APPENDIX 10

SAMPLE STATION 10

MONITORING WELL R2

PA STATE GAME LANDS #95

PROJECT SL-110-7-101.5

SAMPLE 10   PROJECT SL110-7 101.5:BIG BERTHA

DATE	SPEC COND UMHOS/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 #
021793	1500	.00	5.50	12	557	1139	350.0	348.0	2.0	1
022883	1500	.00	5.86	21	571	1261	314.0	309.0	5.0	2
030783	1300	.00	5.25	11	539	1108	292.0	288.0	4.0	3
031483	1550	.00	5.39	11	520	806	308.0	296.0	12.0	4
032593	1300	.00	5.17	08	458	733	226.0	192.0	34.0	5
033183	1400	.00	5.16	09	464	825	282.0	252.0	30.0	6
040793	1400	.00	5.21	10	472	1072	278.0	234.0	44.0	7
041383	1400	.00	5.34	07	448	873	292.0	286.0	6.0	8
042083	1400	.00	4.77	02	806	934	256.0	250.0	6.0	9
042683	1200	.00	4.95	05	426	908	256.0	254.0	2.0	10

2. Pre Closure Analysis (monitoring Point 10)

The reviewer is directed to refer to the following materials during
the discussion of the chemical analyses and trends at this monitoring point

     a. Sheet 29 - which shows the sample data plotted using a time reference basis.

     b. The corresponding graphs (on the 6 pages immediately following the pre
     closure analysis) which show the data, the regression mean line, and the field of
     variance.

     c. Appendix 10 - which contains the raw sample data during pre closure which
     was utilized to develop the means, ranges, and regression analysis results.

1. pH Relationship
The pH at this monitoring point varied from 4.77 - 5.06; the mean value being 5.26. An
extremely strong relationship exists.

2. Specific Conductance Relationship
The specific conductance at this monitoring point varied from 1200 - 1550; the mean
value calculated as 1395.

3. Acidity/Alkaiinity Balance(mg /l)

The alkalinity varied from 2- 21; the mean value was 10. Regression analysis of the
alkalinity values showed: A moderate relationship exists where alkalinity concentrations
increased as conductance increased. The acidity varied from 426- 806 the mean value
was 529. Regression analysis of the sulphate values showed: A weak relationship exists
where acidity concentrations increased as conductance increased.

4. Sulphate Relationship (mg/l)

The sulphates varied from 733 - 1261 ; the mean value was 982. Regression analysis of
the sulphate values showed: A weak relationship exists where sulphate concentrations
increased as conductance increased.

5. Total Iron Relationship (mg/l)

The total iron varied from 226 - 350 ; the mean value was 285. Regression analysis of the
ferrous iron values showed: A strong relationship exists where total iron concentration increases
as conductance L⁻17 creases.

6. Ferrous Iron Relationship (mg/l)
The ferrous iron varied from 192 - 348 ; the mean value was 271. Regression analysis of
the ferrous iron values showed: A strong relation ship exists where ferrous iron
concentration increases as conductance increases.
7. Ferric Iron Relationship (mg/l)
The ferric iron varied from 2- 44 ; the mean value was 14. Regression analysis of the
ferric iron values showed: An extremely weak relationship exists where ferric iron
concentrations increases as conductance increases.

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	1	1395	52.6000
	1395	1956250	73552.5000

REGRESSION COEFFICIENTS OF NORMAL EQUATION
           2.865647921760
           0.001716381418

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1500.0000	5.5000	5.4402	0.0598
1500.0000	5.8600	5.4402	0.4198
1300.0000	5.2500	5.0969	0.1531
1550.0000	5.3900	5.5260	0.1360
1300.0000	5.1700	5.0969	0.0731
1400.0000	5.1600	5.2686	0.1086
1400.0000	5.2100	5.2686	0.0586
1400.0000	5.3400	5.2686	0.0714
1400.0000	4.7700	5.2686	0.4986
1200.0000	4.9500	4.9253	0.0247

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 10
TOTAL SUMS OF SQUARE= .7978
SUMS OF SQUARES DUE TO REGRESSION= .301225
SUMS OF SQUARES DUE TO DEVIATION= .496575
GOODNESS OF FIT= .377569
MULTIPLE CORRELATION COEFFICIENT   0.61447
STANDARD DEVIATION .234894

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	.30	1	.30
DEVIATION	.50	8	.04
TOTAL VARIATION	.80	9	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION =   4.85
     LEVEL .05% - CRITICAL VALUE = 5.32

