

SHAW MINES RUN – STATION #3

SHAW MINES RUN - STATION 3

Description

Shaw Mines Run was sampled near its confluence with the Casselman since July 1967, and has the most complete record of flows and chemical analyses of any of the AMD discharges, with a total of 162 observations (see data file). This is the largest source of AMD during low flows.

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."

* ACID

MAXIMUM 2030.0000000
MINIMUM 4.0000000
RANGE 2026.0000000
VARIANCE 89350.4375000
ST.DEV. 298.9155273
(Q3-Q1)/2 175.0000000
MX.ST.SC. 3.99
MN.ST.SC. -2.79

ST.ERROR
21.5578308
28.8675232

838.5712891
850.0000000
1000.0000000

LOCATION ESTIMATES

MEAN 838.5712891
MEDIAN 850.0000000
MODE 1000.0000000

SOME NEW LOCATION ESTIMATES

HAPPEL 835.2089134
TRIM (.15) 836.9387755
RTWEIGHT 835.9238281

M S Q
I.....
N.....
.....
.....
.....
.....

DEPTH STEM * LEAVES

3 0 * 000
4 22333
5 444444455555555555
6 66666666666666666667777777777777
7 88888888888888888888888888888888999999999999
8 00
9 223333
10 445
11 2
12 2
13 2 * 01
14 0
15 0
16 0
17 0
18 0
19 0
20 0

DEPTH STEM * LEAVES

MINIMUM = 4.00000
MAXIMUM = 2030.00000
COUNT = 161

EACH 'H' REPRESENTS 3
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 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

EACH ' - ' ABOVE = 100.0000
L = 0.0
U = 2200.0000
CASE NO. OF MIN. VAL. = 37
CASE NO. OF MAX. VAL. = 32

VALUE 0.41 SKEWNESS 6.01
2.32 KURTOSIS 6.01
Q1 = 650.0000000
Q3 = 1000.0000000
S- = 539.6557617
S+ = 1137.4868164

EACH ' . ' BELOW = 20.0000
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z

MEMPHIS 2.07000
MAXIMUM 950.00000
COUNT = 158

 * SULF *

VARIABLE NUMBER 12
 NUMBER OF DISTINCT VALUES 113
 NUMBER OF VALUES COUNTED 160
 NUMBER OF VALUES NOT COUNTED 1

MAXIMUM 5800.000000
 MINIMUM 32.000000
 RANGE 5768.000000
 VARIANCE 755829.000000
 ST. DEV. 869.3842773
 (Q3-Q1)/2 446.2500000
 MX. ST. SC. 4.34
 MN. ST. SC. -2.30

LOCATION ESTIMATES

MEAN 2029.1811523
 MEDIAN 1832.5000000
 MODE 2500.0000000

ST. ERROR 68.7308502
 54.8482971

SOME NEW LOCATION ESTIMATES

HAMPEL 1874.5996828
 TRIM (.15) 1906.4642857
 BIVRIGHT 1862.6330566

M
 I
 N

S 0
 - 1
 M H N
 3 4
 O
 P A
 D
 E

DEPTH STEM * LEAVES
 2 0 * 01
 7 * 79999
 38 1 E 000111111222223333334444444
 + 56 M 555555555555556666666666777777888888888899999999999
 66 2 Q 0000111111111111222233333444444
 35 * 5555677777889
 20 3 E 00002244
 12 * 556789
 6 4 * 0222
 2 * *
 2 * *
 2 * 88

SKEWNESS
 KURTOSIS

DEPTH STEM * LEAVES

MINIMUM = 32.0000J
 MAXIMUM = 5800.00000
 COUNT = 160

EACH 'H'
 REPRESENTS
 COUNT(S)

EACH '-' ABOVE = 300.0000
 L= 0.0
 U= 6600.0000
 CASE NO. OF MIN. VAL. = 37
 CASE NO. OF MAX. VAL. = 51

O1= 1507.5000000
 Q3= 2400.0000000
 S- = 1159.7968750
 S+ = 2898.5654297

EACH '.' BELOW = 50.0000

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* ACIDL *

VARIABLE NUMBER 7
NUMBER OF DISTINCT VALUES . . . 72
NUMBER OF VALUES COUNTED . . . 73
NUMBER OF VALUES NOT COUNTED . . 88

MAXIMUM 24999.9765625
MINIMUM 0.0
RANGE 24999.9765625
VARIANCE 21398176.0000000
ST. DEV. 4625.8164063
(03-01)/2 2514.4140625
MX. ST. SC. 3.80
MN. ST. SC. -1.60

LOCATION ESTIMATES

MEAN 7424.0429688
MEDIAN 6916.6562500
MODE 7925.4062500
ST. ERROR 541.4106445
493.8737793

SOME NEW LOCATION ESTIMATES

HADPPL 6803.3149645
TRIM(.15) 6937.6648116
BIRIGHT 6779.5234375

EACH * H*
REPRESENTS
COUNT(S)

HH
HHHH
HHHHH H
HHHHHH H
HHHHHHHH H H
L-----H

EACH ' . ' ABOVE = 1500.0000
L= 0.0
U= 33000.0000
CASE NO. OF MIN. VAL. = 14
CASE NO. OF MAX. VAL. = 96

01= 4482.0000000
03= 9510.8281250
S- = 2798.2265625
S+ = 12049.8593750

VALUE 1.10
1.96
SKEWNESS 3.84
KURTOSIS 3.42

EACH ' . ' BELOW = 200.0000

H S 0
I - 1
N
UM M H 0
AE.E.O. 3
MD A D
P I N E

DEPTH STEM * LEAVES

6 0 * 070011
15 E 222233333
29 0 44444444455555
19 H 66666666777777777
25 0 888999999
16 1 * 0011
12 E 2222333
5 * 4
4 * 6
3 * 8
2 * 0
1 * *
1 * 5
0 * *
0 * *

DEPTH STEM * LEAVES

MINIMUM = 0.0
MAXIMUM = 24999.97656
COUNT = 73

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* TOTPEL ~ *

VARIABLE NUMBER 10
NUMBER OF DISTINCT VALUES . . . 71
NUMBER OF VALUES COUNTED. . . . 71
NUMBER OF VALUES NOT COUNTED . . 90

MAXIMUM 8833.3164063
MINIMUM 0.0
RANGE 8833.3164063
VARIANCE 1606890.0000000
ST. DEV. 1267.5961914
(Q3-Q1)/2 499.2399902
M.I. ST. SC. 5.91
M.N. ST. SC. -1.06

LOCATION ESTIMATES

MEAN 1340.9057617
MEDIAN 1128.7500000
MODE NOT UNIQUE

ST. ERROR 150.4359894
93.0194580

SOME NEW LOCATION ESTIMATES

HARPEL 1130.2124100
TRIM (.15) 1169.0434644
BIWEIGHT 1122.9982910

S 0 Q
M- 1 M H 3 S +
I.....E.E.....
N D A I N

DEPTH STEM * LEAVES

2# 0 0 0001122333444555566777888999
+ 32 1 H 000001111112222334445555666777999
11 2 E 00011122
3 3 *
3 4 * 2
2 5 * 6
1 6 *
1 7 *
1 8 * 8

DEPTH STEM * LEAVES

MINIMUM = 0.0
MAXIMUM = 8833.31641
COUNT = 71

H
H
HH
HHHH
HHHH
HHHH
HHHH
HHHH
HHHH
HHHH
H H H H
L-----H-----H
EACH 'H' REPRESENTS 2 COUNT(S)

EACH '---' ABOVE = 500.0000
L = 0.0
H = 11000.0000
CASE NO. OF MIN. VAL. = 14
CASE NO. OF MAX. VAL. = 96

VALUE 3.51 16.60
SKEWNESS 641.5197754
KURTOSIS 1640.0000000
12.08
28.56
S- = 73.3095703
St = 2608.5019531

EACH '...' BELOW = 75.0000
M
A
X

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* SULPL *

VARIABLE NUMBER 13
NUMBER OF DISTINCT VALUES . . . 68
NUMBER OF VALUES COUNTED . . . 72
NUMBER OF VALUES NOT COUNTED . . 89

MAXIMUM 77916.5000000
MINIMUM 0.0
RANGE 77916.5000000
VARIANCE *****
ST. DEV. 13375.9726563
(Q3-Q1)/2 6669.3320313
MX. ST. SC. 4.30
MN. ST. SC. -1.52

LOCATION ESTIMATES

MEAN 20382.4843750
MEDIAN 17966.6562500
MODE NOT UNIQUE

ST. ERROR

1576.3735352
1993.7854004

SOME NEW LOCATION ESTIMATES

HAMPEL 18236.6468993
TRIM (.15) 18591.6652406
BIWEIGHT 18288.5937500

S O Q
- 1 N M 3
I F. E.
N D A I N

DEPTH STEM * LEAVES

+ 16 0 E 002567778899999
23 1 M 011122344566667778889
33 2 O 12233333333344444455689
11 3 E 0114555
4 4 * 46
2 5 *
2 6 *
2 7 * 27

DEPTH STEM * LEAVES

MINIMUM = 0.0
MAXIMUM = 77916.50000
COUNT = 72

H
H
H HH
H HH
HHH
HHH
HHHH
HHHHHH
HHHHHHH
HH
L-----U

EACH 'H'
REPRESENTS
2
COUNT (S)

EACH '0' ABOVE = 5000.0000
L = 0.0
U = 110000.0000
CASE NO. OF MIN. VAL. = 14
CASE NO. OF MAX. VAL. = 96

VALUE VALUE/S.P.
1.92 6.65
5.76 9.97
SKEWNESS
KURTOSIS

Q1=10901.7304688
Q3=24240.3945313
S-= 7006.5117180
S+=33758.4570313

EACH '0' BELOW = 750.0000

H
A
X

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* I TOTPE *

VARIABLE NUMBER 18
NUMBER OF DISTINCT VALUES . . . 70
NUMBER OF VALUES COUNTED . . . 70
NUMBER OF VALUES NOT COUNTED . . 91

MAXIMUM 3.9461241
MINIMUM 1.0111465
RANGE 2.9349775
VARIANCE 0.1919428
ST. DEV. 0.4381127
MX. ST. SC. 0.1802444
MN. ST. SC. 2.21
 -4.49

LOCATION ESTIMATES
MEAN 2.9792194
MEDIAN 3.0531578
MODE NOT UNIQUE

ST. ERROR 0.0523645
0.0389803

SOME NEW LOCATION ESTIMATES
HAMPEL 3.0540678
TRIM (.15) 3.0430538
RIFWEIGHT 3.0554247

HH EACH 'H'
UR REPRESENTS
HH COUNT(S)
HHH 2
HHHH
HHHHH
HHHHHH
HHHHHHH
HHHHHHH
HHHHHHH
L-----D

EACH '---' ABOVE = 0.1500
 0.9000
 4.2000

CASE NO. OF MIN. VAL. = 141
CASE NO. OF MAX. VAL. = 96

VALUE VALUE/S.D.
-1.74 -5.93
5.46 9.32

Q1= 2.8543549
Q3= 3.2148438
S- = 2.5411062
S+ = 3.4173317

 SKEWNESS
 KURTOSIS

 EACH '---' BELOW = 0.0250
 Q S
 3 +

 M MH
 A DN
 N IP

DEPTH STEM * LEAVES
1 1 * 0
1 *
1 *
2 * 6
3 * 9
3 * 9
2 * 233
6 * 233
9 E 455
16 * 6667777
27 * 88889999999
+ 21 1 M 000000000001111111
22 0 222222222233333333
3 * 9
3 * 67
1 * 9
* *

