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OFFICE PROCEDURES FOR SEDIMENT DATA COMPUTATIONS

THIRD EDITION

WATER RESOURCES BRANCH
INLAND WATERS DIRECTORATE

DIRECTION DES RESSOURCES EN EAU
DIRECTION GÉNÉRALE DES EAUX INTÉRIEURES

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SEDIMENT SURVEY SECTION
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INLAND WATERS DIRECTORATE
WATER RESOURCES BRANCH
OTTAWA, CANADA, 1988

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PREFACE

The Water Resources Branch of the Department of Environment is responsible for the national program of collecting, analyzing and disseminating water quantity data and to provide information and adivce, concerning this aspect of Canada's inland waters. Water quantity or hydrometric data consists mainly of water levels, flows and sediment transport.

Sediment Survey Field and Office Manuals are prepared to define and describe standard procedures and practices to be followed by Water Resources Branch personnel in the collection, processing, computing and publication of Sediment Survey data.

Sediment Survey Manuals are also used as basic training aids by Water Survey of Canada technicians who are progressing through their career development program. Standards defined within the manuals reflect the optimum procedures and practices in their time and therefore, cannot be considered static. Suggestions to effect change will be welcome and will be given careful consideration.

This manual of Office Procedures for Sediment Data Computations was prepared by the Sediment Survey Section of the Water Survey of Canada Division in Hull. Contributions in the form of suggestions and revisions were received from regional offices of the Water Resources Branch and are gratefully acknowledged.

While this manual and selected other manuals released by the Water Resources Branch are intended for internal use, they are available on request to any other agencies or to individuals.

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ILLUSTRATIONS

1. INTRODUCTION

The Water Resources Branch of the Department of Environment is responsible for the national program of collecting, analyzing and disseminating water quantity data and to provide information and advice, concerning this aspect of Canada's inland waters. Water quantity or hydrometric data consists mainly of water levels, flows and sediment transport.

This manual was prepared by M.A. Cashman, Sediment Survey Standards Officer, and approved by Dr. T.J. Day, Head, Sediment Survey Section, Water Survey of Canada Division. It describes the office procedures involved in the computation of data for standard sediment survey stations, and it contains detailed instructions to ensure that national standards and uniformity are maintained throughout the Water Survey of Canada in the office procedures in the computation, coding and keypunching of sediment survey data for eventual publication.

Sediment Survey Manuals are also used as basic training aids by Water Survey of Canada technicians who are progressing through their career development program. Standards defined within the manuals reflect the optimum procedures and practices in their time and therefore, cannot be considered static. Suggestions to effect change will be welcome and will be given careful consideration.

This manual and related manuals referred to herein are intended for internal use within the Water Resources Branch. However, these manuals may be distributed to "outside" agencies for general information on the understanding that the instructions contained herein are subject to change without notice.

2. DEFINITIONS, ABBREVIATIONS AND SIGNIFICANT FIGURES

2.1 Definitions and Abbreviations

The following definitions and abbreviations (in parentheses where applicable) have been adopted for use by the Water Survey of Canada.

Bank, right or left - the margin of a channel as viewed facing downstream. The expression "right" or "left" applies similarly to right or left abutments, cableway towers, etc.

Bed load - the material moving in almost continuous contact with the streambed, being rolled or pushed along the bottom by the force of the water.

Bed load discharge - the weight of bed load passing a cross section of a stream per unit of time.

Bottom withdrawal - a method of sample analysis for determining the suspended sediment particle-size distribution.

Chemically dispersed - the mixing of a water-sediment sample by chemical means using a deflocculating agent, e.g. Calgon.

Clay - sediment particles in the size range between 0.00024 mm and 0.004 mm.

Concentration (mg/L) - the ratio of the dry weight of sediment to the volume of the water-sediment mixture, expressed in milligrams per litre.

Cubic metres per second (m^3/s) - is a unit expressing rate of discharge. One cubic metre per second is equal to one cubic metre of water flowing past a particular point in one second.

Depth-integrated sample - a water-sediment mixture which is accumulated continuously in a sampler that moves vertically at an approximate constant transit rate from the water surface to a point of about nine centimetres above the bed of a stream, and which admits the mixture at a velocity about equal to the instantaneous stream velocity at each point in the vertical.

Depth integration - a method of sampling which will obtain a representative sample of the water-sediment mixture by traversing a sampler through the entire depth of a stream vertical, except in the unsampled zone near the streambed.

Discharge or flow (Q) - the volume of water (including all suspended materials) that passes a point in the stream cross section during a specific time interval and is expressed in cubic metres per second.

Discharge measurement - the determination of the rate of flow of water in a river, using specialized equipment to measure the width, depth and the velocity at several points in a cross section. An observation of NO flow is classed as a discharge measurement.

Drainage area - the area that is enclosed by a topographic divide such that surface runoff would drain by gravity into the stream upstream from the gauging station.

Equal-Discharge-Increment method (EDI) - a sampling technique in which the stream cross section is divided into portions of equal discharge. The centroids of these portions are used as the sampling verticals to provide equal sample volumes of flow segments. Transit rate of the sampler must be constant through each depth transit but may vary from one sampling vertical to another.

Equal-Width-Increment (EWI), previously known as Equal-Transit-Rate method (ETR) - a sampling technique in which the stream cross section is divided into equal increments of width and the centroids of these width-increments are used as the sampling vertical. Transit rate of the sampler must be constant for all depth transits.

Grab sample - a sample taken manually from the surface of the stream, usually without using a sampler. Suspended sediment concentration determined from a grab sample is usually not representative of the true concentration in the cross section.

Gravel - the sediment particles in the size range between 2.0 mm and 64.0 mm.

Hydrograph - a graph showing the stage, discharge, velocity or some other property of water in relation to time.

Individual sample - a single sample consisting of two bottles of water-sediment mixture taken at at the same time. The term "daily" in the future is to be considered synonymous with "individual".

Individual sampling vertical - a selected vertical in a cross section in which individual suspended sediment samples are collected.

Measured suspended sediment discharge - suspended sediment discharge that can be computed from stream discharge and the concentration of sediment determined from depth-integrated sediment samples.

Mechanically dispersed - the mixing of a water-sediment sample by a mechanical mixer without the use of a deflocculating agent.

Milligram per litre (mg/L) - a unit for expressing suspended sediment concentration values. It represents the ratio of the weight of dry sediment to the volume of the water-sediment mixture.

Particle-size - the nominal diameter, expressed in millimetres, of any given sediment particle. It may be determined by sieve or sedimentation methods.

Particle-size analysis - the process of determining the size distribution of sediment particles in a sediment sample.

Particle-size classificiation - a system of dividing the sediment particles into groups, each group having upper and lower dimension limits. The classification used by the Water Survey of Canada follows that proposed by the Subcommittee on Sediment Terminology of the American Geophysical Union, and is as follows:

Classification	Dimension limits, in mm
Clay	0.00024 - 0.004
Silt	0.004 - 0.062
Sand	0.062 - 2.00
Gravel	2.00 - 64.0

Point-integrated sample - a water-sediment mixture that is accumulated continuously in a sampler that is held at a fixed point, over a relatively short period of time, in a river cross section.

Sampling vertical - an approximate vertical path from the water surface to the streambed along which samples of the water-sediment mixture are collected to determine the suspended sediment concentration.

Sand - the sediment particles in the size range between 0.062 mm and 2.00 mm.

Sediment - a fragmental material transported by, suspended in, or deposited by a flowing stream.

Sediment hydrograph - a graph showing the variation of suspended sediment concentration or suspended sediment discharge with respect to time.

Silt - sediment particles in the size range between 0.004 mm and 0.062 mm.

Suspended sediment - sediment that moves in suspension in water either as a colloid or through the influence of the upward component of turbulent currents.

Suspended sediment concentration - the ratio of the weight of dry solids in a water-sediment mixture to the volume of the mixture. This ratio is expressed as "milligrams per litre" (mg/L).

Suspended sediment discharge - the quantity of suspended sediment transported through a cross section per unit of time. The term "suspended sediment" is herein considered to be "measured suspended sediment".

Suspended sediment sample - a quantity of water-sediment mixture representing the average concentration or the average particle-size distribution of suspended sediment.

Total sediment discharge or total sediment load - is the sum of the suspended sediment discharge and the bed load discharge.

Unmeasured sediment discharge or unmeasured sediment load - the difference between total sediment discharge and measured suspended sediment discharge.

Unsampled zone - that portion of the stream depth, just above the streambed, which the sampler nozzle cannot enter because of the configuration of the sampler.

Visual accumulation - the method of determining the size distribution of particles falling in mass in a tube.

Wash load - that part of the total sediment load that is composed of particles of a finer size than the particles present in appreciable quantities in the bed material.

2.2 Significant Figures

The following rules and standards have been adopted by the Water Survey of Canada for expressing data. For additional information refer to the Manual of Hydrometric Data Computation and Publication Procedures, Fifth Edition, Section 2.5.

Area	- square metres will be used to replace square feet, - hectares, to replace acres - square kilometres, to replace square miles - specifically: cross-sectional area, square metres (m^2) water surface area, hectares (ha) drainage area, square kilometres (km^2) - all areas are to be expressed to three significant figures but not to more than two decimal places
Sample Concentration	- milligrams per litre (mg/L) to three significant figures
Sediment load	- tonnes per day (t/d); 1 t = 1000 kg, to three significant figures but not to more than three decimal places
Stream length	- kilometres (km) to three significant figures but not to more than one decimal place
Stream width	- metres (m) to three significant figures but not to more than one decimal place
Volume of sample	- cubic centimetres (cm^3), water plus sediment, to three significant figures but not to more than one decimal place.
Volume of water	- cubic decametres (dam^3) to three significant figures but not to more than two decimal places
Water depth	- metres (m) expressed to the nearest 0.01 m (may change with varying conditions)
Water discharge	- cubic metres per second (m^3/s) to three significant figures but not to more than three decimal places
Water temperature	- degrees Celsius (°C) to the nearest 0.1°C
Water velocity	- metres per second (m/s) to three significant figures but not to more than three decimal places

2.3 Symbols and Footnotes

1. "E" - ESTIMATED

   Use this symbol whenever reconstruction of the concentration curve during a peak period was determined by some indirect interpolation method (Section 3.7, instruction 7). The symbol is to be entered to the right of the daily concentration figure. Do not enter this symbol on monthly or annual totals and means. Use of the symbol must be accompanied by an appropriate reference in a footnote, i.e. E - ESTIMATED.

2. "S" - Sample(s) collected this day

   Use this symbol to indicate a sample collected on this day. The symbol is entered to the right of the mean daily concentration. Use of this symbol must be accompanied by an appropriate reference in a footnote, i.e. "S" - Sample(s) collected this day.

2.4 Definition of National Standards

The term "National Standards" as used in the federal-provincial cost sharing agreements for Water Quantity Surveys and in other contexts refers to the suitability of data for distribution to users, including publication, and to the manner in which hydrometric and sediment surveys are conducted in the Water Resources Branch. This refers to data that have been observed, recorded and computed by a trained person in accordance with the following manuals and other standards. A more comprehensive list may be found in the Manual of Hydrometric Data Computations and Publication Procedures, 1980.

2.5 List of Sediment Survey Manuals

(a) Office Procedures for Sediment Data Computations, 1988
(b) SEDEX System Operations Manual, 1988
(c) Sediment Data Files Operations Manual, 1987
(d) Digitizing Procedures for Suspended Sediment Data, 1988
(e) Automated Suspended Sediment Pump Sampling, First Edition, 1987
(f) Publication Procedures for Sediment Data, First Edition, 1987
(g) Sediment Laboratory Procedures, 1987
(h) Sediment Survey Field Procedures, Draft

2.6 International Standards Organization Manuals

(a) Standards from Technical Committee 113

Number	Title
555	- Dilution Methods for Measurement of Steady Flow - Constant Rate Injection Method
555/II	- Dilution Methods for Measurement of Steady Flow - Integration (Sudden Injection) Method
748	- Velocity-Area Methods, 1979 edition
772	- Vocabulary of Terms and Symbols (bilingual), 1978 edition
1070*	- Slope-Area Method
1088*	- Collection of Data for Determination of Errors in Measurement
1100*	- Establishment and Operation of a Gauging Station and Determination of the Stage-Discharge Relation
1438**	- Thin Plate Weirs
2425	- Measurement of Flow in Tidal Channels
2537	- Cup-type and Propeller-type Current Meters
3454*	- Sounding and Suspension Equipment
3455	- Calibration of Current Meters in Straight Open Tanks
3716	- Functional Requirements and Characteristics of Suspended Sediment Load Samplers
3846	- Free Overfall Weirs in Finite Crest Width (Rectangular Broad-Crested Weirs)
3847	- End-Depth Method for Estimation of Flow in Rectangular Channels with Free Overall
4360	- Triangular Profile Weirs
4363	- Methods for Measurement of Suspended Sediment
4364	- Bed Material Sampling
5168	- Calculation of the Uncertainty of a Flowrate Measurement

Available from: Standards Council of Canada
International Standardization Branch
Foreign Standards Sales Section
Suite 2-401, 2000 Argentia Road
Mississauga, Ontario, L5N 1V8
Telephone 186-9-826-8110 (from Ottawa)

(b) Draft International Standards

4359	- Flumes
4366**	- Echo Sounders
4369**	- Moving Boat Method
4373**	- Water Level Measuring Devices
4375**	- Cableway Systems

(c) Draft Proposals

555/III	- Dilution Methods Using Radio Active Tracers
4365	- Analysis of Sediment
4371	- End Depth Method in Non-Rectangular Channels
4374	- Round Nose Horizontal Crest Weirs
4377	- Flat-V Weirs
6418	- Ultrasonic Velocity Meters
6420	- Position Fixing for Hydrometric Boats
6421	- Methods for Measurement of Sedimentation in Reservoirs
	- Assessment of Uncertainties in Calibration of Gauging Stations and Flowmeters
	- Compound Weirs
	- Telemetry

* Under revision
** Approved in voting

2.7 Canadian Standards Association Publications

a) CSA Standard CAN3-Z234.1-79, Canadian Metric Practice Guide
b) CSA Standard CAN3-Z234.2-76, The International System of Units (SI)
c) CSA Standard CAN3-Z234.4, All-Numeric Dates and Times
d) CSA Special Publication Z351-1978, Glossary of Metric Units

2.8 General Comments

Where the above documents do not fully cover all aspects of our sediment survey work, they will be supplemented by the USGS Series of "Techniques of Water-Resources Investigations".

All sediment laboratory work conducted by the Water Survey of Canada is carried out under uniform standard procedures, and supplemented by the manual "Sediment Laboratory Procedures, 1987".

All manuals are under continuing review and revision.