SAMPLE.TEN   SPECIFIC CONDUCTANCE VS. ALKALINITY

COEFFICIENT MATRIX AND AUGMENTED MATRIX
                    1   1395   96.0000
                 1395   1956250   136450.0000
REGRESSION COEFFICIENTS OF NORMAL EQUATION
-          24.916870415648
            0.024743276284
     ORIGINAL X - Y PAIRS   PREDICTED VALUES   DEVIATION
     1500.0000   12.0000   12.1980   0.1980
     1500.0000   21.0000   12.1980   8.8020
     1300.0000   11.0000   7.2494   3.7506
     1550.0000   11.0000   13.4352   2.4352
     1300.0000   8.0000   7.2494   0.7506
     1400.0000   9.0000   9.7237   0.7237
     1400.0000   10.0000   9.7237   0.2763
     1400.0000   7.0000   9.7237   2.7237
     1400.0000   2.0000   9.7237   7.7237
     1200.0000   5.0000   4.7751   0.2249

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 10
TOTAL SUMS OF SQUARE= 228.4
SUMS OF SQUARES DUE TO REGRESSION= 62.600489
SUMS OF SQUARES DUE TO DEVIATION= 165.799511
GOODNESS OF FIT= .274083
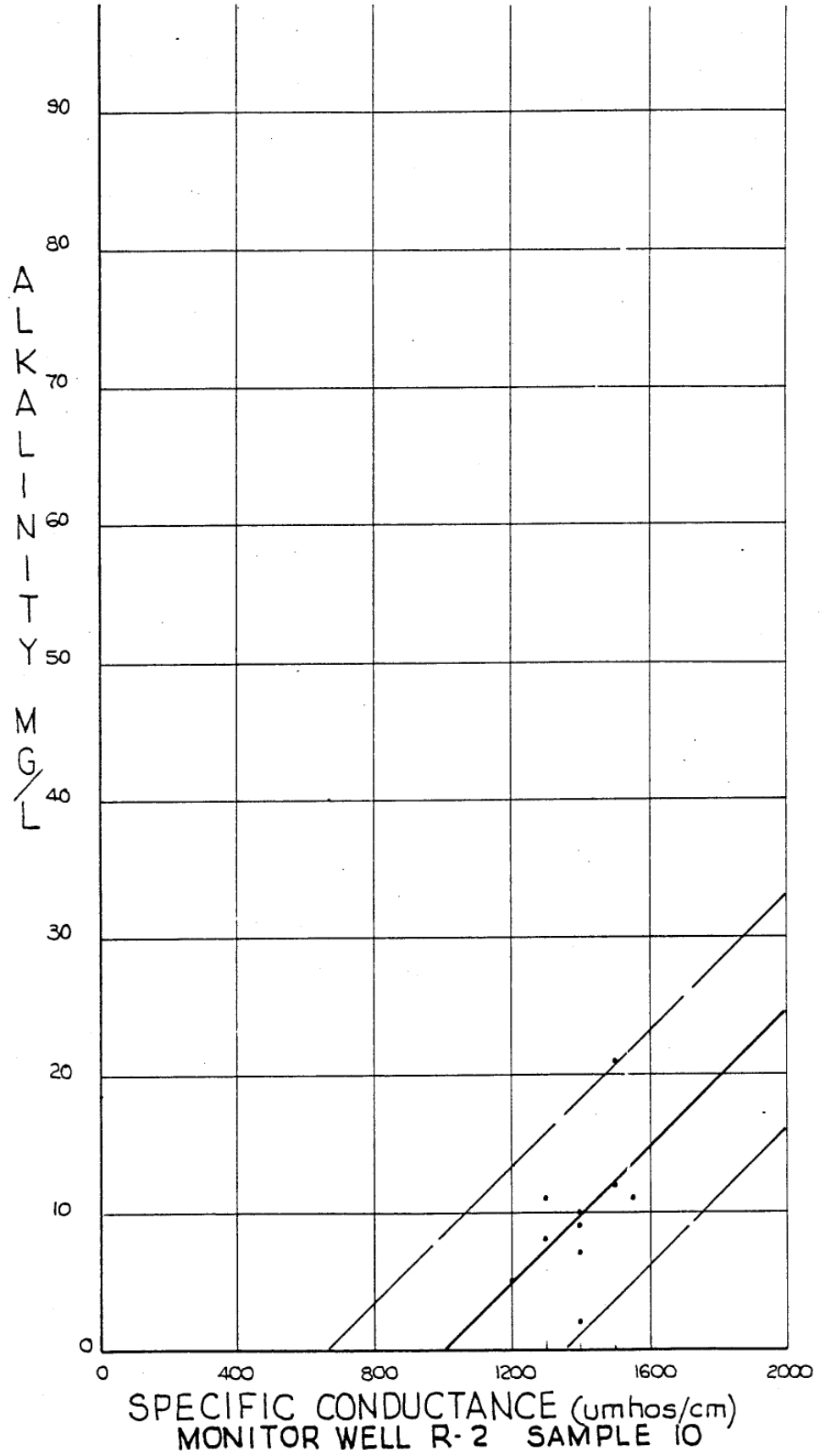MULTIPLE CORRELATION COEFFICIENT   0.52353
STANDARD DEVIATION 4.292105

