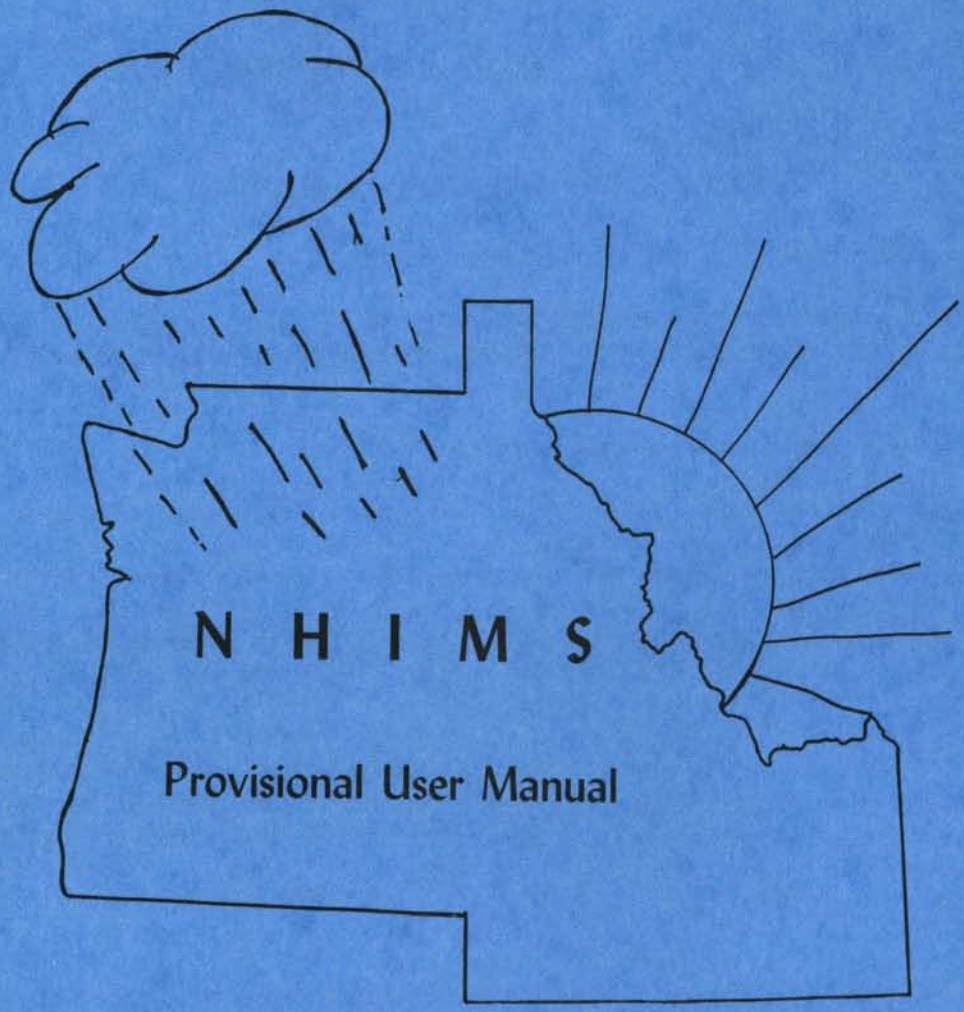
Research Technical Completion Report



NORTHWEST HYDROLOGIC INFORMATION MANAGEMENT SYSTEM

Idaho Water Resources Research Institute
University of Idaho
Moscow, Idaho 83843

August, 1987

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Research Technical Completion Report

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NHIMS

NORTHWEST HYDROLOGIC INFORMATION MANAGEMENT SYSTEM

USER'S MANUAL

by

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********** NOTICE **********

This User's Manual is considered only an interim manual. As with any new system, there are numerous changes which will have to be made to NHIMS and to this manual. Because HISARS was dropped, it was felt that it was essential that documentation of NHIMS be made available immediately.

If there are any problems, errors, undocumented features, suggestions for improvements, or new features desired, please contact:

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As changes in NIHIMS are made, they will be reported via the "NHIMS ?" command on CMS.

****

I. INTRODUCTION

The Northwest Hydrologic Information Management System (NHIMS) was implemented out of a need to have a large body of hydrologic data available for ease of access. Many people have collected information for a project. Often the finding and collection of the necessary data, even when published, takes an inordinate amount of time when compared to the necessary analysis. Since much hydrologic data is in published form, the real need was for an efficient storage and retrieval system.

Between 1975 and 1987, a data management system called HISARS (Hydrologic Information Storage and Retrieval System) was used at the University of Idaho to store and retrieve climatic and hydrologic information. HISARS was originally developed at North Carolina State University by E. H. Wiser. However, due to its age and original design, the maintenance of the HISARS system became difficult, and it was decided to replace it with a new, SAS* based system. The objective of the NHIMS system is to provide users with the same easy access to information as found in HISARS, but with a system that is easier to maintain and modify.

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*SAS is the registered trademark of the SAS Institute, Inc., Cary, NC, USA.

This manual will show how to use the NHIMS system to retrieve the climatic and hydrologic information of interest to you. You do not need to be a skilled programmer in order to use the system; however, you do need to learn some simple commands to tell the system the type and amount of data that you need. NHIMS will retrieve the data that you have identified, and take one of three actions: produce a simple listing, process the data by one of the available analysis programs, or copy the data to an external file for use with other programs.

SAS programmers can also use this manual to learn how to access the files outside of the system itself. The file descriptions and sample retrieval programs given here allow you to retrieve data for use with your own SAS programs.

A complete design document of the NHIMS system, to be used as a reference manual for maintenance programmers, can be obtained from Idaho Water Resources Research Institute.

The NHIMS system operates on the University of Idaho's IBM 4340 VS/1 computer. NHIMS is not, at the present time, an interactive system because of the costs of online storage. It is anticipated that as costs of storage are reduced, at least current data will be kept on line.

It should be emphasized that almost all of the data stored in NHIMS have been obtained from the National Climatic Data Center, NOAA, the Soil Conservation Service, USDA, and the U.S. Geological Survey. Data from other sources are added from time to time upon request.

NHIMS is maintained as part of the Idaho State Climate Program. This Program is sponsered by the Idaho Agricultural Experiment Station which is responsible for the overall program direction and the climate data maintance and by the Idaho Water Resources Research Institute (IWRRI), which is responsible for the maintenance of the water data. The writing of MHIMS was made possible through an allotment project of the IWRRI under which a system analyst and programmmer were hired.

II. USING NHIMS: EXAMPLES

The NHIMS command language provides a simple, straightforward method for the user to communicate with the NHIMS system. As a user, you must first have some idea of the type and quantity of data you are interested in. You specify this information with the NHIMS commands and submit them as a program for execution. (For more information about submitting a program, see Section III.C.)

It is usually best to begin by obtaining an index of the stations for which you will be requesting data. Following are some examples:

-To obtain a list of all stations in Idaho and Lewis counties that have precipitation data available, use the following commands:

```
ACCESS
ELEMENT     PRECIPITATION
COUNTY      IDAHO  LEWIS
LIST        INDEX
```

- To obtain a list of all stations in Division 2 that have air temperature data available, use the following commands:

```
ACCESS
ELEMENT     TEMPERATURE
DIVISION    2
LIST        INDEX
```

- To obtain a list of all stations whose hydrologic unit code begins with 1601, use the following commands:

```
ACCESS
ELEMENT     STREAMFLOW
HUCODE      1601
LIST        INDEX
```

The index listings will provide you with the station code number, the station name, county, elevation, division, hydrologic unit code (hucode), drainage area, latitude, longitude, and the periods of record. Especially important are the station numbers, which can then be used to obtain listings of data for each station. Following are some examples:

- To obtain a list of daily precipitation data for Boise Lucky Peak Dam, use the following commands:

```
ACCESS
ELEMENT     PRECIPITATION
STATION     101018
LIST        DAILY
```

The above commands will retrieve all daily records available for the specified station. It may be that such a listing is more extensive than you need. For example, if the station has been reporting data for 50 years, you will get 50 pages of output. A good way to limit the amount of data retrieved is with the PERIOD command:

```
ACCESS
ELEMENT     PRECIPITATION
STATION     101018
PERIOD      1/1980 TO 12/1985
LIST        DAILY
```

With the above PERIOD command, the data retrieved will be limited to the years 1980 to 1985. Any combination of dates is allowed, and more than one range is allowed. However, if the ending date is earlier than the beginning date, no data will be retrieved.

- Monthly listings can also be requested. To obtain a list of monthly snowfall data for Twin Fall, for two winter seasons, use the following commands:

```
ACCESS
ELEMENT     SNOWFALL
STATION     109303
PERIOD      10/1979  TO  5/1980
            10/1984  TO  5/1985
LIST        MONTHLY
```

Some elements, such as peakflow, do not lend themselves to producing a daily or monthly listing; for example, the peak flow file contains annual records. Data for such elements can be retrieved using the LIST CONTENTS command.

- To obtain two years of peak flow data for the Big Wood River at Hailey, use the following commands:

```
ACCESS
ELEMENT     PEAKFLOW
STATION     13139500
PERIOD      1975 TO 1977
LIST        CONTENTS
```

Some simple types of analyses can be performed on the NHIMS data by using the PROCESS command. (See Section IV.) For example:

- To obtain the number of days in which daily temperatures exceeded 80 degrees for one year at Moscow, use the following commands:

```
ACCESS
ELEMENT      TEMPERATURE
STATION      106152
PERIOD       1/1980  TO  12/1980
PROCESS
HIGH OCCURRENCES
    THRESHOLD  80
```

The COPY command is available for writing the NHIMS data to an external file, for use by another program. This can be especially useful for SAS programmers, who can let NHIMS do the data retrieval, and then can use the resulting SAS data set as input to another SAS program. For example:

- To obtain the snow course records for Island Park, and have the data copied to an external file as a SAS data set, use the following commands:

```
ACCESS
ELEMENT      SNOWCOURSE
STATION      11E10
COPY         DIRECT
```

The COPY command is fully explained in Section V. However, because of the extra job control commands required, it is recommended only for users who have some competence in a programming language.

III. NHIMS USERS' GUIDE: THE ACCESS FACILITIES

A. Using the Access Commands: Details

As in any system, if you want to use data for any purpose, you must first retrieve the data. In NHIMS, this is done by using the ACCESS and related commands such as the data element, station identification, and period of record. The ACCESS facilities are designed to provide copies of data either as a file at your terminal or as paper copies.

Once you have ACCESSed the data, you define how the data will be presented. In NHIMS, your options are to LIST the data, COPY the data to an external file, and to PROCESS the data with one of several standard statistical procedures. Examples of the options are given in Section II, Section III.B (LIST), Section IV (PROCESS), and Section V. (COPY).

The access command language consists of commands followed by one or more operands; the following commands are available with NHIMS:

	Retrieval	Directions	
ACCESS		SORTED	
ELEMENT	operand(s)	METRIC	
STATION	operand(s)	NOHEADER	
COUNTY	operand(s)		
DIVISION or REGION	operand(s)		
HUCODE or BASIN	operand(s)		
ELEVATION	operand(s)	Processing Commands	
AREA	operand(s)	LIST	operand(s)
POINTERS	operand(s)	COPY	operand(s)
PERIOD	operand(s)	PROCESS	operand(s)
AND			
OR			

The format for the commands follows a few simple rules, but is otherwise quite free. The rules are:

- Each access request must contain one ACCESS command and at least one ELEMENT command.
- Except for the ACCESS command, which must be first, and the PROCESS command, which must be last, the commands can be listed in any order.
- Each command must start in column 1, followed by one or more blanks, and then the necessary operand(s). An operand can begin in any column except column 1.
- The operands for a command can be listed all on one line, separated by blanks, or on multiple lines; however, the first column must be blank if the line contains only operands.

- Commands may be used multiple times with different operands.

- The end of an access request is identified by a new ACCESS command, a PROCESS command, or the lack of any further commands.

The following is a detailed description of the access commands and operands.

ACCESS — The ACCESS command signals the beginning of a group of commands that constitute a single access request; ACCESS must always be the first command in a group of commands. Anything else coded in the same line following the ACCESS command will be ignored, and is thus a good place for comments.

ELEMENT — The ELEMENT command identifies the element or elements for which access is(are) requested. The operand must specify the element in one of the following standard forms:

a) PRECIPITATION or RAINFALL
b) TEMPERATURE
c) STREAMFLOW
d) SNOWFALL
e) EVAPORATION
f) PEAKFLOW
g) SNOWCOURSE or COURSE
h) MONTHLY
i) STORAGE
j) HOURRAIN or HOURPRCP

Any number of elements may be specified in a single access request as long as the operands are separated by blanks.

STATION — The STATION command is used to request access to specific stations. Standard agency codes are used for the operands; however, only the code numbers, without the intervening punctuation, are allowed.

The 8-digit code of the U.S. Geological Survey is used for the streamflow, peak flow and reservoir files. The 6-digit code of the National Weather Service is used for the precipitation, temperature, evaporation, snowfall, and monthly files. The 5-digit code of the Soil Conservation Service is used for the snow course file.

COUNTY — The COUNTY command is used to access stations by county. The operand consists of the county name, and data are retrieved for all stations in the specified county. Multiple county names must be separated by one or more blanks; however, if the county name has 2 words (i.e., Twin Falls), be careful that only one blank is used to separate the two words.

Warning: use of the COUNTY command can cause a large amount of data to be retrieved; thus, it is recommended that this command be used only to get an index listing (LIST INDEX) of stations within a particular county.

DIVISION
REGION — The DIVISION (REGION) command can be used to access stations by climatological division (see Figure III.a). The operand is the 2-digit code devised by the National Weather Service, with values ranging from 1-10. A leading zero in front of a 1-digit number is optional. The REGION command will retrieve the same information.

Warning: use of the DIVISION command can cause a large amount of data to be retrieved; thus, it is recommended that this command be used only to obtain and index listing (LIST INDEX) of stations within a particular division.

HUCODE
BASIN — The HUCODE (BASIN) command can be used to access stations by hydrologic unit code, which identifies the river basin (see Figure III.b). The operand is the 8-digit hydrologic unit code, devised by the Office of Water Data Coordination, USGS. The command BASIN will retrieve the same information. An abbreviated version of the operand will retrieve data for all stations whose HUCODE matches the abbreviation; in other words, the command:

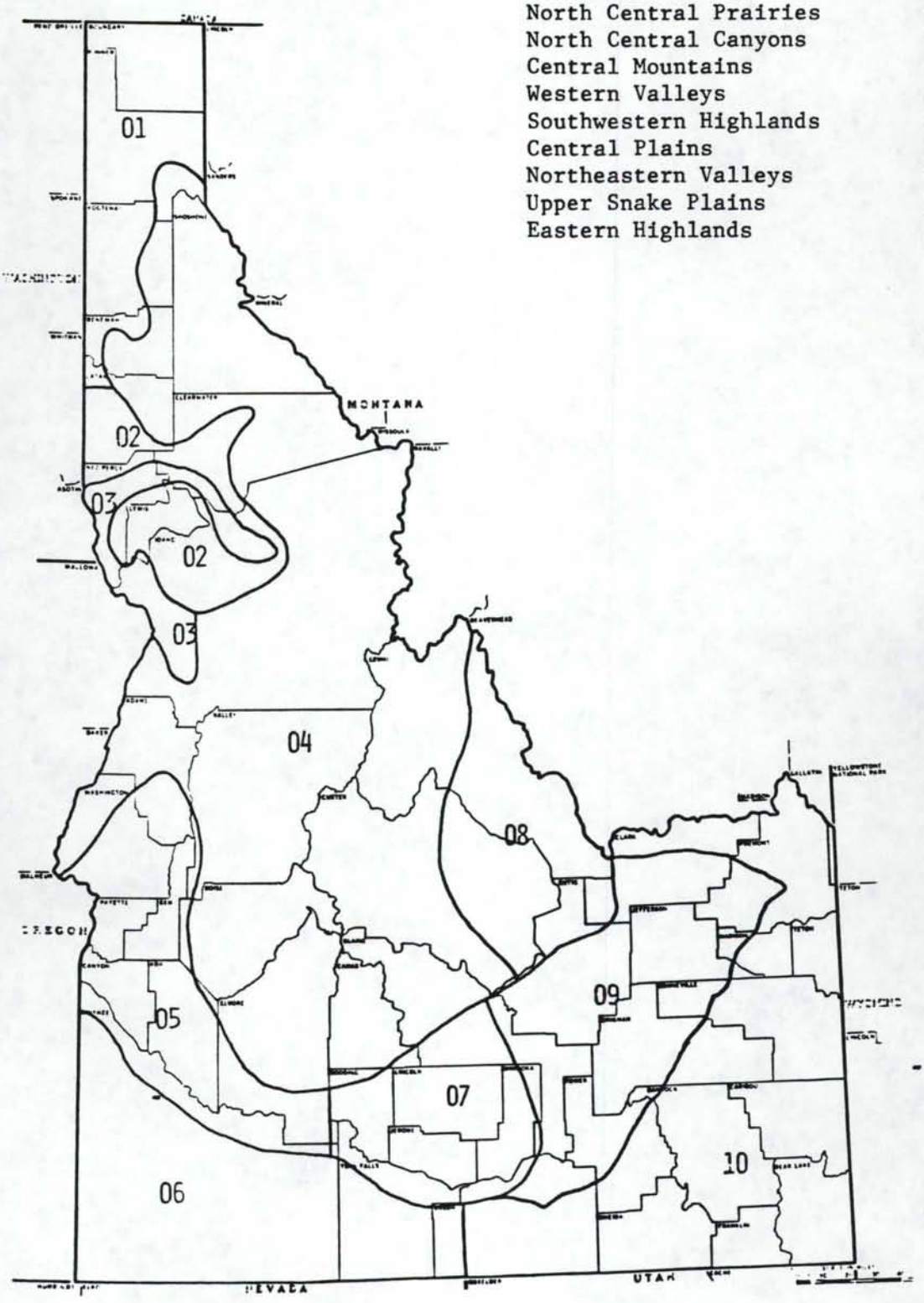
```
HUCODE  1601
```

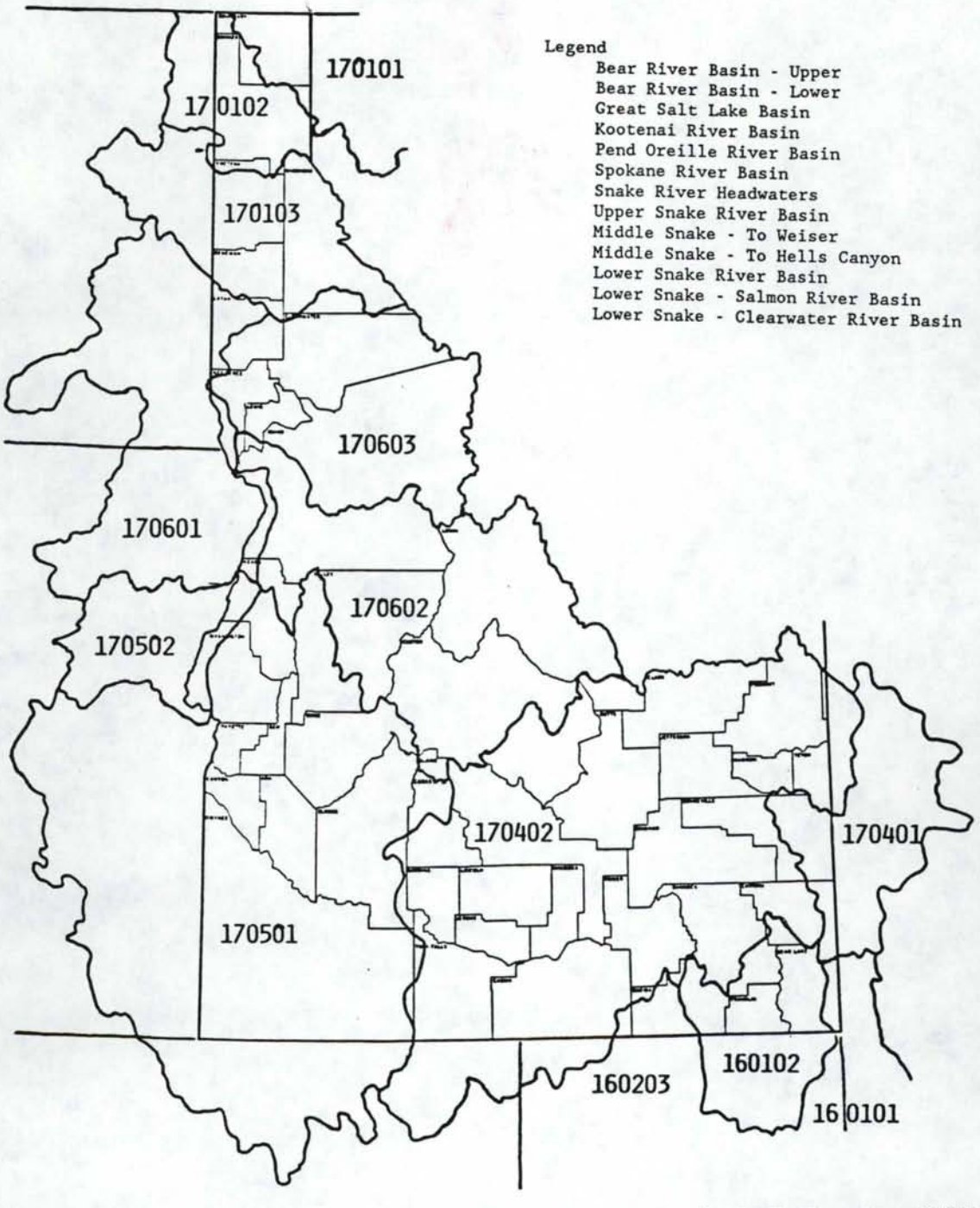
will retrieve data for all stations whose hydrologic unit code begins with 1601.

Warning: use of the HUCODE command can cause a large amount of data to be retrieved; thus, it is recommended that this command be used only to get an index listing (LIST INDEX) of stations within a particular river basin.

Figure III.a. Division Codes Used in NHIMS.

Panhandle	01
North Central Prairies	02
North Central Canyons	03
Central Mountains	04
Western Valleys	05
Southwestern Highlands	06
Central Plains	07
Northeastern Valleys	08
Upper Snake Plains	09
Eastern Highlands	10





Legend

Bear River Basin - Upper	160101
Bear River Basin - Lower	160102
Great Salt Lake Basin	160203
Kootenai River Basin	170101
Pend Oreille River Basin	170102
Spokane River Basin	170103
Snake River Headwaters	170401
Upper Snake River Basin	170402
Middle Snake - To Weiser	170501
Middle Snake - To Hells Canyon	170502
Lower Snake River Basin	170601
Lower Snake - Salmon River Basin	170602
Lower Snake - Clearwater River Basin	170603

Hydrological Unit Map - 1974
State Of Idaho

United States Geological Service (1975)
Reston, Virginia 22092

Figure III.b. Hydrologic Unit Codes Used in NHIMS.

