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COMPOSITIONS OF PLACER GOLD IN THE RAMPART-EUREKA-MANLEY-TOFTY AREA, EASTERN TANANA AND WESTERN LIVENGOOD QUADRANGLES, CENTRAL INTERIOR ALASKA, DETERMINED BY ELECTRON MICROPROBE ANALYSIS

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INTRODUCTION

Quantitative microprobe analyses were performed on 54 placer gold nuggets, representing 13 placer deposits, in the Tofty-Manley-Eureka-Rampart area, Central Interior Alaska. The placers were located on Eureka, Rhode Island, Little Minook Jr., Omega, Deep, Gunnison, Tofty, Hunter, Slate, and Hoosier Creeks and New York Gulch (Fig. 1). Gold was kindly donated by Jim Munsell, Bob Bettisworth, Jim Dale, Steve Losonsky, Don Harris, and the University of Alaska Museum. Average fineness of the placer deposits varies within the region and is lowest near Eureka and highest near Rampart (Fig. 1).

The placer deposits sampled occur on both sides of a strand of the Tintina fault and from the vicinity of late Tertiary-early Quaternary, gold-bearing gravel deposits (Figs. 1, 2). Earlier workers (e.g., Mertie, 1937; Wayland, 1961; Yeend, 1990) have concluded that much of the placer gold in this region was derived from the older gravel deposits. Known lode gold occurrences are present in 90 Ma alkalic plutonic rocks of the Elephant Mountain and Sawtooth plutons (Fig. 2; McCoy and others, 1997). Lack of placer deposits immediately proximal to these intrusions can be ascribed to Quaternary alpine glaciation at higher elevations (mostly the plutons) in this region (Reifenstuhl and others, 1997) which scoured the proximal drainages. Anomalous concentrations of gold are also present with early Tertiary volcanic rocks near Rampart (Liss and others, 1997).

Analyses were performed on the Chimeca SX-50 microprobe at the University of Alaska, Fairbanks between March and April, 1997. Nuggets were mounted in epoxy, ground to a uniform thickness, polished to ¼ micron, and examined under reflected light prior to microprobe analysis. A 30 kV, 30 mA, 1 micron beam was employed for all analyses. Well-characterized natural minerals were employed as calibration and secondary standards. At least 6 analyses were performed on each grain, representing a minimum of 3 analyses from cores and 3 from rims of nuggets. Placer gold analyses with analytical totals of less than 97% were discarded; most analyses totaled to 99-101%. Because we did not analyze for sulfur, some inclusion mineral analyses (e.g., bismuthenite, joseite) total less than 100%. Complete analytical data is given in Table 1.

In addition, element distribution maps were prepared for x grains. Ten-second x-ray counts were measured at 1 micron spots along 5 micron intervals, establishing a 400 x 600 micron grid. The results are presented as dots, the brightness of which are proportional to the elemental concentration present. The nuggets are defined by the presence of Au, Ag, or Hg, with a black background representing the attached minerals (quartz, carbonate, mica) or the mounting epoxy. These maps clearly illustrate elemental zoning in the grains.

Identification of minerals included in the gold grains was by energy dispersive Kevex and checked by qualitative wavelength-dispersive analysis. Quartz, calcite, bismuthenite, joseite, arsenopyrite, chalcopyrite, galena, native Ni, biotite, muscovite, and magnetite were identified.

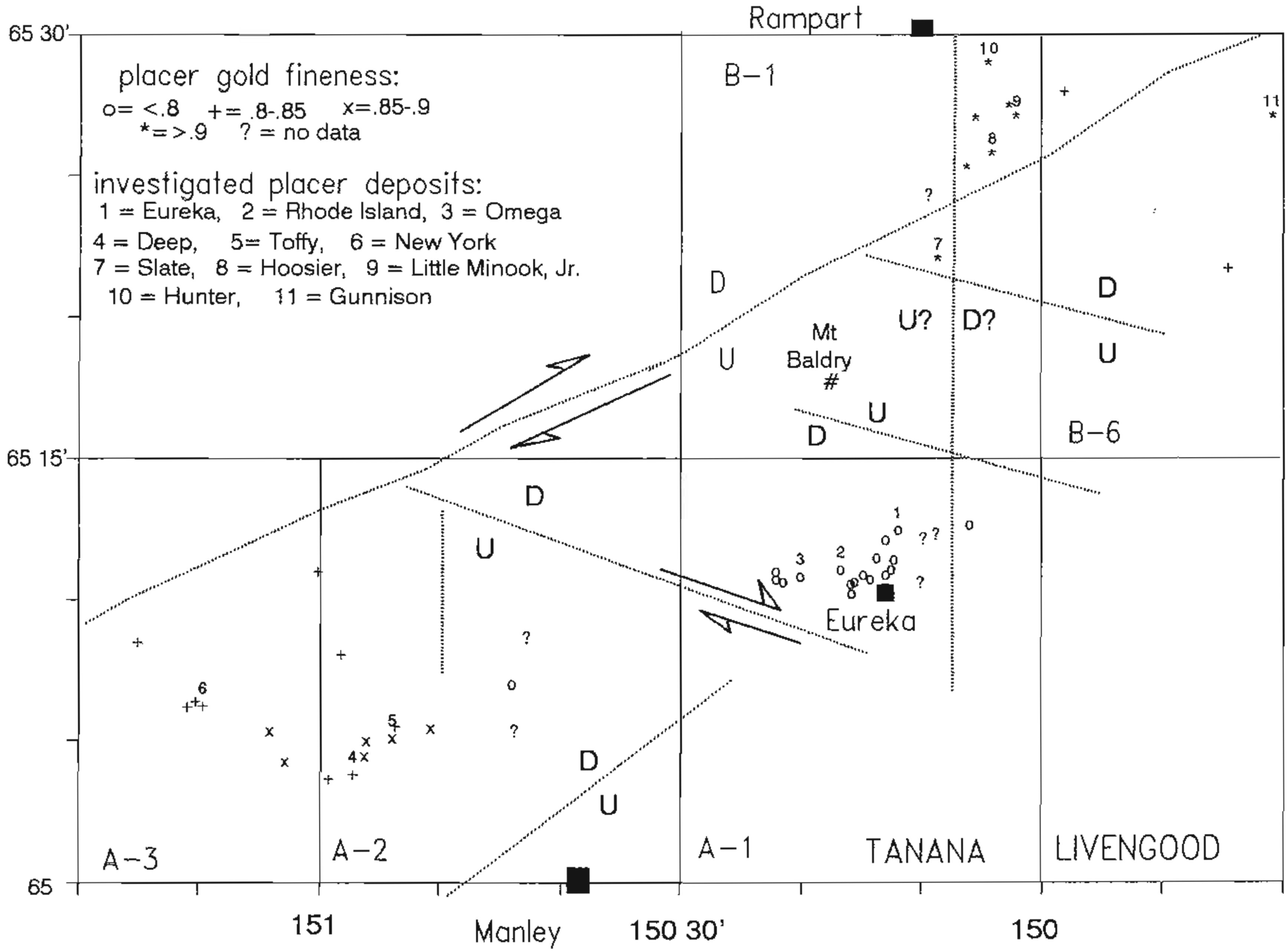

Fig. 1. Map showing known placer gold deposits in the study area, with average gold fineness values from Glover (1920) and Waters (1934), and locations of deposits sampled. Major high-angle faults after Chapman and others (1982), Reifenstuhl and others (1997), and Reifenstuhl and others (unpublished mapping).

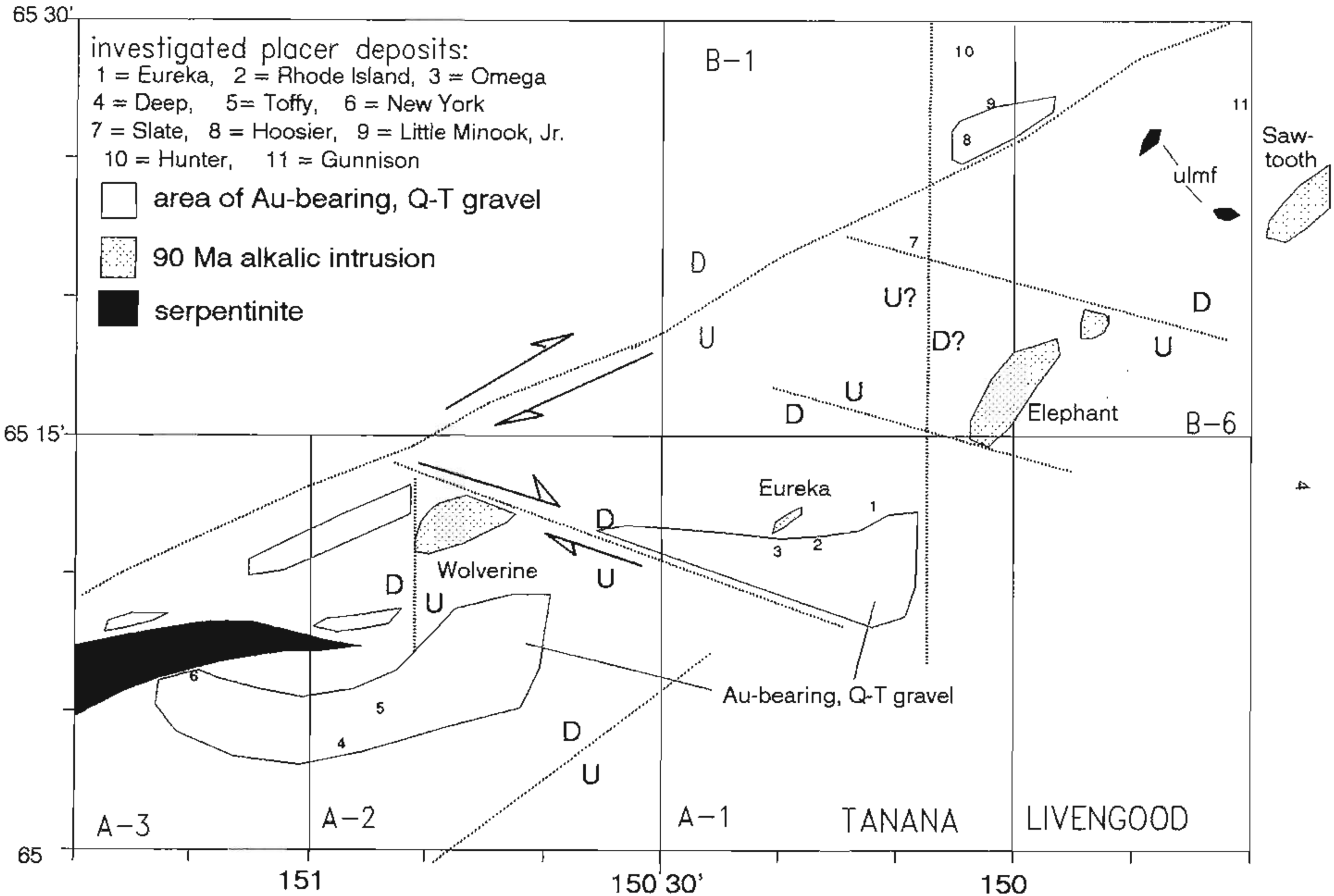

Fig. 2. Map showing some important geologic features in the study region compared to locations of placers sampled. Generalized locations of late Tertiary-early Quaternary Au-bearing gravels after Yeend (1989), Yeend (1990), and Reifenstuhl and others (1997). Distribution of major serpentinite bodies, mid-Cretaceous alkalic plutons, and major high-angle faults after Chapman and others (1982), Weber and others (1992), and Reifenstuhl and others, 1997.

SUMMARY OF STUDY FINDINGS AND INFERENCES

(1) Most of the grains contain significant amounts of Ag and Hg; many exhibit anomalous concentrations of Te. Because the Hg is present in grain cores, it is present naturally and is not related to historic placer gold processing (amalgamation).

(2) Many of the grains exhibit outer rinds--up to 100 microns thick—depleted in Hg and Ag. Because these rinds show variable Hg and Ag depletion and because the morphology of the rinds suggests "veins" into the grains, we interpret these as depletion zones.

(3) Grains closer to obvious bedrock sources (known or inferred) show the least development of such Ag-Hg depletion zones. Grains which come from placers which clearly drain late-Tertiary gravels characteristically contain Ag-Hg depletion zones, and some grains exhibit uniform Ag-Hg depletion. We consequently infer that the development of such leaching zones is a rough indication of the age of the placer gold. Based on this logic, gold in Gunnison Creek and in upper Eureka Creek has been concentrated recently; most other gold in the region shows evidence for derivation from older (pre-Quaternary) gravels, and several cycles of concentration.

(4) Many of the grains contain anomalous Te concentrations, Te-Bi inclusions, or bismuthenite inclusions. Because gold associated with Bi and Te is characteristic of plutonic-related occurrences (Newberry and others, 1995; McCoy and others, 1997), it is likely that this placer gold was originally derived from plutonic lodes, such as those known in the Elephant (Reifenstuhl and others, 1997) and Sawtooth intrusions (Mertie, 1937) and inferred in the Roughtop intrusion.

(5) Some of the grains have very odd compositions, such as the Ag-Hg and Au-Cu grains on Hunter Creek; these almost certainly indicate a different (epithermal??) source.

(6) Some of the grains from New York gulch contain native Ni. These are almost certainly derived from the serpentinized ultramafic rocks on the ridge above the gulch (Fig. 2). As they are also anomalous in Te, it is possible that plutonic-related hydrothermal systems have deposited gold through interaction with the serpentinite. Placer gold grains containing native Ni inclusions are also present in Tofty and Deep Creeks (Fig. 2), which could have also been derived from the ultramafic ridge.

(7) Gold from Gunnison Creek, which lies both below the Sawtooth pluton and several small bodies of serpentinized ultramafic rocks, contains native Ni and Bi-Te inclusions. The most likely explanation here is again a plutonic-related hydrothermal system which interacted with serpentinite.

(8) Gold from Hunter Creek and Little Minook Jr. Creeks (Fig. 2) contain gold with native Ni and do not drain serpentinite. Consequently, their gold cannot be locally derived. Extreme leached rims indicates that their gold was derived from the Tertiary gravels currently above the creeks. Both the placers and the Tertiary gravels are also located on the north side of a strand of the Tintina fault system (Fig .2). Given the presence of native Ni inclusions in the gold, the most likely sources are either from the Tofty region or from the Sawtooth region. Considering the right-lateral movement on the Tintina fault system, we suggest that the Tertiary gravels from which they were derived were originally present in the northwestern part of the Tofty area (Tanana A-3 quadrangle; Fig. 2).

CHARACTERISTICS OF GOLD GRAINS FROM INDIVIDUAL PLACER DEPOSITS

Bettisworth Claims, **Eureka Creek, Eureka District**: placer gold with intergrown vein quartz

65° 12.5'N 150° 11'W Tanana A-1 quadrangle

This placer nugget, donated by Bob Bettisworth, is coarse gold intergrown with vein quartz, of which we sliced off a portion for microprobe analysis. The presence of the intergrown quartz indicates that this sample was derived from a vein source and the source is likely to be in the near vicinity.

The gold in this sample is extremely homogeneous, with respect to both silver and mercury contents, averaging 20% Ag, 1.3% Hg and a fineness of 780 (Fig. 3). Bi and Te are present at detection levels (Table 1); their apparent variations are due to analytical uncertainties. This gold bears compositional similarity to gold-bearing samples (elevated Ag, Bi, and Te) found in outcrop at Elephant Mountain, 10 miles to the northeast (Liss and others, 1997); the spatial proximity and compositional similarities indicate derivation from a similar source. The absence of zoning in the grain is consistent with its lack of flattening or other indications of significant transport and the absence of a late Tertiary-Pliocene gravel source in this area. Almost certainly, this gold represents relatively fresh vein material from a relatively nearby source.

Rhode Island Creek, Eureka District

65° 11'N 150° 17'W Tanana A-1 quadrangle

These placer nuggets are very similar in composition and similar to the gold from Bettisworth's claim on nearby Eureka creek, suggesting a common source. The cores of all the grains are relatively homogeneous with silver contents of 19 to 21%, and the Hg contents are all greater than about 1% (Fig. 4). The Hg in cores varies from 0.8 to 5%, though, so that the fineness of the cores varies from 750 (high Hg) to 840 (low Hg). The grains definitely contain detectable Te, but not Cu or Bi (Table 1).

The rims of most of the grains are depleted in Hg relative to the cores, suggesting that leaching of Hg has taken place (Fig. 4). Two of the nuggets also display Ag-depleted rims. X-Ray maps of these two grains (Figs. 5, 6) show both the Au-rich, Hg- and Ag-depleted rims and the presence of composite grains with Au-enriched rims agglomerated together (Fig. 6). Given the nearby presence of Plio-Pleistocene gold-bearing gravels (Yeend, 1990), which probably contributed to the gold in this Holocene gravel, it is likely that these grains have experienced near-surface oxidation (and consequent Hg and Ag leaching) for several million years. The composite grains probably represent "old" placer gold grains agglomerated (Knight, 1992) during recent erosion and placer gold accumulation in Rhode Island Creek.

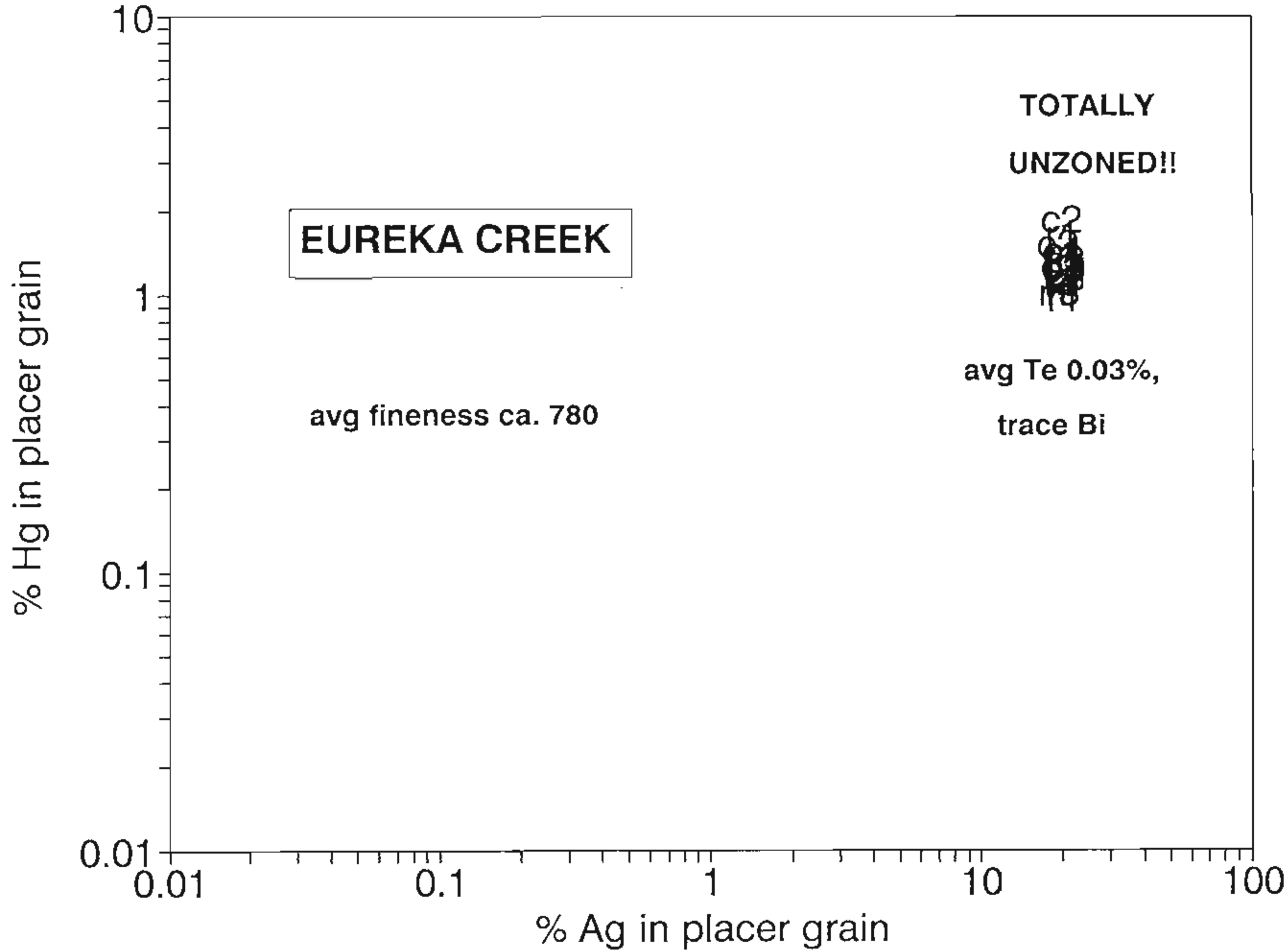

Fig. 3. Compositions of gold from Bettisworth claims, Eureka Creek. c=core, r=rim; numbers refer to grain number in Table 1.

