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WATER RESOURCES DATA SYSTEM

USER'S GUIDE

by

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1. INTRODUCTION

The Water Resources Data System (WRDS) is a computerized data base with flexible methods of retrieval of various resource data. It presently consists of five major data bases: Surface Water Quantity, Water Quality (surface and ground), Climatic, Water Well Levels, and Snow Course. Each data base is then broken down into data files (see Figure 1).

The computerization process began in 1965 when WRRI started encoding all regularly reported streamflow data. All regularly reported surface and ground water quality data, climatologic and snow course data were added later. In addition, data not easily available anywhere else have been added to the system as they have been located. As the data base expanded, the number of retrieval and analysis programs also grew to output the data in a meaningful way. This report describes the WRDS in its present form and gives instructions on how it can be accessed. Previous publications describe earlier versions of the system (Embree and Cole, 1970; Embree and Larson, 1970; Smith, 1974; Smith, Pelton and Bender, 1976; Pelton and Smith, 1977; Pelton, 1979). Vicki Pelton and Meg Frantz assisted the authors of this report in the design and output of the latest system.

Presently, the WRDS is the most extensive data base of Wyoming water resources available anywhere. It provides many kinds of analytical output, and is a fast, effective way to obtain large or small amounts of information. Most requests for data are processed and sent out within 2 working days, and many are mailed the same day the request

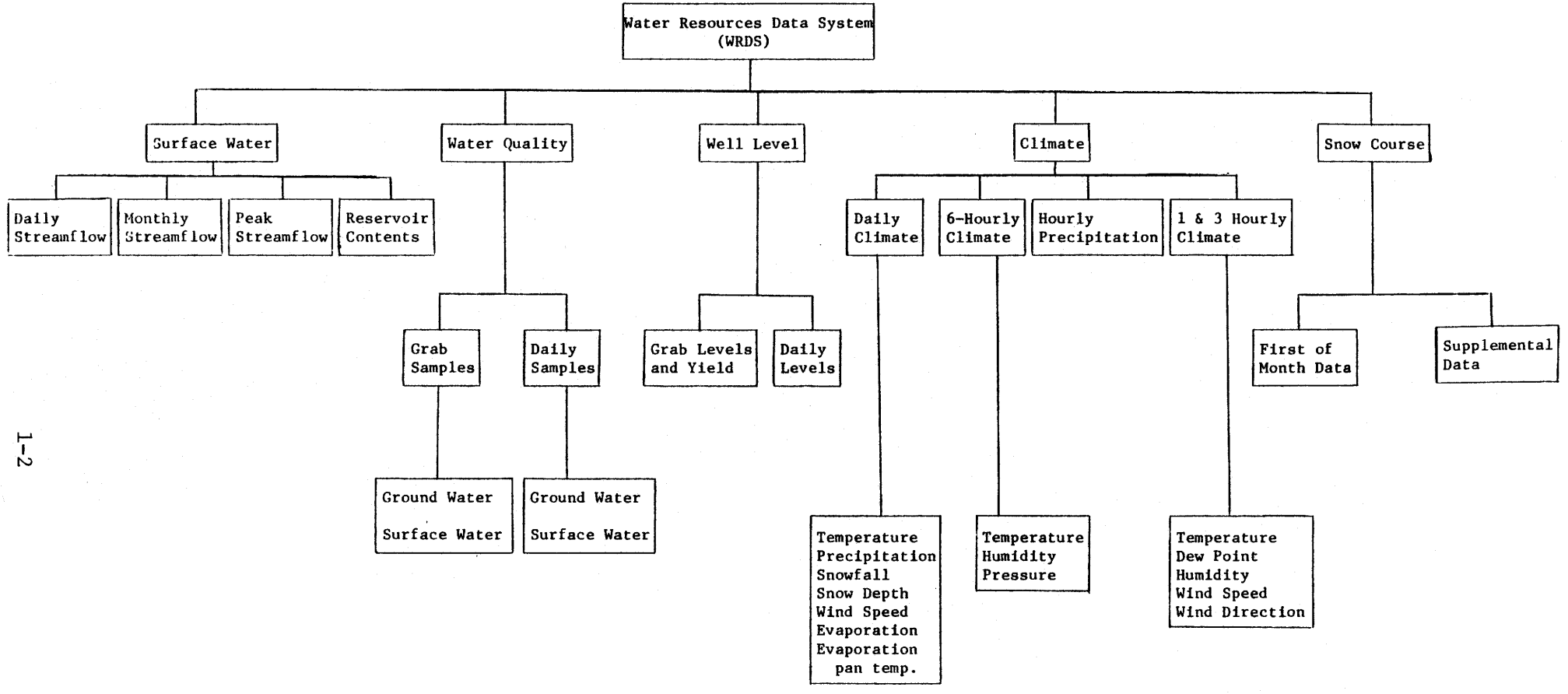

Water Resources Data System (WRDS)
Surface Water
Water Quality
Well Level
Climate
Snow Course
Daily Streamflow
Monthly Streamflow
Peak Streamflow
Reservoir Contents
Grab Samples
Daily Samples
Grab Levels and Yield
Daily Levels
Daily Climate
6-Hourly Climate
Hourly Precipitation
1 & 3 Hourly Climate
First of Month Data
Supplemental Data
Ground Water
Surface Water
Ground Water
Surface Water
Temperature
Precipitation
Snowfall
Snow Depth
Wind Speed
Evaporation
Evaporation pan temp.
Temperature
Humidity
Pressure
Temperature
Dew Point
Humidity
Wind Speed
Wind Direction

FIGURE 1

is received. New programs written to the customer's specification also can be handled, although these requests naturally take longer to complete. For additional information about the system or new programs that have been written, write to the Water Resources Research Institute, Box 3067, University Station, Laramie, Wyoming 82071, or call at (307) 766-2143. See Chapter 13 for a detailed explanation of custom programming and a list of charges for the programs described in this report.

The loose-leaf format has been chosen for this report to facilitate updates. As new programs are written and as old ones are modified revisions to the manual will become available. We hope that this will help to make the WRDS more adaptive to the water resource needs of the state.

2. BASIC RETRIEVAL PROGRAMS

For each data base, there are five programs available to retrieve data. These programs output the data without any statistics or analyses. The programs are:

LISTDATA

DATE

TAPE

PLOTL

PLOTT

LISTDATA prints the data in the form that it is stored, be that water quality grab samples or daily streamflow values. For all data bases, the data can be retrieved by:

a) station number

b) latitude-longitude

c) township-range (6th P.M. in Wyoming only)

d) county

e) drainage basin

Water quality data can also be retrieved by site type, use code, or source organization of the data, and can produce summary statistics on the data. The data retrieved can be limited further by specifying a range of dates, particular parameters or data files, or a second retrieval option (source organization, for example). The specific options for each data base are listed under the program descriptions for that data base.

DATE prints the station headers and the date range of available data for that station. The stations can be retrieved in the same way as for LISTDATA.

TAPE is a program that has been written to facilitate sending our data to users on magnetic tape. We now have the capability to write our data to tape in 80 character records, in either EBCDIC or ASCII, labeled or unlabeled, 7 or 9 track, with a density of 556, 800, 1600, or 6250 BPI. A separate manual is sent with the tape to describe the format of the data, and a source listing of our FORTRAN program to read the tape.

PLOTL is a set of programs on the WRDS which plot stations by location. The plots can be made to any scale, for convenient overlaying on a map. Each data base can plot the stations in 3 to 6 different styles, and each is capable of preventing overprinting of data by stations too close together (a new "overlap" point is created). The size of the print can also be changed to reduce overprinting. Primary retrieval for these plots must be by latitude-longitude or township-range. The individual program descriptions explain all the options and styles for each data base.

PLOTT is a set of programs which plot the WRDS data versus time, allowing the user to discern trends in the data in a visual manner. A year on the x-axis can be represented in 3.6, 9, or 23.4 inches; the computer can scale the y-axis values to the data, or the y-axis value range can be pre-set to allow comparison of plots. Various options are available in each data base which reflect their different types of data. These are explained in the individual program descriptions.

The LISTDATA, DATE, PLOTT, and PLOTL programs are differentiated for the various data bases by adding a 2-letter code. Thus, the DATE

programs are DATESW, DATEWL, DATECL, and DATESC. For the two plotting programs, the data base code is added before the final letter. Thus, PLOTSWL plots surface water data by location, and PLOTSWT plots surface water data versus time.

Water quality has one additional basic retrieval program. LPARAM lists all of the water quality grab parameters that are stored on the WRDS. Currently there are 746 parameters.

3. DATA SOURCES

The WRDS has been in existence for over ten years. During that period, various state and federal agencies and private companies have used the system for storage and retrieval of data. This haphazard approach has resulted in many different sources for the data in some of our data bases, primarily in water quality. The discussion below briefly summarizes the sources and types of data in the WRDS by data base. If public agencies or private groups continue to fund WRDS, new water resources data will be entered onto the system as they are published or sent to WRRI. In addition, ground water quality and level data already on the system, most of which are not identified by aquifer, will be assigned aquifers by WRRI hydrologists, in all cases in which information on well construction is available.

Also, climatic, streamflow, and water quality data from federal agencies will be loaded onto the system as they become available on tape, usually one year after collection. These projects are intended to keep the data bases current and useful for those undertaking water resources projects.

Users of the WRDS system should be cautioned that WRRI considers it the responsibility of each agency or private concern reporting data to ensure that its data are precise and accurate. WRRI will not correct errors, obvious or subtle, in published data before entering them onto the system. The water quality data printouts contain the laboratory which conducted the analyses. Printouts from all data bases contain the agency or private company responsible for the data, if the information

is available. Therefore, if a user suspects the validity of some data, he can question those who generated the data.

Surface Water Quantity

USGS WATSTOR Data

The United States Geological Survey maintains streamflow gaging stations throughout the state. All mean daily flow data collected are available, both historical and current.

WRRI Snowy Range Data

WRRI has an ongoing research project in the Snowy Range Mountains west of Laramie. Daily streamflow has been measured since 1965 at various locations in the area.

State Water Commissioners Data

Daily streamflow and reservoir storage data from the State Engineer's annual reports have been encoded on the WRDS. This includes data for canals and ditches in addition to natural streams.

WRRI EPA Data

WRRI currently collects streamflow data under an EPA grant at 3 gages on the Little Thunder Creek.

Water Quality and Well Levels

WRRI Research Data

WRRI conducts several water quality studies each year. The types of water quality data collected depend on the objectives of the studies. Those WRRI studies which have provided data to WRDS over the past two years include a reconnaissance of ground water drinking water quality in

Wyoming, an acid precipitation investigation in Albany County, and a limnology study in the upper Green River Basin.

BLM Data

The U.S. Bureau of Land Management submits data collected during grazing environmental statements and routine monitoring programs. The data cover approximately 30 major species, toxic heavy metals, nutrients, and bacteria.

USGS WATSTOR Data

The United States Geological Survey collects data and places them on WATSTOR data tapes. Water quality data typically include the major constituents, such as calcium, magnesium, sodium, bicarbonate, sulfate, and chloride. Some inorganic species with primary drinking water standards are occasionally monitored.

USGS Oil and Gas Data

Some oil and gas drillers submit water quality data to USGS on major species, pH, total dissolved solids, and occasionally other species. These data are principally from oil- and gas-bearing formations, but may include drill stem tests from overlying and underlying formations.

EPA Public Water Supply Survey

The U.S. Environmental Protection Agency has monitored approximately 200 of the 300 community public water systems in Wyoming for the ten inorganic species with primary drinking water standards. They have also monitored approximately 20 of the 300 community public water supply systems for six of the seven organic species with primary drinking water

standards. This data base represents the most comprehensive information available on the organic chemicals and many of the inorganic species.

LETC Data

The U.S. Department of Energy's (DOE) Laramie Energy Technology Center (LETC) collects water quality data from its synfuels sites and stores them on WRDS. These data are from a coal gasification project near Hanna, an oil shale project near Rock Springs, and a tar sands project near Vernal, Utah. Water quality is described by a large number of typical and atypical constituents.

DOE NURE Data

DOE has undertaken a National Uranium Resource Evaluation (NURE) to assess domestic uranium areas and identify areas favorable for commercial exploration. NURE includes sampling of wells, springs, and streams primarily for temperature, pH, specific conductivity, and dissolved uranium.

DOE Oil and Gas Tape

DOE has collected water quality data, primarily during oil and gas drilling. Some of the data have come from DOE sampling programs, while the remainder have come principally from drillers and energy companies. Data cover a broad spectrum of constituents and are concentrated in the Powder River Basin.

State Lab Data

The Wyoming Department of Agriculture has conducted hundreds of volunteer potability studies for private well owners. Data are on total

dissolved solids, hardness, sulfate, nitrate, total coliform, and occasionally sodium or other constituents.

DEQ Mine Plans

The Wyoming Department of Environmental Quality has permitted over 60 uranium and coal mine plans in the state, many of which contain data on water quality and water levels. The plans generally include quarterly to annual monitoring of a concentration of wells in a section or few sections. A broad spectrum of constituents are analyzed at each site.

Department of Health Data

The Wyoming Department of Health has conducted water quality surveys of public water supplies for fluoride and selenium. Eighty-eight systems have been monitored at least once for fluoride, and an equal number have been monitored at least once for selenium.

State Engineer Data

The Wyoming State Engineer's Office requests one water quality sample as part of its permitting process for drinking water wells. Water quality analyses typically include total dissolved solids, hardness, sulfate, nitrate, and total coliform. Occasionally the analyses include other major species.

Bureau of Reclamation Data

The U.S. Bureau of Reclamation maintains a water quality monitoring program. These data are principally in the Green River area. These data typically include dissolved solids, sulfate, nitrate, and turbidity.

Climate Data

NOAA Data

The National Oceanic and Atmospheric Administration (NOAA) collects and encodes daily, hourly, and 3-hourly climatic data. Daily climatic data which are published, but not encoded onto their system, are also available.

WRRI Data

The Water Resources Research Institute collects and encodes hourly, 3-hourly, and 6-hourly climatic data for the Snowy Range area, the Pole Mountain area, and at various mine sites in the northeast portion of the state.

Snow Course Data

SCS Data

The Soil Conservation Service maintains over 200 snow pack monitoring locations. All of their first-of-month and supplemental measurements have been encoded.

4. SURFACE WATER QUANTITY PROGRAMS

The surface water quantity data base contains four types of data: daily, monthly, peak flow values, and end-of-month reservoir contents data. Whenever daily data are available, monthly values are calculated from the daily data. For each reporting location, a header record is stored on the data base, which contains all location, drainage basin, source organization, and availability data for the data. Township-range location can be specified as accurately as quarter-quarter-quarter section. "(P)" on the third line of the header indicates the data are public; "(C)" indicates confidential information--the availability of the data is limited by the source organization.

DATESW

This program prints the available surface water stations and optionally the date ranges of the sample data for daily streamflow, monthly streamflow, reservoir contents, and/or peak streamflow. Any combination of data types can be requested. If several data types are requested, and only headers are printed, it is not possible to tell what data types each header has.

For each listing the user should specify:

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

whether just headers or headers and dates are wanted

SURFACE WATER
YEAR RANGES OF DATA AVAILABLE ON THE
WATER RESOURCES DATA SYSTEM
WYOMING WATER RESOURCES RESEARCH INSTITUTE, LARAMIE, WY

YEAR RANGES FOR THE FOLLOWING DATA TYPES WERE REQUESTED:
DAILY DATA FROM THE DAILY FILE
MONTHLY DATA FROM THE DAILY FILE
MONTHLY DATA FROM THE MONTHLY FILE
RESERVOIR DATA FROM THE RESERVOIR FILE
PEAK DATA FROM THE DAILY FILE
PEAK DATA FROM THE PEAK FILE

DAILY STREAMFLOW DATA (ALWAYS INCLUDES MONTHLY SOMETIMES INCLUDES PEAK)	MONTHLY STREAMFLOW DATA	END OF MONTH RESERVOIR CONTENTS DATA	ANNUAL PEAK STREAMFLOW DATA

FONTENELLE CREEK NEAR HERSCHLER RANCH NEAR FONTENELLE, WYO STATION NO. 092105.00
LATITUDE 42-05-46 LONGITUDE 110-24-57 NW1/4SW1/4NE1/4 SECTION 2 TOWNSHIP 24 N,RANGE 115 W 6TH P.M.
ELEVATION 6950.00 FT DRAINAGE AREA 152.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15370000
LINCOLN COUNTY DATA FROM USGS (P)

1952 - 1976	1951 - 1976		1952 - 1976
1978 - 1978	1978 - 1978		

FONTENELLE CREEK NEAR FONTENELLE, WYOMING STATION NO. 092110.00
LATITUDE 42-05-50 LONGITUDE 110-13-20 NE1/4 SECTION 3 TOWNSHIP 24 N,RANGE 113 W 6TH P.M.
ELEVATION 6580.00 FT DRAINAGE AREA 224.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15370000
LINCOLN COUNTY DATA FROM USGS (P)

1916 - 1919	1914 - 1919		1916 - 1919
1932 - 1953	1932 - 1953		1932 - 1953

GREEN RIVER TRIBUTARY NEAR FONTENELLE, WYO. STATION NO. 092111.00
LATITUDE 42-02-40 LONGITUDE 110-09-40 SE1/4 SECTION 19 TOWNSHIP 24 N,RANGE 112 W 6TH P.M.
ELEVATION UNKNOWN DRAINAGE AREA 3.75 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15360000
LINCOLN COUNTY DATA FROM USGS (P)

1969 - 1974

FONTENELLE RESERVOIR NEAR FONTENELLE, WYOMING STATION NO. 092111.50
LATITUDE 42-02-00 LONGITUDE 110-04-00 SECTION 25 TOWNSHIP 24 N,RANGE 112 W 6TH P.M.
ELEVATION UNKNOWN DRAINAGE AREA 4280.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15320000
LINCOLN COUNTY DATA FROM USGS (P)

1965 - 1975

DAYAVE

This program computes and prints average daily streamflows based on daily values for a specified year range. The standard deviations of the daily flow for each day in the range of years are also computed. The calculations can include all available data or they can include only years with complete data. In either case, incomplete years are listed. Monthly mean flows and total flows in cfs and acre-feet are also computed.

For each request, the user should specify:

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

data range (unless all are to be used)

whether the calculations should include years with missing data

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 09188P5.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7463.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

*** AVERAGE DAILY STREAMFLOW IN CFS FOR 1965 - 1976 ***

ALL YEARS SPECIFIED INCLUDED

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	DAY
1	222.0	169.2	136.5	109.7	125.2	124.2	138.7	374.8	1832.0	1797.8	900.0	433.6	1
2	222.4	165.1	134.7	107.0	122.6	121.9	144.1	414.2	1770.8	1756.8	909.8	415.9	2
3	219.3	156.4	135.0	109.4	125.2	117.8	148.1	471.6	1800.8	1759.0	889.3	407.6	3
4	217.3	160.9	133.5	111.8	124.8	116.7	151.9	536.9	1846.2	1772.5	841.6	394.8	4
5	217.3	166.3	132.3	115.2	121.5	118.2	156.3	611.1	1889.7	1804.2	800.2	381.4	5
6	220.4	166.0	128.9	116.8	119.2	118.8	162.3	690.8	1986.6	1846.7	791.9	370.9	6
7	214.9	167.1	125.2	117.4	115.1	120.5	169.8	781.1	2076.3	1853.3	772.9	371.8	7
8	210.5	171.9	120.6	116.8	112.5	119.5	176.0	872.3	2118.7	1832.2	742.3	369.9	8
9	206.5	164.2	119.1	118.5	113.9	118.3	183.3	889.8	2159.8	1792.7	720.7	360.8	9
10	205.7	164.5	116.8	121.0	117.0	118.9	193.2	925.4	2140.8	1766.0	697.2	354.8	10
11	208.6	156.7	117.3	122.9	115.0	118.3	206.1	933.8	2127.0	1749.0	684.7	353.3	11
12	204.7	159.4	113.9	123.0	114.8	120.6	211.6	909.2	2069.2	1741.7	677.0	361.0	12
13	202.5	162.3	112.8	122.6	113.7	121.2	218.0	914.5	2013.3	1725.0	664.6	362.3	13
14	201.5	157.7	115.5	127.6	113.3	119.1	214.1	946.6	1988.7	1682.5	663.3	346.3	14
15	209.5	155.6	117.3	129.1	108.3	121.2	221.0	1001.8	1980.6	1628.3	637.7	335.4	15
16	211.5	153.8	116.5	129.2	109.8	122.8	227.1	1043.8	1952.8	1541.2	605.7	325.8	16
17	210.1	149.8	116.8	127.3	113.6	124.1	229.3	1074.9	1957.5	1469.9	574.0	316.3	17
18	207.3	141.8	114.6	127.5	115.1	123.2	229.7	1143.2	2009.1	1428.6	553.4	305.4	18
19	203.1	141.7	117.3	129.8	113.4	123.8	221.4	1216.9	2044.1	1385.6	548.8	296.0	19
20	199.3	141.6	121.8	131.2	116.3	122.3	223.2	1293.3	2062.5	1363.0	553.3	289.4	20
21	200.1	140.5	121.3	131.7	116.0	122.6	239.1	1326.0	2125.6	1338.7	552.9	284.8	21
22	200.6	133.6	121.5	129.3	114.1	125.7	259.9	1317.2	2219.6	1304.1	557.5	280.8	22
23	197.3	130.6	119.7	128.3	115.4	128.7	289.3	1298.2	2311.5	1235.8	565.8	274.7	23
24	196.8	132.2	118.7	130.0	114.9	129.1	320.3	1311.9	2383.1	1155.8	550.0	266.8	24
25	192.1	132.3	119.3	126.7	116.1	127.3	328.8	1411.9	2394.2	1082.8	515.6	258.7	25
26	186.3	128.3	119.8	126.6	118.8	125.6	319.3	1511.9	2256.7	1031.2	481.0	251.5	26
27	179.5	123.8	118.1	125.8	118.7	124.6	304.3	1568.9	2075.0	990.1	452.2	244.6	27
28	176.8	125.8	115.8	125.1	120.8	127.4	325.9	1728.6	1956.8	952.6	432.7	240.9	28
29	178.0	128.4	115.5	125.1	131.0	129.8	340.4	1869.8	1897.4	920.9	423.2	235.0	29
30	159.8	133.4	113.6	130.0		131.3	361.3	2032.8	1863.3	893.7	428.3	229.8	30
31	163.8		111.4	129.9		134.0		2019.6		893.5	438.3		31
TOTALS	6245.2	4482.7	3740.8	3821.7	3395.6	3917.1	6913.3	34442.4	61309.5	45494.8	19625.3	9720.3	
MEAN	201.5	149.4	120.7	123.3	117.1	123.1	230.4	1111.0	2043.6	1467.6	633.1	324.0	
AC-FT	12387.1	8891.3	7419.7	7580.3	6735.0	7571.2	13712.4	68315.5	121605.6	90237.6	38926.2	19280.0	

AVERAGE ANNUAL TOTAL FLOW IN ACRE FEET: 402651.8

* INDICATES ENCOUNTERED MISSING DATA
** INDICATES MISSING DATA
*** INDICATES TOTAL MONTH'S DATA MISSING

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 091985.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

*** STANDARD DEVIATION OF DAILY STREAMFLOW FOR 1965 - 1976 ***

ALL YEARS SPECIFIED INCLUDED

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	DAY
1	62.2	32.6	30.5	23.8	31.0	20.4	31.5	196.8	713.2	573.1	269.1	211.4	1
2	64.3	42.0	31.5	20.8	28.5	19.0	35.2	220.5	713.0	595.8	285.2	158.0	2
3	65.0	51.5	34.0	21.1	31.5	18.7	36.9	242.9	765.4	667.0	297.5	147.0	3
4	61.5	52.3	34.8	22.0	31.6	21.9	36.1	254.5	774.3	704.7	240.9	147.8	4
5	62.9	47.1	35.8	25.3	29.5	24.0	36.5	274.8	793.4	785.1	201.8	138.3	5
6	72.4	49.5	35.0	24.1	27.0	24.1	39.0	321.6	831.1	884.4	221.9	119.3	6
7	67.4	44.8	30.0	24.5	23.9	21.9	47.1	403.8	843.2	881.6	223.4	114.2	7
8	61.5	44.7	28.1	22.8	22.3	18.1	53.5	505.1	864.4	817.4	207.7	112.4	8
9	57.2	54.2	26.0	21.6	22.4	16.1	63.9	543.8	958.7	802.8	209.2	101.3	9
10	57.4	51.4	21.8	26.4	24.8	16.4	76.9	574.5	959.6	831.9	189.7	100.9	10
11	65.3	54.6	22.8	28.1	20.3	20.7	90.3	539.7	945.1	824.1	203.7	107.4	11
12	59.9	47.6	20.4	30.9	19.5	21.0	97.4	485.0	928.0	764.2	236.0	122.0	12
13	58.1	41.3	18.5	27.9	18.9	22.4	96.0	465.1	923.2	683.6	224.8	139.9	13
14	59.3	38.9	18.4	31.0	23.2	21.0	93.2	471.4	920.0	621.9	221.8	122.0	14
15	76.1	35.3	19.5	27.7	16.8	21.6	94.0	523.6	893.4	562.9	217.6	99.8	15
16	80.3	36.3	21.5	26.0	14.2	24.7	101.6	539.6	972.5	529.9	198.6	105.9	16
17	71.5	37.5	21.8	24.6	15.8	29.3	115.9	559.8	1060.8	536.1	178.4	107.9	17
18	65.2	35.0	23.0	25.1	17.1	29.4	127.0	625.2	1127.4	545.7	164.1	94.9	18
19	62.8	37.6	21.1	24.7	18.3	30.5	112.5	668.4	1180.9	513.4	166.5	82.3	19
20	60.9	38.1	20.2	30.1	18.6	31.4	117.9	672.6	1171.1	485.7	179.7	78.3	20
21	64.8	35.4	17.3	31.1	20.7	29.5	136.7	670.2	1144.5	453.9	201.8	82.1	21
22	58.5	34.8	19.5	30.4	21.5	31.0	175.6	583.0	1079.7	427.8	245.1	84.2	22
23	55.2	34.2	21.7	30.1	23.4	34.1	227.8	492.8	1040.9	398.9	322.2	79.9	23
24	53.9	34.7	22.4	27.8	21.8	35.8	273.3	467.9	1047.6	372.3	328.3	77.0	24
25	55.2	34.4	24.5	29.8	21.3	33.8	228.8	518.3	1103.1	355.0	280.1	74.2	25
26	55.9	30.6	24.1	35.1	21.4	30.0	179.5	594.2	1131.9	355.5	222.2	69.1	26
27	56.2	33.1	21.9	36.2	21.3	27.6	161.1	610.7	1078.7	336.2	188.0	65.3	27
28	50.4	30.9	22.0	38.3	19.8	30.3	180.7	709.5	945.1	316.0	167.7	63.0	28
29	39.3	28.6	23.7	36.4	26.9	34.4	190.5	819.3	787.7	294.5	154.8	64.9	29
30	35.3	29.6	23.7	39.8		32.9	203.8	901.3	671.5	272.3	162.0	63.4	30
31	28.8		22.5	36.0		30.7		847.5		264.4	194.7		31

* INDICATES ENCOUNTERED MISSING DATA
** INDICATES MISSING DATA
*** INDICATES TOTAL MONTH'S DATA MISSING

DURCUR

This program conducts a flow duration analysis on stream discharge data for a specified station over a range of years. Duration curves and tables that may be useful in conducting water supply, irrigation or low flow analyses are produced.

The first table tabulates the number of streamflow occurrences that fall within predetermined class sizes for each year specified. Up to 36 class sizes can be input by the user or can be computed automatically. Data can be classified based on daily, monthly or annual discharge. When using daily values, the analysis can include the entire year, a portion of the year (e.g., Oct. through Feb.) or a combination of two distinct portions of the year (e.g., Oct.-Dec. and Feb.-March). In all cases, years (or portions of years) with incomplete data are excluded from the analysis.

The table also includes total second-foot-days for the entire period (acre-feet for monthly and annual), mean annual second-foot-days, mean daily discharge in cfs and total number of occurrences in each class. Cumulative totals, percent of total accumulated occurrences in each class, class size divided by the drainage area (square miles) and class size divided by the mean daily discharge are also computed.

DURCUR optionally produces three plots depicting stream discharge values as a function of the percent of time in which they are exceeded in a given time period. The horizontal axis always represents percent of time. For mean daily flow analyses, the vertical axes for each plot are:

DURCUR (continued)

1. cubic feet per second per square mile of drainage area (csm)

2. cubic feet per second divided by mean daily flow for the period (cmd)

3. cubic feet per second (cfs)

For monthly or annual flow analyses, the vertical axes for each plot are:

1. hundred-acre-feet per square mile of drainage area

2. acre-feet divided by monthly mean or annual total

3. thousand-acre-feet

For each request, the user should specify:

frequency:
- daily
- monthly
- annual

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

date range (unless all are to be used)

period to be analyzed, for daily only (unless entire year is to be used)

lower limit of each class size (unless limits to be computed automatically)

whether the data should be plotted

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING — STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7469.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

FLOW IN CFS
DURATION TABLE OF DISCHARGE
OCT 1 - MAR 31
DAILY

CLASS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	TOTAL FLOW SFD
1965	0	0	0	0	0	0	3	65	111	3	0	0	0	0	0	0	0	20022.0
1966	0	0	0	0	0	0	0	36	74	40	16	15	1	0	0	0	0	27269.0
1967	0	0	0	0	0	0	0	4	122	43	13	0	0	0	0	0	0	25998.0
1968	0	0	0	0	0	0	0	4	96	51	18	8	6	0	0	0	0	29348.0
1969	0	0	0	0	0	0	0	0	93	48	17	14	10	0	0	0	0	30916.0
1970	0	0	0	0	0	0	17	56	85	24	0	0	0	0	0	0	0	20260.0
1971	0	0	0	0	0	0	0	22	106	54	0	0	0	0	0	0	0	24040.0
1972	0	0	0	0	0	0	0	11	93	39	36	4	0	0	0	0	0	28330.0
1973	0	0	0	0	0	0	0	4	104	32	8	15	19	0	0	0	0	30195.0
1974	0	0	0	0	0	0	0	6	134	19	23	0	0	0	0	0	0	25137.0
1975	0	0	0	0	0	0	0	34	136	12	0	0	0	0	0	0	0	20793.0
1976	0	0	0	0	0	0	0	29	112	39	3	0	0	0	0	0	0	22657.0

SUM IN SFD	304865.0
PERIOD MEAN IN SFD	25405.4
PERIOD MEAN IN CFS	139.4

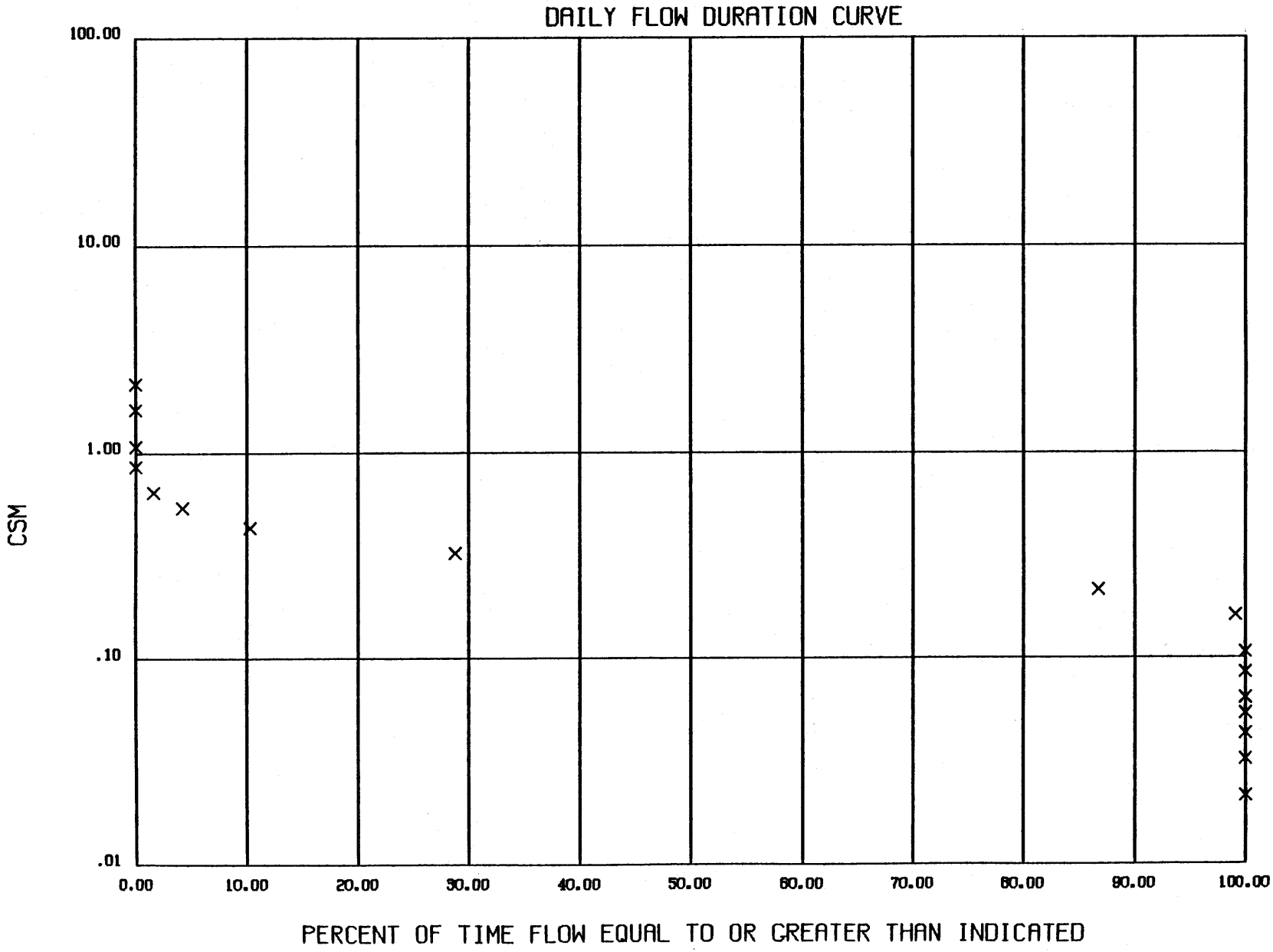
INCOMPLETE YEARS EXCLUDED FROM ANALYSIS

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING — STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7469.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

