Lincoln Pt.

Sediment data

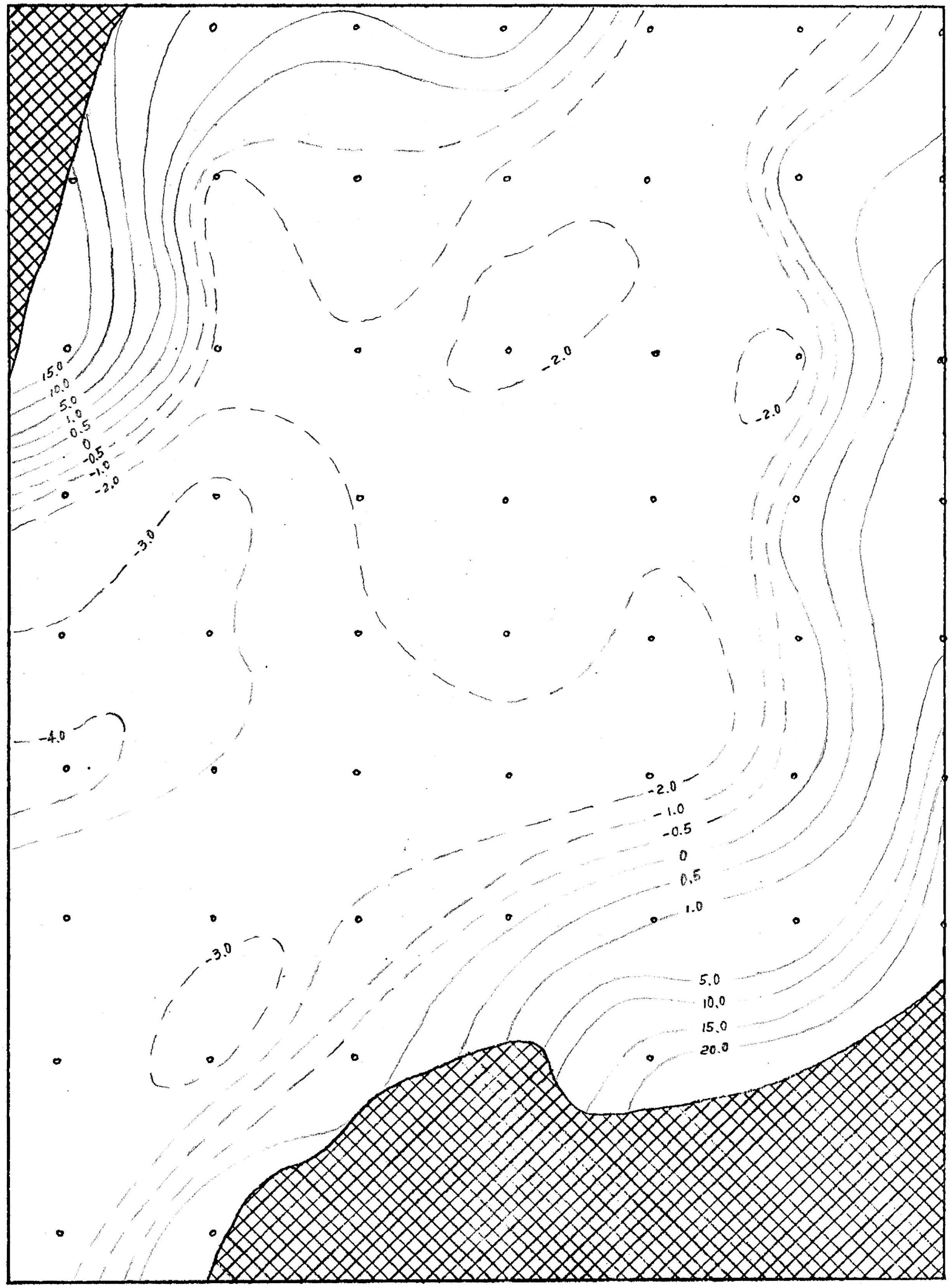
TABLE 1. Significant shorelines and lake levels of Great Salt Lake and Lake Bonneville.

Shoreline/ Level	Approximate age (years before present)	Elevation (feet above sea level)	Approximate surface area (square miles)	Salinity	Level controlled by	Distinguishing characteristics
Stansbury	23,000-20,000 .13 300 ? Thompson	4500	9,300	Moderately saline	Climate	Tufa deposits, variable expression, often not distinctive; conspicuous above oil refineries and near Kennecott smelter.
Bonneville	16,000-14,500	5090 [1]	19,800	Relatively fresh; hard water	Threshold at Zenda near Red Rock Pass, Idaho; spilled to Snake River.	Highest shoreline traceable for over 2000 miles around basin.
Provo	14,500-13,500 12,500 Thompson 1958 GSA Abst	4740 [1]	14,400	Relatively fresh; hard water	Threshold at Red Rock Pass, Idaho; spilled to Snake River.	Tufa deposits, very distinctive, large deltas entering lake, e.g., at Logan, Brigham City, Ogden, Sandy, and Orem-Provo.
Gilbert	11,000-10,000	4250 [1]	6,600	Saline	Climate	Not conspicuous, but recognizable near Syracuse, Magna, Mills Junction, and northwest of Great Salt Lake.
4217	At least twice in last 3000 yrs; most recently possibly circa A.D. 1700.	4217	3,700[2]	Saline	Climate and Great Salt Lake Desert expansion of surface area and evaporation.	Small beach berms and deltas.
4212	A.D. 1873	4212	2,400	Saline	Climate	Wave-washed beach level.
4202	Nine times since A.D. 1851.	4202	1,800	Saline	Climate	Little geomorphic evidence.
4191	A.D. 1963	4191	900	Saline, saturated	Climate	Little geomorphic evidence.
Very low	Most recently possibly circa A.D. 1200.	4180(?)	600(?)	Saline, saturated	Climate	Submerged giant desiccation polygons and buried salt layer.

[1] Because the weight of the deep lakes in the Lake Bonneville basin depressed the earth's crust as much as 240 feet, subsequent rebound has caused the elevations of certain shorelines to be substantially higher in the central part of the basin.

[2] This includes 2800 square miles of water surface in the main part of the Great Salt Lake basin and 900 square miles in the Great Salt Lake Desert, west of the 4217-foot threshold region.

Si



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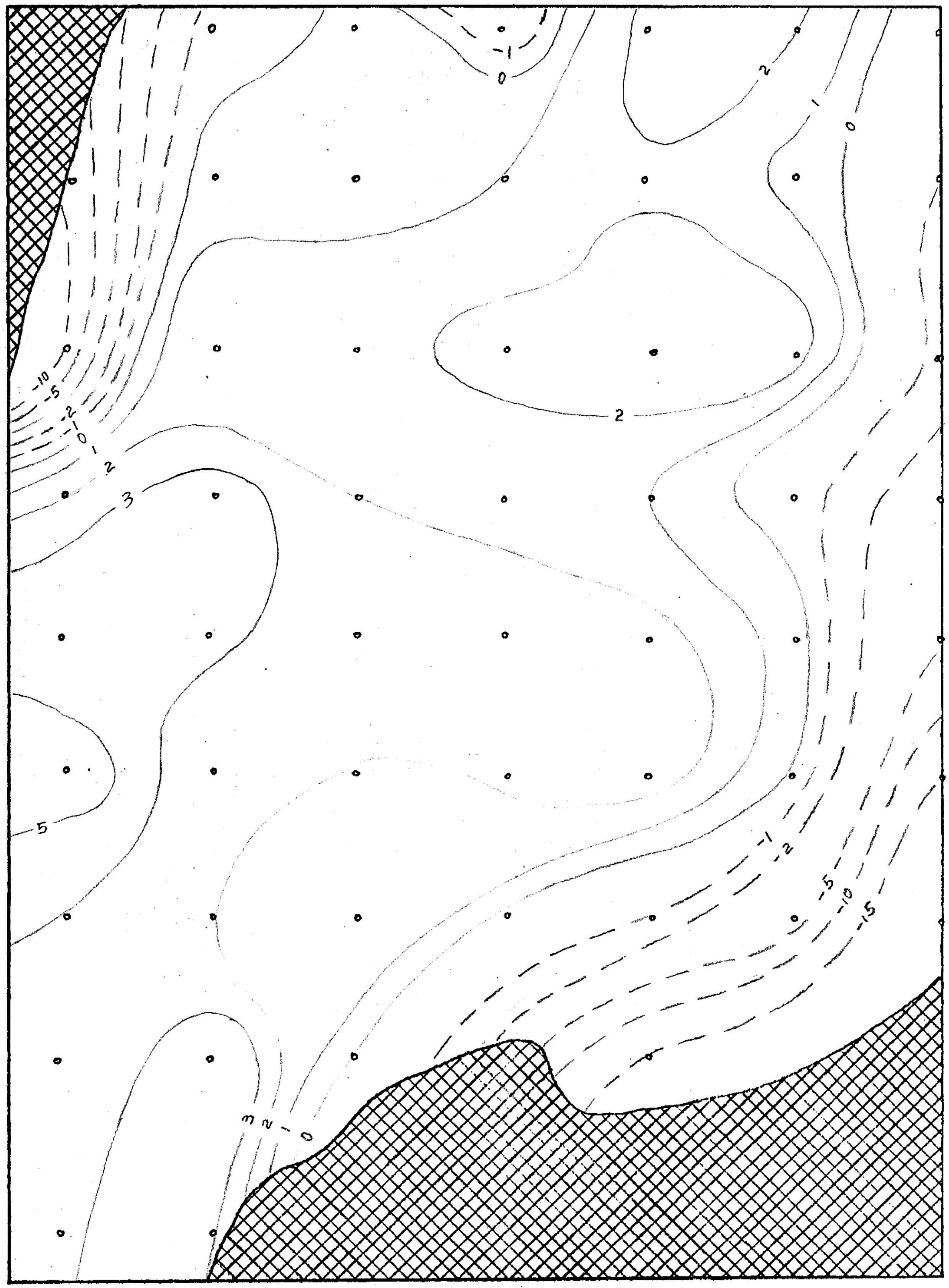
15.0
20.0

Ca



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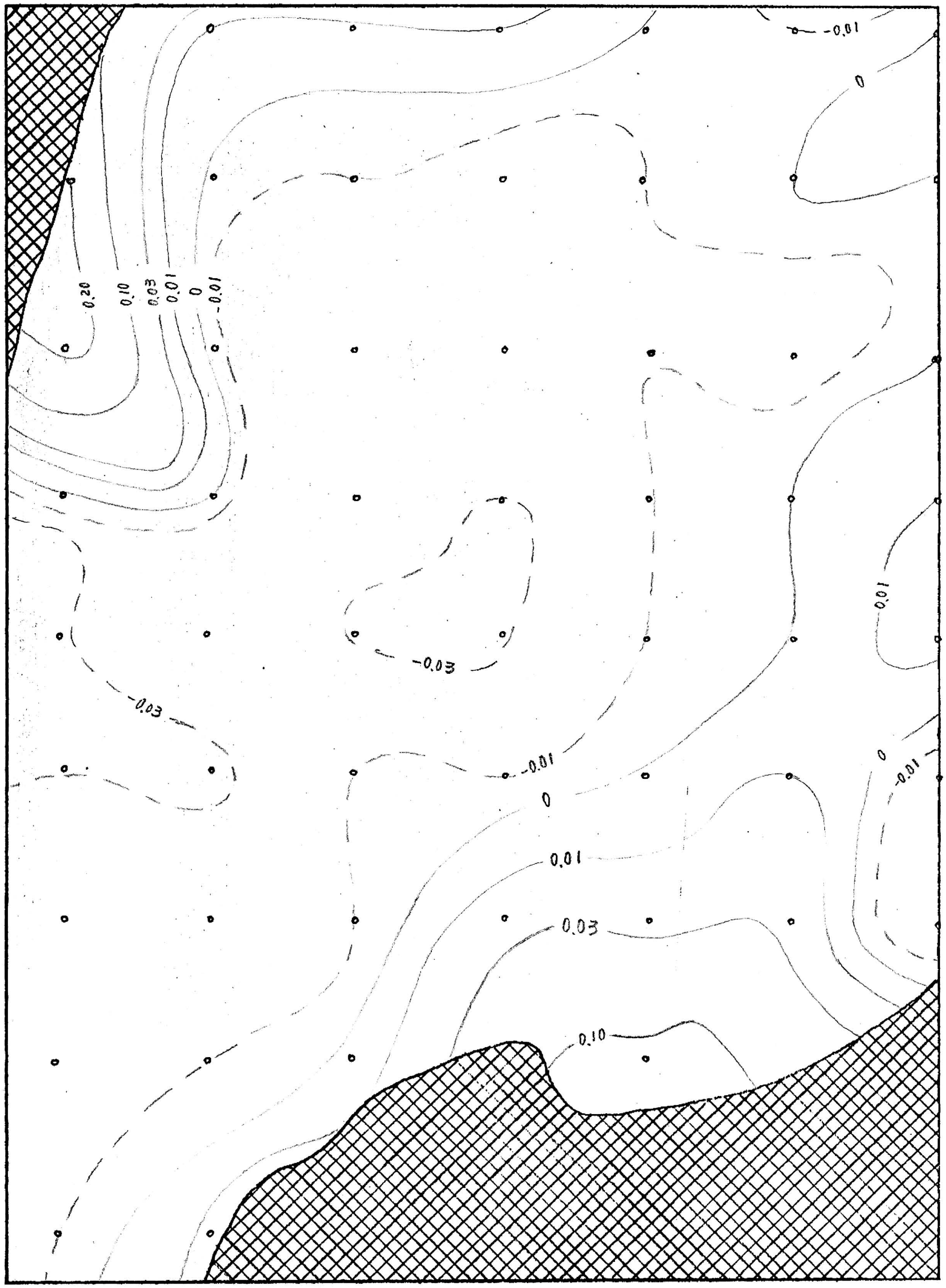

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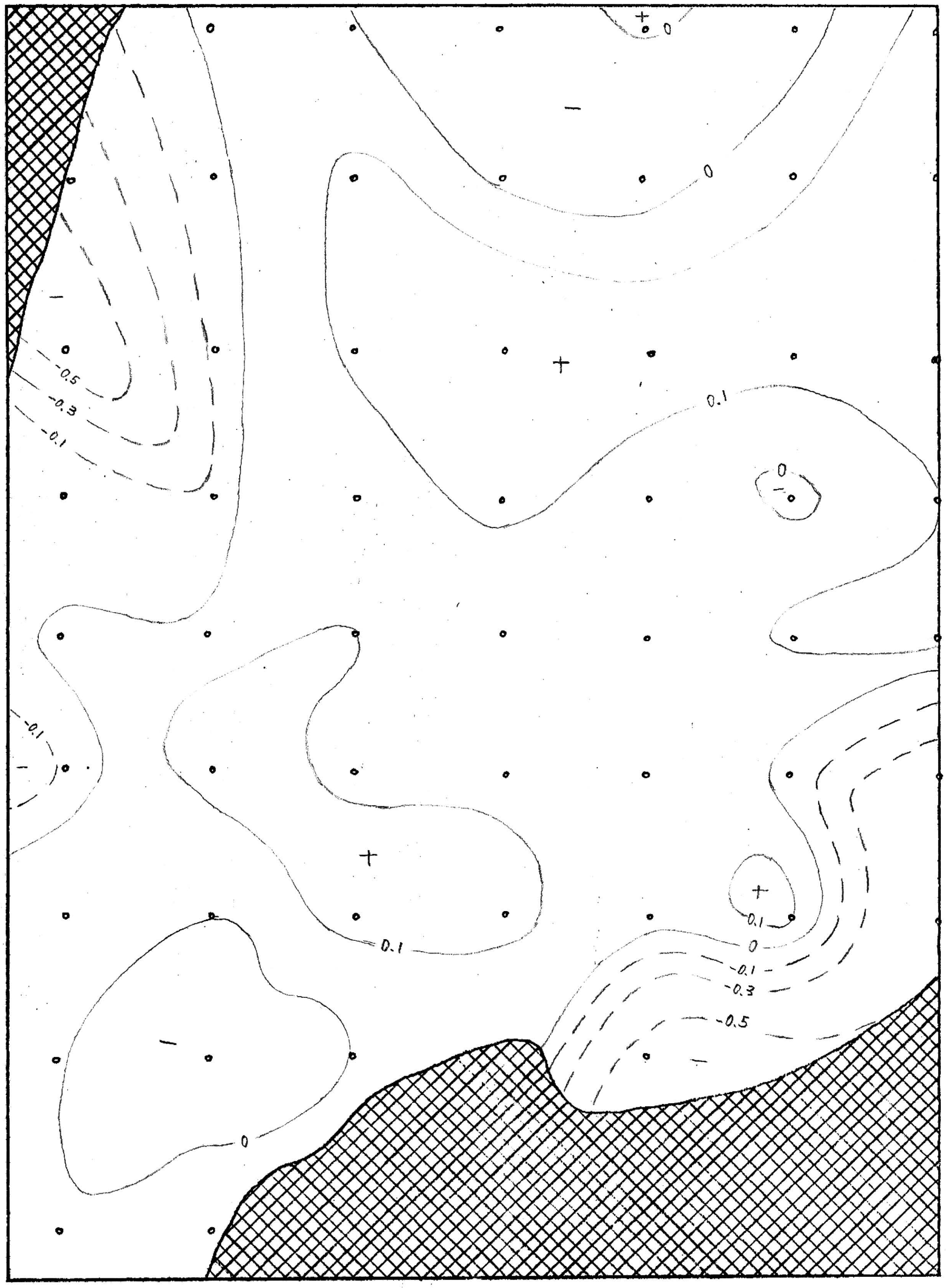

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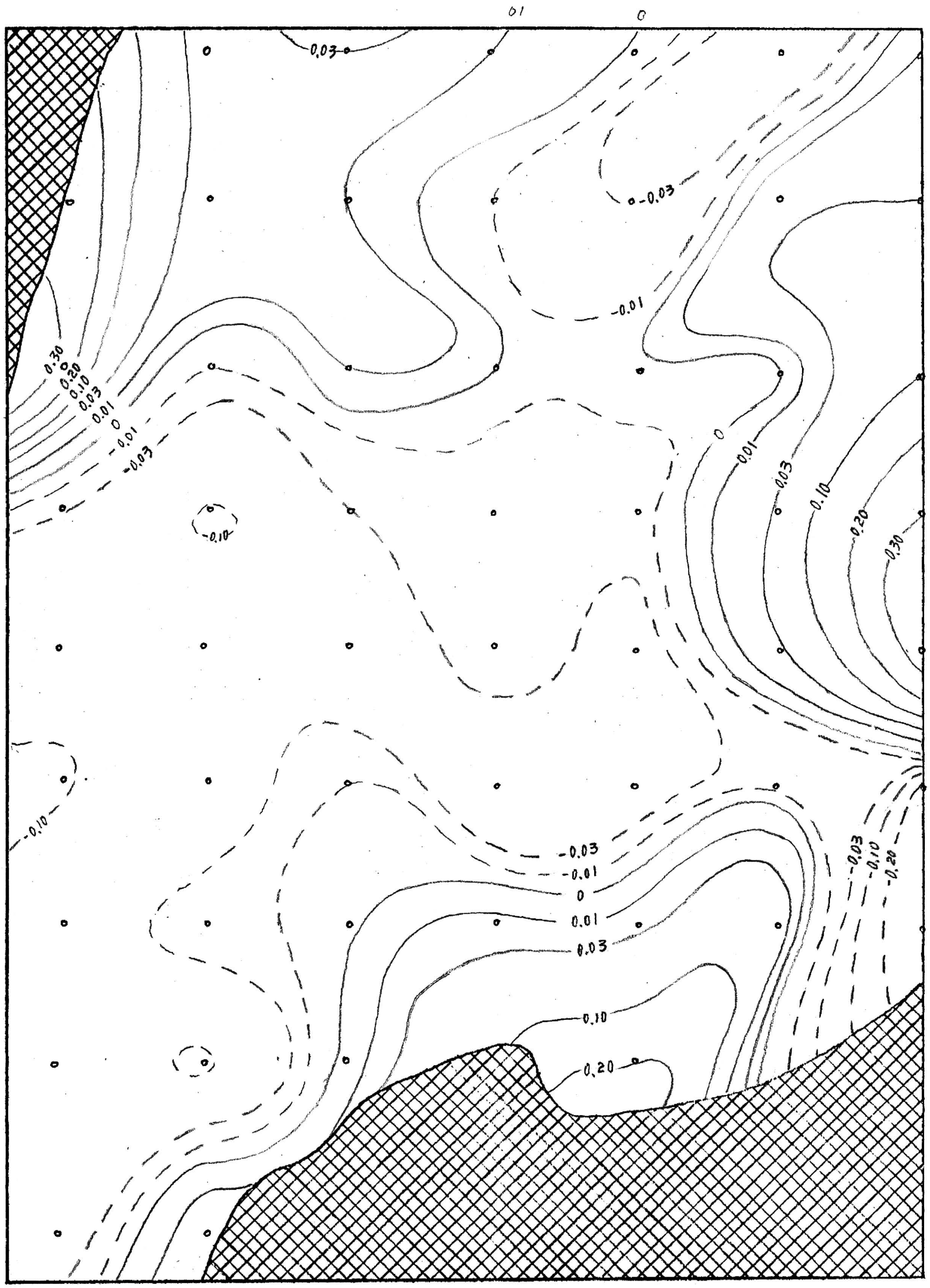
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0
0.01
0.03
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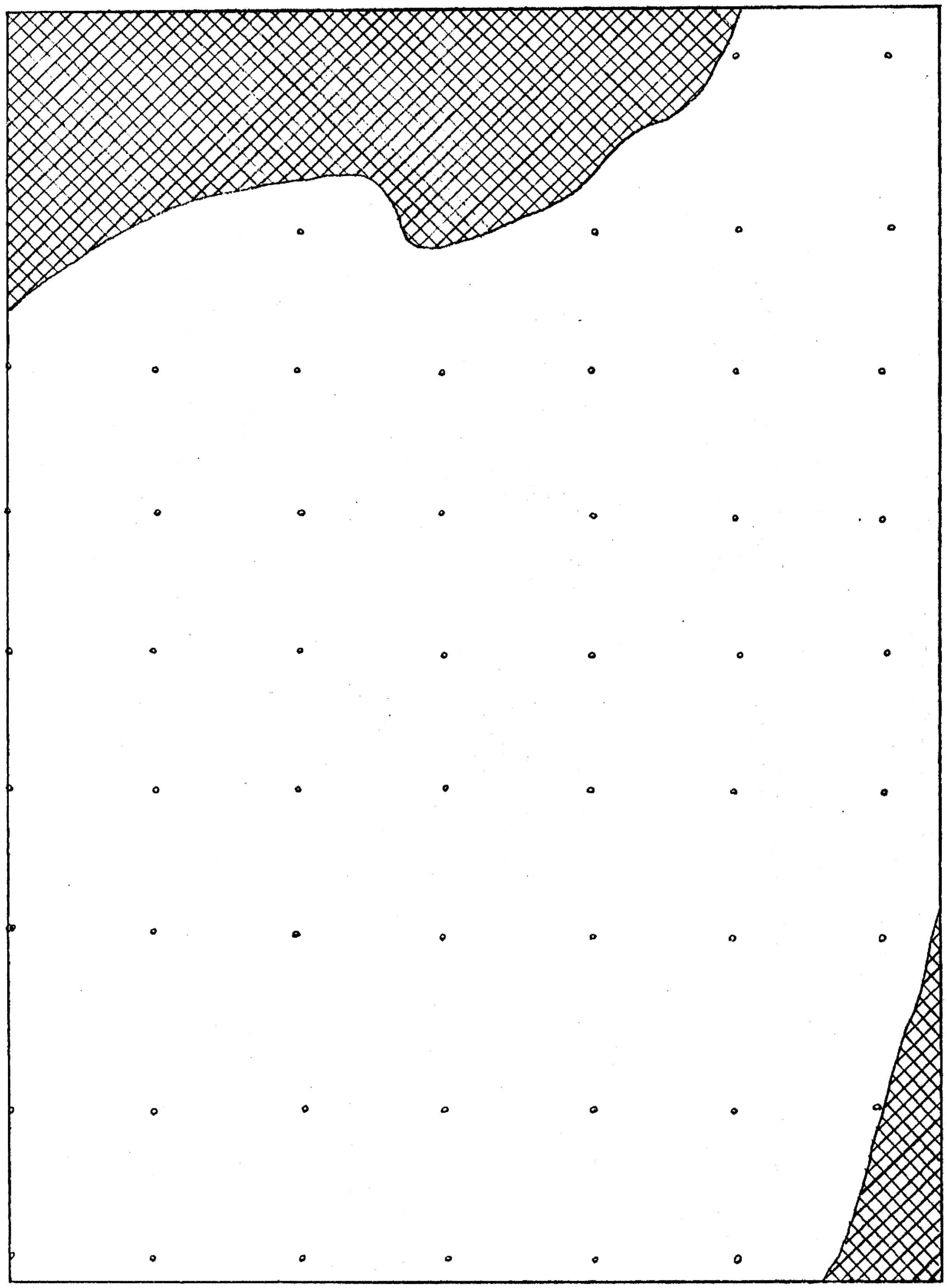
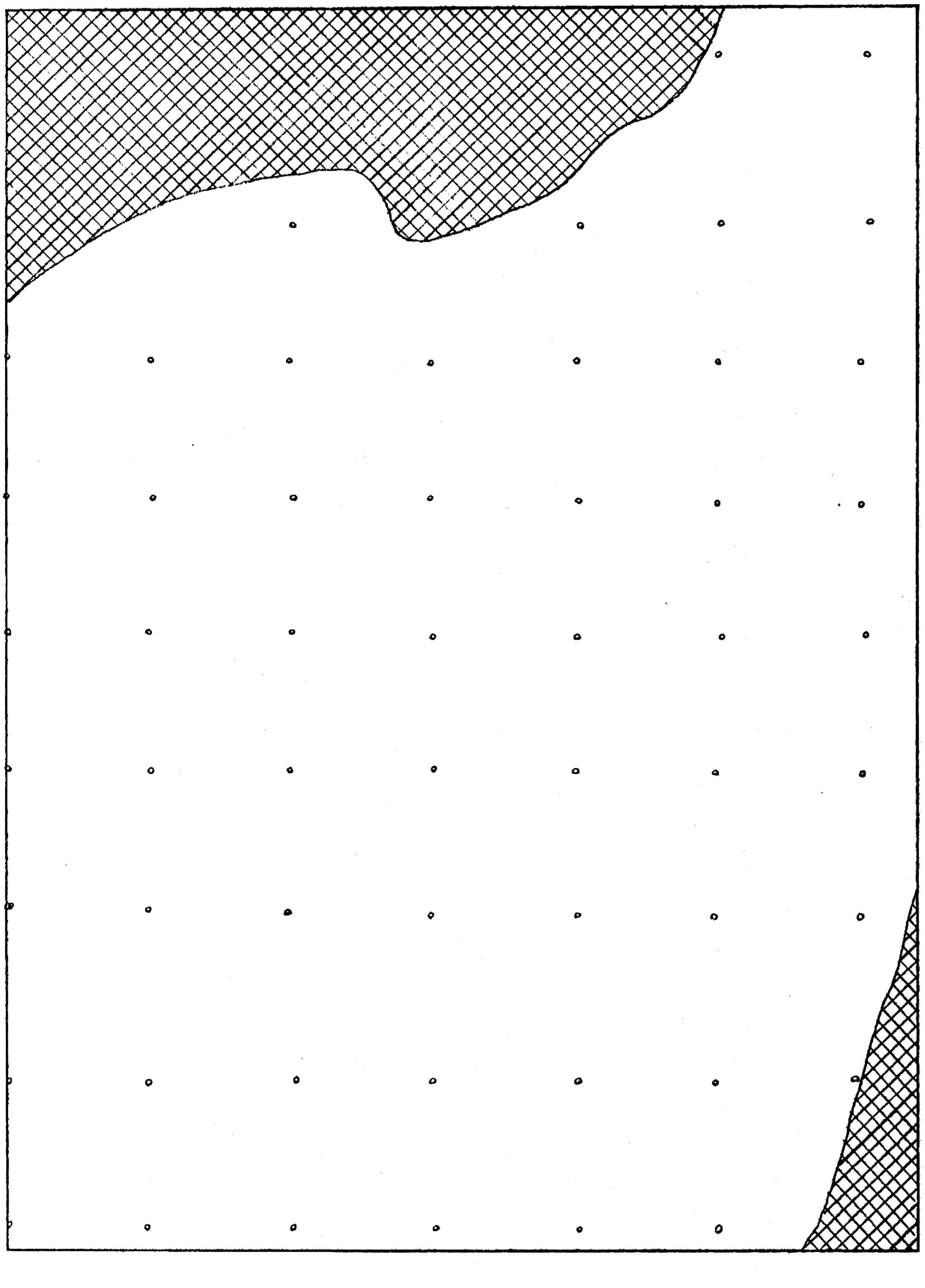
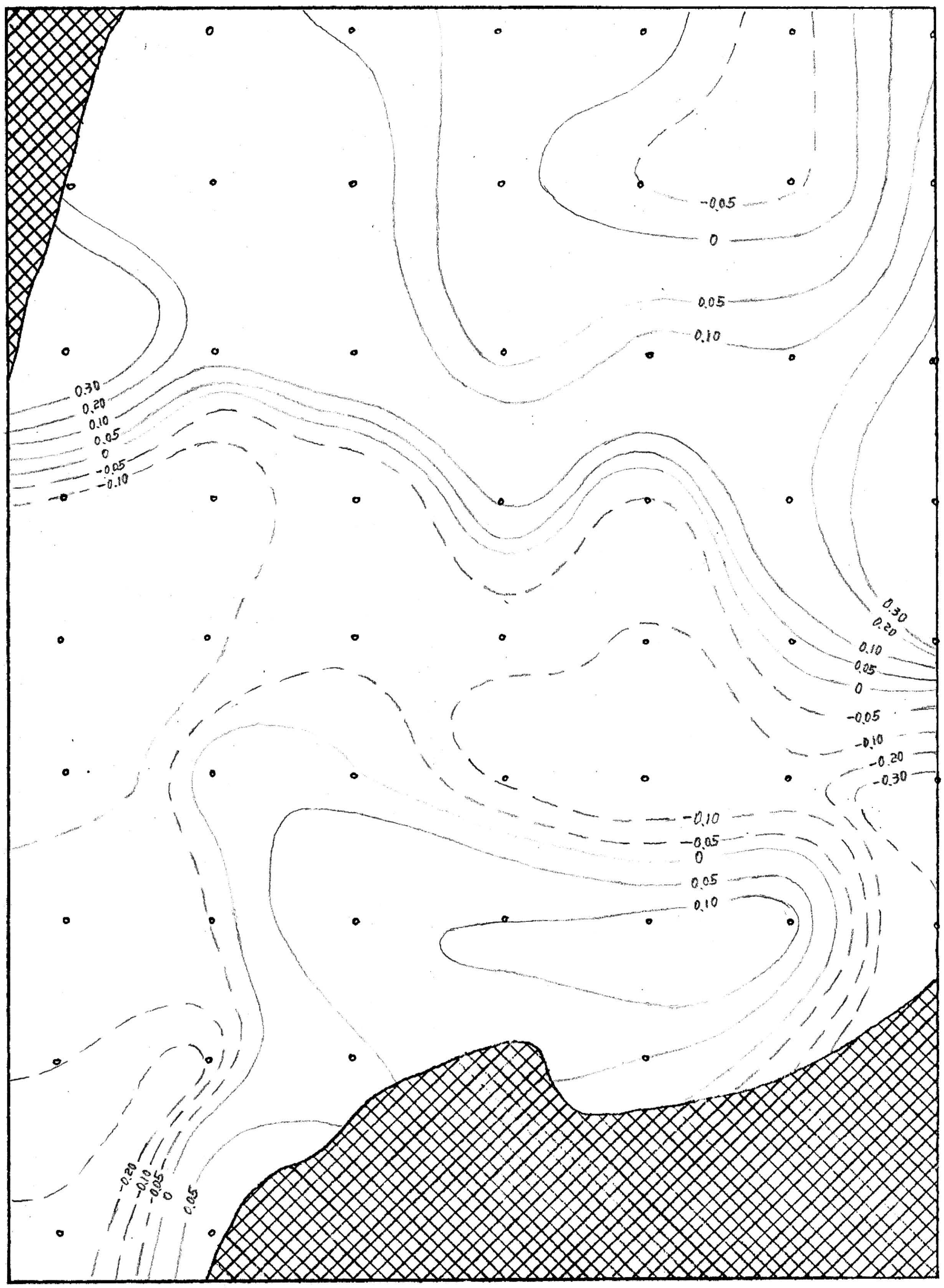




A1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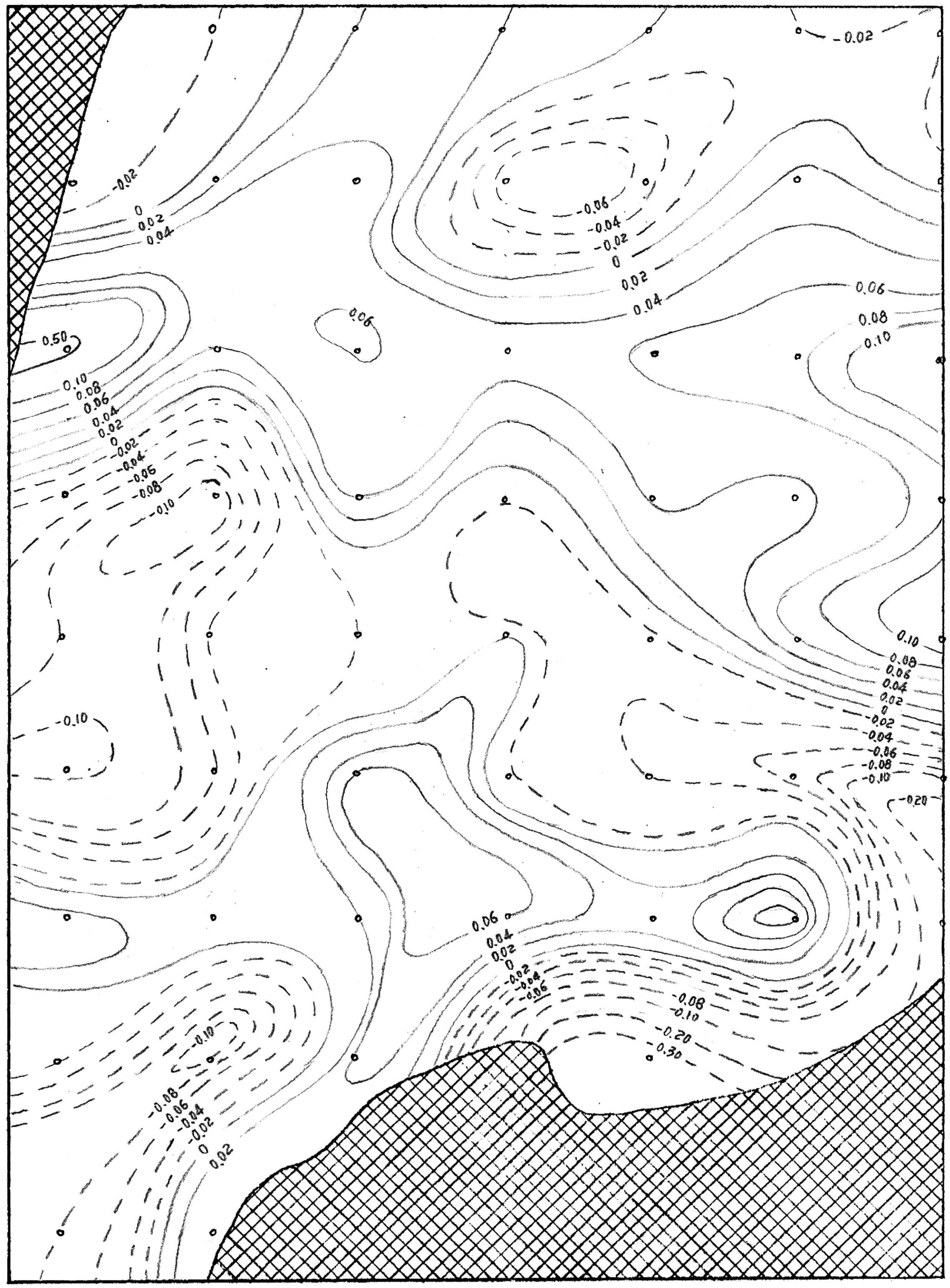
0
0.05

Fe



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0.08
0.10
0.50
0.10
0.08
0.06
0.04
0.02
0
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-0.04
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-0.08
-0.10
-0.20
-0.30
-0.10
-0.08
-0.06
-0.04
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0
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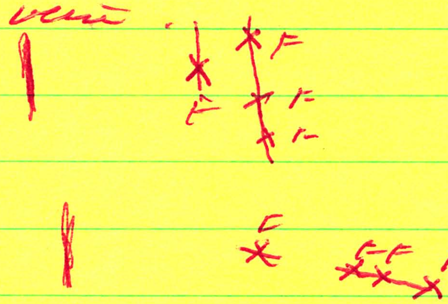
Vein Study

Collect Samples x-cut
from each Calcite Vein - Trace Metals

Good samples from each vein ± 4 for
thermal regime.

Wall rock characteristics? each vein.



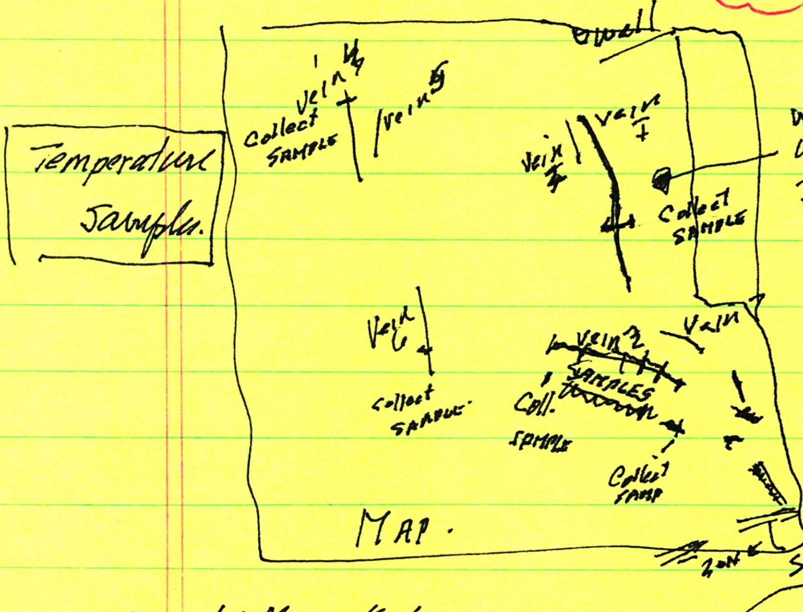
Attitudes and $CaCO_3$ Shoots?
Photos of EACH Vein
Aragonite vs Calcite?

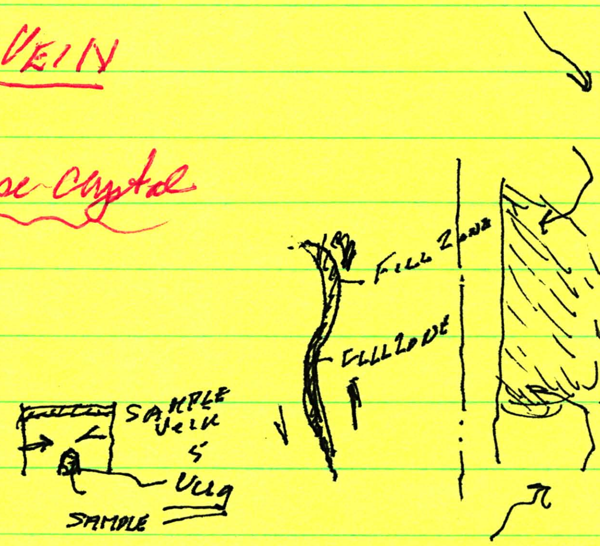
Stain Tests ?

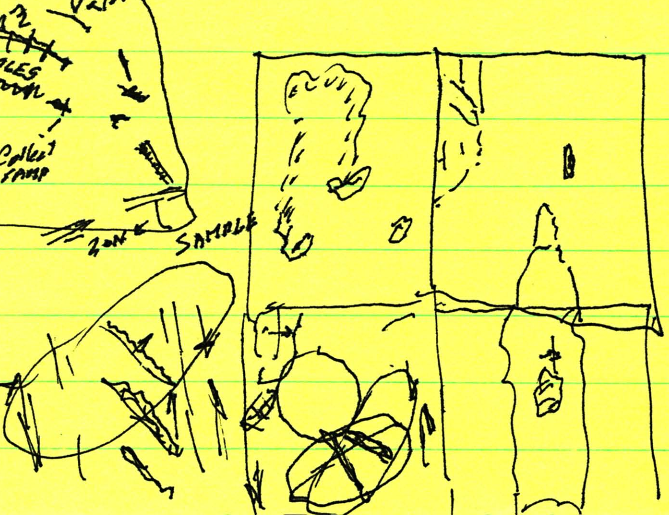
FOTOS

Display Samples. EACH VEIN

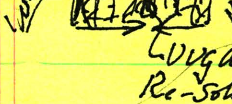
Banded Med xl Coarse crystal





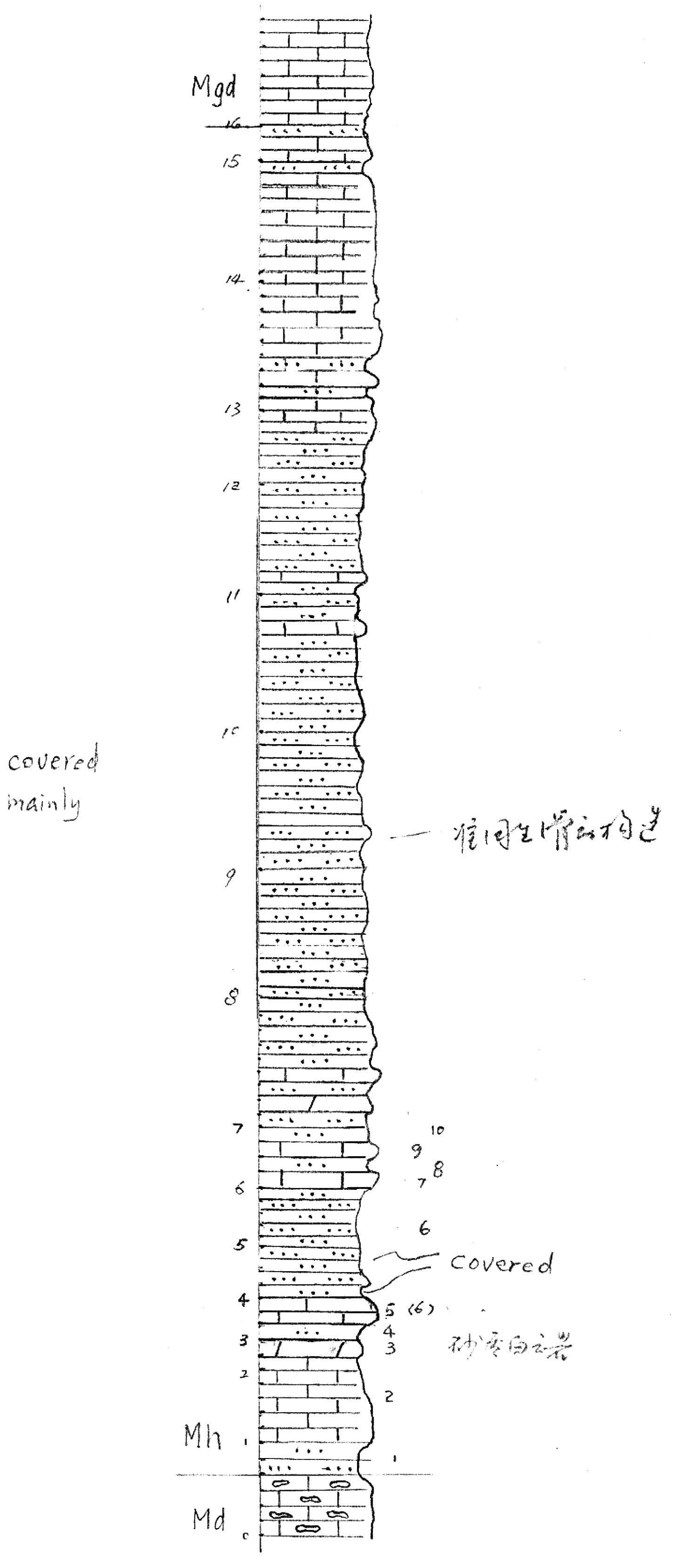


FILL- Wall rock INWARD.



Vug area.
Re-Solution?

1 inch = 100 feet

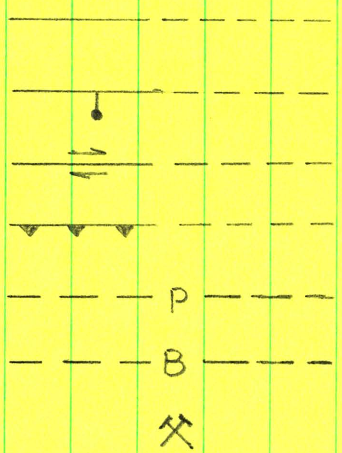


Description of Map Units

	Qus
Qaf	Alluvium –
Qbg	Beach Gravel –
Qtf	Tufa –
Qyf	Younger Fanglomerate –
Qlbg	Lake Bonneville Gravel –
Qlbs	Lake Bonneville silts –
Qosw	Older Slope Wash –
Mmcs	Manning Canyon Shale –
Mgbl	Great Blue Limestone –
Mhb	Humbug Formation –
Mdl	Deseret Limestone –

2

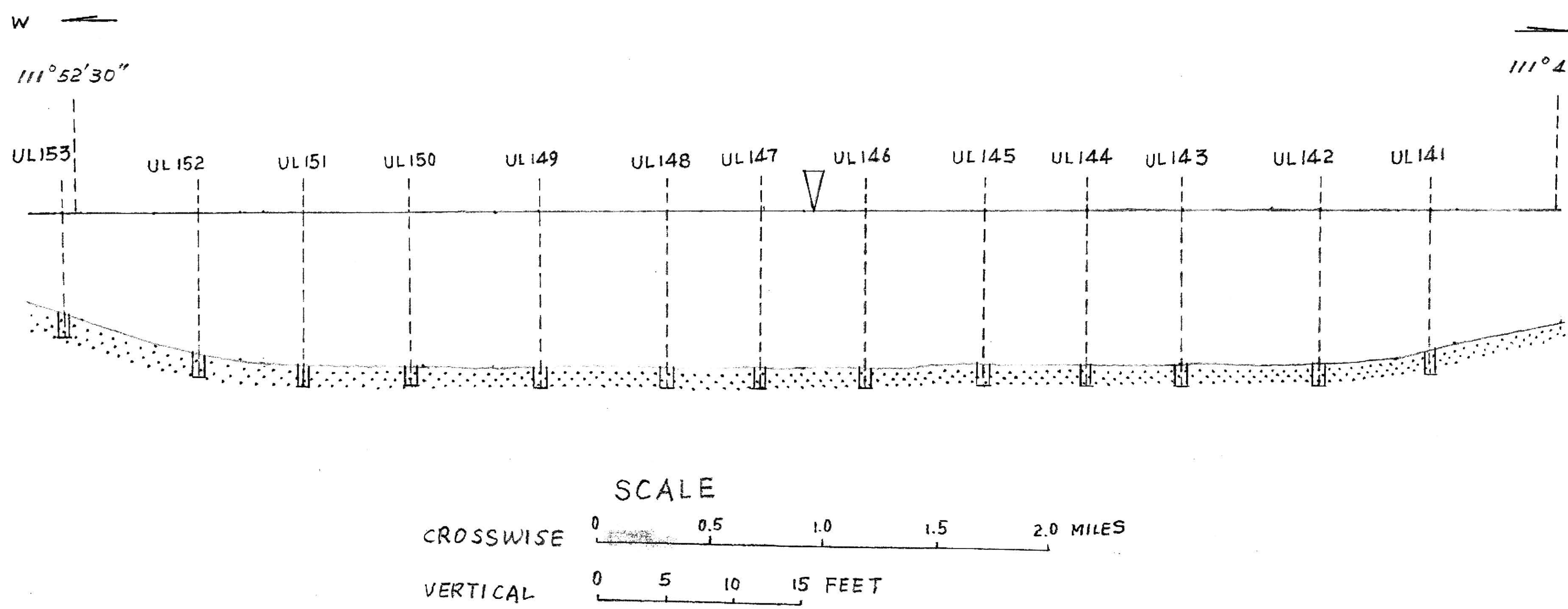
Explanation of Map Symbols



Geologic contact; dashed where inferred.

Normal fault; dashed where inferred.

Strike-slip fault;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E
111°52'30"
111°45'
UL153
UL 152
UL 151
UL 150
UL 149
UL 148
UL 147
UL 146
UL 145
UL 144
UL 143
UL 142
UL 141
SCALE
CROSSWISE
0
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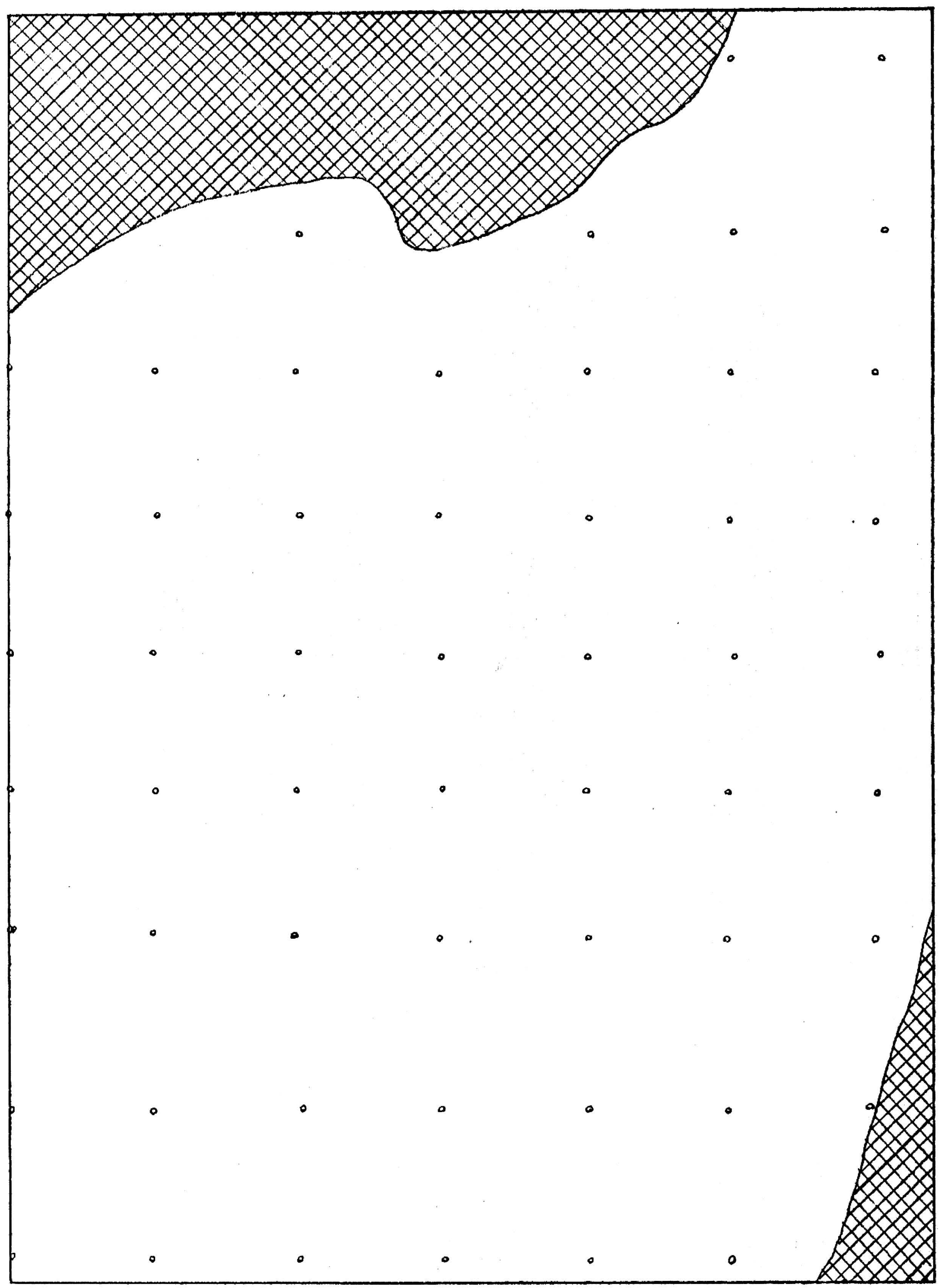
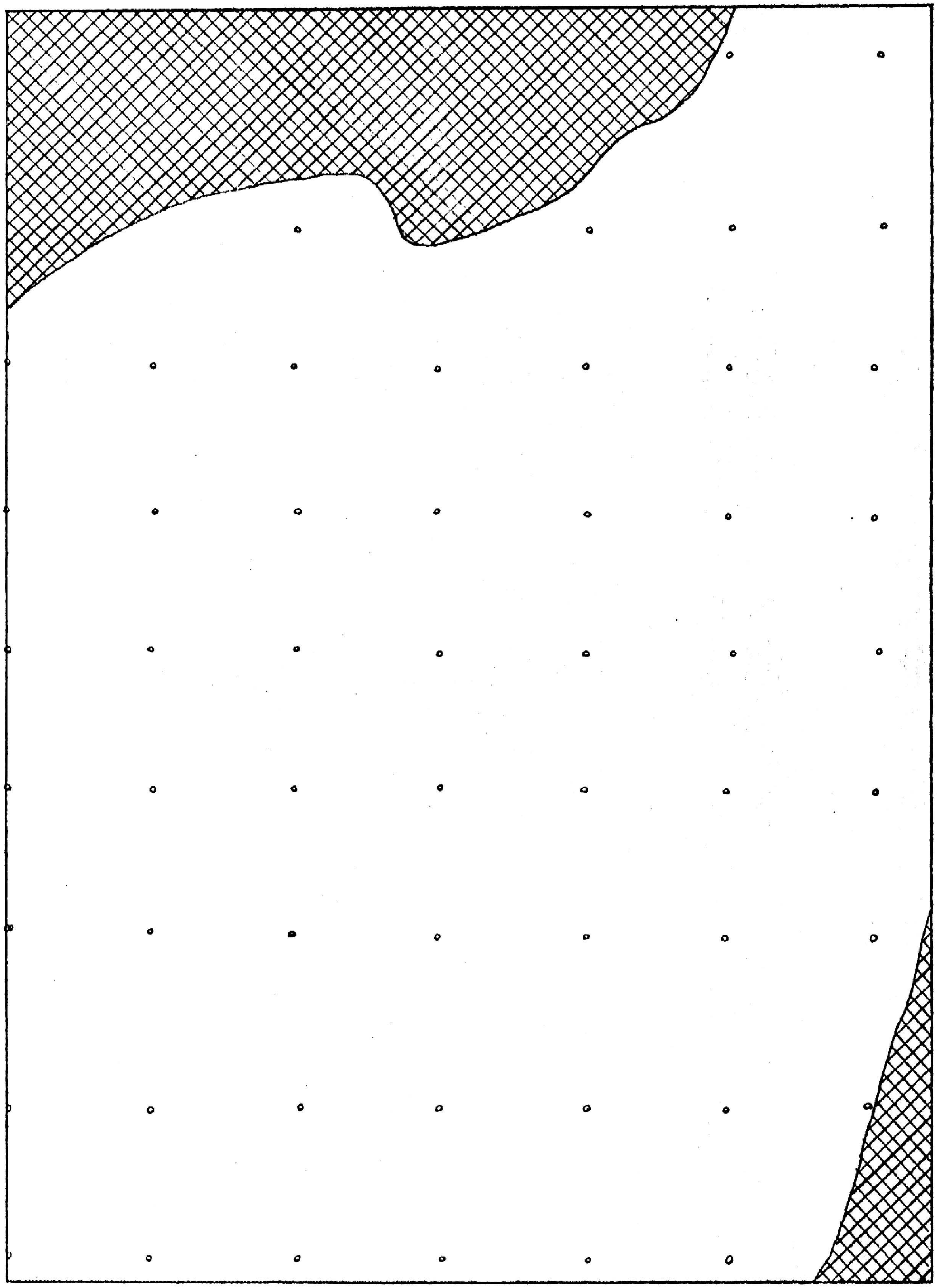
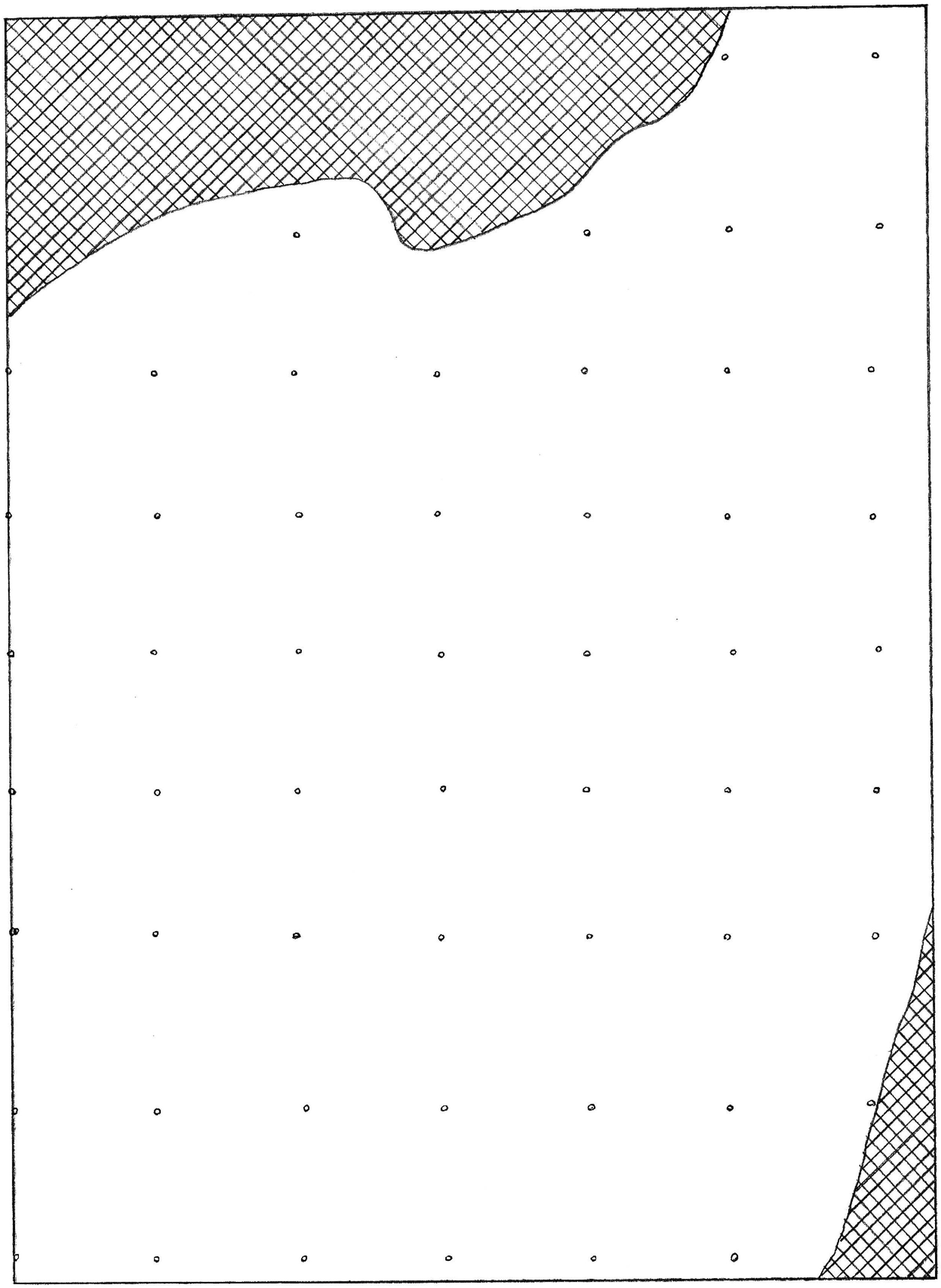
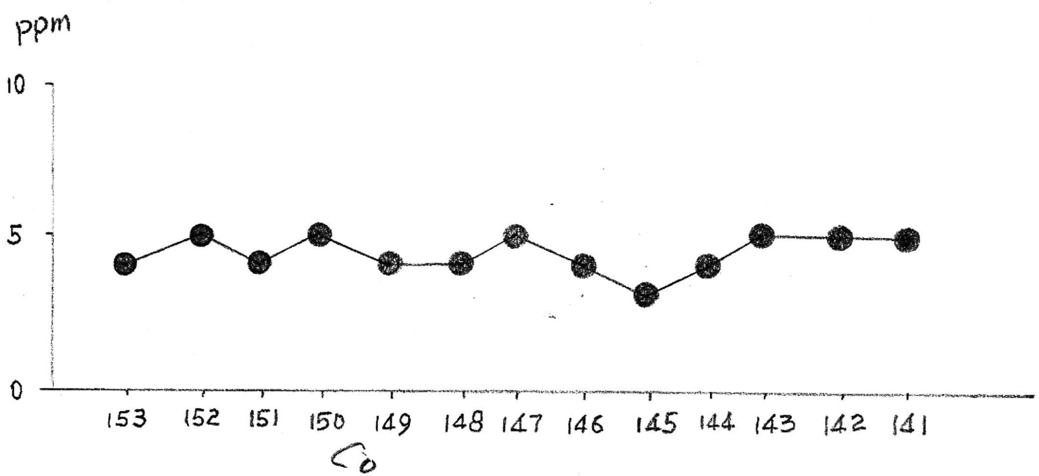
2.0 MILES
VERTICAL
0
5
10
15 FEET







Co



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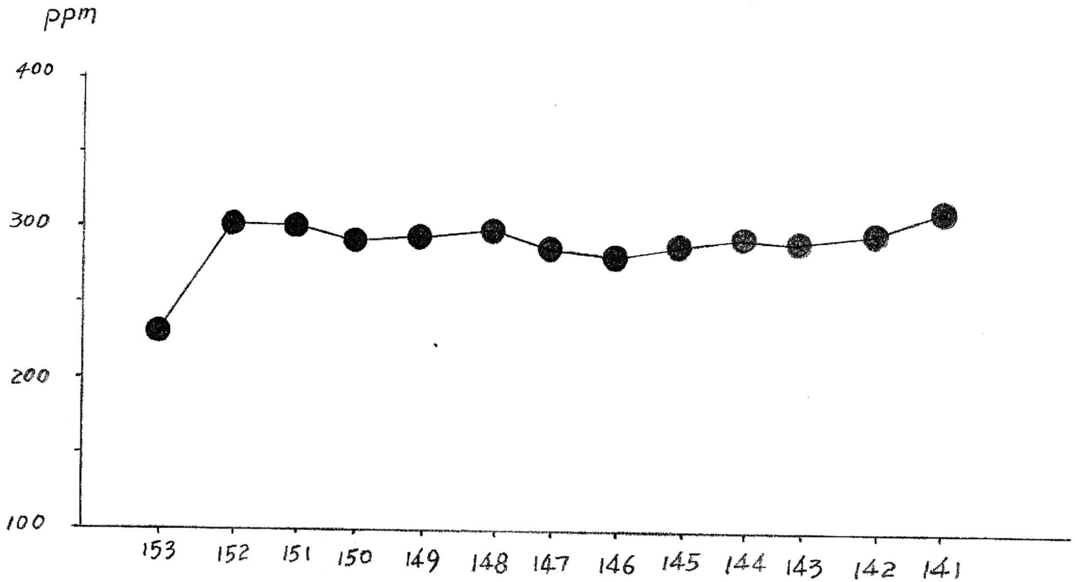
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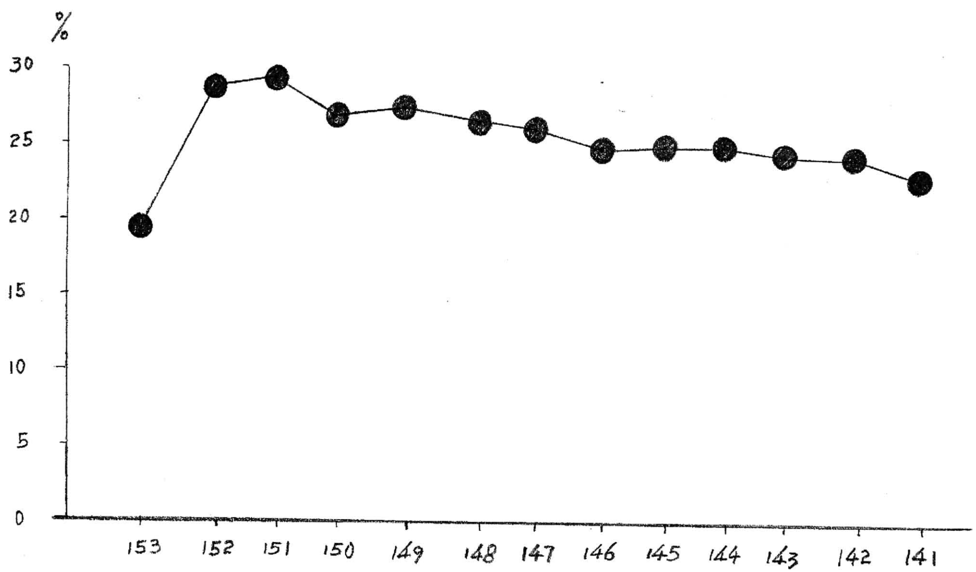
Mn,

Ca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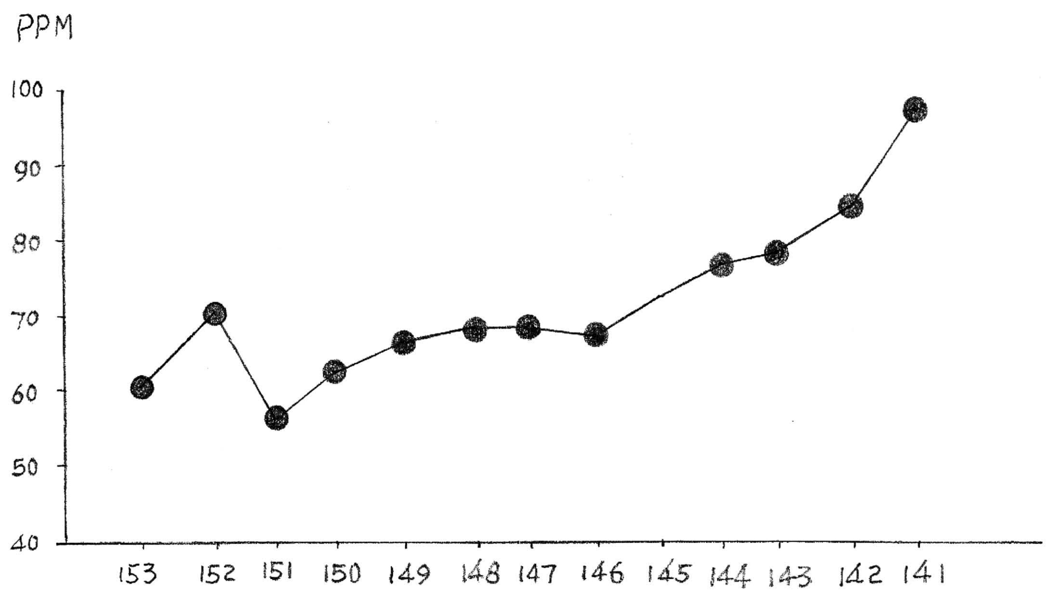
Ca,

Zn



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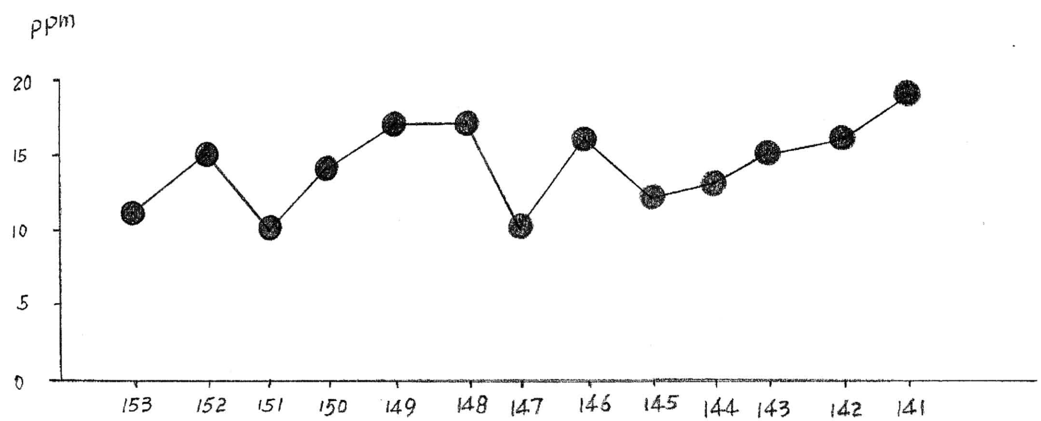
Zn ,

As



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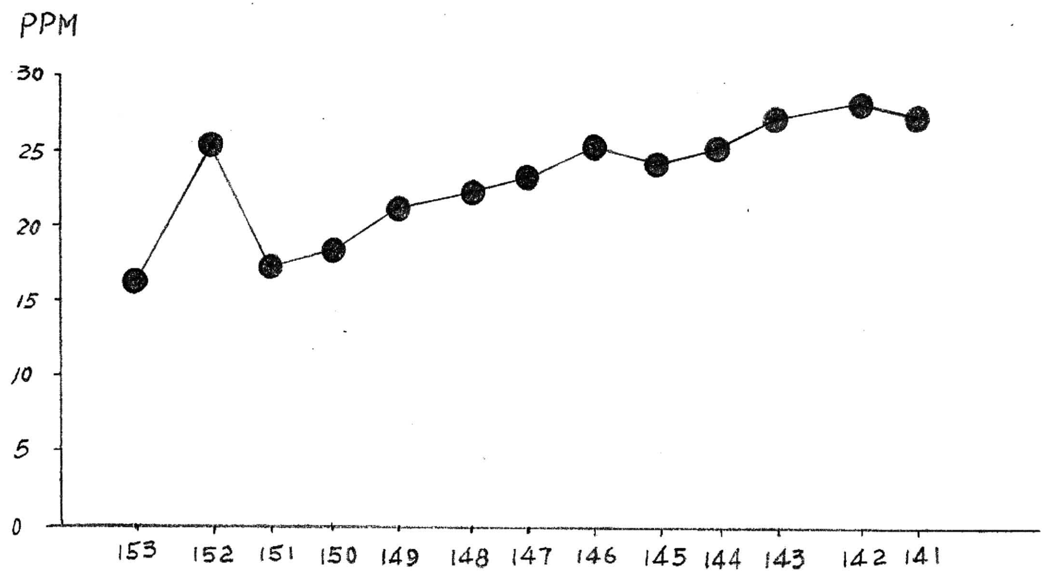
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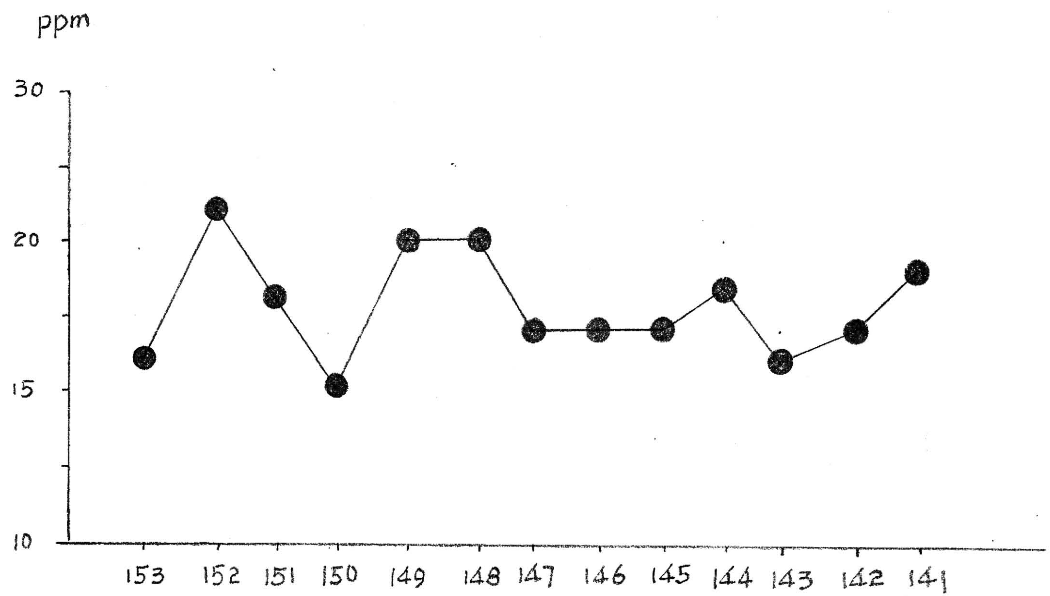
141

Pb,

Ni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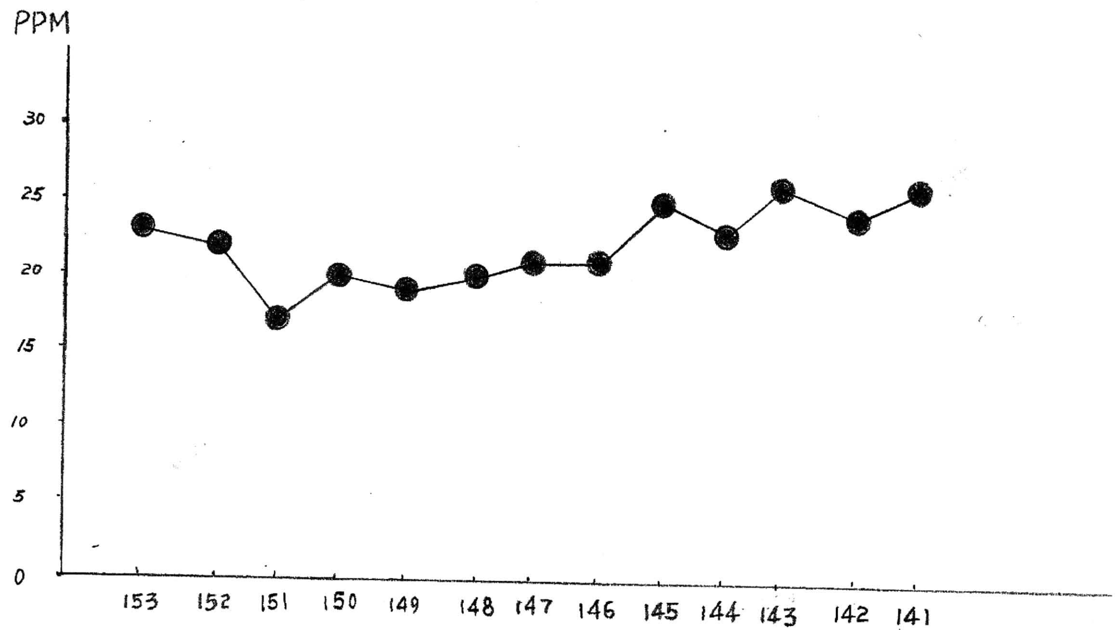
Ni,

Cu


PPM
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25
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10
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152
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150
149
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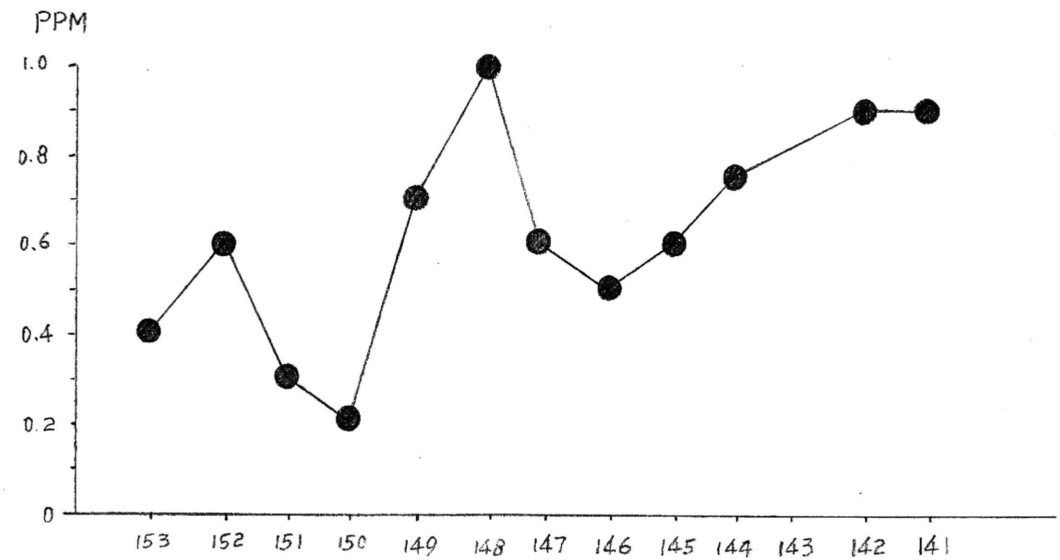
141

Cu ,

Cd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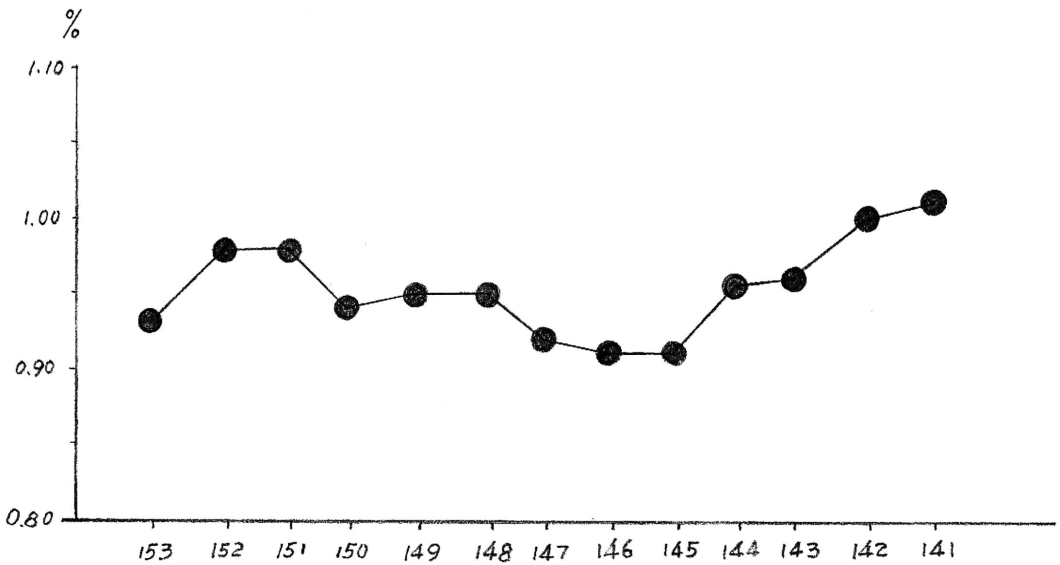
143
142
141

Cd ,

Fe



%
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0.90
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152
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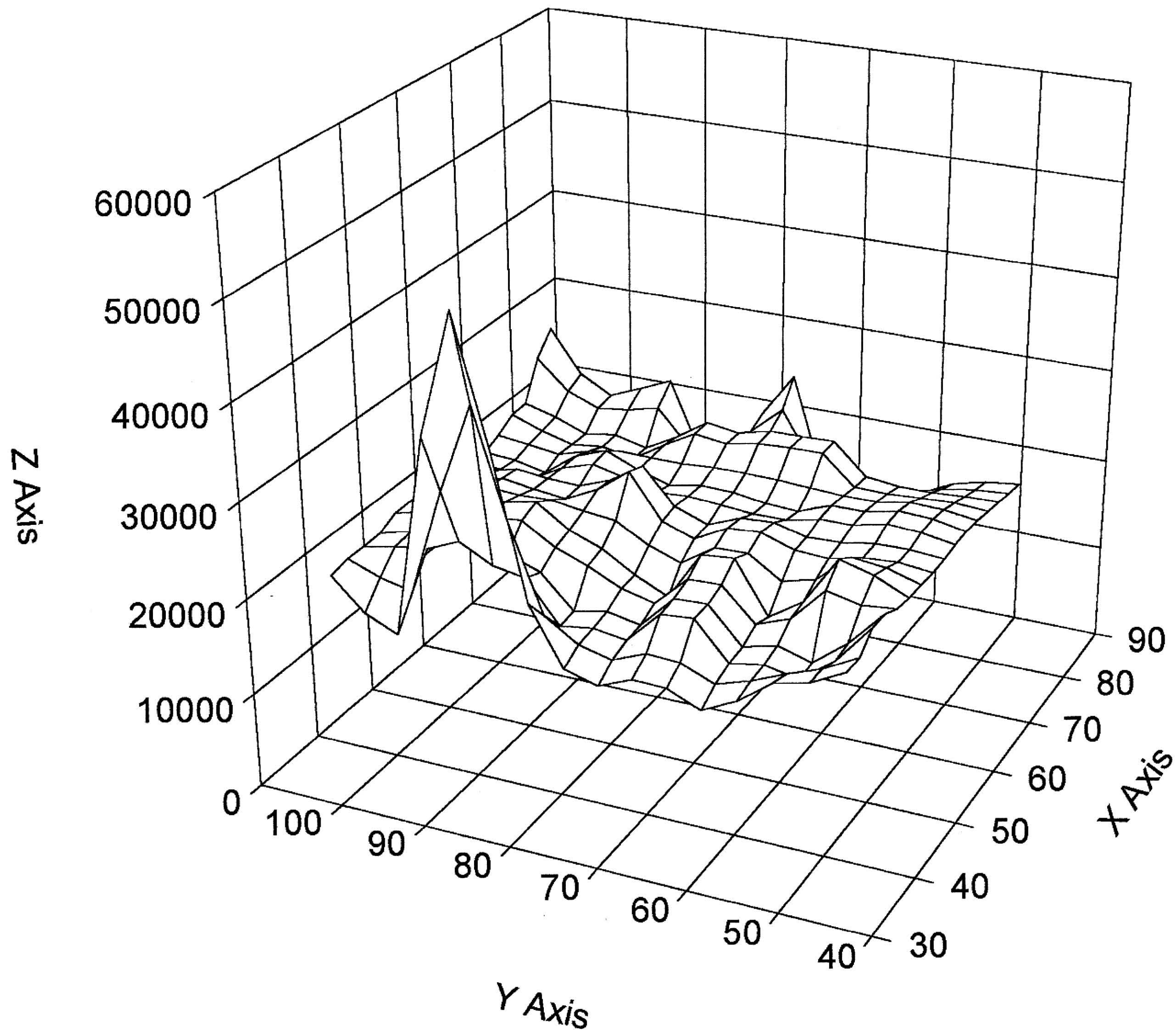
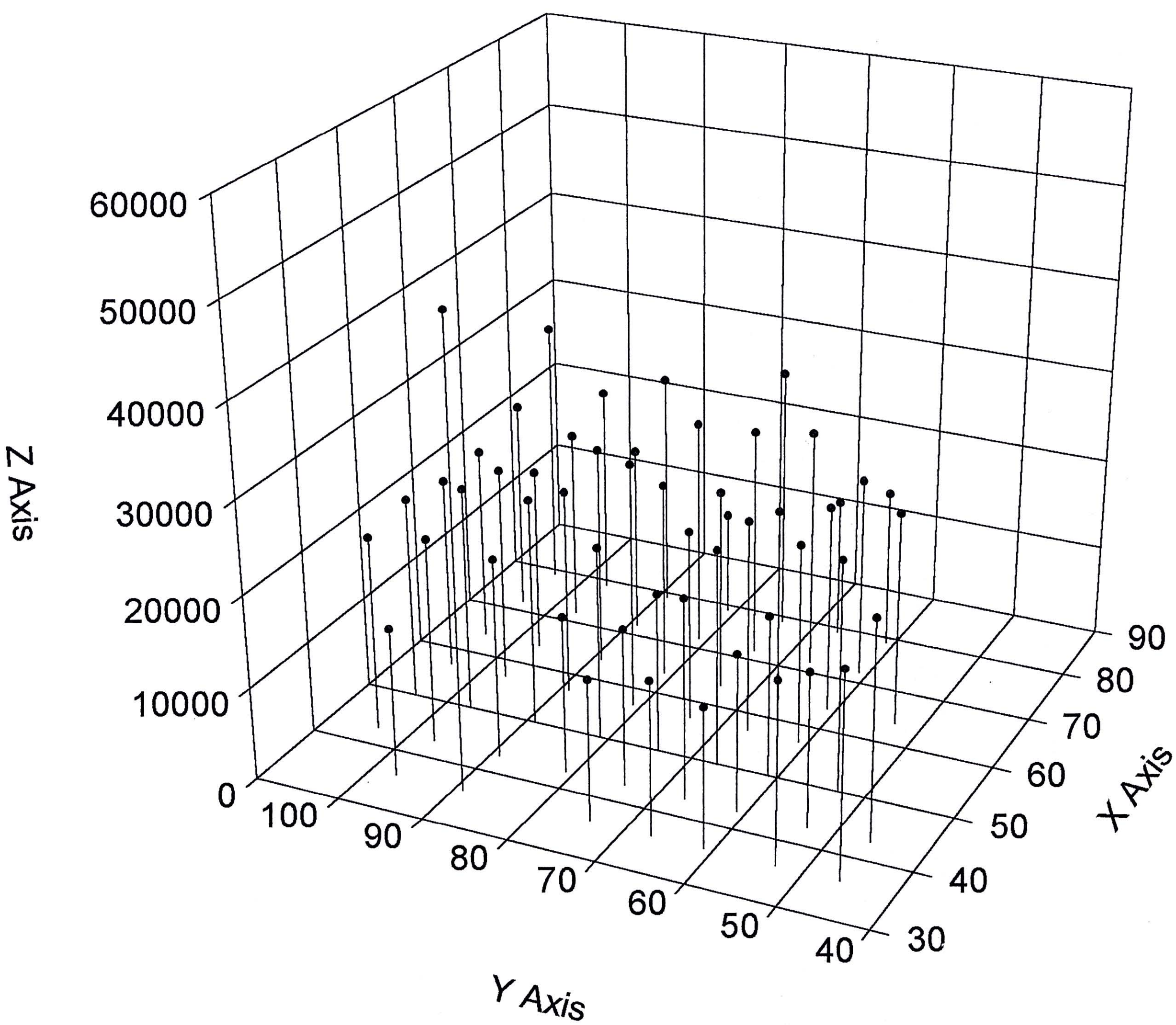
141

Fe,

FE PPM UT LK SED LINC PT (BRIMHALL)



FE PPM UT LK SED LINC PT (BRIMHALL)



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4	UL117	43.0000	53.0000	1.6721e+4	9152.9730	2.3904e+5	515.1820
5	UL118	50.0000	53.0000	2.4958e+4	9792.2610	2.1128e+5	583.4160
6	UL119	64.0000	53.0000	2.3372e+4	7265.0490	7.7839e+4	464.9320
7	UL106	36.0000	61.0000	1.5099e+4	8013.4040	1.9104e+5	418.1050
8	UL107	43.0000	61.0000	1.6946e+4	7371.2390	1.7275e+5	382.0420
9	UL108	50.0000	61.0000	1.7453e+4	8102.5290	1.6797e+5	452.8530
10	UL109	57.0000	61.0000	2.1724e+4	1.0326e+4	2.1805e+5	561.4800
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12	UL111	72.0000	61.0000	2.1919e+4	8877.7170	1.9880e+5	483.6450
13	UL112	79.0000	61.0000	1.7386e+4	4934.8520	5.9806e+4	421.3470
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16	UL096	50.0000	67.0000	2.3380e+4	8820.6940	2.0727e+5	562.1760
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20	UL100	79.0000	67.0000	1.5320e+4	4755.1710	5.0269e+4	555.7150
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46	UL057	72.0000	97.0000	2.0776e+4	7475.2850	1.5600e+5	397.5390
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50	UL047	57.0000	104.0000	2.0985e+4	8356.2110	1.8774e+5	457.6620
51	UL048	64.0000	104.0000	2.1182e+4	8580.4640	2.0368e+5	453.6430
52	UL049	72.0000	104.0000	2.2945e+4	8428.2610	1.9998e+5	439.2730
53	UL050	79.0000	104.0000	2.9168e+4	8803.2490	1.8770e+5	440.9470

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1	1307.7320	6928.6090	615.8220	1036.6910	372.0720	662.4140	6059.4580
2	1359.5100	7580.4420	730.9480	850.8680	416.4480	653.6360	2697.3880
3	1450.9600	4978.4260	554.2270	944.4330	366.3740	734.9670	4663.4790
4	1224.2550	4918.5670	496.5030	1040.1950	312.6080	733.5820	4544.8220
5	1338.2210	7741.1920	688.3230	768.7380	489.6110	720.7660	0.0000
6	834.1830	1150.0020	713.2790	218.3120	249.0730	287.5680	0.0000
7	1140.0490	5590.1480	542.3060	759.4590	317.4870	590.9920	6432.3670
8	1009.9050	6112.3590	569.7480	757.3970	296.0780	454.9330	2507.8060
9	1292.5570	4591.2220	537.3290	768.1440	321.6560	571.3780	8539.1070
10	1377.4410	5434.3330	636.6640	909.2930	445.9150	695.8160	9070.6010
11	1365.9420	6293.4390	846.8280	898.9310	436.6760	617.8060	1.6994e+4
12	1249.8910	5108.2930	666.3620	721.3450	379.0700	565.2280	8497.5630
13	611.3090	1295.9880	506.9280	171.7660	217.8680	220.1760	4201.3750
14	1045.7430	4894.1040	502.8020	900.8760	307.1530	539.4800	3760.5160
15	1183.2030	6129.7810	604.4800	840.2100	339.7970	448.4860	0.0000
16	1548.9910	7148.3440	645.2500	994.4460	386.5220	656.8850	4723.2870
17	1270.2060	7348.7550	669.2340	828.7380	316.9420	473.0130	1.4395e+4
18	1225.8500	7634.5220	550.6120	855.0790	352.9710	631.5630	1.0186e+4
19	1297.4500	9118.2250	680.3680	883.6100	380.4490	511.3490	4181.6530
20	545.9400	794.3580	451.3080	126.5530	194.8020	212.2330	2742.0710
21	942.1390	5349.0310	485.1050	936.0780	291.6070	443.0160	1.0720e+4
22	1106.1080	6837.2440	531.2240	863.8470	321.5430	427.5790	7826.5700
23	973.2250	6896.4010	521.3560	773.9370	303.8990	352.3290	2535.5180
24	1308.4130	6964.9580	603.9980	921.4440	378.4430	664.4750	5523.9970
25	1298.0730	8211.8910	616.0500	976.2100	396.9120	642.9090	1.0986e+4
26	1465.3700	8694.6050	745.8450	904.8100	414.3650	564.1340	7522.8990
27	1477.8380	8673.9180	777.8950	760.7190	438.2430	468.5360	0.0000
28	1005.1020	6372.8000	422.9370	917.4620	288.3110	619.2240	1.1360e+4
29	1550.5330	7587.3680	570.1980	898.8450	390.0200	682.4690	1.9984e+4
30	1562.7650	7643.6180	775.2900	981.3040	423.9010	557.8580	9259.4220
31	1606.8710	5610.8280	573.2100	873.8250	390.7990	573.5000	6248.2430
32	1424.7740	6306.5520	689.0580	841.8670	446.7800	527.4910	6807.9450
33	156.3510	835.4400	395.8570	50.1690	65.0910	303.5120	3580.0030
34	3157.8390	2957.4480	971.7030	365.5140	544.8850	326.6330	1.0939e+4
35	1418.8600	6558.3200	674.4450	978.7520	423.0240	657.2440	1.0036e+4
36	1436.0250	7063.8930	683.0940	975.3870	440.0090	596.6310	6656.1350
37	1439.5620	6422.6270	598.7800	957.8270	430.0220	667.6410	4613.9370
38	1373.6420	7671.5310	640.1250	967.6730	440.8140	587.0350	9536.3910
39	1318.1340	5170.8230	620.1400	947.0630	407.9240	587.7740	8401.0270
40	1524.0940	5313.6440	710.7360	808.4720	435.3890	581.8320	4273.6100
41	1008.1760	1838.6570	492.9950	340.5460	156.3980	306.0850	2741.1700
42	1320.4970	5750.9490	548.1000	890.1470	376.8950	665.0700	4518.4030
43	1590.6730	6316.9610	617.4980	862.4160	414.3060	701.8770	1.0545e+4
44	1413.7640	5588.8540	576.2170	848.7960	395.0510	656.4470	4481.2270
45	1279.3450	6584.3960	489.1300	810.9360	332.4110	548.5260	6020.0330
46	1213.6700	5508.0880	522.0100	763.9480	323.3940	513.8600	6534.0160
47	1340.4080	4770.0930	580.3950	688.6000	371.2400	440.4500	1.4881e+4
48	967.6640	5679.3990	570.9320	818.3010	337.7260	533.9710	3266.7520
49	1222.0400	4022.3820	602.5660	782.5040	383.0390	659.0180	8158.5090
50	1330.8460	5951.7410	594.7900	832.1090	375.1270	633.5200	97.8080
51	1239.7900	5891.1980	594.0970	946.1230	389.7720	695.0490	3839.5050
52	1337.4100	7210.3660	563.0310	908.3650	363.3820	672.0320	6310.7070
53	1451.8320	6460.4580	688.9860	851.4610	403.7300	588.1970	7423.1440

