

APPENDIX 12

SAMPLE STATION 12

MONITORING WELL CI

PA STATE GAME LANDS #95

PROJECT SL-110-7-101.5

SAMPLE 12

PROJECT SL110-7-101.5:RIG 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	FEROUS IRON MG/L	FERRIC IRON MG/L	REC #
032583	1000	.00	6.34	39	00	520	20.2	11.2	9.0	1
040793	1300	.00	10.07	89	00	578	4.5	.0	4.4	2
041383	1100	.00	9.33	55	00	416	23.7	9.2	14.5	3
042083	1100	.00	9.70	68	00	422	94.5	91.5	3.0	4
042583	1000	.00	11.07	117	00	413	109.0	82.0	27.0	5

2. Pre Closure Analysis (monitoring Point 12)

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 31 - 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 12 - 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 6.34 - 11.07; the mean value being 9.10. A weak relationship exists.

2. Specific Conductance Relationship

The specific conductance at this monitoring point varied from 1000 - 1300; the mean value calculated as 1100.

3. Acidity/Alkalinity Balance (mg/l)

The alkalinity varied from 39 - 117; the mean value was 74. Regression analysis of the alkalinity -values showed: An extremely weak relationship exists where alkalinity concentration increases as conductance increases. The acidity varied from 0- 0; the mean value was 0. Regression analysis of the sulphate values showed: No acidity was measured, so n regression analysis was attempted.

4. Sulphate Relationship (mg/l)

The sulphates varied from 413 - 578 ; the mean value was 470. Regression analysis of the sulphate values showed: A strong relationship exists where sulphates concentration increases as conductance increases.

5. Total Iron Relationship (mg/l)

The total iron varied from 4- 109; the mean value was 50. Regression analysis of the ferrous iron values showed: A moderate relationship exists where ferrous iron concentration decreases as conductance increases.

6. Ferrous Iron Relationship (mg/l)

The ferrous iron varied from 4- 27; the mean value was 11. Regression analysis of the ferrous iron values showed: A moderate relationship exists where ferrous iron concentration decreases as conductance increases.

7. Ferric Iron Relationship (mg/l)

The ferric iron varied from 4- 27; the mean value was 11. Regression analysis of the ferric iron values showed: A moderate relationship exists where ferric iron concentration decreases as conductance increases.

SAMPLE.TWELVE

SPECIFIC CONDUCTANCE VS. PH

COEFFICIENT MATRIX AND AUGMENTED MATRIX

550 550 45.5100
611000 50334.0000
REGRESSION COEFFICIENTS OF NORMAL EQUATION
4.097000000000
0.004550000000

ORIGINAL X - Y PAIRS	PREDICTED VALUES	DEVIATION
1000.0000 6.3400	8.6470	2.3070
1300.0000 10.0700	10.0120	0.0580
1100.0000 8.3300	9.1020	0.7720
1100.0000 9.7000	9.1020	0.5980
1000.0000 11.0700	8.6470	2.4230

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
NUMBER OF X - Y PAIRS= 5
TOTAL SUMS OF SQUARE= 13.39228
SUMS OF SQUARES DUE TO REGRESSION= 1.24215
SUMS OF SQUARES DUE TO DEVIATION= 12.15013
GOODNESS OF FIT= .092751
MULTIPLE CORRELATION COEFFICIENT 0.30455
STANDARD DEVIATION 1.742852

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	1.24	1	1.24
DEVIATION	12.15	3	4.05
TOTAL VARIATION	13.39	4	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
F TEST - SIGNIFICANCE OF REGRESSION = 0.31
LEVEL .05% - CRITICAL VALUE =10.13

SAMPLE.TWELVE

SPECIFIC CONDUCTANCE VS. ALKALINITY

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	550	550	368.0000
		611000	407000.0000
REGRESSION COEFFICIENTS OF NORMAL EQUATION			
	33.2666666666666		
	0.0366666666667		
ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1000.0000	39.0000	69.9333	30.9333
1300.0000	89.0000	80.9333	8.0667
1100.0000	55.0000	73.6000	18.6000
1100.0000	68.0000	73.6000	5.6000
1000.0000	117.0000	69.9333	47.0667

