



DEPARTMENT OF CIVIL ENGINEERING

Water Resources Research Group

ENVIRONMENT AGENCY

ANGLIAN REGION CATALOGUE

ACCESSION CODE ADPB

CLASS No. _____

Software Profile

A User Manual for AWSTAGE



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AWSTAGE
(Anglian Water STAGE)

A program for processing river stage data abstracted
from a central Honeywell mainframe computer
enabling direct input in TFFOR and TFCAL software.

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A User Manual for AWSTAGE

January 1990

ENVIRONMENT AGENCY



116810

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January 1989

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1. Introduction

This manual is a report in a series of Technical Reports produced by the Water Resources Research Group at the Department of Civil Engineering, University of Salford.

The manual is a reference to the software package AWSTAGE, a program for processing stage data abstracted from Anglian Waters central Honeywell computer. The report begins by stating the software specification and goes on to discuss the input files required. The structure of AWSTAGE is described and illustrated with a flowchart and an example run-time session described. Annotated samples of input and output datafiles are included.

The Appendices provide a source listing of the program together with a hard copy listing of example input and output datafiles. Datafiles accompany the program on the distribution disk and may be used to replicate the run-time example in the report main body.

The Water Resources Research Group would welcome any comments on this Software Profile. Please contact Professor Ian Cluckie at the address at the front of the report.

2. Typography and Flow Chart Symbols

The body of this manual is printed in a normal (Times font) typeface; other typfaces have special meanings.

`Courier` is used for the listings of the program, datafiles and screen output. **Bolded courier** represents interactive user keyboard input whilst annotated comments of source code and datafile listings are made in **bolded times**.

The program structure is illustrated by a flowchart and described (summarised) textually. Algorithms are described in terms of steps such as input, output and computations. Decisions are made by testing Boolean expressions that are evaluated to be true or false. The flowchart symbols for these processes, along with a symbol to indicate beginning and end are:

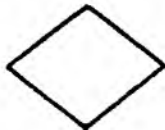
Assignments or computations



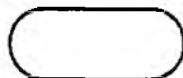
Input or output



Boolean expressions



Start or stop



3. Software Specification and System Requirements

AWSTAGE is a FORTRAN program for processing river stage data abstracted from the Anglian Water central mainframe computer at Huntingdon. The processed data are written to an output file formatted so that they can be used as a direct input to model calibration and verification programs (TFCAL and TFFOR - see bibliography). This automates a potentially time consuming part of data processing.

The software is coded in ANSI FORTRAN 77 and has been developed on a Digital Electronic Company (DEC) MicroVAX II minicomputer using VMS V5.2 and FORTRAN 77 V5.0. The code does not use any non-standard VAX FORTRAN 77 implementations (extensions) and is easily ported to a wide range of FORTRAN environments.

4. River Stage Data in NRA: Anglian Region

Before privatisation Anglian Water Authority operated a central archiving policy for historic hydrometric data, a Honeywell mainframe computer system at Huntingdon being used to store data on magnetic tapes. When required by remote Authority Divisions data were accessed via remote terminal and copied to appropriate local storage. This facility is still available and NRA Anglian Region staff will continue to retrieve historic hydrometric data from this archive.

4.1. Abstracted Stage Data Format

Software was developed by Anglian Water to abstract stage data for specific gauging stations and time periods from the central archive. Data written to local data files has the format described below (see also figure 2 and Appendices 2 and 3).

Table 4.1. Format of Anglian Water Stage Datafiles

Format of gauge details record

Record type	A1	(='G')
Space	A1	
Gauge Name	A40	
Space	A1	
Gauge Number	A6	
Space	A3	
Grid Reference	A12	
Space	A2	
Catchment Area	F8.2	

Format of date record

Record Type	A1	(='D')
Space	A1	
Date: dd	I2	
space	A1	
mm	I2	
space	A1	
yy	I2	
Space	A1	
Quality indicator	A1†	

Format of request record

Record Type	A1	(='R')
Space	A1	
Overall Dates	A19	
Space	A2	
"Threshold"	A11	
Qualifier	A1	
Space	A1	
Threshold	F5.3	
Space	A1	
"Position in Request"	A2	
Position	A10	

Format of stage data record

Record type	A1	(='S')
Space	A2	
Values	12 (A1, F5.3)	

Format of end of of period (= 'E')

Record Type	A1
Space	A1
Message	A76

† see section 4.2 (below)

The information present in the datafile records is used by AWSTAGE to produce a datafile record summary during runtime.

4.2. Data Quality Indicators

Quality indicators flag the status of the stage data and provide a guide to there usefulness. The relevant codes are:

- F = Faulty data
- D = Design standard (i.e. modular flow within design limits)
- B = Non-modular flow
- E = Estimated values (perhaps due to spillway flow, head exceeds structure design limit, or degree of crowning has been estimated when secondary water level trace has failed).

A value of 9.999 indicates a missing datum.

The quality indicators are used by AWSTAGE to produce a data integrity record during runtime. AWSTAGE does not check for missing data.

5. Program Structure and Data Requirements

AWSTAGE has been developed to process stage data abstracted from the Honeywell computer into a form suitable for input to model calibration and verification software (TFFOR and TFCAL - see Tilford, 1989). This chapter briefly describes the structure of AWSTAGE and pertinent data characteristics.

5.1. Stage Data Formats

The abstracted data can have two structures depending on the format of the data request:

- a station specific request: i.e. data for one or more than one 'event' for one particular gauging station.
- an event specific request: i.e. data for one or more than one gauging stations for one particular time period.

5.1.1. Station Specific Data

This format pertains to data abstracted using a request command which specifies data for n events for a single gauging station (where $n \geq 1$), with the individual events having (potentially) different durations. The abstracted datafile therefore consists of a string of event data for a number of events for the same gauging station.

5.1.2. Event Specific Data

This format pertains to data abstracted using a request command which specifies data for a number of gauging stations but for any number of gauging stations. The abstracted datafile therefore consists of a string of data for a number of different gauging stations and one particular time period.

5.2. AWSTAGE and Stage Data

Regardless of whether station or event specific the format of the input datafiles remains the same (see Chapter 4, Appendices 2 and 3, and the annotated figure 2). However the format of the abstracted data does control which of the two data processing subroutines in AWSTAGE are used.

5.3. AWSTAGE Structure

A full source code listing of AWSTAGE is provided in Appendix 1. In addition, a program flowchart is shown in figure 1 and a runtime listing is provided in Appendix 5. The program comprises of a short main segment and three subroutines: execution can be summarised as:

- Read input and output filenames, format of data (i.e. data or station specific), number of stations, number of days data
- Data summary and integrity reports
- Data processing
- Write processed data to an output file.

The main record details as read from the input datafile (i.e. gauge station name, gauge number, grid reference, and catchment area) are summarised on screen. Also a data integrity check (using the data quality indicators on the input datafile as described in Chapter 3) is performed and should a problem exist with the data, this is reported to screen indicating the problem and the date of occurrence.

6. Running the Program

The following is summary of the options that confront a user when the program runs. A full run-time listing of the program user-interface during program execution is provided in Appendix 5. A series of prompts sequentially leads the user through a program initialisation phase establishing input and output filenames, data format etc. Referral to the program flow chart (figure 1) may aid the reader.

The program is invoked by entering Run AWSTAGE. After each response the return (enter) key is pressed, the display scrolls and the next prompt is displayed. When all the prompts have been answered the program processes the data in the input file and writes them to an output file.

6.1. Example Run-Time Session

An example run-time session (Appendix 5) illustrates the use of AWSTAGE. The selected options are summarised below.

Event specific data are selected (i.e. one event for a number of gauging stations)

Input filename=northern.dat

Number of gauging stations in the file=2

Number of days in the event=4

Name of the output file for event 1=northern1.out

Name of the output file for event 2=northern2.out

Record detail summary and data integrity report are written to screen

Another run=yes

Station specific data are selected (i.e. a number of events for one gauging station)

Input filename=blunham.dat

Number of events in the file=2

Number of days in event 1=6

Name of the output file for event 1=blunham1.out

Number of days in event 2=7

Name of the output file for event 2=blunham2.out

Record summary and data integrity report are written to screen

Another run=no

STOP

If a filename is entered by the user which does not exist (in the case of the input datafile) or already exists (in the case of an output file), an appropriate error message notifies the user and a new filename can be entered. Error traps are also invoked should an incorrect response be made to a program prompt.

It should be noted that the program does not check for missing data. Such data are indicated by a marker which has value 9.999, and can be easily traced by visual inspection either of the data themselves or of a plot of the data.

7. Conclusions

This report is a users guide to the FORTRAN software package AWSTAGE, a program for processing river stage data abstracted from AW's central archive (Honeywell) computer into a form suitable for input to model calibration and verification software. The report contains listings of full source code and input and output datafiles; all of which are contained on the software distribution disk.

A runtime listing is provided and described in the text, and the user options are described.

A bibliography is provided if further information on related topics is required.

Bibliography

Cluckie, I.D. and Han, D. (1989). "Radar Data Quantisation, Sampling and Preliminary Model Assessment using Upavon Data", Wessex Radar Information Project, Report no. 4.

