

WEIR NO. 11

WEIR NO. 11

Description

The discharging air seal on an abandoned main heading on the east central edge of SMC generally accounts for less than 20% of the total AMD input to the Casselman, but in low flows it contributes about one-third of the acid load. Weir 11 has been sampled and measured since April 1972, with a total of 39 observations.

The complete statistical descriptions of acidity, iron and sulfate concentrations, loads and log-transformed loads were developed with program BMDP-2D, including histograms (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		STATION 11			MEISSER & EARL HYDROGEOLOGISTS					GAL DFVICE		
	AL	MN	PH	ACIDITY	ACID LOAD	ALKALINITY	IRON	IRON LOAD	TOTAL IRON LOAD	FERROUSSULFATE IRON		SULFATE LOAD	MILION GAL/DAY
4/11/72	-1.00	-1.00	3.10	1054.	5840.91	0.0	315.00	1745.62	1745.62	7.00	14131.24	0.67	461.81
5/26/72	-1.00	-1.00	2.90	868.	2958.43	0.0	213.00	725.97	725.97	6.90	4090.00	0.41	284.03
6/30/72	-1.00	-1.00	3.30	898.	4280.46	0.0	258.00	1229.80	1229.80	71.00	12011.99	0.57	397.22
7/28/72	-1.00	-1.00	3.40	1120.	3080.00	0.0	426.00	1171.50	1171.50	13.00	7974.99	0.33	229.17
8/31/72	-1.00	-1.00	3.80	990.	1947.00	0.0	376.00	739.47	739.47	56.00	2950.00	0.24	163.89
9/28/72	-1.00	-1.00	3.50	1300.	2556.66	0.0	338.00	664.73	664.73	94.80	10816.66	0.24	163.89
11/ 3/72	-1.00	-1.00	3.40	1860.	6339.49	0.0	383.00	1305.39	1305.39	130.00	9543.32	0.41	284.03
11/30/72	-1.00	-1.00	3.00	1280.	4362.66	0.0	328.00	1117.93	1117.93	112.00	7361.99	0.41	284.03
1/22/73	-1.00	-1.00	3.10	1100.	4464.16	0.0	260.00	1055.17	1055.17	-1.00	2150.92	0.49	338.19
2/28/73	-1.00	-1.00	2.70	870.	2965.25	0.0	220.00	749.83	749.83	-1.00	1900.	0.41	284.03
3/29/73	-1.00	-1.00	2.80	1100.	3749.16	0.0	400.00	1363.33	1363.33	-1.00	1900.	0.41	284.03
5/ 1/73	-1.00	-1.00	3.00	920.	3733.66	0.0	240.00	974.00	974.00	-1.00	1800.	0.49	338.19
10/15/74	-1.00	-1.00	2.70	1000.	2500.00	0.0	351.00	877.50	877.50	313.00	5500.00	0.30	208.33
10/31/74	-1.00	-1.00	2.80	1500.	3749.94	0.0	385.00	962.48	962.48	280.00	5499.91	0.30	208.33
11/14/74	-1.00	-1.00	3.10	1128.	4155.55	0.0	328.00	1208.35	1208.35	313.00	2475.	0.44	307.00
11/26/74	-1.00	-1.00	2.80	1560.	3893.76	0.0	350.00	873.60	873.60	325.00	4430.40	0.30	208.00
12/11/74	-1.00	-1.00	3.20	1000.	3480.00	0.0	248.00	863.04	863.04	246.00	8265.00	0.72	290.00
2/25/75	-1.00	-1.00	2.90	300.	1774.80	0.0	196.00	1159.54	1159.54	190.00	10205.09	0.41	493.00
3/18/75	-1.00	-1.00	3.00	2000.	-1.00	0.0	187.00	-1.00	-1.00	179.00	-1.00	-1.00	-1.00
4/18/75	-1.00	-1.00	2.60	1000.	4572.00	0.0	143.00	653.80	653.80	141.00	8343.89	0.55	381.00
6/24/75	-1.00	-1.00	3.10	1350.	4066.20	-1.00	195.00	587.34	587.34	-1.00	1825.	0.36	251.00
11/20/75	-1.00	-1.00	3.00	800.	2413.33	-1.00	380.00	1146.33	1146.33	375.00	5505.41	0.36	251.00
2/ 9/76	-1.00	-1.00	2.90	760.	2617.44	-1.00	247.00	850.67	850.67	150.00	6715.80	0.41	287.00
6/18/80	-1.00	-1.00	2.80	688.	3434.26	0.0	200.00	998.33	998.33	138.00	5920.11	0.60	415.97
8/20/81	-1.00	-1.00	3.50	968.	2395.68	0.0	299.00	825.24	825.24	263.00	4504.32	0.33	230.00
2/16/82	33.00	10.75	3.30	985.	2706.78	0.0	293.00	805.16	805.16	287.00	4580.91	0.33	229.00
3/30/82	40.30	10.38	3.10	968.	4274.68	0.0	240.00	1059.84	1059.84	228.00	1398.	0.53	368.00
4/20/82	35.20	24.70	3.30	793.	2916.24	0.0	247.00	829.92	829.92	224.00	4925.76	0.40	280.00
5/19/82	23.40	19.70	3.30	838.	2664.48	0.0	246.00	856.08	856.08	198.00	4050.72	0.42	290.00
6/16/82	26.85	10.96	3.50	905.	3149.40	0.0	263.00	915.24	915.24	244.00	4927.68	0.42	290.00
7/20/82	28.45	11.08	3.50	786.	2263.68	0.0	276.00	794.88	794.88	242.00	3882.24	0.35	290.00
8/25/82	31.25	24.00	3.50	736.	1987.20	0.0	286.00	772.20	772.20	264.00	3372.30	0.32	225.00
9/13/82	24.60	15.20	3.60	780.	2106.00	0.0	296.00	799.20	799.20	238.00	1417.	0.32	225.00
10/12/82	30.75	27.20	3.40	1008.	2395.01	0.0	-1.00	-1.00	-1.00	-1.00	3825.90	0.32	225.00
11/16/82	28.15	11.85	3.70	884.	1909.44	0.0	408.00	881.28	881.28	370.00	4443.12	0.29	190.00
12/14/82	26.70	13.30	3.70	964.	1862.45	0.0	304.00	587.33	587.33	294.00	3443.04	0.26	180.00
1/20/83	-1.00	-1.00	3.10	920.	-1.00	11.00	434.00	-1.00	-1.00	398.00	2109.74	0.23	161.00
2/ 4/83	-1.00	-1.00	3.70	980.	-1.00	0.0	422.00	-1.00	-1.00	374.00	-1.00	-1.00	-1.00
3/ 4/83	161.00	-1.00	3.20	1008.	-1.00	0.0	392.00	-1.00	-1.00	358.00	-1.00	-1.00	-1.00

PAGE 2 BMDP20 STATION 11 DESCRIPTIVE STATISTICS

* ACID *

VARIABLE NUMBER 6
NUMBER OF DISTINCT VALUES . . 33
NUMBER OF VALUES COUNTED . . . 39
NUMBER OF VALUES NOT COUNTED . 0

MAXIMUM 2000.0000000
MINIMUM 300.0000000
RANGE 1700.0000000
VARIANCE 95972.5625000
ST. DEV. 309.7944336
(03-01)/2 116.0000000
MX.ST.SC. 3.16
MN.ST.SC. -2.33

LOCATION ESTIMATES

MEAN 1022.2819824
MEDIAN 980.0000000
MODE 1000.0000000

ST. ERROR 49.6067963
27.4241486

EACH 'H'
REPRESENTS
2
COUNT(S)

H
HH
HH
HH
HHH
HHH
HHH
HHHH
HHHHHH
HH
I-----U

EACH '---' ABOVE = 150.0000
L= 0.0
CASE NO. OF MIN. VAL. = 18
CASE NO. OF MAX. VAL. = 19

SOME NEW LOCATION ESTIMATES

HARDEL 955.6265017
TRIM(.15) 972.9633700
RIVEIGHT 953.0317383

Q1= 868.0000000
Q3= 1100.0000000
S- = 712.4875488
S+ = 1332.0764160

VALUE 1.15
2.22
SKEWNESS 2.93
KURTOSIS 2.83

EACH '.,' BELOW = 15.0000

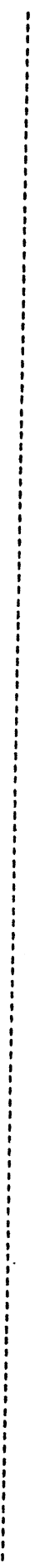
M
I.....
N.....
S -
Q 1
BIN MM 3
IAR.OE.....
WMD DA
TPI EN

* STEM * LEAVES

DEPTH 1 0 * 3
+ 21 17 M 6777788888999999999
17 1 0 000001111233
4 * 558
1 2 * 0
0 * *

* STEM * LEAVES

MINIMUM = 300.00000
MAXIMUM = 2000.00000
COUNT = 39



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 * SUIP *

VARIABLE NUMBER 12
 NUMBER OF DISTINCT VALUES . . . 35
 NUMBER OF VALUES COUNTED . . . 39
 NUMBER OF VALUES NOT COUNTED . . 0

