

APPENDIX 3

SAMPLE STATION 3

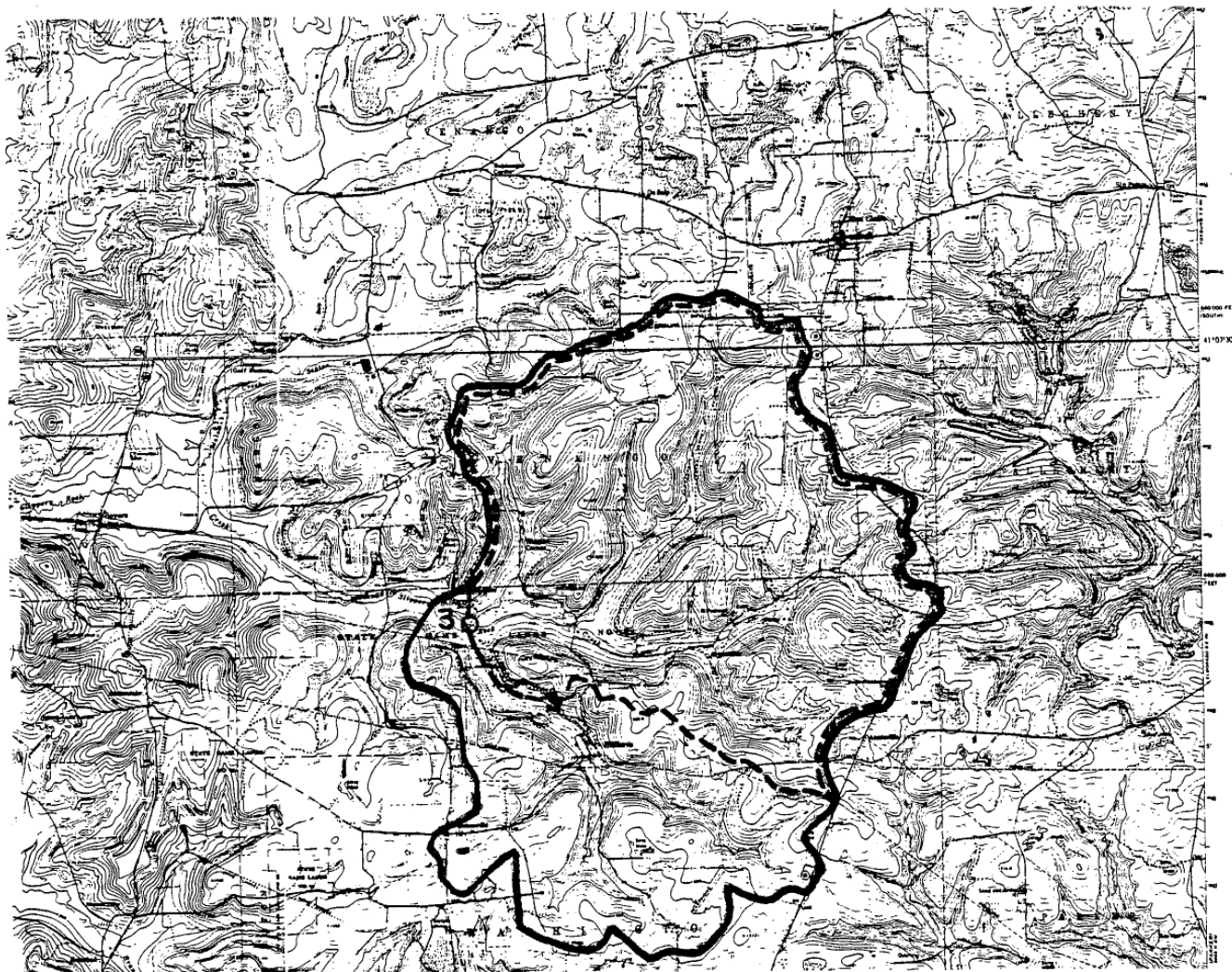
SLIPPERY ROCK CREEK

PA STATE GAME LANDS #95

PROJECT SL-110-7-101.5

LEGEND:

- DRAINAGE AREA
- PROJECT AREA
- SAMPLE STATION



SAMPLE STATION 3 (-)

SAMPLE LOCATION IN RELATION
TO
TOTAL SITE

SAMPLE 3

PROJECT 3L110-7-101.5:BIG BERTHA

DATE	SPEC COND UMMS/CM	DISCHARGE C.F.S.	PH SU	ALKALINITY MG/L	ACIDITY MG/L	SULPHATES MG/L	TOTAL IRON MG/L	FERROUS IRON MG/L	FERRIC IRON MG/L	REC #
021783	280	8.76	4.11	00	20	158	2.0	1.3	1.1	1
022683	340	6.98	4.00	00	19	136	2.3	1.2	1.1	2
030783	380	5.72	3.77	00	26	166	1.7	.9	.8	3
031483	280	8.33	4.15	00	20	122	1.5	.9	.6	4
032583	180	15.79	4.49	00	11	98	.9	.3	.6	5
033183	210	15.79	4.41	00	13	112	1.0	.5	.5	6
040783	200	17.54	3.62	00	21	100	1.5	.7	.8	7
041383	160	23.26	4.68	01	24	68	.6	.4	.1	8
042083	210	17.54	4.33	00	13	101	1.1	.6	.5	9
042683	260	9.65	4.02	00	20	116	1.8	1.0	.8	10
050483	190	33.61	4.38	00	09	27	.4	.2	.2	11
051183	230	12.54	4.31	00	34	87	1.0	.3	.7	12
051983	220	11.80	3.89	00	22	140	1.2	.7	.5	13
052583	170	26.22	4.68	01	13	61	.7	.4	.3	14
060183	250	11.80	4.30	00	15	109	1.2	.6	.6	15
060783	220	12.88	4.29	00	15	99	1.1	.6	.5	16
061283	360	6.64	3.77	00	21	128	1.6	.5	1.1	17
061683	380	5.72	3.59	00	23	151	1.9	.9	1.0	18
062183	410	5.33	3.73	00	29	168	2.2	.8	1.4	19
062983	160	27.18	4.57	01	10	80	1.0	.3	.7	20
071083	460	3.82	3.79	00	22	175	3.3	1.3	2.0	21
071983	480	3.47	3.85	00	26	143	1.6	.3	1.3	22
072683	580	2.19	3.47	00	35	197	3.3	.7	2.6	23
080683	670	1.90	3.40	00	32	235	3.0	1.3	1.7	24
082183	700	1.38	3.39	00	44	331	2.9	1.2	1.7	25

SAMPLE STATION 3

Discharge Relationships

1. Drainage Area

The surface acreage contributing runoff to the monitoring location is estimated to be 4960 acres.

