UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

A GEOCHEMICAL SURVEY USING HEAVY MINERAL CONCENTRATES IN THE MOUNT BELKNAP CALDERA VICINITY, UTAH

by

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ABSTRACT

Geochemical surveys of the rocks, heavy-mineral concentrates, and surface and spring waters in the vicinity of the Mount Belknap caldera, Tushar Mountains, west-central Utah, were conducted during the summers of 1978 and 1979. Anomalous concentrations of mostly lithophile elements, particularly niobium, beryllium, lead, yttrium, tin, zinc, manganese, and molybdenum in the magnetic and nonmagnetic fraction of heavy-mineral concentrates derived from stream sediment suggest that late stage, highly differentiated felsic rocks were involved in the eruptive history of the Mount Belknap caldera.

Q-mode factor analysis was used to characterize the geochemical assemblages within the survey area, and the areal distribution of high-factor scores associated with mineralization indicates favorable target areas for future exploration. The results of these studies indicate that porphyry-type molybdenum and possible associated vein-type uranium mineralized deposits may exist in or near the Mount Belknap caldera.

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INTRODUCTION

The Mount Belknap caldera is located in the Tushar Mountains of west-central Utah, approximately 20 km (12 miles) northeast of Beaver, Utah (figure 1). The study area covers approximately 1,420 square kilometers (550 square miles). The rocks in the area are predominantly rhyolitic Mount Belknap Volcanics and the older intermediate composition Bullion Canyon Volcanics. The area contains several monzonitic to granitic intrusions. Mesozoic and Paleozoic sedimentary rocks are exposed along the eastern margin of the Tushar Mountains near Marysvale. The higher elevations are cut by deep canyons and perennial streams flow in the higher elevations. Stream sediments were collected from unbranched streams, from basins with predominantly one rock type, during the summer of 1978. Geochemical studies of water (Tucker and others, 1980), rocks (R. E. Tucker and others, 1981), and stream-sediment concentrates were conducted in the vicinity of the Mount Belknap caldera to evaluate the possibility of porphyry-type molybdenum and possible associated vein-type uranium deposits in the area.

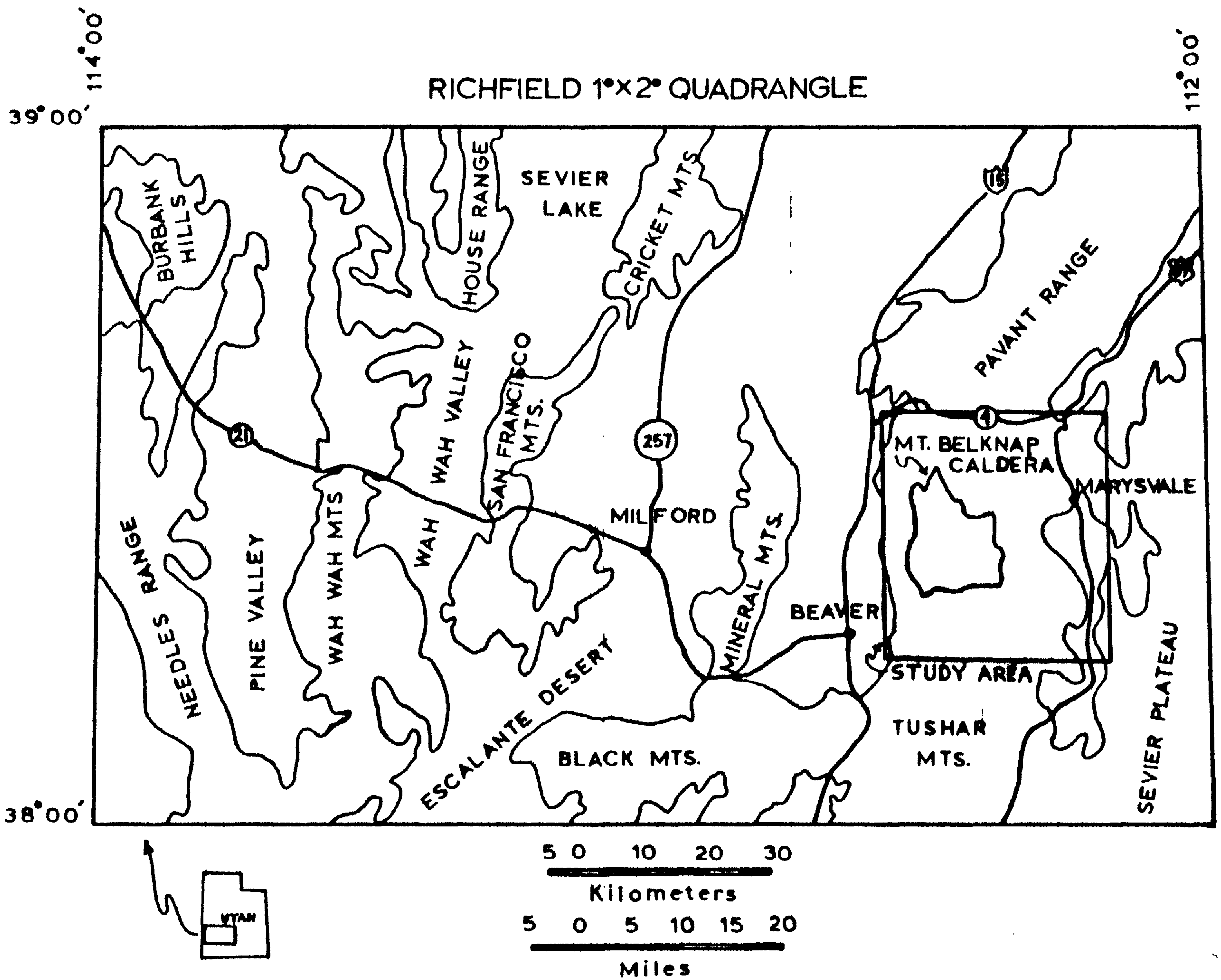


Figure 1.--Index map of the Mount Belknap caldera survey area.

GENERAL GEOLOGY

The Marysvale volcanic field is located in the High Plateaus between the Colorado Plateau and the Basin and Range Province. The Mount Belknap caldera covers an area of approximately 190 square kilometers (75 square miles), within the Tushar Mountains (Cunningham and Steven, 1979d). Paleozoic and Mesozoic limestones and sandstones underlie the volcanic rocks and are exposed along the eastern face of the Tushar Mountains, east of the Mount Belknap caldera. The Bullion Canyon Volcanics unconformably overlie the sedimentary rocks and consist of intermediate composition lava flows, ash-flow tuffs, and related volcano-clastic deposits that erupted between 35 and 22 m.y. ago (Steven, Cunningham, Naeser, and Mehnert, 1978). The Mount Belknap Volcanics overlie the Bullion Canyon Volcanics and was extruded between 22 and 16 m.y. ago (Steven, Cunningham, Naeser, and Mehnert, 1978). Basin and Range faulting probably began about the time of the change over to Mount Belknap Volcanics (Steven, Cunningham, and Rowley, 1978). The volcanic activity of the area is summarized in Table 1. Ages are based on fission-track data for zircon and apatite, and K-Ar ages for alunite, natroalunite, biotite, plagioclase, and sanidine (Steven, Cunningham, and Rowley, 1978). A generalized geologic map of the Mount Belknap caldera and vicinity is given in figure 2. A more complete discussion of the volcanic units in the area is in Cunningham and Steven (1978a, 1979a, 1979b, 1979c, 1979d, 1979e, and 1980), Steven (1977), Steven, Cunningham, Naeser, and Mehnert (1978), Steven and Cunningham (1980), McNair (1951), and Fleck, Anderson, and Rowley (1975).

Mining in the Marysvale area began in 1868 when gold was discovered in Bullion Canyon. A summary of the sporadic mining activity since then is given in Table 2.

Table 1.--Summary of volcanic activity

20 m.y. to present--	Basin and Range extensional tectonism and faulting; some episodic rhyolitic and basaltic volcanism.
22-16 m.y. ago------	Mount Belknap Volcanics--silicic alkalic rhyolitic lava flows, ash flow tuffs, and volcanoclastic deposits and associated intrusive rocks.
About 23 m.y. ago---	Quartz monzonite stocks intrude Bullion Canyon Volcanics.
35-22 m.y. ago------	Bullion Canyon Volcanics--Intermediate composition lava flows, volcanic breccia, ash flow tuffs and volcanoclastic deposits.

Figure 2.--Generalized geologic map of the Mount Belknap caldera area, Utah. The heavy line designates the outline of the Mount Belknap caldera.

DESCRIPTION OF MAP UNITS

Qa ALLUVIAL DEPOSITS (HOLOCENE)--Silts, sands, and gravels in alluvial fans, alluvial slope wash, and stream alluvium

Ts SEVIER RIVER FORMATION, LOWER PART (PLIOCENE AND MIOCENE)--Fluviatile gravels, sands, and silts, with interlayered ash-fall tuffs

MOUNT BELKNAP VOLCANICS (MIOCENE)

Tmi Intrusive rocks--Several small porphyritic quartz latitic to rhyolitic stocks containing scattered phenocrysts of quartz, plagioclase, and sanidine in a finely granular mossic of alkali feldspar and quartz

Tmg Gray Hills Rhyolite Member--Light-gray, spherulitically devitrified alkali-rhyolite lava flows containing sparse sanidine phenocrysts. Contorted flow layering is characteristic

Tmc Crystal-rich Member--Welded alkali rhyolite ash-flow tuff: contains 30 percent phenocrysts of the following: quartz (3 percent), anorthoclase (24 percent), plagioclase (2 percent), and biotite (1 percent). K-Ar age is 18.5 ± 1.2 m.y. (Steven and others, 1977)

Tmr Red Hills Tuff Member--Crystal-poor, welded, white and red alkali-rhyolite ash-flow tuff containing 7-8 percent phenocrysts of anorthoclase, quartz, sodic plagioclase, and minor biotite

Tmj Joe Lott Tuff Member--Crystal-poor welded alkali rhyolite ash-flow tuff containing about 1.5 percent phenocrysts of quartz, plagioclase, and sanidine, with traces of biotite

Tmb Mount Baldy Rhyolite Member--Crystal-poor rhyolite lava flows consisting largely of a fine granular mosaic of quartz and alkali feldspar, and minor plagioclase, biotite, and hematite. Contorted flow layers are common

Tmv Volcaniclastic rocks--Dominantly laharic mud-flow breccias from nearby lava flows of the Mount Baldy Rhyolite Member (Tmb). Some landslide debris and fluviatile sands and gravels are included

Tmm Middle Tuff member--Crystal-poor rhyolite welded ash-flow tuff, closely similar to that in the outflow Joe Lott Member (Tmj)

Tmbl Blue Lake Rhyolite Member--Crystal-poor rhyolite flows, closely similar to those in the Mount Baldy Rhyolite Member (Tmb)

To OSIRIS TUFF (MIOCENE)--Gray and reddish-brown, densely welded, crystal-rich ash-flow tuff phenocrysts consist of andesine (25 percent), biotite (2 percent), and 1 percent each of sanidine, pyroxene, and Fe-Ti oxides. K-Ar age is about 22 m.y. (Fleck and others, 1975).

BULLION CANYON VOLCANICS (MIOCENE AND OLIGOCENE)

Tbi Intrusive rocks--Strongly porphyritic to equigranular, fine- to medium-grained quartz monzonite, containing approximately equal proportions of plagioclase and orthoclase, as much as 30 percent quartz, plus augite, hornblende, and biotite. Minor accessory minerals are apatite, zircon, and Fe-Ti oxides.

Tbu Upper Member--Mostly rhyodacite to andesite lava flows and local ash-flow tuffs

Tbd Delano Peak Tuff Member--Densely welded crystal-rich quartz latite ash-flow tuff containing phenocrysts of plagioclase (32 percent), hornblende (9 percent), Fe-Ti oxide minerals (4 percent), and less than 1 percent each of quartz, biotite, and apatite

Tmb Middle Member--Mostly light-gray and brown rhyodacite lava flows, flow breccia, and volcanic mud-flow breccia that lie between the overlying Delano Peak Tuff Member (Tbd) and underlying Three Creeks Tuff Member (Tbt)

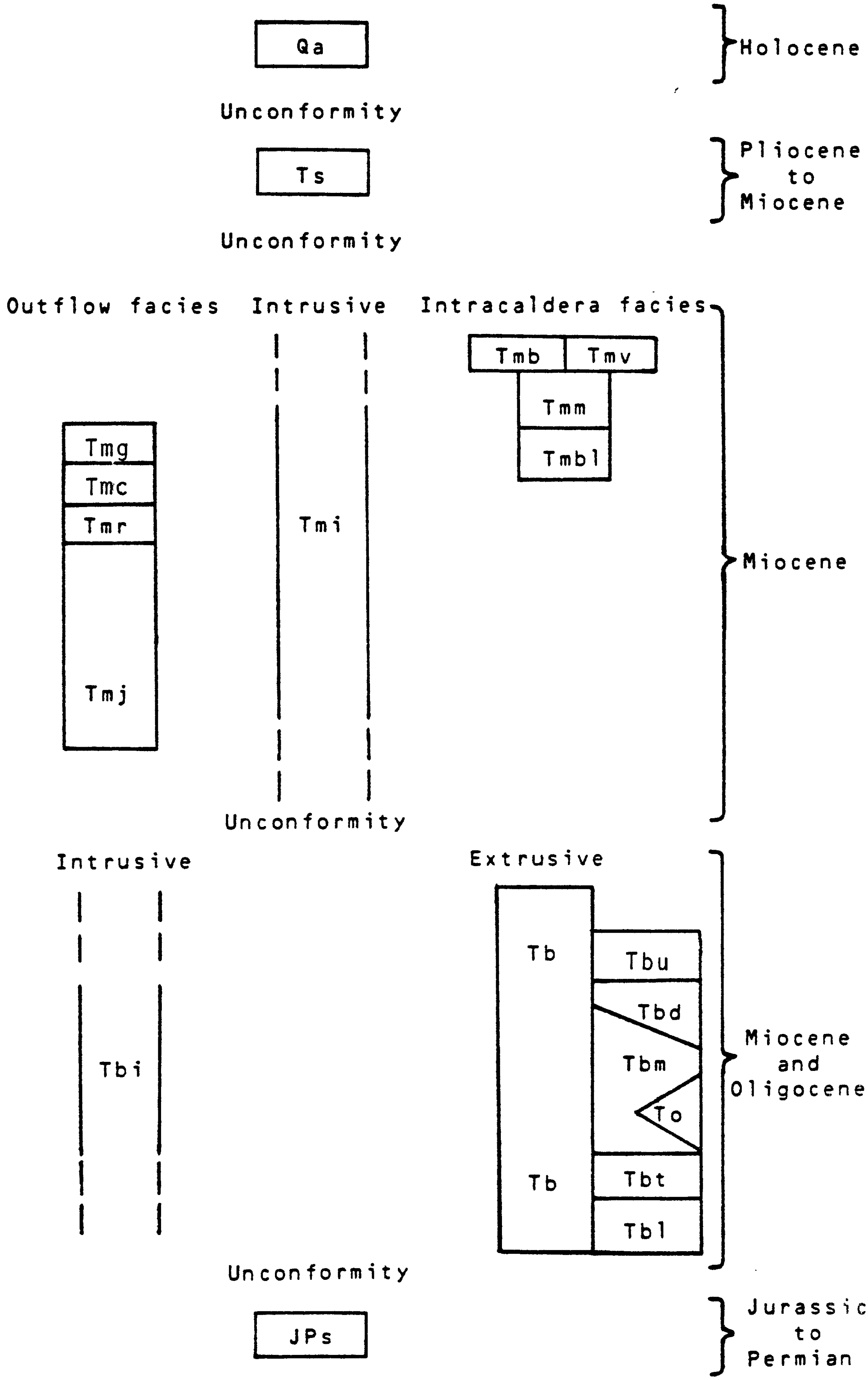
Tbt Three Creeks Tuff Member (Oligocene)--Densely welded light-gray and brown, crystal-rich quartz latite ash-flow tuff containing phenocrysts of plagioclase (35 percent), hornblende (9 percent), biotite (3 percent), and quartz (2 percent). Fe-Ti oxide minerals, sanidine, and other accessory minerals occur in traces. K-Ar age is 27 m.y. (Steven, Cunningham, Naeser, and Mehnert, 1978)

Tbl Lower Member--Mostly volcanic mud-flow breccia, flow breccia, and tuffaceous sedimentary rocks that occur below the Three Creeks Tuff Member (Tbt)

Tb Heterogeneous lava flows and volcanic breccias--Range from thick porphyritic rhyodacite and quartz latite flows containing phenocrysts of plagioclase, biotite, and clinopyroxene, to fine-grained dark lava flows and breccias of intermediate composition, with small phenocrysts of plagioclase and clinopyroxene

UNDIVIDED JURASSIC, TRIASSIC, AND PERMIAN SEDIMENTARY ROCKS

JPS Includes the Jurassic Arapien Formation, Jurassic, and Triassic Navajo Sandstone, Triassic Chinle Formation and its Shinarump Member, at the base are Moenkopi Formation, Permian Kaibab Limestone, Toroweap Formation, and the Queantoweap Sandstone of McNair (1951)



Correlation of map units.

Table 2.-- Mining history

Year	History
1868	Precious and base-metal discoveries in Bullion Canyon. Manto deposits in Mesozoic sediments.
1890	Small gold and silver deposits discovered throughout Tushar Mountains.
1900	Kimberly deposits developed, richest precious metal deposits in the region.
1910	Alunite discovered, mined for potash during World War 1 and aluminum during World War 11.
1949	Uranium discovered in vein deposits north of Marysvale.
Present	Sporadic mining in the region, however, exploration for uranium, porphyry molybdenum deposits, precious and base metals is being actively pursued.

SAMPLING DESIGN, COLLECTION, AND ANALYTICAL TECHNIQUES

The stream-sediment samples were collected during a regional survey of the Richfield 1° x 2° quadrangle in the summer of 1978 (figure 3). The stream-sediment sampling was conducted on a 4-level unbalanced hierarchical design. The 7 1/2-minute quadrangle maps of the survey area were divided into 7.8 square kilometers (3 square mile) cells. Within each cell, an unbranched stream was selected for sampling preferably with a drainage basin less than 2.6 square kilometers (1 square mile). This sample represents level 1 of the sampling design and defines the regional variations. Level 2 of the sampling design is represented by a duplicate sample within a given cell, collected from a stream draining a basin within the original cell, defined as cell variance. Level 3 of the sampling design is represented by samples collected approximately 30 m (100 ft) upstream of the original site sample, defined as the drainage variance. Level 4 of the sampling design is represented by duplicate analysis of a particular sample. Figure 4 is a graphical representation of the sampling design and dendogram.

Each stream-sediment sample consisted of a composite sample weighing approximately 4.5-7.0 kg (10-15 lbs). The sediment was screened with a 6.4 mm (0.25 in) sieve to remove large rock fragments. The sediment was panned to remove the bulk of the common rock-forming minerals, such as feldspar, quartz, and calcite (Theobald and Thompson, 1959). The concentrate was dried and sieved to minus-18-mesh. Magnetite was removed with a hand magnet. The concentrate was separated using bromoform which has a specific gravity of 2.86; Common rock-forming minerals, such as feldspar and quartz, which have a density less than 2.86 were removed. The heavy fraction contains minerals such as sphene, barite, biotite, and hornblende. The minerals were then separated on the basis of magnetic susceptibility using a Frantz isodynamic separator (Flinter, 1959; Hess, 1956; Nickel, 1968, 1969). Table 3 lists some of the more commonly encountered heavy minerals and the ranges of magnetic susceptibility. The varying susceptibility depends primarily on the degree of paramagnetism exhibited by the mineral, which can reflect the amount of substitution into the crystal lattice by ions such as Fe^{+2} (McAndrew, 1957; Rosenblum, 1958; Hurlbut, 1971). The Frantz isodynamic separator used forward and side angles of 15 degrees. At the 0.2 ampere setting, a magnetic and a nonmagnetic fraction or split was collected. The magnetic split at the 0.2 amperage was discarded because it is primarily magnetite and(or) illmenite. The nonmagnetic split was run again through the Frantz isodynamic separator at a 0.6 amperage. The magnetic split at 0.6 amperage contains minerals such as biotite, sphene, pyroxene, hornblende, garnet, and(or) illmenite. The nonmagnetic split at 0.6 amperage contains minerals such as topaz, some sulfates, carbonates, sulfides sphene, rutile, or hematite. The two splits were pulverized in an agate crucible and analyzed with a 6-step, d.c.-arc semiquantitative emission spectrograph for 30 elements. All values are reported as 6-steps per order of magnitude, 1.5, 2, 3, 5, 7, 10, or multiples of 10 (Motooka, McHugh, and Miller, 1979). This scheme approximates the geometric midpoints of the concentration ranges (Motooka and Grimes, 1976). The analytical results of the magnetic and nonmagnetic fraction are given in Appendix 1 and 2, respectively. Appendix 3 lists the elements by sample site for both fractions, which have fewer than 20 reported values. Tables 4 and 5 give a summary of the analytical results for the magnetic and nonmagnetic fractions, respectively.

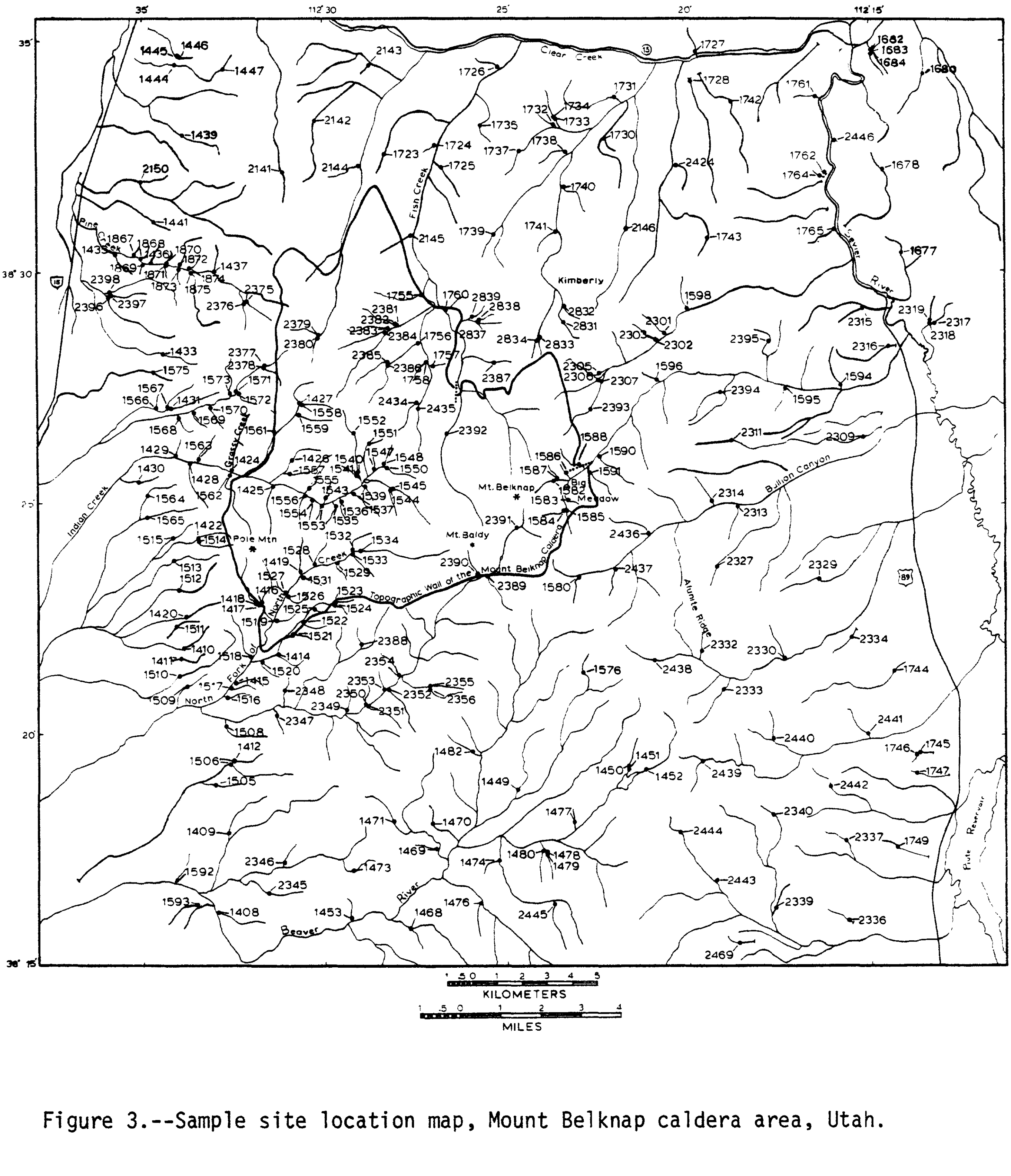


Figure 3.--Sample site location map, Mount Belknap caldera area, Utah.

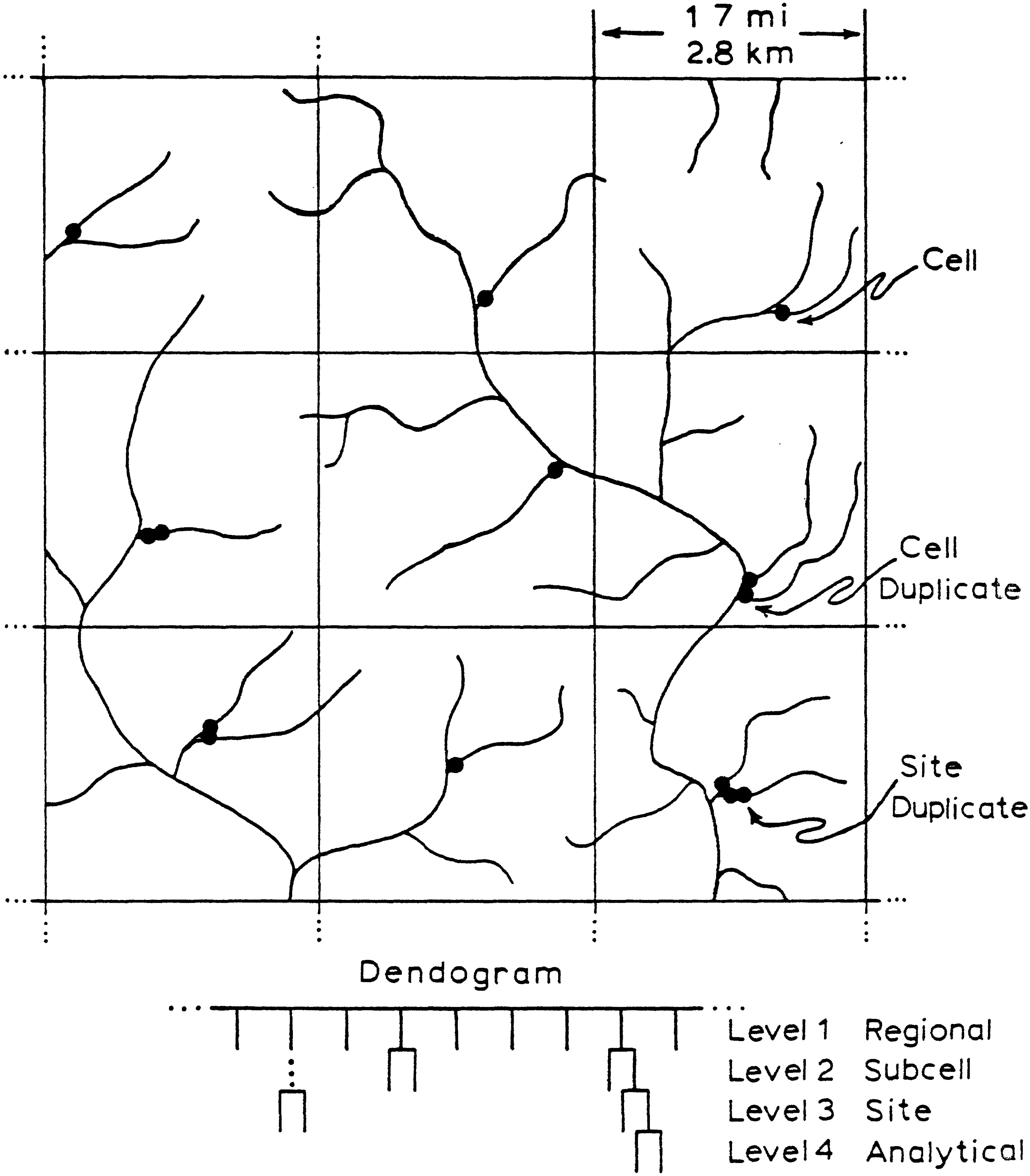


Figure 4.--Graphical representation of the sampling design and dendogram.

Table 3.--Some common minerals arranged in groups based on magnetic susceptibility

AMPERAGE

Greater than 0.1	0.2 - 0.4	0.4 - 0.6	0.6 - 0.8	0.8 - 1.0	1.0 - 1.2	Non-magnetic at 1.2
Magnetite	Allanite	Actinolite	Bornite	Cassiterite	Cassiterite	Anatase
Pyrrhotite	Andradite	Allanite	Calcite	Chalcopyrite	Chalcocite	Anhydrite
	Barkevikite	Augite	Cassiterite	Microlite	Chalcopyrite	Apatite
	Biotite	Biotite	Diopside	Monazite	Clinozoisite	Arsenopyrite
	Chloritoid	Epidote	Forsterite	Muscovite	Covellite	Barite
	Chromite	Euxenite	Hematite	Pyrochlore	Diopside	Beryl
	Columbite	Forsterite	Malacon	Rutile	Enstatite	Brookite
	Fayalite	Gahnite	Monazite	Sphene	Kyanite	Corundum
	Fe-chlorites	Hornblende	Muscovite	Tennantite	Muscovite	Feldspars
	Hypersthene	Idocrase	Rutile	Tetrahedrite	Rutile	Fluorite
	Ilmenite	Mg-chlorites	Sphene	Thorianite	Sillimanite	Kyanite
	Melanite	Perovskite	Thorianite	Tourmaline	Sphene	Leucoxene
	Riebeckite	Sphene	Thorite		Staurolite	Marcasite
	Stilpnomelane	Staurolite	Uraninite		Tennantite	Molybdenite
		Tourmaline			Tetrahedrite	Muscovite
		Xenotime			Thorianite	Pyrite
					Thorite	Quartz
					Tourmaline	Rutile
					Zircon	Scheelite
					Zoisite	Sillimanite
						Topaz
						Zircon

These values are given for settings of 25°- 30° forward slope and 15°- 20° side slope.
After R.W. Boyer 3/27/63

Table 4.--Summary of the analytical results for the magnetic fraction.

Element *	Minimum	Maximum	Mean	Geometric mean	Deviation	Geometric deviation	Valid **	L **	N **	G **
Fe .1%	3	50	31.2	28.1	12.9	1.63	262	0	0	2
Mg .05%	0.1	10	2.06	1.32	2.18	2.52	264	0	0	0
Ca .1%	0.1	7	1.93	1.50	1.45	2.05	264	0	0	0
Ti .005%	0.3	2	1.41	1.31	.480	1.51	70	0	0	194
Mn 20ppm	300	10000	4580	3740	2810	1.94	201	0	0	63
B 20ppm	20	150	34.3	29.5	24.1	1.64	174	88	2	0
Ba 50ppm	70	10000	801	565	884	2.27	264	0	0	0
Be 2ppm	2	150	13.5	7.98	18.6	2.63	183	65	16	0
Co 10ppm	10	200	77.9	66.3	37.9	1.91	247	2	15	0
Cr 20ppm	20	3000	375	271	316	2.37	264	0	0	0
Cu 10ppm	10	1000	92.7	72.3	82.8	2.05	264	0	0	0
La 50ppm	50	2000	344	261	306	2.07	260	0	2	2
Mo 7ppm	7	300	39.0	21.6	54.8	2.71	162	0	102	0
Nb 50ppm	50	5000	289	145	504	2.89	176	68	17	3
Ni 10ppm	10	500	82.3	66.3	60.2	1.96	222	0	42	0
Pb 20ppm	20	10000	403	184	811	3.30	262	1	1	0
Sn 15ppm	20	700	180	140	118	2.23	48	0	216	0
Sr 200ppm	200	5000	427	345	465	1.78	133	62	69	0
V 20ppm	100	2000	563	485	288	1.81	264	0	0	0
Y 20ppm	20	1000	148	120	119	1.83	264	0	0	0
Zn 300ppm	300	5000	873	709	653	1.86	171	0	93	0
Zr 20ppm	70	2000	725	568	504	2.07	253	0	0	11

* concentration is the detection limit

** Valid, number of samples without qualified data; L, concentration less than the lowest standard; N, no detectable concentration; G, concentration greater than the highest standard

Table 5.--Summary of the analytical results for the nonmagnetic fraction.

Element *	Minimum	Maximum	Mean	Geometric mean	Standard Deviation	Geometric deviation	Valid **	L **	N **	G **
Fe .1%	.7	50	5.52	4.03	5.32	2.17	263	0	0	0
Mg .05%	.1	15	1.68	.928	2.21	2.87	263	0	0	0
Ca .1%	.15	30	4.83	3.42	4.00	2.44	263	0	0	0
Ti .005%	.2	2	1.40	1.23	.573	1.80	124	0	0	139
Mn 20ppm	200	10000	2910	2050	2780	2.23	251	0	0	12
B 20ppm	20	2000	91.2	61.6	144	2.27	241	18	4	0
Ba 50ppm	50	10000	1870	879	2640	3.32	234	0	0	29
Be 2ppm	2	100	11.5	7.08	15.3	2.57	193	56	14	0
Bi 15ppm	15	2000	152	49.3	392	3.53	26	0	235	2
Co 10ppm	10	150	23.3	18.3	21.8	1.87	155	25	83	0
Cr 20ppm	20	3000	327	169	427	3.16	258	5	0	0
Cu 10ppm	10	1000	51.7	27.9	119	2.48	176	69	18	0
La 50ppm	50	2000	597	481	393	2.00	262	0	0	1
Mo 7ppm	7	300	24.6	16.2	38.3	2.10	151	0	112	0
Nb 50ppm	50	1500	199	148	194	2.07	231	19	12	1
Ni 10ppm	20	700	82.7	55.4	103	2.34	103	0	160	0
Pb 20ppm	20	50000	522	154	3290	3.46	234	3	26	0
Sn 15ppm	15	2000	259	136	336	3.30	151	0	108	4
Sr 200ppm	200	7000	886	618	1100	2.20	220	21	21	1
V 20ppm	30	5000	220	164	331	1.99	262	0	0	0
W 70ppm	70	700	106	83.6	137	1.66	21	0	242	0
Y 20ppm	30	5000	518	351	614	2.28	255	0	0	8
Zn 300ppm	300	1500	672	614	290	1.54	67	0	196	0
Zr 20ppm	700	2000	1617	1620	438	1.37	28	0	3	232
Th 150ppm	150	5000	479	479	1120	2.87	158	0	104	1

* concentration is the detection limit

** Valid, number of samples without qualified data; L, concentration less than the lowest standard; N, no detectable concentration; G, concentration greater than the highest standard.

ANALYSIS OF VARIANCE

An analysis of variance (ANOVA) was conducted to determine how well a sample represents the chemical composition of the cell, and to determine the variability of the elements within the sampling design. A four-level ANOVA was used. The first level measures the variation between the cells or the regional variance. It is desirable to have the largest variance component in this level. Level 2 measures the variance within a cell, or how well a subcell sample represents the cell. Level 3 measures the variance between the sample site, or how well the sample represents the drainage basin. Level 4 measures the analytical variance.

The ANOVA results can be biased if an element has a significant number of values above or below the detection limits, being defined as qualified data. Values were substituted for qualified data on the following criteria: elemental concentrations that were detected, but less than the lowest standard were given a value equal to one spectrographic interval below the detection limit. Elemental concentrations that were not detected, were given values equal to three spectrographic intervals below the lowest standard, and elemental concentrations that were greater than the highest standard were given values one spectrographic interval above the highest standard. The data were logarithmically transformed prior to performing the analysis of variance (Miesch, 1976). Table 6 lists the samples used in the analysis of variance. Sample 2381 was deleted from the ANOVA for the magnetic fraction, due to insufficient material needed for chemical analysis.

Magnetic Fraction

The variance components for the magnetic fraction are given in Table 7, and a graphical representation is given in figure 5. Elements that contain more than a significant number of qualified data may contain bias in the variance components, but are listed for comparison. The F-test is used to determine if the variance observed between the various levels is significant at the 0.01 significance level. The test uses the hypothesis that the variances are equal; those levels with an * indicate that the hypothesis was not true.

The results of the ANOVA indicates that magnesium, calcium, manganese, barium, beryllium, chromium, lanthanum, molybdenum, niobium, nickel, lead, strontium, yttrium, zinc, and zirconium have significant variance at the 0.01 significance level (used in all levels) for level 1. This indicates that these elements have statistically significant regional variance within the survey area. Manganese, boron, cobalt, lanthanum, and strontium have significant variance components for level 2. Iron, chromium, copper, and vanadium have variance components greater than 20 percent for this level. This indicates a large variability occurs between the basins for these elements, which may reflect different rock types within the basins. Molybdenum and yttrium have significant variance components for level 3, however, the variance component for molybdenum is less than 10 percent of the total variance. Copper has a rather high variance component (17.32 percent) in this level. The ANOVA results indicate that only copper and yttrium have a large variability within a stream bed. Iron, magnesium, boron, copper, lanthanum, vanadium, zinc, and zirconium have variance components greater than 10 percent for level 4, which indicates that the analytical techniques were not satisfactory, or that there is little variance in the other levels (Hoffman and others, 1979). Many of the elements with a high variance in level 4 do have significant variance at the regional level, which tends to indicate the analytical methods are satisfactory for this type of a survey.

Table 6.--Duplicate samples used in analysis of variance

Randomly selected regional samples	Cell duplicates		Site duplicates	Analytical duplicates *
1409	1416	1747	1417	1446
1433	1417	1745	1418	1451
1441	1422	1762	1445	1479
1470	1514	1764	1446	1684
1477	1427	1867	1450	1734
1482	1558	1868	1451	1746
1559	1431	2301	1478	1762
1565	1567	2302	1479	2303
1680	1452	2317	1683	2319
1725	1450	2318	1684	2382
1728	1480	2355	1733	
1744	1478	2356	1734	
2339	1544	2379	1745	
2394	1545	2380	1746	
2395	1582	2383	2302	
2438	1587	2381	2303	
	1682	2385	2318	
	1683	2386	2319	
	1732	2833	2381	
	1733	2834	2382	

* Analytical duplicates were samples analyzed twice.

Table 7.--Variance components as percentages of total variance and the significance of F-ratios derived from the variance components, magnetic fraction.

Element	Hierarchical Level			
	Regional	Within cell	Site	Analytical
Fe -- 75*	36.16	39.59	0.00	24.24
Mg -- 76	80.16 **	7.11	0.32	12.41
Ca -- 76	77.96 **	9.45	7.82	4.77
Mn -- 58	49.35 **	44.22 **	0.00	6.43
B -- 47	21.44	53.65 **	0.00	24.91
Ba -- 76	73.56 **	17.84	0.00	8.59
Be -- 48	85.87 **	8.78	0.37	4.98
Co -- 72	29.76	62.04 **	3.42	7.78
Cr -- 76	61.91 **	21.62	10.06	6.41
Cu -- 76	40.43	28.74	17.32	13.51
La -- 75	47.43 **	41.35 **	0.00	11.23
Mo -- 38	89.41 **	0.24	9.17 **	1.18
Nb -- 46	93.42 **	3.42	1.29	1.87
Ni -- 67	76.11 **	16.84	4.56	2.50
Pb -- 75	84.11 **	12.13	0.72	3.04
Sr -- 41	55.63 **	35.48 **	2.33	6.56
V -- 76	42.30	37.25	0.00	20.45
Y -- 76	27.97 **	0.00	69.88 **	2.15
Zn -- 47	65.00 **	0.00	0.00	35.00
Zr -- 74	66.53 **	11.64	7.23	14.60

* Indicates the number of unqualified elemental concentrations.

** Indicates the difference between hierarchiacal levels is significant at the 0.01 significance level.

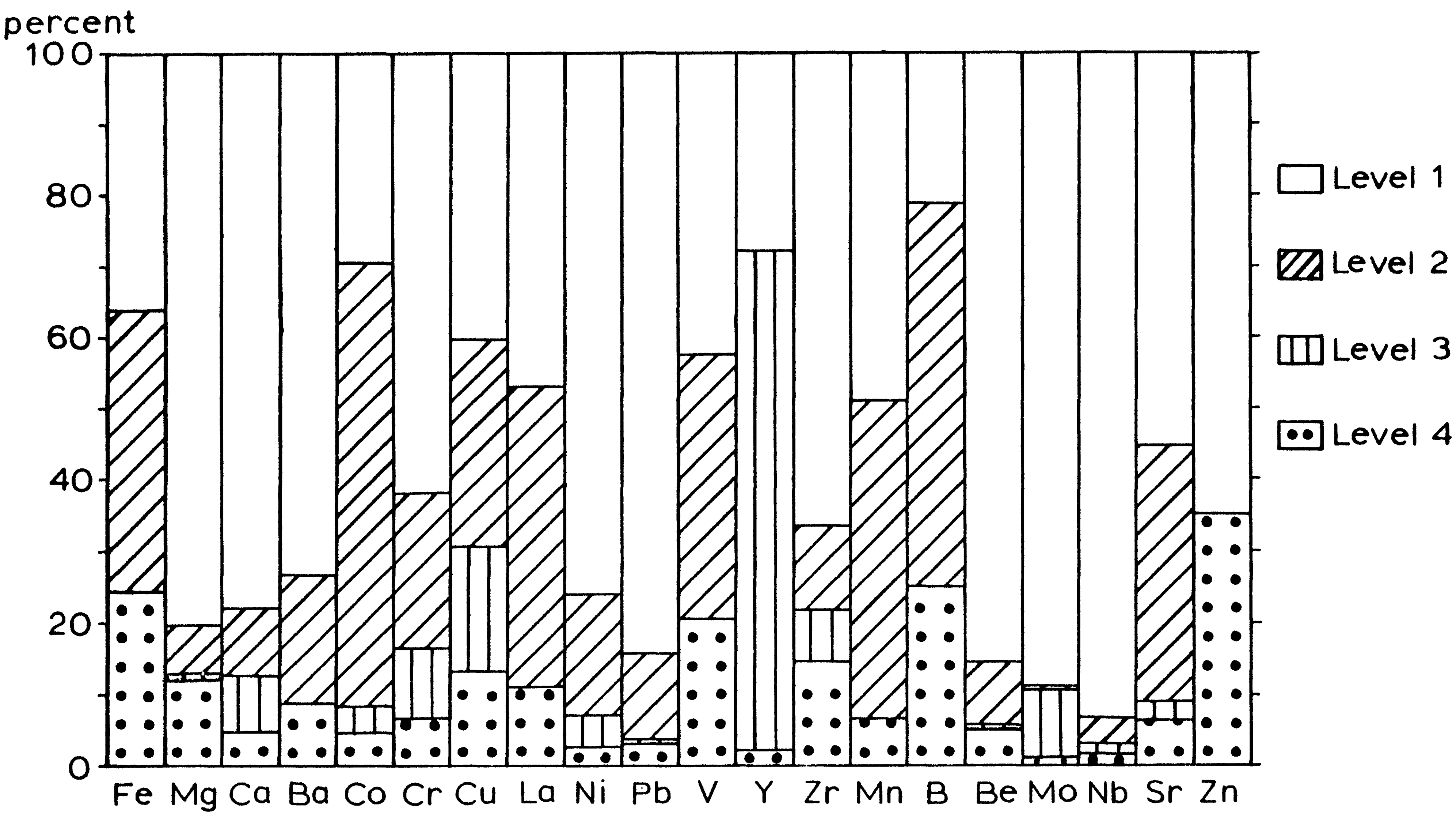


Figure 5.--Graphical representation of the variance components between the hierarchical levels for the magnetic fraction.

Nonmagnetic Fraction

The variance components for the nonmagnetic fraction are given in Table 8, and a graphical representation is given in figure 6. The results for the ANOVA indicate that magnesium, calcium, titanium, manganese, barium, beryllium, chromium, copper, lanthanum, molybdenum, niobium, strontium, vanadium, yttrium, zinc, and thorium have statistically significant variance at the 0.01 significance level (used for all levels) for level 1, or exhibit a regional variance. Only zinc has a significant variance in level 2, however, iron, titanium, boron, and cobalt have variance components greater than 20 percent. This indicates a large variability occurs between the basins within a cell for these elements. Copper, nickel, lead, and strontium have significant variance in level 3, however, the variance component for strontium is less than 10 percent. Molybdenum and vanadium have variance components greater than 20 percent in this level. Iron, calcium, boron, barium, cobalt, molybdenum, vanadium, yttrium, zinc, tin, and thorium have variance components greater than 10 percent in level 4. Most of these elements have significant variance in level 1, which indicates that the analysis techniques are adequate for this type of survey.

The high variance components for elements in level 3 (between site) may be caused by the nugget effect and suggests that the stream beds have segregations of heavy minerals within the sediment. This is of some concern when using stream-sediment concentrates as an exploration media, and points to the necessity of compositing a large sample over a large distance of the stream. The high variance components for yttrium in level 3 of the magnetic fraction and copper, nickel, and lead in the nonmagnetic fraction may warrant the exclusion of these elements from further statistical data analysis techniques. Elements that have more than 20 percent of the total variance in level 4 may also be excluded from further statistical data analysis due to the bias that can be introduced into the interpretation (Hoffman and others, 1979, Rutherford, 1979).

Table 8.--Variance components as percentages of total variance and the significance of F-ratios derived from the variance components, nonmagnetic fraction.

Element	Hierarchical Level			
	Regional	Within cell	Site	Analytical
Fe -- 77*	32.66	38.37	0.00	28.97
Mg -- 77	62.79 **	16.86	13.14	7.21
Ca -- 77	70.23 **	0.00	8.50	21.26
Ti -- 38	65.86 **	20.47	5.12	8.55
Mn -- 74	78.42 **	7.89	5.40	8.29
B -- 72	33.19	32.91	14.54	19.35
Ba -- 68	67.03 **	17.36	0.00	15.61
Be -- 53	88.61 **	4.05	0.00	7.34
Co -- 47	35.65	35.66	0.00	28.68
Cr -- 77	71.78 **	14.17	6.98	7.07
Cu -- 46	63.39 **	0.00	31.24 **	5.37
La -- 76	69.30 **	7.11	16.05	7.55
Mo -- 38	53.46 **	4.54	21.22	20.79
Nb -- 65	80.73 **	10.17	4.46	4.64
Ni -- 33	39.89	0.00	52.34 **	7.78
Pb -- 66	43.08	9.47	44.03 **	3.42
Sr -- 64	86.17 **	2.34	9.04 **	2.45
V -- 77	63.76 **	2.28	20.11	13.85
Y -- 77	76.64 **	7.63	0.00	15.73
Zn -- 20	67.30 **	17.85 **	0.00	14.85
Sn -- 43	45.51	16.40	0.95	37.13
Th -- 39	48.61 **	0.00	14.55	36.85

* Indicates the number of unqualified elemental concentrations

** Indicates the difference between hierarchical levels is significant at the 0.01 significance level.

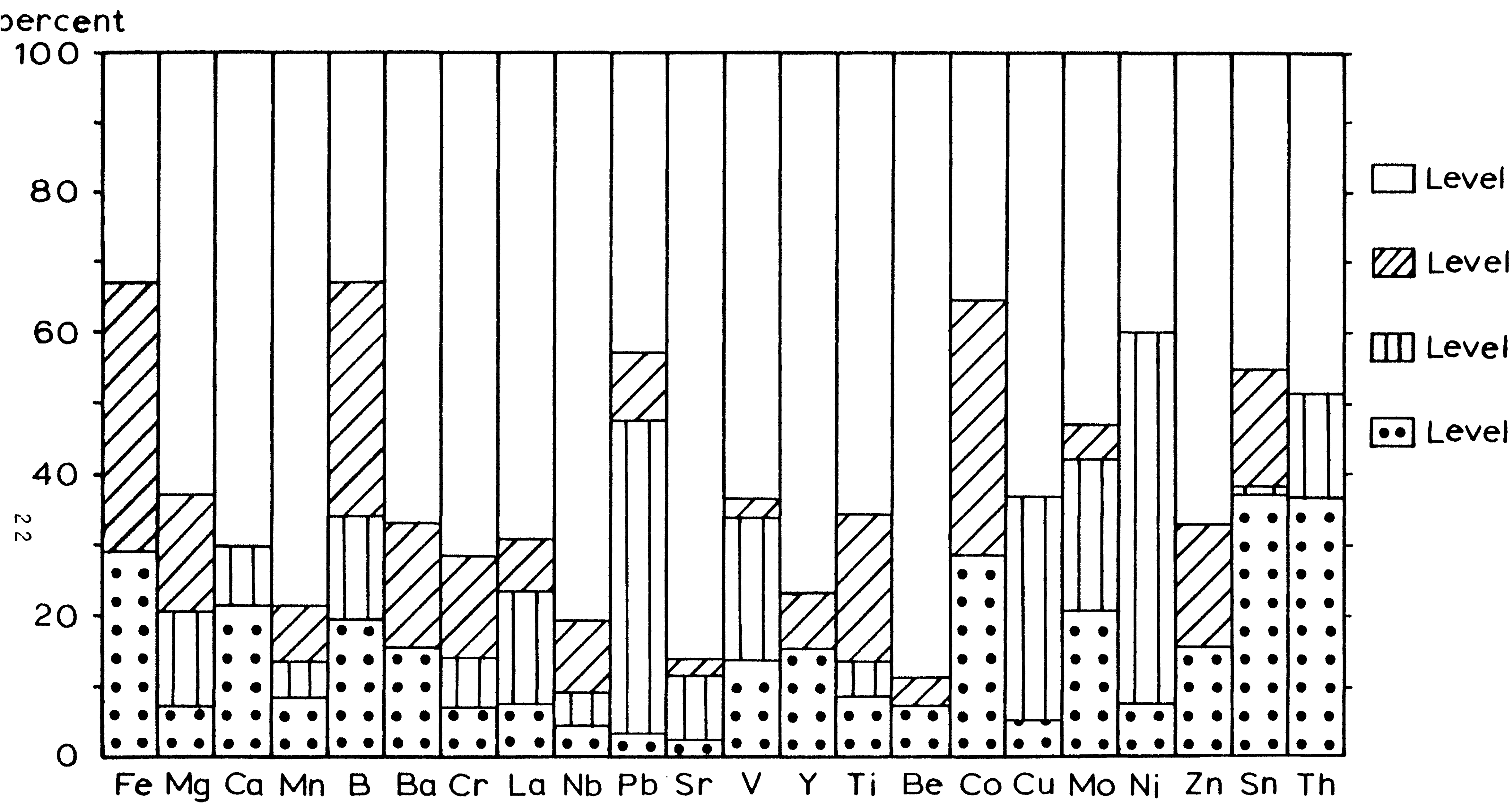


Figure 6.--Graphical representation of the variance components between the hierchical levels for the nonmagnetic fraction.

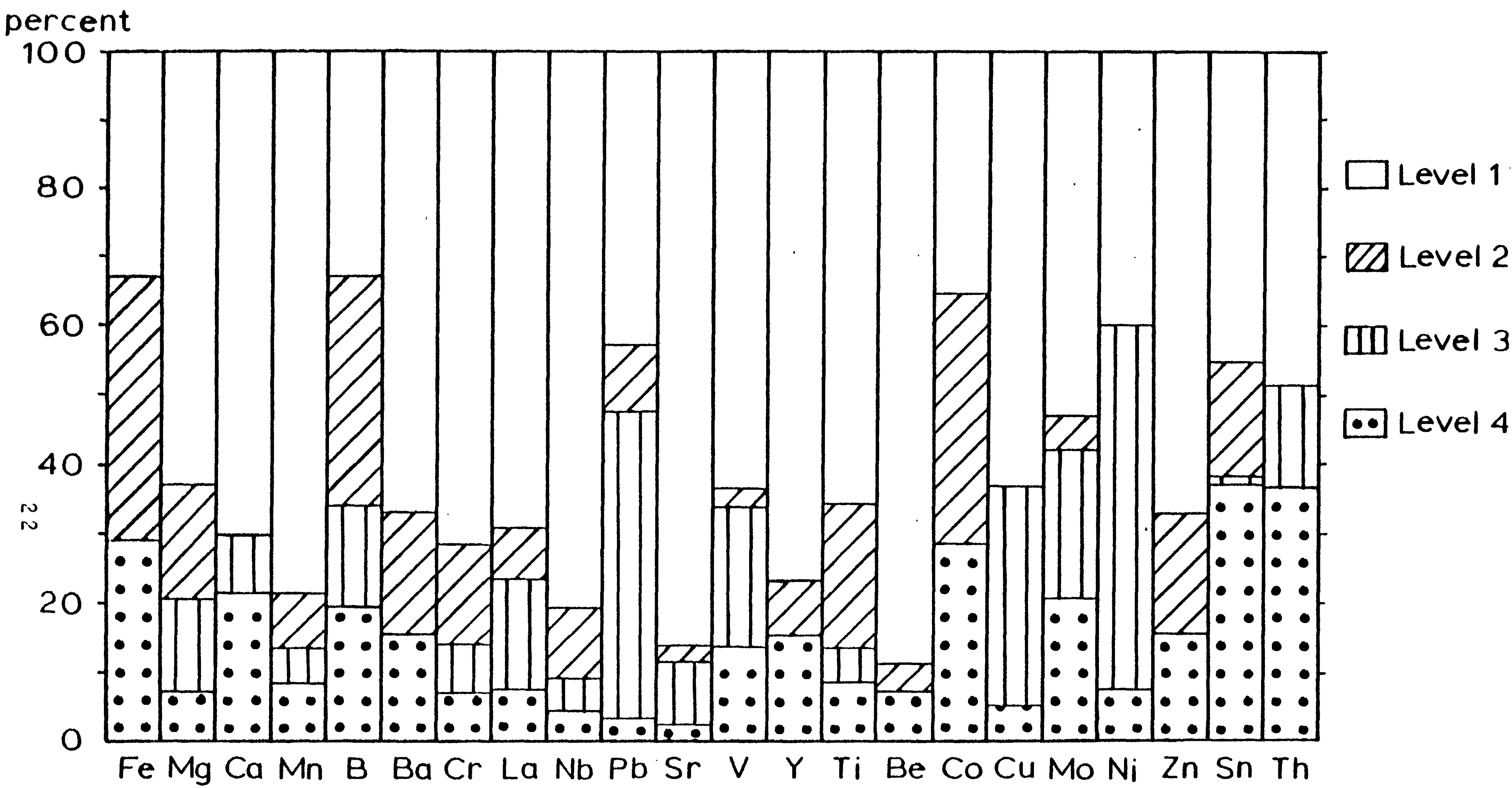


Figure 6.--Graphical representation of the variance components between the hierchical levels for the nonmagnetic fraction.

GEOCHEMISTRY OF THE ROCKS AND STREAM SEDIMENTS

Formation of Porphyry-type Molybdenum Deposits

Careful geological and geochemical studies around known porphyry-type molybdenum and tin deposits have identified many characteristic features and chemical indicators, which seem to reflect the existence of ore bodies (Dagger, 1972; Groves and McCarthy, 1978; Hosking, 1965; Mutschler and others, 1981; Sharp, 1978; Tischendorf, 1972; Van Alstine, 1976; and Wallace and others, 1978). Important among these are: (1) a history of alkali rhyolite volcanic and(or) intrusive activity; (2) presence of anomalous concentrations of a suite of dominantly lithophile elements, including fluorine, gallium, uranium, molybdenum, tin, rubidium, lithium, beryllium, yttrium, lead, bismuth, niobium, and manganese; (3) the depletion of elements such as iron, titanium, barium, strontium, magnesium, cerium, lanthanum, aluminum, copper, and zirconium from the melt; (4) proximity to major crustal lineaments and(or) paleosubduction environments; and (5) association with rocks of high-fluorine content. The porphyry-type molybdenum systems of Climax, Henderson, Urad, and Questa meet many of these criteria, (Westra and Keith, 1981) as do the newly discovered porphyry-type molybdenum deposit at Pine Grove in the Wah Wah Mountains, Utah (Westra and Keith, 1981) and the mineralized areas associated with the Mount Belknap caldera examined in this report. Careful geologic and geochemical studies conducted in the Central Mining Area of the Marysvale Volcanic field by Steven, Cunningham, and Machette (1980) and Cunningham and Steven (1979e) suggest that in these areas hydrothermal vein-type uranium deposits, in a unique geologic setting, may be high-level indicators of underlying porphyry-type molybdenum deposits.

Deposition of mineral deposits are controlled by physicochemical factors such as pressure, temperature, fluid chemistry, pH, and Eh (Hosking, 1965; Sillitoe and others, 1975; Sheraton and Black, 1973; Tischendorf, 1972; and Wallace and others, 1978). The resulting reactions commonly form concentration halos superimposed on a host rock; the form and extent of such halos depend on the complex interaction of such factors as: (1) elemental concentration; (2) thermal gradient and cooling history; (3) wallrock mineralogy; and (4) degree of fracturing in the host rock (Hosking, 1965; Dagger, 1972; Groves and McCarthy, 1978; Tischendorf, 1972; and Wallace and others, 1978). For porphyry-type molybdenum systems, molybdenite is found in the central zone with consecutively larger halos of bismuth, tin, and tungsten (Wallace and others, 1978). Figure 7 depicts idealized elemental halo patterns associated with the emplacement of a highly differentiated leucocratic body containing significant concentrations of the elements molybdenum and tin. These halos can express themselves as enrichments of certain elements and depletions in other elements. The geochemical interrelationships of these elements can be used to locate areas of anomalously low concentrations, as well as areas of anomalously high concentrations.

Hydrothermal activity associated with a rising pluton can significantly alter the mineralogy and geochemical nature of the host rock (Bailey and McCormick, 1974; Groves and Taylor, 1973; and Levension, 1974). The destruction of feldspars, volcanic glass or mafic minerals by circulating fluids can mobilize certain trace elements that were incorporated in the mineral structure (Steven and Cunningham, 1979). It is also possible that trace elements found in the circulating fluids may become incorporated in new minerals (Krapskopf, 1967; Miller and Drever, 1977).

