Stream Dispersion at Selected Sites

GEOLOGICAL SURVEY PROFESSIONAL PAPER 433-K

Prepared in cooperation with the U.S. Atomic Energy Commission

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By RICHARD G. GODFREY *and* BERNARD J. FREDERICK

TRANSPORT OF RADIONUCLIDES BY STREAMS

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SYMBOLS

Symbol	Definition
A	Cross-sectional area of channel in square feet.
$\overline{A}$	$\frac{Q\bar{t}}{x}$ in square feet.
a	Radius of pipe in feet.
B	$\frac{K}{RV_*}$.
b	Top width of channel in feet.
C	Concentration of tracer in curies per cubic feet.
C_{max}	Maximum concentration at observation section in curies per cubic feet.
d	Mean depth of flow in feet.
K	Dispersion coefficient in square feet per second.
M	Quantity of tracer in curies.
M'	$Q\int_{-\infty}^{\infty} C(x,t)\,dt$ in curies.
n	Manning's friction coefficient.
Q	Discharge in cubic feet per second.
R	Hydraulic radius in feet.
S	Slope.

Symbol	Definition
t	Time after injection of tracer in seconds.
$\bar{t}$	Elapsed time for the centroid of tracer cloud to move distance x in seconds.
V	Velocity of flow in feet per second.
$\overline{V}$	Mean velocity of flow in feet per second.
V_*	Shear velocity in feet per second.
x	Longitudinal distance downstream from injection section in feet.
y	Height from channel bed in feet.
α_3	Skew coefficient for time-concentration curve.
γ	$\frac{1}{\sqrt{2\pi}}\left[\frac{M'}{\overline{A}C_{max}}\right]$ in feet.
η	Denominator of the exponent of power-law velocity distribution.
λ_1,λ_2	Times defined in figure 4 in seconds.
σ_t^2	$\frac{\int_{-\infty}^{\infty}(t-\bar{t})^2C(x,t)\,dt}{\int_{-\infty}^{\infty}C(x,t)\,dt}$ in seconds squared.
σ_x	$\sqrt{2Kt}$ in feet.

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ABSTRACT

Eleven tests were conducted to study the dispersion patterns of a radiotracer in five natural stream channels and in one canal. The radiotracer, gold-198, was injected as a line source. The patterns of dispersion that were observed in these channels were compared with patterns predicted by the theoretical model for one-dimensional flow developed by G. I. Taylor (1954). Analysis of the relation between time and concentration of the tracer at several sections in each of the six reaches shows that his theoretical model is not adequate to describe the dispersion patterns actually observed. Dispersion coefficients determined from the test data, though constant as theoretically predicted, are about four to 35 times greater than those predicted by Taylor.

INTRODUCTION

Industrial and domestic wastes, both treated and untreated, are frequently added to the flow of streams. Because these same streams may constitute a major source of industrial and public water supply, it is important to know how these wastes disperse and how they are diluted as they move downstream.

Pioneering work in the study of dispersal processes has been largely devoted to describing these processes in pipes and in laboratory flumes. Through these studies, there developed one-dimensional dispersion equations to model the processes.

The U.S. Geological Survey, in cooperation with the U.S. Atomic Energy Commission, began a series of investigations of dispersion processes in natural channels in 1959. One of these investigations, reported herein, approached the problem by conducting radiotracer tests in five reaches of natural channels and in one reach of a large irrigation canal. The purpose of these tests was to obtain data for an evaluation of the one-dimensional approach to describing dispersion in large open channels such as rivers and canals.

Turbulent flow in natural channels causes the tracer cloud, as it is moved downstream, to disperse over greater distances, and thereby, to decrease in concentration. This study seeks, first, to describe changes in this dispersion with time. If the dispersion increases directly with time, for long times after release of the tracer, then a part of the one-dimensional theory is verified; that is, constant dispersion coefficient. Further, Taylor (1954) shows that the dispersion increases rapidly at short times after tracer release. Evidence of this critical period in the stream dispersion pattern also will be sought. Next, the study seeks to verify theoretical values of the dispersion coefficient as proposed by Taylor (1954). Noncomparability of coefficient values may indicate that convective effects other than those considered by Taylor play an important role in describing the dispersion processes; if noncomparability is the case, then the tracer data form a base for further research on the influence of convection.

THEORETICAL MODELS

Mathematical models describe the turbulent dispersion process in pipes and open channels assuming rather idealized conditions, including uniform flow. These conditions are rarely, if ever, found in natural streams. However, certain information from these models, both qualitative and quantitative, can be used as the basis for the analysis of the field data.

The basic equations for turbulent dispersion under steady uniform flow may be written as

$$\frac{\partial C}{\partial t}+V\frac{\partial C}{\partial x}=K\frac{\partial^2 C}{\partial x^2} \qquad (1)$$

in which C is the mean concentration, V is the mean velocity, K is the mean effective or bulk dispersion coefficient, t is time, and x is the distance along the flow direction. This form of the modified Fickian equation is based on the assumption of a constant K which occurs only after the diffusing material has traveled a considerable distance downstream from the point of

injection (Taylor, 1954). A solution of the above equation that satisfies the initial condition of the introduction of concentrated material at $x=0$ when $t=0$ is

$$C=\frac{M}{A\sqrt{2\pi}\sqrt{2Kt}}\exp-\frac{(x-Vt)^2}{4Kt} \quad (2)$$

in which M is the quantity of tracer injected and A is the cross sectional area of the stream.

Several observations about equation 2 can be made: The maximum concentration, with respect to x, will occur at $x=Vt$ and will decrease as t becomes large, hence as x becomes large. Also the dispersion pattern with respect to x is normally distributed with a mean of $x=Vt$, and a standard deviation of $\sigma_x=\sqrt{2Kt}$. Note that the solution predicts the pattern of dispersion for a given value of K. K must be evaluated independently from theory or by experiments that yield a normal dispersion pattern: The theoretical evaluation of K has been attempted by Taylor (1954) for pipe flow and by Elder (1959), Parker (1958), and I. E. Thomas (written commun., 1958) for open-channel flow.

Taylor assumed that the basic mechanism, which produces the one-dimensional dispersion coefficient K, is the combination of convective transport by longitudinal velocities and diffusive transport by turbulence in the transverse directions. In evaluating the diffusive transport, Taylor assumed that the transverse diffusion coefficient is equal to the momentum exchange coefficient in turbulent flows (Reynolds analogy). Combining this diffusive transport with the convective transport that is obtained from an empirical velocity distribution, he summed the rate of material transfer across a plane moving with the mean velocity, V, and obtained the effective dispersion coefficient

$$K=10.1aV_* \quad (3)$$

in which a is the radius of the pipe and V_* is the shear velocity.

Elder (1959) analyzed the example of dispersion in an open channel using a method similar to one used by Taylor. He assumed a logarithmic velocity distribution and found

$$K=5.93dV_* \quad (4)$$

in which d is the depth of flow.

I. E. Thomas (written commun., 1958) used Taylor's method to analyze a free surface flow. He assumed a power law velocity distribution,

$$V=V_{max}\left(\frac{y}{d}\right)^{1/\eta}$$

in which V is the local velocity in the x direction at height y. He found K to have the following form:

$$K=\frac{dV^3}{V_*}\Phi(\eta)+\frac{dV_*^2}{V}\Psi(\eta). \quad (5)$$

Thomas evaluated $\Phi(\eta)$ and $\Psi(\eta)$ for η equal to 6, 7, 8, 9, and 10. The term $\Psi(\eta)$ in equation 5 is the component due to the longitudinal transfer and is small compared to the $\Phi(\eta)$ term.

In all tests the velocity was described solely as a function of the distance from the bed, which is not true in manmade waterways and most natural streams. Tracy and Lester (1961) found that the velocity distribution in the vertical direction is affected by flume sidewalls for a distance about three times the depth away from the walls.

In evaluating his models, each investigator conducted either laboratory or field tests. Taylor was remarkably successful in substantiating his results with laboratory tests in small pipes at velocities of 7 fps (feet per second); the Reynolds number equaled 1.93×10^4. With lower velocities (4 fps), Taylor found that the time-concentration curve was not symmetrical but steeper on the rising limb as compared to the falling limb. He attributed this to the laminar layer being thicker for lower velocities than for higher velocities and retaining a part of the tracer for a longer period. In applying his model to the pipeline data of Hull and Kent (1952), Taylor showed that the observed value of the dispersion coefficient was about twice the theoretical value. One other significant observation was the effect of curvature in a pipe. The observed dispersion coefficient for a coil where the radius of curvature was 96 times the radius of the pipe also was double the theoretical value. Thus the assumption of uniform flow is limiting because the magnitude of the dispersion coefficient readily reflects any slight departures from uniformity.

Elder's experiments in a channel with depths from 1 to 1.5 cm gave skewed distance-concentration curves. He attributed this skew to that part of the tracer being carried near the wall in the viscous sublayer. In determining the dispersion coefficients from his tests, Elder ignored the long tails and was able to check his theoretical results within 10 percent.

Thomas conducted a field study in the Chicago Sanitary and Ship Canal for verification of his theoretical model. The canal, 26 feet deep and 160 feet wide, had a uniform cross section. The dispersion coefficients determined from the experimental data were about 12 times greater than those computed from his model. The experimental results were five times greater than those from Elder's model and twice those from Taylor's

model. Again the time-concentration curves were skewed.

When the dispersion coefficient is determined experimentally, it is preferable to express it in a dimensionless form:

$$\frac{K}{RV_*}=B$$

in which B is a dimensionless constant and R is the hydraulic radius (Glover, 1962). As for the magnitude of B, it is expected that the experimental data will yield higher values than those obtained from theoretical considerations because of the existence of the velocity gradient across the channel which is not accounted for in the theoretical models. Also, the effects of temporary storage of the tracer and channel curvature tend to increase the value of B over the theoretical value.

The variance of $C(x, t)$ at time t from the relation defined in equation 2 is

$$\sigma_x^2=\frac{\int_{-\infty}^{\infty}(x-Vt)^2C(x, t)\mathrm{d}x}{\int_{-\infty}^{\infty}C(x, t)\mathrm{d}x}=2Kt$$

and, the dispersion coefficient used in this paper is that as defined above:

$$K=\frac{\sigma_x^2}{2t}.$$

DISPERSION EXPERIMENTS IN STREAMS

Prior to the present tests, I. E. Thomas (written commun., 1958), Parker (1958), and Simpson, Beetem, and Ruggles (1958) conducted other dispersion experiments in natural channels or canals. In each test the tracer was released from a point source for a finite time period. Subsequent to the present tests, Glover (1962) used a multiple point source in a braided stream to simulate a plane source.

The tests described in this report help to broaden the range of conditions, experimentally studied, to evaluate the influence of channel geometry and flow characteristics on dispersion.

Six reaches were selected (table 1) to evaluate the effect of alinement by comparing the Clinch River results with those from the Powell and from the two reaches of Copper Creek. (See fig. 1 for locations of reaches.) In multiple tests on the same reach, the channel geometry would be unchanged for all practical purposes; therefore, the effect of depth and discharge could be evaluated.

For each test reach, horizontal and vertical control was established and a topographic map of the low-water channel was prepared. A sketch of each of the study reaches is included in the section, "Supplementary data". Six representative cross sections were chosen in each reach. Where multiple tests were made in the same reach, great care was exercised to use the same sections.

The tracer was injected in a line source across the stream either by wading or from a boat. An instantaneous plane source would be required in order to directly compare the experimental results with the theoretical models. Fortunately, vertical mixing occurs very rapidly and a line source was a satisfactory approximation of a plane source. (In all tests the width-depth ratio was large.)

About 15 milliliters of the tracer, a highly concentrated solution of gold chloride in nitric and hydrochloric acid, was diluted to a volume of 2 liters using water from the stream to minimize the difference in specific gravity between the tracer and the stream. The injection was started several feet from one bank and stopped short of the opposite bank, to minimize the contamination of the banks by the injected solution. The injection was made at a uniform rate over a 1-minute period. The concentration of radionuclide used in each test was proportional to the discharge (about 2 millicuries per cubic foot per second). The resulting

TABLE 1.—*Location of test reaches and summary of test conditions*

Reach	Test	Date	Alinement	Discharge in cubic feet per second	Total length of reach in feet	Total fall in feet
Clinch River (above gage) near Clinchport, Va.	5	June 25, 1959	Straight	240	21, 800	6. 69
Clinch River (below gage) near Speers Ferry, Va.	2	June 16, 1959	do	323	19, 300	6. 85
	7	Feb. 9, 1960		3, 000		7. 38
	10	July 12, 1960		1, 800		7. 35
Copper Creek (above gage) near Gate City, Va.	3	June 18, 1959	Crooked	35. 0	27, 550	79. 87
Copper Creek (below gage) near Gate City, Va.	1	June 9, 1959	Straight	54. 3	13, 550	17. 62
	6	Jan. 14, 1960		300		17. 34
	11	July 14, 1960		48. 0		17. 60
Powell River near Sneedville, Tenn.	4	June 23, 1959	Crooked	140	20, 450	6. 39
Coachella Canal near Holtville, Calif.	8	May 11, 1960	Straight	900	18, 000	2. 01
	9	May 12, 1960		950		

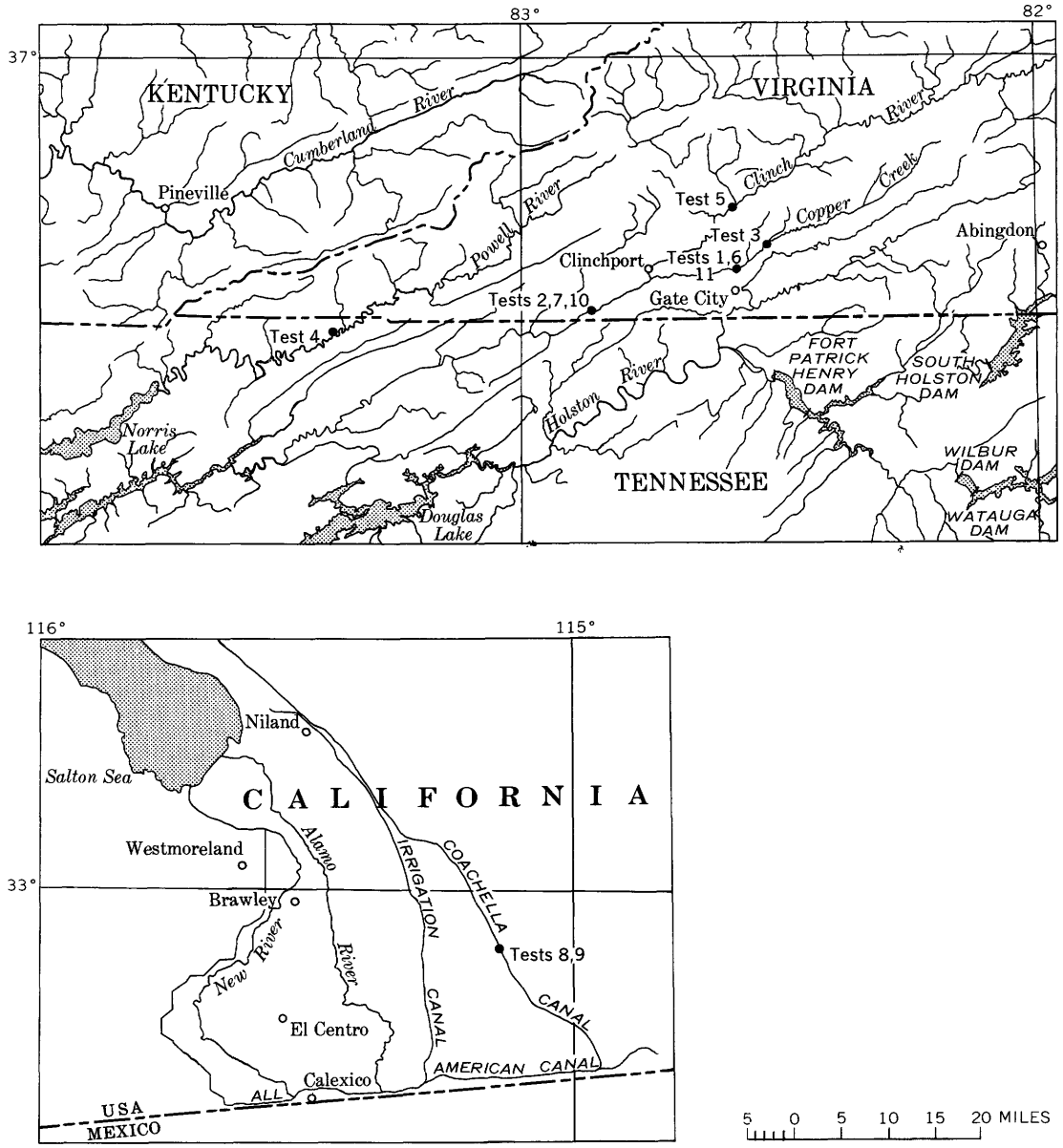

FIGURE 1.—Location of study reaches in Virginia, Tennessee, and California.

concentrations of activity dropped rapidly to a level below that specified as the maximum permissible concentration in unrestricted areas (see Code of Federal Regulations, title 10, part 20, paragraph 20.106 and appendix B, table II, column 2), but were sufficiently high to be easily detected at all cross sections within the reach.

SELECTION OF A RADIOTRACER

The principal advantages of radioisotopes as tracers are the ease of detection, the large range of concentrations that can be observed, and the high order of resolution by radiation detecting equipment. A gamma-emitting isotope is preferred in field studies because of the greater ease of detection. Gamma scintillation techniques are highly perfected and permit the sensing of activity from a large body of water. Measurement in situ is highly advantageous in many open-channel tracer problems because the detailed dispersal pattern is unknown. A program of grab sampling would yield adequate results only if the time of travel of the labeled water were accurately known for proper timing of sample collection at the several measuring sites.

Radiation safety plays an important role in the selection of a radiotracer. Radionuclides that are retained by organisms for long periods were not considered for use. The radioactivity of the isotope should reduce rapidly to very low levels upon completion of the experimental program. A short half life also permits additional testing in the same location within a reasonable time. However,

the half life must be long enough to transport the isotope to the test site and complete the experiment.

Because the isotope is to be injected into a stream, it must be in a water-soluble form. In addition, the amount sorbed by the bed material and the biota should be a minimum. The final considerations are availability and cost. Gold–198 was chosen because of the high permissible concentrations, short half life, and low cost.

RADIATION DETECTION EQUIPMENT

The concentrations of activity in the stream were observed by a scintillation detector with a 1- by 1-inch sodium iodide thallium-activated crystal. A commercially available detector was adapted for use in the field by transistorizing the preamplifier and using a 100-foot lead. The probe assembly (crystal, photomultiplier tube, and preamplifier) were housed in a waterproof case (fig. 2).

The probe was attached to a battery-operated five-decade scaler. The resolving time for the entire system was tested by the two-source method (Price, 1958) and found to be 50 microseconds. The error due to the resolving time is about 5 percent at 60,000 counts per minute and 10 percent at 110,000 counts per minute.

The concentrations were measured at or near the centerline of the stream. Each cross section was provided with a probe and scaler. The six sets of equipment were identical. In testing the relative counting rates versus the high-voltage setting, minor differences were found in the optimum high-voltage setting for each set. Thus each set was used and calibrated as a unit. In the end no sensible differences were found in the calibrations. However, probes and scalers were not interchanged without checking the calibration. Scalers were operated for 15, 30, 60, or 180 seconds for each observation of concentration.

At upstream stations, the concentration changed rapidly as the tracer cloud passed the observation point, and measurements were made at frequent intervals to define the time-concentration curve. The concentrations were high, and a short counting period yielded results that were statistically reliable. As the tracer cloud progressed downstream, concentrations were lower, and longer though less frequent counting periods were used to maintain statistical accuracy of the concentration measurements.

One of three methods was used to stabilize the probe's position in the stream:

1. The probe was clamped to a metal rod driven into the bed of the stream. This rod extended several feet above the water surface and was attached to a taut cable spanning the stream.
2. The probe was placed in a frame which in turn was clamped over an inflated automobile inner tube. The float was again stayed by a cable.
3. The probe was suspended from a boom extending over the prow of a small boat which was fastened to a cable.

In all tests the probe was submerged at a predetermined distance below the water surface.

CALIBRATION OF EQUIPMENT

The initial calibration of the radiation detection equipment was made in a tank with a diameter of 5 feet and a water depth of about 5 feet. The large-dimension tank minimized effects of geometry on the calibration. (See Frederick and Godfrey, 1961.) The probe-mounted crystal for each set of equipment was placed in its operating position 6 inches below the water surface in the tank. The concentrations of radioactivity selected for calibration varied from 0.01 to 25.0 microcuries per cubic foot. Several samples of calibration mixtures were assayed at the National Bureau of Standards, Washington, D.C., or at Abbott Laboratories, Oak Ridge, Tenn.

This method of calibration was used to determine the concentration of injection solution for each test.

ANALYSIS OF DATA

In view of the mathematical models developed earlier, the most significant parameter describing dispersion is the dispersion coefficient,

$$K=\frac{\sigma_x^2}{2t},$$

where K is in square feet per second, σ_x is in feet and t is in seconds.

Field observations of the variation of concentration $C(x, t)$, in microcuries per cubic foot with distance in feet at time t are more difficult to obtain than observations of the variation of concentration with time at a section located some distance x downstream from the injection section. Therefore, it was assumed that

$$\sigma_x^2=\overline{V}^2\sigma_t^2=\left(\frac{x}{\bar{t}}\right)^2\sigma_t^2$$

where

$V=\frac{x}{\bar{t}}$=mean velocity of flow, in feet per second,

$\bar{t}$=elapsed time for the centroid of the tracer cloud to move a distance x, and

$$\sigma_t^2=\frac{\int_{-\infty}^{\infty}(t-\bar{t})^2C(x,t)\mathrm{d}t}{\int_{-\infty}^{\infty}C(x,t)\mathrm{d}t}, \text{ in seconds.}$$

This assumption is only valid if $K/x\overline{V}$ is small (Godfrey, 1961), as was so for these experiments.

