Table 2-6 Assay Results of Samples in the Bau Prospect

Sample No.	Width (cm)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	Sample type and locality
A20R	12	<0.015	<0.3	0.02	<0.01	0.01	Qz vein, Bau footpath
A22R	25	<0.015	0.6	0.40	<0.01	0.01	Qz vein, Kp.Salupolin
A24R	30	<0.015	<0.3	0.03	<0.01	0.06	Qz vein, S.Belopi
B17R	—	<0.015	<0.3	0.03	<0.01	<0.01	Qz float, S.Balimbing
B18R	grab	<0.015	<0.3	0.04	<0.01	<0.01	And Py-diss, S.Balimbing
B20R	grab	<0.015	<0.3	0.02	<0.01	0.01	And Py-film, S.Balimbing
B23R	—	<0.015	<0.3	0.17	<0.01	0.01	Qz float, S.Salupolin
C26R	grab	<0.015	0.6	0.80	<0.01	0.02	Qz-sulphide, S.Belopi
C29R	—	<0.015	<0.3	0.30	<0.01	0.03	Qz float, S.Salore
E36R	20	<0.015	<0.3	0.02	<0.01	0.01	Qz vein, S.Bosokan
E38R	15	<0.015	<0.3	0.03	<0.01	0.01	Qz vein, Bau footpath

Methods of Analysis and Limits of Detection for Ore Assay

Element	Methods of Analysis	Detection Limit	Upper Limit
Au	Fire assay with AA finish	0.015g/t	10 g/t
Ag	Nitric aqua regia with AA finish	0.3 g/t	600 g/t
Cu	Nitric aqua regia with AA finish	0.01 %	100 %
Pb	ditto	0.01 %	100 %
Zn	ditto	0.01 %	100 %

※ AA means Atomic Absorption Method
※ Chemical analysis conducted by Chemex Labs Ltd.

Table 2-7 Assay Results of Samples in the Batuisi Prospect

Sample No.	Width (cm)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	Sample type and locality
A35R	47	<0.015	<0.3	0.03	<0.01	0.07	Qz vein, S.Tarawa(Zone ②)
A37R	33	<0.015	<0.3	0.01	<0.01	<0.01	Qz vein, S.Tarawa(Zone ②)
A42R	35	<0.015	0.3	0.03	<0.01	<0.01	Qz vein, S.Bone(Zone ②)
B43R	20	<0.015	0.3	0.01	<0.01	<0.01	Qz vein, S.Bone(Zone ①)
B46R	48	0.015	<0.3	0.13	<0.01	0.20	Qz vein, NW Tarawa(Zone①)
C38R	—	<0.015	0.6	0.02	<0.01	0.15	Qz block,NW Tarawa(Zone①)
D34R	200	<0.015	<0.3	0.02	<0.01	0.01	Qz vein, S.Tarawa(Zone ①)
D37R	100+	<0.015	<0.3	0.09	<0.01	0.06	Qz vein, S.Tarawa(Zone ①)
E50R	grab	<0.015	<0.3	0.01	<0.01	0.01	Sil shale, S.Malela
E51R	80	<0.015	<0.3	0.32	<0.01	0.05	Qz network, S.Malela
E52R	280+	<0.015	<0.3	0.09	<0.01	0.01	Qz vein, S.Malela
E66R	15	<0.015	<0.3	0.05	<0.01	0.41	Qz vein, S.Malela

※ Details of assaying same as in Table 2-6.

Table 2-8 Assay Results of Samples in the Other Prospects

Sample No.	Width (cm)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	Sample type and locality
B7R	—	<0.015	<0.3	0.03	<0.01	<0.01	Qz float, S.Uroh
B32R	—	<0.015	<0.3	0.04	<0.01	<0.01	Qz float, S.Taroto
B34R	—	0.030	1.2	0.40	<0.01	0.02	Py float, S.Taroto
C5R	—	<0.015	<0.3	0.04	<0.01	0.01	Qz float, S.Rasasisi
C6R	—	0.030	0.3	0.01	<0.01	0.01	Sil-Py float, S.Rasasisi
C20R	—	0.015	<0.3	0.03	<0.01	0.01	Sil float, S.Kakea
C21R	—	<0.015	<0.3	0.02	<0.01	0.01	Qz float, S.Kakea
G5R	—	0.390	1.2	0.02	<0.01	0.01	Qz float, Rantedonga

※ Details of assaying same as in Table 2-6.

Table 2-9 Results of Ore Microscopy

Sample No.	Locality	Minerals								Remarks
		Py	As	Cp	Sp	Ga	Mc	Cv	Io	
A31R	S.Tarawa	△		•	•			•		Quartz float
A41R	S.Tarawa	△		•			•	•	•	Quartz float
B23R	S.Salupoling	△		△				•		Quartz float
B34R	S.Lebutang	○	△	•	•			•		Py(-Qz-Epidote) vein
B46R	NW Tarawa	△	•	•	•	•		•		Quartz vein (Wd=48cm)
C26R	S.Belopi	△		•			•		•	Quartz(-Chlorite) block
C29R	S.Salore	△	•	•	•			•		Quartz block
E51R	S.Malela	△		•				•		Quartz network (Wd=80cm)
E66R	S.Malela	△		•	•					Quartz vein (Wd=15cm)
E70R	S.Malela	•		•				•	•	Quartz vein (Wd=200cm)

Abundance of Minerals: ○;Common, △;Rare, • ;Trace

Abbreviations : Py;Pyrite, As;Arsenopyrite, Cp;Chalcopyrite, Sp;Sphalerite, Ga;Galena, Mc;Malachite, Cv;Covelline, Io;Iron Oxide

Near the junction of S. Salore and S. Belopi, several quartz veins/networks were caught at four localities during geological survey. Each veins run N10°W to N20°W and dip 35°W to 40°W. Their widths vary from few centimeters up to 30 cm. Pyrite, arsenopyrite, chalcopyrite, and sphalerite were observed in quartz vein. Chalcopyrite is replaced by malachite and covelline. Pyrite is sometimes oxidized and replaced by iron-oxide mineral (limonite). Gold has not been observed under the microscope.

Both northern and southern extensions of the zone were inaccesible because of the steep topography.

In the northern side of S. Salore, quartz veins/networks again appear. Outcrops of quartz veins were found at 10 localities along the footpath from the bridge of S. Salore up to Kp. Bosokan. Strikes and dips change variously. Their width are from few centimeters to 25 cm. A small amount of pyrite and limonite was observed in quartz (Fig.2-11).

Strong silicification and pyritization were observed in metasediments and dolerite adjacent to quartz veins. According to X-ray diffraction analysis, quartz, sericite, chlorite, calcite, and pyrite were detected as alteration minerals in the country rocks. At the northern end of the mineralized zone, a siliceous clay vein of 1.2 m wide occurs within shale at a small creek. This vein is composed mainly of quartz and sericite. Pyrite is disseminated in the footwall side of vein. A small amount of gypsum was detected in this vein.

A couple of other mineralized zones was found within the prospect. A quartz float zone was identified around Kp. Salupoling. A small amount of pyrite and chalcopyrite were observed in some of the quartz floats.

A silicified zone occurs in black shale near the junction of S. Salore and S. Balimbing. Black shale is strongly silicified and pyrite is disseminated in this zone.

Quartz floats are widely distributed at the upper reaches of S. Balimbing. Some of them contain pyrite. Gold and chalcopyrite were detected in pan concentrates in this zone. These floats would be originated from surrounding mountains.

Total of 11 samples of quartz veins and quartz floats was assayed within the Bau prospect. No significant value was obtained.

(2) Batuisi prospect

The Batuisi prospect is located between S. Karataun and the upper reaches of S. Pongo in the northwestern part of the survey area (Fig.1-2). The area is approximately 50 km^2. The altitude of S. Karataun is 150 m (at the bridge of

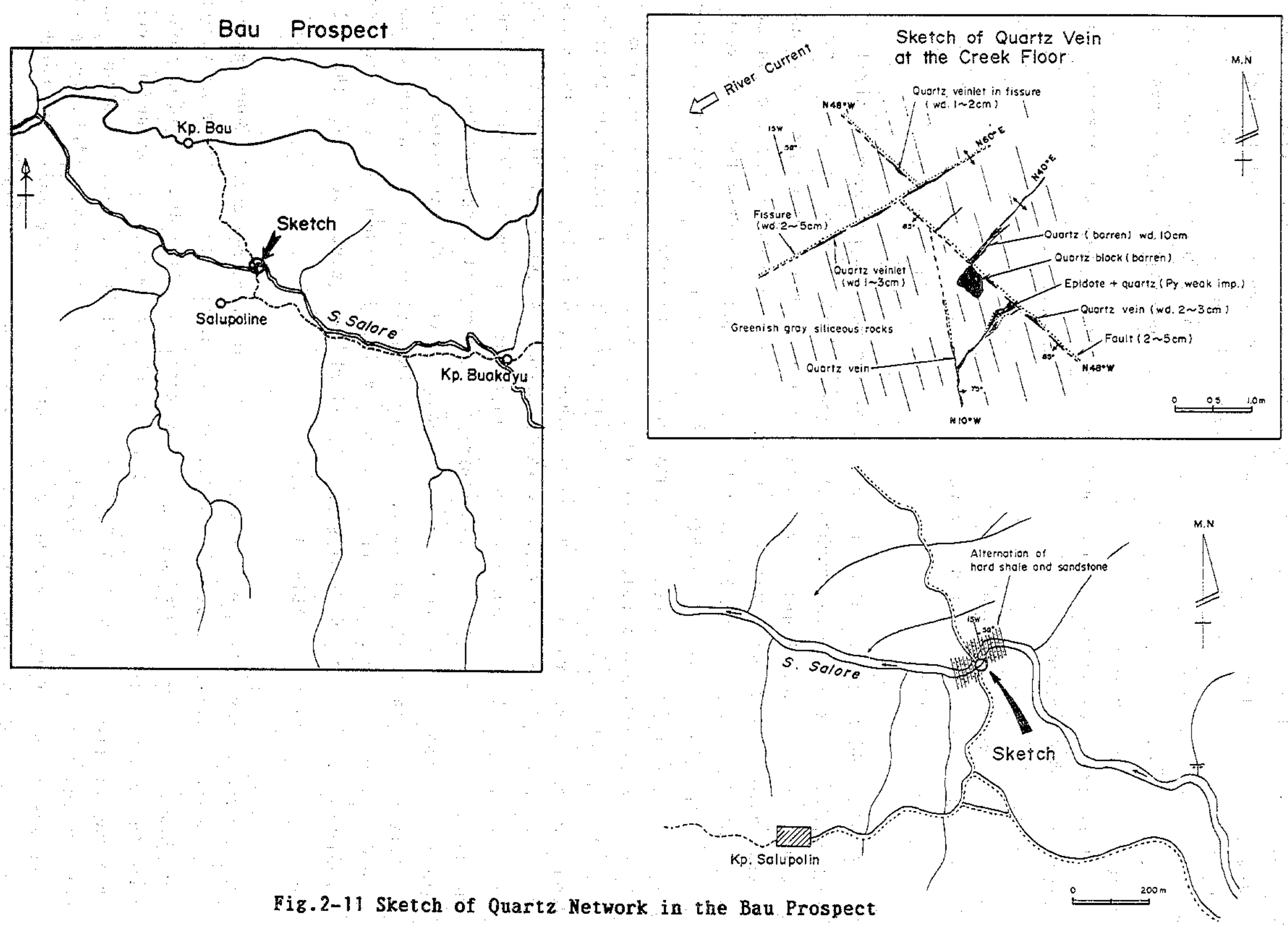


Fig.2-11 Sketch of Quartz Network in the Bau Prospect

Kp. Batuisi). High ridge of more than 600 m above sea level extends northwestward, dividing the prospect into two. The prospect lies geologically among the area of metasediments of the Latimojong Formation. The Mamasa granite batholith occurs at the southeastern area adjacent to the prospect. Dacite lava and volcanic breccia of the Barupu Tuffs are distributed at the high elevations, forming very steep ridges.

Three zones of quartz veins/networks containing sulphide minerals were found within the prospect:

① Middle reaches of S. Tarawa
② Upper reaches of S. Tarawa
③ S. Malela

At the middle reaches of S. Tarawa, 13 quartz veins were found in phyllitic black shale. At the middle reaches of S. Bone, which is located about 1,500 m northwest of S. Tarawa, 6 quartz veins were found in shale. One quartz vein and several quartz float zones were recognized at the hill between the two places. Strike of veins ranges from N-S to N40°W, and is predominantly NNW, and veins steeply dip to the west in general. These quartz veins were grouped together and called the middle reaches of S. Tarawa mineralized zone.

Quartz veins at the middle reaches of S. Tarawa are generally wide, from 30 cm to 2 m in width. Whereas at S. Bone, widths of veins are comparatively thin, from few centimeters up to 25 cm. Vein quartz is generally massive and shows fine- to medium-grained and slightly chalcedonic. A small amount of sulphide minerals is contained in quartz veins. Sulphides tend to concentrate towards one of the wallsides. Pyrite, arsenopyrite, chalcopyrite, sphalerite, galena, malachite, covelline, and limonite were identified under the microscope. Strong silicification with pyrite dissemination was observed at wallrock around veins. A small amount of chlorite and trace of pyrophyllite were detected in the alteration zone by X-ray analysis. A sketch of quartz vein at the hill northwest of S. Tarawa is shown in Fig.2-12.

At several localities of the upper reaches of S. Tarawa and S. Bone, quartz veins/networks occur in bluish grey shale/siltstone. Strike of veins varies from place to place. They generally have gentle dip. Width of veins varies from few centimeters up to 2 m. Pyrite, chalcopyrite, and malachite were observed in quartz veins. Silicification, pyritization, chloritization, and some carbonatization were identified as wallrock alteration. This group of veins was named the upper reaches of S. Tarawa mineralized zone. A sketch of quartz network at the upper reaches of S. Tarawa is shown in Fig.2-13.

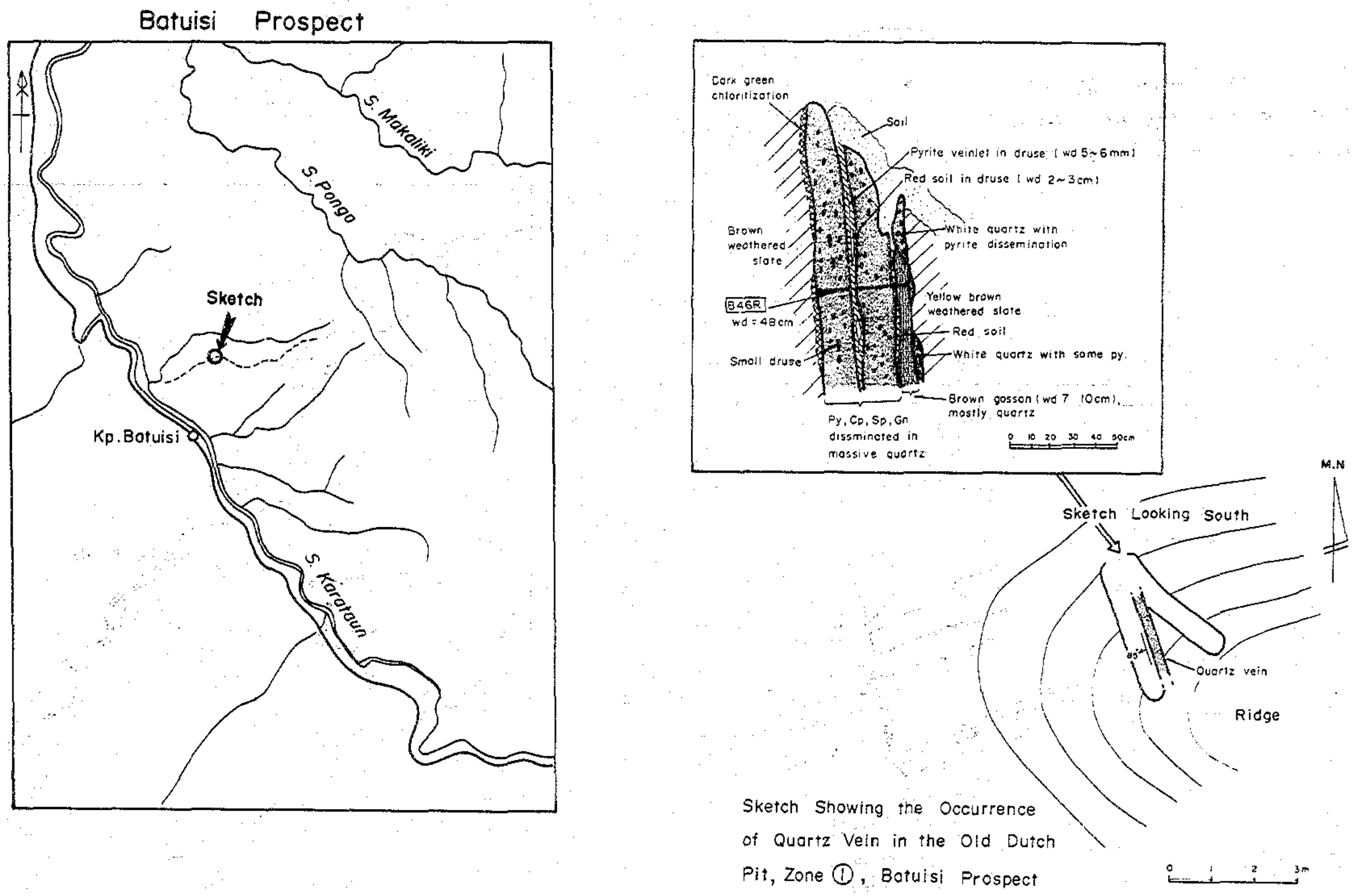


Fig.2-12 Sketch of Quartz Vein at the Hill Northwest of S. Tarawa.

