

COAL RUN - STATION 13

## COAL RUN - STATION 13

Description

Coal Run was sampled near its confluence with the Casselman since March 1972, with a large gap in flow measurements from early 1976 until 1982. There are a total of 65 observations (see data file). During high flows it is the largest source of AMD to the Casselman, but during low flows it ranks second to Shaw Mines Run.

The complete statistical descriptions of acidity, iron and sulfate concentrations, loads and log-transformed loads were developed with program BMDP-2D, including histogram (see "Descriptive BMDP-2D"). Concentrations are named: "ACID," "TOTFE," and "SULF," with corresponding loads called: "ACIDL," "TOTFEL," and "SULFL." Log-transformed loads are: "LACID," "LTOTFE," and "LSULF."

DATE	SHAW MINES COMPLEX		PH	ACIDITY	ACID LOAD	ALKALINITY	STATION 13		MEISER & EARL HYDROGEOLOGISTS		GAL DEVICE	
	AL	MN					IRON	TOTAL IRON LOAD	FERRUSSULFATE	SULFATE LOAD		MILLION GAL/DAY
3/3/72	-1.00	-1.00	2.60	554.	-1.00	0.0	315.00	-1.00	900.	-1.00	-1.00	-1.00
4/11/72	-1.00	-1.00	3.10	546.	-1.00	0.0	200.00	-1.00	1130.	-1.00	-1.00	-1.00
5/26/72	-1.00	-1.00	2.80	628.	1308.33	0.0	125.00	260.42	700.	1458.33	0.25	173.61
6/30/72	-1.00	-1.00	3.10	389.	3241.67	0.0	63.00	525.00	880.	7333.33	1.00	694.44
7/28/72	-1.00	-1.00	3.50	846.	280.57	0.0	350.00	110.83	2550.	807.50	0.04	26.39
8/31/72	-1.00	-1.00	3.70	760.	848.67	0.0	173.00	193.18	930.	1038.50	0.13	93.06
9/28/72	-1.00	-1.00	3.50	180.	837.50	0.0	168.00	187.60	4250.	4745.83	0.13	93.06
11/3/72	-1.00	-1.00	3.50	180.	-1.00	0.0	96.00	-1.00	830.	-1.00	-1.00	-1.00
11/22/72	-1.00	-1.00	2.90	830.	27666.65	0.0	153.00	5100.00	900.	29999.98	4.00	2777.78
1/22/73	-1.00	-1.00	2.80	490.	7268.33	0.0	76.00	1127.33	860.	12756.66	1.78	1236.11
2/28/73	-1.00	-1.00	2.70	500.	12666.66	0.0	85.00	2153.33	1400.	35466.64	3.04	2111.11
3/29/73	-1.00	-1.00	2.70	730.	8577.49	0.0	90.00	1057.50	1100.	12924.99	1.41	979.17
5/1/73	-1.00	-1.00	2.70	550.	23099.98	0.0	100.00	4200.00	910.	38249.97	5.04	3500.00
10/15/74	-1.00	-1.00	2.80	800.	2673.33	0.0	98.40	328.82	2225.	7435.20	0.40	278.47
10/31/74	-1.00	-1.00	2.70	900.	2662.42	0.0	85.00	251.45	1900.	5620.65	0.35	246.52
11/14/74	-1.00	-1.00	3.00	900.	4093.20	0.0	58.70	266.97	1700.	7731.59	0.55	379.00
11/26/74	-1.00	-1.00	2.90	460.	3140.88	0.0	48.00	327.74	1025.	6998.70	0.82	569.00
12/11/74	-1.00	-1.00	3.20	180.	2624.40	0.0	29.00	422.82	875.	12757.50	1.75	1215.00
1/17/75	-1.00	-1.00	2.90	1400.	51379.97	0.0	85.70	3145.19	1475.	54132.47	4.40	3058.33
2/7/75	-1.00	-1.00	2.90	700.	-1.00	0.0	62.20	-1.00	925.	-1.00	-1.00	-1.00
2/25/75	-1.00	-1.00	2.90	1600.	144959.94	0.0	63.50	5753.10	825.	74744.94	10.87	7550.00
3/18/75	-1.00	-1.00	2.90	800.	-1.00	0.0	52.50	-1.00	1100.	-1.00	-1.00	-1.00
3/31/75	-1.00	-1.00	2.80	1000.	-1.00	0.0	31.30	-1.00	975.	-1.00	-1.00	-1.00
4/18/75	-1.00	-1.00	2.70	600.	14824.79	0.0	101.00	1655.44	1375.	33973.49	2.96	2059.00
6/24/75	-1.00	-1.00	2.80	1450.	23804.15	-1.00	67.00	1658.08	252.	4137.00	1.97	1368.06
11/20/75	-1.00	-1.00	3.80	544.	17149.59	-1.00	83.20	2622.88	650.	20491.23	3.78	2627.08
2/9/76	-1.00	-1.00	2.50	530.	18393.12	-1.00	71.20	2470.92	1425.	49453.19	4.16	2892.00
4/12/76	-1.00	-1.00	2.80	640.	-1.00	-1.00	86.00	-1.00	1125.	-1.00	-1.00	-1.00
6/25/76	-1.00	-1.00	2.40	836.	-1.00	-1.00	106.00	-1.00	1570.	-1.00	-1.00	-1.00
9/24/76	-1.00	-1.00	2.70	984.	-1.00	-1.00	97.50	-1.00	2000.	-1.00	-1.00	-1.00
11/19/76	-1.00	-1.00	2.70	680.	-1.00	-1.00	100.00	-1.00	1450.	-1.00	-1.00	-1.00
4/3/77	-1.00	-1.00	3.00	604.	-1.00	-1.00	87.00	-1.00	900.	-1.00	-1.00	-1.00
5/5/78	-1.00	-1.00	3.00	362.	-1.00	-1.00	58.50	-1.00	717.	-1.00	-1.00	-1.00
8/16/78	-1.00	-1.00	2.78	945.	-1.00	0.0	80.90	-1.00	191.	-1.00	-1.00	-1.00
9/14/78	-1.00	-1.00	2.49	905.	-1.00	0.0	-1.00	-1.00	1386.	-1.00	-1.00	-1.00
3/23/79	-1.00	-1.00	2.66	718.	-1.00	0.0	92.20	-1.00	1395.	-1.00	-1.00	-1.00
4/20/79	-1.00	-1.00	2.68	761.	-1.00	0.0	108.00	-1.00	1051.	-1.00	-1.00	-1.00
5/25/79	-1.00	-1.00	2.62	1010.	-1.00	0.0	152.00	-1.00	1629.	-1.00	-1.00	-1.00
2/27/80	-1.00	-1.00	2.89	546.	-1.00	0.0	85.50	-1.00	859.	-1.00	-1.00	-1.00
3/27/80	-1.00	-1.00	2.93	483.	-1.00	0.0	71.20	-1.00	807.	-1.00	-1.00	-1.00
4/28/80	-1.00	-1.00	2.95	551.	-1.00	0.0	81.90	-1.00	812.	-1.00	-1.00	-1.00
6/18/80	-1.00	-1.00	2.77	448.	-1.00	0.0	73.20	-1.00	901.	-1.00	-1.00	-1.00
6/25/80	-1.00	-1.00	2.79	672.	-1.00	0.0	101.00	-1.00	714.	-1.00	-1.00	-1.00
7/16/80	-1.00	-1.00	2.58	819.	-1.00	0.0	105.00	-1.00	1032.	-1.00	-1.00	-1.00
9/11/80	-1.00	-1.00	2.93	712.	-1.00	0.0	110.00	-1.00	1473.	-1.00	-1.00	-1.00
10/7/80	-1.00	-1.00	2.83	1121.	161.42	0.0	115.00	16.56	1617.	232.85	0.02	12.00
12/3/80	-1.00	-1.00	2.92	1034.	-1.00	0.0	124.50	-1.00	1508.	-1.00	-1.00	-1.00
5/29/81	-1.00	-1.00	3.11	346.	-1.00	0.0	6.30	-1.00	1508.	-1.00	-1.00	-1.00
6/25/81	-1.00	-1.00	2.89	863.	-1.00	0.0	20.80	-1.00	813.	-1.00	-1.00	-1.00
7/22/81	-1.00	-1.00	2.85	601.	-1.00	0.0	11.60	-1.00	1207.	-1.00	-1.00	-1.00
11/13/81	-1.00	-1.00	2.85	770.	-1.00	0.0	27.40	-1.00	1091.	-1.00	-1.00	-1.00
2/16/82	7.39	5.90	2.77	747.	-1.00	0.0	20.00	-1.00	1487.	-1.00	-1.00	-1.00
3/30/82	70.80	9.14	3.25	15766.32	-1.00	0.0	29.40	-1.00	616.	-1.00	-1.00	-1.00
4/20/82	69.40	9.47	2.04	19293.11	-1.00	0.0	18.60	-1.00	381.	-1.00	-1.00	-1.00
				714.	8560.00	0.0	41.10	-1.00	961.	-1.00	-1.00	-1.00
							85.20	-1.00	1052.	-1.00	-1.00	-1.00
							1022.40	-1.00	12624.00	-1.00	-1.00	-1.00
							1638.29	-1.00	33558.47	-1.00	-1.00	-1.00
							1144.22	-1.00	26754.22	-1.00	-1.00	-1.00
							33.30	-1.00	961.	-1.00	-1.00	-1.00
							54.60	-1.00	1052.	-1.00	-1.00	-1.00
							1022.40	-1.00	12624.00	-1.00	-1.00	-1.00
							1638.29	-1.00	33558.47	-1.00	-1.00	-1.00
							1144.22	-1.00	26754.22	-1.00	-1.00	-1.00
							33.30	-1.00	961.	-1.00	-1.00	-1.00
							85.20	-1.00	1052.	-1.00	-1.00	-1.00
							1022.40	-1.00	12624.00	-1.00	-1.00	-1.00
							1638.29	-1.00	33558.47	-1.00	-1.00	-1.00
							1144.22	-1.00	26754.22	-1.00	-1.00	-1.00
							33.30	-1.00	961.	-1.00	-1.00	-1.00
							54.60	-1.00	1052.	-1.00	-1.00	-1.00
							1022.40	-1.00	12624.00	-1.00	-1.00	-1.00