	-15- HGPPB	-16- SEPPB	-17- CRPPB	-18- ZNPPB	-19- CDPPB	-20- PBPPB	-21- COPPB
1	32.0000	2485.2610	1.0016e+4	3.9281e+4	3265.0570	8935.9150	3945.5950
2	62.0000	1799.4980	1.1984e+4	4.5145e+4	3542.8630	1.9000e+4	3692.2650
3	40.0000	2012.7870	1.2797e+4	4.0744e+4	2923.5950	1.6983e+4	3256.0860
4	30.0000	1622.0910	9749.8050	3.2009e+4	2519.8230	5220.7520	3280.4090
5	48.0000	4300.7960	1.4988e+4	4.3940e+4	3531.4990	1.0615e+4	4094.9040
6	50.0000	625.4100	9782.8940	5.8554e+4	3221.5310	2.2519e+4	4202.7920
7	24.0000	513.3330	9790.6690	3.8528e+4	2457.9910	8351.9370	3326.6070
8	24.0000	705.5630	9513.4530	3.7741e+4	2775.4540	1.2676e+4	2797.9500
9	30.0000	2150.5760	9178.7100	4.1566e+4	3088.2620	1.5813e+4	3629.6000
10	28.0000	3052.9770	1.2238e+4	4.5851e+4	3364.7220	1.4605e+4	3524.9950
11	36.0000	1762.7050	1.1562e+4	4.6691e+4	3356.5910	7066.5200	3735.2880
12	32.0000	785.3560	1.2926e+4	4.2899e+4	3593.2120	1.0345e+4	3551.3950
13	24.0000	1020.5130	6603.3450	5.4675e+4	2373.7000	6509.0120	3070.2960
14	19.0000	2326.4500	8673.6470	3.7250e+4	2923.5070	1.3913e+4	2594.5240
15	35.0000	1500.8110	1.1135e+4	4.4472e+4	3542.9520	9148.2800	2990.2420
16	40.0000	2215.5410	1.4158e+4	5.4667e+4	3691.5880	2.6304e+4	3767.2120
17	70.0000	1135.8590	1.1776e+4	5.8133e+4	3582.6580	2.8178e+4	3008.6350
18	28.0000	1363.4470	1.1192e+4	3.6819e+4	2528.1720	1.3367e+4	2799.6760
19	48.0000	2292.7380	1.3190e+4	4.6655e+4	3591.6890	1.4289e+4	3994.1300
20	20.0000	1946.7970	5481.1870	2.5813e+4	1924.0330	8060.4650	2388.4950
21	94.0000	2461.0590	1.0230e+4	3.3565e+4	2750.0410	9304.9720	3248.4280
22	42.0000	3645.0840	8282.0350	3.5015e+4	3061.3900	9482.4240	3296.2990
23	67.0000	1248.6370	8404.4690	3.5423e+4	2798.8040	9257.0020	2804.1340
24	22.0000	1287.3200	8811.1070	4.0297e+4	2897.1590	1.5825e+4	3275.9070
25	21.0000	1947.9970	3.9659e+4	4.2661e+4	3050.3880	1.3635e+4	3240.7810
26	41.0000	2597.7360	1.2334e+4	4.6198e+4	3831.8960	1.0948e+4	3086.7820
27	28.0000	548.2040	1.3062e+4	5.2513e+4	4235.4160	1.2169e+4	4079.6400
28	34.0000	5933.3790	6875.7590	2.8534e+4	2247.3620	4017.4880	2271.6540
29	32.0000	2059.9750	1.0872e+4	3.9714e+4	3716.3230	1.5132e+4	3098.9620
30	124.0000	4573.4960	1.4149e+4	7.9672e+4	4187.0200	4.1517e+4	4161.6880
31	39.0000	413.5390	1.0709e+4	4.3892e+4	3194.0720	1.8948e+4	3480.2740
32	66.0000	3426.1380	1.3901e+4	5.1382e+4	4260.7050	1.5313e+4	3609.4340
33	24.0000	1155.0360	5399.9040	1.7350e+4	1820.5210	3517.1340	2381.9360
34	41.0000	6511.3950	1.5778e+4	9.1515e+4	6909.9790	3.6320e+4	7357.7550
35	32.0000	7082.7010	1.1593e+4	4.3730e+4	3699.0560	1.1837e+4	3008.1830
36	44.0000	3796.8070	1.1740e+4	4.6713e+4	3864.6390	9990.7520	3191.1260
37	78.0000	3175.4380	1.1778e+4	4.4492e+4	2930.1240	1.6023e+4	3507.4290
38	46.0000	2670.0060	1.1805e+4	4.9682e+4	3373.3730	1.8300e+4	3607.3040
39	38.0000	3486.4980	1.1553e+4	4.4208e+4	3288.4110	7003.0540	3101.4910
40	54.0000	3890.0930	1.4176e+4	5.0761e+4	3918.8370	1.5488e+4	3908.5880
41	48.0000	1564.3350	8486.1670	2.7359e+4	2092.7590	1.4481e+4	2573.6040
42	55.0000	5168.5520	1.2043e+4	4.1816e+4	3007.2710	1.3577e+4	2882.9180
43	81.0000	2946.1410	1.1173e+4	4.2941e+4	3626.7880	1.5478e+4	3612.8600
44	55.0000	4242.4180	1.2124e+4	4.6912e+4	3299.6000	1.2603e+4	3408.1180
45	38.0000	2544.6380	1.0158e+4	3.7265e+4	3071.7950	1.3092e+4	2535.5540
46	79.0000	3097.8210	1.1966e+4	4.4161e+4	2878.2110	9408.3360	3119.6460
47	100.0000	3543.2250	1.2301e+4	5.7504e+4	3179.8160	2.7775e+4	2348.6760
48	60.0000	4498.6020	1.1930e+4	4.8470e+4	2804.9770	1.1582e+4	2966.0000
49	36.0000	1.0110e+4	1.1894e+4	3.8914e+4	2928.5780	1.1487e+4	3056.2810
50	57.0000	4858.5530	1.1689e+4	3.9997e+4	2535.5520	1.0835e+4	3127.5450
51	69.0000	4409.0380	1.0392e+4	4.4598e+4	3279.9630	1.1693e+4	3401.8070
52	35.0000	2250.7030	1.2243e+4	4.6817e+4	3426.5160	1.4478e+4	3185.9290
53	57.0000	5942.0150	1.4482e+4	5.9920e+4	4103.4640	1.8190e+4	4171.8610

	-22- NIPPB	-23- CUPPB	-24-	-25-	-26-	-27-
1	7924.5980	8774.4790		36.0000	46.0000	2.2128e+4
2	9436.5180	1.2205e+4		36.0000	49.8667	2.0345e+4
3	8761.2070	9369.1630		36.0000	53.7333	1.9548e+4
4	6298.7370	7507.7040		36.0000	57.6000	1.6881e+4
5	9429.0030	9320.9470		36.0000	61.4667	1.5104e+4
6	5898.9280	1.2645e+4		36.0000	65.3333	1.6641e+4
7	6242.6060	6757.2640		36.0000	69.2000	1.6742e+4
8	7315.0780	6004.4110		36.0000	73.0667	1.5309e+4
9	7992.9260	6372.2380		36.0000	76.9333	1.6287e+4
10	8877.9540	9809.2680		36.0000	80.8000	2.2235e+4
11	9046.2870	1.0040e+4		36.0000	84.6667	3.7099e+4
12	7877.1170	1.0079e+4		36.0000	88.5333	4.9833e+4
13	4138.7810	1.6992e+4		36.0000	92.4000	3.6998e+4
14	6657.9810	7563.0500		36.0000	96.2667	1.6031e+4
15	8219.8770	8445.4520		36.0000	100.1333	1.7562e+4
16	9058.1930	1.0602e+4		36.0000	104.0000	2.0708e+4
17	8508.0340	2.0738e+4		38.8667	46.0000	2.2180e+4
18	6716.5030	7718.8400		38.8667	49.8667	2.0243e+4
19	1.0376e+4	9317.7570		38.8667	53.7333	1.8977e+4
20	2947.9910	5967.3760		38.8667	57.6000	1.7475e+4
21	6838.4990	6972.3450		38.8667	61.4667	1.6338e+4
22	5485.4150	6512.3910		38.8667	65.3333	1.7775e+4
23	7728.8360	7065.1720		38.8667	69.2000	1.7918e+4
24	8664.0110	8166.5650		38.8667	73.0667	1.6515e+4
25	1.9655e+4	1.0801e+4		38.8667	76.9333	1.7364e+4
26	1.0344e+4	9826.4180		38.8667	80.8000	1.9633e+4
27	1.0523e+4	1.1785e+4		38.8667	84.6667	2.8433e+4
28	4513.2860	6259.0580		38.8667	88.5333	3.9605e+4
29	7791.2830	9771.5810		38.8667	92.4000	3.0298e+4
30	1.0366e+4	1.7078e+4		38.8667	96.2667	1.9163e+4
31	7238.6400	9012.4200		38.8667	100.1333	1.9900e+4
32	9774.5110	1.0718e+4		38.8667	104.0000	2.1171e+4
33	1440.7830	6079.0580		41.7333	46.0000	2.3674e+4
34	2.1686e+4	1.7447e+4		41.7333	49.8667	1.9598e+4
35	8439.9340	9008.1040		41.7333	53.7333	1.6897e+4
36	9563.5740	9345.9970		41.7333	57.6000	1.7664e+4
37	8576.2370	8942.9310		41.7333	61.4667	1.7046e+4
38	9337.3960	9382.5910		41.7333	65.3333	2.0840e+4
39	8668.5440	8786.1260		41.7333	69.2000	2.0550e+4
40	1.1238e+4	1.1732e+4		41.7333	73.0667	1.7100e+4
41	4787.8890	5189.7270		41.7333	76.9333	1.7624e+4
42	8007.3190	8883.6910		41.7333	80.8000	1.7058e+4
43	9070.2940	9230.7800		41.7333	84.6667	2.1327e+4
44	8822.5630	1.0531e+4		41.7333	88.5333	2.1916e+4
45	7202.6430	7827.1710		41.7333	92.4000	2.3693e+4
46	8162.5030	1.0245e+4		41.7333	96.2667	2.2222e+4
47	8059.2350	1.5080e+4		41.7333	100.1333	2.1763e+4
48	8178.9180	9191.2370		41.7333	104.0000	2.1136e+4
49	8630.9970	8530.9340		44.6000	46.0000	2.3633e+4
50	8535.4340	8117.1830		44.6000	49.8667	1.9907e+4
51	8727.2890	9260.0780		44.6000	53.7333	1.7151e+4
52	7897.1180	9750.3730		44.6000	57.6000	1.8127e+4
53	1.0996e+4	1.7621e+4		44.6000	61.4667	1.7214e+4
54				44.6000	65.3333	2.0924e+4
55				44.6000	69.2000	2.0749e+4

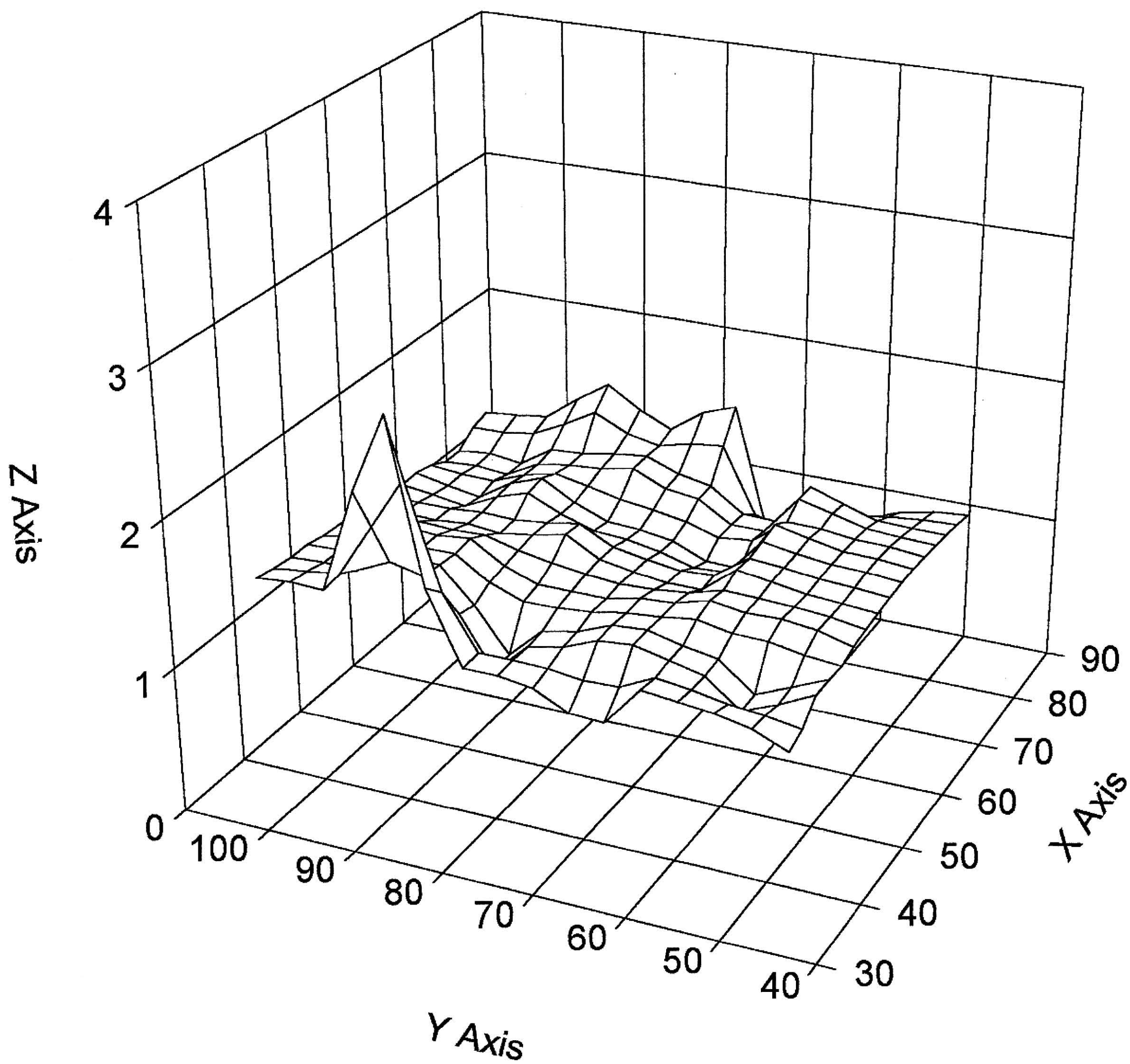
ppb = parts per billion

ppm = parts per million

pct = parts per hundred
or percent = %

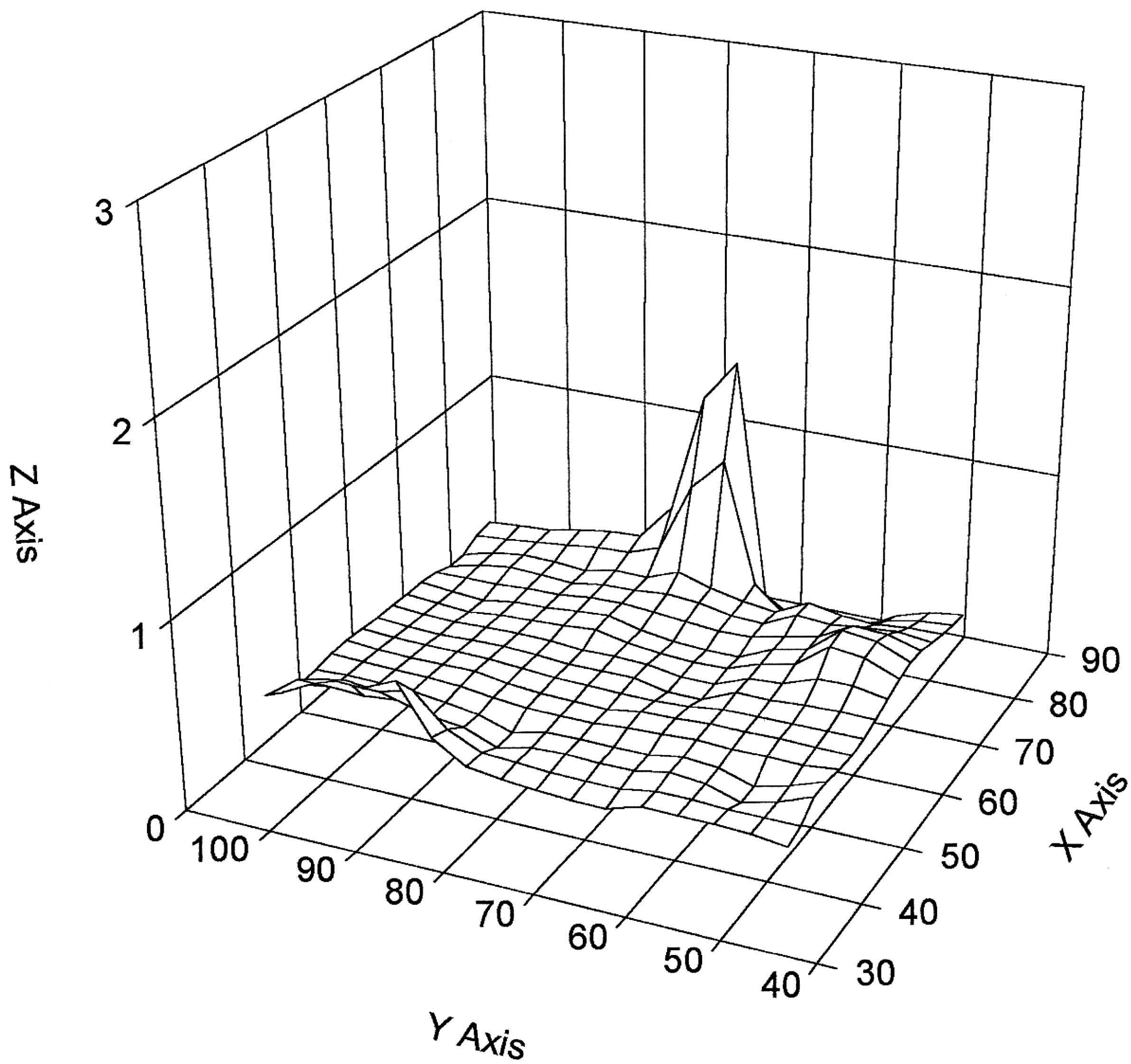
LINCPT

AL PCT UT LK SED (SONERHOLM)

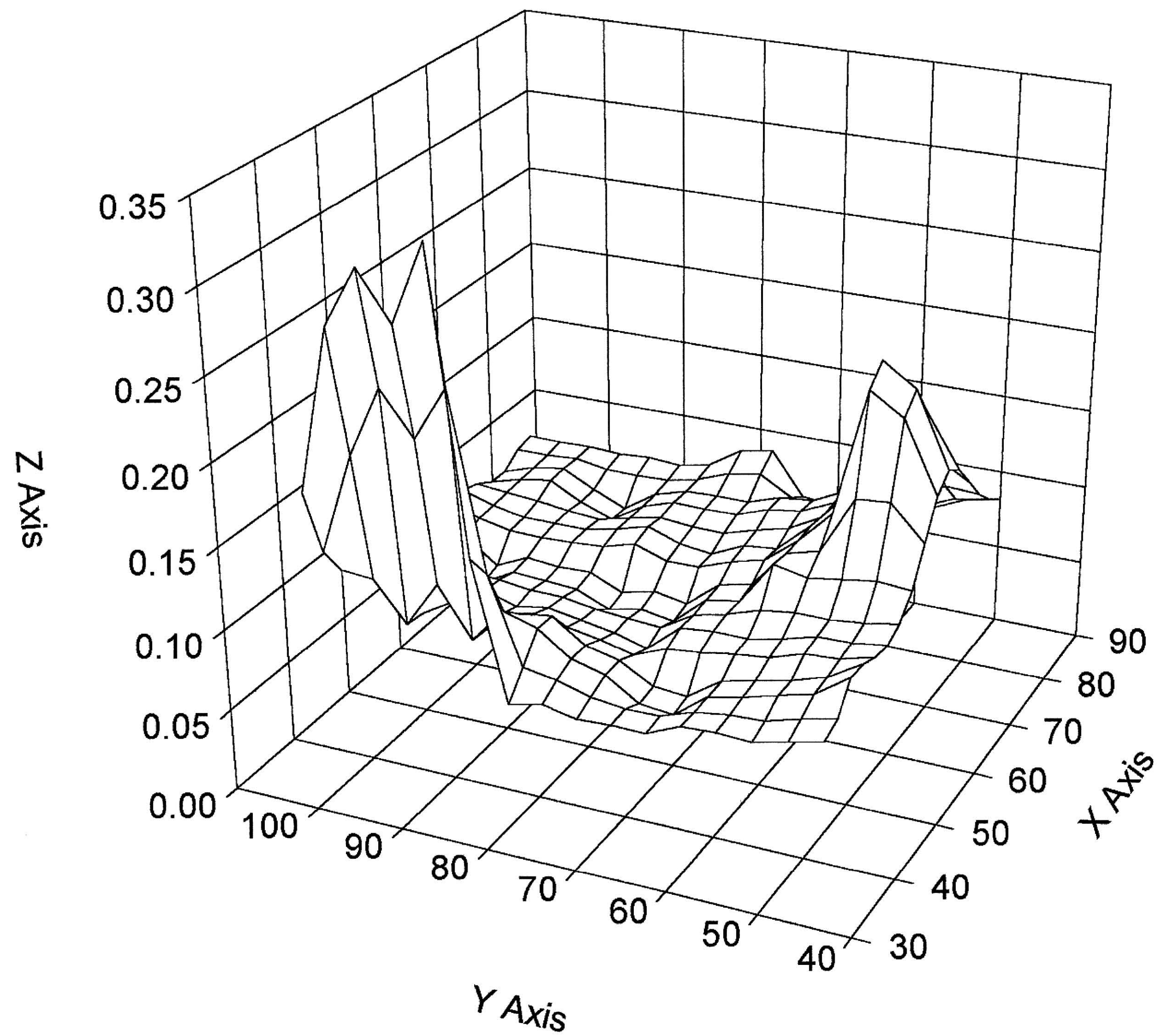


LINCPT

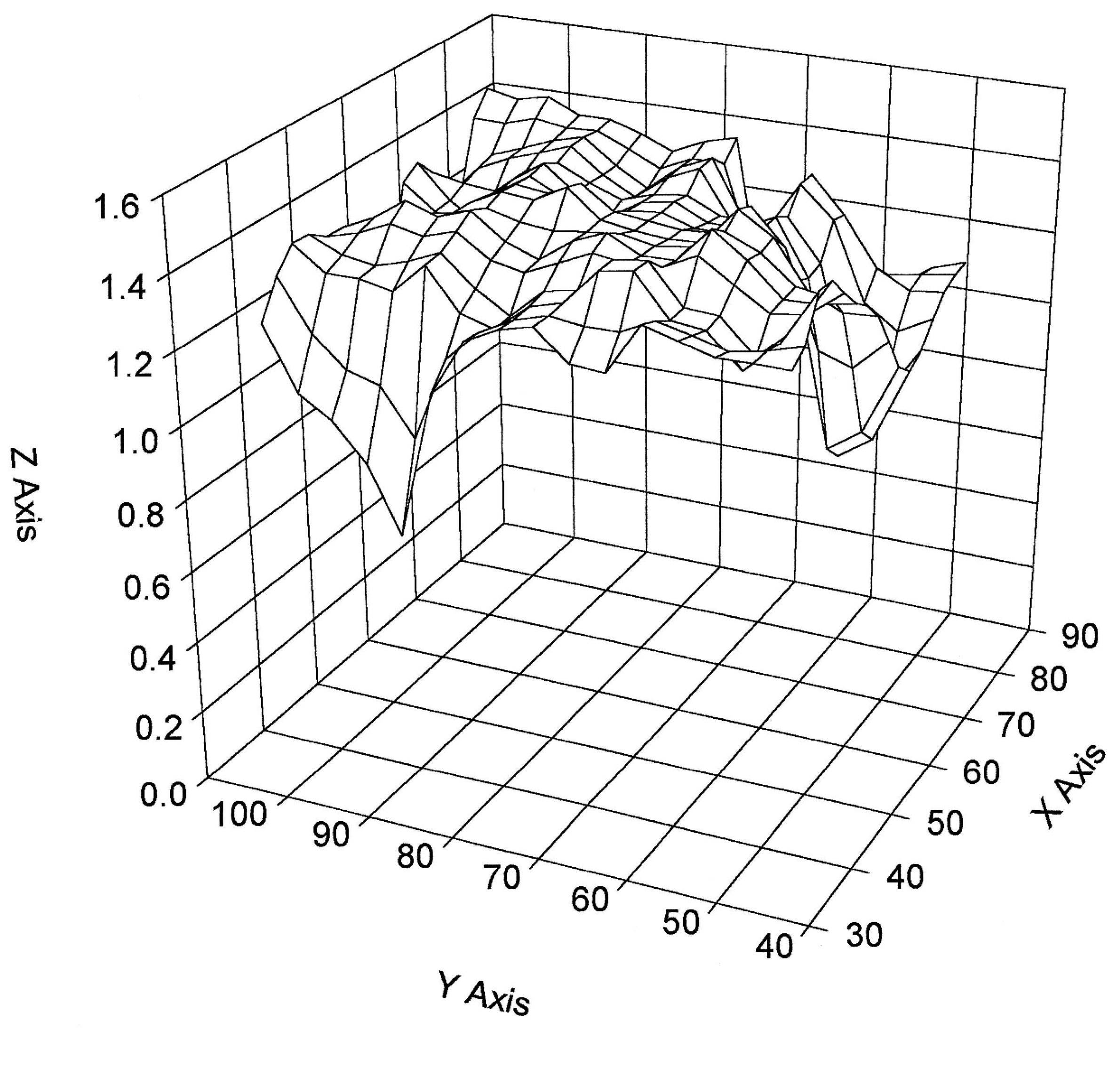
K PCT UT LK SED (SONERHOLM)



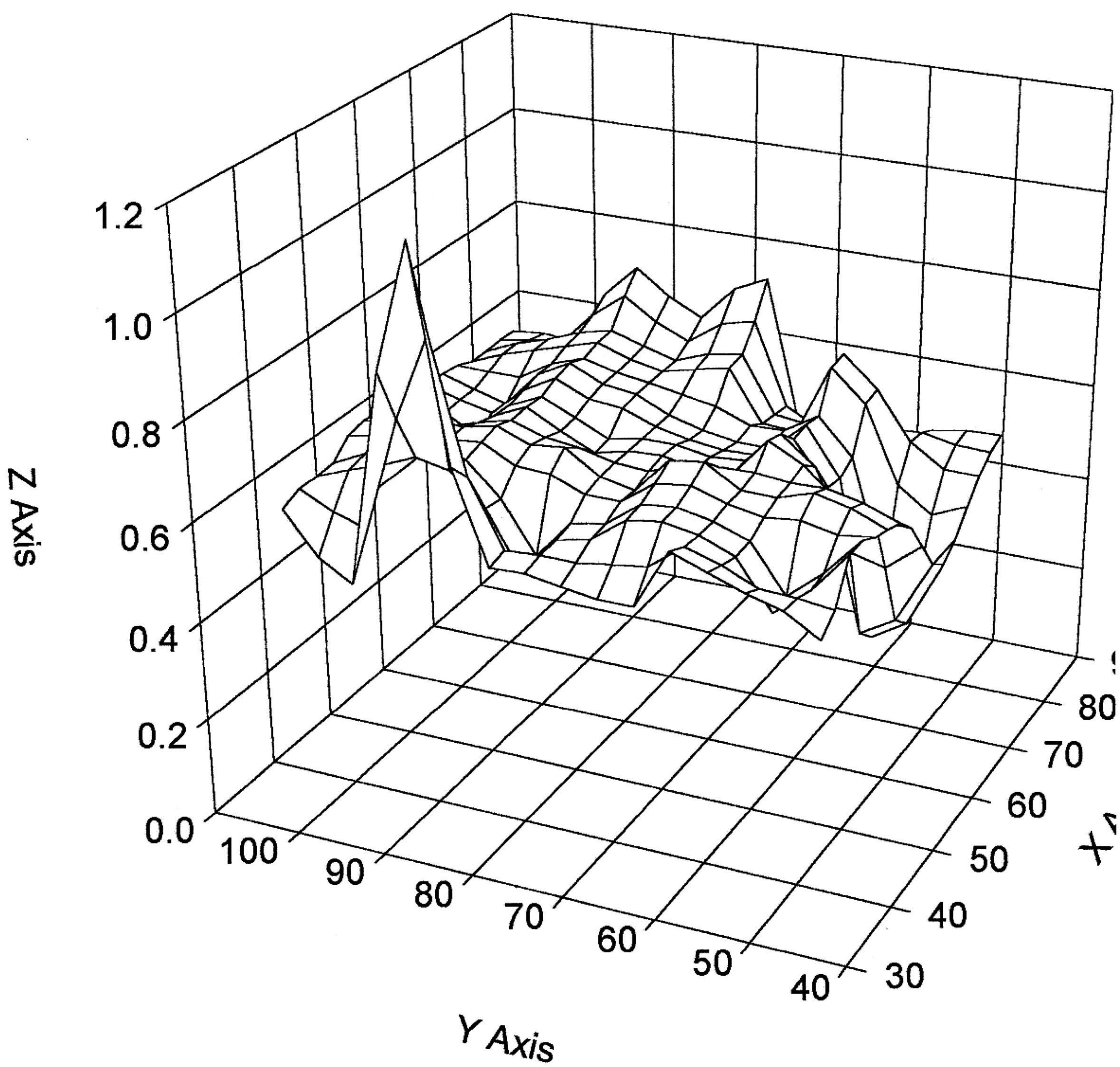
NA PCT UT LK SED (SONERHOLM)



MG PCT UL LK SED LINCPNT (SONERHOLM)



FE PCT UT LK SED LINCPNT (SONERHOLM



	-1- SAMPLEID	-2- EWCOORD	-3- NSCOORD	-4- SIPCT	-5- ALPCT	-6- NAPCT	-7- KPCT
1	UL124	36.0000	46.0000	9.1900	1.0900	0.0900	0.3500
2	UL125	43.0000	46.0000	13.4700	1.2700	0.1100	0.4400
3	UL116	36.0000	53.0000	9.9800	1.2400	0.0800	0.3800
4	UL117	43.0000	53.0000	8.0200	1.0400	0.0900	0.3200
5	UL118	50.0000	53.0000	11.4900	1.3800	0.1000	0.4200
6	UL119	64.0000	53.0000	31.3100	1.3900	0.2300	0.6300
7	UL106	36.0000	61.0000	9.3900	1.2900	0.0800	0.3800
8	UL107	43.0000	61.0000	9.1900	1.2900	0.0800	0.4000
9	UL108	50.0000	61.0000	10.1000	1.4100	0.0900	0.4200
10	UL109	57.0000	61.0000	11.7400	1.4400	0.1200	0.4400
11	UL110	64.0000	61.0000	12.9100	1.4900	0.1200	0.4500
12	UL111	72.0000	61.0000	14.7100	1.5100	0.1200	0.5000
13	UL112	79.0000	61.0000	33.7800	1.1000	0.0800	0.2000
14	UL094	36.0000	67.0000	7.6300	0.9900	0.0700	0.3200
15	UL095	43.0000	67.0000	8.9300	1.3700	0.0600	0.3600
16	UL096	50.0000	67.0000	9.7800	1.3400	0.0900	0.4100
17	UL097	57.0000	67.0000	8.9800	1.2300	0.0900	0.3500
18	UL098	64.0000	67.0000	8.8000	1.0900	0.1000	0.3600
19	UL099	72.0000	67.0000	11.4800	1.1800	0.1100	0.4000
20	UL100	79.0000	67.0000	33.7900	0.8100	0.0900	0.2000
21	UL080	36.0000	74.0000	8.7000	1.1500	0.0700	0.3400
22	UL081	43.0000	74.0000	8.7000	1.2300	0.0800	0.3700
23	UL082	50.0000	74.0000	9.7200	1.2800	0.0700	0.3800
24	UL083	57.0000	74.0000	10.2300	1.2800	0.0700	0.4000
25	UL084	64.0000	74.0000	9.7200	1.2300	0.0900	0.3800
26	UL085	72.0000	74.0000	11.7700	1.3700	0.1000	0.4500
27	UL086	79.0000	74.0000	13.8200	1.7800	0.1200	1.5800
28	UL068	36.0000	81.0000	9.4800	1.1800	0.0700	0.3800
29	UL069	43.0000	81.0000	8.1900	0.9500	0.1000	0.3200
30	UL070	50.0000	81.0000	9.8800	1.2800	0.0800	0.3900
31	UL071	57.0000	81.0000	10.4800	1.4600	0.0700	0.4000
32	UL072	64.0000	81.0000	9.8800	1.2800	0.1000	0.4500
33	UL073	72.0000	81.0000	11.9700	1.5000	0.1000	0.4500
34	UL060	36.0000	89.0000	31.0300	2.7500	0.3300	0.7500
35	UL061	43.0000	89.0000	10.2300	1.5100	0.0800	0.4100
36	UL062	50.0000	89.0000	10.7500	1.5100	0.0800	0.4300
37	UL063	57.0000	89.0000	9.7200	1.3700	0.0800	0.4200
38	UL064	64.0000	89.0000	10.2300	1.5100	0.0900	0.4200
39	UL065	72.0000	89.0000	9.7200	1.4300	0.0800	0.4200
40	UL066	79.0000	89.0000	13.6100	1.7800	0.1000	0.5100
41	UL052	36.0000	97.0000	28.1500	1.5100	0.3100	0.6800
42	UL053	43.0000	97.0000	10.4800	1.4600	0.0800	0.4400
43	UL054	50.0000	97.0000	11.2600	1.5100	0.0900	0.4300
44	UL055	57.0000	97.0000	9.9800	1.3700	0.0700	0.4100
45	UL056	64.0000	97.0000	9.8800	1.2800	0.0900	0.3900
46	UL057	72.0000	97.0000	11.9700	1.2700	0.1000	0.4400
47	UL058	79.0000	97.0000	12.4700	1.4600	0.1000	0.4500
48	UL045	43.0000	104.0000	11.9700	1.4600	0.1100	0.4300
49	UL046	50.0000	104.0000	12.2800	1.4300	0.1100	0.4500
50	UL047	57.0000	104.0000	13.4700	1.3700	0.1100	0.4300
51	UL048	64.0000	104.0000	10.2300	1.3700	0.1000	0.4200
52	UL049	72.0000	104.0000	9.8800	1.2800	0.0900	0.3700
53	UL050	79.0000	104.0000	11.9700	1.4100	0.1000	0.4300

$\bar{X} = 13.08$

	-8- MGPCT	-9- CAPCT	-10- FEPCT	-11-	-12-	-13-
1	1.3500	24.6200	0.5500	36.0000	46.0000	0.5500
2	1.4900	23.7300	0.6600	36.0000	49.8667	0.5909
3	1.3500	27.1100	0.6100	36.0000	53.7333	0.6099
4	1.2500	29.6200	0.5100	36.0000	57.6000	0.6353
5	1.3500	29.9800	0.6700	36.0000	61.4667	0.6599
6	0.7700	8.5300	0.2400	36.0000	65.3333	0.5408
7	1.4000	28.1200	0.6600	36.0000	69.2000	0.5415
8	1.3500	27.1100	0.6400	36.0000	73.0667	0.5505
9	1.5000	26.4000	0.6500	36.0000	76.9333	0.5628
10	1.5000	25.1000	0.7000	36.0000	80.8000	0.5600
11	1.4000	24.6000	0.6600	36.0000	84.6667	0.7418
12	1.4500	22.1400	0.7400	36.0000	88.5333	1.1493
13	0.8700	8.7800	0.4700	36.0000	92.4000	0.8972
14	1.2500	30.6300	0.5300	36.0000	96.2667	0.4712
15	1.4900	27.7900	0.6600	36.0000	100.1333	0.5108
16	1.4000	27.1100	0.7000	36.0000	104.0000	0.5950
17	1.3900	27.5900	0.6100	38.8667	46.0000	0.5787
18	1.3500	28.1200	0.5900	38.8667	49.8667	0.5871
19	1.2800	25.0800	0.5600	38.8667	53.7333	0.5914
20	0.8700	8.7800	0.4900	38.8667	57.6000	0.6210
21	1.3500	28.9200	0.5500	38.8667	61.4667	0.6424
22	1.3500	28.9200	0.5900	38.8667	65.3333	0.5902
23	1.4500	27.8900	0.6100	38.8667	69.2000	0.5807
24	1.4000	27.3700	0.6300	38.8667	73.0667	0.5699
25	1.4000	27.3700	0.6100	38.8667	76.9333	0.5713
26	1.4500	25.8200	0.7000	38.8667	80.8000	0.5664
27	1.4500	22.7200	0.8100	38.8667	84.6667	0.6973
28	1.2800	27.0100	0.5600	38.8667	88.5333	0.9568
29	1.2500	29.9500	0.4900	38.8667	92.4000	0.7852
30	1.3500	27.1100	0.6700	38.8667	96.2667	0.5543
31	1.4900	26.6300	0.6100	38.8667	100.1333	0.5773
32	1.3300	24.3100	0.6600	38.8667	104.0000	0.6107
33	1.3300	24.3100	0.6600	41.7333	46.0000	0.6578
34	0.7300	9.1150	1.1500	41.7333	49.8667	0.5739
35	1.4000	28.8500	0.6700	41.7333	53.7333	0.5161
36	1.4500	26.3400	0.6900	41.7333	57.6000	0.6113
37	1.4500	27.3700	0.6800	41.7333	61.4667	0.6394
38	1.4500	27.3700	0.7000	41.7333	65.3333	0.6512
39	1.4500	27.3700	0.7000	41.7333	69.2000	0.6411
40	1.4500	23.7500	0.7900	41.7333	73.0667	0.5909
41	1.0100	11.3600	0.4700	41.7333	76.9333	0.5750
42	1.3300	25.8600	0.6600	41.7333	80.8000	0.4957
43	1.4500	25.8200	0.6800	41.7333	84.6667	0.6118
44	1.3300	26.2400	0.5600	41.7333	88.5333	0.6739
45	1.2500	27.1100	0.5900	41.7333	92.4000	0.6870
46	1.3900	25.6600	0.6600	41.7333	96.2667	0.6584
47	1.4900	24.1200	0.6100	41.7333	100.1333	0.6357
48	1.3900	24.5100	0.6100	41.7333	104.0000	0.6105
49	1.3500	25.3000	0.6500	44.6000	46.0000	0.6573
50	1.1000	23.5100	0.6500	44.6000	49.8667	0.5805
51	1.4000	27.3700	0.6300	44.6000	53.7333	0.5219
52	1.2500	27.1100	0.6100	44.6000	57.6000	0.6147
53	1.4900	24.1200	0.6100	44.6000	61.4667	0.6397
54				44.6000	65.3333	0.6543
55				44.6000	69.2000	0.6464

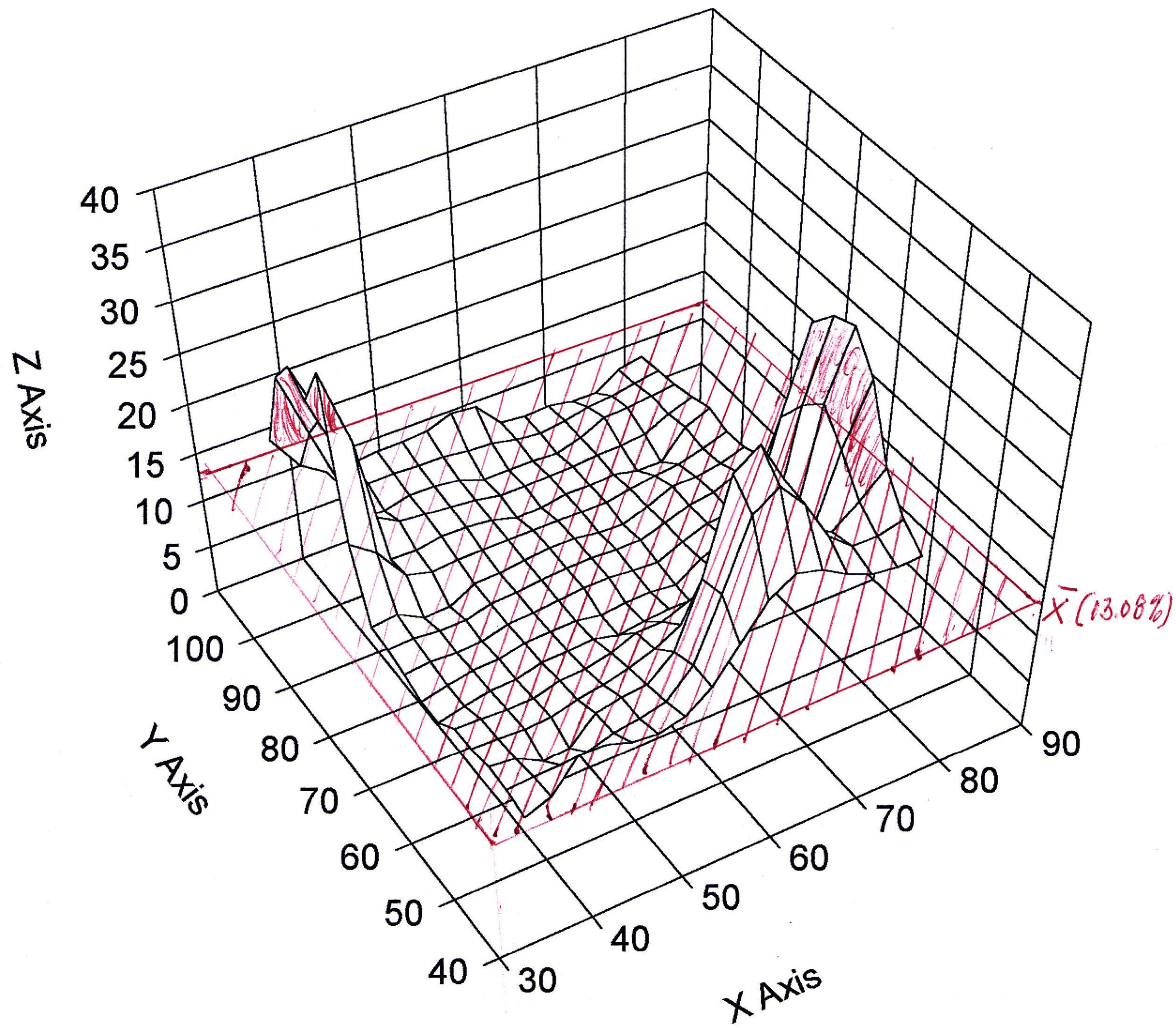
	-8- MGPCT	-9- CAPCT	-10- FEPCT	-11-	-12-	-13-
56				44.6000	73.0667	0.5939
57				44.6000	76.9333	0.5827
58				44.6000	80.8000	0.5029
59				44.6000	84.6667	0.6051
60				44.6000	88.5333	0.6704
61				44.6000	92.4000	0.6716
62				44.6000	96.2667	0.6598
63				44.6000	100.1333	0.6438
64				44.6000	104.0000	0.6121
65				47.4667	46.0000	0.6366
66				47.4667	49.8667	0.6278
67				47.4667	53.7333	0.6423
68				47.4667	57.6000	0.6350
69				47.4667	61.4667	0.6477
70				47.4667	65.3333	0.6716
71				47.4667	69.2000	0.6614
72				47.4667	73.0667	0.6138
73				47.4667	76.9333	0.6142
74				47.4667	80.8000	0.6417
75				47.4667	84.6667	0.6456
76				47.4667	88.5333	0.6808
77				47.4667	92.4000	0.6729
78				47.4667	96.2667	0.6719
79				47.4667	100.1333	0.6557
80				47.4667	104.0000	0.6447
81				50.3333	46.0000	0.6266
82				50.3333	49.8667	0.6545
83				50.3333	53.7333	0.6696
84				50.3333	57.6000	0.6478
85				50.3333	61.4667	0.6500
86				50.3333	65.3333	0.6922
87				50.3333	69.2000	0.6823
88				50.3333	73.0667	0.6106
89				50.3333	76.9333	0.6246
90				50.3333	80.8000	0.6699
91				50.3333	84.6667	0.6622
92				50.3333	88.5333	0.6899
93				50.3333	92.4000	0.6749
94				50.3333	96.2667	0.6796
95				50.3333	100.1333	0.6613
96				50.3333	104.0000	0.6500
97				53.2000	46.0000	0.6123
98				53.2000	49.8667	0.6386
99				53.2000	53.7333	0.6537
100				53.2000	57.6000	0.6520
101				53.2000	61.4667	0.6599
102				53.2000	65.3333	0.6576
103				53.2000	69.2000	0.6481
104				53.2000	73.0667	0.6237
105				53.2000	76.9333	0.6289
106				53.2000	80.8000	0.6446
107				53.2000	84.6667	0.6543
108				53.2000	88.5333	0.6760
109				53.2000	92.4000	0.6594

	-8- MGPCT	-9- CAPCT	-10- FEPCT	-11-	-12-	-13-
110				53.2000	96.2667	0.6395
111				53.2000	100.1333	0.6389
112				53.2000	104.0000	0.6470
113				56.0667	46.0000	0.5758
114				56.0667	49.8667	0.5794
115				56.0667	53.7333	0.6022
116				56.0667	57.6000	0.6639
117				56.0667	61.4667	0.6982
118				56.0667	65.3333	0.6189
119				56.0667	69.2000	0.6177
120				56.0667	73.0667	0.6298
121				56.0667	76.9333	0.6275
122				56.0667	80.8000	0.6107
123				56.0667	84.6667	0.6429
124				56.0667	88.5333	0.6794
125				56.0667	92.4000	0.6493
126				56.0667	96.2667	0.5630
127				56.0667	100.1333	0.6059
128				56.0667	104.0000	0.6498
129				58.9333	46.0000	0.5140
130				58.9333	49.8667	0.4563
131				58.9333	53.7333	0.4732
132				58.9333	57.6000	0.6335
133				58.9333	61.4667	0.6873
134				58.9333	65.3333	0.6215
135				58.9333	69.2000	0.6166
136				58.9333	73.0667	0.6285
137				58.9333	76.9333	0.6280
138				58.9333	80.8000	0.6158
139				58.9333	84.6667	0.6464
140				58.9333	88.5333	0.6769
141				58.9333	92.4000	0.6465
142				58.9333	96.2667	0.5721
143				58.9333	100.1333	0.6066
144				58.9333	104.0000	0.6471
145				61.8000	46.0000	0.4505
146				61.8000	49.8667	0.3210
147				61.8000	53.7333	0.2791
148				61.8000	57.6000	0.5681
149				61.8000	61.4667	0.6525
150				61.8000	65.3333	0.6082
151				61.8000	69.2000	0.6058
152				61.8000	73.0667	0.6148
153				61.8000	76.9333	0.6291
154				61.8000	80.8000	0.6544
155				61.8000	84.6667	0.6613
156				61.8000	88.5333	0.6910
157				61.8000	92.4000	0.6546
158				61.8000	96.2667	0.5966
159				61.8000	100.1333	0.6120
160				61.8000	104.0000	0.6306
161				64.6667	46.0000	0.4250
162				64.6667	49.8667	0.2868
163				64.6667	53.7333	0.2431

	-8- MGPCT	-9- CAPCT	-10- FEPCT	-11-	-12-	-13-
164				64.6667	57.6000	0.5614
165				64.6667	61.4667	0.6594
166				64.6667	65.3333	0.5965
167				64.6667	69.2000	0.5978
168				64.6667	73.0667	0.6107
169				64.6667	76.9333	0.6287
170				64.6667	80.8000	0.6599
171				64.6667	84.6667	0.6678
172				64.6667	88.5333	0.6996
173				64.6667	92.4000	0.6635
174				64.6667	96.2667	0.5909
175				64.6667	100.1333	0.6108
176				64.6667	104.0000	0.6300
177				67.5333	46.0000	0.4472
178				67.5333	49.8667	0.3523
179				67.5333	53.7333	0.3448
180				67.5333	57.6000	0.5802
181				67.5333	61.4667	0.6515
182				67.5333	65.3333	0.6105
183				67.5333	69.2000	0.6088
184				67.5333	73.0667	0.6352
185				67.5333	76.9333	0.6481
186				67.5333	80.8000	0.6589
187				67.5333	84.6667	0.6699
188				67.5333	88.5333	0.6865
189				67.5333	92.4000	0.6636
190				67.5333	96.2667	0.6243
191				67.5333	100.1333	0.6245
192				67.5333	104.0000	0.6253
193				70.4000	46.0000	0.4918
194				70.4000	49.8667	0.4609
195				70.4000	53.7333	0.5103
196				70.4000	57.6000	0.6657
197				70.4000	61.4667	0.7279
198				70.4000	65.3333	0.5834
199				70.4000	69.2000	0.5886
200				70.4000	73.0667	0.6918
201				70.4000	76.9333	0.6768
202				70.4000	80.8000	0.6606
203				70.4000	84.6667	0.6740
204				70.4000	88.5333	0.6981
205				70.4000	92.4000	0.6778
206				70.4000	96.2667	0.6583
207				70.4000	100.1333	0.6385
208				70.4000	104.0000	0.6113
209				73.2667	46.0000	0.5308
210				73.2667	49.8667	0.5316
211				73.2667	53.7333	0.5767
212				73.2667	57.6000	0.6728
213				73.2667	61.4667	0.7316
214				73.2667	65.3333	0.5755
215				73.2667	69.2000	0.5840
216				73.2667	73.0667	0.6967
217				73.2667	76.9333	0.6867

	-8- MGPCT	-9- CAPCT	-10- FEPCT	-11-	-12-	-13-
218				73.2667	80.8000	0.6607
219				73.2667	84.6667	0.6799
220				73.2667	88.5333	0.6999
221				73.2667	92.4000	0.6841
222				73.2667	96.2667	0.6592
223				73.2667	100.1333	0.6390
224				73.2667	104.0000	0.6106
225				76.1333	46.0000	0.5549
226				76.1333	49.8667	0.5588
227				76.1333	53.7333	0.5726
228				76.1333	57.6000	0.5680
229				76.1333	61.4667	0.5421
230				76.1333	65.3333	0.5412
231				76.1333	69.2000	0.5781
232				76.1333	73.0667	0.7420
233				76.1333	76.9333	0.7254
234				76.1333	80.8000	0.6796
235				76.1333	84.6667	0.7068
236				76.1333	88.5333	0.7512
237				76.1333	92.4000	0.6998
238				76.1333	96.2667	0.6308
239				76.1333	100.1333	0.6254
240				76.1333	104.0000	0.6134
241				79.0000	46.0000	0.5673
242				79.0000	49.8667	0.5652
243				79.0000	53.7333	0.5531
244				79.0000	57.6000	0.5007
245				79.0000	61.4667	0.4702
246				79.0000	65.3333	0.4956
247				79.0000	69.2000	0.5252
248				79.0000	73.0667	0.8077
249				79.0000	76.9333	0.7780
250				79.0000	80.8000	0.7061
251				79.0000	84.6667	0.7400
252				79.0000	88.5333	0.7899
253				79.0000	92.4000	0.7246
254				79.0000	96.2667	0.6103
255				79.0000	100.1333	0.6158
256				79.0000	104.0000	0.6100

SI PCT UT LK SED LINCPNT (SONERHOLM)



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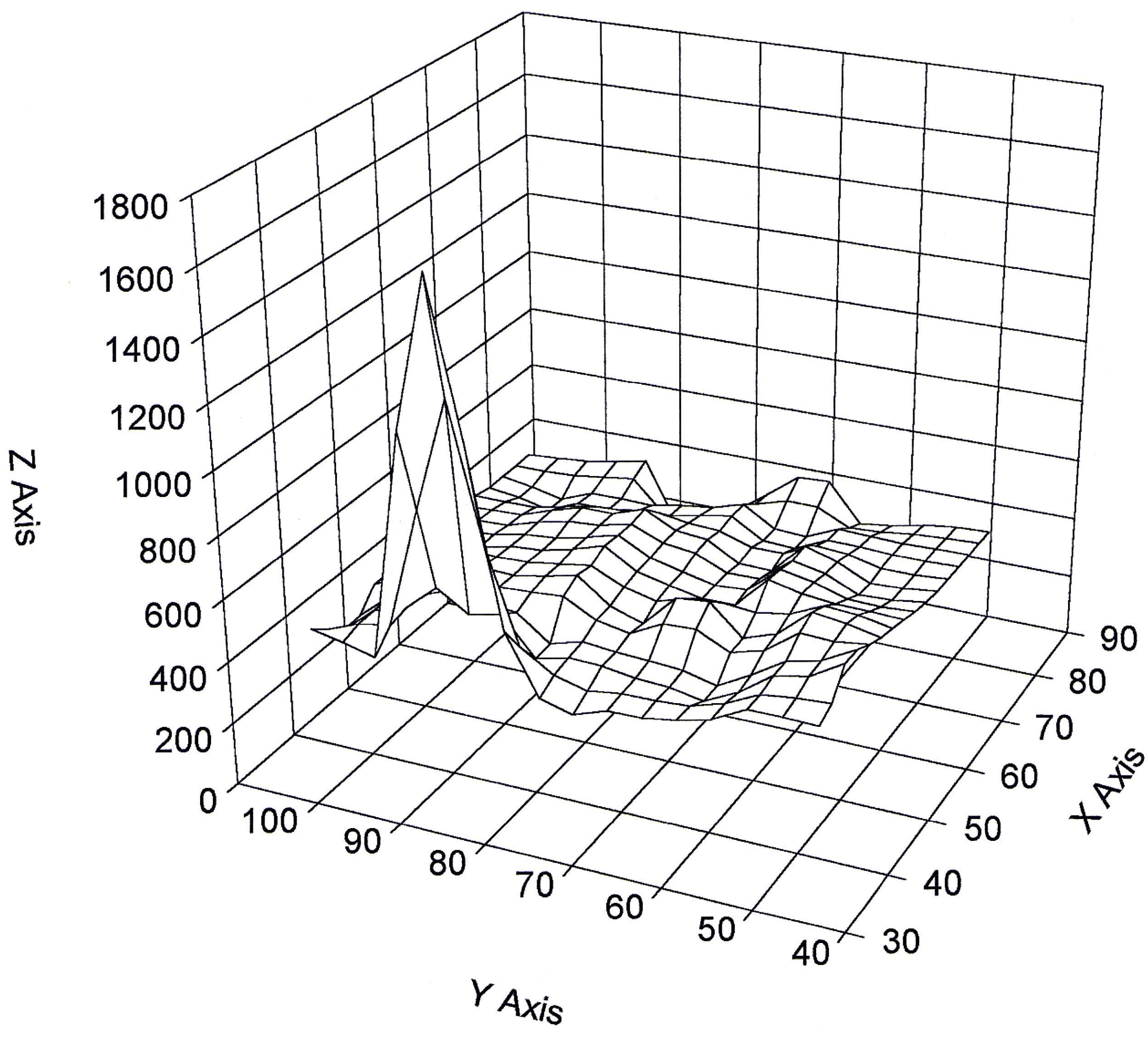

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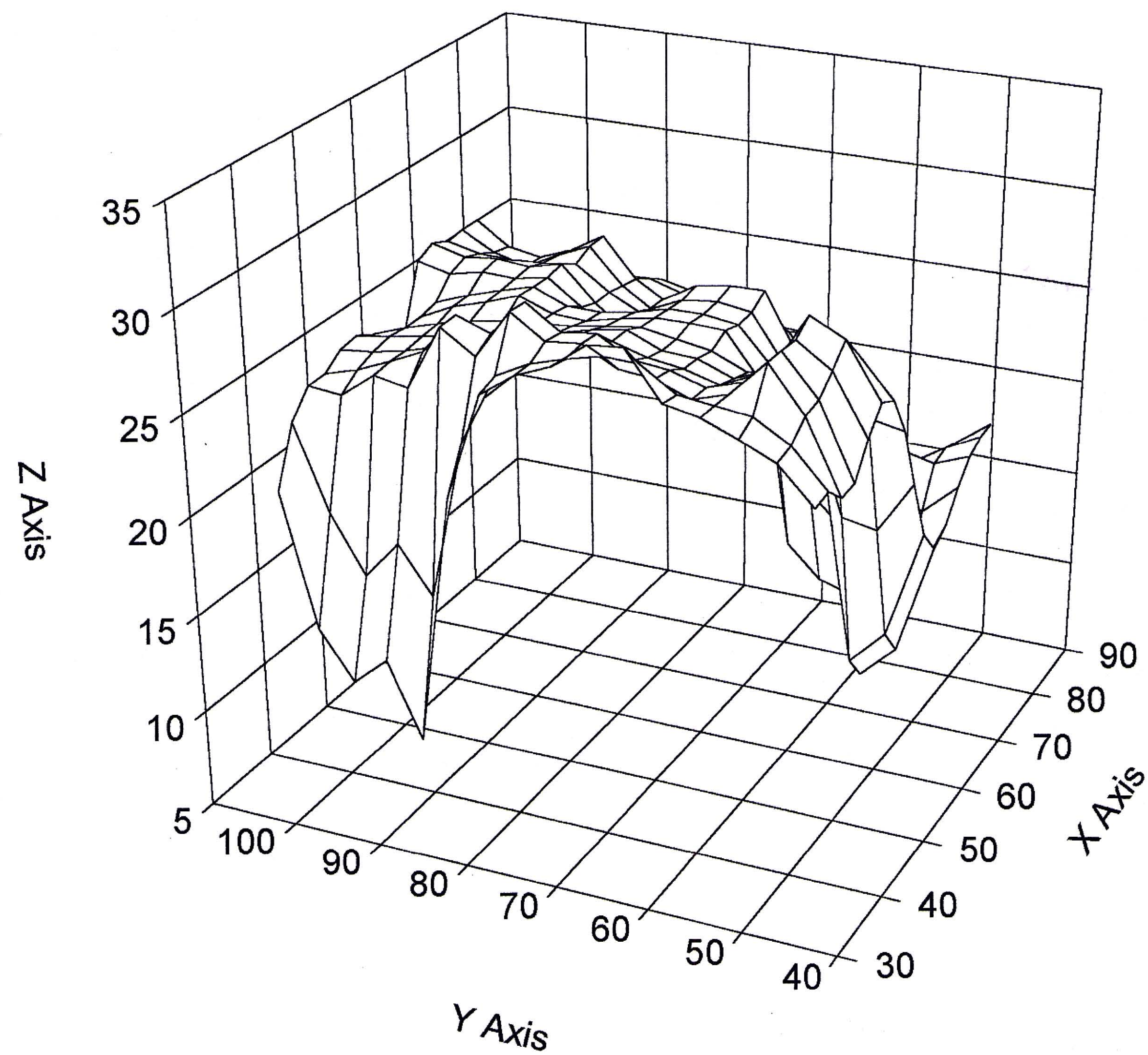

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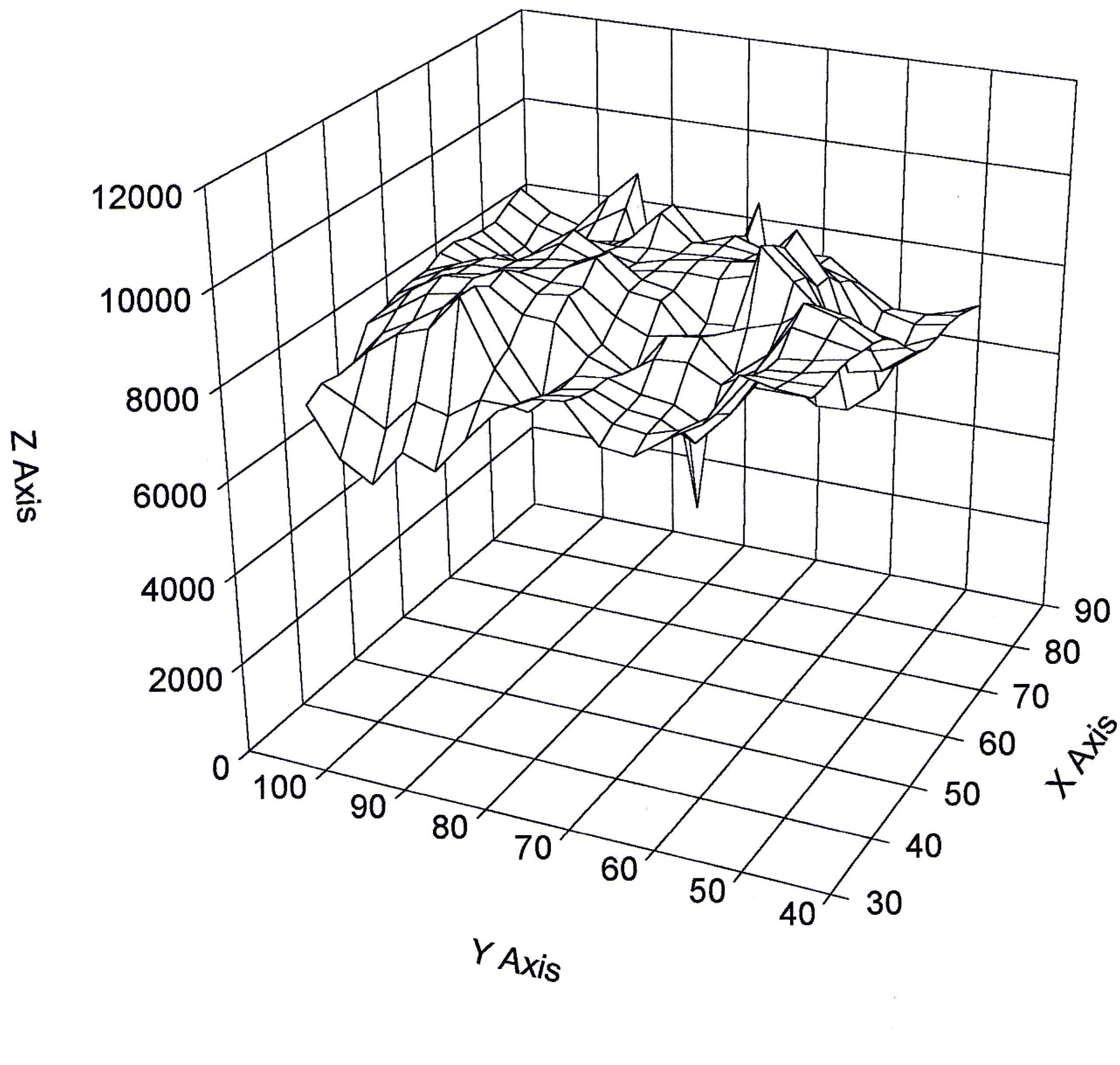

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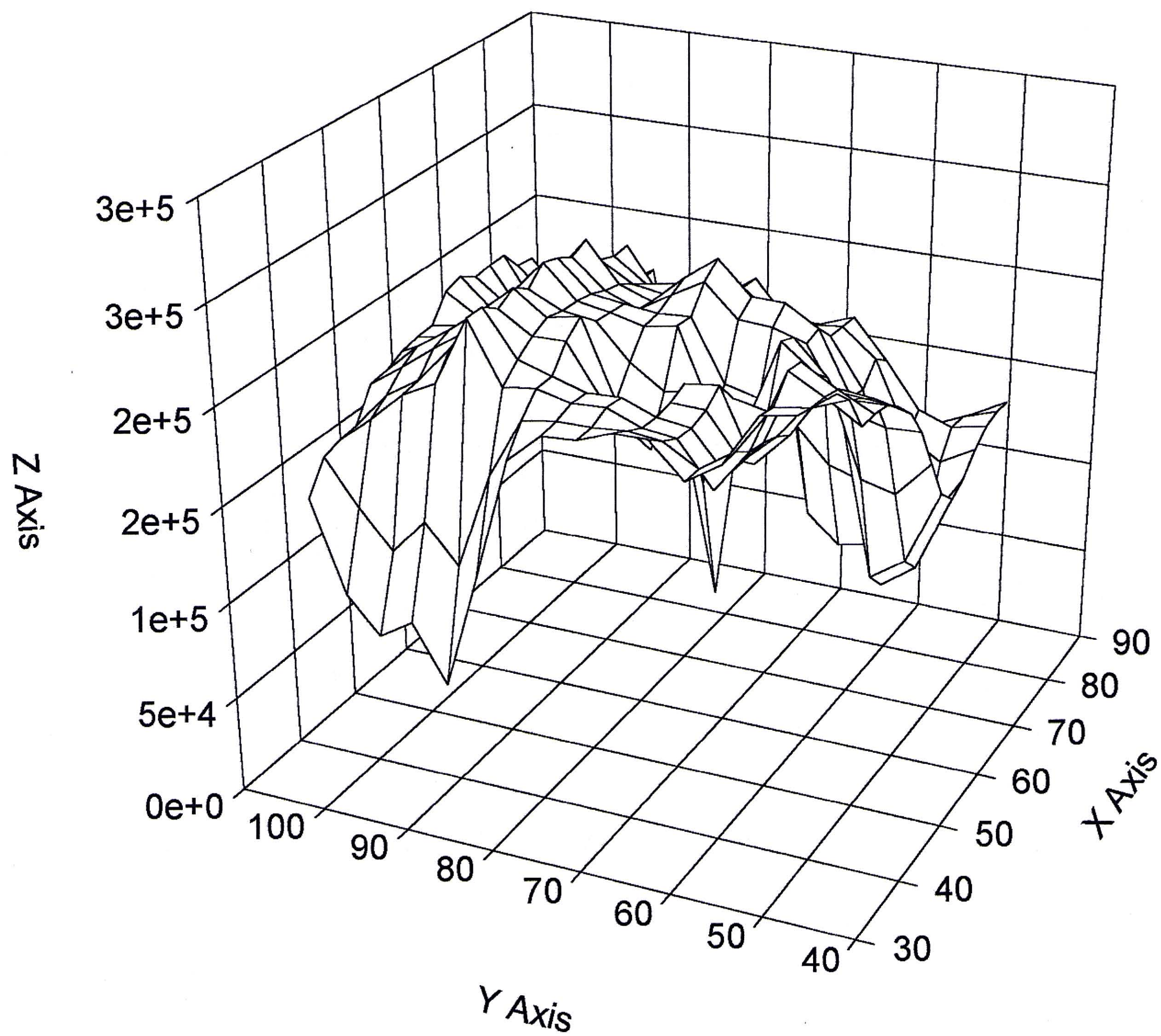

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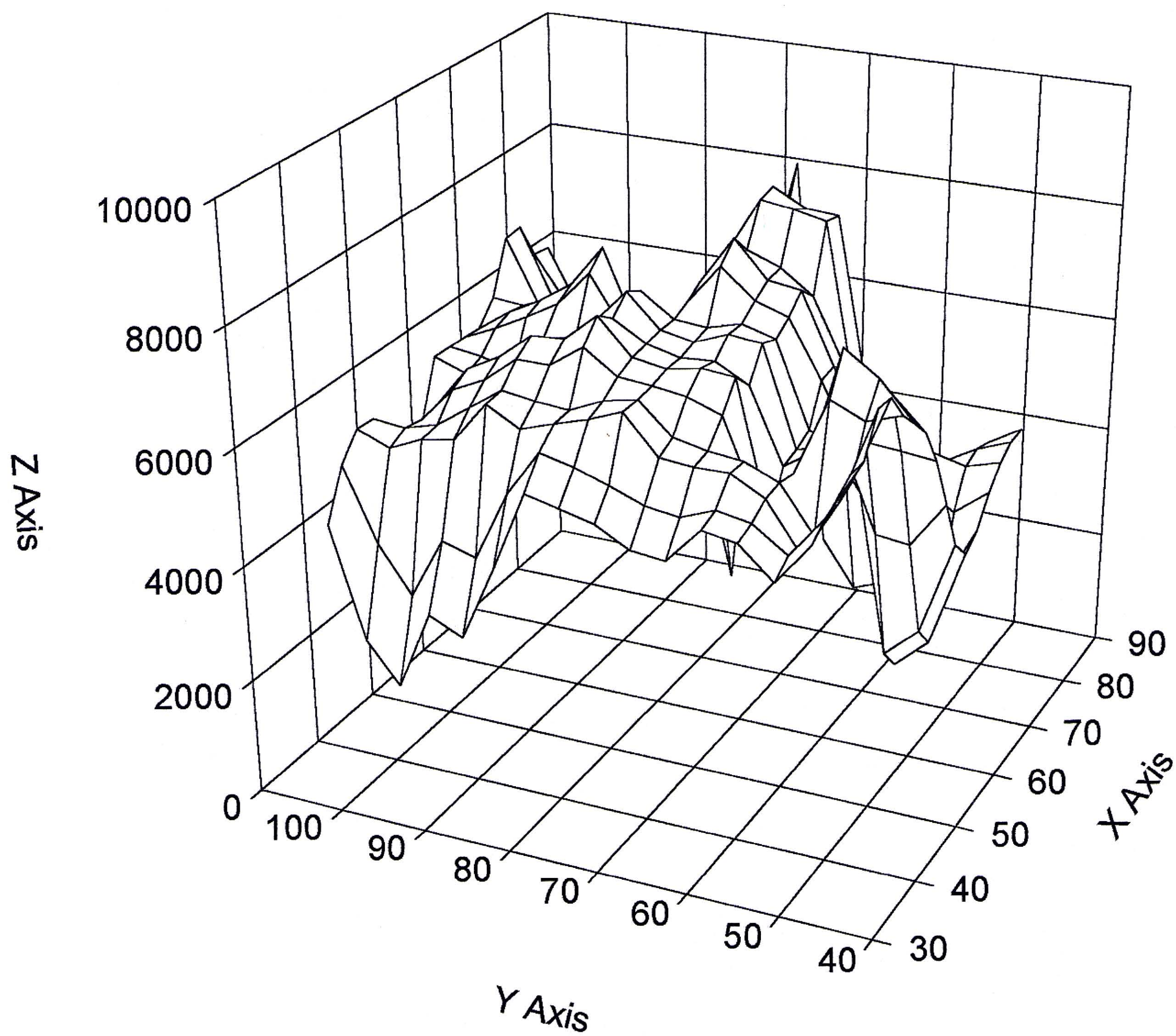

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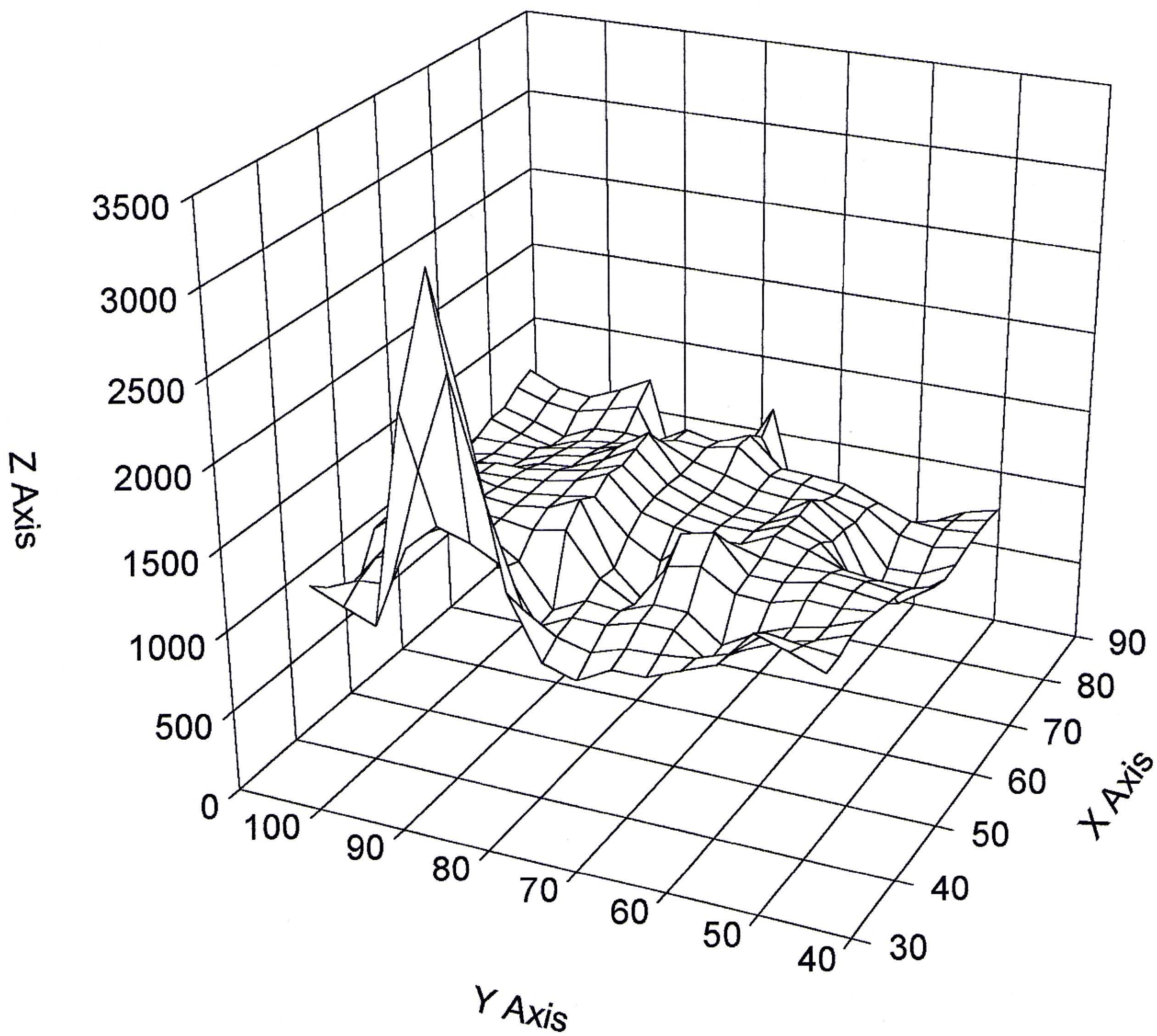

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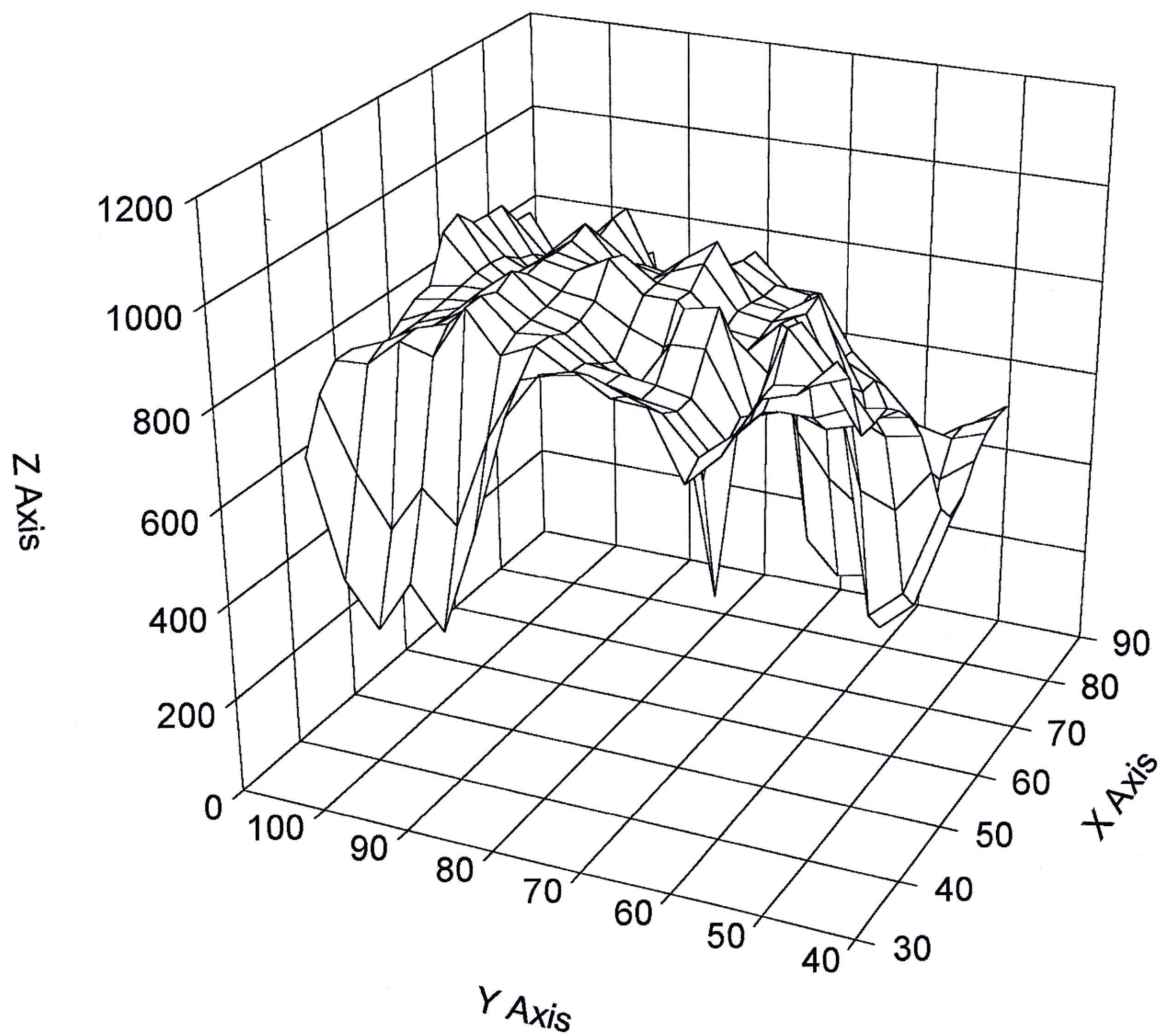

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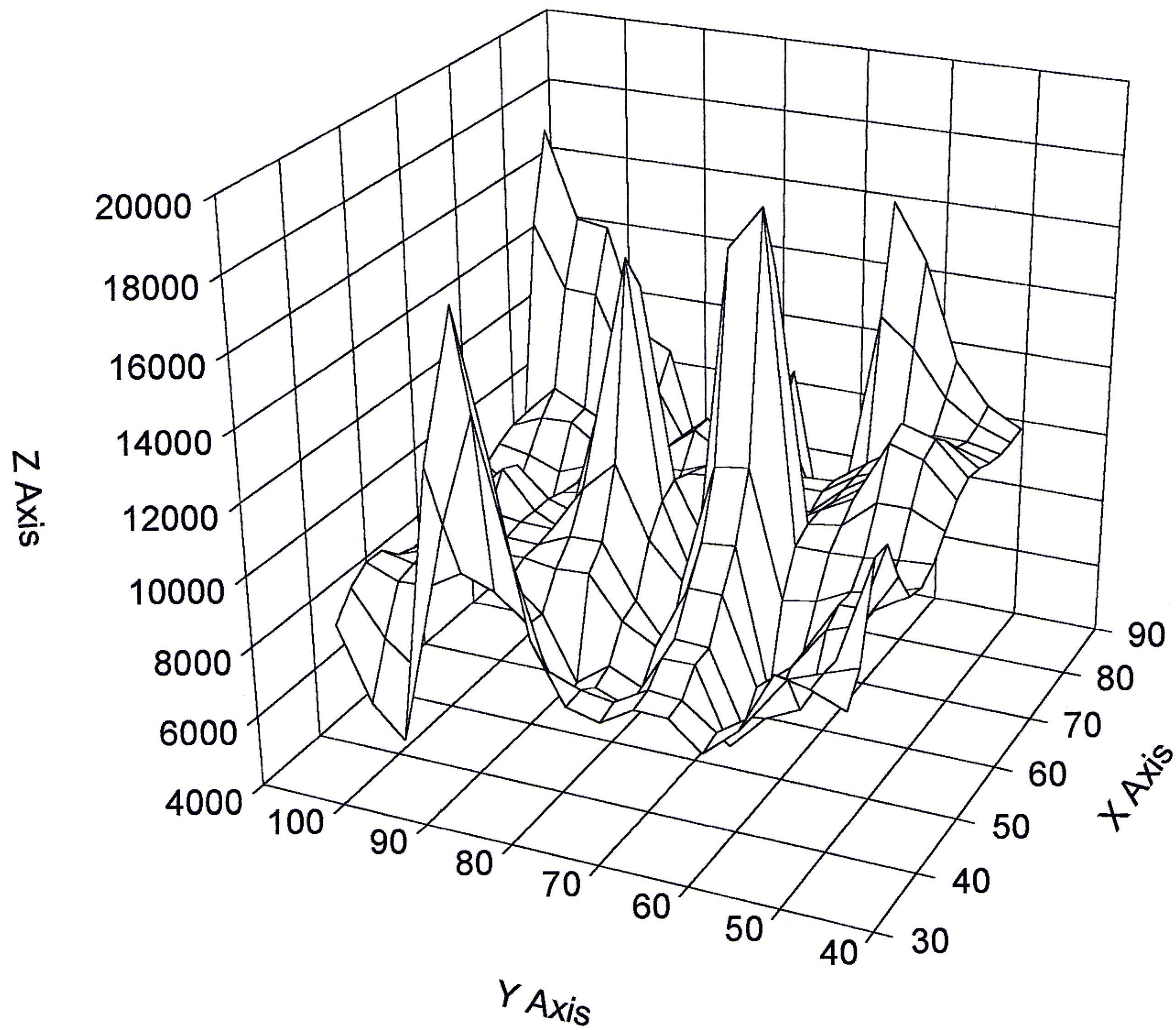

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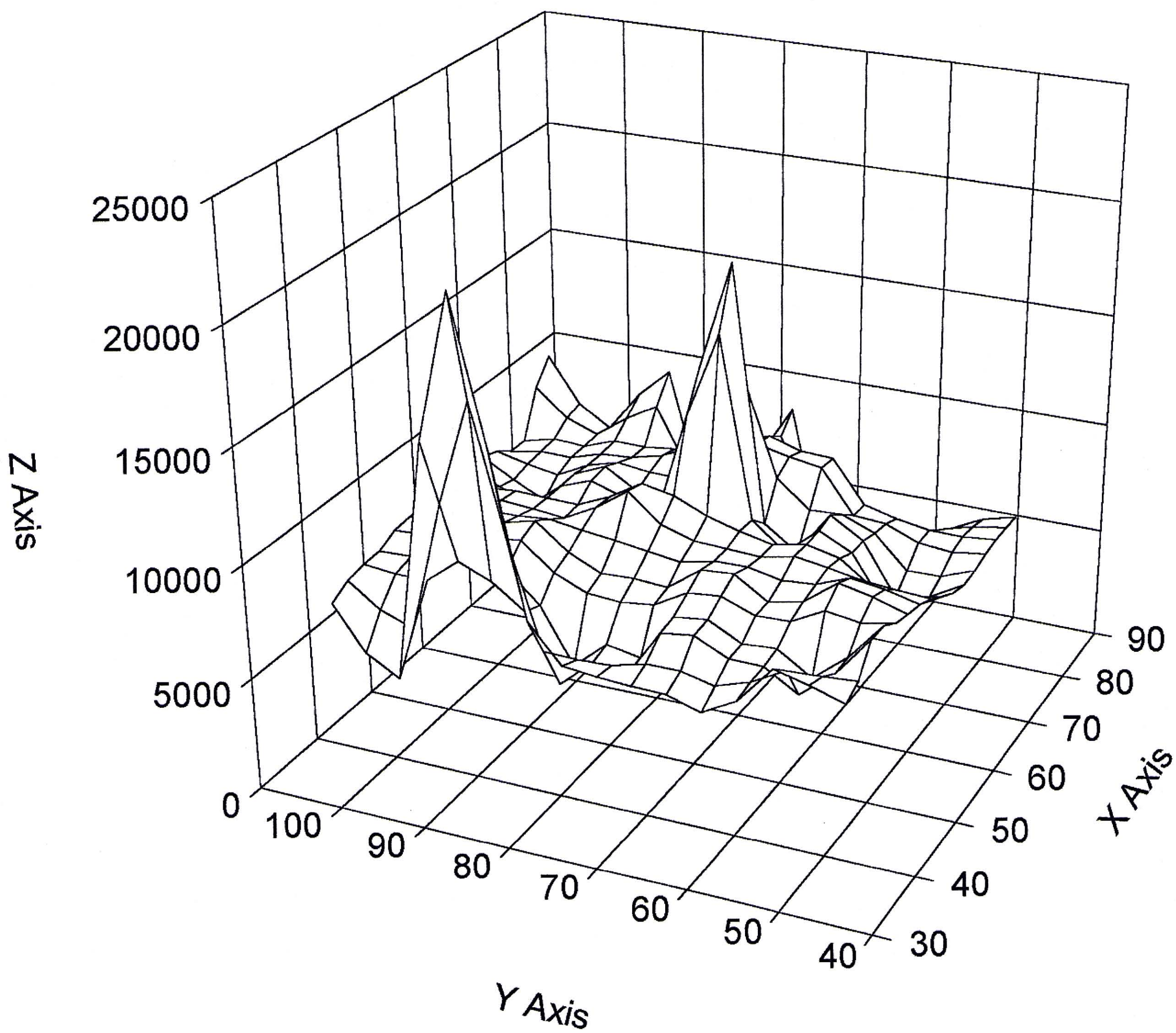

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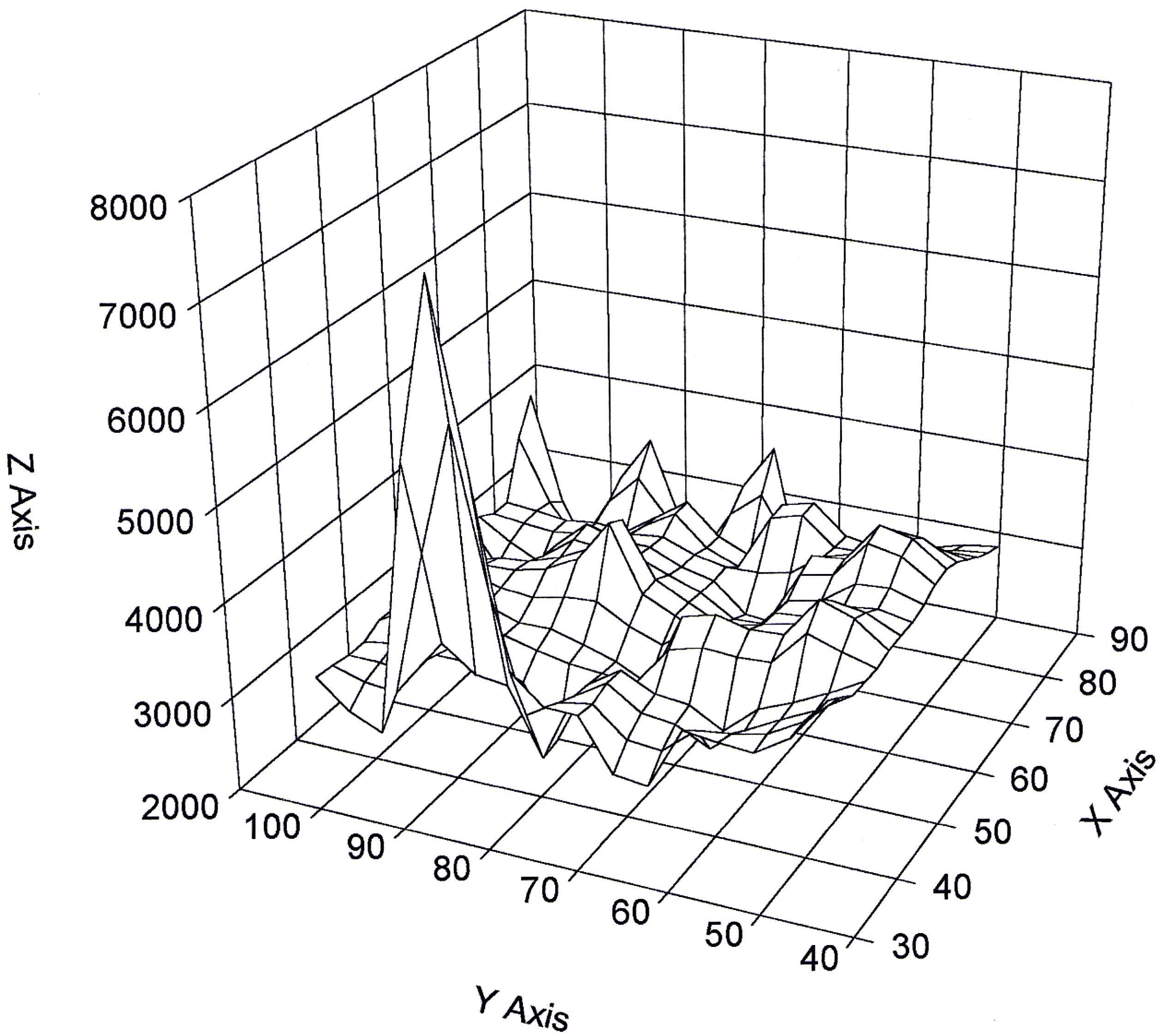
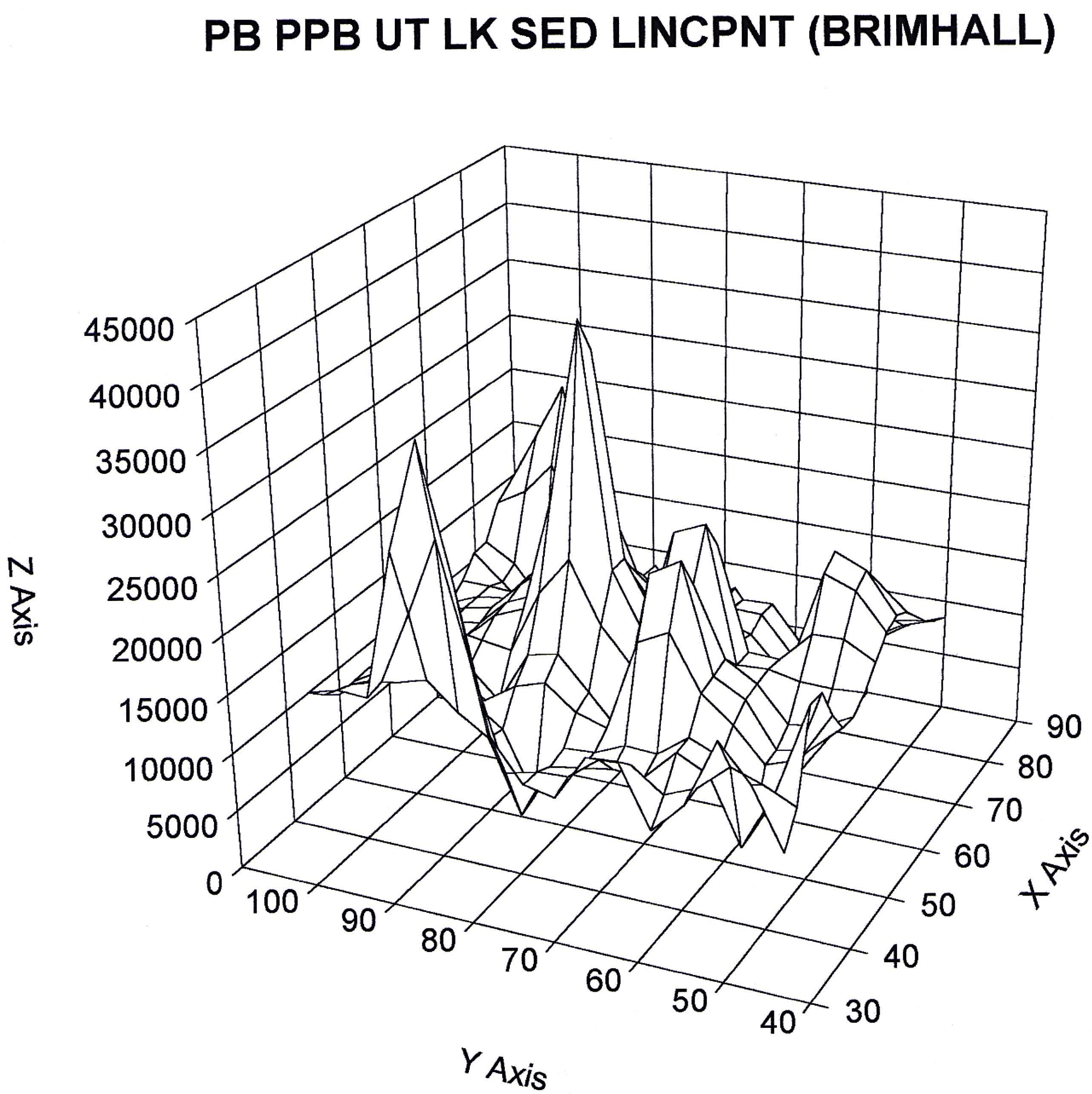
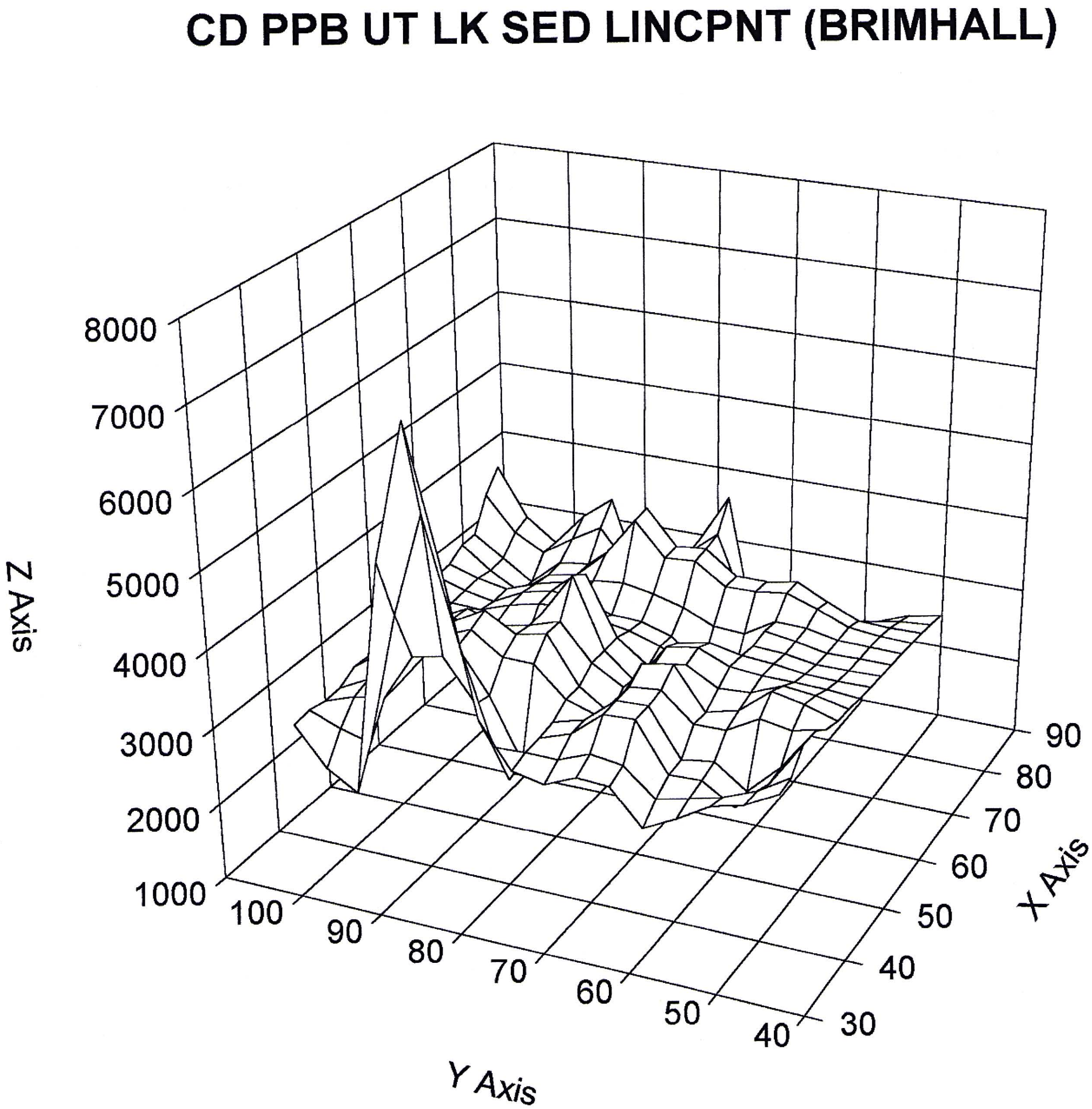