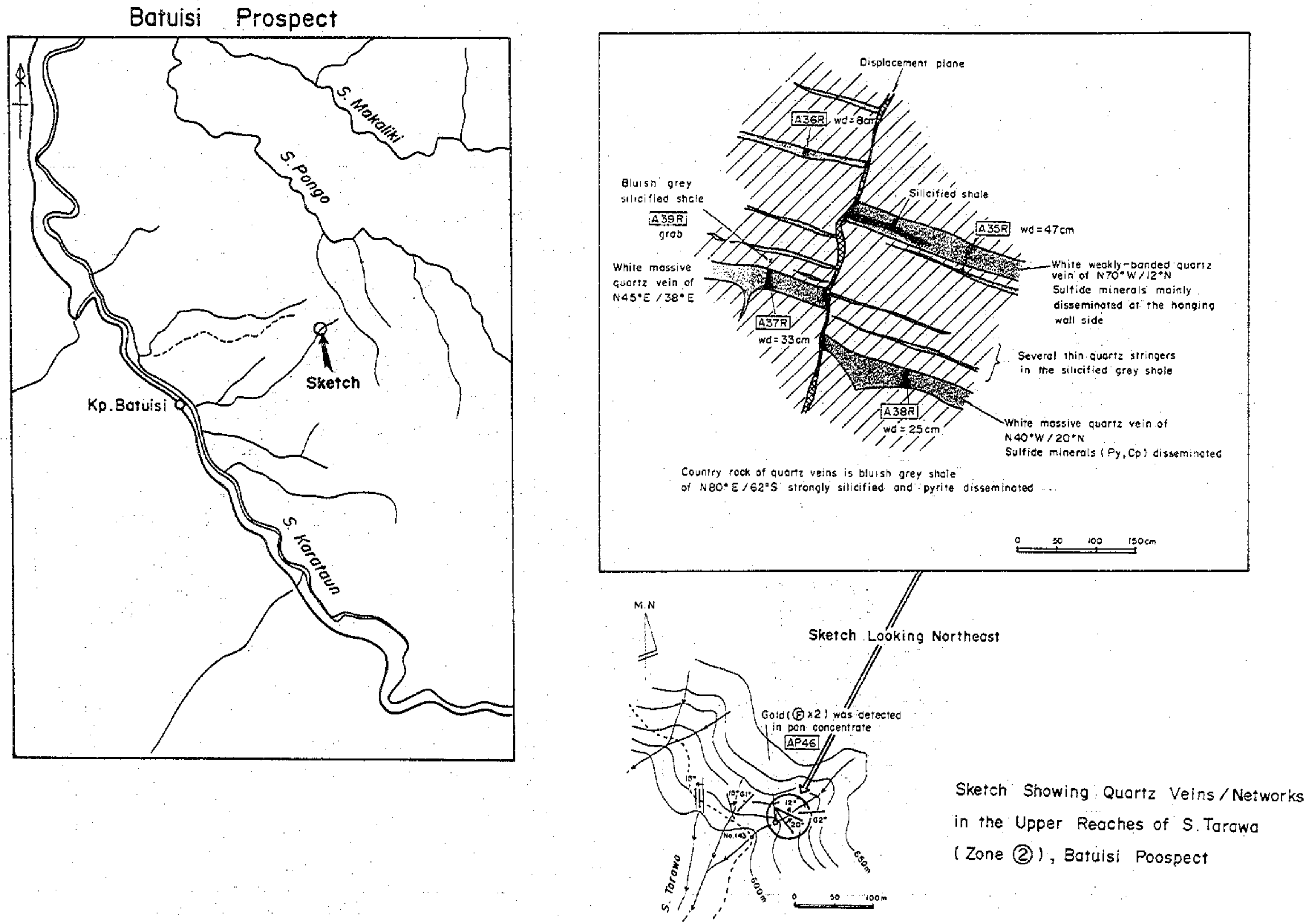


Fig.2-13 Sketch of Quartz Network at the Upper Reaches of S. Tarawa

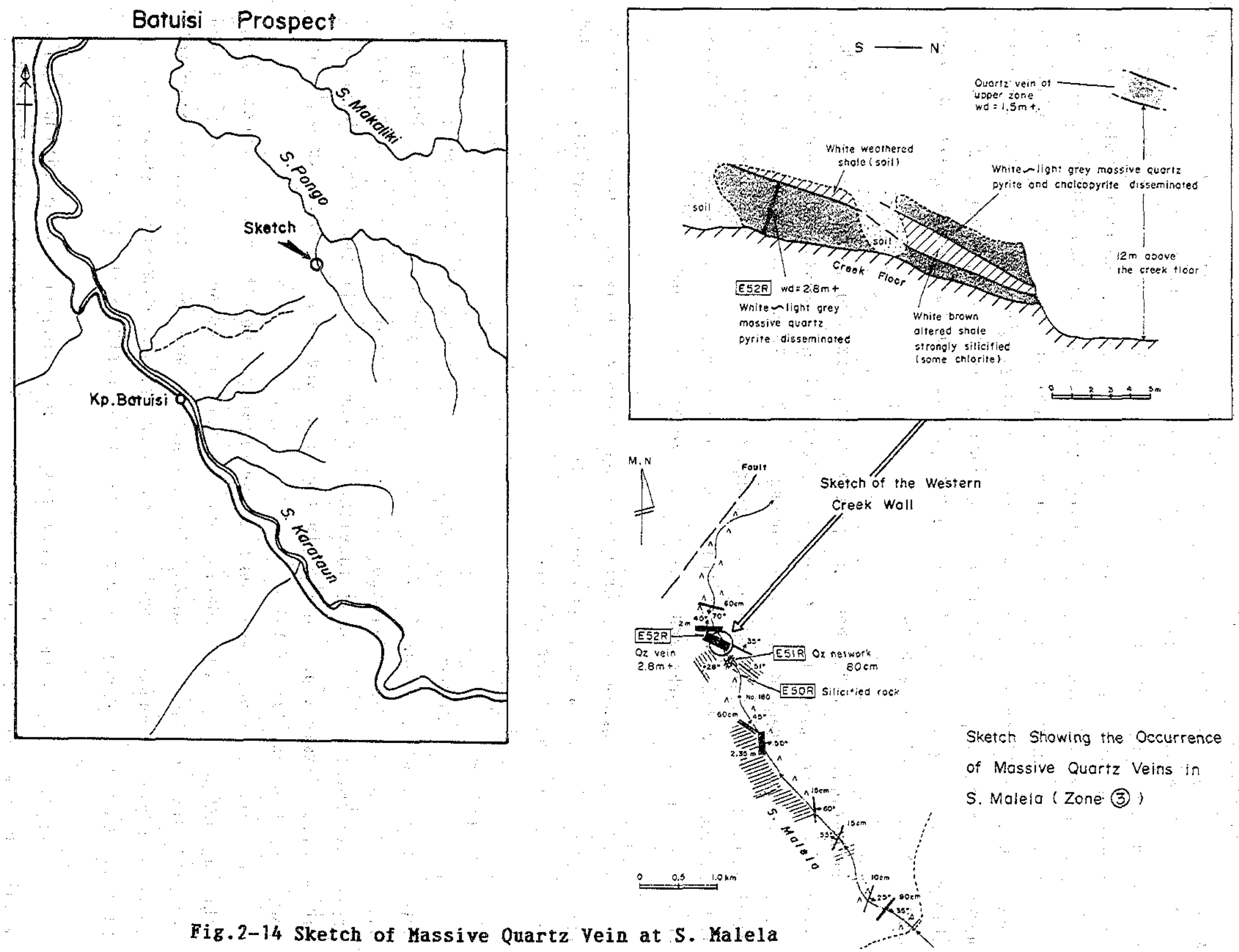


Fig.2-14 Sketch of Massive Quartz Vein at S. Malela

The S. Malela mineralized zone occurs at the other side of the dividing ridge in the northeastern part of the Batuisi prospect. Quartz veins were found at 10 localities along S. Malela (a branch creek of S. Pongo). Veins are hosted by bluish grey shale and dolerite. Trend of veins changes variously. One of the representative veins for example, which was found just below the old Bobokan place, is a massive and about 5 m thick (Fig.2-14). It has N70°W strike and 35°N dip. A small amount of sulphide minerals -- pyrite, chalcopyrite, sphalerite, covelline -- is disseminated in quartz. Gold has yet been detected under the microscope. Silicification, chloritization, and pyritization were observed in the wallrocks. A small amount of calcite and pyrophyllite was also detected in the alteration zone.

Indications of gold bearing quartz mineralization were found at other localities in the prospect. At several places along S. Mate, gold and sulphide minerals were detected in pan concentrates. Those are situated at the northwestern extension of the middle reaches of S. Tarawa mineralized zone. In the southeastern extension of this zone at the upper reaches of S. Beranak, quartz veinlets/networks and quartz float zones were found.

Total of 12 samples of quartz veins and quartz floats was collected for ore assay within the Batuisi prospect. The results were disappointing. No significant gold value was returned.

(3) Other prospects

During the regional survey, gold and heavy mineral concentrations were detected by panning along S. Petagunan and its tributaries. Distribution of quartz floats was also observed. At the upper reaches of S. Taroto, strong pyrite dissemination was found in altered dolerite of the Latimojong Formation. Old alluvial diggings are located in the area, and quartz and/or limonite float zone spread nearby (Fig.2-15).

Quartz float zones were found in many places along the middle reaches of S. Lebutang and S. Lelating. Geology of the area is composed of black shale and andesite lava of the Latimojong Formation. Floats of vein quartz sometimes contain a small amount of pyrite, arsenopyrite, chalcopyrite, sphalerite, and galena. Chlorite and calcite were observed in quartz as gangue minerals.

8 samples consisting of quartz floats were collected from various places within the regional survey area. The assay results showed no significant value of both gold and basemetals.

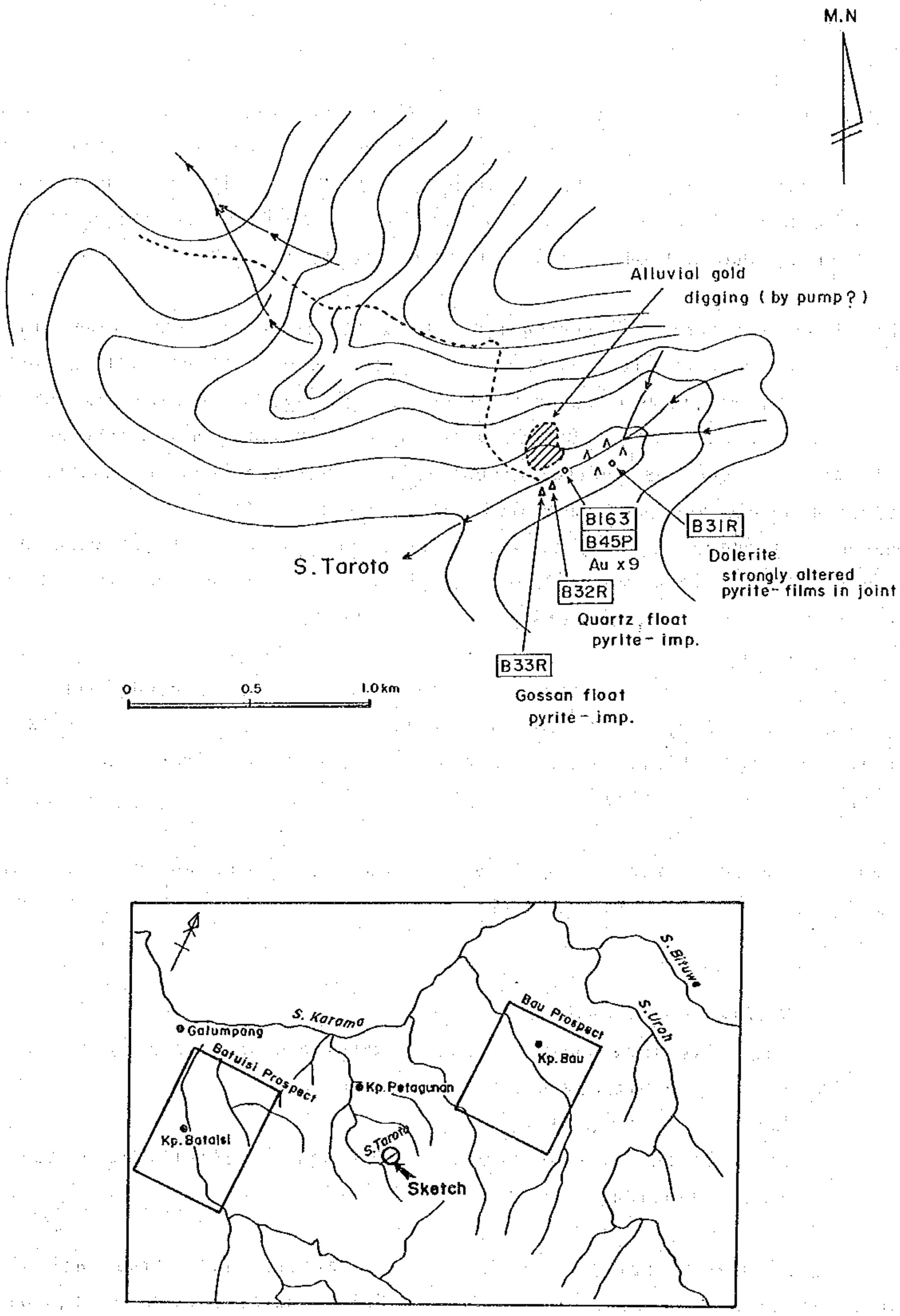


Fig.2-15 Outline of Mineralization at S. Taroto

2-7 Discussions

Indications of primary gold mineralization were caught at several localities in the northwestern part of the survey area, and semi-detailed survey was carried out in two prospects -- Bau and Batuisi. The indications which show primary gold mineralization are ; ① occurrence of gold in pan concentrates, ② distribution of quartz floats, and ③ outcrops of quartz veins.

In those prospects, distribution of gold, cinnabar, and some sulphide minerals in pan concentrates are closely related to each other forming "panning anomalies". Distribution of quartz veins and quartz floats overlaps on those anomalies in a broad scale. Quartz veins generally contain a small amount of sulphide minerals such as pyrite, arsenopyrite, chalcopyrite, and galena. Gold and silver minerals have not been observed in quartz so far.

Based on those evidences, it was assumed that the gold in pan concentrates might come from quartz veins/networks intensively developed at the upper reaches of creeks in the prospects.

31 samples of quartz veins and quartz floats were collected from all over the prospects and provided for assaying this time. The results were disappointing. Almost all samples showed very low gold values. Assay has not proven the origin of gold yet.

Characteristic features of gold mineralization in the northwestern part of the survey area -- Bau, Batuisi, and S. Taroto -- are briefly summarized as follows:

① Metasediments hosted.
② Intensive development of rather massive quartz veins.
③ Associated with sulphide minerals.
④ Lack of silver mineral.
⑤ Hydrothermal alteration mainly composed of silicification and chloritization.

Many gold mineralizations are known in Sulawesi. But almost all of them are volcanic-hosted (Carlile et al.,1990). Gold mineralization in this area is exceptional in that it is hosted by metasediments and dolerite of probably Cretaceous age. The prospects are located north of the Mamasa granite. It is spatially situated around the fringe part of the batholith. Emplacement of granite is inferred to be late Miocene. Intrusions of small stocks and dykes of granitic rocks occur in the prospects. However, any evidence genetically relating mineralization to igneous activities has not been found so far.

Quartz veins sometimes contain a small amount of sulphide minerals in every prospects. Primary sulphide minerals observed under the microscope are ; pyrite, arsenopyrite, chalcopyrite, sphalerite, and galena. Occurrence of sulphides in quartz vein is generally common in epithermal gold deposits. From the chemical aspect of mineralization, a distinctive feature of this area is lack of silver mineral in sulphide association. Silver content in ore is generally low.

Hydrothermal alteration mainly composed of silicification, pyritization, and chloritization occur in gangue minerals and wallrocks. Neither argillic alteration accompanying with quartz-adularia vein, nor advanced argillic alteration comprizing alunite-kaolinite-pyrophyllite assemblage resulting from acidic condition has been found in the prospects.

Considering these features, primary gold mineralization in the prospects may not fit with the category of standard epithermal gold mineralization. Mesothermal is probably the most suitable type for the chemical character of the mineralization. Those unique features of mineralization should be further studied together with geochemical characteristics in the future work.

Gold bearing quarzt veins／networks were preliminary grouped as three mineralized zones trending NW in the Batuisi prospect. Individual vein, however, varies in its strike dirction as was explained in the previous section. It could be defined as an aggregate of veins arranged en echelon of NNW trend, though overall arrangement of the zones tends to be NW direction. A couple of quartz float zones was found outside of the Batuisi prospect. Indications of gold mineralization in panning prospecting also came out at the surrounding areas. Some of them lie at the extensions of known minerilized zones. Entire structure will be drawn out when geochemical analysis is completed. The extent of mineralized zones could be somehow regional.

Prominent direction of vein systems in both Bau and Batuisi prospects is NW to NNW. As is already discussed in the photogeological interpretation, the inferred principal direction produced by the emplacement of granite batholith is NNE to N-S. Anticlinorium recognized in the northwestern part of the survey area is probably the product of granite intrusion. Local fold structures also show similar trend. Whereas fissure patterns of quartz veins are different from the above structure. Evidences connecting the formation of veins with granite intrusion are not known. Thus the source and mechanism of the formation of these veins is, at present, not clear.

Chapter 3 Geochemical Exploration

3-1 Regional Geochemical Exploration

(1) Sampling and chemical analysis

Regional geochemical exploration by means of stream sediment sampling was carried out for the purpose of defining hidden mineralized zones which would otherwise be undetected by geological survey, as well as for clarifying the extension of mineral occurrences known through the geological survey.

Fine sand samples of -80 mesh were collected from sediments in major channels and some of the bigger tributaries. The number of samples collected was more than one thousand (1,010), which corresponds to a sampling density of approximately one sample per 3 km^2. The samples, after being air-dried in the field, were analyzed at Chemex Labs Ltd. of Canada, for 10 elements; Au, Ag, As, Bi, Sb, Hg, Cu, Pb, Zn, and Ba. The analytical methods and the limits of detection are summarized in Table 2-10.

(2) Results

The data processing and analysis of the results will be explained in the report of the next phase of this project.

3-2 Semi-Detailed Geochemical Sampling

(1) Outline of sampling and chemical analysis

The semi-detailed geochemical sampling, composed of pan concentrate sampling and soil sampling, was carried out mainly in two areas; ① Bau prospect and ② Batuisi prospect. Numbers of pan concentrate samples and soil samples collected in the field amounted to 366 and 510 respectively.

Pan concentrate samples were obtained during the stream sediment sampling from trap sites in the active drainage channels mainly in the semi-detailed survey. A bucketful of sand and gravel which were about 2 liters was gathered and carefully panned out. Approximately 5 grams of concentrate was collected at every point. Number of gold grains was counted and heavy mineral composition was examined roughly in the field and carefully under the microscope in the laboratory later.

Table 2-10 Methods of Analysis and Limits of Detection for Stream Sediments

Element	Methods of Analysis	Detection Limit	Upper Limit
Au	Fire assay with AA finish	5 ppb	10 ppm
Ag	Nitric aqua regia with AA finish	0.05 ppm	0.02 %
As	Aqua regia hydride with AA finish	0.2 ppm	0.5 %
Bi	$HCl/KClO_3$ extraction with AA finish	0.2 ppm	0.5 %
Sb	ditto	0.2 ppm	0.1 %
Hg	HNO_3/HCl cold vapour with AA finish	0.1 ppm	0.5 %
Cu	Nitric aqua regia with AA finish	0.2 ppm	0.5 %
Pb	ditto	0.5 ppm	0.5 %
Zn	ditto	1 ppm	0.5 %
Ba	Total digestion with AA finish	10 ppm	1 %

※ AA means Atomic Absorption Method

Table 2-11 Methods of Analysis and Limits of Detection for Soil Samples

Element	Methods of Analysis	Detection Limit	Upper Limit
Au	Fire assay with AA finish	5 ppb	10 ppm
Ag	Nitric aqua regia with AA finish	0.05 ppm	0.02 %
As	Aqua regia hydride with AA finish	0.2 ppm	0.5 %
Bi	$HCl/KClO_3$ extraction with AA finish	0.2 ppm	0.5 %
Sb	ditto	0.2 ppm	0.1 %
Hg	HNO_3/HCl cold vapour with AA finish	0.1 ppm	0.5 %
Cu	Nitric aqua regia with AA finish	0.2 ppm	0.5 %
Pb	ditto	0.5 ppm	0.5 %
Zn	ditto	1 ppm	0.5 %
Ba	Total digestion with AA finish	10 ppm	1 %

※ AA means Atomic Absorption Method

Soil samples were collected from B-layer of residual soil at depths of 20 to 60 cm from the surface. Sampling traverses were set almost at right angles to the inferred strike direction of mineralization. Sampling intervals along the traverses were 300 m on the average. Soil samples were air-dried at the base camp, then sieved to -80 mesh. Chemical analysis was conducted at Chemex Labs for 10 elements; Au, Ag, As, Bi, Sb, Hg, Cu, Pb, Zn, and Ba. The analytical details are given in Table 2-11.

(2) Results of pan concentrate sampling

Panning prospecting was conducted not only in the semi-detailed survey but also during the regional survey. In the regional survey area, topographically important localities such as the junction of major drainage system and its tributaries were checked by pan concentrates. When gold, cinnabar, sulphide minerals, or some heavy minerals were detected in a pan concentrate, a sample of that particular pan concentrate was collected. Total amount of pan concentrate samples collected this year was 366. Among the collected samples, 209 important samples were picked up, and studied in detail microscopically.

Procedure of heavy mineral analysis

The procedure of heavy mineral analysis in the laboratory is as follows:

① Dry pan concentrate samples in the open air.

② Weigh the dried samples.

③ Magnetic mineral fractions -- high magnetic minerals (magnetite) and medium to low magnetic minerals (ilmenite and others) -- were removed by hand-magnet. Remaining non-magnetic concentrate fractions (zircon, gold, cinnabar, sulphide minerals, quartz, etc.) were investigated under binocular microscope.

④ Estimate the percent abundance of mineral distribution for each fractions and count the number of gold grains under binocular microscope.

⑤ Describe the shape and size of gold, cinnabar, chalcopyrite, arsenopyrite, galena, and other minerals.

⑥ Photomicrograph of the selected minerals.

The procedure is illustrated in Fig.2-16. Mineral identification is briefly summarized in Table 2-12.

