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Supergene dispersion of gold at Akatasa prospect, Xinjiang, China

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INTRODUCTION

Akatas, an Uygur word that means the white-stone hill, aptly describes the hill strewn with white vein quartz that constitutes the Akatasa prospect. The Akatasa prospect is about 415 km (258 mi) northeast of Urumqi (fig. 1), the capital of Xinjiang Uygur Autonomous Region. Geographically, the prospect lies on the northeastern margin of the Junggar basin, just to the southwest of the Altay Mountains. The white-stone hill protrudes through the broad bajada stretching southwestward from the Altay Mountains. The topography in the vicinity of the Akatasa prospect is moderately undulating with an average altitude of about 1,000 m (3280 ft). The maximum relief on the bajada in the immediate vicinity of the prospect is about 10 m (33 ft) and the white-stone hill rises about 30 m (98 ft) above the plain. The area has a semi-arid to arid climate. Annual rainfall is 200-300 mm (7.9-11.8 in), and the average wind velocity is 5-6 m/sec (15-20 ft/sec) with a maximum of 18 m/sec (58 ft/sec). Temperatures vary from a minimum of -49.7°C to a maximum of 41°C (Lu, 1980). The soils are poorly developed and vegetation consists of sparse, low shrubs and grasses.

The study area is along the southwestern extension of the Akatasa prospect and is surrounded by material transported from the Altay Range. Access is by an unimproved dirt road suitable for four-wheel-drive vehicles.

The Akatasa gold prospect was discovered by the Fourth Geological Brigade, Xinjiang Bureau of Geology and Mineral Resources (XBGR), in 1981. On the basis of exposed mineralized and altered rock, seven holes were drilled and trenches were dug perpendicular to the exposed quartz vein. A total of 224 kgs of Au in ore containing 3.6-40 g/t was estimated to be present.

A subsequent reconnaissance geochemical survey in the vicinity found three gold anomalies with associated Ag, As, Cu, Hg, and Sb. One of these anomalies included the Akatasa prospect (Ren and Yang, 1986). A regional geochemical reconnaissance survey at a scale of 1:200,000, done in 1987 by the First Regional Geological Survey Brigade, Henan Bureau of Geology and Mineral Resources, shows that the Akatasa prospect is part of a regional anomaly for gold.

Cooperative research between the Institute of Geophysical and Geochemical Exploration, Ministry of Geology and Mineral Resources, China, and the U.S. Geological Survey, began in 1987. The purpose was to investigate the dispersion patterns of gold in the supergene environment around Akatasa and to identify indicator elements and methods suitable for geochemical exploration for gold in this semi-arid area. Sample media included rock, soil, and heavy-mineral concentrates from soils. Rock and soil samples were analyzed to provide a measure of absolute concentrations of trace elements. Heavy-mineral concentrates were produced to provide mineralogical information (morphology, shape, and size) on major, minor, and indicator minerals and chemical information for plotting distribution patterns for the trace elements resident in the heavy minerals. The chemistry and mineralogy of the concentrates also helped to determine mineralogical residences for various elements. The combination of data from the three media thus provide more complete and detailed information for the investigation.

GEOLOGICAL SETTING

The regional geology has been described by the First Regional Geological Survey Brigade (Xinjiang, 1976) and by Zhang (1983). Akatasa is located at the intersection of the northern margin of the eastern Junggar fold system with the southern margin of the Altay fold system. Regionally, the rocks are predominately Middle Devonian chlorite-hornblende schists interbedded with felsic volcanic rocks, and Carboniferous tuffaceous conglomerates. Known hypogene gold occurrences in the area of the Akatasa prospect area were auriferous quartz veins or quartz-pyrite veins. No other type of gold mineralization had been recognized and reported in the area (Zhang, 1983).

The study area for this report covers approximately 0.2 km^2 (0.08 mi^2) at the southwest part of the Akatasa prospect. The geology was mapped concurrently with sample collection (fig. 2). Most of the area is underlain by granitic rock, for which U-Pb dates on zircon (Li, X.H., 1988, written communication) suggest a Late Permian to Early Jurassic age. The southeast part of the study area is underlain by a northwest-southeast-trending belt of coarsely crystaline carbonate rock (marble) and andesite. Phyllite occurs along the contact between the granitic rock and the carbonate rock. Faulting and fracturing are not extensive; the one recognizable fault strikes nearly north-south. Northeast-southwest-trending quartz veins suggest a linear structural feature for which patterns of altered rocks and element distribution provide confirmation.

The rocks in the study area are significantly altered. The alteration minerals are conspicuous but usually sparse. The approximate limit of altered rock was defined by partial conversion of primary biotite in the granitic rock to chlorite and epidote, as seen under a hand lens.

The assemblages of minerals in (1) paramagnetic and nonmagnetic fractions of heavy-mineral concentrates from the soils and (2) thin sections of selected rocks show that key alteration assemblages vary in a systematic way. Siliceous veins and iron-oxide pseudomorphs after pyrite are found along and near the large quartz vein present at sample localities 18, 27, 36, and 37 (fig. 3). Sericite, iron-oxide pseudomorphs after pyrite, and some chlorite and epidote are prominent at localities 1 to 6 along traverse no. TC 22. Chlorite, epidote, and xenomorphic iron oxide with few pyrite pseudomorphs are found outside of the siliceous zone, along the lower slopes on both sides of the hill, and along traverse TC 52 (fig. 3). Some secondary carbonate veins occur in the carbonate rock.

Though the pattern of alteration-mineral distribution is not based on quantitative mineralogy, there is a marked northeast-southwest symmetry of the alteration zones that is centered on the silicified zone where iron-oxide pseudomorphs after pyrite are most abundant. This symmetry suggests that hydrothermal alteration postdates the formation of the rocks, and that the process was controlled by the linear structure that controlled the emplacement of the quartz veins.

Two structural interpretations have been suggested: (1) the stratigraphic sequence reflects an isoclinal anticline symmetrical to the phyllite and the phyllite is an original pre-folding stratigraphic unit; and (2) the phyllite is a ductile fault zone in a nearly monoclinal sequence of rocks. We favor the second interpretation because: (1) the carbonate rock is present only on the south limb of the proposed fold; (2) the granite, prominent on the north side of the phyllite at the west end of the hill and on the south side of the phyllite at the east end of the hill, does not intrude the phyllite but is terminated by the phyllite; (3) the slaty cleavage characteristic of the phyllite is nearly as well developed in the granite along the proposed fault as it is in the "phyllite"; and (4) the proposed fault would provide a suitable conduit for the introduction of the hydrothermal solutions responsible for the veins, alteration, and gold mineralization. Under the second interpretation, it is possible that the carbonate rock is of hydrothermal origin, either as a product of alteration or mineralization.

ROCK GEOCHEMISTRY

Sampling and Analytical Methods

Traverses were laid out to parallel the trenches dug earlier across the eastern end of the hill (fig. 3). The traverses are 60 m (197 ft) apart and sample localities are at 20 m (66 ft) intervals along the traverses. A rock sample weighing about 0.5 kg (1.1 lb) was chipped from outcrops within 0.5-1.0 m of the soil sampling sites if such outcrop was present. The total of 32 rock samples includes duplicate samples. The samples were pulverized to -200 mesh (<0.074 mm) for analysis. Sixteen elements (Ag, As, Au, B, Bi, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, W, and Zn) were determined in the Institute of Geophysical and Geochemical Exploration (IGGE). Gold was determined by graphite furnace atomic absorption spectrometry after aqua regia digestion and preconcentration with polyurethane foam. Silver, Co, Cr, Cu, Mn, Ni, Pb, and Zn were determined by flame atomic absorption spectrophotometry after HNO_3, $HF\text{-}HClO_4$, and aqua regia digestion. Gold, Bi, Hg, and Sb were determined by atomic fluorescent spectrophotometry after aqua regia digestion. Molybdenum and W were determined by polarography after $KOH\text{-}Na_2O_2$ fusion. B was determined by a quantitative arc-emission spectrographic method. The detection limits were: Ag, 20 ppm; As, 0.2 ppm; Au, 0.1 ppb; B, 5 ppm; Bi, 0.1 ppm; Co, 1 ppm; Cr, 15 ppm; Cu, 1 ppm; Hg, 0.05 ppb; Mn, 30 ppm; Mo, 0.5 ppm; Ni, 10 ppm; Pb, 10 ppm; Sb, 0.2 ppm; W, 0.5 ppm; and Zn, 10 ppm. Replicate determinations indicate that the analytical methods have excellent reproducibility. Duplicate samples have a high variability for many of the elements, with variation of as much as a factor of 10 for Au at locality 27.

Distribution of the Elements in Rock Samples

Chemical analyses for the rock samples are presented in Appendix table A1 and are summarized in table 1. The summary statistics include only those samples representative of the major population of the rock data. Extremes have been eliminated as described in the section on statistical methods, and W is eliminated because 26 of the 32 samples analyzed had W values below the lower limit of determination (5 ppm).

The regional background for Au in the Akatasa area is about 1 ppb (Ren and Yang, 1987). In the study area, the geometric mean for Au, excluding the one extreme value, is about 10 ppb. The concentration of Au in rocks varies from 0.5 ppb to 3,700 ppb; excluding the extreme value, the range is from 0.5 ppb to 266 ppb. All but four of the rocks contain 2 ppb or more, so the entire area must be considered anomalous relative to the regional background. Figure 4 shows that all but three samples with gold values of 5 ppb or more are in altered granite. Unaltered granite contains 0.5 to 2.2 ppb Au, andesite contains about 0.8 ppb Au, and carbonate rocks contain 2.5-3.6 ppb. The strike of the high Au values is northeast-southwest, consistent with the alteration pattern.

High values for Ag, Bi, and Sb in altered granite (figs. 5, 6, and 7). Values for Arsenic, B, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, W, and Zn, vary little from normal values for the rock types present; consequently, no distribution patterns for these elements are included here.

Table 1. Summary statistics for 32 rock samples from the southwest part of the Akatasa prospect, Xinjiang, China.

[The extreme sample for Au and the three samples low in Pb (1 ppm) and Cr (≤10.4 ppm) have been omitted. Hg and Au in ppb, all others in ppm]

Element	Minimum	Maximum	Geometric Mean
Ag	0.04	0.37	0.10
As	1.4	11.8	2.8
Au	0.5	266	10.3
B	7	40	22
Bi	0.17	0.86	0.36
Co	1.4	23	2.6
Cr	35	157	93
Cu	5	75	10
Hg	3	20	5
Mn	200	1600	610
Mo	0.21	3.6	0.66
Ni	0.67	36	2.0
Pb	3	20	9
Sb	0.02	0.62	0.065
Zn	10	80	31

SOIL GEOCHEMISTRY

Sampling and analysis

The soils of the area are poorly developed lithosols, developed from a mixture of loess and residual or nearly residual detritus. The maximum thickness of this surficial debris is a few tens of centimeters along the base of the hillside. More commonly, only a few centimeters of loose debris mantles bedrock or is preserved in protected niches in the bedrock surface. Because vegetation is sparse, organic surface litter is negligible.

About 2 kg of soil were collected at each sample site after the locality was cleared of any plant litter. Samples were air dried and sieved into four fractions: -10+40 mesh (-2 mm + 0.45 mm), -40+80 mesh (-0.45 + 0.18 mm), -80+120 mesh (-0.18 + 0.125 mm) and -120 mesh (-0.125 mm). Cohesive clays in the samples tended to agglomerate into balls that could not be disaggregated in the field; consequently all sieve fractions contain varying amounts of finer material. Although there were no coarse particles in the fine fractions, a significant amount of fine material remained in the coarser fractions. All fractions were ground to -200 mesh for analysis. The analytical methods and elements determined are the same as those for the rock samples. Replicate analyses and duplicate samples indicate that reproducibility is remarkably good even for the ore-related elements. For example, average variation between duplicates is less than 30 percent and the maximum is 80 percent for gold in the intermediate fractions of sample 36.

Analytical data for the four soil fractions are listed in appendix tables A2, A3, A4, and A5. The summary statistics presented in tables 2, 3, 4, and 5 do not include the abnormally high sample at site 22-02, nor any data for W.

Distribution of Trace Elements in Soil

Values for concentrations of gold in the four fractions of the soil samples are shown on figures 8, 9, 10, and 11. The distributions of gold in these fractions are different. There seems to be a consistent decrease in the gold content from the coarse to the finer fractions (geometric means, tables 2-5). Although this difference does not have a high statistical significance, it is sufficient to indicate that there is no enhancement of Au in the coarse fractions resulting from the addition of fine material that could not be removed during sieving. Rather, the fine material acts as a diluent in the coarse fractions. This observation is consistent with our visual observations that the majority of the fine material, particularly that finer than 120 mesh, is of barren aeolian origin from a remote source (loess).

Gold in fine (-80+120 mesh and -120 mesh) fractions (figs. 10 and 11) is slightly more uniform in spatial distribution than in the fractions coarser than 80 mesh (figs. 8 and 9). Anomalously high gold in the fine fractions were mainly from samples collected over the altered granite (figs. 10 and 11), and no high values of gold are in the alluvium or colluvium. In coarse fractions, anomalous gold was scattered beyond the limit of alteration, and values >100 ppb gold were found in alluvium (figs. 8 and 9). The geometric mean for gold is greater by a factor of four or more in soils when compared to the rocks at localities where both sample types were collected. The difference is highly significant at a 10 percent probability level for all four fractions of the soils.

Table 2. Summary statistics for the -10+40-mesh fraction of 59 soil samples from the southwest part of the Akatasa prospect, Xinjiang, China

[The sample abnormally low in Pb (3 ppm), Cr (11.9 ppm), and Ni (6.7 ppm) has been omitted. Hg and Au in ppb, all others in ppm]

Element	Minimum	Maximum	Geometric Mean
Ag	0.04	0.36	0.11
As	2	15	7
Au	1.2	710	39
B	8	50	21
Bi	0.2	1.3	.55
Co	3	32	8
Cr	21	161	40
Cu	5	220	28
Hg	3	35	10
Mn	400	1800	830
Mo	0.17	3.6	.74
Ni	6.5	48	17
Pb	7	35	15
Sb	0.2	1.1	.55
Zn	10	130	45

Table 3. Summary statistics for the -40+80-mesh fraction of 59 soil samples from the southwest part of the Akatasa prospect, Xinjiang, China

[The sample low in Pb (1 ppm), Cr (12.7 ppm), and Ni (6.1 ppm) has been omitted. Hg and Au in ppb, all others in ppm]

Element	Minimum	Maximum	Geometric Mean
Ag	0.06	0.42	0.13
As	5.2	17	9.1
Au	1.2	409	38
B	10	50	21
Bi	0.29	1.3	0.61
Co	5	38	16
Cr	24	145	49
Cu	10	200	35
Hg	6	42	16
Mn	600	2500	1200
Mo	0.35	4.2	1.1
Ni	14	52	24
Pb	7	25	16
Sb	0.38	1.3	0.73
Zn	20	200	60

Table 4. Summary statistics for the -80+120-mesh fraction of 59 soil samples from the southwest part of the Akatasa prospect, Xinjiang, China

[The sample low in Pb (1 ppm), Cr (10.5 ppm), and Ni (4.7 ppm) has been omitted. Hg and Au in ppb, all others in ppm]

Element	Minimum	Maximum	Geometric Mean
Ag	0.05	0.48	0.13
As	6	17	10
Au	1.3	475	30
B	10	50	22
Bi	0.23	1.5	0.63
Co	9.2	36	19
Cr	24	133	58
Cu	15	70	38
Hg	8	61	22
Mn	600	2500	1200
Mo	0.35	3.2	1.1
Ni	18	55	29
Pb	5	30	17
Sb	0.52	1.4	0.82
Zn	10	200	72

Table 5. Summary statistics for the -120-mesh fraction of 59 soil samples from the southwest part of the Akatasa prospect, Xinjiang, China.

[The sample low in Pb (1 ppm), Cr (10.8 ppm), and Ni (4.9 ppm) has been omitted. Hg and Au in ppb, all others in ppm]

Element	Minimum	Maximum	Geometric Mean
Ag	0.05	0.48	0.12
As	7.4	15	9.7
Au	1.4	419	25
B	15	150	27
Bi	0.29	1.2	0.55
Co	9.4	32	18
Cr	34	137	67
Cu	15	100	41
Hg	12	45	23
Mn	500	2000	950
Mo	0.27	2.6	0.90
Ni	19	48	33
Pb	4	30	16
Sb	0.46	2.6	0.76
Zn	5	200	74

The concentration ranges and geometric means for Ag, As, B, Bi, Co, Cr, Cu, Hg, Mn, Mo, Ni, Pb, Sb, W, and Zn in the four soil fractions are summarized in tables 2, 3, 4, and 5. Silver, B, Mo, and W show no significant enrichment in the soils when compared to the rocks (table 1). Arsenic, Bi, Co, Cu, Ni, Pb, Mn, and Zn are slightly enriched in the soils. Almost no concentration differences can be seen among the soil fractions for most of these elements. The exceptions are Hg and Zn, which show a highly significant increase in concentration with decrease in size fraction. In contrast to Au, the changes for Hg and Zn reflect primarily the limited analytical variation for these elements. The absolute magnitude of the changes is within the range expected for the lithologic sources of the soils. For Zn, the mean for the coarsest fraction (45 ppm) is fairly typical of felsic igneous rocks (Rose, and others, 1979; Levinson, 1980), which are the dominant residual components of soils at Akatasa. The mean in the finest fraction (74 ppm) is typical of intermediate to mafic rocks and reflects the selective enrichment of mafic minerals in the fine fraction and in the aeolian component of the soils. The Hg is thought to be migrating upward along young, post-mineralization-aged faults (Ren and Yang, 1987). The increase in Hg most likely reflects the greater adsorption capacity of the fine material.

The means for the elements other than gold (tables 2-5) are remarkably similar to averages for soils in general (Rose, and others, 1979; Levinson, 1980) and the ranges are small—an order of magnitude or less. It seems unlikely, therefore, that any of these elements taken alone should provide pathfinder information equivalent to the direct information provided by gold, whose mean is more than an order of magnitude above regional background and whose range exceeds two orders of magnitude. Nevertheless, multielement analyses, considered later, suggest that certain element assemblages may be used to augment the interpretation of the gold data. It is useful in this context to consider the distribution of several of the individual elements to support the subsequent discussion.

Three elements, As, Mo, and Bi, illustrate the major features of the distribution of mineralization-related elements. The -10+40-mesh fraction of the soils is used because this fraction exhibits the greatest range of values, presumably the fraction least homogenized by the addition of loess. The patterns are similar for the other fractions of the soils. High values for As (fig. 12) are most abundant along the southeastern edge of the hill, spatially associated with the phyllite and the carbonate rock. High values for Mo (fig. 13) are most abundant in the central part of the area, spatially associated with the eastern part of the altered granite. High values for Bi (fig. 14) are most abundant in the central and western part of the area, again spatially associated with the altered granite. Thus, there appears to be a progressive northwestward change from As-rich soils in the southeast, to Mo-rich soils in the middle, to Bi-rich soils to the west. Although there is considerable overlap of Mo-rich soils with soils rich in either of the elements, there is very little overlap of Bi-rich soils and As-rich soils.

GEOCHEMISTRY OF HEAVY-MINERAL CONCENTRATES

Sampling and Analysis

A total of 60 soil samples weighing 7 kgs each were collected for heavy-mineral studies. The samples were preconcentrated in the field using a gold pan. The rough concentrates were scanned for gold during panning.

The rough concentrates from the field were cleaned in bromoform (specific gravity [about] >2.85). The minerals that sank in the bromoform were further separated into ferromagnetic, paramagnetic, and nonmagnetic fractions using an electromagnetic separator. The nonmagnetic fractions were re-processed in bromoform and are the fractions for which the greatest amount of useful data are available.

Ferromagnetic fractions and paramagnetic fractions were analyzed mineralogically in the Hebei Regional Geological Survey Brigade and in IGGE. Fourteen trace elements in the magnetic and paramagnetic fractions were determined in the IGGE using emission spectrographic methods.

The nonmagnetic heavy-mineral concentrates were analyzed in the Branch of Geochemistry, USGS, Denver, Colorado, by a variety of mineralogical and analytical procedures. The free gold particles were counted and removed from these concentrates for further processing. After removal of any free gold, the nonmagnetic heavy minerals were analyzed for 31 elements (including Au) by optical emission spectroscopy. The free gold particles were analyzed microscopically to determine morphology, shape and size.

Mineralogical and Geochemical Results for the Heavy-Mineral Concentrates

The Ferromagnetic Fraction

The major minerals in the ferromagnetic fraction are magnetite (>95% by volume), limonite (3% by volume) and titanomagnetite (1% by volume). The minor minerals are hornblende, epidote, apatite, sphene, chlorite, zircon, and mica. These are common rock-forming and alteration minerals of the host lithologies. The weights of the ferromagnetic fractions over altered granitic rock are consistently less than 6 grams; and the weights over unaltered granitic rock, carbonate rock, and andesite are consistently greater than 12 g (fig. 15). A pronounced negative anomaly in the weight of the ferromagnetic fraction conforms to the altered granitic rock. Comparison of figure 6 with figures 4, 8, 9, 10, and 11 reveals that this negative anomaly coincides with the positive anomaly for gold in rocks and soils.

The distributions of Ag and Mo in the ferromagnetic fraction are shown on figures 16 and 17. Most of the high and intermediate Ag values and almost all of the anomalous Mo values are from the altered granitic rock. The positive anomalies of Ag and Mo in the ferromagnetic fraction correspond with the negative anomaly in the weight of the magnetic fraction, and with the positive gold anomalies in rocks and soil. The remaining elements have less distinctive patterns. Concentrations of >2 ppm Sn and between 100 and 500 ppm Cu are most common in the altered granite. Concentrations of copper >500 ppm are in the carbonate rocks, as are most of the samples with B >10 ppm. Concentrations of Zn >400 ppm and Ni >200 ppm are most common in or near the pyllite. Low concentrations of Pb, <20 ppm, are in the unaltered granite.

The Paramagnetic Fraction

The minerals in the paramagnetic fraction are limonite and hematite in pseudomorphs after pyrite, iron oxide (mainly limonite, earthy hematite, and specularite), epidote, chlorite, and lesser garnet and rock fragments. The iron oxide, epidote, and chlorite are derived from the suite of alteration minerals, and their distributions have been discussed previously. Samples containing specularite, which are almost entirely from the altered granite, have a distribution inverse to that of magnetite. It seems likely that the decrease of magnetite is the result of oxidation and reprecipitation of iron during alteration. The pyrite pseudomorphs are in all samples and are black, brown, or yellowish-brown in color. The crystal forms are cubes and pentagonal dodecahedrons. Cubic twins are common, and crystal faces are striated.

The distributions of Ag and Mo in the paramagnetic fraction are shown on figures 18 and 19, respectively. Almost all values >1.0 ppm Ag are in the soil over altered granite. The concentrations of Ag over unaltered granitic rock, andesite, and carbonate rock are almost all <1.0 ppm (mostly 0.2 to 0.7 ppm). The distribution of Mo in the paramagnetic fraction is similar to but somewhat more restricted than that of Ag. High values of Mo (100-7,500 ppm) are in samples over altered granitic rock. In unaltered granite, andesite, and carbonate rock Mo varies from 7.0 ppm to 80 ppm.

The Nonmagnetic Fraction

The minerals of the nonmagnetic fraction are white mica, chlorite, epidote, limonite in pseudomorphs after pyrite, apatite, rutile, tourmaline, zircon, sphene, and free-gold particles. Apatite, sphene, zircon, and rutile are accessory minerals in the host lithologies and are not considered further. Chlorite, epidote, limonite after pyrite, and white mica are related to hydrothermal alteration, and their distributions are the same as that already described for the altered rocks.

Tourmaline was found in all samples in the study area as very fine rounded grains that are difficult to identify under a binocular microscope. Tourmaline is the dominant B mineral in the nonmagnetic fraction; thus, the distribution of B indirectly delineates the distribution of tourmaline. The concentration of B ranges from 100 ppm to 700 ppm in the altered granite and from 70 ppm to 300 ppm in the unaltered granite (fig. 20). The distribution of B in nonmagnetic concentrates suggests that tourmaline distribution is spatially related to areas of altered and mineralized bedrock.

Distribution of Gold Particles in the Nonmagnetic Fraction

Figure 21 shows the distribution of gold particles in rock and gold particles in the heavy-mineral concentrates. Seven free-gold particles were found in a small polished section of vein quartz and altered granitic rock at sample site no. 27 along traverse TC 34. The gold particles were associated with altered pyrite in small fissures and in quartz veinlets. A sample of vein quartz cutting altered granitic rock contained 3,700 ppb Au, whereas the soil sample at this site contained 396 ppb Au.

Gold particles, 24 in all, were found in 13 of the heavy-mineral concentrates, about 22 percent of the sample sites. Free-gold particles were found in the nonmagnetic fractions in some samples collected over the altered rocks and in some samples of alluvium and colluvium. Free-gold particles were also found in the heavy-mineral concentrates derived from material collected over phyllites at sampling sites 3 and 4 on traverse TC 22 (fig. 21).

The number of gold particles and their dimensions are summarized in table 6. The Corey Shape Factors (CSF = $(D_s/(D_i.D_l)^{0.5}$ where D_s, D_i, and D_l are the smallest, intermediate, and largest diameters, respectively (Day and Fletcher, 1986), of the 24 gold particles (fig. 22) shows the distribution of shapes to be bimodal with modes corresponding to flakes and cylinders in the ratio of 1:3. About 70 percent of the gold particles are cylindrical; such gold particles can easily roll down slope.

Gold concentrations in the nonmagnetic fraction (after removal of free-gold particles) are 150 ppm at sampling site 2, 70 ppm at site 8, 30 ppm at site 19, and 20 ppm at site 36. These values most likely represent fine-grained gold included in other minerals, probably pyrite.

Table 6.--Corey Shape Factors (CSF)* for 22 gold particles from the Akatasa Prospect, Xinjiang, China. (A single particle in sample 52-53HN was lost before being measured.)

Sample	Number of particles	Dimensions (mm) Short	Intermediate	Long	CSF
22-2HN	1	0.10	0.12	0.16	0.7
22-3HN	3	0.10	0.14	0.16	0.7
		0.20	0.28	0.58	0.5
		0.60	0.68	0.72	0.9
22-46HN	3	0.06	0.10	0.16	0.5
		0.06	0.10	0.16	0.5
		0.06	0.10	0.18	0.5
28-16HN	1	0.08	0.16	0.16	0.5
28-19aHN	2	0.40	0.54	0.54	0.7
		0.06	0.12	0.16	0.4
34-31HN	1	0.24	0.40	0.68	0.5
40-41HN	2	0.06	0.08	0.14	0.5
		0.16	0.22	0.30	0.6
46-43HN	2	0.04	0.10	0.18	0.3
		0.12	0.18	0.44	0.4
46-47HN	1	0.26	0.28	0.52	0.7
46-49HN	1	0.08	0.14	0.24	0.4
52-54HN	1	0.10	0.16	0.20	0.6
52-57HN	4	0.06	0.06	0.08	0.9
		0.02	0.06	0.06	0.3
		0.04	0.06	0.08	0.6
		0.06	0.24	0.42	0.2

*$CSF=D_s/(D_iD_e)^{0.5}$; D_s, D_i, and D_e are dimensions of the short, intermediate and long axis, respectively.

STATISTICAL METHODS

Frequency distributions for all elements determined in the rocks and soils exhibit positive skewness, a common feature for trace elements. Positive skewness is particularly evident for those elements related to the mineralization. A typical example is the distribution of gold in the coarse fraction of soils (fig. 23B, where one can see that the arithmetic mean is well out on the "tail" of high values and gives a poor measure of the central tendency. A log transformation of the data (fig. 23A) yields a nearly symmetrical distribution, and the geometric mean provides an excellent measure of the central tendency. For this reason, all our data have been logarithmically transformed before statistical treatment.

The logarithmic transformation for some elements in the coarse fraction of the soils (for example, Pb; Fig. 24), initially yielded frequency distributions with an apparent negative skewness and an intuitively unlikely initial correlation coefficient of, for example, 0.7 for Pb and Cr. This negative skewness, and the high correlation coefficient, are the result of a single aberrant sample, number 22-02. All four fractions of the soils at this site contain abnormally low concentrations of several elements. The undue influence of this sample on the outcome of statistical characterization of the data is evident on figure 25, where ranked data for Pb are mapped in Cr (horizontal axis) and Ni (vertical axis) space. Negative skewness and large positive correlations among these elements is forced by the single, outlying sample. Sample 22-02 was removed from the data set before statistical analysis. With the outlier removed, all of the frequency distributions for the soils are approximately lognormal and the correlation coefficients are more reasonable. For example, the correlation coefficient for Pb and Cr in the coarse fraction of the soils is now -0.26.

A similar problem exists for the rock samples (fig. 26). Three samples (22-02, 28-13, 34-23) are clearly different from all the rest. All are in or near the carbonate rock, as was the aberrant soil. Again, these samples have been removed to produce a more coherent data set for statistical analysis. The effect, again, is to change an original correlation coefficient of Pb to Cr from 0.7 to an insignificant 0.07. Sample 34-27b was also removed from the data set because it is enriched by an order of magnitude or more in gold and related elements as when compared with the next highest Au value.

Although 16 elements were determined in all of the samples, tungsten was found in detectable concentrations (>0.5 ppm) in only a few samples (Appendix tables A1-A8). This element was not further considered.

The correlation matrices for 15 elements in rock samples and in samples of the four soil fractions (figs. 27, 28, 29, 30, and 31) allow comparisons among the elements and provide an initial summary of the results. The coefficients significant at the 99 percent confidence level and at the 95 percent confidence level are highlighted in each matrix. The numerical value of a given correlation coefficient is of little importance. The levels of confidence provide an arbitrary but objectively defined way to decide which correlation coefficients are geochemically and geologically important. Coefficients significant at the 95 percent confidence level are assumed to indicate a meaningful association, and coefficients significant at the 99 percent confidence level are assumed to indicate a strong association (Ashley and Albers, 1975).

R-mode factor analysis is a multivariate statistical technique that is widely used to aid the interpretation of geochemical data (Elueze and Olade, 1985). For our data, this technique allows the reduction of the 15x15 matrix of correlation coefficients (W not included) to a small number of "factors" based upon the association of groups of elements. The results of such an analysis for the rocks and soil fractions are summarized graphically on figures 32, 33, 34, 35, and 36 for a varimax rotation. Models with 5, 6, or 7 factors, accounting in each instance for 75 percent or more of the total variance, were considered to be the most consistent with expected geological, hydrothermal, and supergene processes. Only variables with loadings ≥0.40 or ≤-0.40 are considered significant in a particular factor. (The loadings are equivalent to the correlation of the elements with the varimax scores.) All computations were performed by Branch of Geochemical Data Processing, IGGE, and in the Branch of Geochemistry, USGS.

Comparison of the matrices of correlation coefficients with the elemental composition of the factors provides insight into the processes operating in the hypogene and supergene environment. For practical purposes, the factor compositions are a reorganization of the correlation matrices into simpler, multielement associations. A thorough study of the correlation matrices will yield elemental assemblages similar to those of the factors; it is usually more instructive to work backward from the factor compositions to see what sort of binary correlations make up the elemental assemblages. For example, the favored 6-factor model for the rocks (fig. 32) includes nearly unique factors for B and Cr. In the correlation matrix (fig. 27), it is seen that these two elements are not strongly associated with any of the other elements. It is not surprising, therefore, that a reasonable factor model cannot be obtained until B and Cr are isolated as unique factors.