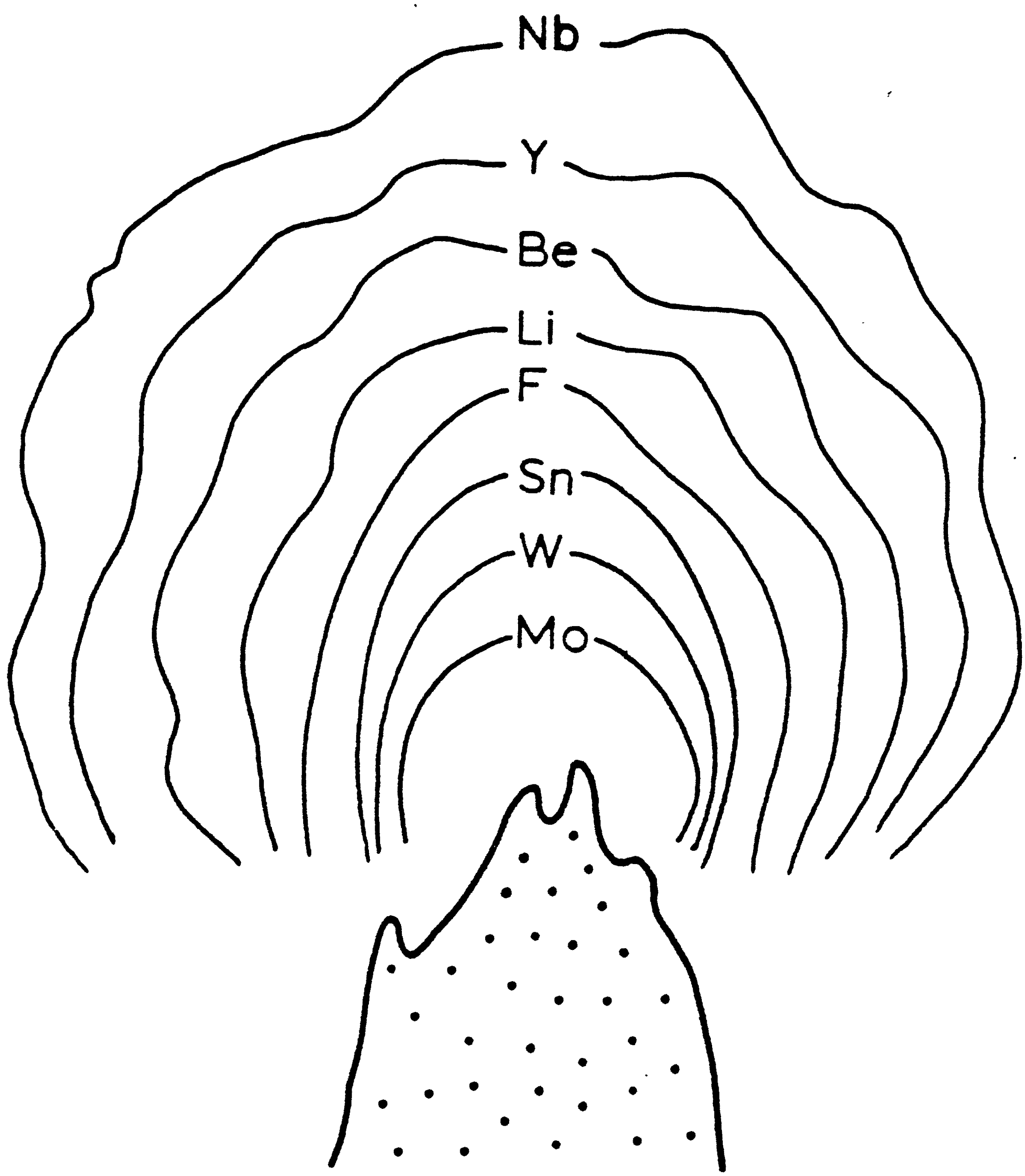


Figure 7.--Idealized cross-section of elemental dispersion along thermal gradients around an ore bearing felsic body. (Summarized from Tischendorf, 1973; Groves and McCarthy, 1978; and Wallace and others, 1978)

Magnetic Fraction

The distribution of metal concentrations in the magnetic and nonmagnetic fractions can be useful in defining areas of ore potential. In interpreting the data from this survey, maps were constructed showing the distribution of anomalously low concentrations for many elements, as well as elevated concentrations. Regions of low metal concentrations for some elements can be as diagnostic as elevated concentrations of certain elements in defining the geochemical character of an area (J. D. Tucker and others, 1981; and R. E. Tucker and others, 1981). When examining the single element plots, it is important to keep in mind that the elemental concentrations represent values for the catchment basin.

The minerals in the magnetic fraction suite are magnetic at 0.6 amperes. Some common minerals in this suite include hornblende, biotite, sphene, allanite, and hydromorphic and(or) detrital iron and manganese oxides (Table 3).

To help define any possible elemental suites within the data, a correlation matrix was utilized. The correlation matrix is given in Table 9, and Table 10 gives the correlation coefficients for the 5 percent and 1 percent levels of significance. Caution should be used when interpretating the elemental correlations when the variance in level 4 is greater than 20 percent, because bias could be introduced into the correlations (Table 7). There are complex interelement correlations, however, two elemental suites can be identified. The first suite consists of nickel, magnesium, calcium, cobalt, vanadium, and chromium. The second suite consists of beryllium, lead, manganese, molybdenum, yttrium, niobium, zinc, titanium, zinc, and thorium. Elevated concentrations of the first elemental suite are generally found outside of the caldera associated with the Mount Belknap Volcanics. These geochemical suites are also defined in the spatial distribution of the elements.

The spatial distributions for elements of the magnetic fraction were examined with respect to rock-type and possible alteration. There are three distinct groups of elements based on their spatial distribution. The first group consists of mangesium, calcium, copper, chromium, and nickel. Elevated concentrations of these elements are most often found within basins draining the Bullion Canyon Volcanics, whereas low concentrations are found within the Mount Belknap rhyolites (figures 8-12). The distribution of vanadium is similar to that of chromium, and the distribution of cobalt is similar to copper. The second group contains iron, barium, lanthanum, strontium, zirconium, and thorium (figures 13-18). These elements do not appear to be associated with either rock type or cluster in any particular region. The third group consists of beryllium, niobium, yttrium, molybdenum, tin, lead, and zinc (figures 19-25). Anomalous concentrations of these elements are predominately found within drainage basins associated with Mount Belknap Volcanics. The distribution of manganese and titanium were not plotted because of the large number of qualified values greater than the highest standards. Boron was not plotted because of the high analytical variance, and because there was no significant variance at the regional level. Caution should be used when interpreting the results for elements that have high variance components in level 3 (site variation) and level 4 (analytical variation).

Table 9.--Correlation matrix for the magnetic fraction.

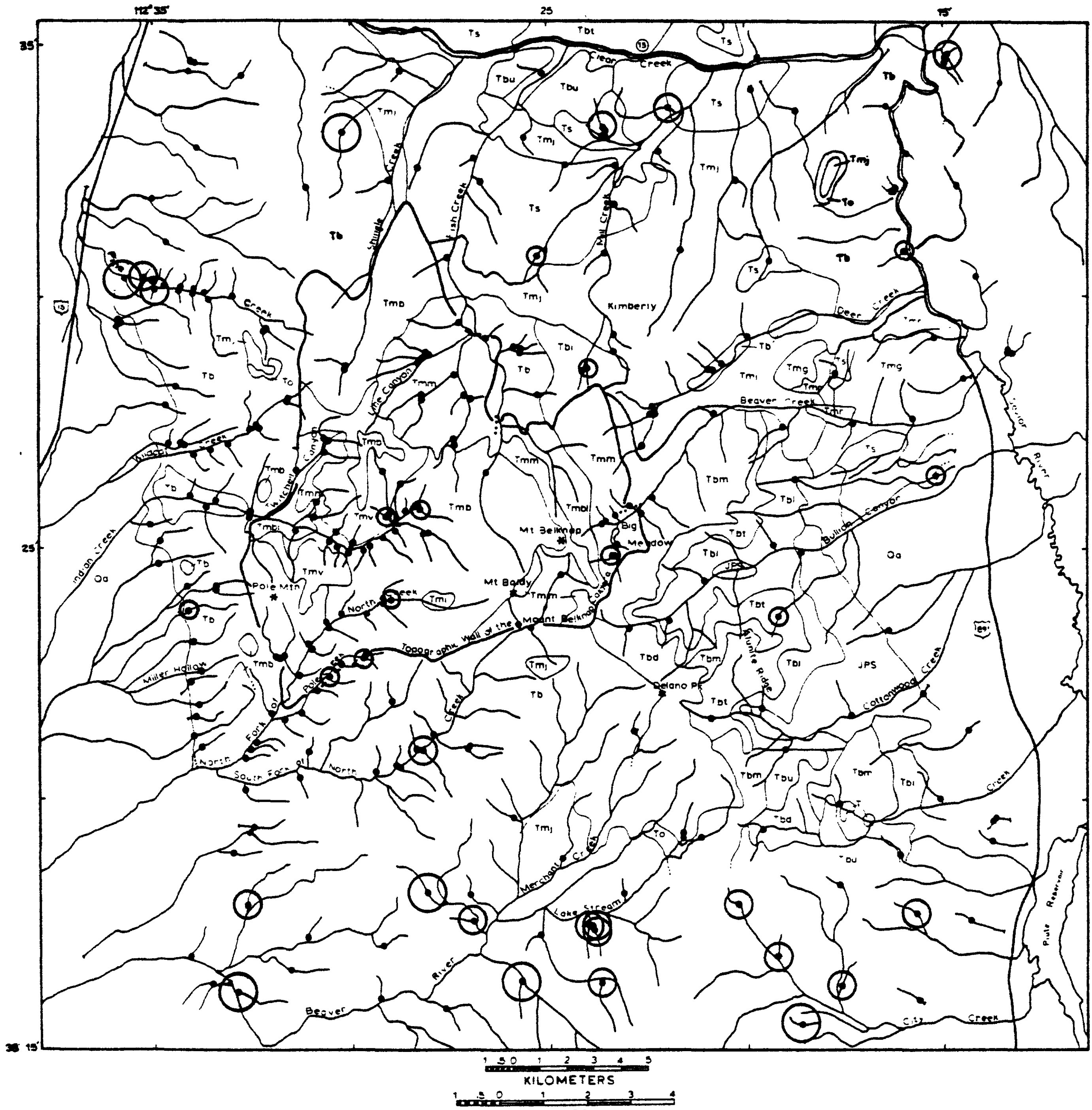
	Fe	Mg	Ca	Ti	Mn	B	Ba	Be	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sn	Sr	V	Y	Zn	Zr
Fe .1%	12.85	-0.54	-0.51	-0.12	-0.07	-0.06	-0.08	-0.10	0.12	0.10	0.20	-0.06	-0.24	0.02	-0.23	-0.02	0.17	-0.08	0.38	-0.03	0.09	0.16
Mg .05%	262	2.18	0.85	0.15	0.11	0.12	-0.10	-0.20	0.10	0.25	-0.12	0.01	-0.17	-0.16	0.37	-0.21	-0.07	-0.12	-0.07	-0.14	-0.25	-0.24
Ca .1%	262	264	1.45	0.23	0.15	0.18	-0.08	-0.17	0.10	0.24	-0.09	0.00	-0.16	-0.21	0.33	-0.21	-0.13	-0.10	-0.01	-0.14	-0.32	-0.26
Ti .005%	70	70	70	0.48	0.30	-0.11	0.03	-0.37	-0.12	0.10	-0.20	0.05	-0.36	0.15	-0.23	-0.22	-0.46	-0.35	0.25	0.02	-0.26	0.16
Mn 20ppm	199	201	201	56	2808.	0.12	0.02	0.27	0.00	-0.08	-0.10	0.48	-0.03	0.48	-0.14	0.25	0.42	-0.12	-0.11	0.54	0.42	0.31
B 20ppm	172	174	174	38	130	24.1	0.01	-0.06	0.11	-0.04	0.02	0.20	-0.04	-0.03	0.14	-0.03	-0.22	-0.05	-0.00	0.16	-0.08	0.22
Ba 50ppm	262	264	264	70	201	174	884	0.31	0.04	-0.14	0.15	0.10	0.24	-0.02	-0.06	0.25	-0.23	0.11	-0.04	0.20	-0.08	0.01
Be 2ppm	183	183	183	45	123	148	183	18.6	-0.30	-0.20	-0.12	0.04	0.63	-0.01	-0.15	0.47	-0.-2	0.37	-0.32	0.28	0.13	0.15
Co 10ppm	245	247	247	62	201	164	247	166	37.9	0.24	0.36	-0.00	-0.28	-0.38	0.20	-0.35	-0.26	-0.18	0.38	-0.33	-0.51	-0.26
Cr 20ppm	262	264	264	70	201	174	264	183	247	315.	0.02	-0.09	-0.23	-0.27	0.39	-0.17	0.06	-0.18	0.47	-0.30	-0.35	-0.22
Cu 10ppm	262	264	264	70	201	174	264	183	247	264	82.8	-0.10	-0.15	-0.32	0.14	-0.08	-0.43	-0.01	0.24	-0.24	-0.43	-0.18
La 50ppm	258	260	260	69	198	172	260	182	243	260	260	305.	0.01	0.14	-0.07	0.03	-0.25	-0.00	-0.15	0.43	0.06	0.37
Mo 7ppm	162	162	162	39	102	132	162	149	145	162	162	160	54.8	-0.05	-0.38	0.45	0.11	0.10	-0.31	0.29	0.04	0.13
Nb 50ppm	176	176	176	30	117	129	176	136	159	176	176	173	134	504.	-0.23	0.03	0.04	-0.00	-0.41	0.49	0.43	0.25
Ni 10ppm	220	222	222	61	190	143	222	144	218	222	222	219	121	139	60.2	-0.15	0.03	-0.02	-0.11	-0.19	-0.29	-0.22
Pb 20ppm	260	262	262	68	199	174	262	183	245	262	262	25-	162	176	220	811.	-0.03	0.09	-0.22	0.19	0.19	0.09
Sn 15ppm	48	48	48	6	8	36	48	47	40	48	48	47	46	44	22	48	118.	-0.25	-0.20	-0.09	0.27	-0.13
Sr 200ppm	133	133	133	51	99	88	133	105	122	133	133	132	92	83	113	131	17	465.	-0.21	0.02	0.16	0.05
V 20ppm	262	264	264	70	201	174	264	183	247	264	264	260	162	176	222	262	48	133	288.	-0.44	-0.54	-0.32
Y 20ppm	262	264	264	70	201	174	264	183	247	264	264	260	162	176	222	262	48	133	264	120.	0.41	0.57
Zn 300ppm	169	171	171	32	111	115	171	123	154	171	171	169	124	138	133	171	46	80	171	171	653.	0.32
Zr 20ppm	251	253	253	69	197	166	253	176	239	253	253	250	155	165	215	251	43	130	253	253	161	504.

note: the diagonal of the correlation matrix contains the standard deviation of the variable for only the valid pairs, numbers below the line denote valid pairs

Table 10.--Correlation coefficients at the 5% and 1% levels of significance.

Degrees of Freedom	5%	1%	Degrees of Freedom	5%	1%
1	.997	1.000	24	.388	.496
2	.950	.990	25	.381	.487
3	.878	.959	26	.374	.478
4	.811	.917	27	.367	.470
5	.754	.874	28	.361	.463
6	.707	.834	29	.355	.456
7	.666	.798	30	.349	.449
8	.632	.765	35	.325	.418
9	.602	.735	40	.304	.393
10	.576	.708	45	.288	.372
11	.553	.684	50	.273	.354
12	.532	.661	60	.250	.325
13	.514	.641	70	.232	.302
14	.497	.623	80	.217	.283
15	.482	.606	90	.205	.267
16	.468	.590	100	.195	.254
17	.456	.575	125	.174	.228
18	.444	.561	150	.159	.208
19	.433	.549	200	.138	.181
20	.423	.537	300	.133	.148
21	.413	.526	400	.098	.128
22	.404	.515	500	.088	.115
23	.396	.505	1000	.062	.081

From Snedecor and Cochran (1967), p. 557.

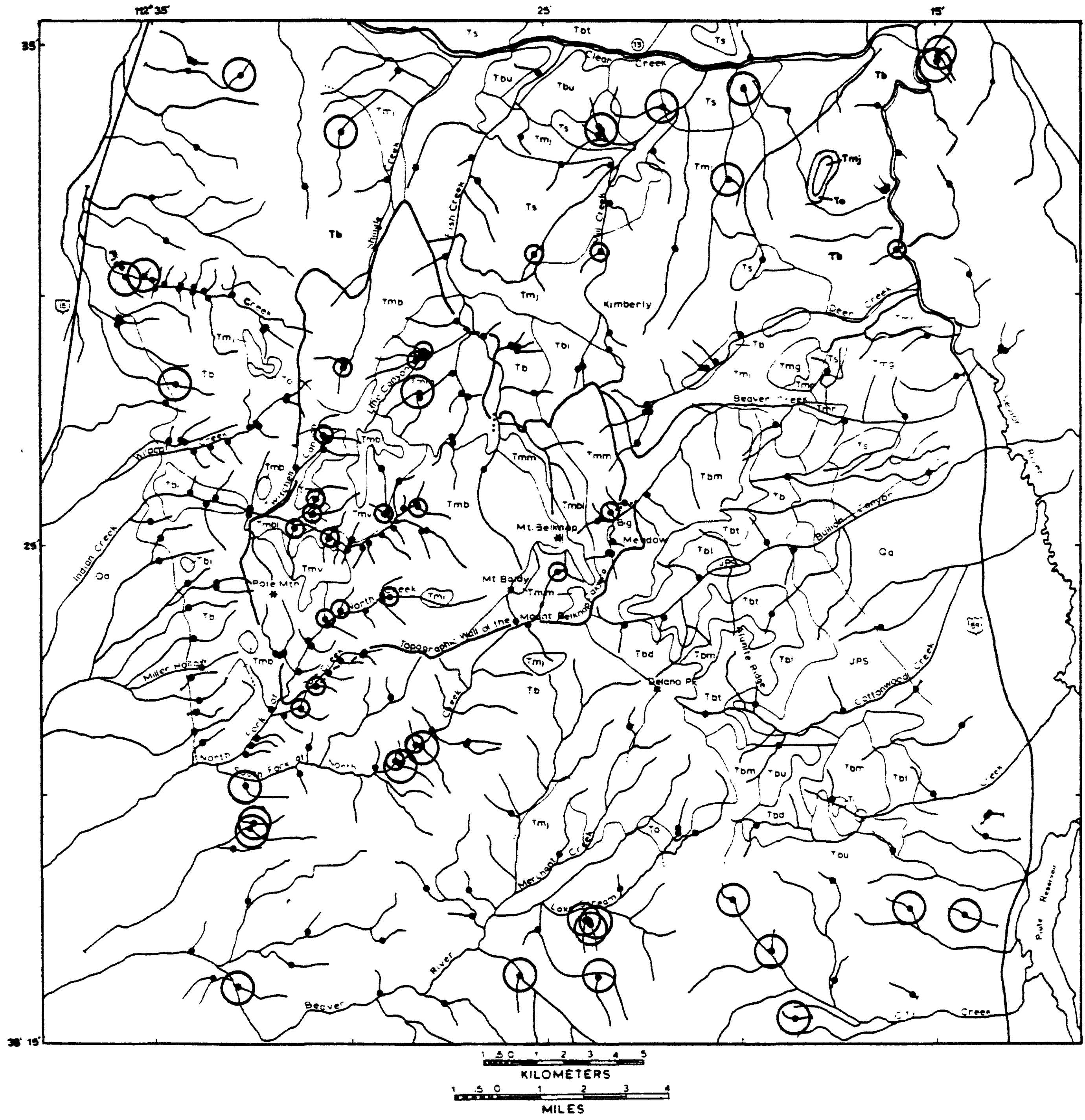


○ >7 %

○ 5 %

○ ≤ 0.3 %

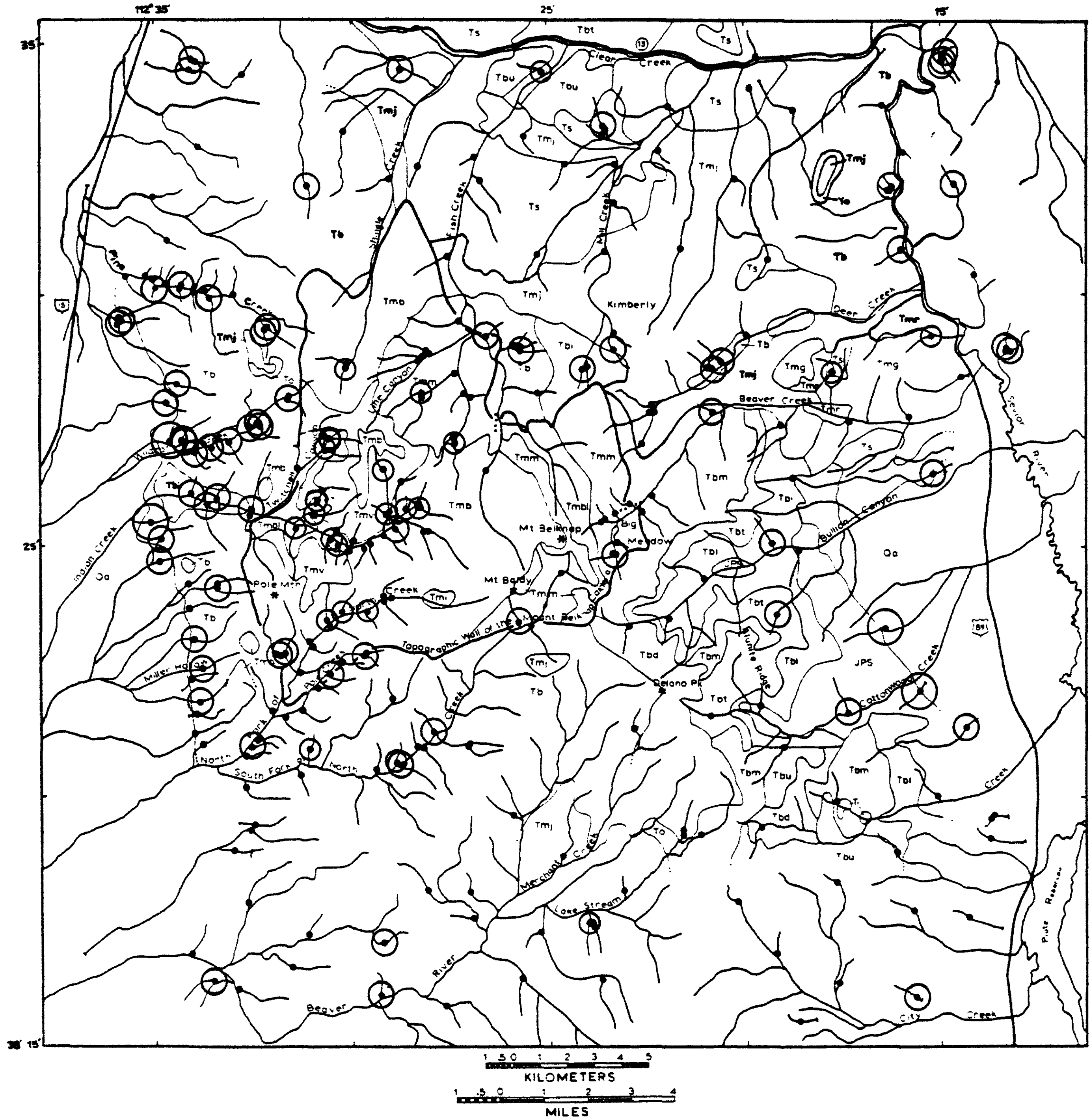
Figure 8.--Distribution of magnesium concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.



5-7 %

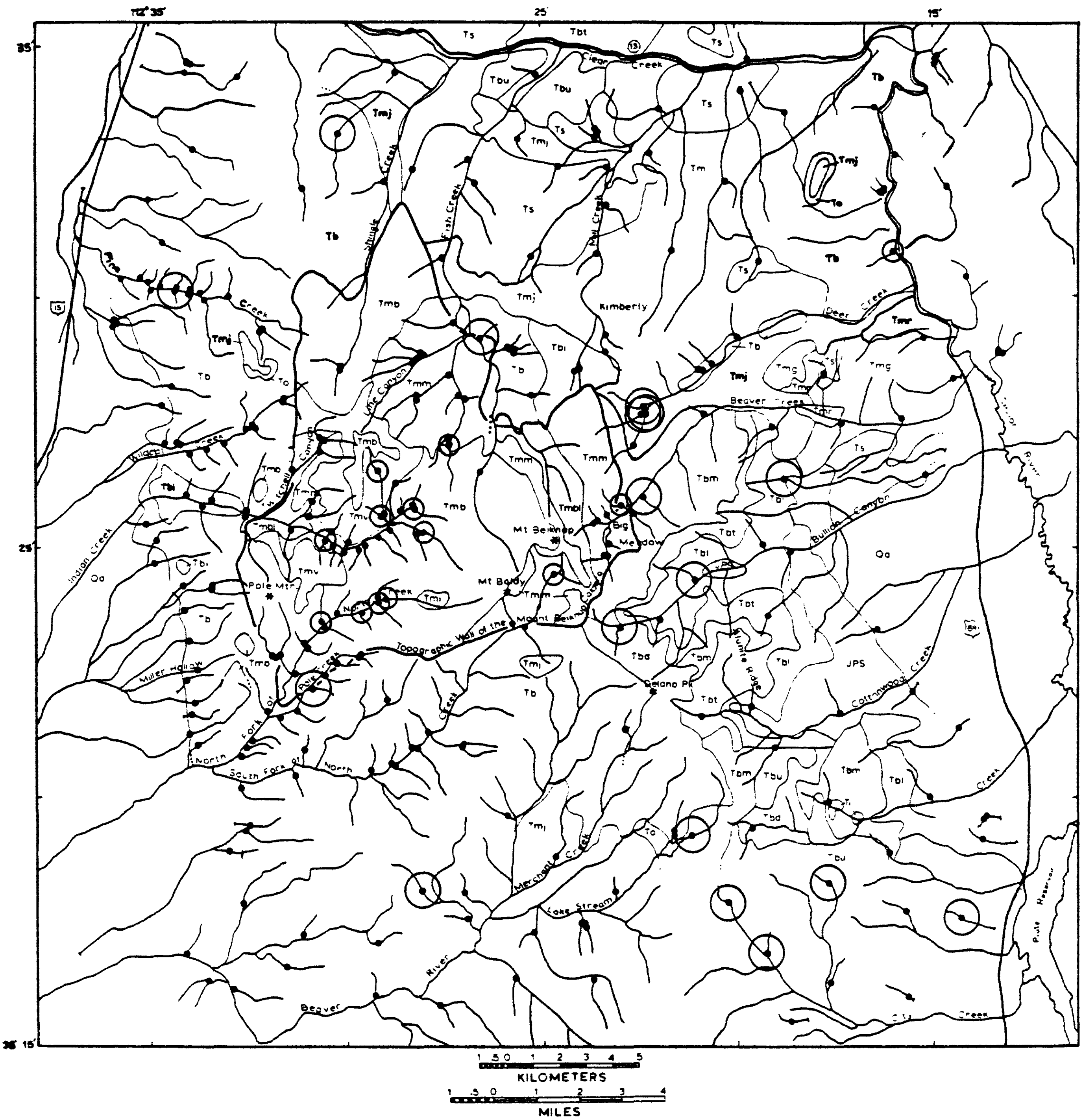
< 0.5 %

Figure 9.--Distribution of calcium concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.



○	> 300 ppm
○	150-200 ppm
○	< 20 ppm

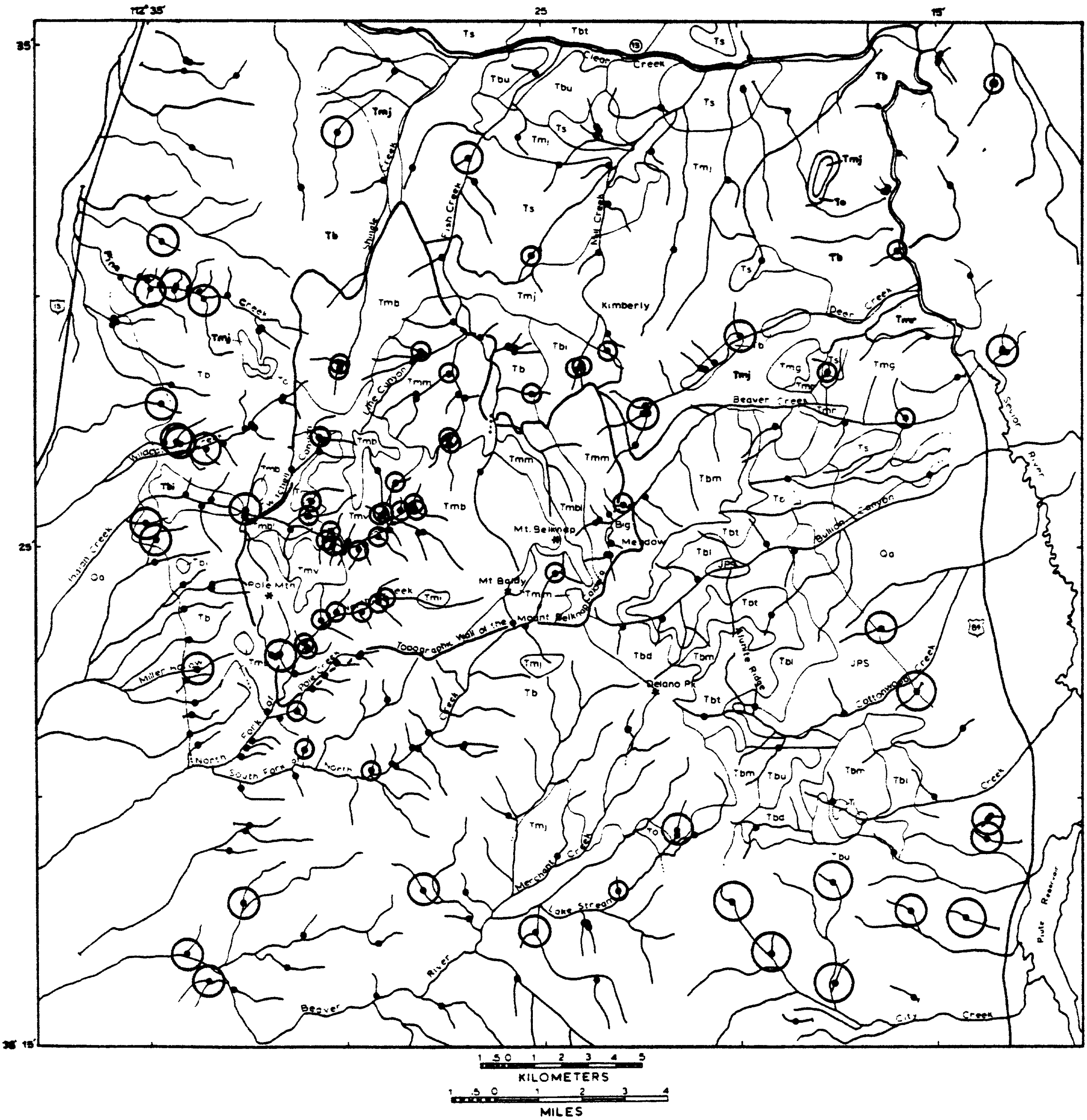
Figure 10.--Distribution of copper concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.



1000 ppm

50 ppm

Figure 11.--Distribution of chromium concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

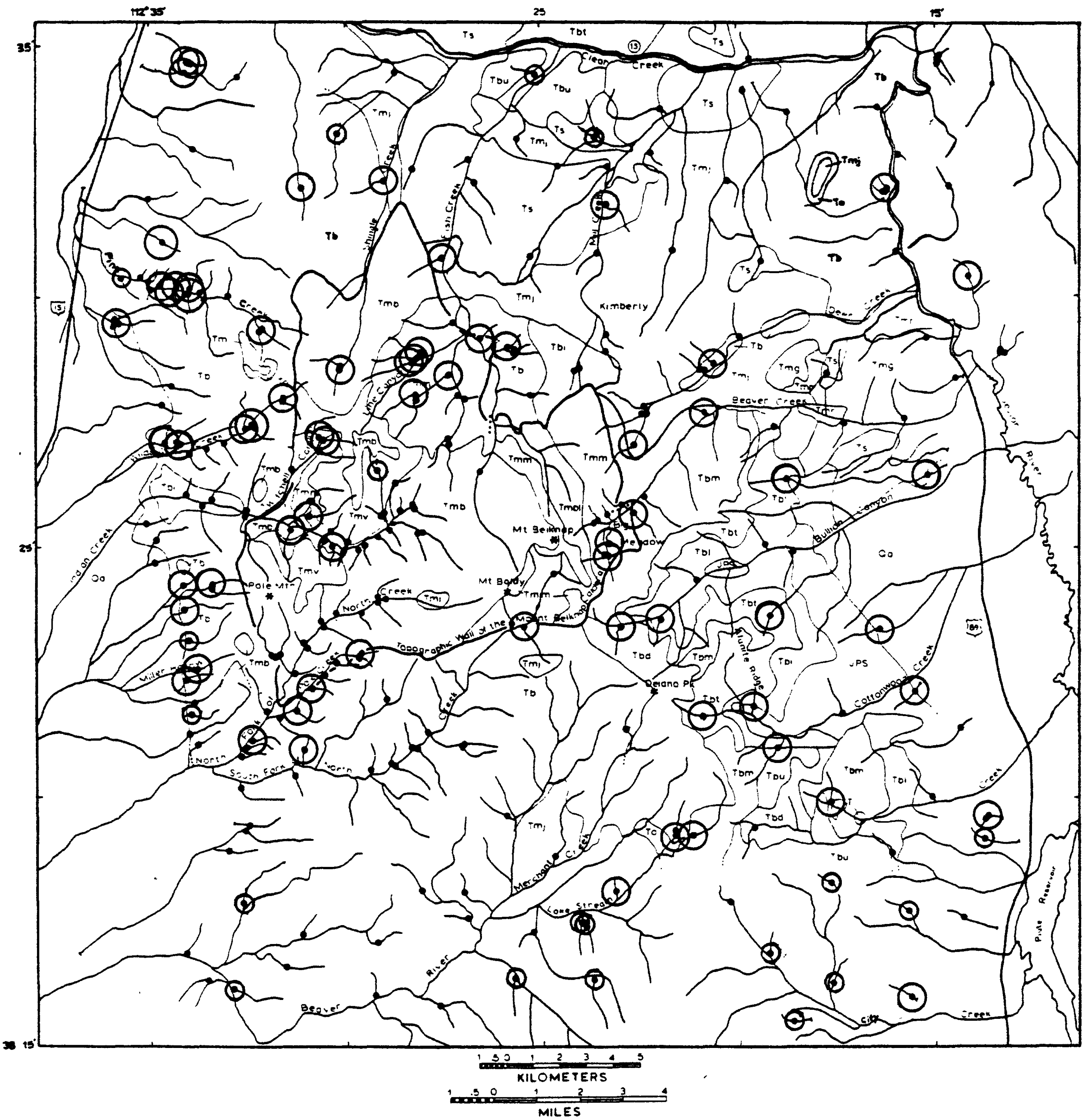


>300

150-200

not detected

Figure 12.--Distribution of nickel concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

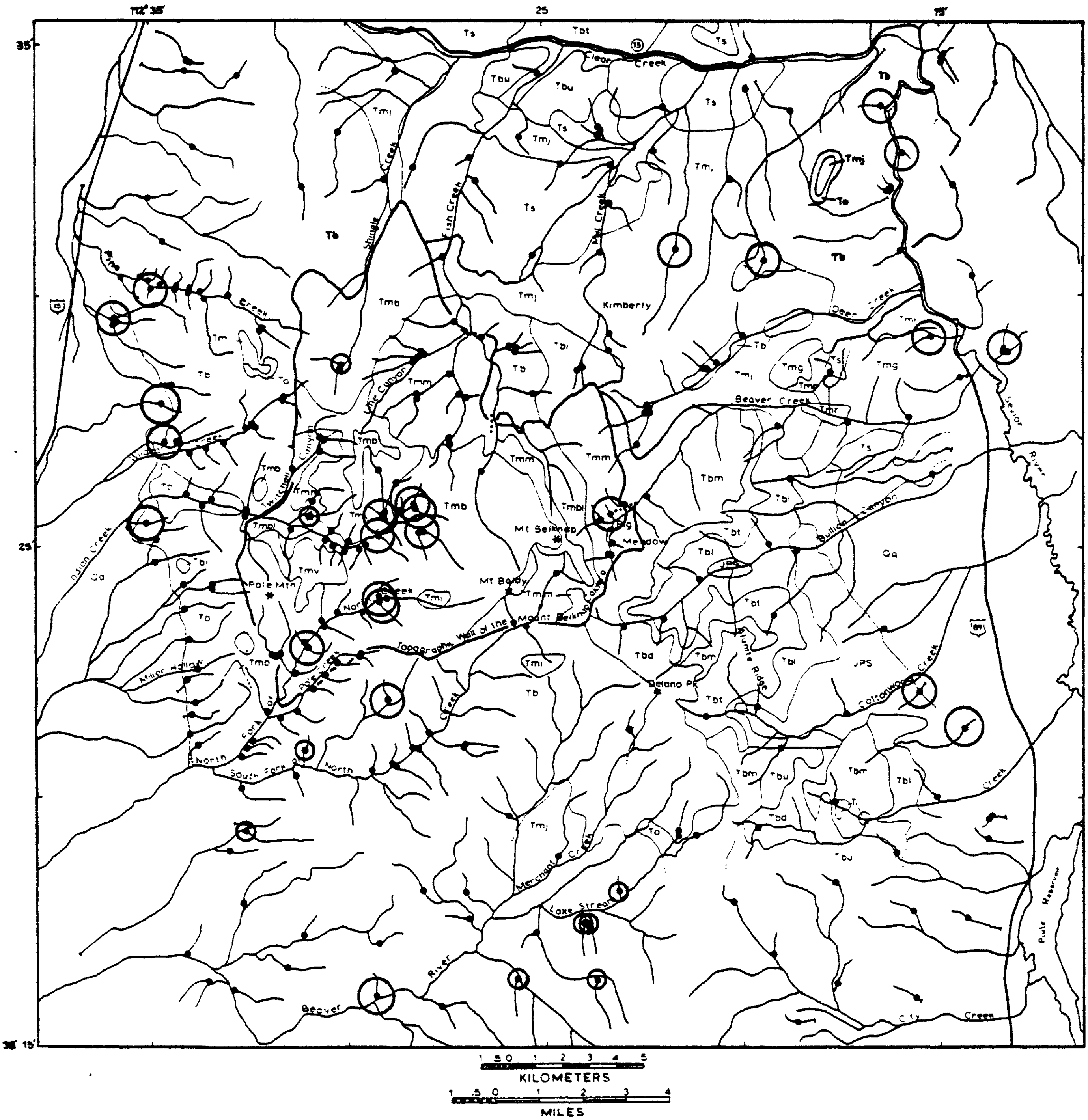


○ > 50 %

○ 50 %

○ ≤ 10 %

Figure 13.--Distribution of iron concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

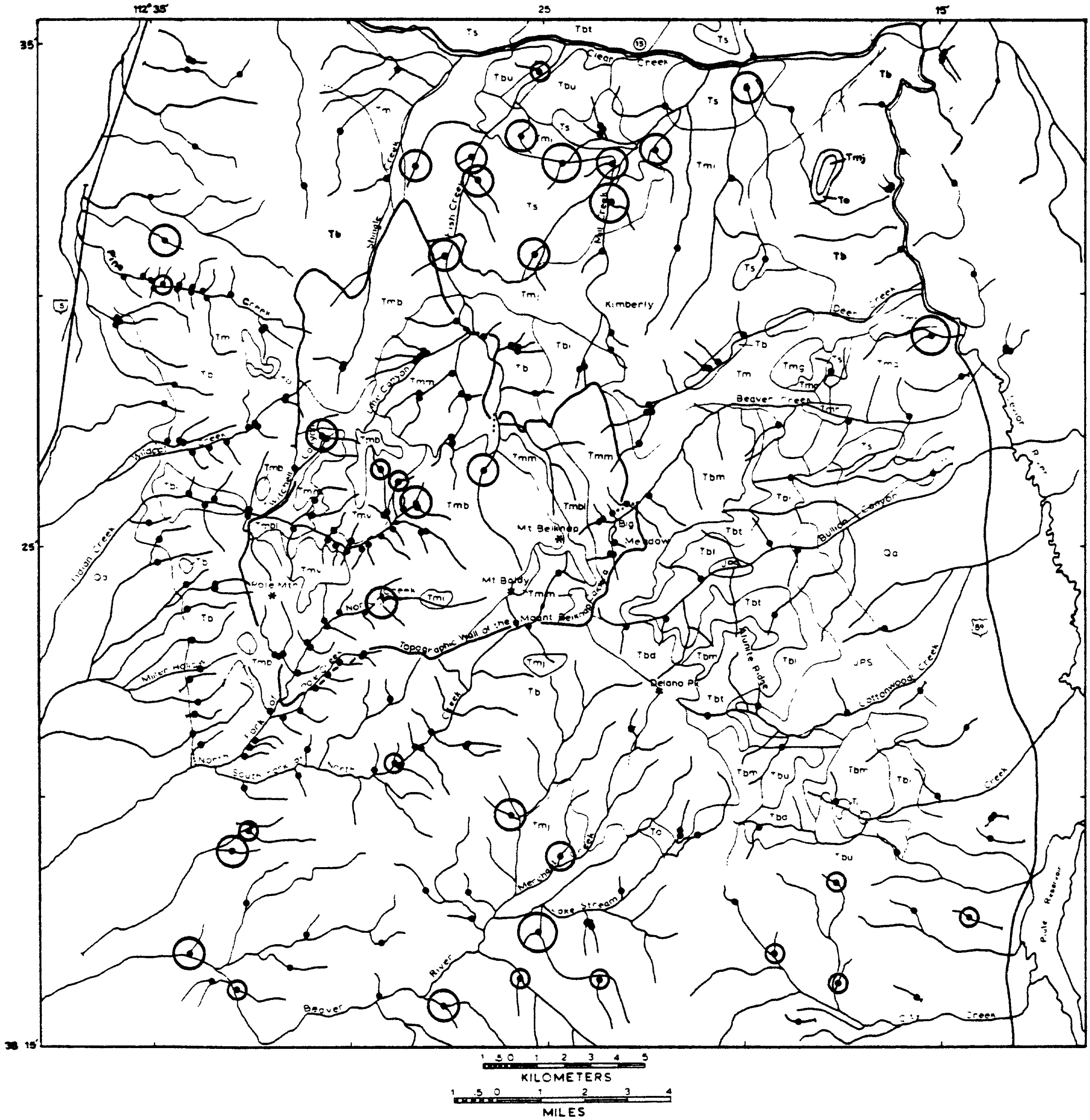


○ >5000 ppm

○ 3000 ppm

○ ≤100 ppm

Figure 14.--Distribution of barium concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

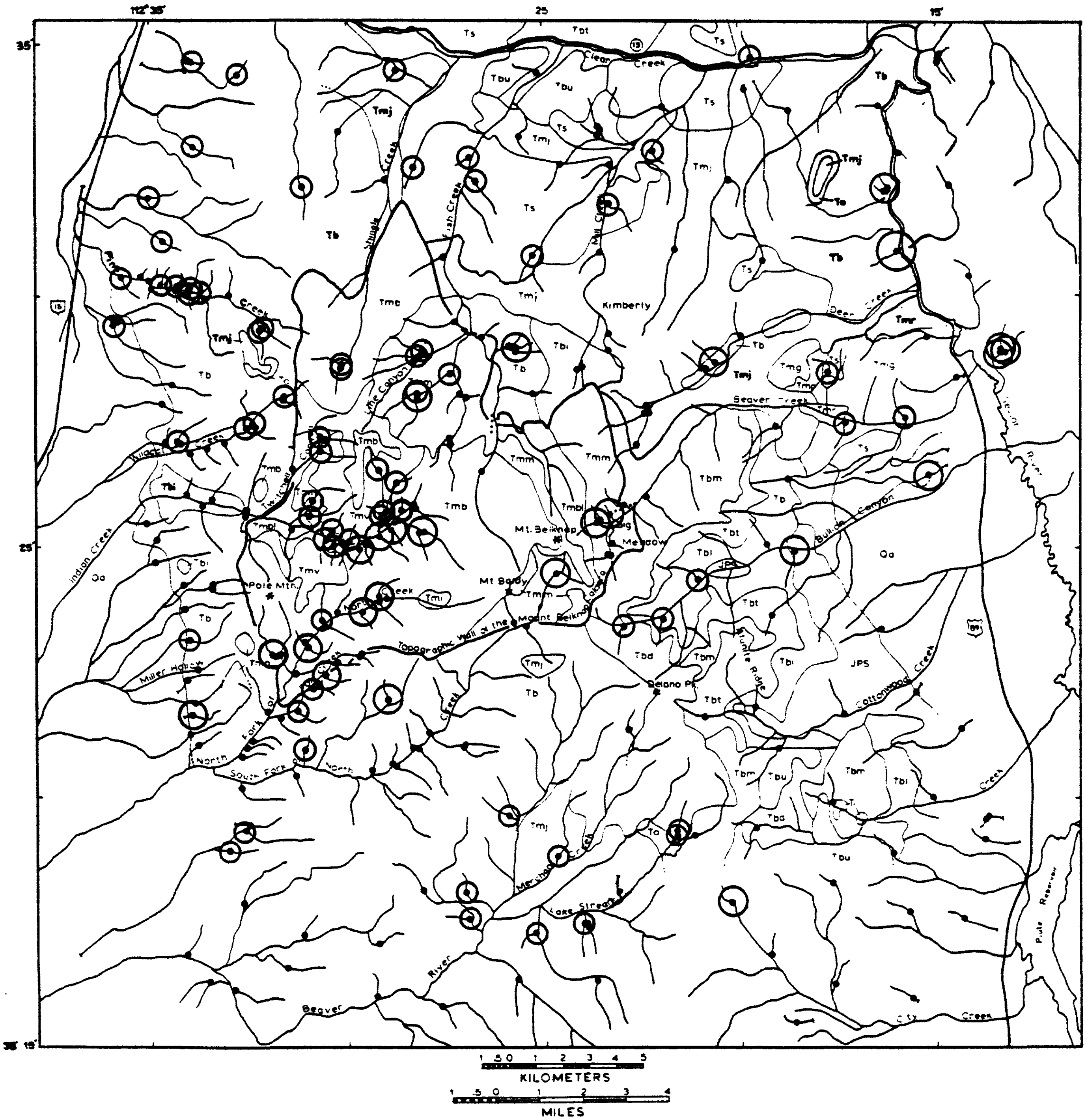


> 2000 ppm

1000-1500 ppm

≤ 70 ppm

Figure 15.--Distribution of lanthanum concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

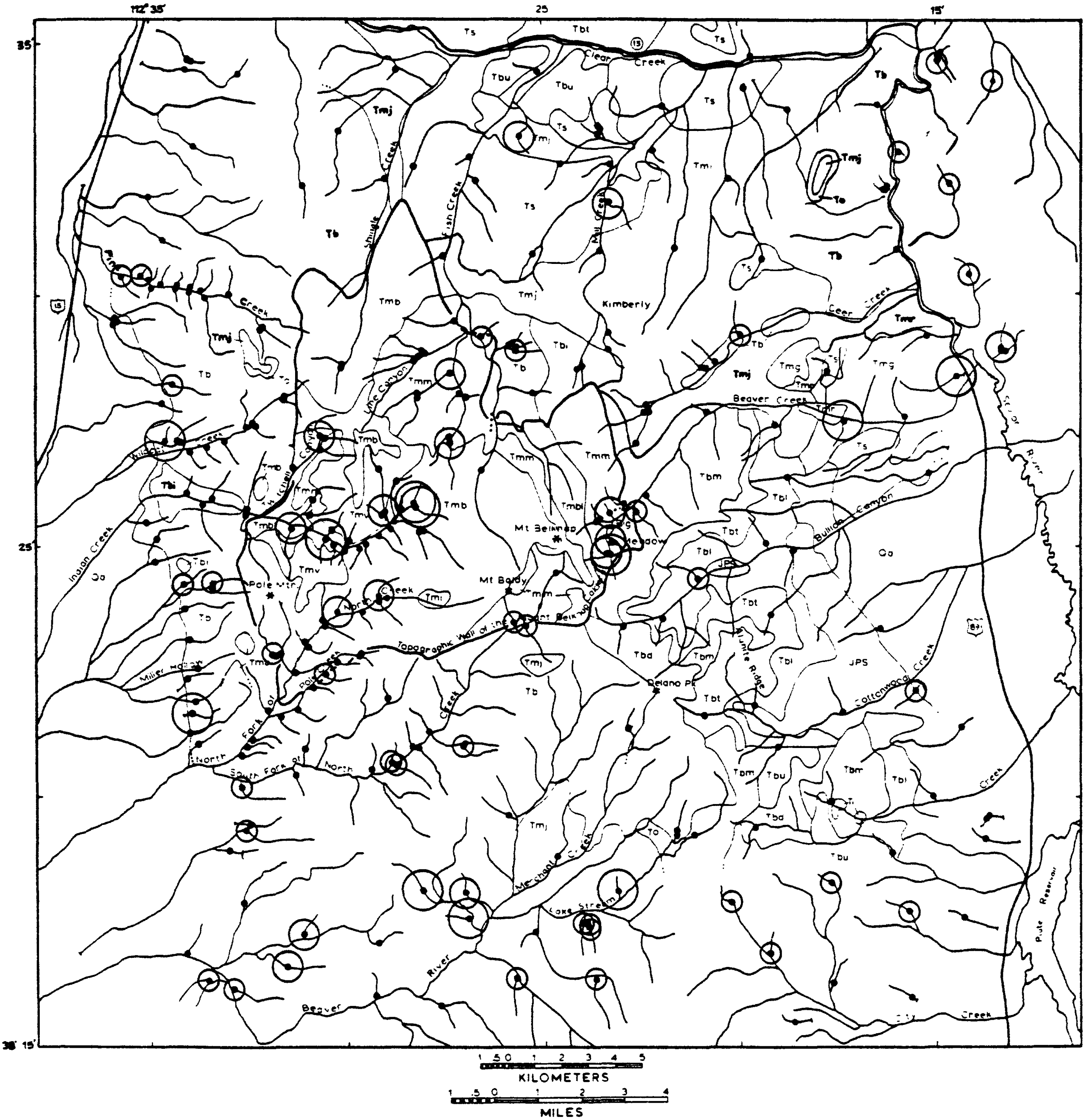


>2000 ppm

700-1500 ppm

50 ppm

Figure 16.--Distribution of strontium concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

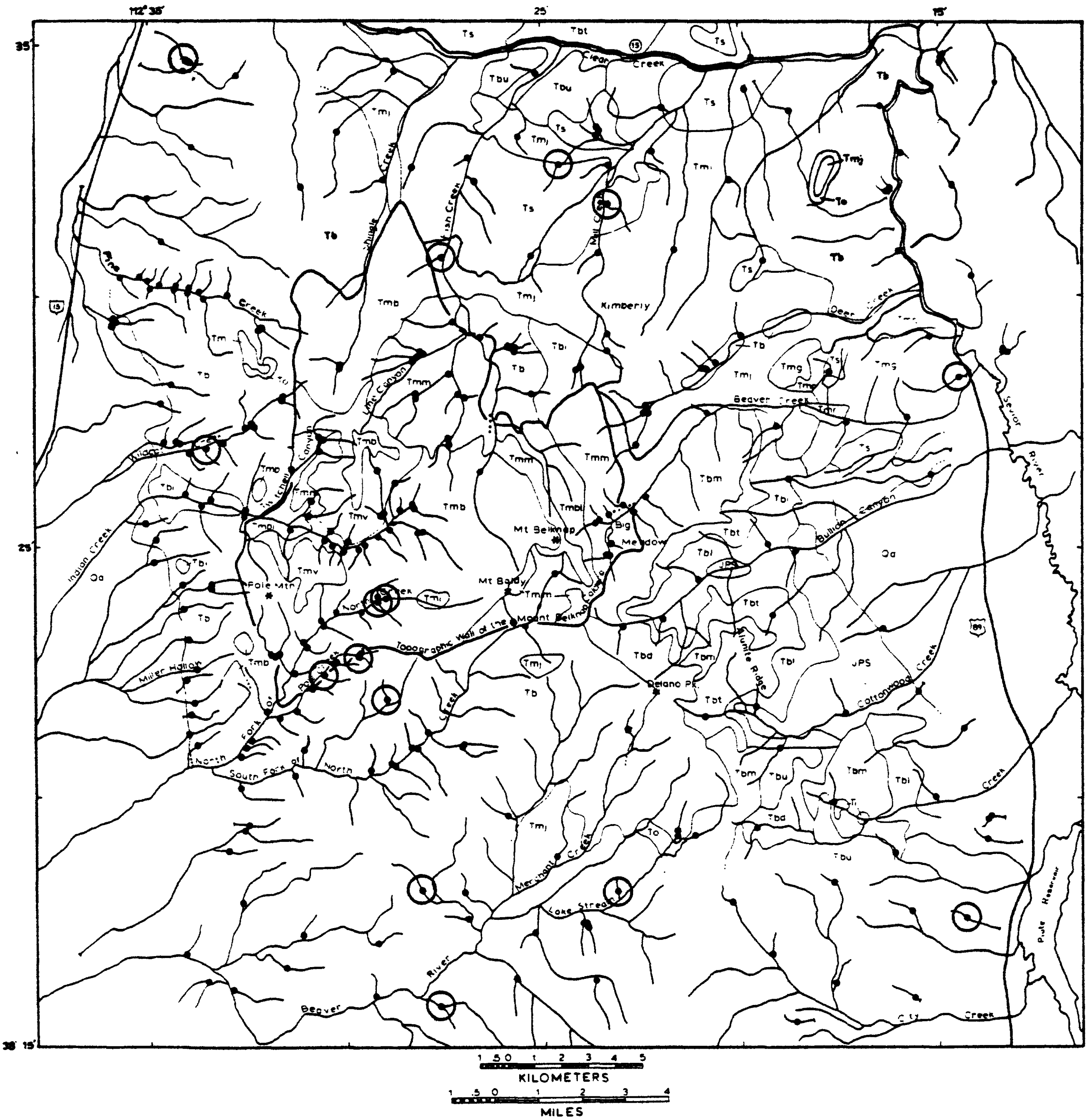


○ >3000 ppm

○ 1500-2000 ppm

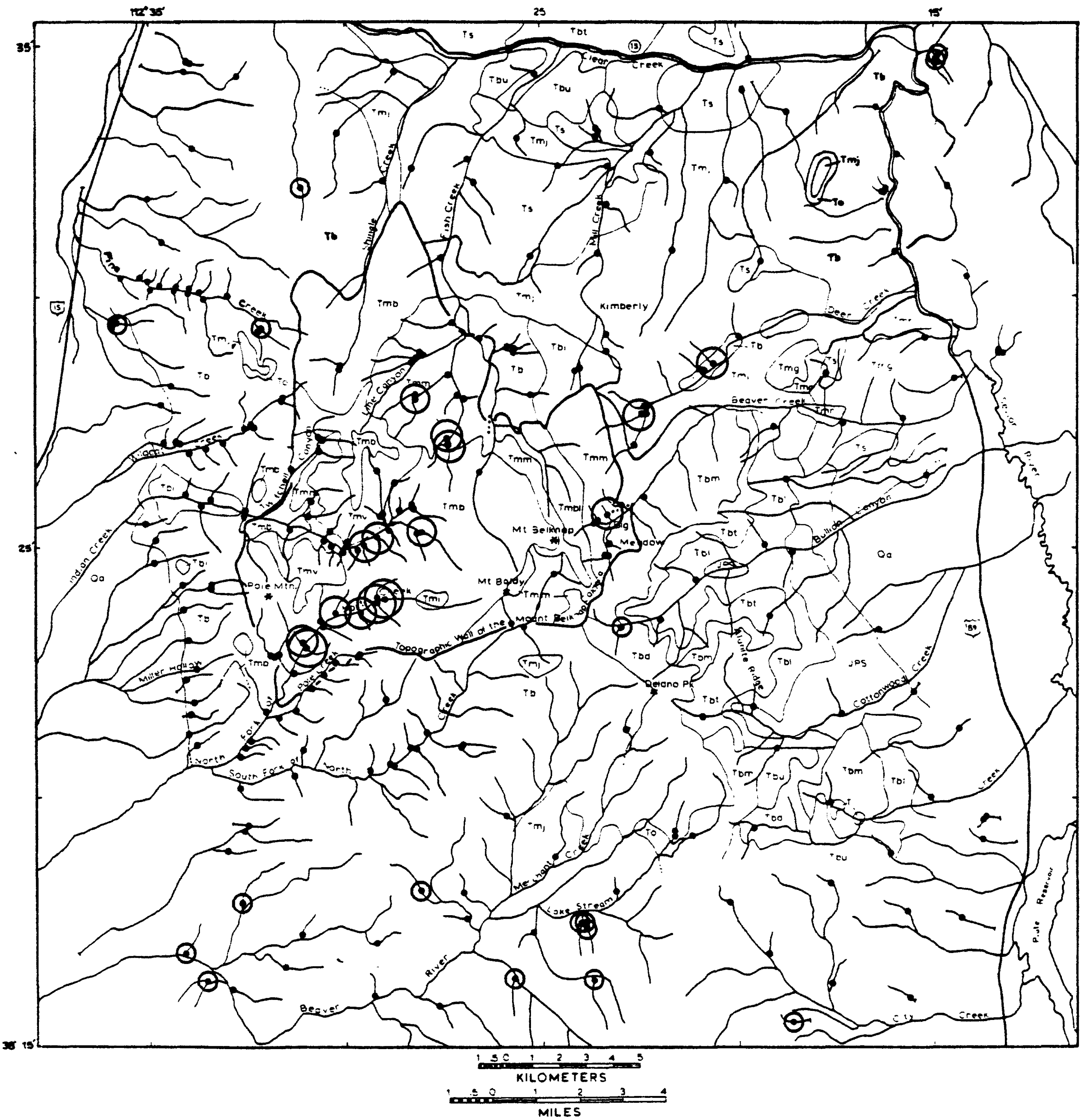
○ ≤ 200 ppm

Figure 17.--Distribution of zirconium concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.