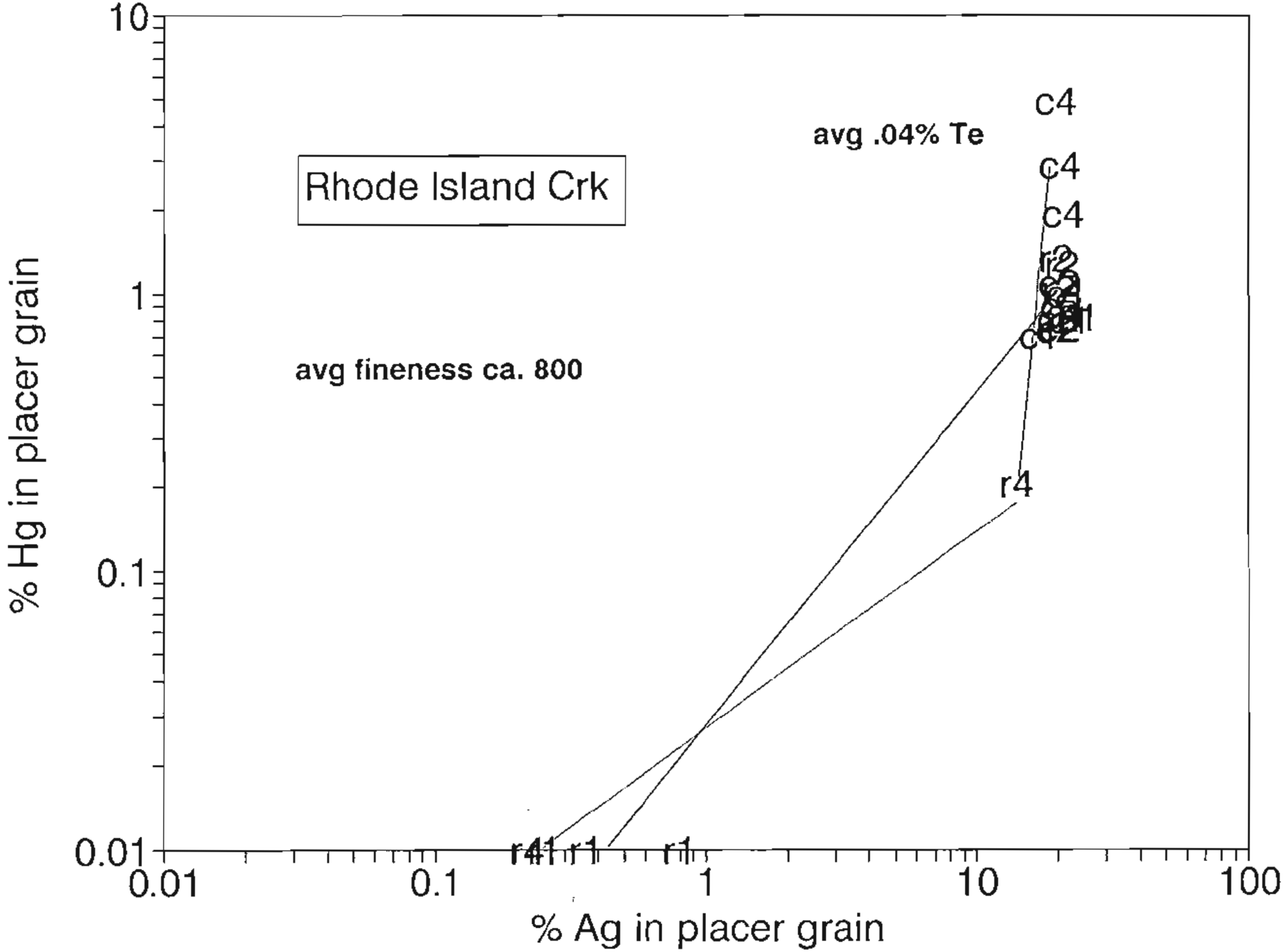

Fig. 4. Compositions of placer gold nuggets from Rhode Island Creek, Eureka district. Abbreviations as in Fig. 3.

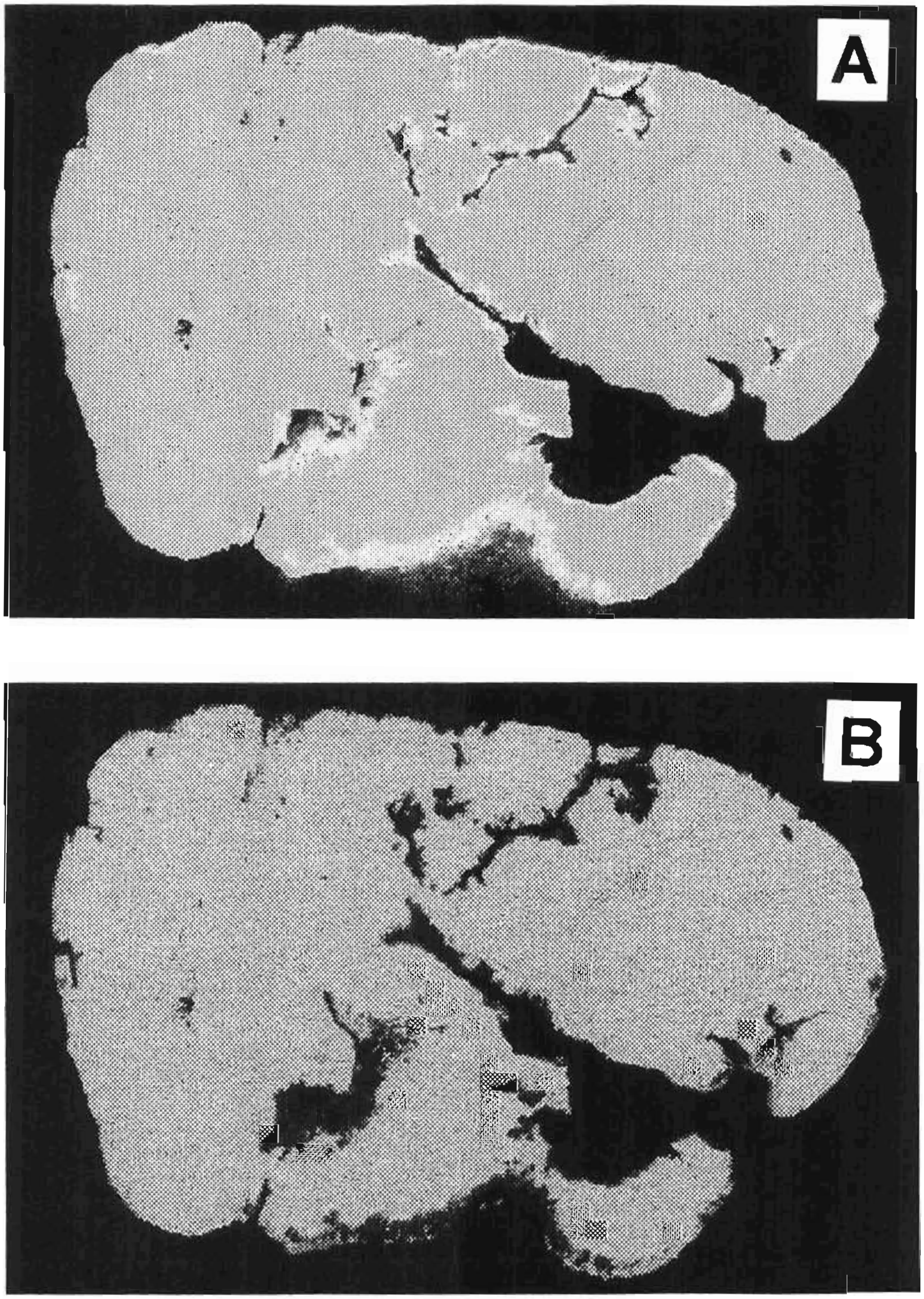

Fig. 5. X-Ray maps of grain 1, Rhode Island Creek. A. Gold X-Ray map, showing variably gold-enriched rims and "veins" (bright) in the nugget (medium grey), mounted in epoxy (black). B. Silver X-Ray map of grain 1, showing depletion (dark) corresponding to gold enrichment in 5A. Nugget is approximately 2 mm wide. Quantitative analyses of the core and rim are given in Table 1.

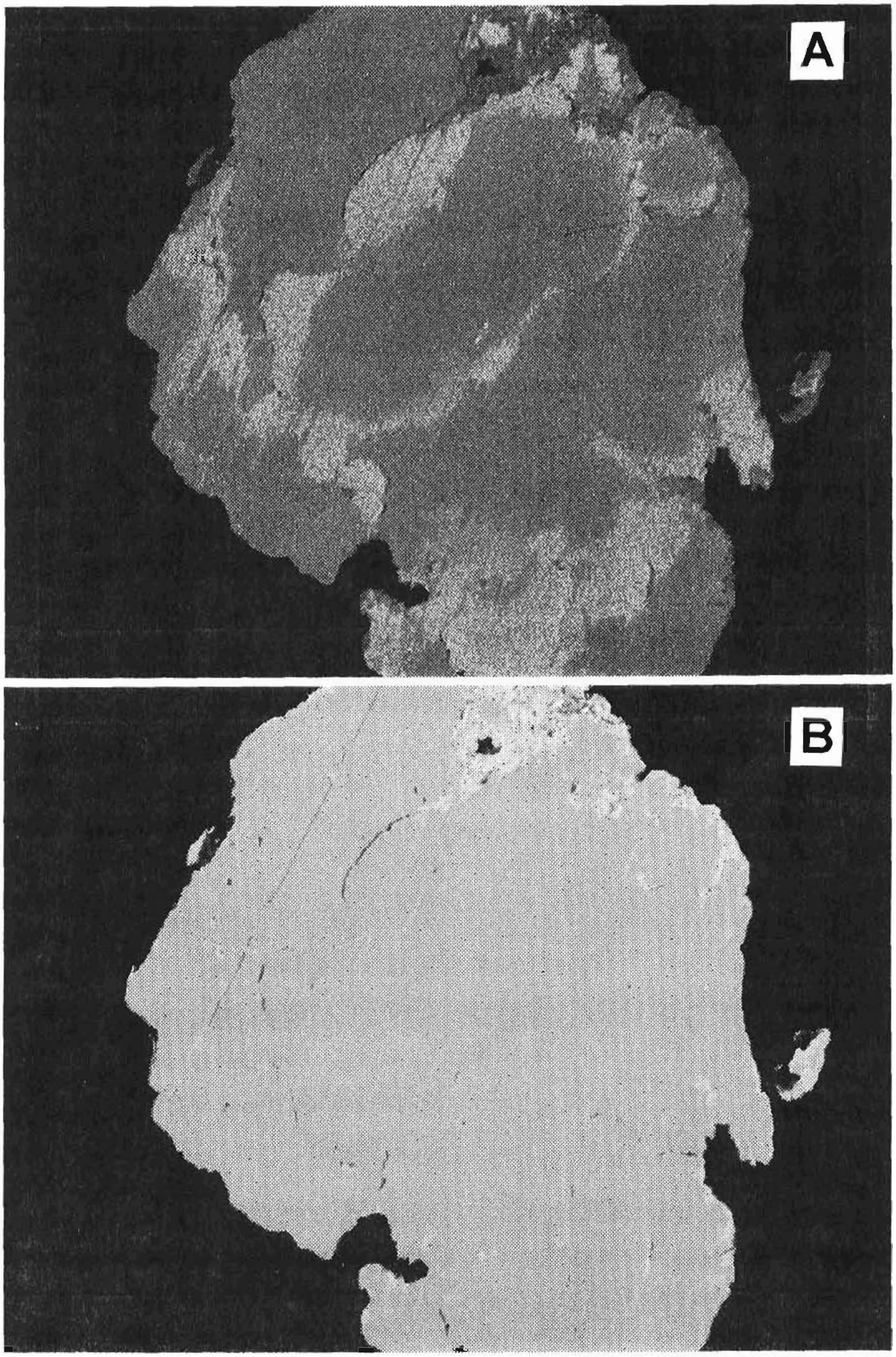

Fig. 6. X-Ray maps of grain 4 from Rhode Island Creek. A. Mercury X-Ray map, showing variably Hg-enriched zones (bright), variably Hg-depleted rim (dark), and "agglomeration" of smaller gold nuggets, some of which display Hg-depleted rims. B. Gold X-Ray map, showing variably Au-enriched rim corresponding to Hg-depleted zones in 6A. Horizontal distance is 3 mm. Quantitative core and rim analyses given in Table 1.

Omega Creek, Eureka district

65° 11'N 150°20' W Tanana A-1 quadrangle

Four grains were examined from Omega Creek. Three of these grains have almost identical compositions, lack appreciable zoning, and contain anomalous Te (Fig. 7). Their compositions are not distinguishable from the Eureka Creek gold (Fig. 3) or from cores of Rhode Island Creek grains (Fig. 4). One grain has a core with abnormally low Hg contents (<.2%) and low Hg- and Ag-rims (Fig. 7). This grain most likely acquired its composition through extensive residence time and was most likely cycled through late Tertiary gravels. This sample is from a placer near Rhode Island Creek and experienced a similar geologic history.

Deep Creek, Tofty district

65° 3.5'N 150°59' W Tanana A-2 quadrangle

Six grains were microprobed from this locale (Figs. 8, 9). One of these grains (#2) contains low Hg and very consistent Ag concentrations (ca. 10%). This composition is unusual for the Eureka-Manley-Tofty area, but resembles Bi-Te-bearing gold from Gunnison Creek (see ahead). Lack of evidence for leaching indicates the composition is primary. Because the Gunnison Creek gold is clearly derived from a plutonic source (see ahead) this grain may represent an uncommon varient on the Eureka-type gold. The other five grains (Figs. 8, 9) all have typical "Eureka-type" Ag-, Hg- rich cores and depleted rims, and are compositionally indistinguishable from the Rhode Island Creek gold. Several of these grains also possess anomalous Te contents. Almost certainly these 5 grains were formed from the same source and experienced the same leaching conditions as the Rhode Island Creek gold. These grains are strong evidence for Yeend (1990)'s hypothesis that the Tofty area gold came from late Tertiary gravels derived from Eureka-area sources.

One grain also contains a tiny inclusion of native Ni, the only terrestrial source for which is serpentinite. Given the presence of serpentinite northwest of this location (Fig. 2), it is likely that either the gold nugget encapsulated Ni in the placer environment or grew around it during hydrothermal gold deposition. Ni^{o} readily oxidizes in surficial environments, so it is unlikely the Ni^{o} was weathered out of serpentinite and then smashed into a gold particle. The other alternative—hydrothermal precipitation of gold onto Ni^{o}—is consequently more likely. The Te, Ag, and Hg content of this gold suggests it was derived from an Elephant Mtn-like source, so that the most obvious possible source is a plutonic-related hydrothermal system which interacted with serpentinite.

Tofty Gulch, Tofty District

65° 5' N 150°54' W Tanana A-2 quadrangle

Six grains were examined from Tofty Gulch, all donated by the UAF Museum. One grain (#3) had a core compositionally indistinguishable from Eureka gold and from cores of Rhode Island and Omega Creek gold (Fig. 10). This same grain contained traces of Te and had a strongly Hg- and Ag-depleted rim. Core compositions suggest derivation from a source like that of the Eureka area; rim compositions indicate significant residence and leaching.

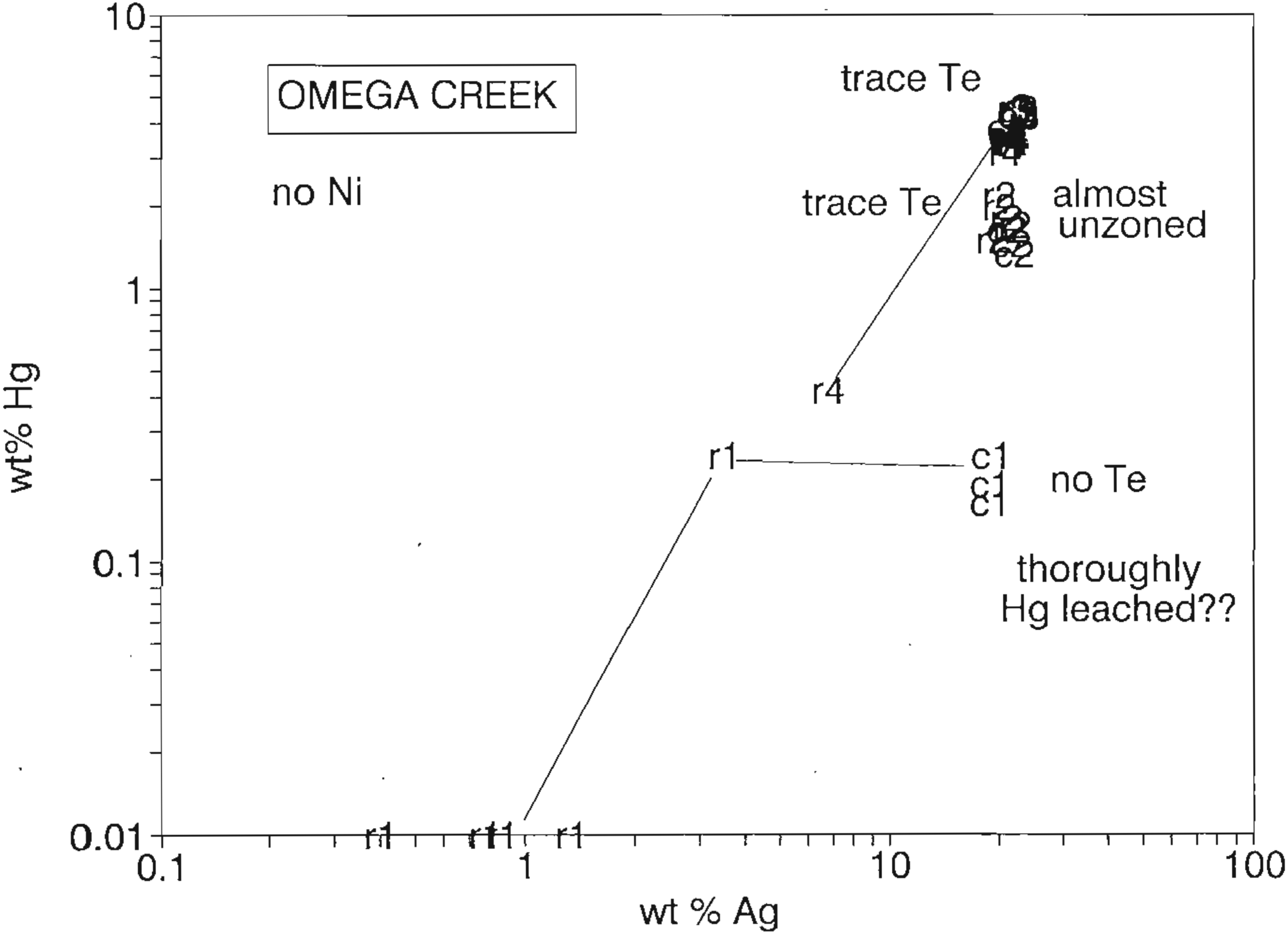

Fig. 7. Compositions of placer gold nuggets from Omega Creek, Eureka district. Abbreviations as in Fig. 3.

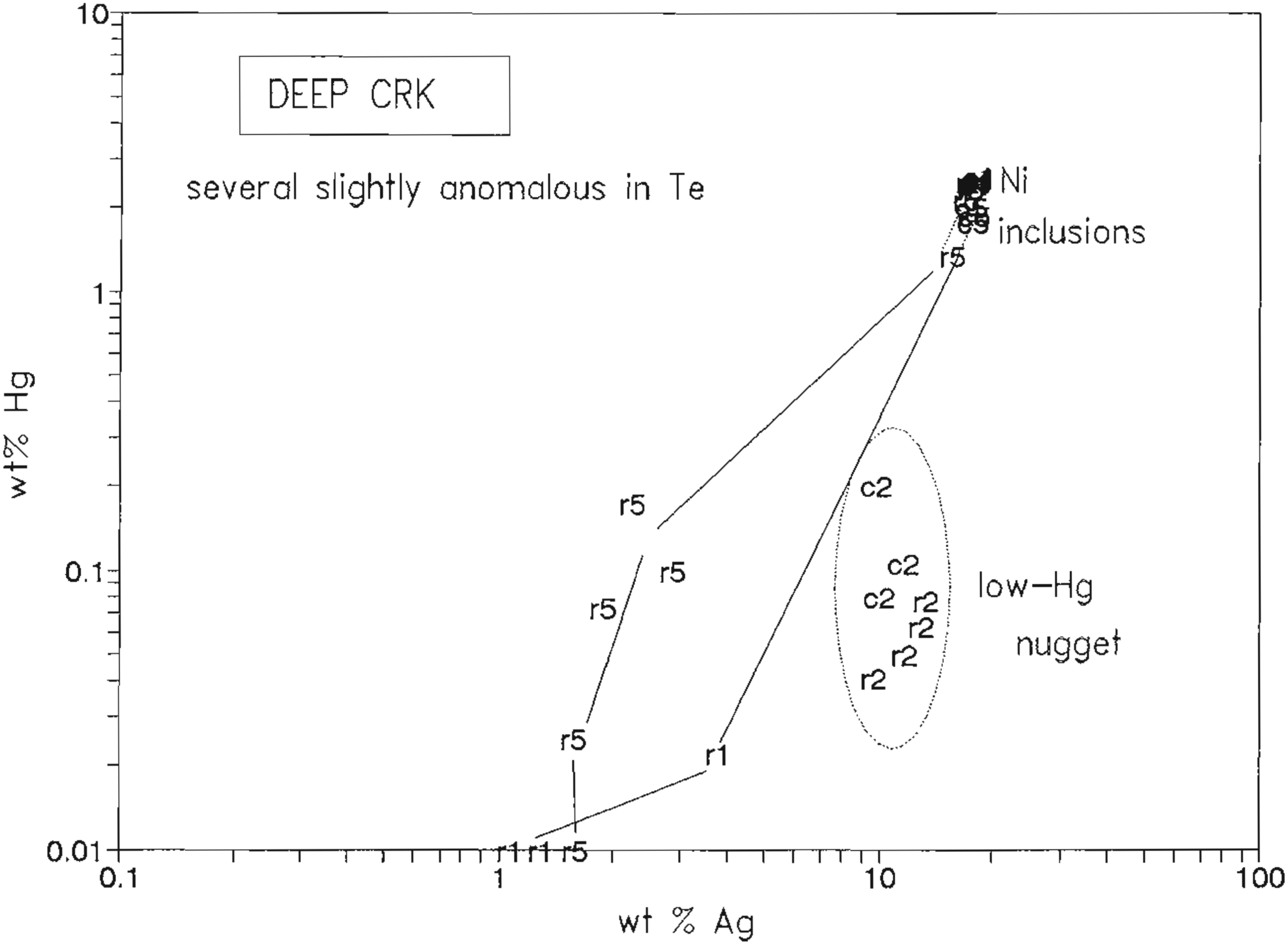

Fig. 8. Compositions of placer gold nuggets 1, 2, and 5 from Deep Creek, Tofty district. Abbreviations as in Fig. 3.

