2.65	373.0000	26.00	0
102	98939.000	86.563	1.6459	0.1271	0.167	1.49	2.65	232.0000	25.90	0
103	99477.063	86.563	1.6459	0.1292	0.192	1.55	2.65	289.0000	25.80	0
104	96588.750	86.563	1.6154	0.1387	0.131	1.41	2.65	331.0000	25.80	0
105	346711.500	110.642	3.3223	0.1234	0.252	1.34	2.65	71.0000	14.00	0
106	355716.250	116.738	3.2614	0.1093	0.299	1.35	2.65	42.0000	13.70	3
107	357755.000	111.252	3.5357	0.1246	0.201	1.34	2.65	162.0000	14.50	0
108	428150.750	113.995	3.6881	0.1217	0.210	1.30	2.65	54.0000	13.00	0
109	388054.000	121.920	3.6576	0.1075	0.331	1.39	2.65	18.0000	-1.00	0
110	387686.000	122.225	3.7186	0.1070	0.279	1.37	2.65	32.0000	15.00	0

ACP - ACOP CANAL DATA OF MAHMOOD, ET AL.(1979)
(SHEET 3 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	337281.875	116.434	3.2004	0.1120	0.289	1.37	2.65	39.0000	14.60	0
112	375651.250	125.882	3.8100	0.1161	0.268	1.49	2.65	17.0000	-1.00	0
113	371800.188	113.386	3.5052	0.1203	0.234	1.37	2.65	493.0000	14.80	0
114	404619.375	114.300	3.5662	0.1186	0.197	1.31	2.65	614.0000	14.00	0
115	392698.000	119.786	3.5662	0.1116	0.275	1.40	2.65	94.0000	14.00	0
116	362908.688	120.091	3.5662	0.1115	0.272	1.36	2.65	116.0000	14.90	0
117	363644.938	110.947	3.4442	0.1196	0.275	1.38	2.65	103.0000	15.80	0
118	394765.125	117.653	3.5357	0.1132	0.279	1.33	2.65	44.0000	16.40	0
119	481924.375	123.444	4.2977	0.0788	0.364	1.28	2.65	29.0000	18.10	0
120	393207.688	111.862	3.5662	0.1208	0.242	1.29	2.65	108.0000	23.80	0
121	412718.000	118.262	3.5966	0.1205	0.220	1.29	2.65	57.0000	21.00	0
122	412038.438	111.862	3.6271	0.1192	0.170	1.23	2.65	218.0000	24.70	0
123	414473.625	111.557	3.6881	0.1212	0.214	1.29	2.65	86.0000	23.10	0
124	412293.250	118.262	3.6271	0.1195	0.233	1.27	2.65	106.0000	23.30	0
125	423251.875	118.262	3.6271	0.1206	0.258	1.30	2.65	59.0000	23.90	4
126	395133.250	113.081	3.8100	0.0606	0.222	1.26	2.65	89.0000	26.90	0
127	417418.625	112.471	3.6576	0.1167	0.202	1.25	2.65	114.0000	25.40	0
128	528675.625	123.444	3.7186	0.0551	0.113	1.27	2.65	95.0000	23.40	0
129	349967.875	112.166	3.4747	0.1115	0.205	1.30	2.65	106.0000	13.10	0
130	349458.188	111.557	3.4138	0.1207	0.230	1.41	2.65	44.0000	15.00	3
131	342945.375	110.947	3.2918	0.1193	0.250	1.43	2.65	33.0000	16.20	0
132	267650.813	117.348	2.8042	0.1124	0.313	1.40	2.65	65.0000	18.00	3
133	321509.500	119.786	3.4138	0.0876	0.169	1.43	2.65	138.0000	14.00	0
134	441289.750	120.396	4.0843	0.0927	0.208	1.31	2.65	181.0000	23.00	0
135	451398.875	121.920	4.2367	0.0975	0.202	1.39	2.65	67.0000	27.00	0
136	486823.250	123.444	4.2672	0.1026	0.199	1.53	2.65	205.0000	29.00	3
137	224439.313	120.701	2.4994	0.0819	0.195	1.75	2.65	65.0000	31.00	0
138	158092.938	118.872	2.2250	0.0695	0.083	1.26	2.65	369.0000	28.00	5
139	139743.625	71.933	2.2250	0.1067	0.149	1.30	2.65	391.0000	25.00	0
140	76936.875	69.494	1.8288	0.1321	0.108	1.52	2.65	125.0000	27.00	0
141	97438.250	70.409	2.1031	0.1343	0.147	1.33	2.65	164.0000	26.00	0
142	110718.875	71.018	2.1641	0.1369	0.179	1.29	2.65	481.0000	26.00	0
143	130455.688	70.409	2.3470	0.1292	0.125	1.56	2.65	297.0000	25.00	0
144	140140.063	70.104	2.3470	0.1337	0.126	1.40	2.65	564.0000	28.00	0
145	137818.063	69.190	2.3774	0.1330	0.132	1.40	2.65	607.0000	28.00	0
146	138044.625	70.409	2.4079	0.1490	0.118	1.39	2.65	563.0000	26.00	0
147	156478.875	72.238	2.4079	0.1493	0.161	1.28	2.65	228.0000	26.80	4
148	153817.063	71.628	2.3470	0.1658	0.144	1.29	2.65	584.0000	26.00	3
149	153307.375	70.714	2.1031	0.1347	0.174	1.49	2.65	419.0000	30.00	4
150	169674.500	70.714	1.8898	0.1336	0.164	1.42	2.65	872.0000	30.00	0
151	169079.875	72.238	2.4689	0.1214	0.162	1.30	2.65	169.0000	28.00	0

AMC - AMERICAN CANAL DATA OF SIMONS, D.B. (1957)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	5011.930	7.620	0.8900	0.3300	0.580	2.21	2.65	448.0000	26.11	4
2	29193.785	22.189	2.5268	0.0580	0.253	2.19	2.65	115.0000	22.22	3
3	12600.613	11.735	1.8318	0.0630	0.096	3.45	2.65	370.0000	23.22	5
4	4142.629	9.327	1.0698	0.1350	0.318	2.78	2.65	254.0000	25.00	3
5	4836.367	10.729	0.8870	0.2370	0.465	2.69	2.65	52.0000	26.11	3
6	25003.020	15.118	2.4018	0.1810	7.000	13.83	2.65	99.1000	16.67	5
7	29420.313	14.813	2.5908	0.1200	0.311	2.21	2.65	185.0000	21.67	3
8	1557.380	3.505	0.7955	0.2530	0.173	3.49	2.65	249.0000	20.56	4
9	1217.588	3.200	0.8047	0.2940	0.229	3.85	2.65	406.0000	21.11	3
10	5623.555	7.589	1.0089	0.3020	0.715	2.01	2.65	123.0000	22.78	4
11	3199.707	3.962	1.3198	0.1100	0.349	3.29	2.65	44.0000	26.11	5

ATC - ATCHAFALAYA RIVER DATA OF TOFFALETI,F.B. (1968)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	14186313.000	503.224	14.7218	0.0492	0.182	1.44	2.65	501.2229	15.00	0
2	13846521.000	483.717	14.1122	0.0503	0.167	1.33	2.65	474.0798	21.11	0
3	12572301.000	476.097	14.2037	0.0465	0.170	1.37	2.65	365.0718	21.11	0
4	12147561.000	457.200	13.7465	0.0505	0.226	1.68	2.65	280.5669	16.67	0
5	12005981.000	457.200	13.4112	0.0513	0.226	1.63	2.65	178.1120	17.78	0
6	11779453.000	469.696	14.5390	0.0445	0.288	1.90	2.65	260.3569	20.56	0
7	11637873.000	468.782	14.7523	0.0445	0.268	1.79	2.65	231.9380	16.11	0
8	11496293.000	454.152	13.2893	0.0500	0.261	1.63	2.65	567.3428	18.33	0
9	11241449.000	454.152	13.1674	0.0479	0.186	1.47	2.65	333.5479	15.00	0
10	10222073.000	451.104	13.2283	0.0443	0.188	1.47	2.65	342.6638	12.22	0
11	9542490.000	448.056	13.8684	0.0453	0.230	1.75	2.65	59.6550	20.00	0
12	9174382.000	417.576	13.3807	0.0416	0.184	1.53	2.65	386.9468	11.67	0
13	8664694.000	435.864	12.9540	0.0414	0.288	1.71	2.65	156.4890	22.22	0
14	8523114.000	435.864	12.8016	0.0380	0.161	1.34	2.65	179.4220	7.78	0
15	8523114.000	412.394	13.8074	0.0398	0.191	1.51	2.65	236.9700	10.00	0
16	8438166.000	408.432	11.6434	0.0385	0.137	1.43	2.65	404.5269	8.89	0
17	8353218.000	414.528	12.0701	0.0425	0.218	1.62	2.65	193.6330	18.33	0
18	8041742.000	406.298	13.6246	0.0374	0.179	1.49	2.65	222.2910	25.56	0
19	7985110.000	438.912	11.8567	0.0375	0.176	1.39	2.65	206.9000	8.33	0
20	7786898.000	411.479	10.8814	0.0380	0.146	1.53	2.65	102.3740	7.78	0
21	6852470.000	402.336	11.0033	0.0336	0.159	1.27	2.65	183.4670	7.22	0
22	6597626.000	393.192	12.8626	0.0342	0.174	2.00	2.65	145.8210	28.89	0
23	5493302.000	408.432	11.2471	0.0362	0.123	1.78	2.65	119.6890	33.89	0
24	5380038.000	405.384	10.8814	0.0346	0.228	1.70	2.65	74.4770	25.56	0
25	4983614.000	387.096	9.4183	0.0276	0.105	1.91	2.65	251.6350	7.78	0
26	4615507.000	390.144	9.0526	0.0277	0.158	1.28	2.65	231.6540	5.00	0
27	4162451.000	396.240	10.5461	0.0310	0.123	1.78	2.65	33.3070	33.33	0
28	3850975.000	340.461	10.8509	0.0204	0.303	1.85	2.65	121.7760	8.33	0
29	3624447.000	368.808	8.1077	0.0236	0.159	1.52	2.65	174.4480	9.44	0
30	3624447.000	390.144	10.0889	0.0323	0.123	1.78	2.65	57.0870	33.89	0
31	3539499.000	365.760	8.3210	0.0226	0.123	1.74	2.65	207.7150	9.44	0
32	3482867.000	350.520	9.2964	0.0197	0.183	1.48	2.65	60.6140	22.22	0
33	3397919.000	373.075	10.5156	0.0291	0.250	1.57	2.65	44.5100	18.89	0
34	3284655.000	350.520	7.8638	0.0153	0.085	1.72	2.65	225.1100	21.11	0
35	3086443.000	374.904	9.4793	0.0265	0.123	1.78	2.65	49.3430	27.22	0
36	2766472.000	349.300	10.4851	0.0258	0.211	1.93	2.65	32.6880	17.22	0
37	2729661.000	344.424	8.2296	0.0190	0.182	1.50	2.65	66.5650	25.00	0
38	2554102.000	348.081	9.9060	0.0266	0.149	1.87	2.65	15.7500	28.89	0
39	2500302.000	329.184	10.4546	0.0187	0.195	1.65	2.65	28.8170	28.89	0
40	2474817.000	335.889	10.5156	0.0243	0.166	1.96	2.65	170.0000	8.33	0
41	2421017.000	334.975	9.9060	0.0166	0.220	1.74	2.65	43.8160	29.44	0
42	2415354.000	327.355	10.5766	0.0187	0.220	1.81	2.65	36.7440	14.44	0
43	2358722.000	338.328	8.9002	0.0243	0.242	1.89	2.65	23.1550	29.44	0
44	2327574.000	334.365	9.2050	0.0181	0.145	1.66	2.65	135.8240	5.56	0
45	2287932.000	327.965	10.1803	0.0196	0.199	1.68	2.65	26.3960	30.56	0
46	2287932.000	327.660	9.8755	0.0181	0.215	1.79	2.65	21.0250	28.89	0
47	2282269.000	333.756	9.9365	0.0219	0.204	1.72	2.65	12.5170	5.56	0
48	2279437.000	331.013	9.9365	0.0150	0.198	1.65	2.65	14.6530	25.00	0
49	2177499.000	322.478	10.2413	0.0173	0.231	1.78	2.65	19.5830	18.89	0
50	2154847.000	321.869	10.3022	0.0173	0.200	1.61	2.65	16.4750	13.33	0
51	2143520.000	328.269	9.8450	0.0150	0.208	1.77	2.65	22.5880	27.78	0
52	2044414.000	321.564	9.9670	0.0225	0.195	1.52	2.65	13.7680	28.33	0
53	1769749.000	323.088	7.0409	0.0155	0.125	1.70	2.65	61.7210	23.89	0
54	1707454.000	323.088	7.5895	0.0135	0.134	1.68	2.65	22.6980	26.67	0
55	1449778.000	316.992	6.9190	0.0136	0.113	1.84	2.65	42.3810	25.56	0

ATC - ATCHAFALAYA RIVER DATA OF TOFFALETI,F.B. (1968)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	1393146.000	316.992	6.8885	0.0105	0.091	2.04	2.65	38.2230	30.00	0
57	1376157.000	316.992	7.1933	0.0100	0.123	1.76	2.65	36.2520	28.89	0
58	1262893.000	316.992	6.6142	0.0108	0.096	1.96	2.65	16.7990	26.11	0
59	1240240.000	313.944	6.7970	0.0106	0.123	1.81	2.65	17.1060	29.44	0
60	1237408.000	313.944	6.7361	0.0113	0.092	2.03	2.65	19.1830	30.00	0
61	1237408.000	316.992	6.7970	0.0112	0.110	1.83	2.65	15.4480	28.33	0
62	1214756.000	316.992	6.4008	0.0107	0.117	1.76	2.65	24.7280	17.78	0
63	1200598.000	316.992	6.4618	0.0096	0.123	1.82	2.65	18.9830	18.89	0
64	1169450.000	313.944	6.8275	0.0110	0.101	2.06	2.65	6.2870	28.33	0
65	1138302.000	313.944	6.2179	0.0101	-1.000	-1.00	2.65	23.4360	15.00	0
66	1084502.000	313.944	6.2789	0.0089	-1.000	-1.00	2.65	18.4980	18.33	0
67	1073176.000	313.944	6.8885	0.0100	0.089	2.16	2.65	4.3060	26.11	0
68	843816.625	310.896	6.4313	0.0069	0.106	1.89	2.65	2.8010	30.56	0
69	719226.250	307.848	6.2484	0.0056	0.096	2.10	2.65	8.2510	28.89	0
70	651267.750	307.848	6.2179	0.0043	-1.000	-1.00	2.65	8.9500	28.89	0
71	637109.750	307.848	6.2179	0.0098	0.137	1.57	2.65	5.6050	29.44	0
72	382265.875	304.800	6.0960	0.0021	-1.000	-1.00	2.65	0.6040	30.56	0

CHI - CANAL DATA OF CHITALE, S.V. (1966)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	242186.625	79.096	3.5601	0.0642	0.057	-1.00	2.65	1490.0000	-1.00	0
2	163723.000	66.547	3.3924	0.0567	0.082	-1.00	2.65	1518.9988	-1.00	0
3	166356.375	66.544	3.4107	0.0567	0.080	-1.00	2.65	1424.9988	-1.00	0
4	157408.500	56.467	3.3498	0.0700	0.030	-1.00	2.65	2316.0000	-1.00	0
5	158371.250	56.610	3.3528	0.0700	0.039	-1.00	2.65	2174.9988	-1.00	0
6	156049.375	56.272	3.3894	0.0600	0.020	-1.00	2.65	2600.9958	-1.00	0
7	153246.125	56.022	3.3680	0.0600	0.024	-1.00	2.65	2886.9968	-1.00	0
8	132802.000	51.901	3.2918	0.0650	0.064	-1.00	2.65	1976.0000	-1.00	0
9	131386.125	51.505	3.2918	0.0650	0.066	-1.00	2.65	1592.9988	-1.00	0
10	27673.203	17.983	2.5207	0.0700	0.033	-1.00	2.65	831.0000	-1.00	0
11	27503.313	17.892	2.5116	0.0700	0.039	-1.00	2.65	822.0000	-1.00	0
12	14809.262	13.551	1.8593	0.0800	0.043	-1.00	2.65	2466.9988	-1.00	0
13	14107.020	13.493	1.8501	0.0800	0.036	-1.00	2.65	1893.9988	-1.00	0
14	14033.398	14.658	1.7191	0.0800	0.037	-1.00	2.65	4229.9922	-1.00	0
15	68918.250	25.682	2.5451	0.1100	0.033	-1.00	2.65	3507.9958	-1.00	0
16	68819.125	25.765	2.5542	0.1100	0.031	-1.00	2.65	3556.9968	-1.00	0
17	59163.426	25.490	2.4445	0.0842	0.021	-1.00	2.65	5758.9922	-1.00	0
18	60720.805	25.560	2.4933	0.0842	0.025	-1.00	2.65	5181.9922	-1.00	0
19	27888.406	18.169	2.1671	0.1116	0.050	-1.00	2.65	2600.9958	-1.00	0
20	24589.598	18.072	2.2433	0.1200	0.046	-1.00	2.65	2516.9988	-1.00	0
21	13189.570	10.701	1.9385	0.1000	0.051	-1.00	2.65	671.0000	-1.00	0
22	13413.277	10.577	1.9660	0.1000	0.050	-1.00	2.65	981.0000	-1.00	0
23	30857.352	20.565	2.3652	0.0800	0.064	-1.00	2.65	918.0000	-1.00	0
24	33738.504	20.577	2.3835	0.0800	0.043	-1.00	2.65	797.0000	-1.00	0
25	19449.969	16.026	2.3805	0.0877	0.044	-1.00	2.65	624.0000	-1.00	0
26	19223.719	15.950	2.3652	0.0877	0.048	-1.00	2.65	512.0000	-1.00	0
27	15872.516	17.340	1.5667	0.1200	0.056	-1.00	2.65	596.0000	-1.00	0
28	15836.273	17.313	1.5667	0.1200	0.070	-1.00	2.65	726.0000	-1.00	0
29	2016.382	5.343	0.9449	0.1145	0.042	-1.00	2.65	1417.9988	-1.00	0
30	3001.495	5.782	1.1003	0.1145	0.046	-1.00	2.65	3131.9968	-1.00	0
31	1151.894	4.349	0.6706	0.1446	0.048	-1.00	2.65	1030.9988	-1.00	0
32	1294.890	4.307	0.7925	0.1646	0.064	-1.00	2.65	760.0000	-1.00	0

CHO - CHOP CANAL DATA OF CHAUDHRY, ET AL. (1970)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	362444.625	118.262	2.9870	0.1613	0.200	1.40	2.65	662.9568	17.78	0
2	424739.875	111.862	2.3774	0.1550	0.140	1.48	2.65	1152.9299	18.89	0
3	233606.875	118.262	2.4689	0.2137	0.110	1.38	2.65	148.1600	15.00	0
4	351118.250	112.166	2.1336	0.1244	0.130	1.34	2.65	706.4480	17.78	0
5	427571.500	121.615	3.1699	0.2024	0.210	1.40	2.65	1217.1670	16.11	0
6	322802.250	120.396	2.6822	0.1957	0.200	1.37	2.65	526.0320	22.22	0
7	172444.375	112.776	1.3106	0.1938	0.090	1.31	2.65	232.3360	15.56	0
8	376602.625	115.824	2.3470	0.1410	0.210	1.52	2.65	702.0879	21.11	0
9	342623.500	116.738	3.1090	0.2538	0.210	1.33	2.65	619.8828	21.67	0
10	334128.625	110.338	2.4689	0.1592	0.210	1.26	2.65	428.1558	20.00	0
11	413413.500	110.642	2.4384	0.1149	0.200	1.33	2.65	1297.1599	18.33	0
12	359613.125	111.252	2.1031	0.1164	0.120	1.36	2.65	531.0999	22.78	0
13	112414.375	57.302	2.3165	0.1340	0.200	1.34	2.65	595.2520	24.44	0
14	27523.145	23.774	1.6764	0.0855	0.200	1.22	2.65	285.8018	29.44	0
15	146676.750	67.666	2.6822	0.2315	0.120	1.26	2.65	473.3408	24.44	0
16	109582.875	57.912	2.6822	0.0800	0.110	1.30	2.65	146.4370	23.89	0
17	362444.625	99.060	3.0785	0.1179	0.120	1.25	2.65	464.4458	29.44	0
18	138465.125	66.142	2.2860	0.1650	0.300	1.40	2.65	395.3960	15.00	0
19	122041.875	53.645	2.3774	0.1845	0.300	1.32	2.65	302.2488	10.56	0
20	120909.250	55.474	2.4384	0.2000	0.100	1.34	2.65	181.2960	20.00	0
21	146110.500	55.778	2.6213	0.1815	0.290	1.36	2.65	244.0620	26.67	0
22	114962.875	57.912	2.3470	0.1404	0.300	1.40	2.65	235.8330	16.67	0
23	138465.125	59.436	2.3774	0.1786	0.300	1.28	2.65	149.8260	11.11	0
24	139031.500	57.912	2.4384	0.1764	0.311	1.31	2.65	198.2500	22.22	0
25	153472.625	58.522	2.7127	0.1650	0.290	1.47	2.65	261.2610	23.89	0
26	143845.250	63.398	2.4689	0.2375	0.300	1.32	2.65	196.5010	22.78	0
27	255410.250	112.166	2.5603	0.2066	0.290	1.33	2.65	304.6968	11.67	0
28	399255.500	112.776	3.4138	0.1779	0.311	1.31	2.65	1316.8889	16.67	0
29	328465.500	97.536	3.3223	0.1876	0.210	1.53	2.65	431.7068	18.89	0
30	226527.875	109.423	2.2860	0.1852	0.311	1.55	2.65	388.2710	18.89	0
31	393592.250	99.670	3.3833	0.1808	0.200	1.23	2.65	298.9839	17.22	0
32	209255.125	71.628	3.3223	0.1274	0.210	1.50	2.65	484.4758	22.22	0
33	166752.875	67.666	2.5603	0.0510	0.190	1.40	2.65	115.7300	27.22	0

