A REVIEW OF THE SSARR VERSUS SIMPAK MODELS FOR THE QU'APPELLE RIVER BASIN

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FOREWORD

The natural flow of the Qu'Appelle River at the Saskatchewan-Manitoba boundary is estimated using the SSARR (Streamflow Synthesis and Reservoir Regulation) model. This model was adapted to the Qu'Appelle River as part of the natural flow studies made by Water Survey of Canada in Calgary, Alberta.

In 1980, it was decided to revise the computational procedure to metric units. A subcommittee of the Committee on Hydrology, the SSARR Model Subcommittee, met on April 22, 1980 and identified eight problem areas that should be resolved before the model is converted to metric. Subcommittee members agreed to resolve these problems as listed.

1) Checking all existing and revised tables - PPWB Secretariat.
2) Model Configuration - Canada Water Resources Branch, Regina.
3) Municipal Sewage Effluent - Canada Water Resources Branch, Regina.
4) Reservoir Regulation Cards for Lakes - Saskatchewan Environment.
5) Overbank Flow - Canada Water Resources Branch, Regina.
6) Use of Index Reservoirs - Saskatchewan Environment.
7) Routing parameters for discharges under 100 c.f.s. - Not Assigned.
8) SSARR vs SIMPAK (River Simulation Package) - Saskatchewan Environment.

This report summarizes the results of study number 8. Similar reports will be written to describe some of the remainng areas. A report may not be required for problems number 1, 2 and 5 because these areas are concerned with direct technical revisions as opposed to the methodology revision proposed in other reports.

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T A B L E O F C O N T E N T S

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I INTRODUCTION

The Simpak (simulating package) Model is a set of computer routines written by Environment Canada and designed to simulate streamflow characteristics of river systems. Although it has many similarities with the streamflow routing sub-routines of the SSARR[1/] model, its input, output, configuration and certain methodology are quite different. Also, the authors of the Simpak model designed it primarily for their own use, therefore, it does not possess the finished characteristics of a marketable software package.

This study attempts to evaluate the functions of the Simpak model, identify the advantages and disadvantages including operating costs, of both the Simpak and the SSARR models and make recommendations on whether Simpak may be used to replace the SSARR as the Qu'Appelle River Natural Flow Model. The three major areas for comparison are: capabilities, ease of operation and computing costs. The Q3 reach of the Qu'Appelle River, from below Katepwa Lake to Welby, was selected for this analysis as it exhibits numerous types of operations and is currently simulated by the SSARR model.

II CAPABILITIES OF SIMPAK

The SSARR and Simpak models were run for the reach of the Qu'Appelle River from Katepwa Lake to Welby for 1978 to compare the function and ease of operation of each model. Water Survey of Canada (WSC) had

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1/ Streamflow Synthesis and Reservoir Regulation Model, U.S. Army Corps of Engineers.

the SSARR model running for 1978 and streamflow and water level data were available on magnetic tape for 1978 thus this year was used for the model comparison. Generally it was found that Simpak could not perform all the functions available in the SSARR, and visa versa, the SSARR could not perform all the functions available in Simpak. Most of the differences are minor. The more significant advantages and disadvantages of the Simpak model as compared to the SSARR model are listed below.

A. ADVANTAGES OF SIMPAK

1. Both WSC and SSARR formatted data can be directly input to Simpak. This feature allows data already coded for use in the SSARR as well as recorded data from WSC tape files to be used directly in Simpak. WSC data has to be reformatted before entering in SSARR.
2. Simpak can calculate mean monthly flows, and total monthly volumes of flow stations[2/]. With SSARR, these calculations must be done manually.
3. Simpak has a "dummy" subroutine which may be used to insert any programming changes an agency may require. This subroutine allows the user to "tune" the model to specific agency needs without making major changes in the program.
4. With Simpak, ratio calculations may be made between stations with the results forming a new station. This option allows more flexibility in calculating local inflows and may aid in modeling such things as drainage projects.

2/ A station is a point along a river system at which streamflow characteristics are either know or to be calculated.

5. A cycling procedure card in Simpak allows one configuration to be looped through for different time periods without making Job Control Language (JCL) setup changes. This feature enables the user to process any number of time periods within a given run.
6. Simpak allows reaches to be easily divided into subreaches where one subreach inputs directly into the next. Using this technique a large river system can be broken down into smaller subreaches so that only the segments required need be run, however, the entire system can still be operated as a whole. This feature allows the optimization of costs and resources.

B. <u>DISADVANTAGES OF SIMPAK</u>

1. Reservoir regulation under backwater conditions is not possible with Simpak. This limitation is a major deficiency since many prairie situations, including several in the Qu'Appelle, require this capability. Extensive programming changes would be required to resolve this deficiency, however, the dummy subroutine mentioned previously may be used to overcome this limitation.
2. Flexibility in the mode of reservoir regulation is limited within a run. For example, in SSARR a reservoir may be regulated using specified elevation for 5 days, then outflow for 3 days, then rate of rise. Simpak will allow only one mode of regulation so that one of the control parameters such as elevation, rate of rise, or outflow must be used for the entire run.

3. Simpak will not interpolate between input data points in the same way that SSARR will. For example, if the user wants to simulate the linear regulation of a lake from one elevation on the first of a month to another elevation at the end of a month, Simpak requires that each daily elevation be input, while with the SSARR the same result is obtained by inserting only the initial and final elevations.
4. Simpak yields identical routed values to the SSARR for stream flow when there are no storage reservoirs or lakes. However, the two models use slightly different lake and reservoir routing techniques. Simpak uses a version of the "PULS Method" whereas SSARR uses an iterative procedure. As a result lake levels and releases calculated by the two models differ slightly. The differences are a result of the different methods of calculation and one method is not considered to be significantly more accurate than the other.
5. Simpak accepts metric data, converts it to English units to carry out calculations, then converts the answers to metric for output. When the model is being set up or calibrated, error messages are given in English units which must be converted to metric before the error can be detected. Although this is a minor inconvenience, it can add to set up time.

6. Simpak does not work on time intervals of less than one day, however, this is not considered a serious disadvantage in calculating natural flows for the Qu'Appelle River.

III. CONVENIENCE

Generally the greater variety of input methods for Simpak reduces the required data coding and the optional outputs available provide more usable results than the SSARR. In spite of the Simpak model being new to Hydrology Branch staff prior to this study, only a short time was required to achieve a comfortable working knowledge of it. The Simpak configuration structure is more logical and ordered with common elements set together. An example of this logical structure is the operation statements describing the specifics of the operation being placed in the order of their execution, with all peripheral configuration such as tables and station name cross references separated. Examples of the input set up and some output options for both models are illustrated in Appendicies I and II.

IV. COST

Simpak's costs were found to be considerably less than for SSARR. The cost of running SSARR for the Q3 reach for a 12-month period was $23.48. Comparatively, the cost of Simpak was $10.66[3/], a 54 per cent saving. For this comparison Simpak was divided into three subreaches and two time period runs[4/]. A breakdown of the itemized computer costs is shown in the following table:

3/ Cost is based on doubling the cost of a 6-month time period.

4/ At the time the study was done Simpak was limited to 30 stations and 200 days per run. Saskatchewan Environment has since increased these sizes to 200 stations and 400 days per run.

ITEMIZED COMPUTER COSTS (DOLLARS)		
	SSARR	SIMPAK
CPU[5/]	9.07	3.66
CORE[6/]	.84	.90
DISK i/o[7/]	8.25	1.14
CARDS READ	.26	.34
LINES PRINTED	5.06	5.62
TOTAL	23.48	10.66

V. CONCLUSION

The Simpak model in its present form does not have the routing capabilities of the SSARR model in handling backwater conditions and variable reservoir regulations. Revisions to the model required to make Simpak routines compatible with SSARR and specifically with the Qu'Appelle Natural Flow Model would require input by a computer analyst. Most of the programming changes would be necessary to correct the reservoir control weakness. It may be advantageous if the model is simply allowed to change as needs change. Changes to Simpak are not within the scope of this study, however, this evaluation shows Simpak has definite potential as an economical replacement for the SSARR routing model and warrants further work.

5/ Central Processing Unit

6/ A data storage unit

7/ Input and Output onto a storage disk file

VI. RECOMMENDATIONS

It is recommended that:

1. The current SSARR Qu'Appelle Natural Flow Model continue to be used until the limitations in the Simpak model have been overcome.
2. Projects be undertaken to change the subroutine(s) within the Simpak model to overcome its present limitations, by:
    a) adding a backwater sub-routine;
    b) adding a sub-routine to interpolate the data between input data points; and
    c) converting Simpak to metric.
3. The improved version of Simpak be implemented to replace the current Qu'Appelle Natural Flow Model.

