A WATER-QUALITY SIMULATION MODEL FOR WELL MIXED ESTUARIES AND COASTAL SEAS: VOLUME IX, THE COMPUTER PROGRAM

J. J. LEENDERTSE, A. B. NELSON

R-2298-RC
APRIL 1978

Rand
SANTA MONICA, CA. 90406

A WATER-QUALITY SIMULATION MODEL FOR WELL MIXED ESTUARIES AND COASTAL SEAS: VOLUME IX, THE COMPUTER PROGRAM

J. J. LEENDERTSE, A. B. NELSON

R-2298-RC
APRIL 1978

Rand
SANTA MONICA, CA. 90406

PREFACE

This report is the last of a series of reports on modeling Jamaica Bay, New York. Even though previous reports in the series have described in much detail all the steps that were taken in these studies, the program itself was never published. In one of the reports it was indicated that the program would be made available to other investigators, and this promise is being fulfilled herewith.

Considerable time has elapsed between this publication and the previous one in the series. Our contractual agreement ended with the publication of Volume VIII in 1975, and the investigators turned their attention to other projects. They have worked only intermittently on this publication, which was sponsored by The Rand Corporation.

CONTENTS

I. INTRODUCTION

The publication of a computer program is generally a difficult task for an investigator. Not only does he lay bare exactly what he did in the investigation, he also must choose a final set from different versions of the program he has developed in the course of his studies. Large computer programs in intensive use are generally in a state of constant flux to meet the demands of specific investigators or to correct errors in options that were not fully tested.

We decided to publish the version that completely reflects the detailed descriptions given in Volume II of the report series. No modifications in the method of computation were made for the experiments described in subsequent reports. Only from time to time modifications in outputs were made to satisfy particular demands in our investigation.

The program as published should be seen as documentation of our work. The model can be used for other investigations, but the user must satisfy himself that all the approximations in the model are applicable in his case.

The model as presented is not a generalized model which can be used for a certain class of estuaries and coastal seas; it is limited in its boundary conditions, and changes are required if the model boundary is not on the left side of the model array.

The model was a tool for engineering analyses, and thus we did not go further in its development than to be able to solve the problem at hand; we refrained from making an extended analysis of the computational properties of the finite difference scheme used in the model. We took, in a few instances, first-order approximations of certain terms of the differential equations, which in our case was satisfactory.

For a more general application, the computational method has some shortcomings. The most important and troublesome is that the advection terms are taken at the lower time level, which introduces a stability condition upon time step and grid size.

For large arrays, the possibility also exists that nonlinear instabilities are generated by the choice of the primitive form of the finite difference expression in the advection terms.

In the Jamaica Bay study, it was not necessary to incorporate advection terms which would not generate these instabilities, because the primitive terms used did not generate troublesome instabilities and because more stable expressions for these terms would have increased the computation time.

II. PROGRAM USAGE

PROGRAM CAPABILITIES

The program in its present form can be used to compute the flow and pollutant distributions in a certain region if:

1. The hydrodynamic and transport equations described in Refs. 1 and 2 are representative of the fluid motions and transport of constituents.
2. Information is available about depth to a certain reference level.
3. The bathymetry can be approximated with sufficient detail. (Computer memory and computer time requirements per run are proportional to the second and roughly third power, respectively, of the reciprocal of the space grid size.)
4. Sufficient data are available for model adjustment.
5. Input water level histories at a single boundary at the left side of the model are available for forcing the model.
6. Time-varying wind and discharge information is available.
7. Currents are relatively weak and the system quite well dampened so that stability conditions of the advection terms are not exceeded.

MODEL LAYOUT

The area for which the simulations are made is covered by a two-dimensional grid on a horizontal plane. All descriptions of spatially varying parameters and of all variables are made on this grid. The grid system is described in Refs. 1 and 2.

The indices of variables in the Y direction (north) are mentioned first in the array description; the variables in the X direction are the second values. The large number of two-dimensional arrays which are required have dimensions NMAX, MMAX, where NMAX is the total number of points in the Y direction and MMAX the total number of points in the X direction. In the Jamaica Bay study the dimensions were 61, 78. In addition to the two-dimensional arrays, three-dimensional arrays are used for the constituents R, RP. Usage of a large number of constituents is discouraged, as the computation time for the reaction model increases with the second power of the number of constituents.

The model is for the foot-pound system. If the metric system is used, certain constants in the program have to be changed. In subroutine CVAL, for example, the constant in the relationship between Chezy values and Manning's values has to be modified.

The required computation times can become considerable, particularly if a fine grid is used, which necessitates the use of a small time step. The investigator will do well to first try to make a Jamaica Bay run to familiarize himself with computer memory and time requirements before making estimates for other runs. The Jamaica Bay model as presented requires about 400,000 bytes of memory.

INPUT DATA DESCRIPTION

General

The data input is divided into roughly three sections. The first section contains control data for the computation, the second section array values for system initialization and control, and the third section presents time-varying inputs.

Control Data

The main control variables are described below. To identify the method of input, we will use the following designation containing three groups of numbers. The first group is the card number, the second the column number range, and the third the format. For example, NMAX (2:1-4:I4) is found on card 2, in columns 1 through 4, and the format is I4. The control variables and parameters are listed in the order in which they are inserted.

TITL (1:1-72:18A4)	Title of the run; it appears in the beginning of the print and data sets written on tape.
NMAX (2:1-4:I4)	Number of grid points in Y direction of the computational grid.

MMAX	(2:5-8:I4)	Number of grid points in X direction of the computational grid.
NB1	(2:9-12:I4)	Lower value of the open boundary at the left side of the computational grid.
NB2	(2:13-16:I4)	Upper value of the open boundary at the left side of the computational grid. A linear interpolation is used for intermediate boundary points between N=NB1 and N=NB2.
ANGLAT	(2:17-21:E5.0)	Latitude in the center of the computational grid; expressed in degrees and positive in the northern hemisphere.
AL	(2:22-26:E5.0)	Distance between points of the computational grid.
AG	(2:27-31:E5.0)	Value of the gravitational acceleration.
AT	(2:32-36:E5.0)	Half the time step which is the time increment between the two levels of the transport equation.
CSET	(2:37-41:E5.0)	Chezy value for the flow computation when the tidal flat is becoming dry. This value is used when the temporal depth is smaller than 2*VAR.
VAR	(2:42-46:E5.0)	Threshold depth on tidal flat. If temporal depth is smaller than this value during the time that this computation checks for flooding, then the point is taken out of the computation.
SEINV	(2:47-51:E5.0)	Water level to start the computation. This value should *not* be identically zero (i.e., 0.0), as during initialization a zero water level means a dry point.
GAMM	(2:52-56:E5.0)	Weighting factor describing that portion of pollution value which is replaced by surrounding values (spatial smoothing). This operation is performed only on the pollution checkpoints before writing the data on tape.
DCO	(2:57-61:E5.0)	Maximum depth not affected by the depth multiplier DML.
DML	(2:62-66:E5.0)	Depth multiplier. The array values of the depth can all be multiplied by DML for a sensitivity analysis of depth schematization in amplitudes and phases of the computed tidal wave in the system.

DEPDEF(2:67-71:E5.0)	Default value for the depth. If no depth value is used in the depth array, DEPDEF is used. It is advantageous to use a value less than the minimum depth during flood. In that case DEPDEF is negative, as the depth is positive downward.
NST (3:1-4:I4)	Time step number to start the integration.
NTAPE (3:5-8:I4)	Time step number at which the computation is restarted from data from the restart tape. If no restart is made, NTAPE=0.
MAXST (3:9-12:I4)	Time step number to terminate the computation. At this time step all data required for a restart are written on tape.
NTFREQ(3:13-16:I4)	Frequency to write data on restart tape. This feature protects long computation against loss because of system failure. It should be used sparingly, as much data are written. The records written can also be used for graphical output programs.
NWLC (3:21-24:I4)	Frequency to print the selected water level and current station values.
NSMO (3:25-28:I4)	Frequency to time smooth. At this interval the computation is backstepped half a time step and restarted from time-averaged values a full time step apart. A time correction is made in the time step of the computation to allow for the loss of the half time step.
NCVAL (3:29-32:I4)	Frequency to compute C values from Manning's coefficient.
NREQ (3:33-36:I4)	Number of time steps between input values of the water level boundary inputs. A linear interpolation of water levels is used for intermediate time steps.
NFL (3:37-40:I4)	Number of time steps in which the concentrations at the boundary return to the preset value.
NSRC (3:41-44:I4)	Number of discharges (outfalls) in the system; number of constituent sources.
NPOL (3:45-48:I4)	Number of constituent measuring stations in the model. At these stations concentrations are written on tape.
NOWL (3:49-52:I4)	Number of water level stations in the model.

NOCUR (3:53-56:I4)	Number of current stations.
NFLOD (3:57-60:I4)	Frequency to check for flooding. Note that very small intervals are not necessarily more accurate, as more noise is generated in the computation. It is preferable to use odd numbers.
NTRA (3:61-64:I4)	Number of sections through which flow and constituent transports in the U direction are computed.
LMAX (3:65-68:I4)	Number of constituents used in the computation.
NWLT (3:69-72:I4)	Frequency to write history tape.
NST (4:1-5:I5) NTAPE (4:6-10:I5) MAXST (4:11-15:I5)	As shown on card 3, but these values will override the ones on the card, allowing more time steps.
WSTR (5:1-8:E8.0)	Wind stress coefficient.
DAIR (5:9-16:E8.0)	Density of air.
DWAT (5:17-24:E8.0)	Density of water.
WCONV (5:25-32:E8.0)	Conversion factor for units used to insert wind speed to units used in computation.
CDCON (5:33-40:E8.0)	Factor for the computation of the longitudinal diffusion coefficient from the temporal depth velocity and the Chezy coefficient (Eq. (2.38) of Ref. 1).
LOX (6:1-5:I5)	Constituent used for computation of dissolved oxygen.
SOX (6:6-15:E10.0)	Saturation value for dissolved oxygen.
AKTP (6:16-25:E10.0)	Reaction rate in BOD-DO system. (This value overrides the one in the reaction matrix.)
LRMX (6:26-30:I5)	Number of constituents which interact. These constituents are listed first. Constituent numbers greater than LRMX should be conservative or only decaying.
NPRINT(7:1-80:16I5) NPRINT(8:1-80:16I5) NPRINT(9:1-80:16I5)	Time steps to print all computational array values. Time steps should be in increasing order.

Array Data

Arrays of data are inserted after the control cards. The number of cards in each group has to be the same as that listed in the control card group.

Water Level Stations (NOWL Cards)

I	(1-5:I5)	Water level station number.
MWL	(6-10:I5)	Location of water level station in X direction.
NWL	(11-15:I5)	Location of water level station in Y direction.

Current Stations (NOCUR Cards)

I	(1-5:I5)	Current station number.
MC	(6-10:I5)	Location of current station in X direction.
NC	(11-15:I5)	Location of current station in Y direction.

Discharge (Outfall) Locations (NSRC Cards)

I	(1-5:I5)	Location number.
MINT	(6-15:I5)	Location of outfall in X direction.
NINT	(11-15:I5)	Location of outfall in Y direction.

Constituent Measuring Stations (KPOL Cards)

I	(1-5:I5)	Location number.
MPOL	(6-15:I5)	Location of station in X direction.
NPOL	(11-15:I5)	Location of station in Y direction.

Cross Sections in which Transports are Computed (NTRA Cards)

I	(1-5:I5)	Section number.
MIT	(6-10:I5)	Column at which cross section is located.
NIT1	(11-15:I5)	First point in N direction of cross section.
NIT2	(16-20:I5)	Last point in N direction of cross section.
BIT	(21-24:A4)	Cross section identification letters.

Return Concentrations at the Open Boundary (LMAX Cards)

RBND	(1-10:E10.0)	Concentration of particular constituent at open boundary and default concentration if not later specified.
POLT	(11-70:15A4)	Identification of concentration.

Reaction Matrix (LMAX Cards)

AKK (Format 8E8.0) Interaction matrix K. The card contains matrix row for Kth concentration.

Depth Array (M*((N+15)/16) Cards)

H (Format 16E4.1) First 16 depth for M=1, then first 16 depth for M=2, etc., to M=MMAX, then second 16 depth for M=1, etc. Depth values are to be multiplied by ten before inserting. Depth is positive downward. The last row should always be above water.

Diffusion Coefficients

The first value inserted is the default value (E5.0), which can be overridden in sections of a row. This procedure allows easy adjustment without inserting a whole array. At the end of the diffusion value, a blank card should be inserted.

The sections are inserted in format 3I5,10E5.0. The first three values are the row number (N=...), the second number the first value of the row, and the third number the last value of the row followed by the actual diffusion values.

Manning's Coefficient

Again, the first value inserted is the default value (E5.0), which can be overriden in sections of a row. Subsequently, the sections are inserted in format 3I5,10E5.0. A blank card should be placed at the end.

Constituent Arrays

A single card with the number of the array (1-5-I5) is first inserted, then the array values, as in the depth array. A blank card should be at the end of the array, as well as at the end of all constituent array groups. Thus, if only default values are used, only one blank card is required for the constituents.

Time-Varying Data

The time-varying tide and wind data are supplied at time intervals

NREQ*2.*AT. Tide data are interpolated. Wind data are kept constant until the next change. If no wind data are supplied, wind intensity and direction are maintained. Each time-varying tide card also has an indicator showing how many discharge changes are following.

Each tide card has the format (F5.0,F7.0,I3,2F5.0). The first value is a sequence number starting with zero; the second is the boundary tide value; the third is a value (NPC) indicating the number of cards following for the discharges; and finally the wind intensity and wind angle data are given.

For each time-varying discharge there is one card. Cards are to be inserted in increasing outfall order in format (I2,7E10.0). The first value is the outfall number, followed by the discharge in ft^3/sec, and then the new concentration values. If the concentration values are omitted, then that particular concentration is unchanged.

Time-varying tide data for a longer period than the simulation time should be supplied, as otherwise the run will be terminated without writing the data sets on tape at the indicated maximum time step.

COMMON

The dimensions in COMMON depend generally on the variables in the control section of the computation. The description and the array dimensions are presented as they appear in the listing of the program.

A(MNMAX)	= Recursion factor array. (MNMAX is the largest value of MMAX and NMAX.)
B(MNMAX)	= Recursion factor array.
P(MNMAX)	= Recursion factor array.
Q(MNMAX)	= Recursion factor array.
RX(MNMAX)	= Recursion factor array.
S(MNMAX)	= Recursion factor array.
DISCH(NSRC)	= Discharge rate.
NA(MNMAX)	= Temporary storage array.
TITL(18)	= Title name array.
NPRINT(48)	= Temporary print array.
F(MNMAX)	= Coriolis value array.
NINT(NSRC)	= N location of discharge.
MINT(NSRC)	= M location of discharge.

NFLI(MAX2)	= Temporary storage array. MAX2=2*(MMAX+NMAX).
XLAND(1)	= Graphics array which is not used.
YLAND(1)	= Graphics array which is not used.
LAND(2)	= Graphics array which is not used.
NPOL(KPOL)	= N location of pollution measuring stations.
MPOL(KPOL)	= M location of pollution measuring stations.
ATR(LMAX,NTRA)	= Cumulative advective transport through cross sections.
DTR(LMAX,NTRA)	= Cumulative diffusive transport through cross sections.
CTR(LMAX,NTRA)	= Cumulative total transport through cross sections.
GRO(LMAX,KPOL)	= Value of concentrations at pollution measuring stations.
MWL(NOWL	= M location of water level stations.
NWL(NOWL)	= N location of water level stations.
MC(NOCUR)	= M location of current stations.
NC(NOCUR)	= N location of current stations.
ZWL(NOWL)	= Value at water level station.
ZCUR(NOCUR)	= Value at current station.
MIT(NTRA)	= M location of cross section.
NIT1(NTRA)	= Lower N value of cross section.
NIT2(NTRA)	= Upper N value of cross section.
FLTR(NTRA)	= Cumulative water transport.
BIT(NTRA)	= Name of cross section.
SINT(LMAX,NSRC)	= Array used for computation of constituent mass added at discharges.
SX(LMAX)	= Temporary array.
R1(LMAX)	= Temporary array.
R2(LMAX)	= Temporary array.
R3(LMAX)	= Temporary array.
R4(LMAX)	= Temporary array.
CONC(LMAX)	= Concentration at outfall.
POLTP(NOWL)	= Temporary array.
POLT(LMAX,NOWL)	= Temporary array.
PLEV(10,LMAX+3)	= Temporary array.
RBND(LMAX)	= Concentration at boundary.

NVOL(80)	= Temporary array.
MVOL(80)	= Temporary array.
AX(MNMAX)	= Recursion factor array.
CX(MNMAX)	= Recursion factor array.
BZ(MNMAX)	= Recursion factor array.
R(LMAX,NMAX,MMAX)	= Constituent array (first level).
RP(LMAX,NMAX,MMAX)	= Constituent array (second level).
FX(LMAX,MNMAX)	= Recursion factor array.
DFL(LMAX,MNMAX)	= Recursion factor array.
E(LMAX,MNMAX)	= Recursion factor array.
PZ(LMAX,MNMAX)	= Recursion factor array.
VMAN(NMAX,MMAX)	= Manning's value array.
REACT(LMAX,LMAX)	= Reaction matrix array.
TINDAT(10)	= Temporary array.
ROX(NMAX,MMAX)	= Reaeration value array.
DIFCO(NMAX,MMAX)	= Diffusion coefficient array.
AKK(LMAX,LMAX)	= Reaction matrix values.
AKM(LMAX)	= Temporary array.
AKP(LMAX)	= Temporary array.
VOLDP(MNMAX)	= Temporary value array for volumes.
VOLDM(MNMAX)	= Temporary value array for volumes.
C(NMAX,MMAX)	= Chezy value array.
H(NMAX,MMAX)	= Depth value array.
SEN(NMAX,MMAX)	= Water level at lowest time level.
SES(NMAX,MMAX)	= Water level at time that point becomes dry.
CZ(61,78)	= Chezy value array.

III. PROGRAM DESCRIPTION

The program consists of 13 subroutines. These subroutines are *not* all called from the MAIN subroutine. All subroutines share COMMON, except that six two-dimensional arrays are specified in each subroutine. COMMON is listed in Appendix A, the simulation program in Appendix B.

For simplicity, the input will be described as cards, and the output of a simulation will be printed values and data sets on two tape units. These tapes can then be used for graphical outputs, to be prepared according to the investigator's own specification and compatible with the plotting devices available to him.

The subroutines do not all have clear functions. In some cases more than one function were combined in a subroutine if that was convenient. This is usually indicated in the description of the different routines.

MAIN

This subroutine controls most of the computation. It reads the time-varying inputs, prepares them for usage in the computation, controls the output, and does part of the time-smoothing of the array variable when this is requested. Also, certain counters are set in this subroutine.

SUBROUTINE SETUP

As the name indicates, this subroutine sets many of the arrays used in the computation. It determines the location of water level stations, current stations, and sources and pollution measurement stations in the model. Subsequently, it determines the reaction matrix, sets certain often-used variables, and inserts zero in the main computation arrays. Furthermore, it calls subroutines like DEPTH, SINVAL, INDAT1, CVAL, and POLIN, which read initial array values. Finally, it performs such functions as reading the restart tape and printing values in several two-dimensional arrays.

SUBROUTINE SEPU

This subroutine computes part of the fluid flow. In particular, it solves Eqs. (19) and (20) of Ref. 2 for the whole computational field. It also calls the subroutine in which the transport is computed (DIFU) and checks if any of the computation points become dry. The recursion formulas which are used are described in Chapter IV of Ref. 2.

SUBROUTINE FLO

This subroutine determines if a dry point should be taken into the computation. The procedures are described in Ref. 2, under Tidal Flat Computations.

SUBROUTINE SEPV

This subroutine also computes part of the fluid flow. In this case it solves Eqs. (22) and (23) of Ref. 2 for the whole computational field. It performs the same function as SEPU, only here water levels and the V velocity are computed implicitly, rather than water levels and the U velocity.

SUBROUTINE DIFU

In this subroutine the transport equations belonging to the hydrodynamic equations of SEPU are computed, as are the reactions between the different pollution constituents.

Since the cross sections at the velocity point and the temporal depth at the water level point are computed, it was convenient to check here if these values could become negative. The procedures are designed so that if this occurs, it is prevented by blocking the pollutant transport through the section and making the point dry, as described in Ref. 2. This procedure should more logically have been in FLO, but could be more efficiently made here. If a point becomes dry because of a negative volume, this rare occurrence is indicated by a printed message.

SUBROUTINE DIFV

This subroutine has the same function as DIFU, but only belongs to SEPU.

SUBROUTINE DEPTH

This subroutine reads the depth cards.

SUBROUTINE SINVAL

This subroutine sets the initial water level at all grid points with water.

SUBROUTINE CVAL

This subroutine computes the Chezy value from the Manning's coefficient. It also sets the C value to a preset value if only a limited depth is available.

SUBROUTINE INDAT1

This subroutine reads the diffusion coefficients and Manning's coefficients.

SUBROUTINE POLIN

This subroutine reads the initial values of the constituent distributions.

TAPE UNIT (8)

Tape Unit (8) is used to write the time step and all array values at certain intervals and at the end of the simulation. This tape can then be used to restart the computation or to abstract data from the tape for further processing.

IV. JAMAICA BAY DATA

The data set shown in Appendix C is a typical simulation performed in a series of experiments to determine the impact of different overflows in Jamaica Bay. The tide input data are shown in Fig. 21 of Ref. 3.

Four constituents were used in the simulation: dissolved oxygen (DO), biochemical oxygen demand (BOD), salinity, and coliform. During the simulation, a rainstorm occurs which generates the discharges at the outfalls. The data set is complete, and can be considered the documentation of the main adjusted variables of the Jamaica Bay system.

This example was selected because it was a simulation with only a few constituents and the characteristics of the constituents were widely varying.

To make data management of the two-dimensional arrays in the input more effective, control values are added in the last eight columns of each input card. Those values in the depth array are part of the state coordinates at the location of the first depth point of the row. In the concentration arrays the type of constituent is shown, plus sequence numbers.

To reduce the volume of this report, only 15.5 hours of time-varying tide data are included in the data set description. This should be sufficient to test computational procedures. The complete data set, together with the program, is available in digital form upon request.

Appendix A

LISTING OF COMMON

1

```
C*****************************************************************
C   JAMAICA BAY COMMON FROM 1972    N.N2640.     .JAMCOM72
C SE,SEP,V,VP,U,UP ARE DIMENSIONED IN EACH SUBROUTINE (SWITCHED IN DIFV)
C
      COMMON A(78),B(78),P(78),Q(78),RX(78),S(78),DISCH(13)
      COMMON NA(61),TITL(18),NPRINT(48),F(78)
      COMMON ATAL,ATAL2,ATL,AKTP,AKTM,ALD,ALDED,CDAL
      COMMON NSRC,NINT(13),MINT(13),NFL,AFL,NFLI(8)
      COMMON NMAX,MMAX,NMAXN,MMAXM
      COMMON NST,AT,CSET,NB1,NB2
      COMMON C1,C2,C3,C4,AK1,SDEN,VAR,GAMM,X0,Y0,X0M,Y0M,DX,DY
      COMMON DX2,DY2,FDX,FDY,IM,JM,XL,YL,Z(200)
      COMMON XLAND(700),YLAND(700),LAND(20)
      COMMON ANGLAT,AL,MAXST,SBND,RINIT,KBND,FF,S20,S21,S22,SOX
      COMMON KPOL,NPOL(12),MPOL(12),ATR(4,5),DTR(4,5),CTR(4,5),GRO(4,12)
      COMMON NWLC,NCVAL,FREQ,NOWL,NOCUR,NWLT
      COMMON MWL(18),NWL(18),MC(9),NC(9)
      COMMON ZWL(18),ZCUR(9),VALMAN,DCO,DML,NFLOD,LRMX
      COMMON NTRA,MIT(5),NIT1(5),NIT2(5),FLTR(5),BIT(5)
      COMMON WINDU,WINDV,COEF,PWIND,PWINDA
      COMMON SINT(4,13),SX(4),R1(4),R2(4),R3(4),R4(4),CONC(4)
      COMMON POLTP(18),POLT(4,18),PLEV(3,10),RBND(4),NVGR
      COMMON NVOL(80),MVOL(80)
      COMMON AX(78),CX(78),BZ(4,78),LMAX,DEPDEF
      COMMON R(4,61,78),RP(4,61,78),FX(4,78),DFL(4,78),E(4,78),PZ(4,78)
      COMMON VMAN(61,78),REACT(4,4),TINDAT(10),ROX(61,78),LOX
      COMMON DIFCO(61,78),AKK(4,4),AKM(4),AKP(4),VOLDP(78),VOLDM(78)
      COMMON C(61,78),H(61,78),SEN(61,78),FOFD,EDY,AG,CD,ZC1,ZC2
      COMMON M,N,NZ,KMAX,INI,SEINV,NTFREQ,NSM0,SES(61,78)
      DIMENSION CZ(61,78)
      EQUIVALENCE (C(1,1),CZ(1,1))
C*****************************************************************
```