DATE	SHAW MINES COMPLEX		STATION 13		ACID ALKALINITY		PH		MEISER & EARL HYDROGEOLOGISTS		GAL DEVICE	
	AL	HN	IRON	TOTAL	LOAD	ALKALINITY	ACIDITY	PH	FERROUS	SULFATE		WILLION GAL/DAY
5/19/82	52.80	16.68	98.70	473.76	46.08	0.0	10.	2.77	14.20	1224.	0.58	409.00
6/16/82	31.00	9.58	68.70	1236.60	18089.98	0.0	1005.	2.96	7.70	880.	2.16	1500.00
7/20/82	46.70	15.20	94.00	527.79	4317.78	0.0	769.	2.75	5.80	1461.	0.68	467.90
8/25/82	30.20	10.70	56.40	554.98	3886.80	0.0	395.	2.96	5.00	8203.22	1.18	820.00
9/13/82	88.80	20.40	126.00	341.71	2505.89	0.0	924.	2.67	1.00	10715.76	0.33	226.00
10/12/82	50.40	24.05	-1.00	-1.00	1867.20	0.0	778.	2.77	-1.00	1626.	0.29	200.00
11/16/82	51.30	10.70	75.00	216.00	1805.76	0.0	627.	3.03	6.50	3952.80	0.35	240.00***
12/14/82	30.40	16.70	52.00	67.39	637.63	0.0	492.	3.08	16.00	4227.84	0.16	108.00
2/ 4/83	-1.00	-1.00	38.00	-1.00	-1.00	0.0	221.	3.23	12.90	1774.22	-1.00	-1.00
3/ 4/83	-1.00	-1.00	61.80	-1.00	-1.00	0.0	420.	2.83	12.00	764.	-1.00	-1.00

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 \* ACJD \*  
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VARIABLE NUMBER . . . . . 6  
 NUMBER OF DISTINCT VALUES . . . . . 61  
 NUMBER OF VALUES COUNTED . . . . . 65  
 NUMBER OF VALUES NOT COUNTED . . . . . 0

MAXIMUM 1600.0000000  
 MINIMUM 179.0000000  
 RANGE 1421.0000000  
 VARIANCE 78487.5000000  
 ST. DEV. 280.1562500  
 (Q3-Q1)/2 159.5000000  
 MX. ST. SC. 3.19  
 MN. ST. SC. -1.89

LOCATION ESTIMATES  
 MEAN 707.5690918  
 MEDIAN 712.0000000  
 MODE NOT UNIQUE

ST. ERROR 34.7490997  
 38.6824799

EACH 'H' REPRESENTS 2  
 COUNT(S)

```

HHHHH
HHHHH
H
H
HH
-----U
  
```

EACH 'L' ABOVE = 100.0000  
 L= 0.0  
 U= 1800.0000  
 CASE NO. OF MIN. VAL. = 53  
 CASE NO. OF MAX. VAL. = 21

SOME NEW LOCATION ESTIMATES  
 HAMPSEL 691.6907790  
 TRIM (.15) 695.8241758  
 BIWEIGHT 683.2397461

Q1= 544.0000000  
 Q3= 863.0000000  
 S-= 427.4128418  
 S+= 987.7253418

VALUE VALUE/S.E.  
 0.63 2.07  
 1.05 1.74

EACH 'S' BELOW = 15.0000

```

M S Q S S
I.....AF.....M H M S +
N.....HAD PNI
  
```

DEPTH	STEM	* LEAVES
3	1	* 788
4	2	* 2
8	3	* 4689
14	4	E 246899
22	5	O 03444555
31	6	* J00224789
+ 12	7	M 011134566677
22	8	Q 0113368
15	9	E 0002468
8	10	* 0113
4	11	* 2
3	12	*
3	13	*
3	14	* 05
1	15	*
1	16	* 0

DEPTH STEM \* LEAVES

MINIMUM = 179.00000  
 MAXIMUM = 1600.00000

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\*\*\*\*\*  
 \* TOTPE \*  
 \*\*\*\*\*

VARIABLE NUMBER . . . . . 9  
 NUMBER OF DISTINCT VALUES . . . . . 58  
 NUMBER OF VALUES COUNTED . . . . . 63  
 NUMBER OF VALUES NOT COUNTED 2

MAXIMUM 350.0000000  
 MINIMUM 18.5999908  
 RANGE 331.3999023  
 VARIANCE 3084.3652344  
 ST. DEV. 55.5370636  
 (Q3-Q1)/2 20.0000000  
 MX. ST. SC. 4.60  
 MN. ST. SC. -1.36

LOCATION ESTIMATES

MEAN 94.3237762 ST. ERROR 6.9970121  
 MEDIAN 85.5000000  
 MODE NOT UNIQUE

EACH 'H'  
 REPRESENTS  
 2  
 COUNT(S)

```

H
H
H
H
HH
HH
HHHH
HHHHHH
HHHHHHH
L-----H H
  
```

EACH 'L' ABOVE = 20.0000  
 L = 20.0000  
 U = 380.0000  
 CASE NO. OF MIN. VAL. = 53  
 CASE NO. OF MAX. VAL. = 5

SOME NEW LOCATION ESTIMATES

HAMPEL 82.8236825  
 TRIM (.15) 85.0436495  
 BLUEIGHT 81.9438782

Q1 = 63.0000000  
 Q3 = 103.0000000  
 S = 38.7867126  
 S+ = 149.8608398

SKFNESS 2.58  
 KURTOSIS 8.65

VALUE 2.58  
 VALUE/S.E. 8.37  
 14.02

EACH 'S' BELOW = 3.0000

```

M S Q BHM M S
I.....TAE..P.....H
N TPI N
  
```

DEPTH STEP \* LEAVES

```

1 0 * 1
4 * 233
13 F 445555555
25 0 66666677777
+ 19 H 888888888899999
20 1 0 000000011
10 E 222
7 * 55
5 * 67
3 * 0
2 *
2 *
2 *
2 *
2 *
1 * 1
1 * 5
0 *
0 *
  
```

DEPTH STEP \* LEAVES

MINIM 18.59999  
MAXIMI 350.00000  
COUNT = 63

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\* SULP \*  
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VARIABLE NUMBER . . . . . 12  
NUMBER OF DISTINCT VALUES . . 61  
NUMBER OF VALUES COUNTED. . . 65  
NUMBER OF VALUES NOT COUNTED . 0

MAXIMUM 4250.0000000  
MINIMUM 252.0000000  
RANGE 3998.0000000  
VARIANCE 323687.3750000  
ST. DEV. 568.9353027  
(03-01)/2 293.0000000  
MX. ST. SC. 5.36  
MN. ST. SC. -1.67

LOCATION ESTIMATES  
MEAN 1200.2153320  
MEDIAN 1089.0000000  
MODE 900.0000000

ST. EPROR 70.5677338  
79.9630432

SOME NEW LOCATION ESTIMATES  
HAMPEL 1121.0051879  
TRIM (.15) 1125.2967033  
BIVEIGHT 1114.5541992

DEPTH STEM \* LEAVES  
2 0 \* 23  
+ 25 0 66677778888888899999999  
12 E 556666679  
4 2 \* 02  
2 \* 5  
1 3 \*\*  
1 \*  
1 4 \* 2  
0 \*

DEPTH STEM \* LEAVES  
MINIMUM = 252.00000  
MAXIMUM = 4250.00000  
COUNT = 65

H H H H H H H H H H H H H H H H H  
EACH 'H' REPRESENTS 2  
COUNT(S) H  
L-----U

EACH 'A' ABOVE = 250.0000  
L = 0.0  
CASE NO. OF MIN. VAL. = 25  
CASE NO. OF MAX. VAL. = 7

VALUE VALUE/S.E.  
2.54 8.36  
10.78 17.74  
Q1= 875.0000000  
Q3= 1461.0000000  
S-= 631.2800293  
St= 1769.1506348

EACH 'S' BELOW = 50.0000

M S O H M H M S  
I.....O...EAP.....  
N D DMA  
E IPN

M  
A  
X



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*****
* ACIDL  *
*****
VARIABLE NUMBER . . . . . 7
NUMBER OF DISTINCT VALUES . 33
NUMBER OF VALUES COUNTED. . 33
NUMBER OF VALUES NOT COUNTED 32

LOCATION ESTIMATES
MEAN          13727.0703125
MEDIAN        4318.6992188
MODE          NOT UNIQUE

ST. ERROR
              4521.6679688
              2885.9406739
    
```

```

H H H H H H H
REPRESENTS COUNT(S)
          3
EACH 'H'
          H
          H
          H
          H
          H
    
```

```

EACH . . . ABOVE = 10000.0000
L=          0.0
H=          180000.0000
CASE NO. OF MIN. VAL. = 46
CASE NO. OF MAX. VAL. = 21
    