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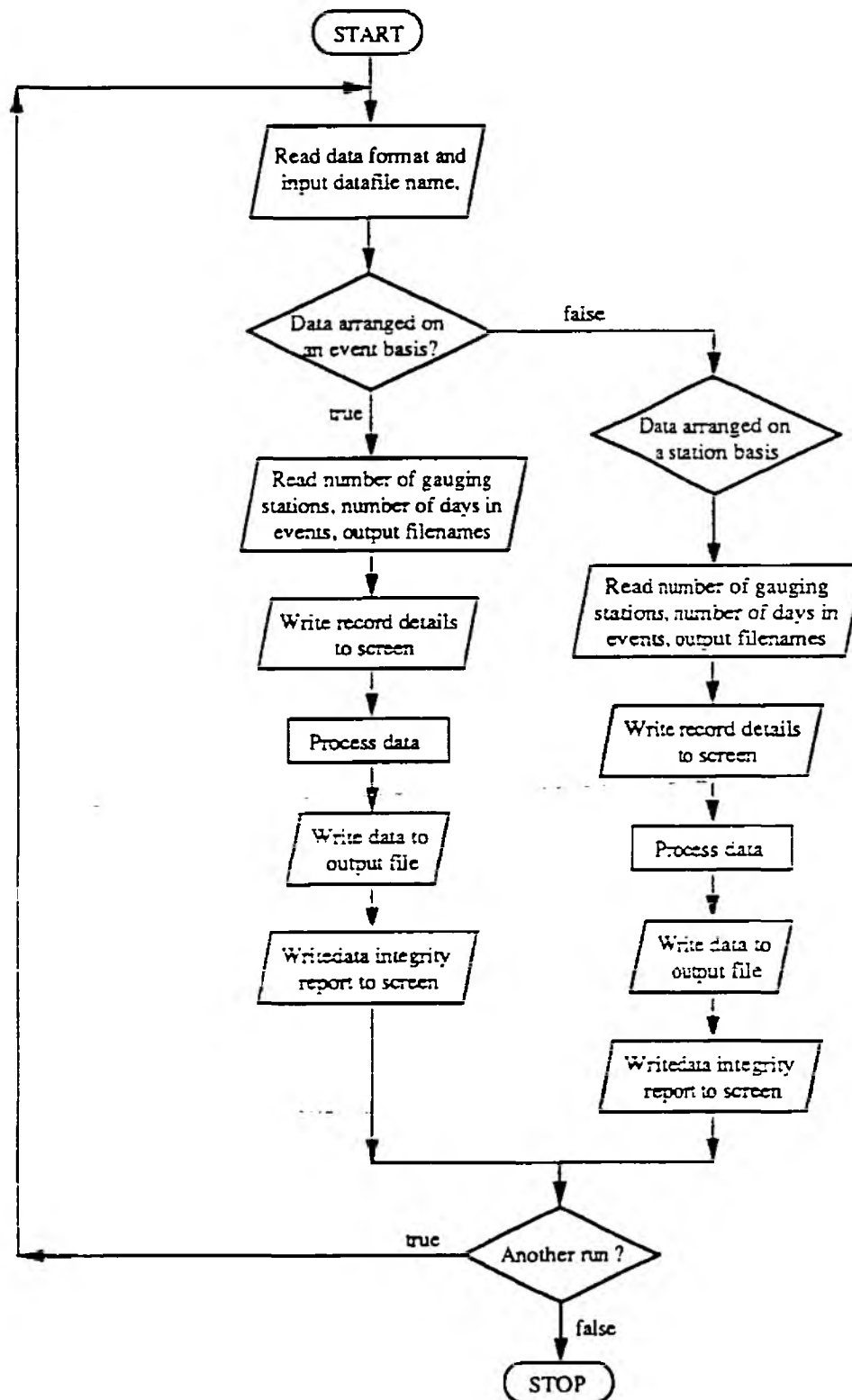


Figure 1: Flow Chart for AWSTAGE

Gauge Details Record



G R.IVEL, BLUNHAM

033022 TL1530 5090 541.30

Request Record



R 04/06/85 - 09/06/85 THRESHOLD- NONE POSITION IN REQUEST- 1 OF 6

Date Record



D 04 06 85 D

Stage Data



S	0.261	0.258	0.256	0.254	0.253	0.251	0.251	0.248	0.246	0.244	0.243	0.242
S	0.241	0.239	0.237	0.235	0.232	0.231	0.230	0.229	0.228	0.228	0.227	0.226
S	0.226	0.225	0.225	0.225	0.225	0.225	0.224	0.224	0.224	0.224	0.225	0.226
S	0.227	0.228	0.231	0.235	0.238	0.242	0.246	0.249	0.250	0.251	0.251	0.251
S	0.250	0.250	0.250	0.251	0.253	0.256	0.258	0.259	0.259	0.259	0.258	0.257
S	0.258	0.258	0.259	0.260	0.260	0.260	0.261	0.264	0.266	0.270	0.272	0.273
S	0.274	0.274	0.276	0.279	0.283	0.287	0.290	0.292	0.292	0.291	0.289	0.288
S	0.288	0.288	0.289	0.292	0.294	0.296	0.297	0.296	0.294	0.291	0.290	0.289
D	05	06	85	F								
S	0.292	0.297	0.298	0.301	0.304	0.310	0.312	0.316	0.318	0.320	0.324	0.326

Figure 2: Example Stage Input File

Data Type Flag, 'STAGE'								
	WILLOW BROOK, FOTHERINGHAY							
	STAGE							
	0000, 5, 6, 85							
Number of Storms (Redundant so =1)	1	384						
Data interval (minutes)	15							
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	} First 7 Lines of Data (809.3)
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
	0.000	0.020	0.062	0.011	0.003	0.000	0.000	
	0.000	0.026	0.071	0.106	0.000	0.001	0.005	

FIGURE 3: Example Stage Output Datafile

Appendices

- Appendix 1 AWSTAGE1 Source Code Listing
- Appendix 2 Example Datafile (by station)
- Appendix 3 Example Datafile (by date)
- Appendix 4 Example Output File
- Appendix 5 Runtime Listing of AWSTAGE

Appendix 1: AWSTAGE Source Code Listing

```

0001 c
0002 c
0003 c -----
0004 c
0005 c          PROGRAM AWSTAGE
0006 c
0007 c      Anglian Water STAGE processing program:
0008 c      A program to reformat data abstracted from the AW Central Archive
0009 c      (ICL Mainframe at Huntingdon). The datafiles can be arranged on a
0010 c      station or event basis.
0011 c
0012 c      Water Resources Research Group
0013 c      Department of Civil Engineering
0014 c      University of Salford
0015 c      SALFORD
0016 c      M5 4WT
0017 c
0018 c      For further information contact:
0019 c      Prof. Ian Cluckie
0020 c
0021 c -----
0022 c
0023 c
0024 c      character*1 reply
0025 c      character*40 abstfile
0026 c      logical exist1
0027 c
0028 c      5 format(i1)
0029 c      6 format(a1)
0030 c      100      format(a40)
0031 c
0032 c      do 232 i=1,10
0033 c          write(*,*)
0034 c      232      continue
0035 c          write(*,*)
0036 c          write(*,*)'-----'
0037 c          #-----'
0038 c          write(*,*)
0039 c          write(*,*)      Stage Processing Program (AWSTAGE)
0040 c          write(*,*)
0041 c          write(*,*)'A program to reformat data abstracted from the
0042 c          * central AW hydrometric '
0043 c          write(*,*)'archive (ICL mainframe at Huntingdon).'
0044 c          write(*,*)
0045 c          write(*,*)'See AWSTAGE Software Profile for further information.'
0046 c          write(*,*)
0047 c          write(*,*)'Water Resources Research Group'
0048 c          write(*,*)'Department of Civil Engineering'
0049 c          write(*,*)'University of Salford'
0050 c          write(*,*)'SALFORD'
0051 c          write(*,*)'M5 4WT'
0052 c          write(*,*)
0053 c          write(*,*)'-----'
0054 c          #-----'
0055 c          write(*,*)
0056 c          write(*,*)
0057 c          write(*,*)'$ Press RETURN (ENTER) to continue'
0058 c          read(*,*)
0059 c          do 211 i=1,20
0060 c              write(*,*)
0061 c      211      continue
0062 c          write(*,*)
0063 c      20 write(*,*)
0064 c
0065 c          write(*,*)
0066 c          write(*,*)'-----'
0067 c          write(*,*)'User Input Segment'

```

```

0068      write(*,*)' -----'
0069      write(*,*)
0070      write(*,*)' How is the datafile formatted?'
0071      write(*,*)' 1) On an event basis (one event)'
0072      write(*,*)' 2) On a station basis (one station)'
0073      write(*,*)' Enter integer corresponding to choice'
0074      10 read(*,5,err=12)istat
0075      if (istat.eq.1.or.istat.eq.2) goto 15
0076      12 write(*,*)
0077      write(*,*)' Enter 1 or 2 according to choice'
0078      goto 10
0079      15 write(*,*)
0080      c
0081      write (*,*)' Enter abstracted filename'
0082      read (*,100)abstfile
0083      45 inquire(file=abstfile,exist=exist1)
0084      if (.not.exist1) then
0085          write(*,*)
0086          write(*,*)' File does not exist'
0087          write(*,*)' EITHER,'
0088          write(*,*)' Check filename and re-enter'
0089          write(*,*)' OR'
0090          write(*,*)' Stop program by entering a zero [0]'
0091          read (*,100)abstfile
0092          if (abstfile.eq.'0') goto 999
0093          goto 45
0094      end if
0095      open (unit=2,file=abstfile,status='old')
0096      write(*,*)
0097      c
0098      if (istat.eq.1) call awdata2
0099      if (istat.eq.2) call awdata1
0100      c
0101      write(*,*)
0102      write(*,*)' Another run ? (Y or N)'
0103      read(*,6)reply
0104      if (reply.ne.'Y'.and.reply.ne.'y'.and.reply.ne.'N'.and.
0105          * reply.ne.'n') then
0106          write(*,*)
0107          write(*,*)' Enter Y or N corresponding to choice'
0108      end if
0109      if (reply.eq.'Y'.or.reply.eq.'y') goto 10
0110      c
0111      999      write(*,*)
0112      write(*,*)' --- AWSTAGE STOP ---'
0113      write(*,*)
0114      end