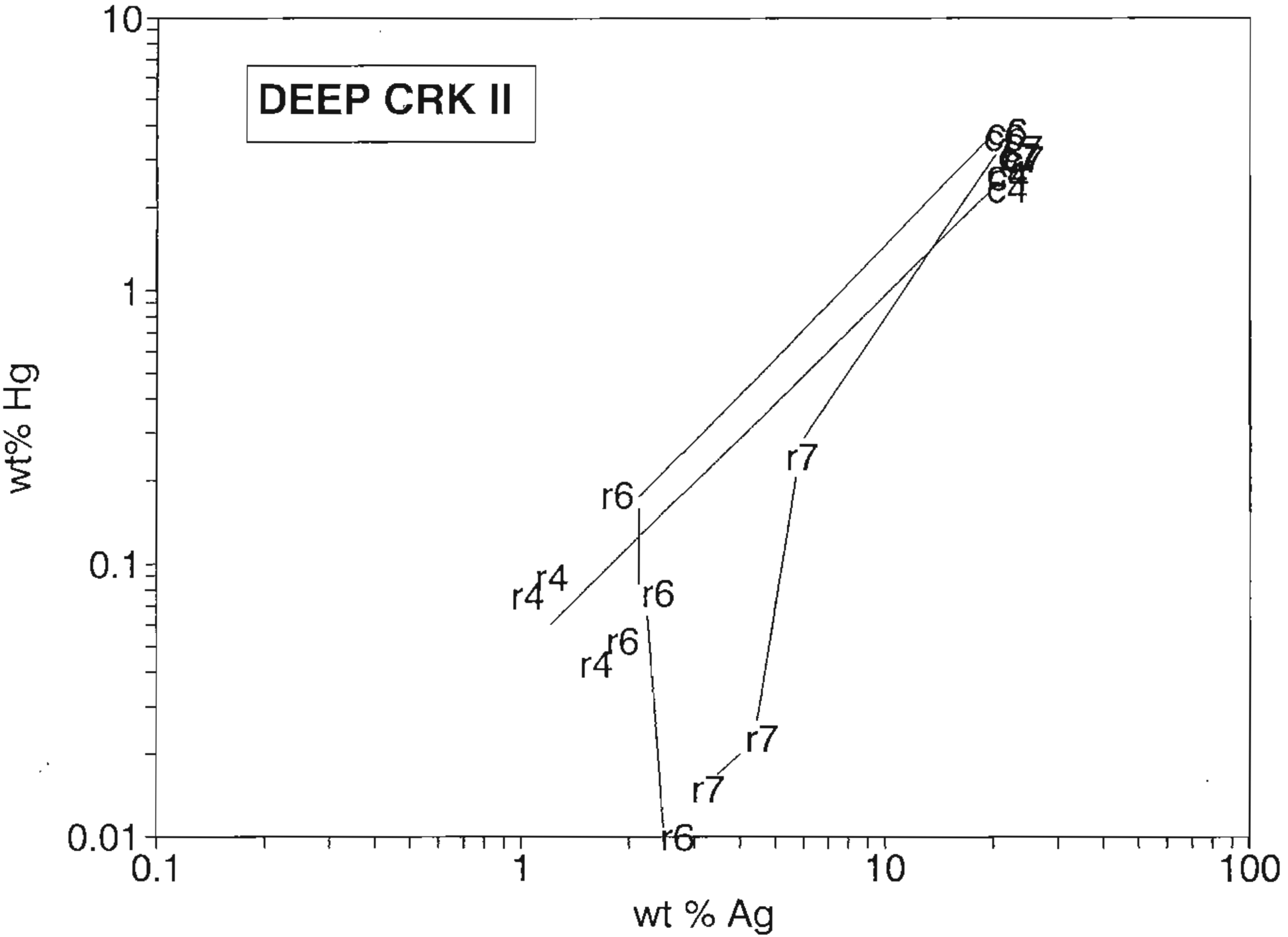

Fig. 9. Compositions of placer gold nuggets 4, 6, and 7 from Deep Creek, Tofty district. Abbreviations as in Fig. 3.

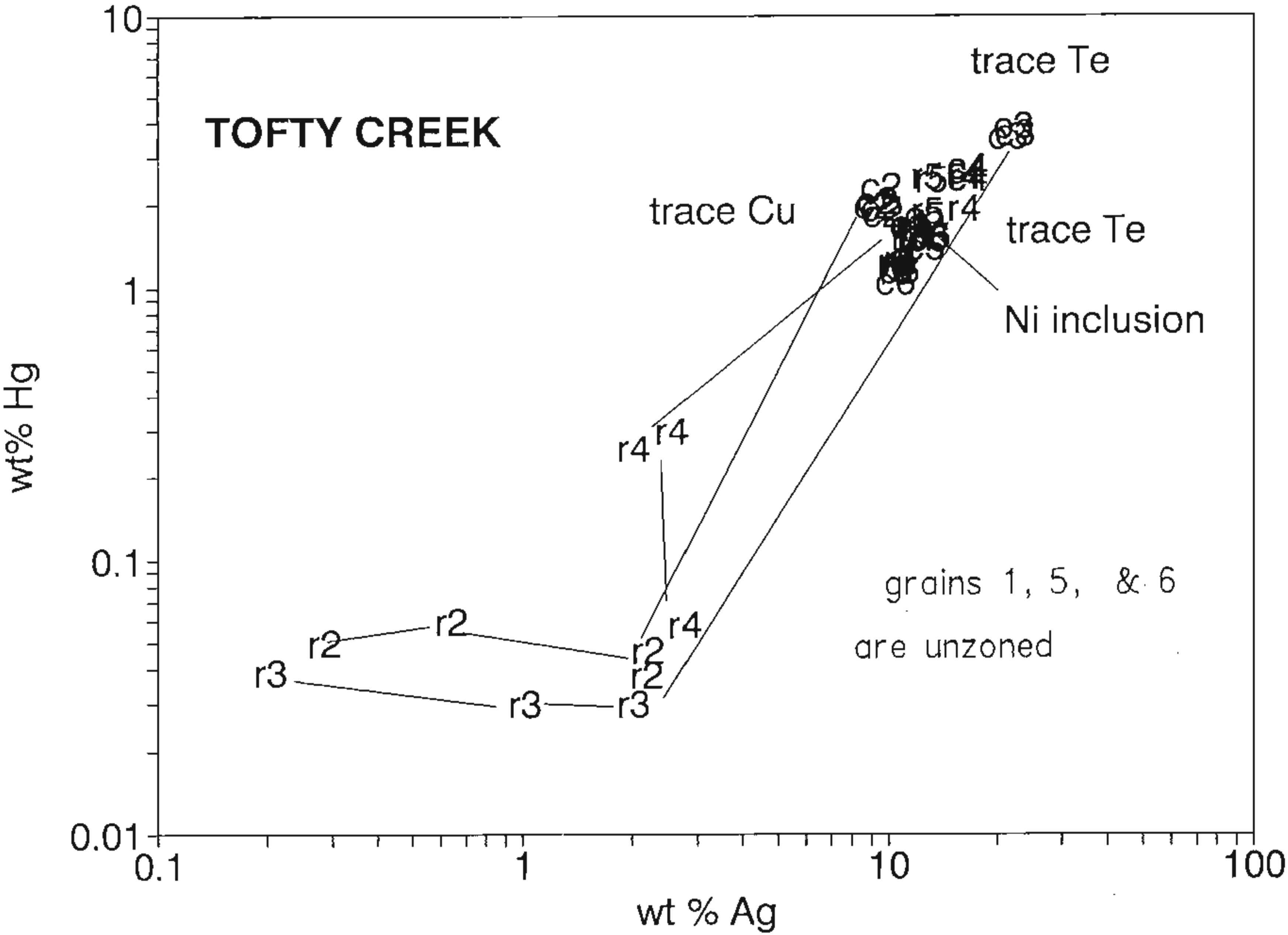

Fig. 10. Compositions of placer gold nuggets from Tofty Gulch, Tofty district. Abbreviations as in Fig. 3.

The other five grains have cores with slightly lower Ag contents (ca. 10-17% vs. 20% Ag) and Hg (ca. 1% vs. 2-3% Hg) than typical of Eureka area gold (Figs. 3, 10). Because several of these contain trace of Te and because the compositions are not radically different, we suggest that these grains are also derived from a Eureka-like source. Because they are depleted in both Ag and Hg (relative to Eureka gold) and appear to exhibit a linear pattern of Ag and Hg contents (Fig. 10) we propose that they represent a pervasive, low-level leaching of Eureka-type gold. Such a leaching event could have taken place in late Tertiary gravels prior to modern placer formation (McDonald and others, 1990). One of the lower-Ag grains contains a native Ni inclusion, which was most likely derived from a serpentinite source (the only known terrestrial source of Ni°). Possibly all the lower-Ag grains (#s 1,2,4, 5, 6) were derived from a hydrothermal source which interacted with serpentinite.

Two of the five low-Ag grains exhibit no compositional zoning; the other three exhibit strongly Ag- and Hg-depleted rims (grains 2-4; Fig. 10). We suggest that this rim leaching took place under the same conditions as experienced by the leached gold in Rhode Island, Deep, and Omega Creeks.

New York Gulch, Tofty district

65° 6' N 151° 9.5' W Tanana A-3 quadrangle

UAF Museum donated three small, irregularly shaped nuggets, 1 dendrite-shaped grain, and 2 cubic gold grains.

Each of the three small nuggets had a different composition, almost certainly indicating different sources and/or residence times (Figs. 11, 12). In addition, one of the grains had a composition (electrum) not previously reported from the Manley-Eureka-Rampart-Tofty area. The"dendrite" was also electrum in composition and the cubic grains were of moderate fineness, with slight evidence for leaching and distinctive inclusions.

Grain 1 is compositionally unzoned, both in terms of Hg and Ag (Fig. 11). Its major (Cu, Ag, Hg) and trace (Bi, Te) element contents are almost identical to those from Eureka and Rhode Island creeks in the Eureka district. Its average fineness is 780 with an Hg content of 3% and no detectable Cu. The absence of compositional zoning, however, suggests that it has not weathered for very long, and consequently is close to its the lode source, or that a hypothetical, soft, high fineness rim was removed by stream abrasion (Knight, 1992).

Grain 2 is compositionally zoned, with an extremely thick Hg-depleted rim and a small core with a composition similar to that of grain 1 (Figs. 11, 13). It has a locally high Te content (up to 4%). The rim is only slightly depleted in Ag, but highly depleted in Hg, indicating somewhat different rates of depletion for the two elements. Grain 2 was almost certainly derived from a Eureka-type source, but the extremely thick leached rind indicates an extensive period of leaching. With continued leaching, this grain would resemble Hg-poor, moderate-Ag grains seen in the Rampart district (see ahead).

Grain 3 is unusual. It has the appearance of a cube with "arms" (Fig. 14). Away from the immediate rim, this grain is high-Hg electrum, with a fineness of 420 to 510 and Hg contents of 2 to 5%. It contains detectable Te and Bi, but not Cu. Oddly, Hg increases in concentration from

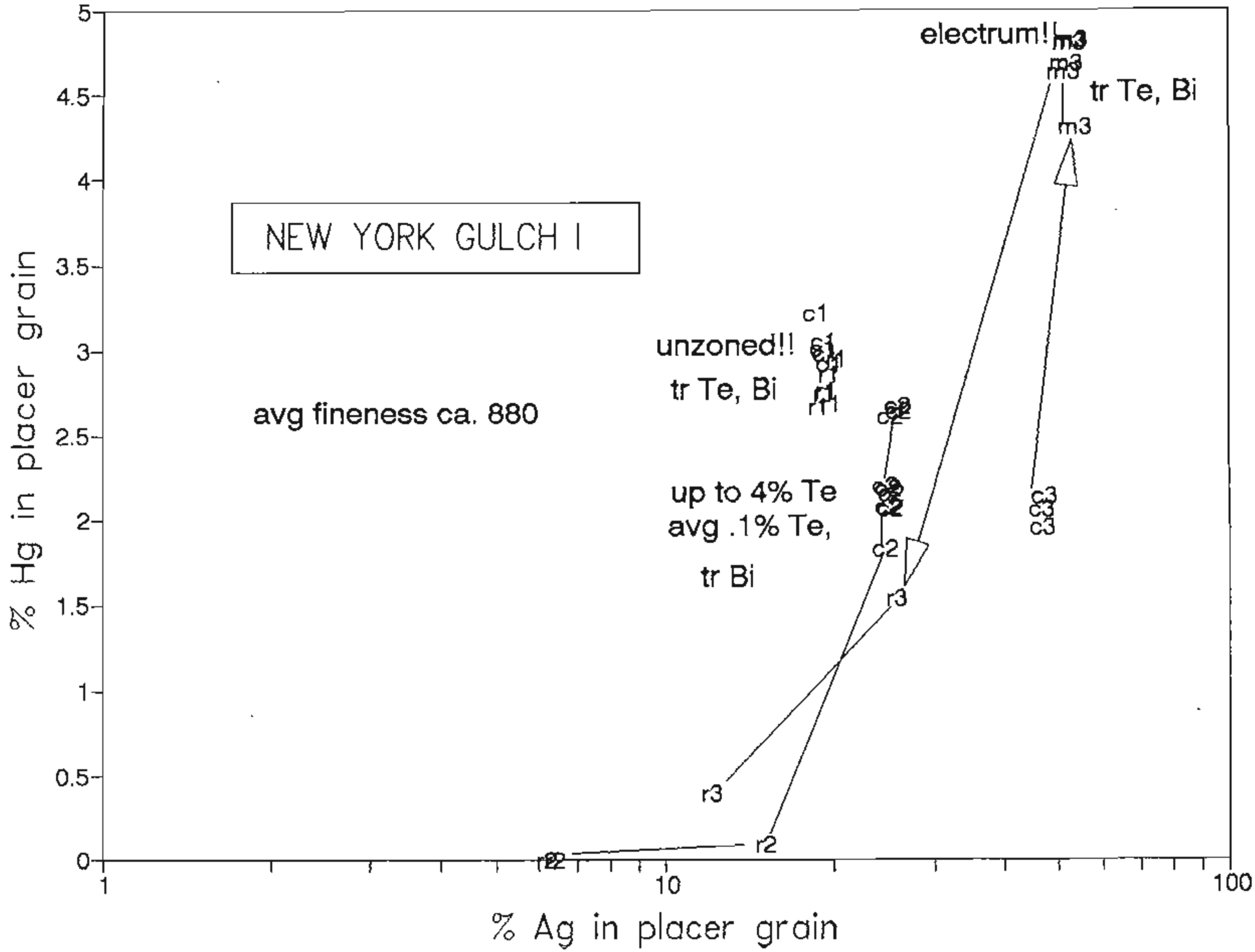

Fig. 11. Compositions of placer gold nuggets 1-3 from New York Gulch, Tofty district. Abbreviations as in Fig. 3.

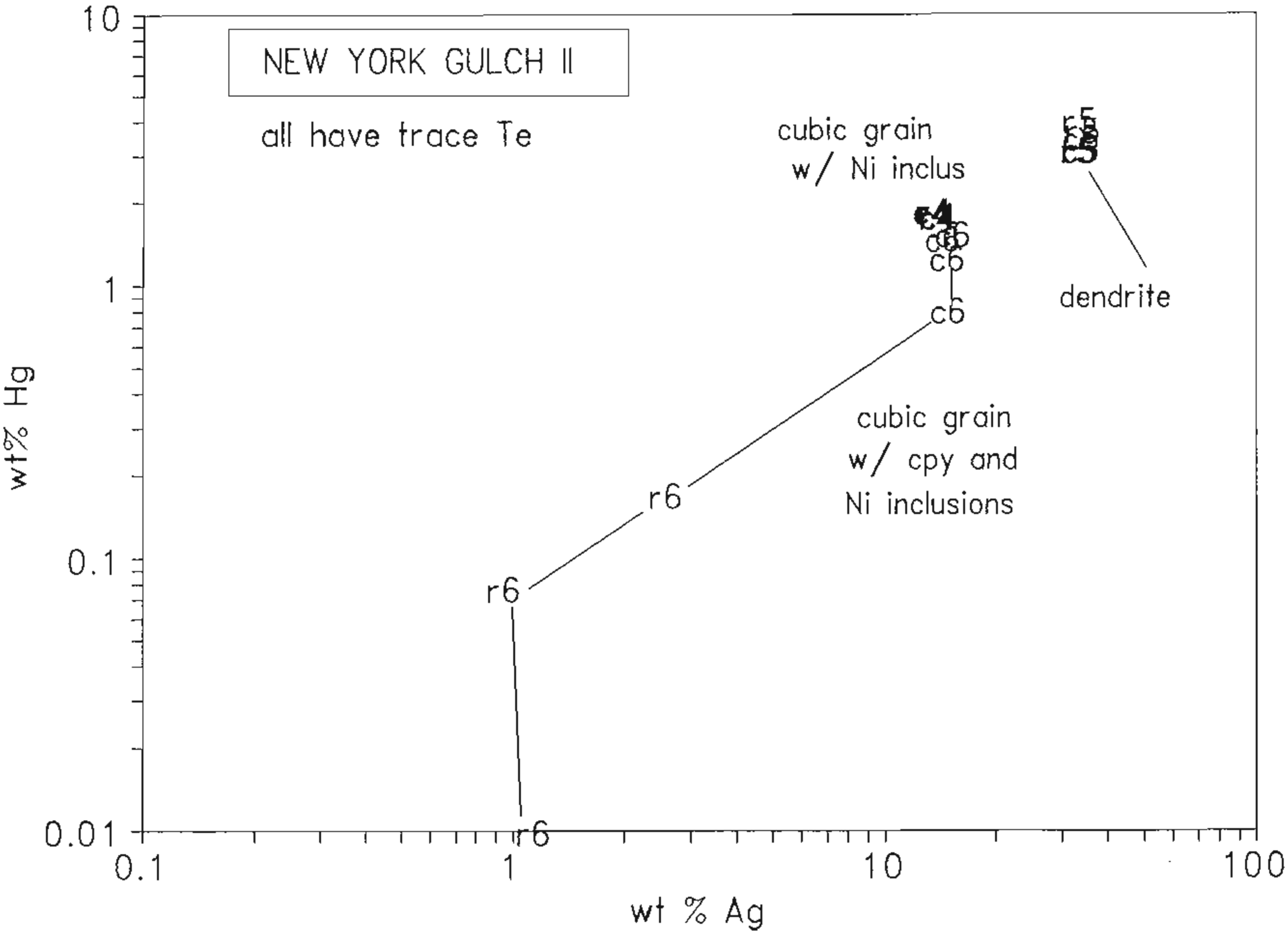

Fig. 12. Compositions of placer gold nuggets 4-6 from New York Gulch, Tofty district. Abbreviations as in Fig. 3.

Fig. 13. Mercury X-Ray map of grain 2 from New York Gulch, showing tiny, residual, high-Hg core (bright) in an almost completely Hg-depleted nugget (medium grey). Black area is epoxy surrounding the grain. Grain is 4 mm long. Quantitative core and rim analyses are given in Table 1.

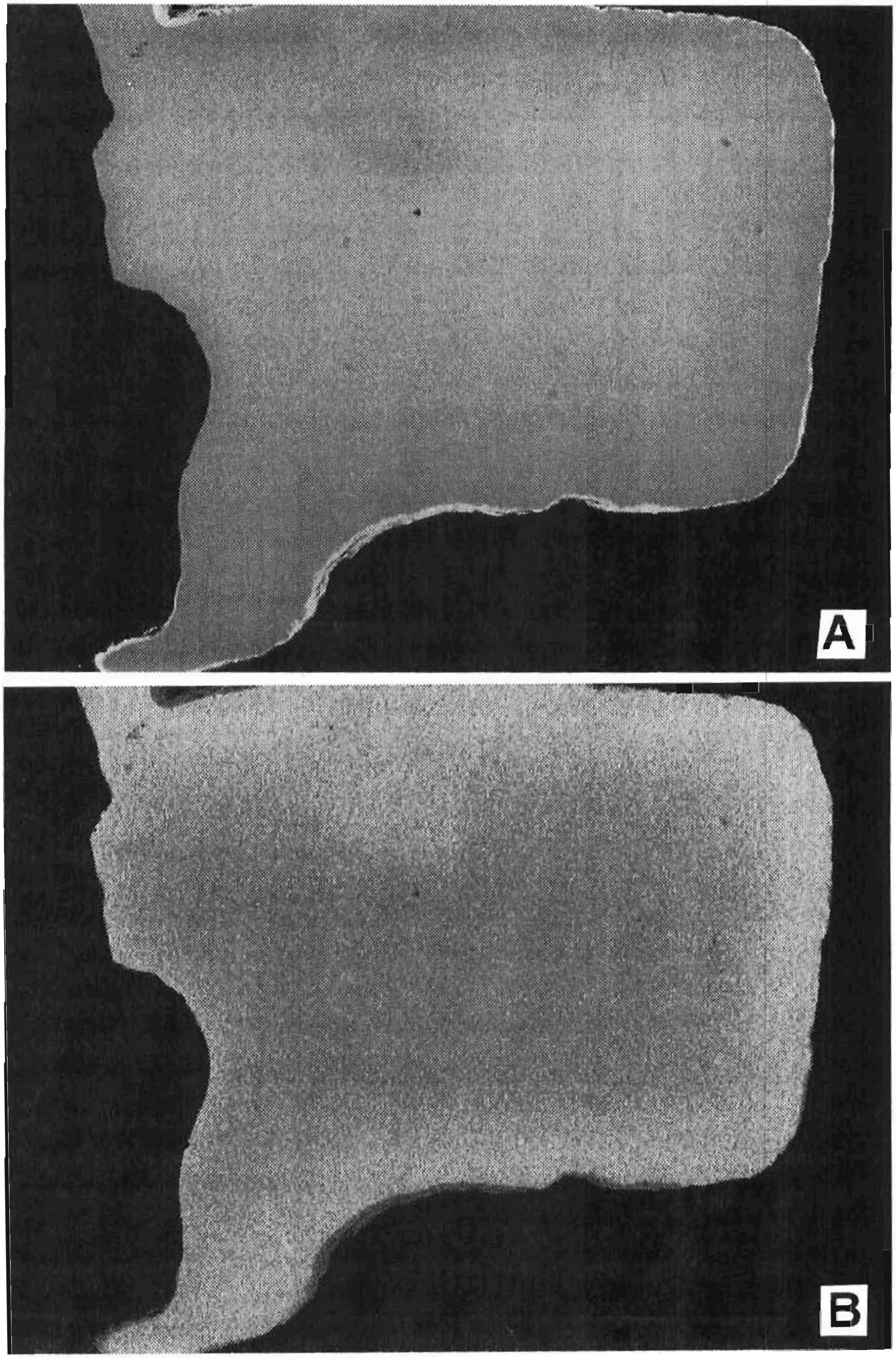

Fig. 14. X-Ray maps of grain 3 from New York Gulch. Grain is 3 mm wide and has the shape of a "cube with arms". Quantitative core, mid, and rim analyses given in Table 1. A. Gold X-Ray map, showing very thin Au-enriched rim (bright) surrounding a core of electrum (medium grey) in a matrix of epoxy (black). B. Mercury X-Ray map, showing core (medium grey) contains less Hg than the margin (medium-bright) and a thin, discontinuous Hg-depletion rim (dark grey) which corresponds to the to Au-enriched rim of 14A.

core (ca. 2%) to mid-grain (ca. 5%; Figs. 11, 14). Only the immediate rim (Fig. 14) is variably depleted in Hg and Ag and enriched in Au. Presumably the increase in Hg from core to mid is an origninal hydrothermal zoning, whereas the narrow leached zone, indicates some leaching, but not as much as experienced by grain 2. The average fineness represented by this nugget is in the vicinity of 500. The only nearby area in Alaska which contains placer electrum of approximately this composition is the Kantishna district, but Kantishna gold does not contain appreciable Hg. The minimal leaching around this grain, and the generally cubic shape, indicate a relatively local source. The elevated Te and Bi suggest a plutonic-related hydrothermal system. In the Fairbanks district (McCoy and others, 1997) plutonic hosted gold is high fineness and plutonic-related veins in metamorphic rocks contain much lower-fineness gold. By analogy, grain 3 might have been derived from a plutonic related vein in metamorphic rocks. Its unique composition suggests formation conditions unusual for the study area.