APPENDIX I

SSARR CONFIGURATION SET-UP AND EXAMPLE OUTPUT

```
//WR2407  JOB WR24,T@GOBERT
/*JOBPARM TIME=1
/*ROUTE PRINT REMOTE34
//X  EXEC PGM=D24G001
//STEPLIB  DD DSN=WR04.SSARR,DISP=SHR
//SYSPRINT  DD SYSOUT=A
//SYSOUT    DD SYSOUT=A
//FT03F001 DD SYSOUT=A
//FT06F001 DD SYSOUT=A
//FT07F001 DD SYSOUT=B
//FT08F001 DD SYSOUT=A
//FT21F001 DD   UNIT=SYSDA,SPACE=(CYL,(10)),
//   DCB=(RECFM=VS,BLKSIZE=3520,LRECL=3516)
//FT22F001 DD   UNIT=SYSDA,SPACE=(CYL,(10)),
//   DCB=(RECFM=VS,BLKSIZE=3520,LRECL=3516)
//FT23F001 DD   UNIT=SYSDA,SPACE=(CYL,(10)),DCB=OPTCD=C
//FT05F001 DD *
JOB           060680  11        1  1      KATEPWA TO WELBY POST-CONVEYANCE
CT 1         60           2        0        0        3        0       10        0
CT 2         60          50       35      100       80      200      150      900
CT 3         60         6409999999999999999
CT 1         61           2        0        0        3        0       10        0
CT 2         61          50       35      100       80      200      150      900
CT 3         61         6409999999999999999
CT 1         70           2        0        0       14        0       20        5
CT 2         70          50       25      100       60      200      150      800
CT 3         70         6909999999999999999
CT 1         75           2        0        0       50       10     1000      270
CT 2         75     9999999999999999
CT 1         76           2        0        0       50        0     1000      230
CT 2         76     9999999999999999
CT 1         80           2        0        0       50        0      100       50
CT 2         80        1000      6739999999999999999
CT 1         90           2        0        0       50        0      100       50
CT 1         90        1000      5009999999999999999
CC01      7500        1          QUAPPELLE RIVER AT OUTLET OF KATEPWA  L -REC
CC01      7030        0          INDIANHEAD CREEK NEAR INDIANHEAD - RECORDED
CC01      7531        0          LOCAL CALCULATED ON INDIANHEAD
CC02      7531                   7030     1200
CC01      7532        0          LOCAL CALCULATED ON INDIANHEAD
CC02      7532                   7030     1000
CC01      7520        0          PHEASANT CR NEAR ABERNATHY RECORDED
CC01      7521        0          FIRST LOCAL ON PHEASANT CREEK
CC02      7521                   7520     1270
CC01      7522        0          SECOND LOCAL ON PHEASANT
CC02      7522                   7520     1000
CR01      7533        0          PHEASANT CREEK - ROUTED
CR02      7533             1 353  5599
CC01      7535        0          QUAPPELLE INDIANHEAD AND PHEASANT - SUMMED
CC01      7541        0          OVERBANK FLOW COMPUTED USING TABLE 60
CC02      7541                   7535   601000
CC01      7545        0          SIGN REVERSAL
CC02      7545 1
CL01      7546        1 2        LAKE CONTAINING OVERBANK FLOW
CL02      7546                            150     100
C110      7546       100                    10    200                     1000
C111      7546       500                  3000999999999999999999999999999999
CR01      7553        0          OVERBANK FLOW ROUTED
CR02      7553             8 353  5599
```

```
CC01     7555      0        QUAPPELLE RIVER WITHOUT OVERBANK FLOW
CR01     7563      0        QUAPPELLE INDIANHEAD AND PHEASANT - ROUTED
CR02     7563           8 350  6460
CC01     7565      0        QUAPPELLE AND LOCAL - SUMMED
CC01     7571      0        OVERBANK FLOW COMPUTED USING TABLE 61
CC02     7571               7565   611000
CC01     7575      0        SIGN REVERSAL
CC02     7575 1
CL01     7576      1        RESERVOIR CONTAINING OVERBANK FLOW
CL02     7576                          200    100
C110     7576    100                     10    200                  1000
C111     7576    500                   3000999999999999999999999999999999
CR01     7583      0        OVERBANK FLOW ROUTED
CR02     7583           8 353  5599
CC01     7585      0        QUAPPELLE RIVER WITHOUT OVERBANK FLOW
CR01     7593      0        QUAPPELLE AND LOCAL - ROUTED
CR02     7593           8 353  5599
CC01     7599      1        QUAPPELLE RIVER AT HYDE - COMPUTED
CC01     7600      0        QUAPPELLE RIVER AT HYDE - RECORDED
CC01     7605      0        QUAPPELLE RIVER BELOW HYDE - SUMMED
CC01     7611      0        OVERBANK FLOW COMPUTED USING TABLE 70
CC02     7611               7605   701000
CC01     7615      0        SIGN REVERSAL
CC02     7615 1
CC01     7625      0        QUAPPELLE RIVER WITHOUT OVERBANK FLOW
CL01     7626      1        DEAD STORAGE RESERVOIR
CL02     7626                          150    100
C110     7626    100                     10    200                  2000
C111     7626    500                   5000999999999999999999999999999999
CR01     7633      0        OVERBANK FLOW - ROUTED
CR02     7633           3 366  4856
CR01     7643      0        QUAPPEL RIVER BELOW HYDE - ROUTED
CR02     7643           3 366  4856
CC01     7622      0        LOCAL CALCULATED FROM PHEASANT CREEK
CC02     7622               7520       300
CC01     7665      1        FLOW SUMMED JUST ABOVE CROOKED LAKE
CC01    87699      0        CROOKED LAKE EVAPORATION-RECORDED
CC01    87700      0        SIGN REVERSAL
CC02    87700 1
CC01     7699      1        CROOKED LAKE NEAR GRAYSON - COMPUTED
CL02     7699 1   7750               149200 147800
C110     7699  147800                 80500 148000              87500 AUG.
C111     7699  148200                 95000 148400             103500 1970
C112     7699  148600                112500 148800             122000 SDOE
C113     7699  149000                132000 149200             142500EXTEND
C114     7699 9999999999999999999999999999
C210     7699    -100 147425           -100   -100 147580          500
C211     7699    -100 147830           1500      0 147580         -100
C212     7699       0 147720            500      0 147940         1500
C213     7699     200 147745           -100    200 147895          500
C214     7699     200 148085           1500    400 147850         -100
C215     7699     400 147990            500    400 148170         1500
C216     7699     800 148010           -100    800 148130          500
C217     7699     800 148270           1500   1200 148130         -100
C218     7699    1200 148240            500   1200 148350         1500
C219     7699    1600 148250           -100   1600 148330          500
C220     7699    1600 148450           1500   2000 148340         -100
C221     7699    2000 148410            500   2000 148520         1500
C222     7699    2400 148430           -100   2400 148490          500
```

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C223     7699      2400 148570             1500   3000 148530              -100
C224     7699      3000 148570              500   3000 148650              1500
C225     7699      4000 148670             -100   4000 148710               500
C226     7699      4000 148770             1500   5000 148790              -100
C227     7699      5000 148830              500   5000 148890              1500
C228     7699      6000 148880             -100   6000 148910               500
C229     7699      6000 148960             1500   7000 148955              -100
C230     7699      7000 148985              500   7000 149035              1500
C231     7699      8000 149010             -100   8000 149030               500
C232     7699      8000 149070             1500   9000 149050              -100
C233     7699      9000 149070              500   9000 149110              1500
C234     7699    -999999
CC01     7700         0         CROOKED LAKE NEAR GRAYSON - RECORDED
C110     7700           0      10                145200     100                 PHONY
C111     7700    146900    1000               99999999999999                     TABL
CC01     7750         0         EKAPO CREEK NEAR MARIEVAL - RECORDED
CC01     7751         0         LOCAL INFLOW CALCULATED ON EKAPO CREEK
CC02     7751                   7750       100
CC01     7755         0         CROOKED LAKE OUTFLOW AND EKAPO - SUMMED
CC01     7761         0         OVERBANK FLOW COMPUTED USING TABLE 75
CC02     7761                   7755   751000
CC01     7762         0         EXTREME OVERBANK COMPUTED USING TABLE 76
CC02     7762                   7755   761000
CL01     7764         1         EXTREME DEAD STORAGE RESERVOIR
CL02     7764                                125     100
C110     7764       100                       10     200                       8000
C111     7764       500                    2000099999999999999999999999999999
CC01     7765         0         SIGN REVERSAL
CC02     7765 1
CL01     7766         1         DEAD STORAGE RESERVOIR
CL02     7766                                125     100
C110     7766       100                       10     200                       8000
C111     7766       500                    2000099999999999999999999999999999
CR01     7773         0         OVERBANK FLOW ROUTED
CR02     7773               6 327  4430
CC01     7775         0         QUAPPELLE RIVER BELOW EKAPO WITHOUT OVERBANK
CR01     7783         0         QUAPPELLE RIVER BELOW EKAPO - ROUTED
CR02     7783               6 327  4430
CC01     7795         1         FLOW SUMMED JUST ABOVE ROUND LAKE
CC01    87799         0         ROUND LAKE EVAPORATION-RECORDED
CC01    87800         0         SIGN REVERSAL
CC02    87800 1
CL01     7799         1     2   ROUND LAKE NEAR WHITEWOOD - COMPUTED
CL02     7799                           146200 144700
C110     7799    144587       0            53000 144700      90             56200
C111     7799    144800     220            59000 144900     400             61600
C112     7799    145000     640            64200 145100     790             66900
C113     7799    145200    1200            69600 145300    1500             72400
C114     7799    145400    1850            75200 145500    2350             78100
C115     7799    145600    3000            81000 145700    3900             84000
C116     7799    145800    6000            87000 145900    8300             90000
C117     7799   99999999999999999999999999999
CC01     7800         0         ROUND LAKE NEAR WHITEWOOD - RECORDED
C110     7800    144800       0            59000 144900      80             61600 SDOE
C111     7800    145000     260            64200 145100     500             66900 JULY
C112     7800    145200     780            69600 145300    1120             72400 1974
C113     7800    145400    1530            75200 145500    2020             78100
C114     7800    145600    2530            81000 145700    3170             84000
C115     7800    145800    3920            87000 145900    4800             90000
```