≥150 ppm

Figure 18.--Distribution of thorium concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

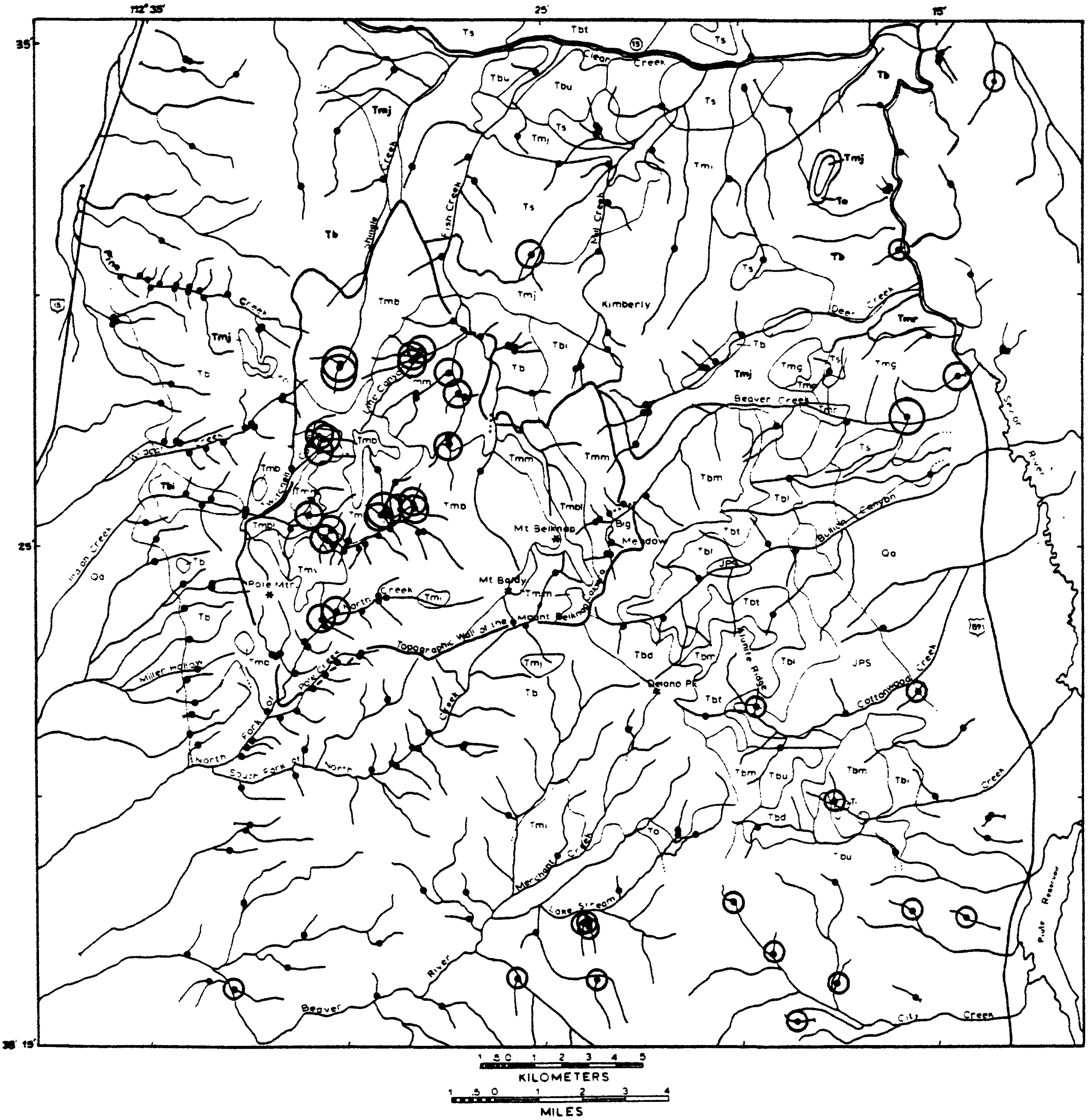


○ ≥ 100 ppm

○ 50-70 ppm

○ ≤ 0.15 ppm

Figure 19.--Distribution of beryllium concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

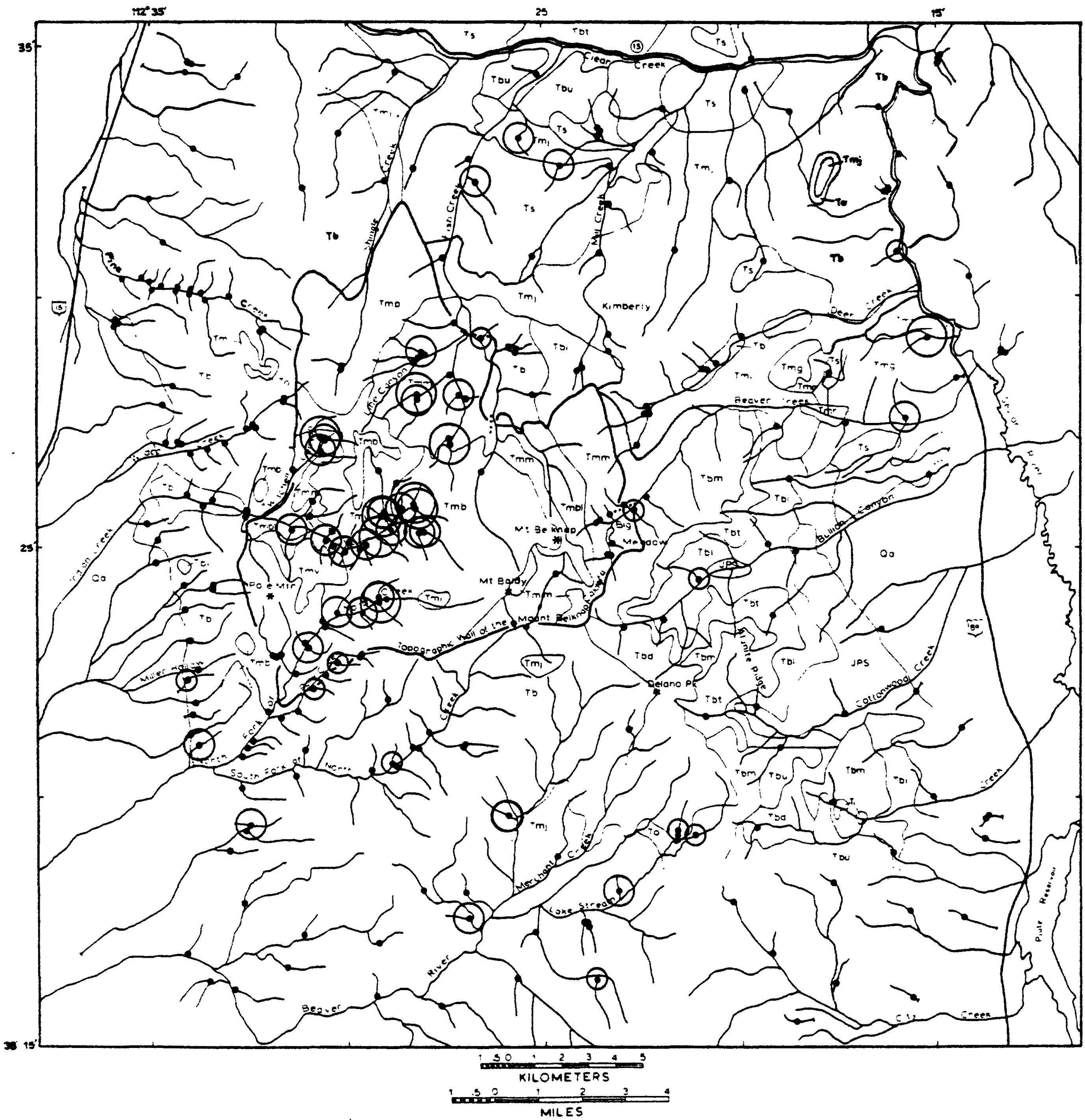


○ ≥3000 ppm

○ 700-2000 ppm

○ 15 ppm

Figure 20.--Distribution of niobium concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

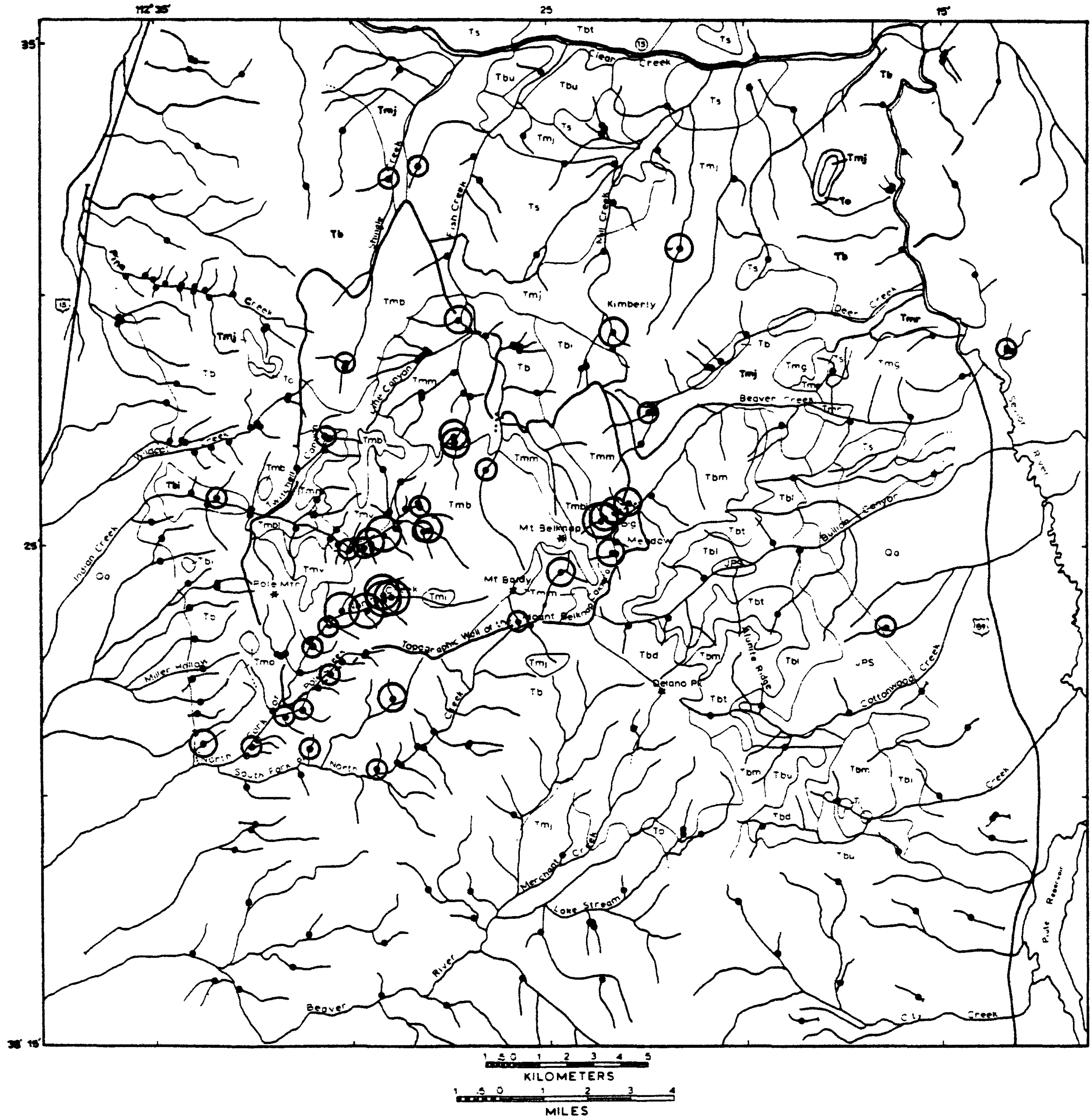


≥ 500 ppm

300 ppm

≤ 50 ppm

Figure 21.--Distribution of yttrium concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

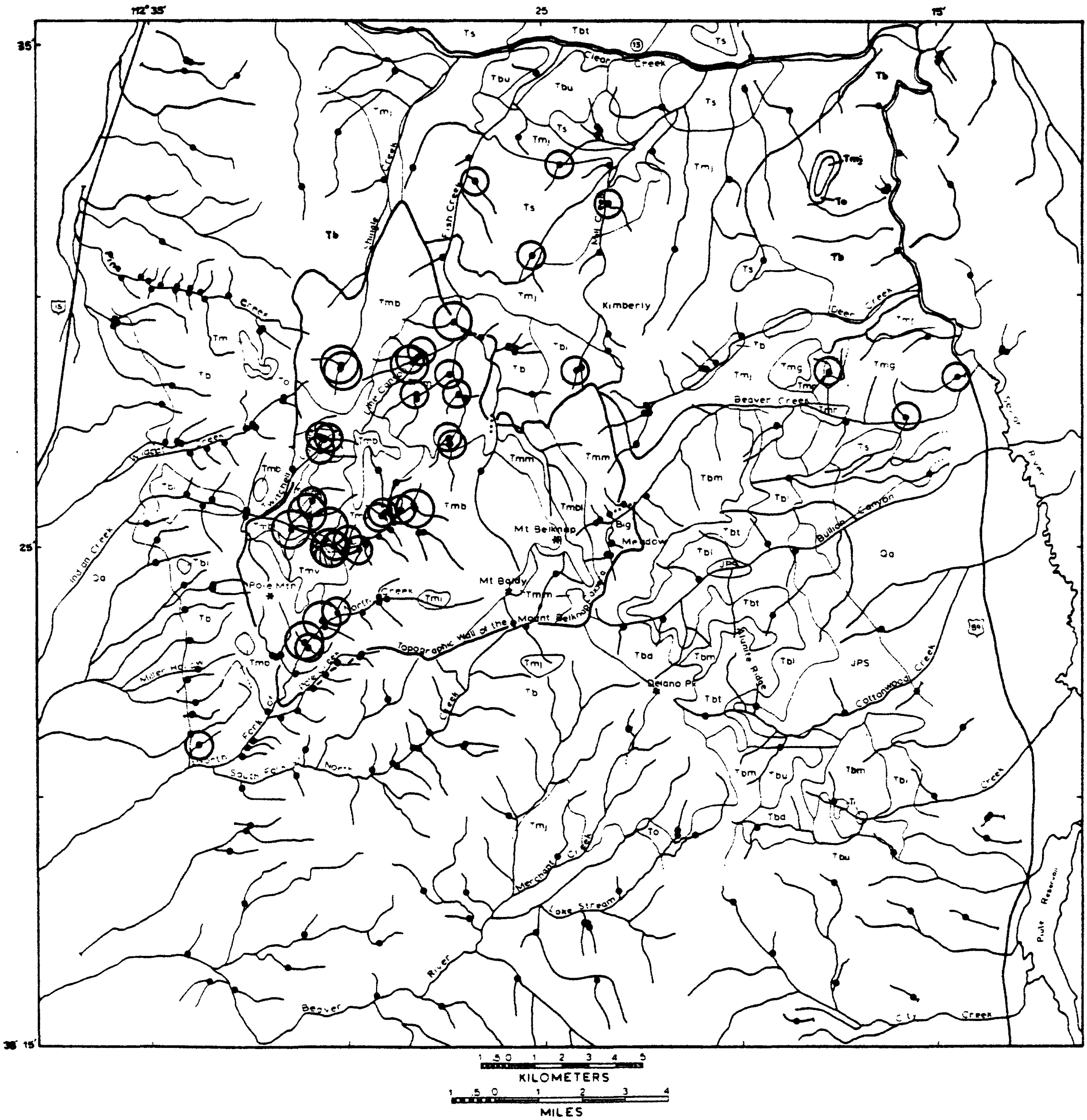


200-300 ppm

100-150 ppm

50-70 ppm

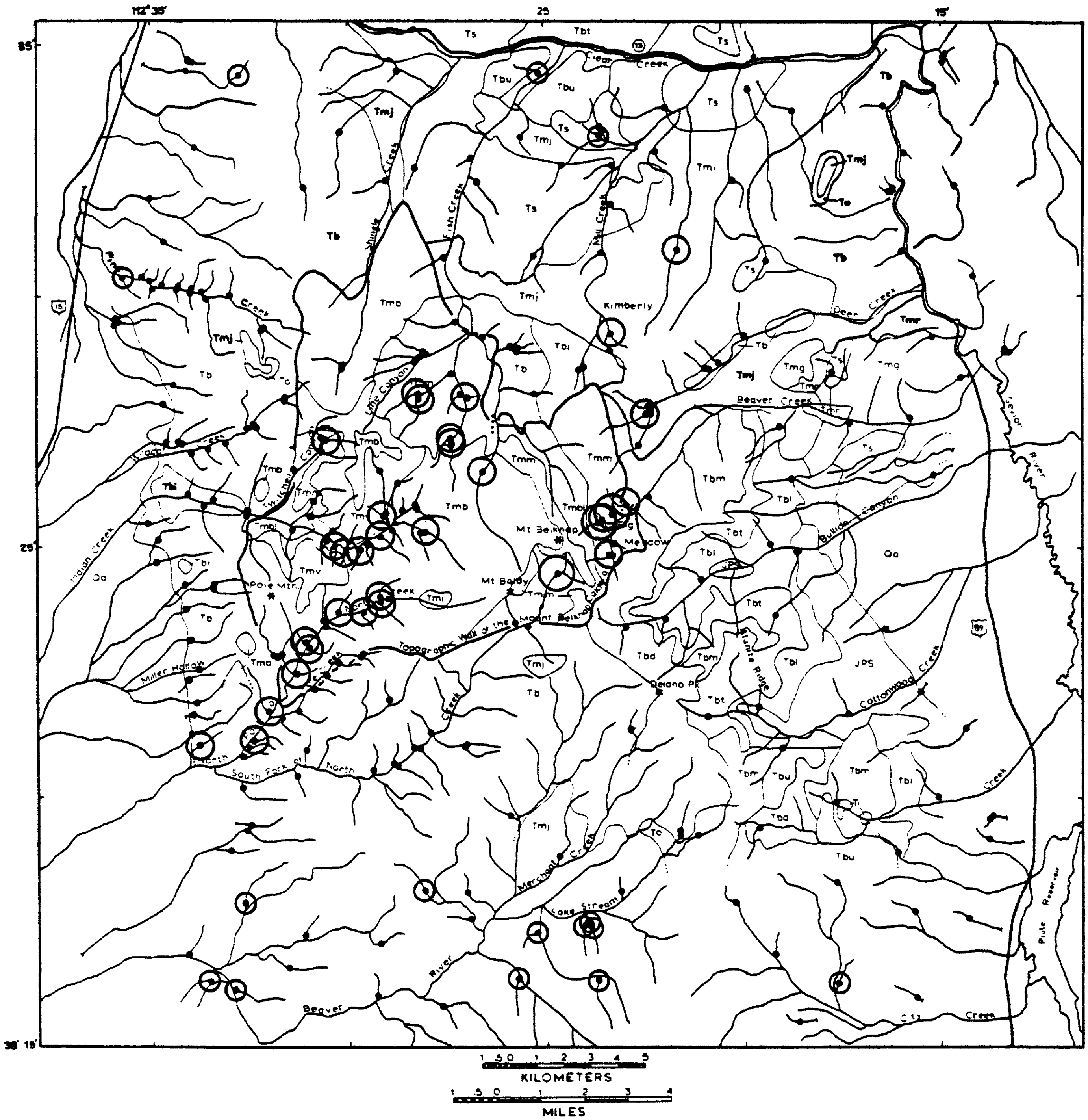
Figure 22.--Distribution of molybdenum concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.



○ ≥ 300 ppm

○ 200 ppm

Figure 23.--Distribution of tin concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

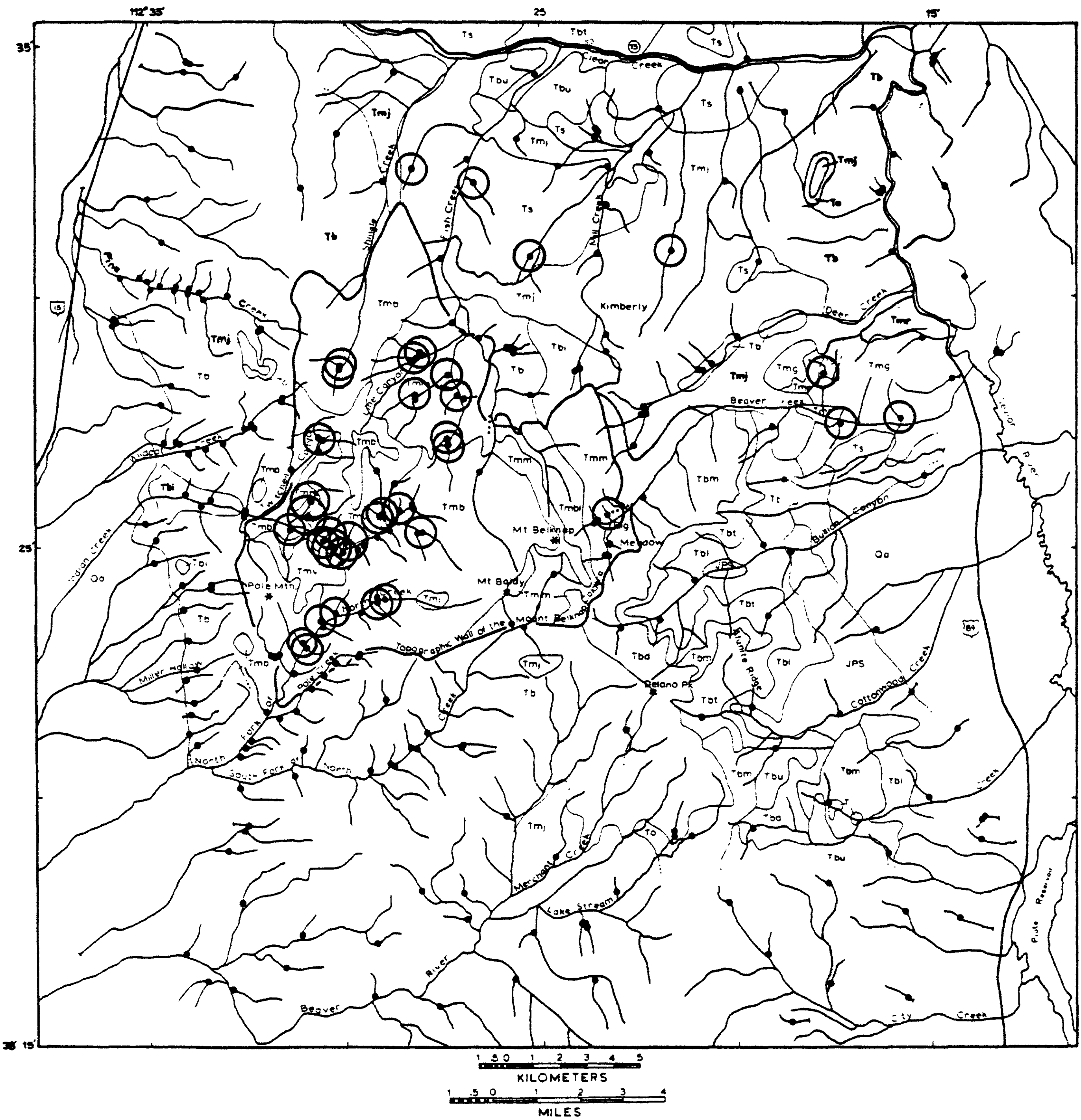


○ ≥ 3000 ppm

○ 1000-2000 ppm

○ ≤ 20 ppm

Figure 24.--Distribution of lead concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.



≥3000 ppm

1500-2000 ppm

Figure 25.--Distribution of zinc concentrations in the magnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

The groupings of elements tend to reflect the mineralogy that occurs within the different rock types. Table 11 gives some elemental concentrations from certain minerals found in the heavy mineral concentrate fraction from a survey in Montana (Breit, 1980). The Bullion Canyon Volcanics may contain sufficient biotite and amphiboles to account for much of the elevated concentrations observed in some trace and minor elements from the concentrates (see geological descriptions). However, the Mount Belknap Volcanics contain only trace amounts of biotite and amphiboles, which indicates other mineral phases are responsible for the elevated concentrations of many trace and minor elements from the concentrates. Minerals such as sphene, rutile, ilmenite, monzonite, allanite, columbite, euxenite, and fergusonite are magnetic at an 0.6 amperage. These minerals may contain elevated concentrations of trace and minor elements and are associated with granitic or rhyolitic rocks (Frondel and others, 1967; Hurlbut, 1971; and Parker and Fleischer, 1968). Some Fe-Ti minerals such as Nb-bearing illmenorutile have been identified in the North Fork of North Creek stock (C. G. Cunningham, oral commun., 1981; also see geologic descriptions).

Trace elements in this fraction may also be associated with hydromorphic and clastic iron and manganese coatings. These coatings may reflect surficial sorption and(or) they may reflect the precipitation of coatings associated with the circulation of hydrothermal fluids along zones of weakness or conduits, such as faults, breccia zones and(or) intraflow volcanic layers. Elevated concentrations of trace and minor elements in this fraction may reflect mineralization processes having occurred at depth (Miller, Motooka, and McHugh, 1980).

The elements beryllium, yttrium, zinc, molybdenum, tin, lead, zirconium, and niobium (figures 19, 21, 25, 22, 23, 24, 17, and 20) define a linear trend extending from the North Fork of North Creek in the southwest, through the headwaters of Indian Creek, to the Kimberly area in the northeast. The highest clustering of elevated concentrations for barium, beryllium, niobium, lead, tin, and zinc (figures 14, 19, 20, 24, 23, and 25) occur in the basins along the North Fork of North Creek, including Pole Creek, being designated the North Fork geochemical anomaly. The headwaters of Indian Creek contain elevated concentrations of these elements and is designated the Indian Creek geochemical anomaly. A clustering of elevated concentrations for molybdenum, lead, strontium, and iron (figures 22, 24, 16, and 13) occurs in the Big Meadow area. Sample 1586 contains elevated concentrations for beryllium and zinc (figures 19 and 25). This area is designated the Big Meadow geochemical anomaly. The basins draining into the Indian Creek and North Fork geochemical anomalies are predominately within Mount Baldy Rhyolite Member rocks, and may reflect the influence of the southern ring fracture and North Fork of North Creek stock. The basins draining into the Big Meadow geochemical anomaly are in the Tmm and Tmbl units of Mount Belknap Rhyolites and Tbm unit of the Bullion Canyon Volcanics. This area may have been influenced by intrusive activity near Gold Mountain.

Table 11.--Elemental concentration found in some minerals from a stream sediment concentrate survey in Montana.

Element	Hornblende	Biotite	Sphene	Magnetic Fraction*	Feldspars
Fe (wt.%)	20	20	2	50	0.7
Mg (wt.%)	2	2	0.1	0.05	0.1
Ca (wt.%)	3	1.5	5	0.2	2
Ti (wt.%)	0.7	1	>2	0.7	0.02
Mn (ppm)	7000	7000	1500	3000	100
Ag (ppm)	<1	<1	<1	<1	<1
As (ppm)	<500	<500	<500	<500	<500
Au (ppm)	<20	<20	<20	<20	<20
B (ppm)	<20	<20	<20	<20	<20
Ba (ppm)	200	1500	<50	50	1000
Be (ppm)	<2	<2	<2	<2	<2
Bi (ppm)	<20	<20	<20	<20	<20
Cd (ppm)	<50	<50	<50	<50	<50
Co (ppm)	50	70	<10	50	<10
Cr (ppm)	70	20	<20	300	<20
Cu (ppm)	10	<10	<10	50	<10
La (ppm)	>2000	<50	1000	700	<50
Mo (ppm)	<10	<10	30	<10	<10
Nb (ppm)	<50	<50	1500	<50	<50
Ni (ppm)	20	20	10	15	10
Pb (ppm)	50	20	<20	<20	20
Sb (ppm)	<200	<200	<200	<200	<200
Sc (ppm)	10	20	15	<10	<10
Sn (ppm)	20	<20	150	<20	<20
Sr (ppm)	<200	<200	<200	<200	500
V (ppm)	500	500	500	5000	<20
W (ppm)	<100	<100	<100	<100	<100
Y (ppm)	500	<20	5000	100	<20
Zn (ppm)	<500	500	<500	<500	<500
Zr (ppm)	500	150	2000	2000	20
Th (ppm)	5000	<200	<200	<200	<200

* - mostly magnetite and ilmenite

from Breit, 1980, page 57.

Nonmagnetic Fraction

The minerals in this fraction are nonmagnetic at a 0.6 amperage. It should be noted, however, that many minerals such as sphene, rutile, and(or) zircon have wide ranges of magnetic susceptibilities (Table 3), due to the amount of paramagnetic ions such as Fe^{2+} that may be incorporated into the crystal lattice.

Elevated concentrations of the ore elements, molybdenum, copper, lead, and(or) zinc in this fraction may reflect a near surficial source for primary sulfide mineral deposits because most sulfides and their weathering products are found in this fraction. It may also represent a mineralogical suite in which these elements have been incorporated into the crystal lattice of minerals, such as sphene, rutile, hematite, monazite, and(or) others (Table 3, and Parker and Fleischer, 1968).

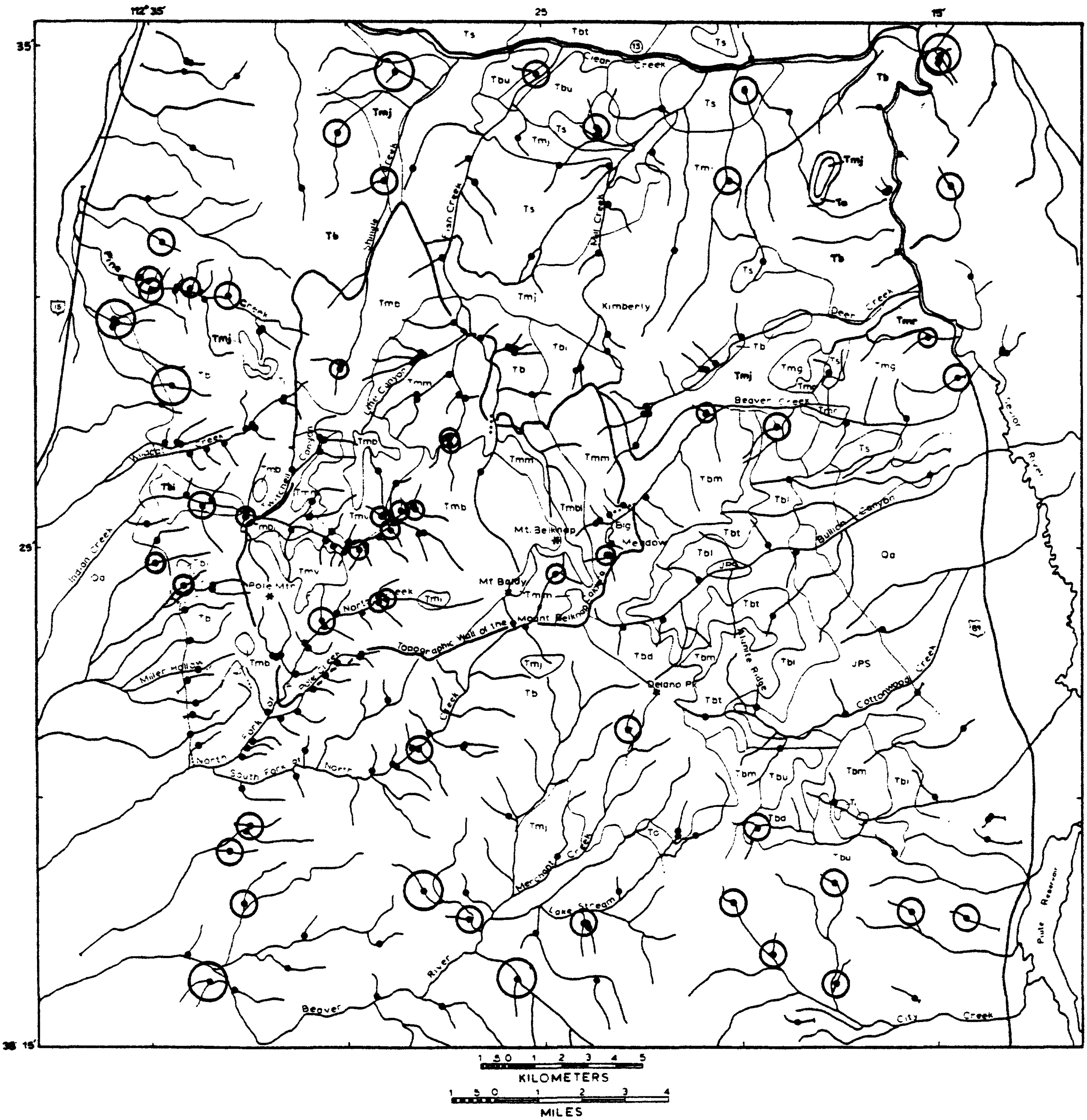
A correlation matrix was used to help define possible geochemical suites within the data sets, and is given in Table 12. Although there are complex interelement correlations, it is possible to depict two geochemical suites from the data. However, not all of the elements in a suite have significant correlations at the 5 percent significance level. The first suite consists of manganese, beryllium, niobium, yttrium, and thorium. The second suite consists of magnesium, calcium, chromium, and nickel. The spatial distribution of the elements appears to define the two major rock types. Anomalous concentrations of the first suite are found within the rhyolitic rocks. Anomalous concentrations of the second suite are found in the Bullion Canyon Volcanics.

The spatial distributions for elements of the nonmagnetic fraction were examined with respect to rock type and possible alteration. There are three distinct groups of elements based on their spatial distribution. The first group contains magnesium, calcium, barium, strontium, chromium, and copper (figures 26-31). Elevated concentrations of these elements are associated with drainages in the Bullion Canyon Volcanics. The second group consists of iron, boron, bismuth, and lanthanum (figures 32-35) and show no definite distribution related to rock type or clustering in certain regions. The third group consists of beryllium, niobium, yttrium, manganese, molybdenum, lead, zinc, and tin (figures 36-43). Elevated concentrations of these elements are associated with drainages in the Mount Belknap caldera and in the Mount Belknap Volcanics. The third group contains many of the elements commonly associated with highly differentiated, leucocratic rhyolites or granites. Elevated concentrations for copper, barium, strontium, iron, and lead (figures 31, 28, 29, and 41) occur in streams draining the known mineral deposits near Alunite Ridge. There are elevated concentrations of copper, barium, iron, molybdenum, strontium, and tin (figures 31, 28, 32, 40, 29, and 43) occur within the Indian Creek geochemical anomaly. The Big Meadow geochemical anomaly has a clustering of elevated concentrations containing molybdenum, lead, niobium, iron, manganese, and copper (figures 40, 41, 37, 32, 39, and 31). The anomalous concentrations of manganese, beryllium, yttrium, zinc, niobium, and lead within the Indian Creek and North Fork geochemical anomalies may reflect the geochemical character of the Mount Baldy Rhyolite Member.

Table 12.--Correlation matrix for the nonmagnetic fraction.

	Fe	Mg	Ca	Ti	Mn	B	Ba	Be	Bi	Co	Cr	Cu	La	Mo	Nb	Ni	Pb	Sn	Sr	V	W	Y	Zn	Zr	Th
Fe .1%	5.32	-0.06	-0.22	-0.07	0.01	-0.08	0.24	0.03	-0.22	0.71	-0.06	0.34	-0.20	0.08	0.03	-0.02	0.09	0.20	-0.04	0.05	-0.03	-0.14	0.36	-0.11	0.15
Mg .05%	263	2.21	0.41	-0.14	-0.10	-0.06	-0.01	-0.28	0.18	0.15	0.87	-0.07	-0.10	-0.10	-0.14	0.41	-0.03	-0.22	-0.06	0.18	-0.09	-0.14	0.01	0.10	-0.25
Ca .1%	263	263	4.00	0.05	-0.25	-0.10	0.05	-0.32	0.25	-0.04	0.42	-0.07	0.33	0.08	-0.28	0.17	-0.07	-0.07	0.02	0.08	0.41	-0.16	-0.22	0.11	-0.44
Ti .005%	124	124	124	0.57	-0.03	0.11	-0.01	-0.17	0.54	-0.28	-0.13	-0.05	0.21	0.03	0.13	-0.40	0.02	0.02	-0.11	-0.07	****	-0.11	-0.31	-0.25	-0.26
Mn 20ppm	251	251	251	118	2782	-0.04	-0.23	0.51	-0.03	-0.05	-0.12	-0.16	0.14	-0.11	0.57	-0.13	-0.01	0.22	-0.26	-0.13	-0.10	0.40	0.19	0.19	0.57
B 20ppm	241	241	241	110	230	144.	-0.04	-0.00	0.54	-0.12	-0.07	-0.00	-0.03	-0.12	-0.12	-0.13	0.04	0.04	-0.04	-0.04	-0.22	-0.01	-0.36	-0.28	0.01
Ba 50ppm	234	234	234	103	223	217	2637	-0.17	0.10	0.20	-0.04	0.05	-0.13	0.03	-0.23	-0.05	-0.07	-0.02	0.30	0.15	0.34	-0.21	0.05	0.20	-0.16
Be 2ppm	193	193	193	85	182	183	174	15.3	-0.19	-0.15	-0.23	-0.10	-0.07	-0.02	0.07	-0.25	-0.00	0.21	-0.24	-0.28	0.00	0.50	0.16	0.18	0.69
Bi 15ppm	26	26	26	7	26	26	24	24	392.	-0.27	0.03	0.02	0.18	-0.12	0.09	-0.36	-0.07	-0.06	-0.05	0.09	****	0.01	0.11	****	-0.20
Co 10ppm	155	155	155	79	152	136	131	105	9	21.8	0.10	0.31	-0.20	-0.04	-0.15	0.17	-0.00	0.20	-0.06	-0.01	-0.18	-0.26	0.39	-0.21	0.11
Cr 20ppm	258	258	258	121	248	236	229	188	26	155	426.	-0.02	-0.06	-0.09	-0.12	0.44	-0.03	-0.24	-0.07	0.18	-0.08	-0.11	0.09	0.20	-0.23
Cu 10ppm	176	176	176	82	167	160	150	137	16	134	174	119.	-0.21	-0.04	-0.12	-0.00	0.00	0.07	0.39	-0.02	0.03	-0.14	0.24	-0.34	-0.23
La 50ppm	262	262	262	123	250	240	233	193	26	154	257	176	393.	-0.03	0.19	0.00	-0.07	-0.10	-0.13	-0.00	0.19	0.34	-0.03	0.27	-0.04
Mo 7ppm	151	151	151	49	141	146	134	133	23	80	147	107	150	38.3	-0.00	-0.11	0.62	-0.01	0.01	-0.02	-0.14	-0.09	-0.01	0.15	0.06
Nb 50ppm	231	231	231	94	220	220	213	177	25	124	226	149	230	143	194.	-0.09	-0.04	0.13	-0.30	-0.13	-0.08	0.27	-0.02	0.42	0.20
Ni 10ppm	103	103	103	63	100	88	88	67	4	91	103	79	102	49	78	103.	-0.06	-0.21	-0.06	-0.04	****	-0.15	0.09	0.10	0.04
Pb 20ppm	234	234	234	106	222	217	207	186	26	136	229	168	233	144	209	87	3290.	-0.02	-0.02	-0.02	-0.19	-0.03	0.19	0.00	0.13
Sn 15ppm	151	151	151	53	142	148	144	123	18	68	147	86	151	99	148	46	137	336.	-0.09	-0.02	-0.23	0.12	-.12	****	0.27
Sr 20ppm	220	220	220	104	213	198	192	154	17	152	218	164	219	121	188	97	193	114	1100.	0.05	0.05	-0.23	-0.15	-0.01	-0.37
V 20ppm	263	263	263	124	251	241	234	193	26	155	258	176	262	151	231	103	234	151	220	331.	0.01	-0.15	0.07	-0.06	-0.06
W 70ppm	21	21	21	1	20	21	18	19	0	15	21	21	21	19	20	4	21	13	21	21	137.	-0.07	****	****	-0.21
Y 20ppm	255	255	255	118	245	233	226	185	26	155	252	172	254	146	223	103	226	145	219	255	21	614.	0.21	0.35	0.46
Zn 300ppm	67	67	67	31	57	65	66	62	9	14	62	29	67	49	64	15	64	52	34	67	0	60	290.	-1.0	0.15
Zr 20ppm	28	28	28	21	27	19	20	21	0	26	28	25	28	15	15	20	26	6	27	28	4	28	2	438.	****
Th 150ppm	148	158	158	56	147	156	151	123	20	65	154	89	157	104	155	39	143	120	119	158	9	151	62	1	1120.

note: the diagonal of the correlation matrix contains the standard deviation of the variable for only the valid pairs, numbers below the line denote valid pairs, **** denotes no correlation was calculated

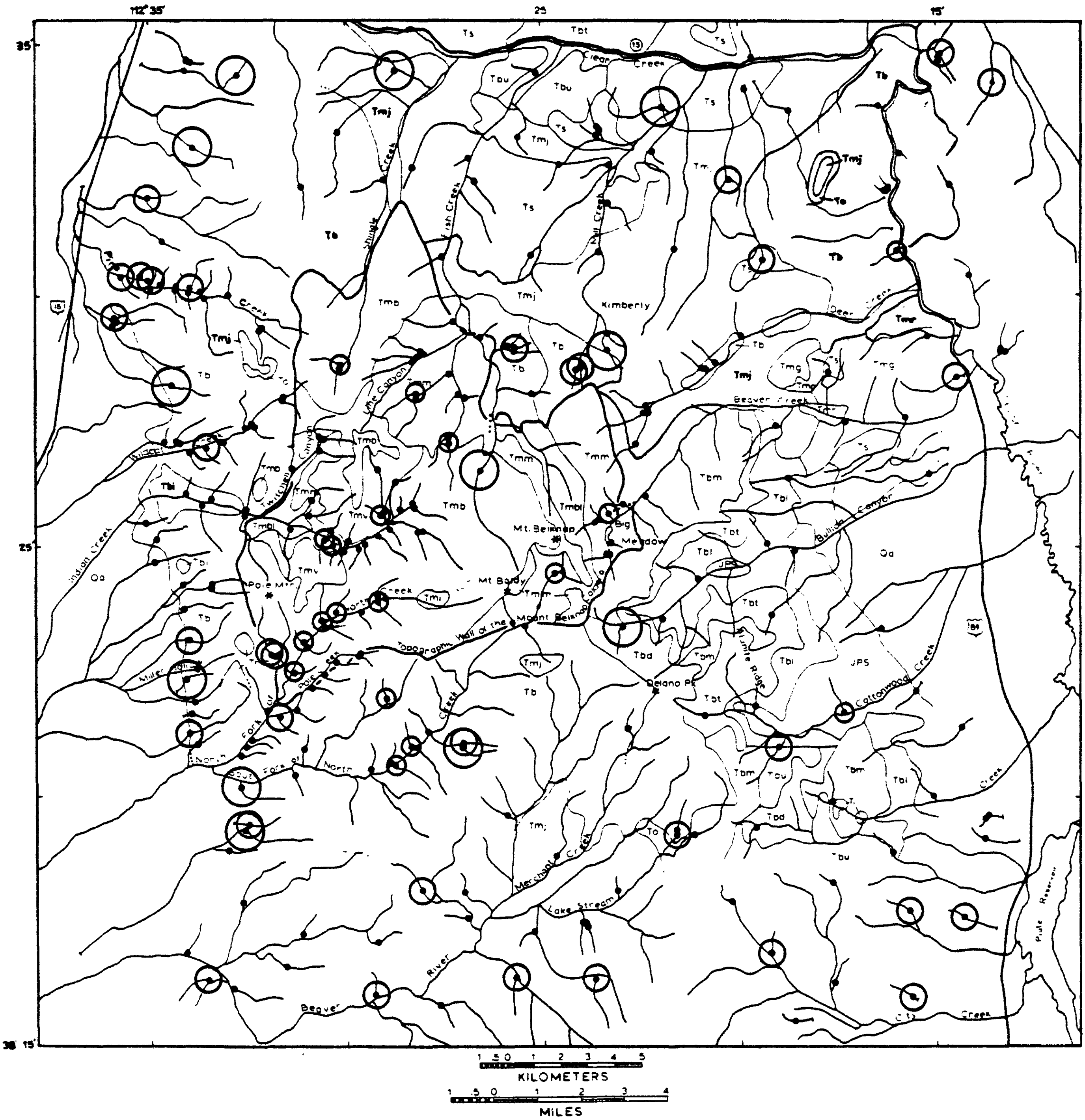


○ ≥10 %

○ 5-7 %

○ ≤0.2 %

Figure 26.--Distribution of magnesium concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

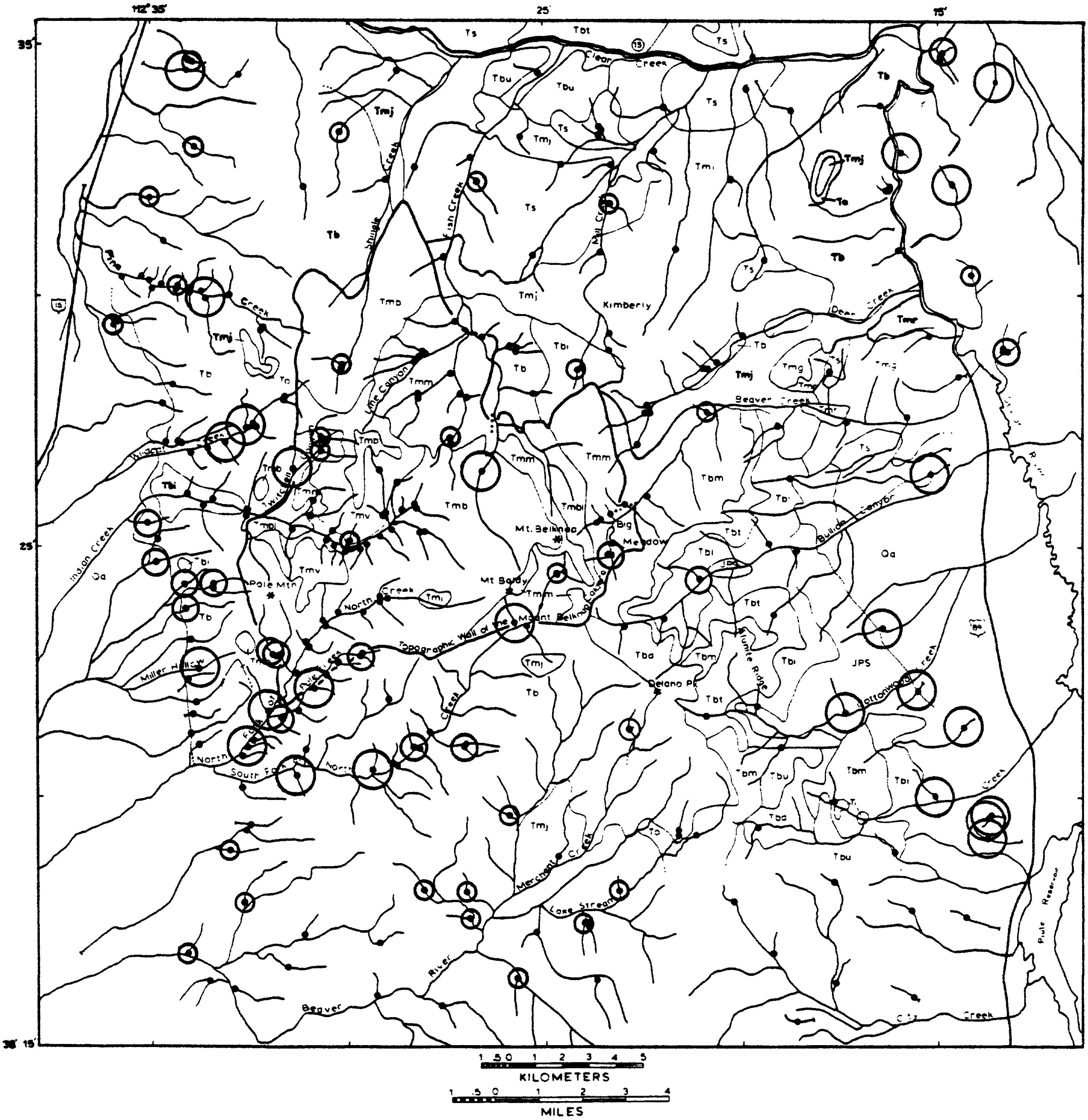


◯ ≥15 %

◯ 10 %

○ ≤0.7 %

Figure 27.--Distribution of calcium concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

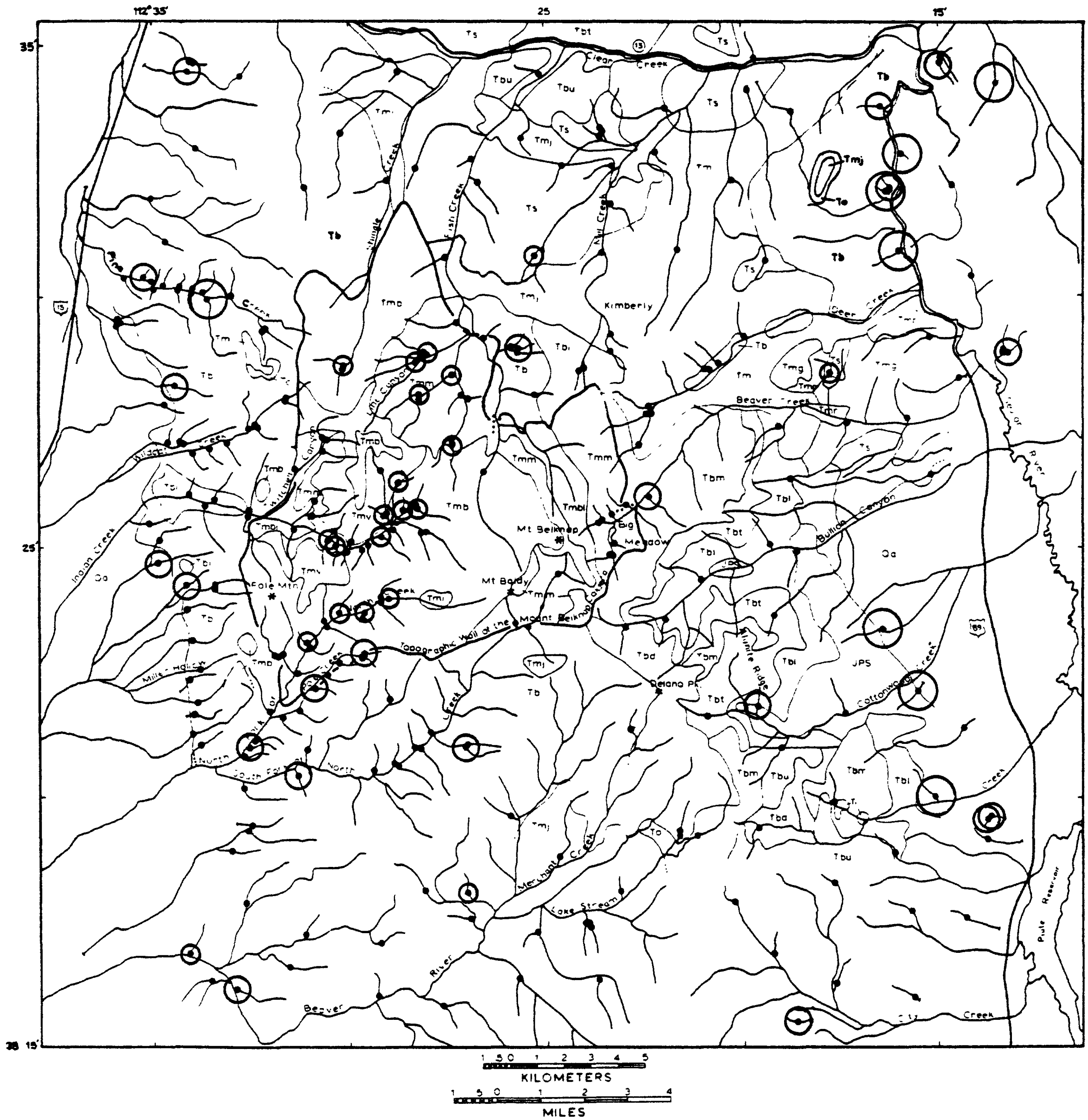


20,000 ppm

10,000 ppm

≤ 200 ppm

Figure 28.--Distribution of barium concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

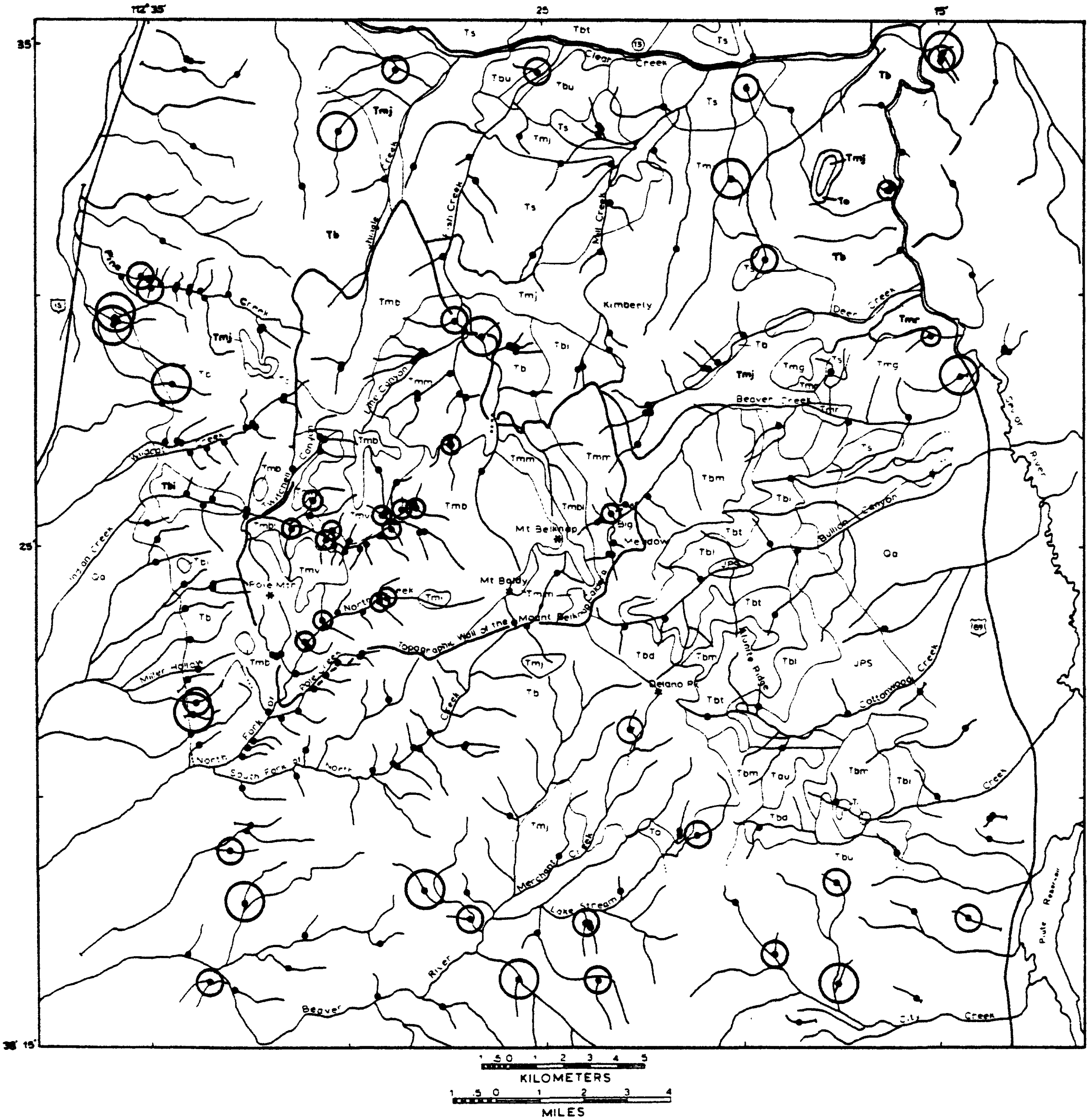


◯ ≥ 3000 ppm

◯ 1500-2000 ppm

◯ 50 ppm

Figure 29.--Distribution of strontium concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

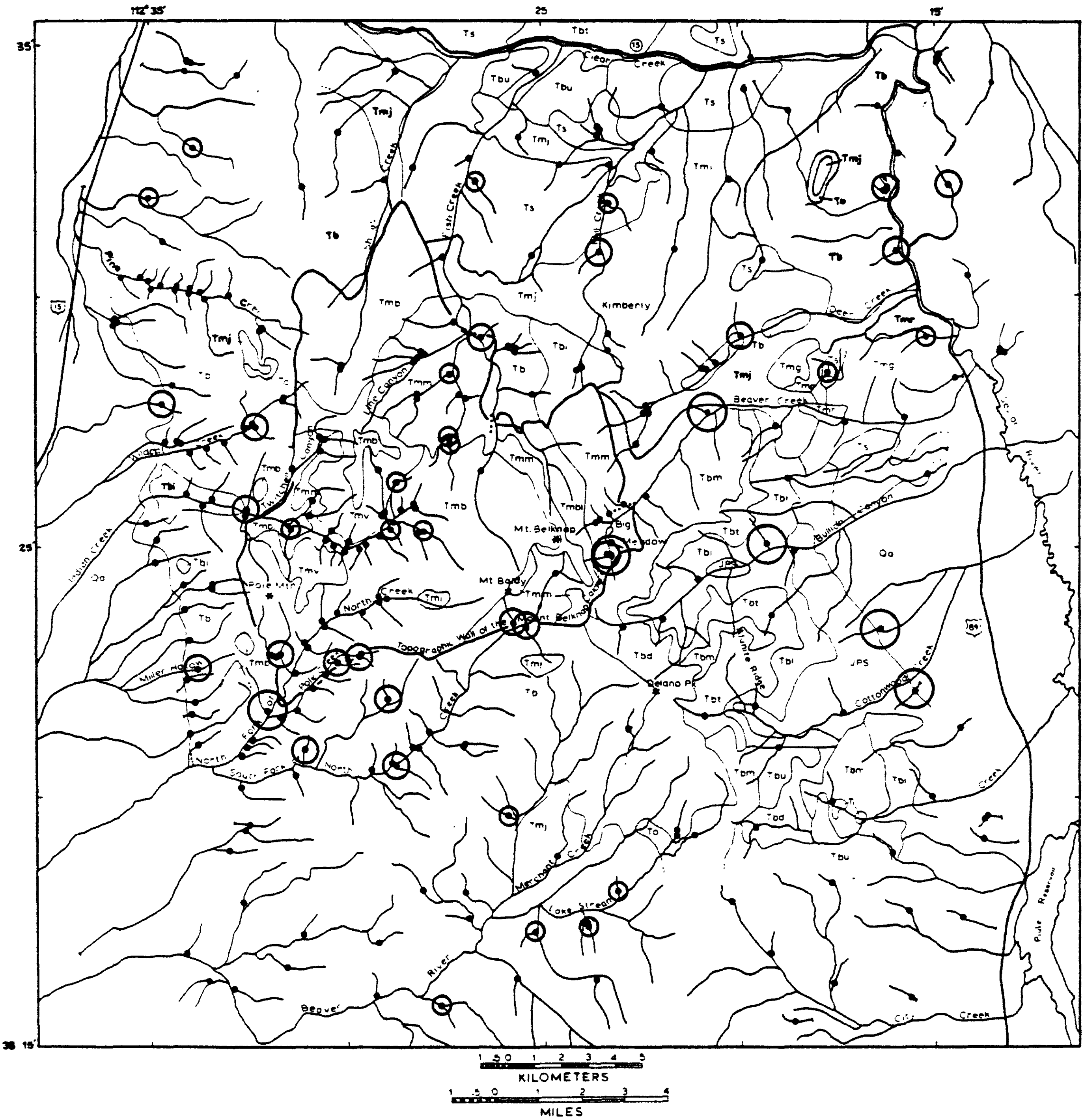


≥1500 ppm

1000 ppm

≤ 20 ppm

Figure 30.--Distribution of chromium concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