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 5

TOTAL SUMS OF SQUARE= 3695.2

SUMS OF SQUARES DUE TO REGRESSION= 80.666667

SUMS OF SQUARES DUE TO DEVIATION= 3614.533333

GOODNESS OF FIT= .02183

MULTIPLE CORRELATION COEFFICIENT 0.14775

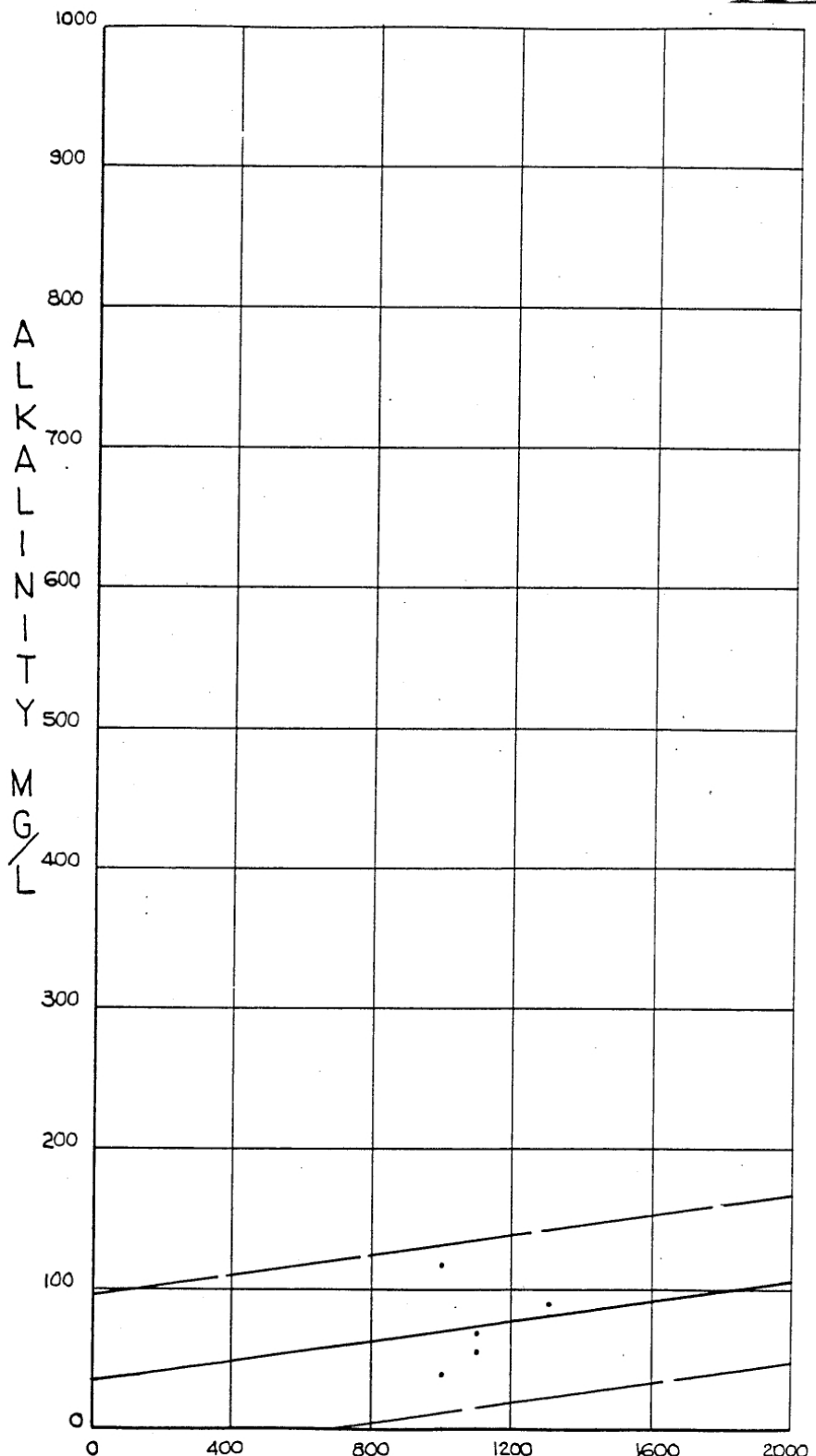
STANDARD DEVIATION 30.060495

SOURCE OF VARIATION	ANALYSIS OF VARIANCE		
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	80.67	1	80.67
DEVIATION	3614.53	3	1204.84
TOTAL VARIATION	3695.20	4	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 0.07