The additional 3 grains are also puzzling. The "dendritic-looking" grain (#5) is also more silver-rich (35%) than normal for the study area, but less so than grain 3 (Figs. 11, 12). It also shows no evidence for compositional zoning or edge-leaching. The strange morphology, lack of compositional zoning, and lack of rounding indicate it is close to its bedrock source. The two cubic grains (#s 4 and 6) are representative of the grains previously inferred (Cathrall and others, 1985; Tripp and Nishi, 1989) to represent supergene gold (grown in place), due to their cubic morphology. However, these cubic grains have compositions almost identical to those of grain 1--which is definitely not cubic--and grain 6 possesses a distinct depletion rim. Because documented supergene gold is invariably nearly pure Au (McDonald and others, 1990), whereas these cubic grains contain abundant Ag and Hg, we interpret them as of hydrothermal origin. We suggest that their cubic morphology is due to hydrothermal replacement of either magnetite or pyrite. Similarly, we suggest that the "cube with arms" morphology of grain 3 (Fig. 14) resulted from hydrothermal replacement of a cubic mineral (magnetite?) with additional hydrothermal growth forming the "arms". The absence of a compositional contrast between the "arms" and "body" of this compositionally unusual grain (Fig. 14) indicate it was not physically assembled in a stream environment; the electrum composition is definately not consistent with a supergene origin (McDonald and others, 1990). Lack of appreciable rounding of grains 3, 4, and 6 suggests that they are close to their source; an obviously possibility is hydrothermally altered serpentinite just north on Serpentine Ridge (Fig. 2), which contains abundant fine-grained, cubic magnetite. Knight (1992) similarly documented that cubic placer gold in the Klondike district contained elevated Hg and Ag, was compositionally identical to lode gold present 0.5 km upslope from the placer, and was consequently weathered from the lode source.

Native Ni inclusions are present in the two cubic grains. Because New York Gulch is just downstream from a large, highly serpentinized, ultramafic body (Fig. 2), a source mechanism as proposed for gold from Deep Creek (hydrothermal gold in altered serpentinite) is likely. The combination of Ni^0 inclusions and cubic form for grains 4 and 6 strongly imply derivation by hydrothermal replacement of Ni^0-bearing magnetite in altered serpentinite.

Slate Creek, Rampart District

65° 22' N 150° 8' W Tanana B-1 quadrangle

Don Harris donated representative placer gold from Slate Creek. We examined 4 grains (Fig. 15), of which 3 showed different compositional patterns. Grains 2 and 3 contain inclusions of $BiTe_2$, and have Ag and Hg compositions indistinguishable from the Eureka Creek gold. Both grains exhibit no compositional zoning. Their compositions and Bi-Te inclusions indicate that most likely they were recently derived from a plutonic gold source, presumably the known gold occurrence on Elephant Mountain or occurrences in altered dikes north of Elephant Mountain. Grain 1 contains essentially no Hg, but is otherwise compositionally similar to grains 2 and 3 (Fig. 15). This grain either represents gold like that of grains 2 and 3 (but leached of its Hg) or gold from a different, unknown, source. Given the evidence for extensive leaching of Hg with only minor loss of Ag seen in grain 2 at New York Gulch (Fig. 13), the former alternative is more likely. Grain 4 (Fig. 15) is significantly lower in Ag than the other grains and shows essentially no compositionally zoning, hence represents a grain derived relatively recently from its lode source. Employing the analogy to the Fairbanks district, this gold could be from a vein source distal to a mineralized pluton.

Hoosier Creek, Rampart district

65° 27' N 150° 5.5' W Tanana B-1 quadrangle

We examined several small nuggets from Hoosier Creek, donated by Jim Dale. In addition, the UAF Museum loaned one large nugget for microprobe examination. The small nuggets include several different types of gold, one of which is very similar to the Museum's nugget.

In total, we examined 8 different grains from Hoosier Creek (Fig. 16). Five of them (grains 3-7) had nearly identical compositions, characterized by cores with fineness of 800 to 810, Cu and Hg below detection, and Bi and Te at detection levels. One grain had rims slightly depleted in Ag, yielding a fineness of 870. We suspect, based on the evidence for Hg leaching for other nuggets in the general area, that these grains originally contained appreciable Hg, which was leached out during residence in the ground. If this is the case, the original lode source of these nuggets was one similar to that of the placer deposits at Rhode Island and Eureka Creeks, and bore some relation to the nearby Elephant Mountain plutonic-hydrothermal system.

One grain (grain 2; Fig. 16) had cores with lower Ag contents, but 1-2% Hg. It also contained detectable Cu and lacked detectable Te or Bi. The rims on this grain are slightly to strongly depleted in Ag and very strongly depleted in Hg (Figs. 16, 17). The core and rim compositions, degree of zoning, and trace Cu content of this grain closely resembles grains 2 and 4-6 from Tofty Gulch (Fig. 10). The zoning clearly indicates a long residence time. Given its location north of a major high angle fault with right-lateral displacement (Fig. 1) it is conceivable that this gold grain was derived from a Tofty-like Tertiary gravel source.

The third group is represented by grain 1 and the UAF Museum nugget (grain 8). These two contain detectable Te, no Cu or Hg, and Ag less than those of the first group (Fig. 16). The rim on the Museum nugget (#8, Fig. 16) is variably depleted in Ag, with a fineness as high as 990.

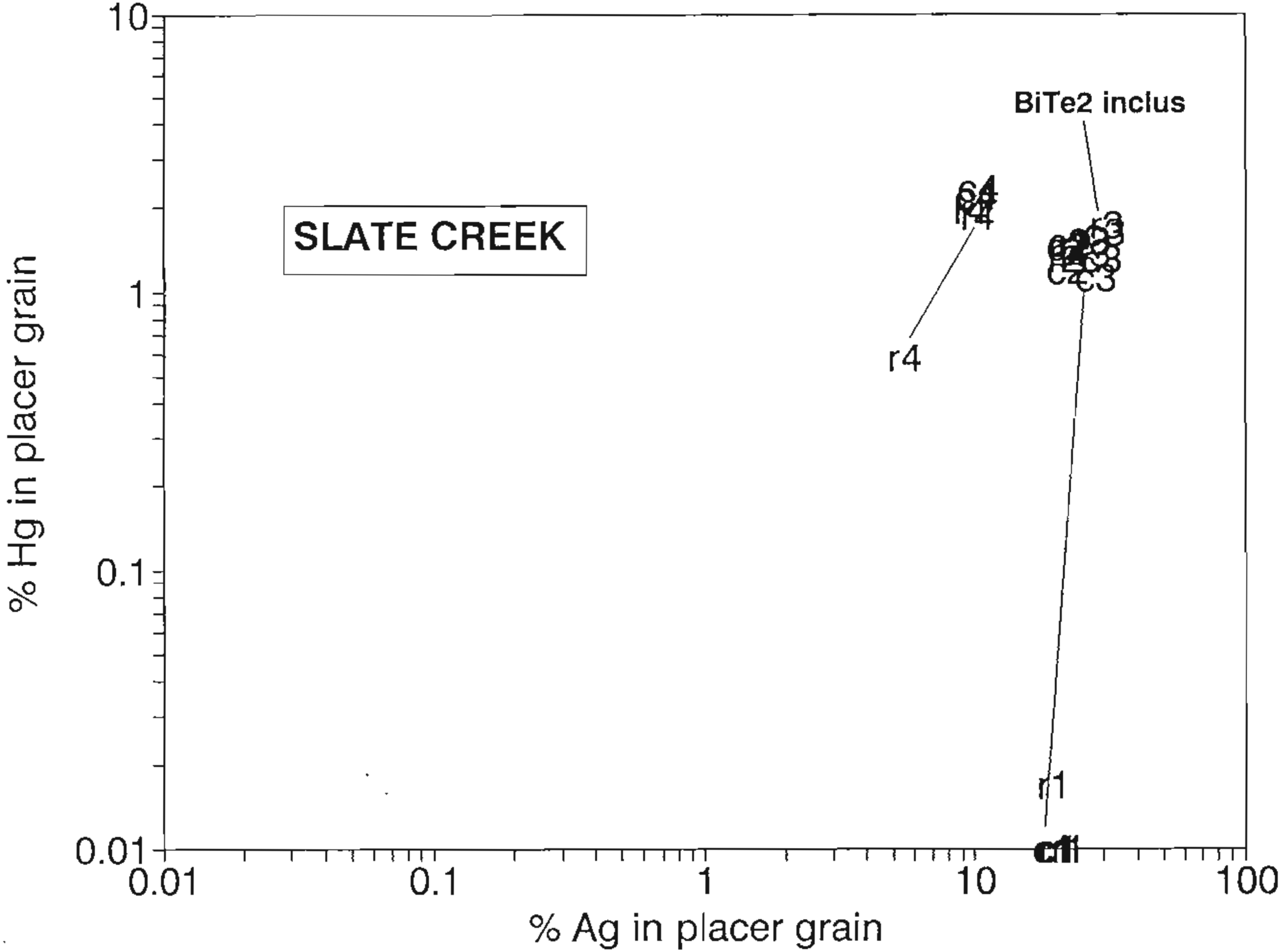

Fig. 15. Compositions of placer gold nuggets from Slate Creek, Rampart district. Grain 1 might represent complete Hg leaching from a grain originally with composition like that of grains 2 and 3. Abbreviations as in Fig. 3.

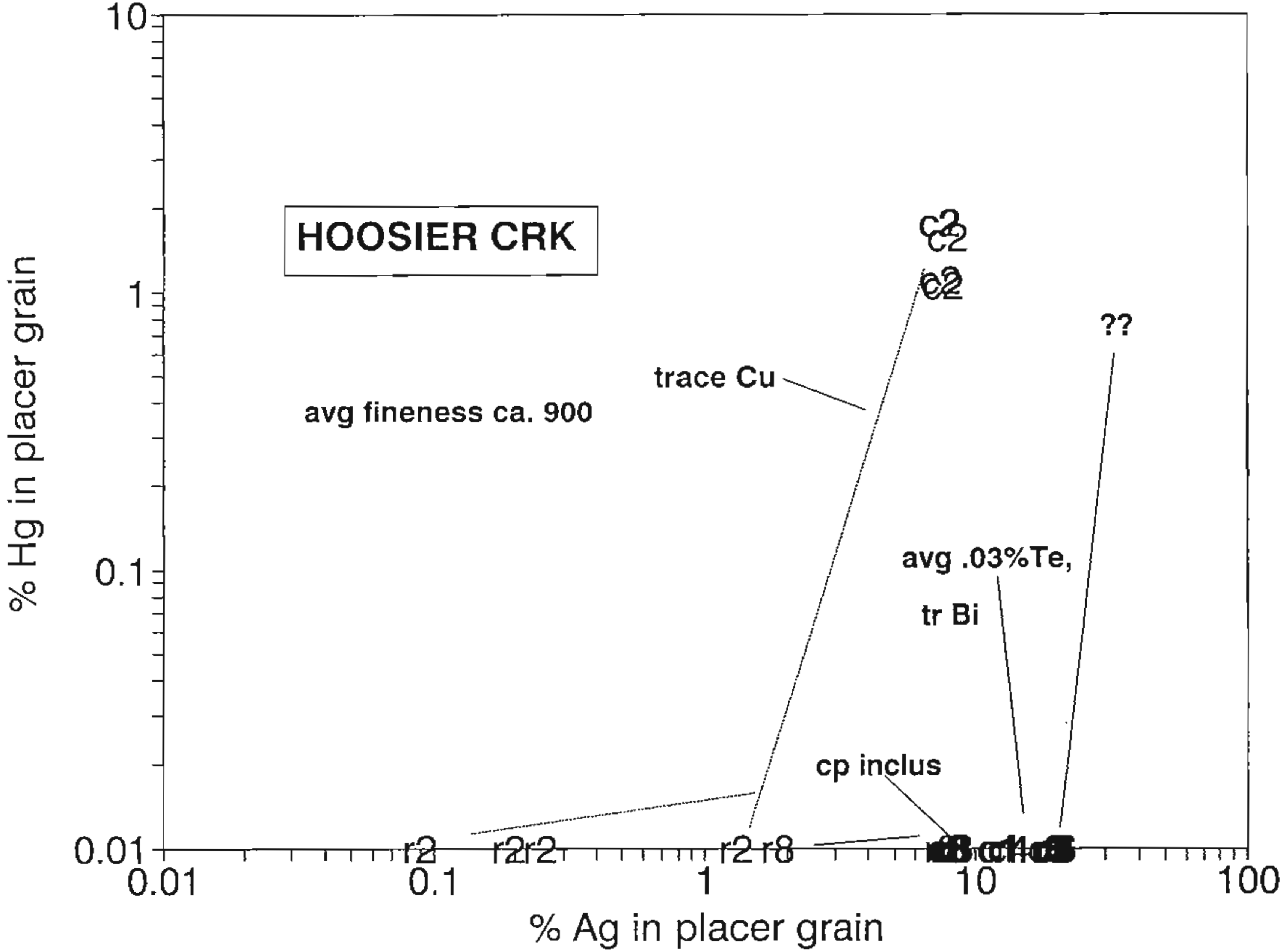

Fig. 16. Compositions of placer gold nuggets from Hoosier Creek, Rampart district. Grains 1 and 3-8 might represent completely Hg-depleted grains with original compositions marked by "??". Abbreviations as in Fig. 3.

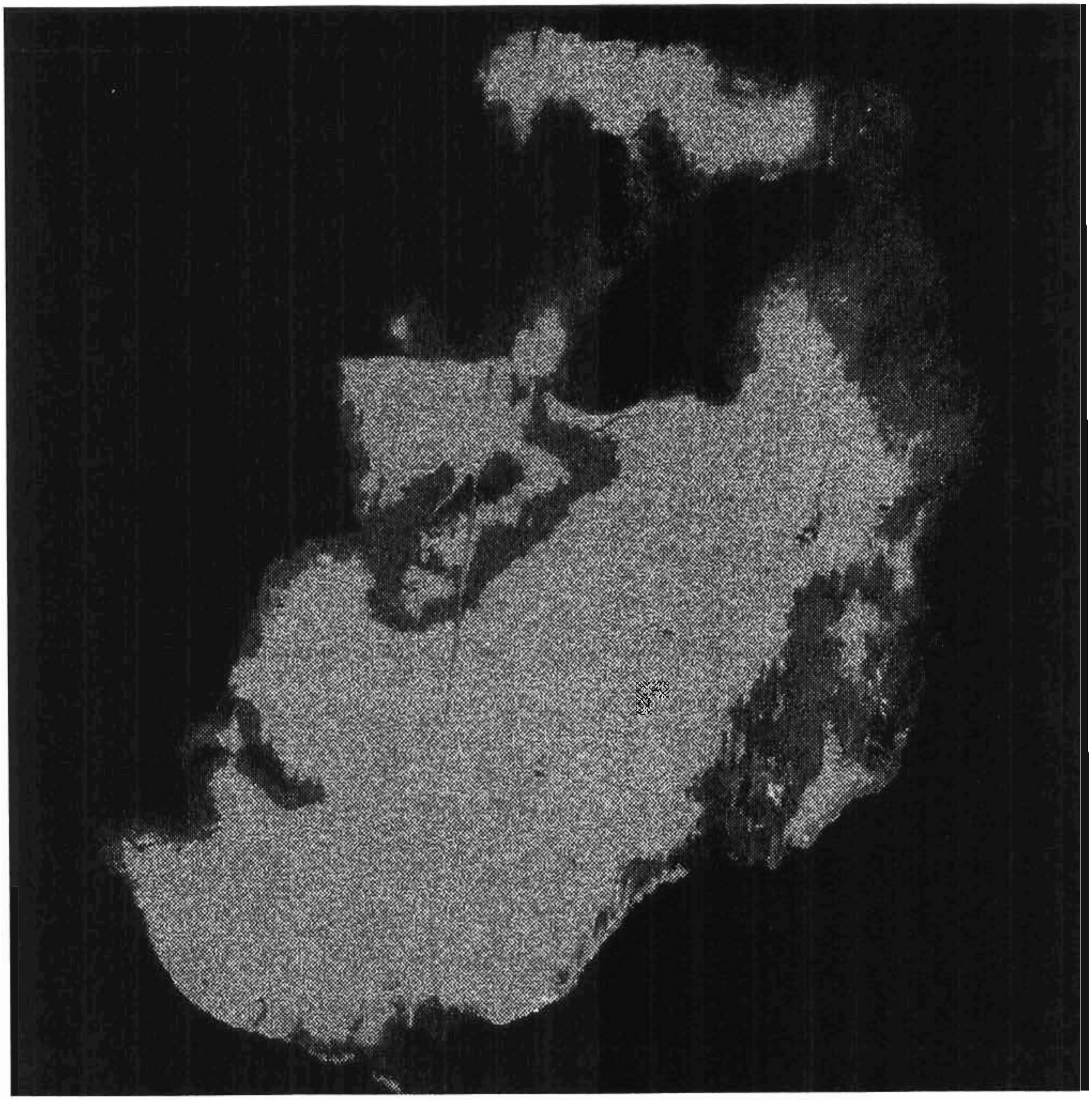

Fig. 17. Silver X-Ray map of grain 2 from Hoosier Creek, showing irregular Ag-depletion rim (dark grey). Grain is 3.5 mm long and is surrounded by epoxy (black). Black oval near the top of the grain is a large inclusion of quartz, around which is a thin Ag-depletion zone. Quantitative core and rim analyses are given in Table 1.

Based on compositional similarities with the first group, we believe that these two grains come from the same lode source as the first group, but have been more completely leached.

Little Minook, Jr. Creek, Rampart district

65° 27'N 150° 2' W Tanana B-1 quadrangle

Representative placer gold grains from Little Minook, Jr. Creek were donated by Jim Munsell, of which we mounted and examined six. Three different populations were found, but all exhibited evidence for extensive leaching; close proximity (Fig. 2) to the nearby, perched, late Tertiary, gold-bearing gravels (Waters, 1934; Mertie, 1937; Reifenstuhl and others, 1997) strongly implies that the gold in Little Minook, Jr. Creek was derived from this older source.

Four of the six grains examined (#s 1-3, 7; Fig. 18) had core compositions and zoning patterns essentially identical to grains 2 and 4-6 from Tofty gulch (Fig. 10) and grain 2 from Hoosier Creek (Fig. 16). These grains also contained trace concentrations of Cu and several contained Ni° inclusions (Fig. 16; Table 1). X-Ray maps of grains 1 and 3 (Figs. 19, 20) show Ag-Hg leached rims indistinguishable from the X-Ray maps of grain 2, Hoosier Creek (Fig. 17). These sub-microscopic similarities argue for a common source, despite the distance which separates the Tofty from the Rampart district.

Grain 5 (Fig. 18) is similar to grains 1 and 3-8 from Hoosier Creek (Fig. 16) in that it lacks detectable Hg but has traces of Te and Bi. Grain 5, however, exhibits considerably more Ag-leaching than do the Hoosier Creek grains. Similar to the Hoosier Creek grains, grain 5 most likely represents a very old, plutonic-related placer grain, which has been completely leached of Hg.

Grain 4 (Fig. 18) has a composition quite different from normal for the study area, containing relatively high Hg (>1%) and low Ag (2-3%) concentrations with a wide Ag-Hg depleted rim (Fig. 21). Grain 4 (Fig. 21) seemingly displays a process of nearly-complete Hg depletion with proportionally less loss of Ag similar to grain 2 from New York Gulch (Fig. 13). Because it is unlike other grains, it may represent a unique (and unusual?) source, but the metal-depletion rim indicates recycling through earlier gravels. The extensive depletion rim on this grain, like that of grain 2 (New York Gulch) shows that nearly complete Hg removal can take place without extensive Ag loss, seemingly observed in many of the low-Hg, moderate-Ag grains.

Hunter Creek, Rampart District

65° 28' N 150° 1'W Tanana B-1 quadrangle

Steve Lasonsky donated several representative placer grains from Hunter Creek. We examined eleven of these. Seven of the grains exhibited Ag-Hg depleted rims (Fig. 22), indicative of significant residence in the near-surface environment; the other 4 grains were essentially unzoned (Fig. 23) and presumably not "old". Four compositional types were observed, suggesting several different sources and/or degree of recycling through Tertiary gravels.

