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Quartz-Pyrite-Molybdenite Stockwork Near South Fork Peak, Taos County, New Mexico

By

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This report is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards.

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Introduction

During the course of field investigations of the additions to the Wheeler Peak Wilderness, N. Mex. (PL 96-550), in the summer of 1981, an area of exposed quartz-pyrite-molybdenite stockwork was discovered by the author. The area, so far known to cover about 0.3 mi^2 (1 km^2), is located on the south wall of the canyon of the South Fork of the Rio Hondo, about 10 mi (6 km) northeast of Taos, New Mexico, and a like distance south-southeast of the Questa molybdenite mine (fig. 1).

Geology and mineralization

The stockwork occurs along and above the upper contact of a Tertiary granite pluton (J. C. Reed, J. Robertson, and P. W. Lipman, unpub. mapping, 1980). The country rock is primarily a layered to massive amphibole gneiss. The area is cut by many dikes and small masses of rhyolite porphyry. Detailed geology is shown on figure 2.

The stockwork veins range from <1 mm to 10 cm in width and show no apparent preferred orientation. The veins and veinlets are spaced as close as 100/meter in the most intense stockwork. On the fringes of the stockwork, as mapped on figure 3, the density falls to approximately 5/meter. An outer halo of hornfelsed gneiss that is more widespread than the stockwork also is shown on figure 3.

All veins contain quartz and pyrite or iron-oxide weathering products formed from pyrite. Molybdenite was observed at localities 93 and 98 (fig. 4). Leaching and weathering at the surface are intense, and it is inferred that molybdenite is more widely distributed in unweathered rock. Samples collected are presented in table 1.

Analyses of 17 samples from the stockwork area show a consistent suite of anomalous metals (table 1). The rhyolite porphyry samples are altered to

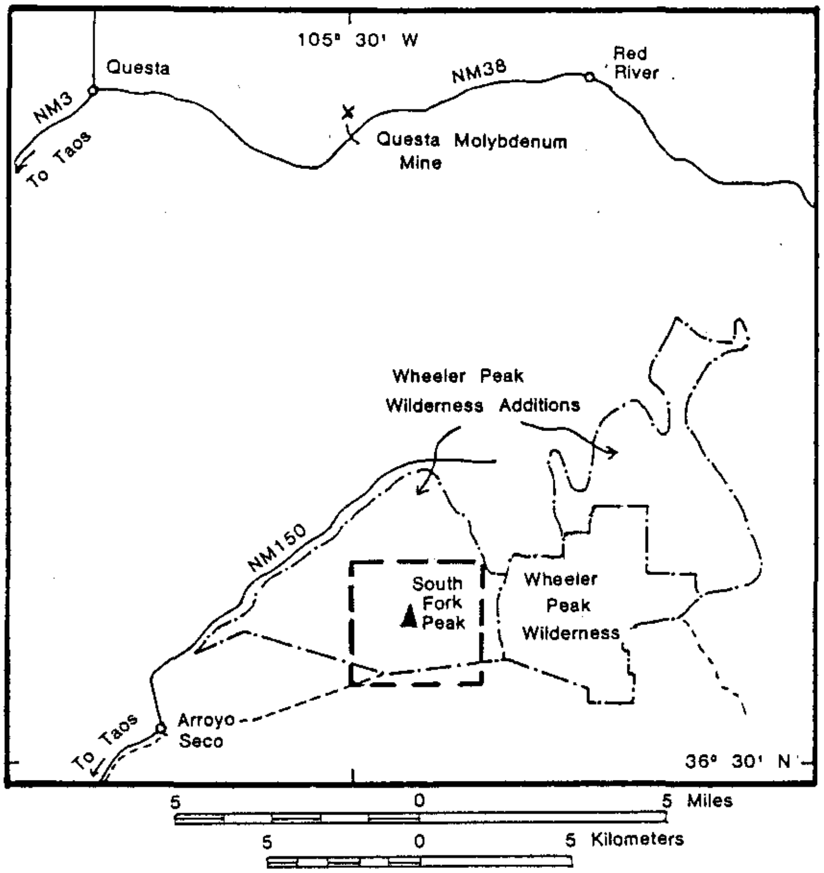

Figure 1.--Index showing location of report area (heavy dashed line) in northern New Mexico.