```

```

0001      c
0002      c
0003      c
0004      c
0005      c -----
0006      c      Subroutine to reformat data with one station (many events)
0007      c -----
0008      c
0009      c      subroutine awdata1
0010      c
0011      c      dimension stage(20000),ndays(100),numlines(1000),itotdata(20000)
0012      c      dimension itotdays(1000)
0013      c      integer date1(30),date2(30),date3(30)
0014      c      integer stdate1(30),stdate2(30),stdate3(30)
0015      c
0016      c      character*40 outfile1
0017      c      dimension outfile1(30)
0018      c      character*19 overdates
0019      c      dimension overdates(30)
0020      c      character*1 sp1,sp2,record
0021      c      character*2 sp4
0022      c      character*3 sp3
0023      c      character*40 gaugenam
0024      c      character*6 gaugenum
0025      c      character*12 gridref
0026      c
0027      c      logical exist2
0028      c
0029      c      100      format (a40)
0030      c      101      format (i2)
0031      c      102      format (2x,a40)
0032      c      103      format (2x,a19)
0033      c      104      format (3x,12(f6.3))
0034      c      105      format (2x,a8)
0035      c      107      format (2x,i1,',',i4)
0036      c      108      format (8(f9.3))
0037      c      109      format (a1,a1,a40,a1,a6,a3,a12,a2,f8.2)
0038      c      110      format (2x,i2,1x,i2,1x,i2)
0039      c      116      format (a2,i2,a1,i2,a1,i2,a1,a1)
0040      c
0041      c      31 write(*,*)
0042      c      write(*,*)' Enter the number of events in the file (integer)'
0043      c      read(*,101,err=31)numevents
0044      c      do 301 i=1,numevents
0045      c          write(*,*)
0046      c      32      write(*,12)i
0047      c      12      format(' Enter the number of days in event (integer)',i2)
0048      c      read(*,101,err=32)ndays(i)
0049      c      33      write(*,13)i
0050      c      13      format(' Enter the name of the outputfile for event ',i2,
0051      c      *' (max. of 40 characters)')
0052      c      read(*,100,err=33)outfile1(i)
0053      c      45      inquire(file=outfile1(i),exist=exist2)
0054      c      if (.not.(.not.exist2)) then
0055      c          write(*,*)
0056      c          write(*,*)' File already exists,
0057      c          * enter a different filename'
0058      c          read (*,100)outfile1(i)
0059      c          goto 45
0060      c      end if
0061      c      46      itotdata(i)=ndays(i)*96
0062      c          numlines(i)=ndays(i)*8
0063      c      301      continue
0064      c      write(*,*)
0065      c
0066      c      read(2,109)record,sp1,gaugenam,sp2,gaugenum,
0067      c      *      sp3,gridref,sp4,cmtarea
0068      c      rewind(2)
0069      c      do 302 i=1,numevents
0070      c          read(2,*)
0071      c          read(2,103)overdates(i)
0072      c          read(2,110)stdate1(i),stdate2(i),stdate3(i)

```



```

0073      do 303 j=1, (ndays(i)*9)
0074          read(2,*)
0075      303      continue
0076      302      continue
0077      rewind(2)
0078      c
0079      write(*,*)
0080      write(*,*) '-----'
0081      write(*,*) '              Record Details'
0082      write(*,*) '-----'
0083      write(*,*)
0084      write(*,111)gaugenam
0085      write(*,112)gaugenum
0086      write(*,113)gridref
0087      write(*,114)cmtarea
0088      write(*,*)
0089      111      format(1x,' Gauge name      ',a40)
0090      112      format(1x,' Gauge number   ',a6)
0091      113      format(1x,' Grid reference ',a12)
0092      114      format(1x,' Catchment area ',f8.2)
0093      c
0094      write(*,*)
0095      do 304 i=1,numevents
0096          write(*,115)i,overdates(i)
0097      115      format(1x,' Event number ',i2,'- Duration: ',a19)
0098      304      continue
0099      write(*,*)
0100      write(*,*)
0101      c
0102      iflag=0
0103      write(*,*)
0104      write(*,*) '-----'
0105      write(*,*) '              Data integrity report'
0106      write(*,*) '-----'
0107      write(*,*)
0108      do 305 l=1,numevents
0109          read(2,109)record,sp1,gaugenam,sp2,gaugenum,
0110          #          sp3,gridref,sp4,cmtarea
0111          read(2,*)
0112          read(2,116)sp4,date1(1),sp1,date2(1),sp1,date3(1),sp1,sp1
0113          if (sp1.ne.'D')
0114          #      call error(sp1,1,gaugenam,date1(1),date2(1),date3(1),iflag)
0115          k=0
0116          do 306 i=1,numlines(1)
0117              read(2,104){stage(k+j),j=1,12)
0118              k=i*12
0119              if (i.eq.numlines(1)) then
0120                  read(2,*)
0121                  goto 306
0122              end if
0123              if (mod(k,96).eq.0) then
0124                  read(2,116)sp4,date1(1),sp1,date2(1),sp1,date3(1),sp1,sp1
0125                  if (sp1.ne.'D')
0126          #      call error(sp1,1,gaugenam,date1(1),date2(1),date3(1),iflag)
0127              end if
0128      306      continue
0129      c
0130      open(unit=3,file=outfile1(1),status='new')
0131      write(3,102)gaugenam
0132      write(3,*) ' STAGE'
0133      write(3,118)stdate1(1),stdate2(1),stdate3(1)
0134      118      format(2x,'0000',',2(12,','),12)
0135      it=1
0136      write(3,107)it,itotdata(1)
0137      write(3,*) ' 15'
0138      k=0
0139      j=0
0140      do 307 i=1,ndays(1)*12
0141          write (3,108){stage(k+j),j=1,8)
0142          k=i*8
0143      307      continue
0144      close(unit=3)

```

```
0145      305      continue
0146      c
0147          if (iflag.eq.0) write(*,*) ' All data are design standard (i.e
0148              # modular flow within design limits) '
0149          write(*,*)
0150          write(*,*)
0151          write(*,*)
0152      c
0153          return
0154      end
```

```

0001      c
0002      c
0003      c
0004      c
0005      c -----
0006      c      Subroutine to reformat data with one event (many stations)
0007      c -----
0008      c
0009      c      subroutine awdata2
0010      c
0011      c      dimension gaugenam(30),gaugenum(30),gridref(30),cmtarea(30)
0012      c      dimension stage(2000)
0013      c
0014      c      character*40 outfile2
0015      c      dimension outfile2(40)
0016      c      character*19 dates
0017      c      dimension dates(10)
0018      c      character*1 sp1,sp2,record
0019      c      character*2 sp4
0020      c      character*3 sp3
0021      c      character*40 gaugenam
0022      c      character*6 gaugenum
0023      c      character*12 gridref
0024      c      character*19 overdates
0025      c      integer date1,date2,date3
0026      c      integer stdate1,stdate2,stdate3
0027      c
0028      c      logical exist3
0029      c
0030      c      100      format (a40)
0031      c      101      format (i2)
0032      c      102      format (2x,a40)
0033      c      104      format (3x,i2,f6.3))
0034      c      107      format (3x,i1,',',i4)
0035      c      108      format (8(f9.3))
0036      c      109      format (a1,a1,a40,a1,a6,a3,a12,a2,f9.2)
0037      c      110      format (2x,i2,1x,i2,1x,i2)
0038      c      111      format (a1,a1,a19)
0039      c      114      format (a2,i2,a1,i2,a1,i2,a1,a1)
0040      c
0041      c      31 write(*,*)
0042      c      write(*,*) ' Enter the number of stations in the file [integer]'
0043      c      read(*,101,err=31) numstat
0044      c      32 write(*,*)
0045      c      write(*,*) ' Enter the number of days in the event [integer]'
0046      c      read(*,101,err=32) itotdays
0047      c      write(*,*)
0048      c
0049      c      do 306 i=1,numstat
0050      c      write(*,*)
0051      c      33      write(*,13) i
0052      c      13      format(' Enter the name of the outputfile for station ',i2,
0053      c      * ' (max. of 40 characters)')
0054      c      read(*,100,err=33) outfile2(i)
0055      c      45      inquire(file=outfile2(i),exist=exist3)
0056      c      if (.not.(.not.exist3)) then
0057      c      write(*,*)
0058      c      write(*,*) ' File already exists,
0059      c      * enter a different filename'
0060      c      read (*,100) outfile2(i)
0061      c      goto 45
0062      c      end if
0063      c      306      continue
0064      c      write(*,*)
0065      c
0066      c      itotdata=itotdays*96
0067      c      numlines=itotdays*8
0068      c
0069      c      do 300 i=1,numstat
0070      c      read(2,109) record,sp1,gaugenam(i),sp2,gaugenum(i),
0071      c      *                                     sp3,gridref(i),sp4,cmtarea(i)
0072      c      read(2,111) sp1,sp1,overdates

