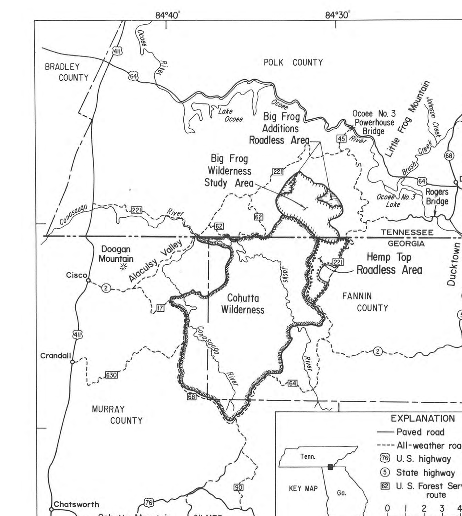

Figure 1.—Index map showing location of Cohutta Wilderness and Hemp Top Roadless Area.

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geochemical survey of the Cohutta Wilderness and the Hemp Top Roadless Area in the Chattahoochee National Forest, Fannin, Gilmer, and Murray Counties, Georgia, and the Cherokee National Forest, Polk County, Tennessee. Cohutta Wilderness was established by Public Law 88-577, September 3, 1964. Hemp Top Roadless Area was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

INTRODUCTION

The contiguous Cohutta Wilderness and Hemp Top Roadless Area are in the western part of the Blue Ridge physiographic province of northern Georgia and southeastern Tennessee (fig. 1). All of the study area is in Georgia except an irregular strip of land about 1 mi at its widest on the northern end of the Cohutta Wilderness in Tennessee. The area of the Cohutta Wilderness is 34,650 acres; that of the Hemp Top Roadless Area is 2,800 acres. The areas are in rugged mountainous terrain—a strongly dissected upland ranging in altitude from about 980 to 4,200 ft above sea level. Local altitude differences of 1,450-2,000 ft and slopes steeper than 25° are common. The north end of the Cohutta Wilderness is about 6 mi south of the Ocoee River gorge, 10 mi west-southwest of the major copper- and sulfur-mining district at Ducktown, Tenn., and approximately 22 mi southeast of Cleveland, Tenn., in Bradley County, west of the area shown in figure 1. The eastern, central, and northwestern parts of the wilderness are drained by Jacks River and its tributaries; the southwestern part, by the Conasauga River and its tributaries; and the Hemp Top Roadless Area, by Tumbling Creek and some of its western tributaries. All drainage ultimately goes to the Ocoee River and from there into the Hiwassee River.

Present Work

A geochemical survey of the Cohutta Wilderness and Hemp Top Roadless Area was done in the fall of 1977, the spring and fall of 1978, and the fall of 1979. J. F. Slack and the author did much of the fieldwork, and at various times were assisted by Richard Ketelle, A. E. Grosz, Donald Henry, Gregory Morley, Ann Stevenson, Thomas Hanley, and Timothy Muzik. About nine man-months of fieldwork was done. Fieldwork consisted of loop traverses, principally along streams where outcrops are best seen and navigation with the aid of an altimeter is essentially exact on the excellent topographic maps of the area. Ridge traversing was done where necessary to gain access to parts of the area and to complete segments of some of the loop traverses. Samples of rock (chips), soil, and stream sediment, and a few panned concentrates of stream sediment were collected along the traverses for geochemical analysis and evaluation. Rock samples and panned concentrates of stream sediment were also collected by the U.S. Bureau of Mines (USBM) in a companion study of the area.

In our reconnaissance sampling we found no evidence of mineral deposits or significant mineralization in the study area. Scattered high-background concentrations of trace elements were found, however, and suggest the presence of minor concentrations of metal-bearing detrital minerals in the sedimentary rocks or small veins.

PROCEDURES

Collection of Samples

During the geochemical survey, 291 composite chip samples of rock exclusive of quartz veins, 379 samples of soil, and 207 samples of fine-grained stream sediment were collected from the Cohutta Wilderness, and 19, 26, and 24 samples, respectively, of similar materials were collected from the Hemp Top Roadless Area. Three panned concentrates were collected from the western part of the Cohutta Wilderness. Rock samples have been grouped according to the four types of rock present in the study area (Gair and Slack, 1982): 1. sandy facies (137 samples[1]); 2. shaly, slaty, and silty facies, abbreviated "sssf" (118 samples[1]); 3. interbedded sandy and shaly, slaty, silty facies, abbreviated "inter" (36 samples[1]); and 4. quartz veins (80 samples)[1]. Sample localities are shown in figures 2-4. Samples of soil and rock were collected so as to provide a fairly even distribution of about 6-8 samples per square mile; additionally, rock sampling was controlled somewhat by the distribution of outcrops and by the objective of obtaining representative samples of the various types of rock. Samples of stream sediment were taken near the downstream ends of most flowing tributaries, and at intervals along some of the longer streams. Localities of rock and panned-concentrate samples collected by the USBM are also shown in figures 2 and 4.

Rock samples are composites of small chips and fragments taken generally at irregular spacings across 3-35 ft of outcrop, or, in a few cases, taken from float boulders of vein quartz. The composite rock samples weighed approximately 0.25-1.0 lb each. Soil samples were dug from the A horizon and upper part of the B horizon, generally from within 4-6 in. of the land surface. Some samples were taken from the base of the sod layer where the sod was broken through and its base was exposed in oversteepened valley walls or next to uprooted trees. Dry, the soil samples each weighed about 0.2-0.5 lb. Fine-grained stream sediment was collected from stream channels, most often from beneath the downstream side of boulders and cobbles in the stream bed; dried samples each weighed about 0.4-1.1 lb.