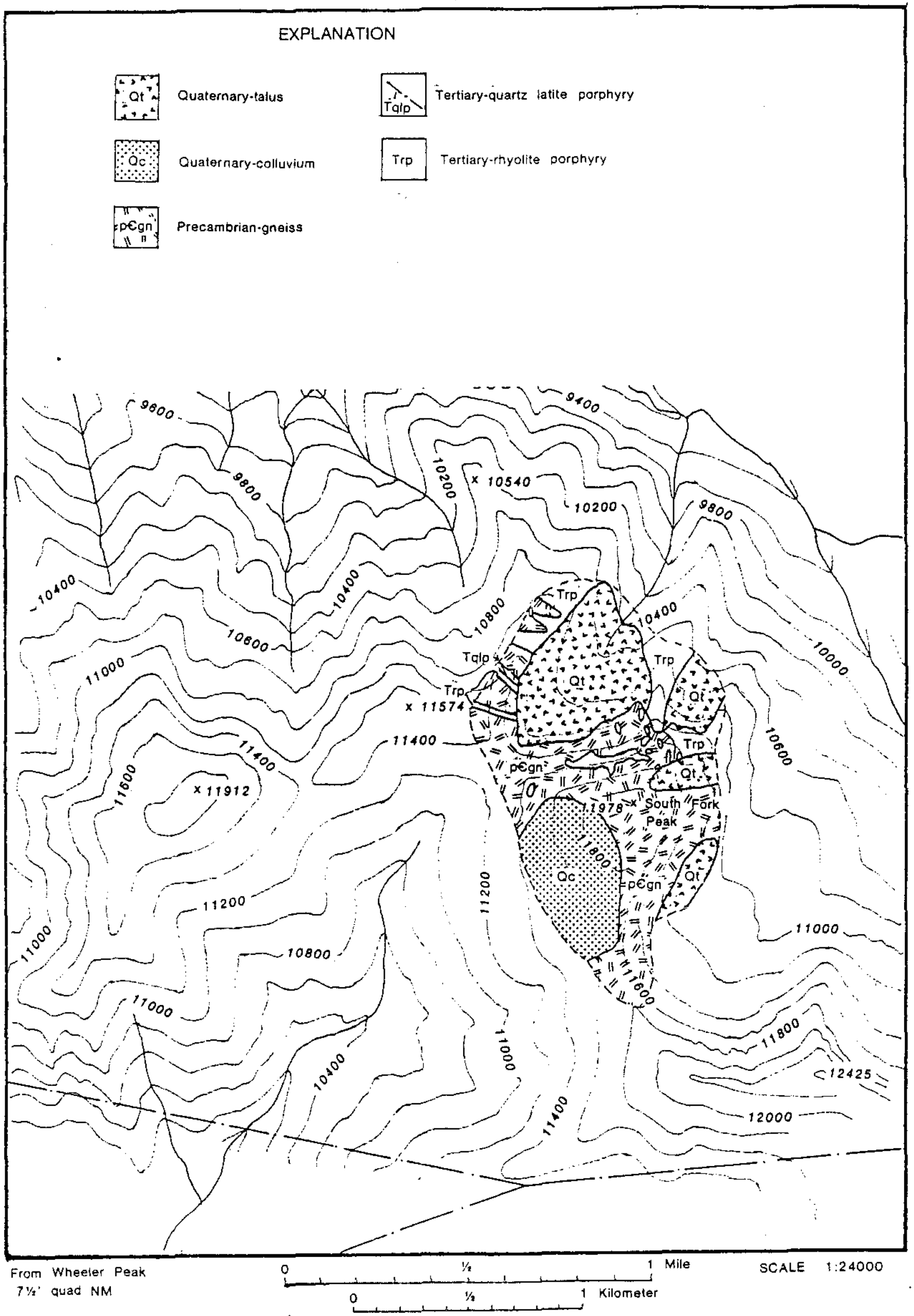

Figure 2.--Geologic map of the South Fork Peak area. The Tertiary rhyolite porphyry consists of quartz, alkali feldspar, and biotite phenocrysts set in an aphanitic groundmass of quartz and feldspar; the groundmass generally becomes coarser grained with decreasing elevation. The Precambrian rocks are layered amphibole gneiss.