DEPTH STEM * LEAVES

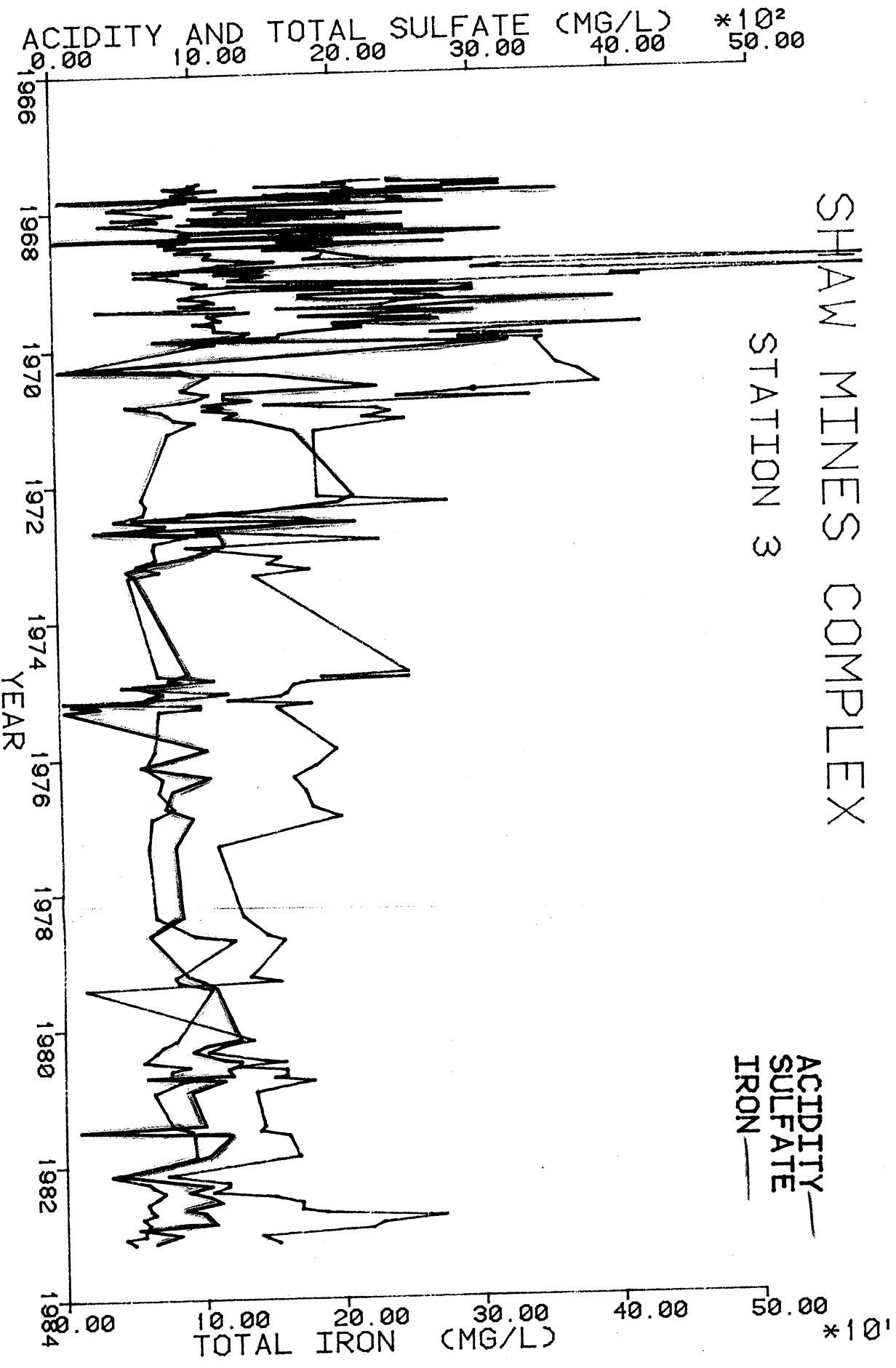
MINIMUM = 1.01115
MAXIMUM = 3.94612
COUNT = 70

Graphical Trends of Observations

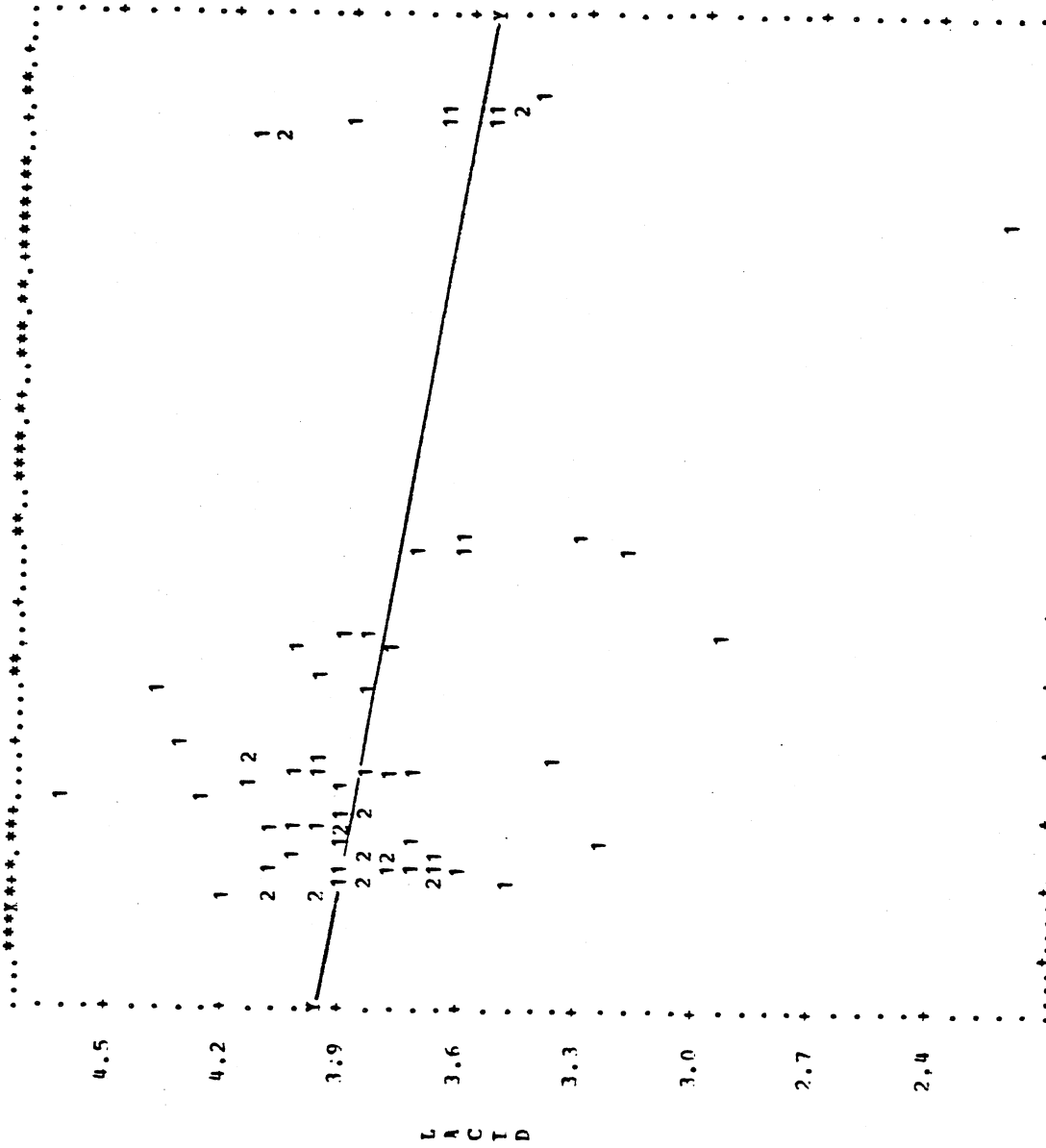
The CalComp plots (three-color) of acidity, iron and sulfate concentrations through time show an overall decrease in all concentrations, with the most striking changes seen in the sulfate and iron.

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.

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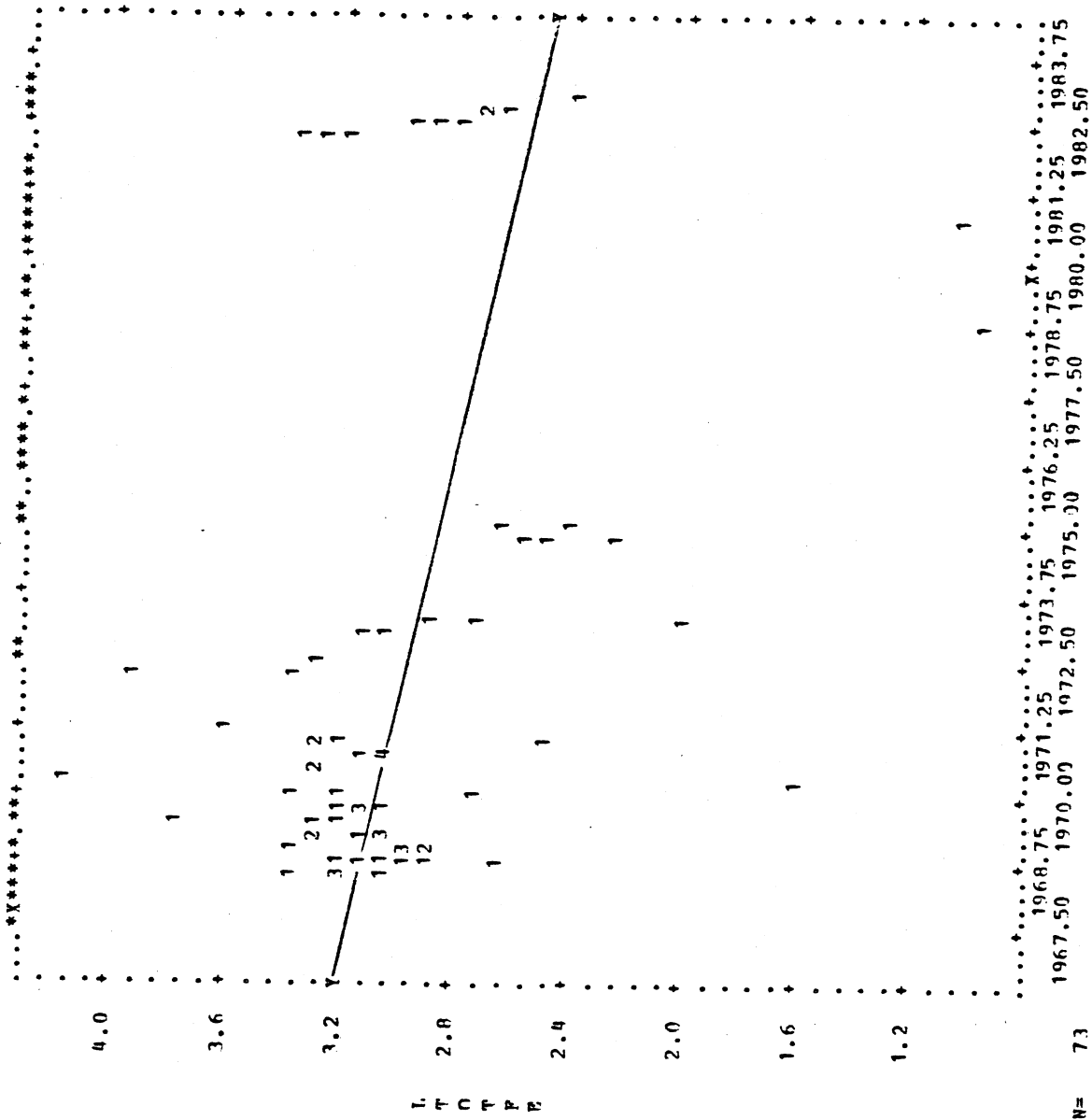