CHP - CHOP CANAL DATA OF CHAUDHRY, ET AL. (1970)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	172444.375	112.776	1.3106	0.1938	0.090	1.31	2.65	232.3360	15.56	0
2	120909.250	55.474	2.4384	0.2000	0.100	1.34	2.65	181.2960	20.00	0
3	109582.875	57.912	2.6822	0.0800	0.110	1.30	2.65	146.4370	23.89	0
4	233606.875	118.262	2.4689	0.2137	0.110	1.38	2.65	148.1600	15.00	0
5	146676.750	67.666	2.6822	0.2315	0.120	1.26	2.65	473.3408	24.44	0
6	362444.625	99.060	3.0785	0.1179	0.120	1.25	2.65	464.4458	29.44	0
7	359613.125	111.252	2.1031	0.1164	0.120	1.36	2.65	531.0999	22.78	0
8	351118.250	112.166	2.1336	0.1244	0.130	1.34	2.65	706.4480	17.78	0
9	424739.875	111.862	2.3774	0.1550	0.140	1.48	2.65	1152.9299	18.89	0
10	166752.875	67.666	2.5603	0.0510	0.190	1.40	2.65	115.7300	27.22	0
11	413413.500	110.642	2.4384	0.1149	0.200	1.33	2.65	1297.1599	18.33	0
12	393592.250	99.670	3.3833	0.1808	0.200	1.23	2.65	298.9839	17.22	0
13	362444.625	118.262	2.9870	0.1613	0.200	1.40	2.65	662.9568	17.78	0
14	322802.250	120.396	2.6822	0.1957	0.200	1.37	2.65	526.0320	22.22	0
15	27523.145	23.774	1.6764	0.0855	0.200	1.22	2.65	285.8018	29.44	0
16	112414.375	57.302	2.3165	0.1340	0.200	1.34	2.65	595.2520	24.44	0
17	342623.500	116.738	3.1090	0.2538	0.210	1.33	2.65	619.8828	21.67	0
18	376602.625	115.824	2.3470	0.1410	0.210	1.52	2.65	702.0879	21.11	0
19	209255.125	71.628	3.3223	0.1274	0.210	1.50	2.65	484.4758	22.22	0
20	334128.625	110.338	2.4689	0.1592	0.210	1.26	2.65	428.1558	20.00	0
21	427571.500	121.615	3.1699	0.2024	0.210	1.40	2.65	1217.1670	16.11	0
22	328465.500	97.536	3.3223	0.1876	0.210	1.53	2.65	431.7068	18.89	0
23	146110.500	55.778	2.6213	0.1815	0.290	1.36	2.65	244.0620	26.67	0
24	255410.250	112.166	2.5603	0.2066	0.290	1.33	2.65	304.6968	11.67	0
25	153472.625	58.522	2.7127	0.1650	0.290	1.47	2.65	261.2610	23.89	0
26	143845.250	63.398	2.4689	0.2375	0.300	1.32	2.65	196.5010	22.78	0
27	114962.875	57.912	2.3470	0.1404	0.300	1.40	2.65	235.8330	16.67	0
28	138465.125	59.436	2.3774	0.1786	0.300	1.28	2.65	149.8260	11.11	0
29	122041.875	53.645	2.3774	0.1845	0.300	1.32	2.65	302.2488	10.56	0
30	138465.125	66.142	2.2860	0.1650	0.300	1.40	2.65	395.3960	15.00	0
31	399255.500	112.776	3.4138	0.1779	0.311	1.31	2.65	1316.8889	16.67	0
32	226527.875	109.423	2.2860	0.1852	0.311	1.55	2.65	388.2710	18.89	0
33	139031.500	57.912	2.4384	0.1764	0.311	1.31	2.65	198.2500	22.22	0

COL - COLORADO RIVER DATA OF U.S. BUREAU OF RECLAMATION (1958)
(SHEET 1 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	403571.688	253.097	2.2982	0.1400	0.310	1.36	2.65	32.4000	19.44	0
2	500160.500	254.550	2.1946	0.1800	0.360	1.48	2.65	768.7000	19.44	0
3	83336.438	240.529	0.9540	0.0900	0.315	1.53	2.65	-1.0000	12.22	0
4	254200.313	247.276	1.4600	0.1670	0.270	1.44	2.65	394.0999	11.11	0
5	158149.563	240.112	0.8473	-1.0000	0.385	1.44	2.65	107.2000	8.89	0
6	334138.750	109.064	2.6304	0.2830	0.240	1.40	2.65	160.1000	19.44	0
7	408385.500	112.773	2.8743	0.3100	0.248	1.35	2.65	346.5000	17.78	0
8	137874.688	92.644	1.9294	0.1960	0.236	1.37	2.65	113.0000	13.33	0
9	210280.875	104.226	2.0635	0.0670	0.310	1.22	2.65	603.5000	9.44	0
10	146454.750	98.690	1.9477	0.2800	-1.000	-1.00	2.65	548.5000	10.00	0
11	362455.625	117.031	2.8316	0.1870	0.300	1.32	2.65	130.5000	12.78	0
12	219115.750	107.581	2.5268	0.2670	0.270	1.32	2.65	316.2998	17.22	0
13	370610.875	111.642	2.6213	0.1600	0.275	1.42	2.65	35.6000	20.00	0
14	245761.875	105.788	2.3957	0.1100	0.280	1.37	2.65	177.9000	17.78	0
15	221494.375	103.946	2.3104	0.2200	0.320	1.44	2.65	325.0000	14.44	0
16	184201.063	102.426	1.9111	0.2670	0.300	1.36	2.65	229.9000	7.78	0
17	141074.500	91.440	1.4265	-1.0000	0.290	1.36	2.65	664.5000	7.22	0
18	156167.375	109.049	1.4508	-1.0000	0.260	1.38	2.65	-1.0000	11.67	0
19	389583.125	114.908	3.6302	0.2000	0.230	1.41	2.65	212.2000	20.28	0
20	348750.250	111.593	3.3376	0.1960	0.260	1.41	2.65	171.9000	22.78	0
21	358774.375	110.152	3.3711	0.2200	0.250	1.50	2.65	354.5000	17.78	0
22	274673.375	101.778	2.7859	-1.0000	0.240	1.21	2.65	296.2998	16.11	0
23	109161.438	95.167	1.5453	0.2770	0.280	1.41	2.65	364.7998	8.89	0
24	198897.500	103.277	2.2525	0.2770	0.295	1.48	2.65	474.2998	9.44	0
25	175592.750	102.425	2.0635	0.4070	0.335	1.40	2.65	316.2000	10.00	0
26	229961.063	103.972	2.4018	0.2200	0.320	1.38	2.65	596.7998	-18.30	0
27	220305.000	109.444	2.8743	0.2130	0.315	1.48	2.65	182.1000	8.89	0
28	293277.563	112.227	3.1151	0.1930	0.280	1.41	2.65	572.8999	12.78	0
29	346173.375	111.584	2.8224	-1.0000	0.250	1.40	2.65	337.2998	15.00	0
30	473740.875	116.166	3.4717	-1.0000	0.320	1.38	2.65	619.2000	16.67	0
31	557445.375	117.202	3.6820	-1.0000	0.300	1.61	2.65	370.7000	17.22	0
32	293504.125	110.277	3.0480	0.1500	0.275	1.54	2.65	159.0000	20.56	0
33	299025.875	110.915	3.0053	0.1500	-1.000	-1.00	2.65	-1.0000	20.00	0
34	500925.000	116.489	3.5753	-1.0000	0.260	1.40	2.65	558.7000	18.89	0
35	243524.875	103.010	2.5695	0.1770	0.300	1.39	2.65	283.0999	17.78	0
36	221720.875	104.272	2.4689	0.2400	0.285	1.34	2.65	477.0999	14.72	0
37	173157.500	102.768	2.0422	0.1530	0.250	1.44	2.65	288.5000	7.78	0
38	124877.250	99.302	1.7252	-1.0000	0.240	1.88	2.65	238.5000	7.78	0
39	152372.938	101.890	1.9202	0.2000	0.290	1.32	2.65	-1.0000	11.67	0
40	241825.875	143.793	2.9901	0.3460	0.200	1.28	2.65	263.8999	20.00	0
41	206996.125	145.060	1.9873	-1.0000	0.230	1.32	2.65	244.0000	-18.30	0
42	88065.375	139.754	1.1460	-1.0000	0.250	1.34	2.65	76.7000	-18.30	0
43	207477.500	143.188	2.0574	-1.0000	0.250	1.36	2.65	349.5000	9.17	0
44	324227.875	144.341	2.9627	0.1660	0.265	1.34	2.65	264.2000	16.67	0
45	413425.938	148.294	3.3711	0.1770	0.240	1.35	2.65	118.5000	16.67	0
46	416257.625	148.203	3.3650	-1.0000	0.280	1.28	2.65	84.6000	20.00	0
47	330712.438	147.690	3.1364	0.0690	0.230	1.35	2.65	151.5000	18.89	0
48	228941.688	146.620	2.7005	0.1460	0.230	1.48	2.65	188.5000	13.89	0
49	125160.438	142.889	2.0025	-1.0000	0.220	1.52	2.65	88.1000	7.78	0
50	262100.688	145.351	2.4384	-1.0000	0.200	1.26	2.65	-1.0000	12.22	0
51	294438.563	158.254	2.7615	0.1000	0.210	1.32	2.65	106.4000	20.00	0
52	216907.000	146.029	2.0269	0.1000	0.220	1.33	2.65	144.7000	11.67	0
53	161745.813	151.911	2.0909	0.0600	0.215	1.36	2.65	23.4000	-18.30	0
54	203116.750	151.821	2.2464	0.1000	0.245	1.33	2.65	261.7000	10.00	0
55	348297.188	159.877	3.8892	0.0370	0.180	1.30	2.65	56.9000	16.67	0

COL - COLORADO RIVER DATA OF U.S. BUREAU OF RECLAMATION (1958)
(SHEET 2 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	454315.500	160.672	3.3132	0.1700	0.175	1.24	2.65	283.5000	17.22	0
57	443158.625	162.431	3.5936	0.1340	0.195	1.26	2.65	47.7000	19.44	0
58	343653.250	157.903	2.8194	0.1440	0.195	1.28	2.65	337.7000	20.00	0
59	234491.750	153.280	2.6396	0.0800	0.155	1.58	2.65	93.8000	14.44	0
60	121337.688	146.603	2.1153	-1.0000	0.170	1.31	2.65	21.9000	7.78	0
61	272861.125	155.802	2.6213	0.1340	0.160	1.46	2.65	-1.0000	13.33	0
62	307096.188	113.613	2.8743	0.2160	0.295	1.45	2.65	199.1000	25.56	0
63	121111.125	107.587	1.4844	0.3330	0.273	1.44	2.65	152.3000	11.67	0
64	131446.750	107.538	1.5697	0.2600	0.288	1.43	2.65	225.4000	12.22	0
65	108226.938	106.985	1.3686	0.2530	0.315	1.65	2.65	113.4000	10.00	0
66	105338.625	106.349	1.4021	0.2330	0.310	1.68	2.65	132.6000	13.33	0
67	196065.813	110.056	2.0361	0.2600	0.300	1.44	2.65	78.3000	11.11	0
68	181652.563	109.786	1.9294	0.2130	0.315	1.42	2.65	412.7000	11.11	0
69	219795.313	110.586	2.0574	0.1930	0.340	1.37	2.65	160.2000	13.89	0
70	217076.938	110.924	2.2220	0.2160	0.330	1.43	2.65	242.1000	16.67	0
71	303924.688	113.052	2.8285	0.2070	0.320	1.55	2.65	328.3999	15.00	0
72	269944.500	112.790	2.6761	0.2240	0.340	1.31	2.65	148.3000	18.89	0
73	223618.125	112.220	2.4902	0.1730	0.355	1.34	2.65	108.5000	20.00	0
74	209799.500	110.904	2.2433	0.2270	0.345	1.43	2.65	211.6000	21.67	0
75	240070.188	111.676	2.2220	0.1870	0.370	1.41	2.65	151.2000	22.22	0
76	274220.375	112.506	2.6548	0.2060	0.370	1.39	2.65	254.7000	22.22	0
77	310607.500	113.093	2.9047	0.1930	0.350	1.31	2.65	166.4000	24.44	0
78	315732.813	114.008	2.7828	0.2330	0.335	1.33	2.65	302.2998	25.56	0
79	345437.188	114.345	3.0663	0.2270	0.360	1.34	2.65	200.7000	26.67	0
80	360501.750	114.729	3.1394	0.2570	0.375	1.41	2.65	213.1000	27.22	0
81	296760.500	112.776	2.8042	0.2330	0.395	1.46	2.65	87.0000	25.56	0
82	279770.375	112.773	2.7219	0.1470	0.400	1.52	2.65	201.8000	26.67	0
83	187599.125	110.693	2.1763	0.1730	0.360	1.53	2.65	276.2998	24.44	0
84	181171.125	110.668	2.1549	0.1770	0.340	1.47	2.65	303.7998	22.22	0
85	155516.125	109.930	1.9294	0.1670	0.325	1.46	2.65	200.1000	20.00	0
86	158404.438	110.320	1.9141	0.1730	0.300	1.46	2.65	193.3000	16.11	0
87	154468.375	110.108	1.8562	0.2070	0.293	1.49	2.65	197.9000	15.00	0
88	121762.438	108.145	1.5850	0.2200	0.300	1.45	2.65	104.5000	11.11	0
89	128898.250	106.772	1.5088	0.2330	0.330	1.41	2.65	239.0000	10.56	0
90	77531.500	103.075	1.1339	0.2070	0.310	1.45	2.65	86.2000	11.11	0
91	135920.875	106.430	1.6734	0.2200	0.315	1.48	2.65	194.8000	8.89	0
92	135127.938	106.365	1.6246	0.2460	-1.000	-1.00	2.65	-1.0000	9.44	0
93	191421.875	110.666	1.9812	0.2670	-1.000	-1.00	2.65	-1.0000	13.33	0
94	267905.625	104.824	2.8529	0.0530	-1.000	-1.00	2.65	81.9000	25.56	0
95	124933.875	104.857	1.9111	0.1070	-1.000	-1.00	2.65	62.8000	13.33	0
96	118194.500	99.950	2.0086	0.1130	0.280	1.54	2.65	20.8000	13.33	0
97	111653.313	96.287	1.9934	0.1470	0.260	1.61	2.65	18.1000	10.00	0
98	96786.938	95.732	1.9050	0.1330	0.280	1.68	2.65	22.7000	13.33	0
99	194904.813	101.492	2.2921	0.1730	0.290	1.47	2.65	112.1000	11.11	0
100	178112.938	100.973	2.0757	0.1270	0.340	1.53	2.65	72.7000	11.11	0
101	191931.563	104.826	2.2555	0.1400	0.430	1.86	2.65	191.9000	11.11	0
102	272776.125	108.450	2.6761	0.1030	0.695	3.12	2.65	178.1000	15.00	0
103	359992.000	116.805	3.0876	0.1270	0.270	1.74	2.65	208.7000	15.56	0
104	308653.625	139.538	2.6365	0.1200	0.320	1.52	2.65	89.6000	18.33	0
105	344616.000	144.789	2.6243	0.1130	0.320	1.47	2.65	140.1000	21.11	0
106	301857.563	139.974	2.5420	0.1470	0.395	1.66	2.65	230.1000	22.22	0
107	344899.125	146.373	2.6975	0.1600	0.340	1.91	2.65	114.7000	23.33	0
108	324624.313	140.966	2.6731	0.1530	0.400	1.75	2.65	192.8000	22.22	0
109	359199.188	146.210	2.9566	0.1270	0.270	1.79	2.65	83.3000	25.00	0
110	387657.625	149.087	3.0846	0.2070	0.280	1.72	2.65	114.2000	25.56	0

COL - COLORADO RIVER DATA OF U.S. BUREAU OF RECLAMATION (1958)
(SHEET 3 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	324794.250	141.753	2.9230	0.0870	0.240	1.49	2.65	111.1000	26.11	0
112	328475.375	146.969	2.9078	0.0730	0.200	1.60	2.65	227.5000	27.22	0
113	335837.750	146.538	2.8529	0.0600	0.225	1.63	2.65	232.8000	25.56	0
114	279770.375	142.122	2.6213	0.1530	0.200	1.36	2.65	167.8000	26.67	0
115	288831.813	142.096	2.5786	0.0670	0.225	1.46	2.65	181.3000	24.44	0
116	239107.438	140.223	2.4262	0.1270	0.205	1.46	2.65	252.7000	23.33	0
117	226534.750	139.332	2.4384	0.0800	0.290	1.41	2.65	163.7000	21.67	0
118	183776.313	136.166	2.0086	0.1570	0.270	1.51	2.65	68.4000	15.56	0
119	166078.250	134.579	1.9080	0.1000	0.285	1.45	2.65	193.2000	14.44	0
120	157356.688	134.736	1.9355	0.2000	0.260	1.49	2.65	176.8000	11.11	0
121	105338.625	130.541	1.5088	0.0600	0.290	1.49	2.65	312.3999	11.11	0
122	92029.750	130.539	1.4874	0.0730	0.313	1.41	2.65	22.9000	11.11	0
123	127708.938	132.522	1.6825	0.1000	0.285	1.54	2.65	139.0000	10.00	0
124	121479.250	132.639	1.7160	0.1200	-1.000	-1.00	2.65	-1.0000	10.00	0
125	188023.875	136.296	1.9903	0.1200	-1.000	-1.00	2.65	-1.0000	13.33	0
126	169901.063	137.422	1.5941	0.1070	0.320	1.37	2.65	143.4000	13.89	0
127	132239.625	136.106	1.4539	0.3890	0.315	1.42	2.65	172.3000	11.67	0
128	115249.563	136.144	1.3716	0.1760	0.310	1.44	2.65	62.4000	11.67	0
129	133995.313	136.717	1.4691	0.1830	0.285	1.56	2.65	176.0000	10.56	0
130	141357.688	136.016	1.5027	0.1220	-1.000	-1.00	2.65	-1.0000	10.56	0
131	201191.188	138.687	1.7953	0.2290	-1.000	-1.00	2.65	-1.0000	15.00	0

HII - HII RIVER DATA OF SHINOHARA, K. AND TSUBAKI, T. (1959)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	1780.467	8.001	0.3069	0.8400	1.440	2.19	2.65	121.4420	-1.00	3
2	2356.031	8.001	0.3968	1.0600	1.440	2.19	2.65	167.3260	-1.00	3
3	2423.920	8.001	0.4249	0.8500	1.440	2.19	2.65	116.3110	-1.00	3
4	2764.357	8.001	0.4929	0.8600	1.440	2.19	2.65	116.5530	-1.00	3
5	3498.565	8.001	0.5901	0.8800	1.440	2.19	2.65	299.4348	-1.00	3
6	4851.316	8.001	0.6520	1.4800	1.440	2.19	2.65	271.3979	-1.00	3
7	4479.223	8.001	0.6989	1.0100	1.440	2.19	2.65	153.8220	-1.00	3
8	4727.293	8.001	0.7321	1.5300	1.440	2.19	2.65	190.6560	-1.00	3
9	1131.821	8.001	0.2021	1.6600	1.330	2.07	2.65	552.8638	-1.00	3
10	2237.401	8.001	0.3719	1.3800	1.330	2.07	2.65	207.4570	-1.00	3
11	1951.239	8.001	0.3871	0.8900	1.330	2.07	2.65	135.8640	-1.00	3
12	2917.885	8.001	0.4542	1.4200	1.330	2.07	2.65	167.1870	-1.00	3
13	181.039	2.000	0.1561	1.6900	1.260	2.13	2.65	295.8108	-1.00	3
14	248.062	2.000	0.1981	1.6100	1.260	2.13	2.65	284.3528	-1.00	3
15	344.331	2.000	0.2569	1.6100	1.260	2.13	2.65	275.4800	-1.00	3
16	428.682	2.000	0.2920	1.6700	1.260	2.13	2.65	283.1399	-1.00	3
17	521.718	2.000	0.3441	1.6600	1.260	2.13	2.65	242.8930	-1.00	3
18	714.485	2.000	0.4670	1.6600	1.260	2.13	2.65	241.8160	-1.00	3
19	47.396	0.800	0.1079	1.6900	1.260	2.13	2.65	225.2580	-1.00	3
20	69.999	0.800	0.1451	1.7200	1.260	2.13	2.65	126.6880	-1.00	3
21	390.077	2.000	0.2950	1.3700	1.460	2.13	2.65	221.5180	-1.00	3
22	494.265	2.000	0.3581	1.4000	1.460	2.13	2.65	210.2660	-1.00	3
23	531.435	2.000	0.3591	1.4600	1.460	2.13	2.65	270.3259	-1.00	3
24	0.941	0.346	0.0189	8.0900	0.210	1.20	2.65	925.0068	-1.00	2
25	1.454	0.346	0.0220	11.3000	0.210	1.20	2.65	1955.0210	-1.00	2
26	1.991	0.346	0.0248	10.7000	0.210	1.20	2.65	3316.1790	-1.00	2
27	1.679	0.346	0.0261	9.7500	0.210	1.20	2.65	2347.2588	-1.00	2
28	2.442	0.346	0.0280	9.2700	0.210	1.20	2.65	1727.6079	-1.00	2
29	3.025	0.346	0.0308	8.0400	0.210	1.20	2.65	4877.5586	-1.00	2
30	4.484	0.346	0.0320	7.2800	0.210	1.20	2.65	4273.5234	-1.00	2
31	5.419	0.346	0.0338	8.3900	0.210	1.20	2.65	5638.6133	-1.00	2
32	4.404	0.346	0.0363	7.0800	0.210	1.20	2.65	3545.5129	-1.00	2
33	6.509	0.346	0.0372	6.6900	0.210	1.20	2.65	3260.8669	-1.00	2
34	7.446	0.346	0.0387	6.4400	0.210	1.20	2.65	4322.8125	-1.00	2
35	3.673	0.346	0.0341	5.8200	0.210	1.20	2.65	1249.3989	-1.00	2
36	5.130	0.346	0.0424	5.8200	0.210	1.20	2.65	1324.5518	-1.00	2
37	4.371	0.346	0.0430	7.6900	0.210	1.20	2.65	1701.8689	-1.00	2
38	7.750	0.346	0.0448	5.1500	0.210	1.20	2.65	2342.4099	-1.00	2