LEVEL .05% - CRITICAL VALUE =10.13



SPECIFIC CONDUCTANCE (umhos/cm)
 MONITOR WELL C-1 SAMPLE 12

SAMPLE.TWELVE

SPECIFIC CONDUCTANCE VS. ACIDITY

COEFFICIENT MATRIX AND AUGMENTED MATRIX

		550	0.0000
	550	611000	0.0000
REGRESSION COEFFICIENTS OF NORMAL EQUATION			
	0.000000000000		
	0.000000000000		

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1000.0000	0.0000	0.0000	0.0000
1300.0000	0.0000	0.0000	0.0000
1100.0000	0.0000	0.0000	0.0000
1100.0000	0.0000	0.0000	0.0000
1000.0000	0.0000	0.0000	0.0000

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 5

TOTAL SUMS OF SQUARE= 0

SUMS OF SQUARES DUE TO REGRESSION= 0

SUMS OF SQUARES DUE TO DEVIATION= 0

GOODNESS OF FIT= 0

MULTIPLE CORRELATION COEFFICIENT 0.00000

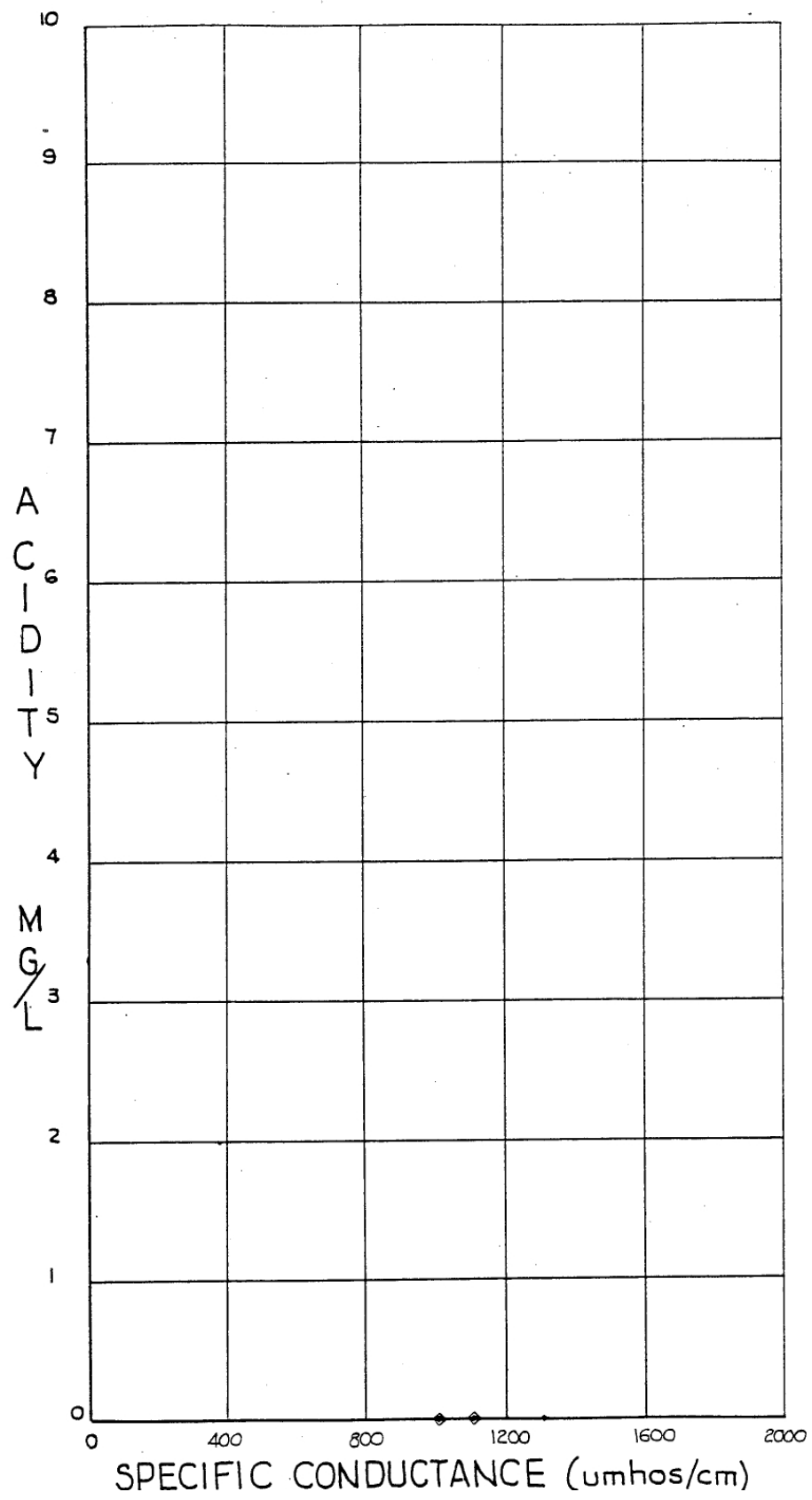
STANDARD DEVIATION 0

ANALYSIS OF VARIANCE			
SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	.00	1	.00
DEVIATION	.00	3	.00
TOTAL VARIATION	.00	4	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 0.00