N= 73
 COR=-.3149

MEAN	ST. DEV.	REGRESSION LINE	RES. MS.
X 1972.4	4.7672	$Y = -4.4489 * X + 1989.4$	20.761
Y 3.8084	.33743	$Y = -.02229 * X + 47.774$.10401

VARIABLE 4 PYEAR VERSUS VARIABLE 16 LACID

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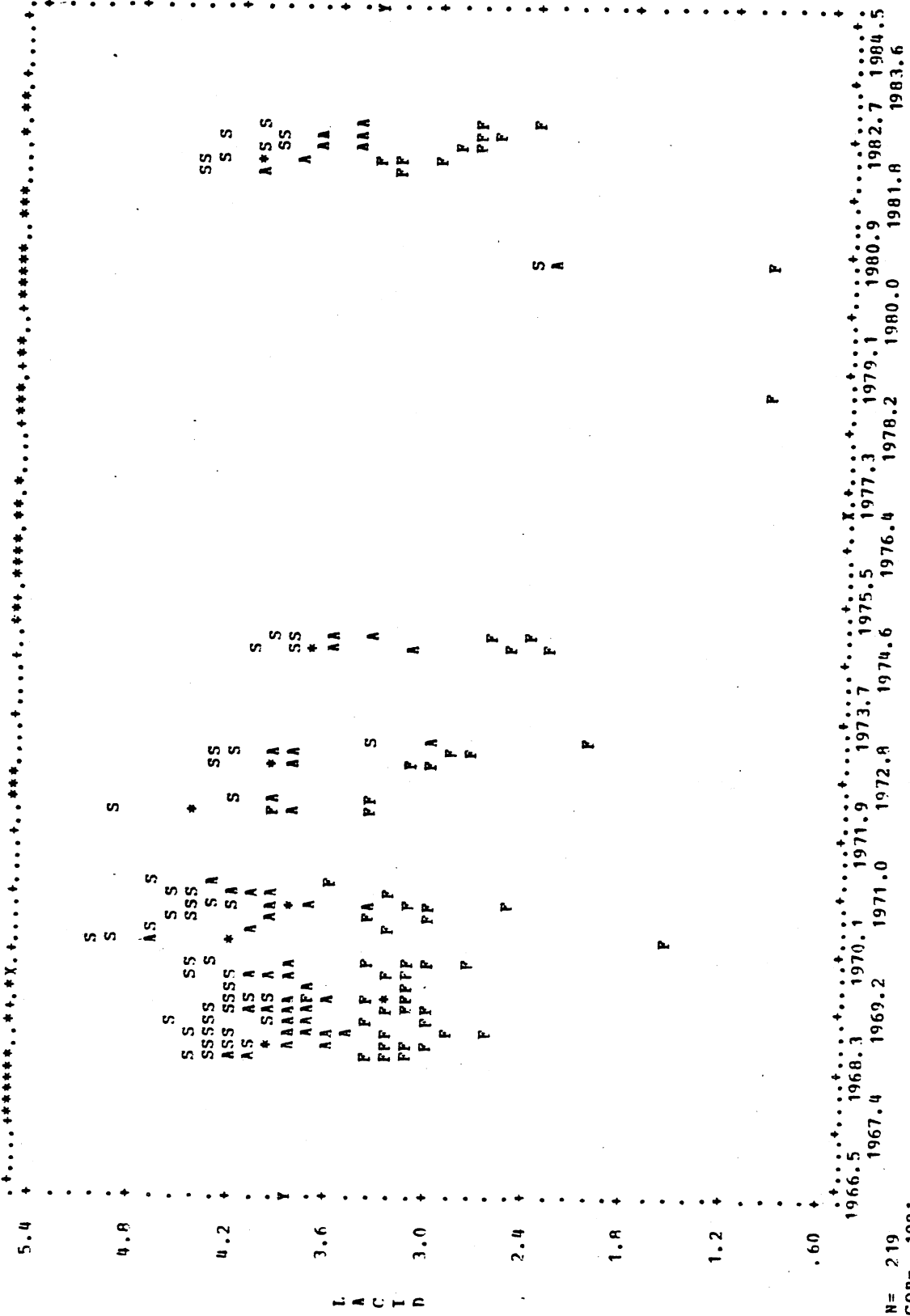


N= 73
COR=-.3705

MEAN ST.DEV. REGRESSION LINE RES.MS.
 X 1972.4 4.6675 X=-3.3699*Y+ 1982.4 19.050
 Y 2.9708 .51323 Y=-.04075*X+ 93.336 .23044

VARIABLE 4 PYEAR VERSUS VARIABLE 18 LTOTPE

PAGE 4 BMDF6D STATION 3 LOG OF LOADS PLOT



REGRESSION LINE

MEAN 3.6719
 ST.DEV. 0.66445
 REGRESSION LINE $Y = -1.4135 * X + 58.987$
 RES.MS. 21.468
 COR = -.1991

VARIABLE 4 PYEAR
 VARIABLE 4 PYEAR
 VARIABLE 4 PYEAR
 VERSUS VARIABLE 16 LACID
 VERSUS VARIABLE 17 LSOLF
 VERSUS VARIABLE 18 LTOFFE
 SYMBOL=A
 SYMBOL=S
 SYMBOL=F

Statistical Comparisons

Station 3 data was grouped into five time groups: 1967-68, 1969-71, 1972-73, 1974-79 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 two periods (1967-68 and 1969-71) are greater than most recent period (1980-83). Decrease of approximately 25-35%.
2. Iron - Same as acidity. Decrease of roughly 50%.
3. Sulfate - Same as acidity. Decrease of roughly 25-40%.
4. Comments - Iron shows greatest decrease, acidity and sulfate show similar reductions. Very significant statistical differences for all three.

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 means for recent years are 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 (1969-71) is significantly greater than 1980-83. Decrease of roughly 40-50%.
2. Log Iron Load - Decrease of roughly 50% from early data to recent, but not significant at 0.05 confidence.

3. Log Sulfate Load - Same as log acid load. Decrease is roughly 40%.
4. Comments - The improvements in acid and sulfate loads in recent years are statistically significant. The improvements in iron loads are significant at a level of 0.086. All load averages have been reduced on the order of 40%.

D. Flows

1. Flows ("AMGPD") - No differences between groups except anomalous low flows in 1974-77.
2. Log Flows ("LMGPD") - Same as flows.
3. Comments - Average flows in 1980-83 are no different than in earliest periods, 1967-68 and 1969-70. 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. 1967-68]
3. 1969-70] No correlation between acid concentrations
4. 1971-73] and flows.
5. 1974-79]
6. 1980-83]
7. Comments - Plots indicate "Type 1" discharge with observed acidities uniformly distributed about the mean over the range of flows.

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

	1967-8	1969-71	1972-3	1974-9	1980-3
MIDPOINTS					
2100.000)					
2000.000)	*				
1900.000)					
1800.000)					
1700.000)					
1600.000)					
1500.000)					
1400.000)	**				
1300.000)	***				
1200.000)	*				
1100.000)	*****				
1000.000)	*****				
900.000)	M*****				
800.000)	*****	*			
700.000)	*****	*			
600.000)	*	****			
500.000)	*	M***			
400.000)	***	*			
300.000)	*	*			
200.000)	*	*			
100.000)		*			
0.0)					

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

MEAN	878.571	1033.750	620.154	795.042	666.448
STD.DEV.	307.884	273.718	167.719	260.484	157.918
R.E.S.D.	256.106	241.719	157.126	247.466	160.768
S. E. M.	41.143	43.279	46.517	53.171	29.325
MAXIMUM	2039.000	2000.000	930.000	1220.000	972.000
MINIMUM	4.000	300.000	260.000	20.000	315.000
SAMPLE SIZE	56	40	13	24	29

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

	SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F VALUE	TAIL PROBABILITY
MEAN						
STD.DEV.	845.801					
R.E.S.D.	243.424	3129734.0000	4	782433.5000	11.45	0.0000
S. E. M.	275.706	*****	157	68356.4143		
MAXIMUM	23.054	TOTAL	161			
MINIMUM	4.000	*****				
SAMPLE SIZE	162	LEVENE'S TEST FOR EQUAL VARIANCES	4, 157	1.20	0.3115	

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

4, 58	16.19	0.0000
4, 135	14.06	0.0000

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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 0.005000

SYMBOL SIGNIFICANCE LEVEL BONFERRONI TEST
 * .05 0.005000
 ** .01 0.001000
 *** .001 0.000100

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1	1967-8	878.57	2	1969-71	1033.75	-155.18	-2.60	89.51	0.0110	-2.87	157	0.0047 *
1	1967-8	878.57	3	1972-3	620.15	258.42	4.16	33.63	0.0002 **	3.21	157	0.0016 *
1	1967-8	878.57	4	1974-9	795.04	83.53	1.24	51.12	0.2197	1.31	157	0.1923
2	1969-71	1033.75	5	1980-3	666.45	212.12	4.20	83.00	0.0001 ***	3.55	157	0.0005 **
2	1969-71	1033.75	3	1972-3	620.15	413.60	6.51	33.94	0.0000 ***	4.96	157	0.0000 ***
2	1969-71	1033.75	4	1974-9	795.04	238.71	3.48	50.50	0.0010 *	3.54	157	0.0006 **
3	1972-3	620.15	5	1980-3	666.45	367.30	7.03	64.19	0.0000 ***	5.76	157	0.0000 ***
3	1972-3	620.15	4	1974-9	795.04	-174.89	-2.48	33.77	0.0185	-1.94	157	0.0539
4	1974-9	795.04	5	1980-3	666.45	-46.29	-0.84	21.95	0.4089	-0.53	157	0.5965
			5	1980-3	666.45	128.50	2.12	36.36	0.0411	1.78	157	0.0766

HISTOGRAM OF * TDTFF * (VARIABLE 9). CASES DIVIDED INTO GROUPS BASED ON VALUES OF * YEAR * (VARIABLE 4)

1967-8 1969-71 1972-3 1974-9 1980-3
++++++

VAR 9
 EXCLUDED
 VALUFS

TABLATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE *

MIDPOINTS
 1050.000)
 1000.000)
 950.000)
 900.000)
 850.000)
 800.000)
 750.000)
 700.000)
 650.000)
 600.000)
 550.000)
 500.000)
 450.000)
 400.000)
 350.000)*
 300.000)*****
 250.000)*****
 200.000)M*****
 150.000)*****
 100.000)*****
 50.000)
 0.0)**