HYDROLOGIC UNIT CODES

I. 1601 -- Bear: The Bear River Basin. Idaho, Utah, Wyoming.

A. 01 -- Upper Bear: The Bear River Basin above Stewart Dam.

01 -- Upper Bear. Utah, Wyoming.
02 -- Central Bear. Idaho, Utah, Wyoming.

B. 02 -- Lower Bear: The Bear River Basin below Stewart Dam.

01 -- Bear Lake.
02 -- Middle Bear.
03 -- Little Bear-Logan.
04 -- Lower Bear-Malad.

II. 1602 -- Great Salt Lake.

A. 03 -- Great Salt Lake Basin:

09 -- Curlew Valley.

III. 1701 -- Kootenai-Pend Oreille-Spokane. Idaho, Montana, Washington.

A. 01 -- Kootenai: The Kootenai River Basin within the United States.

01 -- Upper Kootenai.
02 -- Fisher.
03 -- Yaak.
04 -- Lower Kootenai.
05 -- Moyie.

B. 02 -- Pend Oreille: The Pend Oreille River Basin within the United States.

13 -- Lower Clark Fork.
14 -- Pend Oreille Lake.
15 -- Priest.
16 -- Pend Oreille.

C. 03 -- Spokane: The Spokane River Basin.

01 -- Upper Coeur d'Alene.
02 -- South Fork Coeur d'Alene.
03 -- Coeur d'Alene Lake.
04 -- St. Joe.
05 -- Upper Spokane.
06 -- Hangman.
07 -- Lower Spokane.

08 -- Little Spokane.

IV. 1704 -- Upper Snake: The Snake River Basin to and including the Clover Creek Basin. Idaho, Nevada, Utah, Wyoming.

A. 01 -- Snake Headwaters: The Snake River Basin above Kelly Mountain.

01 -- Snake Headwaters.
02 -- Gros Ventre.
03 -- Greys-Hobock.
04 -- Palisades. Idaho,
05 -- Salt.

B. 02 -- Upper Snake: The Snake River Basin from Kelly Mountain to and including the Clover Creek Basin.

01 -- Idaho Falls.
02 -- Upper Henrys.
03 -- Lower Henrys.
04 -- Teton.
05 -- Willow.
06 -- American Falls.
07 -- Blackfoot.
08 -- Portneuf.
09 -- Lake Walcott.
10 -- Raft.
11 -- Goose.
12 -- Upper Snake-Rock.
13 -- Salmon Falls.
14 -- Beaver-Camas.
15 -- Medicine Lodge.
16 -- Birch.
17 -- Little Lost.
18 -- Big Lost.
19 -- Big Wood.
20 -- Camas.
21 -- Little Wood.

V. 1705 -- Middle Snake: The Snake River Basin from the Clover Creek Basin to Hells Canyon Dam. Idaho, Nevada, Oregon.

A. 01 -- Middle Snake-Boise: The Snake River Basin from the Clover Creek Basin to and including the Weiser River Basin.

01 -- C. J. Strike Reservoir.
02 -- Bruneau.
03 -- Middle Snake-Succor.
04 -- Upper Owyhee.
05 -- South Fork Owyhee.
06 -- East Little Owyhee.
07 -- Middle Owyhee.

08 -- Jordan.
09 -- Crooked-Rattlesnake.
10 -- Lower Owyhee.
11 -- North and Middle Forks Boise.
12 -- Boise-Mores.
13 -- South Fork Boise.
14 -- Lower Boise.
15 -- Middle Snake-Payette.
16 -- Upper Malheur.
17 -- Lower Malheur.
18 -- Bully.
19 -- Willow.
20 -- South Fork Payette.
21 -- Middle Fork Payette.
22 -- Payette.
23 -- North Fork Payette.
24 -- Weiser.

B. 02 -- Middle Snake-Powder: The Snake River Basin from the Weiser River Basin to Hells Canyon Dam.

01 -- Brownlee Reservoir.
02 -- Burnt.
03 -- Powder.

VI. 1706 -- Lower Snake: The Snake River Basin below Hells Canyon Dam to its confluence with the Columbia River. Idaho, Oregon, Washington.

A. 01 -- Lower Snake: The Snake River Basin below Hells Canyon Dam to its confluence with the Columbia River, excluding the Salmon and Clearwater River Basins.

01 -- Hells Canyon.
02 -- Imnaha.
03 -- Lower Snake-Asotin.
04 -- Upper Grande Ronde.
05 -- Wallowa.
06 -- Lower Grande Ronde.
07 -- Lower Snake-Tucannon.
08 -- Palouse.
09 -- Rock.
10 -- Lower Snake.

B. 02 -- Salmon: The Salmon River Basin. Idaho.

01 -- Upper Salmon.
02 -- Pahsimeroi.
03 -- Middle Salmon-Panther.
04 -- Lemhi.
05 -- Upper Middle Fork Salmon.
06 -- Lower Middle Fork Salmon.
07 -- Middle Salmon-Chamberlain.

08 -- South Fork Salmon.
09 -- Lower Salmon.
10 -- Little Salmon.

C. 03 -- Clearwater: The Clearwater River Basin.

01 -- Upper Selway.
02 -- Lower Selway.
03 -- Lochsa.
04 -- Middle Fork Clearwater.
05 -- South Fork Clearwater.
06 -- Clearwater.
07 -- Upper North Fork Clearwater.
08 -- Lower North Fork Clearwater.

ELEVATION The ELEVATION command is used to access stations within a given range of elevations. The operand is given in the form MIN TO MAX. For example, the command ELEVATION 2000 TO 2500 will access all stations between 2000 and 2500 feet elevation, inclusive. Multiple ranges may be given on one or more lines, as long as one complete range is given on the same line. Also, if only a lower limit is desired, only a single limit need be given. Any stations with elevations equal to or above the lower limit will be retrieved.

AREA The AREA command is used to access streamflow stations by drainage area. The format and usage of the operand is identical to that of the ELEVATION command given previously, except that the limits are of drainage areas **in square miles**. Again, if only a lower limit is required, a single limit is sufficient.

AND/OR The AND/OR commands can be used to access records that satisfy one or more criteria. For example, the commands:

```
COUNTY    LATAH
OR
DIVISION  2
```

will retrieve records for all stations that are either in Latah county or in Division 2. Note that the word OR is used in the logical sense. However, the above commands used without the OR command will achieve the same results; in other words, the system default is to retrieve records that match any of the criteria given by the user. The main purpose of explicitly coding the OR command is to help the user recognize the logic of the request.

The AND command is used when all of the criteria given by the user must be met. For example, the commands:

```
COUNTY     TWIN FALLS
AND
ELEVATION  2000
```

will retrieve records for all stations that are both in Twin Falls county and are at an elevation that is equal to or greater than 2000 feet. Note that the AND command is also used in the logical sense. There are no operands for AND/OR commands.

SORTED The SORTED command is a new command not available in HISARS; it is used to indicate that the station numbers given by the user are listed in sorted order and the system does not need to sort them before retrieving the data. Thus, the purpose of this command is to make the system run more efficiently. The SORTED command should only be used when explicitly listing station numbers with a STATION command. There are no operands.

The order in which the numbers must be sorted is ascending order. NHIMS treats the station numbers as character data, using the EBCDIC collating sequence. Therefore, the following station numbers are in the proper sorted order for NHIMS:

NAYLOR
10UI05
106152
12414500
16D03
16D03000
24MONT

METRIC The METRIC command is a new command not currently available in HISARS; it is used to tell the system that all output should be in metric units. There are no operands. The metric units corresponding to standard English units are:

degrees Fahrenheit: degrees Celsius
inches: millimeters (centimeters for snowfall data)
feet: meters
miles: kilometers
cubic feet: cubic meters
acre feet: cubic meters

NOHEADER The NOHEADER command is used to suppress the printing of the header page at the beginning of each access request. Without the command, the header page, containing the commands submitted by the user, the date and time of program execution, and optional messages, is always printed. The NOHEADER command has no operands.

POINTERS The POINTERS command is a new command not currently available in HISARS; it is used to explicitly identify the observation numbers of the requested data, eliminating the need for the NHIMS programs to search the pointer files and thus retrieve the data more quickly and efficiently. Obviously, only one element may be requested when using the POINTERS command, for the observation numbers only have meaning when referring to one of

the main files. Similarly, do not use the command when requesting a listing of the index or the pointer files. Also, it is necessary to use the STATION command in conjunction with the POINTERS command, in order to give the station number which matches the pointers. The key to using the POINTER command is knowing the information in the appropriate pointer file, probably by first getting a listing of that file.

The format of the operands is BEGIN TO END, where BEGIN is the first observation number for which data are requested, and END is the last observation number. All of the data between BEGIN and END must contain data on one station only. For example, the commands:

```
STATION   106152
POINTERS  45116 TO 46135
```

would tell the system to retrieve data on the Moscow station between the observations 45,116 and 46,135, inclusive.

It is recommended that the POINTERS command be used with only one operand, i.e. one range of pointers. However, it is possible to use multiple ranges, as long as they are given in ascending order on separate lines and the STATION command is used to provide the matching station numbers. For example:

```
STATION   100010  106152  106152
POINTERS  5 TO 500
          45116 TO 45140
          46000 TO 46024
```

The above commands would tell the system to retrieve data on station 100010 from observations 5 to 500 and on station 106152 from observations 45,116 to 45,140 and 46,000 to 46,024, inclusive. Thus, use of the POINTERS command with multiple ranges can be used to retrieve non-contiguous records for one station.

PERIOD The PERIOD command is used to specify the beginning and ending dates of one or more periods of record. Without the PERIOD command, the entire period of record is accessed for every station in an ACCESS request. Thus, one can limit the amount of data retrieved to a certain range of dates, saving processing time and money. The format of the operands are BEGIN TO END, where BEGIN and END are dates in the form MONTH/YEAR. For example,

the command:

PERIOD 6/1980 TO 8/1980 6/1981 TO 8/1981

would limit access to records for the three summer months in 1980 and 1981. The format requires the slash ('/') immediately preceeded by the month and followed by the calendar year entered as "1nnn". Any number of periods may be specified, as long as both a beginning and ending date are given. The periods may be given on multiple lines, as long as succeeding lines of operands have a blank in the first column and as long as a complete range is always given on the same line.

It is also possible to only specify years in the PERIOD command; the format is then YEAR TO YEAR. The format YEAR with no TO YEAR is equivalent to BEGIN TO END of Records.

LIST The LIST command directs the system to produce listings of the requested data. The following operands are permitted:

a) INDEX
b) DAILY
c) MONTHLY
d) POINTERS
e) CONTENTS
f) HOURLY

The LIST INDEX command indicates that a listing of the index data is to be produced. Several options are available:

LIST INDEX will produce an index listing for the requested stations that are in the NHIMS system, along with the beginning and ending dates for the period of record. This command produces the same results as with HISARS.

LIST INDEX ALL will print index listings for all requested stations, whether or not they have data in the NHIMS system.

LIST INDEX NHIMS will print index listings for all requested stations that are in the NHIMS system, but no period of record information will be given.

LIST INDEX NONHIMS will print index listings for all requested stations that are not in the NHIMS system.

For all of the LIST INDEX options, one or more elements must be specified.

The LIST DAILY command lists the daily data requested by the user. There is one option available for this commands, and that is to specify the month in which the listing is to begin. For example, LIST DAILY 6 will begin the listing with June as the first month. The default is 1 except for snowfall files where the default is 7 and the streamflow and reservoir files where the default is 10.

The LIST MONTHLY command lists monthly totals or averages. As in the daily listings, the user can request the month in which the listings are to begin. Listings of monthly values, unlike in HISARS, will no longer contain the ratio of the annual total to the annual average for years with complete records. This is due to the fact that the file must be processed twice in order to get this information, and hence the cost of retrieval is increased. It will still be possible to get these ratios, by using the AVERAGE option, i.e., LIST MONTHLY AVERAGE.

The LIST POINTERS command directs the system to produce listings of the pointer files; either a subset of the files or complete listings can be produced.

The LIST CONTENTS command is used to obtain listings of data in the files which do not have the standard monthly record structure. These files currently are snow course, peak flow, and monthly summary.

The LIST HOURLY command is used to obtain hourly listings of the hourly precipitation file.

COPY — The COPY command is provided to permit users to copy records from the NHIMS data files to other permanent or temporary files; then the data can be used with other SAS programs or other programming languages. The COPY facilities are described in detail in Section V.

PROCESS — The PROCESS command is provided to perform computations or statistical manipulations on the various files. The PROCESS facilities are described in detail in Section IV.

B. Example Access Programs and the Corresponding Output

This section contains examples of the output that may be produced by the ACCESS facilities of NHIMS. Examples show the commands used, and the corresponding output. The examples include all listings that are now available.

OUTPUT HEADING PAGE

A heading is printed at the beginning of the output associated with each access group. This contains the system name and version, the date and time of execution, and a list of user commands as recognized by the system. An example is shown in Figure III.c, which resulted from the following commands:

```
ACCESS
ELEMENT     TEMPERATURE
STATION     100010
PERIOD      1/1980 TO 12/1980
LIST        DAILY
```

FILE INDEXES

The command sequence:

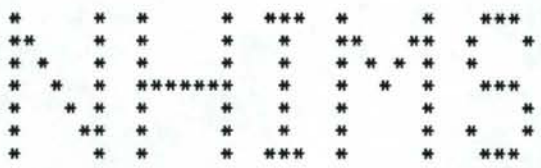
```
ACCESS
ELEMENT     TEMPERATURE
COUNTY      LATAH
LIST        INDEX
```

produced the output shown in Figure III.d.

Not all of the indexes printed will include information under all headings. An example is drainage area which would not be used for temperature files. For any other spaces left blank, the information was not known at file generation time.

Variations of the LIST INDEX command produce listings of different types of stations. (See LIST command, Section III.A.)

All users are encouraged to obtain indexes of the files of interest to them. This is the only way to determine the file contents, periods of record, number of records and so forth.



NORTHWEST HYDROLOGIC INFORMATION MANAGEMENT SYSTEM

VERSION OF MAY, 1987 RUN ON AUG 11, 1987
AT 22:02:03

USER COMMANDS RECEIVED WERE:

```
ELEMENT  TEMPRETURE
STATION  100010
PERIOD   1/1980 TO 12/1980
LIST     DAILY
```

UNIVERSITY OF IDAHO VERSION OF MAY, 1987

FOR MORE INFORMATION, CONTACT THE AGRICULTURAL ENGINEERING DEPARTMENT.
OR TYPE NHIMS ? ON CMS

Figure III.c. Output Heading Page.

```
NUTTERVILLE HILL                                        LATAH        STATION NO.  UI-0001
       LATITUDE  46-48-00       LONGITUDE  116-53-00
       ELEVATION           FT MSL     DIVISION  02      HUCODE  17-06-00-96

       NHIMS RECORDS ARE AVAILABLE FROM 10-1969 TO 03-1982.   NUMBER OF RECORDS:  150

       WRITTEN OR MICROFICHE RECORDS ARE AVAILABLE FROM  07-1955 TO 12-1981.

MOSCOW UNIV OF IDAHO                                    LATAH        STATION NO.  10-6152
       LATITUDE  46-44-00       LONGITUDE  116-58-00
       ELEVATION  2660     FT MSL     DIVISION  02      HUCODE  17-06-00-96

       NHIMS RECORDS ARE AVAILABLE FROM 01-1900 TO 12-1985.   NUMBER OF RECORDS:  1031

       WRITTEN OR MICROFICHE RECORDS ARE AVAILABLE FROM  02-1892 TO ACTIVE .

POTLATCH 3  NNE                                         LATAH        STATION NO.  10-7301
       LATITUDE  46-58-00       LONGITUDE  116-53-00
       ELEVATION  2600     FT MSL     DIVISION  02      HUCODE  17-06-00-96

       NHIMS RECORDS ARE AVAILABLE FROM 03-1915 TO 12-1985.   NUMBER OF RECORDS:  784

       WRITTEN OR MICROFICHE RECORDS ARE AVAILABLE FROM  03-1915 TO ACTIVE .

       ** NOTE **
       DETERMINING THE PERIODS OF RECORD CAN BE EXPENSIVE. CONSULT THE USER'S MANUAL
       FOR LIST INDEX COMMANDS WHICH WILL EXCLUDE SUCH INFORMATION.
```

Figure III.d. Index Listing.

PRECIPITATION Monthly listing of Precipitation

The command sequence:

```
ACCESS
ELEMENT      PRECIPITATION
STATION      106152
PERIOD       1/1975 TO 12/1985
LIST         MONTHLY   AVERAGE
```

produced the output shown in Figure III.e. The deletion of the word AVERAGE would delete the last column. Values in the table are total monthly precipitation amounts in inches; if metric units are requested, the units are millimeters.

The following special symbols are used to qualify the monthly amounts:

M: missing values during month
A: accumulated values during month
E: estimated values during month
T: trace values during month

Only one symbol is printed for one month, and the symbol is selected in the above order.

Monthly means are computed excluding those months with missing data, and the mean annual precipitation is obtained as the sum of the monthly means. Annual totals are obtained for all years, but the ratio of the annual total to the annual mean is obtained only for years with no missing values.

Daily listings

The command sequence:

```
ACCESS
ELEMENT      PRECIPITATION
STATION      106152
PERIOD       1/1982  TO  12/1982
LIST         DAILY
```

produced the output shown in Figure III.f. Values in the table are daily precipitation amounts in inches; if metric units are requested, the units are millimeters. Amounts can be qualified by the same special symbols used in the monthly listings.

MOSCOW UNIV OF IDAHO LATAH 10-6152

TOTAL MONTHLY PRECIPITATION IN INCHES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL	% AVE
1975	4.96E	2.93E	2.34E	2.97	1.85	1.76	2.65	2.82	0.00T	3.84	3.25	3.70	33.07	125
1976	1.86	2.73	2.47	2.87	2.90	1.54	0.84	2.63	0.06	2.31	0.93	1.21	22.35	84
1977	0.77	0.76	1.67	0.47	2.86	0.59	0.67	2.86	2.51	1.09	3.90	4.71	22.86	86
1978	3.04	2.30	1.63	4.74	2.24	0.93	1.05	2.29	1.55	0.09	1.92	2.52	24.30	92
1979	1.07	4.12	2.06	3.30	2.82	1.01	0.49	0.99	0.41	3.19	2.85	3.03	25.34	96
1980	3.65	1.71	2.67E	1.51	4.80	1.99	1.12	1.00	1.08	0.75	3.90	3.88	28.06	106
1981	1.84	3.35	2.81	3.01	2.09	3.43	1.00	0.01	1.03	2.81	2.80	4.63	28.81	109
1982	3.75	3.19M	2.70M	2.38M	1.52	0.67	1.98	1.20	2.38	2.89	2.29	2.72	27.67	
1983	2.81	3.62	4.07	1.83	2.23	2.96	1.91	0.77	1.20	1.73	5.95	2.82	31.90	121
1984	2.16	1.38	2.64	2.05	2.48	3.51	0.66	0.94	1.04	2.36	5.02	2.12	26.36	100
1985	0.45	1.68	1.49	1.10M	1.76M	2.04M	0.11	1.46	3.75	1.96	2.15M	0.54M	18.49	
MEAN	2.40	2.46	2.38	2.53	2.58	1.84	1.13	1.54	1.36	2.09	3.28	3.13	26.46	
NO. OF MONTHS	11	10	10	9	10	10	11	11	11	11	10	10	11 YEARS	
PERCENT ANNUAL	9.1	9.3	9.0	9.6	9.7	7.0	4.3	5.8	5.2	7.9	12.4	11.8		

MEAN ANNUAL PRECIPITATION 26.46 INCHES (11 YEARS)

M: MISSING VALUES DURING MONTH.
A: ACCUMULATED VALUES DURING MONTH.
E: ESTIMATED VALUES DURING MONTH.
T: TRACE VALUES FOR THE MONTH.
*** CAUTION *** MUCH OF THE DATA BEFORE 1970 ARE NOT FLAGGED FOR SPECIAL CONDITIONS.

Figure III.e. Precipitation File Monthly Data Listing.

MOSCOW UNIV OF IDAHO LATAH STATION NO. 10-6152

DAILY PRECIPITATION IN INCHES

1982	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1	0.01	0.03	0.47	0.01			0.32					T
2	0.08	0.05	0.06	0.17						0.06	0.01	0.02
3	0.51		0.13	0.37	0.22		0.45	0.27		0.14		0.72
4	0.22		0.50	0.03			0.06		0.10	0.09	0.01	0.23
5	0.12			0.01		0.07				0.01	0.43	0.01
6				0.10		0.01				0.10	0.21	0.31
7		M		0.01	0.18	0.03	0.12			0.34		0.01
8							T				0.05	
9		T	0.39							0.01		
10								0.37	0.15			
11	0.18		0.22	0.58				0.44	0.24			
12	0.10		T	0.35			T		0.50			0.16
13		0.24	0.02	0.20		0.17			0.10		0.01	0.32
14		0.32	0.06	0.28			0.64		T			T
15	T	0.18	0.23	0.01	0.21		T	0.06				0.24
16	0.86	0.43					0.39			0.03	T	0.05
17	0.06	0.25	T		0.10					0.27	0.47	
18	T	0.09	0.08	T						0.07	0.42	
19	T	0.73	0.05							T	0.04	
20		0.24	0.09						0.07		0.13	0.07
21	0.01	0.53										0.28
22	0.08	0.08			0.38	0.21				0.12		0.21
23	1.09	0.01								0.28		
24	0.16	0.01							0.08	0.11		
25	0.07								0.03	0.01		
26	0.01		T		0.01	0.01			1.08	0.37		0.08
27	T		0.17		0.16	0.14			0.01	0.01		
28	T		0.06	0.26	0.16	T			0.02		0.25	T
29	0.01		0.07		0.09	0.03		0.01		0.77	0.26	0.01
30	0.18		0.05		0.01	T		0.05		0.09		T
31			0.05							0.01		
TOTAL	3.75	3.19	2.70	2.38	1.52	0.67	1.98	1.20	2.38	2.89	2.29	2.72

ZERO VALUES ARE PRINTED AS BLANKS.
M: MISSING DAILY VALUE.
T: TRACE AMOUNT.
A: DAILY VALUE WAS ACCUMULATED.
E: DAILY VALUE WAS ESTIMATED.
B: DAILY VALUE WAS BOTH ACCUMULATED AND ESTIMATED.