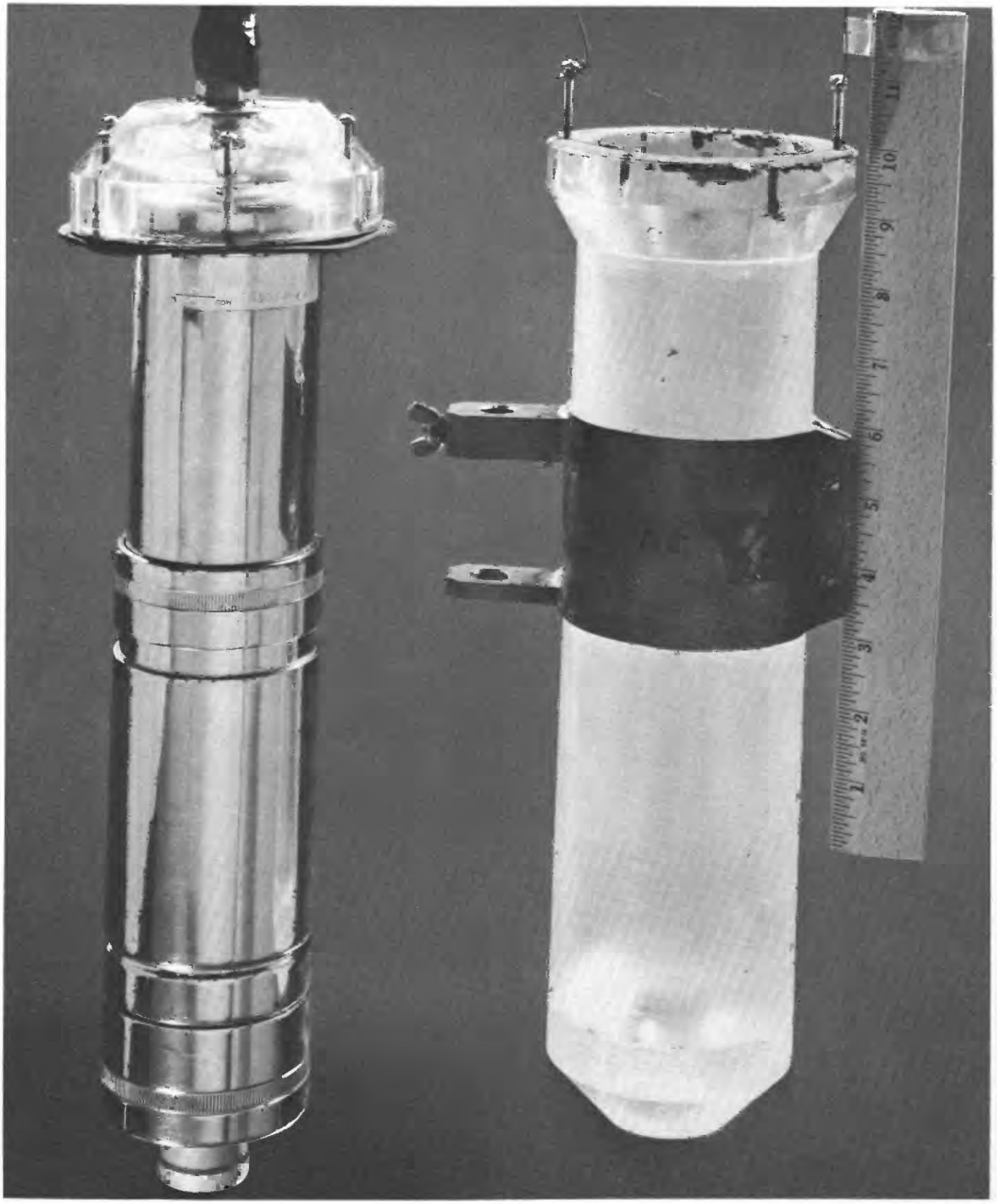

FIGURE 2.—Probe housing scintillation detector and its waterproof case.

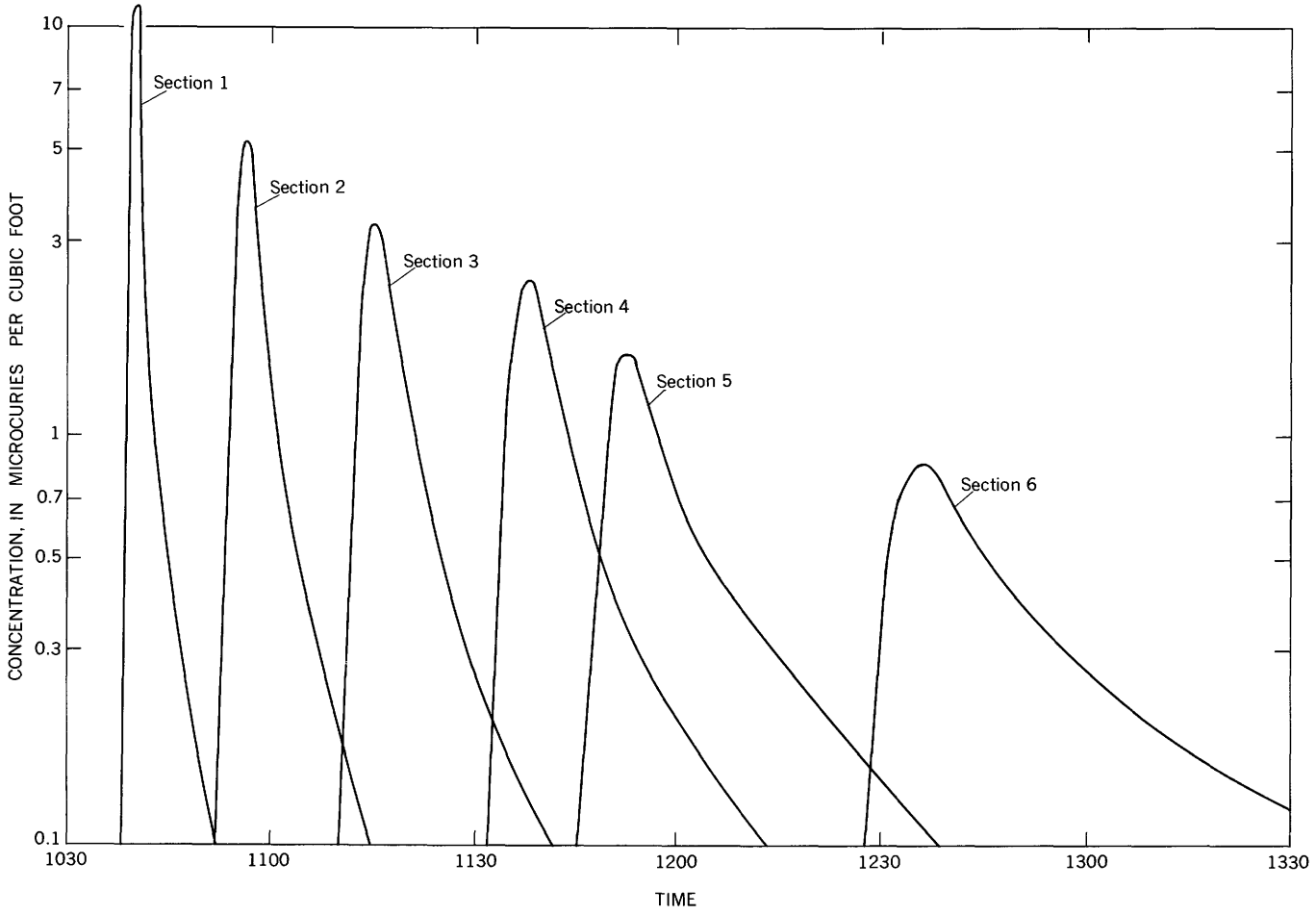

FIGURE 3.—Time-concentration curves for test 10 on the Clinch River at Speers Ferry, Va.

A typical set of time-concentration observations is shown in figure 3. In this test the depths of flow were sufficient to minimize the effect of variations in geometry from section to section on detection of the tracer. Notice the continual decrease in concentration and the increase in time between the rising and falling limbs of the curves as the tracer moves downstream.

The base data obtained in the 11 tests are presented in tables 5–15. (See "Supplementary data".)

The method of moments was used to determine the mean time or centroid of the time-concentration distribution, $\bar{t}$. To obtain σ_t from the skewed time-concentration curves, the following procedure was used.

The time-concentration curve was assumed to be suitably described by a Pearson type III distribution with a skew coefficient α_3. To obtain the skew coefficient, the times λ_1 and λ_2, in seconds, defined in figure 4, were determined for four concentrations of each time-concentration curve. These concentrations were 0.25, 0.50, about 0.61, and 0.75 of the maximum concentration

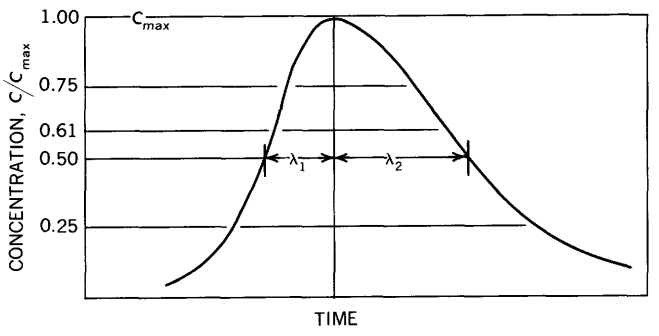

FIGURE 4.—Definition sketch for parameters λ_1 and λ_2 for Pearson type III distribution.

C_{max}. Using the ratio λ_2/λ_1 for the observed data, an estimated skew coefficient at each of the four concentration levels C/C_{max} was determined from table 2; the mean of these four figures was α_3 for a data set. Using this estimate of α_3, the number of standard deviations between rising and falling limbs at the various levels C/C_{max} for a Pearson type III distribution was ob-

tained (table 3). An estimated standard deviation at the four levels was obtained by dividing the time span between rising and falling limbs of the curve $(\lambda_1+\lambda_2)$ for each level by the number of standard deviations at that level. The mean of these four estimates was σ_t for the data set.

The mean time $\bar{t}$ and the standard deviation σ_t are determined solely by the shape of the time-concentration curve, not by the absolute value of the ordinates. Thus, the effect of varied geometry, errors in calibration, and loss of isotope do not affect the computation of these statistical parameters.

TABLE 2.—*Ratio of λ_2 to λ_1 for Pearson type III distribution as a function of α_3 and C/C_{max}*

C/C_{max}	α_3									
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.75	1.000	1.026	1.052	1.080	1.109	1.139	1.172	1.208	1.247	1.290
.60653	1.000	1.034	1.069	1.106	1.146	1.188	1.233	1.283	1.338	1.399
.50	1.000	1.040	1.082	1.126	1.174	1.225	1.280	1.341	1.408	1.485
.25	1.000	1.057	1.118	1.183	1.254	1.332	1.418	1.514	1.622	1.748
.10	1.000	1.074	1.155	1.242	1.339	1.446	1.567	1.705	1.864	2.051
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
.75	1.339	1.395	1.461	1.541	1.641	1.773	1.959	2.253	2.813	4.456
.60653	1.469	1.551	1.648	1.767	1.919	2.124	2.420	2.901	3.849	6.686
.50	1.573	1.676	1.799	1.953	2.154	2.422	2.821	3.476	4.788	8.689
.25	1.985	2.072	2.290	2.567	2.936	3.451	4.228	5.533	8.128	15.649
.10	2.275	2.549	2.893	3.339	3.941	4.794	6.084	8.223	12.413	24.562

TABLE 3.—*Number of standard deviations between rising and falling limbs of a Pearson type III distribution for selected values of α_3 and C/C_{max}*

C/C_{max}	α_3									
	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.75	1.517	1.515	1.510	1.500	1.487	1.470	1.449	1.424	1.395	1.360
.60653	2.000	1.998	1.990	1.979	1.962	1.940	1.913	1.881	1.843	1.800
.50	2.355	2.352	2.344	2.330	2.311	2.286	2.255	2.218	2.174	2.124
.25	3.330	3.327	3.316	3.298	3.273	3.241	3.201	3.153	3.097	3.032
.10	4.292	4.288	4.276	4.256	4.228	4.191	4.146	4.093	4.030	3.958
	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9
.75	1.321	1.276	1.224	1.166	1.100	1.024	0.936	0.833	0.707	0.545
.60653	1.748	1.690	1.625	1.551	1.467	1.371	1.260	1.131	.977	.786
.50	2.066	2.000	1.925	1.840	1.744	1.636	1.511	1.367	1.198	.944
.25	2.959	2.875	2.781	2.675	2.557	2.425	2.277	2.112	1.925	1.708
.10	3.877	3.786	3.684	3.572	3.449	3.314	3.168	3.008	2.832	2.623

An alternate estimate of K can be made assuming that equation 2 is an adequate representation of the time-concentration distribution; if x is sufficiently large and $K/\bar{V}x$ is small,

$$C_{\max}=\frac{M}{A\sqrt{2\pi}\sqrt{2K\bar{t}}},$$

where $C_{\max}$=maximum concentration at observation section, in curies per cubic foot,
M=curies of radiotracer injected, and
A=cross-sectional area for uniform flow, in square feet,

and by rearranging the terms

$$K=\left(\frac{M}{C_{\max}}\right)^2\frac{1}{A^2 4\pi\bar{t}}. \quad (6)$$

Because the measurement of M is subject to assay errors and $C_{\max}$ is affected by the geometry of the measuring section, the ratio of $M/C_{\max}$ in equation 6 is replaced by the ratio $M'/C_{\max}$ where

$$M'=Q\int_{-\infty}^{\infty}C(x,t)dt,$$

and

Q=discharge, in cubic feet per second, thereby, tending to balance measurement errors in the two terms of the ratio. Another measure of area is defined to replace A in equation 6:

$$\overline{A}=\frac{Q}{\bar{V}}=\frac{Q\bar{t}}{x},$$

the average cross-sectional area between the injection and observation sections, in square feet. (The area A listed in tables 5*B*–15*B* in "Supplementary data" is that measured at each test section.) Hence, an overall estimate of K for a test reach can be determined by the following adaptation of equation 6:

$$\sqrt{2K\bar{t}}=\frac{1}{\sqrt{2\pi}}\left(\frac{M'}{\overline{A}C_{max}}\right)=\gamma, \text{ in feet,}$$

or by

$$\sqrt{2K\bar{t}}=\sigma_x, \text{ in feet.}$$

In figure 5 the relations of σ_x and γ to $\sqrt{\bar{t}}$ are shown for tests 8 and 9. The slope of the straight line, whose position is the result of equal weighting of the points related to σ_x and γ, is $\sqrt{2K}$. Plots such as figure 5 for data from all tests showed a straight line relation between $[\sigma_x,\gamma]$ and $\bar{t}$ for long times after the tracer injection. Estimates of K for all tests are given in table 4. In all these plots the intercept of the straight line was less than zero. The rapid changes expected in K for short periods after tracer injection were evidenced only in tests 8 and 9. (See fig. 5.)

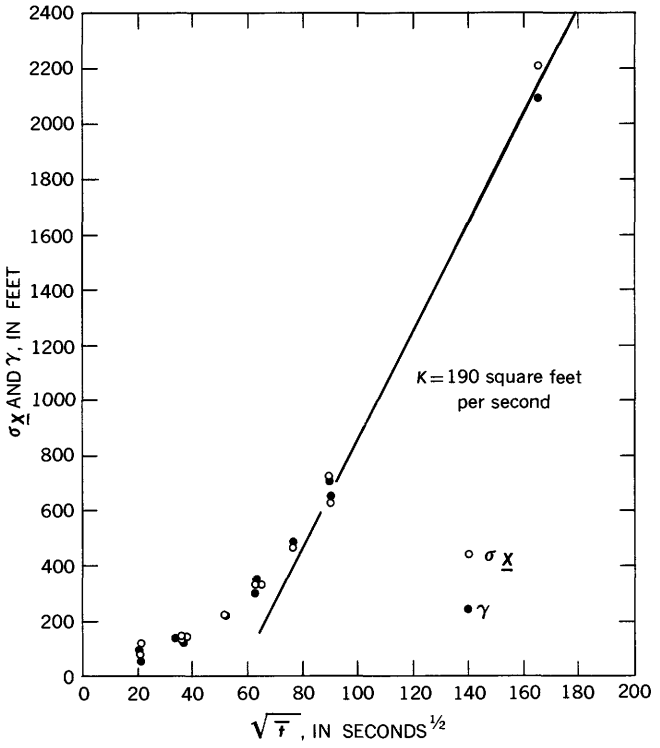

FIGURE 5.—Dispersion analysis for tests 8 and 9 on the Coachella Canal near Holtville, Calif.

TABLE 4.—*Summary of test data*

Test	K in square feet per second	$\frac{K}{K_{theory}}$[1]	Q[1] in cubic feet per second	V[1] in feet per second	$S^{1/2}$	X in feet	$\overline{V}$ in feet per second	$\overline{A}$ in square feet	$\bar{b}$[2] in feet	$\bar{d}$[1,2] in feet	Manning n	Alinement
1	162	20.0	54.3	0.26	0.036	13,550	0.770	70.5	51.6	1.58	0.12	Straight.
2	98	8.1	323	.19	.019	19,300	.828	390	221	4.51	.09	Do.
3	98	11.5	35.0	.34	.054	27,550	.614	57.0	56.1	1.27	.20	Crooked.
4	288	29.7	140	.17	.018	20,450	.538	260	113	2.84	.14	Do.
5	212	34.2	240	.15	.018	21,800	.594	404	114	2.10	.04	Straight.
6	450	24.8	300	.34	.036	13,550	2.02	149	59.6	2.75	.05	Do.
7	119	3.6	3,000	.28	.020	19,300	2.75	1,090	197	5.96	.05	Do.
8	190	14.0	900	.14	.011	18,000	2.24	402	81.2	5.11	.02	Do.
9	190	13.2	950	.14	.011	18,000	2.34	406	81.2	5.30	.02	Do.
10	120	4.8	1,800	.25	.020	19,300	2.16	833	194	5.05	.08	Do.
11	166	23.0	48.0	.25	.036	13,550	.792	60.6	52.8	1.50	.14	Do.

[1] Adjusted for change in stage between times of discharge measurement and test.
[2] Mean width, $\bar{b}$, and mean depth, $\bar{d}$, for test reach based on linear weighting of measured width and mean depth d at observation section.

The observed dispersion coefficients are compared to Taylor's model

$$K_{Theory}=20.2RV_*,$$

adapted for open-channel flow, in table 4. The shear velocity, $V_*=\sqrt{gRS}$, listed in tables 5*B*–15*B* in "Supplementary data", is not a precise value because R varied from section to section.

Other variables listed in table 4 and combinations of these variables were examined for their relationship with K; no relationships applicable to all test data were found.

CONCLUSIONS

Analysis of the data shows some interesting features for turbulent dispersion in streams. First, σ_x^2, or γ, increases linearly with time for long periods after tracer injection and, as Taylor had predicted, the dispersion coefficient becomes constant. Second, the straight line relation between $\sqrt{2K\bar{t}}$ and $\sqrt{\bar{t}}$ does not pass through the origin, however, tests 8 and 9 indicate that K decreases rapidly near the injection section, again confirming Taylor's concepts of the turbulent dispersion process. Third, there is a considerable discrepancy between magnitudes of observed and theoretical (Taylor's) dispersion coefficients.

As previously mentioned, the velocity gradients in the transverse direction and in the vertical direction may tend to produce large dispersion coefficients. A second factor influencing the magnitude of the coefficient is nonuniformity of the channel characteristics of the reach. For instance, slightly better agreement in magnitude of coefficients is suggested for straight reaches than for curved reaches.

Experimental techniques may influence test results, but to a lesser degree, probably, than do convective effects. In the conduct of the tests a line source was used. The tracer was injected into the stream at a depth of about 6 inches. The injection was started a short distance from one bank and stopped a similar distance from the opposite bank. Thus, the steep velocity gradients near the banks and bed did not play their full role until the tracer cloud had migrated to the boundary.

Consideration should be given to the use of equation 2 as a model to compute the dispersion pattern of a containment. C_{max} is inversely proportional to $\sqrt{K}$. The standard deviation of the dispersed cloud is proportional to $\sqrt{K}$. Thus, even though it may not be possible to know K within 25-fold, the error in the maximum concentration and standard deviation is only fivefold. Because the theory gives low values of K the predicted value of the maximum concentration would be too high and the predicted length of the cloud of dispersed material would be too short, in comparison with the field observations.

The magnitude of the discrepancies between observed and theoretical dispersion coefficients suggests that one-dimensional models are too limited to describe dispersion in natural streams. Further, the results of the investigation strongly indicate that experimental data on velocity distribution, such as are given in the section entitled, "Supplementary data," be used for evaluating convective effects on the dispersion coefficient.

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SUPPLEMENTARY DATA

Sketches showing the location of observation sections and channel alinement for the test reaches, except for the Coachella Canal, are in figure 6.

The time-concentration data; channel geometry, flow data, and statistical parameters; and the distribution of velocity in the test sections are listed in parts *A* through *H* of tables 5–15 for tests 1–11, respectively, in this section of the report.

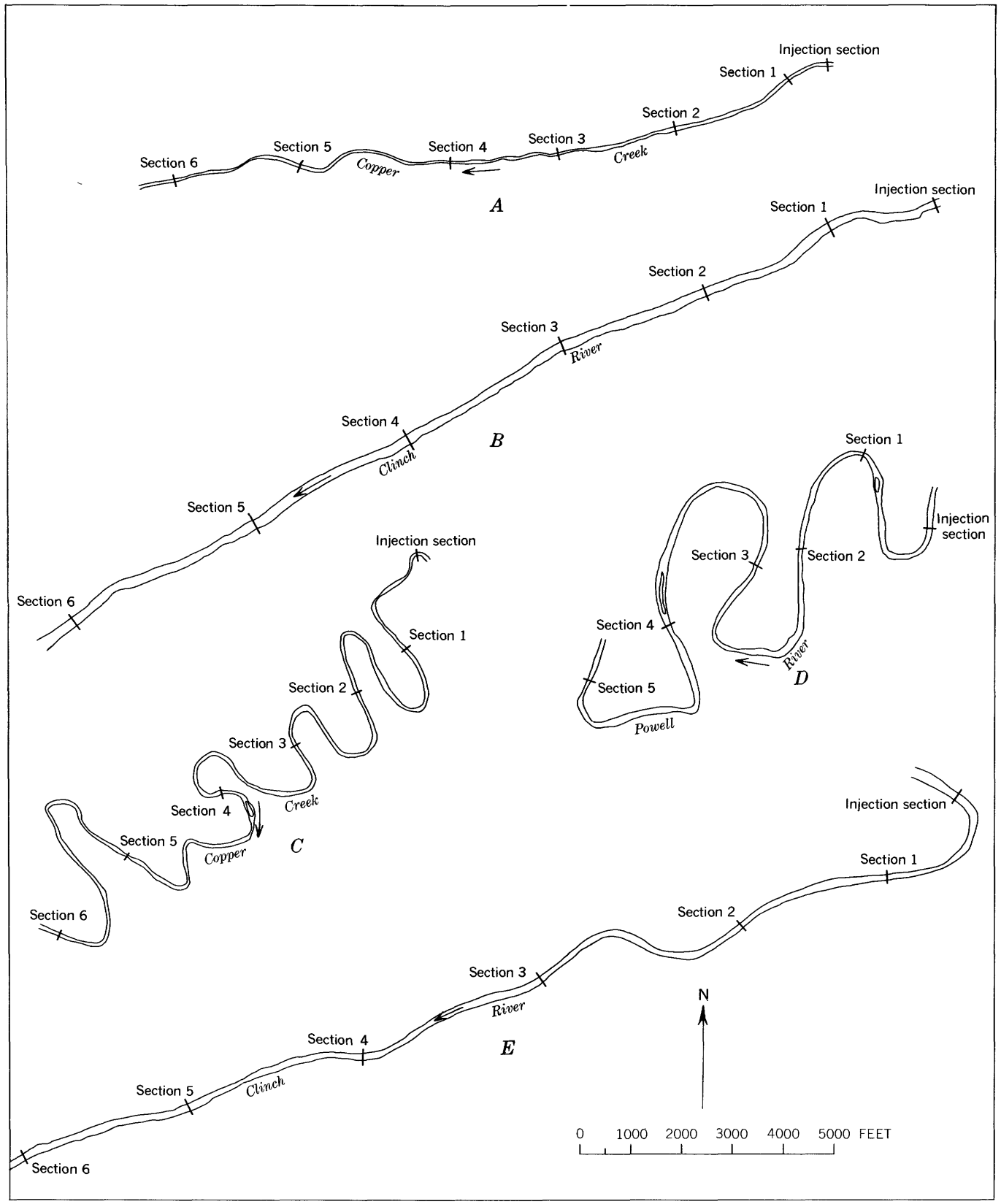

FIGURE 6.—Location sketches for observation sections in tests 1–7, 10, 11. *A*, Tests 1, 6, and 11 in Copper Creek below gage, near Gate City, Va. *B*, Tests 2, 7, and 10 in Clinch River near Speers Ferry, Va. *C*, Test 3 in Copper Creek above gage, near Gate City, Va. *D*, Test 4 in Powell River near Sneedville, Tenn. *E*, Test 5 in Clinch River near Clinchport, Va.