A strong Au-dominated factor appears as factor II for the rocks (fig. 32). The assemblage in order of positive loadings is Au, Bi, Mo, Ag, and As. Lead is negatively related to this factor. In the soil fractions, the Au assemblage is greatly simplified. Only the association of Au and Bi is consistently present. Molybdenum and Ag are more strongly associated with a complex factor in the coarse soil fraction (-10+40 mesh) and with Pb and Zn in the fine soil fractions (-80+120 mesh, Mo only in -120 mesh). The broad suite of elements associated with gold in the rocks is approximated only in the -40+80-mesh fraction of the soils where the assemblage in factor IV is Au, Bi, Ag, and Mo. Arsenic is not associated with the Au factor in any of the soils. Even in the coarsest fraction of the soils where the binary correlation coefficient of As and Au is highly significant (fig. 28), the As is assigned to the complex factor VI rather than to the Bi-Au factor V.

Pb and Zn are consistently correlated at a high significance level and seem to maintain a consistent pattern through all of the sample media. These elements are negatively related to the gold assemblage in the rocks and appear as a separate factor in all fractions of the soils. Surprisingly, Mo and (or) Ag, elements known to be strongly associated with gold, are secondary members of the Pb-Zn factor in all soil fractions. There is a near-total absence of correlation of Pb and Zn with Au in the soils. Similarly, As shifts from its association with the gold assemblage in the rocks to a much stronger association with Sb in the complex assemblage in the coarse fractions of the soils and as an As-Sb factor with subordinate Ag in the fine fractions of the soils. The relationship of Sb and As is consistently stronger with Ag than with Au.

The consistently strong association of Co and Ni, often with Cr, appears to be a purely lithologic factor, with high loadings reflecting the mafic character of the parent rocks. Pb is negatively related to this factor in the rocks, as would be expected for an element most abundant in felsic rocks. In the soils, the association of Pb and Zn overrides the lithologic control on Pb.

In the coarsest fraction of the soils (-10+40 -mesh), Au is significantly correlated with both factors V and VI. This is the fraction of the soils containing the least quantity of loess, hence the most likely to reflect variations in the underlying bedrock. Factor V is the Bi-Au factor common to all of the sample media. Factor VI is a complex factor dominated by As-Sb but including Ag-Au-Co-Mo-B-Mn. The distribution of the factor scores for these two factors over the western extension of the Akatasa prospect are shown on figures 37 and 38. Maximum values for the "gold factor" (factor V) are in the western part of the area, whereas the maximum values for the complex factor (factor VI) are in the central and southeastern part of the area. These distribution patterns are completely predictable from the distributions of individual elements associated with gold in the two factors (figs. 12, 13, and 14). These distributions for the factor score reflect only parts of the gold distribution (fig. 8). Thus, taken alone, the distribution of the factor scores provides at best a partial guide to the distribution of gold and, at worst, a misleading pattern.

DISCUSSION

Akatasa is a gold prospect. Although several of the observed chemical and mineralogical characteristics of the area vary directly with the gold, none of these provides definitive evidence for gold enrichment. It is, therefore, the magnitude, distribution, and character of the gold that will have to be used to evaluate the prospect. The relationships among ancillary features of the mineralized system may then be used to augment the data from gold.

Gold has been determined in outcropping rocks, in soils, and in heavy-mineral concentrates from soils. All three media yield generally similar patterns of gold distribution, but the interrelations among these media are not so obvious. Free gold was found in 14 of the heavy-mineral concentrates, about 25 percent of the samples. From one to three particles were found in each of these samples; the maximum of 5 particles was found in sample 52-57HN collected over alluvium at the northwest corner of the hill (fig. 21).

Individual free-gold particles vary drastically in size. Circumscribing rectangular parallelepipeds fitted to the individual particles range from 0.1 to 300 cubic microns. Volumes of these dimensions range, in pure gold, would range in weight from less than 2 to more than 5000 micrograms. Calculation of the contribution of gold to the original sample from the free gold found in the concentrates yields a range of from 6 to 900 ppb. In all cases where a large gold particle was encountered in the concentrates, the contribution of the free gold to the original samples greatly exceeds the amount of gold found by direct analysis of any of the size fractions of the soils. There is a strong "nugget" effect in the heavy-mineral concentrates.

Chemical analysis of the soils provides a much more uniform distribution of gold values. Not only are the spatial patterns of gold distribution more uniform, but the distribution of chemically determined gold among the four size fractions of each soil sample is remarkably uniform. If one size fraction of the soil is gold-rich, all size fractions of that soil are gold-rich. Furthermore, all of the soils analysed contain less gold than would be expected from the presence of a single free-gold particle. The geometric mean grain size of the free gold would pass through an 80 mesh sieve, and would contribute about 600 ppb gold to that fraction of the soil. The maximum gold value obtained in the 80 to 120 mesh soils is 475 ppb. There does not seem to be a "nugget" effect in the unconcentrated soils.

The reason for the difference between the influence of the free gold on the heavy-mineral concentrates and on the soils is in the difference in sample size. The original sample processed to yield the heavy-mineral concentrate weighed about 7 kg. The individual sieve fractions of the soils ground for analysis weighed about 30 gm. Conservatively, there is considerably less than 1 chance in 100 that free-gold particles will be encountered in the soil samples, based on the frequency with which they appear in the heavy-mineral concentrates. Evidently this relatively rare chance occurrence did not happen. The surprise conclusion is that, for this area, the "nugget" effect is more severe for a large sample (7 kg) than for a small sample (30 gm). If a free-gold particle did get into the small sample, its presence would be easily recognized by a dramatic increase in the gold content of a single sample.

The systematic variation of gold in the sieve fractions of the soils requires the presence of gold in some form other than the discrete particles found in heavy-mineral concentrates and seen fairly frequently in the quartz veins. The uniformity and reproducibility of this gold through the sieve fractions, and particularly in the coarse fractions, requires that this be a dispersed form. The general decrease in the amount of gold from the coarse to the fine fractions of the soils is best explained as dilution by barren eolian material. Accepting this explanation, the dispersal of the gold must predate the dilution. In this environment, the dispersal must be related to bedrock. The alternative and less likely explanation is that the dispersed gold is preferentially enriched in a mechanically resistant mineral phase that is selectively enriched in the coarser fractions during weathering of the bedrock. This interpretation also requires that the dispersed gold is inherited from the bedrock. If the dispersed gold were the result of supergene redistribution of gold, either mechanically as very fine particles or chemically, the gold should be more abundant in the finer fractions of the soils, as is commonly the case in more humid climates (Shelp and Nichol, 1987).

The rock samples generally contain less gold than associated soils. The noteable exception is sample 34-27bR (fig. 4) which contains 3,700 ppb gold, an order of magnitude more than any of the other rock samples. This sample is clearly an outlier and results from an abundance of free gold, an outstanding example of the nugget effect. Seven particles of gold were identified in a 4 cm^2 polished section of this sample.

Either surficial concentration of gold by selective removal of gold-poor detritus by erosion (winnowing) or selective sampling of gold-poor outcrop could yield the apparent enrichment of the soils. As described above, the major component of the gold in the soils is believed to be very fine grained and evenly dispersed. It seems most likely that erosional processes would remove this gold in the same proportion as they would remove other rock-forming minerals. Winnowing undoubtedly does lead to lag enrichment of the free gold, but free gold does not seem to be a major contributor of gold to the soils.

The general pattern of the gold distribution in rocks and in soils implicates altered rocks as the major source for gold. With the exception of silicification associated with quartz veins, the frequency and quality of outcrops is inversely related to alteration. The most altered, and the most gold-rich rocks exposed in the trenches to the east of the study area are soft granular aggregates that do not have natural outcrop. It seems most likely to us that the apparent Au enrichment in the soils results from the bias inherent to outcrop sampling. The rocks richest in gold were not sampled because they did not form outcrops.

The chemistry for both the rocks and the soils yield remarkably similar patterns that coincide with the distribution of hydrothermally altered rocks, as determined by examining the exposed rocks and the heavy minerals in the soils. Although there is some evidence for lateral transport of gold in the surficial environment, particularly in the accumulation of free gold at the base of the hill slope, the major control appears to be the hypogene distribution of gold. The little supergene redistribution that can be detected is mechanical.

Several elements in the soils correlate spatially and statistically with gold, but the range and magnitude of the values for these elements makes them less useful for defining the area of mineralization than does gold alone. Rather than providing pathfinder information, these associated elements are most useful in defining characteristics within the mineral izing system. The elements most consistently related to gold are Ag, Bi, and Mo. Only in the coarse fraction of the soils is the usual pathfinder element, As, correlated with gold. As described above, these four elements are not necessarily associated with each other, but are enriched in the soils over altered rocks in a sequential manner. Bismuth is most commonly enriched in the southwest part of the area whereas As is most commonly enriched in the southeastern part of the area, and these two elements are not correlated. Molybdenum and Ag are highly correlated statistically and most commonly enriched together in the central part of the area. This zonal arrangement is attributed to a temperature gradient. In the western part of the Akatasa prospect, this gradient would be from higher temperature in the Bi-rich western segment to a lower temperature in the As-rich eastern segment. The absence of comparable data for the east part of the prospect precludes firm conclusions, but from the strong association of Bi and Au, and the relatively weak association of As and Au in these data, it is tempting to speculate that the major heat source and the major Au source are to the southwest of the present exposure.

Better pathfinder information is provided by the heavy-mineral concentrates. The abundance of chlorite, tourmaline, and pyrite in the nonmagnetic fractions, and an increase in hematite with a concomitant decrease in magnetite in the magnetic fractions, faithfully reflect the distribution of altered bedrock. The abundance of Ag and Mo in the magnetic fractions provides direct evidence for mineralization. Although this information is useful ancillary information at Akatasa, the heavy-mineral concentrates cannot be used by themselves to explore for deposits of this type. All of the pathfinders we have identified yield weaker and less definitive information than the direct use of Au.

CONCLUSIONS

Gold is anomalous throughout the western extension of the Akatasa prospect. The distribution of gold is related to the distribution of hydrothermally altered rocks. Two forms of gold can be identified; relatively coarse-grained free gold generally associated with quartz veins, and fine-grained gold more uniformly dispersed through the altered rocks. The general conversion of magnetite to hematite suggests an oxidizing hydrothermal fluid, and redistribution of elements related to gold suggests a temperature gradient with increasing temperature of the hydrothermal fluid to the west. A hypothetical model for the system would include a heat source to the west or southwest of the present exposure driving an oxidized hydrothermal fluid upward and eastward along a structural weakness now recognized as the phyllite unit. Reaction of this fluid with the wall rocks to the structure, and cooling of the fluid eastward led to alteration of the rocks, redistribution of several trace elements and the precipitation of gold. The implication of this model is that additional potential may exist to the west or southwest of present exposures.

Geochemical exploration for deposits of this type is severely constrained. Soils appear to be more useful than the rocks because the most promising rocks are poorly exposed. The grain size of the soils has little effect on the gold distribution, although there is some evidence of dilution of gold in the finer fractions. Gold is, for practical purposes, the only indicator element of importance. Fine-grained, dispersed gold is that which should be sought in the soils. Surprisingly, the coarse fraction of the soils (-10+40 mesh) appears to be a superior sampling medium than the finer grained fractions. The relatively coarse free gold is only rarely obtained in the small sample used in a bulk analysis. A heavy-mineral concentrate greatly increases the probability of getting the coarse free gold, but the results are generally more erratic. However, this may be offset by the added mineralogic information and the possibility of detecting pathfinder elements in the concentrates.

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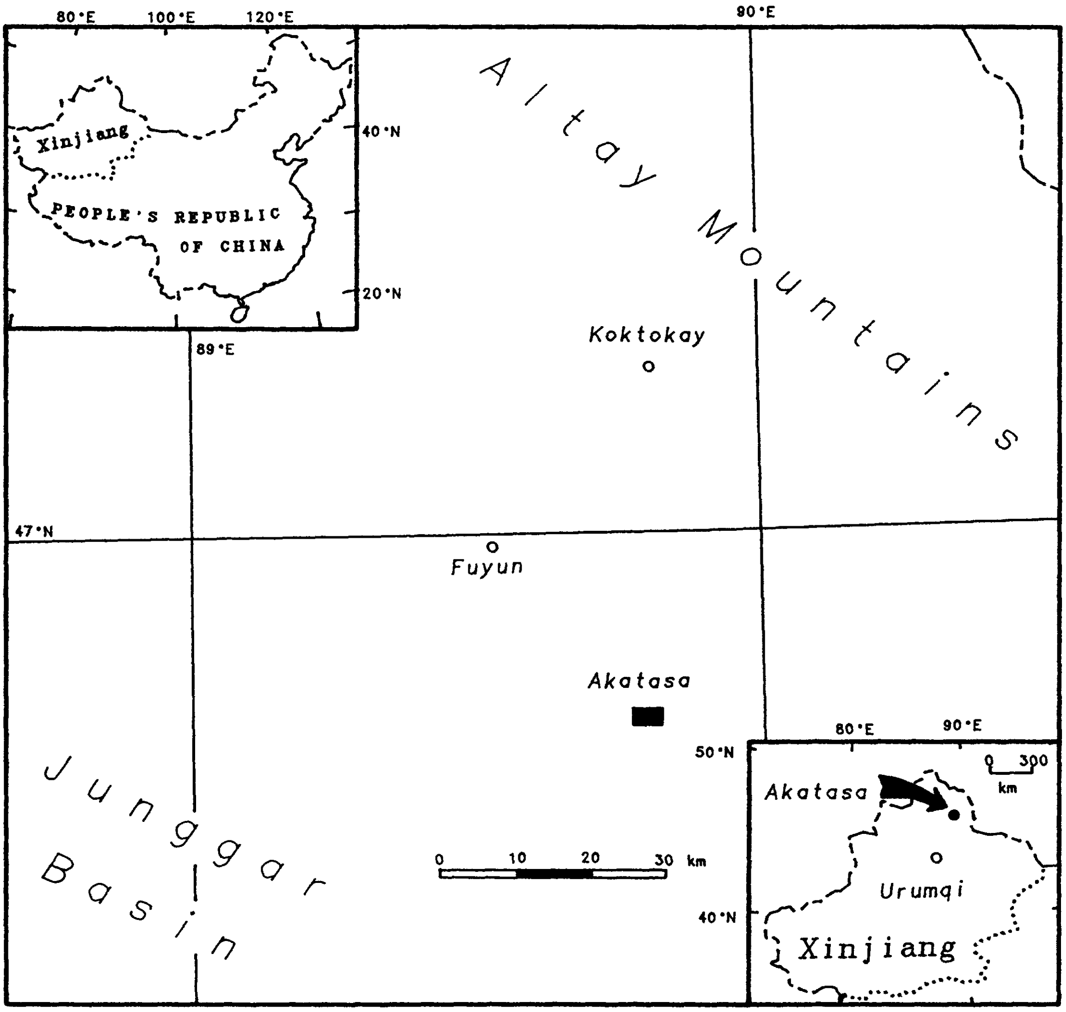


Figure 1. Location of the Akatasa prospect.

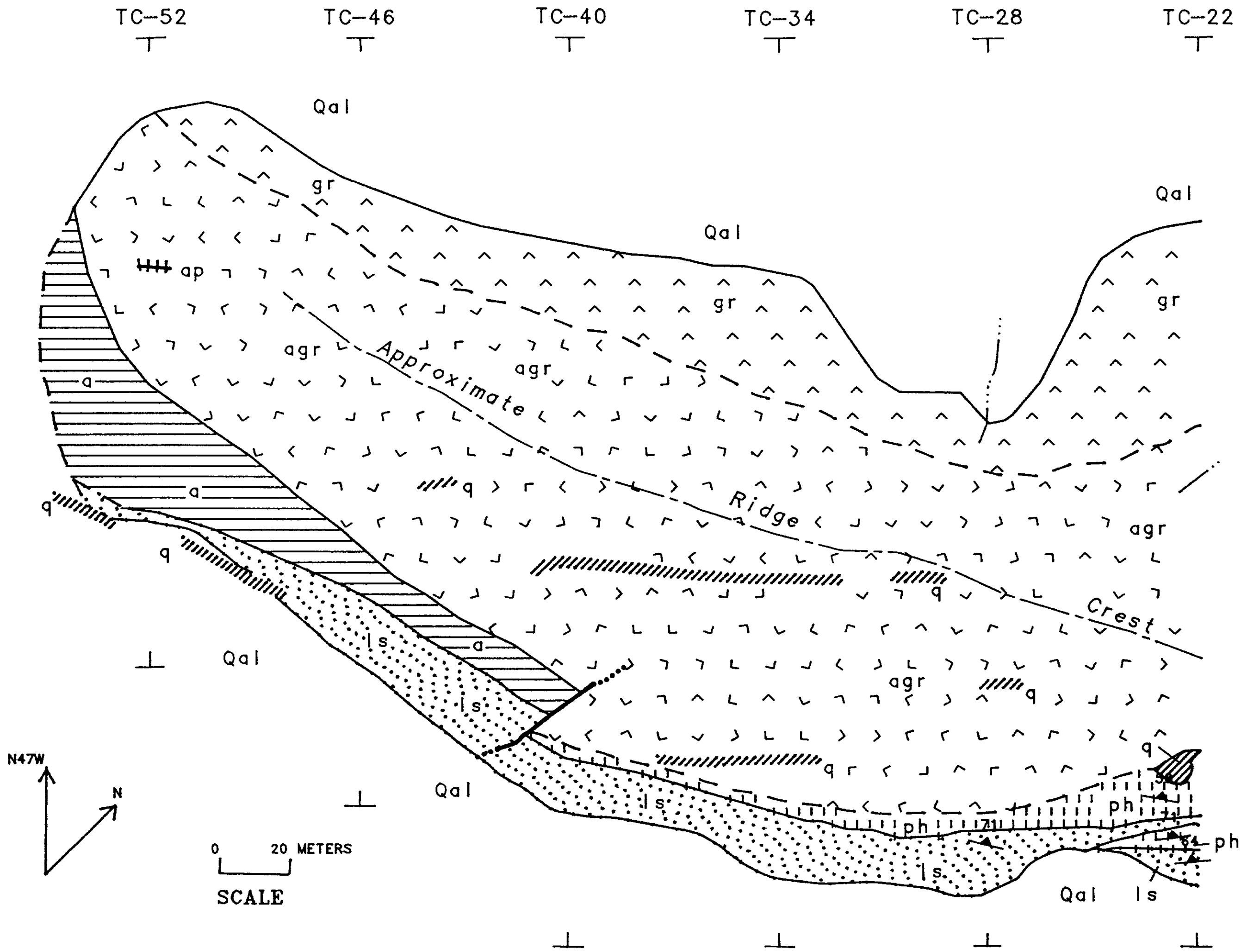
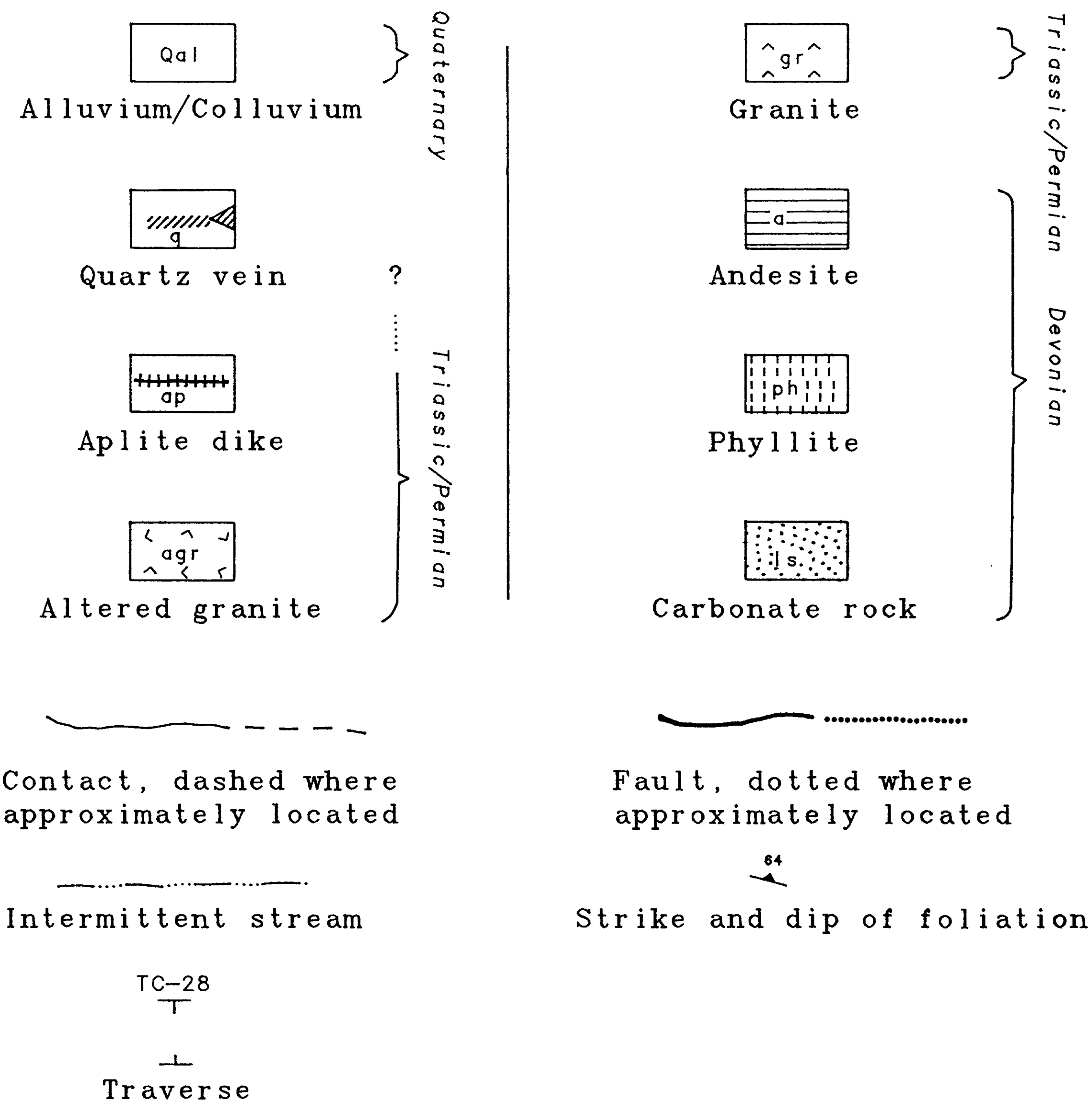
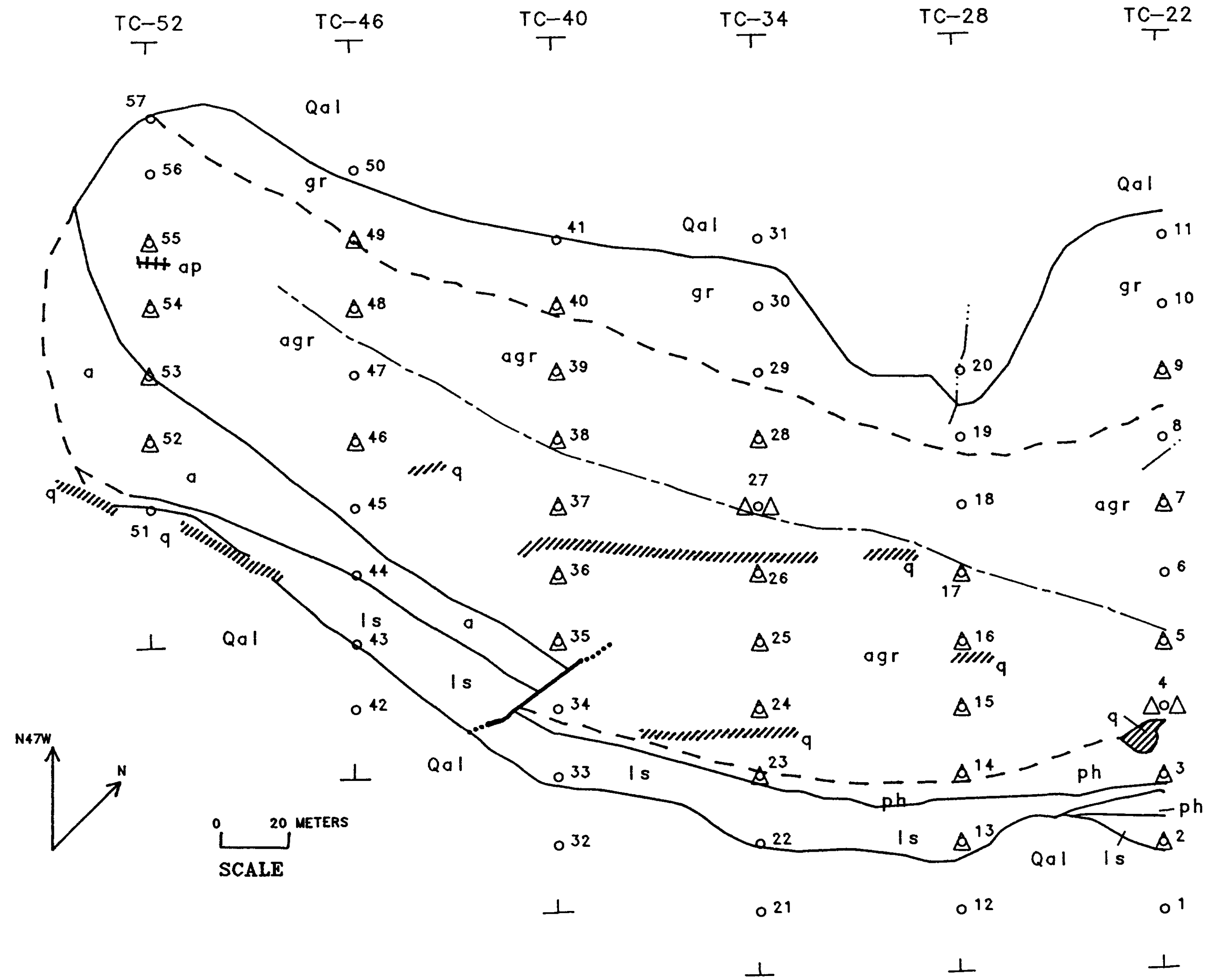


Figure 2. Geologic map of the southwest part of the Akatasa prospect, Xinjiang, China.

EXPLANATION

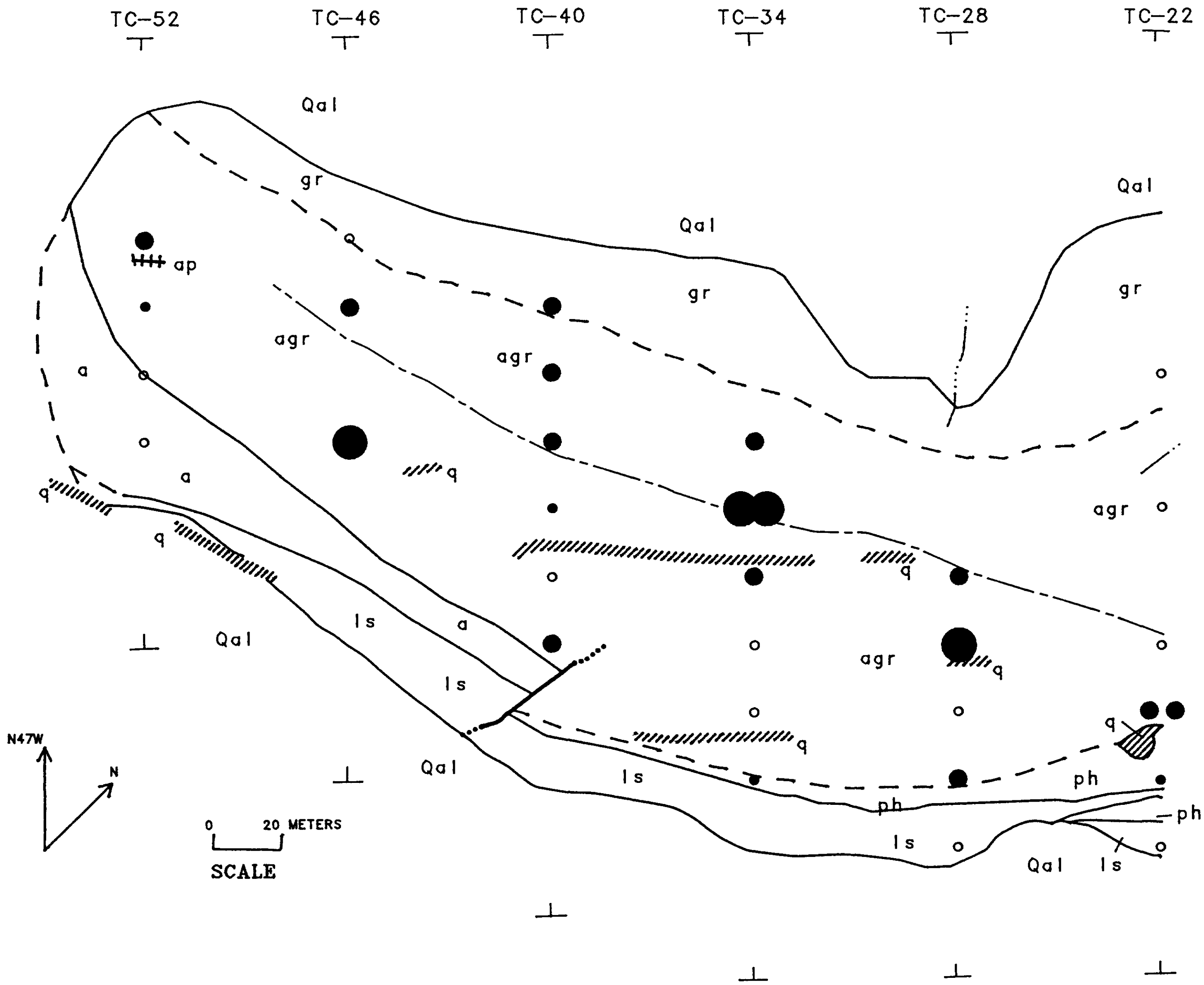




EXPLANATION

○ 38 Soil sample location △ Rock sample location

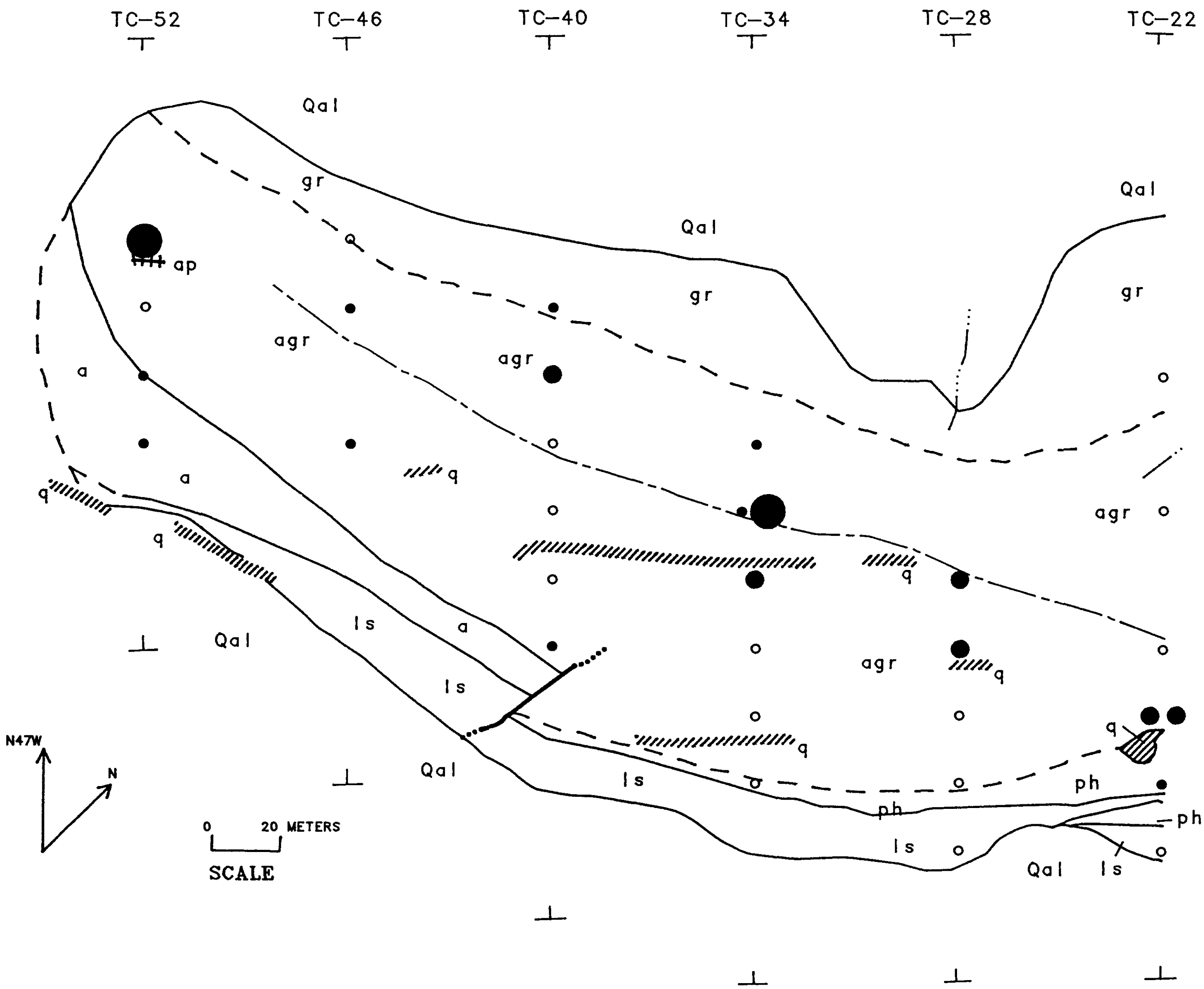
Figure 3. Map showing sampling localities along traverses across the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols and traverse lines as shown on figure 2.)