MAXIMUM 5500.0000000
 MINIMUM 530.0000000
 RANGE 4970.0000000
 VARIANCE 627560.6250000
 ST.DEV. 792.1872559
 (Q3-Q1)/2 372.0000000
 MX.ST.SC. 4.62
 MN.ST.SC. -1.66

LOCATION ESTIMATES

MEAN 1844.0000000
 MEDIAN 1775.0000000
 MODE 1900.0000000

ST. ERROR 126.8514709
 RR.3346252

SOME NEW LOCATION ESTIMATES

HAMPEL 1730.5482688
 TRIM(.15) 1748.3974359
 BIWRIGHT 1731.1381836

S 0 0 S
 - 1 3 +
 I.....AREO.....
 NADAD
 PINE

* DEPTH STEM * LEAVES

0 0 *
 2 2 * 58
 13 1 0 01122344444
 + 16 M 5566677888899999
 10 2 0 12234
 5 F 5589
 1 1 *
 1 1 *
 1 1 *
 1 1 *
 1 1 * 5

DEPTH STEM * LEAVES

MINIMUM = 530.00000
 MAXIMUM = 5500.00000
 COUNT = 39

EACH 'H'
 REPRESENTS
 COUNT(S)
 2

L-----H

EACH 'L' ABOVE = 500.0000
 L= 0.0
 U= 7500.0000
 CASE NO. OF MIN. VAL. = 9
 CASE NO. OF MAX. VAL. = 6

Q1= 1416.0000000
 Q3= 2160.0000000
 S- = 1051.8127441
 S+ = 2636.1872559

VALUE VALUE/S.E.
 2.41 6.14
 9.16 11.68

EACH 'L' BELOW = 50.0000

M
 A
 X



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* ACIDL *

VARIABLE NUMBER 7
NUMBER OF DISTINCT VALUES . 35
NUMBER OF VALUES COUNTED . . 35
NUMBER OF VALUES NOT COUNTED 4

MAXIMUM 6339.4882813
MINIMUM 1774.7998047
RANGE 4564.6875000
VARIANCE 1222944.0000000
ST.DEV. 1105.8684082
(O3-Q1)/2 835.2597656
MX.ST.SC. 2.80
MN.ST.SC. -1.33

LOCATION ESTIMATES

MEAN 3244.7373047
MEDIAN 2965.2500000
MODE NOT UNIQUE

ST.ERROR 106.9258728
322.2250977

SOME NEW LOCATION ESTIMATES

HAMPEL 3145.7462072
TRIM (.15) 3139.1603057
DHWRIGHT 3120.0673828

M S O
- 1
I.....H H M
WE..A..E.....

DEPTH STEM * LEAVES

5 1 E 78999
+ 13 2 H 1244455667999
17 3 * 01447778
9 4 O 0122345
2 5 * 8
1 6 * 3

DEPTH STEM * LEAVES

MINIMUM = 1774.79980
MAXIMUM = 6339.48828
COUNT = 35

H H H H H
HHH H
HHHHH
HHHHHH
HHHHHH
HHHHHHH
HHHHHHH H

EACH 'H' REPRESENTS 1
COUNT(S)

L-----||

EACH '---' ABOVE = 500.0000
L= 500.0000
U= 8000.0000
CASE NO. OF MIN. VAL. = 18
CASE NO. OF MAX. VAL. = 7

Q1= 2395.6796875
Q3= 4066.1992188
S-= 2138.8688965
S+= 4350.6054688

SKEWNESS
KURTOSIS

VALUE 0.82
VALUE/S.E. 1.98

EACH '.' BELOW = 50.0000

N
A
X

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* TOTPEL *

VARIABLE NUMBER 10
NUMBER OF DISTINCT VALUES . . 34
NUMBER OF VALUES COUNTED . . . 34
NUMBER OF VALUES NOT COUNTED . 5

MAXIMUM 1745.6198730
MINIMUM 587.3298340
RANGE 1158.2900391
VARIANCE 60600.8750000
ST. DEV. 246.1724548
(Q3-Q1)/2 161.5250244
MN.ST.SC. 3.25
MN.ST.SC. -1.46

LOCATION ESTIMATES

MEAN 945.5893555
MEDIAN 875.5498047
MODE NOT UNIQUE

ST.ERROR 42.2182159
49.9667511

SOME NEW LOCATION ESTIMATES

HAMPEL 913.0096072
TRIM (.15) 919.6357453
DWEIGHT 911.1870117

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

EACH '---' ABOVE = 100.0000
L= 400.0000
U= 1900.0000
CASE NO. OF MIN. VAL. = 36
CASE NO. OF MAX. VAL. = 1

Q1= 794.8798828
Q3= 1117.9299316
S-= 699.4167480
S+= 1191.7617188

VALUE VALUE/S.E.
1.03 2.46
1.25 1.49

SKENNESS
KURTOSIS

EACH '---' BELOW = 10.0000

S O S
- 0 +
I.....E..AR.E.....
D MI A
I P M N

DEPTH STEM * LEAVES

Table with 3 columns: DEPTH, STEM, LEAVES. Rows include values like 2 5 * 88, 4 6 * 56, 10 7 0 235799, etc.

DEPTH STEM * LEAVES

MINIMUM = 587.32983
MAXIMUM = 1745.61987
COUNT = 34

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* L.ACID *

VARIABLE NUMBER 16
NUMBER OF DISTINCT VALUES 35
NUMBER OF VALUES COUNTED 35
NUMBER OF VALUES NOT COUNTED 4

MAXIMUM 3.8020544
MINIMUM 3.2491493
RANGE 0.5529051
VARIANCE 0.0204500
ST.DEV. 0.1430036
(03-Q1)/2 0.1148801
MX.ST.SC. 2.20
MN.ST.SC. -1.67

LOCATION ESTIMATES

MEAN 3.4879894
MEDIAN 3.4720612
MODE NOT UNIQUE

ST. ERROR 0.0241720
0.0445307

SOME NEW LOCATION ESTIMATES

HAMPEL 3.4858077
TRIM (.15) 3.4871533
RWEIGHT 3.4851179

M H S Q
I 1
N 1

DEPTH STEM * LEAVES
5 32 E 4789
11 33 Q 257789
+ 9 34 H 012367789
15 35 * 347779
9 36 O 0133056
2 37 * 6
1 38 * 0

DEPTH STEM * LEAVES
MINIMUM = 3.24915
MAXIMUM = 3.80205
COUNT = 35

EACH 'H'
REPRESENTS
COUNT(S)
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 = 0.0500
L= 3.1500
U= 3.9000
CASE NO. OF MIN. VAL. = 18
CASE NO. OF MAX. VAL. = 7

VALUE VALUE/S.E.
0.18 0.43
-0.86 -1.04
SKEWNESS Q
KURTOSIS 3

EACH 'S' BELOW = 0.0050
M B M
D W A
I T N



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* LTOPPE *

VARIABLE NUMBER 18
NUMBER OF DISTINCT VALUES . . . 34
NUMBER OF VALUES COUNTED . . . 34
NUMBER OF VALUES NOT COUNTED . . 5

MAXIMUM 3.2419491
MINIMUM -2.7688818
RANGE 0.4730673
VARIANCE 0.0114294
ST. DEV. 0.1069086
(Q3-Q1)/2 0.0740566
MX. ST. SC. 2.61
MN. ST. SC. -1.81

LOCATION ESTIMATES

MEAN 2.9625507 ST. ERROR 0.0183347
MEDIAN 2.9422789
MODE NOT UNIQUE 0.0238717

SOME NEW LOCATION ESTIMATES

HAMPEL 2.9596896
TRIM (.15) 2.9593425
RINEIGHT 2.9572554

M H HM
I..... Q 1
N..... E..AP.....
D MA
I PN

* DEPTH STEM * LEAVES

2 27 * 66
8 28 E 126678
+ 15 29 M 000113334446889
11 30 Q 22456689
3 31 * 13
1 32 * 4

DEPTH STEM * LEAVES *

MINIMUM = 2.76888
MAXIMUM = 3.24195
COUNT = 34

NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 2230
CPU TIME USED 0.724 SECONDS

EACH 'H'
REPRESENTS
COUNT(S)

H H
H H
H H H
HHHHH H
HHHHHHH H
L-----H
-----H

EACH '---' ABOVE = 0.0500
L= 2.6500
U= 3.4000

CASE NO. OF MIN. VAL. = 36
CASE NO. OF MAX. VAL. = 1

Q1= 2.9003010
Q3= 3.0484142
S- = 2.8556499
S+ = 3.0694666

VALUE VALUE/S.E.
0.34 0.82
-0.21 -0.25

SKEWNESS
KURTOSIS

EACH '...' BELOW = 0.0050

Q S
3 +

H
A
X

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* I.SULP *

VARIABLE NUMBER 17
NUMBER OF DISTINCT VALUES . . . 34
NUMBER OF VALUES COUNTED . . . 35
NUMBER OF VALUES NOT COUNTED . . 4