PB PPB UT LK SED LINCPNT (BRIMHALL)
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
Z Axis
100
90
80
70
60
50
40
Y Axis
90
80
70
60
50
40
30
X Axis


CD PPB UT LK SED LINCPNT (BRIMHALL)
8000
7000
6000
5000
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Z Axis
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Y Axis
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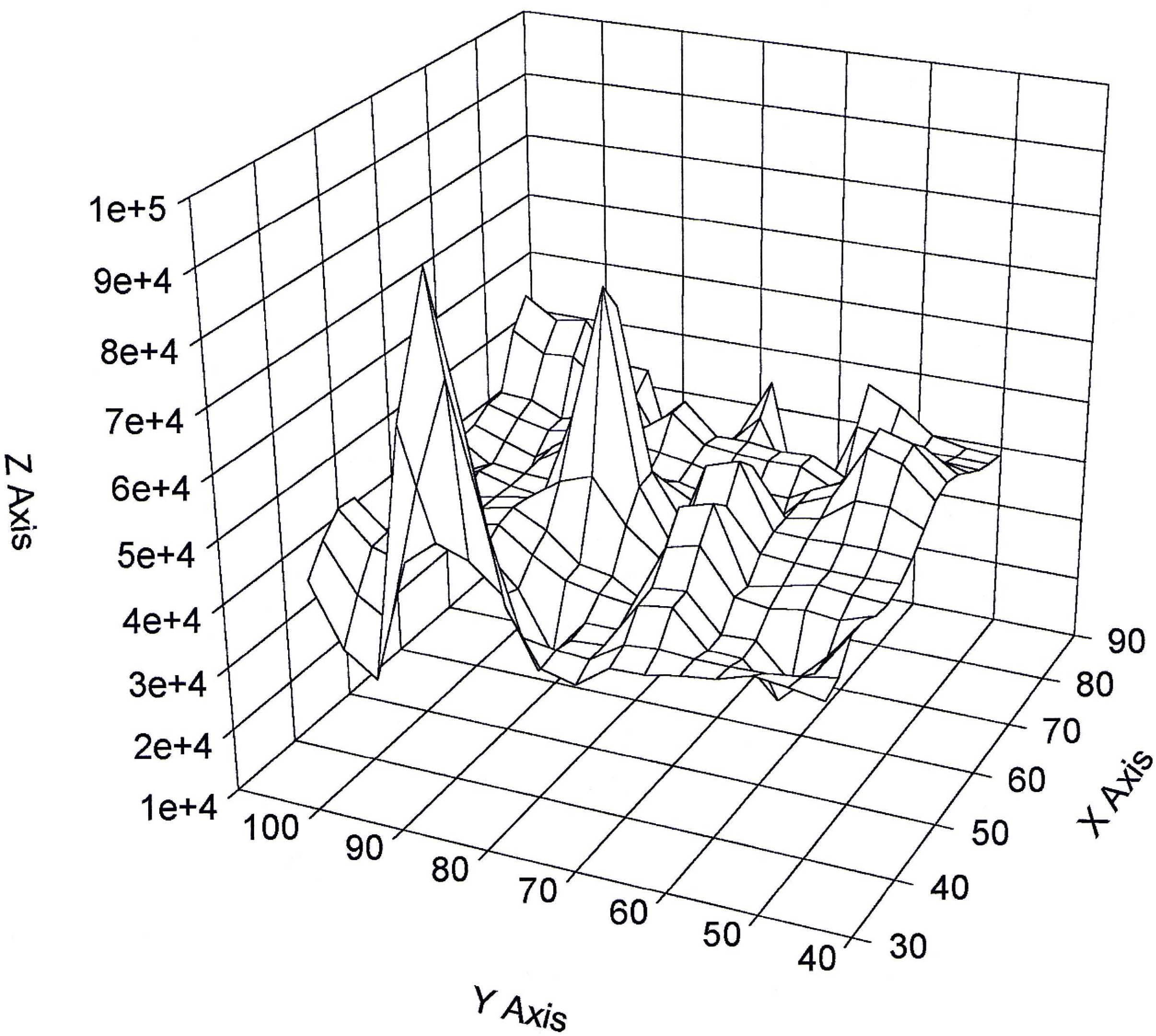
X Axis

ZN PPB UT LK SED LINCPNT (BRIMHALL)



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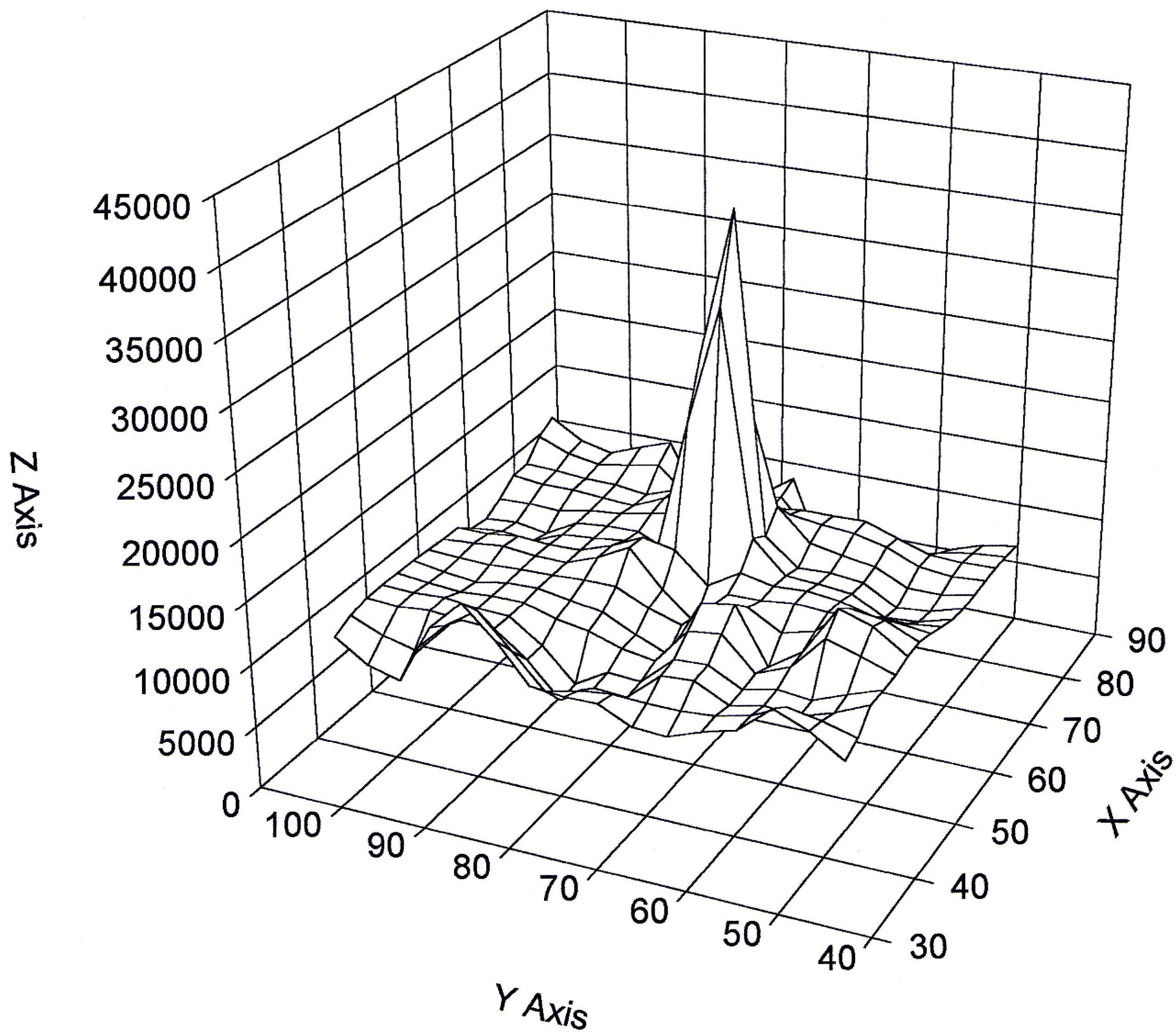

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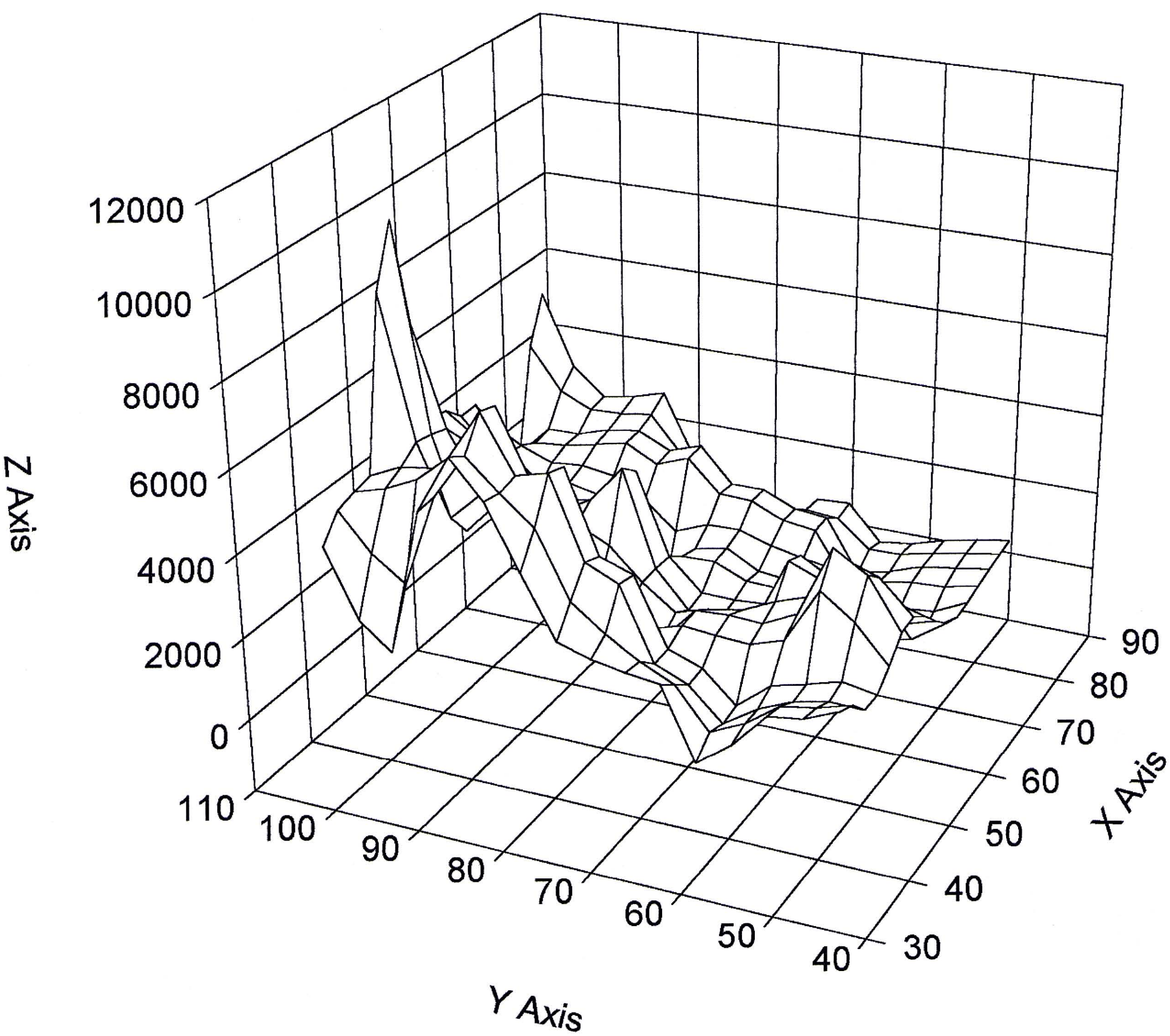
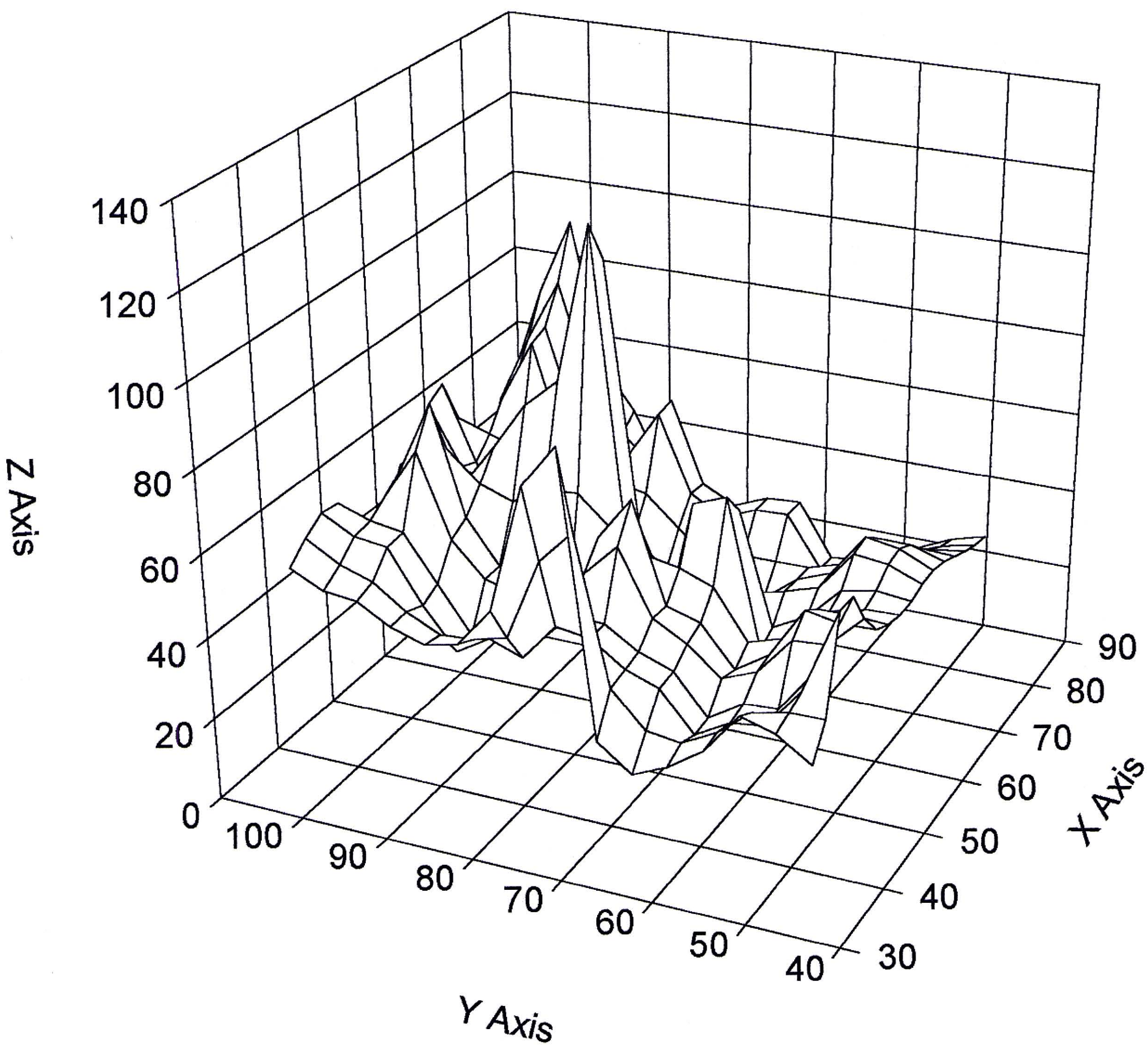


HG PPB UT LK SED LINCPT (BRIMHALL)



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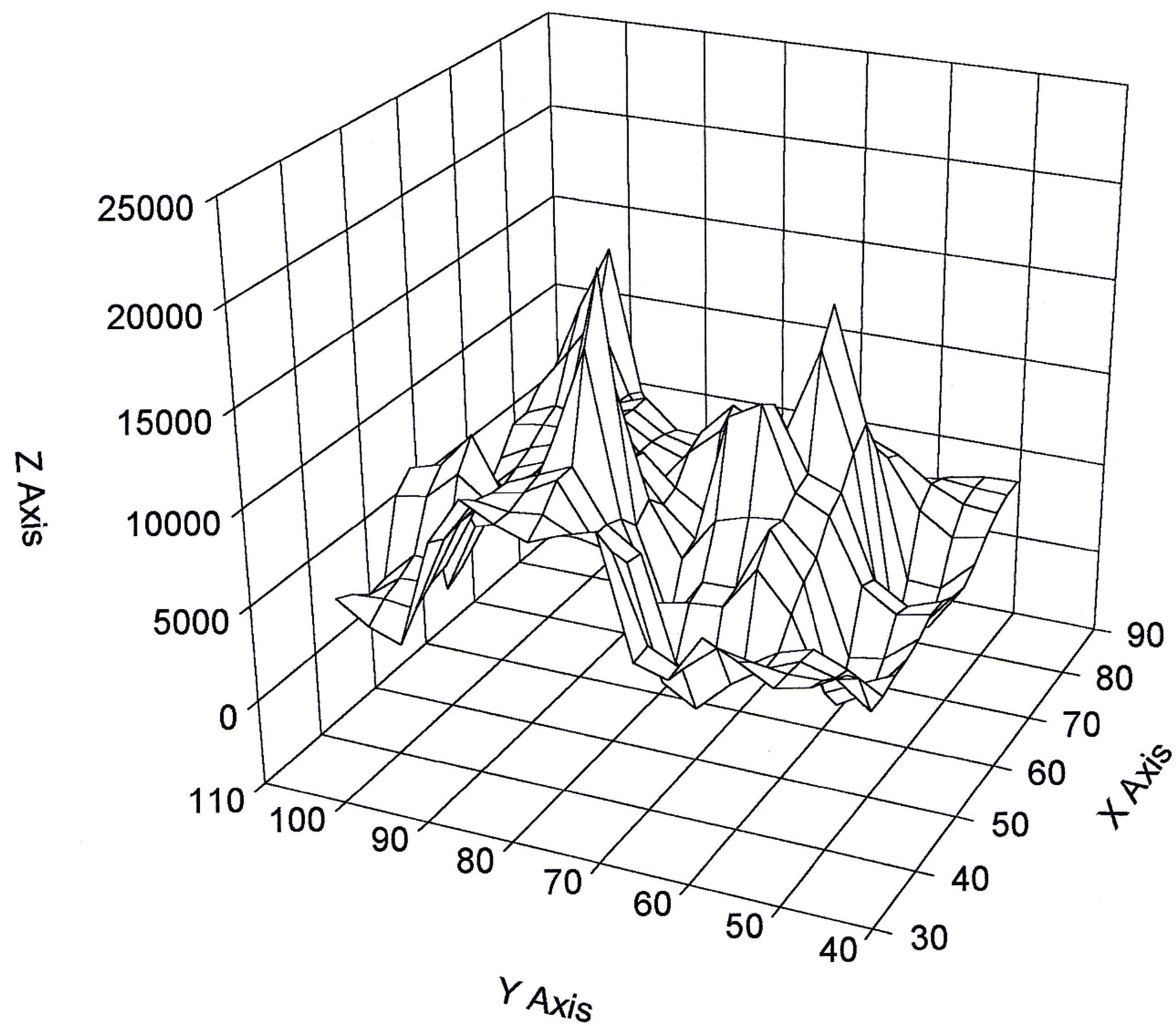

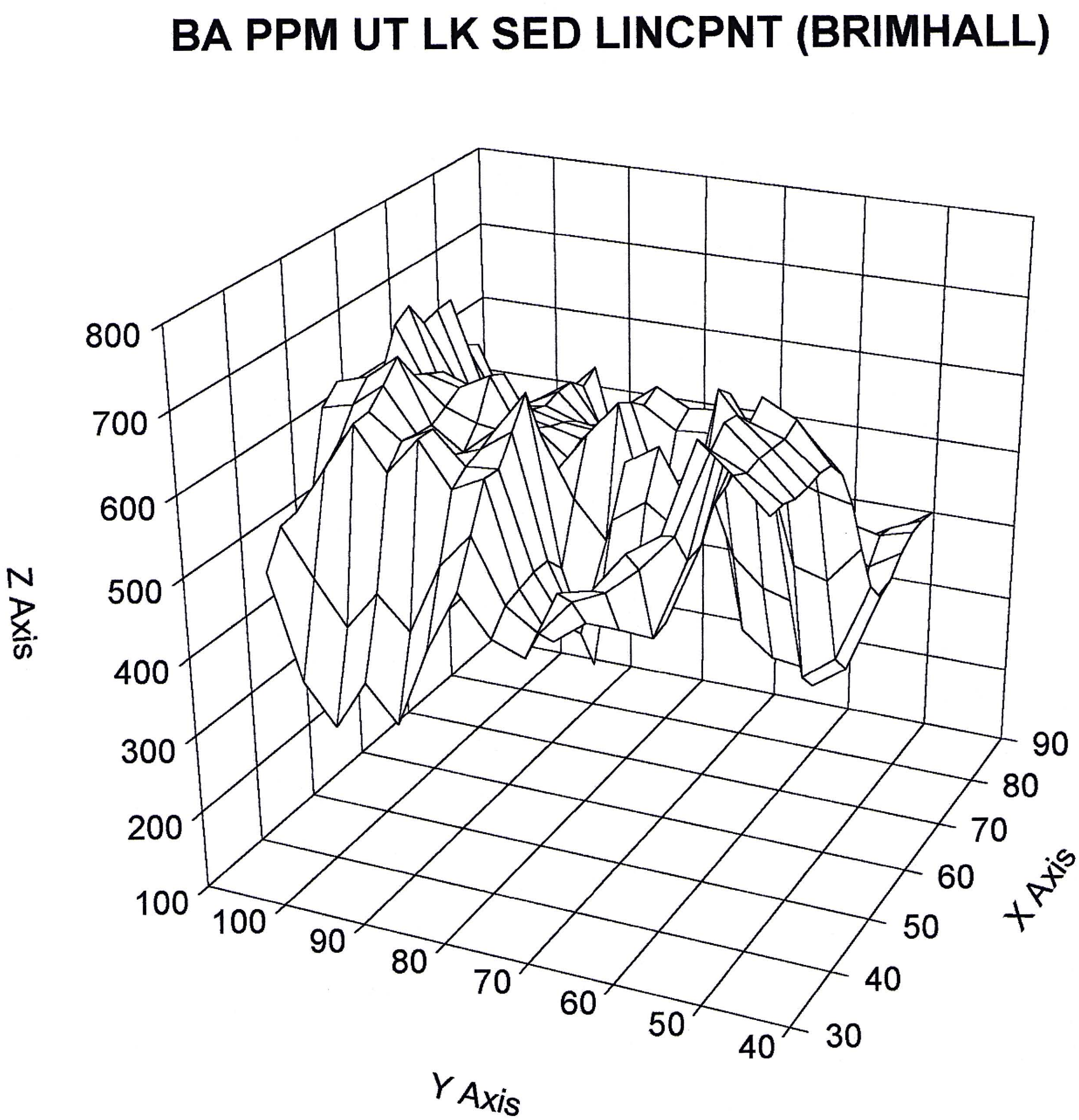
BA PPM UT LK SED LINCPNT (BRIMHALL)
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Y Axis
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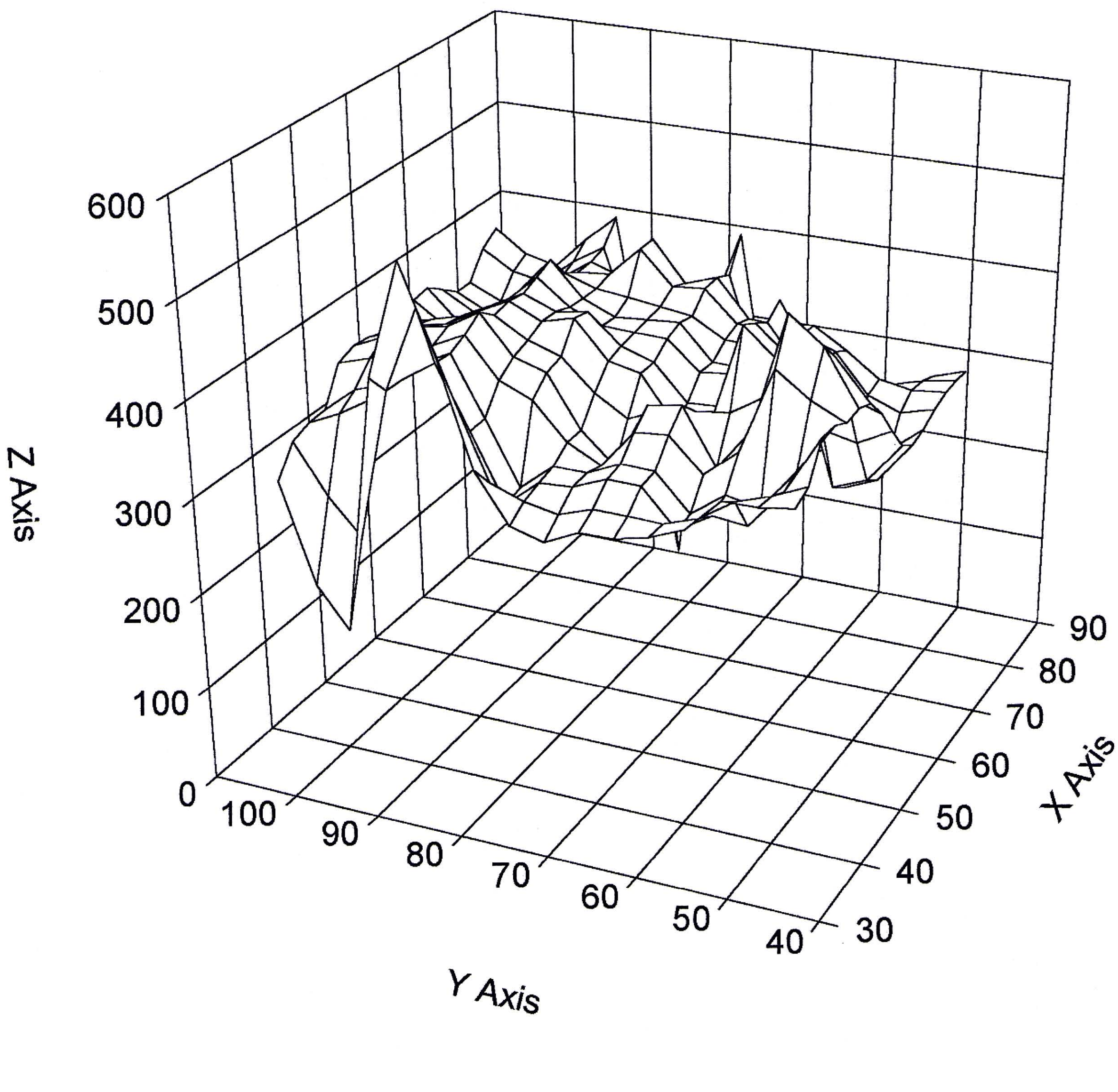
X Axis

MN PPM UT LK SED LINCPNT (BRIMHALL)



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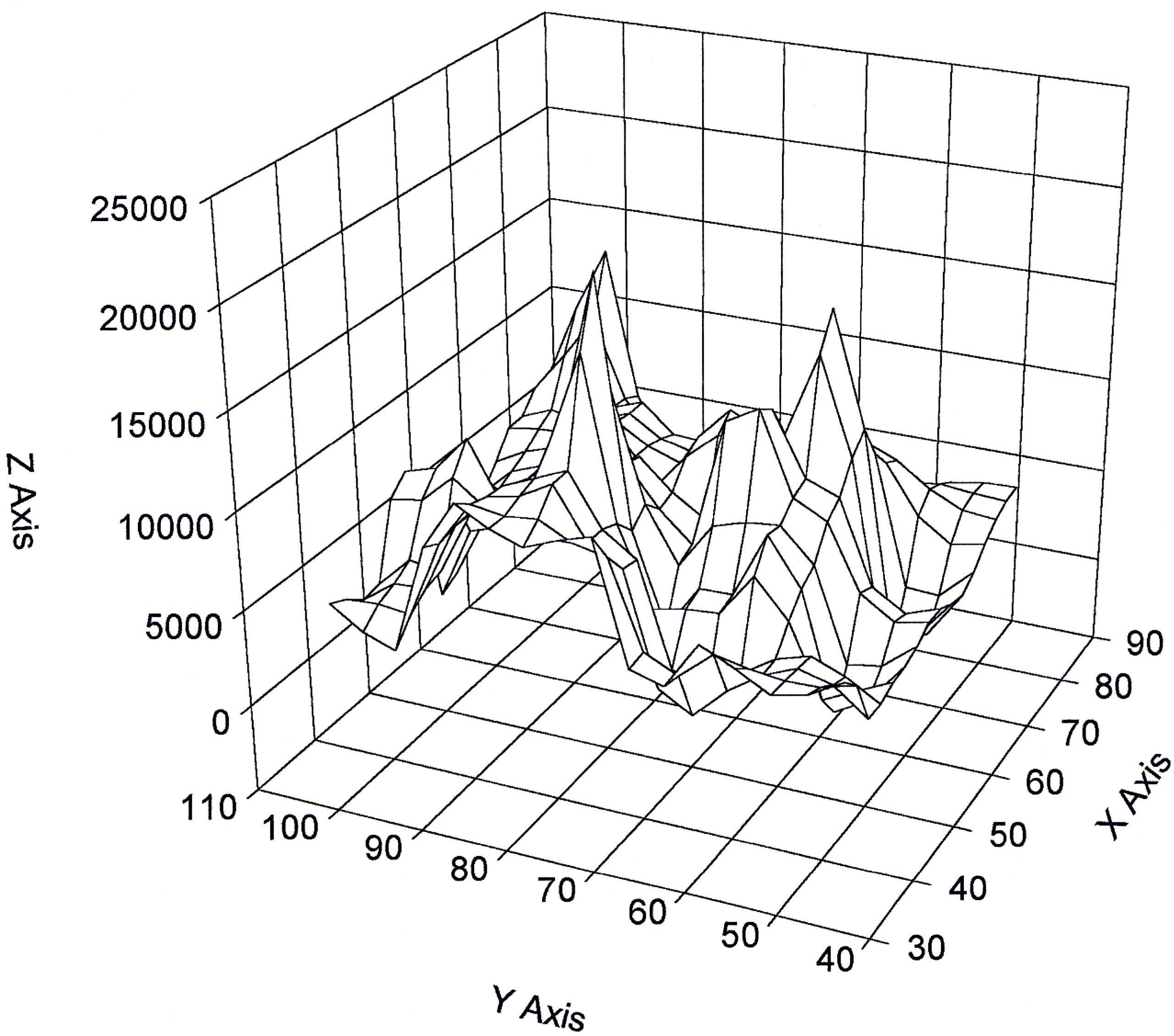

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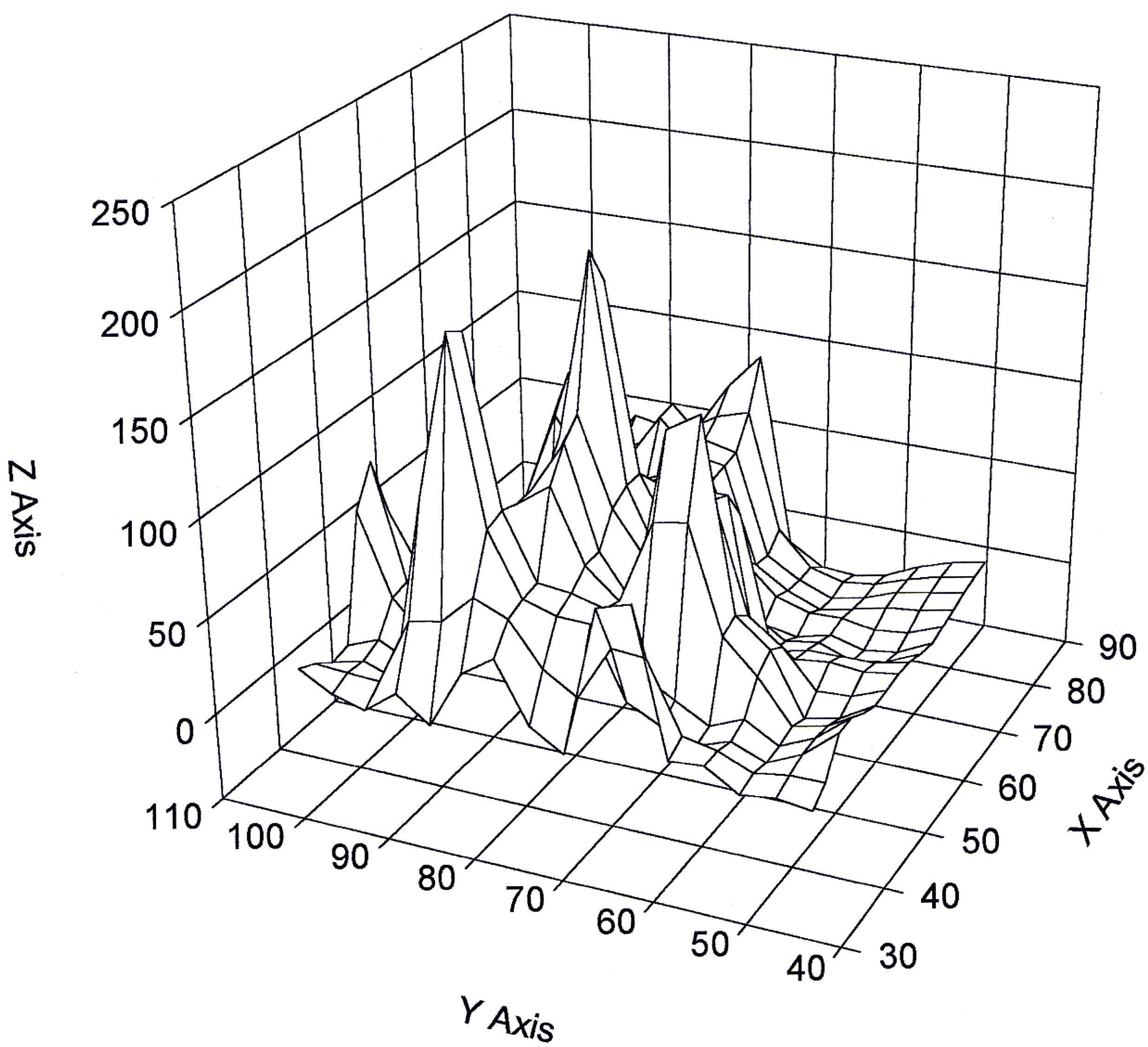
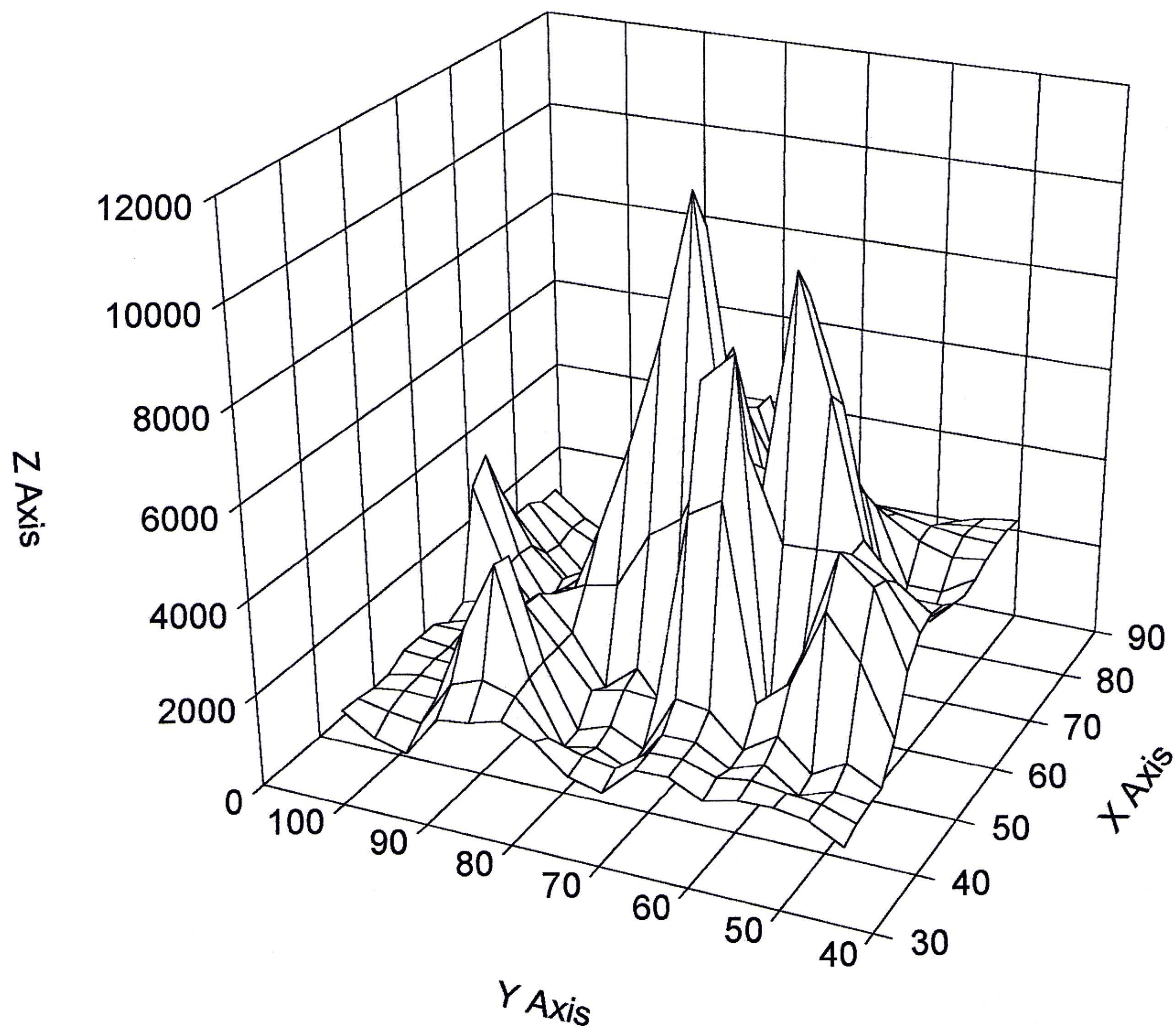
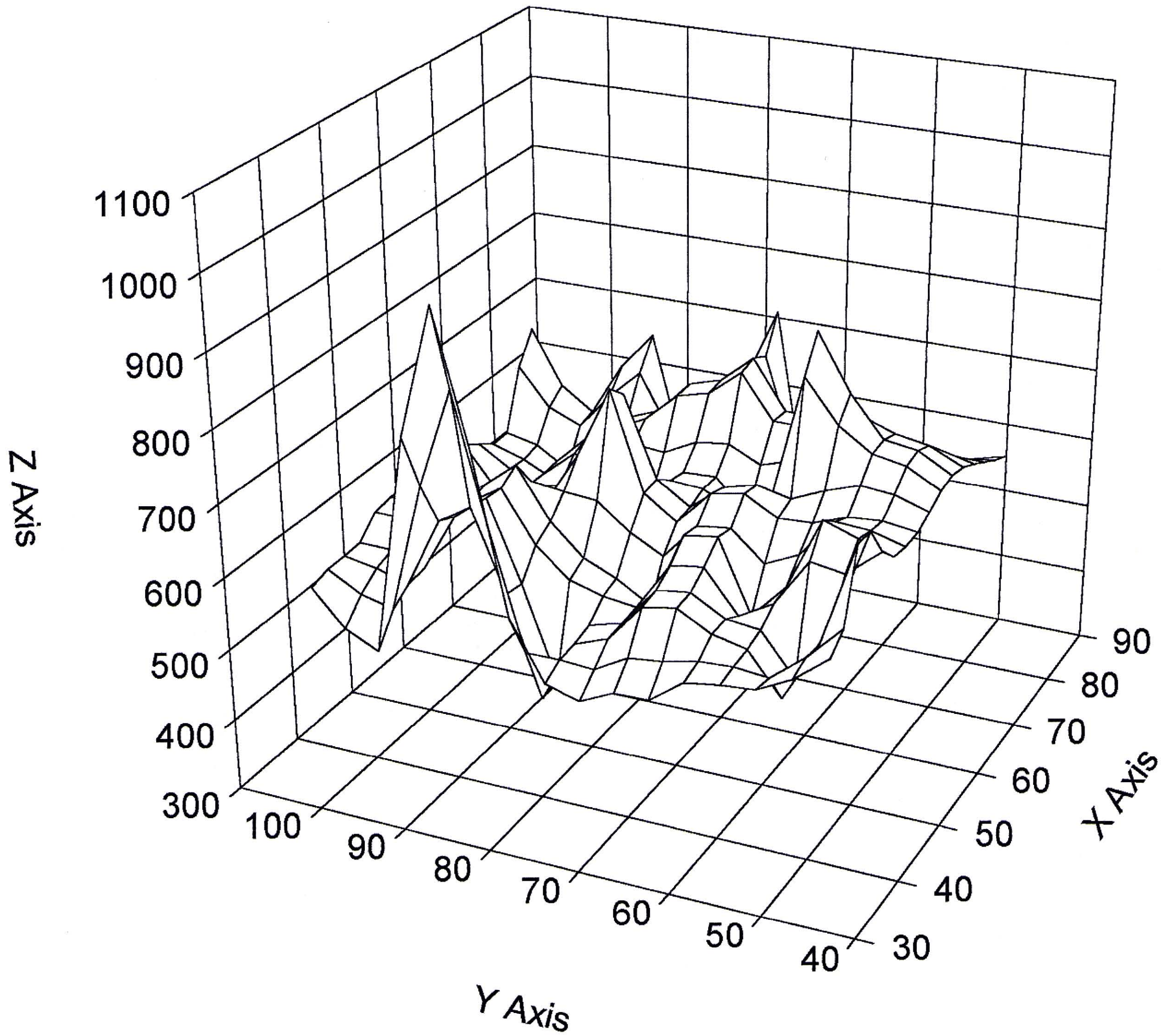


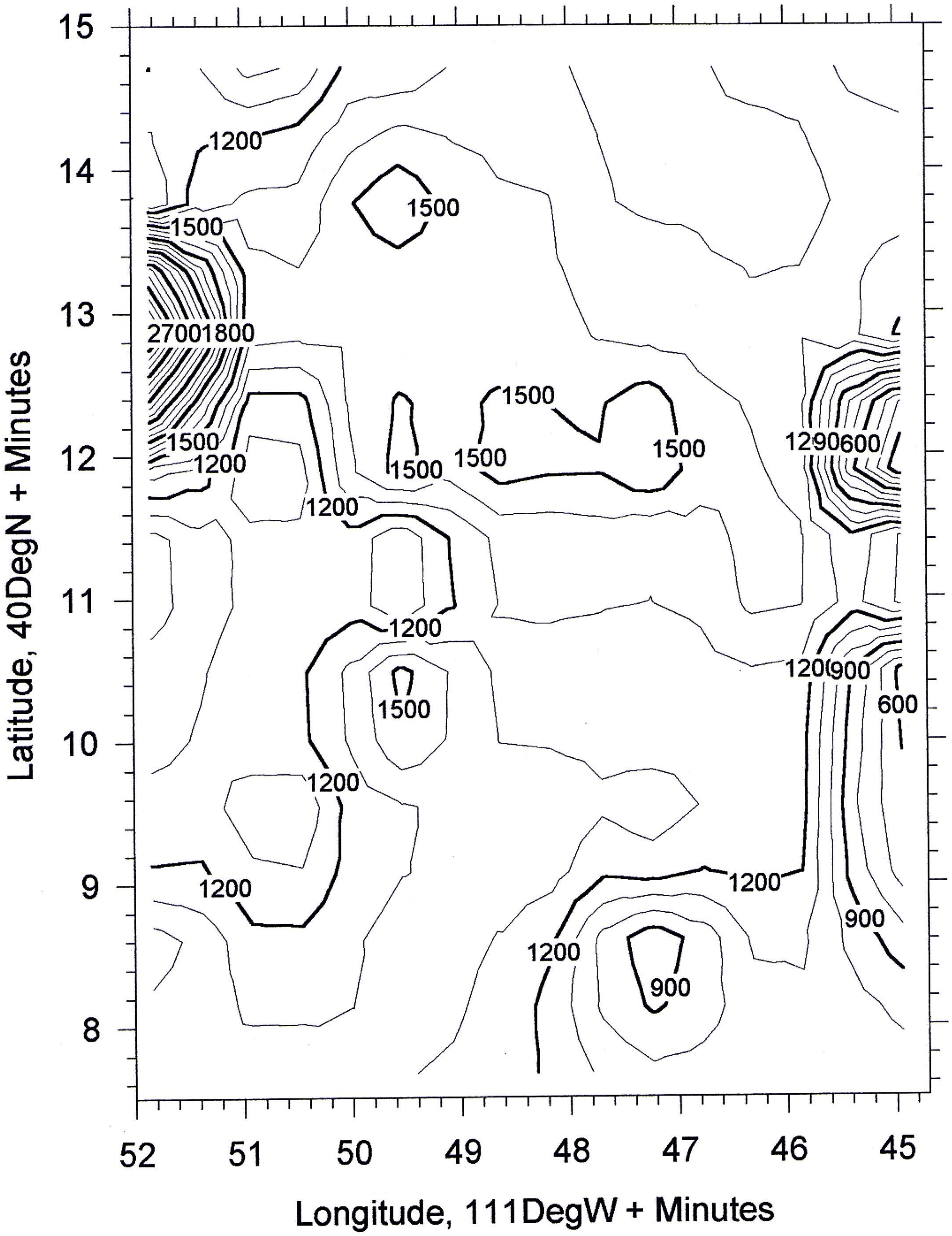
AUPPB UT LK SED LINCPT (BRIMHALL)



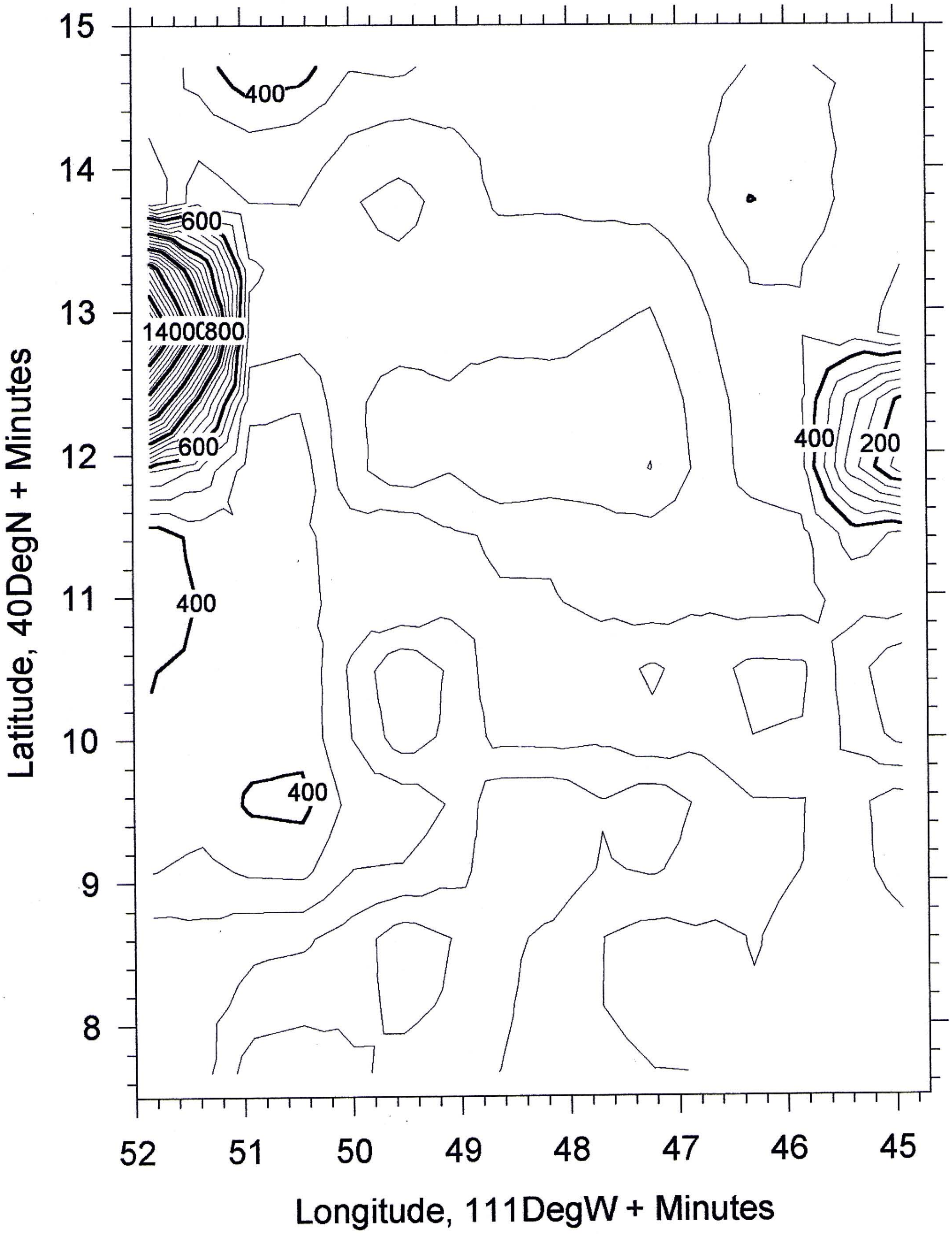
P PPM UT LK SED LINCPNT (BRIMHALL)



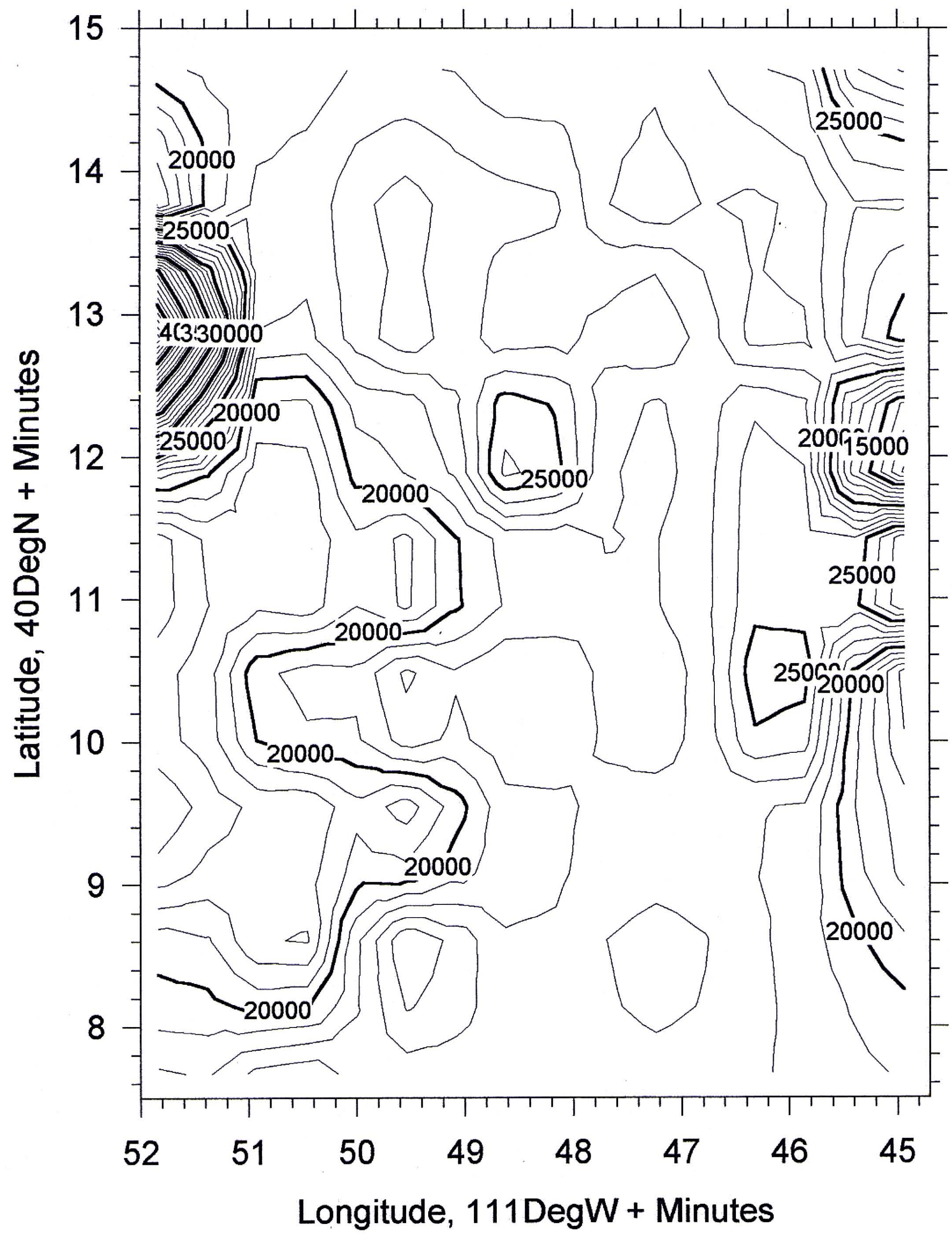
K ppm. Utah Lake Sediments. Lincoln Point Quadrangle



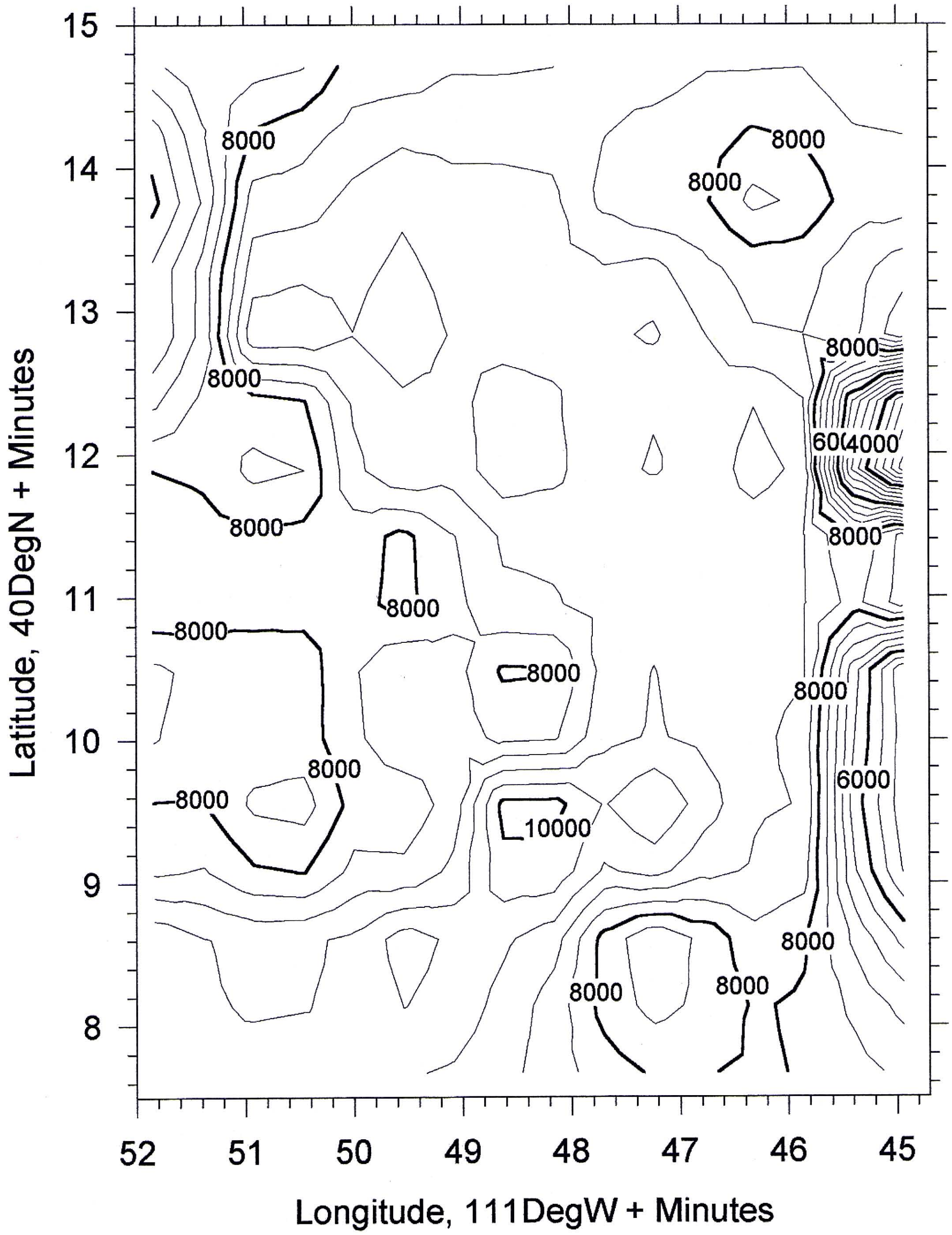
Na ppm. Utah Lake Sediments, Lincoln Point Quadrangle



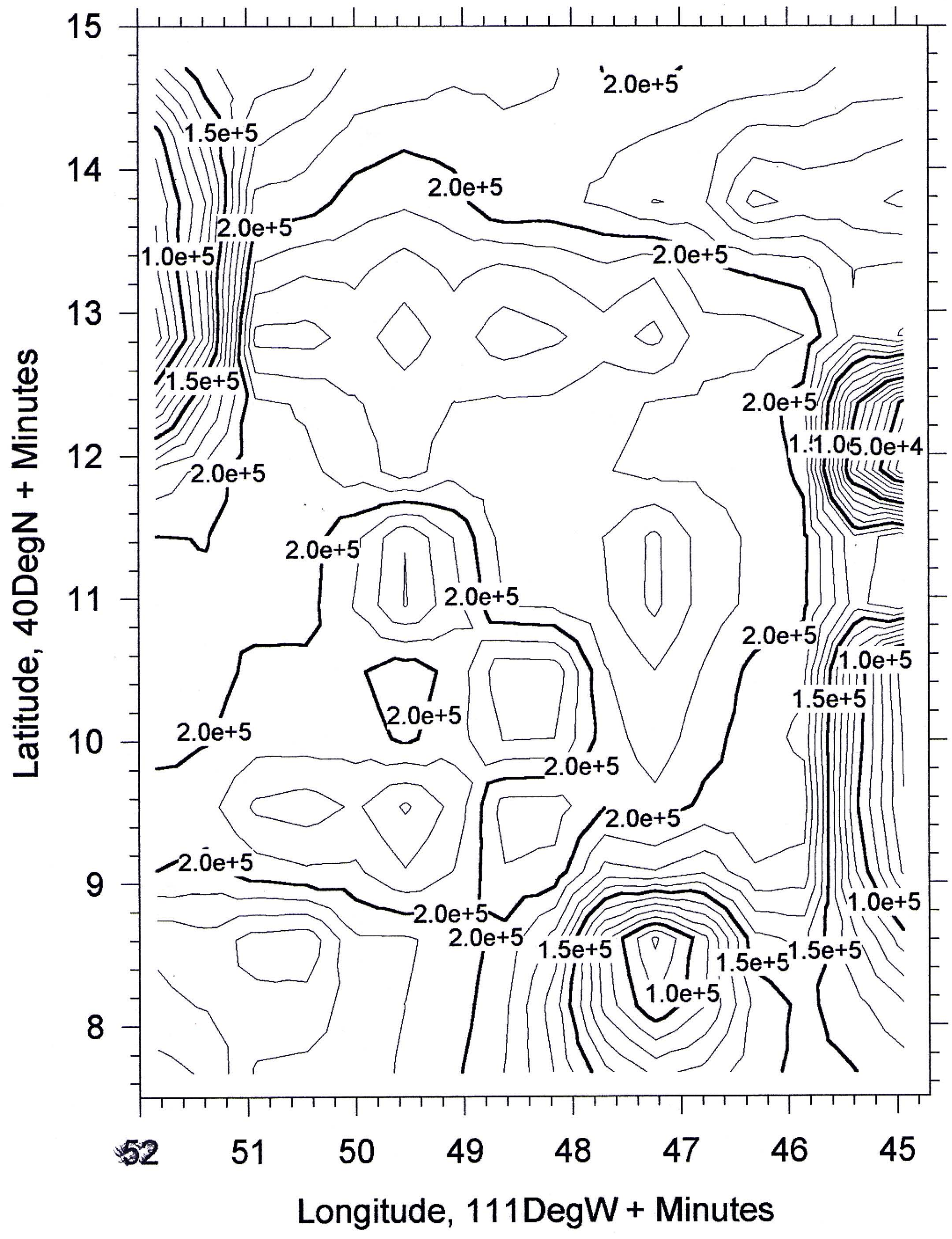
Fe ppm. Utah Lake Sediments, Lincoln Point



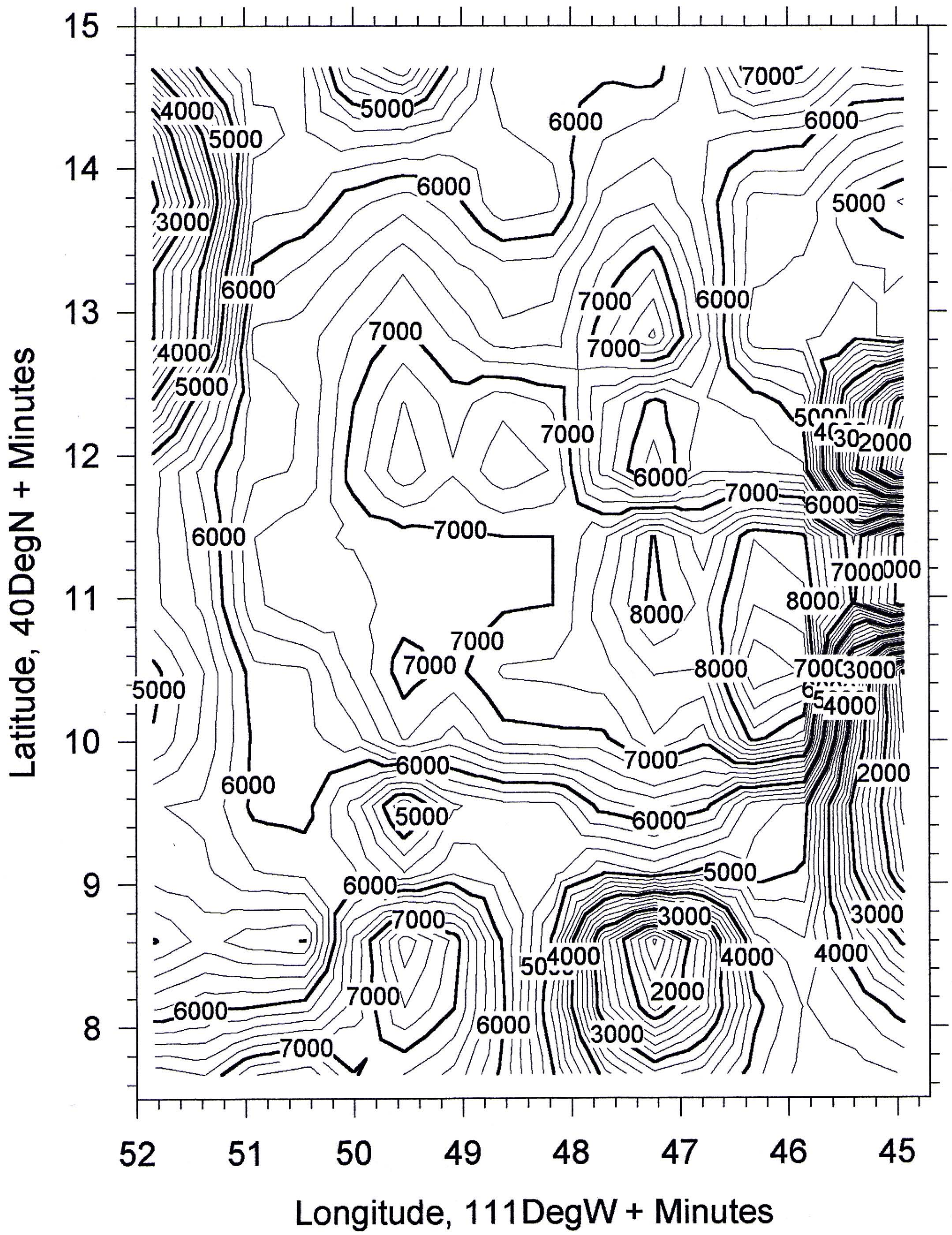
Mg ppm. Utah Lake Sediments, Lincoln Point



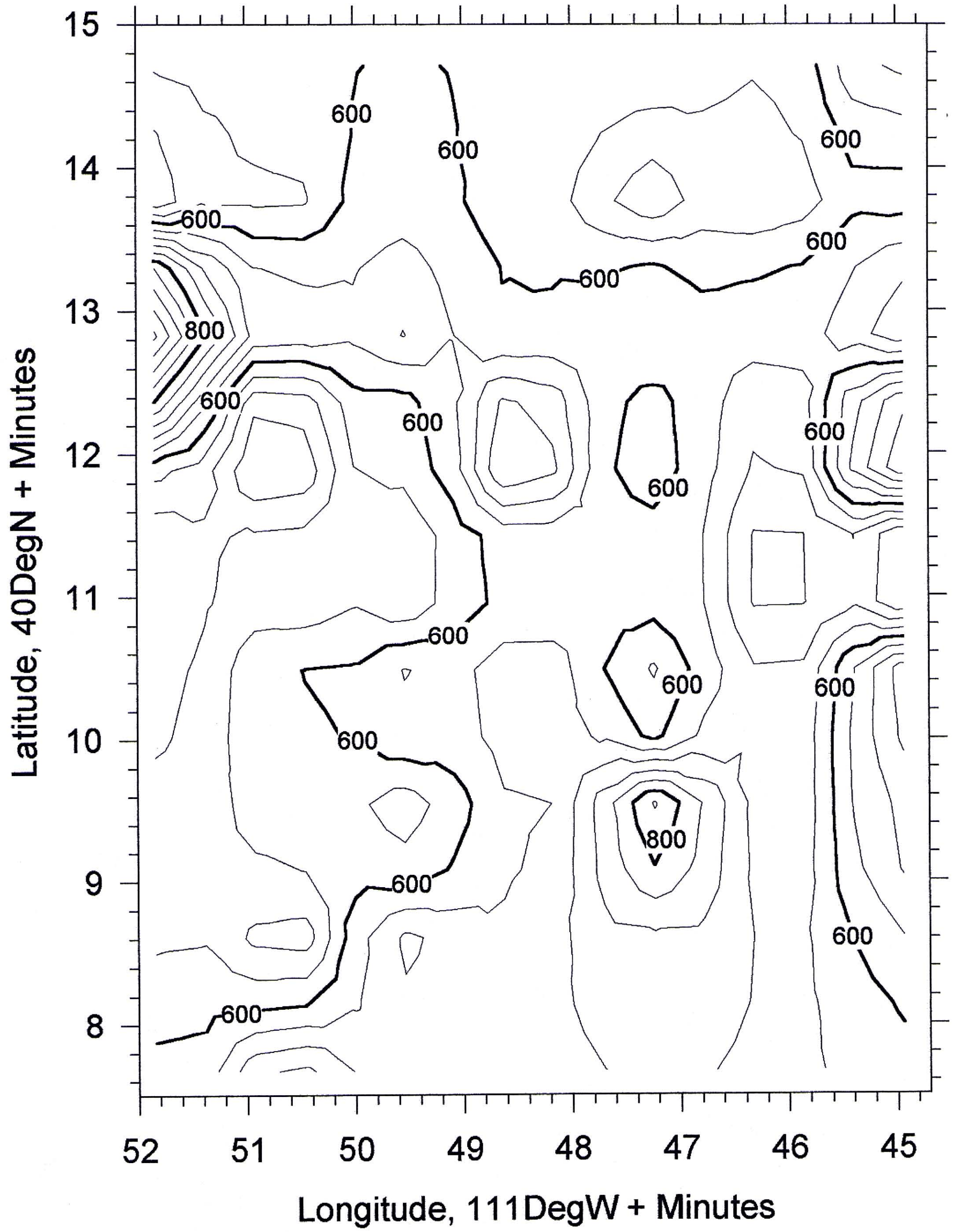
Ca ppm. Utah Lake Sediments, Lincoln Point



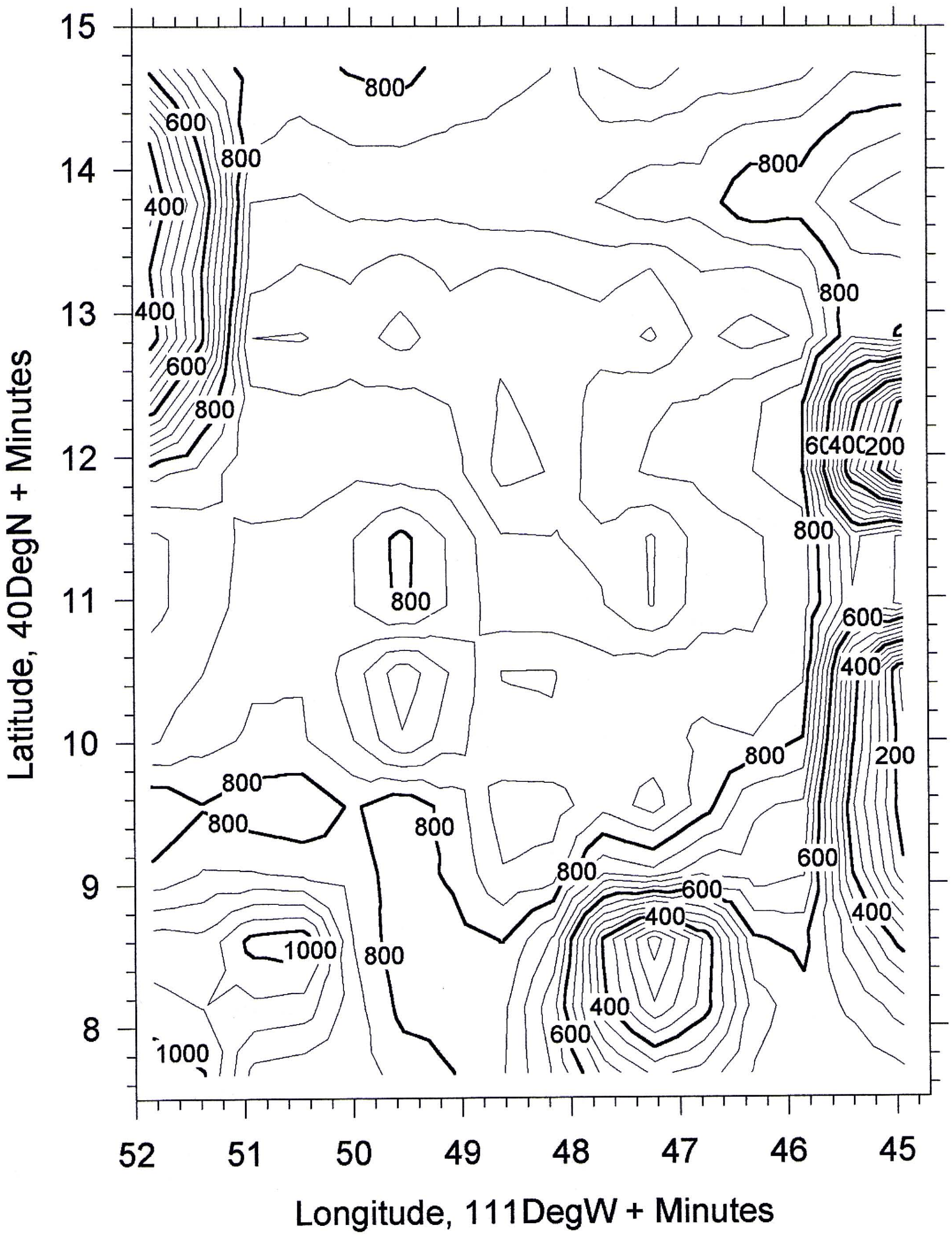
S ppm. Utah Lake Sediments, Lincoln Point Quadrangle



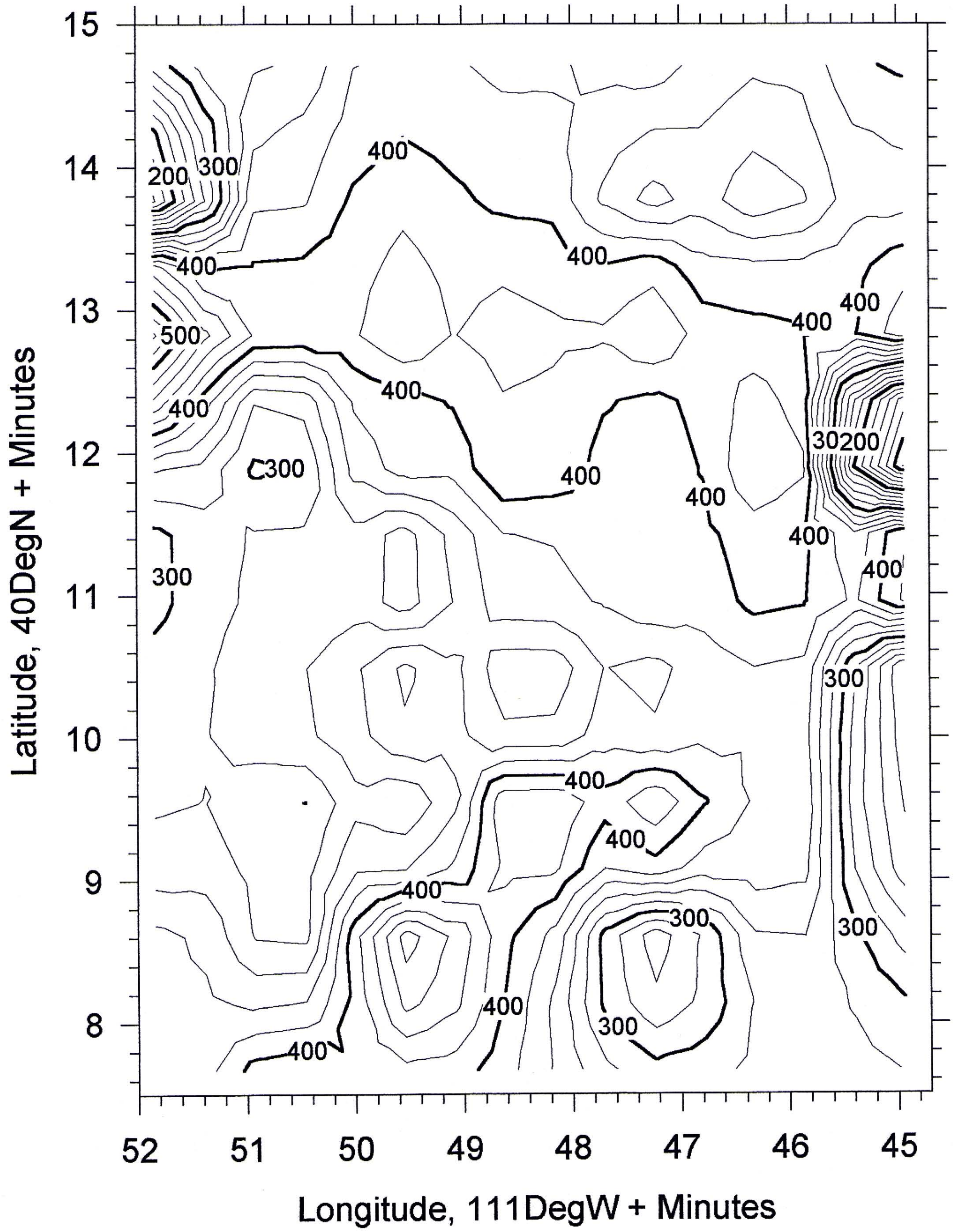
P ppm. Utah Lake Sediments, Lincoln Point Quadrangle



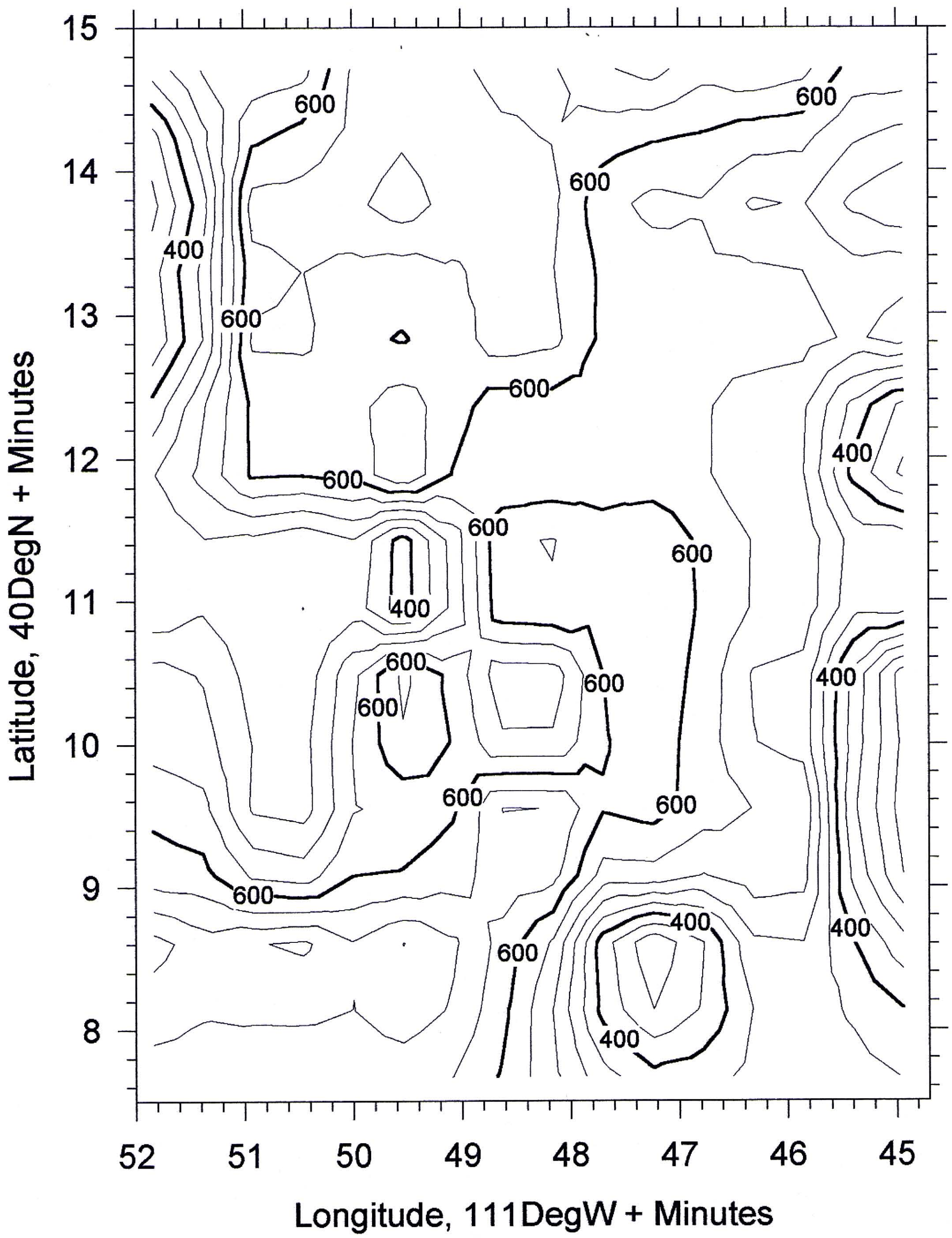
Sr ppm. Utah Lake Sediments, Lincoln Point Quadrangle



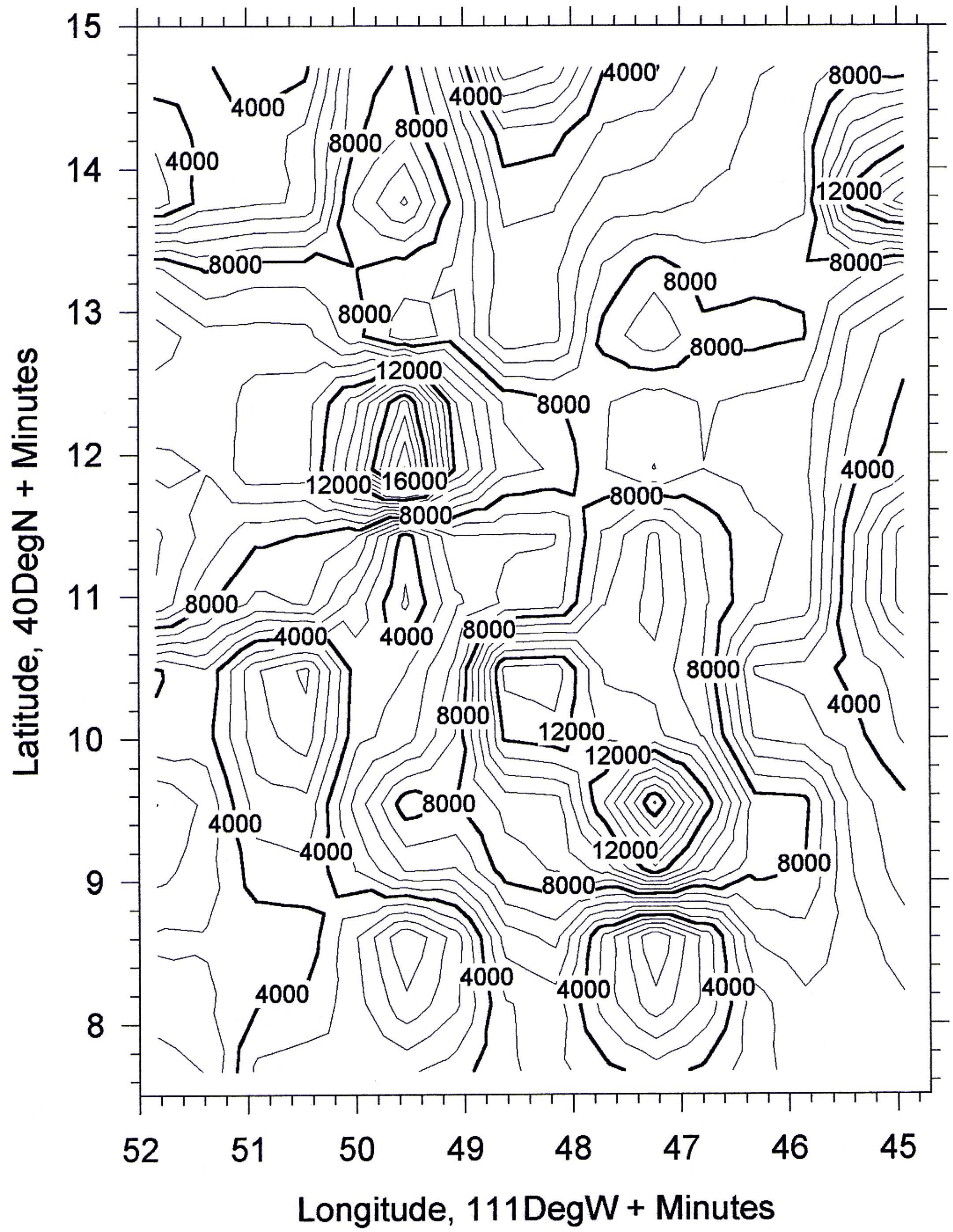
Mn ppm. Utah Lake Sediments, Lincoln Point Quadrangle



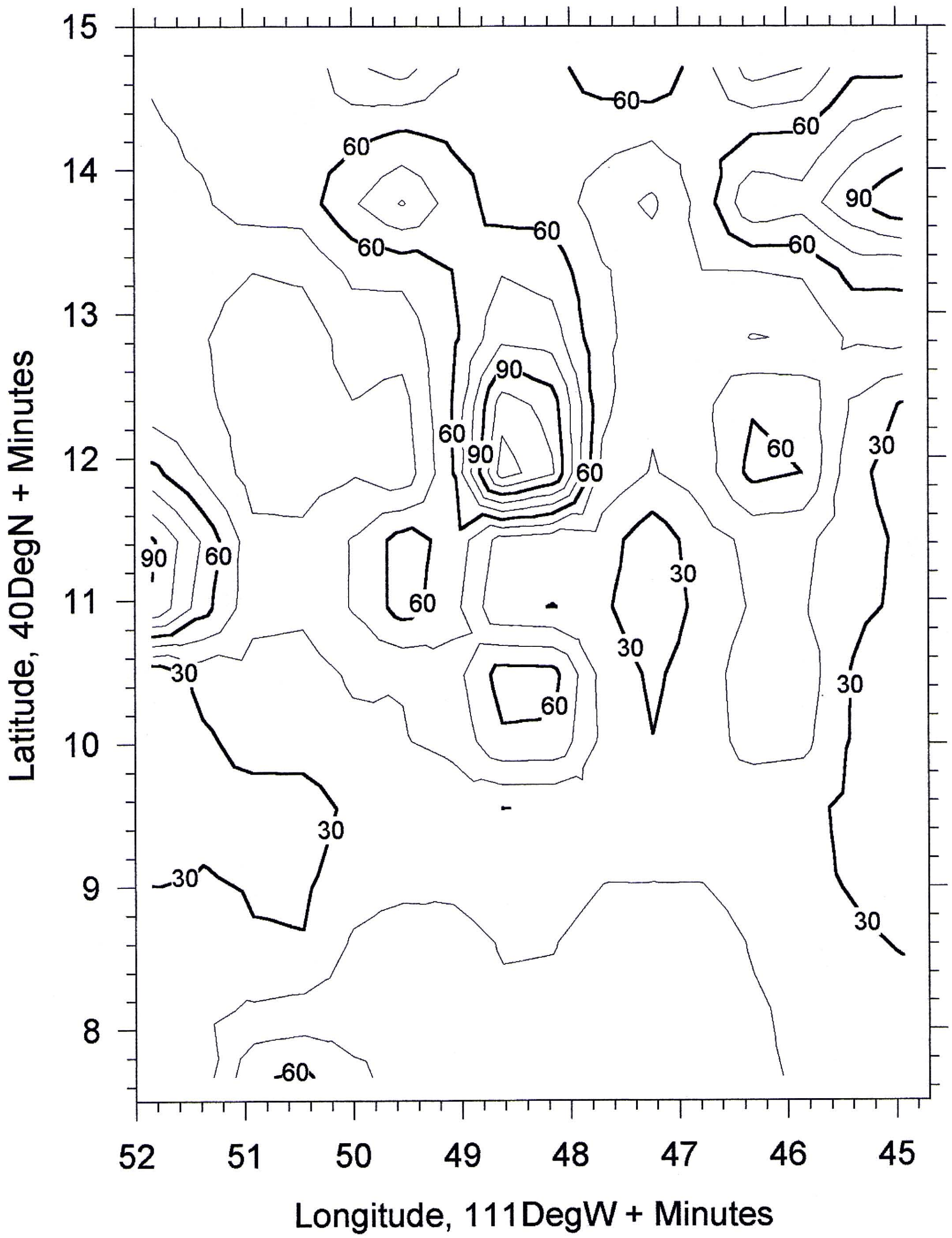
Ba ppm. Utah Lake Sediments, Lincoln Point Quadrangle



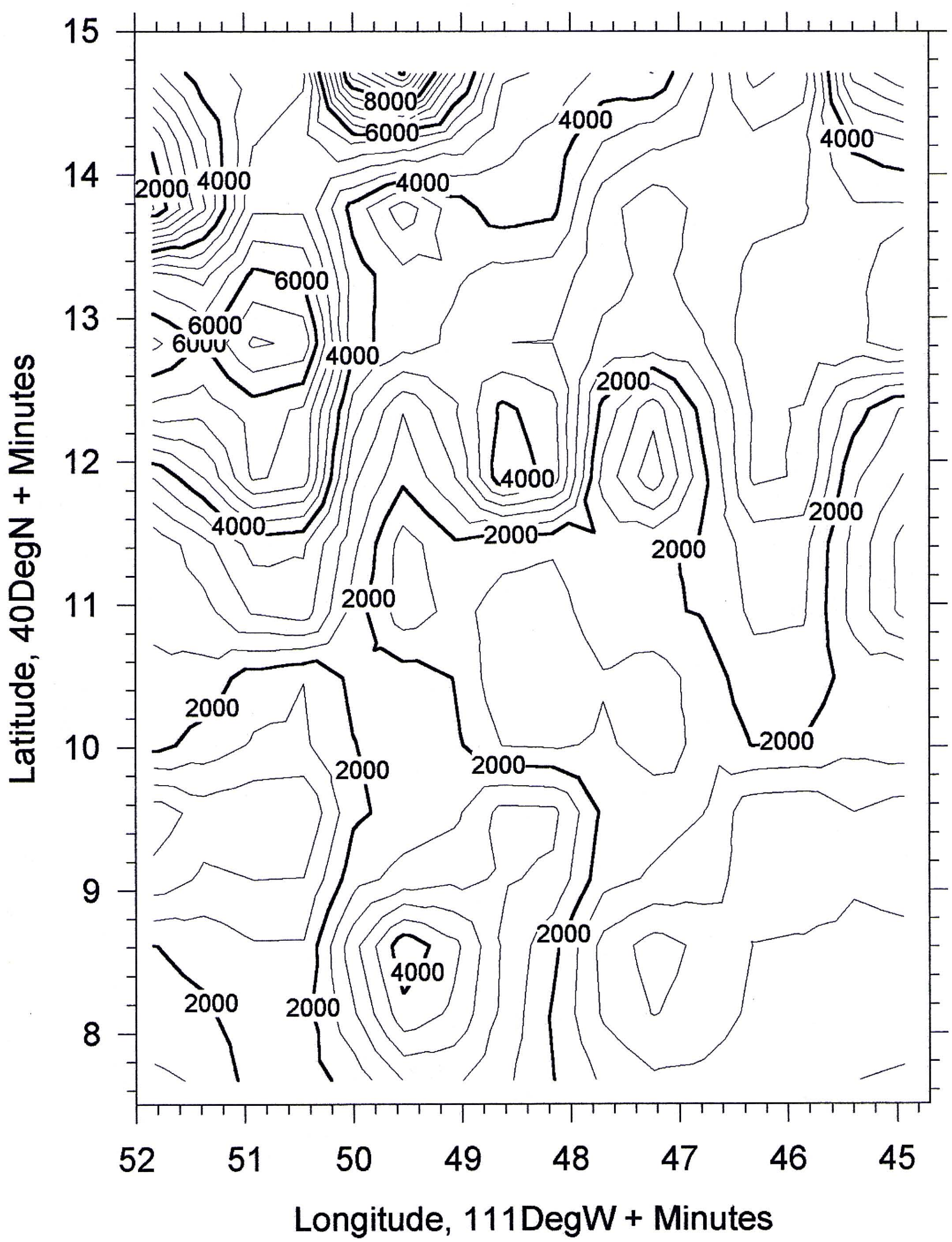
As ppb. Utah Lake Sediments, Lincoln Point Quadrangle



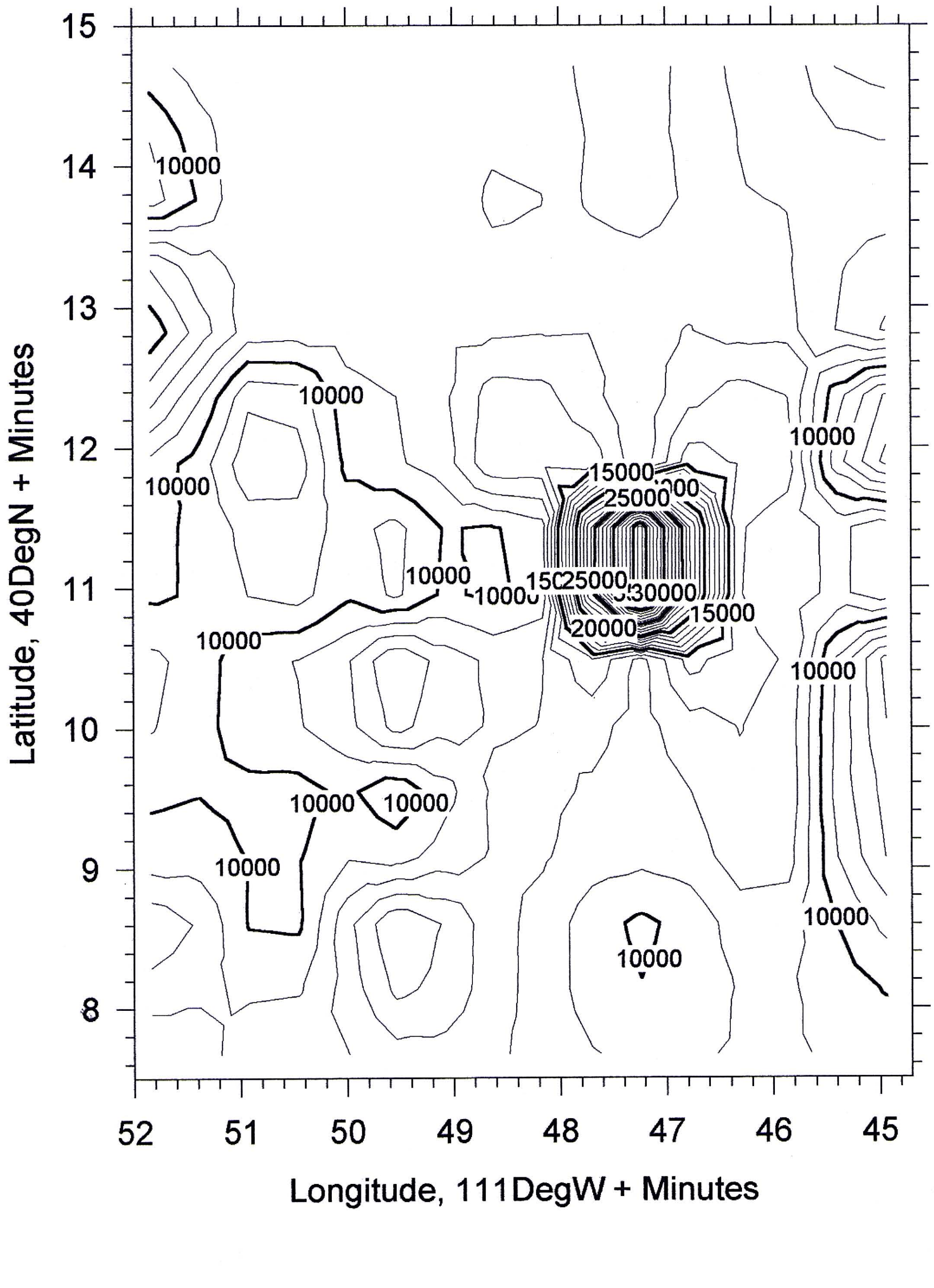
Hg ppm. Utah Lake Sediments, Lincoln Point Quadrangle