```

SOME NEW LOCATION ESTIMATES  
 HAMPEL 5789.1414702  
 TRIM(.15) 7814.9076810  
 BIWRIGHT 7444.0039063

```

VALUE      VALUE/S.E.
3.96      9.29
16.90     19.82

SKEWNESS
KURTOSIS

Q1= 2505.8886719
Q3=17149.0468750
S-=====
S+=39702.0976563
    
```

EACH . . . BELOW = 1500.0000

..... N M S +  
 ..... I.. P.. E...  
 ..... N DM A  
 ..... IPM N

DEPTH	STEM	* LEAVES
+	21	0 M 00000111222233344788
	12	1 Q 2457889
	5	2 E 337
	2	3 *
	2	4 *
	2	5 * 1
	1	6 *
	1	7 *
	1	8 *
	1	9 *
	1	10 *
	1	11 *
	1	12 *
	1	13 *
	1	14 * 5

MINIMUM = 161.42000  
 MAXIMUM = 144959.93750  
 COUNT = 33

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 \* TOTPEL \*  
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VARIABLE NUMBER . . . . . 10  
 NUMBER OF DISTINCT VALUES . . . . . 32  
 NUMBER OF VALUES COUNTED . . . . . 32  
 NUMBER OF VALUES NOT COUNTED . . . . . 33

MAXIMUM 5798.3984375  
 MINIMUM 16.5599976  
 RANGE 5781.8359375  
 VARIANCE 2205955.0000000  
 ST. DEV. 1485.2460938  
 (Q3-Q1)/2 696.0300293  
 MX.ST.SC. 3.04  
 MN.ST.SC. -0.85

LOCATION ESTIMATES

MEAN 1284.3376465  
 MEDIAN 541.4399414  
 MODE NOT UNIQUE

ST. ERROR 262.5566406  
 231.6647949

SOME NEW LOCATION ESTIMATES

HAMPEL 734.1325688  
 TRIM (.15) 902.4955378  
 BIWEIGHT 727.5090332

S - H Q 1 H H T M Q  
 . . . . . I . . . . . E . . . . . R . . . . . E . . . . .  
 N . . . . . D M I A . . . . .  
 I P M N

DEPTH STEM \* LEAVES

+ 17 0 M 001122233344555  
 15 1 Q 00112666  
 7 2 \* 146  
 4 3 E 1  
 3 4 \* 2  
 2 5 \* 1R

DEPTH STEM \* LEAVES

MINIMUM = 16.56000  
 MAXIMUM = 5798.39844  
 COUNT = 32

EACH 'H' REPRESENTS 2  
 COUNT (S)

HHHH  
 HHHHHH H HH  
 L-----H

EACH ' ' ABOVE = 500.0000  
 L = 0.0  
 U = 9000.0000  
 CASE NO. OF MIN. VAL. = 46  
 CASE NO. OF MAX. VAL. = 21

VALUE 1.58 VALUE/S.E. 3.66  
 1.73 1.99  
 SKEWNESS  
 KURTOSIS

EACH ' ' BELOW = 50.0000

Q1= 264.6647949  
 Q3= 1656.7248535  
 S- = -200.9084473  
 S+ = 2769.5837402

.....A  
 .....M  
 .....X

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\* SU.FI. \*  
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VARIABLE NUMBER . . . . . 13  
NUMBER OF DISTINCT VALUES . . . . . 33  
NUMBER OF VALUES COUNTED . . . . . 33  
NUMBER OF VALUES NOT COUNTED . . . . . 32

MAXIMUM 74744.9375000  
MINIMUM 232.8499908  
RANGE 74512.0625000  
VARIANCE \*\*\*\*\*  
ST. DEV. 17928.9335938  
(Q3-Q1)/2 11172.2539063  
MX.ST.SC. 3.24  
MN.ST.SC. -0.92

LOCATION ESTIMATES

MEAN 16677.5273438 ST. ERROR 3121.0263672  
MEDIAN 8204.9687500  
MODE NOT UNIQUE 2034.4670410

SOME NEW LOCATION ESTIMATES

HAMPEL 8377.4667230  
TRIM(.15) 12766.6302929  
BIWEIGHT 7858.0390625

S Q 1 MH T M S  
- M 1 MH T M S  
..J.....EA.....R.....P.....  
N I A  
IP M N

\* STEM \* LEAVES

\* 17 0 M 00111444445577778  
16 1 \* 022225  
10 2 Q 06  
R 3 E 03458  
3 4 \* 9  
2 5 \* 4  
1 6 \*  
1 7 \* 4

DEPTH STEM \* LEAVES

MINIMUM = 232.84999  
MAXIMUM = 74744.93750  
COUNT = 33

EACH 'H'  
REPRESENTS  
COUNT(S)  
H H H  
HH HH  
HHHH HH H  
L-----H

EACH 'L' ABOVE = 5000.0000  
L= 0.0  
U= 90000.0000  
CASE NO. OF MIN. VAL. = 46  
CASE NO. OF MAX. VAL. = 21

VALUE VALUE/S.E.  
1.46 3.43  
1.55 1.82  
SKEWNESS  
KURTOSIS

EACH 'I' BELOW = 750.0000

.....A  
.....X

PAGE 8 RMDP2D STATION 13 DESCRIPTIVE STATISTICS

\*\*\*\*\*  
\* LACID \*  
\*\*\*\*\*

VARIABLE NUMBR . . . . . 16  
NUMBER OF DISTINCT VALUES . . . 33  
NUMBER OF VALUES COUNTED. . . 33  
NUMBER OF VALUES NOT COUNTED 32

MAXIMUM 5.1612482  
MINIMUM 2.2079573  
RANGE 2.9532909  
VARIANCE 0.4243594  
ST.DEV. 0.6514288  
(Q3-Q1)/2 0.4176393  
MX.ST.SC. 2.23  
MN.ST.SC. -2.31

LOCATION ESTIMATES

MEAN 3.7097931  
MEDIAN 3.6353531  
MODE NOT UNIQUE

ST.ERROR 0.1133991  
0.1952377

SOME NEW LOCATION ESTIMATES

HAMPEL 3.7220448  
TRIM (.15) 3.7414913  
BLWRIGHT 3.7244558

M I N  
S - Q 1  
M HT  
E. ER.  
D AI  
I NM

DEPTH STEM \* LEAVES

2 \* 24  
5 E 899  
12 3 Q 1224444  
+ 9 M 555666899  
12 4 Q 1122222334  
2 \* 7  
1 5 \* 1  
0 \* \*

DEPTH STEM \* LEAVES

MINIMUM = 2.20796  
MAXIMUM = 5.16125  
COUNT = 33

EACH 'H'  
REPRESENTS  
COUNT(S)  
1

H H H H H  
H H H H H  
H H H H H  
H H H H H H H H H H H  
H H H H H H H H H H H

L-----H

EACH 'L' ABOVE = 0.2000  
L= 2.0000  
U= 5.6000  
CASE NO. OF MIN. VAL. = 46  
CASE NO. OF MAX. VAL. = 21

VALUE VALUE/S.E.  
-0.18 -0.42  
-0.32 -0.37  
SKEWNESS  
KURTOSIS

Q1= 3.3989620  
Q3= 4.2342405  
S= 3.0583639  
S+= 4.3612213

EACH 'S' BELOW = 0.0250

Q 3 +  
M HT  
E. ER.  
D AI  
I NM

M I N  
S - Q 1  
M HT  
E. ER.  
D AI  
I NM

DEPTH STEM \* LEAVES

2 \* 24  
5 E 899  
12 3 Q 1224444  
+ 9 M 555666899  
12 4 Q 1122222334  
2 \* 7  
1 5 \* 1  
0 \* \*

DEPTH STEM \* LEAVES

MINIMUM = 2.20796  
MAXIMUM = 5.16125  
COUNT = 33



\*\*\*\*\*  
 \* T.TOTPE \*  
 \*\*\*\*\*

VARIABLE NUMBER . . . . . 18  
 NUMBER OF DISTINCT VALUES . . . . . 32  
 NUMBER OF VALUES COUNTED . . . . . 32  
 NUMBER OF VALUES NOT COUNTED . . . . . 33

LOCATION ESTIMATES

MEAN 2.8094330  
 MEDIAN 2.7334137  
