1957N/WP 2076

ENVIRONMENTAL STUDIES ASSOCIATED WITH THE PROPOSED KEMANO COMPLETION HYDROELECTRIC DEVELOPMENT

TECHNICAL MEMORANDUM 1957/2

DOCUMENTATION OF THE NECHAKO RIVER UNSTEADY STATE WATER TEMPERATURE MODEL

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December 1984

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1.0 INTRODUCTION

An understanding of the effect of the proposed Kemano Completion project on Nechako River water temperatures was required for the environmental impact assessment. In response to this need an unsteady state hydrothermal model was developed to analyze two concerns. Initially, this model was developed and used to estimate long term maximum cooling water releases and average annual volume of cooling water required under the proposed project. Secondly, this model was developed for use in the design of a program to manage Nechako River summer hydrothermal regimes between Cheslatta Falls and the Stuart River confluence (Figure 1.1) under a proposed with-project flow regime. This hydrothermal model consists of two computer models, a one-dimensional unsteady state water temperature prediction model and a flow routing model capable of simulating unsteady state flow regimes for the entire river section of study as required by the water temperature model. The flow model is a modification of the UBC Flow Model and is documented in a separate report (Envirocon 1985A). This hydrothermal model has been used successfully in 1983 and 1984 in management programs similar to that designed for the with-project conditions.

Although the hydrothermal model consists of the two models, this report documents only the one-dimensional unsteady state water temperature model used to simulate Nechako River water temperatures under observed hydrothermal regimes and forecast without- and with-project hydrothermal regimes. All references to a model will be for the water temperature model, and documentation of the flow model will be left to Technical Memorandum 1957/1.

A necessary step in the model development was verification using observed input to ensure that the with-project water temperature simulations would be representative under the with-project conditions. The water temperature model

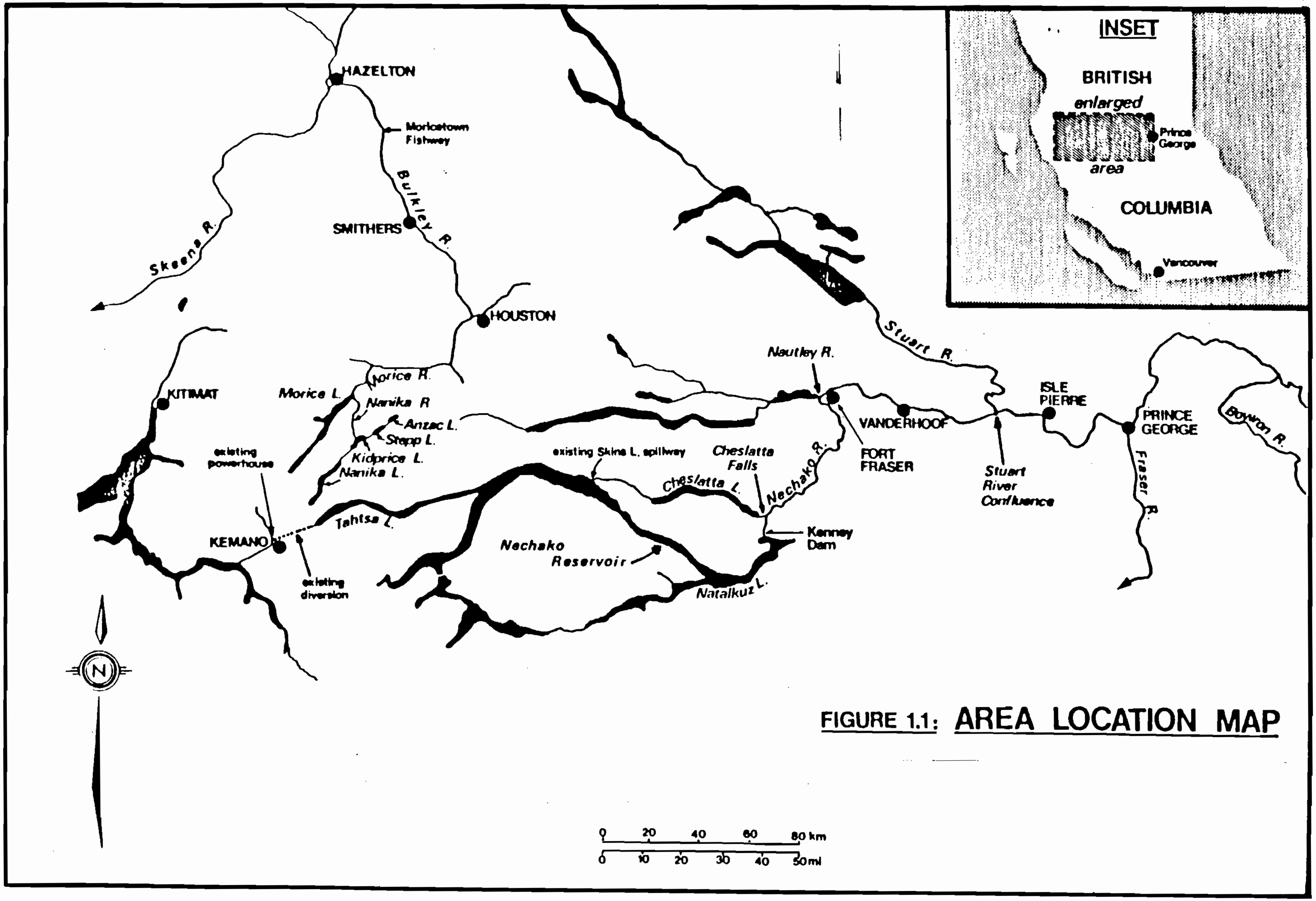


FIGURE 1.1: AREA LOCATION MAP

has been verified for 1974 to 1982 (Envirocon 1984A), and more recently for 1983 and 1984 (Envirocon 1984B, 1985B).

The water temperature model used in all the above applications is the same model with the exception of slight modifications as to how input is read and output is generated. However two basic modelling applications have evolved, observed simulations and forecast simulations. Observed simulations are performed using known flows, water temperatures and meteorological input data. The flows and water temperatures can be for observed with-project or without-project conditions. These types of simulations are one complete computer run for a period defined by the availability of complete records, usually 10 July to 20 August. An example of an observed simulation would be a verification run for the period 10 July to 20 August, 1984.

The forecast simulations are performed using forecast flows, water temperatures and meteorological data. Forecast simulations are carried out on a day by day basis with the length of individual simulations being defined by the length of the meteorological forecasts, currently a five day period. Forecast simulations performed in the 1983 and 1984 summer programs were six-day simulations, including the observed day (previous day), the first day forecast (current day) and the four subsequent forecast days. This forecast approach has also been carried out for proposed with-project conditions using the same meteorological forecast data but with proposed with-project flows and water temperatures.

The initial section (Section 2.0) of this report provides a brief discussion of general theory of one-dimensional water temperature modelling, a detailed description of the model and its structure, a brief discussion of tributary inflows (a significant data input to the modelling process) and a summary of data requirements. The next two sections discuss examples of the observed and forecast water temperature models' set up and operation in Sections 3.0 and 4.0, respectively. Each section provides a general description of the modelling procedure, followed by an explanation of the command procedure file and all input and output files required for the example simulation. Listings of files and detailed descriptions of each parameter within each file for both the observed and forecast water temperature model examples is given in Appendices B and C, respectively. Also, included in Appendix D is a description of an interactive editing program developed to efficiently prepare input files for the forecast flow and water temperature models used in the Nechako River water temperature management programs.

This document has been prepared assuming that the reader has enough computer experience to be able to process jobs interactively and in a batch queue. To assist in the operations of these documented models, command procedures have been included for each type of simulation discussed. However, these procedures are based upon the VAX operating system maintained by H.A. Simons, International Ltd. (Vancouver), and knowledge of this system would assist in understanding this document. A brief discussion of some VAX editing commands has been included in the forecast water temperature model user's guide (Envirocon 1985C) and would be useful to review.

2.0 THE NECHAKO RIVER WATER TEMPERATURE MODEL

2.1 General

Future river water temperatures can be predicted using a mathematical model to simulate the transport of heat by water flowing in an open channel exposed to the atmosphere. This transport is described by the following equation, obtained by applying the principle of conservation of thermal energy to one-dimensional open channel flow (Jobson and Keefer 1979):

$$\frac{\partial(AT)}{\partial t} + \frac{\partial(UAT)}{\partial x} = \frac{\partial(D_x A \partial T)}{\partial x^2} + \frac{H_T W}{rCp} + \frac{H_B P}{rCp} \quad \text{(Equation 1)}$$

This equation contains all the variables involved in the general case of this transport, as follows:

A	=	cross-sectional area of the flowing water (m^2)
T	=	water temperature at any time t (°C)
t	=	time
U	=	cross-sectional average velocity of the flowing water (m/s)
x	=	distance along the channel (m)
D_x	=	longitudinal dispersion coefficient (m^2/s)
H_T	=	flux density of thermal energy transferred from the atmosphere to the flowing water (W/m^2)
W	=	top width of the flowing water (m)
r	=	density of water (Kg/m^3)
Cp	=	specific heat of water at constant pressure (J/Kg/°C)
H_B	=	flux density of thermal energy transferred from the channel bed to the flowing water (W/m^2)
P	=	wetted perimeter of the channel (m).

Equation (1) can be reduced to a form useable in "simple river situations such as the downstream warming of cold water released from a reservoir" (Edinger et al. 1974, page 69) as shown below.

$$\frac{\partial(hT)}{\partial t} + \frac{\partial(QT)}{\partial A_s} + k\,(T-E) = 0 \qquad \text{(Equation 2)}$$

where:

A_s = surface area of the flowing water (m^2)

h = depth of river (m)

E = equilibrium temperature (^oC)

$\vec{Q}$ = flow rate of river (m^3/s)

k = kinematic coefficient of surface heat exchange (m/s)

The important parameters in Equation 2 are the kinematic exchange coefficient (k) and the equilibrium temperature (E), defined as the hypothetical water surface temperature at which the net rate of surface heat exchange would be zero. The method used to determine these parameters (k and E) from meteorological data was previously developed by Edinger et al. (1974).

Temperature calculations are preformed using a Eulerian or fixed distance reference frame. This grid system simplifies water temperature calculations and allows a straightforward means of verifying that hydraulic continuity is maintained in each river sub-reach. Maintaining hydraulic continuity both spatially and with time is a crucial factor in unsteady state water temperature modelling.

The Eulerian grid system was set up using survey data available from previous work (IPSFC 1979). These river channel data (consisting of surface width, cross-sectional areas for survey sections and the distance between these sections) were available for 102 locations along the Nechako River.

The Nechako River flow model (Envirocon 1985A) calculates flows at these 102 locations accounting for routing effects and tributary inflows. The temperature model then uses flow data for the Nechako River and its tributaries, water temperature data for the Nechako River at Cheslatta Falls and the tributaries of the Nechako River, and meteorological data to estimate water temperatures for the 101 sub-reaches of the Nechako River.

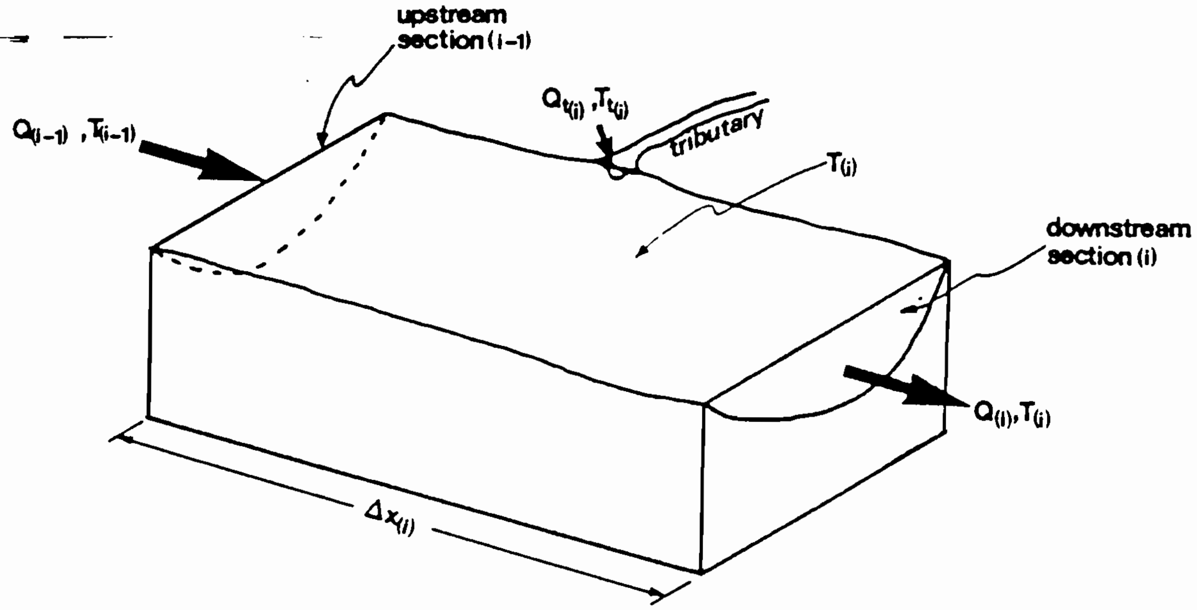
2.2 Model Description and Structure

The Nechako River water temperature model can be described as a one-dimensional unsteady state model operating on an hourly time step using an Eulerian reference frame. This temperature model has been adapted to operate for many different situations. These situations include the verification of model predictions with observed data, the estimation of river temperatures in the cases of both with and without KCP project flow regimes (which differ from observed conditions) and the cases of predictions of flow requirements to maintain river temperature criteria using forecast meteorological data and with and without KCP flow control conditions. However, for all simulations, the water temperature model used has the same structure with only the format of the input data being altered for each simulation to suit the input data requirements.

For the purposes of simulating Nechako River temperatures, the Nechako River has been divided into 101 sub-reaches (hydraulic data available for 102 surveyed cross sections) similar to the example sub-reach represented in Figure 2.1. Note that each sub-reach is identified by the downstream surveyed cross-section. That is sub-reach 2 is located between surveyed cross-section 1 and 2. Sub-reach 1 therefore does not exist (by definition) and no reference in the modelling can be made to a sub-reach 1. Thus, for example, tributaries can only be entered at sub-reach 2 and downstream. The only reference to the upstream end of sub-reach 2 is, of course, the source flow and water temperature in the Nechako

FIGURE 2.1

USE OF THE EULERIAN GRID FOR A RIVER SUB-REACH



River sub-reach(i) at any given time has a:

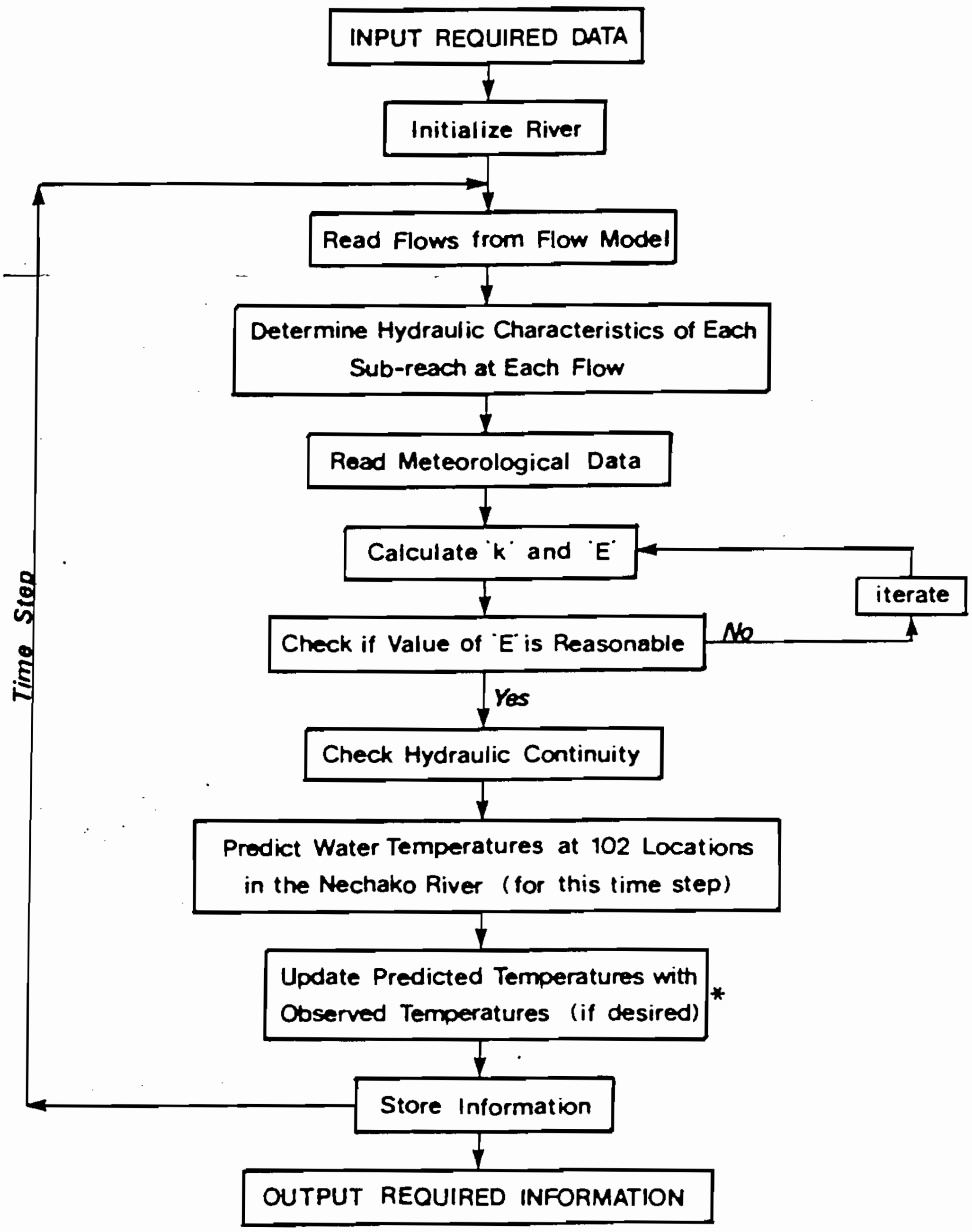
- bulk temperature $T_{(i)}$
- surface area $SA_{(i)}$
- volume $V_{(i)}$

River at Cheslatta Falls. Water temperature computations are performed on an hourly basis for each sub-reach simultaneously, and the results are stored for use in the following hour's calculations. The modelling procedure used for all simulations is best portrayed by a flow chart (Figure 2.2).

Following input of all required data (discussed in detail in the following sections), flows and water temperatures are assigned to each sub-reach (initialization) so that the hydrothermal regime of the entire river is established prior to the start of any computations. This step allows the model to best portray the river's hydrothermal regime with the most recently available observed data and thus reduce modelling run-up error. If the river's initial conditions are not at all representative of the current "real" conditions, several computational steps will be required before the model will produce representative results. Good initialization may not be vital when using the observed model to simulate a long period of output (for example, a 46 day period from 6 July to 20 August) as several days of output may be sacrificed to allow the model to run up. However, good initialization is a vital component of each 6-day simulation using the forecast model, since initial conditions must be set as close as possible to the current "real" river conditions to minimize loss of representative data on which management decisions are made. The initialization procedure used with the forecast model is described in Section 4.1.2.

Once the river system has been initialized, the hourly time step calculations begin. The following procedure is carried out for each hour (Figure 2.2). The first step is to read modelled flows (obtained from the Nechako River flow model (Envirocon 1985A)) for each of the 102 Eulerian grid cross-sections. It must be noted that the Nechako River flow model develops hourly flows for each of the 102 surveyed cross section locations, supplying upstream and downstream hourly flows for each of 101 Eulerian grid sub-reaches. That is the downstream flow of any grid i is the upstream flow of grid i+1 (Figure 2.1). These flows are then

FIGURE 2.2: WATER TEMPERATURE PREDICTION MODEL



* This step used in forecast operations

used to determine the hydraulic characteristics of each 102 cross sections. As each sub-reach is generally hydraulically homogenous, the hydraulic parameters for the upstream and downstream cross sections of each sub-reach are then averaged and assumed to be constant throughout each sub-reach. As depicted in Figure 2.1, tributary flows and temperatures are added to the appropriate sub-reaches to ensure that hydraulic continuity is maintained and thermal inputs are accounted for. Included in the model is a routine which calculates water volume within each sub-reach for each hour of computations and checks that hydraulic continuity is maintained throughout the entire study reach.

The next step is to read the meteorological data and determine, through an iterative approach, two parameters, the kinematic exchange coefficient (k), and the equilibrium temperature (E) (Edinger et al. 1974).

Time-varying water temperature response of each sub-reach is then numerically evaluated from actual flow and boundary data using Equation (2) cast into a finite difference form in time and space (Edinger et al. 1974). These results are then stored and the next hourly time step begins. When all hourly time step computations are complete, water temperature and other necessary parameters for selected locations are output and stored in permanent files.

2.3 Tributary Inflows

An important step in hydrothermal modelling is identification and inclusion of significant tributary inflow (gauged and ungauged) to the mass and heat balance computations. During development of the Nechako River flow model (Envirocon 1985A) six significant tributaries were identified, the Nautley River (gauged) and five ungauged tributaries. The five ungauged tributaries are Swanson Creek, Greer Creek, Stoney Creek, Sinkut River and Cluculz Creek, and have been assigned flows of 1.13 m^3/s, 1.13 m^3/s, 10 percent, 20 percent and 10 percent of the Nautley River flow, respectively (Envirocon 1985A). These ungauged tributary inflows are assigned in a manner consistent with input requirements to the Nechako River flow model to ensure maintenance of hydraulic continuity. The observed model uses, of course, the observed Nautley River inflows. However, in the forecast model, Nautley River inflows for each six day simulation are held constant at a value equal to the previous day's observed flow.

Water temperatures assigned to these tributaries are based upon either observed Nautley River water temperatures (observed mode of modelling) or forecast meteorological parameters (forecast mode of modelling). In the observed model, observed water temperatures are used for the Nautley River and the ungauged tributary water temperatures are estimated from the observed Nautley River water temperatures as follows:

$$T_{SWANSON} = T_{NAUTLEY} - 5.2 \quad (^{o}C)$$
$$T_{GREER} = T_{NAUTLEY} - 2.9 \quad (^{o}C)$$
$$T_{STONEY} = T_{NAUTLEY} \quad (^{o}C)$$
$$T_{SINKUT} = T_{NAUTLEY} - 1.5 \quad (^{o}C)$$
$$T_{CLUCULZ} = T_{NAUTLEY} + 1.6 \quad (^{o}C)$$

These equations were derived from field data gathered in the summer of 1981 (Envirocon 1981). Methods of determining and assigning Nautley River and ungauged tributary water temperatures in the forecast model are discussed in Appendix A. Estimating source water temperatures in the Nechako River at Cheslatta Falls for the forecast model is performed in the same manner as estimating Nautley River temperatures. This method is also contained in Appendix A.

2.4 Data Requirements

Required data for the water temperature model can be generally described in two categories. The first category consists of one data file containing water temperatures for each of the 102 Eulerian grid cross-sections used to initialize the thermal regime of the entire Nechako River system between Cheslatta Falls and the Stuart River confluence. This initialization file is required by both the observed and forecast water temperature models and methods of use are described in Sections 3.1.2 and 4.1.2, respectively.

The second category consists of all data files (other than the initialization file) required by both the observed and forecast models to perform water temperature simulations for as many days as data is available. Generally, the second category of data consists of the following information:

(i) hourly flow data at the 102 surveyed cross sections, supplied by the flow model.

(ii) source water temperature data for the Nechako River at Cheslatta Falls.

(iii) tributary temperatures and flows.

(iv) water temperature data for the Nechako River above the Nautley and Stuart Rivers (if available), used for initialization.

(v) meteorological data including air temperature, solar (short wave) radiation, cloud amount, dewpoint temperature, and wind speed.

A more detailed discussion of these data for the observed and forecast water temperature models are contained in Sections 3.1.3 through 3.1.8 and 4.1.3 through 4.1.8, respectively. Complete observed and forecast water temperature model example set-ups, including command file listing, input files' listing and description, output files' listing, and computer source codes are given in Appendices B and C, respectively.

3.0 OBSERVED WATER TEMPERATURE MODEL

The observed water temperature model has been used to simulate Nechako River water temperatures under observed meteorological conditions with observed, and estimated with- and without-project flows and water temperatures. The purpose of designing an unsteady state water temperature model was to develop the capability of predicting water temperatures during periods of rapidly changing flows as would occur under with-project conditions. An important step in this process was verification of the model under observed conditions. This has been previously documented (Envirocon 1984A) and is left to the reader to review.

This section provides a general discussion of the observed water temperature model's command, input and output files for an example 46 day simulation for the period July 6 to August 20, 1984 (Sections 3.1.1 through 3.1.10). Detailed listings and parameter descriptions of all command, input, output and source coding files used for this 46 day simulation are supplied in Appendix B.

3.1 Modelling Procedure

Simulations using the observed water temperature model are carried out using observed meteorological data, observed Nautley River source water temperatures, and either observed Nechako River water temperatures and flows (observed simulation), or estimated with-project Nechako River water temperatures and flows (hindsight simulations). The general structure of the observed water temperature model is outlined in Figure 2.2.

The following sections (Sections 3.1.1 to 3.1.10) provide explanations of the command procedure (used to control operation of the observed model), and all input and output files required for the example observed simulation.

3.1.1 Command File, TEMPJ06V.COM

Operation of the observed model is controlled by a command file called TEMPJ06V.COM. Input files are called TJ05.OUT, PG84MET.DAT, TU3.DAT, TU5J06V.DAT, FU7J04V.DAT, TU8J06V.DAT and TU9J28V.DAT and are read from logical I/O units 1, 2, 3, 5, 7, 8 and 9, respectively. Output files are called TU4J06V. DAT and TU6J06V.DAT and are written to logical I/O units 4 and 6, respectively. The name of the observed model (fortran source program) is 84T.FOR. Submitting the command @TEMPJ06V.COM will process an observed simulation using the data and observed model mentioned above. Appendix B contains a listing of this file and listings and descriptions of all input and output files discussed in Sections 3.1.2 to 3.1.10.

3.1.2 I/O Unit 1, Initialization Input File, TJ05.OUT

Input file TJ05.OUT contains initial water temperatures at each of the 102 surveyed cross sections for hour 1 of the simulation. Making this file as representative as possible of the "real" river conditions will minimize computer run-up error at the beginning of the simulation. The filename TJ05.OUT implies that water temperatures output for hour 24 of July 5 are used as input for hour 1 of July 6.

3.1.3 I/O Unit 2, Meteorological Input File, PG84MET.DAT

Input file PG84MET.DAT contains meteorological data obtained from 1984 records maintained at the AES weather station located at Prince George Airport. The file consists of air temperature (°C), solar (short wave) radiation (langleys), cloud amount (tenths), dewpoint temperature (°C) and wind speed (km/hr), station pressure (in.Hg), relative humidity (%), and date, line by line for dates July 6 (start of simulation) to August 20 (end of simulation) inclusive. Only the first five parameters on each line are used in the modelling process. Note that in this case data for July 6, 7, 8 was not available and was thus set equal to data for July 9.

3.1.4 I/O Unit 3, Surveyed Hydraulic Input File, TU3.DAT

This file contains cross sectional area of flow and surface width of flow data for the 102 surveyed cross sections for flows ranging from 0 to 30,000 cfs. A subroutine called CALQ(NXSEC) in the water temperature model is used in conjunction with this data to set up rating curves of cross sectional areas and surface widths for each of the 102 surveyed cross sections. Thus a complete hydraulic regime for the entire river is defined for all flows read from the input flow file (FU7J04V.OUT) supplied by the flow model.

The first three cards in this file contain the number of flows (first card) and magnitudes (second and third cards) used in the rating curve set up.

3.1.5 I/O Unit 5, Parameter Control Input File, TU5J06V.DAT

This is the control file used to specify modelling period, size of the simulation time step, coefficients for the windspeed function, location of surveyed cross sections, initial river and tributary flows and source water temperatures, and locations for which output is to be produced.

The first card contains the day and month of the beginning of the simulation. The second card contains the following parameters;

(i) NCON - not used.

(ii) NXSEC - number of surveyed cross sections used in the modelling (102).

(iii) NHR - number of hourly time steps - 1104 for a 46 day simulation.

(iv) DT - size of time step - one hour in this case.

(v) QSO - initial flow in the Nechako River at Cheslatta Falls (m^3/s).

(vi) IGO - specifies that the Nautley River enters the Nechako River at sub-reach 54 - not used but required for documentation.

(vii) IOUT - frequency of output of results - not used but required for documentation.

(viii) NTRIB - number of tributaries - seven in this case; one gauged (Nautley River), five ungauged, and one artificial tributary (at survey cross section number 2) - this artificial tributary was developed for use in the forecast water temperature model (discussed in Section 3.1.7) and does not affect operation of the observed water temperature model -inclusion of this tributary simplifies use of input files.

(ix) JTS - hour of day at which computations begin - in this case, JTS = 0, implying computations begin at midnight with the first hourly output occurring for 0100 hrs.

(x) AI - constant in the windspeed function.

(xi) BI - coefficient in the windspeed function.

Cards 3 through 13 contain locations of the 102 survey cross sections. Entries (in miles) represent the distance from each surveyed cross section to the downstream end of the study reach at the Stuart River confluence. For example Cheslatta Falls and the next cross section downstream are 106.03 and 115.78 miles, respectively upstream of the Stuart River confluence.

Cards 14 and 15 contain the number of lines of hourly flow data (supplied by the flow model and contained in file FU7J04V.OUT) and number of locations for which simulated mean daily water temperatures are to be output, respectively. Card 16 identifies the surveyed cross sections for which mean daily water temperatures are to be output. Cards 17 through 21 supply titles to the above output.

Card 22 contains the number of days of mean daily source water temperature (NDSWT) and the number of extra days of data before start of the simulation (NEDBSP). In this case there are 58 days of data (cards 31 through 35) and the simulation starts on July 6, 8 days after the first data entry in card 31. Thus the first entry in card 31 is for June 28.

Cards 23 through 29 contain the location of each tributary and its initial inflow, card by card. Note that although the artificial tributary in sub-reach 2 is not used in the observed model, it has been assigned an initial inflow of 0.03 m^3/s (1.0 cfs). Assignment of a value of flow to all tributaries used in the modelling process is a requirement of the Nechako River flow model. Again, although this artificial tributary is only used in forecast modelling (flow and water temperature), it has been included in both the observed and forecast flow models and thus is included in the observed water temperature model. This ensures that the Nechako River hydrologic regime is represented in a consistent manner by both the flow and water temperature models. Input file TU9J28V.DAT (Section 3.1.7) also assigns an inflow value of 1.0 cfs to the tributary in sub-reach 2 for each of the 58 days of input data.

Note that tributaries in sub-reaches 15 and 24 have each been assigned an inflow value of 1.13 m^3/s (40 cfs) and tributaries in sub-reaches 78, 88, 97 have been assigned inflow values of 10, 20 and 10 percent of the Nautley River inflow (sub-reach 55), respectively.

Card 30 consists of three parameters, PTVAL, IFCONT, and INITSEC. PTVAL is the value assigned to the source water temperature in the Nechako River assuming a constant value at the source. IFCONT is a flag used to control assignment of Nechako River source water temperatures. If IFCONT=1, the program will use mean daily source water temperatures read from cards 31 through 35. If IFCONT=2, the program will use a constant value of mean daily source water temperatures equal to PTVAL for each day of the simulation. INITSEC defines the sub-reach at which the Nechako River source water temperatures are measured. For example, if INITSEC=2, the source water temperature data were recorded at Cheslatta Falls. If INITSEC=9, the source water temperatures were measured at Bert Irvine's. Note that the value of INITSEC cannot be set equal to 1 as a tributary can only be introduced at the downstream end of a reach due to program structure.

Cards 31 through 35 are mean daily source water temperatures recorded in the Nechako River at the location defined by INITSEC. The number of data entries must be equivalent to NDSWT in card 22 and there must be sufficient entries prior to the start date (NEDBSP) of the simulation. In this case there must be 58 values starting with data for June 28, 8 days prior to July 6, the start of the simulation period. Data for June 28 through July 5 can be estimated in this case.

Whether INFCONT is set equal to 1 or 2, these cards (31 through 35) of data must be included in the file and the number of entries must equal the value of NDSWT in card 22. Cards 36, 37, 38 are not used.

3.1.6 I/O Unit 7, Hourly Flow Input File, FU7J04V.OUT

File FU7J04V.OUT was created from the output of a Nechako River flow model simulation (Envirocon 1985A) and contains hourly flows for each of the 102 surveyed cross sections. Each 9 lines in this file contain flows at each of the 102 cross sections for each hour of the simulation. Therefore there are 9x24=216 lines of data per day, and 9x24x46=9936 lines of data for the complete 46 day simulation. Note that these files are quite large and thus good data management is essential.

3.1.7 I/O Unit 8, Mean Daily Nautley River Water Temperature Input File, TU8J06V.DAT

The number of mean daily Nautley River water temperatures in this file is equivalent to the number of days in the simulation. In this case, there are 46 entries starting on July 6 and ending on August 20. Note that in this case data for July 6, 7, 8 was not available and was thus set equal to data for July 9.

3.1.8 I/O Unit 9, Mean Daily Tributary Inflow Input File, TU9J28V.DAT

This file contains mean daily tributary inflows to sub-reaches 2, 15, 24, 55, 78, 88 and 97. As in the I/O Unit 5 file, TU5J06V.DAT, the number of entries for each tributary must be equivalent to NDSWT in card 22 and there must be sufficient entries prior to the start date (NEDBSP) of the simulation. In this case there must be 58 values starting with data for June 28, 8 days prior to July 6, the start of the simulation period. Data for June 28 through July 5 can be estimated in this case.

Cards 1 to 5 contain 58 days of mean daily flows in an artificial tributary (entering sub-reach 2) used to adjust modelled flows during the 1984 Nechako River hydrothermal program (using forecast water temperature model). These flows are all assigned a value of 1.0 cfs (0.03 m^3/s) for use in the observed water temperature model.

Cards 6 to 10 and 11 to 15 contain 58 days of mean daily flows in Greer Creek and Swanson Creek, respectively, and are all assigned a value of 40.0 cfs. Cards 16 to 20 contain 58 days of recorded Nautley River mean daily flows. Cards 21 to 25, 26 to 30, and 31 to 35 contain 58 days of mean daily flows in Stoney Creek (equivalent to 10% of the Nautley River flows), Sinkut River (equivalent to 20% of the Nautley River flows) and Cluculz Creek (equivalent to 10% of the Nautley River flows), respectively.

3.1.9 I/O Unit 4, Mean Daily Water Temperature Output File, TU4J06V.OUT

This file contains simulated mean daily equilibrium water temperatures and mean daily water temperatures in the Nautley River and the Nechako River in sub-reaches 8 (Bert Irvine's Lodge), 54 (above the Nautley River), 56 (below the Nautley River), 82 (at Vanderhoof) and 102 (above the Stuart River), for the period of the simulation (July 6 to August 20).

3.1.10 I/O Unit 6, Initial Conditions and Hydraulic Continuity Output File, TU6J06V.OUT

Output in this file consists of a summary of parameters assigned in card 2 of file TU5J260X.DAT (Section 3.1.4), a list of initial hydraulic and water temperature data, and hourly computations of flow volume and water temperatures for sub-reaches 2, 7, 54, 55, 56 and 102.

Initial conditions parameters include grid (sub-reach) number, river mile, water velocity, cross sectional area of flow, top width of flow, tributary inflow and initial water temperatures estimated for each grid (sub-reach).

4.0 FORECAST WATER TEMPERATURE MODEL

One component of the operation of the proposed Kemano Completion project is a water temperature management program designed to control summer water temperatures in the Nechako River. The program proposed for use under with-project conditions is similar to the program used in the summers of 1983 and 1984. Both the without-project and with-project programs involve use of forecasted meteorological conditions as input to the forecast water temperature model to predict corresponding forecast water temperatures in the Nechako River. In the 1983 and 1984 summer programs, these forecast water temperatures were used to schedule cooling water releases from the Skins Lake Spillway to achieve specified water temperature criteria. A documented user's guide (Envirocon 1985C) has been prepared which outlines the procedure followed for day by day operations performed in 1984. This section discusses the forecast model set up and operation using the complete set of input and output files (Appendix C) of an example 6 day run, for the period July 26 to July 31, performed on July 27, 1984.

4.1 Modelling Procedure

The general structure of the forecast water temperature model is similar to that of the observed water temperature model and is outlined in Figure 2.1. The main difference between simulations performed using the forecast model and those using the observed model is the format of the input data. The forecast procedure (simulation) is carried out on a day by day basis using one day of observed data and five days of forecast data, and the observed simulation is a single simulation performed with data files complete for an entire simulation period. That is, for a 46 day modelling period from, for example, July 6 to August 20, 46 daily forecast simulations would be performed compared to 1 simulation using the observed model.

The forecast simulation period is defined by the length of the meteorological forecast, which is currently a five day period. Thus each forecast simulation covers a six day period; the previous day (using observed information) and the current and following four days (using the five day forecast information).

Data required by the forecast water temperature model consist of observed and forecast meteorological parameters; observed water temperatures in the Nautley River and in the Nechako River below Cheslatta Falls, above the Nautley River and above the Stuart River; observed flows in the Nautley River and in the Nechako River below Cheslatta Falls and at Vanderhoof; hourly routed flows for the observed and forecast days (supplied by the Nechako River flow model); and a file which describes the initial water temperature at each 102 surveyed cross sections for the first hour of the simulation period. Complete details of data requirements for a practical use of the forecast model are outlined in a report of the 1984 summer operations (Envirocon 1985B).

The most difficult component of the approach using the forecast model is estimating (forecasting) source and tributary water temperatures. The most recent procedure used (1984) involved long term observed water temperatures and observed, forecast, and calculated meteorological parameters (Appendix A).

The following sections (Sections 4.1.1 to 4.1.10) provide explanations of the command procedure (used to control operation of the forecast model), and all input and output files required for the example forecast simulation.

4.1.1 Command File, TEMPJ27.COM

Operation of the forecast water temperature model for the July 27 simulation is controlled by a command file called TEMPJ27.COM. Input files are called TJ25.OUT, TU2J27.DAT, TU3.DAT, TU5J27.DAT, FU7J26J31.OUT, and

TU9J27V.DAT, and are read from logical I/O units 1, 2, 3, 5, 7 and 9, respectively. Output files are called TU4J27.OUT, TU6J27.OUT, TJ26.OUT and TU12J27.OUT and are written to logical I/O units 4, 6, 11 and 12, respectively. The name of the forecast model (fortran source program) is TFMODX.FOR. Submitting the command @TEMPJ27.COM will process a forecast simulation using the data and forecast model mentioned above.Appendix C contains a listing of this file and listings and descriptions of all input and output files discussed in Sections 4.1.1 to 4.1.10.

4.1.2 I/O Unit 1, Initialization Input File, TJ25.OUT

Input file JT25.OUT contains water temperatures at each of the 102 surveyed cross sections for hour 1 of the first day of the simulation. For the present example simulation (July 26 to July 31), TJ25.OUT contains water temperatures for each of the 102 cross sections, output for hour 24 of July 25 for the previous day's 6 day simulation (i.e. July 25 to July 30) performed on July 26 and is used for hour 1 of the 6 day simulation performed on July 27.

A subroutine called TCOR in the source program TFMODX.FOR is used to correct the simulated water temperatures for the observed day (July 26) of the 6 day simulation, to the observed water temperatures using the hourly simulation corresponding to the time the observed water temperature was recorded. In this example the observed water temperature in the Nechako River above the Stuart River was recorded at 1900 hrs on July 26 (Section 4.1.4; file TU5J27.DAT, card 34). Thus TCOR will adjust the simulated water temperatures for hour 19 for July 26 to agree with the corresponding observed values. The July 26 hour 24 simulated water temperatures resulting from this correction will be stored and output to file TJ26.OUT (Section 4.1.9).

Note that the output file TJ26.OUT contains July 26 hour 24 water temperatures for the 102 cross sections to be used as hour 1 initialization water temperatures and read in on I/O unit 1 for the July 28 simulation (July 27 to August 1).

4.1.3 I/O Unit 2, Meteorological Input File, TU2J27.DAT

File TU2J27.DAT contains six days, line by line, of meteorological data, one day observed and five days forecasted. In this case, the previous day (July 26) is observed data and the current day (July 27) and subsequent 4 days (July 28, 29, 30, 31) make up the five day forecasted data. Each line of data consists of air temperature (°C), solar (short wave), radiation (langleys), cloud amount (tenths), dewpoint temperature (°C), and wind speed (km/hr), station pressure (in. Hg), relative humidity (%) and date. Only the first five parameters on each line are used in the modelling process.