*** CAUTION *** MUCH OF THE DATA BEFORE 1970 ARE NOT FLAGGED FOR SPECIAL CONDITIONS.

Figure III.f Precipitation File Daily Data Listing.

TEMPERATURE Monthly average maximums and minimums

The command sequence:

```
ACCESS
ELEMENT      TEMPERATURE
STATION      100010
PERIOD       1/1975 TO 1/1985
LIST         MONTHLY   AVERAGE
```

produced the output shown in Figure III.g. The deletion of the word AVERAGE would delete the last column.

Values in the table are the average maximum and minimum temperatures in degrees Fahrenheit for each month. If metric units are requested, the units are degrees Celsius.

The following special symbols are used to qualify the monthly averages:

M: missing values during month
E: estimated values during month

Monthly means are calculated using only values for complete months. The number of months printed is the smallest number of months for either the maximum or minimum temperatures.

The mean annual temperatures are computed as the average of all complete months. These values may be biased if certain months are missing.

The annual average temperatures are computed using all the monthly averages, and are therefore subject to the same source of unreliability cited above. However, the ratio of the annual average to the mean annual temperature is calculated only for years with complete data.

ABERDEEN EXP STA BINGHAM 10-0010

AVERAGE MONTHLY MAXIMUM TEMPERATURES IN DEGREES F AND MINIMUM TEMPERATURES IN DEGREES F

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL	% AVE
1975	28.1	33.3	42.7	47.3	61.3	72.9	87.9	81.8	76.8	59.1	42.6	39.3	56.1	97
	9.3	17.2	24.4	26.3	35.9	44.6	53.8	44.6	36.5	32.2	19.8	21.8	30.5	102
1976	30.5	33.3	39.6	53.6	70.2	74.4	87.5	80.2	76.7	61.9	51.2	39.6	58.2	101
	11.0	12.8	19.3	30.2	38.4	43.1	50.2	45.3	38.1	25.5	17.9	9.6	28.5	95
1977	24.7	36.4	44.2	64.4	62.7	83.0	84.7	84.2	74.6	65.5	46.4	37.2	59.0	102
	3.6	10.3	19.4	28.8	36.9	49.2	49.4	46.9	38.4	27.9	21.2	24.6	29.7	99
1978	35.3	37.5	53.9M	57.0	63.4	75.2	85.0	82.2	71.8	66.6	41.1	30.7M	58.3	
	20.5	23.2	27.4M	32.6	36.3	42.6	48.3	43.9	37.8	26.0	17.4	10.3M	30.5	
1979	19.7	33.9	46.6	57.2	70.0	78.0	85.9	83.5	81.0	65.5	40.9	37.1M	58.3	
	-2.7	13.9	25.4	29.3	38.7	44.5	48.7	48.2	38.7	30.0	15.9	15.2	28.8	96
1980	31.2	41.8	45.7	62.4	63.1	73.7	85.6	81.3	73.5	61.3	45.1	39.1	58.7	101
	15.4	24.9	25.6	31.3	39.4	43.2	48.9	46.4	40.5	28.2	20.8	22.3	32.2	108
1981	38.1	36.5	51.1	59.2	64.8	74.5	86.4	81.6	77.5	57.9	48.9	37.5	59.5	103
	17.4	14.7	24.2	31.3	38.7	45.2	47.4	42.0	38.0	27.3	23.8	19.5	30.8	103
1982	27.3	30.0	46.2	53.2	65.3	75.1	80.9	86.7	71.2	55.8	40.8	30.4	55.2	95
	7.9	10.0	27.5	26.8	35.5	44.4	50.2	49.1	40.7	29.0	20.1	14.2	29.6	99
1983	35.4	39.0	47.7	52.2	64.1	72.8	81.6	84.5	75.6	61.5	44.4	24.9	57.0	98
	20.3	20.8	29.0	28.7	36.8	44.6	46.7	51.8	39.0	31.8	26.6	7.5	32.0	107
1984	24.4		39.2	53.1	66.0	71.8M	83.8	83.6	72.5	55.5	42.6	27.3	56.3	
	5.9		20.1	29.3	37.8	42.7	51.1	50.5	37.5	27.6	24.1	3.4	30.0	
1985	22.8	25.1	34.8	62.4	71.0	78.0	88.5	83.3	67.6	60.2	34.3	19.0	53.9	93
	-0.7	-2.1	6.8	30.7	38.8	46.0	52.1	42.3	35.3	24.5	11.9	-2.2	23.6	79
MEANS	28.9	34.7	43.8	56.5	65.6	75.8	85.3	83.0	74.4	61.0	43.5	32.7		
	9.8	14.6	22.2	29.6	37.6	44.6	49.7	46.5	38.2	28.2	19.9	13.6		
NO. OF MONTHS	11	10	10	11	11	10	11	11	11	11	11	9		

MEAN ANNUAL MAXIMUM TEMPERATURES 57.6 DEGREES F
MEAN ANNUAL MINIMUM TEMPERATURES 29.8 DEGREES F

M: MISSING VALUES DURING MONTH.
E: ESTIMATED VALUES DURING MONTH.

*** CAUTION *** MUCH OF THE DATA BEFORE 1970 ARE NOT FLAGGED FOR SPECIAL CONDITIONS.

Figure III.g. Temperature File Monthly Data Listing.

TEMPERATURE Daily maximum and minimum temperatures

The command sequence:

```
ACCESS
ELEMENT      TEMPERATURE
STATION      100010
PERIOD       1/1980 to 12/1980
LIST         DAILY
```

produced the output shown in Figure III.h.

Values in the table are daily maximum and minimum temperatures in degrees Fahrenheit. If metric units are requested, the units are degrees Celsius. Missing values are left blank and estimated values are flagged with an "E".

Monthly averages are also printed. For months with missing days, the averages are calculated using the available data.

ABERDEEN EXP STA BINGHAM STATION NO. 10-0010

DAILY MAXIMUM AND MINIMUM TEMPERATURES IN DEGREES F

1980	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
1	35	17	24	4	50	26	42	21	54	31	57	41	76	49	85	52	70	35	81	36	65	23	34	24
2	40	25	34	22	51	28	45	25	73	37	64	42	75	53	86	48	74	38	71	32	65	29	33	24
3	33	22	38	22	47	33	49	23	69	42	53	39	80	55	90	54	81	45	74	30	58	35	44	32
4	37	28	38	29	42	34	48	23	70	43	62	40	76	47	74	36	73	35	79	31	58	28	49	34
5	38	29	33	26	48	31	57	31	74	36	55	41	80	50	78	38	83	39	80	32	63	25	48	20
6	44	18	39	26	40	28	57	31	75	46	58	44	83	43	88	48	89	42	77	31	67	29	36	20
7	26	16	33	22	45	25	49	24	69	48	62	35	87	47	86	51	88	50	77	31	59	37	35	24
8	26	16	43	19	44	26	45	20	63	45	73	41	77	50	86	53	73	50	78	31	70	37	30	16
9	38	22	34	15	45	29	55	28	62	42	80	43	85	51	90	54	76	48	78	32	50	32	20	16
10	40	31	34	15	48	31	58	27	54	39	84	44	88	55	84	41	76	53	67	25	47	35	26	14
11	32	10	35	16	55	27	50	20	52	37	85	49	94	42	85	41	70	51	70	26	47	33	29	15
12	35	9	36	12	50	23	54	22	50	38	78	43	89	51	93	48	61	52	78	37	43	35	36	15
13	50	33	40	13	37	23	56	19	56	32	68	38	84	50	91	45	68	49	72	31	37	29	35	13
14	44	33	42	26	48	27	62	26	60	33	75	44	80	48	88	49	66	43	63	32	37	22	37	10
15	46	31	45	28	55	30	69	38	67	41	58	37	81	48	84	54	78	45	45	33	35	12	35	20
16	40	15	44	31	40	18	60	21	61	41	63	48	80	48	67	52	70	44	35	31	35	10	40	19
17	44	30	46	31	40	18	65	27	50	38	75	42	89	52	75	45	72	41	41	32	34	12	43	21
18	38	28	46	35	46	25	74	35	59	40	85	51	81	41	84	50	79	45	47	32	38	15	40	18
19	30	16	50	35	42	27	76	31	67	42	85	49	88	49	65	44	83	47	57	28	40	13	32	23
20	30	6	49	34	46	21	81	36	75	43	82	48	83	45	65	36	65	32	60	27	38	11	30	18
21	23	6	48	28	53	29	80	42	80	45	88	43	85	45	76	40	67	41	62	28	39	11	36	22
22	29	10	39	31	40	25	79	48	84	49	86	45	91	46	85	46	60	27	59	27	47	12	43	24
23	24	17	44	31	52	29	77	43	82	42	86	50	94	50	86	51	62	29	47	18	42	27	47	31
24	26	19	41	25	45	22	70	46	46	33	70	39	95	52	83	44	70	32	48	18	40	24	42	27
25	30	21	45	25	39	23	59	43	48	34	81	40	92	49	88	42	68	29	55	20	29	0	44	28
26	25	4	50	30	43	16	63	34	42	35	86	46	90	48	76	42	72	30	49	29	27	-4	45	36
27	12	3	56	29	48	25	72	38	58	33	80	38	90	45	81	49	78	35	44	30	25	4	55	27
28	10	-15	60	32	41	26	75	39	63	36	69	32	90	45	78	48	82	39	48	19	34	12	55	27
29	8	-14	47	31	50	26	78	44	66	41	80	49	94	60	79	48	75	35	48	19	36	11	46	30
30	17	-5			56	23	67	35	63	34	84	55	88	53	75	48	75	35	54	22	48	24	41	22
31	17	-5			32	21			65	44			89	49	70	42			56	25			45	22
AVEMAX	31.2		41.8		45.7		62.4		63.1		73.7		85.6		81.3		73.5		61.3		45.1		39.1	
AVEMIN	15.4		24.9		25.6		31.3		39.4		43.2		48.9		46.4		40.5		28.2		20.8		22.3	

MISSING VALUES ARE PRINTED AS BLANKS.
E: DAILY VALUE IS ESTIMATED.

Figure III.h. Temperature File Daily Data Listing.

STREAMFLOW Monthly Streamflow Listing

The command sequence:

```
ACCESS
ELEMENT      STREAMFLOW
STATION      12411000
PERIOD       1960
LIST         MONTHLY
```

produced the output shown in Figure III.i.

Values listed are monthly streamflow totals, in cfs-days; if metric units are requested, the units are cms-days. Sufficient decimal places are provided to print the correct total of the daily values. Means are computed for each month, and the numbers of months used in these computations are also listed.

The annual mean discharge is obtained as the sum of the monthly mean values and is not necessarily equal to the mean of the annual totals. For those annual totals which are complete (i.e. contain 12 months of data), the ratio of the total to the annual mean is computed.

When the word AVERAGE does not follow the operand MONTHLY, the mean annual discharge is not computed until the rest of the table has been printed, so that the ratios of the annual totals to the mean cannot be computed. This processing is more efficient and is recommended unless the ratios are required.

Mean daily discharge values in cubic feet per second and in cubic feet per second per square mile are also given. These values are obtained as the mean for all days used in the computations. Metric units of cubic meters per second and cms/square kilometer can also be obtained.

The following special symbols are used to qualify the monthly amounts:

- M: missing values during month
- A: accumulated values during month
- E: estimated values during month
- T: trace values during month

When data are missing during a month, neither the monthly total nor the recorded daily values are used in the computations.

COEUR D'ALENE RIVER ABOVE SHOSHONE CRK NEAR PRICHARD SHOSHONE 12.4110.00

TOTAL MONTHLY STREAMFLOW IN CFS-DAYS

	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	ANNUAL	% AVE
59-60				11458	14126	37837	80720	72990	23661	6218.00	4050.00	3026.00	254086	
60-61	3526.00	9819.00	5616.00	10883	58833	38400	63580	90690	19646	5684.00	3257.00	2892.00	312826	
61-62	3696.00	2130.00	4039.00	7365.00	12480	11575	95730	69610	17522	5385.00	3687.00	2922.00	236141	
62-63	4652.00	14175	23038	15142	32976	24133	46222	35480	9630.00	4554.00	2679.00	2460.00	215141	
63-64	2854.00	8545.00	4998.00	4347.00	4190.00	6902.00	53220	110500	50237	9223.00	5356.00	4546.00	264918	
64-65	5648.00	11747	51655	16164	18903	25338	82937	65030	18423	6705.00	4295.00	3658.00	310503	
65-66	3145.00	4447.00	5270.00	9276.00	4132.00	24243	68480	57159	12373	5336.00	3364.00	2428.00	199653	
66-67	2668.00	7461.00	23604	21685	21827	22740	41604	87250	25936	6245.00	3033.00	2201.00	266254	
67-68	4576.00	7903.00	7324.00	11925	42199	46722	32461	35112	11580	5353.00	3761.00	5100.00	214016	
68-69	13915	27328	24509	21797	8097.00	19027	88670	78680	18169	6770.00	3614.00	3123.00	313699	
69-70	3280.00	2855.00	4881.00	10913	10998	18965	38035	92960	23948	6902.00	3592.00	2923.00	220252	
70-71	3398.00	5570.00	8362.00	19603	33735	15715	68529	103390	26032	12363	4984.00	3994.00	305675	
71-72	4371.00	4800.00	4622.00	15433	23855	84460	54960	108240	30325	10625	4975.00	3733.00	350399	
72-73	3291.00	3480.00	9807.00	19120	6715.00	18725	26890	26730	7890.00	3601.00	2126.00	2377.00	130752	
73-74	2555.00	13219	30293	80637	18328	34334	88050	109370	67136	10541	4865.00	3302.00	462630	
74-75	3140.00	5889.00	5419.00	8204.00	9110.00	16545	31853	111520	42833	8979.00	4696.00	3218.00	251406	
75-76	4256.00	8473.00	37102	16835	10888	9886.00	60142	82427	15245	5839.00	4670.00	2838.00	258601	
76-77	3048.00	3398.00	2942.00	2609.00	3876.00	7279.00	28634	15207	6005.00	3234.00	2480.00	2674.00	81386	
77-78	2726.00	7505.00	37026	12872	9424.00	43644	58850	58120	16914	6824.00	5456.00	4379.00	263740	
78-79	3210.00	3373.00	2700.00	2222.00	6844.00	30282	48924	76143	11576	5419.00	3057.00	2553.00	196303	
79-80	2932.00	2615.00	9343.00	9358.00	13716	18826	57069	34281	25359	9775.00	4700.00	4254.00	192228	
80-81	3127.00	7507.00	49025	25419	31075	23653	41859	32671	31620	11493	4665.00	3524.00	265638	
81-82	3401.00	5881.00	14879	8001.00	59389	47057	54331	72870	20898	7962.00	4059.00	3117.00	301845	
82-83	3960.00	5101.00	14153	28307	26391	55850	48548	45630	13312	12164	5245.00	3372.00	262033	
83-84	3196.00	16631	6802.00	22272	14192	32655	51813	59010	29157	9218.00	4166.00	1934.00	251046	
MEAN	3940.46	7910.50	16142	16473.9	19852	28591.7	56484.4	69242.8	23017.1	7456.48	4033.28	3221.92		
NO. OF MONTHS	24	24	24	25	25	25	25	25	25	25	25	25		
PERCENT ANNUAL	1.5	3.1	6.3	6.4	7.7	11.2	22.0	27.0	9.0	2.9	1.6	1.3		

MEAN ANNUAL STREAMFLOW 256367 CFS-DAYS

M: MISSING VALUES DURING MONTH.
A: ACCUMULATED VALUES DURING MONTH.
E: ESTIMATED VALUES DURING MONTH.
T: TRACE VALUES FOR THE MONTH.
*** CAUTION *** MUCH OF THE DATA BEFORE 1970 ARE NOT FLAGGED FOR SPECIAL CONDITIONS.

Figure III.i. Streamflow File Monthly Data Listing.

STREAMFLOW Daily Streamflow Listing

The command sequence:

```
ACCESS
METRIC
ELEMENT      STREAMFLOW
STATION      12411000
PERIOD       10/1979 to 9/1980
LIST         DAILY
```

produced the output shown in Figure III.j.

Values listed are daily totals in cubic feet per second. If metric units are requested, the units are cubic meters per second. Monthly totals are also listed.

Note that this is a water year listing; unless the user requests a special starting month, such as LIST DAILY 1, the listing will always begin in October.

An M indicates that the daily value is missing.

COEUR D'ALENE RIVER ABOVE SHOSHONE CRK NEAR PRICHARD SHOSHONE STATION NO. 12.4110.00

MEAN DAILY STREAMFLOW IN CUBIC METERS PER SECOND

1969-1970

	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
1	3.96	2.69	2.15	3.26	8.07	10.6	21.9	30.3	38.2	9.9	4.11	2.58
2	4.70	2.63	2.12	3.12	7.50	9.9	22.9	45.6	39.6	9.3	4.84	2.52
3	4.39	2.52	2.15	2.83	7.22	9.2	21.0	75.9	41.6	8.78	6.15	2.46
4	3.54	2.52	2.18	2.61	7.11	8.50	20.4	104	41.1	8.47	4.79	3.34
5	3.09	3.03	2.21	2.38	6.80	7.79	21.7	131	36.8	8.13	4.30	3.43
6	2.89	3.82	2.24	2.83	6.71	8.78	29.2	159	33.4	7.70	4.11	2.97
7	2.78	3.29	2.32	3.26	6.63	14.0	53.0	136	29.2	7.50	3.82	3.48
8	2.83	2.97	2.38	3.54	6.23	19.0	47.9	107	25.7	7.19	3.68	3.77
9	3.48	2.72	2.55	3.96	6.06	19.2	41.9	96.0	24.5	7.02	3.54	3.23
10	4.11	2.78	2.97	4.25	5.98	18.1	64.6	104	22.1	6.80	3.54	2.89
11	3.68	2.78	3.68	4.81	5.98	17.0	71.6	89.2	19.2	6.63	3.43	2.72
12	3.17	2.72	5.52	5.66	6.91	16.2	57.2	72.5	17.4	6.51	3.34	2.63
13	2.83	2.63	7.19	8.50	7.82	15.4	46.7	63.2	16.2	7.02	3.17	2.58
14	2.78	2.58	7.93	14.8	8.24	15.2	40.8	56.6	15.7	7.11	3.17	2.58
15	2.75	2.63	9.8	40.2	8.67	17.1	36.2	57.8	20.8	6.23	3.09	2.58
16	2.69	2.58	6.23	15.6	15.2	20.6	32.3	74.8	25.4	5.98	3.03	2.58
17	2.61	2.52	4.30	13.2	31.2	22.7	32.0	120	28.0	5.86	2.89	2.58
18	2.55	2.46	3.88	10.8	25.7	22.1	34.6	124	25.4	5.61	2.89	2.58
19	2.52	2.46	3.77	9.6	19.6	21.0	36.0	103	22.5	5.44	2.89	2.52
20	2.44	2.46	3.96	8.35	16.0	20.6	35.1	95.2	20.0	5.18	2.78	2.52
21	2.44	2.72	5.18	8.35	14.2	19.8	33.1	92.9	18.0	5.01	2.72	2.58
22	2.46	3.03	8.67	9.1	13.1	18.3	31.7	93.7	16.7	4.93	2.72	2.72
23	2.44	2.97	7.93	17.0	12.5	18.1	30.6	86.9	15.2	4.84	2.69	3.17
24	2.52	2.89	6.71	21.4	12.0	18.6	34.0	82.7	14.2	4.79	2.63	2.83
25	2.63	2.69	5.52	18.3	11.8	19.2	35.4	79.9	13.2	4.84	2.58	2.63
26	2.78	2.58	4.84	15.4	11.6	19.6	33.7	81.0	12.3	5.01	2.52	2.52
27	2.69	2.44	4.53	14.2	11.6	19.0	30.6	75.0	12.5	4.93	2.46	2.46
28	2.78	2.32	4.25	12.9	11.2	21.2	27.7	61.5	11.9	4.93	2.46	2.46
29	2.89	2.24	3.96	10.9		23.8	26.8	51.3	10.9	4.84	2.46	2.44
30	2.78	2.18	3.68	9.3		24.1	26.6	44.2	10.4	4.53	2.46	2.44
31	2.72		3.40	8.67		22.5		39.9		4.39	2.46	
TOTAL	92.89	80.85	138.23	309.1	311.5	537.1	1077.2	2632.6	678.2	195.46	101.73	82.78
MAX	4.70	3.82	9.80	40.2	31.2	24.1	71.6	159.2	41.6	9.91	6.15	3.77
MIN	2.44	2.18	2.12	2.4	6.0	7.8	20.4	30.3	10.4	4.39	2.46	2.44
MEAN	3.00	2.70	4.46	10.0	11.1	17.3	35.9	84.9	22.6	6.31	3.28	2.76

MISSING DAILY VALUES ARE PRINTED AS BLANKS.
NO MEAN IS COMPUTED IF MORE THAN 5 DAYS ARE MISSING.
THE MAXIMUM AND MINIMUM ARE NOT COMPUTED IF THERE ARE ANY MISSING DAYS IN THE MONTH.

Figure III.j. Streamflow File Daily Data Listing.

SNOWFALL — Monthly Snowfall Listing

The command sequence:

```
ACCESS
ELEMENT      SNOWFALL
STATION      106152
PERIOD       1975 TO 1985
LIST         MONTHLY   AVERAGE
```

produced the output shown in Figure III.k. The deletion of the word AVERAGE would delete the last column. Note that the listing begins with July without the use of an additional operand for the LIST command.

Values in the table are total monthly snowfall amount in inches. If metric units are requested, the units are centimeters. The following special symbols are used to qualify the monthly amounts:

- M: missing values during month
- A: accumulations during month
- E: estimated values during month
- T: Trace total for month

Only one symbol is printed for one month, and the symbol is selected in the above order.

Months during the period of record which are blank are assumed to have no snowfall. Monthly means are computed including these months, but excluding months that have missing data. The mean annual snowfall is obtained as the sum of the monthly means. Annual totals are obtained for all years, but the ratio of the annual total to the annual mean is obtained only for years with no missing values.

** CAUTION **
Some snowfall data previous to 1970 are not flagged as given above. Therefore, the listings may not show the above symbols for data previous to 1970.