Appendix B

PROGRAM LISTING

1

```
C*************************************************************************
C*************************************************************************
C*                                                                       *
C*                                                                       *
C*                             ESTUARY POLLUTION MODEL                   *
C*                     1972 VERSION     N.N2640.        .PRINT72         *
C* SE,SEP,V,VP,U,UP ARE SPECIFIED IN EACH SUBROUTINE (SWITCHED IN DIFV)*
C*                                                                       *
C*                                                                       *
C*************************************************************************
C*************************************************************************
      COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD DISP=OLD,DSN=N.N2640.A1700.JAMCOM72
// DD *,DCB=BLKSIZE=80
C
      GO TO 87
C             SET OPEN BOUNDS AS FUNCTIONS OF TABLEVALUES (XIA(K) ,ETC.)
C                          OR AS FUNCTIONS OF HALFTIMESTEP NUMBER (K).
   89 CONTINUE
      KBND=KBND-1
      IF (KBND.NE.0) GO TO 22
      KBND=FREQ
   20 READ (5,21) BNDK,BNDS,NPC,WIND,WINDA
C  21 FORMAT (2E12.0,I3,37X,2E4.0)
   21 FORMAT (F5.0,F7.0,I3,2F5.0)
      IF (NPC.EQ.0) GO TO 640
      DO 630 NI=1,NPC
      READ (5,610) IN2,DISCHI,(CONC(L),L=1,LMAX)
  610 FORMAT (I2,7E10.0)
      WRITE (6,650) BNDK
  650 FORMAT (1H0,'BNDK= ',E13.6)
      WRITE (6,611) IN2,DISCHI,(CONC(L),L=1,LMAX)
  611 FORMAT (1X,'DISCHARGES',1X,I3,7(1X,E13.6))
      DISCHI=DISCHI/(AL*AL)
      DISCH(IN2)=DISCHI
      DO 620 L=1,LMAX
C   IF CONC(L)=0.0, SINT(L,IN2) IS UNCHANGED.
C   IF CONC(L)<0.0, SINT(L,IN2)=0.0
      IF (CONC(L).EQ.0.0) GO TO 620
      SINT(L,IN2)=0.0
      IF (CONC(L).GT.0.0) SINT(L,IN2)=-DISCHI*CONC(L)
  620 CONTINUE
  630 CONTINUE
  640 CONTINUE
      NBND=.5*FREQ*BNDK
      IF (WINDA.EQ.0.0) GO TO 180
      WRITE (6,650) BNDK
      WRITE (6,641) WIND,WINDA
  641 FORMAT (1X,'WIND CHANGE',2X,E13.6,1X,E13.6)
      WINDA=WINDA/57.29578
      TEMW=4.*AT*COEF*WIND*WIND
      WINDU=TEMW*SIN(WINDA)
      WINDV=TEMW*COS(WINDA)
      PWIND=WIND
      PWINDA=WINDA
  180 CONTINUE
      IF (NBND.GT.NST) GO TO 25
      SBND=BNDS
      GO TO 20
   25 CONTINUE
      DBND=(BNDS-SBND)/FREQ
   22 CONTINUE
      SBND=SBND+DBND
```

```
      DO 170 NK=NB1,NB2
      SEP(NK,1)=SBND
  170 CONTINUE
      DO 172 IN2=1,NSRC
      NY=NINT(IN2)
      MY=MINT(IN2)
      SE(NY,MY)=SE(NY,MY)+AT*DISCH(IN2)
  172 CONTINUE
      IF(ISTEP.EQ.1) GO TO 96
      GO TO 301
C
  87  CONTINUE
      REWIND 8
      REWIND 9
C                 SET DIMENSIONS OF THE SYSTEM
      CALL SETUP
C
      IP=1
            ICFLG= 0
            KADE = 1
      ISTEP=2
      GO TO 500
C
 88   ISTEP=1
      NST =NST +1
      K=2*NST-1
C     SET OPEN BOUND
      IF (NST.LE.MAXST) GO TO 89
  530 CONTINUE
      WRITE (8) NST
      WRITE (8) SE,SEP,SEN,SES
      WRITE (8) U,UP,V,VP
      WRITE (8) R
      WRITE (8) RP
      WRITE (8) C,DFL,NFLI
      WRITE (8) ATR,DTR,CTR,FLTR
      REWIND 8
C*****
      STOP
  96  CONTINUE
 100  CONTINUE
C
C              COMPUTE UP AND SEP ON ROW N ( FIRST HALF TIMESTEP)
      CALL SEPU
      CALL FLOW
      IF (MOD(NST,NFLOD).NE.0) GO TO 190
      DO 185 M=1,MMAX
      DO 185 N=1,NMAX
      IF (SEP(N,M).EQ.0.0) GO TO 179
      IF (C(N,M).NE.0.0) GO TO 185
      C(N,M)=CSET
      GO TO 185
  179 C(N,M)=0.0
  185 CONTINUE
  190 CONTINUE
      IF (MOD(NST,NSMO).NE.2) GO TO 191
      DO 202 N=1,NMAX
      DO 202 M=1,MMAX
      R(1,N,M)=SEN(N,M)
      R(2,N,M)=U(N,M)
  202 CONTINUE
  191 CONTINUE
      DO 201 N=1,NMAX
      DO 201 M=1,MMAX
```

```
1          SEN(N,M)=SE(N,M)
           SE(N,M)=SEP(N,M)
           U(N,M)=UP(N,M)
      201 CONTINUE
C******
           IF (MOD(NST,NCVAL).EQ.0) CALL CVAL
C
C                           PRINT INSTRUCTIONS
C
  500     IF(ISTEP-2)297,296,297
  296     CONTINUE
C
           ICFLG=0
C
    300 CONTINUE
           IF(NST.EQ.NPRINT(IP))  GO TO 295
           IF (NST.LT.NPRINT(IP)) GO TO 297
           IP=IP+1
           GO TO 300
    295 CONTINUE
           IP = IP+1
C
           CALL OUT
C
           ICFLG=1
  297     NUM = 1
           GO TO(299,88),ISTEP
  299     ISTEP=2
           K=2*NST
C                  SET OPEN BOUNDS
           GO TO 89
C
  301     CONTINUE
C                  COMPUTE VP AND SEP ON COLUMN  M ( SECOND HALF TIMESTEP )
           CALL SEPV
C
           IF (MOD(NST,NTFREQ).NE.0) GO TO 500
           IF (NST.EQ.0) GO TO 500
           WRITE (8) NST
           WRITE (8) SE,SEP,SEN,SES
           WRITE (8) U,UP,V,VP
           WRITE (8) R
           WRITE (8) RP
           WRITE (8) C,DFL,NFLI
           WRITE (8) ATR,DTR,CTR,FLTR
           GO TO 500
           END
```

```
      SUBROUTINE SETUP
      COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD DISP=OLD,DSN=N.N2640.      .JAMCOM72
// DD *,DCB=BLKSIZE=80
C******
       READ(5,4)(TITL(J),J=1,18)
 4     FORMAT(18A4)
      WRITE(6,1) (TITL(J),J=1,18)
 1    FORMAT(1H1,18A4)
      READ (5,200) NMAX,MMAX,NB1,NB2,ANGLAT,AL,AG,AT,CSET,VAR,SEINV,
     *             GAMM,DCO,DML,DEPDEF
  200 FORMAT (4I4,12E5.0)
      WRITE (6,201)
  201 FORMAT (1H0,34H    N     M  NB1  NB2  ANGLAT      AL,7X,2HAG,7X,2HAT,
     *            5X,33HCSET        VAR     SEINV       GAMM,
     *            25H     DCO       DML    DEPDEF)
      WRITE(6,202) NMAX,MMAX,NB1,NB2,ANGLAT,AL,AG,AT,CSET,VAR,SEINV,
     *             GAMM,DCO,DML,DEPDEF
  202 FORMAT (4(1X,I4),12(1X,F8.3))
C******
      READ (5,210) NST,NTAPE,MAXST,NTFREQ,NWLC,NSMO,NCVAL,
     *             NREQ,NFL,NSRC,KPOL,NOWL,NOCUR,NFLOD,NTRA,LMAX,NWLT
      READ (5,212) NST,NTAPE,MAXST
  210 FORMAT (20I4)
      WRITE (6,211)
  211 FORMAT (1H0,49H NST NTAP MAXT NTFR NWLC NSMO NCVL NREQ  NFL,
     *            40H NSRC KPOL NOWL NOCR NFLD NTRA LMAX NWLT)
      WRITE(6,212) NST,NTAPE,MAXST,NTFREQ,NWLC,NSMO,NCVAL,
     *             NREQ,NFL,NSRC,KPOL,NOWL,NOCUR,NFLOD,NTRA,LMAX,NWLT
  212 FORMAT (20I5)
      FREQ=NREQ+NREQ
      NFL=NFL+NFL
      IF (NSMO.EQ.0) GO TO 51
      ASMO=NSMO
      AT=AT*(ASMO+.5)/ASMO
   51 CONTINUE
      READ (5,300) WSTR,DAIR,DWAT,WCONV,CDCON
  300 FORMAT (8E8.0)
      COEF=WSTR*DAIR*WCONV*WCONV/DWAT
      WINDU=0.0
      WINDV=0.0
      PWIND=0.0
      PWINDA=0.0
      WRITE (6,305)
  305 FORMAT (1H0,3X,4HCOEF,10X,4HWSTR,10X,4HDAIR,10X,4HDWAT,
     *            9X,5HWCONV,9X,5HCDCON)
      WRITE (6,310) COEF,WSTR,DAIR,DWAT,WCONV,CDCON
  310 FORMAT (8(1X,E13.6))
      READ (5,311) LOX,SOX,AKTP,LRMX
  311 FORMAT (I5,2E10.0,I5)
      WRITE (6,312) LOX,SOX,AKTP,LRMX
  312 FORMAT (1H0,2X,'LOX',7X,'SOX',10X,'AKTP'2X,'LRMX',/,
     *        1H ,I5,2(1X,E13.6),1X,I5)
      READ(5,25) (NPRINT(N),N=1,16)
      READ(5,25) (NPRINT(N),N=17,32)
      READ(5,25) (NPRINT(N),N=33,48)
  25  FORMAT(16I5)
      WRITE (6,212) (NPRINT(N),N=1,48)
      DO 250 J=1,NOWL
      READ (5,410) I,MWL(J),NWL(J)
      WRITE (6,212) I,MWL(J),NWL(J)
      IF (I.NE.J) GO TO 420
  250 CONTINUE
```

```
1         DO 260 J=1,NOCUR
          READ (5,410) I,MC(J),NC(J)
          WRITE (6,212) I,MC(J),NC(J)
          IF (I.NE.J) GO TO 420
      260 CONTINUE
          DO 400 J=1,NSRC
          READ (5,410) I,MINT(J),NINT(J)
          WRITE (6,212) I,MINT(J),NINT(J)
          IF (I.NE.J) GO TO 420
      400 CONTINUE
          DO 405 J=1,KPOL
          READ (5,410) I,MPOL(J),NPOL(J)
          WRITE (6,212) I,MPOL(J),NPOL(J)
          IF (I.NE.J) GO TO 420
      405 CONTINUE
      410 FORMAT (10I5)
          DO 270 J=1,NTRA
          FLTR(J)=0.0
          READ (5,411) I,MIT(J),NIT1(J),NIT2(J),BIT(J)
          WRITE (6,411) I,MIT(J),NIT1(J),NIT2(J),BIT(J)
          IF (I.NE.J) GO TO 420
      270 CONTINUE
      411 FORMAT (4I5,A4)
          GO TO 430
      420 PRINT 425
      425 FORMAT (1X,18HCARDS OUT OF ORDER)
          STOP
      430 CONTINUE
          WRITE (9) TITL
          WRITE (9) NTRA,MIT,NIT1,NIT2,BIT,NOWL,MWL,NWL,NOCUR,MC,NC,NWLC,
         *          KPOL,MPOL,NPOL,AT
          DO 800 L=1,LMAX
          READ (5,432) RBND(L),(POLT(L,J),J=1,15)
      432 FORMAT (E10.0,15A4)
          WRITE (6,433) RBND(L),(POLT(L,J),J=1,15)
      433 FORMAT (1H0,E12.5,2X,15A4)
      800 CONTINUE
      801 FORMAT (10E8.0)
          LTT=LMAX+1
      901 FORMAT(I10,10F4.1)
      902 FORMAT(/'  VEL.CONTOUR TIMES',I5,5X,'CONTOURS AT',10F8.4)
          WRITE (6,433)
          DO 435 L1=1,LMAX
          READ (5,300) (AKK(L1,L2),L2=1,LMAX)
          WRITE (6,310) (AKK(L1,L2),L2=1,LMAX)
      435 CONTINUE
C******
          KBND=1
          MMAXM=MMAX -1
          NMAXN=NMAX -1
          RANGL=3.1415927*ANGLAT/180.
          FF=3.1415927*SIN(RANGL)/21600.
          NST = 0
          C1 = AT*AG/AL
          C2 = AT/AL
          C3 = AT/4.
          C4 = 8.*AT*AG
          NVGR=99999
          FOFD=0.0
          EDY=25.
          CD=CDCON*SQRT(AG+AG)
          ZC1=1.0
          ZC2=1.0
          ATAL=AT/AL
```

```
1         ATL=ATAL/4.0
          ALD=2.0/AL
          ALDED=ALD*EDY
          CDAL=CD*ALD
          SDEN=3.05*3.05*3.05*AL*AL
          DO 35 IZ=1,13
          DISCH(IZ)=0.0
          DO 35 L=1,LMAX
          SINT(L,IZ)=0.0
   35     CONTINUE
          AFL=NFL
          J1=NB2-NB1+1
          DO 495 J=1,J1
          DO 680 L=1,LMAX
  680     DFL(L,J)=0.0
  495     NFLI(J)=NFL
          DO 496 L=1,LMAX
          DO 496 I=1,NTRA
          ATR(L,I)=0.0
          DTR(L,I)=0.0
          CTR(L,I)=0.0
  496     CONTINUE
          DO 6 N=1,NMAX
          DO 8 M=1,MMAX
          DO 700 L=1,LMAX
          R(L,N,M)=0.0
          RP(L,N,M)=0.0
  700     CONTINUE
          ROX(N,M)=AKTP
          VP(N,M)=0.0
          UP(N,M)=0.0
          V(N,M)=0.
          SE(N,M)=0.0
          SEP(N,M)=0.0
          SEN(N,M)=0.0
          SES(N,M)=0.0
          U(N,M) = 0.
          C(N,M) = 0.
 8        H(N,M) = 0.
 6        F(N) = FF
          S21=0.0
          S22=0.0
          CALL DEPTH
          CALL SINVAL
          M=1
          DO 31 N=NB1,NB2
          C(N,M)= 75.
          SEN(N,M)=SEINV
          SEP(N,M)=SEINV
 32       SE(N,M) =SEINV
 31       CONTINUE
          SBND=SEINV
          IP=0
          CALL INDAT1
          CALL CVAL
          DO 30 N=1,NMAX
          DO 30 M=1,MMAX
          DO 740 L=1,LMAX
          R(L,N,M)=RBND(L)
          RP(L,N,M)=RBND(L)
 740      CONTINUE
  30      CONTINUE
          CALL POLIN
C
```

```
      IF (NTAPE.EQ.0) GO TO 101
  100 CONTINUE
      READ  (8) NST
      READ  (8) SE,SEP,SEN,SES
      READ  (8) U,UP,V,VP
      READ (8) R
      READ (8) RP
      READ (8) C,DFL,NFLI
      READ (8) ATR,DTR,CTR,FLTR
      IF (NST.LT.NTAPE) GO TO 100
  101 CONTINUE
C               WRITE INITIAL VALUES
      INI=0
C
      WRITE(6,1) (TITL(J),J=1,18)
 12   FORMAT(/1X,29HINITIAL DEPTHS  IN .1          .3HN= ,I3,2H ,,I3)
      NPR1=1
      NPR2=32
   13 CONTINUE
      IF (NPR2.GT.NMAX) NPR2=NMAX
      WRITE (6,12) NPR1,NPR2
      DO 9 M=1,MMAX
      DO 40 N=NPR1,NPR2
40    NA(N)=H(N,M)*10. +.01
    9 WRITE(6,6001) M,(NA(N),N=NPR1,NPR2)
 6001 FORMAT(1H ,I2,1X,32I4)
      NPR1=NPR2+1
      NPR2=NPR2+32
      IF (NPR1.LE.NMAX) GO TO 13
       WRITE(6,1) (TITL(J),J=1,18)
 15   FORMAT(/1X,28HC VALUES UNTIL NEXT PRINTOUT,5X,3HN= ,I3,2H ,,I3)
  10  FORMAT(1H ,I2,1X,32F4.0)
      NPR1=1
      NPR2=32
   14 CONTINUE
      IF (NPR2.GT.NMAX) NPR2=NMAX
      WRITE (6,15) NPR1,NPR2
      DO 16 JA=1,MMAX
  16  WRITE(6,10) JA,(C(N,JA),N=NPR1,NPR2)
      NPR1=NPR2+1
      NPR2=NPR2+32
      IF (NPR1.LE.NMAX) GO TO 14
      NPR1=1
      NPR2=16
   62 CONTINUE
      IF (NPR2.GT.NMAX) NPR2=NMAX
      WRITE (6,60) NPR1,NPR2
      DO 64 JA=1,MMAX
   64 WRITE (6,61) JA,(DIFCO(N,JA),N=NPR1,NPR2)
      NPR1=NPR2+1
      NPR2=NPR2+16
      IF (NPR1.LE.NMAX) GO TO 62
   60 FORMAT (/1X,'DIFFUSION COEFFICIENTS',5X,'N= ',I3,' ,',I3)
   61 FORMAT (1X,I2,16(1X,F6.1))
      NPR1=1
      NPR2=16
   67 CONTINUE
      IF (NPR2.GT.NMAX) NPR2=NMAX
      WRITE (6,65) NPR1,NPR2
      DO 69 JA=1,MMAX
   69 WRITE (6,66) JA,(VMAN(N,JA),N=NPR1,NPR2)
      NPR1=NPR2+1
      NPR2=NPR2+16
      IF (NPR1.LE.NMAX) GO TO 67
```

```
1         65 FORMAT (/1X,'MANNING COEFFICIENTS',5X,'N= ',I3,' ,',I3)
          66 FORMAT (1X,I2,16(1X,F6.3))
             RETURN
             END
```

```
1
      SUBROUTINE SEPU
      COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD DISP=OLD,DSN=N.N2640.      JAMCOM72
// DD *,DCB=BLKSIZE=80
      N=2
 111  CONTINUE
      IF(N.EQ.NMAX) GO TO 110
      NNN=N+1
      NN=N-1
      M=1
      ST=SEP(N,M)
      IF(ST.EQ.0.) GO TO 124
C     WATER BOUND  ONLY AT M=1
      GAMMA=0.5
      MF=2
      MFF   =MF-1
      TEMP10=U(NNN,MFF)
      IF(TEMP10.EQ.0.)  TEMP10=                  U(NN,MFF)
      TEMP11=U(NN,MFF)
      IF(TEMP11.EQ.0.)  TEMP11=                  U(NNN,MFF)
      ALPHA=1.
      TEMP12    =SQRT(U(N,MFF)**2+(((V(N,MF) + V(NN,MF))**2)/16.))/
     2((SE(N,MFF) + SE(N,MF)+ H(N,MFF)+ H(NN,MFF))*((C(N,MFF) +C(N,MF))
     3**2))*C4
      RX(MFF)=C1/(1. +C2*(U(N,MF)- U(N,MFF))*(1.-ALPHA)*2.0+TEMP12)
      S(MFF)=(U(N,MFF)+ C1* SEP(N,MFF)-C1*(SEN(N,MF)-SEN(N,MFF))
     1 -U(N,MFF)*TEMP12
     3          + (V(N,MF) +V(NN,MF))* 0.5*(AT* F(N) -(1.-GAMMA)* C2 *
     4(TEMP10    -U(N,MFF)) -GAMMA*C2*(U(N,MFF) - TEMP11 )))/
     5(1.  +  C2*(U(N,MF) - U(N,MFF))*(1.-ALPHA)*2.0+TEMP12)
      M=M+1
      GO TO 123
 121  CONTINUE
      RX(M)=0.0
      S(M)=0.
      M=M+1
 122  CONTINUE
      P(M)=0.
      Q(M)=0.
      IF(M.EQ.MMAXM) GO TO 150
 124  CONTINUE
      RX(M)=0.0
      S(M)=0.
      M=M+1
      CE=C(N,M)
      IF(CE.EQ.0.) GO TO 122
 123  CONTINUE
      MMM=M+1
      MM=M-1
      HVT=H(N,M)+ H(N,MM)+SE(N,M) +SE(NNN,M)
      HVB=H(NN,M)+H(NN,MM)+SE(N,M)+SE(NN,M)
      HUR=H(N,M)+ H(NN,M) +SE(N,M)+SE(N,MMM)
      HUL=H(N,MM)+H(NN,MM)+SE(N,M)+SE(N,MM)
      TEMP2= 1. + .5*C2*HUL* RX(MM)
      A(M)=SE(N,M) +.5*C2*(HVB*V(NN,M) - HVT *V(N,M))
      P(M)=.5*C2* HUR/TEMP2
      Q(M)=(A(M) +.5*C2*HUL*S(MM))/TEMP2
      IF(M.EQ.MMAXM) GO TO 150
      CE=C(N,MMM)
      IF(CE.EQ.0.) GO TO 121
      GAMMA = 0.5
      TEMP10=U(NNN,M)
      IF(TEMP10.EQ.0.)  TEMP10 =              U(NN,M)
```

```
       TEMP11=U(NN,M)
       IF(TEMP11.EQ.0.)  TEMP11 =              U(NNN,M)
       TEMP6 =AT*F(N) -(1.-GAMMA)*C2*(TEMP10 -U(N,M))- GAMMA* C2*
      1(U(N,M) - TEMP11)
       TEMP6 = 0.5*TEMP6
       TEMP7    =SQRT( U(N,M)**2 +(((V(N,M)+V(N,MMM) +V(NN,M) + V(NN,MMM)
      2)**2)/16.))/(HUR*((C(N,M)+C(N,MMM))**2))* C4
       B(M) = U(N,M) + TEMP6  *(V(N,M)+V(N,MMM)+V(NN,M) +V(NN,MMM))
      1-U(N,M)*TEMP7-C1*(SEN(N,MMM)-SEN(N,M))-WINDU/HUR
        ALPHA = 0.5
       TEMP1 =1.+C2*(AG*P(M)+U(N,MMM)-U(N,MM))+TEMP7
       RX(MJ=  C1/TEMP1
       S(M)=(B(M)+   C1*Q(M))/TEMP1
       M=M+1
       GO TO 123
  150  CONTINUE
       UP(N,M)=0.
  151  CONTINUE
  112  CONTINUE
       MM=M-1
       SEP(N,M) = -P(M)*UP(N,M)+Q(M)
       IF (C(N,M).EQ.0.0) GO TO 152
       WET=H(N,M)+H(NN,M)+H(N,MM)+H(NN,MM)+SEP(N,M)*4.0
       IF(WET.LT.0.) GO TO 113
   152 CONTINUE
       UP(N,MM) =-RX(MM)*SEP(N,M)+S(MM)
  106  M = M-1
       IF(M.NE.1) GO TO 112
       N=NNN
       GO TO 111
  113  C(N,M)=0.
       SEP(N,M)=0.
       V(N,M)=0.
       V(NN,M)=0.
       U(N,M)=0.
       U(N,MM)=0.
       SES(N,M)=SE(N,M)
       SE(N,M)=0.
       SEN(N,M)=0.
       WRITE(6,115) NST,N,M,SES(N,M)
  115  FORMAT(1X,4HNST=,I4,2X,2HN=,I3,2HM=,I3,2X,4HSES=,F7.4,
      *16HVOLUME NEG. SEPU)
       N=NN
       IF(N.EQ.1) N=2
       GO TO 111
  110  CONTINUE
C******
       CALL DIFU
       DO 173 IN2=1,NSRC
       NY=NINT(IN2)
       MY=MINT(IN2)
       SE(NY,MY)=SE(NY,MY)-AT*DISCH(IN2)
   173 CONTINUE
       IF (MOD(NST,NFLOD).NE.0) GO TO 190
       CSETH=.5*CSET
       DO 360  M=2,MMAXM
       MM=M-1
       MMM=M+1
       N=2
       CT2=C(2,M)
       CT3=C(3,M)
  363  CONTINUE
       IF(N.EQ.NMAXN) GO TO 367
       NN=N
```

```
1          N=N+1
           NNN=N+1
           CT1=CT2
           CT2=CT3
           CT3=C(NNN,M)
           CL2=C(N,MM)
           CR2=C(N,MMM)
           IF(CT2.EQ.0.) GO TO 364
            ST=SE(N,M)
           STP=SEP(N,M)
           IF(ST.LT.STP) STP=ST
           SET=STP+STP
           T1=SET+H(N,M)+H(N,MM)-VAR
           IF (T1.LT.0.0) GO TO 366
           T2=SET+H(NN,M)+H(NN,MM)-VAR
           IF (T2.LT.0.0) GO TO 366
           T3=SET+H(N,M)+H(NN,M)-VAR
           IF (T3.LT.0.0) GO TO 366
           T4=SET+H(N,MM)+H(NN,MM)-VAR
           IF (T4.LT.0.0) GO TO 366
           IF (T1.LT.VAR) GO TO 10
           IF (T2.LT.VAR) GO TO 10
           IF (T3.LT.VAR) GO TO 10
           IF (T4.LT.VAR) GO TO 10
           GO TO 363
        10 CONTINUE
           C(N,M)=CSETH
           GO TO 363
       366 CONTINUE
           H1=H(N,M)+H(N,MM)
           H2=H(N,M)+H(NN,M)
           H3=H(NN,M)+H(NN,MM)
           H4=H(N,MM)+H(NN,MM)
           IF (H1.GT.H2) GO TO 7
           IF (H1.GT.H3) GO TO 6
           IF (H1.GT.H4) GO TO 5
           HMIN=H1
           GO TO 4
         7 IF (H2.GT.H3) GO TO 6
           IF (H2.GT.H4) GO TO 5
           HMIN=H2
           GO TO 4
         6 IF (H3.GT.H4) GO TO 5
           HMIN=H3
           GO TO 4
         5 HMIN=H4
         4 CONTINUE
            STA=SEP(N,M)
            DRY=STA+.5*HMIN
            IF(DRY.LT.0.) GO TO 11
            SES(N,M)=STA
           GO TO 12
        11 CONTINUE
           SES(N,M)=STA
           WRITE (6,13) NST,M,N,SES(N,M),STA,WATADD,S21
        13 FORMAT (1X,4HNST=,I5,2X,2HM=,I3,2X,2HN=,I3,2X,4HSES=,F7.4,
          *            2X,4HSTA=,F7.4,2X,7HWATADD=,F10.2,2X,'S21=',E13.6)
        12 CONTINUE
           SEP(N,M)=0.
           SE(N,M)=0.
           UP(N,M)=0.
           UP(N,MM)=0.
           V(N,M)=0.
           V(NN,M)=0.
```

```
      VP(N,M)=0.
      VP(NN,M)=0.
      C(N,M)=0.0
      CT2=0.0
      GO TO 363
 364  CONTINUE
C**** BEGIN TESTS FOR FLOODING
      CALL FLO(CT1,CT2,CT3,CL2,CR2,NN,NNN,MM,MMM)
      GO TO 363
 367  CONTINUE
 360  CONTINUE
 190  CONTINUE
      RETURN
      END
```

```
1
      SUBROUTINE FLO(CT1,CT2,CT3,CL2,CR2,NN,NNN,MM,MMM)
      COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD DISP=OLD,DSN=N.N2640.       .JAMCOM72
// DD *,DCB=BLKSIZE=80
      SS=SES(N,M)
      VAP=SS+SS
      KCO=1
      IF(CT1.NE.0.) KCO=KCO+1
      IF(CT3.NE.0.) KCO=KCO+1
      IF(CL2.NE.0.) KCO=KCO+1
      IF(CR2.NE.0.) KCO=KCO+1
      GO TO (363,391,392,393,374),KCO
 391  IF(CT3.NE.0.) GO TO 365
      IF(CT1.NE.0.) GO TO 394
      IF(CL2.NE.0.) GO TO 381
      GO TO 380
 392  CONTINUE
      IF(CT1.NE.0.) GO TO  395
      IF((CL2.NE.0.).AND.(CR2.NE.0.)) GO TO 382
      IF((CL2.NE.0.).AND.(CT3.NE.0.)) GO TO 384
      GO TO 385
 395  CONTINUE
      IF(CT3.NE.0.) GO TO 368
      IF(CR2.NE.0.) GO TO 372
      GO TO 371
 393  CONTINUE
      IF(CT3.EQ.0.) GO TO 370
      IF(CR2.EQ.0) GO TO 375
      IF(CL2.EQ.0.) GO TO 376
      GO TO 386
 394  CONTINUE
      ST=SE(NN,M)
      STP=SEP(NN,M)
      IF(ST.LT.STP) STP=ST
      SET=STP+STP-VAP
      IF (SET.LT.0.0) GO TO 363
      DRY=H(NN,M)+H(NN,MM)+SS+SEP(NN,M)
      IF (DRY.LT.0.0) GO TO 363
      SEP(N,M)=SS
      SE(N,M)=SS
      SEN(N,M)=SS
      GO TO 363
 365  CONTINUE
      ST=SE(NNN,M)
      STP=SEP(NNN,M)
      IF(ST.LT.STP) STP=ST
      SET=STP+STP-VAP
      IF (SET.LT.0.0) GO TO 363
      DRY=H(N,M)+H(N,MM)+SS+SEP(NNN,M)
      IF (DRY.LT.0.0) GO TO 363
      SE(N,M)=SS
      SEP(N,M)=SS
      SEN(N,M)=SS
      GO TO 363
 368  CONTINUE
      SET=SEP(NN,M)+SEP(NNN,M)-VAP
      STP =SE(NN,M)+SE(NNN,M) -VAP
      IF(STP.LT.SET) SET=STP
      IF (SET.LT.0.0) GO TO 363
      DRY=H(NN,M)+H(NN,MM) +SS+SEP(NN,M)
      IF(DRY.LT.0.) GO TO 363
      DRY=H(N,M)+H(N,MM) +SS+SEP(NNN,M)
      IF(DRY.LT.0.) GO TO 363
```

```
1         SE(N,M)=SS
          SEP(N,M)=SS
          SEN(N,M)=SS
          GO TO 363
      370 CONTINUE
          SET=(SEP(NN,M)+SEP(N,MMM)+SEP(N,MM))*2./3.-VAP
          IF (SET.LT.0.0) GO TO 363
          DRY=H(NN,M)+H(NN,MM)+SS +SEP(NN,M)
          IF(DRY.LT.0.) GO TO 363
          DRY=H(N,M)+H(NN,M)+SS+SEP(N,MMM)
          IF(DRY.LT.0.) GO TO 363
          DRY=H(N,MM)+H(NN,MM)+SS +SEP(N,MM)
          IF(DRY.LT.0.) GO TO 363
          SE(N,M)=SS
          SEP(N,M)=SS
          SEN(N,M)=SS
          GO TO 363
      371 CONTINUE
          SET=SEP(NN,M)+SEP(N,MM)-VAP
          IF (SET.LT.0.0) GO TO 363
          DRY=H(NN,MM)+H(NN,M)+SS+SEP(NN,M)
          IF(DRY.LT.0.) GO TO 363
          DRY=H(NN,MM)+H(N,MM)+SS+SEP(N,MM)
          IF(DRY.LT.0.) GO TO 363
          SE(N,M)=SS
          SEP(N,M)=SS
          SEN(N,M)=SS
          GO TO 363
      372 CONTINUE
          SET=SEP(NN,M)+SEP(N,MMM)-VAP
          IF (SET.LT.0.0) GO TO 363
          DRY=H(NN,MM)+H(NN,M)+SS+SEP(NN,M)
          IF(DRY.LT.0.) GO TO 363
          DRY=H(NN,M)+H(N,M)+SS+SEP(N,MMM)
          IF(DRY.LT.0.) GO TO 363
          SE(N,M)=SS
          SEP(N,M)=SS
          SEN(N,M)=SS
          GO TO 363
      374 CONTINUE
    C   ALL 4 POINTS WATER
          SET=(SEP(NNN,M)+SEP(NN,M)+SEP(N,MMM)+SEP(N,MM))/2.-VAP
          IF (SET.LT.0.0) GO TO 363
          DRY=H(NN,MM)+H(NN,M)+SS+SEP(NN,M)
          IF(DRY.LT.0.) GO TO 363
          DRY=H(NN,M)+H(N,M)+SS+SEP(N,MMM)
          IF(DRY.LT.0.) GO TO 363
          DRY=H(NN,MM)+H(N,MM)+SS+SEP(N,MM)
          IF(DRY.LT.0.) GO TO 363
          DRY=H(N,M)+H(N,MM)+SS+SEP(NNN,M)
          IF(DRY.LT.0.) GO TO 363
          SE(N,M)=SS
          SEP(N,M)=SS
          SEN(N,M)=SS
          GO TO 363
      375 CONTINUE
          SET=(SEP(NNN,M)+SEP(NN,M)+SEP(N,MM))*2./3.-VAP
          IF (SET.LT.0.0) GO TO 363
          DRY=H(N,M)+H(N,MM)+SS+SEP(NNN,M)
          IF(DRY.LT.0.) GO TO 363
          DRY=H(NN,MM)+H(NN,M)+SS+SEP(NN,M)
          IF(DRY.LT.0.) GO TO 363
          DRY=H(NN,MM)+H(N,MM)+SS+SEP(N,MM)
          IF(DRY.LT.0.) GO TO 363
```

```
      SE(N,M)=SS
      SEP(N,M)=SS
      SEN(N,M)=SS
      GO TO 363
  376 CONTINUE
      SET=(SEP(NNN,M)+SEP(NN,M)+SEP(N,MMM))*2./3.-VAP
      IF (SET.LT.0.0) GO TO 363
      DRY=H(N,M)+H(N,MM)+SS+SEP(NNN,M)
      IF(DRY.LT.0.) GO TO 363
      DRY=H(NN,M)+H(NN,MM)+SS+SEP(NN,M)
      IF(DRY.LT.0.) GO TO 363
      DRY=H(N,M)+H(NN,M)+SS+SEP(N,MMM)
      IF(DRY.LT.0.) GO TO 363
      SE(N,M)=SS
      SEP(N,M)=SS
      SEN(N,M)=SS
      GO TO 363
  380 CONTINUE
      ST=SE(N,MMM)
        STP=SEP(N,MMM)
      IF(ST.LT.STP) STP=ST
      SET=STP+STP-VAP
      IF (SET.LT.0.0) GO TO 363
      DRY=H(N,M)+H(NN,M)+SS+SEP(N,MMM)
      IF (DRY.LT.0.0) GO TO 363
      SE(N,M)=SS
      SEP(N,M)=SS
      SEN(N,M)=SS
      GO TO 363
  381 CONTINUE
      ST=SE(N,MM)
      STP=SEP(N,MM)
       IF(ST.LT.STP) STP=ST
      SET=STP+STP-VAP
      IF (SET.LT.0.0) GO TO 363
      DRY=H(N,MM)+H(NN,MM)+SS+SEP(N,MM)
      IF (DRY.LT.0.0) GO TO 363
      SE(N,M)=SS
      SEP(N,M)=SS
      SEN(N,M)=SS
      GO TO 363
  382 CONTINUE
      SET= SEP(N,MM)+SEP(N,MMM) -VAP
      STP =SE(N,MM)+SE(N,MMM) -VAP
      IF(STP.LT.SET) SET=STP
      IF (SET.LT.0.0) GO TO 363
      DRY=H(NN,MM)+H(N,MM)+SS+SEP(N,MM)
      IF(DRY.LT.0.) GO TO 363
      DRY=H(NN,M)+H(N,M)+SS+SEP(N,MMM)
      IF(DRY.LT.0.) GO TO 363
      SE(N,M)=SS
      SEP(N,M)=SS
      SEN(N,M)=SS
       GO TO 363
  386 CONTINUE
      SET=(SEP(NNN,M)+SEP(N,MM)+SEP(N,MMM))*2./3.-VAP
      IF (SET.LT.0.0) GO TO 363
      DRY=H(N,M)+H(N,MM)+SS+SEP(NNN,M)
      IF(DRY.LT.0.) GO TO 363
      DRY=H(NN,MM)+H(N,MM)+SS+SEP(N,MM)
      IF(DRY.LT.0.) GO TO 363
      DRY=H(NN,M)+H(N,M)+SS+SEP(N,MMM)
      IF(DRY.LT.0.) GO TO 363
      SE(N,M)=SS
```

```
1          SEP(N,M)=SS
           SEN(N,M)=SS
           GO TO 363
  384  CONTINUE
           SET=SEP(NNN,M)+SEP(N,MM)-VAP
           STP =SE(NNN,M)+SE(N,MM)-VAP
           IF(STP.LT.SET) SET=STP
           IF (SET.LT.0.0) GO TO 363
           DRY=H(N,M)+H(N,MM)+SS+SEP(NNN,M)
           IF(DRY.LT.0.) GO TO 363
           DRY=H(NN,MM)+H(N,MM)+SS+SEP(N,MM)
           IF(DRY.LT.0.) GO TO 363
           SE(N,M)=SS
           SEP(N,M)=SS
           SEN(N,M)=SS
           GO TO 363
  385  CONTINUE
           SET=SEP(NNN,M)+SEP(N,MMM)-VAP
           STP =SE(NNN,M)+SE(N,MMM)-VAP
           IF(STP.LT.SET) SET=STP
           IF (SET.LT.0.0) GO TO 363
           DRY=H(N,M)+H(N,MM)+SS+SEP(NNN,M)
           IF(DRY.LT.0.) GO TO 363
           DRY=H(NN,M)+H(N,M)+SS+SEP(N,MMM)
           IF(DRY.LT.0.) GO TO 363
           SE(N,M)=SS
           SEP(N,M)=SS
           SEN(N,M)=SS
           GO TO 363
 363   CONTINUE
           RETURN
           END
```

```
1
      SUBROUTINE SEPV
      COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD DISP=OLD,DSN=N.N2640.      .JAMCOM72
// DD *,DCB=BLKSIZE=80
      M=2
 111  CONTINUE
      IF(M.EQ.MMAX) GO TO 110
      MM=M-1
      MMM=M+1
      N=1
      ST=SEP(N,M)
      IF(ST.EQ.0.) GO TO 324
C     WATERBOUND  ONLY AT N=1
      NF=2
      NFF=NF-1
      TEMP10=V(NFF,MMM)
      IF(TEMP10.EQ.0.)  TEMP10=                 V(NFF,MM)
      TEMP11=V(NFF,MM)
      IF(TEMP11.EQ.0.)  TEMP11=                 V(NFF,MMM)
      DELTA=0.5
      BETA =1.
      TEMP12   =SQRT(V(NFF,M)**2 +(((U(NF,M)+U(NF,MM))**2)/16.))/
     2((SE(NFF,M)+SE(NF,M)+ H(NFF,M)  +H(NFF,MM))*((C(NFF,M)+C(NF,M))
     3**2))*C4
      RX(NFF)=C1/(1.+C2*(V(NF,M)-V(NFF,M))*(1.-BETA)*2.0+TEMP12)
      S(NFF)=(V(NFF,M)+C1*SEP(NFF,M)-C1*(SEN(NF,M)-SEN(NFF,M))
     1-V(NFF,M)*TEMP12
     3          -0.5*(AT* F(N)  +(1.-DELTA)*C2*(TEMP10-V(NFF,M))
     4+DELTA *C2*(V(NFF,M)- TEMP11))*(U(NF,M)+ U(NF,MM)))/
     5(1. +C2*(1.-BETA) *(V(NF,M)- V(NFF,M))*2.0+TEMP12)
      N=N+1
      GO TO 323
 321  CONTINUE
      RX(N)=0.0
      S(N)=0.
      N=N+1
 322  CONTINUE
      P(N)=0.
      Q(N)=0.
      IF(N.EQ.NMAXN) GO TO 350
 324  CONTINUE
      RX(N)=0.0
      S(N)=0.
      N=N+1
      CE=C(N,M)
      IF(CE.EQ.0.) GO TO 322
 323  CONTINUE
      NNN=N+1
      NN=N-1
      HUL=H(N,MM)+H(NN,MM)+SE(N,M)+SE(N,MM)
      HVT=H(N,M)+ H(N,MM)+SE(N,M) +SE(NNN,M)
      HVB=H(NN,M)+H(NN,MM)+SE(N,M)+SE(NN,M)
      HUR=H(N,M)+ H(NN,M) +SE(N,M)+SE(N,MMM)
      TEMP2=1.+ .5*C2*HVB*RX(NN)
      A(N)=SE(N,M)+.5*C2*(HUL*U(N,MM) - HUR* U(N,M))
      P(N)=.5*C2*HVT/TEMP2
      Q(N)=(A(N)+ .5*C2*HVB*S(NN))/TEMP2
      IF(N.EQ.NMAXN) GO TO 350
      CE=C(NNN,M)
      IF(CE.EQ.0.) GO TO 321
      DELTA = 0.5
      TEMP10=V(N,MMM)
      IF(TEMP10.EQ.0.) TEMP10 =                V(N,MM)
```

```
          TEMP11=V(N,MM)
          IF(TEMP11.EQ.0.) TEMP11 =                 V(N,MMM)
          TEMP6 =AT*F(N)+(1.-DELTA)*C2*(TEMP10-V(N,M))
         1               +DELTA*C2*(V(N,M)-TEMP11)
          TEMP6 = 0.5*TEMP6
          TEMP7      = SQRT (V(N,M)**2 +(((U(N,M)+ U(NNN,M) +U(N,MM)+ U(NNN,M
         2M))**2)/16.))/(HVT*((C(N,M)+C(NNN,M))**2))*C4
          B(N) = V(N,M)  -TEMP6   *(U(N,M) + U(NNN,M) +U(NNN,MM)+U(N,MM))
         1-  V(N,M) * TEMP7-C1*(SEN(NNN,M)-SEN(N,M))-WINDV/HVT
           BETA = 0.5
          TEMP1 =1.+C2*(AG*P(N)+V(NNN,M)-V(NN,M))+TEMP7
          RX(N)=  C1/TEMP1
          S(N)=(B(N)+   C1*Q(N))/TEMP1
          N=N+1
          GO TO 323
  350     CONTINUE
          VP(N,M)=0.
  351     CONTINUE
  112     CONTINUE
          NN =N-1
          SEP(N,M) = -P(N)*VP(N,M)+Q(N)
          IF (C(N,M).EQ.0.0) GO TO 152
          WET=H(N,M)+H(NN,M)+H(N,MM)+H(NN,MM)+SEP(N,M)*4.
          IF(WET.LT.0.) GO TO 113
   152    CONTINUE
          VP(NN,M) =-RX(NN)*SEP(N,M)+S(NN)
  306     N = N-1
          IF(N.NE.1) GO TO 112
          M=MMM
          GO TO 111
  113     C(N,M)=0.
          SEP(N,M)=0.
          V(N,M)=0.
          V(NN,M)=0.
          U(N,M)=0.
          U(N,MM)=0.
          SES(N,M)=SE(N,M)
          SE(N,M)=0.
          SEN(N,M)=0.
          WRITE(6,115) NST,N,M,SES(N,M)
  115     FORMAT(1X,4HNST=,I4,2X,2HN=,I3,2HM=,I3,2X,4HSES=,F7.4,
         *16HVOLUME NEG. SEPV)
          M=MM
          IF(M.EQ.1) M=2
          GO TO 111
  110     CONTINUE
  310     CONTINUE
          IF (MOD(NST,NSMO).NE.2) GO TO 191
          DO 202 N=1,NMAX
          DO 202 M=1,MMAX
          SEP(N,M)=.5*(SEP(N,M)+SEN(N,M))
          SE(N,M)=.5*(SE(N,M)+R(1,N,M))
          VP(N,M)=.5*(VP(N,M)+V(N,M))
          U(N,M)=.5*(U(N,M)+R(2,N,M))
  202     CONTINUE
          DO 192 IN2=1,NSRC
          NY=NINT(IN2)
          MY=MINT(IN2)
          SE(NY,MY)=SE(NY,MY)+.5*AT*DISCH(IN2)
  192     CONTINUE
  191     CONTINUE
C******
          CALL DIFV
          DO 174 IN2=1,NSRC
```

```
1           NY=NINT(IN2)
            MY=MINT(IN2)
            SE(NY,MY)=SE(NY,MY)-AT*DISCH(IN2)
        174 CONTINUE
        390 CONTINUE
            IF(MOD(NST  ,NVGR).EQ.0) GO TO 1192
       1193 CONTINUE
            DO 401 N=1,NMAX
            DO 401 M=1,MMAX
            SEN(N,M)=SE(N,M)
            SE(N,M)=SEP(N,M)
            V(N,M)=VP(N,M)
        401 CONTINUE
            GO TO 1191
       1192 CONTINUE
            IF(MOD(NST,NSMO).EQ.1) GO TO 1193
            DO 1401 N=1,NMAX
            DO 1401 M=1,MMAX
            STEMP=V(N,M)
            V(N,M)=VP(N,M)
            VP(N,M)=STEMP
            SEN(N,M)=SE(N,M)
            SE(N,M)=SEP(N,M)
       1401 CONTINUE
       1191 CONTINUE
            RETURN
            END
```