4.1.4 I/O Unit 3, Surveyed Hydraulic Input File, TU3.DAT

This file is exactly the same file used by the observed water temperature model and is documented in Section 3.1.3.

4.1.5 I/O Unit 5, Parameter Control Input File, TU5J27.DAT

With a few exceptions this file is the same as the file documented in Section 3.1.4. Entries in cards 1 through 29 and the last three cards are identical to TU5J06V.DAT with the exception of the date in card 1 and the number of days (46) and the number of days prior to the start of the simulation (16, since the simulation begins on July 26) entered in card 22. Card 30 contains four parameters, PTVAL, IFCONT, INITSEC and TNR. PTVAL is the value assigned to the source water temperature in the Nechako River assuming a constant value of the source. IFCONT is a flag used to control assignment of Nechako River source and Nautley River water temperatures.

Whatever value IFCONT is equated to, the previous day's observed Nechako River source (below Cheslatta Falls) and Nautley River water temperatures (for July 26 in this example) will be assigned values of PTVAL and TNR, respectively. If IFCONT is not equal to 2, water temperatures for both locations for the five subsequent days (forecast days) of the 6 day simulation will be estimated using a forecast procedure (Appendix A). If IFCONT=2, Nechako River source and Nautley River water temperatures for the five forecast days will be assigned mean daily values contained in cards 31 and 32, respectively. INITSEC defines the sub-reach at which the source water temperatures are measured. If INITSEC=2, the source water temperature data were recorded at Cheslatta Falls and if INITSEC=9, the source water temperature data were recorded at Bert Irvine's, downstream of Cheslatta Falls. Note that the value cannot be set equal to 1.

Card 33 contains six coefficients, CTRWT(I), I = 1 to 6, used in estimating tributary inflow water temperatures, for Swanson Creek, Greer Creek, Nautley River, Stoney Creek, Sinkut River and Cluculz Creek. Determination of these coefficients and their use in estimating tributary water temperatures are outlined in Appendix A. Card 34 contains parameters JTIME, OBSPT(54) and OBSPT(102), and represent the time that the water temperature was recorded in the Nechako River above the Stuart River (19 for 1900 hrs on July 26 for this example), the water temperature recorded in the Nechako River above the Nautley River at 1900 hours on July 26 and the water temperature recorded in the Nechako River above the Stuart River at 1900 hours on July 26, respectively. Note that JTIME cannot be assigned a value of 0 (zero). Review of the report outlining the 1984 Nechako River hydrothermal monitoring and control program (Envirocon 1985B) would be instructive in terms of understanding these operational procedures and constraints.

Cards 35, 36 and 37 are not used.

Note that an interactive program (Appendix D) has been developed to edit this parameter control file and file TU9J27.DAT (Section 4.1.6) efficiently, saving time and minimizing editing errors.

4.1.6 I/O Unit 7, Hourly Flow Input File, FU7J26J31.OUT

File FU7J26J31.OUT is of exactly the same format as file FU7J04.OUT (Section 3.1.5) but begins on hour 1 of July 26 and contains 9x24x6=1,296 lines for the six days of simulation.

4.1.7 I/O Unit 9, Mean Daily Tributary Inflow File, TU9J27.DAT

This file is again of the same format as file TU9J28V.DAT documented in Section 3.7. However, this file is updated daily for forecast operations by use of the interactive program (Appendix A) previously mentioned (Section 4.1.4). Cards 1 to 4, 5 to 8, and 9 to 12 remain unchanged at their constant values of 1.0, 40.0 and 40.0 respectivley. Cards 13 through 28 will be updated in response to changes in Nautley River flows. The previous day's observed Nautley River flows (July 26 in this example) will be assigned to each day subsequent to the previous day, thus assuming the Nautley River flow will remain constant for the period of the current six day simulation (July 26 to July 31). Flows for Stoney Creek, Sinkut River and Cluculz Creek in cards 17 to 20, 21 to 24, and 25 to 28, respectively will be upgraded according to their assigned percentages (Section 2.3), by the interactive editing computer program.

4.1.8 I/O Unit 4, Hourly and Mean Daily Water Temperature Output File TU4J27.OUT

This file contains simulated hourly response temperatures and hourly water temperatures for sub-reaches 8, 54, 56, 82 and 102, mean daily water temperatures in the Nechako River at Bert Irvines and the Nautley River, mean daily response and equilibrium temperatures, and mean daily water temperatures in sub-reaches 8 (Bert Irvine's Lodge), 54 (above the Nautley River), 56 (below the Nautley River), 82 (at Vanderhoof) and 102 (above the Stuart River). Mean daily water temperatures are output in both degrees fahrenheit and celsius. The six groups of hourly water temperatures at the beginning of the file are, in order, response temperature, and water temperature for sub-reaches 8, 54, 56, 82 and 102. These are output 12 per line so that there are 12 lines of hourly output (6 days) for each parameter. The mean daily source water temperatures in the Nechako and Nautley Rivers are output for the observed or previous day (OBS) and first three forecast days only as the fourth and fifth forecast days are set equal to the third forecast day (Appendix A). The first entry (July 26, output as 26/07) for the mean daily response temperatures has been intentionally deleted from the output routine in the source program, as this value is not used in the calculations.

4.1.9 I/O Unit 6, Initial Conditions and Hydraulic Continuity Output File, TU6J27.OUT

This output file is of exactly the same format as output file TU6J06V.OUT (Section 3.1.9), with the exception of length of output. TU6J27.OUT contains output for 6 days compared to 46 days in TU6J06V.OUT.

4.1.10 I/O Unit 11, Water Temperature Initialization Output File, TJ26.OUT

This file contains the simulated July 26 hour 24 water temperatures for each of the 102 locations which will be used to initialize the entire Nechako River for the following day's forecast simulation. That is file TJ26.OUT created during the July 27 simulation would be used as the hour 1 initialization water temperature input file read in on I/O unit 1 in the command file TEMPJ28.COM for the July 28 simulation.

4.1.11 I/O Unit 12, Water Temperature Initialization Correction Output File, TU12J27.OUT

This file contains the results of the subroutine TCOR which is used to adjust the previous day's simulated water temperatures to agree with the observed water temperatures at the time the sub-reach 102 water temperature was recorded. Note that water temperatures are recorded in the Nechako River at sub-reach 8 (Bert Irvine's Lodge), 54 (above the Nautley River) and 102 (above the Stuart River) only. The subroutine TCOR uses these water temperatures and the Nautley River water temperatures to adjust (using linear interpolation) water temperatures for the entire river. The first section of the output contains the time at which the sub-reach 102 water temperature was recorded (19 in this example - read in as JTIME from I/O unit 5, input file TU5J27.DAT), and the observed water temperatures in sub-reaches 54 and 102 recorded at that time.

The second section of output contains CORU, COR54, COR55, QS54, QT55, QS56, OBT56, COR56, COR102, D1 and D2. The parameters COR54 and COR102 represent magnitudes of differences between observed and simulated water temperatures (correction) in sub-reach 54 and 102, respectively. CORU is the correction at the upstream source (at sub-reach 8 in this example). COR55 is set equal to COR54. OBT56 is a blended water temperature for the Nechako River below the Nautley River obtained by blending observed Nechako and Nautley River water temperatures. COR56 is the correction obtained using OBT56. The parameters QS54 and QS56 are the flows at cross-sections 54 and 56, respectively corresponding to the hour defined by JTIME. QT55 is the Nautley River flow at hour JTIME. The terms D1 and D2 are the differences between COR54 and CORU, and COR102 and COR56, respectively.

The last three sections of this output file contain linearly interpolated corrections for each sub-reach, the simulated water temperatures before correction for each sub-reach and the revised simulated water temperatures for each sub-reach after correction, respectively.

5.0 ACKNOWLEDGEMENTS

The writers would like to thank Dr. J.E. Edinger of J.E. Edinger Associates, Inc. for his ongoing technical assistance through development and implementation of Envirocon's Water Temperature Model.

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7.0 APPENDICES

This section contains the following appendices:

A Determination of Forecast Source and Tributary Water Temperatures

B Example Set-Up of Observed Water Temperature Model
- July 6 to August 20

C Example Set-Up of Forecast Water Temperature Model
- July 26 to July 31

D Interactive Editing Program for the Forecast Water Temperature Model

APPENDIX A

DETERMINATION OF SOURCE AND TRIBUTARY WATER TEMPERATURES

Thus, using the estimates of A calculated as above and response and dewpoint temperatures calculated from five-day meteorological forecasts, five-day source water temperatures for the Nautley and Nechako Rivers could be determined for each day during the summer program. In actual fact, the source temperatures for days 1 through 3 were calculated using Equation (1) and days 4 and 5 were set equal to the value calculated for day 3.

The above equation could yield unrealistically high predicted source temperatures during periods of rapid warming. To place an upper bound on these predicted temperatures five-day maximum warming curves were developed based on the 1974 to 1982 observed source water temperature data for the two rivers. Days 1 through 3 were calculated using maximum observed incremental increases (1974 to 1982) in a three day period and added to the previous day's observed source water temperature. Days 4 and 5 were set equal to the value calculated for day 3. For each day of operation, the source water temperatures used in the modelling were defined by Equation (1) as long as these values did not exceed the values determined by the maximum curve.

Minimum values for each of the five-day source water temperatures were established by assigning the value of the previous day's observed source water temperature to days 1 through 5 (i.e. constant source water temperatures even if Equation (1) predicted dropping source water temperatures).

Thus, the source water temperatures used in the modelling were those predicted by Equation (1) as long as these values were within the bounds of the maximum and minimum curves. If they were not, the values defined by the maximum or minimum curves were used.

It must be emphasized that this approach to estimating source water temperatures has been used in an attempt to develop a better understanding of how the

Nechako River and, especially, the Nautley River respond to changes in meteorological conditions and more realistically model the responses. It was felt that this approach is an improvement over previous methods when viewed in terms of fisheries management and water use.

APPENDIX B

EXAMPLE SET-UP OF OBSERVED WATER TEMPERATURE MODEL - JULY 6 TO AUGUST 20

OBSERVED MODEL
COMMAND FILE LISTING

TEMPJ06V.COM

TEMPJ06V.COM

```
$SET VERIFY
$DEASSIGN/ALL
$ASSIGN TJ05.OUT          FOR001
$ASSIGN PG84MET.DAT        FOR002
$ASSIGN TU3,DAT           FOR003
$ASSIGN TU4J06V.OUT       FOR004
$ASSIGN TU5J06V,DAT        FOR005
$ASSIGN TU6J06V.OUT       FOR006
$ASSIGN FU7J04V,OUT       FOR007
$ASSIGN TU8J06V.DAT       FOR008
$ASSIGN TU9J29V,DAT        FOR009
$RUN 94T
$DEL T*,TMP;*
$EXIT
```

OBSERVED MODEL
INPUT FILES LISTING
AND DESCRIPTION

TJ05.OUT
PG84MET.DAT
TU3.DAT
TU5J06V.DAT
FU7J04V.OUT
TU8J06V.DAT
TU9J28V.DAT

TJ05.OUT

1	99.9	99.9	99.9	99.9	99.9	99.9	99.9	55.6	55.7	56.0	56.5	56.5
2	56.5	56.9	57.0	57.1	57.2	57.3	57.3	57.4	57.4	57.5	57.5	57.5
3	58.5	58.5	58.6	58.6	58.7	58.7	58.8	58.8	58.9	58.9	58.9	59.0
4	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.1	59.1	59.2
5	59.3	59.4	59.5	59.6	59.8	60.1	60.2	60.3	60.3	60.3	60.3	60.3
6	60.3	60.3	60.3	60.3	60.2	60.1	60.1	60.1	60.1	60.1	60.1	60.2
7	60.2	60.2	60.2	60.2	60.2	60.2	60.1	60.1	60.1	60.1	60.4	60.6
8	60.7	60.7	60.8	60.8	60.7	60.8	60.8	60.9	60.9	61.0	61.0	61.0
9	61.1	61.0	61.0	61.0	61.1	61.1						

[EOF]

Program : 84T.FOR TJ05.OUT
I/O Unit : 1

Card No. : 1 THROUGH 9
Variable(s) : PT(I) I = 1 to 102 (102 = NXSEC)
Format : 12F6.1

Explanation: Initializing water temperature file.
This file is used to initialize water temperatures at each of 102 surveyed cross sections between Cheslatta Falls and the Stuart River Confluence. The file contains 8 cards of 12 entries and 1 card of 6 entries. The first card, represented by this page, contains 99.9 for the first seven survey locations (not used) since the continuous recording thermograph is located within surveyed cross section 8, downstream of Cheslatta Falls.
The file name is TJ05.OUT

Field	1	2	3	4	5	6	7	8	9	10	11	12
Column	6	12	18	24	30	36	42	48	54	60	66	72
Value	99.9	99.9	99.9	99.9	99.9	99.9	99.9	55.6	55.7	56.0	56.5	56.5

PG84MET.DAT

Program	:	84T.FOR
I/O Unit	:	2
Card No.	:	1 THROUGH 46
Variable(s)	:	TA, HS, CC, TDP, V
Format	:	5F7.2

Explanation: This file contains meteorological data used in the modelling. Fields 1 through 5 are used, fields 6 through 12 are not.
The filename is PG84MET.DAT

PG DATA:	Data obtained from the AES weather station in Prince George
J09:	Data for J09 used for J06 as data for J06 not available
84:	Year
07:	Month
06:	Day
63.00:	Relative humidity (%) (not used)
93.40:	Station pressure (in Hg) (not used)
V:	Wind speed (km/hr)
TDP:	Dew point temperature (degree C)
CC:	Cloud cover (tenths)
HS:	Shortwave (solar) radiation (langleys)
TA:	Air Temperature (degree C)

Field

TU3.DAT

```
14
0.0,50.0,100.0,200.0,500.0,1000.0,1500.0,2000.0,3000.0,
4000.0,5000.0,7000.0,10000.0,30000.0,
0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,
0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,
0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,
0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,
0.0,0.0,0.0,0.0,0.0,0.0,
0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,
0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,
0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,
0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,
0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,
0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,
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0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,
0.0,0.0,0.0,0.0,0.0,0.0,
0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,
0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,
0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,
0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,
0.00,0.00,0.00,0.00,0.00,0.00,0.00,0.00,
257.,257.,147.,426.,1645.,187.,235.,223.,196.,123.,184.,442.,
497.,499.,319.,476.,282.,577.,237.,31.,149.,38.,15.,33.,
484.,558.,14.,917.,142.,366.,499.,253.,238.,396.,59.,595.,
1222.,370.,150.,103.,337.,350.,422.,374.,515.,681.,859.,613.,
538.,28.,738.,398.,1494.,126.,
1634.,540.,318.,164.,236.,9.,903.,1989.,1480.,1462.,
354.,562.,329.,478.,1068.,565.,67.,652.,736.,339.,
414.,532.,71.,373.,713.,13.,25.,1893.,1740.,1117.,
2461.,1029.,1807.,1206.,2285.,874.,3029.,2494.,2047.,887.,
1432.,1714.,1088.,480.,1233.,2222.,2635.,2635.,
185.,185.,101.,143.,128.,180.,184.,317.,171.,248.,148.,162.,
245.,416.,191.,144.,232.,248.,410.,28.,183.,30.,13.,132.,
333.,328.,303.,161.,429.,79.,177.,261.,246.,138.,277.,170.,
254.,77.,129.,294.,242.,225.,98.,252.,278.,417.,200.,240.,
137.,310.,255.,121.,225.,47.,
267.,295.,204.,56.,110.,28.,364.,270.,449.,507.,
262.,212.,122.,199.,228.,199.,23.,52.,241.,188.,
228.,330.,166.,436.,218.,120.,14.,299.,256.,248.,
342.,395.,367.,308.,349.,537.,305.,554.,666.,218.,
508.,319.,459.,131.,305.,253.,312.,312.,
268.,268.,163.,452.,1659.,203.,239.,245.,202.,145.,198.,458.,
513.,512.,321.,486.,294.,594.,254.,61.,192.,75.,31.,67.,
499.,586.,27.,938.,174.,392.,532.,280.,261.,412.,72.,604.,
1234.,390.,164.,116.,348.,360.,433.,388.,529.,696.,868.,626.,
550.,55.,761.,420.,1518.,206.,
1648.,561.,336.,174.,243.,18.,915.,2003.,1491.,1464.,
369.,573.,337.,486.,1086.,580.,83.,664.,748.,348.,
428.,544.,82.,385.,726.,26.,49.,1910.,1755.,1129.,
2481.,1047.,1824.,1221.,2299.,898.,3047.,2517.,2074.,899.,
1454.,1722.,1111.,485.,1246.,2229.,2641.,2641.,
186.,186.,103.,146.,129.,189.,185.,318.,173.,251.,152.,165.,
```

55 246.,417.,193.,147.,234.,248.,410.,56.,186.,60.,27.,136.,
56 335.,329.,306.,162.,430.,85.,178.,263.,246.,139.,279.,170.,
57 254.,80.,133.,296.,246.,226.,101.,255.,279.,419.,202.,242.,
58 141.,315.,257.,126.,225.,75.,
59 267.,298.,207.,58.,117.,30.,366.,271.,453.,507.,
60 265.,215.,126.,201.,229.,200.,26.,56.,242.,190.,
61 230.,331.,168.,437.,221.,127.,18.,300.,257.,248.,
62 343.,396.,368.,307.,350.,542.,310.,554.,666.,219.,
63 514.,319.,460.,132.,305.,254.,312.,312.,
64 291.,291.,196.,504.,1688.,236.,248.,290.,214.,190.,226.,491.,
65 546.,539.,324.,507.,318.,598.,288.,123.,279.,151.,61.,133.,
66 531.,642.,54.,981.,238.,444.,599.,335.,307.,444.,99.,623.,
67 1258.,430.,193.,142.,371.,380.,456.,416.,558.,727.,896.,652.,
68 575.,110.,807.,465.,1566.,367.,
69 1676.,601.,372.,192.,255.,35.,940.,2030.,1511.,1468.,
70 397.,596.,354.,501.,1122.,610.,116.,688.,770.,366.,
71 455.,568.,103.,410.,752.,52.,98.,1945.,1795.,1153.,
72 2522.,1084.,1857.,1252.,2328.,945.,3084.,2564.,2128.,923.,
73 1498.,1739.,1157.,495.,1272.,2242.,2651.,2651.,
74 187.,187.,109.,150.,131.,208.,188.,321.,176.,255.,161.,173.,
75 248.,418.,195.,155.,238.,250.,411.,112.,192.,120.,53.,143.,
76 337.,330.,312.,166.,432.,95.,181.,268.,247.,142.,282.,172.,
77 255.,87.,141.,301.,252.,230.,108.,259.,280.,423.,204.,244.,
78 148.,323.,259.,136.,226.,130.,
79 269.,302.,214.,61.,132.,34.,372.,272.,461.,507.,
80 272.,222.,133.,206.,230.,201.,31.,64.,245.,193.,
81 233.,334.,171.,439.,229.,142.,25.,301.,258.,249.,
82 343.,397.,369.,309.,351.,550.,319.,555.,667.,220.,
83 524.,320.,461.,133.,306.,254.,312.,312.,
84 360.,360.,295.,660.,1775.,335.,275.,425.,250.,325.,310.,590.,
85 645.,620.,333.,570.,390.,640.,390.,312.,540.,400.,280.,350.,
86 625.,810.,135.,1110.,430.,600.,800.,300.,245.,440.,150.,680.,
87 1330.,350.,280.,220.,440.,440.,525.,500.,645.,820.,940.,730.,
88 650.,225.,945.,200.,1160.,650.,
89 1760.,723.,480.,248.,293.,88.,1015.,2113.,1573.,1480.,
90 483.,665.,405.,548.,1230.,700.,215.,760.,838.,420.,
91 538.,640.,168.,485.,830.,130.,245.,2050.,1875.,1225.,
92 2645.,1195.,1958.,1345.,2415.,1088.,3195.,2705.,2290.,995.,
93 1630.,1790.,1295.,525.,1350.,2283.,2683.,2683.,
94 192.,192.,125.,164.,136.,265.,195.,330.,184.,269.,189.,195.,
95 253.,420.,201.,178.,250.,254.,415.,200.,209.,205.,137.,163.,
96 345.,335.,329.,176.,439.,127.,191.,281.,80.,152.,290.,176.,
97 259.,69.,165.,316.,272.,240.,130.,273.,285.,434.,212.,252.,
98 168.,349.,267.,100.,229.,297.,
99 273.,317.,235.,72.,178.,47.,388.,274.,497.,508.,
100 294.,244.,16.,222.,235.,206.,48.,89.,252.,202.,
101 244.,344.,182.,446.,251.,189.,46.,307.,260.,253.,
102 345.,403.,375.,313.,357.,577.,348.,556.,668.,222.,
103 557.,323.,466.,135.,310.,256.,313.,313.,
104 475.,475.,460.,920.,1920.,500.,320.,650.,310.,550.,450.,755.,
105 810.,755.,349.,675.,510.,710.,560.,640.,975.,840.,750.,725.,
106 775.,1090.,1130.,1325.,750.,860.,1135.,775.,675.,700.,315.,775.,
107 1450.,750.,425.,350.,555.,540.,640.,640.,790.,975.,1030.,860.,
108 775.,550.,1175.,825.,1950.,1655.,
109 1900.,925.,660.,340.,355.,175.,1140.,2250.,1675.,1500.,
110 625.,780.,490.,625.,1410.,850.,380.,880.,950.,510.,
111 675.,760.,275.,610.,960.,260.,490.,2225.,2025.,1345.,
112 2850.,1380.,2125.,1500.,2560.,1325.,3380.,2940.,2560.,1115.,
113 1850.,1875.,1525.,575.,1480.,2350.,2735.,2735.,
114 200.,200.,152.,187.,145.,360.,207.,345.,198.,292.,235.,232.,
115 262.,424.,213.,214.,270.,261.,421.,278.,238.,267.,279.,197.,
116 356.,343.,358.,193.,450.,180.,207.,303.,255.,168.,304.,183.,
117 265.,145.,205.,341.,305.,257.,166.,296.,293.,453.,225.,265.,
118 202.,392.,280.,216.,234.,575.,
119 280.,340.,270.,90.,254.,67.,414.,278.,525.,508.,
120 330.,280.,194.,248.,242.,214.,76.,129.,264.,216.,
121 [illegible]

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262.,360.,200.,457.,287.,264.,80.,315.,264.,258.,
348.,411.,383.,320.,365.,620.,395.,558.,670.,226.,
610.,328.,474.,139.,315.,258.,314.,314.,
580.,580.,540.,1020.,1960.,590.,460.,790.,475.,640.,610.,890.,
930.,880.,455.,770.,635.,830.,700.,810.,1120.,1030.,950.,855.,
960.,1250.,1300.,1440.,975.,1000.,1300.,1000.,890.,780.,450.,900.,
1575.,860.,570.,505.,675.,640.,745.,760.,945.,1145.,1140.,975.,
900.,850.,1400.,975.,2110.,2025.,
2040.,1128.,840.,433.,418.,338.,1265.,2388.,1778.,1520.,
768.,895.,575.,703.,1590.,1000.,545.,1000.,1063.,600.,
813.,880.,383.,735.,1090.,525.,895.,2400.,2175.,1465.,
3055.,1565.,2293.,1655.,2705.,1563.,3565.,3175.,2830.,1235.,
2070.,1960.,1755.,625.,1610.,2418.,2798.,2788.,
207.,207.,159.,192.,150.,369.,249.,356.,236.,313.,259.,257.,
267.,427.,237.,227.,292.,270.,427.,286.,248.,285.,312.,218.,
358.,346.,361.,200.,453.,189.,216.,310.,260.,178.,307.,190.,
269.,162.,247.,367.,340.,273.,202.,319.,301.,473.,236.,277.,
235.,437.,292.,235.,238.,585.,
297.,364.,305.,108.,330.,89.,441.,282.,565.,509.,
366.,316.,232.,274.,250.,222.,104.,170.,276.,231.,
280.,376.,218.,468.,324.,340.,115.,324.,268.,264.,
351.,420.,392.,327.,374.,664.,443.,560.,672.,230.,
664.,333.,482.,143.,321.,261.,315.,315.,
690.0,690.0,610.0,1110.,2000.,675.0,610.0,925.0,650.0,730.0,
760.0,1025.,1050.,1010.,570.0,860.0,750.0,950.0,850.0,980.0,
1275.,1225.,1150.,980.0,1155.,1420.,1480.,1540.,1195.,1130.,
1475.,1220.,1100.,860.0,575.0,1030.,1690.,975.0,710.0,650.0,
795.0,750.0,850.0,900.0,1090.,1290.,1240.,1090.,1035.,1145.,
1625.,1140.,2260.,2400.,
2180.,1330.,1020.,525.,480.,500.,1390.,2525.,1880.,1540.,
910.,1010.,660.,780.,1770.,1150.,710.,1120.,1175.,690.,
950.,1000.,490.,860.,1220.,790.,1300.,2575.,2325.,1585.,
3260.,1750.,2460.,1810.,2850.,1800.,3750.,3410.,3100.,1355.,
2290.,2045.,1985.,675.,1740.,2485.,2840.,2840.,
213.,213.,167.,197.,156.,378.,283.,367.,273.,335.,
284.,282.,271.,431.,260.,239.,313.,278.,433.,294.,
257.,302.,345.,242.,362.,351.,366.,207.,457.,199.,
224.,317.,267.,187.,310.,198.,274.,180.,287.,392.,
375.,288.,238.,342.,309.,492.,247.,290.,269.,480.,
305.,253.,243.,594.,
294.,387.,340.,126.,406.,108.,467.,286.,605.,509.,
402.,352.,270.,300.,257.,230.,132.,210.,288.,245.,
298.,392.,236.,479.,360.,416.,149.,332.,272.,269.,
354.,428.,400.,334.,382.,707.,490.,562.,674.,234.,
717.,338.,490.,147.,326.,263.,316.,316.,
900.0,900.0,760.0,1300.,2100.,850.0,895.0,1200.,975.0,910.0,
1090.,1280.,1280.,1270.,780.0,1040.,990.0,1180.,1130.,1310.,
1560.,1620.,1560.,1250.,1540.,1750.,1840.,1745.,1630.,1400.,
1810.,1655.,1530.,1025.,830.0,1280.,1925.,1200.,1000.,925.0,
1040.,955.0,1060.,1150.,1390.,1600.,1450.,1340.,1300.,1745.,
2075.,1455.,2560.,3155.,
2510.,1560.,1260.,705.,775.,830.,1625.,2745.,2110.,1560.,
1140.,1260.,840.,940.,2000.,1390.,1040.,1400.,1360.,880.,
1230.,1220.,710.,1090.,1460.,1300.,2110.,2900.,2590.,1840.,
3600.,2125.,2775.,2110.,3125.,2270.,4100.,3830.,3595.,1540.,
2740.,2275.,2430.,775.,1975.,2620.,2940.,2940.,
225.,225.,182.,207.,165.,397.,348.,390.,347.,378.,
335.,331.,280.,438.,306.,264.,358.,296.,445.,310.,
274.,337.,412.,289.,368.,359.,365.,222.,464.,217.,
240.,330.,277.,207.,318.,213.,282.,214.,368.,442.,
445.,320.,310.,387.,326.,532.,270.,315.,337.,570.,
330.,290.,253.,612.,
298.,430.,382.,162.,451.,150.,520.,293.,610.,510.,
432.,383.,345.,338.,287.,241.,185.,397.,350.,264.,
332.,425.,272.,500.,432.,467.,215.,349.,280.,285.,
359.,444.,415.,351.,390.,733.,527.,566.,680.,243.,
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781.,350.,498.,158.,331.,264.,318.,318.,
1125.,1125.,925.0,1495.,2175.,1025.,1175.,1475.,1300.,1100.,
1410.,1550.,1520.,1525.,1000.,1215.,1230.,1420.,1410.,1660.,
1860.,2000.,1960.,1510.,1925.,2075.,2190.,1945.,2080.,1660.,
2140.,2090.,1950.,1190.,1080.,1530.,2165.,1430.,1250.,1100.,
1260.,1120.,1250.,1390.,1580.,1875.,1575.,1500.,1450.,2150.,
2320.,1780.,2860.,3900.,
2825.,1800.,1485.,885.,1040.,1160.,1960.,2860.,2320.,1600.,
1360.,1500.,1010.,1130.,2120.,1625.,1360.,1690.,1525.,1070.,
1500.,1450.,925.,1340.,1710.,1825.,2830.,3240.,2850.,2125.,
3880.,2500.,3080.,2400.,3410.,2770.,4440.,4180.,3975.,1675.,
3190.,2510.,2835.,880.,2175.,2750.,3050.,3050.,
237.,237.,196.,218.,174.,417.,413.,413.,421.,422.,
383.,380.,289.,444.,353.,288.,402.,313.,456.,325.,
292.,372.,478.,335.,374.,368.,385.,236.,472.,236.,
257.,345.,287.,226.,325.,228.,292.,249.,420.,467.,
477.,342.,345.,412.,338.,572.,281.,322.,343.,590.,
339.,328.,262.,632.,
303.,445.,391.,198.,489.,191.,532.,297.,616.,511.,
455.,412.,425.,355.,340.,252.,240.,451.,424.,303.,
367.,457.,307.,522.,504.,720.,284.,367.,287.,320.,
364.,453.,424.,375.,397.,748.,534.,569.,684.,251.,
784.,357.,503.,171.,336.,267.,320.,320.,
1350.,1350.,1090.,1690.,2250.,1200.,1455.,1750.,1625.,1290.,
1730.,1820.,1760.,1780.,1220.,1390.,1470.,1660.,1690.,2010.,
2160.,2380.,2360.,1770.,2310.,2400.,2540.,2145.,2530.,1920.,
2470.,2525.,2370.,1355.,1330.,1780.,2405.,1660.,1500.,1275.,
1480.,1285.,1440.,1630.,1770.,2150.,1700.,1660.,1600.,2555.,
2565.,2105.,3160.,4645.,
3125.,2025.,1690.,1075.,1300.,1480.,2255.,2990.,2525.,1660.,
1540.,1700.,1200.,1320.,2280.,1850.,1675.,1975.,1710.,1260.,
1780.,1680.,1150.,1575.,1960.,2350.,3750.,3575.,3090.,2420.,
4170.,2860.,3430.,2710.,3690.,3270.,4780.,4510.,4365.,1790.,
3610.,2750.,3240.,1000.,2375.,2900.,3225.,3225.,
249.,249.,210.,229.,183.,437.,478.,436.,495.,465.,
431.,429.,298.,450.,399.,312.,446.,330.,468.,341.,
310.,407.,544.,381.,380.,377.,395.,250.,490.,255.,
274.,360.,297.,245.,332.,243.,302.,274.,472.,492.,
509.,364.,380.,437.,350.,612.,292.,329.,349.,610.,
348.,366.,271.,652.,
311.,456.,397.,234.,525.,232.,548.,302.,619.,514.,
465.,417.,505.,382.,377.,290.,294.,458.,442.,331.,
400.,489.,342.,543.,576.,870.,350.,384.,294.,342.,
369.,462.,429.,414.,401.,755.,542.,572.,688.,255.,
796.,364.,508.,190.,339.,269.,325.,325.,
1800.,1800.,1420.,2080.,2400.,1550.,2015.,2300.,2275.,1670.,
2370.,2360.,2240.,2290.,1660.,1740.,1950.,2140.,2250.,2710.,
2760.,3140.,3160.,2290.,3080.,3050.,3240.,2545.,3430.,2440.,
3130.,3395.,3210.,1685.,1830.,2280.,2885.,2120.,2000.,1625.,
1920.,1615.,1820.,2110.,2150.,2700.,1950.,1980.,1900.,3365.,
3055.,2755.,3760.,6135.,
3725.,2475.,2100.,1455.,1820.,2120.,2845.,3250.,2935.,1780.,
1900.,2100.,1580.,1700.,2600.,2300.,2305.,2545.,2090.,1640.,
2340.,2140.,1600.,2045.,2460.,3400.,5590.,4245.,3570.,3010.,
4750.,3580.,4130.,3330.,4250.,4270.,5460.,5170.,5145.,2020.,
4450.,3230.,4050.,1240.,2775.,3200.,3575.,3575.,
273.,273.,238.,251.,201.,477.,608.,482.,643.,552.,
527.,527.,316.,462.,492.,361.,534.,364.,491.,372.,
346.,477.,676.,473.,392.,395.,415.,279.,496.,293.,
308.,390.,317.,283.,346.,273.,322.,334.,576.,542.,
573.,408.,450.,487.,374.,692.,314.,343.,361.,650.,
366.,442.,289.,692.,
327.,478.,409.,306.,597.,314.,580.,312.,625.,520.,
485.,427.,665.,436.,451.,366.,402.,472.,478.,387.,
466.,553.,412.,585.,720.,1170.,482.,418.,308.,386.,
379.,480.,439.,492.,409.,769.,558.,578.,696.,263.,
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820.,378.,518.,228.,345.,273.,335.,335.,
2475.,2475.,1915.,2665.,2625.,2075.,2855.,3125.,3250.,2240.,
3330.,3170.,2960.,3055.,2320.,2265.,2670.,2860.,3090.,3760.,
3660.,4280.,4360.,3070.,4235.,4025.,4290.,3145.,4780.,3220.,
4120.,4700.,4470.,2180.,2580.,3030.,3605.,2810.,2750.,2150.,
2580.,2110.,2390.,2830.,2720.,3525.,2325.,2460.,2350.,4580.,
3790.,3730.,4660.,8370.,
4625.,3150.,2715.,2025.,2600.,3080.,3730.,3640.,3550.,1960.,
2440.,2700.,2150.,2270.,3080.,2975.,3250.,3400.,2635.,2210.,
3180.,2830.,2275.,2750.,3210.,4975.,8350.,5250.,4290.,3895.,
5620.,4660.,5180.,4260.,5090.,5770.,6480.,6160.,6315.,2365.,
5710.,3950.,5265.,1600.,3375.,3650.,4100.,4100.,
309.,309.,280.,284.,228.,537.,803.,551.,865.,683.,
671.,674.,343.,480.,632.,435.,666.,415.,526.,419.,
400.,582.,874.,611.,410.,422.,445.,320.,520.,350.,
359.,435.,347.,340.,367.,318.,352.,424.,732.,617.,
669.,474.,555.,562.,410.,812.,347.,364.,379.,710.,
393.,556.,316.,752.,
351.,511.,427.,414.,705.,437.,628.,327.,634.,529.,
515.,442.,905.,517.,562.,480.,564.,493.,532.,471.,
565.,649.,517.,648.,936.,1620.,680.,469.,329.,452.,
394.,507.,454.,609.,421.,790.,582.,587.,708.,275.,
856.,399.,533.,285.,354.,279.,350.,350.,
6188.,6188.,4788.,6663.,6563.,5188.,7138.,7913.,8125.,5600.,
8325.,7925.,7400.,7638.,5800.,5663.,6675.,7150.,7725.,9400.,
9150.,10700.,10900.,7675.,10588.,10063.,10725.,7863.,11950.,8050.,
10300.,11750.,11175.,5450.,6450.,7575.,9013.,7025.,6875.,5375.,
6450.,5275.,5975.,7075.,6800.,8813.,5813.,6150.,5875.,11450.,
9475.,9325.,11650.,23270.,
10625.,7650.,6815.,5825.,7800.,9480.,9630.,6240.,7650.,3160.,
6040.,6700.,5950.,6070.,6280.,7475.,9550.,9100.,6335.,6010.,
8780.,7430.,6775.,7450.,8210.,15475.,26750.,11950.,9090.,9795.,
11420.,11860.,12180.,10460.,10690.,15770.,13280.,12760.,14115.,4665.,
14110.,8750.,13365.,4000.,7375.,6650.,7600.,7600.,
519.,519.,470.,477.,383.,902.,1349.,926.,1453.,1147.,
1127.,1132.,576.,806.,1062.,731.,1119.,697.,884.,704.,
672.,978.,1468.,1026.,689.,709.,748.,538.,874.,588.,
603.,731.,583.,571.,617.,534.,591.,712.,1230.,1037.,
1124.,796.,932.,944.,689.,1364.,583.,612.,637.,1193.,
660.,934.,531.,1152.,
511.,731.,547.,1134.,1425.,1257.,948.,427.,694.,589.,
715.,542.,2505.,1057.,1302.,1240.,1644.,633.,892.,1031.,
1225.,1289.,1217.,1068.,2376.,4620.,2000.,809.,469.,892.,
494.,687.,554.,1389.,501.,930.,742.,647.,788.,355.,
1096.,539.,633.,665.,414.,319.,450.,450.,
```

Program : 84T.FOR
I/O Unit : 3

TU3.DAT

Card No. : 1
Variable(s) : NEW2
Format : FREE FORMAT

Explanation: I/O input unit 3 file contains surveyed hydraulic data (cross sectional area of flow and surface width of flow) for flows of 0 cfs to 30,000 cfs at 102 surveyed cross sections.
The file name is TU3.DAT

NEW2: Number of discharges used for rating curve
Flows range from 0 to 30,000 cfs.

14

Field

Program : 84T.FOR
1/0 Unit : 3

Card No. : 2
Variable(s) : QD(I) I = 1 to NEW2
Format : FREE FORMAT

0.0,50.0,100.0,200.0,500.0,1000.0,1500.0,2000.0,3000.0,

QD(I): Flows used to establish rating curves
This card contains flows of 0 through 3,000 cfs.

Field

Program : 84T.FOR
I/O Unit : 3

Card No. : 3
Variable(s) : QD(I) I = 1 to NEW2
Format : FREE FORMAT

4000.0,5000.0,7000.0,10000.0,30000.0,

Field

QD(I): Flows used to establish rating curves
This card contains flows of 4,000 through 30,000 cfs.

Program : 84T.FOR
1/0 Unit : 3

Card No. : 4 THROUGH 13
Variable(s) : AT(J) J = 1 to NXSEC (NXSEC = 102)
Format : FREE FORMAT

```
0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,
```

AT(J): Cross sectional area of flow at each of 102 cross sections for a flow of 0 cfs.
Entries are all zeroes for cards 4 through 13.

Field

Program : 84T.FOR
I/O Unit : 3

Card No. : 14 THROUGH 23
Variable(s) : WT(J) J = 1 to NXSEC (NXSEC = 102)
Format : FREE FORMAT

Field 10 20 30 40 50

0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,

WT(J): Surface width of flow at each of 102 cross sections for a flow of 0 cfs.
Entries are all zeroes for cards 14 through 23.

Program : 84T.FOR
I/O Unit : 3

Card No. : 24 THROUGH 297
Variable(s) : AT(J) AND WT(J) J = 1 to NXSEC (NXSEC = 102)
Format : FREE FORMAT

Explanation: Cards 24 through 297 contain cross sectional area of flow and surface widths of flow for each 102 surveyed cross sections for flows of 50 cfs through 30,000 cfs.

Cards 24 to 33 : Cross sectional area of flow for 50 cfs.

Cards 34 to 43 : Surface width of flow for 50 cfs.

Cards 44 to 53 : Cross section area of flow for 100 cfs.

Cards 54 to 63 : Surface width of flow for 100 cfs.

Cards 64 to 73 : Cross section area of flow for 200 cfs.

Cards 74 to 83 : Surface width of flow for 200 cfs.

Cards 84 to 93 : Cross section area of flow for 500 cfs.

Cards 94 to 103 : Surface width of flow for 500 cfs.

Cards 104 to 113: Cross section area of flow for 1,000 cfs.

Cards 114 to 123: Surface width of flow for 1,000 cfs.

Cards 124 to 133: Cross section area of flow for 1,500 cfs.

Cards 134 to 143: Surface width of flow for 1,500 cfs.

Cards 144 to 154: Cross section area of flow for 2,000 cfs.

Cards 155 to 165: Surface width of flow for 2,000 cfs.

Cards 166 to 176: Cross section area of flow for 3,000 cfs.

Cards 177 to 187: Surface width of flow for 3,000 cfs.

Field

Program : 84T.FOR
1/0 Unit : 3

Card No. : 24 THROUGH 297 (cont'd.)
Variable(s) : AT(J) AND WT(J) J = 1 to NXSEC (NXSEC = 102)
Format : FREE FORMAT

Cards 188 to 198: Cross section area of flow for 4,000 cfs.

Cards 199 to 209: Surface width of flow for 4,000 cfs.

Cards 210 to 220: Cross section area of flow for 5,000 cfs.

Cards 221 to 231: Surface width of flow for 5,000 cfs.

Cards 232 to 242: Cross section area of flow for 7,000 cfs.

Cards 243 to 253: Surface width of flow for 7,000 cfs.

Cards 254 to 264: Cross section area of flow for 10,000 cfs.

Cards 265 to 275: Surface width of flow for 10,000 cfs.

Cards 276 to 286: Cross section area of flow for 30,000 cfs.

Cards 287 to 297: Surface width of flow for 30,000

Field

TU5J06V.DAT