LEO - RIVER DATA OF LEOPOLD, L.B. (1969) -- NOT VERIFIED
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	344605.625	139.294	2.7127	0.1133	0.345	-1.00	2.65	109.6000	21.11	0
2	301848.438	134.722	2.6426	0.1467	0.420	-1.00	2.65	214.2700	22.22	0
3	344888.750	140.818	2.8042	0.1600	0.371	-1.00	2.65	92.6900	23.33	0
4	335827.625	140.818	2.9688	0.0600	0.294	-1.00	2.65	205.6100	25.56	0
5	279762.000	136.550	2.7280	0.1533	0.229	-1.00	2.65	141.8800	26.67	0
6	288823.125	136.550	2.6822	0.0660	0.227	-1.00	2.65	146.6100	24.44	0
7	239100.250	135.331	2.5146	0.1270	0.203	-1.00	2.65	269.5498	23.33	0
8	307086.875	107.594	3.0175	0.2160	0.293	-1.00	2.65	159.0200	25.56	0
9	118927.125	104.546	1.4996	0.3330	0.273	-1.00	2.65	94.5500	11.67	0
10	134784.125	104.242	1.6459	0.2600	0.143	-1.00	2.65	140.0400	12.22	0
11	219788.625	106.375	2.1397	0.1900	0.167	-1.00	2.65	116.5700	13.89	0
12	219930.250	106.375	2.3470	0.2160	0.163	-1.00	2.65	151.0900	16.67	0
13	303915.500	106.985	2.9901	0.2066	0.319	-1.00	2.65	244.5000	15.00	0
14	269936.250	106.985	2.8194	0.2240	0.167	-1.00	2.65	93.9500	18.89	0
15	209793.125	106.375	2.3378	0.2267	0.342	-1.00	2.65	151.4400	21.67	0
16	240062.875	106.985	2.3195	0.1870	0.370	-1.00	2.65	77.3700	22.22	0
17	296751.500	106.985	2.9566	0.2333	0.391	-1.00	2.65	50.1500	25.56	0
18	279762.000	106.985	2.8682	0.1466	0.391	-1.00	2.65	118.6000	26.67	0
19	187593.375	106.070	2.2708	0.1733	0.364	-1.00	2.65	207.1400	24.44	0
20	181165.625	106.070	2.2494	0.1770	0.338	-1.00	2.65	269.2998	22.22	0
21	403559.500	248.717	2.3378	0.1400	0.308	-1.00	2.65	47.5500	19.44	0
22	499295.875	250.546	2.2311	0.1800	0.321	-1.00	2.65	563.8699	19.44	0
23	83333.875	238.658	0.9601	0.0900	0.156	-1.00	2.65	516.7998	12.22	0
24	334128.625	103.632	2.7676	0.2830	0.264	-1.00	2.65	113.8900	19.44	0
25	408373.250	106.680	3.0358	0.2900	0.318	-1.00	2.65	277.2400	17.78	0
26	137870.500	88.697	2.0147	0.1960	0.236	-1.00	2.65	63.8200	14.44	0
27	210274.500	99.974	2.1519	0.0670	0.155	-1.00	2.65	372.8899	9.44	0
28	362444.625	111.252	2.9779	0.1866	0.356	-1.00	2.65	70.7900	12.78	0
29	208915.375	102.413	2.6548	0.2670	0.318	-1.00	2.65	274.7998	17.22	0
30	245754.500	100.584	2.5207	0.1100	0.288	-1.00	2.65	114.6800	17.78	0
31	241818.500	137.770	3.1212	0.3460	0.204	-1.00	2.65	151.7500	20.00	0
32	324218.125	141.427	3.0236	0.1660	0.262	-1.00	2.65	232.7200	16.67	0
33	413413.500	141.122	3.5418	0.1770	0.244	-1.00	2.65	89.6700	16.67	0
34	330702.375	141.122	3.2827	0.0690	0.224	-1.00	2.65	145.9300	18.89	0
35	294429.625	152.400	2.8682	0.1000	0.211	-1.00	2.65	85.5800	20.00	0
36	216900.500	141.732	2.0848	0.1000	0.220	-1.00	2.65	98.1100	11.67	0
37	454301.750	153.619	3.4656	0.1700	0.172	-1.00	2.65	207.8500	17.22	0
38	343642.875	152.095	2.9261	0.1437	0.195	-1.00	2.65	279.7000	20.00	0
39	243517.500	101.498	2.6243	0.1770	0.301	-1.00	2.65	379.1799	17.78	0
40	293495.250	103.632	3.2827	0.1530	0.276	-1.00	2.65	112.8000	20.56	0
41	267897.500	98.755	3.0267	0.0533	0.390	-1.00	2.65	71.6000	25.56	0
42	124930.125	95.707	2.0940	0.1067	0.289	-1.00	2.65	51.8800	13.33	0
43	118190.875	96.317	2.1031	0.1133	0.299	-1.00	2.65	11.2200	13.33	0
44	191925.750	100.279	2.3592	0.1400	0.443	-1.00	2.65	129.7300	11.11	0
45	272767.875	103.022	2.8194	0.1033	0.814	-1.00	2.65	168.2100	15.00	0
46	362982.625	109.728	3.3132	0.1267	0.389	-1.00	2.65	168.8600	15.56	0
47	308644.250	134.112	2.7432	0.1200	0.344	-1.00	2.65	63.0300	18.33	0
48	223611.375	106.985	2.6121	0.1730	0.352	-1.00	2.65	75.9700	20.00	0
49	348286.625	151.486	4.1057	0.0370	0.177	-1.00	2.65	49.0700	16.67	0
50	348739.750	104.546	3.5631	0.1960	0.261	-1.00	2.65	110.4500	22.78	0
51	358763.625	102.718	3.6149	0.2200	0.249	-1.00	2.65	243.8100	17.78	0
52	109158.125	92.050	1.5972	0.2766	0.140	-1.00	2.65	259.8198	8.89	0
53	198891.500	98.755	2.3561	0.2770	0.146	-1.00	2.65	192.0900	9.44	0
54	220298.375	103.327	3.0450	0.2130	0.156	-1.00	2.65	152.6300	8.89	0
55	293268.750	105.461	3.3162	0.1930	0.274	-1.00	2.65	469.6599	12.78	0

LEO - RIVER DATA OF LEOPOLD, L.B. (1969) -- NOT VERIFIED
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	158144.750	238.658	0.8534	-10.0000	0.386	-1.00	2.65	55.9300	8.89	0
57	202091.250	147.523	2.3104	-10.0000	0.245	-1.00	2.65	246.0800	10.00	0
58	473726.500	108.814	3.7064	-10.0000	0.317	-1.00	2.65	458.3298	16.67	0
59	443145.250	154.838	3.7704	-10.0000	0.197	-1.00	2.65	31.7400	19.44	0
60	212256.625	141.122	2.0940	-10.0000	0.231	-1.00	2.65	188.5100	6.11	0
61	416245.000	141.122	3.5326	-10.0000	0.276	-1.00	2.65	61.7900	20.00	0
62	324784.375	135.636	3.1151	-10.0000	0.292	-1.00	2.65	106.6100	-1.00	0
63	370599.625	106.375	2.6396	-10.0000	0.366	-1.00	2.65	6.7000	20.00	0
64	315723.250	107.899	3.1120	-10.0000	0.332	-1.00	2.65	217.0200	25.56	0
65	146450.250	94.793	2.0269	-10.0000	0.343	-1.00	2.65	435.0889	10.00	0
66	387645.875	142.646	3.2248	-10.0000	0.360	-1.00	2.65	114.2200	25.56	0
67	345426.750	107.899	3.2492	-10.0000	0.358	-1.00	2.65	148.2900	26.67	0
68	163354.875	147.523	2.1732	-10.0000	0.214	-1.00	2.65	18.7600	11.11	0
69	88062.688	137.160	1.1674	-10.0000	0.243	-1.00	2.65	60.3900	11.11	0
70	254192.625	244.145	1.4783	-10.0000	0.269	-1.00	2.65	75.0900	11.11	0
71	207471.250	138.989	2.1184	-10.0000	0.203	-1.00	2.65	289.6599	8.89	0
72	360490.875	107.899	3.3376	-10.0000	0.188	-1.00	2.65	139.7900	27.22	0

MID - MIDDLE LOUP RIVER DATA OF HUBBEL, D.W. AND MATEJKA, D.Q. (1959)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	9372.586	46.330	0.3167	1.2500	0.344	1.65	2.65	714.2400	25.00	0
2	10222.063	45.720	0.3313	1.4962	0.344	1.65	2.65	747.9600	16.67	0
3	12232.500	43.891	0.2963	0.9280	0.275	1.64	2.65	1986.5999	3.89	0
4	11609.547	42.977	0.2917	1.4394	0.285	1.69	2.65	2269.2000	4.44	0
5	10929.965	44.196	0.3152	1.3258	0.303	1.95	2.65	1380.0000	6.11	0
6	11722.813	44.196	0.3027	1.0227	0.339	1.80	2.65	1376.3999	10.56	0
7	11298.070	44.196	0.3426	1.2500	0.395	1.81	2.65	1401.3999	16.11	0
8	11099.855	44.196	0.3237	1.1932	0.317	1.66	2.65	660.0000	23.89	0
9	10307.012	43.891	0.3219	1.4583	0.317	1.76	2.65	568.7998	24.44	0
10	10788.387	43.891	0.3429	1.1553	0.368	1.85	2.65	475.5798	21.11	0
11	10448.594	43.282	0.3563	1.2500	0.436	2.29	2.65	618.2998	21.67	0
12	9882.270	45.110	0.3295	1.3300	0.429	2.37	2.65	437.7598	24.44	0
13	12487.344	45.110	0.4118	1.3300	0.354	1.87	2.65	1196.0000	20.00	0
14	9599.109	45.110	0.3234	1.3300	0.333	1.70	2.65	920.7000	8.89	0
15	12543.977	45.110	0.2472	1.3447	0.215	1.61	2.65	1306.3999	2.78	0
16	11326.395	44.806	0.3027	1.3300	0.330	1.58	2.65	1466.3999	2.78	0
17	13619.980	39.929	0.3444	1.2500	0.330	1.58	2.65	1692.0000	0.0	0
18	10986.598	46.330	0.2707	1.3300	0.395	1.80	2.65	2444.0000	0.0	0
19	10590.172	44.196	0.2963	1.5720	0.340	1.73	2.65	1134.0000	7.22	0
20	11184.809	43.282	0.3112	1.3300	0.292	1.63	2.65	1729.7998	0.0	0
21	10222.063	44.196	0.3322	1.3447	0.377	1.75	2.65	1283.0999	10.00	0
22	11807.762	45.110	0.3685	1.3300	0.392	1.97	2.65	813.4500	16.11	0
23	11836.074	44.196	0.3761	1.3300	0.401	2.33	2.65	534.6399	27.78	0
24	10391.961	44.806	0.3731	1.2879	0.395	2.23	2.65	482.2400	31.11	0
25	9797.320	43.282	0.3520	1.3300	0.423	2.80	2.65	588.5999	25.56	0
26	10703.438	44.501	0.3612	1.3300	0.398	2.54	2.65	644.3999	24.44	0
27	12090.922	46.330	0.3149	1.3068	0.365	1.69	2.65	1574.3999	3.89	0
28	11298.070	37.490	0.3271	1.1742	0.363	1.77	2.65	1939.2000	1.11	0
29	10363.645	43.282	0.3606	1.3300	0.356	1.59	2.65	883.6099	18.33	0
30	12855.449	43.586	0.4029	1.3300	0.386	1.94	2.65	1305.0000	18.89	0
31	9315.949	45.720	0.3048	1.3300	0.267	1.71	2.65	584.6399	22.22	0
32	10052.168	46.634	0.3347	1.3300	0.328	1.69	2.65	718.0798	22.78	0
33	9344.270	44.806	0.3338	1.4205	0.270	1.75	2.65	766.7998	30.56	0
34	9032.793	46.634	0.3267	1.3258	0.325	2.06	2.65	685.7998	25.56	0
35	10929.965	45.110	0.3295	1.3258	0.312	1.81	2.65	603.6799	26.11	0
36	10250.383	46.634	0.3466	1.3300	0.363	2.15	2.65	1184.3999	26.67	0
37	9457.531	45.415	0.3109	1.2879	0.365	1.90	2.65	988.0000	20.00	0
38	10363.645	45.110	0.3316	1.3068	0.289	1.63	2.65	958.7998	18.33	0

MIS - MISSISSIPPI RIVER DATA OF TOFFALETI, F.B. (1968)
(SHEET 1 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	28825680.000	1109.472	16.4287	0.0382	0.310	1.66	2.65	101.3000	21.11	0
2	26560400.000	1097.280	15.6667	0.0349	0.342	1.45	2.65	94.5090	10.56	0
3	26305552.000	1103.375	14.8133	0.0357	0.190	1.59	2.65	159.7070	17.22	0
4	26079024.000	1097.280	15.0571	0.0382	0.288	1.63	2.65	198.9520	11.11	0
5	26022384.000	1103.375	14.9657	0.0349	0.165	1.38	2.65	164.6740	17.78	0
6	25965760.000	1103.375	14.8133	0.0349	0.204	1.72	2.65	189.3020	16.67	0
7	24465008.000	1103.375	14.4170	0.0365	0.190	1.59	2.65	136.0900	15.00	0
8	24295120.000	1103.375	14.4475	0.0365	0.187	1.55	2.65	192.5930	17.78	0
9	24295120.000	1103.375	14.6914	0.0332	0.190	1.59	2.65	193.0000	17.22	0
10	22850992.000	1100.328	15.4534	0.0415	0.298	1.69	2.65	77.2170	26.11	0
11	22652784.000	1103.375	13.4417	0.0382	0.190	1.59	2.65	190.0000	18.33	0
12	22058144.000	1103.375	13.8074	0.0349	0.190	1.59	2.65	186.4120	11.67	0
13	22029840.000	1097.280	14.6304	0.0365	0.197	1.55	2.65	59.3570	16.67	0
14	21208672.000	1100.328	13.2283	0.0382	0.197	1.55	2.65	144.3570	18.89	0
15	21010464.000	1100.328	12.9845	0.0315	0.177	1.50	2.65	216.4530	10.00	0
16	18490336.000	1097.280	12.5273	0.0398	0.190	1.59	2.65	203.6370	20.00	0
17	18122224.000	1088.135	12.8930	0.0332	0.206	1.62	2.65	137.0660	7.22	0
18	17414336.000	1085.088	12.5578	0.0332	0.232	1.69	2.65	104.6420	7.78	0
19	17017904.000	1091.184	12.1310	0.0382	0.196	1.62	2.65	261.6799	21.67	0
20	16932960.000	1085.088	12.3749	0.0365	0.202	1.64	2.65	167.4720	5.56	0
21	16338328.000	1072.896	12.5578	0.0332	0.197	1.58	2.65	206.9950	6.11	0
22	15177372.000	1066.800	11.5214	0.0357	0.187	1.53	2.65	150.8590	7.22	0
23	14214629.000	1054.608	11.4605	0.0266	0.189	1.53	2.65	193.7350	7.78	0
24	13931469.000	1051.560	11.7653	0.0349	0.193	1.49	2.65	25.8590	6.67	0
25	12204193.000	1033.271	9.5707	0.0432	0.190	1.49	2.65	105.6820	25.56	0
26	11751137.000	1042.416	11.1252	0.0332	0.301	1.63	2.65	45.8510	27.78	0
27	11637873.000	1027.176	14.4780	0.0315	0.301	1.63	2.65	152.7900	19.44	0
28	10901657.000	1045.464	10.6985	0.0266	0.252	1.81	2.65	33.2380	24.44	0
29	10703445.000	1014.984	10.2718	0.0315	0.203	1.61	2.65	140.5180	6.11	0
30	10590181.000	1024.128	10.5766	0.0315	0.292	1.80	2.65	45.3730	24.44	0
31	10561865.000	1008.888	9.2050	0.0365	0.178	1.53	2.65	97.1550	25.00	0
32	10505233.000	1033.271	10.6070	0.0282	0.301	1.63	2.65	48.6890	28.89	0
33	9825650.000	1002.792	8.9306	0.0407	0.190	1.59	2.65	110.2070	33.89	0
34	8041742.000	993.647	9.5402	0.0216	0.305	1.70	2.65	20.5050	27.22	0
35	7503738.000	987.552	8.9306	0.0266	0.301	1.63	2.65	29.1840	28.33	0
36	7447106.000	987.552	9.1745	0.0282	0.301	1.63	2.65	20.8730	29.44	0
37	6937418.000	978.407	8.5649	0.0232	0.301	1.63	2.65	21.9520	28.89	0
38	6540994.000	972.312	8.5954	0.0266	0.301	1.63	2.65	19.5900	29.44	0
39	6456046.000	938.784	8.8392	0.0232	0.312	1.63	2.65	33.8380	20.56	0
40	5493302.000	914.400	6.9190	0.0365	0.187	1.58	2.65	48.7550	31.67	0
41	5323406.000	914.400	8.2296	0.0199	0.301	1.63	2.65	16.3760	30.56	0
42	5125194.000	908.303	6.7361	0.0357	0.190	1.59	2.65	69.6760	33.89	0
43	5096878.000	911.352	7.9248	0.0232	0.311	1.61	2.65	15.0020	28.33	0
44	4955298.000	905.256	8.1077	0.0199	0.300	1.65	2.65	33.2770	17.78	0
45	4898667.000	908.303	7.8334	0.0216	0.324	2.20	2.65	16.3270	29.44	0
46	4813719.000	911.352	7.8334	0.0232	0.311	1.59	2.65	14.5640	25.56	0
47	4700455.000	908.303	7.5895	0.0199	0.346	1.47	2.65	12.0660	23.89	0
48	4615507.000	908.303	7.7724	0.0199	0.301	1.63	2.65	30.8340	30.56	0
49	4530559.000	899.160	7.4981	0.0216	0.315	1.60	2.65	13.2370	17.78	0
50	4502243.000	908.303	7.6810	0.0199	0.286	1.65	2.65	12.4220	28.33	0
51	4332347.000	896.112	7.5286	0.0216	0.320	1.56	2.65	12.1460	17.22	0
52	4275715.000	896.112	7.5286	0.0216	0.292	1.66	2.65	14.5910	17.22	0
53	4247399.000	896.112	7.5895	0.0183	0.304	1.63	2.65	12.2900	17.78	0
54	21605088.000	542.544	17.2822	0.1336	0.656	1.92	2.65	188.4250	27.22	0
55	19934448.000	548.640	16.7640	0.1182	0.684	2.01	2.65	185.4600	25.00	0

MIS - MISSISSIPPI RIVER DATA OF TOFFALETI, F.B. (1968)
(SHEET 2 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	19084976.000	575.462	13.6855	0.1131	0.462	2.00	2.65	329.0950	18.33	0
57	13251885.000	532.181	15.2400	0.0773	0.656	1.92	2.65	118.4090	27.78	0
58	11637873.000	505.968	12.0701	0.0824	0.174	1.37	2.65	511.7068	4.44	0
59	10958289.000	523.036	13.7160	0.0456	0.764	1.99	2.65	235.7780	21.11	0
60	10760077.000	518.160	11.9482	0.1080	0.562	1.99	2.65	96.9270	16.67	0
61	10278705.000	513.588	11.3995	0.0824	0.411	1.87	2.65	178.0010	8.89	0
62	10165441.000	516.635	12.2530	0.0875	0.610	2.05	2.65	213.6660	21.11	0
63	9910597.000	508.711	11.3995	0.1045	0.432	1.95	2.65	145.1890	9.44	0
64	8777958.000	510.844	10.6680	0.1080	0.355	2.21	2.65	232.1240	22.78	0
65	8523114.000	507.796	10.6375	0.0954	0.481	2.13	2.65	104.3750	13.33	0
66	8523114.000	513.893	10.9423	0.0722	0.482	1.96	2.65	132.4710	22.22	0
67	8409850.000	502.920	11.0642	0.1029	0.292	1.79	2.65	175.0940	18.33	0
68	8409850.000	494.995	10.8509	0.0824	0.481	2.13	2.65	109.9020	13.33	0
69	8239954.000	509.625	10.3632	0.0926	0.237	1.95	2.65	233.2590	1.67	0
70	8183322.000	514.502	10.4242	0.0691	0.226	2.02	2.65	187.3850	19.44	0
71	8126690.000	518.160	10.7290	0.1131	0.442	1.93	2.65	103.7800	10.56	0
72	7871846.000	510.844	11.0947	0.0603	0.532	2.76	2.65	130.8890	10.00	0
73	7786898.000	507.187	10.2108	0.0763	0.250	1.95	2.65	239.2770	1.67	0
74	7362158.000	498.653	10.1194	0.0784	0.389	2.40	2.65	127.6820	10.00	0
75	7322516.000	515.721	9.8146	0.1182	0.213	1.68	2.65	320.5750	9.44	0
76	6909102.000	507.187	10.2718	0.0568	0.215	2.86	2.65	112.3400	16.67	0
77	6909102.000	494.995	9.8755	0.0885	0.389	2.40	2.65	121.4610	10.56	0
78	6880786.000	505.968	9.3269	0.1182	0.372	1.76	2.65	226.2150	8.33	0
79	6824154.000	505.358	9.9974	0.0722	0.595	2.00	2.65	67.7200	20.56	0
80	6795838.000	504.748	11.2166	0.0363	0.738	1.85	2.65	86.0840	20.00	0
81	6795838.000	508.406	9.8755	0.0978	0.421	1.91	2.65	105.0940	19.44	0
82	6710890.000	499.262	9.4793	0.1080	0.416	1.91	2.65	137.4130	25.56	0
83	6625942.000	505.968	10.9728	0.0251	0.760	2.81	2.65	131.8830	16.67	0
84	6399414.000	499.872	9.5707	0.0855	0.389	2.40	2.65	108.3220	11.11	0
85	6257834.000	499.872	9.6012	0.0824	0.407	2.45	2.65	106.0730	11.11	0
86	6257834.000	504.139	9.9670	0.0545	0.446	2.79	2.65	105.7370	8.89	0
87	6257834.000	501.701	9.7841	0.0632	0.163	1.33	2.65	118.8290	12.22	0
88	6229518.000	501.091	10.0584	0.1080	0.369	1.71	2.65	77.2190	25.00	0
89	6201202.000	501.701	10.2108	0.0261	0.314	2.65	2.65	166.6600	8.33	0
90	6059622.000	494.385	9.5402	0.0875	0.339	1.60	2.65	112.1430	13.89	0
91	6070949.000	511.454	9.7231	0.1080	0.320	2.59	2.65	105.3590	22.22	0
92	6059622.000	494.385	9.5098	0.0734	0.317	2.57	2.65	85.6240	15.56	0
93	5946358.000	502.920	10.4851	0.0415	0.659	2.74	2.65	51.5760	26.67	0
94	5719830.000	499.872	9.6622	0.0415	0.163	1.37	2.65	181.9710	6.11	0
95	5606566.000	502.920	10.1194	0.0363	0.716	1.86	2.65	44.5850	27.22	0
96	5578250.000	498.348	9.1745	0.0722	0.214	2.77	2.65	91.1300	25.00	0
97	5436670.000	497.738	9.3269	0.0456	0.620	2.24	2.65	60.0810	22.78	0
98	5323406.000	495.300	8.9916	0.0647	0.214	2.77	2.65	72.2110	26.11	0
99	5266774.000	499.567	9.4488	0.0530	0.625	2.37	2.65	86.1490	3.89	0
100	5068562.000	492.861	8.5649	0.0788	0.176	1.39	2.65	101.1220	21.11	0
101	5040246.000	492.252	8.5344	0.0618	0.176	1.39	2.65	103.1490	22.78	0
102	5040246.000	499.872	9.8146	0.0415	0.545	2.16	2.65	24.5890	28.33	0
103	4983614.000	491.032	8.5039	0.0661	0.196	2.98	2.65	98.4200	26.67	0
104	4955298.000	491.947	9.0526	0.0671	0.464	1.90	2.65	38.5760	23.33	0
105	4898667.000	486.765	8.9002	0.0456	0.554	2.05	2.65	31.3030	27.78	0
106	4870351.000	497.433	8.5649	0.0978	0.312	1.80	2.65	70.5180	18.89	0
107	4870351.000	494.385	8.5039	0.1029	0.313	1.72	2.65	106.3160	8.33	0
108	4813719.000	493.776	9.6622	0.0251	0.760	2.81	2.65	92.2940	17.22	0
109	4728771.000	497.738	9.2354	0.0312	0.643	1.78	2.65	34.2050	26.11	0
110	4700455.000	492.252	8.3515	0.0647	0.239	3.76	2.65	80.8870	27.78	0