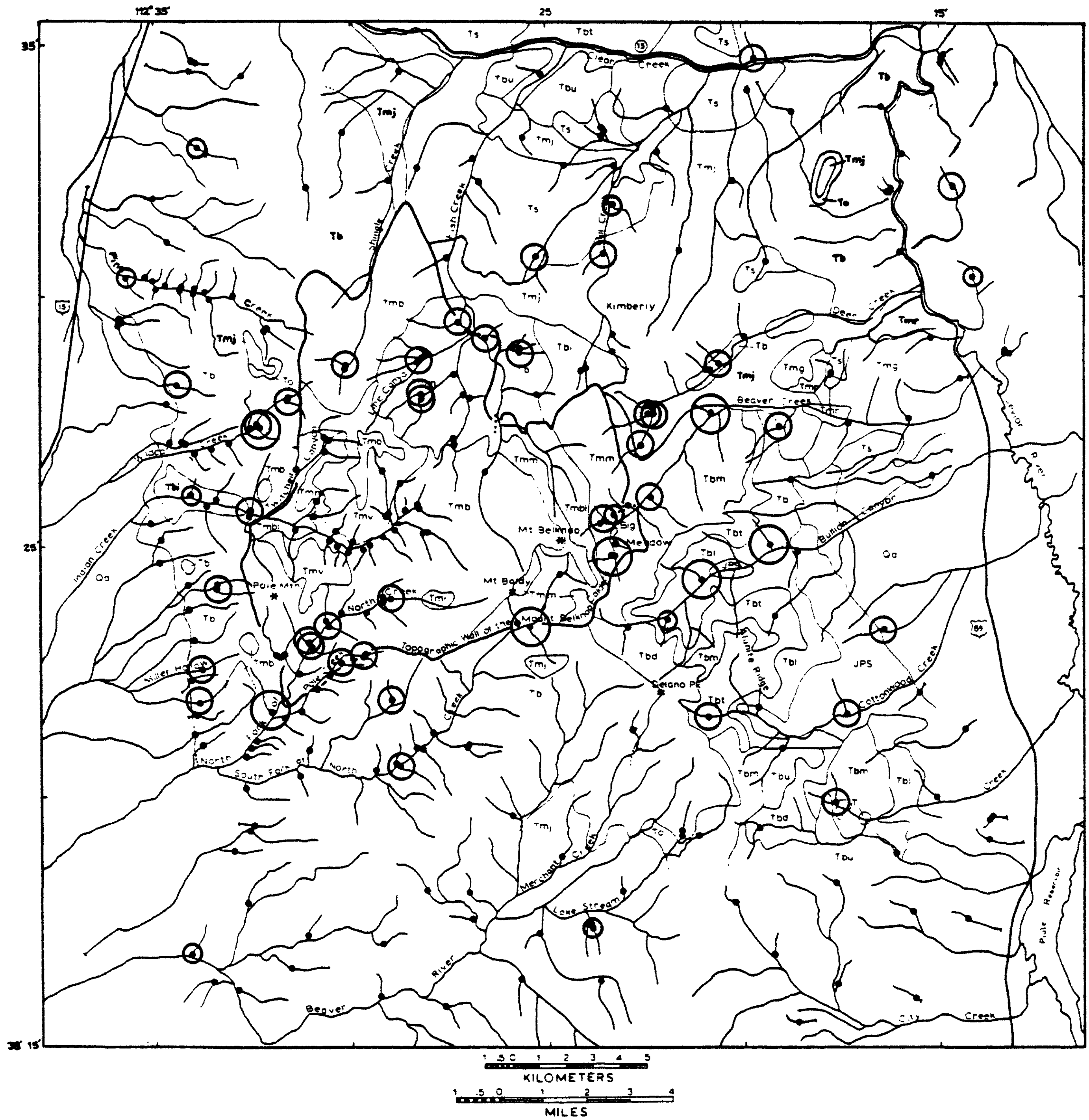


○ ≥200 ppm

○ 50-150 ppm

○ not detected

Figure 31.--Distribution of copper concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

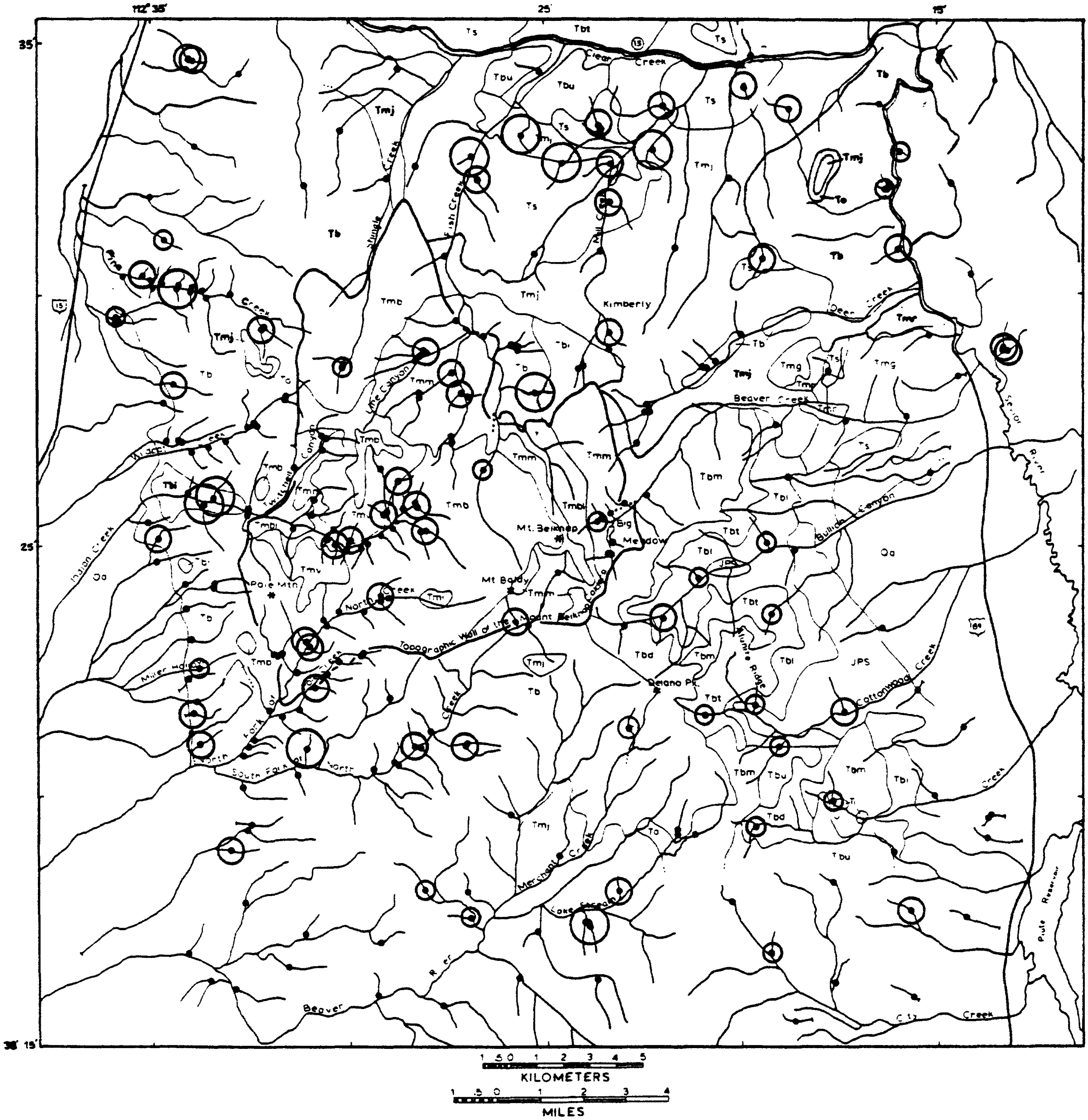


≥20 %

10-15 %

≤1 %

Figure 32.--Distribution of iron concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

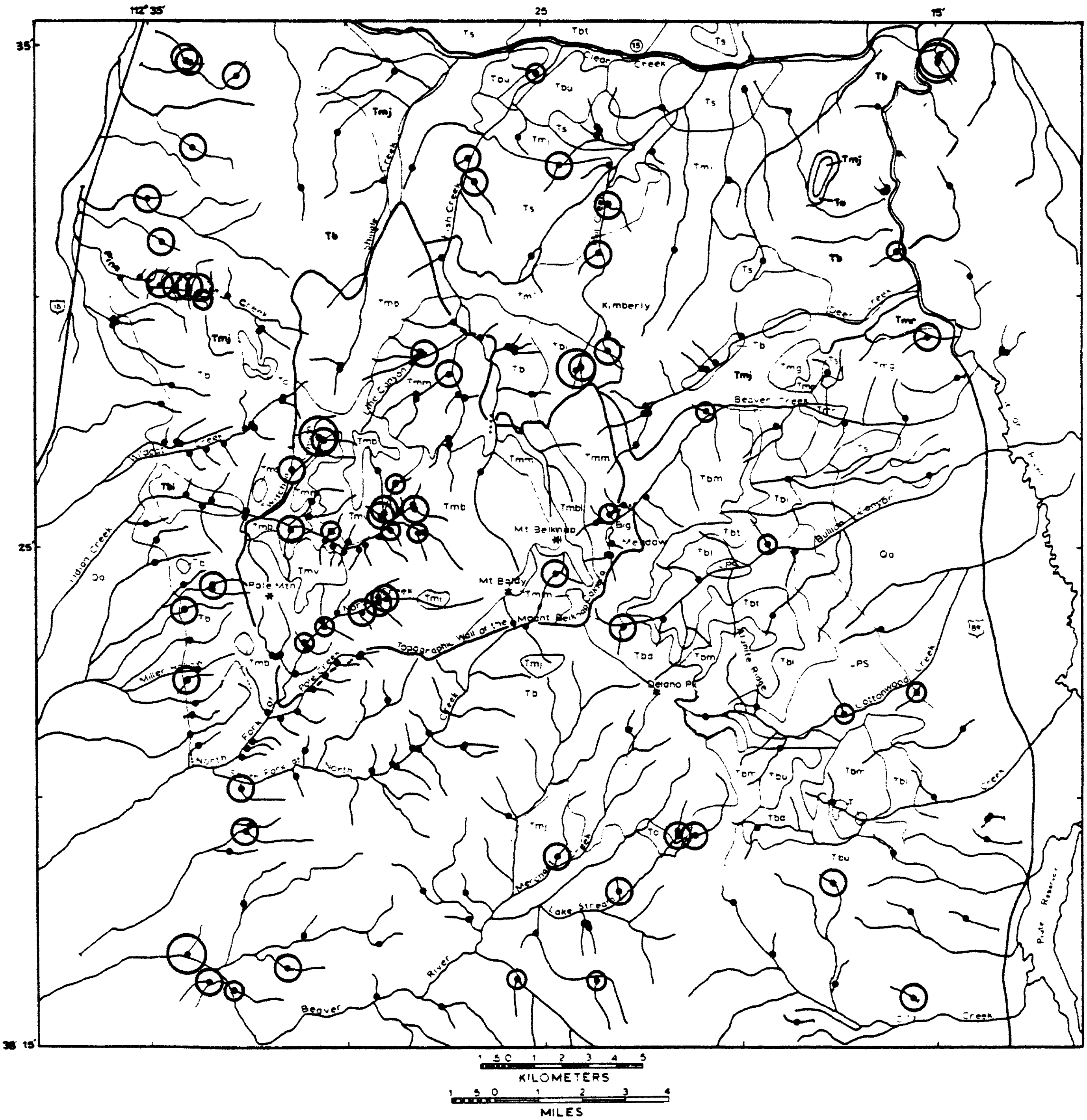


≥300 ppm

150-200 ppm

≤15 ppm

Figure 33.--Distribution of boron concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

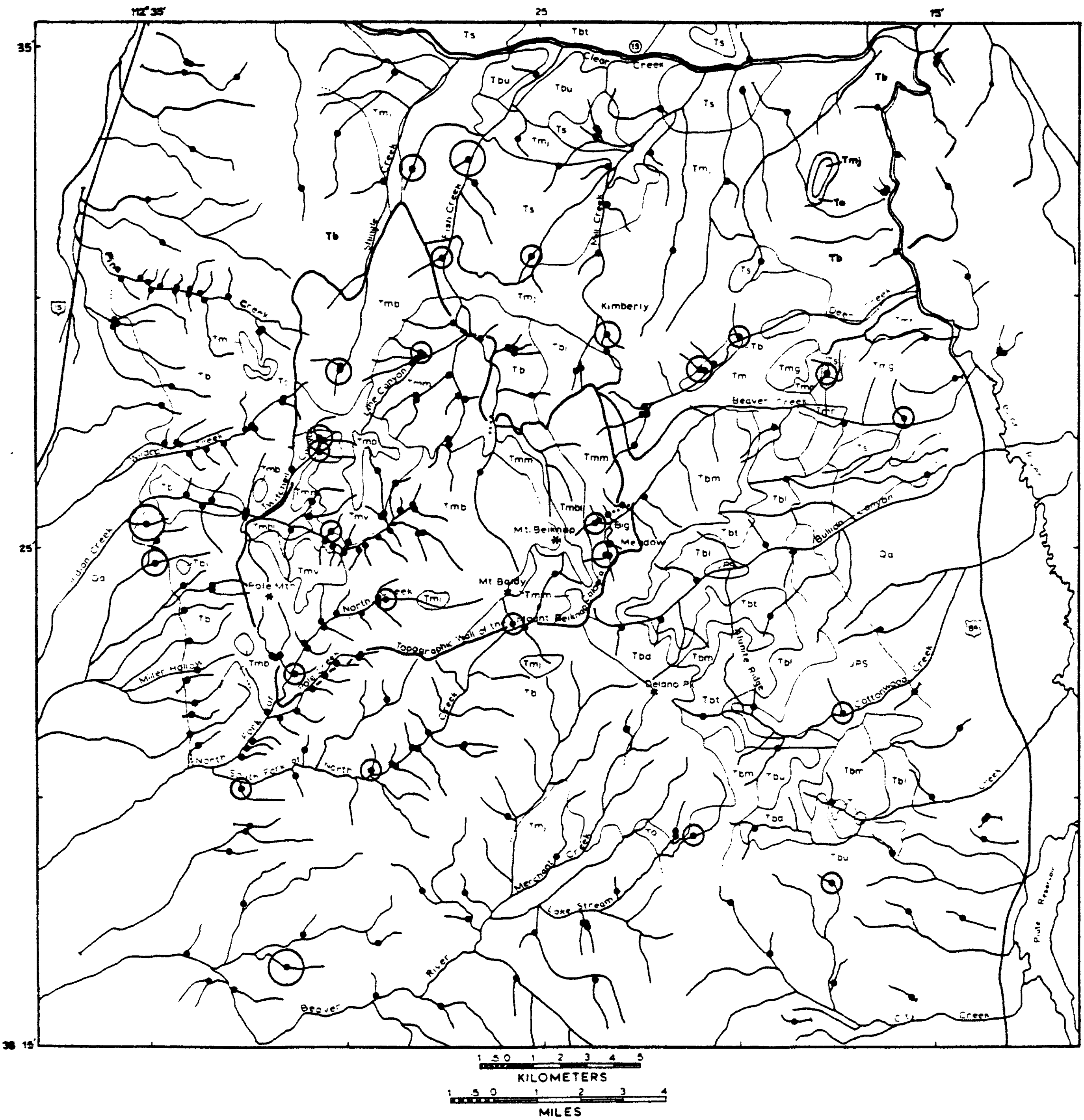


○ ≥ 2000 ppm

○ 1000-1500 ppm

○ ≤ 150 ppm

Figure 34.--Distribution of lanthanum concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

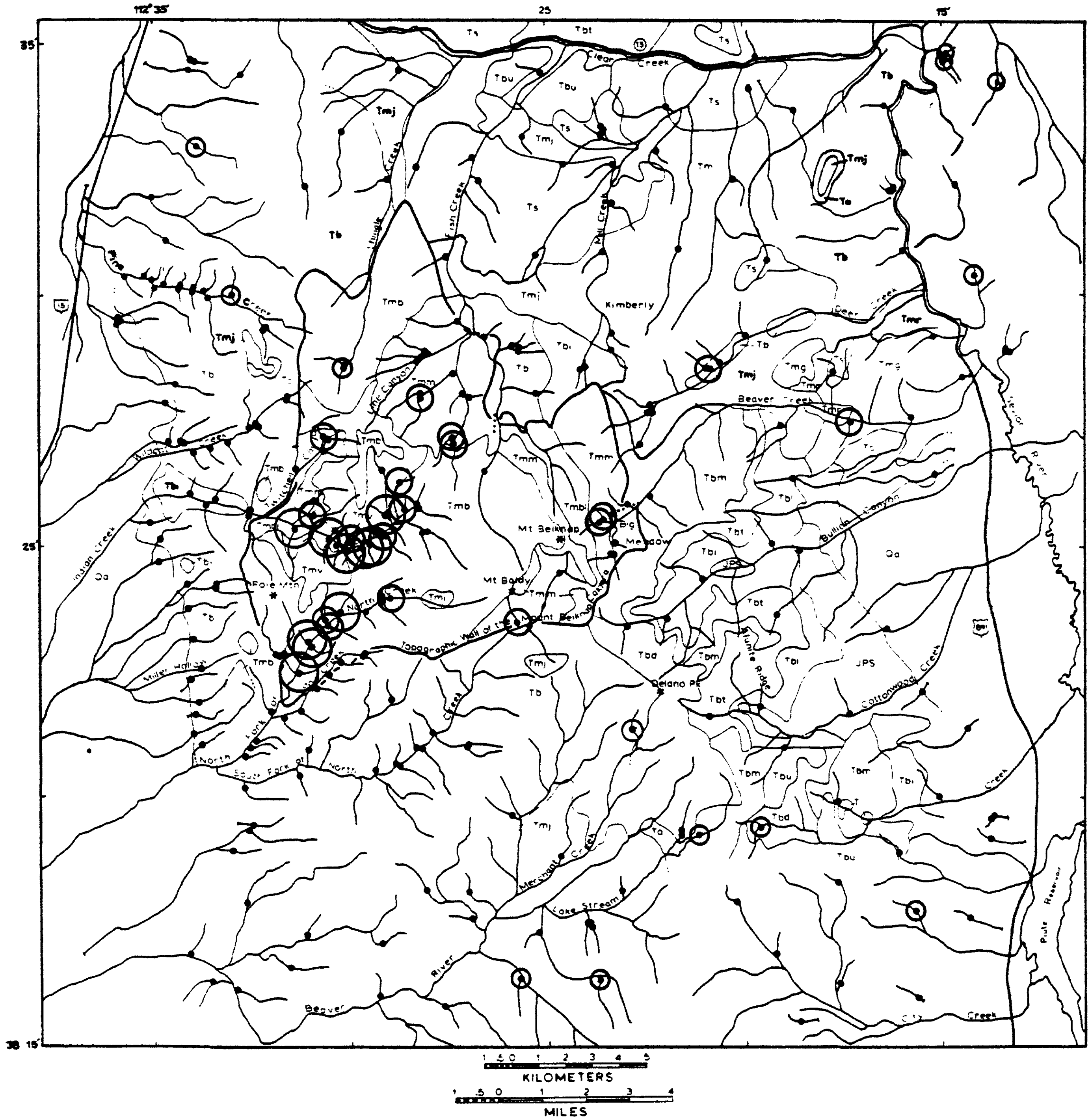


○ ≥ 1000 ppm

○ 100-700 ppm

○ 15-70 ppm

Figure 35.--Distribution of bismuth concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

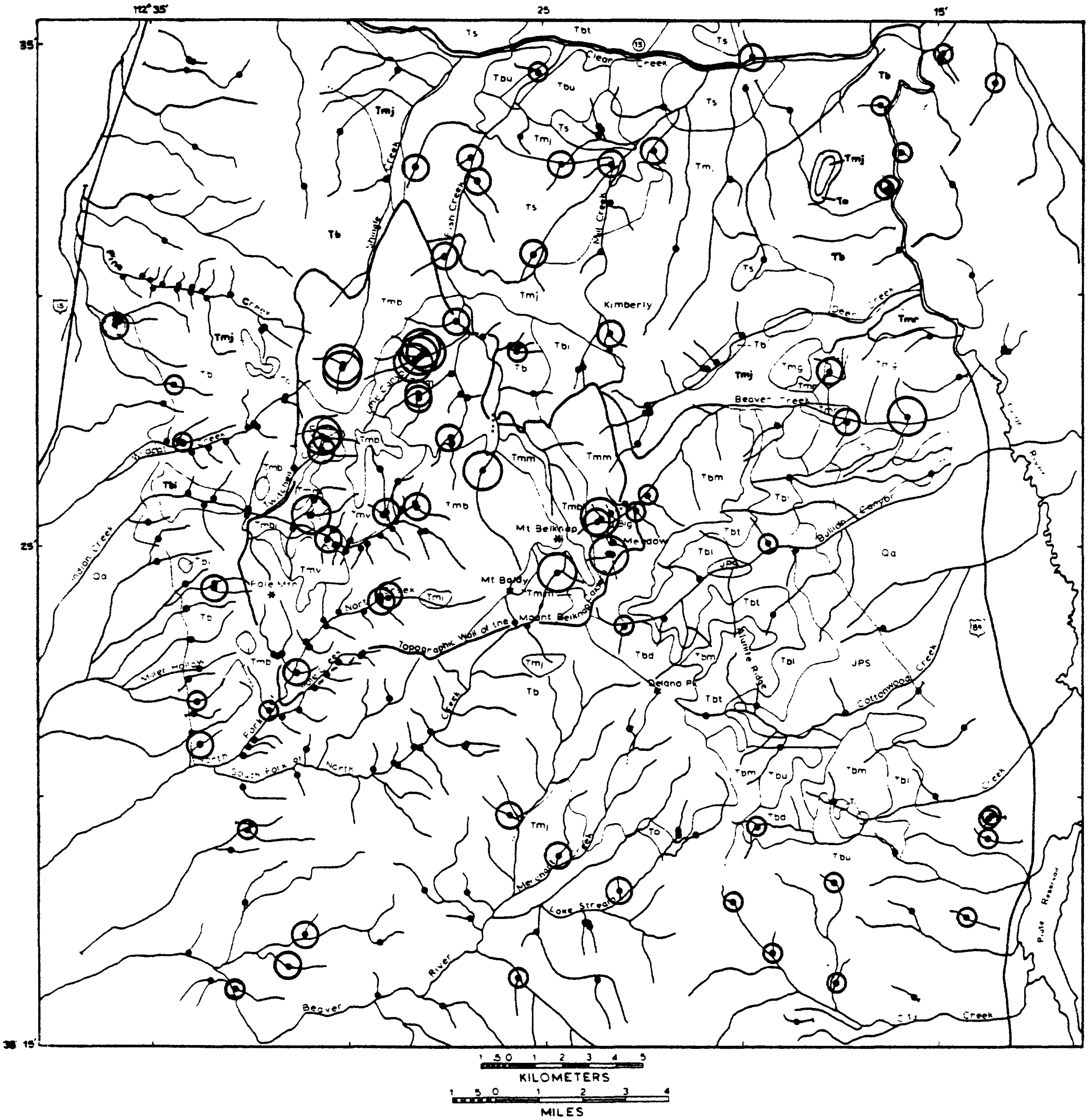


○ ≥ 50 ppm

○ 20-30 ppm

○ 0.7 ppm

Figure 36.--Distribution of beryllium concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

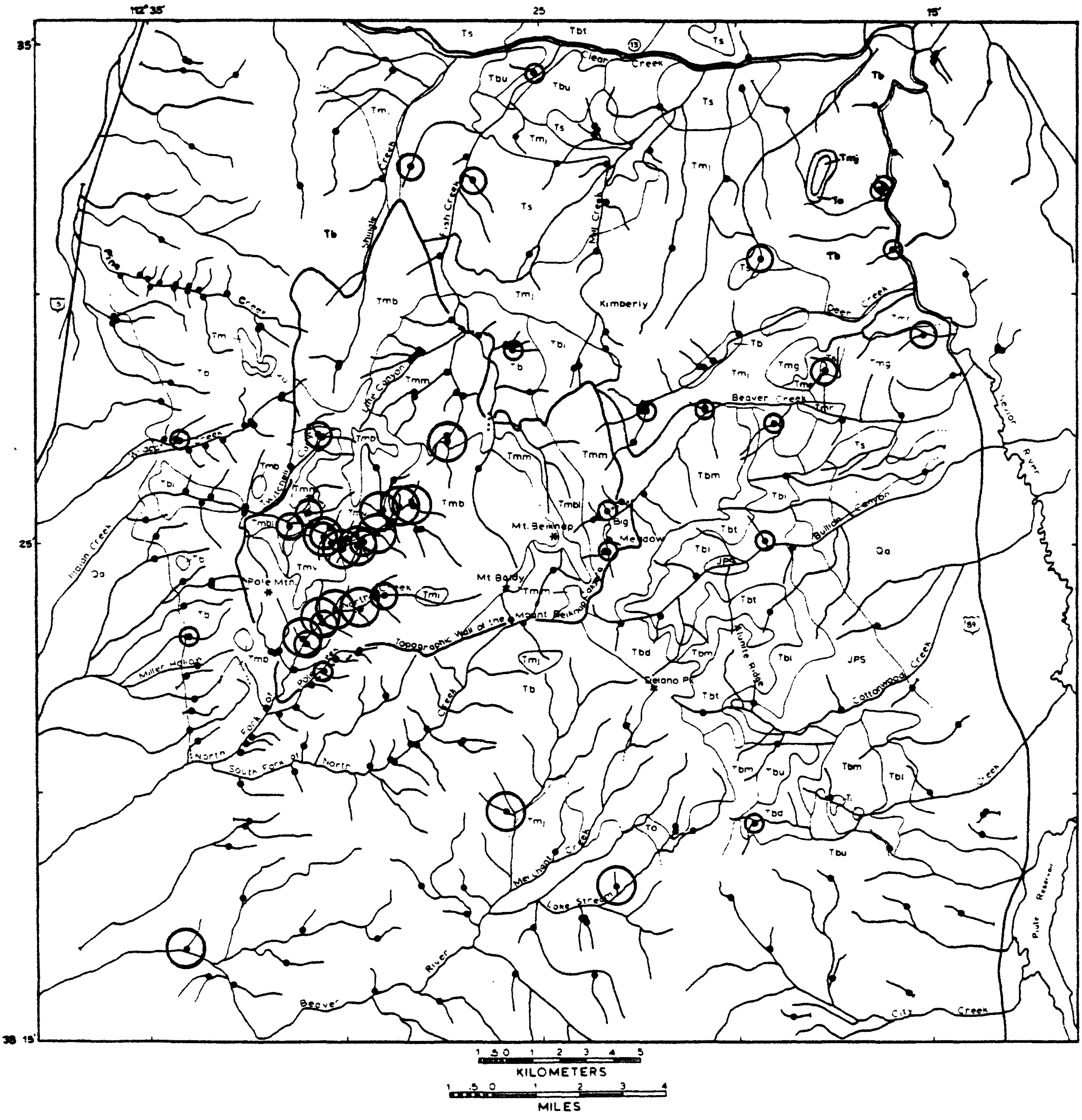


○ ≥ 700 ppm

○ 300-500 ppm

○ ≤ 30 ppm

Figure 37.--Distribution of niobium concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

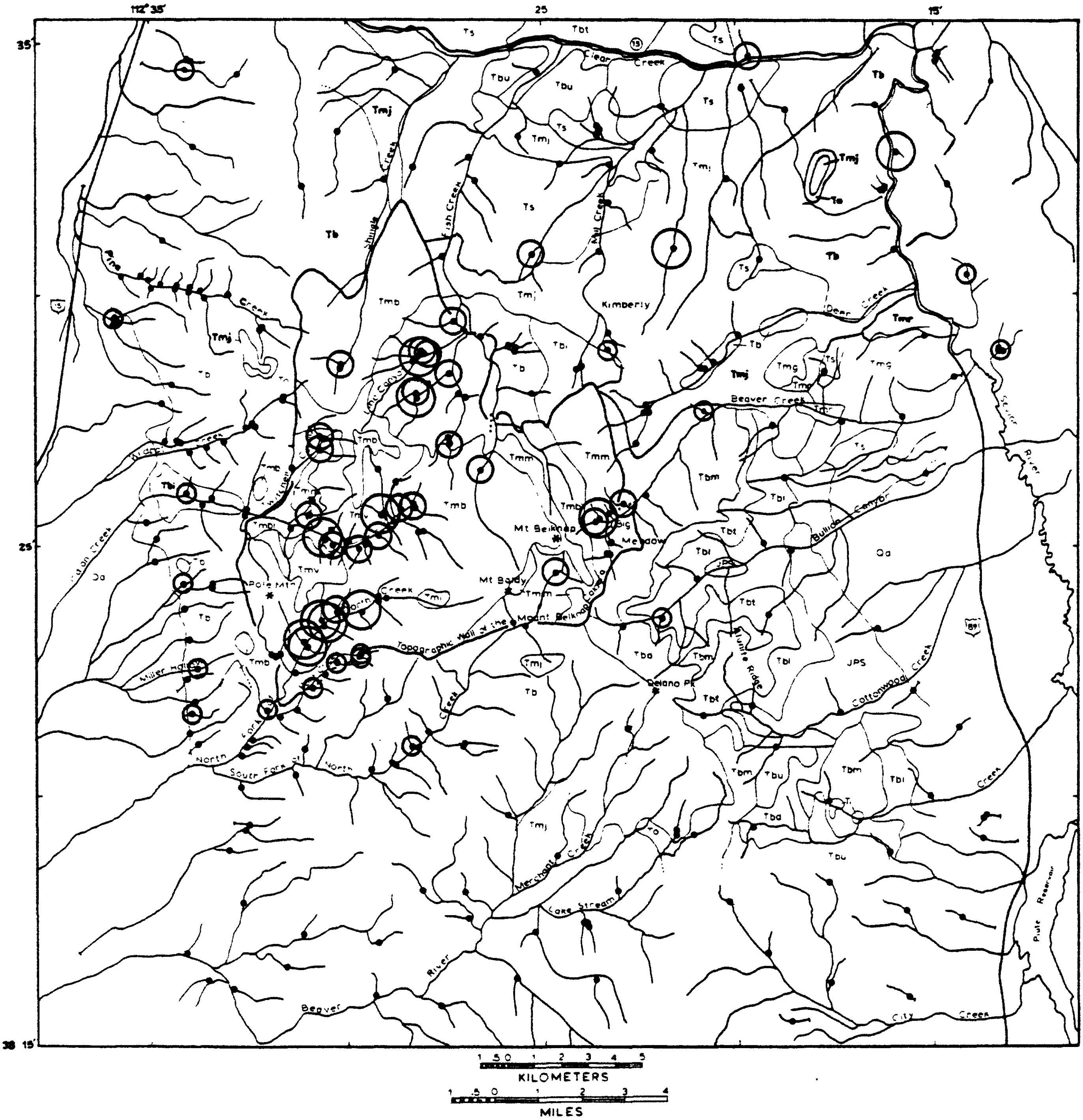


≥3000 ppm

1500-2000 ppm

≤100 ppm

Figure 38.--Distribution of yttrium concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

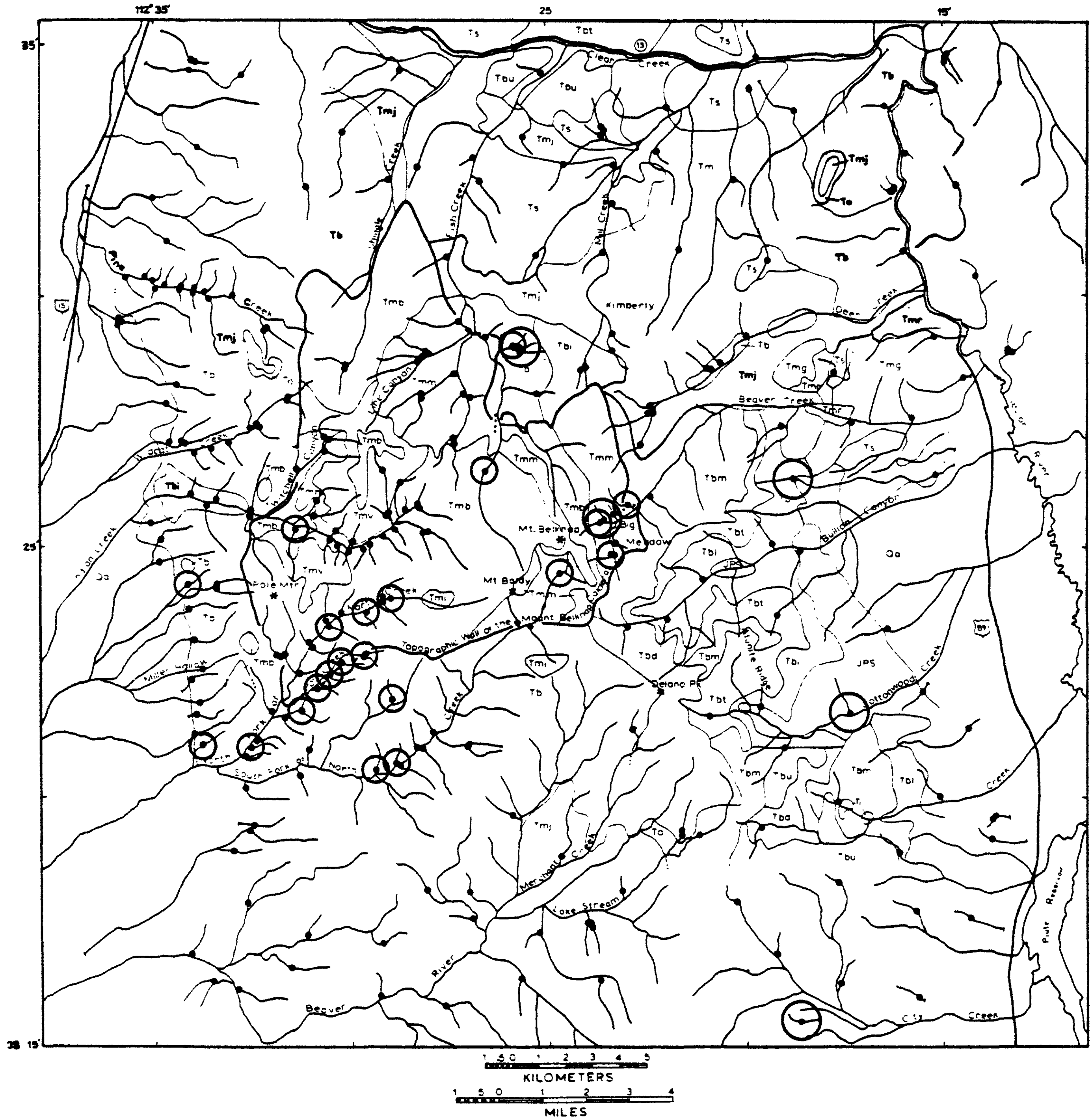


15,000 ppm

10,000 ppm

≤700 ppm

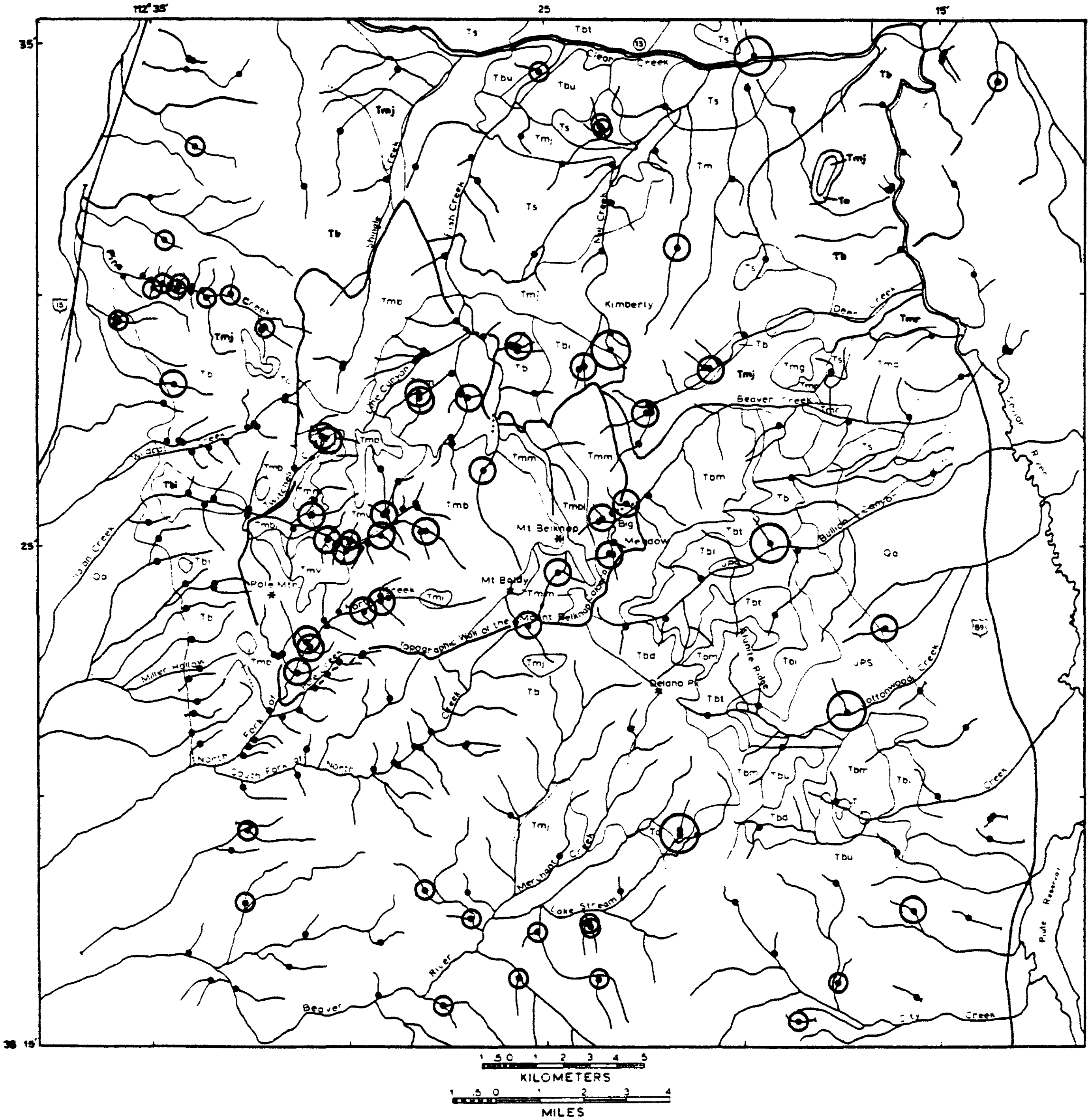
Figure 39.--Distribution of manganese concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.



≥ 100 ppm

30-70 ppm

Figure 40.--Distribution of molybdenum concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

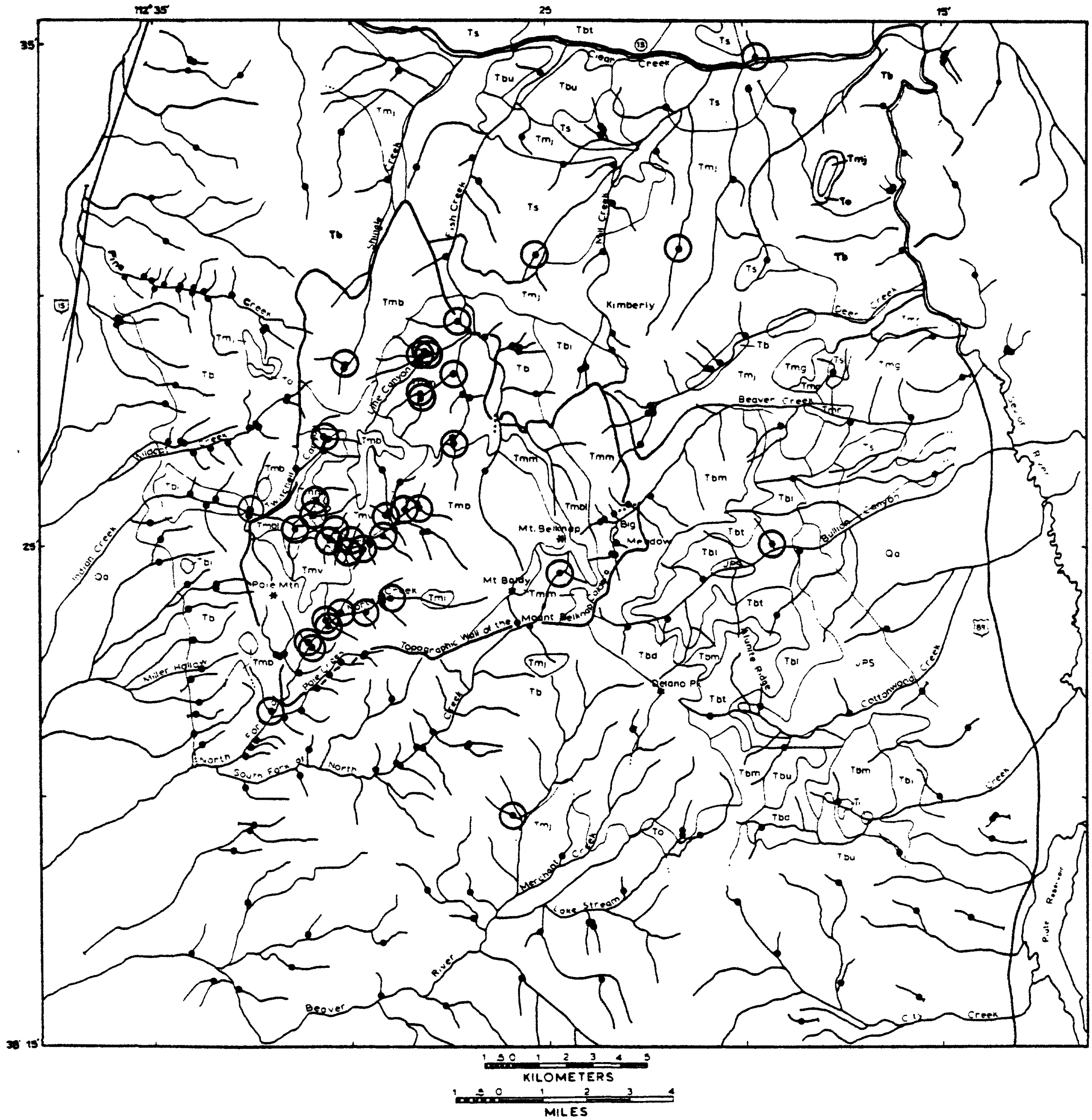


○ ≥ 2000 ppm

○ 700-1500 ppm

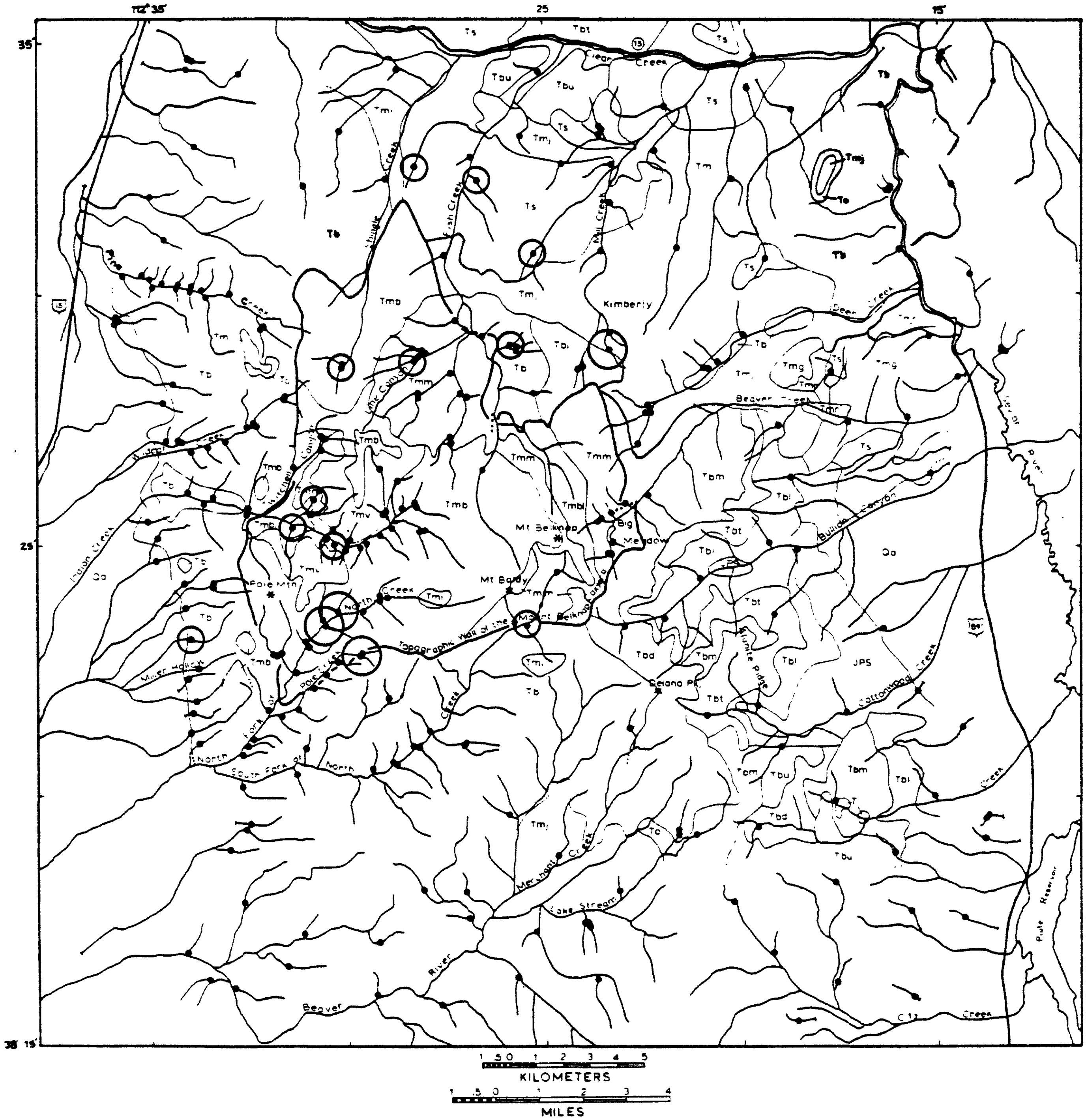
○ ≤ 15 ppm

Figure 41.--Distribution of lead concentations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.



○ ≥ 700 ppm

Figure 42.--Distribution of zinc concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.



◯ ≥ 3000 ppm

◯ 1000-2000 ppm

Figure 43.--Distribution of tin concentrations in the nonmagnetic fraction of the heavy mineral concentrates within the Mount Belknap caldera area, Utah. See figure 2 for description of map units.

The nonmagnetic fraction data are more complicated to interpret. Some of the complex elemental relationships can be seen by examining the distribution of iron, molybdenum, lead, and zinc. In the nonmagnetic fraction, these elements may indicate the presence of sulfide minerals or their weathering products such as carbonates or sulfates. With the exception of zinc (figure 42), elevated concentrations of these elements are found in or around the North Fork and Big Meadow geochemical anomalies and are absent, with the exception of lead and zinc (figures 42 and 43), from the Indian Creek geochemical anomaly. Another subtle geochemical halo indicator is observable in the distributions of niobium and yttrium within the Big Meadow and North Fork geochemical anomalies. The Big Meadow geochemical anomaly contains elevated niobium concentrations and anomalously low yttrium concentrations (figures 38 and 37). Conversely, the North Fork geochemical anomaly contains notably lowered concentrations of niobium, as compared to the rhyolites, but contains some of the highest yttrium concentrations. The geochemical signature of these two anomalies is in keeping with the idealized halos above a differentiated body (figure 7). The differences between niobium and yttrium concentrations may reflect the different rock types, the Bullion Canyon Volcanics and the Mount Belknap Volcanics. However, other geological and geochemical evidence suggests the difference in niobium and yttrium concentrations may be related to the emplacement of intrusive bodies. If this is the case, then the concentration differences would be related to such factors as, mobility due to thermal gradients, depth of intrusive emplacement, host rock, or erosional levels.

Bismuth anomalies are often associated with porphyry-type molybdenum deposits (Neuerburg and others, 1974). The three geochemical anomalies do contain significant bismuth concentrations, but the distribution of bismuth in other sites appears to be controlled by unknown geochemical factors.

There are elevated iron concentrations in the Big Meadow geochemical anomaly which may reflect the presence of pyrite. The North Fork geochemical anomaly seems to be outlined by elevated iron concentrations, but the Indian Creek geochemical anomaly does not. The Bullion Canyon Volcanics could contribute some iron containing minerals to these stream basins. The alteration and iron staining observed in some of the stream basins suggests that the iron concentrations are related to the presence of secondary minerals. The anomalous concentrations of barium and strontium (figures 14 and 16) in the three geochemical anomalies may be related to the presence of secondary minerals as these elements are not generally found in rhyolitic minerals. The elements beryllium, niobium, yttrium, molybdenum, tin, and lead (figures 19-24) may be contained in magmatic minerals that are finely disseminated in the rocks and upon weathering are concentrated in the basins. The elevated concentrations of molybdenum and lead (figures 22 and 24), in the Big Meadow geochemical anomaly, appear to be unique in that elevated concentrations of beryllium, niobium, yttrium, and tin (figures 19-21 and 23) do not occur concurrently.

DISCUSSION

The geochemical data results suggest that complex geochemical and geological relationships are often superimposed within the survey area. As noted earlier, elements such as beryllium, yttrium, niobium, molybdenum, tin, bismuth, and thorium are concentrated in late-stage residual fluids above a differentiating body. Elevated concentrations of certain elements such as molybdenum, lead, or uranium in a host rock does not necessarily indicate ore potential. Minerals such as sphene, hematite, biotite, and amphiboles can incorporate these elements in their crystal lattice, thus dispersing the elements throughout the body. For example, niobium has been reported to occur up to 5 percent in biotite and hematite (Parker and Fleischer, 1968). To form an ore deposit, the ore elements must be significantly concentrated by some mechanism. The elevated concentrations of beyllium, yttrium, niobium, molybdenum, lead, tin, and zinc, and the paucity of minerals such as sphene, hematite, biotite, and amphiboles within the Mount Belknap rhyolites indicates the crystallizing body was highly siliceous and possibly differentiated to a great degree. The eruption of the various outflow facies may have prevented concentration of the ore elements within the magma. It is not known to what extent these outflow facies represent the total volume of the magma. However, if later bodies evolved, differentiated but did not erupt, and the ore elements were significantly concentrated, a porphyry-type molybdenum deposits may have been formed. The emplacement of such bodies may have leaked small amounts of mineralizing fluids along zones of weak ores such as faults or breccia zones. As the chemical environment changed certain minerals or coatings could have formed. Clastic weathering may have concentrated these minerals in the drainage sediments. This type of geochemical signature would be readily expressed in the magnetic fraction of the concentrates (Miller, Motooka, and McHugh, 1980).

The results of this heavy-mineral concentrate survey are in general agreement with the rock and hydrogeochemical surveys conducted in the same area (Tucker and others, 1980, 1981). The Big Meadow and North Fork geochemical anomalies are well defined by all three media. The Grassy Creek geochemical anomaly centered around Grassy Creek is defined in the rock and hydrogeochemical surveys, but is only subtly identified by elevated elemental concentrations of barium, iron, molybdenum, copper, and thorium in the magnetic fraction and iron, copper, barium, and bismuth in the nonmagnetic (figures 14, 13, 22, 10, 18, 32, 31, 28, and 35).

The geochemical evidence suggests that a possible source for the rhyolitic rocks was a highly differentiated body with elevated concentrations of many elements often found in porphyry-type molybdenum mineral deposits. The formation of a porphyry-type molybdenum ore deposit would be contingent upon many factors, such as eruptive history, elemental concentrations, mineral phases present, complexing agents, sulfur content, and depth of emplacement. The geochemical characteristics of the Mount Baldy Rhyolite Member suggest this eruptive phase is related to the solidification of a highly differentiated body. If subsequent differentiated bodies did not erupt, the potential exists for the formation of porphyry-type molybdenum mineral deposits, which may be potentially economic within the Mount Belknap caldera region. Age determinations suggest that rocks younger than the caldera collapse (19 m.y.) may be related to the emplacement of differentiated bodies at depth (C. G. Cunningham, oral commun., 1981). In view of the single element data, the North Fork, Big Meadow, and Alunite Ridge area, and possibly the Grassy Creek geochemical anomalies exhibit the geochemical characteristics typical of the emplacement of highly differentiated, bodies at depth. However, much detailed work is still required to define any economic porphyry-type molybdenum ore potential and(or) possibly associated vein-type uranium ore potential.

Q-MODE FACTOR ANALYSIS APPLIED TO THE STREAM SEDIMENT DATA

The present chemical compositions of the rocks in the study area have resulted from a complex geochemical history, with the original composition having been modified by subsequent hydrothermal activity and other geochemical processes. In this instance, Q-mode factor analysis techniques have been used to gain a better understanding of the complex interrelationships that exist in the data. Q-mode factor analysis is a mathematical technique that calculates a group of end-member compositions that approximately describe the variations within the multispecie data. Q-mode factor analysis demonstrates that certain end-member compositions or factors exist, but does not attach any significance to them. Background information on factor analysis can be found in Davis (1973) and Klovan and Imbrie (1971). The interpretation of the factors and their geological significance is a subjective process which relies on the users knowledge of the geological and geochemical processes that may have affected the area. Information on the use and application of factor analysis to geochemical studies can be found in Miller and others (1979; 1980); Tucker and others (1980; 1981); and Dean and others (1979).

The elements used in the Q-mode factor analysis were selected utilizing the ANOVA results and elements geochemically important to ore formation. Thirteen elements were selected from the magnetic fraction and 11 elements were selected from the nonmagnetic fraction on the basis of (1) having significant regional variance and (2) the variance in level 3 and level 4 being less than 25 percent of the total variance (Tables 7 and 8). In the nonmagnetic fraction, titanium and zinc were excluded because of the high number of qualified values, and molybdenum was included because of its geochemical importance.

Magnetic fraction

Factors 1 and 2

The factor score matrix is given in Table 13, and the factor loadings by sample location are given in Appendix 4.

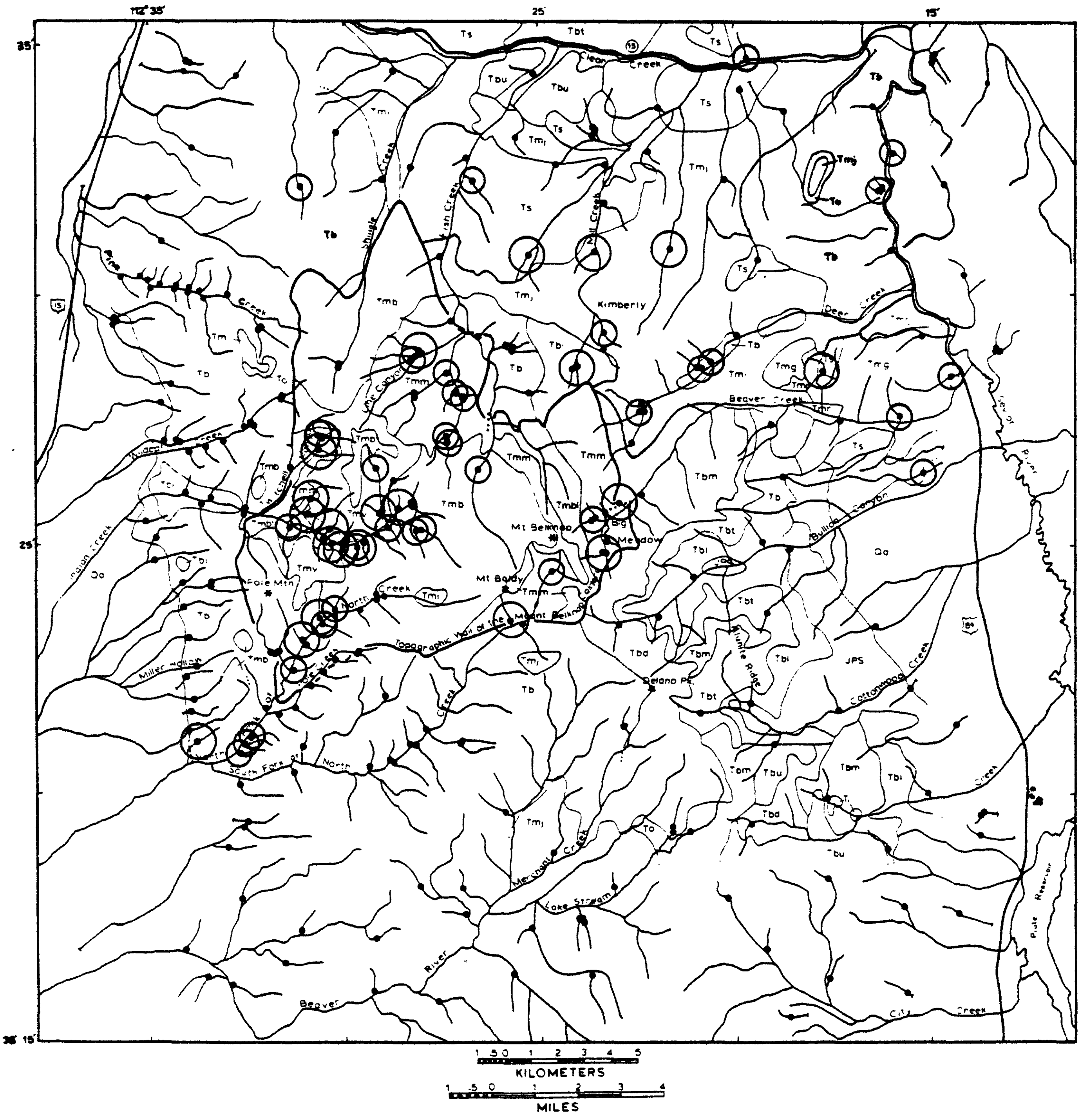
Factors 1 and 2 are interpreted to represent predominately lithologic controls. Factor 1 is defined by high factor scores for manganese, niobium, beryllium, molybdenum, and lead, and explains 35.0 percent of the total variance. The highest factor loadings occur in samples 1554, 2395, 1419, 2382, 1527, 1739, and 1558. The distribution of factor 1 loadings are predominately restricted to the caldera or from drainage basins within rhyolitic outflow facies (figure 44). This factor is interpreted as representing rhyolitic composition rocks.

Factor 2 is defined by high factor scores for calcium, magnesium, manganese, and nickel, and explains 25.2 percent of the total variance. The highest factor loadings occur is samples 1476, 2469, 1682, 2352, 1479, 1408, 1447, and 2445. The distribution of factor 2 loadings are predominately found within the Bullion Canyon Volcanics (figure 45). The highest factor loadings are located in drainage basins in the southern and northern portions of the study area. The Alunite Ridge area and the western margin of the study area, which are also Bullion Canyon Volcanics, do not have high factor loadings. This may represent a difference in the mineralogical composition of these rocks, as compared to the other Bullion Canyon Volcanics.

Table 13.--Factor score matrix for the magnetic fraction.

