CIRCULAR 94

Geochemical and Biogeochemical Studies in the Eagle Nest Quadrangle, New Mexico

by F. LEO MISAQI

(Fazlollah Missaghi)

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Abstract

A geochemical study of bedrock, soil, and plant samples of the area was conducted. The northwestern and north-central parts of the area, known for its mineralization, showed a conspicuous anomaly in metal content. The southwestern part of the area indicated an anomalous metal content. A further, detailed, large-scale study of the southwestern area of the Eagle Nest quadrangle is recommended.

Investigation

The investigated area covers the central part of the Sangre de Cristo Mountains, known as Taos Range (fig. 1). This part of northeastern New Mexico is notable for having the highest point of the state—Wheeler Peak, elevation 13,160 feet. The molybdenite deposit of Questa, on the northwestern margin of the area, is said to be unique among the major molybdenum mines of the world because of its high-grade molybdenite ore produced from fissure veins (Schilling, 1965). At the present time, however, molybdenite of this mine comes from its stockwork deposit.

Elizabethtown, a ghost town located west of Moreno Creek on the eastern margin of the area, used to be the center of a rich placer-gold mining district before 1881 (Anderson, 1957). No other major mining operations are known in the area.

Kenneth F. Clark (1966) describes the geology of the Eagle Nest quadrant, as do various articles in the New Mexico Geological Society guidebook edited by Stuart A. Northrop and Charles B. Read (1966).

The writer conducted this study during the summer of 1966 to determine the pattern of geochemical anomalies in areas to the east of, but immediately adjacent to, the Questa molybdenite deposit and to find potentially favorable anomalies in the Eagle Nest quadrangle.

METHODS OF INVESTIGATION

The basic method of geochemical study comprised bedrock and soil sampling. Plant samples were taken to find a possible relationship between the methods of sampling.

Bedrock outcrops were easy to spot at sampling sites. Plate 1 shows the collection points for rock chip samples, which were later crushed, ground, and screened to —80 mesh size in the laboratory.

The soil was screened on the spot, and the —40 mesh fraction was collected for a further screening in the laboratory, where the —80 mesh fraction was separated for chemical analysis. Where a soil horizon was not well developed, the soil from the holes of burrowing animals was used for sampling. Plate 2 shows the results of soil sampling.

Plant samples consisted of one-year-old twigs of American aspen. This tree was chosen because it grows fast and is easily recognizable. Plate 3 shows the tree sampling locations. Because many sampling points of the central and southwestern parts of the area lie above timberline, no plant samples represent them. Plant samples were reduced in the laboratory and analyzed for traces of metals.

Plates 1, 2, and 3 show that the sampling pattern is not a geometrical one. An effort was made to have all geologic formations represented. Points shown on the maps are common for the rock, soil, and plant samples.

Rock and soil samples were analyzed by the Rocky Mountain Geochemical Laboratories. Copper and zinc contents were determined by atomic absorption; analyses for lead, molybdenum, and arsenic were obtained by colorimetric methods.

Plant samples were analyzed for copper, zinc, lead, and molybdenum at the New Mexico Bureau of Mines' chemical laboratory by atomic absorption methods. No traces of molybdenum were found in plant samples.

Clark's (1966) geological map of Eagle Nest quadrangle was used as a base for this study.

RESULTS OF INVESTIGATION

Table 1 shows the results of chemical analyses. "Total metal" columns in the table represent the rounded-off sum of metal content in each sample. Boldface numbers indicate the anomalously high values of metal content, as determined from Figures 2 through 17.

The following were taken as threshold values, in parts per million, for the area:

(a) in bedrock survey: copper, 80 ppm; zinc, 120 ppm; lead, 30 ppm; molybdenum, 7 ppm; arsenic, 10 ppm; total metal, 250 ppm.

(b) in soil survey: copper, 40 ppm; zinc, 140 ppm; lead, 40 ppm; molybdenum, 5 ppm; arsenic, 10 ppm; total metal, 250 ppm.

(c) in plant survey: copper, 15 ppm; zinc, 70 ppm; lead, 10 ppm; total metal, 70 ppm.

It can be seen that the northwestern and north-central parts of the quadrangle have the largest number of anomalous rock, soil, and plant samples (pls. 1, 2, and

3). This area corresponds to that part of the molybdenum belt that occurs in the investigated area (Schilling) and is mapped as the zone of propylitic alteration by Clark (1966).

Another interesting area lies in the southwestern part of the map. Plate 2 (soil survey) shows the abundance of anomalous samples, less obvious on Plate 1 (bedrock survey) and absent on Plate 3 because the sampling points were above timberline and no plant samples were available.

There is a close correspondence between anomalous soil and rock samples. Samples taken from American aspen generally followed the pattern of rock and soil samples, but they did not indicate the presence of molybdenum. The study of conifers may give a better indication of metal traces.

A more detailed study of the southwestern part of the Eagle Nest quadrangle may clarify the reasons for geochemical anomalies in this area.

Acknowledgments

The writer is indebted to Robert S. LeSage, Adolph and George Mutz, and W. J. Gourley for permission to work on their properties.

Grateful acknowledgment is made to Kenneth F. Clark, Cornell University, who provided me with copies of his geological map of the area and permitted use of the map for this report. My colleagues, George B. Griswold and Frank E. Kottlowski, reviewed the manuscript. Dexter H. Reynolds, research chemist, supervised the analyses of wood samples in the chemical laboratory of the New Mexico Bureau of Mines and Mineral Resources. Samples of rock and soil were analyzed by the Rocky Mountain Geochemical Laboratories, Salt Lake City, Utah.

Special thanks are extended to Miss Teri Ray, who did the editorial work, to William E. Arnold, who drafted the illustrations, and to Mrs. Cheryl LePlatt, who typed the manuscript. All are of the Bureau staff.

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Northrop, Stuart A., and Read, Charles B. (eds.) (1966) *Taos-Raton-Spanish Peaks Country, New Mexico and Colorado,* N. Mex. Geol. Soc., Guidebook, Seventeenth field conference, 128 p.

Schilling, John H. (1965) *Molybdenum resources of New Mexico,* N. Mex. Inst. Min. and Tech., State Bur. Mines and Mineral Res., Bull. 76, 76 p.