1

```
         SUBROUTINE OUT
         COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD DISP=OLD,DSN=N.N2640.        .JAMCOM72
// DD *,DCB=BLKSIZE=80
       2 FORMAT (16(1X,F7.3))
       3 FORMAT (1H0,8X,19HSECOND HALF OF STEP,I6,4X,2HL=,I1)
       5 FORMAT (1H1,8X,18HFIRST HALF OF STEP,I6,4X,2HL=,I1)
       6 FORMAT (1X,18A4)
C        GO TO 8200
         DO 8200 L=1,LMAX
         WRITE (6,5) NST,L
         WRITE (6,6) (POLT(L,J),J=1,15)
         WRITE (6,200)
     200 FORMAT (10X,'INCLUDING PROCESSES IN TIDAL FLATS')
    7110 FORMAT (1H0,5X,3HN= ,I3,2H ,,I3)
         WRITE (6,3) NST,L
         WRITE (6,6) (POLT(L,J),J=1,15)
         WRITE (6,200)
         NPR1=1
         NPR2=16
    1351 CONTINUE
         IF (NPR2.GT.NMAX) NPR2=NMAX
         WRITE (6,7110) NPR1,NPR2
         DO 100 M=1,MMAX
     100 WRITE(6,2) (R(L,N,M),N=NPR1,NPR2)
         NPR1=NPR2+1
         NPR2=NPR2+16
         IF (NPR1.LE.NMAX) GO TO 1351
    8200 CONTINUE
    5020 FORMAT(1H1,26HSE FOR SECOND HALF OF STEP  I5)
         WRITE(6,5020) NST
         NPR1=1
         NPR2=32
    7100 CONTINUE
         IF (NPR2.GT.NMAX) NPR2=NMAX
         WRITE (6,7110) NPR1,NPR2
         DO 6000 M=1,MMAX
         DO 6006 N=NPR1,NPR2
    6006     NA(N)=SEN(N,M)*100.
    6000 WRITE(6,6001) M,(     NA(N),N=NPR1,NPR2)
         NPR1=NPR2+1
         NPR2=NPR2+32
         IF (NPR1.LE.NMAX) GO TO 7100
    6001 FORMAT(1H ,I2,1X,32I4)
         WRITE(6,7020) NST
    7020 FORMAT(1H1,27HSEP FOR SECOND HALF OF STEP  I5)
         NPR1=1
         NPR2=32
    7101 CONTINUE
         IF (NPR2.GT.NMAX) NPR2=NMAX
         WRITE (6,7110) NPR1,NPR2
         DO 7000 M=1,MMAX
         DO 7006 N=NPR1,NPR2
    7006     NA(N)=SEP(N,M)*100.
    7000 WRITE(6,6001) M,(     NA(N),N=NPR1,NPR2)
         NPR1=NPR2+1
         NPR2=NPR2+32
         IF (NPR1.LE.NMAX) GO TO 7101
C        GO TO 8201
    5021 FORMAT(1H1,41HAVERAGED V AND VP FOR SECOND HALF OF STEP  I5)
         WRITE(6,5021) NST
         NPR1=1
         NPR2=32
```

```
1      7102 CONTINUE
            IF (NPR2.GT.NMAX) NPR2=NMAX
            WRITE (6,7110) NPR1,NPR2
            DO 6003 M=1,MMAX
            DO 6007 N=NPR1,NPR2
       6007     NA(N)=VP(N,M)*100.
       6003 WRITE(6,6001) M,(     NA(N),N=NPR1,NPR2)
            NPR1=NPR2+1
            NPR2=NPR2+32
            IF (NPR1.LE.NMAX) GO TO 7102
       5022 FORMAT(1H1,41HAVERAGED U AND UP FOR SECOND HALF OF STEP  I5)
            WRITE(6,5022) NST
            NPR1=1
            NPR2=32
       7103 CONTINUE
            IF (NPR2.GT.NMAX) NPR2=NMAX
            WRITE (6,7110) NPR1,NPR2
            DO 6004 M=1,MMAX
            DO 6008 N=NPR1,NPR2
       6008     NA(N)=U(N,M)*100.
       6004 WRITE(6,6001) M,(     NA(N),N=NPR1,NPR2)
            NPR1=NPR2+1
            NPR2=NPR2+32
            IF (NPR1.LE.NMAX) GO TO 7103
       8201 CONTINUE
            WRITE (6,8000) (L,L=1,LMAX)
       8000 FORMAT (1H0,4X,1HM,4X,1HN,4X,
           *                    2HSE,5X,3HSEN,5X,3HSEP,7X,1HU,7X,1HV,
           *                    6X,1HR,6(I1,7X))
       8050 FORMAT (1X,2I5,11(1X,F7.4))
            DO 8100 K=1,KPOL
            M=MPOL(K)
            N=NPOL(K)
            WRITE (6,8050) M,N,
           *               SE(N,M),SEN(N,M),SEP(N,M),U(N,M),VP(N,M),
           *               (R(L,N,M),L=1,LMAX)
       8100 CONTINUE
            RETURN
            END
```

1

```
      SUBROUTINE FLOW
      COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD DISP=OLD,DSN=N.N2640.      .JAMCOM72
// DD *,DCB=BLKSIZE=80
      DO 820 I=1,NTRA
      M=MIT(I)
      N1=NIT1(I)
      N2=NIT2(I)
      DO 810 N=N1,N2
      IF (C(N,M).EQ.0.0) GO TO 810
      IF (C(N,M+1).EQ.0.0) GO TO 810
      STEMP=.5*(SE(N,M)+SEP(N,M)+SE(N,M+1)+SEP(N,M+1))
      HTEMP=AT*UP(N,M)*(H(N,M)+H(N-1,M)+STEMP)*AL
      FLTR(I)=FLTR(I)+HTEMP
      TCR=H(N-1,M)+H(N,M)+SEP(N,M)+SEP(N,M+1)
      DX1=CDAL*ABS(UP(N,M))*TCR/(C(N,M)+C(N,M+1))*AL
     *        +DIFCO(N,M)+DIFCO(N,M+1)
      DO 1 L=1,LMAX
      RP1=RP(L,N,M)
      RP2=RP(L,N,M+1)
      ATR(L,I)=ATR(L,I)+HTEMP*(RP1+RP2)*.5
      DTR(L,I)=DTR(L,I)+DX1*(RP1-RP2)*TCR*AT*.5
      CTR(L,I)=DTR(L,I)+ATR(L,I)
    1 CONTINUE
  810 CONTINUE
  820 CONTINUE
      DO 700 I=1,NOWL
      M=MWL(I)
      N=NWL(I)
      ZWL(I)=(SEN(N,M)+SE(N,M)+SEP(N,M))/3.0
  700 CONTINUE
      DO 710 I=1,NOCUR
      M=MC(I)
      N=NC(I)
      ZCUR(I)=.25*SQRT((U(N,M)+UP(N,M)+U(N,M-1)+UP(N,M-1))**2
     *             +(VP(N,M)+VP(N,M)+VP(N-1,M)+VP(N-1,M))**2)
  710 CONTINUE
      IF (MOD(NST,NWLC).NE.0) GO TO 780
      WRITE (6,720) NST
  720 FORMAT (1H1,5X,5HTIME=,I5/1H0,3X,1HM,4X,1HN,5X,2HWL)
      WRITE (6,730) ((MWL(I),NWL(I),ZWL(I)),I=1,NOWL)
  730 FORMAT (1X,I4,1X,I4,2X,F7.4)
      WRITE (6,740)
  740 FORMAT (1H0,3X,1HM,4X,1HN,2X,7HCURRENT)
      WRITE (6,730) ((MC(I),NC(I),ZCUR(I)),I=1,NOCUR)
      WRITE (6,830)
  830 FORMAT (2H0 ,3HLOC,4X,9HTRANSPORT)
      DO 835 I=1,NTRA
      WRITE (6,840) BIT(I),FLTR(I)
      WRITE (6,845) (ATR(L,I),L=1,LMAX)
      WRITE (6,845) (DTR(L,I),L=1,LMAX)
      WRITE (6,845) (CTR(L,I),L=1,LMAX)
  835 CONTINUE
  780 IF (MOD(NST,NWLT).NE.0) GO TO 790
      DO 2 K=1,KPOL
      M=MPOL(K)
      N=NPOL(K)
      DO 3 L=1,LMAX
      GRO(L,K)=(1.0-GAMM)*RP(L,N,M)+.25*GAMM*(RP(L,N,M+1)+RP(L,N,M-1)
     *                             +RP(L,N+1,M)+RP(L,N-1,M))
    3 CONTINUE
    2 CONTINUE
      WRITE (9) NST,FLTR,ATR,DTR,CTR,ZWL,ZCUR,GRO
```

```
1       790 CONTINUE
            RETURN
        840 FORMAT (1X,A4,1X,E12.5)
        845 FORMAT (5X,6(1X,E12.5))
            END
```