MOSCOW UNIV OF IDAHO LATAH 10-6152

TOTAL MONTHLY SNOWFALL IN INCHES

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	ANNUAL	% AVE
74-75							35.0	27.8	5.0	6.0	0.0		73.8	
75-76				1.0	15.5	6.5	24.5	18.5	11.0	3.0			80.0	
76-77					0.5	3.5	6.3	2.0	7.5	0.5	0.0		20.3	
77-78					13.0	13.0	12.0	8.0	6.0	1.0			53.0	
78-79					9.0	26.0	17.3	11.0	0.2	3.5			67.0	
79-80					4.9M	2.0M	23.5M	1.5M	4.5M	0.0M			36.4	
80-81						6.5M	1.2M	10.5M	0.4M	0.2M	0.0M		18.8	
81-82					1.1M	16.0M	31.0M	3.6M	4.9M	4.3			60.9	
82-83				0.2	3.5	9.8	3.7	3.2	0.0	0.0T	0.0T	0.0	20.4	
83-84	0.0A	0.0	0.0	0.0A	0.7A	19.8A	3.9A	2.4A	0.0T	0.0T	0.3T	0.0	27.1	53
84-85	0.0	0.0	0.0	0.2	4.8	29.9	5.7	25.7	13.9	0.0	0.0	0.0	80.2	156
85-86	0.0	0.0	0.0	0.0	11.4	4.5							15.9	22
MEAN	0.0	0.0	0.0	0.3	7.3	14.1	13.5	12.3	5.4	2.0	0.1	0.0		
NO. OF MONTHS	3	3	3	5	8	8	8	8	8	9	5	3		
PERCENT ANNUAL	0.0	0.0	0.0	0.5	14.2	27.5	26.4	24.0	10.6	4.0	0.1	0.0		

MEAN ANNUAL SNOWFALL 51.3 INCHES

M: MISSING VALUES DURING MONTH.
A: ACCUMULATED VALUES DURING MONTH.
E: ESTIMATED VALUES DURING MONTH.
T: TRACE VALUES FOR THE MONTH.
*** CAUTION *** MUCH OF THE DATA BEFORE 1970 ARE NOT FLAGGED FOR SPECIAL CONDITIONS.

Figure III.k. Snowfall File Monthly Data Listing.

SNOWFALL

Daily Snowfall Listing

The command sequence:

```
ACCESS
ELEMENT     SNOWFALL
STATION     106152
PERIOD      7/1980 To 6/1981
LIST        DAILY
```

produced the output shown in Figure III.1.

Values in the table are daily snowfall amounts in inches, and snow depth on ground at time of observation in inches. If metric units are requested, the units are centimeters. Values are qualified by the following special symbols:

- M: amount or depth missing;
- A: amount accumulated
- E: amount or depth estimated
- T: trace amount or depth
- B: both accumulated and missing

Only one symbol is printed for one month, and the symbol is selected in the above order.

Monthly total snowfall amounts are also printed.

MOSCOW UNIV OF IDAHO LATAH STATION NO. 10-6152

DAILY SNOWFALL AND SNOW DEPTH ON GROUND IN INCHES

1974-1975

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
1							1 1.0	2 0.0T	1	OT 0.0T	OT	
2							1 0.4	3	OT		OT	
3							1	3 0.0T	OT	0.3	0 0.0T	
4							OT 0.1	3 1.0		0.2	OT 4.6	1
5						0.8	0.5	2 0.0T	1	1.5	1 0.0T	3
6						0.1	OT 0.1	2 0.0T	OT 1.0	0.6	0 0.0T	OT
7						1.8	1 0.0T	1 0.2	OT 0.0T	OT 0.0T	OT	
8					0.7	0.0T	1 1.0	2 0.4	OT	0.8	OT	
9							1 0.1	OT 0.7	1	3.7	OT	
10					0.0T		1 0.4	OT 2.1	OT 0.4	OT 0.0T	2	
11						0.2	1	OT	OT 0.1	OT		
12			0.0T			0.1	1	OT 1.4	OT 0.0T			
13						1.0	1	OT	0.0T			
14						0.1	2	OT 0.3				
15							1 0.2	OT	OT			
16							1 0.0T	OT 0.1	1.3	0.4		
17						0.1	1	OT 0.0T	OT 0.3	OT 0.0T	OT	
18					0.0T		1	OT 0.0T	OT 0.1	OT 0.0T		
19						0.0T	1	OT 0.7	OT		0.1	0.0T
20						0.8	1 0.0T	OT 0.6	1		0.2	
21				2.3 1		0.0T	OT	OT	1 0.0T		0.0T	
22					0.0T	0.0T	OT	OT	OT 1.0	1		
23						0.5	OT 0.0T		OT 0.0T	OT		
24						0.0T	OT 0.8		OT 0.2	OT		
25						0.0T	OT	0.0T	OT 2.8	3.3	OT	
26						0.1	OT 1.3	0.2	OT 0.6	3 0.3		
27					3.0	0.0T	OT 0.2	1 1.1	1 0.0T	2 0.3	OT	
28					0.0T 3	1.3	OT 1.1	2	OT	2 0.0T		
29					0.0T 2	0.0T	2	3		1 0.0T		
30					1	0.4	2 0.2	2	0.0T	OT 0.0T		
31						0.4	2 0.0T	2	0.5	OT		
TOTAL				2.3	3.7	7.7	7.4	8.8	8.3	11.4	4.9	

ZERO VALUES ARE PRINTED AS BLANKS.
M: MISSING DAILY VALUE.
T: TRACE AMOUNT.
A: DAILY VALUE WAS ACCUMULATED.
E: DAILY VALUE WAS ESTIMATED.
B: DAILY VALUE WAS BOTH ACCUMULATED AND ESTIMATED.

*** CAUTION *** MUCH OF THE DATA BEFORE 1970 ARE NOT FLAGGED FOR SPECIAL CONDITIONS.

Figure III.1. Snowfall File Daily Data Listing.

EVAPORATION Monthly Pan Evaporation Listing

The command sequence:

```
ACCESS
ELEMENT     EVAPORATION
STATION     106152
PERIOD      1960 TO 1970
LIST        MONTHLY  AVERAGE
```

produced the output shown in Figure III.m. The deletion of the word AVERAGE would delete the last column.

Values in the table are total monthly evaporation amounts in inches and total monthly wind movements in miles. If metric units are requested, the units are millimeters and kilometers, respectively. The following special symbols are used to qualify values of both evaporation and wind movement:

M: missing values during month
A: accumulations during month
E: estimated values during month

Only one symbol is printed for one month, and the symbol is selected in the above order.

Monthly means are computed excluding those months with missing data, and the mean annual values are obtained as the sum of the monthly means. The number of months printed is the minimum number of months for either wind or evaporation data. Annual totals are obtained for all years, but the ratio of the annual total to the annual mean is obtained only for years with no missing values.

MOSCOW UNIV OF IDAHO LATAH 10-6152

TOTAL MONTHLY EVAPORATION IN INCHES AND WIND MOVEMENT IN MILES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL % AVE
1960				2.96	4.64	7.36	8.73E	5.78E	0.00M				29.47
				2334	2384	1774	833	1014	779				9118
1961				3.16	5.98	6.45	9.05	9.02	5.59				39.25
				2782	2314	1740	1595	1540	1905				11876
1962				5.01	3.68	6.32	8.97	7.11	6.02				37.11
				2321	1564	1138	1132	1221	812				8188
1963				3.36E	6.07	5.65	8.11	8.57	6.21				37.97
				1974	2024	1797	2606	OM	OM				8401
1964				3.33	5.57	5.45	7.40	6.34	3.95				32.04
				2716	2461	1433	1131E	OM	OM				7741
1965				3.40	6.13	7.27	8.60E	7.10	4.09				36.59
				1842E	2470	1837	1836	1514	1525				11024
1966				4.59	7.81	5.68	8.58A	8.38	6.26	2.47	0.00M	0.00M	43.77
				1783	2142	1498	1665	1620	1635	1919	1923M	646M	14831
1967				2.81	5.24	6.54E	8.95E	9.84A	6.42	2.96	0.00M		42.76
				1441	1517	1289	1501	1524	1471	2419	1765		12927
1968				4.45	6.65	7.20	9.86	6.56	4.78				39.50
				3050	2736	2136	1646	1394E	1928				12890
1969				4.52	5.44	7.35	9.29	9.75	5.29	1.47M			43.11
				2792	1565	1508	1370E	1876E	1826	1905			12842
1970					3.80M	7.03	8.86	9.77	4.72	3.58E			37.76
					2014	1725	1485E	1547	1887M	2008M			10666
MEANS	0.00	0.00	0.00	3.76	5.72	6.57	8.76	8.02	5.33	3.00	0.00	0.00	
	0	0	0	2304	2108	1625	1527	1472	1485	2081	1765	0	
NO. OF MONTHS	0	0	0	10	10	11	11	9	8	3	0	0	
PERCENT ANNUAL	0.0	0.0	0.0	9.1	13.9	16.0	21.3	19.5	13.0	7.3	0.0	0.0	
	0.0	0.0	0.0	16.1	14.7	11.3	10.6	10.3	10.3	14.5	12.3	0.0	

MEAN ANNUAL EVAPORATION 41.17 INCHES
MEAN ANNUAL WIND MOVEMENT 14349 MILES

M: MISSING VALUES DURING MONTH.
A: ACCUMULATED VALUES DURING MONTH.
E: ESTIMATED VALUES DURING MONTH.
T: TRACE VALUES FOR THE MONTH.
*** CAUTION *** MUCH OF THE DATA BEFORE 1970 ARE NOT FLAGGED FOR SPECIAL CONDITIONS.

Figure III.m. Evaporation File Monthly Data Listing.

EVAPORATION Daily Pan Evaporation Listing

The command sequence:

```
ACCESS
ELEMENT      EVAPORATION
STATION      106152
PERIOD       1/1960 to 12/1960
LIST         DAILY
```

produced the output shown in Figure III.n.

Values in the table are daily evaporation amounts in inches and total daily wind movement in miles. If metric units are requested, the units are millimeters and kilometers, respectively. Amounts are qualified by the same special symbols as in the monthly listings:

M: missing values during month
A: accumulations during month
E: estimated values during month

Monthly totals are also printed.

MOSCOW UNIV OF IDAHO LATAH STATION NO. 10-6152

DAILY EVAPORATION IN INCHES AND WIND MOVEMENT IN MILES

1960

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1				0.02 55	0.13 32	0.26 71	0.19 74	0.10E 52	M 13			
2				0.06 47	0.02 40	0.25 54	0.23 35	0.03 19	M 20			
3				0.06 43	0.12 31	0.33 81	0.27 31	0.26 42	M 20			
4				0.17 49	0.11 94	0.33 81	0.28 17	0.18 25	M 75			
5				0.15 38	0.09 24	0.26 52	0.17 17	0.15 12	M 44			
6				0.13 39	0.16 45	0.35 101	0.26 17	0.26 6	M 22			
7				0.16 30	0.11 103	0.30 47	0.38 29	0.25 17	M 16			
8				0.14 50	0.09 82	0.23 26	0.31 33	0.23 16	M 16			
9				0.07 69	0.16 47	0.25 24	0.29 30	0.28 13	M 22			
10				0.11 42	0.26 52	0.21 26	0.30 27	0.30 15	M 6			
11				0.11 102	0.16 23	0.33 65	0.26 15	0.24 12	M 13			
12				0.04 72	0.13 93	0.19 24	0.28 18	0.33 30	M 12			
13				0.13 93	0.21 164	0.28 41	0.34 35	0.24 24	M 31			
14				0.13 245	0.25 77	0.07 48	0.29 28	0.23 58	M 27			
15				0.11 219	0.14 28	0.06 109	0.31 24	0.12 23	M 31			
16				0.07 128	0.17 166	0.20 119	0.29 15	0.15 49	M 13			
17				0.13 89	0.13 148	0.21 108	0.36 19	0.22 23	M 14			
18				0.19 162	0.13 135	0.15 49	0.17E 15	0.17 37	M 23			
19				0.01 58	0.15 57	0.28 113	0.25E 23	0.33 47	M 53			
20				0.01 114	0.05 89	0.20 161	0.44E 40	0.25 34	M 65			
21				0.07 125	0.12 116	0.18 56	0.27E 25	0.22 53	M 17			
22				0.01 58	0.13 55	0.21 25	0.34 39	0.08 34	M 24			
23				0.04 51	0.13 43	0.20 24	0.37 65	0.10 64	M 61			
24				0.08 59	0.12 56	0.32 41	0.26 31	0.06 39	M 25			
25				0.01 45	0.18 49	0.31 85	0.23 12	0.07 19	M 29			
26				0.06 52	0.08 55	0.25 32	0.28 12	0.14 71	M 21			
27				0.19 76	0.15 114	0.26 24	0.31 29	0.14 40	M 20			
28				0.14 47	0.21 61	0.27 24	0.30 24	0.11 23	M 15			
29				0.15 31	0.23 56	0.31 32	0.26 18	0.25 64	M 19			
30				0.21 46	0.17 75	0.31 31	0.26 12	0.13 13	M 12			
31					0.35 174		0.18 24	0.16 40				
TOTAL				2.96	4.64	7.36	8.73	5.78	0.00			
TOTAL				2334	2384	1774	833	1014	779			

ZERO VALUES ARE PRINTED AS BLANKS.
M: MISSING DAILY VALUE.
A: DAILY VALUE WAS ACCUMULATED.
E: DAILY VALUE WAS ESTIMATED.
B: DAILY VALUE WAS BOTH ACCUMULATED AND ESTIMATED.

Figure III.n. Evaporation File Daily Data Listing.

RESERVOIR STORAGE

Daily Reservoir Storage Listing

The command sequence:

```
ACCESS
ELEMENT      STORAGE
STATION      10055500
PERIOD       10/1979 TO 9/1980
LIST         DAILY
```

produced the output shown in Figure III.o.

Values are listed in acre-feet, elevation above sea level or state, depending upon the form of the data published by the Geological Survey. If metric units are requested, the units are cubic meters or meters above sea level or state datum.

Days with missing data are printed out as blanks. For months with missing data, the mean, maximum and minimum are not printed out. However, it should be noted that many reservoirs that do not have continuous records during the non-irrigation season, do list either the month-end or beginning of the month contents.

Monthly listings of this file are not yet available.

BEAR LAKE AT LIFTON NEAR ST. CHARLES, IDA BEAR LAKE STATION NO. 10.0555.00

RESERVOIR CONTENTS IN ACRE-FEET, AT 2400 HOURS

1979-1980

	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
1	954200	946700	937100	939100	974800	1007000	1033000	1123000	1323000	1366000	1347000	1254000
2	952100	946700	937100	939100	976900	1008000	1033000	1130000	1329000	1366000	1345000	1250000
3	951500	946700	937100	939800	978900	1009000	1034000	1137000	1335000	1366000	1342000	1247000
4	950800	946700	937100	939800	981000	1011000	1035000	1144000	1340000	1366000	1339000	1244000
5	949400	946700	937100	939800	982400	1013000	1036000	1151000	1343000	1366000	1335000	1241000
6	948700	946700	937100	939800	983800	1014000	1037000	1158000	1345000	1366000	1330000	1238000
7	948000	945300	937100	940500	984400	1015000	1038000	1165000	1347000	1366000	1325000	1238000
8	947300	943900	937100	940500	985100	1017000	1040000	1173000	1349000	1366000	1320000	1237000
9	946700	941900	937100	941200	985100	1018000	1041000	1182000	1351000	1366000	1315000	1235000
10	946000	939100	937100	941900	985800	1020000	1042000	1190000	1353000	1366000	1311000	1233000
11	945300	936400	937100	941900	985800	1021000	1043000	1198000	1354000	1366000	1309000	1231000
12	945300	936400	937100	942600	985800	1022000	1044000	1208000	1356000	1366000	1307000	1230000
13	944600	936400	937100	943900	985800	1022000	1045000	1215000	1357000	1366000	1305000	1228000
14	944600	936400	937100	945300	985800	1022000	1045000	1221000	1359000	1365000	1303000	1227000
15	944600	936400	937100	946700	986500	1023000	1046000	1228000	1360000	1364000	1302000	1225000
16	944600	936400	937100	948000	986500	1023000	1048000	1236000	1361000	1364000	1299000	1223000
17	944600	936400	937100	949400	986500	1024000	1050000	1245000	1361000	1363000	1297000	1221000
18	944600	936400	937100	950800	987200	1024000	1052000	1252000	1362000	1363000	1295000	1218000
19	944600	937100	937100	952100	989300	1026000	1055000	1258000	1363000	1363000	1291000	1215000
20	944600	937100	937100	953500	991300	1027000	1058000	1263000	1363000	1362000	1288000	1213000
21	946000	937100	937800	954900	993400	1028000	1063000	1266000	1364000	1361000	1284000	1210000
22	946700	937100	937800	956300	995500	1029000	1071000	1271000	1365000	1360000	1281000	1207000
23	947300	937100	937800	957600	997500	1030000	1078000	1277000	1365000	1360000	1278000	1204000
24	947300	937100	937800	959000	999600	1031000	1085000	1283000	1365000	1360000	1276000	1201000
25	947300	937100	937800	961100	1001000	1032000	1092000	1290000	1366000	1359000	1273000	1197000
26	947300	937100	937800	963100	1002000	1032000	1095000	1295000	1366000	1358000	1271000	1194000
27	947300	937100	938400	965200	1002000	1033000	1099000	1298000	1366000	1356000	1268000	1191000
28	947300	937100	938400	967200	1004000	1033000	1106000	1302000	1366000	1355000	1265000	1188000
29	947300	937100	938400	969300	1005000	1033000	1109000	1306000	1366000	1353000	1262000	1185000
30	946700	937100	938400	970700		1033000	1114000	1314000	1366000	1351000	1259000	1182000
31	946700		938400	972700		1033000		1317000		1349000	1257000	
MEAN	946700	937100	938400	972700	1005000	1033000	1114000	1317000	1366000	1349000	1257000	1182000
MAX	954200	946700	938400	972700	1005000	1033000	1114000	1317000	1366000	1366000	1347000	1254000
MIN	944600	936400	937100	939100	974800	1007000	1033000	1123000	1323000	1349000	1257000	1182000

MISSING DAILY VALUES ARE PRINTED AS BLANKS.

FOR LISTINGS OF CONTENTS IN ACRE-FEET, THE MEAN MONTHLY VALUE IS THE MONTH END CONTENTS.

FOR ELEVATION AND GAGE HEIGHT LISTINGS, NO MEAN IS COMPUTED IF MORE THAN 5 DAYS ARE MISSING.

THE MAXIMUM AND MINIMUM ARE NOT COMPUTED IF THERE ARE ANY MISSING DAYS IN THE MONTH.

Figure III.o. Reservoir Storage Daily Data Listing.

HOURLY PRECIPITATION

Monthly listing of Hourly Precipitation

The command sequence:

```
ACCESS
ELEMENT      HOURPRCP
STATION      101018
PERIOD       1935 TO 1945
LIST         MONTHLY   AVERAGE
```

produced the output shown in Figure III.p. The deletion of the word AVERAGE would delete the last column. Values in the table are total monthly precipitation amounts in inches; if metric units are requested, the units are millimeters.

The following special symbols are used to qualify the monthly amounts:

M: missing values during month
A: accumulated values during month
E: estimated values during month
T: trace values during month

Only one symbol is printed for one month, and the symbol is selected in the above order.

Monthly means are computed excluding those months with missing data, and the mean annual precipitation is obtained as the sum of the monthly means. Annual totals are obtained for all years, but the ratio of the annual total to the annual mean is obtained only for years with no missing values.

BOISE LUCKY PEAK DAM ADA 10-1018

TOTAL MONTHLY HOURLY PRECIPITATION IN INCHES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL % AVE
1955	1.21A	0.42	0.54	3.08	1.04M	0.00M	0.00	0.00	0.00	0.00M	0.00	0.00	6.29
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00M	0.10		0.01	0.04	0.77	1.42	2.49A	4.83
1958	1.61A	2.01A	1.50A	2.70A	2.29A	2.42	0.54A	0.22	0.34	0.13	1.33	1.55A	16.64
1959	1.73A	0.95A	1.24	0.22	2.07	0.45	0.02	0.00M	1.56A	0.91	0.56	0.74	10.45
1960	1.29A	2.21	1.74A	0.31A	1.42		0.82	0.02M	0.42A	0.40A	0.52M	0.49A	9.64
1961	0.40	1.08	1.51	0.37A	0.59	0.35		0.35A	0.64	1.77	0.93A	0.97A	8.96
1962	0.74A	1.04A	1.06A	0.98	2.09	0.16M		0.02	0.00M	0.98	1.92	0.24	9.23
1963	1.17	2.54	0.42A	2.49	1.03	2.26		1.27	0.37	0.77	3.15	1.07	16.54
1964	2.21A	0.15	0.78A	1.49	1.71	1.42	0.29	0.42	0.60A	0.20A	2.35A	3.88A	15.50
1965	2.98A	0.46A	0.00	1.34M	0.63	0.92A	0.03	1.32	0.28	0.29A	1.66A	0.57A	10.48
MEAN	1.21	0.99	0.80	1.16	1.31	0.99	0.24	0.40	0.42	0.62	1.33	1.09	
NO. OF MONTHS	11	11	11	10	9	8	7	9	10	10	10	11	
PERCENT ANNUAL	11.5	9.3	7.6	11.0	12.4	9.4	2.3	3.8	4.0	5.9	12.6	10.3	

MEAN ANNUAL HOURLY PRECIPITATION 10.58 INCHES (11 YEARS)

M: MISSING VALUES DURING MONTH.
A: ACCUMULATED VALUES DURING MONTH.
E: ESTIMATED VALUES DURING MONTH.
T: TRACE VALUES FOR THE MONTH.
*** CAUTION *** MUCH OF THE DATA BEFORE 1970 ARE NOT FLAGGED FOR SPECIAL CONDITIONS.

Figure III.p. Hourly Precipitation File Monthly Data Listing.

HOURLY PRECIPITATION

Daily Listing For Hourly Precipitation

The command sequence:

```
ACCESS
ELEMENT         HOURPRCP
STATION         WA0107
PERIOD          1/1939 To 12/1939
LIST            DAILY
```

will produce output similar to Figure III.q.

Values in the table are daily precipitation amounts in inches, measured from midnight to midnight. If metric units are requested, the units are millimeters. Amounts are qualified by the following special symbols:

- M: missing amounts during day
- A: accumulations during day
- E: estimated values during day
- T: trace total for day
- S: melting snow measured during day

Only one symbol is printed for one day, and the symbol is selected in the above order.