```
   06   7
1 102 1104      1.00     93.40   54    1    7    0      9.20      0.46
116.03,115.78,114.66,114.30,113.23,112.80,112.04,110.72,109.39,108.22,
107.09,106.31,105.86,104.32,103.94,102.82,101.74,100.37,99.35,97.51,
96.82,95.94,95.56,94.64,94.09,93.45,92.55,91.77,90.93,90.06,
89.19,88.74,87.94,87.02,85.81,85.14,84.41,83.51,81.79,80.44,
79.06,77.60,76.34,74.94,73.71,72.82,71.41,70.26,67.78,66.49,
65.46,64.65,62.61,60.99,
60.32,59.07,57.57,56.61,56.30,54.98,51.89,49.64,49.15,49.01,
46.21,45.32,43.99,42.88,41.74,40.66,39.73,36.99,35.76,34.71,
31.65,30.30,29.18,28.35,27.52,27.16,26.70,26.49,24.47,21.23,
19.98,19.47,18.73,16.70,14.16,12.97,11.97,10.70,9.47,7.99,
6.95,6.12,5.05,3.69,2.44,1.65,0.74,0.00,
 9
5,
8,54,56,82,102,
AT SECTION   8 (AT IRVINE'S LODGE) !
AT SECTION  54 (ABOVE FORT FRASER) !
AT SECTION  56 (BELOW THE NAUTLEY RIVER) !
AT SECTION  82 (AT VANDERHOOF) !
AT SECTION 102 (ABOVE THE STUART R.) !
   58   8
                 2   0.03
                15   1.13
                24   1.13
                55  37.64
                79   3.76
                88   7.53
                97   3.76
13,1,1,9
13,1,13,1,13,1,13,1,13,1,13,1,13,1,13,1,13,1,13,1,13,1,13,1,
14.2,14.7,15.0,13.3,14.2,14.4,14.7,14.7,14.9,14.2,13.9,13.9,
14.2,14.3,14.7,15.0,15.0,15.3,15.0,15.0,15.3,16.1,16.1,16.4,
16.1,15.8,15.8,16.1,15.6,15.6,16.4,16.1,16.4,16.1,15.9,15.3,
15.3,15.1,15.8,15.3,14.9,15.4,99.9,99.9,99.9,99.9
                210   54.0  125.0  120.0
90.0,
3.0,
```

TU5J06V.DAT

Program : 84T.FOR
I/O Unit : 5

Card No. : 1
Variable(s) : OBSDAY, MONTH
Format : FREE FORMAT

Explanation: Control file used to specify modelling period, size of the simulation time step, coefficients for the windspeed function, location of surveyed cross sections, initial river and tributary flows and source water temperatures, and locations for which output is to be produced.
The file name is TU5J06V.DAT

MONTH: July (7)

OBSDAY: The sixth day of the month (06)

9 7
5 06

Field

Program : 84T.FOR
I/O Unit : 5

Card No. : 2
Variable(s) : NCOND,NXSEC,NHR,DT,QSO,IGO,IOUT,NTRIB,JTS,A1,B1
Format : 1X,I1,I4,I5,2F10.2,4I5,2F10.2

Field	Column	Value	Variable	Description
11	71	0.46	B1:	Coefficient in the windspeed function
10	61	9.20	A1:	Constant in the windspeed function
9	51	0	JTS:	Hour of day at which computations begin. Computations begin in the first hour for JTS=0 (midnight)
8	46	7	NTR1B:	Number of tributaries
7	41	1	IOUT:	Frequency of output of results - not used but required for documentation
6	36	54	IGO:	The Nautley River enters the Nechako River at sub-reach 54 - not used but required for documentation
5	31	93.40	QSO:	Initial flow in the Nechako River at Cheslatta Falls (m3/s)
4	21	1.00	DT:	Size of time step. One hour in this case
3	11	1104	NHR:	Number of hourly time steps - 1104 for a 46 day simulation
2	6	102	NXSEC:	Number of surveyed cross sections used in the modelling
1	2	1	NCOND:	Not used

Field

Program : 84T.FOR
I/O Unit : 5

Card No. : 3 THROUGH 13
Variable(s) : X(I) I = 1 to NXSEC (NXSEC = 102)
Format : FREE FORMAT

116.03, 115.78, 114.66, 114.30, 113.23, 112.80, 112.04, 110.72, 109.39, 108.22,

X(I): Distance from each surveyed cross section to the downstream end of the study reach (ie at the confluence of the Nechako and Stuart Rivers). (miles).

Field

Program : 84T.FOR
1/0 Unit : 5

Card No. : 14
Variable(s) : NLHFD
Format : 1X, I2

3 9

NLHFD: Number of lines of hourly flow data

Field

Program : 84T.FOR
I/O Unit : 5

Card No. : 15
Variable(s) : NTRPLT
Format : FREE FORMAT

NTRPLT: Number of locations for which calculated mean daily water temperatures are to be output

5

Field

Program : 84T. FOR
1/0 Unit : 5

Card No. : 16
Variable(s) : IPRT
Format : FREE FORMAT

8, 54, 56, 82, 102,

IPRT: Surveyed cross sections for which mean daily water temperatures are output

Program : 84T.FOR
I/O Unit : 5

Card No. : 17 THROUGH 21
Variable(s) : RIVLOC (K,I) K = 1 to 20; I = 1 to NTRPLT
Format : 20A4

AT SECTION 8 (AT IRVINE'S LODGE):

RIVLOC (K,I): Titles for output of locations identified in card 16

Field

Program : 84T. FOR
1/O Unit : 5

Card No. : 22
Variable(s) : NDSWT, NEDBSP
Format : FREE FORMAT

58 8

NDSWT: Number of days of mean daily source water temperature data (58)

NEDBSP: Number of extra days in data before start of the simulation (8)

Field

Program : 84T. FOR
I/O Unit : 5

Card No. : 23 THROUGH 29
Variable(s) : IGT(N), QTT N=1 to NTR1B
Format : 10X, I7, F7.2

Field	Columns	Example	Description
2	17–24	0.03	QTT: Initial flow of the tributary
1	10–17	2	IGT(N): Survey cross section at which the tributary enters the Nechako River

Program : 84T.FOR
I/O Unit : 5

Card No. : 30
Variable(s) : PTVAL, IFCONT, INITSEC
Format : FREE FORMAT

13.1, 1, 9

PTVAL: Value of the source water temperature in the Nechako River at Cheslatta Falls assuming a constant value (13.1)

IFCONT: Flag used to control assignment of Nechako River source water temperatures. IFCONT = 1: read mean daily water temperatures from cards 31 through 35. IFCONT = 2: use the value of PTVAL for constant mean daily source water temperatures in the Nechako River at Cheslatta Falls (1)

INITSEC: Defines the sub-reach at which the Nechako River source water temperatures are measured. (9)

Field

Program : 84T.FOR
I/O Unit : 5

Card No. : 31 THROUGH 35
Variable(s) : TUPD(I) I = 1, NDSWT
Format : FREE FORMAT

13.1,13.1,13.1,13.1,13.1,13.1,13.1,13.1,13.1,13.1,13.1,13.1,

TUPD(I): Mean daily source water temperatures in the Nechako River at Bert Irvine's Lodge (at survey cross section 8.)

Field

Program : 84T.FOR
I/O Unit : 5

Card No. : 36
Variable(s) : JDAT, PHI, ALON, TZM
Format : 10X, I7, 3F7.1

TZM: Not used (120.0)

ALON: Not used (125.0)

PHI: Not used (54.0)

JDAT: Not used (210)

Program : 84T.FOR
I/O Unit : 5

Card No. : 37
Variable(s) : AZ1
Format : FREE FORMAT

AZ1: Not used

Field

Program : 84T.FOR
I/O Unit : 5

Card No. : 38
Variable(s) : EBH1
Format : FREE FORMAT

EBH1: Not used

3.e,

Field

FU7J04V.OUT

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2001, 2001, 2001, 2041, 2041, 2041, 2041, 2041, 2041, 2041, 2041, 2041, 8/07
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3544, 3544, 3544, 3544, 3810, 3810, 3810, 3810, 3810, 3810, 3810, 3810,
3810, 3943, 3943, 3943, 3943, 3943

OBSERVED MODEL
OUTPUT FILES' LISTING

TU4J06V.OUT
TU6J06V.OUT

Program : 84T.FOR
I/O Unit : 9

Card No. : 1 THROUGH 35
Variable(s) : QTSD (K,I) K = 1 to NDSWT
Format : 12F7.0 I = IGT(N) N = 1 to NTR1B

Note: The number of data elements contained in this file must equal the sum of "NDSWT + NEDBSP" contained in I/O input unit 5. The number and dates of data will be equivalent to the data entries contained in cards 31 through 35 (TUPD(I)) in I/O input 5. For the current example, data begins on June 28 and ends on August 24. Thus there are 58 days (NDSWT) of source water temperature and the modelling begins on July 6, 8 days (NEDBSP) beyond the first entry of these data.

Field

Program : 84T.FOR   TU9J28V.DAT
I/O Unit : 9

Card No. : 1 THROUGH 35
Variable(s) : QTSD(K,I)   K = 1 to NDSWT
Format : 12F7.0   I = IGT(N)   N = 1 to NTR1B

Explanation: Mean daily flows in all tributaries used in the modelling.
The file name is TU9J28V.DAT

Cards 1 to 5: Mean daily flows in an additional tributary used to adjust flows for flow modelling during the 1984 Nechako River hydrothermal program (forecast operations).

Cards 6 to 10: Mean daily flows in Greer Creek
- assumed to be constant to 40 cfs for entire modelling period

Cards 11 to 15: Mean daily flows in Swanson Creek
- assumed to be constant at 40 cfs for entire modelling period

Cards 16 to 20: Recorded mean daily flows in the Nautley River

Cards 21 to 25: Mean daily flows in Stoney Creek
- assumed to be 10% of the recorded Nautley River mean daily flows

Cards 26 to 30: Mean daily flows in the Sinkut River
- assumed to be 20% of the recorded Nautley River mean daily flows

Cards 31 to 35: Mean daily flows in Cluculz Creek
- assumed to be 10% of the recorded Nautley River mean daily flows

Field

TU9J28V.DAT

1	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
2	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
3	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
4	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0
5	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0		
6	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0
7	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0
8	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0
9	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0
10	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0		
11	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0
12	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0
13	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0
14	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0
15	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0	40,0		
16	1330,0	1330,0	1330,0	1330,0	1330,0	1330,0	1330,0	1330,0	1330,0	1330,0	1330,0	1330,0
17	1330,0	1300,0	1280,0	1250,0	1240,0	1220,0	1190,0	1170,0	1160,0	1120,0	1120,0	1100,0
18	1030,0	1010,0	1010,0	980,0	940,0	980,0	952,0	929,0	895,0	885,0	870,0	850,0
19	840,0	810,0	790,0	800,0	770,0	745,0	745,0	720,0	700,0	700,0	690,0	660,0
20	670,0	670,0	660,0	660,0	660,0	640,0	640,0	640,0	640,0	640,0		
21	133,0	133,0	133,0	133,0	133,0	133,0	133,0	133,0	133,0	133,0	133,0	133,0
22	133,0	130,0	128,0	125,0	124,0	122,0	119,0	117,0	116,0	112,0	112,0	110,0
23	103,0	101,0	101,0	98,0	94,0	98,0	95,2	92,9	89,5	88,5	87,0	85,0
24	84,0	81,0	79,0	80,0	77,0	74,5	74,5	72,0	70,0	70,0	69,0	66,0
25	67,0	67,0	66,0	66,0	66,0	64,0	64,0	64,0	64,0	64,0		
26	266,0	266,0	266,0	266,0	266,0	266,0	266,0	266,0	266,0	266,0	266,0	266,0
27	266,0	260,0	256,0	250,0	248,0	244,0	238,0	234,0	232,0	224,0	224,0	220,0
28	206,0	202,0	202,0	196,0	188,0	196,0	190,4	185,8	179,0	177,0	174,0	170,0
29	168,0	162,0	158,0	160,0	154,0	149,0	149,0	144,0	140,0	140,0	138,0	132,0
30	134,0	134,0	132,0	132,0	132,0	128,0	128,0	128,0	128,0	128,0		
31	133,0	133,0	133,0	133,0	133,0	133,0	133,0	133,0	133,0	133,0	133,0	133,0
32	133,0	130,0	128,0	125,0	124,0	122,0	119,0	117,0	116,0	112,0	112,0	110,0
33	103,0	101,0	101,0	98,0	94,0	98,0	95,2	92,9	89,5	88,5	87,0	85,0
34	84,0	81,0	79,0	80,0	77,0	74,5	74,5	72,0	70,0	70,0	69,0	66,0
35	67,0	67,0	66,0	66,0	66,0	64,0	64,0	64,0	64,0	64,0		

[EOF]

Program : 84T. FOR
1/0 Unit : 8

TU8J06V.DAT

Card No. : 1 THROUGH 4
Variable(s) : TTEMPD(K,I) K = 1 to NDAY (NDAY = NHR/24)
Format : 12F6.0 I = IGT(N) N = 1 to NTR1B

Explanation: Mean daily water temperatures recorded in the Nautley River. The number of data elements in this file is equivalent to the number of days of simulation.
The file name is TU8J06V.DAT

Field	1	2	3	4	5	6	7	8	9	10	11	12
Column	6	12	18	24	30	36	42	48	54	60	66	72
Value	55.5	55.5	55.5	55.5	55.5	55.6	61.0	60.3	59.8	61.0	62.3	63.0

62.0

TU8J06V.DAT