MAXIMUM 4.1501808
MINIMUM 3.3242283
RANGE 0.8259525
VARIANCE 0.0419823
ST.DEV. 0.2048957
MX.(Q1)/2 0.1470990
MN.ST.SC. 2.00
-2.03

LOCATION ESTIMATES
MEAN 3.7395906
MEDIAN 3.7403631
MODE 3.8112955
ST. ERROR 0.0346337
0.0455146

SOME NEW LOCATION ESTIMATES
HAMPEL 3.7438650
TRIM (.15) 3.7433691
BIWEIGHT 3.7429800

EACH 'H'
REPRESENTS
COUNT(S)
1
H
HH
HHH H
HHHHH
H HHHHHH
HHHHHHHHH
L-----H

EACH ' . ' ABOVE = 0.0750
L= 3.1500
U= 4.2750
CASE NO. OF MIN. VAL. = 36
CASE NO. OF MAX. VAL. = 1

VALUE VALUE/S.E.
-0.11 -0.27
-0.63 -0.76
O1= 3.6075325
O3= 3.9017305
S=- 3.5346947
S+= 3.9444857

H I S Q
N 1
E
A
N
M
H
O
D
E
A
N
M
H
O
D
E
A
N
EACH ' . ' BELOW = 0.0075

* * * * *
DEPTH STEM * LEAVES
3 33 * 239
4 34 * 7
8 35 E 238A
16 36 O 01445699
+ 5 37 M 44479
14 38 * 11266
9 39 O 01268
4 40 * 03H
1 41 * 5

DEPTH STEM * LEAVES
MINIMUM = 3.32423
MAXIMUM = 4.15018
COUNT = 35



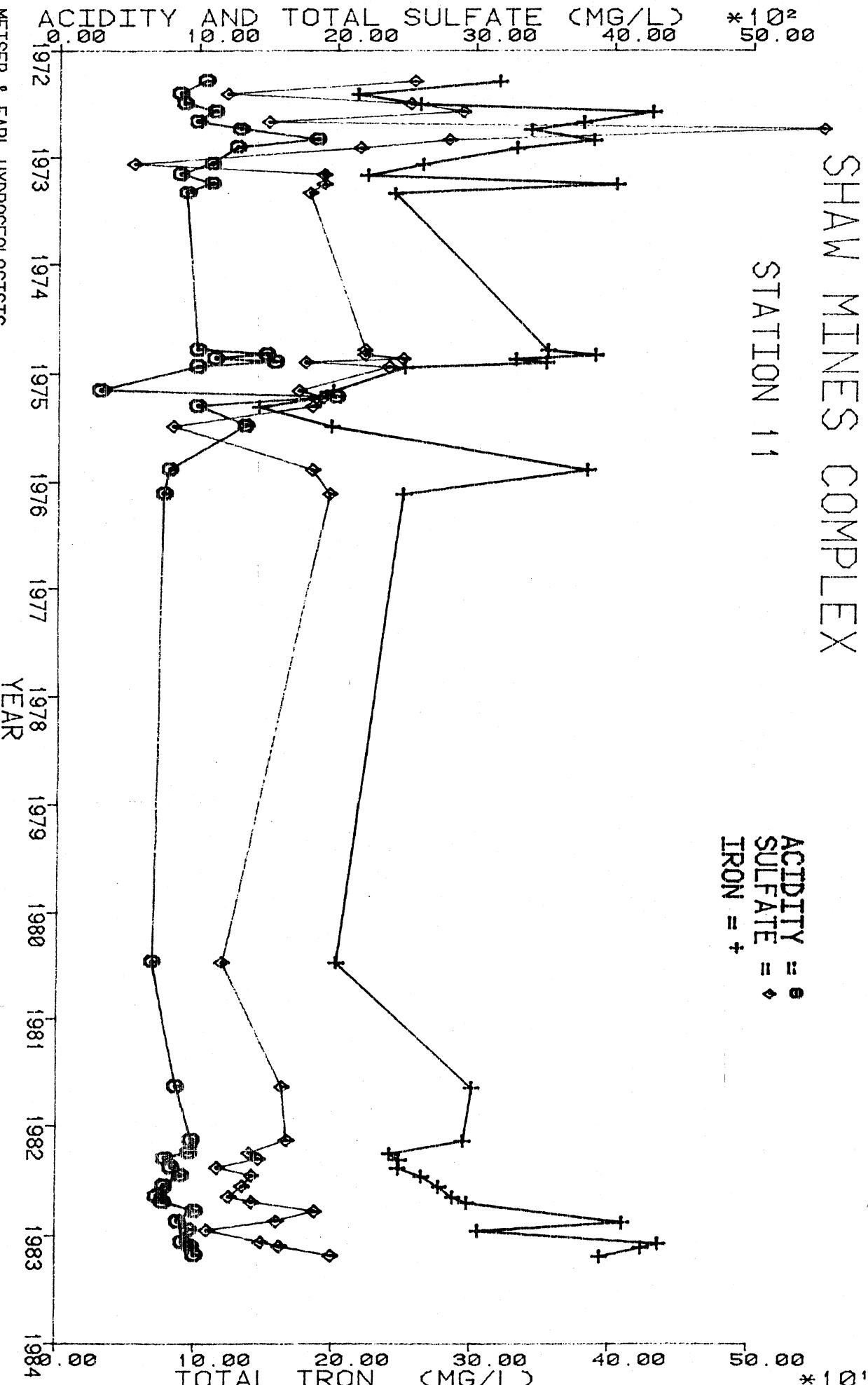
Graphical Trends of Observations

The CalComp plots (three-color) of acidity, iron and sulfate concentrations through time show no obvious trends except for an apparent decrease in sulfate levels.

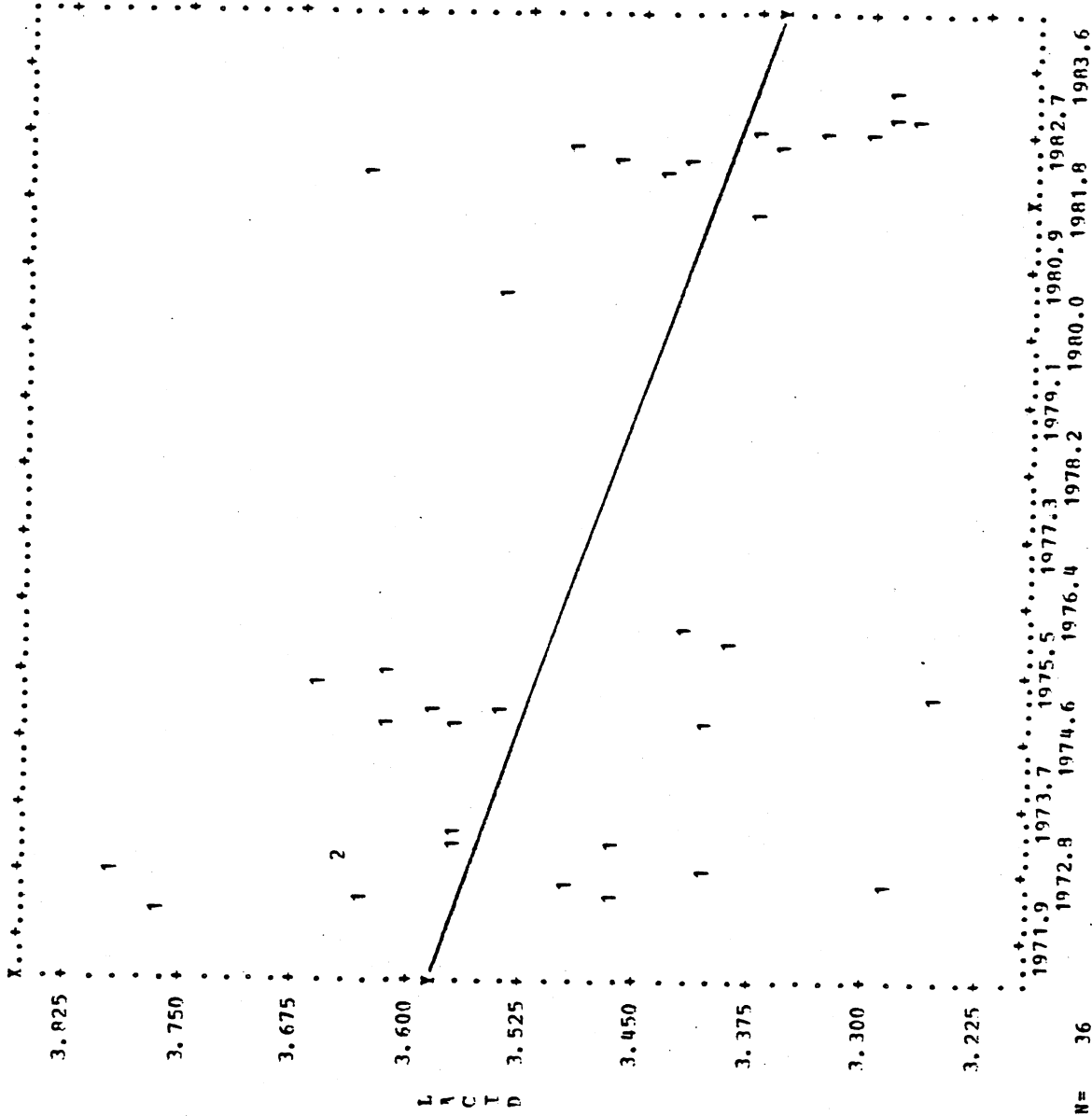
Bivariate scatter plots (BMDP-6D) of the individual log-transformed loads of acid, iron and sulfate through time all show a decrease as indicated by the slope of the regression lines.