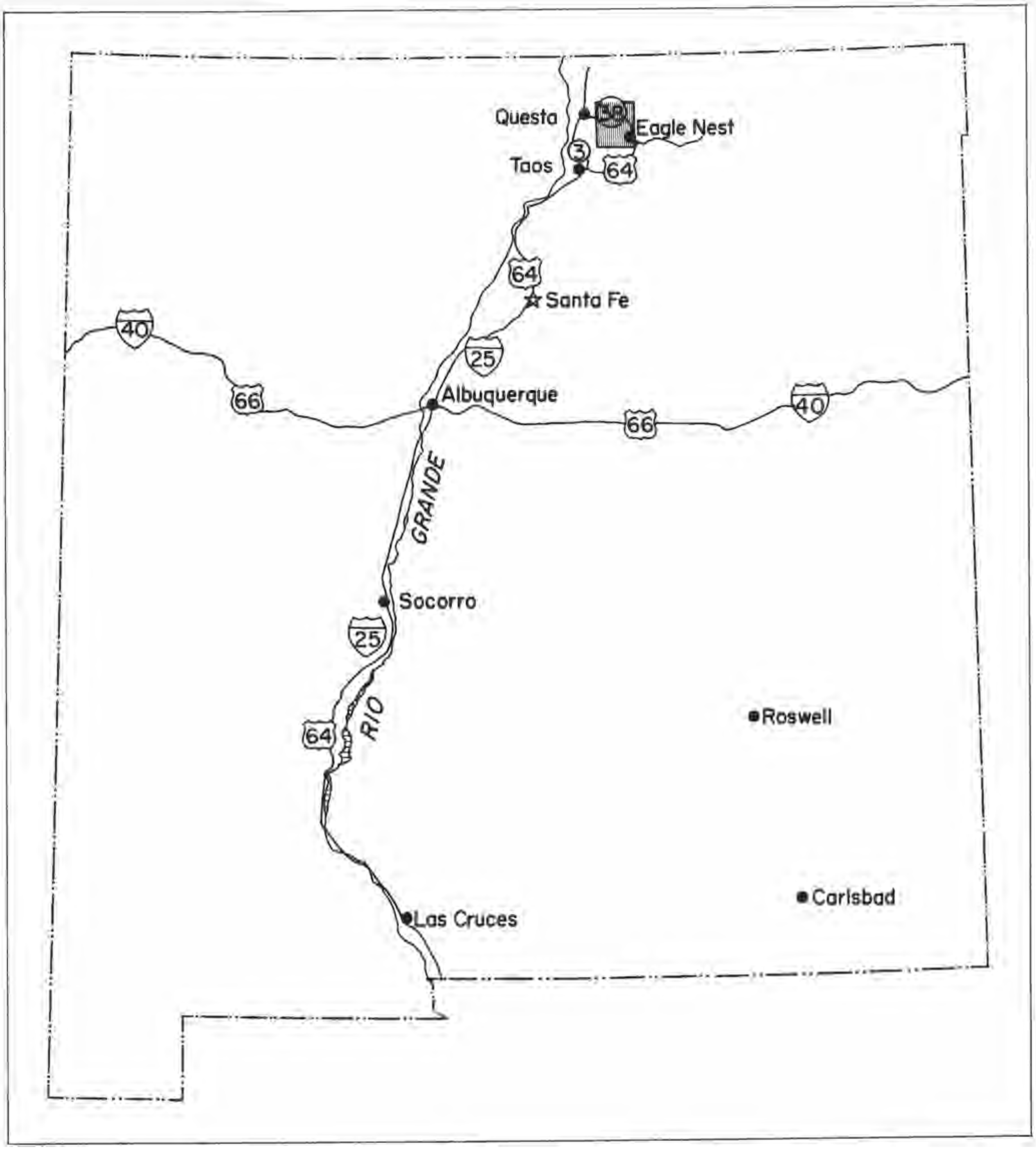


Figure 1
INDEX MAP OF EAGLE NEST QUADRANGLE

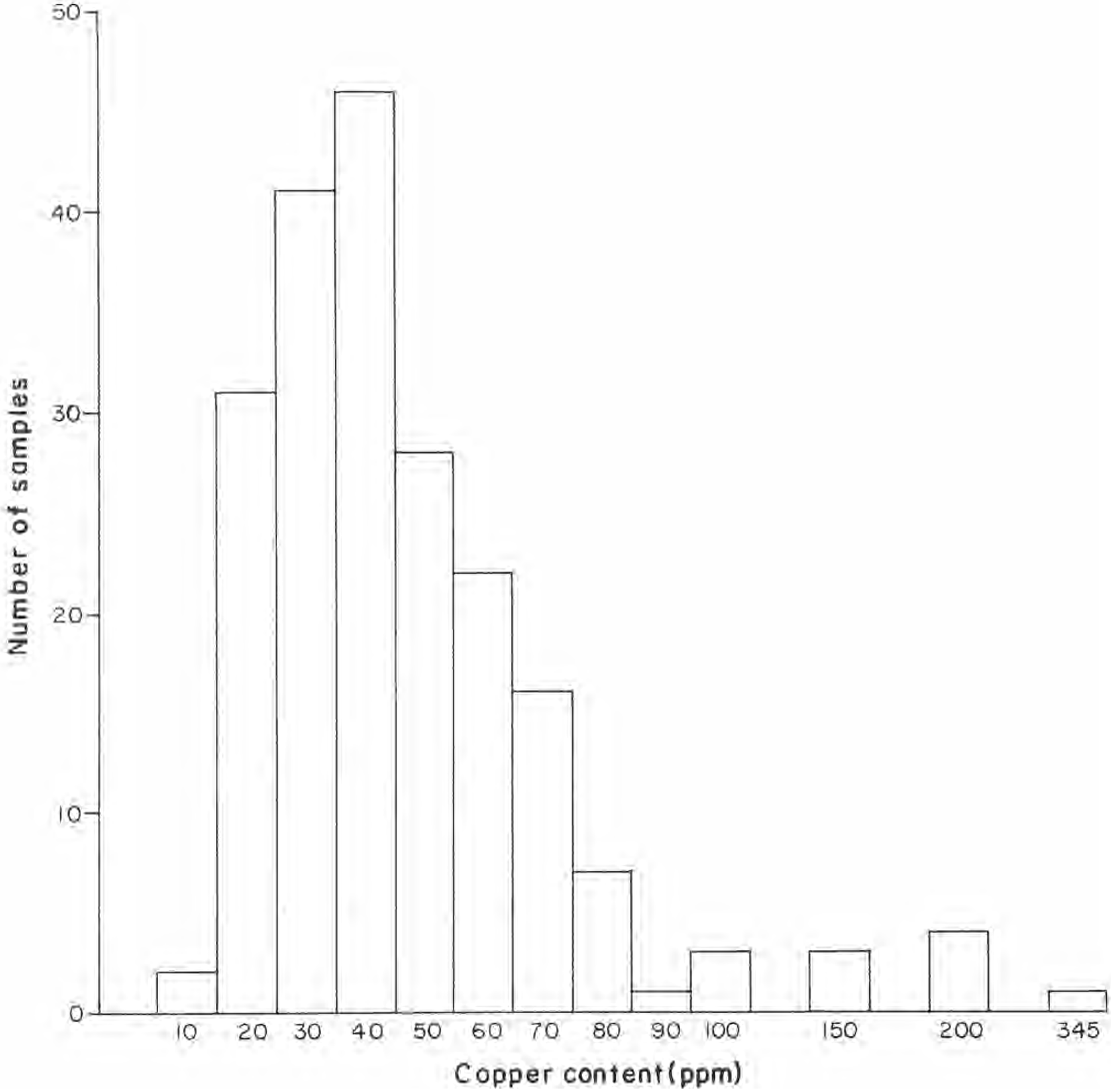


Figure 2
FREQUENCY DISTRIBUTION OF COPPER IN ROCK SAMPLES

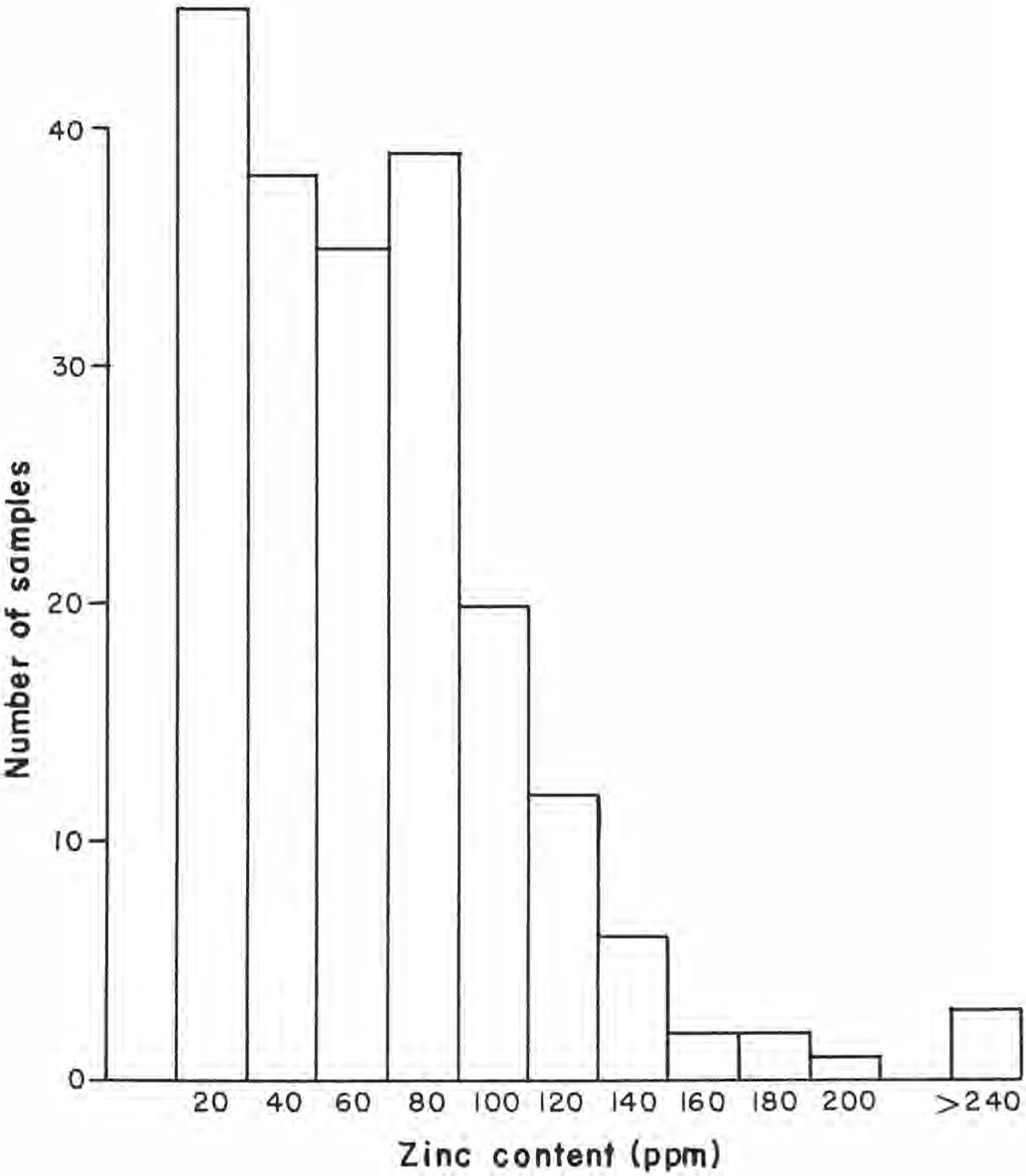


Figure 3

FREQUENCY DISTRIBUTION OF ZINC IN ROCK SAMPLES

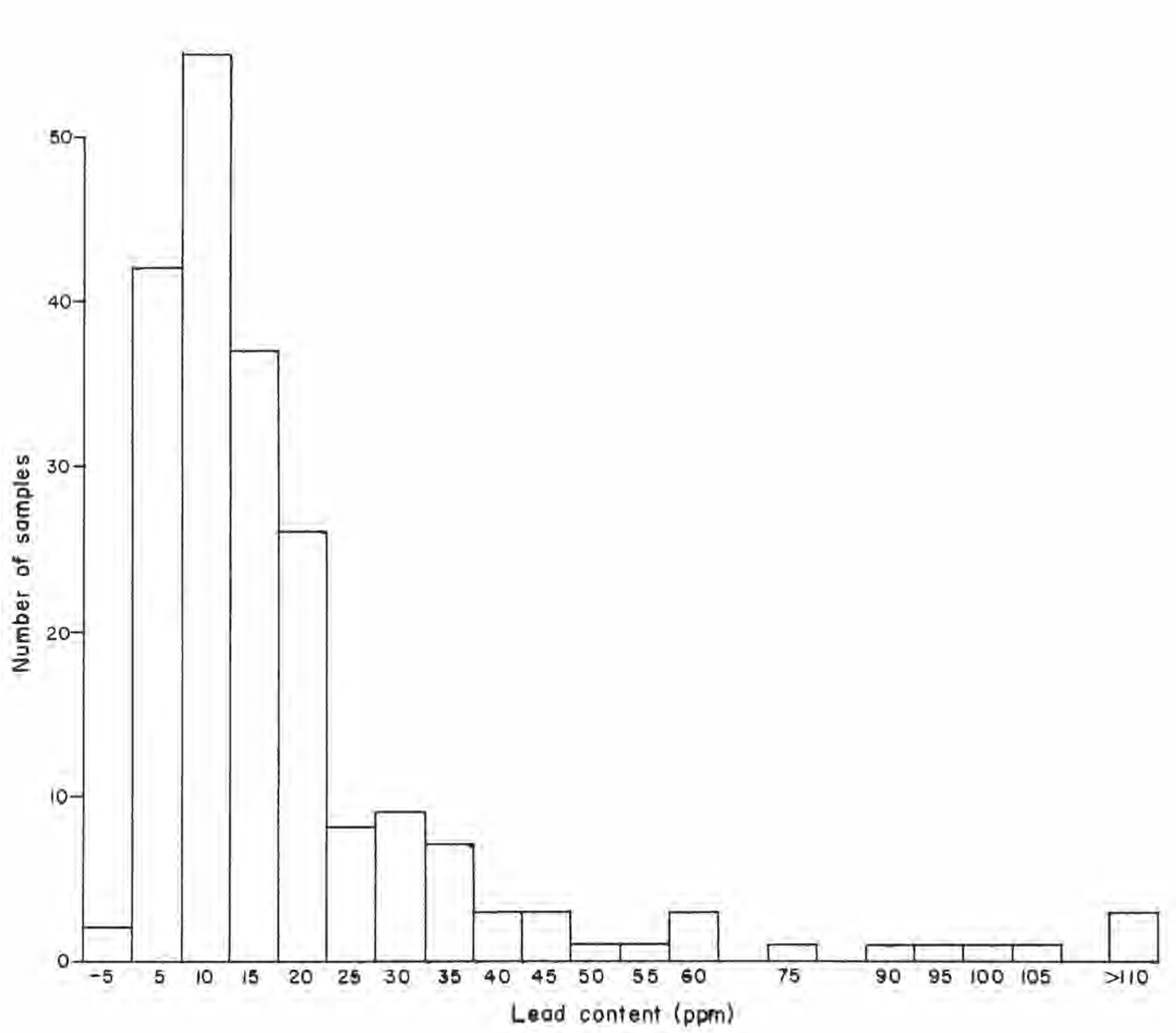


Figure 4
FREQUENCY DISTRIBUTION OF LEAD IN ROCK SAMPLES

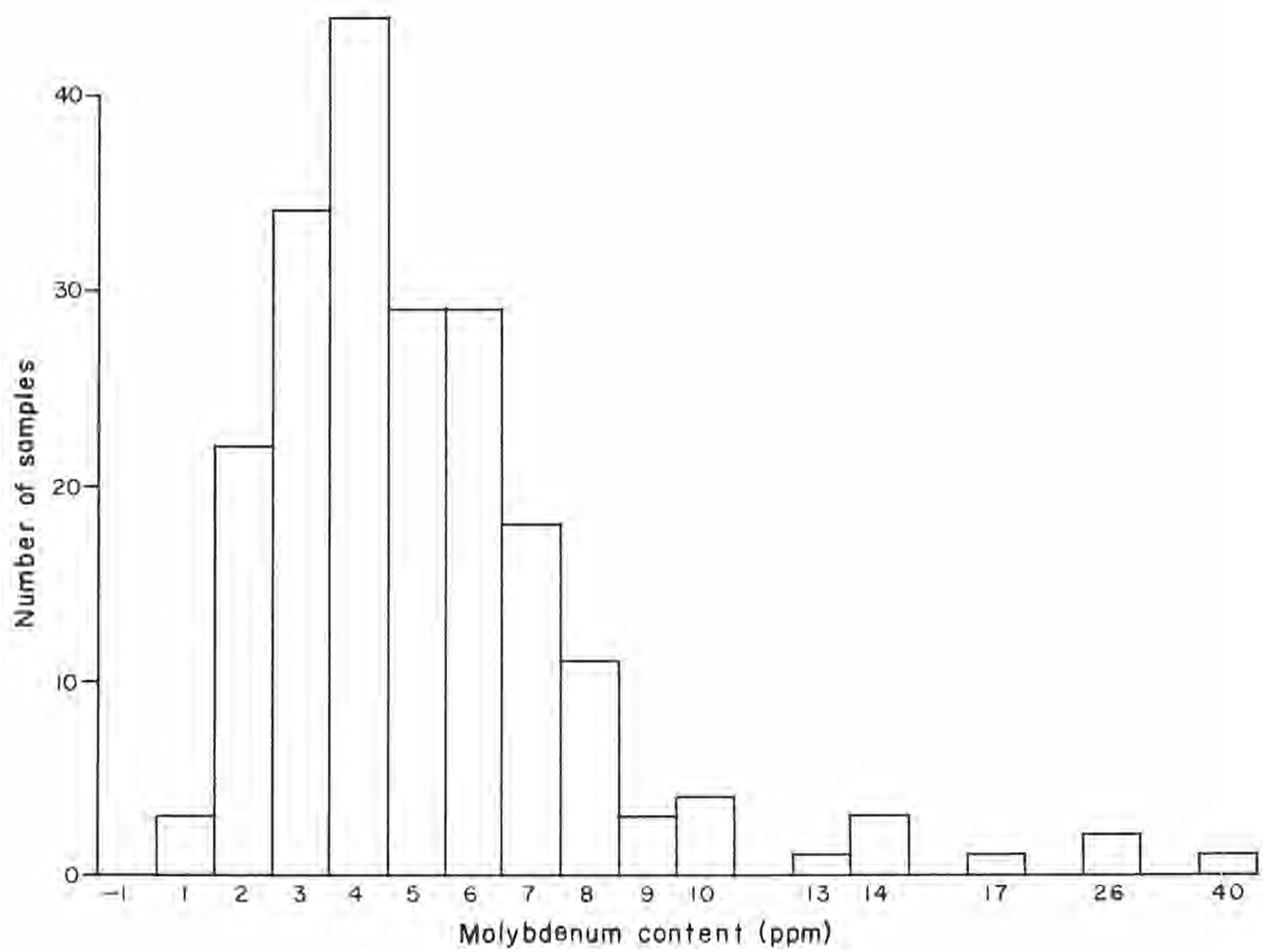


Figure 5
FREQUENCY DISTRIBUTION OF MOLYBDENUM IN ROCK SAMPLES

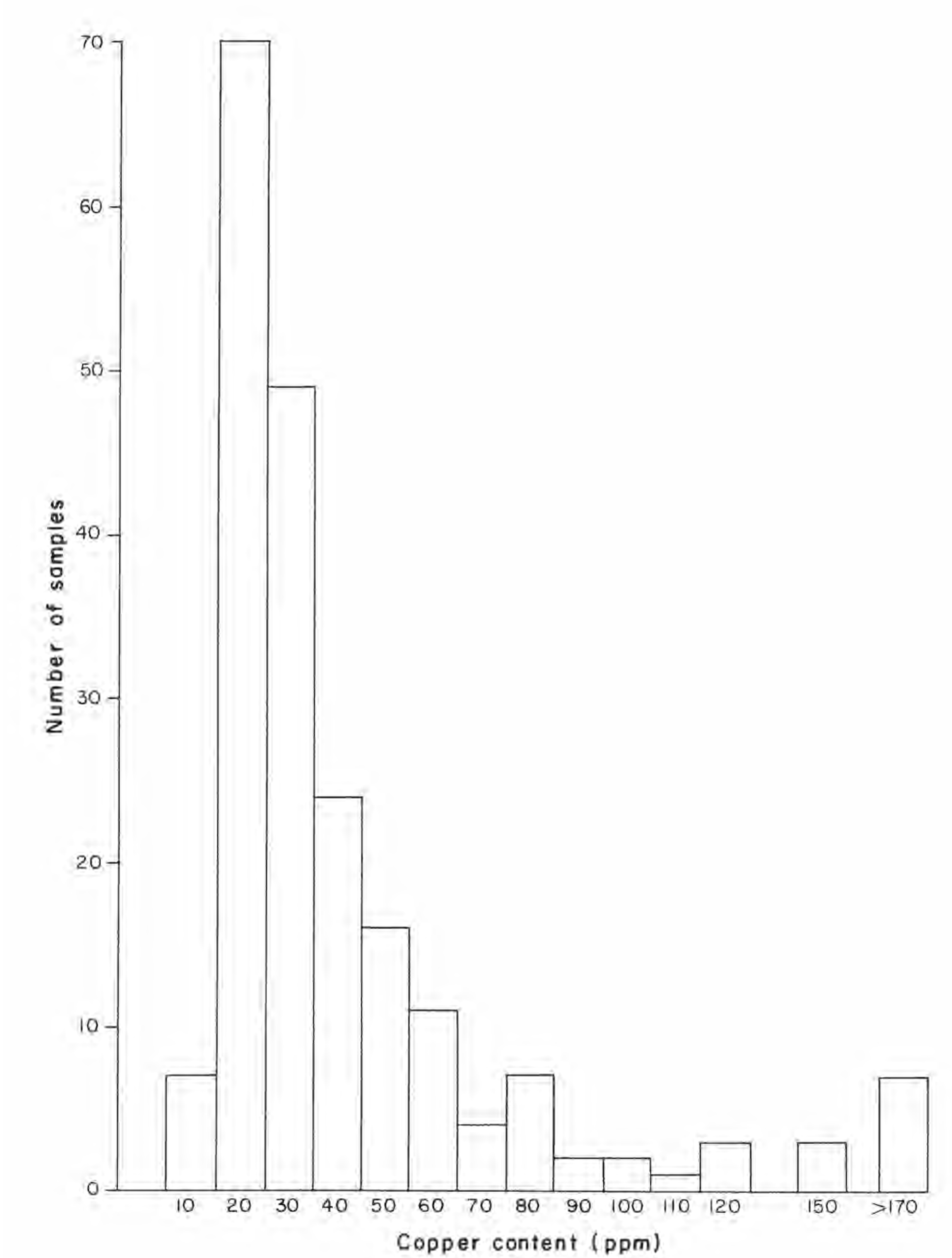


Figure 8
FREQUENCY DISTRIBUTION OF COPPER IN SOIL SAMPLES

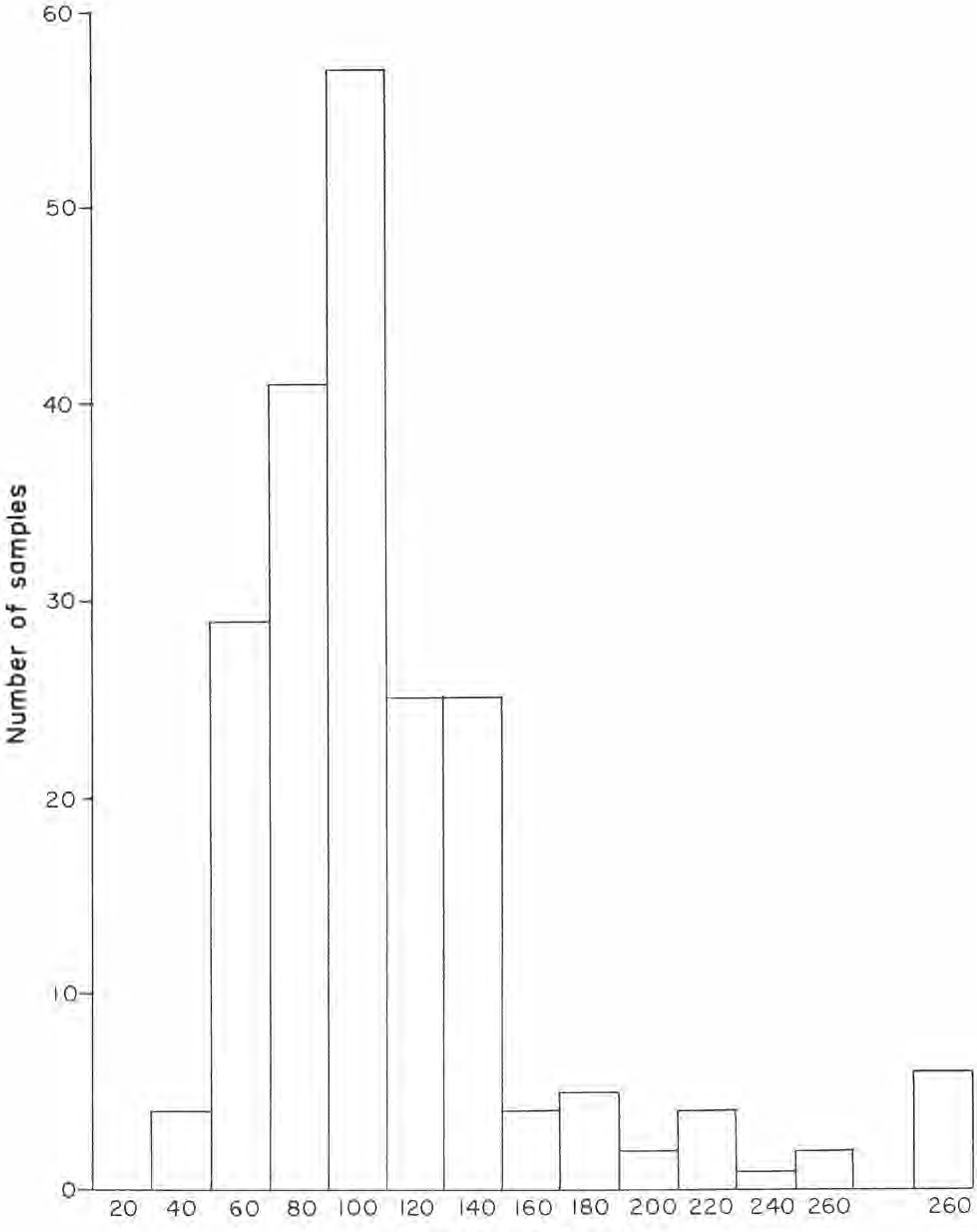


Figure 9
FREQUENCY DISTRIBUTION OF ZINC IN SOIL SAMPLES

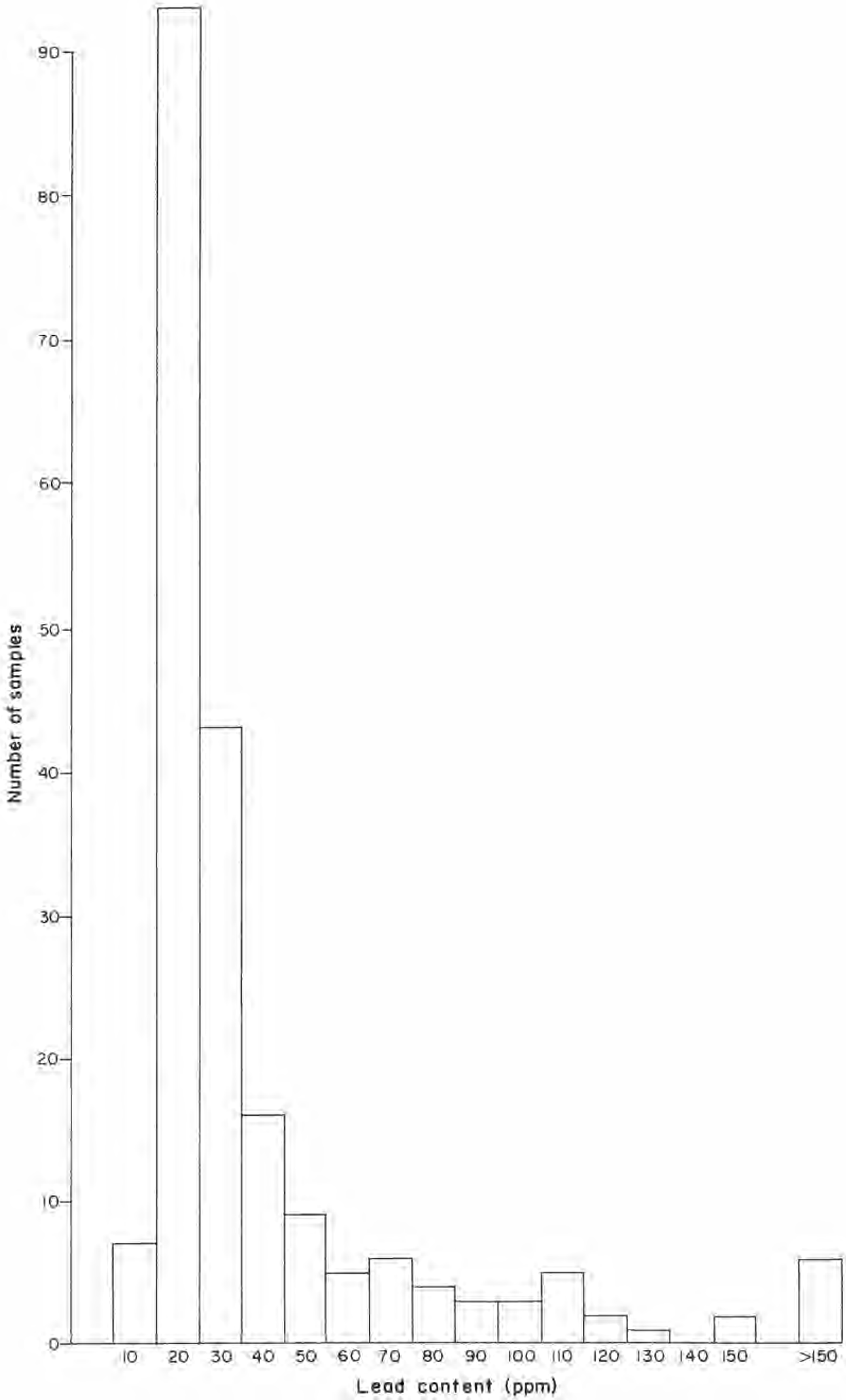


Figure 10
FREQUENCY DISTRIBUTION OF LEAD IN SOIL SAMPLES

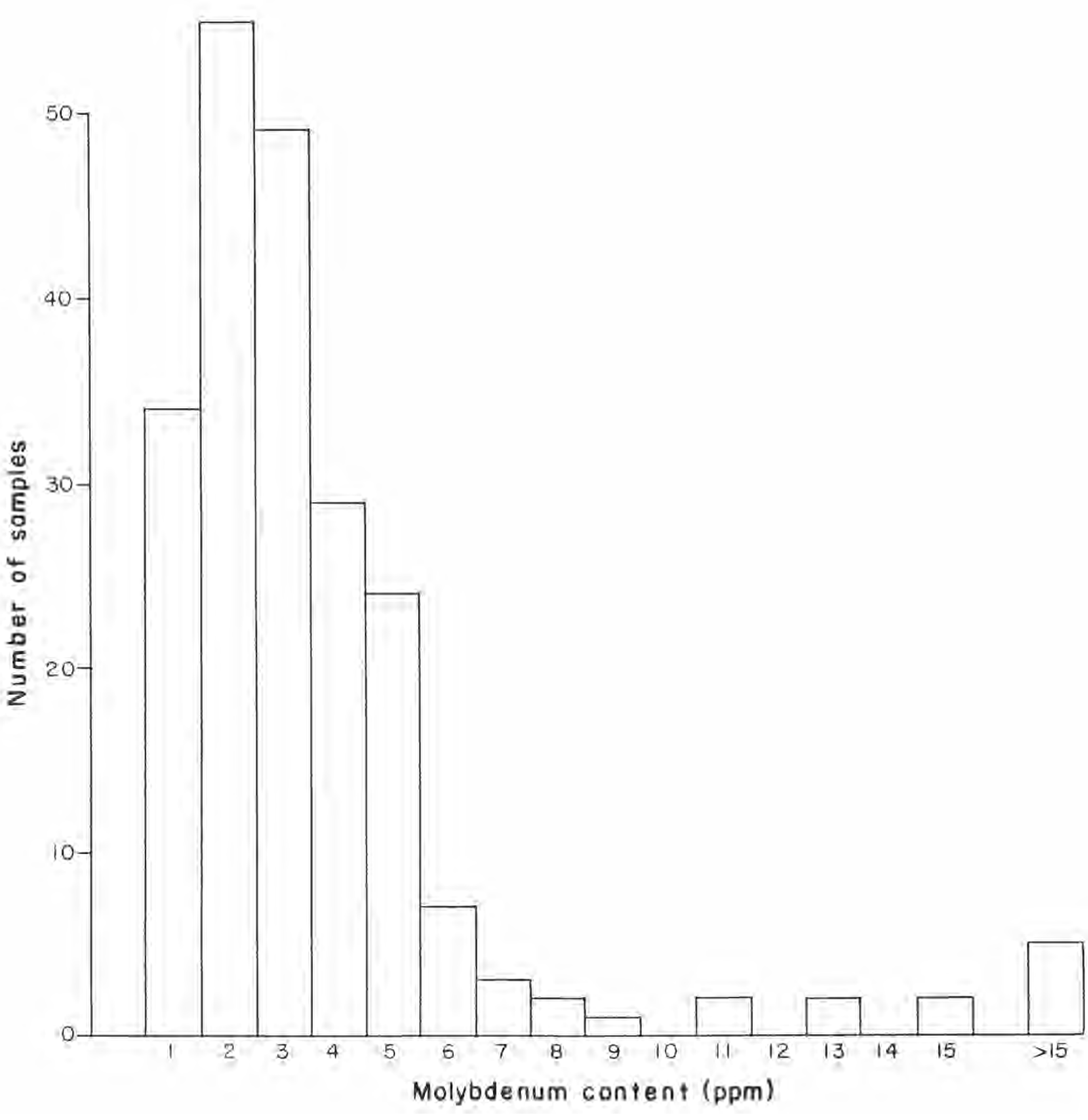


Figure 11

FREQUENCY DISTRIBUTION OF MOLYBDENUM IN SOIL SAMPLES

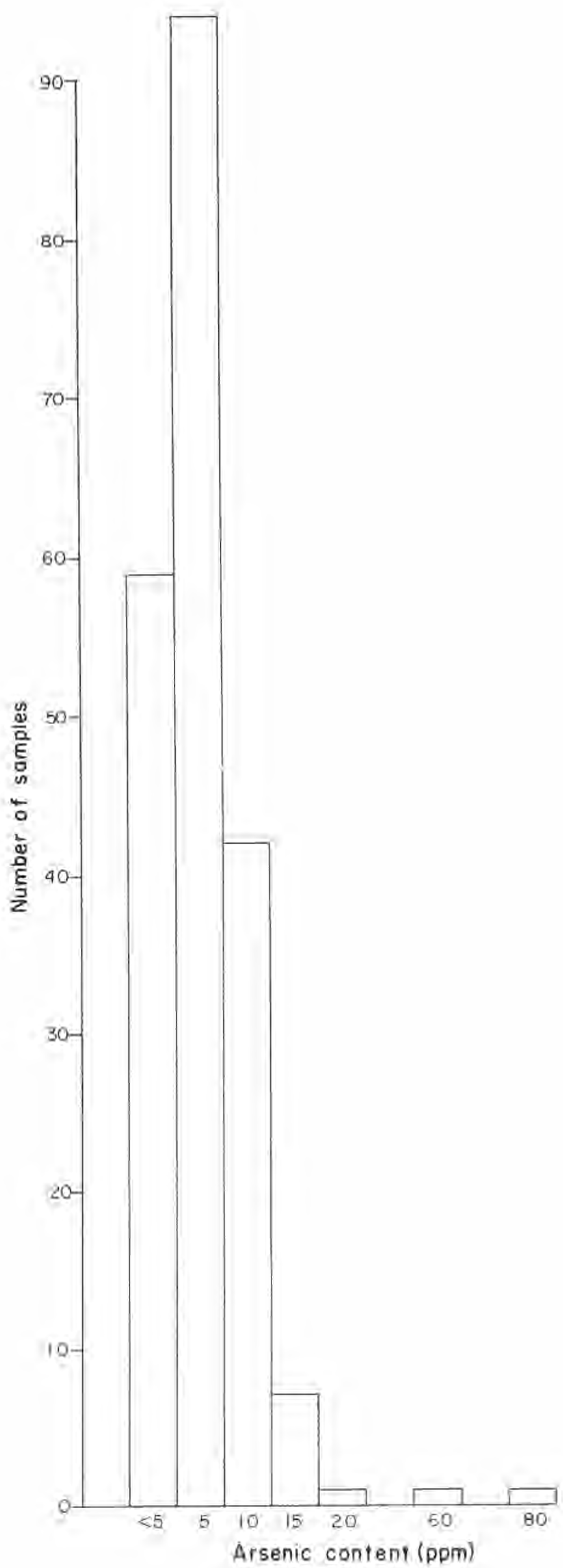


Figure 12
FREQUENCY DISTRIBUTION OF ARSENIC IN SOIL SAMPLES

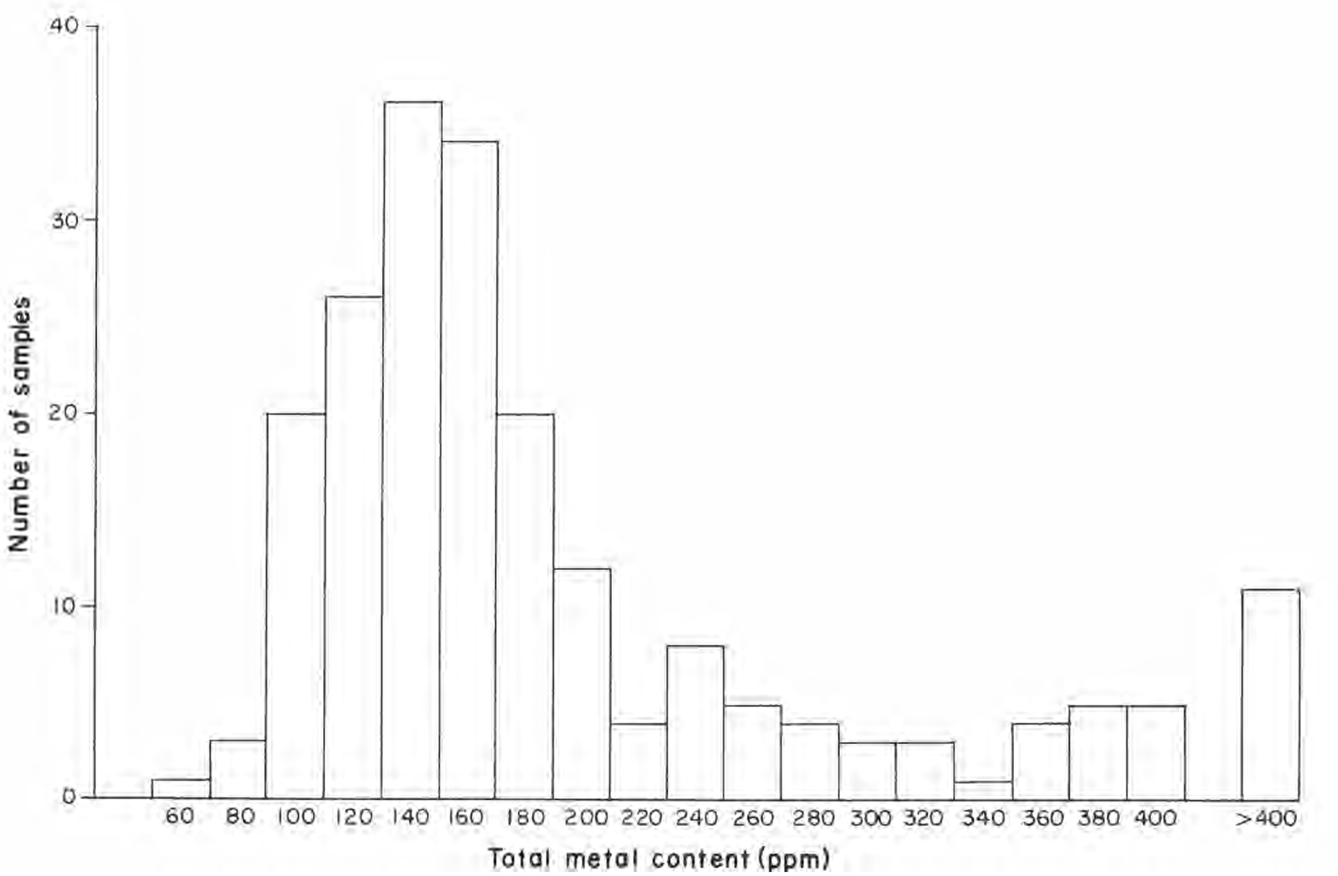


Figure 13

FREQENCY DISTRIBUTION OF TOTAL METAL IN SOIL SAMPLES

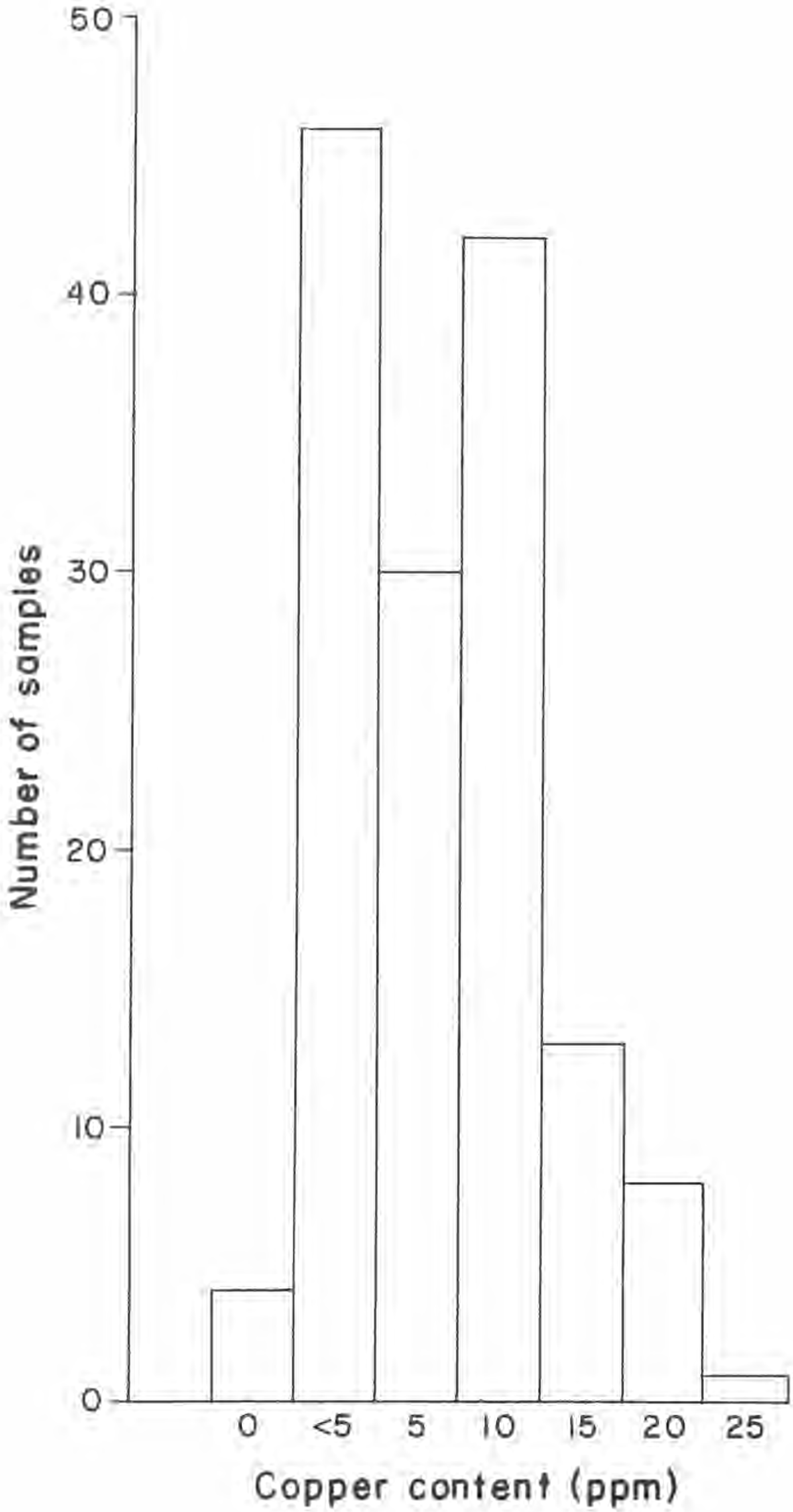


Figure 14