2. Measurement of Discharge

The discharge at this monitoring point was observed using two rectangular weirs capable of measuring a discharge range up to 35 c.f.s. Each weir size was 6' opening, 18 inches high.

3. Observed Discharge

The observed range of discharge measured at this monitoring point varied from 1.38 c.f.s. 33.61 c . f . s . during the sampling.

4. Specific Yield

The specific yield of this monitoring point showed the following range:

0.3 c.f.s./1000 acres Minimum yield

6.8 c.f.s./1000 acres man yield

The reviewer is directed to refer to the following materials during the discussion of the sample analyses and trends at this monitoring points:

- a. Sheet 15 - which shows the data plotted-and shows the regression line and field of variance.
- b. Appendix 3 - which contains the sample data and regression runs

5. pH relationship

The pH during the, sampling period varied from 3.39 –4.68 Regression analysis of the pH values indicates: An extremely strong relation ship exists where pH values increases as discharge increases.

6. Specific conductance relationship

The conductance during the sampling period varied from 140 - 700 Regression analysis of the conductance indicates: An extremely strong relationship exists where conductance decreases as discharge increases.

Chemical Relationships

1. pH relationship

The pH during the sampling period varied from 3.39 - 4.68.

Regression analysis of the pH values showed that

An extremely strong relationship exists where pH values decrease as conductance increases.

2. Acidity/Alkalinity balance (mg/l)

The acidity during the sampling period varied from 9 - 44

Regression analysis of the acidity values indicates:

A strong relationship exists where acidity concentration increases as conductance increases. The alkalinity during the sample period varied from 0-1. No regression analysis was attempted as the alkalinity was generally absent.

3. Sulphate relationship (mg/l)

The sulphates during the sampling period varied from 27 - 331.

Regression analysis of the sulphate values indicates:

An extremely strong relationship exists where sulphate concentrations increase as conductance increases.

4. Total iron relationship (mg/l)

The total iron during the sampling period varied from 0.4 - 3.3

Regression analysis of the total iron values indicates:

An extremely strong relationship exists where total iron concentrations increase as conductance increases.

5. Ferrous, iron relationship (mg/l)

The ferrous iron during the sampling period varied from 0.2 - 1.3

Regression analysis of the ferrous iron values indicates

A moderate relationship exists where ferrous iron concentration increases, conductance increases.

6. Ferric iron relationship (mg/l)

The ferric iron during the sampling period varied from 0.2 - 26

Regression analysis of the ferric iron values indicates:

An extremely strong relationship exists where ferric iron concentrations increase as conductance increases.

SAMPLE.THREE

DISCHARGE VS. SPECIFIC CONDUCTANCE

COEFFICIENT MATRIX AND AUGMENTED MATRIX

2	29	527	7930.0000
29	527	11814	67368.7500
527	11814	301885	994370.0625

REGRESSION COEFFICIENTS OF NORMAL EQUATION

650.093994140625
 45.498275756836
 0.973938405514

ORIGINAL X - Y PAIRS	PREDICTED VALUES	DEVIATION
8.7600 280.0000	326.2668	46.2668
6.9800 340.0000	379.9666	39.9666
5.7200 380.0000	421.7095	41.7095
8.3300 280.0000	338.6738	58.6738
15.7900 180.0000	174.5026	5.4974
15.7900 210.0000	174.5026	35.4974
17.5400 200.0000	151.6877	48.3123
23.2600 160.0000	118.7317	41.2683
17.5400 210.0000	151.6877	58.3123
9.6500 260.0000	301.7314	41.7314
33.6100 140.0000	221.0889	81.0889
12.5400 230.0000	232.6990	2.6990
11.8000 220.0000	248.8255	28.8255
26.2200 170.0000	126.7002	43.2998
11.8000 250.0000	248.8255	1.1745
12.8800 220.0000	225.6473	5.6473
6.6400 360.0000	390.9260	30.9260
5.7200 380.0000	421.7095	41.7095
5.3300 410.0000	435.2566	25.2566
27.1800 160.0000	132.9502	27.0498
3.8200 460.0000	490.5024	30.5024
3.4700 480.0000	503.9419	23.9419
2.1900 580.0000	555.1235	24.8765
1.9000 670.0000	567.1631	102.8369
1.3800 700.0000	589.1609	110.8391

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 2

NUMBER OF X - Y PAIRS= 25

TOTAL SUMS OF SQUARE= 600908

SUMS OF SQUARES DUE TO REGRESSION= 543167

SUMS OF SQUARES DUE TO DEVIATION= 57741

GOODNESS OF FIT= .90391

MULTIPLE CORRELATION COEFFICIENT 0.95074

STANDARD DEVIATION 49.04971

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LAST REGRESSION	394909.00	1	394909.00
CUR. REGRESSION	543167.00	2	271583.00
CUR. ADDITION	148258.00	1	148258.00
CUR. DEVIATION	57741.00	22	2624.59
TOTAL VARIATION	600908.00	24	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 103.48