3. MANUAL PROCEDURES FOR COMPUTATION OF SUSPENDED SEDIMENT DATA

3.1 Computation System Flowchart

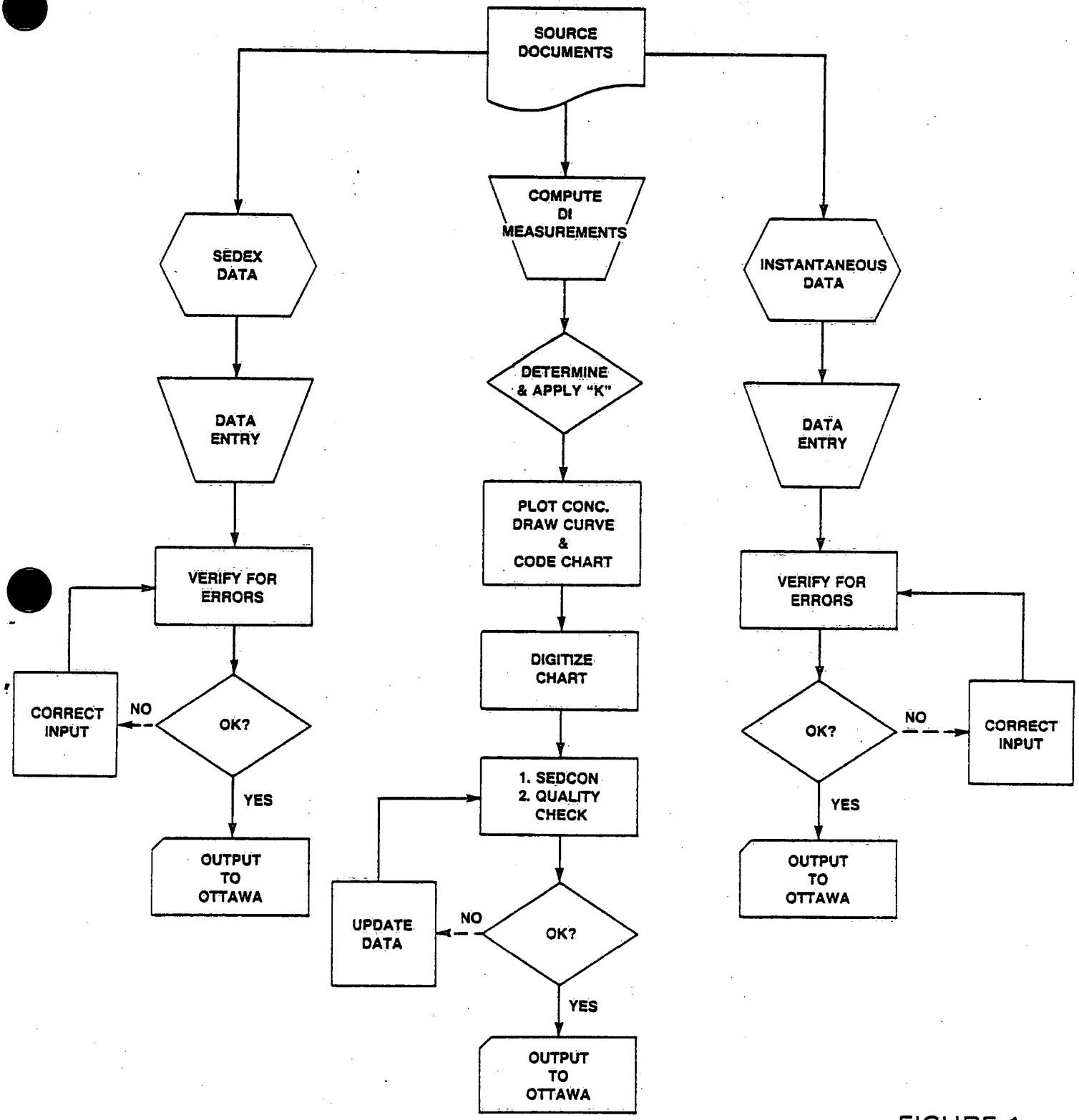

FIGURE 1

3.2 General Instructions

The source data for the office computations of suspended sediment data are the notes and records received from the field and sediment laboratory.

The sediment data for a station to be computed may consist of individual samples only, to two or more of the following: individual samples, equal-discharge-increment or depth-integrating measurements, equal-width-increment measurements and point-integrating measurements. Bed material samples may also be available for some of the stations. Hydrometric data should also be available.

It is essential that all data be identified at every step in the computation process. Therefore, the official name of the gauging station, the station number, and the period for which data are being computed should be entered on each form used in the computation.

The station number is to be shown in a format identical with the identifier used in computer processing, for example, 04TE033. All tabulations and those computations not done by electronic computer (which have a built-in check) must be checked prior to submission of data for publication.

The procedures to be followed in the computations of these data have been outlined in this manual. Hence, for the detailed instruction, procedures and comments for each particular step, reference should be made to the appropriate section hereunder.

3.2.1 Sediment Computation Check List

(a) Reproduce recorder charts from original water level chart or assemble original
(b) Compute Sediment computation measurements (5 verticals)
(c) Determine "K" value when $K = C_{av}/C_d$
(d) Apply "K" to individual samples collected at a single vertical
(e) Plot corrected concentrations and average concentrations from measurements on chart copy
(f) Construct concentration curve
(g) Document concentration curve for Digitizing
(h) Prepare Update Correction Sheet form R-300 for SEDCON indicating sampled days
(i) Digitize chart and Quality check SEDCON listing
(j) Compute Particle Size for, Point-Integrating
(k) Enter, Instantaneous data for Depth and Point-Integrating data using @ WSC
(l) Enter, Bed Material Particle Size data using @ WSC
(m) Enter, Bed Load Particle Size data using @ WSC
(n) Check listings and update
(o) Submit SEDEX updates to Ottawa
(p) Forward Output data to Ottawa
(q) Prepare and Update Station Analysis
(r) Prepare and Update Station Profile
(s) Prepare and Update Station Management package
(t) Submit data to Ottawa for publication
(u) Verify data on computer printouts sent from Ottawa
(v) Approve data for publication

3.2.2 Sediment Station Analysis

The Station Analysis should contain the "Station Name", "Station Number" and "Period of Record". The following headings should be completed with any information that is applicable to the station for the period of record.

SAMPLING PROGRAM

Briefly list the requirements of the Sampling Guide Program and compare with the actual coverage. Mention if "Quality Control" check samples were collected and check samples with Observer were completed.

Indicate the number of single vertical samples and list the dates of the suspended sediment measurements and note whether bed material samples were collected.

EQUIPMENT

Indicate type of samplers used by the Observer and Technician to collect the samples and nozzle size used. Give the single sampling vertical location; also mention if samples were collected from a cableway, bridge, etc.

CONCENTRATION GRAPH

Mention the period of record and if peak flow periods were sampled with Instantaneous Samples.

PARTICLE-SIZE ANALYSIS

Mention if Particle Size information is available, giving dates and type of data, suspended or bed material.

DISSOLVED SOLIDS

Mention if Dissolved Solids information is available and for how many samples.

APPLICATION OF COEFFICIENT

Mention if "K" was applied, giving dates of measurements.

TEMPERATURE (WATER)

Indicate if Water Temperatures were collected, briefly outlining method of collection and type of thermometer.

REMARKS

Give any other information that is unique to this station for the period of record.

3.3 Individual Suspended Samples

It is recommended that the following procedure be used for the first year of record for a station, after which time it is necessary to record only the Suspended Sediment Measurement data on the R-290 form.

When preparing the R-290, for ease of reading, enter not more than 3 individual samples on one sheet, with the date of each sample collection entered chronologically.

1. Date to be entered in column No. 1, on the "Suspended Sediment Computation" sheet, R-290; Figure 2. The method of dating will be month, day, year, e.g. May 16, 1981. Abbreviations may be used in calculations but a number must not be used to indicate the month.

2. The sampling vertical location is to be entered under the date.

3. The time of day when the sample was collected, using the 2400 hour system, is to be entered in column No. 2.

4. The sample numbers are entered in column No. 5. Depth-integrating samples consisting of two bottles are applied with a suffix letter "A" or "B". Some of the sediment stations have been designated a prefix letter, for example T-1031A these letters and numbers must be used in all cases where reference is made to a sample.

5. The sediment concentration, mg/L, for each sample, A and B, is entered in column No. 6. If the samples have been combined by the laboratory the average sediment concentration, mg/L, is entered in column No. 7.

6. The water temperature, °C, at the time of the sediment sample collection, is entered in column No. 15.

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SUSPENDED SEDIMENT COMPUTATION

Date	Time Sample Collected	Measured Flow or Average Daily Discharge		Sample Number	Total Sediment Conc.	Average Sediment Conc.	Particle Size Distribution % finer in mg/l			Total Sediment Yield	Sediment Yield tons/day			Temperature
		Q in m^3/s	%		mg/L	mg/L	Sand .062 - 2.0	Silt .004 - .062	Clay <.004	tonnes/day	Sand	Silt	Clay	°C
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
APR 21														
	19:00			T-1665-A	445	443								14·0
175				B	441									
APR 22														
	18:00			T-1666-A		440								
175				B										
APR 25														
	12:30			T-1667-A		375								13·5
175				B										

FIGURE 2 DAILY SUSPENDED SEDIMENT

3.3.1 Split Vertical Sampling

It is recommended that split vertical samples be collected for rivers and streams with excessive sampling depths or water velocities. If split vertical sampling is necessary, the laboratories should be advised to analyze "A" and "B" samples individually. When plotting the weighted average concentration, for split vertical sampling, the average must be computed by equalizing the sampling intake rate.

The following procedures are used to compute the adjusted concentration for Split Vertical Sampling:

1. Calculate the sampling intake rates for both "A" and "B" samples.

2. Adjust the Sample Volume of sample "B" by the ratio $\frac{\text{INTAKE RATE B}}{\text{INTAKE RATE A}}$

3. Adjust the Dry Weight of sample "B" by the ratio $\frac{\text{INTAKE RATE B}}{\text{INTAKE RATE A}}$

4. Calculate the total of sample Volume "A" + Volume "B" adjusted.

5. Calculate the total of sample Dry Weight "A" + Dry Weight "B" adjusted.

6. Calculate the adjusted Mean Concentration = $\frac{\text{Dry Weight adjusted}}{\text{Total Volume adjusted}} \times 10^6$

EXAMPLE:

Sample No.	Sample Intake Time (s)	Sample Depth (m)	Sample Volume (cc)	Sample Dry Weight (g)	Conc. (mg/L)	Mean Conc. (mg/L)
160 A	14	14.8-7.4	294.6	0.3649	1239	
160 B	13	7.4-0	390.8	0.1879	481	860

1. Sampling intake rate "A" = $\frac{14.8 - 7.4}{14} = 0.5286$

2. Sampling intake rate "B" = $\frac{7.4-0}{13} = 0.5692$

3. Adjusted sample volume "B" = $\frac{\text{Rate B}}{\text{Rate A}} \times \text{Vol. "B"} = \frac{0.5692}{0.5286} \times 390.8 = 420.8$

4. Adjusted sample dry weight "B" = $\frac{\text{Rate B}}{\text{Rate A}} \times \text{Dry Weight "B"} = \frac{0.5692}{0.5286} \times 0.1879 = 0.2023$

5. Adjusted total sample volume = Vol. "A" + Vol. "B" (adjusted) = 294.6 + 420.8 = 715.4

6. Adjusted total sample dry weight = Dry Weight "A" + Dry Weight "B" (adjusted)
   = 0.3649 + 0.2023 = 0.5672

7. Adjusted Mean Concentration = $\frac{\text{Total Dry Weight (adjusted)}}{\text{Total Volume (adjusted)}} \times 10^6 = 792$ mg/L

The Mean Concentration of 860 mg/L is 8% or 68 mg/L greater than the Adjusted Mean of 792 mg/L.

3.4 Depth-Integrating Measurement of Suspended Sediment

1. Date to be entered in column No. 1, on the "Suspended Sediment Computation" sheet, R-290 (as described in Section 3.3).

2. The sampling vertical location of the individual sample collected during the measurement is to be entered in column No. 1 under the date.

3. The sampling locations of the five selected sampling verticals are to be entered in column No. 1, every second line, keeping the figures to the right of the column, as shown in Figure 3.

4. The reference distance, computed as the centroid of the sampling verticals, is then entered under the sampling vertical locations and left justified.

5. The time of day using the 2400 system, when the sampling began and ended, is averaged and entered in column No. 2.

6. The discharge representative of each of the sampling verticals is computed from the flow measurements and entered opposite the sampling vertical locations in column No. 3.

7. The percent of total flow representative of each sampling vertical is computed and entered in column No. 4.

8. The sample numbers are to be entered in column No. 5.

9. The sediment concentration, mg/L, for each sample, A and B, is entered in column No. 6. If the samples have been combined by the laboratory, then the average sediment concentration, mg/L, is entered in column No. 7.

10. The percent of sand, silt and clay as shown on the laboratory analysis sheets is entered in the top left corner of columns 8, 9 and 10, respectively. The sediment concentration is then multiplied by the percent value and entered in the appropriate column immediately to the right of each percent value (see Figure 4).

11. The total suspended sediment yield, tonnes per day, for each vertical is entered in column No. 11 as computed from the formula:

$$r = q \times c \times 0.0864$$

where r = the suspended sediment discharge in tonnes/day for the vertical
q = the discharge in m^3/s for the vertical
c = the concentration in mg/L for the vertical
0.0864 = the conversion factor used to convert "r" to tonnes/day when "q" is in m^3/s and "c" is in mg/L.

or $$\frac{86400 \text{ sec/day} \times 1000 \text{ L/m}^3}{1000 \text{ kg/tonne} \times 1000000 \text{ mg/kg}} = 0.0864 \text{ sec L tonne/mg day m}^3$$

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SUSPENDED SEDIMENT COMPUTATION

Date	Time Sample Collected	Measured Flow or Average Daily Discharge		Sample Number	Total Sediment Conc.	Average Sediment Conc.	Particle Size Distribution % liner in mg/l			Total Sediment Yield	Sediment Yield tons/day			Temperature
		Q in m^3/s	%		mg/L	mg/L	Sand .062 - 2.0	Silt .004 - .062	Clay < .004	tonnes/day	Sand	Silt	Clay	°C
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MAY 23		1150·1												
SINGLE VERTICAL 84	12:15			3427 A		416								9·4
				B										
37		224·3	19·5	3424 A		416				8061·9				
46				B										
55		223·7	19·5	3425 A		422				8156·3				
64	14:30			B										
73		256·8	22·3	3426 A		414				9185·6				
85·5				B										
98		249·8	21·7	3428 A		433				9345·3				
110				B										
122		195·5	17·0	3429 A		430				7263·2				
				B										
Σ		1150·1	100%			2115				42012·3				

TOTAL AVERAGE CONCENTRATION = $\frac{42012.3}{1150.1 \times 0.0864} = 423$

$K = C_{av}/C_d = 423/416 = 1.02$

FIGURE 3 DEPTH INTEGRATING COMPUTATION (NO PARTSIZE)

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SUSPENDED SEDIMENT COMPUTATION

Date	Time Sample Collected	Measured Flow or Average Daily Discharge		Sample Number	Total Sediment Conc.	Average Sediment Conc.	Particle Size Distribution % finer in mg/l			Total Sediment Yield	Sediment Yield tons/day			Temperature
		Q in m^3/s	%		mg/L	mg/L	Sand .062 - 2.0	Silt .004 - .062	Clay <.004	tonnes/day	Sand	Silt	Clay	°C
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
JULY 8		1213·8	100											
SINGLE VERTICAL 128	13:25			T-1266 A		769								21·0
				B										
80		198·3	16·3	T-1264 A		636	30 191	38 242	32 203	10896·7	3272·4	4146·2	3478·1	
96·5				B										
113		253·5	20·9	T-1265 A		695	37 257	35 243	28 195	15222·2	5628·9	5322·3	4271·0	
126·5	13:30			B										
140		262·7	21·6	T-126· A		838	48 402	30 252	22 184	19020·3	9124·3	5719·7	4176·3	
155				B										
170		258·8	21·3	T-1268 A		689	36 248	36 248	28 193	15406·3	5545·4	5545·4	4315·5	
189				B										
208		240·5	19·9	T-1269 A		658	34 224	38 250	28 184	13672·7	4654·5	5194·8	3823·4	
				B										
Σ		1213·8	100%			3516	1322	1235	959	74218·2	28225·5	25928·4	20064·3	

TOTAL AVERAGE SEDIMENT CONCENTRATION = $\frac{74218.2}{1213.8 \times 0.0864} = 708$

AVERAGE SAND = $\frac{28225.5}{104.87232} = 269$

SILT = $\frac{25928.4}{104.87232} = 247$

CLAY = $\frac{20064.3}{104.87} = 191$

$K = C_{av}/C_d = 708/769 = 0.92$

FIGURE 4 DEPTH INTEGRATING COMPUTATION (WITH PARTSIZE)

12. The sediment yield in tonnes/day for the sand is entered in column No. 12 as computed from the formula:

$$r_1 = q \times c_1 \times 0.0864$$

where r_1 = the suspended sand discharge in tonnes/day for the first vertical
q = the flow discharge in m^3/s
c_1 = the concentration of the sand particles, in mg/L.

13. The sediment yield in tonnes/day for the silt is entered in column No. 13 as computed from the formula:

$$r_2 = q \times c_2 \times 0.0864$$

where r_2 = the suspended silt discharge in tonnes/day for the first vertical
q = the flow discharge in m^3/s
c_2 = the concentration of the silt particles in mg/L.

14. The sediment yield in tonnes/day for the clay in entered in column No. 14 as computed from the formula:

$$r_3 = q \times c_3 \times 0.0864$$

where r_3 = the suspended clay discharge in tonnes/day for the first vertical
q = the flow discharge in m^3/s
c_3 = the concentration of the clay particles in mg/L.