LEVEL .05% - CRITICAL VALUE =10.13



SAMPLE.TWELVE

SPECIFIC CONDUCTANCE VS. SULPHATES

COEFFICIENT MATRIX AND AUGMENTED MATRIX

550 550 2349.0000
611000 2606200.0000
REGRESSION COEFFICIENTS OF NORMAL EQUATION
60.9666666666658
0.3716666666667

ORIGINAL X - Y PAIRS	PREDICTED VALUES	DEVIATION
1000.0000 520.0000	432.6333	87.3667
1300.0000 578.0000	544.1333	33.8667
1100.0000 416.0000	469.8000	53.8000
1100.0000 422.0000	469.8000	47.8000
1000.0000 413.0000	432.6333	19.6333

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 5

TOTAL SUMS OF SQUARE= 22632.8

SUMS OF SQUARES DUE TO REGRESSION= 8288.166667

SUMS OF SQUARES DUE TO DEVIATION= 14344.633333

GOODNESS OF FIT= .366202

MULTIPLE CORRELATION COEFFICIENT 0.60515

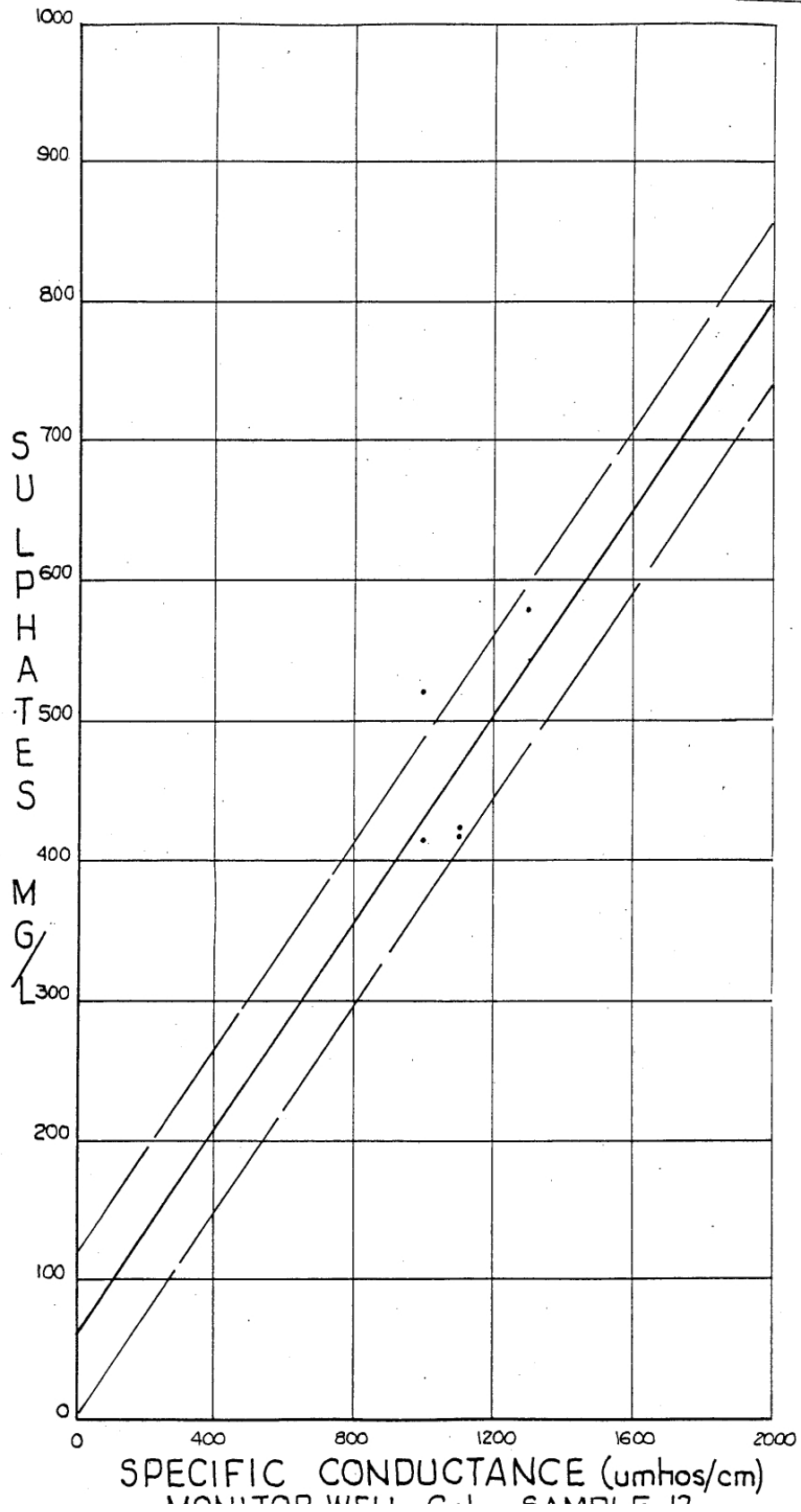
STANDARD DEVIATION 59.884542

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	8288.17	1	8288.17
DEVIATION	14344.63	3	4781.54
TOTAL VARIATION	22632.80	4	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 1.73

LEVEL .05% - CRITICAL VALUE =10.13



SAMPLE.TWELVE

SPECIFIC CONDUCTANCE VS. TOTAL IRON

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	550	550	251.9000
	550	611000	265070.0000
REGRESSION COEFFICIENTS OF NORMAL EQUATION			
	270.746666666667		
-	0.200333333333		

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1000.0000	20.2000	70.4133	50.2133
1300.0000	4.5000	10.3133	5.8133
1100.0000	23.7000	50.3800	26.6800
1100.0000	94.5000	50.3800	44.1200
1000.0000	109.0000	70.4133	38.5867