Results of microscopic observation

Gold was detected in 74 pan concentrate samples under the microscope. Cinnabar, chalcopyrite, arsenopyrite, and galena were observed in 16, 12, 9, and

Fig.2-16 Flow Chart of Heavy Mineral Analysis

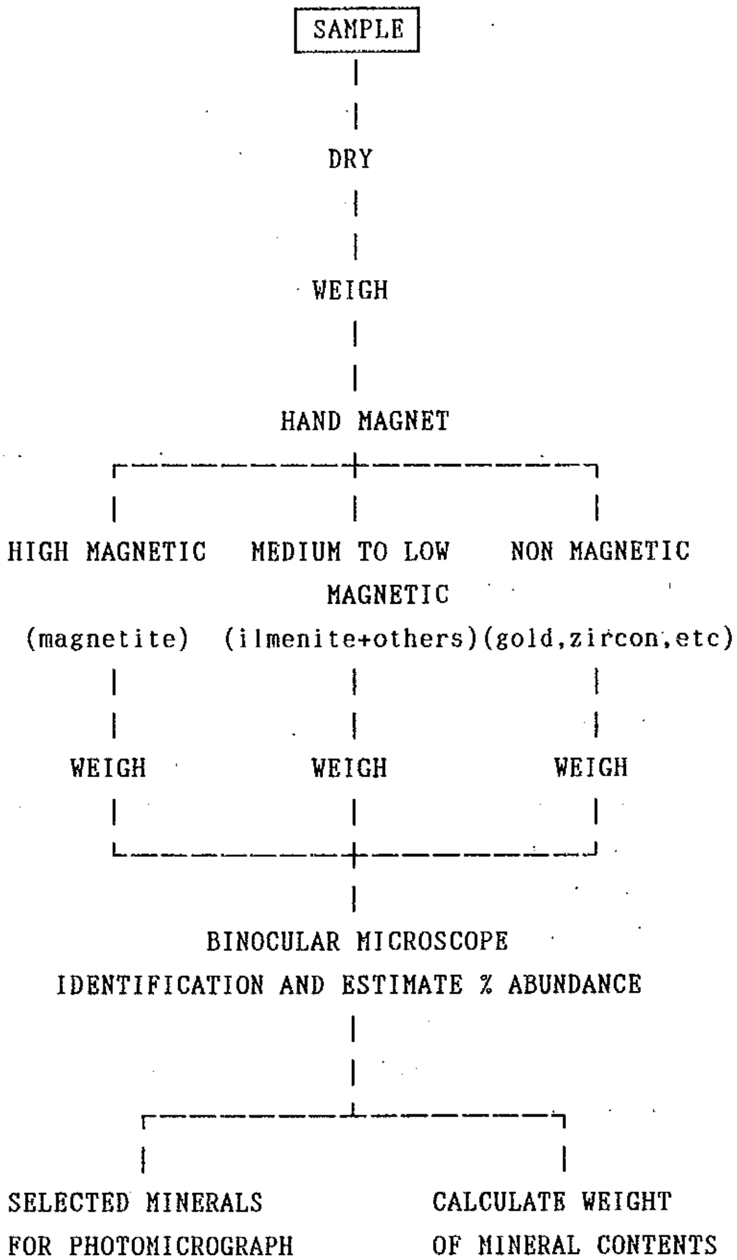


Table 2-12 Identification Table of Heavy Minerals

Mineral	Specific Features for Identification
Magnetite	Black metallic or dirty black, some grains coated by iron-oxide, sub-angular to sub-rounded, strong magnetic, to be seen chain-like, size 0.1 to 0.4 mm.
Ilmenite	Black metallic, medium to low magnetic, typical crystal to sub-rounded, size 0.1 to 0.4 mm.
Pyroxene	Green to yellowish green, transparent to translucent, typical crystal to sub-angular, size 0.1 to 0.6 mm.
Iron oxide	Dark red to reddish yellow, sub-angular to sub-rounded, size 0.1 to 0.6 mm.
Epidote	Dark yellow, prismatic to sub-rounded, high reflectivity, size 0.1 to 0.8 mm.
Amphibole	Black sub-metallic, typical crystal to sub-angular, size 0.1 to 0.8 mm.
Biotite	Brown to dark brown, candle shape or platy, hexagonal, size 0.1 to 0.6 mm.
Garnet	Yellow, pink, or reddish brown, very brilliant, transparent to translucent, typical crystal to sub-rounded, high reflectivity, size 0.1 to 0.8 mm.
Zircon	Rose, reddish yellow, brown, or white, very brilliant, transparent, typical crystal (needle / prismatic) to sub-rounded, high reflectivity, size 0.1 to 0.5 mm.
Barite	White milky, translucent, platy to sub-angular, soft, size 0.1 to 1.0 mm.
Corundum	Brilliant blue, transparent with zoning, high reflectivity, size around 0.3 mm.
Marcasite	Reddish brown, replacement of fossil with sulphide mineral, elongated to rounded, typical fossil shape, size 0.1 to 0.6 mm.
Pyrite	Yellow metallic, cubic crystal to sub-angular, size 0.1 to 1.0 mm.
Chalcopyrite	Yellow to bluish yellow copper metallic, sub-angular to sub-rounded, size around 0.3 mm.
Arsenopyrite	Pale yellow to white metallic, cruciform twins crystal, sub-angular, or sub-rounded, size 0.1 to 0.8 mm.
Galena	Lead grey metallic or dirty grey, cubic crystal, very good cleavage, size around 0.3 mm.

Cinnabar	Red colour, very soft, sub-angular to sub-rounded, size around 0.3 mm.
Gold	Typical gold colour, sub-angular to well-rounded, thin to solid, coarse surface to soft surface, size 50 to 500 micron. ※ Standard of gold grain size VVFC (very very fine) less than 50 micron VF (very fine) 50 to 150 micron FC (fine) 150 to 400 micron MC (medium) 400 to 500 micron CC (coarse) more than 500 micron
Rutile	Reddish brown to brown, prismatic typical crystal or sub-rounded, high reflectivity, size 0.1 to 0.6 mm.
Rock fragment	Many variety.
Quartz	Many variety.

2 samples respectively. The most common minerals are ; magnetite, ilmenite, pyroxene, amphibole, epidote, garnet, zircon, pyrite, and quartz. Other minerals such as barite, cinnabar, chalcopyrite, corundum, galena, rutile, gold, arsenopyrite, and iron-oxide minerals were observed.

Shape of minerals are mostly subangular to subrounded, with lesser amount of typical crystal of zircon, garnet, magnetite, ilmenite, and corundum.

The results of field observation and laboratory check are listed in Appendix 4.

Discussions

Three areas of intensive distribution of gold and some heavy minerals in pan concentrates were obtained ; Bau, Batuisi, and S. Lebutang and its tributaries. Distribution of gold, cinnabar, and sulphide minerals in pan concentrates appear to be closely related to each other forming "panning anomalies". Distribution of quartz veins and quartz floats roughly overlap on these anomalies. This correspondence suggests that panning prospecting could play a significant role in the regional to semi-detailed level of survey.

Origin of cinnabar in pan concentrate is debatable. There are three possibilities ; ① product of hydrothermal system associated with gold mineralization, ② associated with volcanic rocks such as andesite, and ③ precipitation from recent geothermal convection through faults. The close spatial relationship between the occurrences of cinnabar and gold in pan concentrate in a broad scale indicates the possibility of ①. Distribution of mercury in gold deposits is reported in many cases. Although the zoning patterns are specific to individual mineralizing systems, mercury concentration is present in an alteration halo of gold mineralization (Silberman & Berger, 1985). Details of the distribution behaviour of cinnabar in pan concentrates must be examined together with the results of geochemistry.

(3) Results of soil geochemistry

The data processing and analysis of the result of soil geochemistry will be explained in the report of the next phase of this project.

Chapter 4 Preliminary Works of Biogeochemistry and Mercury Gas Geochemistry

4-1 Plant Leaf Sampling

(1) Sampling and analysis

Test sampling of plant leaves for biogeochemistry was carried out in the Batuisi prospect. A sampling line, extending approximately east-west about 2 km long, was set crosscutting the major quartz vein in zone ① at the middle reaches of S. Tarawa. Mercury gas mesurements were also undertaken along this survey line.

Samples were collected from ten locations, positioned within a radius of twenty meters from the soil sampled holes. Four out of ten locations were set very close to the vein (within 50 m), two moderately close to the vein (100 to 150 m), and remaining four locations far from the vein (700 to 900 m). Location map of samples is shown in Fig. 2-17.

6 kinds of grass leaves were collected this time. Two belong to a fernery order -- Kadak and Potok. One is a cogan grass -- Tille. The other three are herbs -- Reubombo, Lito, and Tilutilu. Plant names used here are local Indonesian names. Scientific names are cited in the sample list.

Photographs of leaves were taken on the place. Botanical specimen were also collected in the field. Scientific name was checked by a botanist from the Technical Institute of Bandung. Details of samples are explained in Table 2-14.

Stems and stalks were taken off. Only leaves were selected, washed by river water and dried under the sun. Dried leaves of about 100 grams were sent to Chemex Labs for analysis. 7 elements were analyzed; Au, As, Sb, Cu, Pb, Zn, and Ba. The analytical methods and the limits of detection are shown in Table 2-13.

(2) Results

Results of chemical analysis are listed in the Appendices. The data processing and analysis of the results will be explained in the report of the next phase.

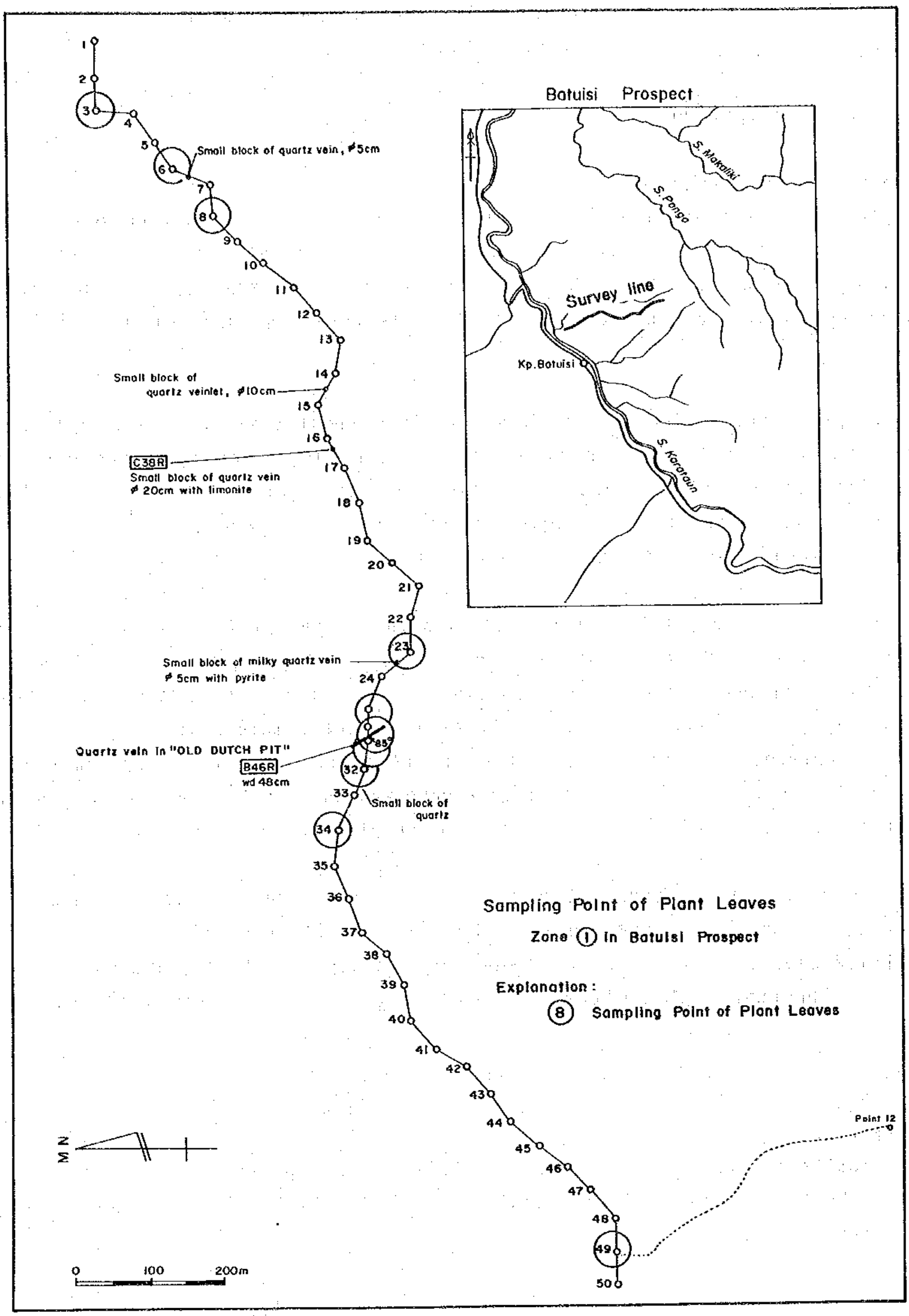


Fig.2-17 Location Map of Plant Leaf Samples

Table 2-13 Methods of Analysis and Limits of Detection for Plant Leaves

Element	Methods of Analysis	Detection Limit	Upper Limit
Au	Fire assay with NAA finish	0.2 ppb	1 ppm
As	Aqua regia hydride with NAA finish	10 ppb	0.01 %
Sb	$HCl/KClO_3$ extraction with NAA finish	5 ppb	0.01 %
Cu	Nitric aqua regia with AA finish	1 ppm	1 %
Pb	ditto	1 ppm	1 %
Zn	ditto	1 ppm	1 %
Ba	Total digestion with AA finish	10 ppm	1 %

※ NAA means Neutron Activation Analysis
AA means Atomic Absorption Method

Table 2-14 Sample List of Plant Leaves

Sample No.	Name of Samples
3-①	
25-①	ln:Reubombo
28-①	sn:Asteraceae
30-①	*eupatorium inulifolium*
32-①	
34-①	
3-②	
6-②	
8-②	
23-②	ln:Tille
25-②	sn:Poaceae
28-②	imperata cylindrica
30-②	
32-②	
34-②	
49-②	
3-③	
6-③	
8-③	
23-③	*ln:Kadak*
25-③	sn:Dovalliaceae
28-③	nephiolepis sp.
30-③	
32-③	
34-③	
49-③	
6-④	
8-④	ln:Potok
23-④	sn:Polypodiaceae
49-④	*dryopteris sp.*
3-⑤	
6-⑤	
8-⑤	
23-⑤	ln:Lito
25-⑤	sn:Schizaeaceae
28-⑤	lygodium palmatum
30-⑤	
32-⑤	
34-⑤	
49-⑤	
3-⑥	
6-⑥	
8-⑥	
23-⑥	ln:Tilutilu
25-⑥	sn:Taecaceae
28-⑥	*tacea pulmata*
30-⑥	
32-⑥	
34-⑥	
49-⑥	

※1 ln=local name, sn=scientific name

※2 The first two digits of sample number show the hole number. The last digit (①~⑥) shows the kind of plant.

4-2 Mercury Gas Geochemistry

(1) Measuring method

Mercury content in gas from soil were measured using portable-type mercury analyser. The instrument adopted was the Mercury Sniffer model PM-1A of Nippon Instruments Corp. The methodology is gold amalgamation : Mercury in soil gas is caught as a gold-amalgum in a ceramics-based collector. The mercury atoms are released through thermal decomposition. Mercury content is, then measured by cold vapour atomic absorption double beam photometer. Detection limit is 0.01 nanograms. Upper limit is 100 nanograms.

Holes of 45 mm in diameter and 50 cm deep were dug using hand auger. PVC tube was then inserted to the depth of about 40 cm. Mouth of the hole was sealed.

Gas of 1.2 liters in soil was sucked out from hole, and analyzed at the point. Fifty measurements were made. The sample line tested for mercury mesurements was running roughly east-west about 2 km long, and crosscutting to the major quartz vein in the zone ① in the Batuisi prospect (same line as plant leaf sampling). The average interval of the holes was 50 m along the line. While in the vicinity of the vein (within 35 m radius), holes were dug much closer -- about 10 m apart from each other. Map of the mercury gas mesurements is shown in Fig.2-18.

(2) Results

Results of mercury contents in the soil gas are listed in Table 2-15. The data processing and analysis of the results will be explained in the report of the next phase.

Table 2-15 Results of Mercury Gas Measurements in the Zone ①, Batuisi Prospect

No.	Hole No.	Hg-cont (nanogr)	Remarks	No.	Hole No.	Hg-cont (nanogr)	Remarks
1	C73S	0.10	Eastern end	26	C98S	0.05	Close to vein
2	C74S	0.08		27	C99S	0.04	Close to vein
3	C75S	0.08		28	C50S	0.09	Close to vein
4	C76S	0.07		29	C51S	0.09	Close to vein
5	C77S	0.07		30	C52S	0.12	Close to vein
6	C78S	0.07		31	C53S	0.15	Close to vein
7	C79S	0.07		32	C54S	0.09	Close to vein
8	C80S	0.05		33	C55S	0.08	
9	C81S	0.06		34	C56S	0.08	
10	C82S	0.05		35	C57S	0.08	
11	C83S	0.06		36	C58S	0.08	
12	C84S	0.05		37	C59S	0.08	
13	C85S	0.04		38	C60S	0.08	
14	C86S	0.05		39	C61S	0.07	
15	C87S	0.04		40	C62S	0.07	
16	C88S	0.03		41	C63S	0.07	
17	C89S	0.05		42	C64S	0.06	
18	C90S	0.04		43	C65S	0.08	
19	C91S	0.05		44	C66S	0.04	
20	C92S	0.04		45	C67S	0.06	
21	C93S	0.05		46	C68S	0.04	
22	C94S	0.04		47	C69S	0.04	
23	C95S	0.03		48	C70S	0.02	
24	C96S	0.04		49	C71S	0.04	
25	C97S	0.04	Close to vein	50	C72S	0.03	Western end

※ Eight holes (C97S~C54S) are arranged ten meters apart. The other holes are arranged approximately fifty meters apart.