                    ANALYSIS OF VARIANCE
     SOURCE OF   SUM OF   DEGREES OF   MEAN
     VARIATION   SQUARES   FREEDOM   SQUARE
LIN. REGRESSION   62.60   1   62.60
DEVIATION   165.80   8   20.72
TOTAL VARIATION   228.40   9

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION =   3.02
     LEVEL .05% - CRITICAL VALUE = 5.32

SPECIFIC CONDUCTANCE (umhos/cm)
MONITOR WELL R-2   SAMPLE 10

COEFFICIENT MATRIX AND AUGMENTED MATRIX
```
                    1                 1395              5291.0000
                 1395              1956250           7414300.0000
```
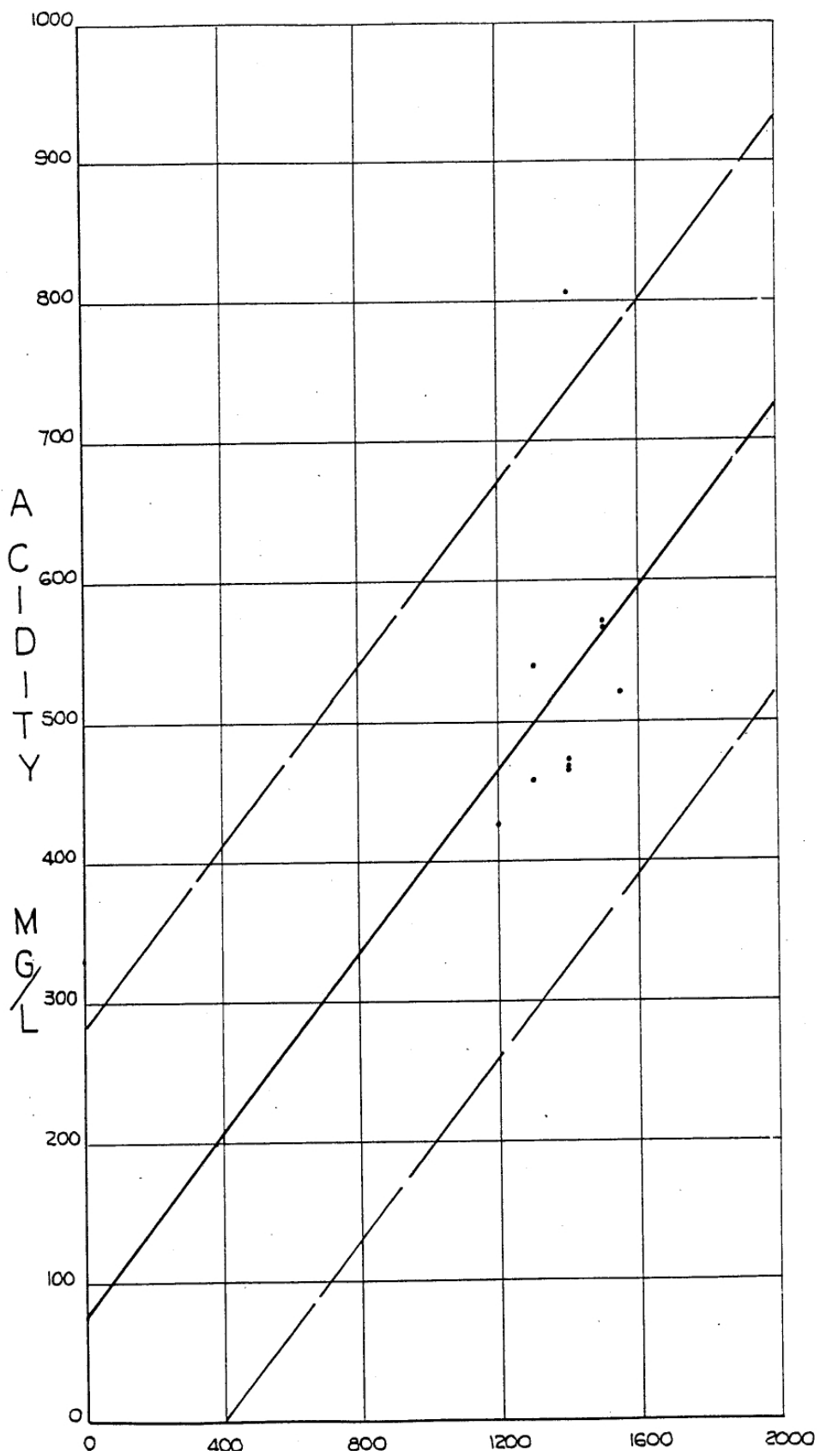REGRESSION COEFFICIENTS OF NORMAL EQUATION
```
          74.036674816616
           0.326210268949
```