LEVEL .05% - CRITICAL VALUE = 3.44

F TEST - IMPROVEMENT OF ADDED TERM = 56.49

LEVEL .05% - CRITICAL VALUE = 4.30

SAMPLE.THREE

SPECIFIC CONDUCTANCE VS. PH

COEFFICIENT MATRIX AND AUGMENTED MATRIX

2 793
793 311630

100.9898
30778.5586

REGRESSION COEFFICIENTS OF NORMAL EQUATION

4.702219009399
0.002089028480

ORIGINAL X - Y PAIRS	PREDICTED VALUES	DEVIATION	
280.0000	4.1100	4.1173	0.0073
340.0000	4.0000	3.9919	0.0081
380.0000	3.7700	3.9084	0.1384
280.0000	4.1500	4.1173	0.0327
180.0000	4.4900	4.3262	0.1630
210.0000	4.4100	4.2635	0.1465
200.0000	3.6200	4.2844	0.6644
160.0000	4.6800	4.3680	0.3120
210.0000	4.3300	4.2635	0.0665
260.0000	4.0200	4.1591	0.1391
140.0000	4.3800	4.4098	0.0298
230.0000	4.3100	4.2217	0.0883
220.0000	3.8900	4.2426	0.3526
170.0000	4.6800	4.3471	0.3329
250.0000	4.3000	4.1800	0.1200
220.0000	4.2900	4.2426	0.0474
360.0000	3.7700	3.9502	0.1802
380.0000	3.5900	3.9084	0.3184
410.0000	3.7300	3.8457	0.1157
160.0000	4.5700	4.3680	0.2020
460.0000	3.7900	3.7413	0.0487
480.0000	3.8500	3.6995	0.1505
580.0000	3.4700	3.4906	0.0206
670.0000	3.4000	3.3026	0.0974
700.0000	3.3900	3.2399	0.1501

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 25

TOTAL SUMS OF SQUARE= 3.760742

SUMS OF SQUARES DUE TO REGRESSION= 2.622314

SUMS OF SQUARES DUE TO DEVIATION= 1.138428

GOODNESS OF FIT= .697286

MULTIPLE CORRELATION COEFFICIENT 0.83504

STANDARD DEVIATION .217795

SOURCE OF VARIATION	ANALYSIS OF VARIANCE		MEAN SQUARE
	SUM OF SQUARES	DEGREES OF FREEDOM	
LIN. REGRESSION	2.62	1	2.62
DEVIATION	1.14	23	.05
TOTAL VARIATION	3.76	24	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 52.98

LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE THREE

DISCHARGE VS. PH

COEFFICIENT MATRIX AND AUGMENTED MATRIX

2
29

29
527

100.9898
1259.7810

REGRESSION COEFFICIENTS OF NORMAL EQUATION

3.608013153076
0.036469742656

ORIGINAL X	Y PAIRS	PREDICTED VALUES	DEVIATION
8.7600	4.1100	3.9275	0.1825
6.9800	4.0000	3.8626	0.1374
5.7200	3.7700	3.8166	0.0466
8.3300	4.1500	3.9118	0.2382
15.7900	4.4900	4.1839	0.3061
15.7900	4.4100	4.1839	0.2261
17.5400	3.6200	4.2477	0.6277
23.2600	4.6800	4.4563	0.2237
17.5400	4.3300	4.2477	0.0823
9.6500	4.0200	3.9599	0.0601
33.6100	4.3800	4.8338	0.4538
12.5400	4.3100	4.0653	0.2447
11.8000	3.8900	4.0384	0.1484
26.2200	4.6800	4.5642	0.1158
11.8000	4.3000	4.0384	0.2616
12.8800	4.2900	4.0777	0.2123
6.6400	3.7700	3.8502	0.0802
5.7200	3.5900	3.8166	0.2266
5.3300	3.7300	3.8024	0.0724
27.1800	4.5700	4.5993	0.0293
3.8200	3.7900	3.7473	0.0427
3.4700	3.8500	3.7346	0.1154
2.1900	3.4700	3.6879	0.2179
1.9000	3.4000	3.6773	0.2773
1.3800	3.3900	3.6583	0.2683

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 25

TOTAL SUMS OF SQUARE= 3.760742

SUMS OF SQUARES DUE TO REGRESSION= 2.360596

SUMS OF SQUARES DUE TO DEVIATION= 1.400146

GOODNESS OF FIT= .627694

MULTIPLE CORRELATION COEFFICIENT 0.79227

STANDARD DEVIATION .241536

SOURCE OF VARIATION	ANALYSIS OF VARIANCE		
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	2.36	1	2.36
DEVIATION	1.40	23	.06
TOTAL VARIATION	3.76	24	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 38.78

LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE THREE

SPECIFIC CONDUCTANCE VS. ALKALINITY

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	2	793	3.0000
	793	311630	490.0000
REGRESSION COEFFICIENTS OF NORMAL EQUATION			
	0.363661229610		
	0.000768165104		

ORIGINAL X	- Y PAIRS	PREDICTED VALUES	DEVIATION
280.0000	0.0000	0.1486	0.1486
340.0000	0.0000	0.1025	0.1025
380.0000	0.0000	0.0718	0.0718
280.0000	0.0000	0.1486	0.1486
180.0000	0.0000	0.2254	0.2254
210.0000	0.0000	0.2023	0.2023
200.0000	0.0000	0.2100	0.2100
160.0000	1.0000	0.2408	0.7592
210.0000	0.0000	0.2023	0.2023
260.0000	0.0000	0.1639	0.1639
140.0000	0.0000	0.2561	0.2561
230.0000	0.0000	0.1870	0.1870
220.0000	0.0000	0.1947	0.1947
170.0000	1.0000	0.2331	0.7669
250.0000	0.0000	0.1716	0.1716
220.0000	0.0000	0.1947	0.1947
360.0000	0.0000	0.0871	0.0871
380.0000	0.0000	0.0718	0.0718
410.0000	0.0000	0.0487	0.0487
160.0000	1.0000	0.2408	0.7592
460.0000	0.0000	0.0103	0.0103
480.0000	0.0000	0.0051	0.0051
580.0000	0.0000	0.0819	0.0819
670.0000	0.0000	0.1510	0.1510
700.0000	0.0000	0.1741	0.1741

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 25
TOTAL SUMS OF SQUARE= 2.64
SUMS OF SQUARES DUE TO REGRESSION= .354582
SUMS OF SQUARES DUE TO DEVIATION= 2.285418
GOODNESS OF FIT= .134311
MULTIPLE CORRELATION COEFFICIENT 0.36648
STANDARD DEVIATION .308586

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	.35	1	.35
DEVIATION	2.29	23	.10
TOTAL VARIATION	2.64	24	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION = 3.57
LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE.THREE