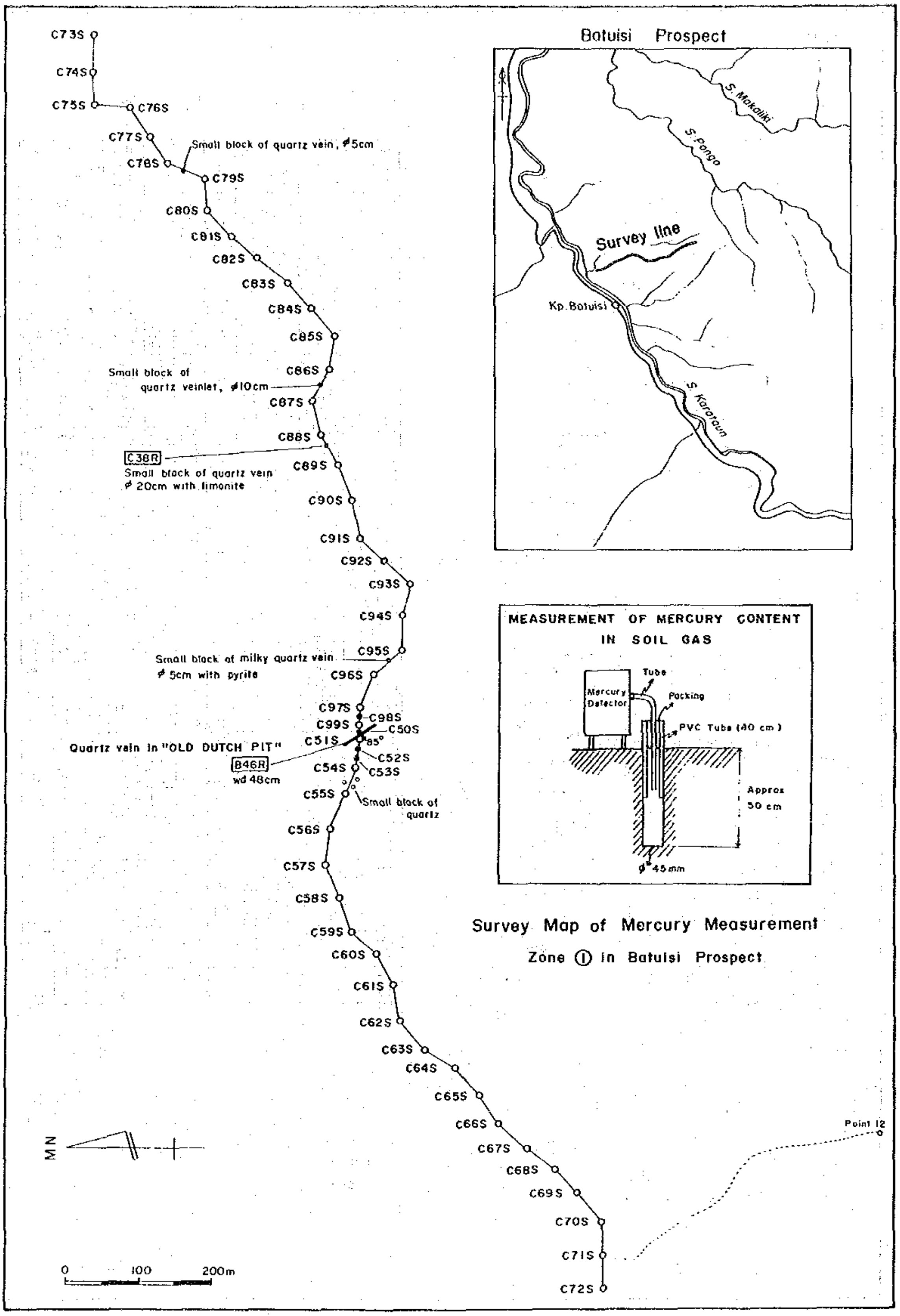
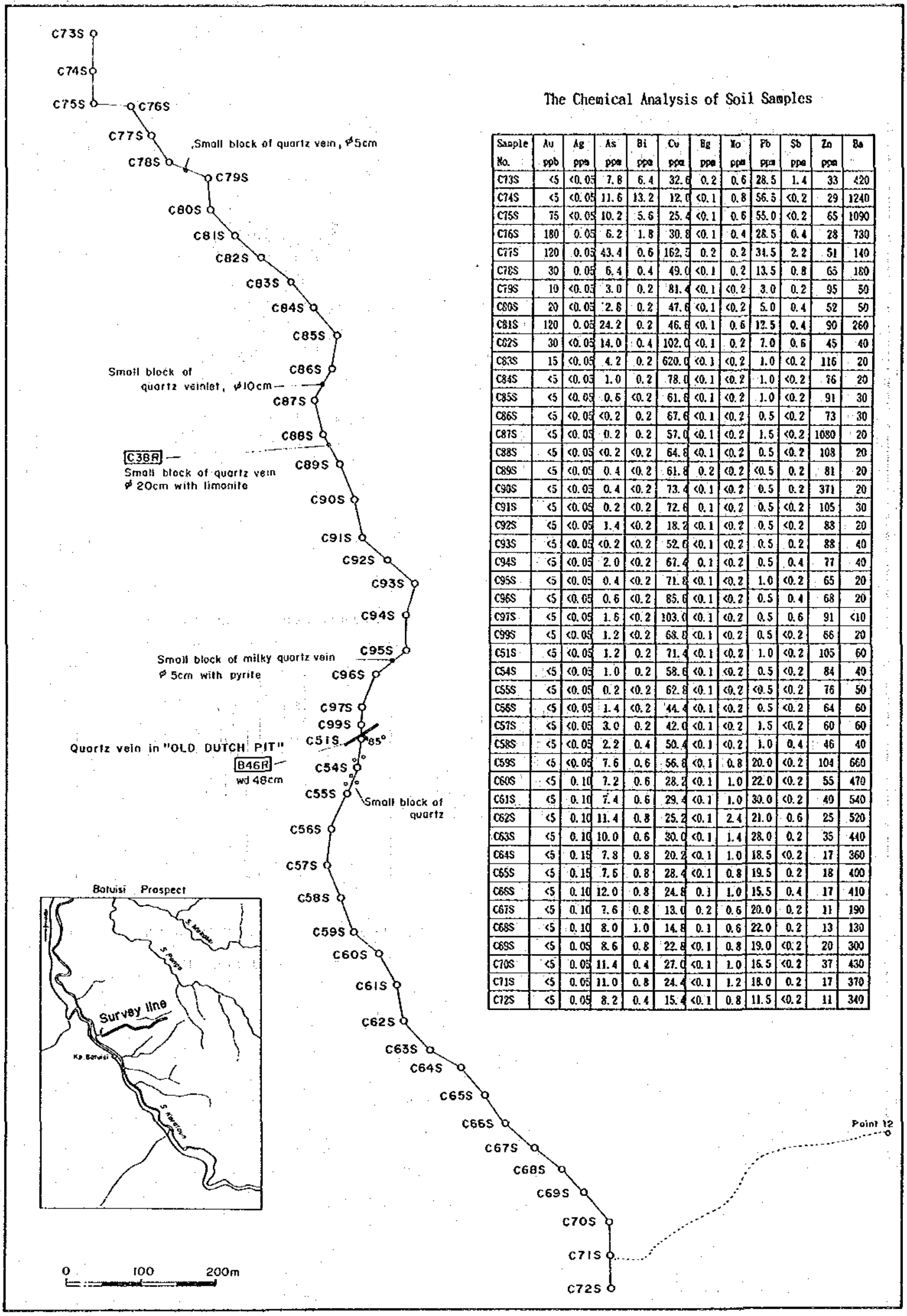


Fig.2-18 Location Map of Mercury Gase Mesurements



The Chemical Analysis of Soil Samples

Sample No.	Au ppb	Ag ppm	As ppm	Bi ppm	Cu ppm	Hg ppm	Mo ppm	Pb ppm	Sb ppm	Zn ppm	Ba
C73S	<5	<0.05	7.8	6.4	32.6	0.2	0.6	28.5	1.4	33	420
C74S	<5	<0.05	11.6	13.2	12.0	<0.1	0.8	56.5	<0.2	29	1240
C75S	75	<0.05	10.2	5.6	25.4	<0.1	0.6	55.0	<0.2	65	1090
C76S	180	0.05	6.2	1.8	30.8	<0.1	0.4	28.5	0.4	28	730
C77S	120	0.05	43.4	0.6	162.5	0.2	0.2	34.5	2.2	51	140
C78S	30	0.05	6.4	0.4	49.0	<0.1	0.2	13.5	0.8	65	160
C79S	10	<0.05	3.0	0.2	81.4	<0.1	<0.2	3.0	0.2	95	50
C80S	20	<0.05	2.8	0.2	47.6	<0.1	<0.2	5.0	0.4	52	50
C81S	120	0.05	24.2	0.2	46.6	<0.1	0.6	12.5	0.4	90	260
C82S	30	<0.05	14.0	0.4	102.0	<0.1	0.2	7.0	0.6	45	40
C83S	15	<0.05	4.2	0.2	620.0	<0.1	<0.2	1.0	<0.2	116	20
C84S	<5	<0.05	1.0	0.2	78.0	<0.1	<0.2	1.0	<0.2	76	20
C85S	<5	<0.05	0.6	<0.2	61.6	<0.1	<0.2	1.0	<0.2	91	30
C86S	<5	<0.05	<0.2	0.2	67.6	<0.1	<0.2	0.5	<0.2	73	30
C87S	<5	<0.05	0.2	0.2	57.0	<0.1	<0.2	1.5	<0.2	1080	20
C88S	<5	<0.05	<0.2	<0.2	64.8	<0.1	<0.2	0.5	<0.2	108	20
C89S	<5	<0.05	0.4	<0.2	61.8	0.2	<0.2	<0.5	0.2	81	20
C90S	<5	<0.05	0.4	<0.2	73.4	<0.1	<0.2	0.5	0.2	371	20
C91S	<5	<0.05	0.2	<0.2	72.6	0.1	<0.2	0.5	<0.2	105	30
C92S	<5	<0.05	1.4	<0.2	18.2	<0.1	<0.2	0.5	<0.2	88	20
C93S	<5	<0.05	<0.2	<0.2	52.6	<0.1	<0.2	0.5	0.2	88	40
C94S	<5	<0.05	2.0	<0.2	67.4	0.1	<0.2	0.5	0.4	77	40
C95S	<5	<0.05	0.4	<0.2	71.8	<0.1	<0.2	1.0	<0.2	65	20
C96S	<5	<0.05	0.6	<0.2	85.6	<0.1	<0.2	0.5	0.4	68	20
C97S	<5	<0.05	1.6	<0.2	103.0	<0.1	<0.2	0.5	0.6	91	<10
C99S	<5	<0.05	1.2	<0.2	68.8	<0.1	<0.2	0.5	<0.2	66	20
C51S	<5	<0.05	1.2	0.2	71.4	<0.1	<0.2	1.0	<0.2	105	60
C54S	<5	<0.05	1.0	0.2	58.6	<0.1	<0.2	0.5	<0.2	84	40
C55S	<5	<0.05	0.2	<0.2	62.8	<0.1	<0.2	<0.5	<0.2	76	50
C56S	<5	<0.05	1.4	<0.2	44.4	<0.1	<0.2	0.5	<0.2	64	60
C57S	<5	<0.05	3.0	0.2	42.0	<0.1	<0.2	1.5	<0.2	60	60
C58S	<5	<0.05	2.2	0.4	50.4	<0.1	<0.2	1.0	0.4	46	40
C59S	<5	<0.05	7.6	0.6	56.8	<0.1	0.8	20.0	<0.2	104	660
C60S	<5	0.10	7.2	0.6	28.2	<0.1	1.0	22.0	<0.2	55	470
C61S	<5	0.10	7.4	0.6	29.4	<0.1	1.0	30.0	<0.2	40	540
C62S	<5	0.10	11.4	0.8	25.2	<0.1	2.4	21.0	0.6	25	520
C63S	<5	0.10	10.0	0.6	30.0	<0.1	1.4	28.0	0.2	35	440
C64S	<5	0.15	7.8	0.8	20.2	<0.1	1.0	18.5	<0.2	17	360
C65S	<5	0.15	7.6	0.8	28.4	<0.1	0.8	19.5	0.2	18	400
C66S	<5	0.10	12.0	0.8	24.8	0.1	1.0	15.5	0.4	17	410
C67S	<5	0.10	7.6	0.8	13.0	0.2	0.6	20.0	0.2	11	190
C68S	<5	0.10	8.0	1.0	14.8	0.1	0.6	22.0	0.2	13	130
C69S	<5	0.05	8.6	0.8	22.8	<0.1	0.8	19.0	<0.2	20	300
C70S	<5	0.05	11.4	0.4	27.0	<0.1	1.0	16.5	<0.2	37	430
C71S	<5	0.05	11.0	0.8	24.4	<0.1	1.2	18.0	0.2	17	370
C72S	<5	0.05	8.2	0.4	15.4	<0.1	0.8	11.5	<0.2	11	340

Fig.2-19 Location Map of Soil Samples at the Hill Northwest of S. Tarawa.

PART Ⅲ CONCLUSIONS AND RECOMMENDATIONS

PART III CONCLUSIONS AND RECOMMENDATIONS

Chapter 1 Conclusions

The first phase exploration in the Toraja area consisted of satellite imergery photogeological interpretation, regional geological and geochemical survey, semi-detailed geological and geochemical survey, and preliminary works for plant leaf biogeochemistry and mercury gas geochemistry. Because of the limited time of the first phase, interpretations and discussions have been made only for photogeology, geology, and mineralization of the survey area. Results of geochemistry will be discussed in the report of the next phase.

Prior to the survey, three potential mineralizations in the survey area were picked up. Those were ; primary gold mineraization, massive sulphide mineralization, and porphyry copper-gold mineralization.

In the course of the regional survey, no positive indication of the latter two mineralizations has been found. Consequently they were eliminated from the target for exploration.

Indications of primary gold mineralization were caught at several places in the northwestern part of the survey area, and semi-detailed geological survey and geochemical sampling were carried out in two prospects -- Bau and Batuisi. The indications which show primary gold mineralization are ; ① occurrence of gold in pan concentrates, ② distribution of floats of vein quartz, and ③ outcrops of quartz veins.

In those prospects, distributions of gold, cinnabar, and some sulphide minerals (such as chalcopyrite, arsenopyrite, and galena) in pan concentrates are closely related to each other forming "panning anomalies". Distribution of quartz veins and quartz floats overlaps on those anomalies in a broad scale.

Quartz veins generally contain a small amount of sulphide minerals. Pyrite, arsenopyrite, chalcopyrite, sphalerite, and galena were observed as primary minerals under the microscope. Gold and silver minerals have not been found in quartz so far.

Based on those evidences, it was assumed that the source of gold in pan concentrates might be quartz veins/networks intensively developed at the upper reaches of creeks in the prospects.

31 samples of quartz veins and quartz floats were collected from all over

the survey area and provided for assaying this time. The results were disappointing. Almost all samples showed very low gold values. Assay has not proven the origin of gold yet.

Petrography, ore microscopy and X-ray diffraction analysis showed several characteristic features of mineralization in this area ; ① metasediments hosted, ② intensive development of massive quartz veins, ③ associated with sulphide minerals, ④ lack of silver mineral, and ⑤ hydrothermal alteration mainly composed of silicification and chloritization. These features suggest that the gold mineralization in this area may be different from the typical epithermal gold mineralization.

Fissure patterns of quartz veins show the dominant NNW trend in both Bau and Batuisi prospects. It was interpreted as an aggregate of veins arranged en echelon of NNW trend, though overall arrangement of the zones tended to be NW direction in the Batuisi prospect.

Photogeological analysis using satellite imergery showed that the principal direction produced by the emplacement of the Mamasa granite might be NNE to N-S in the northwestern area. Anticlinorium recognized through the geological survey has an axis of N-S direction, and was interpreted to be the product of the granite intrusion. Whereas the patterns of quartz veins are different from the above structure. Any evidence genetically connecting the vein formation with the emplacement of granite bodies has not been found so far. Mechanism of vein formation is one of the important theme to be investigated in the next stage work.

Anyhow at this stage, the source of gold in pan concentrates has not been identified. It is supposed that gold could be contained either in the quartz veins/networks or in the alteration zones adjacent to veins. Samples collected in the prospects this time were limited. Only small part was tested. It is not sufficient for finding and delineating ore zone, compared to the extensive development of quartz veins/networks in the prospects. Much detailed and minute sampling is required for identifing primary gold mineralization. The next phase exploration must be aimed at finding primary gold mineralization and delineating the distribution of ore within the areas of extensive quartz veinning.

As the results of the regional and semi-detailed survey in the first phase exploration, northwestern area of approximately 150 km^2 including both Bau and Batuisi prospects is selected for the next stage exploration.

The data processing and statistical analysis of the geochemical survey will be made in the succeeding period. It is expected to reveal the figure of geochemical structure of gold mineralization in the prospects.

Sampling of plant leaves for the application test of plant leaf biogeochemistry was made in the Batuisi prospect. Measurement of mercury content of soil gas in the soil sampled holes was also conducted along the same line of biogeochemical sampling. The results will be discussed in the next phase report.

Chapter 2 Recommendations for the Second Phase

As the results of this year's survey, three areas have been picked up for the next phase exploration prospects. Those are ; ① Batuisi prospect, ② Bau prospect, and ③ S. Lebutang and its tributaries including S. Taroto.

① In the Batuisi prospect, central part of the intensive quartz veinning zone will be checked at first. Detailed survey mainly comprizing gridding, geological survey, and soil sampling is recommended in the prospect. Trenching will be effective for prospecting the nature of primary gold mineraization.

② In the Bau prospect, detailed survey mainly comprizing geological survey and soil sampling is also recommended. Topographic condition must be considered in the survey programme.

③ Along S. Lebutang and its tributaries, semi-detailed level of survey consisting of geological survey, pan concentrate sampling, and soil sampling is recommended. Amount and density of samples for assaying must be significant enough for identifing gold mineralization.

REFERENCES

REFERENCES

Bemmelen,R.W.van, 1949: The Geology of Indonesia, Vol.IA, General Geology, Govn.Printing Office, The Hague, 732pp.

Carlile,J.C., Digdowirogo,S., and Darius,K., 1990, Geological setting, characteristics and regional exploration for gold in the volcanic arcs of North Sulawesi, Indonesia: Jour.Geochem.Expl., v.35, 105-140.

Djumhani, 1981, Metallic mineral deposits of Indonesia, A metallogenic approach: Report of Geological Survey of Japan, n.261, 107-124.

Hamilton,W., 1979, Tectonics of the Indonesian region: U.S.Geol.Surv., Prof.Pap., 1078, 345pp.

Ichihara,S., Yaya,S., and Koswara,Y., 1979: Survey Report on Sangkaropi and Rumanga Ore Deposits, Tana Toraja, Sulawesi (unpublished), 17pp.

Katili,J.A., 1978, Past and present geotectonic position of Sulawesi, Indonesia: Tectonophysics, v.45, 289-322.

Lowder,G.G., and Dow,J.A.S., 1978, Geology and exploration of porphyry copper deposits in North Sulawesi, Indonesia: Econ.Geol., v.73, 628-644.

Priadi,B., et al., 1991, Tertiary and Quaternary magmatism in central Sulawesi: Chronological and petrologic constraints: The proceedings of the Silver Jubilee Symposium, Yogyakarta, Sept., 1991.

Sato,K., and Ishihara,S., 1983, Chemical composition and magnetic susceptibility of the Kofu granitic complex: Bull.Geol.Surv.Japan, v.34, 413-427.

Silberman,M.L., and Berger,B.R.,1985, Relationship of trace-element patterns to alteration and morphology in epithermal precious-metal deposits: Geology and Geochemistry of Epithermal Systems, Reviews in Economic Geology, v.2, 203-232.

Sukamto,R., 1975: Geological map of Indonesia, Sheet VIII, Ujung Pandang, scale 1:1,000,000, Geol.Surv.Indonesia.

Sukamto,R., 1978, The structure of Sulawesi in the light of plate tectonics: In Proc.3rd Region.Conf.Geol.Miner.Res.SE Asia, Jakarta, 1975, Indonesian Assoc. Geologists, 121-141.

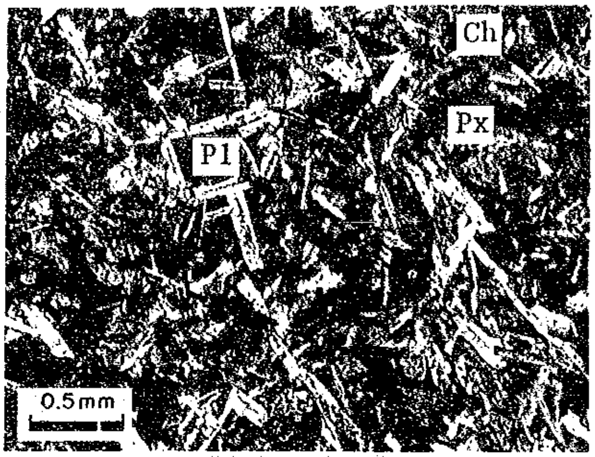
Sunarya,Y., 1989, Overview of gold exploration and exploitation in Indonesia: Geol.Indonesia., v.12, 345-357.

Tayler,D., and van Leeuwen,T., 1980, Porphyry-type deposits in Southeast Asia: Mining Geology Special Issue, n.8, 95-116.

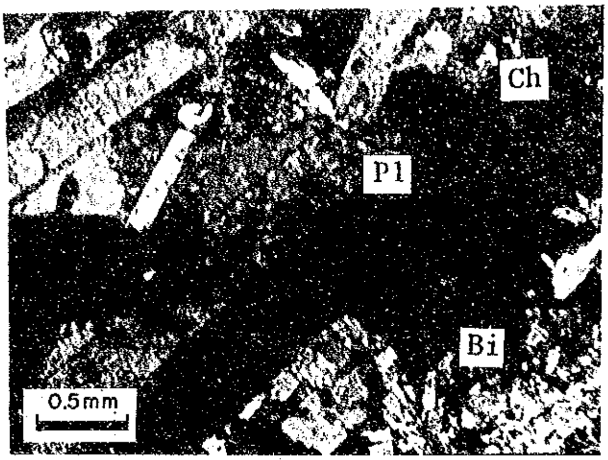
Yoshida,T., Hasbullah,C., and Ohtagaki,T., 1982, Kuroko-type deposits in Sangkaropi area, Sulawesi, Indonesia: Mining Geology, v.32, 369-377.