```
C116      7800    146000   5900           94000 146      7100           97900
C117      7800    146200   8500          101000999999999999999999999999999999
CC01      7771         0       LOCAL CALCULATED ON EKAPO - SECOND
CC02      7771                 7750      1750
CC01      7805         1       ROUND LAKE NEAR WHITEWOOD - SUMMED
CC01      7811         0       OVERBANK FLOW COMPUTED BELOW ROUND LAKE
CC02      7811                 7805   801000
CC01      7815         0       SIGN REVERSAL
CC02      7815 1
CC01      7825         0       QUAPPELLE BELOW ROUND LAKE WITHOUT OVERBANK
CL01      7816         1       OVERBANK DEAD STORAGE
CL02      7816                            125     100
C110      7816       100                     10     200                     6000
C111      7816       500                  150009999999999999999999999999999999
CR01      7833         0       OVERBANK FLOW ROUTED
CR02      7833            10 330  2627
CR01      7843         0       QUAPPELLE RIVER BELOW ROUND - ROUTED
CR02      7843            10 330  2627
CC01      7722         0       LOCAL CALCULATED ON PHEASANT
CC02      7722                 7520       250
CR01      7723         0       LOCAL ON PHEASANT - ROUTED
CR02      7723             4 216  5550
CC01      7772         0       KAPOSVAR CREEK NEAR ESTERHAZY
CC01      7875         0       QUAPPELLE AND LOCAL - SUMMED
CC01      7899         1       QUAPPELLE RIVER AT TANTALLON - COMPUTED
CC01      7900         0       QUAPPELLE RIVER AT TANTALLON - RECORDED
CC01      7781         0       LOCAL CALCULATED ON EKAPO - THIRD
CC02      7781                 7750      1050
CC01      7930         0       CUTARM CREEK NEAR SPYHILL - RECORDED
CC01      7945         0       QUAPPELLE AND CUTARM - SUMMED
CC01      7951         0       OVERBANK CALCULATED BELOW TANTALLON
CC02      7951                 7945   901000
CC01      7955         0       SIGN REVERSAL
CC02      7955 1
CL01      7956         1       OVERBANK DEAD STORAGE
CL02      7956                            133     100
C110      7956       100                     10     200                     5000
C111      7956       500                  150009999999999999999999999999999999
CC01      7965         0       QUAPPELLE BELOW TANTALLON WITHOUT OVERBANK
CR01      7963       0 2       OVERBANK FLOW - ROUTED
CR02      7963             7 329  6110
CR01      7983       0 2       QUAPPELLE AND CUTARM - ROUTED
CR02      7983             7 329  6110
CC01      7999         1       QUAPPELLE RIVER NEAR WELBY - COMPUTED
CC01      8000         0       QUAPPELLE RIVER NEAR WELBY - RECORDED
P         7500      7535
P         7030      7535
P         7531      7535
P         7520      7533
P         7533      7535
P         7521      7535
P         7535      7555
P         7541      7545      7546
P         7545      7555
P         7546      7553
P         7555      7563
P         7563      7565
P         7553      7565
P         7522      7565
```

P	7532	7565	
P	7565	7585	
P	7571	7575	7576
P	7575	7585	
P	7576	7583	
P	7585	7593	
P	7593	7599	
P	7583	7599	
P	7599	7605	
P	7600		
P	7605	7625	
P	7611	7615	7626
P	7615	7625	
P	7626	7633	
P	7625	7643	
P	7643	7665	
P	7633	7665	
P	7622	7665	
P	7665	7699	
P	87700	7699	
P	7699	7755	
P	7700		
P	7750	7755	
P	7751	7755	
P	7755	7775	
P	7761	7765	7766
P	7762	7765	7764
P	7765	7775	
P	7766	7773	
P	7764	7773	
P	7775	7783	
P	7773	7795	
P	7783	7795	
P	7795	7799	
P	87799	87800	
P	87800	7799	
P	7799	7805	
P	7800		
P	7771	7805	
P	7805	7825	
P	7811	7815	7816
P	7815	7825	
P	7816	7833	
P	7825	7843	
P	7833	7875	
P	7843	7875	
P	7722	7723	
P	7723	7875	
P	7772	7875	
P	7875	7899	
P	7899	7945	
P	7900		
P	7781	7945	
P	7930	7945	
P	7945	7965	
P	7951	7955	7956
P	7955	7965	
P	7956	7963	
P	7965	7983	

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P          7963        7999
P          7983        7999
P          7999
P          8000
T     12001017824012031127800
2L         7546 120010178                        10
2L         7576 120010178                        10
2L         7626 120010178                        10
2L         7699 120010178             147852
2L         7764 120010178                        10
2L         7766 120010178                        10
2L         7799 120010178             144792
2L         7816 120010178                        10
2L         7956 120010178                        10
6S         7546 1200101781       012031121       0
6S         7576 1200101781       012031121       0
6S         7626 1200101781       012031121       0
6S         7699 1200101781      4012001021      10
6S         7699 1202603781      1012005041     340
6S         7699 1203004782 14817512015102 148080
6S         7699 1203112782 148020
6S         7799 1200101781      3012001021      1012020011      10
6S         7799 1202004781      1012021041      5012020051     100
6S         7799 1201506781     10012030061      8012031071      40
6S         7799 1201508781      2012001091      2012023091      85
6S         7799 1201510781      9512031101     100
6S         7799 1203011782 14492012031122 144920
6S         7764 1200101781       012031121       0
6S         7766 1200101781       012031121       0
6S         7816 1200101781       012031121       0
6S         7956 1200101781       012031121       0
6S        87699 1200101781       012031051       012001061      1912030061      19
6S        87699 1200107781      1112031071      1112001081      1812031081      18
6S        87699 1200109781      1712030091      1712001101      1312031101      13
6S        87699 1200111781       012031121       0
6S        87799 1200101781       012031051       012001061      1312030061      13
6S        87799 1200107781       812031071       812001081      1312031081      13
6S        87799 1200109781      1212030091      1212001101       912031101       9
6S        87799 1200111781       012031121       0
6D         7030 1200101781      0       0       0       0       0       0       0       0
6D         7030 1200901781      0       0       0       0       0       0       0       0
6D         7030 1201701781      0       0       0       0       0       0       0       0
6D         7030 1202501781      0       0       0       0       0       0       0
6D         7030 1200102781      0       0       0       0       0       0       0       0
6D         7030 1200902781      0       0       0       0       0       0       0       0
6D         7030 1201702781      0       0       0       0       0       0       0       0
6D         7030 1202502781      0       0       0       0
6D         7030 1200103781      0       0       0       0       0       0       0       0
6D         7030 1200903781      0       0       0       0       0       0       0       0
6D         7030 1201703781      0       0       0       0       0       0       0       0
6D         7030 1202503781      0       0      32     203     299     238     138
6D         7030 1200104781     41      20      14      12      12      26      12       6
6D         7030 1200904781      3       5       2       2       1       0       0       0
6D         7030 1201704781      0       0       0       0       0       0       0       0
6D         7030 1202504781      0       0       0       0       0       0
6D         7030 1200105781      0       0       0       0       0       0       0       0
6D         7030 1200905781      0       0       0       0       0       0       0       0
6D         7030 1201705781      0       0       0       0       0       0       0       0
6D         7030 1202505781      0       0       0       0       0       0       0
```

6D	7030	1200106781	0	0	0	0	0	0	0	0
6D	7030	1200906781	0	0	0	0	0	0	0	0
6D	7030	1201706781	0	0	0	0	0	0	0	0
6D	7030	1202506781	0	0	0	0	0	0		
6D	7030	1200107781	0	0	0	0	0	0	0	0
6D	7030	1200907781	0	0	0	0	0	0	0	0
6D	7030	1201707781	0	0	0	0	0	0	0	0
6D	7030	1202507781	0	0	0	0	0	0	0	
6D	7030	1200108781	0	0	0	0	0	0	0	0
6D	7030	1200908781	0	0	0	0	0	0	0	0
6D	7030	1201708781	0	0	0	0	0	0	0	0
6D	7030	1202508781	0	0	0	0	0	0	0	
6D	7030	1200109781	0	0	0	0	0	0	0	0
6D	7030	1200909781	0	0	0	0	0	0	0	0
6D	7030	1201709781	0	0	0	0	0	0	0	0
6D	7030	1202509781	0	0	0	0	0	0		
6D	7030	1200110781	0	0	0	0	0	0	0	0
6D	7030	1200910781	0	0	0	0	0	0	0	0
6D	7030	1201710781	0	0	0	0	0	0	0	0
6D	7030	1202510781	0	0	0	0	0	0	0	
6D	7030	1200111781	0	0	0	0	0	0	0	0
6D	7030	1200911781	0	0	0	0	0	0	0	0
6D	7030	1201711781	0	0	0	0	0	0	0	0
6D	7030	1202511781	0	0	0	0	0	0		
6D	7030	1200112781	0	0	0	0	0	0	0	0
6D	7030	1200912781	0	0	0	0	0	0	0	0
6D	7030	1201712781	0	0	0	0	0	0	0	0
6D	7030	1202512781	0	0	0	0	0	0	0	
6D	7500	1200101781	30	35	35	35	35	35	35	35
6D	7500	1200901781	35	35	35	35	35	35	35	35
6D	7500	1201701781	35	35	35	35	35	35	35	35
6D	7500	1202501781	35	35	35	35	35	35	35	
6D	7500	1200102781	35	35	35	35	35	35	35	35
6D	7500	1200902781	35	35	35	35	35	35	35	35
6D	7500	1201702781	35	35	35	35	35	35	35	35
6D	7500	1202502781	35	35	35	35				
6D	7500	1200103781	35	35	34	35	34	34	34	35
6D	7500	1200903781	34	34	34	35	34	34	35	34
6D	7500	1201703781	35	34	34	34	36	37	34	34
6D	7500	1202503781	34	37	67	74	66	95	123	
6D	7500	1200104781	108	111	126	132	132	136	120	119
6D	7500	1200904781	111	106	95	88	83	79	75	72
6D	7500	1201704781	68	68	62	59	55	54	53	51
6D	7500	1202504781	53	49	49	47	47	46		
6D	7500	1200105781	45	43	44	49	64	57	59	70
6D	7500	1200905781	77	77	78	80	83	86	88	89
6D	7500	1201705781	90	93	95	94	94	93	93	93
6D	7500	1202505781	93	93	93	92	92	91	91	
6D	7500	1200106781	88	88	82	79	76	71	67	64
6D	7500	1200906781	61	59	57	55	53	52	51	51
6D	7500	1201706781	49	48	48	49	46	50	48	47
6D	7500	1202506781	49	49	47	46	46	45		
6D	7500	1200107781	39	38	37	36	33	32	30	28
6D	7500	1200907781	26	26	24	23	22	21	20	19
6D	7500	1201707781	19	18	18	17	17	17	16	16
6D	7500	1202507781	15	15	15	15	15	14	15	
6D	7500	1200108781	4	4	4	4	4	4	3	4
6D	7500	1200908781	3	4	3	3	3	2	1	1
6D	7500	1201708781	5	5	4	4	4	43	44	43