TABLE 5A.--TIME-CONCENTRATION DATA FOR TEST 1, CONCENTRATION OF GOLD-198 IN MICROCURIES PER CUBIC FOOT

(T, 24-HOUR TIME. C, CONCENTRATION. BLANK INDICATES NO DATA.
PERIOD OF INJECTION IS 1121.0 TO 1122.0 EST)

SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		SECTION 6	
T	C	T	C	T	C	T	C	T	C	T	C
1127.5	0.0	1200.5	0.0	1226.0	0.0	1254.0	0.0	1355.0	0.0	1427.0	0.0
1128.0	0.08	1201.5	0.02	1230.0	0.03	1256.0	0.02	1403.0	0.02	1428.0	0.02
1128.5	1.06	1203.0	0.13	1237.0	0.20	1300.0	0.06	1413.0	0.08	1458.0	0.10
1129.0	4.51	1206.5	0.38	1242.0	0.30	1311.0	0.22	1421.0	0.15	1512.0	0.17
1129.8	5.13	1209.5	0.52	1246.0	0.36	1316.0	0.30	1431.0	0.21	1534.0	0.21
1130.5	3.40	1214.0	0.59	1250.0	0.38	1323.0	0.34	1436.0	0.23	1540.0	0.21
1130.7	2.67	1218.0	0.54	1253.0	0.38	1325.0	0.34	1443.0	0.25	1604.0	0.16
1131.3	2.03	1222.0	0.47	1257.0	0.36	1336.0	0.29	1451.0	0.24	1618.0	0.13
1132.0	1.67	1230.5	0.33	1310.0	0.25	1344.0	0.24	1503.0	0.21	1638.0	0.09
1137.0	0.55	1236.5	0.24	1325.0	0.04	1353.0	0.18	1518.0	0.15	1658.0	0.06
1141.7	0.20	1245.0	0.16	1339.0	0.06	1403.0	0.12	1528.0	0.12	1728.0	0.05
1148.0	0.04	1249.0	0.12	1345.0	0.04	1413.0	0.08	1543.0	0.08	1848.0	0.02
1155.5	0.0	1303.0	0.06	1405.0	0.0	1426.0	0.05	1553.0	0.06	2008.0	0.0
		1317.0	0.02			1441.0	0.03	1613.0	0.03		
		1338.5	0.00			1501.0	0.00	1627.0	0.0		

TABLE 5B.--CHANNEL GEOMETRY, FLOW DATA, AND STATISTICAL PARAMETERS FOR TEST 1

(M = 0.067C)
(BLANK INDICATES NO DATA)

SECTION----------	1	2	3	4	5	6
			JUNE 8, 1959			
x -------- ft --	630	3,310	5,670	7,870	11,000	13,550
Width ---- " --	47	49	51	48	58	58
d -------- " --	2.02	1.43	1.49	1.51	1.46	1.90
R -------- " --	1.99	1.42	1.48	1.49	1.45	1.89
Fall ----- " --	.73	4.86	8.00	11.06	14.10	17.62
Temp ----- ^{o}F --	70	69	70	70	71	66
$S^{1/2}$ ----------	.034	.038	.038	.038	.036	.036
Q ------- cfs --	58	58	56	56	56	58
V ------- fps --	.62	.83	.74	.78	.66	.53
A ----- sq ft --	95	70	76	72	84	110
n ----------	.14	.12	.11	.11	.11	.12
			JUNE 9, 1959			
$\bar{t}$ ------- sec --	672	3,890	5,870	8,220	13,100	17,600
$\bar{A}$ ----- sq ft --	57	63	56	56	64	70
V_* ------ fps --	.27	.26	.26	.26	.25	.28
α_3 ----------	1.1	1.3	1.2	1.3	1.1	.8
M^c -------- c --	.065	.060	.059	.058	.059	.078
C_{max} - $\mu c/ft^3$ --	5.13	.59	.38	.34	.25	.21
σ_x ------- ft --	60	726	1,240	1,430	1,650	1,900
γ -------- ft --	87	638	1,100	1,200	1,460	2,100

TABLE 5C.--DISTRIBUTION OF VELOCITY IN SECTION 1 OF REACH USED IN TEST 1

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
1.0	0.4	----	----	----	----	----	----
3.0	1.0	----	----	----	----	----	----
5.0	1.7	----	----	----	----	----	----
7.0	2.2	0.16	0.11	0.10	0.10	0.09	0.06
9.0	2.2	0.21	0.30	0.34	0.28	0.15	0.09
11.0	2.2	0.69	0.57	0.56	0.51	0.54	0.44
13.0	2.1	0.97	1.04	0.90	0.75	0.69	0.70
15.0	2.2	1.12	1.08	1.12	0.97	0.82	0.62
17.0	2.1	1.22	1.15	1.15	1.01	0.79	0.60
19.0	2.1	1.22	1.22	1.12	1.04	0.94	0.70
21.0	2.1	1.28	1.28	1.25	1.17	0.97	0.79
23.0	2.1	1.20	1.22	1.22	1.17	1.10	0.89
25.0	2.2	1.15	1.12	1.08	1.10	0.90	0.75
27.0	2.2	1.20	1.20	1.12	0.96	0.87	0.70
29.0	2.3	1.25	1.25	1.25	1.15	0.97	0.79
31.0	2.3		1.22	1.15	1.04	1.08	0.82
33.0	2.4	0.94	0.89	0.94	0.89	0.69	0.66
35.0	2.4	0.65	0.63	0.62	0.61	0.58	0.40
37.0	2.4	0.54	0.33	0.27	0.40	0.34	0.29
39.0	2.5	0.25	0.13	0.12	0.11	0.08	0.16
41.0	2.7	0.13	0.12	----	0.02	----	0.06
43.0	2.2	----	----	----	----	----	----
45.0	1.6	----	----	----	----	----	----
47.0	0.0	----	----	----	----	----	----

TABLE 5D.--DISTRIBUTION OF VELOCITY IN SECTION 2 OF REACH USED IN TEST 1

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	1.9	0.62	0.61	0.64	0.61	0.52	0.22
4.0	0.0	----	----	----	----	----	----
6.0	2.3	0.55	0.56	0.57	0.62	0.52	0.46
9.0	1.9	0.58	0.60	0.61	0.67	0.62	0.60
14.0	1.9	0.90	0.88	0.78	0.74	0.68	0.60
19.0	1.8	1.25	1.16	1.03	0.96	0.79	0.65
24.0	1.4	1.33	1.30	1.24	1.30	0.94	0.78
30.0	1.3	1.28	1.23	1.16	1.03	1.03	0.80
36.0	1.6	1.07	1.05	1.03	0.92	0.76	0.74
42.0	1.3	0.61	0.82	0.74	0.76	0.78	0.61
46.0	0.8	0.26	0.23	0.21	0.16	0.17	
49.0	0.0	----	----	----	----	----	----

TABLE 5E.--DISTRIBUTION OF VELOCITY IN SECTION 3 OF REACH USED IN TEST 1

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	1.0				0.16		
4.0	2.0	----	----	----	----	----	----
7.0	2.1	0.28	0.49	0.76	0.85	0.78	0.74
12.0	1.6	0.98	0.98	1.07	0.92	0.76	0.54
17.0	1.5	0.96	0.96	0.94	0.82	0.61	0.52
22.0	1.4	1.16	1.05	0.96	0.98	0.80	0.40
27.0	1.4	1.21	1.00	1.05	0.90	0.85	0.57
32.0	1.6	1.24	1.24	1.14	0.98	0.83	0.50
37.0	1.7	1.12	1.16	1.14	1.03	0.78	0.58
41.0	1.8	0.52	0.61	0.72	0.85	0.72	0.49
45.0	1.5	0.62	0.65	0.71	0.68	0.63	0.44
48.0	1.0	0.36	0.38	0.36	0.28	0.14	0.12
51.0	0.0	----	----	----	----	----	----

TABLE 5F.--DISTRIBUTION OF VELOCITY IN SECTION 4 OF REACH USED IN TEST 1

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
4.0	1.8	----	----	----	----	----	----
8.0	2.2	0.36	0.31	0.34	0.28	0.24	0.15
12.0	2.2	0.99	0.44	0.63	0.69	0.62	0.41
16.0	2.3	1.04	1.06	0.99	0.79	0.68	0.62
20.0	2.3	1.20	1.15	1.22	0.99	0.70	0.70
24.0	2.0	1.70	1.66	1.70	1.25	1.12	0.92
28.0	1.6	1.53	1.53	1.28	1.07	0.92	0.70
32.0	0.9		1.37	1.34	1.17	1.12	
36.0	1.3	1.34	1.37	1.22	1.12	0.97	0.79
40.0	1.1		0.84	0.69	0.75	0.59	
42.0	0.9		0.79	0.79	0.56	0.29	
44.0	0.4				0.35		
46.0	0.3				0.37		
48.0	0.0	----	----	----	----	----	----

TABLE 5G.--DISTRIBUTION OF VELOCITY IN SECTION 5 OF REACH USED IN TEST 1

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
4.0	1.2	0.24	0.15	0.15	0.17	0.19	0.13
10.0	2.0	0.40	0.36	0.38	0.26	0.25	0.08
15.0	2.2	0.64	0.61	0.60	0.54	0.54	0.40
20.0	2.1	0.65	0.68	0.80	0.64	0.54	0.36
25.0	1.7	1.03	1.03	0.90	0.82	0.71	0.61
30.0	1.3	1.07	1.14	1.05	1.05	0.83	0.67
35.0	1.2	1.24	1.36	1.22	1.14	0.90	
40.0	1.3	1.27	1.24	1.19	1.03	0.90	0.78
45.0	1.4	1.30	1.24	1.16	0.98	0.85	0.49
50.0	1.6	0.54	0.57	0.60	0.47	0.33	0.45
55.0	1.0	0.18	0.08	0.13	0.21	0.15	0.14
58.0	0.0	----	----	----	----	----	----

TABLE 5H.--DISTRIBUTION OF VELOCITY IN SECTION 6 OF REACH USED IN TEST 1

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	0.4	----	----	----	----	----	----
6.0	1.2	----	----	----	0.11	----	----
10.0	1.2	----	----	----	----	----	----
14.0	2.3	0.16	0.21	0.22	0.28	0.18	0.24
18.0	2.6	0.70	0.75	0.70	0.68	0.54	0.46
22.0	2.2	0.90	0.87	0.82	0.65	0.73	0.44
26.0	2.2	0.94	0.87	0.79	0.78	0.69	0.52
30.0	2.4	1.06	0.99	0.87	0.97	0.66	0.63
34.0	2.6	1.37	1.24	0.99	0.75	0.67	0.49
38.0	2.3	1.40	1.26	1.23	1.12	1.02	0.66
42.0	2.2	0.71	0.70	0.78	0.75	0.52	0.52
46.0	2.4	0.29	0.26	0.22	0.25	----	
50.0	2.0	----	----	----	----	----	----
54.0	1.6	----	----	----	----	----	----
58.0	0.0	----	----	----	----	----	----

TABLE 6A.--TIME-CONCENTRATION DATA FOR TEST 2, CONCENTRATION OF GOLD-198 IN MICROCURIES PER CUBIC FOOT

(T, 24-HOUR TIME. C, CONCENTRATION. BLANK INDICATES NO DATA. PERIOD OF INJECTION IS 1129.5 TO 1130.5 EST)

SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		SECTION 6	
T	C	T	C	T	C	T	C	T	C	T	C
1152.0	0.0	1235.0	0.0	1310.0	0.0	1351.0	0.0	1459.0	0.0	1630.0	0.0
1154.0	0.18	1237.0	0.16	1312.0	0.67	1354.0	0.02	1502.0	0.06	1639.0	0.03
1156.0	1.89	1239.0	0.60	1315.0	1.15	1357.0	0.14	1508.0	0.26	1648.0	0.17
1157.0	3.20	1241.0	1.38	1317.0	1.45	1400.0	0.39	1514.0	0.57	1657.0	0.34
1158.0	4.03	1242.5	2.02	1318.0	1.48	1403.0	0.79	1521.0	0.70	1707.0	0.44
1159.0	3.73	1245.0	2.48	1322.0	1.40	1406.0	1.09	1529.0	0.64	1712.0	0.45
1201.0	2.68	1247.0	2.30	1326.0	1.16	1409.0	1.19	1535.0	0.52	1719.0	0.41
1203.0	1.46	1249.0	1.84	1330.0	0.91	1412.0	1.16	1544.0	0.39	1731.0	0.34
1205.0	0.99	1252.5	1.14	1335.0	0.65	1415.0	1.06	1550.0	0.31	1745.0	0.27
1209.0	0.55	1257.5	0.67	1340.0	0.47	1421.0	0.79	1559.0	0.23	1805.0	0.19
1215.0	0.28	1302.5	0.40	1345.0	0.34	1427.0	0.59	1615.0	0.15	1819.0	0.15
1230.0	0.07	1310.0	0.24	1350.0	0.27	1433.0	0.42	1634.0	0.09	1839.0	0.11
1250.0	0.0	1317.5	0.14	1400.0	0.17	1439.0	0.32	1659.0	0.05	1904.0	0.08
		1330.0	0.08	1430.0	0.05	1450.0	0.21	1729.0	0.03	1930.0	0.06
		1415.0	0.0	1515.0	0.0	1500.0	0.15	1804.0	0.0	2012.0	0.04
						1514.0	0.10	2050.0	0.02		
						1535.0	0.05	2220.0	0.0		
						1617.0	0.0				

TABLE 6B.--CHANNEL GEOMETRY, FLOW DATA, AND STATISTICAL PARAMETERS FOR TEST 2

(M = 0.744C)
(BLANK INDICATES NO DATA)

SECTION----------	1	2	3	4	5	6
			JUNE 15, 1959			
x -------- ft --	2,260	5,170	8,170	11,800	15,300	19,300
Width ---- " --	150	145	135	166	176	156
d -------- " --	3.36	1.81	2.13	3.26	3.60	6.23
R -------- " --	3.32	1.81	2.12	3.20	3.58	6.16
Fall ----- " --	1.11	3.31	5.01	5.56	6.57	6.85
Temp ----- °F --	72	72	67	73	74	74
$S^{1/2}$ ----------	.022	.025	.025	.022	.021	.019
Q ------- cfs --	381	348	334	371	374	345
V ------- fps --	.76	1.32	1.16	.69	.59	.35
A ----- sq ft --	504	263	288	541	633	973
n ----------	.11	.08	.07	.08	.10	.12
			JUNE 16, 1959			
$\bar{t}$ ------- sec --	2,000	5,020	7,380	10,600	15,400	23,300
$\bar{A}$ ----- sq ft --	286	314	291	291	325	390
V_* ------ fps --	.23	.19	.21	.22	.23	.27
α_3 ----------	1.5	1.2	1.6	1.5	1.5	1.1
M^2 -------- c --	.663	.772	.763	.774	.664	.759
C_{max} - $\mu c/ft^3$ --	4.03	2.48	1.48	1.19	.70	.45
σ_x ------- ft --	241	359	886	994	1,290	1,490
Y -------- ft --	230	395	708	892	1,160	1,730

TABLE 6C.--DISTRIBUTION OF VELOCITY IN SECTION 1 OF REACH USED IN TEST 2

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
7.0	1.4	0.71	0.71	0.58	0.52	0.59	
17.0	2.1	0.89	0.81	0.66	0.71	0.29	
22.0	2.3	0.71	0.64	0.55	0.55	0.71	
27.0	2.4	1.13	1.05	0.94	0.83	0.62	
30.0	2.1	1.20	1.13	0.81	0.59	0.33	
33.0	2.2	1.23	1.23	1.20	1.20	0.52	
36.0	2.4	1.15	1.15	1.13	1.08	0.87	
39.0	4.0	1.07	1.04	1.02	0.90	0.82	
42.0	3.9	1.02	1.02	0.94	0.75	0.77	
45.0	4.5	1.02	0.96	0.98	0.92	0.74	
48.0	4.5	1.04	0.97	0.91	0.91	0.70	
51.0	4.4	1.01	1.09	0.97	0.91	0.82	
54.0	4.5	1.09	1.01	1.06	0.89	0.81	
57.0	3.6	1.06	1.06	1.11	0.95	0.67	
61.0	3.7	1.01	1.06	1.04	0.99	0.91	
65.0	5.0	0.92	0.80	0.82	0.77	0.94	
69.0	6.0	0.81	0.75	0.67	0.79	0.93	
73.0	5.6	0.84	0.81	0.74	0.74	0.63	
77.0	5.7	0.80	1.20	1.20	0.88	0.88	
82.0	5.6	1.28	0.72	0.52	0.68	1.10	
87.0	4.7	1.46	1.28	0.74	0.54	0.50	
92.0	1.3	1.36	1.49	1.43	1.36	1.34	
97.0	2.7	1.06	0.97	0.87	0.89	0.83	
10.4	3.3	0.82	0.79	0.80	0.79	0.28	
11.5	4.4	0.61	0.71	0.57	0.54	0.44	
12.8	4.7	0.35	0.67	0.35	0.32	0.28	
15.0	0.0	----	----	----	----	----	

TABLE 6D.--DISTRIBUTION OF VELOCITY IN SECTION 2 OF REACH USED IN TEST 2

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
5.0	0.5		0.21		0.09	----	
12.0	1.1		1.40		1.26	0.92	0.66
19.0	1.8		1.67		1.58	1.26	1.08
26.0	2.5		1.78		1.47	0.76	0.59
33.0	2.2		1.74		1.43	1.15	1.04
40.0	2.3		1.37		1.26	0.92	0.49
47.0	1.9		1.81		1.58	0.34	0.18
54.0	1.8		1.64		1.01	1.37	0.96
61.0	1.7		1.64		1.58	1.01	0.76
68.0	2.0		1.58		1.52	1.23	0.70
75.0	2.2		1.78		1.49	1.04	0.78
82.0	2.1		1.61		1.50	1.40	0.96
89.0	2.3		1.85		1.78	1.50	0.63
96.0	2.2		1.85		1.67	1.34	1.26
103.0	2.0		1.70		1.37	1.31	1.26
110.0	1.9		1.81		1.61	1.40	0.94
117.0	2.0		1.61		1.39	1.01	0.91
124.0	1.9		1.40		1.29	1.06	0.83
130.0	1.8		0.26		1.15	1.12	0.92
136.0	1.6		0.87		0.96	0.77	1.10
145.0	0.0	----	----	----	----	----	----

TABLE 6E.--DISTRIBUTION OF VELOCITY IN SECTION 3 OF REACH USED IN TEST 2

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
15.0	1.2	1.02	1.07	1.00	0.74		
20.0	2.0	0.90	1.17	1.12	0.96		
25.0	2.0	1.09	1.33	1.30	1.09		
30.0	2.2	0.96	1.33	1.30	1.12		
35.0	2.0	1.22	1.36	1.36	1.27		
40.0	2.3	1.22	1.24	1.27	1.00		
45.0	2.1	1.33	1.33	1.36	1.12		
50.0	2.1	1.36	1.40	1.24	1.24		
55.0	2.0	1.36	1.40	1.24	1.12		
60.0	2.0	1.33	1.42	1.33	1.17		
65.0	2.3	1.40	1.45	1.40	1.27		
70.0	2.5	1.45	1.49	1.49	1.42	1.17	
75.0	3.0	1.49	1.49	1.40	1.19	1.07	
80.0	3.1	1.37	1.36	1.24	1.07	1.04	
85.0	3.0	1.40	1.36	1.40	1.36	1.24	
90.0	3.2	1.52	1.49	1.40	1.33	1.24	
95.0	1.8	1.42	1.49	1.42	1.07		
100.0	3.3	1.55	1.33	1.40	1.12	1.04	
105.0	3.7	1.45	1.49	1.36	1.24	1.02	
110.0	3.5	1.27	1.33	1.27	1.02	1.00	
115.0	2.2	1.12	1.12	1.17	0.96		
124.0	2.0	1.17	1.19	1.17	1.12		
135.0	0.0	----	----	----	----	----	

TABLE 6F.--DISTRIBUTION OF VELOCITY IN SECTION 4 OF REACH USED IN TEST 2

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	2.0	----	----	----	----	----	
4.0	3.5	0.21	0.18	0.26	0.14	0.09	
10.0	3.8	0.41	0.46	0.41	0.30	0.18	
16.0	3.5	0.50	0.46	0.48	0.52	0.48	
22.0	3.0	0.46	0.47	0.41	0.46	0.35	
28.0	3.0	0.33	0.52	0.48	0.50	0.51	
34.0	4.0	0.48	0.44	0.42	0.39	0.28	
40.0	4.2	0.58	0.57	0.41	0.55	0.41	
46.0	4.3	0.80	0.75	0.66	0.62	0.52	
52.0	4.0	0.96	0.94	0.88	0.86	0.69	
58.0	4.0	0.86	0.86	0.85	0.79	0.71	
64.0	3.0	1.02	0.90	0.94	1.02	0.77	
70.0	4.5	1.04	1.02	1.00	0.90	0.84	
76.0	4.0	1.07	0.98	0.88	0.84	0.79	
82.0	4.2	1.07	1.09	1.02	0.86	0.62	
88.0	3.0	1.12	1.12	0.94	0.86	0.84	
94.0	3.5	1.04	1.02	0.94	0.86	0.75	
100.0	3.2	1.02	1.00	0.96	0.86	0.84	
106.0	3.0	0.90	0.98	0.86	0.80	0.54	
112.0	2.5	1.00	0.90	0.86	0.90	0.72	
118.0	2.8	1.04	1.04	1.02	0.86	0.80	
124.0	2.7	0.86	0.96	0.96	0.86	0.72	
130.0	3.0	0.94	0.94	0.92	0.84	0.84	
136.0	2.7	0.86	0.86	0.90	0.68	0.65	
142.0	3.0	0.68	0.79	0.72	0.68	0.66	
148.0	2.7	0.75	0.72	0.58	0.68	0.71	
154.0	2.5	0.66	0.71	0.57	0.46	0.45	
160.0	2.0	0.51	0.54	0.46	0.42		
166.0	1.0				0.21		

TABLE 6G.--DISTRIBUTION OF VELOCITY IN SECTION 5 OF REACH USED IN TEST 2

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	2.0	----	----	----	----	----	
10.0	3.2	0.13	0.19	0.20	0.17	0.10	
18.0	3.5	0.58	0.48	0.41	0.41	0.45	
26.0	3.8	0.64	0.63	0.65	0.50	0.43	
34.0	4.0	0.69	0.65	0.65	0.65	0.50	
42.0	4.0	0.74	0.69	0.72	0.47	0.55	
50.0	4.0	0.83	0.84	0.75	0.68	0.54	
58.0	3.5	0.87	0.88	0.79	0.75	0.52	
66.0	3.5	0.85	0.94	0.88	0.79	0.62	
74.0	3.8	0.88	0.88	0.86	0.84	0.63	
82.0	3.5	0.92	0.77	0.82	0.80	0.64	
90.0	4.0	0.83	0.80	0.80	0.75	0.77	
98.0	3.7	0.94	0.75	0.84	0.80	0.59	
106.0	4.0	0.79	0.80	0.65	0.59	0.42	
114.0	4.0	0.96	0.78	0.88	0.69	0.62	
122.0	4.0	0.86	0.96	0.72	0.80	0.63	
130.0	4.5	0.94	0.94	0.85	0.79	0.65	
138.0	4.0	0.85	0.80	0.75	0.75	0.57	
146.0	3.0	0.65	0.59	0.62	0.37	0.43	
154.0	3.3	0.45	0.46	0.41	0.36	0.38	
162.0	3.5	0.24	0.32	0.24	0.32	0.23	
170.0	3.0	0.24	0.17	0.24	0.17	0.09	
176.0	0.0	----	----	----	----	----	