Analysis of samples

All samples collected by the U.S. Geological Survey (USGS) were analyzed by means of semiquantitative spectrographic methods in USGS laboratories in Denver, Colo. Data from samples collected by the USBM are referred to in several places in this report. Unless otherwise indicated, however, the following discussion concerns the sampling and data of the USGS.

Analytical results have been reported on the concentrations of approximately 27 trace elements and a few major elements in each sample. Data for most trace elements are reported in parts per million (ppm) as six steps per order of magnitude (1, 1.5, 2, 3, 5, 7, or multiples of 10 of these numbers). The numbers reported are approximate geometric midpoints of the concentration ranges. Analytical results may include a report of N—not detected at limit of detection for a particular trace element, or L—detected, but below limit of measurement. All samples were also analyzed for zinc and gold by means of the atomic-absorption method, which is much more sensitive than the semiquantitative spectrographic method for these elements. Results of the atomic-absorption analyses have been reported to the nearest 5 ppm for zinc and to the nearest 0.002 ppm or 0.05 ppm for gold. Raw data for all elements for the Cohutta Wilderness have been listed by Siems and others (1979), and geochemical data are summarized in table 1.

EVALUATION OF DATA

In this report, distinctions are drawn between normal (background) ranges of trace-element composition, high-background concentrations (those at the upper end of the normal range), and geochemically anomalous high concentrations. The high-background concentrations are here arbitrarily designated as those equal to or more than two standard deviations above the mean of all values for the trace element, or alternatively, values in the upper 5 percent of the sample population. The threshold for high-background concentrations, the range of values, and the mean, broken down by sample type, for selected trace elements are given in table 1.

The high-background values are not geochemically anomalous. Ideally, a geochemical anomaly represents a smaller population of values distinctly higher than the background (Rose and others, 1979, p. 34-36); however, an anomalous set of values might overlap the high-background values.

In reconnaissance rock and soil sampling such as we did, the wide spacing of samples relative to the likely geographic extent of a geochemical anomaly derived from a mineral deposit probably would result in any such anomaly being represented by one or two samples at best. The anomalous concentrations in such samples might be indistinguishable from high-background concentrations, particularly if the anomalous values overlapped with and were not well above the high end of the background range.

Histograms (fig. 5) show the range of selected trace-element compositions in all samples from the Cohutta Wilderness. No grouping of anomalous values is indicated, either overlapping and forming a hump in the histograms at the high end of the background range or above background, except in the notably barren quartz-vein samples. The highest concentrations in quartz-vein samples, although grouped and distinctly above their thresholds, are comparatively low and fall well within the background range for surrounding rocks; therefore, they are not considered significant.

Not only do individual histograms fail to show any groups of high concentrations, but the similarity of histogram patterns for a trace element from different types of samples tends to confirm that these patterns are showing only background values. Consistent with the uniformity of these patterns is the fact that the thresholds for high background values of a given trace element are the same or differ by only one spectrographic reporting interval from one type of sample to another, except the quartz veins (fig. 5; table 1). The histograms for rock samples have a higher proportion of middle background values than do the histograms for soil and stream-sediment samples, probably reflecting the combination of data from the several types of lithology included in the rock histograms. The histograms for the rock samples, nevertheless, are essentially bell shaped and have the same overall range of background values as do the histograms for the other types of sample.

The high-background concentrations of trace elements occur in samples of rock, soil, and stream sediment that are scattered throughout the study area, making it difficult or impossible to attribute significance to them for mineral resource evaluation. Hence, the scattered high-background rock and soil data are not further considered, except from quartz veins and thin sulfidic rock layers, and from the northeastern part of the area where high-background concentrations of cobalt and nickel in rock, soil, and stream-sediment samples are geographically and perhaps geologically associated.

The three panned-concentrate samples are not an adequate statistical base from which to define background and anomalous values for this type of sample, except for a few elements that can be judged to occur in exceptionally high concentrations on the basis of common experience with panned-concentrate samples from other areas.

Quartz Veins

Histograms for the quartz-vein data show some small clusters of values well above the high-background threshold (fig. 5), but virtually all such high values are within the background range of surrounding rocks. The thresholds for quartz-vein data are almost all substantially lower than thresholds for the same elements in other types of rock that have been sampled (tables 1, 2; fig. 5). This is primarily a result of the barrenness of the quartz veins in the area. Only the threshold for lead, 50 ppm in quartz veins, is close to or equal to the threshold for other rocks. The low level of the thresholds indicates that the mere presence of minor traces of minerals containing these elements is sufficient to bring the elements to attention as high-background quantities. The highest trace-element compositions in the quartz-vein samples are therefore considered to represent sporadic small concentrations of metallic minerals, and possibly of barite, in the veins; these inferred minor mineral concentrations are not considered economically significant because of their probable sporadic distribution and because of the small volume and irregular shape of the host veins.