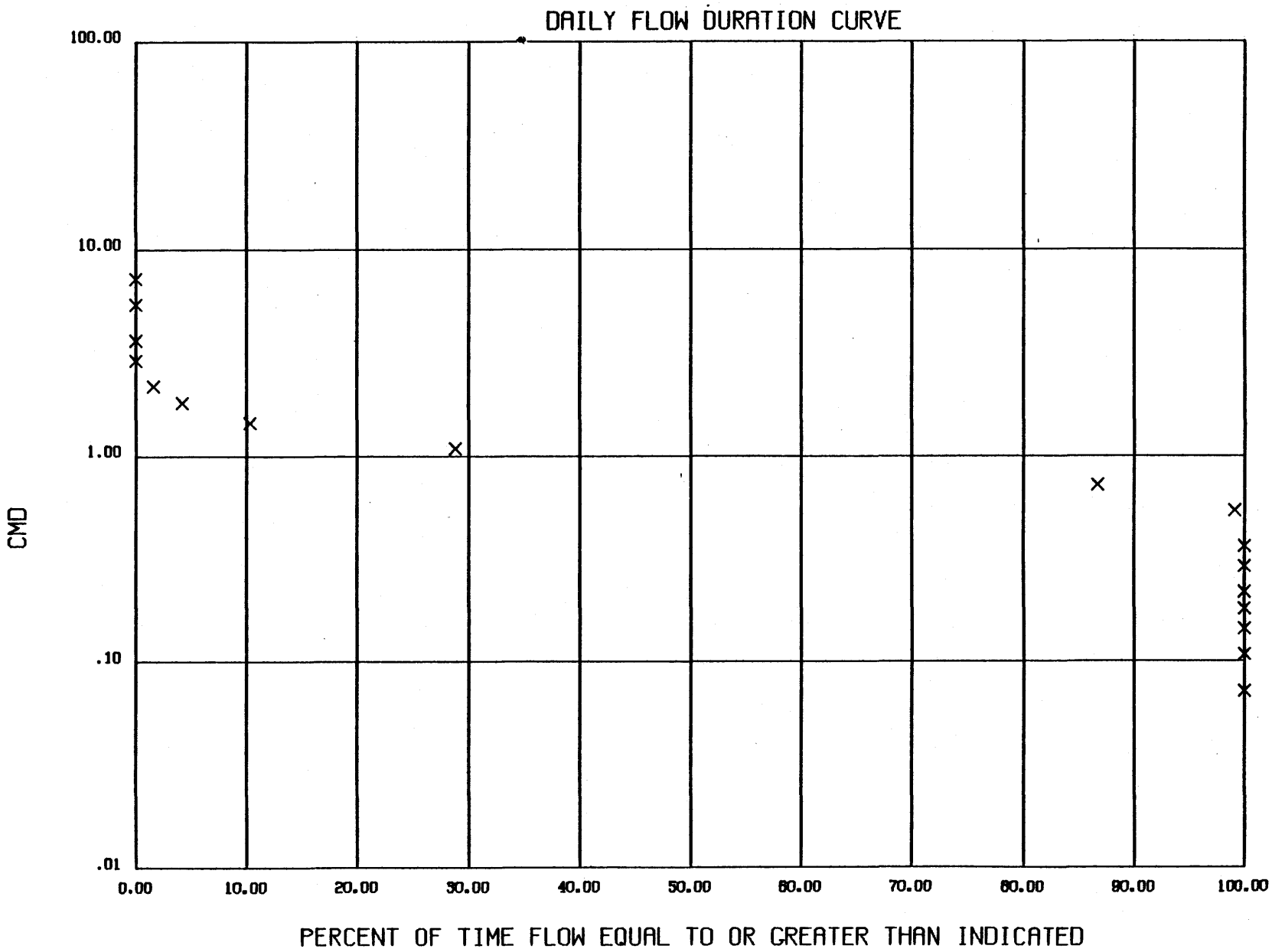
CLASS	SIZE	TOTAL	ACCUM	PERCENT	SIZE/DA	SIZE/MEAN
1	10.0	0.	2187.	100.00	.02	.07
2	15.0	0.	2187.	100.00	.03	.11
3	20.0	0.	2187.	100.00	.04	.14
4	25.0	0.	2187.	100.00	.05	.18
5	30.0	0.	2187.	100.00	.06	.22
6	40.0	0.	2187.	100.00	.09	.29
7	50.0	20.	2187.	100.00	.11	.36
8	75.0	271.	2167.	99.09	.16	.54
9	100.0	1266.	1896.	86.69	.21	.72
10	150.0	404.	630.	28.81	.32	1.08
11	200.0	134.	226.	10.33	.43	1.43
12	250.0	56.	92.	4.21	.53	1.79
13	300.0	36.	36.	1.65	.64	2.15
14	400.0	0.	0.	0.00	.85	2.87
15	500.0	0.	0.	0.00	1.07	3.59
16	750.0	0.	0.	0.00	1.60	5.38
17	1000.0	0.	0.	0.00	2.14	7.17

EACH CLASS SIZE REPRESENTS THE LOWER LIMIT OF THE FLOW RANGE

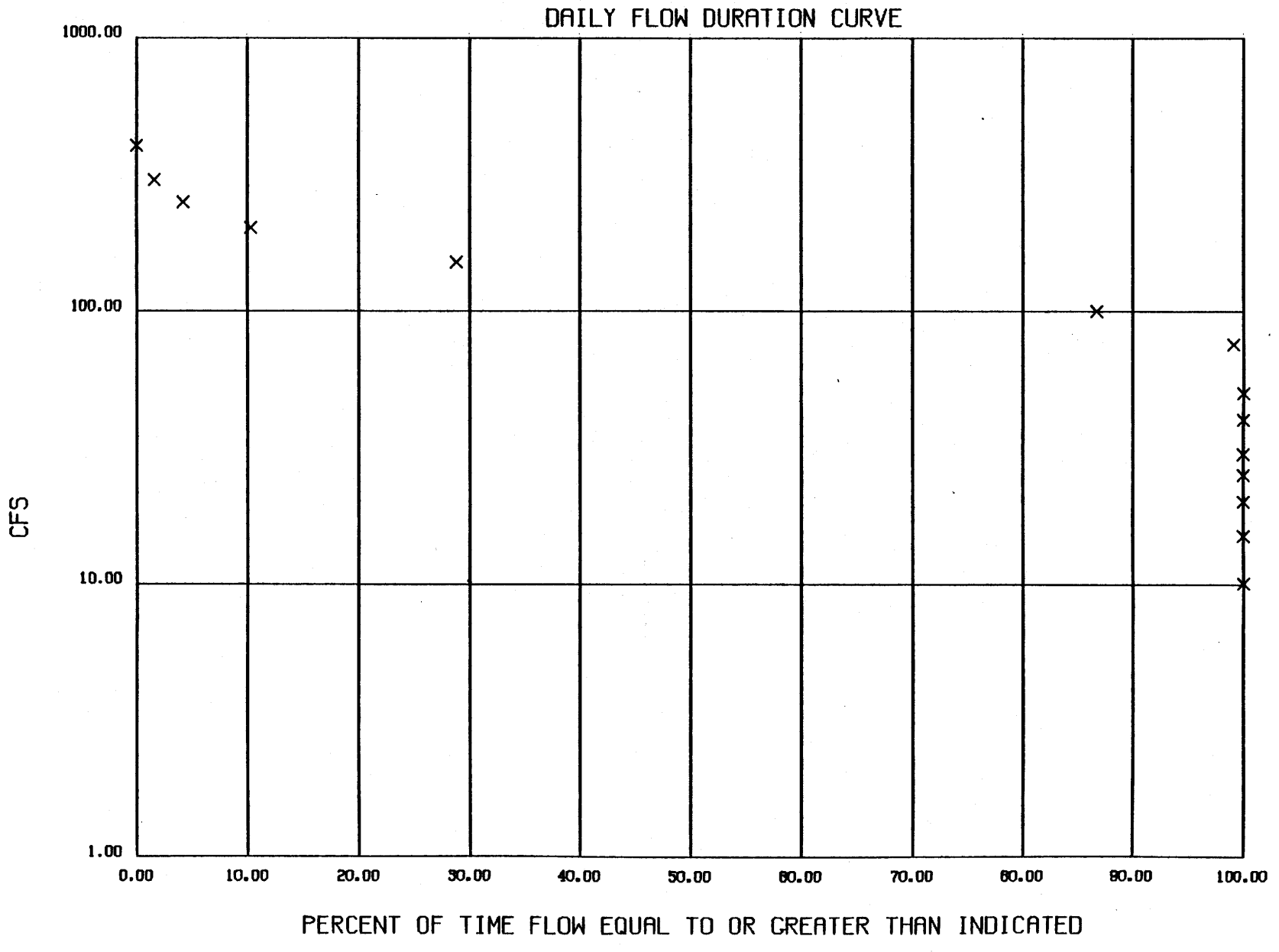
GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N, RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000



GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 091685.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N, RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000



GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 091685.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N, RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000



EXTREMESW

This program prints a table of minimum or maximum daily streamflows for each month for a range of years. The extreme daily streamflow and month of occurrence are printed for each year, and the extreme daily value for the entire date range is printed along with its date of occurrence.

For each request, the user should specify:

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

date range (unless all are to be used)

whether to print maximum or minimum flows

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING — STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

MAXIMUM DAILY FLOW IN CFS FOR MONTH

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	MAX	MONTH
1965	148.00	146.00	120.00	140.00	155.00	120.00	581.00	1610.00	3870.00	2830.00	1530.00	460.00	3870.00	JUN
1966	302.00	196.00	200.00	160.00	125.00	130.00	325.00	2020.00	2030.00	1230.00	725.00	360.00	2030.00	JUN
1967	190.00	134.00	148.00	220.00	210.00	148.00	203.00	2630.00	3050.00	3260.00	1110.00	459.00	3260.00	JUL
1968	328.00	188.00	165.00	165.00	157.00	215.00	250.00	1060.00	2780.00	1580.00	1500.00	710.00	2780.00	JUN
1969	380.00	213.00	170.00	194.00	169.00	153.00	1090.00	2360.00	2410.00	1640.00	831.00	385.00	2410.00	JUN
1970	190.00	147.00	95.00	119.00	126.00	138.00	152.00	3050.00	2900.00	2330.00	674.00	484.00	3050.00	MAY
1971	185.00	167.00	180.00	144.00	115.00	153.00	265.00	3100.00	4720.00	1990.00	1290.00	1020.00	4720.00	JUN
1972	259.00	251.00	139.00	139.00	148.00	197.00	590.00	2670.00	4760.00	1840.00	845.00	580.00	4760.00	JUN
1973	355.00	270.00	189.00	158.00	135.00	135.00	264.00	2550.00	2150.00	1840.00	712.00	719.00	2550.00	MAY
1974	239.00	242.00	145.00	135.00	132.00	140.00	622.00	3570.00	4160.00	2250.00	708.00	296.00	4160.00	JUN
1975	177.00	142.00	140.00	114.00	120.00	126.00	240.00	950.00	2040.00	3750.00	1310.00	294.00	3750.00	JUL
1976	215.00	200.00	120.00	130.00	125.00	115.00	320.00	2310.00	2560.00	2090.00	1390.00	334.00	2560.00	JUN
1978	191.00	160.00	135.00	110.00	110.00	180.00	540.00	1570.00	2570.00	2440.00	1200.00	460.00	2570.00	JUN

		DAY	MONTH	YEAR
MAXIMUM DAILY FLOW FOR GIVEN YEAR RANGE	4760.00 CFS	9	JUN	1972

* INDICATES ENCOUNTERED MISSING DATA
** INDICATES MISSING DATA

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING — STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

MINIMUM DAILY FLOW IN CFS FOR MONTH

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	MIN	MONTH
1965	121.00	88.00	66.00	70.00	110.00	70.00	120.00	442.00	1620.00	1410.00	484.00	302.00	66.00	DEC
1966	205.00	133.00	115.00	120.00	80.00	84.00	140.00	316.00	707.00	544.00	249.00	202.00	80.00	FEB
1967	132.00	85.00	95.00	123.00	138.00	108.00	136.00	159.00	1500.00	1090.00	442.00	247.00	85.00	NOV
1968	150.00	99.00	115.00	118.00	90.00	133.00	140.00	298.00	1030.00	826.00	623.00	374.00	90.00	FEB
1969	215.00	150.00	106.00	122.00	113.00	117.00	172.00	698.00	719.00	652.00	395.00	187.00	106.00	DEC
1970	136.00	74.00	62.00	66.00	95.00	110.00	119.00	160.00	896.00	618.00	280.00	191.00	62.00	DEC
1971	94.00	105.00	123.00	105.00	83.00	90.00	129.00	332.00	1720.00	1020.00	475.00	183.00	83.00	FEB
1972	197.00	121.00	95.00	96.00	91.00	140.00	165.00	451.00	1310.00	712.00	425.00	253.00	91.00	FEB
1973	100.00	155.00	110.00	90.00	101.00	98.00	108.00	214.00	617.00	622.00	278.00	246.00	90.00	JAN
1974	148.00	93.00	95.00	91.00	104.00	105.00	120.00	634.00	1370.00	735.00	283.00	161.00	91.00	JAN
1975	126.00	78.00	95.00	93.00	91.00	95.00	102.00	168.00	950.00	1190.00	302.00	161.00	78.00	NOV
1976	143.00	95.00	105.00	95.00	80.00	90.00	120.00	350.00	967.00	851.00	347.00	229.00	80.00	FEB
1978	149.00	80.00	85.00	85.00	78.00	85.00	180.00	415.00	1120.00	1020.00	338.00	239.00	78.00	FEB

		DAY	MONTH	YEAR
MINIMUM DAILY FLOW FOR GIVEN YEAR RANGE	62.00 CFS	6	DEC	1970

* INDICATES ENCOUNTERED MISSING DATA
** INDICATES MISSING DATA

FLOW

This program performs streamflow frequency analyses. Flood frequencies can be estimated using three methods: the log-Pearson Type III distribution, the Gumbel (Extreme Value Type I) distribution, and the Hazen method. Partial series low and high flow analyses can also be performed using the log-Pearson Type III distribution. For each method, the analysis is limited to data from the WRDS; historic data, comparisons with similar watersheds, or flood estimates from precipitation cannot be incorporated into the analysis. The program computes expected flows, but sometimes the predictions are not justifiable by the amount of data available. As general rules, a minimum of 10 years of data is needed for a useful analysis, and flow estimates for return periods greater than about twice the number of years of data are generally not reliable. The user is responsible for taking into account changes to the watershed such as dams, levees, diversions, etc.

For each analysis, a table is printed containing the data and flow value, along with statistics pertaining to the type of analysis. Percent chance, recurrence intervals, and computed flow are printed in a second table for selected return periods. A plot of the data and the computed curve is provided as an option. For the low and high flow analyses, a month range within the water year can also be specified.

All three of these methods can be useful in performing flow analysis. The Water Resources Council in 1967 chose the log-Pearson Type III as the standard flood frequency distribution for all U.S. government agencies. In that report, and others, comparisons have not shown that any method is always superior to all others (Kite, 1977). It

FLOW (continued)

is left to the user to decide the usefulness or applicability of any of these analyses.

For each analysis, the user should specify:

method of analysis (log-Pearson, Gumbel, or Hazen)

type of analysis:
- peak
- low flow-specific # of days in period
- high flow-specific # of days in period

method of retrieval and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

year range (unless all are to be used)

date range within each water year for low or high flow analysis (unless the whole year is to be used)

whether to plot the data

****

LOW FLOW FREQUENCY ANALYSIS LOG-PEARSON TYPE III METHOD

7 DAY PERIOD, OCTOBER 1 - SEPTEMBER 30

****

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 09188500
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

PERIOD 1944 - 1978 34 YEARS OF DATA

YEAR	DATE	FLOW VALUE Y	LOG Y = X
1944	11 JUL	92.57	1.966477
1945	18 JUL	80.57	1.906181
1946	16 JUN	115.00	2.060698
1947	16 MAY	117.86	2.071356
1948	17 JUN	90.86	1.958359
1949	20 JUN	75.43	1.877536
1950	11 JUL	87.14	1.940232
1951	26 JUN	132.14	2.121044
1952	15 JUN	137.14	2.137173
1953	24 JUN	85.71	1.933053
1954	2 JUL	83.86	1.923540
1955	30 JUN	82.57	1.916830
1956	10 JUN	68.14	1.833420
1957	14 JUN	110.00	2.041393
1958	2 JUN	95.00	1.977724
1959	25 JUN	100.00	2.000000
1960	13 JUN	85.00	1.929419
1961	5 JUN	95.00	1.977724
1962	3 JUL	73.57	1.866709
1963	25 JUN	92.14	1.964462
1964	8 JUL	87.14	1.940232
1965	31 JUN	77.57	1.889702
1966	6 JUN	87.71	1.943070
1967	9 JUL	103.43	2.014641
1968	29 JUN	106.43	2.027058
1969	3 JUN	113.29	2.054175
1970	2 JUL	66.00	1.819544
1971	29 JUN	87.43	1.941653
1972	15 JUN	95.71	1.980977
1973	26 MAY	99.29	1.996887
1974	25 JUN	96.71	1.985491
1975	15 JUL	93.71	1.971806
1976	15 JUN	90.00	1.954243
1978	7 JUL	82.43	1.916078

SUMMATION X =	66.838884
SUMMATION X SQUARED =	131.569063
SUMMATION X CUBED =	259.332713
MEAN OF X =	1.965850
STANDARD DEVIATION =	.072597
SKEW COEFFICIENT =	.346066

STANDARD DEVIATION AND SKEW COEFFICIENT AS DEFINED FOR LOG PEARSON TYPE III METHOD

LOW FLOW FREQUENCY ANALYSIS LOG-PEARSON TYPE III METHOD

7 DAY PERIOD, OCTOBER 1 - SEPTEMBER 30

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 09186500
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7463.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

PERIOD 1944 - 1978 34 YEARS OF DATA

K VALUES- PEARSON TYPE III COORDINATES EXPRESSED IN NUMBER OF STANDARD DEVIATIONS FROM THE MEAN FOR VARIOUS RECURRENCE INTERVALS OR PERCENT CHANCE.
FROM WATER RESOURCES COUNCIL BULLETIN NO. 15
L IS COLUMN NO., J IS ROW NO. IN TABLE

K	L	J
-2.1040	1	28
-1.5550	2	28
-1.2450	3	28
-.8530	4	28
-.0500	5	28
.8240	6	28
1.3090	7	28
1.8490	8	28
2.2110	9	28
2.5440	10	28
2.8560	11	28

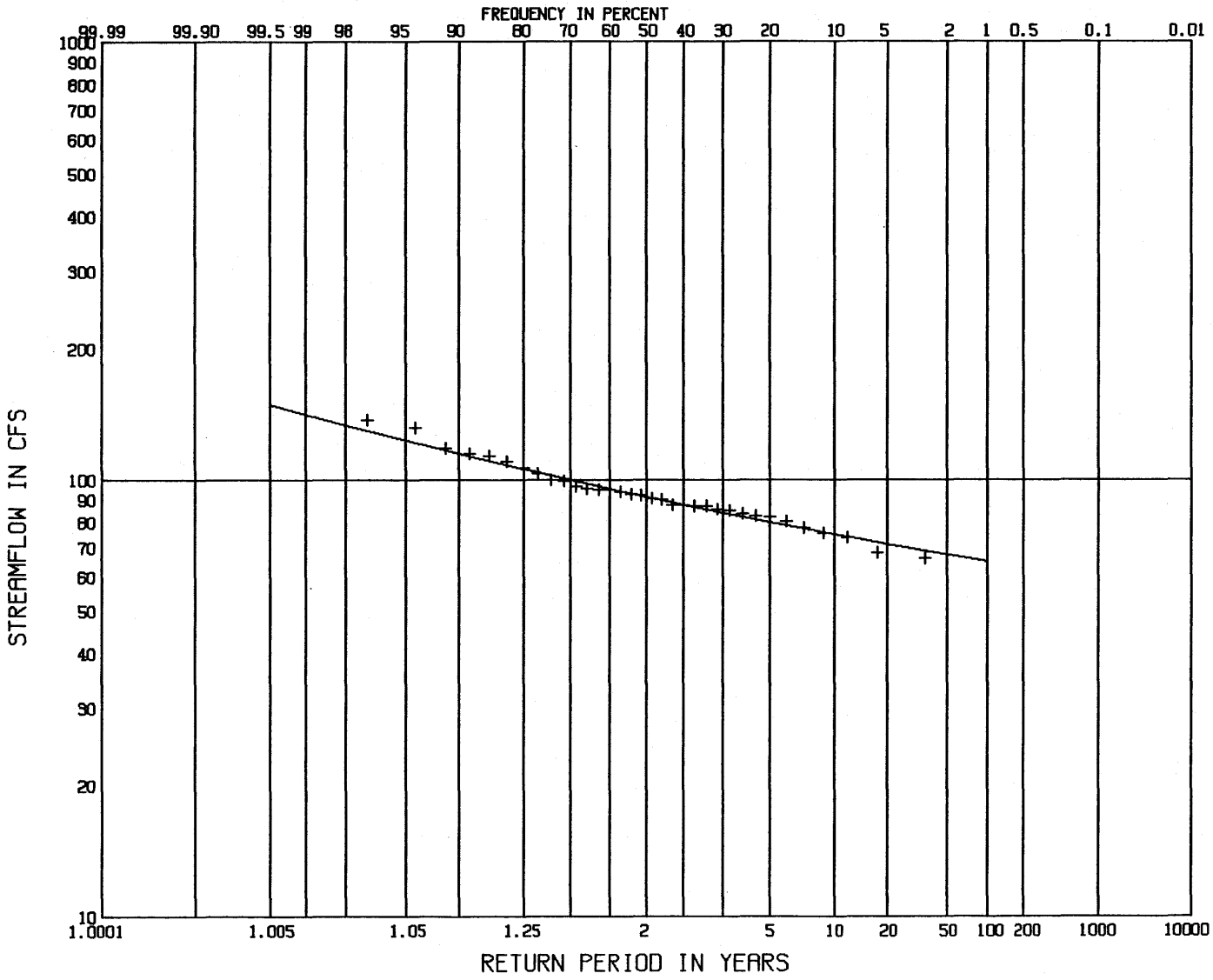
PERCENT CHANCE	RECURRENCE INTERVAL YEARS	COMPUTED FLOW OR GREATER CFS
99.0	1.0101	65.03
95.0	1.0526	71.28
90.0	1.1111	75.07
80.0	1.2500	80.16
50.0	2.0000	91.67
20.0	5.0000	106.09
10.0	10.0000	115.04
4.0	25.0000	125.91
2.0	50.0000	133.76
1.0	100.0000	141.42
.5	200.0000	148.99

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N, RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

LOW FLOW FREQUENCY ANALYSIS

7 DAY PERIOD, OCTOBER 1 - SEPTEMBER 30 LOG-PEARSON TYPE III METHOD

PERIOD 1944 - 1978 34 YEARS OF DATA



****

FLOOD FLOW FREQUENCY ANALYSIS - HAZEN METHOD

ANNUAL INSTANTANEOUS PEAK DISCHARGE IN CFS

****

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

PERIOD 1950- 1976 27 YEARS OF DATA

DATE	FLOW	DEVIATION	DEVIATION SQUARED	DEVIATION CUBED PER 1000
4 JUL 1950	3180.	-95.	9060.	-862.4
19 JUN 1951	3180.	-95.	9060.	-862.4
9 JUN 1952	2960.	-315.	99342.	-31311.0
16 JUN 1953	4080.	805.	647727.	521300.2
29 JUN 1954	4460.	1185.	1403786.	1663226.6
25 JUN 1955	2280.	-995.	990394.	-985625.0
3 JUN 1956	4030.	755.	569745.	430052.3
7 JUN 1957	3720.	445.	197860.	88011.2
31 APR 1958	2430.	-845.	714338.	-603747.9
31 MAY 1959	4420.	1145.	1310601.	1500395.4
5 JUN 1960	1730.	-1545.	2387597.	-3689279.9
31 APR 1961	2020.	-1255.	1575490.	-1977531.5
31 MAY 1962	3350.	75.	5597.	418.8
31 MAY 1963	2840.	-435.	189386.	-82418.0
1 JUL 1964	3100.	-175.	30690.	-5376.4
31 MAY 1965	3940.	665.	441979.	293834.0
10 MAY 1966	2100.	-1175.	1381060.	-1623001.5
6 JUL 1967	3360.	85.	7194.	610.1
24 JUN 1968	2820.	-455.	207194.	-94311.4
9 JUN 1969	2430.	-845.	714338.	-603747.9
31 MAY 1970	3090.	-185.	34294.	-6350.7
25 JUN 1971	4780.	1505.	2264468.	3407604.4
9 JUN 1972	4840.	1565.	2448645.	3831676.6
19 MAY 1973	2670.	-605.	366249.	-221648.5
19 JUN 1974	4230.	955.	911671.	870477.3
7 JUL 1975	3800.	525.	275431.	144550.1
10 JUN 1976	2590.	-685.	469479.	-321679.9
TOTALS	88430.	0.	19662674.	2504402.4

MEAN 3275.

STANDARD DEVIATION 870.

COEFFICIENT OF SKEW
FOR HAZEN METHOD .19

FLOOD FLOW FREQUENCY ANALYSIS - HAZEN METHOD

ANNUAL INSTANTANEOUS PEAK DISCHARGE IN CFS

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

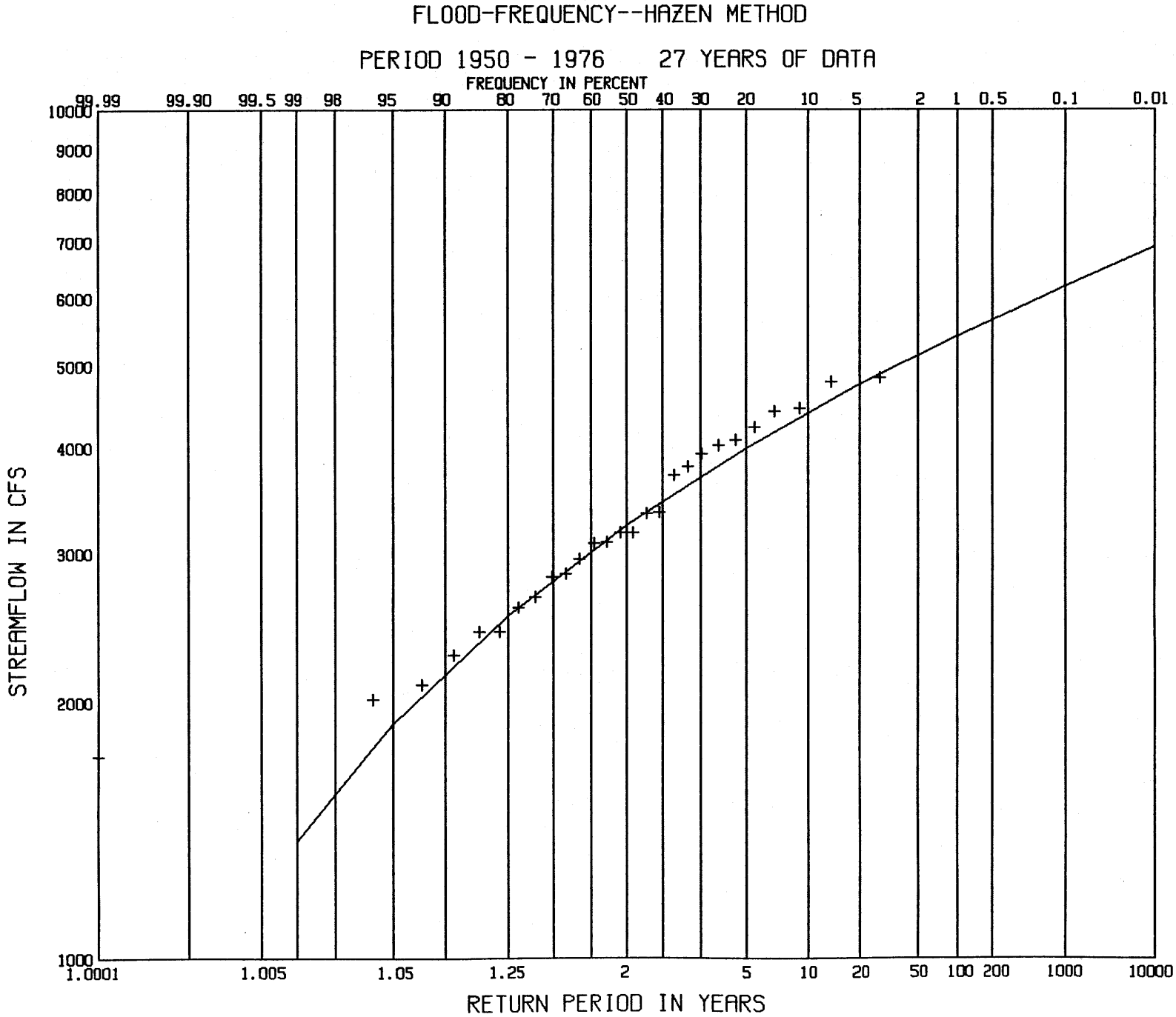
PERIOD 1950- 1976 27 YEARS OF DATA

INTERPOLATED FACTORS FROM HAZEN FREQUENCY TABLE

AND COMPUTED FLOWS

PERCENT CHANCE	RECURRENCE INTERVAL YEARS	FACTOR	COMPUTED FLOW OR GREATER CFS
99.00	1.01	-2.19	1375.
95.00	1.05	-1.59	1891.
80.00	1.25	-.85	2536.
50.00	2.00	-.03	3250.
20.00	5.00	.83	3997.
5.00	20.00	1.71	4760.
1.00	100.00	2.47	5427.
.10	1000.00	3.38	6214.
.01	10000.00	4.18	6912.

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N, RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)



FLOOD-FREQUENCY ANALYSIS

GUMBEL METHOD

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 09185.00
LATITUDE 43-01-09 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

ANNUAL INSTANTANEOUS PEAK DISCHARGE IN CFS

PERIOD 1965 - 1976 12 YEARS OF DATA

INPUT DATA

DATE	FLOW, X	X SQUARED
31 MAY 1965	3940.	15523600.
10 MAY 1966	2100.	4410000.
6 JUL 1967	3360.	11289600.
24 JUN 1968	2820.	7952400.
9 JUN 1969	2430.	5904900.
31 MAY 1970	3090.	9548100.
25 JUN 1971	4780.	22848400.
9 JUN 1972	4840.	23425600.
19 MAY 1973	2670.	7128900.
19 JUN 1974	4230.	17892900.
7 JUL 1975	3800.	14440000.
10 JUN 1976	2590.	6708100.

SUMMATION X = 40650. MEAN OF X = 3388.

SUMMATION X SQUARED = 147072500. MEAN OF X SQUARED = 12256042.

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7463.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

ANNUAL INSTANTANEOUS PEAK DISCHARGE IN CFS

SORTED DATA

DATE	FLOW, X	ORDER NO. M	N/(N-M)
10 MAY 1966	2100.	1	1.09091
9 JUN 1969	2430.	2	1.20000
10 JUN 1976	2590.	3	1.33333
19 MAY 1973	2670.	4	1.50000
24 JUN 1968	2820.	5	1.71429
31 MAY 1970	3090.	6	2.00000
6 JUL 1967	3360.	7	2.40000
7 JUL 1975	3800.	8	3.00000
31 MAY 1965	3940.	9	4.00000
19 JUN 1974	4230.	10	6.00000
25 JUN 1971	4780.	11	12.00000
9 JUN 1972	4840.	12	

S = 917.03518

1/ALPHA = 715.01233

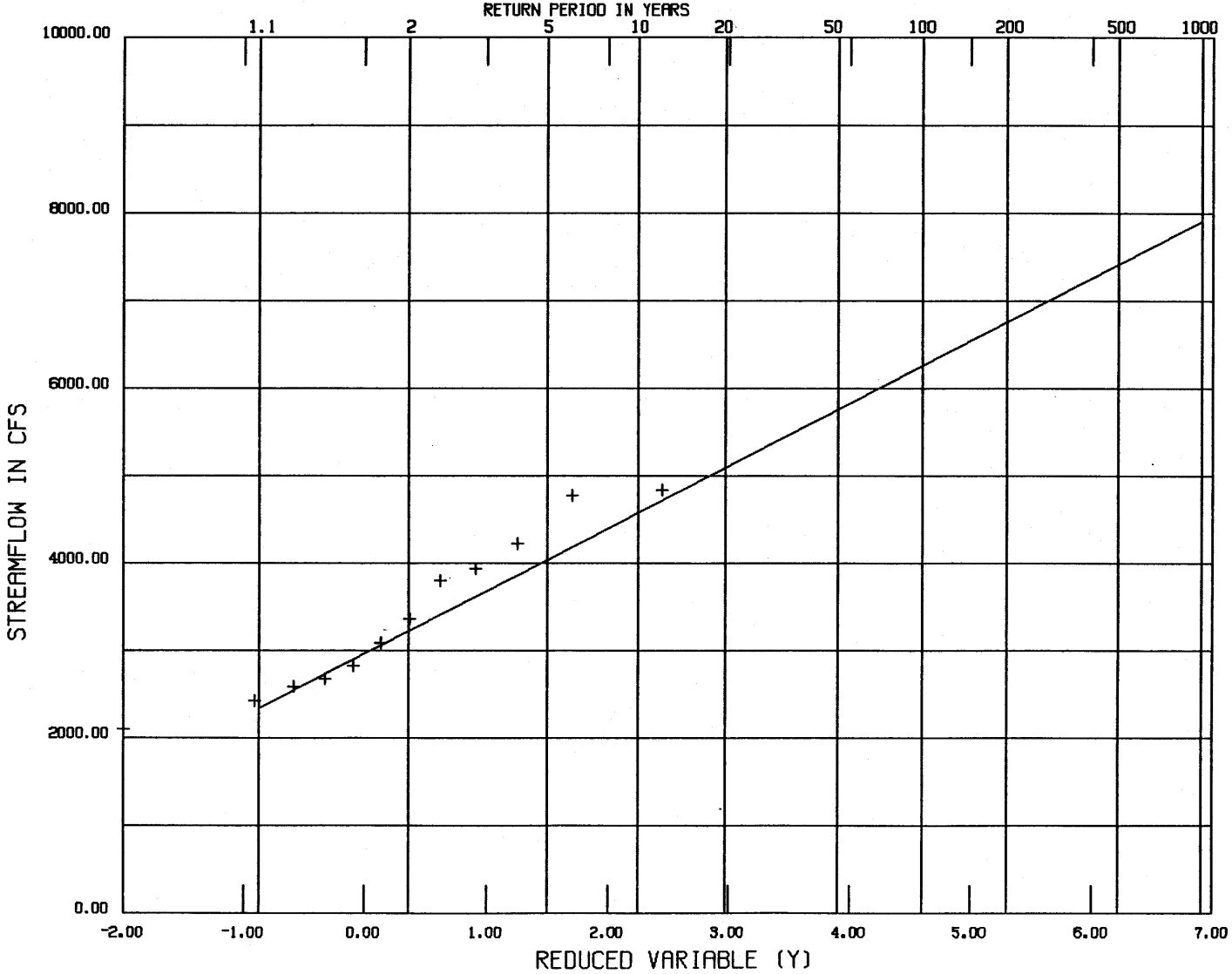
U = 2974.33417

RETURN PERIOD YEARS	Y	ESTIMATED FLOW OR GREATER CFS
2	.3665	3237.
5	1.5000	4047.
10	2.2504	4584.
20	2.9702	5099.
25	3.1985	5262.
50	3.9019	5765.
100	4.6001	6264.
200	5.2958	6761.
500	6.2136	7418.
1000	6.9073	7914.