The scatter plot of combined log-transformed loads ("S, F and A diagram") clearly shows a pattern of decreasing loads for all three, acid, iron and sulfate.

MEISER & EARL HYDROGEOLOGISTS



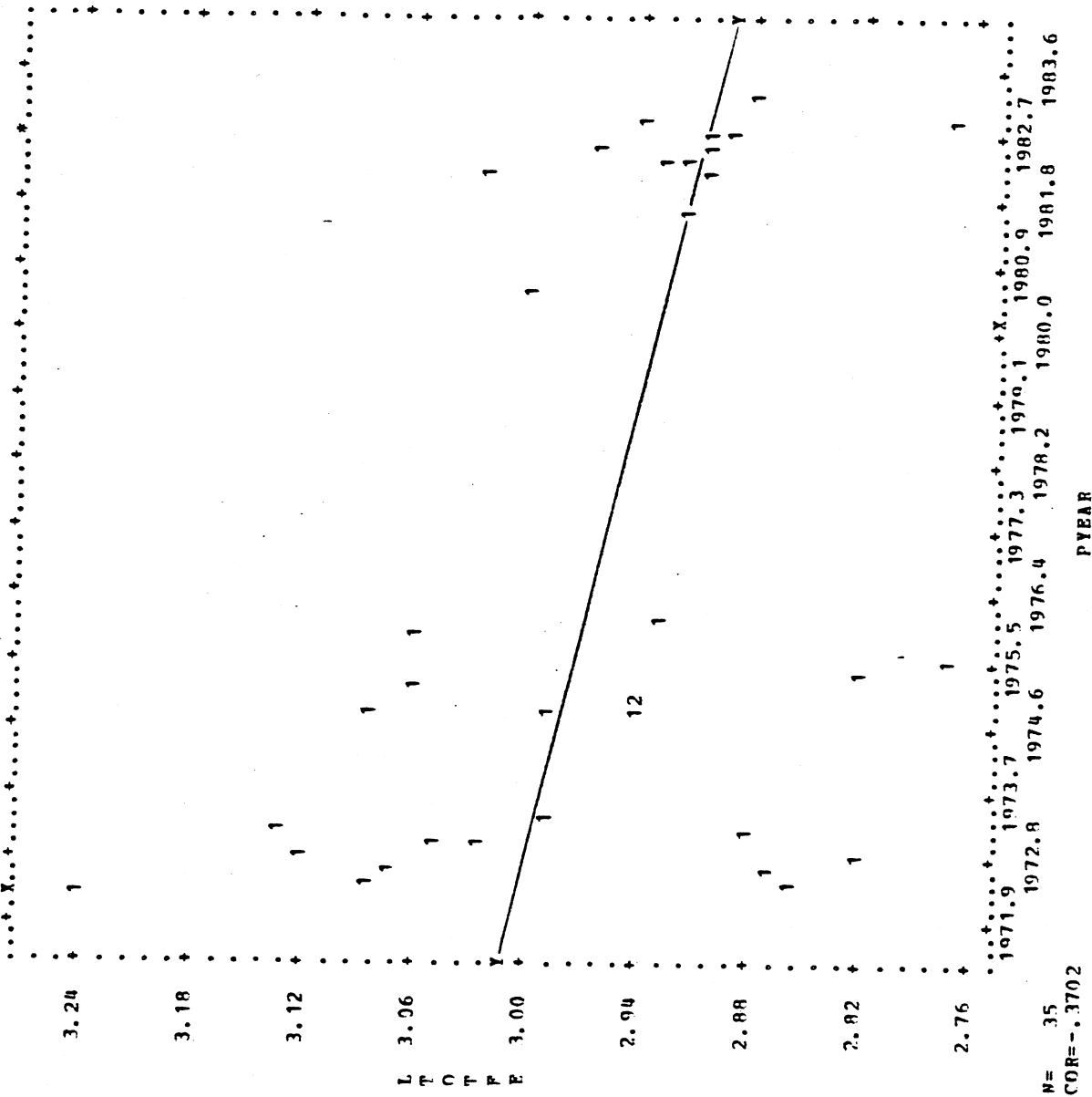
PAGE 5 DNDP6D STATION 11 DESCRIPTIVE STATISTICS



N= 36
COR=-.5297

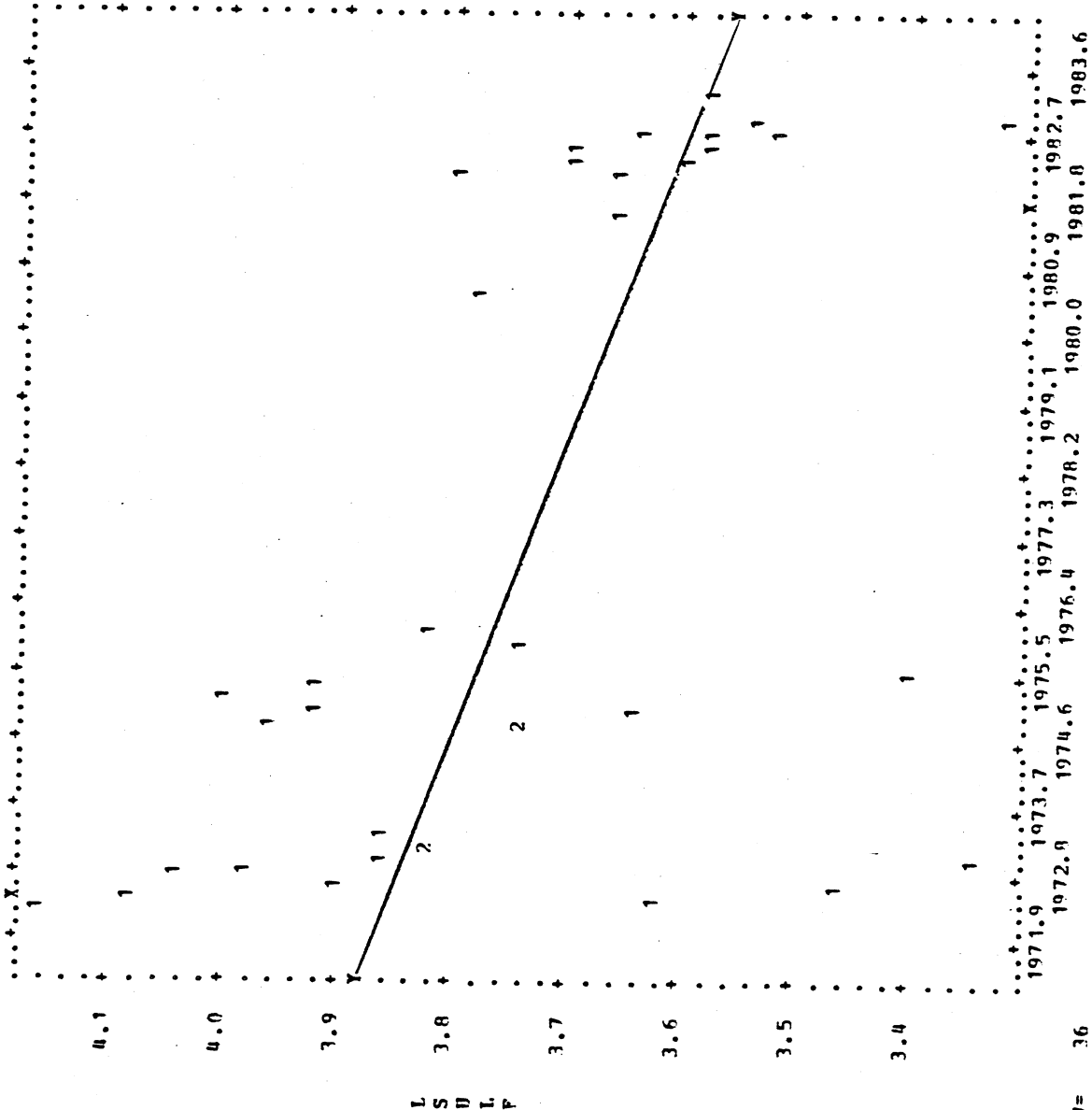
MEAN ST.DEV. REGRESSION LINE RFS.MS.
 X 1977.2 4.3268 X=-15.832*Y+ 2032.3 13.865
 Y 3.4825 .14076 Y=-.01772*X+ 38.522 .01552
 VARIABLE 4 PYEAR VERSUS VARIABLE 16 LACID
 PYEAR