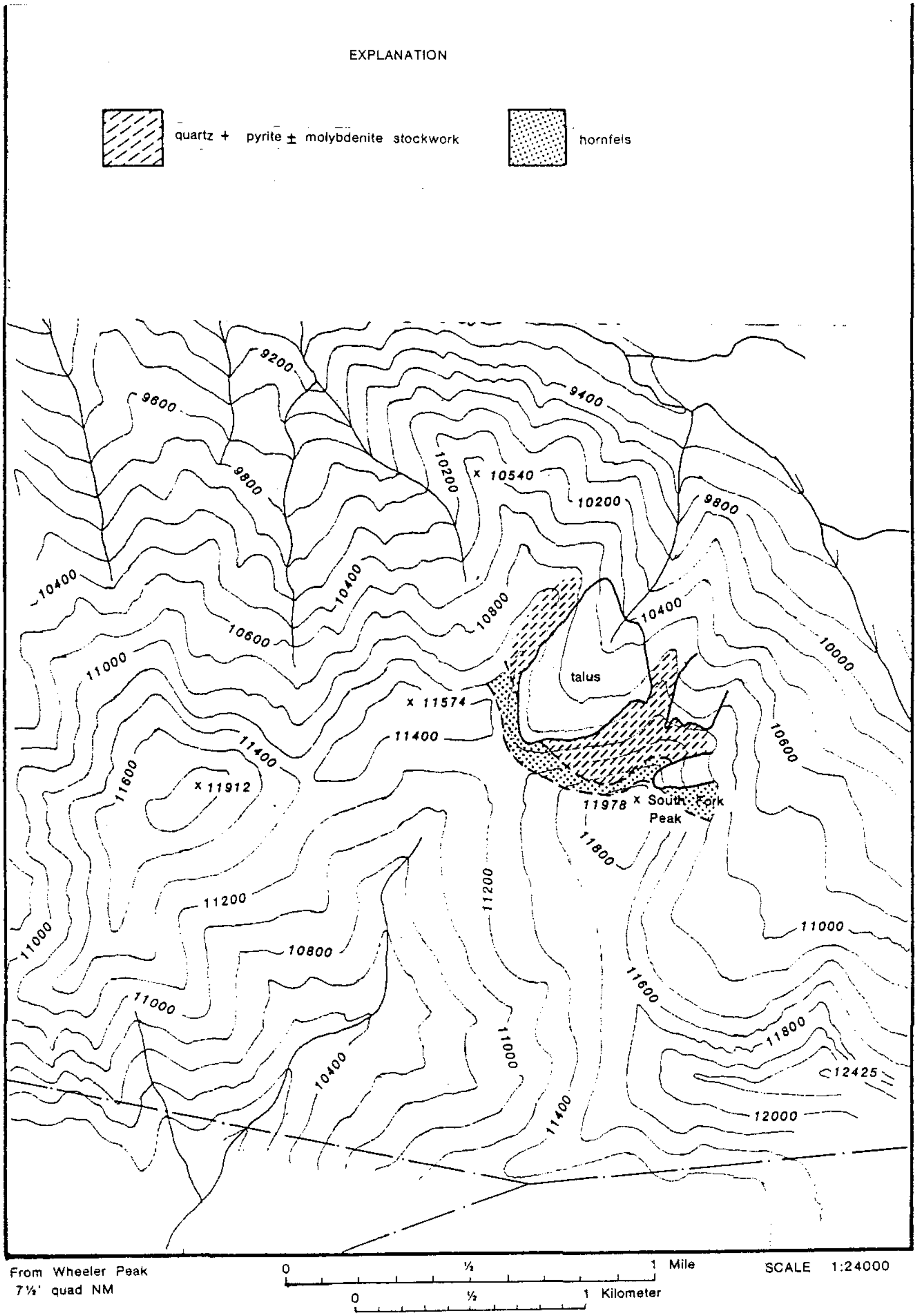

Figure 3.--Map showing distribution of quartz + pyrite ± molybdenite stockwork and hornfels.