FREQUENCY DISTRIBUTION OF COPPER IN PLANT SAMPLES

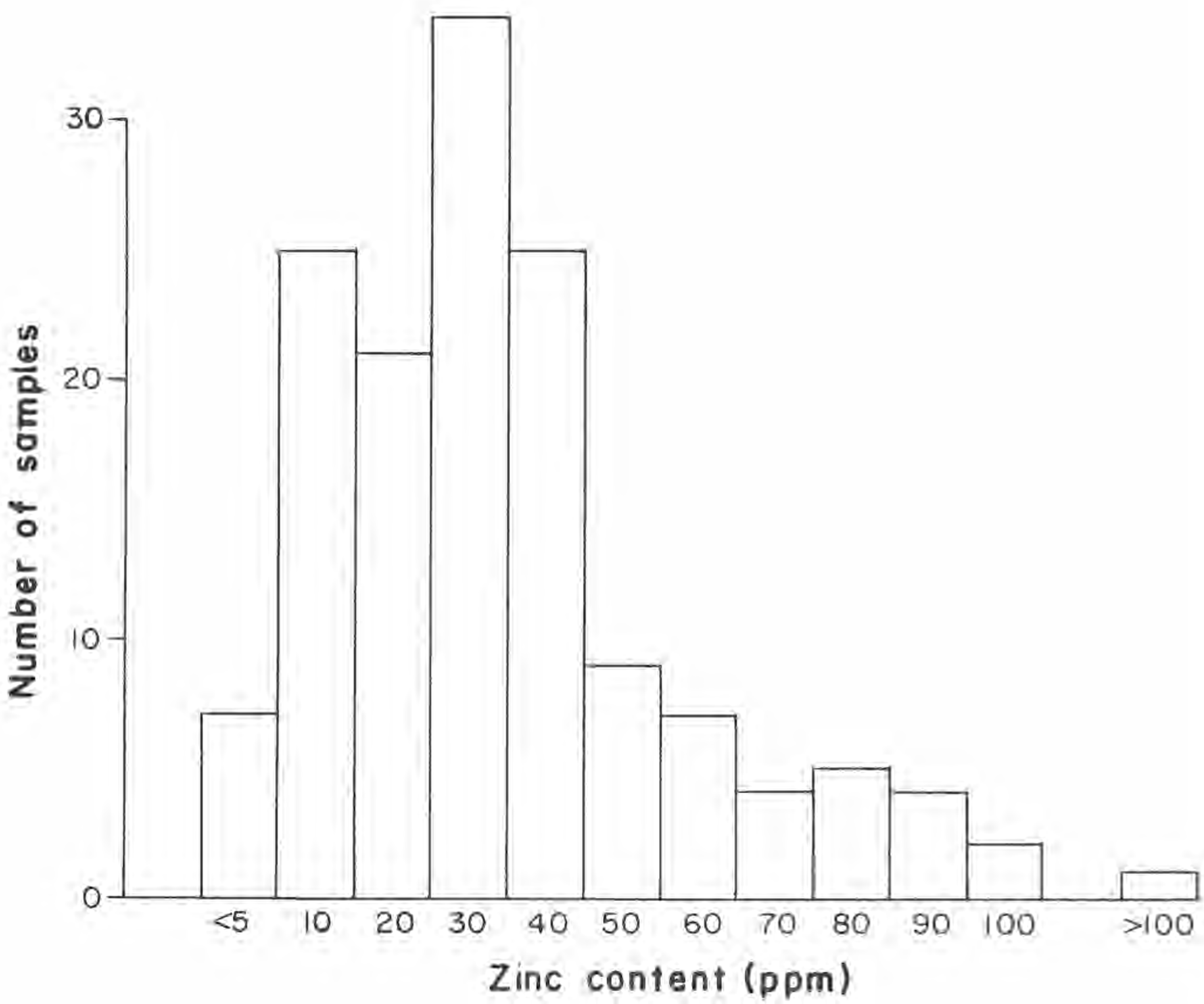


Figure 15
FREQUENCY DISTRIBUTION OF ZINC IN PLANT SAMPLES

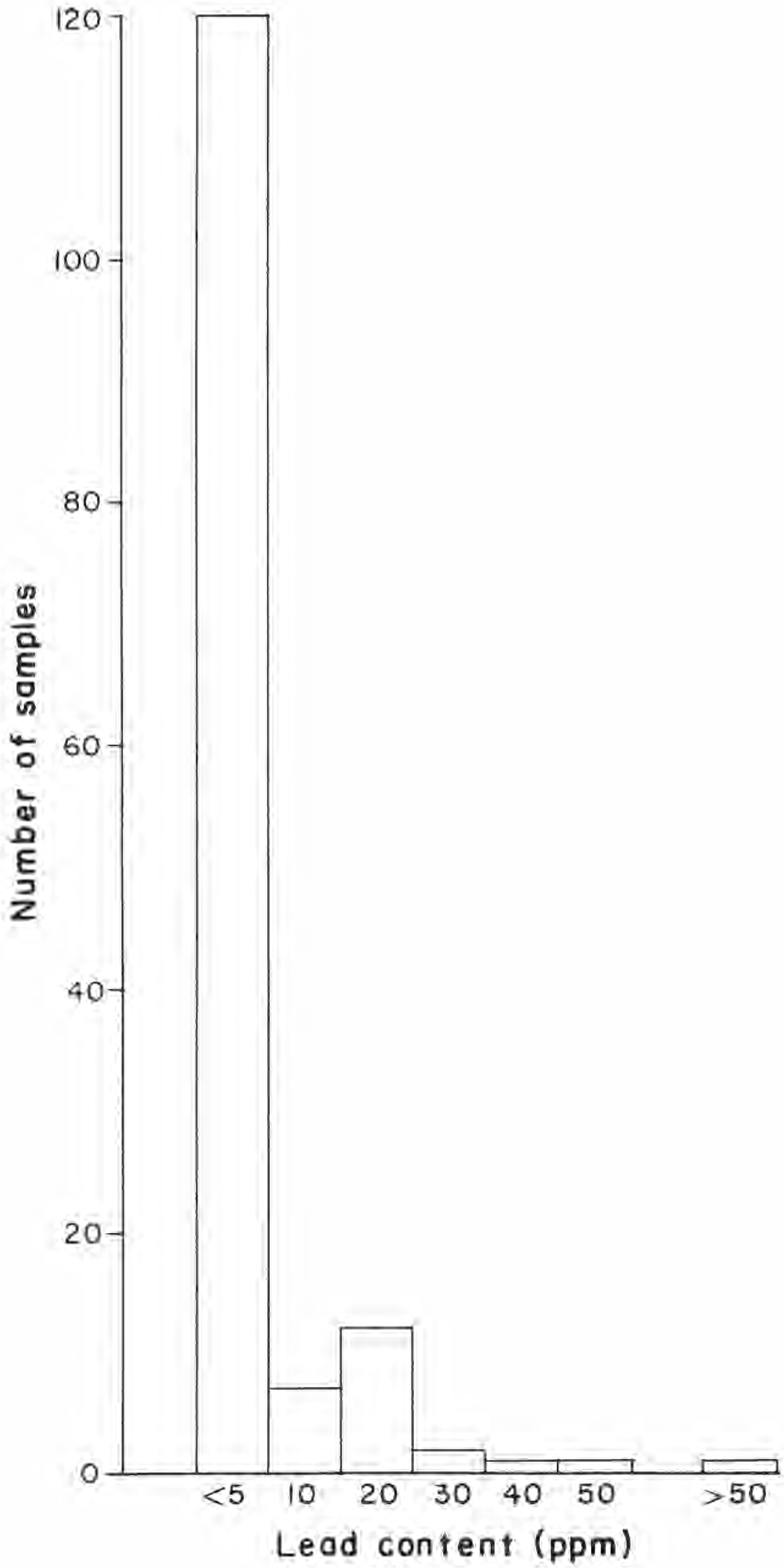


Figure 16
FREQUENCY DISTRIBUTION OF LEAD IN PLANT SAMPLES

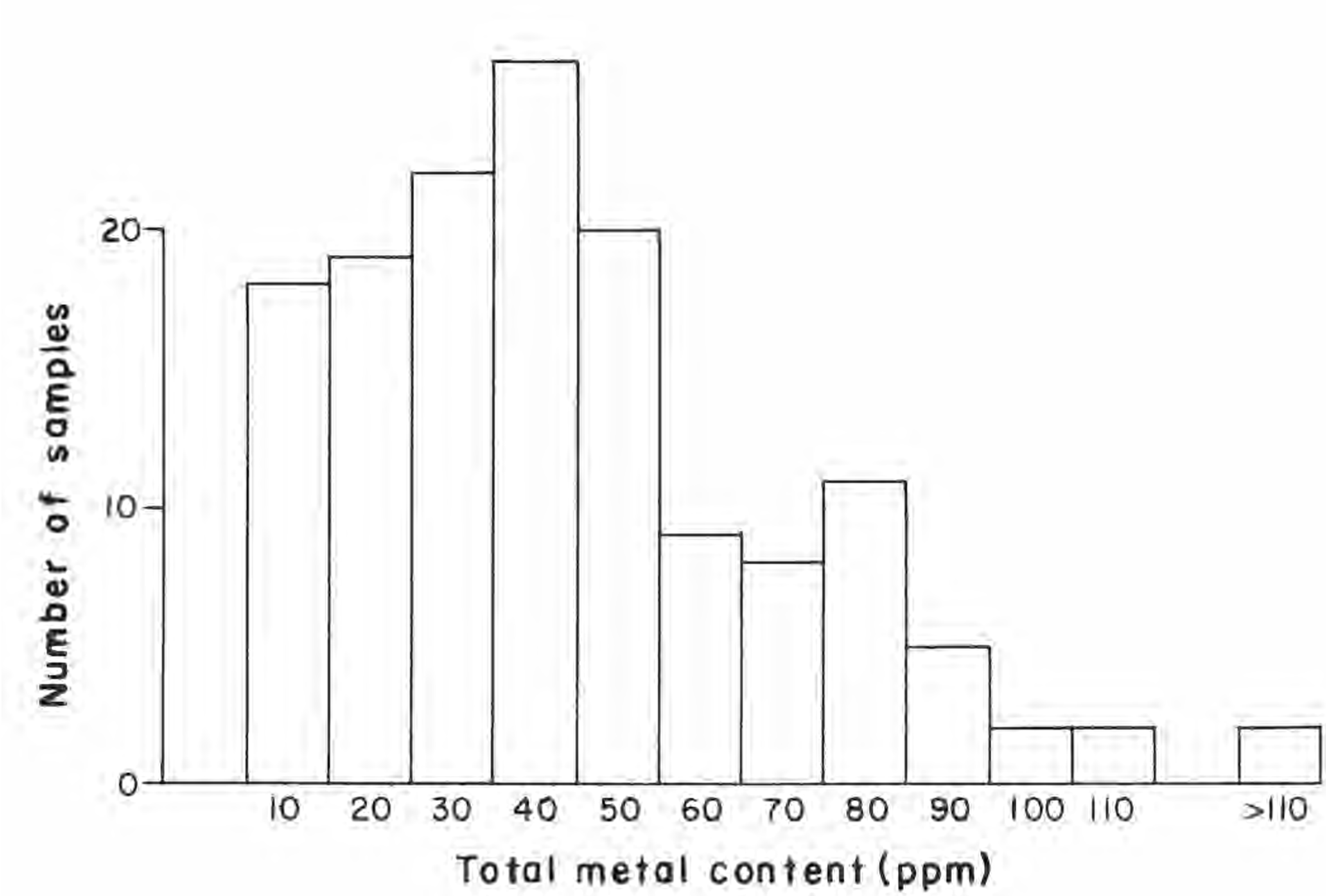


Figure 17
FREQUENCY DISTRIBUTION OF TOTAL METAL IN PLANT SAMPLES

TABLE 1. ASSAY RESULTS FROM ROCK, SOIL, AND PLANT SAMPLING

SAMPLE		ROCK SAMPLES						SOIL SAMPLES						PLANT SAMPLES			
NO.	ROCK FORMATION	CU	ZN	PB	MO	AS	TOTAL	CU	ZN	PB	MO	AS	TOTAL	CU	ZN	PB	TOTAL
1	Latite (propyl. alter.)—Tl	30	110	**40**	5	10	190	35	90	30	4	5	160	5	40	0	45
2	Latite (propyl.-alter.)—Tl	**165**	95	**105**	**40**	5	**410**	**45**	130	**60**	**8**	—5	240	—5	25	—5	25
3	Granite—Tagr	20	20	**45**	5	5	90	20	70	40	5	—5	130	10	**125**	—5	**135**
4	Rhyolite—Tr	45	**155**	30	4	—5	230	30	100	**45**	3	—5	180	—5	35	0	35
5	Latite (propyl. alter.)—Tl	40	65	**60**	5	—5	170	**80**	**160**	**100**	**7**	—5	**350**	—5	25	0	25
6	Granite—Tagr	25	95	**35**	4	—5	160	20	**150**	**70**	5	5	**250**	10	**95**	0	**105**
7	Granite (hydroth. alter.)—Tagr	30	25	30	6	—5	90	**55**	**220**	35	**15**	—5	**320**	**20**	**75**	0	**95**