PAGE 6 BMDP6D STATION 11 DESCRIPTIVE STATISTICS



N= 35
 CDR=-.3702
 MEAN 2.9602
 ST.DEV. .10625
 REGRESSION LINE X=-14.917*Y+2021.2
 RES.MS. .01004
 VARIABLE 4 EYEAR VERSUS VARIABLE 16 LTOTPE

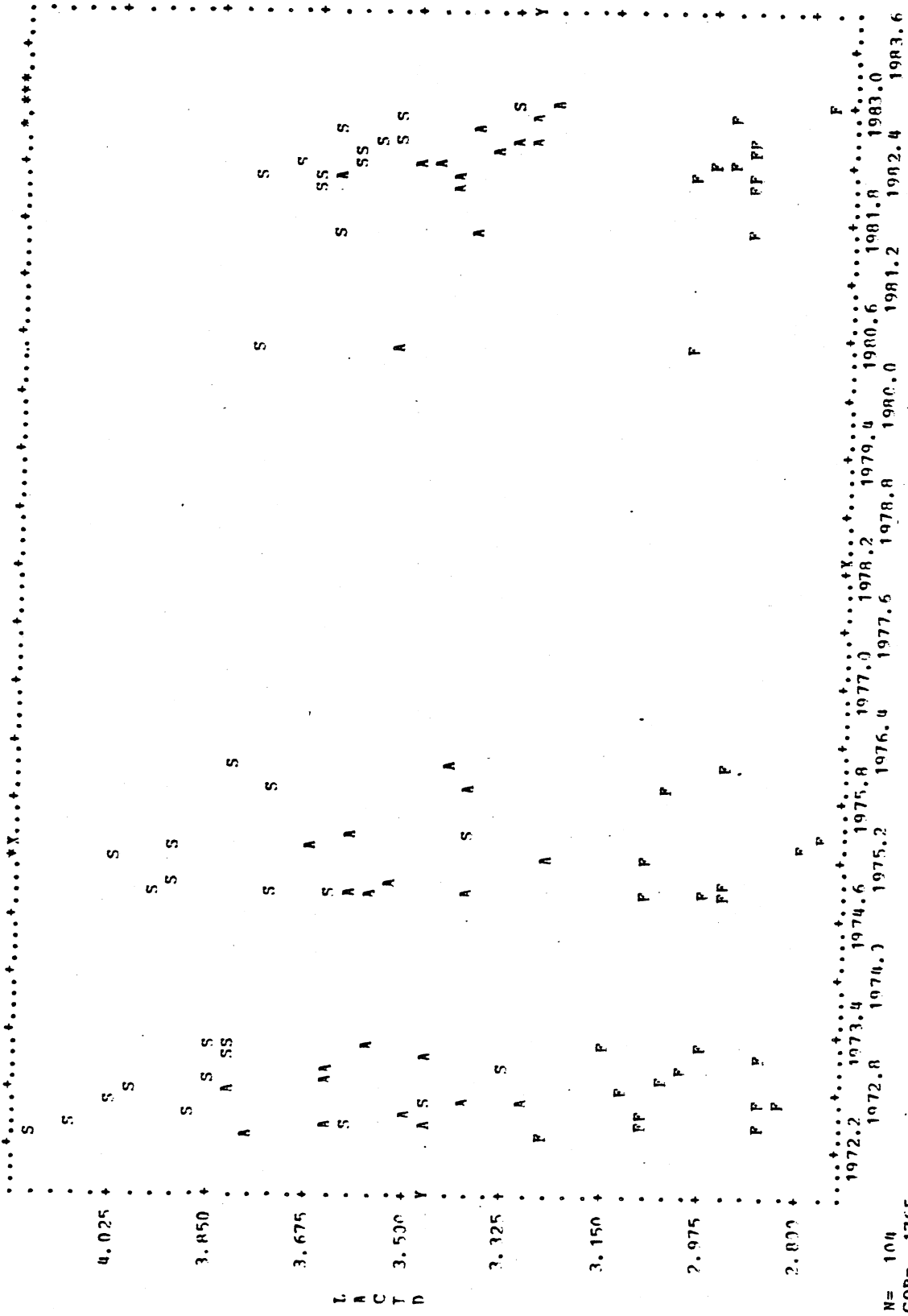
PAGE 4 RNDP6D STATION 11 DESCRIPTIVE STATISTICS



N= 36
COR=-.4958

MEAN ST.DEV. REGRESSION LINE RES.MS.
 X 1977.2 4.3268 Y=-10.537*X+ 2016.6 14.535
 Y 3.7353 .20359 Y=-.02333*X+ 40.061 .03218
 VARIABLE 4 PYEAR VERSUS VARIAB15 17 LS01.F

PAGE 4 BMDP6D STATION 11 LOG OF LOADS PLOT



PYRAF

MEAN ST. DEV. REGRESSION LINE RES. MS.
 X 1977.0 4.2082 $Y = -2.0656X + 1984.0$ 17.326
 Y 3.4009 .35952 $Y = -.01508X + 33.206$.12645

VARIABLE 4 PYRAF VERSUS VARIABLE 16 LACTID SYMBOL=A
 VARIABLE 4 PYRAF VERSUS VARIABLE 17 LSHLP SYMBOL=S
 VARIABLE 4 PYRAF VERSUS VARIABLE 19 LTOPPE SYMBOL=F

Statistical Comparisons

Station 11 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 - Earliest period (1972-73) is significantly greater than most recent period (1980-83). Decrease of approximately 20%.
2. Iron - Nearly identical iron levels for all three periods.
3. Sulfate - Most significant change between early and recent data. Decrease of 35%.
4. Comments - Iron shows no change, but acidity and sulfate both show reductions. Significant statistical differences at only 0.05 probability for these acidity and sulfate.

B. Loads

1. Acid Load - Very significant (0.01 level) reduction from 1972-73 to 1980-83 of roughly 30%.
2. Iron Load - Slight but significant (0.05 level) reduction from 1972-73 to 1980-83 of about 20%.
3. Sulfate - Very significant (0.01 level) reduction from 1972-73 to 1980-83 of over 40%.
4. Comments - Although rigorous statistical testing requires log-transformation of the load data, all loads show reductions from 1972-73 to most recent data on order of 20-40%.

C. Log Loads

1. Log Acid Load - Early data (1972-73) is significantly greater than 1980-83. Decrease of roughly 30%.

2. Log Iron Load - No significant difference between time periods.
3. Log Sulfate Load - Same as log acid load. Decrease is nearly 40%.
4. Comments - The improvements in acid and sulfate loads in recent years are statistically significant, and range about 30-40%. No improvements in iron loads can be statistically justified using log-transformed data.

D. Flows

1. Flows ("AMGPD") - No differences exist between time groups; curiously small range in flows and low standard deviations.
2. Log Flows ("LMGPD") - Same as flows.
3. Comments - Average flows in 1980-83 are no different than in earlier periods, 1972-73 and 1974-76. Therefore, decreases in loads are due to reduced concentrations, not changes in flow.

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. No testing was done on the intermediate time period 1974-76 since no correlation was seen between acidity and flow.

PAGE 3 EMPD7D STATION 11 (FULL DATA SET) DESCRIPTIVE STATISTICS

HISTOGRAM OF * ACID * (VARIABLE * P YEAR * (VARIABLE 4))

1972-3 1974-6 1980-3

Table with 3 columns for years 1972-3, 1974-6, and 1980-3. Rows include MIDPOINTS (2250.000 to 150.000) and GROUP MEANS ARE IDENTIFIED BY *'S IF THEY COINCIDE WITH *'S, N'S OTHERWISE.

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

Summary statistics table with columns for MEAN, STD. DEV., P.F.S.D., S.E.M., MAXIMUM, MINIMUM, and SAMPLE SIZE. Values are provided for 1972-3, 1974-6, and 1980-3.

ALL GROUPS COMBINED (EXCEPT CASES WITH UNUSED VALUES FOR P YEAR)

Analysis of Variance Table with columns: SOURCE, SUM OF SQUARES, DF, MEAN SQUARE, F VALUE, TAIL PROBABILITY. Rows include BETWEEN GROUPS, WITHIN GROUPS, and TOTAL.

LEVENE'S TEST FOR EQUAL VARIANCES (2, 36) 6.27 0.0046
ONE-WAY ANALYSIS OF VARIANCE
TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL
WEICH 2, 16 4.86 0.0224
BROWN-FORSYTHE 2, 17 2.54 0.1084

PAGE 4 RMDP7D STATION 11 (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 COMPARISONS 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

SYMBOL
 *
 **

BONFERRONI TEST
 0.016667
 0.003333
 0.000333

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	SEPARATE VARIANCE T	T-VALUE	POOLED VARIANCE T	
								DF	P-VALUE	DF	P-VALUE
1	1972-3	1113.33	2	1974-6	1127.09	-13.76	-0.09	16.13	0.9325	36	0.9114
1	1972-3	1113.33	3	1980-3	991.94	231.40	2.76	13.26	0.0160 *	36	0.0466
2	1974-6	1127.09	3	1980-3	881.94	245.15	1.74	10.68	0.1106	36	0.0402

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

TAPULATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

- MIDPOINTS 475.000) 450.000) 425.000) * 400.000) * 375.000) ** 350.000) * 325.000) ** 300.000) 275.000) 250.000) *** 225.000) ** 200.000) 175.000) 150.000) 125.000)

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

Table with 2 columns: Statistic and Value. Rows include MEAN (313.003), STD.DEV. (73.777), R.F.S.D. (81.688), S.F.M. (21.207), MAXIMUM (426.000), MINIMUM (213.000), SAMPLER SIZE (12).