Monthly totals are also printed.

Hourly Listing For Hourly Precipitation

The command sequence:

```
ACCESS
ELEMENT     HOURPRCP
STATION     WA0107
PERIOD      1/1939 TO 12/1939
LIST        HOURLY
```

produced the output shown in Figure III.r.

Values in the table are hourly precipitation amounts in inches for the hour ending at the time shown (on a 24-hour clock). If metric units are requested, the units are millimeters. Amounts are qualified by the same special symbols as in the daily listings:

- M: missing amounts during day
- A: accumulations during day
- E: estimated values during day
- T: trace total for day
- S: melting snow measured during day

FOUR MILE CREEK (FALLON) WHITMAN STATION NO. WA-0107

DAILY PRECIPITATION IN INCHES

1939	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1										0.06		
2										0.05		
3	0.04		0.10				0.46					
4		0.29										
5	0.12	0.02										
6		0.29	0.26								0.10	
7		0.24										
8						0.05						0.30
9												0.30
10												0.40
11		0.60	1.24									
12			0.43	0.66								
13	0.14		0.07						0.08			
14		0.89							0.04			0.33
15		0.14										0.56
16												
17	0.26											0.43
18					0.20	0.09						0.28
19						0.07						
20												0.06
21												0.05
22					0.17							
23												
24												
25		0.05		0.08								
26												
27	0.10	0.27			0.18					0.32		
28	0.10											
29												
30												
31												
TOTAL	0.76	2.79	2.10	0.74	0.55	0.21	0.46		0.12	0.43	0.10	

ZERO VALUES ARE PRINTED AS BLANKS.
M: MISSING VALUE(S) DURING DAY.
T: TRACE AMOUNT(S) DURING DAY.
A: ACCUMULATED VALUE(S) DURING DAY.
E: ESTIMATED VALUE(S) DURING DAY.
S: MELTING SNOW MEASURED DURING DAY.

*** CAUTION *** MUCH OF THE DATA BEFORE 1970 ARE NOT FLAGGED FOR SPECIAL CONDITIONS.

Figure III.q. Hourly Precipitation File Daily Data Listing.

FOUR MILE CREEK (FALLON) WHITMAN STATION NO. WA-0107

HOURLY PRECIPITATION IN INCHES

JANUARY , 1939

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
1																									
2					0.04	0.06	0.01																		
3		0.04																				0.06	0.04		0.21
4																									0.04
5				0.04	0.03	0.01	0.02			0.01	0.01														0.12
6																									
7																									
8																									
9																									
10																									
11																									
12																									
13				0.01	0.02	0.03	0.02	0.04	0.02																
14																									0.14
15																									
16																									
17							0.02	0.02	0.03	0.03	0.04	0.06	0.02	0.01	0.02	0.01									
18																									0.26
19																									
20																									
21																									
22																									
23																									
24																									
25																									
26																									
27																									
28			0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01								0.03		0.03	0.02	0.01		0.01	0.10
29																									0.10
30																									
31																									

ZERO VALUES ARE PRINTED AS BLANKS.
M: MISSING HOURLY VALUE.
T: TRACE AMOUNT.
A: HOURLY VALUE WAS ACCUMULATED.
E: HOURLY VALUE WAS ESTIMATED.
B: HOURLY VALUE WAS BOTH ACCUMULATED AND ESTIMATED.
S: MELTING SNOW IN HOURLY MEASUREMENT.
*** CAUTION *** MUCH OF THE DATA BEFORE 1970 ARE NOT FLAGGED FOR SPECIAL CONDITIONS.

Figure III.r. Hourly Precipitation File Hourly Data Listing.

PEAKFLOW

Contents of the Peak Flow File

The command sequence:

```
ACCESS
ELEMENT     PEAKFLOW
STATION     12411000
LIST        CONTENTS
```

produced the output shown in Figure III.s.

The units of peak flow are cfs and of gage height are feet; if metric units are requested, the units are cubic meters per second and meters, respectively.

The following codes are used:

BW - Gage height was due to backwater
NM - Not maximum gage height for water year
MD - Discharge given is a maximum daily
ES - Discharge estimated from another site
DF - Discharge given due to dam failure
LT - Actual discharge is less than indicated value
UR - Unknown effect of regulation or diversion
KR - Known significant effect of regulation or diversion

The data for this listing, and the format of the listing were obtained from the U.S. Geological Survey. At the present time, very few stations have any peaks above base in the file. The vast majority of stations have data only for annual peaks.

EAST FORK POTLATCH RIVER NEAR BOVILL, IDAHO LATAH STATION 13.3414.00

DRAINAGE AREA = 41.6 SQ MI
GAGE DATUM = 2800 FEET

WATER YEAR	ANNUAL PEAK DISCH, CFS	DATE	PEAK FLOW CODE	GAGE HEIGHT OF ANN PEAK, FEET	GAGE HEIGHT CODE	ANNUAL MAX GAGE HEIGHT, FEET	DATE	MAX GAGE HEIGHT CODE
1960	666	30MAR1960		4.73	NM	4.91	07FEB1960	BW
1961	659	22FEB1961		4.73				
1962	964	07APR1962		5.45				
1963	350	04FEB1963	MD		NM	4.96	04FEB1963	BW
1964	530	15APR1964		4.28				
1964		01APR1964		6.19	BW			
1965	1740	23DEC1964		8.19				
1966	362	01APR1966		3.81				
1967	379	11MAY1967		3.79				
1968	817	20FEB1968		5.19	NM	7.09	19FEB1968	BW
1969	750	06JAN1969			NM	4.46	05APR1969	
1970	645	17FEB1970		4.59				
1971	1120	20JAN1971		6.16				

BW - GAGE HEIGHT WAS DUE TO BACKWATER
MD - DISCHARGE GIVEN IS A MAXIMUM DAILY
DF - DISCHARGE GIVEN DUE TO DAM FAILURE
UR - UNKNOWN EFFECT OF REGULATION OR DIVERSION
NM - NOT MAXIMUM GAGE HEIGHT FOR WATER YEAR
ES - DISCHARGE ESTIMATED FROM ANOTHER SITE
LT - ACTUAL DISCHARGE IS LESS THAN INDICATED VALUE
KR - KNOWN SIGNIFICANT EFFECT OF REGULATION OR DIVERSION
NOTE: GAGE DATUM MAY NOT BE EFFECTIVE FOR ENTIRE PERIOD OF RECORD. GAGE HEIGHTS SHOWN ONLY FOR CURRENT DATUM. CONSULT USGS WATER SUPPLY PAPERS FOR CHANGES IN DATUM.

Figure III.s. Annual Peak Streamflow File Listing.

SNOW COURSE Contents of the Snow Course File

The command sequence:

```
ACCESS
ELEMENT      SNOWCOURSE
STATION      16B01
PERIOD       1900 TO 1974
LIST         CONTENTS
```

produced the output shown in Figure III.t.

The units for snow depths and water equivalents are inches; if metric units are requested, the units are centimeters and millimeters, respectively.

The format for the snow course listings is similar to the snow course summaries published by the Soil Conservation Service.

LOWER SANDS CREEK KOOTENAI STATION NO. 16B01

SNOW COURSE RECORDS

SNOW DEPTHS AND WATER CONTENT IN INCHES

WATER YEAR	JANUARY 1 DATE	DEPTH	WC	FEBRUARY 1 DATE	DEPTH	WC	MARCH 1 DATE	DEPTH	WC	APRIL 1 DATE	DEPTH	WC	MAY 1 DATE	DEPTH	WC	JUNE 1 DATE	DEPTH	WC
1936										3/26	61	22.2						
1937	12/30	15	3.8	1/30	41	9.6	3/01	58	18.4	4/08	42	18.0	4/30	17	8.6			
1938	12/31	23	4.8	1/30	29	7.4	2/28	40	12.2	3/31	36	12.5	4/29	0	0.0			
1939	1/02	13	3.5	2/01	44	10.8	2/28	65	18.6	3/31	39	15.0	4/29	0	0.0			
1940	1/01	9	2.1	2/01	16	4.4	3/01	31	10.1	4/01	8	3.6	5/02	0	0.0			
1941	12/30	18	4.2	1/30	32	11.5	2/27	34	11.7	3/27	14	6.7						
1942	1/01	16	3.2	1/30	17	4.9	2/28	34	9.4	3/31	26	8.6	4/30	1	0.3			
1943	12/30	33	8.6	1/31	49	13.8	2/27	54	19.6	3/30	50	19.6	5/01	4	1.8			
1944	12/31	10	3.0	1/31	24	7.1	2/29	37	10.3	3/30	34	11.1	4/29	2	0.6			
1945	12/30	26	5.0	1/31	33	10.0	2/28	36	11.9	3/31	42	15.7	4/30	27	10.2			
1946	1/06	33	10.0	1/30	57	16.3	2/27	68	22.2	3/30	62	23.9	5/05	12	5.3			
1949							3/01	70	25.8	3/31	74	32.1	4/29	31	16.0			
1950							2/25	67	21.7	3/31	77	31.0	4/27	56	24.8			
1951							3/01	56	18.6	3/29	57	22.7	4/30	17	6.5			
1952							2/28	63	22.3	4/03	67	26.3	5/02	24	11.7			
1953							2/26	49	17.4	4/02	51	19.9	5/01	27	11.9			
1954							3/01	59	22.0	4/01	60	23.7	4/29	30	14.0			
1955							3/03	63	15.8	3/31	57	18.4	5/03	47	18.4			
1956							2/28	100	26.7	3/30	79	32.0	4/30	38	17.3			
1957							2/27	56	21.6	3/28	61	24.1	4/29	36	17.8			
1958							2/25	57	23.0	3/31	52	23.4	4/28	37	17.2			
1959							2/27	64	20.6	3/30	68	24.2	4/30	37	16.1			
1960							2/29	55	16.2	3/29	58	19.0	4/29	40	16.4			
1961							2/28	48	15.3	3/31	48	20.2	5/01	25	11.4			
1962							3/01	61	19.9	4/03	66	24.0	5/02	38	16.4			
1963							3/01	28	8.3	3/29	26	10.1	4/30	12	4.5			
1964							3/02	69	24.2	3/31	80	32.2	4/28	66	31.1			
1965							3/02	69	23.9	4/02	66	25.5	4/29	45	19.6			
1966							2/28	60	18.9	3/30	61	22.1	5/03	34	15.3			
1967							3/01	54	14.5	4/03	56	20.4	5/01	44	18.9			
1968							2/29	34	12.2	3/29	32	12.9	4/29	22	9.9			
1969							2/27	71	23.9	4/02	61	24.9	5/02	47	20.4			
1970							2/26	53	17.8	3/30	55	21.5	4/30	49	20.7			
1971							2/25	67	20.3	3/29	72	26.3	4/29	52	21.5			
1972							3/01	75	21.8	3/30	71	29.6	4/27	63	28.4			
1973	12/27	12	3.8	1/30	26	6.7	2/28	26	8.2	3/29	29	9.6	4/30	0	0.0			
1974							2/28	88	28.6	3/26	89	33.9	4/30	73	30.0			

Figure III.t. Snow Course File Contents Listing.

MONTHLY SUMMARY

Contents of the Monthly Summary File

The command sequence:

```
ACCESS
ELEMENT      MONTHLY
STATION      106152
PERIOD       1980 TO 1980
LIST         CONTENTS
```

produced the output shown in Figure III.u.

The values listed here are the monthly summaries of four elements: air temperature, precipitation, snowfall, and evaporation.

The units are degrees Fahrenheit for temperatures, inches for precipitation, snowfall, and evaporation, and miles for wind movement. If metric units are requested, the units are degrees C, millimeters for precipitation and evaporation, centimeters for snowfall, and kilometers for wind movement.

Annual means, maximums, minimums, and totals are also listed.

MOSCOW UNIV OF IDAHO — LATAH — STATION NO. 10-6152

MONTHLY SUMMARIZED STATION DATA

DATE		TEMPERATURES (F)									PRECIPITATION (IN)						EVAP/WIND (IN/MI)	
MONTH	YEAR	MEAN MAX	MEAN MIN	MEAN	HI	DATE	LOW	DATE	HEAT DEGREE DAYS	COOL DEGREE DAYS	TOTAL	GREATEST DAY	DATE	TOTAL SNOWFALL	GREATEST SNOW DEPTH	DATE	TOTAL EVAP	WIND RUN
1	1980	30.8	16.1+	23.5	45	12	-5	29	1281	0	3.65	1.02	5	23.5	18	10		
2	1980	41.7	30.6+	36.2	56	27	17	16	829	0	1.71	0.42+	18	1.5	4	1		
3	1980	44.8	30.5	37.7	54	1	22	6	842	0	2.67	0.48	14	4.5	0			
4	1980	61.1	38.7	49.9	82	28	27	1	448	2	1.51	0.48	29	0.0T	0			
5	1980	64.4	42.1	53.3	81	5	33	16	358	0	4.80	1.42	26	0.0	0		5.02	1578
6	1980	67.7	44.2+	56.0	80	8	34	5	266	0	1.99	0.49	12	0.0	0		5.78	1775
7	1980	80.6	48.0	64.3	97	22	37	1	70	59	1.12	0.59	10	0.0	0		8.37	1273
8	1980	78.5	42.9	60.7	90	11	30	25	145	20	1.00	0.59	31	0.0	0		8.55	1698
9	1980	73.6	43.5	58.6	87	5	33	21	192	6	1.08	0.54	13	0.0	0		5.78	1729
10	1980	63.4	36.8	50.1	86	7	22	22	465	10	0.75	0.56	14	0.0	0		3.94	1754
11	1980	46.0	33.4	39.7	66	4	20	13	754	0	3.90	1.06	7	0.0	0			
12	1980	42.2	30.3	36.3	59	26	-4	7	887	0	3.88	0.83	25	6.5	4+	6		
ANNUAL	1980	57.9	36.4	47.2	97		-5		6537	97	28.06	1.42		36.0	18			

\+ - VALUE OCCURRED ON MORE THAN ONE DAY
M - MISSING RECORDS IN MONTH
T - TRACE MONTHLY VALUE
I - BASED ON INCOMPLETE PERIOD
A - ACCUMULATED AMOUNT
E - ESTIMATED AMOUNT

Figure III.u. Monthly Summary File Contents Listing.

POINTER FILE LISTING

Pointer File Listing

The command sequence:

```
ACCESS
ELEMENT      EVAPORATION
LIST         POINTERS
```

produced the output shown in Figure III.v.

The values listed are the station numbers for all stations in the evaporation file with the first and last observation numbers for each station in the file. The given observation numbers can be used with the POINTERS command in order to directly access data for a particular station.

A listing of pointers for specific stations can be obtained by adding a STATION command to the above commands.

A listing of pointers can be obtained for any of the element files.

To obtain the period of record which corresponds to the pointer, use the LIST INDEX command (see the LIST command in Section III.A).

POINTER LISTING FOR EVAPORATION FILE

STATION	FIRST OBSERVATION	LAST OBSERVATION
100010	1	434
100448	435	852
104598	853	892
104670	893	958
105043	959	970
105275	971	1210
105466	1211	1298
105900	1299	1421
105980	1422	1578
106152	1579	1878
106764	1879	1960
106844	1961	2060
107463	2061	2061
107644	2062	2106
109303	2107	2264
457938	2265	2296

Figure III.v. Listing of the Evaporation pointers file.

C. Submitting a Program for Execution: Job Control Commands

The NHIMS system may be accessed by submitting a batch job via either a 32XX-type display terminal or via a line-mode terminal. In either case, the user must be able to create a file containing the NHIMS commands, add some job control language (JCL) statements to the beginning of the file, and submit the program. In this section, the job control language is first described, and then the submission procedure.

1. Job control language (JCL)

Formats for JCL are specified by the operating system and must be rigorously followed. In particular, blanks are permitted only at points that are clear in the example and not otherwise. The number of blanks at any point is arbitrary. You may create the basic JCL on CMS by entering "NHIMS JCL".

The JCL statements necessary are:

```
//Jname   JOB   (project, aaa-bb-cccc,lines),'user',CLASS=A
//*       PASSWORD=password
/*        DEST=TS
//        EXEC  NHIMS
//NHIMS   DD    *
 ----- nhims commands -----
/*
```

In the example, the user must supply all information in lower case letters, upper case letters must be punched exactly as shown.

name - any name for the job, seven letters or less in length.

project - your project code assigned by Computer Services. To obtain a project code, contact Computer Services at (208) 885-6721.

aaa-bb-cccc - this is your social security number.

lines - number of output lines in 1000's (4 is default). This is about 60 pages of output. Each ACCESS card requires two pages plus one more for each year or PROCESS card to be printed. This is operand rarely needed and may be omitted for most jobs.

user - your name.

The EXEC, NHIMS and /* are to be copied exactly as shown.

2. Submitting the program

A full discussion of how to use the University of Idaho computer system is beyond the scope of this manual. Before you attempt to use NHIMS, you are strongly advised to obtain a CMS Users Guide from the University Bookstore and/or contact User Services at the Compter Center for further information. Video tapes are also available for instructional use.

In addition, you must obtain a userid and project account code from Computer Services before you can use the system. The userid is used for logging onto the timeshare system. All charges are made against the project code.

Once you have logged onto CMS, the procedure would be:

1) enter the EDIT mode (on a line mode terminal) or XEDIT on a 3277 or 3278 terminal.
2) enter the INPUT mode in order to input the proper NHIMS JCL and command cards.
3) hit enter twice to leave EDIT mode.
4) FILE the data.
5) SUBMIT the data to the batch system.
6) use the SCANRDR command to retrieve the NHIMS output.

It is possible to have Computer Services mail output to off-campus locations. Contact Computer Services for the proper procedure.

IV. THE PROCESS FACILITIES

The processing facilities of NHIMS are designed to permit routine types of analysis on data elements stored by the system. Thus the prospective user need not become involved in the complexities of programming and data manipulation in order to obtain the practical results required.

Processing is carried out on data identified by the preceding access group. Acquaintance with the access facilities of NHIMS is therefore prerequisite for use of the processing facilities (see Section III.A).

The available programs cover most routine uses. Suggestions for additional programs are welcome. A large number of additional programs are planned and will be added as time becomes available and specific needs are recognized.

The following illustrate the combined uses of the access and processing facilities.

Ex. 1: To obtain a statistical summary of daily rainfall for all rainfall stations in Power County:

```
ACCESS
ELEMENT     RAINFALL
COUNTY      POWER
PROCESS
DAILY STATISTICS
```

Ex. 2: To make a computation of the number of days that the flow was within various class intervals, for station 13.1850.00 and UI.1000.00 during the common period October 1951 to September 1960.

```
ACCESS
ELEMENT         STREAMFLOW
STATION         13185000
                UI100000
PERIOD          10/1951 To 9/1960
PROCESS
FLOW DURATION TABLE
          13185000      CLASS  100  500  1000
          UI100000      CLASS  1   10   50   100
```

A . Using the Process Commands: Details

The following commands constitute the process facilities of NHIMS:

PROCESS
Process request command)
(Optional Parameters)

The command word PROCESS is coded starting in Column 1. information in the Process Request command must start in Column 1 but information for the Optional Parameters must start in Column 2 or later.

A PROCESS command followed by a Process Request command and Optional Parameters constitutes a single process group. Several process groups may follow a single access group, in which case all processing is carried out on the same data. Each unique process request must be preceeded by the PROCESS command word.

1. The Processing request command

The Process Request command must contain one or more names that identify the types of processing requested. Permissible names are given with the program specifications in Section IV.B. The only formatting restrictions are that the first name must start in Column 1 and not more than one command may be used.

2. Optional parameter command

Some of the processing programs do not require any parameters for execution, whereas others require one or more parameters. Parameter requirements are given in the program specifications in Section IV.B. The specifications also list default values that will be supplied automatically unless replaced by the user. Thus, if no parameter cards are included in the access group, standard system defaults will be used.

If the user wishes to provide parameter values, he needs to give only those values which are not satisfactory by default. Two further options exist:

a) Data for all stations are to be processed using the same values. In this case, only one group of parameter cards is used, and the list of parameters applies to all stations.

b) Different parameter values are required for each station. In this case, one group of parameter cards is used for each station, and the parameters

apply to that station. The station number is coded on the parameter card, starting in Column 2 or later, and the list of parameters follow. The parameter cards must be ordered so that the station numbers are in the same order as retrieved by the access group. The second example in the beginning of Section IV uses this format. At the present time, this option only applies to CLASS and THRESHOLD parameters.

The list of parameters for either case contains the identifying name and value for each parameter. Column 1 may not be used, but the only other formatting requirement is that no punctuation should be given between parameters.

The list of parameters will normally be coded on a single line. However, particularly when using the LENGTH or CLASS parameters, the length of the list may be too long for a single line. In this case, the list can be interrupted at any convenient point and continued on the next card, subject to two conventions:

a) A numerical value cannot be split across two lines:

b) The identification of the parameter being continued must be repeated on the second and following lines, leaving Column 1 blank.

B. Example Process Programs and the Outputs

Following is a listing of the processing programs now implemented in NHIMS. For each program, the following are given:

a) NAME - the standardized name to be used with the Processing Request command;
b) INPUT - the data files which can be used to provide data for the program;
c) OUTPUT - identification of output results obtained from the program;
d) OPTIONS - optional features that are controlled by parameters. Standard default values are also given;
e) An example showing the complete set of NHIMS commands required and consequent output.

Several of the programs permit limiting the months for which the analysis is carried out. Assuming the sequence January-December followed by Annual, processing can begin with any month and terminate with the same or any later month. The form of this parameter can best be illustrated by examples:

a) ONLY APRIL TO JULY - will result in processing only of the months April, May, June, July;

b) ONLY MARCH - will result in processing only for March;

c) ONLY ANNUAL - will result in processing only for the entire year combined, i.e. separate monthly analyses will not be obtained.

STATISTICAL ANALYSIS

NAME - DAILY STATISTICS or MONTHLY STATISTICS

INPUT - STREAMFLOW, PRECIPITATION, TEMPERATURE, SNOWFALL, EVAPORATION

OUTPUT - the following results are tabulated for each month:

a) Number of observations
b) Number of missing values
c) Mean
d) Standard deviation
e) Maximum
f) Minimum
g) Skewness
h) Kurtosis
i) Serial correlation

OPTIONS - Processing period

Standard Defaults - ONLY JANUARY TO ANNUAL

Note: If DAILY STATISTICS is used, the analysis is made on daily values from the input files. If MONTHLY STATISTICS is used, the analysis is made on monthly totals. In the latter case, the serial correlation is between months, and the number of pairs used for calculation is also given. For streamflow files, months with missing daily values are skipped.