EXPLANATION

- ○ < 5 ppb Au
- • ≧ 5 – < 10 ppb Au
- ● ≧ 10 – < 100 ppb Au
- ⬤ ≧ 100 ppb Au

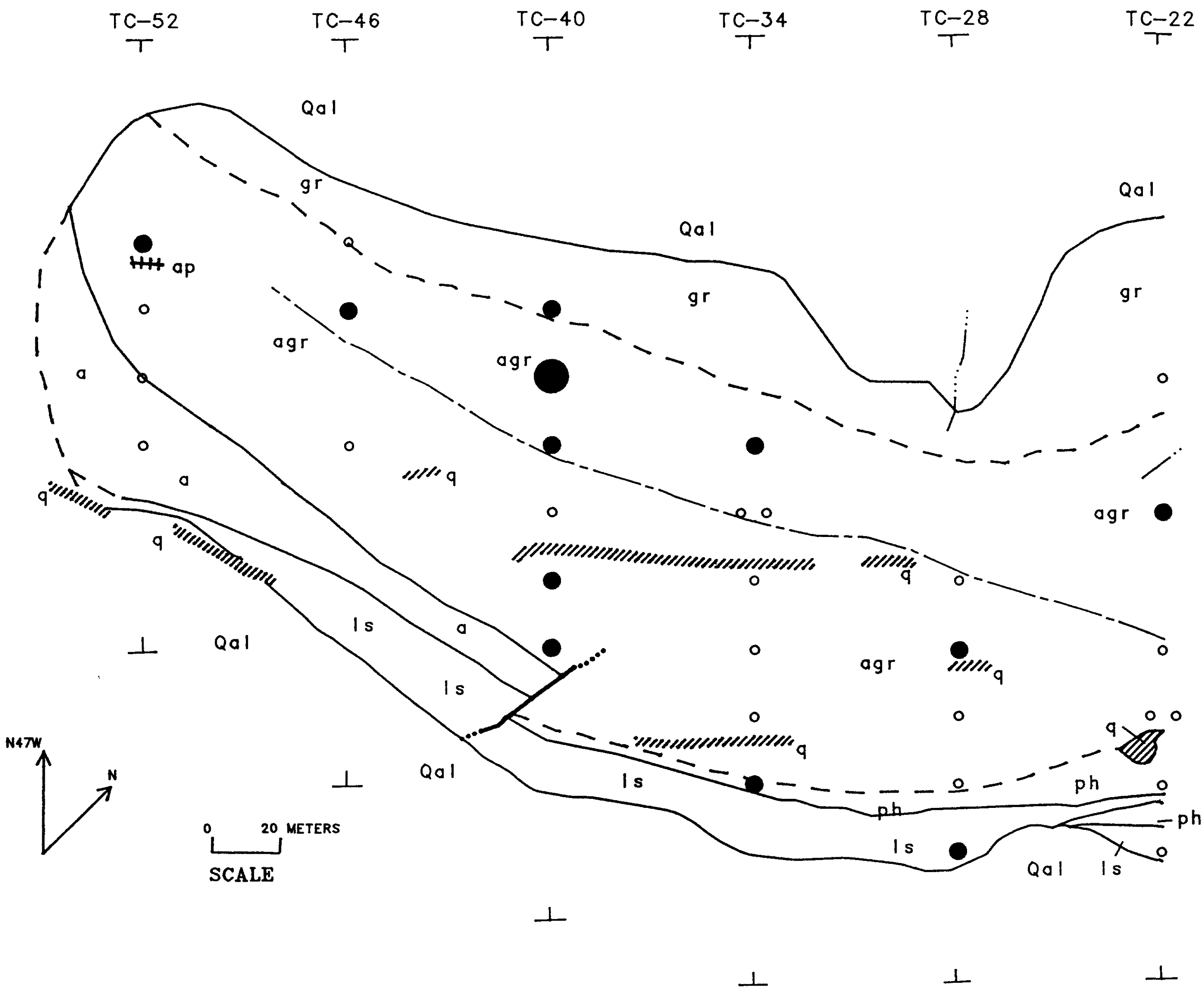
Figure 4. Map showing the distribution of gold in rocks from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



EXPLANATION

- ○ < 0.08 ppm Ag
- • ≧ 0.08 – < 0.16 ppm Ag
- ● ≧ 0.16 – < 0.32 ppm Ag
- ⬤ ≧ 0.32 ppm Ag

Figure 5. Map showing the distribution of silver in rocks from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



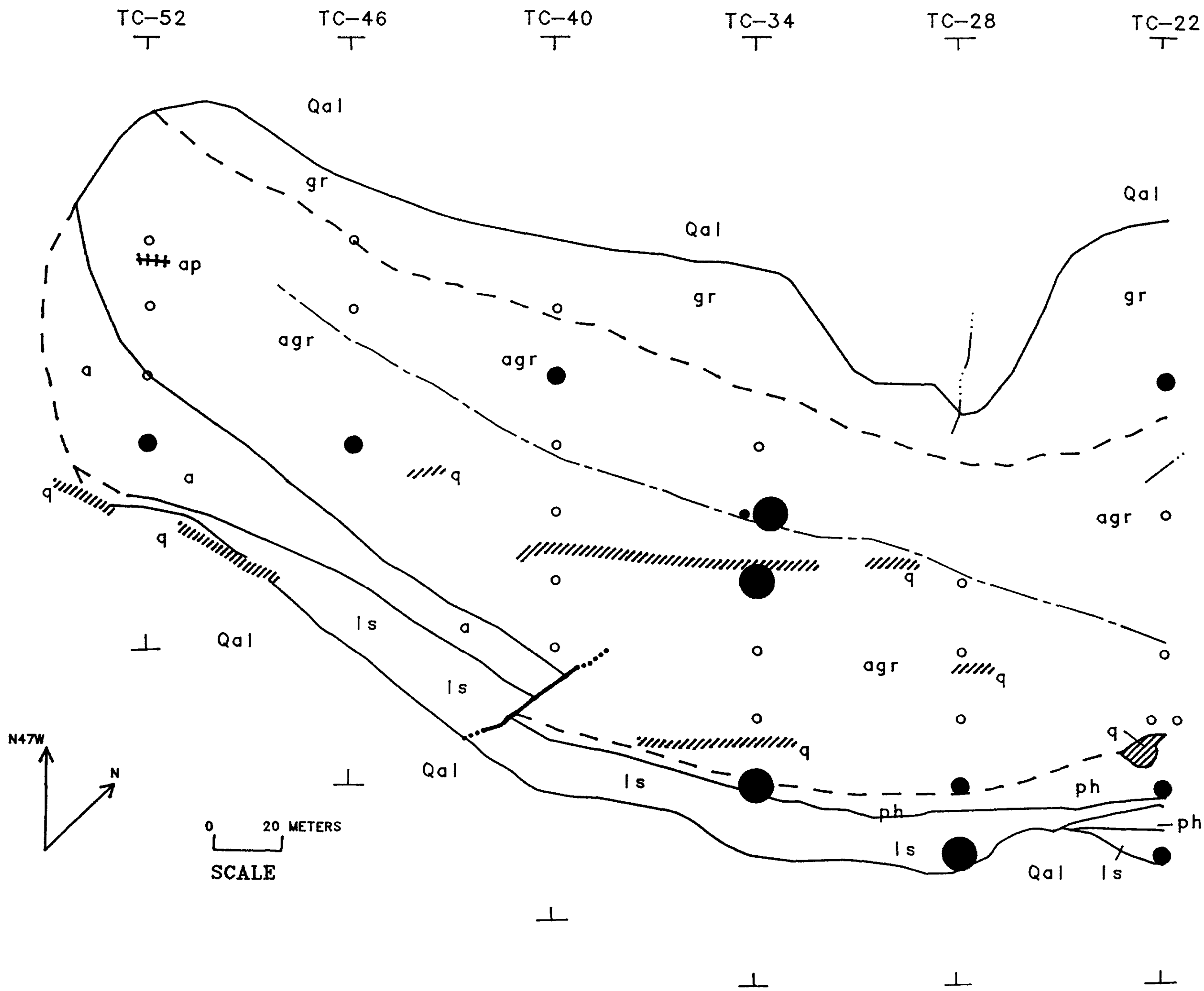
EXPLANATION

◦ < 0.4 ppm Bi

● ≧ 0.4 – < 0.8 ppm Bi

⬤ ≧ 0.8 ppm Bi

Figure 6. Map showing the distribution of bismuth in rocks from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



EXPLANATION

∘ < 0.14 ppm Sb

● ≧ 0.14 – < 0.28 ppm Sb

⬤ ≧ 0.28 ppm Sb

Figure 7. Map showing the distribution of antimony in rocks from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)

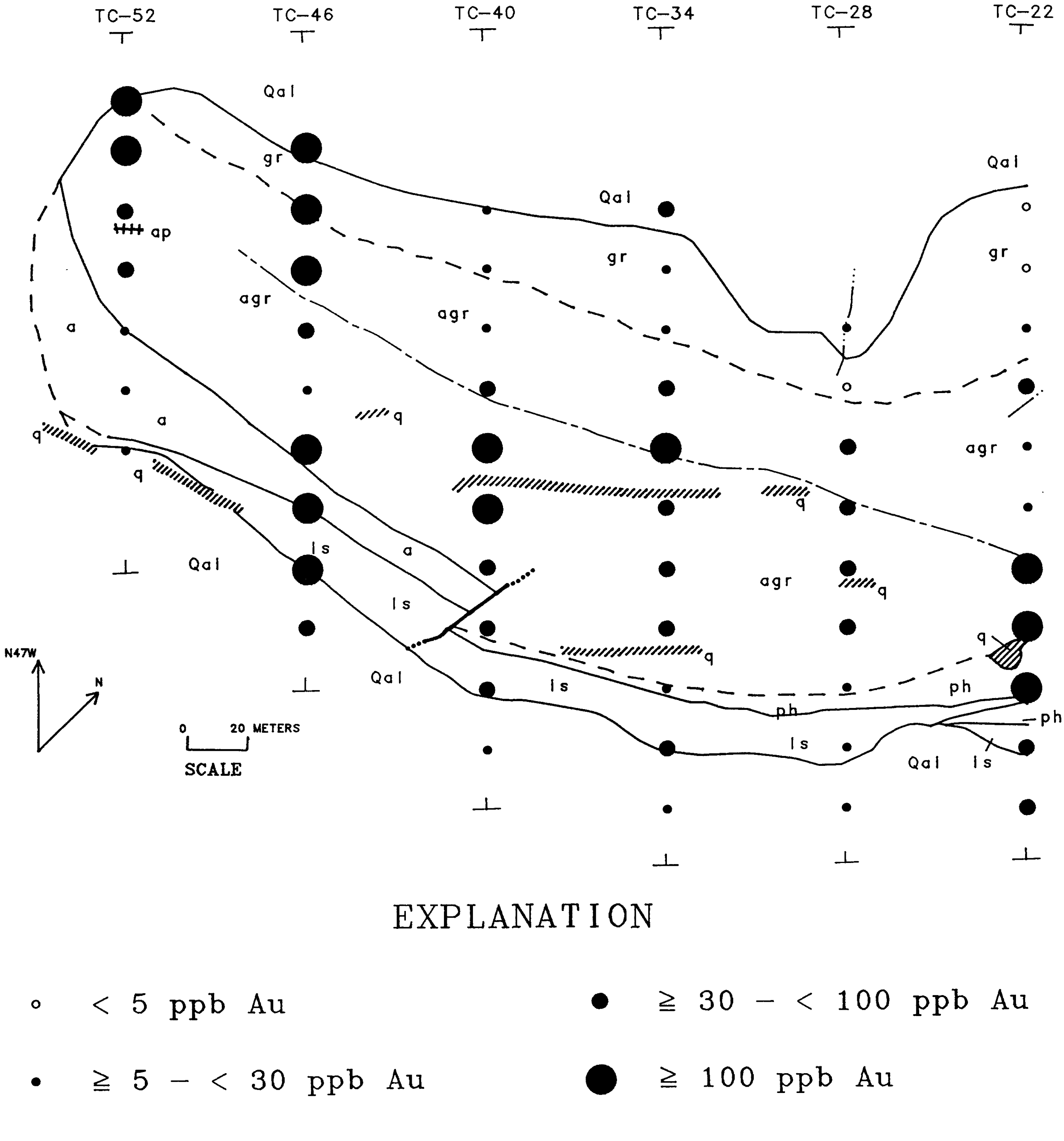


Figure 8. Map showing the distribution of gold in the -10+40-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)

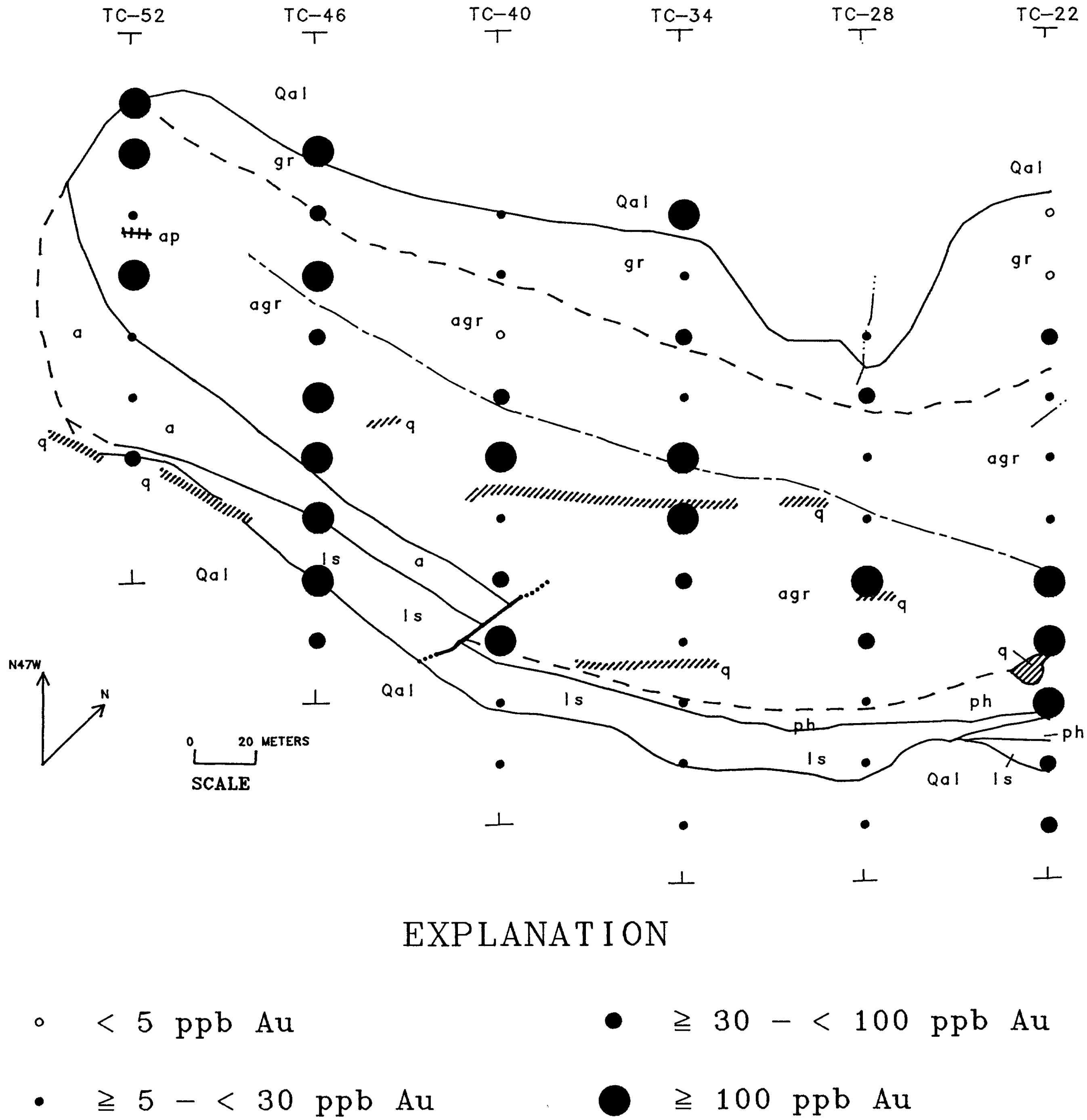
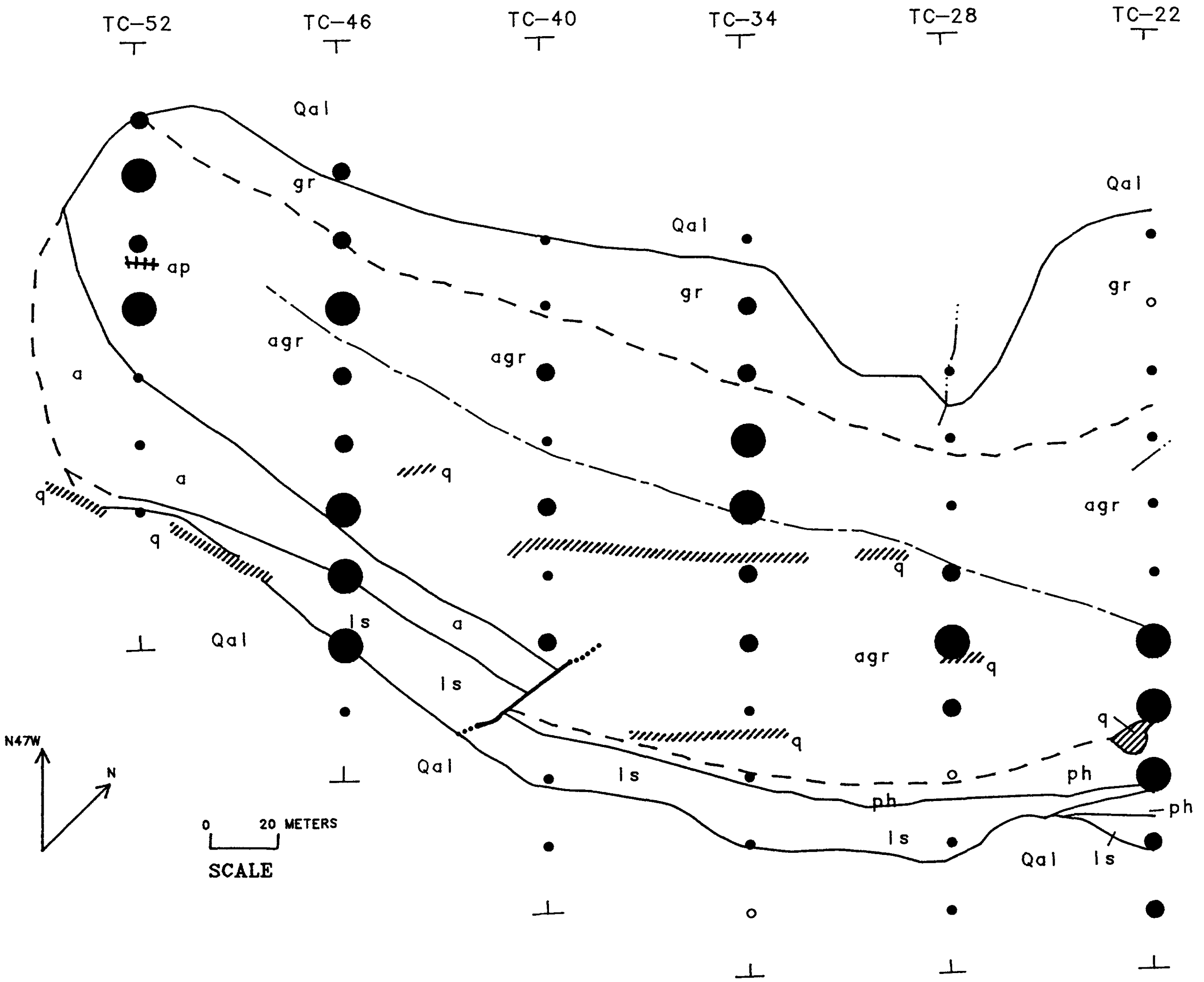


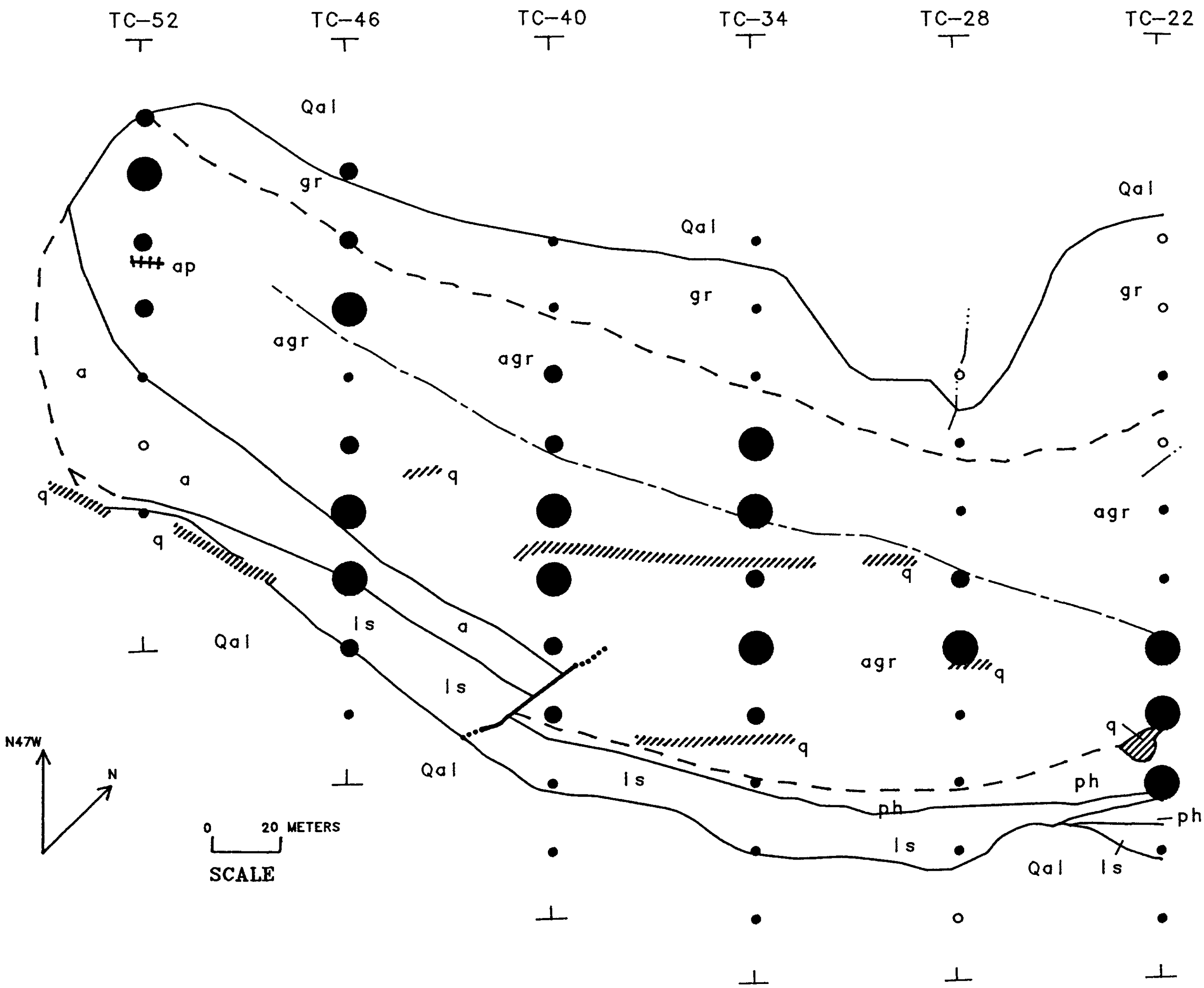
Figure 9. Map showing the distribution of gold in the -40+80-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



EXPLANATION

- ○ < 5 ppb Au
- • ≧ 5 – < 30 ppb Au
- ● ≧ 30 – < 100 ppb Au
- ⬤ ≧ 100 ppb Au

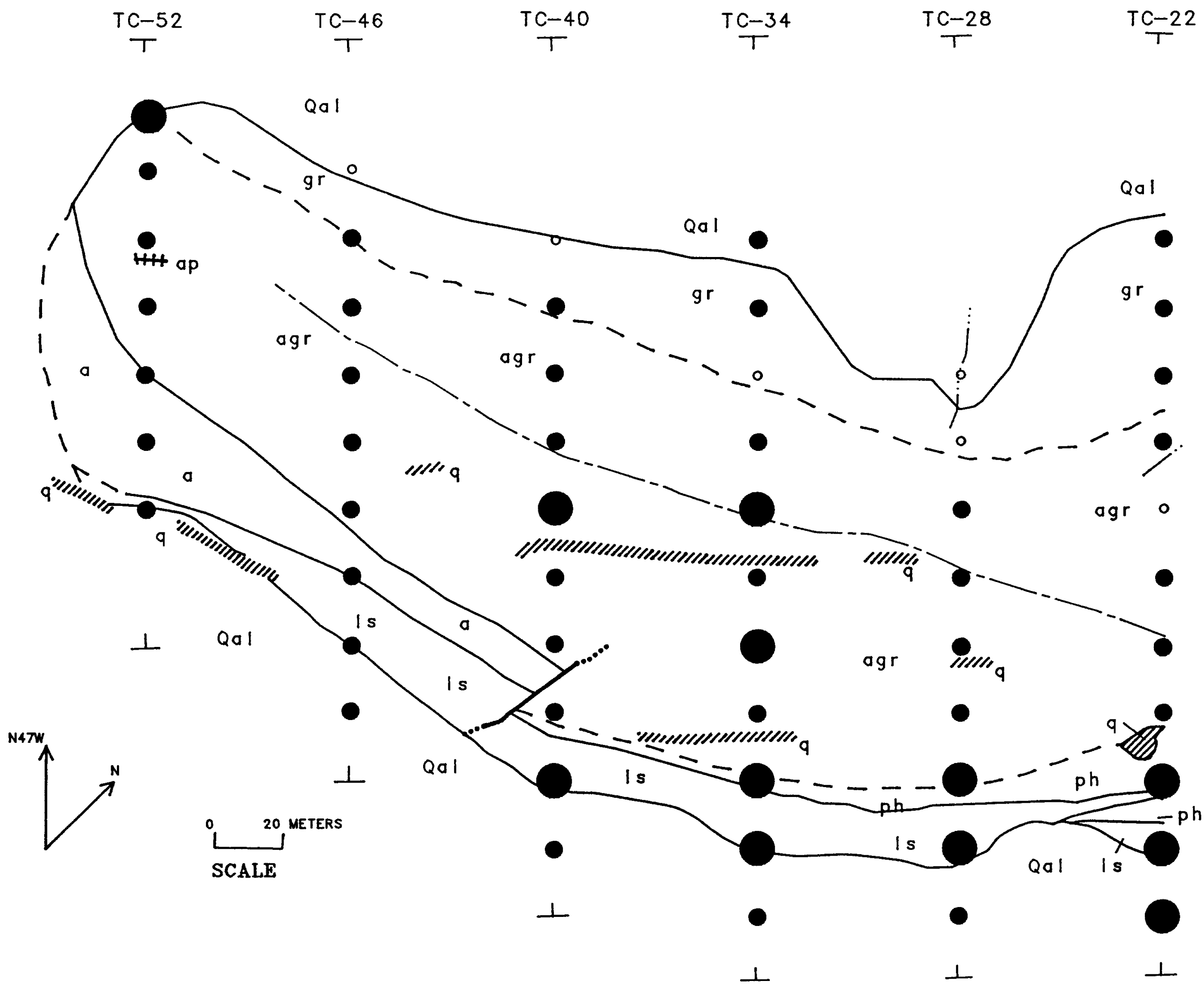
Figure 10. Map showing the distribution of gold in the -80+120-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



EXPLANATION

◦ < 5 ppb Au	● ≧ 30 – < 100 ppb Au
• ≧ 5 – < 30 ppb Au	⬤ ≧ 100 ppb Au

Figure 11. Map showing the distribution of gold in the -120-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