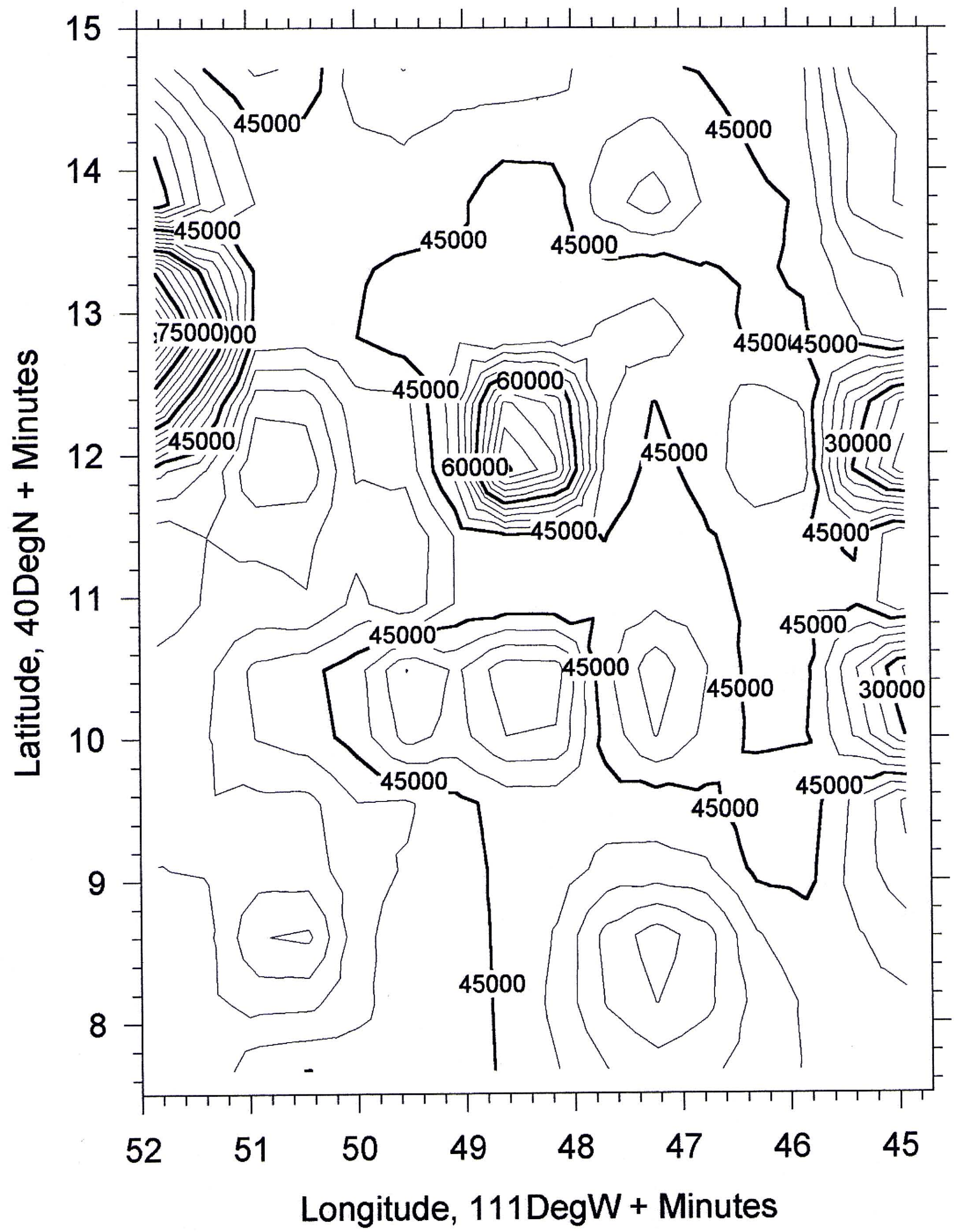
Se ppm. Utah Lake Sediments, Lincoln Point Quadrangle



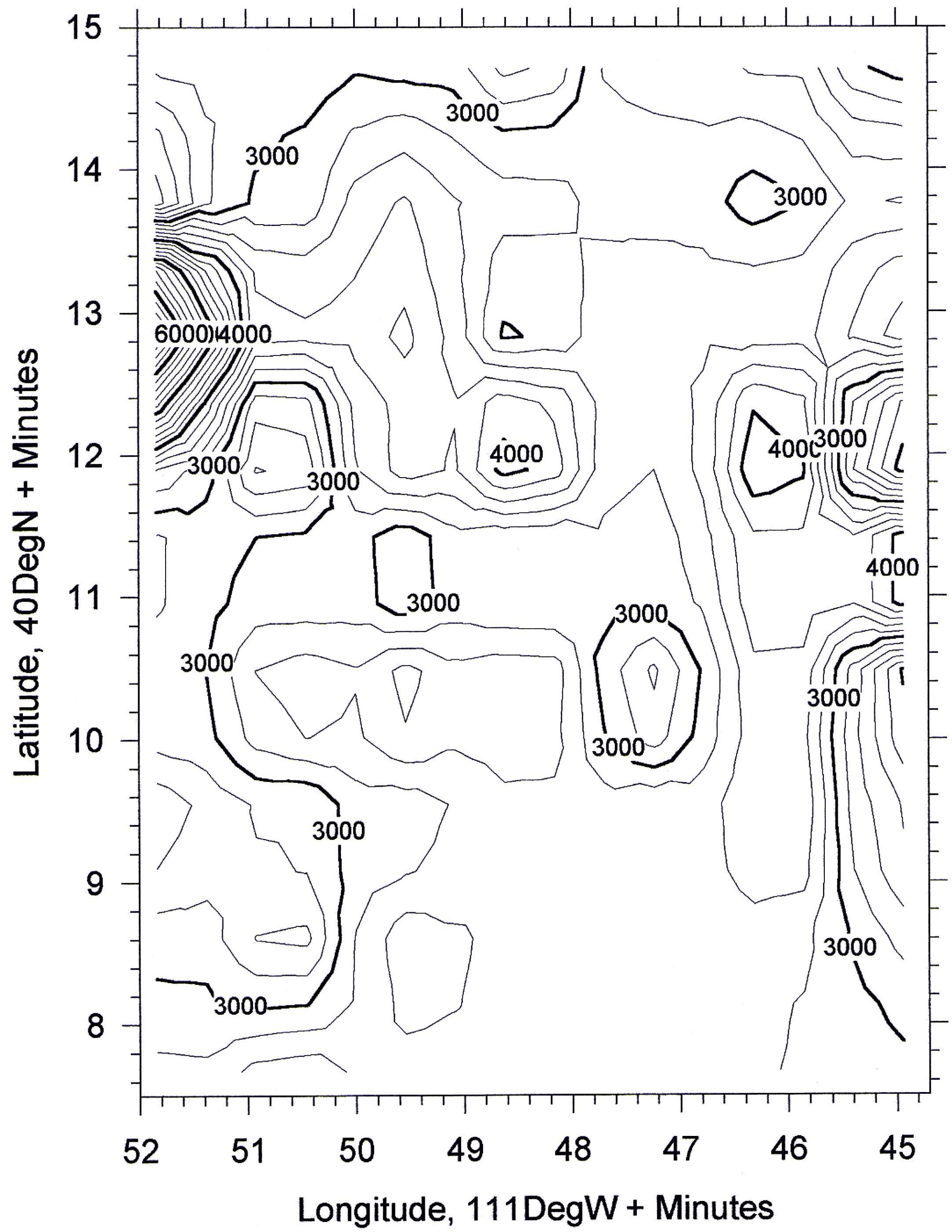
Cr ppm. Utah Lake Sediments, Lincoln Point Quadrangle



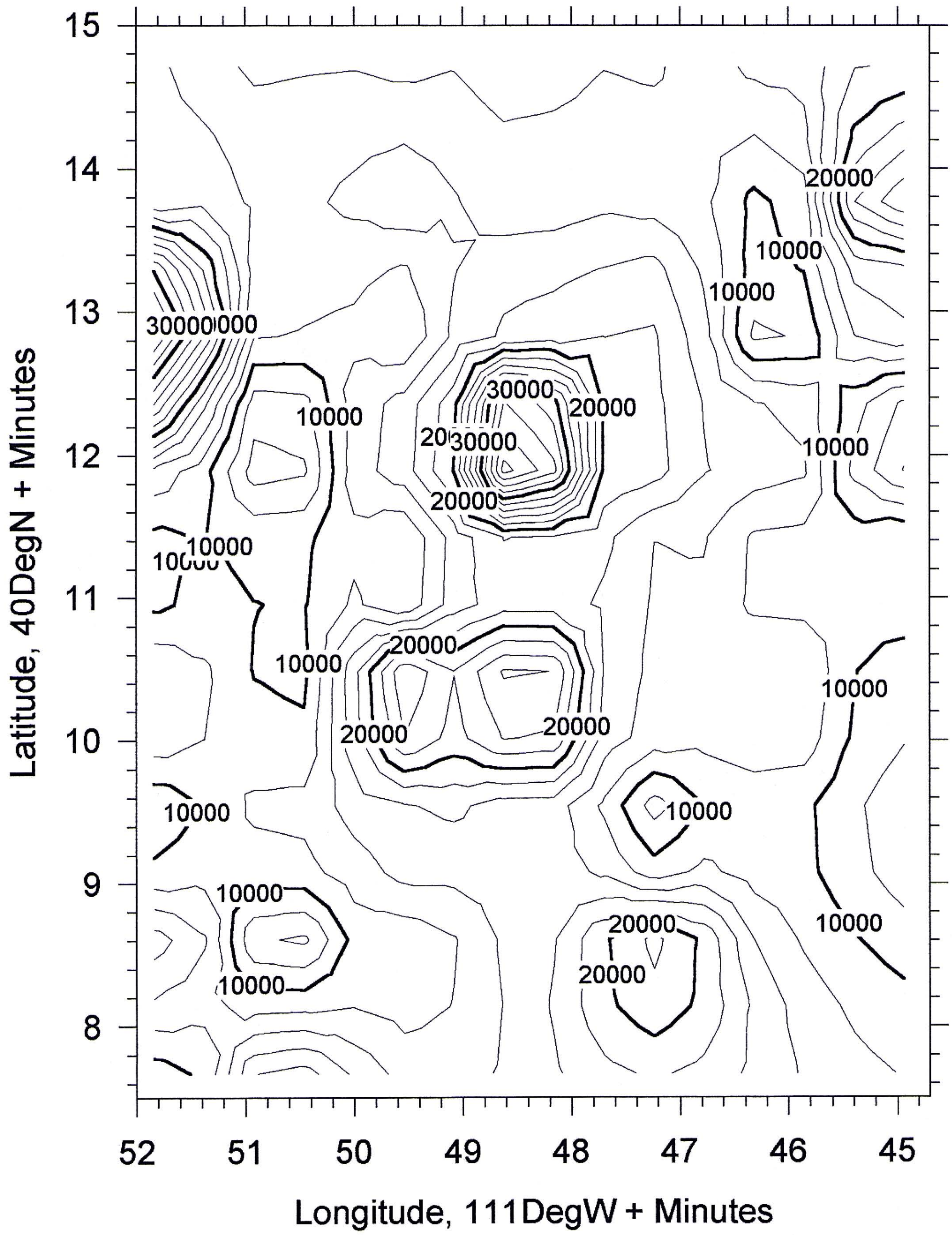
Zn ppm. Utah Lake Sediments, Lincoln Point Quadrangle



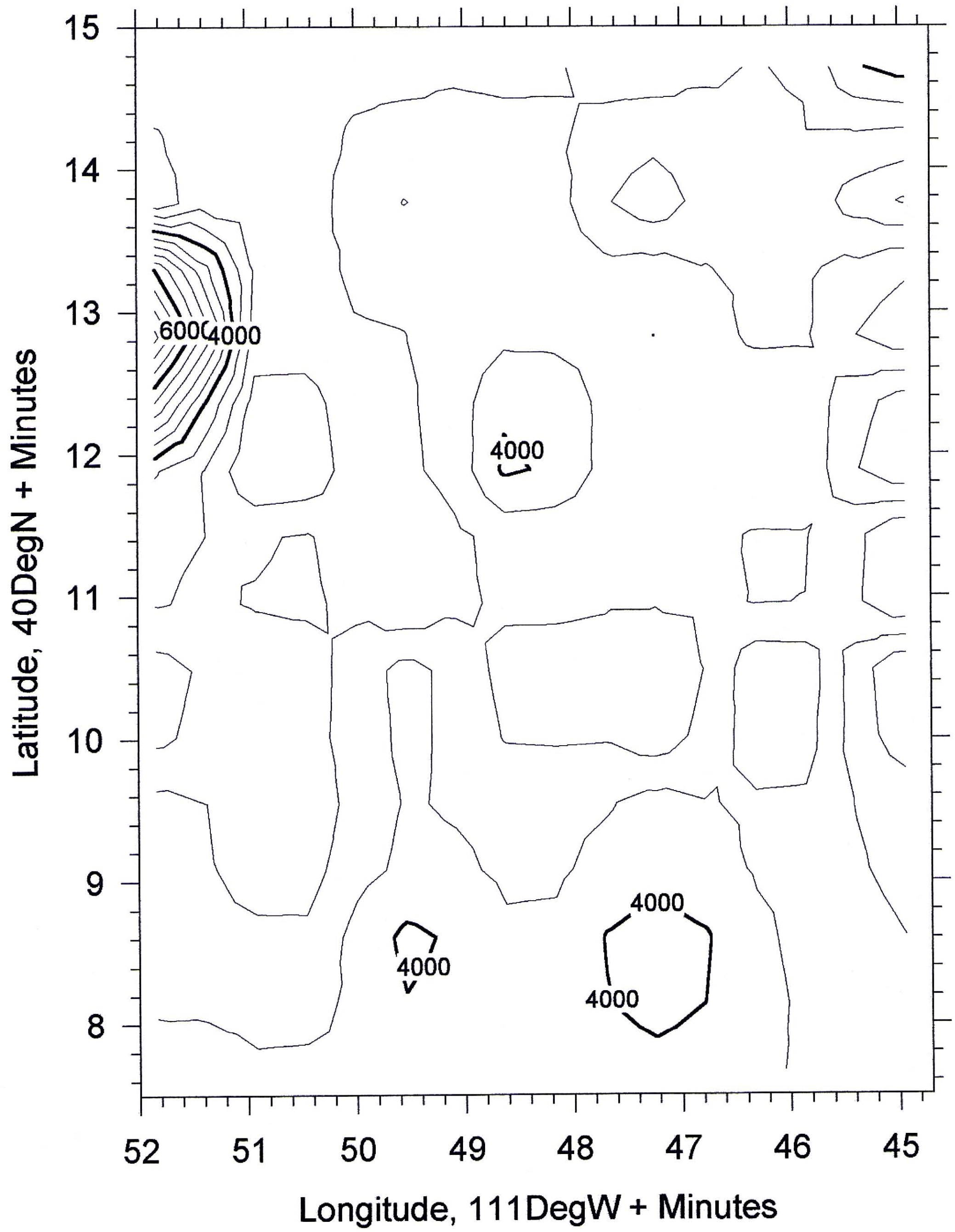
Cd ppm. Utah Lake Sediments, Lincoln Point Quadrangle



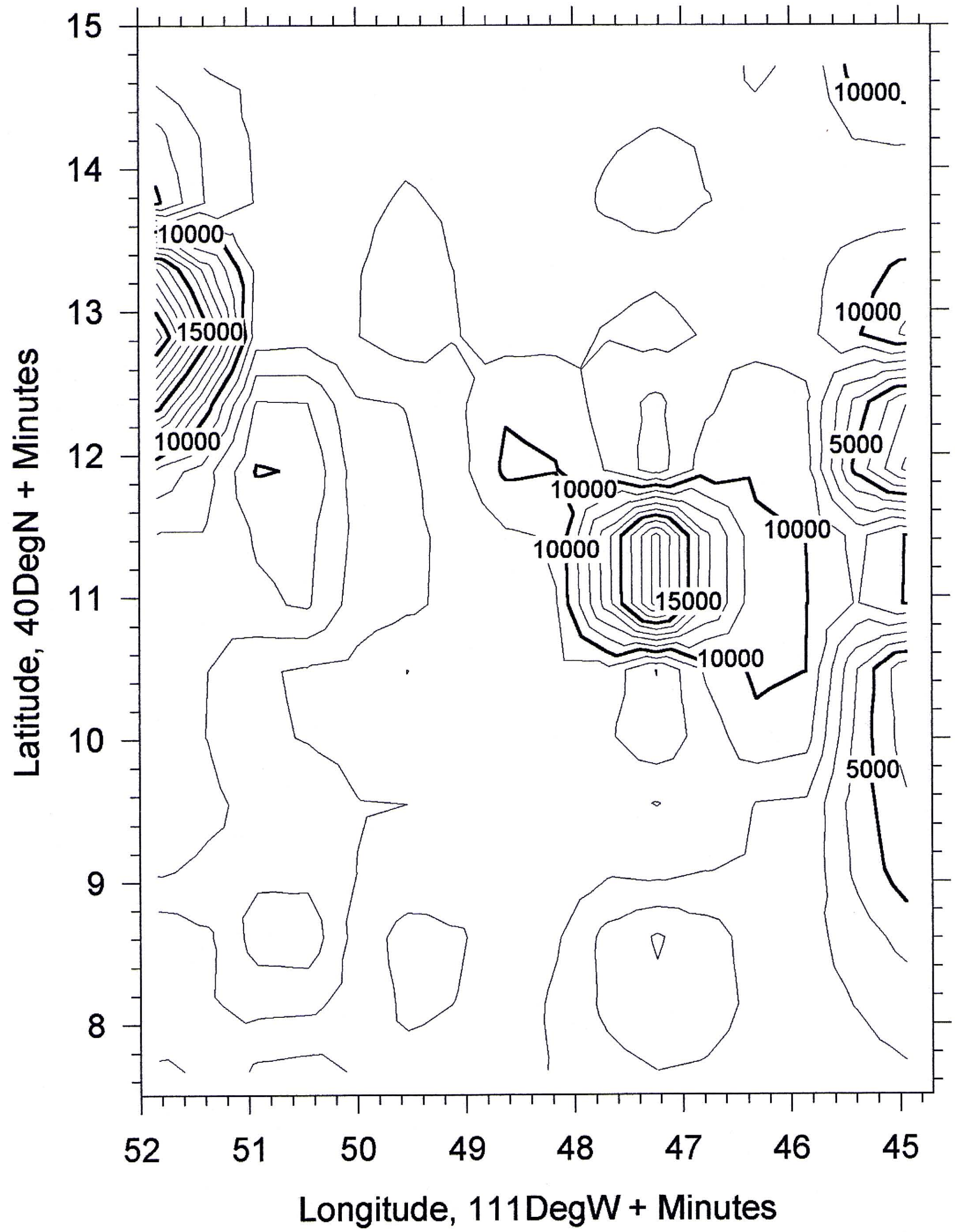
Pb ppb. Utah Lake Sediments, Lincoln Point Quadrangle



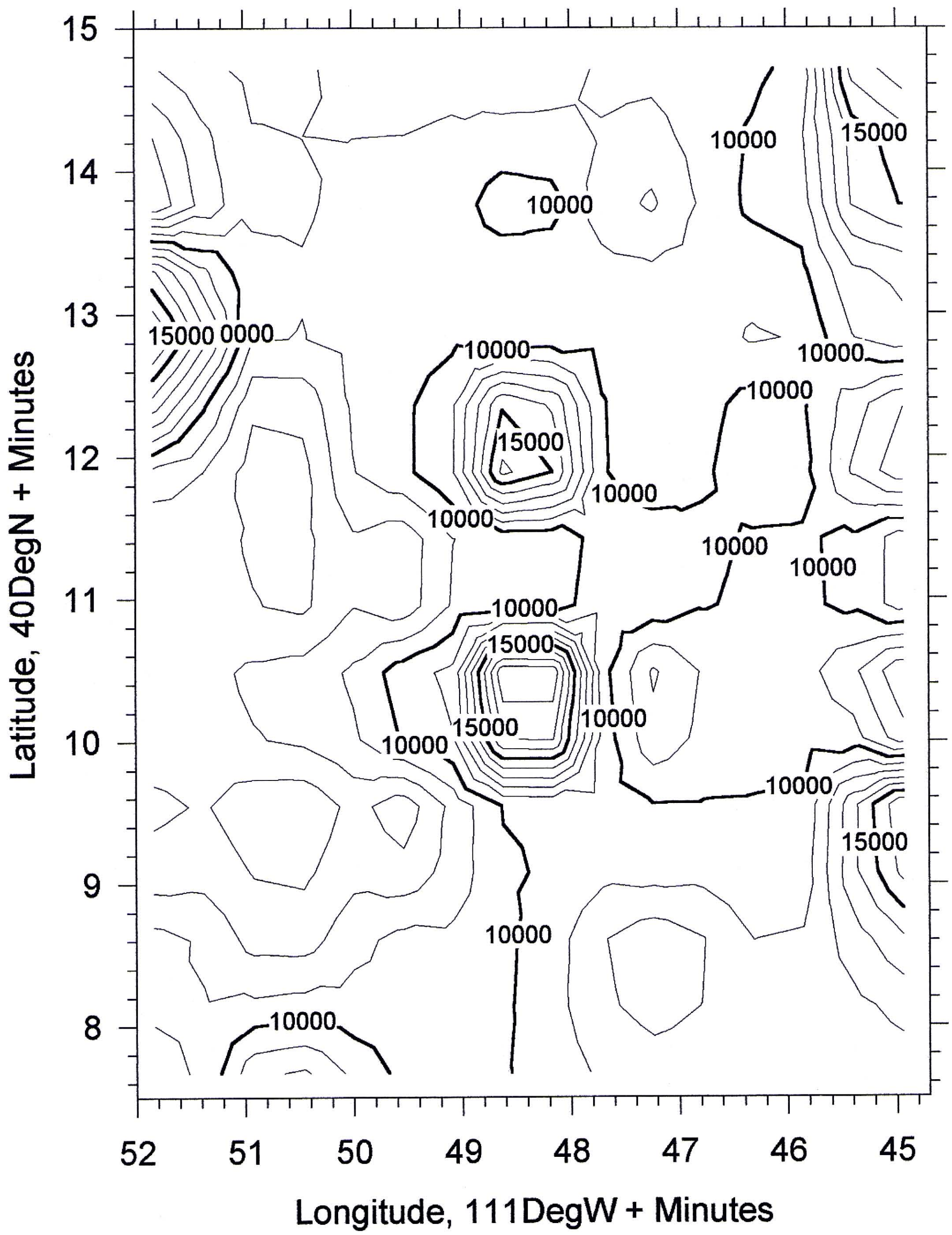
Co ppb. Utah Lake Sediments, Lincoln Point Quadrangle



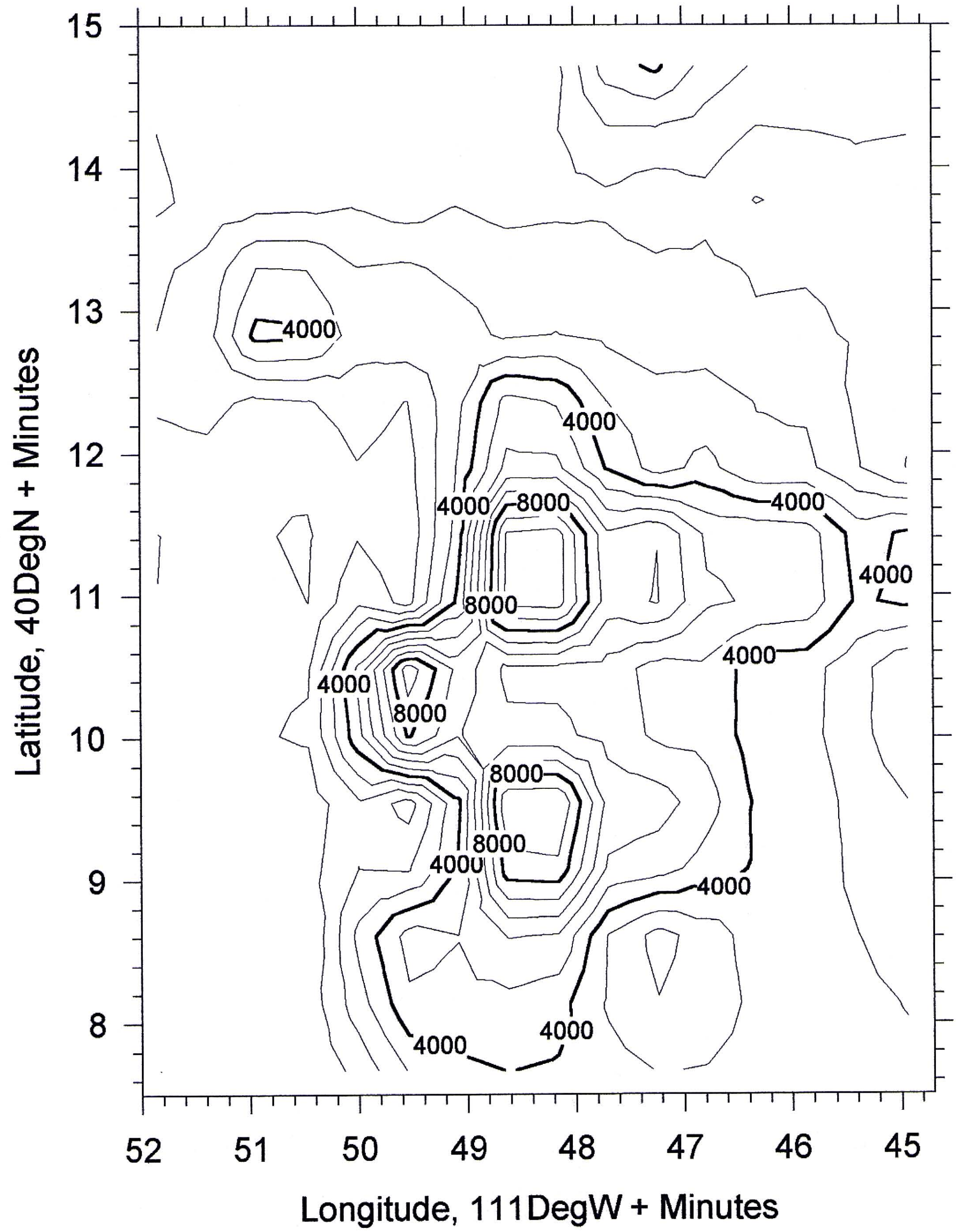
Ni ppb. Utah Lake Sediments, Lincoln Point Quadrangle



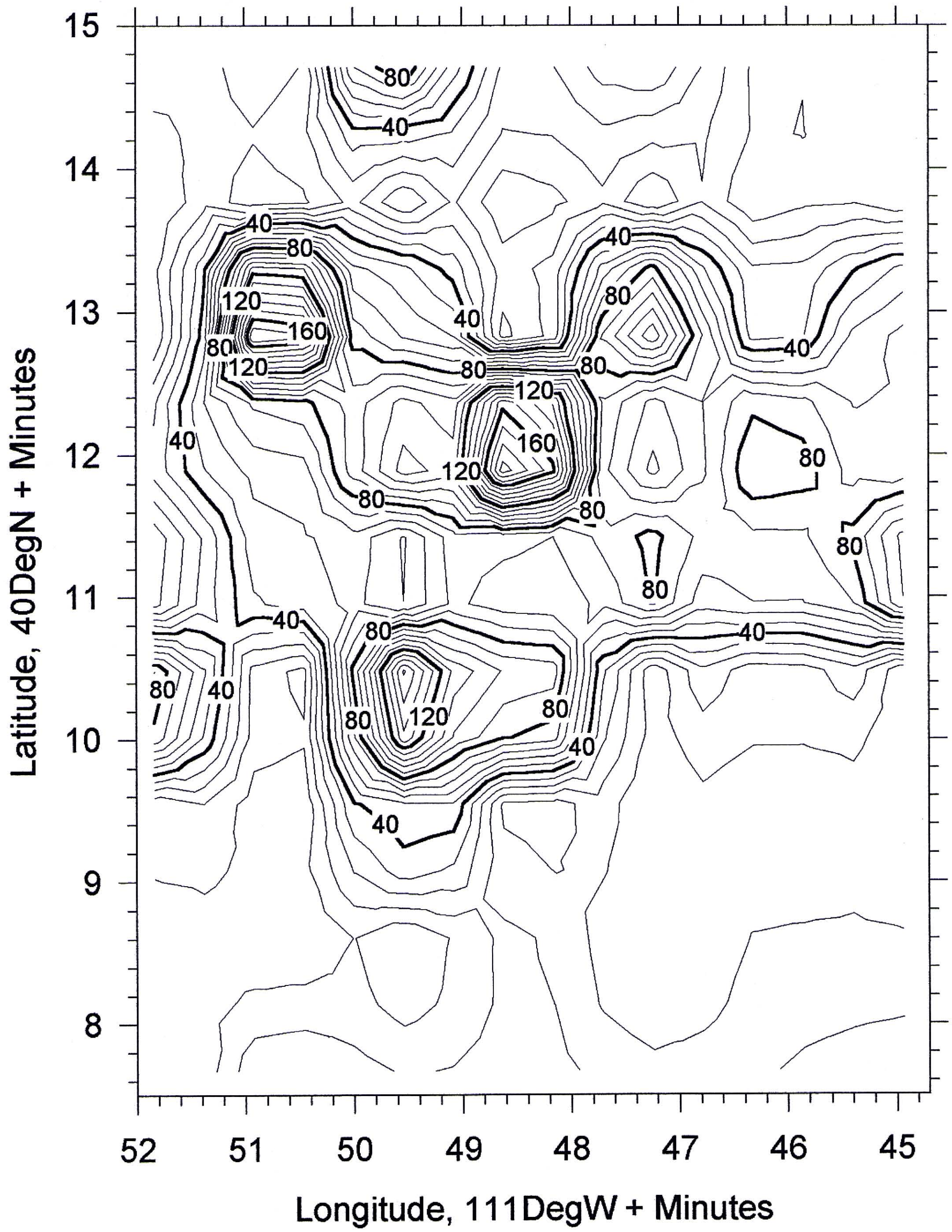
Cu ppb. Utah Lake Sediments, Lincoln Point Quadrangle



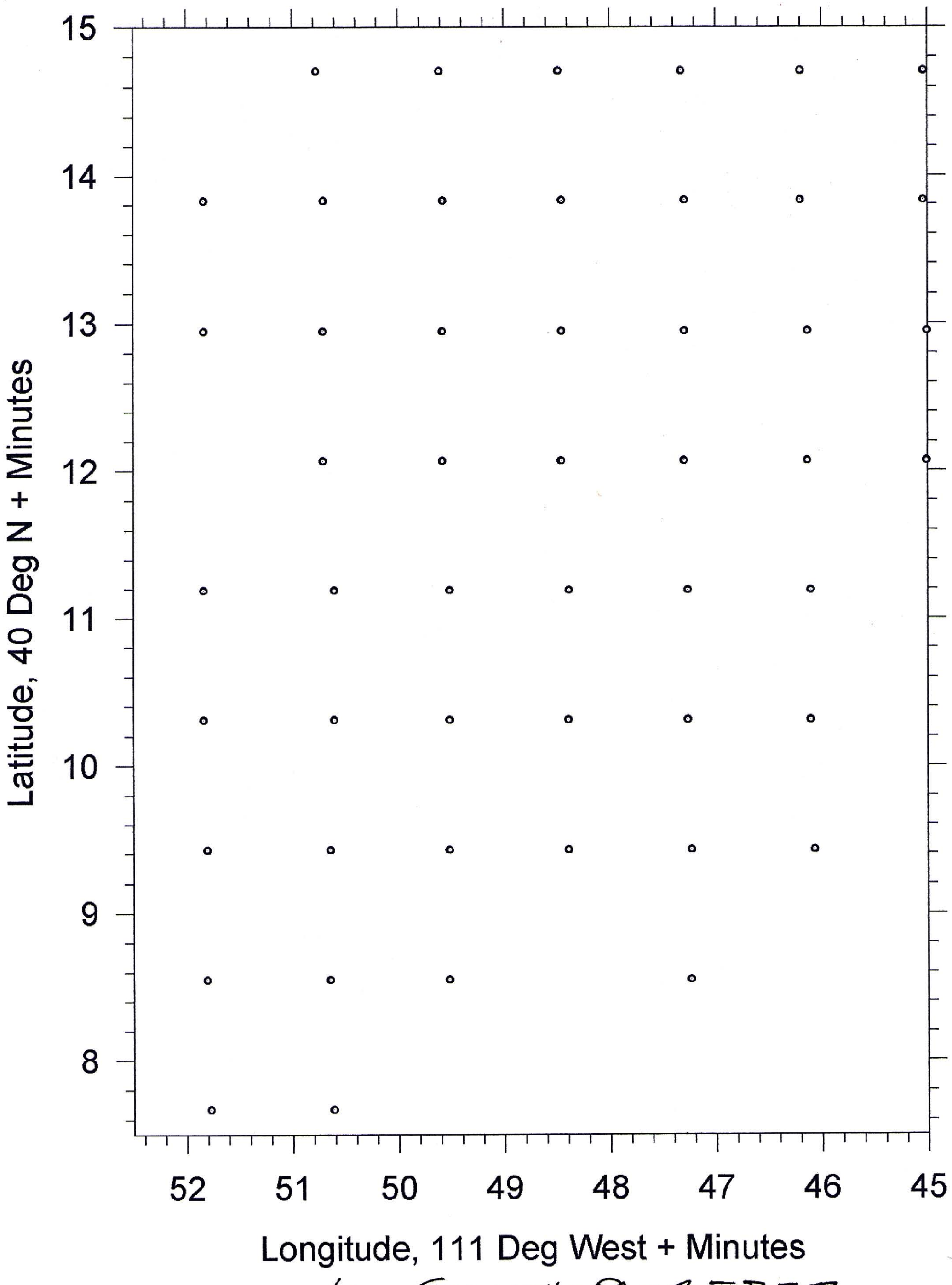
Au ppb. Utah Lake Sediments, Lincoln Point Quadrangle



Ag ppb. Utah Lake Sediments, Lincoln Point Quadrangle

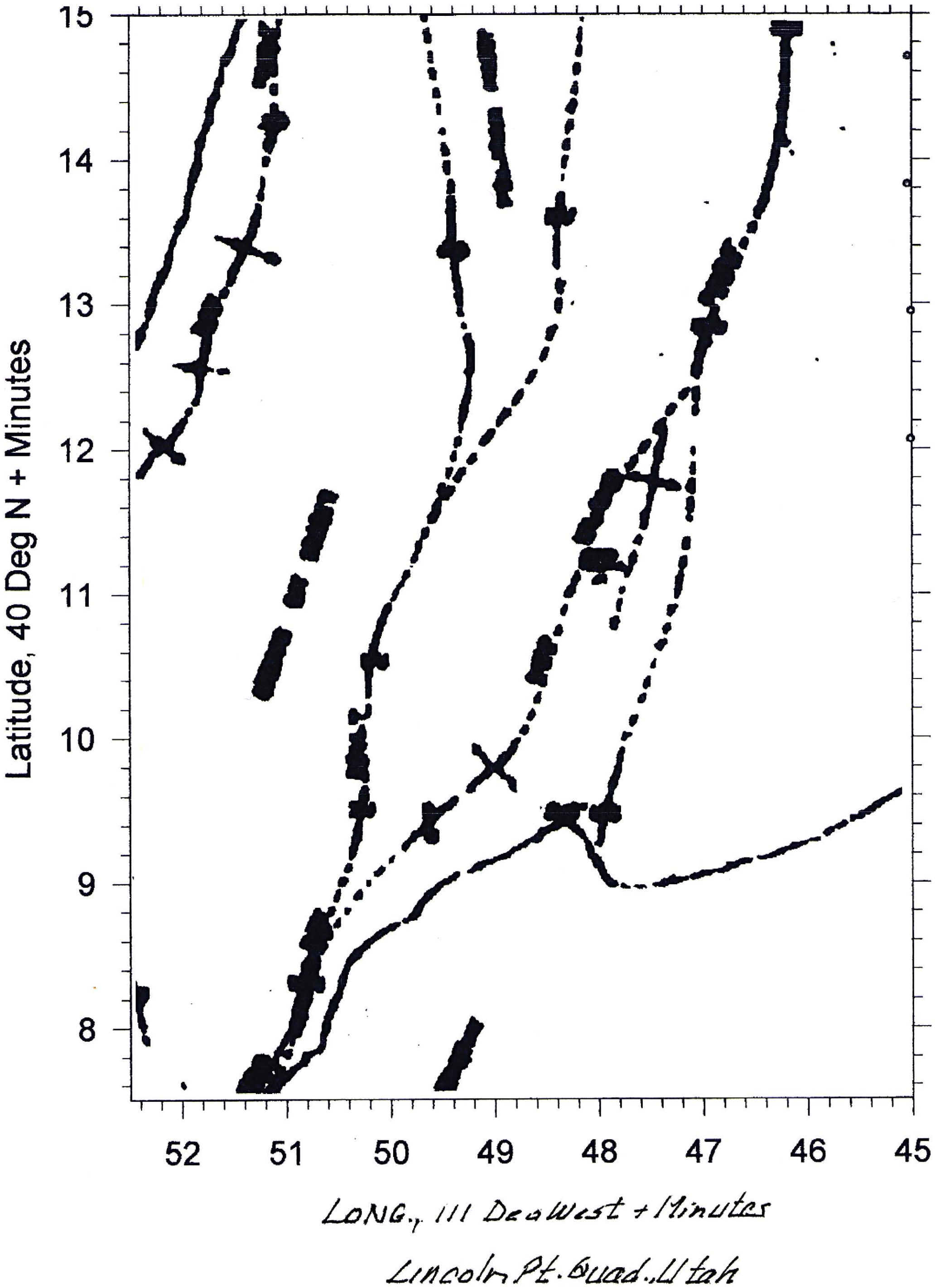


Sample Points, Lincoln Point Quadrangle



LAKE SEDIMENT SAMPLE SITES
Lincoln Pt. Quad., Utah.

Untitled - 6



Latitude, 40 Deg N + Minutes
15
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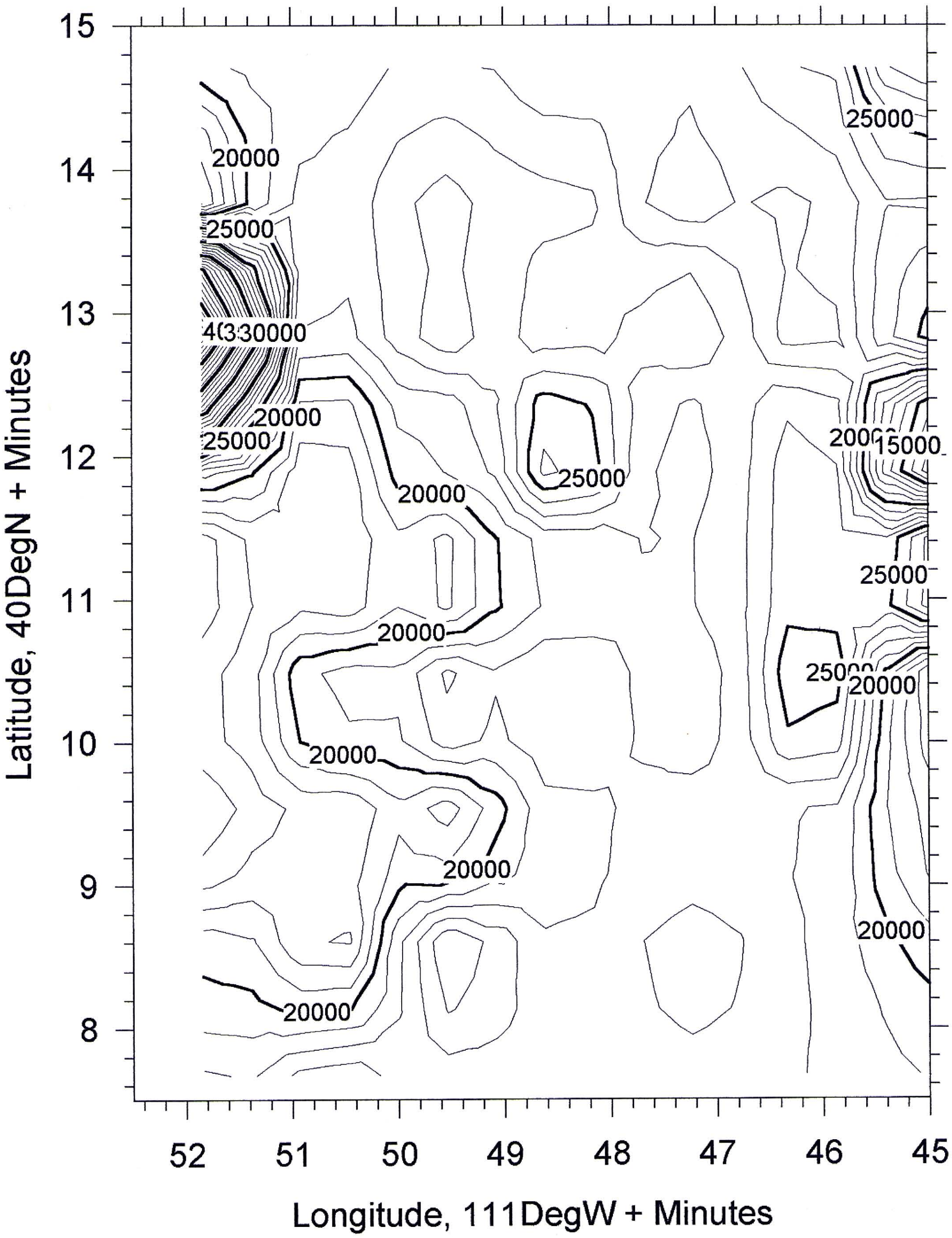
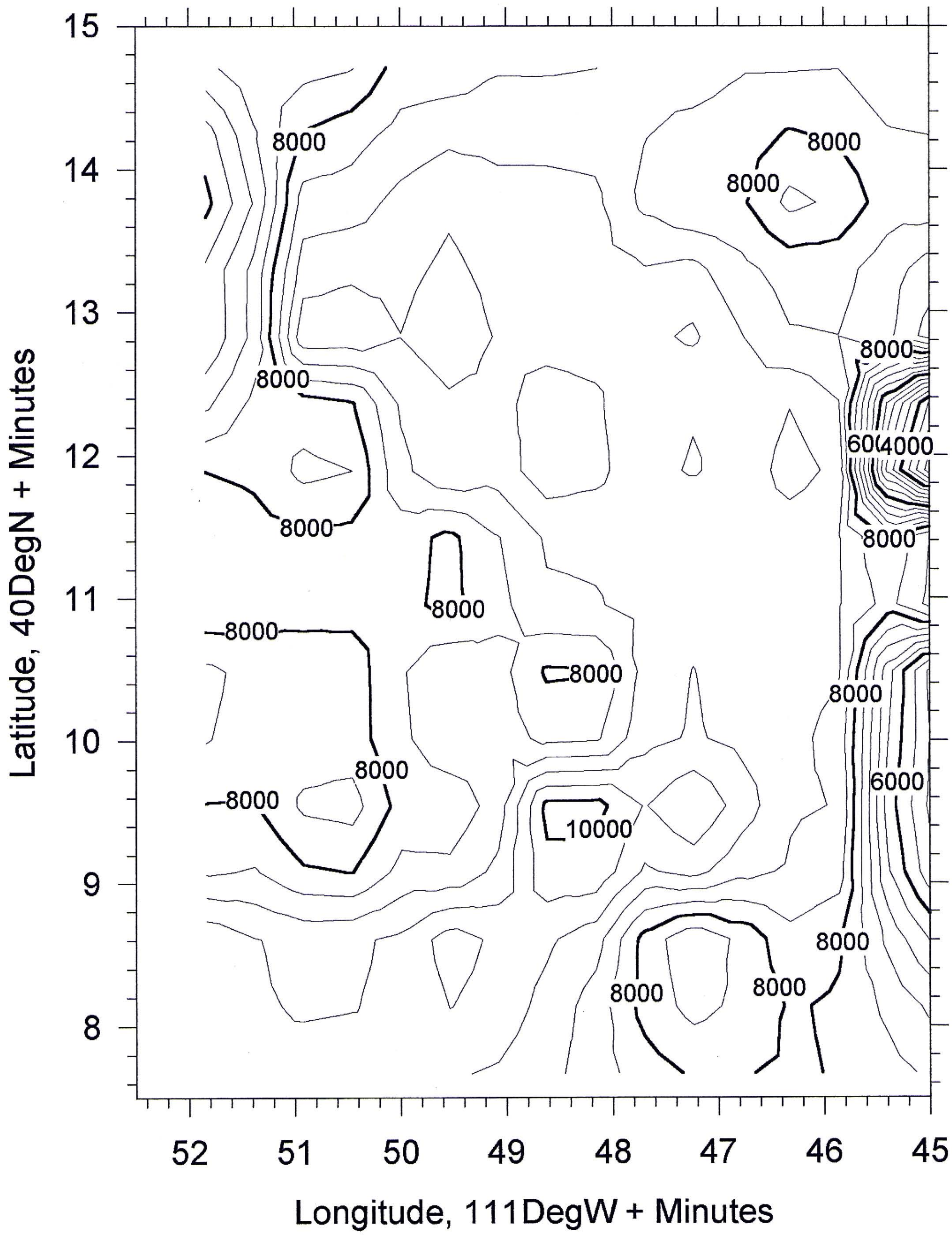
LONG., 111 DegWest + Minutes
Lincoln Pt. Quad., Utah

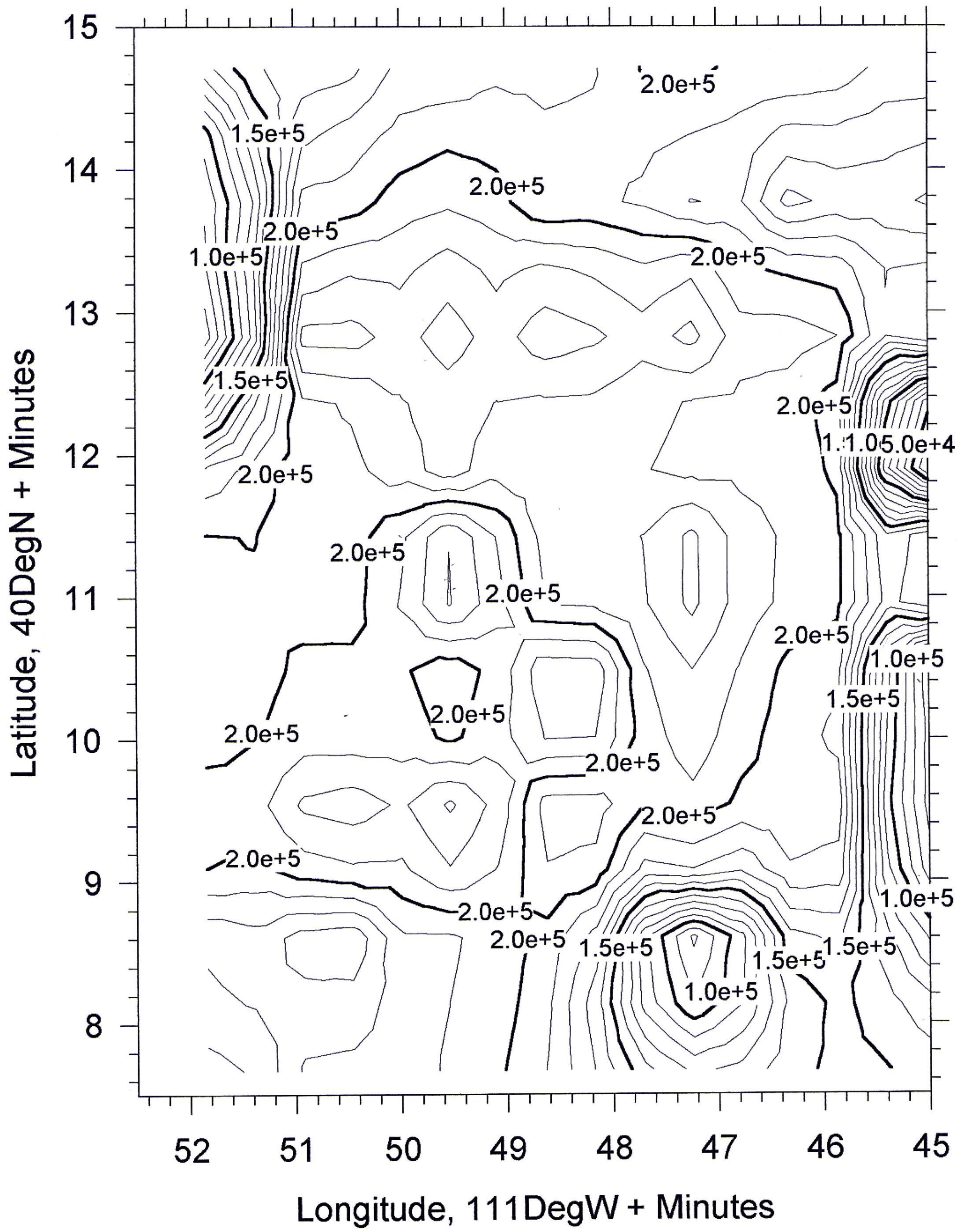
Fe ppm. Utah Lake Sediments, Lincoln Point



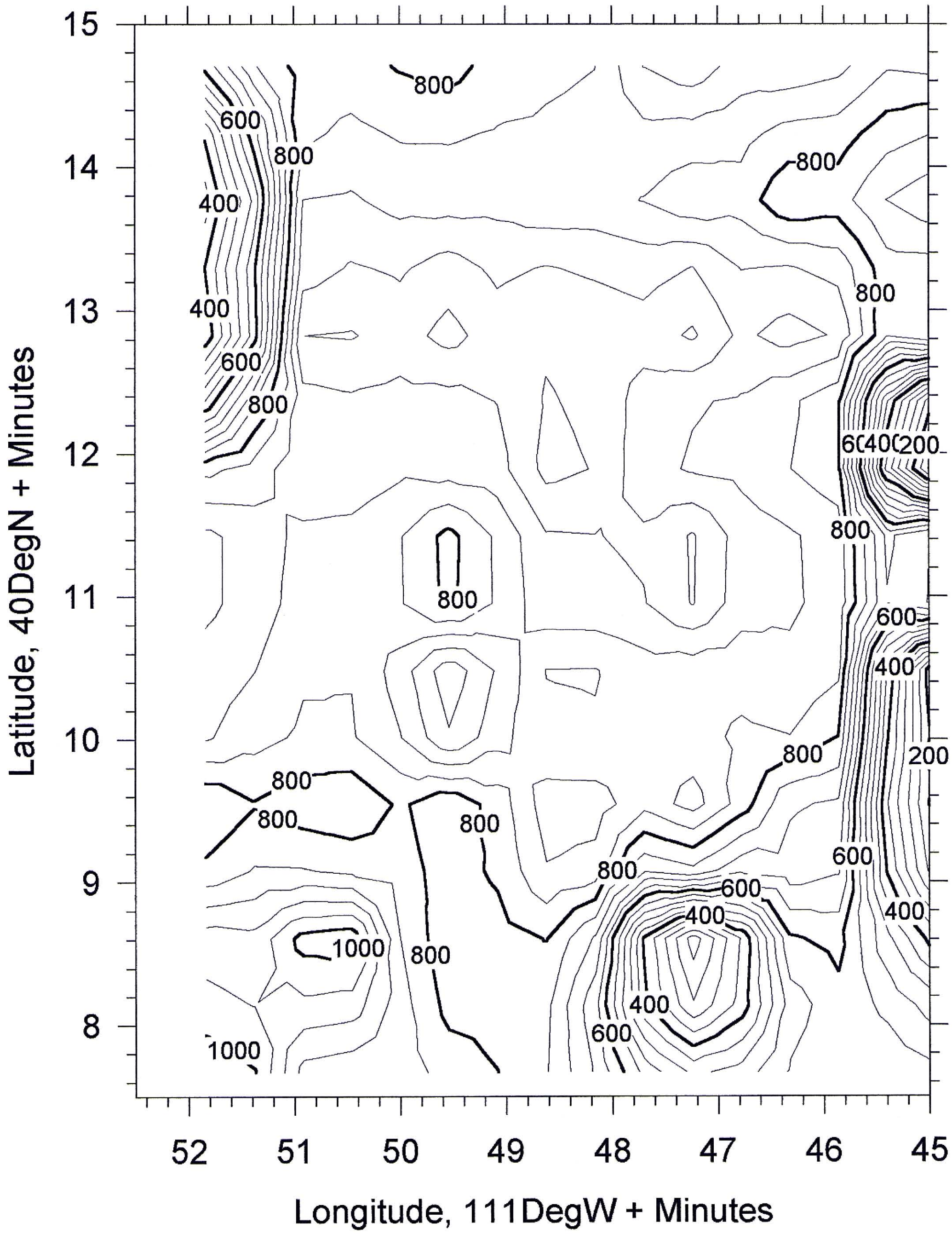
Mg ppm. Utah Lake Sediments, Lincoln Point



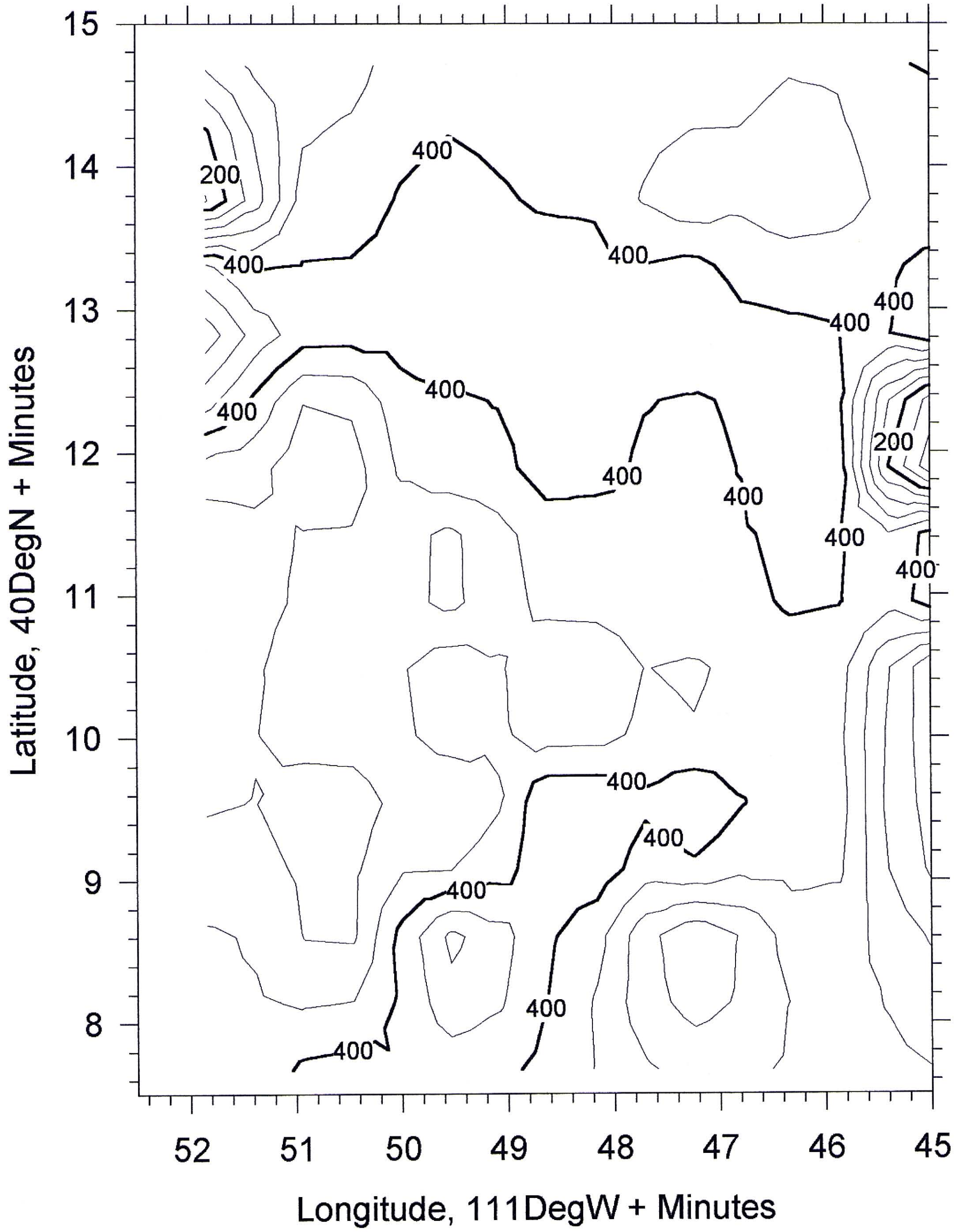
Ca ppm. Utah Lake Sediments, Lincoln Point

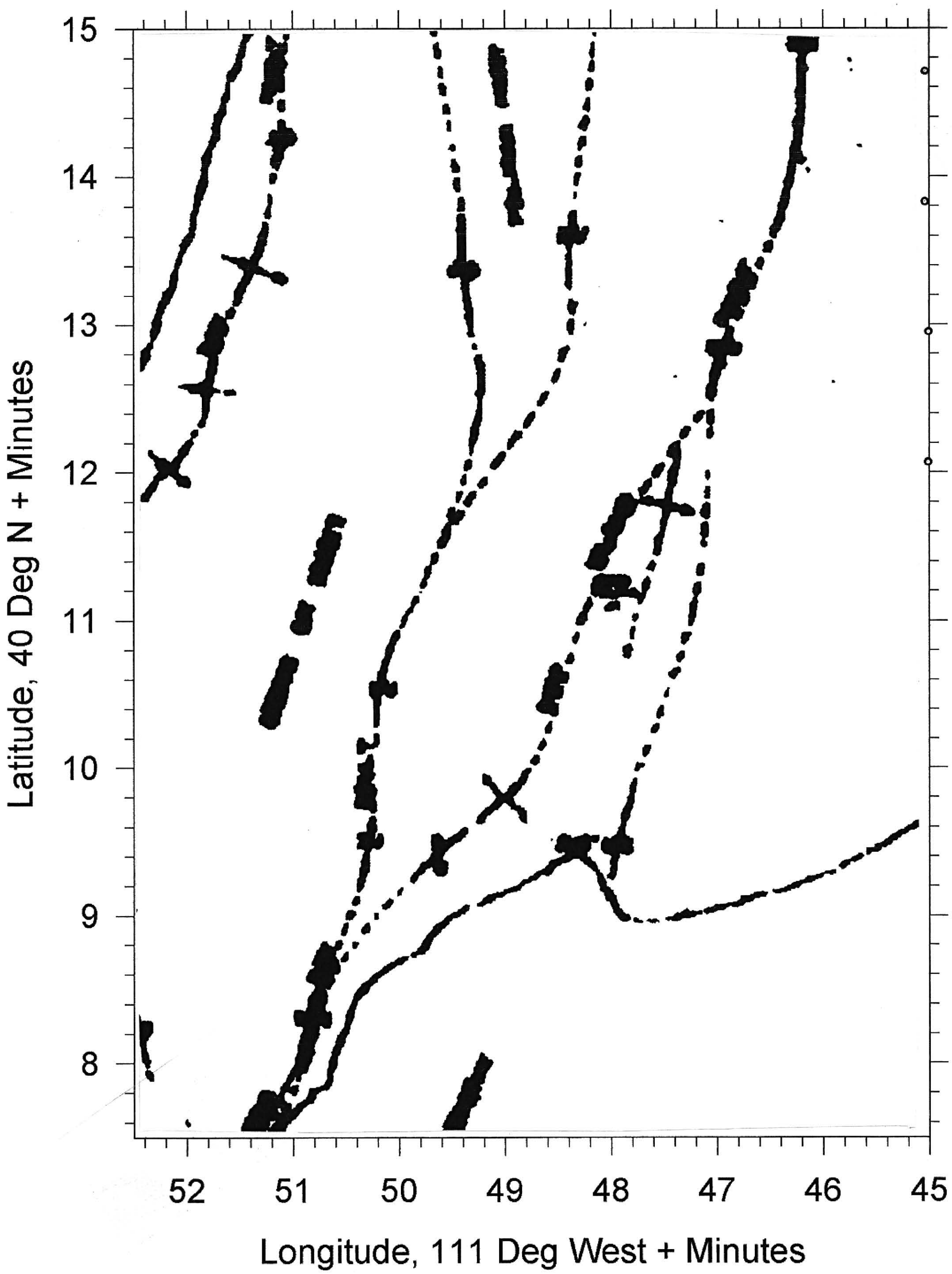


Sr ppm. Utah Lake Sediments, Lincoln Point Quadrangle



Mn, ppm. Utah Lake Sediments, Lincoln Point Quadrangle

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Latitude, 40 Deg N + Minutes
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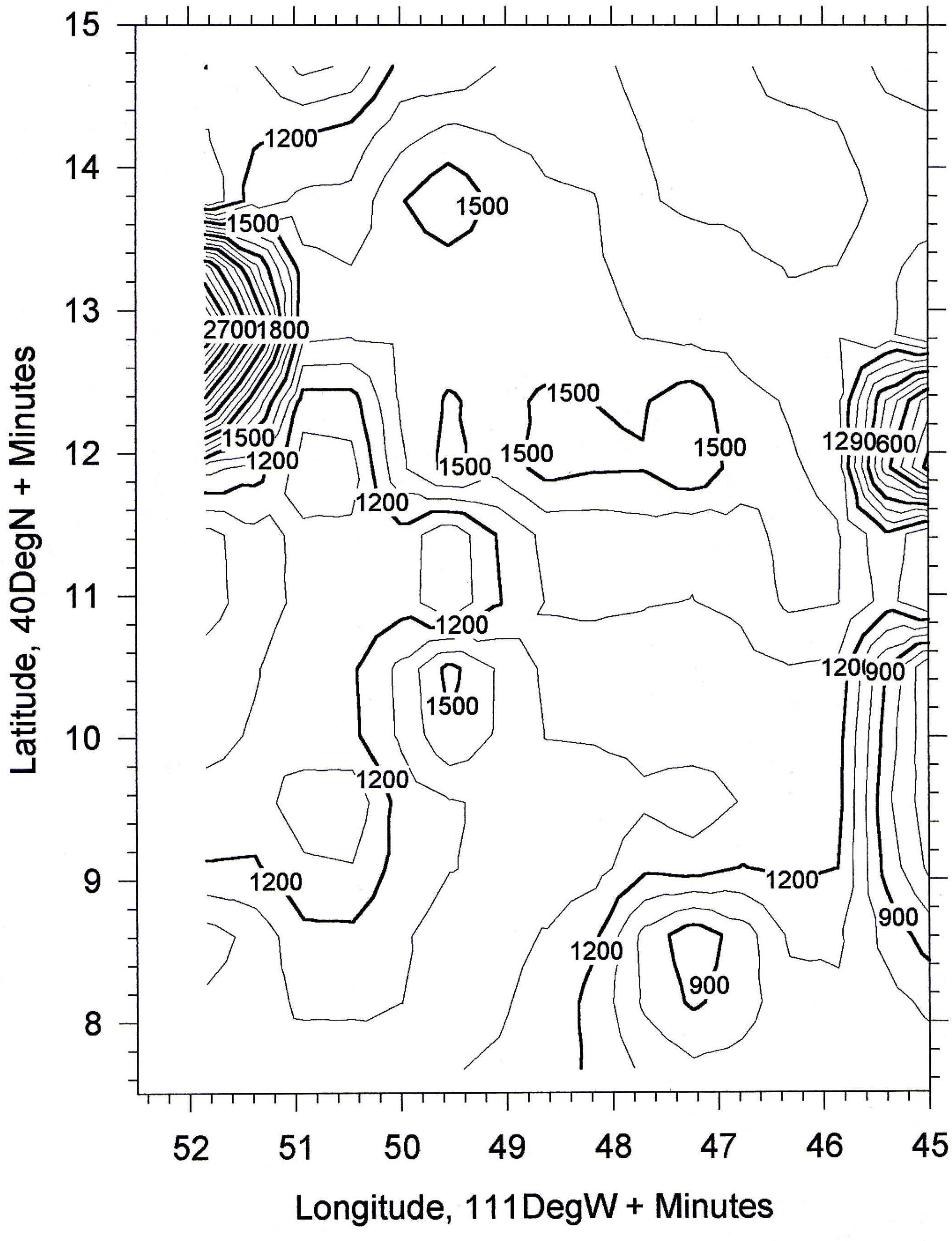
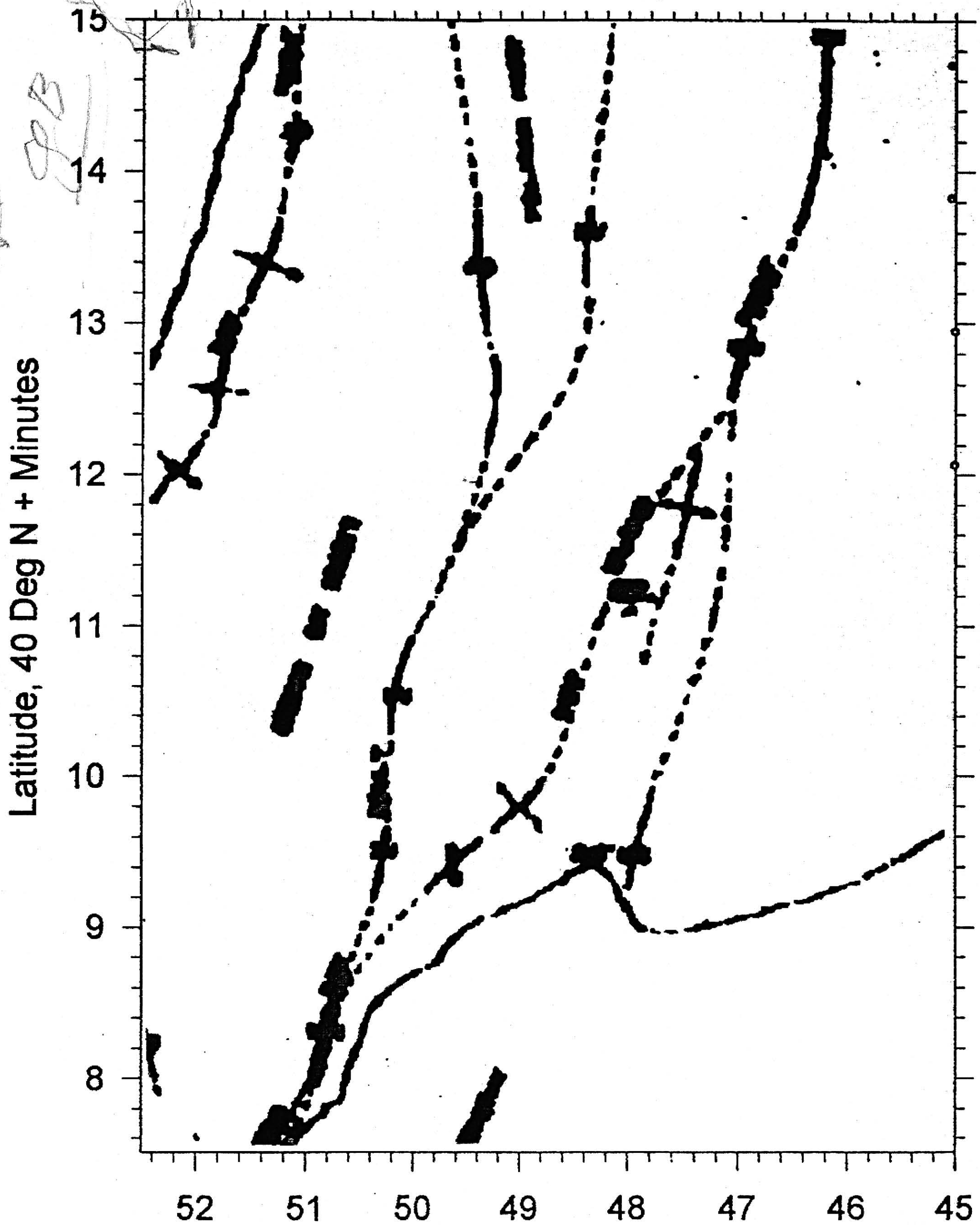
Longitude, 111 Deg West + Minutes

K ppm. Utah Lake Sediments. Lincoln Point Quadrangle



Untitled - 6



LONG., 111 Deg West + Minutes

Lincoln Pt. Quad. Utah

	PPM					%	PPM
	Zn	Pb	Cu	Ni	As	Fe	Cd
mean	70.136	23.091	21.800	17.773	14.600	0.958	0.623
S.D.	7.093	3.330	1.932	1.438	2.066	0.027	0.186

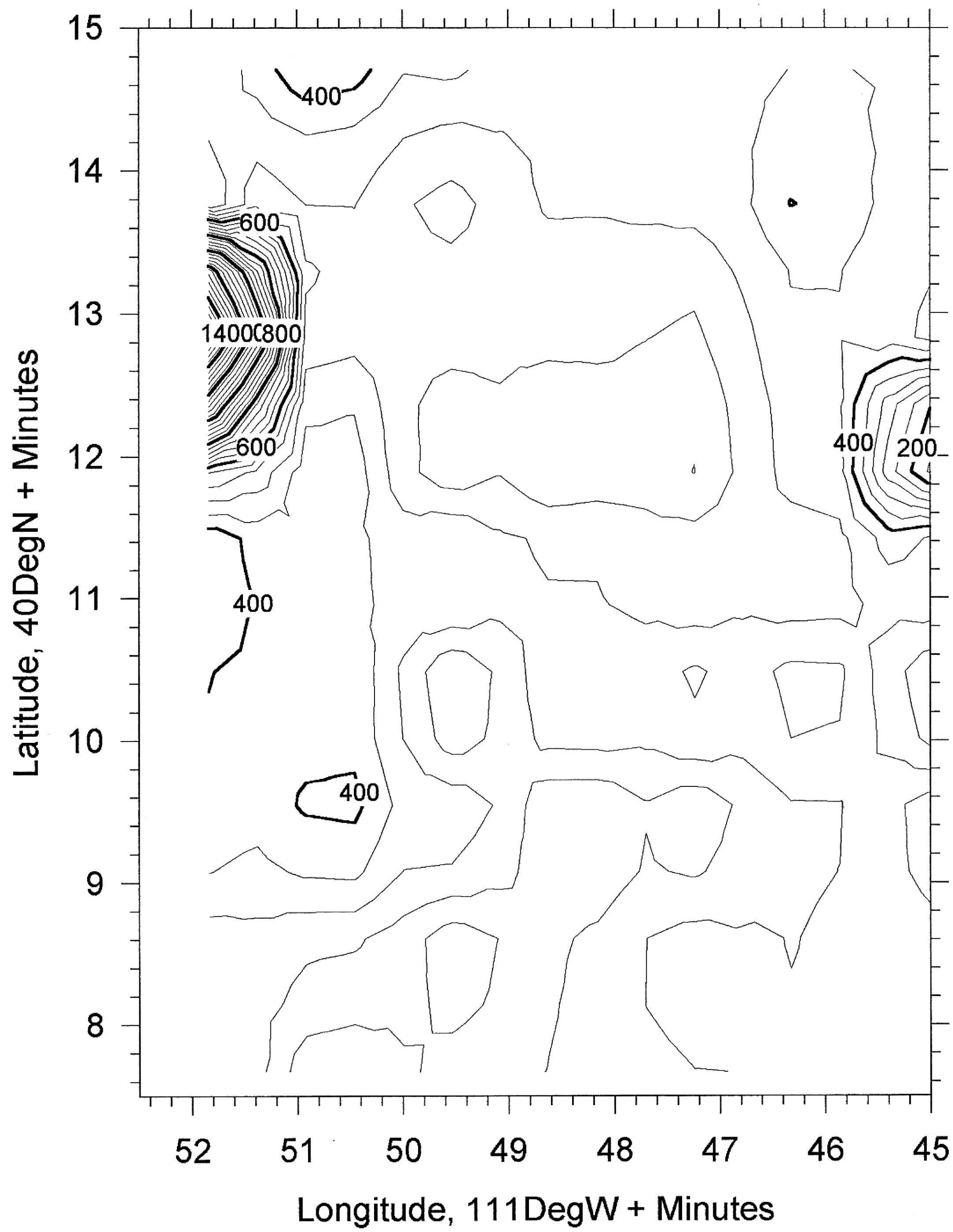
for Utah Lake 13 samples.

mean : Calculate the Mean

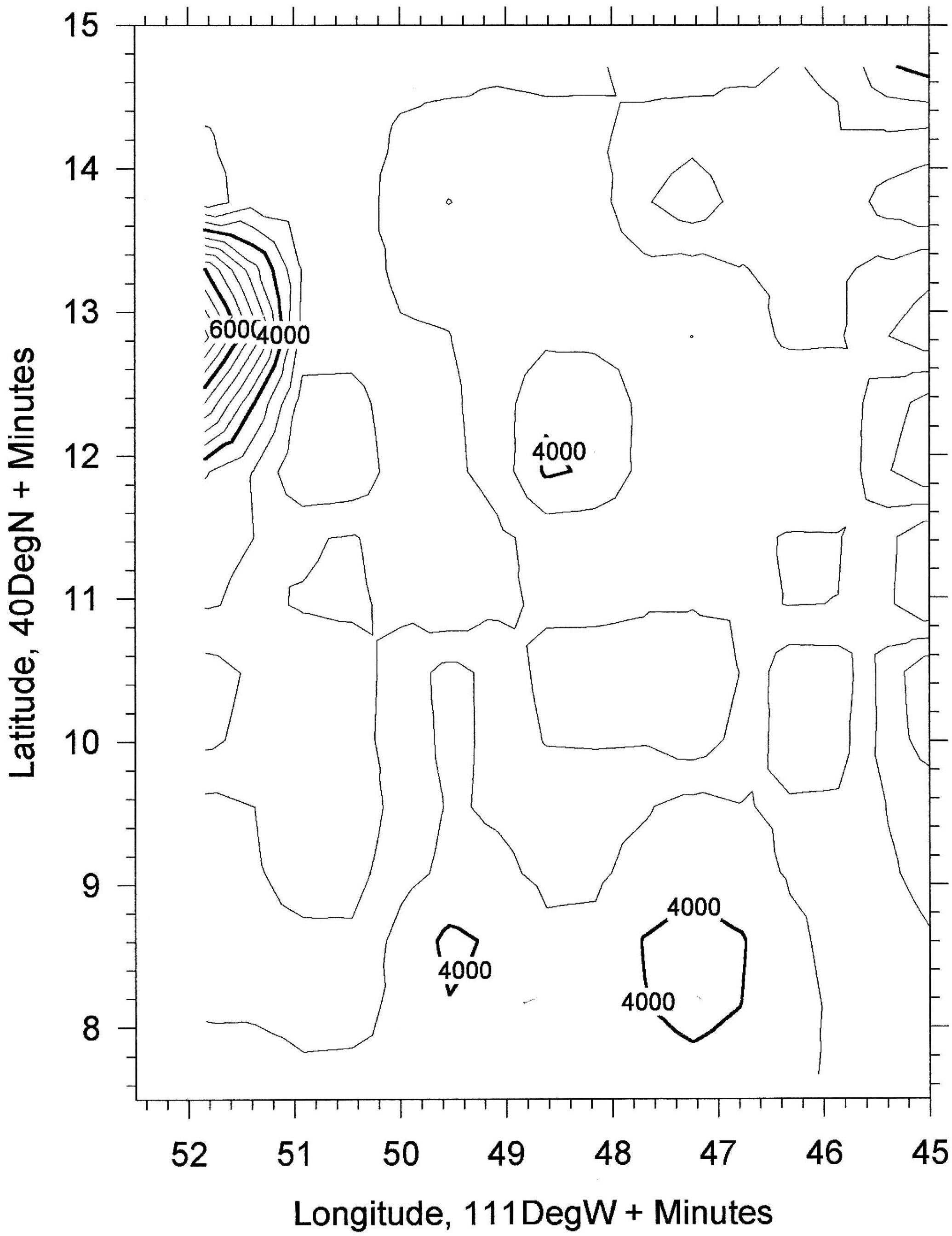
S.D. : Standard deviation

(Acme Analytical Labs, LTD, Vancouver, B.C.)

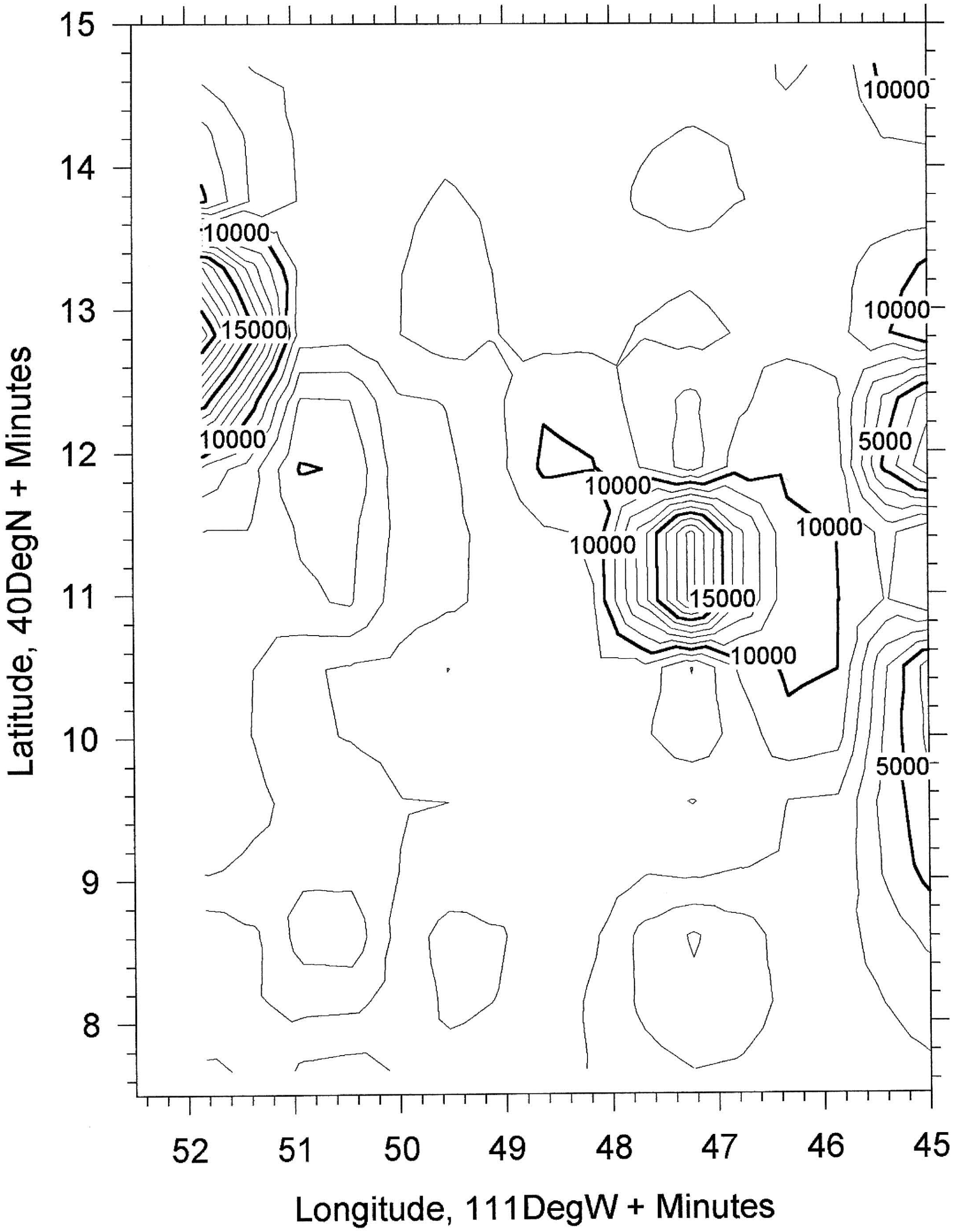
Na ppm. Utah Lake Sediments, Lincoln Point Quadrangle



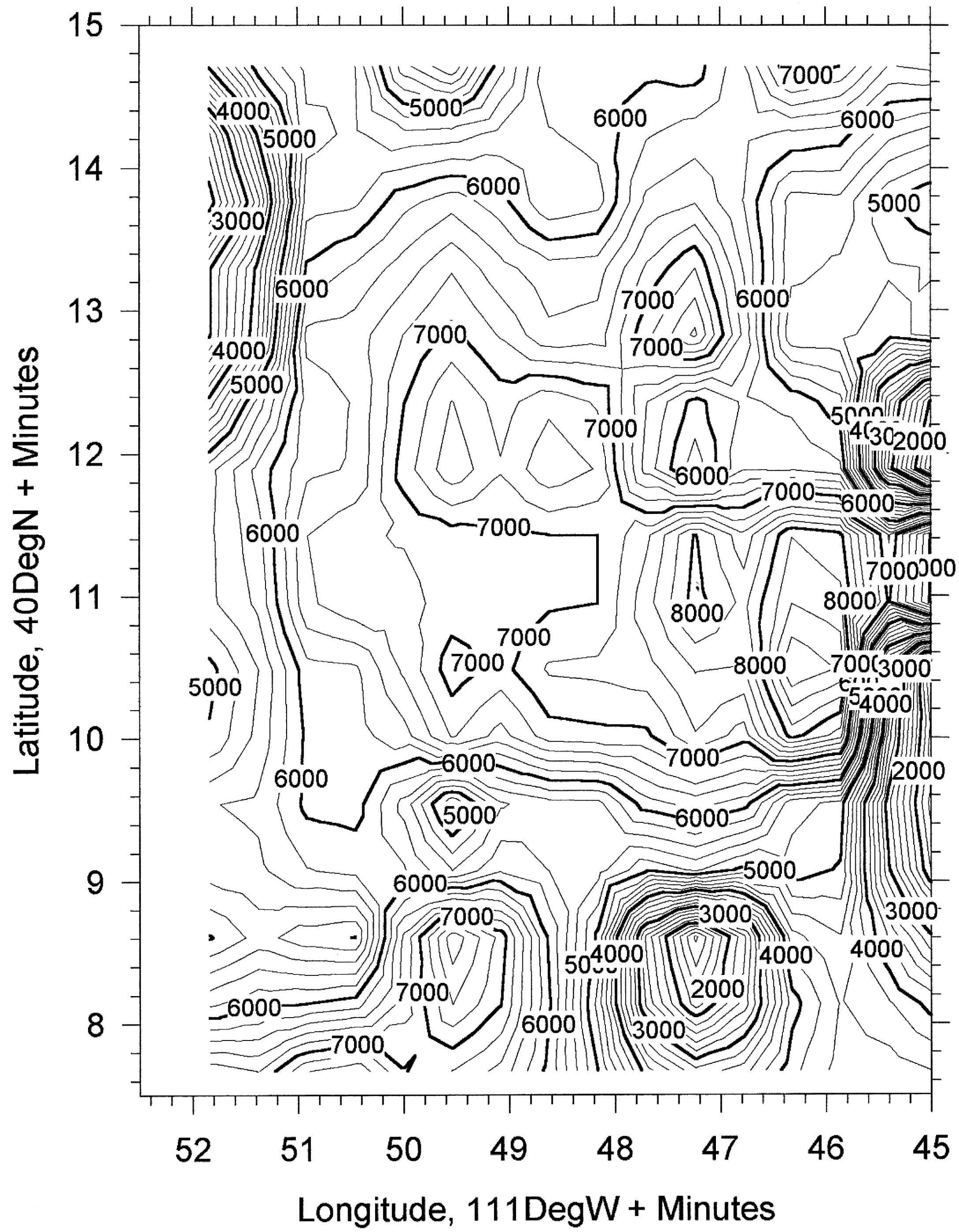
Co ppb. Utah Lake Sediments, Lincoln Point Quadrangle



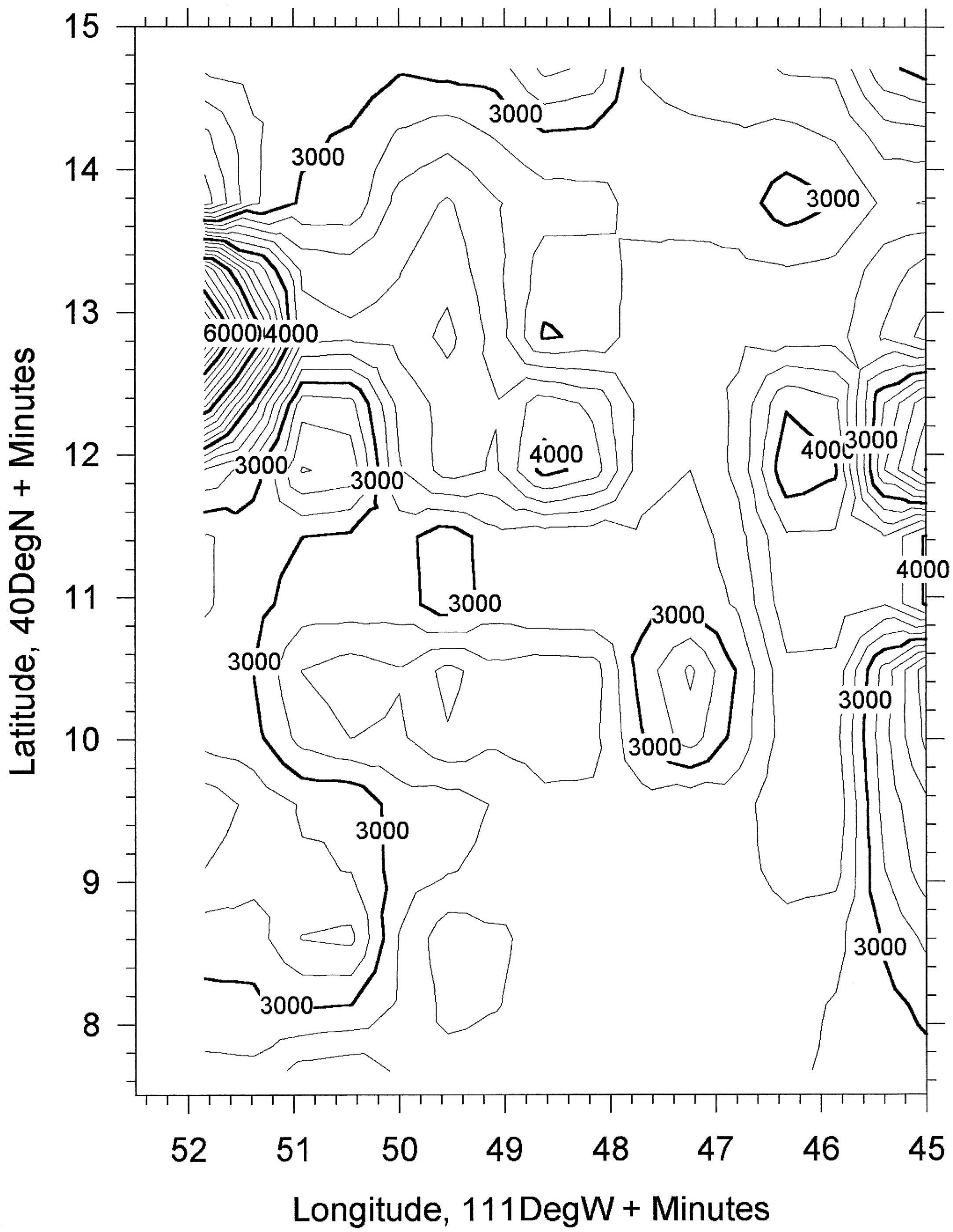
Ni ppb. Utah Lake Sediments, Lincoln Point Quadrangle



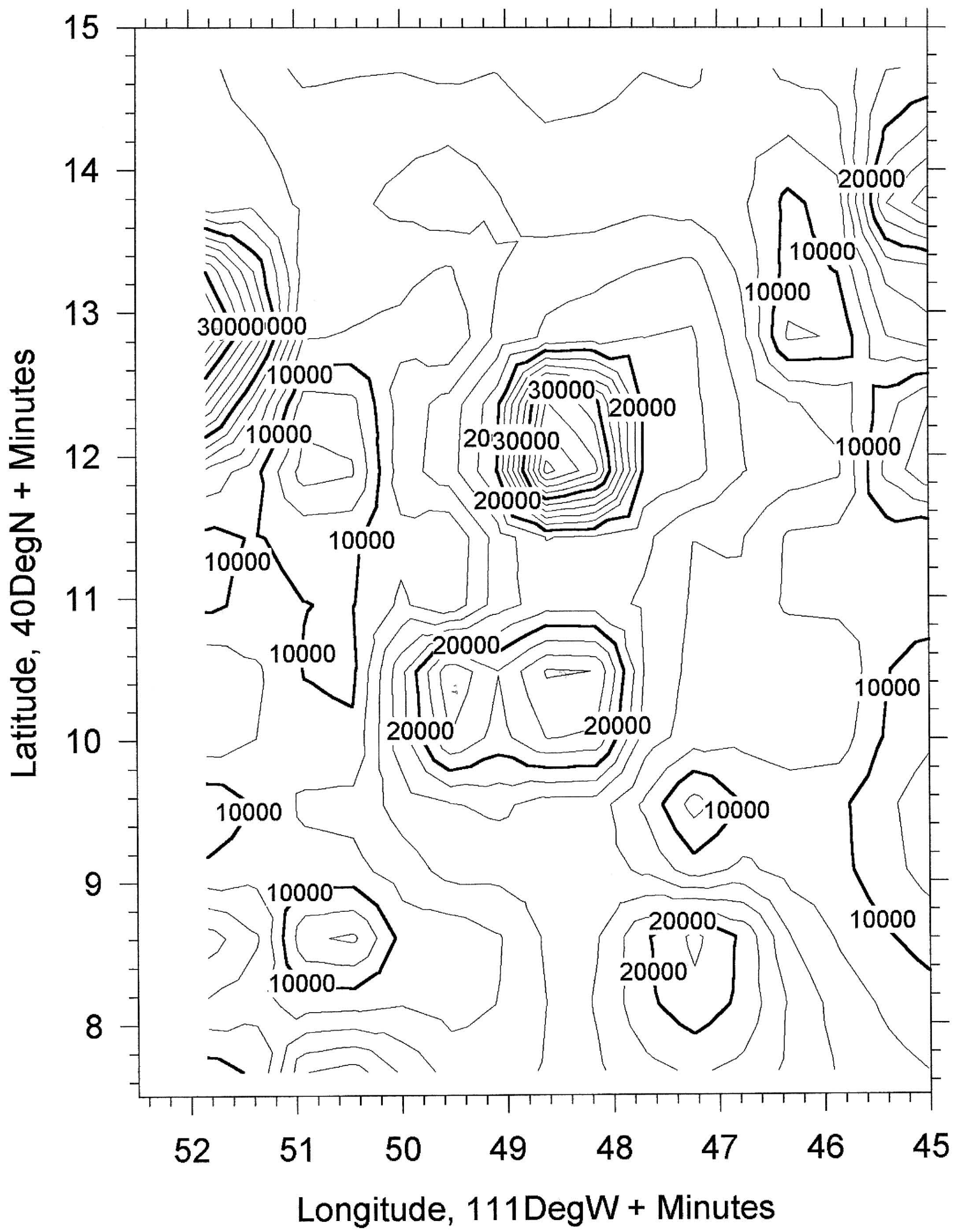
S ppm. Utah Lake Sediments, Lincoln Point Quadrangle