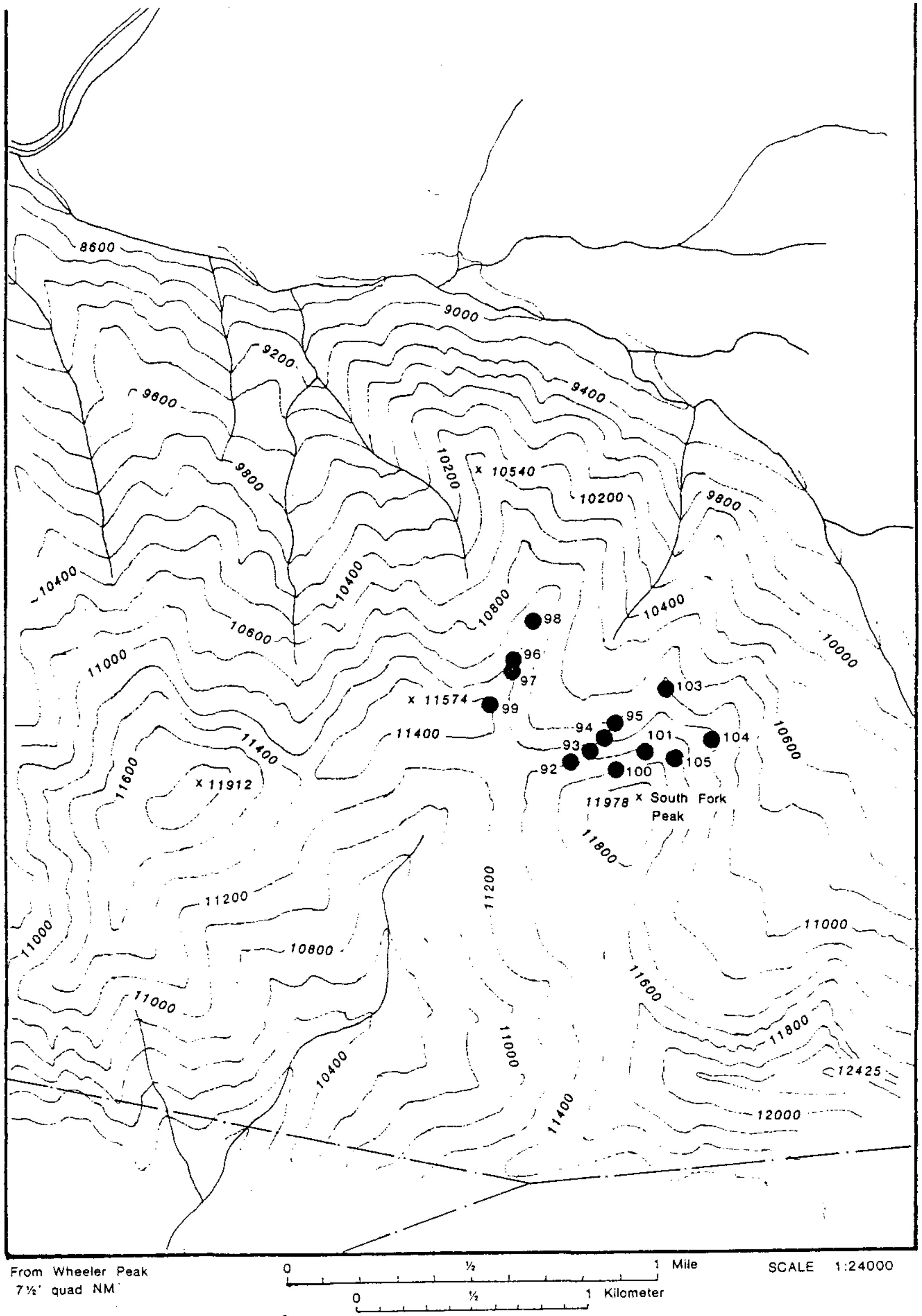

Figure 4.--Map showing location of sample sites.