```
 55.5  55.5  55.5  55.5  55.6  61.0  60.3  59.8  61.0  62.3  63.0  62.0
 61.0  60.1  58.9  59.7  62.2  63.4  62.2  66.4  65.0  65.0  64.7  65.4
 66.3  68.2  66.8  67.4  68.6  68.2  69.4  65.6  65.4  66.5  65.0  65.0
 66.0  66.9  63.9  64.1  65.4  65.4  65.1  64.4  60.7  62.6
123456789012345678901234567890123456789012345678901234567890123456789012
          1         2         3         4         5         6  (12F6.0)
  NAUTLEY  RIVER  TEMPS  FROM  UNCALIBRATED  FIELD  DATA 1984 JULY 09-A20
    ******* FIRST  3  ENTRIES  ARE  ESTIMATED( J6-J8)  ************
```

Program : 84T.FOR
1/0 Unit : 7

FU7J04V.OUT

Card No. : 1
Variable(s) : QS(I) I = 1 to NXSEC (NXSEC = 102)
Format : 12F6.0

Field	1	2	3	4	5	6	7	8	9	10	11	12
Column	6	12	18	24	30	36	42	48	54	60	66	72
Value	2000.	2001.	2001.	2001.	2001.	2001.	2001.	2001.	2001.	2001.	2001.	2001.

Explanation: This file contains hourly flows for each of the 102 surveyed cross sections. Each 9 lines in this file contain flows at each of the 102 cross sections for each hour of the simulation. Therefore, there are 9 x 24 = 216 lines of data per day, and 9 x 24 x 46 = 9936 lines of data for the complete 46 day simulation. The file name is FU7J04V.OUT

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****************************************************************************************************

NOTE THAT ONLY 450 LINES OF THE TOTAL 9936 LINES ( 9X24X46=9936 ) CONTAINED IN THIS FILE HAVE BEEN PRINTED.

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11/08	12/08	13/08	14/08	15/08	16/08	17/08	18/08	19/08	20/08		

59,09	59,88	59,79	59,78	59,57	61,49	61,60	61,10	61,02	61,78	62,19	61,82
61,02	59,33	58,37	58,71	59,87	61,17	61,68	62,92	62,84	62,27	61,97	61,97
62,28	63,54	64,25	64,31	64,82	64,09	62,93	61,81	61,51	61,94	62,62	63,02
62,81	63,20	62,33	61,18	60,95	61,68	61,05	60,44	58,74	59,43		

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 92 (AT VANDERHOOF) :

6/07	7/07	8/07	9/07	10/07	11/07	12/07	13/07	14/07	15/07	16/07	17/07
18/07	19/07	20/07	21/07	22/07	23/07	24/07	25/07	26/07	27/07	28/07	29/07
30/07	31/07	1/08	2/08	3/08	4/08	5/08	6/08	7/08	8/08	9/08	10/08
11/08	12/08	13/08	14/08	15/08	16/08	17/08	18/08	19/08	20/08		

61,61	61,95	62,32	62,27	61,86	62,10	62,80	62,32	62,60	63,28	63,60	63,63
62,52	60,33	59,30	59,37	60,62	62,24	63,43	64,37	64,94	64,12	63,37	63,33
63,60	64,65	65,46	65,95	66,31	66,00	64,55	62,79	61,79	62,54	63,43	63,51
63,67	63,76	63,46	61,99	61,56	62,24	61,94	60,49	59,03	59,40		

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 102 (ABOVE THE STUART R.) :

6/07	7/07	8/07	9/07	10/07	11/07	12/07	13/07	14/07	15/07	16/07	17/07
18/07	19/07	20/07	21/07	22/07	23/07	24/07	25/07	26/07	27/07	28/07	29/07
30/07	31/07	1/08	2/08	3/08	4/08	5/08	6/08	7/08	8/08	9/08	10/08
11/08	12/08	13/08	14/08	15/08	16/08	17/08	18/08	19/08	20/08		

61,73	62,59	63,10	63,35	63,11	62,99	62,95	63,00	63,16	63,97	64,40	64,57
63,94	62,00	60,24	59,79	60,63	62,22	63,83	65,05	65,78	65,57	64,60	64,19
64,36	65,08	65,93	66,68	67,15	67,17	66,16	64,23	62,49	62,52	63,56	63,97
64,01	64,25	64,10	63,15	62,16	62,38	62,56	61,53	59,68	59,38		

TU6J06V.OUT

MODEL IS TO RUN 1104 TIME STEPS EACH 1.00 HOURS LONG. THE RIVER IS DISCRETIZED BY 102 GRID POINTS.
THE INITIALUPSTREAM DISCHARGE IS CONSTANT AT 93.40 CUBIC METERS PER SECOND.
THE PRINTOUT WILL BE GIVEN FOR GRIDS 54 AND 102 FOREACH 1 TIME STEPS.
THE WIND FUNCTION IS 9.20+ 0.46*U IN MM/DAY KPA.

0 INITIAL CONDITIONS

GRID	RIVER MILE	VELOCITY M/HR	AREA SQ METERS	TOP WIDTH METER	TRIB. FLOW CU M/SEC	INITIAL TEMP
1	116.030	3741.	89.9	69.68	0.00	99.90
2	115.780	3741.	89.9	69.68	0.03	99.90
3	114.660	4471.	75.2	56.76	0.00	99.90
4	114.300	2664.	126.2	64.10	0.00	99.90
5	113.230	1705.	197.2	51.12	0.00	99.90
6	112.800	4010.	83.8	122.84	0.00	99.90
~~7~~	~~112.040~~	3697.	91.0	112.02	0.00	99.90
8	110.720	2822.	119.2	120.98	0.00	55.60
9	109.390	3374.	99.6	112.54	0.00	55.70
10	108.220	3743.	89.8	119.24	0.00	56.00
11	107.090	3051.	110.2	106.50	0.00	56.50
12	106.310	2659.	126.4	105.37	0.00	56.50
13	105.860	2677.	125.6	96.17	0.00	56.50
14	104.320	2688.	125.1	134.05	0.00	56.90
15	103.840	4285.	79.4	98.14	1.13	57.00
16	102.820	3313.	101.5	82.66	0.00	57.10
17	101.740	3408.	98.7	113.15	0.00	57.20
18	100.370	2891.	116.3	91.78	0.00	57.30
19	99.350	2981.	112.8	136.64	0.00	57.30
20	97.510	2558.	131.5	95.86	0.00	57.40
21	96.820	2193.	153.3	85.16	0.00	57.40
22	95.940	2087.	161.1	105.92	0.00	57.50
23	95.560	2154.	156.1	131.62	0.00	57.50
24	94.640	2737.	124.3	92.86	1.13	57.50
25	94.090	2186.	153.8	112.72	0.00	58.50
26	93.450	1959.	171.6	110.25	0.00	58.50
27	92.550	1861.	180.7	113.08	0.00	58.60
28	91.770	2005.	167.7	68.95	0.00	58.60
29	90.930	2050.	164.0	142.16	0.00	58.70
30	90.060	2449.	137.3	67.88	0.00	58.70
31	89.190	1896.	177.4	74.71	0.00	58.80
32	88.740	2027.	165.9	101.96	0.00	58.80
33	87.940	2185.	153.9	95.35	0.00	58.90
34	87.020	3368.	99.8	64.83	0.00	58.90
35	85.810	3999.	84.1	97.57	0.00	58.90
36	85.140	2671.	125.9	66.30	0.00	59.00
37	84.410	1812.	185.5	86.87	0.00	59.00
38	83.510	2852.	117.9	68.43	0.00	59.00
39	81.790	3367.	99.9	116.93	0.00	59.00
40	80.440	3702.	90.8	137.01	0.00	59.00
41	79.060	3272.	102.8	138.57	0.00	59.00
42	77.600	3603.	93.3	99.55	0.00	59.00
43	76.340	3240.	103.8	97.69	0.00	59.00
44	74.940	2962.	113.5	120.25	0.00	59.00
45	73.710	2501.	134.4	100.46	0.00	59.00
46	72.820	2151.	156.3	165.82	0.00	59.10
47	71.410	2433.	138.2	83.30	0.00	59.10

48	70.260	2608.	129.0	96.65	0.00	59.20
49	67.780	2691.	125.0	103.27	0.00	59.30
50	66.490	1939.	173.4	175.57	0.00	59.40
51	65.460	1685.	199.6	101.41	0.00	59.50
52	64.650	2331.	144.2	91.87	0.00	59.60
53	62.610	1366.	246.2	77.94	0.00	59.80
54	60.990	1071.	313.9	188.37	0.00	60.10
55	60.320	1685.	280.0	93.99	37.64	60.20
56	59.070	2218.	151.6	132.44	0.00	60.30
57	57.570	2726.	123.3	117.26	0.00	60.30
58	56.610	4768.	70.5	52.67	0.00	60.30
59	56.300	4235.	79.4	140.94	0.00	60.30
60	54.880	3896.	86.3	49.47	0.00	60.30
61	51.890	2097.	160.3	159.59	0.00	60.30
62	49.640	1302.	258.2	99.67	0.00	60.30
63	49.150	1666.	201.9	186.49	0.00	60.30
64	49.010	2302.	146.0	155.54	0.00	60.30
65	46.210	3001.	112.0	133.79	0.00	60.20
66	45.320	2717.	123.8	119.39	0.00	60.10
67	43.980	4062.	82.8	112.48	0.00	60.10
68	42.880	3630.	92.6	104.58	0.00	60.10
69	41.740	1778.	189.1	92.33	0.00	60.10
70	40.660	2478.	135.7	74.46	0.00	60.10
71	39.730	3186.	105.5	61.42	0.00	60.10
72	36.990	2434.	138.2	125.95	0.00	60.20
73	35.760	2568.	130.9	113.45	0.00	60.20
74	34.710	3862.	87.1	84.04	0.00	60.20
75	31.650	2761.	121.8	104.40	0.00	60.20
76	30.300	2808.	119.8	132.47	0.00	60.20
77	29.180	4673.	72.0	86.11	0.00	60.20
78	28.350	3142.	111.3	155.30	3.76	60.20
79	27.520	2358.	142.6	138.27	0.00	60.10
80	27.160	2483.	135.4	165.50	0.00	60.10
81	26.700	1556.	216.1	71.85	0.00	60.10
82	26.490	1206.	278.9	108.02	0.00	60.10
83	24.470	1357.	247.9	85.98	0.00	60.40
84	21.230	1880.	178.9	90.07	0.00	60.60
85	19.980	982.	342.3	109.88	0.00	60.70
86	19.470	1618.	207.9	136.16	0.00	60.70
87	18.730	1263.	266.3	127.32	0.00	60.80
88	16.700	1720.	211.3	111.13	7.53	60.80
89	14.160	1127.	298.3	119.51	0.00	60.70
90	12.970	1496.	224.8	224.79	0.00	60.90
91	11.970	861.	390.4	161.27	0.00	60.90
92	10.700	920.	365.6	172.79	0.00	60.90
93	9.470	976.	344.6	207.63	0.00	60.90
94	7.990	2290.	146.8	74.80	0.00	61.00
95	6.950	1259.	267.1	238.32	0.00	61.00
96	6.120	1543.	217.9	107.32	0.00	61.00
97	5.050	1445.	242.0	152.45	3.76	61.10
98	3.690	4488.	74.9	49.35	0.00	61.00
99	2.440	1779.	189.1	101.35	0.00	61.00
100	1.650	1361.	247.0	80.74	0.00	61.00
101	0.740	1217.	276.2	97.11	0.00	61.10
102	0.000	1217.	276.2	97.11	0.00	61.10

1	1.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	59.9	60.0	59.2	61.0
1	2.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	59.7	59.8	58.6	60.9
1	3.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	59.5	59.6	58.3	60.7
1	4.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	59.4	59.5	58.1	60.7

121	1 6,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	59,3	59,5	58,0	[illegible]
122	1 7,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	59,4	59,5	58,1	60,8
123	1 8,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	59,6	59,7	58,2	60,9
124	1 9,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	59,8	59,9	58,4	61,1
125	1 10,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	60,1	60,2	58,6	61,3
126	1 11,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	60,5	60,5	58,8	61,5
127	1 12,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	60,9	60,9	59,0	61,8
128	1 13,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,3	61,2	59,2	62,1
129	1 14,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,6	61,6	59,4	62,3
130	1 15,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,0	61,9	59,6	62,5
131	1 16,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,3	62,2	59,7	62,7
132	1 17,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,6	62,5	59,8	62,8
133	1 18,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,8	62,7	59,9	62,8
134	1 19,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,9	62,8	60,0	62,8
135	1 20,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	63,0	62,9	60,0	62,7
136	1 21,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,9	62,8	59,9	62,6
137	1 22,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,8	62,8	59,9	62,4
138	1 23,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,7	62,6	59,8	62,2
139	2 0,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,5	62,5	59,7	62,0
140	2 1,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,2	62,3	59,6	61,8
141	2 2,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,0	62,1	59,5	[illegible]
142	2 3,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,8	61,9	59,4	61,5
143	2 4,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,6	61,7	59,4	61,4
144	2 5,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,4	61,6	59,3	61,3
145	2 6,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,3	61,5	59,3	61,3
146	2 7,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,3	61,5	59,3	61,4
147	2 8,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,4	61,6	59,4	61,6
148	2 9,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,5	61,7	59,5	61,8
149	2 10,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,7	61,9	59,6	62,0
150	2 11,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,9	62,1	59,7	62,3
151	2 12,00	25794,0	73030,7	574690,4	233791,4	361189,1	336745,2	99,9	99,9	62,2	62,3	59,9	62,6
152	2 13,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,5	62,6	60,0	62,9
153	2 14,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,7	62,8	60,2	63,2
154	2 15,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	63,0	63,1	60,3	63,4
155	2 16,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	63,2	63,3	60,4	63,6
156	2 17,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	63,4	63,4	60,4	63,7
157	2 18,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	63,5	63,5	60,5	63,8
158	2 19,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	63,5	63,5	60,5	63,8
159	2 20,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	63,5	63,5	60,4	63,7
160	2 21,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	63,4	63,4	60,3	63,6
161	2 22,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	63,2	63,2	60,2	63,4
162	2 23,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,9	63,0	60,1	63,2
163	3 0,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,6	62,7	59,9	63,0
164	3 1,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,3	62,4	59,8	62,8
165	3 2,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,0	62,2	59,6	62,5
166	3 3,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,7	61,9	59,5	62,4
167	3 4,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,5	61,7	59,4	62,2
168	3 5,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,3	61,5	59,3	62,1
169	3 6,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,1	61,4	59,3	62,1
170	3 7,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,1	61,3	59,3	62,1
171	3 8,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,1	61,4	59,3	62,2
172	3 9,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,2	61,4	59,4	62,4
173	3 10,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,4	61,6	59,5	62,6
174	3 11,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,6	61,8	59,6	62,8
175	3 12,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	61,9	62,0	59,7	63,1
176	3 13,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,2	62,3	59,9	63,3
177	3 14,00	25794,0	73030,7	574680,4	233791,4	361189,1	336745,2	99,9	99,9	62,5	62,5	60,0	63,0
	3 15 00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3 14:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	3 15,00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

187	4	0.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	62.5	62.6	59.8	63.3
188	4	1.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	62.2	62.4	59.7	63.0
189	4	2.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.9	62.1	59.6	62.8
190	4	3.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.7	61.8	59.4	62.6
191	4	4.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.4	61.6	59.3	62.5
192	4	5.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.2	61.5	59.3	62.4
193	4	6.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.1	61.3	59.2	62.4
194	4	7.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.1	61.3	59.2	62.4
195	4	8.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.1	61.3	59.3	62.5
196	4	9.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.2	61.4	59.3	62.7
197	4	10.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.4	61.6	59.4	62.9
198	4	11.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.6	61.8	59.6	63.1
199	4	12.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.9	62.0	59.7	63.3
200	4	13.00	25794.0	73030.7	574680.4	233791.4	361199.1	336745.2	99.9	99.9	62.2	62.3	59.9	63.6
201	4	14.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	62.5	62.5	60.0	63.8
202	4	15.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	62.8	62.8	60.1	64.0
203	4	16.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	63.0	63.0	60.2	64.2
204	4	17.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	63.2	63.2	60.3	64.3
205	4	18.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	63.3	63.3	60.3	64.3
206	4	19.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	63.4	63.3	60.3	64.3
207	4	20.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	63.3	63.3	60.3	64.2
208	4	21.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	63.2	63.2	60.2	64.1
209	4	22.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	63.0	63.1	60.1	63.9
210	4	23.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	62.8	62.9	60.0	63.6
211	5	0.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	62.5	62.6	59.8	63.4
212	5	1.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	62.2	62.3	59.7	63.1
213	5	2.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.9	62.1	59.6	62.9
214	5	3.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.6	61.8	59.4	62.7
215	5	4.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.4	61.6	59.3	62.5
216	5	5.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.2	61.4	59.2	62.4
217	5	6.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.0	61.2	59.2	62.4
218	5	7.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	60.9	61.2	59.2	62.4
219	5	8.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	60.9	61.2	59.2	62.4
220	5	9.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.0	61.2	59.2	62.5
221	5	10.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.1	61.3	59.3	62.7
222	5	11.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.3	61.5	59.4	62.9
223	5	12.00	25794.0	73030.7	574680.4	233791.4	361199.1	336745.2	99.9	99.9	61.5	61.6	59.5	63.1
224	5	13.00	25794.0	73030.7	574680.4	233791.4	361189.1	336745.2	99.9	99.9	61.7	61.9	59.6	63.3
225	5	14.00	25794.0	73030.7	574680.4	233791.4	361291.0	336745.2	99.9	99.9	62.0	62.1	59.7	63.5
226	5	15.00	25794.0	73030.7	574680.4	233791.4	361494.8	336745.2	99.9	99.9	62.2	62.3	59.8	63.7
227	5	16.00	25794.0	73030.7	574680.4	233791.4	361800.4	336745.2	99.9	99.9	62.4	62.4	59.9	63.8
228	5	17.00	25794.0	73030.7	574680.4	233791.4	362207.9	336745.2	99.9	99.9	62.6	62.6	60.0	63.9
229	5	18.00	25794.0	73030.7	574680.4	233791.4	362717.3	336745.2	99.9	99.9	62.6	62.6	60.0	63.9
230	5	19.00	25794.0	73030.7	574680.4	233791.4	363430.5	336745.2	99.9	99.9	62.7	62.6	59.9	63.8
231	5	20.00	25794.0	73030.7	574680.4	233791.4	364245.6	336745.2	99.9	99.9	62.6	62.6	59.9	63.7
232	5	21.00	25794.0	73030.7	574680.4	233791.4	365162.5	336745.2	99.9	99.9	62.5	62.5	59.8	63.6
233	5	22.00	25794.0	73030.7	574680.4	233791.4	366181.3	336745.2	99.9	99.9	62.3	62.3	59.7	63.4
234	5	23.00	25794.0	73030.7	574680.4	233791.4	367403.9	336643.3	99.9	99.9	62.0	62.1	59.6	63.2
235	6	0.00	25794.0	73030.7	574680.4	233791.4	368728.3	336643.3	99.9	99.9	61.8	61.9	59.4	62.9
236	6	1.00	25794.0	73030.7	574680.4	233791.4	367098.3	336643.3	99.9	99.9	61.5	61.6	60.3	62.7
237	6	2.00	25794.0	73030.7	574680.4	233791.4	365570.1	336541.4	99.9	99.9	61.2	61.3	60.7	62.5
238	6	3.00	25794.0	73030.7	574680.4	233791.4	364245.7	336541.4	99.9	99.9	60.9	61.1	60.8	62.3
239	6	4.00	25794.0	73030.7	574680.4	233791.4	363023.1	336541.4	99.9	99.9	60.7	60.9	60.9	62.1
240	6	5.00	25794.0	73030.7	574680.4	233791.4	361902.4	336541.4	99.9	99.9	60.5	60.7	60.8	62.1
241	6	6.00	25794.0	73030.7	574680.4	233791.4	360883.7	336541.4	99.9	99.9	60.4	60.6	60.8	62.0
242	6	7.00	25794.0	73030.7	574680.4	233791.4	360068.6	336541.4	99.9	99.9	60.4	60.6	60.9	62.1
243	6	8.00	25794.0	73030.7	574680.4	233791.4	359355.5	336541.4	99.9	99.9	60.5	60.6	60.9	62.2
244	6	9.00	25794.0	73030.7	574680.4	233791.4	358744.2	336541.4	99.9	99.9	60.6	60.9	61.0	62.3
245	6	10.00	25794.0	73030.7	574680.4	233791.4	358234.9	336541.4	99.9	99.9	60.8	60.9	61.2	62.5
246	6	11.00	25794.0	73030.7	574680.4	233791.4	357929.2	336541.4	99.9	99.9	61.1	61.2	61.3	62.7
247	6	12.00	25794.0	73030.7	574680.4	233791.4	357725.4	336541.4	99.9	99.9	61.4	61.5	61.5	63.0
248	6	13.00	25794.0	73030.7	574680.4	233791.4	357623.6	336541.4	99.9	99.9	61.7	61.8	61.6	63.2
249	6	14.00	25794.0	73030.7	574680.4	233791.4	357623.6	336541.4	99.9	99.9	62.1	62.1	61.8	63.4
250	6	15.00	25794.0	73030.7	574680.4	233791.4	357725.5	336541.4	99.9	99.9	62.4	62.4	62.0	63.6
251	6	16.00	25794.0	73030.7	574680.4	233791.4	357929.3	336541.4	99.9	99.9	62.7	62.6	62.1	63.8
252	6	17.00	25794.0	73030.7	574680.4	233791.4	358234.9	336541.4	99.9	99.9	62.9	62.8	62.2	63.9

253	6 18.00	25794.0	73030.7	574680.4	233791.4	358642.4	336541.4	99.9	99.9	63.1	63.0	62.2	64.0
254	6 19.00	25794.0	73030.7	574680.4	233791.4	359049.9	336541.4	99.9	99.9	63.2	63.1	62.3	63.9
255	6 20.00	25794.0	73030.7	574680.4	233791.4	359559.3	336541.4	99.9	99.9	63.2	63.1	62.3	63.9
256	6 21.00	25794.0	73030.7	574680.4	233791.4	360170.6	336541.4	99.9	99.9	63.1	63.1	62.2	63.7
257	6 22.00	25794.0	73030.7	574680.4	233791.4	360883.8	336541.4	99.9	99.9	63.0	63.0	62.1	63.5
258	6 23.00	25794.0	73030.7	574680.4	233791.4	361698.9	336439.5	99.9	99.9	62.8	62.8	62.0	63.3
259	7 0.00	25794.0	73030.7	574680.4	233791.4	362615.8	336439.5	99.9	99.9	62.6	62.6	61.9	63.1
260	7 1.00	25794.0	73030.7	574680.4	233791.4	361495.1	336337.6	99.9	99.9	62.4	62.4	61.7	62.9
261	7 2.00	25794.0	73030.7	574680.4	233791.4	360476.3	336337.6	99.9	99.9	62.1	62.2	61.5	62.7
262	7 3.00	25794.0	73030.7	574680.4	233791.4	359559.4	336235.8	99.9	99.9	61.9	62.0	61.4	62.5
263	7 4.00	25794.0	73030.7	574680.4	233791.4	358744.3	336235.8	99.9	99.9	61.7	61.8	61.3	62.3
264	7 5.00	25794.0	73030.7	574680.4	233791.4	358031.2	336133.9	99.9	99.9	61.5	61.7	61.2	62.2
265	7 6.00	25794.0	73030.7	574680.4	233791.4	357419.9	336133.9	99.9	99.9	61.4	61.6	61.2	62.2
266	7 7.00	25794.0	73030.7	574680.4	233791.4	356808.6	336032.0	99.9	99.9	61.4	61.5	61.2	62.2
267	7 8.00	25794.0	73030.7	574680.4	233791.4	356299.2	335930.1	99.9	99.9	61.4	61.6	61.2	62.3
268	7 9.00	25794.0	73030.7	574680.4	233791.4	355891.7	335930.1	99.9	99.9	61.5	61.6	61.3	62.4
269	7 10.00	25794.0	73030.7	574680.4	233791.4	355586.1	335828.2	99.9	99.9	61.6	61.7	61.3	62.5
270	7 11.00	25794.0	73030.7	574680.4	233791.4	355382.3	335828.2	99.9	99.9	61.8	61.9	61.4	62.7
271	7 12.00	25794.0	73030.7	574680.4	233791.4	355280.4	335726.3	99.9	99.9	62.0	62.1	61.5	62.9
272	7 13.00	25794.0	73030.7	574680.4	233791.4	355178.6	335726.3	99.9	99.9	62.2	62.3	61.6	63.1
273	7 14.00	25794.0	73030.7	574680.4	233791.4	355178.6	335624.4	99.9	99.9	62.4	62.5	61.8	63.3
274	7 15.00	25794.0	73030.7	574680.4	233791.4	355382.3	335522.5	99.9	99.9	62.7	62.6	61.8	63.4
275	7 16.00	25794.0	73030.7	574680.4	233791.4	355688.0	335522.5	99.9	99.9	62.8	62.8	61.9	63.6
276	7 17.00	25794.0	73030.7	574680.4	233791.4	356095.5	335420.6	99.9	99.9	63.0	62.9	62.0	63.6
277	7 18.00	25794.0	73030.7	574680.4	233791.4	356604.9	335420.6	99.9	99.9	63.1	63.0	62.0	63.7
278	7 19.00	25794.0	73030.7	574680.4	233791.4	357318.1	335318.7	99.9	99.9	63.1	63.0	62.0	63.7
279	7 20.00	25794.0	73030.7	574680.4	233791.4	358133.2	335318.7	99.9	99.9	63.0	63.0	62.0	63.6
280	7 21.00	25794.0	73030.7	574680.4	233893.3	359050.1	335216.8	99.9	99.9	62.9	62.9	61.9	63.5
281	7 22.00	25794.0	73030.7	574782.3	233893.3	360170.8	335216.8	99.9	99.9	62.8	62.8	61.8	63.4
282	7 23.00	25794.0	73030.7	574884.2	233995.2	361393.3	335114.8	99.9	99.9	62.6	62.6	61.7	63.2
283	8 0.00	25794.0	73030.7	574986.1	234097.0	362717.8	335114.8	99.9	99.9	62.3	62.4	61.6	63.1
284	8 1.00	25794.0	73030.7	575189.8	234097.0	361189.6	335114.8	99.9	99.9	62.1	62.1	61.3	62.9
285	8 2.00	25794.0	73030.7	575393.6	234198.9	359865.2	335013.0	99.9	99.9	61.8	61.9	61.2	62.7
286	8 3.00	25794.0	73030.7	575699.2	234402.7	358642.6	335013.0	99.9	99.9	61.5	61.7	61.0	62.6
287	8 4.00	25794.0	73030.7	576106.7	234606.4	357623.8	335013.0	99.9	99.9	61.3	61.5	60.9	62.4
288	8 5.00	25794.0	73030.7	576616.1	234810.2	356808.8	334911.1	99.9	99.9	61.1	61.3	60.8	62.3
289	8 6.00	25794.0	73030.7	577227.4	235115.8	356197.5	334809.2	99.9	99.9	61.0	61.2	60.7	62.3
290	8 7.00	25794.0	73030.7	577940.6	235523.3	355688.1	334809.2	99.9	99.9	60.9	61.1	60.7	62.3
291	8 8.00	25794.0	73030.7	578755.7	235930.9	355484.3	334707.3	99.9	99.9	60.9	61.1	60.7	62.4
292	8 9.00	25794.0	73030.7	579672.6	236338.4	355484.3	334605.4	99.9	99.9	61.0	61.1	60.8	62.5
293	8 10.00	25794.0	73030.7	580691.4	236847.8	355688.1	334605.4	99.9	99.9	61.1	61.2	60.8	62.7
294	8 11.00	25794.0	73030.7	581914.0	237357.2	356095.6	334503.5	99.9	99.9	61.2	61.3	60.9	62.8
295	8 12.00	25794.0	73030.7	583238.4	237968.5	356706.9	334401.7	99.9	99.9	61.4	61.5	61.0	63.0
296	8 13.00	25794.0	73030.7	584664.8	238579.7	357623.9	334401.7	99.9	99.9	61.6	61.7	61.1	63.2
297	8 14.00	25794.0	73030.7	586192.9	239292.9	358642.7	334299.8	99.9	99.9	61.8	61.9	61.2	63.4
298	8 15.00	25794.0	73030.7	587823.0	240107.9	359763.3	334197.9	99.9	99.9	62.0	62.0	61.3	63.5
299	8 16.00	25794.0	73030.7	589554.9	240923.0	361087.8	334197.9	99.9	99.9	62.2	62.2	61.4	63.6
300	8 17.00	25794.0	73030.7	591286.9	241839.9	362514.1	334197.9	99.9	99.9	62.3	62.3	61.4	63.7
301	8 18.00	25794.0	73030.7	593120.7	242756.8	364042.3	334096.0	99.9	99.9	62.4	62.4	61.5	63.7
302	8 19.00	25794.0	73030.7	595056.4	243673.8	365774.3	334096.0	99.9	99.9	62.4	62.4	61.5	63.7
303	8 20.00	25794.0	73030.7	597094.0	244590.7	367608.1	334096.0	99.9	99.9	62.4	62.3	61.4	63.6
304	8 21.00	25794.0	73030.7	599131.6	245609.5	369442.0	333994.1	99.9	99.9	62.2	62.2	61.3	63.5
305	8 22.00	25794.0	73030.7	601271.1	246628.3	371377.7	333994.1	99.9	99.9	62.0	62.1	61.2	63.3
306	8 23.00	25794.0	73030.7	603512.5	247647.1	373415.3	333892.3	99.9	99.9	61.8	61.8	61.1	63.1
307	9 0.00	25794.0	73030.7	605753.9	248665.9	375554.8	333790.3	99.9	99.9	61.5	61.6	61.0	62.9
308	9 1.00	25794.0	73030.7	607995.3	249684.7	376777.3	333790.3	99.9	99.9	61.2	61.3	61.0	62.6
309	9 2.00	25794.0	73030.7	610236.6	250703.5	378101.8	333688.4	99.9	99.9	60.9	61.0	60.9	62.4
310	9 3.00	25794.0	73030.7	612478.0	251824.2	379324.3	333688.4	99.9	99.9	60.6	60.7	60.8	62.3
311	9 4.00	25794.0	73030.7	614821.3	252843.0	380750.7	333688.4	99.9	99.9	60.3	60.5	60.7	62.1
312	9 5.00	25794.0	73030.7	617062.6	253963.7	382177.0	333688.4	99.9	99.9	60.1	60.3	60.6	62.1
313	9 6.00	25794.0	73030.7	619405.9	254982.5	383705.2	333688.4	99.9	99.9	59.9	60.1	60.6	62.1
314	9 7.00	25794.0	73030.7	621749.1	256103.1	385233.3	333688.4	99.9	99.9	59.8	60.1	60.5	62.1
315	9 8.00	25794.0	73030.7	624092.4	257223.8	386761.6	333688.4	99.9	99.9	59.8	60.0	60.5	62.2
316	9 9.00	25794.0	73030.7	626333.8	258344.5	388391.7	333688.4	99.9	99.9	59.9	60.1	60.6	62.4
317	9 10.00	25794.0	73030.7	628575.1	259465.1	390021.8	333688.4	99.9	99.9	60.1	60.2	60.7	62.6
318	9 11.00	25794.0	73030.7	630816.5	260585.8	391753.7	333790.3	99.9	99.9	60.3	60.4	60.8	62.9

319	9	12.00	25794.0	73030.7	633159.8	261604.6	393485.7	333892.2	99.9	99.9	60.5	60.6	60.9	63.
320	9	13.00	25794.0	73030.7	635401.1	262623.4	395319.5	334096.0	99.9	99.9	60.8	60.9	61.1	63.
321	9	14.00	25794.0	73030.7	637642.5	263642.3	397153.4	334299.8	99.9	99.9	61.1	61.1	61.2	63.7
322	9	15.00	25794.0	73030.7	639883.9	264762.9	398987.3	334503.5	99.9	99.9	61.3	61.3	61.4	63.9
323	9	16.00	25794.0	73030.7	642125.3	265781.7	400923.0	334809.1	99.9	99.9	61.5	61.5	61.5	64.1
324	9	17.00	25794.0	73030.7	644366.6	266800.5	402960.6	335114.8	99.9	99.9	61.7	61.7	61.5	64.2
325	9	18.00	25794.0	73030.7	646506.1	267819.3	405100.1	335522.3	99.9	99.9	61.7	61.7	61.6	64.3
326	9	19.00	25794.0	73030.7	648645.6	268838.0	407341.5	336031.7	99.9	99.9	61.7	61.7	61.5	64.2
327	9	20.00	25794.0	73030.7	650785.1	269856.8	409582.8	336541.1	99.9	99.9	61.7	61.7	61.5	64.2
328	9	21.00	25794.0	73030.7	652924.6	270875.6	411926.1	337152.4	99.9	99.9	61.5	61.5	61.4	64.0
329	9	22.00	25794.0	73030.7	655064.1	271792.5	414371.2	337763.7	99.9	99.9	61.3	61.4	61.2	63.8
330	9	23.00	25794.0	73030.7	657203.6	272811.3	416816.4	338476.8	99.9	99.9	61.0	61.1	61.1	63.6
331	10	0.00	25794.0	73030.7	659241.3	273830.1	419363.4	339291.9	99.9	99.9	60.7	60.8	60.9	63.4
332	10	1.00	25794.0	73030.7	661278.9	274848.8	419872.8	340106.9	99.9	99.9	60.5	60.6	60.9	63.1
333	10	2.00	25794.0	73030.7	663316.5	275867.7	420484.1	340922.0	99.9	99.9	60.2	60.3	60.8	62.9
334	10	3.00	25794.0	73030.7	665354.1	276886.5	421197.2	341737.1	99.9	99.9	60.0	60.1	60.7	62.8
335	10	4.00	25794.0	73030.7	667391.7	277905.3	421910.4	342755.8	99.9	99.9	59.8	59.9	60.6	62.7
336	10	5.00	25794.0	73030.7	669429.3	278822.2	422725.4	343774.7	99.9	99.9	59.7	59.8	60.6	62.6
337	10	6.00	25794.0	73030.7	671466.9	279739.1	423744.3	344793.4	99.9	99.9	59.7	59.8	60.6	62.6
338	10	7.00	25794.0	73030.7	673504.5	280656.0	424763.0	345812.2	99.9	99.9	59.8	59.9	60.7	62.7
339	10	8.00	25794.0	73030.7	675440.2	281674.8	425781.8	346932.9	99.9	99.9	60.0	60.0	60.8	62.9
340	10	9.00	25794.0	73030.7	677375.9	282591.7	427004.4	347951.7	99.9	99.9	60.2	60.3	60.9	63.1
341	10	10.00	25794.0	73030.7	679311.6	283508.6	428226.9	349072.4	99.9	99.9	60.6	60.6	61.1	63.4
342	10	11.00	25794.0	73030.7	681247.3	284425.5	429449.5	350091.2	99.9	99.9	61.0	61.0	61.4	63.7
343	10	12.00	25794.0	73030.7	683183.1	285342.4	430774.0	351110.0	99.9	99.9	61.4	61.3	61.7	64.0
344	10	13.00	25794.0	73030.7	685118.8	286157.4	432302.2	352128.8	99.9	99.9	61.8	61.8	62.0	64.3
345	10	14.00	25794.0	73030.7	686952.6	287074.3	433830.5	353147.6	99.9	99.9	62.2	62.2	62.2	64.6
346	10	15.00	25794.0	73030.7	688786.4	287991.3	435460.6	354268.3	99.9	99.9	62.6	62.5	62.5	64.8
347	10	16.00	25794.0	73030.7	690620.3	288906.3	437294.4	355398.9	99.9	99.9	62.9	62.8	62.7	65.0
348	10	17.00	25794.0	73030.7	692454.1	289723.2	439128.3	356407.7	99.9	99.9	63.1	63.0	62.8	65.2
349	10	18.00	25794.0	73030.7	694287.9	290640.1	441064.1	357528.4	99.9	99.9	63.3	63.2	62.9	65.3
350	10	19.00	25794.0	73030.7	696121.7	291455.2	443203.5	358547.2	99.9	99.9	63.3	63.3	63.0	65.3
351	10	20.00	25794.0	73030.7	697853.6	292270.3	445444.9	359565.9	99.9	99.9	63.2	63.2	63.0	65.2
352	10	21.00	25794.0	73030.7	699687.4	293085.3	447788.1	360584.9	99.9	99.9	63.1	63.1	62.9	65.1
353	10	22.00	25794.0	73030.7	701521.3	293900.4	450233.3	361603.6	99.9	99.9	62.9	62.9	62.8	64.9
354	10	23.00	25794.0	73030.7	703355.1	294715.4	452780.3	362520.5	99.9	99.9	62.6	62.7	62.6	64.7
355	11	0.00	25794.0	73030.7	705188.9	295530.5	455429.2	363437.4	99.9	99.9	62.3	62.4	62.4	64.4
356	11	1.00	25794.0	73030.7	706920.8	296345.5	455123.5	364456.2	99.9	99.9	62.0	62.1	62.3	64.2
357	11	2.00	25794.0	73030.7	708652.8	297160.6	455021.6	365373.1	99.9	99.9	61.7	61.9	62.2	64.0
358	11	3.00	25794.0	73030.7	710282.9	297975.6	455021.7	366391.9	99.9	99.9	61.5	61.6	62.0	63.9
359	11	4.00	25794.0	73030.7	712014.8	298790.7	455123.6	367410.7	99.9	99.9	61.3	61.4	61.9	63.7
360	11	5.00	25794.0	73030.7	713746.8	299605.7	455327.4	368429.5	99.9	99.9	61.1	61.2	61.8	63.7
361	11	6.00	25794.0	73030.7	715478.7	300318.9	455734.9	369346.4	99.9	99.9	61.0	61.1	61.7	63.6
362	11	7.00	25794.0	73030.7	717210.6	301032.1	456244.3	370263.3	99.9	99.9	61.0	61.1	61.7	63.7
363	11	8.00	25794.0	73030.7	718942.6	301745.3	456855.7	371180.2	99.9	99.9	61.1	61.2	61.7	63.7
364	11	9.00	25794.0	73030.7	720572.6	302458.4	457568.9	372097.2	99.9	99.9	61.2	61.3	61.9	63.9
365	11	10.00	25794.0	73030.7	722202.8	303273.4	458383.9	373014.1	99.9	99.9	61.3	61.4	61.9	64.0
366	11	11.00	25794.0	73030.7	723832.8	303986.6	459300.8	373829.1	99.9	99.9	61.5	61.6	62.0	64.2
367	11	12.00	25794.0	73030.7	725462.9	304801.7	460319.7	374746.0	99.9	99.9	61.8	61.8	62.2	64.4
368	11	13.00	25794.0	73030.7	727092.9	305514.8	461542.2	375561.0	99.9	99.9	62.0	62.0	62.3	64.6
369	11	14.00	25794.0	73030.7	728723.1	306228.0	462866.7	376376.1	99.9	99.9	62.2	62.2	62.4	64.8
370	11	15.00	25794.0	73030.7	730251.3	307043.1	464191.2	377191.2	99.9	99.9	62.4	62.4	62.6	64.9
371	11	16.00	25794.0	73030.7	731779.4	307858.1	465617.5	378108.1	99.9	99.9	62.5	62.5	62.7	65.1
372	11	17.00	25794.0	73030.7	733409.5	308571.3	467145.7	378923.1	99.9	99.9	62.6	62.6	62.7	65.1
373	11	18.00	25794.0	73030.7	735039.6	309386.4	468877.7	379738.1	99.9	99.9	62.6	62.6	62.7	65.1
374	11	19.00	25794.0	73030.7	736771.5	310303.3	470609.6	380553.2	99.9	99.9	62.5	62.5	62.7	65.1
375	11	20.00	25794.0	73030.7	738503.4	311220.2	472545.3	381368.2	99.9	99.9	62.4	62.4	62.6	65.0
376	11	21.00	25794.0	73030.7	740439.2	312035.2	474684.8	382183.3	99.9	99.9	62.2	62.3	62.5	64.9
377	11	22.00	25794.0	73030.7	742374.9	312952.1	476824.3	382996.4	99.9	99.9	62.0	62.0	62.3	64.7
378	11	23.00	25794.0	73030.7	744310.6	313869.0	479167.6	383711.4	99.9	99.9	61.7	61.8	62.1	64.6
379	12	0.00	25794.0	73030.7	746246.3	314785.9	481510.8	384526.5	99.9	99.9	61.4	61.5	61.9	64.4
380	12	1.00	25794.0	73030.7	748182.0	315601.0	482020.2	385239.6	99.9	99.9	61.1	61.3	61.6	64.2
381	12	2.00	25794.0	73030.7	750117.7	316517.9	482631.6	385952.8	99.9	99.9	60.9	61.0	61.3	64.0
382	12	3.00	25794.0	73030.7	752053.4	317434.8	483242.8	386665.9	99.9	99.9	60.6	60.7	61.1	63.8
383	12	4.00	25794.0	73030.7	753987.3	318351.7	483956.0	387379.1	99.9	99.9	60.5	60.6	61.0	63.7
384	12	5.00	25794.0	73030.7	755721.1	319268.6	484771.1	388092.3	99.9	99.9	60.4	60.5	60.9	63.6

385	12	6,00	25794,0	73030,7	757554,9	320083,7	485686,0	388805,4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
386	12	7,00	25794,0	73030,7	759490,6	320898,7	486604,9	389518,6	99,9	99,9	60,4	60,5	60,9	63,7
387	12	8,00	25794,0	73030,7	761324,4	321815,6	487521,9	390231,8	99,9	99,9	60,5	60,6	61,0	63,8
388	12	9,00	25794,0	73030,7	763158,3	322732,5	488540,7	390945,0	99,9	99,9	60,7	60,8	61,1	64,0
389	12	10,00	25794,0	73030,7	764890,2	323649,4	489661,4	391658,1	99,9	99,9	61,0	61,0	61,3	64,2
390	12	11,00	25794,0	73030,7	766724,0	324464,5	490884,0	392371,3	99,9	99,9	61,3	61,3	61,5	64,4
391	12	12,00	25794,0	73030,7	768455,9	325279,6	492208,4	393084,5	99,9	99,9	61,6	61,6	61,7	64,6
392	12	13,00	25794,0	73030,7	770187,9	326094,6	493532,9	393797,7	99,9	99,9	61,9	61,9	62,0	64,9
393	12	14,00	25794,0	73030,7	771919,9	326909,6	494959,3	394510,8	99,9	99,9	62,2	62,2	62,2	65,1
394	12	15,00	25794,0	73030,7	773651,9	327724,7	496385,6	395224,0	99,9	99,9	62,5	62,5	62,4	65,3
395	12	16,00	25794,0	73030,7	775383,9	328539,7	497811,9	395937,2	99,9	99,9	62,7	62,7	62,6	65,4
396	12	17,00	25794,0	73030,7	777014,0	329354,7	499340,2	396548,5	99,9	99,9	62,9	62,9	62,7	65,5
397	12	18,00	25794,0	73030,7	778745,9	330169,8	500868,4	397159,9	99,9	99,9	62,9	62,9	62,8	65,5
398	12	19,00	25794,0	73030,7	780477,9	330883,0	502498,5	397873,0	99,9	99,9	62,9	62,9	62,8	65,5
399	12	20,00	25794,0	73030,7	782209,9	331596,1	504128,6	398586,2	99,9	99,9	62,9	62,9	62,7	65,4
400	12	21,00	25794,0	73030,7	783840,0	332309,3	505758,7	399299,3	99,9	99,9	62,7	62,7	62,6	65,2
401	12	22,00	25794,0	73030,7	785470,1	333022,4	507490,7	400012,5	99,9	99,9	62,5	62,5	62,4	65,0
402	12	23,00	25794,0	73030,7	787100,2	333837,5	509120,8	400827,6	99,9	99,9	62,2	62,3	62,3	64,8
403	13	0,00	25794,0	73030,7	788730,3	334550,6	510852,8	401642,6	99,9	99,9	61,9	62,0	62,1	64,6
404	13	1,00	25794,0	73030,7	790360,4	335263,8	511565,9	402457,7	99,9	99,9	61,6	61,7	61,7	64,3
405	13	2,00	25794,0	73030,7	791888,6	336078,8	512279,1	403272,7	99,9	99,9	61,3	61,4	61,4	64,1
406	13	3,00	25794,0	73030,7	793416,8	336893,8	512992,3	404087,8	99,9	99,9	61,0	61,1	61,2	63,9
407	13	4,00	25794,0	73030,7	795046,9	337607,0	513807,3	404902,8	99,9	99,9	60,8	60,9	61,0	63,8
408	13	5,00	25794,0	73030,7	796575,1	338320,2	514622,3	405717,8	99,9	99,9	60,6	60,7	60,9	63,7
409	13	6,00	25794,0	73030,7	798103,3	339033,3	515539,3	406532,9	99,9	99,9	60,5	60,6	60,8	63,6
410	13	7,00	25794,0	73030,7	799631,5	339746,5	516456,2	407347,9	99,9	99,9	60,4	60,5	60,7	63,6
411	13	8,00	25794,0	73030,7	801159,7	340459,7	517373,1	408163,0	99,9	99,9	60,4	60,5	60,7	63,6
412	13	9,00	25794,0	73030,7	802687,9	341172,9	518290,0	408978,0	99,9	99,9	60,5	60,6	60,7	63,7
413	13	10,00	25794,0	73030,7	804216,1	341886,1	519308,8	409793,0	99,9	99,9	60,6	60,6	60,8	63,8
414	13	11,00	25794,0	73030,7	805642,4	342599,3	520327,6	410608,1	99,9	99,9	60,7	60,8	60,9	63,9
415	13	12,00	25794,0	73030,7	807068,7	343312,5	521448,3	411423,1	99,9	99,9	60,9	60,9	61,0	64,1
416	13	13,00	25794,0	73030,7	808596,9	343923,8	522670,8	412238,2	99,9	99,9	61,0	61,1	61,1	64,2
417	13	14,00	25794,0	73030,7	810023,3	344636,9	523893,4	412951,3	99,9	99,9	61,2	61,2	61,2	64,3
418	13	15,00	25794,0	73030,7	811449,6	345350,0	525319,8	413766,4	99,9	99,9	61,3	61,3	61,3	64,4
419	13	16,00	25794,0	73030,7	812876,0	346063,1	526949,9	414581,4	99,9	99,9	61,3	61,4	61,3	64,4
420	13	17,00	25794,0	73030,7	814404,2	346776,3	528681,9	415294,5	99,9	99,9	61,3	61,4	61,4	64,4
421	13	18,00	25794,0	73030,7	816034,3	347489,4	530617,6	416007,7	99,9	99,9	61,3	61,3	61,3	64,3
422	13	19,00	25794,0	73030,7	817664,4	348304,5	532757,1	416822,7	99,9	99,9	61,2	61,2	61,2	64,2
423	13	20,00	25794,0	73030,7	819396,3	349119,6	535202,3	417535,9	99,9	99,9	61,0	61,1	61,1	64,1
424	13	21,00	25794,0	73030,7	821230,1	350036,5	537749,3	418249,0	99,9	99,9	60,8	60,9	61,0	63,9
425	13	22,00	25794,0	73030,7	923165,8	350851,5	540703,8	418962,2	99,9	99,9	60,6	60,7	60,8	63,6
426	13	23,00	25794,0	73030,7	825203,4	351870,3	543760,1	419675,4	99,9	99,9	60,3	60,4	60,6	63,4
427	14	0,00	25794,0	73030,7	827342,9	352991,0	547122,2	420388,5	99,9	99,9	60,0	60,1	60,3	63,2
428	14	1,00	25794,0	73030,7	829686,1	354009,8	546714,6	421101,7	99,9	99,9	59,8	59,9	60,0	62,9
429	14	2,00	25794,0	73030,7	832233,1	355130,5	546612,8	421713,0	99,9	99,9	59,5	59,6	59,8	62,7
430	14	3,00	25794,0	73030,7	834881,9	356353,1	546714,6	422324,3	99,9	99,9	59,3	59,4	59,6	62,5
431	14	4,00	25794,0	73030,7	837632,7	357677,6	547122,1	422935,5	99,9	99,9	59,2	59,2	59,5	62,3
432	14	5,00	25794,0	73030,7	840485,3	359002,0	547835,3	423648,7	99,9	99,9	59,0	59,1	59,3	62,2
433	14	6,00	25794,0	73030,7	843541,7	360428,4	548752,3	424260,0	99,9	99,9	58,9	59,0	59,2	62,1
434	14	7,00	25794,0	73030,7	846699,9	361956,6	549974,8	424871,3	99,9	99,9	58,9	58,9	59,2	62,1
435	14	8,00	25794,0	73030,7	849960,1	363586,7	551502,9	425482,6	99,9	99,9	58,9	58,9	59,2	62,0
436	14	9,00	25794,0	73030,7	853424,1	365216,7	553336,8	426093,8	99,9	99,9	58,9	59,0	59,2	62,0
437	14	10,00	25794,0	73030,7	856989,8	366846,8	555374,3	426705,1	99,9	99,9	59,0	59,0	59,2	62,1
438	14	11,00	25794,0	73030,7	860657,5	368578,8	557717,6	427418,3	99,9	99,9	59,1	59,1	59,3	62,1
439	14	12,00	25794,0	73030,7	864325,2	370412,6	560264,6	428029,5	99,9	99,9	59,2	59,2	59,4	62,1
440	14	13,00	25794,0	73030,7	868094,7	372144,6	563117,2	428640,8	99,9	99,9	59,3	59,3	59,4	62,2
441	14	14,00	25794,0	73030,7	871864,3	373978,5	566071,7	429252,1	99,9	99,9	59,3	59,3	59,5	62,2
442	14	15,00	25794,0	73030,7	875735,7	375812,3	569026,3	429863,4	99,9	99,9	59,4	59,4	59,5	62,2
443	14	16,00	25794,0	73030,7	879607,2	377646,2	571980,8	430372,8	99,9	99,9	59,4	59,4	59,5	62,1
444	14	17,00	25794,0	73030,7	883376,8	379480,0	575037,1	430984,0	99,9	99,9	59,4	59,4	59,5	62,0
445	14	18,00	25794,0	73030,7	887044,4	381313,8	577991,7	431595,3	99,9	99,9	59,3	59,3	59,5	61,9
446	14	19,00	25794,0	73030,7	890712,2	383045,9	580946,2	432206,6	99,9	99,9	59,2	59,2	59,4	61,8
447	14	20,00	25794,0	73030,7	894277,9	384675,9	583798,8	432817,9	99,9	99,9	59,0	59,1	59,3	61,7
448	14	21,00	25794,0	73030,7	897640,0	386305,9	586651,4	433531,1	99,9	99,9	58,9	58,9	59,1	61,5
449	14	22,00	25794,0	73030,7	900900,1	387834,1	589402,2	434244,3	99,9	99,9	58,6	58,7	59,0	61,3
450	14	23,00	25794,0	73030,7	904058,4	389260,4	592051,1	435059,3	99,9	99,9	58,4	59,5	58,8	61,0
					[illegible]	[illegible]	[illegible]	[illegible]	99,9	99,9	[illegible]	[illegible]	58,4	60,8

451	15	0.00	25794.0	73030.7	907012.9	390686.8	594496.3	435874.3	99.9	99.9	58.2	58.2	58.6	60.8
452	15	1.00	25794.0	73030.7	909763.7	392011.2	596839.5	436689.4	99.9	99.9	57.9	58.0	58.3	60.6
453	15	2.00	25794.0	73030.7	912310.7	393233.7	598979.0	437606.3	99.9	99.9	57.7	57.8	58.0	60.4
454	15	3.00	25794.0	73030.7	914653.9	394354.4	601016.6	438523.2	99.9	99.9	57.5	57.6	57.8	60.2
455	15	4.00	25794.0	73030.7	916793.4	395373.1	602952.4	439643.9	99.9	99.9	57.3	57.4	57.7	60.0
456	15	5.00	25794.0	73030.7	918831.0	396290.0	604684.3	440764.6	99.9	99.9	57.2	57.3	57.6	59.9
457	15	6.00	25794.0	73030.7	920664.9	397105.1	606314.4	441885.3	99.9	99.9	57.2	57.3	57.6	59.9
458	15	7.00	25794.0	73030.7	922295.0	397818.3	607740.8	443209.8	99.9	99.9	57.2	57.3	57.6	59.9
459	15	8.00	25794.0	73030.7	923721.3	398531.4	609065.1	444534.2	99.9	99.9	57.3	57.4	57.6	59.9
460	15	9.00	25794.0	73030.7	925045.8	399040.8	610287.7	445960.6	99.9	99.9	57.5	57.5	57.7	60.0
461	15	10.00	25794.0	73030.7	926166.4	399550.2	611306.5	447386.9	99.9	99.9	57.7	57.7	57.9	60.1
462	15	11.00	25794.0	73030.7	927185.2	399957.7	612223.4	448915.1	99.9	99.9	57.9	57.9	58.1	60.2
463	15	12.00	25794.0	73030.7	928102.1	400365.3	612936.6	450443.3	99.9	99.9	58.2	58.2	58.3	60.3
464	15	13.00	25794.0	73030.7	928815.3	400670.9	613649.8	452073.4	99.9	99.9	58.4	58.4	58.5	60.4
465	15	14.00	25794.0	73030.7	929426.6	400976.5	614261.0	453703.5	99.9	99.9	58.7	58.7	58.7	60.5
466	15	15.00	25794.0	73030.7	929935.9	401180.3	614872.3	455333.6	99.9	99.9	58.9	58.9	58.8	60.6
467	15	16.00	25794.0	73030.7	930343.5	401384.0	615483.5	456963.7	99.9	99.9	59.1	59.0	59.0	60.7
468	15	17.00	25794.0	73030.7	930649.1	401485.9	616094.8	458593.8	99.9	99.9	59.2	59.2	59.1	60.7
469	15	18.00	25794.0	73030.7	930852.9	401587.8	616807.9	460223.8	99.9	99.9	59.3	59.2	59.2	60.6
470	15	19.00	25794.0	73030.7	931056.6	401689.7	617419.1	461853.9	99.9	99.9	59.3	59.2	59.2	60.5
471	15	20.00	25794.0	73030.7	931158.5	401791.6	618132.3	463484.0	99.9	99.9	59.2	59.2	59.1	60.4
472	15	21.00	25794.0	73030.7	931260.3	401791.6	618845.4	465012.2	99.9	99.9	59.1	59.1	59.0	60.3
473	15	22.00	25794.0	73030.7	931260.3	401791.6	619660.4	466438.5	99.9	99.9	58.9	58.9	58.9	60.1
474	15	23.00	25794.0	73030.7	931158.5	401791.6	620475.4	467864.9	99.9	99.9	58.7	58.7	58.8	59.9
475	16	0.00	25794.0	73030.7	931056.6	401791.6	621290.5	469189.3	99.9	99.9	58.5	58.5	58.6	59.7
476	16	1.00	25794.0	73030.7	930852.9	401791.6	620169.8	470411.9	99.9	99.9	58.3	58.3	58.5	59.6
477	16	2.00	25794.0	73030.7	930649.1	401791.6	619049.1	471634.5	99.9	99.9	58.1	58.2	58.4	59.5
478	16	3.00	25794.0	73030.7	930445.3	401791.6	618030.3	472755.1	99.9	99.9	58.0	58.0	58.3	59.4
479	16	4.00	25794.0	73030.7	930241.6	401689.7	617113.4	473672.0	99.9	99.9	57.9	57.9	58.2	59.3
480	16	5.00	25794.0	73030.7	930037.8	401587.8	616196.4	474588.9	99.9	99.9	57.8	57.9	58.2	59.3
481	16	6.00	25794.0	73030.7	929834.1	401485.9	615381.4	475404.0	99.9	99.9	57.8	57.9	58.2	59.3
482	16	7.00	25794.0	73030.7	929630.3	401384.0	614566.4	476117.2	99.9	99.9	57.9	57.9	58.2	59.4
483	16	8.00	25794.0	73030.7	929324.7	401282.1	613955.2	476728.4	99.9	99.9	57.9	58.0	58.2	59.5
484	16	9.00	25794.0	73030.7	929019.1	401180.2	613343.9	477339.7	99.9	99.9	58.0	58.1	58.3	59.6
485	16	10.00	25794.0	73030.7	928713.4	401078.3	612834.6	477849.2	99.9	99.9	58.2	58.2	58.4	59.7
486	16	11.00	25794.0	73030.7	928407.8	400976.4	612427.1	478256.7	99.9	99.9	58.3	58.3	58.6	59.8
487	16	12.00	25794.0	73030.7	928204.1	400772.7	612121.4	478664.2	99.9	99.9	58.5	58.5	58.7	59.9
488	16	13.00	25794.0	73030.7	927898.4	400568.9	611917.7	478969.8	99.9	99.9	58.7	58.7	58.8	60.0
489	16	14.00	25794.0	73030.7	927592.8	400467.0	611815.8	479275.5	99.9	99.9	58.8	58.8	59.0	60.1
490	16	15.00	25794.0	73030.7	927287.2	400263.3	612019.6	479479.2	99.9	99.9	59.0	59.0	59.1	60.2
491	16	16.00	25794.0	73030.7	926981.6	400161.4	612529.0	479683.0	99.9	99.9	59.1	59.1	59.2	60.2
492	16	17.00	25794.0	73030.7	926675.9	399957.6	613344.1	479784.9	99.9	99.9	59.1	59.1	59.2	60.2
493	16	18.00	25794.0	73030.7	926370.3	399855.8	614464.8	479886.8	99.9	99.9	59.2	59.2	59.2	60.2
494	16	19.00	25794.0	73030.7	926064.7	399652.0	615891.1	479988.7	99.9	99.9	59.1	59.1	59.2	60.2
495	16	20.00	25794.0	73030.7	925657.1	399550.2	617623.1	479988.7	99.9	99.9	59.1	59.1	59.2	60.1
496	16	21.00	25794.0	73030.7	925351.5	399448.3	619558.8	479988.7	99.9	99.9	59.0	59.0	59.1	60.0
497	16	22.00	25794.0	73030.7	925045.9	399244.5	621902.1	479886.9	99.9	99.9	58.9	58.9	59.0	59.9
498	16	23.00	25794.0	73030.7	924740.3	399142.6	624449.1	479886.9	99.9	99.9	58.7	58.8	58.9	59.8
499	17	0.00	25794.0	73030.7	924434.6	398938.8	627403.6	479785.0	99.9	99.9	58.6	58.6	58.9	59.7
500	17	1.00	25794.0	73030.7	924129.0	398836.9	623430.3	479683.1	99.9	99.9	58.4	58.5	58.9	59.6
501	17	2.00	25794.0	73030.7	923823.4	398735.0	619762.6	479581.2	99.9	99.9	58.3	58.3	58.8	59.5
502	17	3.00	25794.0	73030.7	923517.8	398531.3	616400.5	479479.4	99.9	99.9	58.2	58.2	58.8	59.5
503	17	4.00	25794.0	73030.7	923212.1	398429.4	613344.1	479377.5	99.9	99.9	58.1	58.2	58.7	59.5
504	17	5.00	25794.0	73030.7	922906.5	398225.6	610593.4	479275.6	99.9	99.9	58.1	58.1	58.7	59.5
505	17	6.00	25794.0	73030.7	922600.9	398123.7	608148.3	479071.8	99.9	99.9	58.2	58.2	58.8	59.6
506	17	7.00	25794.0	73030.7	922295.3	397920.0	606008.9	478969.9	99.9	99.9	58.3	58.3	58.8	59.7
507	17	8.00	25794.0	73030.7	921989.6	397818.1	604073.1	478868.1	99.9	99.9	58.4	58.4	59.0	59.9
508	17	9.00	25794.0	73030.7	921684.0	397716.2	602544.9	478766.3	99.9	99.9	58.6	58.6	59.1	60.1
509	17	10.00	25794.0	73030.7	921378.4	397614.3	601220.5	478562.5	99.9	99.9	58.9	58.9	59.3	60.3
510	17	11.00	25794.0	73030.7	921072.8	397512.3	600201.8	478358.8	99.9	99.9	59.2	59.2	59.6	60.5
511	17	12.00	25794.0	73030.7	920869.0	397308.6	599590.5	478155.0	99.9	99.9	59.5	59.5	59.8	60.7
512	17	13.00	25794.0	73030.7	920563.4	397206.7	599183.0	477951.2	99.9	99.9	59.8	59.8	60.1	61.0
513	17	14.00	25794.0	73030.7	920257.8	397104.8	598979.3	477747.5	99.9	99.9	60.1	60.0	60.3	61.2
514	17	15.00	25794.0	73030.7	919952.1	397002.9	598877.4	477441.8	99.9	99.9	60.3	60.3	60.5	61.3
515	17	16.00	25794.0	73030.7	919748.4	396799.2	598877.4	477238.1	99.9	99.9	60.5	60.5	60.7	61.5
516	17	17.00	25794.0	73030.7	919442.8	396697.3	598877.4	476932.5	99.9	99.9	60.7	60.7	60.9	61.5

17	17 18.00	25794.0	73030.7	919137.1	396595.4	598979.3	476626.8	99.9	99.9	60.8	60.8	60.9	61.6
18	17 19.00	25794.0	73030.7	918831.5	396493.5	599183.1	476423.1	99.9	99.9	60.8	60.8	61.0	61.6
519	17 20.00	25794.0	73030.7	918525.9	396391.7	599488.7	476219.3	99.9	99.9	60.8	60.8	61.0	61.6
520	17 21.00	25794.0	73030.7	918322.1	396187.9	599896.3	476015.6	99.9	99.9	60.7	60.7	60.9	61.5
21	17 22.00	25794.0	73030.7	918118.3	395984.1	600405.6	475811.8	99.9	99.9	60.6	60.6	60.8	61.4
522	17 23.00	25794.0	73030.7	917914.6	395780.4	601016.9	475608.0	99.9	99.9	60.4	60.5	60.7	61.3
523	18 0.00	25794.0	73030.7	917710.8	395576.6	601730.1	475404.3	99.9	99.9	60.3	60.3	60.6	61.2
24	18 1.00	25794.0	73030.7	917507.0	395372.8	600507.5	475200.5	99.9	99.9	60.1	60.1	60.5	61.1
25	18 2.00	25794.0	73030.7	917303.3	395169.1	599386.8	474894.9	99.9	99.9	59.9	60.0	60.4	61.0
526	18 3.00	25794.0	73030.7	917099.5	394965.3	598368.1	474691.2	99.9	99.9	59.8	59.8	60.3	61.0
527	18 4.00	25794.0	73030.7	916895.7	394761.6	597349.3	474487.4	99.9	99.9	59.7	59.7	60.3	61.0
528	18 5.00	25794.0	73030.7	916590.1	394659.7	596432.4	474283.6	99.9	99.9	59.6	59.7	60.2	61.0
529	18 6.00	25794.0	73030.7	916284.4	394557.8	595617.4	474079.9	99.9	99.9	59.6	59.7	60.2	61.1
530	18 7.00	25794.0	73030.7	915978.8	394455.9	594904.3	473876.1	99.9	99.9	59.7	59.8	60.3	61.2
531	18 8.00	25794.0	73030.7	915775.0	394354.1	594191.1	473672.3	99.9	99.9	59.8	59.9	60.4	61.4
532	18 9.00	25794.0	73030.7	915571.3	394252.2	593579.8	473468.6	99.9	99.9	60.0	60.1	60.6	61.6
533	18 10.00	25794.0	73030.7	915367.5	394048.4	593172.3	473264.8	99.9	99.9	60.3	60.3	60.7	61.9
534	18 11.00	25794.0	73030.7	915061.9	393946.5	592764.8	473061.0	99.9	99.9	60.5	60.5	61.0	62.1
535	18 12.00	25794.0	73030.7	914858.1	393844.6	592459.2	472857.3	99.9	99.9	60.8	60.8	61.2	62.4
536	18 13.00	25794.0	73030.7	914654.3	393742.7	592153.6	472653.5	99.9	99.9	61.1	61.1	61.4	62.6
537	18 14.00	25794.0	73030.7	914348.7	393640.8	591949.9	472449.8	99.9	99.9	61.3	61.3	61.6	62.8
538	18 15.00	25794.0	73030.7	914144.9	393538.9	591746.2	472347.9	99.9	99.9	61.5	61.5	61.8	63.0
539	18 16.00	25794.0	73030.7	913941.1	393437.1	591542.4	472144.1	99.9	99.9	61.7	61.7	62.0	63.1
540	18 17.00	25794.0	73030.7	913635.5	393335.2	591338.7	472042.3	99.9	99.9	61.8	61.8	62.1	63.2
541	18 18.00	25794.0	73030.7	913431.8	393233.3	591135.0	47193						

OBSERVED MODEL
COMPUTER CODING

84T.FOR

F 84C.MEM

```
C             ************************************************
C
C***********  ARRAY SIZES ARE LARGE ENOUGH TO RUN A 50 DAY RUN  *************
C
C              THIS PROGRAM READS IN MEAN DAILY INPUT DATA
C          WIND SPEED IS REDUCED FROM A 10M HEIGHT TO A 2M HEIGHT
C
C       INITIALIZING TEMPERATURE ARRAY IS READ IN FROM UNIT 1*
C
C      **** CLOUD COVER FACTOR ON LONG WAVE RADIATION IS INCLUDED ******
C
       DIMENSION PV(1200),PT(1200),
      @TUP(1200),TTEMP(1200,110),@TS(1200,110),
      @TUPD(100),TTEMPD(1200,110),STN(50),ASTN(100,50),@1SD(100,110),
      @RIVLOC(20,50),SA(110),PVO(110),PLT(1200,50),IPRT(50),EB(1200)
       DIMENSION  DX(110),U(110),A(110),FLOW(4,110),W(110),
      @AT(110),WT(110),QSF(110),EQT(1200)
       DIMENSION QT(110),TRIB(110),IG1(110),
      @KPG(20)(110),NPT(110)
       DIMENSION TITLE(20)
       DIMENSION JDATE(50),JMONTH(50)
       DOUBLE PRECISION X(111)
       INTEGER*2 IFREE(1),OBSDAY
       COMMON/A/TA,V,A,H,A1,B1,HS,HL,EA,FLOW
       COMMON/C/FS(97)
       COMMON/S/ QAT(20,110),QWT(20,110),AS(110),WS(110),VS(110),
      1QD(20),QS(110),NEW2,QSQ
       DATA IFREE/'*'/
C
C      MAXIMUM VALUE OF NXSEC IS 110
C
C      STEP 9 TO 28 ARE TO ZERO ARRAYS.
       DO 4 K=1,1200
       EB(K)=0.0
       PT(K)= 0.0
     4 PV(K)=0.0
       DO 5 I=1,110
       X(I)= 0.0
       QT(I)= 0.0
       FLOW(4,I)=0.0
       TRIB(I)= 0.0
       IGT(I)= 0.0
       DX(I)= 0.0
       U(I)= 0.0
       W(I)= 0.0
     5 A(I)= 0.0
C
       DO 7777 L=1,110
       DO 6666 I=1,1200
       TTEMP(I,L)=0.0
       TTEMPD(I,L)=0.0
  6666 CONTINUE
  7777 CONTINUE
C
C      READ INPUT
C
       READ(5,*) OBSDAY,MONTH
```