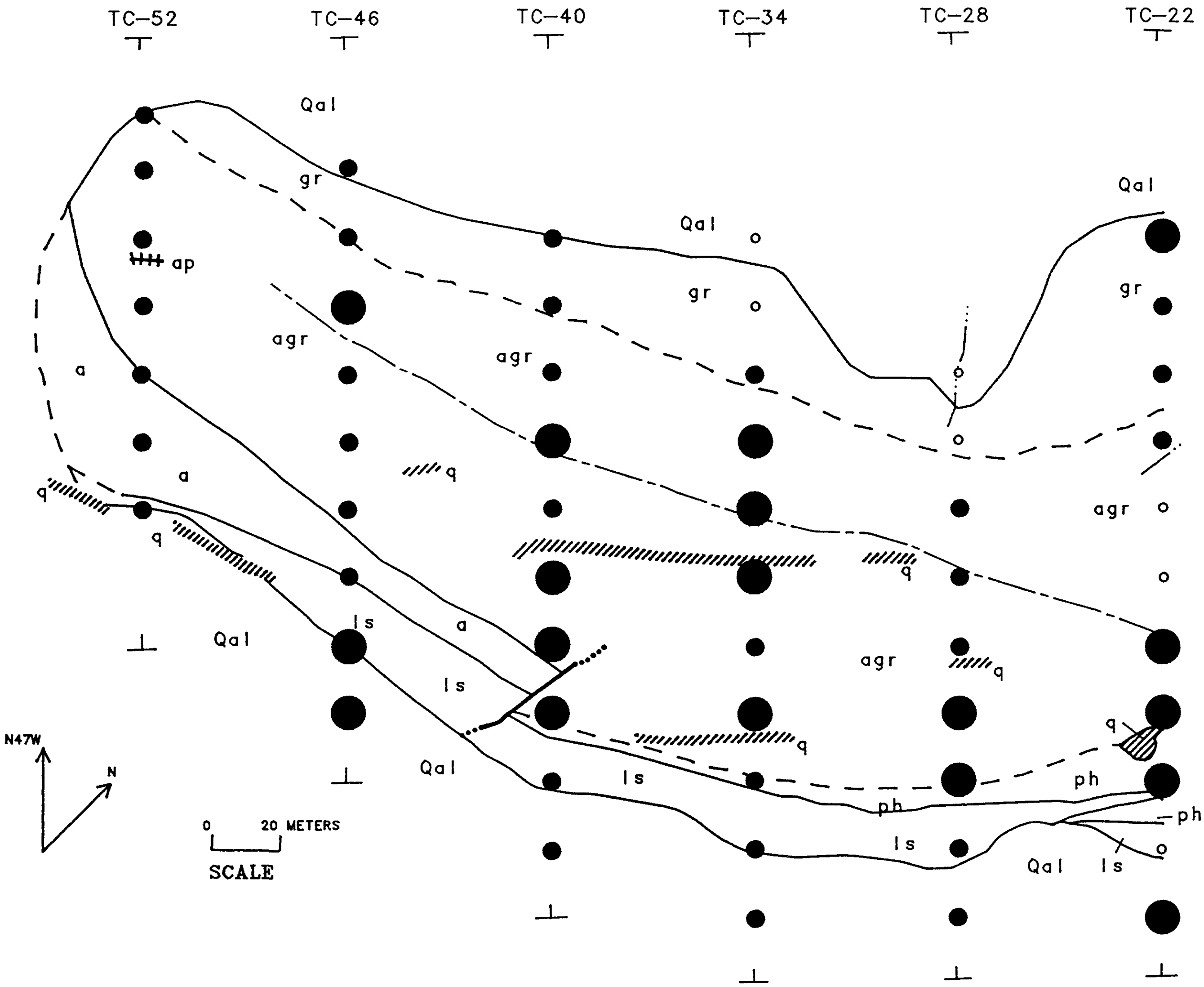
EXPLANATION

○ < 5 ppm As

● ≧ 5 – < 10 ppm As

⬤ ≧ 10 ppm As

Figure 12. Map showing the distribution of arsenic in the -10+40-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



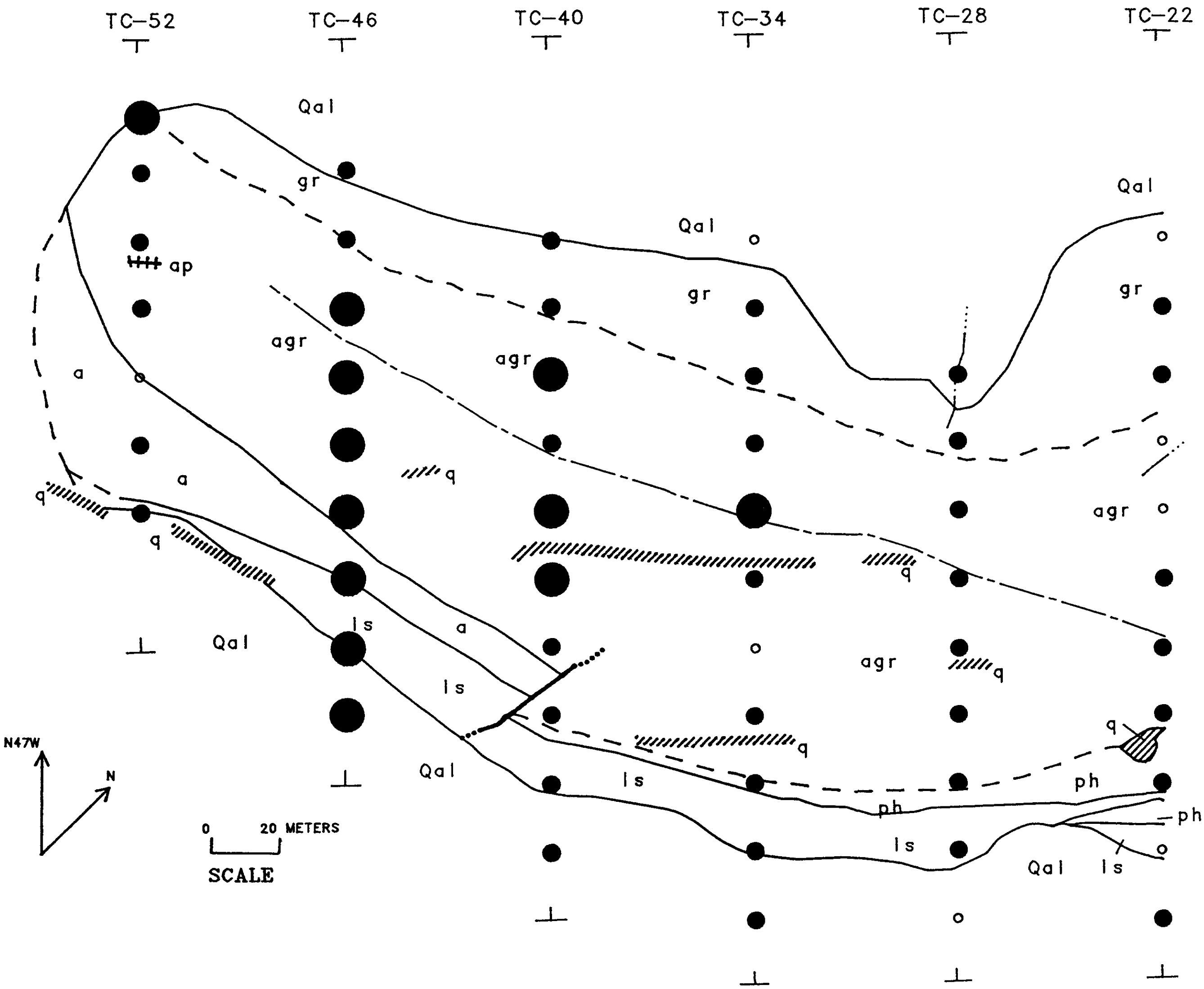
EXPLANATION

○ < 0.4 ppm Mo

● ≧ 0.4 – < 1.0 ppm Mo

⬤ ≧ 1.0 ppm Mo

Figure 13. Map showing the distribution of molybdenum in the -10+40-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



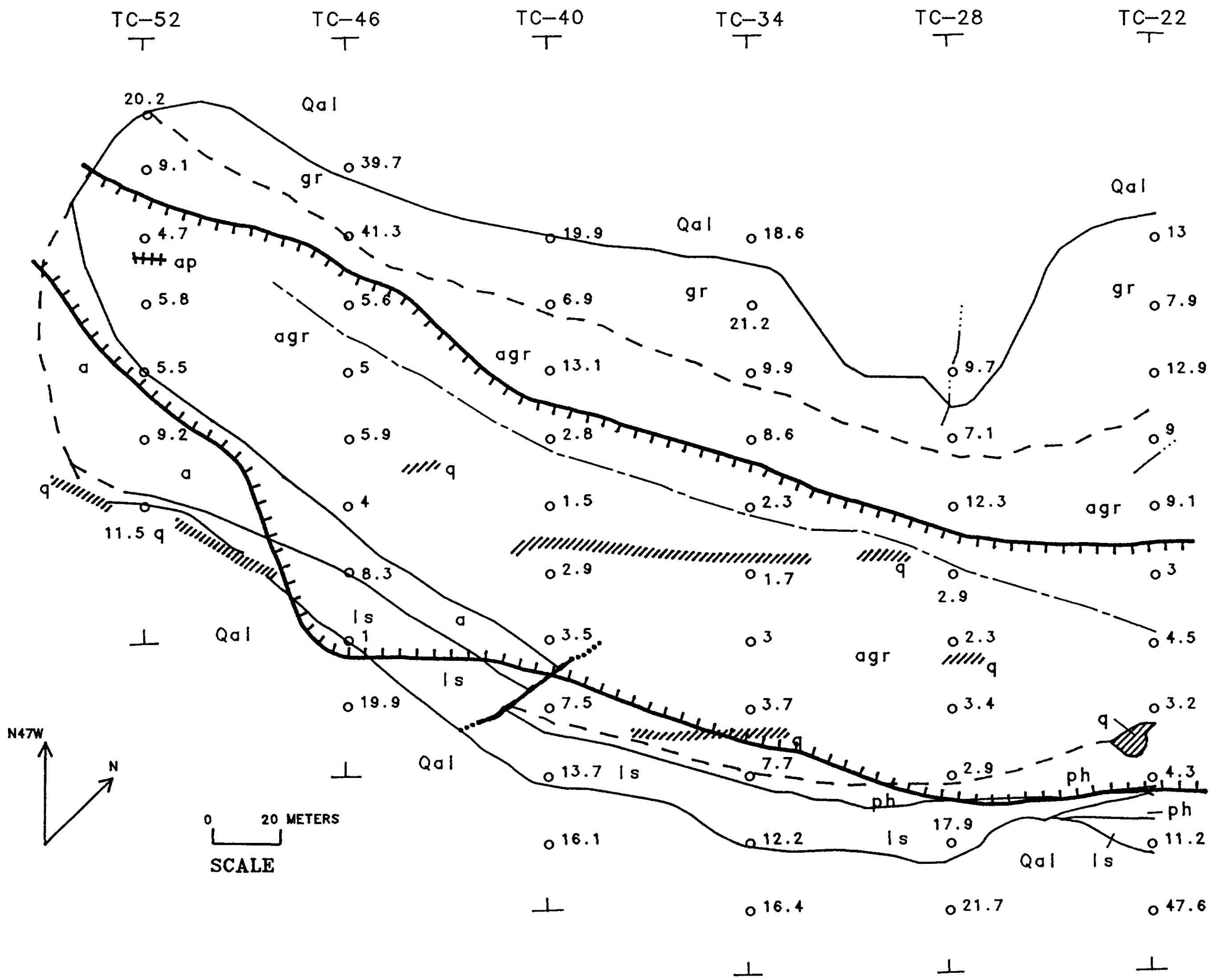
EXPLANATION

○ < 0.4 ppm Bi

● ≧ 0.7 ppm Bi

• ≧ 0.4 – < 0.7 ppm Bi

Figure 14. Map showing the distribution of bismuth in the -10+40-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



EXPLANATION

8.6 Weight of Ferromagnetic Fraction (g/kg)

Approximate 6 g/kg contour, hachures on low side

Figure 15. Map showing the distribution of the weights of the ferromagnetic fractions of heavy-mineral concentrates from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)

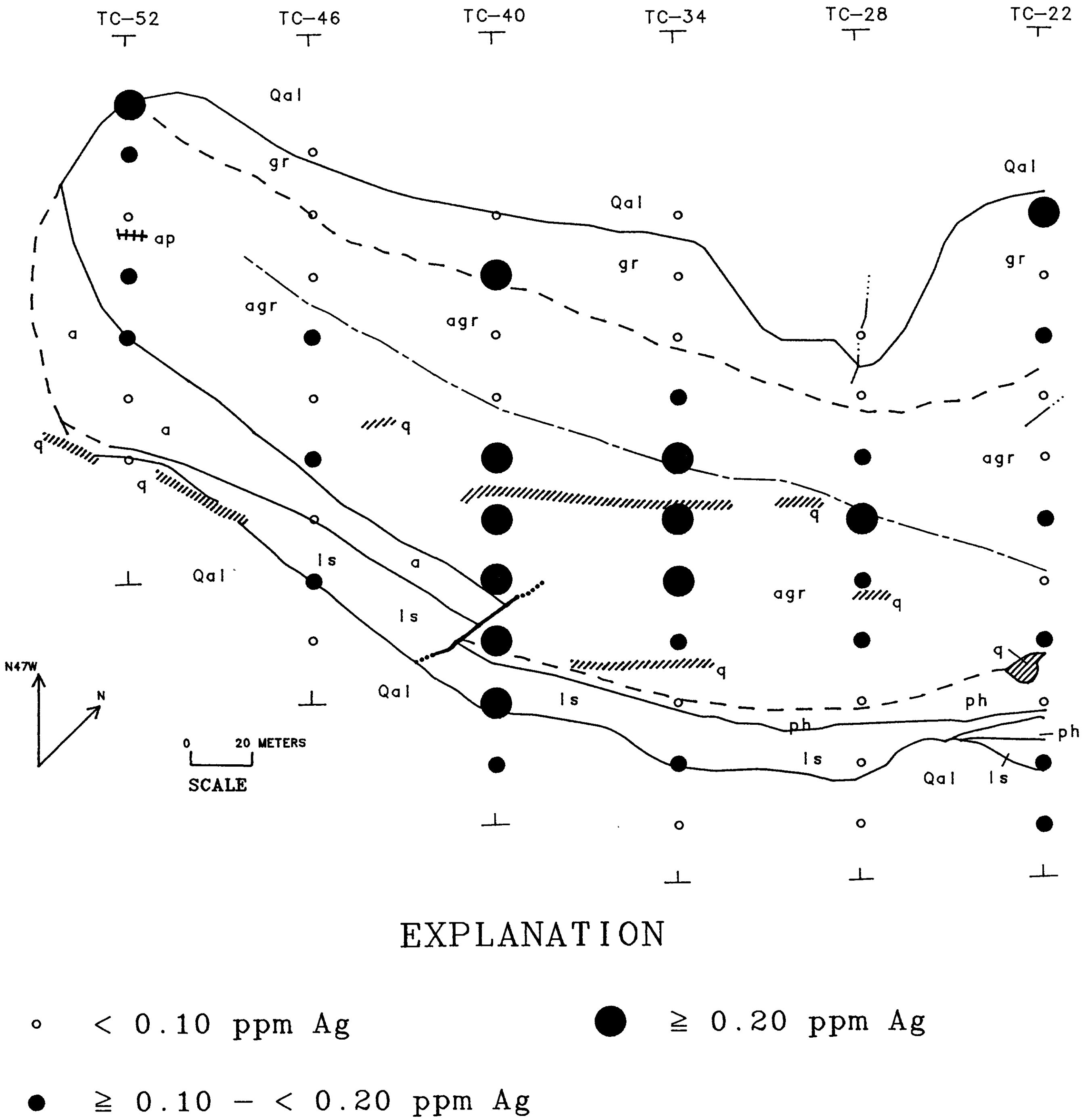
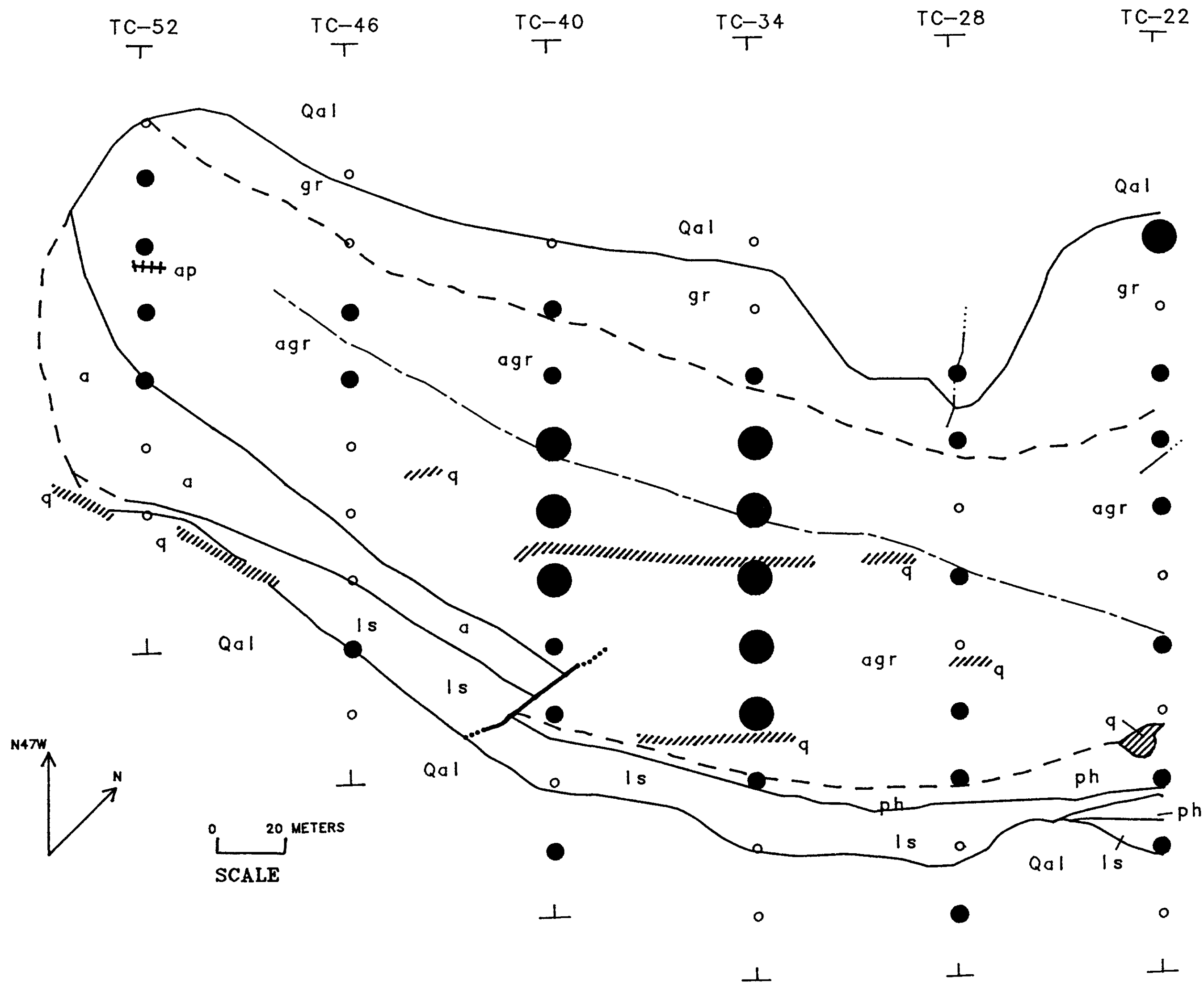


Figure 16. Map showing the distribution of silver in the ferromagnetic fraction of heavy-mineral concentrates from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



EXPLANATION

○ < 10 ppm Mo

● ≥ 25 ppm Mo

• ≥ 10 – < 25 ppm Mo

Figure 17. Map showing the distribution of molybdenum in the ferromagnetic fraction of heavy-mineral concentrates from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)

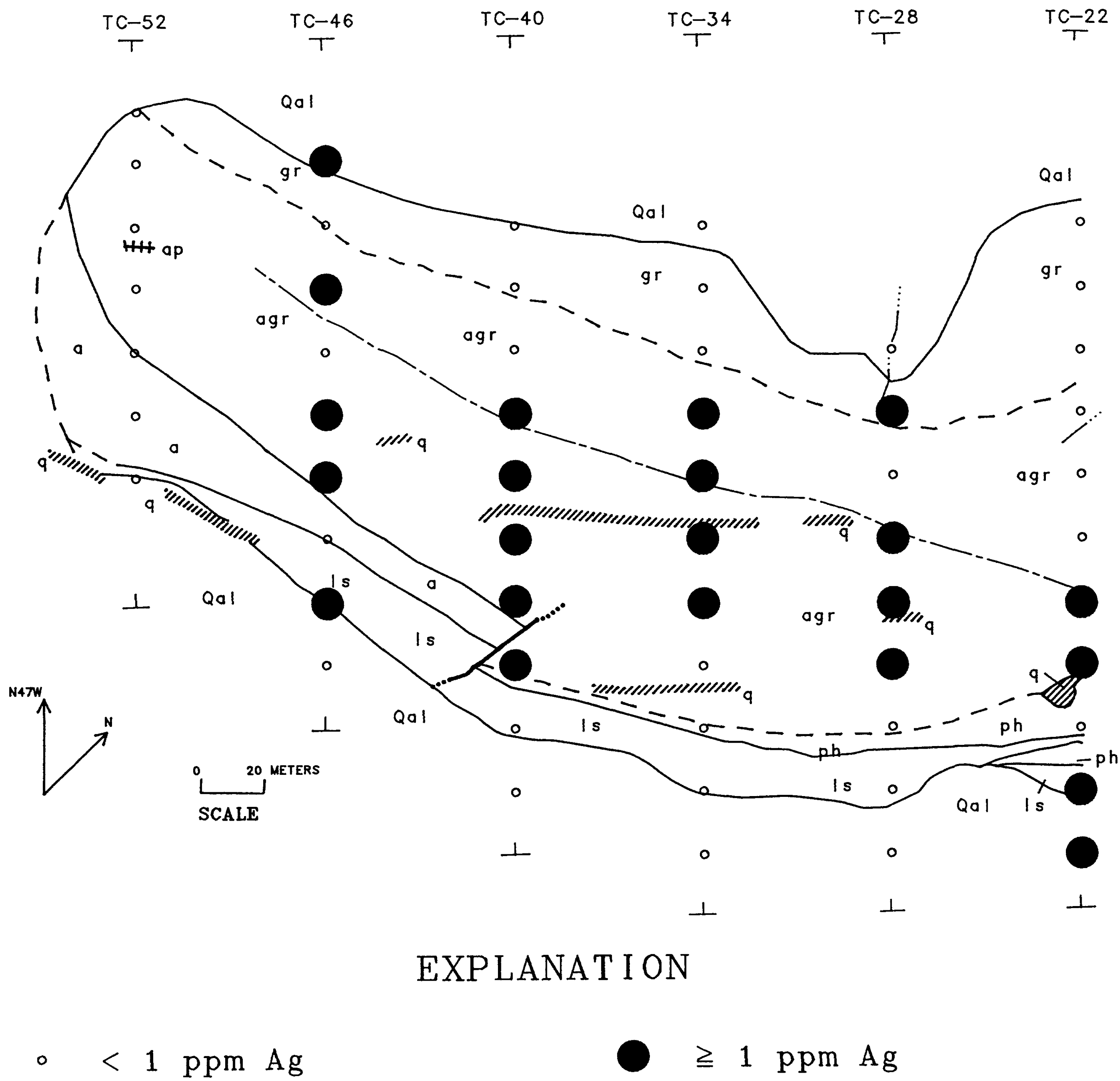
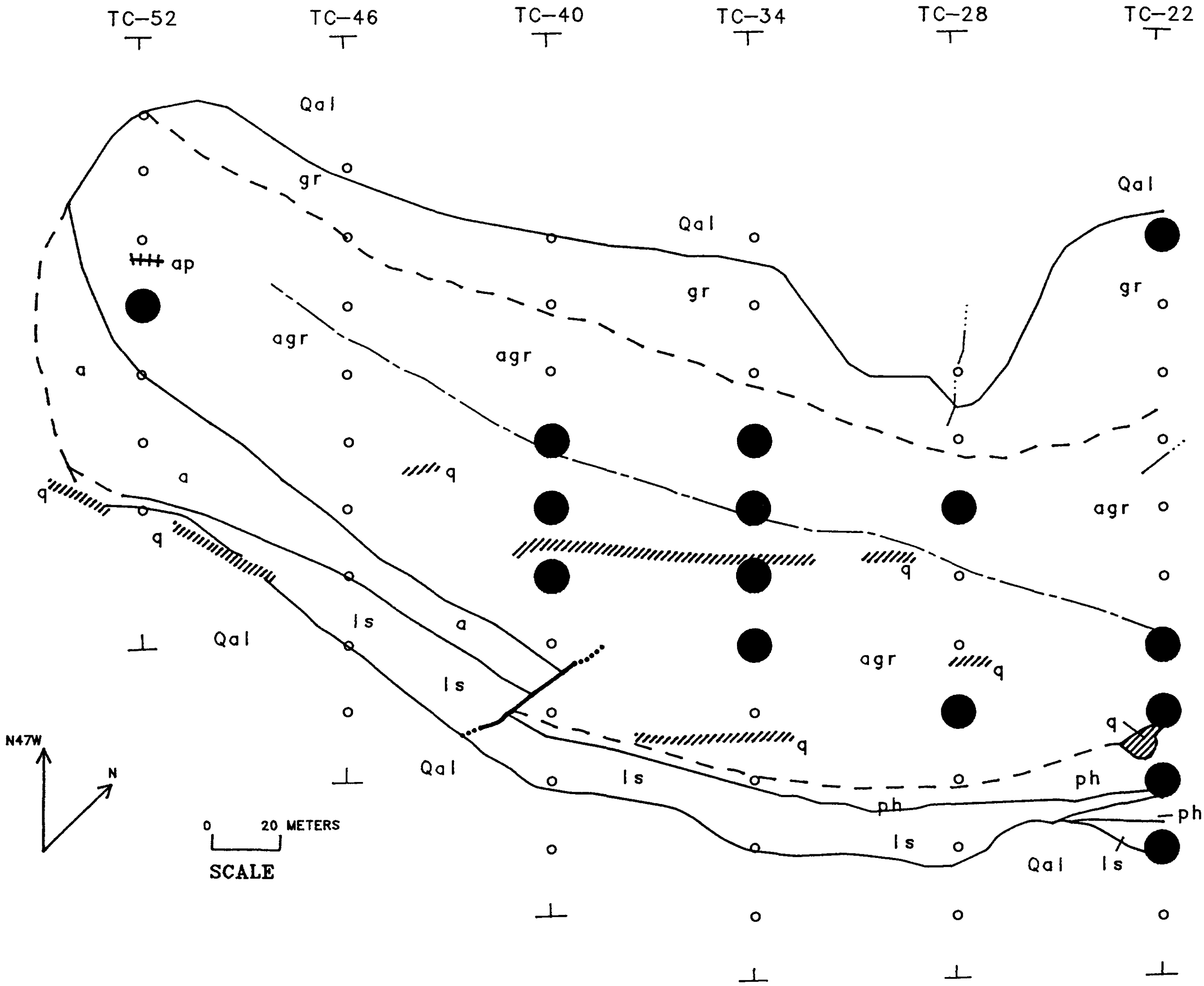


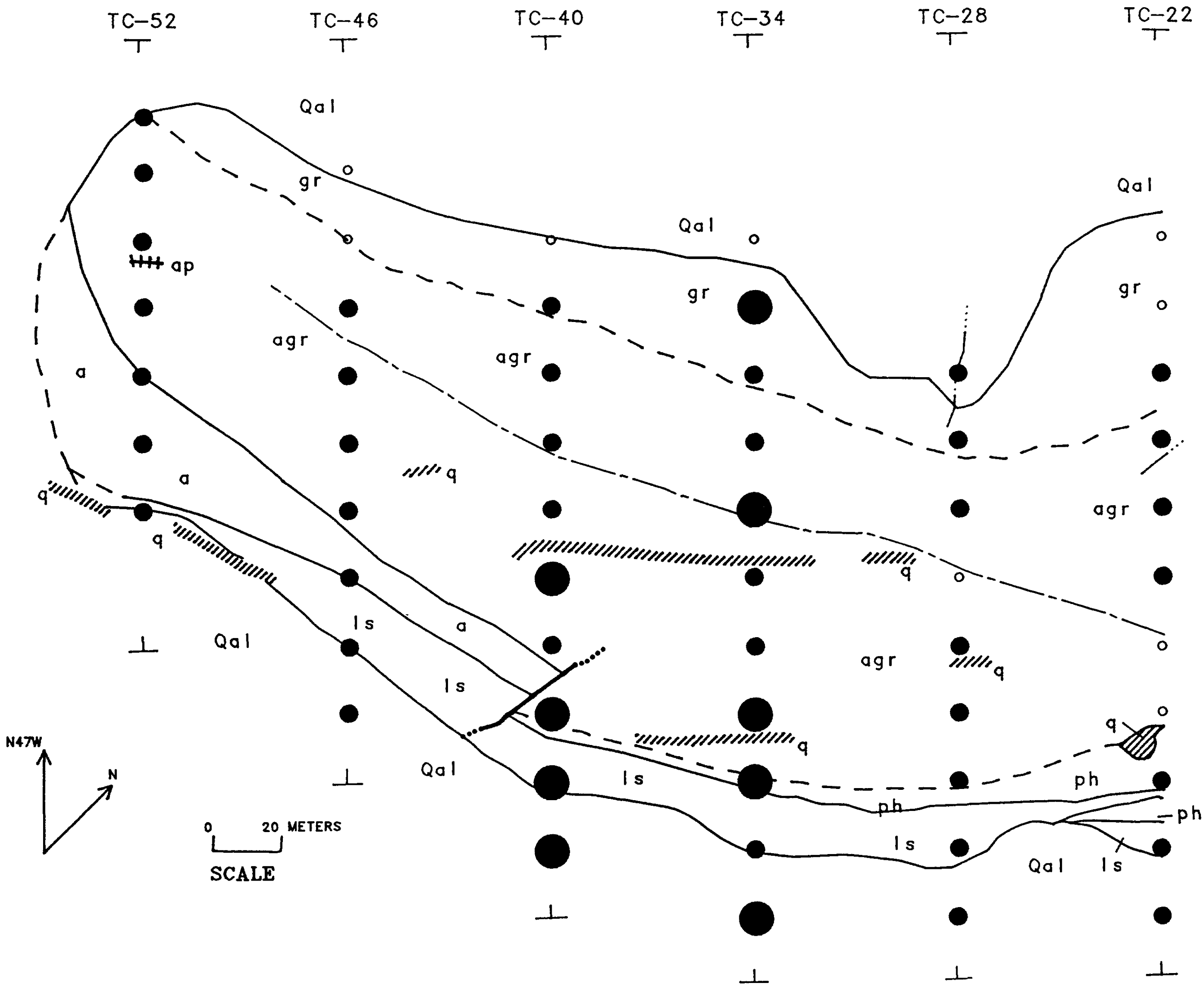
Figure 18. Map showing the distribution of silver in the paramagnetic fractions of heavy-mineral concentrates from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



EXPLANATION

∘ < 100 ppm Mo ● ≥ 100 ppm Mo

Figure 19. Map showing the distribution of molybdenum in the paramagnetic fractions of heavy-mineral concentrates from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



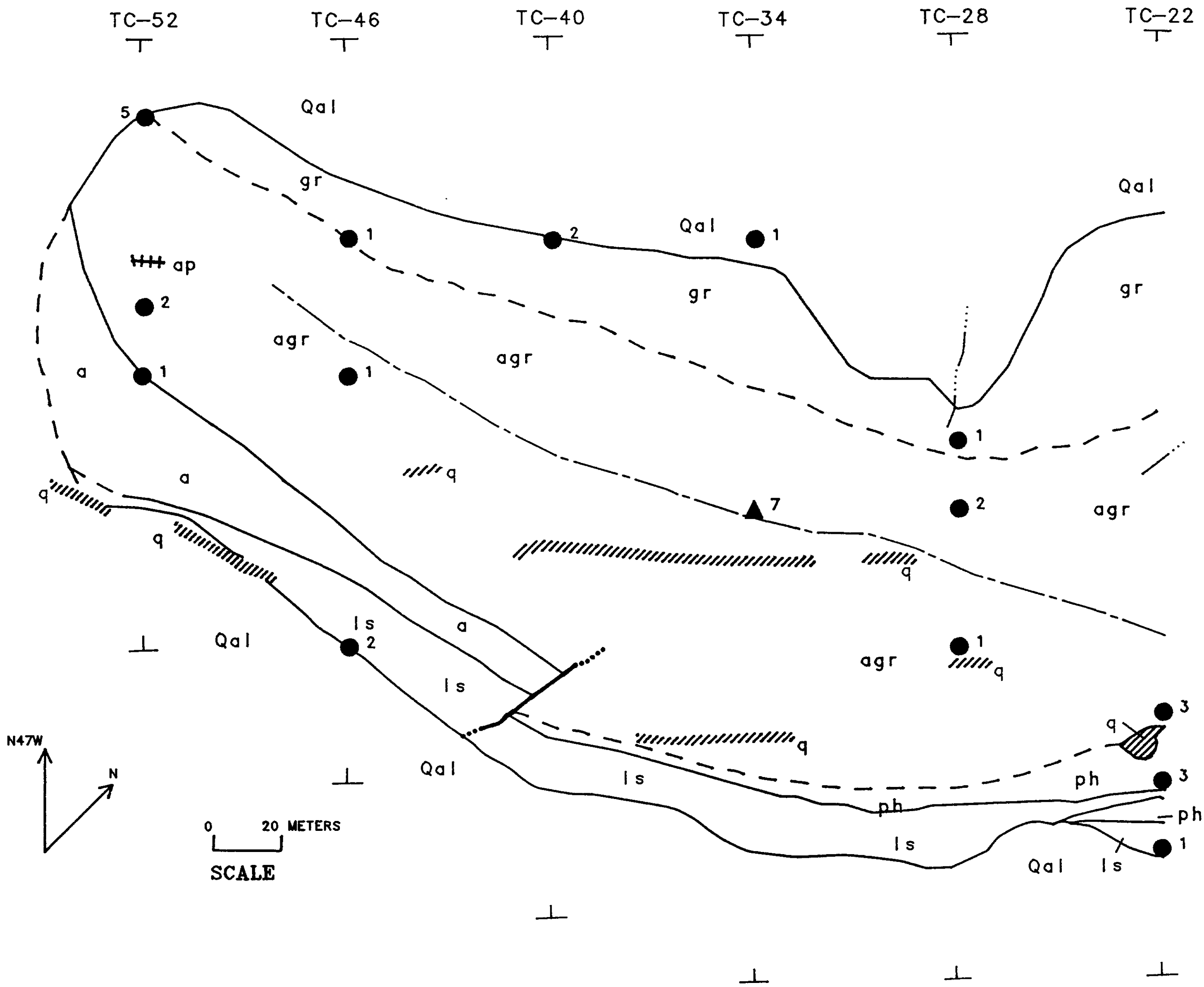
EXPLANATION

∘ 70 – 100 ppm B

● 150 – 300 ppm B

⬤ 500 – 700 ppm B

Figure 20. Map showing the distribution of boron in the nonmagnetic fraction of heavy-mineral concentrates from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)



EXPLANATION

●1 Gold Particles in Heavy Mineral Concentrate

▲5 Gold Particles in Rock (site 27)

Figure 21. Map showing the distribution of free gold particles seen in rocks or in the nonmagnetic fraction of heavy-mineral concentrates from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols as shown on figure 2.)