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 5

TOTAL SUMS OF SQUARE= 9110.508

SUMS OF SQUARES DUE TO REGRESSION= 2408.006667

SUMS OF SQUARES DUE TO DEVIATION= 6702.501333

GOODNESS OF FIT= .264311

MULTIPLE CORRELATION COEFFICIENT 0.51411

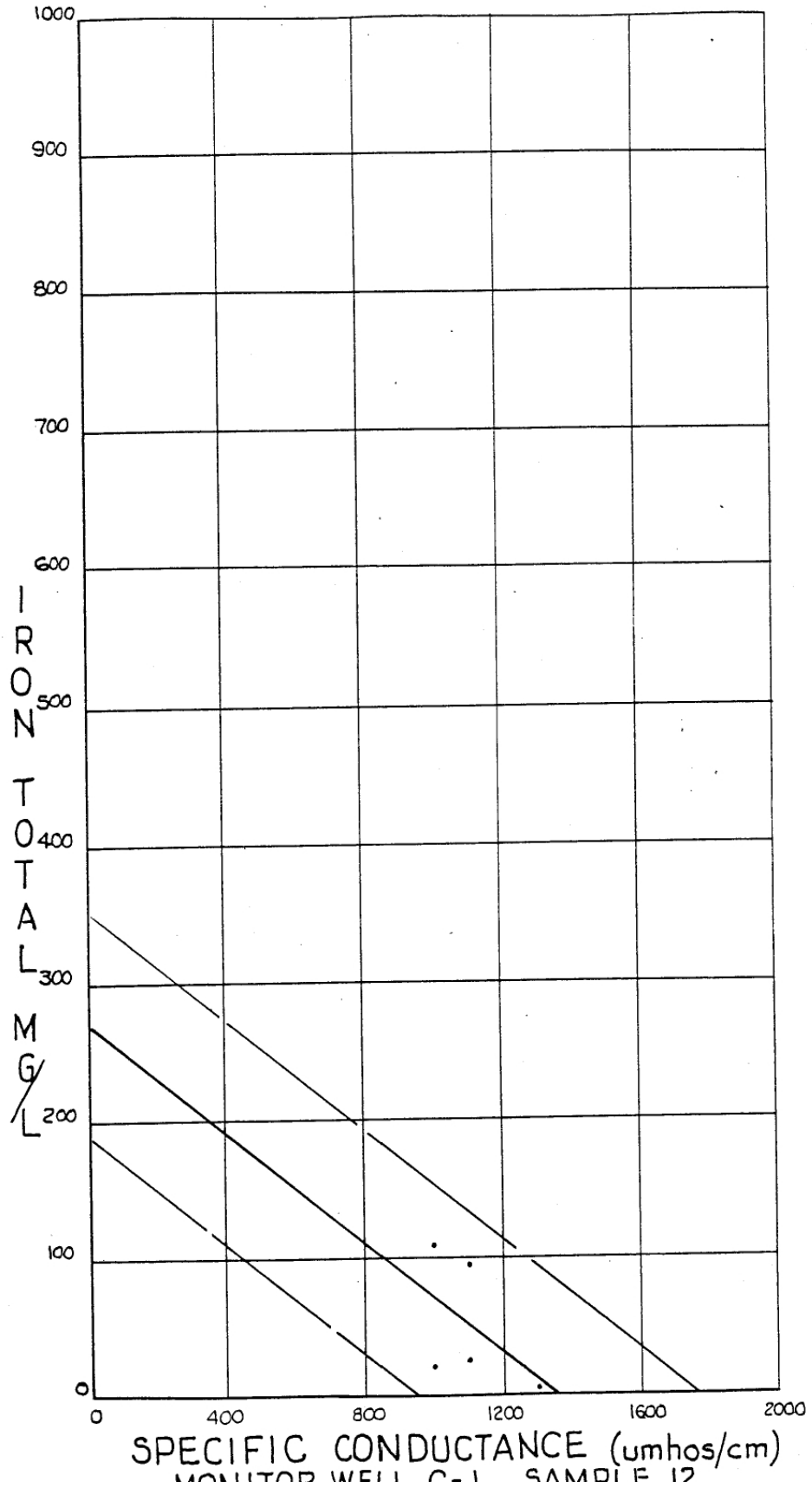
STANDARD DEVIATION 40.934403

ANALYSIS OF VARIANCE			
SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	2408.01	1	2408.01