```
      READ(5,1005)NCOND,NXSEC,NHR,DT,QSO,IGO,IOUT,NTRIB,ITS,A1,B1
 1005 FORMAT(1X,I1,I4,I5,2F10.2,4I5,2F10.2)
      NDAY=NHR/24
      JDATE(1)=OBSDAY
      JMONTH(1)=MONTH
      DO 1001 I=2,NDAY
      JDATE(I)=JDATE(I-1)+1
      JMONTH(I)=JMONTH(I-1)
      IF(JDATE(I).EQ.32) JMONTH(I)=MONTH+1
      IF(JDATE(I).EQ.32) JDATE(I)=1
 1001 CONTINUE
      READ(5,*) (X(I),I=1,NXSEC)
 1006 FORMAT(10X,10F7.3)
      READ(5,1017) NLHFD
 1017 FORMAT(1X,I2)
      READ(5,*) NTRPLT
      READ(5,*)(IPRT(I),I=1,NTRPLT)
      DO 1022 I=1,NTRPLT
      READ(5,1020)(RIVLOC(K,I),K=1,20)
 1020 FORMAT(20A4)
 1022 CONTINUE
C
C************************  RATING CURVE SET-UP  ******************
C
      READ(3,*) NEW2
      READ(3,*)(QD(I),I=1,NEW2)
      DO 2110 I=1,NEW2
      QD(I)=QD(I)*0.0283
      READ(3,*)(AT(J),J=1,NXSEC)
      READ(3,*)(WT(J),J=1,NXSEC)
      DO 2100 J=1,NXSEC
      AT(J)=AT(J)*0.0929
      WT(J)=WT(J)*0.3048
      QAT(I,J)=AT(J)
      QWT(I,J)=WT(J)
 2100 CONTINUE
 2110 CONTINUE
C
      NDAY=NHR/24
      READ(5,*)NDSWT,NEDBSP
      IF (NTRIB.EQ.0) GO TO 8
      DO 7 N=1,NTRIB
      READ(5,1010) IGT(N),QTT
 1010 FORMAT(10X,I7,F7.2)
      I= IGT(N)
      NDAY=NHR/24
      NDO=1
      ND=24
      READ(9,1150)(QTSD(K,I),K=1,NDSWT)
 1150 FORMAT(12F7.0)
      DO 1152 J=1,NDAY
      DO 1151 K=NDO,ND
      QTS(K,I)=QTSD(J+NEDBSP,I)*0.0283
 1151 CONTINUE
      NDO=NDO+24
      ND=ND+24
 1152 CONTINUE
```

```
      IF(N.NE.4) GO TO 1166
      READ(8,1160)(TTEMPD(K,I),K=1,NDAY)
 1160 FORMAT(12F6.0)
      NDO=1
      ND=24
      DO 1180 J=1,NDAY
      DO 1170 K=NDO,ND
      TTEMP(K,I)=(TTEMPD(J,I)-32.0)/1.8
 1170 CONTINUE
      NDO=NDO+24
      ND=ND+24
 1180 CONTINUE
 1166 FLOW(4,I)=QTT
    7 CONTINUE
    3 READ(5,*) PTVAL,IFCONT,INITSEC
      READ(1,317)(PT(I),I=1,102)
  317 FORMAT(12F6.1)
      NDO=1
      ND=24
      READ(5,*)(TUPD(I),I=1,NDSHT)
      DO 1140 J=1,NDAY
      DO 1120 K=NDO,ND
      TUP(K)=TUPD(J+NEDBSP)
 1120 CONTINUE
      NDO=NDO+24
      ND=ND+24
 1140 CONTINUE
      WRITE(6,3005) NHR,DT,NXSEC,QSO,IGO,NXSEC,IOUT
 3005 FORMAT(' MODEL IS TO RUN',I5,' TIME STEPS EACH',F10.2,' HOURS LONG
     1. THE RIVER IS DISCRETIZED BY',I5,' GRID POINTS.',/,' THE INITIAL
     2UPSTREAM DISCHARGE IS CONSTANT AT',F10.2,' CUBIC METERS PER SECOND
     3.',/,' THE PRINTOUT WILL BE GIVEN FOR GRIDS',I5,' AND',I5,' FOR
     4EACH',I5,' TIME STEPS.')
      WRITE(6,1007) A1,B1
 1007 FORMAT(1X,1H ,'THE WIND FUNCTION IS',F10.2,'+',F10.2,'*U IN MM/DAY
     $ KPA.')
C
C     CALL CRS(NXSEC)
C
      DO 6450 I=1,NXSEC
      QS(I)=QSO+FLOW(4,I)
 6450 CONTINUE
C
      CALL CALQ(NXSEC)
C
      DO 6460 I=1,NXSEC
      FLOW(1,I)=VS(I)
      FLOW(2,I)=AS(I)
      FLOW(3,I)=WS(I)
 6460 CONTINUE
C
      XUP=X(1)
      X(NXSEC+1)=X(NXSEC)
      DO 1 I=1,NXSEC
      DX(I)=(X(I)-X(I+1))*1609.34
      X(I)=(XUP-X(I))*1609.34
    1 CONTINUE
```

```
C
C
      INX=NXSEC-1
      PV(1)=A(1)*DX(1)
      DO 3 I=1,INX
      U(I)=(FLOW(1,I)+FLOW(1,I+1))/2.0
      A(I)=(FLOW(2,I)+FLOW(2,I+1))/2.0
      W(I)=(FLOW(3,I)+FLOW(3,I+1))/2.0
      SA(I+1)=W(I)*DX(I)
      QT(I)=FLOW(4,I)
    3 PV(I+1)=A(I)*DX(I)
      PV(NXSEC)= FLOW(2,NXSEC)*(DX(INX))/2.0
      NS=NXSEC
      WRITE (6,3004)
 3004 FORMAT (1X,1H0,50X,'INITIAL  CONDITIONS')
      WRITE(6,3010)
 3010 FORMAT(4X,'GRID  RIVER  VELOCITY    AREA    TOP WIDTH   TRIB. FLOW
     1              INITIAL',/,11X,'MILE     M/HR   SQ METERS   METER',
     25X,'CU M/SEC          ',8X,'TEMP')
      DO 9 I=1,NS
      RM=XUP-X(I)/1609.34
      WRITE(6,3011) I,RM,FLOW(1,I),FLOW(2,I),FLOW(3,I),QT(I),PT(I)
 3011 FORMAT(4X,I3,1X,F7.3,3X,F7.0,1X,F8.1,2X,F9.2,5X,F7.2,15X,F7.2)
    9 CONTINUE
      LIT=1
      JD=1
      NDAY=0
C
C     *****  START TIME LOOP  ***********************************************
C
      DO 2 J=1,NHR
      DO 995 J2=1,NLHFD
      READ(7,500)(QS(12*(J2-1)+I),I=1,12)
  500 FORMAT(1X,12F6.0)
  995 CONTINUE
      DO 1025 I=1,NXSEC
      QS(I)=QS(I)*0.0283
 1025 CONTINUE
C
      CALL CALQ(NXSEC)
C
      DO 1030 I=1,NXSEC
      FLOW(1,I)=VS(I)
      FLOW(2,I)=AS(I)
      FLOW(3,I)=WS(I)
      IF(NTRIB.EQ.0) GO TO 1030
      DO 1029 N=1,NTRIB
      L=IST(N)
      FLOW(4,L)=QTS(J,L)
 1029 CONTINUE
 1030 CONTINUE
      DO 12 I=1,INX
      U(I)=(FLOW(1,I)+FLOW(1,I+1))*0.50
      A(I)=(FLOW(2,I)+FLOW(2,I+1))*0.50
      W(I)=(FLOW(3,I)+FLOW(3,I+1))*0.50
      SA(I+1)=W(I)*DX(I)
      QT(I)=FLOW(4,I)
```

```
      IF(J.GT.1) GO TO 13
      PV(I+1)=A(I)*DX(I)
   13 CONTINUE
   12 CONTINUE
      IF(J .NE. JD) GO TO 77
      JD=JD+24
C
C     READ BOUNDARY CONDITIONS HS=DAILY TOTAL, OTHER INPUT IS MEAN DAILY
C
      READ(2,1050) TA,HS,CC,TDP,V
 1050 FORMAT(5F7.2)
C
C****** WIND SPEED IS REDUCED FROM A HEIGHT OF 10M TO 2M ***********
C
 3636 V=V*0.748
C
C *********** CONVERT  WINDSPEED  FROM  KM/H  TO  M/S  ******************
C
 3638 V=V/3.6
C
C****** CONVERT SOLAR RADIATION FROM LANGLEYS TO WATTS/M**2 *******
C
      HS=HS*.4843
C
      HL=1.171E-07*(TA+273.16)**4.*(1.-(0.261)
     1*EXP((-7.77E-04)*(273.16-(TA+273.16))**2))
      HL=HL*.4843
      HL=HL*(1.0+0.17*CC**2.)
      LOOP=0
      IF(J .EQ. 1) E=TDP
      TM=TDP
      HN=(HS*0.9+HL*0.97)
   60 LOOP=LOOP+1
      BETA=0.35+0.015*TM+0.0012*TM**2
      SK=4.48+(BETA+0.47)*(A1+B1*V**2)
      TDPS=TDP+0.47*(TA-TDP)/(BETA+0.47)
      EO=E
      E=(HN-306.+(SK-4.48)*TDPS)/(SK+0.05*TDPS-0.025*EO)
      TM=(TDPS+E)/2.0
      IF(LOOP .LE. 3) GO TO 60
      IF(ABS(E-EO).LT.0.05) GO TO 62
      GO TO 60
 62   CONTINUE
      EQT(JD)=E*1.8+32.
      TRIB(55)=TTEMP(J,55)
      TRIB(15)=TRIB(55)-5.2
      TRIB(24)=TRIB(55)-2.9
      TRIB(78)=TRIB(55)
      TRIB(88)=TRIB(55)-0.8
      TRIB(97)=TRIB(55)+0.9
      NDAY=NDAY+1
      COUNT=0.0
 77   CONTINUE
      COUNT=COUNT+1.0
      EE(J)=E-COS(.2618*COUNT)*HS/SK
C
      DO 93 I=1,NXSEC
```

```
      PT(I)=(PT(I)-32.0)/1.8
   83 CONTINUE
C
C     ************************************************************************
      DO 86 L=1,LIT
      FHR=FLOAT(LIT)
C     ************************************************************************
C
      IF (IFCONT.EQ.1) GOTO 5555
      IF (IFCONT.EQ.2) GOTO 5556
C
 5555 PT(INITSEC-1)=TUP(J)
C
      GOTO 5558
C
 5556 PT(INITSEC-1)=PTVAL
C
 5558 CONTINUE
C
      DO 85 I=INITSEC,NXSEC
C
      PVO(I)=PV(I)
      PV(I)=PV(I)+(QS(I-1)+QT(I-1)-QS(I))*(DT/FHR)*3600.0
C
C  ***  THE FOLLOWING CHECKS FOR HYDRAULIC CONTINUITY  ***
C
      IF(PV(I).GT.0.0) GO TO 82
      WRITE(6,80) I,PV(I),QS(I-1),PVO(I),QS(I),PT(I)
   80 FORMAT(2X,'I= ',I3,2X,'PV(I)= ',F10.1,2X,
     1'QS(I-1)= ',F7.2,2X,'PVO(I)= ',F10.1,2X,'QS(I)= ',F7.2,2X,
     &'PT(I)= ',F6.2)
   82 CONTINUE
C
C  ********************************************************
C
      PT(I)=(PT(I)*PVO(I)+(QS(I-1)*PT(I-1)+QT(I-1)*TRIB(I-1))
     1*(DT/FHR)*3600.0+(SK*SA(I)*EB(J)*3600.0/(4.1855E+06))*(DT/FHR))/
     2(PV(I)+QS(I)*(DT/FHR)*3600.0+(SK*SA(I)*3600.0/(4.1855E+06))
     3*(DT/FHR))
C
   85 CONTINUE
   86 CONTINUE
      DO 88 I=1,NXSEC
      PT(I)=PT(I)*1.8+32.0
   88 CONTINUE
      TIME=FLOAT(J+JTS)*DT
C      IF(J.EQ.1)WRITE(6,2000) IGO,NXSEC
      IF(MOD(J,IOUT).EQ.0) GO TO 140
      GO TO 2
  140 IC=J/IOUT
      DO 153 KKK=1,NTRPLT
      PLT(J,KKK)=PT(IPRT(KKK))
  153 CONTINUE
C
C      IF(MOD(IC,1000).EQ.0) WRITE(6,2000) IGO,NXSEC
C 2000 FORMAT(1X,'1',2X,'TIME                                        ',
C     1'                                                                 ',
```

```
C     1'TEMP AT   TEMP AT':/:' DAY HOUR  LOOP    BETA    SK    ',
C     1' EB(J)  TDPS    TM    VOL AT    VOL AT    HL    HN    TA   ',
C     1'V  TDP      GRID      GRID',/,12X,'NO.                    ',
C     1'                         54       102                      ',
C     1'                  ',5X,I5,5X,I5)
 2111 IDAY= (TIME/24.0)+1
      HR= TIME-FLOAT(IDAY-1)*24.0
C      WRITE(6,2001)IDAY,HR,LOOP,BETA,SK,EB(J),TDPS,TM,PV(IGO),
C     1PV(NXSEC),HL,HN,TA,V,TDP,PT(IGO),PT(NXSEC)
C 2001 FORMAT(2X,I2,F6.2,I5,F10.4,F8.3,F7.2,F8.2,F7.2,F9.1,F10.1,
C     12F6.1,F5.1,F4.1,F5.1,2F10.1)
C
C    **********************************************************************
C
      IF(J.EQ.1)WRITE(6,2000)
 2000 FORMAT(/,/,/,/,/)
      WRITE(6,2001)IDAY,HR,PV(2),PV(7),PV(54),PV(55),PV(56),PV(102),
     $PT(2),PT(7),PT(54),PT(55),PT(56),PT(102)
 2001 FORMAT(2X,I2,F6.2,2X,6F10.1,4X,6F6.1)
C
C  *************************************************************************
C
    2 CONTINUE
C
C     *****  END OF TIME LOOP  *****************************************
C
      NHO=1
      NH=24
      NDAY=NHR/24
      DO 4300 L=1,NTRPLT
      NHO=1
      NH=24
      DO 4200 I=1,NDAY
      STN(L)=0.0
      DO 4120 K=NHO,NH
      STN(L)=STN(L)+PLT(K,L)
 4120 CONTINUE
      ASTN(I,L)=STN(L)/24.0
      NHO=NHO+24
      NH=NH+24
 4200 CONTINUE
 4300 CONTINUE
      IF(IFCONT.EQ.2) WRITE(4,4301) PTVAL
 4301 FORMAT(/,' SOURCE WATER TEMPERATURE AT CHESLATTA FALLS :',F6.1)
      WRITE(4,4302) (JDATE(I),JMONTH(I),I=1,NDAY)
      WRITE(4,4303) (TTEMPD(I,55),I=1,NDAY)
 4302 FORMAT(/,' NAUTLEY R. TEMPERATURES :',//,4(12(I3,'/0',I1,1X),/))
 4303 FORMAT(/,4(12(F6.2,1X),/))
      NTR=NHR+1
      WRITE(4,4304) (JDATE(I),JMONTH(I),I=1,NDAY)
      WRITE(4,4303) (EQT(JD),JD=25,NTR,24)
 4304 FORMAT(/,' MEAN DAILY EQUILIBRIUM TEMPERATURES :',//,
     &4(12(I3,'/0',I1,1X),/))
      DO 4280 L=1,NTRPLT
      WRITE(4,4220)(RIVLOC(K,L),K=1,20)
 4220 FORMAT(/,' MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. ',
     120A4,/)
```

```
      WRITE(4,4221) (JDATE(I),JMONTH(I),I=1,NDAY)
 4221 FORMAT(4(12(I3,'/0',I1,1X),/))
      WRITE(4,4303)(ASTN(I,L),I=1,NDAY)
 4280 CONTINUE
      STOP
      END
C
C
      SUBROUTINE CRS(NXSEC)
C     SUBROUTINE FOR COMPUTING ABSORPTION COEFFICIENTS ON A RIVER
C     VARIABLE DEFINITIONS
C     J= 1,96 TIME STEP AT 15 MINUTE INCREMENTS
C     I= 1,50 GRID NUMBERS
C     RS(J,I)=ABSORPTION COEFFICIENT FOR TIME J, GRID I
C     EBH(I)=TREE HEIGHT OR EFFECTIVE BARRIER HEIGHT FOR EACH SUBREACH,M
C     AZ(I)=AZIMUTH OF RIVER SUBRECH, DEGREES
C     AZS=AZIMUTH OF SUN, DEGREES
C     BW(I)=BANK WIDTH, DISTANCE FROM TREES TO WATERS EDGE, METERS
C     THE= ANGLE BETWEEN SUN AND STREAM AXIS, DEGREES
C     BET= ANGLE BETWEEN SUN AND A NORMAL TO THE STREAM AXIS, DEGREES
C     ELEV= ELEVATION OF THE SUN, DEGREES
C     XN= NORMAL DISTANCE FROM TREES TO EDGE OF SHADOW, METERS
C     X= DISTANCE FROM TREES TO SHADOW ALONG A BEAM OF LIGHT, METERS
C     DEL= DECLINATION OF THE SUN, DEGREES
C     HA= HOUR ANGLE FROM ZENITH TO SUN, DEGREES
C     DHA= CHANGE IN HOUR ANGLE PER TIME STEP, DEGREES
C     HA0= HOUR ANGLE AT MIDNIGHT, DEGREES
C     PHI= LATITUDE OF RIVER, DEGREES
C     ALON= LONGITUDE OF RIVER, DEGREES
C     TZM= TIME ZONE MERIDIAN
C     JDAT= JULIAN DATE FOR WHICH SHADING COMPUTATIONS ARE MADE
C     DR=  DEGREE TO RADIAN CONVERSION
C
      DIMENSION EBH(110),AZ(110),BW(110),T(110)
      INTEGER*2 IFREE(1)
      COMMON/A/ TA,U,A(110),W(110),A1,B1,HS,HL,EA,FLOW(4,110)
      COMMON/C/ RS(97)
      COMMON/S/ QAT(20,110),QWT(20,110),AS(110),WS(110),VS(110),
     1QD(20),QS(110),NEW2,QS0
      DATA IFREE/'*'/
      READ(5,1000) JDAT,PHI,ALON,TZM
 1000 FORMAT(10X,I7,3F7.1)
      READ(5,*) AZ1
      DO 1100 I=1,NXSEC
      QS(I)=QS0+FLOW(4,I)
 1100 CONTINUE
C
      CALL CALQ(NXSEC)
C
      SFL=0.0
      SBW=0.0
      DO 1200 I=1,NXSEC
      SFL=SFL+FLOW(3,I)
      BW(I)=(WS(I)-FLOW(3,I))/2.0
      SBW=SBW+BW(I)
 1200 CONTINUE
      AVGBW=SBW/FLOAT(NXSEC)
```

```
      AVGFL=SFL/FLOAT(NXSEC)
      READ(5,*) ERH1
 1001 FORMAT(10X,10F7.1)
      DR= 3.14159/180.0
      DHA= 3.75*DR
      PHI= PHI*DR
      DEL= DR*23.45*COS(6.2832*(172.0-FLOAT(JDAT))/365.0)
      HAD= (180.0+ALON-TZM)*DR
      SDSP= SIN(DEL)*SIN(PHI)
      CDCP= COS(DEL)*COS(PHI)
      DO 10 J=1,96
      M= J-1
      AJ=FLOAT(J-1)
      HA=HAD-DHA*AJ
      S= SDSP+CDCP*COS(HA)
      ELEV= ASIN(S)/DR
      AZS= 0.0
      IF(ELEV.GT.1.5) RSM=1.0-1.18*(1.0/ELEV**0.77)
      IF(ELEV.GT.1.5) AZS=ACOS((SIN(DEL)-SIN(ELEV*DR)*SIN(PHI))/(COS
     $(ELEV*DR)*COS(PHI)))
      IF(HA.LT.0.0) AZS= 360.0*DR-AZS
      IF(ELEV.GT.1.5) GO TO 1
      RS(J)= 0.2
      GO TO 10
    1 THE= ABS(AZS-AZ1*DR)
      IF(THE.GT.(180.0*DR))  THE=THE-180.0*DR
      BET= ABS(THE-90.0*DR)
      X= ERH1/TAN(ELEV*DR)
      IF(COS(BET).GE.0.01) GO TO 2
      RS(J)= RSM
      GO TO 10
    2 XN= X*COS(BET)
      IF(XN.GE.AVGBW) GO TO 3
      RS(J)= RSM
      GO TO 10
    3 IF(XN.LE.(AVGBW+AVGFL)) GO TO 4
      RS(J)= 0.2
      GO TO 10
    4 RS(J)= RSM*(AVGFL+AVGBW-XN)/AVGFL+0.2*(XN-AVGBW)/
     $AVGFL
   10 CONTINUE
      DO 60 L=1,NXSEC
   60 RS(97)= RS(96)
      PHI=PHI/DR
      WRITE(6,5050) JDAT,TZM,PHI,ALON
 5050 FORMAT(1X,1H0,39X,'ABSORPTION COEFFICIENTS FOR SOLAR RADIATION',
     138X,//,54X,'JULIAN DAY ',I3,2X,',TIME ZONE  ',1F5.1,' DEGREES',
     229X,/,54X,'LATITUDE=',1F5.1,' LONGITUDE= ',F5.1,' DEGREES',27X,
     3//,'  GRID    ERH     BW  AZIMUTH  ****************************',
     4'**********HOUR**************************************************',/,
     59X,'METER  METER  DEGREE',4X,'5',5X,'6',5X,'7',5X,'8',5X,'9',4X,
     6'10',4X,'11',4X,'12',4X,'13',4X,'14',4X,'15',4X,'16',4X,'17',4X,
     7'18',4X,'19',3X)
C
      WRITE(6,3000) I,ERH1,AVGBW,AZ1,(RS(J),J=20,76,4)
 3000 FORMAT(1X,'  ',1X,I3,F9.1,F7.1,F8.1,1X,15F6.3)
C
```

TEMPJ27.COM

```
$SET VERIFY
$DEASSIGN/ALL
$ASSIGN TJ25.OUT          FOR001
$ASSIGN TU2J27.DAT        FOR002
$ASSIGN TU3.DAT           FOR003
$ASSIGN TU4J27.OUT        FOR004
$ASSIGN TU5J27.DAT        FOR005
$ASSIGN TU6J27.OUT        FOR006
$ASSIGN FU7J26J31.OUT     FOR007
$ASSIGN TU9J27.DAT        FOR009
$ASSIGN TJ26.OUT          FOR011
$ASSIGN TU12J27.OUT       FOR012
$RUN TEMODY
$EXIT
```

FORECAST MODEL
COMMAND FILE LISTING

TEMPJ27.COM

APPENDIX C

EXAMPLE SET-UP OF FORECAST WATER TEMPERATURE MODEL - JULY 26 TO JULY 31

```
      RETURN
      END
C
C
      SUBROUTINE CALQ(NXSEC)
      COMMON/S/ QAT(20,110),QWT(20,110),AS(110),WS(110),VS(110),
     1QD(20),QS(110),NEW2,QSO
      DO 3000 J3=1,NXSEC
      DO 2900 I=2,NEW2
      IF(QS(J3).GE.QD(I)) GO TO 2900
      AS(J3)=QAT(I-1,J3)+((QAT(I,J3)-QAT(I-1,J3))/(QD(I)-QD(I-1)))
     1*(QS(J3)-QD(I-1))
      WS(J3)=QWT(I-1,J3)+((QWT(I,J3)-QWT(I-1,J3))/(QD(I)-QD(I-1)))
     1*(QS(J3)-QD(I-1))
      VS(J3)=3600.0*QS(J3)/AS(J3)
      GO TO 3000
 2900 CONTINUE
 3000 CONTINUE
      RETURN
      END
```

FORECAST MODEL
INPUT FILES' LISTING
AND DESCRIPTION

TJ25.OUT
TU2J27.DAT
TU3.DAT
TU5J27.DAT
FU7J26J31.OUT
TU9J27.DAT

TJ25.OUT

1	99.9	99.9	99.9	99.9	99.9	99.9	99.9	59.5	59.4	59.4	59.4	59.3
2	59.3	59.4	59.4	59.4	59.5	59.5	59.6	59.8	59.9	60.1	60.1	60.3
3	60.4	60.6	60.8	60.9	61.1	61.3	61.4	61.5	61.7	61.8	61.9	62.0
4	62.1	62.2	62.3	62.4	62.4	62.4	62.5	62.6	62.6	62.7	62.8	62.8
5	63.0	63.1	63.2	63.2	63.5	63.7	63.8	64.2	64.2	64.2	64.2	64.3
6	64.4	64.6	64.7	64.7	64.7	64.8	64.8	64.8	64.9	65.0	65.1	65.4
7	65.5	65.6	65.8	65.9	66.0	66.0	66.1	66.2	66.3	66.3	66.7	67.1
8	67.2	67.3	67.4	67.4	67.6	67.6	67.6	67.6	67.6	67.6	67.6	67.6
9	67.6	67.8	67.8	67.9	67.9	68.0						

Program : TFMODX.FOR
I/O Unit : 1

TJ25.OUT

Card No. : 1 THROUGH 9
Variable(s) : PT(I) I = 1 to 102 (102 = NXSEC)
Format : 12F6.1

Explanation: Initializing water temperature file. This file is used to initialize water temperatures at each of 102 surveyed cross sections between Cheslatta Falls and the Stuart River Confluence. The file contains 8 cards of 12 entries and 1 card of 6 entries. The first card, represented by this page, contains 99.9 for the first seven survey locations (not used) since the continuous recording thermograph is located within surveyed cross section 8, downstream of Cheslatta Falls.
The file name is TJ25.OUT

Field	1	2	3	4	5	6	7	8	9	10	11	12
Column	6	12	18	24	30	36	42	48	54	60	66	72
Value	99.9	99.9	99.9	99.9	99.9	99.9	99.9	59.5	59.4	59.4	59.4	59.3

TU2J27.DAT

20.70	498.40	0.43	12.50	10.60	93.20	61.00	26 07	84
18.50	488.60	0.30	9.50	8.00	93.40	56.00	27 07	84
16.00	497.90	0.30	8.00	6.00	93.70	60.00	28 07	94
16.00	533.20	0.20	6.00	2.00	93.90	52.00	29 07	84
15.00	534.80	0.30	5.00	3.00	93.60	52.00	30 07	84
15.00	534.80	0.30	6.00	4.00	93.20	55.00	31 07	84

Program : TFMODX.FOR
I/O Unit : 2

TU2J27.DAT

Card No. : 1 THROUGH 6
Variable(s) : TA, HS, CC, TDP, V
Format : 5F7.2

Explanation: This file contains meteorological data used in the modelling. Fields 1 through 5 are used, fields 6 through 10 are not.
The file name is TU2J27.DAT

84:	Year
07:	Month
26:	Day
61 00:	Relative hunidity (%) (not used)
93.20:	Station pressure (in Hg) (not used)
V:	Wind speed (Km/Hr)
TDP:	Dew point temperature (degree C)
CC:	Cloud cover (tenths)
HS:	Shortwave (solar) radiation (langleys)
TA:	Air Temperature (degree C)

TU3.DAT

```
14
0.0,50.0,100.0,200.0,500.0,1000.0,1500.0,2000.0,3000.0,
4000.0,5000.0,7000.0,10000.0,30000.0,
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610,,328,,474,,139,,315,,258,,314,,314,,
580,,580,,540,,1020,,1960,,590,,460,,790,,475,,640,,610,,890,,
930,,890,,455,,770,,635,,830,,700,,810,,1120,,1030,,950,,855,,
960,,1250,,1300,,1440,,975,,1000,,1300,,1000,,890,,780,,450,,900,,
1575,,860,,570,,505,,675,,640,,745,,760,,945,,1145,,1140,,975,,
900,,850,,1400,,975,,2110,,2025,,
2040,,1128,,840,,433,,418,,338,,1265,,2388,,1778,,1520,,
768,,895,,575,,703,,1590,,1000,,545,,1000,,1063,,600,,
813,,880,,383,,735,,1090,,525,,895,,2400,,2175,,1465,,
3055,,1565,,2293,,1655,,2705,,1563,,3565,,3175,,2830,,1235,,
2070,,1960,,1755,,625,,1610,,2418,,2788,,2788,,
207,,207,,159,,192,,150,,369,,249,,356,,236,,313,,259,,257,,
267,,427,,237,,227,,292,,270,,427,,286,,248,,285,,312,,218,,
358,,346,,361,,200,,453,,199,,216,,310,,260,,178,,307,,190,,
269,,162,,247,,367,,340,,273,,202,,319,,301,,473,,236,,277,,
235,,437,,292,,235,,238,,585,,
287,,364,,305,,108,,330,,88,,441,,292,,565,,509,,
306,,316,,232,,274,,250,,222,,104,,170,,276,,231,,
230,,376,,218,,468,,324,,340,,115,,324,,268,,264,,
351,,420,,392,,327,,374,,664,,443,,560,,672,,230,,
664,,333,,482,,143,,321,,261,,315,,315,,
690,0,690,0,610,0,1110,,2000,,675,0,610,0,925,0,650,0,730,0,
760,0,1025,,1050,,1010,,570,0,860,0,750,0,950,0,850,0,980,0,
1275,,1225,,1150,,980,0,1155,,1420,,1480,,1540,,1195,,1130,,
1475,,1220,,1100,,860,0,575,0,1030,,1690,,975,0,710,0,650,0,
795,0,750,0,850,0,900,0,1090,,1290,,1240,,1090,,1035,,1145,,
1625,,1140,,2260,,2400,,
2190,,1330,,1020,,525,,480,,500,,1390,,2525,,1880,,1540,,
910,,1010,,660,,790,,1770,,1150,,710,,1120,,1175,,690,,
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2290,,2045,,1985,,675,,1740,,2485,,2840,,2840,,
213,,213,,167,,197,,156,,379,,283,,367,,273,,335,,
284,,282,,271,,431,,260,,239,,313,,278,,433,,294,,
257,,302,,345,,242,,362,,351,,366,,207,,457,,198,,
224,,317,,267,,187,,310,,199,,274,,180,,287,,392,,
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294,,397,,340,,126,,406,,108,,467,,286,,605,,509,,
402,,352,,270,,300,,257,,230,,132,,210,,288,,245,,
299,,392,,236,,479,,360,,416,,149,,332,,272,,269,,
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717,,338,,490,,147,,326,,263,,316,,316,,
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1560,,1420,,1560,,1250,,1540,,1750,,1840,,1745,,1630,,1400,,
1810,,1655,,1530,,1025,,830,0,1280,,1925,,1200,,1000,,925,0,
1340,,955,0,1060,,1150,,1390,,1600,,1450,,1340,,1300,,1745,,
2075,,1455,,2560,,3155,,
2510,,1560,,1260,,705,,775,,830,,1625,,2745,,2110,,1560,,
1140,,1260,,840,,940,,2000,,1390,,1040,,1400,,1360,,880,,
1370,,1220,,710,,1090,,1460,,1300,,2110,,2900,,2590,,1840,,
3600,,2125,,2775,,2110,,3125,,2270,,4100,,3830,,3595,,1540,,
2740,,2275,,2430,,775,,1975,,2620,,2940,,2940,,
225,,225,,182,,207,,165,,397,,348,,390,,347,,378,,
335,,331,,280,,438,,306,,264,,358,,296,,445,,310,,
274,,377,,412,,299,,368,,359,,365,,222,,464,,217,,
240,,330,,277,,207,,318,,213,,282,,214,,368,,442,,
445,,320,,310,,397,,326,,532,,270,,315,,337,,570,,
330,,290,,257,,612,,
298,,470,,382,,162,,451,,150,,520,,293,,610,,510,,
432,,387,,345,,338,,297,,241,,185,,397,,350,,264,,
332,,425,,272,,500,,432,,467,,215,,349,,280,,285,,
359,,444,,415,,351,,390,,733,,527,,566,,680,,243,,
381,,350,,498,,158,,331,,264,,318,,318,,

781,350,498,158,331,264,318,318,
1125,1125,925,0,1495,2175,1025,1175,1475,1300,1100,
1410,1550,1520,1525,1000,1215,1230,1420,1410,1660,
1960,2000,1960,1510,1925,2075,2190,1945,2080,1660,
2140,2090,1950,1190,1080,1530,2165,1430,1250,1100,
1260,1120,1250,1390,1580,1875,1575,1500,1450,2150,
2720,1780,2860,3900,
2825,1800,1485,885,1040,1160,1960,2860,2320,1600,
1360,1500,1010,1130,2120,1625,1360,1690,1525,1070,
1500,1450,925,1340,1710,1825,2830,3240,2850,2125,
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3190,2510,2835,880,2175,2750,3050,3050,
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292,372,478,335,374,368,385,236,472,236,
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339,308,262,632,
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357,457,307,522,504,720,284,367,287,320,
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2160,2380,2360,1770,2310,2400,2540,2145,2530,1920,
2470,2525,2370,1355,1330,1780,2405,1660,1500,1275,
1490,1295,1440,1630,1770,2150,1700,1660,1600,2555,
2565,2105,3160,4645,
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1540,1700,1200,1320,2290,1850,1675,1975,1710,1260,
1780,1680,1150,1575,1960,2350,3750,3575,3090,2420,
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348,366,271,652,
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1900,1300,1420,2090,2400,1550,2015,2300,2275,1670,
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3725,2475,2100,1455,1820,2120,2845,3250,2935,1780,
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4750,3580,4130,3330,4250,4270,5460,5170,5145,2020,
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366,442,289,692,
327,479,409,306,597,314,580,312,625,520,
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466,553,412,595,720,1170,482,418,308,386,
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[illegible],[illegible],[illegible],[illegible],2625,2075,2955,3125,3250,2240,

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2475, 2475, 1915, 2665, 2625, 2075, 2855, 3125, 3250, 2240,
3330, 3170, 2960, 3055, 2320, 2265, 2670, 2860, 3090, 3760,
3660, 4280, 4360, 3070, 4235, 4025, 4290, 3145, 4780, 3220,
4120, 4700, 4470, 2180, 2580, 3030, 3605, 2810, 2750, 2150,
2580, 2110, 2390, 2830, 2720, 3525, 2325, 2460, 2350, 4580,
3790, 3730, 4660, 8370,
4625, 3150, 2715, 2025, 2600, 3080, 3730, 3640, 3550, 1960,
2440, 2700, 2150, 2270, 3080, 2975, 3250, 3400, 2635, 2210,
3190, 2830, 2275, 2750, 3210, 4975, 8350, 5250, 4290, 3895,
5620, 4660, 5130, 4260, 5090, 5770, 6480, 6160, 6315, 2365,
5710, 3950, 5265, 1600, 3375, 3650, 4100, 4100,
309, 309, 280, 284, 228, 537, 803, 551, 865, 683,
671, 674, 343, 480, 632, 435, 666, 415, 526, 419,
400, 582, 874, 611, 410, 422, 445, 320, 520, 350,
359, 435, 347, 340, 367, 318, 352, 424, 732, 617,
669, 474, 555, 562, 410, 812, 347, 364, 379, 710,
393, 556, 316, 752,
751, 511, 427, 414, 705, 437, 628, 327, 634, 529,
515, 442, 305, 517, 562, 480, 564, 493, 532, 471,
565, 649, 517, 649, 936, 1620, 680, 469, 329, 452,
394, 507, 454, 609, 421, 790, 582, 587, 708, 275,
956, 399, 533, 295, 354, 279, 350, 350,
6188, 6198, 4798, 6663, 6563, 5188, 7138, 7813, 8125, 5600,
8325, 7925, 7400, 7638, 5800, 5663, 6675, 7150, 7725, 9400,
9150, 10700, 10900, 7675, 10588, 10063, 10725, 7863, 11950, 8050,
10300, 11750, 11175, 5450, 6450, 7575, 9013, 7025, 6875, 5375,
6450, 5275, 5975, 7075, 6800, 8813, 5813, 6150, 5875, 11450,
9475, 9325, 11650, 23270,
10625, 7650, 6915, 5825, 7300, 9480, 9630, 6240, 7650, 3160,
6040, 6700, 5950, 6070, 6280, 7475, 9550, 9100, 6335, 6010,
8780, 7430, 6775, 7450, 8210, 15475, 26750, 11950, 9090, 9795,
11420, 11860, 12180, 10460, 10690, 15770, 13280, 12760, 14115, 4665,
14110, 8750, 13365, 4000, 7375, 6650, 7600, 7600,
519, 519, 470, 477, 383, 902, 1349, 926, 1453, 1147,
1127, 1132, 576, 806, 1062, 731, 1119, 697, 884, 704,
672, 979, 1468, 1026, 699, 709, 748, 538, 874, 588,
603, 731, 583, 571, 617, 534, 591, 712, 1230, 1037,
1124, 796, 932, 944, 689, 1364, 583, 612, 637, 1193,
660, 934, 531, 1152,
511, 731, 547, 1134, 1425, 1257, 948, 427, 694, 589,
715, 542, 2505, 1057, 1302, 1240, 1644, 633, 892, 1031,
1225, 1289, 1217, 1068, 2376, 4620, 2000, 809, 469, 892,
494, 687, 554, 1389, 501, 930, 742, 647, 788, 355,
1096, 539, 633, 665, 414, 319, 450, 450,

Program : TFMODX.FOR
I/O Unit : 3

TU3.DAT

Card No. : 1
Variable(s) : NEW 2
Format : FREE FORMAT

Explanation: I/O input unit 3 file conatins surveyed hydraulic data (cross sectional area of flow and surface width of flow) for flows of 0 cfs to 30,000 cfs at 102 surveyed cross sections.
The file name is TU3.DAT

NEWZ: Number of discharges used for rating curve
Flows range from 0 to 30,000 cfs.

/4

Field

Program : TFMODX.FOR
I/O Unit : 3

Card No. : 2
Variable(s) : QD(I) I = 1 to NEW2
Format : FREE FORMAT

0.0,50.0,100.0,200.0,500.0,1000.0,1500.0,2000.0,3000.0,

QD(I): Flows used to establish rating curves
This card contains flows of 0 through 3,000 cfs.

Field

Program : TFMODX.FOR
I/O Unit : 3

Card No. : 3
Variable(s) : QD(I) I = 1 to NEW2
Format : FREE FORMAT

Field: 4000.0,5000.0,7000.0,10000.0,30000.0,

QD(I): Flows used to establish rating curves
This card contains flows of 4,000 through 30,000 cfs.

Program : TFMODX.FOR
I/O Unit : 3

Card No. : 3
Variable(s) : QD(I) I = 1 to NEW2
Format : FREE FORMAT

4000.0,5000.0,7000.0,10000.0,30000.0,

QD(I): Flows used to establish rating curves
This card contains flows of 4,000 through 30,000 cfs.

Field

Program : TFMODX. FOR
I/O Unit : 3

Card No. : 4 THROUGH 13
Variable(s) : AT(J) J = 1 to NXSEC (NXSEC = 102)
Format : FREE FORMAT

0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,

AT(J): Cross sectional area of flow at each of 102 cross sections for a flow of 0 cfs.
Entries are all zeroes for cards 4 through 13.

Field

Program : TFMODX.FOR
1/0 Unit : 3

Card No. : 14 THROUGH 23
Variable(s) : WT(J) J = 1 to NXSEC (NXSEC = 102)
Format : FREE FORMAT

Field

0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,

WT(J): Surface width of flow at each of 102 cross sections for a flow of 0 cfs.
Entries are all zeroes for cards 14 through 23.

Program : TFMODX.FOR
I/O Unit : 3

Card No. : 24 THROUGH 297
Variable(s) : AT(J) AND WT(J) J = 1 to NXSEC (NXSEC = 102)
Format : FREE FORMAT

Explanation: Cards 24 through 297 contain cross sectional area of flow and surface widths of flow for each 102 surveyed cross sections for flows of 50 cfs through 30,000 cfs.