8	Rhyolite—Tr	20	**140**	15	4	—5	180	10	130	15	3	—5	160	**20**	40	0	60
9	Granite—Tagr	40	60	25	3	5	130	**70**	**250**	**65**	5	—5	**390**	10	55	0	65
10	Granite—Tagr	**175**	15	**40**	**8**	10	**250**	**80**	50	**45**	**8**	—5	180	**20**	25	**20**	65
11	Andesite—Ta	60	80	30	**9**	5	180	40	115	35	4	—5	190	10	35	0	45
12	Rhyolite—Tr	25	10	20	4	—5	60	20	120	35	4	—5	180	10	60	10	**80**
13	Metaquartzite—p€q	30	30	20	7	—5	90	20	85	**90**	**11**	—5	210	—5	**85**	0	**85**
14	Rhyolite—Tr	25	40	30	5	5	100	25	**270**	**60**	3	—5	**360**	—5	25	0	25
15	Latite—Tl	30	20	30	**8**	—5	90	20	70	**45**	3	—5	140	15	60	0	**75**
16	Metaquartzite—p€q	35	40	15	3	10	100	25	**185**	35	4	5	**250**	5	35	0	40
17	Latite (propyl. alter.)—Tl	15	10	**145**	1	—5	170	20	55	35	3	5	120	**25**	25	0	50
18	Rhyolite—Tr	30	15	15	7	5	70	15	50	35	5	—5	100	10	35	0	45
19	Granite—Tagr	45	115	35	4	5	200	**175**	**290**	**110**	4	—5	**580**	10	35	0	45
20	Rhyolite—Tr	30	**135**	30	7	5	210	30	130	40	3	—5	200	—5	**80**	0	**80**
21	Rhyolite—Tr	40	80	25	2	**15**	160	30	120	30	3	—5	180	5	20	0	25
22	Andesite—Ta	45	80	15	2	10	150	25	85	40	4	—5	150	10	25	0	35
23	Rhyolite—Tr	65	20	20	**9**	—5	110	**55**	70	**65**	5	—5	190	**20**	45	0	65