MIS - MISSISSIPPI RIVER DATA OF TOFFALETI, F.B. (1968)
(SHEET 3 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	4615507.000	486.156	8.3820	0.0720	0.220	1.71	2.65	107.8630	18.33	0
112	4558875.000	496.823	9.6317	0.0261	0.500	2.00	2.65	32.0230	25.56	0
113	4530559.000	486.156	8.5039	0.0618	0.211	2.15	2.65	69.0840	28.89	0
114	4502243.000	486.156	8.4125	0.0661	0.196	1.60	2.65	59.0210	26.11	0
115	4502243.000	486.156	8.4125	0.0671	0.196	1.60	2.65	59.0210	26.11	0
116	4388979.000	483.108	7.9858	0.0749	0.208	1.63	2.65	126.3520	6.11	0
117	4190767.000	482.803	8.3515	0.0466	0.596	2.26	2.65	37.5930	27.78	0
118	4134135.000	485.241	8.0772	0.1029	0.433	1.90	2.65	66.5620	21.11	0
119	4049187.000	480.365	8.0162	0.0459	0.459	1.89	2.65	31.3850	25.56	0
120	4020871.000	480.365	7.9858	0.0632	0.215	2.41	2.65	40.4880	24.44	0
121	3992555.000	480.365	8.0162	0.0773	0.500	1.83	2.65	62.3460	24.44	0
122	3907607.000	481.889	7.7724	0.0720	0.219	1.66	2.65	79.2910	15.56	0
123	3907607.000	481.889	7.7724	0.0875	0.219	1.66	2.65	78.2160	16.11	0
124	3850975.000	484.022	7.4676	0.1080	0.223	1.78	2.65	201.8240	8.33	0
125	3850975.000	484.632	7.7419	0.0518	0.458	2.79	2.65	36.0010	20.00	0
126	3822659.000	486.461	7.5590	0.0926	0.370	1.74	2.65	99.7360	13.33	0
127	3766027.000	480.974	7.7724	0.0312	0.634	2.65	2.65	17.2910	29.44	0
128	3681079.000	481.279	7.6505	0.0773	0.555	1.81	2.65	41.5140	26.67	0
129	3624447.000	475.488	7.5286	0.0722	0.457	2.14	2.65	59.4050	25.56	0
130	3624447.000	486.156	7.4676	0.0486	0.427	2.42	2.65	36.8020	18.33	0
131	3567815.000	479.145	6.5837	0.0786	0.173	1.35	2.65	201.0620	16.67	0
132	3426235.000	478.536	7.9858	0.0415	0.732	2.65	2.65	15.0210	28.33	0
133	3397919.000	480.974	7.3457	0.0665	0.359	2.30	2.65	69.5480	12.78	0
134	3256339.000	472.744	7.3457	0.0603	0.302	2.41	2.65	23.5450	26.67	0
135	3256339.000	472.744	7.3457	0.0619	0.302	2.41	2.65	23.2230	26.67	0
136	3114759.000	478.536	7.3152	0.0613	0.669	2.28	2.65	26.6390	7.78	0
137	3086443.000	477.926	6.7361	0.0925	0.392	1.99	2.65	60.9120	22.22	0
138	3029811.000	480.060	7.7419	0.0312	0.546	2.19	2.65	23.9190	24.44	0
139	3001495.000	474.878	6.8275	0.0773	0.509	1.94	2.65	48.2900	26.11	0
140	2916547.000	477.621	6.4008	0.0619	0.444	2.12	2.65	48.9760	18.33	0
141	2888231.000	472.440	6.9494	0.0773	0.478	2.01	2.65	37.0920	25.00	0
142	2831599.000	477.621	6.9494	0.0647	0.290	2.54	2.65	30.7860	21.11	0
143	2789125.000	469.392	6.9494	0.0691	0.314	1.99	2.65	20.7110	22.78	0
144	2633387.000	469.392	6.6446	0.0619	0.586	2.48	2.65	13.5610	18.33	0
145	2627724.000	469.392	5.9436	0.0925	0.560	2.36	2.65	70.3470	1.67	0
146	2486144.000	471.220	6.4008	0.0559	0.270	2.08	2.65	19.4330	22.22	0
147	2299258.000	470.611	5.5474	0.0978	0.621	2.55	2.65	51.1610	9.44	0
148	2279437.000	470.916	6.0350	0.0720	0.215	2.33	2.65	36.8620	5.56	0
149	2279437.000	470.916	6.0350	0.0925	0.215	2.33	2.65	35.9400	5.56	0
150	2270942.000	469.392	5.9741	0.0722	0.575	2.46	2.65	67.0620	1.67	0
151	2208647.000	465.429	6.0655	0.0720	0.300	2.08	2.65	30.4340	5.56	0
152	2115204.000	474.878	6.5227	0.0517	0.600	4.07	2.65	7.4480	21.11	0
153	2101046.000	464.515	5.6388	0.1029	0.401	2.00	2.65	43.4910	16.67	0
154	2064235.000	471.830	6.3398	0.0457	1.129	3.56	2.65	14.7550	11.11	0
155	2004772.000	467.258	5.6083	0.0516	0.284	2.32	2.65	14.1450	21.11	0
156	1911329.000	472.135	6.1874	0.0519	0.557	2.87	2.65	23.0800	1.67	0
157	1885845.000	463.905	5.5474	0.0516	0.277	2.33	2.65	11.6960	18.33	0
158	1885845.000	471.525	6.1570	0.0574	0.616	3.25	2.65	20.6070	1.67	0
159	1806560.000	470.916	6.0960	0.0574	0.578	2.64	2.65	13.8370	5.00	0
160	1766918.000	462.686	5.3950	0.0559	0.261	2.64	2.65	20.8050	6.67	0
161	1755591.000	470.611	6.0046	0.0722	0.513	2.59	2.65	13.7600	5.00	0
162	1633832.000	459.638	5.1816	0.1029	0.321	1.95	2.65	44.6780	2.22	0
163	1560211.000	460.248	4.8158	0.1336	0.295	1.94	2.65	26.2540	14.44	0
164	1512074.000	455.980	4.9378	0.0793	0.230	2.21	2.65	13.4750	3.33	0
165	1512074.000	457.200	4.6634	0.0722	0.472	2.54	2.65	25.0060	1.67	0

MOR - MISSOURI RIVER DATA OF SHEN, H.W., MELLEMA, AND HARRISON (1978)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	908975.625	215.751	3.0785	0.1550	0.199	1.15	2.65	-1.0000	21.67	3
2	928797.500	214.591	3.1486	0.1610	0.208	1.19	2.65	-1.0000	22.78	3
3	891985.500	212.826	3.0023	0.1440	0.193	1.15	2.65	-1.0000	17.78	3
4	906144.000	213.174	3.0450	0.1460	0.207	1.15	2.65	-1.0000	17.78	3
5	900480.500	214.355	2.9200	0.1520	0.209	1.14	2.65	-1.0000	14.44	3
6	931629.250	215.886	2.8316	0.1470	0.209	1.15	2.65	-1.0000	15.56	4
7	996758.375	214.082	2.8499	0.1540	0.223	1.14	2.65	-1.0000	9.44	4
8	934461.000	215.594	2.7828	0.1480	0.222	1.14	2.65	-1.0000	10.00	4
9	940124.375	213.900	2.8164	0.1470	0.209	1.14	2.65	-1.0000	6.67	4
10	965609.625	223.536	3.0876	0.1450	0.204	1.16	2.65	-1.0000	22.22	3
11	971273.000	210.709	2.9139	0.1530	0.199	1.14	2.65	-1.0000	17.22	4
12	923134.125	201.763	2.9962	0.1570	0.210	1.17	2.65	-1.0000	12.78	4
13	937292.625	201.943	2.7737	0.1600	0.224	1.14	2.65	-1.0000	5.00	5
14	962778.000	209.396	3.5662	0.1185	0.190	1.14	2.65	-1.0000	25.56	0
15	889153.750	207.693	3.0937	0.1250	0.200	1.15	2.65	-1.0000	18.89	3
16	948619.500	198.354	2.9383	0.1520	0.222	1.14	2.65	-1.0000	13.33	3
17	894817.125	196.273	2.9444	0.1520	0.208	1.16	2.65	-1.0000	2.22	4
18	1523454.000	214.700	4.2794	0.1440	0.227	1.16	2.65	-1.0000	19.44	3
19	1387533.000	208.595	3.8557	0.1410	0.209	1.17	2.65	-1.0000	10.56	4
20	1228957.000	203.260	3.5936	0.1470	0.220	1.16	2.65	-1.0000	7.22	4
21	962778.000	194.347	3.0724	0.1420	0.218	1.15	2.65	-1.0000	2.78	4
22	1823614.000	221.648	4.9987	0.1670	-1.000	-1.00	2.65	-1.0000	15.56	0
23	1834941.000	222.888	4.9378	0.1470	0.266	1.17	2.65	-1.0000	16.11	3
24	1812288.000	218.133	4.8158	0.1490	0.260	1.17	2.65	-1.0000	10.00	3
25	1837773.000	219.006	4.7549	0.1480	-1.000	-1.00	2.65	-1.0000	7.78	4

MOU - MOUNTAIN CREEK DATA OF EINSTEIN, H.A. (1944)
(SHEET 1 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	153.649	3.923	0.0880	1.3700	0.899	1.84	2.65	79.0200	25.00	0
2	163.812	3.947	0.0920	1.3900	0.899	1.84	2.65	74.1170	25.00	0
3	163.812	3.947	0.0920	1.3700	0.899	1.84	2.65	74.1170	25.00	0
4	170.135	3.975	0.0936	1.3900	0.899	1.84	2.65	83.2560	25.00	0
5	153.649	3.923	0.0880	1.4000	0.899	1.84	2.65	79.0200	25.00	0
6	305.600	4.255	0.1354	1.5000	0.899	1.84	2.65	172.1600	24.00	0
7	299.210	4.249	0.1336	1.4900	0.899	1.84	2.65	108.2070	24.00	0
8	269.579	4.206	0.1244	1.5100	0.899	1.84	2.65	135.1140	24.00	0
9	255.808	4.176	0.1211	1.5100	0.899	1.84	2.65	110.7460	24.00	0
10	249.799	4.160	0.1194	1.4900	0.899	1.84	2.65	145.8120	24.00	0
11	237.987	4.145	0.1156	1.5000	0.899	1.84	2.65	136.0440	24.00	0
12	232.135	4.130	0.1138	1.4900	0.899	1.84	2.65	104.6050	24.00	0
13	220.632	4.115	0.1100	1.4900	0.899	1.84	2.65	91.7160	24.00	0
14	214.937	4.100	0.1082	1.4800	0.899	1.84	2.65	112.9750	24.00	0
15	203.736	4.081	0.1043	1.4800	0.899	1.84	2.65	119.1860	24.00	0
16	198.191	4.063	0.1026	1.4800	0.899	1.84	2.65	122.5210	24.00	0
17	186.031	4.020	0.0992	1.4800	0.899	1.84	2.65	81.5810	21.50	0
18	191.442	4.039	0.1010	1.4900	0.899	1.84	2.65	84.5600	21.50	0
19	186.031	4.020	0.0992	1.5100	0.899	1.84	2.65	108.7740	21.50	0
20	191.442	4.039	0.1010	1.5200	0.899	1.84	2.65	105.7000	21.50	0
21	191.442	4.039	0.1010	1.5500	0.899	1.84	2.65	132.1250	21.50	0
22	191.442	4.039	0.1010	1.5600	0.899	1.84	2.65	95.1300	21.50	0
23	191.442	4.039	0.1010	1.5700	0.899	1.84	2.65	116.2700	21.50	0
24	97.487	3.551	0.0693	1.5200	0.899	1.84	2.65	72.6500	25.00	0
25	318.531	4.267	0.1392	1.5500	0.899	1.84	2.65	686.0959	25.00	0
26	1016.199	4.334	0.3287	1.7900	0.899	1.84	2.65	573.4900	25.00	0
27	1386.118	4.334	0.4147	1.8500	0.899	1.84	2.65	490.5139	25.00	0
28	1463.188	4.334	0.4327	1.8800	0.899	1.84	2.65	431.4858	25.00	0
29	1492.873	4.334	0.4380	1.8300	0.899	1.84	2.65	276.5159	25.00	0
30	1481.030	4.334	0.4362	1.9200	0.899	1.84	2.65	209.0450	25.00	0
31	1345.281	4.334	0.4057	1.8700	0.899	1.84	2.65	230.1390	25.00	0
32	1038.571	4.334	0.3510	1.8400	0.899	1.84	2.65	140.2840	25.00	0
33	683.373	4.334	0.2723	1.7100	0.899	1.84	2.65	71.0670	25.00	0
34	421.809	4.334	0.2047	1.6500	0.899	1.84	2.65	28.7840	25.00	0
35	288.039	4.334	0.1652	1.6300	0.899	1.84	2.65	42.1510	25.00	0
36	226.829	4.295	0.1444	1.6300	0.899	1.84	2.65	26.7630	25.00	0
37	181.901	4.020	0.0970	1.6000	0.899	1.84	2.65	200.2400	25.50	0
38	181.901	4.020	0.0970	1.5900	0.899	1.84	2.65	177.9910	25.50	0
39	181.901	4.020	0.0970	1.5900	0.899	1.84	2.65	200.2400	25.50	0
40	181.901	4.020	0.0970	1.5900	0.899	1.84	2.65	177.9910	25.50	0
41	188.503	4.039	0.0988	1.5800	0.899	1.84	2.65	214.6960	25.50	0
42	188.503	4.039	0.0988	1.5800	0.899	1.84	2.65	171.7570	25.50	0
43	239.447	4.145	0.1156	1.5600	0.899	1.84	2.65	185.9200	25.50	0
44	349.882	4.313	0.1479	1.6300	0.899	1.84	2.65	138.8040	25.50	0
45	446.859	4.334	0.1771	1.6100	0.899	1.84	2.65	181.1350	25.50	0
46	446.859	4.334	0.1771	1.6300	0.899	1.84	2.65	181.1350	25.50	0
47	439.544	4.334	0.1751	1.6100	0.899	1.84	2.65	257.8088	25.50	0
48	432.276	4.334	0.1731	1.5900	0.899	1.84	2.65	234.0570	25.50	0
49	408.055	4.334	0.1652	1.5700	0.899	1.84	2.65	168.6060	25.50	0
50	393.948	4.334	0.1612	1.5800	0.899	1.84	2.65	195.1900	25.50	0
51	393.948	4.334	0.1612	1.5800	0.899	1.84	2.65	195.1900	25.50	0
52	354.650	4.313	0.1499	1.5600	0.899	1.84	2.65	162.5840	25.50	0
53	354.650	4.313	0.1499	1.5600	0.899	1.84	2.65	171.1730	25.50	0
54	336.463	4.295	0.1444	1.5900	0.899	1.84	2.65	204.4820	25.50	0
55	318.531	4.267	0.1392	1.5700	0.899	1.84	2.65	228.6990	25.50	0

MOU - MOUNTAIN CREEK DATA OF EINSTEIN, H.A. (1944)
(SHEET 2 OF 2)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	305.600	4.255	0.1354	1.5700	0.899	1.84	2.65	158.9170	25.50	0
57	118.769	3.764	0.0750	1.5800	0.899	1.84	2.65	40.8900	21.50	0
58	92.452	3.505	0.0676	1.6100	0.899	1.84	2.65	70.0400	21.50	0
59	75.230	3.292	0.0610	1.5100	0.899	1.84	2.65	53.7970	20.00	0
60	345.320	4.282	0.1407	1.3600	0.899	1.84	2.65	263.6958	20.00	0
61	704.793	4.334	0.2493	1.6000	0.899	1.84	2.65	344.5339	20.00	0
62	880.760	4.334	0.2950	1.7500	0.899	1.84	2.65	317.0540	20.00	0
63	963.312	4.334	0.3157	1.7900	0.899	1.84	2.65	384.4119	20.00	0
64	1006.130	4.334	0.3269	1.7700	0.899	1.84	2.65	259.4468	20.00	0
65	1016.199	4.334	0.3287	1.8100	0.899	1.84	2.65	238.9540	20.00	0
66	1016.199	4.334	0.3287	1.8000	0.899	1.84	2.65	406.2219	20.00	0
67	1016.199	4.334	0.3287	1.8000	0.899	1.84	2.65	238.9540	20.00	0
68	932.722	4.334	0.3269	1.7900	0.899	1.84	2.65	195.2550	20.00	0
69	898.769	4.334	0.3194	1.7900	0.899	1.84	2.65	351.2278	20.00	0
70	846.803	4.334	0.3082	1.7700	0.899	1.84	2.65	179.2220	20.00	0
71	814.229	4.334	0.3007	1.7900	0.899	1.84	2.65	111.8350	20.00	0
72	760.645	4.334	0.2893	1.7900	0.899	1.84	2.65	207.5030	20.00	0
73	650.245	4.334	0.2646	1.7900	0.899	1.84	2.65	149.3750	20.00	0
74	458.946	4.334	0.2145	1.7300	0.899	1.84	2.65	145.5010	20.00	0
75	206.113	4.221	0.1282	1.6400	0.899	1.84	2.65	73.6320	20.00	0
76	325.115	4.282	0.1407	1.5300	0.899	1.84	2.65	192.9470	15.00	0
77	325.115	4.282	0.1407	1.5500	0.899	1.84	2.65	192.9470	15.00	0
78	318.544	4.270	0.1391	1.5500	0.899	1.84	2.65	215.9840	15.00	0
79	307.383	4.261	0.1352	1.5500	0.899	1.84	2.65	177.7450	15.00	0
80	300.940	4.249	0.1336	1.5600	0.899	1.84	2.65	161.3780	15.00	0
81	299.210	4.249	0.1336	1.5700	0.899	1.84	2.65	169.0740	15.00	0
82	1000.499	3.923	0.1889	2.6900	0.286	1.47	2.65	758.4509	20.00	0
83	647.416	3.923	0.1463	2.7500	0.286	1.47	2.65	931.4189	20.00	0
84	460.368	3.923	0.1188	2.7600	0.286	1.47	2.65	852.7249	20.00	0
85	326.465	3.923	0.0975	2.8500	0.286	1.47	2.65	619.8340	20.00	0
86	241.215	3.923	0.0823	2.9100	0.286	1.47	2.65	2600.5828	20.00	0
87	184.219	3.923	0.0700	2.9600	0.286	1.47	2.65	1120.4119	20.00	0
88	159.364	3.923	0.0641	3.0200	0.286	1.47	2.65	1091.9949	20.00	0
89	145.551	3.923	0.0609	3.0200	0.286	1.47	2.65	1028.7979	20.00	0
90	134.253	3.923	0.0579	3.0600	0.286	1.47	2.65	602.9058	20.00	0
91	134.253	3.923	0.0579	3.0700	0.286	1.47	2.65	572.7598	20.00	0
92	123.374	3.923	0.0549	3.0600	0.286	1.47	2.65	656.0698	20.00	0
93	111.673	3.923	0.0519	3.0900	0.286	1.47	2.65	688.5698	20.00	0
94	101.226	3.923	0.0487	3.0900	0.286	1.47	2.65	519.7520	20.00	0
95	90.059	3.923	0.0457	3.1100	0.286	1.47	2.65	584.1990	20.00	0
96	90.059	3.923	0.0457	3.1100	0.286	1.47	2.65	359.5068	20.00	0
97	90.059	3.923	0.0457	3.0900	0.286	1.47	2.65	359.5068	20.00	0
98	347.582	3.923	0.1038	2.7600	0.286	1.47	2.65	508.2410	20.00	0
99	174.171	3.923	0.0700	2.4800	0.286	1.47	2.65	418.2529	20.00	0
100	64.431	3.923	0.0396	3.1500	0.286	1.47	2.65	1045.8379	20.00	0

NED - SOUTH AMERICAN RIVER AND CANAL DATA OF NEDECO (1973)
(SHEET 1 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	1139999.000	300.000	2.7800	0.2100	0.500	8.48	2.68	569.7610	30.00	0
2	1309999.000	295.000	3.0100	0.2300	0.500	8.48	2.68	710.3469	30.00	0
3	1784999.000	295.000	3.6900	0.2400	0.500	8.48	2.68	591.1758	30.00	0
4	792999.750	290.000	2.7900	0.2200	0.500	8.48	2.68	492.1499	30.00	0
5	978999.750	285.000	2.9800	0.1700	0.500	8.48	2.68	463.8518	30.00	0
6	603999.750	284.000	2.0800	0.2300	0.500	8.48	2.68	497.0149	30.00	0
7	260999.875	198.000	1.5700	0.3600	1.080	6.36	2.68	49.2020	30.00	0
8	474999.875	195.000	2.1800	0.4600	1.080	6.36	2.68	179.4500	30.00	0
9	865999.750	194.000	3.2200	0.5700	1.080	6.36	2.68	423.2659	30.00	0
10	503999.875	190.000	2.4600	0.4100	1.080	6.36	2.68	197.5580	30.00	0
11	231999.875	197.000	1.3200	0.3500	1.080	6.36	2.68	99.4730	30.00	0
12	2709998.000	610.000	3.9400	0.4800	1.050	4.32	2.68	389.3218	30.00	0
13	2269999.000	620.000	3.4200	0.5400	1.050	4.32	2.68	378.6990	30.00	0
14	3719997.000	620.000	5.1900	0.4100	1.050	4.32	2.68	312.7859	30.00	0
15	1899999.000	605.000	2.2800	0.3600	1.050	4.32	2.68	621.8059	30.00	0
16	1399999.000	622.000	2.0300	0.4900	1.050	4.32	2.68	517.1228	30.00	0
17	2629998.000	785.000	2.8000	0.3600	0.405	2.12	2.68	601.0750	30.00	0
18	1939999.000	785.000	2.0000	0.4800	0.405	2.12	2.68	317.7310	30.00	0
19	3089998.000	798.000	2.6400	0.6200	0.405	2.12	2.68	516.7739	30.00	0
20	1259999.000	845.000	1.5300	0.4000	0.405	2.12	2.68	292.9028	30.00	0
21	2719999.000	400.000	4.6200	0.1300	0.920	2.23	2.68	705.4419	30.00	0
22	2479997.000	415.000	4.1500	0.1700	0.920	2.23	2.68	385.7300	30.00	0
23	3084999.000	415.000	4.6900	0.2200	0.920	2.23	2.68	507.3560	30.00	0
24	1614999.000	400.000	3.3800	0.1700	0.920	2.23	2.68	380.6338	30.00	0
25	1664999.000	400.000	3.0500	0.1700	0.920	2.23	2.68	434.8179	30.00	0
26	1249999.000	395.000	2.5000	0.3800	0.920	2.23	2.68	304.4778	30.00	0
27	3079997.000	446.000	4.6600	0.2000	0.375	1.53	2.68	498.9038	30.00	0
28	2679999.000	450.000	4.4400	0.2000	0.375	1.53	2.68	723.1938	30.00	0
29	3079997.000	454.000	5.2900	0.2000	0.375	1.53	2.68	-1.0000	30.00	0
30	1994998.000	434.000	3.8800	0.1500	0.375	1.53	2.68	152.1540	30.00	0
31	1953998.000	451.000	3.5300	0.1500	0.375	1.53	2.68	329.2178	30.00	0
32	1492999.000	437.000	3.0900	0.1300	0.375	1.53	2.68	146.8440	30.00	0
33	1369999.000	174.000	6.5800	0.1000	0.375	1.53	2.68	2000.3528	30.00	0
34	283999.875	270.000	1.3900	0.4500	0.265	1.47	2.68	411.5408	30.00	0
35	610999.750	290.000	2.1700	0.4500	0.265	1.47	2.68	300.1838	30.00	0
36	651999.875	280.000	2.8800	0.4500	0.265	1.47	2.68	-1.0000	30.00	0
37	255999.875	93.000	3.1600	0.4500	0.265	1.47	2.68	-1.0000	30.00	0
38	155999.875	115.000	1.7300	0.4500	0.265	1.47	2.68	-1.0000	30.00	0
39	236999.875	76.000	2.4700	0.4500	0.265	1.47	2.68	-1.0000	30.00	0
40	3049998.000	460.000	4.7800	0.1500	0.320	1.47	2.68	445.2629	30.00	0
41	2084998.000	605.000	3.0800	0.1100	0.320	1.47	2.68	-1.0000	30.00	0
42	836999.750	394.000	2.5600	0.1100	0.320	1.47	2.68	-1.0000	30.00	0
43	1560000.000	295.000	4.8500	0.0500	0.320	1.47	2.68	-1.0000	30.00	0
44	2819998.000	410.000	6.3500	0.1600	0.310	1.41	2.68	230.9890	30.00	0
45	3849998.000	405.000	6.9400	0.1600	0.310	1.41	2.68	188.4070	30.00	0
46	3939998.000	410.000	7.6200	0.1900	0.310	1.41	2.68	308.0508	30.00	0
47	2857998.000	410.000	6.5700	0.1600	0.310	1.41	2.68	189.8550	30.00	0
48	1528999.000	415.000	4.0600	0.2900	0.310	1.41	2.68	149.2300	30.00	0
49	14259996.000	578.000	13.0600	0.0740	0.210	1.24	2.68	-1.0000	30.00	0
50	10199998.000	582.000	13.2800	0.0620	0.210	1.24	2.68	329.8269	30.00	0
51	3649998.000	570.000	8.8200	0.0260	0.210	1.24	2.68	16.1640	30.00	0
52	4799998.000	565.000	9.2900	0.0350	0.210	1.24	2.68	91.2720	30.00	0
53	883999.750	131.000	5.4600	0.0740	0.210	1.32	2.68	-1.0000	30.00	0
54	420999.875	135.000	3.8200	0.0570	0.210	1.32	2.68	625.9690	30.00	0
55	566999.875	140.000	4.6000	0.0710	0.210	1.32	2.68	590.8279	30.00	0