```

```

0073         read(2,110)stdatel, stdate2, stdate3
0074         do 301 j=1, (itotdays*9)
0075             read(2,*)
0076             301         continue
0077             300         continue
0078         rewind(2)
0079     c
0080         write(*,*)
0081         write(*,*) '-----'
0082         write(*,*) '          Record Details'
0083         write(*,*) '-----'
0084         write(*,*)
0085         write(*,115)overdates
0086         115         format(1x, ' Event duration: ',a19)
0087         write(*,*)
0088         do 302 i=1,numstat
0089             write(*,122)i
0090             122         format(1x, ' Station number ',i2)
0091             write(*,116)gaugenam(i)
0092             write(*,117)gaugenum(i)
0093             write(*,118)gridref(i)
0094             write(*,119)cmntarea(i)
0095             write(*,*)
0096             302         continue
0097             write(*,*)
0098             write(*,*)
0099             116         format(1x, ' Gauge name      ',a40)
0100             117         format(1x, ' Gauge number   ',a6)
0101             118         format(1x, ' Grid reference  ',a12)
0102             119         format(1x, ' Catchment area ',f8.2)
0103     c
0104         iflag=0
0105         write(*,*)
0106         write(*,*) '-----'
0107         write(*,*) '          Data integrity report'
0108         write(*,*) '-----'
0109         write(*,*)
0110         do 303 i=1,numstat
0111             read (2,109) record, sp1, gaugenam(i), sp2, gaugenum(i),
0112             *          sp3, gridref(i), sp4, cmntarea(i)
0113             read (2,*)
0114             read (2,114) sp4, datel, sp1, date2, sp1, date3, sp1, sp1
0115             if (sp1.ne.'D')
0116             *          call error(sp1,1,gaugenam,datel,date2,date3,iflag)
0117             k=0
0118             j=0
0119             do 304 i=1,numlines
0120                 read (2,104) (stage(k+j), j=1,12)
0121                 k=i*12
0122                 if (i.eq.numlines) then
0123                     read(2,*)
0124                     goto 304
0125                 end if
0126                 if (mod(k,36).eq.0) then
0127                     read (2,114) sp4, datel, sp1, date2, sp1, date3, sp1, sp1
0128                     if (sp1.ne.'D')
0129                     *          call error(sp1,1,gaugenam,datel,date2,date3,iflag)
0130                 end if
0131             304         continue
0132     c
0133         open (unit=3,file=outfile2(1),status='new')
0134         write (3,102)gaugenam(1)
0135         write(3,*) ' STAGE'
0136         write (3,121)stdatel, stdate2, stdate3
0137         121         format(2x, '0000 ',2(12,' '),i2)
0138         it=1
0139         write(3,107) it, itordata
0140         write(3,*) ' 15'
0141         k=0
0142         j=0
0143         do 305 i=1,itotdays*12
0144             write (3,108) (stage(k+j), j=1,8)

```

```
0145          k=i*8
0146      305      continue
0147          close (unit=3)
0148      303      continue
0149      c
0150          if (iflag.eq.0) write(*,*) ' All data are design standard (i.e
0151              # modular flow within design limits)'
0152          write(*,*)
0153          write(*,*)
0154          write(*,*)
0155      c
0156          return
0157      end
```

```

0001 c
0002 c
0003 c
0004 c -----
0005 c Subroutine to check integrity of data and report accordingly
0006 c -----
0007 c
0008 c subroutine error(spl, l, gnam, idate1, idate2, idate3, iflag)
0009 c
0010 c character*1 spl
0011 c character*40 gnam
0012 c
0013 c iflag=1
0014 c if (spl.eq.'F') then
0015 c     write(*,*) ' Faulty data:'
0016 c     write(*,5) l, idate1, idate2, idate3, gnam
0017 c     write(*,*)
0018 c 5 format(2x, 'Event ', i2, ' ', 2(i2, '/'), i2, 3x, a40)
0019 c     else if (spl.eq.'B') then
0020 c     write(*,*) ' Non-modular flow:'
0021 c     write(*,6) l, idate1, idate2, idate3, gnam
0022 c     write(*,*)
0023 c 6 format(3x, 'Event ', i2, ' ', 2(i2, '/'), i2, 3x, a40)
0024 c     else if (spl.eq.'E') then
0025 c     write(*,*) ' Estimated data:'
0026 c     write(*,7) l, idate1, idate2, idate3, gnam
0027 c     write(*,*)
0028 c 7 format(2x, 'Event ', i2, ' ', 2(i2, '/'), i2, 3x, a40)
0029 c     else if (spl.eq.'M') then
0030 c     write(*,*) ' Missing data (assigned a value of 9.999):'
0031 c     write(*,8) l, idate1, idate2, idate3, gnam
0032 c     write(*,*)
0033 c 8 format(2x, 'Event ', i2, ' ', 2(i2, '/'), i2, 3x, a40)
0034 c     else
0035 c     write(*,*) ' Problem'
0036 c     end if
0037 c
0038 c return
0039 c end

```

Appendix 2a: Example Datafile 1 (Station specific)

G R.IVEL, BLUNHAM	033022	TL1530	5090	541.30								
R 04/06/85 - 09/06/85	THRESHOLD-	NONE	POSITION IN REQUEST-	1 OF 6								
D 04 06 85 D												
S	0.261	0.258	0.256	0.254	0.253	0.251	0.251	0.248	0.246	0.244	0.243	0.242
S	0.241	0.239	0.237	0.235	0.232	0.231	0.230	0.229	0.228	0.228	0.227	0.226
S	0.226	0.225	0.225	0.225	0.225	0.225	0.224	0.224	0.224	0.224	0.225	0.226
S	0.227	0.228	0.231	0.235	0.238	0.242	0.246	0.249	0.250	0.251	0.251	0.251
S	0.250	0.250	0.250	0.251	0.253	0.256	0.258	0.259	0.259	0.259	0.258	0.257
S	0.258	0.258	0.259	0.260	0.260	0.260	0.261	0.264	0.266	0.270	0.272	0.273
S	0.274	0.274	0.276	0.279	0.283	0.287	0.290	0.292	0.292	0.291	0.289	0.288
S	0.288	0.288	0.289	0.292	0.294	0.296	0.297	0.296	0.294	0.291	0.290	0.289
D 05 06 85 F												
S	0.292	0.297	0.298	0.301	0.304	0.310	0.312	0.316	0.318	0.320	0.324	0.326
S	0.327	0.330	0.331	0.332	0.334	0.334	0.335	0.334	0.333	0.331	0.328	0.324
S	0.321	0.319	0.315	0.314	0.315	0.316	0.318	0.319	0.320	0.320	0.321	0.321
S	0.321	0.321	0.320	0.318	0.315	0.313	0.311	0.310	0.309	0.310	0.311	0.313
S	0.314	0.315	0.316	0.315	0.314	0.312	0.310	0.308	0.306	0.305	0.305	0.305
S	0.306	0.308	0.312	0.314	0.318	0.320	0.321	0.325	0.325	0.325	0.326	0.331
S	0.339	0.351	0.369	0.389	0.405	0.422	0.442	0.458	0.472	0.484	0.496	0.504
S	0.516	0.520	0.528	0.530	0.529	0.528	0.525	0.522	0.517	0.510	0.502	0.494
D 06 06 85 D												
S	9.991	9.991	9.991	9.991	0.460	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.382	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.410	9.991	9.991	9.991
S	9.991	9.991	9.991	9.991	0.488	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.473	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.473	9.991	9.991	9.991
S	9.991	9.991	9.991	9.991	0.489	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.470	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.465	9.991	9.991	9.991
S	9.991	9.991	9.991	9.991	0.470	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.471	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.450	9.991	9.991	9.991
D 07 06 85 E												
S	9.991	9.991	9.991	9.991	0.666	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.750	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.800	9.991	9.991	9.991
S	9.991	9.991	9.991	9.991	0.770	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.739	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.708	9.991	9.991	9.991
S	9.991	9.991	9.991	9.991	0.695	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.670	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.640	9.991	9.991	9.991
S	9.991	9.991	9.991	9.991	0.604	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.588	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.552	9.991	9.991	9.991
D 08 06 85 D												
S	9.991	9.991	9.991	9.991	0.528	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.510	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.490	9.991	9.991	9.991
S	9.991	9.991	9.991	9.991	0.472	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.455	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.455	9.991	9.991	9.991
S	9.991	9.991	9.991	9.991	0.438	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.430	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.425	9.991	9.991	9.991
S	9.991	9.991	9.991	9.991	0.422	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.410	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.400	9.991	9.991	9.991
D 09 06 85 D												
S	9.991	9.991	9.991	9.991	0.395	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.378	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.390	9.991	9.991	9.991
S	9.991	9.991	9.991	9.991	0.390	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.392	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.400	9.991	9.991	9.991
S	9.991	9.991	9.991	9.991	0.385	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.375	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.375	9.991	9.991	9.991