PHOTOGRAPHS

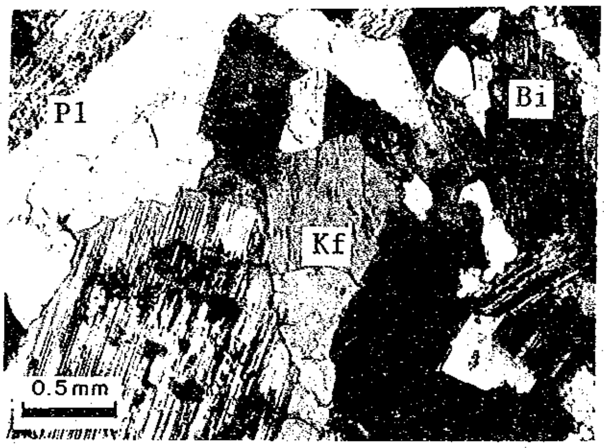
Photo. 1 Photomicrographs of Thin Sections



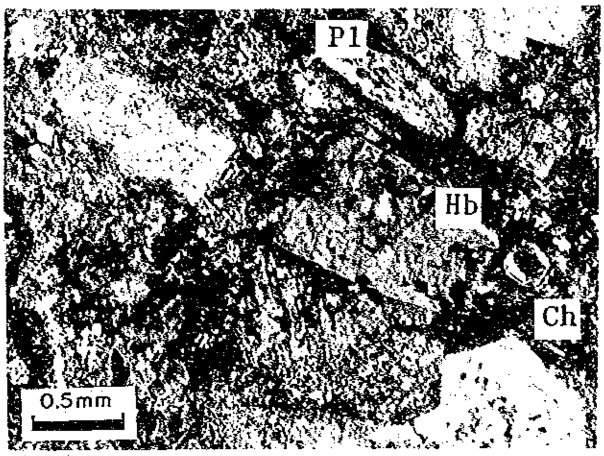
Rock Name : Dolerite (Kl)
Sample No.: B21R
Locality : S. Balimbing
(Crossed Nicol)



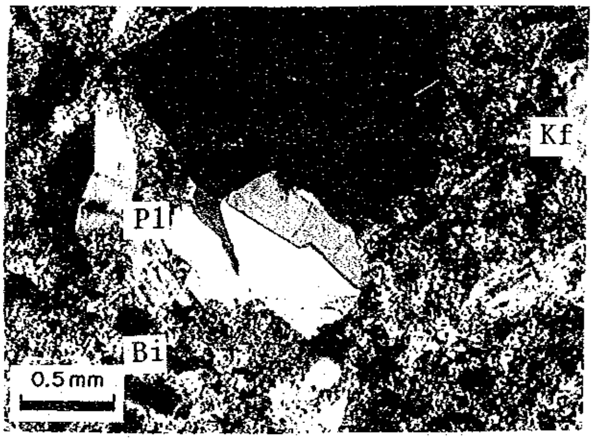
Rock Name : Diorite (Tmk)
Sample No.: C13R
Locality : S. Kakea
(Crossed Nicol)



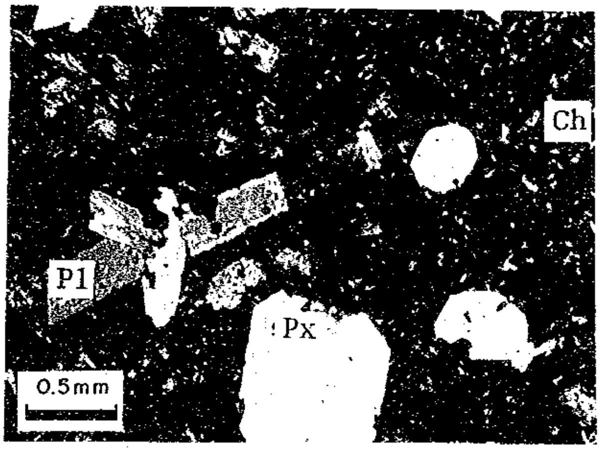
Rock Name : Quartz Monzonite (Tmg)
Sample No.: C34R
Locality : S. Karate
(Crossed Nicol)



Rock Name : Andesite (Dyke)
Sample No.: A29R
Locality : S. Karataun
(Crossed Nicol)



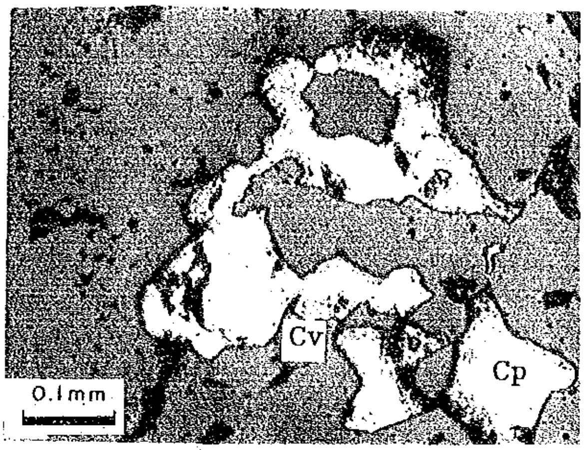
Rock Name : Dacite (Toml)
Sample No.: A3R
Locality : S. Marampa
(Crossed Nicol)



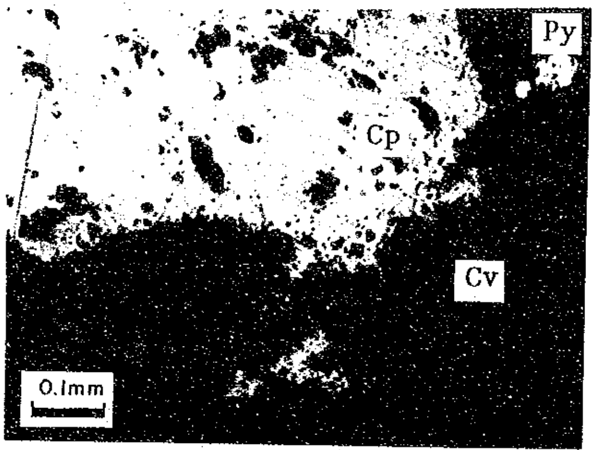
Rock Name : Andesite (Tmt)
Sample No.: D7R
Locality : S. Uroh
(Crossed Nicol)

Abbreviations: Qz;Quartz, Pl;Plagioclase, Kf;Potash Feldspar, Bi;Biotite
Hb;Hornblende, Px;Pyroxene, Ch;Chlorite,

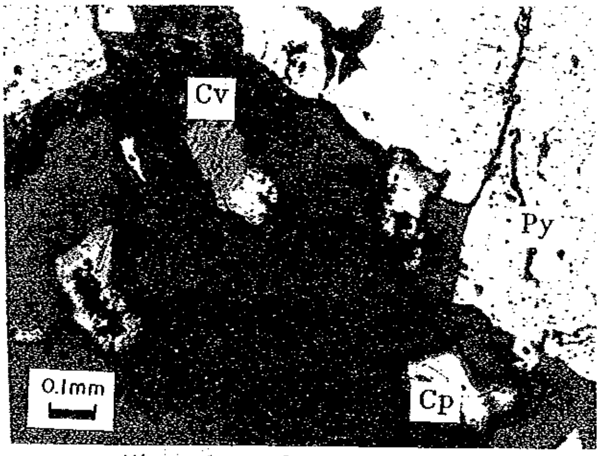
Photo. 2 Photomicrographs of Ores



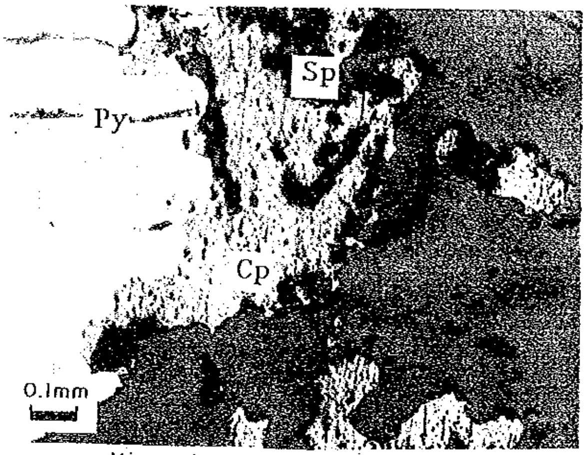
Minerals : Cp-Cv(-Py)
Sample No.: A31R
Locality : S. Tarawa
(Open Nicol)



Minerals : Cp-Cv(-Py)
Sample No.: B23R
Locality : S. Salupoling
(Open Nicol)



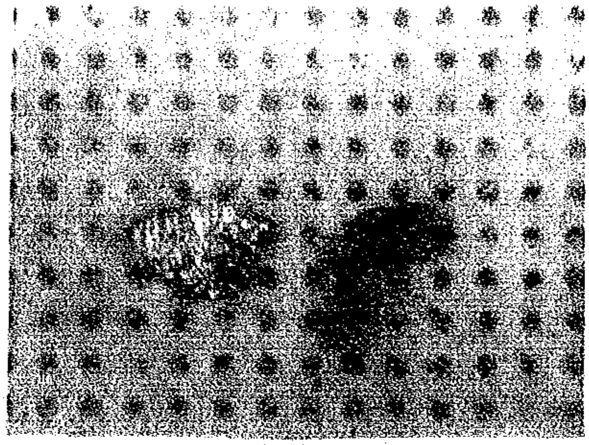
Minerals : Py-Cp-Cv
Sample No.: B46R
Locality : NW of S. Tarawa
(Open Nicol)



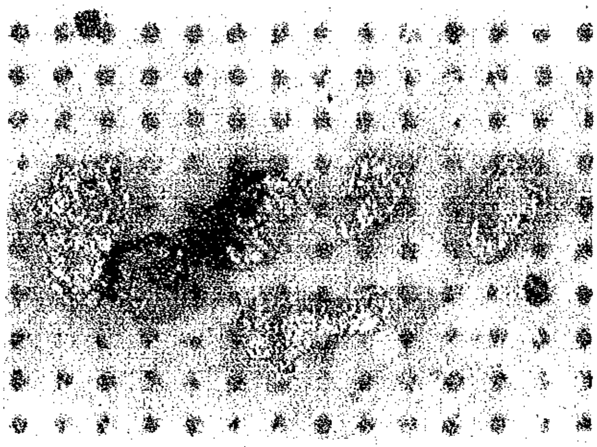
Minerals : Sp-Py(-Cp)
Sample No.: E66R
Locality : S. Malela
(Open Nicol)

Abbreviations: Py;Pyrite, Cp;Chalcopyrite, Sp;Sphalerite, Cv;Covelline

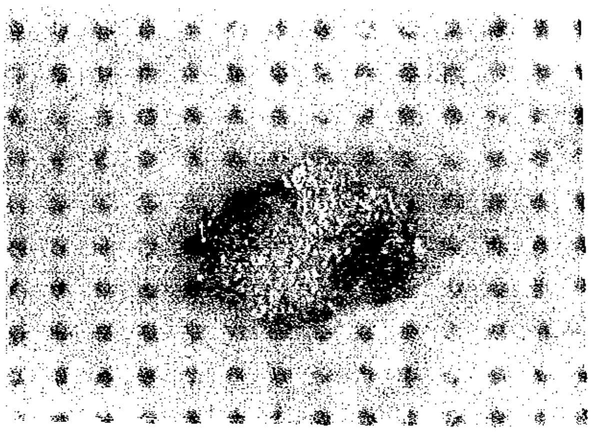
Photo. 3 Photomicrographs of Gold and Heavy Minerals



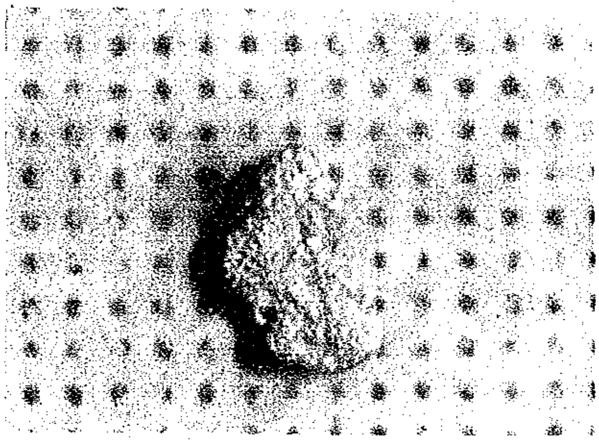
Minerals : Gold(300micron) & Iron Oxide
Sample No.: A3P
Locality : S. Karataun



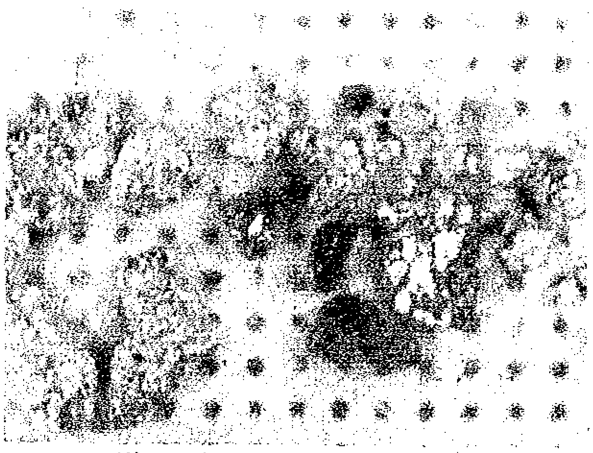
Minerals : Gold(150-400micron)
Sample No.: A5P
Locality : S. Karataun



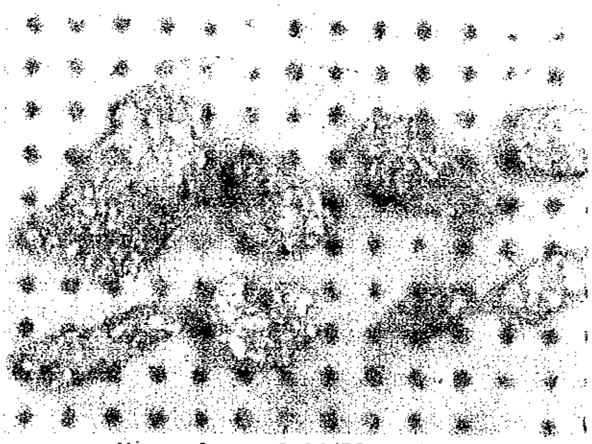
Minerals : Gold(500micron)
Sample No.: A24P
Locality : S. Bullo



Minerals : Gold(500micron)
Sample No.: B27P
Locality : S. Balimbing



Minerals : Gold(50-400mic) & Cinnabar
Sample No.: B35P
Locality : S. Lebutang



Minerals : Gold(75-500micron)
Sample No.: AP48
Locality : S. Bituwe

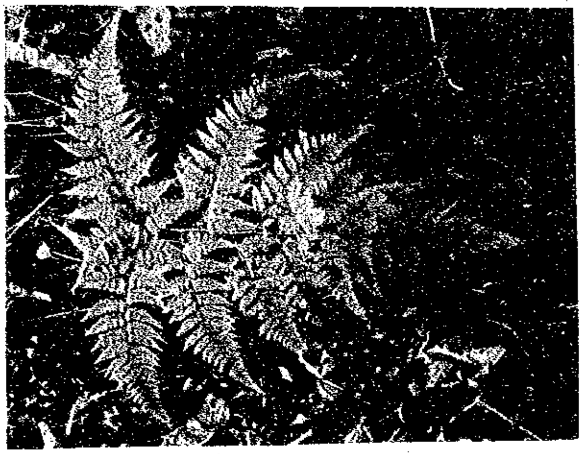
* Backing grid 100 micron

Photo. 4 Photographs of Plant Leaves

ln:Reubombo
sn:Asteraceae
eupatorium inulifolium

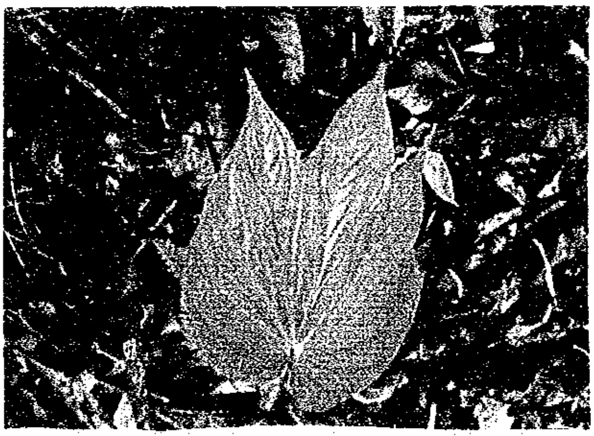
ln:Tille
sn:Poaceae
imperata cylindrica

ln:Kadak
sn:Dovalliaceae
nephiolepis sp.



ln:Potok
sn:Polypodiaceae
dryopteris sp.

ln:Lito
sn:Schizaeaceae
lygodium palmatum



ln:Tilutilu
sn:Taecaceae
tacea pulmata

※ ln=local name, sn=scientific name

APPENDICES

App.1 Results of Chemical Analysis of Stream Sediments(1/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
A001	<5	<0.05	4.2	1.0	4.6	<0.1	<0.2	19.5	0.6	47	1160
A002	<5	<0.05	4.2	1.0	4.4	<0.1	<0.2	20.0	0.8	45	1100
A003	<5	<0.05	1.8	0.4	2.6	<0.1	<0.2	18.5	<0.2	43	1220
A004	<5	<0.05	2.6	0.6	3.8	<0.1	<0.2	16.5	<0.2	43	1460
A005	<5	<0.05	2.0	0.6	4.0	<0.1	0.2	18.0	<0.2	54	1430
A006	<5	<0.05	2.6	1.0	3.8	<0.1	<0.2	16.0	0.2	44	1400
A007	<5	<0.05	3.4	1.2	4.0	<0.1	<0.2	17.5	<0.2	45	1360
A008	<5	<0.05	3.2	1.2	4.4	<0.1	<0.2	19.5	<0.2	51	1460
A009	<5	<0.05	3.2	0.4	4.2	<0.1	0.2	18.0	<0.2	53	1380
A010	<5	<0.05	2.4	0.4	3.6	<0.1	0.2	15.5	<0.2	43	1500
A011	<5	<0.05	3.6	1.8	4.2	<0.1	<0.2	17.5	0.2	49	1420
A012	<5	<0.05	2.6	0.2	4.8	<0.1	0.2	19.0	0.2	70	1320
A013	<5	<0.05	2.8	0.6	4.0	<0.1	<0.2	17.0	0.2	42	1560
A014	<5	<0.05	2.8	0.4	2.6	<0.1	<0.2	11.0	<0.2	32	720
A015	<5	<0.05	2.6	0.2	4.2	<0.1	0.2	18.0	<0.2	47	1480
A016	<5	<0.05	2.4	0.6	3.6	<0.1	<0.2	17.0	<0.2	42	1520
A018	<5	<0.05	3.0	0.6	4.6	<0.1	<0.2	17.0	0.2	47	1480
A019	<5	<0.05	1.6	0.4	6.0	<0.1	<0.2	22.0	<0.2	50	900
A020	<5	<0.05	0.8	<0.2	2.6	<0.1	<0.2	13.0	<0.2	29	780
A021	<5	<0.05	2.8	0.4	3.4	<0.1	<0.2	15.5	<0.2	40	1530
A022	<5	<0.05	3.2	0.4	4.2	0.1	0.2	17.5	0.2	43	1540
A023	<5	<0.05	3.2	0.4	4.2	<0.1	0.2	17.5	<0.2	44	1520
A024	<5	<0.05	2.8	0.6	4.4	0.1	0.2	18.0	0.2	48	1430
A025	<5	<0.05	6.6	0.8	4.4	<0.1	<0.2	20.5	2.6	48	940
A026	<5	0.05	30.8	5.6	8.6	0.2	0.6	49.5	0.4	44	1420
A027	<5	0.05	18.6	2.2	7.2	0.1	0.4	37.5	0.2	45	1360
A028	<5	0.05	18.4	2.4	6.6	0.1	0.4	33.0	0.2	49	1280
A029	<5	0.05	18.6	1.6	6.6	0.2	0.4	21.5	0.4	44	1280
A030	<5	<0.05	35.2	26.6	12.0	<0.1	1.0	98.5	0.2	79	1180
A031	<5	<0.05	12.6	1.0	5.4	<0.1	0.2	18.5	<0.2	35	1340
A032	<5	<0.05	12.0	1.0	9.8	<0.1	0.2	27.5	0.2	61	1200
A033	<5	<0.05	11.4	1.0	10.0	0.2	0.2	28.0	0.2	60	1300
A034	<5	<0.05	7.4	0.8	8.2	0.1	0.2	22.5	0.2	45	1260
A035	<5	<0.05	4.2	0.8	5.8	<0.1	<0.2	12.5	<0.2	32	1270
A036	<5	<0.05	9.4	0.8	8.6	0.2	0.2	24.0	0.4	52	1280
A037	<5	<0.05	5.2	1.0	23.0	<0.1	0.2	25.0	0.2	82	1340
A038	<5	<0.05	4.6	0.4	22.2	<0.1	0.2	25.0	0.2	86	1320
A039	<5	<0.05	4.4	0.4	19.4	0.1	0.2	19.0	<0.2	107	1020
A040	<5	<0.05	4.8	1.0	23.8	0.1	0.2	22.5	0.2	86	1200
A041	<5	<0.05	5.8	1.2	24.2	<0.1	0.2	14.5	<0.2	91	1180
A042	<5	<0.05	4.2	0.4	22.0	<0.1	0.2	20.5	<0.2	68	1380
A043	<5	<0.05	3.4	0.6	14.6	<0.1	0.2	13.5	<0.2	63	980
A044	<5	<0.05	3.4	0.8	25.6	<0.1	0.2	23.0	<0.2	87	1320
A045	<5	<0.05	5.2	1.4	27.6	<0.1	0.2	23.0	0.2	108	1220
A046	<5	<0.05	3.2	0.6	24.6	<0.1	0.2	19.5	<0.2	103	1320
A047	<5	<0.05	3.0	0.6	23.4	<0.1	0.2	18.5	<0.2	92	1100
A048	<5	<0.05	4.6	1.0	24.8	<0.1	<0.2	26.0	0.2	88	1260
A049	<5	0.05	15.8	0.6	29.6	<0.1	0.4	17.5	0.2	109	570
A050	<5	<0.05	4.8	1.4	23.8	<0.1	<0.2	24.5	0.2	91	1160