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 09188B5.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

FLOOD FREQUENCY--GUMBEL METHOD

PERIOD 1965 - 1976 12 YEARS OF DATA



LISTDATASW

This program prints streamflow and reservoir data in a tabular format. Streamflow data can be printed in a daily format, which includes monthly summaries for each water year of data, and the instantaneous peak, if known. Monthly values or peak values can also be output in a tabular format. Reservoir contents data are printed in a monthly format only.

For each request, the user should specify:

data types to retrieve

retrieval method, and value range:
- latitude-longitude
- county
- drainage basin
- township-range (6th p.m. in Wyoming only)
- station number

date range (unless all are to be used)

source organization (unless all are to be used)

GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING — STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

MEAN DAILY FLOW IN CFS BY WATER YEAR
1976

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	DAY
1	158.00	180.00	105.00	100.00	125.00	100.00	120.00	350.00	1780.00	1490.00	906.00	334.00	1
2	155.00	190.00	105.00	95.00	120.00	95.00	130.00	400.00	1820.00	1810.00	1150.00	323.00	2
3	152.00	200.00	110.00	100.00	120.00	93.00	130.00	500.00	1910.00	1920.00	1390.00	308.00	3
4	150.00	194.00	110.00	105.00	110.00	90.00	140.00	650.00	2030.00	1860.00	1190.00	300.00	4
5	147.00	188.00	110.00	105.00	100.00	90.00	150.00	761.00	2110.00	1760.00	920.00	295.00	5
6	145.00	190.00	110.00	105.00	95.00	90.00	160.00	831.00	2180.00	1860.00	785.00	293.00	6
7	145.00	192.00	115.00	100.00	95.00	95.00	160.00	831.00	2300.00	1890.00	711.00	301.00	7
8	160.00	185.00	115.00	105.00	90.00	100.00	170.00	975.00	2430.00	1970.00	647.00	316.00	8
9	165.00	113.00	120.00	105.00	90.00	100.00	190.00	1070.00	2500.00	2010.00	602.00	308.00	9
10	164.00	140.00	120.00	100.00	90.00	105.00	190.00	1100.00	2540.00	2050.00	565.00	298.00	10
11	166.00	150.00	120.00	95.00	95.00	105.00	210.00	1370.00	2560.00	2080.00	537.00	282.00	11
12	172.00	160.00	120.00	95.00	105.00	105.00	240.00	1380.00	2390.00	2090.00	515.00	284.00	12
13	211.00	170.00	115.00	95.00	105.00	100.00	260.00	1180.00	2050.00	2010.00	488.00	287.00	13
14	215.00	180.00	110.00	95.00	105.00	95.00	250.00	1360.00	1600.00	1880.00	467.00	289.00	14
15	193.00	180.00	110.00	100.00	105.00	95.00	250.00	1790.00	1270.00	1710.00	458.00	290.00	15
16	183.00	170.00	110.00	110.00	100.00	95.00	250.00	1610.00	1110.00	1440.00	464.00	282.00	16
17	185.00	160.00	110.00	120.00	100.00	100.00	240.00	1450.00	1060.00	1260.00	466.00	274.00	17
18	183.00	150.00	110.00	120.00	100.00	110.00	230.00	1650.00	1290.00	1250.00	446.00	276.00	18
19	181.00	140.00	110.00	120.00	95.00	110.00	230.00	1960.00	1330.00	1290.00	446.00	292.00	19
20	175.00	130.00	110.00	120.00	95.00	115.00	230.00	2060.00	1170.00	1400.00	431.00	296.00	20
21	170.00	130.00	110.00	120.00	90.00	110.00	250.00	2160.00	1280.00	1310.00	428.00	282.00	21
22	171.00	135.00	110.00	120.00	80.00	110.00	270.00	2310.00	1590.00	1160.00	427.00	274.00	22
23	173.00	135.00	110.00	120.00	85.00	100.00	270.00	2290.00	1710.00	1060.00	437.00	288.00	23
24	166.00	135.00	110.00	120.00	90.00	100.00	270.00	2120.00	1590.00	1010.00	458.00	281.00	24
25	143.00	130.00	115.00	115.00	95.00	105.00	290.00	1940.00	1340.00	980.00	495.00	269.00	25
26	149.00	120.00	115.00	110.00	100.00	100.00	290.00	1710.00	1150.00	1010.00	491.00	262.00	26
27	170.00	110.00	120.00	110.00	100.00	95.00	280.00	1600.00	1010.00	1070.00	461.00	258.00	27
28	180.00	100.00	110.00	115.00	100.00	100.00	290.00	1670.00	967.00	1030.00	431.00	250.00	28
29	170.00	95.00	110.00	120.00	100.00	105.00	300.00	1780.00	1030.00	964.00	393.00	239.00	29
30	160.00	100.00	110.00	125.00		110.00	320.00	1870.00	1190.00	875.00	364.00	229.00	30
31	170.00		105.00	130.00		110.00		1830.00		851.00	347.00		31
TOTAL	5227.00	4552.00	3470.00	3395.00	2880.00	3133.00	6760.00	44558.00	50287.00	46350.00	18316.00	8560.00	
MEAN	168.61	151.73	111.94	109.52	99.31	101.06	225.33	1437.35	1676.23	1495.16	590.84	285.33	
AC-FT	10367.60	9028.76	6882.64	6733.88	5712.39	6214.21	13408.26	88379.46	99742.76	91933.83	36329.24	16978.50	

TOTAL ANNUAL FLOW IN ACRE-FEET = 391711.53

INSTANTANEOUS PEAK IN CFS = 2590.00 JUNE 10

** INDICATES MISSING DATA
* INDICATES COMPUTED FROM INCOMPLETE DATA
E INDICATES ESTIMATED VALUE

FONTENELLE RESERVOIR NEAR FONTENELLE, WYOMING — STATION NO. 092111.50
LATITUDE 42-02-00 LONGITUDE 110-04-00 — SECTION 25 TOWNSHIP 24 N,RANGE 112 W 6TH P.M.
ELEVATION UNKNOWN — DRAINAGE AREA 4280.00 SQ MI — NONCONTRIBUTING 0.00 SQ MI — BASIN 15320000
LINCOLN COUNTY — DATA FROM USGS — (P)

END-OF-MONTH RESERVOIR CONTENTS
IN ACRE-FEET

YEAR	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	MEAN ANNUAL
1965	21560.	28330.	35070.	42280.	43140.	45370.	121300.	221000.	384000.	368700.	358200.	18430.	140615.
1966	27170.	19010.	24390.	23530.	24180.	26380.	23310.	27550.	24180.	24780.	24680.	25200.	24530.
1967	31580.	38110.	40400.	49400.	60120.	72180.	19170.	21160.	31930.	13810.	27430.	17940.	35269.
1968	18580.	17240.	34100.	49990.	65470.	80700.	126500.	162400.	264200.	341400.	341400.	304000.	150498.
1969	258600.	258600.	264200.	250900.	191300.	170600.	222400.	310100.	332100.	332900.	314400.	287300.	266117.
1970	252800.	240400.	225000.	211500.	204700.	180200.	162600.	194300.	287300.	308600.	276000.	246400.	232483.
1971	224400.	219300.	207500.	201500.	191600.	177500.	178700.	178300.	323000.	345400.	337800.	327100.	242675.
1972	323200.	314100.	272200.	237300.	216800.	223200.	197100.	197700.	351100.	349000.	344700.	342900.	280775.
1973	341500.	319100.	309900.	279100.	220300.	175200.	188000.	230500.	312900.	349100.	324000.	337300.	282242.
1974	325000.	323600.	314000.	276200.	208300.	174300.	188700.	210000.	355400.	348300.	329000.	315900.	280725.
1975	301100.	288500.	256200.	222300.	193900.	173700.	167500.	188100.	211300.	357500.	338800.	329700.	252383.

* INDICATES ENCOUNTERED MISSING DATA
** INDICATES MISSING DATA

PLOTSWL

This program plots streamflow and reservoir stations by location. The area to be plotted can be specified by either latitude-longitude or township-range. If two or more stations are so close that plotting their data would cause overprinting, an overlap point can be created, merging these data. This can sometimes be avoided by plotting in a larger scale, or with smaller type. The plot size is limited to 18 inches by 10 feet.

The data plotted can be one of the following styles:

Style 1. type of data available
station number

Style 2. number of years of data available in date range
station number
mean data value (daily, monthly, reservoir or peak)

Style 3. number of years of data available in date range
station number
maximum data value (daily, monthly, reservoir or peak)
minimum data value (daily, monthly, reservoir or peak)

To prevent overprinting data from adjacent stations, the program can combine the data of these stations and plot instead an "overlap point," whose position is the weighted average of the points it replaces.

For overlap points created with style 2, the mean of all of the merged data can be plotted, and with style 3, the maximum data value of all of the merged data can be plotted.

For each plot, the user should specify:

style of plot

scale of plot (such as 1:24000)

whether overlap points should be created, and what to put beside them (if anything)

PLOTSWL (continued)

data types to retrieve

retrieval method and range of values:
latitude-longitude
township-range

date range (unless all dates are desired)

source organization (unless all are to be used)

data print height (.1 or .06 inches)

SCALE -- 1 : 24000

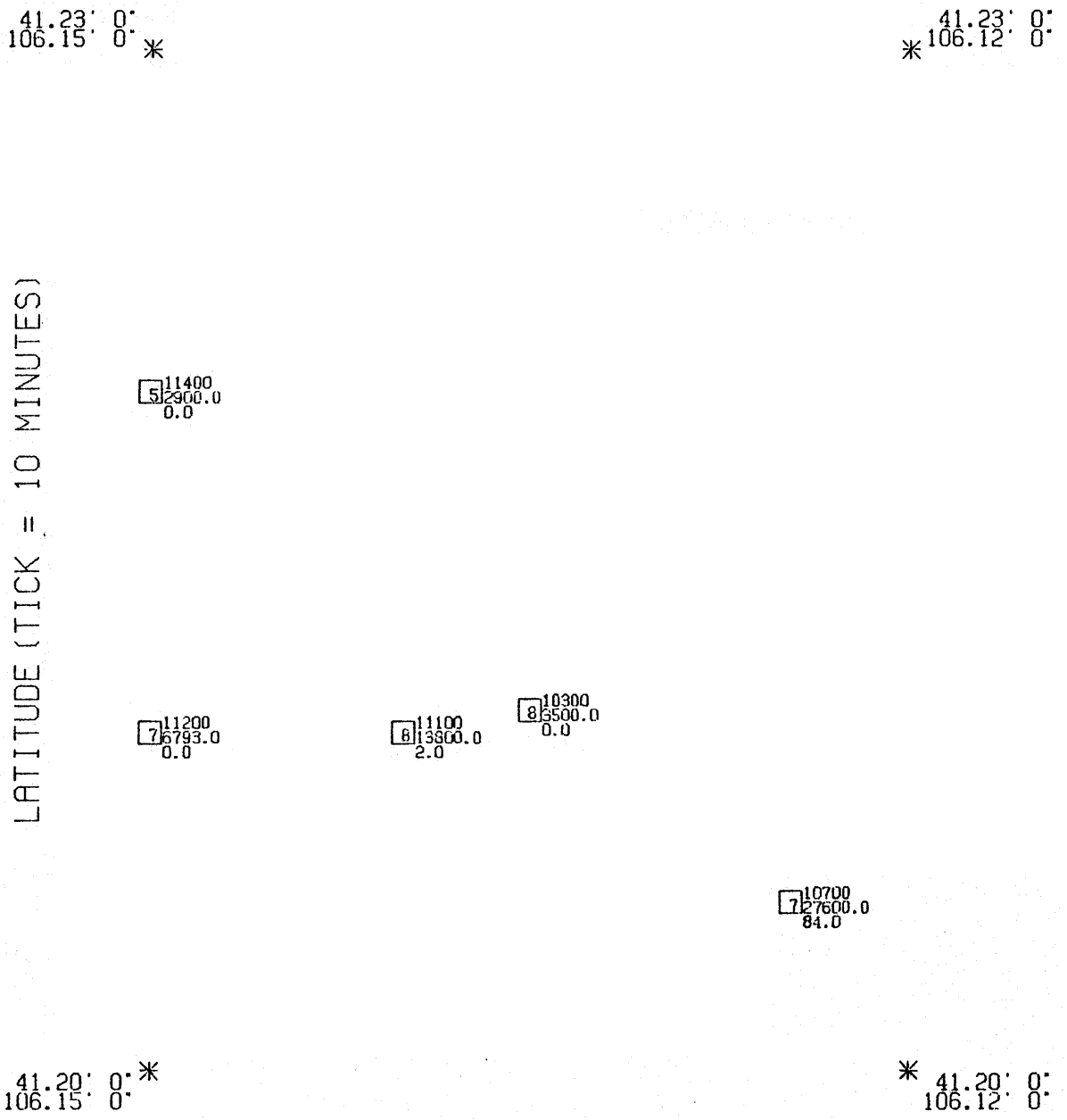
POINTS PLOTTED REPRESENT
[N] N YRS OF DATA AVAIL.
(N=** FOR MORE THAN 99 POINTS)

VALUES PRINTED ARE
LINE 1
STATION NUMBER

LINE 2
(MAX.)
STREAMFLOW (CFS)

LINE 3
(MIN.)
STREAMFLOW (CFS)

35 DATA POINTS ARE REPRESENTED.



PLOTSWT

This program plots streamflow or reservoir data versus time. Daily values are plotted as a continuous line; monthly and reservoir data are plotted as connected points; peak data are plotted as a histogram. The scale on the x-axis can be set to 3.6, 9, or 23.4 inches per water year. Plots can be a maximum of 10 feet long or 30 years. The scale on the y-axis can be set by the computer to accommodate the data, or can be pre-set to insure the same scale for comparison of plots. Peak values can optionally be plotted with daily values.

For each plot, the user should specify:

data types to plot

retrieval method and range of values:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

date range (unless all dates are desired)

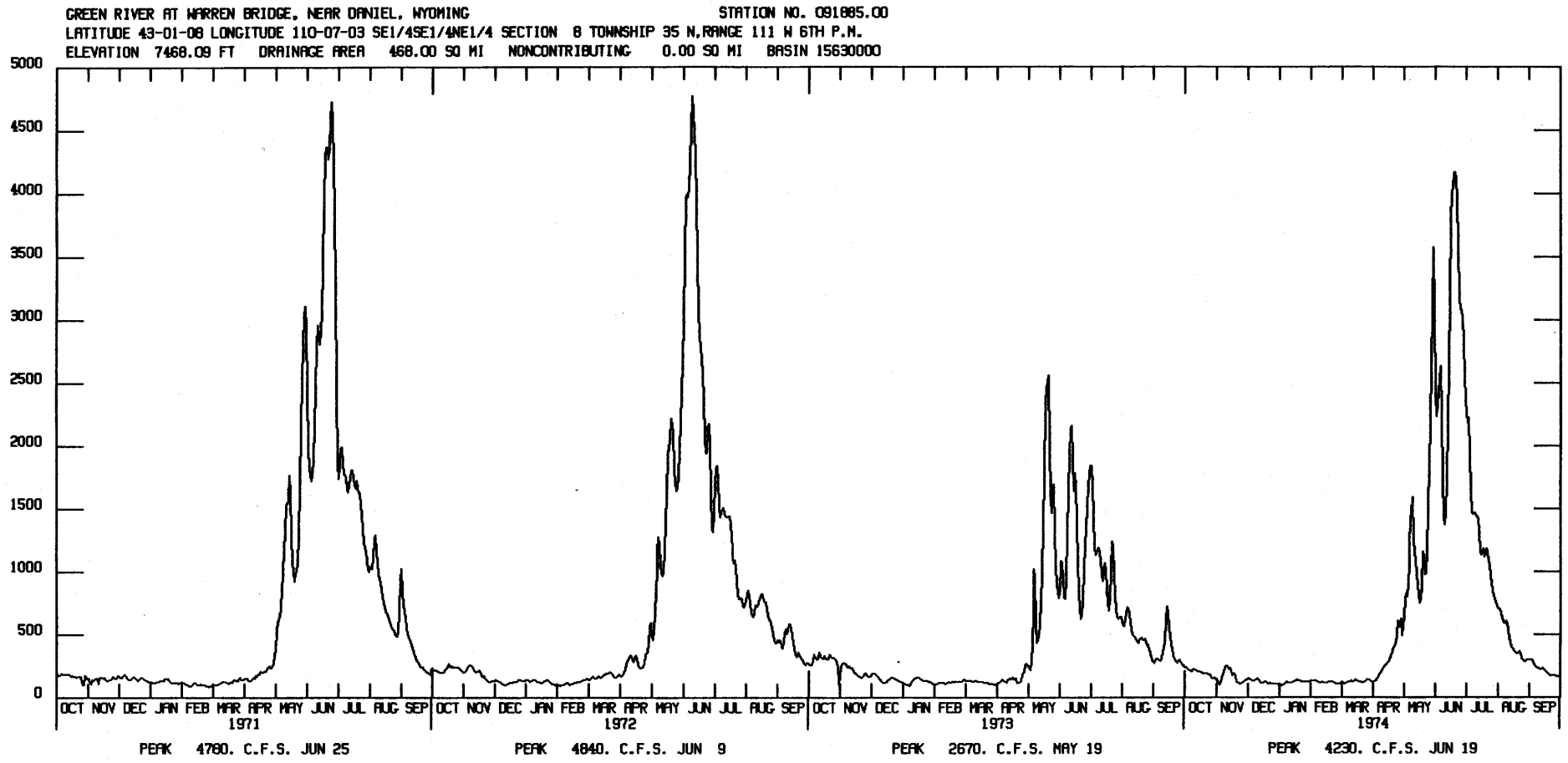
source organization (unless all are to be used)

whether the y-axis should be linear or logarithmic

year length (3.6, 9, or 23.4 inches)

y-axis value range (unless the automatic range is acceptable)

whether peak values are to be plotted (if daily data have been requested)


GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
DAILY STREAMFLOW IN C.F.S.
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP
1971
1972
1973
1974
PEAK 4780. C.F.S. JUN 25
PEAK 4840. C.F.S. JUN 9
PEAK 2670. C.F.S. MAY 19
PEAK 4230. C.F.S. JUN 19

REGRESSW

This program generates a least squares regression analysis for streamflow data. The regression can be one of five types:

1. one daily parameter for two stations
2. monthly data for two stations, analyzed monthly
3. reservoir data and monthly streamflow, analyzed monthly
4. peak data, for two stations
5. total annual streamflow for two stations

The regression fit may be linear or curvilinear. Data transformations ($\log_{10}$ or $\log_e$) may optionally be applied to either/both the independent and dependent values. The fit may be forced through the origin if requested. Plots of the data and regression curve are optional.

The dates of the dependent variable may optionally be offset by a given time period from the dates of the independent variable. This allows for a regression analysis between stations where one is downstream of another.

Confidence limits are calculated and optionally plotted for linear regressions. Also on linear regressions, a test is made of the significance of the slope coefficient (b). The user may specify the significance level, alpha, to be used in the confidence limits and test of the slope coefficient significance (T test).

REGRESSW (continued)

For each request, the user should specify:

type of data

primary retrieval method for dependent stations and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

date range (unless all are to be used)

independent station

source organization

date offset range between independent and dependent date

independent parameter transformation:
- none
- $\log_{10}$
- $\log_e$

dependent parameter transformation:
- none
- $\log_{10}$
- $\log_e$

significance level (.01, .02, .05, .1, or .2)

whether or not the regression equation should be forced through the origin or not forced

whether the equation should be linear or curvilinear

whether to plot the data and equation

DEPENDENT HEADER

NORTH FORK LITTLE SNAKE RIVER NEAR ENCAMPMENT, WYOMING STATION NO. 092518.00
LATITUDE 41-03-00 LONGITUDE 106-57-25 SW1/4 SECTION 33 TOWNSHIP 13 N,RANGE 85 W 6TH P.M.
ELEVATION 8250.00 FT DRAINAGE AREA 9.64 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 14150000
CARBON COUNTY DATA FROM USGS (P)

INDEPENDENT HEADER

NORTH FORK LITTLE SNAKE RIVER NEAR SLATER, COLORADO STATION NO. 092519.00
LATITUDE 41-00-55 LONGITUDE 107-01-20 NE1/4 SECTION 14 TOWNSHIP 12 N,RANGE 86 W 6TH P.M.
ELEVATION 7350.00 FT DRAINAGE AREA 29.30 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 14150000
CARBON COUNTY DATA FROM USGS (P)

*** LINEAR REGRESSION ANALYSIS ***
NO TRANSFORMATION APPLIED TO Y AXIS
NO TRANSFORMATION APPLIED TO X AXIS

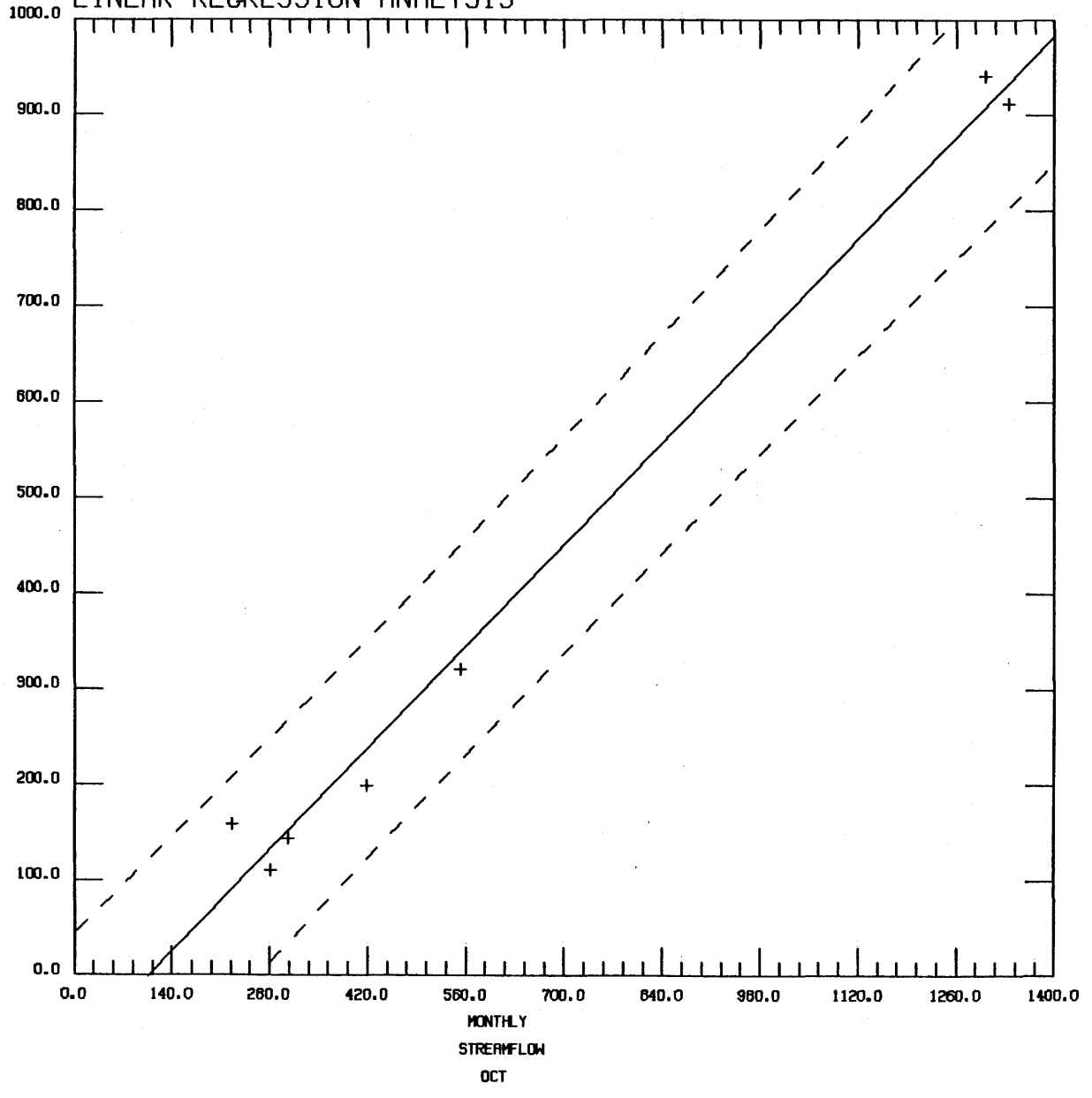
1957 - 1963
REGRESSION ON MEAN OF MONTHLY VALUES
OCT OCT

DEPENDENT VARIABLE	INDEPENDENT VARIABLE
MONTHLY STREAMFLOW	MONTHLY STREAMFLOW
157.88	225.92
319.74	551.80
109.69	280.86
911.60	1333.29
143.21	305.65
940.16	1301.16
197.36	417.52
ARITHMETIC MEAN 397.09	630.89
WEIGHTED ARITHMETIC MEAN 635.80	1010.13
STANDARD DEVIATION 367.38	480.75

Y= -82.514 + .7602X
SAMPLE SIZE IS 7
STANDARD ERROR= 41.03
STANDARD ERROR SQUARED= 1683.66
COEFFICIENT OF DETERMINATION, R SQUARED= .990
COEFFICIENT OF CORRELATION, R= .995
FOR ALPHA= .050 B IS SIGNIFICANT
MINIMUM X= 225.92 CONFIDENCE LIMITS= 207.71 AND -29.23
MAXIMUM X= 1333.29 CONFIDENCE LIMITS= 1060.20 AND 801.91

NORTH FORK LITTLE SNAKE RIVER NEAR ENCAMPMENT, WYOMING

NORTH FORK LITTLE SNAKE RIVER NEAR SLATER, COLORADO
LINEAR REGRESSION ANALYSIS



1957 - 1963

REF. NUMBER = 9251800

Y= -82.51+ .7602X

SAMPLE SIZE IS 7

STANDARD ERROR= 41.0

STND. ERR. SQ.= 1683.7

R SQUARED= .990

R= .995

ALPHA= .050 B IS SIG.

DEPENDENT HEADER

NORTH FORK LITTLE SNAKE RIVER NEAR ENCAMPMENT, WYOMING STATION NO. 092518.00
LATITUDE 41-03-00 LONGITUDE 106-57-25 SW1/4 SECTION 33 TOWNSHIP 13 N,RANGE 85 W 6TH P.M.
ELEVATION 8250.00 FT DRAINAGE AREA 9.64 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 14150000
CARBON COUNTY DATA FROM USGS (P)

INDEPENDENT HEADER

NORTH FORK LITTLE SNAKE RIVER NEAR SLATER, COLORADO STATION NO. 092519.00
LATITUDE 41-00-55 LONGITUDE 107-01-20 NE1/4 SECTION 14 TOWNSHIP 12 N,RANGE 86 W 6TH P.M.
ELEVATION 7350.00 FT DRAINAGE AREA 29.30 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 14150000
CARBON COUNTY DATA FROM USGS (P)

*** LINEAR REGRESSION ANALYSIS ***
NO TRANSFORMATION APPLIED TO Y AXIS
NO TRANSFORMATION APPLIED TO X AXIS

1957 - 1963

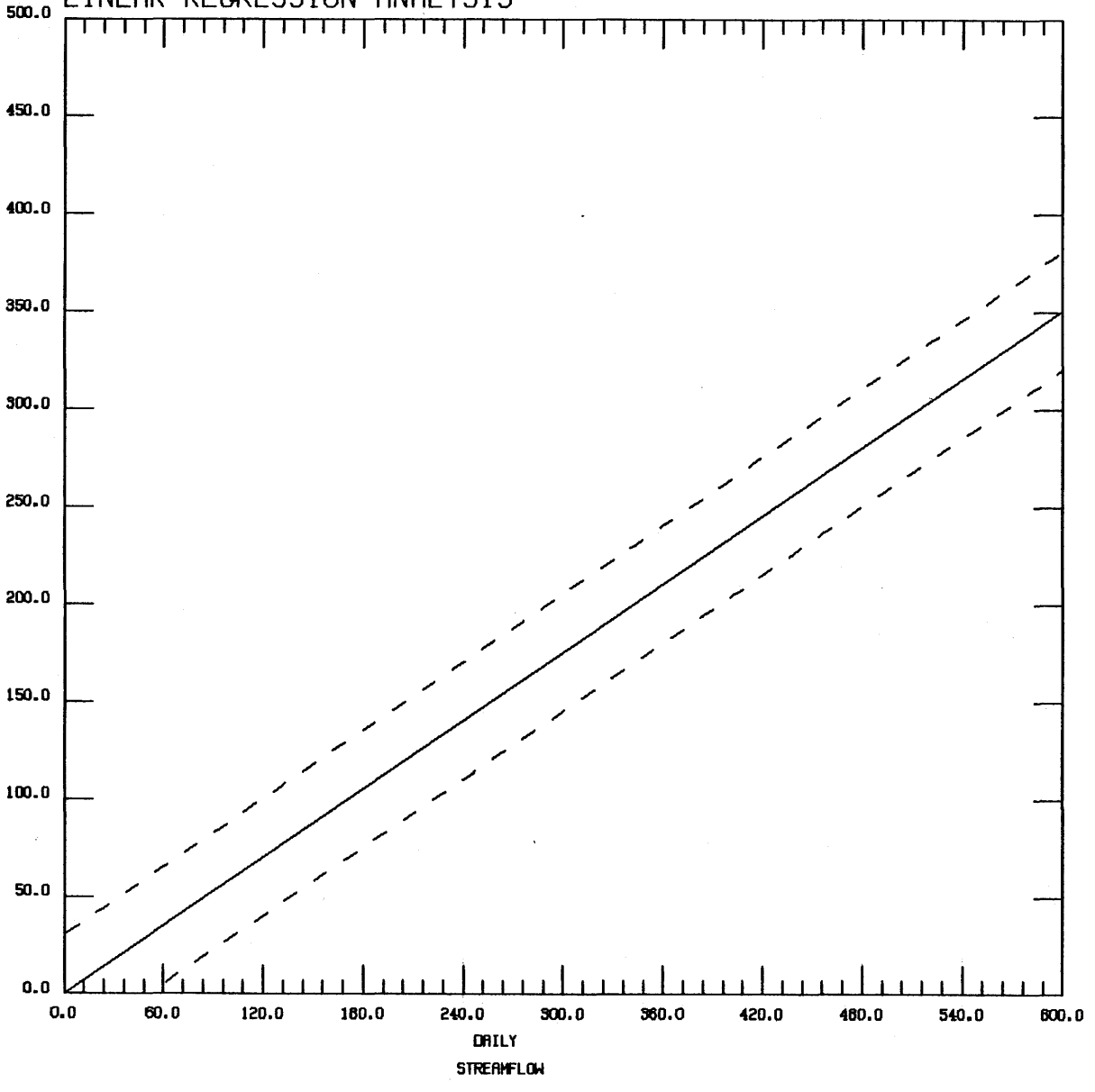
	DEPENDENT VARIABLE	INDEPENDENT VARIABLE
	DAILY STREAMFLOW	DAILY STREAMFLOW
ARITHMETIC MEAN	26.02	44.29
WEIGHTED ARITHMETIC MEAN	126.17	214.80
STANDARD DEVIATION	53.18	87.13

Y= .12+ .5846X
SAMPLE SIZE IS 2556
STANDARD ERROR= 15.31
STANDARD ERROR SQUARED= 234.33
COEFFICIENT OF DETERMINATION, R SQUARED= .917
COEFFICIENT OF CORRELATION, R= .958
FOR ALPHA= .050 B IS SIGNIFICANT

MINIMUM X=	2.40	CONFIDENCE LIMITS=	31.54 AND	-28.48
MAXIMUM X=	565.00	CONFIDENCE LIMITS=	360.64 AND	300.20

NORTH FORK LITTLE SNAKE RIVER NEAR ENCAMPMENT, WYOMING

NORTH FORK LITTLE SNAKE RIVER NEAR SLATER, COLORADO
LINEAR REGRESSION ANALYSIS



1957 - 1963

REF. NUMBER = 9251800

Y= .12+ .5846X

SAMPLE SIZE IS 2556

STANDARD ERROR= 15.3

STND. ERR. SQ.= 234.3

R SQUARED= .917

R= .958

ALPHA= .050 B IS SIG.