Sulfide Layers

Sulfide—all or mainly pyrite—is commonly disseminated in some thin shaly, silty, and sandy beds of the Ocoee Supergroup rocks in the study area. The sulfide content of such layers is typically much less than 1 percent, but may be as great as several percent in some layers, and very locally in thin seams may exceed 50 percent. Such occurrences somewhat resemble sulfide zones in Ocoee rocks of the Citico Creek Wilderness Study Area to the northeast (Slack and others, 1979, p. 19-20). A sulfide concentrate was prepared by A. E. Grosz from one of the most sulfidic of such beds found during the present study, in which sulfidic seams as thick as 1-2 in. and locally containing as much as 70 percent pyrite are irregularly distributed in a layer of dark slaty shale. The concentrate was prepared using heavy liquids and was subsequently split into magnetic and nonmagnetic fractions for spectrographic analysis. A fraction separated by hand magnet contains 1,000 ppm chromium, 500 ppm copper, 50 ppm molybdenum, and 300 ppm nickel, and a nonmagnetic fraction contains 1,000 ppm arsenic. On the basis of these values in concentrates and the correspondingly lower values obtained from rock chip samples of natural occurrences of sulfide, it can be concluded that most of the metals in the rocks are associated with the sulfide minerals. The very limited and irregular distribution of sulfide zones and the low total volume of sulfide indicate that the amount of valuable mineral-commodity materials within sulfidic layers of the Ocoee rocks in the study area is negligible.

Stream-Sediment Samples

No samples of fine-grained stream sediment having identifiable anomalous concentrations of trace elements are present in the area; samples containing high-background amounts are scattered across the area, and some such samples are from adjacent drainage basins. Some of these samples have high-background concentrations of more than one element. The geochemical data from the stream-sediment samples can be expected to be more broadly representative of the underlying geology of the area than are data from the rock and soil samples, but the histogram patterns for the stream-sediment samples, nevertheless, are quite similar to those for rock and soil samples, indicating that typically there is little difference between trace-element compositions at local "spots" of rock and soil, and more generalized compositions representing areas of drainage-basin size. The occurrence of high-background concentrations of a trace element in adjacent drainage basins suggests an abnormal geographic clustering of the element, but the explanation for the geographic grouping remains obscure in the absence of detailed information about rock compositions and distribution within the drainage basins. High-background concentrations of two or more trace elements in a sample may be derived from one source or from scattered sources within a drainage basin, but there is no practical way to make this distinction from the geochemical data. Furthermore, there is no ready way to determine if multiple sources would be more significant for mineral resource potential than a single source. The presence in a single drainage basin of high-background concentrations of two or more trace elements, or the presence of high-background concentrations of one trace element in adjoining basins can at best be construed to be an unexplained weak geochemical anomaly. Adjoining drainage basins containing high-background concentrations and single basins containing high-background concentrations of more than one trace element are shown in figure 6, to point out such areas that appear to have slightly abnormal geochemistry. No mineral resource potential can be attributed to these groupings of high-background concentrations.

Panned-Concentrate Samples

Three panned-concentrate samples were collected by A. E. Grosz in the western part of the Cohutta Wilderness (fig. 4, samples G 158 P, G 159 P, and G 160 P)[2]. The small number of such samples does not allow a systematic evaluation to be made of background and anomalous trace-element compositions. However, concentrations of a few elements in these samples can be categorized as high on the basis of common experience with panned concentrates in other areas of the Appalachians simply by inspection of the data. Various magnetic splits of the three samples contain scattered high concentrations of beryllium, chromium, lead, nickel, tin, and thorium, as shown in the following table.

Sample No.	Type of split	Element	Concentration (ppm)
G 158 P	0.5 amp. magnetic (Frantz)	Cr	1500
	>0.5 amp. magnetic (Frantz)	Pb	200
	0.5 amp. magnetic (Frantz)	Th	1000
	Hand magnet	Sn	100
G 159 P	0.5 amp. magnetic (Frantz)	Cr	500
	>0.5 amp. magnetic (Frantz)	Ni	200
	>0.5 amp. magnetic (Frantz)	Pb	300
	Hand magnet	Be	10
	Hand magnet	Sn	500
G 160 P	Hand magnet	Sn	300

The possible significance of the high trace-element compositions cannot be determined because of the small number of panned concentrates. The high tin content in the hand-magnet splits of every panned concentrate are the most interesting of the high values both in terms of the concentrations of tin represented and in terms of the importance of tin as a commodity. Nevertheless, the resource potential of tin in the area is considered low.

Area of Overlapping High Values in Different Types of Sample

The northeastern part of the study area is the only place where there is any overlap of high-background concentrations of the same trace elements—cobalt and nickel—from different types of sample. Although the concentrations are not anomalous in themselves, their grouping in the same area constitutes a kind of geochemical anomaly. Soil samples containing high-background concentrations of cobalt and nickel and samples of sandy-facies rock containing high-background concentrations of nickel correspond closely to drainage basins whose samples contain high-background concentrations of cobalt and nickel. Samples from the same drainage basins also contain high-background concentrations of manganese and vanadium, and the samples of sandy-facies rock contain high background concentrations of copper and lead (fig. 7). The geochemical anomaly is not related to known mineralization. The most probable cause of the high-background values in the different samples is disseminated pyrite and possibly some base-metal sulfides in the Ocoee rocks containing trace amounts of cobalt and nickel. Characteristically, many beds of Ocoee rocks contain disseminated sulfides over broad areas (e.g., Merschat and Larson, 1972), so the grouping of high-background metal concentrations in the northeastern part of the area suggests an additional controlling factor—either more pyrite disseminated in the rocks of that part of the area, or pyrite in that part of the area containing disproportionately greater amounts of cobalt and nickel. Pyrite was not noted as being any more abundant in the northeast than elsewhere in the study area, but regional variations of a few percent in the amount of disseminated pyrite could easily have been missed. A source for cobalt-bearing and nickel-bearing disseminated sulfides in these Ocoee rocks is unknown. The constituents of these rocks, including disseminated sulfides, were probably derived from a source or sources long since separated tectonically from the present near-surface rocks of the area.