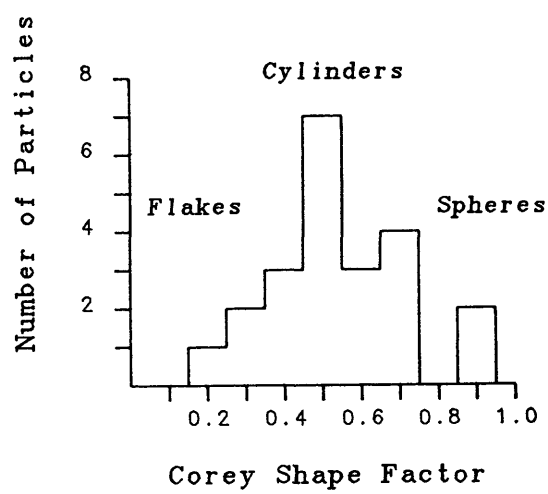


Figure 22. Histogram showing the frequency of Corey Shape Factors for 22 gold particles from the Akatasa Prospect, Xinjiang, China.

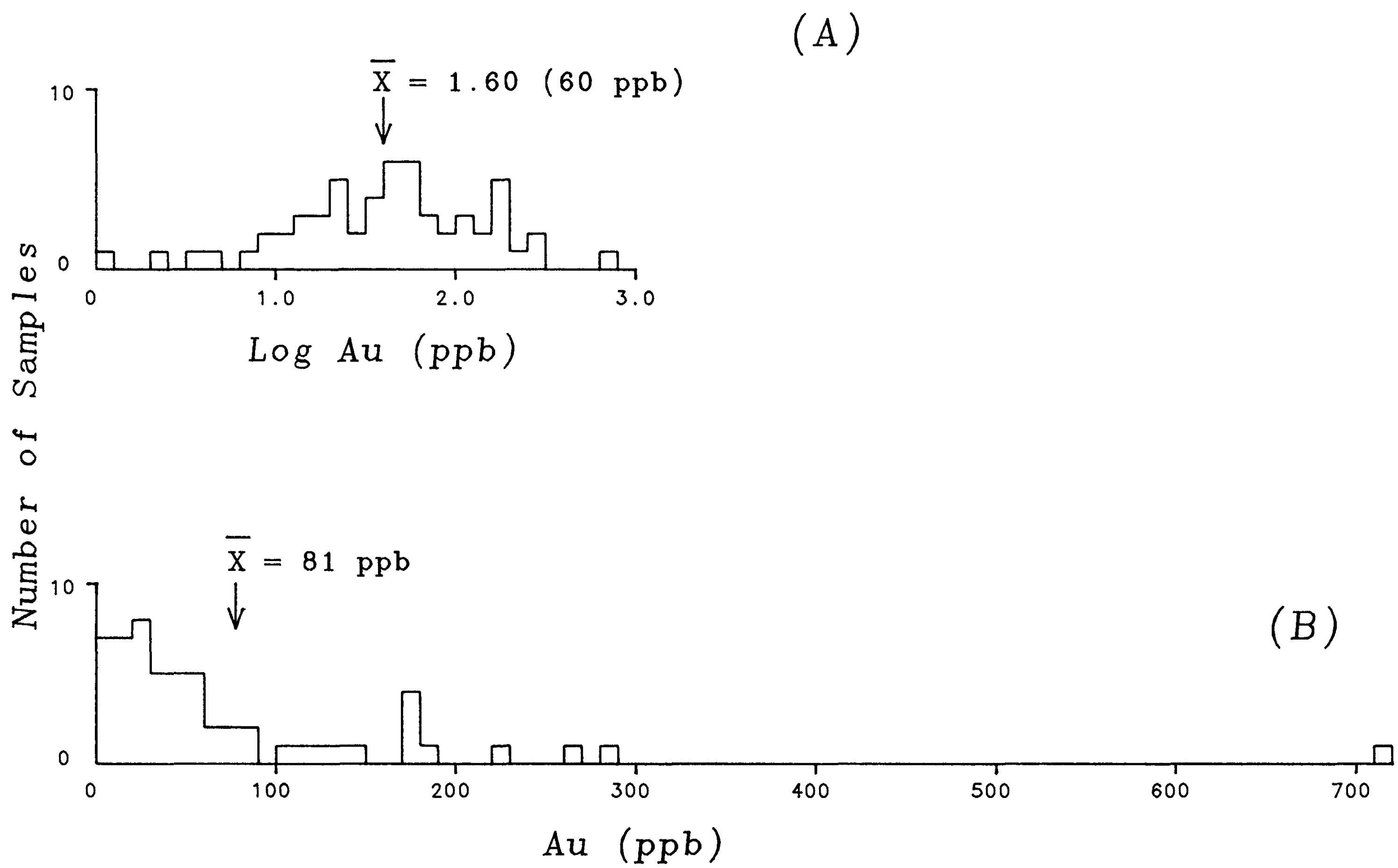


Figure 23. Frequency distributions for gold in the -10+40-mesh fraction of soil samples from the southwest part of the Akatasa prospect, Xinjiang, China, plotted on a logarithmic scale (A) and on an arithmetic scale (B).

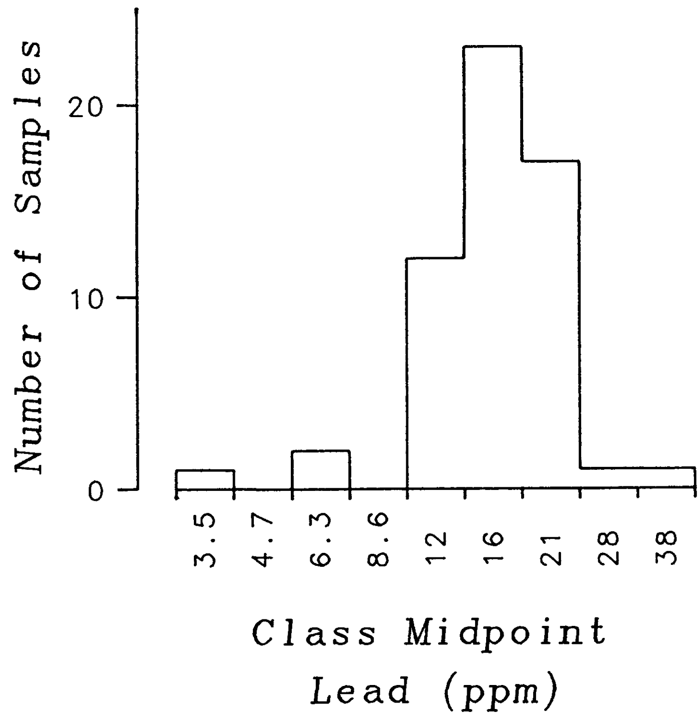


Figure 24. Frequency distribution for lead in the -10+40-mesh fraction of soils after logarithmic transformation, and including the outlying sample number 22-02, southwest part of the Akatasa prospect, Xinjiang, China.

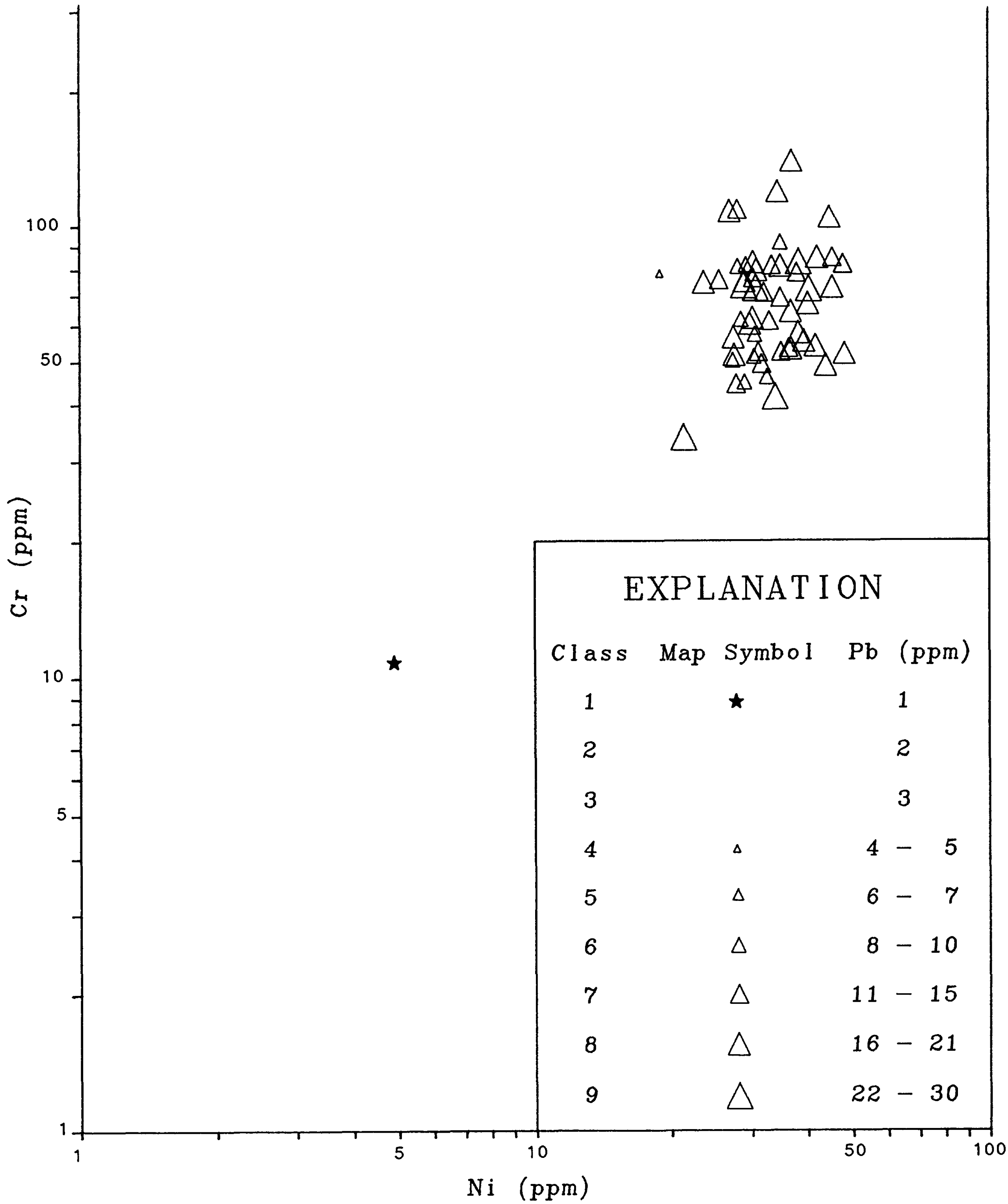


Figure 25. The distribution of lead on a scatter diagram for chromium and nickel in -10+40-mesh soils from the southwest part of the Akatasa prospect, Xinjiang, China. The vertical axis is the log of chromium values; the horizontal axis is the log of nickel values. The classes are the lead content ranked in equal logarithmic intervals. Classes 2 and 3 for lead are vacant because no values determined for lead are in these intervals. Sample 22-02, in class 1 for lead, is an extreme outlier for all three elements.

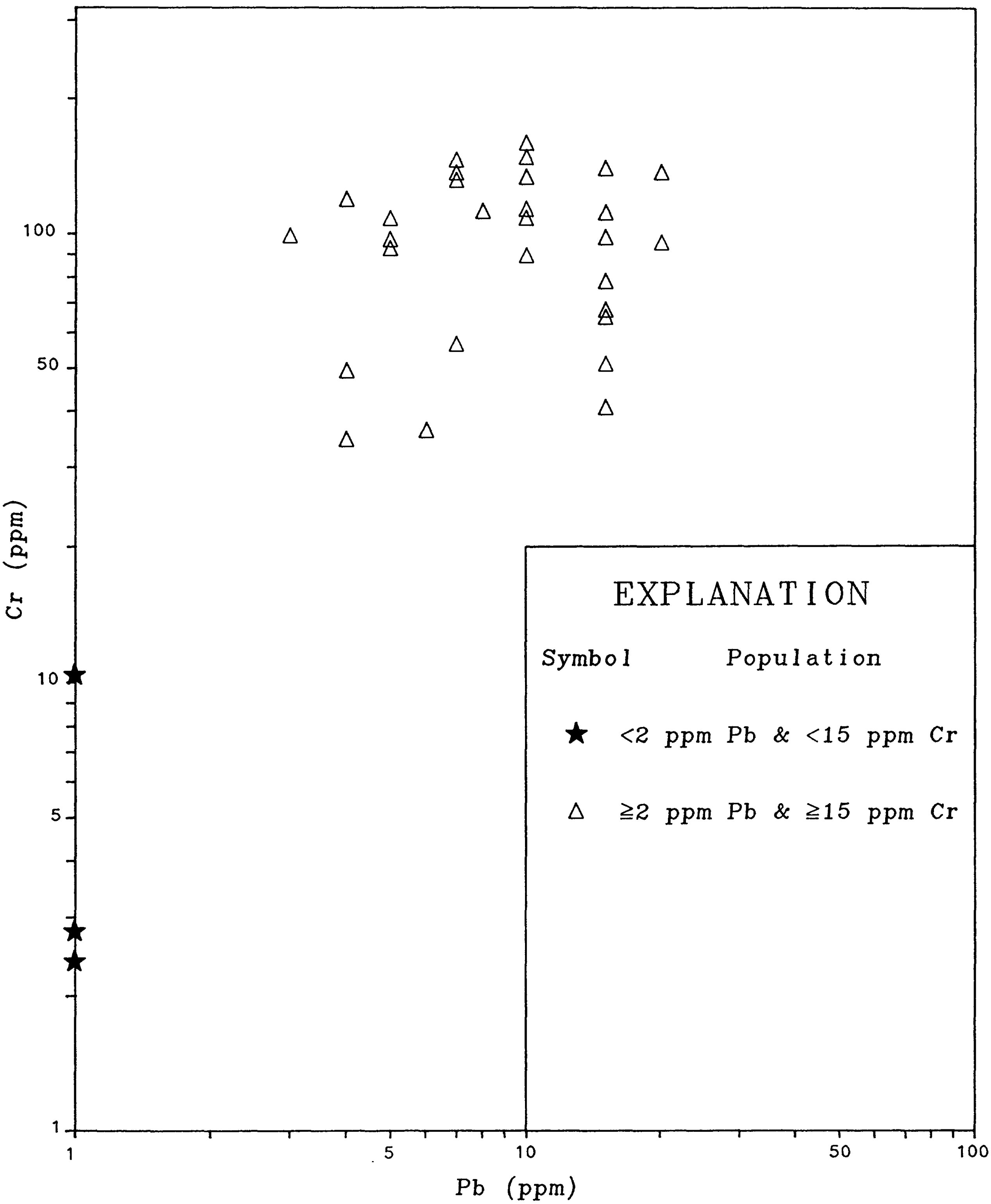


Figure 26. Scatter diagram for chromium (vertical axis) and lead (horizontal axis) in rocks from the southwest part of the Akatasa prospect, Xinjiang, China. Two distinct populations are present.

	As	Sb	Bi	Hg	Au	Ag	Cu	Pb	Zn	Cr	Co	Ni	Mo	Mn	B
As		.48	.30	.01	.36	.50	.26	-.39	-.15	-.09	.35	.28	.44	.00	-.09
Sb			-.17	-.04	.11	.28	.49	-.36	.03	-.03	.31	.35	.10	-.06	-.04
Bi				.03	.44	.23	.02	-.43	-.04	.12	.12	.00	.49	-.01	.26
Hg					.01	.11	.02	.05	.13	.13	.15	.07	.03	-.24	.08
Au						.54	.28	-.41	-.46	.25	-.03	.01	.46	-.28	.20
Ag							.33	-.29	-.02	-.31	-.05	.06	.25	-.29	.14
Cu								.01	.10	.04	-.03	-.03	-.04	-.13	-.03
Pb									.41	.07	-.58	-.64	-.60	-.15	-.26
Zn										.01	-.10	-.22	-.44	-.36	-.24
Cr											-.21	-.27	.10	-.32	.24
Co												.93	.42	.25	-.10
Ni													.42	.16	-.06
Mo														.16	.15
Mn															.17
B															

Correlation coefficient significant at 95 percent confidence level.

Correlation coefficient significant at 99 percent confidence level.

Figure 27. Correlation coefficients for 15 elements in 27 rock samples from the southwest part of the Akatasa prospect, Xinjiang, China.

	As	Sb	Bi	Hg	Au	Ag	Cu	Pb	Zn	Cr	Co	Ni	Mo	Mn	B
As		.86	.19	.28	.42	.50	.13	-.21	-.10	.43	.63	.51	.52	.45	.58
Sb			.33	.47	.44	.60	.14	.02	.15	.39	.62	.54	.63	.53	.66
Bi				.38	.52	.45	.01	.14	.36	.06	.16	.19	.42	.20	.36
Hg					.35	.43	.03	.20	.32	.03	.08	.23	.48	.56	.37
Au						.56	-.08	-.07	.19	.05	.28	.09	.47	.36	.42
Ag							.16	.27	.41	.21	.52	.48	.71	.52	.53
Cu								.02	.14	.31	.14	.02	.11	.28	.22
Pb									.48	-.26	-.05	.08	.13	.02	.02
Zn										-.04	.19	.31	.41	.23	.38
Cr											.59	.56	.24	.19	.35
Co												.72	.58	.20	.44
Ni													.56	.19	.47
Mo														.54	.62
Mn															.40
B															

Correlation coefficient significant at 95 percent confidence level.

Correlation coefficient significant at 99 percent confidence level.

Figure 28. Correlation coefficients for 15 elements in 56 samples of the -10+40-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China.

	As	Sb	Bi	Hg	Au	Ag	Cu	Pb	Zn	Cr	Co	Ni	Mo	Mn	B
As		.84	.05	.13	.14	.32	.32	-.41	-.34	.29	.36	.33	.21	.06	.44
Sb			.19	.30	.27	.52	.26	-.18	-.15	.19	.29	.25	.40	.22	.53
Bi				.20	.41	.36	-.02	.27	.17	.02	.07	.10	.43	.14	.24
Hg					.14	.45	.08	.25	.26	-.02	-.29	.03	.39	.53	.23
Au						.53	.09	.00	.05	.01	-.04	-.18	.37	.21	.27
Ag							.32	.27	.32	.03	.09	.17	.56	.40	.44
Cu								-.09	.01	.26	.06	.06	.25	.36	.34
Pb									.64	-.20	-.13	.03	.18	.11	.09
Zn										-.15	.07	.19	.34	.18	.19
Cr											.42	.52	-.12	-.09	.17
Co												.67	.05	-.38	.02
Ni													.14	-.15	.29
Mo														.36	.43
Mn															.36
B															

Correlation coefficient significant at 95 percent confidence level.

Correlation coefficient significant at 99 percent confidence level.

Figure 29. Correlation coefficients for 15 elements in 56 samples of the -40+80-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China.

	As	Sb	Bi	Hg	Au	Ag	Cu	Pb	Zn	Cr	Co	Ni	Mo	Mn	B
As		.70	.16	.01	.15	.18	.06	-.39	-.26	.18	.14	.08	-.08	.01	.31
Sb			.29	.08	.27	.46	.06	-.02	.02	-.03	.12	.02	.29	.13	.27
Bi				.12	.41	.24	.03	.09	.08	.11	.16	.03	.22	-.12	.09
Hg					.21	.28	-.01	.31	.21	-.06	-.42	-.01	.30	.41	.14
Au						.51	-.03	-.02	-.08	-.25	-.22	-.13	.32	.31	.12
Ag							.17	.42	.39	-.19	.04	.15	.57	.39	.29
Cu								-.00	.07	.29	.17	.09	.16	.16	.26
Pb									.69	-.12	-.02	.25	.32	.07	.22
Zn										-.10	.23	.34	.44	.08	.20
Cr											.49	.45	-.20	-.27	.32
Co												.61	.09	-.41	-.09
Ni													.16	-.09	.22
Mo														.29	.09
Mn															.09
B															

Correlation coefficient significant at 95 percent confidence level.

Correlation coefficient significant at 99 percent confidence level.

Figure 30. Correlation coefficients for 15 elements in 55 samples of the -80+120-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China.

	As	Sb	Bi	Hg	Au	Ag	Cu	Pb	Zn	Cr	Co	Ni	Mo	Mn	B
As		.68	-.22	.02	.17	.24	-.01	-.36	-.30	-.06	.09	-.10	-.03	-.08	.20
Sb			.07	.24	.34	.47	-.17	.00	-.03	.03	.08	-.12	.26	-.05	.23
Bi				.29	.40	.25	-.32	.36	.24	.07	-.03	-.04	.25	-.07	-.08
Hg					.37	.37	-.16	.33	.20	-.21	-.20	-.09	.43	.41	-.36
Au						.65	-.03	.01	-.01	-.18	-.26	-.22	.35	.27	-.02
Ag							-.05	.30	.27	-.08	.11	.08	.50	.24	.05
Cu								-.26	-.15	.14	-.10	-.10	-.02	.38	.00
Pb									.67	.06	.21	.39	.43	-.02	.01
Zn										-.02	.37	.42	.54	.21	.10
Cr											.09	.14	-.20	-.20	.16
Co												.67	.13	-.08	.10
Ni													.18	-.03	.08
Mo														.41	.21
Mn															-.13
B															

Correlation coefficient significant at 95 percent confidence level.

Correlation coefficient significant at 99 percent confidence level.

Figure 31. Correlation coefficients for 15 elements in 56 samples of the -120-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China.

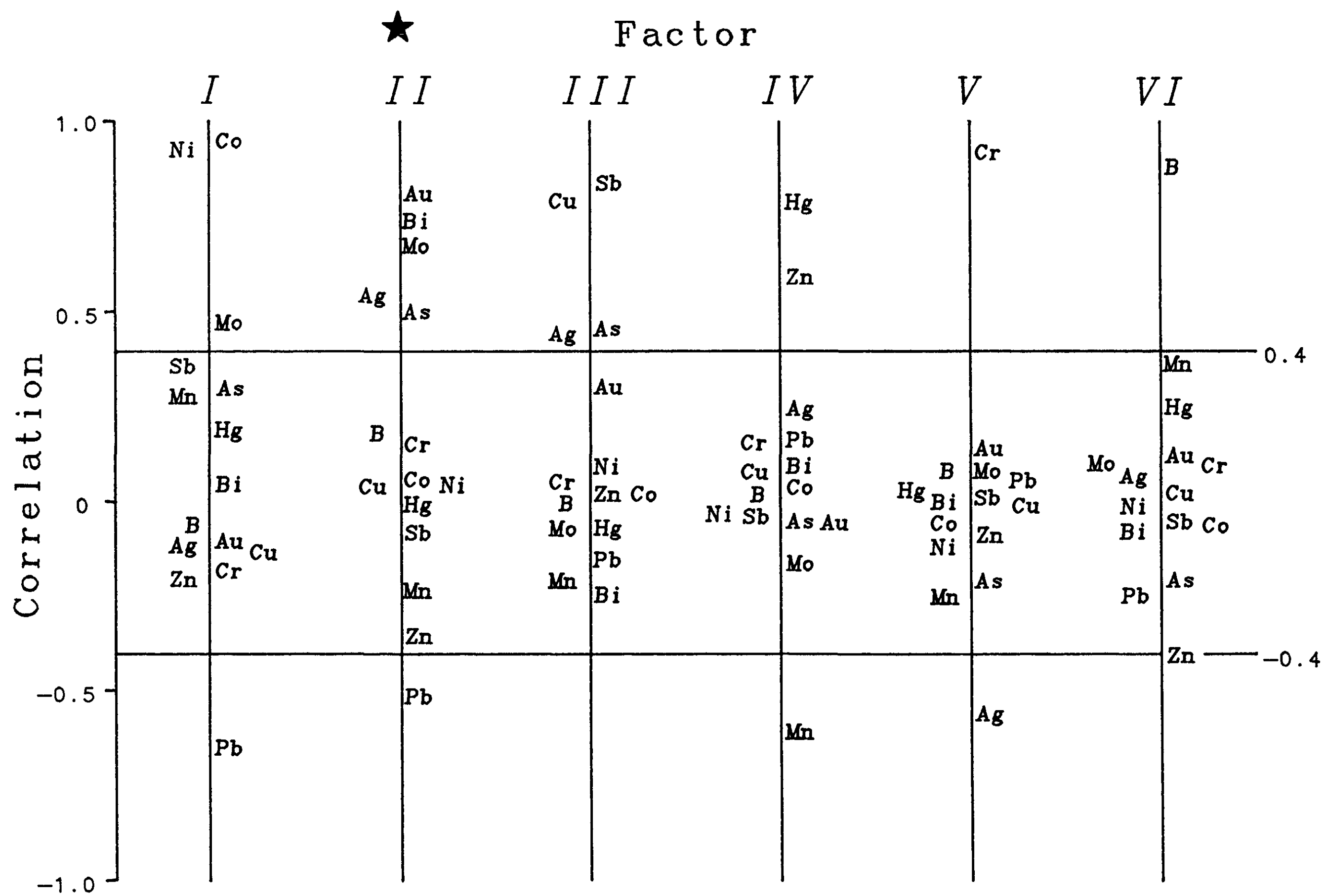


Figure 32. Correlation of variables (elements) with varimax scores for a 6-factor model of chemical data for rocks from the southwest part of the Akatasa prospect, Xinjiang, China. Star indicates the gold factor.

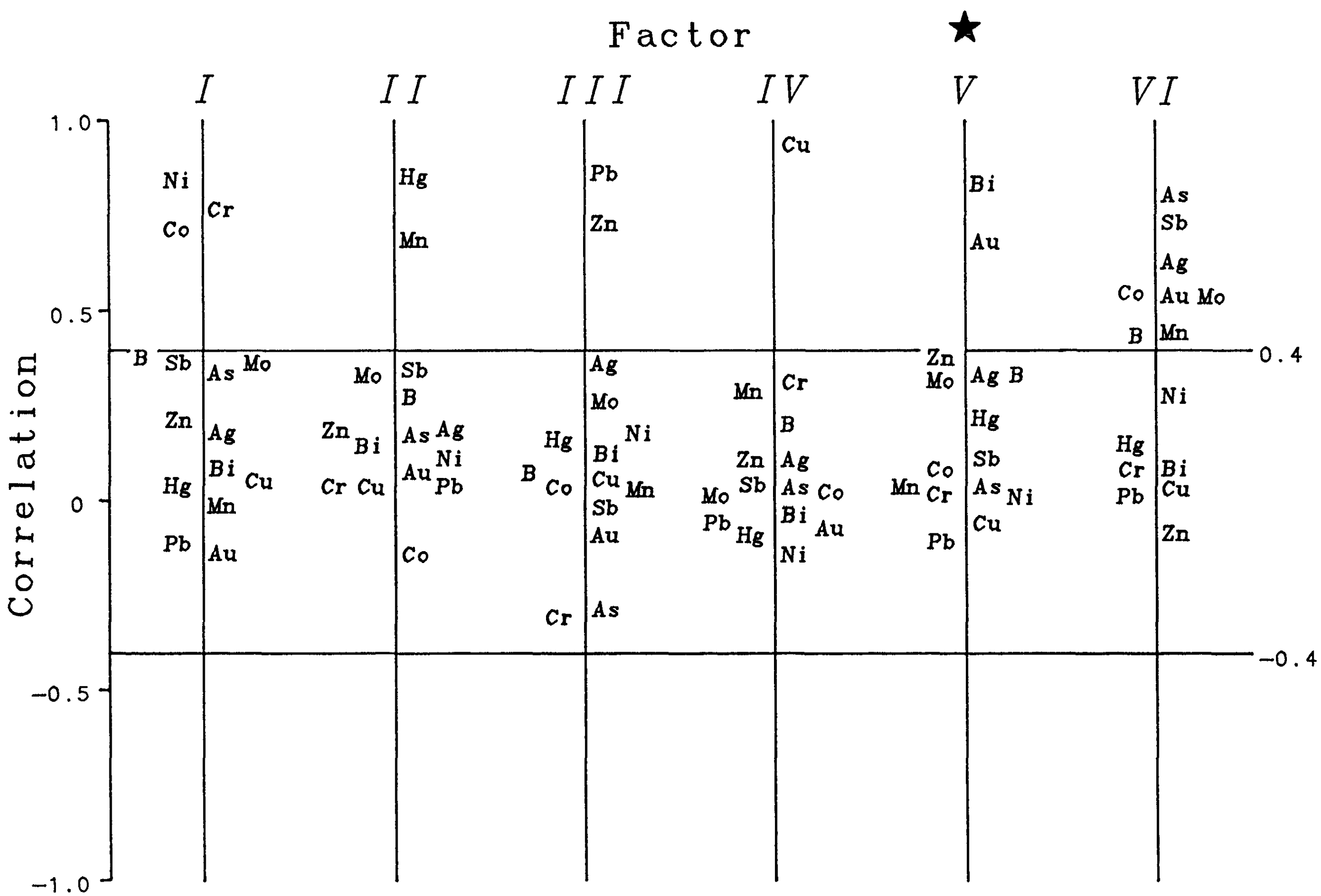


Figure 33. Correlation of variables (elements) with varimax scores for a 6-factor model of chemical data for -10+40-mesh soils from the southwest part of the Akatasa prospect, Xinjiang, China. Star indicates the gold factor.