	Factor				
Element	1	2	3	4	5
Mg	-0.041	0.679	0.053	-0.128	-0.097
Ca	-0.053	0.712	0.092	0.059	0.150
Mn	0.967	0.095	-0.125	0.108	-0.068
Ba	0.030	0.012	0.013	0.100	0.340
Be	0.083	-0.045	-0.018	0.013	0.388
Cr	-0.053	-0.036	-0.019	0.697	-0.108
La	0.089	0.025	0.208	0.073	-0.002
Mo	0.061	-0.058	0.072	-0.098	0.726
Nb	0.103	-0.022	0.009	-0.030	-0.088
Ni	-0.119	0.075	-0.061	0.671	0.123
Pb	0.056	-0.034	-0.015	0.032	0.204
Sr	-0.015	0.028	0.000	0.019	0.302
Zr	0.102	-0.092	0.959	0.064	-0.060

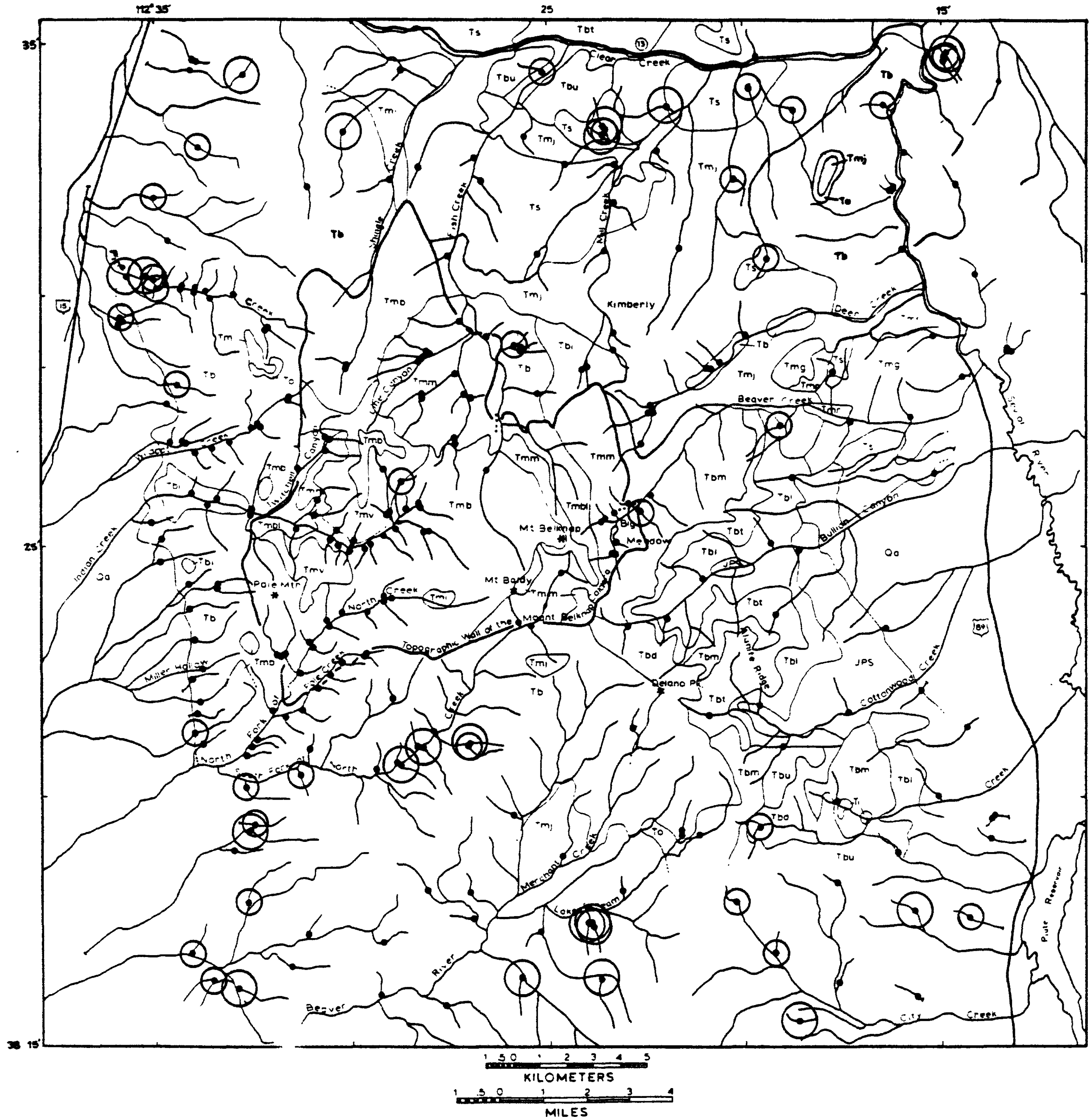
Factor	eigenvalue	cummulative variance
1	184.7	69.98
2	31.9	82.05
3	14.6	87.57
4	9.5	91.17
5	6.7	93.71
6	3.5	95.06



0.97-0.90

0.80-0.89

Figure 44.--Distribution of factor 1 loadings for the magnetic fraction. See figure 2 for description of geologic units.



0.90

0.70-0.89

Figure 45.--Distribution of factor 2 loadings for the magnetic fraction. See figure 2 for description of geologic units.

Factor 3

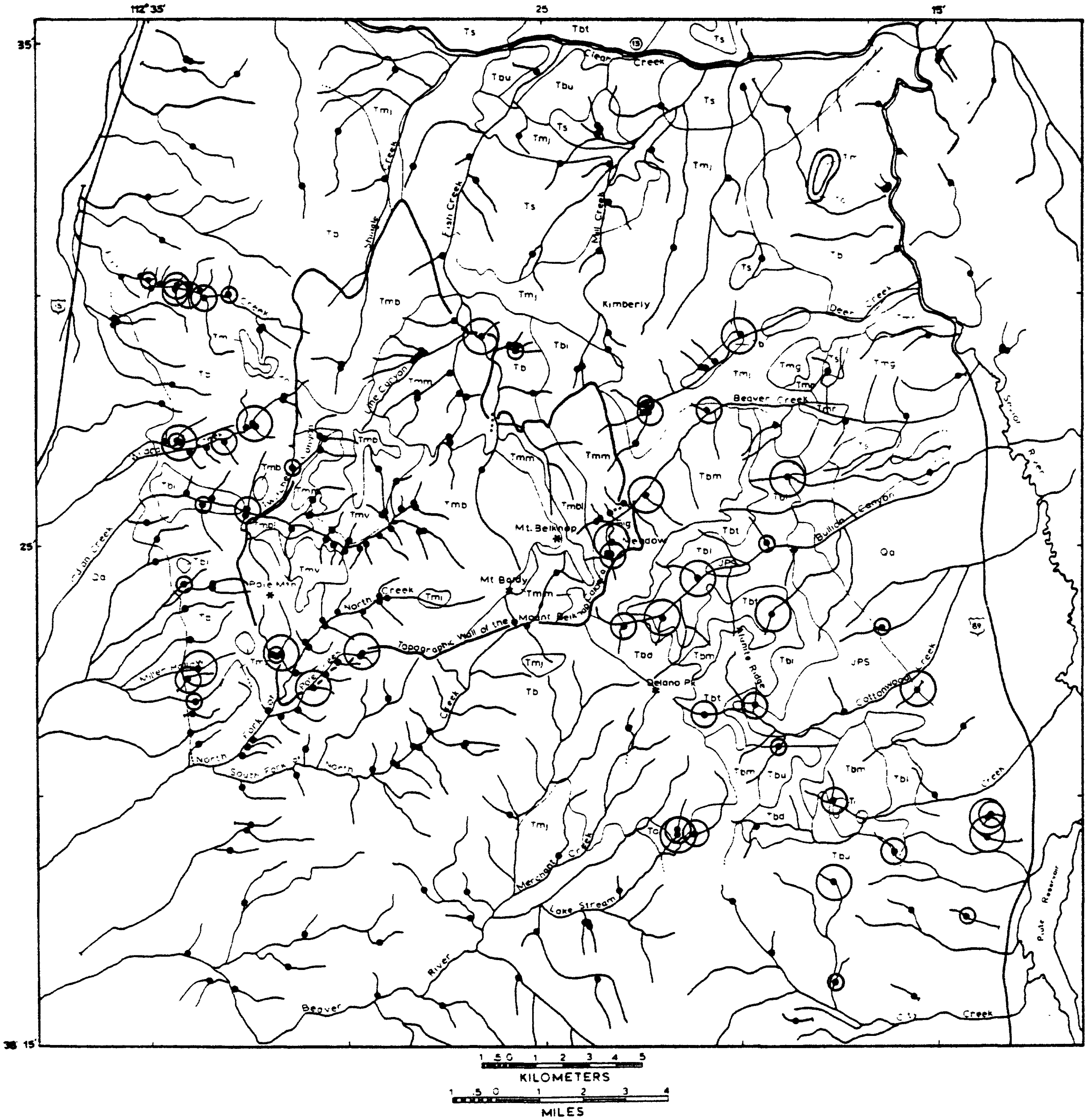
Factor 3 is defined by zirconium, lanthanum, calcium, molybdenum, and magnesium, and explains 13.8 percent of the total variance. The highest factor loadings occur in samples 1411, 2348, 1535, 1444, 1414, 1520, and 1429. The distribution of high factor loadings is given in figure 46 and is not restricted to any particular rock type. High factor loadings are clustered in the Alunite Ridge area extending into the Big Meadow geochemical anomaly, the North Fork geochemical anomaly extending west into Miller Hollow, around the Grassy Creek-Wildcat Creek area, and in the Pine Creek basin. This factor may reflect elemental composition and possibly mineralized rocks different from other Bullion Canyon Volcanics. The elemental and(or) mineral differences may be primary, or this factor may reflect Bullion Canyon Volcanics that have been altered. This may explain why zirconium and molybdenum are present within this factor, and the distribution of high factor loadings coincides to some degree with areas postulated to overlie buried intrusives.

Factor 4

Factor 4 is defined by chromium, nickel, manganese, barium, zirconium, lanthanum, and lead, which explains 16.1 percent of the total variance. The highest factor loadings occur in samples 2436, 1598, 1441, 1521, 1523, and 2327. The distribution of high factor loadings is given in figure 47. High factor loadings occur within basins south of the caldera that define a linear trend that extends across the survey area. The western portion of the caldera is surrounded with high factor loadings. There are a few high factor loadings in the Big Meadow and Indian Creek geochemical anomalies. This factor may reflect the alteration of the Bullion Canyon Volcanics. The areas containing high factor loadings coincide with known alteration.

Factor 5

Factor 5 is defined by beryllium, molybdenum, yttrium, chromium, and zirconium, which explains 3.7 percent of the total variance. The highest factor scores for beryllium and molybdenum occur in this factor. For this reason, this factor is interpreted to reflect possible porphyry-type molybdenum mineralization. The presence of chromium and zirconium are unique in this factor. The highest factor loadings occur in samples 2434, 1425, 1525, 1536, 2388, and 2303 (figure 48). There are clusterings of high factor loadings in the Big Meadow and North Fork geochemical anomalies. A few high factor loadings in the caldera are from drainage basins associated with Mount Baldy Rhyolite Member rocks and many high factor loadings are associated with drainage basins in Joe Lott Tuff. This suggests that these eruptive rocks could have been released from a highly differentiated magma. The Grassy Creek geochemical anomaly (R. E. Tucker and others 1980; 1981) contains high factor loadings, as well as some of the drainage basins draining the western margin of the caldera. Only very subtle indications of this anomaly are reflected in the single element analysis, but factor 5 indicates that the drainage basins in this anomaly contain the same geochemical signature as the North Fork and Big Meadow geochemical anomalies, as well as a few drainage basins from Alunite Ridge.

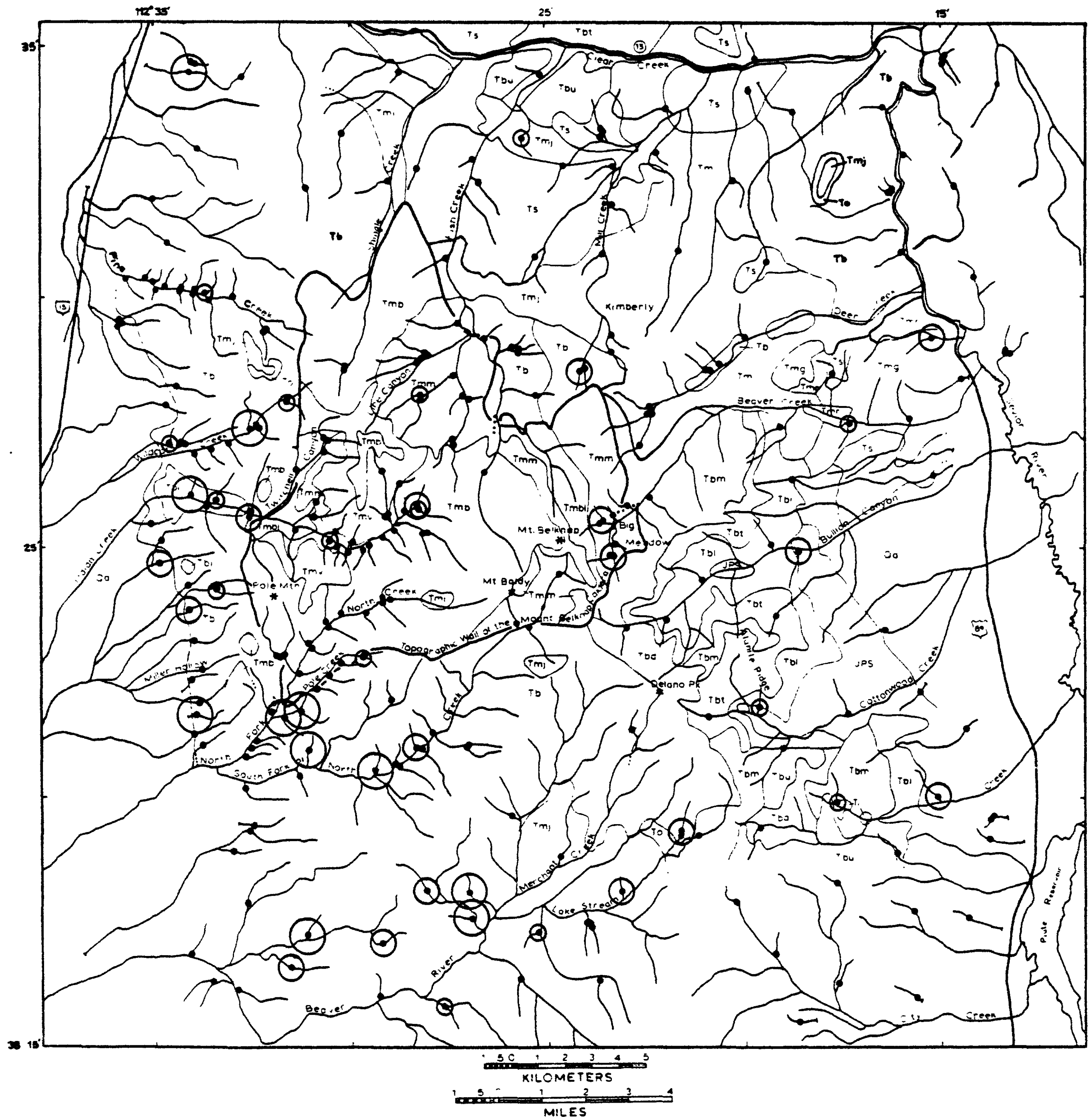


0.75

0.65-0.72

0.60-0.64

Figure 46.--Distribution of factor 3 loadings for the magnetic fraction. See figure 2 for description of geologic units.

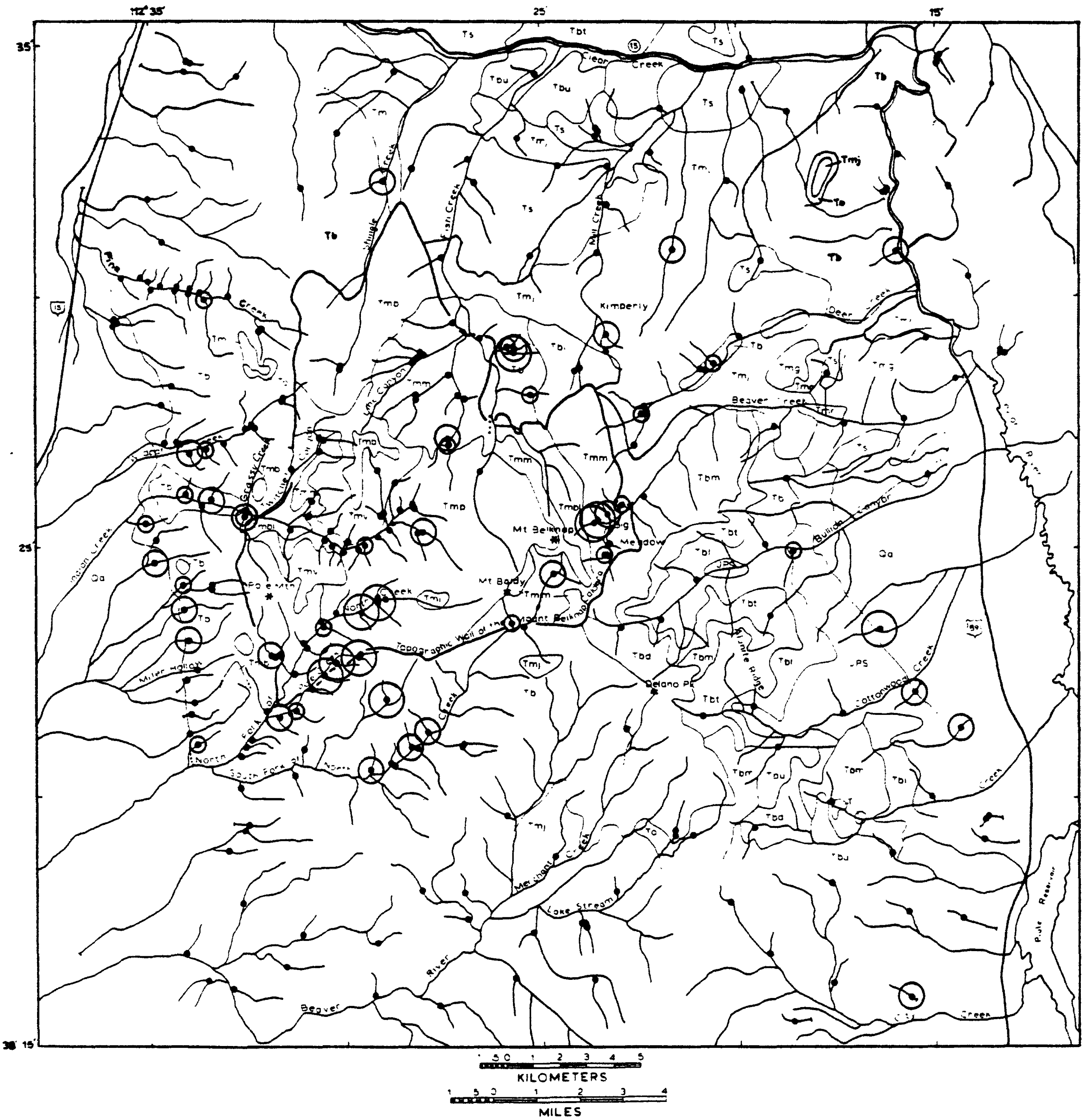


0.70

0.60-0.69

0.53-0.59

Figure 47.--Distribution of factor 4 loadings for the magnetic fraction. See figure 2 for description of geologic units.



○ 0.45

○ 0.30-0.44

○ 0.20-0.29

Figure 48.--Distribution of factor 5 loadings for the magnetic fraction. See figure 2 for description of geologic units.

Steven and others (1980) have postulated that certain hydrothermal uranium mineral deposits may be high level indicators of porphyry-type molybdenum deposits in this region. The Mystery-Sniffer uranium mine (Wyant and Stugard, 1951) is located in the Grassy Creek geochemical anomaly. Two distinct interpretations of the geochemical and geologic factor scores for this area are postulated. The Grassy Creek and North Fork geochemical anomalies may overlie separate intrusives that may have potential for porphyry-type molybdenum mineral deposits. On the other hand, many of the basins between the two anomalies contain high factor loadings. This may indicate that hydrothermal fluids arising from an intrusive under the North Fork geochemical anomaly migrated along zones of weakness caused by the caldera collapse. The uranium deposits in the Grassy Creek geochemical anomalies were formed from these solutions as a result of complex geochemical characteristics in the host rock and solution chemistry. There are high factor loadings from drainage basins on the north side of the South Fork of North Creek, which may indicate the extent of hydrothermal activity related to an intrusive under the North Fork geochemical anomaly. This spatial relationship is in keeping with other porphyry-type molybdenum mineral deposits that are better exposed (Neuerburg and others, 1974; Sharp, 1978). If there are intrusives under both geochemical anomalies, circulation of hydrothermal solutions could have used the same zones of weakness, further complicating the geochemical and geological interpretations of the area. There is geological and geochemical evidence indicating the porphyry-type molybdenum ore deposits of Henderson and Climax were formed by multiple intrusions (Wallace and others, 1978). The North Fork and Grassy Creek geochemical anomalies may represent single or multiple intrusive emplacement. Further geochemical and geological study is required in this area.

Nonmagnetic fraction

The factor score matrix is given in Table 14. The factor loadings by sample location are given in Appendix 5.

Factor 1

Factor 1 is defined by manganese, beryllium, yttrium, lanthanum, and molybdenum, and explains 24.4 percent of the total variance. The highest factor loadings occur in samples 1556, 1526, 1545, 1555, 1531, and 2385. The distribution of factor 1 loadings occur predominately within the caldera or from basins in the Joe Lott Tuff (figure 49). This factor is interpreted as representing rhyolitic rocks.

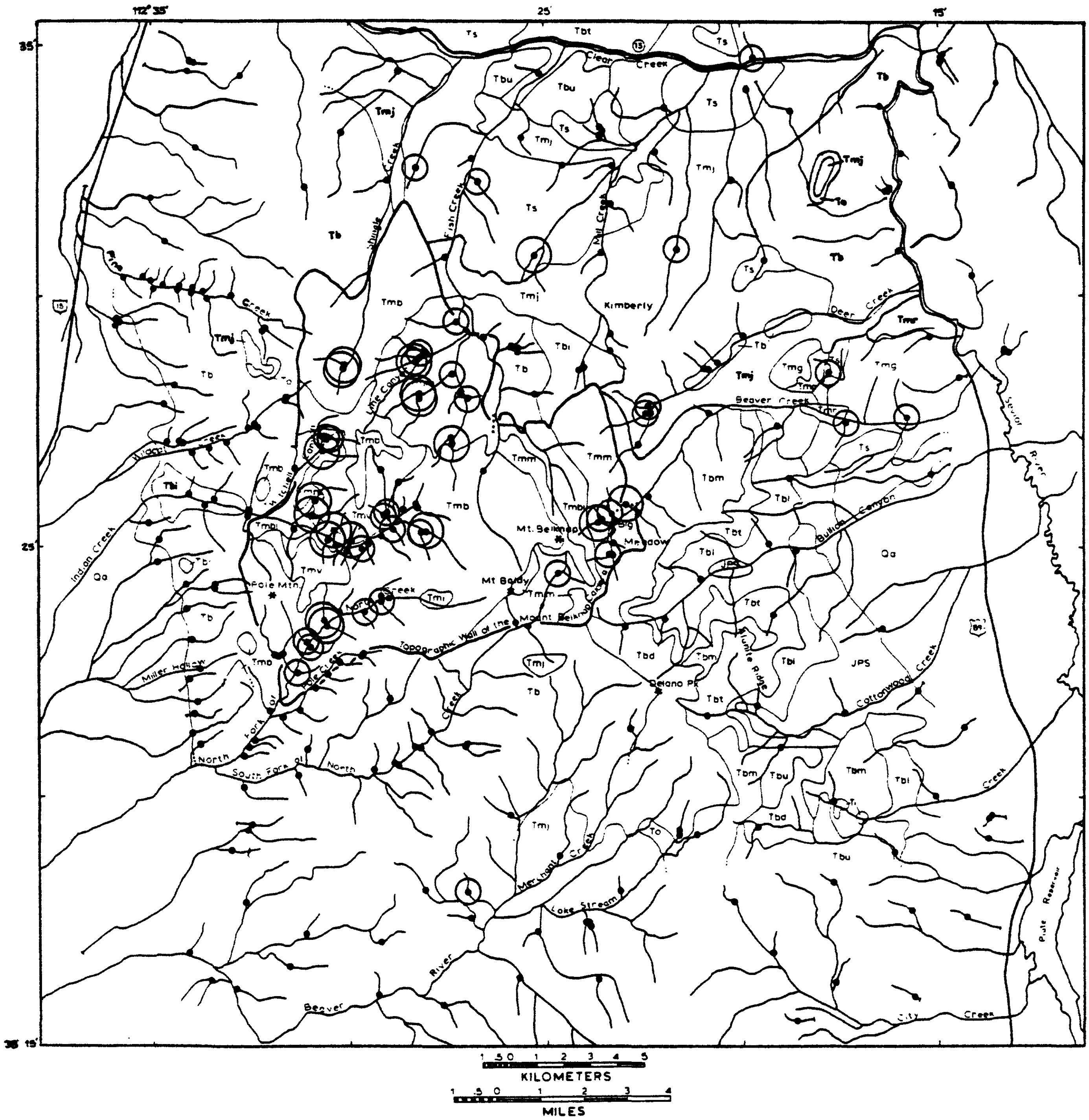
Factor 2

Factor 2 is defined by barium, strontium, calcium, molybdenum, and lanthanum, and explains 23.6 percent of the total variance. The highest factor loadings occur in samples 1444, 1573, 1745, 1521, 1565, 2349, 1747, and 1570. The distribution of factor 2 loadings predominately occur in the western portion of the survey area associated with Bullion Canyon Volcanics, and from a few drainage basins around Alunite Ridge also associated with Bullion Canyon Volcanics (figure 50). This factor is interpreted as representing intermediate-composition rocks that may have been altered by hydrothermal activity.

Table 14.--Factor score matrix for the nonmagnetic fraction.

	Factor				
Element	1	2	3	4	5
Mg	-0.001	0.025	0.660	-0.108	0.021
Ca	-0.117	0.066	0.334	0.511	-0.032
Mn	0.923	0.026	0.101	-0.050	-0.285
Ba	-0.009	0.985	-0.044	-0.064	-0.013
Be	0.255	0.005	-0.046	-0.045	0.703
Cr	-0.042	-0.003	0.656	-0.077	0.127
La	0.109	0.030	-0.059	0.834	-0.013
Mo	0.010	0.051	-0.037	0.030	0.517
Nb	0.080	0.005	-0.005	0.030	0.015
Sr	-0.034	0.136	0.055	0.077	0.050
Y	0.221	-0.038	-0.027	0.099	0.370

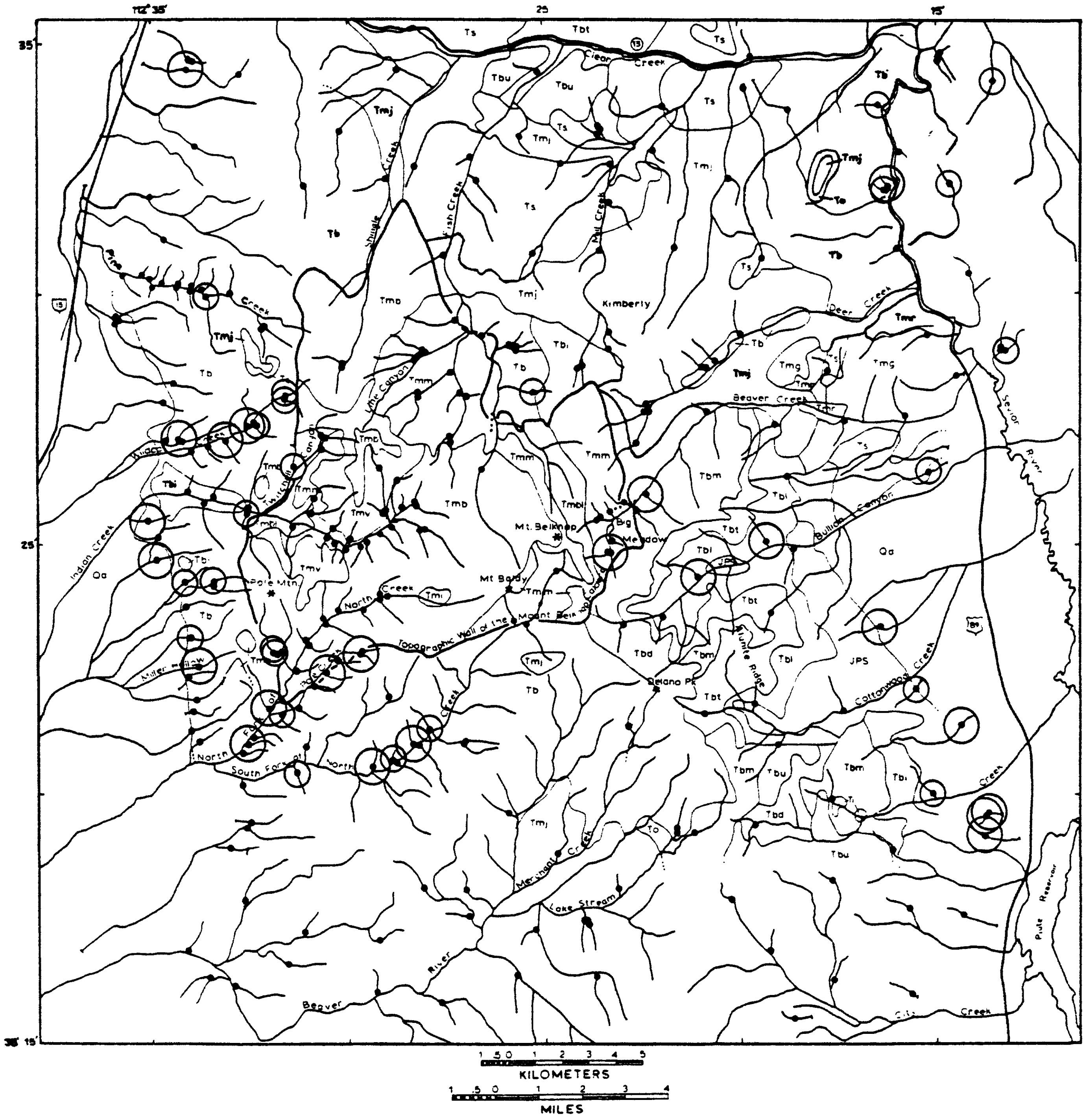
Factor	eigenvalue	cummulative variance
1	147.2	55.97
2	41.7	71.84
3	31.4	83.77
4	17.5	90.43
5	6.9	93.07
6	5.6	95.19



0.94

0.79-0.93

Figure 49.--Distribution of factor 1 loadings for the nonmagnetic fraction. See figure 2 for description of geologic units.



0.97

0.85-0.96

Figure 50.--Distribution of factor 2 loadings for the nonmagnetic fraction. See figure 2 for description of geologic units.

Factor 3

Factor 3 is defined by magnesium, chromium, calcium, manganese, and strontium, which explains 18.3 percent of the total variance. The highest factor loadings occur in samples 1476, 1471, 2339, 1409, 2445, 1433, and 1726. The distribution of high factor 3 loadings occurs in the southern and northern portions of the survey area associated with Bullion Canyon Volcanics (figure 51). The geochemical suite defined by this factor is interpreted as indicating unaltered Bullion Canyon Volcanics.

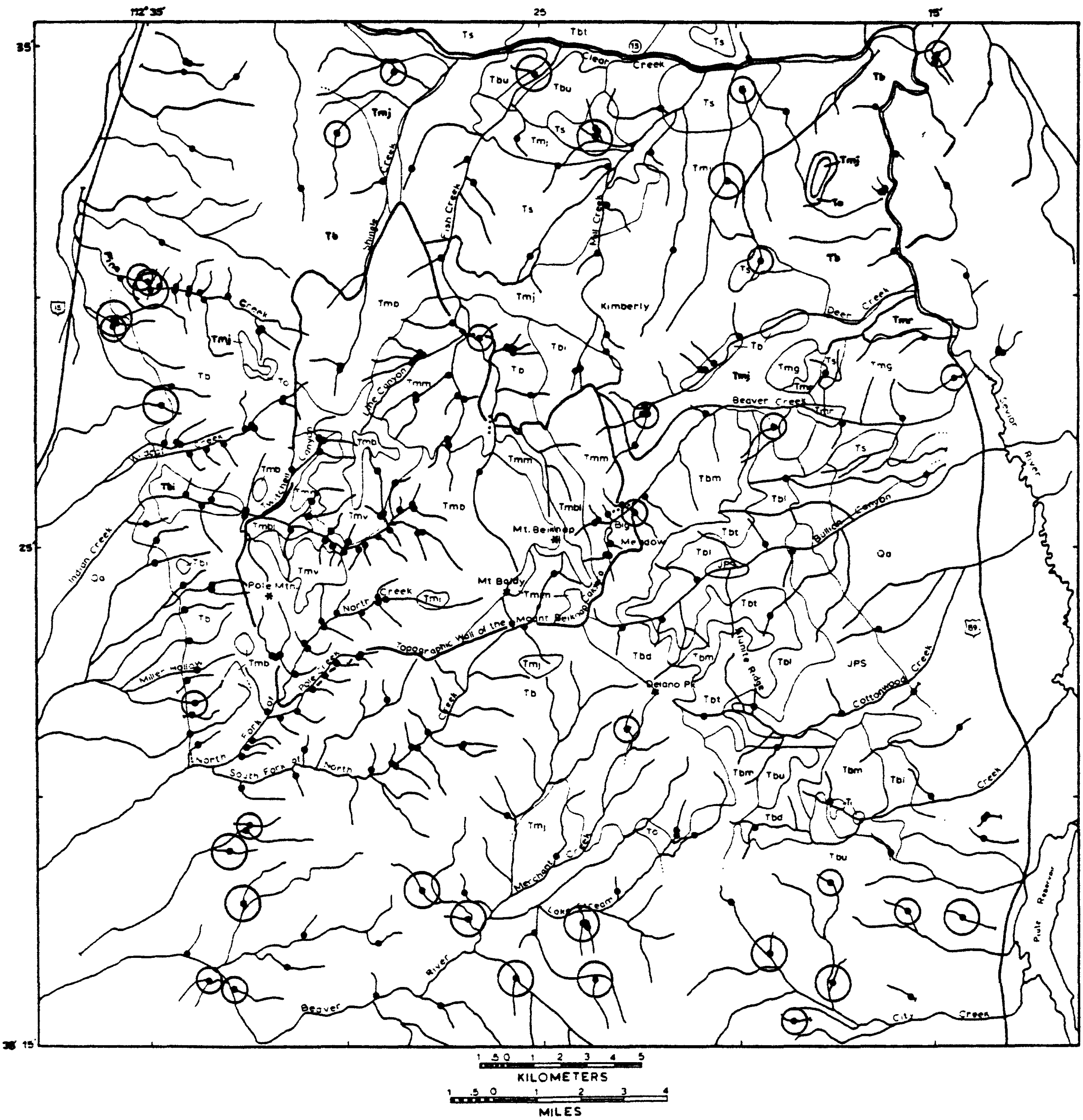
Factor 4

Factor 4 is defined by lanthanum, calcium, yttrium, strontium, niobium, and molybdenum, and explains 23.3 percent of the total variance. The highest factor loadings occur in smaples 1445, 2834, 1439, 1872, 1447, and 1677. The largest clustering of high factor loadings occurs around Pine Creek (figure 52). Many of the drainage basins along the western margin of the caldera have high factor loadings. Other high factor loadings occur throughout the survey area in Bullion Canyon Volcanic rocks. The interpretation of this factor is unclear, but the high percentage of variance explained would indicate a lithologic control.

Factor 5

Factor 5 is defined by beryllium, molybdenum, yttrium, chromium, and strontium, which explains 3.7 percent of the total variance. The highest factor loadings occur in samples 2434, 1425, 1525, 1536, and 2388. High factor loadings cluster along a linear trend from the North Fork geochemical anomaly to the Kimberly area (figure 53). The highest factor scores for beryllium, molybdenum, and yttrium occur in this factor. This factor defines a geochemical suite that is interpreted as representing porphyry-type mineralization. The high factor loadings are most often associated with Mount Baldy Rhyolite Member rocks or Joe Lott Tuff. Some of the drainage basins in the North Fork geochemical anomaly associated with Bullion Canyon Volcanics also contain high factor loadings. This factor is interpreted as representing areas where nonmagnetic minerals, such as molybdenite, topaz, rutile, cassiterite, sulfides, monazite, and(or) others are present in the drainage sediments. This would represent a near-surface source for these minerals. The Big Meadow geochemical anomaly does not have high factor 5 loadings. This suggests that any intrusive associated with this anomaly may be at a greater depth than an intrusive associated with the North Fork geochemical anomaly. This interpretation coincides with the possible identification of niobium and yttrium halos above these two areas, however, other factors, such as host rock type, structural control, elemental concentrations, and(or) weathering characteristics may affect the geochemical signature of these areas.

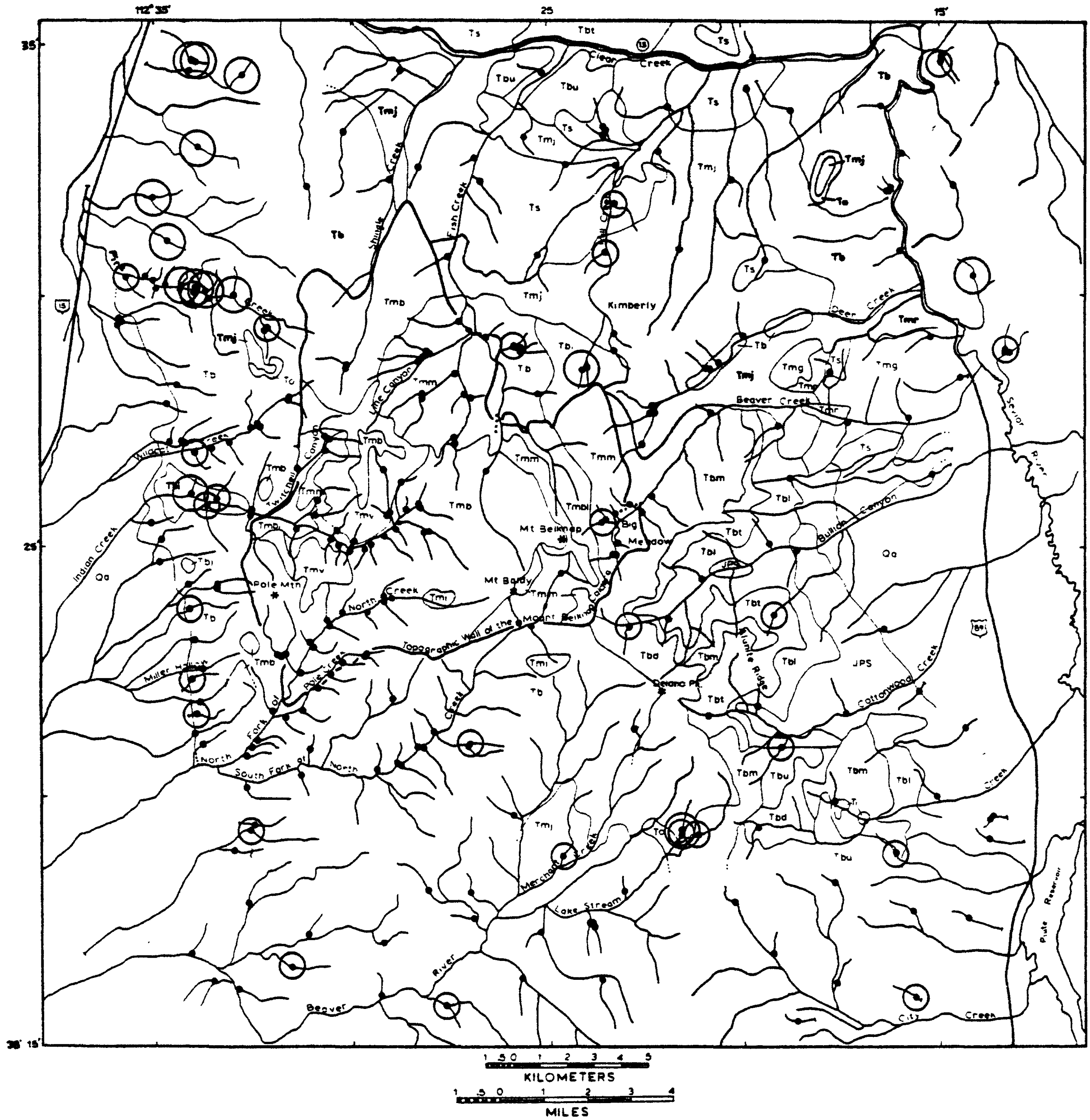
Q-mode factor analysis is a data reduction technique that has facilitated the interpretations of the geochemical data by defining suites of elements that can be related to geochemical processes that have affected the area. The factor analysis resulted in defining the Grassy Creek geochemical anomaly that was only subtly defined by the single element analysis. More detailed geochemical and geological work is required in the area to further assess the economic potential of the North Fork, Big Meadow, Grassy Creek geochemical anomalies, and the Alunite Ridge area.



○ 0.90

○ 0.76-0.89

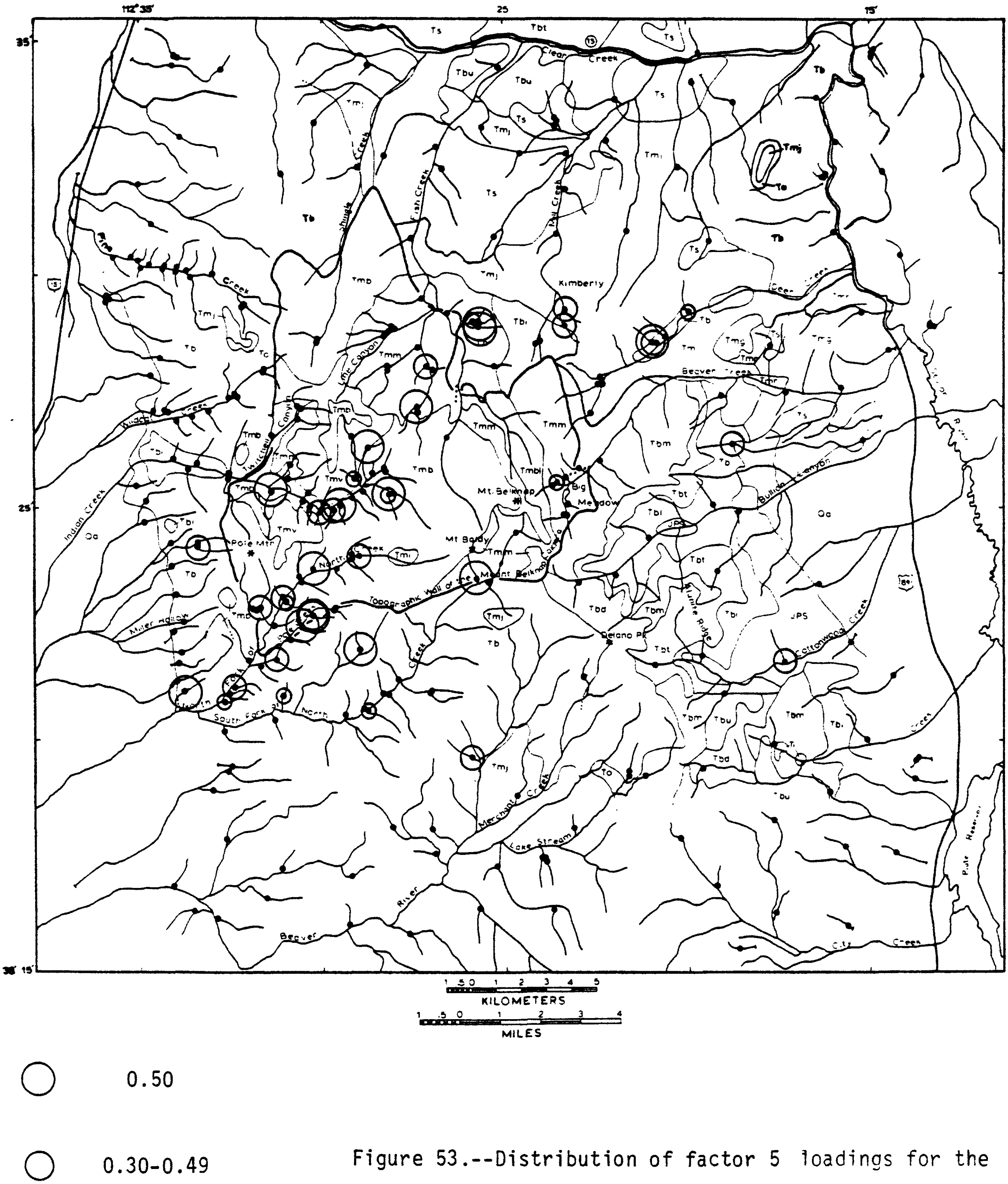
Figure 51.--Distribution of factor 3 loadings for the nonmagnetic fraction. See figure 2 for description of geologic units.



0.90

0.75-0.89

Figure 52.--Distribution of factor 4 loadings for the nonmagnetic fraction. See figure 2 for description of geologic units.



0.50

0.30-0.49

0.25-0.29

Figure 53.--Distribution of factor 5 loadings for the nonmagnetic fraction. See figure 2 for discription of geologic units.

CONCLUSIONS

The geology and geochemistry of the Mount Belknap caldera region suggests that highly differentiated magmas were erupted and(or) intruded in and around the caldera. Data from the Mount Baldy Rhyolite Member, and to a lesser degree the Joe Lott Tuff, suggest that these rocks were erupted from a highly differentiated magma chamber. Porphyry-type molybdenum deposits would most likely have formed at depth with only little release of fluids to the surface. On the basis of single element evaluations and Q-mode factor analysis, the North Fork, Grassy Creek, and Big Meadow geochemical anomalies, and the Alunite Ridge area reflect many of the characteristics commonly associated with the emplacement of highly differentiated magmas that are potentially rich in the ore elements. These four areas contain the highest potential for porphyry-type molybdenum, and possibly associated vein-typpe uranium mineral deposits. Detailed geochemical and geological study in these anomalies is required to further assess their economic potential.

REFERENCES CITED

Bailey, G. B., and McCormick, G. R., 1974, Chemical halos as guides to lode deposit ore in the Park City district, Utah: Economic Geology, v. 69, p. 377-382.

Breit, G. N., 1980, Geochemical exploration study of the Polaris Mining district and vicinity, Beaverhead County, Montana: Colorado School of Mines Masters Thesis, T2359, 264 p.

Butler, B. S., 1913, Geology and ore deposits of the San Francisco and adjacent districts, Utah: U.S. Geological Survey Professional Paper 80, 212 p.

Cunningham, C. G., and Steven, T. A., 1978a, Geologic map of the Delano Peak NW quadrangle, west-central Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-967, scale 1:24,000.

______1978b, Postulated model of uranium occurrence in the central mining area, Marysvale district, west-central Utah: U.S. Geological Survey Open-File Report 78-1093, 19 p.

______1979a, Geologic map of the Delano Peak NE quadrangle, west-central Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-1105, scale 1:24,000.

______1979b, Geologic map of the Deer Trail Mountain-Alunite Ridge mining area, west-central Utah: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-1230, scale 1:24,000.

______1979c, Environments favorable for the occurrence of uranium within the Mount Belknap caldera, Beaver Valley and Sevier River Valley, west-central Utah: U.S. Geological Survey Miscellaneous Open-File Report 79-434, 15 p.

______1979d, Mount Belknap and Red Hills calderas, and associated rocks, Marysvale Volcanic field, west-central Utah: U.S. Geological Survey Bulletin 1468, 34 p.

______1979e, Uranium in the Central mining area, Marysvale district, west-central Utah: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-1177, scale 1:24,000.

______1980, Geologic map of the Beaver NE quadrangle, Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-1191, scale 1:24,000.

Dagger, G. W., 1972, Genesis of the Mount Pleasant tungsten-molybdenum-bismuth deposit, New Brunswick, Canada: Transactions of the Institution of Mining and Metallurgy, v. 82B, p. B73-B102.

Davis, J. C., 1973, Statistics and data analysis in geology: New York, John Wiley and Son, Inc., 550 p.

Dean, W. E., Ringrose, C. D., and Klusman, R. W., 1979, Geochemical variation in soils in the Piceance Creek basin, western Colorado: U.S. Geological Survey Bulletin 1479, 47 p.

Fleck, R. J., Anderson, J. J., and Rowley, P. D., 1975, Chronology of mid-Tertiary volcanism in High Plateaus region of Utah, in Cenozoic geology of southwestern High Plateaus of Utah: Geological Society of America Special Paper 160, p. 53-62.

Flinter, B. H., 1959, The magnetic separation of some alluvial minerals in Malaya: American Mineralogist, v. 44, p. 739-751.

Frondel, J. W., Fleischer, M., and Jones, R. S., 1967, Glossary of uranium- and thorium-bearing minerals: U.S. Geological Survey Bulletin 1250, 69 p.

Groves, D. I., and McCarthy, T. S., 1978, Fractional crystallization and the origin of tin deposits in granotoids. Mineral. Deposita, v. 13, p. 11-26.

Groves, D. I., and Taylor, R. G., 1973, Greisenization and mineralization at Anchor Tin mine, northeast Tasmania: Transactions of the Institution of Mining and Metallurgy, v. 82B, p. 135-146.

Gruner, J. W., Fetzer, W. G., and Rapaport, I., 1951, The uranium deposits near Marysvale Piute County, Utah: Economic Geology, v. 46, p. 243-251.

Hess, H. H., 1956, Notes on operation of Frantz Isodynamic Magnetic Separator, pamphlet published by S. G. Frantz Company, Inc., 8 p.

Hoffman, J. D., Brew, D. A., Forn, C. L., and Johnson, B. R., 1979, Chemical variability of a metavolcanic rock unit in the Tracy Arm-Fords Terror Wilderness study area, Alaska, and the definition of background values for geochemical purposes, in Shorter Contributions to Geochemistry 1979: U.S. Geological Survey Professional Paper 1129A-A-I, p. D1-D9.

Hosking, D. F. G., 1965, The search for tin: Mining Magazine, v. 113, p. 368-382.

Hurlbut, C. S., 1971, Dana's Manual of Mineralogy, John Wiley and Son, Inc., 579 p.

Johnson, J. G., 1973, Placer gold deposits of Utah: U.S. Geological Survey Bulletin 1357, 26 p.

Klovan, J. E., and Imbrie, J., 1971, An algorithm and Fortran-IV program for large-scale Q-mode factor analysis and calculation of factor scores: Journal of the International Association of Mathematical Geology, v. 3, no. 1, p. 61-77.

Krauskopf, K. B., 1967, Introduction to Geochemistry: New York, McGraw-Hill, 721 p.

Levinson, A. A., 1974, Introduction to exploration geochemistry: Applied Publishing Ltd., 924 p.

McAndrew, J., 1957, Calibration of a Frantz isodynamic separator and its application to mineral separation: Australia Institute of Mining and Metallurgy Proceedings, no. 181, p. 59-73.

McNair, A. H., 1951, Paleozoic stragigraphy of northwestern Arizona: American Association of Petroleum Geologists Bulletin, v. 35, no. 3, p. 525-526.

Miller, W. R., and Drever, J. I., 1977, Chemical weathering and related controls on surface water chemistry in the Absaroka Mountains, Wyoming: Geochimica et Cosmochimica Acta, v. 41, p. 1693-1702.

Miller, W. R., McHugh, J. B., and Ficklin, W. H., 1979, Possible uranium mineralization, Mineral Mountains, Utah: U.S. Geological Survey Open-File Report 79-1354, 44 p.

Miller, W. R., McHugh, J. B., and Ficklin, W. H., 1980, Possible uranium mineralization, Beaver basin, Utah: U.S. Geological Survey Open-File Report 80-508, 35 p.

Miller, W. R., Motooka, J. M., and McHugh, J. B., 1980, Distribution of molybdenum in heavy-mineral concentrates, Richfield 1° x 2° quadrangle, Utah: Map MF-1246A.

Motooka, J. M., and Grimes, D. J., 1976, Analytical precision of one-sixth order semiquantitative spectrographic analysis: U.S. Geological Survey Circular 738, 25 p.

Motooka, J. M., McHugh, J. B., and Miller, W. R., 1979, Analyses of the heavy-mineral fractions of drainage sediments, Richfield 1° x 2° quadrangle, Utah: U.S. Geological Survey Open-File Report 79-1699, 214 p.

Mutschler, F. E., Wright, E. G., Ludington, S., and Abbot, J. T., 1981, Granite molybdenum systems: Economic Geology, v. 76, p. 874-897.

Neuerburg, G. J., Botinelly, T., and Watterson, J. R., 1974, Molybdenite in the Montezuma district of central Colorado: U.S. Geological Survey Circular 704, 21 p.

Nickel, E. H., 1968, Structural stability of minerals with the pyrite, marcasite, arsenopyrite, and lollingite structures: Canadian Mineralogist, v. 9, p. 311-321.

______1969, The application of ligand-field concepts to an understanding of the structural stabilities and solid solution limits of sulphides and related minerals: Chemical Geology, v. 5, p. 233-241.

Parker, R. L., and Fleischer, M., 1968, Geochemistry of niobium and tantalum: U.S. Geological Survey Professional Paper 612, 43 p.

Rosenblum, S., 1958, Magnetic susceptibilities of minerals in the Frantz isodynamic magnetic separator: American Mineralogist, v. 43, p. 170-173.

Rutherford, D. W., 1979, A geochemical baseline survey of selected toxic elements in surficial materials in the vicinity of the Paraho Demonatration oilshale processing plant, Anvil Points, Garfield County, Colorado: Colorado School of Mines Masters thesis, T 2232, 153 p.

Sharp, J. E., 1978, A molybdenum mineralized breccia pipe complex, Redwell, Colorado: Economic Geology, v. 73, p. 369-382.

Sheraton, J. W., and Black, L. P., 1973, Geochemistry of mineralized granitic rocks of northeast Queensland: Journal of Geochemical Exploration, v. 2, p. 331-348.

Sillitoe, R. H., Halls, C., and Grant, J. N., 1975, Porphyry tin deposits in Bolivia: Economic Geology, v. 70, p. 913-917.

Snedecor, G. W., and Cochran, W. G., 1967, Statistical Methods: Iowa State University Press, Ames 6th edition, 593 p.

Steven, T. A., 1977, Geologic map of the Sevier SW quadrangle, west-central Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-962, scale 1:24,000

Steven, T. A., Cunningham, C. G., and Machette, M. N., 1980, Integrated uranium systems in the Marysvale volcanic field, west-central Utah: U.S. Geological Survey Open-File Report 80-524, 39 p.

Steven, T. A., Cunningham, C. G., Naeser, C. W., and Mehnert, H. H., 1978, Revised stratigraphy and radiometric ages of volcanic rocks and mineral deposits in the Marysvale area, west-central Utah: U.S. Geological Survey Bulletin 1469, 40 p.

Steven, T. A., Cunningham, C. G., and Rowley, P. D., 1978, Geology and mineralization in the Marysvale mining area, west-central Utah, in Guidebook to mineral deposits of southwestern Utah: Utah Geological Association Publication 7, p. 67-70.

Steven, T. A., and Cunningham, C. G., 1979, Uranium potential of the Big John caldera, Beaver County, Utah: U.S. Geological Survey Open-File Report 79-527, 16 p.

______1980, Geologic map of the Sevier SE quadrangle, west-central Utah: U.S. Geological Survey Miscellaneous Field Studies Map MF-1109, scale 1:24,000.

Theobald, P. K., Jr., and Thompson, C. E., 1959, Geochemical prospecting with heavy-mineral concentrates used to locate a tungsten deposit: U.S. Geological Survey Circular 418, 13 p.

Thurston, W. R., Staatz, M. H., Cox, D. E., et al., 1954, Fluorspar deposits of Utah: U.S. Geological Survey Bulletin 1005, 53 p.

Tischendorf, G., 1972, The metallogenetic basis of tin exploration in the Erzgebirge: Transaction of the Institution of Mining and Metallurgy, v. 82B, p. 9-24.

Tucker, J. D., Miller, W. R., Motooka, J. M., and Hubert, A. E., 1981, A rock and stream sediment concentrate survey over a known Mo-Sn anomaly in the southern Wah Wah Mountains, Utah: U.S. Geological Survey Open-File Report 81-576, 70 p.

Tucker, R. E., Miller, W. R., and McHugh, J. B., 1980, Geochemical results from a natural water study in the Mount Belknap caldera and vicinity, Utah: U.S. Geological Survey Open-File Report 80-1051, 53 p.

______1981, Geochemical results from a rock geochemical survey in the Mount Belknap caldera vicinity, Utah: U.S. Geological Survey Open-File Report 81-576, 97 p.

Van Alstine, R. E., 1976, Continental rifts and lineaments associated with major fluorspar districts: Economic Geology, v. 71, p. 977-987.

Wallace, S. R., Mackenzi, W. B., Blair, R. G., and Muncaster, N. K., 1978, Geology of the Urad and Henderson molybdenite deposits, Clear Creek County, Colorado, with a section on a comparison of these deposits with those at Climax, Colorado: Economic Geology, v. 73, p. 325-368.

Westra, G., and Keith, S. B., 1981, Classification and genesis of stockwork molybdenum deposits: Economic Geology, v. 76, p. 844-873.

Wyant, D. G., and Stugard, F., Jr., 1951, Indian Creek uranium prospects, Beaver County, Utah: U.S. Geological Survey Trace Element Memorandum Report 212, 7 p.