 MODE NOT UNIQUE

ST. ERROR

0.1018267  
 0.1515120

MAXIMUM 3.7633085  
 MINIMUM 1.2190599  
 RANGE 2.5442486  
 VARIANCE 0.3317981  
 ST.DEV. 0.5760192  
 (Q3-Q1)/2 0.3982978  
 MX.ST.SC. 1.66  
 MN.ST.SC. -2.76

EACH 'H'  
 REPRESENTS  
 COUNT(S)

1  
 H H H H H H H H H H H H H H H H  
 H H H H H H H H H H H H H H H H  
 H H H H H H H H H H H H H H H H  
 L-----U

EACH 'L' ABOVE = 0.1500  
 L= 1.2000  
 U= 3.9000

CASE NO. OF MIN. VAL. = 46  
 CASE NO. OF MAX. VAL. = 21

SOME NEW LOCATION ESTIMATES

HANPEL 2.8391039  
 TRIM (.15) 2.8297837  
 BIWEIGHT 2.8401394

Q1= 2.4226542  
 Q3= 3.2192497  
 S=- 2.2334137  
 S+= 3.3854513

SKEWNESS  
 KURTOSIS

EACH 'I' BELOW = 0.0200

S 0  
 I 1  
 M MTH  
 E. ERA  
 D AIM  
 I NHP

\* DEPTH STEM \* LEAVES

1 \* 2  
 2 \* 8  
 9 2 0 0223444  
 + 8 H 55566777  
 15 3 0 0000222334  
 4 E 5677

DEPTU STEM \* LEAVES

MINIMUM = 1.21906  
 MAXIMUM = 3.76311  
 COUNT = 32

NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 2256  
 CPU TIME USED 0.781 SECONDS

PAGE 9 RNDP2D STATION 13 DESCRIPTIVE STATISTICS

\*\*\*\*\*  
\* I S U L P \*  
\*\*\*\*\*

VARIABLE NUMBER . . . . . 17  
NUMBER OF DISTINCT VALUES . . . . . 33  
NUMBER OF VALUES COUNTED . . . . . 33  
NUMBER OF VALUES NOT COUNTED . . . . . 32

MAXIMUM 4.8735819  
MINIMUM 2.3670759  
RANGE 2.5065060  
VARIANCE 0.3265227  
ST. DEV. 0.5714217  
(Q3-Q1)/2 0.3914914  
MX.ST.SC. 1.63  
MM.ST.SC. -2.76

LOCATION ESTIMATES

MEAN 3.9430170 ST. ERROP 0.0994717  
MEDIAN 3.9140768  
MODE NOT UNIQUE 0.0986232

SOME NEW LOCATION ESTIMATES

HAMPEL 4.0088332  
TRIM (.15) 3.9990773  
BIWEIGHT 3.9938927

EACH 'H' REPRESENTS 1  
COUNT(S)  
HH H H  
HH H H  
HH H H  
H HHH HHH  
H HHH HHHHHHHH  
L-----O

EACH 'L' ABOVE = 0.1500  
L= 2.2500  
U= 4.9500  
CASE NO. OF MIN. VAL. = 46  
CASE NO. OF MAX. VAL. = 21

VALUE VALUE/S.E.  
-0.63 -1.47  
0.10 0.11

O1= 3.6444092  
Q3= 4.4273920  
S- = 3.3715944  
S+ = 4.5144386

EACH 'I' BELOW = 0.0200  
I . . . . . S Q I  
N . . . . . H M TH  
E . . . . . E . E . R . A .  
D . . . . . D A I N  
I . . . . . I N M P

DEPTH STEM \* LEAVES

1  
2 \* 3  
5 \* 9  
+ 12 M 666667788889  
16 4 0 01112344  
7 E 5555678

DEPTH STEM \* LEAVES

MINIMUM = 2.36708  
MAXIMUM = 4.87358  
COUNT = 33

### Graphical Trends of Observations

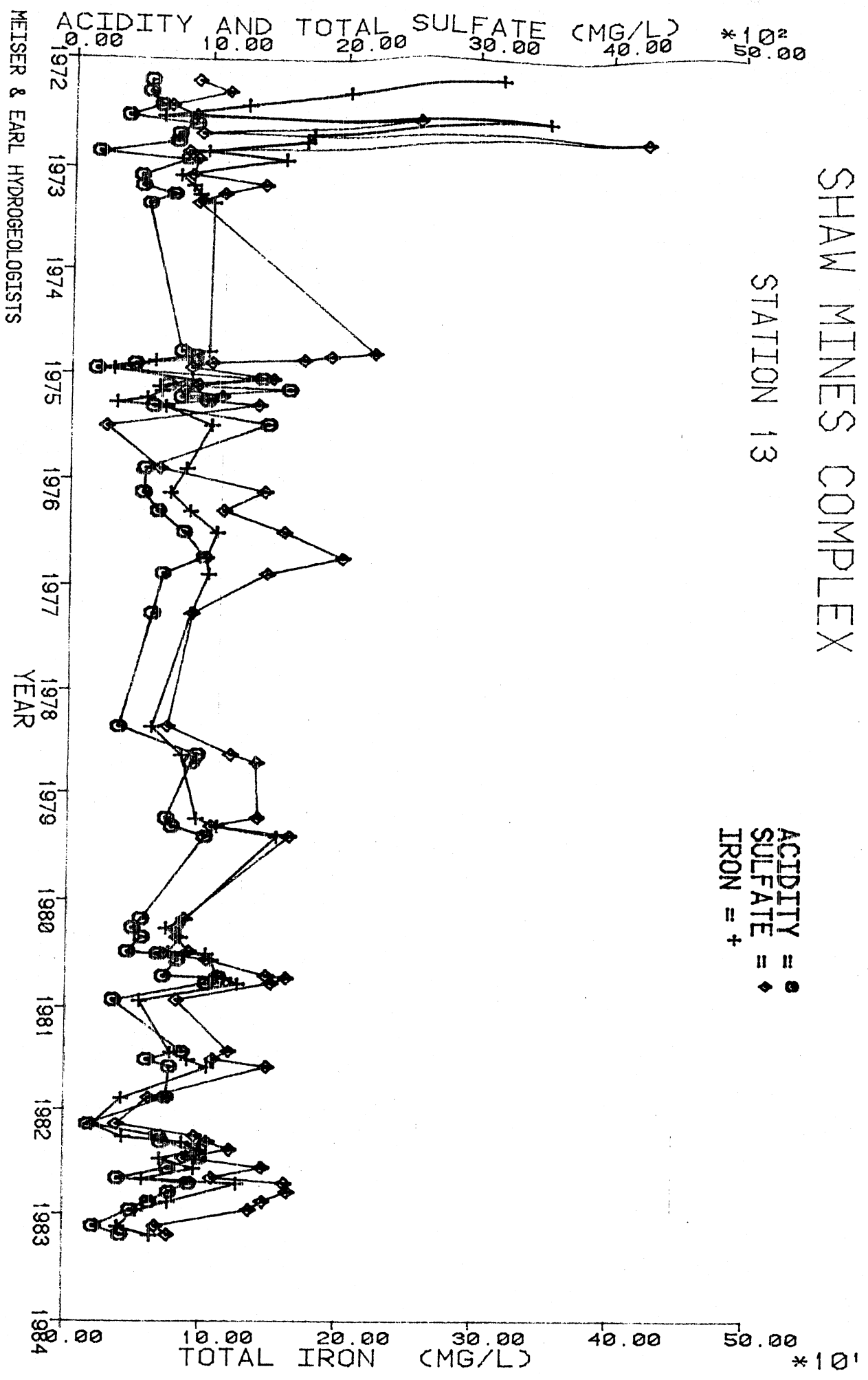
The CalComp plots (three-color) of acidity, iron and sulfate concentrations through time show no obvious trends, except for some higher iron and sulfate concentrations in 1972.

Bivariate scatter plots (BMDP-6D) of the individual log-transformed loads of acid, iron and sulfate ("LACID," "LTOTFE" and "LSULF," respectively) through time all show no change for acid and sulfate loads, and only a slight possible decrease for iron loads, as indicated by the slope of the regression lines. The scatter plot of combined log-transformed loads ("S, F and A diagram") shows no change loads for all three, acid, iron and sulfate.

# SHAW MINES COMPLEX

STATION 13

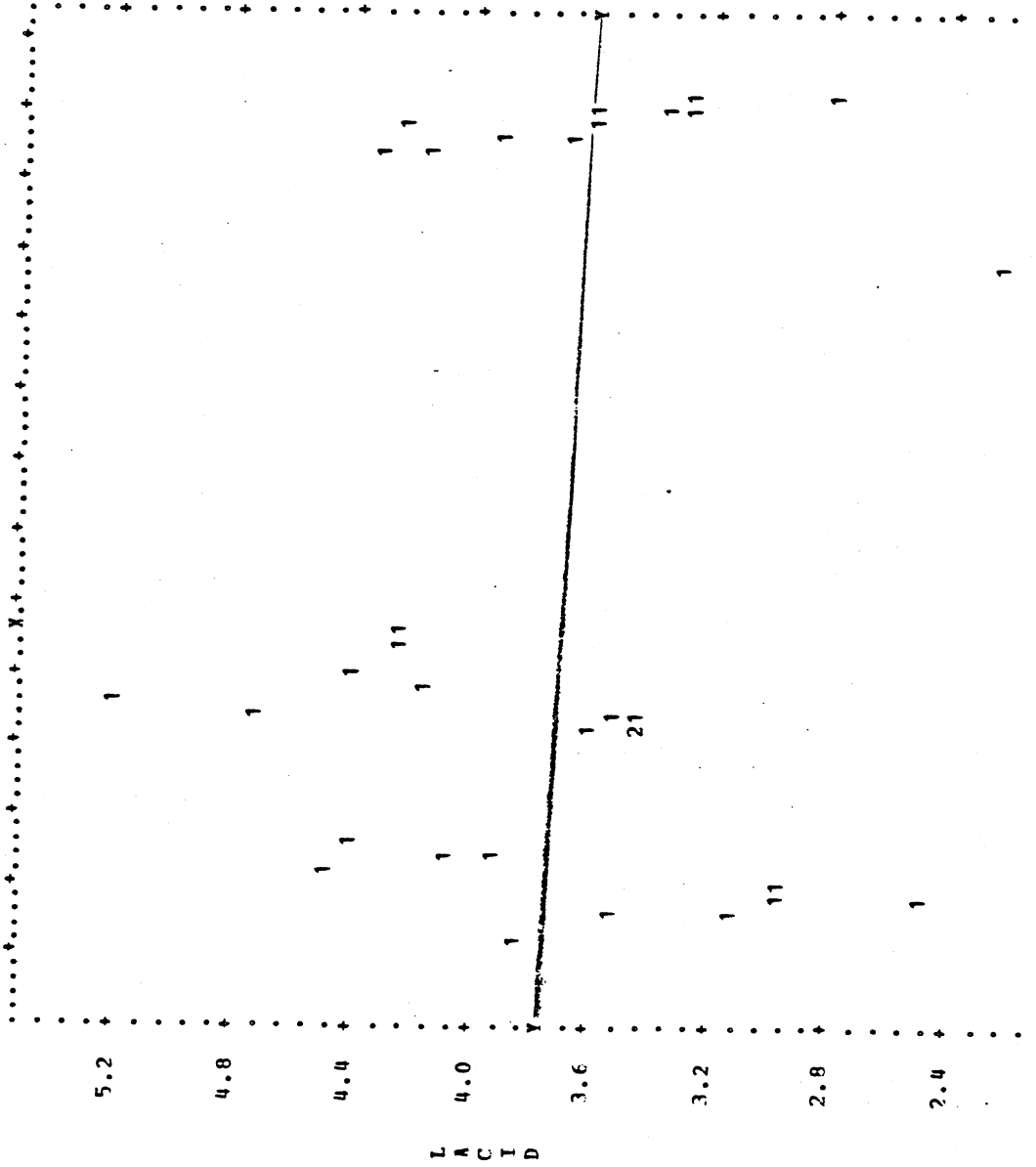
ACIDITY = ●  
 SULFATE = ◆  
 IRON = +



MEISER & EARL HYDROGEOLOGISTS



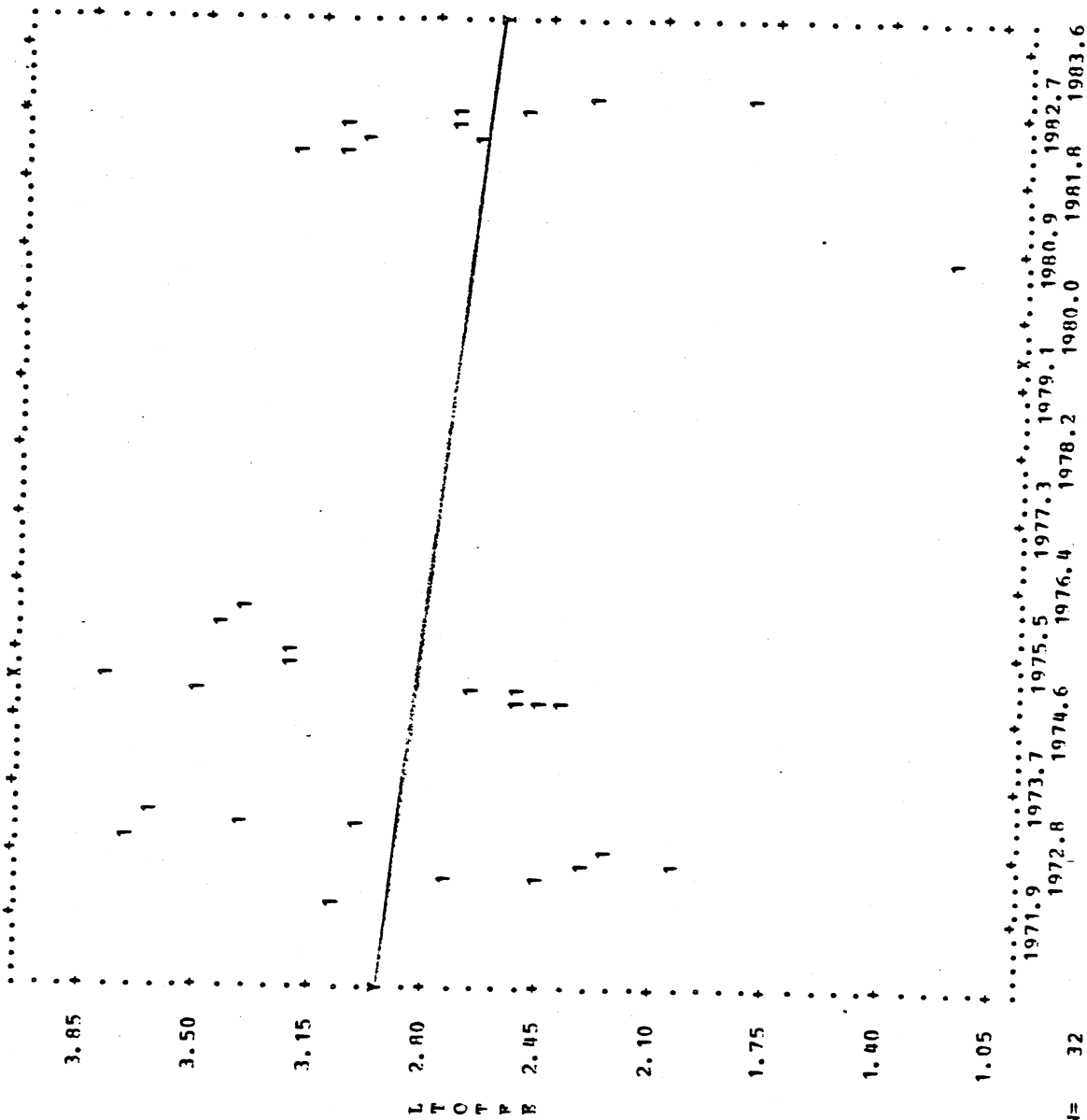
PAGE 5 BNDP6D: STATION 13 DESCRIPTIVE STATISTICS



N= 33  
COR=-.0804

MEAN 1977.1  
ST. DEV. 4.2266  
REGRESSION LINE X=-.52134\*Y+ 20.194  
RES. MS. 18.322  
Y 3.7098  
VARIABLE 4 PVEAR  
VEPVS VARIABLE 16 LACID  
PVEAR

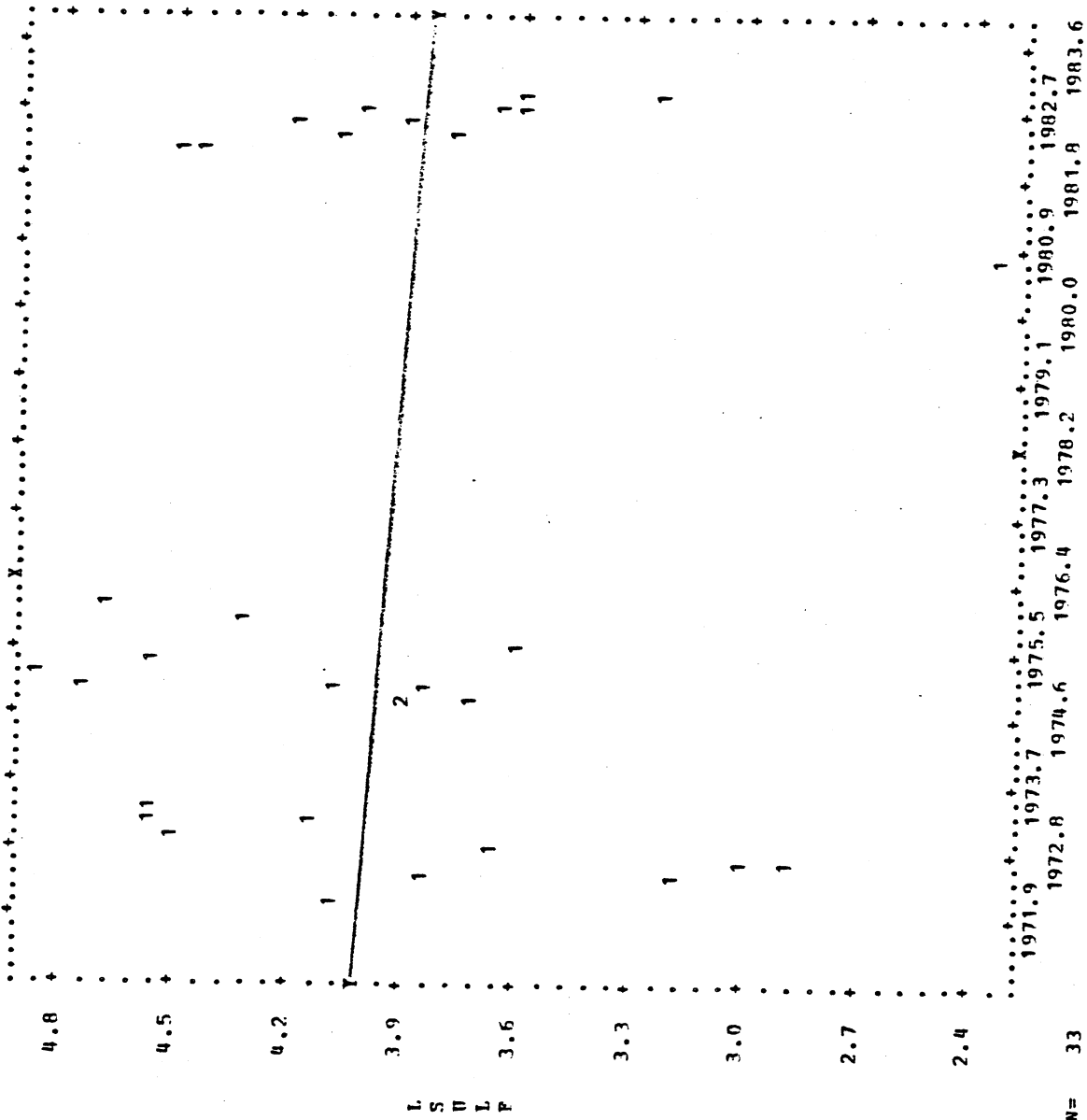
PAGE 6 RMDP6D STATION 13 DESCRIPTIVE STATISTICS



N= 32  
COR=-.1900

MEAN ST.DEV. REGRESSION LINE RES.MS.  
 Y 1976.9 4.1666 X=-1.4036+Y+ 1980.8 17.260  
 Y 2.8904 .57602 Y=-.02683\*X+ 55.841 .32995  
 VARIABLE 4 PYEAR VERSUS VARIABLE 10 LTOTPE

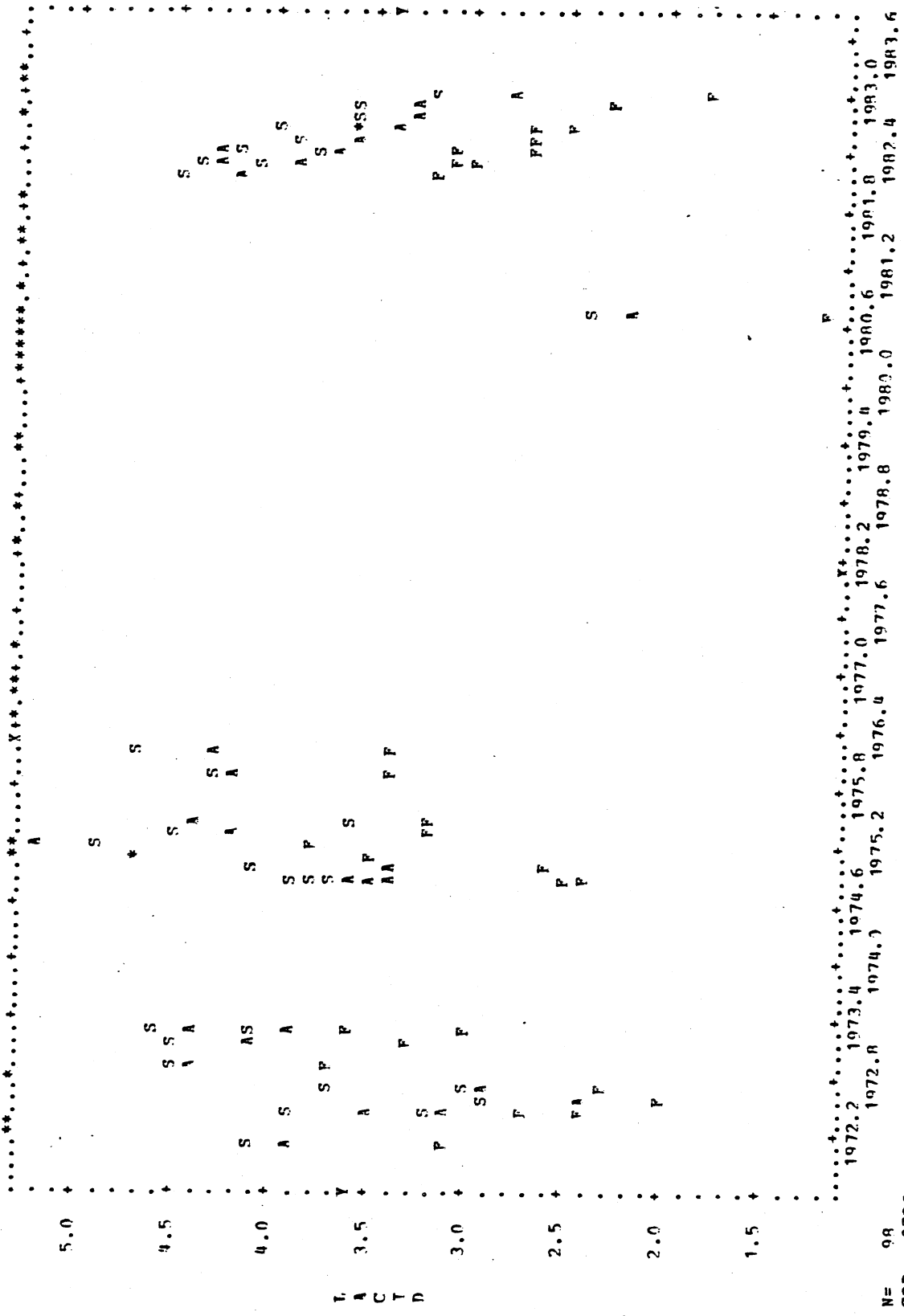
PAGE 4 BMDP6D STATION 13 DESCRIPTIVE STATISTICS



N= 33  
COR=-.0916

MEAN 1977.1  
ST.DEV. 4.2266  
REGRESSION LINE X=-.69251\*Y+ 18.279  
RES.MS. 18.279  
VARIABLE 4 YEAR VERSUS VARIABLE 17 LSOLF  
Y 3.9430  
Y .57142  
Y=-.01266\*X+ 20.968  
PYEAR

PAGE 4 RMDP60 STATION 13 LOG OF LOADS PLOT



N= 98  
COR=-.0708

MEAN ST.DEV. REGRESSION LINE RES.MS.  
 X 4.977.0 4.1667 X=-.43167\*Y+ 1978.5 17.430  
 Y 3.4943 .76992 Y=-.01474\*X+ 32.634 .59515

VARIABLE 4 PYEAR VERSUS VARIABLE 16 LACID SYMBOL=A  
 VARIABLE 4 PYEAR VERSUS VARIABLE 17 LSULF SYMBOL=S  
 VARIABLE 4 PYEAR VERSUS VARIABLE 19 LTOTPF SYMBOL=F

## Statistical Comparisons

Station 13 data was grouped into three time groups: 1972-73, 1974-76 and 1980-83. The BMDP-7D multiple comparisons for concentrations, loads, log-transformed loads and flows are included and a summary interpretation follows.

### A. Concentrations

1. Acidity - No difference between 1972-73 and most recent 1980-83.
2. Iron - Both the most recent (1980-83) and middle (1974-76) periods are less than earliest iron levels (1972-73).
3. Sulfate - Same as acidity, no difference.
4. Comments - Only iron has decreased significantly, by about 45%. No changes for acidity and sulfate.

### B. Loads

1. Acid Load            ]