Example: The command sequence

```
ACCESS
ELEMENT      PRECIPITATION
STATION      106152
PERIOD       1/1975 TO 12/1985
PROCESS
MONTHLY STATISTICS
```

produced the output shown in Figure IV.a.

MOSCOW UNIV OF IDAHO LATAH STATION NO. 10-6152

STATISTICAL ANALYSIS OF MONTHLY PRECIPITATION
1/1975 TO 12/1985

MONTH	NUMBER OF OBS.	NUMBER OF MISSING VALUES	MEAN	STANDARD DEVIATION	MAXIMUM	MINIMUM	SKEWNESS	KURTOSIS	SERIAL CORRELATION
JANUARY	11	0	2.396E+00	1.393E+00	4.96	0.45	3.295E-01	-5.721E-01	6.925E-01
FEBRUARY	11	0	2.525E+00	1.045E+00	4.12	0.76	-1.968E-01	-9.467E-01	2.284E-01
MARCH	11	0	2.414E+00	7.248E-01	4.07	1.49	9.417E-01	1.806E+00	4.686E-01
APRIL	11	0	2.385E+00	1.177E+00	4.74	0.47	3.283E-01	4.803E-01	-6.411E-02
MAY	11	0	2.505E+00	8.900E-01	4.80	1.52	1.816E+00	4.390E+00	-2.245E-01
JUNE	11	0	1.857E+00	1.057E+00	3.51	0.59	4.766E-01	-1.100E+00	-2.040E-02
JULY	11	0	1.135E+00	7.504E-01	2.65	0.11	8.597E-01	1.850E-01	-2.199E-02
AUGUST	11	0	1.543E+00	9.561E-01	2.86	0.01	1.988E-01	-1.187E+00	1.383E-01
SEPTEMBER	11	0	1.365E+00	1.134E+00	3.75	0.00	8.708E-01	5.266E-01	-4.994E-02
OCTOBER	11	0	2.093E+00	1.118E+00	3.84	0.09	-3.458E-01	-4.305E-01	-3.649E-01
NOVEMBER	11	0	3.178E+00	1.444E+00	5.95	0.93	5.301E-01	8.598E-02	-7.758E-02
DECEMBER	11	0	2.898E+00	1.308E+00	4.71	0.54	-3.197E-01	-3.720E-01	3.484E-01
ANNUAL	132	0	2.191E+00	1.212E+00	5.95	0.00	4.199E-01	-5.634E-02	2.069E-01

NUMBER OF COMPLETE YEARS 11

Figure IV.a. Statistical Analysis of Monthly Precipitation.

HIGHEST/ NAME - HIGHEST or MAXIMUM
MAXIMUM INPUT - TEMPERATURE, PRECIPITATION, SNOWFALL, STREAMFLOW, EVAPORATION
OUTPUT - Tabulation of the highest value for each month
OPTIONS - Processing period
Standard Default - ONLY JANUARY TO ANNUAL

Note: Choice of names is arbitrary. For temperature files, the highest values of the maximum and minimum temperatures are given.

An M indicates an incomplete month.

Example: The command sequence

```
ACCESS
ELEMENT     TEMPERATURE
STATION     100010
PERIOD      1/1975 TO 1/1985
PROCESS
MAXIMUM
```

produced the output shown in Figure IV.b.

LOWEST/ NAME - LOWEST or MINIMUM
MINIMUM INPUT - TEMPERATURE, STREAMFLOW, EVAPORATION
OUTPUT - Tabulation of the lowest value for each month.
OPTIONS - Processing period
Standard Default - ONLY JANUARY TO ANNUAL

Note: Choice of names is arbitrary. For temperature files, the lowest values of the maximum and minimum temperatures are given.

Example: The command sequence

```
ACCESS
ELEMENT     TEMPERATURE
PERIOD      1/1975 TO 1/1985
STATION     100010
PROCESS
MINIMUM
```

would produce output similar in appearance to Figure IV.b.

ABERDEEN EXP STA BINGHAM STATION NO. 10-0010

HIGHEST DAILY MAXIMUM TEMPERATURES IN DEGREES F AND MINIMUM TEMPERATURES IN DEGREES F

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUS	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	ANNUAL
1975	46	42	57	63	81	83	98	93	89	80	67	54	98
	33	33	34	34	48	54	65	55	52	44	36	35	65
1976	40	48	57	69	80	93	96	92	94	80	65	52	96
	24	34	30	37	51	57	60	57	51	45	32	26	60
1977	40	53	64	82	78	96	95	94	91	77	64	50	96
	28	28	33	43	48	58	60	59	48	40	35	39	60
1978	45	49	73	69	82	88	95	94	92	78	65	47M	95
	32	32	40	43	48	52	64	55	55	35	32	30M	64
1979	40	44	59	75	85	98	94	97	96	82	55	50M	98
	25	34	32	40	51	58	59	58	53	43	35	32	59
1980	50	60	56	81	84	88	95	93	89	81	70	55	95
	33	35	34	48	49	55	60	54	53	37	37	36	60
1981	51	59	59	75	83	93	97	95	90	75	63	53	97
	25	34	33	47	51	57	58	55	49	43	41	35	58
1982	45	59	58	73	80	89	94	95	88	72	55	44	95
	25	34	35	40	48	54	60	63	50	38	32	32	63
1983	45	51	62	68	87	86	95	98	91	75	64	42	98
	36	32	41	41	52	51	57	60	58	42	40	30	60
1984	39		51	77	89	93	95	95	89	77	56	39	95
	26		34	40	51	53	60	59	57	35	37	23	60
1985	35	40	45	79	87	93	96	98	80	73	63	41	98
	25	22	25	40	48	60	63	54	47	42	29	27	63
PERIOD	51	60	73	82	89	98	98	98	96	82	70	55	
	36	35	41	48	52	60	65	63	58	45	41	39	

HIGHEST MAXIMUM TEMPERATURES 98 DEGREES F
HIGHEST MINIMUM TEMPERATURES 65 DEGREES F

M: MISSING DAILY VALUE.
T: TRACE AMOUNT.
A: DAILY VALUE WAS ACCUMULATED.
E: DAILY VALUE WAS ESTIMATED.

Figure IV.b. Highest Daily Maximum and Minimum Temperatures.

EXTREMES

NAME - EXTREME
INPUT - TEMPERATURE
OUTPUT - Tabulation of the extreme values (i.e. highest maximum and lowest minimum) for each month.
OPTIONS - Processing period
Standard Default - ONLY JANUARY TO ANNUAL

Example: The command sequence

```
ACCESS
ELEMENT       TEMPERATURE
PERIOD        1/1975 TO 12/1985
STATION       100010
PROCESS
EXTREME
```

would produce output similar in appearance to Figure IV.b.

RANK ORDERING

NAME - RANK ORDER
INPUT - STREAMFLOW, PRECIPITATION, TEMPERATURE, SNOWFALL
OUTPUT - Listing of the n largest amounts and their dates ranked from largest to smallest, where n is five times the number of years.
OPTIONS - Processing period
Standard Default - ONLY JANUARY TO ANNUAL

Note: The default processing period is the entire period of record.

Missing data values are ignored.

Example: The command sequence

```
ACCESS
ELEMENT     STREAMFLOW
STATION     12411000
PROCESS
RANK ORDER
```

produced the output shown in Figure IV.c.

COEUR D'ALENE RIVER ABOVE SHOSHONE CRK NEAR PRICHARD SHOSHONE STATION NO. 12.4110.00

LARGEST DAILY STREAMFLOW IN DESCENDING ORDER (CFS)
01/1974 TO 05/1972
JANUARY-ANNUAL

16000.00 15JAN1974	5990.00 29APR1952	5460.00 11MAY1954	5040.00 07MAY1979	4700.00 09MAY1976
12000.00 16JAN1974	5960.00 25APR1956	5420.00 20APR1956	5020.00 05MAY1957	4690.00 12MAY1971
9530.00 23DEC1964	5960.00 15FEB1982	5420.00 09MAY1974	5010.00 13MAY1975	4680.00 18APR1952
9300.00 21FEB1982	5930.00 19MAY1964	5400.00 30APR1959	5000.00 20MAY1954	4680.00 23APR1953
9040.00 22FEB1961	5900.00 01FEB1953	5380.00 30APR1957	4980.00 26APR1956	4680.00 23FEB1961
9000.00 17JAN1974	5900.00 05DEC1975	5380.00 20APR1962	4980.00 23APR1965	4680.00 06MAY1966
8820.00 27DEC1980	5880.00 10MAY1954	5380.00 16FEB1982	4960.00 10MAY1975	4680.00 22MAY1967
8310.00 11FEB1951	5830.00 24APR1953	5360.00 17MAY1954	4940.00 09MAY1956	4660.00 12FEB1961
7830.00 24DEC1950	5820.00 05MAY1971	5360.00 07APR1960	4940.00 19MAY1975	4660.00 22MAY1964
7160.00 04DEC1975	5810.00 28APR1953	5340.00 14MAY1972	4920.00 19APR1956	4660.00 27MAY1974
7100.00 18JAN1974	5800.00 18APR1958	5320.00 08MAY1954	4920.00 03MAY1957	4650.00 18APR1956
7080.00 24DEC1964	5780.00 02MAY1957	5320.00 18MAR1972	4920.00 11FEB1961	4650.00 11MAY1956
7020.00 22APR1965	5720.00 16APR1956	5300.00 25APR1952	4900.00 06APR1960	4650.00 09MAY1967
6950.00 26APR1952	5720.00 09APR1960	5300.00 12MAY1954	4890.00 19MAY1956	4640.00 25APR1953
6900.00 27APR1952	5720.00 15MAY1972	5300.00 01MAY1959	4890.00 18MAY1972	4640.00 05MAY1970
6890.00 22APR1956	5700.00 21MAY1957	5280.00 19APR1962	4890.00 18MAY1975	4640.00 01MAY1974
6860.00 21APR1965	5700.00 31MAR1960	5280.00 16MAY1972	4830.00 14APR1954	4630.00 23APR1969
6830.00 23APR1956	5700.00 24APR1969	5280.00 26APR1974	4820.00 30APR1965	4620.00 07MAY1953
6820.00 26DEC1980	5670.00 19APR1952	5260.00 08APR1960	4820.00 31MAR1978	4620.00 15APR1962
6720.00 28APR1952	5660.00 19MAY1954	5250.00 15APR1956	4790.00 19APR1954	4620.00 09MAY1971
6650.00 12FEB1951	5660.00 07MAY1974	5220.00 03MAY1971	4790.00 17APR1956	4620.00 05MAY1979
6650.00 25APR1974	5660.00 22FEB1982	5200.00 29FEB1972	4790.00 18MAY1956	4610.00 18MAY1967
6600.00 07APR1962	5650.00 29APR1953	5180.00 17FEB1982	4790.00 20MAY1956	4600.00 02MAY1959
6470.00 24APR1956	5650.00 06MAY1979	5160.00 14MAR1972	4790.00 07MAY1957	4580.00 16MAY1954
6440.00 20MAY1964	5640.00 09MAY1954	5150.00 06MAY1957	4790.00 07MAY1970	4580.00 22MAY1955
6400.00 15MAY1975	5640.00 12MAY1975	5120.00 10APR1960	4790.00 10MAY1976	4580.00 17APR1958
6350.00 04MAY1971	5620.00 06MAY1970	5120.00 01MAY1979	4760.00 30MAR1960	4560.00 07MAY1954
6260.00 16MAY1975	5600.00 25DEC1950	5110.00 17MAY1975	4740.00 20APR1952	4560.00 10MAY1956
6220.00 21APR1956	5540.00 08MAY1974	5100.00 13MAY1971	4740.00 29APR1965	4560.00 25APR1969
6190.00 21MAY1964	5520.00 10FEB1951	5100.00 19JAN1974	4720.00 20MAY1955	4550.00 30APR1979
6140.00 18APR1954	5520.00 21MAY1955	5090.00 24APR1974	4720.00 11MAY1969	4540.00 22DEC1955
6140.00 01MAY1957	5510.00 17MAY1964	5080.00 17MAY1972	4700.00 04APR1961	4540.00 16APR1962
6120.00 11MAY1975	5500.00 18MAY1954	5060.00 06MAY1974	4700.00 13MAY1964	4540.00 17MAR1972
6020.00 28DEC1980	5500.00 11MAY1976	5060.00 14MAY1975	4700.00 06MAY1971	4520.00 13MAY1972

Figure IV.c. Rank Ordering of Daily Streamflow Output.

FLOW DURATION TABLE

NAME - FLOW DURATION TABLE

INPUT - STREAMFLOW

OUTPUT - A tabulation of the number of days that the flow was within various class intervals for each complete water year. A second table gives the frequency of discharge greater than or equal to each class interval. Class intervals are listed in cubic feet per second, in cubic feet per second per square mile, and as a ratio to the mean daily discharge.

OPTIONS - CLASS - lower limits of class intervals

Standard Defaults - CLASS = 1, 10, 100, 1000, 10000, 100000, 1000000 CFS

Notes:

a) A maximum of 30 class intervals may be specified.

b) The drainage area is obtained from the index entry for the station. If no area is given in the index, the column of class intervals in cubic feet per second per square mile will be omitted.

c) Days with missing values are not counted.

d) The standard defaults are multiplied by the ACCESS request.

Example: The command sequence

```
ACCESS
ELEMENT        STREAMFLOW
STATION        100010
PROCESS
FLOW DURATION TABLE
     CLASS
```

produced the output shown in Figure IV.d.

COEUR D'ALENE RIVER ABOVE SHOSHONE CRK NEAR PRICHARD SHOSHONE STATION NO. 12.4110.00

FLOW DURATION TABLE

CLASS WATER	1	2	3	4	5	6
NUMBER OF DAYS IN CLASS						
1951	0	36	144	103	77	5
1952	0	31	232	45	52	6
1953	8	105	111	68	69	4
1954	0	33	187	67	69	9
1955	0	9	261	31	63	1
1956	0	13	182	63	99	9
1957	0	55	185	49	70	6
1958	0	93	177	22	72	1
1959	0	26	167	76	94	2
1960	0	18	216	43	84	5
1961	0	54	166	36	108	1
1962	4	70	197	27	64	3
1963	0	76	141	76	72	0
1964	0	35	236	14	75	6
1965	0	0	196	84	81	4
1966	0	64	210	29	62	0
1967	0	78	134	60	93	0
1968	0	24	214	48	80	0
1969	0	25	175	72	92	1
1970	0	90	155	58	61	1
1971	0	23	187	70	81	4
1972	0	6	215	33	105	7
1973	0	92	175	72	26	0
1974	0	36	137	62	118	12
1975	0	17	254	29	58	7

TOTAL VOLUME FOR ALL YEARS: 17845770 ACRE-FEET
MEAN DAILY DISCHARGE: 726.5045 CFS
DRAINAGE AREA: 335 SQ MI

CLASS	CFS	COUNTS	ACCUM	PERCENT	SQ MI	MEAN DAILY	CLASS	CFS	COUNTS	ACCUM	PERCENT	SQ MI	MEAN DAILY
1	10	0	12406	100	0.0	0.0	4	500	61	12213	98	1.5	0.7
2	50	23	12406	100	0.1	0.1	5	1000	99	12152	98	3.0	1.4
3	100	170	12383	100	0.3	0.1	6	5000	0	12053	97	14.9	6.9

Figure IV.d. Flow Duration Table Output.

INTERSTATION CORRELATION

NAME - CORRELATION
INPUT - PRECIPITATION, TEMPERATURE, STREAMFLOW, EVAPORATION, SNOWFALL
OUTPUT - Tabulations of cross correlations between daily values for each pair of up to 10 stations, with the number of pairs of days used in the calculations. Results are listed separately for each month.
OPTIONS - PROCESSING PERIOD
Standard Default - ONLY JANUARY TO ANNUAL

Example: The command sequence

```
ACCESS
ELEMENT     RAINFALL
STATION     103771    105241
            102159    109846
PERIOD      1/1980 TO 12/1980
PROCESS
CORRELATION
     ONLY MAY
```

produced the output shown in Figure IV.e.

CORRELATION ANALYSIS OF DAILY PRCP
5/1980 TO 5/1980

STATIONS:

STATION1	102159	COTTONWOOD 2 WSW	IDAHO
STATION2	103771	GRANGEVILLE	IDAHO
STATION3	105241	LEWISTON WSO AP	NEZ PERCE
STATION4	109846	WINCHESTER 1 ESE	LEWIS

MONTH = MAY NUMBER OF PAIRS = 31

	STN_1	STN_2	STN_3	STN_4
STN_1	1.00000	0.33885	0.29910	0.47117
	0.0000	0.0622	0.1021	0.0075
STN_2	0.33885	1.00000	0.69811	0.76365
	0.0622	0.0000	0.0001	0.0001
STN_3	0.29910	0.69811	1.00000	0.84611
	0.1021	0.0001	0.0000	0.0001
STN_4	0.47117	0.76365	0.84611	1.00000
	0.0075	0.0001	0.0001	0.0000

Figure IV.e. Interstation Correlation Analysis.

DAILY OCCURRENCES

NAME - OCCURRENCES or DAILY OCCURRENCES
INPUT - TEMPERATURE, SNOWFALL, PRECIPITATION
OUTPUT - A tabulation of the number of days that the element exceeded various threshold amounts for each complete year. The mean number of occurrences per year is also given.
OPTIONS - Processing period
THRESHOLD - threshold
Standard Defaults - ONLY JANUARY TO ANNUAL
THRESHOLD 80 F/26 C (TEMP)
1"/25.4 mm (PRCP)
1"/2.54 cm (SNOW)

Notes:

a) A maximum of 10 threshold values may be specified.

b) If a processing period is specified, records during the period must be complete.

c) For snowfall, the tabulation is for a snow season (assumed Sept. 1 - Aug.31). Only one threshold is allowed, and additional dates and snow depths are calculated.

EXAMPLE: The command sequence

```
ACCESS
ELEMENT      TEMPERATURE
STATION      107386
PERIOD       1900 TO 1967
OCCURRENCES
     THRESHOLD  35 32 25 20 10 0 -10 -20
```

produced the output shown in Figure IV.f.

PRIEST RIVER EXP STA BONNER STATION NO. 10-7386

NUMBER OF DAYS MAXIMUM TEMPERATURE ABOVE

YEAR	35 DEG F	32 DEG F	38 DEG F	25 DEG F	20 DEG F	10 DEG F	0 DEG F	-10 DEG F	-20 DEG F
1911	6	15	1	25	28	31	31	31	31
1912	313	335	286	354	357	365	366	366	366
1913	288	312	268	351	360	365	365	365	365
1914	289	305	274	326	333	337	337	337	337
1915	295	324	278	352	362	365	365	365	365
1916	287	299	265	326	341	361	366	366	366
1917	303	327	272	352	360	364	365	365	365
1918	306	322	282	354	361	365	365	365	365
1919	294	313	258	344	355	360	364	365	365
1924	309	321	285	343	347	358	366	366	366
1925	329	350	299	361	365	365	365	365	365
1926	307	322	286	360	362	365	365	365	365
1927	298	321	271	346	355	363	365	365	365
1928	302	327	278	357	364	365	366	366	366
1929	291	306	272	339	351	360	364	365	365
1930	287	311	273	338	349	361	365	365	365
1931	293	327	272	358	364	365	365	365	365
1932	292	310	274	340	354	364	366	366	366
1933	305	329	294	350	356	361	365	365	365
1934	321	350	306	365	365	365	365	365	365
1935	299	328	262	354	361	363	365	365	365
1936	292	313	267	342	351	362	365	366	366
1937	296	315	277	330	339	362	365	365	365
1938	302	327	286	356	363	365	365	365	365
1939	318	345	289	360	361	365	365	365	365
1941	325	347	305	362	365	365	365	365	365
1942	301	328	265	351	357	364	365	365	365
1943	295	315	285	348	357	363	365	365	365
1944	305	334	282	361	366	366	366	366	366
1945	319	336	286	356	365	365	365	365	365
1946	307	333	281	359	364	365	365	365	365
1947	300	332	279	353	362	365	365	365	365
1948	286	315	268	347	359	366	366	366	366
1949	294	307	280	330	345	363	365	365	365
1950	300	323	271	338	343	352	365	365	365
1953	334	355	310	365	365	365	365	365	365
1954	316	337	291	356	359	363	365	365	365
1955	268	295	256	343	352	364	365	365	365
1956	282	310	263	352	360	365	366	366	366
1957	297	319	270	342	348	362	365	365	365
1958	314	337	285	359	365	365	365	365	365
1959	294	320	275	350	359	363	365	365	365
1960	282	312	269	346	358	366	366	366	366
1961	304	327	284	357	361	365	365	365	365
1962	309	328	287	344	354	363	365	365	365
1963	299	319	289	348	355	363	365	365	365
1964	291	322	262	359	362	363	366	366	366
1965	291	321	275	362	365	365	365	365	365
1966	300	339	266	362	364	365	365	365	365
1967	311	335	287	353	360	365	365	365	365

Figure IV.f. Daily Temperature Occurrences.

MONTHLY OCCURRENCES

NAME - MONTHLY OCCURRENCES
INPUT - SNOWFALL, PRECIPITATION
OUTPUT - A tabulation of the number of months that the element exceeded various threshold amounts for each complete year. The mean number of occurrences per year is also given.
OPTIONS - Processing period
THRESHOLD - threshold
Standard Defaults - ONLY JANUARY TO ANNUAL
THRESHOLD 5″/127 mm (PRCP)
10″/25.4 cm (SNOW)

Notes:

a) A maximum of 10 threshold values may be specified.

b) If a processing period is specified, records during the period must be complete.

EXAMPLE: The command sequence

```
ACCESS
ELEMENT      PRECIPITATION
STATION      106152
PERIOD       1/1975 TO 12/1985
MONTHLY OCCURRENCES
     THRESHOLD  0.5  1.0  3.0  5.0
```

produced the output shown in Figure IV.G.

MOSCOW UNIV OF IDAHO LATAH STATION NO. 10-6152

YEAR	NUMBER OF MONTHS PRECIPITATION ABOVE 0.5 INCHES	1 INCHES	3 INCHES	5 INCHES
1975	11	11	4	0
1976	11	9	0	0
1977	11	7	2	0
1978	11	10	2	0
1979	10	9	4	0
1980	12	10	4	0
1981	11	10	4	0
1982	12	11	2	0
1983	12	11	3	1
1984	12	10	2	1
1985	10	9	1	0
MEAN	11.18	9.73	2.55	0.18

NUMBER OF COMPLETE YEARS 11

Figure IV.g. Monthly Precipitation Occurrences.