15. The sediment yield in tonnes per second for each vertical and for the sand, silt and clay particles is computed in the same manner as described in subsections 11, 12, 13 and 14, and is entered below the respective tonnes/day figures. The only exception is that the conversion factor to be used is 1.0×10^{-6} (see item 18).

16. Totals are then calculated for the tonnes/sec and tonnes/day for columns 12, 13 and 14, and the sum of these three columns should be equal to the sum of column No. 11.

17. The average sediment concentration is computed from the formula:

$$C = \frac{R}{Q \times 0.0864}$$

where C = the average suspended sediment concentration in mg/L for the cross section
R = the total suspended sediment yield in tonnes/day
Q = the total discharge in m^3/s from the discharge measurement
0.0864 = conversion factor used to convert "C" into mg/L when R is in tonnes/day and Q in m^3/s

18. The instantaneous sediment concentration is computed from the formula:

$$C_1 = \frac{R_1}{Q \times 1.0 \times 10^{-6}}$$

where C_1 = instantaneous suspended sediment concentration for the cross section at the time of sampling
R_1 = total suspended sediment yield in tonnes/sec

1.0×10^{-6} = conversion factor used to convert "C" into mg/L when R_1 is in tonnes/sec and Q in m^3/s.

or

$$\frac{0.0864 \text{ sec tonne L/mg day m}^3}{86400 \text{ sec/day}} = 1.0 \times 10^{-6} \text{ tonne L/mg m}^3$$

19. The ratio of the average cross-sectional concentration to the daily concentration is computed from the formula:

$$K = \frac{C_{av}}{C_d}$$

where K = ratio (dimensionless)
C_{av} = the average suspended sediment concentration, in mg/L, for the cross section
C_d = the concentration, in mg/L, collected at the individual sampling vertical during the suspended sediment discharge measurement.

This ratio thus determined is used later in the computations (Section 3.7).

Reference should be made to Figure 4, which illustrates the computations described above.

3.5 Equal-Width-Increment (EWI) Measurement

The EWI (Equal-Width-Increment) method replaces the previously known method referred to as ETR (Equal-Transit-Rate) and should now and in future be referred to as EWI.

1. Date to be entered in column No. 1, on the "Suspended Sediment Computations" sheet R-290 (as described in Section 3.3).

2. The sampling vertical location of the individual sample that was collected during the measurement is to be entered in column No. 1, under the date.

3. The times of day when the sampling began and ended are averaged and entered in column No. 2.

4. The total discharge, Q in m^3/s, from the flow measurement is entered in column No. 3.

5. The sample numbers are to be entered in column No. 5.

6. The sediment concentration, mg/L, for the individual sample and the average sediment concentration, mg/L, for the combined samples of the EWI measurement, are entered in column No. 7.

7. The total suspended sediment discharge is entered in column No. 11 as computed from the formula:

$$R = Q \times C \times 0.0864$$

where R = the total suspended sediment dicharge in tonnes/day for the measurement
Q = the total discharge in m^3/s from the flow measurement
C = the total average sediment concentration for the combined samples in mg/L
0.0864 = the conversion factor used to convert "R" into tonnes/day when C is in mg/L and Q in m^3/s.

8. The total average sediment concentration is computed from the formula:

$$C = \frac{R}{Q \times 0.0864}$$

where C = the total average suspended sediment concentration in mg/L for the cross section
R = the total suspended sediment yield in tonnes/day
Q = the total discharge in m^3/s from the flow measurement
0.0864 = conversion factor used to convert "C" into mg/L when R is in tonnes/day and Q in m^3/s.

9. The instantaneous sediment concentration is computed from the formula:

$$C_1 = \frac{R_1}{Q \times 1.0 \times 10^{-6}}$$

where C_1 = instantaneous suspended sediment concentration for the cross section at the time of sampling
R_1 = the total suspended sediment yield in tonnes per second
1.0×10^{-6} = conversion factor used to convert "C_1" into mg/L when R_1 is in tonnes/sec and Q in m^3/s

or $$\frac{0.0864 \text{ sec tonne L/mg day m}^3}{86\ 400 \text{ sec/day}} = 1.0 \times 10^{-6} \text{ tonne L/mg m}^3$$

10. The ratio of the average cross-sectional concentration to the daily concentration is computed from the formula:

$$K = \frac{C_{av}}{C_d}$$

where K = ratio (dimensionless)
C_{av} = the average suspended sediment concentration in mg/L for the cross section
C_d = the concentration, mg/L, collected at the daily sampling vertical during the suspsended sediment discharge measurement

This ratio thus determined is used later in the computations (Section 3.7).

Reference should be made to Figure 5, which illustrates the computations described above.

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SUSPENDED SEDIMENT COMPUTATION

Date	Time Sample Collected	Measured Flow or Average Daily Discharge		Sample Number	Total Sediment Conc.	Average Sediment Conc.	Particle Size Distribution % finer in mg/l			Total Sediment Yield	Sediment Yield tons/day			Temperature
		Q in m^3/s	%		mg/L	mg/L	Sand .062 - 2.0	Silt .004 - .062	Clay < .004	tonnes/day	Sand	Silt	Clay	°C
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
MAR 31		94.0	100%											
SINGLE VERTICAL 84	15:20			1038 A		19								11.0
				B										
				1029										
				1030										
				1031										
				1032										
	15:00			1033		13				106				
				1034										
				1035										
				1036										
				1037										

TOTAL AVERAGE CONCENTRATION = $\frac{106}{94.0 \times 0.0864} = 13$

$K = C_{av}/C_d = 13/19 = 0.68$

FIGURE 5 EQUAL WIDTH INCREMENT MEASUREMENT

3.6 Point-Integrating Measurement

1. Construct a velocity curve for each sampling vertical by plotting the velocity versus depth.

2. Plot the concentration for each vertical versus the depth on the same axis as the velocity curve but with concentration as the abscissa, and draw a smooth curve through the points extrapolating the curve from the surface sample to the water surface and from the bottom sample to the streambed (Figures 6 and 7).

3. Draw a unit sediment discharge curve (unit sediment discharge versus depth) using the values computed from the following formula:

$$U_s = c \times v \times k$$

where U_s = unit sediment discharge mg/s m^3 at a depth, "d", in the vertical
c = concentration mg/L, at a depth, "d"
v = velocity in metres per second at a depth, "d"
k = 1000 L/m^3

4. Determine the mean value of the abscissa for each of the curves from the formula:

$$MV_a = \frac{mp \times k \times V_s \times H_s}{D_v}$$

where MV_a = mean value of the abscissa
mp = mean planimeter reading
k = coefficient for the graph paper
V_s = vertical scale
H_s = horizontal scale
D_v = depth of vertical

The "k" or planimeter coefficient must be determined for each different type of graph paper, e.g. K&E 10 x 10 x 1/2 No. 46-1323 having 1521 squares in a 5 cm^2 area is divided by the reading obtained from the planimeter by traversing the outer boundary of the square.

The mean value may also be determined by use of a scanner, when half of the area is to the right and half to the left of the centre line. The average is the value where the curve intersects the centre line.

5. Determine the unit sediment yield per unit width for the vertical from the formula:

$$U_s = MU_s \times D \times 0.0000864$$

where U_s = unit sediment yield, in tonnes/day/m
MU_s = mean unit sediment discarge, in mg/s m^2
D = depth, in metres
0.0000864 = conversion factor used to change "U_s" into tonnes/day/m when "MU_s" is in mg/s m^2 and "D" is in metres

or $$\frac{86\ 400 \text{ sec/day}}{10 \times 10^8 \text{ mg/tonne}} = 0.0000864 \text{ s tonne/mg day}$$

Steps 1 to 5 are repeated for each of the five selected verticals of the cross section.

6. Plot the cross-sectional profile using data from discharge measurement notes (depth versus distance).

7. Plot the measured velocities versus distance on the same paper to some suitable ordinate (velocity) scale.

8. Plot unit flow versus discharge using flow values computed from the formula:

$$q_1 = v_1 \times d_1$$

where q_1 = unit flow or discharge in m^3/m for a strip one metre wide from the surface to the streambed at a distance x_1 in the profile
v_1 = mean velocity, in m/sec, at the distance x_1
d_1 = depth, in metres, of the water at the distance x_1

9. Plot the mean concentration versus distance for each vertical as obtained from the point-integrating computation as determined in step 4.

10. Plot the average suspended depth-integrating concentration, from column No. 7, Figure 4, versus distance for each vertical. These depth-integrating concentrations will generally be less than those of the point-integrating.

11. Plot the average sediment yield, in tonnes/day/m, versus distance for each of the five verticals, for the point-integrating measurement.

12. For each of the above point plots, draw a smooth curve through the points, extrapolating if necessary in order to produce a curve over the entire width of the cross section. The resulting curves are illustrated in Figure 8.

13. The guiding factors when drawing the total suspended sediment yield curves are: the velocity and unit flow curves and the cross-sectional profile. If additional points are required to establish the sediment yield curve accurately, these may be obtained for any vertical from the formula:

$$A_s = q \times c \times 0.0864$$

where A_s = average sediment yield per unit width in tonnes/day/m
q = unit flow in m^3/m
c = concentration, in mg/L, as obtained for the vertical from the point-integrating curve

14. Planimeter the area bounded by the sediment yield curve to obtain an average reading; the total suspended sediment discharge for the point-integrating measurement is computed from the formula:

$$T_s = R_1 \times W_1 \times U_1 \times P_1$$

where T_s = total suspended sediment discharge, tonnes/day/m
R_1 = mean planimeter reading
W_1 = scale representations, in metres, of one square from the width scale
U_1 = scale representation, in tonnes/day/m, of one square from the total suspended sediment yield curve
P_1 = planimeter coefficient

3.6.1 Calculation of Unit Sediment Discharge (U_s)

Depth (m)		Concentration (mg/L)	Velocity (m/sec)	U_s (mg/sec m^2)	U_s (x 10^4)
VERTICAL	30.5				
Surface	0.20	167	1.73	288910	28.9
	1.40	186	1.89	351540	35.2
	2.70	195	1.73	337350	33.7
	4.10	202	1.75	353500	35.4
	5.40	203	1.51	306530	30.7
	6.10	231	1.16	267960	26.8
	6.65	276	0.86	237360	23.7
Streambed	6.80				
VERTICAL	67.5				
Surface	0.20	265	1.86	492900	49.3
	1.50	298	1.82	542360	54.2
	2.60	316	1.79	565640	56.6
	3.90	314	1.66	521240	52.1
	5.20	411	1.51	620610	62.1
	5.90	509	1.16	590440	59.0
	6.40	569	1.03	586070	58.6
Streambed	6.50				
VERTICAL	101				
Surface	0.20	360	1.62	583200	58.3
	1.30	405	1.55	627750	62.8
	2.60	398	1.55	616900	61.7
	3.90	420	1.44	604800	60.5
	5.20	505	1.33	671650	67.2
	5.90	575	1.14	655500	65.5
	6.40	660	0.89	587400	58.7
Streambed	6.60				
VERTICAL	130				
Surface	0.20	418	0.98	409640	41.0
	1.20	416	1.06	440960	44.1
	2.40	440	1.12	492800	49.3
	3.70	489	1.12	547680	54.8
	4.90	619	0.80	447100	55.7
	5.50	740	0.67	495800	49.6
	5.90	849	0.47	399030	39.9
Streambed	6.10				
VERTICAL	165				
SURFACE	0.20	347	1.42	492740	49.3
	1.50	356	1.45	516200	51.6
	3.00	363	1.33	493100	49.2
	6.00	384	1.23	472320	47.2
	6.80	412	1.07	440840	44.1
	7.30	465	0.87	404550	40.5
Streambed	7.50				

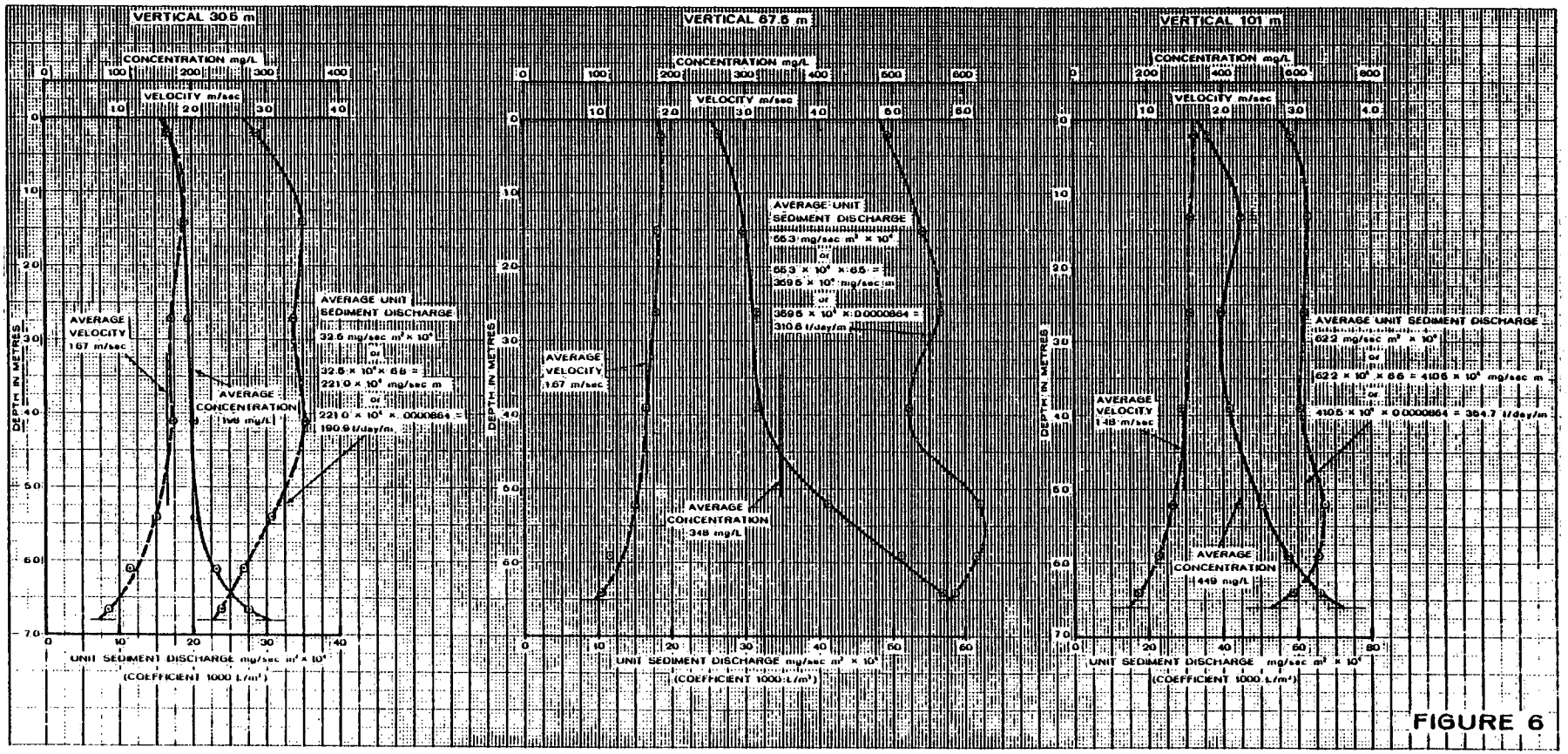
VERTICAL 30.5 m
CONCENTRATION mg/L
VELOCITY m/sec
DEPTH IN METRES
AVERAGE VELOCITY 1.67 m/sec
AVERAGE CONCENTRATION 148 mg/L
AVERAGE UNIT SEDIMENT DISCHARGE
32.8 mg/sec m³ x 10⁴
or
32.8 x 10⁴ x 6.6 =
221.0 x 10⁴ mg/sec m
or
221.0 x 10⁴ x .0000864 =
190.9 t/day/m
UNIT SEDIMENT DISCHARGE mg/sec m³ x 10⁴
(COEFFICIENT 1000 L/m³)
VERTICAL 67.5 m
CONCENTRATION mg/L
VELOCITY m/sec
DEPTH IN METRES
AVERAGE VELOCITY 1.67 m/sec
AVERAGE CONCENTRATION 348 mg/L
AVERAGE UNIT SEDIMENT DISCHARGE
55.3 mg/sec m³ x 10⁴
or
55.3 x 10⁴ x 6.6 =
369.5 x 10⁴ mg/sec m
or
369.5 x 10⁴ x .0000864 =
310.6 t/day/m
UNIT SEDIMENT DISCHARGE mg/sec m³ x 10⁴
(COEFFICIENT 1000 L/m³)
VERTICAL 101 m
CONCENTRATION mg/L
VELOCITY m/sec
DEPTH IN METRES
AVERAGE VELOCITY 1.48 m/sec
AVERAGE CONCENTRATION 449 mg/L
AVERAGE UNIT SEDIMENT DISCHARGE
62.2 mg/sec m³ x 10⁴
or
62.2 x 10⁴ x 6.6 = 410.5 x 10⁴ mg/sec m
or
410.5 x 10⁴ x 0.0000864 = 354.7 t/day/m
UNIT SEDIMENT DISCHARGE mg/sec m³ x 10⁴
(COEFFICIENT 1000 L/m³)