Cards 24 to 33:	Cross sectional area of flow for 50 cfs
Cards 34 to 43:	Surface width of flow for 50 cfs
Cards 44 to 53:	Cross section area of flow for 100 cfs
Cards 54 to 63:	Surface width of flow for 100 cfs
Cards 64 to 73:	Cross section area of flow for 200 cfs
Cards 74 to 83:	Surface width of flow for 200 cfs
Cards 84 to 93:	Cross section area of flow for 500 cfs
Cards 94 to 103:	Surface width of flow for 500 cfs
Cards 104 to 113:	Cross section area of flow for 1,000 cfs
Cards 114 to 123:	Surface width of flow for 1,000 cfs
Cards 124 to 133:	Cross section area of flow for 1,500 cfs
Cards 134 to 143:	Surface width of flow for 1,500 cfs
Cards 144 to 154:	Cross section area of flow for 2,000 cfs
Cards 155 to 165:	Surface width of flow for 2,000 cfs
Cards 166 to 176:	Cross section area of flow for 3,000 cfs
Cards 177 to 187:	Surface width of flow for 3,000 cfs

Field

Program : TFMODX.FOR
1/0 Unit : 3

Card No. : 24 THROUGH 297 (cont'd)
Variable(s) : AT(J) AND WT(J) J = 1 to NXSEC (NXSEC = 102)
Format : FREE FORMAT

Cards 188 to 198: Cross section area of flow for 4,000 cfs

Cards 199 to 209: Surface width of flow for 4,000 cfs

Cards 210 to 220: Cross section area of flow for 5,000 cfs

Cards 221 to 231: Surface width of flow for 5,000 cfs

Cards 232 to 242: Cross section area of flow for 7,000 cfs

Cards 243 to 253: Surface width of flow for 7,000 cfs

Cards 254 to 264: Cross section area of flow for 10,000 cfs

Cards 265 to 275: Surface width of flow for 10,000 cfs

Cards 276 to 286: Cross section area of flow for 30,000 cfs

Cards 287 to 297: Surface width of flow for 30,000 cfs

Field

TU5J27.DAT

```
  26   7
1 102  144       1.00     277.34   54     1     7     0        9.20       0.46
116.03,115.78,114.66,114.30,113.23,112.80,112.04,110.72,109.39,108.22,
107.09,106.31,105.86,104.32,103.84,102.82,101.74,100.37,99.75,97.51,
96.82,95.94,95.56,94.64,94.09,93.45,92.55,91.77,90.93,90.06,
89.19,88.74,87.94,87.02,85.81,85.14,84.41,83.51,81.79,80.44,
79.06,77.60,76.34,74.94,73.71,72.83,71.41,70.26,67.78,66.49,
65.46,64.65,62.61,60.99,
60.32,59.07,57.57,56.61,56.30,54.69,51.89,49.64,49.15,49.01,
46.21,45.32,43.98,42.88,41.74,40.66,39.73,36.99,35.76,34.71,
31.65,30.30,29.18,28.75,27.52,27.16,26.70,26.49,24.47,21.23,
19.98,19.47,18.73,16.70,14.16,12.97,11.97,10.70,9.47,7.99,
6.95,6.12,5.05,3.69,2.44,1.65,0.74,0.00,
 9
5,
8,54,56,82,102,
AT SECTION   8 (AT IRVINE'S LODGE) !
AT SECTION  54 (ABOVE FORT FRASER) !
AT SECTION  56 (BELOW THE NAUTLEY RIVER) !
AT SECTION  82 (AT VANDERHOOF) !
AT SECTION 102 (ABOVE THE STUART R.) !
   46  16
                2    0.03
               15    1.13
               24    1.13
               55   27.73
               78    2.77
               98    5.55
               97    2.77
 59.5  1    9  65.0
 59.5  59.0  59.0  59.5  61.0
 65.0  64.7  65.4  66.3  68.2
0.59,0.40,0.17,0.14,0.22,0.08
19  63.1  68.3
              210    54.0  125.0  120.0
50.0,
3.0,
```

Program : TFMODX.FOR
I/O Unit : 5 TU5J27.DAT

Card No. : 1
Variable(s) : OBSDAY, MONTH
Format : FREE FORMAT

Explanation: Control file used to specify modelling period, size of the simulation time step, coefficients for the windspeed function, location of surveyed cross sections, initial river and tributary flows and source water temperatures, and locations for which output is to be produced.
The file name is TU5J27.DAT

9 7 MONTH: July (7)

5 26 OBSDAY: The twenty-sixth day of the month (26)

Field

Program : TFMODX.FOR
I/O Unit : 5

Card No. : 2
Variable(s) : NCOND,NXSEC,NHR,DT,QSO,IGO,IOUT,NTR1B,JTS,A1,B1
Format : 1X,I1,I4,I5,2F10.2,4I5,2F10.2

Field	End column	Value	Variable	Description
11	71	0.46	B1:	Coefficient in the windspeed function
10	61	9.20	A1:	Constant in the windspeed function
9	51	0	JTS:	Hour of day at which computations begin. Computations begin in the first hour for JTS=0 (midnight)
8	46	7	NTR1B:	Number of tributaries
7	41	1	IOUT:	Frequency of output of results - not used but required for documentation
6	36	54	IGO:	The Nautley River enters the Nechako River at sub-reach 54- not used but required for documentation
5	31	277.34	QSO:	Initial flow in the Nechako River at Cheslatta Falls (m 3/s)
4	21	1.00	DT:	Size of time step. One hour in this case
3	11	144	NHR:	Number of hourly time steps - 144 for a 6 day simulation
2	6	102	NXSEC:	Number of surveyed cross sections used in the modelling
1	2	1	NCOND:	Not used

Field

Program : TFMODX.FOR
I/O Unit : 5

Card No. : 3 THROUGH 13
Variable(s) : X(I) I = 1 to NXSEC (NXSEC = 102)
Format : FREE FORMAT

116.03, 115.78, 114.66, 114.30, 113.23, 112.80, 112.04, 110.72, 109.39, 108.22,

X(I): Distance from each surveyed cross section to the downstream end of the study reach (ie at the confluence of the Nechako and Stuart Rivers) (miles)

Field

Program : TFMODX.FOR
I/O Unit : 5

Card No. : 14
Variable(s) : NLHFD
Format : 1X, I2

Field	
3	NLHFD: Number of lines of hourly flow data

Program : TFMODX.FOR
1/0 Unit : 5

Card No. : 15
Variable(s) : NTRPLT
Format : FREE FORMAT

NTRPLT: Number of locations for which calculated mean daily water temperatures are to be output

5

Field

Program : TFMODX.FOR
I/O Unit : 5

Card No. : 16
Variable(s) : IPRT
Format : FREE FORMAT

Field: 8, 54, 56, 83, 102

IPRT: Surveyed cross sections for which mean daily water temperatures are output

Program : TFMODX.FOR
I/O Unit : 5

Card No. : 17 THROUGH 21
Variable(s) : RIVLOC (K,I) K = 1 to 20, I = 1 to NTRPLT
Format : 20A4

AT SECTION 8 (AT IRVINE'S LODGE):

RIVLOC (K,I): Titles for output of locations identified in card 16

Field

Program : TFMODX.FOR
1/0 Unit : 5

Card No. : 22
Variable(s) : NDSWT,NEDBSP
Format : FREE FORMAT

NDSWT: Number of days of mean daily source water temperature data (46)

NEDBSP: Number of extra days in data before start of the simulation (16)

5 9
46 16

Field

Program : TFMODX.FOR
I/O Unit : 5

Card No. : 23 THROUGH 29
Variable(s) : IGT(N),QTT N = 1 to NTR1B
Format : 10X, I7, F7.2

Field	Columns	Example	Description
2	18–24	0.03	QTT: Initial flow of the tributary
1	11–17	3	IGT(N): Survey cross section at which the tributary enters the Nechako River

Field

Program : TFMODX.FOR
I/O Unit : 5

Card No. : 30
Variable(s) : PTVAL,IFCONT,INITSEC,TNR
Format : F6.1, 2X, I1, 2X, I2, F6.1

Field	Value	Variable	Description
4	65.0	TNR:	Observed Nautley River water temepratures for previous day (July 26 in this example)
3	9	INITSEC:	Defines sub-reach at which the Nechako River source water temperatures are measured
2	1	IFCONT:	If IFCONT = 1 compute forecast source & tributary water temperatures If IFCONT = 2 use observed source & tributary water temepratures
1	59.0	PTVAL:	Observed water temperature in the Nechako River at Cheslatta Falls for the previous day (July 26 in this example)

Field

Program : TFMODX.FOR
1/0 Unit : 5

Card No. : 31
Variable(s) : TCUP(I) I = 1 to 5
Format : 5F6.1

59.5 59.0 59.0 59.5 61.0

6 12 18 24 30

Field

TCUP(I): Mean daily source water temepratures in the Nechako River below Cheslatta Falls for the current day and the four following days.

Program : TFMODX.FOR
I/O Unit : 5

Card No. : 32
Variable(s) : TNUP(I) I = 1 to 5
Format : 5F6.1

Field	6	12	18	24	30
	65.0	64.7	65.4	66.3	68.2

TNUP(I): Mean daily Nautley River water temperatures for the current day plus the four following days.

Program : TFMODX.FOR
I/O Unit : 5

Card No. : 33
Variable(s) : CTRWT(I) I = 1 to 6
Format : FREE FORMAT

0.58,0.40,0.17,0.16,0.22,0.08

CTRWT(I): Coefficients used in estimating tributary inflow water temperatures for Swanson Creek, Greer Creek, Nautley River, Stoney Creek, Sinkut River and Cluculz Creek

Field

Program : TFMODX.FOR
1/0 Unit : 5

Card No. : 34
Variable(s) : JTIME, OBSPT(54), OBSPT(102)
Format : 1X, I2, 2F6.1

Field

3 — 19
9 — 63.7
15 — 68.0

OBSPT(102): Water temperature recorded at 1900 hrs in the Nechako River above the Stuart River (1900 hrs on July 26 in this example)

OBSPT(54): Water temperature recorded at 1900 hrs in the Nechako River above the Nautley River (1900 hrs on July 26 in this example)

JTIME: Time at which water temperature in the Nechako River above the Stuart was recorded. (1900hrs in this example)

Program : TFMODX.FOR
I/O Unit : 5

Card No. : 35
Variable(s) : JDAT, PHI,ALON, TZM
Format : 10X, I7, 3F7.1

TZM: Not used (120.0)

ALON: Not used (125.0)

PHI: Not used (54.0)

JDAT: Not used (210)

Field: 210 54.0 125.0 120.0 (columns 10, 20, 30, 40)

Card No. : 36
Variable(s) : AZ1
Format : FREE FORMAT

AZ1: Not used

90.0,

Field

Card No. : 37
Variable(s) : EBH1
Format : FREE FORMAT

EBH1: Not used

3.0

Field

FU7J26J31.OUT

8492, 8490, 8477, 8472, 8460, 8454, 8439, 8413, 8390, 8373, 8357, 8345, HR 1
8338, 8312, 8304, 8327, 8309, 8286, 8269, 8238, 8222, 8202, 8193, 8171, 26/07
8198, 8193, 8162, 8143, 8123, 8102, 8081, 8071, 8053, 8037, 8016, 8004,
7994, 7983, 7961, 7943, 7925, 7901, 7880, 7856, 7835, 7820, 7800, 7785,
7746, 7723, 7702, 7684, 7641, 7606, 7590, 8524, 8493, 8475, 8469, 8441,
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7908, 7899, 7887, 7855, 8013, 7999, 7987, 7972, 7960, 7947, 7938, 7930,
7921, 8008, 8001, 7997, 7992, 7988,

8541, 8539, 8526, 8522, 8510, 8504, 8489, 8463, 8440, 8423, 8408, 8396, HR 2
8398, 8363, 8355, 8378, 8360, 8337, 8320, 8290, 8274, 8254, 8245, 8223, 26/07
8250, 8235, 8214, 8196, 8176, 8155, 8134, 8124, 8106, 8090, 8069, 8057,
8047, 8036, 8014, 7997, 7979, 7955, 7934, 7910, 7889, 7874, 7854, 7839,
7806, 7778, 7756, 7739, 7695, 7660, 7644, 8576, 8545, 8527, 8521, 8494,
8427, 8376, 8366, 8364, 8312, 8297, 8273, 8254, 8233, 8213, 8195, 8140,
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7945, 7936, 7923, 7899, 8043, 8028, 8015, 7998, 7984, 7970, 7960, 7951,
7940, 8026, 8017, 8012, 8007, 8002,

8591, 8599, 8576, 8571, 8559, 8553, 8538, 8513, 8490, 8474, 8458, 8446, HR 3
8439, 8413, 8406, 8429, 8411, 8388, 8372, 8341, 8326, 8305, 8296, 8275, 26/07
8302, 8287, 8266, 8248, 8228, 8207, 8187, 8176, 8158, 8143, 8122, 8110,
8100, 8089, 8067, 8050, 8032, 8009, 7987, 7963, 7943, 7927, 7908, 7893,
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[illegible], 8047, 8036, 8031, 8024, 8019,

[illegible]640, 8638, 8625, 8621, 8608, 8602, 8588, 8563, 8540, 8523, 8508, 8496, HR 4
8489, 8464, 8456, 8479, 8462, 8439, 8422, 8392, 8377, 8356, 8348, 8326, 26/07
8354, 8339, 8318, 8300, 8280, 8260, 8239, 8229, 8211, 8195, 8174, 8163,
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8538, 8514, 8506, 8529, 8512, 8489, 8473, 8443, 8427, 8407, 8399, 8378, 26/07
8405, 8390, 8369, 8351, 8332, 8311, 8291, 8281, 8263, 8247, 8227, 8215,
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8588, 8563, 8555, 8579, 8562, 8540, 8523, 8493, 8478, 8458, 8449, 8428, 26/07
8456, 8441, 8421, 8403, 8393, 8363, 8343, 8332, 8315, 8299, 8279, 8268,
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8045, 8124, 8111, 8102, 8093, 8086,

[illegible] HR 7

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8972, 8949, 8942, 8966, 8950, 8929, 8913, 8885, 8871, 8852, 8844, 8824, 26/07
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9158, 9156, 9144, 9140, 9129, 9124, 9110, 9087, 9066, 9051, 9036, 9026, HR 15
9019, 8996, 8989, 9013, 8997, 8976, 8961, 8933, 8919, 8900, 8892, 8873, 26/07
8901, 8887, 8868, 8851, 8833, 8814, 8795, 8785, 8769, 8755, 8735, 8725,
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9065, 9042, 9035, 9060, 9044, 9023, 9008, 8980, 8966, 8948, 8940, 8920, 26/07
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9157, 9134, 9127, 9152, 9137, 9116, 9101, 9074, 9060, 9042, 9034, 9015, 26/07
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9202, 9180, 9173, 9198, 9182, 9162, 9147, 9120, 9107, 9088, 9081, 9062, 26/07
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9292, 9270, 9263, 9289, 9273, 9254, 9239, 9212, 9199, 9181, 9173, 9154, 26/07
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9336, 9315, 9308, 9374, 9318, 9299, 9284, 9257, 9244, 9226, 9219, 9200, 26/07
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9380, 9359, 9352, 9378, 9363, 9343, 9329, 9303, 9289, 9272, 9264, 9246, 26/07
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10298,10361,10339,10325,10309,10296,

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73.94	73.63	73.37	73.20	73.12	73.13	73.24	73.44	73.71	74.03	74.38	74.74
75.08	75.38	75.61	75.76	75.82	75.79	75.66	75.44	75.16	74.82	74.44	74.07
74.01	73.64	73.34	73.11	72.97	72.93	72.99	73.13	73.34	73.61	73.91	74.21
74.50	74.75	74.93	75.04	75.06	74.99	74.82	74.57	74.25	73.88	73.47	73.06
73.00	72.61	72.29	72.05	71.90	71.85	71.89	72.03	72.24	72.50	72.79	73.10
73.38	73.63	73.81	73.92	73.93	73.95	73.67	73.41	73.08	72.69	72.27	71.85
71.82	71.44	71.13	70.91	70.79	70.77	70.85	71.03	71.29	71.60	71.95	72.31
72.65	72.95	73.19	73.32	73.37	73.31	73.16	72.91	72.58	72.19	71.77	71.35
71.30	70.92	70.60	70.37	70.24	70.21	70.29	70.46	70.71	71.02	71.36	71.71
72.05	72.34	72.56	72.70	72.74	72.68	72.51	72.26	71.92	71.53	71.10	70.67
70.64	70.27	69.96	69.75	69.63	69.61	69.70	69.88	70.14	70.46	70.82	71.18
71.53	71.83	72.06	72.21	72.26	72.21	72.05	71.80	71.48	71.09	70.68	70.25

~~59.50~~	~~59.54~~	~~59.50~~	59.50	59.50	59.50	59.50	59.50	59.50	59.50	59.50	59.50
59.50	59.50	59.50	59.50	59.50	59.50	59.50	59.50	59.50	59.50	59.50	59.50
61.80	61.80	61.80	61.80	61.80	61.80	61.80	61.80	61.80	61.80	61.80	61.80
61.80	61.90	61.90	61.90	61.80	61.90	61.80	61.90	61.80	61.80	61.80	61.80
63.50	63.50	63.50	63.50	63.50	63.50	63.50	63.50	63.50	63.50	63.50	63.50
63.50	63.50	63.50	63.50	63.50	63.50	63.50	63.50	63.50	63.50	63.50	63.50
64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50
64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50
64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50
64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50
64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50
64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50	64.50

63.50	63.31	63.13	62.99	62.97	62.80	62.77	62.79	62.84	62.93	63.05	63.18
63.31	63.43	63.53	63.61	63.64	63.64	63.10	63.01	62.89	62.75	62.59	62.42
62.22	62.03	61.86	61.71	61.60	61.52	61.49	61.51	61.57	61.66	61.79	61.93
62.09	62.26	62.41	62.56	62.69	62.79	62.85	62.89	62.90	62.88	62.84	62.78
62.70	62.61	62.54	62.48	62.44	62.43	62.46	62.53	62.63	62.76	62.91	63.08
63.26	63.44	63.61	63.76	63.89	63.98	64.04	64.07	64.06	64.03	63.96	63.88
63.79	63.70	63.61	63.55	63.52	63.52	63.57	63.65	63.77	63.93	64.11	64.31
64.50	64.72	64.91	65.07	65.20	65.29	65.34	65.34	65.31	65.24	65.13	65.01
64.88	64.75	64.63	64.53	64.47	64.44	64.46	64.52	64.62	64.76	64.93	65.11
65.29	65.47	65.63	65.75	65.94	65.88	65.87	65.92	65.72	65.58	65.41	65.23
65.04	64.86	64.70	64.57	64.48	64.44	64.45	64.51	64.61	64.75	64.93	65.12
65.31	65.50	65.67	65.81	65.90	65.95	65.94	65.89	65.79	65.65	65.48	65.29

63.91	63.70	63.53	63.39	63.29	63.22	63.19	63.20	63.24	63.30	63.39	63.49
63.59	63.69	63.77	63.83	63.87	63.86	63.50	63.35	63.22	63.09	62.94	62.79
62.89	62.71	62.59	62.47	62.37	62.30	62.27	62.27	62.30	62.37	62.46	62.57
62.69	62.82	62.94	63.05	63.14	63.21	63.27	63.29	63.30	63.29	63.25	63.21
63.19	63.14	63.09	63.05	63.03	63.03	63.06	63.12	63.20	63.31	63.44	63.58
63.73	63.97	64.01	64.14	64.24	64.32	64.38	64.40	64.40	64.38	64.33	64.27
64.12	64.02	63.94	63.89	63.87	63.58	63.91	63.98	64.08	64.21	64.36	64.53
64.70	64.87	65.03	65.17	65.29	65.37	65.42	65.43	65.42	65.37	65.30	65.21
65.11	65.00	64.91	64.83	64.78	64.76	64.77	64.81	64.89	64.99	65.12	65.26
65.41	65.56	65.70	65.81	65.89	65.95	65.96	65.93	65.87	65.78	65.66	65.52
65.37	65.23	65.09	64.98	64.89	64.94	64.83	64.85	64.91	65.01	65.13	65.27
65.40	65.57	65.71	65.83	65.93	65.99	66.01	66.00	65.95	65.87	65.76	65.63

65.90	65.69	65.44	65.27	65.16	65.14	65.19	65.30	65.47	65.69	65.92	66.16
66.39	66.56	66.69	66.75	66.74	66.66	66.48	66.24	65.95	65.63	65.28	64.94
64.57	64.23	63.95	63.74	63.61	63.55	63.57	63.66	63.80	63.99	64.21	64.43

64.40	64.66	64.86	65.00	65.06	65.05	64.97	64.83	64.63	64.40	64.15	63.90
63.66	63.46	63.32	63.25	63.26	63.34	63.50	63.73	64.01	64.33	64.67	65.00
65.31	65.59	65.79	65.93	66.00	65.99	65.90	65.75	65.54	65.29	65.03	64.77
64.52	64.31	64.15	64.07	64.06	64.14	64.28	64.50	64.77	65.08	65.41	65.73
66.04	66.30	66.50	66.64	66.70	66.68	66.59	66.41	66.18	65.92	65.63	65.34
65.08	64.95	64.68	64.57	64.55	64.60	64.72	64.91	65.16	65.45	65.76	66.07
66.36	66.61	66.90	66.93	66.97	66.94	66.82	66.64	66.40	66.11	65.80	65.49

67.91	67.66	67.54	67.47	67.45	67.47	67.53	67.62	67.73	67.86	67.99	68.12
68.22	68.30	68.34	68.34	68.30	68.21	68.30	68.13	67.94	67.73	67.52	67.31
67.10	66.92	66.75	66.63	66.54	66.49	66.47	66.48	66.51	66.55	66.59	66.63
66.65	66.65	66.63	66.57	66.47	66.35	66.20	66.02	65.83	65.63	65.43	65.24
65.05	64.88	64.74	64.64	64.57	64.54	64.54	64.56	64.61	64.67	64.73	64.79
64.85	64.98	64.90	64.89	64.86	64.80	64.72	64.63	64.52	64.41	64.30	64.20
64.11	64.04	64.00	63.99	64.01	64.07	64.15	64.26	64.38	64.52	64.66	64.79
64.92	65.02	65.10	65.16	65.18	65.18	65.16	65.11	65.04	64.97	64.89	64.82
64.75	64.71	64.68	64.69	64.72	64.78	64.87	64.98	65.10	65.24	65.38	65.51
65.63	65.73	65.81	65.86	65.88	65.87	65.83	65.76	65.68	65.59	65.50	65.41
65.34	65.28	65.25	65.25	65.28	65.34	65.43	65.54	65.67	65.82	65.96	66.10
66.23	66.33	66.41	66.45	66.46	66.43	66.39	66.29	66.19	66.07	65.94	65.82

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RESULTS IN DEGREES FAHRENHEIT

SOURCE WATER TEMPERATURES AT IRVINES LODGE AND FROM THE NAUTLEY R.

OBS	1DAY	2DAY	3DAY	OBS	1DAY	2DAY	3DAY
59.50	61.80	63.50	64.50	65.00	68.00	68.74	67.17

MEAN DAILY RESPONSE TEMPERATURES :

26/07	27/07	28/07	29/07	30/07	31/07
	74.01	73.00	71.82	71.30	70.64

MEAN DAILY EQUILIBRIUM TEMPERATURES :

26/07	27/07	28/07	29/07	30/07	31/07
73.94	70.53	68.53	69.46	69.31	68.59

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 8 (AT IRVINE'S LODGE) :

26/07	27/07	28/07	29/07	30/07	31/07
59.50	61.80	63.50	64.50	64.50	64.50

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 54 (ABOVE FORT FRASER) :

26/07	27/07	28/07	29/07	30/07	31/07
63.09	62.20	63.23	64.42	65.15	65.19

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 56 (BELOW THE NAUTLEY RIVER) :

26/07	27/07	28/07	29/07	30/07	31/07
63.43	62.79	63.70	64.64	65.34	65.42

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 92 (AT VANDERHOOF) :

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 102 (ABOVE THE STUART R.) :

26/07	27/07	28/07	29/07	30/07	31/07
67.87	66.39	64.68	64.65	65.33	65.89

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RESULTS IN DEGREES CELSIUS

SOURCE WATER TEMPERATURES AT IRVINES LODGE AND FROM THE NAUTLEY R.

OBS	1DAY	2DAY	3DAY	OBS	1DAY	2DAY	3DAY
15.28	16.56	17.50	18.06	18.33	20.00	20.41	19.54

MEAN DAILY RESPONSE TEMPERATURES :

26/07	27/07	28/07	29/07	30/07	31/07
	23.34	22.78	22.12	21.84	21.47

MEAN DAILY EQUILIBRIUM TEMPERATURES :

26/07	27/07	28/07	29/07	30/07	31/07
23.30	21.41	20.30	20.81	20.17	20.33

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 8 (AT IRVINE'S LODGE) :

26/07	27/07	28/07	29/07	30/07	31/07
15.28	16.56	17.50	18.06	18.06	18.06

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 54 (ABOVE FORT FRASER) :

26/07	27/07	28/07	29/07	30/07	31/07
17.27	16.79	17.35	18.01	18.42	19.44

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 56 (BELOW THE NAUTLEY RIVER) :

26/07	27/07	28/07	29/07	30/07	31/07
17.46	17.11	17.61	19.13	19.52	19.57

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 82 (AT VANDERHOOF) :

26/07	27/07	28/07	29/07	30/07	31/07
19.81	17.91	17.71	18.16	18.56	18.76

MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. AT SECTION 102 (ABOVE THE STUART R.) :

26/07	27/07	28/07	29/07	30/07	31/07
19.93	19.10	18.15	18.14	18.52	18.83

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MODEL IS TO RUN  144 TIME STEPS EACH      1.00 HOURS LONG. THE RIVER IS DISCRETIZED BY  102 GRID POINTS.
THE INITIALUPSTREAM DISCHARGE IS CONSTANT AT    277.34 CUBIC METERS PER SECOND.
THE PRINTOUT WILL BE GIVEN FOR GRIDS   54 AND  102 FOREACH    1 TIME STEPS.
 THE WIND FUNCTION IS       9.20+      0.46*U IN MM/DAY KP A.
0
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INITIAL CONDITIONS

GRID	RIVER MILE	VELOCITY M/HR	AREA SQ METERS	TOP WIDTH METER	TRIB. FLOW CU M/SEC	INITIAL TEMP
1	116.030	4423.	225.7	93.45	0.00	99.90
2	115.790	4423.	225.8	93.46	0.03	99.90
3	114.660	5711.	174.8	94.49	0.00	99.90
4	114.300	4093.	244.0	95.89	0.00	99.90
5	113.230	4119.	242.5	69.95	0.00	99.90
6	112.800	5268.	189.5	162.46	0.00	99.90
7	111.040	3940.	260.0	240.79	0.00	99.90
8	110.720	3501.	295.2	166.54	0.00	59.50
9	109.390	3374.	295.9	259.14	0.00	59.40
10	108.220	4881.	204.6	205.52	0.00	59.40
11	107.090	3291.	303.4	201.59	0.00	59.40
12	106.310	3449.	289.5	202.45	0.00	59.30
13	105.860	3691.	270.5	104.00	0.00	59.30
14	104.320	3578.	279.1	145.94	0.00	59.40
15	103.840	4723.	212.3	190.36	1.13	59.40
16	102.820	4819.	207.2	131.08	0.00	59.40
17	101.740	4099.	243.6	200.31	0.00	59.50
18	100.370	3822.	261.2	125.46	0.00	59.50
19	99.350	3542.	281.9	159.61	0.00	59.60
20	97.510	2913.	342.8	126.76	0.00	59.80
21	96.820	2985.	334.4	120.82	0.00	59.90
22	95.940	2556.	390.6	175.26	0.00	60.10
23	95.560	2511.	397.6	262.37	0.00	60.10
24	94.640	3563.	281.3	183.99	1.13	60.30
25	94.090	2585.	386.3	124.60	0.00	60.40
26	93.450	2714.	367.9	128.08	0.00	60.60
27	92.550	2547.	392.0	135.03	0.00	60.90
28	91.770	3461.	298.5	96.68	0.00	60.90
29	90.930	2292.	435.7	158.01	0.00	61.10
30	90.060	3392.	294.3	105.52	0.00	61.30
31	89.190	2651.	376.6	108.39	0.00	61.40
32	88.740	2330.	428.5	131.67	0.00	61.50
33	87.940	2450.	407.5	105.16	0.00	61.70
34	87.020	5006.	199.5	102.47	0.00	61.80
35	85.910	4249.	235.0	111.43	0.00	61.90
36	85.140	3606.	276.8	96.01	0.00	62.00
37	84.410	3021.	330.4	106.68	0.00	62.10
38	83.510	3888.	256.8	127.41	0.00	62.20
39	81.790	3980.	250.8	219.94	0.00	62.30
40	80.440	5081.	196.5	186.54	0.00	62.40
41	79.060	4238.	235.6	201.96	0.00	62.40
42	77.600	5174.	193.0	143.13	0.00	62.40
43	76.340	4569.	218.5	167.03	0.00	62.50
44	74.940	3863.	258.4	169.77	0.00	62.60
45	73.710	4007.	249.2	124.24	0.00	62.60
46	72.820	3097.	322.4	245.06	0.00	62.70
47	71.410	4673.	213.7	105.10	0.00	62.80
48	70.240	4426.	225.6	110.52	0.00	62.80

51	65.460	2873.	347.5	119.24	0.00	63.20
52	64.650	2932.	340.5	167.15	0.00	63.20
53	62.610	2336.	427.3	95.77	0.00	63.50
54	60.990	1307.	763.7	227.99	0.00	63.70
55	60.320	2433.	451.4	108.89	27.73	63.80
56	59.070	3461.	288.5	155.08	0.00	64.20
57	57.570	4019.	248.4	129.78	0.00	64.20
58	56.610	5409.	184.6	123.99	0.00	64.20
59	56.300	4218.	236.7	212.69	0.00	64.20
60	54.880	3563.	280.2	130.70	0.00	64.30
61	51.890	2928.	341.0	190.44	0.00	64.40
62	49.640	2974.	335.7	99.36	0.00	64.60
63	49.150	3063.	326.0	193.06	0.00	64.70
64	49.010	5517.	181.0	161.06	0.00	64.70
65	46.210	4471.	223.3	156.36	0.00	64.70
66	45.320	4040.	247.1	134.42	0.00	64.80
67	43.980	5089.	196.2	270.97	0.00	64.80
68	42.880	4815.	207.4	155.94	0.00	64.80
69	41.740	3526.	283.2	169.04	0.00	64.90
70	40.660	3668.	272.2	143.99	0.00	65.00
71	39.730	3372.	296.1	168.62	0.00	65.10
72	36.990	3215.	310.6	149.84	0.00	65.40
73	35.760	4137.	241.4	161.06	0.00	65.50
74	34.710	4948.	201.8	141.85	0.00	65.60
75	31.650	3440.	290.2	170.20	0.00	65.80
76	30.300	3860.	258.6	195.86	0.00	65.90
77	29.180	4819.	207.2	155.45	0.00	66.00
78	28.350	3982.	253.2	196.86	2.77	66.00
79	27.520	3401.	293.6	280.90	0.00	66.10
80	27.160	2207.	452.4	484.63	0.00	66.20
81	26.700	1316.	758.6	203.24	0.00	66.30
82	26.490	2074.	481.5	141.91	0.00	66.30
83	24.470	2534.	394.1	99.85	0.00	66.70
84	21.230	2802.	356.4	136.43	0.00	67.10
85	19.980	1932.	516.7	119.79	0.00	67.20
86	19.470	2342.	426.2	153.98	0.00	67.30
87	18.730	2103.	474.7	138.07	0.00	67.40
88	16.700	2574.	395.6	185.58	5.55	67.40
89	14.160	2135.	467.7	129.08	0.00	67.60
90	12.970	1895.	526.7	240.37	0.00	67.60
91	11.970	1676.	595.7	176.91	0.00	67.60
92	10.700	1764.	566.1	178.73	0.00	67.60
93	9.470	1723.	579.4	215.55	0.00	67.60
94	7.990	4589.	217.6	93.58	0.00	67.60
95	6.950	1910.	522.7	260.18	0.00	67.60
96	6.120	2754.	362.5	121.19	0.00	67.60
97	5.050	2078.	485.3	162.30	2.77	67.60
98	3.690	6819.	146.4	95.71	0.00	67.80
99	2.440	3223.	309.9	107.72	0.00	67.90
100	1.650	2969.	336.3	84.92	0.00	67.90
101	0.740	2644.	377.6	106.38	0.00	67.90
102	0.000	2644.	377.6	106.38	0.00	68.00

1	1.00	79817.5	239885.2	1279823.8	526945.9	628534.3	415097.7	99.9	99.9	63.5	63.6	63.9	67.8
1	2.00	79817.5	239885.2	1283389.6	528576.1	629349.3	415607.1	99.9	99.9	63.3	63.4	63.7	67.7
1	3.00	79817.5	239885.2	1286853.5	530308.0	630266.3	416116.5	99.9	99.9	63.1	63.2	63.5	67.5
1	4.00	79817.5	239885.2	1290317.4	531938.1	631488.8	416727.8	99.9	99.9	63.0	63.1	63.4	67.5
1	5.00	79817.5	239885.2	1293883.3	533568.2	632813.3	417339.1	99.9	99.9	62.9	63.0	63.3	67.4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	99.9	99.9	62.9	62.9	63.2	67.5

124	1	9.00	79817.5	239885.2	1308044.6	540088.6	639537.5	420803.0	99.9	99.9	62.9	62.9	63.2	67.7
125	1	10.00	79817.5	239885.2	1311406.6	541718.7	641677.0	421821.8	99.9	99.9	62.9	63.0	63.3	67.9
126	1	11.00	79817.5	239885.2	1314870.5	543348.8	643918.3	422942.4	99.9	99.9	63.0	63.1	63.4	68.0
127	1	12.00	79817.5	239885.2	1318232.5	544978.9	646261.6	424063.1	99.9	99.9	63.2	63.2	63.5	68.1
128	1	13.00	79817.5	239885.2	1321594.5	546609.0	648808.5	425183.8	99.9	99.9	63.3	63.3	63.6	68.2
129	1	14.00	79817.5	239885.2	1324956.5	548137.2	651355.4	426406.3	99.9	99.9	63.4	63.5	63.7	68.3
130	1	15.00	79817.5	239885.2	1328216.8	549767.3	653698.7	427628.9	99.9	99.9	63.5	63.6	63.8	68.3
131	1	16.00	79817.5	239885.2	1331477.0	551397.4	655839.2	428953.3	99.9	99.9	63.6	63.6	63.8	68.3
132	1	17.00	79817.5	239885.2	1334839.0	552925.6	657773.9	430277.7	99.9	99.9	63.6	63.7	63.9	68.3
133	1	18.00	79817.5	239885.2	1338099.1	554453.8	659607.7	431704.0	99.9	99.9	63.6	63.7	63.9	68.2
134	1	19.00	79817.5	239885.2	1341257.4	555981.9	661237.8	433130.3	99.9	99.9	63.1	63.1	63.5	68.3
135	1	20.00	79817.5	239885.2	1344517.5	557510.1	662562.3	434556.7	99.9	99.9	63.0	63.1	63.4	68.1
136	1	21.00	79817.5	239885.2	1347675.8	559038.3	663784.8	435983.0	99.9	99.9	62.9	63.0	63.2	67.9
137	1	22.00	79817.5	239885.2	1350834.0	560566.5	664803.6	437409.3	99.9	99.9	62.7	62.8	63.1	67.7
138	1	23.00	79817.5	239885.2	1353992.3	561992.8	665619.6	438835.7	99.9	99.9	62.6	62.7	62.9	67.5
139	2	0.00	79817.5	239885.2	1357048.6	563521.0	666229.9	440363.9	99.9	99.9	62.4	62.5	62.8	67.3
140	2	1.00	79817.5	239885.2	1360105.0	565049.2	670712.5	441892.1	99.9	99.9	62.2	62.3	62.8	67.1
141	2	2.00	79817.5	239885.2	1363263.3	566475.5	674991.4	443420.3	99.9	99.9	62.0	62.1	62.7	66.9
142	2	3.00	79817.5	239885.2	1366319.6	567901.8	679168.6	444948.5	99.9	99.9	61.9	61.9	62.6	66.8
143	2	4.00	79817.5	239885.2	1369374.1	569328.1	683141.9	446476.7	99.9	99.9	61.7	61.8	62.5	66.6
144	2	5.00	79817.5	239885.2	1372228.6	570754.4	686911.4	448004.9	99.9	99.9	61.6	61.7	62.4	66.5
145	2	6.00	79817.5	239885.2	1375183.1	572180.9	690477.2	449431.2	99.9	99.9	61.5	61.6	62.3	66.5
146	2	7.00	79817.5	239885.2	1378137.6	573607.2	693839.3	450957.6	99.9	99.9	61.5	61.6	62.3	66.5
147	2	8.00	79817.5	239885.2	1380990.4	575033.4	696997.6	452385.8	99.9	99.9	61.5	61.6	62.3	66.5
148	2	9.00	79817.5	239885.2	1383843.0	576357.9	700054.0	453913.9	99.9	99.9	61.6	61.6	62.3	66.5
149	2	10.00	79817.5	239885.2	1386695.6	577682.3	702906.7	455340.3	99.9	99.9	61.7	61.7	62.4	66.5
150	2	11.00	79817.5	239885.2	1389446.4	579108.6	705453.8	456766.5	99.9	99.9	61.8	61.8	62.5	66.6
151	2	12.00	79817.5	239885.2	1392197.1	580432.9	707898.9	458294.7	99.9	99.9	61.9	61.9	62.6	66.6
152	2	13.00	79817.5	239885.2	1394947.9	581757.3	710140.3	459721.0	99.9	99.9	62.1	62.1	62.7	66.7
153	2	14.00	79817.5	239885.2	1397498.6	582979.9	712381.9	461147.3	99.9	99.9	62.3	62.2	62.8	66.7
154	2	15.00	79817.5	239885.2	1400347.5	584202.4	714725.0	462573.6	99.9	99.9	62.4	62.4	62.9	66.6
155	2	16.00	79817.5	239885.2	1402994.4	585425.0	717068.3	463999.9	99.9	99.9	62.6	62.5	63.0	66.6
156	2	17.00	79817.5	239885.2	1405543.4	586545.7	719513.4	465426.2	99.9	99.9	62.7	62.7	63.1	66.5
157	2	18.00	79817.5	239885.2	1407988.5	587666.3	722060.4	466852.5	99.9	99.9	62.8	62.7	63.2	66.3
158	2	19.00	79817.5	239885.2	1410331.8	588685.1	724607.5	468278.8	99.9	99.9	62.9	62.9	63.3	66.2
159	2	20.00	79817.5	239885.2	1412573.1	589703.8	727154.6	469705.2	99.9	99.9	62.9	62.9	63.3	66.0
160	2	21.00	79817.5	239885.2	1414712.6	590722.7	729803.5	471131.5	99.9	99.9	62.9	62.9	63.3	65.8
161	2	22.00	79817.5	239885.2	1416750.1	591639.6	732452.4	472557.8	99.9	99.9	62.9	62.9	63.3	65.6
162	2	23.00	79817.5	239885.2	1418685.9	592556.6	735101.4	473882.3	99.9	99.9	62.8	62.8	63.3	65.4
163	3	0.00	79817.5	239885.2	1420417.9	593371.5	737952.3	475206.7	99.9	99.9	62.8	62.8	63.2	65.2
164	3	1.00	79817.5	239885.2	1422047.9	594186.6	740603.0	476531.1	99.9	99.9	62.7	62.7	63.2	65.0
165	3	2.00	79817.5	239885.2	1423576.1	594899.7	743455.7	477855.5	99.9	99.9	62.6	62.6	63.1	64.9
166	3	3.00	79817.5	239885.2	1425002.5	595612.8	746206.4	479180.0	99.9	99.9	62.5	62.5	63.1	64.7
167	3	4.00	79817.5	239885.2	1426326.9	596224.1	748957.3	480504.4	99.9	99.9	62.5	62.5	63.1	64.6
168	3	5.00	79817.5	239885.2	1427549.4	596835.3	751810.0	481828.9	99.9	99.9	62.4	62.5	63.0	64.6
169	3	6.00	79817.5	239885.2	1428670.1	597344.9	754764.6	483051.4	99.9	99.9	62.4	62.5	63.0	64.5
170	3	7.00	79817.5	239885.2	1429688.9	597954.2	757617.3	484273.9	99.9	99.9	62.5	62.5	63.1	64.5
171	3	8.00	79817.5	239885.2	1430605.9	598363.6	760571.8	485496.5	99.9	99.9	62.5	62.5	63.1	64.6
172	3	9.00	79817.5	239885.2	1431420.9	598771.2	763629.2	486719.1	99.9	99.9	62.6	62.6	63.2	64.6
173	3	10.00	79817.5	239885.2	1432235.9	599076.8	766684.6	487839.8	99.9	99.9	62.8	62.8	63.3	64.7
174	3	11.00	79817.5	239885.2	1432847.0	599382.4	769842.9	488960.5	99.9	99.9	62.9	62.9	63.4	64.7
175	3	12.00	79817.5	239885.2	1433356.4	599688.1	773001.2	490081.2	99.9	99.9	63.1	63.1	63.6	64.8
176	3	13.00	79817.5	239885.2	1433865.8	599891.9	776261.4	491100.0	99.9	99.9	63.3	63.2	63.7	64.8
177	3	14.00	79817.5	239885.2	1434273.3	600095.7	779521.6	492220.7	99.9	99.9	63.4	63.4	63.9	64.9
178	3	15.00	79817.5	239885.2	1434578.9	600197.6	782883.6	493239.4	99.9	99.9	63.6	63.6	64.0	64.9
179	3	16.00	79817.5	239885.2	1434884.5	600299.4	786245.7	494258.2	99.9	99.9	63.8	63.7	64.1	64.9
180	3	17.00	79817.5	239885.2	1435088.1	600401.4	789607.8	495175.1	99.9	99.9	63.9	63.8	64.2	64.9
181	3	18.00	79817.5	239885.2	1435190.1	600401.4	793071.6	496092.0	99.9	99.9	64.0	63.9	64.3	64.8
182	3	19.00	79817.5	239885.2	1435190.1	600401.4	796535.6	496907.1	99.9	99.9	64.0	64.0	64.4	64.7
183	3	20.00	79817.5	239885.2	1435088.1	600401.4	799999.6	497722.0	99.9	99.9	64.1	64.0	64.4	64.6
184	3	21.00	79817.5	239885.2	1434986.3	600299.6	803565.4	498537.1	99.9	99.9	64.1	64.0	64.4	64.5
185	3	22.00	79817.5	239885.2	1434782.5	600197.8	807131.3	499250.3	99.9	99.9	64.0	64.0	64.4	64.4
186	3	23.00	79817.5	239885.2	1434476.9	600095.9	810697.1	499861.6	99.9	99.9	64.0	63.9	64.3	64.3
187	4	0.00	79817.5	239885.2	1434069.3	599993.3	814364.9	500472.9	99.9	99.9	63.9	63.9	64.3	64.2