SPECIFIC CONDUCTANCE VS. ACIDITY

COEFFICIENT MATRIX AND AUGMENTED MATRIX

2
793

793
311630

537.0000
196330.0000

REGRESSION COEFFICIENTS OF NORMAL EQUATION

7.758786201477
0.043257340789

ORIGINAL X - Y PAIRS	PREDICTED VALUES	DEVIATION
280.0000	20.0000	19.8708
340.0000	19.0000	22.4663
380.0000	26.0000	24.1965
280.0000	20.0000	19.8708
180.0000	11.0000	15.5451
210.0000	13.0000	16.8428
200.0000	21.0000	16.4102
160.0000	24.0000	14.6800
210.0000	13.0000	16.8428
260.0000	20.0000	19.0057
140.0000	9.0000	13.8148
230.0000	34.0000	17.7080
220.0000	22.0000	17.2754
170.0000	13.0000	15.1125
250.0000	15.0000	18.5731
220.0000	15.0000	17.2754
360.0000	21.0000	23.3314
380.0000	23.0000	24.1965
410.0000	29.0000	25.4943
160.0000	10.0000	14.6800
460.0000	22.0000	27.6572
480.0000	26.0000	28.5223
580.0000	35.0000	32.8480
670.0000	32.0000	36.7412
700.0000	44.0000	38.0389

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 25
TOTAL SUMS OF SQUARE= 1774.25
SUMS OF SQUARES DUE TO REGRESSION= 1124.46
SUMS OF SQUARES DUE TO DEVIATION= 649.789
GOODNESS OF FIT= .633767
MULTIPLE CORRELATION COEFFICIENT 0.79609
STANDARD DEVIATION 5.203312

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	1124.46	1	1124.46
DEVIATION	649.79	23	28.25
TOTAL VARIATION	1774.25	24	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION = 39.80
LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE.THREE

SPECIFIC CONDUCTANCE VS. SULPHATES

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	2	793	3308.0000
	793	311630	1262810.0000

REGRESSION COEFFICIENTS OF NORMAL EQUATION

19.613494873047
0.355317175388

ORIGINAL X	- Y PAIRS	PREDICTED VALUES	DEVIATION
280.0000	158.0000	119.1023	38.8977
340.0000	136.0000	140.4213	4.4213
380.0000	166.0000	154.6340	11.3660
280.0000	122.0000	119.1023	2.8977
180.0000	98.0000	83.5706	14.4294
210.0000	112.0000	94.2301	17.7699
200.0000	100.0000	90.6769	9.3231
160.0000	68.0000	76.4642	8.4642
210.0000	101.0000	94.2301	6.7699
260.0000	116.0000	111.9960	4.0040
140.0000	27.0000	69.3579	42.3579
230.0000	87.0000	101.3364	14.3364
220.0000	140.0000	97.7833	42.2167
170.0000	61.0000	80.0174	19.0174
250.0000	109.0000	108.4428	0.5572
220.0000	99.0000	97.7833	1.2167
360.0000	128.0000	147.5277	19.5277
380.0000	151.0000	154.6340	3.6340
410.0000	168.0000	165.2935	2.7065
160.0000	80.0000	76.4642	3.5358
460.0000	175.0000	183.0594	8.0594
480.0000	143.0000	190.1657	47.1657
580.0000	197.0000	225.6974	28.6974
670.0000	235.0000	257.6758	22.6758
700.0000	331.0000	268.3354	62.6646

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 25

TOTAL SUMS OF SQUARE= 90394

SUMS OF SQUARES DUE TO REGRESSION= 75864.62

SUMS OF SQUARES DUE TO DEVIATION= 14529.37

GOODNESS OF FIT= .839266

MULTIPLE CORRELATION COEFFICIENT 0.91611

STANDARD DEVIATION 24.60467

SOURCE OF VARIATION	ANALYSIS OF VARIANCE		
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	75864.62	1	75864.62
DEVIATION	14529.38	23	631.71
TOTAL VARIATION	90394.00	24	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 120.09

LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE.THREE

SPECIFIC CONDUCTANCE VS. TOTAL IRON

COEFFICIENT MATRIX AND AUGMENTED MATRIX

2
793

793
311630

41.1999
15797.9727

REGRESSION COEFFICIENTS OF NORMAL EQUATION

0.207260131836
0.004542052746

ORIGINAL X	- Y PAIRS	PREDICTED VALUES	DEVIATION
280.0000	2.4000	1.4790	0.9210
340.0000	2.3000	1.7516	0.5484
380.0000	1.7000	1.9332	0.2332
280.0000	1.5000	1.4790	0.0210
180.0000	0.9000	1.0248	0.1248
210.0000	1.0000	1.1611	0.1611
200.0000	1.5000	1.1157	0.3843
160.0000	0.6000	0.9340	0.3340
210.0000	1.1000	1.1611	0.0611
260.0000	1.8000	1.3882	0.4118
140.0000	0.4000	0.8431	0.4431
230.0000	1.0000	1.2519	0.2519
220.0000	1.2000	1.2065	0.0065
170.0000	0.7000	0.9794	0.2794
250.0000	1.2000	1.3428	0.1428
220.0000	1.1000	1.2065	0.1065
360.0000	1.6000	1.8424	0.2424
380.0000	1.9000	1.9332	0.0332
410.0000	2.2000	2.0695	0.1305
160.0000	1.0000	0.9340	0.0660
460.0000	3.3000	2.2966	1.0034
480.0000	1.6000	2.3874	0.7874
580.0000	3.3000	2.0417	0.4584
670.0000	3.0000	3.2504	0.2504
700.0000	2.9000	3.3867	0.4867

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 25

TOTAL SUMS OF SQUARE= 16.66264

SUMS OF SQUARES DUE TO REGRESSION= 12.39718

SUMS OF SQUARES DUE TO DEVIATION= 4.265457

GOODNESS OF FIT= .74401

MULTIPLE CORRELATION COEFFICIENT 0.86256

STANDARD DEVIATION .421576

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	12.40	1	12.40
DEVIATION	4.27	23	.19
TOTAL VARIATION	16.66	24	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 66.85

LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE.THREE

SPECIFIC CONDUCTANCE VS. FERROUS IRON

COEFFICIENT MATRIX AND AUGMENTED MATRIX

2	793	17.9000
793	311630	6472.9883

REGRESSION COEFFICIENTS OF NORMAL EQUATION

0.296285569668
0.001323186094

ORIGINAL X - Y PAIRS	PREDICTED VALUES	DEVIATION
280.0000	1.3000	0.6668
340.0000	1.2000	0.7462
380.0000	0.9000	0.7991
280.0000	0.9000	0.6668
180.0000	0.3000	0.5345
210.0000	0.5000	0.5742
200.0000	0.7000	0.5609
160.0000	0.4000	0.5080
210.0000	0.6000	0.5742
260.0000	1.0000	0.6403
140.0000	0.2000	0.4815
230.0000	0.3000	0.6006
220.0000	0.7000	0.5874
170.0000	0.4000	0.5212
250.0000	0.6000	0.6271
220.0000	0.6000	0.5874
360.0000	0.5000	0.7726
380.0000	0.9000	0.7991
410.0000	0.8000	0.8388
160.0000	0.3000	0.5080
460.0000	1.3000	0.9050
480.0000	0.3000	0.9314
580.0000	0.7000	1.0637
670.0000	1.3000	1.1828
700.0000	1.2000	1.2225

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 25

TOTAL SUMS OF SQUARE= 2.973621

SUMS OF SQUARES DUE TO REGRESSION= 1.052098

SUMS OF SQUARES DUE TO DEVIATION= 1.921523

GOODNESS OF FIT= .35381

MULTIPLE CORRELATION COEFFICIENT 0.59482

STANDARD DEVIATION .282954

ANALYSIS OF VARIANCE			
SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	1.05	1	1.05
DEVIATION	1.92	23	.08
TOTAL VARIATION	2.97	24	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 12.59

LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE.THREE

SPECIFIC CONDUCTANCE VS. FERRIC IRON

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	2	793	23.2000
	793	311630	9308.9883
REGRESSION COEFFICIENTS OF NORMAL EQUATION			
-	0.101314485073		
	0.003245007712		

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
280.0000	1.1000	0.8073	0.2927
340.0000	1.1000	1.0020	0.0980
380.0000	0.8000	1.1318	0.3318
280.0000	0.6000	0.8073	0.2073
180.0000	0.6000	0.4828	0.1172
210.0000	0.5000	0.5801	0.0801
200.0000	0.8000	0.5477	0.2523
160.0000	0.1000	0.4179	0.3179
210.0000	0.5000	0.5801	0.0801
260.0000	0.8000	0.7424	0.0576
140.0000	0.2000	0.3530	0.1530
230.0000	0.7000	0.6450	0.0550
220.0000	0.5000	0.6126	0.1126
170.0000	0.3000	0.4503	0.1503
250.0000	0.6000	0.7099	0.1099
220.0000	0.5000	0.6126	0.1126
360.0000	1.1000	1.0669	0.0331
380.0000	1.0000	1.1318	0.1318
410.0000	1.4000	1.2291	0.1709
160.0000	0.7000	0.4179	0.2821
460.0000	2.0000	1.3914	0.6086
480.0000	1.3000	1.4563	0.1563
580.0000	2.6000	1.7808	0.8192
670.0000	1.7000	2.0728	0.3728
700.0000	1.7000	2.1702	0.4702

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 25
TOTAL SUMS OF SQUARE= 8.410645
SUMS OF SQUARES DUE TO REGRESSION= 6.327667
SUMS OF SQUARES DUE TO DEVIATION= 2.082977
GOODNESS OF FIT= .75234
MULTIPLE CORRELATION COEFFICIENT 0.86738
STANDARD DEVIATION .294602

ANALYSIS OF VARIANCE			
SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	6.33	1	6.33
DEVIATION	2.08	23	.09
TOTAL VARIATION	8.41	24	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION = 69.87
LEVEL .05% - CRITICAL VALUE = 4.28