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

MEAN	200.750	206.800	111.615	71.478	91.825
STD.DEV.	78.193	143.808	63.757	28.570	28.093
R.E.S.D.	79.933	105.338	66.166	27.616	27.240
S. P. M.	10.440	22.718	17.683	5.957	5.309
MAXIMUM	360.000	950.000	213.000	108.000	125.000
MINIMUM	2.000	2.000	32.000	2.000	9.000
SAMPLE SIZE	56	40	13	23	28

ALL GROUPS COMBINED
 (EXCEPT CASES WITH UNUSED VALUES FOR PYEAR)
 MEAN 157.376
 STD.DPV. 104.946
 R.E.S.D. 94.903
 S. P. M. 8.297
 MAXIMUM 950.000
 MINIMUM 2.000
 SAMPLE SIZE 160

***** ANALYSIS OF VARIANCE TABLE *****
 SOURCE SUM OF SQUARES DF MEAN SQUARE F VALUE TAIL PROBABILITY
 BETWEEN GROUPS 520302.1250 4 130075.5000 16.38 0.0000
 WITHIN GROUPS 1230875.9898 155 7941.1354
 TOTAL 1751178.0000 159
 LEVENY'S TEST FOR EQUAL VARIANCES 4, 155 5.32 0.0005
 ONE-WAY ANALYSIS OF VARIANCE
 TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL
 WELCH BROWN-FORSYTHE
 4, 55 33.94 0.0000
 4, 79 21.10 0.0000

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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 0.005000

SYMBOL * ** ***
SIGNIFICANCE LEVEL .05 .01 .001
BONFERRONI TEST 0.005000 0.001000 0.000100

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	P-VALUE
1	1967-8	200.75	2	1969-71	206.80	-6.05	-0.24	55.46	0.8099	-0.33	155	0.7434
1	1967-8	200.75	3	1972-3	111.62	89.13	4.34	21.28	0.0003	3.25	155	0.0014 *
1	1967-8	200.75	4	1974-9	71.48	129.27	10.75	76.39	0.0	5.86	155	0.0000 ***
2	1969-71	206.80	5	1980-3	91.82	108.92	9.29	76.66	0.0000	5.28	155	0.0000 ***
2	1969-71	206.80	3	1972-3	111.62	95.18	3.30	45.89	0.0019 *	3.35	155	0.0011 *
2	1969-71	206.80	4	1974-9	71.48	135.32	5.76	44.17	0.0000	5.80	155	0.0000 ***
3	1972-3	111.62	5	1980-3	91.82	114.97	4.92	43.18	0.0000	5.24	155	0.0000 ***
3	1972-3	111.62	4	1974-9	71.48	40.14	2.15	14.77	0.0485	1.30	155	0.0000 ***
4	1974-9	71.48	5	1980-3	91.82	19.79	1.07	14.21	0.3016	0.66	155	0.5091
			5	1980-3	91.82	-20.35	-2.55	46.78	0.0141	-0.81	155	0.4184

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

MIDPOINTS
 1967-8 1969-71 1972-3 1974-9 1980-3

6300.000)					
6000.000)					
5700.000)**					
5400.000)					
5100.000)					
4800.000)					
4500.000)					
4200.000)**					
3900.000)**					
3600.000)					
3300.000)**					
3000.000)**					
2700.000)					
2400.000)					
2100.000)M					
1800.000)					
1500.000)					
1200.000)					
900.000)**					
600.000)					
300.000)					
0.0)**					

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

MEAN	2043.518	2760.000	1646.154	1630.792	1511.828
STD.DEV.	976.986	726.442	536.820	459.804	396.713
R.E.S.D.	733.076	715.875	518.400	380.721	352.587
S. F. M.	130.555	114.861	148.887	93.857	73.668
MAXIMUM	5800.000	4200.000	2800.000	2500.000	2709.000
MINIMUM	32.000	1250.000	920.000	149.000	720.000
SAMPLE SIZE	56	40	13	24	29

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

MEAN	2032.214				
STD.DEV.	865.696				
R.E.S.D.	790.160				
S. F. H.	68.015				
MAXIMUM	5800.000				
MINIMUM	32.000				
SAMPLE SIZE	162				

ANALYSIS OF VARIANCE TABLE

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F VALUE	TAIL PROBABILITY
BETWEEN GROUPS	*****	4	8713036.0000	15.94	0.0000
WITHIN GROUPS	*****	157	546535.5145		
TOTAL	*****	161			
LEVENH'S TEST FOR EQUAL VARIANCES					
*****	*****	4, 157	*****	2.37	0.0547
ONE-WAY ANALYSIS OF VARIANCE					
TEST STATISTICS FOR WITHIN-GROUP					
VARIANCES NOT ASSUMED TO BE EQUAL					
WEICH		4, 57		22.43	0.0000
BROWN-FORSYTHE		4, 134		21.83	0.0000

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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 0.005000

SIGNIFICANCE LEVEL
 .05
 .01
 .001

SYMBOL
 *
 **

BONFERRONI TEST
 0.005000
 0.001000
 0.000100

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	SEPARATE VARIANCE T	T-VALUE	POOLED VARIANCE T	P-VALUE	P-VALUE
1	1967-8	2043.52	2	1969-71	2760.00	-716.48	-4.12	93.82	0.0001	***	***	0.0000
1	1967-8	2043.52	3	1972-3	1646.15	397.36	2.01	33.26	0.0530			0.0828
1	1967-8	2043.52	4	1974-9	1630.79	412.73	2.57	77.22	0.0122			0.0235
1	1967-8	2043.52	5	1980-3	1511.83	531.69	3.55	79.72	0.0007	**	**	0.0020
2	1969-71	2760.00	3	1972-3	1646.15	1113.85	5.92	27.53	0.0000	***	***	0.0000
2	1969-71	2760.00	4	1974-9	1630.79	1129.21	7.61	61.77	0.0000	***	***	0.0000
2	1969-71	2760.00	5	1980-3	1511.83	1240.17	9.15	62.87	0.0000	***	***	0.0000
3	1972-3	1646.15	4	1974-9	1630.79	15.36	0.09	21.65	0.9312			0.9520
3	1972-3	1646.15	5	1980-3	1511.83	134.33	0.81	18.13	0.4292			0.5870
4	1974-9	1630.79	5	1980-3	1511.83	118.96	1.00	45.79	0.3240			0.5606

PAIRWISE COMPARISONS AMONG NONEMPTY CELL(GROUP) MEANS.
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SYMBOL * ** ***
 SIGNIFICANCE LEVEL .05 .01 .001
 BONFERRONI TEST 0.005000 0.001000 0.000100

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1	1967-8	7550.99	2	1969-71	9686.08	-2135.09	-1.37	42.01	0.1778	-1.15	68	0.2509
1	1967-8	7550.99	3	1972-3	9187.02	-1636.02	-0.61	9.40	0.5546	-0.63	68	0.5395
1	1967-8	7550.99	4	1974-9	3363.50	4187.49	3.43	16.43	0.0033 *	1.37	68	0.1744
1	1967-8	7550.99	5	1980-3	5877.26	1673.73	1.02	21.77	0.3175	0.73	68	0.4790
2	1969-71	9686.08	3	1972-3	9187.02	499.06	0.18	10.47	0.8590	0.22	68	0.8289
2	1969-71	9686.08	4	1974-9	3363.50	6322.57	4.62	30.61	0.0001 ***	2.25	68	0.0274
2	1969-71	9686.08	5	1980-3	5877.26	3808.81	2.18	30.33	0.0373	1.94	68	0.0569
3	1972-3	9187.02	4	1974-9	3363.50	5823.51	2.27	8.03	0.0526	1.74	68	0.0856
3	1972-3	9187.02	5	1980-3	5877.26	3309.75	1.19	10.80	0.2602	1.24	68	0.2198
4	1974-9	3363.50	5	1980-3	5877.26	-2513.76	-1.73	14.84	0.1051	-0.81	68	0.4228

PAGE 10 DNDP7D STATION 3 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 0.005000

SIGNIFICANCE LEVEL
 .05
 .01
 .001

BONFERRONI TEST
 0.005000
 0.001000
 0.000100

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	SEPARATE VARIANCE T	P-VALUE	SYMBOL	T-VALUE	POOLED VARIANCE T	P-VALUE
1	1967-8	1204.43	2	1969-71	1973.71	-769.27	-1.72	38.40	0.0933	*	-1.22	68	0.2270
1	1967-8	1204.43	3	1972-3	2105.19	-900.76	-0.90	7.23	0.3975	**	-1.02	68	0.3100
1	1967-8	1204.43	4	1974-9	257.19	947.25	6.67	17.23	0.0000	***	0.98	68	0.3320
1	1967-8	1204.43	5	1980-3	860.64	343.79	1.45	17.65	0.1648		0.43	68	0.6690
2	1969-71	1973.71	3	1972-3	2105.19	-131.49	-0.12	9.77	0.9057		-0.17	68	0.8668
2	1969-71	1973.71	4	1974-9	257.19	1716.52	3.97	34.25	0.0004	**	1.95	68	0.0552
2	1969-71	1973.71	5	1980-3	860.64	1113.07	2.36	42.30	0.0232		1.61	68	0.1110
3	1972-3	2105.19	4	1974-9	257.19	1848.01	1.86	7.05	0.1054		1.72	68	0.0896
3	1972-3	2105.19	5	1980-3	860.64	1244.55	1.23	7.57	0.2563		1.35	68	0.1821
4	1974-9	257.19	5	1980-3	860.64	-603.45	-2.89	11.74	0.0138		-0.60	68	0.5516

HISTOGRAM OF * SU1FL * (VARIABLE 13). CASES DIVIDED INTO GROUPS BASED ON VALUES OF * YEAR * (VARIABLE 4)

1967-8 1969-71 1972-3 1974-9 1980-3

VAR 13 EXCLUDED VALUES

MIDPOINTS TABULATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

Table with 5 columns representing years (1967-8, 1969-71, 1972-3, 1974-9, 1980-3) and various statistical measures like MEAN, STD. DEV., R.P.S.D., S.E.M., MAXIMUM, MINIMUM, SAMPLE SIZE.

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

Summary statistics for all groups combined, including MEAN, STD. DEV., R.P.S.D., S.E.M., MAXIMUM, MINIMUM, SAMPLE SIZE, and ANALYSIS OF VARIANCE TABLE.