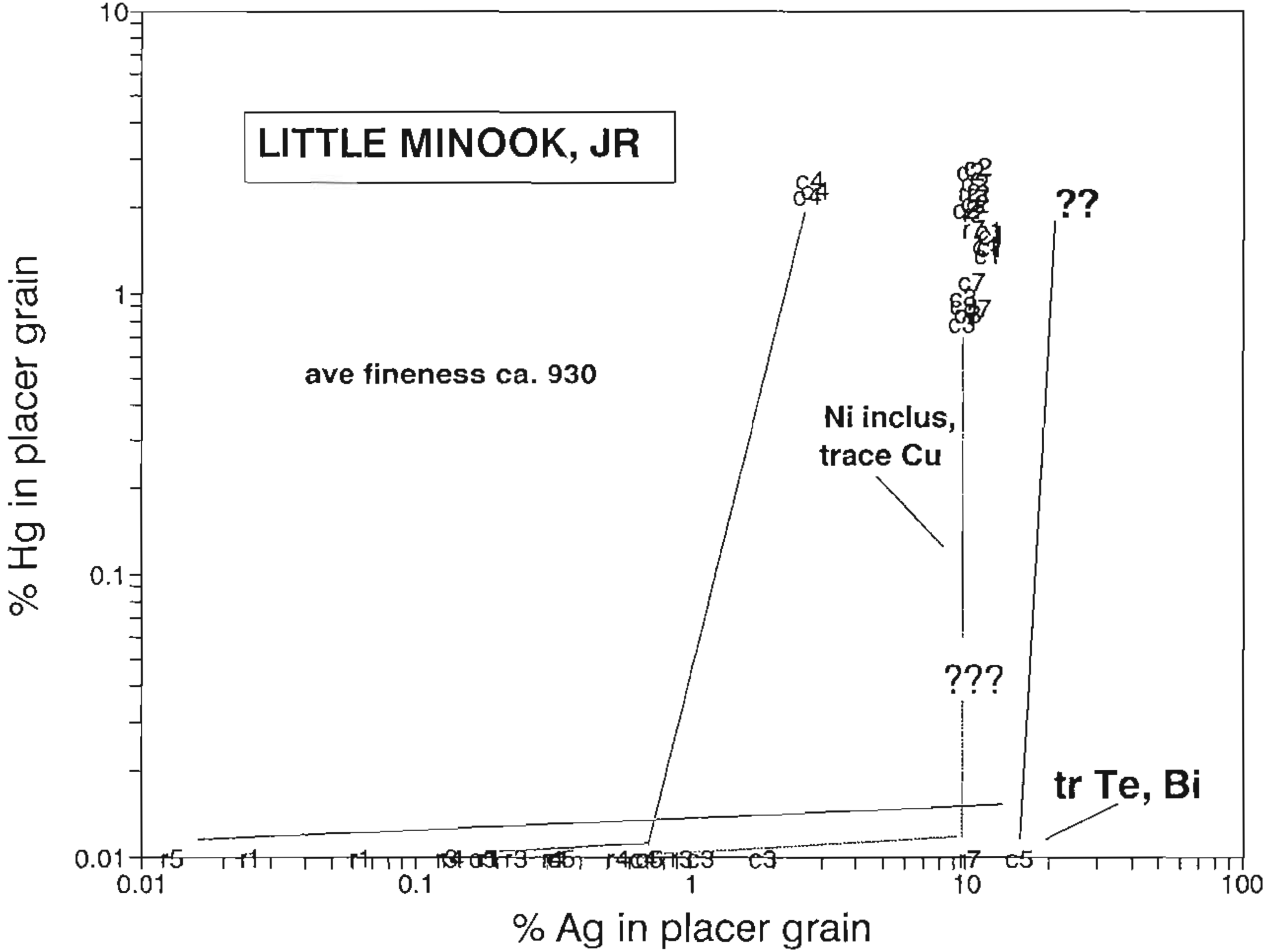

Fig. 18. Compositions of placer gold nuggets from Little Minook, Jr. Creek, Rampart district. . Grain 5, which entirely lacks detectable Hg, might represent a completely Hg-depleted grain with an original composition marked by "??". Abbreviations as in Fig. 3.

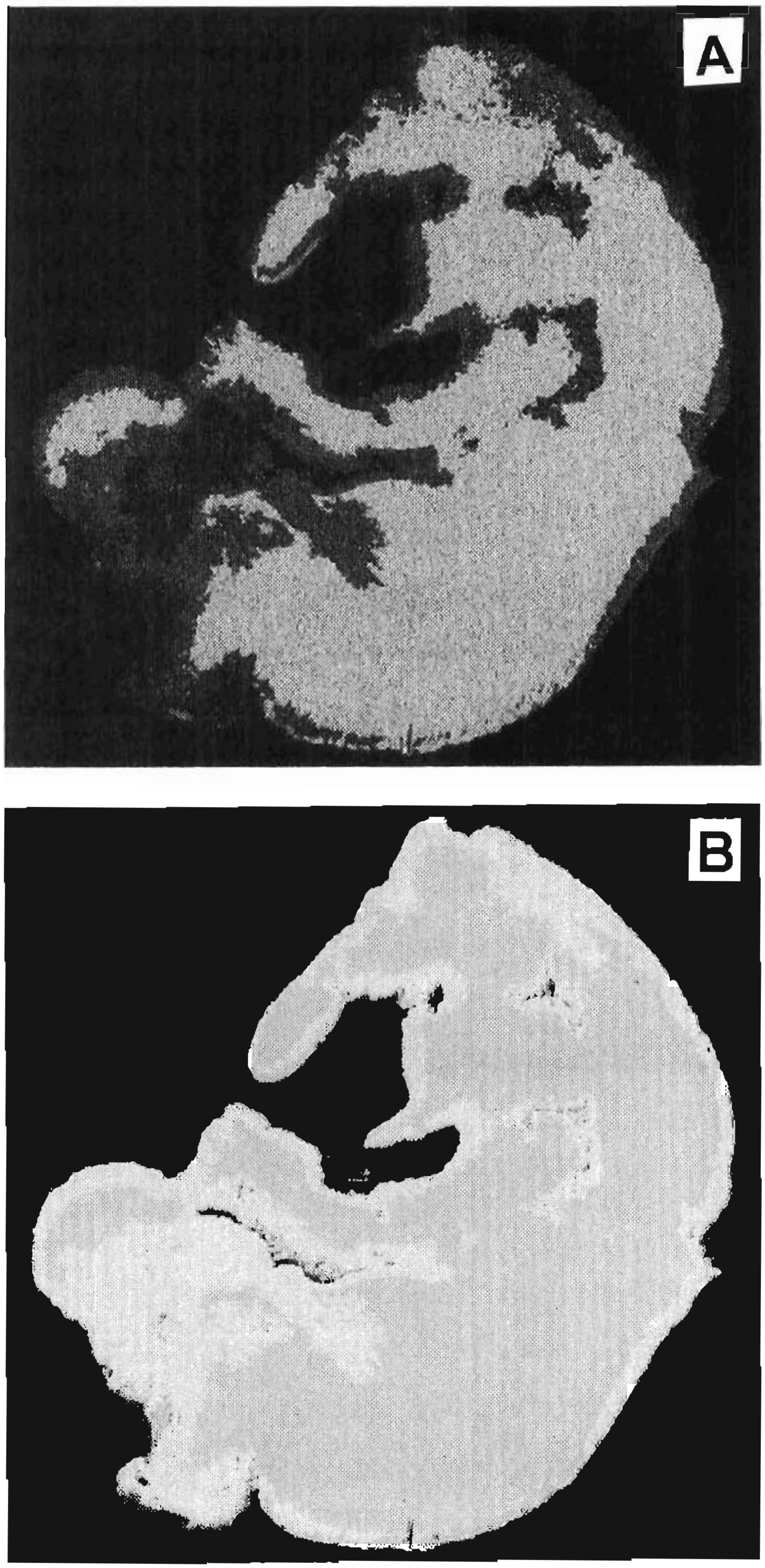

Fig. 19. X-Ray maps of grain 1 from Little Minook, Jr. Creek. Matrix is epoxy (black). Grain is approximately 2 mm x 1.5 mm. Quantitative core and rim analyses are given in Table 1. A. Silver X-Ray map, showing irregular Ag-depleted rim (dark). B. Gold X-Ray map, showing Au-enrichment rim (bright) which matches the Ag-depletion rim.

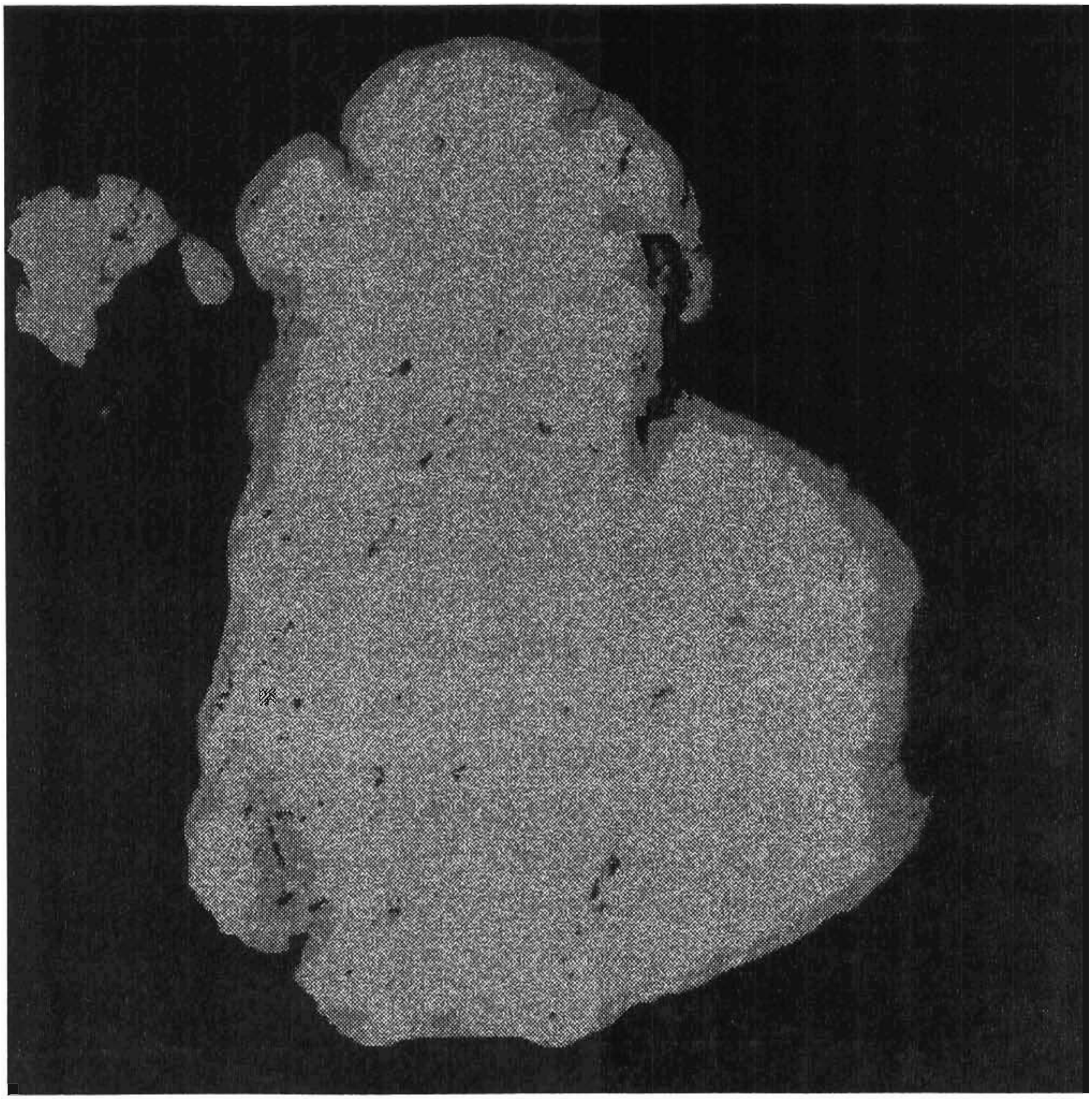

Fig. 20. Mercury X-Ray map of grain 3 from Little Minook, Jr. Creek, showing irregular, thin Hg-depleted rim (medium grey) on Hg-bearing nugget mounted in epoxy (black). Grain is 4 mm long. Quantitative core and rim analyses are given in Table 1.

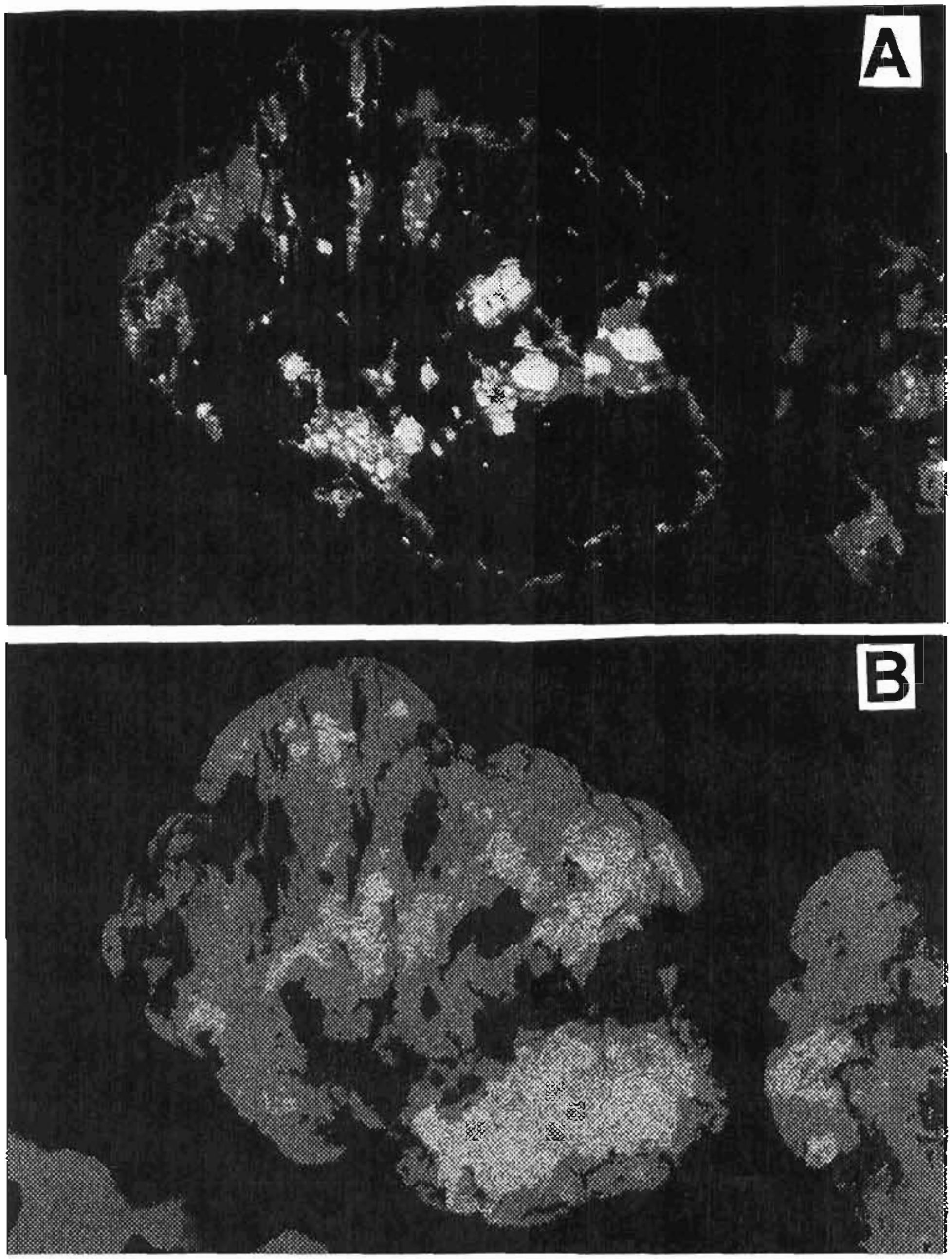

Fig. 21. X-Ray maps of grain 4 (and parts of adjacent Hg-depleted grains, which were not microprobed) from Little Minook, Jr. Creek. Grain is approximately 2 x 2 mm. Quantitative core and rim analyses are given in Table 1. A. Silicon X-Ray map, showing inclusions in grain 4. White areas are quartz, medium grey are other silicate minerals (primarily mica), black areas lack silica. Silicates presumably outline gold grains physically amalgamated in an active stream environment. B. Mercury X-Ray map, showing that the upper half of grain 4 is almost entirely leached of Hg, but still retains significant Ag, as indicated by spot analyses (Table 1), whereas the lower half is less-leached. Significant differences in leaching between the two halves suggests that the grain was amalgamated after leaching.

Grains 1-4 and 7 (Fig. 22) have cores with about 10% Ag and 1% Hg and severely Ag-Hg depleted rims. Rim silver contents vary from 10% to <0.1%, suggesting that Hg is preferentially depleted (Fig. 22). These grains also contains inclusions of native Ni and traces of Cu. The core compositions are indistinguishable from much of the gold present at Deep Creek and Tofty Gulch; the zoning patterns (with preferential loss of Hg) are like grains from Hoosier and Little Minook, Jr. Creeks. The X-Ray map of grain 4 (Fig. 24) closely resembles X-Ray maps for these other grains (Figs. 19-21). Cathrall and others (1987) report up to 1% Pt in Cu- and Bi-poor gold grains from Hunter Creek, presumably this same population. These compositional characteristics indicate that this gold population experienced interaction with ultramafic rocks; that only one population contains Nio and Pt suggests a selective hydrothermal interaction, rather than a mechanical aggregation.

Grain 5 (Fig. 22) is another compositionally unique grain for the study area, containing up to 2% Cu and inclusions of bornite-chalcocite and galena. Presumably due to the high Cu content, it contains little Ag (Fig. 22). We do not understand the origins of this grain, but Cathrall and others (1987) also found that some of the Hunter Creek placer gold contained significant Cu, so that this grain is not a fluke. Perhaps it is of epithermal origins, as gold-bearing early Tertiary volcanic rocks are present in the general area (Liss and others, 1997).

Grain 6 (Fig. 22) has the high Ag (ca. 20%) and Te (0.05%) concentrations characteristic of Eureka-type gold. Both in core and rim compositions this grain closely resembles depleted-rim gold from Rhode Island and Omega Creeks (Figs. 4, 5). Grains 8-11 (Figs. 22, 23) have high Ag and Hg and are anomalous in Te; they are compositionally similar to "fresh" gold from Eureka Creek (Fig. 3), with very slight development of Hg-depletion rims. An obvious possibility is that grain 6 represents almost complete loss of Hg from grains of Eureka-type composition, and that grains 8-11 are either less leached, or have lost by abraison (hypothetical) softer, Hg-depleted rims (a mechanism suggested by Knight, 1992).

Gunnison Creek, Rampart District

65° 27' N 149° 41' W Livengood D-6 quadrangle

Gold from this placer is almost certainly derived from a hydrothermal system associated with the Sawtooth pluton, located approximately 10 km directly upstream. Mineralized samples from the Sawtooth pluton contain up 12 ppm Au and 50 ppm Bi (Chapman and Weber, 1972) and the pluton hosts a historic Au-bearing stibnite prospect (Mertie, 1937). Four grains were selected for analysis. Three of the grains exhibit no compositional zoning; one (grain 4) has a tiny depletion zone in one corner (Fig. 25). Although all the grains contain significant Hg, most of them have lower concentrations than seen in the Eureka area, possibly indicating differences between Elephant-Eureka and Sawtooth hydrothermal systems. All the grains contain inclusions of native Ni, indicating some chemical interaction with the nearby serpentinite (Fig. 2). A proximal source, without cycling through Tertiary gravels is supported by the absence of significant depletion rims (Fig. 25).

Grain 1 is compositionally unzoned and contains low Ag (<1%) and Hg (.1-.3%) concentrations. It compositionally resembles gold intergrown with maldonite (Au_2Bi) present at the granite-hosted Fort Knox gold deposit, near Fairbanks (McCoy and others, 1997). Grains 2 and 4 contain inclusions of bismuthenite and Bi-Te minerals and are compositionally similar to gold from the Eureka area, with slightly lower Ag and Hg contents. Grain 3 has the highest Hg and intermediate Ag contents (Fig. 25).

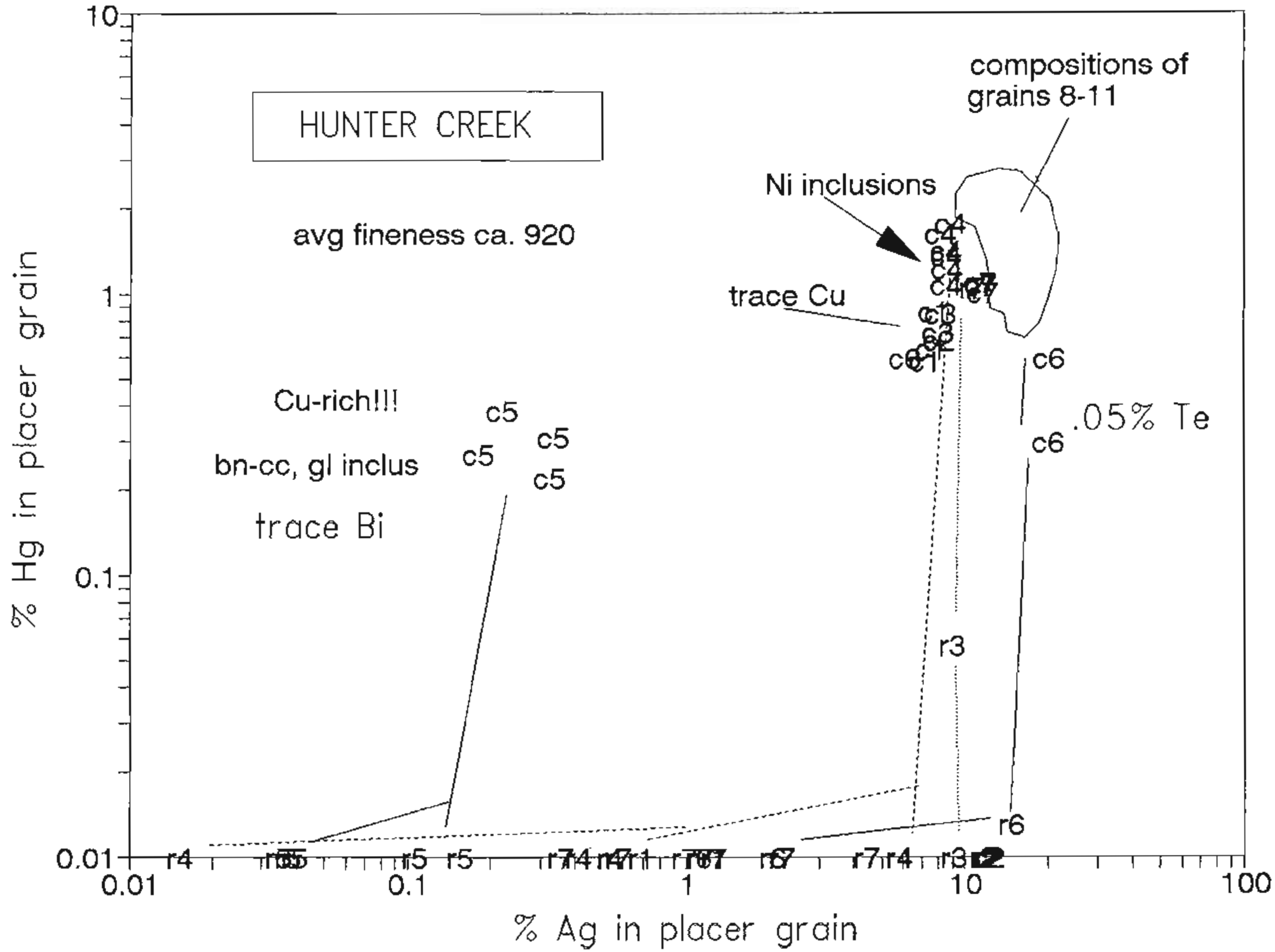

Fig. 22. Compositions of placer gold nuggets from Hunter Creek, Rampart district. Abbreviations as in Fig. 3.