6D	7500	1202508781	43	43	44	47	47	46	47	
6D	7500	1200109781	58	58	57	58	58	57	57	58
6D	7500	1200909781	58	58	57	58	58	58	57	58
6D	7500	1201709781	58	58	57	58	58	58	58	57
6D	7500	1202509781	57	58	58	57	58	58		
6D	7500	1200110781	70	69	70	70	70	69	70	70
6D	7500	1200910781	70	69	70	70	70	69	69	70
6D	7500	1201710781	70	70	69	73	91	138	208	286
6D	7500	1202510781	355	402	431	443	441	429	411	
6D	7500	1200111781	362	342	321	300	281	265	251	239
6D	7500	1200911781	227	218	210	202	195	189	183	177
6D	7500	1201711781	172	167	163	158	154	150	147	143
6D	7500	1202511781	140	137	134	132	129	127		
6D	7500	1200112781	125	123	121	119	117	116	114	112
6D	7500	1200912781	111	110	108	108	107	106	104	104
6D	7500	1201712781	103	102	101	101	99	99	98	98
6D	7500	1202512781	97	97	96	96	96	95	96	
6D	7520	1200101781	0	0	0	0	0	0	0	0
6D	7520	1200901781	0	0	0	0	0	0	0	0
6D	7520	1201701781	0	0	0	0	0	0	0	0
6D	7520	1202501781	0	0	0	0	0	0	0	
6D	7520	1200102781	0	0	0	0	0	0	0	0
6D	7520	1200902781	0	0	0	0	0	0	0	0
6D	7520	1201702781	0	0	0	0	0	0	0	0
6D	7520	1202502781	0	0	0	0				
6D	7520	1200103781	0	0	0	0	0	0	0	0
6D	7520	1200903781	0	0	0	0	0	0	0	0
6D	7520	1201703781	0	0	0	0	1	1	1	1
6D	7520	1202503781	1	2	92	122	119	151	159	
6D	7520	1200104781	117	62	42	32	27	34	32	25
6D	7520	1200904781	22	24	24	30	27	21	19	17
6D	7520	1201704781	18	20	20	18	13	10	9	8
6D	7520	1202504781	7	7	7	5	4	3		
6D	7520	1200105781	2	2	2	3	5	4	2	4
6D	7520	1200905781	3	1	2	5	5	7	6	6
6D	7520	1201705781	5	4	5	4	4	4	4	4
6D	7520	1202505781	6	5	3	2	1	1	1	
6D	7520	1200106781	4	2	2	2	2	2	1	1
6D	7520	1200906781	1	2	2	2	2	8	9	15
6D	7520	1201706781	13	8	8	7	7	5	4	4
6D	7520	1202506781	4	4	4	3	2	1		
6D	7520	1200107781	1	8	7	5	11	5	5	5
6D	7520	1200907781	5	5	4	3	1	0	0	0
6D	7520	1201707781	0	0	0	0	0	0	0	0
6D	7520	1202507781	0	0	0	1	1	1	1	
6D	7520	1200108781	1	1	1	1	1	0	0	0
6D	7520	1200908781	0	0	0	0	0	0	0	0
6D	7520	1201708781	0	0	0	0	0	0	0	0
6D	7520	1202508781	0	0	0	0	0	0	0	
6D	7520	1200109781	0	0	0	0	0	0	0	0
6D	7520	1200909781	0	0	0	0	0	0	0	0
6D	7520	1201709781	0	0	0	0	0	0	0	0
6D	7520	1202509781	0	0	0	0	0	0		
6D	7520	1200110781	0	0	0	0	0	0	0	0
6D	7520	1200910781	0	0	0	0	0	0	0	0
6D	7520	1201710781	0	0	0	0	0	0	0	0
6D	7520	1202510781	0	0	0	0	0	0	0	
6D	7520	1200111781	0	0	0	0	0	0	0	0
6D	7520	1200911781	0	0	0	0	0	0	0	0

6D	7520	1201711781	0	0	0	0	0	0	0	0
6D	7520	1202511781	0	0	0	0	0	0		
6D	7520	1200112781	0	0	0	0	0	0	0	0
6D	7520	1200912781	0	0	0	0	0	0	0	0
6D	7520	1201712781	0	0	0	0	0	0	0	0
6D	7520	1202512781	0	0	0	0	0	0	0	
6D	7750	1200101781	0	0	0	0	0	0	0	0
6D	7750	1200901781	0	0	0	0	0	0	0	0
6D	7750	1201701781	0	0	0	0	0	0	0	0
6D	7750	1202501781	0	0	0	0	0	0	0	
6D	7750	1200102781	0	0	0	0	0	0	0	0
6D	7750	1200902781	0	0	0	0	0	0	0	0
6D	7750	1201702781	0	0	0	0	0	0	0	0
6D	7750	1202502781	0	0	0	0				
6D	7750	1200103781	0	0	0	0	0	0	0	0
6D	7750	1200903781	0	0	0	0	0	0	0	0
6D	7750	1201703781	0	0	0	0	0	0	0	0
6D	7750	1202503781	0	0	0	0	1	2	30	
6D	7750	1200104781	67	93	110	92	90	89	88	63
6D	7750	1200904781	53	44	34	31	28	18	12	9
6D	7750	1201704781	6	8	4	3	3	3	4	6
6D	7750	1202504781	6	6	5	4	3	3		
6D	7750	1200105781	2	3	3	5	5	4	7	11
6D	7750	1200905781	10	11	8	9	9	9	8	8
6D	7750	1201705781	7	5	4	3	3	3	3	3
6D	7750	1202505781	2	1	0	0	0	0	0	
6D	7750	1200106781	0	0	0	0	0	0	0	0
6D	7750	1200906781	0	0	0	0	0	0	0	0
6D	7750	1201706781	0	0	0	0	0	0	0	0
6D	7750	1202506781	0	0	0	0	0	0		
6D	7750	1200107781	0	0	0	0	0	0	0	0
6D	7750	1200907781	0	0	0	0	0	0	1	0
6D	7750	1201707781	0	0	0	0	0	0	0	0
6D	7750	1202507781	0	0	0	0	0	0	0	
6D	7750	1200108781	0	0	0	0	0	0	0	0
6D	7750	1200908781	0	0	0	0	0	0	0	0
6D	7750	1201708781	0	0	0	0	0	0	0	0
6D	7750	1202508781	0	0	0	0	0	0	0	
6D	7750	1200109781	0	0	0	0	0	0	0	0
6D	7750	1200909781	0	0	0	0	0	0	0	0
6D	7750	1201709781	0	0	0	0	0	0	0	0
6D	7750	1202509781	0	0	0	0	0	0		
6D	7750	1200110781	0	0	0	0	0	0	0	0
6D	7750	1200910781	0	0	0	0	0	0	0	0
6D	7750	1201710781	0	0	0	0	0	0	0	0
6D	7750	1202510781	0	0	0	0	0	0	0	
6D	7750	1200111781	0	0	0	0	0	0	0	0
6D	7750	1200911781	0	0	0	0	0	0	0	0
6D	7750	1201711781	0	0	0	0	0	0	0	0
6D	7750	1202511781	0	0	0	0	0	0		
6D	7750	1200112781	0	0	0	0	0	0	0	0
6D	7750	1200912781	0	0	0	0	0	0	0	0
6D	7750	1201712781	0	0	0	0	0	0	0	0
6D	7750	1202512781	0	0	0	0	0	0	0	
6D	7772	1200101781	0	0	0	0	0	0	0	0
6D	7772	1200901781	0	0	0	0	0	0	0	0
6D	7772	1201701781	0	0	0	0	0	0	0	0
6D	7772	1202501781	0	0	0	0	0	0	0	
6D	7772	1200102781	0	0	0	0	0	0	0	0