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1500.0000	567.0000	563.3521	3.6479
1500.0000	571.0000	563.3521	7.6479
1300.0000	539.0000	498.1100	40.8900
1550.0000	520.0000	579.6626	59.6626
1300.0000	458.0000	498.1100	40.1100
1400.0000	464.0000	530.7311	66.7311
1400.0000	472.0000	530.7311	58.7311
1400.0000	468.0000	530.7311	62.7311
1400.0000	806.0000	530.7311	275.2689
1200.0000	426.0000	465.4890	39.4890

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 10
TOTAL SUMS OF SQUARE= 106962.9
SUMS OF SQUARES DUE TO REGRESSION= 10880.743521
SUMS OF SQUARES DUE TO DEVIATION= 96082.156479
GOODNESS OF FIT= .101724
MULTIPLE CORRELATION COEFFICIENT   0.31894
STANDARD DEVIATION 103.32374

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	10880.74	1	10880.74
DEVIATION	96082.16	8	12010.27
TOTAL VARIATION	106962.90	9	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION =   0.91
      LEVEL .05% - CRITICAL VALUE = 5.32

COEFFICIENT MATRIX AND AUGMENTED MATRIX
```
                    1                 1395              9819.0000
                 1395              1956250         13737800.0000
```
REGRESSION COEFFICIENTS OF NORMAL EQUATION
```
        432.154034229823
          0.394083129584
```

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1500.0000	1139.0000	1023.2787	115.7213
1500.0000	1261.0000	1023.2787	237.7213
1300.0000	1108.0000	944.4621	163.5379
1550.0000	886.0000	1042.9829	156.9829
1300.0000	733.0000	944.4621	211.4621
1400.0000	825.0000	983.8704	158.8704
1400.0000	1072.0000	983.8704	88.1296
1400.0000	873.0000	983.8704	110.8704
1400.0000	934.0000	983.8704	49.8704
1200.0000	988.0000	905.0538	82.9462

```
STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 10
TOTAL SUMS OF SQUARE= 236552.9
SUMS OF SQUARES DUE TO REGRESSION= 15879.579707
SUMS OF SQUARES DUE TO DEVIATION= 220673.320293
GOODNESS OF FIT= .067129
MULTIPLE CORRELATION COEFFICIENT          0.25909
STANDARD DEVIATION 156.586263
```
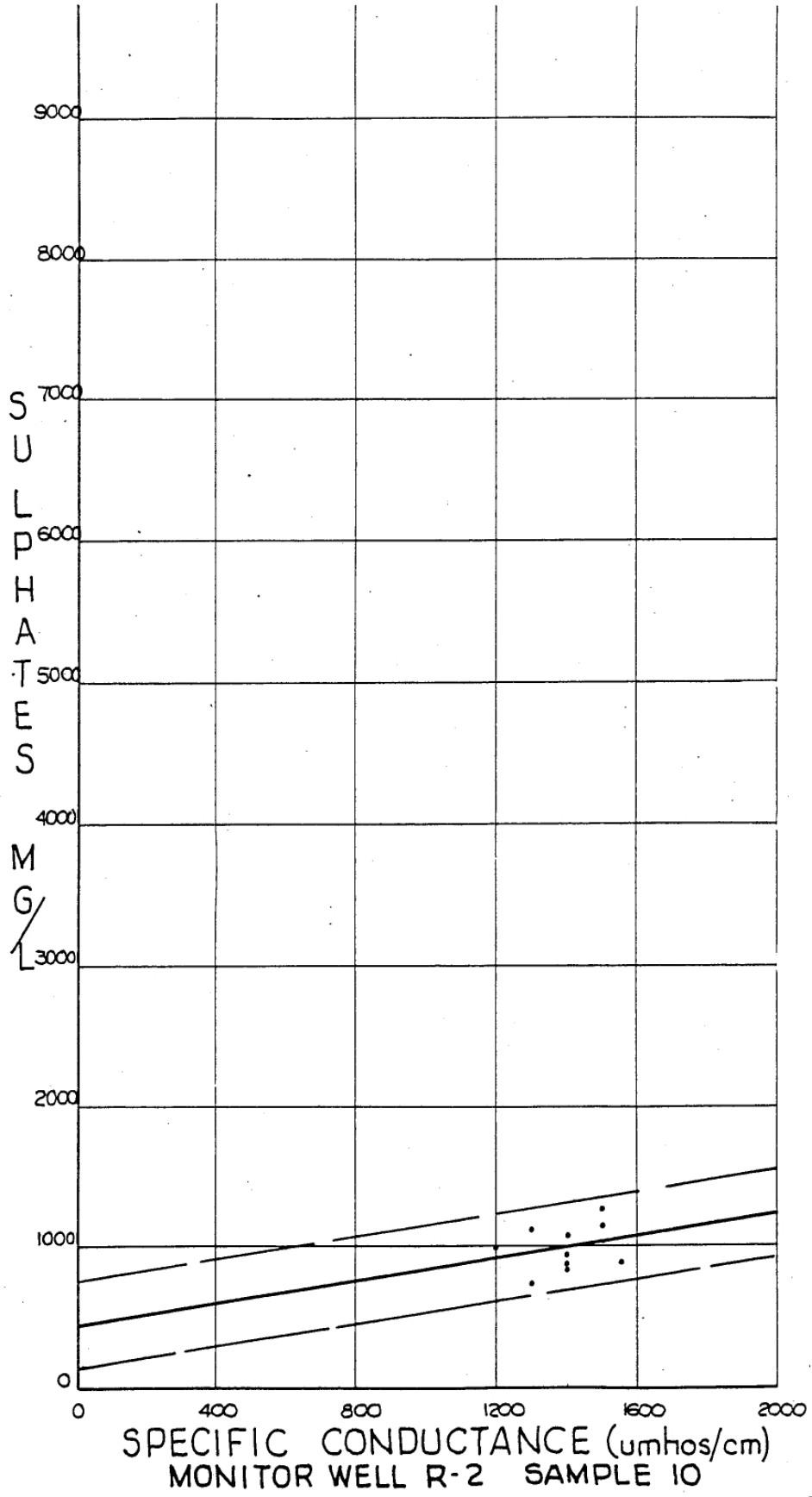
ANALYSIS OF VARIANCE