NED - SOUTH AMERICAN RIVER AND CANAL DATA OF NEDECO (1973)
(SHEET 2 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	477999.750	120.000	3.5500	0.0620	0.210	1.32	2.68	266.5129	30.00	0
57	82999.875	108.000	2.4700	0.0260	0.210	1.32	2.68	11.2120	30.00	0
58	157999.875	114.000	2.6500	0.0360	0.210	1.32	2.68	120.7370	30.00	0
59	379999.750	79.000	5.4000	0.0830	0.150	1.29	2.68	-1.0000	30.00	0
60	354999.875	78.000	5.3700	0.0830	0.150	1.29	2.68	-1.0000	30.00	0
61	478999.875	78.000	6.2400	0.0880	0.150	1.29	2.68	-1.0000	30.00	0
62	439999.875	85.000	4.4700	0.0590	0.150	1.29	2.68	232.6390	30.00	0
63	543999.875	84.000	5.1300	0.0890	0.150	1.29	2.68	156.4490	30.00	0
64	119999.938	76.000	3.5400	0.0200	0.150	1.29	2.68	10.2360	30.00	0
65	21999.988	34.000	3.5600	0.0640	0.100	1.38	2.68	-1.0000	30.00	0
66	15999.988	34.000	3.3500	0.0650	0.100	1.38	2.68	-1.0000	30.00	0
67	10999.992	35.000	3.6300	0.0880	0.100	1.38	2.68	-1.0000	30.00	0
68	110999.875	41.000	4.1200	0.0910	0.100	1.38	2.68	163.4760	30.00	0
69	141999.875	36.000	3.9200	0.0680	0.100	1.38	2.68	393.1919	30.00	0
70	54999.984	39.000	3.0800	0.0890	0.100	1.38	2.68	23.0100	30.00	0
71	56999.980	31.000	3.4200	0.0200	0.100	1.38	2.68	5.8770	30.00	0
72	316999.875	78.000	4.4100	0.0640	0.120	1.32	2.68	-1.0000	30.00	0
73	338999.750	78.000	4.5500	0.0650	0.120	1.32	2.68	-1.0000	30.00	0
74	469999.750	78.000	5.0800	0.0880	0.120	1.32	2.68	-1.0000	30.00	0
75	321999.750	69.000	3.7800	0.0910	0.120	1.32	2.68	328.8728	30.00	0
76	279999.875	85.000	3.1500	0.0770	0.120	1.32	2.68	192.7580	30.00	0
77	369999.875	88.000	3.9100	0.0890	0.120	1.32	2.68	140.8410	30.00	0
78	67999.875	74.000	2.1600	0.0200	0.120	1.32	2.68	9.3060	30.00	0
79	247999.875	74.000	3.4900	0.0600	0.180	1.28	2.68	-1.0000	30.00	0
80	260999.875	76.000	3.4200	0.0620	0.180	1.28	2.68	-1.0000	30.00	0
81	59999.980	73.000	2.7900	0.0200	0.180	1.28	2.68	-1.0000	30.00	0
82	39999.984	75.000	3.0300	0.0370	0.180	1.28	2.68	-1.0000	30.00	0
83	68999.938	27.000	2.7400	0.0920	0.185	1.98	2.68	-1.0000	30.00	0
84	65999.875	28.000	2.6400	0.1300	0.185	1.98	2.68	-1.0000	30.00	0
85	88999.875	32.000	2.6800	0.1700	0.185	1.98	2.68	205.3490	30.00	0
86	125999.875	34.000	2.6200	0.1500	0.185	1.98	2.68	151.5480	30.00	0
87	79999.875	30.000	2.5700	0.1700	0.185	1.98	2.68	261.2529	30.00	0
88	28999.984	27.000	2.2100	0.0200	0.185	1.98	2.68	8.3430	30.00	0
89	8999.988	32.000	1.9000	0.0240	0.185	1.98	2.68	-1.0000	30.00	0
90	195999.875	85.000	2.5800	0.0350	0.120	1.39	2.68	-1.0000	30.00	0
91	186999.875	83.000	2.4900	0.0430	0.120	1.39	2.68	-1.0000	30.00	0
92	168999.875	95.000	2.2100	0.0510	0.120	1.39	2.68	162.9850	30.00	0
93	227999.875	90.000	2.7800	0.0410	0.120	1.39	2.68	168.6430	30.00	0
94	214999.875	100.000	2.9300	0.0470	0.120	1.39	2.68	222.2940	30.00	0
95	50999.984	93.000	1.8000	0.0100	0.120	1.39	2.68	2.9190	30.00	0
96	23999.984	92.000	2.4300	0.0070	0.120	1.39	2.68	-1.0000	30.00	0
97	180999.875	72.000	2.8200	0.0420	0.125	1.63	2.68	-1.0000	30.00	0
98	154999.750	73.000	2.7900	0.0340	0.125	1.63	2.68	-1.0000	30.00	0
99	182999.875	72.000	2.7800	0.0440	0.125	1.63	2.68	-1.0000	30.00	0
100	224999.875	86.000	2.9300	0.0410	0.125	1.63	2.68	215.7230	30.00	0
101	37999.980	77.000	2.4900	0.0030	0.125	1.63	2.68	16.6520	30.00	0
102	98999.875	39.000	2.5800	0.0850	0.125	1.63	2.68	-1.0000	30.00	0
103	86999.875	41.000	2.5000	0.1000	0.125	1.63	2.68	-1.0000	30.00	0
104	149999.875	45.000	2.6200	0.1420	0.125	1.63	2.68	215.8890	30.00	0
105	127999.875	35.000	2.9600	0.1290	0.125	1.63	2.68	58.3050	30.00	0
106	152999.875	41.000	2.6300	0.1770	0.125	1.63	2.68	124.0740	30.00	0
107	33999.988	41.000	2.6600	0.0090	0.125	1.63	2.68	0.0	30.00	0
108	77999.938	75.000	2.0000	0.0230	0.125	1.63	2.68	-1.0000	30.00	0
109	73999.938	69.000	2.1600	0.0260	0.125	1.63	2.68	-1.0000	30.00	0
110	81999.875	75.000	2.0800	0.0240	0.125	1.63	2.68	148.4350	30.00	0

NED - SOUTH AMERICAN RIVER AND CANAL DATA OF NEDECO (1973)
(SHEET 3 OF 3)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	94999.875	75.000	1.8700	0.0460	0.125	1.63	2.68	118.9150	30.00	0
112	80999.938	78.000	1.8200	0.0350	0.125	1.63	2.68	89.1490	30.00	0
113	35999.984	78.000	2.1500	0.0040	0.125	1.63	2.68	0.0	30.00	0

NIO - NIOBRARA RIVER DATA OF COLBY AND HEMBREE (1955)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	7560.363	21.488	0.4669	1.3447	0.310	1.59	2.65	970.0000	23.89	3
2	6456.043	21.336	0.4398	1.2500	0.267	1.69	2.65	1140.0000	20.00	3
3	11354.711	21.336	0.4877	1.7045	0.292	2.08	2.65	1889.9988	5.00	5
4	11722.816	21.641	0.4937	1.7045	0.282	1.63	2.65	1769.9988	6.67	5
5	16055.168	21.946	0.5757	1.7992	0.218	1.51	2.65	1779.9988	11.67	5
6	7645.313	21.336	0.4790	1.2689	0.283	1.64	2.65	780.0000	18.33	3
7	6654.258	21.488	0.4367	1.2879	0.298	1.56	2.65	790.0000	23.33	3
8	7163.941	21.184	0.4605	1.2879	0.351	1.59	2.65	910.0000	22.22	3
9	7220.574	21.336	0.4398	1.1742	0.314	1.58	2.65	1000.0000	17.22	3
10	9740.695	21.336	0.4659	1.4205	0.254	1.63	2.65	1779.9988	15.56	5
11	9429.223	21.031	0.4771	1.4015	0.293	2.24	2.65	1280.0000	16.11	4
12	8891.219	21.336	0.4337	1.3826	0.241	1.58	2.65	1020.0000	10.00	5
13	8324.895	21.641	0.3984	1.5909	0.294	1.62	2.65	1339.9988	1.11	5
14	11949.348	21.641	0.4765	1.3258	0.304	1.69	2.65	1779.9988	1.67	5
15	12883.773	21.641	0.5280	1.6856	0.319	1.64	2.65	2339.9988	14.44	5
16	9061.113	21.336	0.4354	1.6288	0.320	1.66	2.65	1579.9988	11.11	5
17	12232.508	21.336	0.4964	1.6098	0.270	1.63	2.65	2059.9988	20.00	5
18	9032.801	21.031	0.4903	1.5720	0.337	2.52	2.65	1339.9988	20.00	4
19	8070.055	21.336	0.4790	1.3636	0.258	1.63	2.65	1200.0000	23.89	3
20	9287.645	21.336	0.4398	1.5152	0.247	1.61	2.65	1589.9988	7.78	5
21	9174.379	21.336	0.4219	1.5530	0.262	1.64	2.65	1709.9988	1.67	5
22	9599.117	21.031	0.5080	1.2500	0.348	2.33	2.65	893.0000	2.78	4
23	11722.816	21.641	0.5194	1.4773	0.226	1.57	2.65	1819.9988	2.78	5
24	11807.770	21.641	0.4851	1.7045	0.212	1.54	2.65	2119.9988	7.22	5
25	11552.922	21.641	0.5495	1.6288	0.280	1.58	2.65	1699.9988	15.00	4
26	13789.887	21.641	0.5495	1.5341	0.223	1.60	2.65	2749.9978	21.11	5
27	8976.168	21.031	0.4727	1.4962	0.254	1.63	2.65	1200.0000	24.44	4
28	6625.938	21.336	0.4746	1.2500	0.286	1.61	2.65	754.0000	20.00	3
29	7786.895	21.336	0.4920	1.2879	0.325	1.57	2.65	934.0000	25.56	3
30	6569.309	21.336	0.4293	1.1364	0.281	1.59	2.65	503.0000	21.11	3
31	5918.035	21.031	0.4210	1.2500	0.329	1.61	2.65	392.0000	28.89	3
32	7532.051	21.336	0.4920	1.1553	0.296	1.71	2.65	820.0000	20.56	3
33	5861.406	21.336	0.4398	1.2121	0.359	1.74	2.65	429.0000	22.78	3
34	6371.098	21.336	0.4441	1.3258	0.317	1.58	2.65	454.0000	16.67	3
35	6654.258	21.184	0.4693	1.1364	0.306	1.59	2.65	736.0000	16.11	3
36	7956.793	21.184	0.4324	1.4205	0.350	1.55	2.65	1220.0000	11.11	4
37	8239.949	21.336	0.4354	1.4773	0.283	1.62	2.65	1499.9988	8.33	4
38	15064.102	21.946	0.5884	1.6856	0.273	1.59	2.65	2059.9988	5.56	5
39	10193.758	21.641	0.4593	1.6098	0.258	1.67	2.65	1399.9988	12.22	5
40	8013.426	21.031	0.5168	1.3258	0.262	1.65	2.65	792.0000	20.00	3

NSR - N. SASKATCHEWAN R. AND ELBOW R. DATA OF SAMIDE, G.W. (1971)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	26901.813	6.096	2.0422	1.5800	24.644	2.11	2.65	32.2360	13.00	0
2	19582.520	6.096	1.5545	1.5800	22.558	2.15	2.65	24.5230	13.00	0
3	24102.973	6.096	1.7069	1.5800	31.980	2.38	2.65	161.1980	13.00	0
4	24071.320	6.096	2.0117	1.5800	28.307	2.22	2.65	121.9620	13.00	0
5	33109.066	6.096	2.1946	1.5800	17.600	2.47	2.65	81.7210	18.00	0
6	36470.715	6.096	2.4384	1.5800	22.727	2.01	2.65	20.7520	18.00	0
7	19877.609	6.096	1.8288	1.5800	20.547	2.64	2.65	49.2560	18.00	0
8	36428.137	6.096	2.5298	1.5800	27.445	2.02	2.65	25.0430	18.00	0
9	36898.848	6.096	2.5298	1.5800	31.515	2.27	2.65	6.5700	18.00	0
10	39144.324	6.096	2.7432	1.5800	29.186	1.98	2.65	12.9430	18.00	0
11	39144.324	6.096	2.7432	1.5800	34.141	1.77	2.65	12.7450	18.00	0
12	34411.242	6.096	2.4994	1.5800	19.593	2.21	2.65	7.0000	18.00	0
13	34643.184	6.096	2.5298	1.5800	24.377	1.75	2.65	11.8440	18.00	0
14	30029.453	6.096	2.2860	1.5800	13.993	1.83	2.65	18.9420	18.00	0
15	29552.219	6.096	2.3774	1.5800	19.309	2.00	2.65	23.3500	18.00	0
16	24286.680	6.096	2.1641	1.5800	13.606	1.90	2.65	7.1030	18.00	0
17	29377.816	6.096	2.0117	1.5800	30.826	2.27	2.65	19.0970	18.00	0
18	30499.434	6.096	2.0726	1.5800	24.373	1.89	2.65	45.8600	18.00	0
19	31604.922	6.096	2.4689	1.5800	23.807	2.00	2.65	14.5550	18.00	0
20	27908.281	6.096	1.9507	1.5800	24.325	1.93	2.65	26.6740	18.00	0
21	26028.477	6.096	1.8288	1.5800	22.001	2.03	2.65	47.8270	18.00	0
22	26028.477	6.096	1.8288	1.5800	24.101	2.19	2.65	46.7520	18.00	0
23	26028.477	6.096	1.8288	1.5800	22.301	1.95	2.65	65.6200	18.00	0
24	31681.137	6.096	2.2555	1.5800	21.540	2.10	2.65	21.7800	17.00	0
25	31079.465	6.096	2.1336	1.5800	37.223	2.05	2.65	26.2520	17.00	0
26	25156.000	6.096	2.0422	1.5800	40.296	1.86	2.65	10.3170	17.00	0
27	26981.793	6.096	1.9812	1.5800	18.639	2.30	2.65	25.6880	17.00	0
28	26469.605	6.096	1.8288	1.5800	32.530	2.06	2.65	41.3930	17.00	0
29	26469.605	6.096	1.8288	1.5800	29.101	2.17	2.65	53.1940	17.00	0
30	29302.938	6.096	2.0117	1.5800	28.132	1.80	2.65	13.5770	17.00	0
31	22138.395	6.096	1.7678	1.5800	20.188	2.08	2.65	16.9180	17.00	0
32	26543.801	6.096	1.9202	1.5800	45.165	1.50	2.65	4.3910	17.00	0
33	24157.285	6.096	1.7983	1.5800	30.701	2.09	2.65	25.0250	17.00	0
34	24157.285	6.096	1.7983	1.5800	31.916	1.99	2.65	20.3930	17.00	0
35	4908.348	3.048	0.8230	7.4500	14.086	1.85	2.64	125.7020	13.00	0
36	6880.648	3.048	0.8230	7.4500	38.057	1.75	2.64	469.6819	13.00	0
37	6880.680	3.048	0.8230	7.4500	41.335	1.63	2.64	64.0320	13.00	0
38	7052.969	3.048	0.7925	7.4500	57.636	1.66	2.64	25.6710	13.00	0
39	5690.902	3.048	0.7925	7.4500	25.458	2.35	2.64	513.5369	13.00	0
40	7349.488	3.048	0.8534	7.4500	44.176	1.74	2.64	315.1699	13.00	0
41	5830.652	3.048	0.7925	7.4500	49.395	2.07	2.64	222.1560	13.00	0
42	5253.004	3.048	0.7315	7.4500	31.008	1.99	2.64	760.1680	13.00	0
43	5970.809	3.048	0.7925	7.4500	54.890	1.90	2.64	488.0430	13.00	0
44	11621.027	3.048	1.3716	7.4500	31.164	2.06	2.64	545.7720	13.00	0
45	10802.703	3.048	1.0668	7.4500	50.916	2.13	2.64	252.9160	13.00	0
46	10490.543	3.048	1.1887	7.4500	50.916	1.62	2.64	524.4738	13.00	0
47	9985.672	3.048	1.1582	7.4500	76.113	2.34	2.64	505.4399	18.00	0
48	6868.070	3.048	1.0058	7.4500	27.401	1.78	2.64	214.2890	18.00	0
49	6010.691	3.048	0.8839	7.4500	45.102	2.02	2.64	643.6570	18.00	0
50	5335.953	3.048	0.8534	7.4500	30.488	1.90	2.64	252.9580	18.00	0
51	5707.266	3.048	0.8839	7.4500	41.227	2.01	2.64	86.5960	18.00	0
52	5252.500	3.048	0.7620	7.4500	33.096	2.07	2.64	131.5160	18.00	0
53	4709.609	3.048	0.7315	7.4500	29.122	1.94	2.64	247.0010	18.00	0
54	4709.609	3.048	0.7315	7.4500	34.928	1.63	2.64	383.6189	18.00	0
55	4954.547	3.048	0.7925	7.4500	57.506	1.99	2.64	34.8170	18.00	0

OAK - OAK CREEK DATA OF MILHOUS, R.T. (1973)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	2010.436	5.741	0.3718	12.6000	22.000	3.36	2.65	27.6310	5.56	0
2	1415.800	5.709	0.3072	12.5000	16.000	3.73	2.65	7.3760	5.56	0
3	1529.063	5.676	0.3225	12.5000	20.000	3.63	2.65	8.2650	5.56	0
4	2605.071	5.602	0.4657	9.7000	25.000	2.57	2.65	68.3430	5.00	0
5	2605.071	5.602	0.4657	9.7000	17.000	2.91	2.65	51.6040	5.00	0
6	2633.387	5.651	0.4650	9.7000	19.000	3.34	2.65	41.3450	5.00	0
7	2831.599	5.370	0.4945	9.8000	26.000	3.27	2.65	37.7650	5.00	0
8	3397.919	5.775	0.5261	9.9000	24.000	2.38	2.65	111.3320	5.00	0
9	1897.171	5.745	0.3874	10.0000	13.000	3.58	2.65	14.7870	6.67	0
10	1812.224	5.914	0.3704	10.0000	8.200	3.41	2.65	13.9470	6.67	0
11	2605.071	5.816	0.4465	10.2000	27.000	3.78	2.65	51.1770	5.56	0
12	2208.647	5.309	0.4324	10.8000	19.000	2.97	2.65	183.6040	5.56	0
13	1529.063	4.434	0.4035	10.5000	9.500	3.46	2.65	23.6140	5.56	0
14	1330.852	4.225	0.3857	10.4000	11.000	3.63	2.65	13.1480	5.56	0
15	1444.115	4.460	0.3946	10.0000	10.000	3.73	2.65	15.0020	5.56	0
16	1755.592	4.825	0.4185	10.0000	12.000	3.68	2.65	41.1340	5.56	0
17	2095.384	5.283	0.4328	10.0000	23.000	3.27	2.65	69.3260	5.56	0