190	4	3.00	79817.5	239885.2	1432337.4	599077.2	825469.6	502001.1	99.9	99.9	63.6	63.6	63.9	64.0
191	4	4.00	79817.5	239885.2	1431624.3	598771.6	829239.1	502409.5	99.9	99.9	63.6	63.6	63.9	64.0
192	4	5.00	79817.5	239885.2	1430809.3	598465.9	833008.6	502816.1	99.9	99.9	63.5	63.5	63.9	64.0
193	4	6.00	79817.5	239885.2	1429892.4	598058.4	836890.1	503121.8	99.9	99.9	63.5	63.5	63.9	64.1
194	4	7.00	79817.5	239885.2	1428975.5	597549.0	840853.6	503427.4	99.9	99.9	63.6	63.6	63.9	64.2
195	4	8.00	79817.5	239885.2	1428058.6	597039.6	844827.0	503733.0	99.9	99.9	63.6	63.7	64.0	64.3
196	4	9.00	79817.5	239885.2	1427039.8	596530.3	848800.3	504038.6	99.9	99.9	63.8	63.8	64.1	64.4
197	4	10.00	79817.5	239885.2	1425919.0	596020.8	852875.6	504242.4	99.9	99.9	63.9	63.9	64.2	64.5
198	4	11.00	79817.5	239885.2	1424798.3	595409.6	857052.7	504446.2	99.9	99.9	64.1	64.1	64.4	64.7
199	4	12.00	79817.5	239885.2	1423575.9	594900.1	861229.8	504650.0	99.9	99.9	64.3	64.3	64.5	64.8
200	4	13.00	79817.5	239885.2	1422353.3	594288.9	865508.8	504751.9	99.9	99.9	64.5	64.5	64.7	64.9
201	4	14.00	79817.5	239885.2	1421028.8	593677.6	869889.7	504853.8	99.9	99.9	64.7	64.7	64.9	65.0
202	4	15.00	79817.5	239885.2	1419602.4	593066.4	874270.6	504853.8	99.9	99.9	64.9	64.9	65.0	65.1
203	4	16.00	79817.5	239885.2	1418176.0	592353.3	878753.4	504955.8	99.9	99.9	65.1	65.0	65.2	65.2
204	4	17.00	79817.5	239885.2	1416647.8	591640.0	883338.1	504955.8	99.9	99.9	65.2	65.2	65.3	65.2
205	4	18.00	79817.5	239885.2	1415017.9	590926.9	888024.6	504853.9	99.9	99.9	65.3	65.2	65.4	65.2
206	4	19.00	79817.5	239885.2	1413387.6	590111.8	892813.0	504752.0	99.9	99.9	65.3	65.3	65.4	65.2
207	4	20.00	79817.5	239885.2	1411655.9	589296.8	897703.3	504650.1	99.9	99.9	65.3	65.3	65.4	65.1
208	4	21.00	79817.5	239885.2	1409821.9	588481.7	902593.6	504548.2	99.9	99.9	65.3	65.3	65.4	65.0
209	4	22.00	79817.5	239885.2	1407988.0	587564.8	907585.8	504344.4	99.9	99.9	65.2	65.2	65.4	65.0
210	4	23.00	79817.5	239885.2	1406052.3	586546.0	912781.7	504140.6	99.9	99.9	65.1	65.1	65.3	64.9
211	5	0.00	79817.5	239885.2	1404014.6	585527.3	917977.6	503936.8	99.9	99.9	65.0	65.0	65.2	64.8
212	5	1.00	79817.5	239885.2	1401875.1	584508.5	923173.4	503631.2	99.9	99.9	64.9	64.9	65.1	64.8
213	5	2.00	79817.5	239885.2	1399633.9	583387.8	928573.1	503325.6	99.9	99.9	64.7	64.8	65.0	64.7
214	5	3.00	79817.5	239885.2	1397290.5	582267.1	933972.8	503020.0	99.9	99.9	64.6	64.7	64.9	64.7
215	5	4.00	79817.5	239885.2	1394947.4	581146.4	939474.3	502612.5	99.9	99.9	64.5	64.6	64.8	64.7
216	5	5.00	79817.5	239885.2	1392502.3	579923.9	945077.7	502205.0	99.9	99.9	64.5	64.5	64.8	64.7
217	5	6.00	79817.5	239885.2	1389955.3	578803.2	950681.1	501797.6	99.9	99.9	64.4	64.5	64.8	64.8
218	5	7.00	79817.5	239885.2	1387306.5	577580.6	956488.3	501390.1	99.9	99.9	64.5	64.5	64.8	64.9
219	5	8.00	79817.5	239885.2	1384657.8	576358.1	962295.4	500982.6	99.9	99.9	64.5	64.5	64.8	65.0
220	5	9.00	79817.5	239885.2	1381907.0	575033.7	968306.3	500473.3	99.9	99.9	64.6	64.6	64.9	65.1
221	5	10.00	79817.5	239885.2	1379054.3	573811.1	974317.3	499963.9	99.9	99.9	64.8	64.8	65.0	65.2
222	5	11.00	79817.5	239885.2	1376303.5	572486.8	980430.1	499454.4	99.9	99.9	64.9	64.9	65.1	65.4
223	5	12.00	79817.5	239885.2	1373450.8	571162.4	986746.6	498843.2	99.9	99.9	65.1	65.1	65.3	65.5
224	5	13.00	79817.5	239885.2	1370598.0	569838.0	993165.1	498333.8	99.9	99.9	65.3	65.3	65.4	65.6
225	5	14.00	79817.5	239885.2	1367745.4	568411.7	999685.4	497722.6	99.9	99.9	65.5	65.4	65.6	65.7
226	5	15.00	79817.5	239885.2	1364892.8	566985.4	1006205.7	497111.3	99.9	99.9	65.6	65.6	65.7	65.8
227	5	16.00	79817.5	239885.2	1362040.1	565559.0	1012725.9	496500.0	99.9	99.9	65.8	65.7	65.8	65.9
228	5	17.00	79817.5	239885.2	1359085.6	564132.7	1019348.2	495786.9	99.9	99.9	65.8	65.8	65.9	65.9
229	5	18.00	79817.5	239885.2	1356131.1	562808.3	1025869.4	494971.9	99.9	99.9	65.9	65.9	65.9	65.9
230	5	19.00	79817.5	239885.2	1353176.6	561483.9	1032490.7	494258.7	99.9	99.9	65.9	65.9	66.0	65.8
231	5	20.00	79817.5	239885.2	1350222.1	560057.6	1039214.3	493545.6	99.9	99.9	65.8	65.8	65.9	65.8
232	5	21.00	79817.5	239885.2	1347267.6	558733.1	1045837.0	492730.5	99.9	99.9	65.7	65.7	65.9	65.7
233	5	22.00	79817.5	239885.2	1344313.1	557408.7	1052561.1	491915.5	99.9	99.9	65.6	65.6	65.8	65.6
234	5	23.00	79817.5	239885.2	1341358.6	556084.3	1059235.3	491100.5	99.9	99.9	65.4	65.4	65.7	65.5
235	6	0.00	79817.5	239885.2	1338404.1	554759.9	1066111.1	490183.6	99.9	99.9	65.2	65.3	65.5	65.4
236	6	1.00	79817.5	239885.2	1335449.6	553435.5	1072937.0	489266.7	99.9	99.9	65.0	65.1	65.4	65.3
237	6	2.00	79817.5	239885.2	1332597.0	552009.2	1079864.9	488247.9	99.9	99.9	64.9	64.9	65.2	65.3
238	6	3.00	79817.5	239885.2	1329744.4	550684.8	1086792.8	487229.0	99.9	99.9	64.7	64.8	65.1	65.3
239	6	4.00	79817.5	239885.2	1326891.8	549360.4	1093822.5	486210.3	99.9	99.9	64.6	64.6	65.0	65.2
240	6	5.00	79817.5	239885.2	1324039.1	548036.0	1100852.3	485191.4	99.9	99.9	64.5	64.5	64.9	65.3
241	6	6.00	79817.5	239885.2	1321186.5	546711.6	1107983.8	484172.7	99.9	99.9	64.4	64.5	64.8	65.3
242	6	7.00	79817.5	239885.2	1318333.9	545387.2	1115217.3	483051.9	99.9	99.9	64.4	64.5	64.8	65.4
243	6	8.00	79817.5	239885.2	1315481.3	544062.8	1122450.8	482033.1	99.9	99.9	64.5	64.5	64.9	65.5
244	6	9.00	79817.5	239885.2	1312628.6	542738.4	1129786.1	480912.5	99.9	99.9	64.6	64.6	64.9	65.7
245	6	10.00	79817.5	239885.2	1309877.9	541413.9	1137121.6	479791.8	99.9	99.9	64.8	64.8	65.0	65.8
246	6	11.00	79817.5	239885.2	1307127.1	540089.5	1144558.9	478671.0	99.9	99.9	64.9	64.9	65.1	66.0
247	6	12.00	79817.5	239885.2	1304376.4	538765.1	1152098.0	477550.3	99.9	99.9	65.1	65.1	65.3	66.1
248	6	13.00	79817.5	239885.2	1301625.6	537440.7	1159637.1	476429.6	99.9	99.9	65.3	65.3	65.4	66.2
249	6	14.00	79817.5	239885.2	1298874.9	536116.3	1167176.4	475308.9	99.9	99.9	65.5	65.5	65.6	66.3
250	6	15.00	79817.5	239885.2	1296124.1	534791.9	1174817.4	474188.2	99.9	99.9	65.7	65.6	65.7	66.4
251	6	16.00	79817.5	239885.2	1293373.4	533569.3	1182458.4	472965.6	99.9	99.9	65.8	65.8	65.8	66.5
252	6	17.00	79817.5	239885.2	1290724.5	532244.9	1190303.1	471845.0	99.9	99.9	65.9	65.9	65.9	66.5
253	6	18.00	79817.5	239885.2	1288075.6	531022.4	1198147.9	470622.4	99.9	99.9	65.9	65.9	66.0	66.4

256	6 21.00	79817.5	239885.2	1280536.5	527456.6	1222395.3	467158.6	99.9	99.9	65.8	65.8	66.0	66.2
257	6 22.00	79817.5	239885.2	1278295.1	526437.8	1230749.5	465936.0	99.9	99.9	65.7	65.7	65.9	66.1
258	6 23.00	79817.5	239885.2	1276257.5	525418.9	1239307.5	464713.4	99.9	99.9	65.5	65.5	65.8	65.9
259	7 0.00	79817.5	239885.2	1274423.6	524502.0	1248069.3	463490.9	99.9	99.9	65.3	65.3	65.6	65.8

3P1

Card No. : 1
Variable(s) : QS(I)   I = 1 to NXSEC   (NXSEC = 102)
Format : 12F6.0

Explanation: This file contains hourly flows for each of the 102 surveyed cross sections. Each 9 lines in this file contain flows at each of the 102 cross sections for each hour of the simulation. Therefore, there are 9 x 24 = 216 lines of data per day, and 9 x 24 x 6 = 1296 lines of data for the complete 6 day simulation. The file name is FU7J26J31.OUT

Field	1	2	3	4	5	6	7	8	9	10	11	12
Column	6	12	18	24	30	36	42	48	54	60	66	72
	8492.	8490.	8477.	8472.	8460.	8454.	8439.	8413.	8390.	8373.	8357.	8345.

Card No. : 1
Variable(s) : QS(I)   I = 1 to NXSEC   (NXSEC = 102)
Format : 12F6.0

Explanation: This file contains hourly flows for each of the 102 surveyed cross sections. Each 9 lines in this file contain flows at each of the 102 cross sections for each hour of the simulation. Therefore, there are 9 x 24 = 216 lines of data per day, and 9 x 24 x 6 = 1296 lines of data for the complete 6 day simulation.
The file name is FU7J26J31.OUT

Field	1	2	3	4	5	6	7	8	9	10	11	12
Column	6	12	18	24	30	36	42	48	54	60	66	72
Value	8492.	8490.	8477.	8472.	8460.	8454.	8439.	8413.	8390.	8373.	8357.	8345.

TU9J27.DAT

1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0		
40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0		
1330.0	1300.0	1280.0	1250.0	1240.0	1220.0	1190.0	1170.0	1160.0	1120.0	1120.0	1100.0
1030.0	1010.0	1010.0	990.0	940.0	980.0	990.0	990.0	930.0	980.0	990.0	990.0
990.0	990.0	920.0	930.0	990.0	990.0	990.0	990.0	980.0	980.0	990.0	990.0
990.0	990.0	990.0	980.0	980.0	980.0	990.0	990.0	990.0	990.0		
133.0	130.0	128.0	125.0	124.0	122.0	119.0	117.0	116.0	112.0	112.0	110.0
103.0	101.0	101.0	98.0	94.0	98.0	99.0	98.0	98.0	98.0	99.0	98.0
99.0	98.0	98.0	98.0	98.0	98.0	99.0	98.0	98.0	99.0	98.0	98.0
98.0	98.0	99.0	98.0	98.0	99.0	99.0	98.0	98.0	99.0		
266.0	260.0	256.0	250.0	248.0	244.0	238.0	234.0	232.0	224.0	224.0	220.0
206.0	202.0	202.0	196.0	188.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0
196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0
196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0		
133.0	130.0	128.0	125.0	124.0	122.0	119.0	117.0	116.0	112.0	112.0	110.0
103.0	101.0	101.0	98.0	94.0	98.0	99.0	98.0	98.0	98.0	99.0	99.0
99.0	98.0	98.0	98.0	98.0	99.0	98.0	98.0	98.0	98.0	99.0	99.0
99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	98.0	98.0		

[illegible]

Card No. : 1 THROUGH 28
Variable(s) : QTSD(K,I)   K = 1 to NDSWT
Format : 12F7.0   I = IGT(N)   N = 1 to NTR1B

Explanation: Mean daily flows in all tributaries used in the modelling. The file name is TU9J27.DAT

Cards 1 to 4: Mean daily flows in an additional tributary used to adjust flows for flow modelling during the 1984 Nechako River hydrothermal program.

Cards 5 to 8: Mean daily flows in Greer Creek
- assumed to be constant at 40 cfs for entire modelling period.

Cards 9 to 12: Mean daily flows in Swanson Creek
- assumed to be constant at 40 cfs for entire modelling period.

Cards 13 to 16: Recorded mean daily flows in the Nautley River

Cards 17 to 20: Mean daily flows in Stoney Creek
- assumed to be 10% of the recorded Nautley River mean daily flows.

Cards 21 to 24: Mean daily flows in the Sinkut River
- assumed to be 20% of the recorded Nautley River mean daily flows.

Cards 25 to 28: Mean daily flows in Cluculz Creek
- assumed to be 10% of the recorded Nautley River mean daily flows.

Card No. : 1 THROUGH 28
Variable(s) : QTSD(K,I) K = 1 to NDSWT
Format : 12F7.0 I = IGT(N) N = 1 to NTRIB

Note: The number of data elements contained in this file must equal the sum of "NDSWT + NEDBSP" contained in I/O input unit 5. For the current example, data begins on July 10 and ends on August 24. Thus there are 46 days (NDSWT) of tributary flows and the modelling begins on July 26, 16 days (NEDBSP) beyond the first entry of these data.

Field

FORECAST MODEL
OUTPUT FILES' LISTING

TU4J27.OUT
TU6J27.OUT
TJ26.OUT
TU12J27.OUT

TJ26.OUT

1	99.9	99.9	99.9	99.9	99.9	99.9	99.9	59.5	59.5	59.4	59.4	59.4
2	59.4	59.4	59.4	59.5	59.5	59.5	59.6	59.7	59.8	59.9	59.9	60.0
3	60.1	60.2	60.3	60.4	60.5	60.7	60.8	60.8	61.0	61.0	61.1	61.2
4	61.2	61.3	61.4	61.4	61.4	61.5	61.5	61.6	61.6	61.7	61.7	61.8
5	61.9	61.9	62.0	62.1	62.2	62.4	62.5	62.8	62.8	62.9	62.9	62.9
6	63.1	63.2	63.3	63.3	63.4	63.4	63.4	63.5	63.5	63.6	63.7	64.0
7	64.1	64.2	64.4	64.5	64.6	64.7	64.8	64.8	64.9	64.9	65.3	65.7
8	65.9	66.0	66.1	66.3	66.5	66.6	66.6	66.7	66.8	66.8	66.8	66.9
9	66.9	67.1	67.1	67.2	67.2	67.3						

[EOB]

RESULTS OF SUBROUTINE TCOR

HOUR	ORT54	ORT102
19	63.1	68.3

CORU	COR54	COR55	OS54	OT55	OS56	ORT56	COR56	COR102	D1	D2
0.0	-0.5	-0.5	242.3	26.6	268.1	63.5	-0.3	0.2	-0.5	0.5

CORRECTION AT EACH SECTION

0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1
-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
-0.3	-0.3	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.5
-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.3	-0.3	-0.3	-0.3	-0.3
-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1
-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
0.2	0.2	0.2	0.2	0.2	0.2						

PREDICTED TEMP ARRAY BEFORE CORRECTION

99.9	99.9	99.9	99.9	99.9	99.9	99.9	59.5	59.6	59.7	59.8	59.9
60.0	60.2	60.2	60.3	60.5	60.7	60.9	61.1	61.2	61.3	61.4	61.5
61.6	61.7	61.8	61.9	62.0	62.1	62.1	62.2	62.2	62.2	62.3	62.3
62.3	62.3	62.4	62.4	62.5	62.6	62.6	62.7	62.8	62.8	62.9	63.0
63.1	63.2	63.3	63.3	63.5	63.6	63.6	63.8	63.9	63.9	63.9	64.0
64.2	64.4	64.5	64.5	64.7	64.7	64.9	64.9	65.1	65.2	65.3	65.5
65.7	65.7	66.0	66.1	66.2	66.2	66.3	66.4	66.5	66.5	66.7	66.8
66.8	66.8	66.8	66.8	67.0	67.0	67.1	67.2	67.3	67.4	67.5	67.6
67.7	67.8	67.9	68.0	68.0	68.1						

REVISED TEMP ARRAY AFTER CORRECTION

99.9	99.9	99.9	99.9	99.9	99.9	99.9	59.5	59.5	59.6	59.8	59.8
59.9	60.0	60.1	60.2	60.3	60.5	60.6	60.9	61.0	61.1	61.2	61.3
61.4	61.5	61.6	61.7	61.7	61.8	61.9	61.9	61.9	61.9	62.0	62.0
62.0	62.0	62.0	62.1	62.1	62.2	62.2	62.3	62.3	62.4	62.5	62.5
62.6	62.7	62.8	62.8	62.9	63.1	63.1	63.5	63.6	63.6	63.6	63.7
64.0	64.2	64.2	64.2	64.5	64.5	64.7	64.8	64.9	65.0	65.1	65.4
65.5	65.6	65.9	66.0	66.1	66.2	66.3	66.4	66.4	66.5	66.6	66.8
66.8	66.8	66.8	66.9	67.1	67.1	67.2	67.3	67.4	67.5	67.6	67.7

FORECAST MODEL
COMPUTER CODING

TFMODX.FOR

2076

```
C************** COMPLETE TEMPERATURE MODEL IN UNSTEADY FLOW **************
C
C       REVISED TO ENSURE EQUILIBRIUM TEMP IS CALCULATED CORRECTLY
C
C
C              THIS PROGRAM READS IN MEAN DAILY INPUT DATA
C
C        1         2         3         4         5         6         7
C23456789012345678901234567890123456789012345678901234567890123456789012
C
      DIMENSION PV(1000),PT(1000),
     @TCUP(5),TNUP(5),TTEMP(1000,110),QTS(1000,110),
     @TTEMPD(1000,110),STN(40),ASTN(100,40),QTSD(100,110),
     @RIVLOC(20,40),SA(110),PVO(110),PLT(1000,40),IPRT(40),EB(1000)
      DIMENSION  DX(110),U(110),A(110),FLOW(4,110),W(110),
     @AT(110),WT(110),QSF(110),RTR(1000),TROUT(1000),EQT(1000)
      DIMENSION TRIB(110),IST(110),KPG(20,110),NPT(110)
      DIMENSION TITLE(20)
      DIMENSION CTRWT(100),JDATE(6),JMONTH(6)
      DIMENSION OBSPT(110),COR(110)
      DOUBLE PRECISION X(111)
      INTEGER*2 IFREE(1),OBSDAY
      COMMON/B/ X,PT,OBSPT,COR,INITSEC
      COMMON/A/ TA,U,A,W,A1,B1,HS,HL,EA,FLOW
      COMMON/C/ RS(97)
      COMMON/S/ QAT(20,110),QWT(20,110),AS(110),WS(110),VS(110),QSO
      COMMON/Q/ QD(20),QS(110),QT(110),NEW2
      DATA IFREE/'*'/                       CHARACTER * 1 IFREE
C
C     MAXIMUM VALUE OF NXSEC IS 110
C
C     STEP 9 TO 28 ARE TO ZERO ARRAYS.
      DO 4 K=1,1000
      EB(K)=0.0
      PT(K)= 0.0
    4 PV(K)=0.0
      DO 5 I=1,110
      COR(I)=0.0
      OBSPT(I)=0.0
      X(I)= 0.0
      QT(I)= 0.0
      FLOW(4,I)=0.0
      TRIB(I)= 0.0
      IST(I)= 0.0
      DX(I)= 0.0
      U(I)= 0.0
      W(I)= 0.0
    5 A(I)= 0.0
C
      DO 7777 L=1,110
      DO 6666 I=1,1000
      TTEMP(I,L)=0.0
      TTEMPD(I,L)=0.0
 6666 CONTINUE
 7777 CONTINUE
C
C     READ INPUT
```

```
C
      READ(5,300) OBSDAY,MONTH
  300 FORMAT(1X,2I4)
      JDATE(1)=OBSDAY
      JMONTH(1)=MONTH
      DO 1001 I=2,6
      JDATE(I)=JDATE(I-1)+1
      JMONTH(I)=JMONTH(I-1)
      IF(JDATE(I).EQ.32) JMONTH(I)=MONTH+1
      IF(JDATE(I).EQ.32) JDATE(I)=1
 1001 CONTINUE
      READ(5,1005)NCOND,NXSEC,NHR,DT,QSO,IGO,IOUT,NTRIB,JTS,A1,M1
 1005 FORMAT(1X,I1,I4,I5,2F10.2,4I5,2F10.2)
      READ(5,*) (X(I),I=1,NXSEC)
      READ(5,1017) NLHFD
 1017 FORMAT(1X,I2)
      READ(5,*) NTRPLT
      READ(5,*)(IPRT(I),I=1,NTRPLT)
      DO 1022 I=1,NTRPLT
      READ(5,1020)(RIVLOC(K,I),K=1,20)
 1020 FORMAT(20A4)
 1022 CONTINUE
C
C*************************  RATING CURVE SET-UP  ******************
C
      READ(3,*) NEW2
      READ(3,*)(QD(I),I=1,NEW2)
      DO 2110 I=1,NEW2
      QD(I)=QD(I)*0.0283
      READ(3,*)(AT(J),J=1,NXSEC)
      READ(3,*)(WT(J),J=1,NXSEC)
      DO 2100 J=1,NXSEC
      AT(J)=AT(J)*0.0929
      WT(J)=WT(J)*0.3048
      QAT(I,J)=AT(J)
      QWT(I,J)=WT(J)
 2100 CONTINUE
 2110 CONTINUE
C
      NDAY=NHR/24
      READ(5,300)NDSWT,NEDBSP
      IF (NTRIB.EQ.0) GO TO 8
      DO 7 N=1,NTRIB
      READ(5,1010) IGT(N),QTT
 1010 FORMAT(10X,I7,F7.2)
      I= IGT(N)
      NDAY=NHR/24
      NDO=1
      ND=24
      READ(9,1150)(QTSD(K,I),K=1,NDSWT)
 1150 FORMAT(12F7.0)
      DO 1152 J=1,NDAY
      DO 1151 K=NDO,ND
      QTS(K,I)=QTSD(J+NEDBSP,I)*0.0283
 1151 CONTINUE
      NDO=NDO+24
      ND=ND+24
```

```
 1152 CONTINUE
      IF(N.NE.3) GO TO 1166
 1166 FLOW(4,I)=QTT
    7 CONTINUE
    8 READ(5,302) PTVAL,IFCONT,INITSEC,TNR
  302 FORMAT(F6.1,2X,I1,2X,I2,F6.1)
      READ(1,317)(PT(I),I=1,102)
  317 FORMAT(12F6.1)
      NDO=1
      ND=24
      READ(5,304)(TCUP(I),I=1,5)
  304 FORMAT(5F6.1)
      READ(5,304)(TNUP(I),I=1,5)
      READ(5,*)(CTRWT(IGT(I)),I=1,6)
      WRITE(6,3005) NHR,DT,NXSEC,QSO,IGO,NXSEC,IOUT
 3005 FORMAT(' MODEL IS TO RUN',I5,' TIME STEPS EACH',F10.2,' HOURS LONG
     1. THE RIVER IS DISCRETIZED BY',I5,' GRID POINTS.',/,' THE INITIAL
     2UPSTREAM DISCHARGE IS CONSTANT AT',F10.2,' CUBIC METERS PER SECOND
     3.',/,' THE PRINTOUT WILL BE GIVEN FOR GRIDS',I5,' AND',I5,' FOR
     4EACH',I5,' TIME STEPS.')
      WRITE(6,1007) A1,B1
 1007 FORMAT(1X,1H ,'THE WIND FUNCTION IS',F10.2,'+',F10.2,'*V IN MM/DAY
     $ KP A.')
C
      READ(5,308) JTIME,OBSPT(54),OBSPT(102)
  308 FORMAT(1X,I2,2F6.1)
C
C     CALL CRS(NXSEC)
C
      DO 6450 I=1,NXSEC
      QS(I)=QSO+FLOW(4,I)
 6450 CONTINUE
C
      CALL CALQ(NXSEC)
C
      DO 6460 I=1,NXSEC
      FLOW(1,I)=VS(I)
      FLOW(2,I)=AS(I)
      FLOW(3,I)=WS(I)
 6460 CONTINUE
C
      XUP=X(1)
      X(NXSEC+1)=X(NXSEC)
      DO 1 I=1,NXSEC
      DX(I)=(X(I)-X(I+1))*1609.34
      X(I)=(XUP-X(I))*1609.34
    1 CONTINUE
C
C
      INX=NXSEC-1
      PV(1)=A(1)*DX(1)
      DO 3 I=1,INX
      U(I)=(FLOW(1,I)+FLOW(1,I+1))/2.0
      A(I)=(FLOW(2,I)+FLOW(2,I+1))/2.0
      W(I)=(FLOW(3,I)+FLOW(3,I+1))/2.0
      SA(I+1)=W(I)*DX(I)
      QT(I)=FLOW(4,I)
```

```
    3 PV(I+1)=A(I)*DX(I)
      PV(NXSEC)= FLOW(2,NXSEC)*(DX(INX))/2.0
      NS=NXSEC
      WRITE (6,3004)
 3004 FORMAT (1X,1H0,50X,'INITIAL  CONDITIONS')
      WRITE(6,3010)
 3010 FORMAT(4X,'GRID  RIVER  VELOCITY    AREA    TOP WIDTH   TRIB. FLOW
     1              INITIAL',/,11X,'MILE     M/HR   SQ METERS   METER',
     25X,'CU M/SEC          ',8X,'TEMP')
      DO 9 I=1,NS
      RM=XUP-X(I)/1609.34
      WRITE(6,3011) I,RM,FLOW(1,I),FLOW(2,I),FLOW(3,I),QT(I),PT(I)
 3011 FORMAT(4X,I3,1X,F7.3,3X,F7.0,1X,F8.1,2X,F9.2,5X,F7.2,15X,F7.2)
    9 CONTINUE
C
C     THIS  SECTION NO LONGER USED JULY 19,84  SDW
C
C     ********  FORT FRASER WEATHER DATA  **********************
C     TAFF( C),HSFF( MJ/M2),VFF(M/S AT 2M),CCFF(DECIMAL)
C     DATA IS CONVERTED SO UNITS ARE IDENTICAL WITH PRINCE GEORGE
C
C     READ(5,310) TAFF,HSFF,VFF,CCFF
C 310 FORMAT(4F7.2)
C     HSFF=HSFF*23.88
C     VFF=VFF*(3.6/0.748)
C
      WRITE(12,293)
  293 FORMAT(/,'              RESULTS  OF  SUBROUTINE  TCOR  ')
      WRITE(12,289) JTIME,OBSPT(54),OBSPT(102)
  289 FORMAT(///,1X,'   HOUR OBT54 OBT102',//,1X,I6,2F6.1)
      LIT=1
      DEPTH=1.0
      JD=1
      NDAY=0
C
C     *****  START TIME LOOP  ********************************************
C
      DO 2 J=1,NHR
      TR=(TR-32.0)/1.8
      DO 995 J2=1,NLHFD
      READ(7,500)(QS(12*(J2-1)+I),I=1,12)
  500 FORMAT(1X,12F6.0)
  995 CONTINUE
      DO 1025 I=1,NXSEC
      QS(I)=QS(I)*0.0283
 1025 CONTINUE
C
      CALL CALQ(NXSEC)
C
      DO 1030 I=1,NXSEC
      FLOW(1,I)=VS(I)
      FLOW(2,I)=AS(I)
      FLOW(3,I)=WS(I)
      IF(NTRIB.EQ.0) GO TO 1030
      DO 1028 N=1,NTRIB
      L=IGT(N)
      FLOW(4,L)=QTS(J,L)
```

```
 1028 CONTINUE
 1030 CONTINUE
      DO 12 I=1,INX
      U(I)=(FLOW(1,I)+FLOW(1,I+1))*0.50
      A(I)=(FLOW(2,I)+FLOW(2,I+1))*0.50
      W(I)=(FLOW(3,I)+FLOW(3,I+1))*0.50
      SA(I+1)=W(I)*DX(I)
      QT(I)=FLOW(4,I)
      IF(J.GT.1) GO TO 13
      PV(I+1)=A(I)*DX(I)
   13 CONTINUE
   12 CONTINUE
      IF(J .NE. JD) GO TO 77
      JD=JD+24
C
C     READ  WEATHER  DATA  HS=DAILY TOTAL: OTHER INPUT IS MEAN DAILY
C
C     DAY 1 DATA IS OBSERVED MEAN DAILY
C     DAY 2 TO DAY 6 DATA IS FORECAST DATA
C     TA( C), HS(LY),  CC(DECIMAL), TDP( C), V(KM/H)
C
      IF(JD.NE.25) GO TO 6363
      READ(2,1050) TAPG,HSPG,CCPG,TDP,VPG
 1050 FORMAT(5F7.2)
      TA=TAPG
C      IF(TAPG .LT. TAFF) TA=TAFF
      HS=HSPG
C      IF(HSPG .LT. HSFF) HS=HSFF
      CC=CCPG
C      IF(CCPG .LT. CCFF) CC=CCFF
      V=VPG
C      IF(VPG .GT. VFF) V=VFF
      GO TO 3637
 6363 READ(2,1050) TA,HS,CC,TDP,V
C
C     ******  WINDSPEED IS REDUCED FROM 10M TO 2M IN HEIGHT ****
C
 3637 V=V*0.748
C
C****** CONVERT WINDSPEED FROM KM/H TO M/S *****************
C
 3638 V=V/3.6
C
C****** CONVERT SOLAR RADIATION FROM LANGLEYS TO WATTS/M**2 *******
C
      HS=HS*.4843
C
      HL=1.171E-07*(TA+273.16)**4.*(1.-(0.261)
     1*EXP((-7.77E-04)*(273.16-(TA+273.16))**2))
      HL=HL*.4843
      HL=HL*(1.0+0.17*CC**2.)
      LOOP=0
      IF(J .EQ. 1) E=TDP
      TM=TDP
      HN=(HS*0.9+HL*0.97)
   60 LOOP=LOOP+1
      BETA=0.35+0.015*TM+0.0012*TM**2
```

```
      SK=4.48+(BETA+0.47)*(A1+B1*V**2)
      TDPS=TDP+0.47*(TA-TDP)/(BETA+0.47)
      E0=E
      E=(HN-306+(SK-4.48)*TDPS)/(SK+0.05*TDPS-0.025*E0)
C
C *****************
C
      IF(J .EQ. 1) GO TO 61
      GO TO 63
   61 TR=E
      TR=(TR+SK*E*3600.0/((4.1855E+06)*DEPTH))/
     1(1.0+SK*3600.0/((4.1855E+06)*DEPTH))
   63 CONTINUE
C
C *****************
C
      TM=(TDPS+E)/2.0
      IF(LOOP .LE. 3) GO TO 60
      IF(ABS(E-E0).LT.0.05) GO TO 62
      GO TO 60
  62  CONTINUE
      EQT(JD)=E*1.8+32.
      IF(JD .NE. 25) GOTO 222
      PT(INITSEC-1)=PTVAL
      TRIB(55)=(TNR-32.)/1.8
      DO 220 I=2,NXSEC
      IF(I.EQ.16.OR.I.EQ.25.OR.I.EQ.79.OR.I.EQ.89.OR.I.EQ.98)
     1TRIB(I-1)=CTRWT(I-1)*TDP+(1.-CTRWT(I-1))*TR
 220  CONTINUE
      GOTO 232
 222  TR=(TR+SK*E*3600.0/((4.1855E+06)*DEPTH))/
     1(1.0+SK*3600.0/((4.1855E+06)*DEPTH))
      TROUT(JD)=TR*1.8+32.
      DO 250 I=2,NXSEC
      IF(I.EQ.16.OR.I.EQ.25.OR.I.EQ.56.OR.I.EQ.79.OR.I.EQ.89.OR.I.EQ.98)
     1TRIB(I-1)=CTRWT(I-1)*TDP+(1.-CTRWT(I-1))*TR
 250  CONTINUE
      TRIB(2)=60.0
      IF(IFCONT.EQ.2) THEN
       TRIB(55)=TNUP(NDAY)
       GOTO 267
      END IF
      TRIB(55)=((TRIB(55)*1.8)+32.0)
      IF ((TRIB(55)-TNR) .LT. 0.0) TRIB(55)=TNR
      IF(JD .EQ. 49) GOTO 252
      IF(JD .EQ. 73) GOTO 254
      IF(JD .EQ. 97) GOTO 256
      TRIB(55)=TNRF3
      GOTO 267
 252  TNRF1=TRIB(55)
      IF((TRIB(55)-TNR) .GT. 3.0) TRIB(55)=TNR+3.0
      TN1=TRIB(55)
      GOTO 267
 254  TNRF2=TRIB(55)
      IF((TRIB(55)-TNRF1) .GT. 3.0) TRIB(55)=TNRF1+3.0
      IF((TRIB(55)-TNR) .GT. 5.0) TRIB(55)=TNR+5.0
      TN2=TRIB(55)
```

```
      GOTO 267
 256  IF((TRIB(55)-TNRF2) .GT. 3.0) TRIB(55)=TNRF2+3.0
      IF((TRIB(55)-TNRF1) .GT. 5.0) TRIB(55)=TNRF1+5.0
      IF((TRIB(55)-TNR) .GT.6.0) TRIB(55)=TNR+6.0
      TNRF3=TRIB(55)
 267  TRIB(55)=(TRIB(55)-32.0)/1.8
      IF(IFCONT.EQ.2) THEN
       PT(INITSEC-1)=TCUP(NDAY)
       GOTO 232
      END IF
      PT(INITSEC-1)=.225*(TDP+3.46*TR)
      PT(INITSEC-1)=((PT(INITSEC-1)*1.8)+32.0)
      IF((PT(INITSEC-1)-PTVAL) .LT. 0.0) PT(INITSEC-1)=PTVAL
      IF(JD .EQ. 49) GOTO 272
      IF(JD .EQ. 73) GOTO 274
      IF(JD .EQ. 97) GOTO 276
      PT(INITSEC-1)=CFF3
      GOTO 232
 272  CFF1=PT(INITSEC-1)
      IF((PT(INITSEC-1)-PTVAL) .GT. 2.3) PT(INITSEC-1) =PTVAL+2.3
      CF1=PT(INITSEC-1)
      GOTO 232
 274  CFF2=PT(INITSEC-1)
      IF((PT(INITSEC-1)-CFF1) .GT. 2.3) PT(INITSEC-1)=CFF1+2.3
      IF((PT(INITSEC-1)-PTVAL) .GT. 4.0) PT(INITSEC-1)=PTVAL+4.0
      CF2=PT(INITSEC-1)
      GOTO 232
 276  IF((PT(INITSEC-1)-CFF2) .GT. 2.3) PT(INITSEC-1)=CFF2+2.3
      IF((PT(INITSEC-1)-CFF1) .GT. 4.0) PT(INITSEC-1)=CFF1+4.0
      IF((PT(INITSEC-1)-PTVAL) .GT. 5.0) PT(INITSEC-1)=PTVAL+5.0
      CFF3=PT(INITSEC-1)
 232  CONTINUE
      NDAY=NDAY+1
      COUNT=0.0
 77   CONTINUE
      COUNT=COUNT+1.0
      EB(J)=E-COS(.2618*COUNT)*HS/SK
C
      DO 83 I=1,NXSEC
      PT(I)=(PT(I)-32.0)/1.8
   83 CONTINUE
C
C     **********************************************************
      DO 86 L=1,LIT
      FHR=FLOAT(LIT)
C     **********************************************************
C
      JDO=JD-24
      IF(J .EQ. JDO) GO TO 667
      TR=(TR+SK*EB(J)*DT*3600.0/(FHR*(4.1855E+06)*DEPTH))/
     1(1.0+SK*DT*3600.0/(FHR*(4.1855E+06)*DEPTH))
  667 CONTINUE
C
      DO 85 I=INITSEC,NXSEC
C
      PVO(I)=PV(I)
      PV(I)=PV(I)+(QS(I-1)+QT(I-1)-QS(I))*(DT/FHR)*3600.0
```

```
C
C  *** THE FOLLOWING CHECKS FOR HYDRAULIC CONTINUITY  ***
C
      IF(PV(I).GT.0.0) GO TO 82
      WRITE(6,80) I,PV(I),QS(I-1),PVO(I),QS(I),PT(I)
   80 FORMAT(2X,'I= ',I3,2X,'PV(I)= ',F10.1,2X,
     1'QS(I-1)= ',F7.2,2X,'PVO(I)= ',F10.1,2X,'QS(I)= ',F7.2,2X,
     1'PT(I)= ',F6.2)
   82 CONTINUE
C
C  ********************************************************
C
      PT(I)=(PT(I)*PVO(I)+(QS(I-1)*PT(I-1)+QT(I-1)*TRIB(I-1))
     1*(DT/FHR)*3600.0+(SK*SA(I)*EB(J)*3600.0/(4.1855E+06))*(DT/FHR)
     1)/(PV(I)+QS(I)*(DT/FHR)*3600.0+(SK*SA(I)*3600.0/
     1(4.1855E+06))*(DT/FHR))
   85 CONTINUE
   86 CONTINUE
      DO 88 I=1,NXSEC
      PT(I)=PT(I)*1.8+32.0
   88 CONTINUE
      IF(J.EQ.JTIME) GO TO 299
      GO TO 89
  299 COR(INITSEC-1)=0.0
      COR(54)=OBSPT(54)-PT(54)
      OBSPT(56)=(QS(54)*OBSPT(54)+QT(55)*TNR)/QS(56)
      COR(56)=OBSPT(56)-PT(56)
      COR(55)=COR(54)
      COR(102)=OBSPT(102)-PT(102)
C
      CALL TCOR
C
   89 CONTINUE
      IF(J.EQ.24) WRITE(11,393)(PT(I),I=1,102)
  393 FORMAT(12F6.1)
      TR=TR*1.8+32.0
      TIME=FLOAT(J+JTS)*DT
C     IF(J.EQ.1)WRITE(6,2000) IGO,NXSEC
      IF(MOD(J,IOUT).EQ.0) GO TO 140
      GO TO 2
  140 IC=J/IOUT
      RTR(J)=TR
      DO 153 KKK=1,NTRPLT
      PLT(J,KKK)=PT(IPRT(KKK))
  153 CONTINUE
C
C      IF(MOD(IC,1000).EQ.0) WRITE(6,2000) IGO,NXSEC
C 2000 FORMAT(1X,'1',2X,'TIME                                          ',
C     1'                                                                 ',
C     1'TEMP AT   TEMP AT',/,' DAY HOUR  LOOP    BETA     SK     ',
C     1' EB(J)   TDPS     TM     VOL AT     VOL AT     HL     HR     TA   ',
C     1'V  TDP    TR        GRID      GRID',/,12X,'NO.                  ',
C     1'                         54        102                    ',
C     1'                 ',5X,I5,5X,I5)
 2111 IDAY= (TIME/24.0)+1
      HR= TIME-FLOAT(IDAY-1)*24.0
C      WRITE(6,2001)IDAY,HR,LOOP,BETA,SK,EB(J),TDPS,TM,PV(IGO),
```

```
C     1PV(NXSEC),HL,HN,TA,V,TDP,TR,PT(IGO),PT(NXSEC)
C 2001 FORMAT(2X,I2,F6.2,I5,F10.4,F8.3,F7.2,F8.2,F7.2,F9.1,F10.1,
C     12F6.1,F5.1,F4.1,F5.1,F7.1,2F10.1)
C
C     ***********************************************************************
C
      IF(J.EQ.1)WRITE(6,2000)
 2000 FORMAT(/,/,/,/,/)
      WRITE(6,2001)IDAY,HR,PV(2),PV(7),PV(54),PV(55),PV(56),PV(102),
     &PT(2),PT(7),PT(54),PT(55),PT(56),PT(102)
 2001 FORMAT(2X,I2,F6.2,2X,6F10.1,4X,6F6.1)
C
C    ************************************************************************
C
    2 CONTINUE
C
C     *****  END OF TIME LOOP  *********************************
C
      NHO=1
      NH=24
      NDAY=NHR/24
      DO 4101 I=1,NDAY
      WRITE(4,4020)(RTR(J),J=NHO,NH)
 4020 FORMAT(1X,12F6.2)
      NHO=NHO+24
      NH=NH+24
 4101 CONTINUE
      DO 4104 K=1,NTRPLT
      NHO=1
      NH=24
      WRITE(4,4042)
 4042 FORMAT(3X,'  ')
      DO 4102 I=1,NDAY
      WRITE(4,4040)(PLT(J,K),J=NHO,NH)
 4040 FORMAT(1X,12F6.2)
      NHO=NHO+24
      NH=NH+24
 4102 CONTINUE
 4104 CONTINUE
      DO 4300 L=1,NTRPLT
      NHO=1
      NH=24
      DO 4200 I=1,NDAY
      STN(L)=0.0
      DO 4120 K=NHO,NH
      STN(L)=STN(L)+PLT(K,L)
 4120 CONTINUE
      ASTN(I,L)=STN(L)/24.0
      NHO=NHO+24
      NH=NH+24
 4200 CONTINUE
 4300 CONTINUE
      IF(IFCONT.EQ.2) THEN
       CF1=TCUP(1)
       CF2=TCUP(2)
       CFF3=TCUP(3)
       TN1=TNUP(1)
```

```
       TN2=TNUP(2)
       TNRF3=TNUP(3)
      END IF
C
C     **** THIS SECTION OUTPUTS RESULTS IN DEGREES FAHRENHEIT  ****
C
      WRITE(4,4331)
 4331 FORMAT('1',///,'          RESULTS  IN  DEGREES  FAHRENHEIT')
      WRITE(4,4301) PTVAL,CF1,CF2,CFF3,TNR,TN1,TN2,TNRF3
 4301 FORMAT(//,' SOURCE WATER TEMPERATURES AT IRVINES LODGE AND FROM',
     &1X,'THE NAUTLEY R.',//,'   OBS   1DAY  2DAY  3DAY          OBS',
     &1X,' 1DAY  2DAY  3DAY',//,4F6.2,6X,4F6.2,/)
      NTR=NHR+1
      WRITE(4,4303)(JDATE(I),JMONTH(I),I=1,6),(TROUT(JD),JD=49,NTR,24)
 4303 FORMAT(/,' MEAN DAILY RESPONSE TEMPERATURES :',//,6(I3,'/0',I1,1X)
     &,/,7X,5(F6.2,1X))
      WRITE(4,4304)(JDATE(I),JMONTH(I),I=1,6),(EQT(JD),JD=25,NTR,24)
 4304 FORMAT(/,' MEAN DAILY EQUILIBRIUM TEMPERATURES :',//,
     &6(I3,'/0',I1,1X),/,6(F6.2,1X))
      DO 4280 L=1,NTRPLT
      WRITE(4,4220)(RIVLOC(K,L),K=1,20)
 4220 FORMAT(/,' MEAN DAILY WATER TEMPERATURES OF THE NECHAKO R. ',
     120A4,/)
      WRITE(4,4240)(JDATE(I),JMONTH(I),I=1,6),(ASTN(I,L),I=1,NDAY)
 4240 FORMAT(6(I3,'/0',I1,1X),/,6(F6.2,1X))
 4280 CONTINUE
C
C     ******  OUTPUTS RESULTS IN DEGREES CELSIUS **********
C
      WRITE(4,4332)
 4332 FORMAT('1',///,'          RESULTS  IN  DEGREES  CELSIUS')
      PTVAL=(PTVAL-32.0)/1.8
      CF1=(CF1-32.0)/1.8
      CF2=(CF2-32.0)/1.8
      CFF3=(CFF3-32.0)/1.8
      TNR=(TNR-32.0)/1.8
      TN1=(TN1-32.0)/1.8
      TN2=(TN2-32.0)/1.8
      TNRF3=(TNRF3-32.0)/1.8
      WRITE(4,4301) PTVAL,CF1,CF2,CFF3,TNR,TN1,TN2,TNRF3
      DO 5111 JD=25,NTR,24
      TROUT(JD)=(TROUT(JD)-32.0)/1.8
      EQT(JD)=(EQT(JD)-32.0)/1.8
 5111 CONTINUE
      WRITE(4,4303)(JDATE(I),JMONTH(I),I=1,6),(TROUT(JD),JD=49,NTR,24)
      WRITE(4,4304)(JDATE(I),JMONTH(I),I=1,6),(EQT(JD),JD=25,NTR,24)
      DO 4283 L=1,NTRPLT
      WRITE(4,4220)(RIVLOC(K,L),K=1,20)
      DO 5112 I=1,NDAY
      ASTN(I,L)=(ASTN(I,L)-32.0)/1.8
 5112 CONTINUE
      WRITE(4,4240)(JDATE(I),JMONTH(I),I=1,6),(ASTN(I,L),I=1,NDAY)
 4283 CONTINUE
      CONTINUE
      END
C
C
```

```
      SUBROUTINE CRS(NXSEC)
C     SUBROUTINE FOR COMPUTING ABSORPTION COEFFICIENTS ON A RIVER
C     VARIABLE DEFINITIONS
C     J= 1,96 TIME STEP AT 15 MINUTE INCREMENTS
C     I= 1,50 GRID NUMBERS
C     RS(J,I)=ABSOPRTION COEFFICIENT FOR TIME J, GRID I
C     EBH(I)=TREE HEIGHT OR EFFECTIVE BARRIER HEIGHT FOR EACH SUBREACH,M
C     AZ(I)=AZIMUTH OF RIVER SUBRECH, DEGREES
C     AZS=AZIMUTH OF SUN, DEGREES
C     BW(I)=BANK WIDTH, DISTANCE FROM TREES TO WATERS EDGE, METERS
C     THE= ANGLE BETWEEN SUN AND STREAM AXIS, DEGREES
C     BET= ANGLE BETWEEN SUN AND A NORMAL TO THE STREAM AXIS, DEGREES
C     ELEV= ELEVATION OF THE SUN, DEGREES
C     XN= NORMAL DISTANCE FROM TREES TO EDGE OF SHADOW, METERS
C     X= DISTANCE FROM TREES TO SHADOW ALONG A BEAM OF LIGHT, METERS
C     DEL= DECLINATION OF THE SUN, DEGREES
C     HA= HOUR ANGLE FROM ZENITH TO SUN, DEGREES
C     DHA= CHANGE IN HOUR ANGLE PER TIME STEP, DEGREES
C     HAO= HOUR ANGLE AT MIDNIGHT, DEGREES
C     PHI= LATITUDE OF RIVER, DEGREES
C     ALON= LONGITUDE OF RIVER, DEGREES
C     TZM= TIME ZONE MERIDIAN
C     JDAT= JULIAN DATE FOR WHICH SHADING COMPUTATIONS ARE MADE
C     DR=  DEGREE TO RADIAN CONVERSION
C
      DIMENSION EBH(110),AZ(110),BW(110),T(110)
      INTEGER*2 IFREE(1)
      COMMON/A/ TA,V,A(110),W(110),A1,B1,HS,HL,EA,FLOW(4,110)
      COMMON/C/ RS(97)
      COMMON/S/ QAT(20,110),QWT(20,110),AS(110),WS(110),VS(110),QSD
      COMMON/Q/ QD(20),QS(110),QT(110),NEW2
      DATA IFREE/'*'/
      READ(5,1000) JDAT,PHI,ALON,TZM
 1000 FORMAT(10X,I7,3F7.1)
      READ(5,*) AZ1
      DO 1100 I=1,NXSEC
      QS(I)=QSF*0.0283
 1100 CONTINUE
C
      CALL CALB(NXSEC)
C
      SFL=0.0
      SBW=0.0
      DO 1200 I=1,NXSEC
      SFL=SFL+FLOW(3,I)
      BW(I)=(WS(I)-FLOW(3,I))/2.0
      SBW=SBW+BW(I)
 1200 CONTINUE
      AVGBW=SBW/FLOAT(NXSEC)
      AVGFL=SFL/FLOAT(NXSEC)
      READ(5,*) EBH1
 1001 FORMAT(10X,10F7.1)
      DR= 3.14159/180.0
      DHA= 3.75*DR
      PHI= PHI*DR
      DEL= DR*23.45*COS(6.2832*(172.0-FLOAT(JDAT))/365.0)
      HAO= (180.0+ALON-TZM)*DR
```

```
      SDSP= SIN(DEL)*SIN(PHI)
      CDCP= COS(DEL)*COS(PHI)
      DO 10 J=1,96
      M= J-1
      AJ=FLOAT(J-1)
      HA=HAD-DHA*AJ
      S= SDSP+CDCP*COS(HA)
      ELEV= ASIN(S)/DR
      AZS= 0.0
      IF(ELEV.GT.1.5) RSM=1.0-1.18*(1.0/ELEV**0.77)
      IF(ELEV.GT.1.5) AZS=ACOS((SIN(DEL)-SIN(ELEV*DR)*SIN(PHI))/(COS
     1(ELEV*DR)*COS(PHI)))
      IF(HA.LT.0.0) AZS= 360.0*DR-AZS
      IF(ELEV.GT.1.5) GO TO 1
      RS(J)= 0.2
      GO TO 10
    1 THE= ABS(AZS-AZ1*DR)
      IF(THE.GT.(180.0*DR))  THE=THE-180.0*DR
      BET= ABS(THE-90.0*DR)
      X= EBH1/TAN(ELEV*DR)
      IF(COS(BET).GE.0.01) GO TO 2
      RS(J)= RSM
      GO TO 10
    2 XN= X*COS(BET)
      IF(XN.GE.AVGBW) GO TO 3
      RS(J)= RSM
      GO TO 10
    3 IF(XN.LE.(AVGBW+AVGFL)) GO TO 4
      RS(J)= 0.2
      GO TO 10
    4 RS(J)= RSM*(AVGFL+AVGBW-XN)/AVGFL+0.2*(XN-AVGBW)/
     1AVGFL
   10 CONTINUE
      DO 60 L=1,NXSEC
   60 RS(97)= RS(96)
      PHI=PHI/DR
      WRITE(6,5050) JDAT,TZM,PHI,ALON
 5050 FORMAT(1X,1H0,39X,'ABSORPTION COEFFICIENTS FOR SOLAR RADIATION',
     138X,//,54X,'JULIAN DAY ',I3,2X,',TIME ZONE  ',1F5.1,' DEGREES',
     229X,/,54X,'LATITUDE=',1F5.1,' LONGITUDE= ',F5.1,' DEGREES',27X,
     3//,'  GRID    EBH     BW  AZIMUTH  ****************************',
     4'**********HOUR***********************************************',/,
     59X,'METER  METER  DEGREE',4X,'5',5X,'6',5X,'7',5X,'8',5X,'9',4X,
     6'10',4X,'11',4X,'12',4X,'13',4X,'14',4X,'15',4X,'16',4X,'17',4X,
     7'18',4X,'19',3X)
C
      WRITE(6,3000) I,EBH1,AVGBW,AZ1,(RS(J),J=20,76,4)
 3000 FORMAT(1X,' ',1X,I3,F9.1,F7.1,F8.1,1X,15F6.3)
C
      RETURN
      END
C
C
      SUBROUTINE CALQ(NXSEC)
      COMMON/S/ QAT(20,110),QWT(20,110),AS(110),WS(110),VS(110),QSO
      COMMON/Q/ QD(20),QS(110),QT(110),NEW2
      DO 3000 J3=1,NXSEC
```

```
      DO 2900 I=2,NEW2
      IF(QS(J3).GE.QD(I)) GO TO 2900
      AS(J3)=QAT(I-1,J3)+((QAT(I,J3)-QAT(I-1,J3))/(QD(I)-QD(I-1)))
     1*(QS(J3)-QD(I-1))
      WS(J3)=QWT(I-1,J3)+((QWT(I,J3)-QWT(I-1,J3))/(QD(I)-QD(I-1)))
     1*(QS(J3)-QD(I-1))
      VS(J3)=3600.0*QS(J3)/AS(J3)
      GO TO 3000
 2900 CONTINUE
 3000 CONTINUE
      RETURN
      END
C
C
      SUBROUTINE MODIF
      RETURN
      END
C
C
      SUBROUTINE TCOR
C     SUBROUTINE TAKES PRIDICTED WATER TEMP ARRAY AND CORRECTS IT TO
C     BRING IT IN LINE WITH OBSERVED WATER TEMPS
C
      DIMENSION COR(110),OBSPT(110),PT(1000)
      DOUBLE PRECISION X(111)
      COMMON/B/ X,PT,OBSPT,COR,INITSEC
      COMMON/Q/ QD(20),QS(110),QT(110),NEW2
      D1=COR(54)-COR(INITSEC-1)
      D2=COR(102)-COR(56)
      WRITE(12,23) COR(INITSEC-1),COR(54),COR(55),QS(54),QT(55),QS(56),
     &  OBSPT(56),COR(56),COR(102),D1,D2
   23 FORMAT(//,'   CORU COR54 COR55  QS54  QT55  QS56 OBT56 COR56',
     &  1X,'COR102   D1    D2',//,1X,12F6.1)
      DO 10 I=INITSEC,53
      COR(I)=COR(54)-(((80033.-X(I))/80033.)*D1)
   10 CONTINUE
      DO 20 K=57,101
      COR(K)=COR(102)-(((186732.-X(K))/97075.)*D2)
   20 CONTINUE
      WRITE(12,505)
  505 FORMAT(///,'   CORRECTION AT EACH SECTION ')
      WRITE(12,500)(COR(I),I=1,102)
      WRITE(12,506)
  506 FORMAT(//,'   PREDICTED TEMP ARRAY BEFORE CORRECTION')
      WRITE(12,500)(PT(I),I=1,102)
      DO 40 L=1,102
      PT(L)=PT(L)+COR(L)
   40 CONTINUE
      WRITE(12,507)
  507 FORMAT(//,'   REVISED TEMP ARRAY AFTER CORRECTION')
      WRITE(12,500)(PT(I),I=1,102)
  500 FORMAT(//,9(1X,12F6.1,/))
   55 CONTINUE
      RETURN
      END

$ E
```