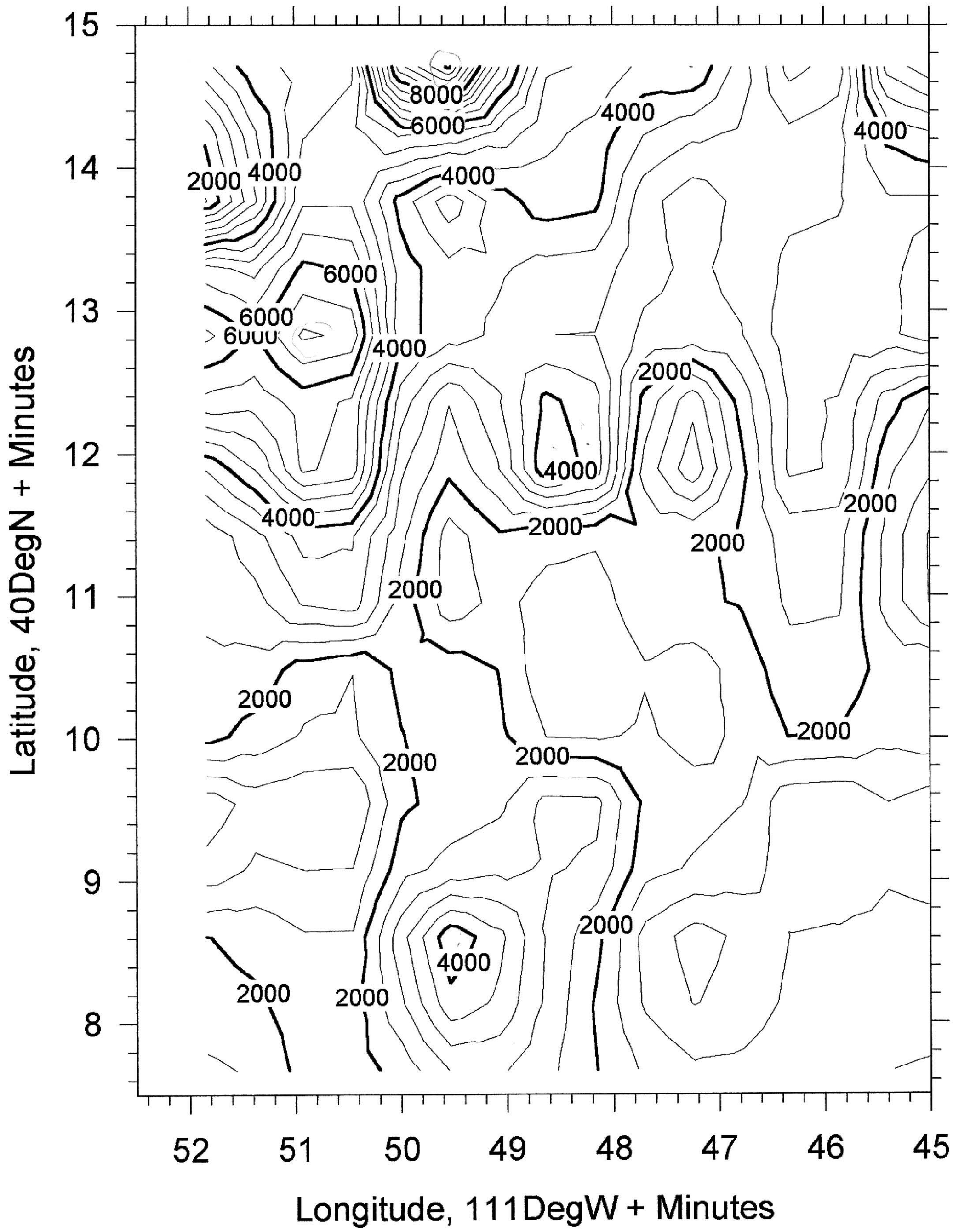
Cd ppm. Utah Lake Sediments, Lincoln Point Quadrangle



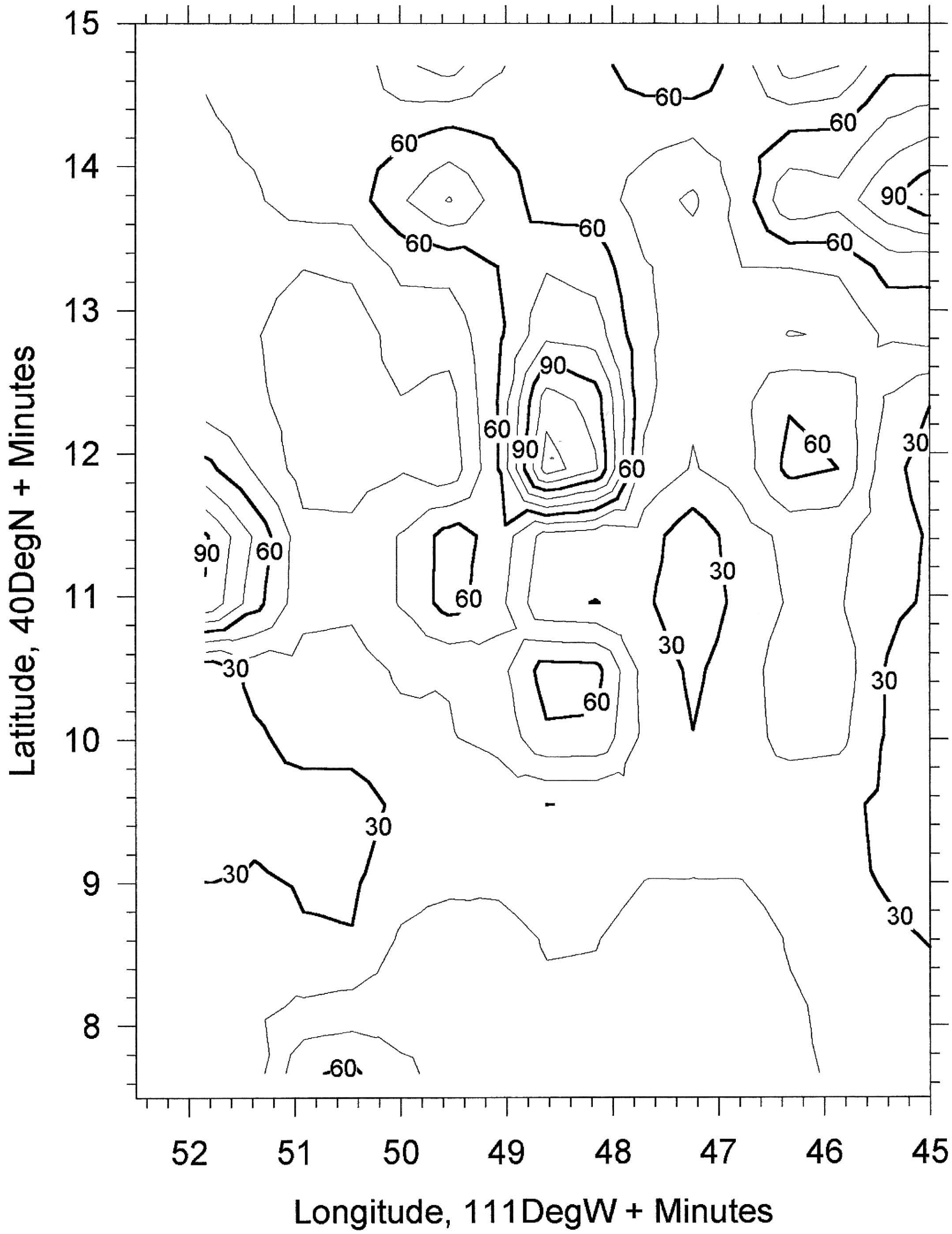
Pb ppb. Utah Lake Sediments, Lincoln Point Quadrangle



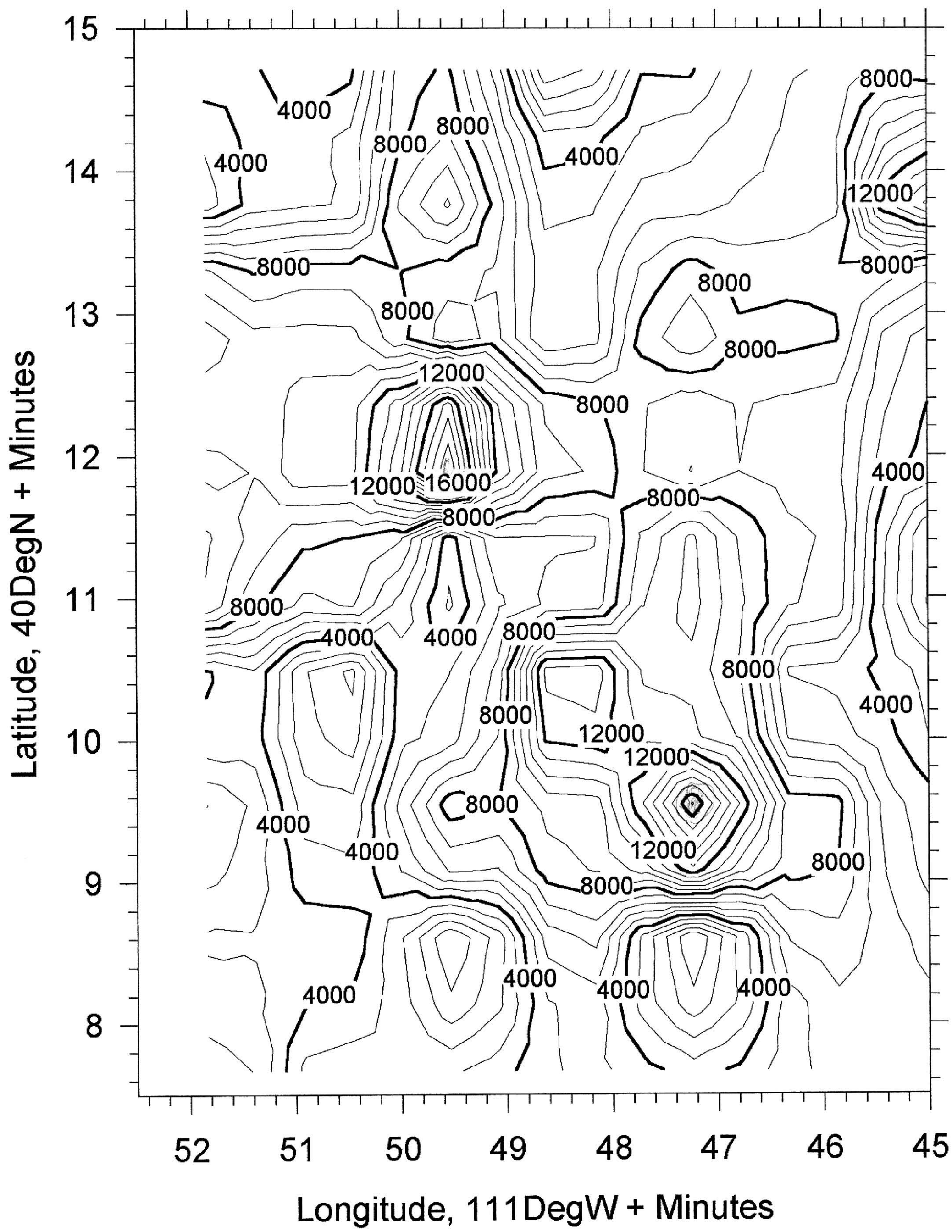
Se ppm. Utah Lake Sediments, Lincoln Point Quadrangle



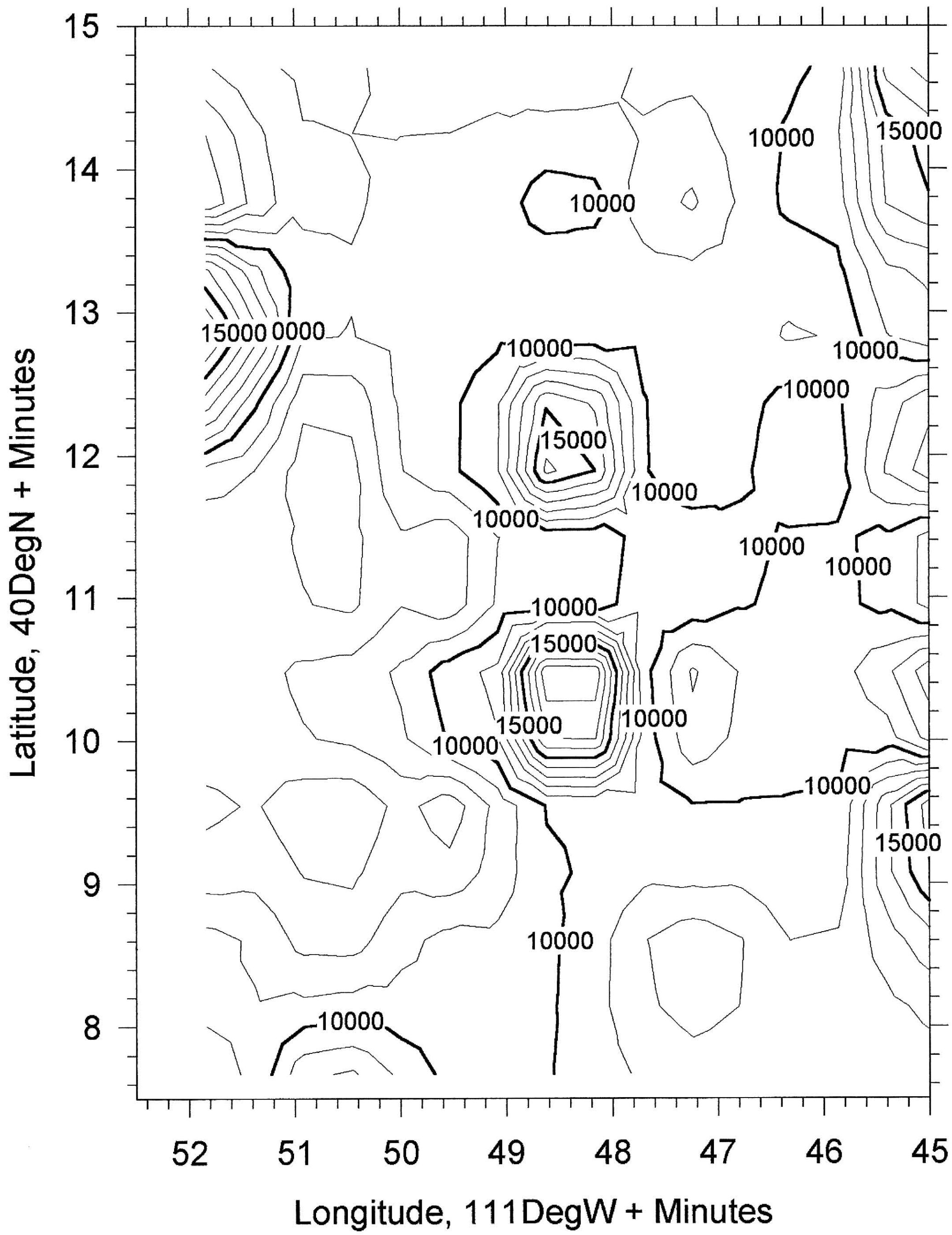
Hg, ppb. Utah Lake Sediments, Lincoln Point Quadrangle



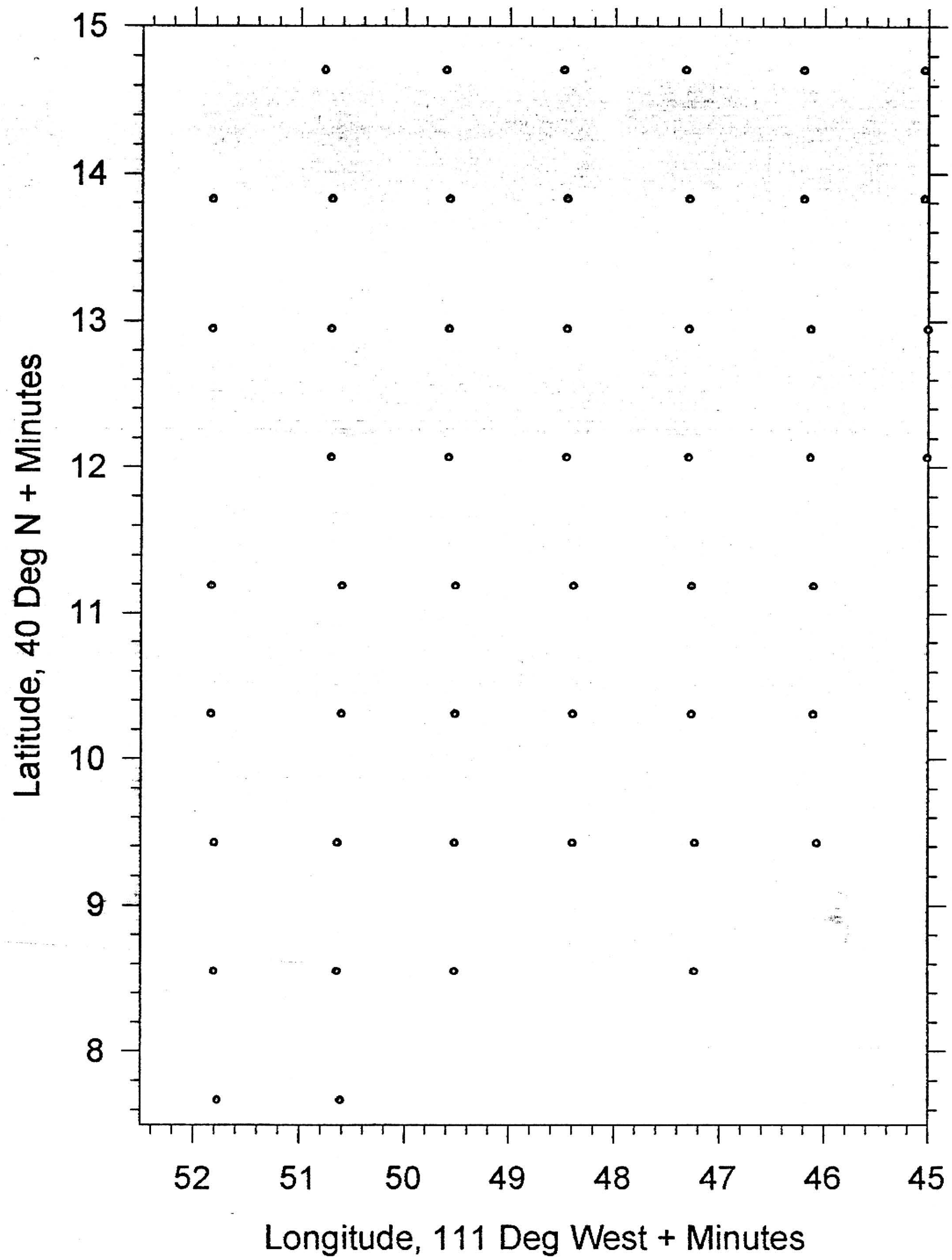
As ppb. Utah Lake Sediments, Lincoln Point Quadrangle



Cu ppb. Utah Lake Sediments, Lincoln Point Quadrangle

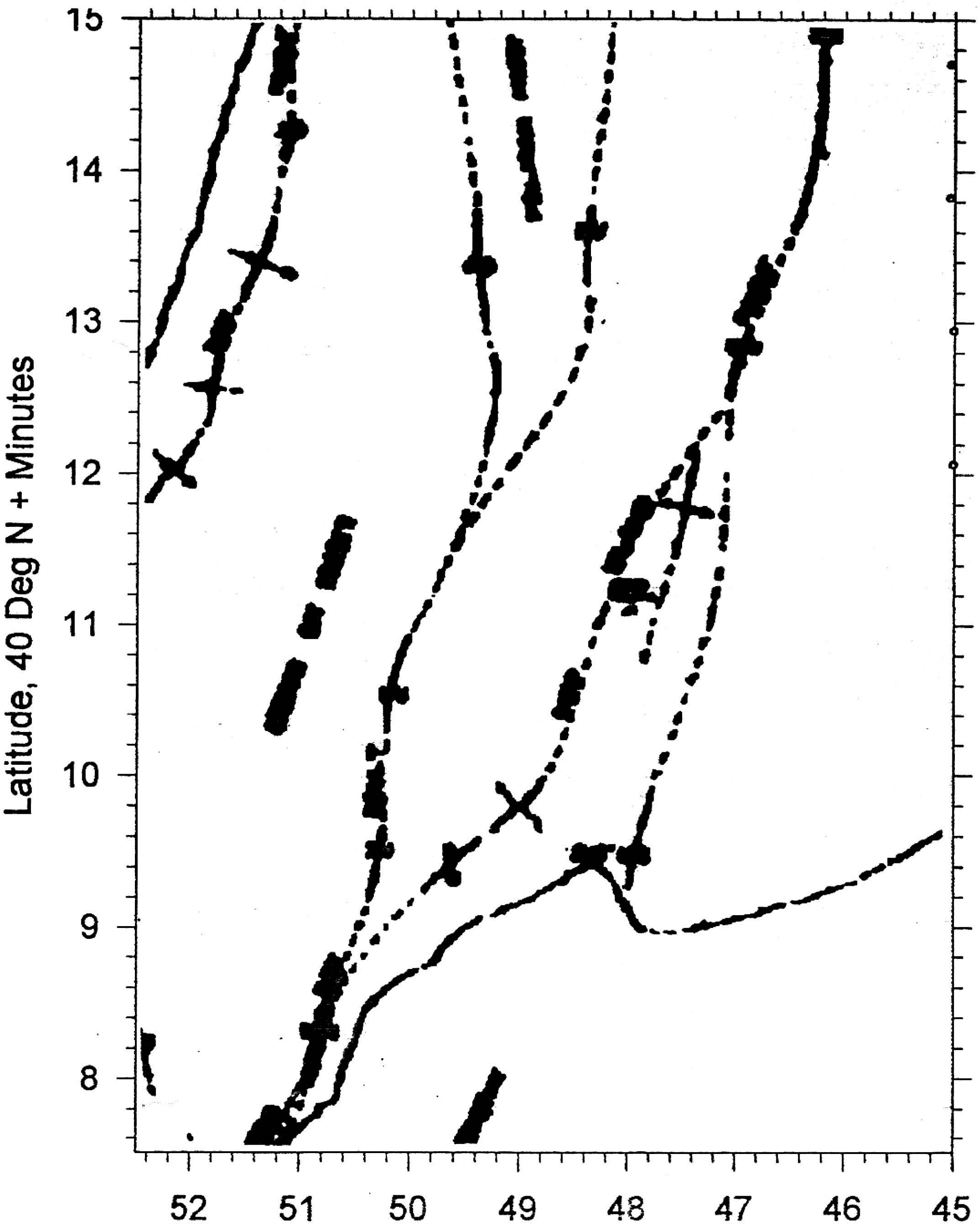


Sample Points, Lincoln Point Quadrangle



LAKE SEDIMENT SAMPLE SITES
Lincoln Pt. Quad., Utah.

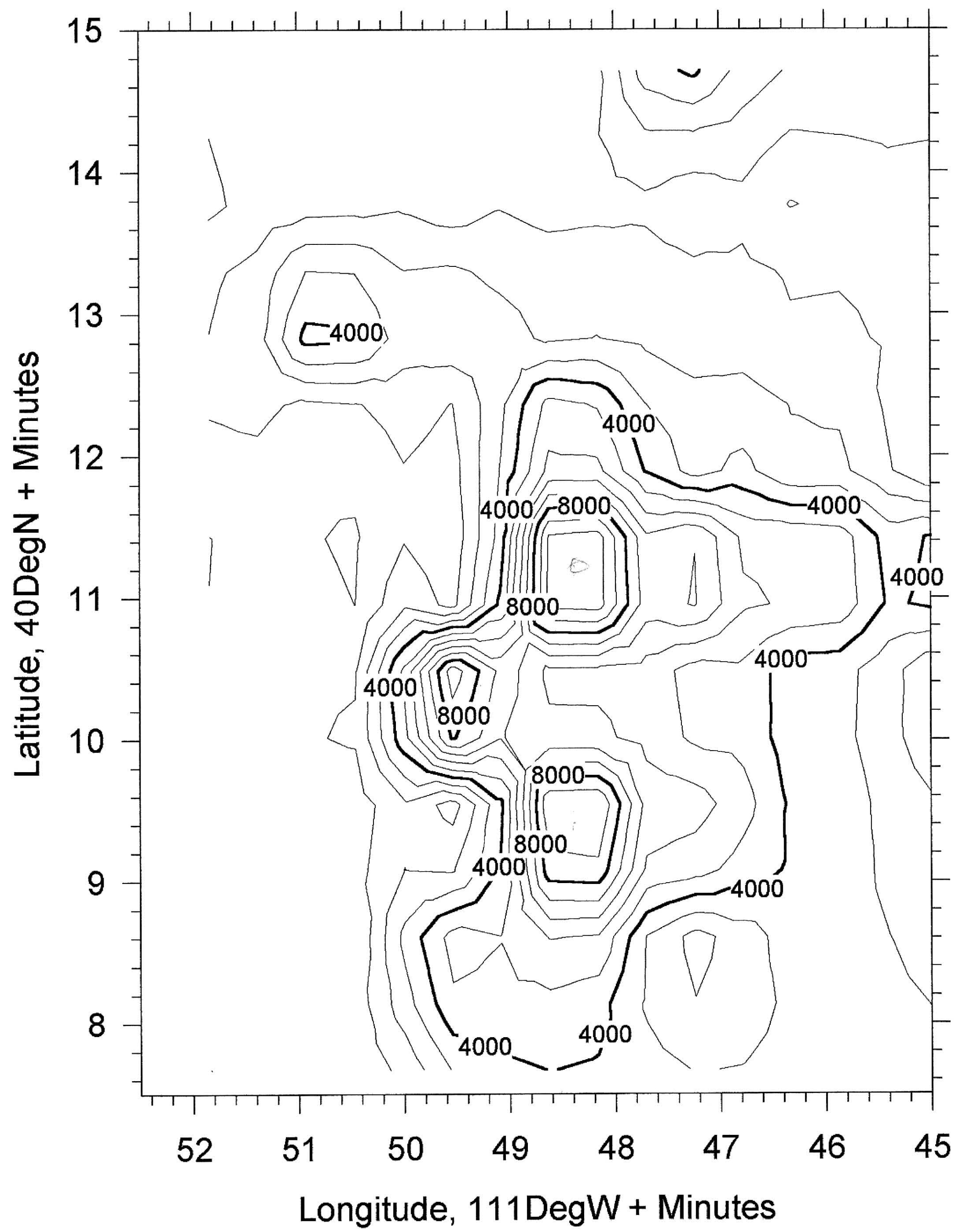
Untitled - 6



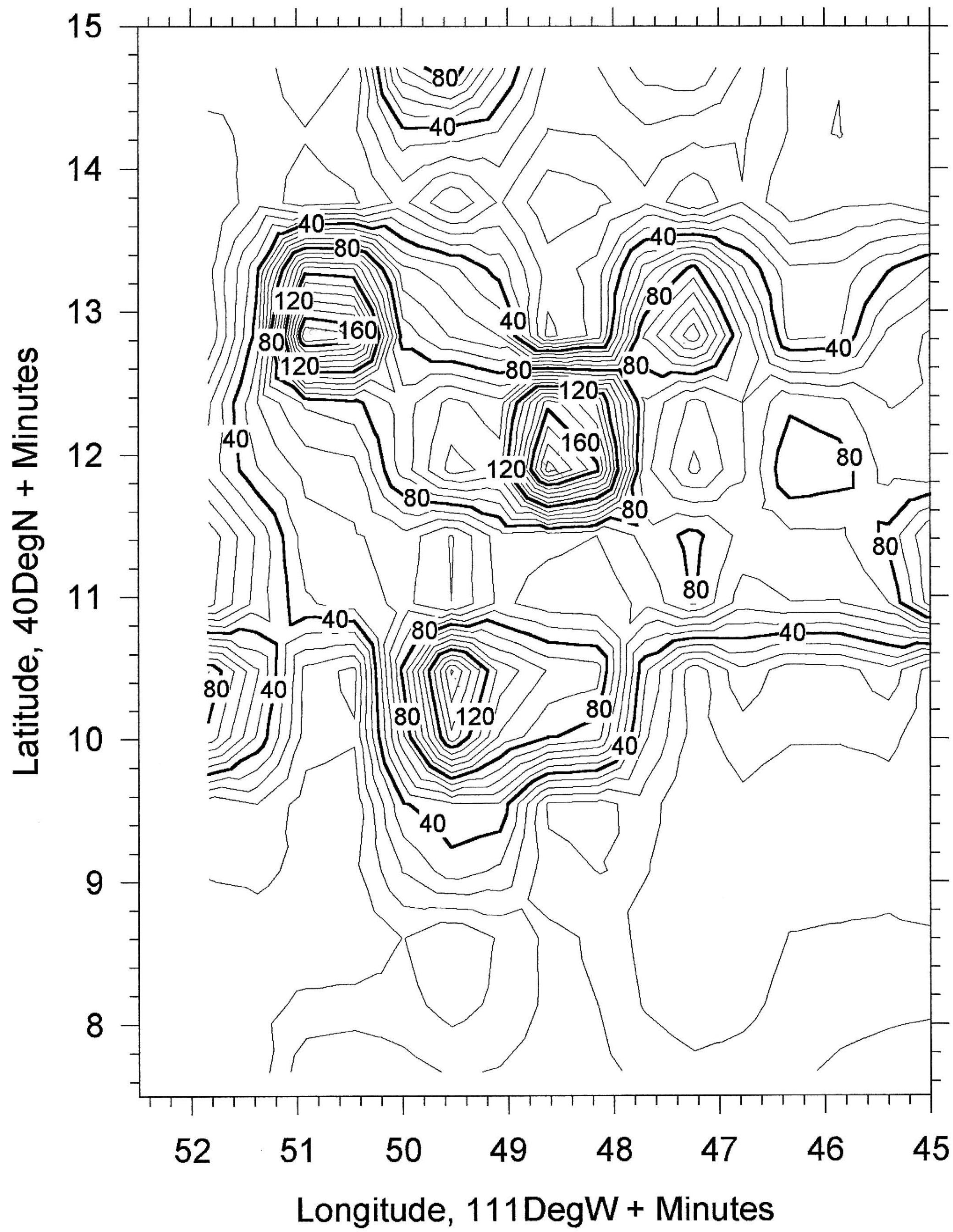
LONG., 111 Deg West + Minutes

Lincoln Pt. Quad. Utah

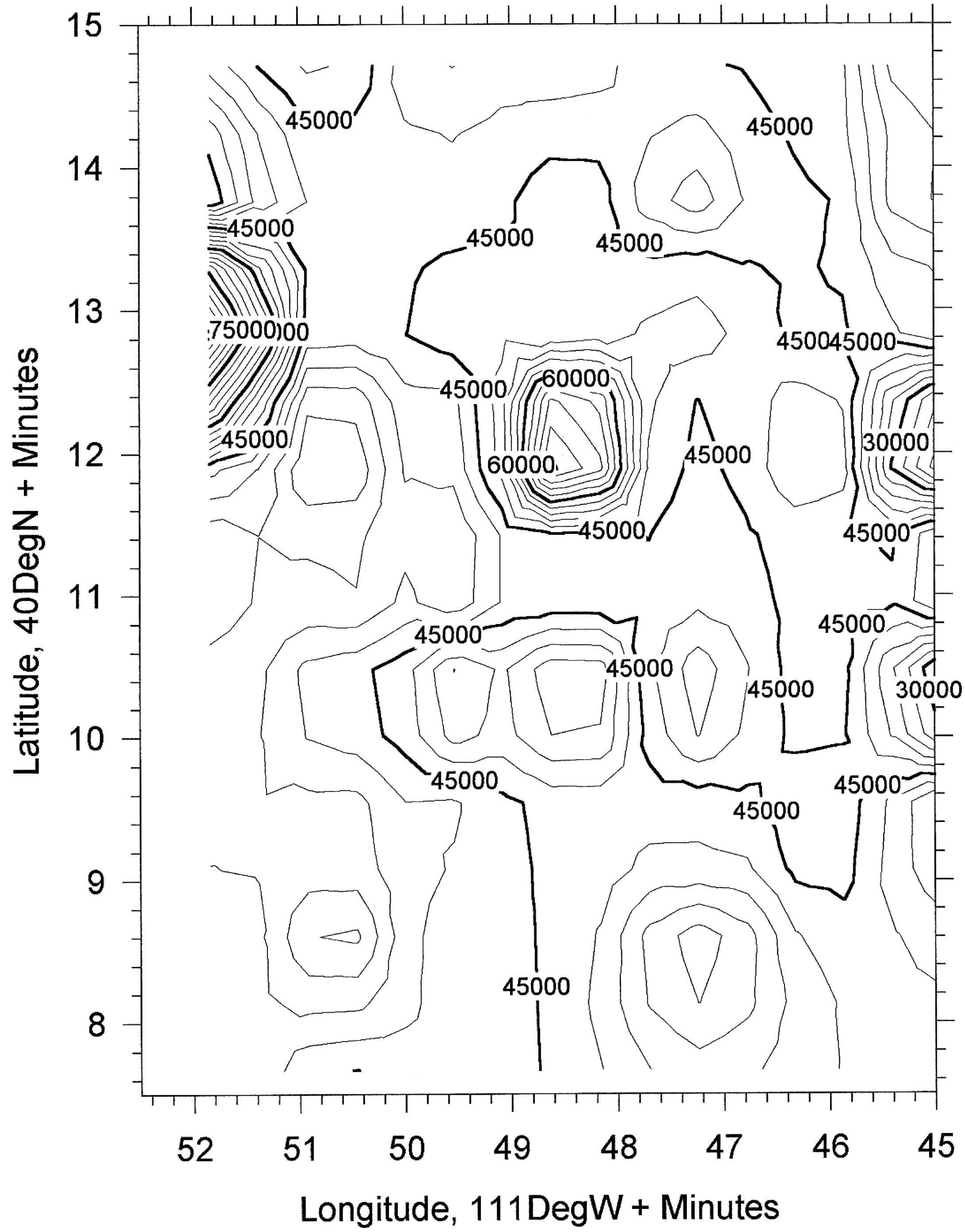
Au ppb. Utah Lake Sediments, Lincoln Point Quadrangle



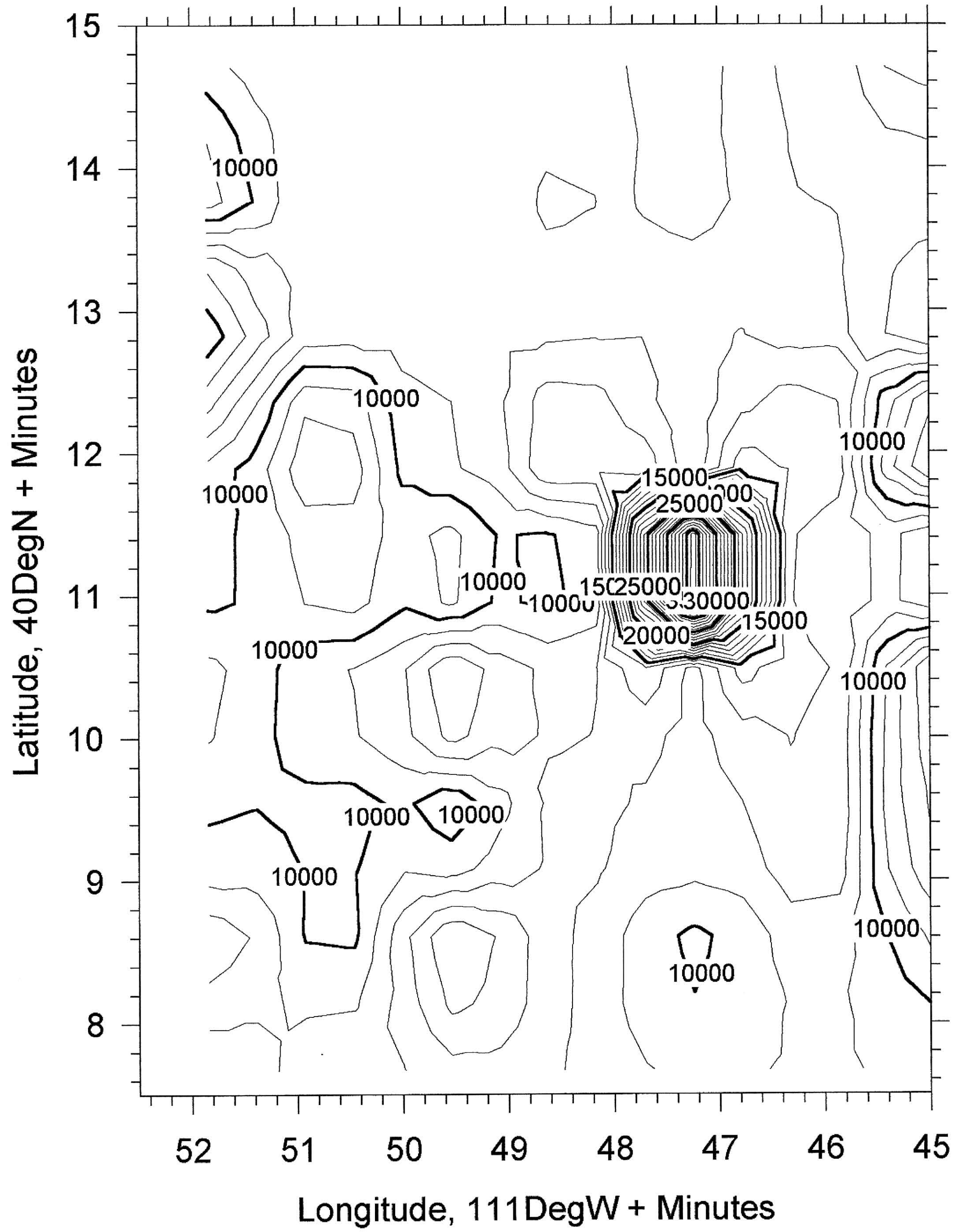
Ag ppb. Utah Lake Sediments, Lincoln Point Quadrangle



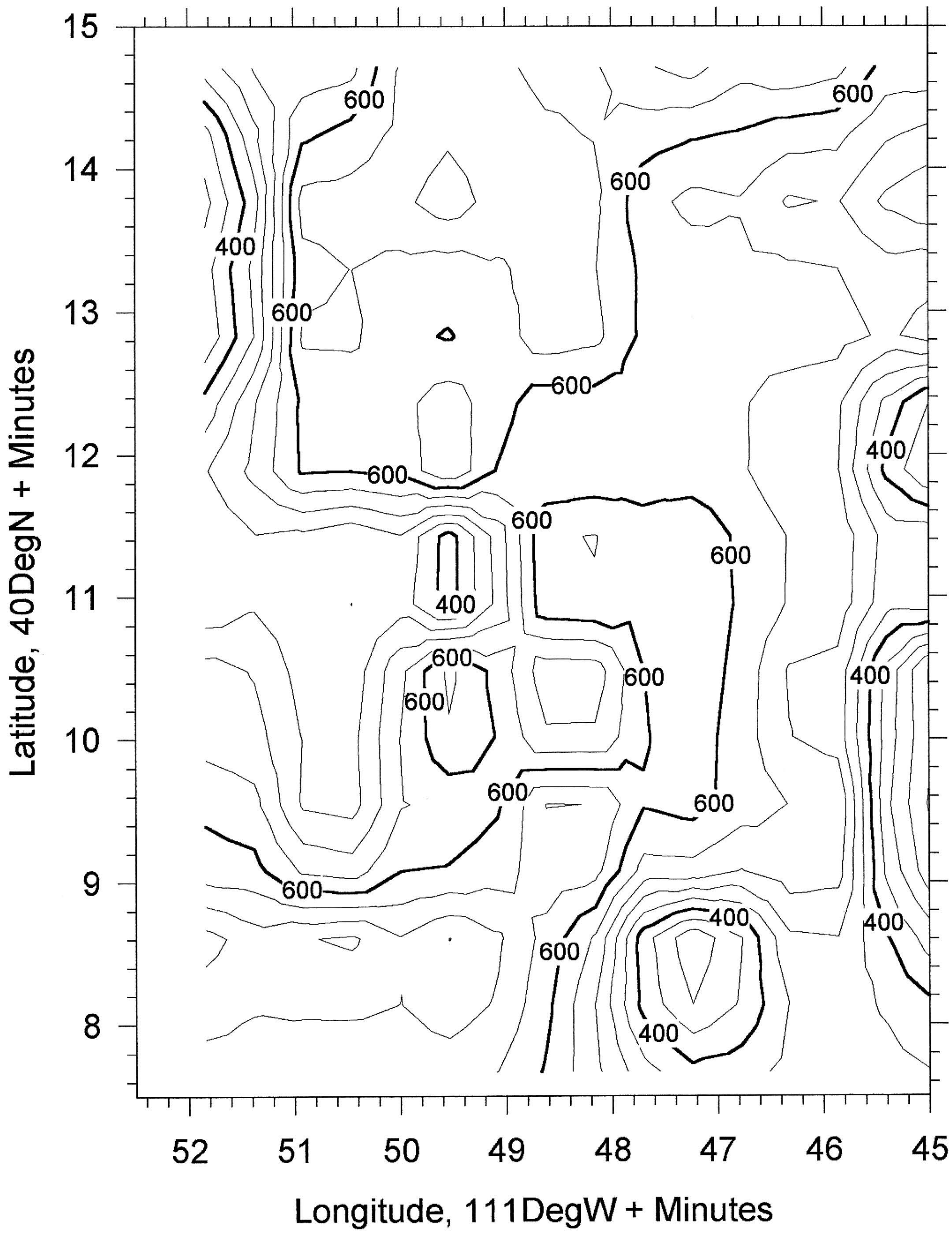
Zn pp~~m~~b. Utah Lake Sediments, Lincoln Point Quadrangle



Cr pp~~m~~b. Utah Lake Sediments, Lincoln Point Quadrangle

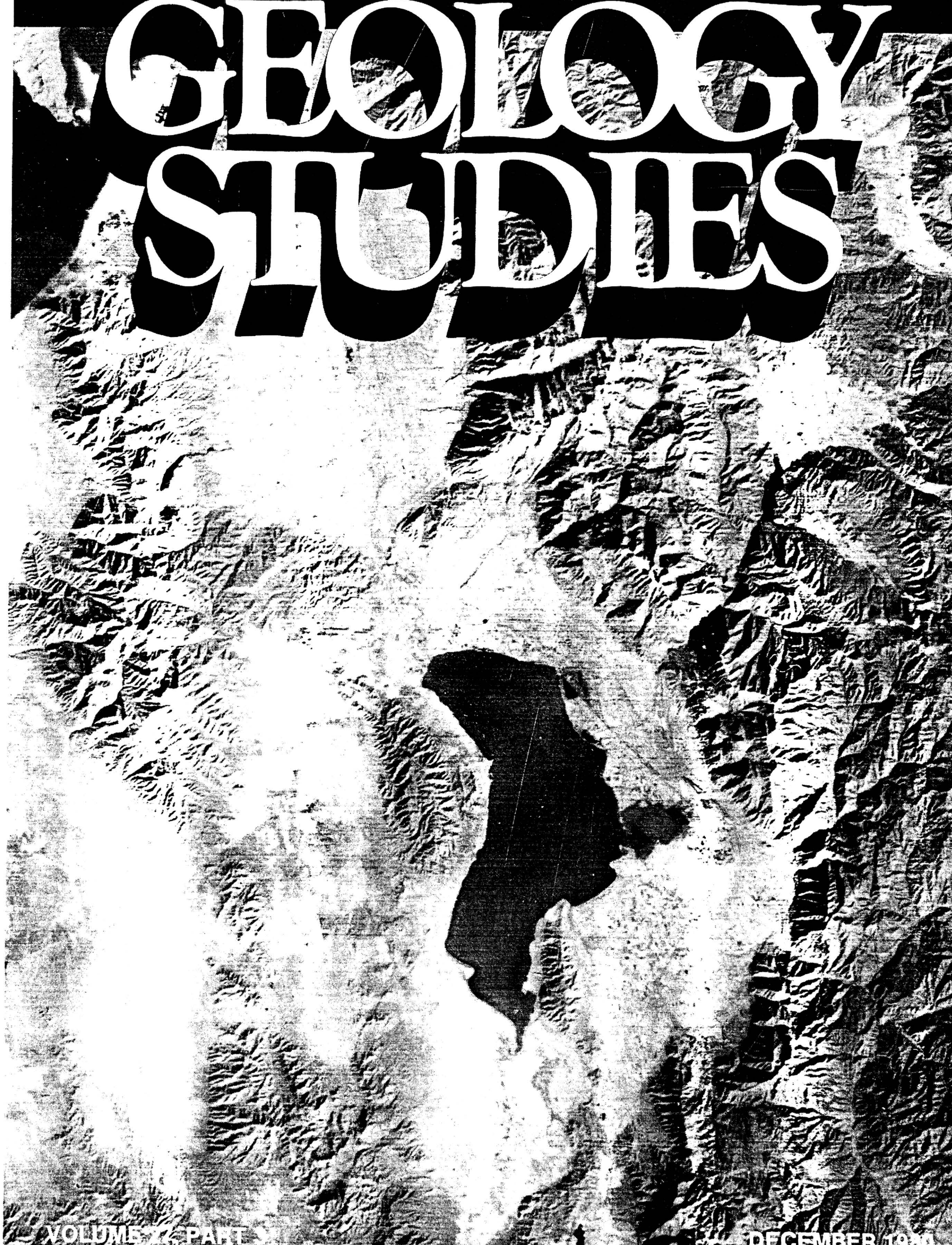


Ba ppm. Utah Lake Sediments, Lincoln Point Quadrangle



BRIGHAM YOUNG UNIVERSITY

GEOLOGY STUDIES



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DECEMBER 1980

Gilbert, G. K., 1877, Report on the Geology of the Henry Mountains: U.S. Ge Survey, Rocky Mt. Region, 166 p.
Gilluly, James, and Reeside, J. B., Jr., 1928, Sedimentary rocks of the San Rafael Sw and some adjacent areas in eastern Utah: U.S. Geol. Survey Prof. Paper 150 D 61-110.
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Recent History of Utah Lake as Reflected in Its Sediments: A First Report

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ABSTRACT.—A core sample of sediment, extending from the upper surface of the present lake floor to a depth of 520 centimeters has been analyzed chemically to determine the variations in concentrations of Ca, Fe, P, Na, and Al. The profiles reflect such major historical events as the major fluctuations of the water level, and the air and water pollution of the lake.

The data can be used to calculate average sedimentation rates in recent years. The average rate in the past 40 years is approximately 3.3 centimeters per year and is mostly associated with precipitation of calcite. From about 1885 to 1935 the rate was approximately 2.6 centimeters per year.

The lower section of the core indicates a very low level and a high salinity of the lake waters 200 to 300 years ago.

In general this study points out a potentially useful method for determining some of the recent histories of lakes, for determining sedimentation rates, and for obtaining other useful environmental data.

CONTENTS

INTRODUCTION

Sediments on the floor of Utah Lake reflect some of the history of the lake. Characteristics of each layer determine the physical conditions prevailing at the time of deposition, and since the layers are deposited on top of one another with the passage of time, it is possible to determine at least a portion of the history of the lake. Data from such samples are especially meaningful when time lines can be established which relate their characteristics to known historical events, especially those events associated with the settlement and urbanization of the land surrounding the lake.

The objective of the present study was to determine the chemical and mineralogical makeup of recent and near-recent sediments in Utah Lake. A suitable sample for a beginning was received from Mr. Robert F. Bolland, Department of Biology, University of Utah, who in September 1970 obtained a core of sediment, 10 centimeters in diameter, extending from the present surface of the lake bed to a depth of about 520 centimeters. The sediment sample consists of recent materials as well as some older materials deposited several hundred years ago, well before the settlement of the region. The sample obtained by Mr. Bolland was taken for the purpose of studying diatoms in the lake. He kindly consented to furnish materials for this study, which was begun in 1971.

The core sample was obtained from the lake bottom about two miles west of the shoreline adjacent to the Geneva Steel Plant.

The work herein reported is an integral part of a series of studies of Utah Lake conducted by the Center for Health and Environmental Studies at Brigham Young University. Such investigations include water chemistry and pesticide levels (Bradshaw et al., 1969, 1972) and biological characteristics of the lake (Eldredge, 1967; Hartman, 1970).

Previous studies on the sediments of Utah Lake have centered largely on particle-size distributions and mechanical properties (Bissell, 1942, 1963; Hunt et al., 1953).

A current engineering investigation related to the present study is the proposed Utah Lake diking project (Fuhriman et al., 1971).

PROCEDURE

The sample core is mostly monotone gray, fine-grained sediment above 460 centimeters (Text-fig. 1). It consists mainly of calcite diluted by clay and minor amounts of quartz and other materials. Below 460 centimeters the sediment is composed principally of medium-grained quartz sand with a minor amount of silt. A thin layer of peat occurs within the sand layers at a depth of 490 centimeters.

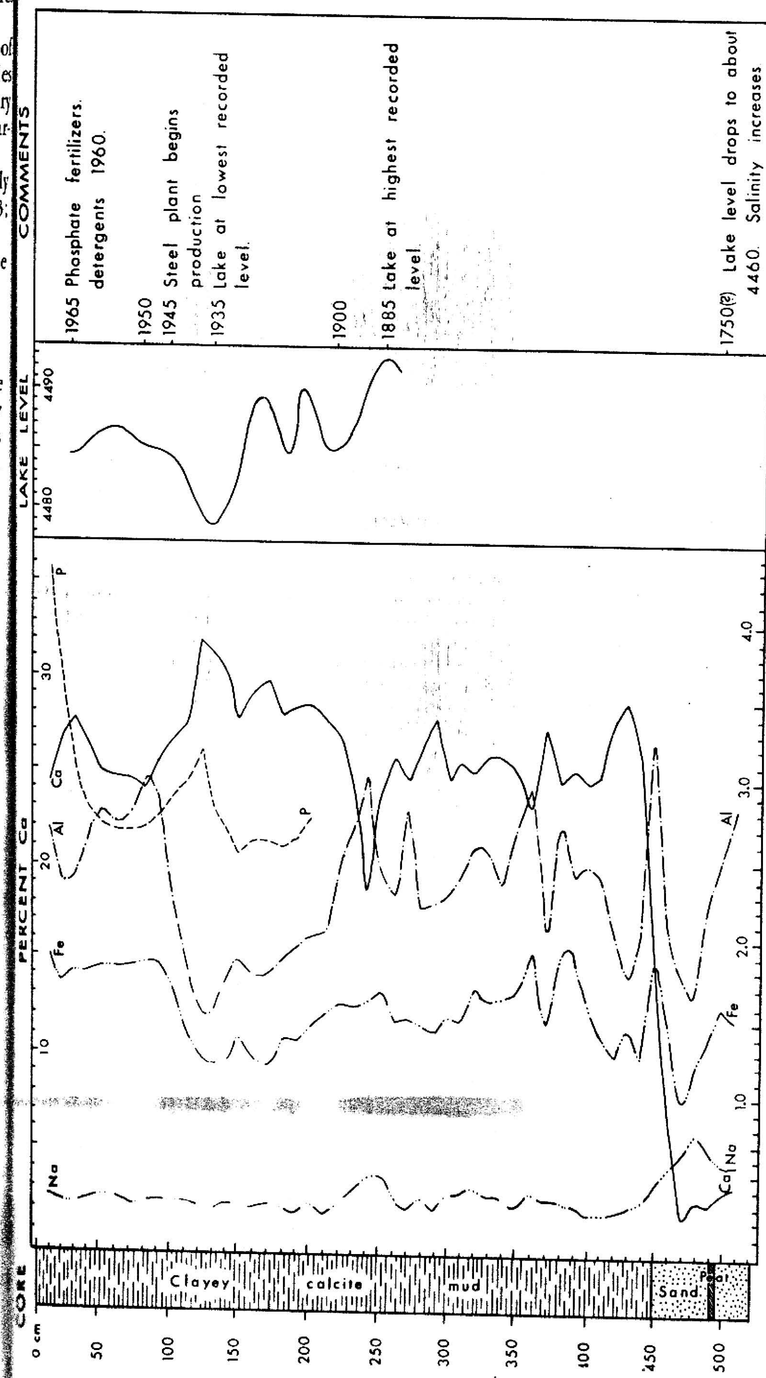
Ca and Al were selected as most representative of the two principal components, calcite and clay. Na was selected as an index to salinity of the lake but (as is shown later) was useful only in a single instance. Fe and P were selected as two elements which might be useful for establishing time lines in the sediments because of the airborne iron oxides emanating from the open-hearth furnaces of the Geneva Steel Plant since about 1945, and because of the widespread use of phosphate fertilizers and detergents in Utah Valley beginning about 1960.

To obtain profiles of these elements, one-gram samples were taken from each 10-centimeter interval of the core, beginning at the top. These samples were dissolved in HF-$HClO_4$ mixed acid to obtain a solution of the contained metals. The resulting solutions were analyzed by atomic absorption spectrophotometry for Ca, Na, and Fe.

Separate samples of sediment were digested in concentrated HNO_3 to dissolve phosphate. The solution containing phosphate was subsequently removed from the insolubles and was precipitated as phosphomolybdate, which in turn was isolated and subsequently dissolved in ammonium hydroxide. P was determined indirectly by measuring Mo with atomic absorption spectrophotometry. Because of the labor involved in the procedure, only the upper portion of the core was analyzed for P.

RESULTS AND DISCUSSION

Profiles of concentrations of the elements are plotted in Text-figure 1. The Ca profile is of prime interest because the sediments of the lake consist mainly of calcium carbonate. The profile demonstrates a peak of 33% Ca at 120 centimeters, and a low of 18% at 240 centimeters. These percentages correspond to 82% and 45% calcite, respectively. It is reasonable to associate the peak at 120 centimeters with the lowest level of the lake in 1934-35, when precipitation of dissolved matter should have been at a maximum



TEXT-FIGURE 1.—Utah Lake sediment sample and associated profiles.

The low at 240 centimeters is assigned to the highest levels of the lake, which occurred in 1885. Since data of the yearly fluctuations of lake level extending to 1884 (Jordan River Pump Station, 1960) are available, the lake level as a function of time can be tied to the Ca profile as a function of time by use of the dates 1885 and 1935 mentioned above. This data is plotted in the upper right-hand corner of Text-figure 1. Note that the minor variations in both profiles are matched rather well: when the lake rises, Ca concentration in the sediment falls, and when the lake drops, the Ca rises. These regularities strongly suggest the correctness of the time assignments, and other data also support them.

Iron concentration in the sediments increases markedly at a depth between 80 and 110 centimeters. A plausible reason for the increase is the introduction of airborne iron-oxide dusts to the lake from the nearby Geneva Steel Plant, which began operation about 1945. Since that time, orange red dusts from the open-hearth furnaces have blanketed the vicinity with iron oxide and other effluents. Moreover, the marked increase of P near the top of the profile at about 20 centimeters depth is probably due to the increased use of phosphate fertilizers and detergents, beginning about 1960.

These data suggest that the time lines established in the upper section of the core are substantially correct. That portion of the core below about 300 centimeters can be assigned to presettlement times. Thus far it has not been possible to assign time lines in this section. However, the marked decrease in the element profiles at about 450 centimeters is due to a change of sediment composition from calcitic mud to quartz sand, presumably deposited along a shoreline established during an exceedingly low level of the lake about 250 years ago. If this interpretation is correct, the climate at this time must have been much drier than at present.

The foregoing data permit calculation of sedimentation rates—at least on a preliminary basis. Between 1935 and 1965, 100 centimeters of sediment accumulated—at an astonishingly high average rate of 3.3 centimeters per year. Between 1885 and 1935, 130 centimeters accumulated—at an average rate of 2.6 centimeters per year. The higher rate in later years probably can be attributed to increased inputs of sediments transported to the lake as solids and salts from agricultural and, later, from urban development. The principal component is calcite, which averages somewhat more than 60% of the sediment.

Projection of the recent sedimentation rate suggests that the lake, now at an average depth of about eight feet, or 240 centimeters, has an expected life of about 75 years! At that time, if present sedimentation rates are correct and continue, Utah Lake will be a mud flat.

It is not presently known whether the calculated rate is typical of the entire lake. The area from which the sample core used in this study was taken is located adjacent to no major drainages which might flush in unusually large amounts of sediment. Moreover, the main component of the sediment appears to be chemically rather than mechanically precipitated—calcite predominates over clay. Reference to the profile of Al in the core shows that it has an almost perfectly inverse trend to Ca. An increase of Ca corresponds to increased deposition of calcite, which "dilutes" the accompanying clay fraction containing Al. Since the major component of the sediment is calcite, accounting for the high rate of sedimentation is the same as accounting for the source of calcite. Ca is moved to the lake both as dissolved salt in surface and ground water and as detrital calcite entrained in muddy water draining into the lake. The relative importance of these sources is not yet assessed.

PRESETTLEMENT HISTORY

The presence of sand in the interval 540-520 centimeters, an enclosed layer of peat at 490 centimeters, and the rapid rise in the Na concentration of the sediment indicate a drastic lowering of the level of Utah Lake and a large increase in its salinity. The sand and peat can be explained only by a lakeward migration of the shoreline, and the thickness of 70 centimeters for these sediments indicates a prolonged stay at that level.

If the sedimentation rate of 2.6 centimeters per year previously determined for the interval from 1885 to 1935 is extrapolated, the lowering of the lake took place about 1750. It is likely, however, that the sedimentation rate was somewhat lower in presettlement times and that the low stand of the lake took place sometime around the year 1700. In 1776, Father Escalante, one of the first white men to visit Utah Lake, noted its shoreline and the fine quality of its water. (Auerbach, 1944, p. 69.) The low stand must have taken place before this time.

The core sediments provide perspective on the history of the lake. It is commonly said these days that man has degraded the lake and its surroundings. It appears equally true, however, that nature did the same thing, and on a grander scale, a few hundred years ago. It is equally clear that nature restored the lake by the time the first white men came into the region. It is easily seen that it is an oversimplification to ascribe all environmental deterioration and restoration to the agency of man: nature degrades and nature restores, too. Such relationships are seen more clearly by studies such as this one, which is cast into a historical framework covering several hundred years or more.

FUTURE WORK

The present study is based on a single core sample. The degree to which it represents the lake as a whole is as yet unknown. It seems imperative that at least a dozen more cores be taken from the length and breadth of the lake for further and more detailed examination. Some questions to be answered include (1) Are the high sedimentation rates found in this study typical of the whole? (2) What was the history of the lake beyond several hundred years ago? (3) What biological changes accompanied the low stand of the lake several hundred years ago? (4) What are the major sources of calcite in the lake sediment? (5) Is groundwater one of those major sources? (6) What is the expected life of the present lake basin? (7) How long will it be before the basin fills up with sediment? Future studies will be aimed at providing answers to these questions.

CREDITS

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Department of Geology at Brigham Young University. Mr. Robert F. Bolland Department of Biology, University of Utah, took the core and made samples available.

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Pennsylvanian Sponges from the Oquirrh Group of Central Utah

J. Keith Rigby[1] and A. Jaren Swensen[2]

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[2]*Kennecott Copper Corporation, Bingham Canyon, Utah.*

ABSTRACT.—The new sponge, *Belemnospongia neofascicularis,* is figured and described from middle Pennsylvanian beds in the Oquirrh Group of the Oquirrh Range in central Utah. Root tufts and dissociated hexactinellid sponge spicules are also figured and described from Pennsylvanian Oquirrh rocks in the Oquirrh and Wasatch ranges of Utah.

CONTENTS

INTRODUCTION

Isolated reports of sponge spicules have been made by several workers during investigation of the exceedingly thick Oquirrh Group of central Utah, but no sponges have been described previously from the section. Several sponges and spongelike fossils have been recently collected from the middle part of the group in the Oquirrh Range by Jaren Swensen and from nearly equivalent beds 30 miles to the southeast, in Provo Canyon, in the Wasatch Range, by J. Keith Rigby and students, including William Brooks, from Brigham Young University.

SYSTEMATIC PALEONTOLOGY

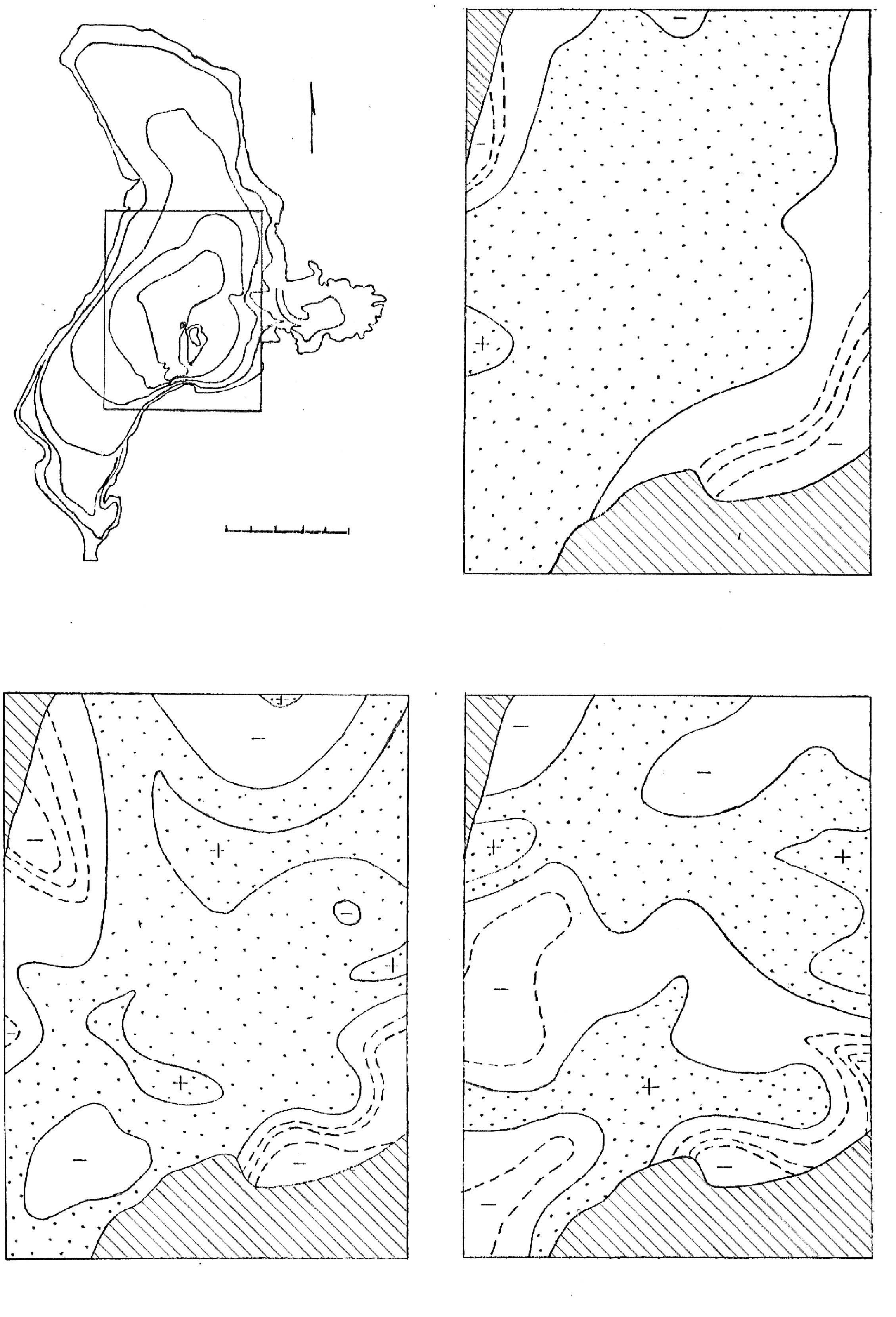
Phylum PORIFERA Grant, 1872
(?) Class DEMOSPONGEA Sollas, 1875
(?) Order EPIPOLASIDA Sollas, 1888
(?) Family CHOHDAE de Laubenfels, 1955
Genus BELEMNOSPONGIA Ulrich, 1889

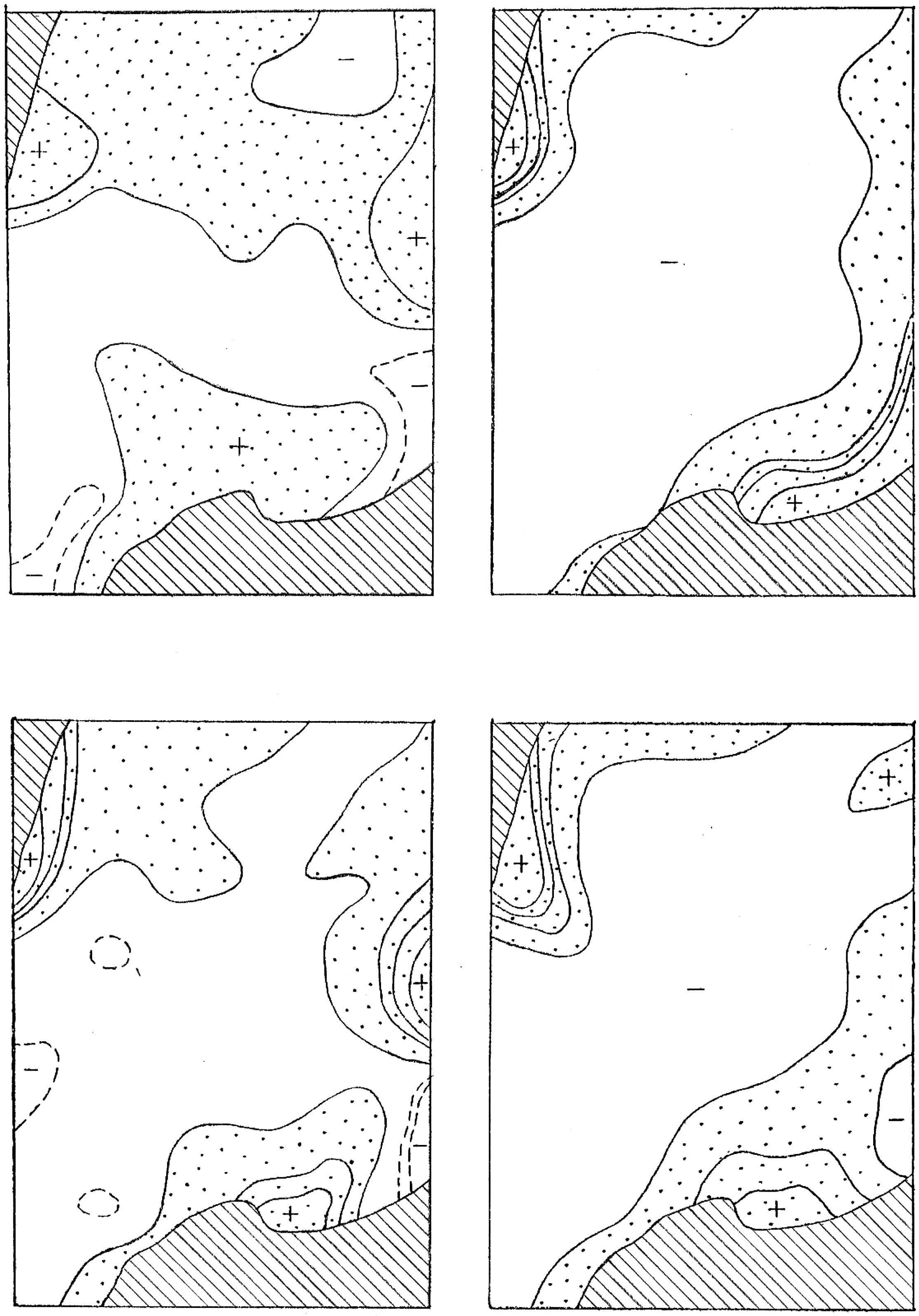
BELEMNOSPONGIA NEOFASCICULARIS n. sp.

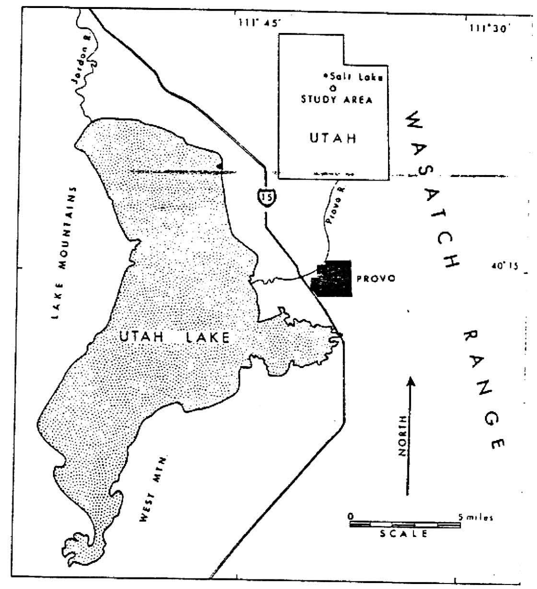
Plate 1, figs. 1-3

Diagnosis.—Low conical to wrinkled funnel-shaped sponge with small spicules strongly clustered in distinct, widely spaced bundles radiating outward from basal area. Spicules diactine, joined to one another by rare short processes.

Description.—The several specimens at hand are low funnel-shaped to broadly conical sponges with circular to slightly elliptical outlines as viewed from above. They range from 20 to 25 mm in diameter and are 3 to 4 mm high. The outer edge of each is bounded by markedly elongated bundles of spicules. At their maximum diameter, near their outer terminations, these bundles or "fascicules" are from 0.3 to 1.0 mm across. They are spaced from 0.5 to 1.0 mm apart at the outer margin, where most are most strongly bundled. In cross section the bundles show great numbers of spicules, ranging from a minimum







TEXT-FIGURE 1.—Index map.

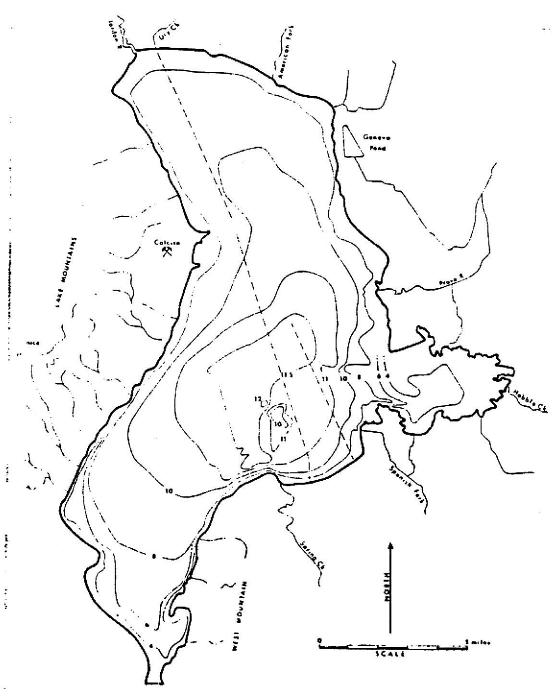
acre-feet of water, loses 330,000 acre-feet of water annually through evaporation, and receives 600,000 acre-feet of water annually. Because its average depth is only 6 to 8 feet, the lake is hazardous in stormy weather: the troughs of waves may bottom out in the lake sediments and capsize a boat. The water is usually warm enough for the ice to be off the lake by late March, although Bissell (1942) reports that work can be done through the ice before it gets too thin.

Purpose and Scope

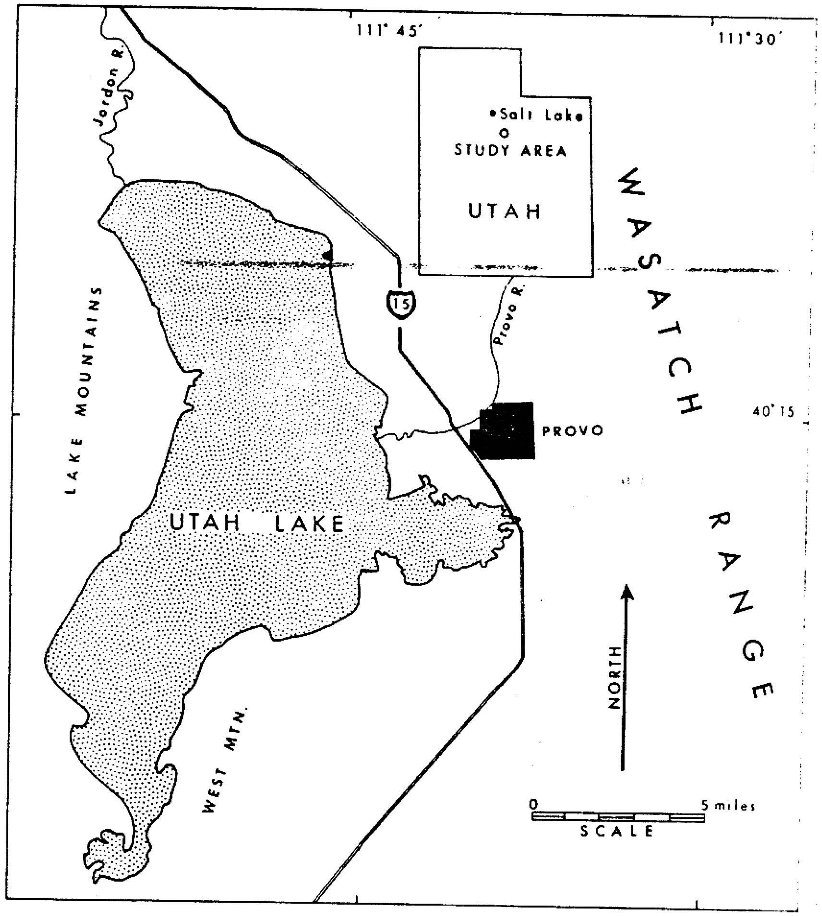
The purpose of this paper is to determine the broad patterns of mineral distribution on the lake floor in preparation for more detailed study of the chemistry and mineralogy of the sediments. The major metals composing the uppermost 12 inches of lake sediments were quantitatively measured, and some selected normative minerals were calculated from these data. The mineral distributions were mapped by multivariate regression methods (trend-surface maps) using computer facilities at Brigham Young University.

Previous Work

The bulk of geologic work on Utah Lake consists of preliminary studies of bottom sediments by Bissell (1942) and Brimhall (1972). Several studies have been done on the water chemistry, but the samples are restricted to about 24 stations (Bradshaw, 1969).



TEXT-FIGURE 2.—Bathymetric and source map, Utah Lake, showing contour interval in feet. Surface of lake 4488 feet above sea level. Dashed lines are inferred faults.



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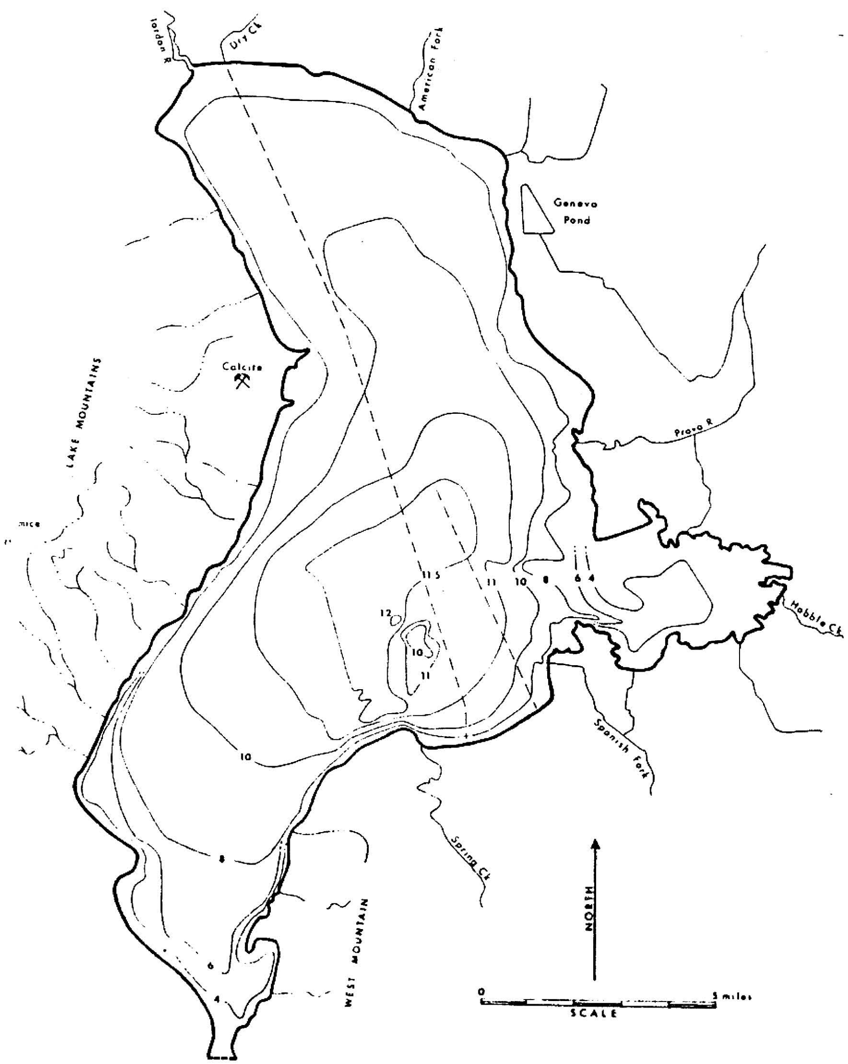
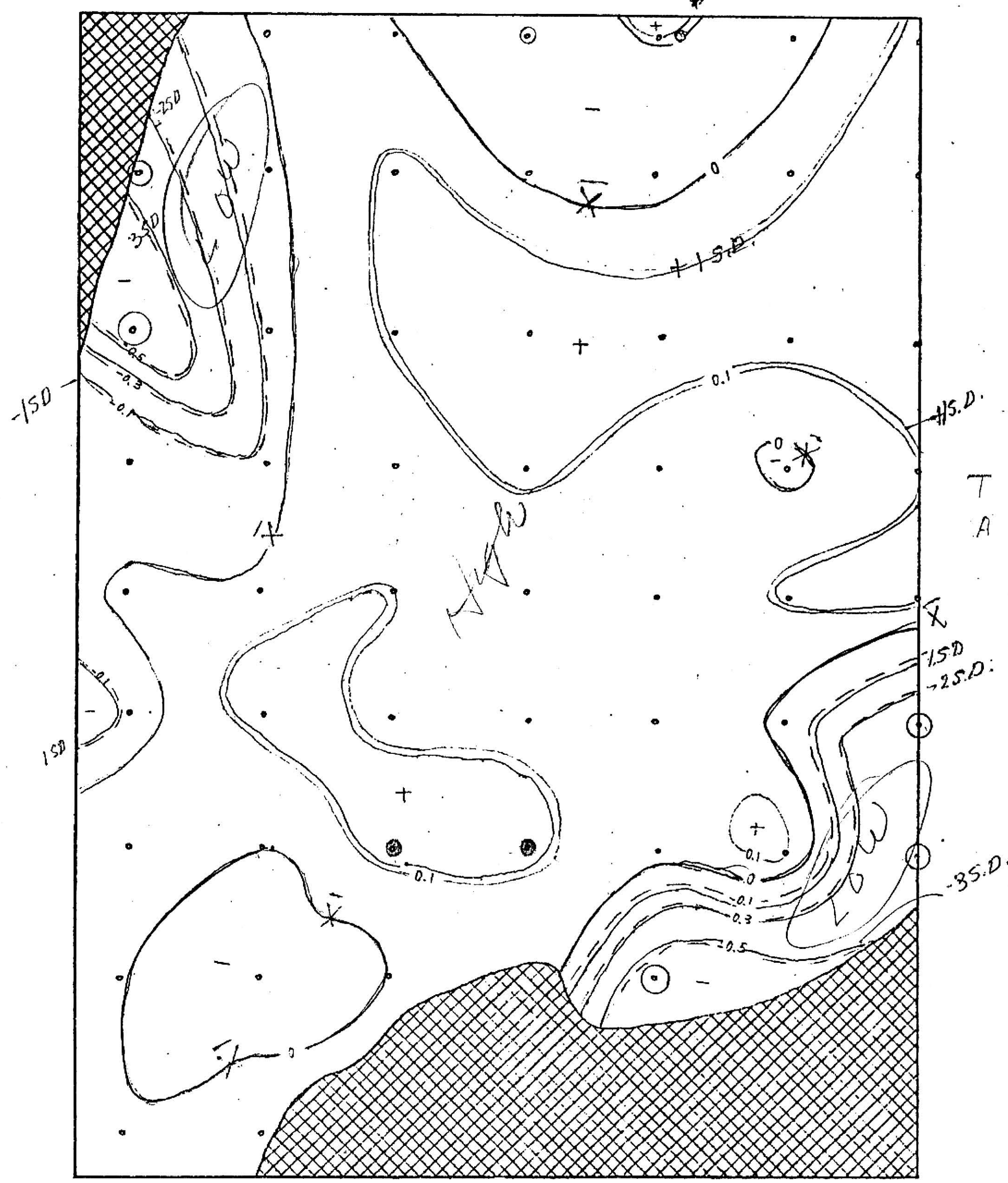


XT-FIGURE 2.—Bathymetric and source map, Utah Lake, showing contour interval in feet. Surface of lake 4488 feet above sea level. Dashed lines are inferred faults.

Mg



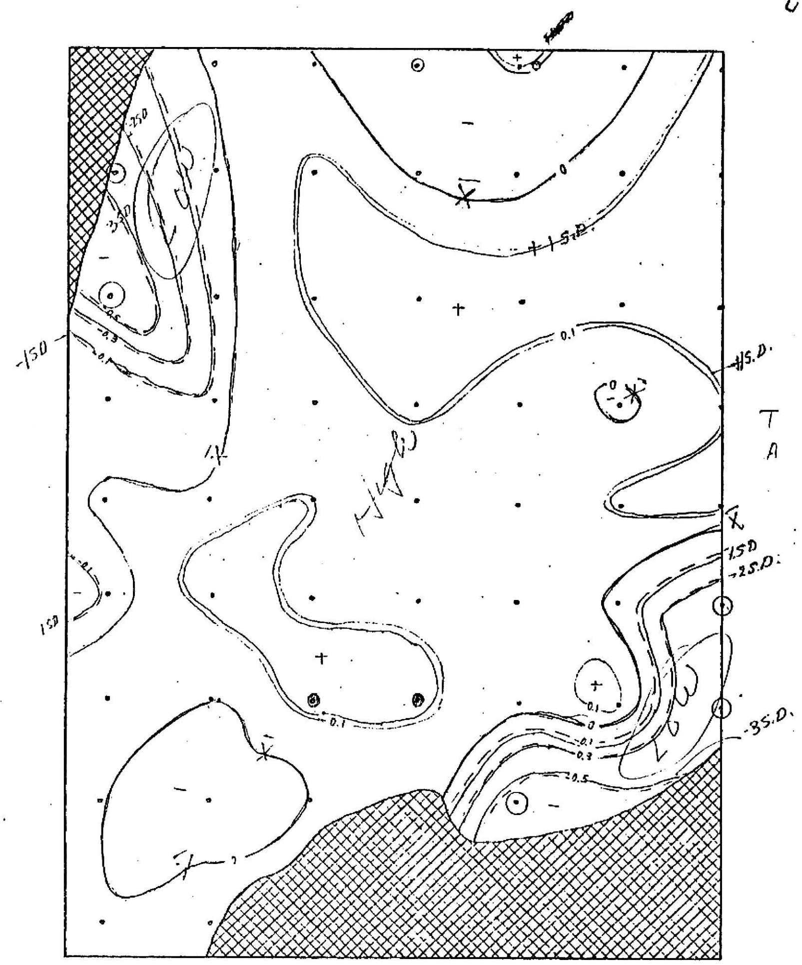
Mean ($\bar{x}$) Content = 1.34%
S.D. = 0.16%
Range: 0.73 – 1.50%

+1S.D = 1.50
+2S.D. = 1.66

−1S.D. = 1.18
− 2S.D = 1.02

> 2S.D = Anomalous
> 1S.D < 2S.D. = Threshold

Mg



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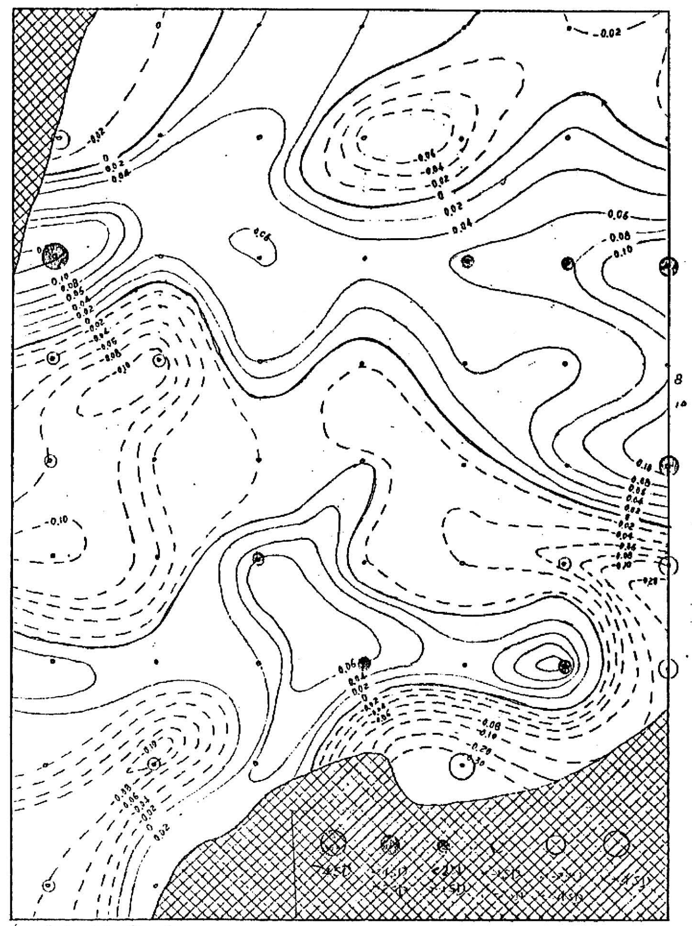
+2 S.D. = 1.66
– 1 S.D. = 1.18
– 2 S.D. = 1.02