FIGURE 6

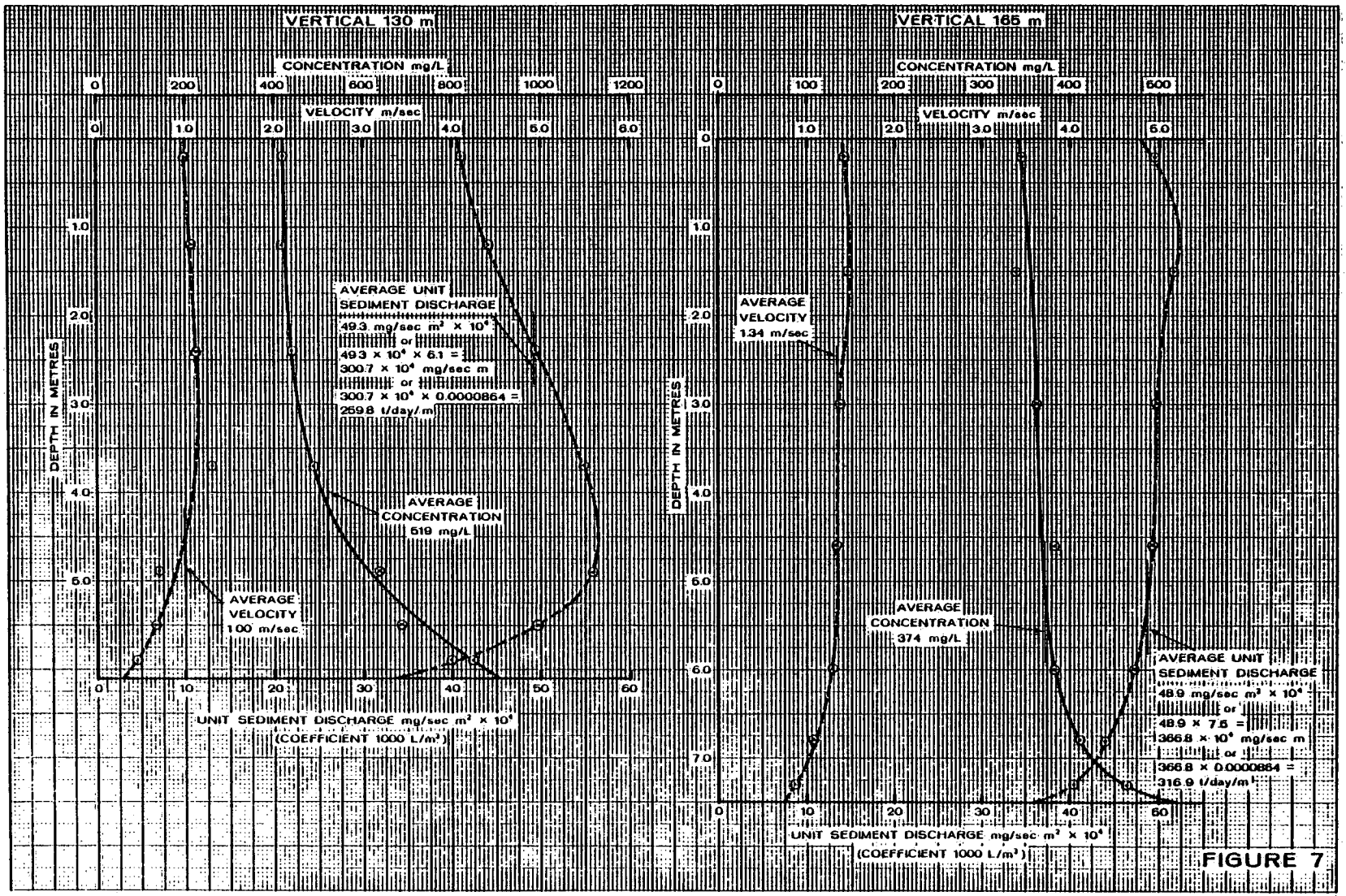
VERTICAL 130 m
CONCENTRATION mg/L
0
200
400
600
800
1000
1200
VELOCITY m/sec
0
1.0
2.0
3.0
4.0
5.0
6.0
DEPTH IN METRES
1.0
2.0
3.0
4.0
5.0
AVERAGE UNIT SEDIMENT DISCHARGE
49.3 mg/sec m² x 10⁴
or
49.3 x 10⁴ x 6.1 =
300.7 x 10⁴ mg/sec m
or
300.7 x 10⁴ x 0.0000864 =
259.8 t/day/m
AVERAGE CONCENTRATION
619 mg/L
AVERAGE VELOCITY
1.00 m/sec
0
10
20
30
40
50
60
UNIT SEDIMENT DISCHARGE mg/sec m² x 10⁴
(COEFFICIENT 1000 L/m³)
VERTICAL 165 m
CONCENTRATION mg/L
0
100
200
300
400
600
VELOCITY m/sec
0
1.0
2.0
3.0
4.0
5.0
DEPTH IN METRES
1.0
2.0
3.0
4.0
5.0
6.0
7.0
AVERAGE VELOCITY
1.34 m/sec
AVERAGE CONCENTRATION
374 mg/L
AVERAGE UNIT SEDIMENT DISCHARGE
48.9 mg/sec m² x 10⁴
or
48.9 x 7.5 =
366.8 x 10⁴ mg/sec m
or
366.8 x 0.0000864 =
316.9 t/day/m
0
10
20
30
40
60
UNIT SEDIMENT DISCHARGE mg/sec m² x 10⁴
(COEFFICIENT 1000 L/m³)

FIGURE 7

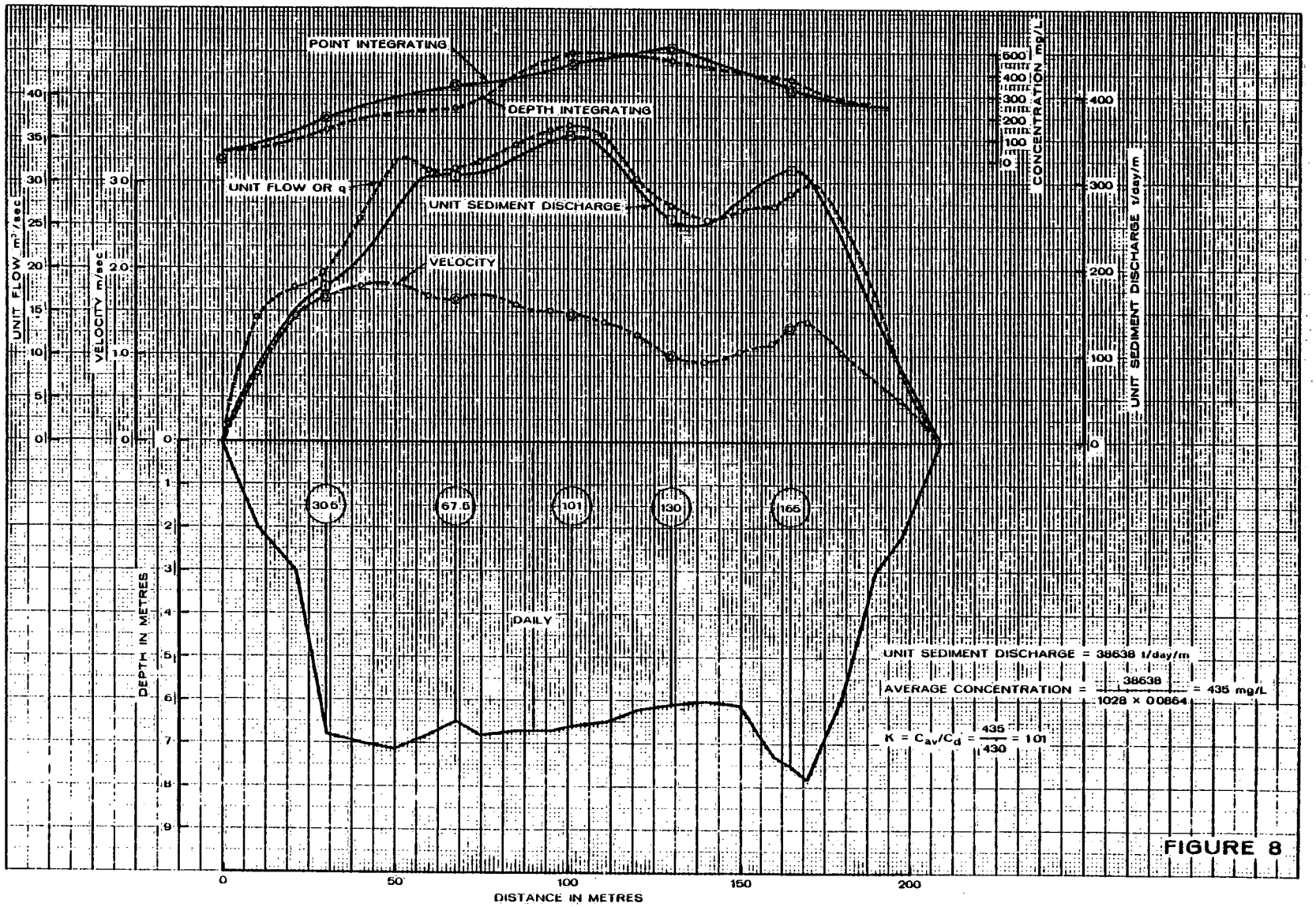
POINT INTEGRATING
DEPTH INTEGRATING
UNIT FLOW OR q
UNIT SEDIMENT DISCHARGE
VELOCITY
UNIT FLOW m³/sec
VELOCITY m/sec
CONCENTRATION mg/L
UNIT SEDIMENT DISCHARGE t/day/m
DEPTH IN METRES
DISTANCE IN METRES
30.5
67.5
101
130
165
DAILY
UNIT SEDIMENT DISCHARGE = 38638 t/day/m
AVERAGE CONCENTRATION = 38638 / 1028 x 00864 = 435 mg/L
K = Cav/Cd = 435/430 = 101

FIGURE 8

3.7 Daily Mean Concentration

1. Prepare a discharge hydrograph indicating the progress of the sample collection for the period of computation.

2. Plot the "K" values as computed for each depth-integrating suspended sediment measurement.

3. Draw a smooth curve through the "K" points. Determine a value of "K" from the curve for each day for the period of computation.

4. Multiply each individual sediment sample concentration by the "K" value determined for the day sampled. The value of "K" and the product of the multiplication should be recorded on the R-290 computation sheet on which the concentration data were recorded (Section 3.4) or in the column provided on the Laboratory Summary Sheet. The product gives the average sediment concentration for the cross section for the time of day the sample was collected.

5. Plot the average sediment concentration, on a copy of the recorder chart, at the time of day when the individual sample was collected.

   A few of the sediment survey stations will have only individual samples collected; for these stations the average sediment concentration as recorded on the R-267 laboratory sheet will be plotted assuming K = 1.0. This is equivalent to assuming that $C_d = C_{av}$.

6. Plot the total average sediment concentration as computed for the depth-integrating measurement at the average time when the samples were collected.

7. Construct a sediment concentration hydrograph by drawing a smooth curve through these concentration points. The water level record on the recorder chart, daily precipitation data, water and air temperatures, turbidity readings, sediment rating curves or other related environmental factors which may be known should be used as a guide in drawing the concentration hydrograph.

8. The daily mean concentration for each day may be determined from the restored sediment concentration hydrograph by use of a scanner and subdividing, or by automated procedures; refer to Suspended Sediment Digitizing Procedures, 1987.

3.8 Suspended Sediment Summary

The following outlines the procedure for calculating the Summary for the Year or Period for manually computed suspended sediment data stations.

1. Record the daily mean discharge (m^3/s) and the daily mean concentration (mg/L), refer to significant figure standards, Section 2.2. Enter the symbol "S" to the right of the mean daily concentration on the days a sediment sample was collected.

2. The suspended sediment load for each day is computed from the formula:

$$R = Q \times C \times 0.0864$$

where R = suspended sediment load for each day, tonnes/day
Q = mean daily discharge, m^3/s
C = mean daily concentration, mg/L

3. Round the monthly and annual totals to three significant figures.

4. Record the monthly summary figures as follows:
   (a) maximum - enter the maximum daily that occurred during the month
   (b) minimum - enter the minimum daily that occurred during the month

5. Record the annual summary as follows:
   (a) Maximum daily load - enter the maximum daily load in tonnes/day for the year or period
   (b) Minimum daily load - enter the minimum daily load in tonnes/day for the year or period
   (c) Maximum daily concentration - enter the maximum daily concentration in mg/L for the year or period
   (d) Minimum daily concentration - enter the minimum daily concentration in mg/L for the year or period
   (e) Total Suspended Sediment Load (tonnes) - is computed by accumulating the totals of each month for the year or period of record
   (f) Mean concentration - for the year is computed from the formula:

$$MC = \frac{TSL}{TQ \times 0.0864}$$

where MC = mean concentration for the year in mg/L
TSL = total suspended load in tonnes/day
TQ = total discharge for the year in m^3/s

   (g) Daily mean load for year - divide the total suspended load by the total number of days for the year or period of record.

4. AUTOMATED PROCEDURES FOR COMPUTATION OF SEDIMENT DATA

This section describes the office procedures required in using the TRS-80 Microcomputer and the program "SEDIM" to compute a suspended sediment measurement including the mid vertical distance, the flow panel discharges and percentage, the total suspended sediment load, the average concentration for the cross section and the "K" factor ratio.

4.1 User Instructions for SEDIM

The cassette tape is run until the recorder counter reads 150;

(a) Connect Pocket Computer to the Cassette Interface
(b) Push Play Button on the Tape Recorder
(c) Set Volume to 6 or 8
(d) Set Tone to 10
(e) Pocket Computer to (On)
(f) Using the MODE KEY set the Computer to (DEF)
(g) Enter Cload SEDIM. Depress ENTER
(h) When the program has been transferred, the tape motion will stop and the Pocket Computer will display the prompt Symbol (?)
(i) Set Computer to (Off)
(j) Disconnect the Pocket Computer from the Cassette Interface.

The SEDIM program is now stored in the memory of the microcomputer and is ready for use.

(1) Press ON; Display should be > DEG DEF
Note: If this is not the display depress "MODE" until it does appear.

(2) Press "SHFT" and "A" keys
Display will be SUSPENDED SEDIMENT VERTICAL DISTANCE "?"

(3) Enter first sampling vertical and depress "ENTER"

(4) Enter second sampling vertical and depress "ENTER"

(5) Enter remaining sampling verticals and depress "ENTER" after each entry

(6) Display will be mean values for verticals one and two; depress "ENTER"

(7) Display will be mean values for verticals three and four; depress "ENTER"

(8) Display will be "INITIAL POINT C = _"; enter the first "Observation" "Distance from Initial Point" from the flow measurement; depress "ENTER"

(9) Display will be "LAST VERT I = _"; enter the last "Distance from Initial Point"; depress "ENTER"

(10) Display "WIDTH = _"; enter the Width of the first panel used for "POINT C"; depress "ENTER"

(11) Display will be "DISC DATA A"; enter the Discharge for this first panel; depress "ENTER".
Note: The first and last discharge panel of the discharge measurement must be "0"

(12) Display will be "WIDTH_"; enter width of next flow panel, depress "ENTER", then enter the discharge for this width, depress ENTER after each value. Continue entering a width and a discharge value until the display reads "PANEL DISC B ="; this value is the Q for the first sampling vertical. Depress "ENTER"

(13) Display will be "WIDTH"; continue entering a "WIDTH" value and a "DISCHARGE" value until the display reads, "PANEL DISC D ="; this value is the "Q" for the second sampling vertical.