APPENDIX D

INTERACTIVE EDITING PROGRAM FOR THE FORECAST WATER TEMPERATURE MODEL

APPENDIX D
Interactive Editing Program for the Forecast Water Temperature Model

1.0 INTRODUCTION

This program was developed so that the majority of input file editing, required for daily forecast operations, could be performed as efficiently as possible, saving time and minimizing editing errors. Use of this program is included in the forecast operations' user's guide documentation (Technical Memorandum 1957/3) and should be reviewed.

The example supplied represents the procedure used for July 27, 1984. The program interactively edits the parameter control input file (Section 4.1.4), the mean daily tributary inflow file (Section 4.1.6) and the measured daily input flow and tributary flow file (used by the Nechako River flow model in forecast operations).

Included in this appendix (Section 3.0) are attachments which summarize files required by this interactive program.

2.0 PROCEDURE

The daily editing operation is controlled by a command file called INPUTS.COM. Input data files TU5J26.DAT, FU3J26.DAT and TU9J26.DAT are input on I/O units 1, 3 and 9, respectively, edited with the current day's information and the updated files FU3J27.DAT, TU5J27.DAT and TU9J27.DAT are output to I/O units 4, 7 and 11, respectively.

The interactive command procedure (INPUTS.COM) assigns the six data files to their appropriate I/O unit numbers and then prompts the user for the required input. Input is entered following the right hand pointed brackets and separated by commas for multiple entries.

The following requests for data are written:

(i) yesterday's date, day and month separated by a comma.

(ii) yesterday's flow in the Nechako River at Bert Irvine's (in cfs).

(iii) estimate of inflow in artificial tributary at sub-reach 2 (in cfs) - this is assigned a value of 1.0 for no correction.

(iv) the current day's Nautley River flow (in cfs).

(v) the previous day's (yesterday's) water temperature in the Nautley River at Bert Irvine's, the value of IFCONT, the value of INITSEC, and the previous day's (yesterday's) Nautley River water temperature - each entry to be separated by a comma.

(vi) initialization time (time at which the water temperature in the Nechako River above the Stuart River was recorded), water temperatures recorded in the Nechako River above the Nautley River and above the Stuart River - each entry to be separated by a comma.

Again note that review of this program's documentation (Technical Memorandum 1957/3) would be most beneficial.

3.0 SUMMARY OF FILES

This section contains attachments consisting of the following:

(i) interactive program command file listing
- INPUTS.COM

(ii) interactive program input files' listing
- TU5J26.DAT
- FU3J26.DAT
- TU9J26.DAT

(iii) interactive program output files' listing
- FU3J27.DAT
- TU5J27.DAT
- TU9J27.DAT

(iv) interactive program, example interactive session
- @ INPUTS.COM

(v) interactive program computer coding
- INPUTS.FOR

INTERACTIVE PROGRAM
COMMAND FILE LISTING

INPUTS.COM

INPUTS.COM

```
$SET VERIFY
$DEASSIGN/ALL
$ !
$ !  FORTRAN  UNITS  1,3,9   ARE  UPDATED  WITH  NEW  INFORMATION
$ !
$ASSIGN/USER_MODE SYS$COMMAND: SYS$INPUT:
$ASSIGN TU5J26.DAT        FOR001
$ASSIGN FU3J26.DAT        FOR003
$ASSIGN FU3J27.DAT        FOR004
$ASSIGN TU5J27.DAT        FOR007
$ASSIGN TU9J26.DAT        FOR009
$ASSIGN TU9J27.DAT        FOR011
$RUN INPUTS
$EXIT
[EOF]
```

INTERACTIVE PROGRAM
INPUT FILES' LISTING

TU5J26.DAT
FU3J26.DAT
TU9J26.DAT

TU5J26.DAT

```
  25   7
1 102  144       1.00    243.95   54    1     7     0       9.20      0.46
116.03,115.78,114.66,114.30,113.23,112.80,112.04,110.72,109.39,108.22,
107.09,106.31,105.86,104.32,103.84,102.82,101.74,100.37,99.35,97.51,
96.82,95.94,95.56,94.64,94.09,93.45,92.55,91.77,90.93,90.06,
89.19,88.74,87.94,87.02,85.81,85.14,84.41,83.51,81.79,80.44,
79.06,77.60,76.34,74.94,73.71,72.82,71.41,70.26,67.78,66.49,
65.46,64.65,62.61,60.99,
60.32,59.07,57.57,56.61,56.30,54.88,51.89,49.64,49.15,49.01,
46.21,45.32,43.98,42.88,41.74,40.66,39.73,36.99,35.76,34.71,
31.65,30.30,29.18,28.35,27.52,27.16,26.70,26.49,24.47,21.23,
19.98,19.47,18.73,16.70,14.16,12.97,11.97,10.70,9.47,7.99,
6.95,6.12,5.05,3.69,2.44,1.65,0.74,0.00,
 8
5,
8,54,56,92,102,
AT SECTION   8 (AT IRVINE'S LODGE) ;
AT SECTION  54 (ABOVE FORT FRASER) ;
AT SECTION  56 (BELOW THE NAUTLEY RIVER) ;
AT SECTION  92 (AT VANDERHOOF) ;
AT SECTION 102 (ABOVE THE STUART R.) ;
  46  15
                2   0.03
               15   1.13
               24   1.13
               55  26.60
               78   2.66
               88   5.32
               97   2.66
 59.5  1   9  66.4
 59.5  59.0  59.0  59.5  61.0
 65.0  64.7  65.4  66.3  68.2
0.58,0.40,0.17,0.16,0.22,0.08
19  64.5  69.0
              210   54.0  125.0  120.0
90.0,
3.0,
EOD
```

FU3J26.DAT

```
     25     7    30     7     3
      -1.00    -1.00   -40.00   -40.00 .  -1.00
6D       831281200107831   9999   9999   9999   9999   9999   9999   9999   9999
6D       831291200907831   9999   9999   9999   9999   9999   9999   9999   9999
6D       831291201707831   9999   9999   9999   9999   9999   9999   9999   9999
6D       831271202507831   9999   9999   9999   9999   9999   9999   9999
6D       831281200108831   9999   9999   9999   9999   9999   9999   9999   9999
6D       831281200908831   9999   9999   9999   9999   9999   9999   9999   9999
6D       831281201708831   9999   9999   9999   9999   9999   9999   9999   9999
6D       831271202508831   9999   9999   9999   9999   9999   9999   9999
      -1.00     1.00     0.10     0.20      0.10 -9655.00
6D       820381200107831   1330   1330   1330   1330   1330   1330   1330   1330
6D       820381200907831   1330   1330   1300   1280   1250   1240   1220   1190
6D ----> 820381201707831   1170   1160   1120   1120   1100   1030   1010   1010
6D       820371202507831    980    940    940    940    940    940    940
6D       820381200108831    940    940    940    940    940    940    940    940
6D       820381200908831    940    940    940    940    940    940    940    940
6D       820381201708831    940    940    940    940    940    940    940    940
6D       820371202508831    940    940    940    940    940    940    940
   999999999
```

TU9J26.DAT

1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
5	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
6	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
7	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
8	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0		
9	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
10	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
11	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
12	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0		
13	1330.0	1300.0	1280.0	1250.0	1240.0	1220.0	1190.0	1170.0	1160.0	1120.0	1120.0	1100.0
14	~~1030.0~~	~~1010.0~~	1010.0	980.0	940.0	940.0	940.0	940.0	940.0	940.0	940.0	940.0
15	940.0	940.0	940.0	940.0	940.0	940.0	940.0	940.0	940.0	940.0	940.0	940.0
16	940.0	940.0	940.0	940.0	940.0	940.0	940.0	940.0	940.0	940.0		
17	133.0	130.0	125.0	125.0	124.0	122.0	119.0	117.0	116.0	112.0	112.0	110.0
18	103.0	101.0	101.0	98.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0
19	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0
20	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0		
21	266.0	260.0	256.0	250.0	248.0	244.0	238.0	234.0	232.0	224.0	224.0	220.0
22	206.0	202.0	202.0	194.0	188.0	188.0	188.0	188.0	188.0	188.0	188.0	188.0
23	188.0	188.0	188.0	188.0	188.0	188.0	188.0	188.0	188.0	188.0	188.0	188.0
24	188.0	188.0	188.0	188.0	188.0	188.0	188.0	188.0	188.0	188.0		
25	133.0	130.0	125.0	125.0	124.0	122.0	119.0	117.0	116.0	112.0	112.0	110.0
26	103.0	101.0	101.0	98.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0
27	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0
28	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0		

.EOP

INTERACTIVE PROGRAM
OUTPUT FILES' LISTING

FU3J27.DAT
TU5J27.DAT
TU9J27.DAT

FU3J27.DAT

```
      26     7    31     7     3
        -1.00   -1.00  -40.00  -40.00   -1.00
6D       831281200107831  9999  9999  9999  9999  9999  9999  9999  9999
6D       831281200907831  9999  9999  9999  9999  9999  9999  9999  9999
6D       831281201707831  9999  9999  9999  9999  9999  9999  9999  9999
6D       831271202507831  9999  9999  9999  9999  9999  9999  9999
6D       831281200108831  9999  9999  9999  9999  9999  9999  9999  9999
6D       831281200908831  9999  9999  9999  9999  9999  9999  9999  9999
6D       831281201708831  9999  9999  9999  9999  9999  9999  9999  9999
6D       831271202508831  9999  9999  9999  9999  9999  9999  9999
        -1.00    1.00    0.10    0.20    0.10-10879.00
6D       820381200107831  1330  1330  1330  1330  1330  1330  1330  1330
6D       820381200907831  1330  1330  1300  1280  1250  1240  1220  1190
6D       820381201707831  1170  1160  1120  1120  1100  1030  1010  1010
6D       820371202507831   980   940   980   980   980   990   980
6D       820381200108831   980   980   990   990   980   990   990   990
6D       820381200908831   980   990   980   980   980   990   980   990
6D       820381201708831   990   980   980   990   980   990   980   980
6D       820371202508831   980   980   980   980   980   980   980
   999999999
```

TU5J27.DAT

```
   26   7
1 102  144       1.00     277.34    54     1     7     0       9.20       0.46
116.03,115.79,114.66,114.30,113.23,112.80,112.04,110.72,109.39,108.22,
107.09,106.31,105.86,104.32,103.84,102.82,101.74,100.37,99.35,97.51,
96.82,95.94,95.56,94.64,94.09,93.45,92.55,91.77,90.93,90.06,
89.19,88.74,87.94,87.02,85.81,85.14,84.41,83.51,81.79,80.44,
79.06,77.60,76.34,74.94,73.71,72.82,71.41,70.26,67.78,66.49,
65.46,64.65,62.61,60.99,
60.32,59.07,57.57,56.61,56.30,54.88,51.89,49.64,49.15,49.01,
46.21,45.32,43.99,42.88,41.74,40.66,39.73,36.99,35.76,34.71,
31.65,30.30,29.18,28.35,27.52,27.16,26.70,26.49,24.47,21.23,
19.99,19.47,19.73,16.70,14.16,12.97,11.97,10.70,9.47,7.99,
6.95,6.12,5.05,3.69,2.44,1.65,0.74,0.00,
-9
5,
9,54,56,82,102,
AT SECTION   8 (AT IRVINE'S LODGE) !
AT SECTION  54 (ABOVE FORT FRASER) !
AT SECTION  56 (BELOW THE NAUTLEY RIVER) !
AT SECTION  82 (AT VANDERHOOF) !
AT SECTION 102 (ABOVE THE STUART R.) !
  46  16
                1   0.03
               15   1.13
               24   1.13
               55  27.73
               78   2.77
               95   5.55
               97   2.77
 59.5  1    9  65.0
 59.5  59.0  59.0  59.5  61.0
 65.0  64.7  65.4  66.3  68.2
0.59,0.40,0.17,0.16,0.22,0.08
19  63 1  68.3
              210   54.0  125.0  120.0
90.0,
3.0,
```

TU9J27.DAT

1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
5	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
6	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
7	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
8	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0		
9	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
10	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
11	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
12	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0		
13	1330.0	1300.0	1280.0	1250.0	1240.0	1220.0	1190.0	1170.0	1160.0	1120.0	1120.0	1100.0
14	1030.0	1010.0	1010.0	980.0	940.0	980.0	990.0	990.0	980.0	990.0	980.0	980.0
15	990.0	990.0	980.0	980.0	980.0	980.0	980.0	980.0	980.0	980.0	980.0	990.0
16	980.0	980.0	980.0	990.0	980.0	990.0	980.0	980.0	990.0	980.0		
17	133.0	130.0	128.0	125.0	124.0	122.0	119.0	117.0	116.0	112.0	112.0	110.0
18	103.0	101.0	101.0	99.0	94.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0
19	98.0	98.0	98.0	98.0	98.0	98.0	99.0	98.0	98.0	98.0	98.0	98.0
20	98.0	98.0	98.0	98.0	98.0	98.0	98.0	99.0	98.0	98.0		
21	266.0	260.0	256.0	250.0	248.0	244.0	238.0	234.0	232.0	224.0	224.0	220.0
22	206.0	202.0	202.0	196.0	188.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0
23	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0
24	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0	196.0		
25	133.0	130.0	128.0	125.0	124.0	122.0	119.0	117.0	116.0	112.0	112.0	110.0
26	103.0	101.0	101.0	98.0	94.0	98.0	99.0	98.0	98.0	99.0	98.0	98.0
27	98.0	98.0	99.0	98.0	98.0	98.0	99.0	99.0	98.0	99.0	98.0	99.0
28	99.0	99.0	98.0	98.0	98.0	98.0	98.0	98.0	99.0	99.0		

END

INTERACTIVE PROGRAM
EXAMPLE INTERACTIVE SESSION

@INPUTS.COM

@INPUTS.COM

```
$SET VERIFY
$DEASSIGN/ALL
$ !
$ !  FORTRAN  UNITS  1,3,9   ARE  UPDATED  WITH  NEW  INFORMATION
$ !
$ASSIGN/USER_MODE SYS$COMMAND: SYS$INPUT:
$ASSIGN TU5J26.DAT         FOR001
$ASSIGN FU3J26.DAT         FOR003
$ASSIGN FU3J27.DAT         FOR004
$ASSIGN TU5J27.DAT         FOR007
$ASSIGN TU9J26.DAT         FOR009
$ASSIGN TU9J27.DAT         FOR011
$RUN INPUTS

  YESTERDAYS  DATE  IS  (DAY,MO) >26,7

  YESTERDAYS  FLOW @ IRVINES (CFS) >9800

  CHESLATTA FALLS CORRECTION FLOW (CFS) >1

 TODAYS NAUTLEY FLOW (CFS) >980

 YEST IRVINES TEMP-IFCONT-INITSEC-YEST NAUTLEY T >59.5,1,9,65.0

 INITIALIZATION TEMP TIME - F.F. TEMP - N.A.S. T >19,63.1,68.3
FORTRAN STOP
$EXIT
```

INTERACTIVE PROGRAM
COMPUTER CODING

INPUTS.FOR

2076

```
C       ******** INPUT.FOR   JULY 84  SDW    *************************
C
C       ******** INPUT.FOR EDITED NOV. 1984  CBJ  *******************
C
C       PROGRAM FOR INTERACTIVE INPUT OF FIELD DATA FOR 1984 NECHAKO
C       RIVER WATER TEMPERATURE CONTROL PROGARAM
C       THIS PRGM EDITS  FU3**.DAT, TU5***.DAT, TU9***.DAT
C
        DIMENSION TCUP(5),TMUP(5),QTSD(100,110),RIVLOC(20,40),
     @IGT(110),TITLE(20),X(110),IPRT(20),CTRWT(20),OBSPT(110),
     @QTT(20),FORAT(10),ID(60)
        CHARACTER KK(10)*80,T1(20)*80,T2(20)*80,T3(20)*80
        CHARACTER K1(10)*25,K2*47
        INTEGER*2 IFREE(1),OBSDAY,MONTH
        INTEGER*2 DD1,MM1,DD2,MM2
        DATA IFREE/'*'/
       READ(1,300) OBSDAY,MONTH
  300  FORMAT(1X,2I4)
       READ(1,1005)NCOND,NXSEC,NHR,DT,QSO,IGO,IOUT,NTRIB,JTS,A1,B1
 1005  FORMAT(1X,I1,I4,I5,2F10.2,4I5,2F10.2)
       DO 1021 I=1,19
       READ(1,1017) T1(I)
 1017  FORMAT(A80)
 1021  CONTINUE
       READ(1,300)NDSWT,NEDBSP
       DO 7 N=1,7
       READ(1,1010) IGT(N),QTT(N)
 1010  FORMAT(10X,I7,F7.2)
       I=IGT(N)
       READ(9,1150)(QTSD(K,I),K=1,NDSWT)
 1150  FORMAT(12F7.1)
    7  CONTINUE
       READ(1,302) PTVAL,IFCONT,INITSEC,TNR
  302  FORMAT(F6.1,2X,I1,2X,I2,F6.1)
       READ(1,304)(TCUP(I),I=1,5)
  304  FORMAT(5F6.1)
       READ(1,304)(TMUP(I),I=1,5)
       READ(1,1017) T2(1)
       READ(1,308) JTIME,OBSPT(54),OBSPT(102)
       DO 1031 I=1,3
       READ(1,1017) T3(I)
 1031  CONTINUE
  308  FORMAT(1X,I2,2F6.1)
C
C       READ(1,310) TAFF,HSFF,VFF,CCFF
C  310  FORMAT(4F7.2)
C
       READ(3,200) DD1,MM1,DD2,MM2,NFL
  200  FORMAT(5I6)
       READ(3,202) (FORAT(I),I=1,5)
  202  FORMAT(2X,5F9.2)
       DO 210 J=1,8
       READ(3,204) KK(J)
  204  FORMAT(A80)
  210  CONTINUE
       READ(3,206) K2,QVAND
  206  FORMAT(A47,F9.2)
```

```
      READ(3,204) KK(9)
      READ(3,212) K1(1),(IB(J),J=1,8)
  212 FORMAT(A24,8I7)
      READ(3,212) K1(2),(IB(J),J=9,16)
      READ(3,214) K1(3),(IB(J),J=17,23)
  214 FORMAT(A24,7I7)
      READ(3,212) K1(4),(IB(J),J=24,31)
      READ(3,212) K1(5),(IB(J),J=32,39)
      READ(3,212) K1(6),(IB(J),J=40,47)
      READ(3,214) K1(7),(IB(J),J=48,54)
      READ(3,216) K1(8)
  216 FORMAT(A25)
C
C     ******** START OF INTERACTIVE EDITING **************************
C
      WRITE(6,100)
  100 FORMAT(/,'$  YESTERDAYS  DATE  IS  (DAY,MO) >')
      READ(5,*) OBSDAY,MONTH
      WRITE(6,102)
  102 FORMAT(/,'$  YESTERDAYS  FLOW @ IRVINES (CFS) >')
      READ(5,*) QICFS
      WRITE(6,104)
  104 FORMAT(/,'$  CHESLATTA FALLS CORRECTION FLOW (CFS) >')
      READ(5,*) CFCF
      WRITE(6,106)
  106 FORMAT(/,'$ TODAYS NAUTLEY FLOW (CFS) >')
      READ(5,*) NFCFS
      WRITE(6,108)
  108 FORMAT(/,'$ YEST IRVINES TEMP-IFCONT-INITSEC-YEST NAUTLEY T >')
      READ(5,*) PTVAL,IFCONT,INITSEC,TNR
      IF(IFCONT .EQ. 1) GO TO 120
      WRITE(6,110)
  110 FORMAT(/,'$  1st  TO  5th  DAY ESTIMATES FOR IRVINES TEMPS >')
      READ(5,*) (TCUP(I),I=1,5)
      WRITE(6,112)
  112 FORMAT(/,'$  1st  TO  5th  DAY ESTIMATES FOR NAUTLEY TEMPS >')
      READ(5,*) (TNUP(I),I=1,5)
  120 CONTINUE
      WRITE(6,122)
  122 FORMAT(/,'$ INITIALIZATION TEMP TIME - F.F. TEMP - N.A.S. T >')
      READ(5,*) JTIME,OBSPT(54),OBSPT(102)
C
C      WRITE(6,124)
C 124  FORMAT(/,'$ FORT FRASER WEATHER DATA  ')
C      WRITE(6,126)
C 126  FORMAT('$  TAFF( C),HSFF(MJ/M2),VFF(M/S @ 2M),CCFF(DECIMAL) >')
C      READ(5,*) TAFF,HSFF,VFF,CCFF
C
C     *****    END  OF  INTERACTIVE  EDITING  ************************
C
C     *******  START  OF  VARIABLE  UPDATING  **************************
C
      QSO=QICFS*.0283
      QVAND=-(QICFS+CFCF+(1.1*NFCFS))
      DD1=OBSDAY
      MM1=MONTH
      DD2=OBSDAY+5
```

```
      IF(DD2 .GT. 31) GO TO 130
      MM2=MONTH
      GO TO 133
  130 DD2=DD2-31
      MM2=MONTH+1
  133 CONTINUE
      FORAT(2)=-CFCF
      IF(MONTH .EQ. 8) GO TO 140
      NEDBSP=OBSDAY-10
      GO TO 142
  140 NEDBSP=OBSDAY+21
  142 CONTINUE
      KSTART=NEDBSP+3
      DO 146 K=KSTART,54
      IQ(K)=NFCFS
  146 CONTINUE
      QTT(2)=CFCF*.0283
      QTT(4)=NFCFS*.0283
      QTT(5)=QTT(4)*.10
      Q78=NFCFS*.10
      QTT(6)=QTT(4)*.20
      Q88=NFCFS*.20
      QTT(7)=QTT(5)
      JSTART=NEDBSP+2
      DO 154 J=JSTART,62
      QTSD(J,2)=CFCF
      QTSD(J,55)=NFCFS
      QTSD(J,79)=Q78
      QTSD(J,89)=Q88
      QTSD(J,97)=Q78
  154 CONTINUE
C
C     ******************** END OF VARIABLE UPDATING *******************
C
C
C     ************ START OF WRITE2 ***********************************
C
      WRITE(4,200) DD1,MM1,DD2,MM2,FL
      WRITE(4,202) (FORAT(I),I=1,5)
      DO 410 J=1,8
      WRITE(4,204) KK(J)
  410 CONTINUE
      WRITE(4,206) K2,QUAND
      WRITE(4,204) KK(9)
      WRITE(4,212) K1(1),(IQ(J),J=1,8)
      WRITE(4,212) K1(2),(IQ(J),J=9,16)
      WRITE(4,212) K1(3),(IQ(J),J=17,23)
      WRITE(4,212) K1(4),(IQ(J),J=24,31)
      WRITE(4,212) K1(5),(IQ(J),J=32,39)
      WRITE(4,212) K1(6),(IQ(J),J=40,47)
      WRITE(4,214) K1(7),(IQ(J),J=48,54)
      WRITE(4,216) K1(8)
C
      WRITE(7,300) OBSDAY,MONTH
      WRITE(7,2005)NCOND,NYSEC,NHR,IT,DSQ,IEQ,IOUT,NTRIP,JTS,A1,B1
 2005 FORMAT(1X,I1,I4,I5,2F10.3,4I5,2F10.2)
      DO 2021 I=1,19
```

```
      WRITE(7,1017) T1(I)
 2021 CONTINUE
      WRITE(7,300)NDSWT,NEDBSP
      DO 27 N=1,7
      WRITE(7,2010) IGT(N),QTT(N)
 2010 FORMAT(10X,I7,F7.2)
      I=IGT(N)
      WRITE(11,2150)(QTSD(K,I),K=1,NDSWT)
 2150 FORMAT(12F7.1)
 27   CONTINUE
      WRITE(7,302) RIVAL,IFCONT,INITSEC,TNR
      WRITE(7,304)(TCUP(I),I=1,5)
      WRITE(7,304)(TNUP(I),I=1,5)
      WRITE(7,1017) T2(1)
      WRITE(7,308) JTIME,OBSPT(54),OBSPT(102)
      DO 2031 I=1,3
      WRITE(7,1017) T3(I)
 2031 CONTINUE
C      WRITE(7,310) TAFF,HSFF,VFF,CCFF
C
C     ********** END  OF  WRITE  *********************************************
C
      STOP
      END

$
```