APPENDIX 4

SAMPLE STATION 4

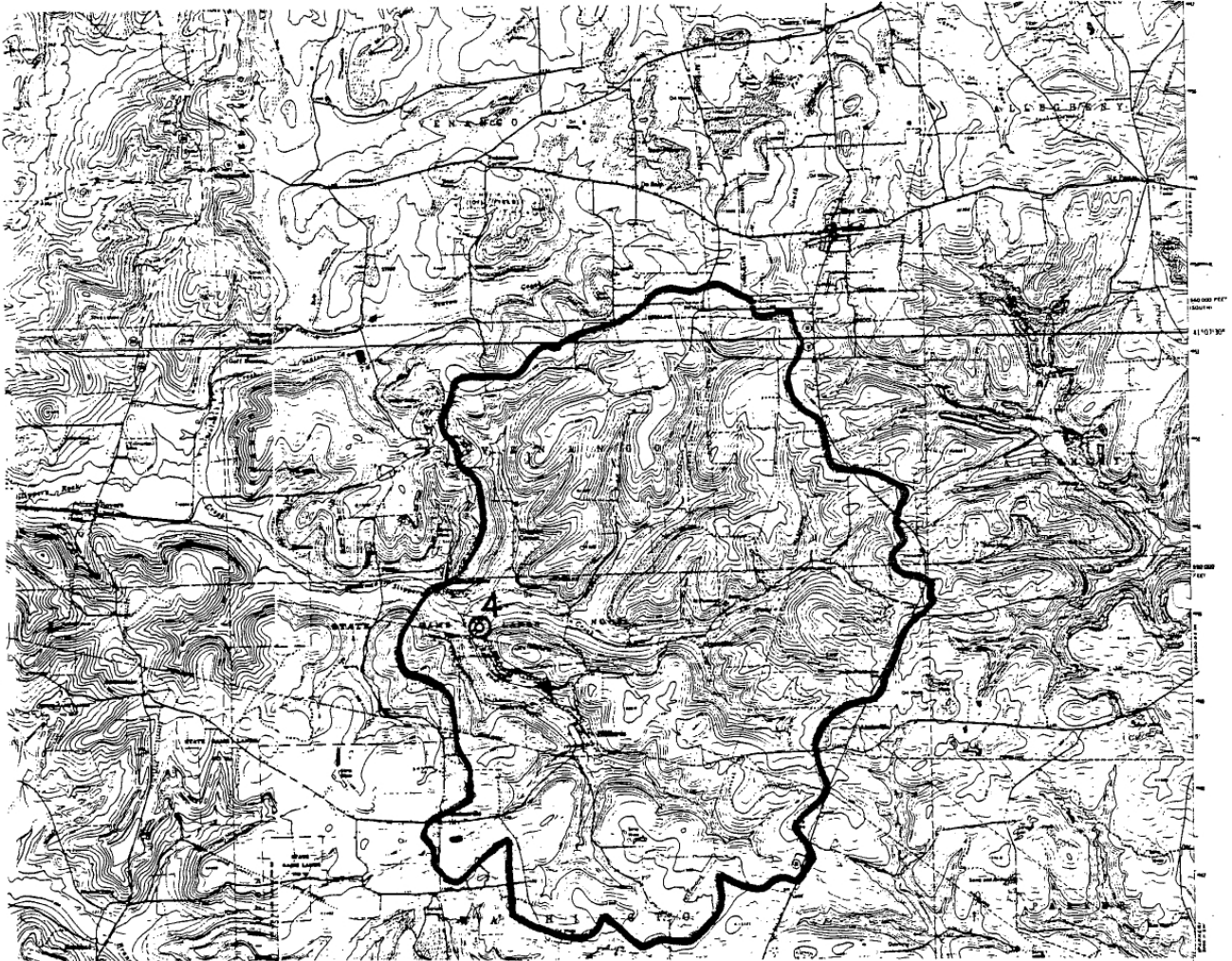
DISCHARGE FROM BIG BERTHA ARTESIAN WELL

PA STATE GAME LANDS #95

PROJECT SL-110-7-101.5

LEGEND:

- DRAINAGE AREA
- PROJECT AREA
- ⊙ SAMPLE STATION



SAMPLE STATION 4 (⊙)

SAMPLE LOCATION IN RELATION
TO
TOTAL SITE

SAMPLE 4 PROJECT SL110-7-101.5:BIG BERTHA

DATE	SPEC COND URHDS/CM	DISCHARGE C.F.S.	PH SU	ALKALINITY MG/L	ACIDITY MG/L	SULPHATES MG/L	TOTAL IRON MG/L	FERROUS IRON MG/L	FERRIC IRON MG/L	REC #
021783	1400	.04	5.94	39	215	894	142.0	137.0	5.0	1
022883	1500	.04	5.99	48	218	1034	146.0	141.0	5.0	2
030783	1400	.04	5.88	53	223	917	138.0	123.0	15.0	3
031483	1450	.04	5.86	49	227	887	147.0	143.0	4.0	4
032583	1450	.04	5.99	43	241	989	141.0	139.0	2.0	5
033183	1400	.04	5.96	32	228	876	144.0	139.0	5.0	6
040783	1550	.04	5.65	43	241	1161	149.0	143.0	6.0	7
041383	1550	.04	5.96	45	251	1135	156.0	149.0	7.0	8
042083	1500	.04	5.82	22	241	951	153.0	150.0	3.0	9
042683	1600	.04	5.83	31	260	1157	160.0	152.0	8.0	10
050483	1600	.04	5.80	44	258	1196	161.0	148.0	13.0	11

SAMPLE STATION 4

Discharge Relationships

1. Drainage Area

The surface acreage contributing runoff to the monitoring location is estimated to be less than one acre.

2. Measurement of Discharge

The discharge at this point was observed using a 90° V-notch weir capable of measuring a discharge range up to 0.40 c.f.s. Also a continuous recording flag device (bubbler) was used.

3. Observed Discharge

The observed range of discharge measured at this monitoring point was .04c.f.s.

4. Specific Yield

The specific yield of this monitoring point showed the following range:

N.A. c.f.s./1000 acres Minimum yield

N.A. c.f.s./1000 acres Maximum yield

The reviewer is directed to refer to the following materials during the discussion of the sample analyses and trends at this monitoring points:

a. Sheet .1-4 shows the data plotted and shows the regression line and field of variance.

b. Appendix- which contains the sample data and regression lines.

5. pH relationship

pH could not be correlated to discharge since a steady-state, discharge condition exists.

6. Specific conductance relationship

Specific conductance could not be correlated to discharge since a steady-state discharge condition exists.

Chemical Relationships

1. pH relationship

The pH during the sampling period varied from 5.65 - 5.99.

Regression analysis of the pH values showed that: A moderate relationship exists where pH values decreases as conductance increases.

2. Acidity/Alkalinity balance (mg/l)

The acidity during the sampling period varied from 215 - 260. Regression analysis of the acidity values indicates: An extremely strong relationship exists where acidity concentration increases as conductance increases.

The alkalinity during the sampling period varied from 31-53. Regression analysis of the alkalinity values indicates: An extremely weak relationship exists where alkalinity concentration decreases as conductance increases

3. Sulphate relationship (mg/l)

The sulphates during the sampling period varied from 876 - 1196. Regression analysis of the sulphate values indicates: An extremely strong relationship exists where sulphate concentrations increase as conductance increases.

4. Total iron relationship (mg/l)

The total iron during the sampling period varied from 138 - 161. Regression analysis of the total iron values indicates: An extremely strong relationship exists where total iron concentrations increase as conductance increases.

5. Ferrous iron relationship (mg/l)

The ferrous iron during the sampling period varied from 123 - 152. Regression analysis of the ferrous iron values indicates: A strong relationship exists where ferrous iron concentrations increase as conductance increases.

6. Ferric iron relationship (mg/l)

The ferric iron during the sampling period varied from 2 - 15. Regression analysis of the ferric iron values indicates: A weak relationship exists where ferric iron concentrations increase as conductance increases.