2. Iron Load            ]       No differences between early and recent
3. Sulfate Load        ]       periods.
4. Comments - High standard deviations make statistical distinction impossible, although the mean iron loads in recent years appears lower than for the earliest two periods. Furthermore, rigorous statistical testing requires log-transformation of the load data.

### C. Log Loads

1. Log Acid Load - Early data (1972-73) is identical to 1980-83.
2. Log Iron Load - No difference between any periods.
3. Log Sulfate Load - Same as log acid load; no changes.
4. Comments - No changes are evident in loads of acid, iron or sulfate during the period of observation 1972-83.

#### D. Flows

1. Flows ("AMGPD") - No differences between any groups; note high standard deviations typical of log normal distributions.
2. Log Flows ("LMGPD") - Same as flows; no differences.
3. Comments - Average flows in 1980-83 are no different than in earlier periods 1972-73 and 1974-76. This is consistent with observed "no changes" in concentrations and loads.

#### E. Acid Concentrations vs. Flows - BMDP-1R Scatter Diagrams

1. All Data        ]
2. 1972-73        ]        No correlation between acid concentrations
3. 1982-83        ]        and flows.
4. Comments - Plots indicate "Type 1" discharge with observed acidities uniformly distributed about the mean over the range of flows. Only the earliest and most recent periods were tested; since no correlation was found between concentration and flow.

PAGE 3 RNDP7D STATION 13 (FULL DATA SET) DESCRIPTIVE STATISTICS

HISTOGRAM OF \* ACID \* (VARIABLE 6). CASES DIVIDED INTO GROUPS BASED ON VALUES OF \* PYEAR \* (VARIABLE 4)  
 \*\*\*\*\*  
 \*\*\*\*\*

1972-3 1974-6 1980-3

MIDPOINTS	1972-3	1974-6	1980-3
1800.000)	*		
1700.000)			
1600.000)	**		
1500.000)			
1400.000)			
1300.000)			
1200.000)			
1100.000)			
1000.000)			
900.000)	*		
800.000)	***		
700.000)	***		
600.000)	M***		
500.000)	***		
400.000)	***		
300.000)	*		
200.000)			
100.000)	*		

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH \*\*S, N'S OTHERWISE

MEAN	500.462	812.360	662.593
STD. DEV.	193.870	326.402	242.915
P.E.S.D.	109.128	306.388	249.961
S. F. M.	53.770	65.280	46.749
MAXIMUM	886.000	1600.000	1121.000
MINIMUM	189.000	100.000	179.000
SAMPLE SIZE	13	25	27

ALL GROUPS COMBINED  
 (EXCEPT CASES WITH UNUSED VALUES  
 FOR PYEAR )

MEAN	707.569
STD. DEV.	280.157
P.E.S.D.	265.484
S. F. M.	34.749
MAXIMUM	1600.000
MINIMUM	179.000
SAMPLE SIZE	65

\*\*\*\*\* ANALYSIS OF VARIANCE TABLE \*\*\*\*\*

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F VALUE	TAIL PROBABILITY
BETWEEN GROUPS	481080.1250	2	240540.0625	3.28	0.0441
WITHIN GROUPS	4542153.5093	62	73260.5405		
TOTAL	5023233.0000	64			

LEVENE'S TEST FOR EQUAL VARIANCES 2, 62 1.20 0.3078  
 \*\*\*\*\*  
 ONE-WAY ANALYSIS OF VARIANCE  
 TEST STATISTICS FOR WITHIN-GROUP  
 VARIANCES NOT ASSUMED TO BE EQUAL.  
 WELCH  
 PRCWN-PORSYTHE  
 2, 36 3.18 0.0536  
 2, 56 3.70 0.0310

PAGE 4 F4DD7D STATION 13 (FULL DATA SET) DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.  
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.016667

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	SEPARATE VARIANCE T		POOLED VARIANCE T		SIGNIFICANCE LEVEL	BONFERRONI TEST
							T-VALUE	DF	P-VALUE	T-VALUE		
1	1072-3	599.46	2	1974-6	812.36	-212.90	-2.52	35.20	0.0165 *	-2.30	62	0.016667
1	1072-3	599.46	3	1990-3	662.59	-63.13	-0.89	29.28	0.3828	-0.69	62	0.003333
2	1974-6	812.36	3	1990-3	662.59	149.77	1.87	44.20	0.0688	1.99	62	0.000333



PAGE 5 BMDP7D STATION 13 (FULL DATA SET) DESCRIPTIVE STATISTICS

HISTOGRAM OF \* TOTPE \* (VARIABLE 9). CASES DIVIDED INTO GROUPS BASED ON VALUES OF \* PYEAR \* (VARIABLE 4)

1972-3 1974-6 1980-3

VAR 9

EXCLUDED VALUES

MIDPOINTS

360.000) 340.000) \* 320.000) \* 300.000) 280.000) 260.000) 240.000) 220.000) 200.000) \* 180.000) \* 160.000) M\* 140.000) 120.000) \* 100.000) \*\* 80.000) \*\*\* 60.000) \* 40.000) 20.000)

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH \*'S, N'S OTHERWISE

MEAN 153.385 STD.DEV. 90.069 R.F.S.D. 88.119 S. F. M. 24.981 MAXIMUM 350.000 MINIMUM 63.000 SAMPLE SIZE 13

ALL GROUPS COMBINED (EXCEPT CASES WITH UNUSED VALUES FOR PYEAR)

MEAN 94.324 STD.DEV. 55.537 R.F.S.D. 42.611 S. F. M. 6.007 MAXIMUM 350.000 MINIMUM 18.600 SAMPLE SIZE 61

ANALYSIS OF VARIANCE TABLE: SOURCE, SUM OF SQUARES, DF, MEAN SQUARE, F VALUE, TAIL PROBABILITY

TEST STATISTICS FOR WITHIN-GROUP VARIANCES: LEVENE'S TEST FOR EQUAL VARIANCES, ONE-WAY ANALYSIS OF VARIANCE

WELCH BROWN-FORSYTHE

PAGE 6 BMDP7D STATION 13 (FULL DATA SET) DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL (GROUP) MEANS.  
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.  
 THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.016667

SIGNIFICANCE LEVEL  
 .05  
 .01  
 .001

BONFERRONI TEST  
 0.016667  
 0.003333  
 0.000333

SYMBOL  
 \*  
 \*\*  
 \*\*\*

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1	1972-3	153.38	2	1974-6	79.40	73.98	2.89	13.19	0.0125 *	4.54	60	0.0000 ***