METALS

Geochemical data bearing on the possible occurrence of copper, lead, zinc, gold, tin, iron, and manganese are considered below.

Copper, Lead, and Zinc

Copper and zinc are recovered at the Ducktown massive-sulfide deposits, 7.5-10 mi east and northeast of the study area, and traces of lead are also present there. The host rock of the deposits is the Copperhill Formation of Hurst (1955) of the Great Smoky Group. This formation is not equivalent to the Panther Bluff and Boyd Gap Formations of the Great Smoky Group (Gair and Slack, 1982; Wiener and Merschat, 1978), which underlie the study area. Our geochemical survey shows that most of the high concentrations of copper, lead, and zinc in the wilderness are just at or slightly higher than the high-background thresholds for those elements (table 3). The paucity of concentrations of copper, lead, and zinc suggest that neither an extension of the Ducktown mineralized zone nor mineralization similar to that at Ducktown is present in the area studied.

Several rock samples collected by G. C. Gazdik and M. L. Dunn, Jr. of the USBM have been analyzed for copper, lead, and zinc, and these samples too contain mainly background amounts (table 4). However, two of the samples from small prospect pits contain 210 ppm and 810 ppm zinc, which are well above the threshold as determined for the USGS rock samples (table 3). These values are believed to represent small concentrations of sphalerite in thin quartz veins.

Gold

Gold has been produced from placer deposits in Murray County, Ga., 8 mi southwest of the Cohutta Wilderness, and along Coker Creek and several of its tributaries in Monroe County, Tenn., about 19 mi northeast of the study area. The source of the Murray County deposits is gold-bearing quartz veins in Fort Mountain Gneiss, which unconformably underlies the Ocoee Supergroup rocks. The source of the Coker Creek deposits is quartz veins and disseminated mineralization in beds of the Ocoee Supergroup (Ashley, 1911; Rove, 1926). Some beds in the Ocoee locally contain as much as 0.5 ppm gold (Hale, 1974), but there is no basis for projecting such relatively rich zones beyond the localities where they are actually known. Geologists of the USBM were told by a local resident that gold had been prospected for by means of hydraulic methods on a tributary of Hickory Creek in the western part of the Cohutta Wilderness prior to establishment of the national forest, but the prospect was not found during our study (G. C. Gazdik, written commun., 1980). A panned-concentrate sample collected by the USBM from Hickory Creek near the reported prospect contains no detectable gold.

All of the rock, soil, and stream-sediment samples collected by the USGS in the Cohutta Wilderness and the Hemp Top Roadless Area were analyzed for gold by means of flameless atomic absorption. Most contain no detectable gold at detection limits of 0.002 ppm or 0.05 ppm; however, 9 samples contain detectable but unmeasurable amounts of gold, and only 9 rock samples, 6 soil samples, and 6 stream-sediment samples contain measurable amounts of gold (less than 0.1 ppm in all samples except one of soil, and four of stream sediment) (table 5). Analyses of six samples of vein quartz and two of panned concentrates collected by G. C. Gazdik and M. L. Dunn, Jr. of the USBM are also shown in table 5. Five of the six vein quartz samples contain traces of gold, and one has 0.3 ppm. The two panned concentrates contain 0.7 ppm and a surprisingly rich 15 ppm gold. In comparison with the evident lack of gold in hundreds of samples, even the small amounts of gold in almost all the samples in which gold has been detected can be considered anomalous. Such gold-bearing samples in general are widely scattered in the area (fig. 8). However, rock samples in which gold has been detected are somewhat grouped a little north of the center of the Cohutta Wilderness and near the northeast end of the Hemp Top Roadless Area, and some drainage basins in which gold has been detected are near one another in the northeastern and southwestern parts of the area. Despite this slight grouping of some gold-bearing samples, the samples still are widely enough spaced that the small concentrations of gold in the bedrock occurrences are probably separate from one another, and the different stream-sediment samples that contain gold probably are derived from separate bedrock sources. Each gold-bearing sample, therefore, probably constitutes a separate gold anomaly. The amount of gold in the rocks sampled is demonstrably low, but only a crude estimation can be made of possible gold content in the source rocks of the alluvial gold. The low gold content of most gold-bearing stream sediment suggests that the source rocks contain small amounts of gold. However, the small number of gold-bearing stream-sediment samples does not provide a very firm basis for such a statistical generalization, and it may simply be that the grade of such stream-sediment samples is generally low because these few samples just happen to be relatively far from their source rocks. The 15 ppm gold found in one panned-concentrate sample collected by the USBM probably is derived from an isolated flake of gold in the analyzed material, as another sample from the same locality showed no gold. The gold-bearing sample probably was derived from a small quartz vein. The actual size of such a vein and the grade of gold in the vein are conjectural. Most veins in the area are small and the grade of most if not all deposits is low. The likely small size of gold-bearing deposits and the wide spacing between them, and the likelihood of low gold content in most if not all occurrences suggest a negligible potential for gold resources in the study area under forseeable economic conditions. Verification of this rather tentative conclusion or a more optimistic determination of the potential for gold resources would require closely spaced collecting and analysis of many additional samples in the vicinity of the sites from which the gold-bearing samples were collected during this study.