LEVENE'S TEST FOR EQUAL VARIANCES ONE-WAY ANALYSIS OF VARIANCE TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL

PAGE 1 MDP7D STATION 3 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 0.005000

SYMBOL * ** ***
 SIGNIFICANCE LEVEL .05 .01 .001
 BONFERRONI TEST 0.005000 0.001000 0.000100

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	SEPARATE VARIANCE	DF	P-VALUE	T-VALUE	SEPARATE VARIANCE	DF	P-VALUE	T-VALUE	POOLED VARIANCE	DF	P-VALUE
1	1967-R	19582.08	2	1969-71	27234.15	-7652.07	-1.84	45.24	45.24	0.0730	-1.39	68	0.1698	-1.39	68	0.1698	68	0.5235
1	1967-R	19582.08	3	1972-3	24517.15	-4935.07	-0.58	7.81	7.81	0.5773	-0.64	68	0.5235	-0.64	68	0.5235	68	0.2123
1	1967-R	19582.08	4	1974-9	8190.60	11391.48	5.13	16.93	16.93	0.0001 ***	1.26	68	0.2123	1.26	68	0.2123	68	0.4642
2	1969-71	27234.15	5	1980-3	14553.48	5028.60	1.57	21.72	21.72	0.1306	0.74	68	0.4642	0.74	68	0.4642	68	0.6918
2	1969-71	27234.15	3	1972-3	24517.15	2717.00	0.30	9.96	9.96	0.7698	0.40	68	0.6918	0.40	68	0.6918	68	0.0252
2	1969-71	27234.15	4	1974-9	8190.60	19043.55	5.00	36.48	36.48	0.0000 ***	2.29	68	0.0252	2.29	68	0.0252	68	0.0331
3	1972-3	24517.15	5	1980-3	14553.48	12680.67	2.85	42.87	42.87	0.0067	2.17	68	0.0331	2.17	68	0.0331	68	0.1037
3	1972-3	24517.15	4	1974-9	8190.60	16326.55	1.96	7.21	7.21	0.0893	1.65	68	0.1037	1.65	68	0.1037	68	0.2130
4	1974-9	8190.60	5	1980-3	14553.48	9963.67	1.15	8.32	8.32	0.2804	1.26	68	0.2130	1.26	68	0.2130	68	0.4936
						-6362.88	-2.34	13.85	13.85	0.0346	-0.69			-0.69				

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

1967-8 1969-71 1972-3 1974-9 1980-3
 * * * * *

TABLATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

4.800)	*				
4.680)	*				
4.560)	*				
4.440)	*				
4.320)	*				
4.200)	**				
4.080)	**				
3.960)	**				
3.840)	M**				
3.720)	M**				
3.600)	*				
3.480)	*				
3.360)	*				
3.240)	*				
3.120)	*				
3.000)	*				
2.880)	*				
2.760)	*				
2.640)	*				
2.520)	*				
2.400)	*				
2.280)	*				

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

MEAN	3.828				
STD.DEV.	0.217	3.481			
R.E.S.D.	0.236	0.235			3.601
S. E. M.	0.058	0.320			0.500
MAXIMUM	4.205	0.143			0.416
MINIMUM	3.464	4.398			0.144
SAMPLE SIZE	14	3.251			4.125
		34			2.243
		8			12

ALL GROUPS COMBINED
 (EXCEPT CASES WITH UNUSED VALUES FOR YEAR)
 MEAN 3.808
 STD.DEV. 0.337
 R.E.S.D. 0.295
 S. E. M. 0.039
 MAXIMUM 4.622
 MINIMUM 2.243
 SAMPLE SIZE 73

ANALYSIS OF VARIANCE TABLE
 SOURCE BETWEEN GROUPS WITHIN GROUPS TOTAL
 SUM OF SQUARES 1.4508 6.7474 8.1982
 DF 4 68 72
 MEAN SQUARE 0.3627 0.0992
 F VALUE 3.66
 TAIL PROBABILITY 0.0093

LEVENE'S TEST FOR EQUAL VARIANCES
 ONE-WAY ANALYSIS OF VARIANCE
 TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL
 WFLCH BROWN-FORSYTHE
 4, 17 3.93 0.0194
 4, 29 3.04 0.0129

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 0.005000

SYMBOL * ** ***
 SIGNIFICANCE LEVEL .05 .01 .001
 BONFERRONI TEST 0.005000 0.001000 0.000100

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	SEPARATE VARIANCE DP	P-VALUE	T-VALUE	P-VALUE	POOLED VARIANCE DP	P-VALUE
1	1967-8	3.83	2	1969-71	3.91	-0.09	-1.21	27.49	0.2376	-0.87	0.3892	68	0.3892
1	1967-8	3.83	3	1972-3	3.84	-0.01	-0.06	9.35	0.9509	-0.07	0.9444	68	0.9444
1	1967-8	3.83	4	1974-9	3.48	0.35	2.89	6.63	0.0249	2.11	0.0383	68	0.0383
2	1969-71	3.91	5	1980-3	3.60	0.23	1.46	14.51	0.1649	1.84	0.0706	68	0.0706
2	1969-71	3.91	3	1972-3	3.84	0.08	0.52	8.26	0.6201	0.62	0.5364	68	0.5364
3	1972-3	3.84	4	1974-9	3.48	0.43	3.83	5.39	0.0108	2.87	0.0054	68	0.0054
3	1972-3	3.84	5	1980-3	3.60	0.31	2.09	12.94	0.0571	2.97	0.0041	68	0.0041
4	1974-9	3.48	4	1974-9	3.48	0.36	2.01	10.99	0.0699	1.99	0.0512	68	0.0512
4	1974-9	3.48	5	1980-3	3.60	0.24	1.17	17.17	0.2591	1.65	0.1033	68	0.1033
			5	1980-3	3.60	-0.12	-0.67	14.54	0.5153	-0.71	0.4801	68	0.4801

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

1967-8 1969-71 1972-3 1974-9 1980-3

VALUES

MIDPOINTS

Table with columns for year groups (1967-8, 1969-71, 1972-3, 1974-9, 1980-3) and rows for statistical measures: MEAN, STD. DEV., R.F.S.D., S.P.M., MAXIMUM, MINIMUM, SAMPLE SIZE.

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

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

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

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

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

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 0.005000

SYMBOL SIGNIFICANCE LEVEL BONFERRONI TEST

* .05 0.005000

** .01 0.001000

*** .001 0.000100

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	1967-8	3.05	2	1969-71	3.14	-0.09	-1.11	44.83	0.2716		-0.65	68	0.5189	
1	1967-8	3.05	3	1972-3	3.04	0.00	0.01	7.88	0.9911		0.01	68	0.9906	
1	1967-8	3.05	4	1974-9	2.21	0.84	3.12	5.36	0.0243		3.81	68	0.0003 **	
1	1967-8	3.05	5	1980-3	2.72	0.33	1.67	11.36	0.1218		1.82	68	0.0734	
2	1969-71	3.14	3	1972-3	3.04	0.09	0.45	8.65	0.6619		0.54	68	0.5928	
2	1969-71	3.14	4	1974-9	2.21	0.93	3.42	5.66	0.0158		4.67	68	0.0000 ***	
2	1969-71	3.14	5	1980-3	2.72	0.42	2.09	12.55	0.0577		2.71	68	0.0086	
3	1972-3	3.04	4	1974-9	2.21	0.83	2.53	9.99	0.0301		3.44	68	0.0010 *	
3	1972-3	3.04	5	1980-3	2.72	0.33	1.19	16.20	0.2521		1.57	68	0.1221	
4	1974-9	2.21	5	1980-3	2.72	-0.51	-1.56	10.20	0.1495		-2.22	68	0.0296	

NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 4066

CPU TIME USED 1.515 SECONDS

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

1967-8 1969-71 1972-3 1974-9 1980-3

VAR 17 EXCLUDED VALUES

TABLATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

MIDPOINTS 5.400) 5.250) 5.100) 4.950) 4.800) 4.650) 4.500) 4.350) 4.200) 4.050) 3.900) 3.750) 3.600) 3.450) 3.300) 3.150) 3.000) 2.850) 2.700) 2.550) 2.400) 2.250)

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

MEAN 4.260 STD.DEV. 0.178 R.F.S.D. 0.177 S.E.M. 0.048 MAXIMUM 4.536 MINIMUM 3.900 SAMPLE SIZE 14

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

MEAN 4.236 STD.DEV. 0.345 P.E.S.D. 0.290 S.E.M. 0.040 MAXIMUM 5.100 MINIMUM 2.429 SAMPLE SIZE 73

ANALYSIS OF VARIANCE TABLE SOURCE BETWEEN GROUPS WITHIN GROUPS TOTAL SUM OF SQUARES 1.6897 6.8848 8.5746 DF 4 68 72 F VALUE 0.4224 0.1012 MEAN SQUARE 4.17 0.0044 TAIL PROBABILITY 0.0044

LEVENY'S TEST FOR EQUAL VARIANCES 4, 68 1.34 0.2652 ONE-WAY ANALYSIS OF VARIANCE TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL WELCH BROWN-FORSYTHE 4, 10 4, 25 10.26 3.53 0.0001 0.0205

PAGE 10 WDP7D STATION 3 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 0.005000

SYMBOL : SIGNIFICANCE LEVEL BONFERRONI TEST
 * .05 0.005000
 ** .01 0.001000
 *** .001 0.000100

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	MEAN DIFF	T-VALUE	SEPARATE VARIANCE T	P-VALUE	T-VALUE	P-VALUE	POOLED VARIANCE T	P-VALUE
1	1967-8	4.26	2	1969-71	4.36	-0.10	-1.55	32.90	0.1300	-0.97	68	0.3341	
1	1967-8	4.26	3	1972-3	4.22	0.04	0.22	8.36	0.8275	0.26	68	0.7980	
1	1967-8	4.26	4	1974-9	3.90	0.36	4.87	10.05	0.0006 **	2.18	68	0.0328	
2	1969-71	4.36	5	1980-3	4.01	0.25	1.54	13.10	0.1475	1.98	68	0.0514	
2	1969-71	4.36	3	1972-3	4.22	0.13	0.84	8.05	0.4233	1.08	68	0.2858	
2	1969-71	4.36	4	1974-9	3.90	0.46	6.52	9.12	0.0001 **	3.01	68	0.0036 *	
3	1972-3	4.22	4	1974-9	4.01	0.35	2.17	12.64	0.0496	3.24	68	0.0018 *	
3	1972-3	4.22	5	1980-3	3.90	0.32	1.98	8.76	0.0800	1.79	68	0.0777	
4	1974-9	3.90	5	1980-3	4.01	0.21	0.97	17.12	0.3438	1.46	68	0.1489	
					4.01	-0.11	-0.69	13.51	0.5034	-0.67	68	0.5072	

PAGE 3 WHPD7D STATION 3 MULTIPLE COMPARISONS ON FLOW

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

1967-8 1969-70 1971-3 1974-7 1980-3

VAR 14 EXCLUDED VALUES MIDPOINTS

Table with 5 columns representing years (1967-8, 1969-70, 1971-3, 1974-7, 1980-3) and rows for statistical measures like MEAN, STD.DEV., R.E.S.D., S.F.M., MAXIMUM, MINIMUM, and SAMPLE SIZE.

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

Table with 5 columns representing years and rows for statistical measures like MEAN, STD.DEV., R.E.S.D., S.F.M., MAXIMUM, MINIMUM, and SAMPLE SIZE.

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

Table with 5 columns representing years and rows for statistical measures like MEAN, STD.DEV., R.E.S.D., S.F.M., MAXIMUM, MINIMUM, and SAMPLE SIZE.

LEVENE'S TEST FOR EQUAL VARIANCES ONE-WAY ANALYSIS OF VARIANCE TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL

Table with 5 columns representing years and rows for statistical measures like MEAN, STD.DEV., R.E.S.D., S.F.M., MAXIMUM, MINIMUM, and SAMPLE SIZE.