App.1 Results of Chemical Analysis of Stream Sediments(2/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
A051	<5	<0.05	7.0	2.2	24.2	<0.1	<0.2	24.5	0.2	104	880
A052	<5	<0.05	4.8	0.4	24.4	0.1	0.2	25.0	0.2	101	1220
A053	<5	<0.05	9.2	1.0	40.6	<0.1	0.2	17.0	<0.2	166	680
A054	<5	<0.05	4.4	1.0	26.2	<0.1	<0.2	26.5	0.2	92	1200
A055	<5	<0.05	6.0	2.6	23.0	<0.1	<0.2	25.0	0.4	99	1140
A056	<5	<0.05	7.4	1.4	36.0	<0.1	0.2	18.5	<0.2	149	640
A057	<5	<0.05	4.8	0.6	24.2	<0.1	<0.2	26.5	0.2	88	1300
A058	<5	<0.05	5.2	1.4	27.4	<0.1	<0.2	27.0	0.4	87	1370
A059	<5	<0.05	4.8	0.8	26.2	<0.1	<0.2	27.5	<0.2	80	1360
A060	<5	0.05	15.2	1.2	34.4	<0.1	0.4	18.0	<0.2	134	500
A061	<5	<0.05	4.2	1.6	25.4	<0.1	<0.2	27.5	0.2	87	1360
A062	<5	<0.05	5.0	0.8	21.6	<0.1	<0.2	25.5	0.2	93	1200
A063	<5	<0.05	5.0	0.6	26.4	<0.1	<0.2	27.0	0.2	79	1420
A064	<5	<0.05	4.8	1.6	23.6	<0.1	<0.2	24.0	<0.2	90	1430
A065	<5	<0.05	2.2	0.2	40.0	<0.1	0.2	20.0	<0.2	204	1160
A066	<5	0.05	9.8	0.2	45.2	<0.1	0.4	16.5	0.2	128	580
A067	<5	<0.05	6.4	0.2	43.6	<0.1	0.2	15.0	<0.2	156	780
A068	<5	<0.05	5.0	0.8	23.8	<0.1	<0.2	26.0	<0.2	93	1220
A069	<5	<0.05	4.8	1.8	25.2	<0.1	<0.2	24.0	0.2	106	1130
A070	<5	<0.05	4.4	2.2	18.4	<0.1	<0.2	25.5	<0.2	122	940
A071	20	<0.05	0.6	0.4	56.8	<0.1	0.2	13.5	<0.2	177	1200
A072	<5	<0.05	1.0	0.2	60.4	<0.1	0.2	13.5	<0.2	151	1000
A073	<5	<0.05	1.2	0.2	72.0	<0.1	0.4	27.5	<0.2	121	2450
A074	<5	<0.05	1.8	1.2	59.2	<0.1	0.2	33.0	<0.2	130	3500
A075	<5	<0.05	2.4	1.4	60.0	<0.1	<0.2	39.5	<0.2	102	4700
A076	<5	<0.05	2.6	2.0	59.2	<0.1	0.2	31.5	<0.2	101	3300
A077	<5	<0.05	2.4	1.6	72.4	<0.1	0.4	37.5	<0.2	87	4300
A078	<5	<0.05	13.0	1.4	60.2	<0.1	0.4	32.0	3.4	119	1900
A079	<5	<0.05	4.4	4.2	41.0	<0.1	<0.2	29.0	<0.2	112	3100
A080	<5	<0.05	4.4	1.0	22.2	<0.1	0.2	46.5	<0.2	62	1100
A081	<5	<0.05	3.8	0.8	17.0	<0.1	0.2	37.5	<0.2	53	1120
A082	<5	<0.05	6.2	1.0	17.6	<0.1	<0.2	37.0	<0.2	40	940
A083	<5	<0.05	5.6	3.2	16.0	<0.1	<0.2	42.5	<0.2	47	1020
A084	<5	<0.05	4.6	1.4	16.0	<0.1	<0.2	34.5	0.2	46	920
A085	<5	<0.05	5.2	1.0	15.8	<0.1	<0.2	35.5	<0.2	47	1000
A086	<5	<0.05	6.2	3.0	16.8	<0.1	<0.2	39.5	0.2	44	940
A087	<5	<0.05	6.4	1.6	32.4	0.1	<0.2	78.5	0.2	100	1000
A088	<5	<0.05	3.8	0.6	15.4	<0.1	0.2	36.0	<0.2	49	920
A089	<5	<0.05	5.6	2.4	15.4	<0.1	<0.2	37.0	0.2	48	930
A090	20	<0.05	6.2	3.2	45.4	<0.1	<0.2	33.5	0.2	65	1440
A091	<5	0.05	4.4	0.6	16.2	0.2	0.2	33.5	0.4	50	1000
A092	<5	<0.05	35.0	0.6	7.8	<0.1	0.2	20.0	0.6	38	700
A093	<5	<0.05	38.4	0.8	7.2	<0.1	0.2	20.5	0.6	41	760
A094	<5	<0.05	71.8	2.2	7.6	<0.1	0.2	23.0	1.2	42	700
A095	<5	<0.05	63.4	4.2	8.0	0.3	0.4	24.5	1.0	45	700
A096	<5	0.05	153.5	9.2	11.2	0.1	0.4	30.5	2.4	46	780
A097	<5	<0.05	37.6	0.6	6.4	<0.1	0.2	22.0	0.8	35	700
A098	<5	<0.05	31.6	0.6	6.8	<0.1	0.2	20.5	0.6	38	740
A099	<5	<0.05	30.2	0.6	6.6	<0.1	0.2	20.0	0.6	40	760

App.1 Results of Chemical Analysis of Stream Sediments(3/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
A100	<5	<0.05	43.0	0.6	6.6	<0.1	0.2	21.0	0.6	38	760
A101	<5	<0.05	47.2	4.0	6.4	<0.1	0.2	23.0	0.8	41	780
A102	<5	<0.05	5.2	0.6	15.8	5.1	0.2	8.0	0.4	72	240
A103	<5	<0.05	73.2	1.8	7.8	<0.1	0.2	23.0	0.8	37	700
A104	<5	<0.05	37.0	1.0	6.4	<0.1	0.2	18.0	0.6	34	760
A105	<5	<0.05	7.4	0.8	14.8	1.7	0.2	9.0	0.6	58	200
A106	<5	<0.05	37.8	1.0	6.6	<0.1	0.2	21.5	0.6	40	680
A107	<5	<0.05	57.0	7.6	6.4	1.1	0.2	19.0	0.6	37	720
A108	<5	<0.05	50.2	0.8	6.8	<0.1	0.2	20.0	0.8	38	740
A109	<5	<0.05	48.6	0.6	6.6	<0.1	0.2	21.0	0.8	38	840
A110	<5	<0.05	72.8	0.8	6.8	<0.1	0.2	20.5	1.0	41	860
A111	450	<0.05	46.2	0.6	31.6	0.2	0.2	5.5	0.4	48	300
A112	<5	<0.05	37.4	1.0	6.8	<0.1	0.2	21.0	0.6	40	740
A113	<5	<0.05	42.0	0.6	10.0	<0.1	0.2	17.5	0.8	40	680
A114	<5	<0.05	25.4	0.4	9.4	<0.1	0.2	14.5	0.4	42	720
A115	<5	<0.05	13.6	0.6	12.4	<0.1	0.2	11.5	0.2	41	560
A116	<5	<0.05	92.6	1.6	6.6	<0.1	0.2	26.5	1.2	43	820
A117	<5	<0.05	7.6	0.6	57.8	<0.1	<0.2	9.5	0.4	94	440
A118	<5	<0.05	3.6	0.6	8.6	<0.1	<0.2	10.0	<0.2	30	1280
A119	<5	<0.05	86.6	3.2	7.0	<0.1	0.2	26.5	1.2	39	800
A120	<5	<0.05	9.8	0.8	24.2	<0.1	0.4	11.5	0.2	56	360
A121	<5	0.05	131.5	4.6	7.8	<0.1	0.4	32.5	1.8	42	720
A122	<5	0.05	98.2	5.6	6.8	<0.1	0.2	28.5	1.0	42	760
A123	<5	<0.05	76.8	0.8	6.8	<0.1	0.2	23.5	1.0	40	700
A124	<5	0.05	94.4	2.2	6.6	<0.1	0.2	28.0	1.2	39	760
A125	<5	<0.05	57.0	0.8	6.0	<0.1	0.2	25.5	0.8	44	740
A126	65	<0.05	7.4	0.6	46.4	<0.1	0.2	13.0	0.4	84	970
A127	30	0.05	10.6	0.4	44.0	<0.1	0.6	20.5	0.6	109	520
A128	350	0.05	19.8	0.8	51.4	<0.1	0.8	22.0	0.8	109	720
A129	<5	<0.05	4.4	0.4	43.8	<0.1	0.2	9.0	0.2	68	320
A130	<5	<0.05	4.2	0.2	38.4	<0.1	0.2	8.0	0.2	68	300
A131	<5	<0.05	6.0	0.4	38.6	<0.1	0.4	11.0	0.2	64	360
A132	<5	<0.05	4.0	<0.2	41.4	<0.1	0.2	9.5	0.2	70	330
A133	100	0.10	15.6	0.8	58.6	<0.1	1.8	15.5	0.6	87	430
A134	<5	<0.05	4.8	0.2	47.6	<0.1	0.4	9.5	0.2	81	300
A135	<5	0.05	6.0	0.4	30.0	<0.1	0.4	13.5	0.2	79	420
A136	<5	<0.05	2.6	0.2	1.4	<0.1	0.2	5.5	0.2	15	380
A137	<5	0.05	25.0	1.6	22.0	<0.1	0.4	14.5	1.4	51	320
A138	110	<0.05	22.4	1.4	22.8	<0.1	0.4	14.0	1.2	61	360
A139	<5	<0.05	9.0	0.8	10.8	<0.1	0.2	9.5	0.4	34	420
B001	<5	<0.05	2.6	0.2	4.6	<0.1	0.2	19.0	<0.2	52	1360
B002	<5	<0.05	2.4	0.4	4.4	<0.1	0.2	18.0	<0.2	45	1300
B005	<5	<0.05	2.8	1.8	4.6	<0.1	0.2	20.0	<0.2	50	1390
B006	<5	<0.05	1.2	0.2	2.8	<0.1	<0.2	16.0	<0.2	36	1220
B007	<5	<0.05	1.8	0.2	3.4	<0.1	<0.2	17.5	<0.2	44	1560
B008	<5	<0.05	2.2	0.2	4.4	<0.1	0.2	19.5	<0.2	55	1420
B010	<5	<0.05	2.2	0.2	4.6	<0.1	0.2	20.5	<0.2	50	1170
B011	<5	<0.05	2.6	0.8	5.0	<0.1	<0.2	27.5	0.2	51	1240
B012	<5	<0.05	6.6	4.6	5.2	<0.1	0.2	21.5	<0.2	61	1300

App. 1 Results of Chemical Analysis of Stream Sediments(4/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
B014	<5	<0.05	1.4	0.4	2.4	<0.1	<0.2	11.0	<0.2	32	1700
B015	<5	<0.05	4.0	0.2	4.2	0.6	0.2	16.5	<0.2	44	1360
B016	<5	<0.05	3.2	0.4	4.8	<0.1	0.2	18.5	0.2	55	1360
B017	<5	0.05	3.4	0.8	4.2	<0.1	0.2	36.5	<0.2	59	1700
B018	<5	<0.05	3.6	0.4	5.8	<0.1	<0.2	19.5	<0.2	48	1540
B019	<5	<0.05	4.0	0.4	4.0	<0.1	0.2	23.5	<0.2	43	1120
B020	<5	0.05	10.2	0.8	35.6	<0.1	0.2	58.0	0.4	106	2200
B021	<5	<0.05	3.6	0.6	4.6	<0.1	0.2	18.5	<0.2	53	1340
B022	<5	0.05	4.0	0.2	12.0	<0.1	<0.2	28.5	<0.2	67	3100
B023	<5	<0.05	4.4	0.4	4.2	<0.1	0.2	22.5	<0.2	54	1320
B024	<5	<0.05	3.0	0.2	6.6	<0.1	<0.2	19.0	<0.2	30	1060
B025	<5	<0.05	2.4	0.2	4.2	<0.1	0.2	19.5	<0.2	49	1330
B026	160	<0.05	2.4	0.4	4.4	<0.1	0.2	23.0	<0.2	72	1040
B027	<5	<0.05	1.8	0.2	4.2	1.7	0.2	20.0	0.2	38	1040
B028	<5	<0.05	2.6	0.4	3.6	<0.1	0.2	18.5	<0.2	44	1360
B030	<5	<0.05	23.8	0.4	12.4	<0.1	0.2	27.0	1.4	63	1320
B031	<5	<0.05	1.8	0.2	4.0	<0.1	0.2	19.0	<0.2	52	1330
B032	<5	<0.05	1.8	1.0	3.8	<0.1	0.2	18.5	<0.2	52	1340
B033	<5	<0.05	2.0	0.2	3.8	<0.1	0.2	17.5	<0.2	43	1360
B034	<5	<0.05	1.8	0.2	3.8	0.3	0.2	16.0	0.2	43	1440
B035	<5	<0.05	1.8	0.2	3.6	0.3	0.2	16.0	0.2	40	1320
B036	<5	<0.05	3.6	0.4	9.6	<0.1	0.2	22.0	0.4	69	850
B037	<5	<0.05	1.6	0.2	4.2	<0.1	0.2	19.0	<0.2	47	1240
B038	<5	<0.05	2.2	0.2	4.2	0.2	0.2	19.5	<0.2	45	1320
B039	<5	<0.05	13.6	0.6	10.4	<0.1	0.2	33.5	0.6	70	900
B040	<5	<0.05	1.6	0.2	4.0	0.4	0.2	17.5	0.2	42	1240
B041	<5	<0.05	1.6	0.2	4.0	0.1	0.2	18.0	0.2	46	1260
B042	<5	<0.05	2.8	0.4	18.4	0.3	<0.2	23.5	0.2	56	900
B043	<5	<0.05	10.2	0.6	22.8	0.2	0.2	29.0	0.4	63	1850
B044	<5	<0.05	1.2	0.2	4.0	0.3	0.2	16.5	0.2	47	1380
B045	<5	<0.05	1.2	0.2	3.4	<0.1	0.2	16.0	<0.2	42	1340
B046	<5	<0.05	20.4	4.4	21.2	<0.1	0.2	31.5	0.4	53	1400
B047	<5	<0.05	3.2	0.6	8.6	<0.1	0.2	38.5	<0.2	42	580
B048	<5	<0.05	3.0	0.4	4.4	0.1	0.2	18.5	<0.2	53	1380
B049	<5	<0.05	9.0	0.4	6.4	<0.1	0.2	35.5	<0.2	43	880
B050	<5	<0.05	3.2	0.4	4.4	<0.1	<0.2	19.0	<0.2	48	1260
B051	<5	<0.05	31.4	0.8	8.8	0.1	0.6	37.0	0.8	54	600
B052	<5	<0.05	3.2	0.2	3.8	<0.1	<0.2	16.5	0.2	42	1380
B053	<5	<0.05	5.2	0.2	27.6	0.1	<0.2	25.5	0.4	53	2300
B054	<5	<0.05	5.0	2.0	5.6	<0.1	<0.2	21.5	0.2	58	1200
B055	<5	<0.05	4.2	0.6	43.0	<0.1	<0.2	44.5	<0.2	67	2800
B056	<5	<0.05	5.6	0.2	6.2	<0.1	<0.2	20.5	<0.2	52	1700
B057	<5	<0.05	3.0	0.2	27.4	0.2	0.2	28.5	0.2	58	2200
B058	<5	<0.05	3.0	0.4	29.4	<0.1	<0.2	29.0	<0.2	70	2200
B059	<5	<0.05	4.8	0.2	5.6	<0.1	<0.2	18.5	<0.2	46	1480
B060	<5	<0.05	4.2	0.2	6.0	<0.1	<0.2	19.5	0.2	48	1320
B061	<5	<0.05	2.6	0.4	21.8	<0.1	<0.2	32.0	<0.2	61	3100
B062	<5	<0.05	1.8	0.4	13.0	<0.1	<0.2	28.5	<0.2	45	3500
B063	<5	<0.05	2.4	0.4	13.6	<0.1	<0.2	40.0	<0.2	69	4500

App. 1 Results of Chemical Analysis of Stream Sediments(5/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
B064	<5	<0.05	2.2	0.2	9.0	<0.1	<0.2	32.0	<0.2	43	4200
B065	<5	<0.05	21.2	0.6	43.6	<0.1	0.4	24.0	1.4	86	1480
B066	<5	<0.05	4.4	0.2	10.6	<0.1	0.2	26.5	0.2	61	4500
B067	<5	<0.05	7.4	0.6	18.6	<0.1	0.4	25.5	0.4	64	3300
B069	90	<0.05	8.4	0.4	50.2	<0.1	0.2	22.5	<0.2	97	1120
B070	<5	<0.05	6.0	0.4	21.4	<0.1	0.4	26.0	0.2	70	3100
B072	<5	<0.05	4.6	0.6	45.2	<0.1	<0.2	19.0	0.2	76	1660
B073	<5	<0.05	4.8	0.4	17.4	0.1	0.4	26.0	<0.2	61	3350
B074	<5	<0.05	3.4	0.4	56.0	<0.1	<0.2	13.0	<0.2	89	960
B075	<5	<0.05	5.0	0.4	26.8	<0.1	0.2	18.0	0.2	89	980
B077	<5	<0.05	3.2	0.4	10.6	<0.1	0.2	26.0	<0.2	57	3700
B079	<5	<0.05	3.4	0.4	10.6	<0.1	0.2	25.5	<0.2	57	3750
B080	<5	<0.05	3.4	0.4	10.2	<0.1	0.4	27.5	<0.2	59	4000
B081	<5	<0.05	3.0	0.4	9.2	0.2	0.2	25.0	<0.2	57	4000
B082	65	<0.05	7.8	0.4	40.4	<0.1	0.2	17.5	2.8	56	840
B083	<5	<0.05	3.8	0.4	9.2	<0.1	0.2	27.0	<0.2	59	4000
B084	<5	0.05	7.6	0.4	24.4	<0.1	0.8	32.0	<0.2	104	2400
B085	<5	<0.05	9.4	0.4	35.0	<0.1	0.2	24.5	0.6	86	1020
B086	<5	<0.05	5.6	0.2	32.8	<0.1	0.2	21.5	0.2	74	2400
B087	<5	<0.05	2.6	<0.2	25.0	<0.1	<0.2	13.5	0.2	68	1160
B088	<5	<0.05	6.4	<0.2	28.8	<0.1	0.4	21.0	0.2	74	2300
B089	<5	<0.05	7.2	0.2	31.6	<0.1	0.2	22.5	<0.2	76	2300
B090	<5	<0.05	8.2	0.4	29.6	<0.1	0.2	21.5	0.4	77	1500
B091	<5	<0.05	6.0	0.2	57.8	<0.1	0.2	7.0	<0.2	143	160
B094	<5	<0.05	6.4	0.2	57.0	<0.1	0.2	7.0	<0.2	121	150
B095	<5	0.05	5.0	<0.2	45.2	<0.1	0.2	7.5	<0.2	96	140
B096	<5	<0.05	4.8	0.2	54.8	<0.1	0.2	7.0	<0.2	120	180
B097	<5	<0.05	8.4	0.4	48.0	0.1	0.4	14.5	<0.2	97	400
B098	310	0.05	10.2	0.4	45.4	<0.1	0.6	17.0	0.2	106	390
B099	<5	<0.05	9.8	0.4	50.4	<0.1	0.4	15.5	0.2	102	450
B101	<5	<0.05	4.4	0.2	33.6	<0.1	0.4	11.5	<0.2	72	420
B102	30	<0.05	8.8	0.2	46.4	<0.1	0.6	15.0	0.2	109	400
B103	10	<0.05	2.0	0.2	8.0	<0.1	1.6	7.0	<0.2	130	500
B104	<5	<0.05	8.4	0.2	48.4	<0.1	0.4	13.0	0.2	94	360
B106	<5	<0.05	17.4	0.6	47.8	0.7	0.6	18.0	0.8	98	600
B107	<5	0.05	20.6	0.4	44.0	<0.1	1.0	21.5	0.6	112	540
B108	<5	0.05	17.2	0.4	43.8	<0.1	0.8	20.0	0.6	102	440
B109	<5	<0.05	4.6	0.2	42.4	<0.1	0.2	10.5	<0.2	74	300
B111	<5	<0.05	6.2	0.2	30.0	<0.1	0.4	13.5	0.2	96	300
B113	<5	<0.05	7.6	0.4	47.0	0.1	0.4	12.5	0.4	95	320
B114	<5	<0.05	9.0	0.4	48.6	0.2	0.6	13.5	0.6	94	380
B115	<5	<0.05	10.4	0.4	41.4	0.1	0.8	29.0	0.6	126	540
B116	10	<0.05	9.2	0.2	46.0	0.3	0.4	11.0	0.4	80	370
B117	<5	<0.05	10.6	0.4	47.8	<0.1	0.6	12.5	1.0	84	500
B118	<5	<0.05	1.2	<0.2	131.0	<0.1	0.2	1.0	<0.2	193	20
B119	<5	<0.05	1.0	0.2	141.5	<0.1	<0.2	1.0	<0.2	165	40
B120	<5	<0.05	14.0	0.4	41.0	<0.1	0.2	18.5	3.4	68	1520
B121	<5	<0.05	3.6	0.2	39.8	<0.1	0.2	2.5	2.8	63	80
B122	<5	<0.05	4.6	<0.2	46.0	<0.1	0.2	13.0	0.6	74	140