S	9.991	9.991	9.991	9.991	0.376	9.991	9.991	9.991	9.991	9.991	9.991	9.991
S	0.362	9.991	9.991	9.991	9.991	9.991	9.991	9.991	0.350	9.991	9.991	9.991
E END OF PERIOD												
G R.IVEL, BLUNHAM						033022		TL1530		5090		541.30
R 22/12/85 - 28/12/85						THRESHOLD-		NONE		POSITION IN REQUEST-		2 OF 6
D 22 12 85 E												
S	0.234	0.236	0.236	0.236	0.236	0.236	0.236	0.236	0.237	0.237	0.238	0.239
S	0.239	0.239	0.239	0.240	0.241	0.242	0.243	0.243	0.242	0.242	0.242	0.242
S	0.242	0.243	0.244	0.243	0.243	0.242	0.242	0.243	0.246	0.249	0.252	0.254
S	0.256	0.257	0.260	0.261	0.264	0.263	0.265	0.266	0.268	0.273	0.277	0.280
S	0.282	0.281	0.280	0.277	0.275	0.275	0.277	0.281	0.285	0.289	0.291	0.291
S	0.288	0.283	0.278	0.274	0.271	0.272	0.274	0.278	0.280	0.282	0.283	0.282
S	0.280	0.276	0.274	0.272	0.268	0.265	0.263	0.260	0.261	0.262	0.265	0.267
S	0.269	0.269	0.268	0.268	0.267	0.268	0.269	0.269	0.268	0.267	0.265	0.264
D 23 12 85 D												
S	0.264	0.262	0.261	0.260	0.259	0.259	0.258	0.258	0.257	0.257	0.256	0.257
S	0.257	0.257	0.257	0.257	0.257	0.257	0.258	0.257	0.257	0.256	0.257	0.257
S	0.257	0.256	0.256	0.257	0.257	0.257	0.257	0.257	0.257	0.256	0.256	0.257
S	0.256	0.257	0.257	0.256	0.257	0.256	0.256	0.257	0.257	0.256	0.256	0.255
S	0.254	0.251	0.251	0.251	0.250	0.251	0.254	0.255	0.258	0.259	0.260	0.259
S	0.258	0.256	0.254	0.253	0.253	0.254	0.255	0.255	0.256	0.258	0.261	0.262
S	0.266	0.269	0.274	0.277	0.281	0.280	0.283	0.287	0.289	0.292	0.295	0.299
S	0.300	0.301	0.303	0.305	0.309	0.311	0.316	0.320	0.330	0.339	0.362	0.378
D 24 12 85 D												
S	0.389	0.398	0.410	0.420	0.436	0.452	0.465	0.476	0.485	0.493	0.505	0.513
S	0.525	0.532	0.536	0.538	0.551	0.559	0.576	0.591	0.611	0.632	0.647	0.662
S	0.675	0.683	0.690	0.695	0.704	0.710	0.720	0.730	0.736	0.738	0.741	0.742
S	0.742	0.741	0.741	0.744	0.748	0.753	0.755	0.754	0.753	0.751	0.750	0.748
S	0.746	0.745	0.746	0.748	0.751	0.750	0.753	0.748	0.744	0.741	0.735	0.732
S	0.731	0.729	0.729	0.730	0.727	0.722	0.715	0.709	0.704	0.696	0.696	0.693
S	0.692	0.692	0.691	0.691	0.690	0.686	0.682	0.675	0.667	0.665	0.664	0.665
S	0.667	0.668	0.669	0.664	0.660	0.656	0.649	0.646	0.645	0.649	0.652	0.654
D 25 12 85 D												
S	0.655	0.654	0.649	0.644	0.638	0.634	0.631	0.630	0.631	0.633	0.634	0.632
S	0.629	0.619	0.612	0.600	0.592	0.588	0.585	0.586	0.589	0.591	0.590	0.585
S	0.580	0.573	0.567	0.563	0.561	0.561	0.562	0.564	0.565	0.564	0.560	0.556
S	0.549	0.547	0.548	0.552	0.557	0.559	0.559	0.556	0.550	0.545	0.540	0.539
S	0.542	0.546	0.551	0.555	0.558	0.557	0.555	0.553	0.549	0.549	0.552	0.558
S	0.565	0.572	0.574	0.574	0.573	0.572	0.573	0.577	0.584	0.593	0.606	0.617
S	0.631	0.638	0.653	0.660	0.668	0.676	0.679	0.683	0.687	0.691	0.698	0.709
S	0.719	0.731	0.738	0.751	0.757	0.763	0.768	0.771	0.775	0.776	0.780	0.783
D 26 12 85 D												
S	0.788	0.790	0.796	0.801	0.806	0.812	0.814	0.818	0.823	0.828	0.830	0.836
S	0.842	0.844	0.846	0.850	0.856	0.860	0.864	0.870	0.873	0.879	0.883	0.886
S	0.888	0.891	0.893	0.894	0.894	0.897	0.900	0.903	0.904	0.907	0.910	0.913
S	0.915	0.915	0.914	0.914	0.914	0.915	0.915	0.917	0.916	0.917	0.920	0.920
S	0.920	0.918	0.921	0.922	0.923	0.922	0.925	0.926	0.926	0.926	0.927	0.926
S	0.925	0.925	0.925	0.921	0.922	0.921	0.919	0.917	0.914	0.913	0.912	0.908
S	0.907	0.905	0.904	0.900	0.899	0.899	0.895	0.893	0.889	0.882	0.876	0.872
S	0.868	0.865	0.862	0.860	0.858	0.855	0.852	0.844	0.840	0.834	0.829	0.820
D 27 12 85 D												
S	0.815	0.813	0.808	0.806	0.804	0.797	0.793	0.785	0.777	0.771	0.765	0.762
S	0.760	0.759	0.757	0.755	0.746	0.737	0.724	0.711	0.695	0.683	0.676	0.673
S	0.671	0.671	0.670	0.667	0.662	0.659	0.657	0.657	0.657	0.659	0.661	0.661
S	0.661	0.658	0.654	0.647	0.642	0.637	0.637	0.637	0.640	0.643	0.644	0.643
S	0.639	0.635	0.632	0.626	0.620	0.618	0.618	0.619	0.621	0.621	0.619	0.616
S	0.613	0.607	0.603	0.598	0.594	0.591	0.591	0.592	0.595	0.597	0.597	0.592
S	0.585	0.578	0.573	0.570	0.569	0.570	0.572	0.574	0.574	0.573	0.567	0.558

S 0.548 0.543 0.542 0.544 0.547 0.549 0.549 0.547 0.544 0.538 0.533 0.529
D 28 12 85 D
S 0.524 0.523 0.525 0.527 0.528 0.526 0.522 0.516 0.513 0.511 0.511 0.511
S 0.513 0.517 0.526 0.537 0.553 0.565 0.571 0.571 0.565 0.554 0.543 0.534
S 0.529 0.520 0.515 0.505 0.492 0.481 0.468 0.458 0.446 0.440 0.434 0.431
S 0.430 0.431 0.434 0.440 0.448 0.456 0.465 0.473 0.476 0.477 0.474 0.470
S 0.466 0.465 0.468 0.473 0.476 0.477 0.474 0.470 0.465 0.462 0.461 0.463
S 0.465 0.469 0.473 0.474 0.475 0.472 0.467 0.459 0.455 0.453 0.454 0.458
S 0.462 0.465 0.465 0.464 0.459 0.453 0.447 0.443 0.442 0.443 0.446 0.450
S 0.452 0.452 0.449 0.445 0.439 0.434 0.431 0.430 0.431 0.434 0.438 0.440
E END OF PERIOD

Appendix 2b: Example Datafile 2 (Event specific)