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

Table with 2 columns: Statistic and Value. Rows include MPAN (299.289), STD.DEV. (77.234), R.F.S.D. (82.364), S.F.M. (12.529), MAXIMUM (434.000), MINIMUM (143.000), SAMPLER SIZE (38).

ANALYSIS OF VARIANCE TABLE. 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. WPLCH 2, 22 0.73 0.4947; 2, 31 0.84 0.4397

PAGE 6 BMDP7D STATION 11 (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

SYMBOL SIGNIFICANCE LEVEL 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	SEPARATE VARIANCE T	T-VALUE	DF	P-VALUE	POOLED VARIANCE T	T-VALUE	DF	P-VALUE
1	1972-3	313.08	2	1974-6	273.64	39.45	1.16	19.68	0.2587		1.22	35	0.2309		1.22	35	0.2309
1	1972-3	313.08	3	1980-3	307.07	6.02	0.21	21.54	0.8339		0.20	35	0.8423		0.20	35	0.8423
2	1974-6	273.64	3	1980-3	307.07	-33.43	-1.03	19.15	0.3146		-1.09	35	0.2847		-1.09	35	0.2847

HISTOGRAM OF * SHIP * (VARIABLE 12). CASES DIVIDED INTO GROUPS BASED ON VALUES OF * PYEAR * (VARIABLE 4)

1972-3 1974-6 1980-3

MIDPOINTS
6000.000)
5600.000) *
5200.000)
4800.000)
4400.000)
4000.000)
3600.000)
3200.000)
2800.000) **
2400.000) M*
2000.000) ***
1600.000) **
1200.000) *
800.000)
400.000) *

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

MEAN 2271.667
STD. DEV. 1225.626
P.E.S.D. 1071.598
S. F. M. 353.808
MAXIMUM 5500.000
MINIMUM 530.000
SAMPLE SIZE 12

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

MEAN 1843.998
STD. DEV. 702.197
P.E.S.D. 630.549
S. F. M. 126.851
MAXIMUM 5500.000
MINIMUM 530.000
SAMPLE SIZE 30

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.

2, 17 6.26 0.0092
2, 15 3.65 0.0512

PAGE 8 DMDP7D STATION 11 (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

SYMBOL SIGNIFICANCE LEVEL BONFERRONI TEST

* .05 0.016667

** .01 0.003333

*** .001 0.000333

GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	SEPARATE VARIANCE T	DF	P-VALUE	T-VALUE	POOLED VARIANCE T	DF	P-VALUE
1	1972-3	2271.67	356.30	0.94	14.04	0.3620	1.16	1.16	36	0.2527	
1	1972-3	2271.67	797.08	2.22	11.68	0.0470	2.84	2.84	36	0.0073 *	
2	1974-6	1915.36	441.18	3.00	14.33	0.0094 *	1.53	1.53	36	0.1338	

NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 1896
 CPU TIME USED 0.744 SECONDS

HISTOGRAM OF * ACIDL * (VARIABLE 7). CASES DIVIDED INTO GROUPS BASED ON VALUES OF * YEAR * (VARIABLE 4)

1972-3 1974-6 1980-3

MIDPOINTS

6650.000)
6300.000) *
5950.000) *
5600.000)
5250.000)
4900.000)
4550.000) *
4200.000) **
3850.000) M *
3500.000)
3150.000) *
2800.000) **
2450.000) *
2100.000) *
1750.000)

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

MEAN 3856.487
STD.DEV. 1295.954
R.F.S.D. 1310.188
S. P. N. 374.109
MAXIMUM 6339.488
MINIMUM 1946.999
SAMPLE SIZE 12

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

MEAN 3208.543
STD.DEV. 1111.114
R.F.S.D. 1140.412
S. P. N. 185.146
MAXIMUM 6339.488
MINIMUM 1774.799
SAMPLE SIZE 36

ANALYSIS OF VARIANCE TABLE
SUM OF SQUARES
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

DF 2 33 35
MEAN SQUARE 5416301.0000 981137.1708
P VALUE 5.52 0.0085
TAIL PROBABILITY 0.1091

2, 19
2, 25
5.64
5.34
0.0119
0.0118

PAGE 6 ...DPTD STATION 11 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	T-VALUE	DF	P-VALUE	SIGNIFICANCE LEVEL	BONFERRONI TEST
1	1972-3	3856.49	2	1974-6	3321.71	534.78	1.13	19.62	0.2741	.05	0.016667
1	1972-3	3856.49	3	1980-3	2572.34	1284.15	3.08	16.17	0.0071 *	.01	0.093333
2	1974-6	3321.71	3	1980-3	2572.34	749.37	2.16	15.80	0.0461	.001	0.000333

T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1.26	33	0.2162	1.83	33	0.0767
3.30	33	0.0024 **			

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

SYMBOL
 *
 **

BONFERRONI TEST
 0.016667
 0.003333
 0.000333

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	SEPARATE VARIANCE T		POOLED VARIANCE T		
							T-VALUE	DF	P-VALUE	T-VALUE	DF
1	1972-3	1070.23	2	1974-6	918.11	152.12	1.34	18.94	1.55	32	0.1318
1	1972-3	1070.23	3	1980-3	837.08	233.15	2.37	13.61	2.54	32	0.0163 *
2	1974-6	918.11	3	1980-3	837.08	81.03	1.11	13.28	0.84	32	0.4078

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	DIFF	MEAN	SYMBOL	SIGNIFICANCE LEVEL	BONFERRONI TEST
1	1972-3	7607.31	2	1974-6	6604.15	1003.16	6604.15	*	.05	0.016667
1	1972-3	7607.31	3	1980-3	4285.73	3321.58	4285.73	**	.01	0.003333
2	1974-6	6604.15	3	1980-3	4285.73	2318.42	4285.73	***	.001	0.000333

SEPARATE VARIANCE T		POOLED VARIANCE T	
T-VALUE	DF	T-VALUE	DF
0.78	19.10	0.93	33
3.09	12.58	3.37	33
2.90	11.50	2.23	33

SEPARATE VARIANCE T		POOLED VARIANCE T	
T-VALUE	P-VALUE	T-VALUE	P-VALUE
0.78	0.4435	0.93	0.3568
3.09	0.0090 *	3.37	0.0019 **
2.90	0.0139 *	2.23	0.0324

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

HIDPOINTS	1972-3	1974-6	1980-3
3.800)*			
3.760)*			
3.720)			
3.680)			
3.640)***	*		
3.600)	***		*
3.560)N*	**		
3.520)	N		
3.480)***			*
3.440)	***		**
3.400)*			**
3.360)			N
3.320)			***
3.280)*			*
3.240)			****

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

MEAN	3.564	3.504	3.397
STD.DFV.	0.147	0.134	0.107
P.E.S.D.	0.150	0.150	0.112
S. P. M.	0.042	0.042	0.029
MAXIMUM	3.802	3.660	3.631
MINIMUM	3.289	3.249	3.270
SAMPLE SIZE	12	10	14

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

MEAN	3.482
STD.DFV.	0.145
P.E.S.D.	0.154
S. P. M.	0.024
MAXIMUM	3.802
MINIMUM	3.249
SAMPLE SIZE	36

***** ANALYSIS OF VARIANCE TABLE *****
 * SOURCE * SUM OF SQUARES * DF * MEAN SQUARE * F VALUE * TAIL PROBABILITY *
 * BETWEEN GROUPS * 0.1852 * 2 * 0.0926 * 5.57 * 0.0082 *
 * WITHIN GROUPS * 0.5483 * 33 * 0.0166 * * *
 * TOTAL * 0.7335 * 35 * * *
 * 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,	20	5.71	0.0109
2,	29	5.39	0.0102

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	
		TEST	P-VALUE
*	.05	0.016667	
**	.01	0.003333	
***	.001	0.000333	

GROUP NO.	GROUP NAME	MEAN	DIFF	SEPARATE VARIANCE T		POOLED VARIANCE T	
				T-VALUE	DF	T-VALUE	DF
1	1972-3	3.56	0.06	1.00	19.82	1.08	33
1	1972-3	3.56	0.17	3.25	19.83	3.28	33
2	1974-6	3.50	0.11	2.09	16.74	2.00	33

GROUP NO.	GROUP NAME	MEAN
2	1974-6	3.50
3	1980-3	3.40
3	1980-3	3.40

MEAN DIFF	T-VALUE	DF	P-VALUE
0.06	1.00	19.82	0.3317
0.17	3.25	19.83	0.0041 *
0.11	2.09	16.74	0.0523

T-VALUE	DF	P-VALUE
1.08	33	0.2879
3.28	33	0.0025 **
2.00	33	0.0539

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

1972-3 1974-6 1980-3

TABLATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

MIDPOINTS

3.255) *

3.220)