POR - PORTUGAL RIVER DATA OF DA CUNHA, L.V. (1969) -- NOT VERIFIED
(SHEET 1 OF 4)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	114896.500	182.401	0.6471	0.9100	2.603	2.30	2.65	129.8940	10.00	0
2	88997.250	173.599	0.5971	0.8200	2.603	2.30	2.65	78.9030	10.00	0
3	88197.313	173.599	0.5922	0.8000	2.603	2.30	2.65	59.6640	10.00	0
4	59598.188	109.999	0.6901	0.6900	2.603	2.30	2.65	48.1340	10.00	0
5	83297.375	102.001	0.9302	0.8500	2.603	2.30	2.65	45.0040	10.00	0
6	104696.750	140.001	0.8224	0.8700	2.603	2.30	2.65	72.6190	10.00	0
7	89897.250	140.001	0.7242	0.7700	2.603	2.30	2.65	105.1300	10.00	0
8	78397.500	114.001	0.7913	0.7300	2.603	2.30	2.65	72.7350	10.00	0
9	121996.125	140.001	0.9114	0.8200	2.603	2.30	2.65	148.5900	10.00	0
10	194093.875	182.901	1.0936	0.7100	2.603	2.30	2.65	89.0430	10.00	0
11	162795.000	182.999	0.9836	0.7300	2.603	2.30	2.65	95.1350	10.00	0
12	279791.250	183.999	1.3567	0.7500	2.603	2.30	2.65	75.7970	10.00	0
13	294990.875	183.999	1.6014	0.6100	2.603	2.30	2.65	91.9970	10.00	0
14	309990.500	184.099	1.6758	0.6500	2.603	2.30	2.65	227.2670	10.00	0
15	221793.125	183.800	1.1848	0.7800	2.603	2.30	2.65	96.3320	10.00	0
16	191194.125	183.499	1.0866	0.8000	2.603	2.30	2.65	80.7280	10.00	0
17	170894.625	183.401	1.0174	0.8200	2.603	2.30	2.65	70.6470	10.00	0
18	215593.250	183.651	1.1607	0.8000	2.603	2.30	2.65	71.8370	10.00	0
19	196994.000	183.630	1.1110	0.8100	2.603	2.30	2.65	146.3390	10.00	0
20	141995.625	182.999	0.8531	0.8200	2.603	2.30	2.65	179.8420	10.00	0
21	152395.125	182.999	0.8949	0.8700	2.603	2.30	2.65	68.3670	10.00	0
22	136995.750	182.801	0.8361	0.8600	2.603	2.30	2.65	105.2150	10.00	0
23	124496.125	182.200	0.7888	0.8500	2.603	2.30	2.65	161.4390	10.00	0
24	357588.875	184.599	1.7389	0.8400	2.603	2.30	2.65	137.6600	10.00	0
25	305190.625	184.050	1.4932	0.8500	2.603	2.30	2.65	196.9910	10.00	0
26	259992.125	183.849	1.3597	0.8900	2.603	2.30	2.65	206.4610	10.00	0
27	477985.500	187.601	1.8489	0.9500	2.603	2.30	2.65	213.3720	10.00	0
28	320390.125	184.099	1.5493	0.9300	2.603	2.30	2.65	251.9150	10.00	0
29	254392.250	183.800	1.3518	0.9200	2.603	2.30	2.65	259.7798	10.00	0
30	218493.250	183.599	1.2232	0.9400	2.603	2.30	2.65	193.3980	10.00	0
31	192494.000	180.999	1.1439	0.9400	2.603	2.30	2.65	227.7480	10.00	0
32	432586.750	187.601	1.7593	0.9100	2.603	2.30	2.65	215.0160	10.00	0
33	349989.250	184.099	1.7273	0.7200	2.603	2.30	2.65	187.2640	10.00	0
34	574982.500	187.400	2.1528	0.7500	2.603	2.30	2.65	146.6160	10.00	0
35	299990.750	185.001	1.6508	0.7800	2.603	2.30	2.65	209.7920	10.00	0
36	297990.875	185.001	1.6310	0.7700	2.603	2.30	2.65	199.2100	10.00	0
37	269991.625	184.739	1.5030	0.7500	2.603	2.30	2.65	202.0740	10.00	0
38	252992.250	184.401	1.4259	0.7200	2.603	2.30	2.65	160.9040	10.00	0
39	544983.500	188.500	2.1309	0.7900	2.603	2.30	2.65	203.0940	10.00	0
40	613981.250	188.939	2.3159	0.8100	2.603	2.30	2.65	168.9200	10.00	0
41	659980.000	188.790	2.4265	0.8200	2.603	2.30	2.65	207.9730	10.00	0
42	369988.750	186.001	1.8334	0.6800	2.603	2.30	2.65	244.2120	10.00	0
43	317990.375	185.300	1.6999	0.7600	2.603	2.30	2.65	247.1750	10.00	0
44	261991.875	185.001	1.5176	0.7800	2.603	2.30	2.65	253.9230	10.00	0
45	211993.375	177.400	1.2128	0.7900	2.603	2.30	2.65	190.6940	10.00	0
46	201993.875	177.250	1.1838	0.8300	2.603	2.30	2.65	257.2039	10.00	0
47	196994.000	176.001	1.1573	0.8600	2.603	2.30	2.65	210.9320	10.00	0
48	177994.375	176.750	1.0775	0.8100	2.603	2.30	2.65	274.8760	10.00	0
49	169994.750	176.601	1.0385	0.8000	2.603	2.30	2.65	212.2350	10.00	0
50	159995.000	176.351	1.0000	0.7900	2.603	2.30	2.65	181.7200	10.00	0
51	136995.750	175.799	0.9101	0.7100	2.603	2.30	2.65	168.0350	10.00	0
52	132995.875	169.399	0.9229	0.7100	2.603	2.30	2.65	189.8950	10.00	0
53	127996.000	168.499	0.9028	0.6800	2.603	2.30	2.65	134.8870	10.00	0
54	119996.125	166.601	0.8681	0.6500	2.603	2.30	2.65	133.3200	10.00	0
55	129996.000	165.150	0.8403	0.6200	2.603	2.30	2.65	130.1050	10.00	0

POR - PORTUGAL RIVER DATA OF DA CUNHA, L.V. (1969) -- NOT VERIFIED
(SHEET 2 OF 4)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	111996.625	164.949	0.8214	0.6200	2.603	2.30	2.65	86.7430	10.00	0
57	96997.000	163.199	0.7245	0.5400	2.603	2.30	2.65	94.5320	10.00	0
58	579982.250	187.900	2.3335	0.7700	2.603	2.30	2.65	54.2260	10.00	0
59	614981.250	188.000	2.3774	0.7900	2.603	2.30	2.65	84.2800	10.00	0
60	639980.625	187.699	2.4414	0.8200	2.603	2.30	2.65	109.9180	10.00	0
61	469985.625	187.601	2.0422	0.7700	2.603	2.30	2.65	183.4140	10.00	0
62	451986.250	187.501	1.9934	0.7400	2.603	2.30	2.65	96.8780	10.00	0
63	409987.500	187.269	1.8556	0.7400	2.603	2.30	2.65	214.1620	10.00	0
64	227993.000	183.999	1.3237	0.7300	2.603	2.30	2.65	248.7150	10.00	0
65	196994.000	183.459	1.1214	0.8100	2.603	2.30	2.65	155.8980	10.00	0
66	184994.250	183.499	1.0564	0.8700	2.603	2.30	2.65	213.9590	10.00	0
67	171994.750	183.499	0.9964	0.8900	2.603	2.30	2.65	281.4968	10.00	0
68	166994.875	183.441	0.9565	0.8800	2.603	2.30	2.65	204.9820	10.00	0
69	172994.625	183.349	0.8873	0.8700	2.603	2.30	2.65	258.2009	10.00	0
70	145995.375	183.249	0.8376	0.8600	2.603	2.30	2.65	187.3310	10.00	0
71	124996.000	180.551	0.8047	0.6800	2.603	2.30	2.65	120.6660	10.00	0
72	117996.250	179.600	0.7788	0.8100	2.603	2.30	2.65	192.5560	10.00	0
73	114996.500	178.500	0.7583	0.8100	2.603	2.30	2.65	199.4150	10.00	0
74	101996.875	173.349	0.7050	0.7600	2.603	2.30	2.65	181.5210	10.00	0
75	74997.688	155.000	0.6270	0.6700	2.603	2.30	2.65	113.1090	10.00	0
76	86997.375	161.599	0.6760	0.7400	2.603	2.30	2.65	113.2870	10.00	0
77	84997.438	161.001	0.6632	0.6800	2.603	2.30	2.65	114.9180	10.00	0
78	72997.750	146.950	0.6483	0.7700	2.603	2.30	2.65	51.1120	10.00	0
79	67997.938	145.399	0.6038	0.7900	2.603	2.30	2.65	106.6350	10.00	0
80	70997.813	138.400	0.5861	0.7900	2.603	2.30	2.65	48.3380	10.00	0
81	49998.484	135.999	0.5221	0.7300	2.603	2.30	2.65	47.8720	10.00	0
82	47998.547	134.450	0.5121	0.7300	2.603	2.30	2.65	27.1330	10.00	0
83	41998.723	131.350	0.4785	0.7100	2.603	2.30	2.65	48.6100	10.00	0
84	57998.242	137.251	0.5627	0.8100	2.603	2.30	2.65	50.3720	10.00	0
85	42498.719	130.500	0.4791	0.7200	2.603	2.30	2.65	26.5030	10.00	0
86	39998.793	126.650	0.4788	0.7100	2.603	2.30	2.65	27.7200	10.00	0
87	36498.887	124.249	0.4575	0.7000	2.603	2.30	2.65	38.0930	10.00	0
88	77047.625	70.400	1.0756	0.7700	2.204	2.12	2.65	128.8310	10.00	0
89	66397.875	70.400	1.0927	0.7400	2.204	2.12	2.65	117.1570	10.00	0
90	58298.227	70.400	0.8800	0.7300	2.204	2.12	2.65	107.1700	10.00	0
91	86797.250	70.400	1.2000	0.7300	2.204	2.12	2.65	80.9030	10.00	0
92	82997.438	70.400	1.1500	0.7500	2.204	2.12	2.65	103.4790	10.00	0
93	77897.625	70.400	1.1000	0.7500	2.204	2.12	2.65	60.7750	10.00	0
94	65498.020	70.400	0.9598	0.7300	2.204	2.12	2.65	68.5190	10.00	0
95	56498.293	70.400	0.8598	0.7200	2.204	2.12	2.65	61.3660	10.00	0
96	39998.793	70.400	0.6675	0.6700	2.204	2.12	2.65	96.3600	10.00	0
97	37998.852	69.699	0.6642	0.6300	2.204	2.12	2.65	101.8950	10.00	0
98	35998.906	69.699	0.6343	0.6200	2.204	2.12	2.65	58.1780	10.00	0
99	34998.938	69.601	0.6251	0.6200	2.204	2.12	2.65	34.6970	10.00	0
100	77997.625	70.400	1.1607	0.7700	2.204	2.12	2.65	83.0360	10.00	0
101	95997.000	70.400	1.3506	0.7600	2.204	2.12	2.65	109.2670	10.00	0
102	93997.125	70.400	1.3308	0.7300	2.204	2.12	2.65	85.5660	10.00	0
103	74997.688	70.400	1.1308	0.7300	2.204	2.12	2.65	108.8850	10.00	0
104	102996.875	70.400	1.4204	0.7500	2.204	2.12	2.65	56.7300	10.00	0
105	165994.875	71.299	2.0281	0.7500	2.204	2.12	2.65	67.5370	10.00	0
106	133995.875	71.000	1.8770	0.7400	2.204	2.12	2.65	110.7220	10.00	0
107	137995.750	70.899	1.8194	0.7600	2.204	2.12	2.65	67.0840	10.00	0
108	155995.125	71.201	1.9766	0.7500	2.204	2.12	2.65	127.4870	10.00	0
109	174994.500	71.500	2.1479	0.7700	2.204	2.12	2.65	94.4370	10.00	0
110	189994.125	71.799	2.2884	0.8300	2.204	2.12	2.65	189.8950	10.00	0

POR - PORTUGAL RIVER DATA OF DA CUNHA, L.V. (1969) -- NOT VERIFIED
(SHEET 3 OF 4)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	178994.375	71.500	2.1879	0.7600	2.204	2.12	2.65	194.7800	10.00	0
112	153995.125	71.201	1.9172	0.8800	2.204	2.12	2.65	148.9140	10.00	0
113	148995.250	71.101	1.8599	0.8800	2.204	2.12	2.65	271.4409	10.00	0
114	142995.625	71.000	1.7822	0.9000	2.204	2.12	2.65	350.8918	10.00	0
115	139995.625	70.799	1.7374	0.8700	2.204	2.12	2.65	269.9080	10.00	0
116	136995.750	70.799	1.6950	0.8200	2.204	2.12	2.65	80.8060	10.00	0
117	134995.750	70.899	1.9382	0.8400	2.204	2.12	2.65	239.0990	10.00	0
118	157995.000	71.101	2.1321	0.8900	2.204	2.12	2.65	231.6960	10.00	0
119	142995.625	70.899	1.9480	0.8900	2.204	2.12	2.65	204.1840	10.00	0
120	196994.000	71.000	2.1647	0.9400	2.204	2.12	2.65	171.7120	10.00	0
121	160995.000	71.601	2.0973	0.9700	2.204	2.12	2.65	123.6370	10.00	0
122	152995.188	70.899	1.9071	0.8100	2.204	2.12	2.65	202.9170	10.00	0
123	156995.125	71.399	1.9385	0.9500	2.204	2.12	2.65	237.9920	10.00	0
124	152995.188	70.899	1.9071	0.9400	2.204	2.12	2.65	246.5150	10.00	0
125	149995.250	70.899	1.8672	0.9200	2.204	2.12	2.65	282.3030	10.00	0
126	152995.188	70.899	1.9071	0.9400	2.204	2.12	2.65	345.6729	10.00	0
127	143995.500	70.899	2.0348	0.8900	2.204	2.12	2.65	252.2660	10.00	0
128	136995.750	70.899	1.9696	0.8500	2.204	2.12	2.65	282.2419	10.00	0
129	130995.875	70.799	1.9123	0.8700	2.204	2.12	2.65	180.8370	10.00	0
130	141995.625	70.899	2.0147	0.8800	2.204	2.12	2.65	246.4000	10.00	0
131	137995.750	70.899	1.9797	0.8700	2.204	2.12	2.65	244.9970	10.00	0
132	120996.125	70.701	1.5587	0.8800	2.204	2.12	2.65	175.7090	10.00	0
133	122996.125	70.701	1.5737	0.8800	2.204	2.12	2.65	207.7660	10.00	0
134	119996.125	70.701	1.5036	0.8900	2.204	2.12	2.65	91.9600	10.00	0
135	116996.375	70.601	1.4710	0.8900	2.204	2.12	2.65	193.4490	10.00	0
136	165994.875	70.899	2.1623	0.8900	2.204	2.12	2.65	247.5660	10.00	0
137	161995.000	70.899	2.1022	0.8600	2.204	2.12	2.65	286.8149	10.00	0
138	158995.125	70.799	2.0751	0.8300	2.204	2.12	2.65	135.9300	10.00	0
139	159995.000	70.799	1.8727	0.9300	2.204	2.12	2.65	261.3599	10.00	0
140	150995.250	70.799	1.8276	0.9200	2.204	2.12	2.65	231.7140	10.00	0
141	140995.625	70.799	1.7026	0.8900	2.204	2.12	2.65	216.3180	10.00	0
142	150995.250	70.799	1.8005	0.8800	2.204	2.12	2.65	198.7280	10.00	0
143	161995.000	70.899	1.9477	0.8900	2.204	2.12	2.65	188.3850	10.00	0
144	178994.375	71.000	2.1345	0.9100	2.204	2.12	2.65	332.4329	10.00	0
145	149995.250	70.799	2.0568	0.9100	2.204	2.12	2.65	173.6530	10.00	0
146	174994.500	71.101	2.3476	0.9500	2.204	2.12	2.65	178.4130	10.00	0
147	157995.000	70.799	2.1769	0.9700	2.204	2.12	2.65	171.0980	10.00	0
148	158995.125	70.799	1.8047	0.9100	2.204	2.12	2.65	259.7930	10.00	0
149	151995.250	70.701	1.8023	0.9100	2.204	2.12	2.65	238.9890	10.00	0
150	150995.250	70.701	1.7922	0.8900	2.204	2.12	2.65	219.9420	10.00	0
151	151995.250	70.701	1.8023	0.9000	2.204	2.12	2.65	202.2840	10.00	0
152	149995.250	70.701	1.7873	0.9000	2.204	2.12	2.65	254.8480	10.00	0
153	149995.250	70.701	1.7773	0.8700	2.204	2.12	2.65	201.3440	10.00	0
154	140995.625	70.701	1.8157	0.9000	2.204	2.12	2.65	226.8030	10.00	0
155	147995.375	70.701	1.8809	0.8700	2.204	2.12	2.65	220.9510	10.00	0
156	140995.625	70.701	1.8358	0.8700	2.204	2.12	2.65	253.1400	10.00	0
157	146995.375	70.701	1.9111	0.8700	2.204	2.12	2.65	222.5740	10.00	0
158	159995.000	70.899	2.0455	0.8700	2.204	2.12	2.65	266.5298	10.00	0
159	160995.000	70.899	2.0242	0.9500	2.204	2.12	2.65	288.4858	10.00	0
160	156995.125	70.899	1.9943	0.9500	2.204	2.12	2.65	227.2300	10.00	0
161	150995.250	70.799	1.9269	0.9500	2.204	2.12	2.65	168.4240	10.00	0
162	147995.375	70.799	1.8971	0.9100	2.204	2.12	2.65	240.0970	10.00	0
163	145995.375	70.799	1.8770	0.8900	2.204	2.12	2.65	260.2629	10.00	0
164	146995.375	70.799	1.8870	0.9300	2.204	2.12	2.65	318.9548	10.00	0
165	150995.250	70.899	2.0547	0.9100	2.204	2.12	2.65	272.3918	10.00	0

POR - PORTUGAL RIVER DATA OF DA CUNHA, L.V. (1969) -- NOT VERIFIED
(SHEET 4 OF 4)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
166	150995.250	70.799	2.0126	0.8800	2.204	2.12	2.65	148.4930	10.00	0
167	145995.375	70.799	1.9876	0.8900	2.204	2.12	2.65	228.0770	10.00	0
168	140995.625	70.799	1.9727	0.8800	2.204	2.12	2.65	282.8479	10.00	0
169	140995.625	70.799	1.9727	0.8700	2.204	2.12	2.65	212.6980	10.00	0
170	138995.750	70.799	1.9477	0.8500	2.204	2.12	2.65	240.4490	10.00	0
171	136995.750	70.799	1.6316	0.8700	2.204	2.12	2.65	287.3809	10.00	0
172	134995.750	70.701	1.6139	0.8800	2.204	2.12	2.65	266.3459	10.00	0
173	127996.000	70.701	1.5889	0.8800	2.204	2.12	2.65	296.8618	10.00	0
174	123996.000	70.601	1.5563	0.8900	2.204	2.12	2.65	307.4319	10.00	0
175	122996.125	70.601	1.5362	0.8700	2.204	2.12	2.65	220.6440	10.00	0
176	118996.250	70.500	1.5133	0.8800	2.204	2.12	2.65	240.4840	10.00	0
177	113996.500	70.500	1.4844	0.8300	2.204	2.12	2.65	185.7260	10.00	0
178	111996.625	70.500	1.4643	0.8300	2.204	2.12	2.65	136.2430	10.00	0
179	108996.625	70.400	1.4414	0.8300	2.204	2.12	2.65	189.0790	10.00	0
180	105996.750	70.400	1.4063	0.8400	2.204	2.12	2.65	177.8260	10.00	0
181	103996.750	70.400	1.3762	0.7900	2.204	2.12	2.65	160.0920	10.00	0
182	98997.000	70.400	1.3262	0.7700	2.204	2.12	2.65	202.6670	10.00	0
183	86997.375	70.299	1.2338	0.7300	2.204	2.12	2.65	161.0300	10.00	0
184	83997.375	70.198	1.2055	0.7400	2.204	2.12	2.65	155.0480	10.00	0
185	83997.375	70.198	1.1954	0.7400	2.204	2.12	2.65	128.8570	10.00	0
186	80997.500	70.101	1.1771	0.7300	2.204	2.12	2.65	131.0220	10.00	0
187	78997.500	70.101	1.1521	0.7300	2.204	2.12	2.65	72.6280	10.00	0
188	74997.688	70.500	1.1110	0.7200	2.204	2.12	2.65	50.4530	10.00	0
189	59998.184	69.900	0.9534	0.7800	2.204	2.12	2.65	75.0930	10.00	0
190	73997.750	70.000	1.0921	0.8400	2.204	2.12	2.65	201.4480	10.00	0
191	95997.000	70.400	1.3048	0.8800	2.204	2.12	2.65	149.9670	10.00	0
192	101996.875	70.400	1.4048	0.8600	2.204	2.12	2.65	164.6120	10.00	0
193	106996.750	70.500	1.4131	0.8500	2.204	2.12	2.65	147.5440	10.00	0
194	157995.000	71.000	2.0973	0.7800	2.204	2.12	2.65	152.0510	10.00	0
195	173994.625	71.000	2.2074	0.7700	2.204	2.12	2.65	225.1580	10.00	0
196	180994.375	71.201	2.2610	0.7800	2.204	2.12	2.65	148.0930	10.00	0
197	169994.750	71.000	2.2074	0.7400	2.204	2.12	2.65	197.5340	10.00	0
198	151995.250	71.101	2.1409	0.7400	2.204	2.12	2.65	192.6730	10.00	0
199	151995.250	71.101	2.1409	0.7300	2.204	2.12	2.65	152.9580	10.00	0
200	150995.250	71.101	2.1309	0.7400	2.204	2.12	2.65	147.4440	10.00	0
201	140995.625	70.899	2.0169	0.7600	2.204	2.12	2.65	208.9530	10.00	0
202	133495.750	70.799	1.7258	0.7600	2.204	2.12	2.65	205.1350	10.00	0
203	128496.000	70.799	1.6758	0.7600	2.204	2.12	2.65	242.2910	10.00	0
204	123996.000	70.799	1.6206	0.7500	2.204	2.12	2.65	190.7610	10.00	0
205	121996.125	70.701	1.6081	0.7000	2.204	2.12	2.65	169.3640	10.00	0
206	116496.375	70.701	1.5581	0.6800	2.204	2.12	2.65	177.5100	10.00	0
207	113496.500	70.601	1.5304	0.6800	2.204	2.12	2.65	233.6840	10.00	0
208	106996.750	70.601	1.5024	0.7000	2.204	2.12	2.65	197.8760	10.00	0
209	101996.875	70.500	1.4594	0.7200	2.204	2.12	2.65	113.0200	10.00	0
210	101996.875	70.500	1.4545	0.7100	2.204	2.12	2.65	133.2080	10.00	0
211	96497.000	70.500	1.3896	0.7600	2.204	2.12	2.65	197.5210	10.00	0
212	43998.660	69.699	0.7535	0.7200	2.204	2.12	2.65	75.6000	10.00	0
213	40998.750	69.699	0.7184	0.7300	2.204	2.12	2.65	62.2440	10.00	0
214	45498.613	69.699	0.7733	0.7500	2.204	2.12	2.65	95.5430	10.00	0
215	39998.793	69.699	0.7032	0.7300	2.204	2.12	2.65	47.9600	10.00	0
216	37498.852	69.699	0.6739	0.6700	2.204	2.12	2.65	38.9550	10.00	0
217	32999.000	69.699	0.6340	0.6600	2.204	2.12	2.65	36.8000	10.00	0
218	29999.086	69.650	0.5645	0.6600	2.204	2.12	2.65	40.4800	10.00	0
219	28999.113	69.650	0.5496	0.7100	2.204	2.12	2.65	33.9860	10.00	0