PAGE 4 HNDP7D STATION 3 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 0.005000

SYMBOL SIGNIFICANCE LEVEL BONFERRONI TEST

* .05 0.005000

** .01 0.001000

*** .001 0.000100

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	DIFF	SEPARATE VARIANCE T		POOLED VARIANCE T			
							T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1	1967-8	0.88	2	1969-70	1.10	-0.21	-1.10	42.99	0.2772	-0.69	68	0.4938
1	1967-8	0.88	3	1971-3	1.88	-0.99	-2.57	11.61	0.0253	-2.55	68	0.0129
1	1967-8	0.88	4	1974-7	0.49	0.39	3.16	16.84	0.0057	0.78	68	0.4382
1	1967-8	0.88	5	1980-3	1.37	-0.49	-1.17	12.52	0.2627	-1.28	68	0.2097
2	1969-70	1.10	3	1971-3	1.88	-0.78	-1.92	14.04	0.0757	-2.30	68	0.0245
2	1969-70	1.10	4	1974-7	0.49	0.61	3.45	33.87	0.0015 *	1.30	68	0.1971
2	1969-70	1.10	5	1980-3	1.37	-0.27	-0.63	14.80	0.5388	-0.83	68	0.4093
3	1971-3	1.88	4	1974-7	0.49	1.38	3.67	10.60	0.0040 *	-2.66	68	0.0097
3	1971-3	1.88	5	1980-3	1.37	0.51	0.93	20.99	0.3647	1.26	68	0.2126
4	1974-7	0.49	5	1980-3	1.37	-0.88	-2.16	11.57	0.0524	-1.71	68	0.0919

PAGE 5 BMDP7D STATION 3 MULTIPLE COMPARISONS ON FLOW

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

1967-8 1969-70 1971-3 1974-7 1980-3

TABULATIONS AND COMPUTATIONS WHICH FOLLOW EXCLUDE VALUES LISTED ABOVE

Table with columns for year (1967-8, 1969-70, 1971-3, 1974-7, 1980-3) and rows for statistical measures like MEAN, STD. DEV., R.E.S.D., S.E.M., MAXIMUM, MINIMUM, SAMPLE SIZE.

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

Summary table for group means and variance analysis, including rows for MEAN, STD. DEV., R.E.S.D., S.E.M., MAXIMUM, MINIMUM, SAMPLE SIZE.

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

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

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

LEVENE'S TEST FOR EQUAL VARIANCES, ONE-WAY ANALYSIS OF VARIANCE, TEST STATISTICS FOR WITHIN-GROUP VARIANCES NOT ASSUMED TO BE EQUAL.

PAGE 6 BMDP7D STATION 3 MULTIPLE COMPARISONS ON FLOW

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

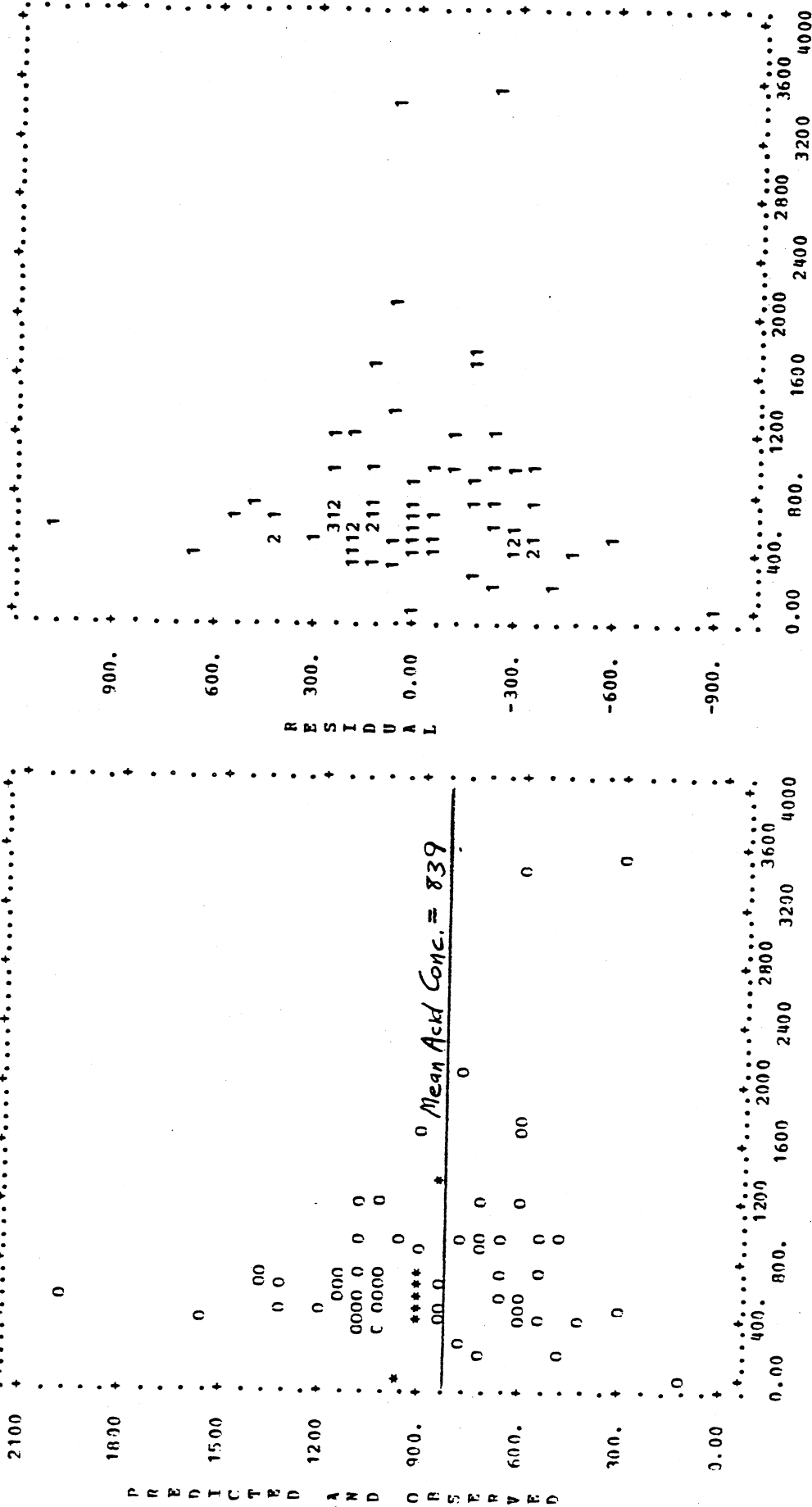
THE VALUE GIVEN FOR THE BONFERRONI TEST IS THE SIMULTANEOUS SIGNIFICANT P VALUE OF COMPARISONS OF ALL PAIRS OF MEANS. THAT IS, AFTER ADJUSTMENT FOR THE MULTIPLE COMPARISON OF ALL PAIRS OF MEANS, TO BE SIGNIFICANT AT THE .05 LEVEL THE P VALUE MUST BE LESS THAN 0.005000

SYMBOL * ** ***
 SIGNIFICANCE LEVEL .05 .01 .001
 BONFERRONI TEST 0.005000 0.001000 0.000100

GROUP NO.	GROUP NAME	MEAN	GROUP NO.	GROUP NAME	MEAN	DIFF	MEAN	T-VALUE	DF	P-VALUE	T-VALUE	DF	P-VALUE
1	1967-8	-0.09	2	1969-70	-0.02	-0.07	-0.02	-1.12	28.50	0.2707	-0.66	68	0.5098
1	1967-8	-0.09	3	1971-3	0.18	-0.27	-0.43	-2.43	14.35	0.0288	-2.14	68	0.0358
1	1967-8	-0.09	4	1974-7	-0.33	0.24	2.74	2.74	7.55	0.0269	1.48	68	0.1448
1	1967-8	-0.09	5	1980-3	-0.09	0.01	0.03	0.03	12.70	0.9761	0.04	68	0.9652
2	1969-70	-0.02	3	1971-3	0.18	-0.20	-1.90	-1.90	12.68	0.0803	-1.85	68	0.0686
2	1969-70	-0.02	4	1974-7	-0.33	0.31	3.74	3.74	6.10	0.0094	2.04	68	0.0455
2	1969-70	-0.02	5	1980-3	-0.09	0.07	0.42	0.42	12.01	0.6853	0.68	68	0.4999
3	1971-3	0.18	4	1974-7	-0.33	0.51	4.09	4.09	13.72	0.0012 *	3.02	68	0.0035 *
3	1971-3	0.18	5	1980-3	-0.09	0.28	1.39	1.39	17.67	0.1806	2.11	68	0.0387
4	1974-7	-0.33	5	1980-3	-0.09	-0.23	-1.27	-1.27	14.16	0.2251	-1.41	68	0.1627

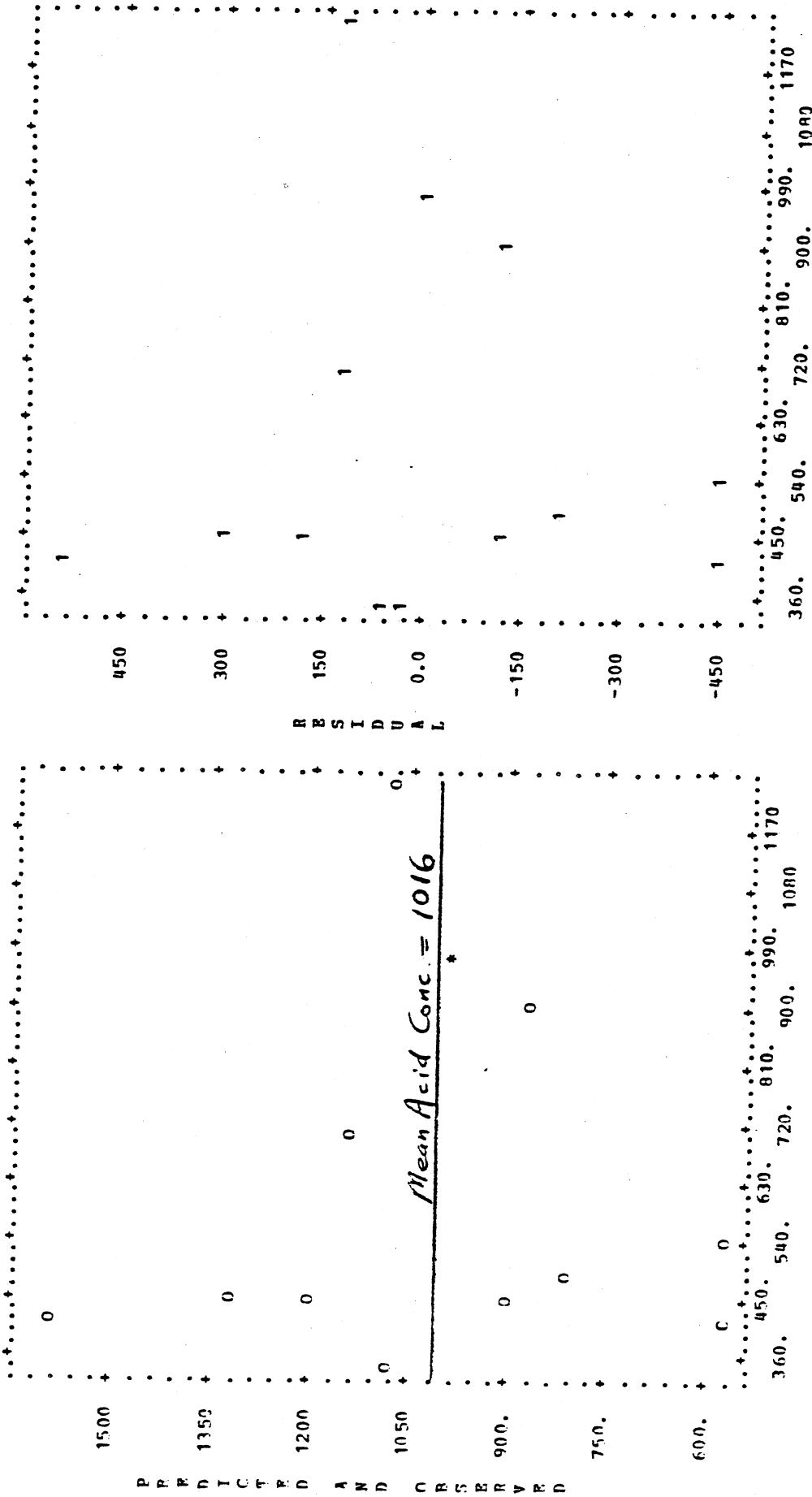
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PAGE 5 BMDP1R LINEAR REGRESSION CONC VS FLOW STA3 1961-83 ALL DATA