DEVIATION	6702.50	3	2234.17
TOTAL VARIATION	9110.51	4	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 1.08

LEVEL .05% - CRITICAL VALUE =10.13



SAMPLE.TWELVE

SPECIFIC CONDUCTANCE VS. FERROUS IRON

COEFFICIENT MATRIX AND AUGMENTED MATRIX

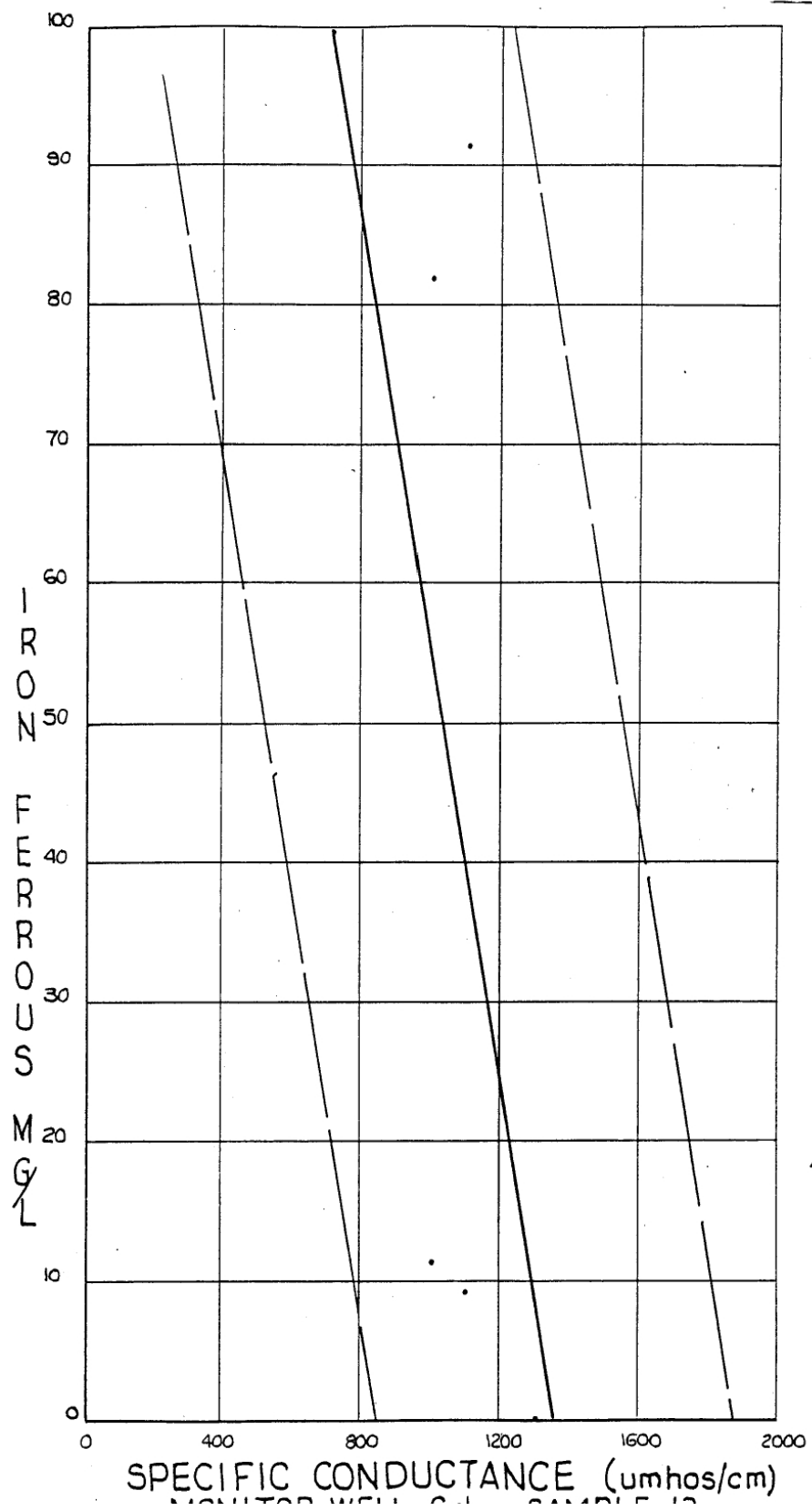
	550	550	193.9000
		611000	203970.0000
REGRESSION COEFFICIENTS OF NORMAL EQUATION	550		
	209.646666666667		
	0.155333333333		

ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1000.0000	11.2000	54.3133	43.1133
1300.0000	0.0000	7.7133	7.7133
1100.0000	9.2000	38.7800	29.5800
1100.0000	91.5000	38.7800	52.7200
1000.0000	82.0000	54.3133	27.6867

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1
 NUMBER OF X - Y PAIRS= 5
 TOTAL SUMS OF SQUARE= 7786.888
 SUMS OF SQUARES DUE TO REGRESSION= 1447.706667
 SUMS OF SQUARES DUE TO DEVIATION= 6339.181333
 GOODNESS OF FIT= .185916
 MULTIPLE CORRELATION COEFFICIENT 0.43118
 STANDARD DEVIATION 39.809488

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	1447.71	1	1447.71
DEVIATION	6339.18	3	2113.06
TOTAL VARIATION	7786.89	4	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE
 F TEST - SIGNIFICANCE OF REGRESSION = 0.69
 LEVEL .05% - CRITICAL VALUE =10.13



SAMPLE.TWELVE

SPECIFIC CONDUCTANCE VS. FERRIC IRON

COEFFICIENT MATRIX AND AUGMENTED MATRIX

	550	550	57.9000
		611000	60970.0000
REGRESSION COEFFICIENTS OF NORMAL EQUATION	61.446666666667		
	0.045333333333		

- ORIGINAL X - Y PAIRS		PREDICTED VALUES	DEVIATION
1000.0000	9.0000	16.1133	7.1133
1300.0000	4.4000	2.5133	1.8867
1100.0000	14.5000	11.5800	2.9200
1100.0000	3.0000	11.5800	8.5800
1000.0000	27.0000	16.1133	10.8867