Appendix 1.--Magnetic stream sediment concentrate data

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm
1408CM42	38 16 12	112 32 55	10	10.0	5.0	1.0	3,000	<20	200
1409CM42	38 17 51	112 32 40	10	7.0	3.0	1.5	3,000	20	300
1410CM42	38 21 51	112 33 55	30	1.0	1.5	>2.0	5,000	30	500
1411CM42	38 21 41	112 33 56	10	1.0	3.0	1.0	3,000	50	700
1412CM42	38 19 31	112 32 32	15	3.0	5.0	2.0	5,000	<20	200
1414CM42	38 21 45	112 31 19	50	.5	.5	>2.0	2,000	30	300
1415CM42	38 21 12	112 32 26	50	1.0	1.0	>2.0	10,000	50	1,500
1416CM42	38 22 51	112 31 43	30	.7	1.0	>2.0	5,000	30	500
1417CM42	38 22 50	112 31 47	30	1.5	2.0	>2.0	3,000	30	500
1418CM42	38 22 49	112 31 49	30	1.5	1.5	>2.0	3,000	30	500
1419CM42	38 23 34	112 30 40	30	.5	.1	>2.0	>10,000	20	150
1420CM42	38 22 34	112 33 48	50	1.0	1.5	>2.0	1,500	20	300
1422CM42	38 24 15	112 33 29	50	1.0	1.0	>2.0	2,000	50	500
1424CM42	38 25 46	112 32 31	30	2.0	2.0	>2.0	2,000	50	500
1425CM42	38 25 26	112 31 24	50	.5	.5	>2.0	>10,000	20	500
1426CM42	38 25 56	112 30 57	30	.7	.5	>2.0	>10,000	30	300
1427CM42	38 27 9	112 30 43	50	.5	.5	>2.0	>10,000	70	700
1428CM42	38 25 55	112 33 40	30	.5	1.5	>2.0	3,000	100	1,500
1429CM42	38 26 5	112 34 5	20	1.0	2.0	>2.0	2,000	150	300
1430CM42	38 25 32	112 35 5	30	.5	1.0	>2.0	7,000	20	2,000
1431CM42	38 27 5	112 34 16	50	1.5	1.0	>2.0	3,000	<20	700
1433CM42	38 28 16	112 34 26	30	5.0	5.0	>2.0	10,000	<20	700
1435CM13	38 30 25	112 35 43	10	10.0	3.0	>2.0	3,000	<20	200
1436CM13	38 30 14	112 34 47	50	2.0	1.5	>2.0	3,000	<20	500
1437CM13	38 30 2	112 33 1	30	2.0	1.5	>2.0	3,000	20	500
1439CM13	38 33 0	112 33 54	20	3.0	3.0	>2.0	3,000	30	300
1441CM13	38 31 7	112 34 41	>50	.7	1.0	>2.0	2,000	20	200
1444CM13	38 34 29	112 34 8	50	1.0	1.0	>2.0	2,000	50	300
1445CM13	38 34 43	112 34 3	50	2.0	3.0	>2.0	5,000	30	300
1446CM13	38 34 41	112 33 56	50	2.0	2.0	>2.0	5,000	<20	500
1447CM13	38 34 23	112 32 47	15	5.0	5.0	>2.0	3,000	30	300
1449CM41	38 18 48	112 24 44	30	1.5	1.5	>2.0	7,000	20	200
1450CM41	38 19 18	112 21 41	50	1.5	1.5	>2.0	2,000	<20	300
1451CM41	38 19 19	112 21 41	30	.5	1.0	>2.0	2,000	<20	200
1452CM41	38 19 20	112 21 6	50	1.5	2.0	>2.0	5,000	<20	700
1453CM41	38 16 2	112 29 17	30	3.0	2.0	>2.0	7,000	<20	3,000
1468CM41	38 15 52	112 27 38	20	5.0	3.0	>2.0	5,000	<20	300
1469CM41	38 17 32	112 26 55	30	7.0	3.0	>2.0	7,000	20	1,000
1470CM41	38 18 1	112 26 57	30	1.0	1.0	>2.0	7,000	<20	500
1471CM41	38 18 7	112 28 5	20	10.0	3.0	>2.0	5,000	100	700
1473CM41	38 17 4	112 29 8	30	3.0	2.0	>2.0	5,000	30	700
1474CM41	38 17 16	112 25 15	15	5.0	3.0	2.0	3,000	<20	200
1476CM41	38 16 22	112 25 43	10	10.0	7.0	1.0	3,000	<20	100
1477CM41	38 18 9	112 23 8	50	3.0	2.0	>2.0	10,000	30	100
1478CM41	38 17 29	112 23 52	10	7.0	5.0	1.5	3,000	20	100

Appendix 1.--Magnetic stream sediment concentrate data -- continued

Sample	Be 2ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm
1408CM42	<2	100	500	70	N	N	N	70
1409CM42	N	70	700	50	700	N	50	200
1410CM42	7	100	700	150	200	V	<50	70
1411CM42	10	20	200	50	500	10	70	50
1412CM42	<2	70	700	50	500	V	<50	100
1414CM42	5	70	200	100	150	50	70	N
1415CM42	10	50	150	50	300	30	100	20
1416CM42	7	70	700	150	200	10	150	150
1417CM42	7	100	500	100	150	7	50	100
1418CM42	10	100	300	150	200	10	<50	100
1419CM42	7	N	30	20	200	10	700	N
1420CM42	3	150	500	150	100	V	<50	150
1422CM42	5	70	500	100	200	10	50	30
1424CM42	7	70	700	150	200	10	50	150
1425CM42	10	30	200	20	500	10	500	20
1426CM42	10	15	70	20	300	15	500	N
1427CM42	10	N	150	20	1,000	50	1,000	N
1428CM42	10	70	300	150	300	10	<50	100
1429CM42	15	100	150	200	200	30	100	100
1430CM42	7	200	70	300	700	20	<50	150
1431CM42	<2	100	700	150	150	V	<50	150
1433CM42	2	70	700	150	100	7	50	100
1435CM13	<2	100	150	70	300	V	50	100
1436CM13	<2	100	500	50	70	V	<50	100
1437CM13	2	100	500	100	200	N	50	100
1439CM13	2	70	500	70	700	N	70	70
1441CM13	<2	150	700	70	300	V	<50	150
1444CM13	<2	100	500	150	1,000	V	50	70
1445CM13	<2	100	700	150	500	7	50	70
1446CM13	2	70	300	50	500	N	50	50
1447CM13	<2	50	150	30	150	7	50	50
1449CM41	2	70	500	70	1,000	7	150	50
1450CM41	<2	150	700	70	100	N	50	150
1451CM41	<2	100	700	70	100	N	<50	100
1452CM41	<2	150	1,000	50	200	V	50	100
1453CM41	<2	100	300	150	700	V	100	100
1468CM41	<2	70	500	70	1,000	V	100	100
1469CM41	<2	70	500	50	500	N	200	50
1470CM41	2	100	200	100	500	10	150	20
1471CM41	N	100	1,500	100	500	V	100	150
1473CM41	<2	100	200	150	700	10	100	50
1474CM41	<2	70	300	70	500	7	70	150
1476CM41	N	100	500	30	50	V	N	100
1477CM41	<2	50	200	50	>2,000	10	200	N
1478CM41	[illegible]	70	500	30	500	N	N	100

Appendix 1.--Magnetic stream sediment concentrate data --continued

Sample	Pb 20ppm	Sn 15ppm	Sr200ppm	V 20ppm	Y 20ppm	Zn300ppm	Zr 20ppm
1408CM42	20	N	500	500	70	N	200
1409CM42	20	N	<200	300	100	N	700
1410CM42	300	N	200	1,000	70	N	300
1411CM42	200	N	700	300	200	N	>2,000
1412CM42	150	N	<200	500	300	N	500
1414CM42	100	N	N	1,000	150	700	1,000
1415CM42	1,000	N	200	700	200	500	1,500
1416CM42	150	N	300	1,000	70	700	300
1417CM42	300	N	500	700	100	300	300
1418CM42	200	N	1,000	500	70	N	200
1419CM42	200	300	N	100	200	2,000	1,000
1420CM42	150	N	<200	700	70	N	500
1422CM42	200	N	200	1,000	70	N	200
1424CM42	150	N	200	700	70	N	1,000
1425CM42	700	300	N	300	300	2,000	2,000
1426CM42	300	200	N	150	200	3,000	1,500
1427CM42	700	200	N	200	1,000	2,000	2,000
1428CM42	200	N	500	700	100	300	500
1429CM42	300	N	300	300	150	N	1,500
1430CM42	300	N	<200	300	150	N	500
1431CM42	100	N	<200	1,000	70	700	500
1433CM42	70	N	200	700	70	500	200
1435CM13	20	N	N	500	100	N	150
1436CM13	50	N	N	500	70	700	500
1437CM13	50	N	<150	200	70	500	500
1439CM13	50	N	N	700	150	N	500
1441CM13	50	N	N	500	70	500	500
1444CM13	150	N	<200	1,000	70	300	1,500
1445CM13	100	N	<200	700	150	300	1,000
1446CM13	100	N	N	700	100	N	700
1447CM13	20	N	N	500	100	N	300
1449CM41	100	N	N	500	200	700	1,000
1450CM41	50	N	N	700	50	700	700
1451CM41	70	N	N	700	50	300	1,000
1452CM41	100	N	<200	1,000	100	500	500
1453CM41	150	N	200	700	150	500	500
1468CM41	50	N	200	500	150	300	1,500
1469CM41	30	N	N	500	300	500	>2,000
1470CM41	70	N	N	500	200	700	2,000
1471CM41	20	N	<200	500	150	500	>2,000
1473CM41	30	N	<200	500	200	700	1,500
1474CM41	20	N	N	500	150	300	1,500
1476CM41	N	N	200	500	70	N	150
1477CM41	70	N	<200	300	300	1,000	>2,000
1478CM41	20	N	<200	300	100	N	200

Sample	Be 2ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm
1479CM41	N	100	500	30	300	N	N	100
1480CM41	N	70	300	10	100	N	N	100
1482CM41	3	150	500	30	1,500	10	100	100
1505CM42	2	100	500	50	1,000	10	70	100
1506CM42	<2	100	200	100	N	N	70	70
1508CM42	3	50	500	70	150	N	<50	100
1509CM42	20	50	200	50	300	100	300	50
1510CM42	7	70	700	100	150	N	70	100
1511CM42	5	50	700	100	150	N	<50	100
1512CM42	10	70	200	150	150	10	<50	50
1513CM42	15	70	300	100	300	30	70	20
1514CM42	20	30	300	150	500	30	100	50
1515CM42	5	70	500	100	150	15	70	50
1516CM42	5	50	200	100	150	10	<50	20
1517CM42	15	50	200	150	300	50	100	20
1518CM42	7	70	500	70	150	10	<50	100
1519CM42	20	70	300	100	300	15	300	30
1520CM42	5	70	300	70	150	50	70	20
1521CM42	5	100	1,500	100	150	10	50	70
1522CM42	10	50	150	150	200	70	50	50
1523CM41	7	100	700	100	200	10	50	100
1524CM41	5	20	200	150	200	30	<50	20
1525CM42	10	70	300	100	200	30	50	30
1526CM42	150	N	70	30	500	50	500	N
1527CM42	50	10	70	30	200	15	500	N
1528CM42	50	10	70	20	300	200	700	N
1529CM41	50	N	30	20	300	300	200	N
1531CM42	30	15	150	30	200	70	200	10
1532CM41	30	N	150	30	300	200	500	20
1533CM41	100	N	20	50	1,000	300	300	N
1534CM41	100	<10	20	30	300	200	150	N
1535CM41	20	20	100	30	500	70	500	N
1536CM41	50	20	700	50	500	100	500	70
1537CM41	70	N	70	50	500	300	500	N
1539CM41	20	20	150	150	300	30	500	20
1540CM41	5	10	100	30	200	20	>5,000	N
1541CM41	7	N	30	15	300	30	1,500	N
1543CM41	5	50	300	30	200	7	300	30
1544CM41	15	70	300	100	300	70	500	50
1545CM41	50	N	50	30	700	150	300	20
1547CM41	7	10	70	20	150	10	1,000	N
1548CM41	15	N	70	100	1,500	20	2,000	N
1550CM41	15	N	50	10	300	70	1,000	N
1551CM41	10	50	70	30	50	10	150	N
1552CM41	3	10	50	10	50	N	500	20

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm
1479CM41	38 17 26	112 23 52	15	7.0	5.0	1.5	3,000	30	150
1480CM41	38 17 33	112 24 0	10	7.0	5.0	1.0	5,000	<20	70
1482CM41	38 19 42	112 26 1	30	1.0	1.5	>2.0	10,000	<20	150
1505CM42	38 18 59	112 32 58	30	2.0	2.0	>2.0	10,000	30	500
1506CM42	38 19 25	112 32 35	20	5.0	5.0	>2.0	7,000	<20	100
1508CM42	38 20 14	112 32 42	20	5.0	5.0	2.0	7,000	<20	500
1509CM42	38 21 3	112 33 48	30	.7	1.5	>2.0	>10,000	50	1,500
1510CM42	38 21 18	112 34 1	30	3.0	3.0	>2.0	7,000	30	500
1511CM42	38 22 19	112 34 6	50	2.0	1.5	>2.0	2,000	50	300
1512CM42	38 23 9	112 34 0	3	.5	1.0	>2.0	1,500	20	500
1513CM42	38 23 46	112 34 7	50	.3	.7	>2.0	2,000	30	500
1514CM42	38 24 11	112 33 26	30	.5	1.0	>2.0	7,000	50	1,000
1515CM42	38 24 18	112 34 10	50	1.0	1.5	>2.0	1,500	20	500
1516CM42	38 20 51	112 32 45	15	1.0	1.0	2.0	5,000	<20	700
1517CM42	38 21 2	112 32 35	30	.5	1.0	>2.0	10,000	30	1,500
1518CM42	38 21 42	112 32 3	30	1.5	3.0	>2.0	7,000	70	700
1519CM42	38 22 30	112 31 20	30	1.0	1.5	>2.0	10,000	20	500
1520CM42	38 21 36	112 31 43	30	.5	.7	>2.0	2,000	30	500
1521CM42	38 22 13	112 30 55	50	.5	.5	>2.0	2,000	30	500
1522CM42	38 22 28	112 30 36	20	.3	.7	1.5	1,500	30	1,500
1523CM41	38 22 54	112 29 37	50	1.0	1.0	>2.0	2,000	20	500
1524CM41	38 22 52	112 29 38	30	.3	.7	1.5	1,000	20	1,500
1525CM42	38 22 45	112 30 19	30	1.0	1.0	>2.0	3,000	30	1,500
1526CM42	38 23 0	112 30 58	30	1.0	1.0	>2.0	>10,000	<20	3,000
1527CM42	38 23 7	112 31 6	30	.5	1.0	>2.0	>10,000	30	1,000
1528CM42	38 23 44	112 30 15	30	.7	.5	>2.0	>10,000	20	1,500
1529CM41	38 23 43	112 29 39	15	1.0	1.5	.5	>10,000	<20	1,500
1531CM42	38 23 27	112 30 33	20	1.0	1.5	2.0	10,000	30	500
1532CM41	38 24 1	112 29 14	30	2.0	1.5	2.0	>10,000	30	3,000
1533CM41	38 23 56	112 29 13	20	.5	1.5	1.0	>10,000	<20	3,000
1534CM41	38 23 59	112 29 3	30	.2	.5	.5	>10,000	20	700
1535CM41	38 24 56	112 29 41	30	.7	1.0	2.0	>2	30	700
1536CM41	38 25 1	112 29 28	30	2.0	3.0	1.5	>10,000	20	700
1537CM41	38 25 13	112 29 10	15	.5	1.0	1.0	>10,000	<20	2,000
1539CM41	38 25 20	112 28 50	20	2.0	1.5	>2.0	>10,000	20	200
1540CM41	38 25 40	112 29 3	30	.5	.7	>2.0	>10,000	30	500
1541CM41	38 25 34	112 29 4	30	.3	.1	>2.0	>10,000	20	2,000
1543CM41	38 25 9	112 29 57	20	2.0	2.0	>2.0	>10,000	20	200
1544CM41	38 25 17	112 28 12	20	2.0	1.5	>2.0	>10,000	20	1,000
1545CM41	38 25 21	112 28 12	20	1.0	1.5	1.0	>10,000	20	2,000
1547CM41	38 25 49	112 28 37	30	.7	1.5	>2.0	>10,000	20	200
1548CM41	38 25 52	112 28 21	20	1.0	1.0	>2.0	>10,000	<20	2,000
1550CM41	38 25 48	112 28 17	20	.3	.5	>2.0	>10,000	<20	2,000
1551CM41	38 26 18	112 28 42	20	3.0	3.0	2.0	7,000	20	150
1552CM41	38 26 36	112 29 15	7	1.0	1.0	1.5	7,000	20	200

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Pb 20ppm	Sn 15ppm	Sr200ppm	V 20ppm	Y 20ppm	Zn300ppm	Zr 20ppm
1479CM41	20	N	200	500	70	N	200
1480CM41	20	N	N	500	70	N	100
1482CM41	100	N	N	500	300	1,000	1,500
1505CM42	700	N	N	300	150	700	1,500
1506CM42	30	N	N	700	70	N	200
1508CM42	30	N	<200	500	70	N	200
1509CM42	1,000	150	200	700	300	700	1,000
1510CM42	150	N	<200	1,000	70	N	300
1511CM42	200	N	<200	1,000	50	N	500
1512CM42	300	N	N	500	70	N	300
1513CM42	500	N	<200	700	100	N	700
1514CM42	500	N	200	500	100	300	1,500
1515CM42	150	N	200	1,000	70	N	200
1516CM42	150	N	<200	700	70	N	500
1517CM42	500	N	300	700	150	500	1,500
1518CM42	1,000	N	300	700	70	N	500
1519CM42	1,000	N	200	1,000	200	500	500
1520CM42	150	N	<200	700	100	300	1,000
1521CM42	200	N	N	1,500	50	N	300
1522CM42	200	N	700	500	50	300	200
1523CM41	200	N	<200	1,000	70	300	300
1524CM41	500	N	300	500	70	N	500
1525CM42	700	N	300	500	70	N	300
1526CM42	2,000	200	1,000	200	300	1,500	1,500
1527CM42	1,500	300	300	200	100	2,000	700
1528CM42	1,000	100	500	150	300	1,500	2,000
1529CM41	1,000	N	1,000	150	300	700	1,500
1531CM42	700	N	<200	200	200	1,000	1,000
1532CM41	2,000	N	700	200	300	700	2,000
1533CM41	2,000	N	500	150	500	1,500	700
1534CM41	700	N	N	100	100	1,500	1,000
1535CM41	1,500	100	700	200	200	1,000	1,500
1536CM41	700	N	300	200	300	1,000	500
1537CM41	1,000	N	1,000	150	500	1,000	1,000
1539CM41	500	30	700	300	300	700	1,500
1540CM41	300	200	N	150	300	1,500	2,000
1541CM41	1,000	200	N	100	700	1,500	1,500
1543CM41	100	200	N	300	200	3,000	1,000
1544CM41	300	N	500	500	300	500	1,000
1545CM41	1,000	N	1,000	150	300	1,500	1,000
1547CM41	150	200	N	150	300	2,000	1,500
1548CM41	300	50	200	150	500	1,000	>2,000
1550CM41	500	300	200	150	700	1,000	>2,000
1551CM41	200	N	N	500	200	500	500
1552CM41	50	20	N	100	70	N	500

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm
1553CM42	38 24 57	112 30 3	30	1.0	1.0	2.0	>10,000	20	1,000
1554CM42	38 25 6	112 30 21	50	.7	.7	>2.0	>10,000	20	150
1555CM42	38 25 24	112 30 23	30	1.0	1.5	>2.0	>10,000	20	150
1556CM42	38 25 11	112 30 31	50	.5	.5	>2.0	>10,000	20	500
1557CM42	38 25 42	112 30 55	50	.5	.5	>2.0	>10,000	<20	70
1558CM42	38 27 10	112 30 35	50	1.0	.7	>2.0	>10,000	<20	1,000
1559CM42	38 26 55	112 30 42	30	2.0	1.5	>2.0	>10,000	50	500
1561CM42	38 26 34	112 31 22	30	1.5	1.0	>2.0	5,000	20	1,000
1562CM42	38 25 38	112 32 34	30	.5	.7	>2.0	2,000	30	500
1563CM42	38 26 0	112 33 26	30	1.0	3.0	2.0	3,000	100	300
1564CM42	38 25 11	112 34 52	30	.7	1.0	1.0	7,000	70	700
1565CM42	38 24 42	112 34 51	30	.7	1.0	>2.0	2,000	30	1,000
1566CM42	38 27 4	112 34 42	50	1.5	1.5	>2.0	>10,000	20	3,000
1567CM42	38 27 7	112 34 18	30	2.0	2.0	>2.0	7,000	<20	1,500
1568CM42	38 26 54	112 34 1	30	.5	2.0	1.5	2,000	50	500
1569CM42	38 26 59	112 33 35	30	.5	1.5	1.5	1,500	50	700
1570CM42	38 27 7	112 33 9	30	.5	.7	>2.0	1,500	<20	500
1571CM42	38 27 27	112 32 22	50	1.0	1.0	>2.0	5,000	20	500
1572CM42	38 27 24	112 32 21	30	1.0	1.0	>2.0	2,000	<20	1,000
1573CM42	38 27 23	112 32 36	50	.5	1.0	>2.0	5,000	<20	500
1575CM42	38 27 49	112 34 43	30	3.0	2.0	>2.0	>10,000	50	5,000
1580CM41	38 23 26	112 23 2	50	1.0	1.5	>2.0	5,000	<20	700
1582CM41	38 25 28	112 23 56	30	.7	.7	>2.0	>10,000	50	1,000
1583CM41	38 25 6	112 23 14	50	.7	.7	>2.0	1,500	<20	500
1584CM41	38 24 54	112 23 22	30	.2	.7	>2.0	>10,000	<20	300
1585CM41	38 24 52	112 23 20	50	.5	.7	>2.0	2,000	<20	300
1586CM41	38 25 41	112 23 20	20	.7	.5	1.0	>10,000	20	3,000
1587CM41	38 25 38	112 23 38	30	.5	.7	>2.0	1,000	20	500
1588CM41	38 25 53	112 22 56	30	1.0	1.0	>2.0	>10,000	<20	1,000
1590CM41	38 26 2	112 22 25	30	1.0	1.0	>2.0	2,000	20	700
1591CM41	38 25 46	112 22 42	50	1.5	1.5	>2.0	3,000	20	300
1592CM42	38 16 52	112 34 4	15	5.0	5.0	2.0	7,000	<20	1,000
1593CM42	38 16 22	112 33 27	15	5.0	3.0	2.0	3,000	<20	200
1594CM41	38 27 31	112 15 45	30	.5	.7	>2.0	>10,000	20	150
1595CM41	38 27 30	112 17 17	30	.5	.7	>2.0	>10,000	20	1,000
1596CM41	38 27 31	112 21 8	50	1.0	1.5	>2.0	2,000	<20	500
1598CM41	38 29 15	112 19 54	30	.7	.7	>2.0	1,500	30	300
1677CM14	38 30 20	112 14 3	50	.5	.7	>2.0	3,000	20	300
1678CM14	38 32 13	112 14 34	30	.5	1.0	>2.0	3,000	20	300
1680CM14	38 34 10	112 13 34	30	2.0	2.0	>2.0	7,000	<20	1,500
1682CM14	38 34 46	112 14 52	15	7.0	5.0	1.5	3,000	<20	500
1683CM14	38 34 47	112 14 55	30	5.0	3.0	>2.0	7,000	<20	1,000
1684CM14	38 34 44	112 14 56	20	5.0	5.0	1.5	5,000	<20	1,000
1723CM14	38 32 37	112 28 19	30	.7	.7	>2.0	10,000	20	500
1724CM14	38 32 48	112 26 54	30	3.0	2.0	>2.0	10,000	100	500

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Be 2ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm
1553CM42	20	20	100	50	300	50	500	20
1554CM42	15	10	70	20	200	7	500	N
1555CM42	7	10	70	30	300	10	700	N
1556CM42	7	N	50	20	200	10	700	N
1557CM42	7	10	100	20	300	20	700	N
1558CM42	15	20	200	50	300	20	700	50
1559CM42	15	70	150	20	300	7	2,000	30
1561CM42	7	70	700	100	200	10	100	100
1562CM42	7	50	200	100	150	15	50	70
1563CM42	10	100	70	150	200	50	70	50
1564CM42	10	150	150	150	700	15	50	150
1565CM42	10	50	200	150	300	10	50	50
1566CM42	<2	200	700	500	300	N	70	70
1567CM42	<2	150	700	150	150	N	<50	150
1568CM42	7	200	100	150	300	20	<50	100
1569CM42	7	200	70	200	300	10	<50	150
1570CM42	2	100	200	150	100	N	50	100
1571CM42	<2	150	300	150	100	N	50	50
1572CM42	5	100	500	150	100	N	<50	100
1573CM42	<2	100	300	150	150	N	70	50
1575CM42	<2	100	500	150	300	7	70	150
1580CM41	N	150	1,000	70	100	N	50	70
1582CM41	30	N	200	50	200	200	200	N
1583CM41	10	100	700	70	300	7	<50	70
1584CM41	15	70	300	70	200	100	150	30
1585CM41	7	100	700	150	300	N	<50	70
1586CM41	50	N	100	100	300	100	150	30
1587CM41	15	50	200	30	300	100	100	30
1588CM41	20	30	50	50	300	100	70	N
1590CM41	7	70	1,000	100	200	N	<50	50
1591CM41	3	50	200	70	200	N	<50	50
1592CM42	N	70	700	70	1,000	N	<50	200
1593CM42	N	100	300	150	100	N	<50	150
1594CM41	2	10	70	30	500	10	5,000	N
1595CM41	10	30	150	30	300	N	300	20
1596CM41	7	70	500	150	500	N	<50	100
1598CM41	5	70	500	100	100	7	70	150
1677CM14	<2	70	200	100	150	15	50	20
1678CM14	<2	100	200	150	300	N	<50	50
1680CM14	<2	100	100	70	150	N	N	N
1682CM14	N	100	200	50	150	N	<50	70
1683CM14	N	150	150	150	300	N	<50	70
1684CM14	<2	100	200	150	200	N	<50	50
1723CM14	<2	100	200	150	1,000	50	300	20
1724CM14	2	100	300	100	1,500	30	500	150

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Pb 20ppm	Sn 15ppm	Sr200ppm	V 20ppm	Y 20ppm	Zn300ppm	Zr 20ppm
1553CM42	1,500	150	300	150	300	1,500	1,000
1554CM42	1,000	300	N	150	200	5,000	700
1555CM42	100	300	N	200	200	2,000	1,500
1556CM42	700	200	N	100	300	2,000	>2,000
1557CM42	100	300	N	200	150	3,000	1,500
1558CM42	1,000	150	200	300	300	1,000	1,000
1559CM42	300	200	N	300	300	1,000	1,000
1561CM42	200	N	<200	1,000	150	N	700
1562CM42	150	N	<200	700	70	N	700
1563CM42	300	N	200	300	100	N	1,000
1564CM42	150	N	300	500	100	700	300
1565CM42	150	N	500	700	100	300	700
1566CM42	150	N	<200	2,000	200	300	>2,000
1567CM42	70	N	N	700	100	500	700
1568CM42	200	N	200	300	150	N	500
1569CM42	300	N	<200	300	100	300	700
1570CM42	150	N	<200	500	70	N	500
1571CM42	100	N	N	700	70	500	300
1572CM42	150	N	200	500	70	N	300
1573CM42	150	N	N	1,000	100	500	1,500
1575CM42	300	N	200	700	200	700	500
1580CM41	100	N	N	1,000	70	500	300
1582CM41	5,000	N	700	500	200	1,000	500
1583CM41	300	N	200	700	70	N	500
1584CM41	2,000	N	300	700	150	1,000	700
1585CM41	500	N	200	700	70	N	1,000
1586CM41	10,000	N	700	200	70	1,500	500
1587CM41	1,000	N	200	1,000	100	500	1,000
1588CM41	2,000	N	500	500	100	1,000	1,000
1590CM41	200	N	300	1,000	70	N	300
1591CM41	300	N	300	1,000	50	N	200
1592CM42	50	20	<200	500	200	300	1,000
1593CM42	20	N	200	300	100	500	200
1594CM41	200	200	N	150	300	2,000	300
1595CM41	300	N	N	300	200	1,500	>2,000
1596CM41	300	N	200	700	70	300	700
1598CM41	100	N	300	500	70	500	200
1677CM14	100	N	<200	700	70	500	200
1678CM14	70	N	<200	1,000	70	700	200
1680CM14	70	N	300	700	100	N	200
1682CM14	70	N	500	500	70	300	300
1683CM14	70	N	500	700	100	500	500
1684CM14	50	N	500	700	100	300	200
1723CM14	100	N	N	1,000	100	1,500	700
1724CM14	150	N	N	500	200	1,000	1,000

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm
1725CM14	38 32 19	112 26 44	30	1.5	1.5	>2.0	>10,000	30	300
1726CM14	38 34 29	112 25 16	10	5.0	3.0	1.5	5,000	<20	700
1727CM14	38 34 47	112 19 45	30	2.0	1.5	>2.0	10,000	20	200
1728CM14	38 34 9	112 19 53	20	3.0	5.0	>2.0	10,000	30	700
1730CM14	38 32 53	112 22 15	30	3.0	3.0	>2.0	10,000	50	700
1731CM14	38 33 46	112 22 1	15	7.0	7.0	1.5	7,000	50	1,500
1732CM14	38 33 35	112 23 55	7	5.0	3.0	1.0	3,000	70	700
1733CM14	38 33 38	112 23 46	15	5.0	5.0	1.5	7,000	<20	300
1734CM14	38 33 40	112 23 45	20	7.0	3.0	2.0	5,000	20	300
1735CM14	38 33 12	112 25 41	30	2.0	3.0	>2.0	10,000	150	500
1737CM14	38 32 37	112 24 39	20	5.0	3.0	>2.0	10,000	50	300
1738CM14	38 32 38	112 23 25	30	3.0	3.0	>2.0	10,000	70	700
1739CM14	38 30 58	112 25 15	30	.3	.5	>2.0	>10,000	<20	300
1740CM14	38 31 50	112 23 26	50	1.0	1.5	>2.0	>10,000	50	500
1741CM14	38 30 58	112 23 44	30	.5	.5	>2.0	7,000	30	500
1742CM14	38 33 53	112 17 49	20	3.0	3.0	2.0	7,000	20	1,000
1743CM14	38 30 48	112 19 22	20	3.0	3.0	>2.0	7,000	20	2,000
1744CM41	38 21 31	112 14 14	20	.5	1.5	2.0	1,500	30	10,000
1745CM41	38 19 38	112 13 39	50	1.0	2.0	>2.0	2,000	20	500
1746CM41	38 19 39	112 13 45	30	1.5	1.5	>2.0	2,000	20	500
1747CM41	38 19 9	112 13 24	10	2.0	2.0	1.5	1,500	20	300
1749CM41	38 18 14	112 14 16	20	5.0	5.0	1.5	3,000	<20	500
1755CM41	38 29 30	112 27 16	15	3.0	3.0	1.5	10,000	20	300
1756CM41	38 28 29	112 27 21	50	.7	.7	>2.0	>10,000	20	300
1757CM41	38 28 0	112 27 1	30	2.0	1.5	>2.0	10,000	30	700
1758CM41	38 28 0	112 27 7	30	2.0	1.5	>2.0	10,000	50	500
1760CM41	38 29 20	112 26 26	50	1.0	2.0	>2.0	1,500	20	500
1761CM14	38 33 47	112 16 26	20	3.0	2.0	2.0	300	<20	2,000
1762CM14	38 32 11	112 16 10	50	1.5	1.5	>2.0	7,000	20	1,000
1764CM14	38 32 4	112 16 22	30	.5	1.0	>2.0	7,000	20	1,000
1765CM14	38 31 3	112 15 58	30	.1	.5	.3	1,000	30	1,500
1867CM13	38 30 24	112 35 16	15	7.0	5.0	>2.0	5,000	<20	300
1868CM13	38 30 20	112 35 3	15	5.0	3.0	2.0	5,000	<20	200
1869CM13	38 30 12	112 34 58	30	7.0	5.0	>2.0	10,000	<20	2,000
1870CM13	38 30 14	112 34 21	50	1.5	1.5	>2.0	5,000	N	700
1871CM13	38 30 10	112 34 23	50	2.0	1.0	>2.0	3,000	<20	1,500
1872CM13	38 30 11	112 34 1	50	1.5	1.5	>2.0	3,000	<20	500
1873CM13	38 30 7	112 34 3	>50	.5	.7	>2.0	3,000	20	300
1874CM13	38 30 7	112 33 48	30	1.0	1.0	>2.0	5,000	<20	500
1875CM42	38 27 0	112 34 27	30	.5	1.0	1.0	1,500	30	700
2141CM13	38 32 9	112 31 5	50	1.5	1.0	>2.0	7,000	<20	1,000
2142CM13	38 33 18	112 30 13	10	10.0	7.0	1.5	5,000	<20	200
2143CM14	38 34 30	112 28 45	30	3.0	3.0	>2.0	7,000	100	500
2144CM14	38 32 21	112 28 57	50	.7	.7	>2.0	3,000	30	700
2145CM14	38 30 50	112 27 32	50	.5	.7	>2.0	7,000	50	300

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Be 2ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm
1725CM14	2	N	300	30	1,500	30	500	100
1726CM14	2	70	200	20	70	N	<50	100
1727CM14	3	100	500	100	500	20	200	70
1728CM14	2	100	200	70	1,000	N	70	50
1730CM14	5	100	500	50	1,000	10	150	70
1731CM14	2	100	300	70	700	N	70	100
1732CM14	2	50	100	50	100	N	<50	50
1733CM14	<2	70	200	70	200	N	50	70
1734CM14	2	100	200	150	300	N	<50	50
1735CM14	3	70	300	50	1,000	15	300	100
1737CM14	5	70	300	50	2,000	15	500	70
1738CM14	7	100	150	100	1,000	10	150	70
1739CM14	7	20	150	50	1,000	15	700	N
1740CM14	5	70	300	50	>2,000	30	300	30
1741CM14	20	50	150	50	500	N	70	30
1742CM14	3	70	200	70	300	7	50	70
1743CM14	2	100	300	100	500	N	100	50
1744CM41	7	30	200	150	300	7	<50	70
1745CM41	<2	70	500	100	300	N	50	100
1746CM41	<2	100	700	100	200	N	<50	150
1747CM41	2	50	700	50	150	N	<50	200
1749CM41	<2	50	1,000	100	50	N	N	300
1755CM41	20	50	700	30	200	100	300	100
1756CM41	10	30	150	30	500	10	1,500	N
1757CM41	20	50	500	50	500	7	200	70
1758CM41	20	70	300	50	300	15	700	50
1760CM41	3	70	1,000	150	200	7	<50	100
1761CM14	<2	50	150	70	200	N	<50	70
1762CM14	2	70	200	150	100	N	<50	30
1764CM14	2	50	200	100	150	N	<50	30
1765CM14	<2	15	50	150	200	15	N	N
1867CM13	<2	100	300	50	100	N	50	100
1868CM13	<2	100	300	70	200	N	<50	150
1869CM13	<2	50	300	150	500	N	70	150
1870CM13	<2	100	700	150	300	N	<50	150
1871CM13	<2	150	1,000	70	150	N	70	70
1872CM13	<2	100	500	50	300	N	<50	100
1873CM13	<2	100	500	100	100	N	<50	50
1874CM13	<2	150	500	100	200	N	100	50
1875CM42	3	150	200	150	100	10	<50	150
2141CM13	N	100	300	150	300	15	50	20
2142CM13	<2	70	1,000	70	500	N	50	150
2143CM14	<2	100	200	150	500	10	70	50
2144CM14	2	100	100	100	200	50	70	20
2145CM14	7	70	500	100	1,000	10	300	70

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Pb 20ppm	Sn 15ppm	Sr200ppm	V 20ppm	Y 20ppm	Zn300ppm	Zr 20ppm
1725CM14	200	200	N	300	300	1,500	1,500
1726CM14	20	N	<200	300	150	N	1,000
1727CM14	150	N	N	500	150	1,000	500
1728CM14	100	N	<200	500	100	300	700
1730CM14	200	N	N	700	150	700	1,000
1731CM14	50	N	300	500	200	N	700
1732CM14	20	N	500	300	100	N	300
1733CM14	30	N	200	500	100	N	500
1734CM14	30	N	<200	500	100	500	300
1735CM14	150	50	<200	300	300	1,000	2,000
1737CM14	300	200	<200	500	300	700	1,000
1738CM14	300	N	<200	700	150	700	500
1739CM14	150	200	N	300	200	2,000	1,000
1740CM14	300	100	N	300	200	1,000	2,000
1741CM14	300	N	<200	500	200	500	300
1742CM14	150	N	500	700	100	300	500
1743CM14	300	N	200	700	200	500	500
1744CM41	200	N	500	500	100	N	300
1745CM41	150	N	<200	700	70	N	300
1746CM41	150	N	200	700	70	N	500
1747CM41	150	N	300	500	70	N	300
1749CM41	30	N	500	700	70	N	700
1755CM41	700	700	200	500	100	500	700
1756CM41	300	150	N	300	200	1,500	2,000
1757CM41	1,500	N	300	300	100	700	700
1758CM41	700	100	<200	500	300	1,500	1,500
1760CM41	200	N	<200	1,000	50	N	150
1761CM14	70	N	200	700	70	N	500
1762CM14	150	N	700	1,000	70	N	500
1764CM14	150	N	300	700	70	N	500
1765CM14	300	N	5,000	300	20	N	300
1867CM13	30	N	<200	500	100	N	150
1868CM13	50	N	<150	200	70	N	300
1869CM13	100	N	<200	500	200	N	1,000
1870CM13	70	N	N	500	100	1,000	500
1871CM13	50	N	<200	700	70	700	500
1872CM13	70	N	N	700	70	500	1,000
1873CM13	50	N	N	500	70	700	500
1874CM13	50	N	N	500	150	500	700
1875CM42	300	N	500	500	70	N	500
2141CM13	150	N	N	1,000	70	1,000	500
2142CM13	50	N	<200	300	150	N	700
2143CM14	50	N	N	700	150	1,000	1,000
2144CM14	70	N	<200	1,000	70	700	500
2145CM14	200	N	<200	1,000	150	500	700

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm
2146CM14	38 30 59	112 21 36	30	1.5	1.0	>2.0	>10,000	20	2,000
2150CM13	38 31 59	112 35 2	15	5.0	3.0	>2.0	5,000	<20	700
2301CM41	38 28 41	112 20 36	50	.7	1.5	>2.0	10,000	20	1,000
2302CM41	38 28 30	112 20 49	30	.7	1.5	>2.0	10,000	20	700
2303CM41	38 28 32	112 20 52	30	.7	1.0	>2.0	7,000	20	700
2305CM41	38 27 50	112 22 28	30	1.5	1.5	>2.0	7,000	20	700
2306CM41	38 27 39	112 22 29	50	1.0	1.0	>2.0	>10,000	20	1,000
2307CM41	38 27 37	112 22 19	30	3.0	2.0	>2.0	7,000	20	500
2309CM41	38 26 28	112 15 9	50	.3	.7	>2.0	10,000	20	1,000
2311CM41	38 26 23	112 18 44	50	.7	1.5	>2.0	3,000	20	500
2313CM41	38 24 58	112 18 37	30	.7	2.0	>2.0	2,000	<20	500
2314CM41	38 25 7	112 19 19	30	1.0	1.5	1.0	3,000	<20	500
2315CM41	38 29 14	112 15 9	30	1.0	1.5	>2.0	>10,000	30	3,000
2316CM41	38 28 23	112 14 24	20	3.0	3.0	>2.0	>10,000	30	1,000
2317CM41	38 28 52	112 13 14	30	3.0	3.0	>2.0	10,000	70	1,500
2318CM41	38 28 53	112 13 20	20	3.0	3.0	>2.0	>10,000	50	1,500
2319CM41	38 28 55	112 13 19	20	3.0	3.0	>2.0	>10,000	70	2,000
2327CM41	38 23 40	112 19 12	50	.3	1.0	1.0	1,500	<20	200
2329CM41	38 23 25	112 16 23	50	.7	1.0	.7	1,500	30	700
2330CM41	38 21 48	112 17 7	20	.7	1.0	.7	5,000	50	700
2332CM41	38 21 51	112 19 37	50	.5	.7	>2.0	1,500	20	300
2333CM41	38 20 59	112 18 58	50	1.0	1.5	>2.0	3,000	20	1,500
2334CM41	38 22 10	112 15 29	50	.7	.7	.7	2,000	30	2,000
2336CM41	38 15 59	112 15 36	50	1.0	2.0	>2.0	3,000	20	500
2337CM41	38 17 43	112 15 41	10	7.0	5.0	1.5	3,000	<20	150
2339CM41	38 16 16	112 17 39	7	7.0	3.0	1.0	2,000	<20	200
2340CM41	38 18 17	112 17 38	10	3.0	3.0	1.0	2,000	<20	300
2345CM42	38 16 37	112 31 31	30	3.0	2.0	>2.0	7,000	30	1,000
2346CM42	38 17 13	112 31 8	30	2.0	1.5	>2.0	7,000	20	1,000
2347CM42	38 20 26	112 31 19	20	5.0	3.0	>2.0	3,000	20	700
2348CM42	38 20 58	112 31 5	50	.5	.7	>2.0	2,000	30	100
2349CM41	38 20 31	112 29 22	30	.7	.7	>2.0	2,000	30	500
2350CM41	38 20 42	112 28 54	30	.5	.5	>2.0	2,000	20	500
2351CM41	38 20 35	112 28 54	30	5.0	5.0	>2.0	3,000	20	1,500
2352CM41	38 21 1	112 28 16	20	7.0	5.0	2.0	2,000	30	500
2353CM41	38 20 59	112 28 23	30	.5	.5	>2.0	2,000	50	1,500
2354CM41	38 21 17	112 27 58	30	.7	1.0	>2.0	3,000	50	1,000
2355CM41	38 21 4	112 27 6	30	3.0	3.0	>2.0	3,000	20	700
2356CM41	38 21 3	112 27 7	20	2.0	3.0	>2.0	3,000	20	300
2375CM42	38 29 20	112 32 7	50	1.0	1.5	>2.0	5,000	<20	300
2376CM42	38 29 21	112 32 13	30	2.0	1.5	>2.0	5,000	<20	700
2377CM42	38 28 2	112 31 43	50	1.5	1.5	>2.0	5,000	20	300
2378CM42	38 27 59	112 31 43	30	1.0	1.0	>2.0	3,000	20	1,000
2379CM42	38 26 41	112 30 9	30	1.0	.7	>2.0	>10,000	20	100
2380CM42	38 28 37	112 30 8	50	.5	.5	>2.0	>10,000	20	200

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Be 2ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm
2146CM14	30	100	100	70	300	100	100	30
2150CM13	<2	70	200	30	200	N	100	100
2301CM41	50	70	200	150	200	10	100	50
2302CM41	20	70	300	150	300	20	100	50
2303CM41	15	150	500	100	300	20	150	100
2305CM41	10	100	1,000	50	300	7	70	100
2306CM41	50	70	1,000	100	500	70	70	150
2307CM41	7	70	3,000	50	300	7	<50	100
2309CM41	10	150	300	150	300	7	70	70
2311CM41	<2	100	1,000	70	300	N	<50	70
2313CM41	5	70	300	100	150	7	<50	50
2314CM41	5	100	500	150	300	7	<50	70
2315CM41	5	70	200	20	2,000	20	500	20
2316CM41	5	70	500	100	300	20	1,000	70
2317CM41	7	50	500	150	500	30	70	100
2318CM41	5	100	500	100	500	20	70	70
2319CM41	10	100	300	150	500	70	70	150
2327CM41	3	100	500	200	200	N	<50	100
2329CM41	7	100	150	1,000	150	50	<50	150
2330CM41	10	100	150	150	150	7	<50	70
2332CM41	<2	70	500	100	150	N	N	70
2333CM41	5	100	700	100	300	N	<50	50
2334CM41	20	100	300	500	100	10	N	300
2336CM41	20	70	300	200	300	30	70	20
2337CM41	<2	70	500	30	100	N	N	200
2339CM41	<2	70	700	50	70	N	N	500
2340CM41	2	70	1,000	50	50	N	<50	300
2345CM42	2	100	150	100	500	10	100	50
2346CM42	2	100	150	100	500	20	200	20
2347CM42	5	70	700	100	300	15	70	50
2348CM42	3	70	200	20	150	50	70	N
2349CM41	5	70	300	70	150	70	70	N
2350CM41	3	100	150	20	50	10	<50	30
2351CM41	7	100	700	150	150	10	<50	100
2352CM41	5	50	500	100	100	7	<50	70
2353CM41	15	50	100	100	200	20	70	30
2354CM41	15	100	150	150	200	20	70	50
2355CM41	3	100	300	100	100	N	50	50
2356CM41	3	100	500	100	150	N	<50	70
2375CM42	N	150	500	150	150	N	100	70
2376CM42	<2	100	500	150	150	N	150	70
2377CM42	<2	100	300	100	150	N	70	50
2378CM42	2	70	300	150	200	N	50	20
2379CM42	3	15	100	50	500	70	>5,000	N
2380CM42	3	20	150	20	150	20	>5,000	N

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Pb 20ppm	Sn 15ppm	Sr200ppm	V 20ppm	Y 20ppm	Zn300ppm	Zr 20ppm
2146CM14	1,000	N	500	500	150	1,500	700
2150CM13	30	N	N	500	100	N	300
2301CM41	150	N	700	500	100	500	300
2302CM41	500	N	500	700	100	N	1,000
2303CM41	500	N	500	700	100	300	500
2305CM41	300	N	200	1,000	70	700	700
2306CM41	2,000	N	500	1,000	150	500	500
2307CM41	500	N	300	1,000	70	300	1,000
2309CM41	300	N	700	700	150	500	500
2311CM41	200	N	<200	1,500	100	500	500
2313CM41	200	N	1,000	700	150	500	1,000
2314CM41	500	N	300	700	70	300	700
2315CM41	500	50	<200	500	500	1,000	>2,000
2316CM41	700	70	200	500	200	1,000	500
2317CM41	300	N	700	700	150	300	1,000
2318CM41	150	N	700	500	150	N	1,500
2319CM41	300	N	700	700	200	N	2,000
2327CM41	300	N	<200	700	70	N	500
2329CM41	500	N	300	300	100	N	500
2330CM41	500	N	200	500	100	700	300
2332CM41	150	N	<200	1,000	70	N	700
2333CM41	300	N	200	700	70	300	500
2334CM41	700	N	200	300	150	500	200
2336CM41	300	N	300	700	70	N	500
2337CM41	30	N	300	500	70	N	100
2339CM41	<20	N	500	200	70	N	300
2340CM41	50	N	300	500	70	N	150
2345CM42	50	N	200	500	150	700	2,000
2346CM42	70	N	<200	500	200	700	2,000
2347CM42	100	N	200	500	100	N	1,000
2348CM42	100	N	N	1,000	150	N	1,500
2349CM41	150	N	<200	700	150	500	1,000
2350CM41	100	N	<200	700	50	N	150
2351CM41	150	N	300	1,000	70	N	100
2352CM41	50	N	300	500	100	N	300
2353CM41	200	N	200	500	100	500	700
2354CM41	300	N	200	500	100	500	500
2355CM41	70	N	200	700	70	N	300
2356CM41	50	N	<200	1,000	70	N	200
2375CM42	50	N	N	500	70	500	1,000
2376CM42	70	N	N	500	100	500	700
2377CM42	100	N	N	700	100	500	1,000
2378CM42	100	N	<200	700	70	300	700
2379CM42	100	300	N	150	150	2,000	700
2380CM42	150	300	N	200	150	1,500	700

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm
2382CM41	38 28 51	112 28 3	50	.7	.5	>2.0	>10,000	<20	300
2383CM41	38 28 45	112 28 15	50	1.0	.3	>2.0	>10,000	<20	300
2384CM41	38 28 40	112 28 21	50	1.0	1.5	>2.0	>10,000	<20	200
2385CM41	38 28 1	112 28 11	50	.7	5.0	>2.0	>10,000	<20	700
2386CM41	38 27 58	112 28 11	30	2.0	1.5	>2.0	>10,000	<20	1,500
2387CM41	38 28 2	112 25 18	30	.7	1.0	>2.0	1,500	50	500
2388CM41	38 21 56	112 28 59	30	.7	1.0	1.0	1,500	20	2,000
2389CM41	38 23 27	112 25 29	50	.7	1.0	>2.0	5,000	150	700
2390CM41	38 22 54	112 26 39	30	.7	.7	>2.0	10,000	30	700
2391CM41	38 24 28	112 24 51	20	.5	.5	.5	>10,000	<20	1,000
2392CM41	38 26 29	112 26 36	20	3.0	2.0	1.5	>10,000	<20	1,000
2393CM41	38 27 5	112 22 40	50	1.0	1.5	>2.0	7,000	20	500
2394CM41	38 27 29	112 19 2	30	1.5	2.0	>2.0	3,000	70	300
2395CM41	38 28 31	112 17 45	30	.5	.7	>2.0	>10,000	20	500
2396CM42	38 29 29	112 35 55	30	1.5	2.0	>2.0	7,000	<20	700
2397CM42	38 29 32	112 35 52	50	1.5	2.0	>2.0	5,000	<20	700
2398CM42	38 29 36	112 35 56	20	5.0	3.0	>2.0	5,000	<20	2,000
2424CM14	38 32 22	112 20 22	30	3.0	5.0	2.0	5,000	<20	1,000
2434CM41	38 27 11	112 27 21	30	.7	1.0	1.5	>10,000	20	1,500
2435CM41	38 27 1	112 27 20	30	.7	1.0	>2.0	>10,000	100	1,000
2436CM41	38 24 27	112 21 6	30	.5	1.0	>2.0	1,000	<20	300
2437CM41	38 23 41	112 22 1	50	.5	1.0	>2.0	1,500	<20	200
2438CM41	38 21 41	112 21 6	50	1.0	1.5	>2.0	5,000	<20	700
2439CM41	38 19 28	112 19 32	20	2.0	3.0	>2.0	3,000	<20	500
2440CM41	38 19 57	112 17 40	50	1.0	1.0	>2.0	2,000	<20	500
2441CM41	38 19 57	112 15 2	30	.5	1.0	>2.0	2,000	20	300
2442CM41	38 18 53	112 16 6	30	1.0	1.5	>2.0	2,000	<20	500
2443CM41	38 16 51	112 19 12	7	7.0	5.0	1.0	5,000	<20	500
2444CM41	38 17 58	112 20 19	20	7.0	7.0	1.5	5,000	N	1,500
2445CM41	38 16 24	112 23 42	10	7.0	5.0	1.5	3,000	<20	100
2446CM14	38 32 55	112 15 53	20	3.0	3.0	>2.0	>10,000	<20	3,000
2469CM41	38 15 32	112 18 21	10	10.0	7.0	1.0	3,000	<20	150
2831CM41	38 28 56	112 23 27	20	.5	1.0	>2.0	7,000	20	500
2832CM41	38 29 12	112 23 20	30	1.5	1.5	.7	>10,000	50	700
2833CM41	38 28 37	112 24 6	30	.3	1.5	>2.0	10,000	30	300
2834CM41	38 28 34	112 24 9	30	.5	2.0	>2.0	3,000	20	200
2837CM41	38 28 57	112 25 43	30	.5	1.5	2.0	1,500	20	700
2838CM41	38 29 0	112 25 44	15	.7	3.0	1.5	2,000	30	300
2839CM41	38 29 5	112 25 54	50	1.5	2.0	>2.0	2,000	<20	500

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Be 2ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm
2382CM41	3	50	300	30	500	15	1,000	30
2383CM41	5	30	200	50	300	15	1,500	50
2384CM41	3	30	150	30	200	20	1,500	20
2385CM41	10	30	500	20	300	30	500	70
2386CM41	50	50	300	50	500	20	500	50
2387CM41	7	50	150	70	300	10	70	N
2388CM41	15	15	100	100	300	100	50	30
2389CM41	7	100	500	50	200	N	<50	30
2390CM41	15	70	200	150	300	50	50	50
2391CM41	30	<10	20	30	300	150	200	N
2392CM41	20	30	500	30	1,000	70	200	70
2393CM41	10	50	500	50	300	10	50	50
2394CM41	2	70	300	70	200	N	<50	70
2395CM41	7	30	100	20	500	10	500	N
2396CM42	<2	100	500	150	500	7	200	100
2397CM42	N	150	500	150	150	N	70	70
2398CM42	<2	100	300	70	200	N	<50	100
2424CM14	<2	100	500	100	200	15	<50	70
2434CM41	50	30	70	50	300	150	200	N
2435CM41	50	10	50	20	200	100	1,000	N
2436CM41	<2	100	1,000	100	150	N	<50	100
2437CM41	<2	70	700	50	150	N	<50	70
2438CM41	<2	100	700	50	300	N	50	100
2439CM41	<2	100	300	100	150	N	<50	70
2440CM41	<2	100	500	70	300	N	N	70
2441CM41	<2	50	500	70	500	N	70	30
2442CM41	<2	100	500	50	200	N	50	70
2443CM41	<2	70	1,000	70	50	N	N	300
2444CM41	<2	100	1,000	70	100	N	N	300
2445CM41	N	70	700	30	50	N	N	100
2446CM14	<2	150	150	100	150	N	<50	20
2469CM41	N	100	500	30	100	N	N	100
2831CM41	20	70	200	150	300	15	70	N
2832CM41	30	20	150	50	150	150	100	50
2833CM41	30	70	150	150	500	30	70	N
2834CM41	10	30	150	50	500	15	<100	N
2837CM41	10	70	150	150	200	20	<50	100
2838CM41	10	70	200	100	200	15	50	50
2839CM41	10	100	300	70	300	15	50	50

Appendix 1.--Magnetic stream sediment concentrate data--continued

Sample	Pb 20ppm	Sn 15ppm	Sr200ppm	V 20ppm	Y 20ppm	Zn300ppm	Zr 20ppm
2382CM41	150	200	N	300	300	2,000	1,000
2383CM41	100	150	N	300	200	2,000	2,000
2384CM41	150	300	<200	300	200	1,000	2,000
2385CM41	2,000	150	N	500	500	1,500	>2,000
2386CM41	1,500	50	700	300	300	1,000	2,000
2387CM41	150	N	300	700	70	300	300
2388CM41	300	N	700	300	150	500	500
2389CM41	300	N	<200	1,500	70	N	200
2390CM41	500	N	200	700	150	700	200
2391CM41	3,000	N	700	100	200	700	500
2392CM41	1,500	N	200	300	200	1,000	700
2393CM41	500	N	<200	700	70	N	500
2394CM41	150	N	<200	700	70	N	300
2395CM41	500	70	N	300	200	1,500	700
2396CM42	100	N	N	500	150	500	700
2397CM42	100	N	200	700	70	700	500
2398CM42	70	N	<200	500	100	300	500
2424CM14	100	N	<200	500	150	N	500
2434CM41	2,000	200	300	200	200	1,500	500
2435CM41	1,000	150	300	100	700	2,000	2,000
2436CM41	200	N	N	1,000	50	500	200
2437CM41	200	N	N	1,000	70	500	700
2438CM41	150	N	200	700	100	500	500
2439CM41	150	N	200	500	70	N	500
2440CM41	200	N	200	1,000	100	500	700
2441CM41	200	N	<200	700	100	N	700
2442CM41	100	N	200	500	70	500	500
2443CM41	30	N	500	300	70	N	100
2444CM41	50	N	700	700	70	N	200
2445CM41	20	N	200	700	50	N	70
2446CM14	150	N	300	700	100	N	200
2469CM41	20	N	200	500	70	N	200
2831CM41	700	20	200	700	100	N	700
2832CM41	2,000	N	300	300	70	1,000	300
2833CM41	500	N	300	500	100	300	500
2834CM41	200	70	500	700	100	300	1,000
2837CM41	150	N	500	300	70	700	200
2838CM41	150	N	1,500	500	100	N	300
2839CM41	200	N	500	1,000	70	500	300

Appendix 2.--Nonmagnetic stream sediment concentrate data

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm	Be 2ppm
1408CN42	38 16 12	112 32 55	2.0	3.00	7.00	.700	1,000	30	500	2
1409CN42	38 17 51	112 32 40	1.5	7.00	5.00	2.000	1,500	70	100	<2
1410CN42	38 21 51	112 33 55	10.0	3.00	7.00	.500	2,000	20	2,000	3
1411CN42	38 21 41	112 33 56	1.5	.50	3.00	1.000	700	150	700	5
1412CN42	38 19 31	112 32 32	1.5	5.00	10.00	>2.000	1,500	50	300	<2
1414CN42	38 21 45	112 31 19	7.0	1.00	1.50	>2.000	3,000	70	1,500	10
1415CN42	38 21 12	112 32 26	3.0	.70	2.00	>2.000	2,000	100	1,000	10
1416CN42	38 22 51	112 31 43	5.0	.70	5.00	2.000	1,500	70	1,500	15
1417CN42	38 22 50	112 31 47	5.0	2.00	10.00	1.500	1,500	30	10,000	5
1418CN42	38 22 49	112 31 49	5.0	3.00	10.00	1.500	1,500	30	10,000	5
1419CN42	38 23 34	112 30 40	7.0	.20	.70	>2.000	>10,000	30	3,000	20
1420CN42	38 22 34	112 33 48	15.0	.50	5.00	2.000	700	<20	>10,000	2
1422CN42	38 24 15	112 33 29	5.0	.50	5.00	>2.000	1,500	50	10,000	7
1424CN42	38 25 46	112 32 31	10.0	1.00	5.00	>2.000	1,000	70	5,000	7
1425CN42	38 25 26	112 31 24	2.0	.50	1.00	1.500	3,000	50	300	50
1426CN42	38 25 56	112 30 57	3.0	.30	1.00	1.500	7,000	50	300	15
1427CN42	38 27 9	112 30 43	5.0	.50	1.50	>2.000	10,000	70	150	20
1428CN42	38 25 55	112 33 40	3.0	.20	3.00	>2.000	1,000	300	700	<2
1429CN42	38 26 5	112 34 5	.7	.50	7.00	>2.000	700	70	200	<2
1430CN42	38 25 32	112 35 5	2.0	.70	3.00	>2.000	1,000	50	10,000	<2
1431CN42	38 27 5	112 34 16	5.0	1.00	2.00	1.500	1,000	30	7,000	2
1433CN42	38 28 16	112 34 26	10.0	10.00	15.00	1.500	2,000	200	1,000	<2
1435CN13	38 30 25	112 35 43	1.0	.70	10.00	1.500	1,000	100	700	2
1436CN13	38 30 14	112 34 47	2.0	1.00	5.00	2.000	1,500	20	700	<2
1437CN13	38 30 2	112 33 1	2.0	.20	7.00	>2.000	1,000	20	300	N
1439CN13	38 33 0	112 33 54	1.0	.30	15.00	>2.000	1,500	50	200	N
1441CN13	38 31 7	112 34 41	1.5	.20	7.00	>2.000	1,000	<20	1,500	<2
1444CN13	38 34 29	112 34 8	1.5	.30	3.00	1.500	700	50	>10,000	<2
1445CN13	38 34 43	112 34 3	1.5	.50	7.00	2.000	1,000	150	500	<2
1446CN13	38 34 41	112 33 56	3.0	1.00	5.00	>2.000	1,500	150	200	<2
1447CN13	38 34 23	112 32 47	1.5	.70	15.00	1.500	1,000	100	700	<2
1449CN41	38 18 48	112 24 44	2.0	.50	3.00	>2.000	2,000	100	300	5
1450CN41	38 19 18	112 21 41	1.5	.70	10.00	2.000	1,000	30	300	<2
1451CN41	38 19 19	112 21 41	2.0	1.00	7.00	>2.000	1,500	20	300	<2
1452CN41	38 19 20	112 21 6	5.0	1.00	7.00	>2.000	2,000	20	500	N
1453CN41	38 16 2	112 29 17	1.5	2.00	10.00	>2.000	2,000	100	1,000	2
1468CN41	38 15 52	112 27 38	1.5	1.50	3.00	>2.000	1,000	30	500	<2
1469CN41	38 17 32	112 26 55	5.0	5.00	7.00	1.500	2,000	<20	150	<2
1470CN41	38 18 1	112 26 57	2.0	.70	3.00	>2.000	5,000	30	200	7
1471CN41	38 18 7	112 28 5	5.0	10.00	10.00	1.000	1,500	<20	50	<2
1473CN41	38 17 4	112 29 8	2.0	3.00	5.00	>2.000	2,000	20	1,000	2
1474CN41	38 17 16	112 25 15	1.5	3.00	5.00	>2.000	1,500	50	300	<2
1476CN41	38 16 22	112 25 43	5.0	10.00	10.00	1.500	1,500	20	70	N
1477CN41	38 18 9	112 23 8	2.0	1.50	5.00	>2.000	3,000	150	200	3
1478CN41	38 17 29	112 23 52	1.5	3.00	5.00	>2.000	1,500	50	300	<2