RED - RED RIVER DATA OF TOFFALETI, F.B. (1968)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	1537558.000	182.880	7.3762	0.0752	0.204	2.16	2.65	499.7510	8.89	0
2	1339346.000	178.308	7.2542	0.0707	0.217	2.21	2.65	416.8728	17.78	0
3	1296872.000	177.698	7.0561	0.0729	0.171	1.54	2.65	293.1719	15.56	0
4	1115650.000	175.260	6.4008	0.0770	0.215	2.19	2.65	286.1919	7.78	0
5	1019375.750	173.126	7.0714	0.0661	0.154	2.82	2.65	170.3140	13.89	0
6	925933.000	170.383	5.7912	0.0797	0.122	1.65	2.65	238.7730	24.44	0
7	863637.750	170.383	5.8217	0.0752	0.124	2.26	2.65	154.6920	29.44	0
8	736215.750	165.506	5.1511	0.0761	0.157	1.67	2.65	344.6699	6.67	0
9	702236.625	169.164	6.1570	0.0716	0.195	2.15	2.65	67.7530	25.00	0
10	594635.875	168.554	5.2730	0.0761	0.167	2.08	2.65	128.9390	27.78	0
11	535172.250	166.116	4.1148	0.0761	0.131	1.66	2.65	239.1350	20.00	0
12	461550.625	164.897	4.3891	0.0770	0.108	1.69	2.65	152.8050	28.33	0
13	421908.250	159.410	3.7490	0.0772	0.171	1.54	2.65	127.4570	2.78	0
14	407750.250	162.154	4.1758	0.0752	0.161	1.31	2.65	83.1990	30.56	0
15	396423.875	162.763	4.3891	0.0756	0.102	1.63	2.65	80.4100	33.89	0
16	362444.625	156.972	3.7490	0.0770	0.108	1.60	2.65	130.4020	20.56	0
17	334128.625	155.753	3.7795	0.0770	0.172	1.42	2.65	79.8420	18.89	0
18	331297.125	160.325	4.4196	0.0824	0.155	2.00	2.65	20.9240	31.11	0
19	278063.000	140.513	3.7186	0.0770	0.112	1.63	2.65	76.8660	23.33	0
20	274948.250	160.020	3.7186	0.0797	0.176	2.03	2.65	42.9750	32.22	0
21	263055.500	150.571	3.6576	0.0806	0.094	1.46	2.65	32.5400	32.22	0
22	255693.375	149.352	3.6576	0.0779	0.104	1.63	2.65	50.7290	35.00	0
23	253994.375	146.304	3.1699	0.0761	0.178	1.52	2.65	46.5200	5.56	0
24	242951.125	146.304	3.5509	0.0770	0.112	1.64	2.65	42.5820	27.78	0
25	229359.500	145.085	3.2614	0.0770	0.157	1.83	2.65	42.1290	14.44	0
26	223696.250	130.454	3.3833	0.0725	0.186	1.56	2.65	29.8140	7.78	0
27	206706.750	138.989	3.5052	0.0761	0.106	1.59	2.65	36.0760	12.22	0
28	206706.750	159.410	3.5052	0.0770	0.103	1.59	2.65	7.8760	17.22	0
29	199627.750	139.903	3.5052	0.0734	0.095	1.50	2.65	26.0430	29.44	0
30	190283.375	155.753	2.9992	0.0743	0.148	1.62	2.65	26.4940	29.44	0

RGC - RIO GRANDE CONVEYANCE CHANNEL; CULBERTSON, SCOTT AND BENNETT (1976)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	15857.434	21.336	0.9231	0.5300	0.240	1.38	2.65	1432.0000	6.00	3
2	25768.328	21.641	1.2879	0.6500	0.230	1.44	2.65	910.0000	15.00	3
3	25201.992	21.641	1.2879	0.6500	0.220	1.39	2.65	918.0000	15.00	3
4	33697.047	21.641	1.1462	0.7300	0.220	1.36	2.65	1360.0000	17.00	4
5	35396.059	20.726	1.1251	0.6600	0.180	1.40	2.65	2695.0000	5.00	5
6	36245.563	22.250	1.2067	0.8000	0.240	1.51	2.65	2304.0000	18.00	4
7	24352.484	20.422	1.3011	0.6300	0.270	1.50	2.65	674.0000	20.00	3
8	39077.242	22.860	1.5118	0.6900	0.280	1.49	2.65	1440.0000	19.00	3
9	16423.770	20.726	0.9234	0.5500	-1.000	-1.00	2.65	-1.0000	11.00	3
10	17556.441	20.726	0.7261	0.5000	-1.000	-1.00	2.65	-1.0000	8.00	5
11	15149.512	20.726	0.6096	0.5500	0.180	1.26	2.65	-1.0000	7.00	5
12	16706.938	20.726	0.7710	0.5000	-1.000	-1.00	2.65	-1.0000	4.00	5
13	9910.895	20.422	0.4913	0.4500	0.160	1.24	2.65	-1.0000	7.00	5
14	5097.031	20.117	0.4849	0.5500	-1.000	-1.00	2.65	-1.0000	16.00	3
15	20246.543	20.726	0.8113	0.5500	0.180	1.35	2.65	-1.0000	12.00	5
16	20954.469	20.726	1.2551	0.6500	-1.000	-1.00	2.65	-1.0000	14.00	3
17	22511.895	21.946	1.1642	0.5000	0.220	1.34	2.65	-1.0000	22.00	4
18	30865.359	21.641	1.1849	0.6000	0.230	1.30	2.65	-1.0000	18.00	4
19	19397.039	21.031	1.1220	0.6500	0.240	1.40	2.65	-1.0000	17.00	4
20	28316.848	21.336	1.3368	0.5500	0.240	1.48	2.65	-1.0000	21.00	3
21	30015.855	21.336	0.9928	0.6000	0.220	1.29	2.65	-1.0000	27.00	5
22	3596.240	16.764	0.4212	0.5000	0.240	1.60	2.65	-1.0000	29.00	5
23	4530.691	20.117	0.4027	0.5000	0.250	1.48	2.65	-1.0000	20.00	3
24	14158.422	20.422	0.7688	0.5500	0.190	1.40	2.65	-1.0000	11.00	3
25	42192.102	21.031	1.1883	0.6000	0.230	1.36	2.65	-1.0000	13.00	5
26	35396.059	20.726	1.1251	0.5500	-1.000	-1.00	2.65	-1.0000	-1.00	5
27	28316.848	20.422	1.0054	0.5500	0.200	1.53	2.65	-1.0000	1.00	5
28	23219.813	20.422	0.8780	0.5500	0.200	1.52	2.65	-1.0000	4.00	5
29	16990.105	20.117	0.7574	0.5500	0.220	1.52	2.65	-1.0000	11.00	5
30	38227.742	20.726	1.2237	0.5500	0.180	1.41	2.65	-1.0000	17.00	5
31	29732.688	21.031	0.9895	0.4800	0.170	1.36	2.65	-1.0000	18.00	5
32	7079.211	20.117	0.3925	0.5500	0.170	1.27	2.65	-1.0000	27.00	5
33	25060.410	20.726	1.3492	0.6000	0.250	1.53	2.65	-1.0000	20.00	3

RGR - RIO GRANDE RIVER DATA OF NORDIN, C.F. AND BEVERAGE, C.P. (1965)
(SHEET 1 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	207273.000	40.234	2.4719	2.3000	0.314	1.59	2.65	5310.0000	15.00	0
2	264471.375	39.624	3.1181	2.4600	0.429	1.58	2.65	3920.0000	14.44	0
3	268718.750	44.196	2.8590	2.4000	0.527	2.12	2.65	1500.0000	16.67	0
4	285991.500	42.672	3.1120	2.3500	0.374	2.68	2.65	2700.0000	16.11	0
5	243234.375	41.148	2.7310	2.4000	1.909	6.73	2.65	1710.0000	16.67	0
6	147526.250	39.319	1.9111	2.2000	0.565	2.80	2.65	5190.0000	15.56	0
7	141579.875	38.100	2.1915	2.3100	0.474	4.11	2.65	1690.0000	16.67	0
8	63427.820	34.442	1.4295	1.6300	0.421	3.15	2.65	2690.0000	19.44	0
9	31997.066	71.323	0.4389	1.3100	10.954	-1.00	2.65	1100.0000	22.22	0
10	35961.309	36.576	1.0577	-1.0000	0.332	1.98	2.65	2910.0000	22.78	0
11	78718.438	36.881	1.6154	1.4400	1.407	4.05	2.65	1300.0000	11.11	0
12	113263.875	39.014	2.3256	1.3300	0.932	2.65	2.65	1540.0000	13.89	0
13	77868.875	35.052	1.4478	1.5900	0.384	1.86	2.65	1620.0000	13.33	0
14	25710.922	29.566	1.0119	0.7200	0.569	2.70	2.65	551.0000	24.44	0
15	30864.434	29.870	1.1003	0.8100	0.655	1.95	2.65	2000.0000	23.33	0
16	169895.875	39.624	2.3927	1.9600	1.190	7.21	2.65	3060.0000	15.00	0
17	41341.352	34.138	1.0272	0.9800	0.380	1.83	2.65	2620.0000	15.00	0
18	19368.137	33.223	0.7650	0.9200	0.531	1.90	2.65	445.0000	25.56	0
19	11779.449	63.398	0.3566	1.2900	0.472	1.76	2.65	178.0000	12.22	0
20	8749.641	53.950	0.3078	1.2900	0.629	2.40	2.65	43.0000	10.56	0
21	15318.945	87.782	0.2987	1.2900	3.096	6.27	2.65	135.0000	14.44	0
22	20076.035	91.440	0.3719	1.2900	1.466	7.20	2.65	273.0000	14.44	0
23	33129.711	91.440	0.5273	1.2900	0.610	2.08	2.65	1030.0000	17.22	0
24	45022.430	86.563	0.5761	1.2900	0.339	2.84	2.65	1400.0000	19.44	0
25	24946.391	91.440	0.4084	1.2900	0.331	1.94	2.65	469.0000	19.44	0
26	18886.766	62.179	0.5273	1.2900	0.363	5.23	2.65	314.0000	18.33	0
27	22199.734	89.916	0.3780	1.2900	0.261	1.61	2.65	499.0000	25.00	0
28	7475.422	52.426	0.3109	1.2900	0.321	1.58	2.65	472.0000	22.78	0
29	7135.629	53.340	0.2926	1.2900	0.291	1.70	2.65	149.0000	21.11	0
30	14157.992	54.254	0.4572	1.2900	0.335	1.60	2.65	639.0000	21.11	0
31	1919.824	23.470	0.2774	1.2900	0.314	2.24	2.65	129.0000	21.67	0
32	4077.503	26.822	0.3597	1.2900	0.382	1.44	2.65	92.0000	22.22	0
33	8324.895	30.480	0.4877	1.2900	0.349	1.76	2.65	276.0000	14.44	0
34	9825.645	35.052	0.4542	1.2900	0.378	1.38	2.65	877.0000	9.44	0
35	9259.324	35.052	0.4359	1.2900	0.415	1.44	2.65	1290.0000	3.33	0
36	13138.617	37.795	0.5029	1.2900	0.411	1.37	2.65	1850.0000	2.22	0
37	13138.617	38.405	0.5212	1.2900	0.404	1.38	2.65	1800.0000	2.78	0
38	13251.883	39.014	0.5212	1.2900	0.389	1.32	2.65	1200.0000	2.22	0
39	14242.938	39.624	0.5425	1.2900	0.406	1.38	2.65	1390.0000	4.44	0
40	14639.363	37.795	0.5578	1.2900	0.474	1.76	2.65	598.0000	3.33	0
41	14979.156	40.538	0.5304	1.2900	0.499	1.72	2.65	1330.0000	9.44	0
42	11722.816	36.576	0.4846	1.2900	0.643	1.88	2.65	543.0000	9.44	0
43	4360.656	28.956	0.3292	1.2900	0.609	1.91	2.65	39.0000	11.67	0
44	7701.945	34.747	0.3962	1.2900	0.525	1.73	2.65	374.0000	14.44	0
45	29448.633	85.344	0.4633	1.2900	0.698	2.32	2.65	2220.0000	15.56	0
46	14554.418	49.987	0.5304	1.2900	0.310	1.67	2.65	222.0000	23.89	0
47	7418.785	27.432	0.5364	1.2900	0.282	1.64	2.65	46.0000	22.22	0
48	11892.715	30.480	0.5913	1.2900	0.211	1.42	2.65	244.0000	23.89	0
49	4558.875	26.213	0.4328	1.2900	0.409	1.94	2.65	24.0000	27.22	0
50	25003.020	82.601	0.3719	1.2900	0.408	3.88	2.65	1410.0000	24.44	0
51	32563.391	85.039	0.4450	1.2900	0.360	1.72	2.65	2600.0000	21.67	0
52	6569.309	27.127	0.4481	1.2900	0.478	2.36	2.65	234.0000	23.33	0
53	5804.773	27.432	0.4206	1.2900	0.368	2.14	2.65	585.0000	21.11	0
54	4842.027	25.603	0.3658	1.2900	0.243	2.24	2.65	248.0000	17.22	0
55	4898.660	28.042	0.3597	1.2900	0.247	1.65	2.65	344.0000	11.11	0

RGR - RIO GRANDE RIVER DATA OF NORDIN, C.F. AND BEVERAGE, C.P. (1965)
(SHEET 2 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
56	9967.227	41.148	0.3901	1.2900	0.416	2.08	2.65	1700.0000	5.56	0
57	10901.652	31.699	0.4084	1.2900	0.330	1.55	2.65	1360.0000	4.44	0
58	13704.938	34.747	0.3840	1.2900	0.356	1.44	2.65	2000.0000	2.22	0
59	15800.320	38.100	0.4328	1.2900	0.380	1.53	2.65	1740.0000	3.89	0
60	15715.375	39.624	0.4938	1.2900	0.391	1.52	2.65	1560.0000	5.00	0
61	16508.223	42.672	0.4755	1.2900	0.419	2.22	2.65	1850.0000	2.78	0
62	13535.043	39.624	0.5060	1.2900	0.375	1.72	2.65	3350.0000	5.56	0
63	26560.398	78.943	0.4846	1.2900	0.486	1.84	2.65	5990.0000	6.11	0
64	27296.613	91.440	0.4389	1.2900	0.462	1.97	2.65	4470.0000	8.33	0
65	26022.395	73.457	0.4420	1.2900	0.325	1.92	2.65	5000.0000	11.11	0
66	35394.988	85.649	0.4968	1.2900	0.256	4.24	2.65	1930.0000	15.00	0
67	15743.688	78.029	0.2865	1.2900	0.272	1.67	2.65	1640.0000	15.00	0
68	26701.977	71.018	0.3993	1.2900	0.386	2.67	2.65	1730.0000	18.89	0
69	20132.672	80.467	0.3749	1.2900	0.333	3.57	2.65	1210.0000	22.78	0
70	1829.213	16.002	0.4267	1.2900	0.258	2.00	2.65	19.0000	25.00	0
71	982.565	18.593	0.2743	1.2900	0.352	1.61	2.65	2.0000	26.67	0
72	98256.500	86.258	0.7772	1.2900	0.249	1.65	2.65	2920.0000	12.22	0
73	94858.563	87.478	0.7650	1.2900	0.361	1.51	2.65	3630.0000	16.67	0
74	156304.250	90.526	1.0089	1.2900	0.393	1.86	2.65	5210.0000	16.67	0
75	135916.750	88.697	0.9540	1.2900	0.361	1.44	2.65	4740.0000	19.44	0
76	225395.250	93.878	1.1979	1.2900	0.400	7.16	2.65	4220.0000	12.78	0
77	252012.250	99.974	1.2466	1.2000	0.442	5.89	2.65	4160.0000	14.44	0
78	252578.625	96.317	1.3228	1.2000	0.623	-1.00	2.65	2680.0000	14.44	0
79	277779.875	102.108	1.3381	1.2700	0.313	19.55	2.65	2480.0000	16.11	0
80	245782.750	89.916	1.4783	1.2700	0.608	12.29	2.65	3140.0000	17.22	0
81	141296.750	90.526	1.1095	1.2300	0.603	3.37	2.65	10700.0000	16.67	0
82	143278.875	90.830	1.2283	1.1300	0.645	3.20	2.65	11400.0000	17.22	0
83	57764.625	86.868	0.6828	1.1800	0.473	2.06	2.65	7230.0000	21.11	0
84	28315.988	80.162	0.5212	1.1800	0.705	4.05	2.65	556.0000	23.89	0
85	59180.426	86.868	0.6645	1.3400	0.337	2.01	2.65	1630.0000	11.11	0
86	104202.750	87.782	0.8595	1.3700	0.444	2.46	2.65	1820.0000	13.89	0
87	74187.875	85.649	0.7285	1.3700	0.424	4.64	2.65	3300.0000	15.00	0
88	19084.977	85.344	0.3322	1.2800	1.056	10.82	2.65	304.0000	24.44	0
89	12940.402	46.634	0.4206	1.5000	0.395	1.68	2.65	367.0000	13.33	0
90	11722.816	46.634	0.4115	1.5000	0.575	9.80	2.65	320.0000	11.67	0
91	15913.586	46.634	0.4633	1.5000	0.395	2.11	2.65	529.0000	16.67	0
92	21576.781	64.618	0.4938	1.5000	0.402	1.46	2.65	667.0000	17.78	0
93	33129.711	68.580	0.6157	1.5000	0.516	2.11	2.65	879.0000	17.78	0
94	48420.348	84.125	0.6309	1.5000	0.500	1.80	2.65	2090.0000	23.33	0
95	26022.395	81.077	0.4755	1.5000	0.363	1.71	2.65	596.0000	21.67	0
96	21378.570	67.970	0.4602	1.5000	0.397	1.72	2.65	553.0000	20.00	0
97	22284.684	79.858	0.4176	1.5000	0.344	1.60	2.65	1120.0000	27.22	0
98	9344.273	44.196	0.3505	1.5000	0.460	1.91	2.65	405.0000	24.44	0
99	10222.066	60.350	0.2530	1.5000	0.174	2.17	2.65	1550.0000	22.78	0
100	15941.898	53.645	0.4359	1.5000	0.453	1.90	2.65	1080.0000	22.78	0
101	4785.398	27.432	0.3261	1.5000	0.397	1.52	2.65	256.0000	20.56	0
102	8324.895	45.720	0.3292	1.5000	0.438	1.93	2.65	496.0000	23.33	0
103	8636.375	45.720	0.3170	1.5000	0.469	2.25	2.65	681.0000	15.56	0
104	7135.629	50.597	0.2835	1.5000	0.247	2.65	2.65	748.0000	11.11	0
105	10193.758	52.426	0.3505	1.5000	0.343	1.76	2.65	1260.0000	6.67	0
106	10448.602	52.426	0.3231	1.5000	0.398	1.64	2.65	1190.0000	5.00	0
107	10137.125	52.426	0.3261	1.5000	0.294	1.98	2.65	1280.0000	1.11	0
108	10929.973	22.860	0.5608	1.5000	0.365	1.62	2.65	1260.0000	0.0	0
109	13733.254	53.035	0.3871	1.5000	0.397	2.84	2.65	1120.0000	2.22	0
110	14582.730	51.511	0.4084	1.5000	0.399	1.48	2.65	1360.0000	8.33	0

RGR - RIO GRANDE RIVER DATA OF NORDIN, C.F. AND BEVERAGE, C.P. (1965)
(SHEET 3 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
111	16451.590	54.254	0.4267	1.5000	0.377	1.39	2.65	1420.0000	8.89	0
112	13591.676	54.254	0.3780	1.5000	0.305	2.07	2.65	722.0000	5.56	0
113	12628.930	53.645	0.4633	1.5000	0.542	2.41	2.65	311.0000	15.00	0
114	33412.867	43.586	0.8473	1.5000	0.405	2.02	2.65	1530.0000	13.89	0
115	44739.270	44.501	0.8931	1.5000	0.291	1.67	2.65	3290.0000	21.11	0
116	8749.641	46.025	0.3536	1.5000	0.420	1.64	2.65	213.0000	24.44	0
117	12827.145	53.035	0.4176	1.5000	0.445	2.04	2.65	1450.0000	21.67	0
118	10363.648	47.244	0.2957	1.5000	0.414	1.67	2.65	3410.0000	21.67	0
119	24408.387	39.014	0.6553	1.5000	0.452	2.99	2.65	3350.0000	28.89	0
120	32280.227	46.330	0.6187	1.5000	0.374	2.21	2.65	4580.0000	23.33	0
121	7475.422	44.501	0.3414	1.5000	0.375	1.65	2.65	1160.0000	21.11	0
122	5833.094	35.357	0.2957	1.5000	0.544	1.67	2.65	924.0000	22.78	0
123	6654.258	39.624	0.3200	1.5000	0.525	1.75	2.65	719.0000	17.78	0
124	7730.266	37.795	0.3566	1.5000	0.372	1.80	2.65	1700.0000	6.67	0
125	10533.547	38.405	0.4054	1.5000	0.318	1.68	2.65	1380.0000	11.11	0
126	12062.609	33.833	0.4328	1.5000	0.312	1.73	2.65	1680.0000	6.67	0
127	14073.047	33.833	0.5060	1.5000	0.439	1.70	2.65	1730.0000	4.44	0
128	17414.336	35.052	0.5395	1.5000	0.354	1.82	2.65	1780.0000	4.44	0
129	16168.430	47.854	0.3993	1.5000	0.294	1.70	2.65	1670.0000	6.11	0
130	14809.262	45.720	0.3810	1.5000	0.201	1.95	2.65	1660.0000	6.11	0
131	17131.176	64.922	0.2896	1.5000	0.215	1.66	2.65	2260.0000	4.44	0
132	13535.043	35.966	0.4785	1.5000	0.336	1.76	2.65	1300.0000	8.33	0
133	24436.695	78.638	0.3901	1.5000	0.495	17.05	2.65	2110.0000	8.33	0
134	14384.520	32.004	0.5974	1.5000	0.237	1.61	2.65	981.0000	10.56	0
135	25257.859	65.532	0.4450	1.5000	0.379	2.02	2.65	1230.0000	10.56	0
136	26305.559	65.227	0.4572	1.5000	0.332	1.61	2.65	1750.0000	10.00	0
137	35394.988	80.162	0.4481	1.5000	0.303	6.54	2.65	2000.0000	14.44	0
138	16961.273	45.720	0.5395	1.5000	0.390	2.29	2.65	2430.0000	18.89	0
139	25144.602	61.570	0.5212	1.5000	0.401	1.74	2.65	1320.0000	21.11	0
140	18886.766	60.046	0.4420	1.5000	0.298	1.69	2.65	876.0000	24.44	0
141	2944.863	43.282	0.2621	1.5000	0.343	1.70	2.65	5.0000	26.67	0
142	7248.895	32.918	0.3719	1.5000	0.578	1.72	2.65	671.0000	26.67	0
143	101371.250	42.672	1.5027	1.5000	0.380	8.04	2.65	2710.0000	13.89	0
144	85231.125	43.891	1.2131	1.5000	0.291	1.73	2.65	2410.0000	16.11	0
145	146110.500	45.720	1.6977	1.5000	0.371	6.16	2.65	2620.0000	17.78	0
146	134784.125	45.415	1.6337	1.5000	0.712	2.58	2.65	3030.0000	22.78	0
147	232191.125	62.484	1.6947	1.7600	5.167	11.03	2.65	3700.0000	15.00	0
148	258808.125	64.008	1.7861	1.8000	0.480	-1.00	2.65	2020.0000	18.33	0
149	275231.375	63.703	1.8806	1.9300	1.077	11.85	2.65	2460.0000	19.44	0
150	243234.375	60.960	1.8288	1.6800	0.569	4.50	2.65	2310.0000	19.44	0
151	144977.875	57.302	1.3686	1.5100	0.513	1.98	2.65	7880.0000	18.89	0
152	141863.125	56.998	1.3625	1.5100	1.000	10.44	2.65	4170.0000	18.89	0
153	62295.184	55.474	0.8321	0.9100	0.433	2.40	2.65	1620.0000	23.89	0
154	28882.309	55.169	0.6614	1.0000	0.536	21.67	2.65	1230.0000	26.67	0
155	62295.184	53.950	0.8230	1.1500	0.232	1.59	2.65	1540.0000	13.89	0
156	101371.250	49.682	1.2192	1.2600	0.293	1.85	2.65	2740.0000	16.67	0
157	71073.125	51.206	0.9449	1.0800	0.238	1.88	2.65	1450.0000	16.67	0
158	19254.875	49.378	0.5364	1.9700	0.454	2.01	2.65	729.0000	24.44	0
159	77302.625	82.906	0.7498	0.8900	0.233	1.71	2.65	3130.0000	14.44	0
160	183770.750	82.906	1.1064	0.8400	0.408	1.62	2.65	4330.0000	16.67	0
161	173860.125	82.906	1.1552	0.8300	0.300	1.61	2.65	2150.0000	21.11	0
162	136766.250	82.906	1.0638	0.7900	0.345	1.59	2.65	2340.0000	22.22	0
163	78152.125	81.991	0.8412	0.7600	0.323	1.63	2.65	1520.0000	21.11	0
164	58330.941	82.296	0.8199	0.8000	0.270	1.72	2.65	1260.0000	23.89	0
165	43606.629	82.296	0.6553	0.8600	0.340	1.61	2.65	1470.0000	13.89	0