STATISTICAL ANALYSIS WITH ORDER OF EQUATION= 1

NUMBER OF X - Y PAIRS= 5

TOTAL SUMS OF SQUARE= 378.128

SUMS OF SQUARES DUE TO REGRESSION= 123.306667

SUMS OF SQUARES DUE TO DEVIATION= 254.821333

GOODNESS OF FIT= .326098

MULTIPLE CORRELATION COEFFICIENT 0.57105

STANDARD DEVIATION 7.981562

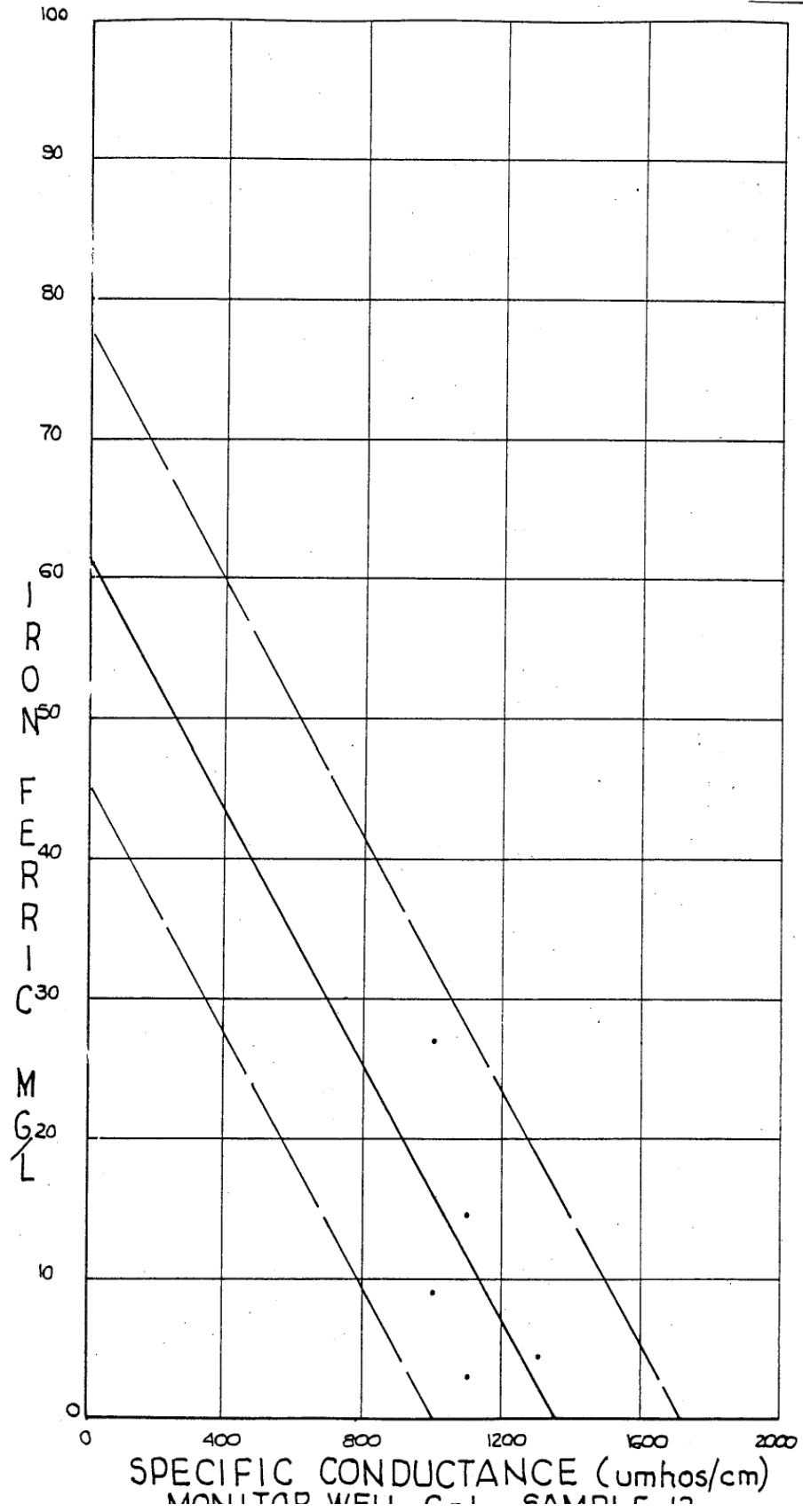
ANALYSIS OF VARIANCE

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
LIN. REGRESSION	123.31	1	123.31
DEVIATION	254.82	3	84.94
TOTAL VARIATION	378.13	4	

F-TEST FOR EQUALITY OF SAMPLE/REGRESSION VARIANCE

F TEST - SIGNIFICANCE OF REGRESSION = 1.45

LEVEL .05% - CRITICAL VALUE =10.13



CLOSURE AND POST CLOSURE DATA LISTING *

SAMPLE TWELVE

DATE	SPEC. COND.	DISCHARGE	pH	ALKALINITY	ACIDITY	SULPHATES	TOTAL IRON	FERROUS IRON	FERRIC IRON
5/11	1500	-	11.74	290	0	345	21.5	16.5	5.0
5/25	1050	-	10.75	72	0	322	81.8	72.3	9.5
6/1	950	-	9.41	238	0	401	-	-	-
6/7	800	-	6.94	66	0	411	43.0	35.0	8.0
6/12	900	-	7.29	181	0	461	-	-	-
6/16	900	-	6.60	86	0	418	32.0	21.0	10.0
6/21	800	-	6.93	115	0	-	380.0	370.0	10.0
6/29	900	-	6.60	123	0	256	280.0	239.0	41.0
7/10	1000	-	6.29	77	0	248	66.0	49.0	17.0
8/21	1000	-	6.52	170	0	228	84.6	75.0	9.6

* Units are as follows:

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