App.1 Results of Chemical Analysis of Stream Sediments(6/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
B123	<5	<0.05	3.0	<0.2	45.2	0.1	0.2	10.5	0.4	69	230
B124	<5	0.05	14.6	0.4	41.0	0.1	0.6	23.0	2.2	92	430
B125	<5	<0.05	12.0	0.4	36.4	<0.1	0.8	31.0	0.4	88	520
B126	<5	<0.05	11.4	0.4	45.4	0.1	0.6	25.5	0.4	101	570
B127	2660	<0.05	2.0	0.4	20.6	0.1	0.2	18.5	<0.2	73	1160
B128	<5	<0.05	1.4	0.2	24.4	0.1	0.2	14.0	<0.2	55	1240
B129	<5	<0.05	0.8	0.4	22.6	<0.1	0.2	17.5	0.2	58	1350
B130	40	<0.05	1.8	0.2	17.8	<0.1	<0.2	18.0	<0.2	60	1480
B131	<5	<0.05	0.2	0.2	35.6	<0.1	<0.2	3.0	<0.2	44	260
B132	<5	<0.05	0.6	0.2	22.2	<0.1	0.2	14.5	<0.2	63	1840
B133	<5	<0.05	7.2	0.4	45.6	<0.1	0.8	13.0	<0.2	70	600
B134	<5	<0.05	0.8	0.4	27.0	<0.1	0.2	18.5	<0.2	61	1100
B135	<5	<0.05	1.2	0.2	26.2	<0.1	0.2	19.0	<0.2	62	1240
B136	<5	<0.05	2.0	0.2	27.2	<0.1	0.2	21.0	<0.2	74	1120
B137	<5	<0.05	1.4	0.2	25.0	<0.1	0.2	23.0	<0.2	71	1180
B138	<5	<0.05	0.2	<0.2	31.6	<0.1	<0.2	5.5	<0.2	41	420
B139	<5	<0.05	0.8	0.2	26.6	<0.1	0.2	20.5	<0.2	67	1160
B140	<5	<0.05	2.6	0.2	27.2	<0.1	<0.2	19.5	<0.2	69	1030
B141	<5	<0.05	7.2	0.4	36.8	<0.1	0.6	23.0	0.2	73	940
B142	<5	<0.05	1.6	0.2	26.0	<0.1	<0.2	19.5	<0.2	64	1180
B143	<5	<0.05	1.6	0.2	25.2	<0.1	0.2	19.5	<0.2	66	1120
B144	<5	<0.05	1.4	0.4	28.2	0.2	<0.2	17.0	<0.2	60	1100
B145	<5	<0.05	1.2	0.4	26.4	<0.1	<0.2	20.5	<0.2	67	1230
B146	<5	<0.05	2.4	0.6	14.4	<0.1	0.2	21.5	<0.2	64	1540
B147	<5	<0.05	2.8	0.2	20.6	<0.1	0.2	11.0	<0.2	60	820
B148	<5	<0.05	0.8	0.4	26.4	0.1	<0.2	11.5	<0.2	55	1260
B149	<5	<0.05	1.6	0.6	12.0	<0.1	0.2	23.0	<0.2	62	1670
B150	<5	<0.05	2.8	0.6	15.8	<0.1	0.2	21.0	<0.2	61	1600
B151	<5	<0.05	0.2	0.2	27.0	<0.1	<0.2	10.0	<0.2	46	880
B152	<5	<0.05	1.2	0.8	5.6	<0.1	<0.2	17.5	<0.2	42	2150
B153	<5	<0.05	2.6	0.6	13.8	0.2	0.2	26.0	<0.2	69	1680
B154	<5	<0.05	1.8	1.2	7.6	<0.1	<0.2	26.0	<0.2	51	1960
B155	<5	<0.05	3.2	0.4	15.2	<0.1	<0.2	14.5	<0.2	51	1320
B156	<5	<0.05	1.4	0.8	9.2	<0.1	0.2	22.5	<0.2	50	1540
B157	210	<0.05	6.8	0.8	49.6	<0.1	0.4	23.5	<0.2	129	1540
B158	1250	<0.05	6.2	1.0	43.6	<0.1	0.4	29.5	<0.2	166	1380
B159	<5	<0.05	6.4	0.4	24.2	<0.1	0.6	34.5	<0.2	122	2300
B160	85	<0.05	5.6	0.4	86.4	<0.1	0.4	11.0	<0.2	131	630
B161	110	<0.05	4.0	0.6	41.4	<0.1	0.2	5.0	<0.2	70	200
B162	100	0.15	6.4	0.4	101.0	<0.1	0.6	28.5	<0.2	246	1360
B163	570	<0.05	2.4	1.0	73.2	<0.1	0.2	12.0	<0.2	147	490
B164	1050	<0.05	2.0	0.6	53.8	<0.1	0.4	10.5	<0.2	118	460
B165	<5	<0.05	2.2	0.4	6.0	0.1	0.2	25.0	<0.2	60	1970
B166	<5	0.05	1.8	0.6	7.4	<0.1	0.4	27.0	<0.2	70	1680
B167	<5	<0.05	1.8	0.6	6.8	0.1	0.2	25.5	<0.2	66	1900
B168	<5	<0.05	4.2	0.6	12.2	0.1	0.2	19.5	<0.2	50	1300
B169	<5	<0.05	1.8	0.6	7.4	<0.1	0.2	20.5	<0.2	52	1780
B170	140	<0.05	2.4	0.8	8.6	0.2	0.4	27.5	<0.2	73	1460
B171	670	<0.05	3.6	0.2	32.0	0.1	<0.2	2.5	0.4	51	80

App.1 Results of Chemical Analysis of Stream Sediments(7/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
B172	<5	<0.05	5.6	0.2	52.6	<0.1	0.2	6.5	0.2	77	140
B173	<5	<0.05	1.8	0.4	8.0	0.1	0.2	21.5	<0.2	52	1700
B174	<5	<0.05	2.8	0.4	16.6	0.1	0.2	22.0	<0.2	67	1720
B175	<5	<0.05	5.8	0.4	26.8	<0.1	0.4	18.5	0.2	97	600
B176	<5	<0.05	2.0	1.4	8.0	<0.1	<0.2	25.0	<0.2	52	1920
B177	<5	<0.05	1.6	1.8	7.2	<0.1	<0.2	25.0	<0.2	47	1980
B178	<5	<0.05	4.8	0.2	33.4	<0.1	0.2	10.5	0.2	76	560
B179	<5	<0.05	1.0	0.4	6.8	<0.1	<0.2	17.0	<0.2	37	2700
B180	<5	<0.05	1.6	1.8	6.6	<0.1	<0.2	26.5	<0.2	50	2000
C001	<5	<0.05	17.0	1.6	6.0	<0.1	0.4	31.0	<0.2	43	1280
C002	<5	0.05	95.8	1.8	14.2	<0.1	0.6	53.5	1.0	62	860
C003	<5	0.05	83.4	1.0	18.8	<0.1	0.4	49.5	4.0	74	680
C004	<5	0.05	50.2	1.0	16.6	<0.1	0.4	49.0	1.8	70	640
C005	<5	<0.05	22.2	1.6	6.6	<0.1	0.4	50.0	0.8	45	940
C006	<5	0.05	54.8	0.6	17.2	<0.1	0.4	33.5	1.8	68	700
C007	35	0.05	39.6	0.6	13.2	<0.1	0.2	34.5	1.0	56	1160
C008	<5	0.05	10.0	1.0	8.8	<0.1	0.2	40.0	0.2	33	1200
C009	<5	<0.05	14.6	0.8	7.0	<0.1	0.2	22.5	0.4	35	960
C010	20	<0.05	36.0	0.6	11.4	0.1	0.2	24.5	0.8	59	680
C011	<5	<0.05	2.4	0.2	2.0	<0.1	<0.2	13.5	<0.2	22	1100
C012	<5	0.05	33.0	5.6	8.2	0.2	0.8	69.0	0.2	64	1280
C013	<5	<0.05	124.5	2.2	14.6	<0.1	0.6	77.0	1.4	61	860
C014	<5	<0.05	134.5	1.0	5.2	0.1	0.4	36.0	3.2	41	1020
C015	<5	<0.05	28.6	1.6	6.6	<0.1	0.4	29.0	0.4	46	1320
C016	<5	0.05	42.2	0.4	16.2	<0.1	0.2	30.5	1.6	60	900
C017	<5	<0.05	51.6	0.4	12.8	<0.1	<0.2	26.5	2.4	55	760
C018	<5	<0.05	39.6	0.2	13.0	0.1	<0.2	25.0	1.8	62	760
C019	<5	<0.05	31.0	1.0	8.2	<0.1	0.2	30.0	1.0	50	800
C020	<5	0.05	59.0	18.8	14.4	2.9	0.6	155.5	1.0	68	1140
C021	<5	<0.05	32.4	0.8	5.4	<0.1	0.6	41.0	0.6	46	500
C022	<5	<0.05	28.2	16.2	5.8	<0.1	0.4	53.0	0.2	44	1060
C023	<5	0.05	35.6	19.8	7.8	<0.1	0.4	70.5	0.4	54	1140
C024	<5	<0.05	23.6	11.0	5.8	<0.1	0.6	34.5	<0.2	43	1160
C025	<5	<0.05	10.4	0.6	3.8	<0.1	0.2	24.5	0.2	36	1080
C026	<5	<0.05	11.6	0.4	4.8	<0.1	0.2	27.0	<0.2	37	900
C027	<5	<0.05	6.6	1.0	6.8	<0.1	0.2	32.0	<0.2	40	1090
C028	<5	0.05	21.0	1.4	7.0	<0.1	0.4	37.5	<0.2	44	1280
C029	<5	<0.05	21.2	0.6	9.6	<0.1	0.4	36.5	0.4	59	720
C030	<5	0.05	42.6	1.4	13.0	<0.1	0.4	44.5	1.0	68	750
C031	<5	<0.05	19.6	0.8	8.0	<0.1	0.2	35.0	0.6	53	740
C032	<5	<0.05	5.2	0.6	26.4	<0.1	0.4	33.0	0.6	202	1520
C033	<5	<0.05	5.6	0.6	23.0	<0.1	0.2	31.5	0.4	170	1140
C034	<5	<0.05	3.2	0.6	32.0	<0.1	0.2	34.5	<0.2	244	1340
C035	<5	<0.05	1.0	0.8	28.2	<0.1	0.2	25.5	<0.2	254	640
C036	<5	<0.05	1.6	0.6	31.4	<0.1	0.2	20.5	<0.2	201	1000
C037	<5	<0.05	0.6	0.6	35.6	<0.1	0.2	26.5	<0.2	199	1280
C038	<5	<0.05	2.0	0.8	35.6	<0.1	0.2	41.0	<0.2	273	930
C039	<5	<0.05	7.2	0.6	23.2	<0.1	0.2	30.5	0.6	106	1140
C040	<5	<0.05	3.0	0.6	42.8	0.1	0.4	44.5	<0.2	206	1160

App.1 Results of Chemical Analysis of Stream Sediments(8/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
C041	<5	<0.05	3.6	0.8	36.0	<0.1	0.2	40.5	<0.2	262	540
C042	<5	<0.05	8.0	0.6	23.6	<0.1	0.2	30.0	0.8	121	1180
C043	<5	<0.05	3.2	0.4	33.2	0.1	0.2	34.5	<0.2	236	1460
C044	<5	<0.05	3.8	0.8	27.6	<0.1	0.6	57.5	<0.2	268	460
C045	<5	<0.05	4.0	0.6	36.0	<0.1	0.2	29.0	<0.2	230	1020
C046	<5	<0.05	3.2	0.4	25.0	<0.1	0.2	31.0	0.2	179	1460
C047	<5	<0.05	10.4	0.4	22.8	<0.1	0.2	31.0	0.8	95	1300
C048	<5	<0.05	11.2	0.4	46.8	<0.1	0.2	48.5	0.2	136	2150
C049	<5	<0.05	5.0	0.8	53.4	<0.1	0.2	33.5	<0.2	216	1150
C050	<5	<0.05	5.4	0.4	44.4	<0.1	0.2	42.0	0.2	154	1800
C051	<5	<0.05	7.2	0.4	31.0	0.1	0.8	47.0	0.6	239	980
C052	<5	<0.05	9.4	0.4	22.0	<0.1	0.2	31.5	0.8	88	1240
C053	<5	<0.05	6.0	0.8	26.4	<0.1	0.2	32.0	0.4	113	820
C054	400	<0.05	7.4	0.4	26.2	<0.1	0.6	36.5	0.6	114	1020
C055	<5	<0.05	6.6	0.4	27.6	<0.1	0.2	31.0	0.6	94	780
C056	<5	<0.05	11.6	0.4	59.4	<0.1	0.2	42.0	0.6	215	1700
C057	<5	<0.05	3.8	0.4	37.0	0.1	<0.2	37.0	0.4	118	1230
C058	<5	<0.05	5.6	0.6	37.0	<0.1	0.2	32.0	0.4	146	1880
C059	<5	<0.05	10.4	0.6	14.4	0.1	0.2	29.5	1.0	63	1460
C060	<5	<0.05	2.6	0.4	19.4	0.1	0.2	28.5	<0.2	109	1680
C061	<5	<0.05	15.2	0.4	31.0	<0.1	<0.2	27.0	0.6	64	2400
C062	<5	<0.05	9.6	0.6	37.6	<0.1	<0.2	40.0	0.4	118	1580
C063	<5	<0.05	17.8	0.6	19.2	<0.1	0.2	34.5	1.0	73	1540
C064	<5	<0.05	10.6	0.8	11.8	<0.1	<0.2	29.5	1.0	58	1140
C065	<5	<0.05	8.6	0.4	11.8	<0.1	<0.2	29.0	1.0	57	1060
C066	<5	<0.05	6.8	0.4	11.4	<0.1	<0.2	26.0	0.8	62	1150
C067	210	<0.05	13.2	0.6	21.6	<0.1	0.2	39.0	2.8	111	1050
C068	<5	<0.05	11.2	0.6	14.0	<0.1	0.2	31.5	1.2	65	1080
C069	<5	<0.05	3.6	0.4	32.6	<0.1	<0.2	29.0	<0.2	64	3550
C070	<5	<0.05	47.4	0.6	15.0	<0.1	0.2	36.5	1.8	76	1200
C071	<5	<0.05	14.2	0.6	19.2	0.3	0.2	37.0	1.0	70	1630
C072	<5	<0.05	7.2	0.8	26.4	<0.1	0.2	48.5	1.0	88	1270
C073	<5	<0.05	13.8	0.8	21.6	<0.1	0.2	35.0	1.0	75	1680
C074	<5	<0.05	5.4	0.8	13.6	<0.1	<0.2	38.5	0.4	44	1340
C075	<5	<0.05	4.2	0.6	14.2	<0.1	0.2	35.0	0.4	56	1520
C076	<5	<0.05	54.2	0.6	16.0	<0.1	0.2	37.0	2.4	88	1160
C077	<5	<0.05	7.0	0.4	22.8	<0.1	0.2	28.0	0.6	137	1250
C078	<5	<0.05	7.0	0.8	24.2	<0.1	0.2	28.5	0.6	127	1320
C079	<5	<0.05	5.8	0.6	25.6	<0.1	0.2	29.5	0.4	141	1330
C080	<5	<0.05	5.2	0.6	44.2	<0.1	0.4	47.0	0.6	164	1720
C081	<5	<0.05	4.6	0.6	27.2	<0.1	0.2	31.0	0.2	90	1300
C082	<5	<0.05	24.4	1.8	38.2	<0.1	<0.2	55.0	0.8	53	3500
C083	<5	0.05	58.8	3.0	59.0	<0.1	<0.2	56.5	1.0	78	2750
C084	<5	0.05	23.2	3.2	53.4	<0.1	<0.2	68.5	0.8	59	2700
C085	<5	<0.05	20.4	2.4	40.0	<0.1	<0.2	58.0	0.8	56	2400
C086	<5	<0.05	18.2	1.8	35.4	<0.1	<0.2	64.5	0.6	61	2350
C087	<5	<0.05	22.8	1.4	32.6	<0.1	<0.2	72.0	0.6	72	1320
C088	<5	0.05	38.6	2.6	45.8	<0.1	<0.2	114.5	0.6	96	2450
C089	<5	0.05	22.2	0.8	35.8	<0.1	<0.2	64.0	0.8	71	1720