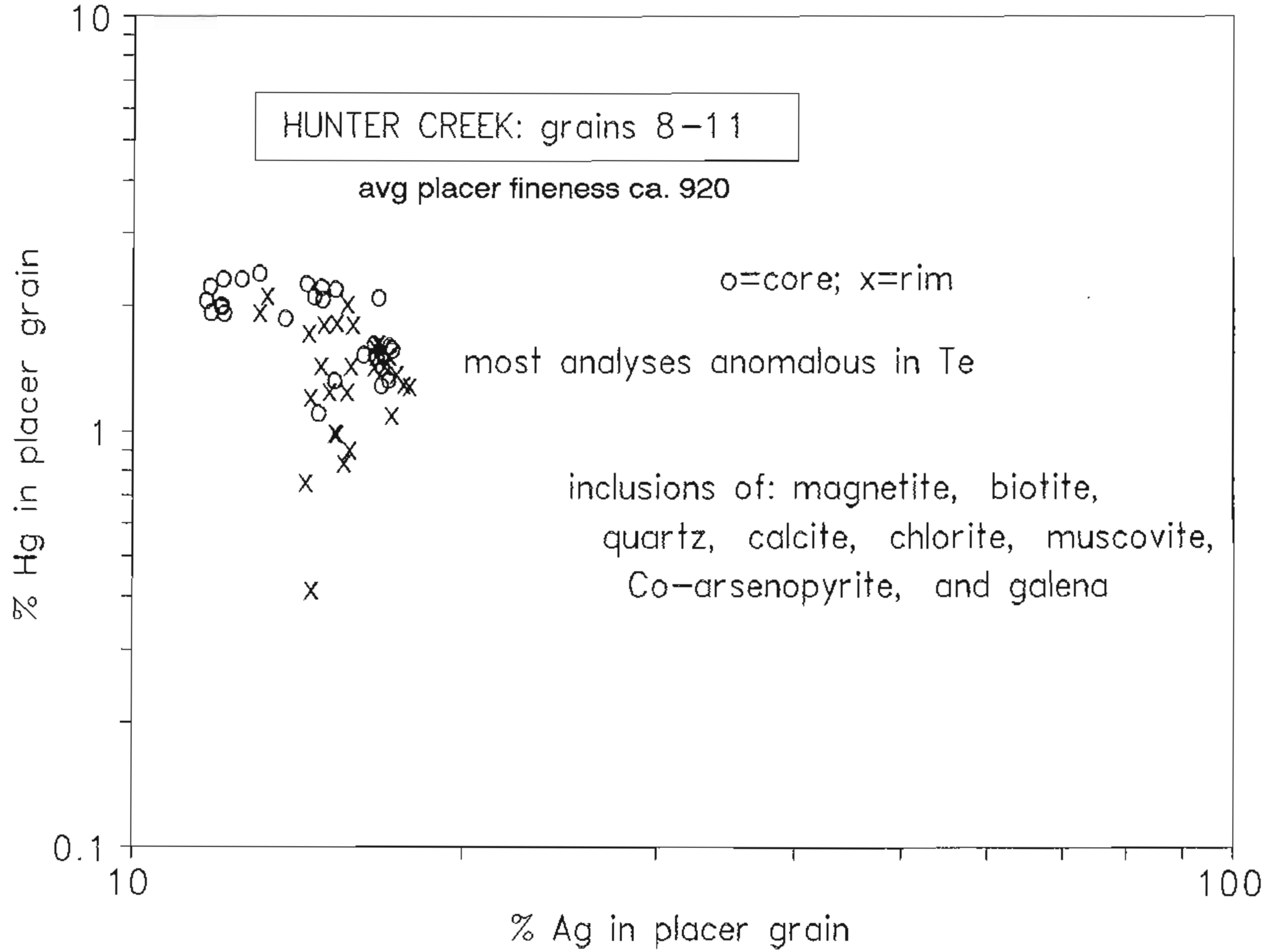

Fig. 23. Detail of compositions, gold nuggets 8-11 from Hunter Creek, Rampart district. Abbreviations as in Fig. 3.

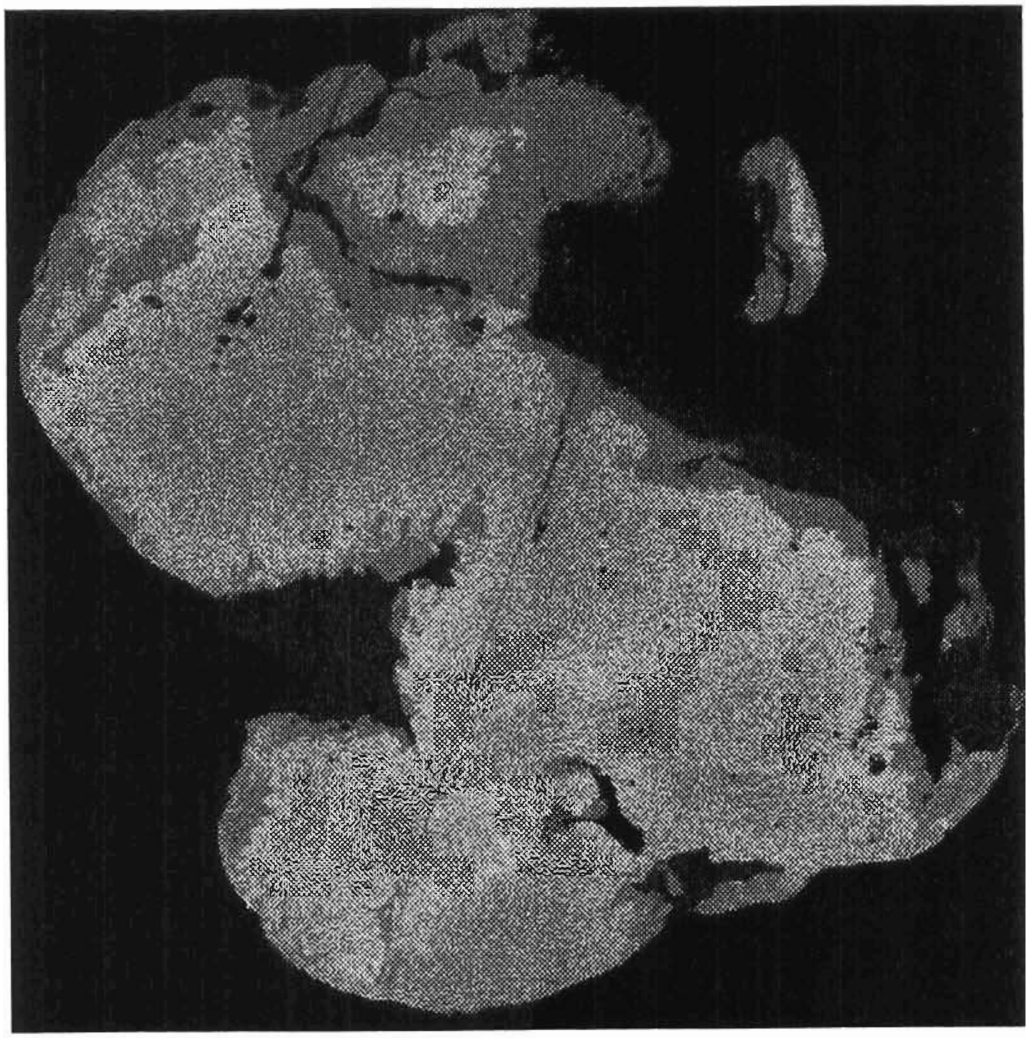

Fig. 24. Mercury X-Ray map of grain 4 from Hunter Creek, showing an irregular Hg-depleted rim (medium grey) around the grain, which is mounted in epoxy (black). Grain is approximately 3 x 4 mm. Quantitative core and rim analyses are given in Table 1.

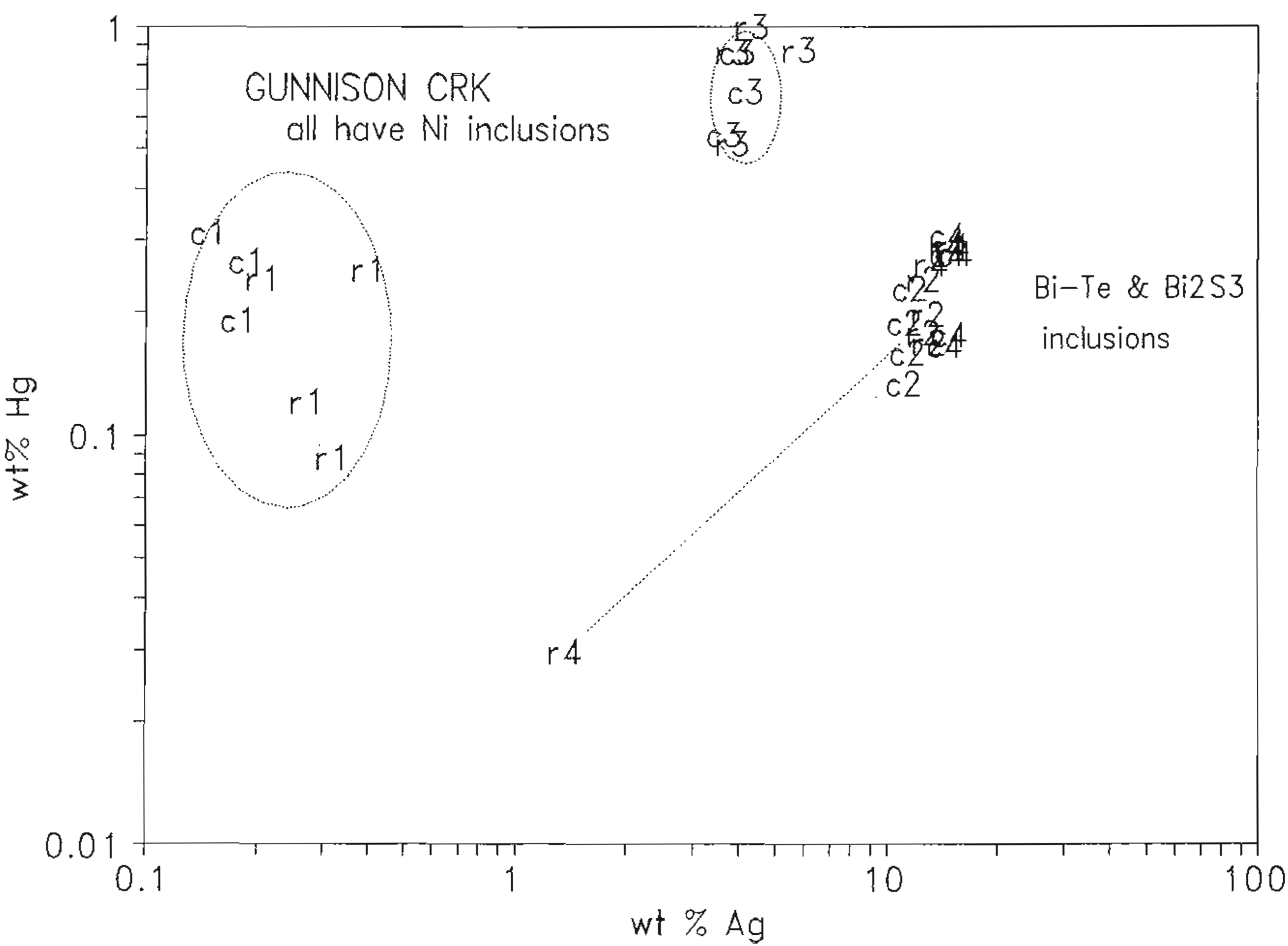

Fig. 25. Compositions of placer gold nuggets from Gunnison Creek, Rampart district. None of the grains exhibit significant development of leached rims. Abbreviations as in Fig. 3.

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TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
			weight percent						
BETTISWORTH CLAIMS, EUREKA CREEK PLACER NUGGET									
BETTIS_LG_GR1,_RIM	r1	20.3	0.0	0.06	0.00	1.28	78.0	99.7	
BETTIS_LG_GR1,_RIM	r1	20.4	0.0	0.00	0.00	1.09	78.7	100.3	
BETTIS_LG_GR1,_RIM	r1	18.9	0.0	0.00	0.04	1.01	78.7	98.6	
BETTIS_LG_GR1,_RIM	r1	20.3	0.0	0.00	0.03	1.41	77.8	99.6	
BETTIS_LG_GR1,_RIM	r1	19.9	0.0	0.00	0.00	1.64	77.9	99.5	
BETTIS_LG_GR1,_CORE	c1	20.2	0.0	0.00	0.01	1.43	77.9	99.5	
BETTIS_LG_GR1,_AU_N	c1	19.9	0.0	0.00	0.00	1.27	78.5	99.6	
BETTIS,_LG_GR1,_BRI	c1	20.1	0.0	0.02	0.05	1.43	78.2	99.8	
BETTIS,_GR2	r1	20.2	0.0	0.00	0.04	0.97	78.2	99.5	
BETTIS_GR2	r2	19.8	0.0	0.00	0.03	1.11	78.3	99.3	
BETTIS_GR2,_NEAR_CO	c2	19.2	0.0	0.00	0.02	1.51	77.9	98.6	
BETTIS_GR2,_CORE	c2	19.7	0.0	0.00	0.07	1.87	78.0	99.6	
BETTIS_LG_GR3,_NEAR	r3	20.0	0.0	0.10	0.04	1.11	78.7	99.9	
BETTIS,_LG_GR3,_NEA	r3	20.0	0.0	0.04	0.00	1.02	78.4	99.4	
BETTIS,_LG_GR3,_COR	c3	19.9	0.0	0.00	0.07	1.24	78.3	99.5	
BETTIS,_LG_GR3,_ADJ	c3	20.2	0.0	0.00	0.05	1.14	78.8	100.2	
BETTIS,_LG_GR3,_ADJ	c3	20.3	0.0	0.00	0.00	1.25	77.9	99.4	
LAST_BETTIS_GOLD_PT	c3	20.3	0.0	0.00	0.00	1.32	78.9	100.5	
RHODE ISLAND CREEK PLACER NUGGETS									
3RI,GR1,DK_RIM1	r1	0.8	0.0	0.00	0.03	0.00	98.6	99.5	
3RI,GR1,RIM2	r1	0.3	0.0	0.00	0.06	0.00	99.5	99.8	
3RI,GR1,LT_SPOT	c1	16.9	0.0	0.00	0.03	0.70	84.0	101.7	
3RI,GR1,DK_RIM3	r1	0.4	0.0	0.00	0.00	0.00	99.6	100.0	
3RI,GR1,COR1	c1	21.3	0.0	0.00	0.03	0.85	77.0	99.3	
3RI,GR1,COR2	c1	21.2	0.0	0.00	0.05	0.99	76.8	99.1	
3RI,GR1,COR3	c1	21.7	0.0	0.00	0.03	0.80	76.1	98.7	
3RI,GR1,GRAY	c1	23.4	0.0	0.00	0.04	0.81	77.3	101.6	
3RI,GR2,RIM2	r2	19.5	0.0	0.00	0.08	1.33	77.4	98.3	
3RI,GR2,RIM3	r2	20.5	0.0	0.00	0.05	1.26	77.2	99.0	
3RI,GR2,RIM1	r2	20.1	0.0	0.00	0.00	1.03	77.8	98.9	
3RI,GR2,COR1	c2	19.8	0.0	0.00	0.05	0.81	78.2	98.8	
3RI,GR2,COR2	c2	20.1	0.0	0.00	0.12	0.74	78.4	99.4	
3RI,GR2,DK_GRAY	c2	20.1	0.0	0.00	0.08	1.08	78.4	99.6	
3RI,GR2,COR3	c2	20.4	0.0	0.00	0.02	0.91	78.2	99.5	
3RI,GR2,COR3--AGAIN	c2	19.6	0.0	0.00	0.03	0.73	77.4	97.7	
3RI,GR4,DK_RIM	r4	13.9	0.0	0.00	0.02	0.21	84.3	98.4	
3RI,GR4,DK_RIM2	r4	0.2	0.0	0.00	0.00	0.00	99.0	99.2	
3RI,GR4,LT__COR1	c4	20.5	0.0	0.00	0.04	1.94	76.2	98.7	
3RI,GR4,COR2	c4	20.1	0.0	0.00	0.04	2.88	74.9	97.9	
3RI,GR4,LT_GRAY	c4	19.3	0.0	0.06	0.08	4.91	75.8	100.2	

TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS, CONT.

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
			weight percent						
OMEGA CREEK PLACER GOLD NUGGETS									
OM_G1_CORE1	c1	18.7	0.00	0.00	0.04	0.16	81.7	100.7	
OM_G1_CORE2	c1	18.9	0.04	0.00	0.02	0.24	81.3	100.4	
OM_G1_CORE3	c1	18.8	0.00	0.00	0.00	0.19	81.1	100.1	
OMG1 NEAR QTZ	r1	0.9	0.00	0.00	0.00	0.00	99.5	100.3	
OMG1 NEAR QTZ	r1	1.3	0.00	0.00	0.00	0.00	99.0	100.4	
OM_G1_DKRIM1	r1	0.8	0.00	0.00	0.00	0.00	97.9	98.7	
OM_G1_DKRIM3	r1	0.4	0.03	0.00	0.00	0.00	96.8	97.2	
OM_G1_CORE4	c1	17.2	0.00	0.00	0.03	1.99	81.3	100.5	
OM_G1_DP_RIM3	r1	3.5	0.00	0.00	0.00	0.24	94.9	98.7	
OM_G2_RIM1	r2	21.2	0.00	0.00	0.04	1.64	77.1	99.9	
OMG2_RIM2	r2	22.0	0.00	0.00	0.04	1.70	77.6	101.3	
OM_G2_RIM3	r2	20.9	0.00	0.00	0.07	1.80	76.8	99.6	
OM_G2_CORE1	c2	21.8	0.03	0.00	0.07	1.33	77.6	100.8	
OM_G2_CORE_2	c2	20.9	0.00	0.00	0.03	1.64	78.2	100.7	
OM_G2_CORE_3	c2	21.4	0.01	0.00	0.12	1.45	77.8	100.7	
OM_G2_RIM1B	r2	19.9	0.02	0.00	0.00	1.98	75.5	97.4	
OM_G2_RIM2B	r2	19.1	0.00	0.00	0.07	1.50	73.8	94.4	
OM_G2_RIM3B	r2	20.0	0.03	0.00	0.09	2.19	74.6	97.0	
OM_G3_CORE1	c3	22.2	0.02	0.00	0.09	4.39	74.2	100.9	
OM_G3_CORE2	c3	22.4	0.00	0.00	0.06	4.50	73.6	100.6	
OM_G3_CORE3	c3	22.5	0.01	0.00	0.07	4.24	73.5	100.4	
OMG3_WHITE RIM1	r3	21.9	0.00	0.00	0.00	4.55	72.3	98.7	
OMG3_WHITE RIM2	r3	22.0	0.02	0.00	0.04	4.43	72.5	99.0	
OMG3_WHITE RIM3	r3	21.8	0.00	0.00	0.05	4.52	72.2	98.5	
OM_G3_RIM1	r3	22.2	0.00	0.00	0.02	4.60	73.5	100.3	
OM_G3_RIM2	r3	22.2	0.00	0.00	0.09	4.58	73.5	100.3	
OM_G3_RIM3	r3	21.9	0.00	0.00	0.00	4.42	74.4	100.8	
OMG4_RIM1	r4	6.8	0.01	0.00	0.04	0.43	92.9	100.1	
OMG4_RIM2	r4	20.7	0.00	0.00	0.06	3.59	74.1	98.5	
OMG4_RIM3	r4	20.8	0.01	0.00	0.00	3.14	77.5	101.4	
OMG4_CORE1	c4	21.2	0.00	0.00	0.07	3.43	76.1	100.8	
OMG4_CORE2	c4	20.9	0.02	0.00	0.02	3.87	76.1	100.9	
OMG4_CORE3	c4	21.0	0.00	0.00	0.03	3.65	75.8	100.4	
OMG4_RIMB1	r4	21.4	0.03	0.00	0.12	3.45	74.5	99.5	
OMG4_RIMB2	r4	21.8	0.00	0.00	0.06	3.50	74.8	100.2	
OMG4_RIMB3	r4	21.4	0.00	0.00	0.00	3.42	75.1	100.0	
OMG4_LT_RIM1	r4	20.7	0.00	0.00	0.00	3.62	74.5	98.9	
OMG4_LT_RIM2	r4	21.0	0.00	0.00	0.06	3.55	75.3	99.9	
OMG4_LT_RIM3	r4	21.1	0.00	0.00	0.05	3.41	75.5	100.1	

TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS, CONT.