24	Mafic gneiss—p€mg	30	55	20	4	**20**	130	**45**	**215**	**55**	5	**20**	**340**	5	60	0	65
25	Mafic gneiss—p€mg	80	90	30	6	5	210	**55**	**215**	**70**	4	**60**	**400**	10	50	0	60
26	Latite (propyl. alter.)—Tl	65	65	**55**	5	5	190	**145**	115	**110**	5	—5	**370**	5	40	0	45
27	Latite (hydroth. alter.)—Tl	**125**	65	**35**	**8**	5	240	**150**	140	**95**	**26**	10	**420**	5	**85**	0	**90**
28	Granite—Tagr	35	25	**60**	5	5	130	**90**	125	**145**	**6**	—5	**370**	—5	35	10	45
29	Latite (propyl. alter.)—Tl	70	75	**100**	5	10	**260**	**100**	**165**	**110**	**15**	10	**400**	5	**75**	0	**80**
30	Latite (hydroth. alter.)—Tl	**100**	120	**90**	**10**	5	**320**	**195**	**230**	**155**	**6**	—5	**590**	15	40	0	55
31	Latite (propyl. alter.)—Tl	60	60	25	4	5	150	**315**	125	**80**	**20**	5	**540**	10	35	0	45
32	Metaquartzite—p€q	20	10	10	5	5	50	30	100	30	2	5	170	10	**75**	0	**85**
33	Andesite—Ta	35	105	25	4	5	170	35	85	20	1	—5	140	15	35	0	50
34	Metaquartzite—p€q	25	5	5	5	—5	40	25	60	35	3	5	130	NO SAMPLE			
35	Metaquartzite—p€q	20	5	5	4	—5	30	20	90	30	3	5	150	5	30	0	35
36	Metaquartzite—p€q	25	5	5	5	5	40	25	80	25	2	—5	130	10	30	0	40
37	Metaquartzite—p€q	60	20	**35**	**14**	5	130	30	**150**	**50**	3	—5	230	10	65	0	**75**