Continue step 13 until a Discharge value is obtained for all 5 sampling verticals.

(14) Depress ENTER. Display will be "TOTAL WIDTH C =". This value should agree with the total width on the "Q" measurement

(15) Depress "ENTER. Display will be "TOTAL DISC Q =". This value should agree with the total discharge of the measurement.

(16) Depress "ENTER". Display will be a % value of "Q" for sampling verticals 1 and 2.

(17) Depress "ENTER". Display will be a % value of "Q" for sampling verticals 3 and 4.

(18) Depress "ENTER". Display will be a % value of "Q" for the last sampling vertical.

(19) Depress "ENTER". Display should be "TOTAL PERC. P=100".

(20) Depress "ENTER". Display should be SED DATA A__"; input the sediment concentration for vertical 1, depress "ENTER", continue inputting the concentration values for the remaining verticals in the same manner, after which time the display will be the TONNES for vertical 1 and 2.

(21) Depress "ENTER". Display will be Tonnes value for verticals 3 and 4.

(22) Depress "ENTER". Display will be Tonnes value for the last vertical.

(23) Depress "ENTER". Display will be "TOTAL SED R = ____ which is the Total Suspended Sediment Yield for the measurement.

(24) Depress "ENTER". Display will be "AVG CONC X = ____ which is the average concentration and computed as Total Sed R ÷ Total Disc. Q x 0.0864.

(25) Depress "ENTER". Display will be "DAILY SED DATA A = ___; input the concentration value of the Individual sample.

(26) Depress "ENTER". Display will be "RATIO K = ___.

If another measurement is to be computed return to Step 2 and continue.

Note: If for some reason you leave the computer in the middle of a computation, it will automatically shut off. If this occurs you must begin at Step 1.

4.1.1 Suspended Sediment Measurement Compuation Program (TRS 80) (SED-1M)

```
 10  "A":  PAUSE "SUSPENDED SEDIMENT"
 20  "A":  PAUSE "VERTICAL DISTANCE"
 30  INPUT S, T, U, V, W
 40  A(28) = (T-S)/2 + S
 45  P(29) = (U - T)/2 + (T - S)/2 + A(28)
 50  A(30) = (V - U)/2 + (U - T)/2 + A(29)
 60  A(31) = (W - V)/2 + (V - U)/2 + A(30)
 70  PRINT A(28), A(29)
 75  PRINT A(30), A(31)
 80  B = 0, A = 0, H = 0, D = 0, C = 0, E = 0, F = 0, G = 0, K = 0
 90  INPUT "INITIAL POINT C = "; C
 91  Z = C
 95  INPUT "LAST VERT I = "; I
100  INPUT "VERT DIST H = "; H, "DISC DATA A = "; A: C = C + H: B = B + A: IF C < A(28) GOTO 100
110  B = B + (A * (A(28) - C)/H)
125  PRINT "PANEL DISC B = "; B
127  D = D + (A * (C - A(28))/H)
130  INPUT "VERT DIST H = "; H, "DISC DATA A = "; A: C = C + H: D = D + A: IF C<A(29) GOTO 130
140  D = D + (A * (A(29)) - C)/H)
145  PRINT "PANEL DISC D = "; D
147  E = E + (A * (C - A(29))/H)
150  INPUT "VERT DIST H = "; H, "DISC DATA A = "; A:C = C + H: E = E + A: IF C<A(30) GOTO 150
155  E = E + (A * A(30) - C)/H)
170  PRINT "PANEL DISC E = "; E
175  F = F + (A * (C - A(30))/H)
180  INPUT "VERT DIST H = "; H, "DISC DATA A = "; A:C = C + H:  F = F + A: IF C<A(31) GOTO 180
185  F = F + (A * (A(31) - C)/H)
190  PRINT "PANEL DISC F = ;  F
195  G = G + (A * (C - A(31))/H)
200  INPUT "VERT DIST H = "; H, "DISC DATA A  = "; A:C = C + H: G = G + A: IF C<I GOTO 200
210  PRINT "PANEL DISC G = "; G
219  C = C - Z
220  PRINT "TOTAL WIDTH C = "; C
225  Q = B + D + E + F + G
230  PRINT "TOTAL DISC Q = "; Q
240  J = B/Q * 100
250  L = D/Q * 100
260  M = E/Q * 100
270  N = F/Q * 100
280  O = G/Q * 100
290  PRINT J, L
300  PRINT M, N
305  PRINT O
310  P = J + L + M + N + O
315  PRINT "TOTAL PERC P = "; P
317  S = 0, T = 0, U = 0, V = 0, W = 0
320  INPUT "SED DATA A = "; A:S = A * B * 0.0864
330  INPUT "SED DATA A = "; A:T = A * D * 0.0864
340  INPUT "SED DATA A = "; A:U = A * E * 0.0864
350  INPUT "SED DATA A = "; A:V = A * F * 0.0864
360  INPUT "SED DATA A = "; A:W = A * G * 0.0864
365  PRINT, S, T
370  PRINT U, V
375  PRINT W
```

```
380  R = S + T + U + V + W
385  PRINT "TOTAL SED R = "; R
387  X = R/(Q * 0.0864)
388  PRINT "AVG CONC X = "; X
390  INPUT "DAILY SED DATA A = "; A: K = X/A
400  PRINT "RATIO K = "; K
410  END
```

5. CODING AND KEYING OF SEDIMENT DATA

As of 1971, the suspended sediment concentrations were stored on one magnetic tape file called SUSCON. The sediment concentration data are plotted and a curve drawn on a copy of the recorder chart. The sediment concentration graph is digitized and then processed by the SEDCON program which computes daily mean concentrations and supplies punched output card images in the packed format 71-102.

The decision was made in 1973 to automate the publication of the sediment data, which required the creation of four additional data files. In 1986 these data files were combined into the following three files: INSTANTANEOUS, BEDLOAD and SEDEX. This section briefly outlines the procedures for Coding and Keypunching of the sediment data for inclusion to the above mentioned files at Headquarters.

For additional information and greater detail, reference should be made to the Sediment Data Files Operation Manual, 1987.

5.1 General Instructions for SEDCON Output Format

This format is produced from the SEDCON program. The following outlines the general instructions for keypunching the output if required for updating purposes.

The data are to be punched by the month, a new line is started for each month. For a month with either full or partial records, start punching on the first day for which a figure and/or symbol is shown and stop punching on the last day of the month for which a figure and/or symbol is shown. The data fields are punched "free form", without right or left justification or padding. For each day, punch the figure (if any), then the symobl (if any) followed by a (+) sign to indicate the end of that field. For the data field for each day, punch all digits (including zero) and the decimal point (if any) but do not allow for blanks.

For months which are incomplete, enter only a (+) sign for the missing days between the terminal days for which there is a record, for example, if values of 123S are shown only for March 4, 7 and 10, enter 04 in Col. 16-17, then starting in col. 21, enter as follows: 123S+++123S+++123S+ (no blanks).

The data field must be complete on each line, i.e., the last field on any line should not overflow into the next. Digits or letters after the last (+) sign on that line will be ignored. Therefore, if the (+) sign indicating the end of the last field was not entered, then completely repunch the last field into the next.

Symbols in the data field are shown to the right of the numeric value as the letters E, N, S or X (all other letters are to be rejected).

5.1.1 Sediment Concentrations in Format 71-102

Column(s)

1	is numeric and indicates the type of data: 7 concentrations for milligrams per litre
2	is numeric and indicates the Region as follows: 2 for Vancouver 6 for Longueuil 3 for Calgary 7 for Dartmouth 4 for Winnipeg 8 for Regina 5 for Guelph 9 for Yellowknife
3-9	contain the station number, e.g. 05AA001
10-12	are the last three digits of the year, e.g. 980 for 1980
13-15	are the first three letters of the month, e.g. JAN for January
16-17	are numeric, indicating the day corresponding to the first data field, e.g. 08
18-20	are blank
21-80	are numeric and/or alphabetic and are "free form" data fields.

THE ONLY PERMISSIBLE ALPHABETIC CHARACTERS ARE:

"S" - to indicate a sampled value (stored as a symbol code on SUSCON)
"E" - to indicate an estimated value (stored as a symbol code on SUSCON)
"X" - to delete the value and symbol from SUSCON
"N" - to delete the symbol only from SUSCON

"N" and "X" never occur with numeric values. "S" and "E" may occur with a numeric value, or by themselves. In the latter case, the Symbol code is placed in SUSCON without affecting the numeric value already there. On the other hand, if a numeric value is entered without a symbol code, the symbol code already on SUSCON (if any) is deleted.

5.1.2 Valid Extreme Codes in Format 74-103

Normally, if a year (or standard period) of concentration data is incomplete, the extremes of concentration and of the derived "tonnes" values are not considered to be valid for the year and will not appear in the summaries. It is possible, however, to designate as valid one or both extremes for a station-year with incomplete records. The designation of a concentration extreme as valid must also apply to the tonnes extreme if there are any flow data available for that station-year. Thus only the following combinations are possible:

(1) If concentration and flow records are complete, then both the maximum and the minimum concentrations and tonnes are valid.

(2) If the concentration record is complete but flow is incomplete, then:

(a) maximum and minimum concentrations are valid and either

(b) (i) both maximum and minimum tonnes are invalid, if no valid extremes are designated or

(ii) one or both tonnes extremes are designated valid.

Note: Case 2 shows that the valid extremes designation may be needed even when the concentration record is complete.

(3) If the concentration record is incomplete then either:

(a) both maximum and minimum concentrations and tonnes are invalid, if no valid extremes are designated or

(b) maximum concentration and tonnes are both valid if designation is "H" or "B" and minimum concentration and tonnes are both valid if designation is "L" or "B".

(4) If there are no flow data for the station-year, then there are no tonnes values, and the valid extremes designation, if any, applies only to the concentrations.

Valid extreme codes for incomplete records are keypunched in the following format:

Column(s)	Description
1	type of record, 7 for SUSCON data
2	Region code, 2 to 9
3-9	station number, e.g. 03AC007
10	blank
11-14	year
15	blank
16	valid extreme code for an incomplete year or an incomplete standard period: B - Both the minimum and the maximum within the incomplete standard period are to be considered valid extremes H - only the maximum within the incomplete standard period is to be considered a valid extreme L - only the minimum within the incomplete standard period is to be considered a valid extreme X - the original entry was incorrect and the B, H or L is to be deleted
17-80	blank

6. INSTANTANEOUS DATA FILE @ WSC

This section briefly outlines the preparation of entering sediment data to be submitted to update the INSTANTANEOUS file either by the creation of new records or by the modification or deletion of existing records.

The INSTANTANEOUS file contains data of four distinct types representing particle size analysis of depth-integrating (DI), point-integrating (PI), bed load (BL) and bed material (BM). Each DI, BL and BM record contains the analysis of a measurement (consisting of one or more samples) collected at a sediment station at a particular day and time. Each PI record contains the analysis of a sample collected at a fixed depth of one vertical within the entire point-integrating measurement at a station at a particular day and time.

Each format corresponds to one record on the INSTANTANEOUS file. The Format will have one of two functions: to create a new record or to modify an existing record. The format is matched to a INSTANTANEOUS record through the record-identifying fields. If the format matches an existing INSTANTANEOUS record, i.e. has the same record-id, its contents will be used to modify or create a new record.

6.1 Set-up Instructions for Running @ WSC

The procedures outlined are for entering suspended sediment data into the PDP11/44 minicomputer using the @ WSC procedures:

The following files must be resident on the USER IDENTIFICATION CODE (UIC) from which the user is invoking the @ WSC procedure:

NAME.STR - MASTER NAME FILE; if the name of the sediment station is not in the file, a warning message will appear at the bottom of the screen notifying you of this fact. It may be added to the file by calling up the @ WSC procedure, asking for SEDIMENT from the MAIN MENU, and then asking for the STATION NAME FILE. Once inside, key in the station number and your initials (just TWO) and press <RETURN> twice to put the cursor in the STATION NAME field. Type in the name and press <RETURN>. If you have no additional stations press <RETURN> until the cursor returns to the top of the form in the station number field. To exit, press <RETURN> twice.

INnn.SED - MASTER DEPTH INTEGRATING INSTANTANEOUS DATA FILE. This file will contain all the instantaneous sediment on the Depth Integrating Form. This file is created automatically when you EXIT and UPDATE from the FORM.

6.2 General Operating Procedures for @ WSC Procedure

1. LOGIN TO YOUR ACCOUNT AND INVOKE THE "WSC" PROCEDURE BY TYPING "@ WSC<RETURN>". WHEN <RETURN> IS PRESSED A SERIES OF MENUS WILL APPEAR.

2. DATA ENTRY FORMS MAY BE INVOKED BY CHOOSING THE "DATA ENTRY" OPTION FROM THE "SEDIMENT" MENU AND PRESSING <RETURN>.

3. THE FORMS CONTAIN 3 MAIN AREAS FOR INFORMATION ENTRY AND DISPLAY:

   "INFORMATION FIELDS"
   - THIS IS THE AREA WHERE INFORMATION IS FIRST ENTERED. IT IS LOCATED AT THE UPPER LEFT HAND CORNER OF THE SCREEN, I.E., "STATION NUMBER"

"DATA LINE"
- THIS IS A 6-8 LINE SCROLLED REGION, EACH LINE IS MADE UP OF SEVERAL FIELDS. DATA IS ENTERED UNDER THE APPROPRIATE FIELD HEADING.

"MESSAGE LINE"
- THE BOTTOM LINE OF THE FORM IS RESERVED FOR ERROR' WARNING AND HELP INFORMATION MESSAGES WHEN REQUIRED.

4. VALID KEYS WITHIN THE "INFORMATION FIELDS" ARE:

RETURN - THE "<RETURN>" ALLOWS THE USER TO MOVE FORWARD FROM FIELD TO FIELD.

BACKSPACE - THE "<BACKSPACE>" ALLOWS BACKSPACING FROM FIELD TO FIELD

TAB - THE "<TAB>" WILL ALLOW THE USER TO EXIT AND DISPLAY THE "DATA ENTRY" MENU.

5. VALID KEYS WITHIN A "DATA LINE" ARE:

RETURN & ENTER - THE "<RETURN>" AND "<ENTER>" WILL ADVANCE THE CURSOR FORWARD FROM ONE FIELD TO THE NEXT FIELD.

DELETE - THE "<DELETE>" WILL ALLOW DELETION OF CHARACTERS WITHIN A RIGHT JUSTIFIED FIELD (GENERALLY A NUMERIC FIELD).

<— - THE "<BACK ARROW>" ALLOWS THE USER TO MOVE BACKWARD WITHIN A FIELD.

↓ - THE "<DOWN ARROW>" PERMITS THE USER TO SCROLL DOWNWARD FROM A FIELD WITHIN THE "DATA LINE". WHEN THIS IS DONE THE NEXT RECORD WILL BE DISPLAYED OR THE CURRENT RECORD WILL BE REDISPLAYED IF IT IS THE LAST RECORD. THIS OPERATION SHOULD BE PERFORMED SLOWLY.

↑ - THE "<UP ARROW>" PERMITS THE USER TO SCROLL UPWARD FROM ANY FIELD WITHIN THE "DATA LINE". WHEN THIS IS DONE THE PREVIOUS RECORD WILL BE DISPLAYED OR A MESSAGE INDICATING THE TOP OF FILE HAS BEEN REACHED. THIS OPERATION SHOULD BE PERFORMED SLOWLY.

BACKSPACE - THE "<BACKSPACE>" KEY WILL ALLOW YOU TO BACKSPACE FROM FIELD TO FIELD EXCEPT AS INDICATED IN (SECTION 7.1 14).

PF3 or TAB - THE "<PF3>" OR "<TAB>" TO OPEN THE NEXT LINE READY TO ENTER DATA.

NOTE: THE LINE THAT THE CURSOR IS ON WILL APPEAR TO HAVE BEEN DELETED BUT IT HAS NOT. ENTER YOUR NEW LINE OF DATA.

PF2 - HELP KEY WHICH WILL DISPLAY A LINE OF INFORMATION ON THE EMSSAGE LINE PERTAINING TO THE FIELD THE CURSOR IS LOCATED IN.