HIGH/LOW OCCURRENCES

NAME - HIGH OCCURRENCES or LOW OCCURRENCES
INPUT - TEMPERATURE
OUTPUT - A tabulation of the number of days that the temperature was above/below a threshold amount for each complete year, and the first and last dates of occurrence. For LOW OCCURRENCES, the length of the period in days that the temperature was always equal to or greater than the threshold is also listed.
OPTIONS - Processing period
THRESHOLD - the threshold in degrees.
Standard Defaults -
ONLY JANUARY TO ANNUAL
HIGH - THRESHOLD 90 F/32 C
LOW - THRESHOLD 32 F/0 C

Notes:

a) Only one threshold value may be specified.

b) If a processing period is specified, only records during the processing period must be complete.

Example: The command sequence

```
ACCESS
ELEMENT        TEMPERATURE
STATION        100010
PROCESS
LOW OCCURRENCES
```

produced the output shown in Figure IV.h.

ABERDEEN EXP STA

BINGHAM

STATION NO. 10-0010

YEAR	NUM OF DAYS TEMPERATURE BELOW 32 DEGREES F	LAST DAY BELOW 32 DEGREES F	FIRST DAY BELOW 32 DEGREES F	LENGTH OF PERIOD >= 32 DEGREES F
1975	196	25MAY1975	03SEP1975	101
1976	204	26JUN1976	08SEP1976	74
1977	188	30MAY1977	09SEP1977	102
1979	192	08JUN1979	12SEP1979	96
1980	178	01MAY1980	22SEP1980	144
1981	194	15JUN1981	01AUG1981	47
1982	182	31MAY1982	11SEP1982	103
1983	179	16MAY1983	10SEP1983	117
1984	172	02JUN1984	24SEP1984	114
1985	208	15MAY1985	20SEP1985	128
MEAN	189.30			102.6

NUMBER OF COMPLETE YEARS 10

Figure IV.h. Low Temperature Occurrences.

CALENDAR NAME - CALENDAR
INPUT - TEMPERATURE and PRECIPITATION
OUTPUT - a calendar-like output, containing the normal maximum and minimum temperatures and precipitation for the date, along with the record extremes for those elements. Space is provided to fill in the new values as they occur daily.
OPTIONS - Processing period
Standard default - none

Notes:

a) The ONLY options must be specified with the CALENDAR process, giving a specific month and year. A range of months can be given, but only one full calendar year is allowed.

b) The period command is important to use here, because the long-term normals are calculated using the period of record specified.

Example: The command sequence

```
ACCESS
ELEMENT    TEMPERATURE  PRECIPITATION
PERIOD     1900 TO 1987
STATION    106152
PROCESS
CALENDAR
   ONLY JUNE 1987  TO  JUNE 1987
```

produced the output shown in Figure IV.j.

CLIMATE CALENDAR

TEMPERATURES IN DEGREES F AND PRECIPITATION IN INCHES

STATION CODE - 5 TO 8 CHARACTERS=106152 TEXTUAL NAME FOR THE STATION=MOSCOW UNIV OF IDAHO COUNTY NAME FOR THE STATION=LATAH

JUNE 1987

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1 NORMAL ACTUAL 68.9 MAX _____ 44.5 MIN _____ 0.07 PPT _____ 88/84 HIGH MAX 29/84 LOW MIN 1.61/23 HIGH PPT	2 NORMAL ACTUAL 69.2 MAX _____ 44.3 MIN _____ 0.07 PPT _____ 87/77 HIGH MAX 33/77 LOW MIN 1.84/71 HIGH PPT	3 NORMAL ACTUAL 68.9 MAX _____ 44.5 MIN _____ 0.04 PPT _____ 91/73 HIGH MAX 30/73 LOW MIN 1.03/04 HIGH PPT	4 NORMAL ACTUAL 69.6 MAX _____ 44.9 MIN _____ 0.03 PPT _____ 91/62 HIGH MAX 32/62 LOW MIN 0.52/84 HIGH PPT	5 NORMAL ACTUAL 70.7 MAX _____ 45.5 MIN _____ 0.08 PPT _____ 88/01 HIGH MAX 32/01 LOW MIN 1.47/74 HIGH PPT	6 NORMAL ACTUAL 70.7 MAX _____ 46.2 MIN _____ 0.09 PPT _____ 90/19 HIGH MAX 30/19 LOW MIN 0.95/57 HIGH PPT
7 NORMAL ACTUAL 69.7 MAX _____ 46.0 MIN _____ 0.09 PPT _____ 91/79 HIGH MAX 35/79 LOW MIN 1.12/85 HIGH PPT	8 NORMAL ACTUAL 70.3 MAX _____ 45.5 MIN _____ 0.10 PPT _____ 88/75 HIGH MAX 33/75 LOW MIN 0.91/27 HIGH PPT	9 NORMAL ACTUAL 70.3 MAX _____ 45.7 MIN _____ 0.03 PPT _____ 91/77 HIGH MAX 33/77 LOW MIN 0.51/70 HIGH PPT	10 NORMAL ACTUAL 71.7 MAX _____ 45.0 MIN _____ 0.05 PPT _____ 89/73 HIGH MAX 28/73 LOW MIN 0.71/37 HIGH PPT	11 NORMAL ACTUAL 72.4 MAX _____ 46.2 MIN _____ 0.03 PPT _____ 90/19 HIGH MAX 32/19 LOW MIN 0.95/07 HIGH PPT	12 NORMAL ACTUAL 72.0 MAX _____ 46.4 MIN _____ 0.06 PPT _____ 91/76 HIGH MAX 31/76 LOW MIN 0.66/65 HIGH PPT	13 NORMAL ACTUAL 70.7 MAX _____ 46.6 MIN _____ 0.07 PPT _____ 88/81 HIGH MAX 35/81 LOW MIN 1.18/71 HIGH PPT
14 NORMAL ACTUAL 71.9 MAX _____ 46.2 MIN _____ 0.03 PPT _____ 95/79 HIGH MAX 32/79 LOW MIN 0.84/26 HIGH PPT	15 NORMAL ACTUAL 71.9 MAX _____ 47.2 MIN _____ 0.07 PPT _____ 90/78 HIGH MAX 32/78 LOW MIN 1.02/56 HIGH PPT	16 NORMAL ACTUAL 71.5 MAX _____ 46.8 MIN _____ 0.06 PPT _____ 93/73 HIGH MAX 34/73 LOW MIN 0.85/29 HIGH PPT	17 NORMAL ACTUAL 71.0 MAX _____ 45.9 MIN _____ 0.05 PPT _____ 96/73 HIGH MAX 34/73 LOW MIN 0.82/79 HIGH PPT	18 NORMAL ACTUAL 73.1 MAX _____ 46.2 MIN _____ 0.05 PPT _____ 95/73 HIGH MAX 32/73 LOW MIN 0.73/65 HIGH PPT	19 NORMAL ACTUAL 74.0 MAX _____ 47.2 MIN _____ 0.05 PPT _____ 93/78 HIGH MAX 35/78 LOW MIN 0.83/26 HIGH PPT	20 NORMAL ACTUAL 74.7 MAX _____ 47.6 MIN _____ 0.03 PPT _____ 98/08 HIGH MAX 35/08 LOW MIN 0.54/75 HIGH PPT
21 NORMAL ACTUAL 75.5 MAX _____ 47.2 MIN _____ 0.04 PPT _____ 94/47 HIGH MAX 33/47 LOW MIN 0.95/84 HIGH PPT	22 NORMAL ACTUAL 74.1 MAX _____ 48.0 MIN _____ 0.05 PPT _____ 96/66 HIGH MAX 37/66 LOW MIN 0.55/03 HIGH PPT	23 NORMAL ACTUAL 74.9 MAX _____ 47.9 MIN _____ 0.05 PPT _____ 96/52 HIGH MAX 36/52 LOW MIN 0.59/07 HIGH PPT	24 NORMAL ACTUAL 74.5 MAX _____ 47.2 MIN _____ 0.04 PPT _____ 93/85 HIGH MAX 30/85 LOW MIN 0.70/58 HIGH PPT	25 NORMAL ACTUAL 75.1 MAX _____ 48.1 MIN _____ 0.04 PPT _____ 95/85 HIGH MAX 33/85 LOW MIN 0.32/11 HIGH PPT	26 NORMAL ACTUAL 75.4 MAX _____ 48.9 MIN _____ 0.04 PPT _____ 96/76 HIGH MAX 31/76 LOW MIN 1.72/34 HIGH PPT	27 NORMAL ACTUAL 74.5 MAX _____ 48.1 MIN _____ 0.03 PPT _____ 95/76 HIGH MAX 36/76 LOW MIN 0.82/70 HIGH PPT
28 NORMAL ACTUAL 74.1 MAX _____ 46.5 MIN _____ 0.02 PPT _____ 94/75 HIGH MAX 31/75 LOW MIN 0.49/41 HIGH PPT	29 NORMAL ACTUAL 75.2 MAX _____ 48.0 MIN _____ 0.04 PPT _____ 95/19 HIGH MAX 35/19 LOW MIN 0.94/41 HIGH PPT	30 NORMAL ACTUAL 76.3 MAX _____ 47.3 MIN _____ 0.01 PPT _____ 100/66 HIGH MAX 34/66 LOW MIN 0.40/21 HIGH PPT				

Figure IV.j. Calendar Process.

V. THE COPY FACILITIES

A. INTRODUCTION

The COPY command is part of the ACCESS facility of NHIMS. Those records which have been ACCESSed by the preceding ACCESS command will be copied onto an external data set. As such, familiarity with the ACCESS facilities is prerequisite to application of material in this chapter.

The main purpose of the COPY facility is to permit users with programs in other languages to obtain copies of the data for their use, or to allow SAS programmers to obtain subsets of data in the form of a SAS data set. The user can create a permanent file if one wishes to repeatedly use the same data, or a temporary file can be created that will be deleted at the end of the job.

There are two reasons for separating the guide to the copying facility from the rest of the access commands. First, the user is here assumed to have some competence in a programming language. Secondly, some additional job control language requirements are needed to use the copying procedure. This guide, then, presumes experience in computer use that was not requisite for the ACCESS guide.

Three operands are available for use with the COPY command:

FORMATTED, FORMATTED 80, and DIRECT.

a) Using the COPY command without any operands causes the system to write the data without a format.

b) If the word FORMATTED is used, the output files will be written with format control (in the FORTRAN sense). Otherwise, the files will be written without format.

c) If the operand FORMATTED 80 is used, the data will be written in formatted, 80-byte records; without the 80 portion of the operand, a record length of 380 is used.

d) If the operand DIRECT is used, the data will be written as a SAS data set.

On output, the records for each element are put in a separate file. To aid in finding the output file, supplemental output is printed. This consists of the

station identification, the beginning and ending dates of the records copied, and the name of the file on which the copy was made. The names of the files, and the order in which the files are copied, are discussed fully in Section V.D.

B. OUTPUT FILE FORMATS

1. Direct

If the files are copied with the DIRECT operand, they will be stored as SAS data sets, accessible only with a SAS program. The user does not need to worry about the format of the files; one need only know the name of the data set and the variables within the data set. The name of the data set is always the 4-character abbreviation for the element, used throughout NHIMS:

PRCP : precipitation	SNOC : snow course
TEMP : temperature	MNTH : monthly summary
STRM : streamflow	RESV : reservoir storage
SNOW : snowfall	PEAK : peak flow
EVAP : evaporation	HPCP : hourly precipitation

The variables in the data set are the same as in the main element file (see Section VI.A.), plus a few variables from the index file: AREA, ELEV, NAME, and COUNTY.
A formatted version of the station number, called STN_FORM, is also included, except in the snow course file.

2. Formatted

For some files - streamflow, rainfall, hourrain- a single value is copied for each day or hour. For other files - temperature, evaporation and snowfall - two values are copied for each day. Still, other files have an annual record structure. Therefore, each of the different elements has its own output format. However, there is some standardization in that all copied records begin with a similar header, and each day's (or hour's) data is written in 10 bytes. If the 80-byte option is requested, the record lengths are 80; otherwise, the record length is 380.

As a general rule, the header record is of the form:

Value 1 - Station identification code
Value 2 - Year
Value 3 - Month
Value 4 - Contains the day for hourly precipitation, otherwise zero.
Value 5 - Monthly(daily) summary code (see Section VI.A)
Value 6 - Number of days in month (hours in day)
Value 7 - Monthly total or average (or daily)
Value 8 - Monthly total or average for second value

Exceptions to the format are as follows:

a) If a certain value in the header does not pertain to an element, its value will be zero. For instance, the precipitation file only has one monthly total, so value 8 (second monthly total) would be zero.

b) The peakflow file stores its three annual codes in place of values 5-7, since the number of days in the month has no application.

c) The snow course file header has the card number value in place of the monthly summary code, and the number of annual measurements in place of the number of days per month.

The remaining data for each element is written in the order below:

PRCP: 31 daily values, 10 bytes each
TEMP: 62 maximum and minimum temperatures, 5 bytes each; one day is written together: MAX MIN MAX MIN, etc.
STRM: 31 daily values, 10 bytes each
SNOW: 62 snowfall and snow depth values, 5 bytes each; one day is written together: SNOW DEPTH SNOW DEPTH etc.
EVAP: 62 evaporation and wind movement values, 5 bytes each; one day is written together: EVAP WIND EVAP WIND etc.
SNOC: 6 months of 4 values each: month, day, snow depth and water equivalent; 10 bytes each
MNTH: variables in the following order, 10 bytes each:
MAXTEMP MINTEMP TMEAN TDEPART HIGHEST HIGHDAY
LOWEST LOWDAY DEGDAYS COOLDAYS PRECIP PDEPART
PPTMAX PMAXDAY SNOWFALL SNODEPTH SMAXDAY
EVAP WIND
PEAK: two values per record, 10 bytes each: the annual peakflow and corresponding gage height
RESV: 31 daily storage values, 10 bytes each
HPCP: 24 hourly values, 10 bytes each

The numbers are written with a real or integer format, depending on the nature of the number. The format corresponds exactly to how the number would appear when printed with a LIST command. For example, daily precipitation values are written with a 10.2 format, and daily temperature values are written with a 5. format.

3. Unformatted

The records written with the unformatted copy, i.e., the COPY command with no operand, follow the same pattern as described in the formatted section; however, they are all written in a real binary format, with four bytes per value.

A problem is encountered when trying to write station numbers that contain character data in a real binary format; the solution is discussed in Section V.C.

C. READING THE COPIED RECORDS

After the records have been copied, they can be read by several other languages. It is especially easy to use the data with a SAS program, if the COPY DIRECT command has been used.

One problem with reading the formatted and unformatted records is that many station numbers, in fact all stations in the snow course file, contain character data. Thus, with formatted data, the program reading the records must use a character format if any of the requested station numbers contain characters. With unformatted records, it is impossible to write character data with a real binary format; thus, if any of the station numbers contain characters, the system first sets the numbers to zero before writing them. A message is always written describing this action and telling the user the real value of the station number before it was converted.

D. JOB CONTROL REQUIREMENTS

Job control requirements for access have been described in Section III.C. Since output files are being created, additional Job Control Language (JCL) cards must be supplied to define the output data sets. These output file cards must be inserted between the EXEC card and the NHIMS card.

It is possible to create up to 10 output files, one for each element, in a single NHIMS run. The file names are OUT1, OUT2 . . ., in that order. These must be related to data set names by DD cards in the job control language. Examples of the format of such cards are given below.

There are two types of output files that can be created, permanent and temporary. A permanent file may be kept after the end of the job for as long as the user wishes. This requires that the user meet certain conventions established by Computer Services. The prospective user should therefore discuss requirements with them. A temporary file is automatically deleted at the end of a job. Because of this, the user does not have to meet any of the computing center conventions, and the facility is readily available.

Generally, a user who has a repeated need for the same data will choose to create a permanent file. Similarly, a user who is developing a program and requires test data during debugging runs will wish to have a set of data only

once, a temporary data set will be preferable. A charge is made for files stored on disk packs, so that a user should check before creating extensive permanent files. There is no charge for temporary files.

1. Permanent files

Output file cards required to create permanent files should be in the following form:

```
//OUT1 DD DSN=aaa.bbb.ccc,UNIT=DISK,
//  SPACE=(TRK,m,RLSE),DISP=(NEW,CATLG)
```

1) File name OUT1 must always be used for the first output file. If additional output files are required, names must be OUT2, OUT3, ..., OUT10.

2) The DSN is usually a three level qualified name. The first level is the project code to which storage is to be charged. The other two levels are identifiers provided by the user. The last level identifier must be different for each OUT1, OUT2, etc. and must be different from any identifier previously used to store data. It is recommended that "bbb" be the users name, although this can be omitted.

3) In the SPACE parameter, the number of tracks must be provided as an integer. For example, if 5.7 tracks are required, rounded up to 6, so that SPACE=(TRK,6,RLSE). Contact User Services at the University Computer Center for more information on how to define tracks.

4) A user may also store data sets on tape. In this case, UNIT=TAPE, the SPACE parameter is left out, and the VOL=SER=number is for a tape. A JIC card and a write label are also required.

5) Since DCB information is provided by NHIMS, no such parameter should be given on the DD card.

6) When the file is no longer needed, you must remember to DELETE the file or you will be charged for the space until Computer Services purges the files at the end of the year. This is most easily done using PGM=IEFBR14.

7) When the copied data are to be read by CMS, the copied file must be written on the CMS disk. This requires that the first three letters of ccc in the DSN be CMS. An additional parameter must also be used on the DD card. This is VOL=REF=CMS.

8) A CMS data set created as in 7 above will be automatically deleted within three days unless special arrangements are made with Computer Services.

9) Numerous examples of file copying can be obtained from the State Climatologist in the Agricultural Engineering Department.

2. Temporary files

Output file cards required to create temporary files should be in the following form:

```
//OUT1 DD DSNAME=&&OUT1,UNIT=DISK,SPACE=(TRK,m),
   DISP=(NEW,PASS)
```

Note that in this case a temporary data set name is used, identified by the leading ampersands. The only variable information required is the number of tracks in the space parameter, which is calculated as above.

The user who wishes to create temporary files will be executing a two-step job, the first copying the file, and the second executing the program which uses the file.

3. Matching Elements with File Names

Regardless of the order in which the user specifies the elements, the data will be written to the OUT1, OUT2, . . ., files in this order:

PRECIPITATION
TEMPERATURE
STREAMFLOW
SNOWFALL
EVAPORATION
MONTHLY SUMMARY
SNOW COURSE
RESERVOIR STORAGE
PEAKFLOW
HOURLY PRECIPITATION

Thus, if the user asks for precipitation, snowfall and snow course elements, OUT1 will contain all requested precipitation data, OUT2 will contain all requested snowfall data, and OUT3 will contain all requested snow course data. Similarly, if temperature and evaporation elements are requested, OUT1 will contain the temperature data and OUT2 will contain the evaporation data. If only one element is requested, the data will always be written to OUT1.

VI. RETRIEVING THE DATA WITHOUT NHIMS

A. File Descriptions

The external files to be managed by the Northwest Hydrologic Information Management System (NHIMS) are permanent SAS data sets. Each type of climatic or hydrologic element is stored in a separate file, and one record of a file usually contains one month's data for a particular weather station. All records are of fixed length, and 4 bytes of each record are reserved for internal use by the SAS system itself.

There are currently NHIMS files for ten different elements: precipitation, air temperature, stream flow, snowfall, evaporation, reservoir storage, snow course, monthly summary, hourly precipitation and peak flow. In addition, one other file is included in the system. The index file contains additional information on all of the NHIMS stations, such as the station's name, county, elevation, latitude and longitude, etc.

In the following file descriptions, each subsection begins with the name of a SAS data library, which contains all data sets relating to a particular element. The library name is used as the operand for the DSN parameter in the JCL DD statement. For example, to access precipitation data, first identify the proper library to the operating system:

```
//ddname  DD  DSN=NHIMS.PRECIP.DAILY,DISP=SHR
```

After each library name, all SAS data sets in the library are named and described. The SAS data set name is used in conjunction with the ddname to refer to a particular file within the SAS program. For example, to access the precipitation data, use the data set name MAINDATA in a SET statement:

```
SET ddname.MAINDATA;
```

Once a data set has been named in a SET statement, all values are accessed simply by using the individual variable names.

Most of the libraries contain one data set with the main climatic or hydrologic data (MAINDATA). A POINTERS data set for each main file is kept in a separate library. The POINTERS files identify the beginning and ending record numbers where each station's data can be found; the number of records in the POINTERS file equals the number of unique stations in the main file.

All POINTER files store the following:

Number of Records(Stations)
Number of Bytes/Record

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
Station code number	STATION	CHAR
First observation(record)	FOBS_PTR	NUM
Last observation(record)	LOBS_PTR	NUM

Each data set description has additional notes which name the units of all numerical values, explain any codes, and identify which numbers must be adjusted on input, because some numerical values are scaled up in order to be stored as integers. All illegal end-of-month values, such as February 31, are stored as missing. The PROC CONTENTS procedure can also be used to obtain a description of any of the data sets.

1. NHIMS.INDEX

SAS Data Set Name - INDEX.

Number of Records - 2,047.

Number of Bytes/Record - 142.

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
Station code number	STATION	CHAR
Station name	NAME	CHAR
Station's county	COUNTY	CHAR
Division or region	DIVISION	NUM
Hydrologic unit code	HUCODE	NUM
Drainage area	AREA	NUM
Latitude of station	LAT	NUM
Longitude of station	LONG	NUM
Elevation of station	ELEV	NUM
Beginning date of printed records for station	REC_BEG	CHAR
Ending date of printed records for station	REC_END	CHAR
Flag for NHIMS station	F_NHIMS	CHAR
Flag for temperature data	F_TEMP	CHAR
Flag for precipitation data	F_PRCP	CHAR
Flag for snowfall data	F_SNOW	CHAR
Flag for streamflow data	F_STRM	CHAR
Flag for month summary data	F_MNTH	CHAR
Flag for divisional data	F_DIVN	CHAR
Flag for reservoir data	F_RESV	CHAR
Flag for peak flow data	F_PEAK	CHAR
Flag for snow course data	F_SNOC	CHAR
Flag for evaporation data	F_EVAP	CHAR
Extra flag for new element	F_ELEM1	CHAR
Extra flag for new element	F_ELEM2	CHAR
Extra flag for new element	F_ELEM3	CHAR

NOTES

1. The units are square miles for drainage area and feet above sea level for elevation.

2. The beginning and ending dates for printed records refer to the data available at the State Climate Office, whether on paper, microfiche, or computer format of some type; these records are not necessarily available from the NHIMS data base. The values are in the form MM-YYYY, where MM is the month and YYYY is the year. If the month is not known, zeroes are stored. If the entire date is unknown, the word UNKNOWN is stored in place of the date. The word ACTIVE is stored in place of the ending date for active stations.