SAMPLE FOUR

DISCHARGE VS. SPECIFIC CONDUCTANCE

COEFFICIENT MATRIX AND AUGMENTED MATRIX
1

18400.0000
856.0000

REGRESSION COEFFICIENTS OF NORMAL EQUATION

3582.041020709090
52429.799999999990

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
8.0400	1400.0000	1490.9091	90.9091
9.0400	1500.0000	1490.9091	9.0909
0.0400	1400.0000	1490.9091	90.9091
1.0400	1450.0000	1490.9091	40.9091
2.0400	1450.0000	1490.9091	40.9091
3.0400	1550.0000	1490.9091	59.0909
4.0400	1550.0000	1490.9091	59.0909
5.0400	1500.0000	1490.9091	9.0909
6.0400	1400.0000	1490.9091	109.9091
7.0400	1500.0000	1490.9091	109.9091

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
 NUMBER OF X - Y PAIRS= 11
 TOTAL SUMS OF SQUARE= 39090.909091
 SUM OF SQUARES DUE TO REGRESSION= 1.117587E-3
 SUM OF SQUARES DUE TO DEVIATION= 39090.909091
 MEASURE OF FIT= 1.891301E-13
 MULTIPLE CORRELATION COEFFICIENT 0.00000
 STANDARD DEVIATION 70.870611

ANALYSIS OF VARIANCE			
SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
REGRESSION	.00	1	.00
DEVIATION	39090.91	9	8565.56
TOTAL VARIATION	39090.91	10	

F-TEST FOR EQUALITY OF SAMPLE REGRESSION VARIANCE
 F TEST - SIGNIFICANCE OF REGRESSION = 0.00
 LEVEL .05% - CRITICAL VALUE = 5.12

SAMPLE.FOUR

DISCHARGE VS. PH

COEFFICIENT MATRIX AND AUGMENTED MATRIX

1

64.6799
2.5872

REGRESSION COEFFICIENTS OF NORMAL EQUATION

9.479994773865

384.000000000000

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
0.0400	5.9400	5.8800	0.0600
0.0400	5.9900	5.8800	0.1100
0.0400	5.8800	5.8800	0.0000
0.0400	5.8600	5.8800	0.0200
0.0400	5.9900	5.8800	0.1100
0.0400	5.9600	5.8800	0.0800
0.0400	5.6500	5.8800	0.2300
0.0400	5.9600	5.8800	0.0800
0.0400	5.8200	5.8800	0.0600
0.0400	5.8300	5.8800	0.0500
0.0400	5.8000	5.8200	0.0800

SAMPLE.FOUR

SPECIFIC CONDUCTANCE VS. ALKALINITY

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	1	1640	449.0000
	1640	2451000	668400.0000
REGRESSION COEFFICIENTS OF NORMAL EQUATION			
	66.498977661133		
	0.017224933952		

ORIGINAL X	- Y PAIRS	PREDICTED VALUES	DEVIATION
1400.0000	39.0000	42.3841	3.3841
1500.0000	48.0000	40.6616	7.3384
1400.0000	53.0000	42.3841	10.6159
1450.0000	49.0000	41.5228	7.4772
1450.0000	43.0000	41.5228	1.4772
1400.0000	32.0000	42.3841	10.3841
1550.0000	43.0000	39.8003	3.1997
1550.0000	45.0000	39.8003	5.1997
1500.0000	22.0000	40.6616	18.6616
1600.0000	31.0000	38.9391	7.9391
1600.0000	44.0000	38.9391	5.0609

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 11

TOTAL SUMS OF SQUARE= 835.6367

SUMS OF SQUARES DUE TO REGRESSION= 17.57421

SUMS OF SQUARES DUE TO DEVIATION= 818.0625

GOODNESS OF FIT= .021031

MULTIPLE CORRELATION COEFFICIENT 0.14502

STANDARD DEVIATION 9.04468

ANALYSIS OF VARIANCE			
SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	17.57	1	17.57
DEVIATION	818.06	9	90.90
TOTAL VARIATION	835.64	10	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 0.19

LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE.FOUR

SPECIFIC CONDUCTANCE VS. ACIDITY

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	1	1640	2603.0000
	1640	2451000	3890900.0000

REGRESSION COEFFICIENTS OF NORMAL EQUATION

- 17.229812622070
0.170276105404

ORIGINAL X	Y PAIRS	PREDICTED VALUES	DEVIATION
1400.0000	215.0000	221.1567	6.1567
1500.0000	218.0000	238.1843	20.1843
1400.0000	223.0000	221.1567	1.8433
1450.0000	227.0000	229.6705	2.6705
1450.0000	241.0000	229.6705	11.3295
1400.0000	228.0000	221.1567	6.8433
1550.0000	241.0000	246.6979	5.6979
1550.0000	251.0000	246.6979	4.3021
1500.0000	241.0000	238.1843	2.8157
1600.0000	260.0000	255.2118	4.7882
1600.0000	258.0000	255.2118	2.7882

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 11

TOTAL SUMS OF SQUARE= 2434.562

SUMS OF SQUARES DUE TO REGRESSION= 1713.625

SUMS OF SQUARES DUE TO DEVIATION= 720.9375

GOODNESS OF FIT= .703874

MULTIPLE CORRELATION COEFFICIENT 0.83897

STANDARD DEVIATION 8.490804

SOURCE OF VARIATION	ANALYSIS OF VARIANCE		
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	1713.63	1	1713.63
DEVIATION	720.94	9	80.10
TOTAL VARIATION	2434.56	10	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 21.39

LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE.FOUR

SPECIFIC CONDUCTANCE VS. SULPHATES

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	1	1640	11197.0000
	1640	2451000	16783089.0000

REGRESSION COEFFICIENTS OF NORMAL EQUATION

1236.767578125000
1.512283325195

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1400.0000	894.0000	880.4290	13.5710
1500.0000	1034.0000	1031.6572	2.3428
1400.0000	917.0000	880.4290	36.5710
1450.0000	887.0000	956.0432	69.0432
1450.0000	989.0000	956.0432	32.9568
1400.0000	876.0000	880.4290	4.4290
1550.0000	1161.0000	1107.2715	53.7285
1550.0000	1135.0000	1107.2715	27.7285
1500.0000	951.0000	1031.6572	80.6572
1600.0000	1157.0000	1182.8857	25.8857
1600.0000	1176.0000	1182.8857	13.1143