G WILLOW BROOK, FOTHERINGHAY 032002 TL0670 9330 89.60
R 05/06/85 - 08/06/85 THRESHOLD- NONE POSITION IN REQUEST- 1 OF 7
D 05 06 85 D
S 0.351 0.347 0.347 0.350 0.349 0.353 0.350 0.353 0.348 0.348 0.355 0.354
S 0.356 0.358 0.356 0.356 0.360 0.361 0.355 0.363 0.364 0.360 0.362 0.370
S 0.367 0.370 0.373 0.374 0.378 0.378 0.381 0.379 0.380 0.386 0.385 0.388
S 0.392 0.388 0.392 0.395 0.393 0.394 0.398 0.401 0.404 0.407 0.411 0.412
S 0.413 0.415 0.413 0.416 0.415 0.415 0.411 0.416 0.419 0.417 0.418 0.419
S 0.416 0.419 0.416 0.415 0.416 0.417 0.419 0.417 0.416 0.415 0.416 0.417
S 0.415 0.417 0.415 0.415 0.417 0.415 0.412 0.414 0.418 0.415 0.412 0.414
S 0.412 0.412 0.415 0.411 0.414 0.415 0.410 0.413 0.410 0.411 0.411 0.412
D 06 06 85 D
S 0.414 0.416 0.414 0.420 0.421 0.424 0.427 0.427 0.430 0.429 0.428 0.426
S 0.433 0.432 0.431 0.434 0.438 0.440 0.438 0.439 0.440 0.440 0.439 0.439
S 0.438 0.439 0.436 0.439 0.437 0.439 0.436 0.435 0.437 0.433 0.434 0.433
S 0.433 0.433 0.433 0.432 0.432 0.431 0.432 0.434 0.432 0.438 0.439 0.441
S 0.441 0.443 0.443 0.445 0.448 0.452 0.456 0.458 0.460 0.465 0.465 0.471
S 0.476 0.479 0.487 0.489 0.493 0.496 0.500 0.503 0.507 0.512 0.517 0.522
S 0.526 0.531 0.535 0.542 0.546 0.551 0.556 0.561 0.565 0.567 0.574 0.581
S 0.584 0.590 0.595 0.603 0.606 0.615 0.622 0.631 0.642 0.651 0.663 0.677
D 07 06 85 D
S 0.689 0.701 0.714 0.726 0.737 0.751 0.759 0.772 0.787 0.805 0.820 0.834
S 0.847 0.863 0.879 0.896 0.912 0.924 0.936 0.946 0.960 0.973 0.988 1.002
S 1.013 1.027 1.039 1.052 1.066 1.082 1.095 1.109 1.122 1.132 1.144 1.155
S 1.161 1.167 1.176 1.186 1.190 1.198 1.201 1.206 1.210 1.210 1.212 1.215
S 1.215 1.217 1.217 1.214 1.213 1.208 1.205 1.199 1.193 1.186 1.180 1.176
S 1.170 1.161 1.151 1.146 1.139 1.135 1.124 1.115 1.109 1.104 1.095 1.091
S 1.082 1.077 1.075 1.069 1.065 1.060 1.059 1.050 1.047 1.040 1.037 1.032
S 1.026 1.023 1.018 1.010 1.007 1.002 1.000 0.995 0.991 0.987 0.985 0.981
D 08 06 85 D
S 0.973 0.969 0.967 0.963 0.959 0.955 0.950 0.946 0.944 0.938 0.935 0.930
S 0.923 0.923 0.916 0.911 0.909 0.900 0.895 0.888 0.885 0.880 0.874 0.871
S 0.866 0.858 0.852 0.847 0.842 0.835 0.831 0.827 0.824 0.819 0.815 0.812
S 0.805 0.799 0.793 0.787 0.783 0.779 0.775 0.772 0.769 0.768 0.765 0.763
S 0.761 0.759 0.757 0.754 0.749 0.745 0.746 0.741 0.739 0.735 0.734 0.730
S 0.726 0.724 0.721 0.720 0.716 0.713 0.710 0.707 0.705 0.702 0.698 0.696
S 0.693 0.689 0.687 0.685 0.680 0.677 0.675 0.672 0.668 0.665 0.664 0.660
S 0.658 0.655 0.651 0.651 0.648 0.647 0.643 0.640 0.639 0.636 0.633 0.631
E END OF PERIOD
G HARPERS BROOK, ISLIP 032003 SP9830 7990 74.30
R 05/06/85 - 08/06/85 THRESHOLD- NONE POSITION IN REQUEST- 2 OF 7
D 05 06 85 D
S 0.209 0.211 0.211 0.209 0.207 0.208 0.216 0.227 0.237 0.242 0.243 0.243
S 0.240 0.237 0.234 0.231 0.227 0.223 0.219 0.215 0.211 0.208 0.205 0.202
S 0.199 0.196 0.193 0.191 0.189 0.187 0.184 0.183 0.181 0.179 0.179 0.178
S 0.179 0.179 0.180 0.181 0.183 0.183 0.182 0.182 0.183 0.182 0.183 0.187
S 0.190 0.192 0.194 0.195 0.197 0.198 0.197 0.198 0.199 0.203 0.209 0.213
S 0.215 0.215 0.214 0.213 0.212 0.211 0.211 0.211 0.209 0.207 0.205 0.203
S 0.203 0.203 0.203 0.203 0.203 0.203 0.201 0.200 0.199 0.197 0.195 0.195
S 0.193 0.192 0.191 0.191 0.192 0.194 0.197 0.201 0.205 0.207 0.208 0.207
D 06 06 85 D
S 0.207 0.206 0.205 0.205 0.207 0.209 0.211 0.211 0.213 0.215 0.218 0.222
S 0.226 0.231 0.237 0.244 0.252 0.260 0.267 0.273 0.278 0.284 0.293 0.301
S 0.309 0.314 0.318 0.321 0.323 0.323 0.326 0.327 0.328 0.330 0.331 0.332

S	0.335	0.339	0.345	0.353	0.361	0.367	0.371	0.375	0.378	0.381	0.382	0.381
S	0.387	0.412	0.414	0.401	0.388	0.381	0.379	0.381	0.385	0.389	0.394	0.398
S	0.403	0.410	0.415	0.423	0.431	0.439	0.446	0.453	0.461	0.473	0.488	0.507
S	0.525	0.539	0.555	0.571	0.589	0.609	0.629	0.647	0.667	0.687	0.708	0.732
S	0.759	0.785	0.818	0.851	0.884	0.916	0.947	0.975	1.001	1.024	1.047	1.065
D 07 06 85 D												
S	1.081	1.095	1.112	1.127	1.144	1.163	1.180	1.188	1.199	1.206	1.213	1.219
S	1.219	1.221	1.220	1.217	1.215	1.207	1.199	1.187	1.175	1.159	1.143	1.127
S	1.109	1.092	1.075	1.057	1.039	1.022	1.005	0.987	0.971	0.953	0.936	0.919
S	0.903	0.886	0.870	0.855	0.842	0.827	0.813	0.799	0.787	0.776	0.767	0.756
S	0.746	0.738	0.730	0.721	0.714	0.707	0.701	0.695	0.691	0.686	0.682	0.677
S	0.673	0.667	0.661	0.656	0.651	0.647	0.643	0.639	0.636	0.633	0.629	0.625
S	0.622	0.617	0.613	0.609	0.606	0.603	0.599	0.596	0.593	0.589	0.587	0.583
S	0.580	0.577	0.574	0.572	0.569	0.565	0.563	0.560	0.557	0.555	0.551	0.549
D 08 06 85 D												
S	0.547	0.544	0.542	0.539	0.537	0.534	0.531	0.529	0.527	0.524	0.522	0.519
S	0.518	0.515	0.513	0.511	0.508	0.505	0.503	0.500	0.499	0.496	0.494	0.491
S	0.488	0.487	0.483	0.480	0.480	0.477	0.475	0.472	0.470	0.467	0.465	0.463
S	0.461	0.459	0.456	0.455	0.452	0.451	0.448	0.447	0.444	0.443	0.440	0.439
S	0.437	0.435	0.434	0.432	0.431	0.429	0.427	0.426	0.424	0.423	0.421	0.419
S	0.419	0.417	0.415	0.414	0.413	0.411	0.411	0.410	0.408	0.407	0.406	0.405
S	0.404	0.403	0.403	0.402	0.402	0.402	0.403	0.403	0.403	0.402	0.400	0.399
S	0.397	0.395	0.395	0.394	0.393	0.392	0.391	0.391	0.391	0.391	0.391	0.391
E END OF PERIOD												

Appendix 3a: Output Stage Data File (first event from blunham.dat)

R.IVEL, BLUNHAM

STAGE

0000, 4, 6, 85

1, 576

15

0.261	0.258	0.256	0.254	0.253	0.251	0.251	0.248
0.246	0.244	0.243	0.242	0.241	0.239	0.237	0.235
0.232	0.231	0.230	0.229	0.228	0.228	0.227	0.226
0.226	0.225	0.225	0.225	0.225	0.225	0.224	0.224
0.224	0.224	0.225	0.226	0.227	0.228	0.231	0.235
0.238	0.242	0.246	0.249	0.250	0.251	0.251	0.251
0.250	0.250	0.250	0.251	0.253	0.256	0.258	0.259
0.259	0.259	0.258	0.257	0.258	0.258	0.259	0.260
0.260	0.260	0.261	0.264	0.266	0.270	0.272	0.273
0.274	0.274	0.276	0.279	0.283	0.287	0.290	0.292
0.292	0.291	0.289	0.288	0.288	0.288	0.289	0.292
0.294	0.296	0.297	0.296	0.294	0.291	0.290	0.289
0.292	0.297	0.298	0.301	0.304	0.310	0.312	0.316
0.318	0.320	0.324	0.326	0.327	0.330	0.331	0.332
0.334	0.334	0.335	0.334	0.333	0.331	0.328	0.324
0.321	0.319	0.315	0.314	0.315	0.316	0.318	0.319
0.320	0.320	0.321	0.321	0.321	0.321	0.320	0.318
0.315	0.313	0.311	0.310	0.309	0.310	0.311	0.313
0.314	0.315	0.316	0.315	0.314	0.312	0.310	0.308
0.306	0.305	0.305	0.305	0.306	0.308	0.312	0.314
0.318	0.320	0.321	0.325	0.325	0.325	0.326	0.331
0.339	0.351	0.369	0.389	0.405	0.422	0.442	0.458
0.472	0.484	0.496	0.504	0.516	0.520	0.528	0.530
0.529	0.528	0.525	0.522	0.517	0.510	0.502	0.494
9.991	9.991	9.991	9.991	0.460	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.382	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.410	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.488	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.473	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.473	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.489	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.470	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.465	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.470	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.471	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.450	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.666	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.750	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.800	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.770	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.739	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.708	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.695	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.670	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.640	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.604	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.588	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.552	9.991	9.991	9.991
9.991	9.991	9.991	9.991	0.528	9.991	9.991	9.991