TABLE 6H.--DISTRIBUTION OF VELOCITY IN SECTION 6 OF REACH USED IN TEST 2

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
13.0	3.3	0.38	0.32	0.26	0.25	0.14	
20.0	5.0	0.42	0.40	0.37	0.33	0.27	
27.0	6.7	0.47	0.46	0.43	0.34	0.24	
34.0	6.8	0.49	0.52	0.48	0.44	0.39	
41.0	8.1	0.48	0.49	0.54	0.46	0.41	
48.0	8.0	0.50	0.44	0.46	0.50	0.33	
55.0	8.7	0.47	0.50	0.38	0.47	0.41	
62.0	9.0	0.48	0.48	0.52	0.37	0.36	
69.0	9.1	0.43	0.48	0.45	0.40	0.28	
76.0	8.8	0.46	0.43	0.41	0.40	0.31	
83.0	8.0	0.46	0.47	0.36	0.32	0.26	
90.0	8.0	0.41	0.47	0.46	0.33	0.30	
97.0	7.7	0.35	0.38	0.39	0.30	0.31	
104.0	7.5	0.40	0.41	0.37	0.34	0.27	
111.0	7.0	0.46	0.41	0.37	0.34	0.32	
118.0	6.0	0.38	0.36	0.38	0.29	0.29	
125.0	5.5	0.39	0.34	0.27	0.26	0.22	
132.0	5.5	0.36	0.31	0.23	0.21	0.15	
139.0	4.0	0.19	0.18	0.18	0.20	0.16	
146.0	4.0	0.12	0.17	0.12	0.11	0.16	
156.0	0.0	----	----	----	----	----	

TABLE 7A.--TIME-CONCENTRATION DATA FOR TEST 3, CONCENTRATION OF GOLD-198 IN MICROCURIES PER CUBIC FOOT

(T, 24-HOUR TIME. C, CONCENTRATION. BLANK INDICATES NO DATA.
PERIOD OF INJECTION IS 949.5 TO 950.5 EST)

SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		SECTION 6	
T	C	T	C	T	C	T	C	T	C	T	C
1123.0	0.0	1303.5	0.0	1441.5	0.0	1604.5	0.0	1730.0	0.0	2000.0	0.0
1125.0	0.08	1309.5	0.05	1445.5	0.01	1630.5	0.10	1800.0	0.02	2030.0	0.01
1126.0	0.19	1315.5	0.12	1455.5	0.05	1650.5	0.18	1830.0	0.05	2100.0	0.04
1129.0	0.78	1320.5	0.19	1505.5	0.12	1700.5	0.20	1900.0	0.10	2130.0	0.08
1131.0	1.13	1327.5	0.30	1515.5	0.17	1708.5	0.20	1920.0	0.14	2145.0	0.09
1132.0	1.23	1335.5	0.37	1520.5	0.20	1716.5	0.20	1935.0	0.16	2155.0	0.10
1134.5	1.32	1340.5	0.38	1525.5	0.21	1730.5	0.18	1950.0	0.15	2205.0	0.10
1137.0	1.23	1345.5	0.37	1530.5	0.22	1750.5	0.13	2010.0	0.12	2220.0	0.08
1151.0	0.42	1355.5	0.32	1535.5	0.22	1810.5	0.09	2030.0	0.09	2240.0	0.06
1155.0	0.29	1415.5	0.20	1540.5	0.22	1830.5	0.06	2100.0	0.06	2300.0	0.05
1200.0	0.19	1435.5	0.10	1550.5	0.20	1840.5	0.05	2130.0	0.04	2330.0	0.04
1206.0	0.10	1450.5	0.06	1635.5	0.08	1850.5	0.04	2200.0	0.02	2400.0	0.02
1213.0	0.04	1520.5	0.02	1645.5	0.06	1910.5	0.03	2230.0	0.01	0130.0	0.01
1226.0	0.0	1605.5	0.0	1700.5	0.04	1950.5	0.01	2310.0	0.0	0330.0	0.0
				1745.5	0.0	2030.5	0.0				

TABLE 7B.--CHANNEL GEOMETRY, FLOW DATA, AND STATISTICAL PARAMETERS FOR TEST 3

(M = 0.064C)
(BLANK INDICATES NO DATA)

SECTION----------	1	2	3	4	5	6
JUNE 17, 1959						
x -------- ft --	2,350	7,100	11,000	15,750	21,250	27,550
Width ---- " --	31	66	66	61	58	55
d -------- " --	1.38	1.38	1.02	1.33	1.25	1.39
R -------- " --	1.36	1.32	.99	1.32	1.21	1.38
Fall ----- " --	.15	.23	.21	.22	.21	.21
Temp ----- ^{o}F --	66	67	70	71	70	70
$S^{1/2}$ ----------	.068	.067	.063	.058	.055	.054
Q ------- cfs --	36	34	34	32	38	40
V ------- fps --	.85	.37	.50	.40	.53	.53
A ----- sq ft --	42	90	67	81	72	76
n ----------	11.02	31.35	44.22	52.21	65.24	79.87
JUNE 18, 1959						
$\bar{t}$ ------- sec --	6,660	14,900	21,600	27,800	36,300	44,900
$\bar{A}$ ----- sq ft --	99	73	68	61	59	57
V_* ------ fps --	.45	.44	.36	.38	.34	.36
α_3 ----------	1.3	1.2	1.1	1.0	.8	.6
M -------- c --	.057	.051	.039	.045	.043	.029
C_{max} - $\mu c/ft^3$ --	1.32	.38	.22	.20	.16	.10
σ_x ------- ft --	207	82	1,190	1,56	1,650	1,650
γ -------- ft --	173	728	1,030	1,45	1,790	2,030

TABLE 7C.--DISTRIBUTION OF VELOCITY IN SECTION 1 OF REACH USED IN TEST 3

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
1.5	0.6	----	----	----	----	----	
3.0	0.9	----	----	----	----	----	
4.5	1.0	----	----	----	----	----	
6.0	1.0	0.09	0.13	0.09	0.08	----	
7.5	1.2	0.36	0.36	0.28	0.27	0.18	
9.0	1.2	0.47	0.43	0.38	0.33	0.20	
10.5	1.4	0.58	0.58	0.50	0.50	0.39	
12.0	1.5	0.72	0.63	0.55	0.54	0.36	
13.5	1.6	0.63	0.66	0.50	0.39	0.45	
15.0	1.5	0.52	0.51	0.51	0.46	0.40	
16.5	1.6	0.61	0.66	0.61	0.63	0.72	
18.0	1.9	0.99	1.12	1.10	1.04	0.80	
19.5	1.9	1.40	1.37	1.29	1.26	1.15	
21.0	1.9	1.54	1.47	0.48	0.39	0.99	
22.5	1.9	1.93	1.61	0.80	0.98	0.87	
24.0	1.8	1.61	1.54	1.50	1.50	1.40	
25.5	1.8	1.64	1.47	1.31	1.34	1.15	
27.0	1.6	1.23	1.40	1.26	1.98	1.29	
28.5	1.3	1.17	1.17	0.96	1.04	0.96	
30.0	1.0	0.82	0.92	0.88	0.96	0.90	
31.0	0.0	----	----	----	----	----	

TABLE 7D.--DISTRIBUTION OF VELOCITY IN SECTION 2 OF REACH USED IN TEST 3

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
1.0	0.3	----	----	----	----	----	
4.0	0.3	----	----	----	----	----	
7.0	0.4	----	----	----	----	----	
10.0	0.8	----	----	----	----	----	
13.0	0.6	----	----	----	----	----	
16.0	1.1	0.08	----	----	----	----	
19.0	1.5	0.21	0.24	0.19	0.14	0.18	
22.0	1.2	0.25	0.29	0.13	0.22	----	
25.0	1.4	0.38	0.40	0.36	0.31	0.36	
28.0	1.6	0.48	0.44	0.40	0.33	0.25	
31.0	1.9	0.50	0.55	0.56	0.64	0.52	
34.0	1.6	0.48	0.46	0.43	0.43	0.40	
37.0	1.9	0.48	0.46	0.43	0.34	0.24	
40.0	2.0	0.51	0.55	0.55	0.50	0.36	
43.0	1.6	0.47	0.42	0.36	0.29	0.34	
46.0	2.0	0.88	0.75	0.66	0.51	0.36	
49.0	2.0	0.96	0.90	0.83	0.75	0.16	
52.0	2.2	0.92	1.20	0.87	0.78	0.63	
55.0	2.1	0.63	0.63	0.59	0.52	0.20	
58.0	1.7	0.47	0.36	0.40	0.33	0.21	
61.0	1.4	0.25	0.25	0.19	0.18	0.10	
64.0	0.9	0.08	----	----	----	----	
66.0	0.0	----	----	----	----	----	

TABLE 7E.--DISTRIBUTION OF VELOCITY IN SECTION 3 OF REACH USED IN TEST 3

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
5.0	0.6	----	----	----	----	----	
8.0	0.7	0.38	0.32	0.35	0.34	0.29	
11.0	0.6	0.55	0.60	0.48	0.52	0.48	
14.0	0.6	0.75	0.63	0.64	0.63	0.57	
17.0	1.0	0.68	0.61	0.54	0.54	0.50	
19.0	1.4	0.67	0.71	0.64	0.50	0.50	
21.0	1.3	0.77	0.75	0.70	0.70	0.57	
23.0	1.2	0.76	0.78	0.71	0.61	0.52	
25.0	1.2	0.81	0.80	0.67	0.65	0.56	
28.0	1.2	0.80	0.77	0.75	0.75	0.64	
31.0	1.2	0.81	0.73	0.73	0.68	0.57	
34.0	1.2	0.73	0.67	0.63	0.58	0.60	
37.0	1.3	0.68	0.65	0.61	0.56	0.41	
40.0	1.2	0.63	0.61	0.60	0.52	0.48	
43.0	1.4	0.56	0.64	0.58	0.55	0.39	
46.0	1.2	0.71	0.75	0.65	0.67	0.58	
49.0	1.2	0.65	0.70	0.64	0.56	0.44	
52.0	1.2	0.64	0.62	0.61	0.49	0.33	
55.0	1.0	0.75	0.64	0.70	0.61	0.38	
57.0	1.0	0.67	0.58	0.50	0.34	0.28	
62.0	1.0	0.35	0.39	0.27	0.16	0.14	
66.0	0.0	----	----	----	----	----	

TABLE 7F.--DISTRIBUTION OF VELOCITY IN SECTION 4 OF REACH USED IN TEST 3

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
4.0	1.7	0.33	0.37	0.40	0.32	0.24	
7.0	1.7	0.55	0.49	0.57	0.48	0.45	
9.0	1.8	0.52	0.52	0.44	0.38	0.12	
11.0	1.7	0.65	0.65	0.60	0.57	0.57	
13.0	1.6	0.67	0.60	0.63	0.57	0.61	
15.0	2.0	0.56	0.60	0.55	0.54	0.32	
17.0	2.0	0.58	0.55	0.56	0.44	0.37	
19.0	1.7	0.67	0.61	0.55	0.48	0.44	
21.0	1.8	0.64	0.71	0.67	0.60	0.57	
23.0	1.9	0.75	0.75	0.68	0.67	0.63	
26.0	1.9	0.58	0.57	0.48	0.45	0.22	
29.0	1.6	0.56	0.49	0.48	0.30	0.11	
32.0	1.4	0.55	0.56	0.50	0.38	0.24	
35.0	1.2	0.54	0.43	0.52	0.33	0.09	
38.0	1.1	0.56	0.57	0.55	0.44	0.32	
41.0	1.2	0.60	0.50	0.43	0.38	0.14	
44.0	1.3	0.42	0.37	0.39	0.38	0.14	
48.0	1.2	0.35	0.42	0.43	0.40	0.15	
52.0	0.9	0.17	0.23	0.19	0.17	0.17	
55.0	0.6	----	----	----	----	----	
61.0	0.0	----	----	----	----	----	

TABLE 7G.--DISTRIBUTION OF VELOCITY IN SECTION 5 OF REACH USED IN TEST 3

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
4.0	1.2	0.22	0.22	0.13	----	----	
7.0	1.5	0.33	0.35	0.26	0.2[illegible]	0.21	
10.0	1.6	0.60	0.62	0.58	0.56	0.42	
13.0	1.7	0.77	0.79	0.76	0.65	0.59	
16.0	1.7	0.93	0.91	0.82	0.72	0.70	
19.0	1.8	0.84	0.84	0.82	0.72	0.58	
22.0	1.8	0.91	0.89	0.77	0.74	0.61	
25.0	1.5	0.82	0.77	0.77	0.72	0.58	
28.0	1.4	0.80	0.89	0.82	0.75	0.66	
31.0	1.6	0.77	0.85	0.72	0.72	0.65	
34.0	1.4	0.65	0.70	0.70	0.5[illegible]	0.49	
37.0	1.4	0.62	0.54	0.50	0.48	0.40	
40.0	1.0	0.51	0.49	0.40	0.50	0.39	
43.0	1.1	0.40	0.39	0.40	0.36	0.10	
46.0	0.9	0.36	0.35	0.36	0.34	0.31	
49.0	1.0	0.37	0.31	0.23	0.12	0.10	
52.0	0.6	0.36	0.21	0.20	0.17	0.15	
55.0	0.3	0.27	0.31	0.26	0.30	0.28	
58.0	0.2				0.09		

TABLE 7H.--DISTRIBUTION OF VELOCITY IN SECTION 6 OF REACH USED IN TEST 3

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
2.0	0.7	0.09	0.09	0.13	0.10	0.11	
4.0	0.8	0.23	0.21	0.22	0.24	0.22	
6.0	0.8	0.31	0.32	0.34	0.36	0.31	
8.0	0.7	0.44	0.48	0.43	0.41	0.35	
10.0	0.8	0.58	0.62	0.57	0.54	0.32	
12.0	0.9	0.67	0.70	0.69	0.65	0.52	
14.0	1.1	0.69	0.75	0.74	0.63	0.49	
16.0	0.8	0.70	0.80	0.70	0.62	0.67	
18.0	1.2	0.70	0.85	0.82	0.84	0.75	
20.0	1.7	0.69	0.72	0.70	0.52	0.51	
22.0	1.8	0.77	0.75	0.72	0.70	0.55	
24.0	1.6	0.80	0.75	0.78	0.65	0.60	
26.0	1.9	0.77	0.69	0.69	0.50	0.46	
28.0	2.0	0.85	0.82	0.79	0.67	0.60	
30.0	2.0	0.82	0.85	0.70	0.74	0.52	
32.0	1.9	0.70	0.70	0.67	0.52	0.58	
34.0	2.1	0.70	0.67	0.69	0.65	0.62	
36.0	1.9	0.77	0.72	0.63	0.62	0.50	
38.0	2.2	0.77	0.74	0.69	0.57	0.36	
40.0	2.0	0.72	0.67	0.62	0.63	0.49	
42.0	1.8	0.67	0.58	0.53	0.52	0.37	
44.0	1.6	0.51	0.49	0.44	0.50	0.46	
46.0	1.6	0.31	0.41	0.46	0.43	0.36	
48.0	1.4	0.36	0.35	0.34	0.34	0.29	
50.0	1.2	0.27	0.26	0.30	0.22	0.28	
52.0	1.3	0.09	0.11	0.10	0.15	0.10	
54.0	1.0	----	----	----	----	----	
55.0	0.6	----	----	----	----	----	

TABLE 8A.--TIME-CONCENTRATION DATA FOR TEST 4, CONCENTRATION OF GOLD-198 IN MICROCURIES PER CUBIC FOOT

(T, 24-HOUR TIME, C, CONCENTRATION, BLANK INDICATES NO DATA, PERIOD OF INJECTION IS 849.0 TO 850.0 EST)

SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		SECTION 6	
T	C	T	C	T	C	T	C	T	C	T	C
1003.0	0.0	1120.0	0.0	1248.0	0.0	1452.0	0.0	1640.0	0.0		
1006.0	0.09	1126.0	0.12	1258.0	0.05	1525.0	0.08	1710.0	0.02		
1009.0	0.41	1132.0	0.32	1310.0	0.14	1600.0	0.15	1740.0	0.07		
1012.0	0.59	1138.0	0.44	1322.0	0.18	1615.0	0.16	1810.0	0.10		
1014.0	0.63	1142.0	0.46	1332.0	0.19	1622.0	0.16	1830.0	0.11		
1016.0	0.64	1144.0	0.46	1342.0	0.20	1630.0	0.16	1840.0	0.11		
1018.0	0.63	1146.0	0.46	1352.0	0.19	1645.0	0.15	1845.0	0.11		
1020.0	0.57	1152.0	0.42	1410.0	0.17	1715.0	0.13	1850.0	0.11		
1025.0	0.45	1200.0	0.37	1430.0	0.14	1800.0	0.09	1900.0	0.11		
1030.0	0.37	1220.0	0.24	1500.0	0.10	1845.0	0.06	1940.0	0.09		
1040.0	0.27	1240.0	0.16	1530.0	0.06	1930.0	0.04	2040.0	0.05		
1100.0	0.16	1300.0	0.11	1600.0	0.03	2015.0	0.02	2140.0	0.03		
1130.0	0.08	1330.0	0.06	1630.0	0.01	2100.0	0.01	2250.0	0.01		
1210.0	0.02	1410.0	0.03	1710.0	0.0	2200.0	0.0	2400.0	0.0		
1300.0	0.0	1500.0	0.0								

TABLE 8B.--CHANNEL GEOMETRY, FLOW DATA, AND STATISTICAL PARAMETERS FOR TEST 4

(M = 0.260C)
(BLANK INDICATES NO DATA)

SECTION----------	1	2	3	4	5	6
			JUNE 22, 1959			
x -------- ft --	3,150	5,510	11,000	15,750	20,450	23,600
Width ---- " --	103	100	118	122	122	101
d -------- " --	3.74	1.62	2.67	3.57	2.32	2.89
R -------- " --	3.69	1.61	2.64	3.55	2.30	2.87
Fall ----- " --	1.39	2.37	3.83	4.60	6.39	
Temp ----- °F --	67	74	74	76	76	
$S^{1/2}$ ----------	.021	.021	.019	.017	.018	
Q ------- cfs --	146	161	148	137	140	145
V ------- fps --	.38	.99	.48	.31	.49	.50
A ----- sq ft --	385	162	315	435	283	292
n ----------	.20	.13	.12	.14	.13	
			JUNE 23, 1959			
$\bar{t}$ ------- sec --	6,720	12,500	19,500	30,400	38,000	
$\bar{A}$ ----- sq ft --	299	317	248	270	260	
V_* ------ fps --	.23	.15	.17	.18	.16	
α_3 ----------	1.1	1.4	1.4	1.4	1.2	
M^2 -------- c --	.215	.263	.198	.248	.184	
C_{max} - $\mu c/ft^3$ --	.64	.46	.20	.16	.11	
σ_x ------- ft --	334	760	1,770	2,890	3,060	
γ -------- ft --	449	719	1,590	2,290	2,560	

TABLE 8C.--DISTRIBUTION OF VELOCITY IN SECTION 1 OF REACH USED IN TEST 4

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
19.0	1.3	0.29	0.27	0.19	0.19		
29.0	1.7	0.41	0.49	0.40	0.39	0.41	
34.0	1.8	0.55	0.58	0.37	0.16	0.13	
39.0	2.1	0.29	0.48	0.45	0.24	0.24	
44.0	2.5	0.56	0.38	0.21	0.23	0.38	
49.0	2.8	0.73	0.50	0.30	0.40	0.43	
54.0	3.3	0.67	0.64	0.54	0.50	0.58	
59.0	3.5	0.50	0.49	0.64	0.62	0.58	
63.0	3.7	0.76	0.83	0.85	0.71	0.68	
67.0	4.0	0.89	0.78	0.58	0.56	0.58	
70.0	4.2	0.78	0.78	0.78	0.76	0.67	
73.0	4.5	0.76	0.85	0.85	0.81	0.67	
76.0	5.0	0.89	0.83	0.81	0.64	0.64	
79.0	5.0	0.92	0.72	0.79	0.71	0.87	
81.0	5.3	0.78	0.64	0.56	0.52	0.41	
84.0	5.5	0.49	0.71	0.78	0.58	0.46	
86.0	5.0	0.52	0.37	0.56	0.67	0.46	
90.0	5.9	0.66	0.68	0.76	0.58	0.32	
94.0	4.0	0.36	0.27	0.30	0.24	0.28	
103.0	0.0	----	----	----	----	----	

TABLE 8D.--DISTRIBUTION OF VELOCITY IN SECTION 2 OF REACH USED IN TEST 4

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
4.0	1.6	0.21	0.22	0.17	0.15	0.09	
9.0	1.6	0.96	0.96	0.75	0.71	0.64	
14.0	1.7	1.00	0.96	0.98	0.86	0.80	
19.0	1.8	1.00	0.98	0.96	0.82	0.65	
24.0	1.8	1.12	1.19	1.15	1.09	1.02	
29.0	1.9	1.19	1.22	1.12	1.07	0.98	
34.0	2.0	1.30	1.22	1.22	1.09	0.96	
39.0	1.9	1.15	1.24	0.92	1.12	1.07	
44.0	1.9	1.22	1.22	1.22	1.09	1.00	
49.0	1.9	1.24	1.24	1.24	1.22	1.02	
54.0	1.7	1.30	1.33	1.22	0.90	0.79	
59.0	1.7	1.40	1.36	1.30	1.27	0.98	
64.0	1.7	1.43	1.44	1.36	1.30	0.96	
69.0	1.8	1.07	1.15	0.84	0.77	0.68	
74.0	1.7	1.52	1.40	1.27	1.07	0.74	
79.0	1.6	1.33	1.40	1.44	1.22	0.82	
84.0	1.4	1.27	1.33	1.02	1.02	0.74	
89.0	1.3	1.22	1.30	1.24	1.07	0.80	
94.0	1.1	1.15	1.22	1.15	1.12	0.82	
99.0	0.8	0.05	0.05	0.10	0.10	----	
100.0	0.0	----	----	----	----	----	

TABLE 8E.--DISTRIBUTION OF VELOCITY IN SECTION 3 OF REACH USED IN TEST 4

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
3.0	2.8	----	----	----	----	----	
8.0	2.5	0.30	0.24	0.14	0.19	0.11	
13.0	2.0	0.48	0.54	0.49	0.45	0.36	
18.0	2.5	0.52	0.48	0.50	0.44	0.35	
23.0	2.8	0.58	0.54	0.53	0.50	0.56	
28.0	3.0	0.61	0.58	0.58	0.58	0.52	
33.0	3.1	0.68	0.66	0.67	0.69	0.56	
38.0	3.2	0.68	0.75	0.69	0.69	0.57	
43.0	3.3	0.69	0.75	0.71	0.58	0.44	
48.0	3.3	0.74	0.72	0.66	0.64	0.54	
53.0	3.3	0.72	0.74	0.71	0.66	0.58	
58.0	3.1	0.74	0.69	0.69	0.58	0.67	
63.0	3.0	0.71	0.69	0.72	0.63	0.52	
68.0	3.0	0.69	0.71	0.67	0.64	0.53	
73.0	2.8	0.66	0.64	0.66	0.59	0.54	
78.0	2.7	0.58	0.58	0.57	0.59	0.47	
83.0	2.5	0.63	0.60	0.56	0.53	0.40	
88.0	2.5	0.54	0.53	0.51	0.48	0.40	
93.0	2.5	0.58	0.44	0.39	0.42	0.33	
98.0	2.6	0.39	0.39	0.47	0.40	0.29	
103.0	2.5	0.38	0.39	0.40	0.36	0.27	
108.0	2.2	0.47	0.29	0.32	0.33	0.27	
113.0	2.0	0.29	0.32	0.27	0.25	0.16	
118.0	0.0	----	----	----	----	----	