38	Rhyolite—Tr	20	30	25	4	5	80	30	105	35	1	5	180	10	20	0	30
39	Latite (prophyl. alter.)—Tl	70	100	30	4	—5	200	35	130	30	1	—5	200	15	10	0	25
40	Latite—Tl	60	**175**	**45**	6	5	**290**	35	125	**45**	2	—5	210	10	25	0	35
41	Granite—p€gr	60	110	20	5	—5	190	25	100	15	1	—5	140	10	30	**40**	**80**
42	Mafic gneiss—p€mg	80	110	30	6	10	240	15	85	15	2	5	120	10	30	0	40
43	Latite (hydroth. alter.)—Tl	35	15	**165**	6	5	230	30	45	30	3	5	110	15	25	0	40
44	Latite (hydroth. alter.)—Tl	55	25	**75**	**13**	—5	170	20	35	**125**	**13**	10	200	**20**	35	**20**	**75**
45	Latite (hydroth. alter.)—Tl	70	100	25	3	—5	200	**60**	130	**110**	4	10	**310**	10	35	0	45
46	Rhyolite (prophyl. alter.)—Tr	55	35	**120**	6	5	220	**80**	135	**475**	**9**	10	**710**	5	**70**	0	**75**
47	Quartz porphyry—Tqp	30	25	**35**	**8**	5	100	15	40	**80**	**11**	5	150	**20**	40	0	60
48	Latite (hydroth. alter.)—Tl	30	30	**45**	3	—5	110	30	140	15	**6**	—5	190	—5	50	0	50
49	Rhyolite—Tr	30	30	**40**	7	10	120	20	80	25	2	—5	130	**20**	25	0	45
50	Metaquartzite—p€q	20	40	20	4	5	90	25	100	**50**	4	—5	180	—5	25	0	25

A minus sign (—) is to be read "less than" and a plus sign (+) "greater than."
Anomalous values are given in boldface numbers.