3.185)

3.150) *

3.115) *

3.080) **

3.045) *

3.010) M

2.975) *

2.940)

2.905)

2.870) ***

2.835) *

2.800)

2.765)

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

MEAN 3.012

STD.DEV. 0.131

R.E.S.D. 0.140

S. E. M. 0.038

MAXIMUM 3.242

MINIMUM 2.823

SAMPLE SIZE 12

2.952

0.103

0.100

0.033

3.082

2.769

10

13

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

MEAN 2.960

STD.DEV. 0.106

R.E.S.D. 0.108

S. E. M. 0.018

MAXIMUM 3.242

MINIMUM 2.769

SAMPLE SIZE 35

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

LEVENE'S TEST FOR EQUAL VARIANCES 2, 32 3.82 0.0325

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

2, 18 0.1079 2, 25 2.57 0.0962

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

0.016667

0.033333

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	3.01	2	1974-6	2.95	0.06	1.19	19.95	19.95	0.2483	1.36	32	0.1822	
1	1972-3	3.01	3	1980-3	2.92	0.09	2.24	15.45	15.45	0.0404	2.28	32	0.0291	
2	1974-6	2.95	3	1980-3	2.92	0.03	0.91	13.94	13.94	0.3774	0.79	32	0.4376	

NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 2098

CPU TIME USED 1.034 SECONDS

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

1972-3 1974-6 1980-3
 MIDPOINTS

4.140) *	*	**
4.080) *	*	**
4.020) *	*	**
3.960) *	*	**
3.900) *	*	**
3.840) M***	*	M***
3.780)	*	**
3.720)	*	**
3.660)	*	**
3.600) *	*	**
3.540)	*	**
3.480) *	*	**
3.420)	*	**
3.360) *	*	**
3.300)	*	**

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

MEAN	3.826	3.789	3.619
STD. DEV.	0.245	0.182	0.115
R.F.S.D.	0.239	0.182	0.108
S. E. M.	0.071	0.058	0.031
MAXIMUM	4.150	4.009	3.791
MINIMUM	3.333	3.392	3.324
SAMPLE SIZE	12	10	14

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

MEAN	3.735	DF	2	MEAN SQUARE	4.63	TAIL PROBABILITY	0.0168
STD. DEV.	0.204		33				
R.F.S.D.	0.208						
S. E. M.	0.034						
MAXIMUM	4.150						
MINIMUM	3.324						
SAMPLE SIZE	36						

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

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F VALUE	TAIL PROBABILITY
BETWEEN GROUPS	0.3181	2	0.1591		
WITHIN GROUPS	1.1327	33	0.0343		
TOTAL	1.4508	35			

LEVENE'S TEST FOR EQUAL VARIANCES

2	33	2.37	0.1088
---	----	------	--------

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

2	18	5.69	0.0121
2	24	4.41	0.0234

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	MEAN DIFF	T-VALUE	DF	P-VALUE	SEPARATE VARIANCE T	T-VALUE	DF	P-VALUE	POOLED VARIANCE T	T-VALUE	DF	P-VALUE
1	1972-3	3.83	0.04	0.40	19.78	0.6920		0.46	33	0.6469		0.46	33	0.6469
1	1972-3	3.03	0.21	2.68	15.11	0.0169		2.84	33	0.0076 *		2.84	33	0.0076 *
2	1974-6	3.79	0.17	2.61	14.11	0.0203		2.22	33	0.0331		2.22	33	0.0331

SYMBOL * ** ***

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

1972-3 1974-6 1980-3
 VAR 14 EXCLUDED VALUES

TABULATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

MIDPOINTS	*	**
0.735)		
0.700)		
0.665) *	*	
0.630)		
0.595)		
0.560) *	*	
0.525)		
0.490) **	*	
0.455)		
0.420) H****	H*	
0.385)	**	
0.350)	H	
0.315) *	**	
0.280)	***	
0.245) **	****	

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

MEAN	0.423
STD. DEV.	0.124
R.E.S.D.	0.115
S. E. M.	0.036
MAXIMUM	0.670
MINIMUM	0.240
SAMPLE SIZE	12

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

MEAN	0.401
STD. DEV.	0.118
R.E.S.D.	0.113
S. E. M.	0.029
MAXIMUM	0.710
MINIMUM	0.230
SAMPLE SIZE	35

ANALYSIS OF VARIANCE TABLE

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F VALUE	TAIL PROBABILITY
BETWEEN GROUPS	0.0211	2	0.0105	0.75	0.4916
WITHIN GROUPS	0.4500	32	0.0141		
TOTAL	0.4719	34			

LEVENE'S TEST FOR EQUAL VARIANCES: 2, 32, 0.37, 0.9167

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

2,	20	0.00	0.4632
2,	29	0.73	0.4916

PAGE 4 BMDP7D STATION 11 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 0.016657

SYMBOL	SIGNIFICANCE LEVEL	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	SEPARATE VARIANCE T	T-VALUE	DF	P-VALUE	POOLED VARIANCE T	T-VALUE	DF	P-VALUE
1	1972-3	0.42	2	1974-6	0.41	0.01	0.15	18.91	0.8799	0.15	0.15	32	0.8708	0.16	0.16	32	0.8708
1	1972-3	0.42	3	1980-3	0.37	0.05	1.18	21.66	0.2520	0.91	0.91	32	0.2633	1.14	1.14	32	0.2633
2	1974-6	0.41	3	1980-3	0.37	0.05	0.91	17.04	0.3751	0.91	0.91	32	0.3661	0.92	0.92	32	0.3661

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

1972-3 1974-6 1980-3

VAR 16 EXCLUDED VALUES

TABLATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

- 0.140)
-0.175) *
-0.210)
-0.245) *
-0.280)
-0.315) **
-0.350)
-0.385) H****
-0.420)
-0.455)
-0.490) *
-0.525)
-0.560)
-0.595)
-0.630) **

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

- MEAN -0.391
STD.DPV. 0.133
P.E.S.D. 0.119
S. P. M. 0.038
MAXIMUM -0.174
MINIMUM -0.620
SAMPLE SIZE 12

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

- MEAN -0.414
STD.DEV. 0.123
P.E.S.D. 0.125
S. P. M. 0.021
MAXIMUM -0.149
MINIMUM -0.638
SAMPLE SIZE 35

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-PAY ANALYSIS OF VARIANCE TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL

- WEICH 2, 21 0.76 0.4794
BROWN-FORSYTHE 2, 31 0.75 0.4788

PAGE 6 RMDP7D STATION 11 MULTIPLE COMPARISONS ON FLOW

PAIRWISE COMPARISONS AMONG NONEMPTY CELL (GROUP) MEANS.
 ASTERISKS DENOTE THE LEVELS OF SIGNIFICANCE OF THE DONPERRONI TESTS.
 THE VALUE GIVEN FOR THE DONPERRONI 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

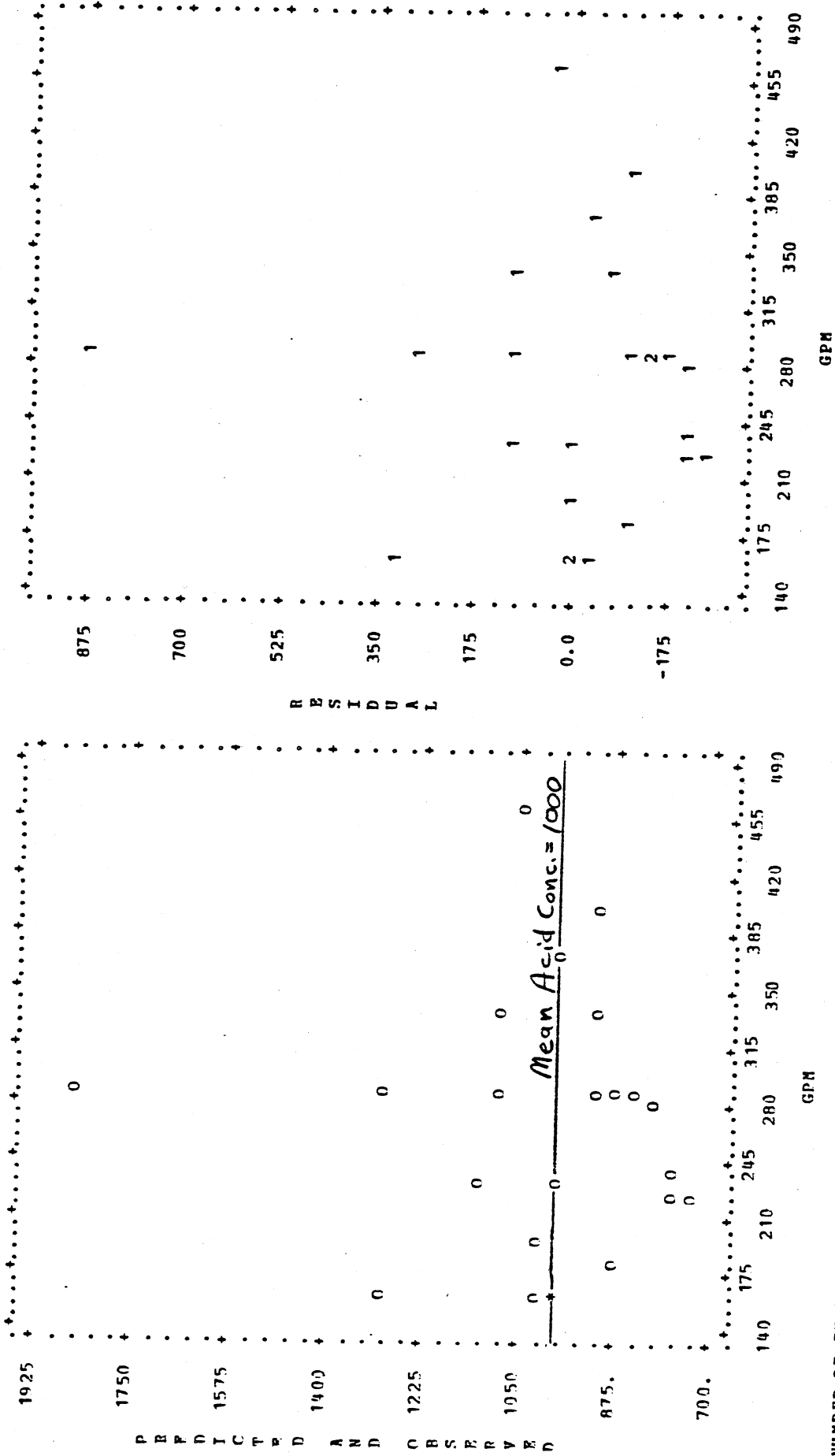
SYMBOL	SIGNIFICANCE LEVEL	DONPERRONI TEST
*	.05	0.016667
**	.01	0.003333
***	.001	0.000333