6D	7772	1200902781	0	0	0	0	0	0	0	0
6D	7772	1201702781	0	0	0	0	0	0	0	0
6D	7772	1202502781	0	0	0	0				
6D	7772	1200103781	0	0	0	0	0	0	0	0
6D	7772	1200903781	0	0	0	0	0	0	0	0
6D	7772	1201703781	0	0	0	0	0	0	0	0
6D	7772	1202503781	0	0	0	1	2	4	4	
6D	7772	1200104781	7	2	9	4	3	17	18	2
6D	7772	1200904781	2	2	4	3	3	2	1	4
6D	7772	1201704781	5	3	1	0	0	0	0	0
6D	7772	1202504781	0	0	0	0	0	0		
6D	7772	1200105781	0	0	0	0	0	0	0	0
6D	7772	1200905781	0	0	0	0	0	0	0	0
6D	7772	1201705781	0	0	0	0	0	0	0	0
6D	7772	1202505781	0	0	0	0	0	0	0	
6D	7772	1200106781	0	0	0	0	0	0	0	0
6D	7772	1200906781	0	0	0	0	0	0	0	0
6D	7772	1201706781	0	0	0	0	0	0	0	0
6D	7772	1202506781	0	0	0	0	0	0		
6D	7772	1200107781	0	0	1	1	1	1	1	1
6D	7772	1200907781	1	1	1	1	0	0	0	0
6D	7772	1201707781	0	0	0	0	1	1	1	1
6D	7772	1202507781	1	1	2	2	2	3	6	
6D	7772	1200108781	0	0	0	0	0	0	0	0
6D	7772	1200908781	0	0	0	0	0	0	0	0
6D	7772	1201708781	0	0	1	1	1	1	1	2
6D	7772	1202508781	4	24	67	56	39	4	3	
6D	7772	1200109781	2	1	0	0	0	0	0	0
6D	7772	1200909781	0	0	0	0	0	0	0	0
6D	7772	1201709781	0	0	0	0	0	0	0	0
6D	7772	1202509781	0	0	0	0	0	0		
6D	7772	1200110781	0	0	0	0	0	0	0	0
6D	7772	1200910781	0	0	0	0	0	0	0	0
6D	7772	1201710781	0	0	0	0	0	0	0	0
6D	7772	1202510781	0	0	0	0	0	0	0	
6D	7772	1200111781	0	0	0	0	0	0	0	0
6D	7772	1200911781	0	0	0	0	0	0	0	0
6D	7772	1201711781	0	0	0	0	0	0	0	0
6D	7772	1202511781	0	0	0	0	0	0		
6D	7772	1200112781	0	0	0	0	0	0	0	0
6D	7772	1200912781	0	0	0	0	0	0	0	0
6D	7772	1201712781	0	0	0	0	0	0	0	0
6D	7772	1202512781	0	0	0	0	0	0	0	
6D	7930	1200101781	0	0	0	0	0	0	0	0
6D	7930	1200901781	0	0	0	0	0	0	0	0
6D	7930	1201701781	0	0	0	0	0	0	0	0
6D	7930	1202501781	0	0	0	0	0	0	0	
6D	7930	1200102781	0	0	0	0	0	0	0	0
6D	7930	1200902781	0	0	0	0	0	0	0	0
6D	7930	1201702781	0	0	0	0	0	0	0	0
6D	7930	1202502781	0	0	0	0				
6D	7930	1200103781	0	0	0	0	0	0	0	0
6D	7930	1200903781	0	0	0	0	0	0	0	0
6D	7930	1201703781	0	0	0	0	1	2	3	4
6D	7930	1202503781	5	6	12	23	26	30	35	
6D	7930	1200104781	40	64	59	57	46	36	45	36
6D	7930	1200904781	38	41	49	35	29	27	30	22
6D	7930	1201704781	28	33	35	29	28	25	25	24
6D	7930	1202504781	20	18	16	16	14	14		

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6D        7930 1200105781    12     11     10      9      9      9      9      9
6D        7930 1200905781    10      8      9     12     11     11      9      8
6D        7930 1201705781     8     10      9      6      4      3      3      3
6D        7930 1202505781     4      4      7      5      6      5      5
6D        7930 1200106781     4      3      2      2      2      2      2      2
6D        7930 1200906781     2      1      2      2      1      2      3      3
6D        7930 1201706781     3      2      2      1      1      1      1      1
6D        7930 1202506781     2      3      2      2      2      2
6D        7930 1200107781     3      3      3      3      3      2      2      2
6D        7930 1200907781     2      2      2      2      2      2      2      1
6D        7930 1201707781     2      2      2      2      1      1      1      1
6D        7930 1202507781     2      1      0      0      0      0      0
6D        7930 1200108781     0      0      0      0      0      0      0      2
6D        7930 1200908781     1      0      0      0      7      6      4      2
6D        7930 1201708781     1      1      1      1      1      1      2      2
6D        7930 1202508781     3      3      3      3      3      3      4
6D        7930 1200109781     4      4      4      4      5      5      4      3
6D        7930 1200909781     3      3      2      2      3      2      2      1
6D        7930 1201709781     3      4      6      6      4      3      3      3
6D        7930 1202509781     3      3      3      7      5      2
6D        7930 1200110781     1      2      3      3      2      2      2      1
6D        7930 1200910781     0      0      0      0      0      0      0      0
6D        7930 1201710781     0      0      0      0      0      0      0      0
6D        7930 1202510781     0      0      0      0      0      0      0
6D        7930 1200111781     0      0      0      0      0      0      0      0
6D        7930 1200911781     0      0      0      0      0      0      0      0
6D        7930 1201711781     0      0      0      0      0      0      0      0
6D        7930 1202511781     0      0      0      0      0      0
6D        7930 1200112781     0      0      0      0      0      0      0      0
6D        7930 1200912781     0      0      0      0      0      0      0      0
6D        7930 1201712781     0      0      0      0      0      0      0      0
6D        7930 1202512781     0      0      0      0      0      0      0
PE        7699C                             120010178120311278 720   1478   1483
PE        7799R                             120010178120311278 720   1447   1452
PQ        7999W      7799R      7699C   7665A120010178120311278 720      0   1000
END
/*
//
```

RUN DATE RUN NO. INITIAL DATE, HOUR
0 1 JAN 78 1200

COLUMBIA RIVER FORECASTING SERVICE

	STATION 762.6 DEAD STORAGE RESERVOIR			STATION 762.5 QUAPPELLE RIVER WITHOUT OVERBANK FLOW			STATION 764.3 QUAPPEL RIVER BELOW HYDE - ROUTED			
DATE-HOUR	FLOW CFS	ELEVATION FEET-MSL	STORAGE ACRE-FEET	FLOW CFS	GAGE HEIGHT FEET	STORAGE ACRE-FEET	FLOW CFS	GAGE HEIGHT FEET	STORAGE ACRE-FEET	HOUR-DATE
14 SEP 78 1200	0.	1.50	1,005.	1.			2.			120 14 SEP 78
15 SEP 78 1200	0.	1.50	1,005.	1.			2.			120 15 SEP 78
16 SEP 78 1200	0.	1.50	1,005.	1.			2.			120 16 SEP 78
17 SEP 78 1200	0.	1.50	1,005.	1.			2.			120 17 SEP 78
18 SEP 78 1200	0.	1.50	1,005.	1.			2.			120 18 SEP 78
19 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 19 SEP 78
20 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 20 SEP 78
21 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 21 SEP 78
22 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 22 SEP 78
23 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 23 SEP 78
24 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 24 SEP 78
25 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 25 SEP 78
26 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 26 SEP 78
27 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 27 SEP 78
28 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 28 SEP 78
29 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 29 SEP 78
30 SEP 78 1200	0.	1.50	1,005.	1.			1.			120 30 SEP 78
1 OCT 78 1200	0.	1.50	1,005.	2.			1.			120 1 OCT 78
2 OCT 78 1200	0.	1.50	1,005.	2.			1.			120 2 OCT 78
3 OCT 78 1200	0.	1.50	1,005.	3.			1.			120 3 OCT 78
4 OCT 78 1200	0.	1.50	1,005.	4.			1.			120 4 OCT 78
5 OCT 78 1200	0.	1.50	1,005.	4.			2.			120 5 OCT 78
6 OCT 78 1200	0.	1.50	1,005.	5.			2.			120 6 OCT 78
7 OCT 78 1200	0.	1.50	1,005.	6.			3.			120 7 OCT 78
8 OCT 78 1200	0.	1.50	1,005.	6.			4.			120 8 OCT 78
9 OCT 78 1200	0.	1.50	1,005.	7.			5.			120 9 OCT 78
10 OCT 78 1200	0.	1.50	1,005.	7.			5.			120 10 OCT 78
11 OCT 78 1200	0.	1.50	1,005.	8.			6.			120 11 OCT 78
12 OCT 78 1200	0.	1.50	1,005.	8.			7.			120 12 OCT 78
13 OCT 78 1200	0.	1.50	1,005.	8.			7.			120 13 OCT 78
14 OCT 78 1200	0.	1.50	1,005.	9.			8.			120 14 OCT 78
15 OCT 78 1200	0.	1.50	1,005.	9.			8.			120 15 OCT 78
16 OCT 78 1200	0.	1.50	1,005.	10.			9.			120 16 OCT 78
17 OCT 78 1200	0.	1.50	1,005.	11.			9.			120 17 OCT 78
18 OCT 78 1200	0.	1.50	1,005.	13.			10.			120 18 OCT 78
19 OCT 78 1200	0.	1.50	1,005.	15.			11.			120 19 OCT 78
20 OCT 78 1200	0.	1.50	1,005.	17.			12.			120 20 OCT 78
21 OCT 78 1200	0.	1.50	1,005.	19.			14.			120 21 OCT 78
22 OCT 78 1200	0.	1.50	1,005.	22.			16.			120 22 OCT 78
23 OCT 78 1200	0.	1.50	1,005.	24.			19.			120 23 OCT 78
24 OCT 78 1200	0.	1.50	1,005.	27.			22.			120 24 OCT 78
25 OCT 78 1200	0.	1.50	1,005.	30.			24.			120 25 OCT 78
26 OCT 78 1200	0.	1.50	1,005.	32.			27.			120 26 OCT 78

APPENDIX II

SIMPAK CONFIGURATION SET-UP AND

EXAMPLE OUTPUT