TABLE 1. ASSAY RESULTS FROM ROCK, SOIL, AND PLANT SAMPLING (cont)

SAMPLE NO.	ROCK FORMATION	ROCK SAMPLES CU	ZN	PB	MO	AS	TOTAL	SOIL SAMPLES CU	ZN	PB	MO	AS	TOTAL	PLANT SAMPLES CU	ZN	PB	TOTAL
51	Andesite (propyl. alter.)—Ta	35	85	20	2	—5	140	25	130	30	3	—5	190	10	50	0	60
52	Andesite (hydroth. alter)—Ta	70	75	20	7	5	180	**45**	65	35	3	5	150	10	60	0	70
53	Andesite (hydroth. alter.)—Ta	35	55	20	5	—5	110	**50**	55	**70**	**7**	10	190	15	85	0	**90**
54	Andesite (propyl. alter.)—Ta	55	**180**	**35**	**8**	5	**280**	35	**320**	**120**	3	5	**480**	—5	**95**	0	**95**
55	Mafic gneiss—p€ mg	70	110	15	3	5	200	**60**	120	25	2	10	220		NO SAMPLE		
56	Granite—p€ gr	20	50	10	4	—5	80	20	80	20	2	5	130		NO SAMPLE		
57	Sandstone—ℙ	40	50	15	4	—5	110	15	70	20	1	10	120		NO SAMPLE		
58	Metaquartzite—p€ q	35	10	10	3	—5	60	30	95	30	3	10	170	10	45	0	55
59	Metaquartzite—p€ q	20	5	5	2	5	40	20	80	30	4	5	140	10	**80**	0	**90**
60	Mafic gneiss—p€ mg	55	**130**	15	4	5	210	**60**	130	25	1	5	220		NO SAMPLE		
61	Granite—p€ gr	15	30	10	2	—5	60	20	95	20	2	—5	140		NO SAMPLE		
62	Mafic gneiss—p€ mg	65	105	10	4	5	190	**45**	115	20	1	5	190		NO SAMPLE		
63	Sandstone—ℙ	30	55	10	4	5	100	30	100	25	1	10	170		NO SAMPLE		
64*	Metaquartzite—p€ q	50	60	15	**26**	5	160	30	120	20	2	10	180		NO SAMPLE		
65	Metaquartzite—p€ q	30	30	10	7	5	80	15	95	20	1	10	140		NO SAMPLE		
66	Sandstone—ℙ	30	40	10	6	—5	90	20	55	15	1	5	100		NO SAMPLE		
67	Sandstone—ℙ	50	80	15	3	5	150	30	90	15	1	5	140	—5	10	0	10
68	Sandstone—ℙ	40	40	15	4	—5	100	20	85	15	2	—5	120	10	40	0	50
69	Sandstone—ℙ	15	70	10	3	5	100	15	95	15	2	5	130	5	30	0	35
70	Mafic gneiss—p€ mg	70	100	15	4	5	190	**145**	**180**	**100**	4	10	**440**		NO SAMPLE		
71	Granite—p€ gr	40	40	20	5	5	110	**50**	140	**90**	2	5	**290**		NO SAMPLE		
72	Mafic gneiss—p€ mg	**95**	**250**	20	3	—5	**370**	**90**	135	35	1	10	**270**		NO SAMPLE		
73	Mafic gneiss—p€ mg	**345**	80	**50**	6	**155**	**640**	**100**	**145**	**60**	4	**80**	**390**		NO SAMPLE		
74	Granite—p€ gr	35	45	**35**	7	**15**	140	**55**	140	**185**	3	**15**	**400**		NO SAMPLE		
75	Granite—p€ gr	30	50	20	2	5	110	**55**	135	**50**	2	—5	240		NO SAMPLE		
76	Mafic gneiss—p€ mg	70	105	15	5	5	200	**65**	**170**	**120**	**6**	5	**370**		NO SAMPLE		
77	Mafic gneiss—p€ mg	40	**290**	20	2	—5	**350**	**220**	**+1000**	**700**	**6**	10	**+2000**		NO SAMPLE		
78	Mafic gneiss—p€ mg	50	**145**	15	4	—5	210	**230**	**330**	**245**	2	**15**	**820**		NO SAMPLE		
79	Granite—p€ gr	65	50	15	5	—5	130	**70**	130	25	2	10	240		NO SAMPLE		
80	Mafic gneiss—p€ mg	**160**	100	15	3	10	**290**	**120**	115	15	1	5	**260**	15	10	**30**	55
81	Mafic gneiss—p€ mg	**100**	55	10	3	—5	170	**60**	90	20	2	10	180		NO SAMPLE		
82	Granite—p€ gr	15	60	5	2	10	90	15	105	20	3	5	150	—5	10	0	10
83	Mafic gneiss—p€ mg	20	70	10	3	5	110	**55**	**220**	30	2	5	**310**	15	25	0	40
84	Granite—p€ gr	20	40	5	3	—5	70	**50**	**250**	**60**	2	—5	**360**		NO SAMPLE		
85	Granite—p€ gr	30	45	10	5	10	100	**50**	120	**45**	3	10	230		NO SAMPLE		
86	Mafic gneiss—p€ mg	65	60	10	3	5	140	**80**	105	35	1	5	230		NO SAMPLE		
87	Granite—p€ gr	60	30	10	**8**	5	110	**45**	75	20	3	—5	140		NO SAMPLE		
88	Mafic gneiss—p€ mg	70	30	10	5	10	120	**245**	100	25	4	5	**380**		NO SAMPLE		
89	Granite—Thgr	45	35	20	6	—5	110	10	70	20	3	10	110	10	25	0	35
90	Mafic gneiss—p€ mg	45	**130**	20	4	5	200	15	60	20	1	5	100		NO SAMPLE		
91	Granite—p€ gr	20	40	10	2	5	80	10	85	15	2	5	120		NO SAMPLE		
92	Mafic gneiss—p€ mg	65	120	20	4	5	210	20	105	20	3	10	160		NO SAMPLE		
93	Granite—p€ gr	10	30	5	2	—5	50	10	70	20	1	5	110		NO SAMPLE		
94	Mafic gneiss—p€ mg	40	80	5	3	5	130	15	100	15	2	5	140	15	25	0	40
95	Mafic gneiss—p€ mg	40	90	10	5	—5	140	**50**	95	20	1	5	170		NO SAMPLE		
96	Mafic gneiss—p€ mg	80	95	10	5	—5	190	35	105	15	1	5	160		NO SAMPLE		
97	Mafic gneiss—p€ mg	50	55	10	3	—5	120	40	85	20	1	10	160		NO SAMPLE		
98	Mafic gneiss—p€ mg	30	45	5	5	—5	80	20	90	15	1	5	130		NO SAMPLE		
99	Sandstone—ℙ	20	20	10	5	5	60	35	110	25	2	**15**	190		NO SAMPLE		

* Possible contamination of rock sample.
A minus sign (—) is to be read "less than" and a plus sign (+) "greater than."
Anomalous values are given in boldface numbers.

TABLE 1. ASSAY RESULTS FROM ROCK, SOIL, AND PLANT SAMPLING (cont)

SAMPLE		ROCK SAMPLES						SOIL SAMPLES						PLANT SAMPLES			
NO.	ROCK FORMATION	CU	ZN	PB	MO	AS	TOTAL	CU	ZN	PB	MO	AS	TOTAL	CU	ZN	PB	TOTAL
100	Granite—p€gr	20	50	10	4	—5	80	30	90	20	2	5	150		NO SAMPLE		
101	Migmatite—p€mm	60	100	15	4	5	180	**50**	135	35	2	5	230		NO SAMPLE		
102	Mafic gneiss—p€mg	75	80	15	2	10	180	**75**	115	25	**6**	5	230		NO SAMPLE		
103	Mafic gneiss—p€mg	60	**140**	15	3	10	230	**115**	130	30	1	5	**280**		NO SAMPLE		
104	Migmatite—p€mm	40	90	10	3	10	150	20	105	20	4	5	150		NO SAMPLE		
105	Mafic gneiss—p€mg	75	110	10	3	5	200	30	85	20	2	10	150		NO SAMPLE		
106	Granite—p€gr	25	50	10	4	10	100	20	100	15	4	5	140	5	35	0	40
107	Latite—Tl	40	30	10	6	—5	90	30	80	20	4	10	140		NO SAMPLE		
108	Mafic gneiss—p€mg	60	35	10	5	—5	110	40	85	25	3	5	160	—5	35	0	35
109	Granite—p€gr	45	35	15	6	—5	100	40	90	15	2	5	150		NO SAMPLE		
110	Mafic gneiss—p€mg	**150**	**310**	20	2	—5	**480**	**80**	**175**	20	3	5	**280**		NO SAMPLE		
111	Latite—Tl	55	95	10	7	5	170	35	100	30	3	5	170		NO SAMPLE		
112	Rhyolite—Tr	20	40	**60**	4	—5	120	15	75	20	2	5	120		NO SAMPLE		
113	Granite—p€gr	45	55	10	7	10	130	40	85	15	3	5	150		NO SAMPLE		
114	Granite—Tagr	60	55	10	4	—5	130	35	90	20	3	5	150		NO SAMPLE		
115	Mafic gneiss—p€mg	40	55	10	4	5	110	**65**	75	25	4	5	170		NO SAMPLE		
116	Latite—Tl	35	70	15	2	—5	120	20	65	15	3	—5	100	—5	10	0	10
117	Rhyolite—Tr	30	70	20	4	—5	120	20	80	25	1	5	130	—5	10	**20**	30
118	Mafic gneiss—p€mg	40	65	15	3	—5	120	20	55	20	5	—5	100	—5	15	0	15
119	Granite—p€gr	15	40	15	3	5	80	25	70	20	5	5	120	—5	—5	0	5
120	Granite—p€gr	15	20	10	3	10	60	15	50	15	4	5	90	—5	40	—5	40
121	Andesite—Ta	20	60	20	2	10	110	25	60	20	1	5	110	—5	20	0	20
122	Granite—p€gr	40	70	10	3	10	130	25	115	20	3	5	170	—5	—5	0	5
123	Andesite—Ta	50	85	20	5	10	170	20	65	15	3	10	110	—5	45	**20**	65
124	Latite—Tl	35	75	20	3	5	140	20	60	15	1	5	100	—5	5	0	5
125	Latite—Tl	80	80	20	6	5	190	20	70	15	4	10	120	—5	5	0	5
126	Latite (propyl. alter.)—Tl	30	20	15	**10**	5	80	**120**	75	**80**	4	**15**	**290**	—5	5	0	5
127	Mafic gneiss—p€mg	50	40	15	5	5	110	20	40	10	2	5	80	—5	40	0	40
128	Latite—Tl	30	85	20	5	5	140	35	105	25	3	10	180	0	25	0	25
129	Andesite—Ta	30	60	15	2	5	110	20	75	25	3	10	130	—5	25	**15**	40
130	Andesite—Ta	40	80	15	4	5	140	30	130	25	3	5	190		NO SAMPLE		
131*	Andesite—Ta	50	60	10	**26**	—5	150	25	80	15	2	10	130	5	30	0	35
132	Latite—Tl	30	85	10	2	5	130	20	100	25	1	5	150	—5	25	0	25
133	Andesite—Ta	45	85	15	4	10	160	30	70	15	2	5	120	0	5	0	5
134	Latite—Tl	40	75	20	4	5	140	25	90	15	3	10	140		NO SAMPLE		
135	Latite (propyl. alter.)—Tl	15	15	15	3	10	60	20	70	30	3	10	130	—5	15	0	15
136	Granite—p€gr	40	50	10	8	10	120	**50**	130	**45**	**20**	5	**250**		NO SAMPLE		
137	Mafic gneiss—p€mg	40	65	15	4	10	130	**55**	**200**	**110**	5	5	**370**	0	60	**15**	**75**
138	Mafic gneiss—p€mg	20	95	15	5	—5	130	**50**	75	20	4	5	150	10	5	0	15
139	Metaquartzite—p€q	30	55	20	2	10	120	20	75	20	4	5	120		NO SAMPLE		
140	Granite—p€gr	20	40	15	2	5	80	20	110	20	4	5	**260**	5	25	0	30
141	Andesite—Ta	50	70	10	1	5	140	**45**	85	15	4	5	150	—5	10	—5	10
142	Andesite—Ta	40	70	15	4	—5	130	25	75	20	3	5	130	—5	20	0	20
143	Latite—Tl	60	70	15	3	10	160	40	95	20	3	5	160		NO SAMPLE		
144	Sandstone—IP	70	**130**	25	4	5	230	40	90	20	2	10	160		NO SAMPLE		
145	Sandstone—IP	30	**195**	25	2	10	**260**	20	100	15	2	10	150	10	20	0	30
146	Sandstone—IP	20	40	10	4	5	80	35	85	20	2	5	150		NO SAMPLE		
147	Sandstone—IP	45	10	5	7	10	80	25	50	20	1	10	110	5	10	0	15
148	Sandstone—IP	30	20	10	3	5	70	25	60	15	2	10	110	10	5	0	15