3. The flags (all variables that begin with F_) identify which element files contain data for the current station. The F_NHIMS flag tells whether the station has data in any of the NHIMS files, while the other flags pertain to one particular file. There are some stations in the index which have no data in NHIMS. The values of the flag variables will be either 'N' for no data or 'Y' for yes, data are available for that element.

4. The index file is currently being revised to ensure accuracy and completeness. Although usable at the present time (May, 1987), be aware that some stations may not yet have listings in the index, or the station listings may be incomplete.

2. NHIMS.PRECIP.DAILY

SAS Data Set Name - MAINDATA.

Number of Records - 81,498.

Number of Bytes/Record - 144.

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
Station code number	STATION	CHAR
Calendar year	YEAR	NUM
Month	MONTH	NUM
Monthly summary of codes	MONTHSUM	NUM
Monthly total rainfall X 100	PRCP_TOT	NUM
Remarks code for daily rainfall amount	P_CODE1-P_CODE31	CHAR
Daily rainfall amount X 100	PRECIP1-PRECIP31	NUM

NOTES

1. Missing numeric data are stored as a single period.

2. The units for daily rainfall amounts and the monthly total rainfall are inches.

3. The monthly total and the 31 daily rainfall amounts are adjusted in order to be stored as integers; to get the true data values, each number must be multiplied by 0.01.

4. The daily codes for rainfall amounts are blank if there are no special conditions. Otherwise, the possible values for the codes are:

   - A 'T' means the corresponding daily value was a trace value

   - An 'A' means the corresponding daily value was accumulated

   - An 'E' means the corresponding daily value was estimated

   - A 'B' means the corresponding daily value was both estimated and accumulated

5. The monthly summary variable summarizes the information in the daily code variables. The summary is stored as an integer number, which is used to flag special conditions during the month. If no special conditions exist, then the value is zero; otherwise, the values of the flags mean:

- 8: Missing values during month

- 4: Accumulated values during month

- 2: Estimated values during month

- 1: Trace amounts during month

If more than one condition is flagged, then value of MONTHSUM will be the sum of all the applicable conditions.

3. **NHIMS.TEMP.AIR**

SAS Data Set Name - MAINDATA.

Number of Records - 73,376.

Number of Bytes/Record - 141.

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
Station code number	STATION	CHAR
Calendar year	YEAR	NUM
Month	MONTH	NUM
Flag for missing/estimated data during month	MONTHSUM	NUM
31 maximum daily temperatures	MAXTMP1-MAXTMP31	NUM
31 minimum daily temperatures	MINTMP1-MINTMP31	NUM

NOTES

1. Missing numeric data are stored as a single period.

2. The units for temperature are degrees Fahrenheit.

3. Daily values that are estimates are stored as out-of-range negative numbers; each one is scaled down by a factor of 200. If the monthly flag shows there are estimates for one month, each daily value should be checked to see if it is less than -80; if so, it is an estimate and should be scaled up by 200. The number -80 is used because it is out of range for a low temperature; yet if you add the scaling factor 200, it is also out of range for a high temperature.

4. The monthly summary variable summarizes the information in the daily code variables. The summary is stored as an integer number, which is used to flag special conditions during the month. If no special conditions exist, then the value is zero; otherwise, the values of the flags mean:

   - 128: Missing maximum temperatures during month

   - 32: Estimated maximum temperatures during month

   - 8: Missing minimum temperatures during month

   - 2: Estimated minimum temperatures during month

If more than one condition is flagged, then value of MONTHSUM will be the sum of all the applicable conditions.

4. **NHIMS.STREAM**

SAS Data Set Name - MAINDATA.

Number of Records - 136,828.

Number of Bytes/Record - 146.

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
Station code number	STATION	CHAR
Calendar year	YEAR	NUM
Month	MONTH	NUM
Monthly total discharge X 100	STRM_TOT	NUM
31 daily values: mean daily discharge X 100	FLOW1-FLOW31	NUM

NOTES

1. The 31 daily values and the monthly total are adjusted in order to be stored as integers; to get the true data values, each number must be multiplied by 0.01.

2. All missing data are stored as a single period (.) .

3. The units for discharge are cubic feet per second (cfs).

5. NHIMS.SNOW.FALL

SAS Data Set Name - MAINDATA.

Number of Records - 32,324.

Number of Bytes/Record - 237.

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
Station code number	STATION	CHAR
Calendar year	YEAR	NUM
Month	MONTH	NUM
Monthly summary of codes	MONTHSUM	NUM
Monthly total snowfall X 10	SNOW_TOT	NUM
Remarks code for daily snowfall amount	S_CODE1-S_CODE31	CHAR
Remarks code for daily snow depth	D_CODE1-D_CODE31	CHAR
Daily snowfall amount X 10	SNOW1-SNOW31	NUM
Daily snow depth	DEPTH1-DEPTH31	NUM

NOTES

1. Missing numeric data are stored as a single period (.) .

2. The units for snowfall amounts, snow depths, and the monthly total are inches.

3. The monthly total and the 31 daily snowfall amounts are adjusted in order to be stored as integers; to get the true data values, each number must be multiplied by 0.1.

4. The daily codes for snowfall amounts and snow depths are blank if there are no special conditions. Otherwise, the possible values for the codes are:

   - A 'T' means the corresponding daily value is a trace

   - An 'A' means the corresponding daily value is accumulated

   - An 'E' means the corresponding daily value is estimated

- A 'B' means the corresponding daily value is both estimated and accumulated

5. The monthly summary variable summarizes the information in the daily code variables. The summary is stored as an integer number, which is used to flag special conditions during the month. If no special conditions exist, then the value is zero; otherwise, the values of the flags mean:
   - 128: Snowfall amounts missing during month
   - 64: Snowfall amounts accumulated during month
   - 32: Snowfall amounts estimated during month
   - 16: Trace snowfall amounts during month
   - 8: Snow depths missing during month
   - 4: Snow depths accumulated during month
   - 2: Snow depths estimated during month
   - 1: Trace snow depths during month

   If more than one condition is flagged, the value of MONTHSUM will be the sum of all the applicable conditions.

6. NHIMS.EVAP

SAS Data Set Name - MAINDATA.

Number of Records - 2,296.

Number of Bytes/Record - 271.

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
Station code number	STATION	CHAR
Calendar year	YEAR	NUM
Month	MONTH	NUM
Total monthly wind movement	WIND_TOT	NUM
Total monthly evaporation X 100	EVAP_TOT	NUM
Monthly summary of codes	MONTHSUM	NUM
31 daily flags for estimated or accumulated wind values	W_CODE1-W_CODE31	CHAR
31 daily flags for estimated or accumulated evaporation values	E_CODE1-E_CODE31	CHAR
31 daily wind movement values	WIND1-WIND31	NUM
31 daily evaporation values X 100	EVAP1-EVAP31	NUM

NOTES

1. The 31 daily evaporation values and the total monthly evaporation are adjusted to be stored as integers; to get the true values, each number must be multiplied by 0.01.

2. Missing numeric data are stored as a single period (.) .

3. The units for evaporation are inches; the units for wind movement are miles.

4. If non-blank, the daily codes for wind and evaporation identify the following special conditions:

   - An 'A' means the corresponding daily value is accumulated

   - An 'E' means the corresponding daily value is estimated

- A 'B' means the corresponding daily value is both estimated and accumulated

5. The monthly summary variable summarizes the information in the daily code variables. The summary is stored as an integer number, which is used to flag special conditions during the month. If no special conditions exist, then the value is zero; otherwise, the values of the flags mean:

   - 128: Wind movements missing during month

   - 64: Wind movements accumulated during month

   - 32: Wind movements estimated during month

   - 8: Evaporation values missing during month

   - 4: Evaporation values accumulated during month

   - 2: Evaporation values estimated during month

   If more than one condition is flagged, the value of MONTHSUM will be the sum of all the applicable conditions.

7. NHIMS.RESVOIR

SAS Data Set Name - MAINDATA.

Number of Records - 7,618.

Number of Bytes/Record - 145.

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
Station code number	STATION	CHAR
Calendar Year	YEAR	NUM
Month	MONTH	NUM
Code for time of day	TIMECODE	NUM
Code for data units	UNITCODE	CHAR
31 values: daily storage	STORGE1-STORGE31	NUM

NOTES

1. The 31 daily values may or may not need to be adjusted, depending on the value of the units code:

   - If UNITCODE = 'A', then the units of storage are acre-feet, and no adjustment of the daily values is necessary.
   - If UNITCODE = 'E', then the units of storage are feet of elevation above sea level, and the daily values must be multiplied by 0.01 on input.
   - If UNITCODE = 'S', then the units of storage are feet above datum, and the daily values must be multiplied by 0.01 on input.

2. All missing data are stored as a single period (.)

3. The units for the time code variable are hours in 24-hour time.

8. NHIMS.PEAKS

SAS Data Set Name - MAINDATA.

Number of Records - 17,249.

Number of Bytes/Record - 31.

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
Station code number	STATION	CHAR
Water Year of Peak Flow	WAT_YEAR	NUM
Month of Peak Flow	MONTH	NUM
Day of Peak Flow	DAY	NUM
Calendar Year of Peak Flow	YEAR	NUM
Gage Height X 100	GAGE_HT	NUM
Annual Peak Flow	PEAKFLOW	NUM
Remarks Code for Gage Height	GH_CODE	CHAR
Remarks Code for Peak Flow	PK_CODE	CHAR
Remarks Code for Regulation or Diversion	RD_CODE	CHAR

NOTES

1. The values for gage height are adjusted in order to be stored as integers; to get the true data values, each number must be multiplied by 0.01.

2. Missing numeric data are stored as a single period (.); missing or non-applicable character data are stored as blanks.

3. The units for peak flow are cubic feet per second; the units for gage height are feet.

4. For the gage height remarks code:

   - a '1' indicates that the gage height was due to backwater; NHIMS will print a 'BW' message.

   - a '2' indicates that the gage height was not the maximum for the water year; NHIMS will print an 'NM' message. Also, the record immediately following contains information for the same water year. This information may be additional peakflow records or the maximum gage height value. If there are multiple records for one water year, the last one will always contain the maximum gage height.

5. For the peak flow remarks code:

   - a '1' indicates that the value given is a maximum daily; NHIMS will print an 'MD' message.

   - a '2' indicates that the discharge is estimated from information at another site; NHIMS will print an 'ES' message.

   - a '3' indicates that the maximum was due to dam failure; NHIMS will print a 'DF' message.

   - a '4' indicates that the actual discharge is less than the indicated value; NHIMS will print an 'LT' message.

6. For the regulation and diversion remarks code:

   - a '1' indicates an unknown effect of regulation or diversion; NHIMS will print an 'UR' message.

   - a '2' indicates a known significant effect of regulation or diversion; NHIMS will print a 'KR' message.

9. NHIMS.SNOW.COURSE

SAS Data Set Name - MAINDATA.

Number of Records - 8,698.

Number of Bytes/Record - 79.

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
FIPS code for state	STATE	NUM
Code showing when monthly measurement occurred	CARDNO	NUM
Monthly snow depths	DEPTH1-DEPTH6	NUM
Month of measurement	MONTH1-MONTH6	NUM
Day of measurement	DAY1-DAY6	NUM
Water Year	YEAR	NUM
Snow water equivalent	WATER1-WATER6	NUM
SCS station code number	STATION	CHAR
Station type	TYPE	CHAR

NOTES

1. The units for snow depth and snow water equivalent are inches.

2. The possible values for the CARDNO variable are:

   - 1: first-of-month measurement

   - 2: mid-month measurement

   - 3-6: special measurements

3. The station type variable (TYPE) has the following possible values:

   - A: aerial station

   - B: soil moisture station

   - other possible values, the meaning presently unknown

10. NHIMS.MONTHLY

SAS Data Set Name - MAINDATA

Number of Records - 95,821

Number of Bytes/Record - 84

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
Calendar year	YEAR	NUM
Month	MONTH	NUM
Mean maximum monthly temperature	MAXTEMP	NUM
Mean minimum monthly temperature	MINTEMP	NUM
Monthly mean temperature	TMEAN	NUM
Departure from normal temperature	TDEPART	NUM
Heating degree days	DEGDAYS	NUM
Highest maximum temperature during month	HIGHEST	NUM
Day of occurrence of highest temperature	HIGHDAY	NUM
Lowest minimum temperature during month	LOWEST	NUM
Day of occurrence of lowest temperature	LOWDAY	NUM
Total precipitation during month	PRECIP	NUM
Precipitation departure from normal	PDEPART	NUM
Maximum daily precipitation during month	PPTMAX	NUM
Date of maximum daily precipitation	PMAXDAY	NUM
Total monthly snowfall	SNOFALL	NUM
Maximum depth of snow on ground during month	SNODEPTH	NUM
Day of occurrence of maximum snow depth	SMAXDAY	NUM
Total wind run for month	WIND	NUM
Total monthly evaporation	EVAP	NUM
Cooling degree days	COOLDAYS	NUM
Flag for maximum monthly temperature	PLUS1	CHAR
Flag for minimum monthly temperature	PLUS2	CHAR
Flag for maximum monthly precipitation	PLUS3	CHAR

FIELD	VARIABLE NAME	TYPE
Flag for maximum monthly snow depth	PLUS4	CHAR
Flag for total monthly precipitation	PLUS5	CHAR
Flag for total monthly snowfall	PLUS6	CHAR

NOTES

1. Values of the PLUS flags will have the following meanings:

   - +: Value occurred on more than one day
   - A: Accumulated amount
   - B: Accumulated amount includes estimated values
   - E: Estimated amount
   - I: Monthly value based on an incomplete period
   - M: Data element for the flag is missing
   - T: Trace value

2. The units are inches for snowfall, evaporation and precipitation, degrees Fahrenheit for temperature, miles for wind movement, and degree Fahrenheit-days for heating and cooling degree days.

11. NHIMS.PRECIP.HOUR

SAS Data Set Name - MAINDATA.

Number of Records - 158,400.

Number of Bytes/Record - 94.

RECORD DESCRIPTION

FIELD	VARIABLE NAME	TYPE
Station code number	STATION	CHAR
Calendar year	YEAR	NUM
Month	MONTH	NUM
Day	DAY	NUM
Daily summary of codes	DAYSUM	NUM
Daily total rainfall X 100	HPCP_TOT	NUM
Remarks code for hourly rainfall amount	H_CODE1-H_CODE24	CHAR
Hourly rainfall amount X 100	HPCP1-HPCP24	NUM

NOTES

1. Missing numeric data are stored as a single period (.) .

2. The units for hourly precipitation amounts and the daily total precipitation are inches.

3. The daily total and the 24 hourly precipitation amounts are adjusted in order to be stored as integers; to get the true data values, each number must be multiplied by 0.01.

4. The hourly codes for precipitation amounts are blank if there are no special conditions. Otherwise, the possible values for the codes are:

   - An 'M' means the corresponding hourly value was missing

   - A 'T' means the corresponding hourly value was a trace value

   - An 'A' means the corresponding hourly value was accumulated

   - An 'E' means the corresponding hourly value was estimated

- A 'B' means the corresponding hourly value was both estimated and accumulated

- An 'S' means the corresponding hourly value contained melting snow

5. The daily summary variable summarizes the information in the hourly code variables. The summary is stored as an integer number, which is used to flag special conditions during the month. If no special conditions exist, then the value is zero; otherwise, the values of the flags mean:

   - 16: Melting snow in measurement(s) during month

   - 8: Missing values during month

   - 4: Accumulated values during month

   - 2: Estimated values during month

   - 1: Trace amounts during month

   If more than one condition is flagged, then value of DAYSUM will be the sum of all the applicable conditions.

12. NHIMS.FORMATS

The format library contains permanent, user-defined SAS formats for use by the NHIMS system; thus, it is unlike the other libraries in that it does not contain actual data. The formats have been created using PROC FORMAT, are stored in load module form, and can be used by any SAS program which properly identifies the library. In order to use the formats, override the LIBRARY DD statement in the SAS cataloged procedure:

```
//LIBRARY  DD  DISP=(OLD,PASS),DSN=NHIMS.FORMATS
```

The remainder of this section describes the formats.

A) Format name - MNTH.

This is a value format which converts the numeric values 1-13 to the full name of the corresponding month. The statement:

```
PUT  MONTH  MNTH. ;
```

would print 'JANUARY' if the value of MONTH is 1, or would print 'AUGUST' if the value of MONTH is 8.

B) Format name - LATFORM.

This is a picture format intended for use with six-digit latitude values. It formats a numeric value into the picture '00-00-00'. The statement:

```
PUT  LAT  LATFORM. ;
```

would print the value 464400 as 46-44-00.

C) Format name - LONGFORM.

This is a picture format intended for use with seven-digit longitude values. It formats a numeric value into the picture '000-00-00'. The statement:

```
PUT  LONG  LONGFORM. ;
```

would print the value 1165800 as 116-58-00.

D) Format name - HUCFORM.

This is a picture format intended for use with eight-digit hydrologic unit codes. It formats a numeric value into the picture '00-00-00-00'. The statement:

```
PUT  HUCODE  HUCFORM. ;
```

would print the value 17060096 as 17-06-00-96.

E) Format name - $GHFORM.

This is a value format which converts the character values 1 or 2 to the corresponding character code for gage height in the peak flow file. The statement:

```
PUT  GH_CODE  $GHFORM. ;
```

would print 'BW' if the value of GH_CODE is '1', or would print 'NM' if the value of GH_CODE is '2'. Any other values would be printed as blanks.

F) Format name - $PKFORM.

This is a value format which converts the character values 1-4 to the corresponding character code for peak flow in the peak flow file. The statement:

```
PUT  PK_CODE  $PKFORM. ;
```

would print the corresponding letter codes for PK_CODE. (See Section VI.A.8.)

G) Format name - $RDFORM.

This is a value format which converts the character values 1-2 to the corresponding character code for regulation and diversion in the peak flow file. The statement:

```
PUT  RD_CODE  $RDFORM. ;
```

would print the corresponding letter codes for RD_CODE. (See Section VI.A.8.)

B. SAMPLE RETRIEVAL PROGRAM

The following program can be used to access data from the air temperature file. By changing the DD statement and the station numbers in the STATIONS data step, the same program can be used to access data for other elements or other stations. The intent is to allow you to retrieve the SAS data you are interested in without using the NHIMS system. If you want the index data as well, you must also include a DD statement for that file. If you want to use the NHIMS formats, you must use a ddname of LIBRARY to identify the NHIMS.FORMATS file, and this must be the first DD statement after the EXEC statement.

```
//JREAD    JOB  (XXXXX,XXX-XX-XXXX),XXXXXX
//*       PASSWORD=XXXXXX
/*        DEST=TS
//ASK     EXEC  SAS
//SDS     DD  DISP=SHR,DSN=NHIMS.TEMP.AIR
//SDS     DD  DISP=SHR,DSN=NHIMS.POINTERS
//SYSIN   DD  *
    OPTIONS NOCENTER;

    DATA STATIONS;  /* user requested stations */
      INPUT STATION $;
      CARDS;
        102390
        106152
    ;


    PROC SORT DATA = STATIONS;  /* not needed if  */
                                /* already sorted */
      BY STATION;



    DATA PTRS;
       /* match station requests with their pointers */
      MERGE SDS.POINTERS(IN=LEGAL)
            STATIONS(IN=REQUEST);
        BY STATION;

      IF REQUEST AND LEGAL ;


    DATA SUBSET;  /* find the requested data */
      SET PTRS;
      DO I = FOBS_PTR TO LOBS_PTR;
         SET SDS.MAINDATA POINT = I;
         DROP FOBS_PTR LOBS_PTR ;

     /* Can insert subsetting IF statements here in  */
     /* order to limit the amount of data retrieved. */
     /* Whether or not you use subsetting IFs, you   */
     /* ALWAYS use an output statement.              */
     /* IF YEAR ¢= 1980  THEN  OUTPUT;               */

        OUTPUT; /* INCLUDED ONLY WHEN SUBSETTING "IF" */
                /* IS NOT USED */
      END;

   /* now add your own SAS program */

     PROC PRINT DATA = SUBSET;
          BY STATION;
          ID YEAR MONTH;
```

VII. CHANGES FROM HISARS TO NHIMS

Although the same command language used in the HISARS system is retained in NHIMS, some changes were made in the implementation of the new system. The most obvious ones are in the JCL statements necessary to run the system, and in the use of the COPY command. Minus those two exceptions, any programs that currently run with HISARS will run on the NHIMS system; the other changes concern the addition of new commands.

1. JCL statements

   The EXEC statement should now request the NHIMS cataloged procedure, and the statement identifying the beginning of your NHIMS commands should be called NHIMS. Change your JCL statements to look like this:

```
//Jname  JOB  (projectcode,aaa-bb-cccc),yourname,CLASS=A,
//*     MSGLEVEL=(0,0)
/*      DEST=TS
//      EXEC   NHIMS
//NHIMS   DD  *

------ nhims commands -----

/*
```

   NOTE: You must include the "CLASS=A" statement in the job card. This provides the necessary memory allocation.

2. COPY command

   The changes in the COPY command are the following: (for more information about COPY, see Section V.)

   - Use OUT1, OUT2, ..., OUT10 for the DD names, instead of OUTA, OUTB, ...

   - All stations requested for one element are written to the same file, not to separate files, as was the case with HISARS. One output file is created for each requested element and the information is written in sorted order by the station number.

   - The DIRECT operand creates a SAS data set instead of an ISAM file.

   - No adjustment of numbers from integer to real is required. All numbers are adjusted before being copied and will be written just as they would appear on an output listing.

3. ELEMENT command

Two new element operands have been added: one for the snow course element (SNOWCOURSE), and one for the monthly summary file (MONTHLY). In addition, the operand PRECIPITATION can be used as a synonym to retrieve rainfall data.

4. PROCESS command

- One new process has been added: CALENDAR.

- The SUMMARY process has been dropped.

5. Retrieval commands

The new data retrieval commands that were not available in HISARS are:

- METRIC

- POINTERS

- NOHEADER

- SORTED

In addition, HUCODE is a synonym for BASIN and DIVISION is a synonym for REGION.

VIII. DATA AND INFORMATION GUIDE

Additional information on the sources of data and about climate or water data will be added here in the next edition of the NHIMS User's Guide.