Appendix 2.--Nonmagnetic stream sediment concentrate data-- continued

Sample	Bi 15ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm	Pb 20ppm
1408CN42	N	10	500	20	100	N	<50	20	500
1409CN42	N	30	1,500	<10	300	N	150	150	N
1410CN42	N	70	1,000	50	700	10	N	150	100
1411CN42	N	<10	50	15	300	N	70	N	20
1412CN42	N	15	1,500	10	700	N	150	100	30
1414CN42	N	50	70	30	300	50	200	N	150
1415CN42	N	10	30	20	300	20	100	N	500
1416CN42	N	15	150	70	700	10	70	20	300
1417CN42	N	20	500	30	500	10	70	50	300
1418CN42	N	15	500	30	700	N	70	70	100
1419CN42	N	N	<20	10	300	10	200	N	300
1420CN42	N	70	150	150	700	10	50	30	300
1422CN42	N	10	150	30	1,000	20	100	N	100
1424CN42	N	30	300	150	500	10	70	70	150
1425CN42	N	N	<20	N	1,000	70	200	N	500
1426CN42	N	N	20	<10	300	N	200	N	300
1427CN42	200	N	50	<10	2,000	15	700	N	700
1428CN42	N	N	100	20	500	10	150	N	50
1429CN42	N	<10	100	20	700	N	150	N	50
1430CN42	>2,000	10	70	10	500	N	70	N	500
1431CN42	N	15	100	30	200	N	<50	N	30
1433CN42	N	50	3,000	150	500	N	<50	150	1,500
1435CN13	N	<10	200	<10	700	N	200	N	20
1436CN13	N	10	200	<10	1,000	N	70	50	N
1437CN13	N	N	100	<10	700	15	150	N	N
1439CN13	N	N	100	N	1,500	10	150	N	N
1441CN13	N	N	70	<10	1,000	15	200	N	N
1444CN13	N	<5	30	<10	300	N	70	N	20
1445CN13	N	N	100	<10	1,500	N	70	N	20
1446CN13	N	10	200	10	1,500	N	100	N	20
1447CN13	N	<10	100	<10	1,500	N	70	N	500
1449CN41	N	N	200	<10	1,000	15	300	20	70
1450CN41	N	<10	150	<10	1,000	N	70	N	200
1451CN41	N	15	200	10	700	10	150	20	2,000
1452CN41	15	15	200	10	1,000	10	150	N	30
1455CN41	N	10	500	15	700	N	150	20	30
1468CN41	N	N	300	N	700	10	200	30	N
1469CN41	N	30	1,000	10	300	N	200	300	N
1470CN41	N	N	150	<10	700	15	200	N	50
1471CN41	N	30	1,500	<10	200	N	100	200	N
1473CN41	N	20	500	10	700	15	200	30	20
1474CN41	N	N	500	N	700	N	200	100	N
1476CN41	N	50	1,500	10	100	N	<50	100	N
1477CN41	N	N	300	N	1,500	N	500	N	30
1478CN41	N	10	700	<10	700	7	200	30	N

Appendix 2.--Nonmagnetic stream sediment concentrate data-- continued

Sample	Sn 15ppm	Sr200ppm	V 20ppm	W 70ppm	Y 20ppm	Zn300ppm	Zr 20ppm	Th150ppm
1408CN42	N	1,500	100	N	150	N	2,000	N
1409CN42	20	<200	150	N	300	N	>2,000	N
1410CN42	N	700	300	N	200	N	2,000	N
1411CN42	N	500	70	N	200	N	>2,000	200
1412CN42	50	700	150	N	1,000	N	>2,000	150
1414CN42	300	200	300	100	200	N	>2,000	N
1415CN42	100	300	150	N	200	N	>2,000	150
1416CN42	300	1,000	200	N	500	N	>2,000	300
1417CN42	N	1,000	150	N	300	N	>2,000	150
1418CN42	30	1,000	150	N	300	N	>2,000	N
1419CN42	300	200	70	N	3,000	1,000	>2,000	2,000
1420CN42	N	1,000	100	N	200	N	1,000	N
1422CN42	N	1,000	200	N	200	N	>2,000	150
1424CN42	N	1,000	300	N	200	1,500	>2,000	N
1425CN42	1,000	200	70	N	2,000	1,000	>2,000	5,000
1426CN42	1,500	200	70	N	500	700	>2,000	1,000
1427CN42	100	<200	50	N	2,000	1,000	>2,000	2,000
1428CN42	15	700	300	N	300	300	>2,000	300
1429CN42	N	500	200	N	300	N	>2,000	200
1430CN42	N	300	150	70	300	N	>2,000	300
1431CN42	N	1,000	150	N	100	N	>2,000	N
1433CN42	20	1,500	500	N	200	N	>2,000	N
1435CN13	N	1,000	100	N	300	N	>2,000	500
1436CN13	N	1,000	300	N	500	N	>2,000	N
1437CN13	20	500	300	N	500	N	>2,000	N
1439CN13	30	700	200	N	700	N	>2,000	150
1441CN13	N	700	200	N	500	N	>2,000	150
1444CN13	N	2,000	70	N	200	N	>2,000	N
1445CN13	50	1,000	300	N	300	N	>2,000	300
1446CN13	N	700	500	N	500	N	>2,000	N
1447CN13	15	1,000	70	N	300	N	>2,000	150
1449CN41	50	200	150	N	1,000	N	>2,000	300
1450CN41	100	1,000	100	N	300	N	>2,000	N
1451CN41	50	1,000	300	N	300	N	N	150
1452CN41	N	700	300	N	500	N	>2,000	500
1453CN41	100	1,000	200	N	500	N	>2,000	200
1468CN41	200	500	150	N	500	N	>2,000	200
1469CN41	15	200	200	N	300	N	>2,000	N
1470CN41	150	N	150	N	1,000	500	>2,000	500
1471CN41	N	200	200	N	200	N	2,000	N
1473CN41	100	200	150	N	700	N	>2,000	200
1474CN41	50	200	100	N	500	N	>2,000	200
1476CN41	N	200	300	N	150	N	>2,000	N
1477CN41	150	200	100	N	3,000	300	>2,000	300
1478CN41	70	200	100	N	700	N	>2,000	200

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm	Be 2ppm
1479CN41	38 17 26	112 23 52	1.0	1.00	3.00	>2.000	1,000	300	300	<2
1480CN41	38 17 33	112 24 0	5.0	7.00	7.00	>2.000	3,000	20	150	<2
1482CN41	38 19 42	112 26 1	1.5	1.00	5.00	>2.000	3,000	70	200	10
1505CN42	38 18 59	112 32 58	2.0	5.00	5.00	>2.000	1,500	150	100	<2
1506CN42	38 19 25	112 32 35	1.5	.70	15.00	1.500	1,000	30	1,500	7
1508CN42	38 20 14	112 32 42	1.5	2.00	15.00	1.500	1,000	20	5,000	<2
1509CN42	38 21 3	112 33 48	3.0	.70	1.50	>2.000	1,500	200	300	15
1510CN42	38 21 18	112 34 1	5.0	2.00	10.00	.500	1,500	30	300	5
1511CN42	38 22 19	112 34 6	5.0	2.00	15.00	2.000	1,500	20	1,000	3
1512CN42	38 23 9	112 34 0	7.0	.70	10.00	2.000	2,000	30	10,000	10
1513CN42	38 23 46	112 34 7	5.0	.30	3.00	>2.000	1,000	100	3,000	7
1514CN42	38 24 11	112 33 26	10.0	.30	3.00	>2.000	1,500	50	700	10
1515CN42	38 24 16	112 34 10	2.0	.20	5.00	>.002	700	100	10,000	5
1516CN42	38 20 51	112 32 45	7.0	.70	5.00	>2.000	2,000	70	2,000	15
1517CN42	38 21 2	112 32 35	7.0	1.00	2.00	>2.000	2,000	50	>10,000	15
1518CN42	38 21 42	112 32 3	30.0	.50	5.00	.700	700	20	>10,000	3
1519CN42	38 22 30	112 31 20	5.0	.70	3.00	>2.000	10,000	50	1,500	50
1520CN42	38 21 36	112 31 43	7.0	.50	10.00	>2.000	1,000	20	10,000	10
1521CN42	38 22 13	112 30 55	3.0	.30	3.00	>2.000	700	150	>10,000	7
1522CN42	38 22 28	112 30 36	7.0	.70	1.00	>2.000	1,000	100	1,500	7
1523CN41	38 22 54	112 29 37	3.0	.30	5.00	>2.000	700	20	3,000	7
1524CN41	38 22 52	112 29 38	15.0	.30	1.00	>2.000	500	50	10,000	7
1525CN42	38 22 45	112 30 19	10.0	.30	.70	>2.000	700	100	700	10
1526CN42	38 23 0	112 30 58	10.0	.30	1.00	1.500	>10,000	150	1,000	70
1527CN42	38 23 7	112 31 6	10.0	.30	.50	2.000	>10,000	200	700	100
1528CN42	38 23 44	112 30 15	5.0	.30	.50	1.500	10,000	70	1,500	100
1529CN41	38 23 43	112 29 39	7.0	.30	1.00	1.000	>10,000	100	1,500	15
1531CN42	38 23 27	112 30 33	10.0	1.00	2.00	.300	>10,000	100	1,000	20
1532CN41	38 24 1	112 29 14	2.0	.30	1.00	1.000	2,000	200	1,500	7
1533CN41	38 23 56	112 29 13	1.5	.10	.70	1.000	7,000	70	300	15
1534CN41	38 23 59	112 29 3	15.0	.15	1.00	>2.000	5,000	30	700	20
1535CN41	38 24 56	112 29 41	3.0	.10	1.50	.700	10,000	70	5,000	50
1536CN41	38 25 1	112 29 28	5.0	.70	1.50	.500	3,000	50	700	50
1537CN41	38 25 13	112 29 10	7.0	.50	1.50	2.000	10,000	70	500	20
1539CN41	38 25 20	112 28 50	1.5	.20	1.00	.300	7,000	100	5,000	15
1540CN41	38 25 40	112 29 3	3.0	.30	1.50	2.000	7,000	70	300	10
1541CN41	38 25 34	112 29 4	7.0	.20	.15	>2.000	>10,000	150	3,000	50
1543CN41	38 25 9	112 29 57	3.0	1.00	2.00	1.000	7,000	150	200	20
1544CN41	38 25 17	112 28 12	3.0	.50	1.50	1.000	3,000	100	700	15
1545CN41	38 25 21	112 28 12	2.0	.50	1.50	1.000	7,000	200	500	15
1547CN41	38 25 49	112 28 37	3.0	.20	1.50	1.000	10,000	70	500	20
1550CN41	38 25 48	112 28 17	2.0	.20	1.00	1.000	10,000	150	1,500	15
1551CN41	38 26 18	112 28 42	2.0	.50	1.00	.700	2,000	150	300	20
1553CN42	38 24 57	112 30 3	5.0	.70	1.50	1.500	7,000	70	500	50
1554CN42	38 25 6	112 30 21	7.0	.30	.50	>2.000	10,000	150	300	100

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Bi 15ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm	Pb 20ppm
1479CN41	N	<10	300	N	500	N	150	N	N
1480CN41	N	30	1,000	<10	500	N	150	100	20
1482CN41	N	N	500	N	700	10	300	20	20
1505CN42	N	20	1,000	<10	500	N	150	100	300
1506CN42	N	10	150	10	1,000	N	<50	N	N
1508CN42	N	10	700	10	1,000	N	70	50	300
1509CN42	15	N	100	<10	700	30	300	N	300
1510CN42	N	10	700	20	500	10	50	50	20
1511CN42	N	10	500	50	1,500	N	<50	20	100
1512CN42	N	15	200	50	700	10	70	N	200
1513CN42	N	15	70	20	1,000	20	200	N	150
1514CN42	N	10	150	50	500	20	300	N	150
1515CN42	N	<10	100	30	300	70	150	N	150
1516CN42	N	15	100	50	700	15	150	N	100
1517CN42	N	10	150	30	500	50	150	N	300
1518CN42	N	100	100	200	500	N	<50	150	100
1519CN42	50	N	150	20	700	15	300	N	1,500
1520CN42	N	10	100	50	700	20	100	N	70
1521CN42	N	<10	200	20	300	50	200	N	300
1522CN42	N	10	150	50	200	50	100	N	100
1523CN41	N	<10	150	50	500	20	100	N	100
1524CN41	N	<10	200	100	300	50	150	N	150
1525CN42	N	10	150	100	300	50	150	N	150
1526CN42	N	N	70	15	300	15	100	N	1,500
1527CN42	N	N	20	10	150	7	150	N	700
1528CN42	N	N	30	10	300	15	150	N	500
1529CN41	N	N	30	10	1,500	50	70	N	700
1531CN42	N	N	300	<10	100	30	70	20	300
1532CN41	N	N	30	10	500	10	150	N	300
1533CN41	N	N	<20	<10	1,000	20	500	N	700
1534CN41	30	N	20	<10	1,000	50	500	N	300
1535CN41	N	N	70	<10	300	15	200	N	500
1536CN41	N	N	300	<10	200	20	150	N	100
1537CN41	N	N	70	<10	300	20	150	N	700
1539CN41	N	N	20	N	100	N	100	N	20
1540CN41	N	N	30	<10	1,000	N	500	N	150
1541CN41	N	N	<20	<10	1,500	N	200	N	700
1543CN41	N	N	150	<10	200	N	150	20	N
1544CN41	N	N	30	15	150	N	100	N	30
1545CN41	N	N	30	N	300	20	150	N	700
1547CN41	N	N	20	10	500	N	200	N	200
1550CN41	N	N	<20	10	1,000	7	300	N	200
1551CN41	N	N	30	N	100	N	100	N	70
1553CN42	N	N	50	10	200	10	200	N	700
1554CN42	N	N	30	<10	200	N	150	N	300

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Sn 15ppm	Sr200ppm	V 20ppm	W 70ppm	Y 20ppm	Zn300ppm	Zr 20ppm	Th150ppm
1479CN41	100	700	100	N	500	N	>2,000	300
1480CN41	30	200	500	N	500	N	>2,000	N
1482CN41	300	<200	200	N	3,000	1,000	>2,000	700
1505CN42	300	<200	150	N	500	N	>2,000	200
1506CN42	100	1,000	70	N	300	N	>2,000	150
1508CN42	50	1,000	70	N	200	N	>2,000	150
1509CN42	100	<200	100	N	1,000	500	>2,000	1,500
1510CN42	70	1,000	200	N	200	N	>2,000	150
1511CN42	N	1,000	200	N	300	N	>2,000	N
1512CN42	1,000	1,000	200	N	100	N	>2,000	200
1513CN42	200	300	150	70	200	N	>2,000	150
1514CN42	70	300	200	N	200	N	>2,000	200
1515CN42	200	2,000	300	70	200	N	>2,000	N
1516CN42	500	700	300	N	300	N	>2,000	300
1517CN42	300	1,500	300	70	300	N	>2,000	150
1518CN42	N	1,000	100	N	200	700	>2,000	N
1519CN42	N	300	150	N	1,000	N	>2,000	1,500
1520CN42	100	1,000	300	700	200	N	>2,000	150
1521CN42	500	1,500	300	100	200	N	>2,000	150
1522CN42	N	300	500	70	100	N	>2,000	N
1523CN41	N	1,500	300	70	200	N	2,000	N
1524CN41	>2,000	1,000	500	100	200	N	>2,000	150
1525CN42	N	500	300	N	300	N	>2,000	150
1526CN42	200	200	100	N	1,500	1,000	>2,000	1,500
1527CN42	500	N	70	N	>5,000	700	>2,000	5,000
1528CN42	>2,000	N	70	N	>5,000	700	>2,000	5,000
1529CN41	N	N	50	N	3,000	700	>2,000	5,000
1531CN42	>2,000	500	70	N	2,000	700	>2,000	1,500
1532CN41	N	<200	70	N	300	N	>2,000	3,000
1533CN41	15	<200	50	N	1,000	500	>2,000	5,000
1534CN41	200	N	70	N	1,500	700	>2,000	2,000
1535CN41	200	200	100	N	>5,000	700	>2,000	3,000
1536CN41	150	<200	50	N	1,500	1,500	>2,000	2,000
1537CN41	20	N	70	N	>5,000	N	>2,000	3,000
1539CN41	70	200	50	N	1,000	500	>2,000	2,000
1540CN41	500	200	70	N	700	500	>2,000	1,500
1541CN41	300	N	50	N	>5,000	700	>2,000	3,000
1543CN41	100	<200	70	N	700	700	>2,000	1,500
1544CN41	200	200	100	N	700	N	>2,000	1,500
1545CN41	N	200	50	N	700	500	>2,000	1,500
1547CN41	500	N	70	N	>5,000	700	>2,000	5,000
1550CN41	N	N	50	N	>5,000	700	>2,000	>5,000
1551CN41	500	N	100	N	1,000	N	>2,000	1,000
1553CN42	300	200	50	N	3,000	1,000	>2,000	2,000
1554CN42	1,000	N	50	N	>5,000	500	>2,000	5,000

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm	Be 2ppm
1555CN42	38 25 24	112 30 23	3.0	.70	1.00	1.000	5,000	100	300	15
1556CN42	38 25 11	112 30 31	7.0	.30	.70	2.000	>10,000	100	700	20
1557CN42	38 25 42	112 30 55	15.0	.70	1.00	>2.000	10,000	50	300	30
1558CN42	38 27 10	112 30 35	3.0	.30	1.00	2.000	7,000	50	700	15
1559CN42	38 26 55	112 30 42	5.0	.70	1.50	2.000	10,000	100	200	15
1561CN42	38 26 34	112 31 22	5.0	.70	5.00	2.000	2,000	50	>10,000	7
1562CN42	38 25 38	112 32 34	5.0	.20	3.00	>2.000	1,000	50	7,000	7
1563CN42	38 26 0	112 33 26	2.0	1.50	3.00	>2.000	1,000	300	500	<2
1564CN42	38 25 11	112 34 52	5.0	.50	1.50	>2.000	1,000	150	1,000	3
1565CN42	38 24 42	112 34 51	7.0	.20	2.00	>2.000	1,000	50	10,000	3
1566CN42	38 27 4	112 34 42	2.0	1.00	5.00	>2.000	2,000	100	1,500	2
1567CN42	38 27 7	112 34 18	1.5	1.00	3.00	1.500	1,000	30	700	<2
1568CN42	38 26 54	112 34 1	3.0	.50	5.00	>2.000	1,500	100	1,500	2
1569CN42	38 26 59	112 33 35	2.0	.30	10.00	>2.000	1,500	50	7,000	<2
1570CN42	38 27 7	112 33 9	7.0	.50	3.00	>2.000	1,500	30	>10,000	2
1571CN42	38 27 27	112 32 22	10.0	1.50	3.00	>2.000	2,000	20	3,000	<2
1572CN42	38 27 24	112 32 21	20.0	.50	2.00	2.000	1,000	20	5,000	2
1573CN42	38 27 23	112 32 36	5.0	.50	3.00	>2.000	1,000	20	>10,000	<2
1575CN42	38 27 49	112 34 43	3.0	2.00	5.00	>2.000	5,000	30	1,000	2
1576CN41	38 21 23	112 22 53	3.0	5.00	7.00	1.000	2,000	<20	200	N
1580CN41	38 23 26	112 23 2	5.0	.70	30.00	2.000	3,000	<20	1,500	N
1582CN41	38 25 28	112 23 56	5.0	.30	2.00	>2.000	10,000	50	700	20
1583CN41	38 25 6	112 23 14	7.0	.30	7.00	>2.000	1,500	30	1,500	7
1584CN41	38 24 54	112 23 22	7.0	.15	1.50	>2.000	7,000	20	700	15
1585CN41	38 24 52	112 23 20	50.0	.50	3.00	1.000	1,000	70	10,000	7
1586CN41	38 25 41	112 23 20	.7	.30	.50	.300	2,000	20	300	7
1587CN41	38 25 38	112 23 38	15.0	.50	1.50	>2.000	>10,000	20	700	30
1588CN41	38 25 53	112 22 56	2.0	.30	3.00	>2.000	10,000	30	1,000	15
1590CN41	38 26 2	112 22 25	15.0	1.00	5.00	>2.000	1,500	20	>10,000	5
1591CN41	38 25 46	112 22 42	7.0	3.00	3.00	1.500	2,000	30	1,000	5
1592CN42	38 16 52	112 34 4	1.0	1.00	7.00	>2.000	3,000	20	100	N
1593CN42	38 16 22	112 33 27	5.0	10.00	10.00	1.500	3,000	70	300	<2
1594CN41	38 27 31	112 15 45	3.0	.70	2.00	>2.000	7,000	150	1,500	7
1595CN41	38 27 30	112 17 17	5.0	.50	5.00	>2.000	7,000	30	300	20
1596CN41	38 27 31	112 21 8	20.0	.20	7.00	.200	200	<20	200	<2
1598CN41	38 29 15	112 19 54	3.0	.50	2.00	>2.000	700	100	3,000	7
1677CN14	38 30 20	112 14 3	.7	.30	7.00	>2.000	700	70	150	N
1678CN14	38 32 13	112 14 34	10.0	5.00	7.00	2.000	3,000	30	>10,000	<2
1680CN14	38 34 10	112 13 34	2.0	1.50	10.00	.300	2,000	<20	>10,000	N
1682CN14	38 34 48	112 14 52	5.0	15.00	10.00	.300	2,000	N	10,000	N
1683CN14	38 34 47	112 14 55	3.0	5.00	7.00	1.000	2,000	30	5,000	N
1684CN41	38 34 44	112 14 56	1.5	3.00	5.00	1.000	2,000	50	2,000	<2
1723CN14	38 32 37	112 28 19	5.0	1.00	2.00	>2.000	5,000	100	1,500	7
1724CN14	38 32 46	112 26 54	2.0	2.00	5.00	>2.000	5,000	300	300	5
1725CN14	38 32 19	112 26 22	2.0	.50	5.00	>2.000	7,000	200	200	15

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Bi 15ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm	Pb 20ppm
1555CN42	15	N	20	<10	100	N	200	N	100
1556CN42	N	N	20	<10	500	15	500	N	1,500
1557CN42	N	N	50	<10	700	10	700	N	700
1558CN42	N	N	100	<10	1,000	10	300	N	1,000
1559CN42	20	<10	30	<10	700	N	300	N	500
1561CN42	N	N	200	20	1,500	20	200	N	150
1562CN42	N	10	100	30	500	10	100	N	300
1563CN42	N	10	50	20	500	10	150	N	30
1564CN42	50	10	150	50	300	10	100	N	100
1565CN42	500	<10	200	30	300	20	150	N	100
1566CN42	N	10	300	10	500	N	200	20	70
1567CN42	N	10	200	10	300	N	100	N	150
1568CN42	N	15	50	50	500	15	70	N	100
1569CN42	N	10	50	10	700	N	70	N	50
1570CN42	N	20	100	30	500	10	70	20	70
1571CN42	N	30	100	30	500	N	150	N	300
1572CN42	N	100	100	100	300	N	70	50	150
1573CN42	N	20	100	20	300	10	150	N	70
1575CN42	N	20	700	15	500	N	200	70	70
1576CN41	N	15	1,000	<10	700	N	<50	100	N
1580CN41	N	15	150	30	1,500	N	N	N	50
1582CN41	15	N	100	<10	700	30	500	N	500
1583CN41	N	15	70	50	700	N	100	N	100
1584CN41	100	N	70	70	500	70	700	N	1,000
1585CN41	N	100	100	200	500	N	70	150	500
1586CN41	N	N	20	<10	50	N	100	N	500
1587CN41	N	20	70	50	700	200	700	N	1,000
1588CN41	N	N	50	<10	500	30	200	N	1,000
1590CN41	N	30	200	50	500	7	<50	20	150
1591CN41	N	20	500	50	500	7	<50	70	100
1592CN42	N	N	300	<10	2,000	N	200	N	100
1593CN42	N	30	1,000	15	1,000	N	70	100	20
1594CN41	20	<10	100	10	700	10	700	N	500
1595CN41	N	N	70	<10	700	7	300	N	200
1596CN41	N	100	100	700	50	7	N	150	300
1598CN41	20	<10	300	70	200	15	100	N	200
1677CN14	N	N	70	<10	700	N	70	N	50
1678CN14	N	50	300	70	300	N	70	20	50
1680CN14	N	10	150	<10	700	N	N	N	N
1682CN14	N	50	2,000	<10	700	N	N	150	500
1683CN14	N	20	1,000	<10	>2,000	10	70	70	200
1684CN41	N	10	700	<10	2,000	N	100	N	20
1723CN14	100	N	150	10	500	15	500	N	70
1724CN14	2,000	10	200	<10	1,000	10	500	N	50
1725CN14	N	N	70	N	1,000	7	500	N	100

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Sn 15ppm	Sr200ppm	V 20ppm	W 70ppm	Y 20ppm	Zn300ppm	Zr 20ppm	Th150ppm
1555CN42	300	<200	70	N	500	700	>2,000	1,000
1556CN42	100	N	150	N	2,000	700	>2,000	1,500
1557CN42	500	<200	50	N	1,500	700	>2,000	2,000
1558CN42	300	<200	70	N	500	300	>2,000	1,500
1559CN42	50	200	70	N	500	N	>2,000	N
1561CN42	700	1,000	200	N	500	N	>2,000	500
1562CN42	N	1,000	150	N	200	N	>2,000	200
1563CN42	N	300	200	N	300	N	>2,000	500
1564CN42	N	500	300	N	200	N	>2,000	150
1565CN42	N	1,500	700	N	200	N	>2,000	N
1566CN42	15	700	200	N	500	500	>2,000	500
1567CN42	300	1,000	100	N	300	500	>2,000	300
1568CN42	N	300	150	N	500	N	>2,000	N
1569CN42	N	700	100	70	300	N	>2,000	150
1570CN42	N	1,000	200	N	200	N	>2,000	N
1571CN42	N	300	300	N	300	500	>2,000	150
1572CN42	N	500	200	N	150	N	>2,000	N
1573CN42	N	1,000	100	N	300	N	>2,000	150
1575CN42	30	700	150	N	500	N	>2,000	500
1576CN41	N	700	300	N	200	300	>2,000	N
1580CN41	N	1,000	300	N	300	N	>2,000	N
1582CN41	200	200	100	N	500	N	>2,000	700
1583CN41	N	1,000	200	N	300	N	>2,000	N
1584CN41	300	<200	100	N	500	500	>2,000	700
1585CN41	200	500	150	N	100	N	2,000	N
1586CN41	N	<200	30	N	70	N	>2,000	N
1587CN41	300	200	150	70	300	N	>2,000	300
1588CN41	200	200	70	N	500	300	2,000	300
1590CN41	N	1,500	500	70	150	N	>2,000	N
1591CN41	N	500	500	N	150	N	1,500	N
1592CN42	300	N	100	N	5,000	N	>2,000	200
1593CN42	N	300	150	N	500	N	>2,000	200
1594CN41	150	200	100	N	500	N	>2,000	1,500
1595CN41	200	200	70	N	700	300	>2,000	500
1596CN41	N	200	50	N	70	N	1,000	N
1598CN41	N	1,000	500	N	150	N	>2,000	200
1677CN14	N	500	100	N	300	500	>2,000	500
1678CN14	N	1,000	500	N	200	N	>2,000	N
1680CN14	N	5,000	1,000	N	200	N	2,000	N
1682CN14	N	1,000	500	N	200	N	>2,000	N
1683CN14	N	700	5,000	N	300	N	>2,000	1,500
1684CN41	N	1,500	1,000	N	300	N	>2,000	N
1723CN14	1,500	200	150	N	1,500	N	>2,000	500
1724CN14	300	300	150	N	700	N	>2,000	300
1725CN14	1,000	200	100	N	2,000	500	>2,000	1,000

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm	Be 2ppm
1726CN14	38 34 29	112 25 16	5.0	7.00	7.00	.500	3,000	20	300	<2
1727CN14	38 34 47	112 19 45	15.0	1.50	3.00	>2.000	10,000	30	300	5
1728CN14	38 34 9	112 19 53	5.0	7.00	7.00	>2.000	7,000	150	1,000	2
1730CN14	38 32 53	112 22 16	2.0	1.50	5.00	>2.000	3,000	500	300	3
1731CN14	38 33 46	112 22 1	2.0	1.50	15.00	2.000	1,500	150	2,000	5
1732CN14	38 33 35	112 23 55	1.5	3.00	5.00	2.000	1,000	150	1,000	2
1733CN14	38 33 38	112 23 46	2.0	2.00	5.00	1.500	2,000	50	2,000	2
1734CN14	38 33 40	112 23 45	1.5	1.50	3.00	2.000	1,000	100	700	3
1735CN14	38 33 12	112 25 41	2.0	.70	3.00	>2.000	3,000	500	500	5
1737CN14	38 32 37	112 24 39	1.5	1.00	5.00	>2.000	5,000	300	300	10
1738CN14	38 32 38	112 23 25	5.0	2.00	5.00	>2.000	5,000	200	2,000	5
1739CN14	38 30 58	112 25 15	10.0	.70	3.00	>2.000	10,000	50	300	15
1740CN14	38 31 50	112 23 26	1.0	.30	5.00	>2.000	2,000	150	200	10
1741CN14	38 30 58	112 23 44	10.0	.70	3.00	>2.000	2,000	70	1,000	10
1742CN14	38 33 53	112 17 49	3.0	1.50	3.00	1.500	2,000	150	700	3
1743CN14	38 30 48	112 19 22	3.0	7.00	10.00	>2.000	3,000	150	2,000	2
1744CN41	38 21 31	112 14 14	3.0	.70	5.00	2.000	1,000	70	>10,000	3
1745CN41	38 19 38	112 13 39	5.0	1.00	3.00	1.500	1,500	20	>10,000	2
1746CN41	38 19 39	112 13 45	5.0	1.50	7.00	1.000	1,500	50	>10,000	2
1747CN41	38 19 9	112 13 24	2.0	1.50	3.00	1.000	1,000	100	>10,000	<2
1749CN41	38 18 14	112 14 16	5.0	5.00	10.00	1.000	1,500	30	500	<2
1755CN41	38 29 30	112 27 16	10.0	3.00	5.00	2.000	10,000	30	500	10
1756CN41	38 28 29	112 27 21	5.0	.50	1.00	>2.000	10,000	150	700	15
1757CN41	38 28 0	112 27 1	7.0	1.00	2.00	2.000	7,000	70	500	15
1758CN41	38 28 0	112 27 7	5.0	1.00	1.50	2.000	2,000	200	500	10
1760CN41	38 29 20	112 26 26	15.0	3.00	7.00	>2.000	1,500	30	700	7
1761CN14	38 33 47	112 16 26	7.0	3.00	5.00	.500	3,000	20	>10,000	<2
1762CN14	38 32 11	112 16 10	5.0	2.00	5.00	1.000	3,000	20	>10,000	2
1764CN14	38 32 4	112 16 22	5.0	.30	2.00	.500	1,000	<20	>10,000	2
1765CN14	38 31 3	112 15 58	7.0	.30	.70	2.000	300	150	>10,000	<2
1867CN13	38 30 24	112 35 16	3.0	3.00	10.00	1.000	1,500	150	1,000	<2
1868CN13	38 30 20	112 35 3	3.0	5.00	10.00	1.500	2,000	70	700	2
1869CN13	38 30 12	112 34 58	3.0	5.00	7.00	>2.000	2,000	100	300	<2
1870CN13	38 30 14	112 34 21	1.5	.30	5.00	>2.000	1,500	20	200	3
1871CN13	38 30 10	112 34 23	2.0	1.00	3.00	>2.000	1,000	300	700	2
1872CN13	38 30 11	112 34 1	2.0	.20	10.00	>2.000	1,000	30	300	<2
1873CN13	38 30 7	112 34 3	2.0	.30	5.00	>2.000	1,000	70	500	<2
1874CN13	38 30 7	112 33 48	2.0	.50	5.00	>2.000	1,500	100	1,000	<2
1875CN42	38 27 0	112 34 27	3.0	.50	1.50	2.000	700	70	>10,000	<2
2141CN13	38 32 9	112 31 5	7.0	2.00	2.00	>2.000	3,000	50	3,000	3
2142CN13	38 33 18	112 30 13	2.0	5.00	7.00	>2.000	2,000	30	200	<2
2143CN14	38 34 30	112 28 45	3.0	10.00	15.00	2.000	5,000	50	500	<2
2144CN14	38 32 21	112 28 57	5.0	5.00	3.00	>2.000	2,000	70	3,000	2
2145CN14	38 30 50	112 27 32	3.0	.50	7.00	>2.000	2,000	50	500	7
2146CN13	38 30 59	112 21 36	7.0	.50	3.00	>2.000	>10,000	70	2,000	10

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Bi 15ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm	Pb 20ppm
1726CN14	N	20	1,000	15	100	N	N	100	N
1727CN14	N	15	500	20	500	10	300	30	5,000
1728CN14	N	20	1,000	<10	500	10	200	70	70
1730CN14	N	10	500	10	700	15	300	N	100
1731CN14	N	<10	200	10	700	N	150	N	20
1732CN14	N	15	700	<10	300	N	100	100	200
1733CN14	N	20	300	<10	300	N	100	20	<20
1734CN14	N	<10	200	<10	300	N	150	N	N
1735CN14	N	N	150	<10	700	N	200	N	30
1737CN14	N	N	200	<10	1,000	7	500	N	50
1738CN14	N	15	300	10	500	15	300	20	100
1739CN14	15	N	150	<10	700	15	300	N	500
1740CN14	N	N	100	N	1,500	N	200	N	150
1741CN14	N	15	150	100	1,000	7	150	N	500
1742CN14	N	10	200	10	300	N	100	N	70
1743CN14	N	N	1,000	10	1,000	10	200	70	100
1744CN41	N	15	100	50	500	10	50	20	100
1745CN41	N	20	150	30	300	N	N	50	50
1746CN41	N	10	200	30	500	10	<50	30	50
1747CN41	N	10	300	15	300	N	<50	70	20
1749CN41	N	20	1,000	15	300	N	<50	200	20
1755CN41	N	20	1,000	30	500	20	500	100	500
1756CN41	N	N	30	N	1,500	N	200	N	300
1757CN41	N	N	300	15	700	N	200	N	1,000
1758CN41	N	10	100	10	300	15	200	N	70
1760CN41	N	20	1,500	100	700	20	70	50	300
1761CN14	N	20	500	30	300	N	N	50	50
1762CN14	N	20	100	70	200	N	<50	N	50
1764CN14	N	10	20	50	200	N	N	N	70
1765CN14	N	15	70	150	50	7	50	N	70
1867CN13	N	15	1,000	20	500	N	50	150	20
1868CN13	N	20	700	50	500	N	50	100	20
1869CN13	N	20	1,000	10	500	N	200	150	N
1870CN13	N	10	50	<10	1,500	10	100	N	N
1871CN13	N	10	50	10	300	N	100	N	N
1872CN13	N	N	70	<10	1,000	10	200	N	100
1873CN13	N	<10	30	10	500	N	70	N	50
1874CN13	N	10	70	15	1,000	10	200	N	20
1875CN42	N	20	50	20	150	N	50	N	<20
2141CN13	N	20	100	30	700	10	150	N	100
2142CN13	N	N	1,500	<10	700	N	100	100	20
2143CN14	N	30	1,000	10	500	10	100	70	30
2144CN14	N	20	50	20	500	10	150	N	70
2145CN14	20	10	200	30	500	20	500	N	100
2146CN13	N	N	200	10	300	10	200	N	1,500

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Sn 15ppm	Sr200ppm	V 20ppm	W 70ppm	Y 20ppm	Zn300ppm	Zr 20ppm	Th150ppm
1726CN14	N	500	200	N	100	N	>2,000	N
1727CN14	70	200	150	N	500	700	>2,000	300
1728CN14	20	200	200	N	500	N	>2,000	N
1730CN14	150	300	150	N	700	300	>2,000	700
1731CN14	15	700	100	N	500	N	>2,000	150
1732CN14	N	700	70	N	300	N	>2,000	150
1733CN14	N	1,000	100	N	300	N	>2,000	N
1734CN14	N	700	70	N	300	N	>2,000	500
1735CN14	200	300	150	N	500	N	>2,000	700
1737CN14	300	200	150	N	700	500	>2,000	700
1738CN14	70	300	200	N	500	500	>2,000	700
1739CN14	2,000	N	200	N	1,000	700	>2,000	1,500
1740CN14	300	<200	100	N	1,000	N	>2,000	1,000
1741CN14	20	500	200	N	300	N	>2,000	150
1742CN14	N	1,000	300	N	300	N	>2,000	300
1743CN14	70	500	200	N	1,500	N	>2,000	300
1744CN41	N	1,000	200	N	150	N	>2,000	N
1745CN41	N	1,500	200	N	150	N	2,000	N
1746CN41	N	2,000	200	N	200	N	>2,000	N
1747CN41	N	1,000	150	N	200	N	>2,000	N
1749CN41	N	1,000	200	N	200	N	>2,000	N
1755CN41	N	300	300	N	300	1,000	>2,000	200
1756CN41	300	N	70	N	1,000	700	>2,000	1,500
1757CN41	70	200	150	N	500	N	>2,000	300
1758CN41	N	300	100	N	300	300	>2,000	700
1760CN41	N	700	500	70	200	N	2,000	N
1761CN14	N	1,500	300	N	100	N	2,000	N
1762CN14	N	1,500	300	N	70	N	2,000	N
1764CN14	N	7,000	100	N	70	N	2,000	N
1765CN14	N	>10,000	200	N	30	N	1,000	N
1867CN13	30	1,500	150	N	200	N	>2,000	N
1868CN13	50	1,000	150	N	200	N	>2,000	N
1869CN13	200	300	200	N	500	N	>2,000	700
1870CN13	N	700	200	N	500	N	>2,000	N
1871CN13	N	500	150	N	300	N	>2,000	150
1872CN13	N	500	300	N	500	N	>2,000	150
1873CN13	N	500	150	N	300	N	>2,000	200
1874CN13	15	300	300	N	500	N	>2,000	150
1875CN42	N	7,000	100	N	200	N	>2,000	N
2141CN13	300	300	300	N	700	N	>2,000	150
2142CN13	70	200	100	N	1,000	N	>2,000	200
2143CN14	200	300	100	N	300	N	>2,000	N
2144CN14	300	300	200	N	300	N	>2,000	200
2145CN14	100	500	300	N	500	N	>2,000	500
2146CN13	500	300	200	N	500	1,500	>2,000	500

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm	Be 2ppm
2150CN13	38 31 59	112 35 2	1.5	.50	10.00	>2.000	3,000	30	200	<2
2301CN41	38 28 41	112 20 36	15.0	.70	1.50	>2.000	1,500	50	700	15
2302CN41	38 28 30	112 20 49	5.0	.50	5.00	>2.000	1,500	70	700	15
2303CN41	38 28 32	112 20 52	7.0	1.00	1.50	>2.000	1,500	70	1,000	20
2305CN41	38 27 50	112 22 28	5.0	1.00	5.00	1.500	5,000	20	500	10
2306CN41	38 27 39	112 22 29	10.0	1.00	2.00	2.000	5,000	30	500	10
2307CN41	38 27 37	112 22 19	10.0	3.00	3.00	1.500	3,000	70	500	7
2309CN41	38 26 28	112 15 9	2.0	.30	3.00	2.000	2,000	30	>10,000	15
2311CN41	38 26 23	112 18 44	7.0	1.50	3.00	2.000	1,000	30	5,000	2
2313CN41	38 24 58	112 18 37	5.0	.70	3.00	>.002	1,500	70	2,000	3
2314CN41	38 25 7	112 19 19	30.0	.30	1.50	.500	1,000	<20	5,000	2
2315CN41	38 29 14	112 15 9	2.0	.15	5.00	>2.000	3,000	30	5,000	3
2316CN41	38 28 23	112 14 24	2.0	5.00	10.00	2.000	2,000	50	5,000	3
2317CN41	38 28 52	112 13 14	5.0	1.00	5.00	>2.000	1,000	150	10,000	2
2318CN41	38 28 53	112 13 20	1.5	1.00	5.00	2.000	700	200	3,000	2
2319CN41	38 28 55	112 13 19	7.0	.50	3.00	>2.000	1,000	70	700	7
2327CN41	38 23 40	112 19 12	7.0	1.00	5.00	>2.000	1,000	<20	1,500	2
2329CN41	38 23 25	112 16 23	15.0	.70	3.00	1.500	1,000	50	>10,000	2
2330CN41	38 21 48	112 17 7	10.0	1.00	.70	1.500	1,000	200	>10,000	5
2332CN41	38 21 51	112 19 37	7.0	1.00	1.00	>2.000	1,000	<20	1,500	3
2333CN41	38 20 59	112 18 58	5.0	1.50	10.00	>2.000	2,000	N	1,500	2
2334CN41	38 22 10	112 15 29	5.0	2.00	2.00	2.000	1,000	100	>10,000	2
2336CN41	38 15 59	112 15 36	2.0	.70	10.00	>2.000	1,500	20	300	10
2337CN41	38 17 43	112 15 41	2.0	5.00	10.00	1.500	1,000	150	1,500	N
2339CN41	38 16 16	112 17 39	3.0	7.00	5.00	.700	1,000	20	500	<2
2340CN41	38 18 17	112 17 38	3.0	5.00	5.00	.200	1,500	50	500	<2
2345CN42	38 16 37	112 31 31	2.0	1.50	5.00	>2.000	2,000	70	300	2
2346CN42	38 17 13	112 31 8	2.0	2.00	7.00	>2.000	3,000	20	500	2
2347CN42	38 20 26	112 31 19	3.0	2.00	5.00	>2.000	2,000	50	>10,000	3
2348CN41	38 20 58	112 31 5	7.0	1.00	3.00	>2.000	1,500	2,000	1,000	7
2349CN41	38 20 31	112 29 22	7.0	1.00	2.00	>2.000	1,500	100	>10,000	5
2350CN41	38 20 42	112 28 54	7.0	.70	.50	>2.000	1,500	100	7,000	5
2351CN41	38 20 35	112 28 54	15.0	2.00	3.00	>2.000	1,500	50	2,000	10
2352CN41	38 21 1	112 28 16	7.0	5.00	7.00	>2.000	3,000	100	7,000	7
2353CN41	38 20 59	112 28 23	2.0	.50	.70	>2.000	700	200	10,000	10
2354CN41	38 21 17	112 27 58	7.0	1.00	2.00	>2.000	1,000	100	5,000	7
2355CN41	38 21 4	112 27 6	3.0	1.50	10.00	1.500	1,500	50	2,000	5
2356CN41	38 21 3	112 27 7	3.0	1.50	15.00	1.500	1,500	150	10,000	5
2375CN42	38 29 20	112 32 7	1.5	.30	3.00	2.000	1,000	20	300	<2
2376CN42	38 29 21	112 32 13	3.0	1.00	3.00	>2.000	2,000	150	700	2
2377CN42	38 28 2	112 31 43	7.0	.70	2.00	>2.000	2,000	50	5,000	2
2378CN42	38 27 59	112 31 43	10.0	.70	1.50	>2.000	3,000	100	7,000	5
2379CN42	38 28 41	112 30 9	10.0	.30	.70	>2.000	10,000	50	70	15
2380CN42	38 28 37	112 30 8	5.0	.20	1.00	2.000	7,000	100	500	7
2381CN41	38 28 51	112 28 1	7.0	1.50	2.00	>2.000	10,000	150	700	15

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Bi 15ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm	Pb 20ppm
2150CN13	N	N	150	N	1,500	15	200	N	70
2301CN41	N	15	200	50	300	7	200	20	200
2302CN41	N	15	150	30	300	20	150	N	700
2303CN41	300	15	200	50	200	20	150	20	200
2305CN41	N	15	300	30	300	7	100	20	300
2306CN41	N	10	300	30	300	7	100	30	700
2307CN41	N	20	700	50	300	N	50	70	150
2309CN41	N	<10	70	30	700	15	100	N	200
2311CN41	N	20	150	30	500	150	70	20	500
2313CN41	N	10	100	20	300	10	70	N	200
2314CN41	N	150	70	200	150	20	<50	100	3,000
2315CN41	N	N	20	N	1,500	7	150	N	150
2316CN41	N	15	1,500	10	700	N	500	100	200
2317CN41	N	10	200	20	500	15	100	20	300
2318CN41	N	<10	70	<10	300	N	100	N	N
2319CN41	N	10	100	30	500	10	70	N	100
2327CN41	N	50	150	50	500	N	70	N	200
2329CN41	N	50	100	1,000	200	15	50	100	700
2330CN41	30	15	150	50	150	300	50	30	50,000
2332CN41	N	20	150	50	300	N	50	20	200
2333CN41	N	N	200	30	700	N	100	N	100
2334CN41	N	10	500	1,000	100	10	100	30	100
2336CN41	N	10	300	30	1,000	N	70	N	200
2337CN41	N	10	700	10	300	N	50	150	1,000
2339CN41	N	30	1,500	15	300	N	<50	700	N
2340CN41	20	30	1,000	20	1,000	N	N	700	30
2345CN42	>2,000	N	150	<10	1,000	15	300	N	50
2346CN42	N	N	500	15	700	20	300	50	50
2347CN42	N	15	700	15	500	10	150	30	100
2348CN41	N	10	150	70	500	20	100	N	150
2349CN41	30	15	150	50	200	50	200	N	200
2350CN41	N	20	150	30	300	50	150	N	150
2351CN41	N	20	500	100	500	15	70	70	100
2352CN41	N	30	1,000	50	500	10	70	150	70
2353CN41	N	10	30	20	200	10	150	N	200
2354CN41	N	15	100	30	300	15	150	N	150
2355CN41	N	15	150	30	700	N	50	N	30
2356CN41	N	10	200	30	700	N	50	N	50
2375CN42	N	<10	50	<10	500	N	150	N	N
2376CN42	N	15	300	20	700	20	300	20	30
2377CN42	N	20	70	20	500	N	200	N	50
2378CN42	N	50	100	50	300	N	200	N	150
2379CN42	N	N	100	<10	500	20	1,500	N	150
2380CN42	150	N	30	<10	500	20	1,000	N	100
2381CN41	N	N	100	15	1,500	10	700	N	150

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Sn 15ppm	Sr200ppm	V 20ppm	W 70ppm	Y 20ppm	Zn300ppm	Zr 20ppm	Th150ppm
2150CN13	100	700	500	N	500	N	>2,000	150
2301CN41	N	700	500	N	200	N	>2,000	N
2302CN41	100	500	200	N	200	N	>2,000	150
2303CN41	15	500	200	N	150	N	>2,000	N
2305CN41	300	700	200	N	200	N	>2,000	N
2306CN41	N	1,000	300	N	150	N	>2,000	N
2307CN41	N	700	500	N	100	N	1,500	N
2309CN41	100	1,000	70	N	500	N	>2,000	500
2311CN41	N	700	300	N	200	N	>2,000	N
2313CN41	N	1,000	300	N	200	N	>2,000	N
2314CN41	N	300	100	N	70	1,000	1,500	N
2315CN41	70	<200	70	N	2,000	N	>2,000	700
2316CN41	300	700	150	N	300	N	>2,000	700
2317CN41	N	1,500	200	N	300	300	>2,000	150
2318CN41	15	1,000	100	N	300	300	>2,000	150
2319CN41	300	700	200	N	150	N	2,000	N
2327CN41	N	500	300	N	200	N	>2,000	N
2329CN41	N	5,000	70	N	200	N	>2,000	N
2330CN41	N	700	150	N	150	N	>2,000	N
2332CN41	N	2,000	300	N	200	N	>2,000	N
2333CN41	100	700	200	N	300	N	>2,000	N
2334CN41	N	7,000	200	N	200	N	>2,000	N
2336CN41	50	1,000	200	N	300	N	>2,000	N
2337CN41	N	1,000	70	N	200	N	>2,000	N
2339CN41	N	1,000	150	N	150	N	>2,000	N
2340CN41	N	700	100	N	200	N	>2,000	700
2345CN42	150	300	200	N	1,000	N	>2,000	700
2346CN42	150	200	300	N	1,000	N	>2,000	300
2347CN42	100	1,500	200	N	500	N	>2,000	N
2348CN41	500	700	300	N	300	N	>2,000	700
2349CN41	300	1,000	300	N	200	N	>2,000	150
2350CN41	300	700	300	70	200	N	>2,000	N
2351CN41	N	700	300	70	150	N	2,000	N
2352CN41	20	1,000	500	N	200	N	2,000	N
2353CN41	500	500	200	70	200	N	>2,000	150
2354CN41	300	300	200	N	150	N	>2,000	200
2355CN41	30	1,000	150	N	300	N	>2,000	N
2356CN41	30	1,500	150	N	300	N	>2,000	200
2375CN42	100	1,000	100	N	500	N	>2,000	200
2376CN42	100	200	300	N	500	N	N	1,000
2377CN42	15	1,000	300	N	300	N	N	300
2378CN42	N	300	500	N	200	N	>2,000	N
2379CN42	200	N	70	N	700	700	>2,000	3,000
2380CN42	1,000	<200	70	N	700	500	>2,000	2,000
2381CN41	300	N	100	N	1,000	1,000	>2,000	1,000

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm	Be 2ppm
2382CN41	38 28 51	112 28 3	7.0	2.00	1.50	>2.000	10,000	70	2,000	7
2383CN41	38 28 45	112 28 15	10.0	1.50	1.00	>2.000	>10,000	20	1,500	10
2384CN41	38 28 40	112 28 21	3.0	.30	1.00	>2.000	5,000	70	300	15
2385CN41	38 28 1	112 28 11	10.0	1.00	.70	>2.000	10,000	20	300	15
2386CN41	38 27 58	112 28 11	15.0	2.00	2.00	>2.000	>10,000	20	300	20
2387CN41	38 28 2	112 25 18	2.0	.70	7.00	2.000	1,500	300	7,000	2
2388CN41	38 21 56	112 28 59	15.0	.50	.50	>2.000	700	70	700	10
2389CN41	38 23 27	112 25 29	20.0	.70	2.00	1.500	3,000	20	1,000	15
2390CN41	38 22 54	112 26 39	7.0	.30	1.50	2.000	1,500	150	1,500	20
2391CN41	38 24 28	112 24 51	5.0	.20	.70	>2.000	10,000	20	200	10
2392CN41	38 26 29	112 26 36	3.0	1.50	15.00	>2.000	10,000	<20	>10,000	15
2393CN41	38 27 5	112 22 40	10.0	1.50	2.00	2.000	3,000	20	700	10
2394CN41	38 27 29	112 19 2	15.0	5.00	5.00	2.000	5,000	20	2,000	3
2395CN41	38 28 31	112 17 45	5.0	.30	2.00	>2.000	7,000	100	500	15
2396CN42	38 29 29	112 35 55	2.0	3.00	7.00	>2.000	2,000	20	200	3
2397CN42	38 29 32	112 35 52	2.0	1.50	3.00	>2.000	1,500	50	300	<2
2398CN42	38 29 36	112 35 56	7.0	10.00	10.00	>2.000	3,000	N	2,000	<2
2424CN14	38 32 22	112 20 22	3.0	7.00	10.00	2.000	2,000	20	1,000	2
2434CN41	38 27 11	112 27 21	2.0	.20	1.00	1.500	1,500	100	200	20
2435CN41	38 27 1	112 27 20	5.0	.15	.70	.300	10,000	30	500	30
2436CN41	38 24 27	112 21 6	20.0	1.50	1.50	>2.000	1,500	<20	10,000	2
2437CN41	38 23 41	112 22 1	1.0	1.00	5.00	1.500	500	200	500	<2
2438CN41	38 21 41	112 21 6	10.0	2.00	7.00	>2.000	2,000	N	1,500	<2
2439CN41	38 19 28	112 19 32	7.0	5.00	7.00	1.000	2,000	<20	5,000	N
2440CN41	38 19 57	112 17 40	10.0	3.00	5.00	2.000	2,000	<20	5,000	3
2441CN41	38 19 57	112 15 2	5.0	.70	3.00	1.500	1,000	100	>10,000	<2
2442CN41	38 18 53	112 16 6	5.0	1.00	5.00	2.000	1,500	20	700	2
2443CN41	38 16 51	112 19 12	3.0	5.00	10.00	.300	1,500	<20	700	2
2445CN41	38 16 24	112 23 42	3.0	7.00	10.00	1.000	1,500	20	300	N
2446CN14	38 32 55	112 15 53	3.0	3.00	7.00	.300	>10,000	<20	>10,000	<2
2469CN41	38 15 32	112 18 21	2.0	1.50	5.00	1.500	700	50	500	<2
2831CN41	38 28 56	112 23 27	2.0	.70	20.00	>2.000	1,500	20	500	5
2832CN41	38 29 12	112 23 20	2.0	.50	1.00	2.000	1,000	200	2,000	7
2833CN41	38 28 37	112 24 6	7.0	.70	10.00	>2.000	7,000	50	300	15
2834CN41	38 28 34	112 24 9	2.0	.70	10.00	>2.000	2,000	70	200	7
2837CN41	38 28 57	112 25 43	15.0	.50	1.50	1.500	1,000	30	1,000	10
2838CN41	38 29 0	112 25 44	3.0	.50	10.00	>2.000	1,000	70	1,500	10
2839CN41	38 29 5	112 25 54	3.0	.30	7.00	>2.000	1,000	70	700	7

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Bi 15ppm	Co 10ppm	Cr 20ppm	Cu 10ppm	La 50ppm	Mo 7ppm	Nb 50ppm	Ni 10ppm	Pb 20ppm
2382CN41	20	N	150	10	700	15	700	20	150
2383CN41	N	N	100	20	500	15	700	20	100
2384CN41	N	N	30	<10	300	10	1,000	N	150
2385CN41	N	N	100	10	700	N	300	N	700
2386CN41	N	30	300	10	700	15	300	30	1,000
2387CN41	N	N	150	10	700	10	70	N	100
2388CN41	N	10	100	150	200	70	200	N	200
2389CN41	N	50	100	70	500	7	70	30	700
2390CN41	50	10	70	100	500	20	100	N	200
2391CN41	N	N	50	<10	1,500	30	1,000	N	700
2392CN41	N	N	700	<10	500	70	>5,000	50	1,000
2393CN41	N	20	200	20	300	7	70	30	300
2394CN41	N	30	700	50	300	N	50	70	150
2395CN41	70	N	100	N	700	15	500	N	300
2396CN42	N	10	1,500	<10	500	N	300	100	50
2397CN42	N	20	700	<10	700	15	150	N	<20
2398CN42	N	70	2,000	20	500	N	100	150	70
2424CN14	N	20	1,500	<10	700	N	100	150	150
2434CN41	N	N	30	N	200	20	300	N	200
2435CN41	N	N	20	N	300	15	150	N	150
2436CN41	N	100	150	50	300	N	50	100	200
2437CN41	N	<10	150	<10	200	N	50	N	50
2438CN41	N	50	500	20	700	N	100	50	100
2439CN41	N	50	700	70	300	N	<50	70	70
2440CN41	N	30	500	30	300	N	70	50	200
2441CN41	N	10	100	15	500	N	50	N	300
2442CN41	N	20	150	30	700	N	50	20	50
2443CN41	N	20	1,000	30	300	N	N	200	20
2445CN41	N	20	1,000	<10	100	N	<50	100	N
2446CN14	N	50	100	50	300	N	N	N	100
2469CN41	N	10	700	<10	300	N	50	20	N
2831CN41	N	<10	150	20	1,500	200	150	N	3,000
2832CN41	100	N	70	10	300	20	300	N	150
2833CN41	N	15	50	30	1,000	10	100	N	700
2834CN41	N	N	50	10	2,000	10	100	N	300
2837CN41	N	15	100	50	300	20	<50	30	200
2838CN41	N	<10	150	50	500	200	100	N	1,000
2839CN41	N	<10	100	30	700	30	100	N	150

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Sn 15ppm	Sr200ppm	V 20ppm	W 70ppm	Y 20ppm	Zn300ppm	Zr 20ppm	Th150ppm
2382CN41	300	<200	150	N	700	1,000	>2,000	700
2383CN41	1,000	N	70	N	500	1,000	>2,000	700
2384CN41	150	<200	70	N	700	300	>2,000	1,000
2385CN41	300	N	150	N	700	1,000	>2,000	500
2386CN41	200	200	200	N	700	1,000	>2,000	500
2387CN41	N	1,000	100	N	500	500	>2,000	300
2388CN41	300	1,000	500	100	150	N	>2,000	N
2389CN41	2,000	700	500	70	200	N	2,000	N
2390CN41	300	700	200	N	200	N	>2,000	N
2391CN41	100	<200	70	N	700	700	>2,000	1,500
2392CN41	100	200	100	N	700	N	>2,000	500
2393CN41	50	300	300	N	150	N	2,000	N
2394CN41	N	500	1,000	N	70	N	1,000	N
2395CN41	300	N	150	N	1,500	500	>2,000	1,500
2396CN42	100	300	200	N	500	N	>2,000	1,000
2397CN42	30	700	300	N	500	N	>2,000	150
2398CN42	N	500	300	N	300	N	>2,000	N
2424CN14	20	700	200	N	500	N	>2,000	150
2434CN41	500	<200	70	N	1,000	500	>2,000	1,500
2435CN41	500	N	50	N	3,000	700	>2,000	2,000
2436CN41	N	500	300	N	150	N	>2,000	N
2437CN41	N	1,000	100	N	300	N	>2,000	N
2438CN41	N	1,000	300	N	200	N	1,500	N
2439CN41	N	500	200	N	100	N	>2,000	N
2440CN41	N	1,000	300	N	200	N	>2,000	N
2441CN41	N	7,000	150	N	150	N	>2,000	N
2442CN41	N	700	200	N	200	N	>2,000	N
2443CN41	N	1,000	150	N	150	N	1,500	N
2445CN41	N	500	200	N	150	N	>2,000	N
2446CN14	N	7,000	500	N	150	N	1,000	N
2469CN41	N	2,000	70	N	200	N	>2,000	150
2831CN41	>2,000	700	200	N	300	N	>2,000	N
2832CN41	N	500	100	N	200	N	>2,000	N
2833CN41	200	700	150	N	300	N	>2,000	N
2834CN41	50	1,000	150	N	500	N	>2,000	150
2837CN41	N	500	300	N	100	N	700	N
2838CN41	150	1,500	200	70	200	N	>2,000	N
2839CN41	1,000	1,000	200	70	300	N	>2,000	N

Appendix 3.--Elements with less than 20 valid values.

magnetic fraction

As 500 ppm

sample	concentration in ppm
1429	500
1430	1000
1563	700
1568	1000
1569	1000
1744	500
2146	700
2329	500
2330	1500
2334	2000
2832	700

Bi 20 ppm

sample	concentration in ppm
1430	100
1541	70

W 100 ppm

sample	concentration in ppm
1520	70
2353	2000
2354	200

Th 200 ppm

sample	concentration in ppm
1445	L
1468	L
1471	L
1477	L
1522	L
1524	L
1533	200
1534	700
1596	L
1737	L
1740	L
1749	L
2145	L
2316	L
2388	200

nonmagnetic fraction

As 500 ppm

sample	concentration in ppm
1433	1000
1563	700
1596	1000
2314	1000
2438	1000

Appendix 4.--Factor loadings by sample site for the magnetic fraction.