```
//WR04QSPK JOB WR04,MCDONALD
/*JOBPARM T=1
//* Q3 PART 1 KATEPWA TO HYDE   Q3.SIMP1.GM*******
/*ROUTE  PRINT RMT34
//  EXEC PGM=SIMPAK
//STEPLIB DD DSN=SB02DR.SIMP.LOAD,DISP=SHR
//FT04F001 DD DSN=&&TEMP,UNIT=3350,SPACE=(TRK,(50,5)),
//  DCB=(RECFM=FB,LRECL=80,BLKSIZE=4000)
//FT06F001 DD SYSOUT=A
//FT10F001 DD SYSOUT=A
//FT11F001 DD SYSOUT=A
//FT07F001 DD DSN=[redacted],
//   DISP=(NEW,CATLG,DELETE),UNIT=DISK,SPACE=(TRK,(10,10),RLSE),
//   DCB=(RECFM=FB,LRECL=80,BLKSIZE=1600)
//FT08F001 DD *
0     7576          1         0.          0.         0.
0     7576          2         1.         10.         0.
0     7576          3         2.       1000.         0.
0     7576          4         5.       3000.         0.
0     7576          5999999999999999999999999999999999
0     754111        1         0.          0.
0     754111        2         0         100.0
0     754111        3       350.        500.0
0     754111        4       800.       1000.
0     754111        5      1500.       2000.
0     754111        6      6400.       9000.
0     754111        7999999999999999999999
0     757111        1         0.          0.
0     757111        2         0         100.0
0     757111        3       350.        500.0
0     757111        4       800.       1000.
0     757111        5      1500.       2000.
0     757111        6      6400.       9000.
0     757111        7999999999999999999999
0     7546          1         0.          0.         0.
0     7546          2         1.         10.         0.
0     7546          3         2.       1000.         0.
0     7546          4         5.       3000.         0.
0     7546          5999999999999999999999999999999999
/*
//FT16F001 DD DSN=[redacted],DISP=SHR
//FT05F001 DD *
     Q3 BENCH MARK-SIMPACK  (KAT.-HYD)
         7500         1       QUAPPELLE R AT OUTLET OF KATEPWA-REC
         7030         1       INDIANHEAD CR NR INDIANHEAD-REC
         7531         1       LOCAL CALCULATED ON INDIANHEAD
         7532         1       LOCAL CALCULATED ON INDIANHEAD
         7520         1       PHEASANT CR NR ABERNATHY-REC
         7521         1       FIRST LOCAL ON PHEASANT CR
         7522         1       SECOND LOCAL ON PHEASANT CR
         7533         1       PHEASANT CR - ROUTED
         9000         0       SUM
         9001         0       SUM
         9002         0       SUM
         7535         1       QUAPELLE INDIANHEAD AND PHEASANT - SUM
         7541         1       OVERBANK FLOW - CORR. TABLE
         7546         9       LAKE CONTAINING OVERBANK FLOW
         7553         1       OVERBANK FLOW -ROUTED
         7555         1       QUAPPELLE R WITHOUT OVERBANK FLOW
```

INPUT DATA IN SSARR FORMAT IN THIS FILE

```
        7563          1       QUAPPELLE INDIANHEAD AND PHEASANT - ROUTED
        7565          1       QUAPPELLE AND LOCAL - SUM
        7571          1       OVERBANK FLOW - CORR TABLE
        7576          9       LAKE CONTAINING OVERBANK FLOW
        7583          1       OVERBANK FLOW - ROUTED
        7585          1       QUAPPELLE R WITHOUT OVERBANK FLOW
        7593          1       QUAPPELLE AND LOCAL - ROUTED
        7599          1       QUAPPELLE R AT HYDE - COMPUTED
/*
//FT05F002 DD *
01 01 1978  30 06 1978          1    1                    -2
REAC        7533      7520                   0 1          .353      55.99
TRSF        7521      7520                     1 1        1.27
ADD         9000      7533      7521           1
TRSF        7531      7030                     1 1        1.20
ADD         9001      7030      7531           1
ADD         7535      7500      9000      9001 1
EXTN        7541      7535
SUBT        7555      7535      7541           1 1 1
REAC        7563      7555                  30 8          .350      64.6   30.0
TRSF        7532      7030                     1 1        1.0
RESE        7546      7541                   0 1   9      10.        1.5  1.0
REAC        7553      7546                   0 8          .353      55.99    0
TRSF        7522      7520                     1 1          1
ADD         9002      7522      7553      7532 1
ADD         7565      9002      7563           1
EXTN        7571      7565
SUBT        7585      7565      7571           1 1 1
RESE        7576      7571                   0 1   9      10.        2.0  1.0
REAC        7583      7576                   0 8          .353      55.99    0
REAC        7593      7585                   0 8          .353      55.99  30.0
ADD         7599      7593      7583           1
FILE        7599                               1
MEAN        7500                               2 0
 1 1 1 1 1 1
MEAN        7030                               2 0
 1 1 1 1 1 1
MEAN        7520                               2 0
 1 1 1 1 1 1
MEAN        7533                               2 0
 1 1 1 1 1 1
MEAN        7535                               2 0
 1 1 1 1 1 1
MEAN        7541                               2 0
 1 1 1 1 1 1
MEAN        7553                               2 0
 1 1 1 1 1 1
MEAN        7555                               2 0
 1 1 1 1 1 1
MEAN        7563                               2 0
 1 1 1 1 1 1
MEAN        7565                               2 0
 1 1 1 1 1 1
MEAN        7571                               2 0
 1 1 1 1 1 1
MEAN        7583                               2 0
 1 1 1 1 1 1
MEAN        7585                               2 0
 1 1 1 1 1 1
```

```
MEAN        7599                                2 0
 1 1 1 1 1 1
/*
//FT05F003 DD *
/*
//
```

```
//WR04QSPK JOB WR04,MCDONALD
/*JOBPARM T=1
//* Q3 PART 2 HYDE TO ROUND L    Q3.SIMP2.GM*******
/*ROUTE  PRINT RMT34
//  EXEC PGM=SIMPAK
//STEPLIB DD DSN=SB02DR.SIMP.LOAD,DISP=SHR
//FT04F001 DD DSN=&&TEMP,UNIT=3350,SPACE=(TRK,(50,5)),
//  DCB=(RECFM=FB,LRECL=80,BLKSIZE=4000)
//FT06F001 DD SYSOUT=A
//FT07F001 DD DSN=WR04GM.Q3.SIMP2.OUT,
//    DISP=(NEW,CATLG,DELETE),UNIT=DISK,SPACE=(TRK,(10,10),RLSE),
//    DCB=(RECFM=FB,LRECL=80,BLKSIZE=1600)
//FT10F001 DD SYSOUT=A
//FT11F001 DD SYSOUT=A
//FT08F001 DD *
0      7611111      1          0         0.0
0      7611111      2          0        14.0
0      7611111      3        5.0        20.0
0      7611111      4       25.0        50.0
0      7611111      5       60.0       100.0
0      7611111      6      150.0       200.0
0      7611111      7      690.0       800.0
0      7611111      89999999999
0      7762111      1        0.0         0.0
0      7762111      2       10.0        50.0
0      7762111      3      230.0      1000.0
0      7762111      49999999999
0      7761111      1        0.0         0.0
0      7761111      2       10.0        50.0
0      7761111      3      270.0      1000.0
0      7761111      49999999999
0      7626         1        1.0        10.0
0      7626         2        2.0      2000.0
0      7626         3        5.0      5000.0
0      7626         49999999999
0      7764         1        1.0        10.0
0      7764         2        2.0      8000.0
0      7764         3        3.0     20000.0
0      7764         49999999999
0      7766         1        1.0        10.0
0      7766         2        2.0      8000.0
0      7766         3        3.0     20000.0
0      7766         49999999999
0      7699         1    1478.00     80500.0        10.0
0      7699         2    1480.00     87500.0       280.0
0      7699         3    1482.00     95000.0       780.0
0      7699         4    1484.00    103500.0      1550.0
0      7699         5    1486.00    112500.0      2700.0
0      7699         6    1488.00    122000.0      4400.0
0      7699         7    1490.00    132000.0      7500.0
0      7699         8    1492.00    142500.0     11000.0
0      7699         99999999999
0      7799         1    1447.00     56400.0        -1.
0      7799         2    1447.90     57700.0         0.0
0      7799         3    1448.00     59000.0         1.0
0      7799         4    1449.00     61600.0       80.0
0      7799         5    1450.00     64200.0       260.0
0      7799         6    1451.00     66900.0       500.0
0      7799         7    1452.00     69600.0      780.0
```