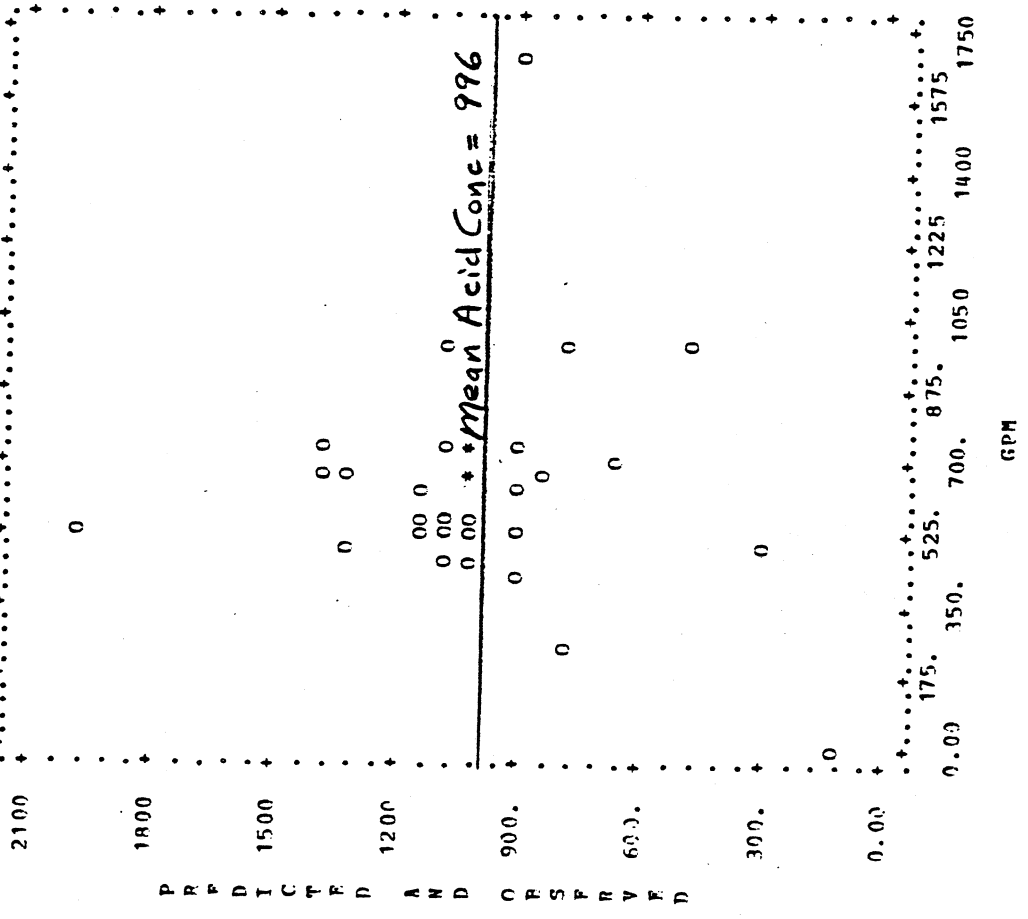
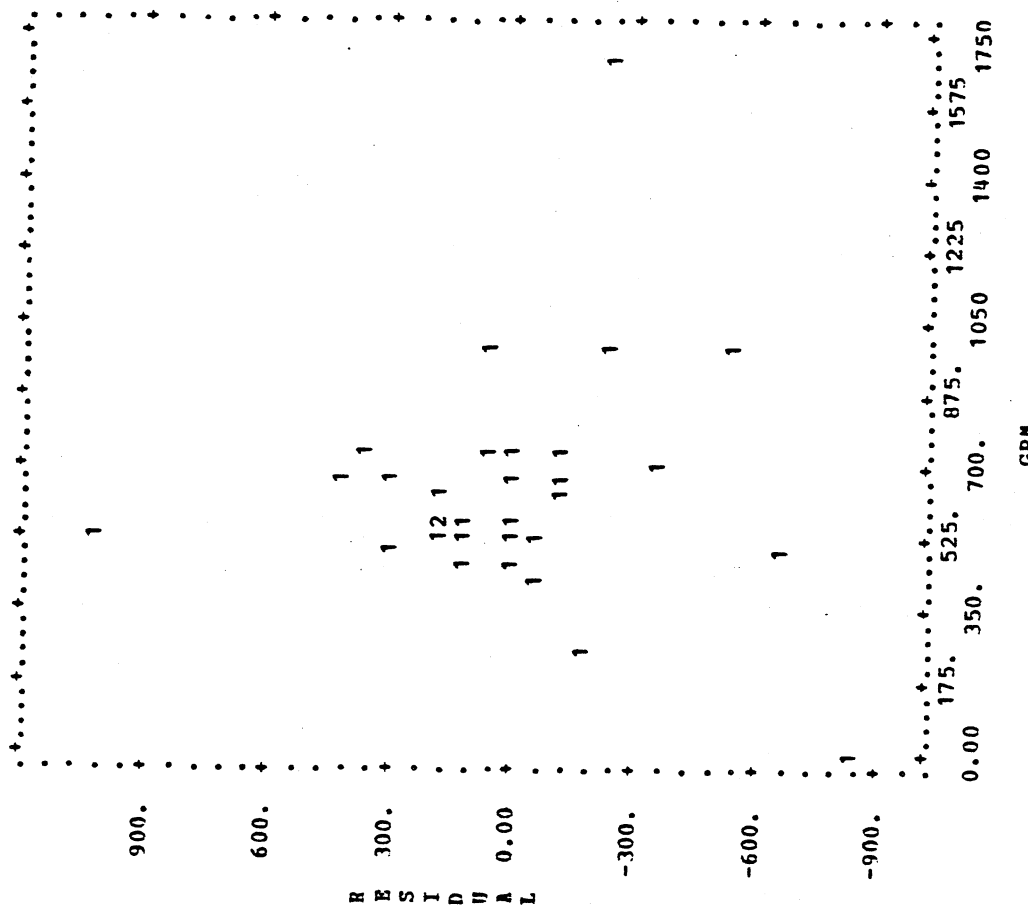