1	1972-3	153.38	3	1980-3	78.57	74.82	2.92	13.19	0.0117 *	4.66	60	0.0000 ***
2	1974-6	79.40	3	1980-3	78.57	0.83	0.11	47.91	0.9158	0.06	60	0.9507

PAGE 7 BMDP7D STATION 13 (FULL DATA SET) DESCRIPTIVE STATISTICS

HISTOGRAM OF \* SUIP \* (VARIABLE 12). CASES DIVIDED INTO GROUPS BASED ON VALUES OF \* PEAR \* (VARIABLE 4)

1972-3 1974-6 1980-3

Table with columns for MIDPOINTS and values for years 1972-3, 1974-6, and 1980-3. Includes asterisks for significance and a note about group means.

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH \*'S, M'S OTHERWISE

Summary statistics table including MEAN, STD. DEV., R.E.S.D., S.F.M., MAXIMUM, MINIMUM, and SAMPLE SIZE for each year.

ALL GROUPS COMBINED (EXCEPT CASES WITH UNUSED VALUES FOR PYPAR)

Summary statistics table for all groups combined, including MEAN, STD. DEV., R.E.S.D., S.F.M., MAXIMUM, MINIMUM, and SAMPLE SIZE.

ANALYSIS OF VARIANCE TABLE

Analysis of Variance Table with columns: SOURCE, SUM OF SQUARES, DF, MEAN SQUARE, F VALUE, TAIL PROBABILITY.

TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL

Table for Levene's Test for Equal Variances and Brown-Forsythe test, including WPICH and BROWN-FORSYTHE values.

PAGE 8 BMDP7D STATION 13 (FULL DATA SET) DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.  
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.016667

SIGNIFICANCE LEVEL	BONFERRONI TEST
.05	0.016667
.01	0.003333
.001	0.000333

GROUP NO.	GROUP NAME	MEAN	DIFF	MEAN	MEAN	T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1	1972-3	1333.95		1245.64	88.21	0.30	14.66	0.7658	0.45	62	0.6523
1	1972-3	1333.95		1093.81	240.03	0.84	13.49	0.4134	1.25	62	0.2167
2	1974-6	1245.64		1393.81	151.83	1.33	45.42	0.1886	0.96	62	0.3407

NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 2104  
 CPU TIME USED 0.805 SECONDS



PAGE 6 BMDP7D STATION 13 DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS. ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.016667

SIGNIFICANCE LEVEL

SYMBOL

BONFERRONI TEST

\* .05 0.016667

\*\* .01 0.003333

\*\*\* .001 0.000333

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	DIFF	T-VALUE	SEPARATE VARIANCE	DF	P-VALUE	T-VALUE	POOLED VARIANCE	DF	P-VALUE
1	1972-3	8579.10	2	1974-6	25972.19	-17393.09	-1.33	11.18	30	0.2094	-1.58	30	0.1251	
1	1972-3	8579.10	3	1980-3	6792.40	1786.70	0.48	15.90	30	0.6354	0.17	30	0.8698	
2	1974-6	25972.19	3	1980-3	6792.40	19179.79	1.49	10.51	30	0.1648	1.82	30	0.0786	

HISTOGRAM OF \* TOTFEL \* (VARIABLE 10). CASES DIVIDED INTO GROUPS BASED ON VALUES OF \* PYEAR \* (VARIABLE 4)

1972-3 1974-6 1980-3

VAR 10 EXCLUDED VALUES

TABLATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

MIDPOINTS 7000.000) 6500.000) 6000.000) 5500.000) 5000.000) \* 4500.000) 4000.000) \* 3500.000) 3000.000) 2500.000) 2000.000) \* 1500.000) N 1000.000) \*\* 500.000) \*\* 0.0 ) \*\*\*

\* \*\* N\* \*\*\*\*\* \* \*\* N\*\*\* \*\*

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH \*'S, N'S OTHERWISE

MEAN 1491.358 1722.313 1728.751 1707.752 521.238 5798.395 251.450 11 658.165 527.455 575.710 159.034 1638.288 16.560 11

ALL GROUPS COMBINED (EXCEPT CASES WITH UNUSED VALUES FOR PYEAR )

MEAN 1284.338 1485.247 1400.440 262.557 5798.395 16.560 32

ANALYSIS OF VARIANCE TABLE with columns: SOURCE, SUM OF SQUARES, DF, MEAN SQUARE, F VALUE, TAIL PROBABILITY. Includes rows for BETWEEN GROUPS, WITHIN GROUPS, TOTAL, and LEVENE'S TEST FOR EQUAL VARIANCES.

TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL WELCH BROWN-FORSYTHE

2, 15 2, 20 2.59 1.58 0.1001 0.2315

PAGE 10 RMDP7D STATION 13 DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL (GROUP) MEANS.  
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.016667

SIGNIFICANCE LEVEL

BONFERRONI TEST

SYMBOL

.05  
 .01  
 .001

\*  
 \*\*  
 \*\*\*

0.016667  
 0.003333  
 0.000333

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	DIFF	MEAN	T-VALUE	SEPARATE VARIANCE	T-VALUE	POOLED VARIANCE	T-VALUE	P-VALUE
1	1972-3	1491.36	2	1974-6	1722.31	-230.96	1722.31	-0.30	18.66	-0.36	29	-0.36	0.7193
1	1972-3	1491.36	3	1980-3	658.16	833.19	658.16	1.42	10.42	1.31	29	1.31	0.2008
2	1974-6	1722.31	3	1980-3	658.16	1064.15	658.16	1.95	11.85	1.71	29	1.71	0.0973



PAGE 13 BMDP7D STATION 13 DESCRIPTIVE STATISTICS

HISTOGRAM OF \* SUFLP \* (VARIABLE 13). CASES DIVIDED INTO GROUPS BASED ON VALUES OF \* PYEAR \* (VARIABLE 4)

1972-3 1974-6 1980-3

Table with 3 columns for years 1972-3, 1974-6, and 1980-3. Rows include labels like MIDPOINTS, MEAN, STD.DEV., R.F.S.D., S. P. M., MAXIMUM, MINIMUM, and SAMPLE SIZE.

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH \*'S, N'S OTHERWISE

Summary statistics table for each year, including Mean, Std. Dev., R.F.S.D., S.P.M., Maximum, Minimum, and Sample Size.

ALL GROUPS COMBINED (EXCEPT CASES WITH UNUSED VALUES FOR PYEAR)

Summary statistics for all groups combined, including Mean, Std. Dev., R.F.S.D., S.P.M., Maximum, Minimum, and Sample Size.

ANALYSIS OF VARIANCE TABLE