5. WATER QUALITY PROGRAMS

The water quality data base contains both grab samples and daily samples for ground and surface water locations. For every location with a water quality sample, a header is stored with the location in latitude-longitude, township-range, city-county and elevation. The type of site and the use of the water are also listed, as well as the source organization and their number for the location. Drainage basin code and drainage area (both contributing and non-contributing) are given for stream locations when known; aquifer, well depth, and well permit number are given for wells when known. There are currently over 13,000 water quality locations on WRDS, and for many not all of these items are known. Latitude-longitude is the most complete location information, and site type and user are usually known. On the other hand, the aquifer identification for most wells has not been made. As the funding and data become available, the headers are updated. While most water quality headers contain "(P)", which indicates public data, there do exist headers with "(C)", which indicates confidential data whose access is limited by the source organization.

For the more than 80,000 grab samples on the system the WRDS tries to store the sample collector, the testing lab, and whether the water was treated, along with the time and values. This information is not stored for samples collected daily; these are stored by water year.

ANCAT

This program calculates ion ratios and the anion/cation balance from water quality grab samples. The balance is computed by dividing the difference of the cations and anions by the total cations and anions, and multiplying by 100. These are based on the eight parameters (with their USGS parameter codes):

Anions	Cations
bicarbonate (449)	sodium (930)
carbonate (445)	potassium (935)
dissolved chloride (940)	calcium (915)
sulfate (945)	magnesium (925)

Total dissolved solids concentrations (USGS parameters 70300 and 30301) are also reported. The anions and cations are printed in milliequivalents per liter and as a percentage of the anion or cation total. The assumption made here is that the eight parameters examined represent essentially all of the anions and cations present. If none of the eight parameters is present, that sample is not printed. If only some parameters are present, the ratios and balance printed should be regarded as suspect.

For each request, the user should specify:

primary retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- site type
- source organization
- use
- township-range
- station numbers

ANCAT (continued)

secondary retrieval, if any, and value range:
- latitude-longitude
- county
- drainage basin
- site type
- source organization
- use
- township-range
- aquifer

date range

labs to exclude, if any

**STATION NO. 9188500 GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
LATITUDE 43-01-00 LONGITUDE 110-07-20 IN SUBLETTE COUNTY ELEVATION 7468.00 FT.
1/4- 1/4 SECTION 8 TOWNSHIP 35N RANGE 111W 6TH P.M. DRAINAGE BASIN CODE 15620000
SITE TYPE STREAM USE MONITORING OR OBSERVATION (P) USGS # 9188500
AQUIFER 0 DRAINAGE AREA 468.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 0.0 FT. WELL PERMIT NO. 0 WRRI DATA 1973-1974

* AFTER A VALUE TAGS IT AS LESS-THAN
$ AFTER A VALUE TAGS IT AS GREATER-THAN

15 MAY 62 - 1 JUN 62
COLL. BY USGS
TESTING : UNKNOWN
TREATED : UNTREATED

DISSOLVED SODIUM MILLIEQUIV (PER CENT)	DISSOLVED POTASSIUM MILLIEQUIV (PER CENT)	DISSOLVED CALCIUM MILLIEQUIV (PER CENT)	DISSOLVED MAGNESIUM MILLIEQUIV (PER CENT)	BICARBONATE ION MILLIEQUIV (PER CENT)	CARBONATE ION MILLIEQUIV (PER CENT)	DISSOLVED CHLORIDE MILLIEQUIV (PER CENT)	SULFATE ION MILLIEQUIV (PER CENT)
.14355	.02046	2.39520	.82260	2.24543	0.00000	0.00000	1.04100
(4.24477)	(.60488)	(70.82606)	(24.32428)	(68.32429)	(0.00000)	(0.00000)	(31.67571)

BALANCE	TDS	TDS-ROE	CA/MG	CL/SO4	CL/NA	HCO3/SO4	NA/(CA+MG)
1.430303	----------	199.00000	2.91174	0.00000	0.00000	2.15699	.04461

2 JUN 62 - 19 JUN 62
COLL. BY USGS
TESTING : UNKNOWN
TREATED : UNTREATED

DISSOLVED SODIUM MILLIEQUIV (PER CENT)	DISSOLVED POTASSIUM MILLIEQUIV (PER CENT)	DISSOLVED CALCIUM MILLIEQUIV (PER CENT)	DISSOLVED MAGNESIUM MILLIEQUIV (PER CENT)	BICARBONATE ION MILLIEQUIV (PER CENT)	CARBONATE ION MILLIEQUIV (PER CENT)	DISSOLVED CHLORIDE MILLIEQUIV (PER CENT)	SULFATE ION MILLIEQUIV (PER CENT)
.10005	.03068	1.84630	.74857	1.86846	0.00000	0.00000	.74952
(3.67075)	(1.12577)	(67.73921)	(27.46427)	(71.37029)	(0.00000)	(0.00000)	(28.62971)

BALANCE	TDS	TDS-ROE	CA/MG	CL/SO4	CL/NA	HCO3/SO4	NA/(CA+MG)
2.014006	----------	156.00000	2.46645	0.00000	0.00000	2.49288	.03856

DATEWQ

This program lists the dates of grab and/or daily water quality samples for a selected set of stations. For each station within the specified area, a header is printed which includes the reference number, station name, elevation, location by: township-range, latitude-longitude, county (or state if outside Wyoming), and drainage basin. Site type, use (if known), aquifer (if known) for ground water, drainage area and non-contributing drainage area for streams, depth for wells, and discharge permit number if applicable are also printed in the header. Each date that grab samples were taken can be listed, followed optionally by the year range for each daily parameter.

Grab dates can be dates when any samples were taken, or those dates when particular parameters were sampled. Similarly, only the dates of particular daily parameters can be listed. If the chosen parameters were not tested at a station, that header would not appear in the output. Also, there are two options which permit considering only those values which exceed EPA's drinking water standards, and which allow the user to exclude analyses done at particular labs.

For each listing, the user should specify:

primary retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- site type
- source organization
- use
- township-range
- station number

DATEWQ (continued)

secondary retrieval method, if any, and value range:
- latitude-longitude
- county
- drainage basin
- site type
- source organization
- use
- township-range
- aquifer

whether grab and/or daily dates are to be listed, and the parameters to list the dates of, if not all parameters

whether all values are to be considered, or only those exceeding EPA drinking water standards

any labs to be excluded (up to 3)

**STATION NO. 11958 BUCKSKIN MINE WELL P4
LATITUDE 44-26-36 LONGITUDE 105-33-00 IN CAMPBELL COUNTY ELEVATION 4222.70 FT.
SW1/4-NW1/4 SECTION 32 TOWNSHIP 52N RANGE 72W 6TH P.M. DRAINAGE BASIN CODE 06011800
SITE TYPE WELL USE MONITORING OR OBSERVATION (P) WYO DEQ # 500
AQUIFER 125FRUN DRAINAGE AREA 0.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 119.0 FT. WELL PERMIT NO. 30282 WELL SCREENED AT 32-119 SAMPLING METHOD- BAIL

****DATES OF GRAB SAMPLES****
25 NOV 75 25 NOV 75 15 JAN 76 8 MAR 76 19 APR 76 2 JUN 76 20 JUL 76 11 AUG 76 1 SEP 76 12 OCT 76
12 OCT 76 2 NOV 77

**STATION NO. 11959 BUCKSKIN MINE WELL P4-C
LATITUDE 44-26-36 LONGITUDE 105-33-00 IN CAMPBELL COUNTY ELEVATION 4223.40 FT.
SW1/4-NW1/4 SECTION 32 TOWNSHIP 52N RANGE 72W 6TH P.M. DRAINAGE BASIN CODE 06011800
SITE TYPE WELL USE MONITORING OR OBSERVATION (P) WYO DEQ # 500
AQUIFER 125FRUN DRAINAGE AREA 0.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 245.0 FT. WELL PERMIT NO. 30280 WELL SCREENED AT 130-244 SAMPLING METHOD- BAIL

****DATES OF GRAB SAMPLES****
25 NOV 75 15 JAN 76 8 MAR 76 8 MAR 76 19 APR 76 19 APR 76 2 JUN 76 2 JUN 76 20 JUL 76 11 AUG 76
1 SEP 76 12 OCT 76 2 DEC 76 2 NOV 77

**STATION NO. 11956 BUCKSKIN MINE WELL P2
LATITUDE 44-26-49 LONGITUDE 105-32-24 IN CAMPBELL COUNTY ELEVATION 4169.60 FT.
NW1/4-NE1/4 SECTION 32 TOWNSHIP 52N RANGE 72W 6TH P.M. DRAINAGE BASIN CODE 06011800
SITE TYPE WELL USE MONITORING OR OBSERVATION (P) WYO DEQ # 500
AQUIFER 125FRUN DRAINAGE AREA 0.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 78.0 FT. WELL PERMIT NO. 30963 WELL SCREENED AT 16-78 SAMPLING METHOD- BAIL

****DATES OF GRAB SAMPLES****
25 NOV 75 15 JAN 76 8 MAR 76 19 APR 76 2 JUN 76 20 JUL 76 11 AUG 76 1 SEP 76 12 OCT 76 2 NOV 77

**STATION NO. 11957 BUCKSKIN MINE WELL P2-C
LATITUDE 44-26-49 LONGITUDE 105-32-24 IN CAMPBELL COUNTY ELEVATION 4169.70 FT.
NW1/4-NE1/4 SECTION 32 TOWNSHIP 52N RANGE 72W 6TH P.M. DRAINAGE BASIN CODE 06011800
SITE TYPE WELL USE MONITORING OR OBSERVATION (P) WYO DEQ # 500
AQUIFER 125FRUN DRAINAGE AREA 0.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 189.0 FT. WELL PERMIT NO. 30283 WELL SCREENED AT 90-189 9 JUN 79-PUMP ALL OTHER SAMPLES-BAIL

****DATES OF GRAB SAMPLES****
8 MAR 76 19 APR 76 2 JUN 76 20 JUL 76 11 AUG 76 1 SEP 76 12 OCT 76 2 NOV 77 9 JUN 79

**STATION NO. 11964 BUCKSKIN MINE WELL P10
LATITUDE 44-26-49 LONGITUDE 105-32-42 IN CAMPBELL COUNTY ELEVATION 4158.00 FT.
NE1/4-NW1/4 SECTION 32 TOWNSHIP 52N RANGE 72W 6TH P.M. DRAINAGE BASIN CODE 06011800
SITE TYPE WELL USE MONITORING OR OBSERVATION (P) WYO DEQ # 500
AQUIFER 125FRUN DRAINAGE AREA 0.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 20.0 FT. WELL PERMIT NO. 31906 WELL SCREENED AT 10-20 SAMPLING METHOD- BAIL

****DATES OF GRAB SAMPLES****
25 NOV 75 15 JAN 76 8 MAR 76 19 APR 76 2 JUN 76 20 JUL 76 11 AUG 76 1 SEP 76 1 SEP 76 12 OCT 76
2 NOV 77

**STATION NO. 4216 UNNAMED WELL #46 NORTH-NORTHWEST OF GILLETTE, WYOMING
LATITUDE 44-27-00 LONGITUDE 105-35-00 IN CAMPBELL COUNTY ELEVATION 4375.00 FT.
SE1/4-SE1/4 SECTION 25 TOWNSHIP 52N RANGE 73W 6TH P.M. DRAINAGE BASIN CODE 06011800
SITE TYPE WELL OR SPRING USE UNKNOWN (P) USGS # 0

LISTDATAWQ

This program retrieves water quality data by one of eight retrieval methods. An optional second check can also be made. Station headers are then printed along with grab or daily data. As with DATEWQ, only particular parameters can be printed, or only values exceeding U.S. Environmental Protection Agency (EPA) drinking water standards, up to three labs can be excluded from analysis. Grab values printed can also be flagged for exceeding EPA standards, and milliequivalents per liter can be printed for applicable parameters.

Unlike the other LISTDATA programs, LISTDATAWQ has the option to print statistics computed from the grab data with or without printing the grab data. These include the maximum, minimum, mean, standard deviation, ratio test value, ratio test results, the distribution curve skewness, and the coefficient of variation. Also, the data of up to five stations can be combined as one set of values for these statistics.

For each request, the user should specify:

primary retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- site type
- source organization
- use
- township-range
- station number

secondary retrieval method, if any, and value range:
- latitude-longitude
- county
- drainage basin
- site type
- source organization
- use
- township-range
- aquifer

whether grab or daily data are to be retrieved

LISTDATAWQ (continued)

date range

whether statistics of grab data are to be printed

selected parameters to print, unless all data are to be printed

whether milliequivalents are to be printed for grab data

whether to flag values exceeding EPA standards or to only print values exceeding EPA drinking water standards

labs to exclude, if any

station numbers to combine, if any

**STATION NO. 9188500 GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
LATITUDE 43-01-00 LONGITUDE 110-07-20 IN SUBLETTE COUNTY ELEVATION 7468.00 FT.
1/4- 1/4 SECTION 8 TOWNSHIP 35N RANGE 111W 6TH P.M. DRAINAGE BASIN CODE 15620000
SITE TYPE STREAM USE MONITORING OR OBSERVATION (P) USGS # 9188500
AQUIFER 0 DRAINAGE AREA 468.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 0.0 FT. WELL PERMIT NO. 0 WRRI DATA 1973-1974

* AFTER A VALUE TAGS IT AS LESS-THAN
$ AFTER A VALUE TAGS IT AS GREATER-THAN

COLLECTED BY / TESTING LAB / TREATMENT		JSGS	7 WATER TEMPERATURE DEG. C	23 STREAMFLOW CFS	34 CONDUCTIVITY MICROMHOS AT 25 DEG. C	43 FIELD PH STAND. UNITS	45 TOTAL ALKALINITY MG/L	50 CARBONATE ION MG/L
UNKNOWN	UNTREATED							
4 JAN 68	TIME 1720		0.	136.000	565.000	8.00000	124.000	0.
14 FEB 68	TIME 1000		0.	97.0000	578.000	8.10000	128.000	0.
31 MAR 68	TIME 1715		1.00000	202.000	524.000	7.70000	110.000	0.
9 MAY 68	TIME 1030		7.00000	460.000	419.000	7.60000	122.000	0.
16 JUN 68	TIME 1550		13.0000	1320.00	226.000	8.20000	79.0000	0.
12 JUL 68	TIME 700		9.00000	1500.00	142.000	7.50000	44.0000	0.
14 AUG 68	TIME 1230		13.0000	866.000	161.000	7.80000	37.0000	0.
14 SEP 68	TIME 1530		11.0000	406.000	280.000	7.50000	64.0000	0.
15 OCT 68	TIME 1320		4.00000	400.000	376.000	7.80000	93.0000	0.
18 NOV 68	TIME 1215		1.00000	185.000	499.000	7.50000	120.000	0.
19 DEC 68	TIME 1140		0.	125.000	523.000	7.60000	130.000	0.
11 JAN 69	TIME 1600		0.	140.000	558.000	7.20000	129.000	0.
13 FEB 69	TIME 1145		0.	116.000	539.000	7.70000	120.000	0.
23 MAR 69	TIME 1340		0.	140.000	587.000	8.00000	130.000	0.
6 MAY 69	TIME 845		8.00000	1260.00	364.000	7.90000	128.000	0.
3 JUN 69	TIME 1430		12.0000	1280.00	237.000	7.70000	79.0000	0.
8 JUL 69	TIME 1010		12.0000	1020.00	170.000	7.90000	50.0000	0.
7 AUG 69	TIME 1210		15.0000	658.000	207.000	8.00000	61.0000	0.
28 AUG 69	TIME 1330		16.0000	406.000	235.000	8.00000	56.0000	0.
24 SEP 69	TIME 1155		12.0000	236.000	359.000	8.40000	84.0000	2.00000
23 OCT 69	TIME 1410		7.50000	155.000	510.000	8.20000	128.000	0.
23 NOV 69	TIME 1030		0.	87.0000	625.000	8.00000	133.000	0.
3 DEC 69	TIME 1020		0.	80.0000	636.000	7.90000	135.000	0.
7 JAN 70	TIME 1400		----------	122.000	----------	----------	----------	----------
9 JAN 70	TIME 1315		0.	83.0000	635.000	7.80000	135.000	0.
31 JAN 70	TIME 1140		----------	119.000	----------	----------	----------	----------
11 FEB 70	TIME 1535		0.	99.0000	596.000	7.20000	122.000	0.
10 MAR 70	TIME 1000		0.	117.000	580.000	7.70000	122.000	0.
8 APR 70	TIME 1330		----------	129.000	----------	----------	----------	----------
12 APR 70	TIME 1445		1.00000	123.000	581.000	8.00000	125.000	0.
12 APR 70	TIME 1450		1.00000	123.000	585.000	8.30000	----------	----------
11 MAY 70	TIME 35		1.00000	400.000	388.000	7.90000	103.000	0.
11 MAY 70	TIME 845		1.00000	400.000	388.000	7.90000	103.000	0.
13 MAY 70	TIME 1500		----------	1470.00	----------	----------	----------	----------
8 JUN 70	TIME 1245		----------	1960.00	----------	----------	----------	----------
9 JUN 70	TIME 1720		8.50000	2420.00	166.000	7.40000	59.0000	0.
12 JUL 70	TIME 1630		----------	1710.00	----------	----------	----------	----------
16 JUL 70	TIME 920		13.0000	1020.00	142.000	7.30000	50.0000	0.
3 AUG 70	TIME 1500		----------	1030.00	----------	----------	----------	----------
6 AUG 70	TIME 1445		----------	532.000	195.000	8.10000	50.0000	0.
10 SEP 70	TIME 1945		13.0000	430.000	216.000	8.20000	47.0000	0.
11 SEP 70	TIME 730		----------	420.000	----------	----------	----------	----------
1 OCT 70	TIME 43		10.0000	181.000	430.000	8.30000	100.000	0.
1 OCT 70	TIME 1350		10.0000	181.000	430.000	8.30000	100.000	0.
5 NOV 70	TIME 1430		.500000	132.000	531.000	8.20000	112.000	0.
6 DEC 70	TIME 16		0.	180.000	495.000	8.10000	105.000	0.
6 DEC 70	TIME 1600		0.	180.000	495.000	8.10000	105.000	0.
7 JAN 71	TIME 1400		0.	121.000	583.000	7.80000	125.000	0.
31 JAN 71	TIME 1140		0.	117.000	550.000	7.90000	115.000	0.

LOAD

This program models a constituent's load in a stream. Assuming that there is a relationship between mean daily streamflow (obtained from the daily surface water quantity data file) and a constituent's concentrations (obtained from the grab water quality data file) at a particular station, LOAD determines a regression equation to correlate the two for that station. This equation is then used to derive concentrations on those days on which streamflow was measured. Daily loads are calculated by the product of mean daily streamflow and derived constituent concentration.

The output of the model consists of the station headers for the station from both the surface water quantity and the water quality data base. The pairs of values used to derive the regression equation are optionally printed. The equation and supporting statistics are then printed, followed by two tables: one of total monthly loads, and one of mean monthly concentrations. Up to eight plots can also be generated. The regression equation and data can be plotted. The computed daily load values can also be plotted, with the observed load values also plotted. Finally, histograms for all data, complete months of data, or complete years of data can be plotted for mean monthly load or mean monthly concentrations.

Two date ranges are needed for this program, one to specify the period used for the regression, and a second period for which load values are calculated. Often, mean flow data are available for a far longer period than water quality data for the station, and it is left to the user's discretion how much extrapolation should be performed.

LOAD (continued)

The program assumes a correlation between constituent concentrations in grab samples and mean daily flows. A more commonly accepted correlation is between concentrations in the grab samples and the flows at the time the samples are taken. However, the purpose of the regression is to extend the constituent data base, and the most abundant flow data for regression are mean daily streamflows. The model is expected to perform adequately for large perennial streams, whose mean daily streamflows approximate the flow at the time of water quality sampling. For ephemeral streams and small perennial streams, whose mean daily flow may not approximate the flow at the time the grab sample was taken, the load model program will likely produce inaccurate output.

For each request, the user should specify:

station number of gages

date range for regression (unless all grab data are to be used)

constituent parameter to use (total dissolved solids, sum of constituents, is used otherwise)

labs to exclude, if any

date range for load values (unless all daily flow data are to be used)

whether the regression data should be printed

which, if any, plots are desired:
- regression equation and data
- daily loads, calculated and observed
- histogram of mean monthly loads, all data
- histogram of mean monthly loads, complete months
- histogram of mean monthly loads, complete years
- histogram of mean monthly concentrations, all data
- histogram of mean monthly concentrations, complete months
- histogram of mean monthly concentrations, complete years

significance level of regression (.01, .02, .05, .1 or .2) (.05 is assumed)

DEPENDENT HEADER

**STATION NO. 9188500 GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
LATITUDE 43-01-00 LONGITUDE 110-07-20 IN SUBLETTE COUNTY ELEVATION 7468.00 FT.
1/4- 1/4 SECTION 8 TOWNSHIP 35N RANGE 111W 6TH P.M. DRAINAGE BASIN CODE 15620000
SITE TYPE STREAM USE MONITORING OR OBSERVATION - (P) USGS # 9188500
AQUIFER 0 DRAINAGE AREA 468.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 0.0 FT. WELL PERMIT NO. 0

INDEPENDENT HEADER
GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING STATION NO. 091885.00
LATITUDE 43-01-08 LONGITUDE 110-07-03 SE1/4SE1/4NE1/4 SECTION 8 TOWNSHIP 35 N,RANGE 111 W 6TH P.M.
ELEVATION 7468.09 FT DRAINAGE AREA 468.00 SQ MI NONCONTRIBUTING 0.00 SQ MI BASIN 15630000
LINCOLN COUNTY DATA FROM USGS (P)

LOG Y= 3.50 -.4620LOG X
SAMPLE SIZE IS 109
STANDARD ERROR= .11
STANDARD ERROR SQUARED= .01
COEFFICIENT OF DETERMINATION, R SQUARED= .782
COEFFICIENT OF CORRELATION, R= -.885
FOR ALPHA= .050 B IS SIGNIFICANT
MINIMUM X= 1.90 CONFIDENCE LIMITS= 2.83 AND 2.41
MAXIMUM X= 3.60 CONFIDENCE LIMITS= 2.06 AND 1.62

**STATION NO. 9188500 GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
LATITUDE 43-01-00 LONGITUDE 110-07-20 IN SUBLETTE COUNTY ELEVATION 7468.00 FT.
1/4- 1/4 SECTION 8 TOWNSHIP 35N RANGE 111W 6TH P.M. DRAINAGE BASIN CODE 15620000
SITE TYPE STREAM USF MONITORING OR OBSERVATION (P) USGS # 9188500
AQUIFER 0 DRAINAGE AREA 468.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 0.0 FT. WELL PERMIT NO. 0

TOTAL MONTHLY LOAD IN TONS/MONTH

BY WATER YEAR

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL	MEAN %
1972	4828.8	4214.9	3439.0	3490.4	3142.0	4118.7	5343.2	13111.3	18776.5	12029.2	8760.1	6320.2	87574.3	110.2
1973	5555.1	4430.1	3754.3	3507.1	3090.1	3437.4	3703.4	10879.9	11880.5	10707.9	7330.1	5961.2	74237.0	93.4
1974	4474.7	3853.3	3438.3	3429.2	3078.3	3509.7	5478.9	12467.9	18097.5	12295.7	6924.6	4511.5	81559.6	102.6
1975	3838.3	3229.9	3327.4	3198.8	2878.9	3299.4	3868.3	7303.7	13251.5	17177.6	8268.9	4934.3	74577.0	93.8
ALL DATA														
N	4	4	4	4	4	4	4	4	4	4	4	4	4	
MAX	5555.1	4430.1	3754.3	3507.1	3142.0	4118.7	5478.9	13111.3	18776.5	17177.6	8760.1	6320.2	87574.3	
MEAN	4674.2	3932.0	3489.8	3406.4	3047.3	3591.3	4598.5	10940.7	15501.5	13052.6	7820.9	5431.8	79487.0	
MIN	3838.3	3229.9	3327.4	3198.8	2878.9	3299.4	3703.4	7303.7	11880.5	10707.9	6924.6	4511.5	74237.0	
COMPLETE MONTHS														
N	4	4	4	4	4	4	4	4	4	4	4	4	4	
MAX	5555.1	4430.1	3754.3	3507.1	3142.0	4118.7	5478.9	13111.3	18776.5	17177.6	8760.1	6320.2	87574.3	
MEAN	4674.2	3932.0	3489.8	3406.4	3047.3	3591.3	4598.5	10940.7	15501.5	13052.6	7820.9	5431.8	79487.0	
MIN	3838.3	3229.9	3327.4	3198.8	2878.9	3299.4	3703.4	7303.7	11880.5	10707.9	6924.6	4511.5	74237.0	
COMPLETE YEARS														
N	4	4	4	4	4	4	4	4	4	4	4	4	4	
MAX	5555.1	4430.1	3754.3	3507.1	3142.0	4118.7	5478.9	13111.3	18776.5	17177.6	8760.1	6320.2	87574.3	
MEAN	4674.2	3932.0	3489.8	3406.4	3047.3	3591.3	4598.5	10940.7	15501.5	13052.6	7820.9	5431.8	79487.0	
MIN	3838.3	3229.9	3327.4	3198.8	2878.9	3299.4	3703.4	7303.7	11880.5	10707.9	6924.6	4511.5	74237.0	

**STATION NO. 9188500 GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
LATITUDE 43-01-00 LONGITUDE 110-07-20 IN SUBLETTE COUNTY ELEVATION 7468.00 FT.
1/4- 1/4 SECTION 8 TOWNSHIP 35N RANGE 111W 6TH P.M. DRAINAGE BASIN CODE 15620000
SITE TYPE STREAM USE MONITORING OR OBSERVATION (P) USGS # 9188500
AQUIFER 0 DRAINAGE AREA 468.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 0.0 FT. WELL PERMIT NO. 0

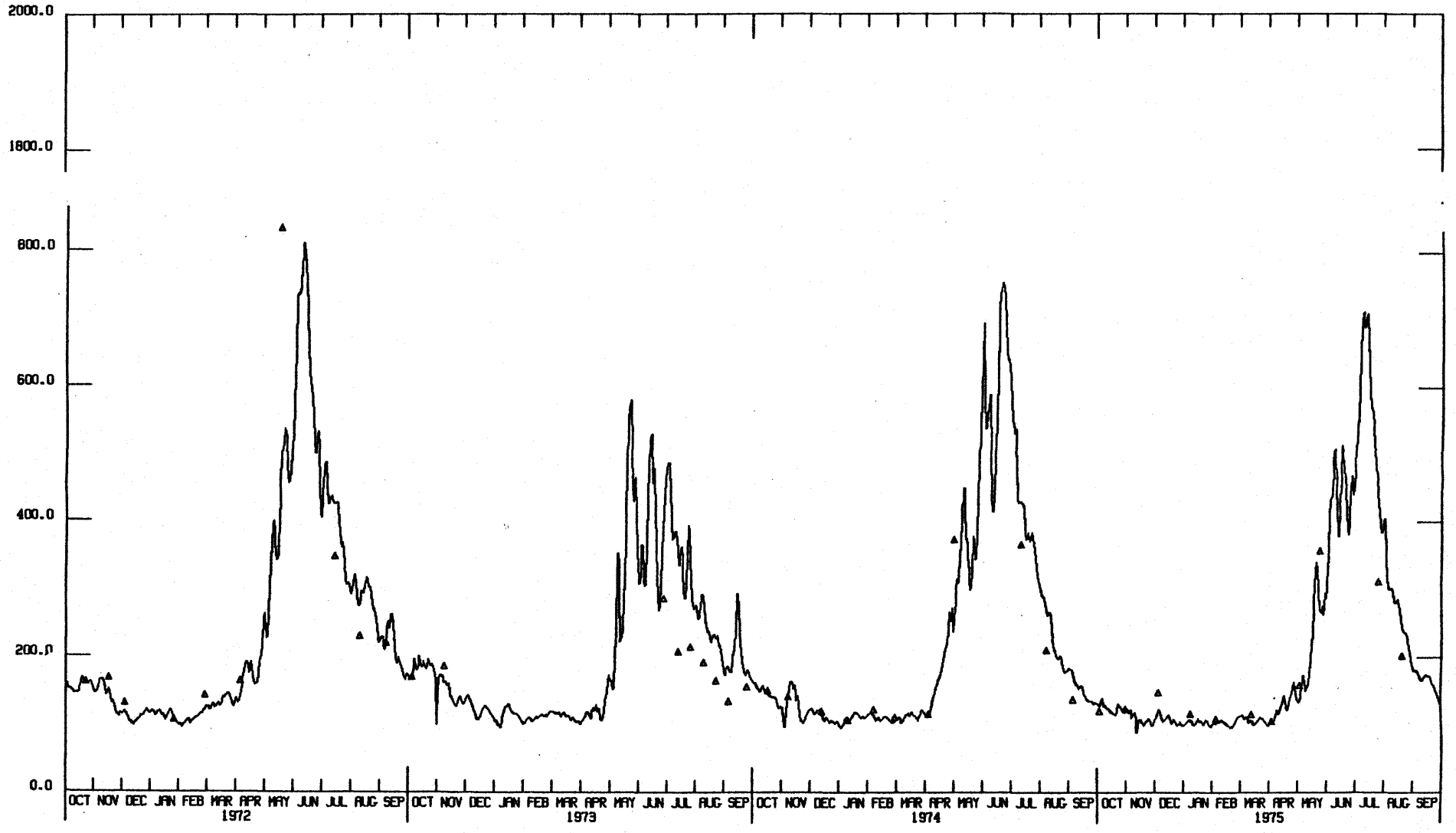
MEAN MONTHLY CONCENTRATIONS IN MG/L

BY WATER YEAR

YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL	MEAN %
1972	259.7	280.6	347.2	342.9	353.9	297.5	226.7	105.8	76.4	116.5	154.7	197.6	13305.1	85.3
1973	228.5	270.0	321.0	340.3	349.4	347.6	312.6	117.1	113.2	128.7	179.6	206.1	20445.5	131.1
1974	276.5	300.8	347.0	348.2	350.5	341.7	214.3	109.0	79.5	114.1	186.4	265.6	14178.3	90.9
1975	316.2	355.6	357.2	370.2	371.2	360.3	302.1	171.3	105.5	84.8	159.2	246.8	14431.4	92.6
ALL DATA														
N	4	4	4	4	4	4	4	4	4	4	4	4	4	
MAX	316.2	355.6	357.2	370.2	371.2	360.3	312.6	171.3	113.2	128.7	186.4	265.6	20445.5	
MEAN	270.3	301.8	343.1	350.4	356.3	336.8	263.9	125.8	93.6	111.0	170.0	229.0	15590.1	
MIN	228.5	270.0	321.0	340.3	349.4	297.5	214.3	105.8	76.4	84.8	154.7	197.6	13305.1	
COMPLETE MONTHS														
N	4	4	4	4	4	4	4	4	4	4	4	4	4	
MAX	316.2	355.6	357.2	370.2	371.2	360.3	312.6	171.3	113.2	128.7	186.4	265.6	20445.5	
MEAN	270.3	301.8	343.1	350.4	356.3	336.8	263.9	125.8	93.6	111.0	170.0	229.0	15590.1	
MIN	228.5	270.0	321.0	340.3	349.4	297.5	214.3	105.8	76.4	84.8	154.7	197.6	13305.1	
COMPLETE YEARS														
N	4	4	4	4	4	4	4	4	4	4	4	4	4	
MAX	316.2	355.6	357.2	370.2	371.2	360.3	312.6	171.3	113.2	128.7	186.4	265.6	20445.5	
MEAN	270.3	301.8	343.1	350.4	356.3	336.8	263.9	125.8	93.6	111.0	170.0	229.0	15590.1	
MIN	228.5	270.0	321.0	340.3	349.4	297.5	214.3	105.8	76.4	84.8	154.7	197.6	13305.1	

STATION NO. 9188500 GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
LATITUDE 43-01-00 LONGITUDE 110-07-20 IN SUBLETTE COUNTY ELEVATION 7468.00 FT.
1/4- 1/4 SECTION 8 TOWNSHIP 35N RANGE 111W 6TH P.M. DRAINAGE BASIN CODE 15620000
SITE TYPE STREAM USE MONITORING OR OBSERVATION (P) USGS # 9188500
AQUIFER 0 DRAINAGE AREA 468.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 0.0 FT. WELL PERMIT NO. 0