* Possible contamination of rock sample.
A minus sign (—) is to be read "less than" and a plus sign (+) "greater than."
Anomalous values are given in boldface numbers.

TABLE 1. ASSAY RESULTS FROM ROCK, SOIL, AND PLANT SAMPLING (cont)

SAMPLE		ROCK SAMPLES						SOIL SAMPLES						PLANT SAMPLES			
NO.	ROCK FORMATION	CU	ZN	PB	MO	AS	TOTAL	CU	ZN	PB	MO	AS	TOTAL	CU	ZN	PB	TOTAL
196	Granite—p Є gr	60	65	10	6	5	150	25	90	25	3	5	150	5	25	0	30
197	Mafic gneiss—p Є mg	**110**	80	5	3	5	200	**45**	125	25	3	5	200	10	10	0	20
198	Latite (propyl. alter.)—Tl	85	75	10	**8**	10	190	**110**	140	**80**	**13**	10	**350**	5	15	0	20
199	Andesite (hydroth. alter.)—Ta	**200**	115	10	**9**	10	**340**	**230**	115	**270**	**58**	10	**680**	10	50	5	65
200	Granite—Tagr	35	15	5	6	—5	60	**80**	**270**	**90**	**34**	—5	**470**	5	25	0	30
201	Latite (propyl. alter.)—Tl	40	75	20	4	5	140	**50**	80	**150**	**7**	5	**290**	10	5	—5	15
202	Latite—Tl	30	65	10	3	—5	110	35	**160**	**70**	5	10	**280**	10	25	0	35
203	Latite—Tl	60	60	15	8	—5	140	35	80	35	5	**15**	170	—5	20	0	20
204	Andesite—Ta	40	75	5	4	—5	120	40	85	20	2	5	150	—5	—5	0	5

A minus sign (—) is to be read "less than" and a plus sign (+) "greater than."
Anomalous values are given in boldface numbers.

EXPLANATION

Metal content in American Aspen samples

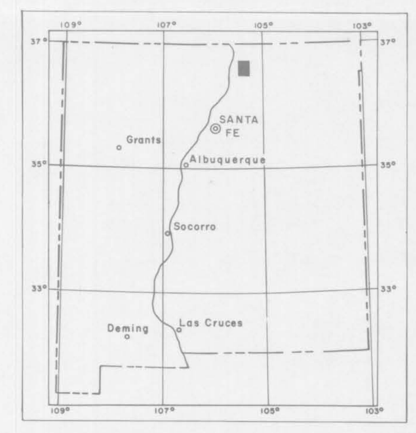
Zn — 70 parts per million

Pb — 10 parts per million

Cu — 15 parts per million

Total metal content >70 parts per million

The number on the map is the sample number
Assay values are given in Table 1



INDEX MAP OF NEW MEXICO

Base and topography adapted by Kenneth F. Clark
from U. S. Geological Survey Advance proofs.

Geochemistry by F. L. Misaqi, 1967

BIOGEOCHEMICAL MAP OF THE
EAGLE NEST FIFTEEN MINUTE QUADRANGLE, NEW MEXICO
PLANT SAMPLING

Scale 1:48,000

1 0 1 2 3 MILES

Contour interval 500 FEET

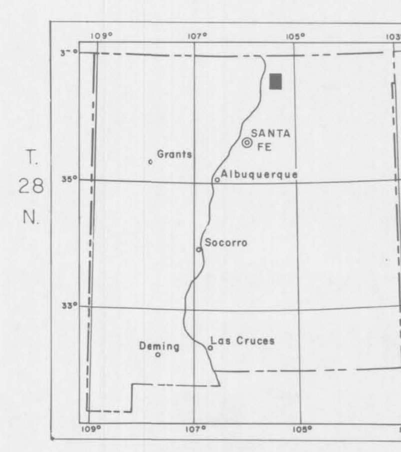
EXPLANATION

Metal content in soil samples

Pb	□	■
	40 parts per million	
Zn	△	▲
	140 parts per million	
As	○	●
	10 parts per million	
Mo	☼	✸
	5 parts per million	
Cu	◇	◆
	40 parts per million	

◯ Total metal content >250 parts per million

The number on the map is the sample number. Assay values are given in Table 1



INDEX MAP OF NEW MEXICO

Base and topography adapted by Kenneth F. Clark from U. S. Geological Survey Advance proofs.

Geochemistry by F. L. Misaqi, 1967

GEOCHEMICAL MAP OF THE EAGLE NEST FIFTEEN MINUTE QUADRANGLE, NEW MEXICO SOIL SAMPLING

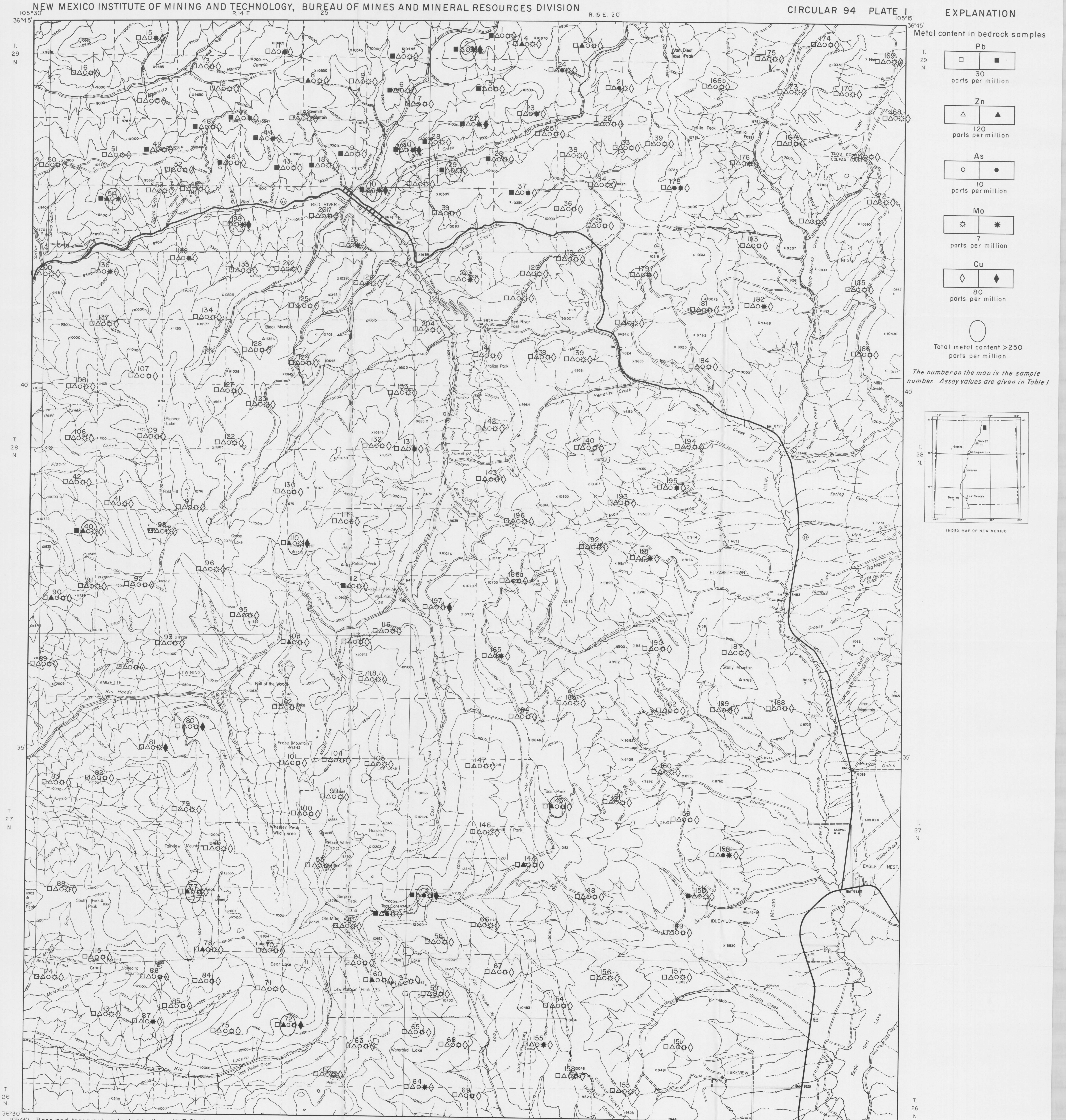
Scale 1:48,000

1 0 1 2 3 MILES

Contour interval 500 FEET

NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY, BUREAU OF MINES AND MINERAL RESOURCES DIVISION

CIRCULAR 94 PLATE I



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Geochemistry by F.L. Misaqi, 1967

GEOCHEMICAL MAP OF THE EAGLE NEST FIFTEEN MINUTE QUADRANGLE, NEW MEXICO BEDROCK SAMPLING

Scale 1:48,000

1 0 1 2 3 MILES

Contour interval 500 FEET