REORDERED VARIMAX MATRIX -

		COMM.	1	2	3	4	5
92	1554CM42	0.9892	0.9661	0.1617	0.1094	0.1326	-0.0138
239	2395CM41	0.9960	0.9655	0.1540	0.1315	0.1488	-0.0243
11	1419CM42	0.9871	0.9604	0.0825	0.1994	0.1208	-0.0591
226	2382CM41	0.9940	0.9378	0.1348	0.2190	0.2137	-0.0531
70	1527CM42	0.9496	0.9349	0.1579	0.1042	0.1403	0.1415
148	1739CM14	0.9705	0.9327	0.1080	0.2466	0.1635	-0.0365
96	1558CM42	0.9899	0.9321	0.1692	0.2060	0.2195	0.0433
91	1553CM42	0.9918	0.9316	0.1842	0.2155	0.1546	0.1402
234	2390CM41	0.9876	0.9196	0.2120	-0.0108	0.2402	0.1978
115	1534CM41	0.9597	0.9196	0.1057	0.1152	0.1882	0.2327
95	1557CM42	0.9831	0.9136	0.0976	0.3506	0.1387	-0.0420
16	1426CM42	0.9885	0.9134	0.1102	0.3503	0.1353	-0.0340
82	1541CM41	0.9672	0.9116	0.0439	0.3390	0.1332	0.0403
119	1538CM41	0.9786	0.9060	0.1679	0.2187	0.1102	0.2639
150	1741CM14	0.9354	0.9039	0.1969	0.0986	0.2544	0.0717
260	2833CM41	0.9544	0.9011	0.2501	0.1468	0.1707	0.1709
181	2146CM14	0.9875	0.9000	0.2125	0.1310	0.1462	0.3061
97	1559CM42	0.9679	0.8995	0.2928	0.2132	0.1633	-0.0299
189	2309CM41	0.9666	0.8940	0.1302	0.1055	0.3412	0.0862
86	1547CM41	0.9743	0.8915	0.1974	0.3469	0.1354	-0.0429
62	1519CM42	0.9854	0.8912	0.3203	0.1267	0.2514	0.0965
90	1552CM41	0.9763	0.8910	0.3446	0.1915	0.1595	-0.0456
93	1555CM42	0.9867	0.8897	0.2171	0.3572	0.1359	-0.0447
52	1509CM42	0.9856	0.8892	0.2004	0.2189	0.1999	0.2585
84	1544CM41	0.9849	0.8844	0.2897	0.2222	0.2107	0.1582
83	1543CM41	0.9862	0.8800	0.3507	0.2150	0.2019	-0.0429
165	1764CM14	0.9643	0.8731	0.2869	0.1948	0.2830	0.0402
134	1723CM14	0.9079	0.8729	0.1770	0.2639	0.1949	0.0838
235	2391CM41	0.9589	0.8724	0.0944	0.0636	0.1159	0.4140
244	2434CM41	0.9766	0.8712	0.1396	0.0719	0.0939	0.4291
80	1539CM41	0.9775	0.8683	0.2670	0.3533	0.1543	0.0604
258	2831CM41	0.9709	0.8682	0.2334	0.3204	0.2101	0.1255
159	1756CM41	0.9893	0.8564	0.1025	0.4685	0.1503	-0.0580
15	1425CM42	0.9926	0.8555	0.0790	0.4680	0.1847	-0.0369
124	1594CM41	0.7631	0.8544	0.1318	0.0055	0.0938	-0.0830
259	2832CM41	0.9542	0.8510	0.2465	0.0114	0.1430	0.3856
17	1427CM42	0.9903	0.8500	0.0709	0.4880	0.1523	0.0393
73	1531CM42	0.9720	0.8483	0.2531	0.3229	0.1451	0.2510
227	2383CM41	0.9700	0.8449	0.0909	0.4528	0.1970	-0.0638
184	2302CM41	0.9812	0.8441	0.2626	0.3208	0.2863	0.1223
176	2141CM13	0.7741	0.8402	0.3860	0.2206	0.2634	0.0332
183	2301CM41	0.5978	0.8365	0.2380	0.0200	0.2494	0.2292
85	1545CM41	0.9893	0.8349	0.1856	0.2313	0.1211	0.4354
228	2384CM41	0.9681	0.8342	0.1843	0.4601	0.1579	-0.0414
245	2435CM41	0.9658	0.8313	0.0974	0.4419	0.1099	0.2406
236	2392CM41	0.9612	0.8300	0.3798	0.1702	0.2643	0.1710
138	1727CM14	0.9833	0.8236	0.4068	0.1436	0.3448	0.0047
194	2316CM41	0.9925	0.8176	0.4937	0.0781	0.2694	0.0395
60	1517CM42	0.9863	0.8132	0.1421	0.4865	0.1991	0.1686
7	1415CM42	0.9786	0.8129	0.1844	0.4874	0.1886	0.1029

REORDERED VARIMAX MATRIX -CONT

		COMM.	1	2	3	4	5
187	2306CM41	0.9658	0.8118	0.1820	0.0485	0.4530	0.2628
160	1757CM41	0.9714	0.8109	0.3734	0.2093	0.3524	0.0806
256	2446CM14	0.9474	0.8106	0.5107	-0.0133	0.1574	0.0676
59	1516CM42	0.9858	0.8094	0.4050	0.3014	0.2676	0.0650
136	1725CM14	0.9312	0.8051	0.2380	0.3850	0.2797	0.0026
230	2386CM41	0.9559	0.7999	0.2216	0.4457	0.2230	0.1360
128	1677CM14	0.9739	0.7998	0.4130	0.1494	0.3565	0.1190
78	1536CM41	0.9621	0.7988	0.3864	0.0900	0.2863	0.2908
113	1582CM41	0.8897	0.7961	0.0926	0.0630	0.0947	0.4841
237	2393CM41	0.9868	0.7855	0.3948	0.2023	0.4109	0.0640
164	1762CM14	0.9406	0.7852	0.4685	0.1933	0.2464	0.0900
200	2330CM41	0.9662	0.7825	0.3888	0.1195	0.4056	0.1543
76	1534CM41	0.8867	0.7817	0.0317	0.1811	0.0641	0.4376
71	1528CM42	0.9581	0.7789	0.0426	0.4226	0.0849	0.4048
108	1571CM42	0.9884	0.7785	0.4439	0.1220	0.4127	0.0003
161	1758CM41	0.9793	0.7742	0.3064	0.4739	0.2451	0.0368
233	2389CM41	0.9612	0.7725	0.3782	0.0529	0.4649	0.0492
196	2318CM41	0.9853	0.7700	0.4346	0.3523	0.2760	0.0571
185	2303CM41	0.9892	0.7665	0.2792	0.1780	0.5111	0.1754
88	1550CM41	0.9736	0.7648	0.0284	0.6016	0.1257	0.1007
94	1556CM42	0.9672	0.7645	0.0465	0.6011	0.1292	-0.0508
224	2379CM42	0.6074	0.7600	0.1132	0.1121	0.0657	0.0012
225	2380CM42	0.6052	0.7569	0.0845	0.0814	0.1127	-0.0763
125	1595CM41	0.9705	0.7557	0.0649	0.6041	0.1681	-0.0435
111	1575CM42	0.8828	0.7533	0.4015	0.0564	0.3711	0.1153
130	1680CM14	0.9541	0.7506	0.6029	0.0482	0.1382	0.0762
74	1532CM41	0.9624	0.7451	0.1766	0.4265	0.1159	0.4251
180	2145CM14	0.8805	0.7425	0.1836	0.3330	0.4296	0.0036
87	1548CM41	0.9621	0.7386	0.1020	0.6204	0.1453	0.0067
81	1540CM41	0.6760	0.7252	0.0600	0.3635	0.0924	-0.0760
213	2350CM41	0.9781	0.7211	0.4474	0.0957	0.4597	0.1938
69	1526CM42	0.7550	0.7195	0.0965	0.2610	0.1241	0.3802
101	1564CM42	0.8602	0.7174	0.3016	0.1021	0.4726	0.1444
79	1537CM41	0.9389	0.7154	0.0720	0.1973	0.0565	0.6163
197	2319CM41	0.9761	0.7143	0.3861	0.4458	0.2960	0.1744
117	1586CM41	0.6981	0.7097	0.0701	0.0357	0.1362	0.4118
147	1738CM14	0.9395	0.7091	0.5880	0.1866	0.2315	0.0501
72	1529CM41	0.9261	0.7037	0.1185	0.3025	0.0492	0.5683
20	1430CM42	0.8407	0.7019	0.2580	0.2012	0.4483	0.2000
103	1566CM42	0.9500	0.6991	0.1695	0.5843	0.3017	-0.0092
149	1740CM14	0.7869	0.6979	0.1605	0.4834	0.2010	-0.0010
193	2315CM41	0.9275	0.6977	0.1378	0.6201	0.1909	0.0291
174	1874CM13	0.9882	0.6950	0.3504	0.3985	0.4715	-0.0356
49	1505CM42	0.9721	0.6947	0.3515	0.4851	0.3612	-0.0035
57	1514CM42	0.9919	0.6938	0.1509	0.6147	0.2976	0.1463
48	1482CM41	0.8995	0.6879	0.2311	0.4905	0.3629	-0.0254
75	1533CM41	0.9331	0.6871	0.0992	0.1471	0.0611	0.6524
140	1730CM14	0.9663	0.6805	0.5372	0.3439	0.3100	0.0148
195	2317CM41	0.9905	0.6733	0.5452	0.3142	0.3471	0.1443
32	1449CM41	0.9202	0.6729	0.3537	0.4639	0.3546	-0.0369

Appendix 4.--Factor loadings by sample site for the magnetic fraction--continued.

REORDERED VARIMAX MATRIX -CONT

		COMM.	1	2	3	4	5
240	2396CM42	0.9865	0.6703	0.4769	0.3027	0.4663	0.0248
179	2144CM14	0.9297	0.6681	0.3068	0.4619	0.1924	0.3725
158	1755CM41	0.9473	0.6664	0.5204	0.1988	0.3394	0.2788
129	1678CM14	0.9328	0.6616	0.4879	0.1574	0.4791	0.0522
135	1724CM14	0.8590	0.6598	0.4269	0.3456	0.3464	0.0457
229	2385CM41	0.9192	0.6445	0.3352	0.5658	0.2574	0.0715
186	2305CM41	0.9813	0.6380	0.3778	0.2565	0.6040	0.0315
145	1735CM14	0.9774	0.6270	0.3866	0.5908	0.2924	0.0154
3	1410CM42	0.9764	0.6242	0.4651	0.1162	0.5952	0.0521
217	2354CM41	0.9658	0.6166	0.3972	0.4155	0.3821	0.3306
222	2377CM42	0.9808	0.6165	0.4425	0.5430	0.3304	-0.0285
61	1518CM42	0.9530	0.6047	0.5895	0.1733	0.4381	0.1332
221	2376CM42	0.9827	0.5954	0.5359	0.3663	0.4548	-0.0086
36	1453CM41	0.8707	0.5949	0.5716	0.2135	0.3615	0.1180
68	1525CM42	0.9273	0.5922	0.4502	0.2329	0.3807	0.4180
220	2375CM42	0.9767	0.5919	0.3755	0.5201	0.4627	-0.0276
146	1737CM14	0.8149	0.5819	0.5559	0.3507	0.2104	0.0005
104	1567CM42	0.9725	0.5808	0.4932	0.2394	0.5762	0.0506
43	1476CM41	0.9866	0.0555	0.9774	0.0921	0.1367	0.0344
257	2469CM41	0.9879	0.0580	0.9761	0.1065	0.1387	0.0349
131	1682CM14	0.9948	0.1260	0.9686	0.1506	0.1164	0.0670
215	2352CM41	0.9833	0.0575	0.9597	0.1545	0.1746	0.0674
46	1479CM41	0.9907	0.1125	0.9568	0.1201	0.2167	0.0347
1	1408CM42	0.9415	0.0822	0.9548	0.0997	0.1132	0.0168
31	1447CM13	0.9812	0.1619	0.9540	0.1649	0.1138	0.0696
255	2445CM41	0.9802	0.0264	0.9508	0.0585	0.2500	0.0289
47	1480CM41	0.9911	0.2299	0.9507	0.0568	0.1745	0.0257
45	1478CM41	0.9834	0.1175	0.9503	0.1329	0.2191	0.0292
167	1867CM13	0.9927	0.2326	0.9489	0.0730	0.1778	0.0352
142	1732CM14	0.9746	0.2281	0.9358	0.1683	0.1129	0.0751
205	2337CM41	0.9801	0.0766	0.9285	0.0589	0.3234	0.0644
133	1684CM14	0.9845	0.2928	0.9256	0.1053	0.1455	0.0991
177	2142CM13	0.9851	0.1490	0.9179	0.2127	0.2756	0.0154
214	2351CM41	0.9789	0.1304	0.9119	0.0750	0.3224	0.1444
23	1435CM13	0.8321	0.1125	0.8970	0.0896	0.0792	-0.0232
123	1593CM42	0.9534	0.1702	0.8945	0.0926	0.3372	0.0455
144	1734CM14	0.9323	0.3232	0.8933	0.1385	0.1017	-0.0176
141	1731CM14	0.9850	0.2997	0.8927	0.2340	0.1919	0.0813
218	2355CM41	0.9845	0.2880	0.8904	0.1329	0.2605	0.0864
50	1506CM42	0.9782	0.4001	0.8864	0.0659	0.1644	0.0333
182	2150CM13	0.9748	0.3704	0.8726	0.1309	0.2408	0.0324
51	1503CM42	0.9883	0.3344	0.8702	0.0681	0.2760	0.0493
143	1733CM14	0.9865	0.4111	0.8677	0.1791	0.1759	0.0395
254	2444CM41	0.9880	0.1228	0.8644	0.0652	0.4539	0.1244
168	1868CM13	0.9571	0.3358	0.8459	0.1163	0.3387	0.0226
253	2443CM41	0.9718	0.1478	0.8339	0.0228	0.4986	0.0734
242	2398CM42	0.9488	0.3650	0.8276	0.2114	0.2817	0.0813
243	2424CM14	0.9256	0.3272	0.8187	0.2143	0.2956	0.1219
219	2356CM41	0.9473	0.2881	0.8170	0.1186	0.4206	0.0760
132	1683CM14	0.9772	0.5145	0.7984	0.1925	0.1888	0.0480

REORDERED VARIMAX MATRIX -CONT

		COMM.	1	2	3	4	5
5	1412CM42	0.9293	0.3091	0.7965	0.2208	0.3837	0.0584
163	1761CM14	0.8873	0.0059	0.7956	0.3877	0.2697	0.1769
249	2439CM41	0.9533	0.3113	0.7955	0.3051	0.3492	0.0918
2	1409CM42	0.8973	0.1366	0.7925	0.2846	0.4118	0.0009
22	1433CM42	0.9850	0.5144	0.7900	0.0347	0.3057	0.0401
169	1869CM13	0.9829	0.4733	0.7859	0.2665	0.2601	0.0509
26	1439CM13	0.9358	0.2793	0.7848	0.3270	0.3660	0.0303
137	1726CM14	0.9563	0.3674	0.7786	0.3974	0.2384	0.0177
210	2347CM42	0.9509	0.2316	0.7734	0.4604	0.2921	0.0428
157	1749CM41	0.9690	0.0705	0.7666	0.2108	0.5683	0.0943
264	2839CM41	0.9497	0.3096	0.7478	0.2712	0.3859	0.2685
122	1592CM42	0.9721	0.3541	0.7436	0.3296	0.4270	0.0525
238	2374CM41	0.9781	0.4222	0.7432	0.2110	0.4450	0.0706
121	1591CM41	0.9855	0.5219	0.7391	0.1422	0.3699	0.0991
89	1551CM41	0.9730	0.6368	0.7207	0.1964	0.0854	-0.0472
151	1742CM14	0.9867	0.5939	0.7173	0.2033	0.2617	0.0978
53	1510CM42	0.9900	0.5439	0.7012	0.0837	0.4404	0.0386
152	1743CM14	0.9576	0.5924	0.6916	0.2186	0.2683	0.0926
42	1474CM41	0.9602	0.2053	0.6833	0.5927	0.3158	0.0099
139	1723CM14	0.9201	0.5955	0.6794	0.2454	0.2044	0.0430
9	1417CM42	0.9794	0.3596	0.6676	0.1706	0.5866	0.1769
58	1515CM42	0.9393	0.2588	0.6609	0.1816	0.5994	0.2033
178	2143CM14	0.9929	0.5898	0.6447	0.4240	0.2214	0.0214
37	1468CM41	0.9583	0.3507	0.6438	0.5735	0.3027	-0.0193
206	2339CM41	0.7814	-0.0283	0.6424	0.0569	0.5982	0.0824
263	2838CM41	0.6873	0.2071	0.6390	0.2005	0.2701	0.3506
24	1436CM13	0.9735	0.3745	0.6344	0.3041	0.5812	0.0235
25	1437CM13	0.9886	0.3812	0.6311	0.3220	0.5835	0.0267
10	1418CM42	0.8764	0.3942	0.6097	0.1010	0.5084	0.2839
30	1446CM13	0.9829	0.5898	0.6014	0.4097	0.3247	0.0082
29	1445CM13	0.9675	0.4490	0.5951	0.4722	0.4341	0.0177
241	2397CM42	0.9815	0.5853	0.5902	0.2519	0.4749	0.0408
231	2337CM41	0.8678	0.4807	0.5750	0.4319	0.2452	0.2437
204	2336CM41	0.9114	0.4907	0.5716	0.3367	0.2887	0.3332
105	1568CM42	0.8609	0.3058	0.5593	0.4051	0.4569	0.2858
262	2837CM41	0.8906	0.2469	0.5545	0.1652	0.5537	0.4341
4	1411CM42	0.9592	0.2529	0.2620	0.8846	0.1960	0.0753
211	2348CM42	0.9500	0.3268	0.0866	0.8757	0.2085	0.1595
77	1535CM41	0.9420	0.1471	0.1064	0.8508	0.0841	0.4221
28	1444CM13	0.9171	0.2698	0.1965	0.8046	0.3971	-0.0255
6	1414CM42	0.9370	0.4370	0.0989	0.8043	0.1647	0.2495
63	1520CM42	0.9441	0.4079	0.1483	0.7782	0.2721	0.2760
19	1429CM42	0.9407	0.2525	0.3502	0.7779	0.3244	0.2097
212	2349CM41	0.8925	0.3957	0.1550	0.7429	0.1887	0.3527
39	1470CM41	0.9951	0.6191	0.1594	0.7402	0.1924	-0.0388
209	2346CM42	0.9923	0.5931	0.2836	0.7299	0.1650	0.0132
38	1469CM41	0.9543	0.3740	0.5225	0.7127	0.1757	-0.0521
110	1573CM42	0.9661	0.5718	0.1711	0.7126	0.3182	-0.0305
208	2345CM42	0.9863	0.5445	0.4019	0.7004	0.1942	0.0006
118	1587CM41	0.9076	0.2512	0.0859	0.6921	0.1717	0.5732

Appendix 4.-- Factor loadings by sample site for the magnetic fraction--continued.

REORDERED VARIMAX MATRIX -CONT

		COMM.	1	2	3	4	5
44	1477CM41	0.8203	0.5164	0.2401	0.6879	0.1420	-0.0514
261	2834CM41	0.8937	0.4609	0.4050	0.6805	0.1868	0.1555
41	1473CM41	0.9834	0.4765	0.4969	0.6786	0.2210	0.0037
116	1585CM41	0.9728	0.3180	0.1598	0.6749	0.6246	0.0221
56	1513CM42	0.9464	0.4947	0.1739	0.6655	0.3578	0.3170
191	2313CM41	0.8529	0.2770	0.4427	0.6466	0.3534	0.1931
216	2353CM41	0.8954	0.4942	0.1758	0.6454	0.2815	0.3527
99	1562CM42	0.9650	0.4416	0.2658	0.6450	0.5010	0.1798
251	2441CM41	0.9044	0.3978	0.3032	0.6319	0.5048	-0.0111
102	1565CM42	0.9424	0.4191	0.3657	0.6308	0.4114	0.2567
40	1471CM41	0.8781	0.2041	0.5717	0.6222	0.3431	-0.0688
172	1872CM13	0.9953	0.3701	0.4497	0.6043	0.5392	0.0097
67	1524CM41	0.8742	0.3240	0.2325	0.5898	0.3398	0.5019
223	2378CM42	0.9544	0.5720	0.4121	0.5757	0.3528	0.0392
100	1563CM42	0.9000	0.3586	0.5595	0.5731	0.1996	0.3002
246	2436CM41	0.9318	0.0710	0.3097	0.0990	0.9059	0.0208
127	1598CM41	0.9240	0.1664	0.3371	0.0746	0.8687	0.1499
27	1441CM13	0.9743	0.2267	0.3291	0.3123	0.8464	0.0264
64	1521CM42	0.7690	0.1957	0.1272	0.1133	0.8377	-0.0050
66	1523CM41	0.9806	0.2875	0.4334	0.1981	0.8098	0.1226
198	2327CM41	0.9778	0.2500	0.3256	0.4198	0.7923	0.0725
21	1431CM42	0.9644	0.3320	0.4253	0.2582	0.7778	0.0406
162	1760CM41	0.9232	0.1116	0.5454	0.0811	0.7734	0.0927
155	1746CM41	0.9891	0.1907	0.5163	0.2959	0.7708	0.0676
114	1583CM41	0.9335	0.2740	0.2806	0.4237	0.7666	0.1122
109	1572CM42	0.9742	0.3099	0.4834	0.1971	0.7634	0.1511
120	1590CM41	0.8240	0.2741	0.3765	0.1872	0.7541	0.0590
12	1420CM42	0.9467	0.1451	0.4934	0.3218	0.7537	0.1026
156	1747CM41	0.9625	0.0580	0.6050	0.1406	0.7503	0.1019
203	2334CM41	0.7155	0.1196	0.2192	0.0095	0.7464	0.3097
8	1416CM42	0.9856	0.5570	0.3205	0.0781	0.7457	0.1023
207	2340CM41	0.9522	0.0202	0.6309	0.0271	0.7373	0.0973
33	1450CM41	0.9705	0.1895	0.4793	0.4014	0.7369	0.0274
190	2311CM41	0.9146	0.3674	0.3902	0.2996	0.7332	0.0067
247	2437CM41	0.9609	0.2403	0.2914	0.5491	0.7187	-0.0113
188	2307CM41	0.7790	0.3369	0.3188	0.2308	0.7127	-0.0512
175	1875CM42	0.8195	0.1971	0.3476	0.3476	0.6875	0.2577
170	1870CM13	0.9883	0.5039	0.4647	0.2155	0.6864	0.0306
201	2332CM41	0.9902	0.2905	0.2487	0.6190	0.6787	0.0039
171	1371CM13	0.8510	0.3466	0.4482	0.2707	0.6754	0.0205
34	1451CM41	0.9696	0.2640	0.2284	0.6257	0.6752	-0.0172
107	1570CM42	0.8865	0.3046	0.3330	0.4665	0.6734	0.1084
112	1580CM41	0.9276	0.5477	0.4214	0.0916	0.6648	-0.0065
54	1511CM42	0.9735	0.2277	0.6097	0.3286	0.6639	0.0353
35	1452CM41	0.9695	0.4801	0.5075	0.2111	0.6608	0.0142
154	1745CM41	0.9537	0.2452	0.6416	0.2278	0.6461	0.1124
248	2438CM41	0.9935	0.5787	0.4333	0.2425	0.6410	0.0338
14	1424CM42	0.9835	0.1795	0.5187	0.5283	0.6277	0.0949
173	1873CM13	0.9717	0.5863	0.2933	0.3846	0.6268	-0.0332
252	2442CM41	0.9855	0.3179	0.5650	0.4142	0.6240	0.0659

REORDERED VARIMAX MATRIX -CONT

		COMM.	1	2	3	4	5
126	1596CM41	0.9601	0.2871	0.4549	0.5216	0.6233	0.1004
250	2440CM41	0.9928	0.3455	0.3998	0.5798	0.6135	0.0309
98	1561CM42	0.9753	0.5860	0.3720	0.3410	0.6108	0.0642
202	2333CM41	0.9031	0.4321	0.4702	0.3418	0.6031	0.1216
13	1422CM42	0.9004	0.4378	0.5639	0.1810	0.5838	0.1311
199	2329CM41	0.8470	0.2164	0.3328	0.3569	0.5792	0.4759
18	1428CM42	0.9203	0.4448	0.4305	0.3405	0.5761	0.2988
106	1569CM42	0.3113	0.2044	0.3992	0.5000	0.5575	0.2220
192	2314CM41	0.9848	0.4482	0.4682	0.4946	0.5556	0.1067
55	1512CM42	0.9434	0.4204	0.5209	0.3484	0.5415	0.2842
65	1522CM42	0.9228	0.3275	0.2187	0.1806	0.3080	0.8001
232	2388CM41	0.9360	0.2935	0.2408	0.3919	0.1498	0.7847
153	1744CM41	0.2801	0.1159	0.1871	0.1058	0.2501	0.3973
166	1765CM14	0.1620	0.0703	0.0669	0.0908	0.0572	0.3756

Appendix 5.--Factor loadings by sample site for the normagnetic fraction.

REORDERED VARIMAX MATRIX -

		COMM.	1	2	3	4	5
92	1556CN42	0.9889	0.9831	0.0654	0.0821	0.1036	-0.0273
16	1426CN42	0.9812	0.9745	0.0660	0.1055	0.1231	-0.0285
85	1545CN41	0.9784	0.9647	0.0972	0.1288	0.1403	0.0462
91	1555CN42	0.9628	0.9618	0.0748	0.1629	0.0213	0.0711
93	1557CN42	0.9943	0.9605	0.0495	0.0970	0.2157	0.1156
73	1531CN42	0.9592	0.9566	0.0902	0.1892	0.0025	0.0097
229	2385CN41	0.9909	0.9557	0.0560	0.1476	0.2143	-0.0823
223	2379CN42	0.9464	0.9534	0.0351	0.1080	0.1511	-0.0403
11	1419CN42	0.9545	0.9531	0.1971	0.0682	0.0488	0.0108
83	1543CN41	0.9691	0.9499	0.0518	0.2304	0.0798	0.0682
95	1559CN42	0.9853	0.9492	0.0515	0.1241	0.2365	-0.1016
230	2386CN41	0.9825	0.9486	0.0543	0.2273	0.1470	-0.0796
227	2383CN41	0.9776	0.9477	0.1313	0.1642	0.0834	-0.1681
224	2380CN42	0.9391	0.9473	0.0934	0.0983	0.1412	-0.0584
245	2435CN41	0.9416	0.9410	0.0471	0.0542	0.0881	0.2078
112	1582CN41	0.9673	0.9409	0.1019	0.1156	0.2414	0.0090
147	1739CN14	0.9914	0.9401	0.0615	0.1722	0.2701	-0.0357
118	1588CN41	0.9549	0.9386	0.1330	0.1278	0.1950	-0.0425
228	2384CN41	0.9315	0.9321	0.0732	0.0961	0.1847	0.1185
180	2146CN13	0.9598	0.9317	0.1671	0.1696	0.0603	-0.1770
69	1526CN42	0.9295	0.9272	0.0766	0.0684	0.0186	0.2427
116	1586CN41	0.9144	0.9269	0.1557	0.1630	-0.0319	0.0594
239	2395CN41	0.9897	0.9141	0.0836	0.1139	0.3535	0.0963
226	2382CN41	0.9806	0.9073	0.2139	0.2231	0.2150	-0.1252
72	1529CN41	0.9538	0.9030	0.1119	0.0527	0.3491	0.0344
62	1519CN42	0.9363	0.8932	0.1473	0.1247	0.2062	0.2424
137	1727CN14	0.9715	0.8921	0.0646	0.3421	0.1750	-0.1545
159	1757CN41	0.9767	0.8912	0.0964	0.2601	0.3247	-0.0087
123	1594CN41	0.9806	0.8806	0.2212	0.1615	0.3453	-0.1045
75	1533CN41	0.9767	0.8790	0.0644	0.0350	0.4420	0.0589
114	1584CN41	0.8785	0.8772	0.1292	0.0852	0.2344	0.1735
84	1544CN41	0.9278	0.8736	0.1945	0.1599	0.1487	0.2812
124	1595CN41	0.9702	0.8701	0.0788	0.1781	0.4147	0.0560
94	1558CN42	0.9586	0.8643	0.1136	0.0897	0.4367	-0.0059
81	1540CN41	0.9796	0.8622	0.0682	0.0805	0.4693	-0.0698
186	2306CN41	0.9431	0.8598	0.1454	0.3805	0.1939	-0.0195
158	1756CN41	0.9623	0.8558	0.0862	0.0657	0.4629	-0.0618
225	2381CN41	0.9656	0.8458	0.0909	0.1421	0.4689	-0.0436
135	1725CN14	0.9704	0.8452	0.0474	0.1122	0.4811	0.0989
235	2391CN41	0.9362	0.8423	0.0537	0.0533	0.4658	-0.0638
133	1723CN14	0.9335	0.8392	0.2492	0.2188	0.3315	0.0973
82	1541CN41	0.8536	0.8298	0.1315	0.0101	0.2781	0.2651
39	1470CN41	0.9857	0.8228	0.0675	0.2214	0.5037	0.0369
117	1587CN41	0.7570	0.8222	0.0928	0.0725	0.1370	0.2197
89	1553CN42	0.8971	0.8186	0.0468	0.0730	0.0707	0.4631
70	1527CN42	0.8655	0.8091	0.0234	0.0217	0.0211	0.4576
80	1539CN41	0.9770	0.8088	0.5647	0.0603	-0.0153	0.0120
17	1427CN42	0.9509	0.7936	0.0409	0.0497	0.5608	0.0499
157	1755CN41	0.9565	0.7916	0.0869	0.5397	0.1649	-0.0616
185	2305CN41	0.9184	0.7852	0.1450	0.4343	0.3027	-0.0224

REORDERED VARIMAX MATRIX -CONT

		COMM.	1	2	3	4	5
76	1534CN41	0.9632	0.7676	0.1155	0.0088	0.5042	0.3262
237	2393CN41	0.9593	0.7659	0.2248	0.4825	0.2829	0.0969
86	1547CN41	0.6422	0.7434	0.0162	0.0355	0.1692	0.2436
79	1537CN41	0.6388	0.7399	0.0172	0.0570	0.1205	0.2706
233	2389CN41	0.9196	0.7399	0.2772	0.2188	0.4601	0.1893
160	1758CN41	0.9661	0.7364	0.2137	0.3546	0.3964	0.3085
87	1550CN41	0.6615	0.7320	0.0736	0.0200	0.2735	0.2123
77	1535CN41	0.7499	0.7268	0.2445	0.0191	0.0868	0.3923
88	1551CN41	0.8432	0.7203	0.0723	0.1079	0.0879	0.5475
146	1738CN14	0.9837	0.7125	0.3487	0.4583	0.3783	-0.0365
90	1554CN42	0.8166	0.7123	0.0031	0.0061	0.0429	0.5543
71	1528CN42	0.8322	0.7122	0.0574	0.0015	0.0587	0.5641
145	1737CN14	0.9914	0.7074	0.0883	0.2647	0.6426	0.0157
259	2833CN41	0.9299	0.7014	0.0994	0.2401	0.6077	-0.0338
6	1414CN42	0.8395	0.6958	0.3882	0.2152	0.2471	0.3121
7	1415CN42	0.9405	0.6904	0.3774	0.2294	0.4266	0.2945
134	1724CN14	0.9811	0.6753	0.0926	0.3479	0.6278	-0.0371
109	1575CN42	0.9673	0.6423	0.1928	0.6240	0.3493	-0.0792
74	1532CN41	0.9505	0.6415	0.4570	0.0675	0.5583	0.1176
182	2301CN41	0.8569	0.5787	0.2715	0.3574	0.3653	0.4326
175	2141CN13	0.9147	0.5510	0.5458	0.2874	0.4801	0.0082
48	1482CN41	0.7310	0.5213	0.0357	0.3296	0.4945	0.3238
234	2390CN41	0.8784	0.5004	0.3997	0.0754	0.4734	0.4884
28	1444CN13	0.9944	0.0241	0.9946	0.0049	0.0669	-0.0079
108	1573CN42	0.9889	0.0492	0.9910	0.0259	0.0599	0.0023
153	1745CN41	0.9941	0.0744	0.9906	0.0648	0.0522	-0.0179
64	1521CN42	0.9928	0.0396	0.9865	0.0310	0.0618	0.1151
100	1565CN42	0.9921	0.0764	0.9865	0.0518	0.0888	0.0506
211	2349CN41	0.9883	0.0877	0.9855	0.0464	0.0083	0.0847
155	1747CN41	0.9863	0.0415	0.9847	0.1134	0.0449	-0.0044
105	1570CN42	0.9894	0.0858	0.9841	0.0252	0.1136	-0.0095
215	2353CN41	0.9817	0.0833	0.9828	-0.0100	0.0082	0.0936
21	1431CN42	0.9954	0.0949	0.9822	0.1249	0.0768	-0.0126
152	1744CN41	0.9905	0.0467	0.9821	0.0516	0.1452	0.0028
61	1518CN42	0.9874	0.0288	0.9813	0.0416	0.1478	-0.0001
119	1590CN41	0.9939	0.0800	0.9798	0.0899	0.1392	0.0078
198	2329CN41	0.9618	0.0318	0.9776	0.0490	0.0465	0.0231
246	2436CN41	0.9806	0.1209	0.9748	0.1123	0.0527	-0.0215
191	2314CN41	0.9817	0.1410	0.9743	0.0627	0.0768	0.0517
163	1762CN14	0.9928	0.1535	0.9736	0.1289	0.0435	-0.0527
154	1746CN41	0.9961	0.0643	0.9722	0.1330	0.1705	-0.0048
12	1420CN42	0.9874	0.0331	0.9711	0.0472	0.2026	0.0052
67	1524CN41	0.9804	0.0531	0.9710	0.0267	0.0636	0.1735
60	1517CN42	0.9932	0.1534	0.9689	0.0398	0.0904	0.1455
115	1585CN41	0.9787	0.0940	0.9670	0.0445	0.1787	0.0294
20	1430CN42	0.9754	0.0841	0.9653	0.0492	0.1840	-0.0131
194	2317CN41	0.9970	0.0679	0.9599	0.1370	0.2266	0.0303
188	2309CN41	0.9837	0.1635	0.9599	0.0019	0.1662	0.0895
162	1761CN14	0.9959	0.1477	0.9532	0.2475	0.0544	-0.0373
107	1572CN42	0.9896	0.1515	0.9527	0.1158	0.2131	-0.0128

Appendix 5.--Factor loadings by sample site for the nonmagnetic fraction--continued.

REORDERED VARIMAX MATRIX -CONT

		COMM.	1	2	3	4	5
209	2347CN42	0.9818	0.1080	0.9490	0.2331	0.1204	0.0280
58	1515CN42	0.9630	0.0399	0.9486	0.0539	0.1631	0.1791
164	1764CN14	0.9010	0.0264	0.9479	0.0140	0.0405	0.0017
174	1875CN42	0.8982	0.0110	0.9471	0.0216	0.0205	0.0115
251	2441CN41	0.9068	0.0331	0.9414	0.0493	0.1309	0.0029
97	1562CN42	0.9913	0.1363	0.9402	0.0547	0.2822	0.0788
212	2350CN41	0.9530	0.1946	0.9343	0.0689	0.0850	0.1737
202	2334CN41	0.9047	0.0211	0.9341	0.1736	-0.0056	0.0382
129	1680CN14	0.9684	0.0765	0.9309	0.1534	0.2679	-0.0258
216	2354CN41	0.9809	0.1857	0.9307	0.1587	0.1932	0.1331
128	1678CN14	0.9745	0.1428	0.9263	0.2983	0.0743	-0.0401
222	2378CN42	0.9887	0.3681	0.9126	0.0962	0.0962	-0.0421
13	1422CN42	0.9842	0.1425	0.8958	0.0724	0.3912	0.0554
63	1520CN42	0.9703	0.0726	0.8914	0.1276	0.3833	0.0854
96	1561CN42	0.9656	0.1512	0.8886	0.0494	0.3859	0.0404
55	1512CN42	0.9679	0.1447	0.8833	0.1742	0.3672	0.0382
9	1417CN42	0.9749	0.0828	0.8827	0.3268	0.2838	0.0389
221	2377CN42	0.9854	0.3227	0.8681	0.1187	0.3344	-0.0409
10	1418CN42	0.9846	0.0887	0.8557	0.3635	0.3343	0.0249
231	2387CN41	0.9891	0.1540	0.8494	0.1780	0.4604	0.0159
126	1598CN41	0.9548	0.1646	0.8344	0.3440	0.2119	0.2613
14	1424CN42	0.9898	0.1419	0.8318	0.3083	0.4115	0.1155
218	2356CN41	0.9336	0.0652	0.8212	0.2604	0.4327	0.0030
104	1569CN42	0.9524	0.1176	0.8044	0.1590	0.5144	-0.0396
165	1765CN14	0.6332	-0.0265	0.7941	0.0272	0.0136	0.0322
195	2318CN41	0.9351	0.1025	0.7648	0.3283	0.4806	0.0299
250	2440CN41	0.9973	0.2187	0.7568	0.5777	0.2072	0.0075
199	2330CN41	0.6867	0.0465	0.7380	-0.0011	-0.0033	0.3740
258	2832CN41	0.9515	0.3934	0.7266	0.1470	0.3807	0.3197
255	2446CN14	0.9240	0.5780	0.7190	0.1974	0.0612	-0.1738
66	1523CN41	0.9631	0.1360	0.6949	0.2289	0.6047	0.2090
214	2352CN41	0.9924	0.2294	0.6848	0.6534	0.2022	0.0554
190	2313CN41	0.9666	0.3938	0.6825	0.3340	0.4818	0.0429
106	1571CN42	0.9691	0.4043	0.6822	0.3274	0.4794	-0.0558
236	2392CN41	0.6464	0.4237	0.6211	0.2194	0.1771	0.0395
189	2311CN41	0.6112	0.1014	0.6010	0.1358	0.2539	0.3960
200	2332CN41	0.6975	0.2853	0.5755	0.3727	0.3738	0.0791
65	1522CN42	0.7517	0.3211	0.5220	0.2513	0.2078	0.5194
43	1476CN41	0.9787	0.0343	0.0462	0.9831	0.0792	0.0517
40	1471CN41	0.9775	0.0422	0.0455	0.9786	0.1130	0.0573
205	2339CN41	0.9647	0.0344	0.0902	0.9684	0.0993	0.0873
2	1409CN42	0.9630	0.0919	0.0399	0.9681	0.0963	0.0806
254	2445CN41	0.9649	0.0557	0.0839	0.9634	0.1599	0.0328
22	1433CN42	0.9668	0.0284	0.1005	0.9578	0.1804	0.0771
136	1726CN14	0.9796	0.2266	0.0808	0.9571	0.0756	-0.0078
242	2398CN42	0.9857	0.1368	0.1768	0.9529	0.1606	0.0438
38	1469CN41	0.9950	0.1797	0.0643	0.9493	0.2360	0.0392
156	1749CN41	0.9848	0.0784	0.1238	0.9305	0.3094	0.0425
253	2443CN41	0.9847	0.0779	0.1475	0.9281	0.3057	0.0449
243	2424CN14	0.9897	0.1232	0.1377	0.9148	0.3375	0.0689

REORDERED VARIMAX MATRIX -CONT

		COMM.	1	2	3	4	5
49	1505CN42	0.9593	0.1627	0.0502	0.9139	0.2976	0.0805
47	1480CN41	0.9683	0.2644	0.0616	0.9096	0.2586	0.0199
168	1869CN13	0.9889	0.1979	0.0842	0.9082	0.3387	0.0550
141	1732CN14	0.9913	0.1169	0.2420	0.8989	0.3210	0.0899
1	1408CN42	0.8934	0.0643	0.1806	0.8798	0.2827	0.0517
204	2337CN41	0.9564	0.0298	0.2602	0.8761	0.3452	0.0345
5	1412CN42	0.9586	0.1106	0.0755	0.8740	0.4044	0.1154
110	1576CN41	0.9820	0.1815	0.0819	0.8730	0.4241	0.0218
176	2142CN13	0.9283	0.1801	0.0545	0.8727	0.3456	0.1089
177	2143CN14	0.9235	0.2771	0.0977	0.8686	0.2859	-0.0317
240	2396CN42	0.8730	0.1767	0.0593	0.8560	0.3095	0.0982
167	1868CN13	0.9716	0.1639	0.1599	0.8532	0.4372	0.0096
122	1593CN42	0.9093	0.2023	0.0767	0.8440	0.3874	0.0132
166	1867CN13	0.9517	0.0956	0.2015	0.8269	0.4652	0.0410
187	2307CN41	0.9700	0.4801	0.1408	0.8254	0.1890	0.0518
161	1760CN41	0.8748	0.1288	0.1263	0.8136	0.3869	0.1750
130	1682CN14	0.9389	0.0502	0.5166	0.8099	0.1092	0.0399
256	2469CN41	0.8348	0.0456	0.1887	0.7903	0.4042	0.0951
138	1728CN14	0.9810	0.5484	0.1352	0.7876	0.1935	-0.0657
206	2340CN41	0.9019	0.1540	0.1094	0.7849	0.4983	0.0431
193	2316CN41	0.9627	0.1203	0.4740	0.7827	0.3282	0.0573
238	2394CN41	0.9834	0.5206	0.2927	0.7740	0.1397	-0.0895
151	1743CN14	0.9463	0.2678	0.2231	0.7704	0.4719	0.0927
3	1410CN42	0.9572	0.2045	0.3156	0.7683	0.4707	0.0626
120	1591CN41	0.9455	0.3708	0.2529	0.7602	0.4016	0.0698
45	1478CN41	0.9475	0.2419	0.0915	0.7483	0.5576	0.0988
53	1510CN42	0.9218	0.1456	0.1239	0.7352	0.5795	0.0946
249	2439CN41	0.9816	0.1487	0.6249	0.7302	0.1885	-0.0140
42	1474CN41	0.9609	0.2556	0.1017	0.7108	0.6148	0.0452
143	1734CN14	0.9648	0.3101	0.3146	0.6752	0.5514	0.0986
41	1473CN41	0.9572	0.3385	0.2162	0.6708	0.5795	0.0999
142	1733CN14	0.9709	0.3559	0.5104	0.6455	0.4085	-0.0167
241	2397CN42	0.8505	0.2805	0.1067	0.6344	0.5844	0.1283
213	2351CN41	0.9455	0.3211	0.4648	0.6230	0.4243	0.2413
150	1742CN14	0.9539	0.5386	0.2870	0.6089	0.4589	0.0009
247	2437CN41	0.7992	0.0575	0.2572	0.6037	0.6001	0.0718
178	2144CN14	0.7314	0.2954	0.5049	0.5514	0.2918	-0.0052
29	1445CN13	0.9663	0.1535	0.1238	0.1557	0.9503	-0.0111
260	2834CN41	0.9754	0.2327	0.0824	0.1451	0.9446	0.0352
26	1439CN13	0.9713	0.1410	0.0888	0.2340	0.9427	0.0044
171	1872CN13	0.9692	0.1380	0.1109	0.2289	0.9407	0.0237
31	1447CN13	0.9728	0.0783	0.1420	0.2577	0.9379	-0.0206
127	1677CN14	0.9713	0.1152	0.0988	0.2647	0.9371	-0.0072
169	1870CN13	0.9396	0.2542	0.0791	0.0870	0.9276	0.0281
19	1429CN42	0.9758	0.1189	0.1097	0.3081	0.9245	0.0063
33	1450CN41	0.9769	0.1162	0.1214	0.3167	0.9210	-0.0097
27	1441CN13	0.9979	0.1778	0.3050	0.1689	0.9176	0.0529
25	1437CN13	0.9626	0.1892	0.1299	0.2611	0.9150	0.0675
181	2150CN13	0.9951	0.3304	0.0902	0.2234	0.9095	-0.0276
30	1446CN13	0.9192	0.2401	0.0779	0.2027	0.9024	0.0005

Appendix 5.--Factor loadings by sample site for the nonmagnetic fraction--continued.

REORDERED VARIMAX MATRIX -CONT

		COMM.	1	2	3	4	5
173	1874CN13	0.9796	0.2970	0.2258	0.1714	0.9004	0.0146
172	1873CN13	0.9618	0.2445	0.2106	0.2551	0.8901	-0.0187
148	1740CN14	0.9370	0.3599	0.0621	0.0969	0.8830	0.1208
35	1452CN41	0.9981	0.3135	0.1472	0.3332	0.8758	-0.0030
24	1436CN13	0.9674	0.2785	0.1853	0.3027	0.8739	0.0077
54	1511CN42	0.9862	0.1153	0.1668	0.4408	0.8664	0.0062
203	2336CN41	0.9539	0.2157	0.1187	0.3680	0.8644	0.1037
219	2375CN42	0.9290	0.3343	0.1677	0.2095	0.8618	0.0503
263	2839CN41	0.9462	0.2016	0.2250	0.2520	0.8594	0.2299
18	1428CN42	0.9781	0.3139	0.2983	0.2343	0.8557	0.0587
34	1451CN41	0.9776	0.2496	0.1439	0.4278	0.8434	0.0108
50	1506CN42	0.8857	0.0806	0.2460	0.3266	0.8426	0.0456
23	1435CN13	0.9160	0.1106	0.1971	0.4002	0.8395	0.0070
252	2442CN41	0.9924	0.3045	0.2273	0.3782	0.8390	-0.0318
207	2345CN42	0.9455	0.3883	0.0981	0.3058	0.8265	0.0925
113	1583CN41	0.9518	0.2842	0.3614	0.2413	0.8233	0.0668
32	1449CN41	0.9183	0.4501	0.0875	0.1854	0.8057	0.1565
111	1580CN41	0.7997	0.1098	0.1696	0.3281	0.8044	-0.0636
196	2319CN41	0.9606	0.3447	0.2960	0.2788	0.7968	0.2037
149	1741CN14	0.9131	0.4345	0.2258	0.1864	0.7902	0.1192
132	1684CN41	0.8360	0.2125	0.2315	0.3778	0.7710	0.0033
98	1563CN42	0.9102	0.3044	0.2132	0.4248	0.7676	0.0488
37	1468CN41	0.9184	0.2615	0.1677	0.4838	0.7595	0.1054
103	1568CN42	0.9525	0.3571	0.4315	0.2590	0.7529	0.0700
4	1411CN42	0.9360	0.2913	0.3770	0.3390	0.7527	0.1660
201	2333CN41	0.9337	0.2458	0.3070	0.4603	0.7520	-0.0400
217	2355CN41	0.9239	0.1876	0.3856	0.4218	0.7493	0.0255
197	2327CN41	0.9881	0.2053	0.4512	0.4303	0.7464	-0.0012
56	1513CN42	0.9209	0.2328	0.5369	0.0592	0.7459	0.1363
131	1683CN14	0.8204	0.1608	0.3399	0.3786	0.7318	0.0126
46	1479CN41	0.9374	0.2917	0.1440	0.5427	0.7274	0.0895
44	1477CN41	0.7924	0.4384	0.0404	0.2146	0.7262	0.1584
8	1416CN42	0.9581	0.3799	0.3566	0.2656	0.7250	0.3008
257	2831CN41	0.6896	0.0804	0.1229	0.2137	0.7237	0.3141
140	1731CN14	0.6252	0.1241	0.3097	0.4352	0.7236	0.0303
179	2145CN14	0.8929	0.4116	0.1753	0.3861	0.7159	0.1767
121	1592CN42	0.7051	0.3709	0.0187	0.1343	0.7157	0.1919
220	2376CN42	0.9265	0.4613	0.2009	0.3981	0.7108	0.0984
192	2315CN41	0.8971	0.3917	0.5006	0.0321	0.6980	0.0690
57	1514CN42	0.9465	0.4877	0.2560	0.2516	0.6954	0.3102
36	1453CN41	0.9646	0.2343	0.2205	0.6160	0.6939	0.0151
170	1871CN13	0.9337	0.3591	0.3517	0.4618	0.6834	0.0267
59	1516CN42	0.9592	0.4409	0.4344	0.2286	0.6797	0.2486
144	1735CN14	0.9860	0.6572	0.1492	0.2683	0.6781	-0.0077
210	2348CN41	0.9774	0.4465	0.3498	0.3765	0.6729	0.2472
248	2438CN41	0.9934	0.2672	0.3209	0.6235	0.6556	-0.0232
51	1508CN42	0.9569	0.0310	0.5312	0.4998	0.6510	0.0073
101	1566CN42	0.9778	0.4113	0.3949	0.4966	0.6372	0.0076
52	1509CN42	0.9413	0.5125	0.0926	0.1241	0.6344	0.5022
208	2346CN42	0.9597	0.4568	0.1303	0.5778	0.6256	0.0934

REORDERED VARIMAX MATRIX -CONT

		COMM.	1	2	3	4	5
139	1730CN14	0.9688	0.5168	0.1045	0.5481	0.6211	0.0681
102	1567CN42	0.9353	0.2964	0.3397	0.6003	0.6081	0.0444
99	1564CN42	0.9667	0.4283	0.5141	0.3928	0.5851	0.1497
183	2302CN41	0.8335	0.4301	0.2527	0.3573	0.5338	0.4147
125	1596CN41	0.4554	-0.1120	0.1174	0.4269	0.4957	0.0330
261	2837CN41	0.9199	0.4507	0.4528	0.2501	0.4841	0.4635
244	2434CN41	0.9406	0.6315	0.0587	0.0322	0.2256	0.6974
15	1425CN42	0.9676	0.5616	0.0547	-0.0157	0.4071	0.6952
68	1525CN42	0.8160	0.3220	0.2754	0.1431	0.3652	0.6947
78	1536CN41	0.8706	0.5986	0.0906	0.1512	0.0742	0.6897
232	2388CN41	0.6365	0.2410	0.2584	0.1103	0.1895	0.6809
184	2303CN41	0.8692	0.5266	0.3146	0.3456	0.1739	0.5859
262	2838CN41	0.5017	0.0781	0.2258	0.1609	0.4005	0.5083

Appendix 2.--Nonmagnetic stream sediment concentrate data--continued

Sample	Sn 15ppm	Sr200ppm	V 20ppm	W 70ppm	Y 20ppm	Zn300ppm	Zr 20ppm	Th150ppm
1479CN41	100	700	100	N	500	N	>2,000	300
1480CN41	30	200	500	N	500	N	>2,000	N
1482CN41	300	<200	200	N	3,000	1,000	>2,000	700
1505CN42	300	<200	150	N	500	N	>2,000	200
1506CN42	100	1,000	70	N	300	N	>2,000	150
1508CN42	50	1,000	70	N	200	N	>2,000	150
1509CN42	100	<200	100	N	1,000	500	>2,000	1,500
1510CN42	70	1,000	200	N	200	N	>2,000	150
1511CN42	N	1,000	200	N	300	N	>2,000	N
1512CN42	1,000	1,000	200	N	100	N	>2,000	200
1513CN42	200	300	150	70	200	N	>2,000	150
1514CN42	70	300	200	N	200	N	>2,000	200
1515CN42	200	2,000	300	70	200	N	>2,000	N
1516CN42	500	700	300	N	300	N	>2,000	300
1517CN42	300	1,500	300	70	300	N	>2,000	150
1518CN42	N	1,000	100	N	200	700	>2,000	N
1519CN42	N	300	150	N	1,000	N	>2,000	1,500
1520CN42	100	1,000	300	700	200	N	>2,000	150
1521CN42	500	1,500	300	100	200	N	>2,000	150
1522CN42	N	300	500	70	100	N	>2,000	N
1523CN41	N	1,500	300	70	200	N	2,000	N
1524CN41	>2,000	1,000	500	100	200	N	>2,000	150
1525CN42	N	500	300	N	300	N	>2,000	150
1526CN42	200	200	100	N	1,500	1,000	>2,000	1,500
1527CN42	500	N	70	N	>5,000	700	>2,000	5,000
1528CN42	>2,000	N	70	N	>5,000	700	>2,000	5,000
1529CN41	N	N	50	N	3,000	700	>2,000	5,000
1531CN42	>2,000	500	70	N	2,000	700	>2,000	1,500
1532CN41	N	<200	70	N	300	N	>2,000	3,000
1533CN41	15	<200	50	N	1,000	500	>2,000	5,000
1534CN41	200	N	70	N	1,500	700	>2,000	2,000
1535CN41	200	200	100	N	>5,000	700	>2,000	3,000
1536CN41	150	<200	50	N	1,500	1,500	>2,000	2,000
1537CN41	20	N	70	N	>5,000	N	>2,000	3,000
1539CN41	70	200	50	N	1,000	500	>2,000	2,000
1540CN41	500	200	70	N	700	500	>2,000	1,500
1541CN41	300	N	50	N	>5,000	700	>2,000	3,000
1543CN41	100	<200	70	N	700	700	>2,000	1,500
1544CN41	200	200	100	N	700	N	>2,000	1,500
1545CN41	N	200	50	N	700	500	>2,000	1,500
1547CN41	500	N	70	N	>5,000	700	>2,000	5,000
1550CN41	N	N	50	N	>5,000	700	>2,000	>5,000
1551CN41	500	N	100	N	1,000	N	>2,000	1,000
1553CN42	300	200	50	N	3,000	1,000	>2,000	2,000
1554CN42	1,000	N	50	N	>5,000	500	>2,000	5,000

Sample	Latitude	Longitude	Fe .1%	Mg .05%	Ca .1%	Ti .005%	Mn 20ppm	B 20ppm	Ba 50ppm	Be 2ppm
1555CN42	38 25 24	112 30 23	3.0	.70	1.00	1.000	5,000	100	300	15
1556CN42	38 25 11	112 30 31	7.0	.30	.70	2.000	>10,000	100	700	20
1557CN42	38 25 42	112 30 55	15.0	.70	1.00	>2.000	10,000	50	300	30
1558CN42	38 27 10	112 30 35	3.0	.30	1.00	2.000	7,000	50	700	15
1559CN42	38 26 55	112 30 42	5.0	.70	1.50	2.000	10,000	100	200	15
1561CN42	38 26 34	112 31 22	5.0	.70	5.00	2.000	2,000	50	>10,000	7
1562CN42	38 25 38	112 32 34	5.0	.20	3.00	>2.000	1,000	50	7,000	7
1563CN42	38 26 0	112 33 26	2.0	1.50	3.00	>2.000	1,000	300	500	<2
1564CN42	38 25 11	112 34 52	5.0	.50	1.50	>2.000	1,000	150	1,000	3
1565CN42	38 24 42	112 34 51	7.0	.20	2.00	>2.000	1,000	50	10,000	3
1566CN42	38 27 4	112 34 42	2.0	1.00	5.00	>2.000	2,000	100	1,500	2
1567CN42	38 27 7	112 34 18	1.5	1.00	3.00	1.500	1,000	30	700	<2
1568CN42	38 26 54	112 34 1	3.0	.50	5.00	>2.000	1,500	100	1,500	2
1569CN42	38 26 59	112 33 35	2.0	.30	10.00	>2.000	1,500	50	7,000	<2
1570CN42	38 27 7	112 33 9	7.0	.50	3.00	>2.000	1,500	30	>10,000	2
1571CN42	38 27 27	112 32 22	10.0	1.50	3.00	>2.000	2,000	20	3,000	<2
1572CN42	38 27 24	112 32 21	20.0	.50	2.00	2.000	1,000	20	5,000	2
1573CN42	38 27 23	112 32 36	5.0	.50	3.00	>2.000	1,000	20	>10,000	<2
1575CN42	38 27 49	112 34 43	3.0	2.00	5.00	>2.000	5,000	30	1,000	2
1576CN41	38 21 23	112 22 53	3.0	5.00	7.00	1.000	2,000	<20	200	N
1580CN41	38 23 26	112 23 2	5.0	.70	30.00	2.000	3,000	<20	1,500	N
1582CN41	38 25 28	112 23 56	5.0	.30	2.00	>2.000	10,000	50	700	20
1583CN41	38 25 6	112 23 14	7.0	.30	7.00	>2.000	1,500	30	1,500	7
1584CN41	38 24 54	112 23 22	7.0	.15	1.50	>2.000	7,000	20	700	15
1585CN41	38 24 52	112 23 20	50.0	.50	3.00	1.000	1,000	70	10,000	7
1586CN41	38 25 41	112 23 20	.7	.30	.50	.300	2,000	20	300	7
1587CN41	38 25 38	112 23 38	15.0	.50	1.50	>2.000	>10,000	20	700	30
1588CN41	38 25 53	112 22 56	2.0	.30	3.00	>2.000	10,000	30	1,000	15
1590CN41	38 26 2	112 22 25	15.0	1.00	5.00	>2.000	1,500	20	>10,000	5
1591CN41	38 25 46	112 22 42	7.0	3.00	3.00	1.500	2,000	30	1,000	5
1592CN42	38 16 52	112 34 4	1.0	1.00	7.00	>2.000	3,000	20	100	N
1593CN42	38 16 22	112 33 27	5.0	10.00	10.00	1.500	3,000	70	300	<2
1594CN41	38 27 31	112 15 45	3.0	.70	2.00	>2.000	7,000	150	1,500	7
1595CN41	38 27 30	112 17 17	5.0	.50	5.00	>2.000	7,000	30	300	20
1596CN41	38 27 31	112 21 8	20.0	.20	7.00	.200	200	<20	200	<2
1598CN41	38 29 15	112 19 54	3.0	.50	2.00	>2.000	700	100	3,000	7
1677CN14	38 30 20	112 14 3	.7	.30	7.00	>2.000	700	70	150	N
1678CN14	38 32 13	112 14 34	10.0	5.00	7.00	2.000	3,000	30	>10,000	<2
1680CN14	38 34 10	112 13 34	2.0	1.50	10.00	.300	2,000	<20	>10,000	N
1682CN14	38 34 48	112 14 52	5.0	15.00	10.00	.300	2,000	N	10,000	N
1683CN14	38 34 47	112 14 55	3.0	5.00	7.00	1.000	2,000	30	5,000	N
1684CN41	38 34 44	112 14 56	1.5	3.00	5.00	1.000	2,000	50	2,000	<2
1723CN14	38 32 37	112 28 19	5.0	1.00	2.00	>2.000	5,000	100	1,500	7
1724CN14	38 32 48	112 26 54	2.0	2.00	5.00	>2.000	5,000	300	300	5
1725CN14	38 32 19	112 26 [illegible]	2.0	.50	3.00	>2.000	7,000	200	200	15