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 11
TOTAL SUMS OF SQUARE= 153632
SUMS OF SQUARES DUE TO REGRESSION= 135165
SUMS OF SQUARES DUE TO DEVIATION= 18467
GOODNESS OF FIT= .879797
MULTIPLE CORRELATION COEFFICIENT 0.93797
STANDARD DEVIATION 42.97323

SOURCE OF VARIATION	ANALYSIS OF VARIANCE			MEAN SQUARE
	SUM OF SQUARES	DEGREES OF FREEDOM		
LIN. REGRESSION	135165.00	1		135165.00
DEVIATION	18467.00	9		2051.89
TOTAL VARIATION	153632.00	10		

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION = 65.87
LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE.FOUR

SPECIFIC CONDUCTANCE VS. TOTAL IRON

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	1	1640	1637.0000
	1640	2451000	2446050.0000

REGRESSION COEFFICIENTS OF NORMAL EQUATION

11.795043945313
0.091905772686

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1400.0000	142.0000	140.4631	1.5369
1500.0000	146.0000	149.6537	3.6537
1400.0000	138.0000	140.4631	2.4631
1450.0000	147.0000	145.0584	1.9416
1450.0000	141.0000	145.0584	4.0584
1400.0000	144.0000	140.4631	3.5369
1550.0000	149.0000	154.2490	5.2490
1550.0000	156.0000	154.2490	1.7510
1500.0000	153.0000	149.6537	3.3463
1600.0000	160.0000	158.8443	1.1557
1600.0000	161.0000	158.8443	2.1557

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 11

TOTAL SUMS OF SQUARE= 601.6875

SUMS OF SQUARES DUE TO REGRESSION= 499.3125

SUMS OF SQUARES DUE TO DEVIATION= 102.375

GOODNESS OF FIT= .829854

MULTIPLE CORRELATION COEFFICIENT 0.91096

STANDARD DEVIATION 3.199609

SOURCE OF VARIATION	ANALYSIS OF VARIANCE SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	499.31	1	499.31
DEVIATION	102.38	9	11.38
TOTAL VARIATION	601.69	10	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 43.90

LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE.FOUR

SPECIFIC CONDUCTANCE VS. FERROUS IRON

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	1	1640	1564.0000
	1640	2451000	2336600.0000

REGRESSION COEFFICIENTS OF NORMAL EQUATION
20.621734619141
0.081534206867

ORIGINAL X - Y PAIRS	PREDICTED VALUES	DEVIATION
1400.0000 137.0000	134.7696	2.2304
1500.0000 141.0000	142.9230	1.9230
1400.0000 123.0000	134.7696	11.7696
1450.0000 143.0000	138.8463	4.1537
1450.0000 139.0000	138.8463	0.1537
1400.0000 139.0000	134.7696	4.2304
1550.0000 143.0000	146.9997	3.9997
1550.0000 149.0000	146.9997	2.0003
1500.0000 150.0000	142.9230	7.0770
1600.0000 152.0000	151.0765	0.9235
1600.0000 148.0000	151.0765	3.0765

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 11

TOTAL SUMS OF SQUARE= 655.6875

SUMS OF SQUARES DUE TO REGRESSION= 392.8125

SUMS OF SQUARES DUE TO DEVIATION= 262.875

GOODNESS OF FIT= .599085

MULTIPLE CORRELATION COEFFICIENT

0.77401

STANDARD DEVIATION 5.127132

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	392.81	1	392.81
DEVIATION	262.88	9	29.21
TOTAL VARIATION	655.69	10	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION = 13.45
LEVEL .05% - CRITICAL VALUE = 4.28

SAMPLE.FOUR

SPECIFIC CONDUCTANCE VS. FERRIC IRON

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	1	1640	73.0000
	1640	2451000	109450.0000

REGRESSION COEFFICIENTS OF NORMAL EQUATION

- 8.844008445740
0.010383177549

ORIGINAL X	Y PAIRS	PREDICTED VALUES	DEVIATION
1400.0000	5.0000	5.6924	0.6924
1500.0000	5.0000	6.7308	1.7308
1400.0000	15.0000	5.6924	9.3076
1450.0000	4.0000	6.2116	2.2116
1450.0000	2.0000	6.2116	4.2116
1400.0000	5.0000	5.6924	0.6924
1550.0000	6.0000	7.2499	1.2499
1550.0000	7.0000	7.2499	0.2499
1500.0000	3.0000	6.7308	3.7308
1600.0000	8.0000	7.7691	0.2309
1600.0000	13.0000	7.7691	5.2309

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 11

TOTAL SUMS OF SQUARE= 162.5456

SUMS OF SQUARES DUE TO REGRESSION= 6.37085

SUMS OF SQUARES DUE TO DEVIATION= 156.1748

GOODNESS OF FIT= .039194

MULTIPLE CORRELATION COEFFICIENT 0.19798

STANDARD DEVIATION 3.951896

SOURCE OF VARIATION	ANALYSIS OF VARIANCE		MEAN SQUARE
	SUM OF SQUARES	DEGREES OF FREEDOM	
LIN. REGRESSION	6.37	1	6.37
DEVIATION	156.17	9	17.35
TOTAL VARIATION	162.55	10	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 0.37

LEVEL .05% - CRITICAL VALUE = 4.28

POST CLOSURE DATA LISTING

SAMPLE FOUR

DATE	SPEC. COND.	DISCHARGE	pH	ALKALINITY	ACIDITY	SULPHATES	TOTAL IRON	FERROUS IRON	FERRIC IRON
6/12	2100	.08	5.48	20	31	1354	174	167	7
6/16	1700	.04	5.23	10	276	1176	168	165	3
6/21	1500	.04	5.52	13	273	1182	168	156	12
6/29	1400	.04	5.29	7	255	1119	160	154	6
7/10	1900	.04	5.59	21	284	1229	180	172	8
7/19	1800	.04	4.19	0	297	1082	172	166	6
7/26	1800	.04	5.17	10	292	1208	170	160	10
8/6	1800	.04	5.55	17	280	1103	172	162	10
8/21	1600	.04	5.72	21	317	1265	180	177	3