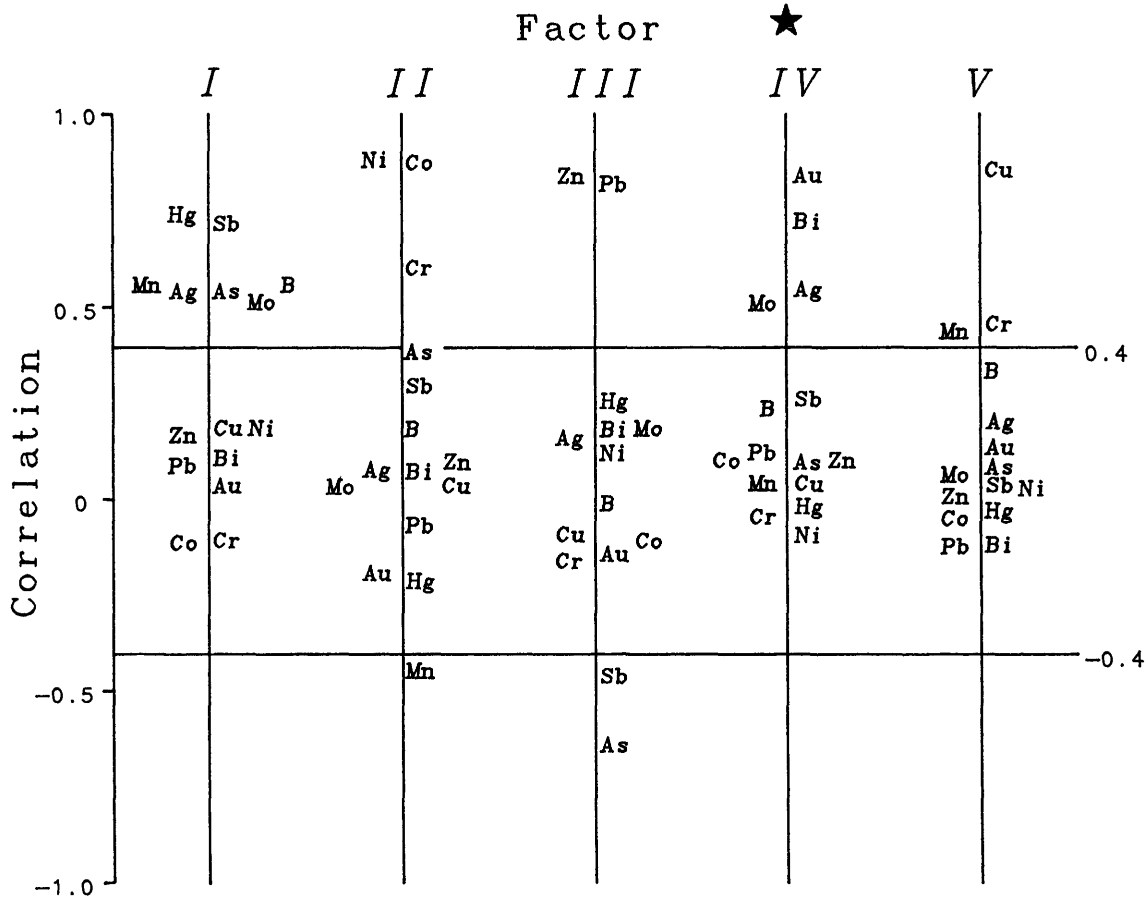


Figure 34. Correlation of variables (elements) with varimax scores for a 5-factor model of chemical data for -40+80-mesh soils from the southwest part of the Akatasa prospect, Xinjiang, China. Star indicates the gold factor.

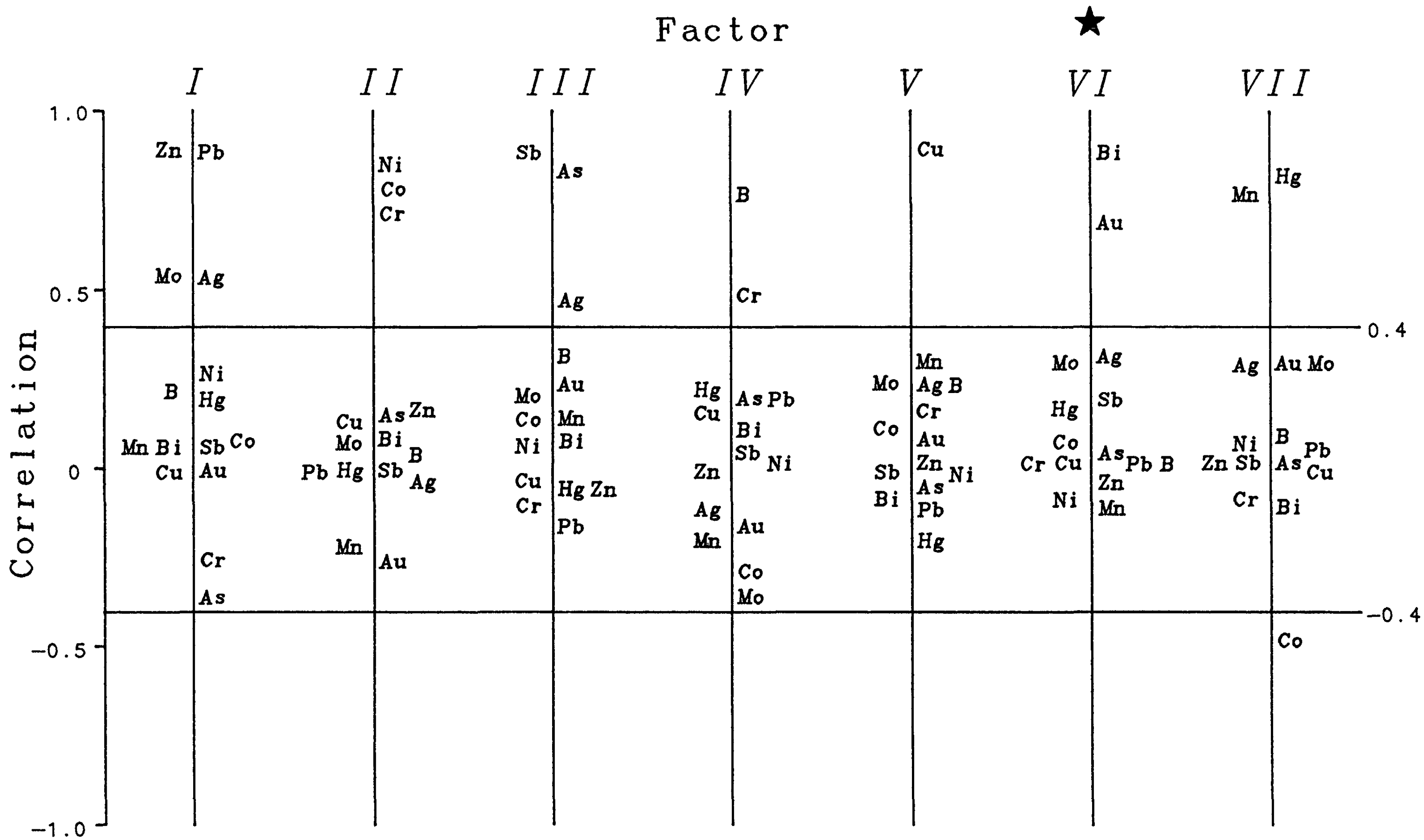


Figure 35. Correlation of variables (elements) with varimax scores for a 7-factor model of chemical data for -80+120-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China. Star indicates the gold factor.

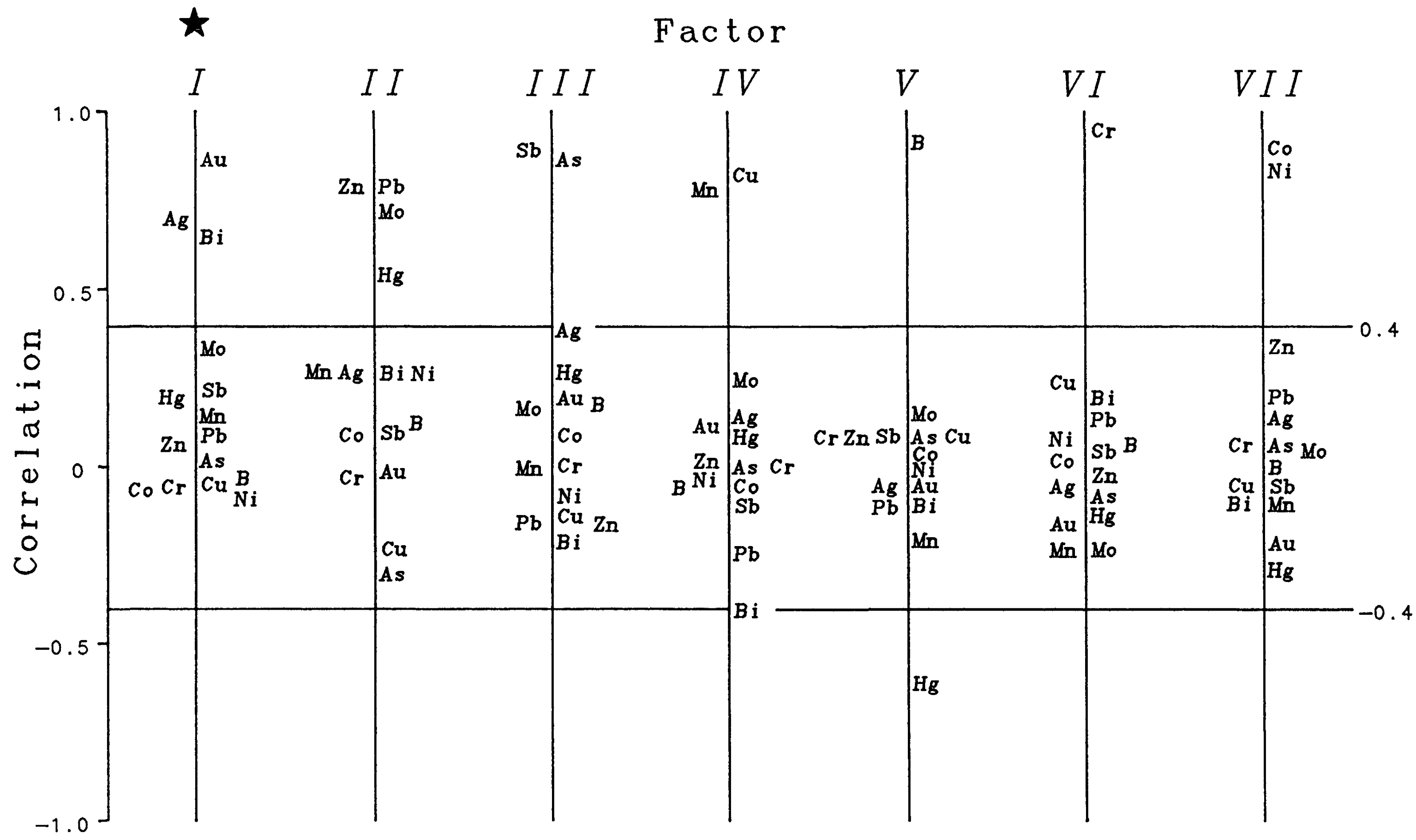
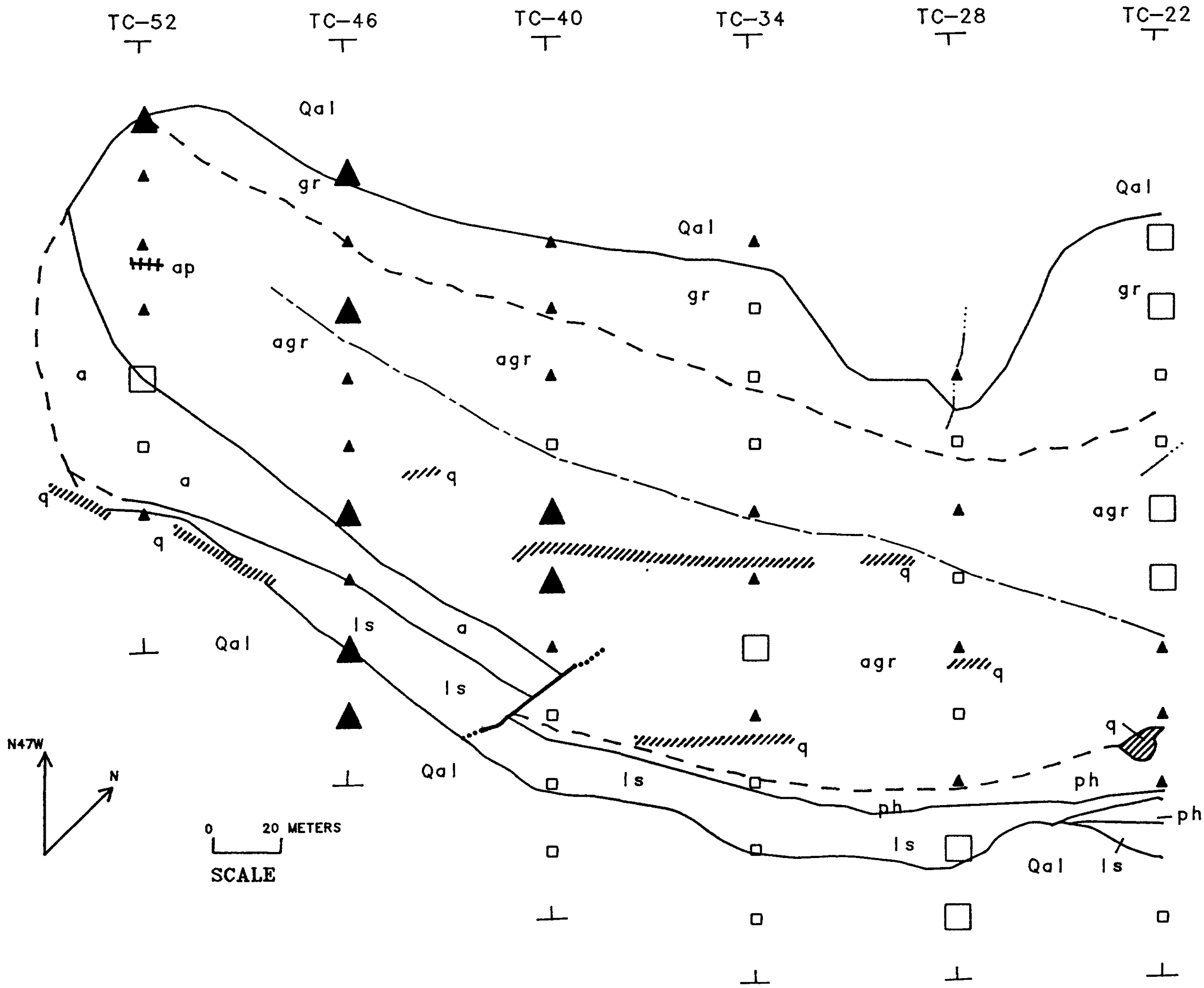


Figure 36. Correlation of variables (elements) with varimax scores for a 7-factor model of chemical data for -120-mesh soils from the southwest part of the Akatasa prospect, Xinjiang, China. Star indicates the gold factor.



EXPLANATION

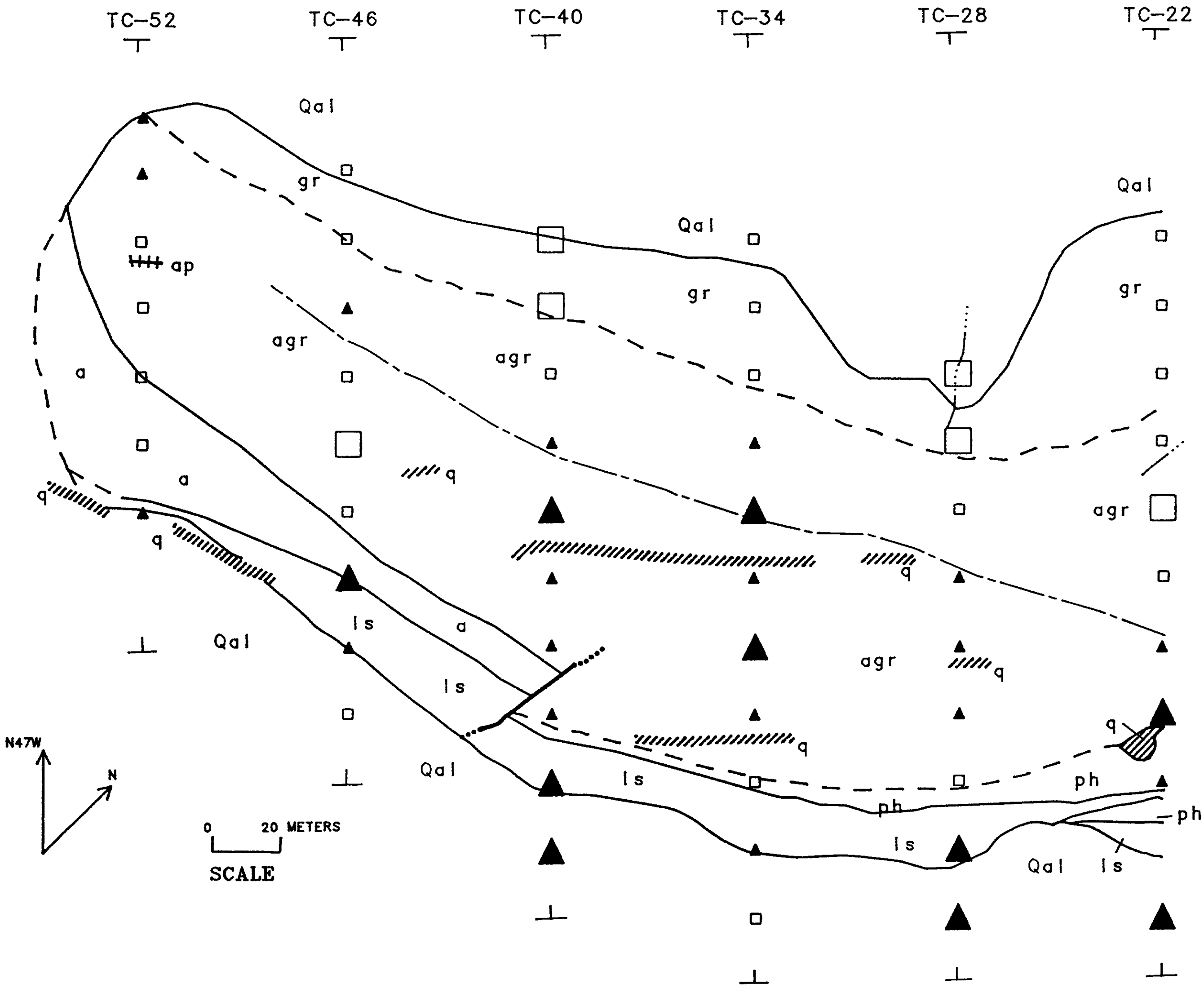
□ < -1.0

▲ ≧ 0.0 to < 1.0

□ ≧ -1.0 to < 0.0

▲ ≧ 1.0

Figure 37. Map showing the distribution of factor-5 scores (Bi, Au) for the -10+40-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols and traverse lines as shown on figure 2.)



EXPLANATION

□ < −1.0

▫ ≧ −1.0 to < 0.0

▴ ≧ 0.0 to < 1.0

▲ ≧ 1.0

Figure 38. Map showing the distribution of factor-6 scores (As, Sb, Ag, Au, Co, Mo, B, Mn) for the -10+40-mesh fraction of soils from the southwest part of the Akatasa prospect, Xinjiang, China. (Geologic symbols and traverse lines as shown on figure 2.)

Table A1.--Analytical data for 32 rock samples, Akatasa prospect, Xinjiang, China. [Au and Hg in ppb, all other elements in ppm].

Sample	As	Sb	Bi	Hg	Au	Ag	Cu	Pb	Zn	Cr	Co	Ni	Mo	W	Mn	B
22-02R	5.4	.18	.34	5	3.6	.05	2	1	10	2.8	3.1	6.0	.11	<5	1000	30
22-03R	6.0	.14	.31	6	9.0	.11	5	4	10	34.6	16.3	36.5	1.9	<5	1600	20
22-04aR	2.0	.08	.28	3	13	.29	5	4	30	49.1	3.2	13.8	.89	20	300	30
22-04bR	1.6	.06	.31	3	42	.29	10	6	40	36.2	3.5	11.2	.66	20	250	30
22-05R	1.4	.02	.21	3	1.3	.07	15	15	30	77.6	1.5	1.2	.51	<5	1000	15
22-07R	2.4	.02	.41	3	.6	.06	10	15	45	40.6	1.7	.9	.31	<5	800	10
22-09R	2.6	.22	.17	4	.5	.05	10	15	40	64.6	1.9	1.0	.32	<5	900	15
28-13R	9.8	.68	.52	5	2.6	.05	2	1	10	2.4	2.2	.4	.10	<5	1000	7
28-14R	2.6	.20	.31	3	64	.06	25	4	20	118	10.8	28.6	2.4	<5	800	20
28-15R	1.4	.08	.31	6	3.8	.05	5	10	30	146	1.6	1.2	1.2	<5	700	30
28-16R	4.8	.08	.69	5	152	.30	30	7	30	56.2	1.5	.8	.48	20	600	30
28-17R	2.2	.08	.28	3	75	.21	20	15	35	50.7	1.4	.7	.27	<5	700	20
34-23R	3.8	.32	.45	4	5.6	.05	2	1	10	10.4	2.1	.6	.12	<5	800	7
34-24R	1.6	.08	.28	12	4.8	.05	15	15	35	138	1.5	.8	.22	<5	600	30
34-25R	1.4	.04	.38	4	2.8	.04	5	8	30	111	1.5	.9	.25	<5	650	30
34-26R	6.4	.62	.31	4	16	.25	75	7	30	135	1.4	1.2	.73	15	600	40
34-27aR	2.2	.02	.31	6	266	.13	5	7	20	144	1.5	.8	1.3	<5	650	30
34-27bR	11.8	.58	.33	13	3698	.71	5	5	20	91.8	6.9	2.4	3.7	<5	300	5
34-28R	11.8	.04	.45	3	33	.10	5	7	20	130	2.0	1.3	2.2	<5	800	30
40-35R	2.2	.04	.62	3	26	.10	10	10	30	112	1.6	1.3	.47	<5	700	40
40-36R	1.4	.02	.45	5	3.3	.05	7	10	30	107	1.5	.9	.33	<5	600	30
40-37R	1.4	.06	.38	3	7.7	.05	7	10	30	132	1.7	1.2	.44	<5	600	20
40-38R	1.8	.02	.52	6	13	.06	7	15	30	110	2.1	1.4	2.6	10	600	20
40-39R	5.0	.14	.86	6	40	.20	7	3	40	98.2	3.2	1.5	3.4	25	600	20
40-40R	4.6	.08	.62	9	14	.08	20	5	40	96.2	23.4	18.3	3.6	<5	600	30
46-46R	5.2	.18	.31	5	147	.09	20	10	30	157	2.3	1.9	.42	<5	200	7
46-48R	3.6	.04	.41	3	11	.10	7	20	35	135	2.1	.9	.70	<5	500	20
46-49R	2.8	.06	.38	7	2.2	.06	7	5	45	107	14.5	15.9	.27	<5	800	20
52-52R	4.2	.16	.24	6	.8	.15	7	15	80	67.0	5.0	4.8	.29	<5	500	15
52-53R	2.2	.04	.21	11	2.0	.08	10	20	40	94.4	1.9	1.3	.21	<5	400	20
52-54R	1.6	.04	.24	8	6.7	.07	7	15	30	97.1	1.6	.9	.21	<5	500	30
52-55R	3.4	.04	.45	20	50	.37	15	10	30	88.4	1.8	1.8	1.4	<5	400	20

Table A2.--Analytical data for 60 soil samples, -10+40 mesh fraction, Akatasa prospect, Xinjiang, China. [Au and Hg in ppb, all other elements in ppm].

Sample	As	Sb	Bi	Hg	Au	Ag	Cu	Pb	Zn	Cr	Co	Ni	Mo	W	Mn	B
22-01-1	12.8	.92	.57	8	70	.16	60	15	25	30.8	21.3	18.2	1.0	<5	800	25
22-02-1	11.0	.56	.34	8	54	.10	15	3	10	11.9	7.9	6.7	.29	<5	900	10
22-03-1	10.4	.64	.66	7	140	.16	20	10	30	103	25.2	41.9	2.1	5	800	30
22-04a-1	7.6	.66	.69	5	178	.30	40	15	50	31.1	18.5	18.3	1.5	10	700	20
22-04b-1	8.2	.88	.80	7	234	.34	40	15	60	35.1	20.5	12.7	1.5	10	750	20
22-05-1	5.2	.42	.54	14	118	.13	8	15	35	21.2	4.1	9.9	1.0	5	800	20
22-06-1	5.6	.70	.43	8	7	.06	10	15	40	23.4	6.2	14.3	.34	<5	700	20
22-07-1	4.0	.30	.34	14	13	.07	7	20	50	21.2	4.2	12.1	.32	<5	600	15
22-08-1	5.2	.36	.34	5	52	.06	5	20	40	26.8	4.5	12.5	.50	<5	650	15
22-09-1	5.6	.40	.46	7	8	.08	15	20	50	28.4	5.9	14.5	.49	<5	700	15
22-10-1	7.0	.58	.46	15	1	.09	20	20	50	38.0	8.7	21.0	.61	<5	600	15
22-11-1	5.2	.42	.37	7	4	.07	15	20	45	25.1	9.4	43.6	1.2	<5	400	15
28-12-1	8.0	.54	.29	6	21	.11	20	20	10	33.7	10.5	13.9	.60	<5	800	10
28-13-1	14.8	1.0	.40	10	23	.09	25	7	10	104	11.5	18.6	.66	<5	1600	20
28-14-1	10.4	.76	.60	6	11	.15	30	10	85	120	31.9	47.6	2.0	<5	800	30
28-15-1	6.0	.54	.57	14	45	.18	40	18	50	49.8	9.6	16.3	1.0	<5	1600	20
28-16-1	5.6	.48	.69	17	63	.36	20	20	50	44.8	9.2	17.1	.95	<5	1000	20
28-17-1	9.0	.64	.40	23	45	.14	45	18	60	48.2	8.7	20.7	.62	<5	1200	25
28-18-1	8.2	.60	.60	16	35	.08	65	15	50	52.2	6.4	17.0	.53	<5	700	25
28-19a-1	3.2	.26	.40	3	2	.05	85	15	35	45.6	3.2	6.9	.17	<5	600	10
28-19b-1	3.6	.34	.51	14	7	.07	100	15	40	60.0	10.4	10.3	.29	<5	550	15
28-20-1	2.0	.20	.49	8	8	.04	85	15	35	37.2	3.0	6.5	.21	<5	550	8
34-21-1	7.0	.54	.43	5	25	.08	75	15	40	161	12.6	23.9	.86	<5	600	30
34-22-1	10.6	.88	.51	16	37	.07	20	15	25	59.1	12.6	13.6	.50	<5	600	30
34-23-1	10.2	.72	.46	13	20	.08	45	7	20	82.4	12.2	27.2	.40	<5	700	20
34-24-1	6.8	.64	.49	10	48	.15	220	20	100	51.7	8.7	19.0	1.1	<5	1500	50
34-25-1	11.2	.88	.23	13	87	.11	50	10	40	33.2	6.2	11.6	.63	<5	1700	25
34-26-1	7.2	.74	.57	18	36	.16	30	10	60	40.6	8.3	19.9	1.2	<5	1600	30
34-27-1	13.0	.84	.76	34	281	.22	25	15	40	39.7	6.5	17.8	2.8	<5	1800	30
34-28-1	6.8	.62	.45	17	71	.11	35	15	60	34.9	6.1	15.5	1.5	<5	1200	25
34-29-1	4.8	.38	.42	7	19	.10	85	15	50	38.6	6.0	13.3	.68	<5	850	20
34-30-1	5.2	.34	.57	4	15	.05	25	15	35	26.3	3.8	8.9	.20	<5	600	10
34-31-1	5.2	.30	.36	4	40	.08	10	20	60	27.6	7.5	14.2	.32	<5	500	15
40-32-1	8.6	.62	.45	3	28	.11	10	15	35	44.2	9.6	16.4	.67	<5	800	25
40-33-1	11.8	1.0	.60	9	61	.24	60	20	100	44.0	22.4	32.5	.96	<5	850	30
40-34-1	9.8	1.1	.48	15	50	.14	30	10	70	72.5	18.1	25.9	1.0	<5	800	25
40-35-1	6.2	.64	.63	8	43	.20	30	20	130	44.7	15.6	27.3	1.4	<5	1200	30
40-36a-1	7.8	.76	.93	20	179	.28	20	15	80	41.5	11.3	22.0	2.0	<5	1000	25
40-36b-1	8.0	.78	.69	21	190	.23	30	20	70	47.3	14.7	26.9	2.0	5	1200	30
40-37-1	11.8	.86	1.0	25	710	.27	35	20	70	47.4	12.8	23.1	.98	<5	1200	20
40-38-1	9.0	.80	.66	35	56	.12	50	20	80	44.6	15.3	22.9	3.6	<5	1800	20
40-39-1	7.2	.56	.75	17	12	.15	20	20	50	31.2	5.1	13.9	.76	<5	800	25
40-40-1	5.2	.40	.63	13	22	.08	75	15	65	37.9	7.3	15.4	.70	<5	800	20
40-41-1	4.8	.36	.57	17	19	.06	15	15	50	34.4	8.2	14.8	.57	<5	700	25
40-42-1	5.4	.50	.93	19	44	.08	20	15	50	37.6	9.9	15.3	1.1	<5	900	30
46-43-1	7.0	.98	1.0	18	220	.12	20	15	65	24.9	6.1	10.1	2.0	10	700	30
46-44-1	8.2	.84	.78	17	132	.18	40	35	100	29.0	11.0	16.8	.99	<5	1000	30
46-45-1	5.6	.42	.84	12	267	.09	10	15	50	34.6	5.7	13.6	.61	<5	800	20
46-46-1	5.6	.54	.87	11	21	.09	15	20	50	47.1	5.2	43.9	.54	<5	800	20
46-47-1	6.0	.44	.81	7	33	.07	15	15	40	26.6	3.7	10.3	.54	<5	800	20
46-48-1	7.8	.78	1.3	17	178	.32	50	25	80	45.2	9.9	20.0	1.2	<5	1200	20
46-49-1	6.6	.56	.63	8	173	.05	10	10	40	50.3	10.9	13.6	.42	<5	700	12
46-50-1	4.6	.32	.45	4	184	.09	10	10	50	43.4	14.1	13.7	.47	<5	500	15
46-51-1	7.2	.44	.66	4	22	.05	40	10	30	23.2	7.4	9.9	.58	<5	1000	15
52-52-1	6.0	.28	.45	4	15	.04	50	10	30	22.3	4.3	8.2	.41	<5	550	15
52-53-1	5.0	.30	.25	4	5	.08	60	15	40	39.3	7.5	13.0	.52	<5	700	15
52-54-1	6.8	6.0	.53	16	80	.08	30	10	30	31.7	6.1	15.9	.46	<5	800	20
52-55-1	7.0	.44	.61	12	50	.11	30	15	40	42.4	7.0	16.2	.66	<5	1000	20
52-56-1	6.6	.48	.53	8	122	.12	35	15	30	28.2	10.8	12.0	.62	<5	500	25
52-57-1	12.0	.72	.94	4	105	.14	45	10	30	58.8	9.5	17.5	.65	<5	600	40

Table A3.--Analytical data for 60 soil samples, -40+80 mesh fraction, Akatasa prospect, Xinjiang, China. [Au and Hg in ppb, all other elements in ppm].