RGR - RIO GRANDE RIVER DATA OF NORDIN, C.F. AND BEVERAGE, C.P. (1965)
(SHEET 4 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD- ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
166	15602.105	80.772	0.3810	0.8600	0.293	1.78	2.65	544.0000	17.22	0
167	72772.063	82.296	0.8108	0.9300	0.348	1.58	2.65	1710.0000	18.33	0
168	60879.387	82.296	0.7803	0.8600	0.342	1.61	2.65	1460.0000	21.67	0
169	59180.426	82.296	0.7559	0.8300	0.336	1.93	2.65	1290.0000	16.67	0
170	37943.430	81.686	0.6523	0.8600	0.330	1.61	2.65	1200.0000	20.56	0
171	21491.836	72.238	0.4389	0.8600	0.372	1.82	2.65	2570.0000	8.33	0
172	17272.754	79.858	0.3597	0.8600	0.276	1.78	2.65	1100.0000	10.56	0
173	17640.859	81.077	0.3749	0.8600	0.368	1.62	2.65	1310.0000	16.67	0
174	20982.145	85.344	0.3932	0.8600	0.325	1.63	2.65	1230.0000	18.33	0
175	18490.344	77.724	0.4023	0.8600	0.329	1.65	2.65	3210.0000	17.78	0
176	26050.711	83.515	0.4328	0.8600	0.314	1.58	2.65	2880.0000	16.11	0
177	28315.988	81.077	0.4572	0.8600	0.246	1.94	2.65	1810.0000	20.56	0
178	27919.566	80.162	0.3932	0.8600	0.279	1.70	2.65	1310.0000	18.89	0
179	11184.813	74.371	0.3414	0.8600	0.215	1.81	2.65	1310.0000	16.11	0
180	5634.883	24.079	0.4511	0.8600	0.361	1.52	2.65	261.0000	23.89	0
181	2786.293	27.127	0.2408	0.8600	0.337	1.62	2.65	262.0000	21.67	0
182	15970.219	79.858	0.3261	0.8600	0.197	1.44	2.65	1520.0000	21.67	0
183	16225.063	52.121	0.5182	0.8600	0.364	1.47	2.65	7240.0000	18.89	0
184	14044.727	79.248	0.3139	0.8600	0.222	1.93	2.65	985.0000	23.89	0
185	13959.781	65.227	0.3993	0.8600	0.302	1.69	2.65	759.0000	22.22	0
186	17329.387	89.611	0.3353	0.8600	0.344	1.56	2.65	2370.0000	25.56	0
187	13563.355	48.768	0.5182	0.8600	0.318	2.99	2.65	562.0000	22.78	0
188	5266.770	14.021	0.5913	0.8600	0.277	1.70	2.65	3460.0000	26.67	0
189	7645.313	54.864	0.2835	0.8600	0.228	2.11	2.65	741.0000	27.22	0
190	498.361	8.839	0.1585	0.8600	0.300	1.79	2.65	200.0000	26.11	0
191	2299.259	32.918	0.1768	0.8600	0.296	1.62	2.65	183.0000	24.44	0
192	44739.270	83.820	0.4694	0.8600	0.348	1.72	2.65	4160.0000	15.00	0
193	117511.375	82.601	0.9327	0.8600	0.286	1.73	2.65	5830.0000	14.44	0
194	87213.250	82.906	0.6675	0.8600	0.301	1.69	2.65	5050.0000	15.56	0
195	80700.563	82.601	0.7437	0.8600	0.265	1.67	2.65	2810.0000	17.78	0
196	146110.500	82.601	0.9906	0.8600	0.278	1.64	2.65	4140.0000	18.33	0
197	129404.000	82.601	0.9235	0.8600	0.254	1.60	2.65	2460.0000	22.78	0
198	194247.625	82.296	1.1217	0.8000	0.329	1.81	2.65	3930.0000	14.44	0
199	235589.000	82.601	1.3594	0.8000	0.303	1.76	2.65	4500.0000	15.56	0
200	245782.750	82.296	1.2527	0.7900	0.394	1.44	2.65	5080.0000	19.44	0
201	285991.500	83.210	1.4630	0.8000	0.301	1.64	2.65	2940.0000	23.33	0
202	231058.500	82.906	1.3228	0.8300	0.311	1.57	2.65	2800.0000	19.44	0
203	164232.750	82.296	1.0455	0.7400	0.362	1.51	2.65	3950.0000	18.33	0
204	122891.375	81.077	0.8138	0.7600	0.372	1.64	2.65	3610.0000	17.22	0
205	113263.875	81.382	0.9022	0.7600	0.274	1.89	2.65	4390.0000	19.44	0
206	171028.500	83.210	1.0363	0.8000	0.379	1.43	2.65	5760.0000	22.78	0
207	17046.227	39.014	0.5608	0.8600	0.332	1.89	2.65	1270.0000	6.67	0
208	59463.586	81.991	0.7803	0.8300	0.328	1.66	2.65	1480.0000	15.00	0
209	35111.828	40.538	1.0485	0.8300	0.310	1.63	2.65	1280.0000	18.33	0
210	57481.465	81.686	0.8931	0.8200	0.283	1.70	2.65	894.0000	23.33	0
211	63144.660	81.382	0.8047	0.8300	0.224	1.63	2.65	1640.0000	13.89	0
212	95141.688	82.296	0.9510	0.8300	0.230	1.60	2.65	2040.0000	18.89	0
213	63994.145	81.686	0.7102	0.8500	0.218	1.48	2.65	934.0000	17.22	0
214	151207.375	84.125	0.9815	0.8600	0.254	8.70	2.65	3160.0000	17.78	0
215	27947.883	67.970	0.4694	0.8000	0.369	1.64	2.65	2730.0000	21.67	0
216	12827.145	69.190	0.3048	0.7900	0.424	1.83	2.65	315.0000	26.11	0
217	7588.684	23.470	0.5334	1.1000	0.378	1.39	2.65	466.0000	6.67	0
218	2859.915	25.603	0.3688	1.1000	0.396	1.59	2.65	6.0000	9.44	0
219	18971.715	101.498	0.3353	1.1000	0.303	1.63	2.65	1060.0000	8.33	0
220	10929.973	103.022	0.2134	1.1000	0.235	1.82	2.65	729.0000	13.89	0

RGR - RIO GRANDE RIVER DATA OF NORDIN, C.F. AND BEVERAGE, C.P. (1965)
(SHEET 5 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
221	3624.447	29.261	0.3505	1.1000	0.277	1.66	2.65	63.0000	10.56	0
222	20415.824	110.338	0.3200	1.1000	0.328	1.62	2.65	851.0000	16.67	0
223	12147.559	41.453	0.4724	1.1000	0.311	1.57	2.65	539.0000	14.44	0
224	40208.711	101.194	0.4785	1.1000	0.233	1.62	2.65	1450.0000	18.33	0
225	17980.652	103.632	0.3353	1.1000	0.322	1.69	2.65	572.0000	17.22	0
226	40208.711	101.498	0.4968	1.1000	0.337	1.64	2.65	1060.0000	19.44	0
227	36810.785	106.680	0.5273	1.1000	0.348	1.68	2.65	1040.0000	19.44	0
228	10986.602	35.052	0.6309	1.1000	0.248	1.84	2.65	204.0000	19.44	0
229	9004.480	39.624	0.3932	1.1000	0.352	1.73	2.65	415.0000	19.44	0
230	12090.926	41.148	0.5090	1.1000	0.372	1.56	2.65	574.0000	19.44	0
231	1948.140	16.764	0.2316	1.1000	0.265	1.62	2.65	651.0000	16.11	0
232	14809.262	52.426	0.4633	1.1000	0.316	-1.00	2.65	700.0000	27.22	0
233	4870.348	29.261	0.4145	1.1000	0.282	1.77	2.65	149.0000	27.78	0
234	6682.570	31.394	0.4145	1.1000	0.381	1.60	2.65	94.0000	21.11	0
235	29448.633	74.981	0.4054	1.1000	0.242	1.80	2.65	2900.0000	23.89	0
236	10363.648	39.014	0.4420	1.1000	0.360	1.62	2.65	2640.0000	21.67	0
237	2035.920	9.601	0.4176	1.1000	0.328	1.55	2.65	274.0000	25.56	0
238	2293.595	17.678	0.2804	1.1000	0.397	1.51	2.65	252.0000	17.78	0
239	676.752	7.925	0.2164	1.1000	0.362	1.51	2.65	99.0000	13.89	0
240	6994.047	46.939	0.2621	1.1000	0.325	1.60	2.65	509.0000	8.89	0
241	9853.965	54.254	0.3475	1.1000	0.376	1.66	2.65	505.0000	5.56	0
242	12572.301	71.933	0.2987	1.1000	0.234	1.78	2.65	996.0000	2.78	0
243	6852.469	41.148	0.3200	1.1000	0.299	1.64	2.65	594.0000	1.11	0
244	15800.320	108.204	0.2591	1.1000	0.341	1.57	2.65	1730.0000	1.67	0
245	11184.813	47.244	0.4115	1.1000	0.337	1.52	2.65	406.0000	10.00	0
246	8296.586	48.463	0.3505	1.1000	0.266	1.66	2.65	268.0000	8.33	0
247	3737.711	26.518	0.3383	1.1000	0.365	1.40	2.65	53.0000	7.22	0
248	7956.793	29.870	0.4359	1.1000	0.357	1.38	2.65	637.0000	14.44	0
249	25541.020	121.920	0.3658	1.1000	0.296	1.61	2.65	831.0000	17.22	0
250	5804.773	29.261	0.4633	1.1000	0.364	1.64	2.65	816.0000	15.56	0
251	2086.889	23.774	0.2042	1.1000	0.294	1.65	2.65	140.0000	16.11	0
252	4049.187	33.528	0.3505	1.1000	0.211	-1.00	2.65	97.0000	22.22	0
253	7503.734	29.566	0.4633	1.1000	0.333	1.60	2.65	1070.0000	22.22	0
254	71356.250	99.670	0.6005	1.1000	0.300	1.74	2.65	5820.0000	24.44	0
255	39076.066	99.060	0.3749	1.1000	0.250	1.74	2.65	3080.0000	23.89	0
256	22397.945	99.670	0.4420	1.1000	0.427	1.74	2.65	2920.0000	22.78	0
257	1444.115	21.641	0.1798	1.1000	0.452	1.58	2.65	53.0000	19.44	0
258	2859.915	33.528	0.2012	1.1000	0.370	1.37	2.65	143.0000	20.00	0
259	11496.293	47.244	0.3962	1.1000	0.361	1.42	2.65	570.0000	9.44	0
260	12175.875	40.538	0.4846	1.1000	0.345	1.81	2.65	807.0000	5.56	0
261	17046.227	51.511	0.5639	1.1000	0.319	1.76	2.65	1210.0000	8.89	0
262	16479.902	45.415	0.5304	1.1000	0.327	1.59	2.65	1060.0000	8.89	0
263	17131.176	50.597	0.4237	1.1000	0.344	1.48	2.65	1650.0000	6.11	0
264	19141.605	56.693	0.4267	1.1000	0.403	1.58	2.65	2460.0000	7.22	0
265	16140.109	68.275	0.4023	1.1000	0.374	1.52	2.65	1420.0000	10.00	0
266	106184.875	101.194	0.8443	1.1000	0.281	1.73	2.65	6820.0000	21.11	0
267	114113.438	97.536	0.9205	1.1000	0.298	1.86	2.65	7550.0000	16.67	0
268	86080.500	97.536	0.7315	1.1000	0.189	1.76	2.65	3730.0000	18.33	0
269	155737.875	98.755	1.2314	1.1000	0.362	1.87	2.65	4990.0000	19.44	0
270	142995.750	99.060	1.4082	1.1000	0.327	1.59	2.65	8470.0000	23.89	0
271	2673.030	24.994	0.3200	0.6900	0.356	1.55	2.65	24.0000	12.78	0
272	6031.305	31.699	0.3871	0.6900	0.313	1.63	2.65	176.0000	17.78	0
273	11439.656	80.772	0.2804	0.6900	0.314	1.54	2.65	371.0000	25.00	0
274	5323.402	45.720	0.3444	0.6900	0.325	1.61	2.65	11.0000	21.67	0
275	4049.187	16.154	0.7071	0.6900	0.173	1.42	2.65	199.0000	20.00	0

RGR - RIO GRANDE RIVER DATA OF NORDIN, C.F. AND BEVERAGE, C.P. (1965)
(SHEET 6 OF 6)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
276	2106.710	13.716	0.3170	0.6900	0.297	1.62	2.65	128.0000	23.89	0
277	1356.336	20.117	0.2073	0.6900	0.231	1.61	2.65	63.0000	25.56	0
278	3058.127	21.946	0.2896	0.6900	0.259	1.68	2.65	1270.0000	26.11	0
279	1059.018	11.887	0.2347	0.6900	0.311	1.65	2.65	35.0000	23.33	0
280	2446.502	18.593	0.4115	0.6900	0.304	1.69	2.65	48.0000	17.22	0
281	4643.816	19.812	0.4450	0.6900	0.327	1.61	2.65	81.0000	11.67	0
282	15375.578	62.179	0.4663	0.6900	0.258	1.69	2.65	497.0000	3.33	0
283	8947.852	35.662	0.4115	0.6900	0.357	1.47	2.65	558.0000	4.44	0
284	12855.461	63.398	0.4328	0.6900	0.174	-1.00	2.65	549.0000	5.00	0
285	10816.703	49.073	0.4054	0.6900	0.351	1.46	2.65	557.0000	7.22	0
286	5210.141	26.213	0.3993	0.6900	0.264	1.63	2.65	229.0000	13.89	0
287	2916.547	29.870	0.2438	0.6900	0.328	1.61	2.65	87.0000	15.56	0
288	12997.035	82.906	0.3292	0.6900	0.251	1.87	2.65	407.0000	22.78	0
289	18433.711	63.094	0.3780	0.6900	0.318	1.57	2.65	1350.0000	24.44	0
290	33412.867	78.638	0.4755	0.6900	0.325	1.55	2.65	1500.0000	26.11	0
291	107317.500	118.872	0.7803	0.6900	0.289	1.66	2.65	4890.0000	16.11	0
292	83532.125	120.396	0.6523	0.6900	0.258	1.65	2.65	3350.0000	17.78	0
293	118927.125	120.396	0.7803	0.6900	0.224	1.60	2.65	2820.0000	23.89	0

RIO - RIO GRANDE NEAR BERNALILLO, NM, DATA OF TOFFALETI, F.B. (1968)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	285991.500	83.210	1.4630	0.8000	0.315	1.70	2.65	2454.1309	23.33	0
2	245782.750	82.296	1.2527	0.7900	0.315	1.70	2.65	2824.6289	19.44	0
3	235589.000	82.601	1.3594	0.8000	0.315	1.70	2.65	2995.4419	15.56	0
4	231058.500	82.906	1.3228	0.8300	0.315	1.70	2.65	2347.7959	19.44	0
5	194247.625	82.296	1.1217	0.8000	0.315	1.70	2.65	3211.2129	14.44	0
6	171028.500	83.210	1.0363	0.8000	0.315	1.70	2.65	4544.3789	22.78	0
7	164232.750	82.296	1.0455	0.7400	0.315	1.70	2.65	3597.9219	18.33	0
8	122891.375	81.077	0.8138	0.7600	0.315	1.70	2.65	2984.4509	17.22	0
9	113263.875	81.382	0.9022	0.7600	0.315	1.70	2.65	3662.8298	19.44	0
10	183770.750	82.906	1.1064	0.8400	0.368	1.63	2.65	2521.5698	16.67	0
11	173860.125	82.906	1.1552	0.8300	0.300	1.63	2.65	2142.7568	21.11	0
12	136766.250	82.906	1.0638	0.7900	0.345	1.56	2.65	1851.9119	22.22	0
13	95141.688	82.296	0.9510	0.8300	0.219	1.66	2.65	1726.5439	18.89	0
14	78152.125	81.991	0.8412	0.7600	0.323	1.63	2.65	1114.1038	21.11	0
15	77302.625	82.906	0.7529	0.8900	0.225	1.75	2.65	2521.7119	14.44	0
16	59463.586	81.991	0.7803	0.8300	0.328	1.66	2.65	1001.4839	15.00	0
17	58330.941	82.296	0.8199	0.8000	0.270	1.78	2.65	924.5989	23.89	0
18	57481.465	81.686	0.8931	0.8200	0.283	1.75	2.65	598.4048	23.33	0
19	35111.828	40.538	1.0485	0.8300	0.310	1.65	2.65	783.7178	18.33	0
20	282310.375	194.158	0.8047	0.8000	0.315	1.70	2.65	3171.9800	20.00	0
21	246349.125	196.596	0.6675	0.7900	0.315	1.70	2.65	3776.9849	20.00	0
22	235305.875	164.897	0.7772	0.8000	0.315	1.70	2.65	3841.3179	17.22	0
23	220581.500	154.838	0.8291	0.8300	0.315	1.70	2.65	2774.0430	21.67	0
24	190566.625	169.774	0.6553	0.8000	0.315	1.70	2.65	4350.1758	16.11	0
25	168763.250	162.154	0.6370	0.8000	0.315	1.70	2.65	2825.4639	25.00	0
26	154322.125	158.496	0.6492	0.7400	0.315	1.70	2.65	2797.2090	20.56	0
27	133934.625	157.886	0.6949	0.7600	0.315	1.70	2.65	3630.7759	22.22	0
28	124024.000	151.790	0.5822	0.7600	0.315	1.70	2.65	2887.7510	18.89	0
29	180939.125	173.736	0.6309	0.8400	0.362	1.72	2.65	2875.6418	18.33	0
30	172727.500	149.047	0.6645	0.8300	0.329	1.61	2.65	2420.0999	23.33	0
31	133651.375	106.680	0.7468	0.7900	0.341	1.73	2.65	2121.7878	22.78	0
32	110149.125	194.462	0.5334	0.8300	0.207	1.63	2.65	1637.1968	18.33	0
33	82399.500	195.072	0.3597	0.8900	0.316	1.65	2.65	2923.3838	17.78	0
34	80700.563	112.776	0.7346	0.7600	0.333	1.57	2.65	724.9209	21.11	0
35	59463.586	192.634	0.3322	0.8300	0.328	1.66	2.65	1118.0588	16.67	0
36	57481.465	176.784	0.4816	0.8000	0.354	1.60	2.65	596.5779	26.67	0
37	57481.465	108.814	0.4389	0.8200	0.283	1.75	2.65	867.9158	22.78	0
38	35111.828	139.903	0.4023	0.8300	0.310	1.65	2.65	463.6499	18.33	0

SNK - SNAKE AND CLEARWATER RIVER DATA OF SEITZ, H.R. (1976)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	1832044.000	176.784	4.3586	0.8700	0.520	25.90	2.65	9.8840	8.00	0
2	3029811.000	192.024	5.4254	1.1200	24.000	40.67	2.65	21.1140	8.00	0
3	2888231.000	192.024	5.2730	1.0900	25.000	2.57	2.65	32.6870	9.00	0
4	2474817.000	188.976	4.8463	1.0100	30.000	2.40	2.65	27.3480	9.00	0
5	2534281.000	188.976	4.6025	1.0300	33.000	35.53	2.65	11.1420	9.00	0
6	2811778.000	188.976	5.2121	1.0800	0.540	8.46	2.65	11.7480	11.00	0
7	3511183.000	198.120	5.9131	1.2100	0.640	60.41	2.65	4.0160	12.00	0
8	3143075.000	193.548	5.5474	1.1400	0.610	17.45	2.65	12.8520	13.00	0
9	3114759.000	193.548	5.4864	1.1300	0.560	17.96	2.65	14.1320	13.00	0
10	2944863.000	192.024	5.3340	1.1000	0.880	63.72	2.65	10.7070	15.00	0
11	2859915.000	190.500	5.2730	1.0900	0.560	7.03	2.65	8.3200	15.00	0
12	971238.500	137.160	4.2062	0.2450	0.420	1.41	2.65	5.2760	6.00	0
13	1149629.000	138.684	4.4501	0.2800	0.470	1.46	2.65	9.8130	5.50	0
14	1353504.000	140.208	4.6939	0.3180	0.480	38.25	2.65	3.7510	8.50	0
15	1353504.000	140.208	4.6939	0.3180	0.480	1.48	2.65	3.8830	8.50	0
16	1543221.000	141.732	4.0234	0.3530	0.590	61.09	2.65	10.2060	6.50	0
17	2293595.000	145.390	5.6693	0.4900	0.760	46.14	2.65	24.6920	10.00	0
18	1812223.000	142.951	5.2121	0.4050	0.400	62.02	2.65	22.9870	10.00	0
19	1574369.000	142.037	4.9987	0.3600	0.590	100.10	2.65	20.6340	11.00	0
20	1619674.000	142.037	5.0597	0.3670	0.580	57.78	2.65	16.1840	11.00	0
21	1551716.000	141.732	4.9378	0.3540	0.950	37.31	2.65	16.7530	12.00	0

TRI - TRINITY RIVER DATA OF KNOTT, J.M. (1974)
(SHEET 1 OF 1)

ID NO.	DISCHARGE L/S	WIDTH M	DEPTH M	SLOPE S*1000	D50 MM	GRAD-ATION	SPEC. GRAV.	CONC. PPM	TEMP. DEG. C	BF
1	39642.391	30.175	0.8473	3.0000	3.400	3.32	2.65	243.1430	8.00	0
2	82682.625	31.699	1.1979	2.8000	4.200	4.32	2.65	674.8398	7.50	0
3	43889.785	52.426	0.6614	2.9000	11.800	11.11	2.65	36.2690	6.00	0
4	82116.375	53.950	1.1156	2.6000	4.700	6.69	2.65	250.3770	7.00	0