> 2 S.D. = Anomalous
> 1 S.D. < 2 S.D. = Threshold

Fe



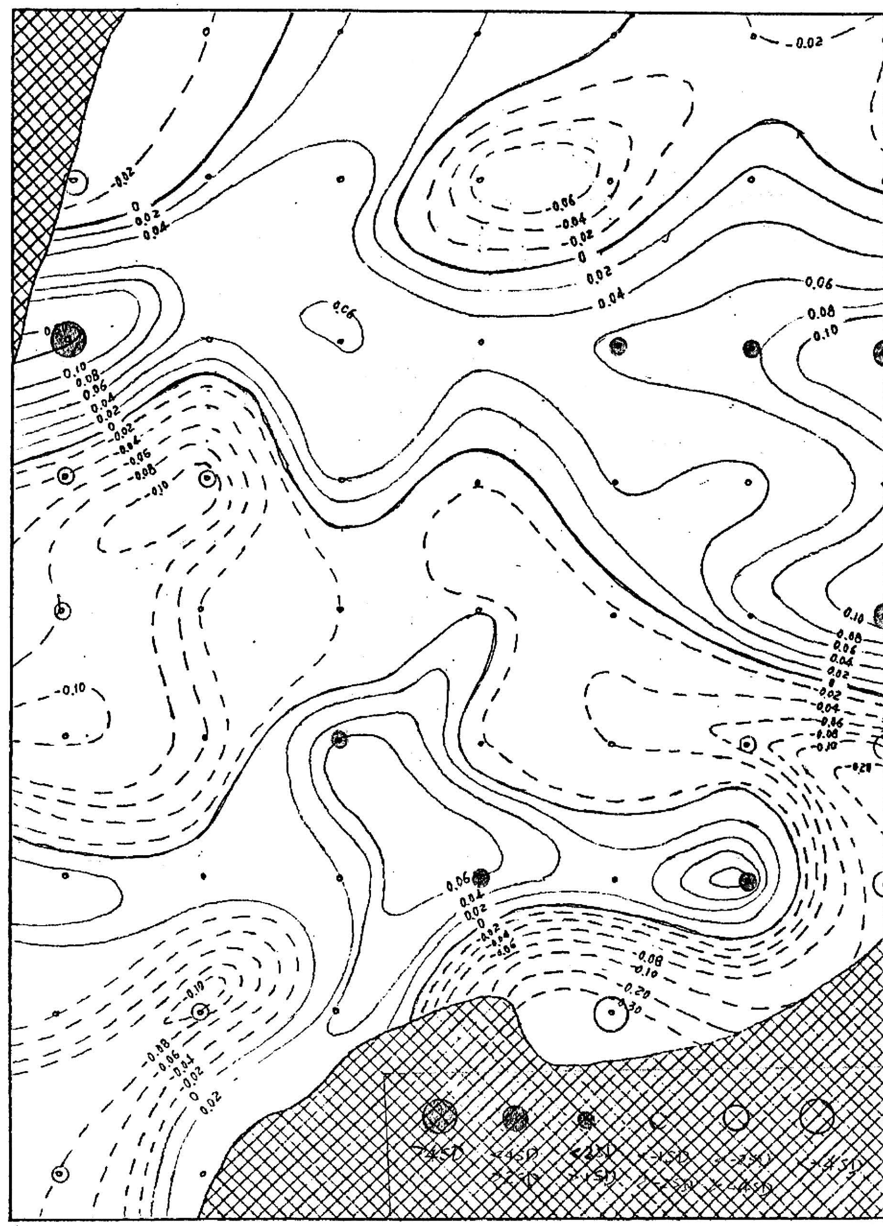
Lincoln Point Quadrangle

Mean ($\bar{x}$) = 0.69%

S.D. = 0.07%

Range: 0.24-1.15%

Fe



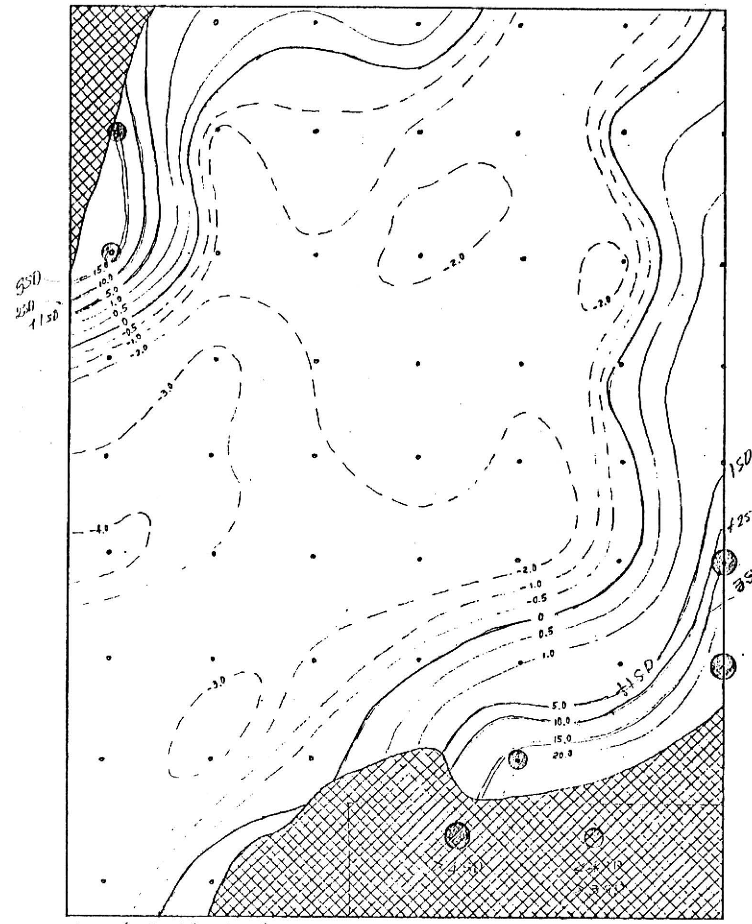
Lincoln Point Quadrangle

Mean ($\bar{x}$) = 0.63%

S.D. = 0.07%

Range: 0.24-1.15%

Si



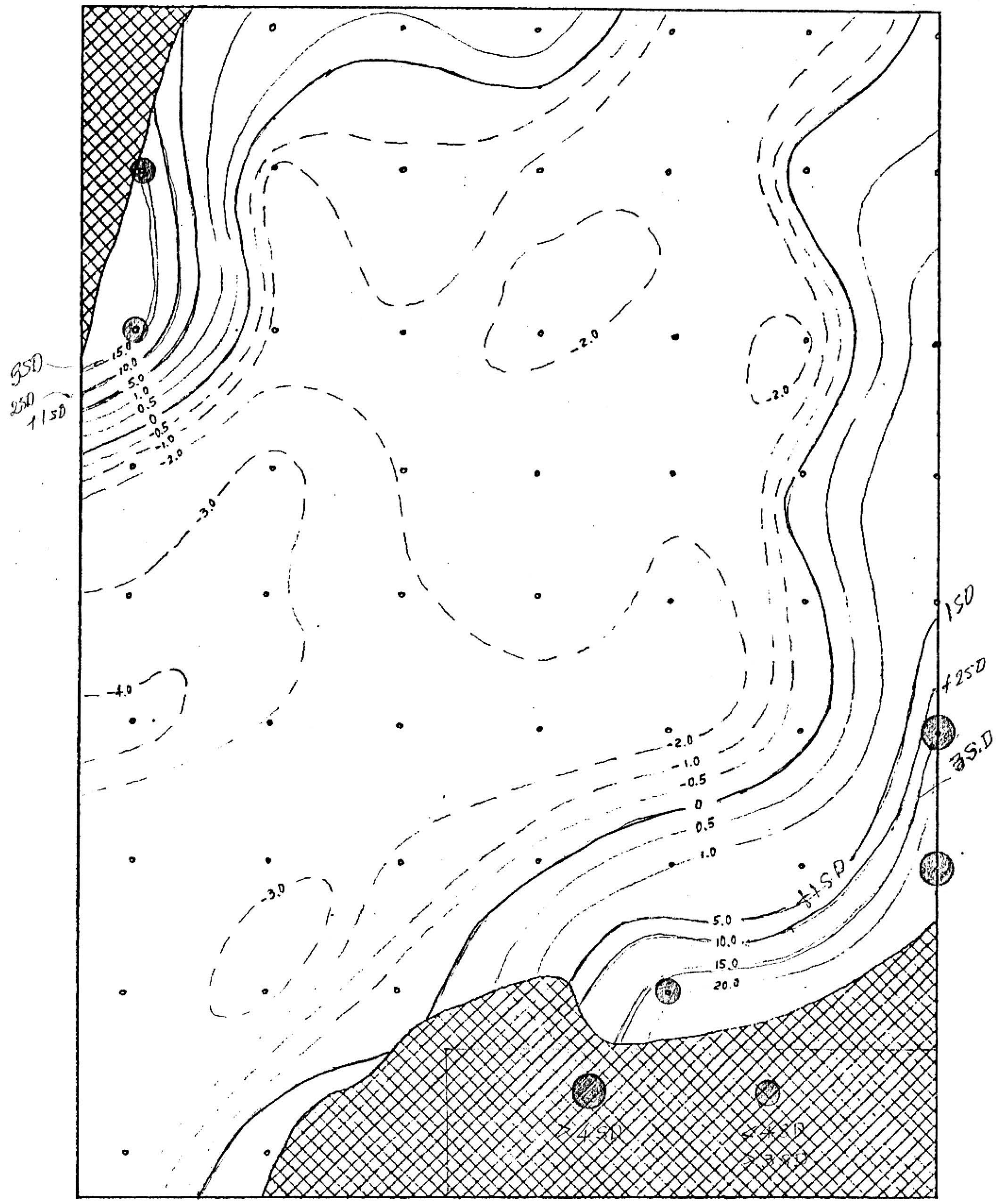
Lincoln Point Quadrangle

MEAN ($\bar{X}$) Content: 11.83%   +1.S.D.: 16.83   -1.S.D.: 6.88 = Threshold

STANDARD DEVIATION: 4.95%   +2SD: 21.73   -2S.D.: 1.93 Anomalous

Range: 7.63 - 33.76%

Si



Lincoln Point Quadrangle

MEAN ($\bar{X}$) Content: 11.83%

STANDARD DEVIATION: 4.95%

Range: 7.63 - 33.76%

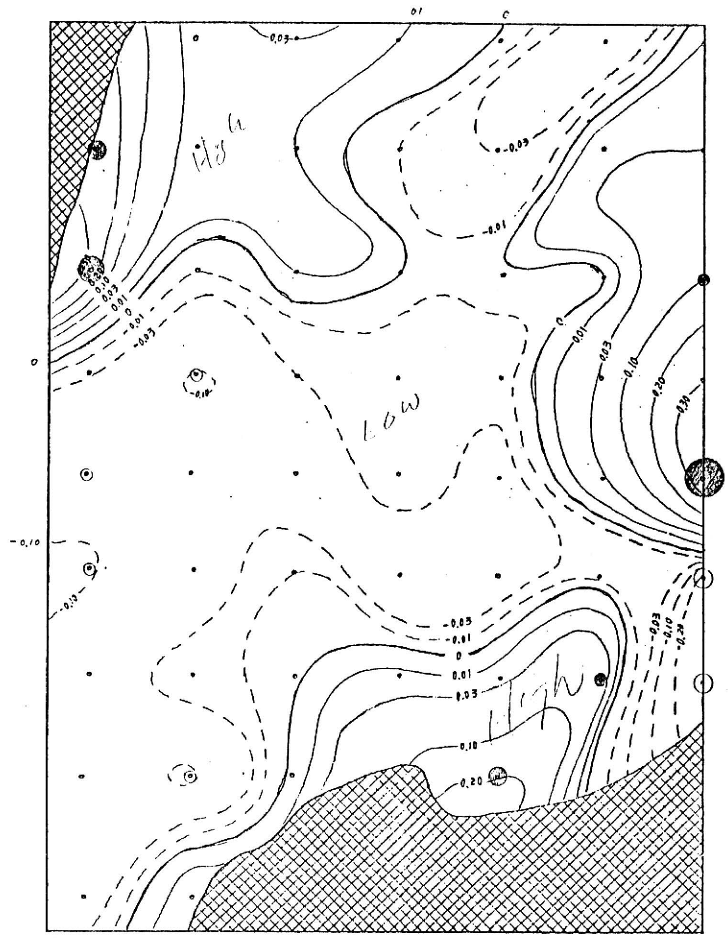
+1 S.D.: 16.83

+2SD: 21.73

-1 S.D.: 6.88 = Threshold

-2 S.D.: 1.93 Anomalous

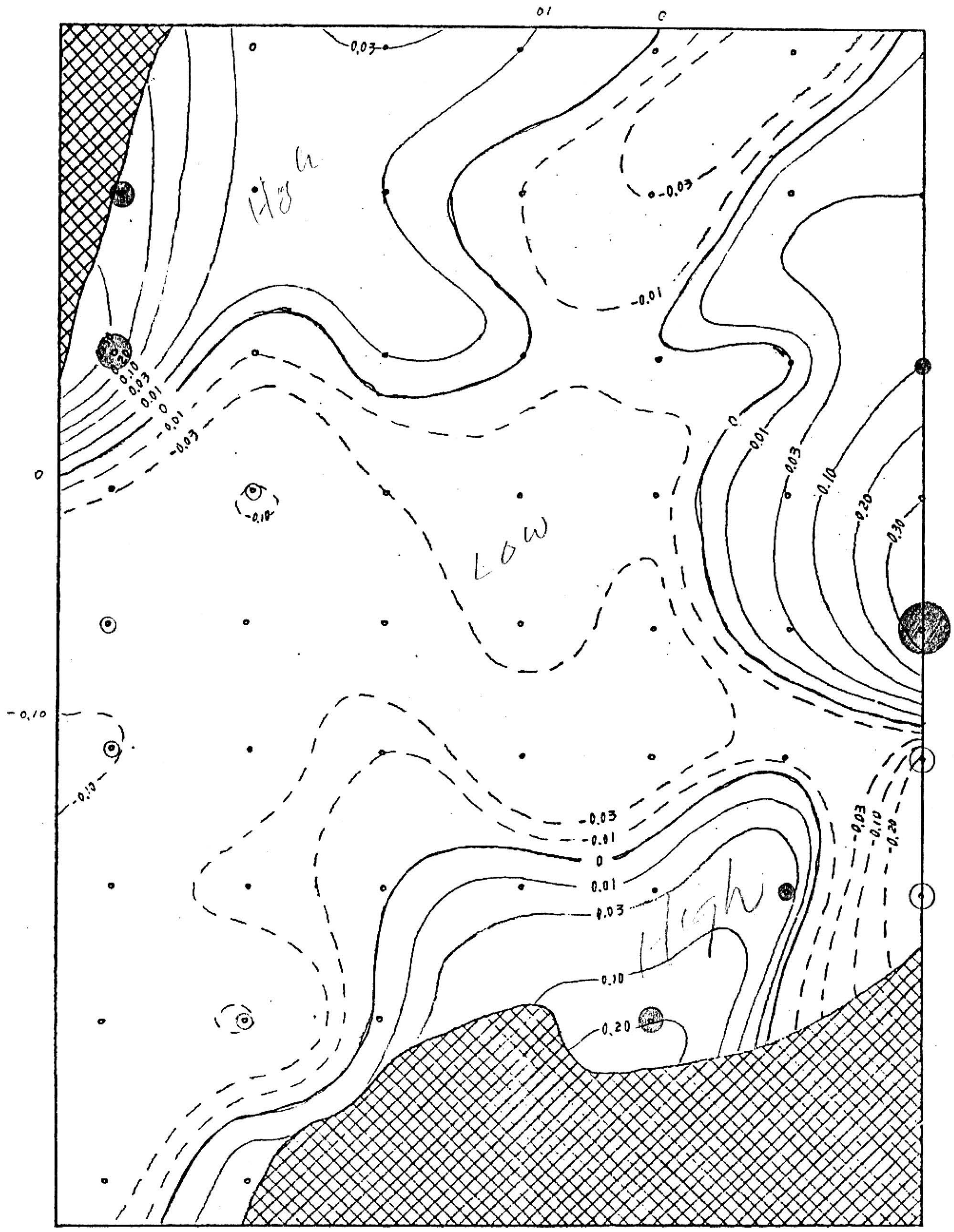
K



Lincoln Point Quadrangle

MEAN (K) Content: 0.42%
STANDARD DEVIAT. = 0.08%
RANGE: 0.20% - 1.58%

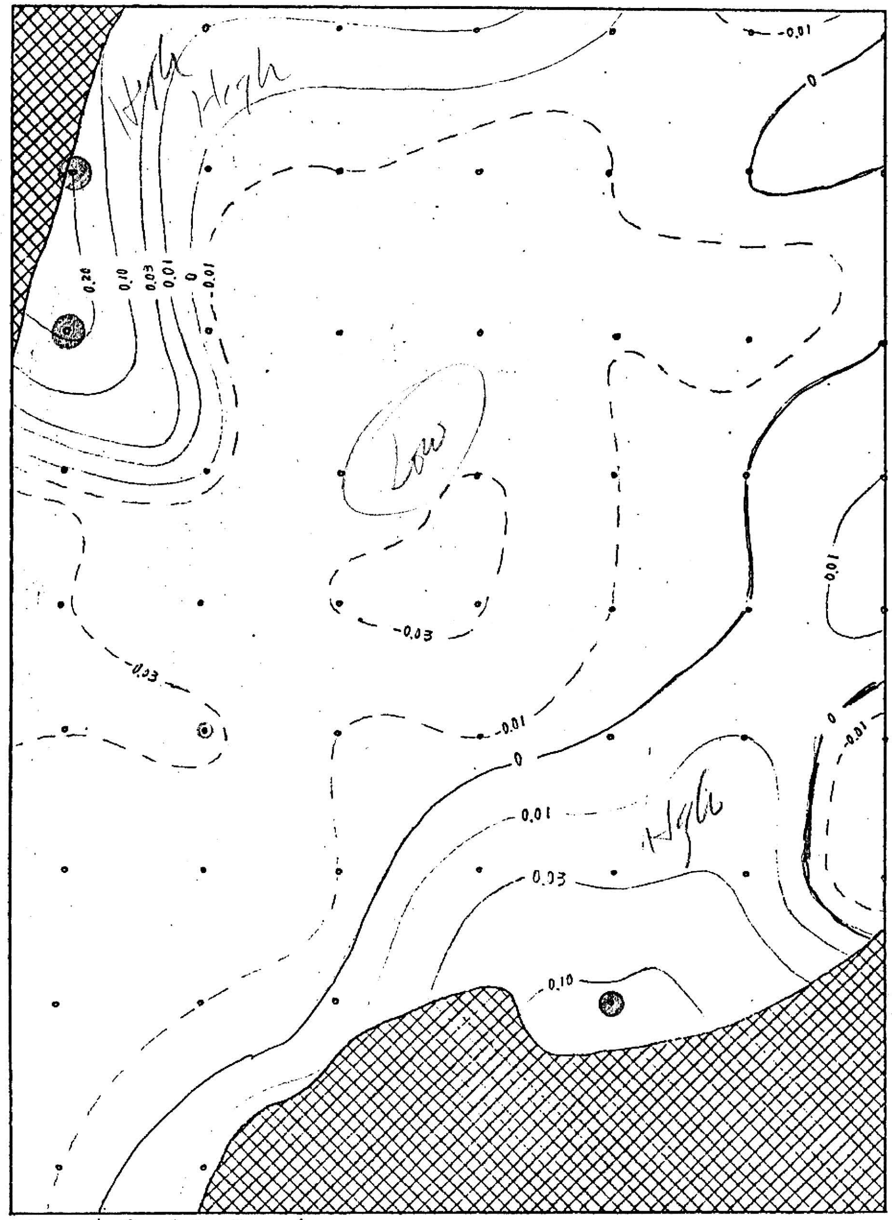
K



Lincoln Point Quadrangle

MEAN (X) Content: 0.42%
STANDARD DEVIAT.: 0.08%
RANGE: 0.20% - 1.58%

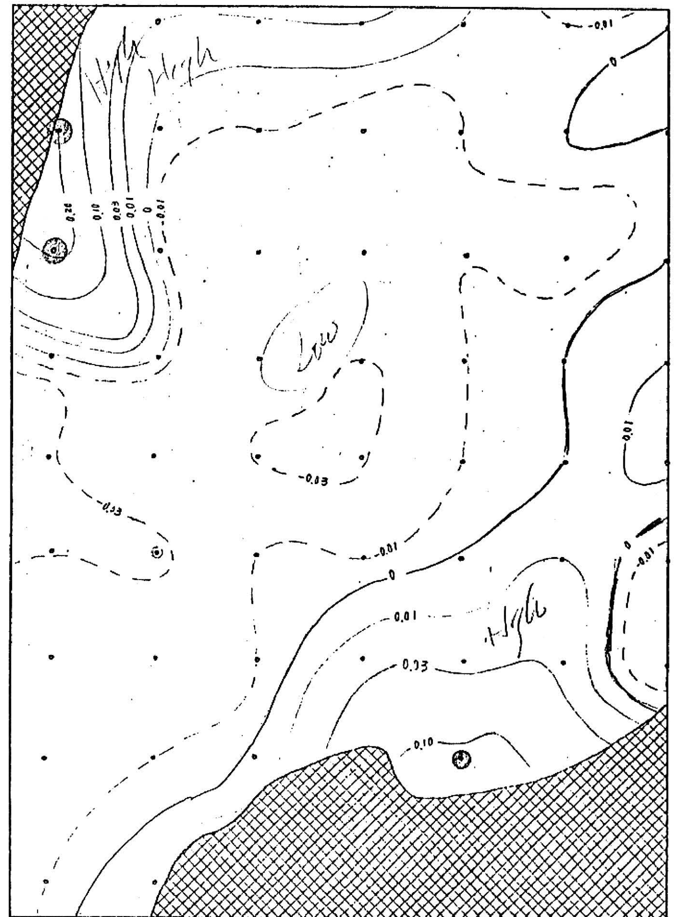
Na



Lincoln Point Quadrangle

Mean Content: = 0.10%
Standard Deviation: 0.04%
Range 0.06 - 0.33%

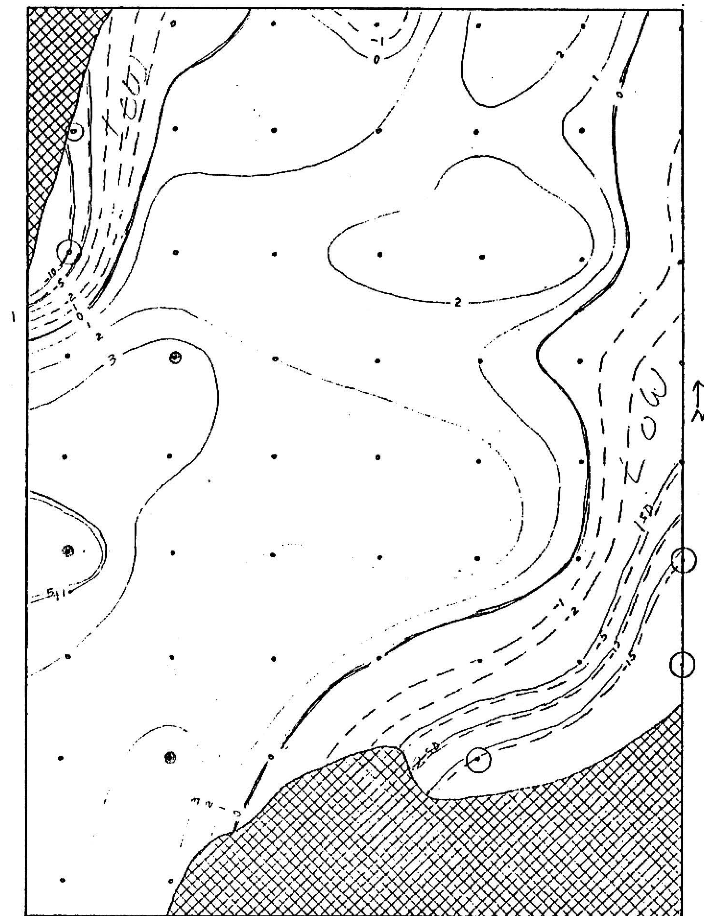
Na



Lincoln Point Quadrangle

Mean Content: = 0.10%
Standard Deviation: 0.04%
Range 0.06 - 0.33%

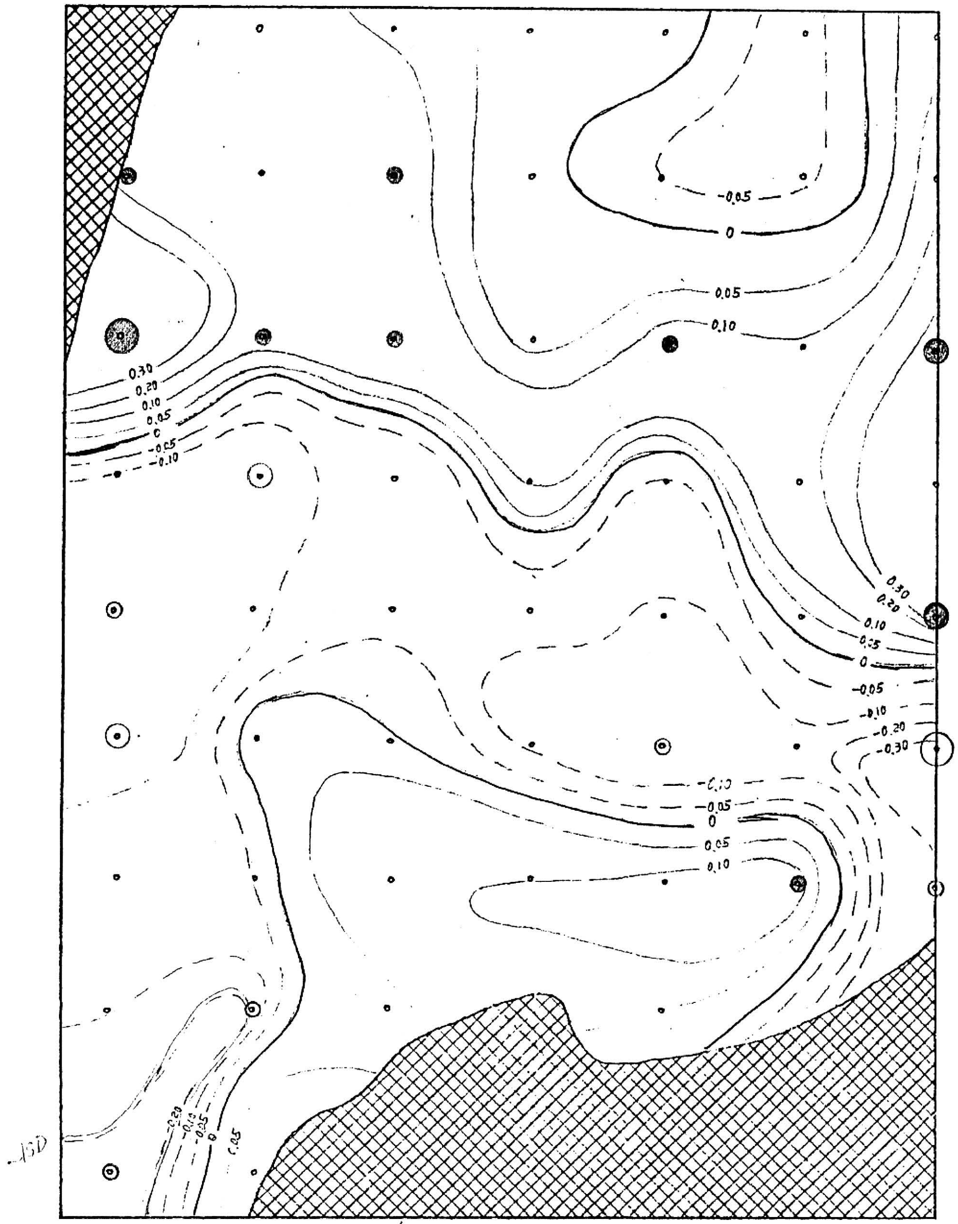
Ca



Lincoln Point Quadrangle

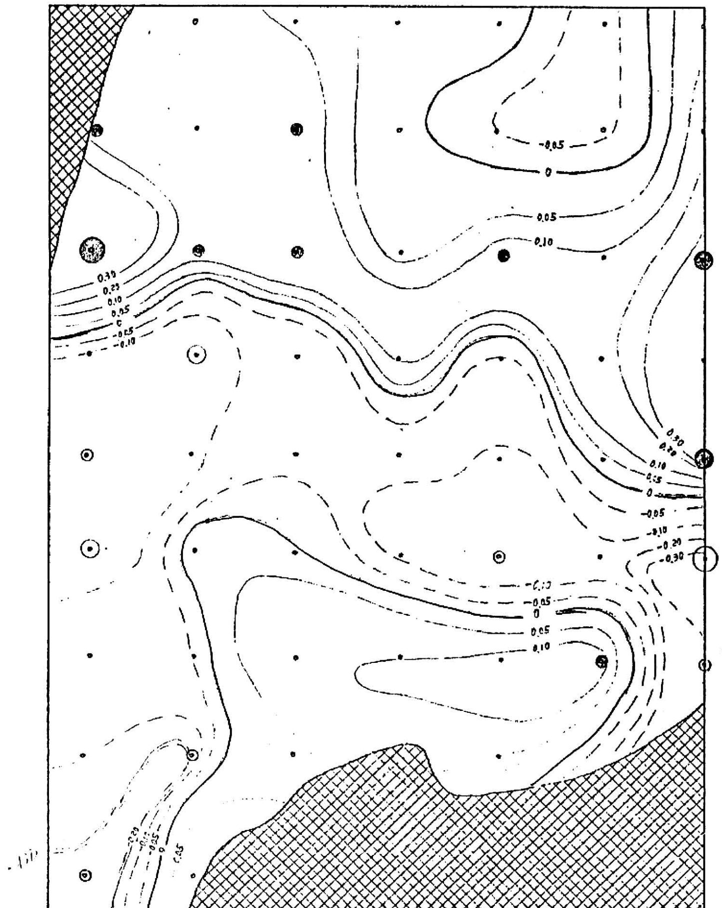
Mean ($\bar{x}$) Content = 25.13%
S.D. = 4.91
Range: 8.54 — 31.13%

~~#~~ + 1 S.D. = 29.04
+ 2 S.D. = 33.96



Mean ($\bar{X}$) Content: 1.34%
STANDARD DEVIATION: 0.17 %
RANGE: 0.81-2.75

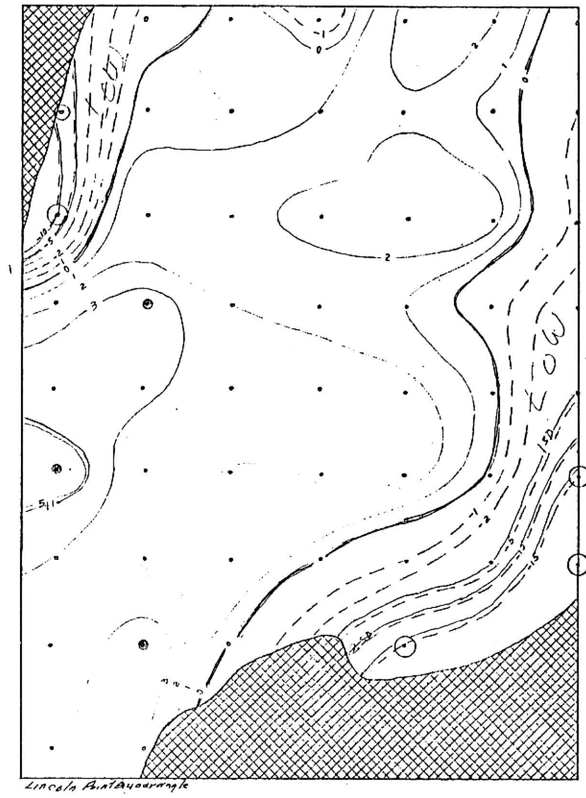
+1 S.D = 1.51 -1 S.D = 1.17 Threshold
+2 S.D = 1.68 -2 S.D = 1.00
> 2 S.D = anomalous



Mean ($\bar{X}$) Content: 1.34%
STANDARD DEVIATION: 0.17%
RANGE: 0.81-2.75

+1 S.D = 1.51
+2 S.D = 1.68
-1 S.D = 1.17
-2 S.D = 1.00
Threshold
>2 S.D = Anomalous

Ca

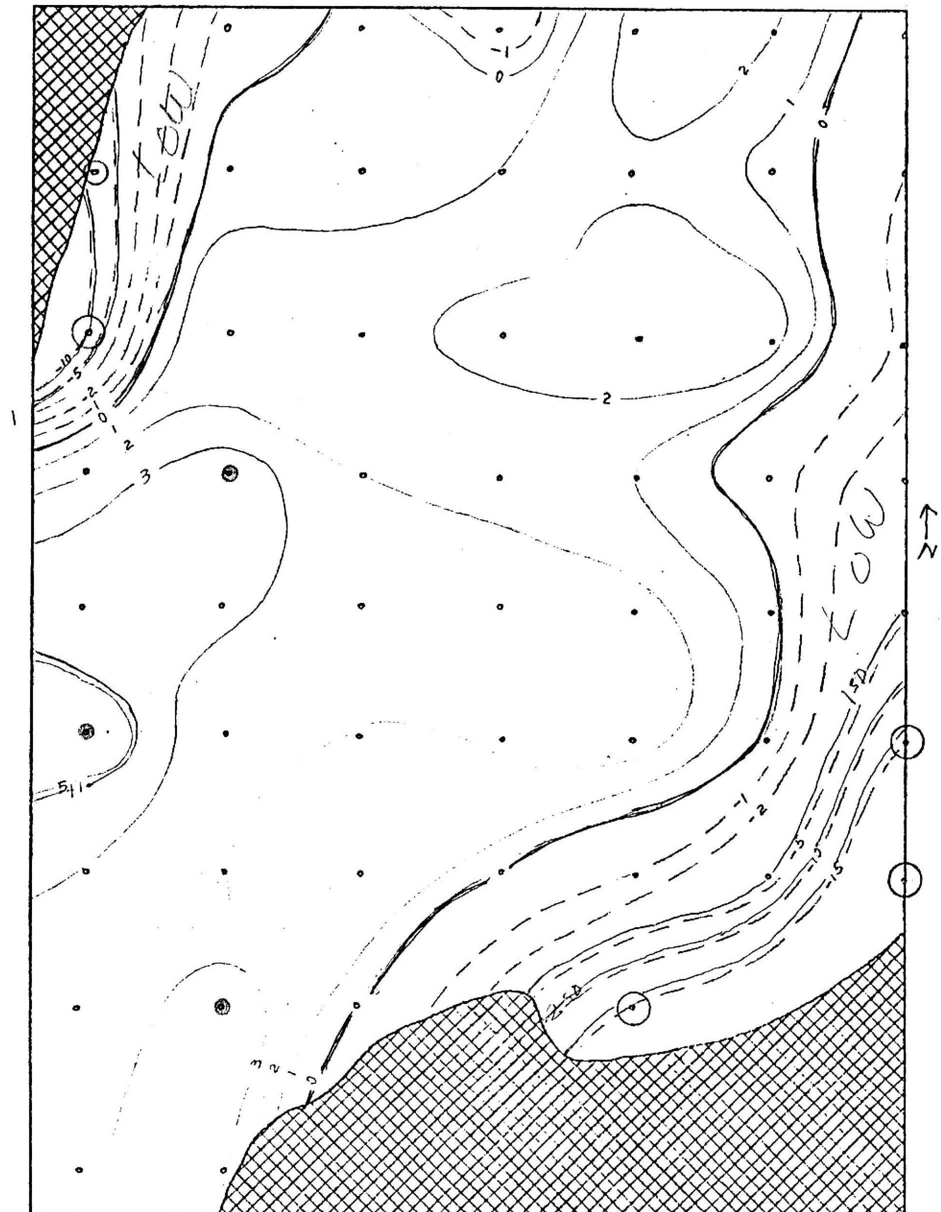


Lincoln Point Quadrangle

Mean ($\bar{x}$) Content = 25.13%
S.D. = 4.91
Range: 8.54 — 31.13%

+1 S.D. = 28.04
+2 S.D. = 33.95

Ca

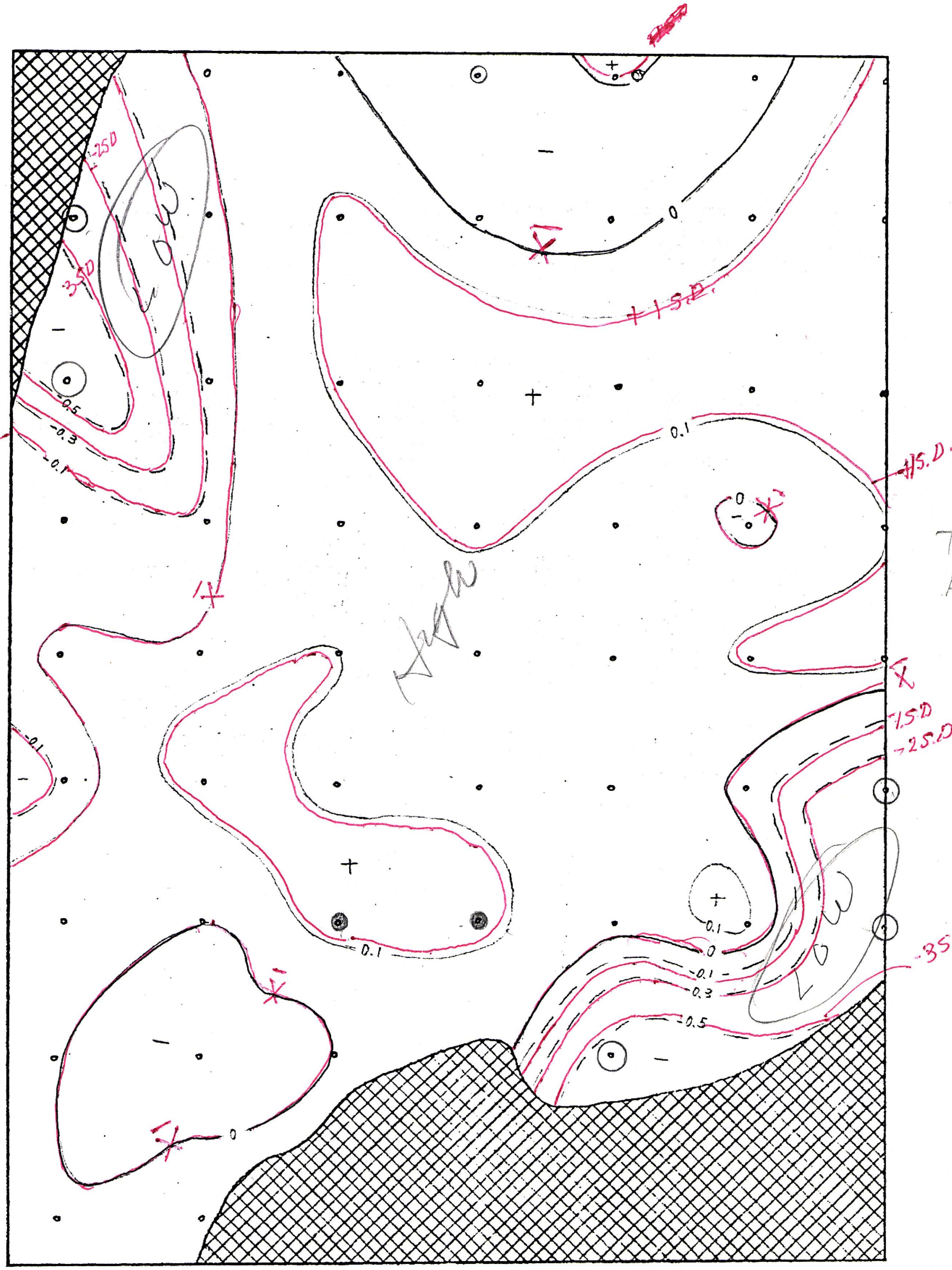


Lincoln Point Quadrangle

Mean ($\bar{x}$) Content = 25.13%
S.D. = 4.91
Range: 8.54 — 31.13%

+1 S.D. = 29.04
+2 S.D. = 33.95

Mg

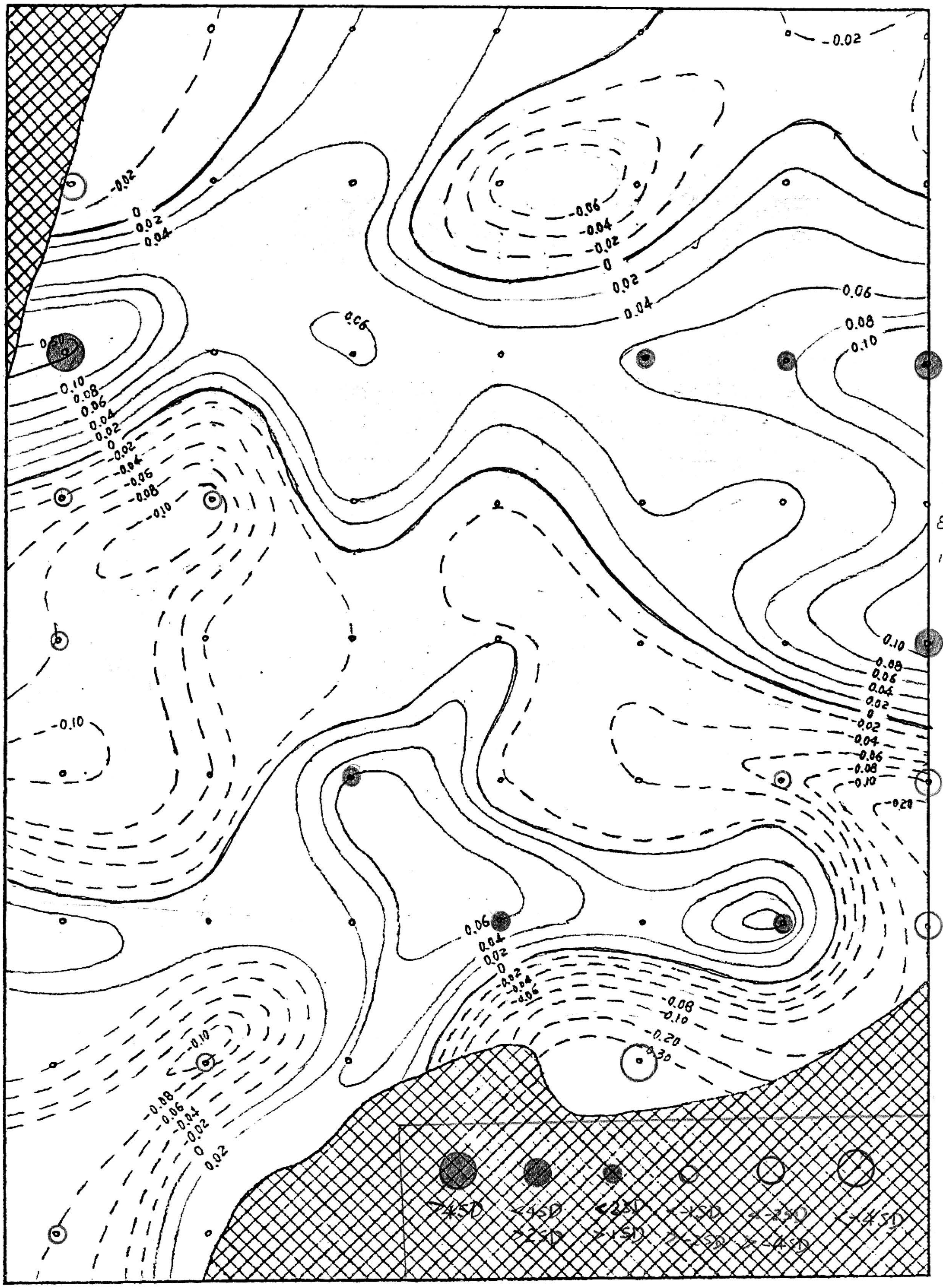


Mean ($\bar{x}$) Content = 1.34%
S.D. = 0.16%
Range: 0.73–1.50%

+1S.D = 1.50 -1S.D. = 1.18
+2.S.D. = 1.66 -2S.D = 1.02

> 2S.D. = Anomalous
> 1S.D < 2S.D. = Threshold

Fe



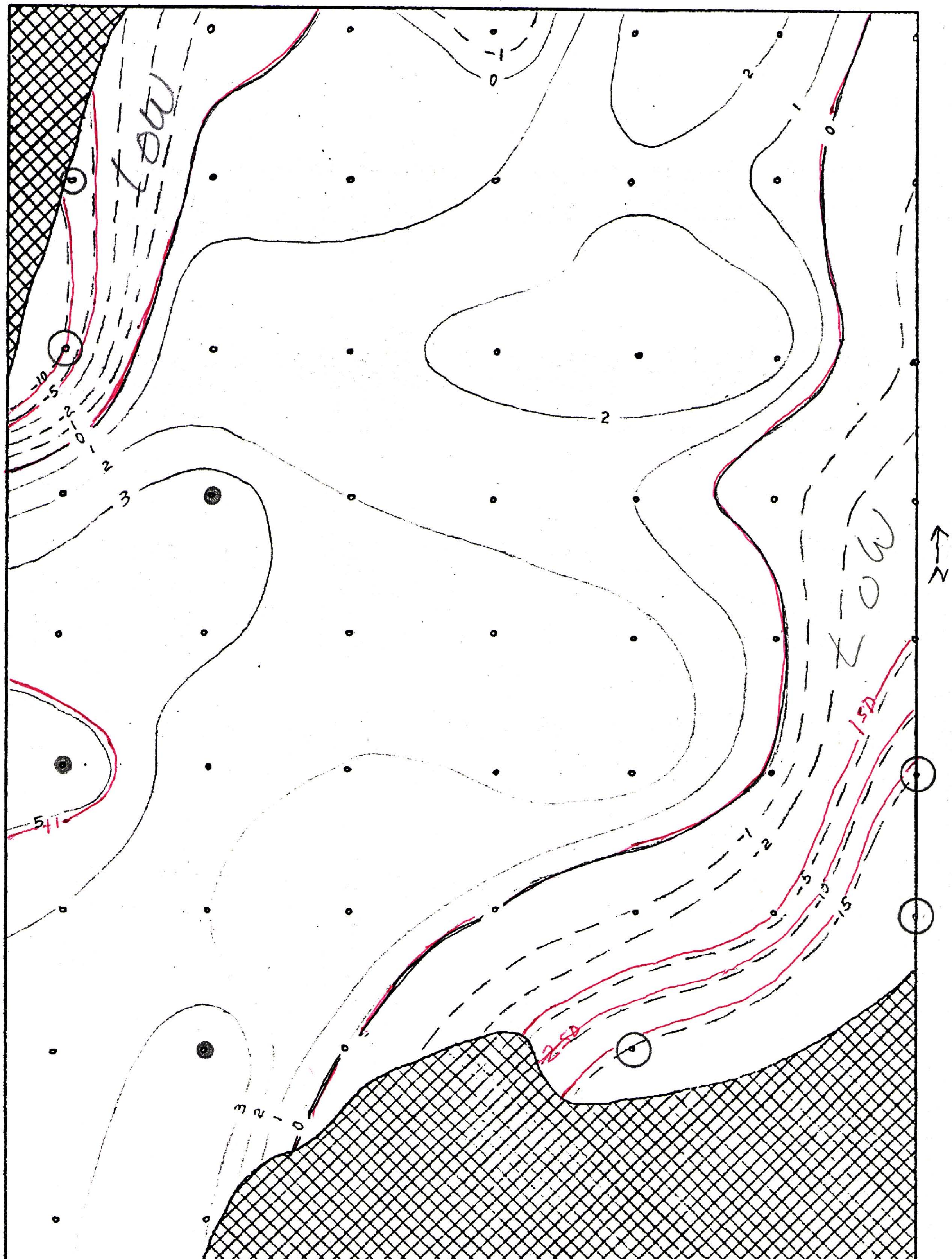
Lincoln Point Quadrangle

Mean ($\bar{x}$) = 0.63%

S.D. = 0.07%

Range: 0.24-1.15%

Ca

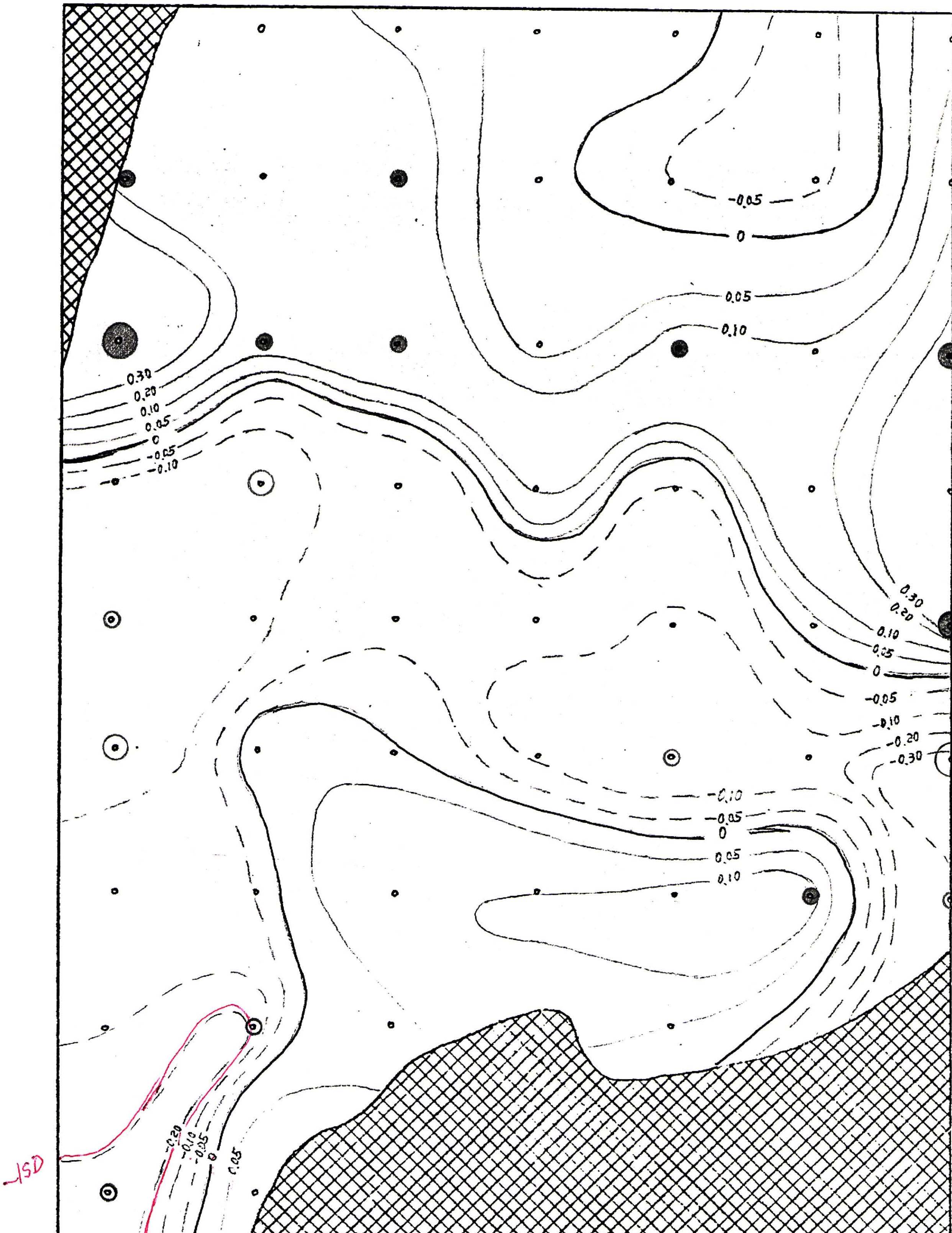


Lincoln Point Quadrangle

Mean ($\bar{x}$) Content = 25.13%
S.D. = 4.91
Range: 8.54 — 31.13%

+1 S.D. = 29.04
+2 S.D. = 33.95

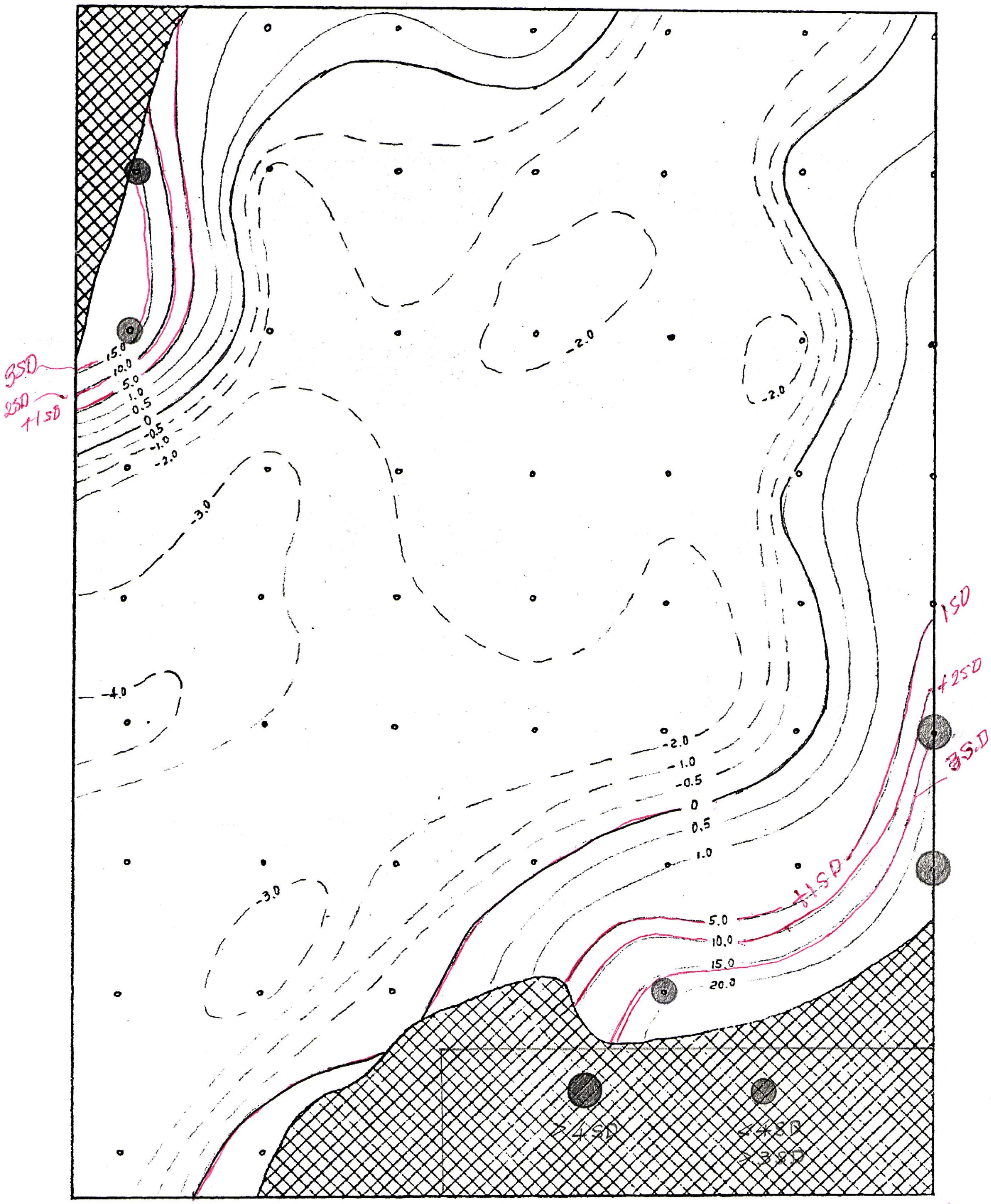
A1



Mean ($\bar{X}$) Content: 1.34%
STANDARD DEVIATION: 0.17%
RANGE: 0.81-2.75

+1S.D.=1.51 -1S.D.=1.17 Threshold
+2S.D.=1.68 -2S.D.=1.00
>2S.D.=anomalous

Si



Lincoln Point Quadrangle

MEAN ($\bar{X}$) Content: 11.83%

STANDARD DEVIATION: 4.95%

Range: 7.63 - 33.76%

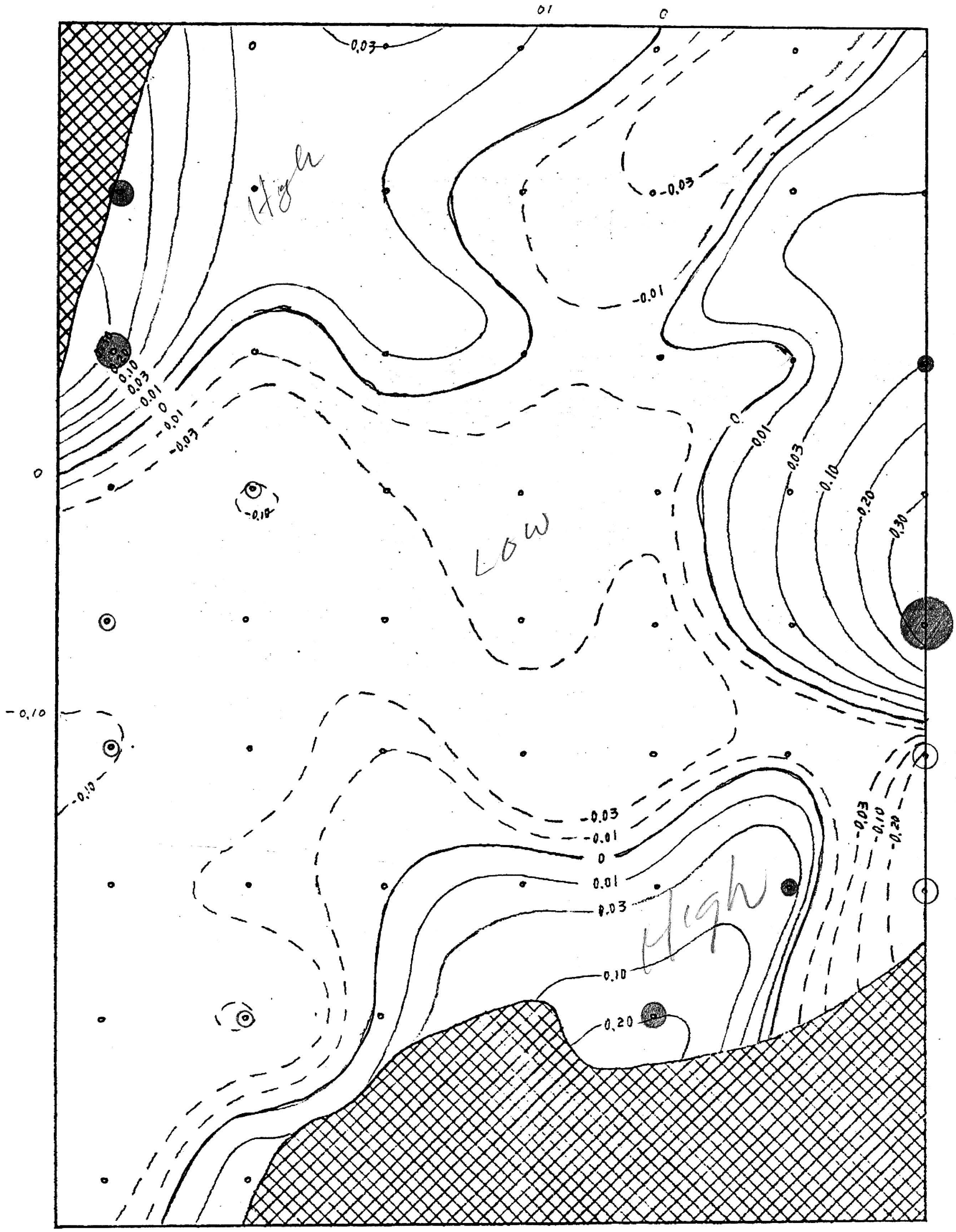
+1 S.D.: 16.83

+2SD = 21.73

-1 S.D. = 6.88 = Threshold

-2 S.D. = 1.93 Anomalous

K



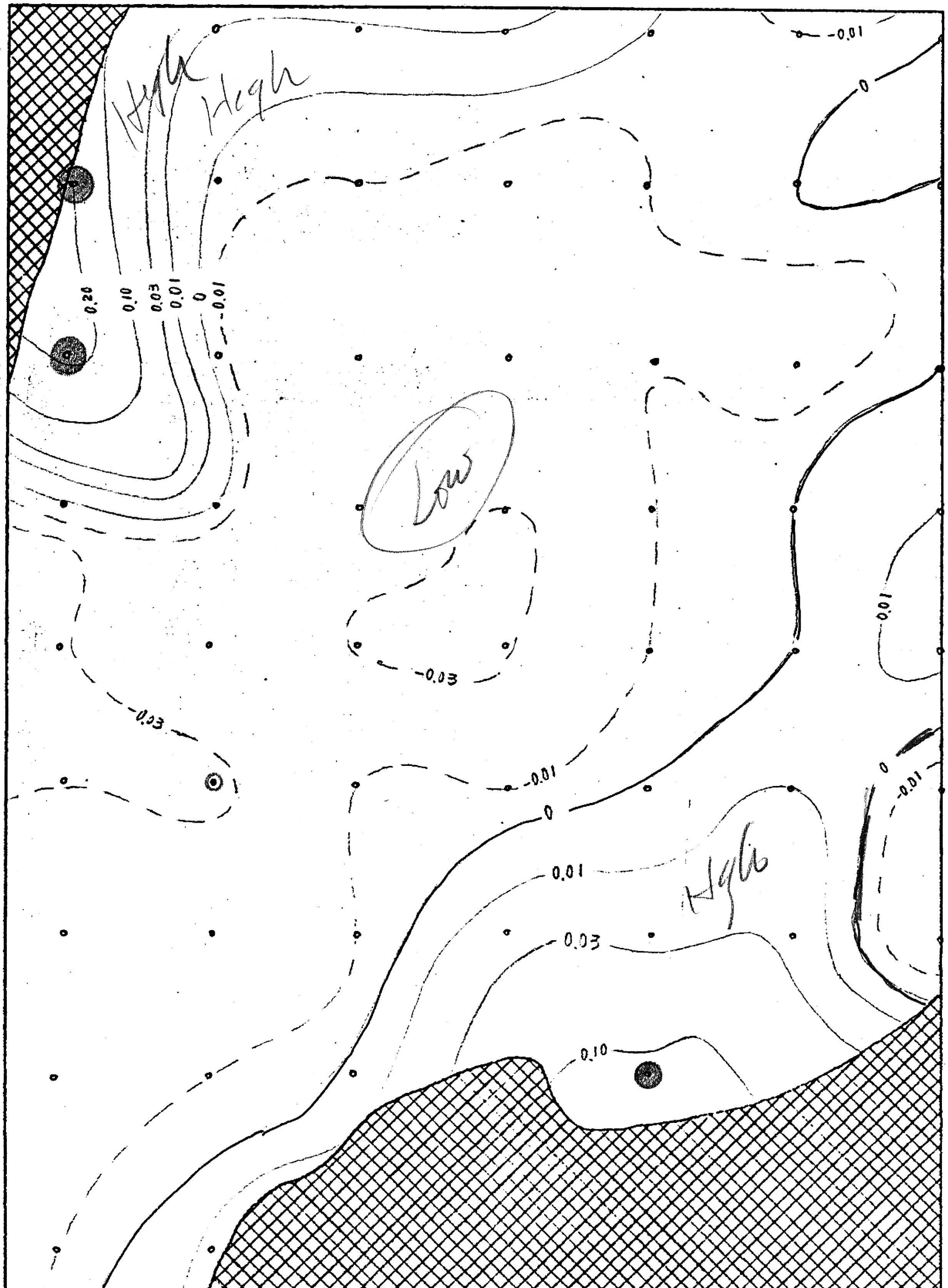
Lincoln Point Quadrangle

MEAN (X) Content: 0.42%

STANDARD DEVIAT.= 0.08%

RANGE 0.20% - 1.58%

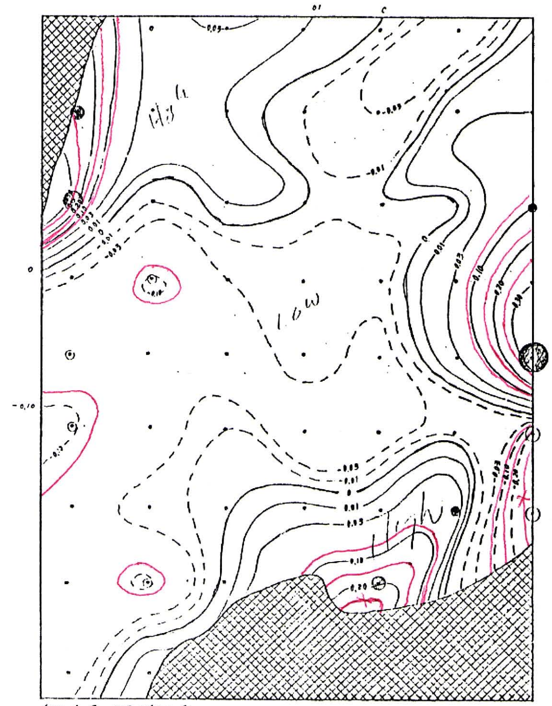
Na



Lincoln Point Quadrangle

Mean Content: = 0.10%
Standard Deviation: 0.04%
Range 0.06 - 0.33%

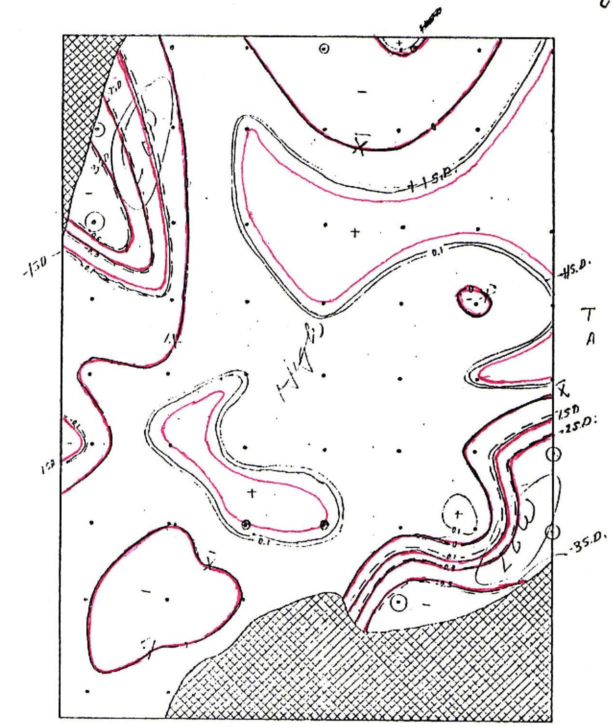
K



Lincoln Point Quadrangle

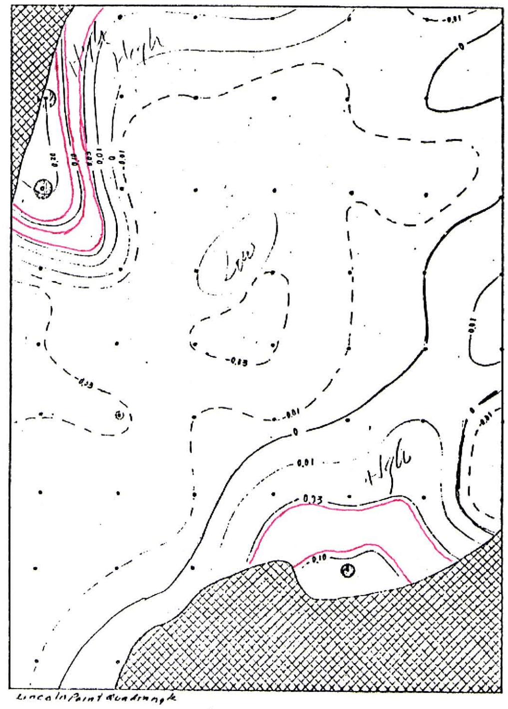
MEAN (X̄) Content: 0.42 %
STANDARD DEVIAT. = 0.08%
RANGE : 0.20% – 1.50%

Mg



Mean ($\bar{x}$) content = 1.34%   +1 S.D = 1.50   -1 S.D. = 1.18
S.D = 0.16%   +2 S.D = 1.66   -2 S.D = 1.02
Range: 0.73 - 1.50%

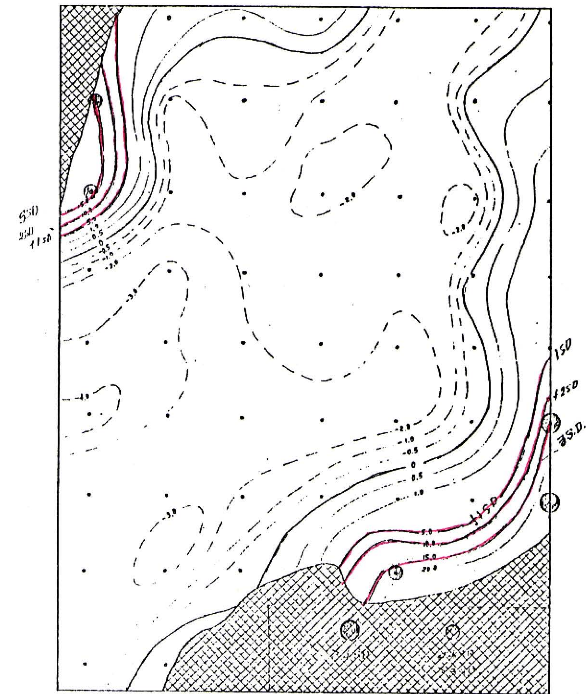
> 2 S.D = Anomalous
> 1 S.D < 2 S.D = Threshold



Lincoln Point Quadrangle

MEAN CONTENT: = 0.10%
STANDARD DEVIATION: 0.04%
RANGE: 0.06 - 0.33%

Si

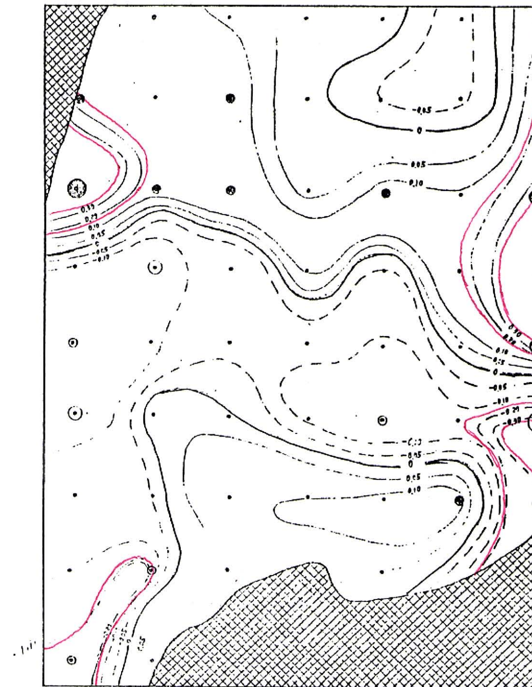


Lincoln Point Quadrangle

MEAN ($\bar{X}$) Content: 11.83% +1 S.D.: 16.81 −1 S.D.: 6.88 = Threshold

STANDARD DEVIATION: 4.95% +2 S.D.: 21.73 −2 S.D.: 1.93 Anomalous

Range: 7.63 - 33.76%

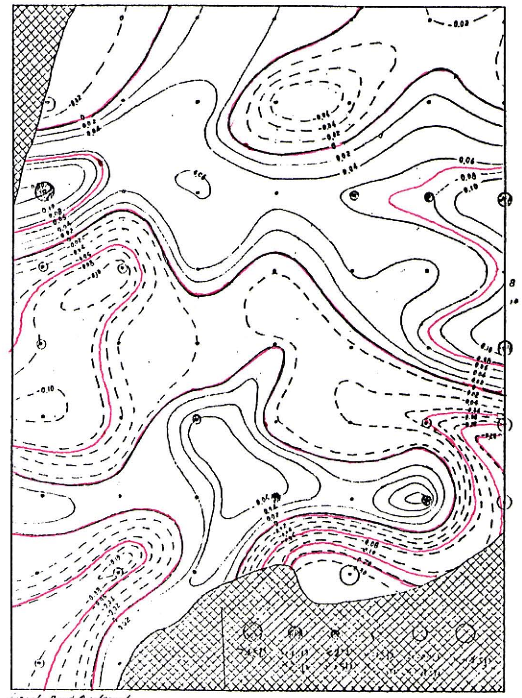


Mean ($\bar{X}$) Content: 1.34%
STANDARD DEVIATION: 0.17%
RANGE: 0.81-2.75

+1 S.D = 1.51
+2 S.D = 1.68

−1 S.D = 1.17 Threshold
−2 S.D = 1.00
> 2 S.D = Anomalous

<u>Fe</u>



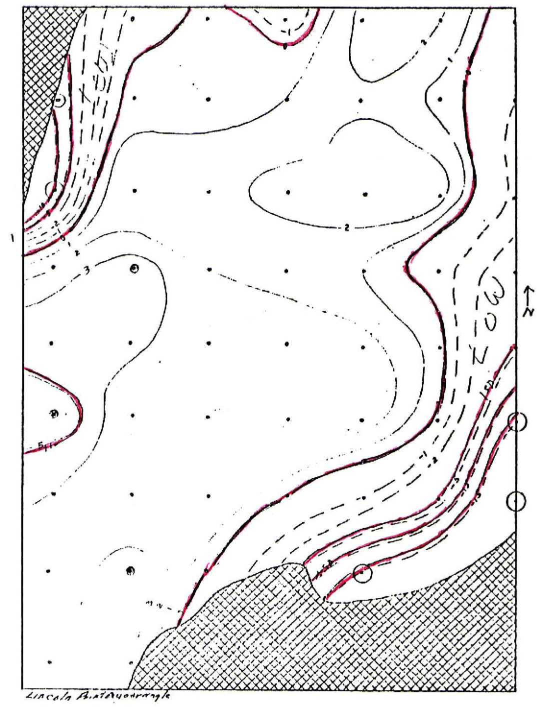
[illegible]

Mean ($\bar{x}$) = 0.69%

S.D. = 0.07%

Range: 0.24-1.15%

Ca



Lincoln Point Quadrangle

Mean ($\bar{x}$) Content : 25.13%
S.D. : 4.91
Range: 8.54 — 31.13%

~~+~~ +1 S.D. : 28.04
+2 S.D. : 33.95

QUATTRO PRO

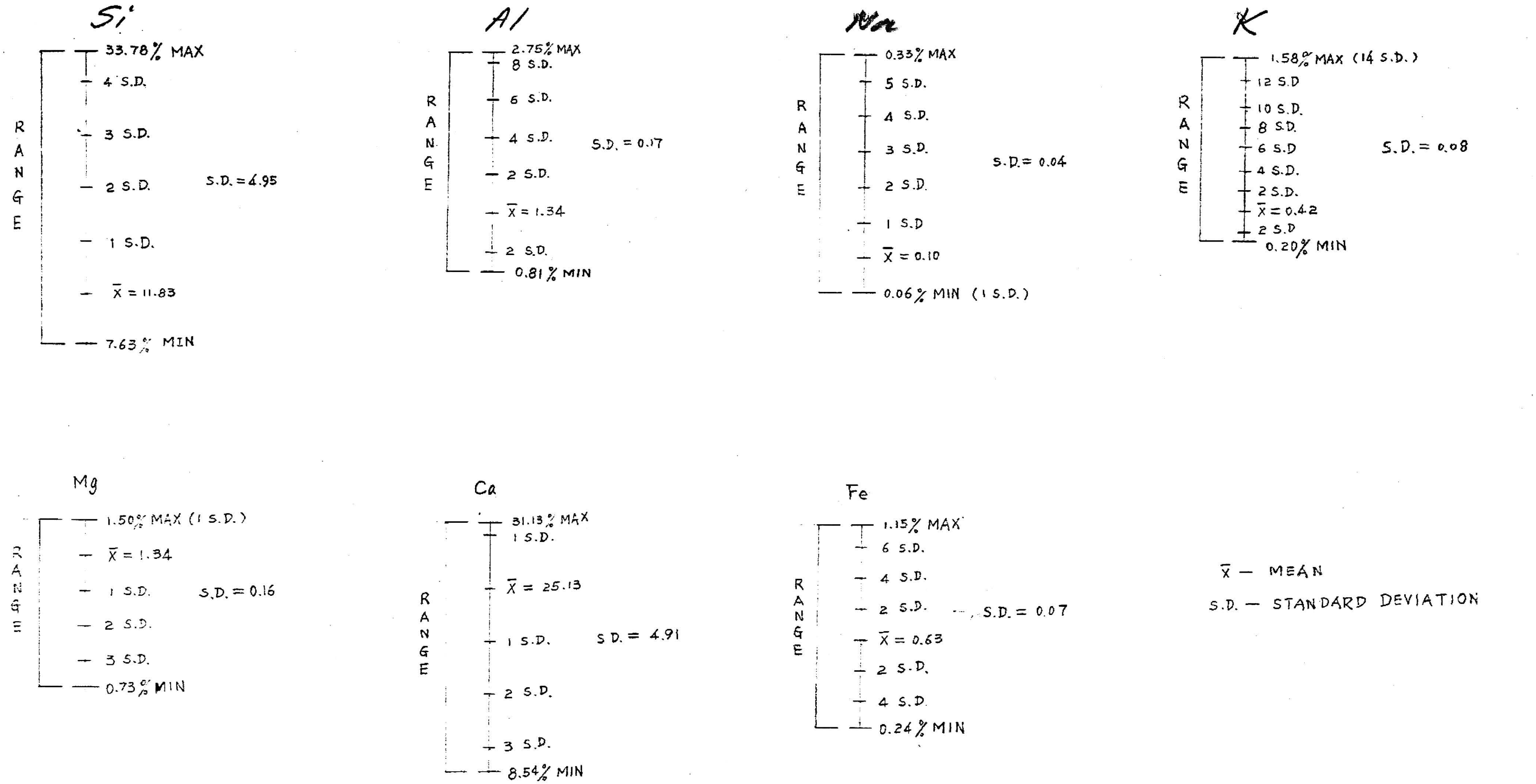
	PPM					%	PPM
	Zn	Pb	Cu	Ni	As	Fe	Cd
mean	70.136	23.091	21.800	17.773	14.600	0.958	0.623
S.D.	7.093	3.330	1.932	1.438	2.066	0.027	0.186

mean : Calculate the Mean

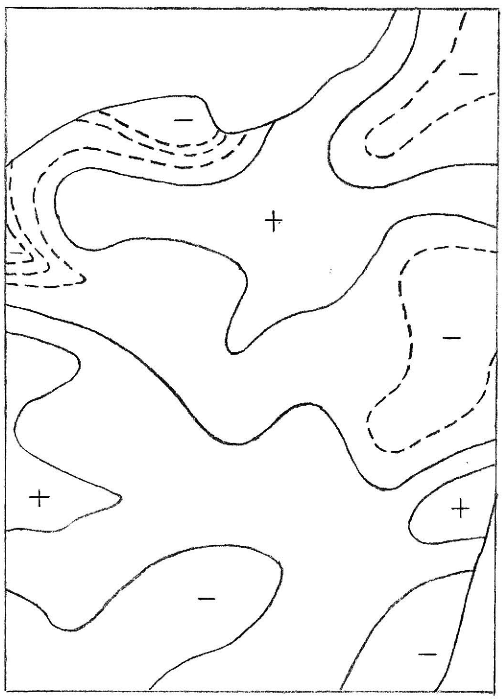
S.D. : Standard deviation

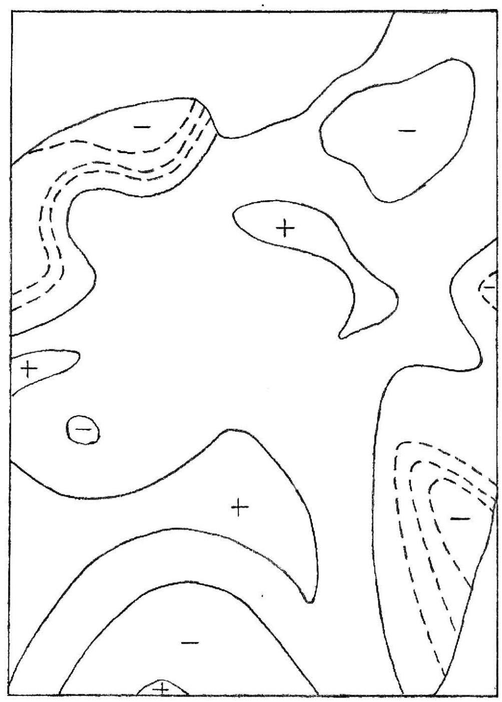
for Utah Lake 13 samples.

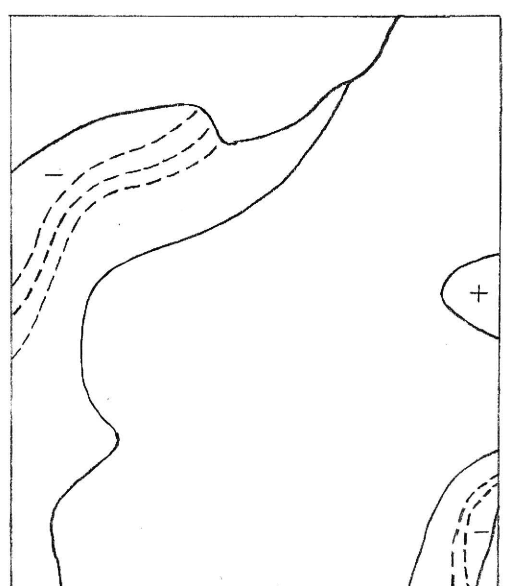
Acme Analytical Labs., LTD
Vancouver, B.C.

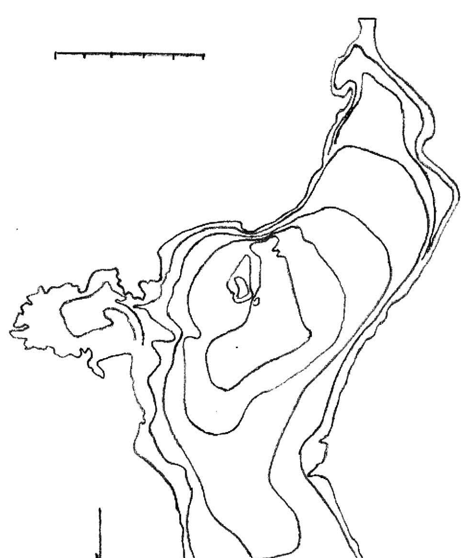


Sonerholm, P.A, 1974; BYU Geology Studies, vol 21, pt. 3, p. 97-117









	Ca
Mg	Fe

Al	Si
K	Na

Taylor series expansion of an integral that appears in the process of maximizing the entropy need to be retained.

The resulting distribution function is

$$f(H, p_\theta) = e^{-(H-\beta(p_\theta))/\alpha(p_\theta)}. \tag{2.8}$$

This form greatly simplifies the problem of finding an FRC equilibrium state by reducing the number of numerical integrations needed to determine a macroscopic quantity from three to one. It also leads to a much simpler transport problem. Now instead of solving for a the two-dimensional function f_s, one need only find the two one-dimensional functions α_s and β_s.

The characterization of the equilibrium is completed by choosing the static approximations of Maxwell's equations. The specific equations describing this situation in a cylinder for purely poloidal magnetic fields are:

$$\Delta^*\psi = -\frac{4\pi}{c} r j_\theta, \tag{2.9}$$

$$n_e = n_i. \tag{2.10}$$

Equation (2.9) is Ampere's law, where $\psi = rA_\theta = \int_0^r B_z r dr$ is the poloidal flux function ($\psi = \phi/(2\pi)$), A_θ is the vector potential, B_z is the axial component of the magnetic field, and c is the speed of light. The Grad-Shafranov operator Δ^* is defined by

$$\Delta^*\psi \equiv r\frac{\partial}{\partial r}\frac{1}{r}\frac{\partial \psi}{\partial r} + \frac{\partial^2 \psi}{\partial z^2}. \tag{2.11}$$

In the one dimensional situation the second term is zero by assumption. Equation (2.10) is the quasineutrality condition. This condition replaces Poisson's equation when the scale lengths of the physical phenomena considered are long compared to the Debye length. This is the case for FRC equilibria; for which, even in the sheath region where the gradients are large, the gradient scale length is several thousand Debye lengths.

The study by Bissell treated samples taken from 11 localities in which particle size, moisture content, organic carbon, organic content, and acid-soluble percentage were determined. The study by Brimhall dealt with recent history of Utah Lake as reflected by the chemical profile of Na, Mg, Ca, Al, and Fe.

Acknowledgments

The writer wishes to acknowledge the assistance of Dr. Willis H. Brimhall of the Department of Geology of Brigham Young University in preparing samples and adapting the trend-surface computer programs to fit the computer facilities at the Science Computation Center.

Special thanks are given to my long-suffering wife, Jan, for her support, for assisting me through college, and for typing the manuscript.

Thanks also are given to my parents and my wife's parents for their encouragement and financial assistance, both deeply appreciated.

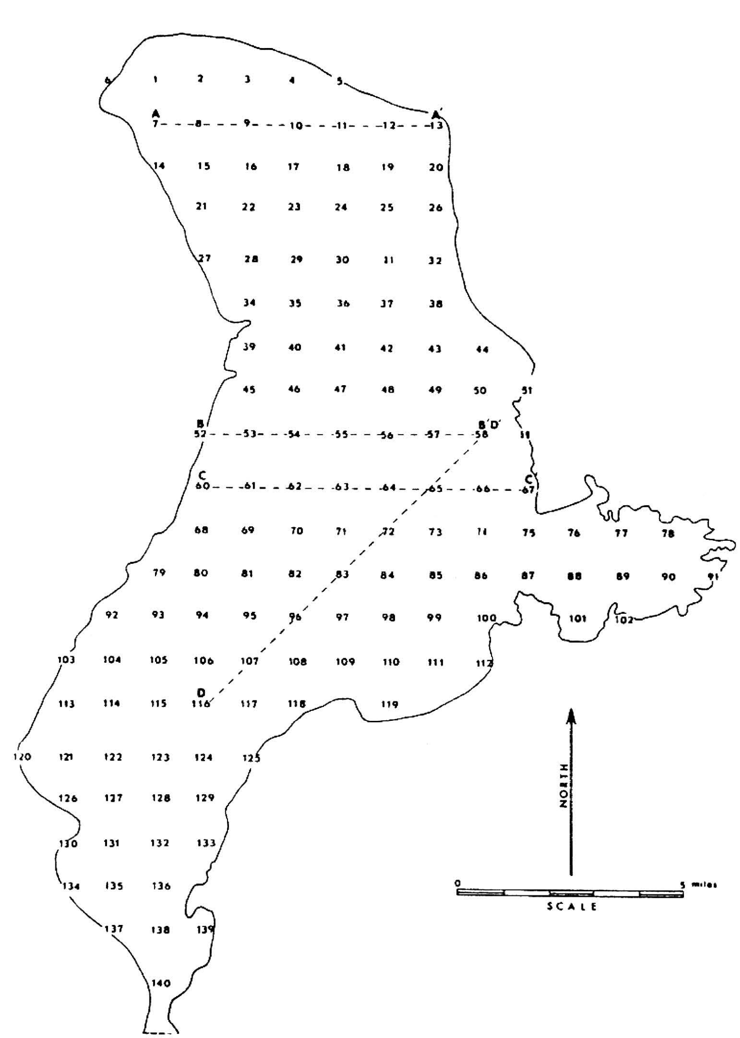
Field Methods

Core samples were taken from a boat in April and May with a Davis peat sampler, modified by Bissell (1942). One hundred thirty-nine cores were taken from as many locations in approximate 12-inch lengths on a regularly spaced gridwork of one mile that coincided with the intersections of section lines (see Text-fig. 3). As soon as each core was taken from the lake bottom, it was placed, together with a numbered label, in a double-thickness plastic bag, and the bag was sealed and numbered on the outside. Location of the sample stations was determined by calibrating the speed of the boat in feet per second at a set engine RPM and using a topographic sheet to locate landmarks on which to take a heading. The system was self correcting for drift in that a heading on a landmark kept the boat headed for the sample location rather than an imaginary magnetic point. The samples were taken on windless days to avoid the danger of capsizing in rough weather and to minimize drift. It is believed that sample locations were generally within $\pm$ 100 feet of true position since samples near and on shore, which could be located within $\pm$ 100 feet, gave the writer a chance to locate the boat position quite accurately. The error introduced in sample location was cumulative only in each separate traverse of the lake, which was from east to west, the shortest distance across the lake, and the amount of error never built up to any sizeable amount. If it had, the last stop on a sample run, which was near or on shore, would have made this readily apparent and the approximate distance easily judged.

Laboratory Methods

Each numbered sample was removed from its container, and a portion was cut from the full length. The portion was placed in a numbered glass container and heated to 200° C for four hours to drive off the free water. The sample was then crushed and screened to pass 60 mesh and a 50 gm portion was then placed in a numbered glass bottle with an airtight cap.

The crushed sample was prepared for analysis by a technique described by Brimhall and Embree (1970). A 0.3333 gm portion of the sample was mixed well with 1.67 gm of powdered anhydrous lithium metaborate and poured into a clean graphite crucible. The crucible was placed in a furnace at 1000° C for 10 to 15 minutes to fuse the sample. The molten bead was then poured into 400 ml of cold dilute HNO_3 (1:20) and stirred until dissolved. The sample

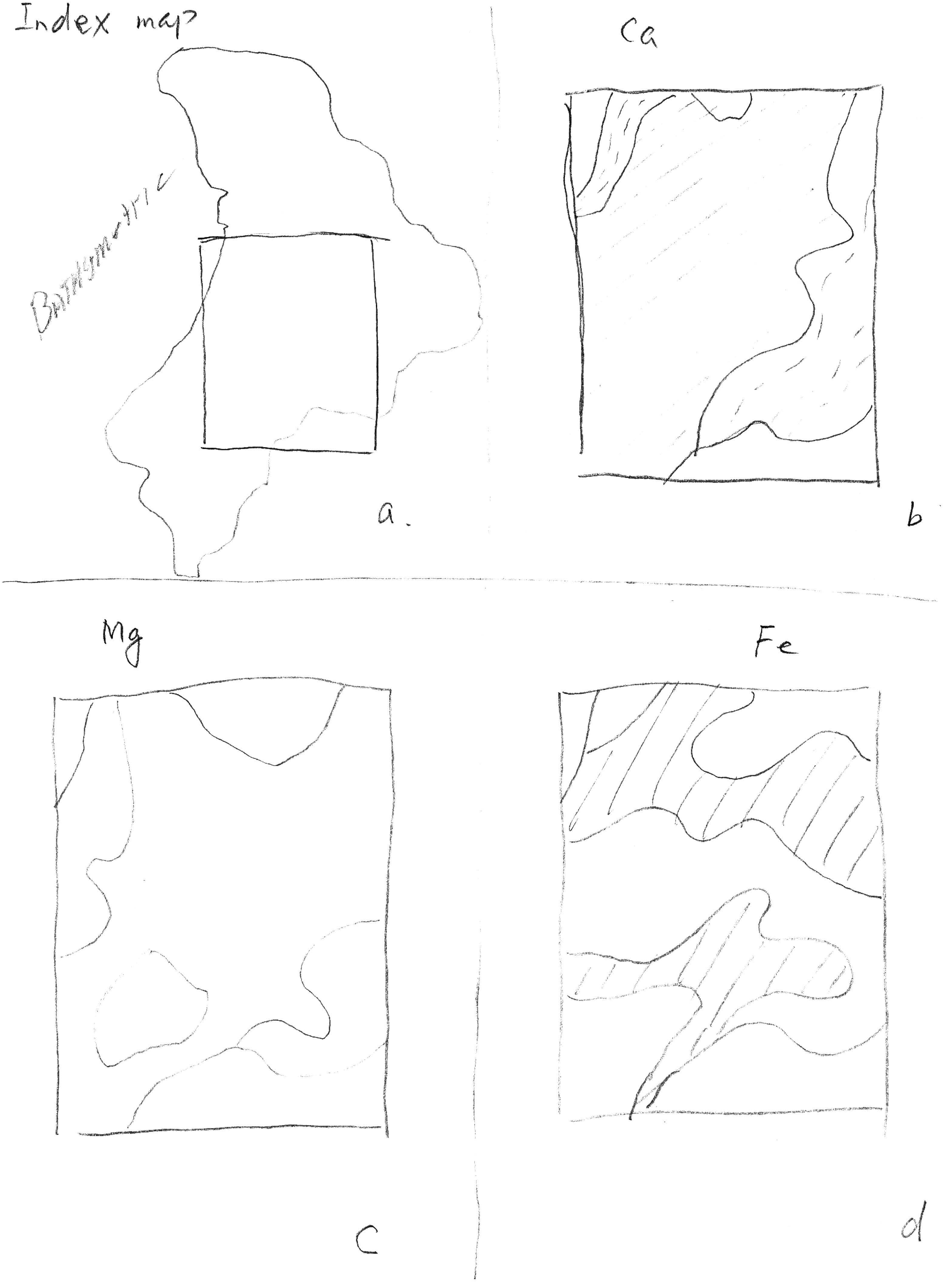


TEXT-FIGURE 3.—Sample location map. Numbers in italics represent samples in which the total mineral percentage fell outside the allowable error.

was brought to 500 ml volume and filtered. A 250 ml portion of the sample was poured into a numbered plastic bottle with an airtight cap. The samples were then at a concentration equivalent to 1 gm in 1500 ml dilution.

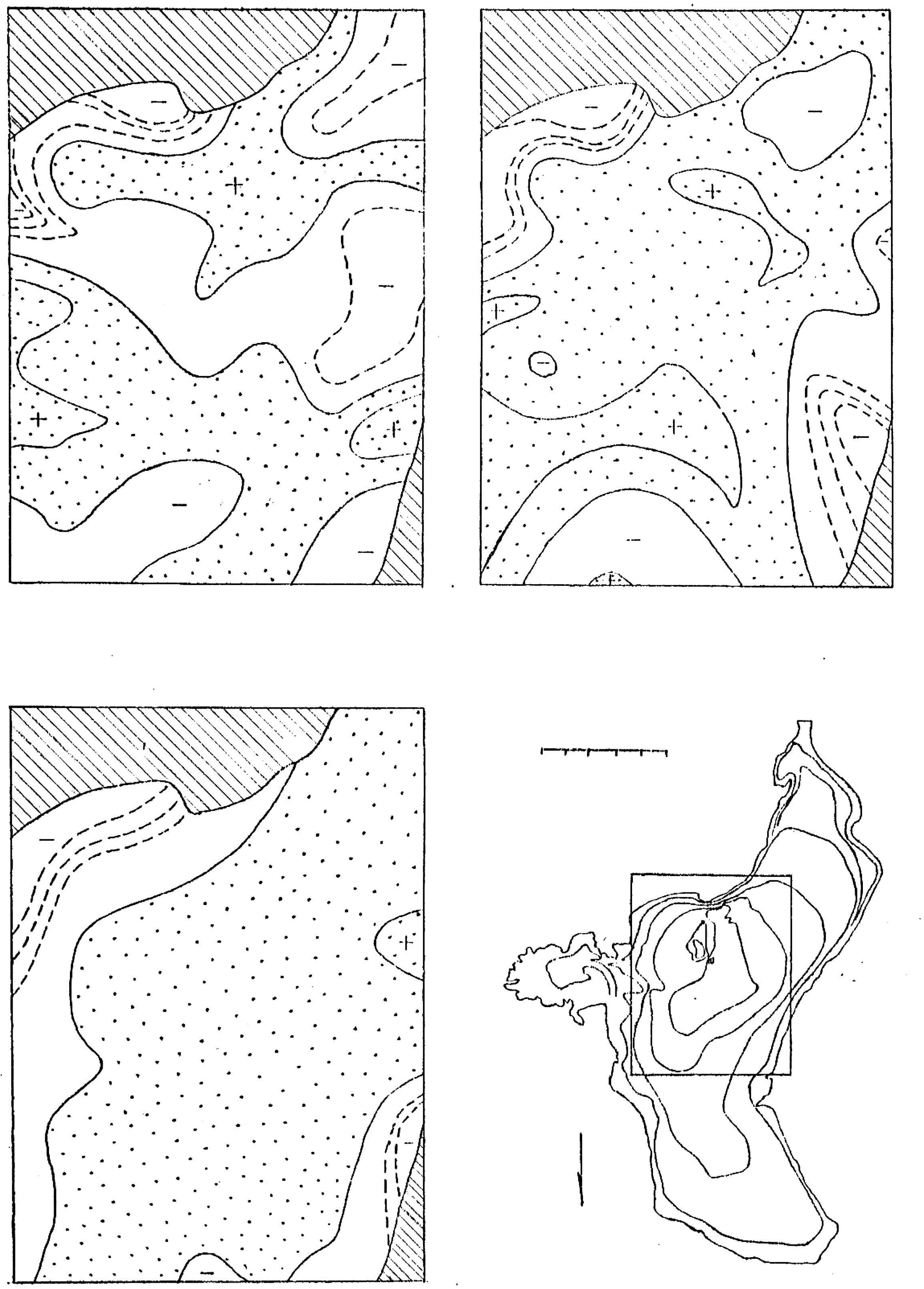
A standard for measuring precision of reproducibility of sample preparation was made by taking 5 gm portions of 5 of the foregoing samples, chosen at random, and mixing them well. A 0.3333 gm portion of the precision standard was processed after every 6 samples.

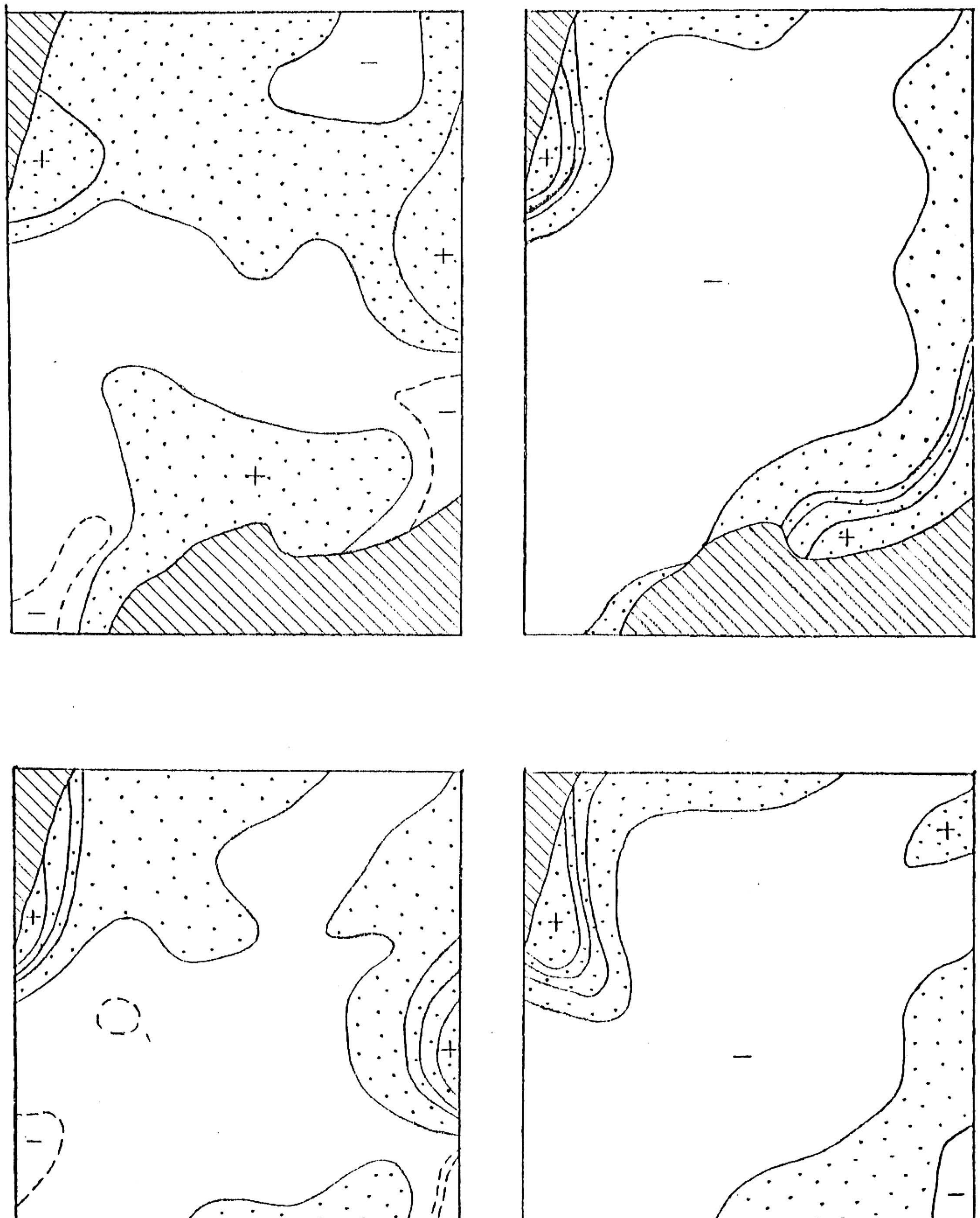
The samples were arranged in a tray so that (1) no sample was more than 4 determinations from a precision standard and (2) the artificial standards


Index map
Bathymetric
a.
Ca
b
Mg
c
Fe
d

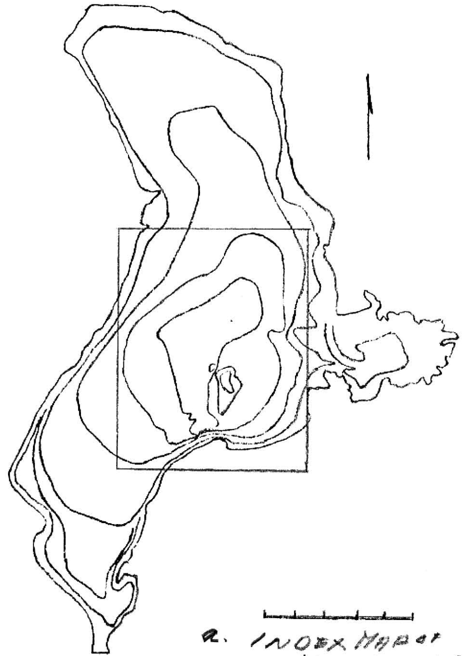
ACKNOWLEDGEMENTS

I gratefully acknowledge many useful discussions with Jim Schwarzmeier and Ralph Lewis concerning the basic physics used to develop the kinetic aspects of the transport problem described in this thesis. Thanks are also due to the members of the CTR-3 group (FRC experiment). In particular, discussions concerning the experimental diagnostics with Bob Chrien, Waheed Hugrass, Don Rej and Michel Tuszewski were very important in the application of the two dimensional modeling described in CHAPTER 3. Richard Milroy was kind enough to let me have a copy of the 3D MHD code used for the stability analysis in CHAPTER 3. He also set up the first stability run and performed the rotational stability runs for the case presented in the appendix. I also thank Ed Caramana and C. K. Rowdyshrub for useful discussions regarding numerical methods, and spiritual support. I thank Diane Forbes and Vicky Fletcher for taking care of the Purdue red tape while I was doing my work at Los Alamos. I thank Professor Choi for his encouragement. But, most of all I thank my wife, Roxanne, for putting up with the headaches associated with and inconvenience of this lengthy project.