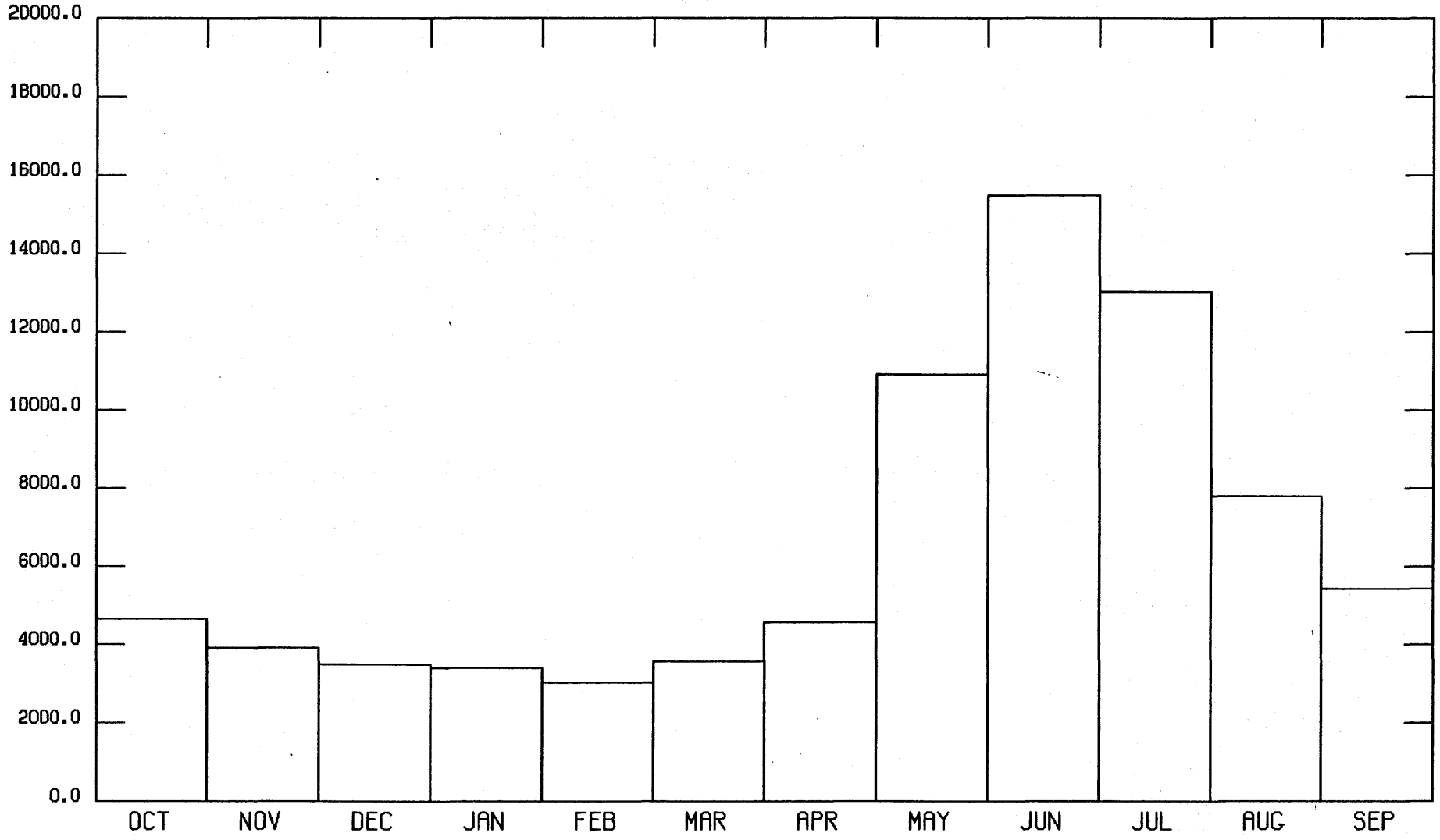
CALCULATED DAILY SALINITY LOAD VALUES



△ OBSERVED DAILY SALINITY LOAD VALUES

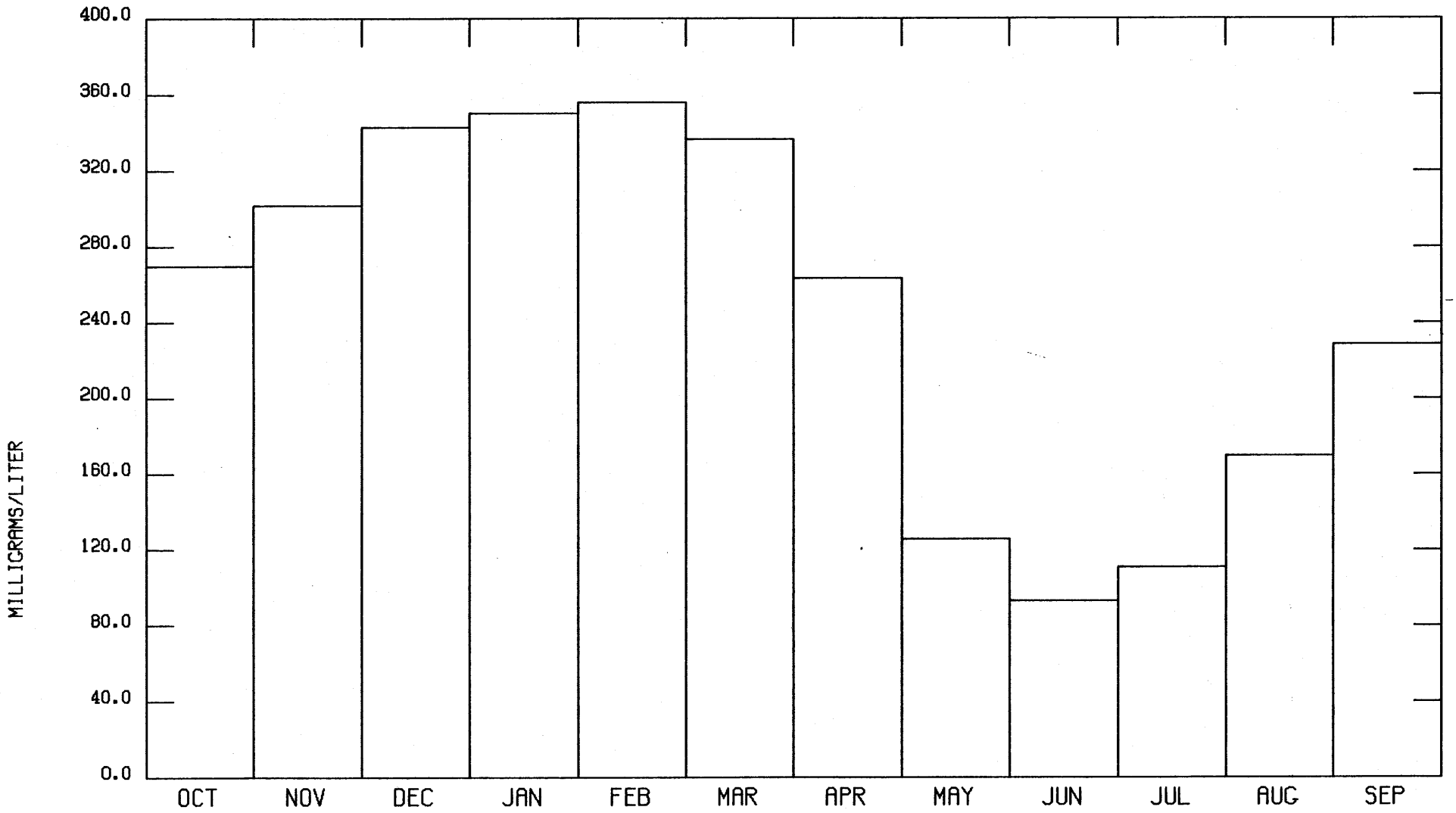
STATION NO. 9188500 GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
LATITUDE 43-01-00 LONGITUDE 110-07-20 IN SUBLETTE COUNTY ELEVATION 7468.00 FT.
1/4- 1/4 SECTION 8 TOWNSHIP 35N RANGE 111W 6TH P.M. DRAINAGE BASIN CODE 15620000
SITE TYPE STREAM USE MONITORING OR OBSERVATION (P) USGS # 9188500
AQUIFER 0 DRAINAGE AREA 468.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 0.0 FT. WELL PERMIT NO. 0

MEAN MONTHLY DISSOLVED SOLIDS LOAD VALUES
COMPLETE MONTHS OF DATA



STATION NO. 9188500 GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
LATITUDE 43-01-00 LONGITUDE 110-07-20 IN SUBLETTE COUNTY ELEVATION 7468.00 FT.
1/4- 1/4 SECTION B TOWNSHIP 35N RANGE 111W 6TH P.M. DRAINAGE BASIN CODE 15620000
SITE TYPE STREAM USE MONITORING OR OBSERVATION (P) USGS # 9188500
AQUIFER 0 DRAINAGE AREA 468.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 0.0 FT. WELL PERMIT NO. 0

MEAN MONTHLY DISSOLVED SOLIDS CONCENTRATION
COMPLETE YEARS OF DATA



LPARAM

This program lists the water quality parameters and their associated code numbers that are stored on the WRDS. They are listed in parameter code order. The system currently stores 746 different parameters. New parameters are added when necessary. While it is technically possible to analyze each sample for every possible parameter, it should be remembered that in reality only a few parameters are usually analyzed for each sample. The number of parameters analyzed varies widely among the samples.

WATER QUALITY
GRAB SAMPLE PARAMETERS AVAILABLE ON THE WATER RESOURCES DATA SYSTEM
WYOMING WATER RESOURCES RESEARCH INSTITUTE, LARAMIE, WY

1 CROSS-SECT FROM RT BANK UPSTRM FEET	2 DEPTH OF COLLECTION FEET	3 STREAM WIDTH FEET	4 X-SECT VERT LOCATION PERC OF DPTH	5 NO. USED IN SAMP ACCOUNT PROCEDURE	6 CROSS-SECT FROM LT BANK DWNSTRM FEET	7 WATER TEMPERATURE DEG. C	8 4F INCH PAN EVAP. TEMP. DEG. C
9 24 INCH PAN EVAP. TEMP. DEG. C	10 WET BULB TEMPERATURE DEG. C	11 AIR TEMPERATURE DEG. C	12 CLOUD COVER PERCENT	13 WIND VELOCITY M.P.H.	14 WIND AZIMUTH DEGREES	15 WEATHER	16 ACCUMULATED RAINFALL INCHES
17 EVAPORATION INCHES PER DAY	18 RESERVOIR STORAGE ACRE-FEET	19 STREAM VELOCITY FT/SEC	20 WELL YIELD GALLONS/DAY	21 WELL YIELD GALLONS/MIN.	22 INSTANT. WELL YIELD GALLONS/MIN.	23 STREAMFLOW CFS	24 INSTANT. STREAMFLOW CFS
25 NUMBER OF SAMPLING POINTS	26 MEAN STREAM DEPTH FEET	27 STREAM STAGE FEET ABOVE DATUM	28 TURBIDITY JTU	29 HELLIGE TURBIDITY MG/L AS SIO2	30 TRANSPARENCY SECCHI DISK INCHES	31 COLOR PLATINUM COBALT UNITS	32 ODOR THRESHOLD # AT ROOM TEMP
33 OXIDATION REDCT POTENT MILLIVOLTS	34 CONDUCTIVITY MICROMHOS AT 25 DEG. C	35 SAMPLE TREATMENT	36 DISSOLVED OXYGEN MG/L	37 DISSOLVED OXYGEN PERC OF SAT.	38 IMMEDIATE OXYGEN DEMAND MG/L	39 BIOCHEMICAL OXYGEN DEMND 5-DAY MG/L	40 CHEM OXYGEN DEMAND .025 NK2CR07 MG/L
41 BOTTOM DEPOS CHEM OXYGEN DEMAND UG/KG	42 CHEM OXYGEN DEMAND .25 NK2CR07 MG/L	43 FIELD PH STAND. UNITS	44 CARBON DIOXIDE MG/L	45 TOTAL ALKALINITY MG/L	46 CARBONATE ALKALINITY MG/L	47 TOTAL ACIDITY MG/L	48 CO2 ACIDITY MG/L
49 BICARBONATE ION MG/L	50 CARBONATE ION MG/L	51 SEDIMENT MOISTURE PERCENT	52 BOTTOM DEPOS IGNITION LOSS MG/KG	53 TOT. RESIDUE FOE 105C MG/L	54 TOTAL VOLATILE RESIDUE MG/L	55 TOTAL FIXED RESIDUE MG/L	56 DISSOLVED SOLIDS FOE 105C MG/L
57 VOLATILE FILTRABLE RESIDUE MG/L	58 FIXED FILTRABLE RESIDUE MG/L	59 TOTAL NON-FILTRABLE RESIDUE MG/L	60 VOLATILE NONFILT. RESIDUE MG/L	61 FIXED NON-FILTRABLE RESIDUE MG/L	62 FIXED NON-SETTLEABLE RESIDUE MG/L	63 VOLATILE NON SETTLEABLE RESIDUE MG/L	64 TOTAL OIL-GREASE MG/L
65 TOTAL NITROGEN MG/L (N)	66 NITROGEN IN BOTTOM DEP-OSITS MG/KG	67 ORGANIC NITROGEN MG/L	68 DISS ORGANIC NITROGEN MG/L	69 DISSOLVED AMMONIA MG/L (N)	70 TOTAL AMMONIA MG/L (N)	71 BOTTOM DEPOS AMMONIA MG/KG	72 DISSOLVED NITRITE MG/L (N)
73 TOTAL NITRITE MG/L (N)	74 BOTTOM DEPOS NITRITE MG/KG	75 DISSOLVED NITRATE MG/L (N)	76 TOTAL NITRATE MG/L (N)	77 BOTTOM DEPOS NITRATE MG/KG	78 DISSOLVED KJELDAHL NITROGEN MG/L	79 SUSPENDED KJELDAHL NITROGEN MG/L	80 TOTAL KJELDAHL NITROGEN MG/L
81 BOTTOM DEPOS KJELDAHL NITROGEN MG/L	82 TOTAL NITRITE PLUS NITRATE MG/L	83 DISSOLVED NITRITE PLUS NITRATE MG/L	84 BOTTOM DEPOS NITRITE PLUS NITRATE MG/L	85 TOTAL AMMONIA PLUS ORGANIC MG/L	86 DISSOLVED AMMONIA PLUS ORGANIC MG/L	87 ALBUMINOID NITROGEN MG/L	88 TOTAL PHOSPHATE MG/L

PLOTWQL

This program plots water quality grab data by location. Up to two parameter values can be plotted for each station. Areas to be plotted can be requested by latitude-longitude or by township-range. The stations plotted can be limited by one of six methods, and samples from up to three labs can be excluded. Optionally, only values exceeding EPA drinking water standards can be considered.

The data plotted can be in one of the following styles:

Style 1. site type
station number

Style 2. number of samples available
station number
mean value of given parameter

Style 3. number of samples available
station number
maximum value of given parameter
minimum value of given parameter

Style 4. number of samples available
station number
mean value of first parameter
mean value of second parameter

Style 5. number of samples available
station number
maximum value of first parameter
maximum value of second parameter

Style 6. number of samples available
station number
minimum value of first parameter
minimum value of second parameter

To prevent overprinting data from adjacent stations, the program can combine the data of these stations and plot instead an "overlap point," whose position is the weighted average of the points it replaces.

PLOTWQL (continued)

For each style, the program can optionally plot beside overlap points:

Style 1. nothing is plotted beside the overlap point

Style 2. mean value of given parameter

Style 3. maximum value of given parameter

Style 4. mean value of first parameter

Style 5. maximum value of first parameter

Style 6. minimum value of first parameter

Nothing can be plotted beside an overlap point if style 1 is desired, and the overlap point will reflect the number of stations overlapping.

For each plot, the user should specify:

style of plot

scale of plot

whether overlap points should be created, and whether to print anything beside them

retrieval method and value range:
- latitude-longitude
- township-range

secondary retrieval method and value range:
- county
- drainage basin
- site type
- source organization
- use
- aquifer

date range (unless all are to be used)

first and second parameters, as applicable

labs to exclude, if any

whether to consider only values exceeding EPA drinking water standards

print height (.1 or .06 inches)

SCALE -- 1 : 24000

POINTS PLOTTED REPRESENT
- ⊙ UNKNOWN
- △ WELL
- \+ SPRING
- × WELL OR SPRING
- ◇ STREAM
- ⊹ LAKE OR RESERVOIR
- ⧖ DITCH
- Z PIPE OR TAP
- Y RETORT WATER
- ⊠ HAULED WATER
- [N] N OVERLAP POINTS
  (N=** FOR MORE THAN 99 POINTS)

VALUES PRINTED ARE
LINE 1
STATION NUMBER

14 DATA POINTS ARE REPRESENTED.

41.28' 0'
106.50' 0'

41.28' 0'
106.47' 0'

41.25' 0'
106.50' 0'

41.25' 0'
106.47' 0'

6627000

5779

LATITUDE (TICK = 10 MINUTES)

LONGITUDE (TICK = 10 MINUTES)

PLOTWQT

Trends and correlations in water quality data are more apparent when the data are plotted versus time. PLOTWQT can plot grab and daily water quality data versus time in a variety of styles. These are:

1. one to six grab parameters for a given station; each parameter is plotted with unique connected symbols

2. one to six daily parameters for a given station; each parameter is plotted with a unique dotted line pattern

3. one grab and one daily parameter for a given station; the grab parameter is plotted with connected symbols, the daily parameter has a dotted line

4. one grab or one daily parameter for up to three stations; the values for each station are plotted as unique connected symbols (grab data) or as unique dotted line patterns (daily data)

5. one to three grab parameters for a given station; all of the grab values are connected by the same line; only the symbols denote the separate parameters

For each style, the station header(s) is printed above the plot, and all parameter symbols or patterns are also defined in the plot. When more than one parameter is plotted, the first parameter is plotted according to one scale (on the left edge of the plot), and the other parameters can be plotted according to a second scale (on the right edge of the plot). The y-axis scale can be selected by the program or pre-set by the user. A maximum of 10 years of data can be plotted at one time with a maximum plot length of 10 feet, and the time scale can be one of three sizes. Up to three labs can be excluded from consideration. An additional option exists to plot only values exceeding EPA drinking water standards.

PLOTWQT (continued)

For each plot, the user should specify:

style of plot

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- site type
- source organization
- use
- township-range
- station number

secondary retrieval, if any, and value range:
- latitude-longitude
- county
- drainage basin
- site type
- source organization
- use
- township-range
- aquifer

date range (unless all are to be used)

parameter(s) to plot

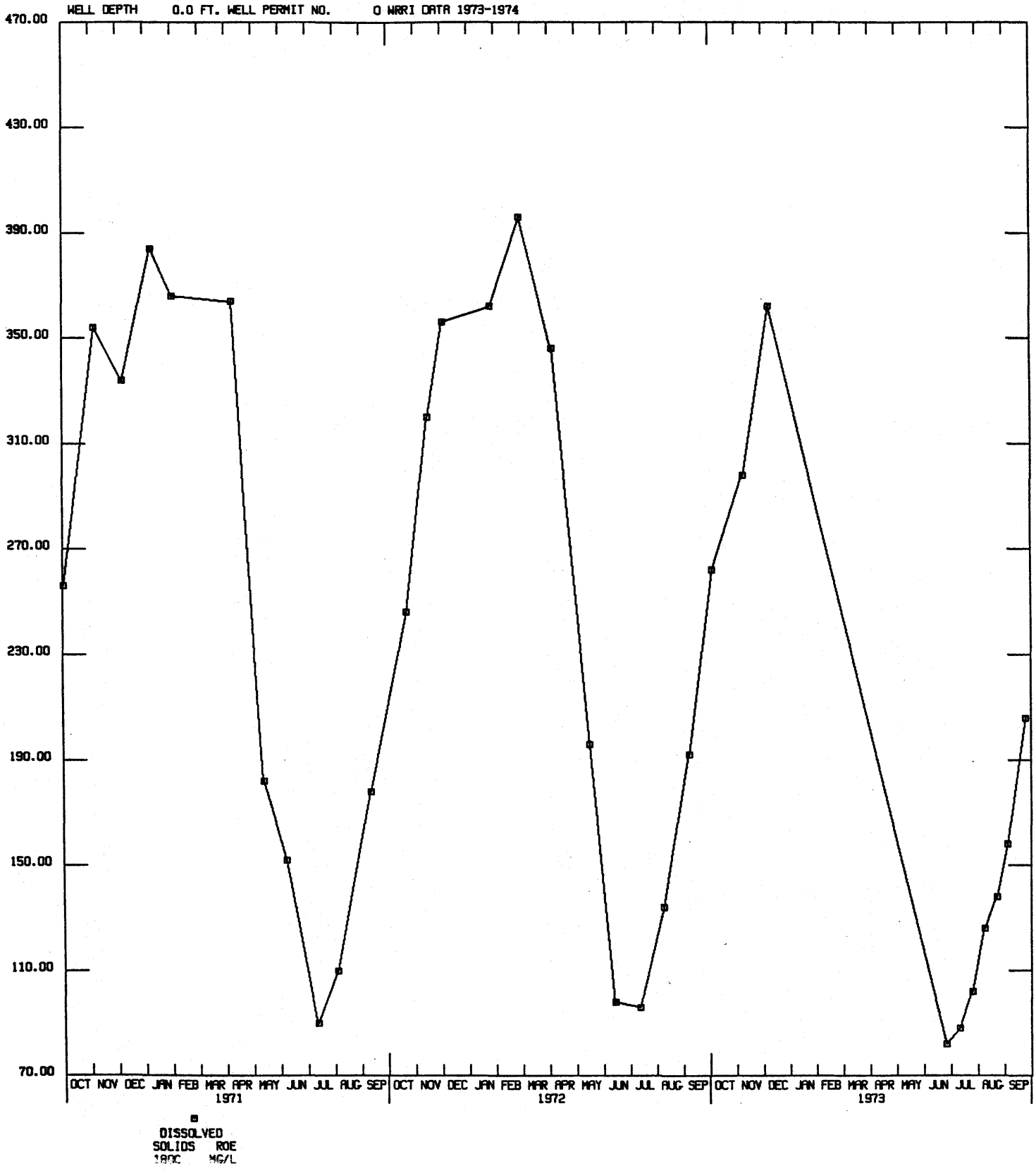
year length (3.6, 9, or 23.4 inches per year)

y-axis concentration range(s) (unless the automatic range(s) is (are) acceptable)

labs to exclude (if any)

whether to consider only concentrations exceeding EPA drinking water standards

STATION NO. 9188500 GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
LATITUDE 43-01-00 LONGITUDE 110-07-20 IN SUBLETTE COUNTY ELEVATION 7468.00 FT.
1/4- 1/4 SECTION 8 TOWNSHIP 35N RANGE 111W 6TH P.M. DRAINAGE BASIN CODE 15620000
SITE TYPE STREAM USE MONITORING OR OBSERVATION (P) USGS # 9188500
AQUIFER 0 DRAINAGE AREA 468.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 0.0 FT. WELL PERMIT NO. 0 WRRI DATA 1973-1974



REGRESWQ

This program generates a least squares regression analysis for either grab or daily water quality data. The regression can be one of six types:

1. two grab parameters for a given station
2. two daily parameters for a given station
3. two daily parameters, averaged monthly, for a given station
4. one grab parameter for two stations
5. one daily parameter for two stations
6. one daily parameter, averaged monthly, for two stations

The regression fit can be linear or curvilinear. Data transformations ($\log_{10}$ or $\log_e$) can optionally be applied to either/both the independent and dependent values. The fit can be forced through the origin if requested. Plots of the data and regression curve are optional.

The dates of the dependent variable can optionally be offset by a given time period from the dates of the independent variable. This allows for a regression analysis between stations where one is downstream from another.

Confidence limits are calculated and optionally plotted for linear regressions. Also on linear regressions, a test is made of the significance of the slope coefficient (b). The user may specify the significance level, alpha, to be used in the confidence limits and test of the slope coefficient significance (T test).

REGRESWQ (continued)

For each request, the user should specify:

type of data

primary retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- site type
- source organization
- use
- township-range
- station number

secondary retrieval, if any, and value range:
- latitude-longitude
- county
- drainage basin
- site type
- source organization
- use
- township-range
- aquifer

date range (unless all are to be used)

independent/dependent parameters, as applicable

independent station number, if applicable

date offset range between independent and dependent date

independent parameter transformation:
- none
- $\log_{10}$
- $\log_e$

dependent parameter transformation:
- none
- $\log_{10}$
- $\log_e$

significance level (.01, .02, .05, .1, or .2)

whether the regression equation should be forced through the origin or not forced

whether the equation should be linear or curvilinear

whether to plot the data and equation

REGRESWQ (continued)

whether to only use concentrations exceeding EPA drinking water standards

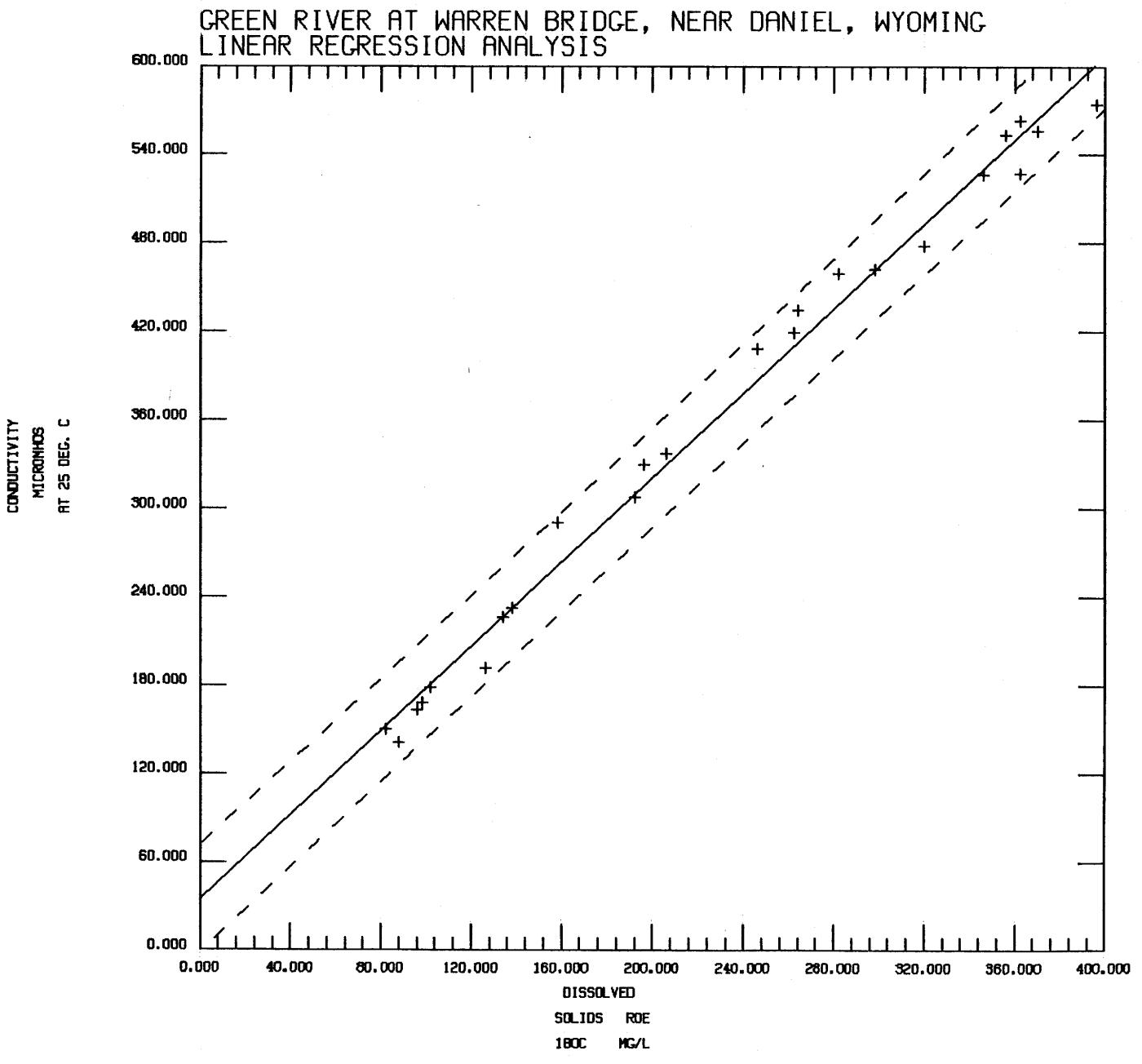
labs to exclude, if any

**STATION NO. 9188500 GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
LATITUDE 43-01-00 LONGITUDE 110-07-20 IN SUBLETTE COUNTY ELEVATION 7468.00 FT.
1/4- 1/4 SECTION 8 TOWNSHIP 35N RANGE 111W 6TH P.M. DRAINAGE BASIN CODE 15620000
SITE TYPE STREAM USE MONITORING OR OBSERVATION (P) USGS # 9188500
AQUIFER 0 DRAINAGE AREA 468.00 SQ. MI. NONCONTRIBUTING 0.00 SQ. MI. DISCHARGE PERMIT NO. 0
WELL DEPTH 0.0 FT. WELL PERMIT NO. 0 WRRI DATA 1973-1974

*** LINEAR REGRESSION ANALYSIS ***
NO TRANSFORMATION APPLIED TO Y AXIS
NO TRANSFORMATION APPLIED TO X AXIS
1 OCT 71 - 31 DEC 73

	DEPENDENT VARIABLE	INDEPENDENT VARIABLE
	CONDUCTIVITY MICROMHOS AT 25 DEG. C	DISSOLVED SOLIDS ROE 180C - MG/L
	408.00	246.00
	478.00	320.00
	553.00	356.00
	527.00	362.00
	574.00	396.00
	526.00	346.00
	329.00	196.00
	168.00	98.00
	163.00	96.00
	226.00	134.00
	307.00	192.00
	419.00	262.00
	462.00	298.00
	563.00	362.00
	150.00	82.00
	141.00	88.00
	178.00	102.00
	191.00	126.00
	232.00	138.00
	290.00	158.00
	337.00	206.00
	434.00	264.00
	459.00	282.00
	556.00	370.00
ARITHMETIC MEAN	361.29	228.33
WEIGHTED ARITHMETIC MEAN	429.06	271.17
STANDARD DEVIATION	152.72	106.29

Y= 34.90+ 1.4294X
SAMPLE SIZE IS 24
STANDARD ERROR= 15.86
STANDARD ERROR SQUARED= 251.55
COEFFICIENT OF DETERMINATION, R SQUARED= .990
COEFFICIENT OF CORRELATION, R= .995
FOR ALPHA= .050 B IS SIGNIFICANT
MINIMUM X= 82.00 CONFIDENCE LIMITS= 186.99 AND 117.24
MAXIMUM X= 396.00 CONFIDENCE LIMITS= 636.23 AND 565.69


GREEN RIVER AT WARREN BRIDGE, NEAR DANIEL, WYOMING
LINEAR REGRESSION ANALYSIS
CONDUCTIVITY MICROMHOS AT 25 DEG. C
600.000
540.000
480.000
420.000
360.000
300.000
240.000
180.000
120.000
60.000
0.000
0.000
40.000
80.000
120.000
160.000
200.000
240.000
280.000
320.000
360.000
400.000
DISSOLVED SOLIDS RDE 180C MG/L
1 OCT 71 - 31 DEC 73
REF. NUMBER = 9188500
Y= 34.90+ 1.4294X
SAMPLE SIZE IS 24
STANDARD ERROR= 15.86
STND. ERR. SQ.= 251.55
R SQUARED= .990
R= .995
ALPHA= .050 B IS SIG.

6. WELL LEVEL PROGRAMS

The well level data base contains two data files: the grab data file contains the date the well was tested, the level, and sometimes the yield; the daily file contains only well levels taken daily. A header exists for each well in the data base. It contains location information for the well, in the form of latitude-longitude, township-range, county, elevation, drainage basin, X-Y coordinates and zone, and aquifer, if known. The header also contains the well depth, well permit number, a use description, the transmissivity and storage coefficient, if known. Up to 8 lines of comments can also be put into the header, where casing descriptions and other information are stored.

When water quality samples are taken from wells, the well level and/or the yield are sometimes also measured. Data for some wells are stored in both the water quality data base and the well level data base; the well level header provides space for cross-referencing the well by its water quality reference number. There do exist wells, however, whose level and/or yield values are only stored on the water quality data base with other parameters.

DATEWL

This program prints well level station headers, and the dates of any grab samples and/or the year range of daily samples that were taken there. A header contains the station reference number, name, location by latitude-longitude, township-range, county and aquifer (if known) and drainage basin, elevation, depth of well, well permit number, use, transmissivity, and storage coefficient.

For each listing, the user should specify:

primary retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

secondary retrieval method, if any, and value range:
- aquifer
- source organization
- use

whether grab and/or daily dates are desired

**** STN # 2052 BELCO PETROLEUM CORP. WELL, SOUTH OF BIG PINEY, WYOMING. THE WELL IS IN THE WASATCH FORMATION. DRILLED IN AUGUST, 1964. COMPLETED IN OCT., 1964. WATER PRODUCTION AT 735-95 FT. AND 845-880 FT. THE WELL HAS A 16 INCH CASING.

LATITUDE 42-23-00 LONGITUDE 110-10-00 SUBLETTE COUNTY ELEVATION 6896.00 FT. AQUIFER 0
SW1/4-SW1/4-SE1/4 SECTION 29 TOWNSHIP 28N RANGE 112W 6TH P.M. DRAINAGE BASIN CODE 15410000
WELL DEPTH 900.0 FT. WELL PERMIT NO. 0 DATA FROM USGS (P)
USE UNKNOWN W.Q. STN. NO. 0 TRANSMISSIVITY 0.0 FT3/DAY/FT
STORAGE COEFFICIENT 0.000000 X= 0.00 Y= 0.00 ZONE

****DATES OF GRAB SAMPLES****

16 OCT 64

**** STN # 6700 UNNAMED WELL, SOUTHWEST OF BIG PINEY, WYOMING. THE WELL IS IN THE WASATCH FORMATION.

LATITUDE 42-24-00 LONGITUDE 110-12-00 SUBLETTE COUNTY ELEVATION 7000.00 FT. AQUIFER 0
1/4-SW1/4-NE1/4 SECTION 19 TOWNSHIP 28N RANGE 112W 6TH P.M. DRAINAGE BASIN CODE 15001550
WELL DEPTH 153.0 FT. WELL PERMIT NO. 0 DATA FROM USGS (P)
USE ABANDONED OR UNUSED W.Q. STN. NO. 0 TRANSMISSIVITY 0.0 FT3/DAY/FT
STORAGE COEFFICIENT 0.000000 X= 0.00 Y= 0.00 ZONE

****DATES OF GRAB SAMPLES****

21 JUN 65 11 AUG 65 11 DEC 65 5 DEC 70 18 JAN 72 3 APR 72 27 SEP 72 8 FEB 73 10 MAY 73 9 SEP 73
7 NOV 73

****DATES OF DAILY WELL LEVELS****
JUN 1965 - JUN 1965
SEP 1965 - DEC 1965
FEB 1966 - DEC 1966
FEB 1967 - DEC 1967
FEB 1968 - DEC 1968
FEB 1969 - DEC 1969
FEB 1970 - FEB 1970

**** STN # 2310 BRINKERHOFF DRILLING COMPANY WELL, SOUTH OF BIG PINEY, WYOMING. TOP OF FORMATION, WASATCH-0, TRANSITION ZONE-3990 FT., MESAVERDE-4290 FT. DRILLED IN MAY THROUGH JUNE, 1959. DRILLED TO 4909 FT., PLUGGED AT 750 FT.