```
0     7799        8   1453.00   72400.0     1120.0
0     7799        9   1454.00   75200.0     1530.0
0     7799       10   1455.00   78100.0     2020.0
0     7799       11   1456.00   81000.0     2530.0
0     7799       12   1457.00   84000.0     3170.0
0     7799       13   1458.00   87000.0     3920.0
0     7799       14   1459.00   90000.0     4800.0
0     7799       15   1460.00   94000.0     5900.0
0     7799       16   1461.00   97900.0     7100.0
0     7799       17   1462.00  101000.0     8500.0
0     7799       18   1465.00  111000.0     8500.0
0     7799       1999999999999999999999999999999999
/*
//FT05F001 DD *
     Q3 BENCH MARK-SIMPACK
        7520          1       PHEASANT CR NR ABERNATHY-REC
        7599          1       QUAPPELLE R AT HYDE - COMPUTED
        7611          1       OVERBANK FLOW - CORR TABLE
        7625          1       QUAPPELLE R WITHOUT OVERBANK FLOW
        7626          1       DEAD ST RES
        7633          1       OVERBANK FLOW - ROUTED
        7643          1       QUAPPELLE R BL HYDE - ROUTED
        7622          1       LOCAL CALCULATED FROM PHEASANT CR
        7665          1       FLOW SUMMED JUST ABOVE CROOKED LAKE
       87699          1       CROOKED LAKE EVAP -REC
       87700          1       CROOKED LAKE INFLOW LESS EVAP
        7699          9       CROOKED LAKE NR GRAYSON - COMPUTED
        7750          1       EKAPO CR NR MARIEVAL - REC
        7751          1       LOCAL INFLOW CALC ON EKAPO
        7755          1       CROOKED LAKE OUTFLOW AND EKAPO - SUM
        7761          1       OVERBANK FLOW - CORR TABLE
        7762          1       EXTREME OVERBANK FLOW - CORR TABLE
        7764          1       EXTREME DEAD ST RES
        7766          1       DEAD ST RES
        7773          1       OVERBANK FLOW - ROUTED
        7775          1       QUAPPELLE R BL EKAPO LESS OVERBANK
        7783          1       QUAPPELLE R BL EKAPO - ROUTED
        7795          1       FLOW SIMMED JUST ABOVE ROUND LAKE
       87799          1       ROUND L EVAP - REC
       87800          1       ROUND L INFLOW LESS EVAP
        7799          9       ROUND L NR WHITEWOOD - COMPUTED
/*
//FT05F002 DD *
01 01 1978  30 06 1978          1    1                -2
EXTN       7611       7599
SUBT       7625       7599     7611          1 1 1
RESE       7626       7611                 0 1   9      10       1.5      1.0
REAC       7633       7626                   3         .366     48.56
REAC       7643       7625                   3         .366     48.56
TRSF       7622       7520                   1 1        0.3
ADD        7665       7622     7643    7633  1
SUBT      87700       7665    87699          1 1 1
TRSF       7751       7750                   1 1        1.0
RESE       7699      87700                 0 1       82320.   1492.00  1478.00
ADD        7755       7699     7750    7751  1
EXTN       7762       7755
EXTN       7761       7755
RESE       7764       7762                 0 1   9      10       1.25     1.0
RESE       7766       7761                 0 1   9      10       1.25     1.0
```

```
SUBT       7775     7755     7761     7762 1 1 1
REAC       7773     7764     7766          6            .327     44.30
REAC       7783     7775                   6            .327     44.30
ADD        7795     7773     7783          1
SUBT      87800     7795    87799          1 1 1
RESE       7799    87800                 0 1          57960   1462.00   1447.
FILE       7799                            1
MEAN       7520                            2 0
 1 1 1 1 1 1
MEAN       7599                            2 0
 1 1 1 1 1 1
MEAN       7611                            2 0
 1 1 1 1 1 1
MEAN       7625                            2 0
 1 1 1 1 1 1
MEAN       7633                            2 0
 1 1 1 1 1 1
MEAN       7643                            2 0
 1 1 1 1 1 1
MEAN       7622                            2 0
 1 1 1 1 1 1
MEAN       7665                            2 0
 1 1 1 1 1 1
MEAN      87700                            2 0
 1 1 1 1 1 1
MEAN       7699                            2 0
 1 1 1 1 1 1
MEAN       7750                            2 0
 1 1 1 1 1 1
MEAN       7751                            2 0
 1 1 1 1 1 1
MEAN       7755                            2 0
 1 1 1 1 1 1
MEAN       7761                            2 0
 1 1 1 1 1 1
MEAN       7762                            2 0
 1 1 1 1 1 1
MEAN       7773                            2 0
 1 1 1 1 1 1
MEAN       7775                            2 0
 1 1 1 1 1 1
MEAN       7783                            2 0
 1 1 1 1 1 1
MEAN       7795                            2 0
 1 1 1 1 1 1
MEAN      87800                            2 0
 1 1 1 1 1 1
MEAN       7799                            2 0
 1 1 1 1 1 1
/*
//FT05F003 DD *
/*
//FT16F001 DD DSN=WR04GM.Q3.SIMP2.IN,DISP=SHR
//
```

INPUT DATA IN SSARR FORMAT IN THIS FILE.

```
//WR04QSPK JOB WR04,MCDONALD
/*JOBPARM T=1
//* Q3 PART 3 BELOW ROUND LAKE   Q3.SIMP3.GM*******
/*ROUTE  PRINT RMT34
//  EXEC PGM=SIMPAK
//STEPLIB DD DSN=SR02DR.SIMP.LOAD,DISP=SHR
//FT04F001 DD DSN=&&TEMP,UNIT=3350,SPACE=(TRK,(50,5)),
//  DCB=(RECFM=FB,LRECL=80,BLKSIZE=4000)
//FT06F001 DD SYSOUT=A
//FT10F001 DD SYSOUT=A
//FT11F001 DD SYSOUT=A
//FT08F001 DD *
0     7811111      1         0          0
0     7811111      2         0       50.0
0     7811111      3      50.0      100.0
0     7811111      4     673.0     1000.0
0     7811111      599999999999999999999
0     7951111      1         0          0
0     7951111      2         0       50.0
0     7951111      3      50.0      100.0
0     7951111      4     500.0     1000.0
0     7951111      599999999999999999999
0     7816         1       1.0       10.0
0     7816         2       2.0     6000.0
0     7816         3       5.0    15000.0
0     7816         499999999999999999999
0     7956         1       1.0       10.0
0     7956         2       2.0     5000.0
0     7956         3       3.0    15000.0
0     7956         499999999999999999999
/*
//FT16F001 DD DSN=WR04GM.Q3.SIMP3.IN,DISP=SHR
//FT05F001 DD *
     Q3 BENCH MARK-SIMPACK  3D STEP
         7750           1      EKAPO CR NR MARIEVAL-REC
         7520           1      PHEASANT CR NR ABERNATHY-REC
         7799           1      ROUND L NR WHITEWOOD - COMPUTED
         7771           1      LOCAL CALC ON EKAPO - SECOND
         7805           1      ROUND L NR WHITEWOOD - SUM
         7811           1      OVERBANK FLOW COMPUTED BL ROUND L
         7825           1      QUAPPELLE BL ROUND L WITHOUT OVERBANK
         7816           1      OVERBANK DEAD ST
         7833           1      OVERBANK FLOW - ROUTED
         7843           1      QUAPPELLE R BL ROUND L - ROUTED
         7722           1      LOCAL CALC ON PHEASANT
         7723           1      LOCAL ON PHEASANT - ROUTED
         7772           1      KAPOSVAR CR NR ESTERHAZY
         7875           1      QUAPPELLE AND LOCAL - SUM
         7899           1      QUAPPELLE R AT TANTALLON - COMPUTED
         7900           1      QUAPPELLE R AT TANTALLON - REC
         7781           1      LOCAL CALC ON EKAPO - THIRD
         7930           1      CUTARM CR NR SPYHILL - REC
         7945           1      QUAPPELLE AND CUTARM - SUM
         7951           1      OVERBANK CALC BL TANTALLON
         7956           1      OVERBANK DEAD ST
         7965           1      QUAPPELLE BL TANTALLON WITHOUT OVERBANK
         7963           1      OVERBANK FLOW - ROUTED
         7983           1      QUAPPELLE AND CUTARM - ROUTED
         7999           1      QUAPPELLE R NR WELBY -COMPUTED
```

INPUT DATA IN SSARR FORMAT IN THIS FILE.

```
/*
//FT05F002 DD *
01 01 1978  30 06 1978           1    1                        -2
TRSF        7771        7750                       1 1         1.75
ADD         7805        7771        7799           1
EXTN        7811        7805
SUBT        7825        7805        7811           1 1 1
RESE        7816        7811                     0 1   9        10        1.25        1.0
REAC        7843        7825                      10           .330      26.27
REAC        7833        7816                      10           .330      26.27
TRSF        7722        7520                       1 1         0.25
REAC        7723        7722                       4           .216      55.50
ADD         7875        7723        7833           1
ADD         7899        7772        7843      7875 1
TRSF        7781        7750                       1 1         1.05
ADD         7945        7899        7781      7930 1
EXTN        7951        7945
SUBT        7965        7945        7951           1 1 1
RESE        7956        7951                     0 1   9        10        1.33        1.0
REAC        7963        7956                       7           .329      61.10
REAC        7983        7965                       7           .329      61.10
ADD         7999        7963        7983           1
MEAN        7520                                   2 0
 1 1 1 1 1 1
MEAN        7750                                   2 0
 1 1 1 1 1 1
MEAN        7799                                   2 0
 1 1 1 1 1 1
MEAN        7771                                   2 0
 1 1 1 1 1 1
MEAN        7805                                   2 0
 1 1 1 1 1 1
MEAN        7811                                   2 0
 1 1 1 1 1 1
MEAN        7825                                   2 0
 1 1 1 1 1 1
MEAN        7816                                   2 0
 1 1 1 1 1 1
MEAN        7833                                   2 0
 1 1 1 1 1 1
MEAN        7843                                   2 0
 1 1 1 1 1 1
MEAN        7722                                   2 0
 1 1 1 1 1 1
MEAN        7723                                   2 0
 1 1 1 1 1 1
MEAN        7772                                   2 0
 1 1 1 1 1 1
MEAN        7875                                   2 0
 1 1 1 1 1 1
MEAN        7899                                   2 0
 1 1 1 1 1 1
MEAN        7781                                   2 0
 1 1 1 1 1 1
MEAN        7930                                   2 0
 1 1 1 1 1 1
MEAN        7945                                   2 0
 1 1 1 1 1 1
MEAN        7951                                   2 0
```