Table 1.--Analyses of mineralized rock samples from South Fork Peak area, New Mexico

[Semiquantitative spectrographic analyses, not in parentheses, by S. J. Sutley. Semiquantitative energy-dispersive X-ray fluorescence analyses, in parentheses, by S. D. Ludington. Elements not detected by spectrographic analyses are as follows, with their lower limits of detection in parts per million (ppm) shown in parentheses: As (200), Au (10), Cd (20), Sb (100). Other elements detected by spectrographic analyses not reported below are as follows, with their lower limits of detection in ppm or percent shown in parentheses: Mg (0.02%), Ca (0.05%), Ti (0.002%), La (20 ppm), Sc (5 ppm). Symbols used: N = not detected at limit of detection; L = detected, but below limit of determination; < = less than amount shown; > = greater than amount shown; () above element symbol = limit of detection of element by spectrographic analysis. All elements are reported in parts per million except for Fe, which is reported in percent]

Rock unit	Sample No.	Rb	(100) Sr	(10) Y	(10) Zr	(20) Nb	(5) Mo	(10) Pb	(200) Zn	(5) Cu	(0.05) Fe%	(10) Mn	(0.5) Ag	(20) Ba	(1) Be	(10) Bi	(5) Co	(10) Cr	(5) Ni	(10) Sn	(10) V	(50) W	(100) Th
RHYOLITE PORPHYRY	93	(155)	N (35)	N (<3)	50 (55)	30 (45)	7 (15)	50 (30)	N (30)	30 (50)	0.7	200	L	50	2	N	L	50	10	N	10	N	N
	96		300	N	70	N	5	20	N	10	1.5	300	N	500	L	N	5	15	20	N	50	N	N
	97	(105)	100 (145)	L (<3)	50 (70)	L (15)	7 (10)	15 (20)	N (40)	20 (50)	1	300	L	300	3	N	5	20	10	N	15	N	N
	98	(210)	L (95)	N (<3)	50 (55)	L (25)	150 (185)	15 (20)	N (40)	15 (50)	1.5	200	N	300	70	70	N	20	10	N	15	N	N
	99	(65)	100 (120)	N (5)	70 (85)	L (20)	15 (20)	20 (30)	N (30)	15 (50)	1	500	L	200	2	N	5	30	20	N	10	N	N
	101	(70)	150 (165)	L (5)	50 (55)	20 (45)	30 (35)	30 (30)	N (30)	150 (120)	3	1000	5	100	15	30	10	50	20	N	30	L	N
	103	(205)	L (50)	L (5)	50 (50)	30 (40)	70 (55)	20 (20)	N (30)	30 (50)	1	300	1.5	200	2	L	N	70	10	N	15	N	N
	104	(260)	N (30)	10 (5)	70 (110)	L (20)	7 (20)	20 (20)	N (70)	15 (50)	1.5	700	N	300	2	N	7	50	15	N	30	N	N
	105	(130)	100 (70)	L (5)	100 (65)	L (25)	20 (25)	20 (20)	N (30)	100 (110)	1.5	500	.5	300	5	N	7	50	10	N	20	N	N
GNEISS	92	(50)	150 (190)	30 (25)	50 (90)	N (5)	20 (30)	15 (20)	N (150)	500 (400)	5	1000	2	100	2	20	50	15	20	N	300	L	N
	100	(5)	150 (195)	50 (25)	50 (60)	N (5)	100 (100)	10 (20)	N (130)	200 (150)	5	1000	.5	70	2	L	30	30	30	N	200	70	N
	102	(60)	100 (135)	20 (15)	50 (70)	N (5)	L (15)	10 (20)	N (100)	100 (70)	7	1000	1	100	1.5	N	50	70	70	N	200	N	N
VEINS	94A	(390)	N (50)	N (5)	50 (45)	N (<3)	50 (40)	30 (30)	N (70)	150 (160)	5	700	1.5	200	3	50	5	100	30	20	200	700	N
	94B	(250)	N (30)	10 (10)	20 (30)	N (<3)	30 (35)	20 (20)	N (60)	100 (50)	3	500	.7	150	50	10	N	70	15	15	100	500	N
	94C	(25)	N (10)	N (<3)	N (3)	N (15)	1000 (1400)	30 (100)	L (50)	50 (80)	2	1000	30	30	3	50	5	70	20	10	20	100	N
	95A	(155)	500 (630)	20 (15)	50 (70)	N (5)	5 (10)	10 (20)	N (100)	500 (410)	5	1000	1	150	2	15	50	100	50	L	200	N	N
	95B	(275)	700 (630)	20 (15)	50 (65)	N (<3)	7 (10)	10 (20)	N (80)	300 (380)	5	1000	1	100	2	10	30	100	50	10	300	50	N