LATITUDE 42-26-00 LONGITUDE 110-08-00 SUBLETTE COUNTY ELEVATION 6750.00 FT. AQUIFER 0
NE1/4-NE1/4-SW1/4 SECTION 11 TOWNSHIP 28N RANGE 112W 6TH P.M. DRAINAGE BASIN CODE 15510000
WELL DEPTH 750.0 FT. WELL PERMIT NO. 0 DATA FROM USGS (P)
USE UNKNOWN W.Q. STN. NO. 0 TRANSMISSIVITY 0.0 FT3/DAY/FT
STORAGE COEFFICIENT 0.000000 X= 0.00 Y= 0.00 ZONE

****DATES OF GRAB SAMPLES****

6 JUN 56

**** STN # 2053 LINCOLN IDAHO OIL AND GAS CO WELL, SOUTHWEST OF BIG PINEY, WYOMING. THE SURFACE IS ALMY FORMATION. DRILLED IN 1919. WATER PRODUCTION AT 572-86 FT. THE WELL WAS CASED.

LATITUDE 42-26-00 LONGITUDE 110-20-00 SUBLETTE COUNTY ELEVATION 8250.00 FT. AQUIFER 0
NW1/4-NE1/4-NE1/4 SECTION 12 TOWNSHIP 28N RANGE 114W 6TH P.M. DRAINAGE BASIN CODE 15500000
WELL DEPTH 586.0 FT. WELL PERMIT NO. 0 DATA FROM USGS (P)
USE UNKNOWN W.Q. STN. NO. 0 TRANSMISSIVITY 0.0 FT3/DAY/FT
STORAGE COEFFICIENT 0.000000 X= 0.00 Y= 0.00 ZONE

****DATES OF GRAB SAMPLES****

1 JUL 19

LISTDATAWL

This program outputs well level station headers with grab and/or daily data. Values can be printed as feet below ground or as feet above sea level. A grab sample consists of the static water level and usually the well yield at the time. Daily samples are only well levels.

For each request, the user should specify:

primary retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

secondary retrieval method, if any, and value range:
- aquifer
- source organization
- use

date range (unless all dates are desired)

whether to include grab and/or daily data

whether to print levels as below ground or above sea level

**** STN # 5184 TOWN OF WHEATLAND WELL, WEST OF WHEATLAND, WYOMING. THE WELL WAS DRILLED IN 1933 AND IS 15 INCHES IN DIAMETER. THE CASING IS IRON OR STEEL PIPE. THE WELL IS IN SANDSTONE, IN THE ARIKAREE FORMATION. TOP OF FORMATION, SOIL-0, ARIKAREE FORMATION = ALTERNATING SAND AND SANDSTONE-16 FT., YELLOW CLAY-323 FT., ALTERNATING SAND AND SANDSTONE-328 FT., SAND AND CLAY-380 FT., WHITE CLAY-400 FT., ALTERNATING SANDSTONE AND SAND-405 TO 453 FEET.

LATITUDE 42-03-00 LONGITUDE 104-57-00 PLATTE COUNTY ELEVATION 4702.00 FT. AQUIFER 0
NW1/4-NW1/4-SE1/4 SECTION 12 TOWNSHIP 24N RANGE 68W 6TH P.M. DRAINAGE BASIN CODE 11060400
WELL DEPTH 453.0 FT. WELL PERMIT NO. 0 DATA FROM USGS (P)
USE INDUSTRIAL SUPPLY, NON-MINING W.Q. STN. NO. 0 TRANSMISSIVITY 0.0 FT3/DAY/FT
STORAGE COEFFICIENT 0.000000 X= 0.00 Y= 0.00 ZONE

STN #	5184	1 JUN 54	LEVEL =	12.0	FT BELOW REF PT, YIELD =	560.0	GPM, REF PT IS	0.0	FT ABOVE GROUND
STN #	5184	8 JUL 58	LEVEL =	11.9	FT BELOW REF PT, YIELD =		GPM, REF PT IS	0.0	FT ABOVE GROUND
STN #	5184	20 AUG 58	LEVEL =	11.9	FT BELOW REF PT, YIELD =		GPM, REF PT IS	0.0	FT ABOVE GROUND
STN #	5184	3 SEP 58	LEVEL =	15.2	FT BELOW REF PT, YIELD =		GPM, REF PT IS	0.0	FT ABOVE GROUND
STN #	5184	25 SEP 58	LEVEL =	11.6	FT BELOW REF PT, YIELD =	563.0	GPM, REF PT IS	0.0	FT ABOVE GROUND
STN #	5184	6 FEB 59	LEVEL =	15.0	FT BELOW REF PT, YIELD =		GPM, REF PT IS	0.0	FT ABOVE GROUND
STN #	5184	22 MAY 59	LEVEL =	11.7	FT BELOW REF PT, YIELD =		GPM, REF PT IS	0.0	FT ABOVE GROUND
STN #	5184	13 AUG 59	LEVEL =	11.7	FT BELOW REF PT, YIELD =		GPM, REF PT IS	0.0	FT ABOVE GROUND

**** STN # 251 UNNAMED WELL NORTHWEST OF CASPER, WYOMING. WELL IS IN THE ALLUVIUM.
LATITUDE 42-52-20 LONGITUDE 106-25-45 NATRONA COUNTY ELEVATION 5250.00 FT. AQUIFER 0
NE1/4-NE1/4-NE1/4 SECTION 33 TOWNSHIP 34N RANGE 80W 6TH P.M. DRAINAGE BASIN CODE 11410000
WELL DEPTH 57.0 FT. WELL PERMIT NO. 0 DATA FROM USGS (P)
USE ABANDONED OR UNUSED W.Q. STN. NO. 4669 TRANSMISSIVITY 0.0 FT3/DAY/FT
STORAGE COEFFICIENT 0.000000 X= 0.00 Y= 0.00 ZONE

**** DAILY WELL LEVEL DATA IN FEET BELOW GROUND ****
**** NEGATIVE VALUES INDICATE FEET ABOVE GROUND ****
FOR 1969 TIME 0
ONCE A DAY

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	7.8	7.6	7.8	7.8	7.8	6.8	5.5	4.8	5.4	5.9	6.3	6.3
2	7.8	7.7	8.0	7.8	7.8	6.6	5.5	4.9	5.4	5.8	6.2	6.2
3	8.0	8.0	7.9	7.8	7.8	6.4	5.4	4.9	5.3	6.0	6.2	6.1
4	7.7	7.8	7.9	7.9	7.9	5.9	5.5	4.9	5.3	**	6.0	6.0
5	7.6	7.7	7.8	7.9	8.0	5.7	5.5	5.0	5.4	**	6.0	6.1
6	7.7	7.7	7.8	7.7	8.1	5.6	5.5	5.0	5.6	6.3	6.1	**
7	7.3	7.7	7.8	7.7	8.1	5.7	5.6	5.2	5.9	6.1	6.0	**
8	7.3	8.0	8.0	7.7	8.1	5.9	5.8	5.2	5.0	5.9	6.1	**
9	7.7	7.9	8.0	8.1	8.0	5.6	5.9	5.4	4.9	6.0	6.2	**
10	7.6	7.9	8.1	8.0	8.0	5.6	5.9	5.9	5.0	6.0	6.1	**
11	7.6	7.9	7.9	8.0	7.9	5.3	5.2	5.9	5.2	6.4	6.2	**
12	7.6	7.7	7.9	8.0	7.9	5.1	5.0	5.8	5.2	6.4	6.1	**
13	7.8	7.7	8.0	7.8	7.9	5.1	5.0	5.6	**	6.1	6.3	**
14	7.7	7.7	8.0	7.8	7.9	5.1	5.1	**	5.3	6.0	6.1	**
15	7.7	7.9	8.0	7.9	7.9	**	5.2	**	5.4	6.2	5.8	**
16	7.7	7.9	8.0	8.1	8.1	**	5.4	**	5.6	6.2	5.8	**
17	7.7	8.1	8.0	7.9	8.0	**	5.5	**	5.7	6.2	6.1	**
18	7.7	7.9	7.9	7.8	7.9	**	5.5	**	5.7	6.1	6.5	**
19	7.5	7.8	7.9	7.8	7.9	**	5.5	5.4	5.7	6.1	6.3	**
20	7.5	7.8	8.1	7.8	8.1	5.1	5.2	5.4	5.7	6.3	6.2	**
21	7.5	7.9	7.9	8.1	7.1	**	**	5.6	**	6.3	6.0	**
22	7.5	7.8	7.9	7.9	7.1	5.1	**	5.7	**	6.2	6.1	**
23	7.7	7.8	7.7	7.8	7.1	5.1	**	5.7	**	6.2	6.2	**
24	7.8	7.9	8.2	7.7	8.0	**	4.2	5.7	**	6.2	6.2	**
25	**	7.8	8.0	7.7	8.0	**	4.1	5.7	**	6.3	6.3	**
26	**	7.8	8.0	7.9	7.9	**	4.1	5.3	6.0	6.3	6.3	**
27	**	8.0	7.8	8.1	7.7	5.3	4.4	5.0	6.0	6.0	6.3	**
28	**	7.9	7.8	7.9	7.5	5.3	4.5	5.0	6.0	5.9	6.3	**
29	7.7		8.1	7.7	6.9	5.5	4.6	5.0	6.0	6.2	6.3	**
30	7.8		8.0	7.8	6.6	5.5	4.6	5.1	5.9	6.3	6.3	6.4
31	7.8		7.8		7.8		4.8	5.2		6.2		6.3

** INDICATES MISSING DATA

PLOTWLL

Plots of well level data are available in five styles, and in any scale. Well levels and depths can be printed as feet above sea level or feet below ground. A range of well depths can also be specified. Overlap points can be generated from two points whose data would otherwise overprint each other.

The styles of plots available are:

Style 1. well location symbol only

Style 2. number of samples available
mean water level

Style 3. number of samples available
station number
mean water level
well depth

Style 4. number of samples available
station number
mean water level
aquifer

Style 5. number of samples available
well depth
mean water level
aquifer

To prevent overprinting data from adjacent stations, the program can combine the data of these stations and plot instead an "overlap point," whose position is the weighted average of the points it replaces.

These overlap points can indicate either the number of wells represented (for style 1) or the total number of samples available at the well represented. For all but style 1, the maximum, minimum, and/or mean of the mean water levels of each well can be printed.

PLOTWLL (continued)

For each plot, the user should specify:

style of plot

scale of plot

whether overlap points should be created, and whether to print anything beside them

primary retrieval method and value range:
- latitude-longitude
- township-range

secondary retrieval method, if any, and value range:
- aquifer
- source organization
- use

date range (unless all are to be used)

well depth range (unless all are to be used)

whether to include grab and/or daily data

whether to print values as below ground or above sea level

print height (.1 or .06 inches)

WELL LEVEL DATA : 1800- 1999

SCALE -- 1 : 24000

POINTS PLOTTED REPRESENT
[N] N SAMPLES AVAILABLE
(N=** FOR MORE THAN 99 POINTS)

44.24' 0'
105.32' 0'

44.24' 0'
105.28' 0'

LATITUDE (TICK = 10 MINUTES)

7161
19 20.12
76.00

85

7166
16 62.72
117.00

7122
32 70.88
210.00

7118
1 11.20
58.00

7169
11 14.24
261.00

VALUES PRINTED ARE
LINE 1
STATION NUMBER

LINE 2
AVE. WELL LEVEL (FT)
(BELOW GROUND)

LINE 3
WELL DEPTH (FEET)
(BELOW GROUND)

164 DATA POINTS ARE REPRESENTED.

44.21' 0'
105.32' 0'

44.21' 0'
105.28' 0'

PLOTWLT

This program plots well levels and yields against time. The water levels in a well can be plotted in terms of feet below ground or as feet above sea level. Up to 3 grab stations, or 3 daily stations, or one grab and one daily station, can be plotted at a time. The water level and yield can also be plotted for a given station on the same graph.

For each request, the user should specify:

station(s) to be plotted

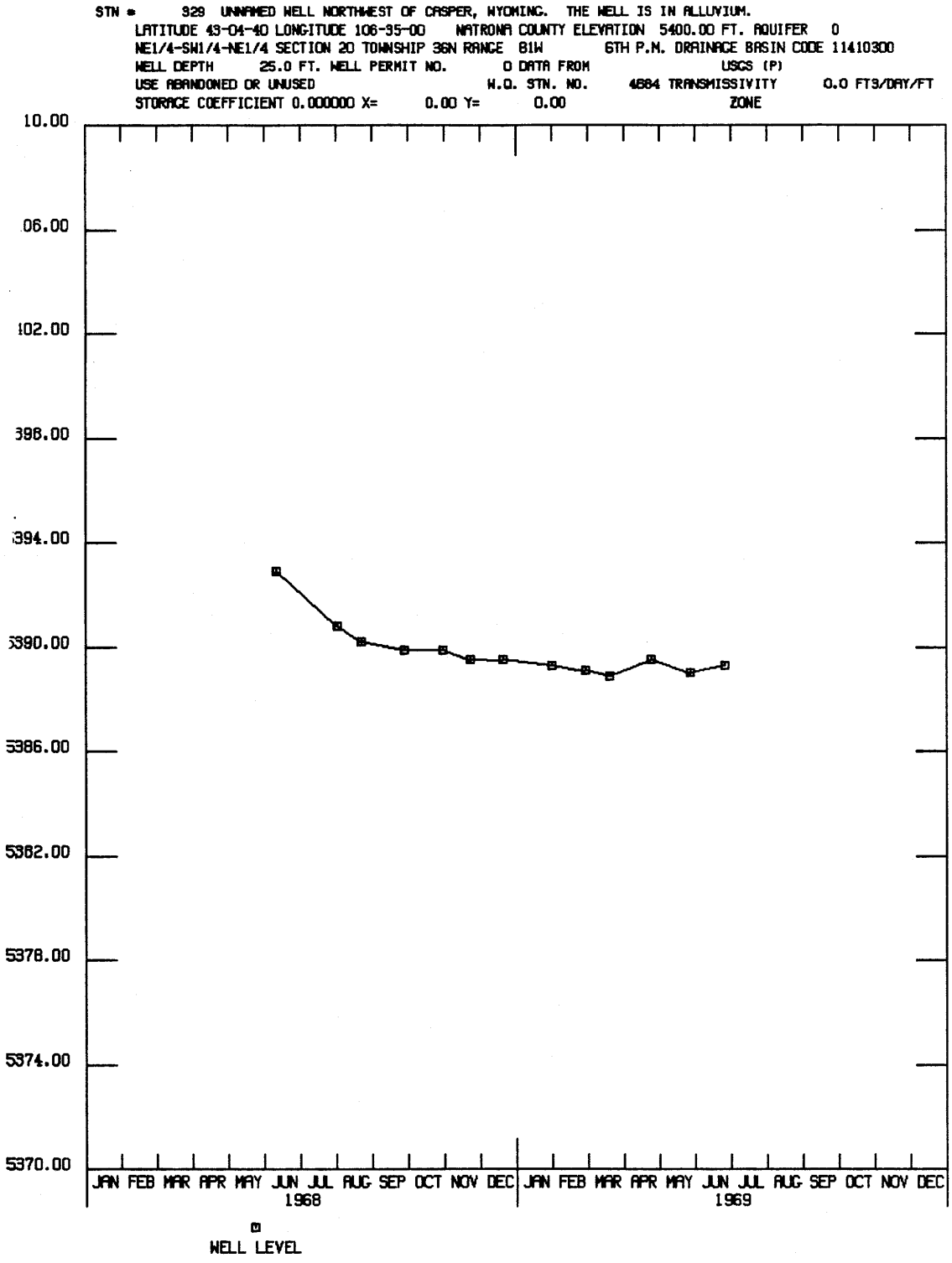
date range (unless all dates are to be used)

whether to plot grab levels, yields, and/or daily levels

whether to print levels as below ground or above sea level

year length (3.6, 9, or 23.4 inches per year)

y-axis value range(s) (unless the automatic range(s) is (are) acceptable)


STN # 929 UNNAMED WELL NORTHWEST OF CASPER, WYOMING. THE WELL IS IN ALLUVIUM.
LATITUDE 43-04-40 LONGITUDE 106-35-00 NATRONA COUNTY ELEVATION 5400.00 FT. AQUIFER 0
NE1/4-SW1/4-NE1/4 SECTION 20 TOWNSHIP 36N RANGE 81W 6TH P.M. DRAINAGE BASIN CODE 11410300
WELL DEPTH 25.0 FT. WELL PERMIT NO. 0 DATA FROM USGS (P)
USE ABANDONED OR UNUSED W.Q. STN. NO. 4884 TRANSMISSIVITY 0.0 FT3/DAY/FT
STORAGE COEFFICIENT 0.000000 X= 0.00 Y= 0.00 ZONE
10.00
06.00
102.00
398.00
394.00
5390.00
5386.00
5382.00
5378.00
5374.00
5370.00
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
1968
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
1969
WELL LEVEL

7. CLIMATIC PROGRAMS

The climatic data base divides the data into four files: daily climate, 6-hourly climate, hourly precipitation, and 1,3 hourly climate. Header information for a given station includes latitude-longitude, township-range, county, elevation, drainage basin code and source organization. The township-range location is given to the third quarter section. While almost all of the climate headers contain "(P)", which indicates public data, there do exist headers with "(C)", which indicates confidential data whose access is limited by the source organization.

Due to the large amount of daily climatic data stored, the daily file is physically separated from the other climatic files. This prevents all of the currently written programs from accessing daily climatic data concurrently with 1,3 or 6-hourly data.

DAILY

Sometimes daily data are necessary, regardless of the actual frequency of data collection. DAILY summarizes 6 hour, hourly precipitation, and 1,3 hour climatic data to a daily format, except for wind direction. Monthly and annual summary values are also computed. The data may be printed in the units that the data are stored in, or it can be converted to other units.

For each request, the user should specify:

data file:
- 6 hour climatic
- hourly precipitation
- 1,3 hour climatic

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

date range (unless all years are desired)

parameters desired

units of measure, if other than English:
- centimeters
- degrees centigrade
- kilometers
- knots

STATION NO. 24089 CASPER NATRONA COUNTY INTERNATIONAL AIRPORT
LATITUDE 42-55-00 LONGITUDE 106-28-00 ELEVATION 5338.00 FEET NATRONA COUNTY
SW1/4-SW1/4-NW1/4 SECTION 17 TOWNSHIP 34N RANGE 80W 6TH P.M.
WRRI IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 14110100

DAILY CLIMATIC DATA FOR 1975 COMPUTED FROM HOURLY VALUES

DRY BULB TEMPERATURE DEGREES FAHRENHEIT

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1	19.50	22.38	39.88	10.63	41.13	51.75	75.50	64.25	68.88	50.88	43.25	38.38	1
2	16.25	31.50	35.88	18.75	42.75	61.00	70.25	65.25	65.13	57.63	47.88	43.50	2
3	19.00	25.63	35.63	33.63	53.38	60.75	74.50	70.75	58.63	60.25	50.25	44.63	3
4	26.38	3.13	37.88	42.38	60.75	58.00	74.75	71.88	58.75	62.25	50.38	46.63	4
5	22.63	-3.63	36.25	39.50	44.88	62.25	74.50	73.38	59.00	55.13	53.38	30.88	5
6	32.38	13.50	24.75	37.00	36.63	62.25	73.75	77.63	64.25	66.38	53.13	37.38	6
7	22.38	21.25	16.63	26.50	41.63	56.13	70.00	78.88	62.63	62.75	46.00	40.00	7
8	30.25	.88	33.13	23.13	43.88	52.13	69.63	68.13	65.63	39.50	33.63	39.00	8
9	18.50	30.63	28.88	29.25	47.50	45.75	71.25	70.25	67.00	47.00	27.63	44.75	9
10	9.75	34.00	28.50	28.38	48.50	47.75	68.13	73.38	68.63	58.38	37.88	44.13	10
11	-8.63	30.38	20.63	30.75	49.38	54.00	66.50	71.88	48.25	55.50	25.00	26.00	11
12	6.63	35.25	19.38	34.75	50.25	61.50	66.25	69.50	49.88	48.00	27.63	37.50	12
13	30.38	38.63	30.75	37.00	53.63	62.00	73.50	61.75	54.75	43.00	42.25	20.38	13
14	35.13	26.88	33.50	43.13	58.13	56.50	77.63	60.88	63.00	37.88	47.75	7.88	14
15	28.38	14.38	35.13	41.38	62.00	61.50	76.00	61.13	65.13	45.50	50.88	21.63	15
16	27.38	20.50	39.50	46.13	66.75	52.88	71.13	61.88	66.13	41.38	45.63	12.75	16
17	32.75	12.63	34.88	33.88	60.25	46.63	72.88	64.63	58.38	48.75	31.13	4.75	17
18	34.75	13.63	42.00	31.38	63.75	51.50	72.75	70.75	42.88	55.88	29.13	25.50	18
19	29.13	24.13	49.00	41.38	52.00	54.75	67.38	72.75	44.25	51.13	21.75	27.38	19
20	35.88	29.00	45.38	41.63	31.50	57.88	70.50	68.38	42.75	56.13	15.50	27.88	20
21	19.63	13.75	36.75	43.38	34.13	53.25	73.50	69.38	46.00	52.88	17.75	28.88	21
22	25.50	7.00	42.63	51.88	42.25	57.88	73.50	68.38	51.38	37.38	33.88	22.63	22
23	35.50	27.00	25.00	49.88	47.00	62.63	69.13	69.63	54.38	26.38	30.25	20.63	23
24	31.38	32.38	27.88	49.00	51.63	68.75	70.88	61.63	56.38	23.75	32.25	24.88	24
25	25.25	24.38	30.13	56.00	40.75	63.13	74.13	58.38	58.25	29.75	16.00	31.63	25
26	27.75	25.50	17.25	47.63	48.50	58.88	74.25	62.75	55.63	45.25	16.25	32.25	26
27	5.50	33.13	5.75	42.75	52.75	67.63	76.38	70.38	48.00	30.25	22.50	28.38	27
28	12.38	36.38	6.50	40.75	42.88	68.63	78.50	72.38	52.25	31.75	11.88	22.75	28
29	11.88		13.75	35.13	49.38	71.75	79.00	65.38	47.13	43.88	-1.13	27.00	29
30	5.50		32.63	35.00	51.00	71.88	73.88	69.25	45.38	51.38	8.63	31.75	30
31	16.38		23.00		49.75		68.63	71.88		41.75		14.13	31
MAX	35.88	38.63	49.00	56.00	66.75	71.88	79.00	78.88	68.88	66.38	53.38	46.63	
MIN	-8.63	-3.63	5.75	10.63	31.50	45.75	66.25	58.38	42.75	23.75	-1.13	4.75	
MEAN	22.11	22.29	29.96	37.40	48.99	58.71	72.53	68.28	56.29	47.02	32.28	29.29	

MAXIMUM FOR THE YEAR: 79.00 29 JUL
MINIMUM FOR THE YEAR: -8.63 11 JAN
MEAN FOR THE YEAR: 43.91

* INDICATES PARTIAL VALUES
** INDICATES MISSING DATA

DATECL

Climate dates can be obtained for any of the four data files: daily climatic, 6 hour climatic, hourly precipitation, or 1,3 hour climatic. Dates for any or all parameters within a data file can be listed below the station headers, or only the headers can be printed. A header is printed only if it has the specified data. Station headers contain the station number, name, elevation, source organization, and location by latitude-longitude, township-range, county and drainage basin.

For each listing, the user should specify:

data file:
- daily
- 6 hour
- hourly precipitation
- 1,3 hour

parameter range (unless all are to be used)

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

DAILY CLIMATE
YEAR RANGES OF DATA AVAILABLE ON THE
WATER RESOURCES DATA SYSTEM
WYOMING WATER RESOURCES RESEARCH INSTITUTE, LARAMIE, WY

STATION NO. 481610 CENTENNIAL
LATITUDE 41-19-00 LONGITUDE 106-08-00 ELEVATION 8140.00 FEET ALBANY COUNTY
SW1/4-SW1/4-SE1/4 SECTION 27 TOWNSHIP 16N RANGE 78W 6TH P.M.
NOAA IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 11062020

MAXIMUM TEMPERATURE
1899 - 1903
1914 - 1919
1948 - 1970
1977 - 1979
MINIMUM TEMPERATURE
1899 - 1903
1914 - 1914
1948 - 1970
1977 - 1979
MEAN TEMPERATURE
1899 - 1903
1914 - 1914
1948 - 1970
1977 - 1979
PRECIPITATION
1899 - 1907
1911 - 1942
1944 - 1970
1977 - 1979
SNOWFALL
1948 - 1970
1977 - 1979
SNOWDEPTH
1948 - 1970
1977 - 1979

STATION NO. 482680 DOUBLE FOUR RANCH (FLETCHER PARK 1942-1947)
LATITUDE 42-11-00 LONGITUDE 105-24-00 ELEVATION 6200.00 FEET ALBANY COUNTY
SE1/4-SE1/4-NW1/4 SECTION 31 TOWNSHIP 26N RANGE 71W 6TH P.M.
NOAA IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 11060500

MAXIMUM TEMPERATURE
1949 - 1979
MINIMUM TEMPERATURE
1949 - 1979
MEAN TEMPERATURE
1949 - 1979
PRECIPITATION
1942 - 1979
SNOWFALL
1949 - 1971
1974 - 1979
SNOWDEPTH
1949 - 1971
1974 - 1979

1- AND 3-HOUR CLIMATE
YEAR RANGES OF DATA AVAILABLE ON THE
WATER RESOURCES DATA SYSTEM
WYOMING WATER RESOURCES RESEARCH INSTITUTE, LARAMIE, WY

STATION NO. 24022 LARAMIE GENERAL BREES FIELD
LATITUDE 41-19-00 LONGITUDE 105-35-00 ELEVATION 7200.00 FEET ALBANY COUNTY
NW1/4-NW1/4-NE1/4 SECTION 33 TOWNSHIP 16N RANGE 73W 6TH P.M.
WRRI IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 11061700

DRY BULB TEMPERATURE
FEB 1948 - MAR 1948
MAY 1948 - DEC 1954
WET BULB TEMPERATURE
FEB 1948 - MAR 1948
MAY 1948 - DEC 1954
DEWPOINT TEMPERATURE
FEB 1948 - MAR 1948
MAY 1948 - DEC 1954
RELATIVE HUMIDITY
FEB 1948 - MAR 1948
MAY 1948 - DEC 1954
WIND SPEED
FEB 1948 - MAR 1948
MAY 1948 - DEC 1954
WIND DIRECTION
FEB 1948 - MAR 1948
MAY 1948 - DEC 1954

STATION NO. 24376 POLE MOUNTAIN
LATITUDE 41-16-00 LONGITUDE 105-22-00 ELEVATION 8095.00 FEET ALBANY COUNTY
NW1/4-NW1/4-SE1/4 SECTION 16 TOWNSHIP 15N RANGE 71W 6TH P.M.
WRRI IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 12001100

WIND SPEED
JAN 1975 - JUL 1977
SEP 1977 - SEP 1977
WIND DIRECTION
JAN 1975 - JUL 1977

STATION NO. 24437 LITTLE BROOKLYN
LATITUDE 41-22-00 LONGITUDE 106-15-00 ELEVATION 10360.00 FEET ALBANY COUNTY
SE1/4-SE1/4-NE1/4 SECTION 10 TOWNSHIP 16N RANGE 79W 6TH P.M.
WRRI IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 11062020

WIND SPEED
OCT 1971 - MAY 1972
WIND DIRECTION
OCT 1971 - MAY 1972

STATION NO. 24516 KNIGHT SCIENCE CAMP
LATITUDE 41-21-00 LONGITUDE 106-14-00 ELEVATION 9940.00 FEET ALBANY COUNTY

EXTREMECL

This program prints and plots extreme monthly values for a given range of years for daily, 6-hourly, hourly precipitation, and 1,3 hour climatic data (excluding wind direction). A table of monthly maximum values can be printed for each type of data. A table of minimum values can be printed for all types of data except daily precipitation, snowfall, snow depth, wind and hourly precipitation. An overall maximum and minimum value will be printed for the range of years.

A histogram depicting mean extreme values for each month of the range of years will be generated. The range of values on the vertical axis of the plot can optionally be input if more detail is desired than is afforded by the preset ranges.

For each plot, the user should specify:

data file:
- daily
- 6 hour
- hourly precipitation
- 1,3 hour

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

date range

parameters desired

conversion units, if any:
- centimeters
- degrees centigrade
- kilometers
- knots

vertical axis value range, if different from default

STATION NO. 24089 CASPER NATRONA COUNTY INTERNATIONAL AIRPORT
LATITUDE 42-55-00 LONGITUDE 106-28-00 ELEVATION 5338.00 FEET NATRONA COUNTY
SW1/4-SW1/4-NW1/4 SECTION 17 TOWNSHIP 34N RANGE 80W 6TH P.M.
WRRI IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 14110100

MAXIMUM MONTHLY VALUES FOR 1955 - 1975

DRY BULB TEMPERATURE DEGREES FAHRENHEIT

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1955	47.00*	44.00	55.00	74.00	81.00*	86.00	96.00	95.00	90.00	77.00	61.00	52.00	71.50*
1956	53.00	51.00	69.00	69.00	81.00	94.00	95.00	90.00	88.00	81.00	60.00	50.00	73.41
1957	44.00	55.00	60.00	69.00	76.00	88.00	94.00	94.00	84.00	85.00	50.00	50.00	70.75
1958	47.00	64.00	55.00	74.00	86.00	93.00	93.00	96.00	90.00	80.00	65.00	56.00	74.91
1959	53.00	48.00	57.00*	77.00	80.00	93.00*	98.00*	94.00	92.00	70.00*	63.00	53.00	73.16*
1960	45.00*	44.00	69.00	73.00*	86.00*	92.00	96.00	93.00	92.00	77.00	59.00	54.00	73.33*
1961	52.00	54.00	66.00	72.00*	84.00	95.00*	92.00	95.00	83.00	74.00	53.00*	49.00*	72.41*
1962	47.00	64.00	62.00	80.00	81.00	92.00	94.00	92.00	83.00	80.00	64.00	58.00	74.75
1963	50.00	62.00	66.00	73.00	80.00	94.00	95.00	90.00	87.00	83.00	64.00	50.00	74.50
1964	47.00	45.00	63.00	70.00	88.00	90.00	95.00	93.00	85.00	76.00	63.00	52.00	72.25
1965	50.00	53.00	59.00	73.00	78.00	82.00	91.00	94.00	81.00	79.00	70.00	58.00	72.33
1966	50.00	46.00	71.00	67.00	83.00	92.00	98.00	92.00	86.00	74.00	60.00	52.00	72.58
1967	48.00	53.00	68.00	72.00	83.00	86.00	94.00	94.00	89.00	75.00	59.00	42.00	71.91
1968	47.00	51.00	67.00	73.00	77.00	89.00	92.00	94.00	86.00	74.00	58.00	52.00	71.66
1969	51.00	52.00	65.00	78.00	90.00	90.00	96.00	97.00	89.00	70.00	62.00	53.00	74.41
1970	55.00	56.00	61.00	68.00	80.00	99.00	92.00	94.00	85.00	81.00	56.00	53.00	73.33
1971	59.00	56.00	68.00	72.00	80.00	92.00	93.00	93.00	88.00	81.00	55.00	50.00	73.91
1972	45.00	60.00	69.00	67.00	83.00	90.00	91.00	95.00	83.00	75.00	50.00	46.00	71.16
1973	48.00	49.00	54.00	66.00	81.00	90.00	97.00	93.00	84.00	79.00	66.00	61.00	72.33
1974	55.00	48.00	64.00	74.00	79.00	94.00	93.00	90.00	86.00	78.00	58.00	52.00	72.58
1975	47.00	47.00	60.00	74.00	80.00	89.00	95.00	94.00	90.00	83.00	68.00	56.00	73.58
MEAN	49.52*	52.47	63.23*	72.14*	81.76*	90.95*	94.28*	93.42	86.71	77.71*	60.19*	52.33*	72.89*

MAXIMUM VALUE: 99.00* 27 JUN, 1970

E INDICATES ESTIMATED VALUE
* INDICATES PARTIAL VALUES
** INDICATES MISSING DATA

STATION NO. 24089 CASPER NATRONA COUNTY INTERNATIONAL AIRPORT
LATITUDE 42-55-00 LONGITUDE 106-28-00 ELEVATION 5338.00 FEET NATRONA COUNTY
SW1/4-SW1/4-NW1/4 SECTION 17 TOWNSHIP 34N RANGE 80W 6TH P.M.
WRRI IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 14110100