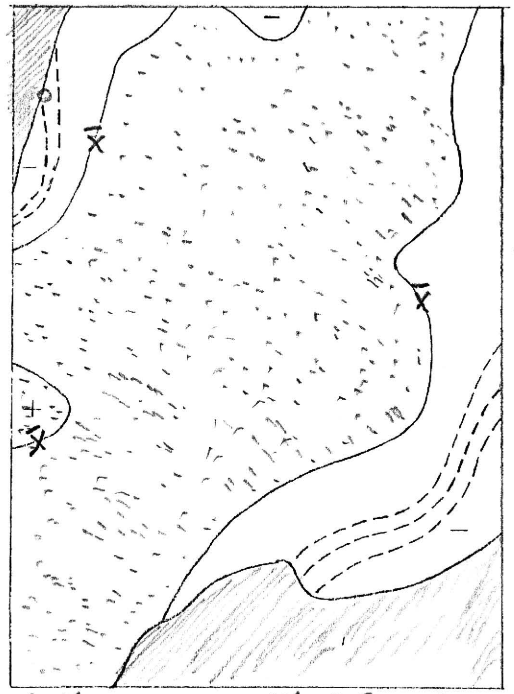




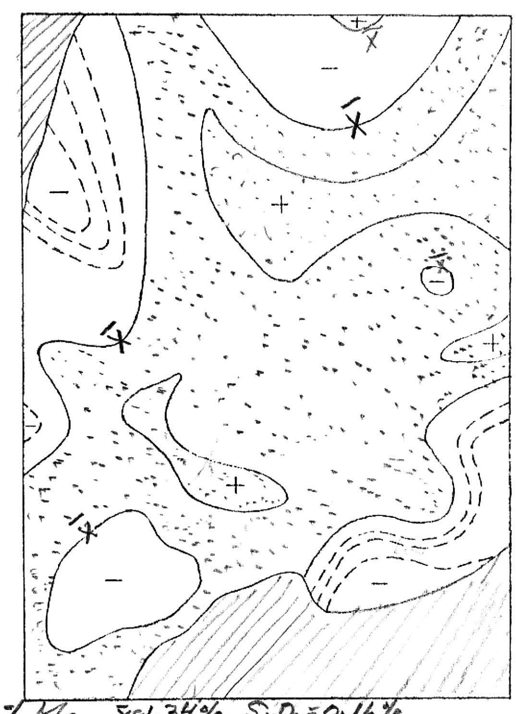
Ca %



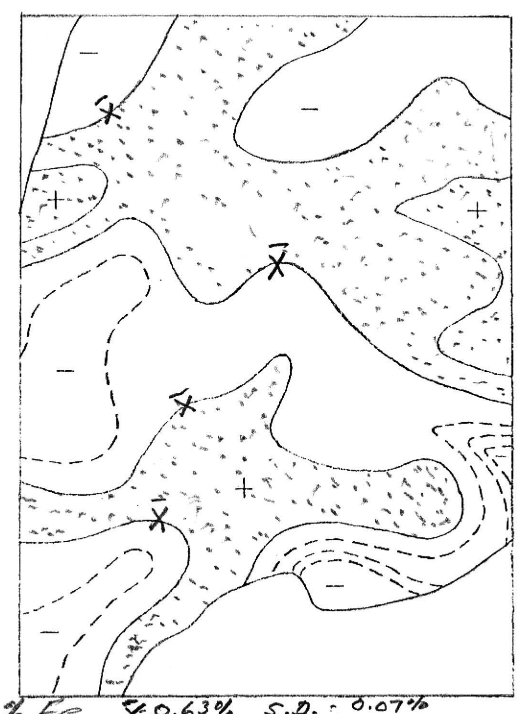
a. INDEX MAP OF UTAH LAKE AND Lincoln Point quadrangle



b. % Ca ~ $\bar{x}$ = 25.1%, S.D. 4.9
Rge 8.5 - 31.1% - 1 S.D.



c. % Mg $\bar{x}$ = 1.34%, S.D. = 0.16%
Rge: 0.73 - 1.50%

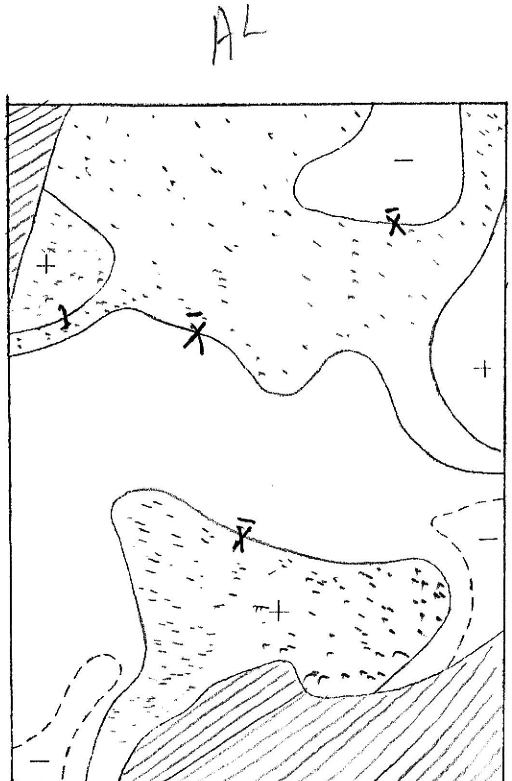


d. % Fe $\bar{x}$ 0.63% S.D. - 0.07%
Rge: 0.24 - 1.15%

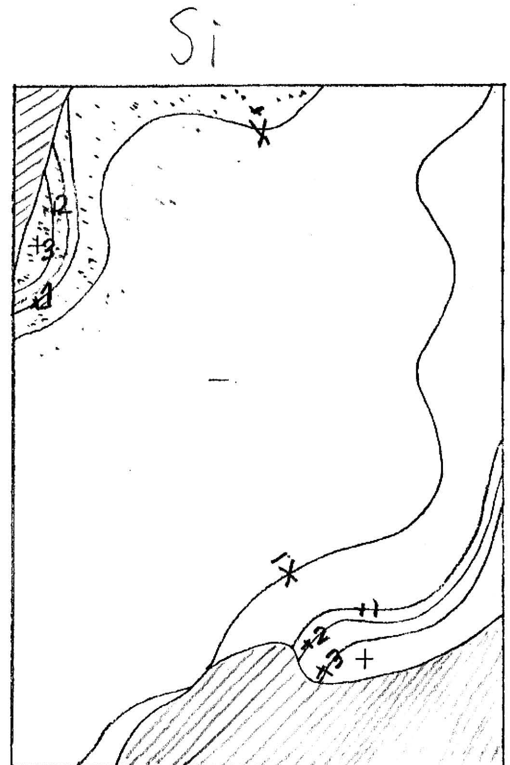
Figure — a, b, c, d a. index map showing depth of lake in feet (m), and location of Lincoln Point quadrangle; b. % Ca content, upper bottom lake sediments; c. % Mg content of upper bottom lake sediments; d. % Fe content, upper bottom lake sediments
(Contours based on Smorholm data, 1974)

Stipple pattern is above mean content for element.

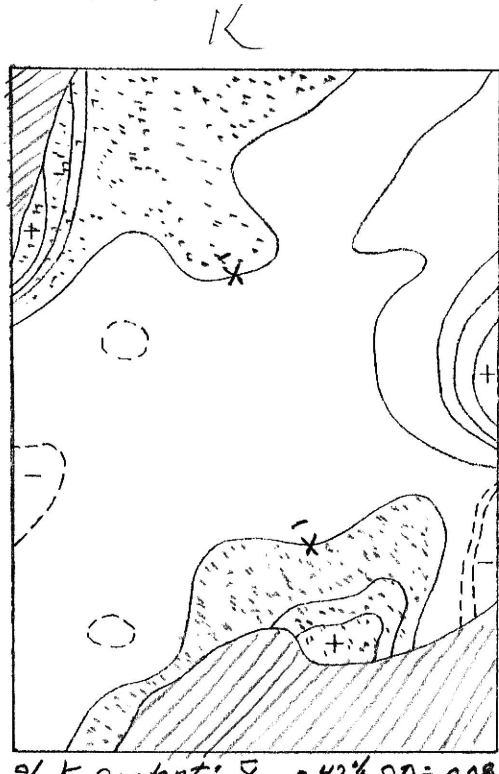
LOCATE SAMPLES



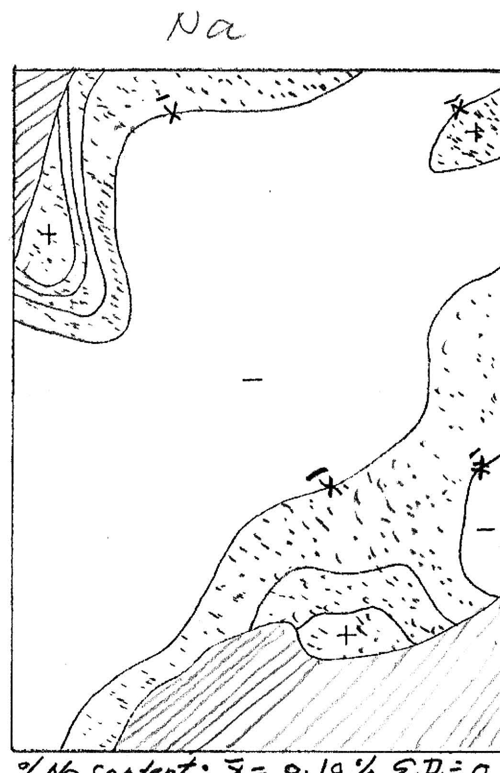
a. %Al content: $\bar{x}$ = 1.34%, S.D. = 0.17%
Rge: 0.81 – 2.25%



b. %Si content: $\bar{x}$ = 11.83, S.D. = 4.95%
Rge: 7.63 – 33.76%



c. %K content: $\bar{X}$ = 0.42%, S.D. = 0.08%
Rge: 0.20 – 1.58%



d. %Na content: $\bar{x}$ = 0.10%, S.D. = 0.04%
Rge: 0.06 – 0.33%

Figure — Percent content of Al, Si, K and Na in upper bottom lake sediments of Utah Lake, Lincoln Point quadrangle. Stippled pattern includes areas containing greater than $\bar{x}$ content of element, diagonal lines = land area

Table ——

SELECTED Metal Analyses - Lower Great Blue Formation

Sec 6, T, T6S, R1E

UTAH COUNTY, UTAH

Sample #	SELECTED Metals (ppm and percent) Cu	Pb	Zn	Ag	Mn	Fe%	U	Sr	Ca%	Mg%	Ba	W
World*												
Mgb-1	4	<3	9	0.6	40	.06	<5	470	41.93	0.13	88	4
Mgb-2	3	<3	5	0.6	23	.04	<5	510	37.10	1.33	19	5
Mgb3	3	<3	4	0.8	28	.05	7	393	39.88	0.14	8	4

Geochemical analyses by Acme Analytical Labs, LTD, Vancouver, B.C.

Composite [illegible] analyses of marine limestones after

MEANS, STANDARD DEVIATION AND STANDARD ERROR OF THE MEAN OF SEDIMENTS, UTAH LAKE (LINCOLN POINT QUADRANGLE)

PAGE 1

	Si	Al	Na	K	Mg	Ca	Fe
$\overline{X}$	11.83	1.34	0.10	0.42	1.34	25.13	0.63
Standard deviation	4.95	0.17	0.04	0.08	0.16	4.91	0.07
045	0.14	0.12	0.01	0.01	0.05	-0.62	-0.02
046	0.45	0.09	0.01	0.03	0.01	0.17	0.02
047	1.64	0.03	0.01	0.01	-0.24	-1.62	0.02
048	-1.60	0.03	0	0	0.06	2.24	0
049	-1.95	-0.06	-0.01	-0.05	-0.09	1.98	-0.02
050	0.14	0.07	0	0.01	0.15	-1.01	-0.02
052	16.32	0.17	0.21	0.26	~~0.06~~	-13.77	-0.16
053	-1.35	0.12	-0.02	0.02	-0.33	0.73	0.03
054	-0.57	0.17	-0.01	0.01	-0.01	0.69	0.05
055	-1.85	0.03	-0.03	-0.01	0.11	1.11	-0.07
056	-1.95	-0.06	-0.01	-0.03	-0.01	1.98	-0.04
057	0.14	-0.07	0	0.02	-0.09	0.53	0.03
058	0.64	0.12	0	0.03	0.05	-1.01	-0.02
060	19.20	1.41	0.23	0.33	0.15	-16.02	0.52
061	-1.60	0.17	-0.02	-0.01	-0.61	1.72	0.04
062	-1.08	0.17	-0.02	0.01	-0.07	1.21	0.06
063	-2.11	0.03	-0.02	0	~~0.18~~ 0.11	2.24	0.05
064	-1.60	0.17	-0.01	0	0.11	2.24	0.07
065	-2.11	0.09	-0.02	0	0.11	2.24	0.07
066	1.78	0.44	0	0.09	0.11	-1.38	0.16
068	-2.35	-0.16	-0.03	-0.04	-0.06	1.88	-0.07
069	-3.64	-0.39	0	-0.10	-0.09	4.82	-0.14
070	-1.95	-0.06	-0.02	-0.03	0.01	1.98	0.04
071	-1.35	0.12	-0.03	-0.02	0.15	1.50	-0.02
072	-1.95	-0.06	-0.01	-0.02	0.06	0.92	0.04
073	0.14 -3.13	0.16	0	0.03	-0.01	-0.82	0.03
080	-3.13	-0.19	-0.03	-0.08	0.01	3.79	-0.08
081	-2.11	-0.11	-0.02	-0.05	0.01	3.79	-0.04
082	-1.60	-0.06	-0.03	-0.04	0.11	2.76	-0.02
083	-2.11	-0.06	-0.03	-0.02	0.06	2.24	0
084	-0.06	-0.11	-0.01	-0.04	0.06	2.24	-0.02
085	1.99	0.03	0	0.03	0.11	0.69	0.07
086	5.80	0.44	0.02	1.16	0.11	-2.41	0.18
094	-4.20	-0.35	-0.03	-0.10	-0.09	5.50	-0.10
095	-2.90	0.03	-0.04	-0.06	0.15	2.66	-0.07
096	-2.05	0	-0.01	-0.01	0.06	1.98	0.07

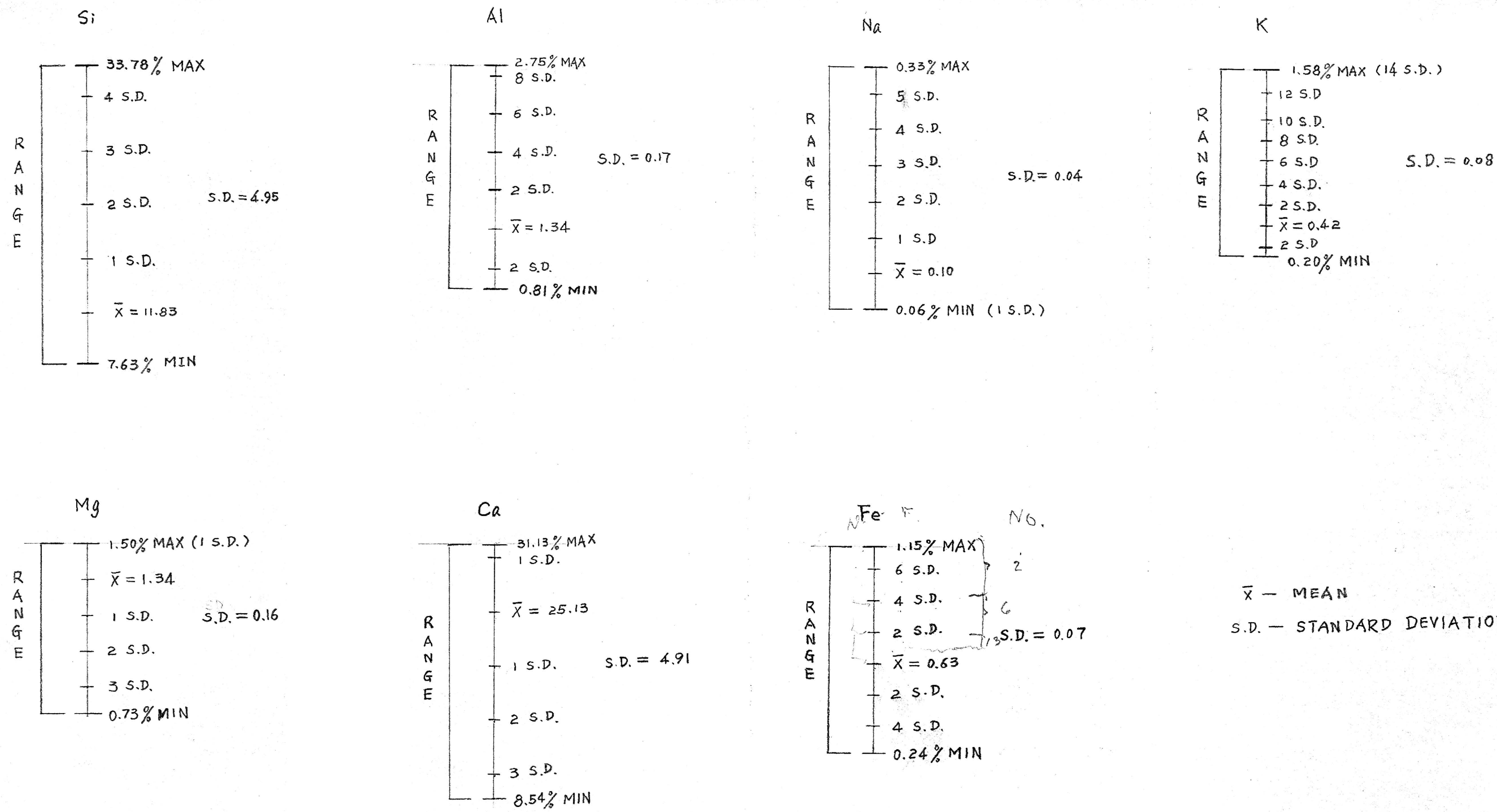
	Si	Al	Na	K	Mg	Ca	Fe
$\overline{X}$	11.83	1.34	0.10	0.42	1.34	25.13	0.63
S. D.	4.95	0.17	0.04	0.08	0.16	4.91	0.07
097	-2.85	-0.11	-0.01	-0.07	0.05	2.46	-0.02
098	-3.03	-0.25	0	-0.06	0.01	2.99	-0.04
099	-0.35	-0.16	0.01	-0.02	-0.06	-0.05	-0.07
100	21.95	-0.53	-0.02	-0.22	-0.47	-16.35	-0.14
106	-2.44	-0.05	-0.02	-0.04	0.06	2.99	0.03
107	-2.64	-0.05	-0.02	-0.02	0.01	1.98	0.01
108	-1.73	0.07	-0.01	0	0.16	1.27	0.02
109	-0.09	0.10	0.02	0.02	0.16	-0.03	0.07
110	1.08	0.15	0.02	0.03	0.06	-0.53	0.03
111	2.88	0.17	0.02	0.08	0.11	-2.99	0.11
112	21.95	-0.24	-0.02	-0.22	-0.47	-16.35	-0.16
116	-1.85	-0.10	-0.02	-0.04	~~-0.13~~ 0.01	1.98	-0.02
117	-3.81	-0.30	-0.01	-0.10	~~-0.06~~ -0.09	4.49	-0.12
118	-0.34	0.04	0	0	~~-0.01~~ 0.01	-0.15	0.04
119	19.48	0.05	0.13	0.21	~~-0.01~~ -0.57	-16.60	-0.39
124	-2.64	-0.25	-0.01	-0.07	~~-0.09~~ 0.01	2.89	-0.08
125	1.64	0.07	0.01	0.02	0.06	3.65	0.03

6 : ≥1, <2

4 : ≥2 <4

1 : ≥4

1 : >14



Sonerholm, P.A., 1974, BYU Geology Studies, vol. 21, pt. 3, p. 97-117

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER BC V6A 1R6 PHONE(604)253-3158 FAX(604)253-1716

GEOCHEMICAL ANALYSIS CERTIFICATE

Paul Proctor File # 95-2557
2949 Apache Way, Provo UT U.S.A. 80604

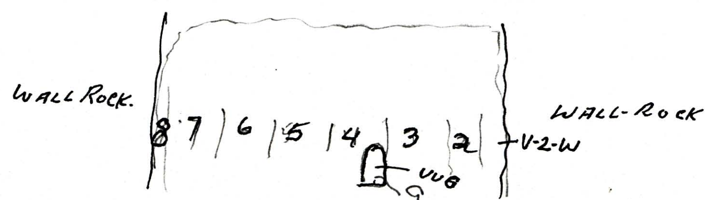
SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm
V-2-W	<1	14	7	2	.4	<1	<1	179	.01	4	<5	≤2	<2	149	<.2	<2
V-2-2	<1	7	3	2	<.3	2	2	130	.02	5	<5	≤2	<2	154	<.2	2
V-2-3	<1	7	<3	1	<.3	<1	1	155	.01	5	<5	≤2	<2	194	<.2	<2
V-2-4	<1	6	<3	1	<.3	1	1	95	.03	11	<5	<2	<2	191	<.2	2
V-2-5	<1	3	<3	1	<.3	<1	1	140	.01	4	<5	<2	<2	164	<.2	2
RE V-2-5	<1	6	4	<1	<.3	<1	1	141	.01	2	<5	<2	<2	165	<.2	<2
V-2-6	<1	4	<3	2	<.3	1	1	62	.02	5	<5	<2	<2	126	<.2	<2
V-2-7	<1	3	6	2	<.3	1	1	86	.02	6	<5	<2	<2	228	<.2	<2
STANDARD C	19	58	39	128	6.5	71	30	1028	3.92	41	22	7	34	47	16.6	16

SAMPLE#	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Tl ppm	Hg ppm
V-2-W	<2	11	39.28	.002	4	1	.13	1	<.01	<3	.02	<.01	.01	<2	<5	<1
V-2-2	<2	<1	39.45	.002	<1	2	.16	3	<.01	4	.02	<.01	<.01	15	<5	<1
V-2-3	<2	1	39.27	.003	<1	1	.19	1	<.01	<3	.02	<.01	<.01	3	<5	<1
V-2-4	<2	1	40.66	.003	<1	1	.15	2	<.01	3	.02	<.01	.01	4	<5	<1
V-2-5	<2	<1	39.79	.003	<1	<1	.18	1	<.01	3	.02	<.01	<.01	2	<5	<1
RE V-2-5	<2	<1	39.77	.003	<1	<1	.18	1	<.01	3	.02	<.01	<.01	3	<5	<1
V-2-6	<2	1	40.38	.001	<1	<1	.08	3	<.01	<3	.01	<.01	<.01	3	<5	<1
V-2-7	<2	1	40.45	.002	1	1	.18	3	<.01	4	.02	<.01	<.01	2	<5	<1
STANDARD C	18	62	.46	.085	38	51	.84	170	.08	27	1.72	.05	.14	10	<5	2

ICP - .500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN FE SR CA P LA CR MG BA TI B W AND LIMITED FOR NA K AND AL.
- SAMPLE TYPE: PULP Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.

DATE RECEIVED: JUL 27 1995 **DATE REPORT MAILED:** Aug 2/95 **SIGNED BY**..........D.TOYE, C.LEONG, J.WANG; CERTIFIED B.C. ASSAYERS

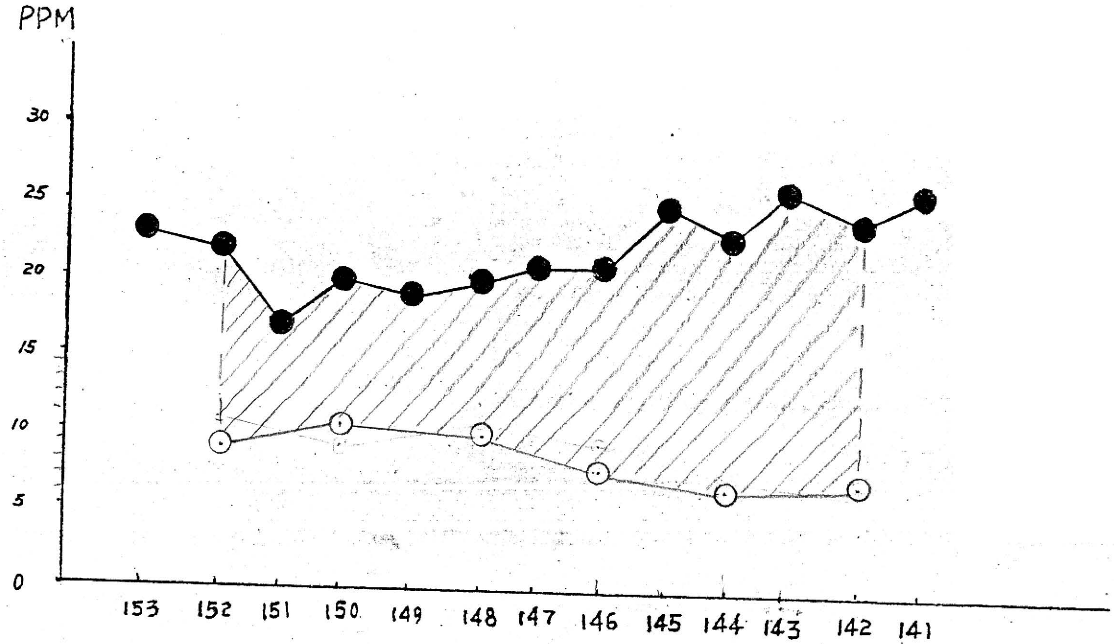
Vein 2 - Cedarstrom CaCO3 Veins, Lake Mtns. Utah.
See sketch of Sampled Vein.



Check Notes

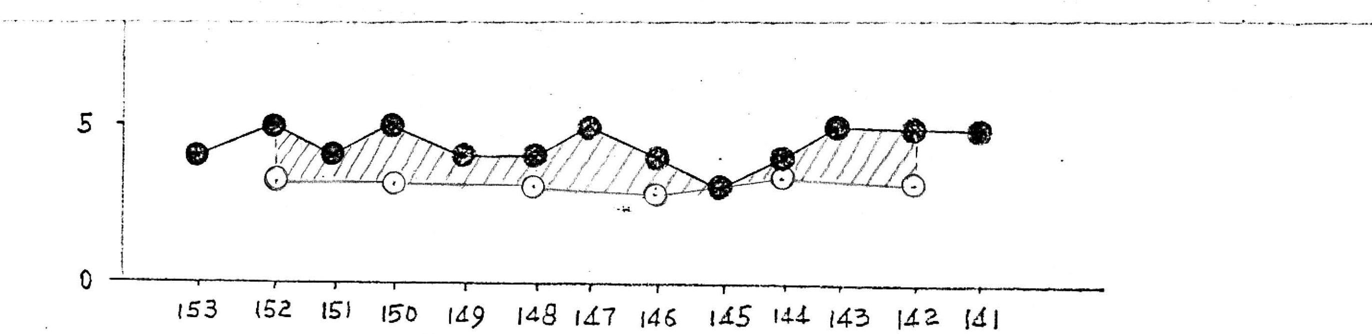
Vein X-Sec.

Cu



PPM
30
25
20
15
10
5
0
153
152
151
150
149
148
147
146
145
144
143
142
141

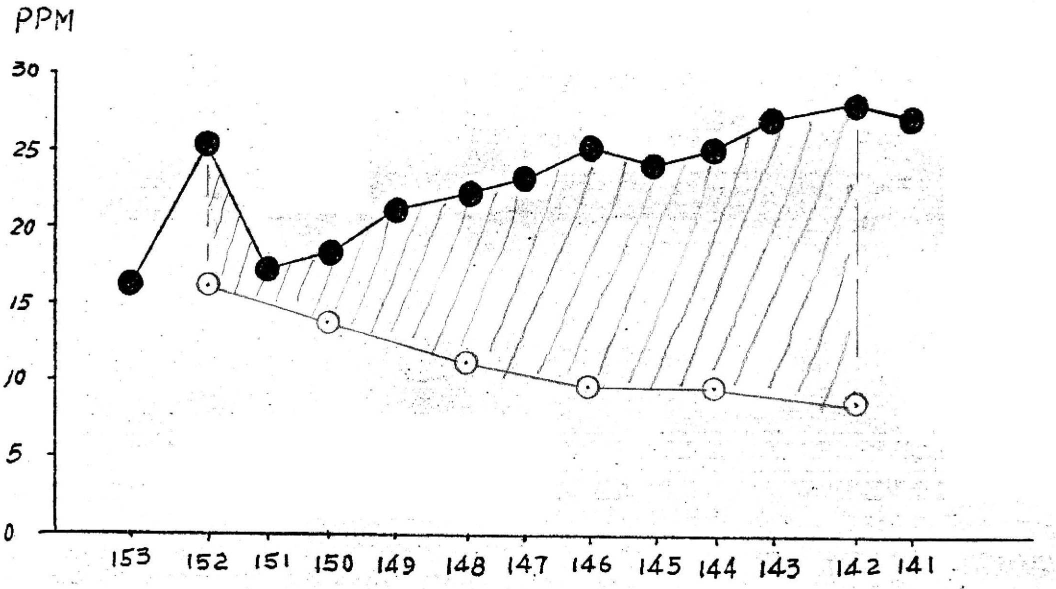
Cu ,



5
0
153
152
151
150
149
148
147
146
145
144
143
142
141

Co

Pb



PPM
30
25
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153
152
151
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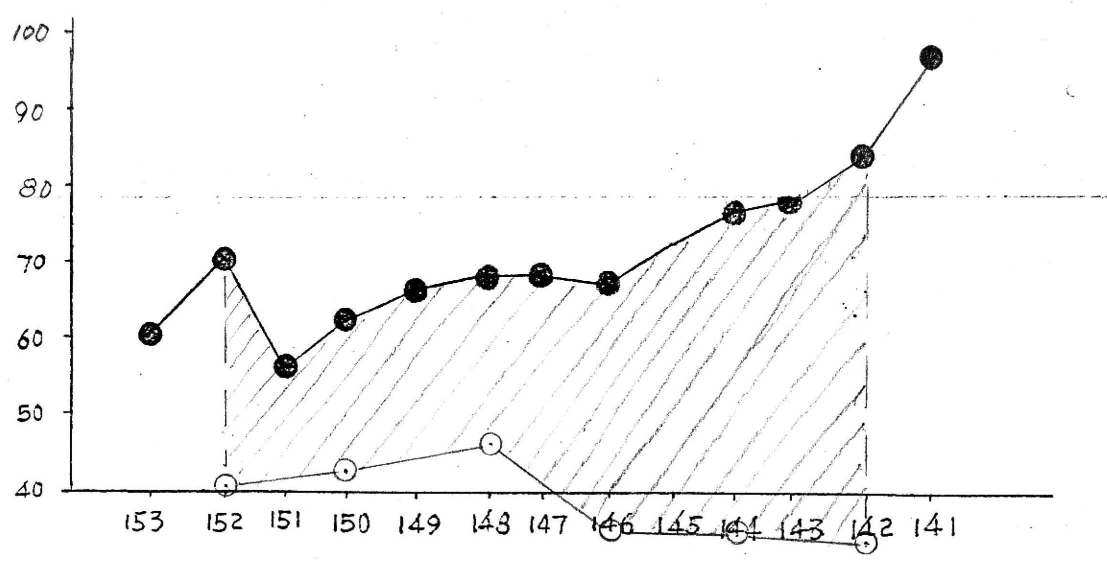
142
141

Pb,



100
90
80
70
60
50
40
153
152
151
150
149
148
147
146
145
144
143
142
141

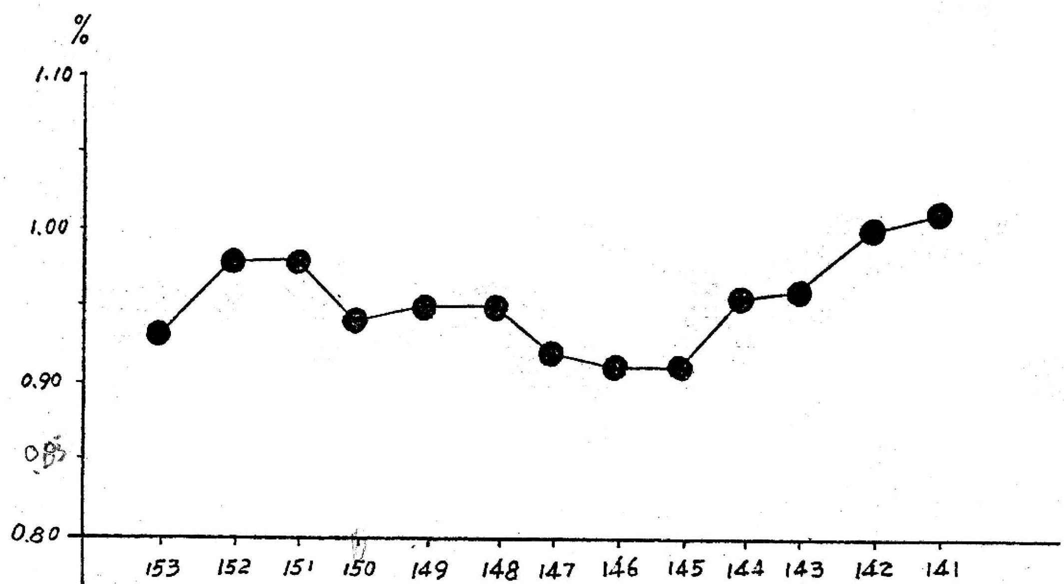
Zn

Zn,

Fe

2.58
2.101
2.50
1.739
1.69
1.53

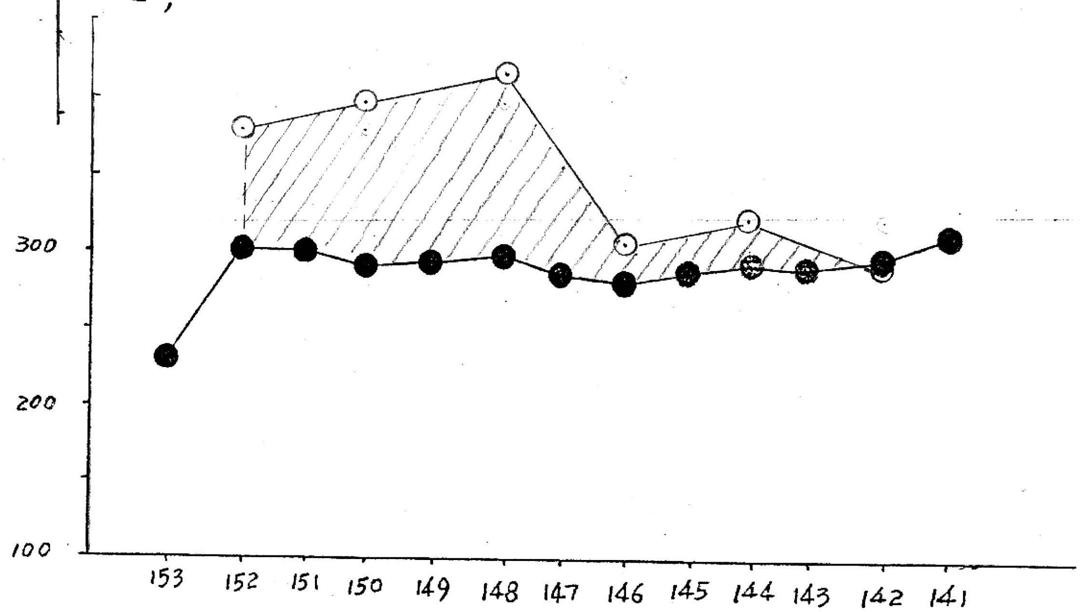
1/100 = 1%
1/1,000 = 0.1
1/10,000 = 0.01
1/100,000 = 0.001
1/1,000,000 = 0.0001
.02



7

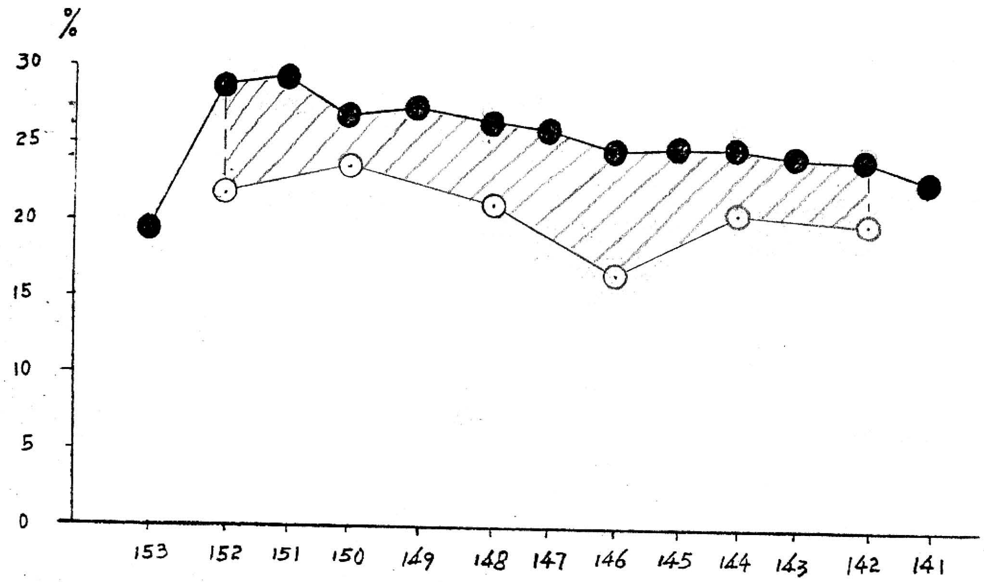
Fe,

Mn



Mn,

Ca



%
30
25
20
15
10
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0
153
152
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149
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143
142
141

Ca,

20
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10
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148
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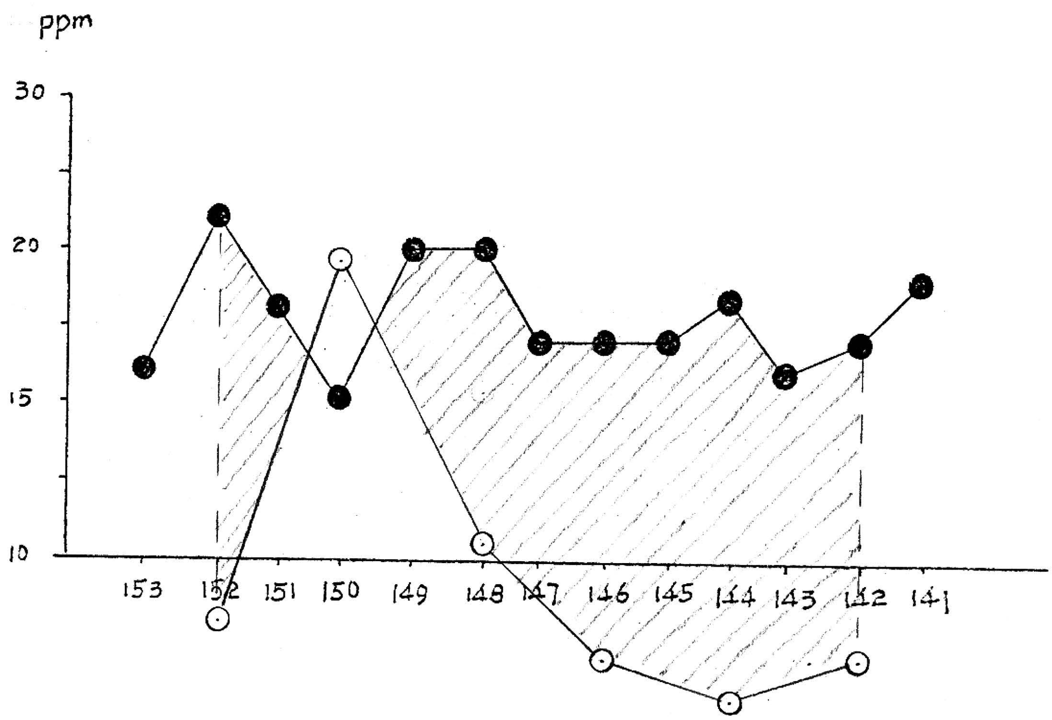
142
141

Ni,

Ni



ppm
30
20
15
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153
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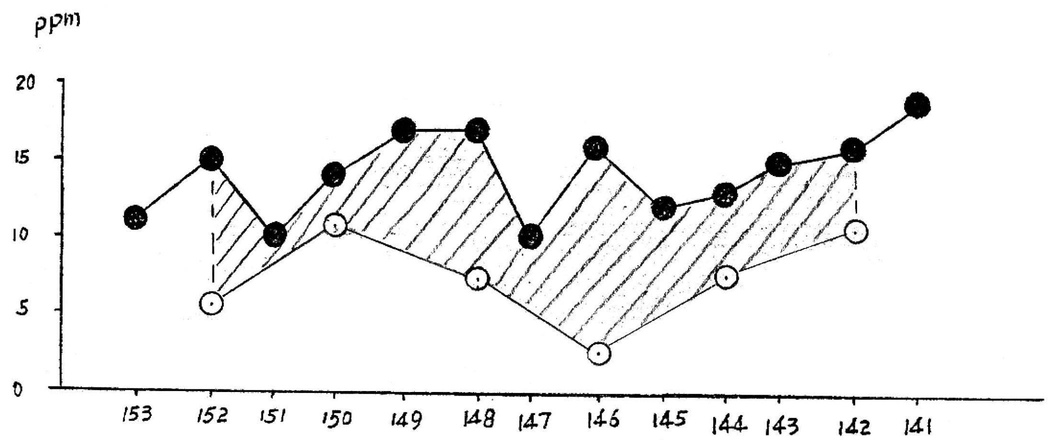
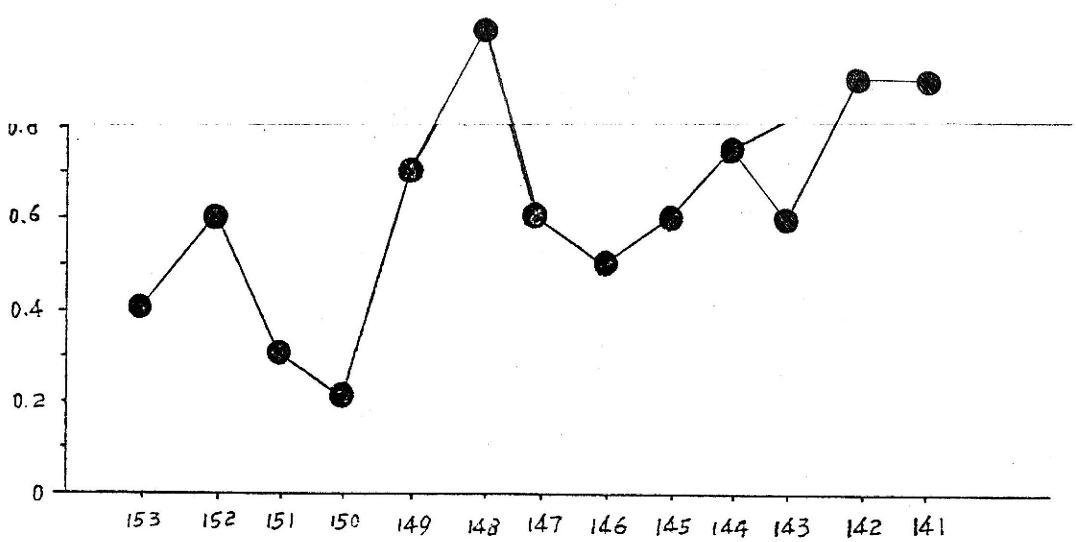
145
144
143
142
141

Ni,

As



As ,



?

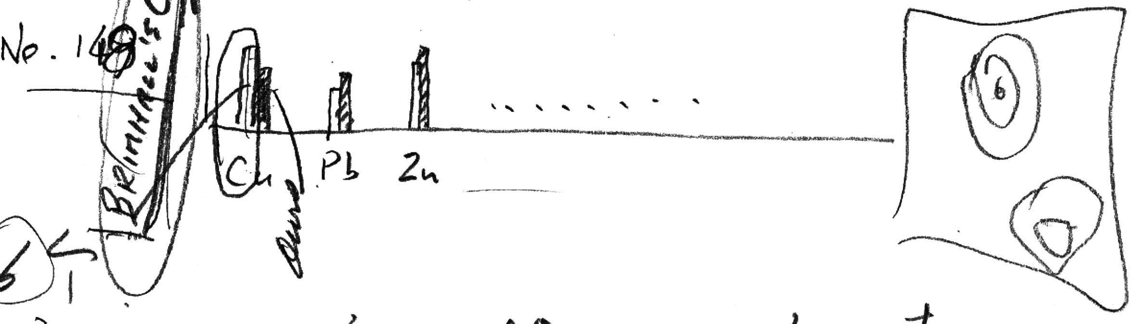
Cd ,

Cd
2.89
3.05
3.83
2.79
3.06
2.75

(PW – B)

1、作每一点 两次分析结果的比较图.

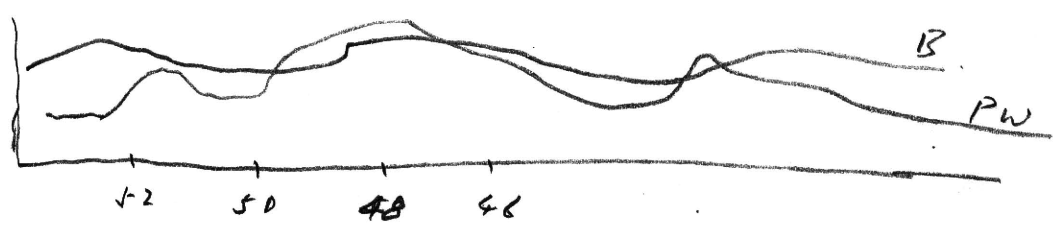
eg. No. 148



共 6 个

2. 作剖面比较曲线 (11个元素)

eg. Cu



共 11 个.

11 elements.

Cu Pb Zn Ag Ni Co Mn Fe As Cd Ca

?

loess /lə:s/

1960134011

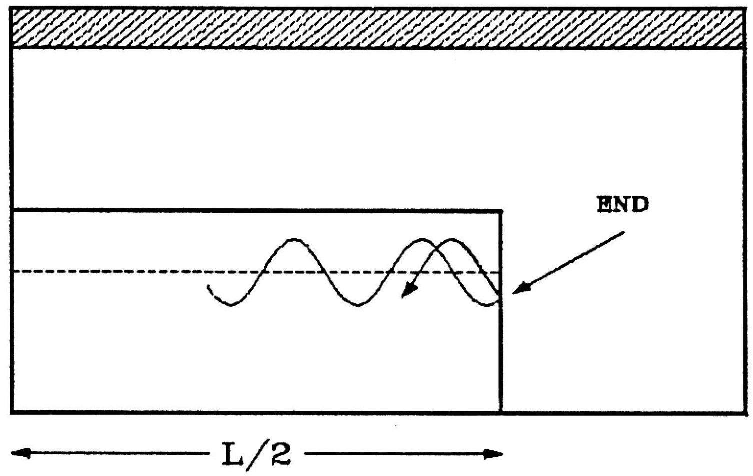


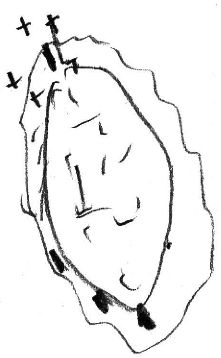
Figure 4.1: Illustration of the quasi one-dimensional motion of a particle.

of axial contraction or expansion of the FRC. The details of such motion can not be treated in a purely one dimensional model. To choose a_z, imagine that the FRC is a cylinder of length ℓ having fields that are axially uniform over its length. Then for a given particle in static fields, $H_\perp$, p_θ and p_z are constants of motion everywhere inside the FRC. When a particle encounters an end, $H_\perp$ and p_z need not be conserved; p_θ is conserved by the assumption of cylindrical symmetry. An idealized situation is assumed in which the particle is "specularly" reflected at the ends of the FRC. Specular reflection implies that p_r is conserved in the interaction, and thus $H_\perp$ is a global constant of the motion. The situation is illustrated in Figure 4.1. It is useful to consider the full Hamiltonian describing the motion of a particle in the situation just described,

$$\begin{aligned} H &= \frac{p_r^2}{2m} + \frac{(p_\theta - q\psi/c)^2}{2mr^2} + \frac{p_z^2}{2m} + q\phi \\ &= H_\perp + \frac{p_z^2}{2m}. \end{aligned} \tag{4.9}$$

NEVADA W (tungsten) vs West Mtn!
ppm.

	< 2
50	< 2
150	
	< 2
250	
600	< 2
	< 2



7 8 9
0,000,000,000

Au

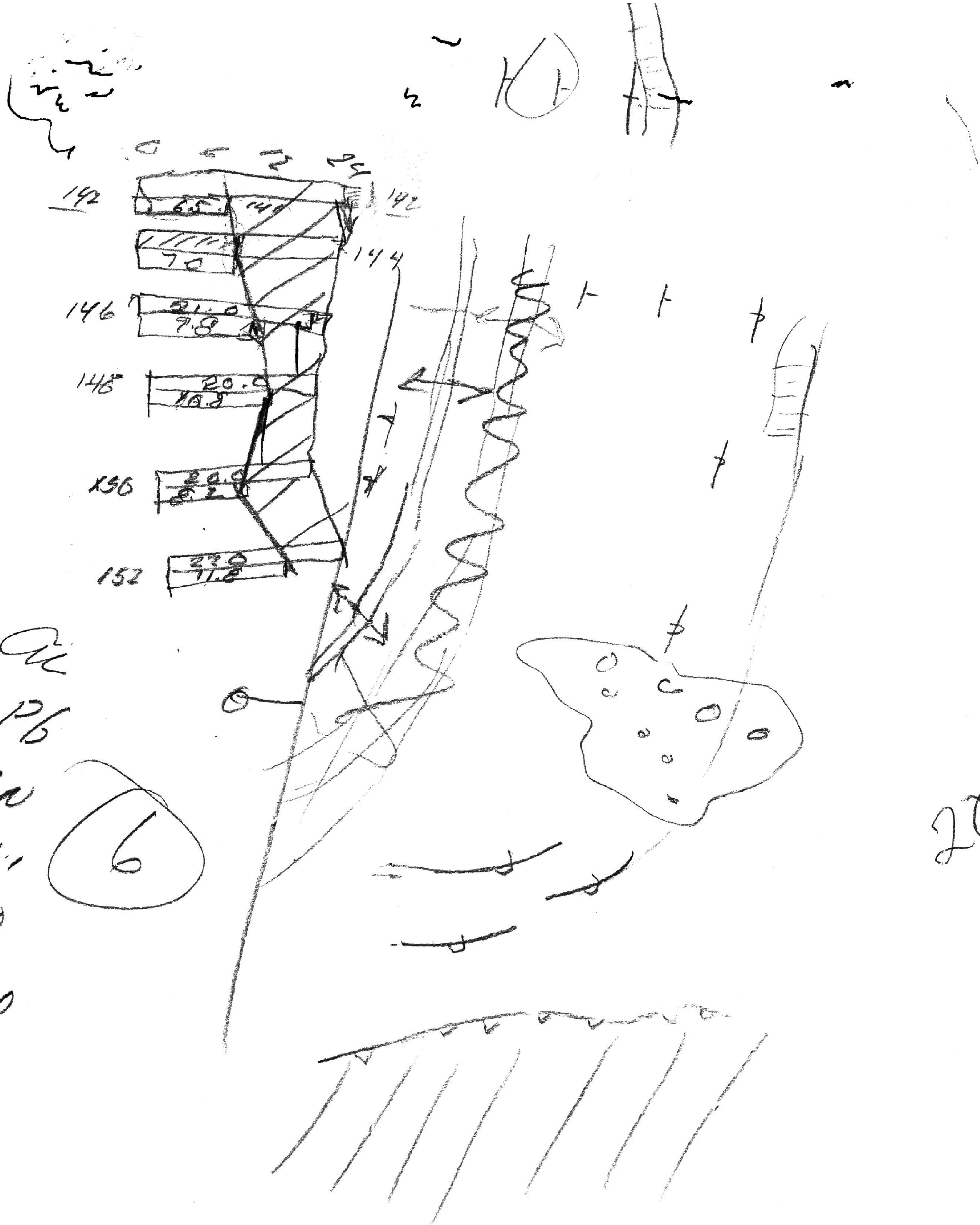
Pb

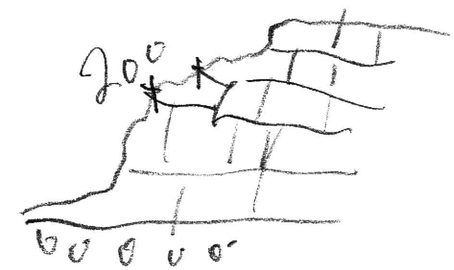
Zn

Ni

Cd

Cu





200ppb

Ls Au = 2-3 ppb

	-1- SAMPLEID	-2- LONGITUD	-3- LATITUD	-4- FEPPM	-5- MGPPM	-6- CAPPM
1	UL125	50.6120	7.6690	2.3756e+4	9359.5920	2.1715e+5
2	UL124	51.7720	7.6690	2.2128e+4	9310.7290	2.4441e+5
3	UL119	47.2340	8.5490	2.3372e+4	7265.0490	7.7839e+4
4	UL118	49.5200	8.5490	2.4958e+4	9792.2610	2.1128e+5
5	UL117	50.6450	8.5490	1.6721e+4	9152.9730	2.3904e+5
6	UL116	51.8060	8.5490	1.9552e+4	9525.8010	2.2826e+5
7	UL112	44.9450	9.4280	1.7386e+4	4934.8520	5.9806e+4
8	UL111	46.0700	9.4280	2.1919e+4	8877.7170	1.9880e+5
9	UL106	51.8040	9.4280	1.5099e+4	8013.4040	1.9104e+5
10	UL107	50.6430	9.4280	1.6946e+4	7371.2390	1.7275e+5
11	UL108	49.5180	9.4280	1.7453e+4	8102.5290	1.6797e+5
12	UL109	48.3920	9.4280	2.1724e+4	1.0326e+4	2.1805e+5
13	UL110	47.2310	9.4280	2.2583e+4	1.0008e+4	2.0713e+5
14	UL098	47.2640	10.3080	2.1078e+4	9226.1870	2.2055e+5
15	UL099	46.1030	10.3080	2.6119e+4	9012.5430	1.9763e+5
16	UL100	44.9420	10.3080	1.5320e+4	4755.1710	5.0269e+4
17	UL097	48.3900	10.3080	2.3216e+4	7760.7160	1.6586e+5
18	UL094	51.8380	10.3080	1.6597e+4	7460.8190	2.0936e+5
19	UL095	50.6060	10.3080	2.1641e+4	7750.7360	1.9738e+5
20	UL096	49.5160	10.3080	2.3380e+4	8820.6940	2.0727e+5
21	UL086	44.9390	11.1880	2.8751e+4	9296.5060	1.8580e+5
22	UL083	48.3880	11.1880	2.0789e+4	8848.2310	2.1778e+5
23	UL084	47.2620	11.1880	2.1909e+4	9067.5850	2.3552e+5
24	UL085	46.1000	11.1880	2.5054e+4	8996.5530	2.1127e+5
25	UL082	49.5140	11.1880	1.7309e+4	7787.8920	1.6489e+5
26	UL081	50.6050	11.1880	1.6953e+4	8149.7620	2.0545e+5
27	UL080	51.8360	11.1880	1.5272e+4	8391.1410	2.0092e+5
28	UL074	45.0070	12.0680	1.1275e+4	1945.2830	1.4181e+4
29	UL073	46.1330	12.0680	2.4808e+4	9528.3700	2.0716e+5
30	UL070	49.5820	12.0680	2.1064e+4	9158.1750	2.2650e+5
31	UL071	48.4560	12.0680	2.6826e+4	9528.1350	2.1739e+5
32	UL072	47.2940	12.0680	2.1456e+4	8771.9290	2.0693e+5
33	UL069	50.7080	12.0680	1.6918e+4	7380.7890	2.0821e+5
34	UL064	47.2920	12.9470	2.3980e+4	9278.6110	2.3391e+5
35	UL065	46.1300	12.9470	2.0426e+4	8420.6420	2.1667e+5
36	UL066	45.0040	12.9470	2.5698e+4	9524.6300	1.9193e+5
37	UL063	48.4540	12.9470	2.2445e+4	9078.6720	2.3787e+5
38	UL060	51.8330	12.9470	4.9862e+4	6420.4900	6.3228e+4
39	UL061	50.7070	12.9470	2.1591e+4	9642.3990	2.3937e+5
40	UL062	49.5800	12.9470	2.4699e+4	9471.1060	2.3531e+5
41	UL054	49.5780	13.8270	2.4478e+4	9128.7470	2.0836e+5
42	UL055	48.4510	13.8270	2.3392e+4	8946.1710	1.9009e+5
43	UL056	47.2900	13.8270	2.0154e+4	8025.6170	1.7959e+5
44	UL057	46.1980	13.8270	2.0776e+4	7475.2850	1.5600e+5
45	UL058	45.0360	13.8270	2.2872e+4	8161.9580	1.5775e+5
46	UL053	50.7050	13.8270	2.2219e+4	8613.1870	1.9476e+5
47	UL052	51.8320	13.8270	1.5980e+4	5872.0490	8.0992e+4
48	UL050	45.0340	14.7070	2.9168e+4	8803.2490	1.8770e+5
49	UL045	50.7730	14.7070	2.1119e+4	7452.4300	1.6388e+5

	-1- SAMPLEID	-2- LONGITUD	-3- LATITUD	-4- FEPPM	-5- MGPPM	-6- CAPPM
50	UL046	49.6110	14.7070	2.2082e+4	8157.5800	1.8210e+5
51	UL047	48.4850	14.7070	2.0985e+4	8356.2110	1.8774e+5
52	UL048	47.3220	14.7070	2.1182e+4	8580.4640	2.0368e+5
53	UL049	46.1960	14.7070	2.2945e+4	8428.2610	1.9998e+5

	-7- NAPPM	-8- KPPM	-9- SPPM	-10- PPPM	-11- SRPPM	-12- MNPPM
1	600.2570	1359.5100	7580.4420	730.9480	850.8680	416.4480
2	497.5080	1307.7320	6928.6090	615.8220	1036.6910	372.0720
3	464.9320	834.1830	1150.0020	713.2790	218.3120	249.0730
4	583.4160	1338.2210	7741.1920	688.3230	768.7380	489.6110
5	515.1820	1224.2550	4918.5670	496.5030	1040.1950	312.6080
6	500.7560	1450.9600	4978.4260	554.2270	944.4330	366.3740
7	421.3470	611.3090	1295.9880	506.9280	171.7660	217.8680
8	483.6450	1249.8910	5108.2930	666.3620	721.3450	379.0700
9	418.1050	1140.0490	5590.1480	542.3060	759.4590	317.4870
10	382.0420	1009.9050	6112.3590	569.7480	757.3970	296.0780
11	452.8530	1292.5570	4591.2220	537.3290	768.1440	321.6560
12	561.4800	1377.4410	5434.3330	636.6640	909.2930	445.9150
13	547.7220	1365.9420	6293.4390	846.8280	898.9310	436.6760
14	431.6970	1225.8500	7634.5220	550.6120	855.0790	352.9710
15	421.6200	1297.4500	9118.2250	680.3680	883.6100	380.4490
16	555.7150	545.9400	794.3580	451.3080	126.5530	194.8020
17	439.8640	1270.2060	7348.7550	669.2340	828.7380	316.9420
18	397.8830	1045.7430	4894.1040	502.8020	900.8760	307.1530
19	402.9700	1183.2030	6129.7810	604.4800	840.2100	339.7970
20	562.1760	1548.9910	7148.3440	645.2500	994.4460	386.5220
21	458.9060	1477.8380	8673.9180	777.8950	760.7190	438.2430
22	476.0710	1308.4130	6964.9580	603.9980	921.4440	378.4430
23	505.5550	1298.0730	8211.8910	616.0500	976.2100	396.9120
24	507.7170	1465.3700	8694.6050	745.8450	904.8100	414.3650
25	433.4390	973.2250	6896.4010	521.3560	773.9370	303.8990
26	426.6500	1106.1080	6837.2440	531.2240	863.8470	321.5430
27	362.4510	942.1390	5349.0310	485.1050	936.0780	291.6070
28	122.1490	156.3510	835.4400	395.8570	50.1690	65.0910
29	463.1260	1424.7740	6306.5520	689.0580	841.8670	446.7800
30	548.3450	1550.5330	7587.3680	570.1980	898.8450	390.0200
31	564.3820	1562.7650	7643.6180	775.2900	981.3040	423.9010
32	564.4740	1606.8710	5610.8280	573.2100	873.8250	390.7990
33	400.8880	1005.1020	6372.8000	422.9370	917.4620	288.3110
34	528.5280	1373.6420	7671.5310	640.1250	967.6730	440.8140
35	443.0810	1318.1340	5170.8230	620.1400	947.0630	407.9240
36	498.4600	1524.0940	5313.6440	710.7360	808.4720	435.3890
37	505.0940	1439.5620	6422.6270	598.7800	957.8270	430.0220
38	1611.6660	3157.8390	2957.4480	971.7030	365.5140	544.8850
39	489.2460	1418.8600	6558.3200	674.4450	978.7520	423.0240
40	504.2060	1436.0250	7063.8930	683.0940	975.3870	440.0090
41	535.2380	1590.6730	6316.9610	617.4980	862.4160	414.3060
42	473.9370	1413.7640	5588.8540	576.2170	848.7960	395.0510
43	464.3930	1279.3450	6584.3960	489.1300	810.9360	332.4110
44	397.5390	1213.6700	5508.0880	522.0100	763.9480	323.3940
45	457.5740	1340.4080	4770.0930	580.3950	688.6000	371.2400
46	475.2080	1320.4970	5750.9490	548.1000	890.1470	376.8950
47	403.8490	1008.1760	1838.6570	492.9950	340.5460	156.3980
48	440.9470	1451.8320	6460.4580	688.9860	851.4610	403.7300
49	363.7220	967.6640	5679.3990	570.9320	818.3010	337.7260

	-7- NAPPM	-8- KPPM	-9- SPPM	-10- PPPM	-11- SRPPM	-12- MNPPM
50	431.4850	1222.0400	4022.3820	602.5660	782.5040	383.0390
51	457.6620	1330.8460	5951.7410	594.7900	832.1090	375.1270
52	453.6430	1239.7900	5891.1980	594.0970	946.1230	389.7720
53	439.2730	1337.4100	7210.3660	563.0310	908.3650	363.3820

	-13- BAPPM	-14- ASPPB	-15- HGPPB	-16- SEPPB	-17- CRPPB	-18- ZNPPB
1	653.6360	2697.3880	62.0000	1799.4980	1.1984e+4	4.5145e+4
2	662.4140	6059.4580	32.0000	2485.2610	1.0016e+4	3.9281e+4
3	287.5680	0.0000	50.0000	625.4100	9782.8940	5.8554e+4
4	720.7660	0.0000	48.0000	4300.7960	1.4988e+4	4.3940e+4
5	733.5820	4544.8220	30.0000	1622.0910	9749.8050	3.2009e+4
6	734.9670	4663.4790	40.0000	2012.7870	1.2797e+4	4.0744e+4
7	220.1760	4201.3750	24.0000	1020.5130	6603.3450	5.4675e+4
8	565.2280	8497.5630	32.0000	785.3560	1.2926e+4	4.2899e+4
9	590.9920	6432.3670	24.0000	513.3330	9790.6690	3.8528e+4
10	454.9330	2507.8060	24.0000	705.5630	9513.4530	3.7741e+4
11	571.3780	8539.1070	30.0000	2150.5760	9178.7100	4.1566e+4
12	695.8160	9070.6010	28.0000	3052.9770	1.2238e+4	4.5851e+4
13	617.8060	1.6994e+4	36.0000	1762.7050	1.1562e+4	4.6691e+4
14	631.5630	1.0186e+4	28.0000	1363.4470	1.1192e+4	3.6819e+4
15	511.3490	4181.6530	48.0000	2292.7380	1.3190e+4	4.6655e+4
16	212.2330	2742.0710	20.0000	1946.7970	5481.1870	2.5813e+4
17	473.0130	1.4395e+4	70.0000	1135.8590	1.1776e+4	5.8133e+4
18	539.4800	3760.5160	19.0000	2326.4500	8673.6470	3.7250e+4
19	448.4860	0.0000	35.0000	1500.8110	1.1135e+4	4.4472e+4
20	656.8850	4723.2870	40.0000	2215.5410	1.4158e+4	5.4667e+4
21	468.5360	0.0000	28.0000	548.2040	1.3062e+4	5.2513e+4
22	664.4750	5523.9970	22.0000	1287.3200	8811.1070	4.0297e+4
23	642.9090	1.0986e+4	21.0000	1947.9970	3.9659e+4	4.2661e+4
24	564.1340	7522.8990	41.0000	2597.7360	1.2334e+4	4.6198e+4
25	352.3290	2535.5180	67.0000	1248.6370	8404.4690	3.5423e+4
26	427.5790	7826.5700	42.0000	3645.0840	8282.0350	3.5015e+4
27	443.0160	1.0720e+4	94.0000	2461.0590	1.0230e+4	3.3565e+4
28	303.5120	3580.0030	24.0000	1155.0360	5399.9040	1.7350e+4
29	527.4910	6807.9450	66.0000	3426.1380	1.3901e+4	5.1382e+4
30	682.4690	1.9984e+4	32.0000	2059.9750	1.0872e+4	3.9714e+4
31	557.8580	9259.4220	124.0000	4573.4960	1.4149e+4	7.9672e+4
32	573.5000	6248.2430	39.0000	413.5390	1.0709e+4	4.3892e+4
33	619.2240	1.1360e+4	34.0000	5933.3790	6875.7590	2.8534e+4
34	587.0350	9536.3910	46.0000	2670.0060	1.1805e+4	4.9682e+4
35	587.7740	8401.0270	38.0000	3486.4980	1.1553e+4	4.4208e+4
36	581.8320	4273.6100	54.0000	3890.0930	1.4176e+4	5.0761e+4
37	667.6410	4613.9370	78.0000	3175.4380	1.1778e+4	4.4492e+4
38	326.6330	1.0939e+4	41.0000	6511.3950	1.5778e+4	9.1515e+4
39	657.2440	1.0036e+4	32.0000	7082.7010	1.1593e+4	4.3730e+4
40	596.6310	6656.1350	44.0000	3796.8070	1.1740e+4	4.6713e+4
41	701.8770	1.0545e+4	81.0000	2946.1410	1.1173e+4	4.2941e+4
42	656.4470	4481.2270	55.0000	4242.4180	1.2124e+4	4.6912e+4
43	548.5260	6020.0330	38.0000	2544.6380	1.0158e+4	3.7265e+4
44	513.8600	6534.0160	79.0000	3097.8210	1.1966e+4	4.4161e+4
45	440.4500	1.4881e+4	100.0000	3543.2250	1.2301e+4	5.7504e+4
46	665.0700	4518.4030	55.0000	5168.5520	1.2043e+4	4.1816e+4
47	306.0850	2741.1700	48.0000	1564.3350	8486.1670	2.7359e+4
48	588.1970	7423.1440	57.0000	5942.0150	1.4482e+4	5.9920e+4
49	533.9710	3266.7520	60.0000	4498.6020	1.1930e+4	4.8470e+4

	-13- BAPPM	-14- ASPPB	-15- HGPPB	-16- SEPPB	-17- CRPPB	-18- ZNPPB
50	659.0180	8158.5090	36.0000	1.0110e+4	1.1894e+4	3.8914e+4
51	633.5200	97.8080	57.0000	4858.5530	1.1689e+4	3.9997e+4
52	695.0490	3839.5050	69.0000	4409.0380	1.0392e+4	4.4598e+4
53	672.0320	6310.7070	35.0000	2250.7030	1.2243e+4	4.6817e+4

	-19- CDPPB	-20- PBPPB	-21- COPPB	-22- NIPPB	-23- CUPPB	-24- AUPPB
1	3542.8630	1.9000e+4	3692.2650	9436.5180	1.2205e+4	1021.9830
2	3265.0570	8935.9150	3945.5950	7924.5980	8774.4790	797.0430
3	3221.5310	2.2519e+4	4202.7920	5898.9280	1.2645e+4	2119.3450
4	3531.4990	1.0615e+4	4094.9040	9429.0030	9320.9470	5133.2150
5	2519.8230	5220.7520	3280.4090	6298.7370	7507.7040	827.9910
6	2923.5950	1.6983e+4	3256.0860	8761.2070	9369.1630	1282.4040
7	2373.7000	6509.0120	3070.2960	4138.7810	1.6992e+4	2413.7160
8	3593.2120	1.0345e+4	3551.3950	7877.1170	1.0079e+4	3823.3710
9	2457.9910	8351.9370	3326.6070	6242.6060	6757.2640	1078.8680
10	2775.4540	1.2676e+4	2797.9500	7315.0780	6004.4110	1079.6600
11	3088.2620	1.5813e+4	3629.6000	7992.9260	6372.2380	1199.5220
12	3364.7220	1.4605e+4	3524.9950	8877.9540	9809.2680	1.0173e+4
13	3356.5910	7066.5200	3735.2880	9046.2870	1.0040e+4	6000.3650
14	2528.1720	1.3367e+4	2799.6760	6716.5030	7718.8400	4417.6650
15	3591.6890	1.4289e+4	3994.1300	1.0376e+4	9317.7570	3351.0320
16	1924.0330	8060.4650	2388.4950	2947.9910	5967.3760	1628.0640
17	3582.6580	2.8178e+4	3008.6350	8508.0340	2.0738e+4	5050.0530
18	2923.5070	1.3913e+4	2594.5240	6657.9810	7563.0500	1426.0040
19	3542.9520	9148.2800	2990.2420	8219.8770	8445.4520	1441.8740
20	3691.5880	2.6304e+4	3767.2120	9058.1930	1.0602e+4	9599.1180
21	4235.4160	1.2169e+4	4079.6400	1.0523e+4	1.1785e+4	4326.8680
22	2897.1590	1.5825e+4	3275.9070	8664.0110	8166.5650	1.1664e+4
23	3050.3880	1.3635e+4	3240.7810	1.9655e+4	1.0801e+4	7572.3180
24	3831.8960	1.0948e+4	3086.7820	1.0344e+4	9826.4180	5945.2340
25	2798.8040	9257.0020	2804.1340	7728.8360	7065.1720	792.1970
26	3061.3900	9482.4240	3296.2990	5485.4150	6512.3910	522.9140
27	2750.0410	9304.9720	3248.4280	6838.4990	6972.3450	744.3420
28	1820.5210	3517.1340	2381.9360	1440.7830	6079.0580	667.3790
29	4260.7050	1.5313e+4	3609.4340	9774.5110	1.0718e+4	2349.6190
30	3716.3230	1.5132e+4	3098.9620	7791.2830	9771.5810	1201.1620
31	4187.0200	4.1517e+4	4161.6880	1.0366e+4	1.7078e+4	5912.4220
32	3194.0720	1.8948e+4	3480.2740	7238.6400	9012.4200	2780.8360
33	2247.3620	4017.4880	2271.6540	4513.2860	6259.0580	754.4570
34	3373.3730	1.8300e+4	3607.3040	9337.3960	9382.5910	1788.7060
35	3288.4110	7003.0540	3101.4910	8668.5440	8786.1260	1630.7230
36	3918.8370	1.5488e+4	3908.5880	1.1238e+4	1.1732e+4	1401.3290
37	2930.1240	1.6023e+4	3507.4290	8576.2370	8942.9310	2197.4470
38	6909.9790	3.6320e+4	7357.7550	2.1686e+4	1.7447e+4	1610.8710
39	3699.0560	1.1837e+4	3008.1830	8439.9340	9008.1040	4523.7640
40	3864.6390	9990.7520	3191.1260	9563.5740	9345.9970	2964.5140
41	3626.7880	1.5478e+4	3612.8600	9070.2940	9230.7800	1148.8580
42	3299.6000	1.2603e+4	3408.1180	8822.5630	1.0531e+4	1233.5410
43	3071.7950	1.3092e+4	2535.5540	7202.6430	7827.1710	1040.0970
44	2878.2110	9408.3360	3119.6460	8162.5030	1.0245e+4	737.0940
45	3179.8160	2.7775e+4	2348.6760	8059.2350	1.5080e+4	1221.4300
46	3007.2710	1.3577e+4	2882.9180	8007.3190	8883.6910	1208.5040
47	2092.7590	1.4481e+4	2573.6040	4787.8890	5189.7270	626.0070
48	4103.4640	1.8190e+4	4171.8610	1.0996e+4	1.7621e+4	2117.1630
49	2804.9770	1.1582e+4	2966.0000	8178.9180	9191.2370	1147.5260

	-19- CDPPB	-20- PBPPB	-21- COPPB	-22- NIPPB	-23- CUPPB	-24- AUPPB
50	2928.5780	1.1487e+4	3056.2810	8630.9970	8530.9340	1410.6250
51	2535.5520	1.0835e+4	3127.5450	8535.4340	8117.1830	1165.7610
52	3279.9630	1.1693e+4	3401.8070	8727.2890	9260.0780	4186.0810
53	3426.5160	1.4478e+4	3185.9290	7897.1180	9750.3730	2311.7200

	-25- AGPPB	-26-	-27-	-28-	-29-
1	24.1350		44.9390	7.6690	4.6829e+4
2	0.0000		44.9390	8.1382	4.7548e+4
3	0.0000		44.9390	8.6074	4.9555e+4
4	0.0000		44.9390	9.0766	5.3459e+4
5	0.0000		44.9390	9.5458	5.4537e+4
6	0.0000		44.9390	10.0150	3.0004e+4
7	0.0000		44.9390	10.4842	2.6573e+4
8	0.0000		44.9390	10.9534	5.0890e+4
9	9.0460		44.9390	11.4226	5.0618e+4
10	0.0000		44.9390	11.8918	1.8666e+4
11	46.6600		44.9390	12.3610	2.3235e+4
12	0.0000		44.9390	12.8302	5.0579e+4
13	0.0000		44.9390	13.2994	5.1346e+4
14	0.0000		44.9390	13.7686	5.7446e+4
15	5.4990		44.9390	14.2378	5.7284e+4
16	0.0000		44.9390	14.7070	5.9896e+4
17	102.1800		45.3989	7.6690	4.7067e+4
18	90.6500		45.3989	8.1382	4.7240e+4
19	0.0000		45.3989	8.6074	4.7755e+4
20	158.3210		45.3989	9.0766	4.9287e+4
21	111.2280		45.3989	9.5458	4.8813e+4
22	50.9700		45.3989	10.0150	3.8578e+4
23	86.2680		45.3989	10.4842	3.6262e+4
24	71.6380		45.3989	10.9534	4.5630e+4
25	41.7360		45.3989	11.4226	4.4590e+4
26	53.9620		45.3989	11.8918	2.9581e+4
27	0.0000		45.3989	12.3610	3.3444e+4
28	65.5880		45.3989	12.8302	4.7500e+4
29	91.7560		45.3989	13.2994	4.9919e+4
30	117.7430		45.3989	13.7686	5.4949e+4
31	203.5660		45.3989	14.2378	5.4723e+4
32	44.0260		45.3989	14.7070	5.7740e+4
33	57.8900		45.8589	7.6690	4.7779e+4
34	119.4470		45.8589	8.1382	4.7551e+4
35	25.9430		45.8589	8.6074	4.6223e+4
36	66.6290		45.8589	9.0766	4.3865e+4
37	0.0000		45.8589	9.5458	4.3147e+4
38	0.0000		45.8589	10.0150	4.5331e+4
39	189.6100		45.8589	10.4842	4.5977e+4
40	63.0300		45.8589	10.9534	4.5790e+4
41	0.0000		45.8589	11.4226	4.5960e+4
42	0.0000		45.8589	11.8918	4.9100e+4
43	0.0000		45.8589	12.3610	4.7796e+4
44	0.0000		45.8589	12.8302	4.4572e+4
45	0.0000		45.8589	13.2994	4.5350e+4
46	0.0000		45.8589	13.7686	4.5297e+4
47	0.0000		45.8589	14.2378	4.7158e+4
48	0.0000		45.8589	14.7070	4.7521e+4
49	2.9000		46.3188	7.6690	4.9433e+4

	-25- AGPPB	-26-	-27-	-28-	-29-
50	89.5600		46.3188	8.1382	5.0005e+4
51	22.4540		46.3188	8.6074	4.8214e+4
52	39.5960		46.3188	9.0766	4.4214e+4
53	6.8650		46.3188	9.5458	4.3262e+4
54			46.3188	10.0150	4.5680e+4
55			46.3188	10.4842	4.6240e+4
56			46.3188	10.9534	4.5892e+4
57			46.3188	11.4226	4.6247e+4
58			46.3188	11.8918	5.0536e+4
59			46.3188	12.3610	4.9345e+4
60			46.3188	12.8302	4.4421e+4
61			46.3188	13.2994	4.4639e+4
62			46.3188	13.7686	4.4186e+4
63			46.3188	14.2378	4.5396e+4
64			46.3188	14.7070	4.6811e+4
65			46.7787	7.6690	5.1667e+4
66			46.7787	8.1382	5.4721e+4
67			46.7787	8.6074	5.5179e+4
68			46.7787	9.0766	4.8433e+4
69			46.7787	9.5458	4.5750e+4
70			46.7787	10.0150	4.2683e+4
71			46.7787	10.4842	4.1789e+4
72			46.7787	10.9534	4.3721e+4
73			46.7787	11.4226	4.4620e+4
74			46.7787	11.8918	4.5965e+4
75			46.7787	12.3610	4.6471e+4
76			46.7787	12.8302	4.6946e+4
77			46.7787	13.2994	4.5185e+4
78			46.7787	13.7686	4.2203e+4
79			46.7787	14.2378	4.3533e+4
80			46.7787	14.7070	4.5217e+4
81			47.2387	7.6690	5.2638e+4
82			47.2387	8.1382	5.7063e+4
83			47.2387	8.6074	5.8544e+4
84			47.2387	9.0766	4.8882e+4
85			47.2387	9.5458	4.6670e+4
86			47.2387	10.0150	3.8836e+4
87			47.2387	10.4842	3.7213e+4
88			47.2387	10.9534	4.2684e+4
89			47.2387	11.4226	4.2977e+4
90			47.2387	11.8918	4.4037e+4
91			47.2387	12.3610	4.4911e+4
92			47.2387	12.8302	4.9608e+4
93			47.2387	13.2994	4.6687e+4
94			47.2387	13.7686	3.7297e+4
95			47.2387	14.2378	4.1081e+4
96			47.2387	14.7070	4.4595e+4
97			47.6986	7.6690	5.0973e+4

	-25- AGPPB	-26-	-27-	-28-	-29-
98			47.6986	8.1382	5.4308e+4
99			47.6986	8.6074	5.4985e+4
100			47.6986	9.0766	4.8893e+4
101			47.6986	9.5458	4.6528e+4
102			47.6986	10.0150	4.3848e+4
103			47.6986	10.4842	4.2644e+4
104			47.6986	10.9534	4.3874e+4
105			47.6986	11.4226	4.5093e+4
106			47.6986	11.8918	4.7598e+4
107			47.6986	12.3610	4.8555e+4
108			47.6986	12.8302	4.8628e+4
109			47.6986	13.2994	4.5862e+4
110			47.6986	13.7686	4.0588e+4
111			47.6986	14.2378	4.2306e+4
112			47.6986	14.7070	4.4067e+4
113			48.1585	7.6690	4.7903e+4
114			48.1585	8.1382	4.8896e+4
115			48.1585	8.6074	4.8350e+4
116			48.1585	9.0766	4.6447e+4
117			48.1585	9.5458	4.6182e+4
118			48.1585	10.0150	5.3688e+4
119			48.1585	10.4842	5.5564e+4
120			48.1585	10.9534	4.2805e+4
121			48.1585	11.4226	4.3963e+4
122			48.1585	11.8918	6.9977e+4
123			48.1585	12.3610	6.5103e+4
124			48.1585	12.8302	4.6213e+4
125			48.1585	13.2994	4.5689e+4
126			48.1585	13.7686	4.6356e+4
127			48.1585	14.2378	4.3941e+4
128			48.1585	14.7070	4.0725e+4
129			48.6185	7.6690	4.5389e+4
130			48.6185	8.1382	4.5478e+4
131			48.6185	8.6074	4.5543e+4
132			48.6185	9.0766	4.5843e+4
133			48.6185	9.5458	4.6114e+4
134			48.6185	10.0150	5.3998e+4
135			48.6185	10.4842	5.5827e+4
136			48.6185	10.9534	4.2844e+4
137			48.6185	11.4226	4.4369e+4
138			48.6185	11.8918	7.5775e+4
139			48.6185	12.3610	6.9756e+4
140			48.6185	12.8302	4.5051e+4
141			48.6185	13.2994	4.5476e+4
142			48.6185	13.7686	4.6796e+4
143			48.6185	14.2378	4.3890e+4
144			48.6185	14.7070	4.0045e+4
145			49.0784	7.6690	4.3899e+4

	-25- AGPPB	-26-	-27-	-28-	-29-
146			49.0784	8.1382	4.3913e+4
147			49.0784	8.6074	4.3938e+4
148			49.0784	9.0766	4.3722e+4
149			49.0784	9.5458	4.4188e+4
150			49.0784	10.0150	4.9802e+4
151			49.0784	10.4842	5.0465e+4
152			49.0784	10.9534	4.2229e+4
153			49.0784	11.4226	4.2253e+4
154			49.0784	11.8918	4.9073e+4
155			49.0784	12.3610	4.9597e+4
156			49.0784	12.8302	4.6865e+4
157			49.0784	13.2994	4.5566e+4
158			49.0784	13.7686	4.4251e+4
159			49.0784	14.2378	4.2782e+4
160			49.0784	14.7070	4.0714e+4
161			49.5383	7.6690	4.3091e+4
162			49.5383	8.1382	4.3547e+4
163			49.5383	8.6074	4.3937e+4
164			49.5383	9.0766	4.2276e+4
165			49.5383	9.5458	4.1629e+4
166			49.5383	10.0150	5.2173e+4
167			49.5383	10.4842	5.4055e+4
168			49.5383	10.9534	3.6796e+4
169			49.5383	11.4226	3.6328e+4
170			49.5383	11.8918	3.9892e+4
171			49.5383	12.3610	4.1136e+4
172			49.5383	12.8302	4.6670e+4
173			49.5383	13.2994	4.5640e+4
174			49.5383	13.7686	4.2944e+4
175			49.5383	14.2378	4.1857e+4
176			49.5383	14.7070	3.8923e+4
177			49.9983	7.6690	4.3191e+4
178			49.9983	8.1382	4.1351e+4
179			49.9983	8.6074	4.1008e+4
180			49.9983	9.0766	4.0936e+4
181			49.9983	9.5458	4.1930e+4
182			49.9983	10.0150	4.6262e+4
183			49.9983	10.4842	4.6805e+4
184			49.9983	10.9534	3.9762e+4
185			49.9983	11.4226	3.8119e+4
186			49.9983	11.8918	3.9222e+4
187			49.9983	12.3610	4.0868e+4
188			49.9983	12.8302	4.4920e+4
189			49.9983	13.2994	4.4591e+4
190			49.9983	13.7686	4.3201e+4
191			49.9983	14.2378	4.2404e+4
192			49.9983	14.7070	4.0486e+4
193			50.4582	7.6690	4.5058e+4

	-25- AGPPB	-26-	-27-	-28-	-29-
194			50.4582	8.1382	3.8326e+4
195			50.4582	8.6074	3.2476e+4
196			50.4582	9.0766	3.7492e+4
197			50.4582	9.5458	3.8065e+4
198			50.4582	10.0150	4.3471e+4
199			50.4582	10.4842	4.4092e+4
200			50.4582	10.9534	3.6164e+4
201			50.4582	11.4226	3.5423e+4
202			50.4582	11.8918	3.0908e+4
203			50.4582	12.3610	3.3978e+4
204			50.4582	12.8302	4.3465e+4
205			50.4582	13.2994	4.3615e+4
206			50.4582	13.7686	4.2100e+4
207			50.4582	14.2378	4.3945e+4
208			50.4582	14.7070	4.7562e+4
209			50.9181	7.6690	4.4348e+4
210			50.9181	8.1382	3.8093e+4
211			50.9181	8.6074	3.3157e+4
212			50.9181	9.0766	3.7343e+4
213			50.9181	9.5458	3.8208e+4
214			50.9181	10.0150	4.2202e+4
215			50.9181	10.4842	4.2908e+4
216			50.9181	10.9534	3.6861e+4
217			50.9181	11.4226	3.5546e+4
218			50.9181	11.8918	3.0135e+4
219			50.9181	12.3610	3.3681e+4
220			50.9181	12.8302	4.3987e+4
221			50.9181	13.2994	4.4523e+4
222			50.9181	13.7686	4.2003e+4
223			50.9181	14.2378	4.4347e+4
224			50.9181	14.7070	4.8397e+4
225			51.3781	7.6690	3.9852e+4
226			51.3781	8.1382	3.9681e+4
227			51.3781	8.6074	3.9549e+4
228			51.3781	9.0766	3.8862e+4
229			51.3781	9.5458	3.8799e+4
230			51.3781	10.0150	3.8883e+4
231			51.3781	10.4842	3.8360e+4
232			51.3781	10.9534	3.6348e+4
233			51.3781	11.4226	3.5987e+4
234			51.3781	11.8918	3.8783e+4
235			51.3781	12.3610	5.0839e+4
236			51.3781	12.8302	6.9429e+4
237			51.3781	13.2994	5.7571e+4
238			51.3781	13.7686	3.6978e+4
239			51.3781	14.2378	3.9078e+4
240			51.3781	14.7070	4.5013e+4
241			51.8380	7.6690	3.9282e+4

	-25- AGPPB	-26-	-27-	-28-	-29-
242			51.8380	8.1382	4.0117e+4
243			51.8380	8.6074	4.0742e+4
244			51.8380	9.0766	3.9042e+4
245			51.8380	9.5458	3.8533e+4
246			51.8380	10.0150	3.7556e+4
247			51.8380	10.4842	3.7258e+4
248			51.8380	10.9534	3.3990e+4
249			51.8380	11.4226	3.3940e+4
250			51.8380	11.8918	4.2858e+4
251			51.8380	12.3610	6.9323e+4
252			51.8380	12.8302	9.1199e+4
253			51.8380	13.2994	7.4158e+4
254			51.8380	13.7686	2.7389e+4
255			51.8380	14.2378	3.1161e+4
256			51.8380	14.7070	4.0000e+4

several minutes

Prof. Wang:

Sorry I missed you. You went to B-32 (Laboratory) just as I came down here.

diffraction

[1] Dr. Griffen will run $\boxed{XRD}$ samples next week (all 14 of those collected from Utah Lake. We should have a couple of grams or so of each sample - properly labelled for this analysis. He would be pleased to have you present when he runs them.

fluorescence

[2] I talked with Dr. Tingey of the Geology Staff regarding $\boxed{XRF}$ analyses for major elements and trace elements of the 14 samples of [1]. He will be happy to run them. We need at least 10 grams or so of each powdered sample in separate small containers for these XRF analyses.

Preparations of these can be made and I'll draw them off for Dr Griffen (and get time of runs) and for Dr Tingey.

Thanks for your help.

Paul D

B M T

0,000,000,000

1000

0,0005,000,000

21/100

00,217780

0,000,000

20779

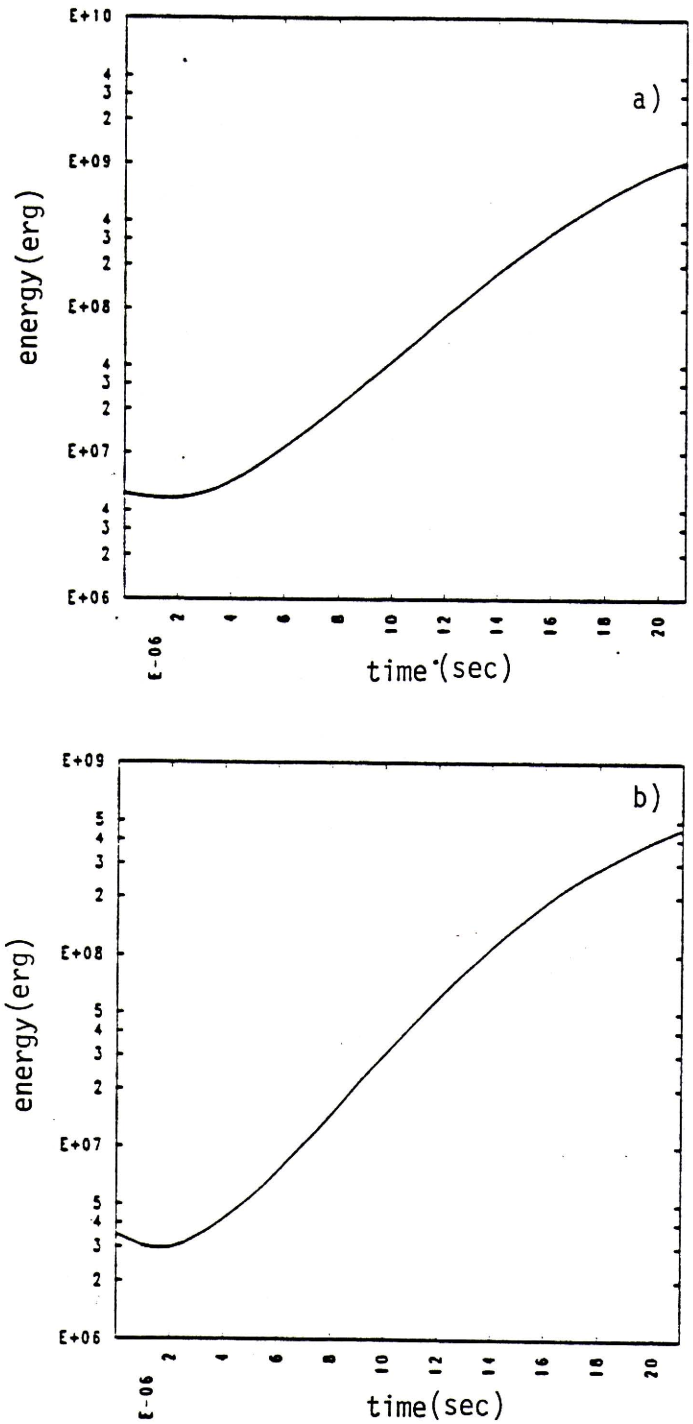


Figure 3.9: Kinetic energy of the m=1 mode vs time for: a) case 1, and b) case 3 of the high flux study.

Column Statistics - C:\SPW\ASLINC01.SPW

	-1- SAMPLEID	-2- LONGITUD	-3- LATITUD	-4- FEPPM	-5- MGPPM	-6- CAPPM
Mean	--	48.4941	11.5862	2.1800e+4	8330.4608	1.8669e+5
Std.Dev	--	2.2614	2.0601	5348.0336	1450.4296	5.1894e+4
Std.Err	--	0.3106	0.2830	734.6089	199.2318	7128.1331
95% Conf		0.6233	0.5678	1474.1287	399.7955	1.4304e+4
99% Conf		0.8306	0.7566	1964.2873	532.7305	1.9060e+4
Size	53.0000	53.0000	53.0000	53.0000	53.0000	53.0000
Total	0.0000	2570.1860	614.0700	1.1554e+6	4.4151e+5	9.8948e+6
Min		44.9390	7.6690	1.1275e+4	1945.2830	1.4181e+4
Max		51.8380	14.7070	4.9862e+4	1.0326e+4	2.4441e+5
Min.Pos		44.9390	7.6690	1.1275e+4	1945.2830	1.4181e+4
Missing	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other	53.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Skewness		-0.0839	-0.0850	2.5592	-2.1488	-1.7748

Column Statistics - C:\SPW\ASLINC01.SPW

	-7- NAPPM	-8- KPPM	-9- SPPM	-10- PPPM	-11- SRPPM	-12- MNPPM
Mean	487.7372	1281.9089	5839.7659	608.6248	798.5008	362.1514
Std.Dev	174.4508	377.5202	1935.7694	105.3543	229.0400	82.1609
Std.Err	23.9627	51.8564	265.8984	14.4715	31.4611	11.2857
95% Conf	48.0855	104.0594	533.5743	29.0398	63.1324	22.6468
99% Conf	64.0743	138.6600	710.9916	38.6958	84.1244	30.1770
Size	53.0000	53.0000	53.0000	53.0000	53.0000	53.0000
Total	2.5850e+4	6.7941e+4	3.0951e+5	3.2257e+4	4.2321e+4	1.9194e+4
Min	122.1490	156.3510	794.3580	395.8570	50.1690	65.0910
Max	1611.6660	3157.8390	9118.2250	971.7030	1040.1950	544.8850
Min.Pos	122.1490	156.3510	794.3580	395.8570	50.1690	65.0910
Missing	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Skewness	4.9926	1.5811	-1.0831	0.8056	-2.0201	-1.1505

Column Statistics - C:\SPW\ASLINC01.SPW

	-13- BAPPM	-14- ASPPB	-15- HGPPB	-16- SEPPB	-17- CRPPB	-18- ZNPPB
Mean	555.2490	6600.4833	46.3585	2881.2345	1.1674e+4	4.4631e+4
Std.Dev	133.0400	4266.0575	22.0333	1901.8109	4515.9304	1.1730e+4
Std.Err	18.2744	585.9881	3.0265	261.2338	620.3107	1611.2694
95% Conf	36.6711	1175.8935	6.0732	524.2140	1244.7683	3233.3102
99% Conf	48.8644	1566.8866	8.0926	698.5190	1658.6628	4308.4094
Size	53.0000	53.0000	53.0000	53.0000	53.0000	53.0000
Total	2.9428e+4	3.4983e+5	2457.0000	1.5271e+5	6.1873e+5	2.3654e+6
Min	212.2330	0.0000	19.0000	413.5390	5399.9040	1.7350e+4
Max	734.9670	1.9984e+4	124.0000	1.0110e+4	3.9659e+4	9.1515e+4
Min.Pos	212.2330	97.8080	19.0000	413.5390	5399.9040	1.7350e+4
Missing	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Skewness	-0.9593	0.8013	1.3202	1.3629	4.4625	1.3991

Column Statistics - C:\SPW\ASLINC01.SPW

	-19- CDPPB	-20- PBPPB	-21- COPPB	-22- NIPPB	-23- CUPPB	-24- AUPPB
Mean	3246.5982	1.4162e+4	3353.9564	8427.8349	9818.4682	2731.4967
Std.Dev	765.2413	7226.1439	749.1951	3116.8152	3267.2989	2565.1888
Std.Err	105.1140	992.5872	102.9099	428.1275	448.7980	352.3558
95% Conf	210.9306	1991.8099	206.5077	859.1170	900.5963	707.0671
99% Conf	281.0666	2654.1012	275.1730	1144.7797	1200.0511	942.1720
Size	53.0000	53.0000	53.0000	53.0000	53.0000	53.0000
Total	1.7207e+5	7.5060e+5	1.7776e+5	4.4668e+5	5.2038e+5	1.4477e+5
Min	1820.5210	3517.1340	2271.6540	1440.7830	5189.7270	522.9140
Max	6909.9790	4.1517e+4	7357.7550	2.1686e+4	2.0738e+4	1.1664e+4
Min.Pos	1820.5210	3517.1340	2271.6540	1440.7830	5189.7270	522.9140
Missing	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Skewness	1.8734	1.7393	2.8185	1.9545	1.4761	1.8037

	-25- AGPPB	-26-	-27-	-28-	-29-
Mean	38.8471		48.3885	11.1880	6578.4436
Std.Dev	52.1789		2.1243	2.1671	3131.0377
Std.Err	7.1673		0.1328	0.1354	195.6899
95% Conf	14.3826		0.2615	0.2667	385.3812
99% Conf	19.1649		0.3446	0.3515	507.8975
Size	53.0000		256.0000	256.0000	256.0000
Total	2058.8960		1.2387e+4	2864.1280	1.6841e+6
Min	0.0000		44.9390	7.6690	7.6053
Max	203.5660		51.8380	14.7070	1.9300e+4
Min.Pos	2.9000		44.9390	7.6690	7.6053
Missing	0.0000		0.0000	0.0000	0.0000
Other	0.0000		0.0000	0.0000	0.0000
Skewness	1.4099		##########	##########	0.6731

14 September 1995

Dr. Hellmut Doelling
Project Manager
Utah Geological Survey
2363 South Foothill Blvd
Salt Lake City, Utah 84109-1491

Dear Hellmut:

You ask for an estimate for chemical analyses, thin sections and other analytical work related to the Lincoln Point and West Mountain quadrangles, Utah County, Utah.