1

```
      SUBROUTINE DIFU
      COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD DISP=OLD,DSN=N.N2640.        JAMCOM72
// DD *,DCB=BLKSIZE=80
      IS=0
      DO 80 N=NB1,NB2
      J=N-NB1+1
      IF (UP(N,1).LT.0.0) GO TO 70
      IF (NFLI(J).LT.NFL) GO TO 60
      DO 500 L=1,LMAX
  500 DFL(L,J)=(R(L,N,1)-RBND(L))
   60 NFLI(J)=NFLI(J)-1
      ASFL=NFLI(J)
      ASFL=ASFL*3.1416
      AST=(COS(ASFL/AFL)-1.0)*.5
      DO 505 L=1,LMAX
  505 RP(L,N,1)=RBND(L)-DFL(L,J)*AST
      IF (NFLI(J).GT.0) GO TO 65
      DO 510 L=1,LMAX
  510 RP(L,N,1)=RBND(L)
   65 CONTINUE
      GO TO 80
   70 NFLI(J)=NFL
      DO 515 L=1,LMAX
  515 RP(L,N,1)=R(L,N,1)-ATAL*UP(N,1)*(R(L,N,2)-R(L,N,1))
   80 CONTINUE
   90 CONTINUE
      DO 300 N=2,NMAXN
      CZ00 =CZ(N,1)
      DO 520 L=1,LMAX
      E(L,2)=0.0
      FX(L,2)=0.0
      IF (CZ00.NE.0.0) FX(L,2)=RP(L,N,1)
  520 CONTINUE
      M=2
      MMM=3
      CZ00=CZ(N,M)
      IF(CZ00.EQ.0.) GO TO 122
      GO TO 123
 121  CONTINUE
      M=MMM
      MMM=M+1
      IF (M.EQ.MMAX) GO TO 150
 122  CONTINUE
      AX(M)=0.0
      CX(M)=0.0
      VOLD=.25*(H(N,M)+H(N,M-1)+H(N-1,M)+H(N-1,M-1))+SES(N,M)
      VOLDP(M)=VOLD
      VOLDM(M)=VOLD
      DO 525 L=1,LMAX
      BZ(L,M)=VOLD
      PZ(L,M)=VOLD*R(L,N,M)
  525 CONTINUE
 124  CONTINUE
      M=MMM
      MMM=M+1
      IF (M.EQ.MMAX) GO TO 150
      CZ00=CZ(N,M)
      IF(CZ00.EQ.0.) GO TO 122
 123  CONTINUE
      CZ00=CZ(N,M)
      CZ01=CZ(N,M-1)
      CZ02=CZ(N,M+1)
```

```
1          CZ20=C(N+1,M)
           CZ10=C(N-1,M)
           SP00=SEP(N,M)
           S00=SE(N,M)
           S20=SE(N+1,M)
           S10=SE(N-1,M)
           SP02=SEP(N,M+1)
           SP01=SEP(N,M-1)
           SP20=SEP(N+1,M)
           SP10=SEP(N-1,M)
           S02=SE(N,M+1)
           S01=SE(N,M-1)
           IF(CZ02.NE.0.) GO TO 20
           SP02=SP00
           S02=S00
    20     CONTINUE
           IF(CZ01.NE.0.) GO TO 21
           SP01=SP00
           S01=S00
    21     CONTINUE
           IF(CZ20.NE.0.) GO TO 22
           SP20=SP00
           S20=S00
    22     CONTINUE
           IF(CZ10.NE.0.) GO TO 23
           SP10=SP00
           S10=S00
    23     CONTINUE
           H00=H(N,M)
           H01=H(N,M-1)
           H10=H(N-1,M)
           H11=H(N-1,M-1)
           U00=UP(N,M)
           U01=UP(N,M-1)
           V00=V(N,M)
           V10=V(N-1,M)
           VAT=ATAL2*V10
           VAL=ATAL2*V00
           G3=(H00+H10+H01+H11)/4.0
           C3B=G3+SP00
           C6=H00+H10+S00+S02
           C7=H01+H11+S00+S01
           C8=H00+H10+SP00+SP02
           C9=H01+H11+SP00+SP01
           C10=H00+H01+SP00+SP20
           C11=H10+H11+SP00+SP10
           IF(C8.LT.0.) GO TO 400
           IF(C9.LT.0.) GO TO 400
           IF(C10.LT.0.) GO TO 400
           IF(C11.LT.0.) GO TO 400
   401     CONTINUE
           G1=ATL*C7
           G1A=ATL*C9
           G2=ATL*C6
           G2A=ATL*C8
           C3P=G3+S00
           G4=H00+H01+S00+S20
           C5=H10+H11+S00+S10
           VOLDP(M)=C3B
           VOLDM(M)=C3P
           DIFA=DIFCO(N,M)
           DX00=CDAL*ABS(U00)*C8/(CZ00+CZ02)+(DIFA+DIFCO(N,M+1))/AL
           DX01=CDAL*ABS(UP(N,M-1))*C9/(CZ00+CZ01)+(DIFA+DIFCO(N,M-1))/AL
           DY00=CDAL*ABS(V00)*G4/(CZ00+CZ(N+1,M))+(DIFA+DIFCO(N+1,M))/AL
```

```
      DY10=CDAL*ABS(V(N-1,M))*C5/(CZ00+CZ(N-1,M))+(DIFA+DIFCO(N-1,M))/AL
      IF (CZ01.EQ.0.0) DX01=0.0
      IF (CZ02.EQ.0.0) DX00=0.0
      IF (CZ10.EQ.0.0) DY10=0.0
      IF (CZ20.EQ.0.0) DY00=0.0
      O1=1.0
      O2=1.0
      O3=1.0
      O4=1.0
      DO 530 L=1,LMAX
      R1(L)=R(L,N-1,M)
      R2(L)=R(L,N,M)
      R3(L)=R(L,N,M)
      R4(L)=R(L,N+1,M)
      SX(L)=0.0
  530 CONTINUE
C****
      DO 8400 K=1,NSRC
      NIN=NINT(K)
      MIN=MINT(K)
      IF (N.NE.NIN) GO TO 8240
      IF (M.NE.MIN) GO TO 8200
      DO 535 L=1,LMAX
  535 SX(L)=SINT(L,K)
      C3P=C3P-AT*DISCH(K)
 8000 IF (U00.GT.0.0) GO TO 8020
      IF (U01.GT.0.0) GO TO 8010
      O2=2.0
      O3=0.0
      GO TO 8100
 8010 O1=2.0
      O2=2.0
      O3=0.0
      O4=0.0
      GO TO 8100
 8020 IF (U01.LT.0.0) GO TO 8100
      O1=2.0
      O4=0.0
 8100 IF (V00.LT.0.0) GO TO 8120
      IF (V10.LT.0.0) GO TO 8400
      DO 540 L=1,LMAX
  540 R2(L)=R1(L)
      GO TO 8400
 8110 CONTINUE
      DO 545 L=1,LMAX
      R2(L)=R1(L)
      R3(L)=R4(L)
  545 CONTINUE
      GO TO 8400
 8120 IF (V10.GT.0.0) GO TO 8110
      DO 550 L=1,LMAX
  550 R3(L)=R4(L)
      GO TO 8400
 8200 IF (M.NE.MIN+1) GO TO 8220
 8210 IF (U01.GT.0.0) GO TO 8400
      O1=0.0
      O4=2.0
      GO TO 8400
 8220 IF (M.NE.MIN-1) GO TO 8400
 8230 IF (U00.LT.0.0) GO TO 8400
      O2=0.0
      O3=2.0
      GO TO 8400
 8240 IF (M.NE.MIN) GO TO 8400
```

```
1           IF (N.NE.NIN+1) GO TO 8260
      8250 IF (V10.GT.0.0) GO TO 8400
           DO 555 L=1,LMAX
       555 R1(L)=R2(L)
           GO TO 8400
      8260 IF (N.NE.NIN-1) GO TO 8400
      8270 IF (V00.LT.0.0) GO TO 8400
           DO 560 L=1,LMAX
       560 R4(L)=R3(L)
      8400 CONTINUE
           IF(M.NE.2) GO TO 8401
           IF (U01.GE.0.0) GO TO 8401
           O1=0.0
           O4=2.0
      8401 CONTINUE
           AX(M)=-G1*ZC1*U01*O1-G1A*DX01
           CX(M)=G2*ZC1*U00*O2-G2A*DX00
           DO 570 L=1,LMAX
           BZ(L,M)=C3B        +G2*ZC1*U00*O3+G2A*DX00-G1*ZC1*U01*O4+G1A*DX01
           PZ(L,M)=C3P        *R(L,N,M)-AT*SX(L)
          *  +ATL*(C5*(ZC2*V10*(R1(L)+R2(L))-(R(L,N,M)-R(L,N-1,M))*DY10)
          *        -G4*(ZC2*V00*(R3(L)+R4(L))+(R(L,N,M)-R(L,N+1,M))*DY00))
       570 CONTINUE
           IF(CZ02.EQ.0.) GO TO 121
           M=MMM
           MMM=M+1
           IF(M.EQ.MMAX) GO TO 150
           GO TO 123
      150  CONTINUE
     C
     C                    REACTION MODEL
     C
           DO 201 L=1,LMAX
           DO 575 M=2,MMAXM
           MMM=M+1
           TEM=0.0
           RTEM1=R(L,N,M)
           IF (L.GT.LRMX) GO TO 6
           IF (L.EQ.1) GO TO 1
           LJM=L-1
           DO 2 LJ=1,LJM
           IF (LJ.GT.LRMX) GO TO 3
           RTEM=RP(LJ,N,M)
           IF (RTEM.LE.0.0) GO TO 2
           AKF=AKK(L,LJ)
           IF ((RTEM1.LE.0.0).AND.(AKF.GE.0.0)) GO TO 2
           TEM=TEM+AKF*RTEM*VOLDP(M)
         2 CONTINUE
         1 CONTINUE
           IF (L.EQ.LMAX) GO TO 3
           LJM=L+1
           DO 4 LJ=LJM,LMAX
           IF (LJ.GT.LRMX) GO TO 3
           RTEM=R(LJ,N,M)
           IF (RTEM.LE.0.0) GO TO 4
           AKF=AKK(L,LJ)
           IF ((RTEM1.LE.0.0).AND.(AKF.GE.0.0)) GO TO 4
           TEM=TEM+AKF*RTEM*VOLDM(M)
         4 CONTINUE
         3 CONTINUE
           IF (L.NE.LOX) GO TO 6
           AKF=ROX(N,M)
           TEM=TEM-AKF*(SOX-.5*RTEM1)
           TEMM=.5*AKF*AT
```

```
1         GO TO 7
        6 CONTINUE
          AKF=.5*AKK(L,L)
          TEM = TEM +AKF*VOLDM(M)*RTEM1
          TEMM=AKF  *VOLDP(M)*AT
        7 CONTINUE
          D1=BZ(L,M)+AX(M)*E(L,M)+TEMM
          FX(L,MMM)=(PZ(L,M)-TEM*AT-AX(M)*FX(L,M))/D1
          E(L,MMM)=-CX(M)/D1
      575 CONTINUE
          M=MMAX
          DO 200 J=2,MMAX
          MM=M-1
          RP(L,N,MM)=E(L,M)*RP(L,N,M)+FX(L,M)
          M=MM
  200     CONTINUE
          IF(NST.GT.2) GO TO 210
          IF(L.GT.2) GO TO 210
          IF(N.LT.2) GO TO 210
          IF(N.GT.5) GO TO 210
          WRITE(6,211) NST,L,N
  211     FORMAT(1X,3I5)
          DO 212 MX=15,17
          WRITE(6,213) BZ(L,MX),PZ(L,MX),AX(MX),CX(MX),FX(L,MX),E(L,MX),
         *ROX(N,MX),RP(L,N,MX),R(L,N,MX),SES(N,MX),SE(N,MX),SEP(N,MX)
  212     CONTINUE
  210     CONTINUE
  213     FORMAT(1X,1P12E10.3)
   201    CONTINUE
   300    CONTINUE
          GO TO 404
  400     CONTINUE
          IF(C8.LT.0.) C8=0.
          IF(C9.LT.0.) C9=0.
          IS=IS+1
          NVOL(IS)=N
          MVOL(IS)=M
          IF(C3B.GT.0.) GO TO 402
          STA=.25*VAR -G3
          WATADD=    (STA-SEP(N,M))*AL*AL
          S21=S21+WATADD
          WRITE(6,403) NST,M,N,STA,SEP(N,M),WATADD,S21
  403     FORMAT (1X,4HNST=,I5,2X,2HM=,I3,2X,2HN=,I3,2X,4HSET=,F7.4,
         *2X,4HSEP=,F7.4,2X,7HWATADD=,F10.2,2X,4HCUM=,E13.6,2X,4HDIFU)
          SEP(N,M)=STA
  402     CONTINUE
          GO TO 401
  404     CONTINUE
          IF(IS.LT.1) GO TO 405
          DO 406 IST=1,IS
          N=NVOL(IST)
          M=MVOL(IST)
          C(N,M)=0.
          SES(N,M)=SEP(N,M)
          SEP(N,M)=0.
          SE(N,M)=0.
          SEN(N,M)=0.
          U(N,M)=0.
          UP(N,M)=0.
          UP(N,M-1)=0.
          U(N,M-1)=0.
          V(N,M)=0.
          V(N-1,M)=0.
  406     CONTINUE
```

```
1       405  CONTINUE
             RETURN
             END
```

1

```
      SUBROUTINE DIFV
C
C*******************************************************************
C*******************************************************************
C
C  COMMON IS SHUFFLED IN THIS SUBROUTINE
C  THIS IS THE USUAL COMMON
C     COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
C  THIS IS THE COMMON USED IN THIS SUBROUTINE
      COMMON SEP(61,78),SE(61,78),VP(61,78),V(61,78),UP(61,78),U(61,78)
C
C*******************************************************************
C*******************************************************************
// DD DISP=OLD,DSN=N.N2640.       .JAMCOM72
// DD *,DCB=BLKSIZE=80
C
      IS=0
      DO 380 N=NB1,NB2
      J=N-NB1+1
      IF (UP(N,1).LT.0.0) GO TO 370
      IF (NFLI(J).LT.NFL) GO TO 360
      DO 500 L=1,LMAX
  500 DFL(L,J)=(R(L,N,1)-RBND(L))
  360 NFLI(J)=NFLI(J)-1
      ASFL=NFLI(J)
      ASFL=ASFL*3.1416
      AST=(COS(ASFL/AFL)-1.0)*.5
      DO 505 L=1,LMAX
  505 R(L,N,1)=RBND(L)-DFL(L,J)*AST
      IF (NFLI(J).GT.0) GO TO 380
      DO 510 L=1,LMAX
  510 RP(L,N,1)=RBND(L)
      GO TO 380
  370 NFLI(J)=NFL
      DO 515 L=1,LMAX
  515 R(L,N,1)=RP(L,N,1)-ATAL*UP(N,1)*(RP(L,N,2)-RP(L,N,1))
  380 CONTINUE
  390 CONTINUE
      DO 900 M=2,MMAXM
      CZ00=CZ(1,M)
      DO 520 L=1,LMAX
      E(L,2)=0.0
  520 FX(L,2)=0.0
      N=2
      NNN=3
      CZ00=CZ(N,M)
      IF(CZ00.EQ.0.) GO TO 122
      GO TO 123
 121  CONTINUE
      N=NNN
      NNN=N+1
      IF (N.EQ.NMAX) GO TO 150
 122  CONTINUE
      AX(N)=0.0
      CX(N)=0.0
      VOLD=.25*(H(N,M)+H(N,M-1)+H(N-1,M)+H(N-1,M-1))+SES(N,M)
      VOLDP(N)=VOLD
      VOLDM(N)=VOLD
      DO 525 L=1,LMAX
      BZ(L,N)=VOLD
      PZ(L,N)=VOLD*RP(L,N,M)
  525 CONTINUE
 124  CONTINUE
```

```
      N=NNN
      NNN=N+1
      IF (N.EQ.NMAX) GO TO 150
      CZ00=CZ(N,M)
      IF(CZ00.EQ.0.) GO TO 122
 123  CONTINUE
      CZ00=CZ(N,M)
      CZ10=CZ(N-1,M)
      CZ20=CZ(N+1,M)
      CZ01=C(N,M-1)
      CZ02=C(N,M+1)
      SP00=SEP(N,M)
      S00=SE(N,M)
      S02 =SE(N,M+1)
      S01 =SE(N,M-1)
      S20 =SE(N+1,M)
      S10 =SE(N-1,M)
      SP02=SEP(N,M+1)
      SP01=SEP(N,M-1)
      SP20=SEP(N+1,M)
      SP10=SEP(N-1,M)
      IF(CZ02.NE.0.) GO TO 920
      SP02=SP00
      S02=S00
  920 CONTINUE
      IF(CZ01.NE.0.) GO TO 21
      SP01=SP00
      S01 =S00
  21  CONTINUE
      IF(CZ20.NE.0.) GO TO 22
      SP20=SP00
      S20 =S00
  22  CONTINUE
      IF(CZ10.NE.0.) GO TO 23
      SP10=SP00
      S10 =S00
  23  CONTINUE
      H00=H(N,M)
      H01=H(N,M-1)
      H10=H(N-1,M)
      H11=H(N-1,M-1)
      V00=V(N,M)
      V10=V(N-1,M)
      U00=UP(N,M)
      U01=UP(N,M-1)
      UAT=ATAL2*U01
      UAL=ATAL2*U00
      G3=(H00+H10+H01+H11)/4.0
      C3B=G3+S00
      C6=H00+SP00+H01+SP20
      C7=H10+H11+SP00+SP10
      C8=H00+H01+S00+S20
      C9=H10+H11+S00+S10
      C10=H00+H10+S00+S02
      C11=H01+H11+S00+S01
      IF(C8.LT.0.) GO TO 400
      IF(C9.LT.0.) GO TO 400
      IF(C10.LT.0.) GO TO 400
      IF(C11.LT.0.) GO TO 400
 401  CONTINUE
      G1=ATL*C7
      G1A=ATL*C9
      G2=ATL*C6
      G2A=ATL*C8
```

```
      C3P=G3+SP00
      G4=H00+H10+SP00+SEP(N,M+1)
      C5=H01+H11+SP00+SEP(N,M-1)
      VOLDP(N)=C3P
      VOLDM(N)=C3B
      DIFA=DIFCO(N,M)
      DX00=CDAL*ABS(U00)*G4/(CZ00+CZ(N,M+1))+(DIFA+DIFCO(N,M+1))/AL
      DX01=CDAL*ABS(UP(N,M-1))*C5/(CZ00+CZ(N,M-1))
     *      +(DIFA+DIFCO(N,M-1))/AL
      DY00=CDAL*ABS(V00)*C8/(CZ00+CZ20)+(DIFA+DIFCO(N+1,M))/AL
      DY10=CDAL*ABS(V(N-1,M))*C9/(CZ00+CZ10)+(DIFA+DIFCO(N-1,M))/AL
      IF (C(N-1,M).EQ.0.0) DY10=0.0
      IF (C(N+1,M).EQ.0.0) DY00=0.0
      IF (C(N,M-1).EQ.0.0) DX01=0.0
      IF (C(N,M+1).EQ.0.0) DX00=0.0
      O1=1.0
      O2=1.0
      O3=1.0
      O4=1.0
      DO 530 L=1,LMAX
      R1(L)=RP(L,N,M-1)
      R2(L)=RP(L,N,M)
      R3(L)=RP(L,N,M)
      R4(L)=RP(L,N,M+1)
      SX(L)=0.0
 20    CONTINUE
  530 CONTINUE
C****
      DO 8900 K=1,NSRC
      NIN=NINT(K)
      MIN=MINT(K)
      IF (M.NE.MIN) GO TO 8740
      IF (N.NE.NIN) GO TO 8700
      DO 535 L=1,LMAX
  535 SX(L)=SINT(L,K)
      C3P=C3P-AT*DISCH(K)
 8500 IF (V00.LT.0.0) GO TO 8520
      IF (V10.LT.0.0) GO TO 8600
      O1=2.0
      O4=0.0
      GO TO 8600
 8510 O1=2.0
      O2=2.0
      O3=0.0
      O4=0.0
      GO TO 8600
 8520 IF (V10.GT.0.0) GO TO 8510
      O2=2.0
      O3=0.0
 8600 IF (U00.GT.0.0) GO TO 8620
      IF (U01.GT.0.0) GO TO 8610
      DO 540 L=1,LMAX
  540 R3(L)=R4(L)
      GO TO 8900
 8610 CONTINUE
      DO 545 L=1,LMAX
      R2(L)=R1(L)
      R3(L)=R4(L)
  545 CONTINUE
      GO TO 8900
 8620 IF (U01.LT.0.0) GO TO 8900
      DO 550 L=1,LMAX
  550 R2(L)=R1(L)
      GO TO 8900
```

```
1    8700 IF (N.NE.NIN+1) GO TO 8720
     8710 IF (V10.GT.0.0) GO TO 8900
          O1=0.0
          O4=2.0
          GO TO 8900
     8720 IF (N.NE.NIN-1) GO TO 8900
     8730 IF (V00.LT.0.0) GO TO 8900
          O2=0.0
          O3=2.0
          GO TO 8900
     8740 IF (N.NE.NIN) GO TO 8900
          IF (M.NE.MIN+1) GO TO 8760
     8750 IF (U01.GT.0.0) GO TO 8900
          DO 555 L=1,LMAX
      555 R1(L)=R2(L)
          GO TO 8900
     8760 IF (M.NE.MIN-1) GO TO 8900
     8770 IF (U00.LT.0.0) GO TO 8900
          DO 560 L=1,LMAX
      560 R4(L)=R3(L)
     8900 CONTINUE
          IF (M.NE.2) GO TO 8950
          IF (U01.GE.0.0) GO TO 8950
          DO 565 L=1,LMAX
      565 R1(L)=R2(L)
     8950 CONTINUE
          AX(N)=-G1*ZC2*V10*O1-G1A*DY10
          CX(N)=G2*ZC2*V00*O2-G2A*DY00
          DO 570 L=1,LMAX
          BZ(L,N)=C3B       +G2*ZC2*V00*O3+G2A*DY00-G1*ZC2*V10*O4+G1A*DY10
          PZ(L,N)=C3P       *RP(L,N,M)-AT*SX(L)
         *  +ATL*(C5*(ZC1*U01*(R1(L)+R2(L))-(RP(L,N,M)-RP(L,N,M-1))*DX01)
         *        -G4*(ZC1*U00*(R3(L)+R4(L))+(RP(L,N,M)-RP(L,N,M+1))*DX00))
      570 CONTINUE
          IF(CZ20.EQ.0.) GO TO 121
          N=NNN
          NNN=N+1
          IF(N.EQ.NMAX) GO TO 150
          GO TO 123
     150  CONTINUE
C
C                         REACTION MODEL
C
          L=LMAX
          DO 200 LP=1,LMAX
          DO 575 N=2,NMAXN
          NNN=N+1
          TEM=0.0
          RTEM1=RP(L,N,M)
          IF (L.GT.LRMX) GO TO 6
          IF (L.EQ.1) GO TO 1
          LJM=L-1
          DO 2 LJ=1,LJM
          IF (LJ.GT.LRMX) GO TO 3
          RTEM=RP(LJ,N,M)
          IF (RTEM.LE.0.0) GO TO 2
          AKF=AKK(L,LJ)
          IF ((RTEM1.LE.0.0).AND.(AKF.GE.0.0)) GO TO 2
          TEM=TEM+AKF*RTEM*VOLDP(N)
        2 CONTINUE
        1 CONTINUE
          IF (L.EQ.LMAX) GO TO 3
          LJM=L+1
          DO 4 LJ=LJM,LMAX
```

```
1         IF (LJ.GT.LRMX) GO TO 3
          RTEM=R(LJ,N,M)
          IF (RTEM.LE.0.0) GO TO 4
          AKF=AKK(L,LJ)
          IF ((RTEM1.LE.0.0).AND.(AKF.GE.0.0)) GO TO 4
          TEM=TEM+AKF*RTEM*VOLDM(N)
        4 CONTINUE
        3 CONTINUE
          IF (L.NE.LOX) GO TO 6
          AKF=ROX(N,M)
          TEM=TEM-AKF*(SOX-.5*RTEM1)
          TEMM=.5*AKF*AT
          GO TO 7
        6 CONTINUE
          AKF=.5* AKK(L,L)
          TEM =TEM +AKF *VOLDP(N)* RTEM1
          TEMM= AKF*VOLDM(N)*AT
        7 CONTINUE
          D1=BZ(L,N)+AX(N)*E(L,N)+TEMM
          FX(L,NNN)=(PZ(L,N)-TEM*AT-AX(N)*FX(L,N))/D1
          E(L,NNN)=-CX(N)/D1
      575 CONTINUE
          N=NMAX
      580 CONTINUE
          DO 201 J1=2,NMAX
          NN=N-1
          R(L,NN,M)=E(L,N)*R(L,N,M)+FX(L,N)
          N=NN
      201 CONTINUE
          IF(NST.GT.2) GO TO 210
          IF(L.GT.2) GO TO 210
          IF(M.LT.15) GO TO 210
          IF(M.GT.16) GO TO 210
          WRITE (6,211) NST,L,M
  211     FORMAT(1X,3I5)
          DO 212 NX=2,5
          WRITE(6,213) BZ(L,NX),PZ(L,NX),AX(NX),CX(NX),FX(L,NX),E(L,NX),
         *ROX(NX,M),R(L,NX,M),RP(L,NX,M),SES(NX,M),SE(NX,M),SEP(NX,M)
  213     FORMAT(1X,1P12E10.3)
  212     CONTINUE
  210     CONTINUE
          L=L-1
  200     CONTINUE
   900    CONTINUE
          GO TO 404
  400     CONTINUE
          IF(C8.LT.0.) C8=0.
          IF(C9.LT.0.) C9=0.
          IS=IS+1
          NVOL(IS)=N
          MVOL(IS)=M
          IF(C38.GT.0.) GO TO 402
          STA=.25*VAR -G3
          WATADD = (STA-SE(N,M))*AL*AL
          S21=S21+WATADD
          WRITE(6,403) NST,M,N,STA,SE(N,M),WATADD,S21
  403     FORMAT (1X,4HNST=,I5,2X,2HM=,I3,2X,2HN=,I3,2X,4HSET=,F7.4,
         *2X,3HSE=, F7.4,2X,7HWATADD=,F10.2,2X,4HCUM=,E13.6,2X,4HDIFV)
          SE(N,M)=STA
  402     CONTINUE
          GO TO 401
  404     CONTINUE
          IF(IS.LT.1) GO TO 405
          DO 406 IST=1,IS
```

```
      N=NVOL(IST)
      M=MVOL(IST)
      C(N,M)=0.
      SES(N,M)=SE(N,M)
      SE(N,M)=0.
      SEP(N,M)=0.
      SEN(N,M)=0.
      UP(N,M)=0.
      UP(N,M-1)=0.
      V(N,M)=0.
      V(N-1,M)=0.
      U(N,M)=0.
      U(N,M-1)=0.
      VP(N,M)=0.
      VP(N-1,M)=0.
406   CONTINUE
405   CONTINUE
      RETURN
      END
```

```
1
          SUBROUTINE DEPTH
          COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
    // DD DISP=OLD,DSN=N.N2640.       .JAMCOM72
    // DD *,DCB=BLKSIZE=80
          NR1=1
          NR2=16
       10 CONTINUE
          IF (NR2.GT.NMAX) NR2=NMAX
          DO 12 M=1,MMAX
          READ (5,3) (H(N,M),N=NR1,NR2)
       12 CONTINUE
          NR1=NR2+1
          NR2=NR2+16
          IF (NR1.LE.NMAX) GO TO 10
          DO 1 N=1,NMAX
          DO 2 M=1,MMAX
           HT=H(N,M)
          IF (HT.GE.DCO) H(N,M)= DML*H(N,M)
          IF(HT.EQ.0.) H(N,M)=-DEPDEF
      2   CONTINUE
      1   CONTINUE
          RETURN
      3   FORMAT(16E4.1)
          END
```

```
1
          SUBROUTINE SINVAL
          COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD     DISP=OLD,DSN=N.N2640.        .JAMCOM72
// DD     *,DCB=BLKSIZE=80
          TEMP=4. *VAR
          TR1=SEINV+SEINV-VAR
          DO 1  N=2,NMAX
          NN=N-1
          DO 2  M=2,MMAX
          MM=M-1
          H1=H(N,M)+H(N,MM)
          H2=H(N,M)+H(NN,M)
          H3=H(NN,M)+H(NN,MM)
          H4=H(N,MM)+H(NN,MM)
          IF (TR1+H1.LT.0.0) GO TO 8
          IF (TR1+H2.LT.0.0) GO TO 8
          IF (TR1+H3.LT.0.0) GO TO 8
          IF (TR1+H4.LT.0.0) GO TO 8
          SE(N,M)=SEINV
          SEP(N,M)=SEINV
          SEN(N,M)=SEINV
          GO TO 3
        8 CONTINUE
          IF (H1.GT.H2) GO TO 7
          IF (H1.GT.H3) GO TO 6
          IF (H1.GT.H4) GO TO 5
          HMIN=H1
          GO TO 4
        7 IF (H2.GT.H3) GO TO 6
          IF (H2.GT.H4) GO TO 5
          HMIN=H2
          GO TO 4
        6 IF (H3.GT.H4) GO TO 5
          HMIN=H3
          GO TO 4
        5 HMIN=H4
        4 SES(N,M)=.5*(VAR-HMIN)
       3  CONTINUE
       2  CONTINUE
       1  CONTINUE
          RETURN
          END
```