Tin

As noted above, tin concentrations are unusually and consistently high in hand-magnet splits of three panned concentrates from the western part of the Cohutta Wilderness (fig. 9). In most other types of sample, the tin detected is below the measurable limit of 10 ppm. Two rock samples have 10 ppm tin, and a few samples of stream sediment contain 10-150 ppm tin. Because tin was not detected in many hundreds of samples, all tin-bearing samples could well be considered anomalous. The 30 ppm and especially 150 ppm tin in the stream-sediment samples are exceptionally high for that type of sample in areas of metasedimentary rocks.

The fact that high tin content in panned-concentrate samples occurs only in the hand-magnet splits tends to diminish the potential significance of these results. Theobald and others (1967, table 4) found as much as 2,000 ppm tin in alluvial magnetite of the Inner Piedmont of the Carolinas, so the high tin content in samples of Ocoee rocks from the study area may not necessarily represent any significant occurrence of the principal tin commodity mineral, cassiterite. Tin in magnetite might reflect a tin-rich environment where the magnetite originally crystallized, but the magnetite has now probably passed through at least two erosion cycles and is long (and possibly far) removed from the rocks in which it originally formed. Possible sources of tin in the various samples are: 1. cassiterite-bearing fossil placers within Ocoee sedimentary rocks; 2. alluvial and other magnetite; and 3. unknown granitic-type veins or greisen zones cutting the Ocoee rocks. The first and third of these possibilities would represent a mineral resource potential, but because no granitic rocks, veins of suitable type, or greisen-like zones have been found, the third possibility can be largely discounted. The first possibility also cannot be considered very likely because of the lack of significant amounts of tin in nonmagnetic splits of the panned concentrates; nevertheless, tin in the magnetic splits cannot be entirely dissociated from cassiterite, because cassiterite might be intergrown with magnetite in detrital grains of the panned concentrates. Much additional sampling and analytical work would be required to determine the cause and significance of the high tin values. The geochemical and geological data indicate virtually no potential for conventional greisen-type tin deposits in the area. But, the existence of samples having a range of tin concentrations including some quite high ones over a broad area of the western part of the Cohutta Wilderness, and the presence of tin in different types of sample in proximity to one another (fig. 9) suggest that the Ocoee rocks in that part of the study area may have a very small resource potential for fossil placer or other as yet undefined types of tin resources.

Iron and Manganese

Prospecting for iron and associated manganese and a small production of such material took place in the early 1900s at Doogan Mountain on the west side of Alaculsy Valley, 3 mi northwest of the boundary of the Cohutta Wilderness (Watson, 1908). The iron deposits consist of compact and porous limonitic deposits in the fault zone of a major thrust bounding the Alaculsy Valley. Individual iron deposits apparently are distributed principally along contacts between sandy and argillaceous rocks and as fracture fillings in brecciated quartzite (Hull and others, 1919; Haseltine, 1924; G. C. Gazdik, oral commun., 1981). It is not known if the deposits originated as primary iron deposits that were secondarily enriched by weathering or if they are entirely secondary, although the association with a fault and with rocks that do not contain concentrations of iron minerals away from the known deposits suggest that the deposits are of secondary origin. Similar deposits elsewhere in Georgia (Haseltine, 1924; McCallie, 1900) evidently formed by the weathering and replacement of quartzite-slate-mica schist assemblages and are entirely secondary, or formed by the weathering of siderite interbeds in such rock assemblages and were primary iron concentrations that have been upgraded secondarily. Many such deposits also appear to be on or near major thrust faults. Faults or associated fractures may have been instrumental in providing passageways for the secondary movement and concentration of iron. No carbonate has been noted in the vicinity of the Doogan Mountain deposits, which are probably derived entirely from the weathering of iron silicate minerals and disseminated iron sulfides in the sandy and argillaceous rocks associated with the deposits.

All samples collected during this study were analyzed for iron and manganese and were found to contain universally small amounts of these elements in normal samples of rock, soil, and stream sediment relative to grades suitable as ore or even remotely approaching ore. However, samples collected by the USBM from the Doogan Mountain prospects and similar material having secondary concentrations of iron oxide in two small areas within the Cohutta Wilderness show wide variations in iron and manganese content (table 6). Some of them contain acceptable amounts of iron for ore, but consistently have too much silica, phosphorus, and alumina.

The two known occurrences of secondary iron in the Cohutta Wilderness are areas of typically Ocoee sandy-silty-argillaceous rocks and so appear to have been derived from such rocks. The two occurrences also are on or close to major inferred faults (Gair and Slack, 1982, map B), and similar occurrences of secondarily concentrated iron may occur elsewhere in the area along faults. In major respects, these iron occurrences appear to be like those at Doogan Mountain. Because of the variable content of iron and manganese, the presence of undesirable minor constituents, the characteristic small size and sporadic distribution of such fault-related deposits, and the availability of much larger and more suitable deposits elsewhere, the Cohutta Wilderness and Hemp Top Roadless Area are considered to have no resource potential for iron or manganese.

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[1]Number of samples are only from Cohutta Wilderness.

[2]Other panned-concentrate samples were collected by the USBM and are shown in figure 4, but are discussed in this report only with respect to their gold content.