Analysis of Variance Table with columns: SOURCE, SUM OF SQUARES, DF, MEAN SQUARE, F VALUE, TAIL PROBABILITY. Includes rows for Between Groups, Within Groups, Total, and Levene's Test.

ONE-WAY ANALYSIS OF VARIANCE TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL WELCH BROWN-FORSYTHE

Small table showing test statistics and probabilities for Welch and Brown-Forsythe tests.

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.  
ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.016667

SYMBOL  
\*  
\*\*  
\*\*\*

SIGNIFICANCE LEVEL  
.05  
.01  
.001

BONFERRONI TEST  
0.016667  
0.003333  
0.000333

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1	1972-3	14473.22	2	1974-6	25223.32	-10750.11	-1.24	16.64	0.2324	-1.42	30	0.1658
1	1972-3	14473.22	3	1980-3	10680.83	3792.38	0.69	15.70	0.5005	0.51	30	0.6129
2	1974-6	25223.32	3	1980-3	10680.83	14542.49	1.84	13.21	0.0885	2.01	30	0.0534

HISTOGRAM OF \* LACID \* (VARIABLE 16). CASES DIVIDED INTO GROUPS BASED ON VALUES OF \* PYEAR \* (VARIABLE 4)

1972-3 1974-6 1980-3

MIDPOINTS

- 5.500)
5.250)
5.000)
4.750)
4.500) \*
4.250) \*
4.000) \*\*
3.750) \*
3.500) H
3.250)
3.000) \*\*\*
2.750)
2.500) \*
2.250)
2.000)

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH \*\*S, M'S OTHERWISE

Table with 2 columns: Statistic and Value. Rows include MEAN (3.562), STD.DEV. (0.683), R.E.S.D. (0.764), S.E.M. (0.216), MAXIMUM (4.442), MINIMUM (2.442), SAMPLE SIZE (10).

ALL GROUPS COMBINED (EXCEPT CASES WITH UNUSED VALUES FOR PYEAR)

Table with 2 columns: Statistic and Value. Rows include MEAN (3.710), STD.DEV. (0.651), R.E.S.D. (0.667), S.E.M. (0.113), MAXIMUM (5.161), MINIMUM (2.208), SAMPLE SIZE (33).

ANALYSIS OF VARIANCE TABLE. Table with 5 columns: SOURCE, SUM OF SQUARES, DF, MEAN SQUARE, F VALUE, TAIL PROBABILITY. Rows include BETWEEN GROUPS, WITHIN GROUPS, TOTAL, LEVENE'S TEST FOR EQUAL VARIANCES, ONE-WAY ANALYSIS OF VARIANCE.

TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL WELCH BROWN-FORSYTHE

Table with 2 columns: Statistic and Value. Rows include 2, 19 (2.16), 2, 2R (2.07), 2, 19 (0.1431), 2, 2R (0.1408).

PAGE 16 BMDP7D STATION 13 DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.  
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.016667

SIGNIFICANCE LEVEL	SYMBOL	BONFERRONI TEST
.05	*	0.016667
.01	**	0.003333
.001	***	0.000333

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1	1972-3	3.56	2	1974-6	4.03	-0.46	-1.65	17.99	0.1154	-1.69	30	0.1019
1	1972-3	3.56	3	1980-3	3.54	0.02	0.07	18.41	0.9421	0.08	30	0.9396
2	1974-6	4.03	3	1980-3	3.54	0.49	1.92	20.93	0.0684	1.84	30	0.0749

PAGE 19 BMDP7D STATION 13 DESCRIPTIVE STATISTICS

HISTOGRAM OF \* LTOFFE \* (VARIABLE 18). CASES DIVIDED INTO GROUPS BASED ON VALUES OF \* PYEAR \* (VARIABLE 4)

1972-3 1974-6 1980-3

VAR 18 EXCLUDED VALUES

TABLATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

MIDPOINTS 4.000) 3.800) \* 3.600) \* 3.400) \* 3.200) \* 3.000) \*\* 2.800) M 2.600) 2.400) \* 2.200) \*\* 2.000) \* 1.800) 1.600) 1.400) 1.200)

GROUP MEANS ARE DENOTED BY N'S IF THEY COINCIDE WITH \*\*S, N'S OTHERWISE

MEAN 2.847 3.000 0.505 0.601 0.152 3.763 2.038 10 STD.DEV. 0.592 0.661 0.187 3.708 2.038 10

ALL GROUPS COMBINED (EXCEPT CASES WITH UNUSED VALUES FOR PYEAR )

MEAN 2.809 STD.DEV. 0.576 R.E.S.D. 0.596 S. E. M. 0.102 MAXIMUM 3.763 MINIMUM 1.219 SAMPLE SIZE 32

ANALYSIS OF VARIANCE TABLE

Table with columns: SOURCE, SUM OF SQUARES, DF, MEAN SQUARE, F VALUE, TAIL PROBABILITY. Rows include BETWEEN GROUPS, WITHIN GROUPS, TOTAL, and LEVENE'S TEST FOR EQUAL VARIANCES.

ONE-WAY ANALYSIS OF VARIANCE TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL. WELCH BROWN-FORSYTHE

2, 19 0.2513 2, 28 1.50 0.2409

PAGE 20 6NDP7D STATION 13 DESCRIPTIVE STATISTICS

PAIRWISE COMPARISONS AMONG NONEMPTY CELL (GROUP) MEANS.  
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS. TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.016667

SIGNIFICANCE LEVEL  
 .05  
 .01  
 .001

BONFERRONI TEST  
 0.016667  
 0.003333  
 0.000333

SYMBOL  
 \*  
 \*\*  
 \*\*\*

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	SEPARATE VARIANCE DF	P-VALUE	T-VALUE	POOLED VARIANCE DF	P-VALUE
1	1972-3	2.85	2	1974-6	3.00	-0.15	-0.63	17.83	0.5361	-0.61	29	0.5436
1	1972-3	2.85	3	1980-3	2.58	0.26	1.01	18.86	0.3264	1.06	29	0.2979
2	1974-6	3.00	3	1980-3	2.58	0.41	1.75	19.42	0.0956	1.72	29	0.0968

NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 2056  
 CPU TIME USED 1.024 SECONDS

PAGE 17 BMDP7D STATION 13 DESCRIPTIVE STATISTICS

HISTOGRAM OF \* LSULP \* (VARIABLE 17). CASES DIVIDED INTO GROUPS BASED ON VALUES OF \* PYEAR \* (VARIABLE 4)

MIDPOINTS	1972-3	1974-6	1980-3
4.860)	*		
4.680)	**		
4.500)	***		**
4.320)	*		*
4.140)	**		**
3.960)	M		**
3.780)	M		M
3.600)	*		***
3.420)			*
3.240)	*		
3.060)	*		
2.880)	*		
2.700)			
2.520)			
2.340)			

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH \*S, N'S OTHERWISE \*

MEAN	3.845	4.202	3.788
STD.DEV.	0.637	0.446	0.579
R.F.S.D.	0.693	0.510	0.540