LINEFEED - THE "<LINEFEED>" KEY WILL CLEAR THE FIELD THAT THE CURSOR IS POSITIONED IN.

6. EACH FORM HAS SPECIAL OPTIONS VALID WITHIN THE "INTERPRET FIELD" OF THE "DATA LINE" OF THE FORM.

THE "INTERPRET FIELD" IS THE FIRST FIELD IN WHICH THE CURSOR APPEARS IN A "DATA LINE" BUT THERE MAY BE TWO "INTERPRET FIELDS" A SIN THE CASE OF THE BEDLOAD & BED MATERIAL FORMS ("MON" & SAMPLING VERTICAL" FIELDS)

THE SPECIAL OPTIONS WITHIN THESE FIELDS ARE AS FOLLOWS:

D - "D " WILL DELETE AN EXISTING RECORD.
I.E., "D" IN COLUMN 1 FOLLOWED BY SPACE SPACE.

T - "T " WILL DISPLAY THE FIRST RECORD ON THE FOLLOWING LINE.

B - "B " WILL DISPLAY THE LAST RECORD ON THE FOLLOWING LINE.

I - "I " WILL ALLOW THE USER TO INSERT A RECORD BEFORE THE FIRST RECORD ON A FILE. THIS SYMBOL IS ONLY VALID WHEN THE CURSOR IS ON THE FIRST RECORD POSITION.

RETURN - IF THE FIRST FIELD IS BLANK AND THE RETURN KEY IS PRESSED A MESSAGE WILL APPEAR.

"ENTER MONTH OR PRESS RETURN TO EXIT"

IF <RETURN> IS PRESSED THE PROCEDURE WILL EXIT AND THE "DATA ENTRY MENU" WILL BE DISPLAYED. AT THIS POINT THE CORRECTIONS ENTERED WILL BE SAVED UNTIL UPDATED TO THE MASTER FILE (OPTION 6 FROM MENU).

BACKSPACE - IF THE FIRST FIELD IS BLANK AND THE <BACKSPACE> IS PRESSED A MESSAGE WILL APPEAR:

"ENTER MONTH OR PRESS BACKSPACE TO ABORD"

IF <BACKSPACE> IS PRESSED THE PROCEDURE WILL ABORT AND THE "DATA ENTRY MENU" WILL BE DISPLAYED. AT THIS POINT THE CORRECTIONS ENTERED FOR THAT STATION WILL BE IGNORED.

6.3 Instructions for the Instantaneous Suspended Sediment Form

When logged into the MINI the prompt sign ($>) will appear.

1. To engage the procedure,enter @ WSC followed by <RETURN>.

   The display will be: MAIN MENU

   0 - STOP
   1 - HYDROMETRIC DATA
   2 - SEDIMENT DATA
   3 - MAP DATA
   4 - DIGITAL DATA
   5 - SUB OFFICE DATA
   6 - DATA ANALYSIS

2. From the MAIN MENU choose SEIDMENT DATA: 2 followed by <RETURN>.

   The display will be: SEDIMENT MENU.

   0 - STOP
   1 - DATA ENTRY
   2 - STATION NAME
   3 - DIGITIZING
   4 - SEDCON MENU
   5 - RETURN TO MAIN MENU

3. From the SEIDMENT MENU choose DATA ENTRY: 1 followed by <RETURN>.

   The display will be: SEDIMENT DATA ENTRY MENU

   0 - ABORT AND RETURN TO SEDIMENT MENU
   1 - UPDATING CORRECTIONS
   2 - INSTANTANEOUS SUSPENDED SEDIMENT
   3 - POINT INTEGRATING PARTICLE-SIZE
   4 - BED LOAD PARTICLE-SIZE
   5 - BED MATERIAL PARTICLE-SIZE
   6 - UPDATING AND RETURN TO SEDIMENT MENU

4. From the SEDIMENT DATA ENTRY MENU choose number (2):
   INSTANTANEOUS SUSPENDED SEDIMENT followed by <RETURN>.

   The INSTANTANEOUS SUSPENDED SEDIMENT FORM will appear with the cursor in the space to the right of STATION NUMBER OF THE INFORMATION FIELD.

5. Enter the STATION NUMBER but DO NOT PRESS <RETURN>. The cursor will advance automatically to the next field, displaying the station name, and will advance automatically to the YEAR of data. If the station name is not on file, a warning message will appear informing you of this fact. This is of no great concern at this time. Simply add the name to the file later.

6. Enter the LAST 2 digits for the year of data. DO NOT PRESS RETURN. The cursor will automatically advance to the INITIAL field.

7. Enter your initials (just TWO). DO NOT PRESS <RETURN>, the cursor will appear temporarily next to the message displayed at the bottom left of the screen: SEARCHING FOR STATION.

6.3.1 For a New File

1. Enter the MONTH, DAY, and TIME when sample was collected. Do NOT press RETURN after each entry.
   If the TIME has not been recorded on the sediment files it must be estimated and coded with a symbol (E).

2. Enter the WATER TEMPERATURE at the time of sample collection. The temperature should be in celsius degrees with one decimal, i.e., 10.0. In the case the cursor will advance automatically to the next field. If the temperature is entered only as 10, press <RETURN> to advance the cursor to the next field. In the case as the cursor advances the temperature will appear as 10.0.

3. Enter the INSTANTANEOUS DISCHARGE at the time of sampling. The standard significant figure rules apply. Where applicable a (0) negative discharge will be accepted. THE ONLY ACCEPTABLE SYMBOLS FOR THE INSTANTANEOUS DISCHARGES ARE:

   A - MANUAL GAUGE
   B - ICE CONDITIONS
   E - ESTIMATED

NOTE: (a) IF THE INSTANTANEOUS DISCHARGE IS UNATTAINABLE, LEAVE THE COLUMN BLANK. PRESS THE <RETURN> TO ADVANCE TO THE NEXT FIELD. THE PROGRAM IN HEADQUARTERS WILL READ THE FLOW FILE AND ENTER THE APPLICABLE SYMBOL AND NOTE, AS FOLLOWS:

   H - DAILY MEAN
   V - DAILY MEAN ; MANUAL GAUGE
   W - DAILY MEAN ; ICE CONDITIONS
   Y - DAILY MEAN ; ESTIMATED

(b) FOR SUSPENDED SEDIMENT MEASUREMENTS (FIVE VERTICALS) THE PANEL DISCHARGE, TO BE ENTERED, WILL BE THE COMPUTED DISCHARGE FOR EACH OF THE SEDIMENT SAMPLING VERTICALS.

(c) FOR THE SINGLE VERTICAL COLLECTED DURING A SUSPENDED SEDIMENT MEASUREMENT THE INSTANTANEOUS DISCHARGE WILL BE THE TOTAL DISCHARGE FOR THE FLOW MEASUREMENT.

4. Enter the remaining data for each field, press <RETURN> to advance to the next field if data unknown.

NOTE: (a) A concentration value MUST be entered or a warning message will appear and prevent you from continuing. The concentration value entered should be the sampled concentration as recorded by the Laboratory. IF A CONCENTRATION VALUE IS SUSPICIOUS AND NOT USED, THE VALUE SHOULD NOT BE ENTERED.

(b) If the laboratory lists a concentration for the A and B sample enter each line of data into the computer.

NOTE: THE TIME OF THE SAMPLE COLLECTION FOR A AND B MUST BE DIFFERENT BY AT LEAST ONE MINUTE.

(c) Split vertical sampling MUST have the TOP sample coded with the symbol (T), while the BOTTOM sample MUST be coded with the symbol (B); See Section 6.4.5

(d) If a reminder of the acceptable symbols and/or designations for a specific field (e.g., Sampler Type) is required, press <PF2> to display the symbols for that field. The cursor must be in the field for which you desire the HELP.

5. After entering the appropriate data in the DISSOLVED SOLIDS field (a value or a blank), press <RETURN> if particle size data is to be entered, otherwise, press <PF3> to bypass this section. However, once in the particle size section, the only way to exit is to continue pressing <RETURN> until the end of the section.

6. After the <RETURN> or <PF3> have been pressed at the end of a data entry, the cursor will advance to the next line, duplicating the MONTH, SINGLE VERTICAL and SAMPLER TYPE. To change any of these fields, move the cursor to the desired field to enter the new data and/or press the <SPACE BAR> to remove extraneous characters.

7. To change data in any of these fields, the cursor should be in the left most side of the field. Type in the data over the old, use the <SPACE BAR> to eliminate existing data. However, if the cursor is in the right most side of the field, the <DELETE> must be used to remove all characters before entering new data.

8. To EXIT from the form program (the cursor must be in the MONTH field) press <LINE FEED> to delete the MONTH, then press <RETURN>. The display will be: ENTER MONTH OR PRESS <RETURN> TO EXIT.

   If <RETURN> is pressed to EXIT, the SEDIMENT DATA ENTRY MENU is displayed. Choose one of the following:

   0 - ABORT (all data entered during the session will be lost)
   6 - UPDATE AND RETURN TO SEDIMENT MENU

6.3.2 For Data Already on File

After the information field has been completed, the first and last lines of the data on file will be displayed, with the cursor locating itself on the first (TOP) line of the data. To move up or down within the data, press the <UP ARROW> or <DOWN ARROW> slowly. The cursor only moves line-by-line.

1. INSERTING ADDITIONAL DATA AT THE BEGINNING OF A FILE

   Enter "I" as the first character followed by <SPACE BAR> <SPACE BAR>. A blank line will appear to enter the new data.

2. INSERTING ADDITIONAL DATA WITHIN THE FILE

   Press the <DOWN ARROW> until the cursor is positioned on the line above the desired insertion point. Press <PF3> to open a new line for inserting any additional new data. Enter the desired data as previously explained.

3. INSERTING ADDITIONAL DATA AT THE END OF THE FILE

   Enter "B", followed by <SPACE BAR> <SPACE BAR>, to advance to the BOTTOM of the file. Press <PF3> to open a new line. Enter the desired data as previously explained.

6.4 Acceptable Symbols and/or Designations

6.4.1 Instantaneous Discharge Symbols:

BLANK - INSTANTANEOUS DISCHARGE
A - MANUAL GAUGE
B - ICE CONDITIONS
E - ESTIMATED

NOTE: SEE 3.1.3: THE DAILY MEAN DISCHARGE WILL BE ENTERED FROM THE FLOW FILES AT HEADQUARTERS AUTOMATICALLY.

6.4.2 Single Vertical Location

DIGITS (e.g., 5, 14, 130, etc.)
WERB - Water's Edge RIGHT Bank
WELB - Water's Edge LEFT Bank
1QRB - One quarter the distance FROM the RIGHT Bank
3QRB - Three quarters the distance FROM the RIGHT Bank
1QLB - One quarter the distance FORM the LEFT Bank
3QLB - Three quarters the distance FROM the LEFT Bank
MID - MID STREAM
MULT - Composite sediment measurement
BLANK- Vertical UNKNOWN, three dashes (---) will be displayed

6.4.3 Single Vertical Symbols

BLANK - the regular single sampling vertical
K - not a regular single vertical from LEFT Bank
L - a sediment measurement vertical not at the regular measurement cross-section from LEFT Bank
M - a sediment measurement vertical
X - not at regular single sampling vertical
Z - a sediment measurement vertical not at the regular measurement cross-section

NOTE: 1. THE symbols M,X,Z, OR BLANK, are assumed to be from RIGHT Bank

2. Each of the verticals of the suspended sediment measurement must be entered giving the location of the sampling vertical with the symbol (M) to indicate that it is one of the sediment measurement verticals.

6.4.4 Sampler Types

DH48; DH59; D49; D74; D77; P61; P63; P72; PWS; PS82;
DIP - for sample collected using sample bottle ONLY
PUMP - an automatic sampling device
SURF - for sample collected at the surface using a sampler
BLANK - for sampler UNKNOWN, three dashes (---) will be displayed

NOTE: Hyphen (-) between the alpha and numeric characters will not be accepted (e.g., D-49 will NOT be allowed)

6.4.5 Instantaneous Concentration Symbols

B - SPLIT SAMPLE BOTTOM PORTION ONLY
C - COARSE MATERIAL PRESENT

F - SAMPLE BOTTLE FILLED
G - ORGANIC MATERIAL PRESENT
T - SPLIT SAMPLE TOP PORTION ONLY

6.5 Special Function Keys for the Instantaneous Suspended Sediment Form

When entered in the FIRST column of the MONTH field, the following codes will perform their designated functions.

D - "D " WILL DELETE AN EXISTING RECORD
I.E., D IN COLUMN 1 FOLLOWED BY <SPACE> <SPACE>.

T - "T " WILL DISPLAY THE FIRST RECORD ON THE FOLLOWING LINE.

B - "B " WILL DISPLAY THE LAST RECORD ON THE FOLLOWING LINE.

I - "I "WILL ALLOW THE USER TO INSERT A RECORD BEFORE THE FIRST RECORD ON A FILE. THIS SYMBOL IS ONLY VALID WHEN THE CURSOR IS ON THE FIRST RECORD POSITION.

RETURN - IF THE FIRST FIELD IS BLANK AND THE <RETURN> IS PRESSED A MESSAGE WILL APPEAR:

"ENTER MONTH OR PRESS <RETURN> TO EXIT"

IF <RETURN> IS PRESSED THE PROCEDURE WILL EXIT AND THE "SEDIMENT DATA ENTRY" MENU WILL BE DISPLAYED. AT THIS POINT THE DATA ENTERED PREVIOUSLY WILL BE SAVED UNTIL UPDATED TO THE MASTER FILE (OPTION 6 FROM MENU).

BACKSPACE - IF THE FIRST FIELD IS BLANK AND THE <BACKSPACE> IS PRESSED A MESSAGE WILL APPEAR:

"ENTER MONTH OR PRESS <BACKSPACE> TO ABORT"

IF <BACKSPACE> IS PRESSED THE PROCEDURE WILL ABORT AND THE "SEDIMENT DATA ENTRY" MENU WILL BE DISPLAYED. AT THIS POINT THE DATA ENTERED PREVIOUSLY FOR THE STATION WILL BE IGNORED.

LINE FEED - BY PRESSING <LINE FEED> ALL THE INFORMATION IN A FIELD WILL BE DELETED.

6.6 Procedures to Exit from the Data Entry Option

6.6.1 From Within a Form

NOTE: THE CURSOR MUST BE IN THE MONTH FIELD TO EXECUTE THE FOLLOWING:

EXIT - IF THE MONTH FIELD IS NOT BLANK PRESS <LINE FEED> TO DELETE THE MONTH. THE NOTE "RECORD INSERTION" WILL APPEAR.

- PRESS <RETURN>, THE NOTE "ENTER MONTH OR PRESS <RETURN> TO EXIT" WILL APPEAR.

- PRESS <RETURN> AGAIN AND THE NOTE:
"SEDIMENT DATA ENTRY MENU" WILL APPEAR.

- SELECT OPTION "2" IF MORE STATIONS ARE TO BE ENTERED.

ABORT - THE CURSOR MUST BE IN THE MONTH FIELD.

- IF THE MONTH FIELD IS NOT BLANK PRESS <LINE FEED> TO DELETE THE MONTH!

- PRESS <BACKSPACE>, THE FOLLWOING NOTE WILL APPEAR:

  "ENTER THE MONTH OR PRESS <BACKSPACE>

- PRESS <BACKSPACE> AGAIN. A MESSAGE "WORKING" WILL APPEAR AND THEN THE "SEDIMENT DATA ENTRY MENU" WILL BE DISPLAYED.

NOTE: ONLY THE CORRECTIONS ENTERED FOR THE CURRENT STATION WILL BE DELETD. ALL PREVIOUS CORRECTIONS WILL REMAIN UNTIL MASTER FILE IS UPDATED.

6.6.2 From the Data Entry Menu

UPDATE - RETURN TO "DATA ENTRY" MENU VIA THE EXIT OR ABORT PROCEDURE.

- ENTER "6" AND PRESS <RETURN>, ALL CORRECTIONS ENTERED DURING THE SESSION WILL BE UPDATED WITH THEIR RESPECTIVE FILES. WHEN UPDATING HAS BEEN COMPLETED THE PROCEDURE WILL RETURN TO THE SEDIMENT MENU.

ABORT - ENTER OPTION "0" AND PRESS <RETURN>, ALL DATA ENTERED DURING THE SESSION WILL NOT BE UPDATED.