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	15879.58	1	15879.58
DEVIATION	220673.32	8	27584.17
TOTAL VARIATION	236552.90	9	

```
F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION =          0.58
     LEVEL .05% - CRITICAL VALUE = 5.32
```

SPECIFIC CONDUCTANCE (umhos/cm)
MONITOR WELL R-2   SAMPLE 10

COEFFICIENT MATRIX AND AUGMENTED MATRIX
```
              1                1395                   2854.0000
           1395             1956250              4005200.0000
```
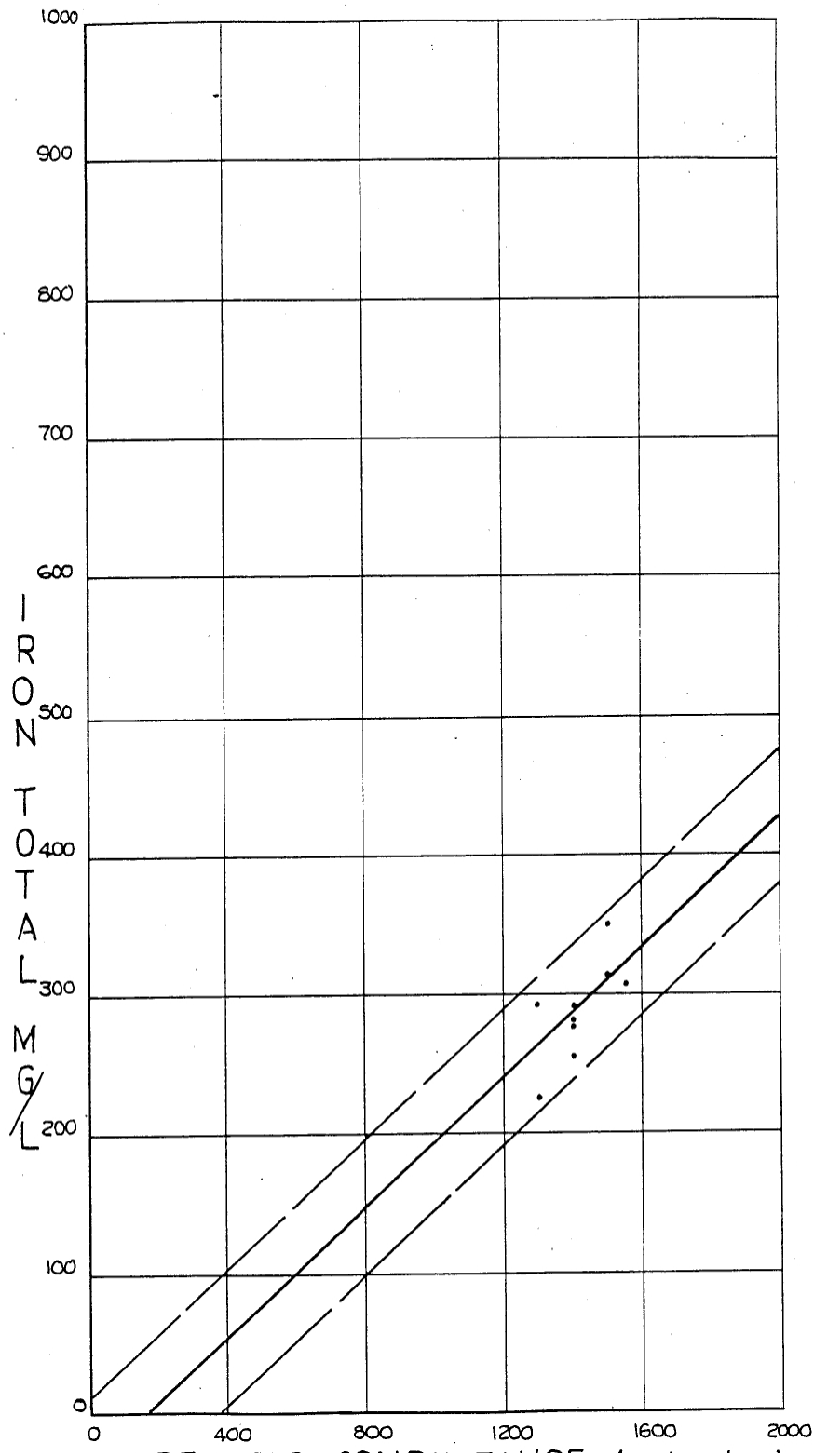REGRESSION COEFFICIENTS OF NORMAL EQUATION
```
-          40.259168704163
           0.233447432763
```