9.991	9.991	9.991	0.510	9.991	9.991	9.991
9.991	9.991	9.991	0.490	9.991	9.991	9.991
9.991	9.991	9.991	0.472	9.991	9.991	9.991
9.991	9.991	9.991	0.455	9.991	9.991	9.991
9.991	9.991	9.991	0.455	9.991	9.991	9.991
9.991	9.991	9.991	0.438	9.991	9.991	9.991
9.991	9.991	9.991	0.430	9.991	9.991	9.991
9.991	9.991	9.991	0.425	9.991	9.991	9.991
9.991	9.991	9.991	0.422	9.991	9.991	9.991
9.991	9.991	9.991	0.410	9.991	9.991	9.991
9.991	9.991	9.991	0.400	9.991	9.991	9.991
9.991	9.991	9.991	0.395	9.991	9.991	9.991
9.991	9.991	9.991	0.378	9.991	9.991	9.991
9.991	9.991	9.991	0.390	9.991	9.991	9.991
9.991	9.991	9.991	0.390	9.991	9.991	9.991
9.991	9.991	9.991	0.392	9.991	9.991	9.991
9.991	9.991	9.991	0.400	9.991	9.991	9.991
9.991	9.991	9.991	0.385	9.991	9.991	9.991
9.991	9.991	9.991	0.375	9.991	9.991	9.991
9.991	9.991	9.991	0.375	9.991	9.991	9.991
9.991	9.991	9.991	0.362	9.991	9.991	9.991
9.991	9.991	9.991	0.350	9.991	9.991	9.991

Appendix 3b: Output Stage Data File (second event from blunham.dat)

R.IVEL, BLUNHAM

STAGE

0000, 22,12,85

1, 672

15

0.234	0.236	0.236	0.236	0.236	0.236	0.236	0.236
0.237	0.237	0.238	0.239	0.239	0.239	0.239	0.240
0.241	0.242	0.243	0.243	0.242	0.242	0.242	0.242
0.242	0.243	0.244	0.243	0.243	0.242	0.242	0.243
0.246	0.249	0.252	0.254	0.256	0.257	0.260	0.261
0.264	0.263	0.265	0.266	0.268	0.273	0.277	0.280
0.282	0.281	0.280	0.277	0.275	0.275	0.277	0.281
0.285	0.289	0.291	0.291	0.288	0.293	0.278	0.274
0.271	0.272	0.274	0.278	0.280	0.282	0.283	0.282
0.280	0.276	0.274	0.272	0.268	0.265	0.263	0.260
0.261	0.262	0.265	0.267	0.269	0.269	0.268	0.268
0.267	0.268	0.269	0.269	0.268	0.267	0.265	0.264
0.264	0.262	0.261	0.260	0.259	0.259	0.258	0.258
0.257	0.257	0.256	0.257	0.257	0.257	0.257	0.257
0.257	0.257	0.258	0.257	0.257	0.256	0.257	0.257
0.257	0.256	0.256	0.257	0.257	0.257	0.257	0.257
0.257	0.256	0.256	0.257	0.256	0.257	0.257	0.256
0.257	0.256	0.256	0.257	0.257	0.256	0.256	0.255
0.254	0.251	0.251	0.251	0.250	0.251	0.254	0.253
0.258	0.259	0.260	0.259	0.258	0.256	0.254	0.253
0.253	0.254	0.255	0.255	0.256	0.258	0.261	0.262
0.266	0.269	0.274	0.277	0.281	0.280	0.283	0.287
0.289	0.292	0.295	0.299	0.300	0.301	0.303	0.305
0.309	0.311	0.316	0.320	0.330	0.339	0.362	0.376
0.399	0.399	0.410	0.420	0.436	0.452	0.465	0.476
0.488	0.493	0.505	0.513	0.525	0.532	0.536	0.538
0.551	0.559	0.576	0.591	0.611	0.632	0.647	0.662
0.675	0.683	0.690	0.695	0.704	0.710	0.720	0.730
0.736	0.738	0.741	0.742	0.742	0.741	0.741	0.744
0.748	0.753	0.755	0.754	0.753	0.751	0.750	0.748
0.746	0.745	0.746	0.748	0.751	0.750	0.753	0.748
0.744	0.741	0.735	0.732	0.731	0.729	0.729	0.730
0.727	0.722	0.715	0.709	0.704	0.696	0.696	0.693
0.692	0.692	0.691	0.691	0.690	0.686	0.682	0.675
0.667	0.665	0.664	0.665	0.667	0.668	0.669	0.664
0.660	0.656	0.649	0.646	0.645	0.649	0.652	0.654
0.655	0.654	0.649	0.644	0.638	0.634	0.631	0.630
0.631	0.633	0.634	0.632	0.629	0.619	0.612	0.600
0.592	0.588	0.585	0.586	0.589	0.591	0.590	0.585
0.580	0.573	0.567	0.563	0.561	0.561	0.562	0.564
0.565	0.564	0.560	0.556	0.549	0.547	0.548	0.552
0.557	0.559	0.559	0.556	0.550	0.545	0.540	0.539
0.542	0.546	0.551	0.555	0.558	0.557	0.555	0.553
0.549	0.549	0.552	0.558	0.565	0.572	0.574	0.574
0.573	0.572	0.573	0.577	0.584	0.593	0.606	0.617
0.631	0.638	0.653	0.660	0.668	0.676	0.679	0.683
0.687	0.691	0.698	0.709	0.719	0.731	0.738	0.751
0.757	0.763	0.768	0.771	0.775	0.776	0.780	0.783

0.788	0.790	0.796	0.801	0.806	0.812	0.814	0.818
0.823	0.828	0.830	0.836	0.842	0.844	0.846	0.850
0.856	0.860	0.864	0.870	0.873	0.879	0.883	0.886
0.888	0.891	0.893	0.894	0.894	0.897	0.900	0.903
0.904	0.907	0.910	0.913	0.915	0.915	0.914	0.914
0.914	0.915	0.915	0.917	0.916	0.917	0.920	0.920
0.920	0.918	0.921	0.922	0.923	0.922	0.925	0.926
0.926	0.926	0.927	0.926	0.925	0.925	0.925	0.921
0.922	0.921	0.919	0.917	0.914	0.913	0.912	0.908
0.907	0.905	0.904	0.900	0.899	0.899	0.895	0.893
0.889	0.882	0.876	0.872	0.868	0.865	0.862	0.860
0.858	0.855	0.852	0.844	0.840	0.834	0.829	0.820
0.815	0.813	0.808	0.806	0.804	0.797	0.793	0.785
0.777	0.771	0.765	0.762	0.760	0.759	0.757	0.755
0.746	0.737	0.724	0.711	0.695	0.683	0.676	0.673
0.671	0.671	0.670	0.667	0.662	0.659	0.657	0.657
0.657	0.659	0.661	0.661	0.661	0.658	0.654	0.647
0.642	0.637	0.637	0.637	0.640	0.643	0.644	0.643
0.639	0.635	0.632	0.626	0.620	0.618	0.618	0.619
0.621	0.621	0.619	0.616	0.613	0.607	0.603	0.598
0.594	0.591	0.591	0.592	0.595	0.597	0.597	0.592
0.585	0.578	0.573	0.570	0.569	0.570	0.572	0.574
0.574	0.573	0.567	0.558	0.548	0.543	0.542	0.544
0.547	0.549	0.549	0.547	0.544	0.538	0.533	0.529
0.524	0.523	0.525	0.527	0.528	0.526	0.522	0.516
0.513	0.511	0.511	0.511	0.513	0.517	0.526	0.537
0.553	0.565	0.571	0.571	0.565	0.554	0.543	0.534
0.529	0.520	0.515	0.505	0.492	0.481	0.468	0.458
0.446	0.440	0.434	0.431	0.430	0.431	0.434	0.440
0.448	0.456	0.465	0.473	0.476	0.477	0.474	0.470
0.466	0.465	0.468	0.473	0.476	0.477	0.474	0.470
0.465	0.462	0.461	0.463	0.465	0.469	0.473	0.474
0.475	0.472	0.467	0.459	0.455	0.453	0.454	0.458
0.462	0.465	0.465	0.464	0.459	0.453	0.447	0.443
0.442	0.443	0.446	0.450	0.452	0.452	0.449	0.445
0.439	0.434	0.431	0.430	0.431	0.434	0.438	0.440

Appendix 3c: Output Stage Data File (first event from northern.dat)