TABLE 8F.--DISTRIBUTION OF VELOCITY IN SECTION 4 OF REACH USED IN TEST 4

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
17.0	4.0	0.23	0.14	0.28	0.22	0.19	
24.0	4.0	0.34	0.19	0.44	0.35	0.26	
29.0	3.7	0.33	0.27	0.33	0.46	0.29	
34.0	3.7	0.49	0.45	0.41	0.48	0.35	
39.0	3.7	0.41	0.33	0.46	0.50	0.40	
43.0	3.7	0.48	0.49	0.48	0.45	0.29	
47.0	3.7	0.47	0.50	0.46	0.38	0.39	
51.0	3.8	0.58	0.52	0.44	0.52	0.40	
55.0	3.8	0.51	0.56	0.35	0.40	0.35	
60.0	4.0	0.64	0.47	0.41	0.50	0.30	
65.0	4.0	0.43	0.64	0.50	0.37	0.37	
70.0	4.0	0.55	0.35	0.48	0.44	0.37	
75.0	4.0	0.59	0.64	0.61	0.40	0.33	
80.0	4.0	0.46	0.41	0.35	0.40	0.35	
85.0	4.0	0.41	0.33	0.41	0.33	0.23	
90.0	4.0	0.40	0.41	0.42	0.38	0.19	
95.0	4.0	0.23	0.28	0.32	0.27	0.20	
100.0	4.0	0.33	0.40	0.38	0.26	0.24	
110.0	3.7	0.20	0.29	0.37	0.24	0.17	
122.0	3.0				0.07		

TABLE 8G.--DISTRIBUTION OF VELOCITY IN SECTION 5 OF REACH USED IN TEST 4

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
3.0	1.6	----	0.07	0.17	0.08	----	
8.0	1.8	0.09	0.08	0.06	----	----	
13.0	1.8	0.22	0.25	0.34	0.30	0.22	
18.0	1.9	0.56	0.57	0.51	0.48	0.33	
23.0	2.0	0.57	0.52	0.50	0.41	0.40	
28.0	2.1	0.60	0.52	0.45	0.43	0.32	
33.0	2.1	0.54	0.52	0.54	0.39	0.42	
38.0	2.3	0.52	0.48	0.47	0.51	0.44	
43.0	2.3	0.59	0.60	0.54	0.54	0.49	
48.0	2.5	0.59	0.57	0.49	0.54	0.36	
53.0	2.5	0.60	0.62	0.62	0.52	0.48	
58.0	2.4	0.66	0.66	0.60	0.59	0.47	
63.0	2.4	0.65	0.69	0.69	0.59	0.54	
68.0	2.5	0.67	0.71	0.66	0.66	0.55	
73.0	2.5	0.71	0.68	0.70	0.71	0.62	
78.0	2.5	0.66	0.76	0.73	0.66	0.60	
83.0	2.7	0.75	0.78	0.73	0.68	0.62	
88.0	2.8	0.78	0.78	0.68	0.63	0.55	
93.0	2.9	0.67	0.72	0.75	0.71	0.54	
98.0	3.2	0.62	0.67	0.71	0.60	0.56	
103.0	3.3	0.55	0.67	0.60	0.55	0.50	
108.0	3.3	0.68	0.59	0.62	0.60	0.54	
113.0	3.1	0.30	0.27	0.30	0.29	0.28	
118.0	2.2	0.10	0.10	0.14	0.08	----	
122.0	0.0	----	----	----	----	----	

TABLE 8H.--DISTRIBUTION OF VELOCITY IN SECTION 6 OF REACH USED IN TEST 4

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
4.0	1.1	0.08	0.08	----	----	----	
8.0	1.2	0.32	0.37	0.32	0.24	0.20	
12.0	1.3	0.51	0.51	0.43	0.37	0.22	
16.0	1.3	0.39	0.32	0.31	0.32	0.26	
20.0	2.0	0.39	0.39	0.41	0.31	0.25	
24.0	2.3	0.32	0.26	0.27	0.20	0.25	
28.0	2.4	0.30	0.33	0.32	0.28	0.20	
32.0	2.8	0.56	0.49	0.37	0.33	0.30	
36.0	2.8	0.45	0.47	0.45	0.39	0.38	
40.0	3.1	0.54	0.58	0.56	0.41	0.36	
44.0	3.8	0.59	0.60	0.59	0.43	0.34	
48.0	4.1	0.75	0.66	0.70	0.55	0.44	
53.0	4.3	0.55	0.71	0.66	0.58	0.39	
57.0	4.5	0.70	0.73	0.73	0.54	0.41	
61.0	4.6	0.70	0.71	0.64	0.60	0.55	
65.0	4.7	0.67	0.68	0.71	0.67	0.62	
69.0	4.6	0.64	0.64	0.64	0.62	0.60	
73.0	4.6	0.73	0.68	0.73	0.64	0.55	
77.0	4.5	0.67	0.70	0.62	0.60	0.55	
81.0	3.7	0.60	0.60	0.57	0.59	0.51	
85.0	3.4	0.62	0.61	0.59	0.61	0.55	
89.0	2.4	0.55	0.52	0.60	0.54	0.45	
93.0	1.7	0.39	0.47	0.55	0.42		
97.0	1.2	0.08	0.12	0.08			
101.0	0.0	----	----	----	----	----	

TABLE 9A.--TIME-CONCENTRATION DATA FOR TEST 5, CONCENTRATION OF GOLD-198 IN MICROCURIES PER CUBIC FOOT

(T, 24-HOUR TIME. C, CONCENTRATION. BLANK INDICATES NO DATA.
PERIOD OF INJECTION IS 909.5 TO 910.5 EST)

SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		SECTION 6	
T	C	T	C	T	C	T	C	T	C	T	C
0955.0	0.0	1054.0	0.0	1219.0	0.0	1318.0	0.0	1518.0	0.0	1654.0	0.0
0958.0	0.14	1056.0	0.02	1224.0	0.04	1325.0	0.03	1542.0	0.05	1704.0	0.02
1001.0	0.76	1059.0	0.14	1234.0	0.17	1332.0	0.07	1606.0	0.10	1720.0	0.04
1004.0	1.25	1102.0	0.29	1244.0	0.29	1340.0	0.12	1630.0	0.13	1740.0	0.07
1005.5	1.34	1105.0	0.44	1249.0	0.31	1350.0	0.16	1642.0	0.13	1800.0	0.09
1007.0	1.24	1108.0	0.53	1254.0	0.29	1357.0	0.18	1654.0	0.13	1820.0	0.10
1010.0	0.89	1110.0	0.55	1305.0	0.25	1401.0	0.18	1718.0	0.11	1830.0	0.10
1015.0	0.51	1112.0	0.54	1320.0	0.19	1405.0	0.18	1742.0	0.09	1840.0	0.10
1020.0	0.34	1116.0	0.46	1340.0	0.13	1415.0	0.17	1806.0	0.07	1900.0	0.09
1030.0	0.19	1120.0	0.39	1410.0	0.08	1435.0	0.15	1830.0	0.05	1930.0	0.07
1040.0	0.11	1130.0	0.27	1450.0	0.04	1455.0	0.12	1900.0	0.03	2015.0	0.05
1100.0	0.04	1200.0	0.10	1540.0	0.02	1530.0	0.08	1940.0	0.02	2100.0	0.03
1130.0	0.0	1240.0	0.02	1630.0	0.0	1630.0	0.04	2020.0	0.01	2230.0	0.01
		1330.0	0.0			1730.0	0.0	2140.0	0.0	0150.0	0.0

TABLE 9B.--CHANNEL GEOMETRY, FLOW DATA, AND STATISTICAL PARAMETERS FOR TEST 5.

(M = 0.377C)
(BLANK INDICATES NO DATA)

SECTION----------	1	2	3	4	5	6
			JUNE 24, 1959			
x -------- ft --	3,000	6,100	11,000	14,700	18,400	21,800
Width ---- " --	126	141	88	84	110	156
d -------- " --	1.62	2.11	1.51	1.93	2.55	1.74
R -------- " --	1.62	2.11	1.51	1.91	2.53	1.70
Fall ----- " --	1.81	2.10	4.87	5.84	6.13	6.69
Temp ----- ^{o}F --	77	75	77	76	77	77
$S^{1/2}$ ----------	.025	.019	.021	.020	.018	.018
Q ------- cfs --	205	216	210	202	179	208
V ------- fps --	1.00	.72	1.58	1.24	.64	.76
A ----- sq ft --	204	298	133	162	280	272
n ----------	.04	.05	.04	.04	.04	.04
			JUNE 25, 1959			
$\bar{t}$ ------- sec --	3,920	8,280	15,500	20,200	29,300	36,700
$\bar{A}$ ----- sq ft --	314	326	338	330	382	404
V_* ------ fps --	.18	.16	.15	.16	.16	.13
α_3 ----------	.5	1.4	1.5	1.6	1.0	.9
M^2 -------- c --	.339	.302	.338	.305	.282	.272
C_{max} - $\mu c/ft^3$ --	1.34	.55	.31	.18	.13	.10
σ_x ------- ft --	222	632	1,410	2,910	2,720	2,950
Y -------- ft --	321	672	1,290	2,040	2,270	2,690

TABLE 9C.--DISTRIBUTION OF VELOCITY IN SECTION 1 OF REACH USED IN TEST 5

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
5.0	0.5	0.12	0.12	0.18	0.20	0.12	
10.0	0.9	0.49	0.39	0.43	0.33	0.12	
15.0	1.6	0.68	0.69	0.79	0.81	0.72	
20.0	1.6	0.57	0.63	0.54	0.50	0.51	
25.0	2.0	1.07	1.12	1.04	0.98	0.79	
30.0	2.0	1.12	1.07	0.75	0.53	0.36	
35.0	2.1	1.49	1.42	1.33	0.90	0.63	
40.0	2.3	1.33	1.45	1.33	1.33	0.99	
45.0	2.5	1.40	1.45	1.27	1.12	0.75	
50.0	2.0	1.02	1.07	0.82	0.79	0.71	
56.0	1.9	1.36	1.40	1.40	1.39	0.75	
61.0	1.5	1.52	1.49	1.52	1.40	1.12	
66.0	1.7	1.33	1.40	1.40	1.10	1.40	
71.0	1.7	1.59	1.63	1.52	1.46	1.09	
76.0	1.6	1.17	1.12	1.14	1.02	0.94	
81.0	1.5	1.40	1.33	1.40	1.24	1.16	
86.0	1.5	1.19	1.10	1.40	1.27	1.36	
91.0	2.1	1.36	1.40	1.33	1.02	0.77	
96.0	2.1	1.24	1.43	1.24	1.12	0.92	
101.0	2.2	1.12	1.19	1.07	0.75	0.68	
106.0	1.4	1.04	1.07	1.04	0.98	0.57	
111.0	0.9	0.88	0.88	0.86	0.82	0.84	
116.0	1.5	0.56	0.69	0.68	0.68	0.61	
121.0	1.4	0.84	0.63	0.55	0.56	0.42	
126.0	0.0	----	----	----	----	----	

TABLE 9D.--DISTRIBUTION OF VELOCITY IN SECTION 2 OF REACH USED IN TEST 5

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
5.0	1.9	0.34	0.36	0.36	0.32	0.28	
10.0	2.5	0.41	0.50	0.59	0.52	0.48	
15.0	2.9	0.58	0.64	0.65	0.65	0.56	
20.0	3.1	0.60	0.68	0.76	0.72	0.62	
25.0	3.2	0.76	0.86	0.86	0.91	0.84	
30.0	2.7	1.08	1.08	1.14	1.06	0.97	
35.0	2.4	1.14	1.14	1.14	1.01	1.06	
40.0	2.3	1.26	1.29	1.23	1.14	1.14	
45.0	2.1	1.23	1.26	1.16	1.14	1.08	
51.0	2.1	1.12	1.27	1.12	0.94	1.00	
56.0	2.1	1.04	1.02	0.84	0.82	0.63	
61.0	2.0	1.07	1.07	0.96	0.94	0.90	
66.0	1.8	0.98	0.96	0.98	0.75	0.68	
71.0	2.1	1.09	1.12	0.98	0.94	0.71	
76.0	2.2	0.84	0.83	0.83	0.77	0.57	
81.0	2.2	0.88	0.90	0.77	0.72	0.55	
86.0	2.3	0.86	0.90	0.77	0.65	0.44	
91.0	2.2	0.86	0.84	0.72	0.48	0.42	
96.0	2.1	0.72	0.75	0.64	0.52	0.50	
101.0	2.1	0.71	0.69	0.66	0.62	0.52	
106.0	2.2	0.78	0.80	0.69	0.72	0.46	
111.0	2.0	0.84	0.82	0.90	0.84	0.57	
116.0	2.2	0.75	0.77	0.71	0.53	0.38	
121.0	2.1	0.47	0.47	0.40	0.23	0.28	
126.0	2.2	0.27	0.25	0.21	0.18	0.14	
141.0	0.0	----	----	----	----	----	

TABLE 9E.--DISTRIBUTION OF VELOCITY IN SECTION 3 OF REACH USED IN TEST 5

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
4.0	0.5	----	----	----	----	----	
8.0	1.0	1.24	1.85	1.71	1.40	1.12	
12.0	1.4	1.24	1.98	2.02	1.93	1.07	
16.0	1.7	1.98	2.27	2.17	1.98	1.27	
20.0	2.0	1.98	2.22	2.22	2.07	1.71	
24.0	2.5	1.71	1.93	1.82	1.71	1.30	
28.0	2.4	2.02	2.17	2.07	1.71	1.30	
32.0	2.0	1.89	2.22	2.27	2.12	1.71	
36.0	1.5	1.71	2.02	2.02	1.89	1.52	
40.0	1.7	1.71	2.22	2.17	2.02	1.85	
44.0	2.0	1.59	2.07	1.78	1.71	1.59	
48.0	2.2	2.12	2.17	2.17	1.82	1.33	
52.0	2.2	1.67	1.89	1.71	1.67	1.30	
56.0	2.0	1.55	1.67	1.59	1.24	1.02	
60.0	1.8	1.33	1.93	1.85	1.67	0.77	
64.0	1.4	1.55	1.71	1.67	1.44	1.22	
68.0	1.3	1.00	1.30	1.24	1.07	0.90	
72.0	1.1	1.27	1.49	1.49	1.33	1.09	
76.0	1.0	0.98	1.24	1.36	1.07	0.96	
80.0	0.8	----	1.24	0.96	0.86	0.81	
84.0	0.8	----	0.98	0.94	0.94	0.69	
88.0	0.0	----	----	----	----	----	

TABLE 9F.--DISTRIBUTION OF VELOCITY IN SECTION 4 OF REACH USED IN TEST 5

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
3.0	0.9	0.16	0.23	0.28	0.49	0.70	
6.0	1.1	1.75	1.86	1.90	1.86	1.49	
10.0	1.0	1.31	1.56	1.72	1.43	1.25	
14.0	1.6	1.64	2.03	2.03	1.46	1.28	
18.0	1.7	1.60	1.68	1.56	1.43	1.40	
22.0	1.9	1.68	1.94	1.86	1.79	1.40	
26.0	2.2	1.82	1.90	1.82	1.64	1.46	
30.0	2.4	1.32	1.68	1.60	1.18	0.98	
34.0	2.3	1.75	1.79	1.60	1.56	0.98	
38.0	2.2	1.25	1.25	1.23	1.18	0.85	
42.0	2.1	1.49	1.56	1.46	1.18	0.96	
46.0	2.1	1.68	1.79	1.68	1.40	1.10	
50.0	2.3	1.72	1.68	1.60	1.37	1.05	
54.0	2.4	1.46	1.40	1.37	1.28	0.90	
58.0	2.4	1.40	1.40	1.34	1.23	1.08	
62.0	2.2	1.56	1.64	1.01	1.16	0.87	
66.0	2.4	1.60	1.64	1.56	1.40	1.13	
70.0	2.1	1.49	1.60	1.43	1.25	1.08	
74.0	2.3	1.25	1.34	0.87	0.89	0.62	
78.0	2.0	0.65	0.64	0.40	0.39	0.24	
82.0	1.4	0.04	----	----	0.05	0.04	
84.0	0.0	----	----	----	----	----	

TABLE 9G.--DISTRIBUTION OF VELOCITY IN SECTION 5 OF REACH USED IN TEST 5

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
5.0	1.2	0.12	0.12	0.11	0.14	0.14	
10.0	2.0	0.74	0.77	0.67	0.62	0.48	
15.0	2.5	0.94	0.96	1.00	0.96	0.81	
20.0	3.4	1.02	1.12	1.15	1.12	0.80	
25.0	3.7	1.10	1.05	1.10	0.89	0.79	
30.0	2.7	0.98	1.00	1.00	0.92	0.83	
35.0	3.4	0.96	1.07	1.02	0.89	0.72	
40.0	3.2	0.94	1.00	0.90	0.87	0.66	
45.0	2.6	0.77	0.81	0.72	0.67	0.55	
50.0	3.0	0.71	0.77	0.64	0.58	0.55	
55.0	3.2	0.70	0.68	0.66	0.57	0.53	
60.0	3.6	0.67	0.62	0.53	0.49	0.49	
65.0	3.2	0.86	0.82	0.78	0.72	0.52	
70.0	3.2	0.77	0.71	0.63	0.57	0.44	
75.0	2.9	0.73	0.68	0.72	0.66	0.59	
80.0	2.8	0.69	0.68	0.66	0.58	0.50	
85.0	2.5	0.75	0.71	0.63	0.57	0.12	
90.0	2.2	0.30	0.40	0.33	0.36	0.28	
95.0	1.8	0.14	0.11	0.14	0.18	0.11	
100.0	1.5	----	----	----	----	----	
105.0	1.2	0.34	0.25	0.20	0.20	0.11	
110.0	0.0	----	----	----	----	----	

TABLE 9H.--DISTRIBUTION OF VELOCITY IN SECTION 6 OF REACH USED IN TEST 5

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	
6.0	1.3	0.56	0.56	0.54	0.48	0.23	
12.0	1.8	1.24	1.33	1.33	1.15	0.92	
18.0	2.4	0.40	0.71	0.82	0.56	0.48	
24.0	2.0	0.77	0.75	0.75	0.71	0.67	
30.0	1.6	0.72	0.66	0.54	0.25	0.26	
36.0	2.0	0.82	1.02	1.02	0.74	0.67	
42.0	2.2	0.92	1.00	0.90	0.88	0.64	
48.0	2.0	0.81	0.85	0.87	0.84	0.77	
54.0	2.2	0.88	0.94	0.86	0.79	0.84	
60.0	2.2	0.64	0.75	0.77	0.74	0.69	
64.0	2.2	0.75	0.68	0.86	0.75	0.96	
68.0	2.2	0.31	0.36	0.41	0.39	0.53	
71.0	0.6				0.83		
74.0	2.2	1.28	1.20	0.90	0.68	0.70	
80.0	2.6	0.76	0.77	0.85	0.85	0.71	
86.0	2.5	0.74	0.76	0.85	0.79	0.72	
92.0	2.8	0.74	0.81	0.85	0.71	0.63	
98.0	2.5	1.05	1.07	1.00	0.96	0.72	
104.0	2.1	0.41	0.39	0.57	0.74	0.76	
110.0	2.2	0.96	1.20	1.20	1.05	0.72	
116.0	1.4	1.20	1.25	1.20	0.96	0.70	
122.0	0.3				1.10		
128.0	1.2	1.34	1.34	1.30	1.12	0.94	
134.0	1.1	1.07	1.10	1.05	1.00	0.77	
140.0	1.0	0.90	0.84	0.90	0.81	0.60	
146.0	1.0	0.72	0.74	0.68	0.63	0.56	
152.0	0.5		0.13		0.15	----	
156.0	0.0	----	----	----	----	----	

TABLE 10A.--TIME-CONCENTRATION DATA FOR TEST 6, CONCENTRATION OF GOLD-198 IN MICROCURIES PER CUBIC FOOT

(T, 24-HOUR TIME. C, CONCENTRATION. BLANK INDICATES NO DATA. PERIOD OF INJECTION IS 1108.0 TO 1108.6 EST)

SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		SECTION 6	
T	C	T	C	T	C	T	C	T	C	T	C
1111.5	0.0	1125.0	0.0	1138.0	0.0	1149.0	0.0	1210.0	0.0	1226.0	0.0
1112.0	2.00	1126.0	0.15	1139.0	0.12	1152.0	0.26	1215.0	0.05	1231.0	0.07
1112.5	16.50	1127.0	1.13	1140.0	0.30	1155.0	0.67	1220.0	0.25	1236.0	0.22
1113.0	13.45	1128.0	2.30	1143.0	1.21	1158.0	0.95	1225.0	0.52	1241.0	0.40
1113.5	7.26	1128.5	2.74	1145.0	1.61	1200.0	1.09	1228.0	0.64	1245.0	0.50
1114.0	5.29	1129.0	2.91	1147.0	1.64	1202.0	1.13	1231.0	0.70	1249.0	0.58
1115.0	3.37	1129.5	2.91	1149.0	1.56	1204.0	1.10	1234.0	0.72	1251.0	0.59
1116.0	2.29	1130.0	2.80	1153.0	1.26	1206.0	1.04	1237.0	0.71	1253.0	0.59
1117.0	1.54	1131.0	2.59	1158.0	0.86	1208.0	0.95	1240.0	0.65	1257.0	0.54
1118.0	1.03	1133.0	2.18	1203.0	0.53	1213.0	0.72	1244.0	0.55	1304.0	0.44
1120.0	0.40	1137.0	1.34	1208.0	0.30	1218.0	0.50	1248.0	0.45	1313.0	0.27
1124.0	0.10	1143.0	0.60	1213.0	0.17	1223.0	0.31	1258.0	0.24	1323.0	0.14
1128.0	0.04	1149.0	0.23	1218.0	0.10	1228.0	0.21	1308.0	0.12	1333.0	0.06
1133.0	0.02	1158.0	0.08	1228.0	0.04	1238.0	0.08	1318.0	0.06	1343.0	0.03
1138.0	0.0	1208.0	0.03	1238.0	0.01	1248.0	0.02	1333.0	0.03	1403.0	0.02
		1218.0	0.0	1248.0	0.0	1300.0	0.0	1353.0	0.0	1423.0	0.0

TABLE 108.--CHANNEL GEOMETRY, FLOW DATA, AND STATISTICAL PARAMETERS FOR TEST 6

(M = 0.450C)
(BLANK INDICATES NO DATA)

SECTION----------	1	2	3	4	5	6
			JAN. 13, 1960			
x -------- ft --	630	3,310	5,670	7,870	11,000	13,550
Width ---- " --	46	63	57	58	65	70
d -------- " --	3.28	2.43	2.61	2.67	2.68	2.96
R -------- " --	3.07	2.41	2.56	2.61	2.62	2.91
Fall ----- " --	.62	4.42	7.51	10.70	13.86	17.34
Temp ----- °F --	50	50	50	50	51	50
$Sl^{1/2}$ ----------	.031	.037	.036	.037	.036	.036
Q ------- cfs --	249	276	280	269	286	308
V ------- fps --	1.65	1.82	1.88	1.74	1.64	1.49
A ----- sq ft --	151	153	149	155	174	207
n ----------	.05	.05	.05	.05	.05	.06
			JAN. 14, 1960			
$\bar{t}$ ------- sec --	380	1,640	2,740	3,650	5,630	6,720
$\bar{A}$ ----- sq ft --	181	149	145	139	154	149
V_* ------ fps --	.31	.33	.33	.34	.33	.35
α_3 ----------	1.5	1.7	1.4	1.3	.8	1.1
M -------- c --	.616	.596	.560	.494	.439	.394
C_{max} - $\mu c/ft^3$ --	16.5	2.91	1.64	1.13	.72	.59
σ_x ------- ft --	73	780	1,190	1,550	1,600	2,010
γ -------- ft --	82	550	939	1,260	1,580	1,820