S. E. M.	0.201	0.134	0.167
MAXIMUM	4.582	4.874	4.526
MINIMUM	2.901	3.617	2.367
SAMPLE SIZE	10	11	12

ALL GROUPS COMBINED (EXCEPT CASES WITH UNUSED VALUES FOR PYEAR )

MEAN	3.943
STD.DEV.	0.571
R.E.S.D.	0.561
S. E. M.	0.099
MAXIMUM	4.874
MINIMUM	2.367
SAMPLE SIZE	33

\*\*\*\*\* ANALYSIS OF VARIANCE TABLE \*\*\*\*\*

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F VALUE	TAIL PROBABILITY
BETWEEN GROUPS	1.1230	2	0.5615	1.81	0.1817
WITHIN GROUPS	9.3258	30	0.3109		
TOTAL	10.4488	32			

LEVENE'S TEST FOR EQUAL VARIANCES

2	30	0.57	0.5701
---	----	------	--------

ONE-WAY ANALYSIS OF VARIANCE  
TEST STATISTICS FOR WITHIN-GROUP  
VARIANCES NOT ASSUMED TO BE EQUAL  
WELCH  
BROWN-FORSYTHE

2	19	2.16	0.1433
2	27	1.79	0.1868

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.  
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.016667

SYMBOL	SIGNIFICANCE LEVEL	BONFERRONI TEST
*	.05	0.016667
**	.01	0.003333
***	.001	0.000333

GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	SEPARATE VARIANCE T	P-VALUE	MEAN	MEAN DIFF	P-VALUE	SEPARATE VARIANCE T	P-VALUE	MEAN	MEAN DIFF	P-VALUE	SEPARATE VARIANCE T	P-VALUE
1	1972-3	3.84	-0.36	-1.47	15.96	4.20	-0.36	0.1599	-1.47	30	3.84	-0.36	0.1599	-1.47	30
1	1972-3	3.84	0.06	0.22	18.49	3.79	0.06	0.8290	0.22	30	3.84	0.06	0.8290	0.22	30
2	1974-6	4.20	0.41	1.93	20.43	3.79	0.41	0.0675	1.93	30	4.20	0.41	0.0675	1.93	30



PAGE 3 BHDP7D STATION 13 MULTIPLE COMPARISONS ON FLOW

HISTOGRAM OF \* AMGPD \* (VARIABLE 14). CASES DIVIDED INTO GROUPS BASED ON VALUES OF \* YEAR \* (VARIABLE 4)

1972-3 1974-6 1980-3

VAR 14 EXCLUDED VALUES

MIDPOINTS 11.900 11.200 10.500 9.800 9.100 8.400 7.700 7.000 6.300 5.600 4.900 4.200 3.500 2.800 2.100 1.400 0.700 0.0

GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH \*\*S, N'S OTHERWISE

MEAN 1.682 STD.DEV. 1.783 R.F.S.D. 1.884 S.E.M. 0.564 MAXIMUM 5.040 MINIMUM 0.040 SAMPLE SIZE 10

ALL GROUPS COMBINED (PKCPT CASES WITH UNUSED VALUES FOR PYEAR)

MEAN 2.119 STD.DEV. 2.563 R.F.S.D. 2.392 S.E.M. 0.464 MAXIMUM 10.870 MINIMUM 0.020 SAMPLE SIZE 33

ANALYSIS OF VARIANCE TABLE

SOURCE BETWEEN GROUPS WITHIN GROUPS TOTAL

SUM OF SQUARES 10.3531 216.5821 226.9353

DF 2 30 32

MEAN SQUARE 5.1766 7.2194

F VALUE 0.72

TAIL PROBABILITY 0.4964

LEVENE'S TEST FOR EQUAL VARIANCES

ONE-WAY ANALYSIS OF VARIANCE

TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL

WELCH BROWN-POPSYTHE

2, 19 0.66 0.5277

2, 27 0.74 0.4845

PAGE 4 BMDP7D STATION 13 MULTIPLE COMPARISONS ON FLOW

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.  
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.  
 THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.016667

SYMBOL	SIGNIFICANCE LEVEL	BONFERRONI TEST
*	.05	0.016667
**	.01	0.003333
***	.001	0.000333

GROUP NO.	GROUP NAME	MEAN	MEAN	MEAN	MEAN	T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1	1972-3	1.68	2.91	1.23	1.14	-1.14	16.37	0.2712	-1.05	30	0.3039
1	1972-3	1.68	1.76	-0.08	-0.07	-0.07	18.46	0.9411	-0.07	30	0.9475
2	1974-6	2.91	1.76	1.15	0.92	0.92	20.66	0.3679	1.03	30	0.3127

PAGE 5 BMDP7D STATION 13 MULTIPLE COMPARISONS ON FLOW

HISTOGRAM OF \* LMGPD \* (VARIABLE 16). CASES DIVIDED INTO GROUPS BASED ON VALUES OF \* PYEAR \* (VARIABLE 4)

1972-3 1974-6 1980-3

TABLATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

Table with columns for MIDPOINTS and GROUP MEANS ARE DENOTED BY M'S IF THEY COINCIDE WITH \*\*S, N'S OTHERWISE. Includes values like 1.260, 1.080, 0.900, etc.

Table with columns for MEAN, STD. DEV., R.E.S.D., S.F.M., MAXIMUM, MINIMUM, SAMPLE SIZE. Includes values like -0.159, 0.731, 0.829, etc.

Table with columns for ALL GROUPS COMBINED, ANALYSIS OF VARIANCE TABLE, SUM OF SQUARES, DE, MEAN SQUARE, F VALUE, TAIL PROBABILITY. Includes values like 0.035, 0.657, 0.680, etc.

PAGE 6 BMDP7D STATION 13 MULTIPLE COMPARISONS ON FLOW

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.  
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE BONFERRONI TESTS.

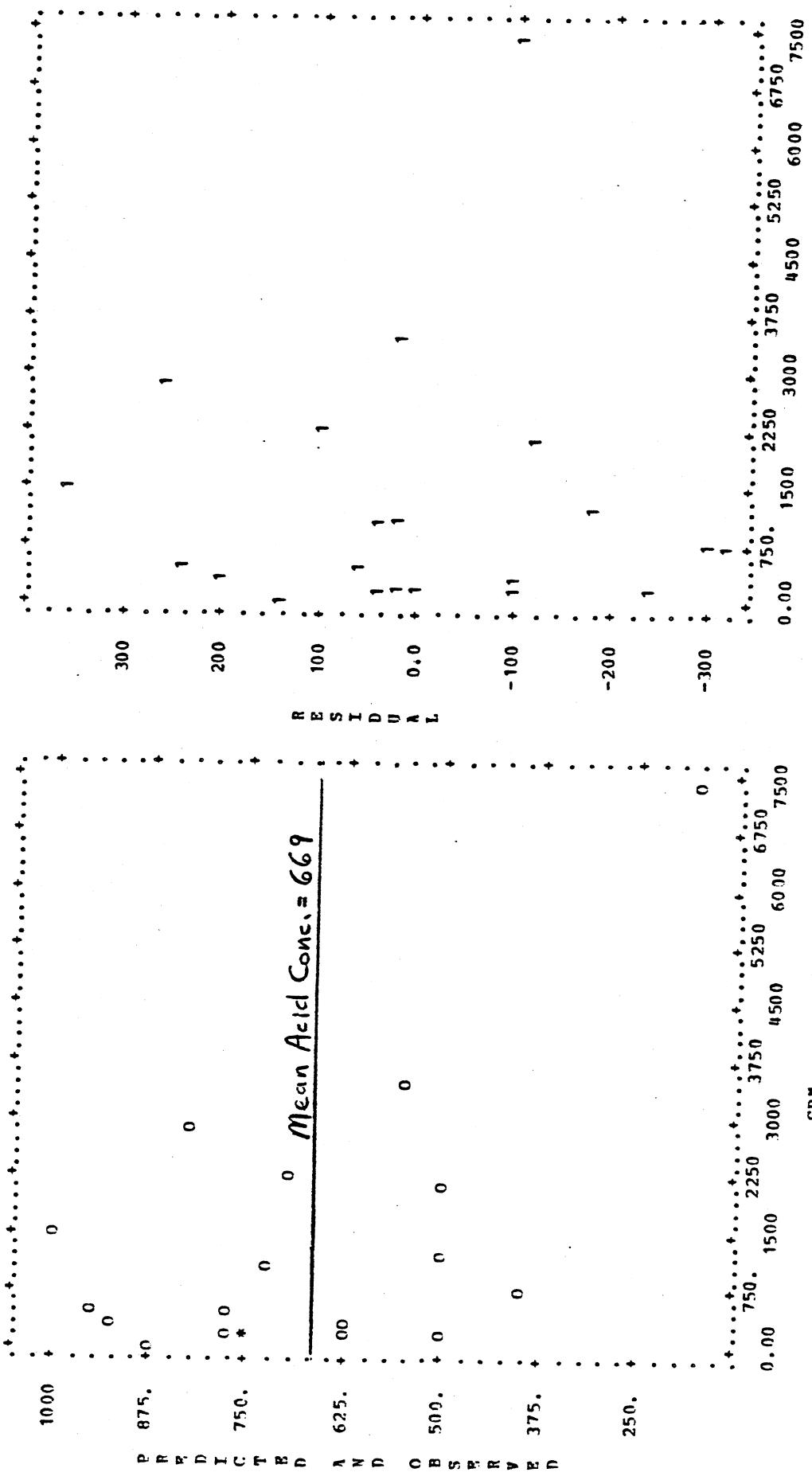
THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.016667

SYMBOL \* \*\* \*\*\*  
 SIGNIFICANCE LEVEL .05 .01 .001  
 BONFERRONI TEST 0.016667 0.003333 0.000333

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	SEPARATE DF	VARIANCE	P-VALUE	T-VALUE	POOLED DF	VARIANCE	P-VALUE
1	1972-3	-0.16	2	1974-6	0.24	-0.40	-1.47	15.43	0.1613	0.1613	-1.43	30	0.1644	0.1644
1	1972-3	-0.16	3	1980-3	-0.19	0.03	0.10	18.94	0.9233	0.9233	0.11	30	0.9146	0.9146
2	1974-6	0.24	3	1980-3	-0.19	0.43	1.74	19.64	0.0983	0.0983	1.60	30	0.1194	0.1194

NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 1810  
 CPU TIME USED 0.711 SECONDS

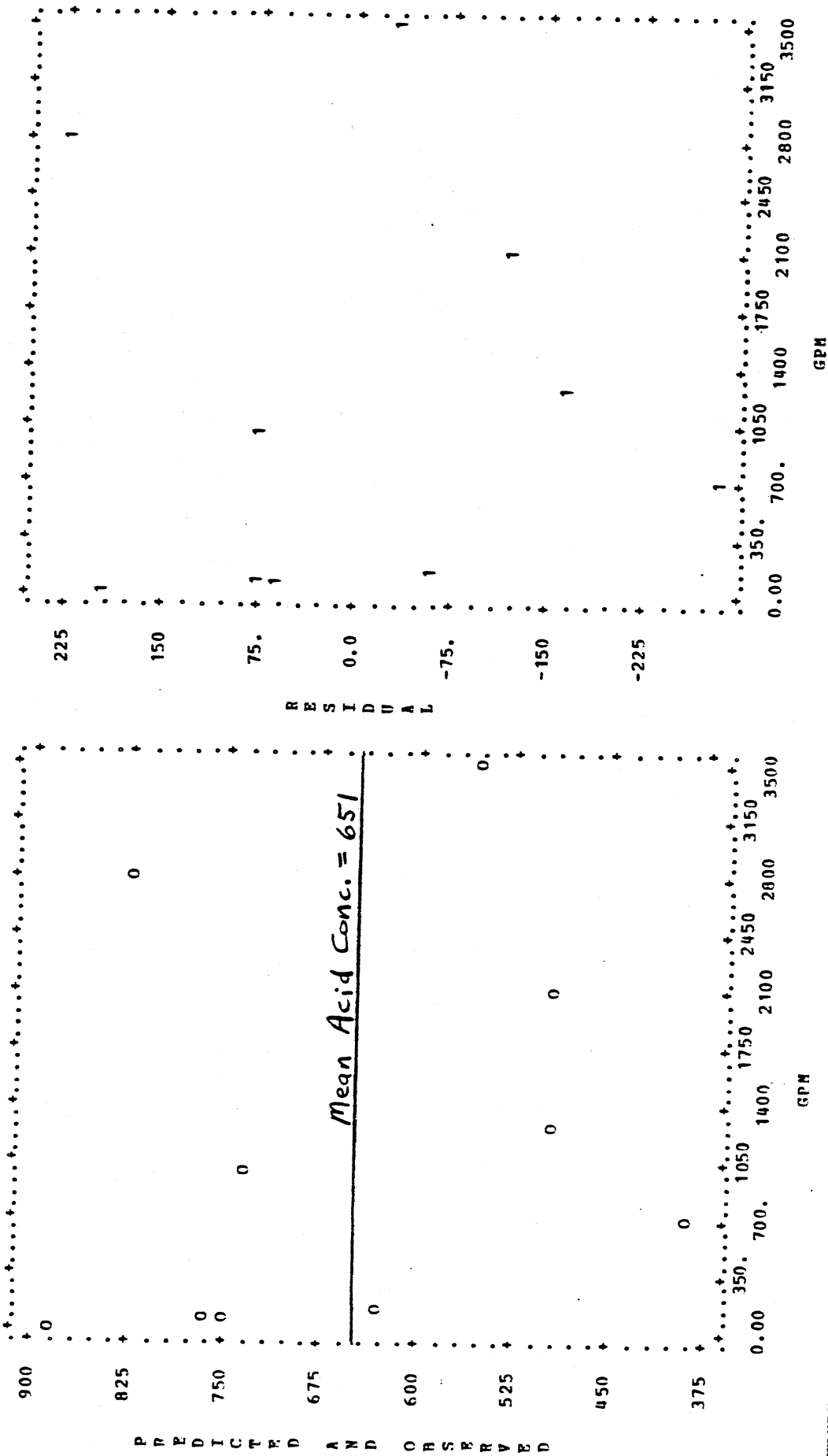
PAGE 5 RMDP1R STATION 13 REGRESSION ACID CONCENTRATION VS FLOW ALL DATA 1972-73 and 1982-83



GPM

NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 1198  
CPU TIME USED 0.599 SECONDS

PAGE 10 BMDP1H STA 13 1972-73



NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 1198  
 CPU TIME USED 0.179 SECONDS