```
 1 1 1 1 1 1
MEAN      7956                               2 0
 1 1 1 1 1 1
MEAN      7965                               2 0
 1 1 1 1 1 1
MEAN      7963                               2 0
 1 1 1 1 1 1
MEAN      7983                               2 0
 1 1 1 1 1 1
MEAN      7999                               2 0
 1 1 1 1 1 1
/*
//FT05F003 DD *
/*
//
```

Q3 BENCH MARK-SIMPACK

OUTFLOW (CFS)

7665	FLOW SUMMED JUST ABOVE CROOKED LAKE
87699	CROOKED LAKE EVAP -REC
87700	CROOKED LAKE INFLOW LESS EVAP
7750	EKAPO CR NR MARIEVAL - REC
7751	LOCAL INFLOW CALC ON EKAPO
7755	CROOKED LAKE OUTFLOW AND EKAPO - SUM
7761	OVERBANK FLOW - CORR TABLE
7762	EXTREME OVERBANK FLOW - CORR TABLE

DATE	STATION 7665	STATION 87699	STATION 87700	STATION 7750	STATION 7751	STATION 7755	STATION 7761	STATION 7762
1 MAY 1978	127.50	0.0	127.50	2.00	2.00	96.00	22.59	20.65
2 MAY 1978	121.79	0.0	121.79	3.00	3.00	91.00	21.22	19.49
3 MAY 1978	115.20	0.0	115.20	3.00	3.00	84.00	19.31	17.87
4 MAY 1978	108.32	0.0	108.32	5.00	5.00	81.00	18.48	17.18
5 MAY 1978	102.00	0.0	102.00	5.00	5.00	74.00	16.57	15.56
6 MAY 1978	95.32	0.0	95.32	4.00	4.00	65.00	14.11	13.47
7 MAY 1978	89.37	0.0	89.37	7.00	7.00	64.00	13.83	13.24
8 MAY 1978	86.21	0.0	86.21	11.00	11.00	64.00	13.83	13.24
9 MAY 1978	84.00	0.0	84.00	10.00	10.00	55.00	11.37	11.16
10 MAY 1978	83.27	0.0	83.27	11.00	11.00	50.00	10.00	10.00
11 MAY 1978	85.01	0.0	85.01	8.00	8.00	37.00	7.40	7.40
12 MAY 1978	88.81	0.0	88.81	9.00	9.00	32.00	6.40	6.40
13 MAY 1978	92.57	0.0	92.57	9.00	9.00	25.00	5.00	5.00
14 MAY 1978	96.97	0.0	96.97	9.00	9.00	18.00	3.60	3.60
15 MAY 1978	99.63	0.0	99.63	8.00	8.00	126.00	30.80	27.60
16 MAY 1978	101.67	0.0	101.67	8.00	8.00	126.00	30.80	27.60
17 MAY 1978	102.39	0.0	102.39	7.00	7.00	124.00	30.25	27.14
18 MAY 1978	102.77	0.0	102.77	5.00	5.00	120.00	29.16	26.21
19 MAY 1978	103.41	0.0	103.41	4.00	4.00	118.00	28.61	25.75
20 MAY 1978	103.19	0.0	103.19	3.00	3.00	116.00	28.06	25.28
21 MAY 1978	103.33	0.0	103.33	3.00	3.00	116.00	28.06	25.28
22 MAY 1978	103.81	0.0	103.81	3.00	3.00	116.00	28.06	25.28
23 MAY 1978	104.38	0.0	104.38	3.00	3.00	116.00	28.06	25.28
24 MAY 1978	105.54	0.0	105.54	3.00	3.00	116.00	28.06	25.28
25 MAY 1978	107.51	0.0	107.51	2.00	2.00	114.00	27.52	24.82
26 MAY 1978	108.91	0.0	108.91	1.00	1.00	112.00	26.97	24.36
27 MAY 1978	110.11	0.0	110.11	0.0	0.0	110.00	26.42	23.89
28 MAY 1978	111.33	0.0	111.33	0.0	0.0	110.00	26.42	23.89
29 MAY 1978	112.61	0.0	112.61	0.0	0.0	110.00	26.42	23.89
30 MAY 1978	113.92	0.0	113.92	0.0	0.0	110.00	26.42	23.89
31 MAY 1978	114.85	0.0	114.85	0.0	0.0	110.00	26.42	23.89

Q3 BENCH MARK-SIMPACK

STATION 7699

CROOKED LAKE NR GRAYSON - COMPUTED

DATE	OUTPUT (CFS)	ELEVATION (FEET)	STORAGE (ACRE FT)	DELTA STORAGE (CFS DAYS)
1 JAN 1978	30.00	1478.51	82297.	-11.67
2 JAN 1978	30.00	1478.51	82274.	-11.67
3 JAN 1978	30.00	1478.50	82250.	-11.67
4 JAN 1978	30.00	1478.49	82227.	-11.67
5 JAN 1978	30.00	1478.49	82204.	-11.67
6 JAN 1978	30.00	1478.48	82181.	-11.67
7 JAN 1978	30.00	1478.47	82158.	-11.64
8 JAN 1978	30.00	1478.47	82135.	-11.51
9 JAN 1978	30.00	1478.46	82113.	-11.08
10 JAN 1978	30.00	1478.46	82093.	-10.00
11 JAN 1978	30.00	1478.45	82077.	-7.88
12 JAN 1978	30.00	1478.45	82068.	-4.55
13 JAN 1978	30.00	1478.45	82068.	-0.41
14 JAN 1978	30.00	1478.45	82074.	3.46
15 JAN 1978	30.00	1478.45	82086.	5.82
16 JAN 1978	30.00	1478.46	82098.	6.36
17 JAN 1978	30.00	1478.46	82110.	5.64
18 JAN 1978	30.00	1478.46	82125.	7.58
19 JAN 1978	30.00	1478.47	82139.	7.05
20 JAN 1978	30.00	1478.47	82159.	10.56
21 JAN 1978	30.00	1478.49	82199.	20.04
22 JAN 1978	30.00	1478.50	82253.	27.16
23 JAN 1978	30.00	1478.52	82307.	27.26
24 JAN 1978	30.00	1478.53	82356.	24.48
25 JAN 1978	30.00	1478.54	82398.	21.55
26 JAN 1978	30.00	1478.55	82436.	19.01
27 JAN 1978	30.00	1478.56	82469.	16.83
28 JAN 1978	30.00	1478.57	82499.	14.84
29 JAN 1978	30.00	1478.58	82524.	12.90
30 JAN 1978	30.00	1478.58	82546.	11.05
31 JAN 1978	30.00	1478.59	82565.	9.46

MEANS(1978)	0	0	0	23	3	4	0	0	0	0	0	0
MEANS(1978)	0	0	0	32	5	0	0	0	0	0	0	0
MEANS(1978)	0	0	0	51	90	83	0	0	0	0	0	0
MEANS(1978)	0	0	0	57	9	0	0	0	0	0	0	0
MEANS(1978)	0	0	0	107	98	83	0	0	0	0	0	0
MEANS(1978)	0	0	0	81	48	33	0	0	0	0	0	0
MEANS(1978)	0	0	0	53	52	50	0	0	0	0	0	0
MEANS(1978)	0	0	0	69	48	33	0	0	0	0	0	0
MEANS(1978)	0	0	0	8	25	34	0	0	0	0	0	0
MEANS(1978)	0	0	0	52	53	50	0	0	0	0	0	0
MEANS(1978)	0	0	0	5	0	1	0	0	0	0	0	0
MEANS(1978)	0	0	0	6	1	0	0	0	0	0	0	0
MEANS(1978)	0	0	0	4	0	0	0	0	0	0	0	0
MEANS(1978)	0	0	0	12	26	35	0	0	0	0	0	0
MEANS(1978)	0	0	0	68	79	85	0	0	0	0	0	0
MEANS(1978)	0	0	0	34	5	0	0	0	0	0	0	0
MEANS(1978)	0	0	0	32	7	2	0	0	0	0	0	0
MEANS(1978)	0	0	0	135	92	87	0	0	0	0	0	0
MEANS(1978)	0	0	0	62	37	37	0	0	0	0	0	0
MEANS(1978)	0	0	0	47	37	37	0	0	0	0	0	0
MEANS(1978)	0	0	0	73	54	50	0	0	0	0	0	0
MEANS(1978)	0	0	0	46	36	37	0	0	0	0	0	0
MEANS(1978)	0	0	0	74	54	50	0	0	0	0	0	0
MEANS(1978)	0	0	0	110	91	88	0	0	0	0	0	0

TOTALS(1978)	0.	0.	0.	704.	112.	131.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	985.	146.	0.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	1501.	2804.	2515.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	1724.	256.	0.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	3225.	3060.	2515.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	1628.	1417.	1015.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	1596.	1643.	1500.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	906.	1417.	1015.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	198.	788.	1038.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	1585.	1650.	1504.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	176.	28.	33.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	190.	31.	29.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	92.	0.	0.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	388.	820.	1068.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	2065.	2470.	2572.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	1034.	153.	0.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	979.	238.	60.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	4079.	2861.	2632.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	1864.	1158.	1121.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	1129.	1158.	1121.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	2214.	1703.	1511.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	1107.	1143.	1135.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	2222.	1697.	1517.	0.	0.	0.	0.	0.	0.
TOTALS(1978)	0.	0.	0.	3329.	2840.	2653.	0.	0.	0.	0.	0.	0.