TABLE 10C.--DISTRIBUTION OF VELOCITY IN SECTION 1 OF REACH USED IN TEST 6

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	2.7	----	----	----	----	----	----
4.0	3.1	0.12	0.15	----	----	----	----
6.0	3.4	0.75	0.85	1.04	0.98	0.61	0.56
8.0	3.1	1.22	1.36	1.33	1.09	1.00	0.77
10.0	3.1	1.36	1.40	1.45	1.22	0.94	0.98
12.0	3.1	1.89	1.98	1.93	1.65	1.45	1.27
14.0	3.1	2.31	2.26	2.26	2.12	1.89	1.78
16.0	3.2	2.41	2.52	2.46	2.31	2.02	1.98
18.0	3.2	2.58	2.70	2.41	2.41	2.12	2.02
20.0	3.3	2.70	2.70	2.58	2.52	1.93	1.85
22.0	3.7	2.77	2.64	2.46	2.31	1.68	1.67
24.0	3.6	2.89	2.77	2.36	1.36	1.17	1.09
26.0	3.5	2.89	2.89	2.77	2.17	1.62	1.45
28.0	3.5	3.02	2.89	2.70	2.41	1.82	1.82
30.0	3.6	3.02	2.95	2.77	2.41	2.22	1.98
32.0	3.7	2.77	2.70	2.64	2.46	2.02	1.67
34.0	3.9	2.89	2.77	2.70	2.41	2.02	1.49
36.0	4.1	2.02	2.22	2.46	2.17	1.59	1.49
38.0	4.0	1.07	1.49	1.93	1.89	1.52	1.27
40.0	3.8	0.72	0.98	1.36	1.42	1.17	1.12
42.0	3.7	0.37	0.49	0.92	1.02	0.81	0.92
44.0	3.1	0.40	0.46	0.38	0.29	0.25	
46.0	0.0	----	----	----	----	----	----

TABLE 10D.--DISTRIBUTION OF VELOCITY IN SECTION 2 OF REACH USED IN TEST 6

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
4.0	1.5	0.43	0.50	0.33	0.32	0.24	
7.0	2.4	0.50	0.50	0.35	0.41	----	
10.0	3.3		0.52	0.43	0.39	0.35	0.22
13.0	3.4	1.19	1.07	1.17	1.07	0.90	0.82
16.0	3.3	2.58	2.58	2.41	1.89	1.78	1.49
19.0	3.0	2.22	2.12	1.89	2.12	1.67	1.49
22.0	3.0	2.83	2.83	2.58	2.41	2.22	2.22
25.0	3.1	3.02	2.95	2.89	2.89	2.64	2.41
28.0	3.0	2.89	3.02	2.95	2.89	2.41	2.12
31.0	2.7	3.02	3.09	2.95	3.02	2.52	
34.0	2.6	3.23	3.31	3.23	3.09	2.64	
37.0	2.6	3.09	3.23	3.09	2.70	2.58	
40.0	2.9	2.77	2.89	2.70	1.67	1.24	1.19
43.0	3.0	2.70	2.83	2.58	2.31	1.98	1.89
46.0	2.8	2.26	2.31	2.22	1.45	0.74	0.94
49.0	2.8	1.59	1.59	1.63	1.12	0.51	0.51
52.0	2.6	1.30	1.30	1.24	0.90	0.66	
55.0	2.1	0.39	0.57	1.04	1.07	0.24	
58.0	0.6	----	----	----	----	----	----
63.0	0.0	----	----	----	----	----	----

TABLE 10E.--DISTRIBUTION OF VELOCITY IN SECTION 3 OF REACH USED IN TEST 6

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
6.0	2.7	0.52	0.52	0.40	0.44	0.49	
9.0	2.8	0.80	0.92	1.12	1.40	1.40	1.34
12.0	3.0	1.37	1.75	1.82	1.68	1.53	1.40
15.0	3.0	1.56	2.03	1.98	1.82	1.53	1.53
18.0	2.9	1.68	2.32	2.18	2.18	1.40	1.64
21.0	2.9	1.79	2.53	2.58	2.23	1.98	1.82
24.0	3.0	2.42	2.65	2.58	2.18	2.23	1.98
27.0	2.9	2.58	3.02	2.96	2.71	2.18	2.12
30.0	3.0	2.77	3.09	3.16	2.13	2.71	2.37
33.0	3.0	2.77	3.16	3.16	2.89	2.58	2.65
36.0	3.3	2.71	3.09	3.02	2.71	2.47	1.98
39.0	3.3	2.18	2.77	2.77	2.65	2.53	2.23
42.0	3.4	2.08	2.47	2.53	2.23	2.23	1.37
45.0	3.3	0.56	0.67	1.46	1.34	1.49	1.53
50.0	2.3				0.70		
57.0	0.0	----	----	----	----	----	----

TABLE 10F.--DISTRIBUTION OF VELOCITY IN SECTION 4 OF REACH USED IN TEST 6

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
4.0	2.2	----	----	----	----	----	----
6.0	2.8	0.20	0.28	0.35	0.36	0.42	0.34
8.0	3.0	0.25	0.38	0.44	0.30	0.25	0.10
10.0	3.7	0.21	0.34	0.29	0.30	0.24	0.19
12.0	3.8	0.48	0.42	0.26	0.36	0.20	0.20
14.0	3.7	0.55	0.45	0.63	0.62	0.71	0.74
16.0	3.6	1.09	0.89	0.89	1.00	1.15	0.98
18.0	3.6	1.59	1.48	1.84	1.70	1.66	1.70
20.0	3.7	2.21	2.10	2.45	2.45	2.01	1.62
22.0	3.7	2.93	3.00	3.14	2.87	2.34	2.01
24.0	3.5	3.21	3.30	3.21	2.93	2.62	2.10
26.0	3.5	3.39	3.30	3.30	3.00	1.74	1.59
28.0	3.3	3.51	3.82	3.82	3.74	3.21	2.56
30.0	3.2	3.74	3.90	3.82	3.52	2.89	2.60
32.0	3.0	3.66	3.66	3.14	2.57	2.28	1.78
34.0	2.9	3.38	3.38	3.07	3.00	2.70	2.35
36.0	2.8	3.45	3.59	3.59	3.32	2.76	1.97
38.0	2.8	3.90	3.90	3.90	3.59	2.76	1.97
40.0	2.6	2.99	3.45	3.30	3.30	2.63	2.22
42.0	2.6	2.63	2.63	2.17	2.55	2.02	1.65
44.0	2.4	1.91	2.35	2.51	2.35	1.71	1.34
46.0	2.2	1.36	1.59	1.62	1.71	1.42	1.27
48.0	2.1	1.12	1.26	1.33	1.30	0.87	0.38
50.0	1.7	1.09	1.14	1.12	1.12	1.00	0.76
52.0	1.5	0.64	0.66	0.67	0.66	0.38	0.23
54.0	1.3	0.57	0.52	0.50	0.52	0.41	0.12
58.0	0.0	----	----	----	----	----	----

TABLE 10G.--DISTRIBUTION OF VELOCITY IN SECTION 5 OF REACH USED IN TEST 6

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	1.6	0.28	0.36	0.33	0.26	0.27	
5.0	2.6	0.56	0.46	0.52	0.35	0.30	0.29
8.0	3.1	0.71	0.64	0.58	0.62	0.41	0.21
11.0	3.3	0.88	0.84	0.87	0.72	0.66	0.53
14.0	3.6	1.26	1.22	1.20	1.09	0.81	0.56
17.0	3.5	1.59	1.52	1.48	1.42	1.12	1.02
20.0	3.4	1.63	1.63	1.59	1.52	1.15	1.09
23.0	3.2	1.74	1.81	1.81	1.74	1.37	1.17
26.0	3.0	1.89	2.02	2.02	1.85	1.78	1.59
29.0	2.8	2.11	2.17	2.31	2.22	1.93	1.63
32.0	2.7	2.26	2.35	2.31	2.22	2.06	1.63
33.0	2.8	2.50	2.50	2.56	2.50	2.27	2.01
36.0	2.6	2.75	2.82	2.87	2.68	2.45	1.96
39.0	2.7	2.87	3.07	2.93	2.68	2.56	1.92
42.0	2.7	2.87	3.00	2.96	2.62	2.34	2.05
45.0	2.7	2.87	3.14	2.75	2.56	2.27	1.84
48.0	2.7	3.00	3.14	2.93	2.82	2.39	1.92
51.0	2.7	2.68	2.75	2.68	2.34	2.27	1.88
54.0	2.8	1.88	2.27	2.10	1.88	1.15	1.17
57.0	2.9	1.30	1.24	1.02	0.81	0.55	0.51
60.0	2.1	0.74	0.60	0.52	0.40	0.20	----
63.0	1.0	0.50	0.44	0.38	0.34	0.18	
65.0	0.0	----	----	----	----	----	----

TABLE 10H.--DISTRIBUTION OF VELOCITY IN SECTION 6 OF REACH USED IN TEST 6

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
1.0	0.4	----	----	----	----	----	----
4.0	1.6	----	----	----	----	----	----
7.0	2.1	0.24	0.24	0.19	0.14	0.19	0.17
10.0	2.2	0.40	0.57	0.32	0.34	0.22	0.22
13.0	2.1	0.67	0.71	0.77	0.61	0.53	0.37
16.0	3.1	0.81	0.49	0.62	0.38	0.40	0.33
19.0	3.6	0.97	1.12	1.14	1.04	1.20	0.74
22.0	4.0	2.16	2.11	1.97	2.16	3.38	0.55
25.0	4.0	2.62	2.62	2.56	2.10	1.51	1.27
28.0	3.7	2.87	2.93	2.45	2.05	1.92	1.88
31.0	3.7	3.14	3.00	2.82	2.45	2.15	1.96
34.0	3.9	3.39	3.44	3.39	2.93	2.50	2.34
37.0	4.0	3.30	3.30	3.07	2.75	2.15	2.01
40.0	4.0	2.93	2.93	2.93	2.50	1.81	1.51
43.0	4.0	2.68	2.68	2.62	2.27	1.74	1.59
46.0	3.8	2.27	2.21	1.96	1.59	1.30	1.24
49.0	4.0	1.66	1.48	1.42	1.55	1.36	1.42
52.0	3.9	0.67	0.74	0.70	0.71	0.76	0.58
53.0	3.8	0.45	0.50	0.54	0.51	0.24	0.37
56.0	3.2	0.22	0.18	0.18	0.14	0.12	0.14
59.0	2.8	0.10	0.10	0.18	0.15	0.06	0.05
62.0	2.0				0.02		
70.0	0.0	----	----	----	----	----	----

TABLE 11A.--TIME-CONCENTRATION DATA FOR TEST 7, CONCENTRATION OF GOLD-198 IN MICROCURIES PER CUBIC FOOT

(T, 24-HOUR TIME. C, CONCENTRATION. BLANK INDICATES NO DATA.
PERIOD OF INJECTION IS 1017.0 TO 1018.0 EST)

SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		SECTION 6	
T	C	T	C	T	C	T	C	T	C	T	C
1025.5	0.0	1037.0	0.0	1052.0	0.0	1107.0	0.0	1128.0	0.0	1147.0	0.0
1026.0	0.78	1038.0	0.50	1053.0	0.51	1108.0	0.11	1130.0	0.24	1150.0	0.06
1026.5	5.27	1039.0	2.42	1054.0	2.06	1110.0	1.20	1132.0	0.94	1153.0	0.49
1027.0	7.70	1040.0	4.13	1055.0	4.28	1112.0	2.50	1134.0	1.46	1156.0	1.10
1027.5	6.74	1040.5	4.46	1056.0	4.66	1112.5	2.60	1135.0	1.47	1158.0	1.21
1028.0	4.07	1041.0	4.26	1057.0	4.17	1113.0	2.54	1136.0	1.44	1200.0	1.10
1029.0	1.83	1042.0	3.45	1058.0	3.45	1115.0	1.78	1138.0	1.12	1203.0	0.82
1030.0	0.89	1044.0	1.96	1100.0	2.08	1117.0	1.19	1140.0	0.82	1206.0	0.66
1032.0	0.32	1048.0	0.69	1104.0	0.88	1121.0	0.61	1145.0	0.46	1212.0	0.45
1034.0	0.17	1052.0	0.26	1108.0	0.36	1125.0	0.37	1150.0	0.31	1220.0	0.32
1036.0	0.10	1058.0	0.12	1114.0	0.20	1130.0	0.23	1200.0	0.18	1230.0	0.22
1038.0	0.05	1104.0	0.08	1120.0	0.10	1135.0	0.15	1210.0	0.10	1240.0	0.15
1043.0	0.03	1110.0	0.06	1130.0	0.05	1145.0	0.08	1220.0	0.05	1300.0	0.07
1048.0	0.01	1120.0	0.02	1140.0	0.02	1200.0	0.04	1230.0	0.02	1320.0	0.04
1053.0	0.0	1140.0	0.0	1200.0	0.0	1220.0	0.0	1250.0	0.0	1340.0	0.0

TABLE 11B.--CHANNEL GEOMETRY, FLOW DATA, AND STATISTICAL PARAMETERS FOR TEST 7

(M = 3.770C)
(BLANK INDICATES NO DATA)

SECTION----------	1	2	3	4	5	6
			FEB. 8, 1960			
x -------- ft --	2,260	5,170	8,170	11,800	15,300	19,300
Width ---- " --	204	210	185	195	204	171
d -------- " --	6.13	5.24	6.43	7.64	7.25	9.24
R -------- " --	6.01	5.19	6.38	7.48	7.15	9.10
Fall ----- " --	2.10	3.22	4.27	5.05	6.41	7.38
Temp ----- ^{o}F --	41	43	41	41	42	41
$S^{1/2}$ ----------	.030	.025	.023	.021	.020	.020
Q ------- cfs --	3,700	3,740	3,690	3,890	3,680	3,600
V ------- fps --	2.96	3.40	3.10	2.61	2.49	2.28
A ----- sq ft --	1,250	1,100	1,190	1,490	1,480	1,580
n ----------	.06	.05	.05	.05	.05	.05
			FEB. 9, 1960			
$\bar{t}$ ------- sec --	678	1,640	2,600	3,730	5,210	7,020
$\bar{A}$ ----- sq ft --	901	952	955	949	1,020	1,090
V_* ------ fps --	.42	.32	.33	.34	.30	.34
α_3 ----------	1.2	1.3	1.2	1.1	1.0	1.0
M^2 -------- c --	3.25	5.14	6.34	4.56	3.87	4.98
C_{max} - $\mu c/ft^3$ --	7.70	4.46	4.66	2.60	1.47	1.21
σ_x ------- ft --	180	433	529	568	766	1,010
Y -------- ft --	187	482	568	736	1,030	1,508

TABLE 11C.--DISTRIBUTION OF VELOCITY IN SECTION 1 OF REACH USED IN TEST 7

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
10.0	1.5	1.04	1.33	1.24	0.75	0.94	
19.0	2.0	1.04	1.12	0.92	0.43	----	
28.0	1.9	0.22	0.25	0.34	0.25	----	
37.0	2.2	0.87	0.69	0.54	0.37	0.33	
46.0	2.3	0.57	0.36	0.40	0.36	0.21	
55.0	5.9	0.30	0.30	0.51	0.57	0.74	0.64
64.0	6.8	2.52	2.83	2.77	2.58	1.93	1.55
73.0	6.1	3.68	3.61	3.31	2.77	2.22	1.80
82.0	7.7	4.30	4.30	4.30	4.30	3.68	3.16
91.0	7.7	4.41	4.41	3.92	3.76	3.31	2.77
100.0	7.4	4.59	4.41	4.41	4.20	3.31	2.95
109.0	8.3	4.90	4.90	4.10	4.10	3.92	3.53
118.0	9.0	4.90	4.30	3.92	3.47	3.40	3.16
127.0	6.5	5.12	5.24	4.79	3.40	2.83	1.52
136.0	7.6	5.24	5.24	5.12	4.20	3.76	3.09
145.0	8.6	4.79	4.79	5.12	4.41	4.30	3.16
154.0	9.6	3.23	3.53	4.67	4.59	4.01	3.16
163.0	10.3	2.58	2.95	3.53	3.31	3.40	2.70
172.0	9.2	2.07	2.26	3.02	2.02	2.46	1.59
181.0	8.4	1.64	1.52	1.93	1.68	1.04	0.96
190.0	6.7	1.30	1.40	1.07	0.77	0.37	0.29
199.0	4.0				0.44		
204.0	0.0	----	----	----	----	----	----

TABLE 11D.--DISTRIBUTION OF VELOCITY IN SECTION 2 OF REACH USED IN TEST 7

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
30.0	2.5						
40.0	3.5	2.02	1.67	1.93	2.02	1.93	1.40
49.0	4.3	2.17	2.07	2.17	1.93	2.46	2.10
58.0	5.8	3.31	3.31	3.61	3.40	3.31	2.64
67.0	6.4	3.84	4.01	4.01	3.92	3.40	2.41
76.0	7.3	4.41	4.41	4.30	3.84	3.23	2.22
85.0	7.2	4.41	4.01	4.41	3.92	3.23	2.41
94.0	6.8	4.41	4.59	4.41	3.31	3.09	3.16
103.0	6.3	4.59	4.59	4.50	3.92	3.40	2.95
114.0	6.1	4.69	4.69	4.79	4.50	4.41	3.40
125.0	6.9	4.69	4.50	4.41	4.10	3.61	3.02
134.0	7.0	4.50	4.79	4.59	4.41	3.61	2.64
143.0	7.1	4.90	4.90	4.69	4.50	4.20	3.61
152.0	7.3	4.79	4.90	4.50	4.41	3.68	3.31
161.0	6.6	4.50	4.69	4.20	4.41	3.61	3.16
170.0	6.4	3.68	4.20	4.20	4.41	3.84	3.10
179.0	6.7	3.16	3.47	3.76	3.76	3.31	3.16
188.0	5.8	1.40	1.42	1.86	1.36	2.07	1.89
200.0	3.9	0.40	0.63	1.02	1.19	1.09	0.18
210.0	0.0	----	----	----	----	----	----

TABLE 11E.--DISTRIBUTION OF VELOCITY IN SECTION 3 OF REACH USED IN TEST 7

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
20.0	2.5	----	----	----	----	----	----
35.0	6.9	0.92	1.04	1.30	1.55	1.55	1.04
44.0	7.1	2.22	2.58	2.77	2.77	2.77	2.22
53.0	7.8	3.16	3.31	3.31	3.09	2.77	2.36
62.0	8.0	3.40	3.47	3.53	3.31	2.95	2.58
71.0	8.1	3.68	3.84	3.61	3.53	2.95	2.64
80.0	7.7	3.84	3.92	3.84	3.84	3.31	2.95
89.0	7.8	3.92	4.01	4.01	3.92	3.40	2.77
98.0	8.1	4.10	4.10	3.76	3.84	3.68	3.02
107.0	8.8	4.20	4.30	3.92	3.84	3.31	2.89
116.0	9.0	4.41	4.30	4.41	4.01	3.92	3.16
125.0	9.1	4.41	4.41	4.41	3.84	3.68	2.70
134.0	9.1	4.01	4.20	4.50	4.10	3.53	2.89
143.0	7.9	3.47	3.68	4.01	3.84	3.31	2.83
152.0	6.7	3.02	3.31	3.40	3.40	3.16	2.89
161.0	7.2	1.98	1.89	2.07	2.22	2.36	2.17
170.0	5.0	1.36	1.12	1.36	1.09	1.17	1.04
179.0	1.3	0.41	0.57	0.71	0.62		
185.0	0.0	----	----	----	----	----	----

TABLE 11F.--DISTRIBUTION OF VELOCITY IN SECTION 4 OF REACH USED IN TEST 7

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
20.0	8.7	0.56	0.75	0.94	0.90	0.62	0.50
30.0	9.3	1.55	1.98	1.93	1.65	1.36	1.02
40.0	8.6	2.41	2.52	2.17	1.85	1.59	1.59
50.0	9.0	3.08	3.01	2.76	2.57	2.07	1.67
59.0	8.8	3.31	3.23	3.08	2.76	2.31	1.45
68.0	9.4	3.53	3.46	3.39	2.95	2.95	2.64
77.0	8.9	3.53	3.31	3.46	2.76	2.70	2.41
85.0	9.5	3.83	3.75	3.67	3.33	2.95	2.64
93.0	9.5	3.60	3.75	3.53	3.31	2.76	2.76
101.0	8.5	3.60	3.83	3.60	3.31	2.76	2.46
109.0	7.7	3.75	3.83	3.67	3.53	2.95	2.70
117.0	8.5	3.83	3.83	3.60	3.27	2.88	2.82
125.0	7.8	3.67	3.67	3.67	3.23	2.82	2.52
133.0	8.2	3.75	3.75	3.46	3.53	3.08	2.76
141.0	7.3	3.67	3.67	3.39	3.46	3.08	2.82
149.0	7.8	3.31	3.46	3.46	3.46	2.88	3.08
157.0	8.2	2.95	3.08	3.08	2.95	2.88	1.75
165.0	7.8	2.07	2.46	2.64	2.36	2.07	1.93
173.0	8.1	1.49	1.49	1.98	2.02	1.78	1.45
195.0	0.0	----	----	----	----	----	----

TABLE 11G.--DISTRIBUTION OF VELOCITY IN SECTION 5 OF REACH USED IN TEST 7

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED					
		0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
18.0	7.9	0.75	1.04	1.31	1.59	1.24	1.14
26.0	8.2	2.07	2.17	2.31	2.22	1.67	1.55
38.0	9.0	2.95	3.01	3.23	2.70	2.07	1.71
46.0	8.9	3.15	3.46	3.31	3.23	2.64	2.31
54.0	8.6	3.60	3.53	3.60	3.39	2.95	2.70
62.0	8.3	3.01	3.60	3.53	2.76	2.07	1.98
70.0	8.5	3.15	3.15	3.31	3.23	3.01	2.46
78.0	8.8	3.08	3.08	2.95	3.01	2.41	2.07
86.0	8.3	3.31	3.31	3.15	2.52	2.70	2.88
94.0	8.8	3.46	3.60	3.39	3.23	2.95	2.76
102.0	8.5	3.67	3.67	3.46	3.31	3.08	2.76
110.0	8.3	3.75	3.83	3.31	3.46	3.15	2.70
118.0	8.1	3.92	3.83	3.67	3.31	3.31	2.36
126.0	8.0	3.67	3.67	3.67	3.53	3.08	2.70
134.0	8.0	3.46	3.39	3.46	3.31	2.70	2.46
142.0	8.0	3.01	3.01	3.15	2.95	2.46	2.36
150.0	8.0	2.46	2.52	2.70	2.64	2.46	2.17
158.0	7.9	1.89	2.07	2.36	2.26	1.98	1.78
166.0	7.7	1.12	1.22	1.36	1.30	1.24	1.07
174.0	7.4	0.68	0.57	0.84	0.75	0.72	0.81
204.0	0.0	----	----	----	----	----	----

TABLE 11H.--DISTRIBUTION OF VELOCITY IN SECTION 6 OF REACH USED IN TEST 7

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED					
		0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
20.0	8.4	1.27	1.24	1.40	1.36	1.12	0.77
27.0	9.3	1.67	1.78	2.02	1.89	1.63	1.24
34.0	9.9	2.12	2.36	2.31	2.02	1.82	1.59
41.0	11.2	2.52	2.64	2.70	2.64	2.26	2.12
48.0	12.0	2.95	2.95	2.95	2.70	1.93	1.71
55.0	11.8	3.23	3.31	3.23	3.31	2.82	2.41
62.0	11.3	3.46	3.53	3.46	3.31	2.64	2.57
69.0	10.5	3.53	3.46	3.46	3.15	2.76	2.64
76.0	11.3	3.31	3.53	3.01	3.15	2.76	2.07
83.0	11.1	3.15	3.23	2.88	2.95	3.01	2.41
90.0	11.9	3.08	2.88	2.70	2.82	2.70	2.52
97.0	12.2	2.88	2.88	2.95	2.70	2.36	2.22
104.0	11.9	2.76	2.64	2.64	2.57	2.22	2.07
111.0	11.6	2.52	2.52	2.52	2.46	2.22	2.12
118.0	10.7	2.36	2.36	2.46	2.36	2.22	1.89
125.0	10.3	2.17	2.12	2.22	2.22	2.12	1.82
132.0	9.3	1.89	1.98	2.07	2.02	1.89	1.75
139.0	8.7	1.71	1.82	1.67	1.78	1.67	1.49
146.0	8.3	1.40	1.52	1.49	1.55	1.36	1.19
153.0	7.6	1.12	1.40	1.24	1.12	1.08	1.00
160.0	6.9	1.17	1.00	1.07	0.81	0.74	0.82
171.0	0.0	----	----	----	----	----	----