1

```
      SUBROUTINE CVAL
      COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD DISP=OLD,DSN=N.N2640.A1700.JAMCOM72
// DD *,DCB=BLKSIZE=80
C
C
      CSETH=.5*CSET
      SEXP=1./6.
      DO 1 N=2,NMAX
      NN=N-1
      DO 2 M=2,MMAX
      ST=SEP(N,M)
      IF(ST.EQ.0.) GO TO 2
      MM=M-1
      SET=SEN(N,M)+SE(N,M)
      T1=SET+H(N,M)+H(N,MM)
      IF (T1.LT.0.0) GO TO 366
      T2=SET+H(NN,M)+H(NN,MM)
      IF (T2.LT.0.0) GO TO 366
      T3=SET+H(N,M)+H(NN,M)
      IF (T3.LT.0.0) GO TO 366
      T4=SET+H(N,MM)+H(NN,MM)
      IF (T4.LT.0.0) GO TO 366
      IF (T1.LT.VAR) GO TO 10
      IF (T2.LT.VAR) GO TO 10
      IF (T3.LT.VAR) GO TO 10
      IF (T4.LT.VAR) GO TO 10
       C(N,M)=1.49*(.25*(H(N,M)+H(NN,M)+H(N,MM)+H(NN,MM))+.5*SET)
     1          **SEXP/VMAN(N,M)
      GO TO 363
   10 CONTINUE
      C(N,M)=CSETH
      GO TO 363
  366 C(N,M)=0.0
      IF (NST.NE.0) WRITE (6,13) NST,M,N,SES(N,M),SET
   13 FORMAT (1X,4HNST=,I5,2X,2HM=,I3,2X,2HN=,I3,2X,4HSES=,F7.4,
     *           2X,4HSET=,F7.4)
      SES(N,M)=SE(N,M)
      U(N,M)=0.0
      U(N,M-1)=0.0
      UP(N,M)=0.0
      UP(N,M-1)=0.0
      V(N,M)=0.0
      V(N-1,M)=0.0
      VP(N,M)=0.0
      VP(N-1,M)=0.0
      SE(N,M)=0.0
      SEN(N,M)=0.0
      SEP(N,M)=0.0
  363 CONTINUE
    2 CONTINUE
    1 CONTINUE
      RETURN
      END
```

1

```
         SUBROUTINE INDAT1
         COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD DISP=OLD,DSN=N.N2640.        JAMCOM72
// DD *,DCB=BLKSIZE=80
         READ (5,100) DIFDEF
     100 FORMAT (E5.0)
         DO 110 N=1,NMAX
         DO 110 M=1,MMAX
     110 DIFCO(N,M)=DIFDEF
     120 READ (5,130) M,N1,N2,(TINDAT(M1),M1=1,10)
     130 FORMAT (3I5,10E5.0)
         IF (M+N1+N2.EQ.0) GO TO 150
         M1=0
         DO 140 N=N1,N2
         M1=M1+1
     140 DIFCO(N,M)=TINDAT(M1)
         GO TO 120
     150 CONTINUE
         READ (5,100) VMDEF
         DO 160 N=1,NMAX
         DO 160 M=1,MMAX
     160 VMAN(N,M)=VMDEF
     170 READ (5,130) M,N1,N2,(TINDAT(M1),M1=1,10)
         IF (M+N1+N2.EQ.0) GO TO 190
         M1=0
         DO 180 N=N1,N2
         M1=M1+1
     180 VMAN(N,M)=TINDAT(M1)
         GO TO 170
     190 CONTINUE
         RETURN
         END
```

```
1
          SUBROUTINE POLIN
          COMMON SE(61,78),SEP(61,78),V(61,78),VP(61,78),U(61,78),UP(61,78)
// DD DISP=OLD,DSN=N.N2640.       .JAMCOM72
// DD *,DCB=BLKSIZE=80
     3 FORMAT (16E4.1)
     4 FORMAT (I5)
     5 READ (5,4) L
       IF (L.EQ.0) RETURN
       NR1=1
       NR2=16
    10 CONTINUE
       IF (NR2.GT.NMAX) NR2=NMAX
       DO 12 M=1,MMAX
       READ (5,3) (R(L,N,M),N=NR1,NR2)
        DO 20 N=NR1,NR2
        RAPP=R(L,N,M)
        IF(RAPP.EQ.0.) R(L,N,M)=RBND(L)
    20 CONTINUE
C
    12 CONTINUE
       NR1=NR2+1
       NR2=NR2+16
       IF (NR1.LE.NMAX) GO TO 10
       DO 15 N=1,NMAX
       DO 15 M=1,MMAX
       RP(L,N,M)=R(L,N,M)
    15 CONTINUE
       GO TO 5
       END

//
```

Appendix C

DATA SET, JAMAICA BAY MODEL

```
(05-20-72) 2 WK (WPCF UP X ROCK BR C) WQ23A  R=4135,H=4156,G=4953
  61  78   3   8 40.6 500. 32.2 30.0 30.0  0.8  -.2  .4   3.5 1.06  9.9
   0    05953 372  30  40  20   6 248  13  12  18   9   5   5   4   6
    0    0  101
 .0026    .00237  1.9362  1.68    14.3
    1  7.2      .000030        2
  100
  248  744 1488 2232 2976 3720 4464 5208 5952 6696 7440 8184 8928 96721041611160
11904119141192314136148801562416368171121785618600188481909619344195921984020088
    1    9    4
    2   48   19
    3   10   45
    4   59   48
    5   77   49
    6   10    6
    7   31   15
    8   51   23
    9   69   36
   10   52   34
   11   56   49
   12   10   31
   13   11   45
   14   19   52
   15   30   56
   16   44   58
   17   26   38
   18    1    4
    1    5    5
    2    5    6
    3    4    7
    4   39   15
    5   25   38
    6   14   47
    7   69   35
    8   55   36
    9   52   36
    1   50   55
    2   37   14
    3   18   57
    4   62   60
    5   77   56
    6   16   57
    7    6   52
    8    3   56
    9   77   54
   10   43   28
   11   33   13
   12   49   30
   13   22   60
    1   10    6
    2   31   15
    3   51   23
    4   69   36
    5   52   34
    6   56   49
    7   10   31
    8   11   45
    9   16   50
   10   30   56
   11   44   58
```

```
   12   26   38
    1    6    4    8 BAI
    2   12   42   49 CAN
    3   20   27   39 PUM
    4   43   16   21 SCH
    5   38   54   60 GRA
5.5         DO
0.6         BOD
15.5        SALINITY
.01         COLIFORM PLANTS
 0.3E-04 0.3E-05 0.0E 00 0.0E 00
 0.0E 00 0.3E-05 0.0E 00 0.0E 00
 0.0E 00 0.0E 00 0.0E 00 0.0E 00
 0.0E 00 0.0E 00 0.0E 00 .265E-4
-100 280 340 280 250 230 210  30-104                                     1245280
-100 280 340 290 250 210 200  30-105                 180 180 190         2245285
-100  50 330 330 270 180 200  35-105                 180 180 190         3245290
-100- 10 356 476 356 300 280 114-105                     170 170         4245295
- 80-100 356 476 356 300 280 114-105                     170 170         5245300
- 60- 10 230 445 420 250 180 250  20-105                                 6245305
- 63- 10 200 420 250 240 190 250  30-105                     180         7245310
- 70- 70 270 390 280 240 370 250  70-105                     180         8245315
- 85- 85 260 360 250 290 280 260 200-115-115                             9245320
- 85-105 320 320 290 260 290 310 240-115-115                            10245325
-120-105 300 300 280 290 280 280 260+180-115                            11245330
-120-105 300 300 280 290 290 270 290 300-110-110-110-110-110-110        12245335
-115-105 290 430 290 270 340 290 320 335 335+280-105-105 396 378        13245340
-115-105 200+300 330 310 282 330 332 335 435 531 510 562 490 441        14245345
-110-110- 97+160 355 305 282 359 328 330 350 375 370 410 450 425        15245350
-110-110-102-100 297 350 300 318 322 325 300 303 250 240 373 373        16245355
-110-110-105-150 100 339 391 310 318 307  20  20 373 373 373 373        17245360
            -100-100 321 319 298 280 280 250  21  11 373 373 373        18245365
            -120-120- 80 410 475 230 283 301 295  12 373 373 373        19245370
            -120-120- 90 180 353 227 227 320 285 100  13  12  10        20245375
            -120-120-100- 90 310 270 320 225 375 278 140  14  11        21245380
                        - 90 260 269 310 310 278 275 294  50  11        22245385
                            - 90 330 270 265 310 298 285 282  20        23245390
                            -100 100 190 120 290 321 310 265  80        24245395
                            -100-100 175  80 160 315 305  90 100        25245400
                            -100-100-100  80 190 275 335 113 140        26245405
                                    -100 -90 109 265 223 260 160        27245410
                                         -90 145 303 210 170 173        28245415
                                         -90 140 241 223 190 183        29245420
                                         -90 215 222 210 180 172        30245425
                                        -100 230 230 210 189 172        31245430
                                        - 95 200 220 212 155  80        32245435
                                        - 90 170 242 282 130  30        33245440
                                        - 75 190 330 285  70  25        34245445
                                        - 75- 40 420 250  30  30        35245450
                                        - 85- 80 420 298  30  30        36245455
                                            - 95 320 330  40  25        37245460
                                            - 95  28 455 300  40        38245465
                                                - 80 367 280  40        39245470
                                                - 85 280 284  60        40245475
                                                - 90  80 522 300        41245480
                                                - 90- 20 322 425        42245485
                                                    - 80 232 345        43245490
                                                        - 80 220        44245495
                                                        - 80  50        45245500
                                                            - 90        46245505
                                                                        47245510
```

```
                                                                        48245515
                                                                        49245520
                                                                        50245525
                                                                        51245530
                                                                        52245535
                                                                        53245540
                                                                        54245545
                                                                        55245550
                                                                        56245555
                                                                        57245560
                                                                        58245565
                                                                        59245570
                                                                        60245575
                                                                        61245580
                                                                        62245585
                                                                        63245590
                                                                        64245595
                                                                        65245600
                                                                        66245605
                                                                        67245610
                                                                        68245615
                                                                        69245620
                                                                        70245625
                                                                        71245630
                                                                        72245635
                                                                        73245640
                                                                        74245645
                                                                        75245650
                                                                        76245655
                                                                        77245660
                                                                        78245665
                                        -105-105-105-150-120-100         1325280
 220 210 250 180 180 200 200 180 180 180 180+250- 10- 95- 90- 96         2325285
 210 200 210 210 120 250 200 250 250 250 150+350 400- 85- 86- 90         3325290
             210 120 350 200 110        - 80+434 498- 70- 85- 90         4325295
                     380 380            - 90 175 500 530 375   5         5325300
 400 380 400 400 380 380 380            -120- 10 300 478 365  25         6325305
 400 380 400 400 380 380 380            -110- 80 139 221 450 285         7325310
                                        -120- 80   5 192 382 325         8325315
                                        - 90-105   2 280 470 342         9325320
                        - 94- 50- 15-  3- 20  10 430 455 467 305        10325325
-120-130-120-120-105- 40   2 100  80 162 382 430 420 380 254 120        11325330
  20  20 255 285 379 380 410 429 335 338 355 334  50  79 241 306        12325335
 442 455 445 430 440 430 429 343 335 326 280  60  80  99  70  70        13325340
 445 434 443 400 335 325 250 251 160  70  20  30  80 110  77  52        14325345
 426 406 373 373 373 373 373 373 373 102 140 162 120 101 120  25        15325350
 373 373 373 373 373 373 373 373 373 373 125 110 110  25  15   8        16325355
 373 373 373 373 373 373 373 373 373 373  10  10  10  15  15  12        17325360
 373 373 373 373 373 373 373 373 106  20  30  20  70  40  25  15        18325365
 373 373 373 373  60  10  40 113 153 181 124  60  44  80  20  10        19325370
  20  89 161  40  16  10   9   7-  5  79 162 142 142  70  20  30        20325375
  30 160 170  30  15  12-  2- 70-110- 70  20  20 110 141 162 147        21325380
  40 160 168  30  20  10- 10- 70- 50- 45  20  22  30  20  30  80        22325385
 180 173 170  40  20-  8- 40- 80-105- 60   5  12  20  28  26  11        23325390
 165 173  60  40  19- 60- 50- 90-140- 75   6  18-  5  25  20-  5        24325395
 164 165  20  45  14- 95-110-150-140- 65   8-  8-  5    -  2-  8        25325400
 165  59  30  28  12  11- 20-100- 85- 42  18  24  55-  3-  4-  5        26325405
 168 167 120  40  43  32- 89- 60- 65-  6  63  40  25  40-  1-  6        27325410
 170 215 182 183 167 185  30  20  60  40  35  34- 10+  5   8  30        28325415
 170 165 190  90 208 206 160 246 153 180  45  35-  2- 30- 13  80        29325420
  63  20  10  30  30  25  20  40  98 132  20-  5- 40- 31- 24  30        30325425
```

35- 5- 6 5 7 9 22 42 42 76 130 2- 22- 21- 18- 10 31325430
20 4- 8+ 2 3 5 18 40 30 53 172 3- 35- 12- 16- 10 32325435
10 5- 7 2- 50- 20 3 5 25 42 267 28- 6- 13- 18- 20 33325440
10- 4- 5 3- 80- 60 12 16 25 28 160 40 25 6- 11- 15 34325445
- 3- 2- 4 1- 70- 30 6 15 20 100 100 45 35 15 15 5 35325450
- 4- 5- 5- 11 2- 2 8 40 60 106 10 50- 12+ 12 13 16 36325455
- 5- 5- 6 7 3- 2 6 65 109 40 30 30- 8- 10 2 18 37325460
4- 2+ 3+ 7 4- 3 4 55 65 78 20 30 12- 16- 12 10 38325465
28 20 10 9 2- 11 2 140 60 30 20 20- 3- 18+ 7 3 39325470
30 10 10 12 3- 13 2 40 93 20 18 15 20- 30 10 5 40325475
130 20 30 20 4- 6- 3- 2 98 50 18 13 10 1 1 34 41325480
304 286 10 30 4- 60- 2+ 5 40 135 110 80 30 30 80 88 42325485
214 284 30 30 2- 70- 70- 60- 50+ 10 40 90 180 182 70 40 43325490
322 189 122 172 80- 52- 90- 60- 50- 50- 50- 40- 50 62 28- 20 44325495
220 275 172 148 165 155 5- 25- 25- 60- 60- 55- 60- 60- 60- 70 45325500
70 205 142 145 190 189 152 223 255 215 210 86- 15- 60- 60- 50 46325505
- 32 112 350 135 78 81 140 150 105 110 128 185 283- 60- 60- 50 47325510
-105 25 180 210 172 65 30 28 22 35 52 48 180 125 115 88 48325515
- 95- 75 110 140 188 180 152- 35- 65- 88- 98- 32 150 120 162 288 49325520
- 80- 75- 20 160 166 180 187- 25- 20- 35- 58 28 218 218 23 82 50325525
- 75- 75-100 30 150 195 205 203 30 28 28 28 20- 50 20 60 51325530
- 40- 70 205 302 210 106 62 54 68 90 120 120 154 52325535
- 95- 70 318 70 180 225 245 247 247 206 140 56 10 53325540
201 195 20 55- 30 180 160 35- 10- 16- 20 8 13 54325545
- 45- 50- 50- 55- 40 55 147 30- 11- 20- 18 1- 10 55325550
- 55- 60 70 280 300- 10- 18 5- 5- 16 56325555
- 60- 60 85 210 530- 12- 13- 12- 8- 8 57325560
- 65 60 387 402 448 10 2- 5 20 58325565
- 65 40 330 385 493 30 4 15 10 59325570
- 64- 62- 60- 65- 65 -10 285 298 493 420 5- 20 5 60325575
- 60- 52 380 360 22 40 2 337 515 475 319- 20- 10 61325580
- 60- 55 290 260 420 280 40 28 375 422 413 455 375 62325585
- 65- 75- 85- 65- 55 400 395 45 400 510 542 505 365 63325590
-115- 2 300 400 370 470 549 560 64325595
- 55- 75-100- 12- 28 32 220 447 557 65325600
- 70 380- 80-105-150-150-100 180 362 586 66325605
1 640 290-115-160-135-100-100-100 475 67325610
- 80 480 480- 87-150- 38-110-100-100 50 68325615
15 55 230 12- 55- 65-100-100 50 69325620
- 60- 55- 48 28 230 460 18 33 35 25 50 70325625
- 60- 30 140 440 460 230 180 180 180 180 180 71325630
- 40- 40 35- 42 30 28 34 35 38 38 35 72325635
- 60- 55 12-140-140- 85-150-100-100-100-100 73325640
-100 74325645
75325650
76325655
77325660
78325665
-120-120-120-120-120-120 1405280
-100-110-150-150 170 170 130 140 140 140 150 150 2405285
-100-100- 15 10 15 20 15 180 170 170 130 140 140 140 150 150 3405290
- 20- 65 10 20 25 62 281 210 54 100-100-100- 85 4405295
- 80- 25- 40 50 420 460 479 415 342 -10 -60- 80-100 5405300
-100- 10 226 415 460 447 443 485 420 425 120 6-100-120 6405305
60 380 445 477 312 213 232 268 389 423 350 228- 12-120 7405310
335 428 352 180 25 30 35 35 149 422 414 348 190-100 8405315
351 205 15 15 10 10 15 25 35 190 325 380 300-105 -120 9405320
285 20 5 5 8 8 12 12 10 25 300 345 348 172 35- 10 10405325
127 110 90 10 5- 2 6 8 12 18 46 313 331 312 258- 20 11405330
127 110 90 10- 80- 70-100- 28 5 8 21 47 277 250 249 25 12405335
15 30 25 10-110-120-110-110- 16 8 16 35 47 294 255 190 13405340

```
  20  10  10   5-110-120-100-110-110- 32  18  28  30 226 231 251        14405345
  50  30  30  10-110-110-100-105-100-100-  8  10   6  28 348 354        15405350
   5   5   8  10- 28- 88- 98-100-110-110-100   6  15  18  46 324        16405355
 - 5-  5   5  10  10- 85-110-115-110-108-106- 50   8  16  35 200        17405360
  13  13  13  13  15- 30-105-100-100-105-105- 80   3  16  35  51        18405365
  65  25   8-  5  18   8- 32- 60-  8-  8- 60- 70  60  48  49  51        19405370
  20-  8  20-  8  15  18  15-  5  15  12  10  18  26  22  25  28        20405375
 138 110  83  35  28  12  15  10  12-  8-   2  25  18  12  16  15        21405380
 102 120 109 127  61  12-  1   5-  6-  5   2  18   9  14  18  12        22405385
  25  28  25  45 177  82- 10-  3- 10  13  16  15  17   9  12   6        23405390
 - 10   8   3  34  98 133-  6-  4- 10   3-  1   2   8  11   2- 35        24405395
 -  4   5-  3-  8  45 137   3-  1   5   3   2-  5- 10  12   2- 22        25405400
 -  8   4   8   4  35 108 132- 10   3- 10   5   5   4  12   6-  1        26405405
 - 18-  9-  1   6  15  28 161-  8-  1-  5- 15-  1- 10  14-  5- 10        27405410
 -  3-  4   1  10  15  30 140-  5-  1-  2-  2   1   8  14-  8-  4        28405415
 123  78  75  47  48  88 138  50-  1-  1  10  12   2   8-  3  11        29405420
 - 10-  5-  5   8  15  26 105  65  12   6   3  13  12  16  18   2        30405425
 - 15- 12- 35- 12   2   5  79  60-  3-  8- 12   9  12  16  18   8        31405430
 - 10-  8-  5- 10   2   5  88  99  38   8  12   9-  2   2   3 104        32405435
 -  3-  1   7  15  15  15  55 275 100  28   8-  8-  6-  2-  1   4        33405440
 - 12-  6   3   7  12  16 225 300 123 115  28  28-  6-  2-  1-  5        34405445
 - 12-  5  15  18- 15   2  28  12  47  60  85 117  59  32-  5- 10        35405450
   8-  8   8-100-100   2-  8- 10- 10-  2  31  32  36  85  89  38        36405455
  12  15   2-111-  2- 90- 80-  8- 10-  8   3  32  32  30  34  67        37405460
  35  15   8- 65-  2- 72-  2- 80- 12- 13-  9   3-  2- 12-  5  28        38405465
   8   5   3   3-  2- 60-  2- 42- 80- 16- 14- 12- 28- 32- 39- 38        39405470
   5  10   8   3- 57- 10- 62- 42- 32- 35- 28- 43- 47-100-150-150        40405475
  25  28   4   2- 65- 30- 28- 70-125-150-150-110- 60- 45- 42- 22        41405480
  35  15- 15- 50- 50- 50-150-135- 60- 35- 50- 65- 38- 29- 50-  2        42405485
  41- 50- 51-110- 48- 28- 23- 28- 48   2   4   6-  2-  2- 50- 60        43405490
  15   1- 40- 10-  2-  2-  2-  2-  2-  2- 42- 42- 38- 85- 45   6        44405495
 - 50- 55- 55- 30- 42- 42- 52- 52- 85- 48- 46- 32- 40- 16  12  30        45405500
 - 15- 25- 45- 60- 48- 48- 28- 10-  6  12- 38- 18- 18- 25   6  50        46405505
 - 35- 25- 10- 15  10  15   5-  5  12  14  12  10-  3- 22- 16  12        47405510
  30  30  30  30  10  40  18  12  28  26- 24   1- 24- 26  16 240        48405515
  85  40  35  35  25  30   6-  8- 10- 32- 12- 48 300 300 421 405        49405520
 143 148  42  42   5-  5  67 261 296 300 318 300 300 433 413 476        50405525
  85 100 147 125 234 345 313 260 250 250 250 250 250 420 413 420        51405530
 248 256 260 288 200 200 250 250  22  14  19  16  28 331 378 403        52405535
 250  85  30  20  15- 38- 36- 12- 12- 28-  18  16  18 331 393 337        53405540
  15  30  80  25  38- 33- 30-  1- 28- 23- 28-  6  35 430 380 436        44
  35  35  35  80  35  22  28-  1   3- 18- 22- 41  12 393 236 261        55405550
  25- 20-  5  20  25  80  38  28  30  18- 45- 23  12 350 261 320        56405555
  50- 10- 30- 15-  5  12  42  42  70  28  23  14  48 300 284 293        57405560
 - 10- 25- 35- 25-  5- 30- 38- 28  38  38  34 100 390 292 283 300        58405565
 - 35- 38- 28- 15- 18- 30- 40- 30- 22- 10  28 350 291 315 288 278        59405570
 - 10- 34- 38- 40- 30- 40- 40- 33- 30- 25  28 292 312 290 283 245        60405575
 - 28- 30- 36- 43- 42- 40- 40- 36- 30- 12  60 370 305 275 261 233        61405580
 - 30- 26- 28- 38- 41- 33- 40- 29- 28   5  48 220 268 262 244  35        62405585
 - 28- 22- 10- 38- 38- 22- 28- 24-110-110   3  42 140 192 195  22        63405590
 513- 33- 25  10   8   2- 15- 18-115- 90-112- 35  18  28  29   4        64405595
 557- 30- 28- 28- 12  80 400 120   6-105-115-100-100   8   1            65405600
 534 367- 42- 28 282 326 330 378 205 150- 12-105-105-100-100            66405605
 498 520 350 295 334 314 360 380 387 380 267  42-100                    67405610
 372 518 549 305 398 375 365 200 407 413 260  98   3- 98                68405615
  57  75 260 218 225 375 374 394 245 219 241 135  91- 32                69405620
  50  15 160 218 183 213 264 354 315 243 250- 50- 50                    70405625
  28-100  10 136 160  12 120 140  91  88-100-125                        71405630
-118-110  55 170  35 138 106  52  32- 43-122-105                        72405635
-143-156  35 170- 50- 50  88 148 121- 61-100                            73405640
-150-150  38 180-111- 35- 75  32 149 210  45  12-100                    74405645
```

```
-120-100  35 180- 52-110- 75  32  28 210 207 247 247 180 180 270         75405650
-120 120 170 170- 12-105- 45- 60  18  19 209 213 299 240 240 270         76405655
 170 170  50  50 170  12- 50- 35  30  18 202 162 287 278 280 270         77405660
                                                                         78405665
                                                                          1485280
 130 130 120 120 120 120 120 120                                          2485285
 130 130 120 120 120 120 120 120                                          3485290
                                                                          4485295
          50  50                                                          5485300
          50  50                                                          6485305
          60  60                                                          7485310
         100 100                                                          8485315
         120 120                                                          9485320
- 95     130 130                                                         10485325
- 50-100 170 170             50  50                                      11485330
- 25- 50 170 170             50  50                                      12485335
  25  20 150  80             60  60                                      13485340
 230  63  80  80             60  60                                      14485345
 371 101  42-150             60  60                                      15485350
 427 404  36- 98-150         60  60      40  40                          16485355
  66 250 319  64  31 120  80  70  60      50  50                          17485360
  38  73 370 240 174 120  80  70  60      50  50                          18485365
  35  38  68 357 385 129- 50              50  50                          19485370
  25  28  30 355 342 296- 68              50  50                          20485375
  16  18  22  88 398 396 310- 50-100      50  50                          21485380
  13  12  24  26 350 380 285  16-150      50  50                          22485385
   2  10  12  26  54 387 424  24-150-150  50 150                          23485390
- 18   8  12  16  22  47 410 188- 28   6  52  76                          24485395
   1-  5  10  15  22  34 371 222 150 150 150 150                          25485400
- 10-  4   6  12  20  40 339 227  35  35  35  28                          26485405
-  2-  1   7  13  20  28 307 207  35  22- 12- 22                          27485410
   3-  8-  3   8   8  35 276 338  28-100-150-150                          28485415
-  2-  4-  2- 12   6  25 120 316  26-120-150-150                          29485420
-  4-  3-  3- 22   8 123 459 234  28-150 150 150                          30485425
   6   4   8  14  18  34 303 292  22-135 150 150                          31485430
  18  22  16  18  15  29 235 295  35-120 150 150                          32485435
   6  16  18  26  18  24 213 227 254- 70 150 150                          33485440
   1  12  14  16  20  35 283 227 261- 50 150 150                          34485445
-  1   6  12  35  70 220 203 227 195  20 150 150                          35485450
  42  44  28  65 161  50  35  60 277  85 110 110                          36485455
 113 162 218 123  55  45  55  58 232 294  10   2                          37485460
  14   6- 35-100- 68  35  60  70 245 287  35- 22                          38485465
- 52-120-120- 32  12  18  35  45 282 120  14  38                          39485470
-120- 88- 25   6   5   8  30  35 245  95 140 150                          40485475
- 28-  2- 80  12   5   8  35  35 280  35  10  12                          41485480
-  2-  2- 80   4-  2   2  30  35 168  20  22   8                          42485485
- 50- 85- 85- 50- 58  16 320 340 343 316  15   2                          43485490
  12  14 280 393 326 372 355 340 338 272 220 170                          44485495
  45 340 372 396 375 363 350 292 283 230 130 120                          45485500
  45 340 348 368 343 291 292 290 255  35 150 150                          46485505
 350 368 272 258 368 289 330 193 198- 22 140 140                          47485510
 443 368 347 398 308 260 335 250  35-110 140 140                          48485515
 385 243 399 403 248 321 295 194- 23-135 140 140                          49485520
 375 375 456 333 255 320 218  22-120     140 140                          50485525
 380 405 392 248 258 222 194   4-120     140 140                          51485530
 420 385 260 265 263 200  18-140         140 140                          52485535
 500 425 180 257 233 180-100-135         140 140                          53485540
 233 378 433 255  35  12-120             140 140                          54485545
 270 295 283 220  12-100-135             130 130                          55485550
 310 293 262 188- 32- 85                 130 130                          56485555
 288 272 158  12-100-135                 130 130                          57485560
```

```
 305 267  35- 49-100                      130 130                            58485565
 290 228  16-115                          130 130                            59485570
 222  18-  4-135                          130 130                            60485575
  35- 55                                  130 130                            61485580
  18-120                                  130 130                            62485585
-110                                                                         63485590
-120                                                                         64485595
                                                                             65485600
                                                                             66485605
                                                                             67485610
                                                                             68485615
                                                                             6948
                                                                             7048
         240 240  70  70  70  60  70 -10 -18 -14                             7148
         240 240  70  70  70  70  70  60 - 2 - 3                             7248
  90 180 210 180  70  70   9  70  70  70  34  32                             7348
 220 210 210 210 160              70  70  70  16                             7448
 220 270 210 210 180 160  80      70  70  70  16                             7548
 270 270 260 250 250 230 160  60     -15  34 - 5                             7648
 220 220 210 180 140 140  80  60                                             7748
                                                                             78485665
 20.0                                           DIFFUSION DEFAULT COEFFICIENT
    3   41   50  65.  65.  65.  65.  65.  65.  65.  65.  65.  65.
    3   51   56  65.  65.  65.  65.  65.  65.
    6   52   52  45.
    7   52   52  45.
    8   52   52  45.
    9   52   52  45.
   10   52   52  45.
   11   52   52  45.
   12   52   52  45.
   13   52   52  45.
   18   55   57  45.  45.  45.
   20   60   60  45.
   21   60   60  45.
   22   60   60  45.
   23   60   60  45.
   24   60   60  45.
   25   59   60  45.  45.
   26   59   60  45.  45.
   49   60   60  65.
   50   60   60  65.
   51   60   60  65.
   52   60   60  65.
   53   60   60  65.
   54   60   60  65.
   55   60   60  65.
   56   60   60  65.
   57   60   60  65.
   58   60   60  65.
   59   60   60  65.
   60   60   60  65.
   61   60   60  65.
   62   60   60  65.
   76   45   54  45.  45.  45.  45.  45.  45.  45.  45.  45.  45.
   76   55   55  45.
   77   45   54  45.  45.  45.  45.  45.  45.  45.  45.  45.  45.
   77   55   56  45.  45.
   45   48   57  80.  80.  80.  80.  80.  80.  80.  80.  80.  80.
   45   58   59  80.  80.
   46   48   57  80.  80.  80.  80.  80.  80.  80.  80.  80.  80.
```

46	58	59	80.	80.								
47	48	57	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
47	58	59	80.	80.								
48	48	57	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
48	58	58	80.									
49	48	57	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
49	58	58	80.									
50	48	57	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
51	47	56	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
51	57	57	80.									
52	46	55	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
52	56	56	80.									
53	45	54	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
53	55	55	80.									
54	45	54	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
54	55	55	80.									
55	45	54	80.	80.	80.	80.	80.	80.	80.	80.	80.	80.
56	45	53	80.	80.	80.	80.	80.	80.	80.	80.	80.	
57	45	53	80.	80.	80.	80.	80.	80.	80.	80.	80.	
58	45	53	80.	80.	80.	80.	80.	80.	80.	80.	80.	
59	45	52	80.	80.	80.	80.	80.	80.	80.	80.		
60	45	51	80.	80.	80.	80.	80.	80.	80.			
61	43	51	80.	80.	80.	80.	80.	80.	80.	80.	80.	
62	43	50	80.	80.	80.	80.	80.	80.	80.	80.		
63	43	50	80.	80.	80.	80.	80.	80.	80.	80.		
64	44	49	80.	80.	80.	80.	80.	80.				
65	45	48	80.	80.	80.	80.						