HARPERS BROOK, ISLIP

STAGE

0000, 5, 6, 85

1, 384

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0.209	0.211	0.211	0.209	0.207	0.208	0.216	0.227
0.237	0.242	0.243	0.243	0.240	0.237	0.234	0.231
0.227	0.223	0.219	0.215	0.211	0.208	0.205	0.202
0.199	0.196	0.193	0.191	0.189	0.187	0.184	0.183
0.181	0.179	0.179	0.178	0.179	0.179	0.180	0.181
0.183	0.183	0.182	0.182	0.183	0.182	0.183	0.187
0.190	0.192	0.194	0.195	0.197	0.198	0.197	0.198
0.199	0.203	0.209	0.213	0.215	0.215	0.214	0.213
0.212	0.211	0.211	0.211	0.209	0.207	0.205	0.203
0.203	0.203	0.203	0.203	0.203	0.203	0.201	0.200
0.199	0.197	0.195	0.195	0.193	0.192	0.191	0.191
0.192	0.194	0.197	0.201	0.205	0.207	0.208	0.207
0.207	0.206	0.205	0.205	0.207	0.209	0.211	0.211
0.213	0.215	0.218	0.222	0.226	0.231	0.237	0.244
0.252	0.260	0.267	0.273	0.278	0.284	0.293	0.301
0.309	0.314	0.318	0.321	0.323	0.323	0.326	0.327
0.328	0.330	0.331	0.332	0.335	0.339	0.345	0.353
0.361	0.367	0.371	0.375	0.378	0.381	0.382	0.381
0.387	0.412	0.414	0.401	0.388	0.381	0.379	0.381
0.385	0.389	0.394	0.398	0.403	0.410	0.415	0.423
0.431	0.439	0.446	0.453	0.461	0.473	0.488	0.507
0.525	0.539	0.555	0.571	0.589	0.609	0.629	0.647
0.667	0.687	0.708	0.732	0.759	0.785	0.819	0.851
0.864	0.916	0.947	0.975	1.001	1.024	1.047	1.065
1.081	1.095	1.112	1.127	1.144	1.163	1.180	1.198
1.199	1.206	1.213	1.219	1.219	1.221	1.220	1.217
1.215	1.207	1.199	1.187	1.175	1.159	1.143	1.127
1.109	1.092	1.075	1.057	1.039	1.022	1.005	0.987
0.971	0.953	0.936	0.919	0.903	0.886	0.870	0.855
0.842	0.827	0.813	0.799	0.787	0.776	0.767	0.756
0.746	0.738	0.730	0.721	0.714	0.707	0.701	0.693
0.691	0.686	0.682	0.677	0.673	0.667	0.661	0.656
0.651	0.647	0.643	0.639	0.636	0.633	0.629	0.625
0.622	0.617	0.613	0.609	0.606	0.603	0.599	0.596
0.593	0.589	0.587	0.583	0.580	0.577	0.574	0.572
0.569	0.565	0.563	0.560	0.557	0.555	0.551	0.549
0.547	0.544	0.542	0.539	0.537	0.534	0.531	0.529
0.527	0.524	0.522	0.519	0.518	0.515	0.513	0.511
0.508	0.505	0.503	0.500	0.499	0.496	0.494	0.491
0.488	0.487	0.483	0.480	0.480	0.477	0.475	0.472
0.470	0.467	0.465	0.463	0.461	0.459	0.456	0.455
0.452	0.451	0.448	0.447	0.444	0.443	0.440	0.439
0.437	0.435	0.434	0.432	0.431	0.429	0.427	0.426
0.424	0.423	0.421	0.419	0.419	0.417	0.415	0.414
0.413	0.411	0.411	0.410	0.408	0.407	0.406	0.405
0.404	0.403	0.403	0.402	0.402	0.402	0.403	0.403
0.403	0.402	0.400	0.399	0.397	0.395	0.395	0.394
0.393	0.392	0.391	0.391	0.391	0.391	0.391	0.391

Appendix 3d: Output Stage Data File (second event from northern.dat)

WILLOW BROOK, FOTHERINGHAY

STAGE

0000, 5, 6, 85

1, 384

15

0.351	0.347	0.347	0.350	0.349	0.353	0.350	0.353
0.348	0.348	0.355	0.354	0.356	0.358	0.356	0.356
0.360	0.361	0.355	0.363	0.364	0.360	0.362	0.370
0.367	0.370	0.373	0.374	0.378	0.378	0.381	0.379
0.380	0.386	0.385	0.388	0.392	0.388	0.392	0.395
0.393	0.394	0.398	0.401	0.404	0.407	0.411	0.412
0.413	0.415	0.413	0.416	0.415	0.415	0.411	0.416
0.419	0.417	0.418	0.419	0.416	0.419	0.416	0.415
0.416	0.417	0.419	0.417	0.416	0.415	0.416	0.417
0.415	0.417	0.415	0.415	0.417	0.415	0.412	0.414
0.418	0.415	0.412	0.414	0.412	0.412	0.415	0.411
0.414	0.415	0.410	0.413	0.410	0.411	0.411	0.412
0.414	0.416	0.414	0.420	0.421	0.424	0.427	0.427
0.430	0.429	0.428	0.426	0.433	0.432	0.431	0.434
0.438	0.440	0.438	0.439	0.440	0.440	0.439	0.439
0.438	0.439	0.436	0.439	0.437	0.439	0.436	0.435
0.427	0.433	0.434	0.433	0.433	0.433	0.433	0.432
0.432	0.431	0.432	0.434	0.432	0.438	0.439	0.441
0.441	0.443	0.443	0.445	0.448	0.452	0.456	0.458
0.460	0.465	0.465	0.471	0.476	0.479	0.487	0.489
0.493	0.496	0.500	0.503	0.507	0.512	0.517	0.522
0.526	0.531	0.535	0.542	0.546	0.551	0.556	0.561
0.565	0.567	0.574	0.581	0.584	0.590	0.595	0.603
0.606	0.615	0.622	0.631	0.642	0.651	0.663	0.677
0.689	0.701	0.714	0.726	0.737	0.751	0.759	0.772
0.787	0.805	0.820	0.834	0.847	0.863	0.879	0.896
0.912	0.924	0.936	0.946	0.960	0.970	0.988	1.002
1.013	1.027	1.039	1.052	1.066	1.082	1.095	1.109
1.122	1.132	1.144	1.155	1.161	1.167	1.176	1.186
1.190	1.198	1.201	1.206	1.210	1.210	1.212	1.215
1.215	1.217	1.217	1.214	1.213	1.208	1.205	1.199
1.193	1.186	1.180	1.176	1.170	1.161	1.151	1.146
1.139	1.135	1.124	1.115	1.109	1.104	1.095	1.091
1.082	1.077	1.075	1.069	1.065	1.060	1.059	1.050
1.047	1.040	1.037	1.032	1.026	1.023	1.019	1.010
1.007	1.002	1.000	0.995	0.991	0.987	0.985	0.981
0.973	0.969	0.967	0.963	0.959	0.955	0.950	0.946
0.944	0.938	0.935	0.930	0.922	0.923	0.916	0.911
0.909	0.900	0.895	0.888	0.885	0.880	0.874	0.871
0.866	0.858	0.852	0.847	0.842	0.835	0.831	0.827
0.824	0.819	0.815	0.812	0.805	0.799	0.793	0.787
0.783	0.779	0.775	0.772	0.769	0.768	0.765	0.765
0.761	0.759	0.757	0.754	0.749	0.745	0.746	0.741
0.739	0.735	0.734	0.730	0.726	0.724	0.721	0.720
0.716	0.713	0.710	0.707	0.705	0.702	0.698	0.696
0.693	0.689	0.687	0.685	0.680	0.677	0.675	0.672
0.668	0.665	0.664	0.660	0.658	0.655	0.651	0.651
0.648	0.647	0.643	0.640	0.639	0.636	0.633	0.631

Appendix 4: Runtime Listing of AWSTAGE

The following is a runtime listing of AWSTAGE as described in Chapter of the main report. Bolded text indicates user input.

Stage Processing Program (AWSTAGE)

A program to reformat data abstracted from the central AW hydrometric archive (ICL mainframe at Huntingdon).

See AWSTAGE Software Profile for further information.

Water Resources Research Group
Department of Civil Engineering
University of Salford
SALFORD
MS 4WT

S Press RETURN (ENTER) to continue

User Input Segment

How is the datafile formatted ?

- 1) On an event basis (one event)
- 2) On a station basis (one station)

Enter integer corresponding to choice

1

Enter abstracted filename

northern.dat

Enter the number of stations in the file [integer]

2

Enter the number of days in the event [integer]

4

Enter the name of the outputfile for station 1 (max. of 40 characters)

northern1.out

Enter the name of the outputfile for station 2 (max. of 40 characters)

northern2.out

Record Details

Event duration: 05/06/85 - 08/06/85

Station number 1

Gauge name WILLOW BROOK, FOTHERINGHAY

Gauge number 032002

Grid reference TL0670 9330

Catchment area 89.60

Station number 2

Gauge name HARPERS BROOK, ISLIP

Gauge number 032003

Grid reference SP9830 7990

Catchment area 74.30

Data integrity report

All data are design standard (ile modular flow within design limits)

Another run ? [Y or N]

Y

User Input Segment

How is the datafile formatted ?

- 1) On an event basis (one event)
- 2) On a station basis (one station)

Enter integer corresponding to choice

2

Enter abstracted filename

blunham.dat

Enter the number of events in the file [integer]

2

Enter the number of days in event [integer] 1

6

Enter the name of the outputfile for event 1 (max. of 40 characters)

blunham1.dat

Enter the number of days in event [integer] 2

7

Enter the name of the outputfile for event 2 (max. of 40 characters)

blunham2.dat

Record Details

Gauge name R.IVEL, BLUNHAM

Gauge number 033022

Grid reference TL1530 5090

Catchment area 541.30

Event number 1- Duration: 04/06/85 - 09/06/85

Event number 2- Duration: 22/12/85 - 28/12/85

Data integrity report

Faulty data:

Event 1 5/ 6/85 R.IVEL, BLUNHAM

Non-modular flow:

Event 1 7/ 6/85 R.IVEL, BLUNHAM

Estimated data:

Event 2 22/12/85 R.IVEL, BLUNHAM

Another run ? [Y or N]

n

--- AWSTAGE STOP ---

s