I earlier submitted some samples for geochemical analyses to the following contractor:
Acme Analytical Laboratories, Ltd
c/o 250 H Street
Blaine, Washington 98230

The address is their U.S. Shipping office, though their headquarters are in Vancouver, B.C. Canada, c/o 852 East hastings St. V6A IR6. We have found this certified laboratory to be very good in their analytical procedures and results. Costs are much less than the U.S. because of favorable exchange rates against the Canadian $.

Our estimate for the projected analytical costs are:
Lincoln Point Quadrangle:

Geoch. Analyses:	40 Sediment-Rock Samples-	206.00
	15 Hydrogeochem. Samples-	139.50
	10 Thin Sections -	105.00
	Subtotal	$450.50
West Mountain Quadrangle		
Geoch. Analyses:	30 Sediment-Rock Samples	$155.00
	10 Hydrogeochem. Samples	139.50
	10 Thin Sections -	105.00
	Subtotal	$399.50
Total for two quadrangles:		$845.00

We will stay within the estimated amounts, which in reality may be less than indicated. We hope these amounts can be included in your budget for these two mapping projects. I have asked Acme Analytical Laboratories to bill your office, attn you, directly.

Thanks for your continued support.

Sincerely,

Paul Dean Proctor and Wenxia Wang
Department of Geology
Brigham Young University
Provo, Utah 84601

20 August 1995

Manager
Acme Analytical Laboratories, Ltd.
250 H Street
Blaine, Washington 98230

Dear Manager:

I enclose ~~eleven~~ twelve rock powders prepared for geochemical analysis. Would you please undertake Analytical Procedure "Group ID ICP" with the 32 element run. Samples include:

Mgb-1	Qpc-SE12-1-LPT	BI-1-TUA-LPT
Mgb-02	Qps-NW4-7-2-LPT	BI-2-TBG-LPT
Mgb-03	QPC-NE18-LPT	LPT-3-TU
	CA-NSESE6-LPT	COM-UtLS-14' UC-S44-2-LPT

Please send a copy of the results to my address and bill to:

Utah Geological Survey
Attn: Dr. H. Doelling, Project Mgr.
2363 South Foothill Blvd.
Salt Lake City, Utah 84109-1491

Thank you for your service.

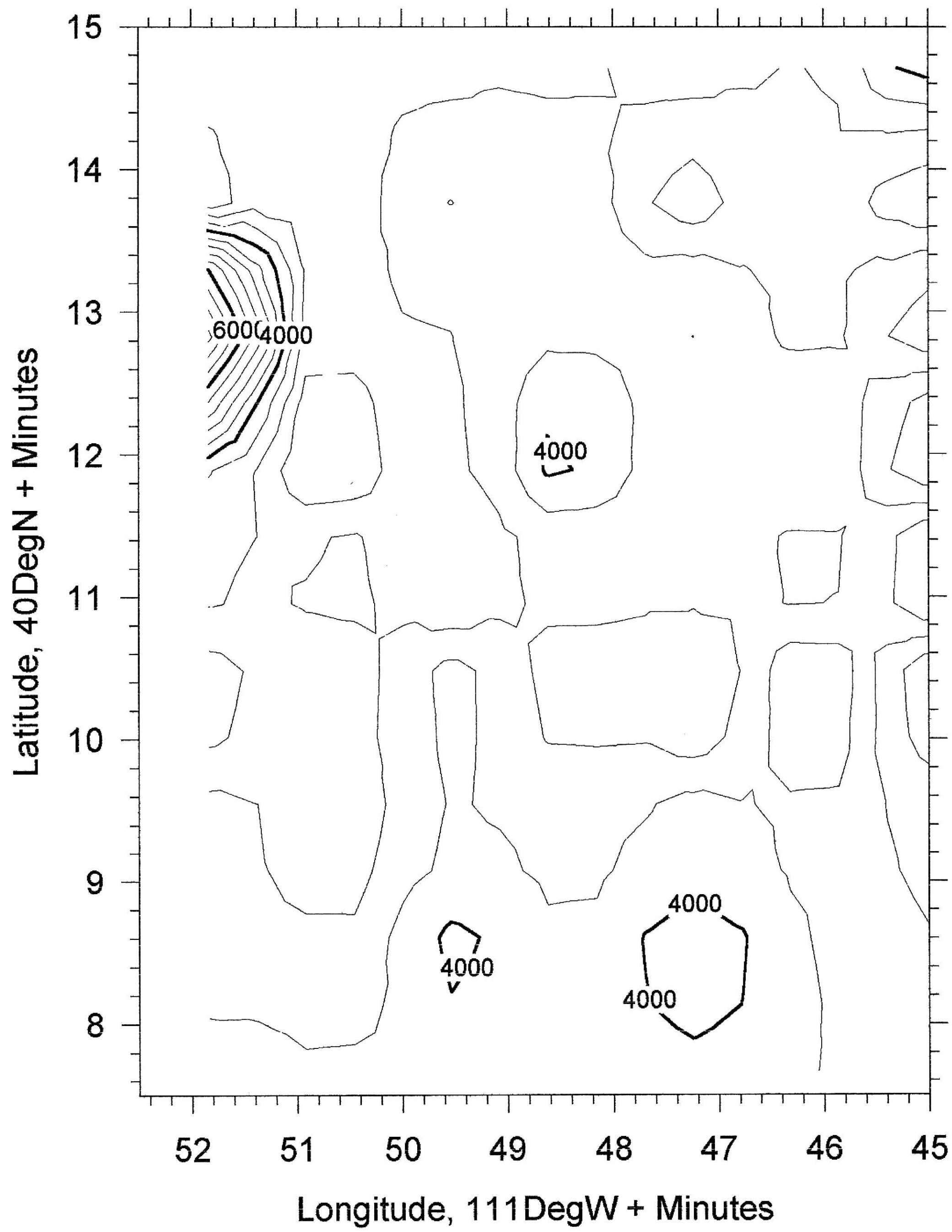
Sincerely,

Paul Dean Proctor
2949 Apache Way
Provo, Utah 84604

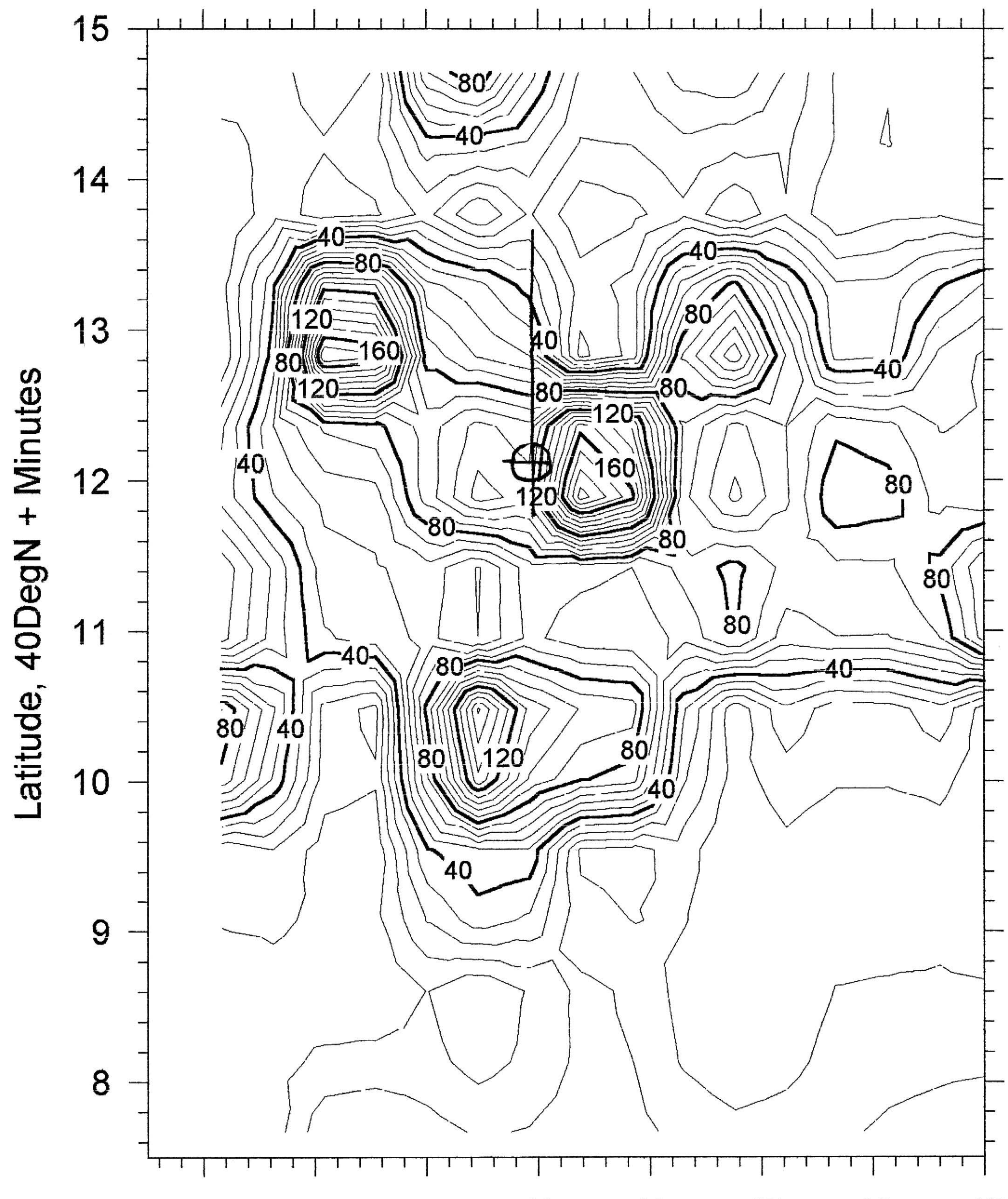
Enclosure: Samples
cc: Dr. H. Doelling

cc Wang, Wenxia

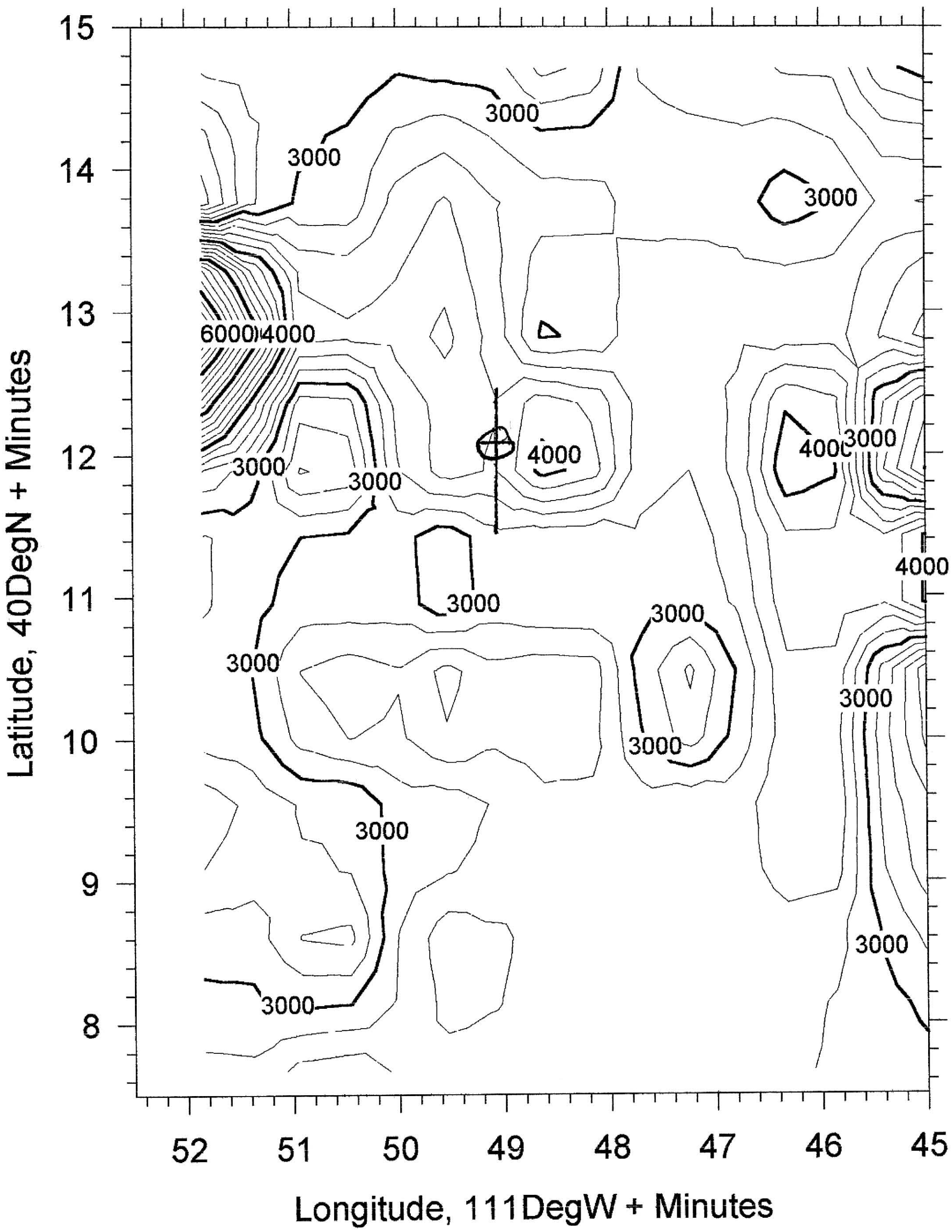
Co ppb. Utah Lake Sediments, Lincoln Point Quadrangle



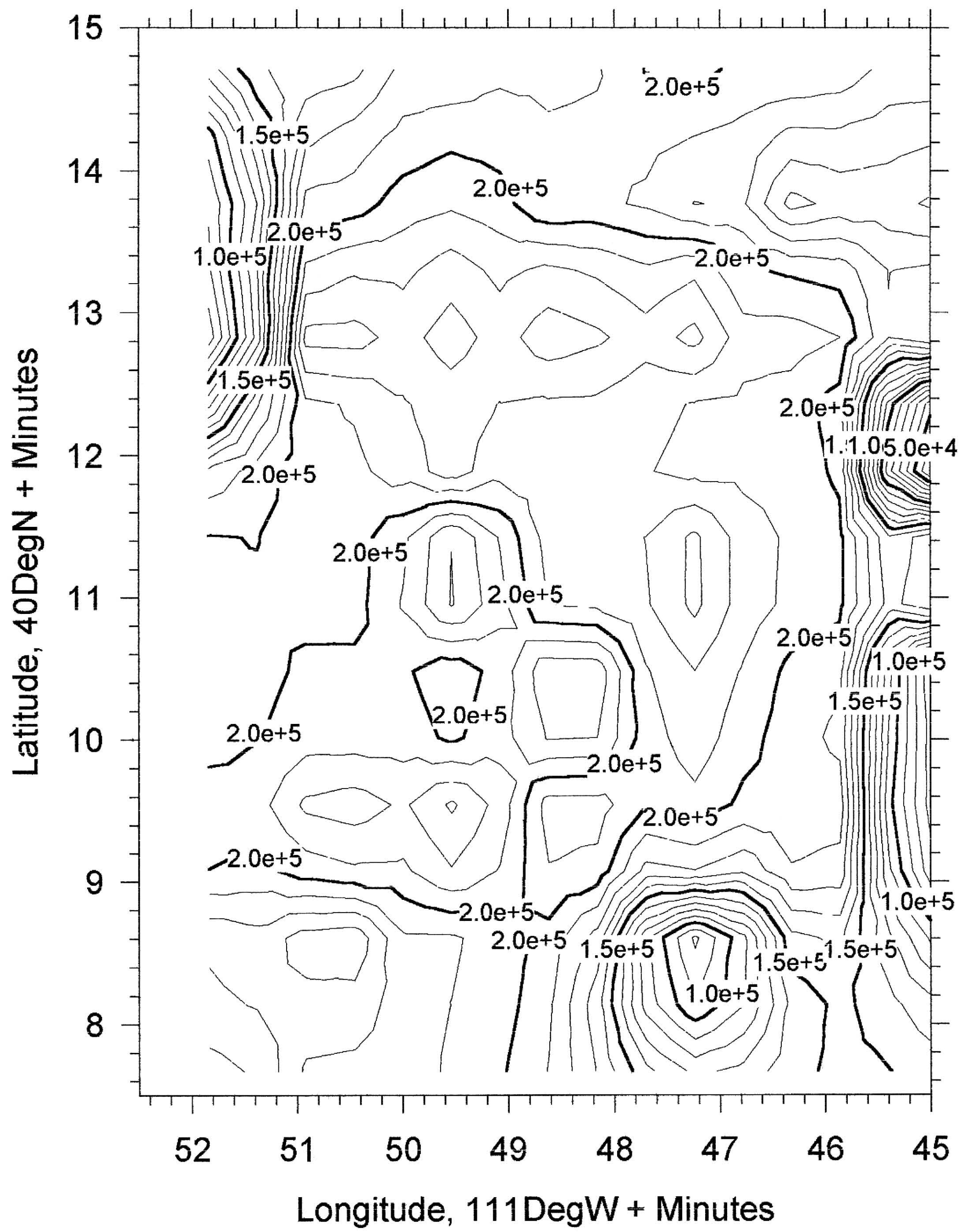
Ag ppb. Utah Lake Sediments, Lincoln Point Quadrangle



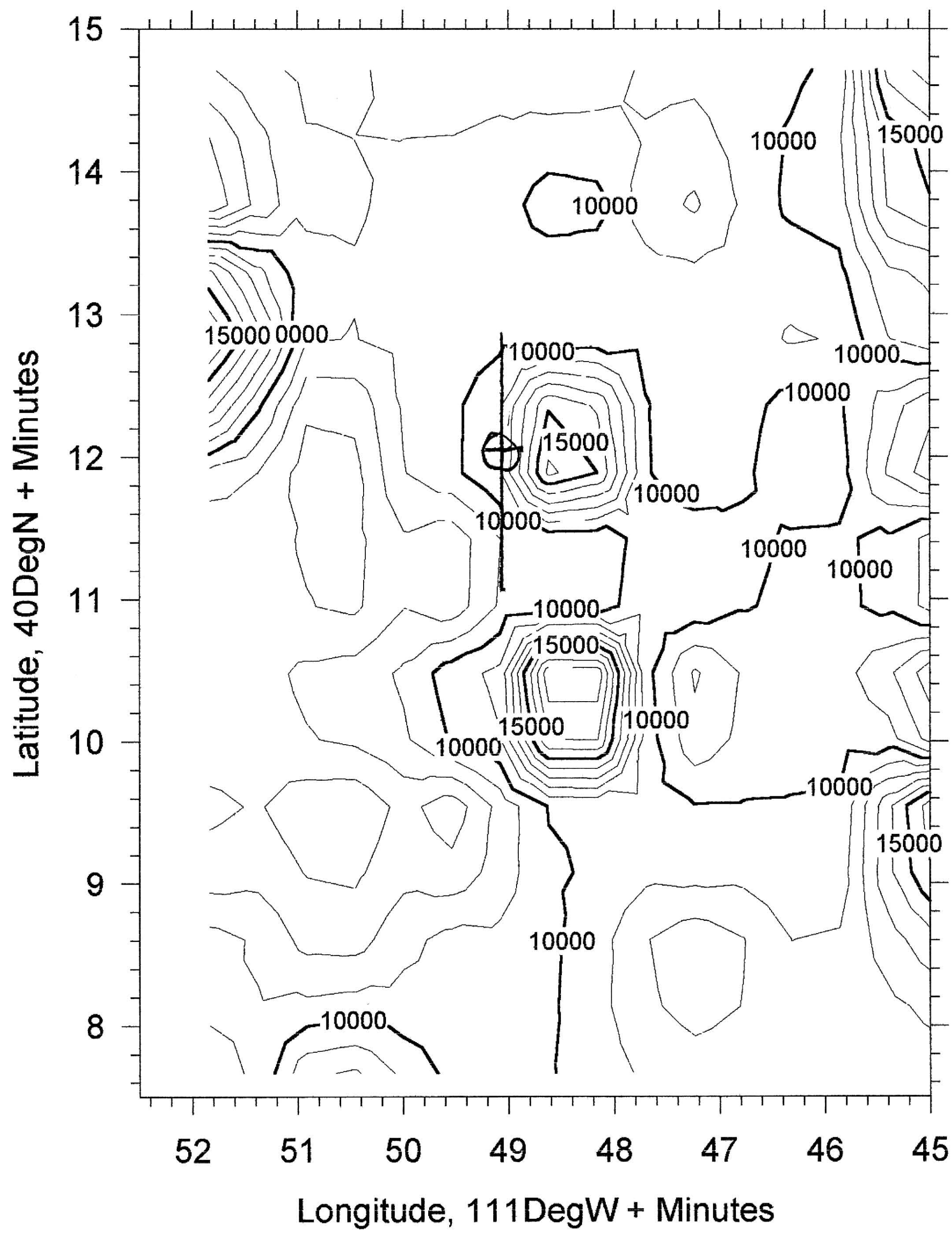
Cd, ppb. Utah Lake Sediments, Lincoln Point Quadrangle



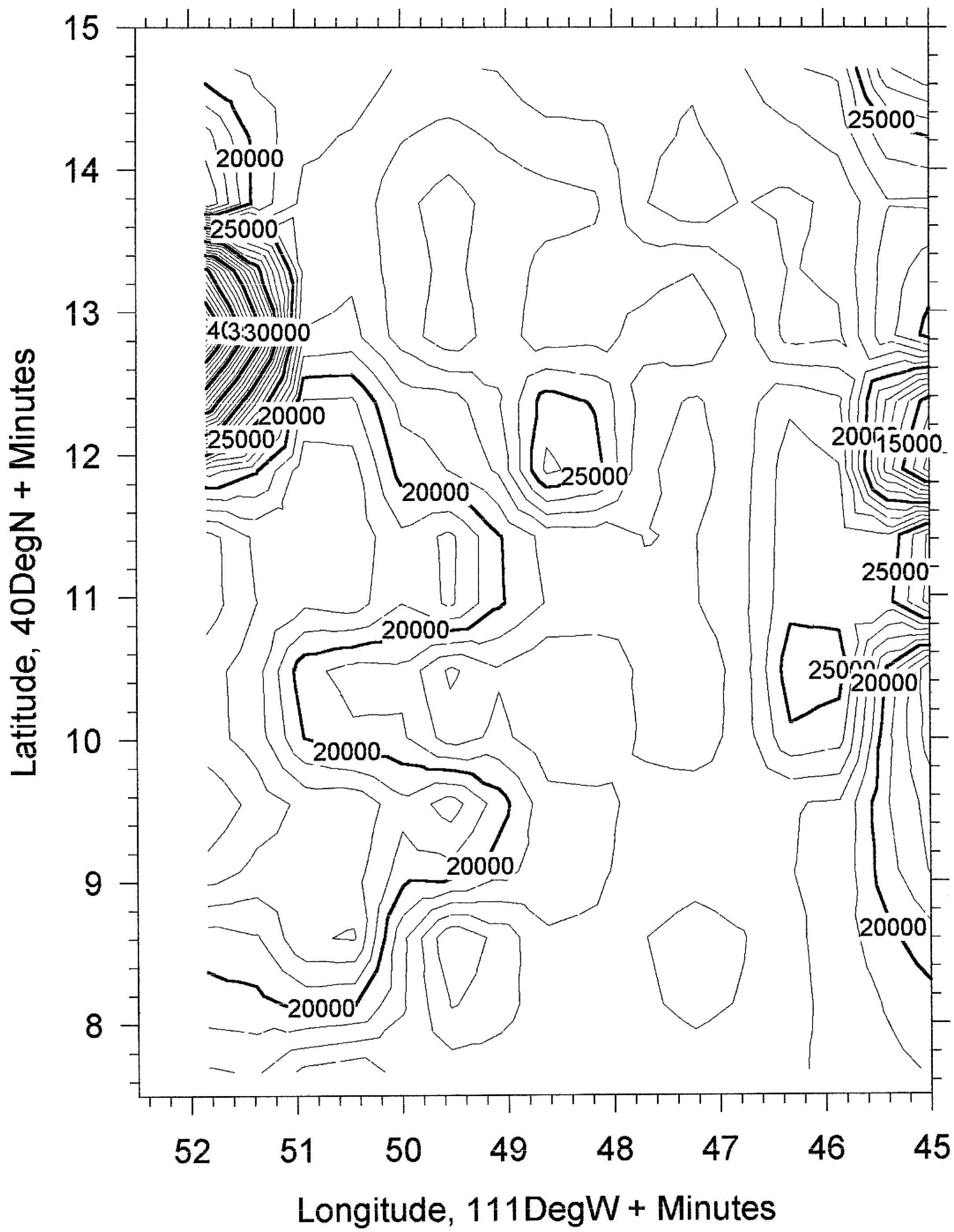
Ca ppm. Utah Lake Sediments, Lincoln Point



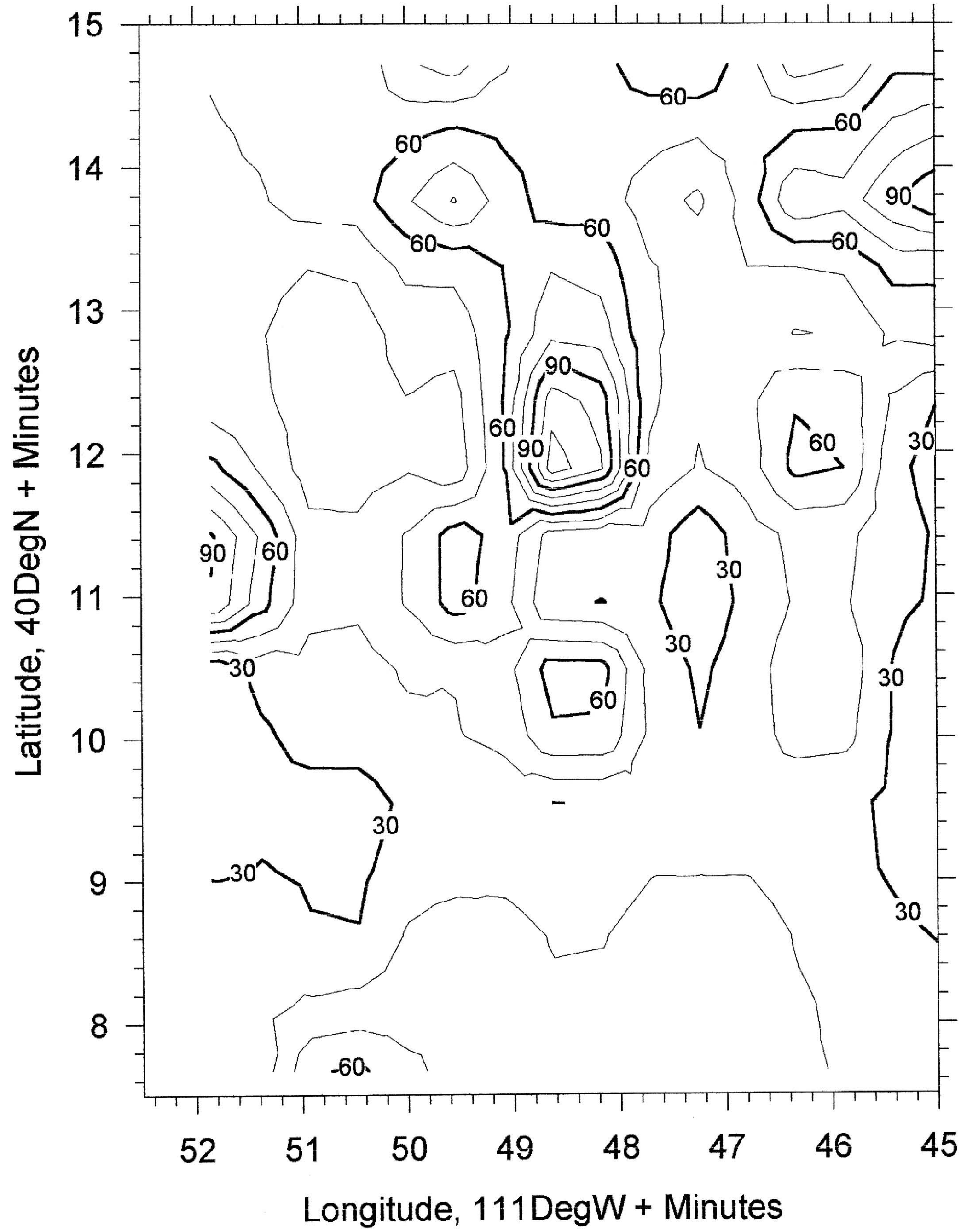
Cu ppb. Utah Lake Sediments, Lincoln Point Quadrangle



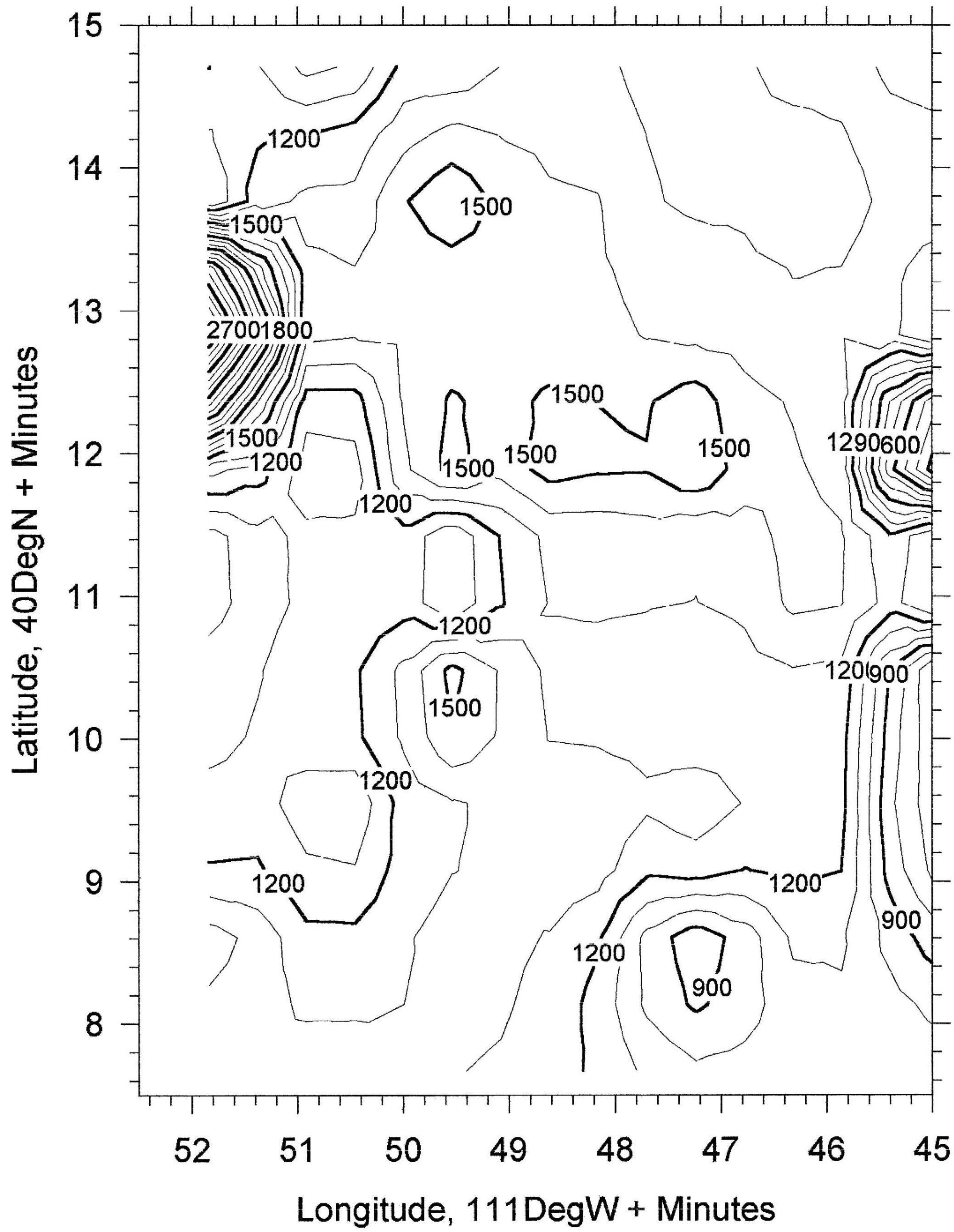
Fe ppm. Utah Lake Sediments, Lincoln Point



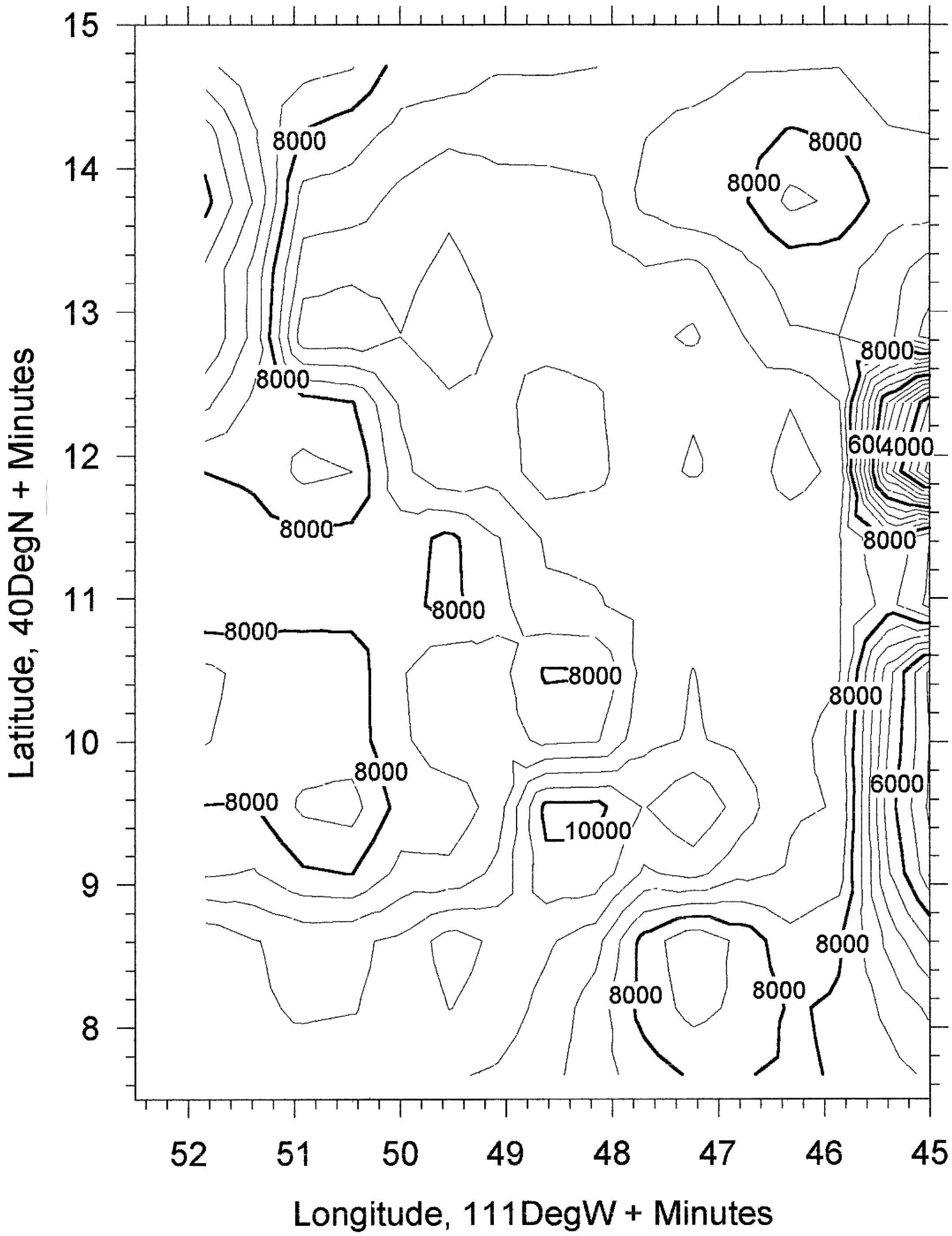
Hg, ppb. Utah Lake Sediments, Lincoln Point Quadrangle



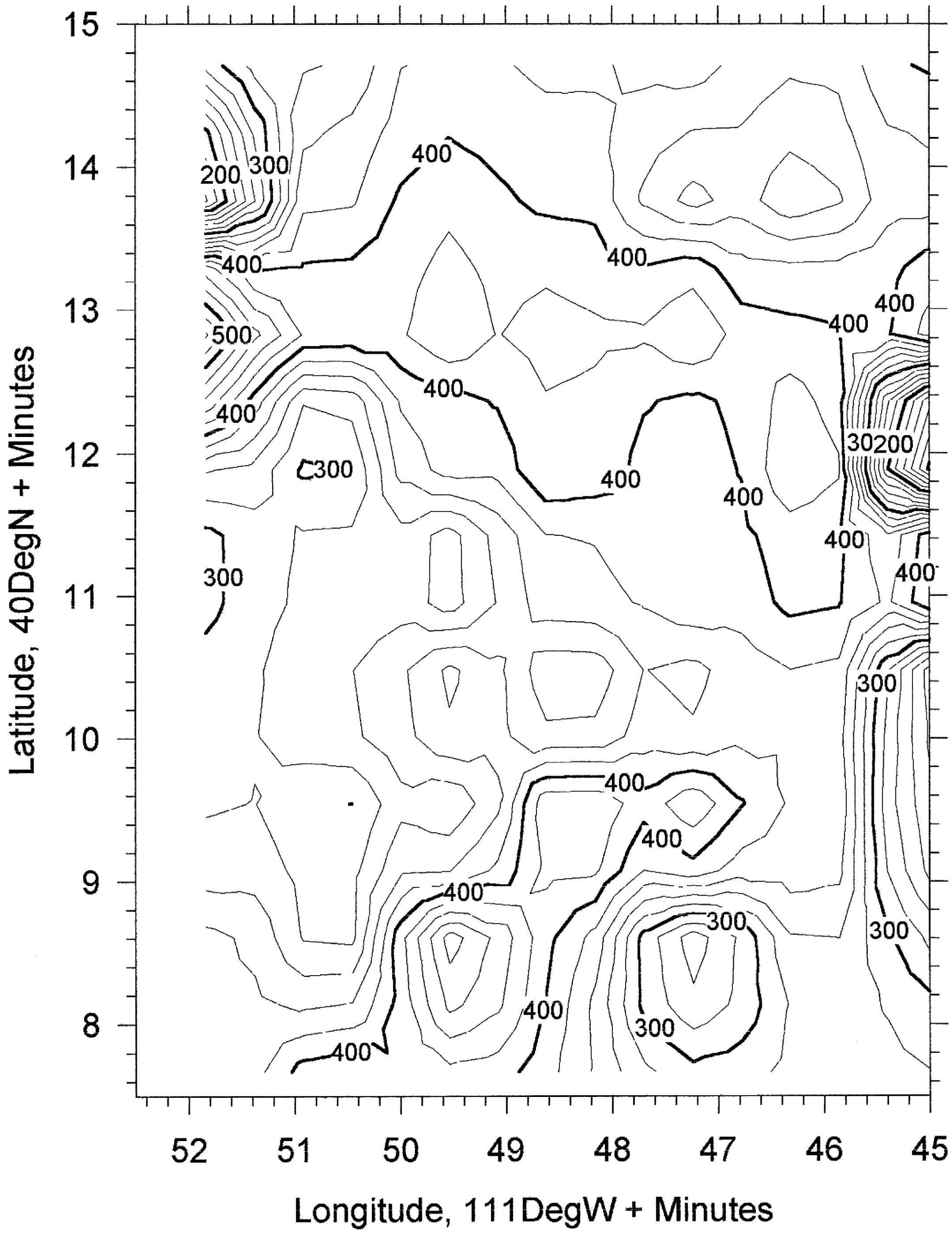
K ppm. Utah Lake Sediments. Lincoln Point Quadrangle



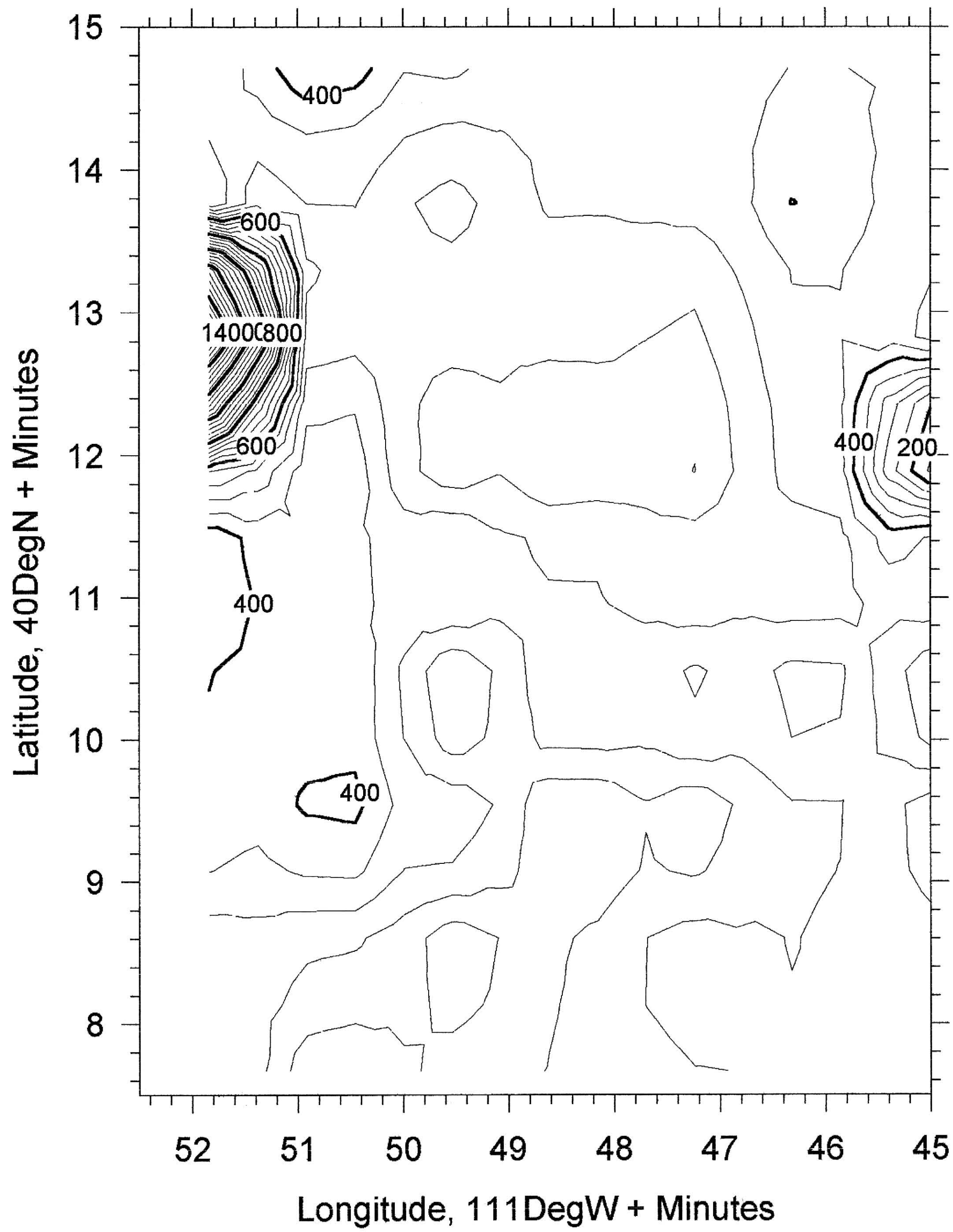
Mg ppm. Utah Lake Sediments, Lincoln Point



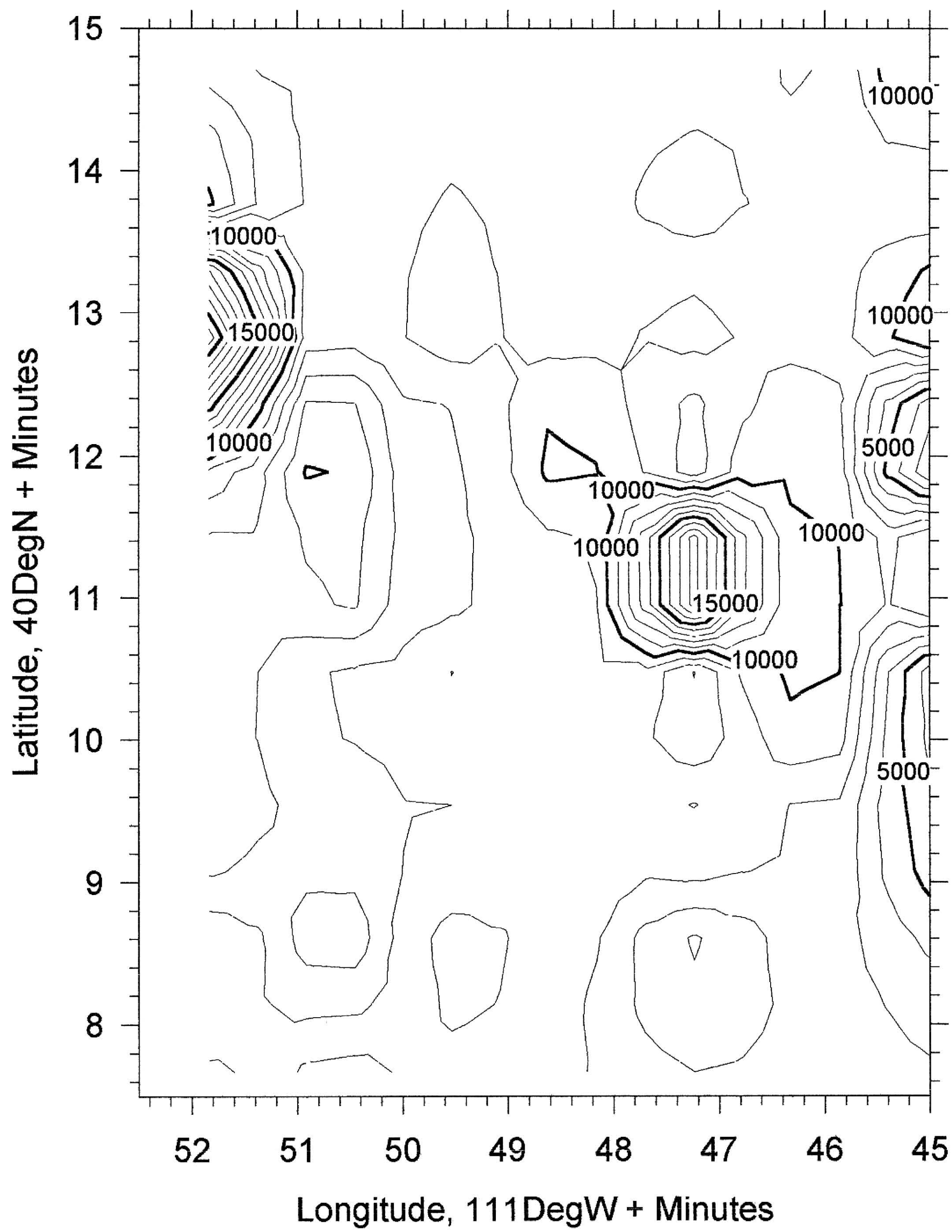
Mn, ppm. Utah Lake Sediments, Lincoln Point Quadrangle



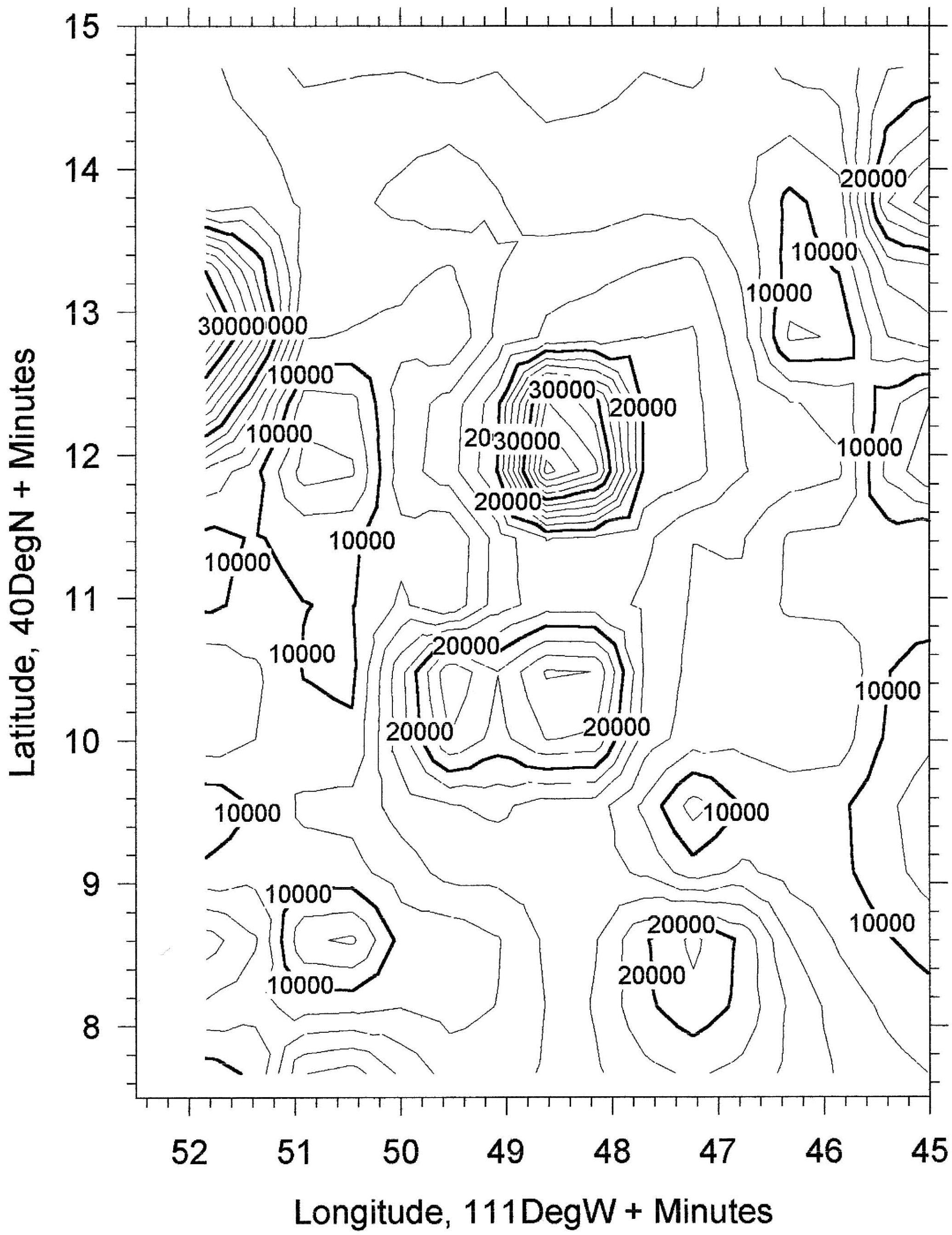
Na ppm. Utah Lake Sediments, Lincoln Point Quadrangle



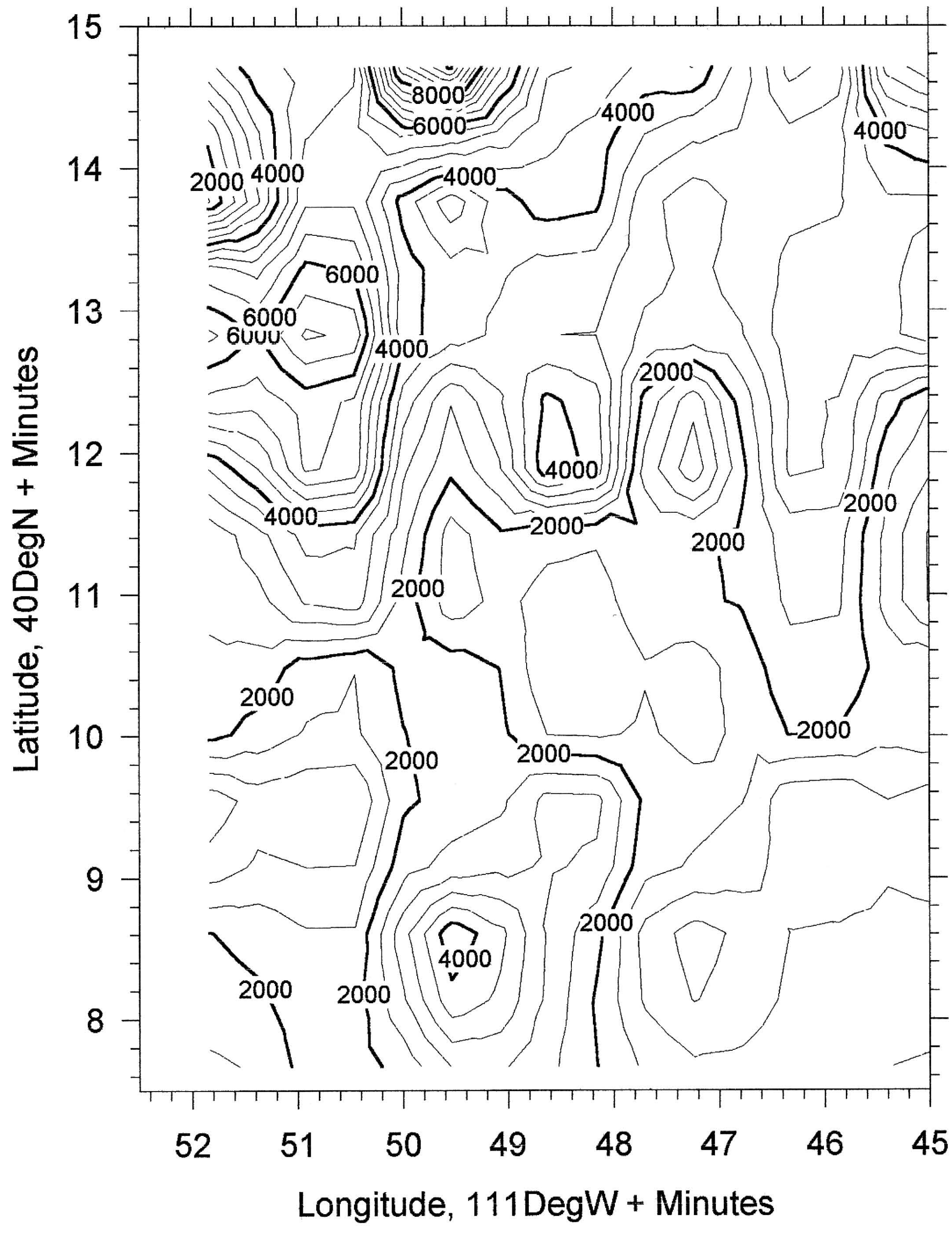
Ni ppb. Utah Lake Sediments, Lincoln Point Quadrangle



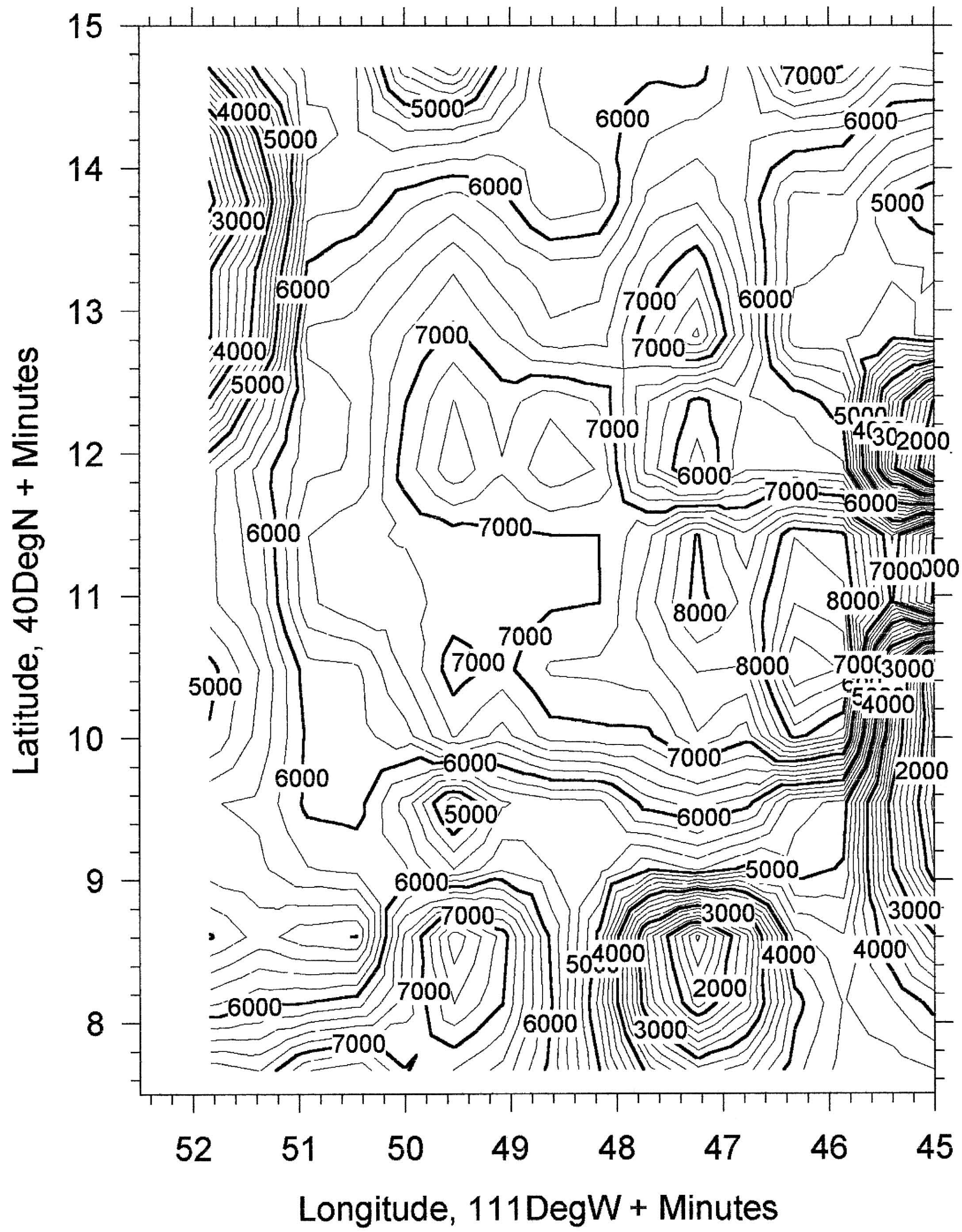
Pb ppb. Utah Lake Sediments, Lincoln Point Quadrangle



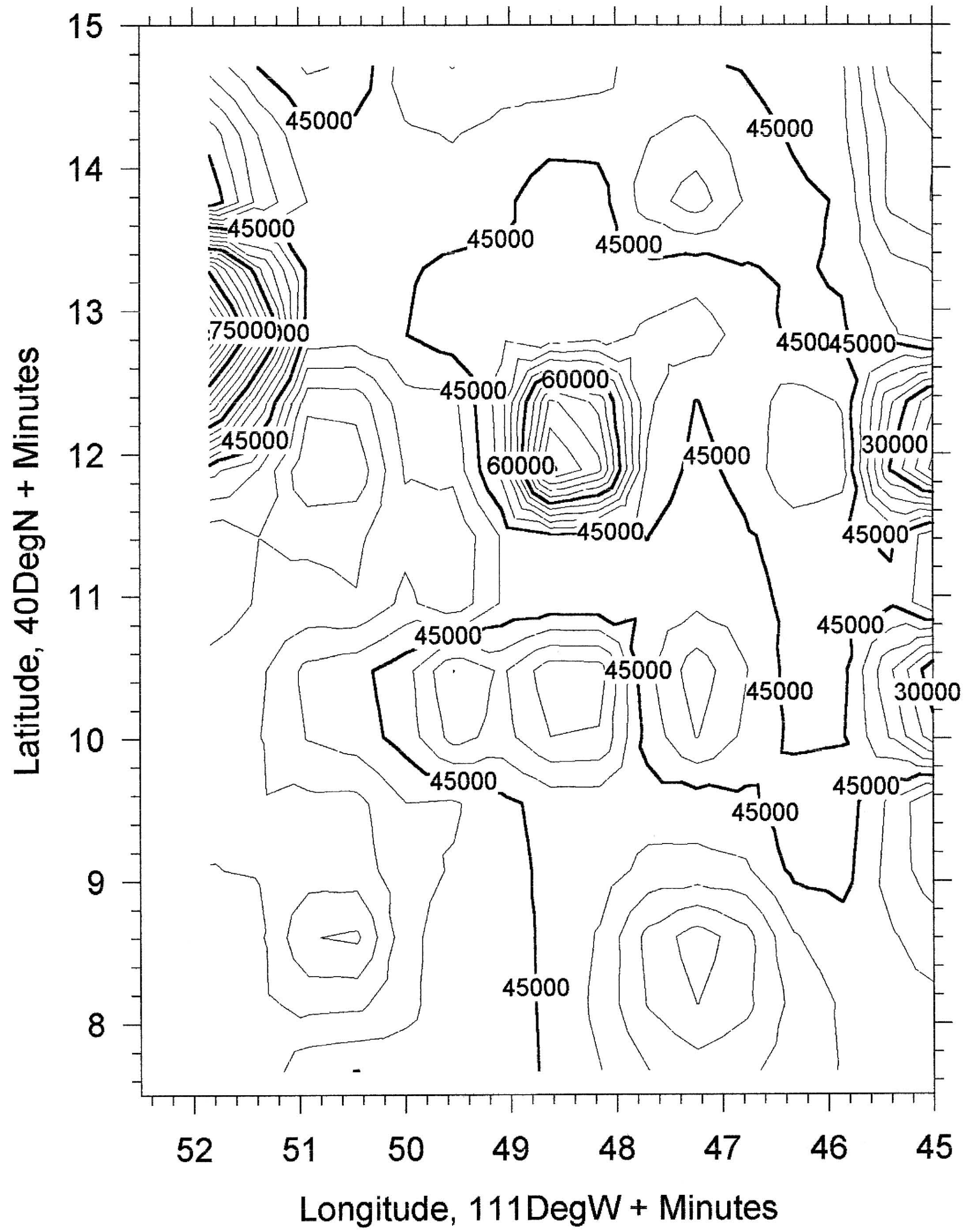
Se, ppb. Utah Lake Sediments, Lincoln Point Quadrangle



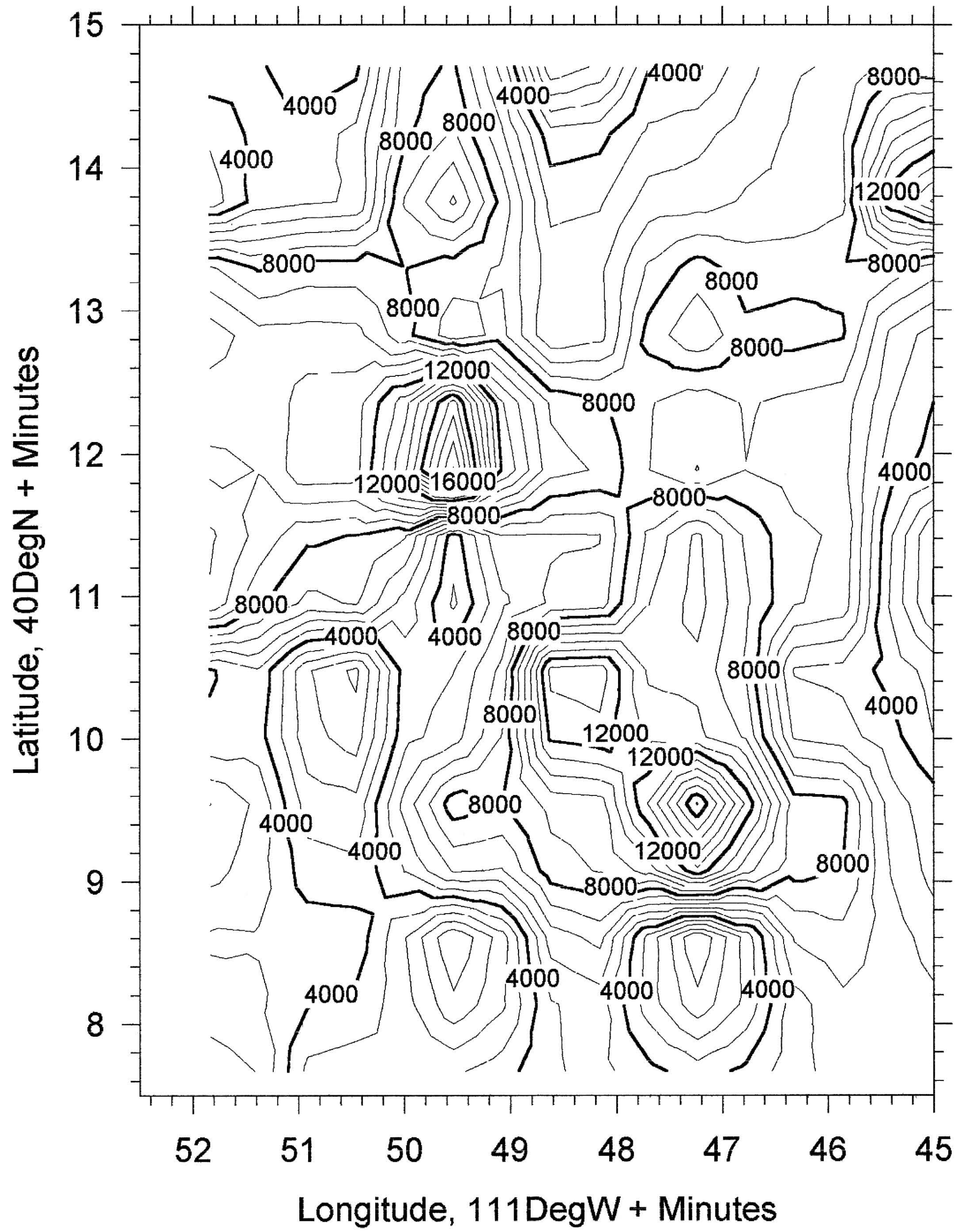
S ppm. Utah Lake Sediments, Lincoln Point Quadrangle



Zn, ppb. Utah Lake Sediments, Lincoln Point Quadrangle



As ppb. Utah Lake Sediments, Lincoln Point Quadrangle



December 15, 1995

Dave Tingey
Department of Geology

Dear Dave:

These are the Utah lake sediments we discussed, SAMPLE NOS. UL-141-154. We would like to obtain:

(1) Major element analysis on each sample

(2) Trace metal analysis on each sample with as many of the following as possible. Cu, Pb, Zn, Ag, Ni, Co, Mn, As, Au, Cd, Sb, V, B, La, Ba, and others as you normally do.

Thanks,

Paul

Paul D. Proctor

Enclosure

For File

COPY

December 15, 1995

Dr. Dana Griffen
Department Chair
Department of Geology
673 WIDB

Dear Dana:

These are the Utah lake sediments we discussed. They represent a profile across Utah Lake. We would like to have an XRD analysis on each sample.

Dr. Wang would like to be there to see how the instrument operates. You can let me know when you will get them

Thanks,

Paul

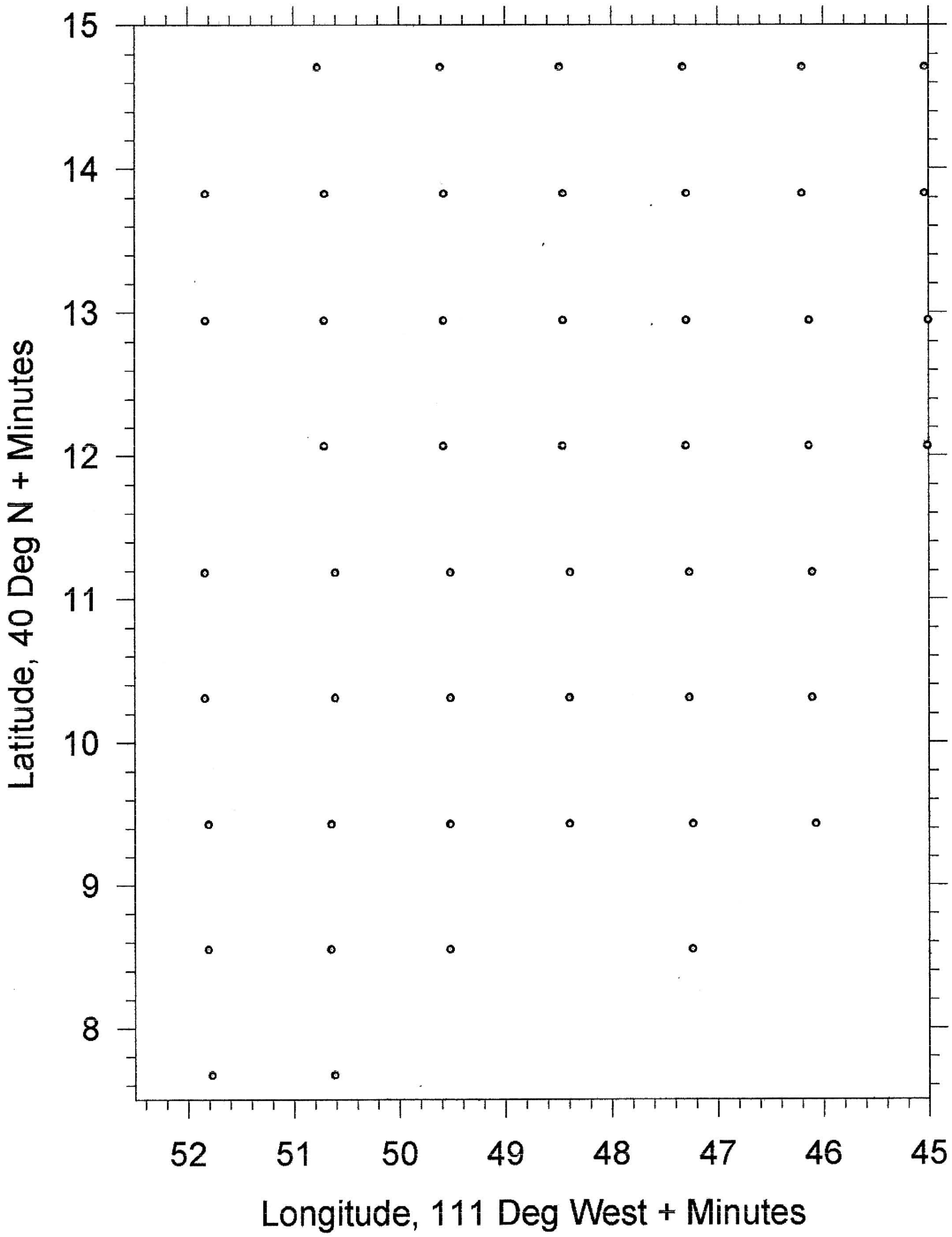
Paul D. Proctor

Enclosure

For File

COPY

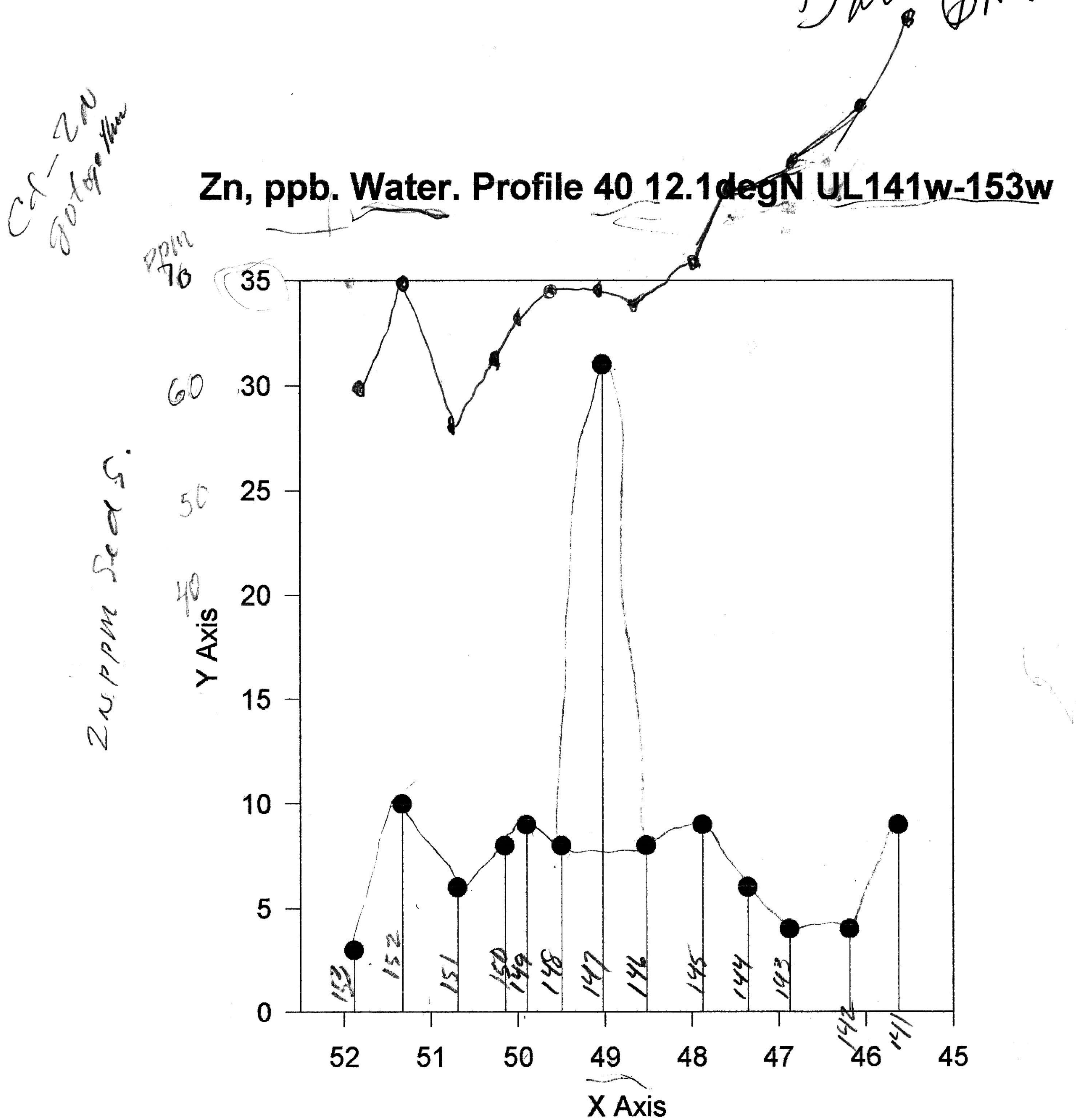
Sample Points, Lincoln Point Quadrangle



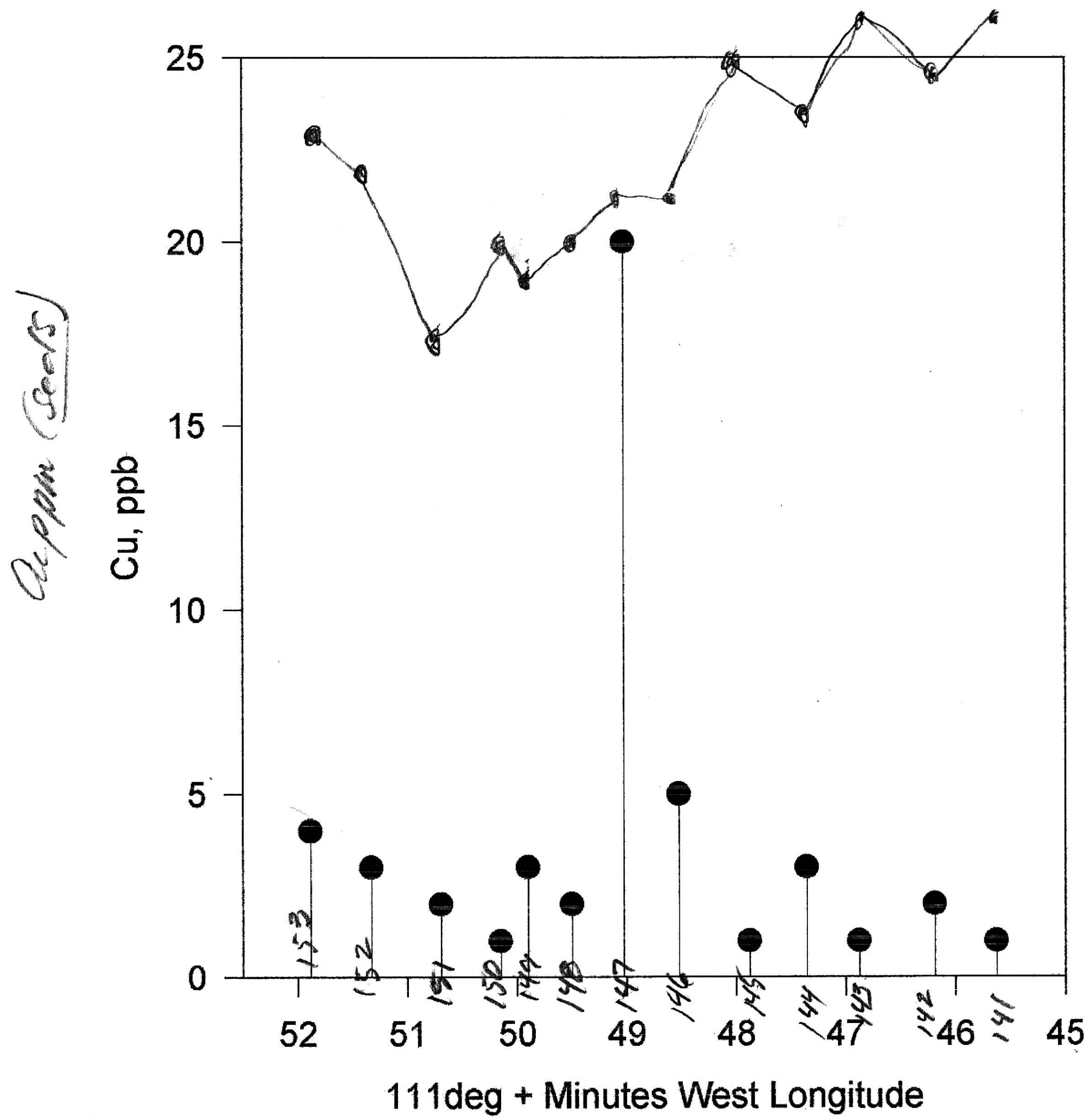
Ho Au Pb Zn Ag Au As - - -

1145

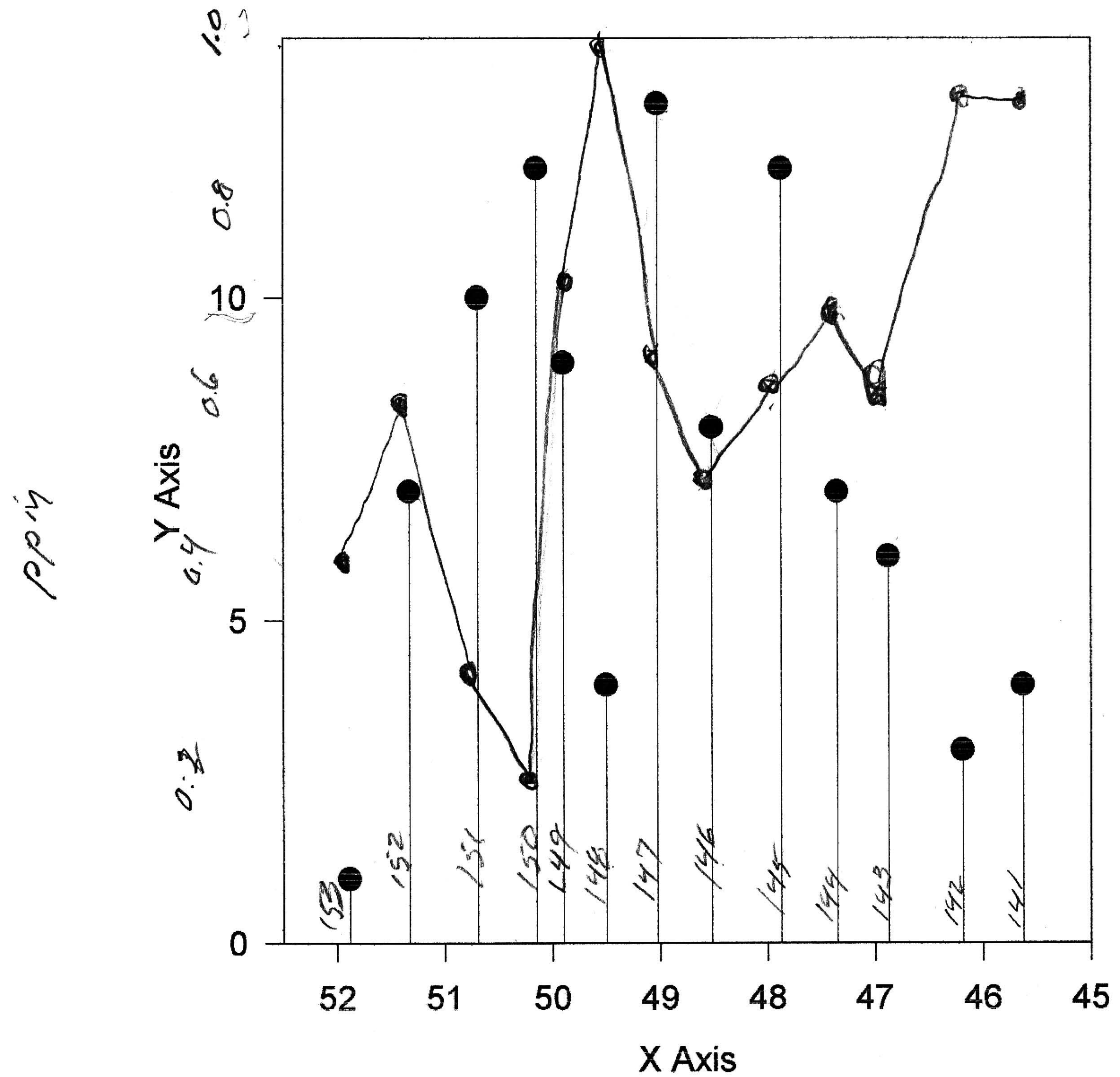
Dave Jengey DATA.



Cu, ppb. Water. Profile 40 12.1degN UL141w-154w



Cd, ppb. Water. Profile 40 12.1degN UL141w-153w

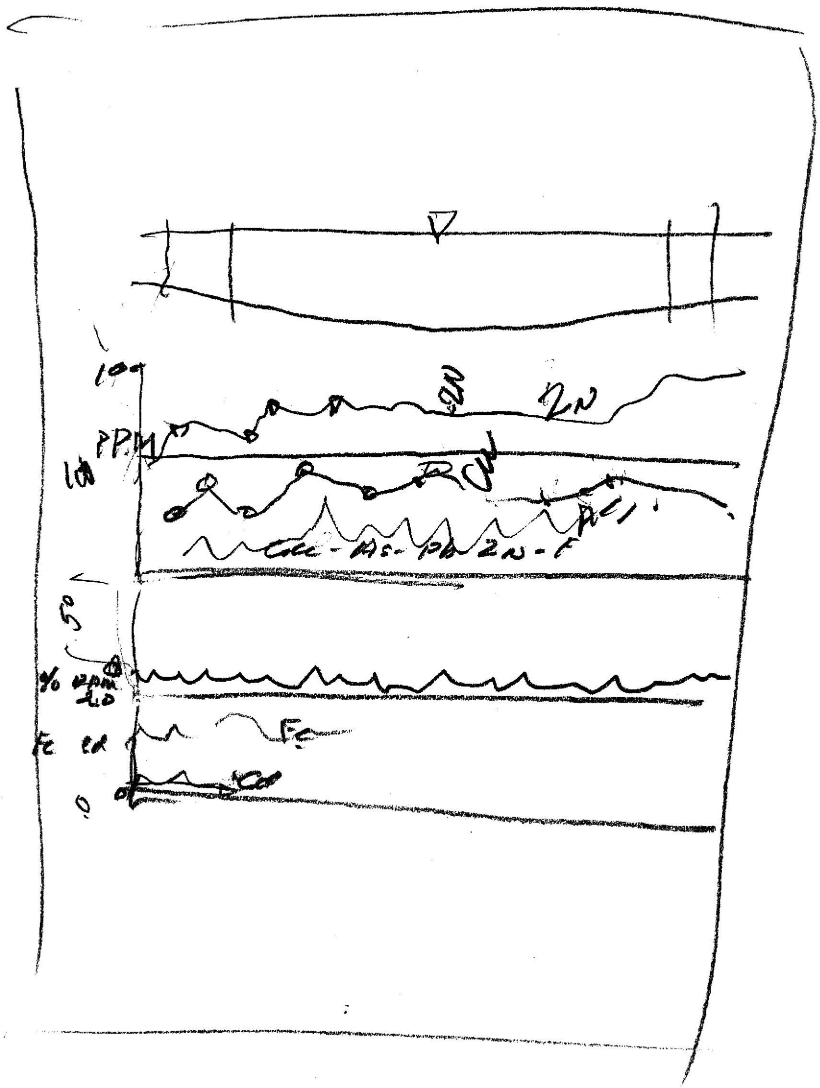


C:\SPW\CDWAT01.SPW

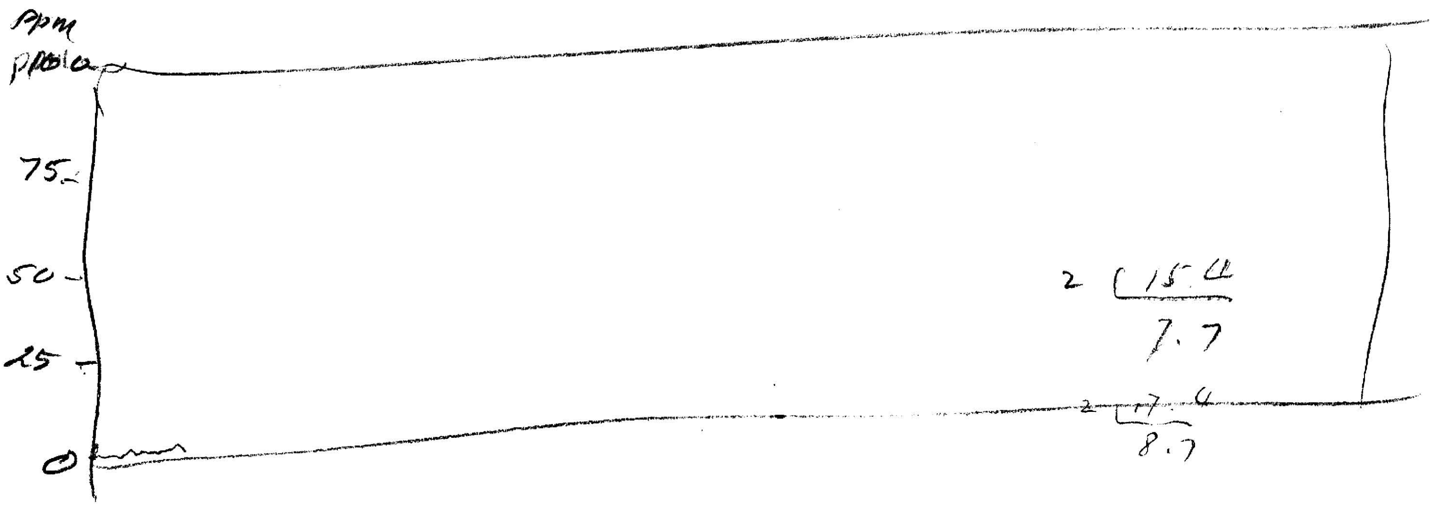
	-1- SAMPLEID	-2- LONGITUDE	-3- LATITUDE	-4- CU	-5- CD	-6- ZN
1	141W	45.6270	12.0670	1.0000	4.0000	9.0000
2	142W	46.1880	12.0670	2.0000	3.0000	4.0000
3	143W	46.8770	12.0360	1.0000	6.0000	4.0000
4	144W	47.3560	12.0380	3.0000	7.0000	6.0000
5	145W	47.8780	12.0670	1.0000	12.0000	9.0000
6	146W	48.5200	12.0790	5.0000	8.0000	8.0000
7	147W	49.0310	12.0650	20.0000	13.0000	31.0000
8	148W	49.5030	12.0670	2.0000	4.0000	8.0000
9	149W	50.1510	12.0770	1.0000	12.0000	8.0000
10	150W	50.6940	12.0690	2.0000	10.0000	6.0000
11	151W	51.3280	12.0580	3.0000	7.0000	10.0000
12	152W	51.8830	12.0270	4.0000	1.0000	3.0000
13	153W	52.5620	12.0490	1.0000	1.0000	6.0000
14	154W	49.8990	10.8750	3.0000	9.0000	9.0000

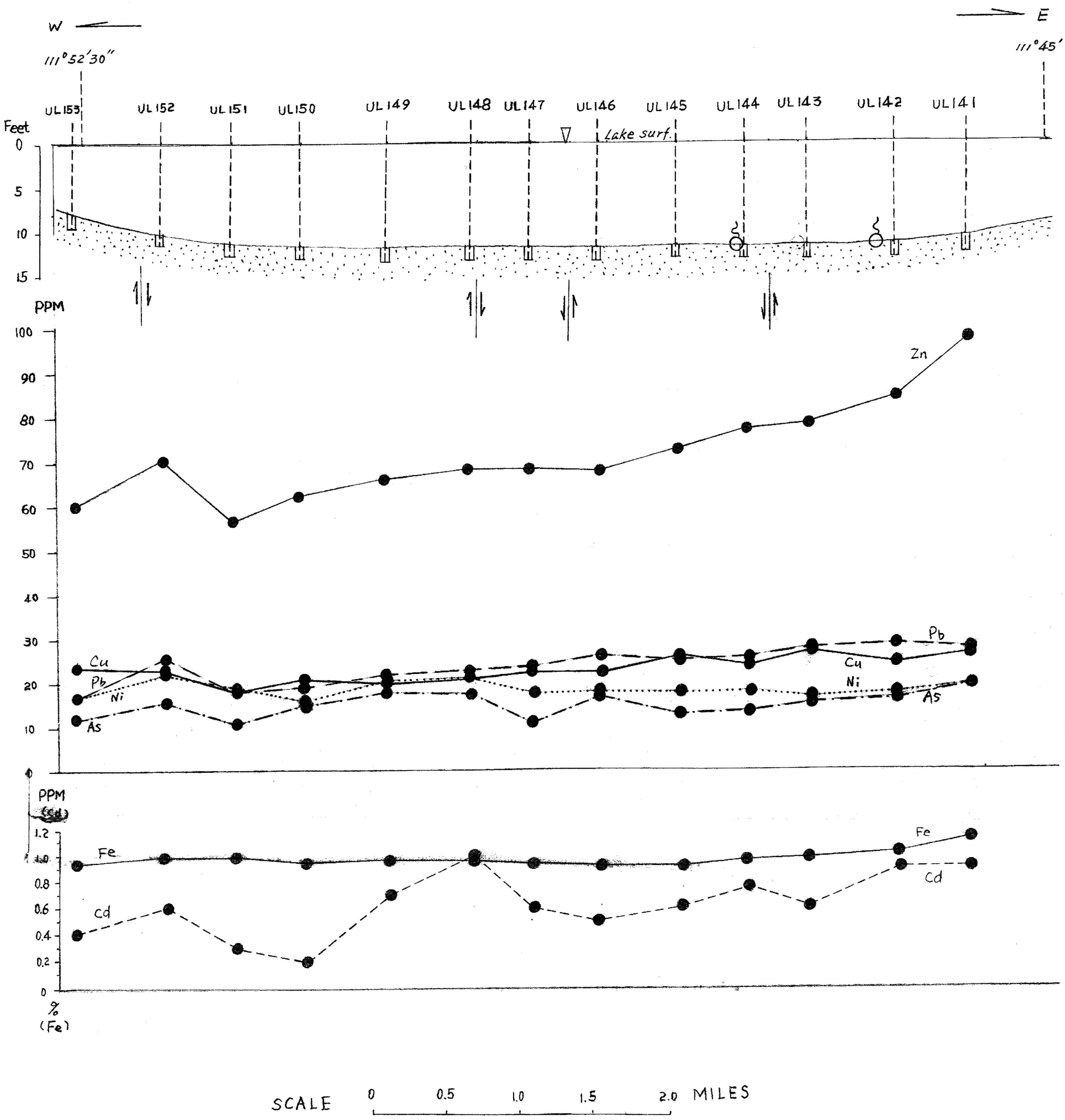
111° 45.6270′ 40° 12.0670′

varied to find the minimum error state. This is essentially a statement of the fact that, although a method for advancing the distribution function in known fields was successfully developed, the problem was not posed in such a way that the fields are well determined.




W
PSI
SAMPLE
UTAH LAKE
LOCATE SAMPLES
E


ppm
75
50
25
0
2
15.4
7.7
8.7



E-W Geochemical Profile across
Utah Lake.
(Acme Analytical Lab. Inc., Vancouver B.C.)