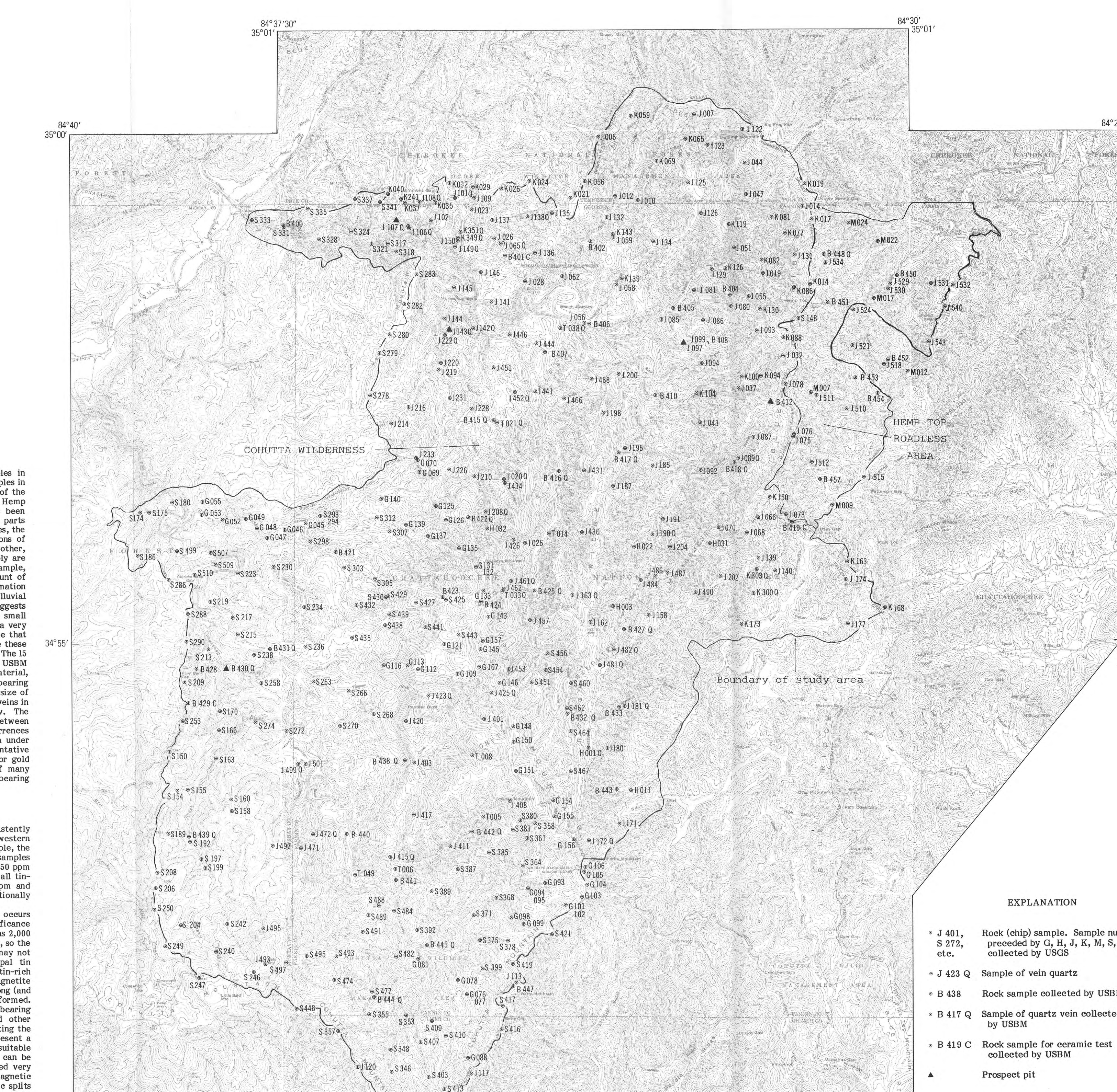

Figure 2.—Localities of rock samples and prospect pits.