Sample	As	Sb	Bi	Hg	Au	Ag	Cu	Pb	Zn	Cr	Co	Ni	Mo	W	Mn	B
22-01-2	15.6	1.2	.60	8	50	.11	60	7	30	38.7	34.1	22.7	1.3	<5	950	25
22-02-2	12.6	.74	.43	7	36	.06	7	1	10	12.7	8.4	6.1	.28	<5	800	10
22-03-2	12.8	.86	.80	11	205	.14	20	10	40	86.7	35.6	50.9	2.3	10	900	40
22-04a-2	9.2	.80	1.2	7	212	.30	40	15	50	34.9	26.6	20.9	2.0	10	850	20
22-04b-2	8.6	.82	1.0	9	192	.34	40	15	70	38.4	27.7	26.3	2.0	15	900	25
22-05-2	6.8	.56	.57	21	197	.18	20	20	50	23.6	5.7	14.0	1.7	5	1300	20
22-06-2	7.2	.62	.43	15	11	.09	20	20	70	27.1	15.1	22.7	.71	<5	1300	20
22-07-2	6.0	.46	.40	16	8	.09	10	25	70	28.2	10.8	19.5	.61	<5	750	15
22-08-2	7.2	.70	.34	12	6	.08	15	20	60	38.6	10.3	20.2	.72	<5	900	15
22-09-2	7.0	.50	.66	8	30	.08	15	20	70	39.1	9.3	20.3	.72	<5	800	15
22-10-2	8.6	.70	.66	23	1	.10	25	20	70	44.2	16.7	29.2	.86	<5	1200	15
22-11-2	8.2	.54	.37	15	4	.10	40	20	80	35.9	21.7	32.6	2.0	<5	650	15
28-12-2	11.6	.80	.31	9	12	.10	40	15	25	43.2	21.3	22.6	.81	<5	700	10
28-13-2	15.6	1.1	.40	13	5	.11	30	7	20	98.6	19.8	23.2	.64	<5	1500	20
28-14-2	11.0	.86	.57	28	14	.12	40	15	80	145	28.4	52.4	1.8	<5	1000	25
28-15-2	7.0	.74	.63	19	83	.18	40	18	50	50.6	11.6	18.6	1.3	<5	2000	20
28-16-2	8.0	.74	.66	31	218	.40	85	25	60	72.2	12.4	17.2	.98	<5	1800	20
28-17-2	13.2	1.0	.54	34	23	.14	50	20	60	54.5	12.6	26.8	.91	<5	1800	50
28-18-2	8.4	.64	.71	24	12	.11	80	15	50	64.5	10.4	24.0	.87	<5	850	20
28-19a-2	5.8	.40	.63	8	43	.14	200	20	100	75.9	15.5	22.9	.81	<5	1500	20
28-19b-2	6.6	.58	.57	16	22	.12	80	20	65	70.2	12.8	22.9	.74	<5	1100	20
28-20-2	5.2	.38	.31	9	8	.06	50	20	70	50.8	7.9	15.9	.83	<5	1200	25
34-21-2	10.2	.84	.34	8	13	.07	50	10	50	68.6	17.0	22.6	.63	<5	700	30
34-22-2	13.0	1.1	.46	17	18	.10	40	10	25	52.7	18.0	21.2	.67	<5	1000	30
34-23-2	12.8	.92	.57	16	11	.08	45	10	20	70.9	15.5	32.8	.35	<5	800	20
34-24-2	8.0	.71	.69	14	22	.20	60	20	120	40.5	17.8	28.7	1.6	<5	2500	50
34-25-2	13.0	.96	.29	19	81	.13	70	10	50	44.4	8.5	22.7	.94	<5	2200	25
34-26-2	7.6	.82	.63	19	103	.17	45	10	60	44.9	10.0	19.1	2.0	<5	2200	25
34-27-2	15.0	1.1	.63	36	409	.24	70	10	50	37.0	5.1	13.8	3.1	<5	2200	40
34-28-2	8.8	.74	.63	31	23	.12	30	15	60	39.0	8.9	18.5	1.5	<5	1400	20
34-29-2	7.6	.59	.45	22	30	.12	60	20	70	44.7	14.4	21.0	.92	<5	1200	20
34-30-2	6.4	.48	.51	13	21	.09	10	15	100	41.2	14.8	23.3	.55	<5	800	20
34-31-2	8.0	.54	.45	7	260	.09	20	10	60	47.5	22.4	24.1	.67	<5	600	15
40-32-2	11.2	.86	.81	7	29	.10	20	20	60	77.7	21.8	30.3	.88	<5	800	25
40-33-2	13.0	1.3	.45	15	24	.24	85	20	200	53.4	37.7	43.4	1.6	<5	1200	40
40-34-2	10.6	.88	.69	17	220	.12	40	20	60	69.5	21.6	28.1	.94	<5	1200	20
40-35-2	9.0	.94	.51	23	58	.21	25	20	120	46.8	18.5	25.9	1.6	<5	1500	30
40-36a-2	9.8	.98	.96	26	18	.35	30	15	100	41.1	19.6	38.5	1.6	<5	900	25
40-36b-2	9.6	.98	.81	30	238	.29	40	20	100	59.5	20.5	32.0	2.2	5	1400	30
40-37-2	17.4	1.2	.63	42	246	.42	40	20	100	53.1	22.9	23.8	1.5	<5	1500	20
40-38-2	9.4	.86	.99	36	71	.13	50	15	80	39.0	17.7	28.5	4.2	<5	2500	20
40-39-2	8.4	.62	.75	22	3	.10	30	20	80	43.2	16.0	24.3	1.4	<5	1200	20
40-40-2	8.0	.58	.99	21	14	.09	25	20	70	39.4	15.8	23.8	.78	<5	1500	20
40-41-2	7.4	.50	.78	20	20	.07	20	15	70	55.5	18.4	26.7	1.1	<5	900	20
40-42-2	7.4	.74	.78	18	66	.10	35	20	65	74.1	24.1	23.7	1.6	<5	1000	15
46-43-2	10.2	1.2	1.1	22	270	.15	40	20	75	38.0	17.4	15.8	2.5	20	800	30
46-44-2	11.8	1.1	1.3	21	158	.17	35	25	80	46.8	17.2	21.6	1.1	<5	1200	25
46-45-2	7.6	.70	.63	19	311	.11	25	25	60	44.9	11.0	20.1	.97	<5	1500	25
46-46-2	6.8	.62	1.3	27	178	.11	20	15	60	52.4	9.2	19.1	.92	<5	1800	20
46-47-2	8.2	.64	1.3	10	47	.09	25	20	60	37.3	8.5	15.8	1.2	<5	1000	20
46-48-2	8.6	.88	.84	27	115	.25	40	25	85	45.1	14.8	32.2	1.7	<5	2200	25
46-49-2	7.8	.64	.57	7	43	.09	15	10	50	52.6	22.3	22.5	.53	<5	1000	12
46-50-2	6.0	.42	.42	14	142	.10	20	10	70	61.0	22.4	20.0	.55	<5	650	10
46-51-2	9.2	.66	.48	7	33	.06	40	10	40	31.8	14.0	13.9	.69	<5	1200	15
52-52-2	9.2	.46	.42	14	5	.06	60	10	60	38.6	15.9	18.3	.65	<5	1300	12
52-53-2	7.6	.58	.58	7	8	.09	45	15	50	48.5	19.6	28.8	.86	<5	1200	15
52-54-2	9.4	.72	.58	26	119	.16	30	15	60	48.2	17.3	27.2	.86	<5	1500	25
52-55-2	9.8	.66	.69	24	19	.14	40	15	50	57.2	13.3	29.3	.82	<5	1300	20
52-56-2	9.0	.70	.83	25	143	.15	35	20	55	44.4	16.1	26.1	1.1	<5	1100	25
52-57-2	14.2	.76	1.0	6	160	.17	75	15	50	66.8	24.4	36.1	1.2	<5	800	40

Table A4.--Analytical data for 60 soil samples, -80+120 mesh fraction, Akatasa prospect, Xinjiang, China. [Au and Hg in ppb, all other elements in ppm. OB = insufficient sample].

Sample	As	Sb	Bi	Hg	Au	Ag	Cu	Pb	Zn	Cr	Co	Ni	Mo	W	Mn	B
22-01-3	16.0	1.3	.63	8	37	.10	60	7	40	46.6	34.9	26.9	1.5	<5	950	10
22-02-3	8.4	.58	.34	8	33	.05	5	1	10	10.5	4.5	4.7	.23	<5	600	5
22-03-3	12.0	1.0	.49	15	137	.17	20	18	40	74.8	27.9	55.0	2.0	7	900	25
22-04a-3	9.8	1.0	1.3	8	216	.28	40	15	60	36.9	26.5	27.0	1.8	10	800	20
22-04b-3	9.2	.98	.97	14	280	.35	50	20	80	39.3	27.2	30.6	1.8	15	900	15
22-05-3	7.2	.76	.49	25	189	.26	35	30	85	24.2	9.2	19.2	2.0	5	1300	20
22-06-3	8.8	.68	.54	25	8	.10	20	25	70	36.2	17.4	27.3	.89	<5	1200	15
22-07-3	7.4	.60	.51	22	8	.10	30	20	70	34.9	13.1	23.6	.74	<5	800	15
22-08-3	7.4	.60	.37	13	5	.09	20	20	85	35.5	12.6	19.4	.75	<5	900	20
22-09-3	9.0	.70	.74	19	10	.10	20	25	85	43.4	14.0	24.2	.90	<5	900	15
22-10-3	10.6	.90	.46	32	1	.10	25	20	85	39.1	18.6	34.5	.87	<5	1200	15
22-11-3	6.0	.54	.26	20	9	.10	40	20	80	45.4	24.9	26.6	2.2	<5	650	10
28-12-3	12.0	.88	.43	12	15	.14	40	25	100	69.9	25.6	29.0	.73	<5	700	50
28-13-3	14.4	1.0	.49	19	14	.08	20	5	10	82.5	13.2	18.6	.46	<5	1400	20
28-14-3	10.6	.78	.57	30	3	.14	50	20	85	133	31.8	50.6	1.7	<5	1000	25
28-15-3	7.6	.74	.61	25	52	.18	60	18	50	63.7	15.9	22.7	1.4	<5	2200	20
28-16-3	8.4	.74	.83	34	139	.48	60	30	80	57.1	7.6	25.4	1.5	<5	2500	20
28-17-3	13.6	.96	.60	34	88	.14	45	20	60	53.2	14.2	29.4	.93	<5	2200	30
28-18-3	9.6	.68	.63	26	16	.12	60	18	60	69.2	18.9	26.8	1.5	<5	1200	25
28-19a-3	8.2	.62	.57	25	20	.12	60	20	85	83.9	19.7	34.1	.84	<5	1000	30
28-19b-3	8.2	.66	.54	22	20	.11	85	20	70	80.4	16.1	30.8	.79	<5	1200	25
28-20-3	7.8	.68	.34	17	5	.10	60	25	120	63.3	16.0	29.6	1.0	<5	1500	30
34-21-3	11.6	1.1	.57	20	1	.14	50	25	150	117	25.6	45.1	1.1	<5	700	50
34-22-3	13.4	1.3	.69	17	10	.09	70	10	30	76.8	20.2	26.7	.60	<5	800	20
34-23-3	12.8	.84	.37	18	22	.80	40	10	20	76.4	14.1	23.2	.35	<5	800	20
34-24-3	9.2	.88	.54	15	24	.18	50	20	120	46.6	17.1	28.4	1.3	<5	2500	30
34-25-3	12.8	.98	.23	22	41	.17	34	8	65	44.6	15.4	27.6	1.3	<5	2200	30
34-26-3	9.0	.92	.48	28	70	.21	40	15	100	48.3	16.2	28.9	2.0	<5	2200	20
34-27-3	15.6	1.1	.72	39	475	.28	40	10	60	43.5	10.9	24.1	3.0	<5	2200	30
34-28-3	10.0	.86	.93	48	407	.13	35	10	75	49.3	12.9	26.4	1.7	<5	1500	20
34-29-3	8.4	.66	.51	23	56	.13	60	20	85	68.1	18.4	28.9	.98	<5	1200	20
34-30-3	10.2	.74	.48	25	60	.10	20	20	100	57.1	19.4	31.3	.70	<5	700	20
34-31-3	9.6	.56	.54	14	22	.10	35	10	120	84.6	32.2	38.9	1.3	<5	900	20
40-32-3	13.0	.90	.87	14	14	.17	30	20	70	75.0	18.4	27.3	.70	<5	600	30
40-33-3	13.4	1.3	.69	15	15	.26	70	25	200	69.2	36.0	49.2	1.4	5	1200	20
40-34-3	OB	OB	OB	OB	OB	OB	OB	OB	OB	OB	OB	OB	OB	OB	OB	OB
40-35-3	9.0	1.0	.69	26	49	.26	30	20	160	42.3	20.5	42.3	1.7	<5	1500	25
40-36a-3	9.6	.94	.78	32	23	.21	40	30	120	47.0	18.5	28.0	2.4	5	1600	30
40-36b-3	10.0	.94	.78	26	244	.27	35	20	100	58.2	22.4	25.7	1.6	<5	1400	25
40-37-3	17.4	1.2	.66	45	40	.47	35	20	120	53.4	19.6	21.5	1.4	<5	1200	20
40-38-3	10.4	1.0	.81	51	12	.11	40	15	80	45.6	15.8	29.3	3.2	<5	1600	25
40-39-3	11.6	.80	.90	33	31	.08	35	20	80	47.4	16.1	24.2	1.1	<5	1200	25
40-40-3	9.6	.86	.78	61	24	.14	40	20	100	75.9	22.4	28.3	1.1	<5	1000	20
40-41-3	9.0	.58	.87	23	13	.09	30	15	80	84.2	20.5	36.5	1.4	<5	800	15
40-42-3	8.0	.82	.84	15	27	.10	35	20	75	96.2	22.9	28.7	1.3	<5	900	20
46-43-3	11.0	1.4	1.5	21	228	.17	35	20	75	48.3	16.9	17.9	2.2	20	700	25
46-44-3	12.4	1.1	.90	29	176	.16	30	25	70	49.4	17.2	25.8	.87	<5	1200	30
46-45-3	9.4	.88	.69	26	153	.12	30	25	100	83.0	17.7	31.1	1.2	<5	1600	25
46-46-3	9.0	.88	1.2	31	42	.14	30	20	80	80.0	17.8	29.0	1.1	<5	1200	20
46-47-3	8.8	.76	1.1	29	38	.10	35	20	85	69.0	17.9	26.9	1.4	<5	1000	20
46-48-3	11.4	1.0	.87	33	127	.21	40	25	100	43.1	17.5	39.0	1.2	<5	1600	20
46-49-3	9.4	.72	.81	10	31	.09	15	10	65	45.0	26.2	27.6	.61	<5	1200	10
46-50-3	8.4	.66	.96	18	64	.10	45	10	50	61.5	23.8	25.9	.60	<5	1000	15
46-51-3	9.2	.66	.51	18	11	.06	60	10	50	48.6	12.6	19.0	.82	<5	1300	20
52-52-3	9.2	.52	.39	16	6	.05	50	10	50	51.6	15.9	21.2	.62	<5	1200	12
52-53-3	9.6	.60	.61	15	6	.09	45	20	50	81.3	21.8	42.2	.82	<5	1200	20
52-54-3	10.4	.72	.44	33	104	.10	30	10	60	54.1	14.3	26.6	.67	<5	1300	25
52-55-3	9.6	.66	.69	30	66	.16	40	20	60	67.1	17.0	44.4	.98	<5	1100	20
52-56-3	9.8	.72	.69	25	139	.15	35	20	55	44.7	16.6	39.6	.98	<5	1100	25
52-57-3	12.8	.66	1.2	15	83	.15	70	10	50	84.7	22.2	33.1	.91	<5	800	50

Table A5.--Analytical data for 60 soil samples, -120 mesh fraction, Akatasa prospect, Xinjiang, China. [Au and Hg in ppb, all other elements in ppm].

Sample	As	Sb	Bi	Hg	Au	Ag	Cu	Pb	Zn	Cr	Co	Ni	Mo	W	Mn	B
22-01-4	13.8	1.0	.31	12	27	.11	60	10	50	44.5	21.6	29.0	1.1	<5	700	150
22-02-4	7.0	.48	.23	7	29	.05	5	1	10	10.8	3.7	4.9	.25	<5	400	10
22-03-4	10.2	.84	.40	19	158	.18	20	15	40	81.0	19.1	47.7	1.1	5	700	25
22-04a-4	9.2	.94	.89	17	240	.39	50	20	100	54.8	23.4	39.2	1.3	5	750	25
22-04b-4	9.4	.86	.74	19	257	.29	40	15	70	42.4	17.7	31.6	1.0	5	750	30
22-05-4	8.0	.54	.49	28	165	.15	30	25	60	3.6	9.4	21.3	.90	5	750	20
22-06-4	8.8	.84	.46	27	5	.10	30	25	100	41.3	21.2	33.9	.71	<5	750	20
22-07-4	12.0	.90	.40	27	7	.12	25	20	100	52.7	19.7	36.7	.80	<5	800	25
22-08-4	9.2	.72	.31	18	3	.09	20	20	100	51.1	18.8	27.5	.75	<5	900	25
22-09-4	9.6	.72	.40	21	7	.11	30	20	100	63.7	21.1	36.7	1.0	<5	1300	25
22-10-4	9.8	.82	.43	34	1	.09	25	20	70	48.5	18.3	43.7	.67	<5	800	20
22-11-4	8.8	.66	.46	22	4	.11	30	20	80	57.2	21.2	38.1	1.4	<5	650	20
28-12-4	10.8	.78	.49	12	3	.11	30	18	120	81.8	20.0	30.3	.90	<5	700	50
28-13-4	14.4	.94	.34	19	19	.10	35	4	<10	77.2	13.2	18.9	.27	<5	600	20
28-14-4	9.0	.66	.54	28	5	.12	50	20	80	103	27.2	44.6	1.5	<5	1000	30
28-15-4	8.6	.80	.46	25	10	.21	100	20	65	74.3	21.5	29.0	1.2	<5	1600	25
28-16-4	8.0	.64	.51	41	151	.48	60	20	100	80.2	18.4	34.8	.87	<5	1200	20
28-17-4	11.8	.90	.40	38	70	.12	85	18	60	78.6	13.9	30.8	.76	<5	1600	15
28-18-4	10.0	.70	.46	30	6	.08	60	15	50	75.5	15.3	30.3	.86	<5	800	25
28-19a-4	8.6	.60	.60	23	5	.12	50	20	100	83.8	19.0	41.9	.76	<5	1000	30
28-19b-4	8.4	.70	.66	23	8	.11	85	20	85	98.6	16.8	36.7	.76	<5	800	30
28-20-4	7.6	.58	.40	17	4	.10	85	25	120	81.9	20.0	38.2	1.1	<5	1500	30
34-21-4	11.0	1.0	.57	22	5	.09	30	20	80	137	16.9	36.9	.70	<5	600	70
34-22-4	13.0	.90	.29	16	8	.08	100	10	40	90.4	20.0	34.8	.52	<5	700	20
34-23-4	13.2	.92	.37	18	21	.10	50	10	20	80.7	15.6	29.2	.44	<5	800	30
34-24-4	8.4	.76	.34	17	30	.13	85	20	100	61.2	14.2	28.5	.94	<5	1500	30
34-25-4	12.8	.92	.51	26	137	.19	40	10	70	45.7	16.0	32.5	1.0	<5	1800	30
34-26-4	8.4	.76	.51	31	58	.21	35	20	100	68.4	17.8	34.8	1.5	<5	1800	40
34-27-4	15.0	1.0	.60	42	419	.27	40	10	65	44.1	11.7	27.8	2.6	<5	2000	40
34-28-4	10.6	.84	.51	45	100	.13	50	15	100	48.9	19.8	31.6	1.9	<5	1500	15
34-29-4	8.6	.66	.39	22	15	.09	85	20	70	74.9	15.6	25.5	.72	<5	1000	20
34-30-4	9.2	.68	.54	26	8	.12	15	20	200	66.3	22.7	40.0	.87	<5	900	25
34-31-4	9.4	.68	.60	14	15	.09	30	10	120	77.6	21.1	37.8	.73	<5	600	30
40-32-4	13.0	.88	.63	20	13	.18	40	15	100	80.6	23.3	33.3	.80	<5	500	30
40-33-4	12.8	.98	.42	17	14	.15	80	25	100	83.8	31.7	45.2	1.1	<5	1200	30
40-34-4	10.2	.72	.60	21	38	.13	20	15	70	52.9	17.1	36.3	.69	<5	700	25
40-35-4	7.6	.76	.45	28	37	.15	65	15	130	51.9	18.4	34.9	1.2	<5	1500	30
40-36a-4	7.8	.74	.75	29	130	.16	30	25	70	72.7	16.2	28.9	1.2	<5	800	30
40-36b-4	8.4	.80	1.2	26	27	.17	30	15	80	62.0	17.7	27.3	1.1	<5	1200	25
40-37-4	15.2	1.0	.93	40	208	.43	40	20	120	59.9	19.7	29.8	1.3	<5	1200	20
40-38-4	10.4	.96	.69	43	49	.10	40	15	100	51.9	16.4	31.1	2.2	<5	1200	30
40-39-4	7.8	.66	.72	32	32	.08	35	20	85	61.7	17.2	30.2	.90	<5	800	25
40-40-4	8.8	.70	.72	28	17	.12	30	20	85	72.1	17.7	45.2	.77	<5	800	25
40-41-4	8.6	.70	.81	23	9	.09	30	25	85	71.5	22.5	40.2	1.0	<5	900	30
40-42-4	7.4	.72	.84	16	18	.09	25	15	85	107	17.1	28.0	.93	<5	800	40
46-43-4	9.2	1.1	1.2	26	80	.19	35	20	70	73.9	11.5	23.6	1.4	10	650	30
46-44-4	10.4	1.0	.63	28	142	.25	45	30	200	77.5	20.2	39.1	1.1	<5	850	40
46-45-4	8.8	.82	.63	23	141	.13	30	20	120	117	17.4	34.3	.98	<5	1000	25
46-46-4	8.4	.80	.81	30	42	.10	30	20	70	106	13.7	26.9	.66	<5	1000	25
46-47-4	9.0	.76	.90	43	22	.10	30	20	80	55.9	17.4	27.4	1.2	<5	1000	20
46-48-4	9.0	.84	1.2	27	113	.16	30	25	55	71.8	16.3	30.7	.84	<5	1000	25
46-49-4	10.8	.76	.90	22	45	.10	20	10	70	50.7	23.9	30.4	.53	<5	850	15
46-50-4	8.2	.74	.75	19	36	.10	50	15	60	60.8	23.8	32.9	.71	<5	1200	20
46-51-4	7.4	.52	.72	17	5	.06	80	10	50	56.7	13.7	30.5	.65	<5	1200	18
52-52-4	7.8	.46	.42	13	3	.05	100	10	55	80.0	11.9	28.0	.54	<5	800	20
52-53-4	8.0	.52	.44	17	6	.08	45	20	55	51.5	21.2	48.0	.69	<5	1000	30
52-54-4	9.0	.64	.50	29	76	.09	40	10	60	49.7	17.1	27.3	.64	<5	1300	25
52-55-4	8.6	.58	.53	23	49	.09	80	15	55	70.2	13.5	32.0	.67	<5	1000	30
52-56-4	9.4	.66	.69	17	126	.13	40	20	60	53.5	21.6	41.5	1.0	<5	700	30
52-57-4	11.2	.60	.61	16	65	.10	70	10	50	69.7	17.2	29.9	.64	<5	1000	40

Table A6.--Analytical data for 60 heavy-mineral concentrate samples derived from soils, ferromagnetic fraction, Akatasa prospect, Xinjiang, China. [Weight in grams, Fe in percent, and all other elements in ppm].

Sample	B	Cu	Pb	Sn	Mn	Ti	Cr	Ni	Mo	V	Ag	Zn	Co	As	Fe %	Weight
22-01HM	3.8	597	23.4	<1.0	550	2307	792	230	7.0	947	.11	383	39.6	<5	27.9	47.6
22-02HM	16.6	779	30.5	<1.0	647	1835	>10000	810	20.5	966	.13	484	46.2	<5	23.5	11.2
22-03HM	21.3	80.0	27.1	3.5	733	1208	1983	>1000	17.6	786	.08	1325	38.7	<5	22.0	4.3
22-04aHM	2.3	145	28.3	<1.0	822	1560	795	144	5.2	637	.15	166	30.5	<5	30.2	3.2
22-04bHM	2.9	106	27.2	<1.0	821	1210	1665	104	3.6	608	.09	186	27.5	<5	24.0	3.2
22-05HM	2.6	93.3	31.6	1.0	907	2999	240	66	19.5	615	.09	206	20.7	<5	27.1	4.5
22-06HM	6.4	39.0	33.1	2.5	3039	8330	482	69	6.7	741	.11	222	25.0	<5	42.3	3.0
22-07HM	1.7	43.2	37.1	1.0	1950	4050	264	53	16.3	742	.06	307	25.3	<5	29.6	9.1
22-08HM	<1.0	41.5	34.5	1.0	4973	1766	183	40	24.9	717	.06	359	23.8	<5	26.8	9.0
22-09HM	2.8	34.2	35.1	1.7	>10000	7681	151	25	14.2	657	.12	313	29.6	<5	30.4	12.9
22-10HM	1.7	24.3	31.7	<1.0	2982	2733	81	28	5.8	652	.06	238	23.7	<5	27.5	7.9
22-11HM	4.0	206	28.4	1.2	1539	>10000	652	64	36.1	920	.23	159	35.9	<5	45.8	13.0
28-12HM	13.3	366	32.5	1.3	934	9093	881	100	10.7	1055	.08	248	47.7	<5	20.5	21.7
28-13HM	12.1	506	27.0	4.3	1121	4707	3858	347	6.6	826	.08	815	53.2	<5	41.9	17.9
28-14HM	11.1	151	26.9	4.6	1184	4497	1517	630	15.7	945	.08	1375	53.4	<5	26.8	2.9
28-15HM	2.1	105	37.3	1.8	1622	2394	450	68	10.7	787	.13	255	31.0	<5	28.2	3.4
28-16HM	5.3	78.2	33.9	1.9	>10000	7929	278	47	2.2	686	.15	264	23.9	<5	34.4	2.3
28-17HM	7.7	256	50.8	3.9	>10000	2723	207	48	10.9	730	.63	296	30.9	<5	30.3	2.9
28-18HM	5.5	59.9	39.6	2.0	>10000	6192	183	30	9.6	692	.12	608	23.1	<5	34.8	12.3
28-19aHM	2.6	59.4	36.8	2.7	4370	4109	222	42	10.5	725	.09	266	26.4	<5	28.1	7.1
28-19bHM	2.7	39.2	36.0	1.9	>10000	7593	208	34	7.5	709	.10	333	26.0	<5	35.0	7.1
28-20HM	1.4	28.3	33.0	2.4	>10000	8943	130	24	15.5	747	.08	288	24.7	<5	34.1	9.7
34-21HM	29.9	183	35.6	3.6	1070	8745	434	70	2.4	797	.07	131	41.4	<5	31.1	16.4
34-22HM	11.9	649	30.6	1.2	2310	9093	549	119	3.6	885	.13	269	45.5	<5	34.5	12.2
34-23HM	18.6	100	34.4	4.1	1011	6924	804	>1000	11.7	888	.08	461	43.6	<5	24.5	7.7
34-24HM	4.2	91.0	38.1	2.1	2512	5564	433	117	27.8	874	.14	353	34.6	<5	29.7	3.7
34-25HM	10.8	102	32.1	4.3	7403	6413	269	60	37.4	719	.21	237	34.1	<5	21.9	3.0
34-26HM	8.6	101	36.5	3.4	2745	8731	365	83	40.4	886	.26	306	28.2	<5	25.6	1.7
34-27HM	14.5	343	42.7	2.6	>10000	>10000	200	52	182	896	1.26	317	31.8	<5	27.8	2.3
34-28HM	3.8	28.9	35.4	2.2	>10000	7171	118	23	66.4	717	.17	319	22.9	<5	34.8	8.6
34-29HM	<1.0	53.2	21.0	<1.0	1640	2212	241	49	19.1	894	.09	297	27.9	<5	29.0	9.9
34-30HM	1.9	34.4	21.7	<1.0	1840	3344	467	74	3.6	932	.05	165	29.1	<5	25.5	21.2
34-31HM	<1.0	128	6.8	<1.0	908	789	720	130	3.5	1186	.07	161	36.9	<5	33.8	18.6
40-32HM	11.3	428	43.5	2.6	1578	>10000	523	179	12.2	944	.12	309	40.7	<5	29.7	16.1
40-33HM	11.4	735	32.2	1.5	1027	6028	654	226	8.7	1033	.20	288	45.9	<5	23.2	13.7
40-34HM	9.6	238	42.5	3.1	2393	8917	694	267	11.0	948	.21	287	48.2	<5	28.2	7.5
40-35HM	9.2	137	33.4	2.9	1139	3131	784	257	13.5	829	1.54	337	44.1	<5	30.0	3.5
40-36aHM	8.7	418	35.6	2.2	1211	8284	1805	190	35.6	852	9.70	288	43.2	<5	30.8	2.9
40-36bHM	8.9	416	32.4	2.3	2460	7824	579	205	37.1	820	.66	296	43.1	<5	41.5	2.9
40-37HM	4.2	400	38.0	2.3	1356	5264	248	41	40.4	823	.51	303	33.5	<5	26.8	1.5
40-38HM	2.1	119	33.2	2.2	3971	3967	230	53	46.1	841	.07	278	30.0	<5	24.9	2.8
40-39HM	2.2	91.2	33.6	1.9	2592	4558	177	75	18.9	892	.07	331	32.9	<5	29.3	13.1
40-40HM	<1.0	90.2	29.3	1.7	1838	1962	400	58	18.4	912	.55	298	38.8	<5	30.2	6.9
40-41HM	<1.0	102	17.1	<1.0	1136	4055	2051	59	9.6	1043	.06	186	30.8	<5	32.8	19.9
46-42HM	11.4	72.8	33.5	2.6	862	8371	2306	83	5.3	810	.06	230	36.9	<5	29.3	19.9
46-43HM	8.2	161	34.1	1.6	985	>10000	665	81	10.2	809	.11	336	34.3	<5	38.7	1.0
46-44HM	10.5	187	34.6	1.2	1019	3685	698	89	8.9	792	.07	336	35.8	<5	30.0	8.3
46-45HM	4.3	219	38.1	4.6	1148	6700	183	60	6.9	737	.13	328	32.4	<5	31.4	4.0
46-46HM	4.5	36.2	40.5	3.6	3922	3692	228	66	5.3	650	.06	305	35.7	<5	29.7	5.9
46-47HM	2.2	213	49.7	3.0	2117	3139	375	49	14.9	838	.10	329	27.2	<5	29.8	5.0
46-48HM	6.4	391	42.2	3.7	1373	6846	604	76	12.0	818	.07	214	33.5	<5	29.3	5.6
46-49HM	<1.0	54.2	8.5	<1.0	909	836	842	96	.6	884	.05	98	36.6	<5	32.4	41.3
46-50HM	<1.0	109	4.2	<1.0	548	549	1234	126	.7	936	.06	168	33.5	<5	30.8	39.7
52-51HM	2.7	30.4	21.8	<1.0	994	3855	579	89	4.7	888	.05	269	25.2	<5	28.2	11.5
52-52HM	3.2	85.8	28.7	1.2	927	4982	1803	91	3.5	783	.06	294	30.0	<5	27.0	9.2
52-53HM	6.1	245	43.3	1.5	1264	3562	631	115	12.3	820	.11	237	34.0	<5	27.5	5.5
52-54HM	7.8	161	61.3	4.7	1320	6654	400	75	10.8	774	.13	308	33.1	<5	22.0	5.8
52-55HM	8.3	157	44.3	5.0	1250	7906	660	82	12.8	919	.08	284	32.5	<5	28.1	4.7
52-56HM	20.7	195	34.1	4.0	1083	6804	3406	130	10.5	1003	.17	215	34.3	<5	28.6	9.1
52-57HM	48.4	520	26.9	3.1	1354	8492	344	206	7.5	1273	.25	166	44.1	<5	27.3	20.2

Table A7.--Analytical data for 60 heavy-mineral concentrate samples derived from soils, paramagnetic fraction, in the western part of the Akatasa prospect, Xinjiang, China. [All elements in ppm].