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
			weight percent						
DEEP CREEK PLACER GOLD NUGGETS									
DEEP_CRK_G1_RIM1	r1	1.3	0.01	0.00	0.00	0.00	98.9	100.2	
DEEP_CRK_G1_RIM2	r1	1.1	0.01	0.00	0.00	0.00	98.3	99.3	
DEEP_CRK_G1_RIM3	r1	17.1	0.00	0.00	0.03	2.45	79.5	99.1	
DEEP_CRK_G1_RIM	r1	3.8	0.00	0.00	0.03	0.02	96.6	100.5	
DEEP_CRK_G1_CORE1	c1	18.3	0.02	0.00	0.08	2.58	79.5	100.4	Ni°
DEEP_CRK_G1_CORE2	c1	18.3	0.06	0.00	0.04	2.49	79.1	99.9	inclus
DEEP_CRK_G1_CORE3	c1	17.9	0.01	0.00	0.01	2.43	79.1	99.5	
DEEP_CRK_G1_CORE4	c1	17.6	0.00	0.00	0.02	2.45	78.8	98.9	
DEEP_CRK_G1_CORE5	c1	18.4	0.05	0.00	0.04	2.57	79.5	100.5	
DEEP_CRK_G2_RIM1	r2	11.5	0.00	0.00	0.05	0.05	89.2	100.8	
DEP_CRK_G2_RIM2	r2	13.2	0.00	0.00	0.06	0.08	87.3	100.7	
DEEP_CRK_G2_RIM3	r2	12.9	0.00	0.00	0.04	0.06	87.6	100.6	
DEEP_CRK_G2_RIM4	r2	9.6	0.00	0.00	0.00	0.04	89.3	98.9	gar?
DEEP_CRK_G2_CORE1	c2	9.9	0.04	0.00	0.01	0.08	89.7	99.8	inclus
DEEP_CRK_G2_CORE2	c2	9.8	0.01	0.00	0.00	0.20	88.9	98.9	
DEEP_CRK_G2_CORE3	c2	11.6	0.00	0.00	0.00	0.11	88.8	100.5	
DEEP_CRK_GR4_RIM	r4	22.3	0.03	0.00	0.00	2.37	76.3	101.0	
DEEP_CRK_GR4_RIM2	r4	21.8	0.04	0.00	0.04	2.51	76.5	100.9	
DEEP_CRK_GR4_RIM3	c4	20.6	0.02	0.00	0.02	2.88	75.8	99.4	
DEEP_CRK_G4_RIM4	r4	1.2	0.01	0.00	0.00	0.09	98.6	99.9	
DEEP_CRK_G4_RIM5	r4	1.0	0.00	0.00	0.04	0.08	98.7	99.9	
DEEP_CRK_G4_RIM6	r4	1.6	0.01	0.00	0.03	0.04	97.9	99.6	
DEEP_CRK_G4_CORE1	c4	21.4	0.00	0.00	0.00	2.68	75.8	99.9	
DEEP_CRK_G4_CORE2	c4	21.7	0.01	0.00	0.02	2.60	75.3	99.6	
DEEP_CRK_G4_CORE3	c4	21.4	0.02	0.00	0.03	2.34	76.6	100.4	
DEEP_CRK_G5_DEPL_RI	r5	2.8	0.00	0.00	0.00	0.10	98.1	101.1	
DEEP_CRK_G5_DEPL_RI	r5	1.9	0.00	0.00	0.00	0.07	97.9	99.9	
DEEP_CRK_G5_AWAY_FR	r5	2.2	0.00	0.00	0.00	0.17	95.9	98.3	
DEEP_CRK_G5_STILL_F	r5	17.3	0.00	0.00	0.00	2.35	79.9	99.5	
DEEP_CRK_G5_MARGIN_	r5	1.6	0.04	0.00	0.00	0.00	98.2	99.8	
DEEP_CRK_G5_MARGIN_	r5	15.6	0.00	0.00	0.02	1.35	85.9	102.9	
DEEP_CRK_G5_MARGIN_	r5	16.9	0.00	0.00	0.00	2.13	81.3	100.3	
DEEP_CRK_G5_DEPL_RIM	r5	1.6	0.00	0.00	0.00	0.03	99.2	100.8	
DEEP_CRK_G5_CORE1	c5	17.7	0.01	0.00	0.00	1.87	80.2	99.8	Ni°
DEEP_CRK_G5_CORE2	c5	17.5	0.01	0.00	0.04	2.00	80.7	100.2	inclus
DEEP_CRK_G5_CORE3	c5	17.5	0.03	0.00	0.06	1.77	80.6	100.0	
DEEP_CRK_G6_RIM1	r6	2.7	0.00	0.00	0.00	0.00	97.5	100.2	
DEEP_CRK_G6_RIM2	r6	1.8	0.05	0.00	0.00	0.18	96.3	98.4	
DEEP_CRK_G6_RIM3	r6	2.4	0.02	0.00	0.00	0.08	96.4	98.9	
DEEP_CRK_G6_RIM4	r6	1.9	0.00	0.00	0.00	0.05	97.6	99.6	
DEEP_CRK_G6_CORE1	c6	21.4	0.00	0.00	0.10	3.80	74.4	99.7	

TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS, CONT.

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
			weight percent						
DEEP_CRK_G6_CORE2	c6	21.1	0.00	0.00	0.07	3.63	76.1	100.9	
DEEP_CRK_G7_RIM1	r7	3.3	0.00	0.00	0.00	0.02	95.5	98.8	
DEEP_CRK_G7_RIM3	r7	4.6	0.00	0.00	0.00	0.02	94.3	98.9	
DEEP_CRK_G7_RIM4	r7	5.9	0.00	0.00	0.00	0.25	94.3	100.4	
DEEP_CRK_G7_CORE1	c7	23.7	0.00	0.00	0.03	3.28	73.6	100.6	
DEEP_CRK_G7_CORE2	c7	23.0	0.01	0.00	0.04	3.11	73.1	99.2	
DEEP_CRK_G7_CORE3	c7	23.3	0.04	0.00	0.03	3.06	73.6	100.0	
DEEP_CRK_G7_CORE4	c7	23.8	0.00	0.00	0.05	3.04	73.7	100.5	
TOFTY CREEK PLACER GOLD									
TFTYG1_COR1	c1	11.5	0.04	0.00	0.03	1.72	86.8	100.0	
TFTYG1_COR2	c1	12.0	0.02	0.00	0.07	1.52	86.8	100.4	
TFTYG1_COR3	c1	11.4	0.02	0.00	0.05	1.69	87.2	100.3	
TFTY_G1_RIM1_DP	r1	11.6	0.05	0.00	0.00	1.69	87.1	100.5	
TFTY_G1_RIM2_DP?	r1	11.3	0.02	0.00	0.00	1.54	86.4	99.2	
TFTYG1_RIM3_DP?	r1	11.3	0.05	0.00	0.04	1.54	84.5	97.4	
TFTY_G1_RIM4	r1	11.9	0.01	0.00	0.02	1.54	86.8	100.2	
TFTY_G1_RIM5	r1	11.9	0.01	0.00	0.00	1.67	86.4	99.9	
TFTY_G1_RIM6	r1	12.1	0.03	0.00	0.00	1.65	86.9	100.7	
TFTYG2_RIM1_DP	c2	9.1	0.31	0.00	0.00	2.00	87.5	98.9	
TFTY_G2_RIM2_DP?	r2	0.3	0.00	0.00	0.00	0.05	97.8	98.1	
TFTY_G2_RIM3_DP?	r2	0.6	0.02	0.00	0.05	0.06	96.8	97.6	
TFTY_GR2_COR1	r2	2.2	0.00	0.00	0.02	0.05	97.9	100.2	
TFTY_GR2_COR_2	c2	9.5	0.33	0.00	0.01	1.96	87.9	99.7	
TFTY_GR2_COR_3	c2	9.6	0.34	0.00	0.00	1.87	88.3	100.1	
TFTY_G2_RIM1	c2	9.3	0.23	0.00	0.07	2.09	90.0	101.7	
TFTY_G2_RIM5	r2	2.2	0.08	0.00	0.00	0.04	98.2	100.5	
TFTY_G2_RIM6	c2	9.5	0.30	0.00	0.01	2.34	87.9	100.0	
TFTY_G3_RIM1	r3	1.0	0.00	0.00	0.03	0.03	98.9	100.0	
TFTY_G3_RIM2	r3	2.0	0.00	0.00	0.00	0.03	99.2	101.3	
TFTY_G3_RIM3	r3	0.2	0.02	0.00	0.00	0.04	99.3	99.6	
TFTY_G3_CORE1	c3	22.1	0.01	0.00	0.06	3.90	74.4	100.4	
TFTY_G3_CORE2	c3	22.2	0.00	0.00	0.00	3.70	74.2	100.1	
TFTY_G3_CORE3	c3	21.3	0.00	0.00	0.03	3.57	74.7	99.6	
TFTY_G4_RIM1	r4	2.0	0.00	0.00	0.00	0.26	97.9	100.2	
TFTY_G4_RIM2	r4	2.6	0.00	0.00	0.00	0.30	97.2	100.1	
TFTY_G4_RIM3	r4	16.1	0.04	0.00	0.09	1.95	80.4	98.6	
TFTY_G4_CORE1	c4	16.4	0.00	0.00	0.05	2.51	81.6	100.6	
TFTY_G4_CORE2	c4	16.5	0.00	0.00	0.04	2.77	81.1	100.4	
TFTY_G4_CORE3	c4	16.4	0.04	0.00	0.00	2.69	81.0	100.1	
TFTY_G4_RIM4	r4	16.3	0.01	0.00	0.05	2.56	81.3	100.3	
TFTY_G4_RIM5	r4	16.2	0.00	0.00	0.05	2.55	81.8	100.6	
TFTY_G4_RIM6	r4	2.8	0.02	0.00	0.00	0.06	96.9	99.7	

TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS, CONT.

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
				weight percent					
TFTY_GR5_RIM1	r5	13.1	0.00	0.00	0.02	2.50	84.9	100.5	
TFTY_GR5_RIM2	r5	12.7	0.02	0.00	0.02	1.92	85.1	99.8	
TOFTY_GR5_RIM3	r5	12.7	0.04	0.00	0.01	2.55	84.0	99.4	
TFTY_GR5_CORE1	c5	13.0	0.03	0.00	0.00	1.56	85.8	100.4	Ni°
TFTY_GR5_COR2	c5	12.5	0.03	0.00	0.00	1.42	86.3	100.	inclus
TFTY_GR5_COR3	c5	12.6	0.03	0.00	0.01	1.83	85.5	100.0	cal incl
TFTY_GR6_RIM1	r6	10.8	0.03	0.00	0.03	1.28	88.3	100.4	
TFTY_GR6_RIM2	r6	10.7	0.05	0.00	0.05	1.24	89.3	101.3	
TFTY_GR6_RIM3	r6	10.3	0.04	0.00	0.00	1.24	87.3	98.9	
TFTY_GR6_LT_AREA	c6	12.7	0.07	0.00	0.00	1.51	86.9	101.2	
TFTY_GR6_CORE1	c6	10.4	0.08	0.00	0.06	1.06	89.0	100.6	
TFTY_GR6_COR2	c6	12.9	0.06	0.00	0.00	1.54	87.1	101.6	
TFTY_GR6_COR3	c6	10.7	0.08	0.00	0.02	1.17	88.7	100.7	
TFTY_GR6_RIM4	r6	10.4	0.01	0.00	0.02	1.25	87.7	99.4	
TFTY_GR6_RIM5	r6	10.5	0.00	0.00	0.02	1.16	87.2	98.9	
TFTY_GR6_RIM6	r6	10.5	0.06	0.00	0.08	1.18	88.5	100.3	
NEW YORK GULCH PLACER NUGGETS									
NY_GUL_G1_RIM	r1	19.5	0.0	0.00	0.00	2.86	77.5	99.8	
NY_GUL_G1_RIM	r1	20.1	0.0	0.00	0.00	2.94	76.8	99.8	
NY_GUL_G1_RIM	r1	18.6	0.0	0.00	0.02	2.67	76.8	98.2	
NY_GUL_G1_BN_RIM	r1	19.2	0.0	0.00	0.00	2.76	78.0	99.9	
NY_GUL_G1_BN_RIM	r1	19.6	0.0	0.00	0.02	2.68	77.8	100.1	
NY_GUL_G1_BN_RIM	r1	19.1	0.0	0.06	0.00	2.74	78.2	100.1	
NY_GUL_G1_CORE	c1	18.5	0.0	0.00	0.01	3.22	77.6	99.3	
NY_GUL_G1_CORE	c1	18.9	0.0	0.14	0.04	3.00	78.1	100.1	
NY_GUL_G1_CORE	c1	19.1	0.0	0.04	0.00	3.05	78.0	100.1	
NY_GUL_G1_CORE	c1	19.1	0.0	0.00	0.00	2.97	77.8	99.9	
NY_GUL_G1_CORE	c1	19.5	0.0	0.00	0.06	2.92	77.8	100.3	
NY_GUL_G2_EDGE	r2	6.1	0.0	0.00	0.02	0.00	95.0	101.1	
NY_GUL_G2_EDGE	r2	6.4	0.0	0.00	0.05	0.00	95.8	102.2	
NY_GUL_G2_EDGE	r2	15.0	0.0	0.00	0.01	0.09	85.8	100.9	
NY_GUL_G2_CORE	c2	25.6	0.0	0.00	0.01	2.68	71.3	99.6	
NY_GUL_G2_CORE	c2	24.9	0.0	0.00	0.04	2.61	72.1	99.7	
NY_GUL_G2_CORE	c2	25.7	0.0	0.00	0.06	2.65	71.8	100.3	
NY_GUL_G2_CORE	c2	24.9	0.0	0.00	0.07	2.07	72.5	99.6	
NY_GUL_G2_CORE	c2	25.1	0.0	0.00	0.10	2.15	72.6	100.0	
NY_GUL_G2_CORE	c2	24.5	0.0	0.00	0.07	2.20	73.9	100.6	
NY_GUL_G2_CORE	c2	24.4	0.0	0.00	0.00	1.83	73.5	99.7	
NY_GUL_G2_CORE	c2	24.7	0.0	0.00	0.03	2.07	73.3	100.2	
NY_GUL_G2_CORE	c2	24.8	0.0	0.00	4.00	2.18	72.8	103.8	
NY_GUL_ELEC_RIM	r3	53.5	0.0	0.00	0.04	4.30	41.5	99.3	
NY_GUL_ELEC_RIM	r3	12.0	0.1	0.00	0.00	0.39	66.9	79.3	

TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS, CONT.

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
				weight percent					
NY_GUL_ELEC_RIM	r3	22.6	0.0	0.00	0.03	1.54	65.8	90.0	
NY_GUL_ELEC_NOT_RIM	m3	51.5	0.0	0.01	0.04	4.68	41.9	98.2	
NY_GUL_ELEC_NOT_RIM	m3	52.2	0.0	0.00	0.10	4.80	41.8	98.9	
MY_GUL_ELEC_INCL?	m3	52.3	0.0	0.00	0.08	4.82	42.0	99.2	
NYH_GUL_ELEC_INCL?	m3	51.0	0.0	0.07	0.12	4.63	42.5	98.3	
NY_GUL_ELEC_CORE	c3	46.7	0.0	0.03	0.09	2.13	51.0	99.9	
NY_GUL_ELEC_CORE	c3	46.2	0.0	0.00	0.09	2.06	50.9	99.3	
NY_GUL_ELEC_CORE	c3	46.3	0.0	0.00	0.07	1.95	51.3	99.6	
NYG_G1,_RIM	r4	13.9	0.02	0.00	0.00	1.89	84.7	100.6	Ni°
NYG_G1,_RIM	r4	13.9	0.03	0.00	0.00	1.89	84.5	100.3	inclus
NYG_G1,_RIM	r4	14.2	0.10	0.00	0.04	1.80	85.3	101.4	
NYG_G1,_CORE	c4	14.4	0.04	0.00	0.06	1.80	84.1	100.4	
NYG_G1,_CORE	c4	14.2	0.08	0.00	0.03	1.82	84.2	100.4	
NYG_G1,_CORE	c4	13.8	0.07	0.00	0.07	1.88	84.4	100.2	
NYG_G2_ELECT,_RIM	r5	34.9	0.00	0.00	0.08	3.73	61.7	100.4	
NYG_G2_ELECT,_RIM	r5	34.4	0.00	0.00	0.08	4.05	61.8	100.3	
NYG_G2_ELECT,_RIM	r5	34.2	0.05	0.00	0.08	3.15	61.8	99.3	
NYGULG2_CORE	c5	34.7	0.04	0.00	0.09	3.51	62.9	101.3	
NYG_G2_CORE2	c5	34.7	0.01	0.00	0.05	3.20	63.0	101.0	
NYG_G2_CORE3	c5	34.5	0.01	0.00	0.05	3.13	62.6	100.3	
NYG_G3,CORE	c6	14.8	0.07	0.00	0.06	1.50	83.8	100.3	cubic
NYGUL_GR3_CORE	c6	15.1	0.07	0.00	0.02	1.27	83.6	100.0	grain;
NYG_GR3_CORE3	c6	15.3	0.17	0.00	0.03	0.82	83.3	99.6	Ni°+cp
NYG_GR3_CORE4	c6	15.7	0.02	0.00	0.00	1.55	83.1	100.3	inclus
NYG_G3_RIM2	r6	1.2	0.03	0.00	0.00	0.00	99.0	100.2	
NYG_G3_RIM3	r6	1.0	0.01	0.00	0.08	0.08	99.8	100.9	
NYG_G3_RIM4	r6	2.6	0.00	0.00	0.00	0.17	96.0	98.9	
SLATE CREEK PLACER NUGGETS									
4SLATE,GR1,RIM1	r1	21.9	0.0	0.00	0.07	0.00	77.1	99.2	
4SLATE,GR1,RIM2	r1	19.8	0.0	0.00	0.04	0.00	77.6	97.5	
4SLATE,GR1,RIM3	r1	19.5	0.0	0.00	0.01	0.02	76.2	95.7	
4SLATE,GR1,BI-TE	inclus	0.1	0.0	48.02	45.69	0.00	2.2	96.0	
4SLATE,GR1,BI_TE	inclus	0.2	0.0	49.24	39.79	0.08	2.4	91.7	
4SLATE,GR1,CORE	c1	20.1	0.0	0.00	0.03	0.00	78.3	98.4	
4SLATE,GR1,CORE	c1	19.3	0.0	0.00	0.06	0.00	79.1	98.5	
4SLATE,GR2,RIM	r2	23.5	0.0	0.10	0.07	1.46	76.0	101.1	
4SLATE,GR2,RIM2	r2	21.5	0.0	0.00	0.03	1.39	76.5	99.4	
4SLATE,GR2,_DK	c2	21.9	0.0	0.00	0.05	1.20	75.2	98.3	
4SLATE,GR2,CORE1	c2	22.1	0.0	0.00	0.10	1.50	74.3	98.0	
4SLATE,GR2,CORE2	c2	21.8	0.0	0.00	0.06	1.44	74.8	98.1	
4SLATE,GR2,RIM	r2	21.6	0.0	0.00	0.06	1.31	74.3	97.3	
4SLATE,GR3,CORE1	c3	30.0	0.0	0.00	0.10	1.63	66.5	98.2	

TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS, CONT.

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
			weight percent						
4SLATE,GR3,CORE2	c3	29.3	0.0	0.14	0.04	1.31	67.5	98.3	
4SLATE,GR3,CORE3	c3	27.7	0.0	0.00	0.00	1.13	67.8	96.7	
4SLATE,GR3,RIM1	r3	30.8	0.0	0.00	0.02	1.74	62.9	95.4	
4SLATE,GR3,RIM2	r3	27.6	0.0	0.00	0.03	1.39	68.6	97.6	
4SLATE,GR3,RIM3	r3	27.5	0.0	0.00	0.00	1.52	69.1	98.2	
4SLATE,GR4,RIM1	r4	10.2	0.0	0.00	0.00	1.88	86.1	98.1	
4SLATE,GR4,RIM2	r4	9.6	0.0	0.00	0.05	1.97	85.4	97.0	
4SLATE,GR4,CORE1	c4	10.0	0.0	0.00	0.00	2.22	85.4	97.7	
4SLATE,GR4,CORE2	c4	10.3	0.0	0.00	0.00	2.35	86.1	98.8	
4SLATE,GR4,RIM	r4	5.4	0.0	0.00	0.02	0.58	92.7	98.8	
4SLATE,GR4,CORE	c4	10.0	0.1	0.00	0.04	2.18	85.6	97.9	
HOOSIER CREEK PLACER NUGGETS									
1HO,GR1,GOUGED_AREA	c1	11.9	0.0	0.00	0.00	0.00	87.9	99.8	
1HO,GR1,ADJAC	c1	12.3	0.0	0.00	0.01	0.00	87.8	100.1	
1HO,GR1,RIM1	r1	12.7	0.0	0.00	0.05	0.00	86.6	99.4	
1HO,GR1,RIM2	r1	13.0	0.0	0.00	0.07	0.00	85.9	99.0	
1HO,GR1,RIM3	r1	12.8	0.0	0.00	0.01	0.00	86.4	99.2	
1HO,GR1,COR1	c1	12.3	0.0	0.00	0.04	0.00	87.3	99.6	
HOOSIER_GR2_CORE	c2	7.5	0.1	0.00	0.00	1.06	90.4	99.0	
HOOSIER_GR2_RIM	r2	0.1	0.0	0.00	0.00	0.00	99.7	99.8	
HOOSER_GR2_RIM2	r2	1.3	0.0	0.00	0.00	0.00	98.6	99.9	
HOOSIER_GR2_RIM3	r2	0.2	0.1	0.00	0.00	0.00	99.5	99.8	
HOOSIER_GR2_RIM4	r2	0.2	0.1	0.00	0.00	0.00	100.0	100.2	
HOOSIER_GR2_CORE	c2	7.3	0.1	0.00	0.00	1.11	90.4	98.8	
HOOSIER_GR2,_INCLUS	c2	7.3	0.0	0.00	0.05	1.77	89.2	98.3	
HOOSIER_GR2,_CORE	c2	7.8	0.0	0.00	0.04	1.57	90.2	99.6	
HOOSIER,_GR2,_CORE	c2	7.4	0.0	0.00	0.02	1.77	89.7	98.9	
HOOSIER,_GR3,_SMALL	c3	19.0	0.0	0.00	0.00	0.00	80.6	99.6	
HOOSIER,_GR3,_SMALL	c3	18.4	0.0	0.00	0.06	0.00	79.7	98.2	
HOOSIER,_GR3,_RIM	r3	19.0	0.0	0.00	0.00	0.00	80.6	99.6	
HOOSIER,_GR3,_RIM	r3	19.3	0.0	0.00	0.05	0.00	80.1	99.4	
HOOSIER,_GR3,_RIM	r3	18.5	0.1	0.00	0.03	0.00	80.3	98.9	
HOOSIER_GR4,_RIM	r4	13.6	0.0	0.00	0.04	0.00	86.5	100.2	
HOOSIER,_GR5,_SM_COR	c4	13.0	0.0	0.00	0.01	0.00	87.4	100.4	
HOOSIER,_GR6,_RIM	r6	18.3	0.1	0.04	0.00	0.00	80.2	98.6	
HOOSIER,_GR6,_RIM	r6	18.8	0.0	0.00	0.02	0.00	80.6	99.4	
HOOSIER,_GR6,_CORE	c6	19.4	0.0	0.06	0.06	0.00	79.8	99.3	
HOOSIER,_GR6,_CORE	c6	19.0	0.0	0.00	0.01	0.00	81.1	100.2	
HOOSIER,_GR7,_CORE	c7	18.8	0.0	0.07	0.00	0.00	80.7	99.6	
HOOSIER,_LAST_SMALL	c7	19.3	0.0	0.00	0.01	0.00	80.4	99.7	

TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS, CONT.