END DIFF COEF

.031 MANNING DEFAULT COEFFICIENT

37	56	58	.026	.026	.026							
38	56	58	.026	.026	.026							
39	56	58	.026	.026	.026							
40	56	58	.026	.026	.026							
41	56	58	.026	.026	.026							
42	56	58	.026	.026	.026							
43	56	58	.026	.026	.026							
44	56	58	.026	.026	.026							
45	56	58	.026	.026	.026							
47	23	30	.026	.026	.026	.026	.026	.026	.026	.026		
48	29	30	.026	.026								
49	29	32	.026	.026	.026	.026						
50	31	32	.026	.026								
51	31	34	.026	.026	.026	.026						
51	40	48	.026	.026	.026	.026	.026	.026	.026	.026	.026	
52	31	40	.026	.026	.026	.026	.026	.026	.026	.026	.026	.026
72	39	41	.026	.026	.026							
73	39	41	.026	.026	.026							
74	40	41	.026	.026								
22	9	18	.034	.034	.034	.034	.034	.034	.034	.034	.034	.034
23	10	18	.034	.034	.034	.034	.034	.034	.034	.034	.034	
24	10	18	.034	.034	.034	.034	.034	.034	.034	.034	.034	
25	10	18	.034	.034	.034	.034	.034	.034	.034	.034	.034	
26	11	18	.034	.034	.034	.034	.034	.034	.034	.034		
27	12	18	.034	.034	.034	.034	.034	.034	.034			
28	13	18	.034	.034	.034	.034	.034	.034				
29	13	18	.034	.034	.034	.034	.034	.034				
30	13	18	.034	.034	.034	.034	.034	.034				
31	13	18	.034	.034	.034	.034	.034	.034				
32	13	18	.034	.034	.034	.034	.034	.034				
33	13	18	.034	.034	.034	.034	.034	.034				
34	13	18	.034	.034	.034	.034	.034	.034				

```
 35   13   18 .034 .034 .034 .034 .034 .034
 36   13   18 .034 .034 .034 .034 .034 .034
 37   13   18 .034 .034 .034 .034 .034 .034
 38   14   18 .034 .034 .034 .034 .034
 39   14   19 .034 .034 .034 .034 .034 .034
 40   15   20 .034 .034 .034 .034 .034 .034
 41   15   20 .034 .034 .034 .034 .034 .034
 42   15   21 .034 .034 .034 .034 .034 .034 .034
 43   16   21 .034 .034 .034 .034 .034 .034
 44   16   21 .034 .034 .034 .034 .034 .034
 45   17   21 .034 .034 .034 .034 .034
 46   17   21 .034 .034 .034 .034 .034
 47   18   21 .034 .034 .034 .034
 48   19   23 .034 .034 .034 .034 .034
 49   19   23 .034 .034 .034 .034 .034
 50   20   23 .034 .034 .034 .034
 51   21   24 .034 .034 .034 .034
 52   21   27 .034 .034 .034 .034 .034 .034 .034
 53   22   27 .034 .034 .034 .034 .034 .034
 54   21   27 .034 .034 .034 .034 .034 .034 .034
 55   25   27 .034 .034 .034
 56   25   27 .034 .034 .034
 57   25   28 .034 .034 .034 .034
 58   25   28 .034 .034 .034 .034
 59   26   29 .034 .034 .034 .034
 60   26   29 .034 .034 .034 .034
 61   26   30 .034 .034 .034 .034 .034
 62   23   30 .034 .034 .034 .034 .034 .034 .034 .034
 63   25   31 .034 .034 .034 .034 .034 .034 .034
 64   26   31 .034 .034 .034 .034 .034 .034
 65   27   33 .034 .034 .034 .034 .034 .034 .034
 66   31   34 .034 .034 .034 .034
 67   25   25 .034
 67   32   34 .034 .034 .034
 68   25   26 .034 .034
 68   33   40 .034 .034 .034 .034 .034 .034 .034 .034
 69   25   27 .034 .034 .034
 69   33   40 .034 .034 .034 .034 .034 .034 .034 .034
 70   25   29 .034 .034 .034 .034 .034
 70   33   40 .034 .034 .034 .034 .034 .034 .034 .034
 71   25   32 .034 .034 .034 .034 .034 .034 .034 .034
 71   33   40 .034 .034 .034 .034 .034 .034 .034 .034
 72   25   33 .034 .034 .034 .034 .034 .034 .034 .034 .034
 72   36   40 .034 .034 .034 .034 .034
 73   36   42 .034 .034 .034 .034 .034 .034 .034
 74   36   37 .034 .034
 74   40   42 .034 .034 .034
 75   36   37 .034 .034
 75   41   44 .034 .034 .034 .034
 76   35   37 .034 .034 .034
 76   41   50 .034 .034 .034 .034 .034 .034 .034 .034 .034 .034
 76   51   57 .034 .034 .034 .034 .034 .034 .034
 77   34   38 .034 .034 .034 .034 .034
 77   42   50 .034 .034 .034 .034 .034 .034 .034 .034 .034
 77   51   56 .034 .034 .034 .034 .034 .034
                                                                   END MANN COEF
  1
0.0 0.0 4.5 4.5 4.5 4.5 4.5 4.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0          DO 1  1
0.0 0.0 4.5 4.5 4.5 4.5 4.5 4.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0          DO 1  2
0.0 0.0 4.5 4.5 4.5 4.5 4.5 4.5 0.0 0.0 0.0 0.0 0.0 0.0 3.7 3.6          DO 1  3
0.0 0.0 4.5 4.5 4.5 4.5 4.5 4.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 3.6          DO 1  4
```

0.0	0.0	0.0	4.5	4.5	4.5	4.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	DO 1 5
0.0	0.0	0.0	4.4	4.3	4.3	4.3	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	DO 1 6
0.0	0.0	4.4	4.4	4.3	4.3	4.3	4.2	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	DO 1 7
0.0	0.0	0.0	4.4	4.3	4.3	4.3	4.2	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	DO 1 8
0.0	0.0	0.0	4.4	4.3	4.3	4.3	4.2	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	DO 1 9
0.0	0.0	0.0	4.4	4.3	4.3	4.3	4.2	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	DO 1 10
0.0	0.0	0.0	4.4	4.3	4.3	4.3	4.2	4.2	4.1	0.0	0.0	0.0	0.0	0.0	0.0	DO 1 11
0.0	0.0	0.0	4.4	4.3	4.3	4.3	4.2	4.2	4.1	0.0	0.0	0.0	0.0	0.0	0.0	DO 1 12
0.0	0.0	0.0	4.4	4.3	4.3	4.3	4.2	4.2	4.1	4.1	0.0	0.0	0.0	0.0	0.0	DO 1 13
0.0	0.0	0.0	4.4	4.3	4.3	4.3	4.2	4.2	4.1	4.1	4.0	4.0	0.0	3.8	3.7	DO 1 14
0.0	0.0	0.0	4.4	4.3	4.3	4.2	4.2	4.1	4.1	4.0	4.0	3.9	3.8	3.8	3.7	DO 1 15
0.0	0.0	0.0	0.0	4.3	4.3	4.2	4.2	4.1	4.1	4.0	4.0	3.9	3.8	3.8	3.7	DO 1 16
0.0	0.0	0.0	0.0	0.0	4.3	4.2	4.1	4.1	4.0	4.0	3.9	3.9	3.8	3.8	3.7	DO 1 17
0.0	0.0	0.0	0.0	0.0	4.3	4.2	4.1	4.1	4.0	4.0	3.9	3.9	3.8	3.8	3.7	DO 1 18
0.0	0.0	0.0	0.0	0.0	0.0	4.2	4.1	4.1	4.0	3.9	3.9	3.8	3.8	3.7	3.7	DO 1 19
0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	4.0	4.0	3.9	3.9	3.8	3.8	3.7	3.7	DO 1 20
0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	4.0	3.9	3.9	3.8	3.8	3.8	3.7	3.7	DO 1 21
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	3.9	3.9	3.8	3.8	3.8	3.7	3.7	DO 1 22
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	3.9	3.8	3.8	3.8	3.8	3.7	3.7	DO 1 23
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	3.8	3.8	3.8	3.8	3.7	3.7	DO 1 24
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	3.8	3.8	3.8	3.7	3.7	3.7	DO 1 25
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	3.8	3.8	3.7	3.7	3.7	DO 1 26
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	3.8	3.7	3.7	3.7	DO 1 27
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	3.7	3.7	3.7	DO 1 28
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	3.7	3.7	3.7	DO 1 29
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	3.7	3.7	3.7	DO 1 30
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	3.7	3.7	3.7	DO 1 31
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	3.7	3.7	3.7	DO 1 32
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	3.7	3.7	3.6	DO 1 33
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	3.7	3.7	3.6	DO 1 34
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	3.7	3.7	3.6	DO 1 35
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	3.7	3.7	3.6	DO 1 36
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	3.7	3.6	3.6	DO 1 37
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	3.7	3.6	3.6	DO 1 38
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	3.6	3.6	3.6	DO 1 39
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	3.6	3.6	DO 1 40
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	3.6	3.6	DO 1 41
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	3.6	3.6	DO 1 42
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	3.6	DO 1 43
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	3.6	DO 1 44
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	DO 1 45
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	DO 1 46
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	DO 1 47
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	DO 1 48
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	DO 1 49
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	DO 1 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	0.0	0.0	0.0	0.0	DO 1 51
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	DO 1 52
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	DO 1 53
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	DO 1 54
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	DO 1 55
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	DO 1 56
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	DO 1 57
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	DO 1 58
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	DO 1 59
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	DO 1 60
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	DO 1 61
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	DO 1 62
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	DO 1 63
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	DO 1 64
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	DO 1 65

```
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          DO 1 66
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          DO 1 67
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          DO 1 68
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          DO 1 69
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          DO 1 70
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          DO 1 71
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          DO 1 72
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          DO 1 73
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          DO 1 74
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          DO 1 75
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          DO 1 76
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          DO 1 77
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          DO 1 78
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          DO 2  1
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          DO 2  2
3.5 3.5 3.4 3.4 3.4 3.4 3.3 3.3 3.3 3.3 3.2 3.2 3.2 0.0 0.0 0.0          DO 2  3
0.0 0.0 0.0 0.0 3.4 3.4 3.3 3.3 0.0 0.0 0.0 3.2 3.2 0.0 0.0 0.0          DO 2  4
0.0 0.0 0.0 0.0 0.0 0.0 3.3 0.0 0.0 0.0 0.0 0.0 3.2 3.1 0.0 0.0          DO 2  5
0.0 0.0 0.0 0.0 0.0 0.0 3.3 0.0 0.0 0.0 0.0 0.0 3.2 3.1 3.1 3.1          DO 2  6
0.0 3.5 3.5 3.4 3.4 3.4 3.3 0.0 0.0 0.0 0.0 0.0 0.0 3.1 3.1 3.1          DO 2  7
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 3.1 3.1 3.1          DO 2  8
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 3.1 3.1 3.1          DO 2  9
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 3.1 3.1 3.1          DO 2 10
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 3.3 3.2 3.2 3.2 3.1 3.1 3.1          DO 2 11
0.0 0.0 0.0 0.0 0.0 0.0 3.4 3.3 3.3 3.3 3.2 3.2 3.2 3.1 3.1 3.1          DO 2 12
0.0 3.6 3.5 3.5 3.4 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.1 3.1 3.1 3.0          DO 2 13
3.7 3.6 3.5 3.5 3.4 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.1 3.1 3.1 3.0          DO 2 14
3.6 3.6 3.5 3.5 3.5 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.2 3.1 3.1 3.0          DO 2 15
3.6 3.6 3.5 3.5 3.5 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.1 3.1 3.0 3.0          DO 2 16
3.6 3.6 3.5 3.5 3.5 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.1 3.1 3.0 3.0          DO 2 17
3.6 3.6 3.5 3.5 3.5 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.1 3.1 3.0 3.0          DO 2 18
3.7 3.6 3.6 3.5 3.5 3.4 3.4 3.3 3.3 3.3 3.2 3.1 3.1 3.0 3.0 3.0          DO 2 19
3.7 3.6 3.6 3.5 3.5 3.4 3.4 3.3 3.3 3.3 3.2 3.1 3.1 3.0 3.0 3.0          DO 2 20
3.7 3.6 3.6 3.5 3.5 3.4 3.4 0.0 0.0 0.0 3.2 3.1 3.1 3.0 3.0 3.0          DO 2 21
3.7 3.6 3.6 3.6 3.5 3.5 3.4 0.0 0.0 0.0 0.0 3.2 3.1 3.1 3.0 3.0          DO 2 22
3.7 3.6 3.6 3.6 3.5 3.5 3.4 0.0 0.0 0.0 0.0 3.2 3.1 3.1 3.0 3.0          DO 2 23
3.7 3.6 3.6 3.6 3.5 0.0 0.0 0.0 0.0 0.0 0.0 3.2 3.1 3.1 3.0 3.0          DO 2 24
3.7 3.6 3.6 3.6 3.5 0.0 0.0 0.0 0.0 0.0 0.0 3.2 3.1 0.0 0.0 3.0          DO 2 25
3.7 3.6 3.6 3.6 3.6 0.0 0.0 0.0 0.0 0.0 0.0 3.2 3.1 0.0 0.0 3.0          DO 2 26
3.7 3.6 3.6 3.6 3.6 3.5 0.0 0.0 0.0 0.0 3.3 3.2 3.1 3.1 3.0 3.0          DO 2 27
3.7 3.6 3.6 3.6 3.6 3.5 3.5 0.0 0.0 0.0 3.3 3.2 3.1 3.1 3.0 3.0          DO 2 28
3.7 3.6 3.6 3.6 3.6 3.5 3.5 3.4 3.4 3.3 3.3 3.2 3.1 3.1 3.0 3.0          DO 2 29
3.7 3.6 3.6 3.6 3.6 3.5 3.5 3.4 3.4 3.3 3.3 3.2 3.1 0.0 3.0 3.0          DO 2 30
3.6 3.6 3.6 3.6 3.5 3.5 3.4 3.4 3.3 3.3 3.2 3.2 3.1 0.0 3.0 3.0          DO 2 31
3.6 3.6 3.6 3.6 3.5 3.5 3.4 3.4 3.3 3.3 3.2 3.2 3.1 3.1 3.0 3.0          DO 2 32
3.6 3.6 3.6 3.5 3.5 0.0 3.4 3.4 3.3 3.3 3.3 3.2 3.1 3.1 3.0 3.0          DO 2 33
3.6 3.6 3.6 3.5 0.0 0.0 0.0 3.4 3.4 3.3 3.3 3.2 3.2 3.1 3.1 3.0          DO 2 34
3.6 3.6 3.6 3.5 0.0 0.0 0.0 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.1 3.1          DO 2 35
3.6 3.6 3.6 3.5 0.0 0.0 3.5 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.2 3.1          DO 2 36
3.6 3.6 3.6 3.5 3.5 3.5 3.5 3.4 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.1          DO 2 37
3.6 3.6 3.6 3.5 3.5 3.5 3.5 3.4 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.2          DO 2 38
3.6 3.6 3.5 3.5 3.5 3.5 3.4 3.4 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.2          DO 2 39
3.6 3.6 3.5 3.5 3.5 3.5 3.4 3.4 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.2          DO 2 40
3.6 3.6 3.5 3.5 3.5 3.5 3.4 3.4 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.2          DO 2 41
3.6 3.6 3.5 3.5 3.5 0.0 0.0 3.4 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.2          DO 2 42
3.6 3.5 3.5 3.5 3.5 0.0 0.0 0.0 0.0 3.4 3.3 3.3 3.3 3.2 3.2 3.2          DO 2 43
3.6 3.5 3.5 3.5 3.5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 3.2 3.2 3.2          DO 2 44
3.5 3.5 3.5 3.5 3.5 3.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0          DO 2 45
3.5 3.5 3.5 3.5 3.5 3.4 3.4 3.4 3.3 0.0 0.0 0.0 0.0 0.0 0.0 0.0          DO 2 46
0.0 3.5 3.5 3.5 3.4 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.1 0.0 0.0 0.0          DO 2 47
0.0 0.0 3.5 3.5 3.4 3.4 3.3 3.3 3.3 3.2 3.2 3.1 3.1 3.0 0.0 0.0          DO 2 48
```

0.0	0.0	3.5	3.5	3.4	3.4	3.3	3.3	0.0	0.0	0.0	0.0	3.1	3.0	3.0	3.0	DO 2 49
0.0	0.0	0.0	3.4	3.4	3.4	3.3	3.3	0.0	0.0	0.0	0.0	3.1	3.1	3.0	3.0	DO 2 50
0.0	0.0	0.0	0.0	3.4	3.4	3.3	3.3	3.3	3.2	0.0	3.1	3.1	3.1	3.0	3.0	DO 2 51
0.0	0.0	0.0	0.0	0.0	3.3	3.3	3.3	3.2	3.2	3.2	3.1	3.1	3.1	3.0	3.0	DO 2 52
0.0	0.0	0.0	0.0	0.0	0.0	3.3	3.3	3.2	3.2	3.1	3.1	3.1	3.0	3.0	3.0	DO 2 53
0.0	0.0	0.0	0.0	0.0	3.3	3.3	3.3	3.2	3.2	3.1	3.1	3.1	3.0	3.0	2.9	DO 2 54
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	3.1	3.1	3.0	3.0	2.9	2.9	DO 2 55
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.0	3.0	2.9	2.9	2.8	2.8	DO 2 56
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	2.9	2.9	2.8	2.8	2.8	2.7	DO 2 57
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	2.9	2.8	2.8	2.8	2.8	2.7	DO 2 58
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	2.9	2.8	2.8	2.8	2.7	2.7	DO 2 59
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	2.8	2.8	2.8	2.8	2.7	2.7	DO 2 60
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.8	2.8	2.7	2.7	2.7	2.6	DO 2 61
0.0	0.0	0.0	0.0	0.0	0.0	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	DO 2 62
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	DO 2 63
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.7	2.7	2.6	2.6	2.6	DO 2 64
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.7	2.6	2.6	2.6	DO 2 65
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	2.5	2.4	DO 2 66
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	2.3	DO 2 67
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	DO 2 68
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.4	0.0	0.0	0.0	0.0	0.0	0.0	DO 2 69
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.4	2.4	2.4	0.0	0.0	0.0	0.0	DO 2 70
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	DO 2 71
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3	DO 2 72
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	DO 2 73
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	DO 2 74
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	DO 2 75
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	DO 2 76
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	DO 2 77
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	DO 2 78
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	DO 3 1
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	DO 3 2
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	2.8	2.8	2.8	2.8	2.7	2.7	2.7	DO 3 3
0.0	0.0	0.0	3.0	2.9	2.9	2.9	2.9	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0	DO 3 4
0.0	0.0	0.0	3.0	2.9	2.9	2.9	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0	0.0	DO 3 5
0.0	0.0	0.0	3.0	2.9	2.9	2.9	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0	0.0	DO 3 6
0.0	0.0	3.0	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.7	2.7	0.0	0.0	0.0	0.0	DO 3 7
3.0	3.0	3.0	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.7	2.7	2.7	0.0	0.0	0.0	DO 3 8
3.0	3.0	3.0	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.7	2.7	2.7	0.0	0.0	0.0	DO 3 9
3.0	3.0	3.0	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.6	0.0	0.0	DO 3 10
3.0	3.0	3.0	2.9	2.9	2.9	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	DO 3 11
3.0	3.0	3.0	2.9	0.0	0.0	0.0	0.0	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	DO 3 12
3.0	3.0	2.9	2.9	0.0	0.0	0.0	0.0	0.0	2.7	2.7	2.7	2.6	2.6	2.6	2.6	DO 3 13
3.0	3.0	2.9	2.9	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.7	2.6	2.6	2.6	2.5	DO 3 14
3.0	3.0	2.9	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	2.6	2.6	2.5	2.5	DO 3 15
3.0	2.9	2.9	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	2.6	2.5	2.5	DO 3 16
3.0	2.9	2.9	2.9	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	2.5	2.5	2.5	DO 3 17
3.0	2.9	2.9	2.9	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5	2.4	DO 3 18
2.9	2.9	2.9	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.4	2.4	DO 3 19
2.9	2.9	2.9	2.8	2.8	2.8	2.7	0.0	0.0	2.6	0.0	0.0	2.5	2.5	2.4	2.4	DO 3 20
2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.5	2.4	2.4	DO 3 21
2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.3	DO 3 22
2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.4	2.3	DO 3 23
2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 24
2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 25
2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 26
2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 27
2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 28
2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 29
2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 30
2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 31

2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 32
3.0	2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 33
3.0	3.0	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 34
3.0	3.0	3.0	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 35
3.1	3.0	3.0	0.0	0.0	0.0	2.8	2.8	2.7	2.7	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 36
3.1	3.1	3.0	0.0	0.0	0.0	0.0	0.0	2.8	2.7	2.7	2.6	2.6	2.5	2.4	2.3	DO 3 37
3.1	3.1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.7	2.6	2.6	2.5	2.4	2.3	DO 3 38
3.1	3.1	3.1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.6	2.6	2.5	0.0	0.0	DO 3 39
3.1	3.1	3.1	3.1	3.0	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	DO 3 40
3.1	3.1	3.1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	DO 3 41
3.1	3.1	3.1	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	DO 3 42
3.1	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	2.3	DO 3 43
3.1	3.1	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	2.3	DO 3 44
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	2.3	DO 3 45
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	2.5	2.4	2.3	DO 3 46
0.0	3.0	0.0	0.0	0.0	0.0	0.0	2.7	2.7	2.7	2.6	2.6	2.5	2.5	2.4	2.3	DO 3 47
0.0	2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.3	2.2	DO 3 48
2.9	2.9	2.8	2.8	2.8	2.7	2.7	2.7	2.6	2.6	2.5	2.5	2.4	2.3	2.1	2.0	DO 3 49
3.0	2.9	2.9	2.8	2.8	2.7	2.7	2.6	2.6	2.5	2.5	2.4	2.3	2.2	2.1	2.0	DO 3 50
3.0	2.9	2.9	2.8	2.8	2.7	2.7	2.6	2.6	2.5	2.5	2.4	2.3	2.1	2.0	1.8	DO 3 51
3.0	2.9	2.9	2.8	2.8	2.7	2.7	2.6	2.6	2.5	2.5	2.3	2.2	2.0	1.8	1.5	DO 3 52
2.9	2.9	2.8	2.8	2.8	2.7	0.0	2.6	2.6	2.5	2.5	2.3	2.2	2.0	1.8	1.5	DO 3 53
2.9	2.8	2.8	2.8	2.7	0.0	0.0	2.5	2.5	2.4	2.3	2.1	2.0	1.8	1.5	1.4	DO 3 54
2.8	2.8	2.8	2.7	2.6	2.6	2.5	2.5	2.4	2.3	2.1	2.0	1.8	1.5	1.4	1.4	DO 3 55
2.8	2.7	2.7	2.7	2.6	2.6	2.5	2.5	2.4	2.3	0.0	0.0	1.8	1.5	1.4	1.4	DO 3 56
2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.4	2.3	2.1	2.0	0.0	1.5	1.4	1.4	1.3	DO 3 57
2.7	2.7	2.6	2.6	2.6	2.5	0.0	2.3	2.2	2.0	1.8	1.5	1.4	1.4	1.3	1.3	DO 3 58
2.7	0.0	0.0	2.6	2.6	2.5	0.0	0.0	2.0	1.8	1.5	1.4	1.4	1.3	1.3	1.2	DO 3 59
2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.8	1.5	1.4	1.4	1.3	1.3	1.2	DO 3 60
2.6	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.4	1.4	1.3	1.3	1.2	1.2	DO 3 61
2.6	2.5	2.5	0.0	0.0	0.0	0.0	0.0	2.0	1.5	1.5	1.4	1.4	1.3	1.3	1.3	DO 3 62
2.5	2.5	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.4	1.4	1.3	1.3	DO 3 63
2.5	2.5	2.4	2.4	0.0	2.3	2.2	2.2	0.0	0.0	0.0	0.0	1.5	1.4	1.4	1.4	DO 3 64
2.5	2.5	2.4	2.4	2.3	2.3	2.3	2.2	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	DO 3 65
2.4	2.4	0.0	0.0	2.3	2.3	2.2	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	DO 3 66
2.3	2.3	2.3	0.0	2.2	2.2	2.2	2.2	2.1	2.1	2.1	0.0	0.0	0.0	0.0	0.0	DO 3 67
2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	0.0	0.0	0.0	0.0	DO 3 68
2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	2.1	0.0	0.0	0.0	DO 3 69
2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	0.0	0.0	0.0	0.0	DO 3 70
2.3	0.0	0.0	2.3	2.3	2.3	2.3	2.3	2.2	2.2	2.2	0.0	0.0	0.0	0.0	0.0	DO 3 71
0.0	0.0	0.0	2.3	2.3	2.3	2.3	2.2	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	DO 3 72
0.0	0.0	0.0	2.3	2.3	0.0	2.3	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	DO 3 73
0.0	0.0	0.0	2.3	0.0	0.0	0.0	2.2	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	DO 3 74
0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	2.2	2.2	2.2	2.2	0.0	0.0	0.0	0.0	DO 3 75
0.0	0.0	0.0	2.3	2.3	0.0	0.0	0.0	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.1	DO 3 76
0.0	2.3	2.3	2.3	2.2	0.0	0.0	0.0	0.0	2.2	2.2	2.2	2.2	2.1	2.1	2.1	DO 3 77
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	DO 3 78
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				DO 4 1
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				DO 4 2
2.7	2.6	2.6	2.6	2.6	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0				DO 4 3
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				DO 4 4
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				DO 4 5
0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				DO 4 6
0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				DO 4 7
0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				DO 4 8
0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				DO 4 9
0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				DO 4 10
0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				DO 4 11
2.5	0.0	0.0	2.4	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0				DO 4 12
2.5	2.5	2.5	2.4	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0				DO 4 13
2.5	2.5	2.4	2.4	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0				DO 4 14