6.7 Instructions for the Point Integrating Particle-Size Form

When logged into the MINI the prompt sign ($>) will appear.

1. To engage the procedure, enter @ WSC followed by <RETURN>.

   The display will be: MAIN MENU

   0 - STOP
   1 - HYDROMETRIC DATA
   2 - SEDIMENT DATA
   3 - MAP DATA
   4 - DIGITAL DATA
   5 - SUB OFFICE DATA
   6 - DATA ANALYSIS

2. From the MAIN MENU choose SEDIMENT DATA: 2 followed by <RETURN>.

   The display will be: SEDIMENT MENU

   0 - STOP
   1 - DATA ENTRY
   2 - STATION NAME
   3 - DIGITIZING
   4 - SEDCON MENU
   5 - RETURN TO MAIN MENU

3. From the SEDIMENT MENU choose DATA ENTRY: 1 followed by <RETURN>

   The display will be: SEDIMENT DATA ENTRY MENU

   0 - ABORT AND RETURN TO SEDIMENT MENU
   1 - UPDATING CORRECTIONS
   2 - INSTANTANEOUS SUSPENDED SEDIMENT
   3 - POINT INTEGRATING PARTICLE-SIZE
   4 - BED LOAD PARTICLE-SIZE
   5 - BED MATERIAL PARTICLE-SIZE
   6 - UPDATING AND RETURN TO SEDIMENT MENU

4. From the SEDIMENT DATA ENTRY MENU choose number (3):
   POINT INTEGRATING PARTICLE-SIZE followed by <RETURN>.

   The POINT INTEGRATING PARTICLE-SIZE FORM with the cursor to the left of STATION NUMBER will be displayed.

5. Enter the STATION NUMBER. The cursor will advance automatically to the next field, entering the name of the station, and will advance automatically to the YEAR of data. If the station name is not on file, a warning message will appear informing you of this fact. This is of no great concern at this time. Simply put the name into the file later.

6. Enter the LAST 2 digits for the year of data. DO NOT PRESS <RETURN>. The cursor will automatically advance to the initial field.

7. Enter your initials (just TWO). DO NOT PRESS <RETURN>, the cursor will appear temporarily next to the emssage displayed at the bottom of the screen: SEARCHING FOR STATION. The display will be the FORM.

6.7.1 For a New File

The cursor will appear on the top line in the first column of the first field, i.e. (MONTH) and will wait until the month is entered. To advance from field to field, press <RETURN>. To go back from field to field, press <BACKSPACE>.
If a reminder of the acceptable symbols and/or designations for a specific field (e.g., Sampler Type) is required, press <PF2> to display the symbols for that field. The cursor must be in the field for which you desire the HELP. These messages will appear at the lower left of the screen.

8. Enter the MONTH, DAY and TIME, when sample was collected. Do NOT press <RETURN> after each entry. If the TIME is not available, press <RETURN> (--- will appear for TIME unknown).

9. Enter the WATER TEMPERATURE in Celsius degrees at the time of sample collection. If the WATER TEMPERATURE is not available press <RETURN> (--- will appear for WATER TEMPERATURE unknown).

10. Enter the INSTANTANEOUS DISCHARGE at time of sampling. Standard significant figure rules should apply. Where applicable a (-) negative discharge will be accepted.

NOTE: FOR POINT INTEGRATING SEDIMENT MEASUREMENTS (FIVE VERTICALS) THE INSTANTANEOUS DISCHARGE, TO BE ENTERED, WILL BE THE COMPUTED DISCHARGE FOR EACH OF THE SEDIMENT SAMPLING VERTICAL PANELS.

11. Enter the SAMPLING VERTICAL LOCATION. Standard significant figure rules should apply. Press <RETURN> (SEE SECTION 8.2).

12. Enter DEPTH OF SAMPLE. The depth should be to the nearest decimetre less than 10, to the nearest centimetre between 10 and 100, and to hte nearest one metre greater than 100.

13. Enter the remaining data for each field, i.e., SAMPLER TYPE, CONCENTRATION OF SAMPLE, DISSOLVED SOLIDS, and the PERCENT FINER values IN MILLIMETRES. If the data is UNKNOWN press <RETURN> to advance to the next field.

NOTE: (a) If there are no PERCENT FINER values available, due to loss of sample or sample analysis etc., one of the following message notes must be entered in the PERCENT FINER field.

THE MESSAGE NOTES ARE: M1 "DATA NOT AVAILABLE"
M2 "SAMPLE DESTROYED"
M3 "SAMPLE COMBINED WITH DEPTH BELOW"

(b) If the concentration value is not available the CONCENTRATION field must be acknowledged, therefore enter "0" then press <RETURN>. The cursor will advance to the DISSOLVED SOLIDS field. If it is also not available press <RETURN>. The cursor will advance to the PERCENT FINER field. Enter the appropriate note as M2, M2, or M3. Press <PF3> then <RETURN>. The message "RECORD INSERTION" will appear and the cursor will advance to the next line. Press "UP ARROW" then RETURN until the cursor is at the "0". Press BACKSPACE to the TYPE OF SAMPLER field, press <PF3>, the message "RECORD INSERTION" will be displayed and the cursor will be on the next line. Only the "DATE" and "SAMPLER TYPE" will be duplicated. Procede entering the next sample.

14. To enter the STREAMBED DEPTH, enter the DEPTH of SAMPLE, and advance the cursor to the CONCENTRATION field. Press <BACKSPACE>, follow by <PF3>. The message "PRESS RETURN FOR STREAMBED--OR--ENTER THE VALUE" will appear. Press RETURN and the symbols "SB" will appear in the "PERCENT FINER" field to represent the "STREAMBED". The cursor will advance to the next line. The MONTH, DAY, WATER TEMPERATURE, SAMPLING VERTICAL and the TYPE OF SAMPLER will be duplucated and the cursor will stop in the TIME field.

15. Enter the DISSOLVED SOLIDS. If no particle size data is available press <PF3>. The cursor will advance to the next line. The MONTH, DAY, WATER TEMPERATURE, SAMPLING VERTICAL, and TYPE OF SAMPLER will be duplicated. However if particle size data is available simply press <RETURN> to advance to the PERCENT FINER field. When the end of the field is reached or 100 percent is entered the cursor will automatically advance to a new line and will duplicate the above information. To change the data in any of these fields, enter the new data into the field and press the <SPACEBAR> to remove any extraneous characters.

16. To change data in any of these fields, the cursor could be in the left or right position of the data field. If the cursor is in the left most position, simply type in the new data over the old data. Use the <SPACEBAR> to eliminate existing data. However, if the cursor is in the right most position of the field, the <DELETE> key must be used to remove all characters before entering new data.

17. TO EXIT from the form, the cursor must be in the MONTH field, press the <LINE FEED> to delete the MONTH, then press <RETURN>. The display will be:

ENTER MONTH OR PRESS RETURN TO EXIT

If <RETURN> is pressed to EXIT the SEDIMENT DATA ENTRY MENU is displayed. Choose one of the following.

0 - ABORT (this will abort and all data entered during the session will be lost)
6 - UPDATE AND RETURN TO MAIN MENU

6.7.2 For Data Already on File

After the information field has been completed, the first and last lines of the data on file will be displayed, with the cursor locating itself on the first (TOP) line of the data. Press the <UP> or <DOWN ARROW> slowly to move the cursor up or down line-by-line within the data.

1. Inserting Additional Data at the Beginning of a File

Enter "I" as the first character followed by <SPACE> <SPACE>. A blank line will appear to enter the new data.

2. Inserting Additional Data within the File

Press the <DOWN ARROW> until the cursor is positioned on the line above the desired insertion point. Press <PF3> to open a new line for inserting additional new data. Enter the desired data as previously explained.

3. Inserting Additional Data at the End of the File

To add data at the end of a file, press "8", followed by <SPACE> <SPACE>. Press <PF3> to open a new line to insert the new data. Enter the desired data as previously explained.

6.8 Acceptable Symbols and/or Designations

6.8.1 Instantaneous Discharge Symbols:

BLANK - INSTANTANEOUS DISCHARGE
A - MANUAL GAUGE
B - ICE CONDITIONS
E - ESTIMATED

6.8.2 Single Vertical Location

DIGITS (e.g., 5, 14, 130, etc.)
MID - MID STREAM
MULT - Composite sediment measurement
BLANK - Vertical UNKNOWN, three dashes (---) will be displayed

6.8.3 Sampler Types

P61; P63; P72; PWS; PS82; SURF
PUMP: an automatic sampling device
SURF: for sample collected at the surface using a sampler
BLANK for sampler UNKNOWN, three dashes (---) will be displayed

NOTE: Hyphens (-) between the alpha and numeric characters will not be accepted (e.g., P-61 will NOT be allowed)

6.8.4 Concentration Symbols

C - COARSE MATERIAL PRESENT
F - SAMPLE BOTTLE FILLED
G - ORGANIC MATERIAL PRESENT

6.9 Special Function Keys for the Point Integrating Particle-Size

When entered in the FIRST column of the MONTH field, the following codes will perform their designated functions.

D - "D " WILL DELETE AN EXISTING RECORD
I.E., D IN COLUMN 1 FOLLOWED BY <SPACE> <SPACE>.

T - "T " WILL DISPLAY THE FIRST RECORD ON THE FOLLOWING LINE.

B - "B " WILL DISPLAY THE LAST RECORD ON THE FOLLOWING LINE.

I - "I "WILL ALLOW THE USER TO INSERT A RECORD BEFORE THE FIRST RECORD ON A FILE. THIS SYMBOL IS ONLY VALID WHEN THE CURSOR IS ON THE FIRST RECORD POSITION.

RETURN - IF THE FIRST FIELD IS BLANK AND THE <RETURN> IS PRESSED A MESSAGE WILL APPEAR:

"ENTER MONTH OR PRESS <RETURN> TO EXIT"

IF <RETURN> IS PRESSED THE PROCEDURE WILL EXIT AND THE "SEDIMENT DATA ENTRY" MENU WILL BE DISPLAYED. AT THIS POINT THE DATA ENTERED PREVIOUSLY WILL BE SAVED UNTIL UPDATED TO THE MASTER FILE (OPTION 6 FROM MENU).

BACKSPACE - IF THE FIRST FIELD IS BLANK AND THE <BACKSPACE> IS PRESSED A MESSAGE WILL APPEAR:

"ENTER MONTH OR PRESS <BACKSPACE> TO ABORT"

IF <BACKSPACE> IS PRESSED THE PROCEDURE WILL ABORT AND THE "SEDIMENT DATA ENTRY" MENU WILL BE DISPLAYED. AT THIS POINT THE DATA ENTERED PREVIOUSLY FOR THE STATION WILL BE IGNORED.

6.10 Procedures to Exit from the Data Entry Option

6.10.1 From Within a Form

NOTE: THE CURSOR MUST BE IN THE MONTH FIELD TO EXECUTE THE FOLLOWING:

EXIT - PRESS <LINE FEED> TO DELETE THE MONTH FIELD.
THE NOTE "RECORD INSERTION" WILL APPEAR.

- PRESS <RETURN>, THE NOTE "ENTER MONTH OR PRESS <RETURN> TO EXIT" WILL APPEAR.

- PRESS <RETURN> AGAIN AND THE "SEDIMENT DATA ENTRY MENU" WILL APPEAR.

- PRESS "2" IF MORE STATIONS ARE TO BE ENTERED.

ABORT - PRESS <LINE FEED> TO DELETE THE MONTH:
THE CURSOR WILL MORE TO THE NEXT LINE AND DISPLAY THE "MONTH"
THE MESSAGE "RECORD INSERTION" WILL APPEAR!

- PRESS "RETURN THE NOTE:

"ENTER THE MONTH OR PRESS <BACKSPACE> WILL APPEAR.

NOTE: ONLY THE CORRECTIONS ENTERED FOR THE CURRENT STATION WILL BE DELETD. ALL PREVIOUS CORRECTIONS WILL REMAIN UNTIL MASTER FILE IS UPDATED.

6.10.2 From the Data Entry Menu

UPDATE - RETURN TO "DATA ENTRY" MENU VIA THE EXIT OR ABORT PROCEDURE.

- ENTER "6" AND <RETURN>, ALL CORRECTIONS ENTERED DURING THE SESSION WILL BE UPDATED WITH THEIR RESPECTIVE FILES. WHEN UPDATING HAS BEEN COMPLETED THE PROCEDURE WILL RETURN TO THE SEDIMENT MENU.

ABORT - ENTER OPTION "0" AND PRESS <RETURN>, ALL DATA ENTERED DURING THE SESSION WILL NOT BE UPDATED.

6.11 Instructions for the Bed Load Particle-Size Form

When logged into the MINI the prompt sign ($>) will appear.

1. To engage the procedure, enter @ WSC followed by <RETURN>.

The display will be: MAIN MENU

0 - STOP
1 - HYDROMETRIC DATA
2 - SEDIMENT DATA
3 - MAP DATA
4 - DIGITAL DATA
5 - SUB OFFICE DATA
6 - DATA ANALYSIS

2. From the MAIN MENU choose SEDIMENT DATA: 2 followed by <RETURN>.

   The display will be: SEDIMENT MENU

   0 - STOP
   1 - DATA ENTRY
   2 - STATION NAME
   3 - DIGITIZING
   4 - SEDCON MENU
   5 - RETURN TO MAIN MENU

3. From the SEDIMENT MENU choose DATA ENTRY: 1 followed by <RETURN>

   The display will be: SEDIMENT DATA ENTRY MENU

   0 - ABORT AND RETURN TO SEDIMENT MENU
   1 - UPDATING CORRECTIONS
   2 - INSTANTANEOUS SUSPENDED SEDIMENT
   3 - POINT INTEGRATING PARTICLE-SIZE
   4 - BED LOAD PARTICLE-SIZE
   5 - BED MATERIAL PARTICLE-SIZE
   6 - UPDATING AND RETURN TO SEDIMENT MENU

4. From the SEDIMENT DATA ENTRY MENU choose number (4):
   POINT INTEGRATING PARTICLE-SIZE followed by <RETURN>.

   At this point the screen will convert to 132 characters and the BED LOAD PARTICLE-SIZE FORM will appear with the cursor in the blank space to the right of STATION NUMBER.

5. Enter in the STATION NUMBER but DO NOT PRESS <RETURN>. The cursor will advance automatically to the next field, putting in the name of the station, and will advance automatically to the YEAR field. If the station name is not on file, a warning message will appear informing you of this fact. This is of no great concern at this time. Simply enter the name in the file later.

6. Enter the LAST 2 digits of the data year. DO NOT PRESS <RETURN>. The cursor will automatically advance to the initial field.

7. Enter your initials (just TWO). DO NOT PRESS <RETURN>, the cursor will appear temporarily with a message displayed at the bottom of the screen: SEARCHING FOR STATION. The display will be the FORM.

6.11.1 For a New File

The cursor will appear on the top line in the first oclumn of the MONTH field and will wait until you begin to enter the information. To advance form field to field, press <RETURN>. To go back from field to field, press <BACKSPACE>.

If a reminder of the acceptable symbols and/or designations for a specific field (e.g., Sampler Type) is required, press the <PF2> to display the symbols for that field. The cursor must be in the field for which you desire the HELP.

8. Enter the MONTH, DAY and TIME when the sample was collected. Do NOT press <RETURN> after each entry. If the TIME is not available, press <RETURN> (--- will appear for TIME unknown).

9. Enter the INSTANTANEOUS DISCHARGE at the time of sampling. Standard significant figure rules should apply.
Where applicable a (-) negative discharge will be accepted.

10. Enter the SAMPLING VERTICAL press <RETURN>. Standard significant rules should apply, press RETURN. Each of the sampling verticals of the measurement must be entered. The depth should be to the nearest decimetre less than 10, to the nearest centimetre between 10 and 100 and to the nearest one metre greater than 100.

11. Enter the SAMPLER TYPE. The first 3 LETTERS ONLY of teh sampler used should be entered as follows:

    ARN = ARNHEM; BAS = BASKET; BOG = BOGARDI; SON = SONIC; SPH = SPHINX;
    VUV = VUV; PIT = PIT; VOR = VORTEX; OTH = OTHER; --- = UNKNOWN

12. Enter the PERCENT FINER values IN MILLIMETRES and press <RETURN> to advance to the next field.

NOTE: a) If there are no PERCENT FINER values available, due to loss of sample or sample analysis etc., one of the following message notes must be entered in the PERCENT FINER field.