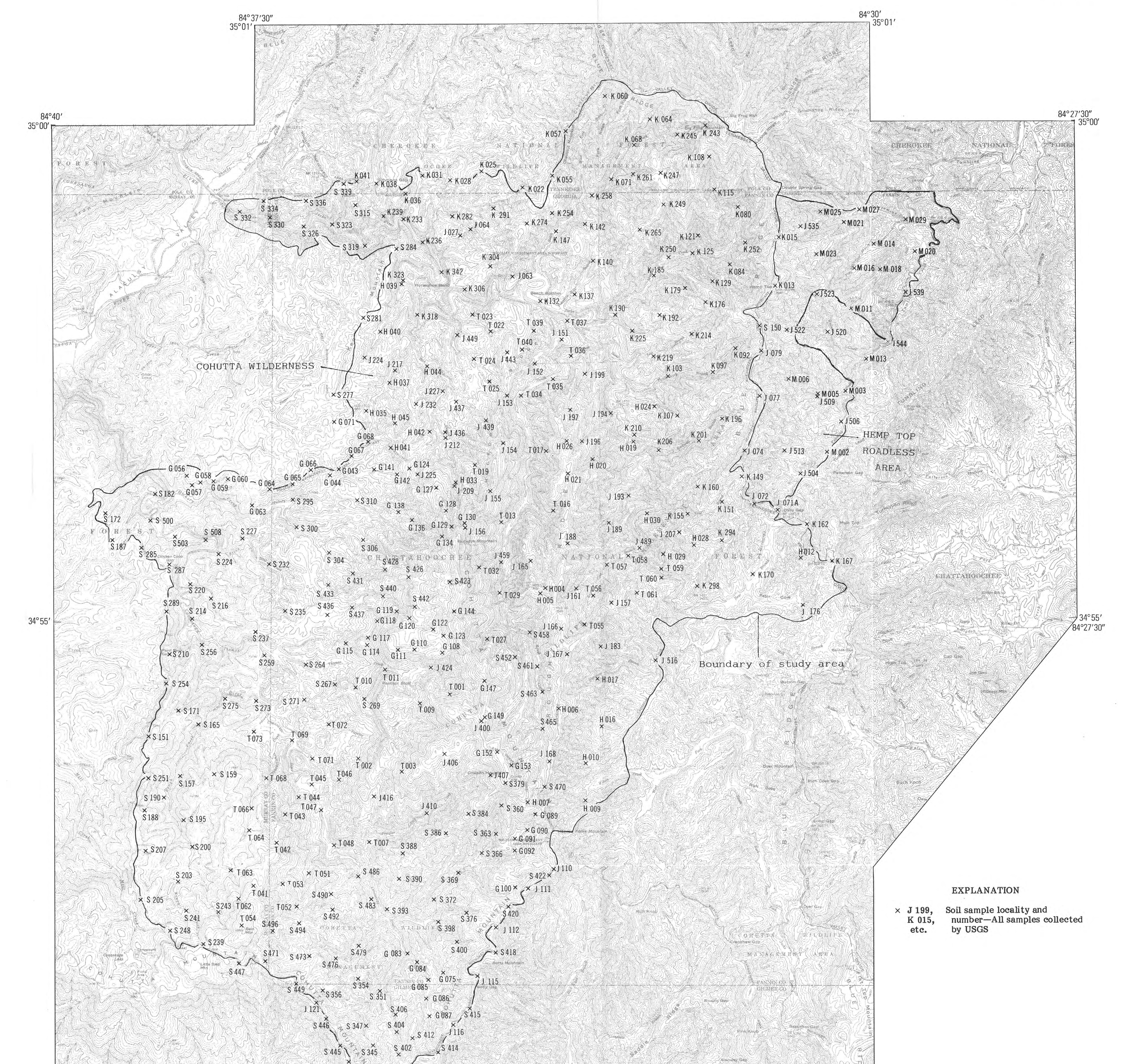

Figure 3.—Localities of soil samples.