GROUP NO.	GROUP NAME	MEAN	DIFF	MEAN DIFF	T-VALUE	SEPARATE VARIANCE	T-VALUE	POOLED VARIANCE	T-VALUE	P-VALUE
1	1972-3	-0.39	0.01	0.13	0.13	19.77	0.14	32	0.14	0.8922
1	1972-3	-0.39	0.06	1.12	1.12	21.99	1.13	32	1.13	0.2650
2	1974-6	-0.40	0.05	0.97	0.97	19.02	0.94	32	0.94	0.3539
2	1974-6	-0.40								
3	1980-3	-0.45								
3	1980-3	-0.45								

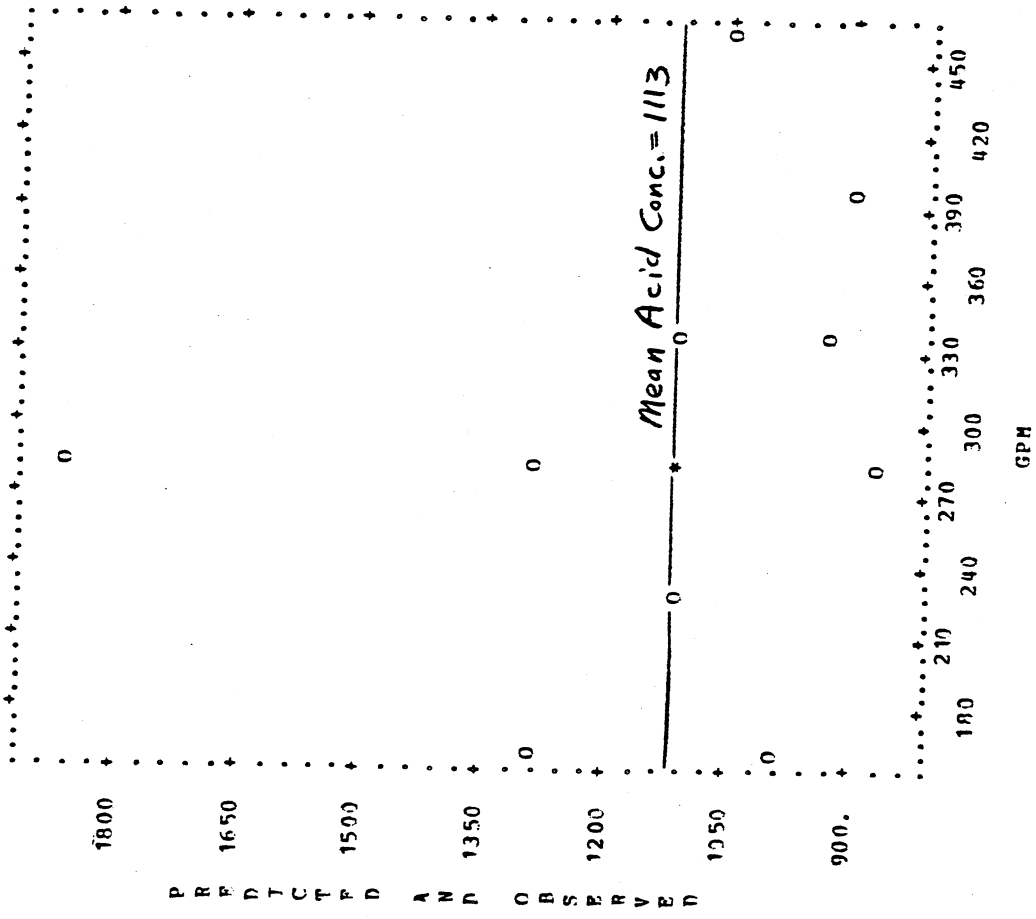
NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 1680
 CPU TIME USED 0.666 SECONDS

PAGE 5 DMDPIR STATION 11 REGRESSION ACID CONCENTRATION VS FLOW ALL DATA 1972-73 and 1982-83

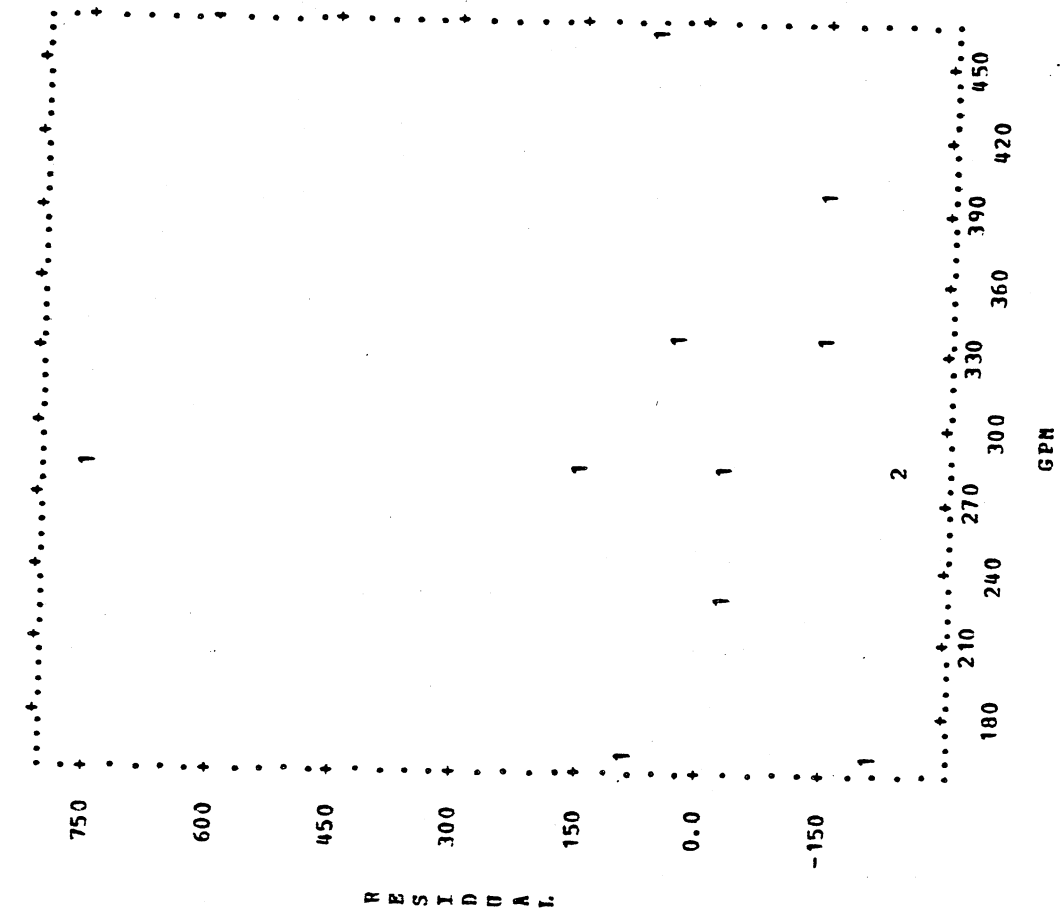
PAGE 5 DMDPIR STATION 11 REGRESSION ACID CONCENTRATION VS FLOW



NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 1190
CPU TIME USED 0.599 SECONDS



NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 1198
 CPU TIME USED 0.174 SECONDS



Station 11 1982-83

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