THE MESSAGE NOTES ARE: M4 "No material collected"
M5 "Combined with sample above"
M6 "Combined with sample below"

13. To change data in any of these fields, the cursor should be in the left most side of the field. Type in the data over the old, use the SPACE BAR to eliminate existing data. However if the cursor is in the right most side of the field, the <DELETE> key must be used to remove all characters before entering new data.

14. TO EXIT from the form, the cursor must be in the MONTH field press the <LINE FEED> to delete the MONTH, then press <RETURN>. The display will be:

    ENTER MONTH OR PRESS RETURN TO EXIT

    If the MONTH is entered you just carry on. If <RETURN> is pressed to EXIT the SEDIMENT DATA ENTRY MENU is displayed. Choose one of the following.

    0 - ABORT (all data entered during the session will be lost)
    6 - UPDATE AND RETURN TO SEDIMENT MENU

6.11.2 <u>For Data Already on File</u>

After steps 1 through 7 have been completed, the first and last lines of the data on file will be displayed, with the cursor locating on the first (TOP) line of the data. To more up or down within the data, press the <UP> or <DOWN ARROW> slowly. The cursor will only move line-by-line.

1. Inserting Additional Data at the Beginning of a File

Enter "I" as the first character followed by <SPACE> <SPACE>. A blank line will appear to enter the new data.

2. Inserting Additional Data within the File

Press the <DOWN ARROW> until the cursor is positioned on the line above the desired insertion point. Press <PF3> to open a new line for inserting additional new data. Enter the desired data as previously explained.

3. Inserting Additional Data at the End of the File

Press "B", followed by <SPACE> <SPACE>. Press <PF3> to open a new line to insert the new data. Enter the desired data as previously explained.

6.12 Acceptable Symbols and/or Designations

6.12.1 Instantaneous Discharge Symbols:

BLANK - INSTANTANEOUS DISCHARGE
A - MANUAL GAUGE
B - ICE CONDITIONS
E - ESTIMATED

6.12.2 Single Vertical Location

DIGITS (e.g., 5, 14, 130, etc.)
MID - MID STREAM
MULT - Composite sediment measurement
BLANK- Vertical UNKNOWN, three dashes (---) will be displayed

6.12.3 Sampler Types

THE FIRST THREE LETTERS OF THE SAMPLER TYPE TO BE ENTERED:
ARN = ARNHEM; BAS = BASKET; BOG = BOGARDI; PIT = PIT; SON = SONIC; SPH = SPHINX;
VOR = VORTEX; VUV = VUV; OTH for OTHER
BLANK for sampler UNKNOWN, and will be displayed as (---)

6.13 Special Function Keys for the Bed Load Particle-Size Form

When entered in the FIRST column of the MONTH field, the following codes will perform their designated functions.

D - "D " FOLLOWED BY RETURN WILL DELETE A EXISTING RECORD

T - "T " FOLLOWED BY RETURN WILL DISPLAY TO FIRST RECORD ON THE FILE ON THE FOLLOWING LINE.

B - "B " FOLLOWED BY RETURN WILL DISPLAY TO LAST RECORD ON THE FILE ON THE FOLLOWING LINE.

I - "I "FOLLOWED BY RETURN WILL ALLOW THE USER TO INSERT A RECORD BEFORE THE FIRST RECORD ON A FILE. THIS SYMBOL IS ONLY VALID WHEN THE CURSOR IS ON THE FIRST RECORD POSITION.

RETURN - IF THE FIRST FIELD IS BLANK AND THE <RETURN> IS PRESSED THE FOLLOWING MESSAGE WILL APPEAR:

"ENTER MONTH OR PRESS <RETURN> TO EXIT"

IF <RETURN> IS PRESSED THE PROCEDURE WILL EXIT AND THE "DATA ENTRY" MENU WILL BE DISPLAYED. AT THIS POINT THE DATA ENTERED PREVIOUSLY WILL BE SAVED UNTIL UPDATED TO THE MASTER FILE (OPTION 6 FROM MENU).

BACKSPACE - IF THE FIRST FIELD IS BLANK AND THE <BACKSPACE> IS PRESSED A MESSAGE WILL APPEAR:

"ENTER MONTH OR PRESS <BACKSPACE> TO ABORT"

IF <BACKSPACE> IS PRESSED THE PROCEDURE WILL ABORT AND THE "DATA ENTRY" MENU WILL BE DISPLAYED. AT THIS POINT THE DATA ENTERED PREVIOUSLY FOR THE STATION WILL BE IGNORED.

6.14 Procedures to Exit from the Data Entry Option

6.14.1 From Within a Form

NOTE: THE CURSOR MUST BE IN THE MONTH FIELD TO EXECUTE THE FOLLOWING:

EXIT - PRESS <LINE FEED> TO DELETE THE MONTH FIELD.
THE NOTE "RECORD INSERTION" WILL APPEAR.

- PRESS <RETURN>, THE NOTE "ENTER MONTH OR PRESS <RETURN> TO EXIT" WILL APPEAR.

- PRESS <RETURN> AGAIN AND THE "SEDIMENT DATA ENTRY MENU" WILL APPEAR.

- PRESS "2" IF MORE STATIONS ARE TO BE ENTERED.

ABORT - PRESS <LINE FEED> TO DELETE THE MONTH:
THE CURSOR WILL MORE TO THE NEXT LINE AND DISPLAY THE "MONTH"
THE MESSAGE "RECORD INSERTION" WILL APPEAR.

- PRESS "RETURN THE NOTE:

"ENTER THE MONTH OR PRESS <BACKSPACE> WILL APPEAR.

NOTE: ONLY THE CORRECTIONS ENTERED FOR THE CURRENT STATION WILL BE DELETD. ALL PREVIOUS CORRECTIONS WILL REMAIN UNTIL MASTER FILE IS UPDATED.

6.14.2 From the Data Entry Menu

UPDATE - RETURN TO "DATA ENTRY" MENU VIA THE EXIT OR ABORT PROCEDURE.

- ENTER "6" AND <RETURN>, ALL CORRECTIONS ENTERED DURING THE SESSION WILL BE UPDATED WITH THEIR RESPECTIVE FILES. WHEN UPDATING HAS BEEN COMPLETED THE PROCEDURE WILL RETURN TO THE WSC MAIN MENU.

ABORT - ENTER OPTION "0" AND PRESS <RETURN>, ALL DATA ENTERED DURING THE SESSION WILL NOT BE UPDATED.

6.15 Instructions for the Bed Material Particle-Size Form

When logged into the MINI the prompt sign ($>) will appear.

1. To engage the procedure, enter @ WSC followed by <RETURN>.

   The display will be: MAIN MENU

   0 - STOP
   1 - HYDROMETRIC DATA
   2 - SEDIMENT DATA
   3 - MAP DATA
   4 - DIGITAL DATA
   5 - SUB OFFICE DATA
   6 - DATA ANALYSIS

2. From the MAIN MENU choose SEDIMENT DATA: 2 followed by <RETURN>.

   The display will be: SEDIMENT MENU

   0 - STOP
   1 - DATA ENTRY
   2 - STATION NAME
   3 - DIGITIZING
   4 - SEDCON MENU
   5 - RETURN TO MAIN MENU

3. From the SEDIMENT MENU choose DATA ENTRY: 1 followed by <RETURN>

   The display will be: SEDIMENT DATA ENTRY MENU

   0 - ABORT AND RETURN TO SEDIMENT MENU
   1 - UPDATING CORRECTIONS
   2 - INSTANTANEOUS SUSPENDED SEDIMENT
   3 - POINT INTEGRATING PARTICLE-SIZE
   4 - BED LOAD PARTICLE-SIZE
   5 - BED MATERIAL PARTICLE-SIZE
   6 - UPDATING AND RETURN TO SEDIMENT MENU

4. From the SEDIMENT DATA ENTRY MENU choose number (5):
   BED MATERIAL PARTICLE-SIZE followed by <RETURN>.

   The BED MATERIAL PARTICLE-SIZE FORM will appear with the cursor in the blank space to the right of STATION NUMBER.

5. Enter the STATION NUMBER. The cursor will advance automatically to the next field, putting in the name of the station, and will advance automatically to the YEAR field. If the station name is not on file, a warning message will appear informing you of this fact. This is of no great concern at this time. Simply enter the name in the file later.

6. Enter the LAST 2 digits of the data year. DO NOT PRESS <RETURN>. The cursor will automatically advance to the initial field.

7. Enter your initials (just TWO). DO NOT PRESS <RETURN>, the cursor will appear temporarily with a message displayed at the bottom of the screen: SEARCHING FOR STATION. The display will be the FORM.

6.15.1 For a New File

The cursor will appear on the top line in the first oclumn of the MONTH field and will wait until you begin to enter the information. To advance form field to field, press <RETURN>. To go back from field to field, press <BACKSPACE>.

If a reminder of the acceptable symbols and/or designations for a specific field (e.g., Sampler Type) is required, press the <PF2> to display the symbols for that field. The cursor must be in the field for which you desire the HELP.

8. Enter the MONTH, DAY and TIME when the sample was collected. Do NOT press <RETURN> after each entry. If the TIME is not available, press <RETURN> (--- will appear for TIME unknown).

9. Enter the INSTANTANEOUS DISCHARGE at the time of sampling. Standard significant figure rules should apply.
Where applicable a (-) negative discharge will be accepted.

10. Enter the SAMPLING VERTICAL. Standard significant rules should apply, press RETURN. Each of the sampling verticals of the measurement must be entered.

11. Enter the SAMPLER TYPE. THE SAMPLER USED TO COLLECT THE SAMPLE IS TO BE ENTERED AS FOLLOWS:

I.E. CLAMP; CORE; LANE; SCOOP; BM54; BMH53; BMH60; OTHER;
SHIP for SHIPEK; --- for UNKNOWN

12. Enter the PERCENT FINER values IN MILLIMETRES and press <RETURN> to advance to the next field.

NOTE: a) If there are no PERCENT FINER values available, due to loss of sample or sample analysis etc., one of the following message notes must be entered in the PERCENT FINER field.

THE MESSAGE NOTES ARE: M4 "No material collected"
M5 "Combined with sample above"
M6 "Combined with sample below"

13. To change data in any of these fields, the cursor should be in the left most side of the field. Type in the data over the old, use the SPACE BAR to eliminate existing data. However if the cursor is in the right most side of the field, the <DELETE> key must be used to remove all characters before entering new data.

14. TO EXIT from the form, the cursor must be in the MONTH field press the <LINE FEED> to delete the MONTH, then press <RETURN>. The display will be:

ENTER MONTH OR PRESS RETURN TO EXIT

If <RETURN> is pressed TO EXIT the SEIDMENT DATA ENTRY MENU is displayed. Choose one of the following:

0 - ABORT (this will abort and all data entered during the the session will be lost) or
6 - UPDATE AND RETURN TO MAIN MENU

6.15.2 For Data Already on File

After steps 1 through 7 have been completed, the first and last lines of the data on file will be displayed, with the cursor locating on the first (TOP) line of the data. To more up or down within the data, press the <UP> or <DOWN ARROW> slowly. The cursor will only move line-by-line.

1. Inserting Additional Data at the Beginning of a File

   Enter "I" as the first character followed by <SPACE> <SPACE>. A blank line will appear to enter the new data.

2. Inserting Additional Data within the File

   Press the <DOWN ARROW> until the cursor is positioned on the line above the desired insertion point. Press <PF3> to open a new line for inserting additional new data. Enter the desired data as previously explained.

3. Inserting Additional Data at the End of the File

   To add additional data at the end of a file, press "B", followed by <SPACE> <SPACE>. Press <PF3> to open a new line to insert the new data. Enter the desired data as previously explained.

6.16 Acceptable Symbols and/or Designations

6.16.1 Instantaneous Discharge Symbols:

BLANK - INSTANTANEOUS DISCHARGE
A - MANUAL GAUGE
B - ICE CONDITIONS

6.16.2 Sample Vertical Location

DIGITS (e.g., 5, 14, 130, etc.)
MID - MID STREAM
MULT - Composite sediment measurement (ETR)
BLANK- Vertical UNKNOWN, three dashes (---) will be displayed

6.12.3 Sampler Types

THE FIRST THREE LETTERS OF THE SAMPLER TYPE TO BE ENTERED:
e.g., CLAMP; CORE; LANE; SCOOP; BM54; BMH53; BMH60; SHIPEK; OTHER;
BLANK (---) indicates sampler UNKNOWN.

6.17 Special Function Keys for the Bed Load Particle-Size Form

When entered in the FIRST column of the MONTH field, the following codes will perform their designated functions.

D - "D "WILL DELETE A EXISTING RECORD
I.E., "D" IN COLUMN 1 FOLLOW BY <SPACE> <SPACE>

T - "T "WILL DISPLAY TO FIRST RECORD ON THE FILE.

B - "B "WILL DISPLAY TO LAST RECORD ON THE FILE.

I - "I "WILL ALLOW THE USER TO INSERT A RECORD BEFORE THE FIRST RECORD ON A FILE. THIS SYMBOL IS ONLY VALID WHEN THE CURSOR IS ON THE FIRST RECORD POSITION.

RETURN - IF THE FIRST FIELD IS BLANK AND THE <RETURN> IS PRESSED THE FOLLOWING MESSAGE WILL APPEAR:

"ENTER CORRECTION OR PRESS <RETURN> TO EXIT"

IF <RETURN> IS PRESSED AGAIN THE PROCEDURE WILL EXIT AND THE "SEDIMENT DATA ENTRY" MENU WILL BE DISPLAYED. AT THIS POINT THE CORRECTION ENTERED PREVIOUSLY WILL BE SAVED UNTIL UPDATED TO THE MASTER FILE (OPTION 6 FROM THE "SEDIMENT DATA ENTRY MENU".

BACKSPACE - IF THE FIRST FIELD IS BLANK AND THE <BACKSPACE> IS PRESSED, THE FOLLOWING MESSAGE WILL APPEAR:

"ENTER MONTH OR PRESS <BACKSPACE> TO ABORT"

IF <BACKSPACE> IS PRESSED AGAIN THE PROCEDURE WILL ABORT AND THE "DATA ENTRY" MENU WILL BE DISPLAYED. AT THIS POINT THE DATA ENTERED PREVIOUSLY FOR THE STATION WILL BE IGNORED.

7. BEDLOAD VOLUMETRIC DATA FILE

Bedload data have been computed volumetricly in tonnes or cubic metres, depending on the method of sampling and/or the amount of material. Because of the difficulty in collecting the bedload data, at present, monthly rather than daily figures are available.

7.1 General Instructions for BEDLOAD Volumetric File

Monthly information is punched with the digits 32 in columns 16 and 17 and the data beginning in column 21. The EDIT program recognizes the digits 32 as being a monthly total. If daily bedload data are available, then they are keypunched in the same manner as the sediment concentration, i.e. format 71-102.

7.1.1 Bedload Volumetric Data Format 71-102

Column(s)

1	is alphabetic and indicates the type of data as follows: J for tonnes K for cubic metres
2	is numeric and indicates the Region as follows: 2 for Vancouver — 6 for Longueuil 3 for Calgary — 7 for Dartmouth 4 for Winnipeg — 8 for Regina 5 for Guelph — 9 for Yellowknife
3-9	contain the station number, e.g. 05AA001
10-12	are the last three digits of the year, e.g. 971 for 1971
13-15	are the first three letters of the month, e.g. JAN for January
16-17	are numeric indicating the day to the first data field, e.g. 08 for January 8; a day of '32' means that the value given is a monthly total, not a daily value
18-20	are blank
21-80	are numeric and/or alphabetic and are the "free form" data fields

THE ONLY PERMISSIBLE ALPHABETIC CHARACTERS ARE:

"S" - to indicate a sampled value (stored as a symbol code on SUSCON)
"E" - to indicate an estimated value (stored as a symbol code on SUSCON)
"X" - to delete the value and symbol from SUSCON
"N" - to delete the symbol only from SUSCON

"N" and "X" never occur with numeric values. "S" and "E" may occur with a numeric value, or by themselves. In the latter case the Symbol code is placed in SUSCON without affecting the numeric value already there. On the other hand, if a numeric value is entered without a symbol code, the symbol code already on SUSCON (if any) is deleted.

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