2.5	2.4	2.4	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	DO 4 15
2.5	2.4	2.4	0.0	0.0	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	DO 4 16
2.4	2.4	2.4	2.3	0.0	0.0	0.0	0.0	2.1	0.0	0.0	2.0	0.0	DO 4 17
2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.1	0.0	0.0	2.0	0.0	DO 4 18
2.4	2.3	2.3	2.3	2.3	2.2	2.2	0.0	0.0	0.0	0.0	2.0	0.0	DO 4 19
2.4	2.3	2.3	2.3	2.3	2.2	0.0	0.0	0.0	0.0	0.0	2.0	0.0	DO 4 20
2.3	2.3	2.3	2.2	2.2	2.1	2.1	0.0	0.0	0.0	0.0	1.6	0.0	DO 4 21
2.2	2.1	2.1	2.0	1.9	1.9	1.8	1.8	0.0	0.0	0.0	1.6	0.0	DO 4 22
2.2	2.1	2.1	2.0	1.9	1.9	1.8	1.8	0.0	0.0	0.0	1.6	0.0	DO 4 23
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	0.0	0.0	0.0	1.6	0.0	DO 4 24
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	0.0	DO 4 25
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	0.0	DO 4 26
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	0.0	DO 4 27
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	0.0	0.0	0.0	0.0	DO 4 28
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	0.0	0.0	0.0	0.0	DO 4 29
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	0.0	0.0	0.0	0.0	DO 4 30
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	0.0	0.0	1.6	0.0	DO 4 31
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	0.0	0.0	1.6	0.0	DO 4 32
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	0.0	0.0	1.6	0.0	DO 4 33
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	0.0	0.0	1.6	0.0	DO 4 34
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	0.0	DO 4 35
2.3	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	0.0	DO 4 36
2.3	2.2	2.1	2.0	1.8	1.5	1.4	1.4	1.3	1.2	1.1	1.1	0.0	DO 4 37
2.3	2.2	2.1	0.0	0.0	1.5	1.4	1.4	1.3	1.2	1.1	1.1	0.0	DO 4 38
0.0	0.0	0.0	0.0	0.0	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.0	DO 4 39
0.0	0.0	0.0	0.0	1.8	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.0	DO 4 40
0.0	0.0	0.0	0.0	1.5	1.4	1.3	1.3	1.2	1.1	1.0	1.0	0.0	DO 4 41
2.3	2.2	0.0	0.0	1.5	1.4	1.3	1.3	1.2	1.1	1.0	1.0	0.0	DO 4 42
0.0	0.0	0.0	0.0	0.0	1.4	1.3	1.3	1.2	1.1	1.0	1.0	0.0	DO 4 43
0.0	0.0	0.0	0.0	0.0	1.4	1.3	1.2	1.1	1.0	1.0	1.0	0.0	DO 4 44
2.2	2.1	2.0	1.5	1.4	1.3	1.3	1.2	1.1	1.0	1.0	1.0	0.0	DO 4 45
2.1	2.0	1.8	1.5	1.4	1.3	1.2	1.1	1.0	1.0	1.0	1.0	0.0	DO 4 46
2.1	2.0	1.5	1.4	1.3	1.3	1.2	1.1	1.0	1.0	1.0	1.0	0.0	DO 4 47
2.0	1.8	1.5	1.4	1.3	1.2	1.1	1.0	1.0	0.0	0.0	1.0	0.0	DO 4 48
1.8	1.5	1.4	1.3	1.3	1.2	1.1	1.0	1.0	0.0	0.0	1.0	0.0	DO 4 49
1.8	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.0	0.0	0.0	1.0	0.0	DO 4 50
1.5	1.4	1.3	1.3	1.2	1.1	1.0	1.0	0.0	0.0	0.0	1.0	0.0	DO 4 51
1.4	1.4	1.3	1.2	1.1	1.1	1.0	0.0	0.0	0.0	0.0	1.0	0.0	DO 4 52
1.4	1.3	1.3	1.2	1.1	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	DO 4 53
1.4	1.3	1.2	1.1	1.1	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	DO 4 54
1.3	1.3	1.2	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	DO 4 55
1.3	1.2	1.1	1.1	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	DO 4 56
1.3	1.2	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	DO 4 57
1.2	1.1	1.1	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	DO 4 58
1.2	1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	DO 4 59
1.1	1.1	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	DO 4 60
1.1	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	DO 4 61
1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	DO 4 62
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	DO 4 63
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	DO 4 64
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	DO 4 65
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	DO 4 66
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	DO 4 67
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	DO 4 68
0.0	0.0	0.0	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.5	0.0	DO 4 69
0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	DO 4 70
0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	DO 4 71
0.0	0.0	0.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	0.0	DO 4 72
0.0	0.0	0.0	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	0.0	DO 4 73
0.0	2.1	2.1	2.1	2.1	0.0	0.0	0.0	0.0	2.0	2.0	2.0	0.0	DO 4 74
0.0	2.1	2.1	2.1	2.1	0.0	0.0	0.0	0.0	2.0	2.0	2.0	0.0	DO 4 75

```
2.1 2.1 2.1 2.1 2.1 2.1 2.1 0.0 0.0 0.0 2.0 2.0 0.0                DO 4 76
2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.0 0.0 0.0 0.0 0.0 0.0                DO 4 77
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                DO 4 78
  2
0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0    BOD 1  1
0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0    BOD 1  2
0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.6 0.6    BOD 1  3
0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.6    BOD 1  4
0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.6    BOD 1  5
0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0    BOD 1  6
0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0    BOD 1  7
0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0    BOD 1  8
0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0    BOD 1  9
0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0 0.0    BOD 1 10
0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0    BOD 1 11
0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0 0.0    BOD 1 12
0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.0 0.0 0.0 0.0    BOD 1 13
0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.0 0.4 0.4    BOD 1 14
0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4    BOD 1 15
0.0 0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4    BOD 1 16
0.0 0.0 0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4    BOD 1 17
0.0 0.0 0.0 0.0 0.0 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4    BOD 1 18
0.0 0.0 0.0 0.0 0.0 0.0 0.4 0.4 0.3 0.3 0.3 0.3 0.3 0.3 0.4 0.4    BOD 1 19
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.4    BOD 1 20
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2 0.2 0.3 0.3 0.3 0.3    BOD 1 21
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2 0.2 0.3 0.3 0.3    BOD 1 22
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2 0.2 0.3 0.3 0.3    BOD 1 23
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2 0.2 0.3 0.3    BOD 1 24
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2 0.2 0.3 0.3    BOD 1 25
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2 0.3 0.3    BOD 1 26
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2 0.3    BOD 1 27
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.3    BOD 1 28
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2    BOD 1 29
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2    BOD 1 30
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2    BOD 1 31
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2    BOD 1 32
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2    BOD 1 33
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2    BOD 1 34
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.2 0.2 0.2    BOD 1 35
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 0.2 0.2 0.2    BOD 1 36
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 0.2 0.2 0.2    BOD 1 37
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 0.2 0.2 0.3    BOD 1 38
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 0.3 0.3 0.3    BOD 1 39
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 0.3 0.3    BOD 1 40
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 0.3 0.3    BOD 1 41
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 0.3 0.3    BOD 1 42
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 0.4    BOD 1 43
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 0.4    BOD 1 44
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    BOD 1 45
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    BOD 1 46
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    BOD 1 47
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    BOD 1 48
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    BOD 1 49
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    BOD 1 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 0.0 0.0 0.0 0.0    BOD 1 51
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    BOD 1 52
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    BOD 1 53
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    BOD 1 54
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    BOD 1 55
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    BOD 1 56
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    BOD 1 57
```

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	BOD 1 58
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	BOD 1 59
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	BOD 1 60
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	BOD 1 61
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	BOD 1 62
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	BOD 1 63
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	BOD 1 64
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	BOD 1 65
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	BOD 1 66
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	BOD 1 67
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	BOD 1 68
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	BOD 1 69
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	BOD 1 70
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	BOD 1 71
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	BOD 1 72
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	BOD 1 73
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	BOD 1 74
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	BOD 1 75
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	BOD 1 76
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	BOD 1 77
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	BOD 1 78
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	BOD 2 1
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	BOD 2 2
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.0	0.0	0.0	BOD 2 3
0.0	0.0	0.0	0.0	0.7	0.7	0.7	0.7	0.0	0.0	0.0	0.8	0.8	0.0	0.0	0.0	BOD 2 4
0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.0	0.0	BOD 2 5
0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.7	0.8	0.8	0.8	BOD 2 6
0.0	0.6	0.6	0.6	0.6	0.6	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.8	0.8	BOD 2 7
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	0.7	0.7	0.8	BOD 2 8
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	0.7	0.7	0.7	BOD 2 9
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	0.7	0.7	0.7	BOD 2 10
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.7	0.7	0.7	BOD 2 11
0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	BOD 2 12
0.0	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	BOD 2 13
0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	BOD 2 14
0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	BOD 2 15
0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	BOD 2 16
0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.7	BOD 2 17
0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.7	BOD 2 18
0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.7	BOD 2 19
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.7	BOD 2 20
0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.7	BOD 2 21
0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.7	BOD 2 22
0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	BOD 2 23
0.3	0.3	0.3	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	BOD 2 24
0.3	0.3	0.3	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.0	0.0	0.6	BOD 2 25
0.3	0.3	0.3	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.0	0.0	0.6	BOD 2 26
0.3	0.3	0.3	0.3	0.4	0.4	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 27
0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 28
0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	BOD 2 29
0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.0	0.6	0.6	BOD 2 30
0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.0	0.6	0.6	BOD 2 31
0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	BOD 2 32
0.2	0.3	0.3	0.3	0.3	0.0	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	BOD 2 33
0.2	0.3	0.3	0.3	0.0	0.0	0.0	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	BOD 2 34
0.2	0.3	0.3	0.3	0.0	0.0	0.0	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	BOD 2 35
0.3	0.3	0.3	0.3	0.0	0.0	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	BOD 2 36
0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	BOD 2 37
0.3	0.3	0.3	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	BOD 2 38
0.3	0.3	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	BOD 2 39
0.3	0.3	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	BOD 2 40

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	BOD 2 41
0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	BOD 2 42
0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	BOD 2 43
0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	BOD 2 44
0.4	0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 2 45
0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 2 46
0.0	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0	BOD 2 47
0.0	0.0	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.0	BOD 2 48
0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.6	BOD 2 49
0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.5	0.6	0.6	BOD 2 50
0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.5	0.5	0.6	0.6	0.6	BOD 2 51
0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	BOD 2 52
0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	BOD 2 53
0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	BOD 2 54
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.6	0.6	0.6	0.6	BOD 2 55
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 56
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 57
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 58
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 59
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 60
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 61
0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 62
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 63
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 64
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	BOD 2 65
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	0.6	0.6	BOD 2 66
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.6	BOD 2 67
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 2 68
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	BOD 2 69
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	BOD 2 70
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 71
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 2 72
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	BOD 2 73
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	BOD 2 74
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	BOD 2 75
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	BOD 2 76
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	BOD 2 77
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	BOD 2 78
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	BOD 3 1
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	BOD 3 2
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	BOD 3 3
0.0	0.0	0.0	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	BOD 3 4
0.0	0.0	0.0	0.9	0.9	0.9	0.9	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 3 5
0.0	0.0	0.0	0.9	0.9	0.9	0.9	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 3 6
0.0	0.0	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	BOD 3 7
0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	0.0	0.0	0.0	BOD 3 8
0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	0.0	0.0	0.0	BOD 3 9
0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	0.0	0.0	BOD 3 10
0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	BOD 3 11
0.7	0.7	0.7	0.8	0.0	0.0	0.0	0.0	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	BOD 3 12
0.7	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.9	0.9	0.9	0.9	1.0	1.0	1.0	BOD 3 13
0.7	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9	0.9	0.9	1.0	1.0	BOD 3 14
0.7	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9	0.9	0.9	1.0	BOD 3 15
0.7	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9	0.9	0.9	BOD 3 16
0.7	0.7	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.9	0.9	0.9	BOD 3 17
0.7	0.7	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.9	0.9	BOD 3 18
0.7	0.7	0.7	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.9	BOD 3 19
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.0	0.0	0.8	0.0	0.0	0.8	0.8	0.8	0.9	BOD 3 20
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	BOD 3 21
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	BOD 3 22
0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	BOD 3 23

0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 24
0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 25
0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 26
0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 27
0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 28
0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 29
0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 30
0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 31
0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 32
0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 33
0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 34
0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	BOD 3 35
0.6	0.6	0.6	0.0	0.0	0.0	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	BOD 3 36
0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	BOD 3 37
0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.7	0.7	0.7	0.8	0.8	BOD 3 38
0.5	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.7	0.7	0.0	0.0	BOD 3 39
0.5	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	BOD 3 40
0.5	0.5	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 3 41
0.5	0.5	0.6	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	BOD 3 42
0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.9	BOD 3 43
0.5	0.6	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	1.0	BOD 3 44
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	1.0	BOD 3 45
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	0.9	1.0	1.0	BOD 3 46
0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.7	0.8	0.8	0.9	1.0	1.0	1.1	BOD 3 47
0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9	1.0	1.0	1.1	BOD 3 48
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.1	BOD 3 49
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.1	1.1	1.2	BOD 3 50
0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.1	1.2	BOD 3 51
0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.1	1.1	1.2	1.2	BOD 3 52
0.6	0.6	0.6	0.6	0.6	0.6	0.0	0.7	0.8	0.9	1.0	1.0	1.1	1.1	1.2	1.2	BOD 3 53
0.6	0.6	0.6	0.6	0.6	0.0	0.0	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.2	1.3	BOD 3 54
0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	BOD 3 55
0.6	0.6	0.6	0.6	0.6	0.7	0.8	0.9	0.9	1.0	0.0	0.0	1.2	1.2	1.3	1.3	BOD 3 56
0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.9	1.0	1.0	1.1	0.0	1.2	1.2	1.3	1.3	BOD 3 57
0.6	0.6	0.6	0.6	0.7	0.8	0.0	0.9	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.3	BOD 3 58
0.6	0.0	0.0	0.6	0.7	0.8	0.0	0.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.3	BOD 3 59
0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3	BOD 3 60
0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.2	1.2	1.3	1.3	1.3	1.3	BOD 3 61
0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.4	BOD 3 62
0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.3	1.3	1.3	1.4	BOD 3 63
0.6	0.6	0.6	0.6	0.0	0.8	0.9	0.9	0.0	0.0	0.0	0.0	1.1	1.2	1.3	1.4	BOD 3 64
0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	BOD 3 65
0.6	0.6	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 3 66
0.6	0.6	0.6	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	BOD 3 67
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	BOD 3 68
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.0	0.0	0.0	BOD 3 69
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	BOD 3 70
0.6	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	BOD 3 71
0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	BOD 3 72
0.0	0.0	0.0	0.6	0.6	0.0	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 3 73
0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.0	0.0	BOD 3 74
0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	BOD 3 75
0.0	0.0	0.0	0.6	0.6	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 3 76
0.0	0.6	0.6	0.6	0.6	0.0	0.0	0.0	0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	BOD 3 77
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	BOD 3 78
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				BOD 4 1
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				BOD 4 2
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0				BOD 4 3
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				BOD 4 4
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				BOD 4 5
0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				BOD 4 6