varying degrees, as shown by variable Rb:Sr ratios, but all have anomalous values of Mo, Cu, and other metals. The samples of altered gneiss similarly contain anomalous amounts of Mo and Cu and other introduced metals; the zinc in these gneiss samples is probably primary and not related to the stockwork. The veins represented by samples 94A, B, and C are largely quartz and are about 1 cm in width. The veins of samples 95A and B are narrow, near 0.1 cm in width, and are rich in pyrite. The suite of anomalous metals, Mo, Pb, Cu, Ag, Bi, Sn, V, and W is characteristic of systems related to molybdenum occurrences.

As studies have not been completed on the area north and northwest of the stockwork, no limits can presently be assigned. Quartz veins along State road 150 (fig. 1), just northwest of the area of wilderness addition, were sampled in 1971 by A. V. Heyl and G. N. Bozion. Highway cuts were then fresh along the newly widened road. Chip samples of fresh vein material contained as much as 1,000 ppm Mo and highly anomalous amounts of Cu, Ag, Pb, and Bi; several contained anomalous values of W, Mn, V, Sn, and Be (A. V. Heyl, written commun., 1981). These veins are near vertical and strike toward South Fork Peak. Though the geochemical signature of these veins is similar to that of the South Fork Peak stockwork, their lower structural position (3,000 ft below the stockwork) and preferred northwest orientation argue against their being part of the same geochemical system. The veins may be related to a northwest-trending system of rhyolite porphyry dikes which is probably the same age as the granite pluton below the South Fork Peak stockwork.

Conclusions

The area is thought to be of possible economic significance for the following reasons:

1. The quartz-pyrite stockwork is widespread and covers at least 0.3 mi^2 (1 km^2). The area is bounded on the south and southeast by unaltered rock; as the area to the west and northwest has not been examined in detail, no limits can be drawn.
2. The geologic setting is very similar to that of the molybdenite ore deposits in the Questa district (Carpenter, 1968). In both areas the mineralization occurs along and above the roof of similar granitic plutons. The host rocks at South Fork Peak, though Precambrian in age, are very similar chemically to the Tertiary andesite hosts of the Questa deposits.
3. The suite of anomalous metals shown by the analyses of porphyry, gneissic host rock, and veins is that associated with molybdenum deposits. Although ore-grades are not found, higher grade rock may be present below the zone of weathering or in unexposed portions of the stockwork system.

Reference

Carpenter, R. H., 1968, Geology and ore deposits of the Questa molybdenum mine area, Taos County, New Mexico, in Ridge, J. D., ed., Ore deposits of the United States, 1933-1967: New York, The American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., p. 1328-1350.