TABLE 12A.--TIME-CONCENTRATION DATA FOR TEST 8, CONCENTRATION OF GOLD-198 IN MICROCURIES PER CUBIC FOOT

(T, 24-HOUR TIME. C, CONCENTRATION. BLANK INDICATES NO DATA. PERIOD OF INJECTION IS 1101.0 TO 1102.0 PDT)

SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		SECTION 6	
T	C	T	C	T	C	T	C	T	C	T	C
1107.3	0.0	1119.9	0.0	1140.0	0.0	1159.5	0.0			1300.0	0.0
1107.5	0.40	1120.5	1.48	1141.0	0.32	1201.0	0.61			1303.0	0.07
1107.7	1.15	1121.0	4.79	1142.0	2.10	1202.0	1.46			1306.0	0.37
1107.9	14.50	1121.5	9.73	1143.0	4.96	1203.0	3.34			1309.0	1.58
1108.1	24.46	1122.0	14.06	1144.0	8.64	1204.0	5.32			1311.0	2.04
1108.2	24.84	1122.2	14.78	1144.4	9.20	1204.5	5.80			1313.0	1.86
1108.3	24.78	1122.5	14.29	1144.8	9.02	1205.0	5.68			1316.0	1.22
1108.5	23.60	1123.0	11.36	1145.2	8.50	1206.0	4.66			1319.0	0.82
1108.7	16.26	1123.5	6.20	1146.0	5.94	1207.0	3.32			1323.0	0.47
1108.9	8.70	1124.0	3.45	1147.0	3.42	1208.0	2.04			1327.0	0.27
1109.8	5.60	1124.5	1.68	1148.0	1.81	1210.0	0.85			1331.0	0.14
1109.3	3.76	1125.0	0.76	1149.0	0.83	1212.0	0.54			1335.0	0.08
1109.5	2.46	1126.0	0.22	1151.0	0.24	1214.0	0.33			1339.0	0.05
1109.9	0.64	1127.0	0.07	1153.0	0.08	1218.0	0.14			1343.0	0.02
1110.3	0.0			1155.0	0.0	1222.0	0.0			1347.0	0.0

TABLE 12B.--CHANNEL GEOMETRY, FLOW DATA, AND STATISTICAL PARAMETERS FOR TEST 8

(M = 1.58 C)
(BLANK INDICATES NO DATA)

SECTION----------	1	2	3	4	5	6
			MAY 10, 1960			
x -------- ft --	1,000	3,000	6,000	9,000	13,000	18,000
Width ---- " --	80	78	80	82	89	72
d -------- " --	5.18	5.26	4.74	5.06	5.06	5.42
R -------- " --	4.88	5.02	4.55	4.87	4.85	5.10
Fall ----- " --	.12	.37	.76	.97		2.01
Temp ----- ^{o}F --						
$S^{1/2}$ ----------						
Q ------- cfs --	911	897	885	900	901	903
V ------- fps --	2.20	2.19	2.33	2.17	2.00	2.32
A ----- sq ft --	414	410	379	415	450	390
n ----------	.02	.02	.02	.02		.02
			MAY 11, 1960			
$\bar{t}$ ------- sec --	447	1,290	2,640	3,900		8,040
$\bar{A}$ ----- sq ft --	402	386	396	390		402
V_* ------ fps --	.14	.14	.13	.12		.14
α_3 ----------	1.3	.9	.9	1.3		1.2
M^3 -------- c --	1.39	1.87	2.07	1.73		1.33
C_{max} - $\mu c/ft^3$ --	24.84	14.78	9.20	5.80		2.04
σ_x ------- ft --	72	144	224	331		640
Y -------- ft --	55	131	227	305		646

TABLE 12C.--DISTRIBUTION OF VELOCITY IN SECTION 1 OF REACH USED IN TEST 8

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	4.1	1.48	1.59	1.59	1.67	1.55	1.36
6.0	5.2	1.85	2.01	2.11	1.93	1.67	1.73
10.0	5.4	2.40	2.51	2.45	2.30	2.16	1.97
14.0	5.3	2.63	2.63	2.63	2.45	2.16	2.01
18.0	5.2	2.75	2.69	2.51	2.45	2.16	1.93
22.0	5.3	2.69	2.69	2.45	2.16	2.16	1.89
26.0	5.4	2.75	2.75	2.56	2.40	2.21	1.93
30.0	5.6	2.63	2.63	2.35	2.30	2.06	1.74
34.0	5.5	2.63	2.63	2.56	2.16	2.01	2.01
38.0	5.7	2.63	2.40	2.40	2.16	2.01	1.77
42.0	5.7	2.63	2.63	2.30	2.35	1.97	1.85
46.0	5.7	2.63	2.40	2.51	2.16	1.85	1.81
50.0	5.7	2.69	2.63	2.40	2.11	1.81	1.67
54.0	5.7	2.56	2.63	2.51	2.45	1.97	1.97
58.0	5.5	2.75	2.63	2.56	2.40	2.16	1.93
62.0	5.8	2.63	2.63	2.63	2.21	1.89	1.78
66.0	5.5	2.35	2.40	2.40	2.16	1.97	1.81
70.0	5.1	2.21	2.25	2.30	2.16	2.06	1.71
74.0	4.0	1.93	1.93	1.89	1.77	1.52	1.36
78.0	3.1	1.48	1.71	1.59	1.45	1.30	1.30
80.0	0.0	----	----	----	----	----	----

TABLE 12D.--DISTRIBUTION OF VELOCITY IN SECTION 2 OF REACH USED IN TEST 8

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	3.4	1.59	1.77	1.81	1.67	1.36	
4.0	4.5	1.77	1.97	2.21	1.89	1.77	1.63
8.0	5.4	2.25	2.30	2.51	2.21	2.06	1.93
12.0	5.5	2.51	2.56	2.56	2.35	1.85	1.77
16.0	5.4	2.69	2.63	2.51	2.45	2.06	1.89
20.0	5.6	2.75	2.75	2.63	2.35	2.11	1.85
24.0	5.8	2.75	2.69	2.63	2.40	2.01	1.63
28.0	6.1	2.63	2.63	2.35	2.30	1.85	1.12
32.0	5.7	2.69	2.56	2.45	2.30	2.01	1.85
36.0	5.5	2.63	2.63	2.45	2.21	1.97	1.97
40.0	5.6	2.56	2.45	2.51	2.26	2.01	1.97
44.0	5.5	2.56	2.45	2.51	2.11	1.89	1.74
48.0	5.5	2.40	2.56	2.30	2.06	1.97	1.89
52.0	5.9	2.51	2.56	2.35	2.30	1.89	1.74
56.0	5.6	2.63	2.69	2.51	2.21	2.11	1.97
60.0	5.7	2.56	2.45	2.51	2.21	2.01	1.77
64.0	5.5	2.56	2.51	2.30	2.35	2.01	1.89
68.0	5.6	2.56	2.51	2.56	2.45	1.97	1.81
72.0	4.8	1.93	2.21	2.11	1.85	1.77	1.67
76.0	2.7	1.21	1.48	1.59	1.45	1.36	1.21
78.0	0.0	----	----	----	----	----	----

TABLE 12E.--DISTRIBUTION OF VELOCITY IN SECTION 3 OF REACH USED IN TEST 8

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	2.9	1.36	1.55	1.67	1.74	1.59	1.29
6.0	4.1	1.89	2.11	2.31	2.21	1.97	1.74
10.0	4.9	2.31	2.70	2.63	2.63	2.31	2.21
14.0	4.5	2.88	2.95	2.95	2.88	2.63	2.46
18.0	4.9	2.95	2.95	2.82	2.77	2.31	2.16
22.0	5.2	2.70	2.82	2.57	2.46	1.81	1.77
26.0	5.4	2.57	2.70	2.82	2.46	2.26	2.01
30.0	5.4	2.77	2.77	2.46	2.70	2.21	2.01
34.0	5.2	2.77	2.57	2.57	2.41	2.01	1.81
38.0	5.2	2.70	2.41	2.63	2.36	2.16	1.89
42.0	5.2	2.63	2.51	2.41	2.51	1.93	1.81
46.0	5.2	2.63	2.46	2.51	2.51	2.21	1.77
50.0	5.1	2.82	2.65	2.77	2.77	2.36	1.93
54.0	5.5	2.77	2.41	2.46	2.11	2.01	1.77
58.0	5.4	2.71	2.77	2.63	2.31	2.01	1.85
62.0	5.2	2.77	2.77	2.65	2.41	2.11	2.06
66.0	5.1	2.51	2.77	2.77	2.41	2.41	2.11
70.0	5.0	2.51	2.63	2.63	2.51	2.21	1.93
74.0	4.0	1.93	1.89	2.16	2.01	1.77	1.39
78.0	2.9	1.48	1.48	1.67	1.29	1.04	0.99
80.0	0.0	----	----	----	----	----	----

TABLE 12F.--DISTRIBUTION OF VELOCITY IN SECTION 4 OF REACH USED IN TEST 8

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	2.2	1.11	1.04	0.99	1.07	0.97	0.93
6.0	4.8	1.51	1.62	1.89	1.71	1.62	1.42
10.0	5.6	2.21	2.31	2.31	1.85	1.77	1.74
14.0	5.7	2.63	2.63	2.63	2.41	2.11	1.67
18.0	5.7	2.63	2.63	2.57	2.51	2.21	1.85
22.0	5.5	2.77	2.57	2.21	2.41	2.11	1.77
26.0	5.6	2.71	2.77	2.65	2.41	1.93	1.85
30.0	5.4	2.77	2.63	2.63	2.21	2.01	1.85
34.0	5.7	2.63	2.70	2.41	2.41	1.89	1.77
38.0	5.7	2.46	2.41	2.36	2.21	1.85	1.85
42.0	5.6	2.63	2.51	2.41	2.41	1.89	1.97
46.0	5.6	2.65	2.46	2.51	2.46	2.21	1.97
50.0	5.5	2.57	2.51	2.36	2.36	1.89	1.48
54.0	5.6	2.63	2.57	2.51	2.41	2.11	1.59
58.0	5.6	2.46	2.51	2.46	2.21	2.16	2.01
62.0	5.3	2.77	2.51	2.57	2.31	2.16	2.01
66.0	5.4	2.57	2.46	2.51	2.21	2.21	1.93
70.0	5.6	2.11	2.21	2.36	2.36	2.21	2.01
74.0	4.8	1.51	1.59	1.85	1.77	1.67	1.51
78.0	3.5		1.24			1.36	
82.0	0.0	----	----	----	----	----	----

TABLE 12G.--DISTRIBUTION OF VELOCITY IN SECTION 5 OF REACH USED IN TEST 8

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
3.0	3.8		1.29	1.21	0.83	0.15	
5.0	4.7	1.42	1.55	1.67	1.32	1.04	0.64
9.0	5.8	1.97	2.01	1.97	1.81	1.51	1.48
13.0	5.7	2.21	2.21	2.06	2.06	1.77	1.71
17.0	5.4	2.31	2.41	2.26	2.21	1.81	1.74
21.0	5.4	2.41	2.31	2.26	2.11	1.85	1.97
25.0	5.2	2.46	2.26	2.16	2.06	2.01	1.77
29.0	5.7	2.41	2.41	2.26	2.16	1.93	1.74
33.0	5.6	2.46	2.35	2.35	2.16	1.74	1.62
37.0	5.5	2.46	2.31	2.31	2.16	1.89	1.55
41.0	5.4	2.41	2.41	1.93	1.89	1.67	1.59
43.0	5.2	2.46	2.51	2.16	2.11	1.74	1.62
47.0	5.2	2.41	2.41	2.26	2.01	2.06	1.74
51.0	5.2	2.46	2.41	2.16	2.21	1.71	1.62
55.0	5.4	2.57	2.51	2.26	1.93	1.89	1.81
59.0	5.4	2.57	2.57	2.41	2.21	1.81	1.62
63.0	5.3	2.57	2.57	2.35	2.35	2.06	1.89
67.0	5.4	2.51	2.63	2.51	2.46	1.97	1.68
71.0	5.2	2.06	2.57	2.46	2.41	2.41	2.16
75.0	5.4	2.26	2.35	2.31	2.21	1.81	1.55
79.0	5.0	1.93	2.01	1.97	1.93	1.59	1.36
83.0	4.7	1.48	1.48	1.74	1.45	1.42	1.19
87.0	3.0	0.55	0.55	0.56	0.34	0.28	
89.0	0.0	----	----	----	----	----	----

TABLE 12H.--DISTRIBUTION OF VELOCITY IN SECTION 6 OF REACH USED IN TEST 8

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	3.6		1.71	2.11	1.59	1.59	
6.0	5.2	2.26	2.35	2.11	2.11	1.89	1.71
10.0	5.7	2.57	2.51	2.46	2.46	2.11	1.89
14.0	5.8	2.70	2.76	2.70	2.63	2.41	2.11
18.0	5.8	2.70	2.57	2.63	2.26	1.93	2.01
22.0	5.8	2.76	2.63	2.63	2.46	2.06	2.11
26.0	6.0	2.76	2.70	2.63	2.35	2.41	1.85
30.0	6.2	2.63	2.57	2.57	2.51	2.16	1.74
34.0	6.2	2.76	2.70	2.46	2.41	1.97	1.81
38.0	6.0	2.70	2.76	2.70	2.46	2.16	1.74
42.0	6.0	2.57	2.70	2.26	2.31	2.16	2.11
46.0	6.2	2.46	2.51	2.70	2.26	2.31	1.77
50.0	6.0	2.57	2.57	2.57	2.46	2.26	1.64
54.0	5.9	2.41	2.31	2.35	2.31	1.93	1.74
58.0	5.7	2.51	2.70	2.63	2.33	2.35	1.97
62.0	5.5	2.31	2.63	2.35	2.16	2.11	1.77
66.0	4.5	2.01	2.01	2.06	2.11	2.11	1.45
70.0	3.0		1.64	1.74	1.74	1.51	
72.0	0.0	----	----	----	----	----	----

TABLE 13A.--TIME-CONCENTRATION DATA FOR TEST 9, CONCENTRATION OF GOLD-198 IN MICROCURIES PER CUBIC FOOT

(T, 24-HOUR TIME. C, CONCENTRATION. BLANK INDICATES NO DATA.
PERIOD OF INJECTION IS 906.0 TO 907.0 PDT)

SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		SECTION 6	
T	C	T	C	T	C	T	C	T	C	T	C
0911.3	0.0	0924.2	0.0	0959.0	0.0	1031.0	0.0	1105.0	0.0	1603.0	0.0
0911.6	2.90	0924.6	0.27	1001.0	0.02	1033.0	0.05	1107.0	0.04	1610.0	0.06
0911.9	10.05	0925.0	1.10	1003.0	0.04	1035.0	0.46	1109.0	0.17	1617.0	0.21
0912.2	16.50	0925.5	3.25	1005.0	0.10	1037.0	1.59	1111.0	0.57	1624.0	0.41
0912.5	20.83	0926.0	7.10	1007.0	1.00	1039.0	2.37	1113.0	1.03	1631.0	0.50
0912.8	19.96	0926.5	8.06	1009.0	3.52	1041.0	2.00	1115.0	1.25	1633.5	0.52
0913.0	15.71	0927.0	7.52	1009.5	3.86	1043.0	1.29	1117.0	1.15	1636.0	0.50
0913.5	6.14	0927.5	4.80	1010.0	3.80	1045.0	0.85	1119.0	0.92	1643.0	0.42
0914.0	2.68	0928.0	2.91	1012.0	2.34	1047.0	0.55	1121.0	0.71	1650.0	0.32
0914.5	1.49	0929.0	0.95	1014.0	1.10	1049.0	0.39	1123.0	0.55	1657.0	0.22
0915.0	0.97	0930.0	0.25	1018.0	0.42	1051.0	0.27	1125.0	0.43	1704.0	0.13
0916.0	0.41	0932.0	0.08	1022.0	0.18	1055.0	0.13	1129.0	0.26	1711.0	0.08
0917.0	0.16	0934.0	0.05	1026.0	0.10	1059.0	0.07	1135.0	0.11	1718.0	0.04
0918.0	0.07	0938.0	0.02	1030.0	0.04	1103.0	0.03	1141.0	0.05	1725.0	0.02
0919.0	0.0	0942.0	0.0	1034.0	0.0	1110.0	0.0	1147.0	0.0	1735.0	0.0

TABLE 13B.--CHANNEL GEOMETRY, FLOW DATA, AND STATISTICAL PARAMETERS FOR TEST 9

(M = 1.21 C)
(BLANK INDICATES NO DATA)

SECTION----------	1	2	3	4	5	6
			MAY 12, 1960			
$\bar{t}$ ------- sec --	411	1,260	3,940	5,760	7,980	27,200
$\bar{A}$ ----- sq ft --	391	399	417	420	420	406
V_* ------ fps --	.14	.14	.13	.14	.14	
α_3 ----------	.9	.7	1.2	1.2	1.2	.6
M -------- c --	1.83	1.13	1.39	1.19	.931	1.11
C_{max} - $\mu c/ft^3$ --	20.83	8.06	3.86	2.37	1.25	.52
σ_x ------- ft --	119	138	340	474	728	2,210
Y -------- ft --	89	140	344	477	708	2,090

TABLES 13C THROUGH H ARE THE SAME AS TABLES 12C THROUGH H.

TABLE 14A.--TIME-CONCENTRATION DATA FOR TEST 10, CONCENTRATION OF GOLD-198 IN MICROCURIES PER CUBIC FOOT

(T, 24-HOUR TIME. C, CONCENTRATION. BLANK INDICATES NO DATA.
PERIOD OF INJECTION IS 1029.0 TO 1030.0 EST)

SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		SECTION 6	
T	C	T	C	T	C	T	C	T	C	T	C
1037.0	0.0	1051.0	0.0	1109.0	0.0	1130.0	0.0	1143.0	0.0	1224.0	0.0
1038.0	1.02	1052.0	0.21	1110.0	0.12	1132.0	0.12	1146.0	0.17	1227.0	0.09
1038.4	5.40	1053.0	1.00	1111.0	0.38	1134.0	1.05	1148.0	0.43	1230.0	0.40
1038.8	9.70	1054.0	3.28	1112.0	1.17	1136.0	2.22	1150.0	1.35	1233.0	0.76
1039.1	11.30	1055.0	4.93	1113.0	2.40	1137.0	2.40	1152.0	1.60	1235.0	0.86
1039.4	10.80	1055.5	5.28	1114.2	3.32	1138.0	2.31	1154.0	1.43	1237.0	0.82
1039.8	8.42	1056.0	5.11	1115.0	3.20	1140.0	1.60	1156.0	1.11	1240.0	0.69
1040.2	6.10	1057.0	3.83	1116.0	2.76	1142.0	1.15	1159.0	0.78	1245.0	0.50
1040.6	4.35	1058.0	2.48	1118.0	1.76	1146.0	0.68	1204.0	0.50	1250.0	0.38
1041.0	2.76	1100.0	1.29	1120.0	1.04	1150.0	0.42	1209.0	0.38	1300.0	0.27
1042.0	1.35	1102.0	0.73	1123.0	0.65	1154.0	0.29	1219.0	0.24	1315.0	0.18
1043.0	0.90	1104.0	0.47	1126.0	0.43	1159.0	0.21	1229.0	0.15	1330.0	0.12
1045.0	0.50	1106.0	0.34	1130.0	0.27	1209.0	0.12	1244.0	0.07	1350.0	0.07
1048.0	0.25	1110.0	0.19	1140.0	0.11	1229.0	0.05	1259.0	0.04	1415.0	0.03
1051.0	0.10	1115.0	0.09	1155.0	0.05	1250.0	0.0	1325.0	0.0	1445.0	0.0
1055.0	0.0	1120.0	0.0	1215.0	0.0						

TABLE 14B.--CHANNEL GEOMETRY, FLOW DATA, AND STATISTICAL PARAMETERS FOR TEST 10

(M = 2.45 C)
(BLANK INDICATES NO DATA)

SECTION----------	1	2	3	4	5	6
			JULY 11, 1960			
x -------- ft --	2,260	5,170	8,170	11,800	15,300	19,300
Width ---- " --	200	165	160	183	175	166
d -------- " --	5.70	5.31	6.50	7.43	7.37	8.92
R -------- " --	5.56	5.25	6.41	7.21	7.21	8.74
Fall ----- " --	2.30	4.12	4.66	5.32	6.49	7.35
Temp ----- °F --	67	67	67	68	68	68
$S^{1/2}$ ----------	.032	.028	.024	.021	.021	.020
Q ------- cfs --	3,030	2,820	3,150	3,070	2,960	3,010
V ------- fps --	2.66	3.22	3.03	2.26	2.29	2.03
A ----- sq ft --	1,140	876	1,040	1,360	1,290	1,480
n ----------	.08	.08	.08	.08	.08	.08
			JULY 12, 1960			
$\bar{t}$ ------- sec --	684	1,730	3,070	4,570	5,740	8,940
$\bar{A}$ ----- sq ft --	545	602	677	698	674	833
V_* ------ fps --	.43	.36	.34	.32	.32	.34
α_3 ----------	1.2	.7	1.5	1.0	1.4	1.6
M -------- c --	3.02	3.19	3.06	3.05	2.96	2.79
C_{max} - $\mu c/ft^3$ --	11.30	5.28	3.32	2.40	1.60	.86
σ_x ------- ft --	188	330	558	544	830	1,390
Y -------- ft --	195	400	542	726	1,090	1,550

TABLE 14C.--DISTRIBUTION OF VELOCITY IN SECTION 1 OF REACH USED IN TEST 10

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
52.0	5.0	----	----	----	----	----	----
58.0	6.0	0.62	0.68	0.57	0.53	0.36	0.33
64.0	3.3	----	1.01	1.17	0.98	----	
70.0	6.8	1.79	2.14	3.13	2.55	2.09	1.41
76.0	6.4	3.06	3.57	3.57	3.50	3.13	2.81
82.0	7.0	3.73	3.98	3.98	3.89	2.97	
88.0	6.4	3.65	4.17	3.98	3.89	3.06	
94.0	6.3	4.37	4.17	3.98	3.89	3.43	
100.0	7.0	4.17	4.47	4.27	4.17	3.89	
106.0	8.8	4.27	4.37	3.89	3.98	3.73	
112.0	8.6	4.86	4.86	4.56	3.50	3.13	
118.0	7.5	4.97	4.86	4.17	2.74	1.95	
124.0	4.5	----	4.97	4.75	4.75	4.27	
130.0	7.6	4.86	4.97	4.75	4.37	3.73	
136.0	7.8	4.97	4.97	4.86	4.56	3.73	
142.0	8.3	4.37	4.65	4.86	4.47	4.27	
148.0	9.3	3.38	3.89	4.27	4.47	3.81	
154.0	9.3	3.06	3.13	3.73	3.98	3.06	
160.0	9.3	2.24	2.74	3.20	3.37	3.13	
166.0	7.7	1.79	2.04	2.67	2.74	2.44	
172.0	8.0	1.47	1.50	2.14	2.38	2.14	
178.0	7.9	1.14	1.54	1.79	1.57	1.44	
184.0	6.2		0.53	0.87	0.85	0.76	
190.0	4.6		0.36	0.18	0.39	0.24	
200.0	0.0	----	----	----	----	----	----