Sample	Cu	Pb	Zn	Ag	Mo	Ni	Cr	Co	V	Fe	Sn	B
22-1HG	180	60	221	2.4	75	280	409	>500	520	33.6	<1.0	227
22-2HG	130	98	130	1.9	130	300	432	360	560	33.8	<1.0	490
22-3HG	125	90	330	.72	170	280	909	250	190	34.3	<1.0	360
22-4aHG	250	58	283	3.9	110	220	147	>500	500	63.6	2.2	287
22-4bHG	140	68	287	2.5	90	130	130	210	330	37.8	1.2	220
22-5HG	210	115	313	1.1	340	43	45	105	340	70.0	2.3	160
22-6HG	135	95	208	.42	48	90	337	94	450	72.7	17.1	539
22-7HG	160	180	319	.30	38	85	202	100	290	33.7	9.6	476
22-8HG	200	270	672	.40	48	54	171	95	290	35.5	18.9	401
22-9HG	220	320	611	.63	44	65	117	105	500	33.6	14.8	285
22-10HG	210	280	481	.60	25	58	117	115	420	35.0	14.8	279
22-11HG	190	200	209	.39	180	115	193	270	400	33.5	6.6	439
28-12HG	180	45	178	.28	12	145	486	160	440	39.7	9.3	362
28-13HG	230	34	91	.31	13	290	867	185	400	39.5	2.1	287
28-14HG	190	88	227	.34	68	460	875	180	480	33.5	4.6	394
28-15HG	240	360	407	1.3	120	105	198	100	980	33.9	8.4	357
28-16HG	230	650	453	2.7	85	70	100	61	520	34.7	3.5	392
28-17HG	130	570	469	4.3	90	57	74	68	420	37.3	5.7	228
28-18HG	200	300	439	.58	110	115	201	90	750	37.4	15.3	262
28-19aHG	220	110	503	1.1	20	95	261	110	720	59.5	17.4	576
28-19bHG	170	330	376	.74	25	100	118	95	600	36.0	16.5	395
28-20HG	160	200	562	.48	8	50	122	77	560	34.9	21.6	419
34-21HG	230	64	202	.56	9	270	203	165	1200	52.0	8.9	426
34-22HG	220	44	208	.21	10	180	305	190	1350	75.4	11.9	518
34-23HG	160	140	156	.24	12	210	251	140	620	34.1	10.0	538
34-24HG	160	215	451	.71	33	73	190	70	700	34.3	10.0	306
34-25HG	230	420	574	1.6	140	100	125	92	460	36.4	2.2	189
34-26HG	220	500	482	2.1	200	80	274	105	600	34.0	5.5	282
34-27HG	250	320	346	3.2	400	73	88	80	1300	34.0	1.1	285
34-28HG	270	125	590	4.2	240	50	144	92	2000	34.6	7.9	274
34-29HG	180	200	341	.75	27	78	343	88	1050	33.5	9.1	324
34-30HG	145	150	213	.27	7	80	319	94	1100	33.6	14.1	345
34-31HG	190	60	149	.49	8	80	284	150	1500	46.6	5.0	228
40-32HG	230	110	156	.32	8	125	569	140	1300	33.9	4.4	263
40-33HG	170	54	97	.35	7	120	197	130	1150	41.3	2.8	246
40-34HG	220	500	175	1.4	23	155	841	130	1150	33.6	3.1	285
40-35HG	290	240	326	1.7	75	205	210	170	1000	34.2	3.1	358
40-36aHG	230	240	238	4.4	125	95	147	100	780	34.2	4.2	333
40-36bHG	300	300	238	4.2	230	110	105	130	750	36.7	<1.0	156
40-37HG	540	180	379	2.8	260	110	101	150	550	34.7	2.2	135
40-38HG	440	670	518	3.0	>500	110	106	160	750	38.1	3.8	186
40-39HG	260	225	376	.48	80	90	195	130	740	33.9	13.0	331
40-40HG	240	85	290	.73	26	110	289	180	1050	46.0	12.1	437
40-41HG	240	140	147	.65	83	115	191	210	1100	34.4	3.8	170
46-42HG	320	135	216	.71	64	190	241	210	1050	33.8	2.7	398
46-43HG	230	370	256	4.2	70	160	128	145	4400	36.0	2.4	311
46-44HG	260	115	284	.56	74	78	266	145	960	33.5	9.9	473
46-45HG	270	270	342	2.2	70	80	194	130	680	35.0	7.0	192
46-46HG	220	275	383	1.7	50	95	445	120	780	35.0	10.4	246
46-47HG	110	223	291	.38	57	47	172	81	495	29.1	8.5	686
46-48HG	150	442	311	1.5	99	59	203	106	851	18.0	8.4	819
46-49HG	82	73	256	.40	6	96	205	107	694	34.7	15.0	581
46-50HG	120	61	232	1.3	29	126	195	114	587	28.2	11.5	919
52-51HG	130	68	207	.34	22	51	131	135	807	20.4	5.9	447
52-52HG	125	52	176	.25	7	102	132	130	674	23.4	3.8	452
52-53HG	145	242	227	.68	61	100	187	146	838	19.7	3.6	906
52-54HG	115	206	313	.90	123	58	139	94	574	12.5	5.4	759
52-55HG	115	154	295	.57	70	65	196	105	997	17.6	8.0	>1000
52-56HG	140	148	265	.97	88	86	204	141	1494	21.2	3.4	>1000
52-57HG	150	82	156	.71	34	163	206	181	>2500	32.3	5.0	>1000

Table A8.--Analytical data for 60 heavy-mineral concentrate samples derived from soils, non-magnetic fraction, Akatasa prospect, Xinjiang, China. [Ca, Fe, Mg, Na, P, and Ti in percent, all other elements in ppm].

Sample	Ca %	Fe %	Mg %	Na %	P %	Ti %	Ag	As	Au	B	Ba	Be	Bi
22-01HN	7	30	1.5	1.5	3	2	<1	<200	<20	200	1000	<2	<20
22-02HN	10	5	1	1	3	>2	7	<200	150	150	1000	2	<20
22-03HN	7	7	1	.7	3	>2	<1	<200	<20	200	700	<2	<20
22-04bHN	7	7	.7	.7	5	>2	<1	<200	<20	100	700	<2	<20
22-05HN	3	7	.5	1	3	>2	<1	<200	<20	100	3000	<2	<20
22-06HN	7	2	.5	1.5	1.5	>2	<1	<200	<20	150	300	5	<20
22-07HN	7	2	.7	.7	2	>2	<1	<200	<20	200	200	<2	<20
22-08HN	10	3	.5	.7	2	>2	2	<200	70	200	300	<2	<20
22-09HN	7	5	.7	.7	2	>2	<1	<200	<20	200	300	2	<20
22-10HN	10	5	.7	1	3	>2	<1	<200	<20	100	500	<2	<20
22-11HN	10	1.5	.3	.7	10	>2	<1	<200	<20	70	200	<2	<20
28-12HN	10	7	1.5	1	2	2	<1	<200	<20	150	200	<2	<20
28-13HN	15	10	1	.5	1.5	2	<1	<200	<20	150	300	<2	<20
28-14HN	10	3	1.5	1	2	>2	<1	<200	<20	300	500	2	<20
28-15HN	5	20	1.5	.7	1	2	<1	<200	<20	150	5000	2	<20
28-16HN	5	5	1	1	2	>2	<1	<200	<20	200	1000	2	<20
28-17HN	7	7	1	1	1.5	>2	<1	<200	<20	100	1000	<2	<20
28-18HN	7	3	.7	.7	2	>2	<1	<200	<20	150	200	<2	<20
28-19aHN	7	5	.7	.5	3	>2	<1	<200	<20	300	700	<2	<20
28-19bHN	5	5	1	1	1	>2	<1	<200	30	150	500	<2	<20
28-20HN	7	3	.7	1	2	>2	<1	<200	<20	200	200	<2	<20
34-21HN	10	5	2	1	2	>2	<1	<200	<20	500	300	<2	<20
34-22HN	15	3	1	.7	10	>2	<1	<200	<20	300	200	<2	<20
34-23HN	7	5	1	.5	3	>2	<1	<200	<20	500	500	<2	20
34-24HN	5	7	1.5	1.5	5	>2	<1	<200	<20	700	300	<2	<20
34-25HN	7	7	1	2	2	>2	<1	<200	<20	300	1000	<2	<20
34-26HN	5	5	.7	1	3	>2	<1	<200	<20	300	500	2	<20
34-27HN	7	10	1	2	3	>2	<1	<200	<20	500	5000	<2	<20
34-28HN	10	7	1	2	2	>2	<1	<200	<20	200	1500	<2	<20
34-29HN	10	10	1.5	1	3	>2	<1	<200	<20	200	500	<2	<20
34-30HN	10	7	1	1	7	>2	<1	<200	<20	500	300	<2	<20
34-31HN	20	3	.7	.7	15	>2	<1	<200	<20	70	150	<2	<20
40-32HN	10	7	1.5	2	3	>2	<1	<200	<20	500	200	<2	<20
40-33HN	10	7	1	3	3	2	<1	<200	<20	500	500	<2	<20
40-34HN	7	7	1.5	2	1.5	>2	<1	<200	<20	700	700	<2	<20
40-35HN	7	5	.7	2	2	>2	<1	<200	<20	300	1000	<2	20
40-36aHN	7	7	1	3	1.5	>2	<1	<200	<20	500	700	<2	<20
40-36bHN	5	10	1	2	1	>2	<1	<200	20	500	3000	<2	<20
40-37HN	5	15	.7	2	1	>2	<1	<200	<20	200	5000	<2	<20
40-38HN	5	10	.7	3	.7	>2	<1	<200	<20	300	10000	<2	<20
40-39HN	5	20	.7	1.5	.5	2	<1	<200	<20	300	300	<2	<20
40-40HN	7	7	1	2	2	>2	<1	<200	<20	200	500	<2	<20
40-41HN	10	3	.7	.7	7	>2	<1	<200	<20	100	300	<2	<20
46-42HN	7	5	.7	2	3	>2	<1	<200	<20	150	500	<2	<20
46-43HN	5	7	.7	1	5	>2	<1	<200	<20	200	500	2	20
46-44HN	7	5	.7	2	5	>2	<1	<200	<20	200	5000	<2	<20
46-45HN	5	7	1	3	1.5	>2	<1	<200	<20	150	3000	<2	<20
46-46HN	5	5	1	3	1.5	>2	<1	<200	<20	200	700	2	<20
46-47HN	10	5	1.5	5	1.5	>2	<1	<200	<20	150	1000	2	<20
46-48HN	5	3	.7	3	2	>2	<1	<200	<20	150	500	<2	<20
46-49HN	10	3	.7	.7	5	>2	<1	<200	<20	70	200	<2	<20
46-50HN	10	5	.7	1	5	>2	<1	<200	<20	100	300	<2	<20
52-51HN	7	7	1	3	2	>2	<1	<200	<20	150	500	<2	<20
52-52HN	10	7	.7	3	1.5	>2	<1	<200	<20	150	500	<2	<20
52-53HN	7	7	1	2	3	>2	<1	<200	<20	150	700	<2	<20
52-54HN	7	5	.7	1.5	5	>2	<1	<200	<20	200	1000	<2	<20
52-55HN	7	10	.7	2	2	>2	<1	<200	<20	150	1000	<2	<20
52-56HN	7	30	2	1.5	1	>2	<1	<200	<20	200	1500	<2	50
52-57HN	10	10	1	3	3	>2	<1	<200	<20	200	700	<2	100

Table A8.--Analytical data for 60 heavy-mineral concentrate samples derived from soils, non-magnetic fraction, Akatasa prospect, Xinjiang, China. [Ca, Fe, Mg, Na, P, and Ti in percent, all other elements in ppm].

Sample	Cd	Co	Cr	Cu	Ga	Ge	La	Mn	Mo	Nb	Ni	Pb	Sb
22-01HN	<50	200	300	300	100	<20	700	2000	15	50	200	50	<200
22-02HN	<50	20	300	30	100	<20	500	1000	30	50	50	20	<200
22-03HN	<50	30	300	30	150	<20	700	700	<10	70	70	30	<200
22-04bHN	<50	20	50	50	70	<20	1000	1000	<10	70	20	30	<200
22-05HN	<50	20	50	50	100	<20	2000	5000	<10	150	10	100	<200
22-06HN	<50	<20	100	20	70	<20	1000	700	<10	50	15	30	<200
22-07HN	<50	<20	150	20	50	<20	1500	1000	<10	70	15	50	<200
22-08HN	<50	<20	100	30	70	<20	2000	1500	50	100	10	50	<200
22-09HN	<50	<20	100	50	70	<20	2000	1000	20	100	10	70	<200
22-10HN	<50	<20	70	30	70	<20	1000	1500	10	100	15	70	<200
22-11HN	<50	<20	50	30	30	<20	700	700	<10	70	10	20	<200
28-12HN	<50	20	150	50	70	<20	700	1000	10	50	30	30	<200
28-13HN	<50	100	200	100	150	<20	1000	1000	30	<50	100	30	<200
28-14HN	<50	20	300	20	100	<20	1500	700	<10	50	50	30	<200
28-15HN	<50	70	100	150	100	<20	1000	>10000	15	100	50	150	<200
28-16HN	<50	<20	100	100	100	<20	1500	2000	<10	100	10	70	<200
28-17HN	<50	20	100	100	100	<20	1500	3000	<10	200	15	100	<200
28-18HN	<50	<20	150	30	70	<20	1000	700	15	70	10	70	<200
28-19aHN	<50	<20	100	30	50	<20	1500	5000	50	70	15	20	<200
28-19bHN	<50	<20	100	50	70	<20	700	3000	300	70	15	30	<200
28-20HN	<50	<20	100	20	70	<20	700	1500	30	100	10	30	<200
34-21HN	<50	20	150	50	70	<20	1000	1000	<10	50	20	50	<200
34-22HN	<50	<20	100	70	70	<20	1500	1000	<10	50	15	30	<200
34-23HN	<50	<20	200	30	100	<20	2000	1500	<10	100	30	50	<200
34-24HN	<50	<20	200	30	70	<20	2000	1500	<10	100	20	30	<200
34-25HN	<50	<20	150	50	100	<20	1500	2000	<10	150	20	70	<200
34-26HN	<50	<20	70	30	100	<20	700	1000	<10	100	15	30	<200
34-27HN	<50	20	100	100	100	<20	2000	3000	15	200	20	70	<200
34-28HN	<50	<20	70	100	100	<20	700	2000	<10	100	20	50	<200
34-29HN	<50	<20	200	100	100	<20	700	2000	10	150	20	70	<200
34-30HN	<50	<20	200	20	70	<20	700	1500	<10	70	20	30	<200
34-31HN	<50	<20	50	30	30	<20	700	1000	10	50	<10	20	<200
40-32HN	<50	20	300	30	70	<20	1500	1000	50	70	30	30	<200
40-33HN	<50	<20	100	70	100	<20	1000	1000	<10	50	20	30	<200
40-34HN	<50	20	200	50	100	<20	>2000	1500	<10	70	30	50	<200
40-35HN	<50	<20	100	30	70	<20	1000	1000	<10	100	10	30	<200
40-36aHN	<50	<20	150	50	100	<20	1500	1500	<10	100	15	50	<200
40-36bHN	<50	20	100	70	100	<20	1500	2000	10	150	20	30	<200
40-37HN	<50	30	70	70	100	<20	700	2000	<10	200	15	70	<200
40-38HN	<50	100	100	300	100	<20	700	>10000	100	150	30	50	<200
40-39HN	<50	100	70	300	70	<20	700	1500	10	50	20	20	<200
40-40HN	<50	20	70	50	100	<20	500	1500	<10	70	20	30	<200
40-41HN	<50	<20	100	30	20	<20	700	1000	10	70	10	50	<200
46-42HN	<50	<20	100	50	100	<20	500	700	<10	50	20	30	<200
46-43HN	<50	<20	150	200	70	<20	1000	1000	10	70	15	30	<200
46-44HN	<50	<20	70	50	100	<20	700	1500	<10	70	15	30	<200
46-45HN	<50	<20	50	30	150	<20	700	1000	<10	70	15	50	<200
46-46HN	<50	<20	70	50	100	<20	700	1000	<10	100	20	50	<200
46-47HN	<50	<20	100	70	200	<20	500	1000	<10	70	20	70	<200
46-48HN	<50	<20	50	50	100	<20	300	700	<10	50	15	30	<200
46-49HN	<50	<20	70	20	30	<20	700	1000	<10	50	10	20	<200
46-50HN	<50	<20	70	20	50	<20	700	1000	<10	50	10	30	<200
52-51HN	<50	<20	50	20	100	<20	300	1500	30	50	10	30	<200
52-52HN	<50	<20	30	30	100	<20	200	1000	<10	70	<10	20	<200
52-53HN	<50	<20	100	50	70	<20	500	1500	<10	70	15	30	<200
52-54HN	<50	<20	100	50	70	<20	1500	1500	<10	100	10	50	<200
52-55HN	<50	30	150	200	100	<20	700	2000	<10	100	20	50	<200
52-56HN	<50	200	200	700	100	<20	700	7000	15	100	70	100	<200
52-57HN	<50	20	150	200	100	<20	1500	1500	<10	70	20	70	<200

Table A8.--Analytical data for 60 heavy-mineral concentrate samples derived from soils, non-magnetic fraction, Akatasa prospect, Xinjiang, China. [Ca, Fe, Mg, Na, P, and Ti in percent, all other elements in ppm].

Sample	Sc	Sn	Sr	Th	V	W	Y	Zn	Zr	Pd	Pt
22-01HN	30	70	1000	200	200	70	200	<500	>2000	<5	<5
22-02HN	20	20	1500	<200	200	200	150	<500	>2000	<5	<5
22-03HN	20	20	1000	200	200	150	200	<500	>2000	<5	<5
22-04bHN	15	50	300	<200	150	300	200	<500	>2000	<5	<5
22-05HN	<10	100	200	200	150	200	500	<500	>2000	<5	<5
22-06HN	20	50	200	200	150	50	300	<500	>2000	<5	<5
22-07HN	30	70	200	200	150	<50	500	<500	>2000	<5	<5
22-08HN	20	30	300	300	150	200	500	<500	>2000	<5	<5
22-09HN	20	50	500	200	150	150	300	<500	>2000	<5	<5
22-10HN	10	50	500	<200	150	50	300	<500	>2000	<5	<5
22-11HN	10	30	300	<200	150	50	200	<500	>2000	<5	<5
28-12HN	30	50	500	<200	150	70	300	<500	>2000	<5	<5
28-13HN	50	30	700	200	150	200	500	<500	>2000	<5	<5
28-14HN	30	50	300	500	150	150	500	<500	>2000	<5	<5
28-15HN	20	30	500	<200	100	150	300	<500	>2000	<5	<5
28-16HN	10	50	300	<200	150	1000	500	<500	>2000	<5	<5
28-17HN	10	50	300	200	150	100	500	<500	>2000	<5	<5
28-18HN	20	70	200	300	150	50	700	<500	>2000	<5	<5
28-19aHN	20	50	200	200	150	200	500	<500	>2000	<5	<5
28-19bHN	15	50	300	<200	150	1000	500	<500	>2000	<5	<5
28-20HN	15	70	500	<200	150	300	500	<500	>2000	<5	<5
34-21HN	30	50	700	200	150	<50	700	<500	>2000	<5	<5
34-22HN	20	30	700	300	150	<50	700	<500	>2000	<5	<5
34-23HN	30	20	500	700	200	<50	700	<500	>2000	<5	<5
34-24HN	30	50	300	300	150	1000	700	<500	>2000	<5	<5
34-25HN	20	30	300	200	150	200	700	<500	>2000	<5	<5
34-26HN	15	20	200	200	100	50	500	<500	>2000	<5	<5
34-27HN	10	30	500	300	200	300	700	<500	>2000	<5	<5
34-28HN	15	<20	700	<200	200	200	500	<500	>2000	<5	<5
34-29HN	10	50	700	<200	300	200	500	<500	>2000	<5	<5
34-30HN	15	30	500	200	200	<50	500	<500	>2000	<5	<5
34-31HN	10	20	1000	<200	300	500	700	<500	>2000	<5	<5
40-32HN	20	30	500	500	200	300	700	<500	>2000	<5	<5
40-33HN	20	<20	700	500	200	70	500	<500	>2000	<5	<5
40-34HN	30	50	300	700	200	<50	700	<500	>2000	<5	<5
40-35HN	15	20	300	200	150	150	500	<500	>2000	<5	<5
40-36aHN	15	70	300	200	150	50	700	<500	>2000	<5	<5
40-36bHN	15	20	500	200	200	150	500	<500	>2000	<5	<5
40-37HN	10	<20	200	<200	150	150	500	<500	>2000	<5	<5
40-38HN	10	<20	300	<200	150	150	300	<500	>2000	<5	<5
40-39HN	15	<20	<200	<200	100	<50	500	<500	>2000	<5	<5
40-40HN	10	20	500	<200	150	<50	500	<500	>2000	<5	<5
40-41HN	10	70	200	<200	500	200	700	<500	>2000	<5	<5
46-42HN	20	20	300	<200	150	300	700	<500	>2000	<5	<5
46-43HN	30	20	500	200	200	700	700	<500	>2000	<5	<5
46-44HN	15	20	300	<200	150	200	700	<500	>2000	<5	<5
46-45HN	10	20	300	<200	150	700	500	<500	>2000	<5	<5
46-46HN	10	<20	300	<200	150	50	500	<500	>2000	<5	<5
46-47HN	15	30	700	<200	150	70	500	<500	>2000	<5	<5
46-48HN	20	<20	200	<200	100	70	500	<500	>2000	<5	<5
46-49HN	10	30	300	<200	500	50	300	<500	>2000	<5	<5
46-50HN	15	70	500	<200	500	100	300	<500	>2000	<5	<5
52-51HN	20	50	700	<200	200	200	500	<500	>2000	<5	<5
52-52HN	15	<20	700	<200	200	<50	300	<500	>2000	<5	<5
52-53HN	15	20	500	<200	150	700	500	<500	>2000	<5	<5
52-54HN	10	30	300	<200	150	500	700	<500	>2000	<5	<5
52-55HN	20	50	300	<200	200	50	700	<500	>2000	<5	<5
52-56HN	30	50	500	<200	300	70	500	<500	>2000	<5	<5
52-57HN	30	50	700	200	300	200	700	<500	>2000	<5	<5

Table A9.--Mineralogical data for 59 nonmagnetic heavy-mineral concentrate samples derived from soil, western part of the Akatasa prospect, Xinjiang, China. [For gold, numbers are gold particles found in that sample; for other minerals, 0 = not found, 1 = present, 2 = abundant, and 3 = dominant. (?) = probable, but not confirmed].

Sample	Gold particle	White Mica	Chlorite	Epidote	Zircon	Apatite	Rutile	Tourmaline	Pyrite Pseudomorph	Amphibole	Sphene
22-1	0	3	3	1	1	1	1	1	0	1	1
22-2	1	3	2	1	1	1	1	1	1	1	1
22-3	3	2	2	1	1	1	1	1	2	1	0
22-4b	3	2	0	1	0	2	1	2	0	1	0
22-5	0	2	1	1	1	1	1	1	1	0	1
22-6	0	2	0	1	1	2	1	2	1	1	1
22-7	0	2	1	1	1	2	1	1	1	0	2
22-8	0	2	1	1	1	2	1	1	0	1	2
22-9	0	1	1	1	1	2	0	2	1	1	2
22-10	0	1	1	1	1	2	1	1	0	1	2
22-11	0	1	1	1	1	2	1	2	1	0	2
28-12	0	2	2	1	1	2	1	1	1	2	0
28-13	0	2	2	1	1	1	1	1	2	1	1
28-14	0	2	2	1	1	1	1	1	1	1	0
28-15	0	2	2	1	1	1	1	1	1	1	1
28-16	1	2	2	1	1	2	1	1	1	1	2
28-17	0	2	2	1	1	2	1	1	1	1	1
28-18	2	1	2	1	1	2	1	1	1	1	2
28-19a	1	1	1	1	1	2	1	1	2	1	2
28-19b	0	2	1	1	1	2	1	1	1	1	2
28-20	0	1	1	1	0	2	1	1	0	1	2
34-21	0	2	2	1	1	1	1	1	1	1	1
34-22	0	2	1	1	1	2	1	1	1	1	1
34-23	0	2	1	1	1	2	1	1	0	1	2
34-24	0	1	1	1	1	2	1	1	0	1	1
34-25	0	2	1	1	1	1	1	1	0	1	1
34-26	0	2	1	1	1	2	1	1	0	0	1
34-27	0	2	2	1	1	1	1	1	1	1	1
34-28	0	2	1	1	1	2	1	1	0	1	1
34-29	0	2	0	1	1	2	1	1	0	1	2
34-30	0	1	1	1	1	2	1	1	0	1	2
34-31	1	0	1	0	1	2	1	1	1	1	2
40-32	0	1	2	1	1	2	1	1	1	1	2
40-33	0	2	2	1	1	1	1	1	1	1	1
40-34	0	2	2	1	1	1	1	1	0	1	1
40-35	0	2	2	1	1	2	1	1	1	0	1
40-36a	0	2	1	1	1	2	1	1	1	1	2
40-36b	0	2	1	1	1	1	1	1	0	1	0
40-37	0	2	2	1	1	1	1	1	1	1	1
40-38	0	2	2	0	1	1	1	1	1	1	1
40-39	0	1	1	1	1	2	1	1	2	1	1
40-40	0	1	1	1	2	3	1	1	1	1	1
40-41	2	1	1	1	1	2	1	1	0	1	3
46-42	0	2	1	1	1	2	1	1	1	0	2
46-43	2	1	2	1	1	2	1	1	1	0	1
46-44	0	1	1	1	1	2	1	1	0	0	2
46-45	0	2	2	1	1	1	1	1	0	0	1
46-46	0	2	1	1	1	2	1	1	0	1	1
46-47	1	2	1	1	1	2	1	1	0	0	2
46-48	0	2	1	1	1	2	1	1	0	1	2
46-49	1	1	1	0	0	2	1	1	0	1	2
46-50	0	1	1	1	1	2	2	1	0	1	2
52-51	0	2	2	1	1	1	1	1	0	1	2
52-52	0	2	2	0	1	1	1	1	0	1	2
52-53	1	1	1	1	1	2	1	1	0	1	2
52-54	2	2	1	1	1	2	1	1	0	0	1
52-55	0	1	1	1	1	2	1	1	1	1	2
52-56	0	1	1	1	1	2	1	1	2	2	1
52-57	5	0	1	2	1	2	1	1	1	2	1

Table A9.--Mineralogical data for 59 nonmagnetic heavy-mineral concentrate samples derived from soil, western part of the Akatasa prospect, Xinjiang, China. [For gold, numbers are gold particles found in that sample; for other minerals, 0 = not found, 1 = present, 2 = abundant, and 3 = dominant. (?) = probable, but not confirmed].

Sample	Hematite	Anatase	Specularite	Fresh Pyrite	Pyroxene	Spinel	Barite	Corundum	Sillimanite	Moissanite
22-1	3	0	0	0	0	0	0	0	1	0
22-2	1	0	0	0	0	0	0	0	0	0
22-3	0	1	0	1	0	0	0	0	0	0
22-4b	1	1	2	1	0	0	0	0	0	0
22-5	2	0	0	1	0	0	1(?)	0	0	0
22-6	2	0	0	0	1	1	0	0	0	0
22-7	1	0	0	0	0	0	0	0	0	0
22-8	1	0	0	0	1	0	0	0	0	0
22-9	1	0	0	0	0	0	0	0	0	0
22-10	2	0	0	0	0	0	0	0	0	0
22-11	1	0	0	0	0	0	0	0	0	0
28-12	0	0	0	0	1	1	1(?)	0	0	0
28-13	1	0	0	0	1	0	1(?)	0	0	0
28-14	2	1	0	0	1	1	0	0	0	0
28-15	3	0	0	0	0	0	0	0	0	0
28-16	1	0	0	0	0	0	0	0	0	0
28-17	2	0	0	0	1	0	0	0	0	0
28-18	1	0	0	0	1	0	1(?)	0	0	0
28-19a	1	0	0	0	1	0	0	0	0	0
28-19b	1	0	0	0	1	0	0	0	0	0
28-20	1	0	0	0	1	0	0	0	0	0
34-21	2	0	0	0	1	0	0	0	0	0
34-22	1	1	0	0	1	0	1(?)	0	0	0
34-23	2	0	0	0	0	0	0	0	0	0
34-24	2	0	0	0	0	0	0	0	0	0
34-25	2	0	0	0	1	0	0	0	0	0
34-26	1	0	0	0	0	0	0	0	0	0
34-27	2	0	0	0	0	0	0	0	0	0
34-28	2	0	0	0	0	0	0	0	0	0
34-29	1	0	0	0	0	0	0	0	0	0
34-30	2	0	0	0	0	0	0	1(?)	1	0
34-31	1	0	0	0	0	0	0	0	1	0
40-32	1	1	0	0	1	0	0	0	1	0
40-33	0	0	0	0	0	0	0	0	0	0
40-34	1	0	0	0	1	0	1(?)	0	1	0
40-35	2	0	0	0	0	0	0	0	1	0
40-36a	1	0	0	0	1	0	0	0	0	0
40-36b	2	0	0	0	0	0	1(?)	0	1	0
40-37	2	0	0	0	0	0	0	0	1	0
40-38	2	0	0	0	0	0	0	0	0	1
40-39	2	0	0	0	0	0	0	0	0	0
40-40	1	0	0	0	1	0	1(?)	0	0	0
40-41	1	0	0	0	0	0	0	0	0	0
46-42	1	0	0	0	0	0	0	0	0	1
46-43	2	0	0	0	0	0	1(?)	0	0	0
46-44	1	0	0	0	0	0	0	0	0	0
46-45	2	0	0	0	0	0	0	0	0	0
46-46	2	0	0	0	0	0	0	0	0	0
46-47	0	0	0	0	0	0	0	0	0	0
46-48	1	0	0	0	0	0	0	0	0	0
46-49	2	0	1	0	1	0	1(?)	0	0	0
46-50	2	0	1	0	0	0	0	0	0	0
52-51	1	0	0	0	0	0	0	0	1	0
52-52	1	0	0	0	0	0	1(?)	0	1	0
52-53	2	0	1	0	0	0	0	0	0	0
52-54	2	0	1	0	0	0	1(?)	0	1	0
52-55	2	0	0	0	0	0	0	0	0	0
52-56	0	0	0	0	0	1	1(?)	0	1	0
52-57	1	0	0	0	1	0	0	0	1	0