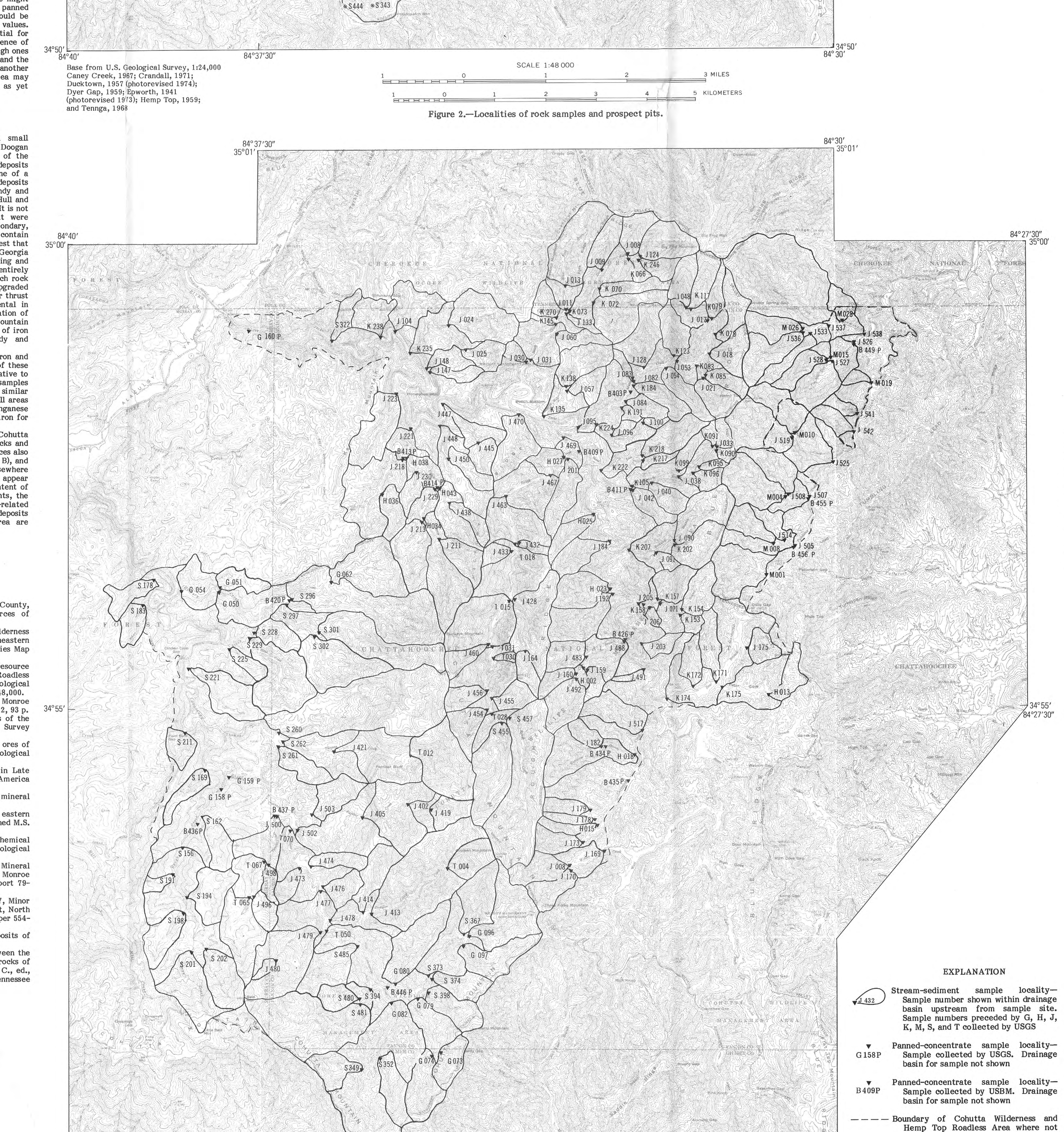

Figure 4.—Localities of stream-sediment and panned-concentrate samples.

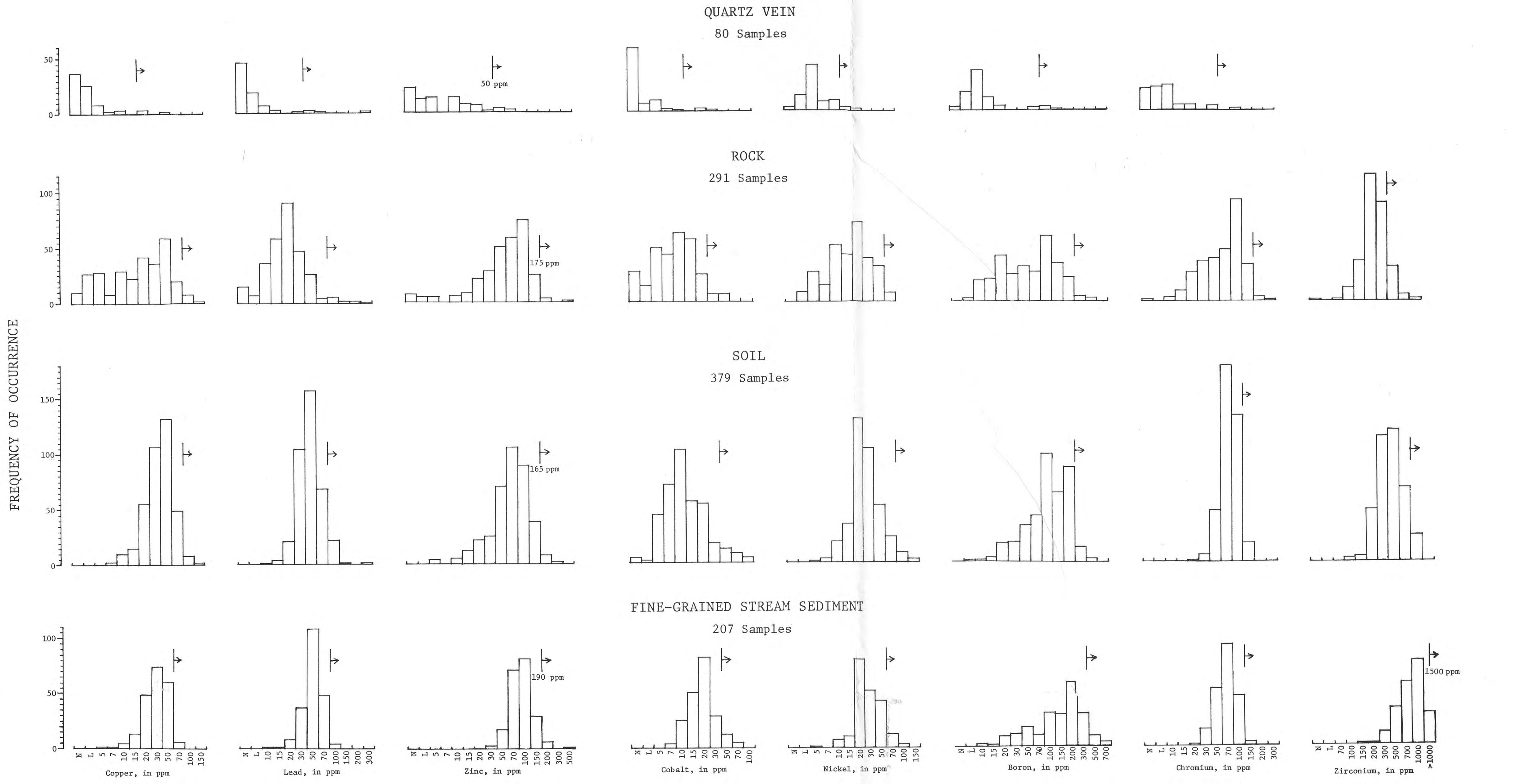

Figure 5.—Abundances of selected trace elements in vein-quartz, rock, soil, and stream-sediment samples. Arbitrary geochemical threshold shown between background and high-background concentrations of trace elements; arrow points in direction of high-background values. Analyses are by means of semiquantitative spectrographic method, except for zinc which was by means of atomic-absorption method. Original atomic-absorption results for zinc in increments of 5 ppm are fitted here to the six-step per order of magnitude geometric scale on which spectrographic data are reported.

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By
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