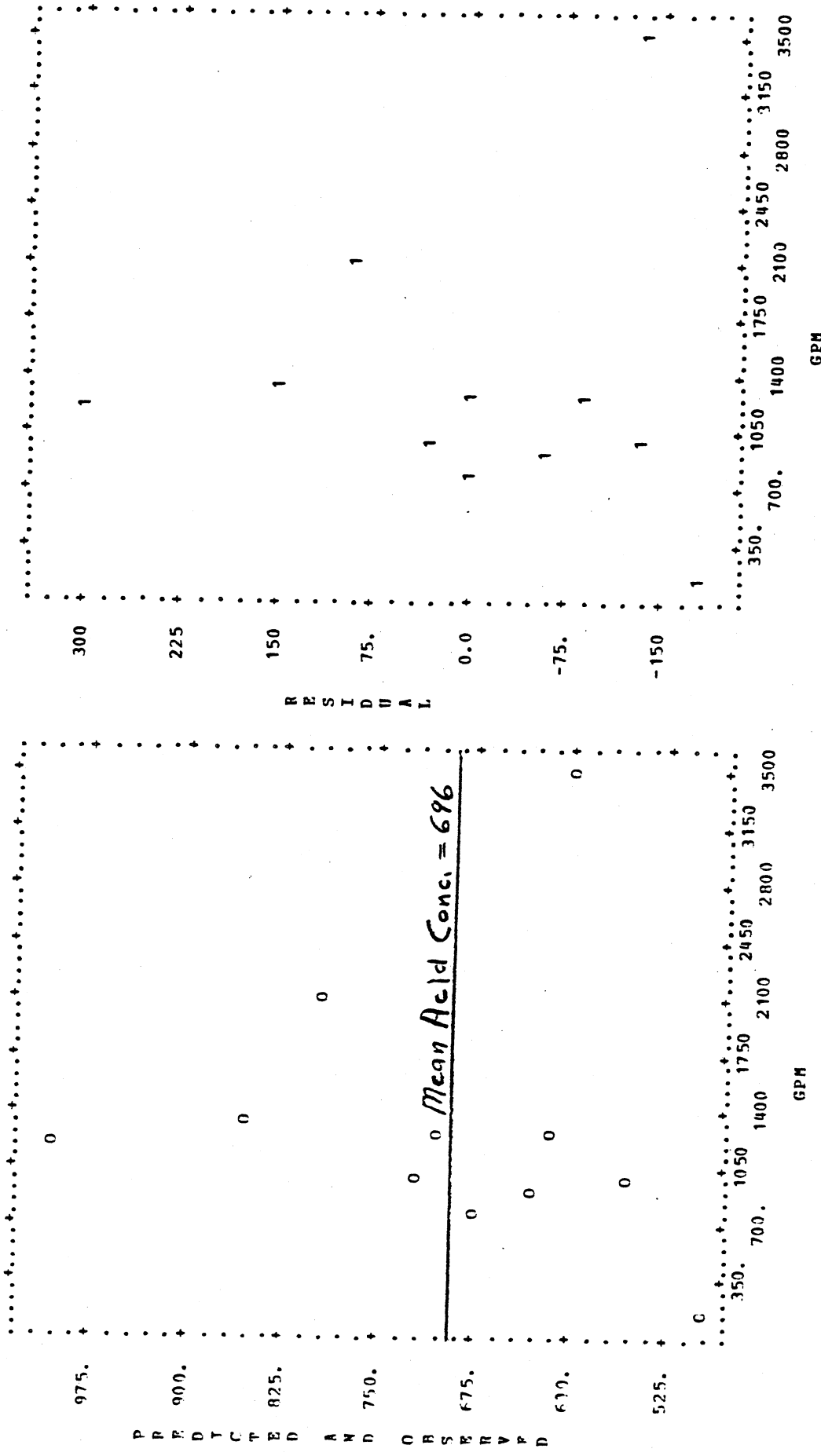
GPM

NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 1354
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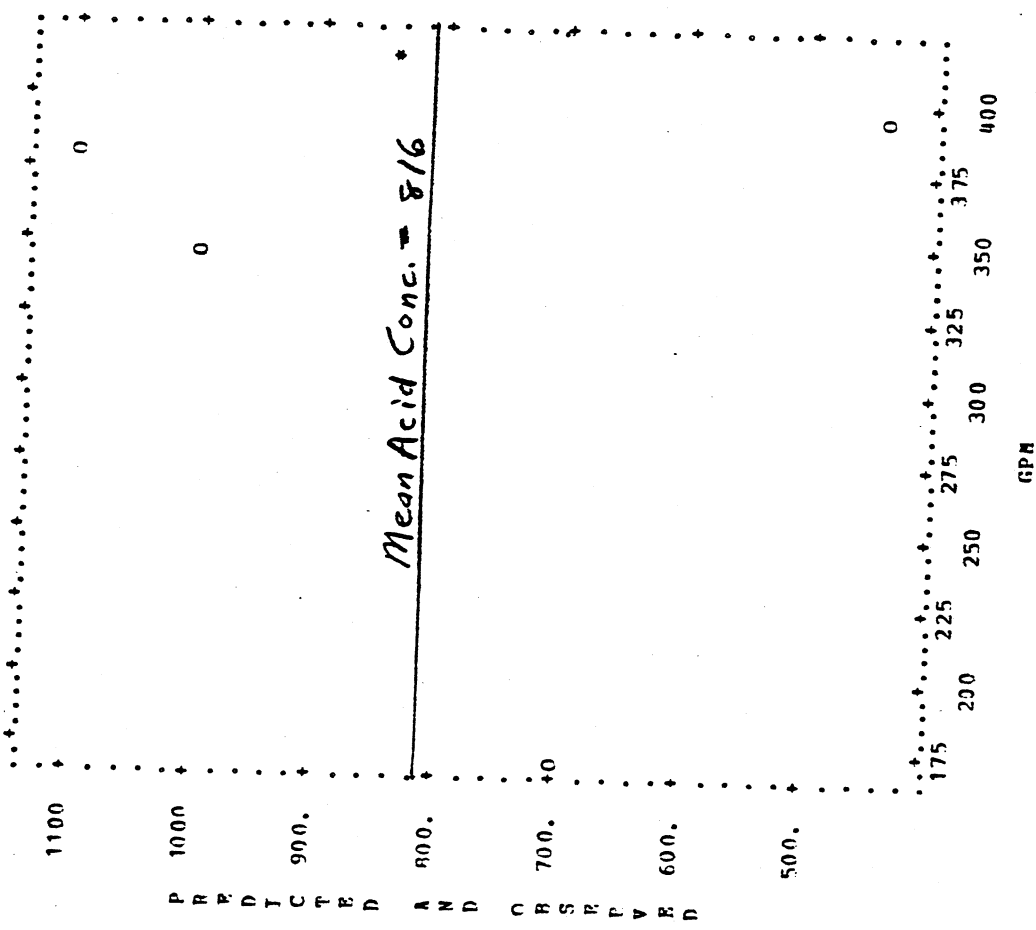
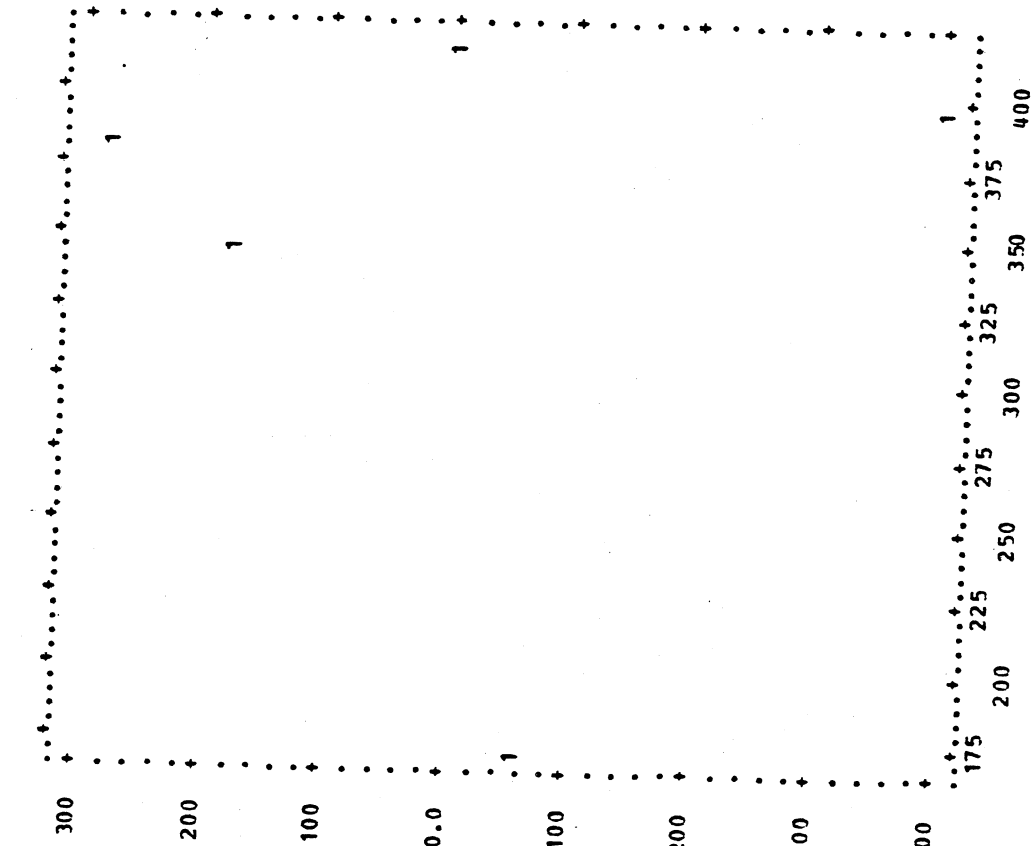


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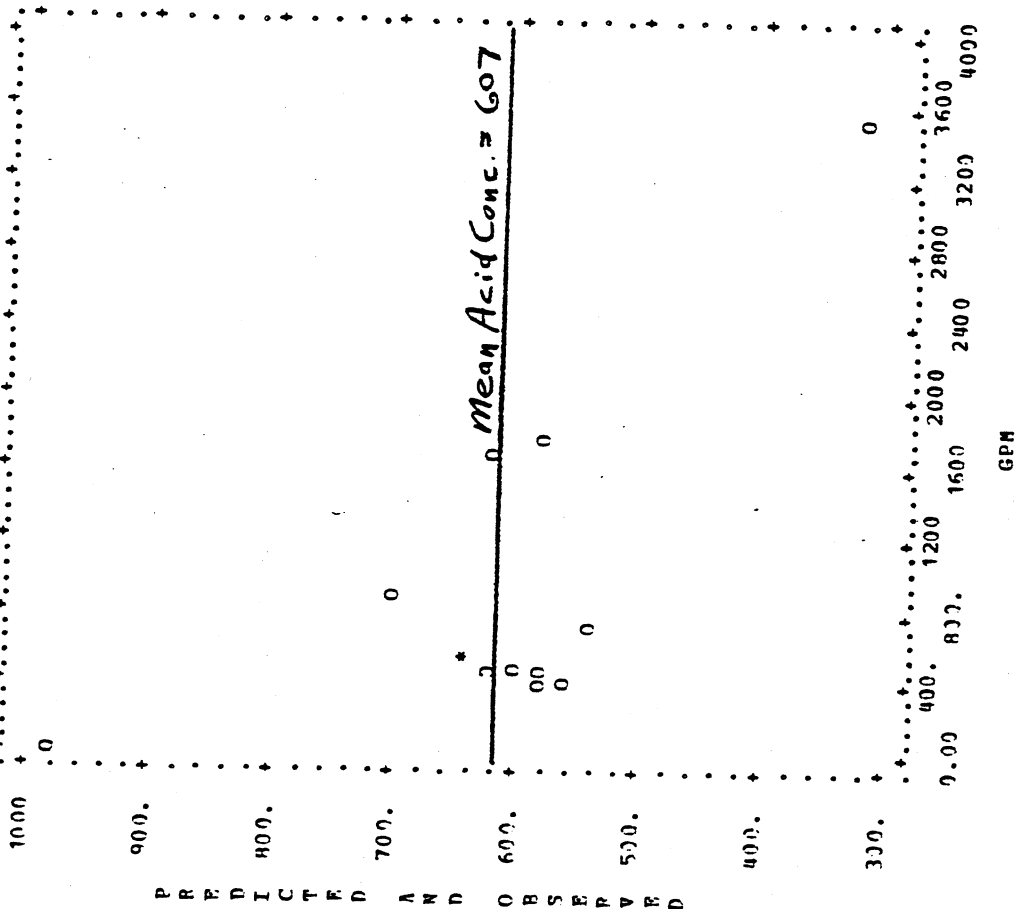
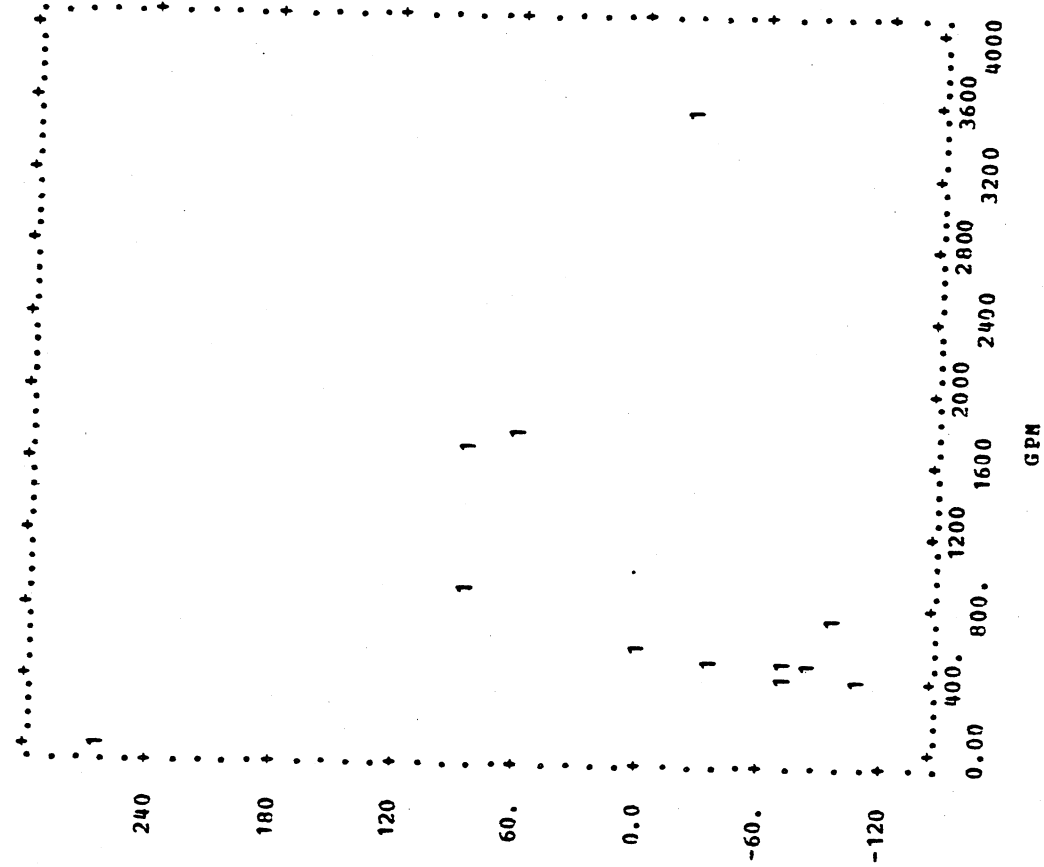


NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 1354
 CPU TIME USED 0.243 SECONDS



NUMBER OF INTEGER WORDS OF STORAGE USED IN PRECEDING PROBLEM 1354
 CPU TIME USED 0.242 SECONDS

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PREDICTED OBSERVED