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1500.0000	350.0000	309.9120	40.0880
1500.0000	314.0000	309.9120	4.0880
1300.0000	292.0000	263.2225	28.7775
1550.0000	308.0000	321.5844	13.5844
1300.0000	226.0000	263.2225	37.2225
1400.0000	282.0000	286.5672	4.5672
1400.0000	278.0000	286.5672	8.5672
1400.0000	292.0000	286.5672	5.4328
1400.0000	256.0000	286.5672	30.5672
1200.0000	256.0000	239.8778	16.1222

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 10
TOTAL SUMS OF SQUARE= 10912.4
SUMS OF SQUARES DUE TO REGRESSION= 5572.39022
SUMS OF SQUARES DUE TO DEVIATION= 5340.00978
GOODNESS OF FIT= .510648
MULTIPLE CORRELATION COEFFICIENT   0.71460
STANDARD DEVIATION 24.358457

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	5572.39	1	5572.39
DEVIATION	5340.01	8	667.50
TOTAL VARIATION	10912.40	9	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION =   8.35
     LEVEL .05% - CRITICAL VALUE = 5.32

IRON TOTAL MG/L

1000
900
800
700
600
500
400
300
200
100
0

0   400   800   1200   1600   2000

COEFFICIENT MATRIX AND AUGMENTED MATRIX

```
              1                 1395              2709.0000
           1395              1956250           3803900.0000
```
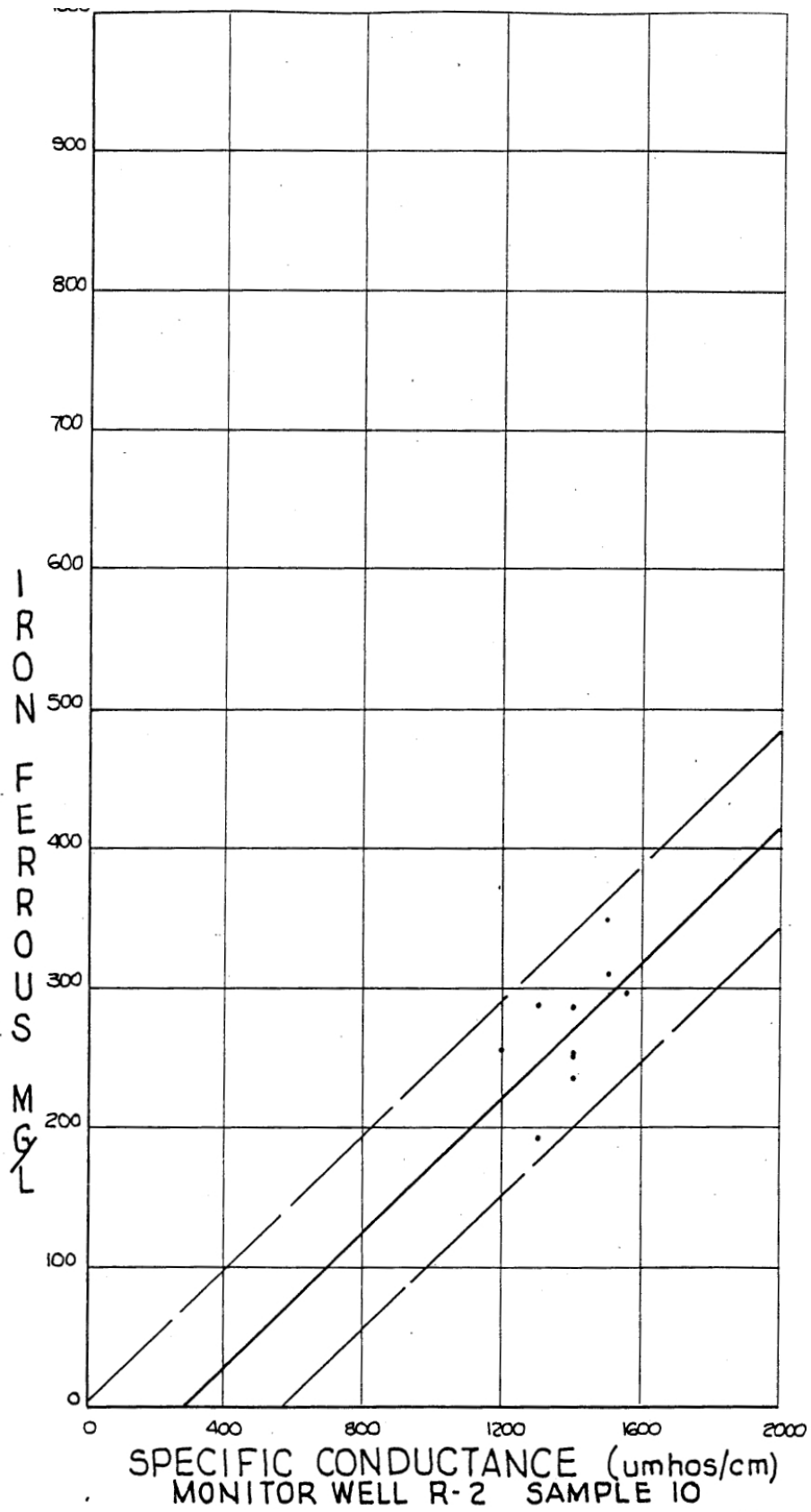
REGRESSION COEFFICIENTS OF NORMAL EQUATION
```
-        68.061124694383
          0.242982885086
```