MINIMUM MONTHLY VALUES FOR 1955 - 1975

DRY BULB TEMPERATURE DEGREES FAHRENHEIT

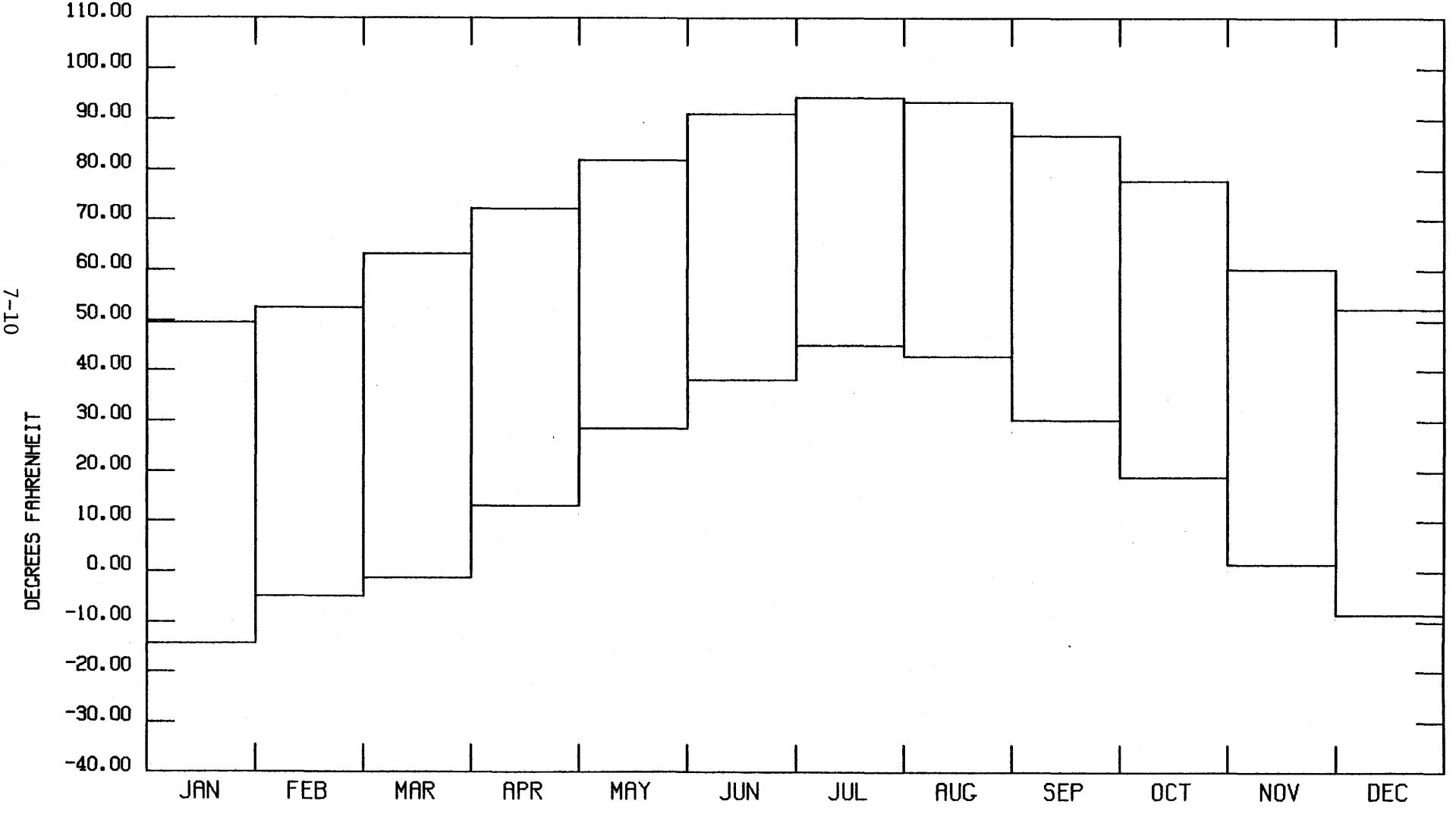
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1955	-4.00*	-9.00	-11.00	10.00	35.00*	38.00	45.00	49.00	32.00	22.00	-11.00	-5.00	15.91*
1956	-5.00	-11.00	-12.00	16.00	29.00	43.00	49.00	37.00	32.00	24.00	-5.00	-7.00	15.83
1957	-20.00	-1.00	-1.00	10.00	33.00	40.00	46.00	47.00	32.00	23.00	6.00	3.00	18.16
1958	6.00	-6.00	-2.00	16.00	27.00	43.00	44.00	41.00	31.00	20.00	-6.00	0.00	17.83
1959	-22.00	-1.00	6.00*	15.00	33.00	39.00*	40.00*	46.00	26.00	22.00*	-10.00	4.00	16.50*
1960	-9.00*	-17.00	-16.00	17.00*	30.00*	39.00	51.00	41.00	36.00	22.00	6.00	-2.00	16.50*
1961	-4.00	9.00	12.00	17.00*	30.00	45.00*	47.00	51.00	24.00	15.00	3.00*	-16.00*	19.41*
1962	-28.00	-13.00	-2.00	20.00	34.00	35.00	46.00	37.00	29.00	26.00	19.00	-11.00	16.00
1963	-26.00	-4.00	4.00	23.00	33.00	45.00	49.00	49.00	42.00	17.00	12.00	-12.00	19.33
1964	-5.00	-1.00	-4.00	15.00	31.00	38.00	51.00	38.00	23.00	21.00	-3.00	-30.00	14.50
1965	-4.00	-12.00	-18.00	26.00	28.00	39.00	46.00	35.00	22.00	28.00	18.00	-8.00	16.83
1966	-15.00	-8.00	-1.00	-2.00	26.00	32.00	50.00	37.00	34.00	16.00	-7.00	-6.00	13.00
1967	-6.00	4.00	-1.00	14.00	22.00	39.00	48.00	41.00	36.00	19.00	-1.00	-13.00	16.83
1968	-16.00	1.00	7.00	2.00	18.00	37.00	38.00	40.00	32.00	21.00	8.00	-27.00	13.41
1969	-9.00	4.00	-5.00	23.00	28.00	29.00	44.00	44.00	36.00	11.00	2.00	1.00	17.33
1970	-19.00	3.00	0.00	8.00	27.00	35.00	46.00	48.00	29.00	14.00	0.00	-6.00	15.41
1971	-13.00	-12.00	-3.00	8.00	30.00	41.00	39.00	46.00	26.00	-1.00	3.00	-3.00	13.41
1972	-38.00	-13.00	3.00	6.00	26.00	41.00	30.00	44.00	21.00	3.00	-4.00	-27.00	7.66
1973	-24.00	-9.00	13.00	5.00	28.00	33.00	45.00	46.00	30.00	24.00	4.00	-9.00	15.50
1974	-24.00	1.00	2.00	22.00	24.00	32.00	45.00	40.00	30.00	27.00	7.00	-1.00	17.08
1975	-16.00	-9.00	0.00	-1.00	24.00	37.00	45.00	41.00	29.00	20.00	-12.00	-8.00	12.50
MEAN	-14.33*	-4.95	-1.38*	12.95*	28.38*	38.09*	44.95*	42.76	30.09	18.76*	1.38*	-8.71*	15.66*

MINIMUM VALUE: -38.00* 14 JAN, 1972

E INDICATES ESTIMATED VALUE
* INDICATES PARTIAL VALUES
** INDICATES MISSING DATA

STATION NO. 24089 CASPER NATRONA COUNTY INTERNATIONAL AIRPORT
LATITUDE 42-55-00 LONGITUDE 106-28-00 ELEVATION 5338.00 FEET NATRONA COUNTY
SW1/4-SW1/4-NW1/4 SECTION 17 TOWNSHIP 34N RANGE 80W 6TH P.M.
WRRI IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 14110100

MEAN EXTREME VALUES FOR JAN 1955 - DEC 1975
DRY BULB TEMPERATURE



LISTDATACL

This program prints out the climatic data requested in a tabular format. Daily data are printed one year per page; the other data files are printed one month per page. Retrieval can be by any of five methods, and can be further limited by source organization. A parameter range can be specified for each data file.

For each request, the user should specify:

data file:
- daily
- 6 hour
- hourly precipitation
- 1,3 hour climate

parameter range (unless all are to be used)

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

date range

conversion units, if any:
- centimeters
- degrees centigrade
- kilometers
- knots

STATION NO. 481570 CASPER WB AP (MOVED 7 MILES IN 1950)
LATITUDE 42-55-00 LONGITUDE 106-28-00 ELEVATION 5338.00 FEET NATRONA COUNTY
SE1/4-SW1/4-SW1/4 SECTION 17 TOWNSHIP 34N RANGE 80W 6TH P.M.
NOAA IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 1141C1CC

DAILY VALUES FOR 1975

MEAN TEMPERATURE DEGREES FAHRENHEIT

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DAY
1	20.00	18.00	41.50	8.50	41.00	52.50	76.50	65.00	65.50	51.00	45.50	35.50	1
2	14.50	31.50	42.00	14.00	42.50	57.00	71.50	65.00	62.50	59.00	50.00	45.50	2
3	19.00	22.00	38.50	33.00	52.00	62.00	75.00	71.00	59.00	61.50	53.00	46.50	3
4	23.50	2.50	39.50	41.50	57.00	58.00	74.00	70.00	59.50	60.50	54.50	49.50	4
5	20.50	-3.50	38.50	43.50	46.00	61.00	74.50	72.00	60.00	56.50	54.00	32.50	5
6	32.00	11.50	23.50	40.00	35.50	63.00	73.00	76.50	65.00	66.00	55.00	36.50	6
7	22.50	21.00	12.50	28.00	43.00	60.50	73.50	76.00	63.00	61.50	44.50	36.50	7
8	28.50	0.00	35.50	23.50	46.00	52.00	72.00	67.50	64.50	40.50	36.50	38.00	8
9	15.00	12.50	31.00	27.50	48.50	48.00	71.00	69.50	66.00	46.50	29.50	47.50	9
10	7.50	34.50	29.50	28.00	50.00	48.00	67.50	73.00	67.00	59.50	36.00	42.50	10
11	-8.00	30.50	14.00	32.00	48.00	53.00	66.50	71.00	49.50	56.50	23.50	29.00	11
12	4.50	35.50	16.50	36.00	48.50	60.50	63.50	69.00	50.50	51.50	28.50	36.50	12
13	29.50	38.50	30.00	36.00	54.00	62.00	71.50	63.00	55.00	43.50	45.00	17.00	13
14	36.50	26.00	35.00	40.50	56.50	57.50	76.50	64.50	62.50	39.00	50.50	7.00	14
15	25.00	15.50	35.50	41.00	60.50	61.50	77.00	65.50	65.50	45.00	51.50	23.00	15
16	25.50	19.50	41.50	47.50	64.50	55.50	73.50	63.50	65.00	42.50	46.00	5.00	16
17	29.00	15.00	36.50	36.00	60.00	46.50	73.00	65.00	61.00	47.00	33.50	2.00	17
18	35.50	13.00	42.50	31.50	62.50	52.50	74.00	68.50	45.50	58.00	28.50	21.00	18
19	28.50	23.50	49.50	42.00	51.50	55.50	69.50	69.50	45.00	51.00	20.00	27.50	19
20	35.00	27.00	45.00	45.00	31.50	58.50	71.00	68.50	42.50	57.00	18.00	27.50	20
21	20.00	7.00	38.50	42.50	34.50	54.50	73.00	69.50	47.00	50.50	18.50	28.50	21
22	24.50	5.50	41.50	51.00	43.50	59.50	73.50	71.00	53.00	43.50	34.00	20.50	22
23	37.50	25.50	21.50	50.50	46.50	62.00	69.50	69.50	55.50	26.00	30.00	20.00	23
24	31.00	34.00	26.50	49.00	51.00	65.50	71.00	59.00	57.00	24.00	29.50	23.00	24
25	24.00	26.50	27.50	55.50	41.50	65.50	74.50	57.50	58.50	26.50	11.50	32.50	25
26	29.00	23.00	21.50	50.50	48.00	60.00	73.00	63.00	54.50	46.50	12.00	30.50	26
27	5.00	32.50	6.50	43.50	53.50	65.50	75.50	69.50	51.00	32.50	21.00	24.50	27
28	10.00	35.00	7.00	41.00	44.00	66.00	82.50	71.00	54.50	31.00	9.50	23.00	28
29	11.00		13.50	37.50	50.00	71.00	77.00	66.00	49.50	43.50	-2.50	27.00	29
30	5.50		30.50	34.00	52.50	70.50	75.00	69.00	46.00	54.50	6.50	31.00	30
31	13.50		25.00		50.00		70.50	70.50		42.50		14.00	31
MEAN	21.13	20.82	30.24	37.67	48.84	58.83	72.89	68.03	56.68	47.56	32.45	28.40	

MEAN FOR THE YEAR 1975: 43.79
MAXIMUM VALUE FOR 1975: 82.50 26 JUL
MINIMUM VALUE FOR 1975: -8.00 11 JAN

* INDICATES PARTIAL VALUES
** INDICATES MISSING DATA
*** INDICATES TOTAL MONTH'S DATA MISSING
E INDICATES ESTIMATED VALUE

STATION NO. 481570 CASPER WR AP (MOVED 7 MILES IN 1950)
LATITUDE 42-55-00 LONGITUDE 106-28-00 ELEVATION 5338.00 FEET NATRONA COUNTY
SE1/4-SW1/4-SW1/4 SECTION 17 TOWNSHIP 34N RANGE 80W 6TH P.M.
NOAA IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 11410100

APRIL 1975

HOURLY PRECIPITATION INCHES

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	DAILY TOTAL
1	.01	.01	.01	.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.05
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	.01	.01	.03	0.00	0.00	0.00	.01	.11	.11	.03	.02	.03	.01	.01	.05	0.00	0.00	.01	0.00	0.00	0.00	0.00	.44
8	0.00	0.00	0.00	0.00	0.00	.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.01
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.01
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.01	.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.02
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.01	.19	.06	.01	.01	.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.29
18	0.00	.01	.01	.02	0.00	0.00	0.00	.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.05
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	.10
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31																									

MONTHLY TOTAL = .97
MAXIMUM AMOUNT IN ONE DAY = .44 DAY = 7
MAXIMUM AMOUNT IN ONE HOUR = .19 DAY = 17 HOUR = 10
NUMBER OF EVENTS IN MONTH = 33

* INDICATES PARTIAL VALUES
** INDICATES MISSING DATA
*** INDICATES TOTAL DAY'S DATA MISSING
T INDICATES TRACE
NEXT INDICATES VALUE ACCUMULATED IN NEXT DAY'S VALUE

STATION NO. 24089 CASPER NATRONA COUNTY INTERNATIONAL AIRPORT
LATITUDE 42-55-00 LONGITUDE 106-28-00 ELEVATION 5338.00 FEET NATRONA COUNTY
SW1/4-SW1/4-NW1/4 SECTION 17 TOWNSHIP 34N RANGE 80W 6TH P.M.
WRRI IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 14110100

HOURLY CLIMATE VALUES FOR RELATIVE HUMIDITY PERCENT

NOV 1978

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	DAILY AVE	DAY
1			60			67			51			35			23			33			49			51	46	1
2			51			55			46			30			25			36			43			65	44	2
3			67			73			65			34			26			29			51			43	49	3
4			47			37			34			31			16			20			36			34	32	4
5			43			48			47			36			35			39			55			68	46	5
6			65			65			47			28			18			24			34			39	40	6
7			36			33			34			26			23			23			23			23	28	7
8			21			24			27			22			19			18			21			23	22	8
9			27			78			73			68			76			82			78			78	70	9
10			81			80			80			77			73			80			76			83	79	10
11			83			83			80			77			77			81			84			84	81	11
12			84			92			88			84			81			85			88			84	86	12
13			84			84			74			68			62			73			83			91	77	13
14			87			75			87			70			60			77			77			84	77	14
15			77			67			71			65			60			60			71			67	67	15
16			65			62			60			66			58			55			60			60	61	16
17			62			62			68			64			59			61			66			66	64	17
18			66			92			88			81			72			78			91			92	83	18
19			87			91			87			80			70			79			79			83	82	19
20			83			83			83			73			67			73			80			76	77	20
21			76			84			88			71			63			88			81			100	81	21
22			100			100			84			49			57			70			67			75	75	22
23			78			69			69			59			45			28			56			72	60	23
24			75			75			69			64			55			72			92			80	73	24
25			92			92			88			72			85			88			84			88	86	25
26			88			96			88			88			78			92			92			84	88	26
27			71			84			81			75			78			62			74			65	74	27
28			68			60			72			72			67			82			84			80	73	28
29			68			71			60			61			69			69			75			69	68	29
30			69			75			81			64			57			82			78			78	73	30
31																										31

AVERAGE FOR NOV 1978: 65.35

* INDICATES PARTIAL VALUES
** INDICATES MISSING DATA
*** INDICATES TOTAL DAY'S DATA MISSING

MONTHLY

For those times when only monthly summary values are needed, MONTHLY computes monthly values from any climatic data except wind direction. The total will represent total or mean values, depending upon the parameter. For example, monthly precipitation will be printed as totals, monthly temperature as mean values. Also computed are annual summaries, and three sets of statistics, including mean and standard deviation for: (1) all months with at least some data, (2) complete months only, and (3) complete years only.

For each request, the user should specify:

data file:
- daily
- 6 hour
- hourly precipitation
- 1,3 hour

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

date range (unless all data are desired)

parameters desired

conversion units:
- centimeters
- degrees centigrade
- kilometers
- knots

STATION NO. 24089 CASPER NATRONA COUNTY INTERNATIONAL AIRPORT
LATITUDE 42-55-00 LONGITUDE 106-28-00 ELEVATION 5338.00 FEET NATRONA COUNTY
SW1/4-SW1/4-NW1/4 SECTION 17 TOWNSHIP 34N RANGE 80W 6TH P.M.
WRRI IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 14110100

MEAN MONTHLY VALUES FOR 1955 - 1975

DRY BULB TEMPERATURE DEGREES FAHRENHEIT

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	PERCENT OF MEAN
1955	23.12*	21.07	26.34	43.13	54.86*	59.51	74.28	73.05	60.47	50.05	26.58	27.73	45.01*	**
1956	27.02	23.64	33.27	39.84	55.21	69.91	71.01	67.22	61.23	50.33	30.54	28.67	46.49	103.16
1957	16.59	32.11	34.51	38.30	51.01	61.03	72.57	70.53	56.32	45.84	29.29	32.55	45.05	99.96
1958	28.08	30.92	28.43	39.90	59.17	62.99	65.49	71.62	60.35	49.35	34.34	28.98	46.63	103.47
1959	24.73	23.35	32.50*	41.77	50.30	67.21*	71.48*	71.28	56.84	43.86*	30.88	31.35	45.46*	**
1960	23.11*	18.84	32.98	44.75*	54.55*	64.60	72.78	68.62	60.31	47.08	33.67	25.93	45.60*	**
1961	28.49	30.94	36.16	40.44*	53.77	66.69*	70.58	72.24	50.99	44.49	30.49*	22.74*	45.66*	**
1962	16.29	27.02	29.78	46.13	54.04	61.42	68.05	68.12	58.01	50.40	39.47	30.34	45.75	101.52
1963	14.13	32.40	34.96	42.30	55.28	64.69	72.52	70.48	63.66	53.82	38.12	25.43	47.31	104.98
1964	24.15	21.90	25.46	39.38	53.78	60.78	74.64	66.73	56.31	47.03	32.09	24.97	43.93	97.48
1965	30.28	23.92	21.18	45.32	49.69	59.63	69.36	66.81	47.25	50.91	39.28	30.11	44.47	98.68
1966	23.04	25.01	36.47	38.73	56.48	61.92	75.19	66.39	61.26	44.70	36.07	25.92	45.93	101.92
1967	27.14	27.85	36.54	42.32	48.29	57.99	68.95	68.92	60.16	48.03	31.50	19.14	44.73	99.25
1968	24.22	29.73	36.51	37.80	47.67	60.16	68.90	64.61	56.21	47.72	32.22	20.42	43.84	97.28
1969	26.97	28.96	27.85	46.65	55.20	56.58	71.15	72.06	63.45	37.42	34.56	28.15	45.75	101.52
1970	23.86	32.06	27.96	37.23	52.81	62.72	70.99	72.70	54.03	40.87	34.54	25.50	44.60	98.97
1971	25.56	24.87	31.13	40.61	49.25	64.13	67.24	71.52	53.45	41.96	31.12	23.76	43.71	96.99
1972	18.41	28.75	38.20	42.13	51.35	64.34	65.69	67.06	56.00	43.24	30.33	18.15	43.63	96.81
1973	19.83	24.93	32.75	35.87	51.19	62.94	68.25	70.74	53.77	47.79	32.89	27.44	44.03	97.70
1974	19.86	27.95	36.09	43.07	51.32	65.21	72.65	64.08	53.43	47.51	34.13	24.79	45.00	99.85
1975	22.11	22.29	29.96	37.40	48.99	58.71	72.53	68.28	56.29	47.02	32.28	29.28	43.76	97.10
ALL MONTHS WITH AT LEAST SOME DATA														
MEAN	23.19*	26.59	31.85*	41.09*	52.58*	62.53*	70.68*	69.19	57.13	46.63*	33.06*	26.25*	45.06*	
STDEV	4.34	4.00	4.46	3.05	3.01	3.29	2.76	2.68	4.15	3.81	3.25	3.87	1.05	
N	21	21	21	21	21	21	21	21	21	21	21	21	21	
ALL COMPLETE MONTHS														
MEAN	23.19	26.59	31.82	40.94	52.35	62.06	70.64	69.19	57.13	46.77	33.19	26.43	44.97	
STDEV	4.57	4.00	4.58	3.09	3.08	3.10	2.83	2.68	4.15	3.85	3.28	3.89	1.15	
N	19	21	20	19	19	19	20	21	21	20	20	20	17	
ALL COMPLETE YEARS														
MEAN	22.79	27.31	31.82	40.76	52.39	62.06	70.30	68.69	57.12	46.70	33.69	26.09	44.97	
STDEV	4.63	3.46	4.66	3.22	3.21	3.16	2.87	2.63	4.23	4.08	3.07	4.03	1.15	
N	17	17	17	17	17	17	17	17	17	17	17	17	17	

MAXIMUM DAILY VALUE: 99.00* 27 JUN, 1970
MINIMUM DAILY VALUE: -38.00* 14 JAN, 1972

E INDICATES ESTIMATED VALUE
* INDICATES PARTIAL VALUES
** INDICATES MISSING DATA

PLOTCLL

PLOTCLL plots climate stations by location. The retrieval can be specified in terms of latitude-longitude or township-range. Overlap points can be generated to prevent the overprinting of data from adjacent stations. Using a larger scale or the small print size can also reduce overprinting.

The plot styles are:

Style 1. type of data available (daily, 6 hour, hourly precipitation, 1,3 hour)
station number

Style 2. number of months or years of data available
station number
mean value of parameter

Style 3. number of months or years of data available
station number
maximum value of parameter
minimum value of parameter

Style 4. number of months or years of data available
station number
mean value of parameter 1
mean value of parameter 2

Style 5. number of months or years of data available
station number
maximum value of parameter 1
maximum value of parameter 2

Style 6. number of months or years of data available
station number
minimum value of parameter 1
minimum value of parameter 2

Style 1 cannot plot the location of daily climatic stations with stations from the other data files.

For styles 4 through 6, the parameters specified must be from the same data file. The number of years of data is plotted for daily climatic data; the number of months of data is plotted for 6 hour, hourly precipitation, and 1,3 hour data.

PLOTCLL (continued)

To prevent overprinting data from adjacent stations, the program can combine the data of these stations and plot instead an "overlap point," whose position is the weighted average of the points it replaces.

Overlap points can optionally have the following printed beside them for each style:

1. nothing beside overlap point for style 1
2. mean value of parameter for all stations represented by point
3. maximum value of parameter for all stations represented by point
4. mean value of parameter 1 for all stations represented by point
5. maximum value of parameter 1 for all stations represented by point
6. minimum value of parameter 1 for all stations represented by point

For each plot, the user should specify:

style of plot

scale of plot

whether overlap points are to be created, and what to print beside them

data file, or files for style 1

retrieval method and value range:
latitude-longitude
township-range

source organization (unless all are to be used)

date range (unless all are desired)

first and second parameters, as applicable

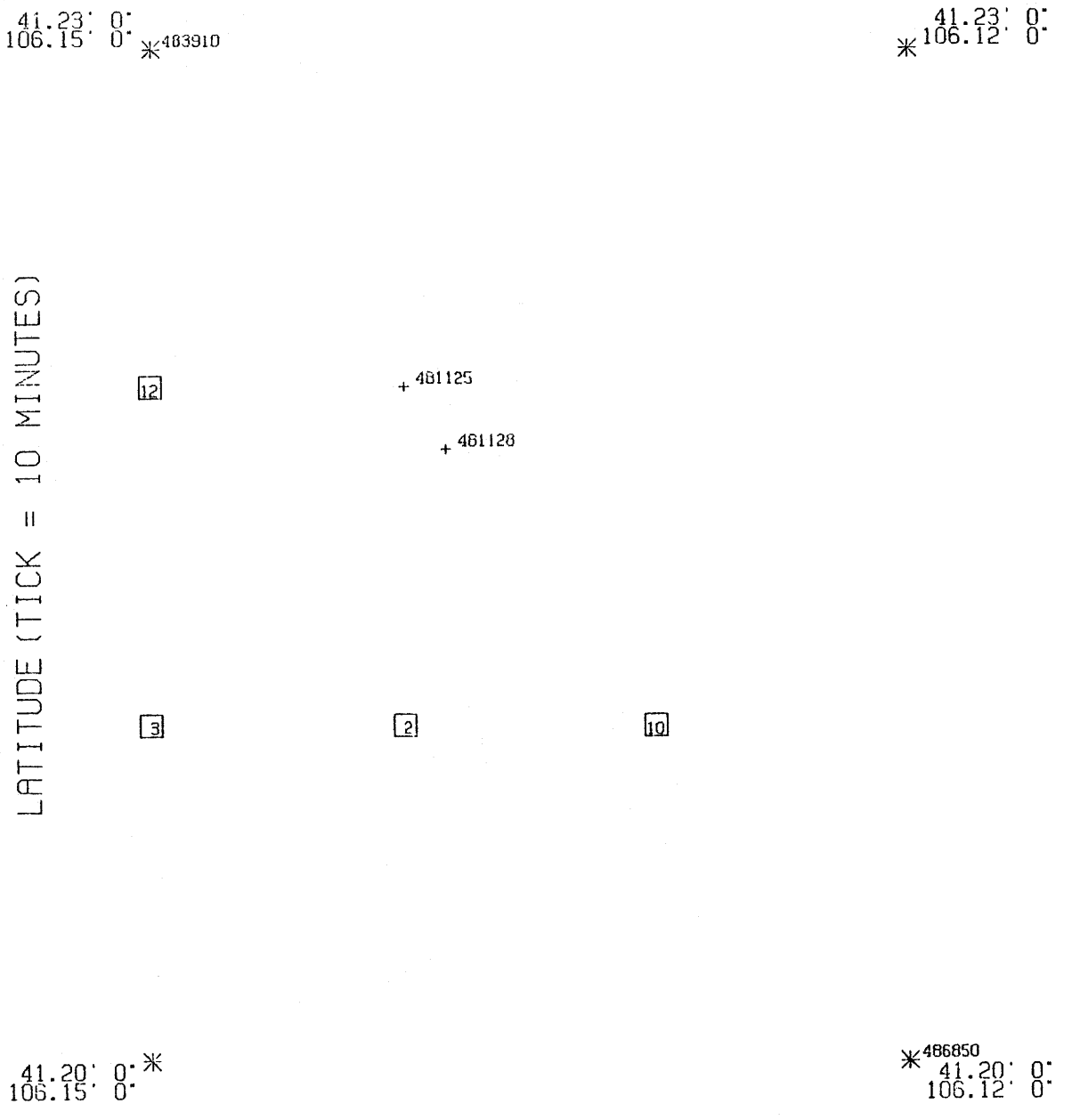
print height (.1 or .06 inches)

SCALE -- 1 : 24000

POINTS PLOTTED REPRESENT
⊙ DAILY CLIMATE STATION
△ 6 HOUR CLIMATE STATION
+ HOURLY PRECIPITATION STATION
× 1,3 HOUR CLIMATE STATION
◈ DAILY CLIMATE, HOURLY PRECIP.
✣ 1,3 HOUR & 6 HOUR CLIMATE
[N] N OVERLAP POINTS
(N=×× FOR MORE THAN 99 POINTS)

VALUES PRINTED ARE
LINE 1
STATION NUMBER

31 DATA POINTS ARE REPRESENTED.



STORM

This program summarizes storm events from hourly precipitation data for a specific station and year range. A precipitation occurrence of one hour or longer constitutes a storm. For each storm, the occurrence date, beginning hour, duration in hours, total amount of precipitation and average intensity (inches/hour) are computed and printed. Missing values and trace values are assumed to have a value of zero.

In some cases, it may be preferable to analyze the storms that occur during a portion of the year (e.g., April through August) rather than the entire year. For those instances, an option exists to analyze any month range (inclusive) within the year.

For each request, the user should specify:

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

date range (unless all dates are to be used)

month range (unless January through December is to be used)

units of measure (inches or centimeters)

STATION NO. 481570 CASPER WB AP (MOVED 7 MILES IN 1950)
LATITUDE 42-55-00 LONGITUDE 106-28-00 ELEVATION 5338.00 FEET NATRONA COUNTY
SE1/4-SW1/4-SW1/4 SECTION 17 TOWNSHIP 34N RANGE 80W 6TH P.M.
NOAA IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 11410100

STORM SUMMARY FOR HOURLY PRECIPITATION VALUES
MAY 1972 - JUL 1972

BEGINNING DATE	BEGINNING HOUR	DURATION IN HOURS	AMOUNT IN INCHES	INTENSITY INCHES/HOUR
6 MAY 1972	6	4	.05	.01
6 MAY 1972	11	1	.01	.01
7 MAY 1972	18	4	.07	.02
8 MAY 1972	16	1	.04	.04
8 MAY 1972	18	2	.03	.02
8 MAY 1972	21	1	.01	.01
9 MAY 1972	20	7	.22	.03
10 MAY 1972	8	1	.01	.01
10 MAY 1972	13	2	.05	.03
10 MAY 1972	16	1	.01	.01
10 MAY 1972	20	1	.02	.02
11 MAY 1972	10	1	.01	.01
11 MAY 1972	19	2	.05	.03
13 MAY 1972	4	1	.05	.05
19 MAY 1972	14	2	.11	.06
19 MAY 1972	21	1	.02	.02
1 JUN 1972	22	1	.01	.01
2 JUN 1972	21	3	.22	.07
3 JUN 1972	19	2	.02	.01
4 JUN 1972	19	6	.26	.04
5 JUN 1972	3	1	.01	.01
5 JUN 1972	5	4	.08	.02
7 JUN 1972	16	2	.04	.02
18 JUN 1972	22	2	.03	.02
19 JUN 1972	6	1	.01	.01
22 JUN 1972	18	3	.09	.03
23 JUN 1972	16	1	.03	.03
25 JUN 1972	15	1	.03	.03
2 JUL 1972	2	1	.01	.01
2 JUL 1972	5	4	.05	.01
7 JUL 1972	14	1	.01	.01
20 JUL 1972	18	1	.54	.54
27 JUL 1972	20	2	.28	.14
31 JUL 1972	7	4	.11	.03
31 JUL 1972	21	2	.04	.02

NO MISSING DATA WERE ENCOUNTERED

ASSUMPTIONS:
(1) MISSING DATA AND TRACE VALUES ARE ASSUMED TO HAVE A VALUE OF ZERO.
(2) VALUES DISPLAYED MAY REPRESENT AN ACCUMULATION OF PREVIOUS VALUES.
(3) IN THE EVENT AN ACCUMULATED VALUE IS DETECTED, THE BEGINNING HOUR OF THE STORM IS GIVEN BY THE HOUR ACCUMULATION BEGAN.
(4) IF A STORM WAS DETECTED IN THE GIVEN DATE RANGE BUT BEGAN IN A MONTH NOT REQUESTED, IT IS ASSUMED THAT THE STORM ACTUALLY BEGAN DURING THE FIRST HOUR OF THE GIVEN DATE RANGE.

WINDROSE

Prevailing wind patterns can be difficult to discern from tabular data. This program plots a windrose which graphically presents this information. Two tables of wind speed classes versus direction depict the percent of time wind speed is within a range and the percent of time it is below four values. Wind data are computed for a range of months over a range of years.

For each plot, the user should specify:

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

year range (unless all dates are to be used)

month range (unless all months are to be used)

units (mph or kph)

STATION NO. 24089 CASPER NATRONA COUNTY INTERNATIONAL AIRPORT
LATITUDE 42-55-00 LONGITUDE 106-28-00 ELEVATION 5338.00 FEET NATRONA COUNTY
SW1/4-SW1/4-NW1/4 SECTION 17 TOWNSHIP 34N RANGE 80W 6TH P.M.
WRRI IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 14110100

CROSS-CORRELATION OF WIND SPEED AND DIRECTION
FROM MAY TO DEC FOR 1970 TO 1978
PERCENT OF TIME WIND IS WITHIN CLASS SIZE

	CLASS SIZE IN MILES PER HOUR										
	00-04	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-UP
N	.2	2.4	.9	.3	.2	.0	.0	0.0	0.0	0.0	0.0
NNE	.2	4.3	2.1	1.3	.4	.1	0.0	0.0	0.0	0.0	0.0
NE	.2	2.1	1.1	.4	.1	0.0	.0	0.0	0.0	0.0	0.0
ENE	.1	1.7	.8	.2	.1	0.0	0.0	0.0	0.0	0.0	0.0
E	.3	2.9	1.6	.8	.2	.0	0.0	0.0	0.0	0.0	0.0
ESE	.1	1.1	.5	.1	.1	.0	0.0	0.0	0.0	0.0	0.0
SE	.2	1.0	.2	.1	.0	.0	0.0	0.0	0.0	0.0	0.0
SSE	.2	1.2	.2	.0	.0	0.0	0.0	0.0	0.0	0.0	0.0
S	.1	1.0	.3	.1	.1	.0	.0	0.0	0.0	0.0	0.0
SSW	.2	2.1	2.6	3.1	3.2	1.0	.3	.1	.0	.0	.0
SW	.2	2.9	3.8	4.1	3.5	1.1	.4	.1	0.0	0.0	0.0
WSW	.3	4.7	4.4	2.1	1.3	.4	.2	.0	0.0	.0	0.0
W	.4	6.0	3.0	1.6	1.0	.3	.1	.0	0.0	.0	0.0
WNW	.2	2.0	.7	.5	.2	.0	.0	.0	0.0	0.0	0.0
NW	.1	2.1	.6	.3	.1	.0	.0	.0	0.0	0.0	0.0
NNW	.3	3.3	.8	.3	.1	.0	.0	0.0	0.0	0.0	0.0
VAR	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CALM	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOT	5.1	40.8	23.6	15.6	10.7	3.0	.9	.3	.0	.0	.0

52920 HOURS OF DATA
0 HOURS OF NO DATA
52920 TOTAL HOURS

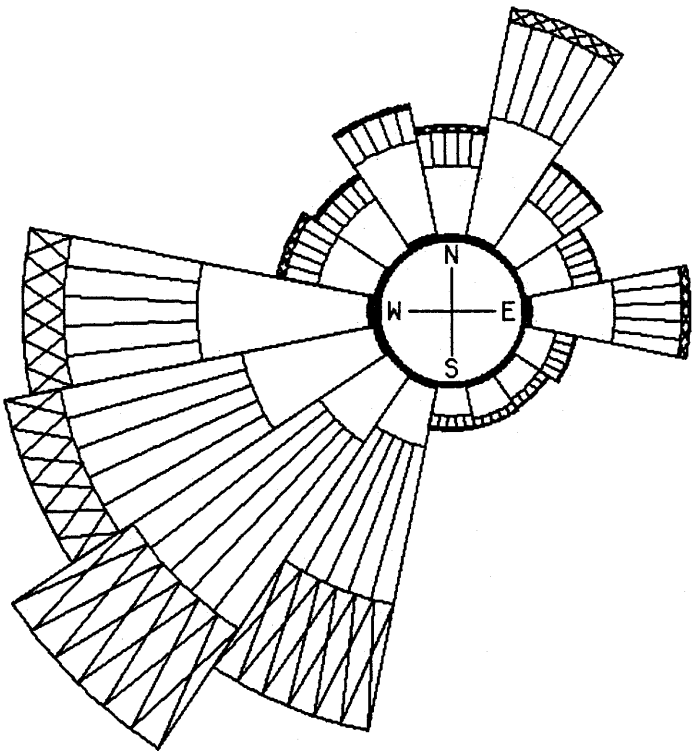
STATION NO. 24089 CASPER NATRONA COUNTY INTERNATIONAL AIRPORT
LATITUDE 42-55-CC LONGITUDE 106-28-00 ELEVATION 5338.00 FEET NATRONA COUNTY
SW1/4-SW1/4-NW1/4 SECTION 17 TOWNSHIP 34N RANGE 80W 6TH P.M.
WRRI IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 1411C1CO

FROM MAY TO DEC FOR 1970 TO 1978
PERCENT OF TIME WIND SPEED IS LESS THAN INDICATED AMOUNT

	AMOUNT IN MILES PER HOUR			
	5	10	20	INFINITY
N	.2	2.6	3.8	4.1
NNE	.2	4.5	7.9	8.4
NE	.2	2.2	3.7	3.9
ENE	.1	1.8	2.8	2.9
E	.3	3.2	5.6	5.9
ESE	.1	1.2	1.9	2.0
SE	.2	1.2	1.5	1.6
SSE	.2	1.3	1.6	1.7
S	.1	1.2	1.6	1.7
SSW	.2	2.3	8.0	12.5
SW	.2	3.0	10.9	16.0
WSW	.3	5.0	11.5	13.4
W	.4	6.4	11.0	12.5
WNW	.2	2.3	3.4	3.7
NW	.1	2.3	3.2	3.3
NNW	.3	3.6	4.8	4.9
VAR	0.0	0.0	0.0	0.0
CALM	1.7	1.7	1.7	1.7
TOT	5.1	45.9	85.1	100.0

52920 HOURS OF DATA
0 HOURS OF NO DATA
52920 TOTAL HOURS

WIND ROSE
CASPER NATRONA COUNTY INTERNATIONAL AIRPORT
FROM MAY TO DEC FOR 1970 TO 1978

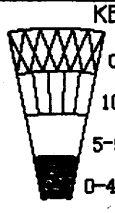


WINDS VARIABLE

PERCENT OF TIME	AT SPEEDS LESS THAN
0.0	5 MPH
0.0	10 MPH
0.0	20 MPH
0.0	INF.