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
				weight percent					
G1_HOO_RIM-big	r8	7.5	0.0	0.00	0.05	0.00	93.4	100.9	
G1_HOO_RIM-big	r8	1.8	0.0	0.00	0.01	0.00	98.8	100.6	
G1_HOO_RIM-big	r8	8.1	0.0	0.00	0.02	0.00	92.3	100.4	
G1_HOO_RIM-big	r8	8.5	0.0	0.00	0.00	0.00	91.5	100.1	
G1_HOO_RIM-big	r8	8.4	0.0	0.01	0.00	0.00	91.3	99.8	
G1_HOO_RIM-big	r8	8.4	0.0	0.03	0.01	0.00	92.5	100.9	
G1_HOO_RIM-big	r8	8.0	0.0	0.00	0.02	0.00	92.6	100.7	
G1_HOO_CORE	c8	7.8	0.0	0.00	0.00	0.00	92.7	100.5	cp
G1_HOO_CORE	c8	7.8	0.0	0.00	0.00	0.00	92.6	100.5	inclus
G1_HOO_CORE	c8	7.9	0.0	0.06	0.05	0.00	93.1	101.1	
G1_HOOSIER_LAST_COR	c8	8.1	0.0	0.00	0.05	0.00	92.8	101.0	
LITTLE MINOOK, JR. PLACER NUGGETS									
5MJ,GR1,RIM1	r1	0.0	0.0	0.00	0.01	0.00	98.8	98.8	
5MJ,GR1,RIM2	r1	0.2	0.1	0.00	0.00	0.00	98.2	98.4	
5MJ,GR1,RIM3	r1	0.3	0.1	0.06	0.03	0.00	98.4	98.8	
5MJ,GR1,COR1	c1	12.0	0.0	0.00	0.00	1.67	85.0	98.7	
5MJ,GR1,COR2	c1	11.9	0.0	0.00	0.05	1.38	84.8	98.1	
5MJ,GR1,DK	c1	12.1	0.0	0.09	0.07	1.47	86.0	99.8	
5MJ,GR1,RIM	r1	0.2	0.1	0.00	0.00	0.00	99.7	100.0	
5MJ,GR1,CORE	c1	12.3	0.0	0.00	0.04	1.61	84.4	98.3	
5MJ,GR1,RIM	r1	0.1	0.0	0.00	0.00	0.00	99.6	99.7	
5MJ,GR1,CORE	c1	11.7	0.0	0.03	0.04	1.49	85.5	98.8	
5MJ,GR2,RIM1	r2	10.6	0.0	0.00	0.03	1.94	86.3	98.9	
5MJ,GR2,CORE1	c2	10.6	0.0	0.00	0.01	2.09	86.4	99.1	Ni°
5MJ,GR2,CORE2	c2	10.3	0.0	0.00	0.00	2.73	85.8	98.8	inclus
5MJ,GR2,CORE3	c2	10.5	0.0	0.00	0.03	2.48	86.4	99.5	
5MJ,GR2,RIM2	r2	10.9	0.0	0.00	0.00	2.26	85.6	98.8	
5MJ,GR2,RIM3	r2	10.2	0.0	0.03	0.02	2.30	85.3	97.9	
5MJGR2,"RAISED"	c2	10.8	0.0	0.00	0.00	2.82	85.5	99.2	
5MJ,GR2,DARK	c2	9.9	0.0	0.00	0.08	1.98	69.2	81.2	
5MJ,GR3,RIM1	r3	0.2	0.0	0.00	0.03	0.00	98.4	98.7	
5MJ,GR3,RIM2	r3	0.9	0.0	0.00	0.01	0.00	97.8	98.8	
5MJ,GR3,RIM3	r3	0.1	0.0	0.02	0.00	0.00	99.2	99.3	
5MJ,GR3,COR1	c3	9.5	0.0	0.00	0.00	0.79	88.1	98.4	
5MJ,GR3,CORE2	c3	10.0	0.0	0.05	0.00	0.85	88.7	99.6	
5MJ,GR3,CORE3	c3	9.6	0.0	0.00	0.08	0.97	88.2	98.9	
5MJ,GR3,DARK	c3	1.8	0.0	0.02	0.00	0.00	94.4	96.3	
5MJ,GR3,DK_AREA	c3	1.1	0.0	0.00	0.00	0.00	99.4	100.5	
5MJ,GR3,LT_AREA	c3	9.6	0.1	0.00	0.00	0.91	87.7	98.3	
5MJ,GR4,RIM1	r4	0.5	0.0	0.00	0.00	0.00	99.3	99.9	
5MJ,GR4,RIM2	r4	0.3	0.0	0.00	0.00	0.00	98.8	99.1	
5MJ,GR4,RIM3	r4	0.1	0.0	0.00	0.00	0.00	98.1	98.2	

TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS, CONT.

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
			weight percent						
5MJ,GR4,COR1	c4	2.6	0.1	0.00	0.00	2.22	93.6	98.5	
5MJ,GR4,COR2	c4	2.6	0.1	0.00	0.00	2.53	93.1	98.4	
5MJ,GR4,COR3	c4	2.8	0.1	0.01	0.01	2.34	93.9	99.2	
5MJ,GR4,COR4	c4	0.7	0.0	0.00	0.01	0.00	98.6	99.3	
5MJ,GR5,LT_CENTRAL_	c5	15.5	0.0	0.00	0.00	0.00	84.2	99.7	
5MJ,GR5,DK	c5	0.2	0.0	0.00	0.02	0.00	99.9	100.2	
5MJ,GR5,DK	c5	0.7	0.0	0.00	0.00	0.00	92.1	92.9	
5MJ,GR5,RIM	r5	0.0	0.0	0.00	0.00	0.00	99.3	99.3	
5MJ,GR5,DK	c5	0.3	0.0	0.00	0.00	0.00	101.2	101.6	
5MJ,GR7,CORE1	c7	10.4	0.0	0.00	0.06	1.11	87.5	99.1	Ni°
5MJ,GR7,CORE2	c7	10.9	0.0	0.00	0.03	0.89	87.2	99.1	inclus
5MJ,GR7,RIM1	r7	10.6	0.1	0.00	0.02	1.69	86.2	98.6	
5MJ,GR7,RIM2	r7	10.4	0.0	0.00	0.00	0.00	87.9	98.3	
HUNTER CREEK PLACER NUGGETS									
2HUNT,GR1,CORE1	c1	7.2	0.0	0.00	0.00	0.58	91.0	98.8	
2HUNT,GR1,RIM1	r1	1.2	0.0	0.00	0.04	0.00	99.7	101.0	
2HUNT,GR1,DARK_SPOT	c1	7.5	0.1	0.00	0.02	0.63	90.3	98.5	
2HUNT,GR1,RIM	r1	0.7	0.0	0.00	0.00	0.00	98.9	99.6	
2HUNT,GR1,CORE	c1	7.7	0.1	0.00	0.02	0.86	90.4	99.1	
2HUNT,GR2,CORE	c2	12.2	0.0	0.00	0.03	0.00	87.9	100.1	
2HUNT,GR2,CORE2	r2	12.2	0.0	0.00	0.01	0.00	88.0	100.2	
2HUNT,GR2,RIM	r2	11.8	0.0	0.00	0.07	0.00	87.6	99.5	
2HUNT,GR2,RIM2	r2	11.5	0.0	0.15	0.00	0.00	88.0	99.7	
2HUNT,GR2,_RIM3	r2	11.6	0.0	0.00	0.00	0.00	88.1	99.7	
2HUNT,GR2,CORE3	c2	12.0	0.0	0.00	0.00	0.00	88.2	100.2	
2HUNT,GR2,CORE	c2	8.0	0.0	0.00	0.00	0.68	90.6	99.3	
2HUNT,GR3,CORE1	c3	8.1	0.0	0.00	0.01	0.85	89.8	98.8	
2HUNT,GR3,CORE2	c3	7.9	0.0	0.00	0.02	0.73	89.8	98.5	
2HUNT,GR3,RIM	r3	9.0	0.0	0.00	0.00	0.00	90.2	99.3	
2HUNT,_GR3,RIM2	r3	9.0	0.0	0.02	0.00	0.06	89.3	98.3	
2HUNT,GR4,ORANGE_RIM	r4	5.8	0.0	0.00	0.02	0.00	93.3	99.1	
2HUNT,GR4,ORANGE_RIM	r4	0.5	0.1	0.00	0.00	0.00	98.2	98.8	
2HUNT,_GR4,CORE	c4	8.5	0.0	0.00	0.00	1.36	88.9	98.8	Ni°
2HUNT,GR4,CORE2	c4	8.5	0.0	0.00	0.01	1.07	89.0	98.5	inclus
2HUNT,_GR4,_RIM	r4	0.0	0.0	0.00	0.01	0.00	99.4	99.4	
2HUNT,GR4,CORE3	c4	8.1	0.0	0.00	0.03	1.64	87.8	97.6	
2HUNT,GR4,RIM2	r4	0.4	0.0	0.00	0.00	0.00	99.1	99.6	
2HUNT,GR4CORE4	c4	8.5	0.0	0.00	0.04	1.41	88.7	98.7	
2HUNT,GR4,CORE4	c4	8.6	0.0	0.00	0.01	1.22	88.2	98.1	
2HUNT,GR4,CORE5	c4	8.8	0.0	0.00	0.07	1.77	88.3	98.9	
2HUNT,AU_ADJAC	r5	0.3	1.9	0.00	0.00	0.18	96.6	98.9	
2HUNT,GR5,RIM	r5	0.0	0.0	0.00	0.00	0.00	99.1	99.1	

TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS, CONT.

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
			weight percent						
2HUNT,_GR5,CORE	c5	0.3	1.9	0.00	0.03	0.31	96.5	99.0	bn-cc,
INCLU_IN_2HUN-ORG	c5	0.2	1.9	0.02	0.00	0.27	95.3	97.7	gl
2HUN-ORG,_MAIN	c5	0.2	1.9	0.00	0.00	0.39	96.8	99.3	inclus
#2-HUNT_RIM	r5	0.2	0.0	0.03	0.00	0.00	99.3	99.5	
#2-HUNT_RIM_ORANGE	r5	0.0	0.1	0.11	0.00	0.00	99.2	99.4	
#2-HUNT_ORAN-RIM	r5	0.1	0.0	0.00	0.02	0.00	99.9	100.0	
#2-HUNT_ORANG_RIM	r5	0.0	0.0	0.00	0.00	0.00	93.7	93.8	
#2-HUNT,_ORAN_RIM	r5	2.7	1.0	0.00	0.00	0.13	95.4	99.3	
#2HUNT_ORG-CORE	c5	0.3	1.9	0.00	0.00	0.22	96.3	98.8	
#2-HUNT_YL1	c6	20.0	0.0	0.00	0.06	0.59	78.9	99.6	
#2HUNT_YL2-CORE	c6	19.7	0.0	0.00	0.06	0.30	79.9	100.0	
#2-HUNT_YL3-EDGE	c6	19.6	0.0	0.00	0.04	0.00	79.7	99.3	
#2HUNT_YL4-EDGE	r6	14.7	0.0	0.01	0.06	0.01	83.3	98.0	
#2HUNT_YL5-EDGE	r6	2.0	0.0	0.00	0.00	0.00	98.4	100.5	
#2HUNT_YL-EDGE	r6	1.1	0.0	0.00	0.04	0.00	98.7	99.8	
2HUNT,GR7,RIM	r7	2.2	0.0	0.00	0.00	0.00	97.1	99.3	
2HUNT,GR7,RIM	r7	4.4	0.0	0.00	0.00	0.00	95.2	99.5	
2HUNT,GR7,CORE	c7	11.3	0.0	0.00	0.06	1.09	85.6	98.1	
2HUNT,GR7,CORE2	c7	11.5	0.0	0.00	0.03	1.01	86.7	99.2	
2HUNT,GR7,RIM2	r7	1.3	0.0	0.00	0.00	0.00	98.7	100.0	
2HUNT,GR7,RIM3	r7	0.4	0.0	0.13	0.02	0.00	98.3	98.8	
2HUNT,GR7,DK_RIM	r7	10.6	0.0	0.00	0.06	1.05	85.7	97.4	
2HUNT,GR7,RIM	r7	1.0	0.0	0.00	0.03	0.00	96.1	97.1	
2HUNT,GR7,CORE	c7	11.5	0.1	0.00	0.03	1.07	86.3	98.9	
2HUNT,GR7,RIM	r7	0.6	0.0	0.00	0.04	0.00	97.6	98.3	
2HUNT,GR7,RIM	r7	1.1	0.0	0.05	0.04	0.00	98.4	99.6	
HUNT8,_RIM1	r8	17.2	0.00	0.00	0.03	1.57	81.3	100.1	
HUNT_8,_RIM2	r8	16.8	0.04	0.00	0.00	1.67	80.7	99.2	
HUNT_8,_RIM3	r8	16.7	0.05	0.00	0.00	1.47	80.4	98.7	
HUNT_8_CORE1	c8	17.2	0.05	0.00	0.00	1.38	82.3	100.9	aspy
HUNT_8_CORE2	c8	17.2	0.04	0.00	0.07	1.66	82.5	101.5	inclus
HUNT_8_CORE3	c8	16.7	0.04	0.00	0.05	1.57	82.1	100.5	
HUNT_8_RIM4	r8	15.8	0.03	0.00	0.04	1.28	83.1	100.3	
HUNT_9A,_RIM1	r9	15.8	0.00	0.00	0.03	0.93	83.8	100.6	
HUNT_9A_RIM2	r9	15.4	0.00	0.00	0.00	1.02	83.1	99.5	
HUNT_9A_RIM3	r9	15.2	0.03	0.00	0.01	1.28	83.0	99.5	
HUNT_9A,_RIM4	r9	14.9	0.00	0.00	0.06	1.49	83.1	99.6	
HUNT_9A_CORE1	c9	15.3	0.01	0.00	0.01	1.37	83.6	100.3	
HUNT9A_RIM4	r9	15.4	0.00	0.00	0.04	1.02	83.7	100.1	
HUNT_9A_CORE3	c9	15.4	0.00	0.00	0.05	2.28	83.4	101.1	

TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS, CONT.

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
			weight percent						
HUNT_9A_RIM1	r9	15.6	0.00	0.00	0.01	0.86	85.3	101.8	
HUNT_9B_RIM2	r9	14.5	0.00	0.00	0.03	0.78	84.5	99.8	
HUNT_9B_RIM3	r9	14.6	0.01	0.00	0.02	1.24	83.5	99.4	
HUNT_9B_RIM4	r9	14.6	0.03	0.00	0.07	0.43	82.9	98.0	
HUNT_9B_CORE1	c9	14.5	0.01	0.00	0.04	2.35	84.1	100.9	
HUNT_9B_CORE_2	c9	14.9	0.00	0.00	0.04	2.29	83.2	100.4	
HUNT_9B_CORE_3	c9	14.8	0.00	0.00	0.02	1.15	83.7	99.7	
HUNT_10B,_RIM1	r10	17.0	0.00	0.00	0.00	1.61	81.2	99.9	
HUNT_10B,_RIM2	r10	17.3	0.00	0.00	0.10	1.12	80.7	99.2	
HUNT_10B_RIM3	r10	15.8	0.01	0.00	0.08	2.07	82.4	100.3	
HUNT_10B_CORE1	c10	12.6	0.00	0.00	0.03	2.40	84.2	99.2	aspy
HUNT_10B_CORE2	c10	13.8	0.02	0.00	0.00	1.93	83.3	99.1	inclus
HUNT_10B_CORE3	c10	13.1	0.05	0.00	0.00	2.48	83.5	99.1	
HUNT_10C_CORE1	c10	14.9	0.03	0.00	0.00	2.15	84.9	102.0	
HUNT_10C_CORE2	c10	14.7	0.02	0.00	0.07	2.18	83.1	100.1	
HUNT_10A_RIM1	r10	14.5	0.02	0.00	0.05	1.77	83.2	99.6	
HUNT_10A_RIM2	r10	15.0	0.02	0.00	0.00	1.86	81.4	98.3	
HUNT_1-A_RIM3	r10	13.3	0.02	0.00	0.00	2.19	85.0	100.5	
HUNT_10A_CORE_1	c10	12.1	0.06	0.00	0.00	2.06	85.0	99.1	
HUNT_10A_CORE2	c10	11.8	0.00	0.00	0.00	1.99	85.1	98.9	
HUNT11C,_TINY_DENDR	r11	17.5	0.00	0.00	0.04	1.41	81.8	100.7	
HUNT11C,_RIM2	r11	18.0	0.01	0.00	0.00	1.32	82.2	101.5	
HUNT_11C,_RIM3	r11	17.7	0.04	0.00	0.02	1.33	81.7	100.8	
HUNT_11C,_RIM4	r11	15.9	0.00	0.00	0.05	1.49	82.0	99.5	
HUNT_11C,_CORE1	c11	16.3	0.01	0.00	0.00	1.58	81.5	99.4	
HUNT_11C,_CORE2	c11	16.9	0.02	0.00	0.00	1.33	81.7	100.0	
HUNT_11C,_CORE3	c11	17.0	0.00	0.00	0.08	1.46	82.0	100.5	
HUNT11B,_RIM1	r11	16.7	0.02	0.00	0.07	1.64	80.6	99.0	
HUNT11B,_RIM2	r11	17.0	0.01	0.00	0.01	1.48	79.8	98.3	
HUNT11B,_RIM3	r11	16.8	0.02	0.00	0.03	1.56	80.0	98.4	
HUNT11B,_CORE1	c11	17.3	0.05	0.00	0.07	1.62	81.3	100.4	
HUNT11B,_CORE2	c11	16.7	0.00	0.00	0.05	1.67	81.3	99.7	
HUNT11B,_CORE3	c11	16.8	0.00	0.00	0.01	2.17	80.8	99.8	
HUNT10_ARM1_CORE	c10	12.1	0.00	0.00	0.01	2.41	85.5	100.0	
HUNT10_ARM1_MID	c10	11.8	0.00	0.00	0.01	2.31	85.2	99.3	
HUNT10_ARM1_RIM	r10	13.1	0.03	0.00	0.00	1.98	84.7	99.8	
HUNT10_ARM1_INCLUS	c10	11.7	0.00	0.00	0.03	2.13	85.3	99.2	
HUNT10_ARM1_RIM2	r10	15.4	0.00	0.00	0.02	1.86	81.9	99.2	
HUNT10_ARM1_RIM3	r10	15.9	0.00	0.00	0.00	1.85	80.8	98.6	
HUNT10_ARM1_CORE2	c10	12.1	0.00	0.00	0.00	2.08	84.5	98.6	
HUNT10_ARM1_CORE3	c10	12.2	0.00	0.00	0.00	1.99	84.0	98.2	

TABLE 1: MICROPROBE DATA FOR PLACER GOLD NUGGETS, CONT.

Description	Label	Ag	Cu	Bi	Te	Hg	Au	Total	Notes
			weight percent						
GUNNISON CREEK PLACER GOLD									
GUNNISON_G1_CORE1	c1	0.2	3.96	0.00	0.00	0.32	95.7	100.1	all
GUNISON_G1_CORE2	c1	0.2	4.01	0.00	0.00	0.27	95.8	100.2	grains
GUNNISON_G1_CORE3	c1	0.2	4.02	0.00	0.00	0.19	95.8	100.2	have
GUNNISON_G1_RIM1	r1	0.3	3.93	0.00	0.00	0.12	95.1	99.4	Ni°
GUNNISON_G1_RIM2	r1	0.4	3.93	0.00	0.00	0.26	95.4	100.0	inclus
GUNNISON_G1_RIM3	r1	0.3	4.00	0.00	0.00	0.09	95.0	99.4	
GUNNISON_G1_RIM4	r1	0.2	4.02	0.00	0.00	0.24	94.4	98.9	
GUNNISON_G2_NEAR_CO	c2	11.5	0.03	0.00	0.03	0.19	88.3	99.9	
GUNNISON_G2_CORE2	c2	11.7	0.04	0.00	0.03	0.16	89.0	100.9	
GUNNISON_G2_COR3	c2	11.4	0.02	0.00	0.01	0.14	89.1	100.6	
GUNNISON_G2_CORE4	c2	11.9	0.05	0.00	0.05	0.23	88.4	100.6	
GUNNISON_G2_RIM1	r2	13.4	0.00	0.00	0.01	0.17	84.1	97.7	
GUNNISON_G2_RIM2	r2	12.9	0.00	0.00	0.00	0.24	84.6	97.8	
GUNNISON_G2_RIM3	r2	13.2	0.05	0.00	0.00	0.20	86.3	99.8	
GUNNISON_G2_RIM4	r2	12.9	0.02	0.00	0.03	0.18	87.8	101.2	
GUNNISON_G3_RIM1-SP	r3	6.0	0.03	0.00	0.00	0.88	92.9	99.7	
GUNNISON_G3_RIM2	r3	3.9	0.02	0.00	0.00	0.88	93.9	98.7	
GINNINSON_G3_RIM3	r3	4.4	0.05	0.00	0.05	1.01	95.3	100.8	
GUNNISON_G3_RIM4	r3	3.9	0.02	0.00	0.02	0.52	95.1	99.6	
GUNNISON_G3_CORE1	c3	3.7	0.02	0.00	0.01	0.55	96.0	100.3	
GUNNISON_G3_CORE2	c3	4.3	0.01	0.00	0.00	0.70	95.1	100.1	
GUNNISON_G3_CORE_3	c3	4.0	0.01	0.00	0.00	0.87	95.3	100.2	
GUNNISON_G3_CORE_4	c3	4.2	0.01	0.00	0.00	1.98	93.6	99.8	
GUNNISON_G4_RIM1	r4	1.4	0.02	0.00	0.04	0.03	99.1	100.9	
GUNNISON_G4_RIM2	r4	14.9	0.02	0.00	0.00	0.30	84.2	99.4	
GUNN_G4_RIM3	r4	15.4	0.01	0.00	0.03	0.29	83.9	99.6	
GUNNISON_G4_RIM4	r4	13.4	0.00	0.00	0.02	0.27	84.6	98.4	
GUNNISON_G4_CORE1	c4	15.1	0.00	0.00	0.08	0.28	83.4	100.5	
GUNNISON_G4_Bi-Te	inclus	15.3	0.01	3.10	1.75	0.00	81.6	101.8	
GUNNISON_G4_Bi_2S_3	inclus	0.3	0.30	55.57	0.00	0.00	2.2	58.3	
GUNNISON_G4_CORE2	c4	15.7	0.00	0.00	0.01	0.28	85.0	100.9	
GUNNISON_G4_CORE3	c4	14.8	0.00	0.00	0.00	0.17	85.6	100.6	
GUNNISON_G4_CORE4	c4	15.1	0.00	0.00	0.09	0.18	85.4	100.8	
GUNNISON_G4_CORE5	c4	14.9	0.01	0.00	0.03	0.31	84.9	100.2	

Analyses performed using a Chimeca SX-50 electron microprobe at the University of Alaska, Department of Geology Microbeam facility. A 30 kV, 30 Ma, 1 micron beam was employed for all analyses.