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1500.0000	348.0000	296.4132	51.5868
1500.0000	309.0000	296.4132	12.5868
1300.0000	288.0000	247.8166	40.1834
1550.0000	296.0000	308.5623	12.5623
1300.0000	192.0000	247.8166	55.8166
1400.0000	252.0000	272.1149	20.1149
1400.0000	234.0000	272.1149	38.1147
1400.0000	286.0000	272.1149	13.8851
1400.0000	250.0000	272.1149	22.1149
1200.0000	254.0000	223.5183	30.4817

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 10
TOTAL SUMS OF SQUARE= 17212.9
SUMS OF SQUARES DUE TO REGRESSION= 6036.90978
SUMS OF SQUARES DUE TO DEVIATION= 11175.99022
GOODNESS OF FIT= .35072
MULTIPLE CORRELATION COEFFICIENT   0.59222
STANDARD DEVIATION 35.238852

<div align="center">ANALYSIS OF VARIANCE</div>

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	6036.91	1	6036.91
DEVIATION	11175.99	8	1397.00
TOTAL VARIATION	17212.90	9	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION =   4.32
      LEVEL .05% - CRITICAL VALUE = 5.32

SPECIFIC CONDUCTANCE (umhos/cm)
MONITOR WELL R-2   SAMPLE 10

COEFFICIENT MATRIX AND AUGMENTED MATRIX
```
              1                1395                    145.0000
           1395             1956250                201300.0000
```
REGRESSION COEFFICIENTS OF NORMAL EQUATION
```
          27.801955990220
-          0.009535452323
```

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1500.0000	2.0000	13.4988	11.4988
1500.0000	5.0000	13.4988	8.4988
1300.0000	4.0000	15.4059	11.4059
1550.0000	12.0000	13.0220	1.0220
1300.0000	34.0000	15.4059	18.5941
1400.0000	30.0000	14.4523	15.5477
1400.0000	44.0000	14.4523	29.5477
1400.0000	6.0000	14.4523	8.4523
1400.0000	6.0000	14.4523	8.4523
1200.0000	2.0000	16.3594	14.3594

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 10
TOTAL SUMS OF SQUARE= 2154.5
SUMS OF SQUARES DUE TO REGRESSION= 9.297066
SUMS OF SQUARES DUE TO DEVIATION= 2145.202934
GOODNESS OF FIT= 4.315185E-3
MULTIPLE CORRELATION COEFFICIENT   0.06569
STANDARD DEVIATION 15.438778

```
                 ANALYSIS OF VARIANCE
     SOURCE OF       SUM  OF      DEGREES OF      MEAN
     VARIATION       SQUARES       FREEDOM       SQUARE
LIN. REGRESSION        9.30          1            9.30
DEVIATION           2145.20          8          268.15
TOTAL VARIATION     2154.50          9
```

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION =   0.03
     LEVEL .05% - CRITICAL VALUE = 5.32