CALM 1.7 PERCENT OF TIME
NO WINDS GREATER THAN 52. MPH

KEY



OVER 19 MPH
10-19 MPH
5-9 MPH
0-4 MPH

ONE INCH EQUALS
5 PERCENT OF TIME

WINTER

WINTER computes precipitation data for a particular station for the winter seasons (fall and spring) for a range of years. Fall and spring dates are uniquely defined for each station based on the latitude and elevation of the station. Specifically,

Fall date = 523.6 - .00686*E - 3.8299*L

Spring date = -199.0 + .01012*E + 5.1413*L

where:

E = elevation (feet)

L = latitude (degrees north)

These equations yield the seasons' Julian dates which are then converted to the Gregorian dates. The precipitation data between the two dates are then totaled to define total winter precipitation for the given year.

The mean is computed for the range of years specified. Maximum and minimum values, standard deviation, coefficient of skewness and degree of kurtosis are computed based on the observed values (total precipitation for each winter) divided by the mean. The Kolmogorov-Smirnov test is applied to test the hypothesis that the data are normally distributed. For this test, a significance level of .10, .05, .025, .01 or .005 may be used.

This program is being developed in cooperation with the United States Forest Service Experimental Station in Laramie, Wyoming. Additional questions regarding theoretical assumptions should be referred to Ron Tabler, USFS Experimental Station, Laramie, Wyoming 82070.

WINTER (continued)

For each request, the user should specify:

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

source organization (unless all are to be used)

date range

significance level for Kolmogorov-Smirnov test

STATION NO. 486440 MORAN 5WNW (MORAN 1911-1961)
LATITUDE 43-51-00 LONGITUDE 110-35-00 ELEVATION 6789.00 FEET TETON COUNTY
NE1/4-NW1/4-NE1/4 SECTION 19 TOWNSHIP 45N RANGE 114W 6TH P.M.
NOAA IS THE DATA SOURCE (P) DRAINAGE BASIN CODE 17230000

WINTER PRECIPITATION VALUES

LATITUDE	LONGITUDE	ELEVATION	FALL	SPRING	YEAR	TOTAL PRECIP.	PRECIP./MEAN
43-52-00	110-35-00	6740.00	5 NOV	5 APR	1950-1951	11.66	.90
					1952-1953	10.56	.81
					1953-1954	9.78	.75
43-52-00	110-35-00	6798.00			1954-1955	8.93	.69
					1955-1956	19.56	1.51
43-51-00	110-35-00	6798.00			1956-1957	12.19	.94
					1957-1958	11.96	.92
					1958-1959	14.09	1.09
					1959-1960	9.51	.73
					1960-1961	9.14	.71
					1961-1962	14.25	1.10
					1962-1963	10.24	.79
					1963-1964	12.20	.94
					1964-1965	18.10	1.40
					1965-1966	10.17	.78
					1966-1967	14.05	1.08
					1967-1968	11.73	.90
					1968-1969	13.60	1.05
					1969-1970	12.67	.98
					1970-1971	19.51	1.50
					1971-1972	17.43	1.34
					1972-1973	8.80	.68
					1973-1974	18.54	1.43
					1974-1975	14.79	1.14
43-51-00	110-35-00	6789.00			1976-1977	5.97	.46
43-40-00	110-43-00	6470.00		1 APR	1977-1978	17.63	1.36

SAMPLE SIZE :	26
MEAN :	12.96
MINIMUM :	.46
MAXIMUM :	1.51
STANDARD DEV. :	.28
COEFFICIENT OF SKEWNESS :	.35
DEGREE OF KURTOSIS :	2.62

KOLMOGOROV-SMIRNOV TEST
RESULT FOR ALPHA = .005 : NORMAL

8. SNOW COURSE PROGRAMS

The snow course data base contains data collected and published by the Soil Conservation Service. The file includes snow depth, water equivalent and snow density for snow course measurement. The header for each measurement site includes latitude-longitude, township-range, elevation, county, and drainage basin code, along with the SCS station number. The data consist of measurements generally made on or near the first of the month for January through June. Supplemental measurements are sometimes made in the middle of the months.

DATESC

This program prints the headers for the snow course measurement site and optionally the range of dates of the available data.

For each listing, the user should specify:

retrieval method and value range:
- latitude-longitude
- county
- drainage basin
- township-range
- station number

whether just headers or headers and dates are wanted

SNOW COURSE DATA
YEAR RANGES OF DATA AVAILABLE ON THE
WATER RESOURCES DATA SYSTEM
WYOMING WATER RESOURCES RESEARCH INSTITUTE, LARAMIE, WY

STATION NO. 160002 ARRASTRE LAKE SNOW COURSE IN NORTH PLATTE RIVER BASIN, SCS NO. 6H21H
LATITUDE 41-22-00 LONGITUDE 106-23-00 ELEVATION 10280.00 FEET UNKNOWN COUNTY
SECTION 9 TOWNSHIP 16N RANGE 80W 6TH P.M. (P) DRAINAGE BASIN CODE 00000000

1975 - 1976

STATION NO. 160003 CASPER MOUNTAIN PILLOW SNOW COURSE IN NORTH PLATTE RIVER BASIN, NO.
LATITUDE 00-00-00 LONGITUDE 0-00-00 ELEVATION 7900.00 FEET UNKNOWN COUNTY
SECTION 0 TOWNSHIP 0 RANGE 0 P.M. (P) DRAINAGE BASIN CODE 00000000

1976 - 1977

STATION NO. 160004 BOTTLE CREEK SNOW COURSE IN NORTH PLATTE RIVER BASIN, SCS NO. 6HE
LATITUDE 41-11-00 LONGITUDE 106-53-00 ELEVATION 8700.00 FEET UNKNOWN COUNTY
SECTION 13 TOWNSHIP 14N RANGE 85W 6TH P.M. (P) DRAINAGE BASIN CODE 00000000

1938 - 1977

STATION NO. 160005 BOXELDER SNOW COURSE IN NORTH PLATTE RIVER BASIN, SCS NO. 5G1
LATITUDE 42-33-00 LONGITUDE 105-53-00 ELEVATION 7280.00 FEET UNKNOWN COUNTY
SECTION 19 TOWNSHIP 30N RANGE 75W 6TH P.M. (P) DRAINAGE BASIN CODE 00000000

1950 - 1977

STATION NO. 160006 BUCK CREEK SNOW COURSE IN NORTH PLATTE RIVER BASIN, SCS NO. 5G3
LATITUDE 42-38-00 LONGITUDE 105-56-00 ELEVATION 7900.00 FEET UNKNOWN COUNTY
SECTION 8 TOWNSHIP 30N RANGE 76W 6TH P.M. (P) DRAINAGE BASIN CODE 00000000

1972 - 1977

STATION NO. 160007 JOE WRIGHT SNOW COURSE IN NORTH PLATTE RIVER BASIN, SCS NO.6J37
LATITUDE 41-31-00 LONGITUDE 106-53-00 ELEVATION 10000.00 FEET UNKNOWN COUNTY
SECTION 25 TOWNSHIP 7N RANGE 76W 6TH P.M. (P) DRAINAGE BASIN CODE 00000000

1973 - 1977

STATION NO. 160008 CASPER MOUNTAIN SNOW COURSE IN NORTH PLATTE RIVER BASIN, SCS NO. 6G1MP
LATITUDE 42-44-00 LONGITUDE 106-18-00 ELEVATION 7800.00 FEET UNKNOWN COUNTY
SECTION 21 TOWNSHIP 32N RANGE 79W 6TH P.M. (P) DRAINAGE BASIN CODE 00000000

1975 - 1977

LISTDATASC

This program prints the snow course data in a 3-table format. The first table contains snow depth data, the second water equivalent data, and the third snow density data. In each table, the date of the first-of-month measurement is printed above the measured value, and the day of any supplemental data is printed above that value. Annual maximum values are also printed. Statistics consisting of maximum, mean, minimum values, and standard deviation are optionally available.

For each request, the user should specify:

retrieval method, and value range:
- latitude-longitude
- county
- drainage basin
- township-range (6th p.m. in Wyoming only)
- station number

date range (unless all are to be used)

whether statistics are also to be printed

STATION NO. 160008 CASPER MOUNTAIN SNOW COURSE IN NORTH PLATTE RIVER BASIN, SCS NO. 661MP
LATITUDE 42-44-00 LONGITUDE 106-18-00 ELEVATION 7850.00 FEET UNKNOWN COUNTY
SECTION 21 TOWNSHIP 32N RANGE 79W 6TH P.M. (P) DRAINAGE BASIN CODE 00000000

SNOW COURSE DATA : DEPTH OF SNOW (INCHES)

YEAR	JANUARY FIRST DATE	JANUARY SUPP. DAY	FEBRUARY FIRST DATE	FEBRUARY SUPP. DAY	MARCH FIRST DATE	MARCH SUPP. DAY	APRIL FIRST DATE	APRIL SUPP. DAY	MAY FIRST DATE	MAY SUPP. DAY	JUNE FIRST DATE	JUNE SUPP. DAY	ANNUAL MAX DATE
1972	JAN 4	17	FEB 1	14	FEB 29	15	MAR 31	14	APR 28	17			APR 28
	36.	39.	39.	48.	40.	44.	52.	53.	59.	42.			59.
1973	JAN 3		FEB 2		FEB 28		MAR 30		MAY 2	15	JUN 4		MAY 2
	38.		42.		45.		71.		119.	84.	53.		119.
1974	JAN 4		JAN 30		FEB 27		APR 1		APR 30	14			APR 30
	30.		36.		52.		42.		60.	41.			60.
1975	DEC 31		FEB 3		FEB 28		APR 1		APR 30		MAY 29		APR 1
	33.		37.		36.		54.		52.		30.		54.
1976	DEC 30		JAN 30		FEB 28		MAR 31		APR 30		JUN 1		APR 30
	28.		37.		43.		48.		54.		0.		54.
1977	JAN 5		JAN 25		FEB 28		MAR 30		APR 29				MAR 30
	24.		24.		39.		77.		45.				77.
N	6	1	6	1	6	1	6	1	6	3	3		6
MAX	36.0	39.0	42.0	48.0	52.0	44.0	77.0	53.0	119.0	84.0	53.0		119.0
MEAN	31.5	39.0	35.3	48.0	42.5	44.0	57.3	53.0	64.8	55.7	27.7		70.5
MIN	24.0	39.0	24.0	48.0	36.0	44.0	42.0	53.0	45.0	41.0	0.0		54.0
S DEV	5.2		6.2		5.6		13.7		27.1	24.5	26.6		25.2

STATION NO. 160008 CASPER MOUNTAIN SNOW COURSE IN NORTH PLATTE RIVER BASIN, SCS NO. 661MP
LATITUDE 42-44-00 LONGITUDE 106-18-00 ELEVATION 7850.00 FEET UNKNOWN COUNTY
SECTION 21 TOWNSHIP 32N RANGE 79W 6TH P.M. (P) DRAINAGE BASIN CODE 00000000

SNOW COURSE DATA : WATER EQUIVALENT (INCHES)

YEAR	JANUARY FIRST DATE	JANUARY SUPP. DAY	FEBRUARY FIRST DATE	FEBRUARY SUPP. DAY	MARCH FIRST DATE	MARCH SUPP. DAY	APRIL FIRST DATE	APRIL SUPP. DAY	MAY FIRST DATE	MAY SUPP. DAY	JUNE FIRST DATE	JUNE SUPP. DAY	ANNUAL MAX DATE
1972	JAN 4	17	FEB 1	14	FEB 29	15	MAR 31	14	APR 28	17			APR 28
	8.6	9.6	10.6	12.5	12.1	12.6	15.0	16.9	18.2	16.8			13.1
1973	JAN 3		FEB 2		FEB 28		MAR 30		MAY 2	15	JUN 4		MAY 2
	8.2		11.9		13.0		20.3		35.8	32.0	22.1		35.7
1974	JAN 4		JAN 30		FEB 27		APR 1		APR 30	14			APR 30
	6.9		9.2		13.7		13.4		22.1	15.6			22.0
1975	DEC 31		FEB 3		FEB 28		APR 1		APR 30		MAY 29		APR 30
	8.0		9.5		10.8		12.9		16.8		9.1		16.7
1976	DEC 30		JAN 30		FEB 28		MAR 31		APR 30		JUN 1		APR 30
	7.4		11.5		12.0		12.8		18.8		0.0		18.7
1977	JAN 5		JAN 25		FEB 28		MAR 30		APR 29				APR 29
	4.2		6.3		9.7		14.5		16.7				16.6
N	6	1	6	1	6	1	6	1	6	3	3		6
MAX	8.6	9.6	11.9	12.5	13.7	12.6	20.3	16.9	35.8	32.0	22.1		35.8
MEAN	6.9	9.6	9.7	12.5	11.9	12.6	14.9	16.9	21.4	21.5	10.4		21.4
MIN	4.2	9.6	6.3	12.5	9.7	12.6	12.8	16.9	16.7	15.6	0.0		16.7

STATION NO. 160008 CASPER MOUNTAIN SNOW COURSE IN NORTH PLATTE RIVER BASIN, SCS NO. 661M2
LATITUDE 42-44-00 LONGITUDE 106-18-00 ELEVATION 7850.00 FEET UNKNOWN COUNTY
SECTION 21 TOWNSHIP 32N RANGE 79W 6TH P.M. (P) DRAINAGE BASIN CODE 00000000

SNOW COURSE DATA : DENSITY OF SNOW (%)

YEAR	JANUARY FIRST DATE	JANUARY SUPP. DAY	FEBRUARY FIRST DATE	FEBRUARY SUPP. DAY	MARCH FIRST DATE	MARCH SUPP. DAY	APRIL FIRST DATE	APRIL SUPP. DAY	MAY FIRST DATE	MAY SUPP. DAY	JUNE FIRST DATE	JUNE SUPP. DAY	ANNUAL MAX DATE
1972	JAN 4	17	FEB 1	14	FEB 29	15	MAR 31	14	APR 28	17			MAY 17
	23.9	24.6	27.2	26.0	30.3	28.6	28.8	31.9	30.8	40.0			40.0
1973	JAN 3		FEB 2		FEB 28		MAR 30		MAY 2	15	JUN 4		JUN 4
	21.6		23.3		28.9		28.6		30.1	38.1	41.7		41.6
1974	JAN 4		JAN 30		FEB 27		APR 1		APR 30	14			MAY 14
	22.7		25.6		26.3		31.9		36.8	38.0			38.0
1975	DEC 31		FEB 3		FEB 28		APR 1		APR 30		MAY 29		APR 30
	18.2		25.7		30.0		23.9		32.3		30.3		32.3
1976	DEC 30		JAN 30		FEB 29		MAR 31		APR 30		JUN 1		APR 30
	26.4		31.1		27.9		26.7		34.8				34.8
1977	JAN 5		JAN 25		FEB 28		MAR 30		APR 29				APR 29
	17.5		26.3		24.9		18.8		37.1				37.1
N	6	1	6	1	6	1	6	1	6	3	2		6
MAX	26.4	24.6	31.1	26.0	30.3	28.6	31.9	31.9	37.1	40.0	41.7		41.7
MEAN	21.7	24.6	27.4	26.0	28.0	28.6	26.5	31.9	33.7	38.7	36.0		37.3
MIN	17.5	24.6	25.6	26.0	24.9	28.6	18.8	31.9	30.1	38.0	30.3		32.3
S DEV	3.4		2.1		2.1		4.6		3.0	1.1	8.0		3.4

E INDICATES ESTIMATED DATA

9. RESERVED FOR FUTURE USE

10. MAGNETIC TAPE OUTPUT OPTIONS

TAPE

TAPE writes the data requested to a tape in the format that the data are stored on the WRDS. Data from any or all of the data bases can be output to one tape. The tape is written in fixed length records, 80 characters per record. The blocking factor is optional, and each data base is written to a separate file on the tape. The program outputs surface water data, followed by water quality, well level, and finally climatic data. For each station retrieved, a header record is written to tape, followed by the data records for that station. The header record contains the station name, number, location, and other information used to describe the station.

TAPE retrieves data similarly to the LISTDATA programs for each data base. For each tape requested, the user should specify:

data base(s) to access

specifications as described for each data base's LISTDATA

7-track (even parity) or 9-track (odd parity)

556 or 800 BPI for 7-track
800, 1600, or 6250 BPI for 9-track

number of 80-character records per block

EBCDIC or ASCII

unlabeled or standard ANSI labels

11. STATISTICAL ASSUMPTIONS

Some of the analyses written for the WRDS involve numerous statistical calculations and a few of these make intrinsic assumptions about the data. In this section we would like to explain the methods used in these programs, and specify any assumptions made, and any limitations of the programs. While we cannot guarantee the accuracy of reliability of any output from the WRDS, we do make every effort to use standard techniques in our programming and to correct any deficiencies when they are found.

The Estimating or Regression Equation

For linear regression analyses, the estimating equation is given by $y_c = a + bx$, and for second degree regression analyses, the equation is given by $y_c = a + bx + cx^2$, where x represents the independent variable (observed value) and y the dependent variable (computed value). The method of least squares regression analysis provides a means of determining the coefficients a, b, and c (for second degree) where the "line has been so fitted, that the sum of the squares of the y deviation from it is less than those from any other straight line. A curve fitted in this manner is usually considered by statisticians to be the best with which to estimate values of one variable when values of the other variable are known" (Croxton, pg. 393).

For a linear fit, the coefficients are determined by solving the following normal equations simultaneously:

$$\Sigma y = N*a + b*\Sigma x$$

$$\Sigma x*y = a*\Sigma x + b*\Sigma x^2$$

where: x represents observed values of the independent variable

y represents observed values of the dependent variable

N represents the sample size

For a curvilinear fit, the coefficients are determined by solving the following normal equations simultaneously:

$$\Sigma y = N*a + b*\Sigma x + c*\Sigma x^2$$

$$\Sigma x*y = a*\Sigma x + b*\Sigma x^2 + c*\Sigma x^3$$

$$\Sigma x^2*y = a*\Sigma x^2 + b*\Sigma x^3 + c*\Sigma x^4$$

where: x, y, N are described above.

Standard Error

The standard error provides a means of measuring the dispersion of the y values about the estimating equation. It may be interpreted as a measure of the dependability of the estimate yielding an approximation of the range within which values can be expected to fall if the distribution is normal. It is computed as follows:

$$\sqrt{\frac{\Sigma y^2 - a*\Sigma y - b*\Sigma x*y - c*\Sigma x*\Sigma y}{N - KDEGREE - 1}}$$

where: x represents observed values of the independent variable

y represents observed values of the dependent variable

a,b,c represent the coefficients of the regression equation (c = 0 for linear analyses)

N represents the sample size

KDEGREE = 1 for first degree (linear) analyses
= 2 for second degree (curvilinear) analyses

Coefficient of Correlation and Coefficient of Determination

The correlation coefficient provides a measure of the degree of relationship between the two variables being analyzed. The sign of the coefficient is the same as the sign of the second coefficient (b) in the estimating equation. The magnitude of the coefficient (always between -1 and +1) describes the degree to which the two variables are related. A correlation coefficient of zero indicates no relationship exists between the two variables. A correlation coefficient close to positive or negative one indicates the two variables are highly related.

The coefficient of determination is the square of the correlation coefficient. The correlation coefficient is computed as follows:

$$\frac{N*\Sigma x*y - \Sigma x*\Sigma y}{\sqrt{(N*\Sigma x^2 - \Sigma x*\Sigma x)\ (N*\Sigma y^2 - \Sigma y*\Sigma y)}}$$

where: x represents observed values of the independent variable

y represents observed values of the dependent variable

N represents the sample size

Significance of b and Confidence Limits

The significance of b is a measure of the degree to which b differs from zero. For small samples, the test statistic is given by:

$$t = \sqrt{\frac{NR*\Sigma x^2 - \Sigma x*\Sigma x}{NR}} * \frac{b}{SE}$$

This value is compared to $T_{\alpha/2}$, where $T_{\alpha/2}$ is the t-table value for a given significance level (alpha) and degrees of freedom. For $|t| > T_{\alpha/2}$, one can conclude that b is significant, i.e., that the accuracy of the formulated slope of the estimating equation is not just a chance occurrence. For $|t| < T_{\alpha/2}$, one can conclude that b is not significant and the formulated estimating equation has questionable predictability.

Construction of confidence limits for an individual value of y, given an x value, provides an interval within which the y value may be expected to fall. The width of the interval is a function of alpha. The upper and lower limits of the interval are given by:

$$a + b*x_o \pm T_{\alpha/2}*SE* \sqrt{1. + \frac{1.}{NR} + \frac{(NR*x_o - \frac{\Sigma x}{NR})^2}{NR*\Sigma x^2 - \Sigma x*\Sigma x}}$$

where: a,b represent the coefficients of the estimating equation

x_o represents an observed value of the independent variable

x represents observed values of the independent variable

Significance of b and Confidence Limits (continued)

$T_{\alpha/2}$ represents the t-table value for a given alpha and degrees of freedom

SE represents the standard error

NR represents the sample size

Skewness and Kurtosis

Skewness and kurtosis are measures that provide information describing two characteristics of a given frequency distribution, symmetry and peakedness. A normal frequency distribution is an example of a distribution symmetric about the mean. The skewness coefficient describes the symmetry (or asymmetry) for a particular distribution, whether it tends to "tail off" to the left or right. A skew coefficient of zero implies a symmetric distribution. A coefficient of less than zero implies a negative or left skewness while a coefficient greater than zero implies a positive or right skewness. Skewness is computed as follows:

$$SK = \frac{(N^2 * \Sigma y^3 - 3 * N * \Sigma y \Sigma y^2 + 2 * (\Sigma y)^3)}{N * (N - 1) * (N - 2) * S_y^3}$$

where: N = sample size

y = observed values

Sy = standard deviation of the observed values

Kurtosis is a measure of the peakedness of the distribution. It is intended to describe the scatter of observations close to the central value versus those at the ends of the distribution. The estimated kurtosis of a normal distribution is 3. More peaked distributions have values greater than 3, while flatter distributions have values less than 3. Kurtosis is computed as follows:

$$K = \frac{N^3 * \Sigma y^4 - 4 * N^2 * \Sigma y \Sigma y^3 + 6 * N * (\Sigma y)^2 * \Sigma y^2 - 3 * (\Sigma y)^4}{N * (N - 1) * (N - 2) * (N - 3) * S_y^4}$$

where: N, y, and S_y are described above.

Kolmogorov-Smirnov One-Sample Test

The Kolmogorov-Smirnov test is used to test the supposition that a set of observed data is drawn from an hypothesized distribution, e.g., normal, binomial, poisson, etc. To test for a normal distribution, the following procedure is employed:

--Obtain the test statistic D:

$$D = \sup|S(x) - F_o(x)|$$

where for each x:

$$S(x) = \frac{\text{number of sample observations less than or equal to } x}{N}$$

$$F_o(x) = P(0 \leq Z \leq z)$$

where: $z = (x - \bar{x})/\sigma$

$\bar{x}$ = sample mean

σ = standard deviation of the observed values

N = sample size

(Note: z may be interpreted as the standard normal variate variable for a given observed value x. $P(0 \leq Z \leq z)$ is the area under the normal curve between 0 and z.)

Reject the hypothesis that the data are drawn from a normal distribution at a given significance level, alpha (α), if D exceeds the $1 - \alpha$ quantile given in the table of "Quantiles of the Kolmogorov-test statistic" (Daniel, 1978). If D does not exceed the $1 - \alpha$ quantile, accept the hypothesis.

A similar procedure may be used to test other hypothesized distributions.

CAUTION: The value obtained by computing $|S(x_i) - F_o(x_i)|$ may not be the largest vertical distance between $S(x_i)$ and $F_o(x_i)$, i.e., this may not occur at an observed value of x. It has been shown that

Kolmogorov-Smirnov One-Sample Test (continued)

$\sup|S(x_{i-1}) - F_o(x_i)|$ for all x must also be considered in the determination of D. ($S(x_{i-1})$ numerically precedes $S(x_i)$.)

Log-Pearson Type III Distribution

This probability analysis method involves transforming flow values to logarithmic values (base 10), and computing the mean, standard deviation and skew coefficient used to index a table of Skew Curve Factors, which was taken from the Water Resources Council Bulletin No. 15 (1967). The equations used are:

$$\gamma = \frac{n^2 \Sigma x^3 - 3n \Sigma x \Sigma x^2 + 2(\Sigma x)^3}{n(n-1)(n-2)\sigma^3}$$

$$X_T = \log^{-1} (\bar{x} + K_T T)$$

where: x = log transformed flow value

σ = standard deviation

γ = coefficient of skewness

X_T = flow magnitude for recurrence interval T

K = Skew Curve Factor for a given γ and recurrence interval T

Gumbel Distribution

Gumbel's method employs the Fisher-Tippett Extreme Value Type I distribution function. In this technique, recurrence intervals are computed using the equation:

$$X_T = \bar{x} - 0.45005\sigma - 0.7797\sigma \ln(\ln(T/T-1))$$

where: X_T = flow magnitude for recurrence interval T

$\bar{x}$ = mean flow value

T = recurrence interval

σ = standard deviation of flow values

Hazen Distribution

Hazen's method for estimating flood flows computes the skew coefficient using the equation:

$$\gamma = \frac{\Sigma\ (x - \bar{x})3}{(n - 1)\ \sigma^3}$$

where: γ = skew coefficient

x = flow values

$\bar{x}$ = mean flow value

n = number of years of data

σ = standard deviation

This value is then adjusted by the factor (1 + (8.5/n)).

This corrected value is then used to index a table of frequency factor values, and the magnitude is calculated by:

$$X_T = \bar{x} + \sigma\ K_T$$

where: X_T = flow magnitude for recurrence interval T

K_T = frequency factor

LOAD

The load modeling program operates with a number of assumptions. The first is that a correlation exists between a constituent concentration and instantaneous streamflow. The assumption has been examined and found to be an accurate one for total dissolved solids (Steele, 1973; DeLong, 1977). This dilution model approach assumes that streamflow, Q, and constituent concentration, C, are related by the equation:

$$c = a_o \cdot Q^b$$

or its equivalent form:

$$\log C = a_1 + b \log Q$$

where: a_o, a_1 and b are regression parameters, and $a_1 = \log a_o$.

A further assumption made in this program is there exists a correlation between instantaneous streamflow and mean daily streamflow. This assumption is valid for large perennial streams, those which are not affected by short-term flow changes, such as flash floods. Ephemeral streams, which usually are characterized by highly variable flow rates during the day would not meet this assumption. The LOAD program produces a regression equation using constituent concentration and mean daily streamflow as the dependent and independent variables, respectively. This correlation only exists at sites where the flow rate is relatively constant over a particular day.

The regression is done using the subroutines described elsewhere in this publication. The derived equation is then applied in the load

LOAD (continued)

model to calculate daily load values from the mean daily streamflow values. The equation is

$$L = 0.002696 \cdot a_o \, Q^{b+1}$$

Flows are then cumulated into monthly values and printed as total loads and as mean concentrations.

12. REFERENCES

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13. USER CHARGES

Charges are made on a request basis. A request may consist of any number of analyses and/or retrievals. For programs already written, the charges consist of the setup fee and the cost of the individual retrievals and analyses. For writing new programs, we will give you a cost estimate based on expected programming time. All programming is done on a contract basis.

The setup charge reflects our average costs to process requests. The program charges reflect computer execution time. Development costs are not included in these prices. These charges are subject to change to reflect changes in our processing and computer costs.

Job Setup - printed output - regardless of the number of retrievals or analyses	$30.00
Job Setup - tape output - regardless of the amount of data retrieved	$50.00
Tapes if we supply and take responsibility	$25.00

Surface Water Programs

DATESW	per station	.05
DAYAVE	per station	.50
DURCUR	per station	.50
	per plot	1.50
FLOW	per analysis	.50
	per plot	1.50
LISTDATASW	per year of daily data	.05
	per month of monthly data	.05
	per peak-station	.05
EXTREMESW	per year	.10
REGRESSW	per analysis	.50
	per plot	1.50
PLOTSWL	per plot	4.00
PLOTSWT	per year	.50

Water Quality Programs

ANCAT	per analysis	.05
DATEWQ	per station	.05
LOAD	per analysis	1.00
	per plot	1.50
LPARAM	per request	1.00
LISTDATAWQ	per grab sample	.05
	per year of daily samples	.05
PLOTWQL	per plot	4.00
PLOTWQT	per year	.50
REGRESWQ	per analysis	.50
	per plot	1.50

Well Level Programs

DATEWL	per station	.05
LISTDATAWL	per grab sample	.05
	per year of daily samples	.05
PLOTWLL	per plot	4.00
PLOTWLT	per year	.50

Climatic Programs

DAILY	per year	.10
DATECL	per station	.05
EXTREME	per year	.10
	per plot	1.50
LISTDATACL	per year of daily data	.05
	per month of 1,3 or 6 hr data	.05
MONTHLY	per year	.10
PLOTCLL	per plot	4.00
STORM	per month	.10
WINDROSE	per plot (and tables)	2.00
WINTER	per station	1.00

Snow Course Programs

DATESC	per station	.05
LISTDATASC	per station	.05

Tape Output

TAPE	per record	.05

Example

Assume that a user is interested in surface water quality and quantity data for an area. There are 10 streamflow stations with 20 years each of data, and 25 water quality stations in the area with 15 grab samples each. If the user requested a LISTDATA for each station, a PLOTWQL for the area, and EXTREMESW for each streamflow station, the cost would be:

Job Setup	$30.00
LISTDATASW - 200 years @ $.05/yr	10.00
LISTDATAWQ - 375 grab samples @ $.05/sample	18.75
PLOTWQL - 1 plot @ $4/plot	4.00
EXTREMESW - 200 years @ $.10/yr	20.00
Total	$82.75

WRDS BULLETIN NO. 1
March, 1986

TO: WRDS Users

SUBJECTS: Updates for Surface Water, Snow Course and Climate Databases; Changes in WRDS Billing Schedule

The Surface Water database has been updated with USGS historical daily and peak data for water years 1982, 1983 and 1984. All new data has been verified with USGS publications. The latitude boundary for the Surface Water database has been extended from 45 degrees, 25 minutes to 45 degrees, 45 minutes into Montana. Period of record data for the extended area, which includes 38 new stations, have been added and are now available to users.

The Snow Course database is currently in the process of being updated with 1984 data from the Soil Conservation Service. This data will be available to users during the second quarter of 1986.

Preparations are now underway to begin the Climate database update with hourly precipitation data for 1979 to October, 1985 and daily data for 1983 to November, 1985 with data from the National Oceanographic and Atmospheric Administration. This data will be available to users during the second quarter of 1986.

In addition, WRDS is now providing data entry and custom programming on a limited basis to state agencies.

The WRDS billing schedule has recently been reorganized. Request charges will now be computed from actual computer costs incurred while processing each individual request rather than on a retrieved output basis. We feel that this new schedule will be more equitable to users and will result in a dramatic reduction in request costs by as much as 50 percent in most cases. Personnel charges and cost of materials will remain the same. Overhead for in-state requests will be 20 percent with the overhead for out-of-state requests at 39 percent. The new billing schedule will go into effect immediately.

PLEASE INSERT THIS MEMO IN THE BACK OF YOUR USER'S GUIDE