0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 4 7
0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 4 8
0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 4 9
0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 4 10
0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	BOD 4 11
1.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	BOD 4 12
1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	BOD 4 13
1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	BOD 4 14
1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	BOD 4 15
1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	BOD 4 16
0.9	1.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.8	0.0	BOD 4 17
0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.8	0.0	BOD 4 18
0.9	0.9	0.9	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.8	0.0	BOD 4 19
0.9	0.9	0.9	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	BOD 4 20
0.9	0.9	0.9	0.9	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.8	0.0	BOD 4 21
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.8	0.0	BOD 4 22
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.8	0.0	BOD 4 23
0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.8	0.0	BOD 4 24
0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.0	BOD 4 25
0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.0	BOD 4 26
0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.0	BOD 4 27
0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.0	BOD 4 28
0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.0	BOD 4 29
0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.0	0.0	0.0	0.0	BOD 4 30
0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.0	0.0	0.8	0.0	BOD 4 31
0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.0	0.0	0.8	0.0	BOD 4 32
0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.0	0.0	1.0	0.0	BOD 4 33
0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.0	0.0	1.0	0.0	BOD 4 34
0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.0	1.0	0.0	BOD 4 35
0.8	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.1	1.2	0.0	BOD 4 36
0.8	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.2	0.0	BOD 4 37
0.8	0.8	0.9	0.0	0.0	1.0	1.1	1.1	1.1	1.1	1.2	1.2	0.0	BOD 4 38
0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1	1.1	1.2	1.2	1.2	0.0	BOD 4 39
0.0	0.0	0.0	0.0	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.2	0.0	BOD 4 40
0.0	0.0	0.0	0.0	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.0	BOD 4 41
1.0	1.0	0.0	0.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.0	BOD 4 42
0.0	0.0	0.0	0.0	0.0	1.2	1.3	1.3	1.4	1.3	1.3	1.2	0.0	BOD 4 43
0.0	0.0	0.0	0.0	0.0	1.3	1.3	1.4	1.4	1.4	1.4	1.4	0.0	BOD 4 44
1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	0.0	BOD 4 45
1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	0.0	BOD 4 46
1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	0.0	BOD 4 47
1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	0.0	0.0	1.4	0.0	BOD 4 48
1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.4	0.0	0.0	1.4	0.0	BOD 4 49
1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.4	0.0	0.0	0.0	1.4	0.0	BOD 4 50
1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.4	0.0	0.0	0.0	1.4	0.0	BOD 4 51
1.3	1.3	1.3	1.3	1.4	1.4	1.4	0.0	0.0	0.0	0.0	1.4	0.0	BOD 4 52
1.3	1.3	1.3	1.3	1.4	1.4	0.0	0.0	0.0	0.0	0.0	1.4	0.0	BOD 4 53
1.3	1.3	1.3	1.4	1.4	1.4	0.0	0.0	0.0	0.0	0.0	1.4	0.0	BOD 4 54
1.3	1.3	1.3	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	BOD 4 55
1.3	1.3	1.4	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	BOD 4 56
1.3	1.3	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	BOD 4 57
1.3	1.4	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	BOD 4 58
1.3	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	BOD 4 59
1.4	1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	BOD 4 60
1.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	BOD 4 61
1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	BOD 4 62
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	BOD 4 63
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	BOD 4 64
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	BOD 4 65
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	BOD 4 66
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	BOD 4 67

```
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                          BOD 4 68
0.0 0.0 0.0 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.0                          BOD 4 69
0.0 0.0 0.0 0.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0                          BOD 4 70
0.0 0.0 0.0 0.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0                          BOD 4 71
0.0 0.0 0.0 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.0                          BOD 4 72
0.0 0.0 0.0 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.0                          BOD 4 73
0.0 0.6 0.6 0.6 0.6 0.0 0.0 0.0 0.0 0.6 0.6 0.6 0.0                          BOD 4 74
0.0 0.6 0.6 0.6 0.6 0.0 0.0 0.0 0.0 0.6 0.6 0.6 0.0                          BOD 4 75
0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.0 0.0 0.0 0.6 0.6 0.0                          BOD 4 76
0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.0 0.0 0.0 0.0 0.0                          BOD 4 77
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                          BOD 4 78
   3
0.  0. 15.715.715.715.715.715.7 0.  0.  0.  0.  0.  0.  0.  0.               S1 1  1
0.  0. 15.715.715.715.715.715.7 0.  0.  0.  0.  0.  0.  0.  0.               S1 1  2
0.  0. 15.715.715.715.715.715.7 0.  0.  0.  0.  0.  0. 15.115.1              S1 1  3
0.  0. 15.615.615.615.615.615.6 0.  0.  0.  0.  0.  0.  0. 15.1              S1 1  4
0.  0.  0. 15.615.615.615.615.6 0.  0.  0.  0.  0.  0.  0. 15.1              S1 1  5
0.  0.  0. 15.615.615.615.615.6 0.  0.  0.  0.  0.  0.  0.  0.               S1 1  6
0.  0. 15.615.615.615.615.615.615.6 0.  0.  0.  0.  0.  0.  0.               S1 1  7
0.  0.  0. 15.615.615.615.615.615.6 0.  0.  0.  0.  0.  0.  0.               S1 1  8
0.  0.  0. 15.515.515.515.515.515.5 0.  0.  0.  0.  0.  0.  0.               S1 1  9
0.  0.  0. 15.515.515.515.515.515.5 0.  0.  0.  0.  0.  0.  0.               S1 1 10
0.  0.  0. 15.515.515.515.515.515.515.5 0.  0.  0.  0.  0.  0.               S1 1 11
0.  0.  0. 15.515.515.515.515.515.515.5 0.  0.  0.  0.  0.  0.               S1 1 12
0.  0.  0. 15.415.515.515.515.515.415.415.4 0.  0.  0.  0.  0.               S1 1 13
0.  0.  0. 15.415.415.415.415.415.415.415.415.415.4 0. 15.315.3              S1 1 14
0.  0.  0. 15.415.415.415.415.415.415.415.415.415.415.315.315.3              S1 1 15
0.  0.  0.  0. 15.415.415.415.415.415.415.415.415.315.315.315.3              S1 1 16
0.  0.  0.  0.  0. 15.415.415.415.415.415.315.315.315.315.315.3              S1 1 17
0.  0.  0.  0.  0. 15.415.415.415.315.315.315.315.315.315.315.3              S1 1 18
0.  0.  0.  0.  0.  0. 15.315.315.315.315.315.315.315.315.315.3              S1 1 19
0.  0.  0.  0.  0.  0.  0. 15.315.315.315.315.315.315.315.215.2              S1 1 20
0.  0.  0.  0.  0.  0.  0. 15.315.315.315.315.315.215.215.215.2              S1 1 21
0.  0.  0.  0.  0.  0.  0.  0. 15.315.315.215.215.215.215.215.2              S1 1 22
0.  0.  0.  0.  0.  0.  0.  0. 15.215.215.215.215.215.215.215.2              S1 1 23
0.  0.  0.  0.  0.  0.  0.  0.  0. 15.215.215.215.215.215.215.1              S1 1 24
0.  0.  0.  0.  0.  0.  0.  0.  0. 15.215.215.215.215.115.115.1              S1 1 25
0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 15.215.115.115.115.115.1              S1 1 26
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 15.115.115.115.115.1              S1 1 27
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 15.115.115.115.1              S1 1 28
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 15.115.115.015.0              S1 1 29
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 15.015.015.015.0              S1 1 30
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 15.015.015.015.0              S1 1 31
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 15.015.015.015.0              S1 1 32
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.914.914.914.9              S1 1 33
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.914.914.914.9              S1 1 34
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.914.914.914.9              S1 1 35
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.914.914.9              S1 1 36
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.814.814.8              S1 1 37
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.814.814.8              S1 1 38
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.814.814.8              S1 1 39
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.714.7              S1 1 40
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.714.7              S1 1 41
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.714.7              S1 1 42
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.7              S1 1 43
0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.7              S1 1 44
                                                                             S1 1 45
                                                                             S1 1 46
                                                                             S1 1 47
                                                                             S1 1 48
                                                                             S1 1 49
```

```
                                                                 S1 1 50
                                                                 S1 1 51
                                                                 S1 1 52
                                                                 S1 1 53
                                                                 S1 1 54
                                                                 S1 1 55
                                                                 S1 1 56
                                                                 S1 1 57
                                                                 S1 1 58
                                                                 S1 1 59
                                                                 S1 1 60
                                                                 S1 1 61
                                                                 S1 1 62
                                                                 S1 1 63
                                                                 S1 1 64
                                                                 S1 1 65
                                                                 S1 1 66
                                                                 S1 1 67
                                                                 S1 1 68
                                                                 S1 1 69
                                                                 S1 1 70
                                                                 S1 1 71
                                                                 S1 1 72
                                                                 S1 1 73
                                                                 S1 1 74
                                                                 S1 1 75
                                                                 S1 1 76
                                                                 S1 1 77
                                                                 S1 1 78
 0.                                                              S1 2  1
 0.                                                              S1 2  2
15.115.115.115.115.115.115.115.115.115.115.115.115.1 0.  0.  0.  S1 2  3
 0.  0.  0.  0. 15.115.115.115.1 0.  0.  0. 15.115.1 0.  0.      S1 2  4
 0.  0.  0.  0.  0.  0. 15.1 0.  0.  0.  0.  0. 15.115.1 0.  0.  S1 2  5
 0.  0.  0.  0.  0.  0. 15.1 0.  0.  0.  0.  0. 15.115.115.115.1 S1 2  6
 0. 15.115.115.115.115.115.1 0.  0.  0.  0.  0.  0. 15.115.115.1 S1 2  7
 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 15.115.115.1 S1 2  8
 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 15.115.115.1 S1 2  9
 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 15.115.115.1 S1 2 10
 0.  0.  0.  0.  0.  0.  0.  0.  0. 15.215.215.215.115.115.115.1 S1 2 11
 0.  0.  0.  0.  0.  0. 15.315.215.215.215.215.215.115.115.115.1 S1 2 12
 0. 15.315.315.315.315.315.215.215.215.215.215.215.115.115.115.1 S1 2 13
15.315.315.315.315.315.215.215.215.215.215.215.215.115.115.115.1 S1 2 14
15.315.315.315.315.215.215.215.215.215.215.215.115.115.115.115.1 S1 2 15
15.315.315.315.215.215.215.215.215.215.215.115.115.115.115.115.1 S1 2 16
15.315.315.215.215.215.215.215.215.215.115.115.115.115.115.115.0 S1 2 17
15.315.215.215.215.215.215.215.215.115.115.115.115.115.115.015.0 S1 2 18
15.215.215.215.215.215.215.215.115.115.115.115.115.115.015.015.0 S1 2 19
15.215.215.215.215.215.215.115.115.115.115.115.115.015.015.015.0 S1 2 20
15.215.215.215.215.215.115.1 0.  0.  0. 15.115.015.015.015.015.0 S1 2 21
15.215.215.215.115.115.115.1 0.  0.  0.  0. 15.015.015.015.014.9 S1 2 22
15.215.115.115.115.115.115.1 0.  0.  0.  0. 15.015.014.914.914.9 S1 2 23
15.115.115.115.115.1 0.  0.  0.  0.  0.  0. 15.014.914.914.914.9 S1 2 24
15.115.115.115.115.1 0.  0.  0.  0.  0.  0. 14.914.9 0.  0. 14.8 S1 2 25
15.115.115.115.115.0 0.  0.  0.  0.  0.  0. 14.914.9 0.  0. 14.8 S1 2 26
15.115.115.015.015.015.0 0.  0.  0.  0. 14.914.914.914.814.814.8 S1 2 27
15.015.015.015.015.015.015.0 0.  0.  0. 14.914.914.814.814.814.7 S1 2 28
15.015.015.015.015.015.014.914.914.914.914.914.814.814.814.714.7 S1 2 29
15.015.015.015.014.914.914.914.914.914.814.814.814.8 0. 14.714.7 S1 2 30
15.015.014.914.914.914.914.914.914.814.814.814.814.7 0. 14.714.6 S1 2 31
14.914.914.914.914.914.914.814.814.814.814.814.714.714.714.614.6 S1 2 32
```

```
14.914.914.914.914.9 0.  14.814.814.814.814.714.714.714.714.614.6     S1 2 33
14.914.914.914.8 0.  0.  0. 14.814.714.714.714.714.714.614.614.5     S1 2 34
14.914.814.814.8 0.  0.  0. 14.714.714.714.714.714.614.614.614.5     S1 2 35
14.814.814.814.8 0.  0. 14.714.714.714.714.714.614.614.614.514.5     S1 2 36
14.814.814.814.714.714.714.714.714.714.714.614.614.614.614.514.5     S1 2 37
14.814.814.714.714.714.714.714.714.714.614.614.614.614.514.514.5     S1 2 38
14.714.714.714.714.714.714.714.714.614.614.614.614.614.514.514.5     S1 2 39
14.714.714.714.714.714.714.614.614.614.614.614.614.514.514.514.5     S1 2 40
14.714.714.714.714.714.614.614.614.614.614.614.614.514.514.514.5     S1 2 41
14.714.714.714.714.6 0.  0. 14.614.614.614.614.514.514.514.514.5     S1 2 42
14.714.714.714.614.6 0.  0.  0.  0. 14.614.614.514.514.514.514.5     S1 2 43
14.714.714.614.614.6 0.  0.  0.  0.  0.  0.  0.  0. 14.514.514.5     S1 2 44
14.614.614.614.614.614.6 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.      S1 2 45
14.614.614.614.614.614.614.614.614.6 0.  0.  0.  0.  0.  0.  0.      S1 2 46
 0. 14.614.614.614.614.614.614.614.614.514.514.514.5 0.  0.  0.      S1 2 47
 0.  0. 14.614.614.614.614.614.614.614.514.514.514.514.5 0.  0.      S1 2 48
 0.  0. 14.614.614.614.614.614.6 0.  0.  0.  0. 14.514.514.514.4     S1 2 49
 0.  0.  0. 14.614.614.614.614.5 0.  0.  0.  0. 14.514.514.514.4     S1 2 50
 0.  0.  0.  0. 14.614.514.514.514.514.5 0. 14.514.514.514.414.4     S1 2 51
 0.  0.  0.  0.  0. 14.514.514.514.514.514.514.514.514.514.414.4     S1 2 52
 0.  0.  0.  0.  0.  0. 14.514.514.514.514.514.514.514.414.414.4     S1 2 53
 0.  0.  0.  0.  0. 14.514.514.514.514.514.514.514.514.414.414.4     S1 2 54
 0.  0.  0.  0.  0.  0.  0.  0.  0. 14.514.514.514.514.414.414.4     S1 2 55
 0.  0.  0.  0.  0.  0.  0.  0.  0. 14.514.514.514.414.414.414.4     S1 2 56
 0.  0.  0.  0.  0.  0.  0.  0.  0. 14.514.514.414.414.414.414.4     S1 2 57
 0.  0.  0.  0.  0.  0.  0.  0.  0. 14.514.514.414.414.414.414.4     S1 2 58
 0.  0.  0.  0.  0.  0.  0.  0.  0. 14.514.414.414.414.414.414.4     S1 2 59
 0.  0.  0.  0.  0.  0.  0.  0.  0. 14.414.414.414.414.414.414.3     S1 2 60
 0.  0.  0.  0.  0.  0.  0.  0.  0. 14.414.414.414.414.414.414.3     S1 2 61
 0.  0.  0.  0.  0.  0. 14.414.414.414.414.414.414.414.414.314.3     S1 2 62
 0.  0.  0.  0.  0.  0.  0.  0. 14.414.414.414.414.414.314.314.3     S1 2 63
 0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.414.414.314.314.314.3     S1 2 64
 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.314.314.314.314.3     S1 2 65
 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.314.3     S1 2 66
 0.  0.  0.  0.  0.  0.  0.  0. 14.1 0.  0.  0.  0.  0.  0. 14.2     S1 2 67
 0.  0.  0.  0.  0.  0.  0.  0. 14.1 0.  0.  0.  0.  0.  0.  0.      S1 2 68
 0.  0.  0.  0.  0.  0.  0.  0. 14.114.1 0.  0.  0.  0.  0.  0.      S1 2 69
 0.  0.  0.  0.  0.  0.  0.  0. 14.114.114.114.1 0.  0.  0.  0.      S1 2 70
 0.  0.  0.  0.  0.  0.  0.  0. 14.114.114.114.114.114.114.114.1     S1 2 71
 0.  0.  0.  0.  0.  0.  0.  0. 14.114.114.114.114.114.114.114.1     S1 2 72
                                                                     S1 2 73
                                                                     S1 2 74
                                                                     S1 2 75
                                                                     S1 2 76
                                                                     S1 2 77
                                                                     S1 2 78
                                                                     S1 3  1
                                                                     S1 3  2
 0.  0.  0.  0.  0.  0.  0.  0. 14.914.914.914.914.814.814.814.8     S1 3  3
 0.  0.  0. 15.015.015.015.014.914.914.914.9 0.  0.  0.  0.  0.      S1 3  4
 0.  0.  0. 15.015.015.015.014.914.914.9 0.  0.  0.  0.  0.  0.      S1 3  5
 0.  0.  0. 15.115.015.015.014.914.914.9 0.  0.  0.  0.  0.  0.      S1 3  6
 0.  0. 15.115.115.015.015.014.914.914.914.814.8 0.  0.  0.  0.      S1 3  7
15.115.115.115.115.015.015.014.914.914.814.814.814.7 0.  0.  0.      S1 3  8
15.115.115.115.115.015.015.014.914.914.814.814.814.7 0.  0.  0.      S1 3  9
15.115.115.115.115.015.015.014.914.914.814.814.814.714.7 0.  0.      S1 3 10
15.115.115.115.015.015.015.014.914.914.814.814.714.714.714.714.6     S1 3 11
15.115.115.115.0 0.  0.  0.  0. 14.914.814.814.714.714.714.614.6     S1 3 12
15.115.115.115.0 0.  0.  0.  0.  0. 14.814.814.714.714.614.614.6     S1 3 13
15.115.115.115.0 0.  0.  0.  0.  0.  0. 14.714.714.614.614.614.5     S1 3 14
15.115.115.015.0 0.  0.  0.  0.  0.  0.  0. 14.714.614.614.514.5     S1 3 15
```

```
15.115.015.015.0 0.  0.  0.  0.  0.  0.  0.  0. 14.614.514.514.5          S1 3 16
15.015.015.015.015.0 0.  0.  0.  0.  0.  0.  0. 14.514.514.514.5          S1 3 17
15.015.015.015.015.0 0.  0.  0.  0.  0.  0.  0.  0. 14.514.514.5          S1 3 18
15.015.015.015.014.914.9 0.  0.  0.  0.  0.  0.  0. 14.514.514.4          S1 3 19
15.015.014.914.914.914.814.8 0.  0. 14.5 0.  0. 14.514.514.414.4          S1 3 20
14.914.914.914.914.814.814.714.614.514.514.514.514.414.414.414.4          S1 3 21
14.914.914.814.814.814.714.614.514.514.514.514.414.414.414.414.4          S1 3 22
14.914.814.814.814.714.614.514.514.514.514.414.414.414.414.414.4          S1 3 23
14.814.814.814.714.614.614.514.514.514.414.414.414.414.414.414.3          S1 3 24
14.814.814.714.714.614.514.514.514.414.414.414.414.414.414.314.3          S1 3 25
14.814.714.714.614.514.514.514.414.414.414.414.414.414.314.314.3          S1 3 26
14.714.714.614.514.514.514.514.414.414.414.414.414.314.314.314.3          S1 3 27
14.714.614.614.514.514.514.414.414.414.414.414.314.314.314.314.3          S1 3 28
14.614.614.514.514.514.414.414.414.414.414.314.314.314.314.314.3          S1 3 29
14.614.514.514.514.514.414.414.414.414.314.314.314.314.314.314.2          S1 3 30
14.614.514.514.514.414.414.414.414.414.314.314.314.314.314.214.2          S1 3 31
14.514.514.514.414.414.414.414.414.314.314.314.314.314.214.214.2          S1 3 32
14.514.514.514.414.414.414.414.414.314.314.314.314.214.214.214.2          S1 3 33
14.514.514.514.414.414.414.414.314.314.314.314.314.214.214.214.2          S1 3 34
14.514.514.414.414.414.414.414.314.314.314.314.214.214.214.214.2          S1 3 35
14.514.514.4 0.  0.  0. 14.314.314.314.314.314.214.214.214.214.2          S1 3 36
14.514.514.4 0.  0.  0.  0.  0. 14.314.314.214.214.214.214.214.1          S1 3 37
14.514.414.4 0.  0.  0.  0.  0.  0. 14.314.214.214.214.214.214.1          S1 3 38
14.514.414.414.4 0.  0.  0.  0.  0.  0. 14.214.214.214.2 0.  0.          S1 3 39
14.514.414.414.414.4 0.  0.  0.  0.  0. 14.2 0.  0.  0.  0.  0.          S1 3 40
14.514.414.414.4 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.          S1 3 41
14.414.414.4 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.          S1 3 42
14.414.4 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.114.1          S1 3 43
14.414.4 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.1          S1 3 44
 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.1          S1 3 45
 0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.114.114.1          S1 3 46
 0. 14.4 0.  0.  0.  0.  0. 14.214.214.214.214.114.114.114.114.1          S1 3 47
 0. 14.414.414.314.314.314.314.214.214.214.214.114.114.114.114.1          S1 3 48
14.414.414.414.314.314.314.314.214.214.214.214.114.114.114.114.1          S1 3 49
14.414.414.414.314.314.314.314.214.214.214.214.114.114.114.114.1          S1 3 50
14.414.414.414.314.314.314.214.214.214.214.214.114.114.114.114.1          S1 3 51
14.414.414.314.314.314.314.214.214.214.214.114.114.114.114.114.1          S1 3 52
14.414.414.314.314.314.3 0. 14.214.214.214.114.114.114.114.114.1          S1 3 53
14.414.414.314.314.3 0.  0. 14.214.214.214.114.114.114.114.114.1          S1 3 54
14.414.414.314.314.314.214.214.214.214.214.114.114.114.114.114.1          S1 3 55
14.414.314.314.314.314.214.214.214.214.1 0.  0. 14.114.114.114.1          S1 3 56
14.414.314.314.314.314.214.214.214.214.114.1 0. 14.114.114.114.1          S1 3 57
14.314.314.314.314.214.2 0. 14.214.214.114.114.114.114.114.114.1          S1 3 58
14.3 0.  0. 14.314.214.2 0.  0. 14.214.114.114.114.114.114.114.1          S1 3 59
14.3 0.  0.  0.  0.  0.  0.  0. 14.214.114.114.114.114.114.114.1          S1 3 60
14.314.3 0.  0.  0.  0.  0.  0.  0. 14.114.114.114.114.114.114.1          S1 3 61
14.314.314.3 0.  0.  0.  0.  0. 14.114.114.114.114.114.114.114.1          S1 3 62
14.314.314.2 0.  0.  0.  0.  0.  0.  0.  0. 14.114.114.114.114.1          S1 3 63
14.314.214.214.2 0. 14.214.214.1 0.  0.  0.  0. 14.114.114.114.1          S1 3 64
14.314.214.214.214.214.214.214.1 0.  0.  0.  0.  0.  0. 14.1 0.          S1 3 65
14.214.2 0.  0. 14.214.214.114.114.1 0.  0.  0.  0.  0.  0.  0.          S1 3 66
14.214.214.2 0. 14.214.214.114.114.114.114.1 0.  0.  0.  0.  0.          S1 3 67
14.214.214.214.214.214.114.114.114.114.114.114.1 0.  0.  0.  0.          S1 3 68
14.214.214.214.214.214.114.114.114.114.114.114.114.1 0.  0.  0.          S1 3 69
14.214.214.214.214.114.114.114.114.114.114.114.1 0.  0.  0.  0.          S1 3 70
14.2 0.  0. 14.214.114.114.114.114.114.114.1 0.  0.  0.  0.  0.          S1 3 71
 0.  0.  0. 14.114.114.114.114.114.114.1 0.  0.  0.  0.  0.  0.          S1 3 72
 0.  0.  0. 14.114.1 0. 14.114.114.1 0.  0.  0.  0.  0.  0.  0.          S1 3 73
 0.  0.  0. 14.1 0.  0.  0. 14.114.114.1 0.  0.  0.  0.  0.  0.          S1 3 74
 0.  0.  0. 14.1 0.  0.  0.  0. 14.114.114.114.1 0.  0.  0.  0.          S1 3 75
 0.  0.  0. 14.114.1 0.  0.  0. 14.114.114.114.114.114.114.114.0          S1 3 76
```

```
 0. 14.114.114.114.1 0.   0.   0.   0. 14.114.114.114.114.114.114.0          S1 3 77
                                                                            S1 3 78
                                                                            S1 4  1
                                                                            S1 4  2
14.714.714.714.614.614.614.614.6 0.   0.   0.   0.   0.                     S1 4  3
 0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.             S1 4  4
 0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.             S1 4  5
 0.   0.   0. 14.5 0.   0.   0.   0.   0.   0.   0.   0.   0.             S1 4  6
 0.   0.   0. 14.5 0.   0.   0.   0.   0.   0.   0.   0.   0.             S1 4  7
 0.   0.   0. 14.5 0.   0.   0.   0.   0.   0.   0.   0.   0.             S1 4  8
 0.   0.   0. 14.5 0.   0.   0.   0.   0.   0.   0.   0.   0.             S1 4  9
 0.   0.   0. 14.5 0.   0.   0.   0.   0.   0.   0.   0.   0.             S1 4 10
 0.   0.   0. 14.5 0.   0.   0.   0.   0.   0.   0.   0.   0.             S1 4 11
14.6 0.   0. 14.5 0.   0.   0.   0. 14.4 0.   0.   0.   0.               S1 4 12
14.614.514.514.5 0.   0.   0.   0. 14.4 0.   0.   0.   0.                 S1 4 13
14.514.514.514.5 0.   0.   0.   0. 14.4 0.   0.   0.   0.                 S1 4 14
14.514.514.5 0.   0.   0.   0.   0. 14.4 0.   0.   0.   0.               S1 4 15
14.514.514.5 0.   0.   0.   0.   0. 14.4 0.   0.   0.   0.               S1 4 16
14.514.514.414.4 0.   0.   0.   0. 14.4 0.   0. 14.2 0.                   S1 4 17
14.414.414.414.414.414.414.414.414.4 0.   0. 14.2 0.                       S1 4 18
14.414.414.414.414.414.414.4 0.   0.   0.   0. 14.2 0.                     S1 4 19
14.414.414.414.414.414.4 0.   0.   0.   0.   0. 14.2 0.                   S1 4 20
14.414.414.414.414.314.314.3 0.   0.   0.   0. 14.2 0.                     S1 4 21
14.414.414.314.314.314.314.314.3 0.   0.   0. 14.2 0.                       S1 4 22
14.414.314.314.314.314.314.314.3 0.   0.   0. 14.2 0.                       S1 4 23
14.314.314.314.314.314.314.314.3 0.   0.   0. 14.2 0.                       S1 4 24
14.314.314.314.314.314.314.214.214.214.214.214.2 0.                         S1 4 25
14.314.314.314.314.214.214.214.214.214.214.214.2 0.                         S1 4 26
14.314.314.314.214.214.214.214.214.214.214.214.2 0.                         S1 4 27
14.314.214.214.214.214.214.214.214.2 0.   0.   0.   0.                     S1 4 28
14.214.214.214.214.214.214.214.214.2 0.   0.   0.   0.                     S1 4 29
14.214.214.214.214.214.214.214.114.1 0.   0.   0.   0.                     S1 4 30
14.214.214.214.214.214.114.114.114.1 0.   0. 14.1 0.                       S1 4 31
14.214.214.214.114.114.114.114.114.1 0.   0. 14.1 0.                       S1 4 32
14.214.214.114.114.114.114.114.114.1 0.   0. 14.0 0.                       S1 4 33
14.214.114.114.114.114.114.114.114.0 0.   0. 14.0 0.                       S1 4 34
14.114.114.114.114.114.114.014.014.014.014.014.0 0.                         S1 4 35
14.114.114.114.114.114.014.014.014.014.014.014.0 0.                         S1 4 36
14.114.114.114.114.014.014.014.014.014.014.014.0 0.                         S1 4 37
14.114.114.1 0.   0. 14.014.014.014.014.014.014.0 0.                       S1 4 38
 0.   0.   0.   0.   0. 14.014.014.014.014.014.014.0 0.                     S1 4 39
 0.   0.   0.   0. 14.014.014.014.014.014.014.014.0 0.                       S1 4 40
 0.   0.   0.   0. 14.014.014.014.014.014.014.014.0 0.                       S1 4 41
14.114.1 0.   0. 14.014.014.014.014.014.014.014.0 0.                         S1 4 42
 0.   0.   0.   0.   0. 14.014.014.014.014.014.014.0 0.                     S1 4 43
 0.   0.   0.   0.   0. 14.014.014.014.014.014.014.0 0.                     S1 4 44
14.114.014.014.014.014.014.014.014.014.014.014.0 0.                         S1 4 45
14.114.014.014.014.014.014.014.014.014.014.014.0 0.                         S1 4 46
14.014.014.014.014.014.014.014.014.014.014.014.0 0.                         S1 4 47
14.014.014.014.014.014.014.014.014.0 0.   0. 14.0 0.                       S1 4 48
14.014.014.014.014.014.014.014.014.0 0.   0. 14.0 0.                       S1 4 49
14.014.014.014.014.014.014.014.0 0.   0.   0. 14.0 0.                     S1 4 50
14.014.014.014.014.014.014.014.0 0.   0.   0. 14.0 0.                     S1 4 51
14.014.014.014.014.014.014.0 0.   0.   0.   0. 14.0 0.                   S1 4 52
14.014.014.014.014.014.0 0.   0.   0.   0.   0. 14.0 0.                   S1 4 53
14.014.014.014.014.014.0 0.   0.   0.   0.   0. 14.0 0.                   S1 4 54
14.014.014.014.014.0 0.   0.   0.   0.   0.   0. 14.0 0.                 S1 4 55
14.014.014.014.014.0 0.   0.   0.   0.   0.   0. 14.0 0.                 S1 4 56
14.014.014.014.0 0.   0.   0.   0.   0.   0.   0. 14.0 0.                 S1 4 57
14.014.014.014.0 0.   0.   0.   0.   0.   0.   0. 14.0 0.                 S1 4 58
14.014.014.0 0.   0.   0.   0.   0.   0.   0.   0. 14.0 0.               S1 4 59
```

```
14.014.014.0 0.  0.  0.  0.  0.  0.  0.  0. 14.0 0.
14.014.0 0.  0.  0.  0.  0.  0.  0.  0.  0. 14.0 0.
14.0 0.  0.  0.  0.  0.  0.  0.  0.  0.  0. 14.0 0.







 0.  0.  0. 14.014.014.014.014.014.014.014.014.0 0.
 0.  0.  0. 14.0 0.  0.  0.  0.  0.  0.  0.  0.  0.
 0.  0.  0. 14.0 0.  0.  0.  0.  0.  0.  0.  0.  0.
 0.  0.  0. 14.014.014.014.014.014.014.014.014.0 0.
 0.  0.  0. 14.014.014.014.014.014.014.014.014.0 0.
 0. 14.014.014.014.0 0.  0.  0.  0. 14.014.014.0 0.
 0. 14.014.014.014.0 0.  0.  0.  0. 14.014.014.0 0.
14.014.014.014.014.014.014.0 0.  0.  0. 14.014.0 0.
14.014.014.014.014.014.014.014.0 0.  0.  0.  0.  0.

    0          END OF POLLUTANT ARRAYS
   0.-0.2720  7  11.   60.
 1  119.8     3.0        13.0       .28        .024
 2  33.9      4.4        55.0       1.36       .024
 3  127.3     5.5        11.5       1.44       .024
 9  6.0       0.0        0.0        0.0        0.0
10   0.6      4.4        55.0       1.36       1000.0
12   0.33     4.4        55.0       1.36       1000.0
13   0.0      0.0        0.0        0.0        0.0
   0.-0.2720     11.   60.
   1.-0.2106     11.   60.
   2.-0.1615
   3.-0.1213
   4.-0.0763     11.   60.
   5.-0.0075
   6. 0.0810
   7. 0.1752     11.   60.
   8. 0.2596
   9. 0.3341
  10. 0.4095     11.   60.
  11. 0.4898
  12. 0.5758
  13. 0.6675     11.   57.
  14. 0.7650
  15. 0.8641
  16. 0.9739     12.   54.
  17. 1.1025
  18. 1.2336
  19. 1.3499     12.   51.
  20. 1.4498
  21. 1.5473
  22. 1.6456     12.   48.
  23. 1.7447
  24. 1.8496
  25. 1.9553     13.   45.
  26. 2.0626
  27. 2.1683
  28. 2.2559     13.   42.
  29. 2.3124
  30. 2.3689
  31. 2.4713     13.   39.
  32. 2.6057
```

33.	2.7286		
34.	2.8236	13.	36.
35.	2.9063		
36.	2.9841		
37.	3.0570	14.	33.
38.	3.1431		
39.	3.2397		
40.	3.3192	14.	30.
41.	3.3782		
42.	3.4429		
43.	3.5232	14.	31.
44.	3.6067		
45.	3.6829		
46.	3.7427	14.	32.
47.	3.7763		
48.	3.7902		
49.	3.8019	15.	33.
50.	3.8262		
51.	3.8661		
52.	3.9077	15.	34.
53.	3.9388		
54.	3.9564		
55.	3.9673	15.	35.
56.	3.9708		
57.	3.9534		
58.	3.9259	15.	36.
59.	3.9023		
60.	3.8941		
61.	3.9032	15.	37.
62.	3.9144		
63.	3.8992		
64.	3.8471	16.	38.
65.	3.7809		
66.	3.7206		
67.	3.6659	16.	39.
68.	3.6039		
69.	3.5277		
70.	3.4336	16.	40.
71.	3.3295		
72.	3.2364		
73.	3.1617	16.	39.
74.	3.0963		
75.	3.0169		
76.	2.9062	16.	38.
77.	2.7756		
78.	2.6534		
79.	2.5482	16.	37.
80.	2.4433		
81.	2.3294		
82.	2.2195	16.	36.
83.	2.1245		
84.	2.0325		
85.	1.9324	17.	35.
86.	1.8230		
87.	1.7099		
88.	1.6012	17.	34.
89.	1.4997		
90.	1.4083		
91.	1.3216	17.	33.
92.	1.2305		
93.	1.1329		

94.	1.0324	17.	32.
95.	0.9297		
96.	0.8158		
97.	0.6953	17.	31.
98.	0.5857		
99.	0.4932		
100.	0.4208	17.	30.
101.	0.3620		
102.	0.3072		
103.	0.2460	17.	32.
104.	0.1717		
105.	0.0925		
106.	0.0134	17.	34.
107.	-0.0629		
108.	-0.1350		
109.	-0.2050	17.	36.
110.	-0.2679		
111.	-0.3212		
112.	-0.3731	17.	38.
113.	-0.4269		
114.	-0.4752		
115.	-0.5096	18.	40.
116.	-0.5331		
117.	-0.5580		
118.	-0.5831	18.	42.
119.	-0.6064		
120.	-0.6292		
121.	-0.6436	18.	44.
122.	-0.6422		
123.	-0.6175		
124.	-0.5837	18.	46.
125.	-0.5530		
126.	-0.5229		
127.	-0.4891	18.	48.
128.	-0.4445		
129.	-0.3908		
130.	-0.3265	18.	50.
131.	-0.2501		
132.	-0.1677		
133.	-0.0824	18.	49.
134.	0.0019		
135.	0.0869		
136.	0.1849	17.	48.
137.	0.2970		
138.	0.4145		
139.	0.5253	17.	47.
140.	0.6259		
141.	0.7294		
142.	0.8392	16.	46.
143.	0.9511		
144.	1.0560		
145.	1.1505	16.	45.
146.	1.2448		
147.	1.3491		
148.	1.4724	16.	44.
149.	1.6072		
150.	1.7262		
151.	1.8142	15.	43.
152.	1.8849		
153.	1.9640		
154.	2.0619	15.	42.

REFERENCES

1. Leendertse, J. J., *A Water Quality Simulation Model for Well-Mixed Estuaries and Coastal Seas: Vol. I, Principles of Computation*, The Rand Corporation, RM-6230-RC, February 1970.

2. Leendertse, J. J., and E. C. Gritton, *A Water-Quality Simulation Model for Well Mixed Estuaries and Coastal Seas: Vol. II, Computation Procedures*, The Rand Corporation, R-708-NYC, July 1971.

3. Leendertse, J. J., *A Water-Quality Simulation Model for Well Mixed Estuaries and Coastal Seas: Vol. IV, Jamaica Bay Tidal Flows*, The Rand Corporation, R-1009-NYC, July 1972.