TABLE 14D.--DISTRIBUTION OF VELOCITY IN SECTION 2 OF REACH USED IN TEST 10

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
14.0	3.3		1.54	2.09	1.87	----	
30.0	5.0	2.74	2.99	3.06	3.13	2.74	2.44
36.0	5.4	3.29	3.38	3.50	3.43	2.92	1.65
42.0	6.0	3.73	3.81	3.81	3.81	3.38	3.02
48.0	6.7	3.81	3.89	3.98	3.57	3.20	2.99
54.0	6.4	3.98	3.89	3.20	3.57	2.81	2.38
60.0	6.2	3.89	3.98	3.65	3.38	2.80	2.09
66.0	6.0	3.98	3.89	3.57	3.65	2.81	2.74
72.0	5.9	4.07	3.98	3.81	3.50	2.99	2.44
78.0	5.7	4.07	3.89	3.81	3.20	2.92	2.63
84.0	6.0	4.07	4.17	4.17	3.38	3.20	2.09
90.0	6.3	4.17	4.17	3.98	3.57	3.20	2.44
96.0	6.4	3.98	4.17	3.98	3.73	3.13	2.38
102.0	6.6	4.17	4.07	4.27	4.07	3.20	3.07
108.0	6.5	4.17	4.27	4.07	3.89	3.57	2.99
114.0	6.0	4.17	4.27	4.27	3.89	3.57	3.20
120.0	6.5	4.27	4.37	4.27	3.89	3.31	2.74
126.0	6.3	3.89	3.98	4.07	3.89	3.38	2.92
132.0	6.3	3.57	3.65	3.81	3.50	3.06	2.80
138.0	6.4	3.20	3.20	3.50	3.38	2.86	2.24
144.0	6.3	2.55	3.06	3.20	3.20	2.67	2.55
150.0	6.1	1.34	1.65	2.19	2.67	2.44	1.95
165.0	0.0	----	----	----	----	----	----

TABLE 14E.--DISTRIBUTION OF VELOCITY IN SECTION 3 OF REACH USED IN TEST 10

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
20.0	6.5	0.53	1.07	1.86	2.32	2.23	1.98
25.0	6.8	2.23	2.42	2.47	2.47	2.29	2.14
30.0	7.0	2.84	2.67	2.85	2.85	2.59	1.82
35.0	7.2	3.10	3.10	3.18	2.85	2.65	1.94
40.0	7.4	3.29	3.25	3.43	3.25	2.59	2.23
45.0	7.2	3.70	3.43	3.18	3.18	2.65	2.29
50.0	7.5	3.49	3.34	2.78	3.18	2.59	2.02
55.0	7.5	3.43	3.29	3.29	3.10	2.65	2.27
60.0	7.2	3.56	3.43	3.49	3.25	2.85	2.02
65.0	7.0	3.18	3.34	3.25	3.43	2.85	2.47
70.0	7.3	4.23	3.95	3.63	3.36	3.25	2.47
75.0	8.0	4.23	4.04	3.95	3.95	3.25	2.42
80.0	8.2	4.14	4.23	4.14	3.49	3.43	2.78
85.0	8.2	4.14	3.87	3.95	3.78	3.25	2.65
90.0	8.3	4.14	4.23	4.23	3.56	2.47	2.17
95.0	8.5	4.34	4.23	4.34	4.14	3.63	3.34
100.0	9.0	4.34	4.34	4.44	3.87	3.25	2.71
105.0	8.5	4.27	4.27	3.95	3.87	3.34	2.27
113.0	8.2	3.95	3.95	4.04	4.04	3.43	2.85
121.0	7.0	3.56	3.78	3.78	3.63	3.78	2.47
129.0	6.3	2.96	3.03	3.34	3.10	3.18	2.65
137.0	7.1	1.86	2.17	2.42	2.53	2.12	1.86
145.0	5.5	0.55	0.61	0.90	1.08	1.40	1.00
160.0	0.0	----	----	----	----	----	----

TABLE 14F.--DISTRIBUTION OF VELOCITY IN SECTION 4 OF REACH USED IN TEST 10

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
10.0	7.6	0.57	0.55	0.92	0.85	0.51	0.19
21.0	7.6	1.19	1.10	1.40	1.30	1.19	1.07
30.0	7.4	1.60	1.49	1.43	1.34	1.37	1.07
39.0	7.9	2.02	2.07	1.71	1.56	1.40	1.10
48.0	8.3	2.58	2.47	2.47	2.12	1.56	1.37
57.0	9.2	2.77	3.10	2.65	2.31	2.12	1.68
66.0	8.8	3.02	2.96	2.96	2.58	2.24	2.02
75.0	8.1	3.53	3.40	3.25	3.10	2.52	2.02
84.0	8.9	3.40	3.46	3.25	2.89	2.71	2.36
93.0	8.2	3.33	3.53	3.25	2.96	2.83	2.07
102.0	7.9	3.61	3.68	3.53	3.02	2.89	2.47
111.0	7.6	3.46	3.46	3.40	2.96	2.71	2.52
120.0	7.5	3.53	3.61	3.17	3.17	2.65	2.41
129.0	7.8	3.40	3.53	3.46	3.10	2.83	2.65
138.0	7.8	2.83	3.10	3.10	2.96	2.47	2.31
147.0	7.4	2.26	2.36	2.58	2.65	2.36	1.85
156.0	7.2	1.64	1.68	2.07	1.98	1.68	1.56
165.0	6.8	0.96	1.12	1.28	1.05	1.13	0.94
174.0	6.5	0.15	0.48	0.57	0.73	0.42	0.45
183.0	0.0	----	----	----	----	----	----

TABLE 14G.--DISTRIBUTION OF VELOCITY IN SECTION 5 OF REACH USED IN TEST 10

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
15.0	7.5	0.71	0.72	1.09	1.17	0.90	0.62
23.0	7.4	1.12	1.33	1.67	1.71	1.67	1.49
31.0	7.2	1.67	2.23	1.75	1.22	1.00	0.82
39.0	8.7	3.10	3.18	2.96	2.85	2.32	2.17
47.0	8.5	3.18	3.03	2.85	2.85	2.53	2.12
55.0	8.2	3.25	3.10	2.85	2.78	2.65	2.02
63.0	8.3	3.03	2.78	3.03	2.85	2.62	2.47
71.0	8.5	2.85	2.85	2.65	2.53	2.17	1.63
79.0	7.5	2.90	2.85	2.71	2.59	2.47	1.94
87.0	8.2	3.25	3.25	3.25	3.03	2.71	2.29
95.0	8.1	3.25	3.18	3.18	2.96	2.23	1.86
103.0	8.1	3.34	3.34	3.34	3.34	2.29	2.29
111.0	7.8	3.43	3.10	3.10	3.10	2.71	2.29
119.0	8.0	3.43	3.43	3.43	3.03	2.59	2.07
127.0	8.2	3.18	3.03	3.18	2.96	2.47	1.90
135.0	8.1	2.65	2.71	2.65	2.65	2.17	1.71
143.0	8.0	2.02	2.29	2.37	2.37	1.98	1.52
151.0	8.0	1.46	1.86	2.07	1.98	1.71	1.71
159.0	7.8	0.71	1.00	1.27	1.44	1.12	1.19
165.0	6.4	0.58	0.75	0.77	0.86	0.84	0.58
175.0	0.0	----	----	----	----	----	----

TABLE 14H.--DISTRIBUTION OF VELOCITY IN SECTION 6 OF REACH USED IN TEST 10

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
10.0	3.2		0.62	0.64	0.68	0.78	0.78
18.0	5.2	1.00	1.07	1.12	1.00	0.54	0.40
26.0	8.0	1.52	1.25	1.37	1.28	1.05	1.02
34.0	9.9	1.60	1.60	1.65	1.82	1.78	1.25
42.0	10.7	1.78	2.26	2.36	2.47	2.18	2.07
50.0	11.7	2.07	2.47	2.58	2.58	2.58	2.02
58.0	12.0	2.96	2.83	2.83	2.58	2.65	2.02
66.0	12.0	3.02	3.02	2.77	2.41	2.41	2.18
74.0	11.7	3.02	2.89	2.71	2.71	2.65	1.94
82.0	11.5	2.65	2.89	2.71	2.47	2.12	2.18
90.0	11.1	2.77	2.71	2.65	2.52	2.18	1.98
98.0	10.8	2.52	2.52	2.52	2.52	2.31	1.94
106.0	10.7	2.58	2.31	2.36	2.22	1.98	1.78
114.0	10.5	2.02	2.07	2.18	2.18	1.82	1.56
122.0	10.3	1.98	1.78	2.02	1.78	1.74	1.64
130.0	9.4	1.94	1.85	1.78	1.52	1.68	1.46
138.0	8.8	1.60	1.71	1.60	1.30	1.37	1.10
146.0	8.0	1.28	1.37	1.22	1.00	1.02	0.85
155.0	7.1	0.98	0.70	0.73	0.98	0.96	0.81
166.0	0.0	----	----	----	----	----	----

TABLE 15A.--TIME-CONCENTRATION DATA FOR TEST 11, CONCENTRATION OF GOLD-198 IN MICROCURIES PER CUBIC FOOT

(T, 24-HOUR TIME. C, CONCENTRATION. BLANK INDICATES NO DATA.
PERIOD OF INJECTION IS15000.0 TO 0.0)

SECTION 1		SECTION 2		SECTION 3		SECTION 4		SECTION 5		SECTION 6	
T	C	T	C	T	C	T	C	T	C	T	C
0908.4	0.0	0942.0	0.0	1010.0	0.0	1035.0	0.0	1137.0	0.0	1230.0	0.0
0908.8	0.56	0945.0	0.10	1015.0	0.23	1045.0	0.21	1143.0	0.04	1240.0	0.07
0909.2	1.56	0948.0	0.55	1020.0	0.54	1050.0	0.39	1153.0	0.13	1250.0	0.17
0909.6	4.13	0951.0	0.96	1025.0	0.73	1055.0	0.52	1203.0	0.23	1300.0	0.23
0910.0	7.68	0954.0	1.09	1028.0	0.78	1100.0	0.59	1213.0	0.31	1310.0	0.27
0910.4	9.54	0956.5	1.12	1031.5	0.80	1105.0	0.62	1218.0	0.33	1315.0	0.28
0910.6	9.69	0959.0	1.07	1035.0	0.77	1110.0	0.60	1223.0	0.34	1320.0	0.28
0910.8	9.54	1002.0	0.97	1040.0	0.68	1120.0	0.49	1228.0	0.34	1325.0	0.28
0911.2	8.27	1006.0	0.82	1050.0	0.47	1130.0	0.37	1233.0	0.33	1330.0	0.27

TABLE 15B.--CHANNEL GEOMETRY, FLOW DATA, AND STATISTICAL PARAMETERS FOR TEST 11

(M = 0.112C)
(BLANK INDICATES NO DATA)

SECTION----------	1	2	3	4	5	6
			JULY 13, 1960			
x -------- ft --	630	3,310	5,670	7,870	11,000	13,550
Width ---- " --	44	51	57	49	60	54
d -------- " --	2.26	1.20	1.41	1.54	1.61	1.60
R -------- " --	2.18	1.18	1.39	1.50	1.59	1.59
Fall ----- " --	.73	4.86	7.89	11.3	14.02	17.60
Temp ----- ^{o}F --	71	70	70	71	72	72
$S^{1/2}$ ----------	.034	.038	.037	.038	.036	.036
Q ------- cfs --	63	63	63	67	68	68
V ------- fps --	.64	1.05	.79	.89	.71	.79
A ----- sq ft --	99	61	80	75	96	86
n ----------	.18	.13	.12	.12	.13	.13
			JULY 14, 1960			
$\bar{t}$ ------- sec --	642	4,150	6,360	8,580	13,700	17,100
$\bar{A}$ ----- sq ft --	48	60	53	52	59	60
V_* ------ fps --	.29	.24	.25	.26	.26	.26
α_3 ----------	1.0	1.2	.9	1.1	1.2	1.0
M^2 -------- c --	.104	.103	.102	.102	.085	.079
C_{max} - $\mu c/ft^3$ --	9.69	1.12	.80	.62	.34	.28
σ_x ------- ft --	68	604	899	1,300	1,790	2,010
Y -------- ft --	87	609	948	1,260	1,670	1,860

TABLE 15C.--DISTRIBUTION OF VELOCITY IN SECTION 1 OF REACH USED IN TEST 11

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	1.8	0.04	0.09	0.09	0.08	0.13	
4.0	2.3	0.18	0.21	0.19	0.18	0.19	----
6.0	2.1	0.40	0.45	0.45	0.37	0.40	0.33
8.0	2.0	0.47	0.51	0.56	0.52	0.45	0.36
10.0	2.0	0.67	0.67	0.63	0.59	0.50	0.37
12.0	2.0	0.76	0.74	0.70	0.63	0.48	0.42
14.0	2.1	0.81	0.84	0.77	0.72	0.68	0.56
16.0	2.2	0.85	0.92	0.87	0.70	0.63	0.44
18.0	2.2	0.92	0.94	0.87	0.85	0.62	0.47
20.0	2.3	0.96	0.98	1.00	0.88	0.68	0.56
22.0	2.6	1.04	1.04	0.92	0.74	0.56	0.41
24.0	2.5	1.04	1.04	0.85	0.57	0.49	0.34
26.0	2.5	1.09	1.09	1.00	0.83	0.74	0.55
28.0	2.5	1.07	1.07	1.07	0.88	0.70	0.58
30.0	2.6	1.02	1.02	0.94	0.72	0.71	0.50
32.0	2.8	1.02	1.07	0.94	0.85	0.68	0.56
34.0	3.0	0.96	0.96	0.92	0.67	0.49	0.45
36.0	3.0	0.77	0.88	0.76	0.66	0.55	0.41
38.0	2.7	0.55	0.62	0.63	0.51	0.37	0.27
40.0	2.7	0.26	0.28	0.44	0.45	0.34	0.30
42.0	1.8		0.06	0.12	0.14	0.10	
44.0	0.0	----	----	----	----	----	----

TABLE 15D.--DISTRIBUTION OF VELOCITY IN SECTION 2 OF REACH USED IN TEST 11

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	0.9	0.22	0.21	0.24	0.26	0.19	
4.0	1.3	0.34	0.38	0.42	0.45	0.44	----
6.0	1.8	0.74	0.62	0.58	0.52	0.46	0.45
8.0	2.0	0.85	0.81	0.77	0.72	0.74	0.67
10.0	1.8	0.92	0.94	0.88	0.81	0.81	0.74
12.0	1.6	1.04	1.02	1.09	1.15	0.98	0.79
14.0	1.3	1.22	1.27	1.33	1.30	1.14	
16.0	1.1	0.98	1.33	1.36	1.33	1.27	
18.0	1.1	0.98	1.48	1.55	1.52	1.52	
20.0	1.1	0.92	1.45	1.52	1.36	1.36	
22.0	1.0	0.96	1.52	1.55	1.48	1.39	
24.0	1.0	0.83	1.42	1.59	1.45	1.36	
26.0	0.9	0.94	1.52	1.59	1.55	1.36	
28.0	1.0		1.67	1.71	1.55	1.39	
30.0	1.1		1.59	1.67	1.67	1.33	
32.0	1.0		1.59	1.59	1.45	1.22	
34.0	1.1		1.52	1.55	1.39	1.19	
36.0	1.3		1.48	1.39	1.19	1.00	
38.0	1.4		1.48	1.45	1.36	1.27	
40.0	1.5		1.45	1.39	1.24	1.00	
42.0	1.3		1.24	1.22	1.10	0.92	
44.0	1.2		0.72	0.72	0.51	0.46	
46.0	1.3		0.68	0.64	0.58	0.55	
48.0	1.1		0.27	0.30	0.19	----	
51.0	0.0	----	----	----	----	----	----

TABLE 15E.--DISTRIBUTION OF VELOCITY IN SECTION 3 OF REACH USED IN TEST 11

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	0.8	----	----	----	----	----	----
4.0	1.2	----	----	----	----	----	----
6.0	1.6		0.14	0.27	0.21	0.34	
8.0	1.8		0.33	0.50	0.52	0.44	
10.0	1.9		0.68	0.66	0.70	0.62	0.55
12.0	1.8	0.83	0.78	0.68	0.51	0.38	0.25
14.0	1.8	0.85	0.96	0.90	0.79	0.70	0.50
16.0	1.6	1.04	1.05	1.02	0.98	0.62	0.61
18.0	1.4	1.02	1.10	1.02	0.94	0.83	0.68
20.0	1.4	1.10	1.13	1.13	1.02	0.74	0.62
22.0	1.4	1.25	1.17	1.10	0.96	0.71	0.61
24.0	1.4	1.28	1.17	1.10	1.00	0.85	0.68
26.0	1.2	1.28	1.25	1.14	1.07	0.88	0.61
28.0	1.3	1.28	1.30	1.22	1.14	0.94	0.87
30.0	1.3	1.22	1.22	1.22	1.07	0.90	0.63
32.0	1.3	1.22	1.30	1.28	1.19	0.96	0.68
34.0	1.3	1.28	1.37	1.37	1.25	0.92	0.68
36.0	1.4	1.34	1.30	1.19	1.10	0.96	0.67
38.0	1.4	1.29	1.28	1.19	1.12	1.00	0.73
40.0	1.5	1.25	0.98	1.22	1.07	0.96	0.63
42.0	1.5	0.96	0.98	0.92	0.81	0.74	0.66
44.0	1.6	0.90	1.13	1.13	1.07	0.88	0.59
46.0	1.8	0.74	0.85	0.94	0.96	0.76	0.54
48.0	1.8	0.78	0.83	0.96	0.92	0.73	0.56
50.0	1.6	0.66	0.71	0.70	0.68	0.71	0.32
53.0	1.2	0.36	0.36	0.38	0.34	----	----
55.0	0.9	0.27	0.27	0.28	----	----	----
57.0	0.0	----	----	----	----	----	----

TABLE 15F.--DISTRIBUTION OF VELOCITY IN SECTION 4 OF REACH USED IN TEST 11

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED 0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
2.0	1.3				0.36		
4.0	1.7	0.77	0.75	0.74	0.72	0.69	0.66
6.0	1.9	0.77	0.79	0.86	0.68	0.50	0.40
8.0	2.0	0.29	0.36	0.57	0.96	1.24	0.86
10.0	2.0	1.27	1.27	1.44	1.55	1.40	1.27
12.0	2.0	1.63	1.78	1.67	1.67	1.55	1.36
14.0	2.1	1.63	1.63	1.55	1.55	1.36	1.12
16.0	2.3	1.71	1.71	1.85	1.63	1.40	1.30
18.0	2.4	1.78	1.85	1.82	1.78	1.52	0.90
20.0	2.3	1.52	1.55	1.49	1.37	1.00	0.79
22.0	2.2	1.30	1.40	1.44	1.40	1.12	0.88
24.0	2.1	1.02	1.09	1.09	1.04	0.92	0.61
26.0	1.9	0.63	0.69	0.74	0.72	0.48	0.18
28.0	1.7	0.44	0.45	0.46	0.53	0.52	0.34
30.0	1.5	0.33	0.32	0.33	0.27	0.25	0.22
32.0	1.3	0.19	0.32	0.33	0.33	0.17	0.15
34.0	1.3	0.34	0.32	0.32	0.30	0.22	0.16
36.0	1.4	0.33	0.33	0.28	0.32	0.18	0.10
38.0	1.3	0.29	0.31	0.33	0.30	0.21	0.18
40.0	1.1	0.30	0.28	0.29	0.28	0.26	0.06
42.0	0.8	0.36	0.32	0.29	0.23	0.16	
44.0	0.7		0.25	0.24	0.22	0.15	
46.0	0.4				0.18		
48.0	0.2				0.03		
49.0	0.0	----	----	----	----	----	----

TABLE 15G.--DISTRIBUTION OF VELOCITY IN SECTION 5 OF REACH USED IN TEST 11

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED					
		0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
5.0	1.6	0.29	0.27	0.29	0.21	0.12	----
8.0	1.9	0.34	0.35	0.29	0.28	0.16	----
11.0	2.0	0.42	0.44	0.37	0.35	0.29	0.24
13.0	2.4	0.46	0.52	0.44	0.38	0.27	0.18
15.0	2.4	0.60	0.56	0.53	0.50	0.51	0.25
17.0	2.3	0.56	0.62	0.56	0.53	0.45	0.29
19.0	2.2	0.68	0.72	0.60	0.56	0.44	0.35
22.0	2.1	0.78	0.84	0.80	0.76	0.56	0.40
25.0	1.7	0.97	0.97	0.84	0.82	0.72	0.50
28.0	1.6	1.11	1.09	1.09	1.09	0.84	0.66
30.0	1.6	1.19	1.24	1.07	1.12	0.77	0.58
33.0	1.5	1.24	1.30	1.19	1.09	1.02	0.75
36.0	1.4	1.33	1.49	1.36	1.33	1.19	1.02
39.0	1.4	1.40	1.52	1.33	1.30	0.94	0.92
41.0	1.4	1.45	1.44	1.44	1.33	1.07	0.71
43.0	1.5	1.36	1.49	1.40	1.12	0.94	0.94
45.0	1.5	1.33	1.40	1.33	1.27	1.04	0.74
47.0	1.5	1.15	1.24	1.18	1.12	1.02	0.71
49.0	1.6	0.94	0.94	0.90	0.52	0.67	0.53
51.0	1.6	0.71	0.79	0.75	0.66	0.56	0.53
54.0	1.5	0.30	0.42	0.24	0.28	0.28	0.18
57.0	1.5	0.14	0.19	0.18	0.15	0.14	0.06
60.0	0.0	----	----	----	----	----	----

TABLE 15H.--DISTRIBUTION OF VELOCITY IN SECTION 6 OF REACH USED IN TEST 11

(DASHED LEADERS INDICATE NO VELOCITY. BLANK INDICATES NO DATA)

DISTANCE FROM LEFT BANK, IN FEET	DEPTH, IN FEET	VELOCITY, IN FEET PER SECOND, AT RELATIVE DEPTH INDICATED					
		0.1	0.2	0.4	0.6	0.8	0.9
0.0	0.0	----	----	----	----	----	----
3.0	1.0	0.55	0.55	0.53	0.47	0.25	0.12
6.0	1.5	0.68	0.84	0.65	0.41	0.34	0.38
9.0	1.9	0.38	0.38	0.32	0.28	0.29	0.39
12.0	1.8	0.84	0.97	1.11	0.86	0.75	0.64
15.0	1.8	0.73	0.73		0.91	0.84	0.50
17.0	1.8	0.50	0.46	0.62	0.68	0.70	0.60
19.0	2.0	0.48	0.54	0.53	0.50	0.47	0.31
21.0	2.0	0.57	0.59	0.60	0.59	0.64	0.47
23.0	1.8	0.90	0.95	0.97	0.84	0.69	0.47
25.0	1.7	1.11	1.11	1.11	0.99	0.90	0.56
27.0	1.7	1.19	1.21	1.16	1.11	0.90	0.56
29.0	1.7	1.19	1.27	1.24	1.11	0.84	0.44
31.0	1.6	1.29	1.32	1.29	1.21	1.09	0.76
33.0	1.7	1.29	1.39	1.27	1.19	0.84	0.78
35.0	1.7	1.32	1.29	1.36	1.24	0.91	0.80
38.0	1.8	1.36	1.45	1.45	1.27	0.93	0.75
41.0	1.8	1.11	1.11	1.24	1.19	1.01	0.68
44.0	1.8	0.78	0.80	0.76	0.80	0.73	0.64
47.0	1.7	0.56	0.64	0.60	0.66	0.48	0.48
50.0	1.7	0.53	0.54	0.63	0.58	0.50	0.40
54.0	0.0	----	----	----	----	----	----

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