SPECIFIC CONDUCTANCE (umhos/cm)
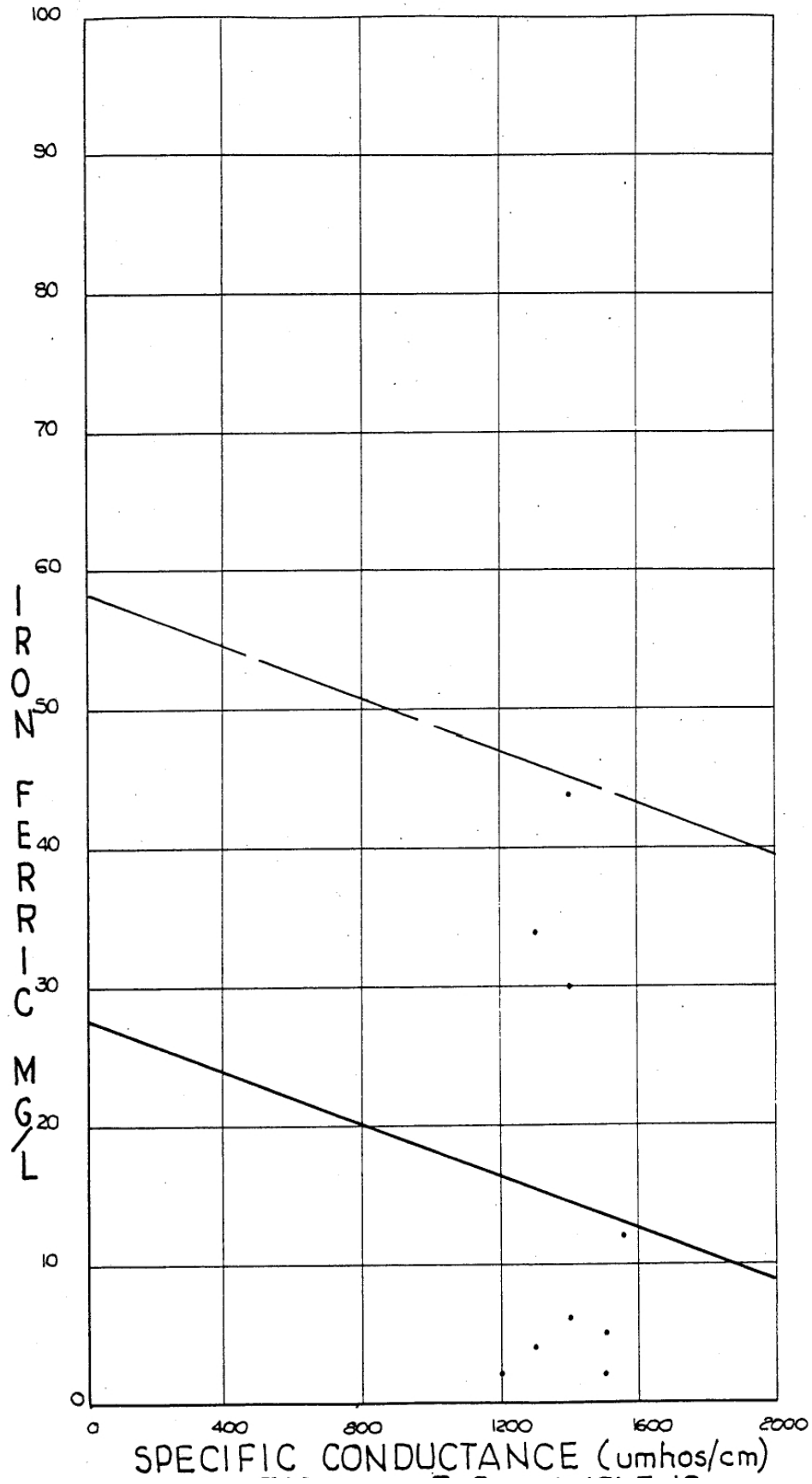
CLOSURE AND POST CLOSURE DATA LISTING *

SAMPLE TEN

DATE	SPEC. COND.	DISCHARGE	pH	ALKALINITY	ACIDITY	SULPHATES	TOTAL IRON	FERROUS IRON	FERRIC IRON
5/11	1000	--	4.99	8	423	777	268	236	32
5/19	1450	--	5.41	10	392	879	222	188	34
5/25	1400	--	5.31	10	374	670	233	200	33
6/1	1400	--	5.03	7	324	621	201	178	23
6/7	1200	--	4.97	6	340	654	190	186	4
6/12	1200	--	4.74	4	314	900	188	182	4
6/16	1200	--	4.50	0	323	601	187	182	5
6/21	1000	--	4.79	4	335	881	166	164	4
6/29	1100	--	5.23	4	288	654	218	218	0
7/10	1200	--	4.89	6	268	808	160	157	3
7/26	1200	--	4.69	4	238	631	140	132	8
8/6	1000	--	4.72	3	204	590	132	126	6
8/21	1100	--	4.96	6	218	738	120	103	17

* Units are as follows:

specific conductance	-	unhos/cm
discharge	-	c.f.s.
pH	-	standard units
all others	-	mg/l