App.1 Results of Chemical Analysis of Stream Sediments(9/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
C090	<5	<0.05	5.0	0.6	22.6	<0.1	0.2	27.5	0.2	116	960
C091	<5	0.05	21.6	0.8	18.2	<0.1	<0.2	111.5	1.4	83	1640
C092	<5	0.05	11.2	0.6	39.0	<0.1	<0.2	119.5	1.2	83	2000
C093	<5	0.05	21.6	0.8	28.2	<0.1	<0.2	123.5	1.4	86	1930
C094	<5	<0.05	2.8	0.4	4.4	<0.1	<0.2	17.0	<0.2	22	820
C095	<5	<0.05	0.6	0.2	3.2	<0.1	<0.2	9.5	<0.2	16	680
C096	115	<0.05	4.4	0.6	10.8	<0.1	<0.2	21.0	<0.2	73	800
C097	<5	0.05	26.6	0.2	37.8	0.1	0.2	15.5	1.4	93	640
C098	<5	0.05	30.4	0.4	35.0	<0.1	0.2	17.0	1.6	92	680
C099	<5	0.05	29.8	0.4	34.8	<0.1	0.2	18.5	1.4	93	770
C100	<5	0.05	33.6	0.4	31.6	<0.1	0.4	18.5	1.8	91	800
C101	<5	0.05	29.6	0.4	29.8	<0.1	0.2	18.5	1.4	97	830
C102	<5	0.05	38.6	0.4	27.8	0.1	0.4	19.0	2.2	85	1040
C103	<5	0.05	3.0	0.2	93.4	0.1	<0.2	2.0	0.2	129	120
C104	<5	0.05	8.6	0.2	36.6	<0.1	0.2	13.5	0.4	70	240
C105	<5	0.05	36.0	0.4	27.8	<0.1	0.4	21.0	2.0	87	1000
C106	<5	0.05	34.6	0.4	26.6	<0.1	0.4	22.0	1.8	87	1080
C107	<5	0.05	34.0	0.2	25.4	<0.1	0.4	21.5	1.8	83	1160
C108	<5	0.05	26.6	0.4	29.2	<0.1	0.6	23.5	1.4	91	1280
C109	<5	0.05	28.4	0.4	25.4	<0.1	0.4	24.0	1.6	84	1240
C110	<5	0.05	43.6	0.4	29.8	<0.1	0.4	23.0	1.8	83	1180
C111	<5	0.05	28.2	0.4	45.2	<0.1	0.2	14.0	1.4	92	640
C112	<5	<0.05	17.0	0.4	38.8	<0.1	0.2	23.0	4.2	69	1780
C113	<5	<0.05	17.2	0.4	41.0	0.1	0.2	24.0	5.4	74	1800
C114	<5	<0.05	15.0	0.6	31.4	<0.1	0.2	25.0	4.0	76	1830
C115	<5	<0.05	15.2	0.4	43.4	<0.1	0.2	23.5	3.8	72	1820
C116	<5	<0.05	15.0	0.6	44.2	<0.1	0.2	23.0	3.6	70	1840
C117	<5	<0.05	17.6	0.6	35.4	<0.1	0.2	23.0	4.2	73	1780
C118	<5	<0.05	15.2	0.6	39.6	<0.1	0.2	23.0	3.4	71	1700
C119	<5	<0.05	15.4	0.4	39.2	<0.1	0.2	22.0	3.0	74	1600
C120	<5	<0.05	17.4	0.6	36.8	<0.1	0.2	21.5	4.0	77	1520
C121	<5	<0.05	15.6	0.6	33.2	0.1	0.2	25.5	3.6	70	1900
C122	155	<0.05	7.0	0.2	52.4	<0.1	0.2	11.0	0.4	84	680
C123	<5	<0.05	2.0	0.4	7.6	0.2	<0.2	9.0	<0.2	27	1260
C124	<5	<0.05	60.0	0.8	6.8	<0.1	0.2	23.0	0.8	43	700
C125	<5	<0.05	4.4	0.2	16.6	<0.1	<0.2	7.5	0.2	36	1140
C126	<5	<0.05	2.4	0.2	15.8	<0.1	<0.2	10.0	0.2	33	340
C127	<5	<0.05	3.0	0.2	5.4	0.1	<0.2	9.5	<0.2	35	240
C128	<5	0.05	156.5	6.0	9.0	0.1	0.4	36.0	1.6	45	750
C129	<5	<0.05	7.0	0.2	6.4	<0.1	<0.2	6.0	0.2	24	220
C130	<5	0.05	109.5	4.4	6.8	<0.1	0.2	27.5	0.6	40	780
C131	<5	<0.05	68.6	0.8	7.2	0.1	0.2	21.0	0.4	44	820
C132	<5	<0.05	17.4	2.0	15.6	0.4	0.2	11.5	0.6	43	280
C133	<5	<0.05	0.8	0.2	0.4	<0.1	0.2	3.5	<0.2	8	380
C134	<5	<0.05	126.0	5.0	7.4	<0.1	0.2	28.0	0.8	47	880
C135	<5	<0.05	1.6	0.2	10.0	<0.1	<0.2	5.0	<0.2	34	490
C136	<5	<0.05	0.4	0.2	9.0	<0.1	<0.2	4.5	<0.2	41	480
C137	<5	<0.05	0.8	0.2	6.6	<0.1	<0.2	5.0	<0.2	42	620
C138	<5	0.05	193.0	3.4	8.2	<0.1	0.4	29.5	1.6	50	800

App. 1 Results of Chemical Analysis of Stream Sediments(10/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
C139	<5	<0.05	2.8	0.8	3.2	<0.1	<0.2	9.0	<0.2	20	400
C140	<5	0.10	53.0	70.0	7.6	<0.1	0.4	55.5	0.6	51	620
C141	<5	<0.05	60.4	5.8	7.8	0.1	0.2	37.5	1.2	37	700
C142	<5	<0.05	38.6	1.2	6.6	0.1	0.2	29.5	0.8	37	620
C143	<5	<0.05	0.8	<0.2	2.6	<0.1	<0.2	6.5	<0.2	14	400
C144	<5	0.05	2.4	0.4	4.8	<0.1	<0.2	22.5	<0.2	32	480
C145	<5	<0.05	1.2	0.4	5.0	<0.1	<0.2	10.5	<0.2	21	650
C146	<5	<0.05	38.8	0.6	7.0	<0.1	0.2	31.0	1.0	39	660
C147	<5	<0.05	1.2	0.8	5.8	0.2	<0.2	19.0	<0.2	30	700
C148	<5	<0.05	2.4	0.2	3.0	<0.1	<0.2	8.5	<0.2	18	360
C149	<5	0.05	90.0	7.2	10.4	<0.1	0.4	47.5	2.0	50	860
C150	<5	<0.05	3.2	1.2	2.8	<0.1	<0.2	9.5	<0.2	20	530
C151	<5	<0.05	53.6	2.6	6.4	0.1	0.2	34.0	1.4	46	740
C152	<5	<0.05	89.6	3.2	8.0	<0.1	0.4	50.0	1.8	52	750
C153	<5	0.05	51.0	0.6	7.2	0.3	0.2	25.0	0.6	45	900
C154	<5	<0.05	2.4	<0.2	4.2	0.2	<0.2	9.5	<0.2	31	1020
C155	<5	<0.05	1.4	0.2	4.2	0.1	<0.2	6.0	<0.2	23	500
C156	<5	<0.05	2.0	0.6	4.0	0.1	<0.2	7.5	<0.2	21	520
C157	<5	<0.05	0.6	2.8	3.2	<0.1	<0.2	5.5	<0.2	15	440
C158	<5	<0.05	1.4	3.4	2.8	0.1	<0.2	4.5	<0.2	14	440
C159	<5	<0.05	78.4	0.4	6.2	<0.1	0.2	32.0	1.2	47	840
C160	<5	<0.05	181.0	0.6	6.2	0.1	0.2	30.0	1.6	45	880
C161	<5	<0.05	6.8	13.6	6.4	<0.1	<0.2	8.0	<0.2	35	690
C162	<5	<0.05	1.4	0.2	2.8	<0.1	<0.2	11.5	<0.2	25	980
C163	<5	<0.05	1.2	5.8	3.8	<0.1	<0.2	9.5	<0.2	30	540
C164	<5	<0.05	3.4	0.2	6.4	<0.1	<0.2	7.0	<0.2	28	620
C165	<5	<0.05	0.8	<0.2	5.0	<0.1	<0.2	7.5	<0.2	28	560
C166	<5	<0.05	1.6	<0.2	4.4	<0.1	<0.2	4.0	<0.2	26	650
C167	<5	<0.05	4.4	0.4	7.8	<0.1	<0.2	5.0	<0.2	31	670
C168	<5	<0.05	1.8	0.4	5.0	<0.1	<0.2	4.5	<0.2	36	560
C169	<5	<0.05	1.2	0.4	4.8	<0.1	<0.2	4.0	<0.2	26	620
C170	<5	<0.05	1.6	7.4	3.0	<0.1	<0.2	5.0	<0.2	19	560
C171	<5	<0.05	1.2	2.6	3.8	<0.1	<0.2	10.5	<0.2	23	480
C172	<5	<0.05	84.4	5.8	6.0	<0.1	0.2	27.5	1.0	45	880
C173	<5	<0.05	1.8	1.2	3.0	<0.1	<0.2	11.5	<0.2	20	460
C174	<5	<0.05	1.2	1.6	2.8	<0.1	<0.2	10.0	<0.2	20	470
C175	<5	<0.05	0.8	0.2	2.4	<0.1	<0.2	5.5	<0.2	18	460
D001	<5	<0.05	16.6	0.6	8.0	<0.1	0.2	32.0	0.6	49	1100
D002	<5	0.05	20.0	0.6	11.4	<0.1	0.4	43.5	1.8	68	630
D003	<5	<0.05	11.8	0.8	7.0	<0.1	0.2	30.5	0.2	48	1200
D004	<5	<0.05	15.0	0.8	7.0	<0.1	0.2	31.0	0.4	52	1280
D005	<5	<0.05	13.2	0.6	6.6	<0.1	0.2	29.5	0.4	48	1140
D006	<5	0.05	16.0	1.2	7.8	<0.1	0.2	33.0	0.4	49	990
D007	<5	<0.05	18.6	1.6	6.6	<0.1	0.2	37.0	0.8	46	660
D008	<5	<0.05	17.2	0.4	7.4	<0.1	0.2	33.0	0.4	52	950
D009	<5	<0.05	14.8	0.4	9.2	0.1	<0.2	33.0	0.4	67	630
D010	<5	<0.05	15.4	0.4	8.0	<0.1	0.2	36.0	0.4	52	1180
D011	<5	<0.05	14.2	0.6	6.4	<0.1	0.2	26.5	0.4	51	1420
D012	<5	<0.05	10.6	0.6	7.2	<0.1	0.2	28.0	0.2	48	1280

App.1 Results of Chemical Analysis of Stream Sediments(11/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
D013	<5	<0.05	10.0	0.8	6.6	0.1	0.4	28.0	0.2	51	1320
D014	<5	<0.05	9.2	0.6	5.8	<0.1	0.2	24.0	0.2	45	1380
D015	<5	<0.05	11.0	0.6	6.6	0.1	0.2	27.5	0.2	54	1460
D016	<5	<0.05	9.0	0.6	6.0	0.2	0.2	24.5	<0.2	45	1500
D017	<5	<0.05	10.4	0.6	5.8	0.1	0.2	26.0	0.2	47	1420
D018	<5	<0.05	9.8	0.6	6.0	<0.1	0.2	25.5	0.2	51	1480
D019	<5	<0.05	11.2	0.6	7.0	<0.1	0.2	28.5	0.4	52	1040
D020	<5	<0.05	6.6	0.4	24.0	<0.1	0.4	36.5	0.2	81	1580
D021	<5	<0.05	4.2	0.6	6.6	<0.1	<0.2	20.5	0.2	50	1260
D022	<5	<0.05	4.6	0.8	40.4	<0.1	0.2	48.5	<0.2	73	2800
D023	<5	<0.05	2.0	1.8	11.0	<0.1	0.2	47.5	<0.2	105	3250
D024	<5	<0.05	5.4	0.6	8.2	<0.1	0.2	23.5	<0.2	66	1400
D025	<5	<0.05	3.2	0.6	15.8	<0.1	0.2	33.0	<0.2	56	1840
D026	<5	<0.05	4.2	0.4	6.4	<0.1	<0.2	20.5	<0.2	50	1420
D027	<5	<0.05	4.0	0.2	6.4	<0.1	0.2	20.0	<0.2	50	1420
D028	<5	<0.05	4.6	0.8	51.0	<0.1	<0.2	33.0	0.2	65	1960
D029	25	<0.05	4.8	0.4	7.4	<0.1	0.2	23.5	0.2	54	1360
D030	<5	<0.05	6.2	0.6	28.0	<0.1	0.2	41.5	0.2	100	1640
D031	<5	<0.05	4.8	0.6	7.4	<0.1	0.2	20.5	0.2	57	1380
D032	<5	<0.05	5.2	0.4	6.4	<0.1	<0.2	20.5	0.2	52	1320
D033	<5	<0.05	3.2	0.6	61.0	<0.1	<0.2	37.0	<0.2	61	4700
D034	<5	<0.05	4.8	0.6	7.2	<0.1	0.2	20.5	<0.2	55	1380
D035	15	<0.05	3.0	0.8	52.4	<0.1	0.2	35.0	<0.2	66	2900
D036	<5	<0.05	2.8	0.6	24.0	<0.1	<0.2	28.0	<0.2	46	3900
D037	<5	<0.05	3.0	0.6	36.0	<0.1	0.2	33.0	<0.2	79	2000
D038	<5	<0.05	0.8	0.6	30.2	<0.1	<0.2	34.5	<0.2	67	3450
D039	<5	<0.05	2.0	0.6	34.4	0.1	<0.2	34.5	<0.2	80	1800
D040	<5	<0.05	1.2	0.8	52.8	<0.1	<0.2	34.5	<0.2	81	2700
D041	<5	<0.05	2.6	0.4	37.0	<0.1	<0.2	30.5	<0.2	76	1980
D042	<5	<0.05	1.2	0.2	59.8	0.1	<0.2	32.5	<0.2	72	2450
D043	<5	<0.05	3.0	0.4	32.4	<0.1	0.2	33.5	<0.2	70	2700
D044	<5	<0.05	2.4	0.2	33.8	0.1	<0.2	32.5	<0.2	80	4200
D045	<5	<0.05	1.8	0.8	58.2	<0.1	<0.2	42.5	<0.2	115	2600
D046	<5	<0.05	1.0	0.6	54.4	<0.1	0.2	39.5	0.2	103	3300
D047	<5	<0.05	1.2	1.0	37.0	0.1	0.2	32.5	<0.2	74	2100
D048	<5	<0.05	1.4	0.6	63.2	<0.1	<0.2	45.5	<0.2	121	2000
D049	<5	<0.05	2.0	0.8	68.2	0.2	<0.2	35.5	<0.2	84	2900
D050	<5	<0.05	2.2	0.4	22.2	<0.1	0.2	31.0	<0.2	79	1520
D051	<5	<0.05	2.4	0.6	19.6	<0.1	0.2	29.5	<0.2	76	1640
D052	<5	<0.05	3.4	0.6	9.2	0.1	0.2	25.5	0.2	62	1480
D053	<5	<0.05	1.8	1.0	46.6	<0.1	<0.2	45.5	<0.2	110	1120
D054	<5	<0.05	2.6	1.0	48.4	<0.1	0.2	40.5	0.2	111	1130
D055	<5	<0.05	2.8	2.0	11.6	<0.1	0.4	28.0	<0.2	150	1300
D056	40	<0.05	0.8	0.8	44.0	0.2	0.2	32.5	<0.2	102	1560
D057	<5	<0.05	1.4	1.2	73.0	<0.1	0.2	46.0	<0.2	170	2700
D058	<5	<0.05	1.4	1.0	57.6	<0.1	0.2	40.5	<0.2	156	3000
D059	<5	<0.05	0.6	0.4	59.6	<0.1	0.2	20.5	<0.2	101	1450
D060	<5	<0.05	7.6	0.6	46.4	<0.1	0.2	37.0	0.2	106	1380
D061	<5	<0.05	3.4	0.2	17.2	<0.1	<0.2	8.5	0.4	60	230

App.1 Results of Chemical Analysis of Stream Sediments(12/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
D062	<5	<0.05	4.2	0.4	19.6	<0.1	0.2	14.0	0.6	91	380
D063	<5	<0.05	3.6	0.6	11.4	<0.1	0.2	26.0	0.2	93	1360
D064	<5	<0.05	5.6	0.4	21.4	<0.1	0.2	10.5	1.2	76	320
D065	<5	<0.05	2.0	0.4	21.8	<0.1	0.2	18.5	<0.2	89	290
D066	<5	<0.05	2.0	0.2	8.2	<0.1	0.2	7.5	<0.2	64	160
D067	<5	<0.05	3.6	0.6	10.2	<0.1	0.2	26.0	<0.2	56	1380
D068	<5	<0.05	5.8	0.6	65.2	<0.1	0.4	22.5	<0.2	101	840
D069	<5	<0.05	8.6	0.6	52.0	<0.1	0.8	19.5	<0.2	70	320
D070	<5	<0.05	11.2	0.8	42.6	0.1	0.6	29.5	0.2	111	680
D071	<5	<0.05	14.2	0.8	38.6	<0.1	1.2	38.5	0.4	102	700
D072	<5	<0.05	12.2	0.8	40.6	<0.1	0.6	24.0	1.2	100	520
D073	<5	<0.05	0.8	0.2	3.6	<0.1	0.2	4.5	<0.2	20	520
D074	<5	<0.05	125.5	3.2	7.8	<0.1	0.2	25.0	1.4	59	880
D075	<5	0.05	99.6	0.6	7.6	<0.1	0.2	26.0	1.2	43	800
D076	<5	<0.05	13.0	0.2	32.2	<0.1	0.4	9.5	0.4	60	400
D077	<5	<0.05	81.8	5.2	10.8	0.1	0.2	23.5	0.8	41	760
D078	<5	0.05	116.0	12.6	6.6	<0.1	0.2	27.5	1.2	47	830
D079	<5	<0.05	6.6	0.2	30.2	<0.1	<0.2	2.0	0.2	43	110
D080	<5	<0.05	17.6	0.2	14.2	<0.1	<0.2	9.5	0.2	27	340
D081	<5	<0.05	60.2	0.4	6.4	<0.1	0.2	25.5	0.8	44	780
D082	<5	<0.05	3.4	<0.2	16.6	<0.1	<0.2	4.0	0.2	21	60
D083	30	<0.05	4.6	0.2	13.2	<0.1	<0.2	3.0	<0.2	34	320
D084	<5	<0.05	1.8	0.4	5.2	<0.1	<0.2	7.5	<0.2	30	700
D085	<5	<0.05	3.8	0.4	20.0	0.1	<0.2	6.0	<0.2	29	410
D086	<5	<0.05	0.6	<0.2	8.6	<0.1	<0.2	3.5	<0.2	31	400
D087	<5	<0.05	2.2	0.2	4.8	<0.1	<0.2	8.0	<0.2	29	760
D088	<5	<0.05	2.0	<0.2	8.8	<0.1	<0.2	3.0	<0.2	36	440
D089	<5	<0.05	1.0	<0.2	6.6	<0.1	<0.2	3.5	<0.2	43	460
D090	<5	<0.05	2.6	0.2	5.0	<0.1	<0.2	11.0	<0.2	32	780
D091	<5	<0.05	0.8	5.4	3.4	<0.1	<0.2	6.5	<0.2	21	490
D092	<5	<0.05	0.8	2.0	3.6	<0.1	<0.2	9.5	<0.2	23	450
D093	<5	<0.05	1.0	0.6	4.8	<0.1	0.2	4.5	<0.2	55	610
D094	<5	<0.05	0.8	0.8	3.4	<0.1	<0.2	6.0	<0.2	21	440
D095	<5	<0.05	1.2	0.4	4.0	<0.1	<0.2	6.0	<0.2	25	440
D096	<5	<0.05	0.8	1.0	3.8	<0.1	<0.2	5.5	<0.2	29	660
D097	<5	<0.05	1.8	1.8	4.0	<0.1	<0.2	5.0	<0.2	24	520
D098	<5	<0.05	1.4	0.4	3.8	<0.1	<0.2	5.5	<0.2	25	520
D099	<5	<0.05	2.0	3.0	5.0	<0.1	<0.2	10.5	<0.2	33	800
D100	<5	<0.05	1.4	<0.2	8.8	<0.1	<0.2	2.0	<0.2	35	300
D101	<5	<0.05	2.2	1.8	5.4	<0.1	<0.2	3.5	<0.2	36	480
E001	<5	0.05	39.0	1.8	7.0	0.1	0.4	33.0	0.4	48	1220
E002	<5	0.05	34.6	2.0	6.6	<0.1	0.4	30.5	0.2	46	1180
E003	<5	0.05	16.2	0.8	13.0	<0.1	<0.2	24.5	0.8	59	780
E004	<5	0.05	30.0	2.2	8.0	<0.1	0.2	36.0	0.4	47	1120
E006	<5	<0.05	6.4	0.8	4.0	<0.1	<0.2	6.5	<0.2	28	500
E007	<5	0.05	35.8	15.6	8.6	<0.1	0.2	51.0	0.4	44	1060
E009	<5	<0.05	22.0	1.6	7.2	<0.1	0.2	28.0	0.2	44	1140
E010	<5	<0.05	6.0	0.6	4.0	<0.1	<0.2	11.5	<0.2	38	660
E011	<5	0.05	31.0	0.8	5.6	<0.1	<0.2	22.0	2.4	56	700

App.1 Results of Chemical Analysis of Stream Sediments(13/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
E012	<5	<0.05	33.4	0.6	7.2	<0.1	<0.2	14.0	1.0	65	560
E013	<5	0.05	15.8	1.6	8.4	0.1	0.2	48.5	0.2	68	850
E014	<5	0.05	45.0	2.8	9.0	0.1	0.4	46.0	0.6	51	1060
E015	<5	0.20	7.8	8.4	11.4	<0.1	<0.2	61.5	0.2	107	840
E016	<5	0.05	3.4	6.0	6.0	<0.1	<0.2	28.0	<0.2	62	780
E017	<5	0.10	61.0	17.4	10.6	0.2	1.2	92.5	0.8	61	1050
E018	<5	<0.05	12.6	4.0	9.6	<0.1	<0.2	33.5	<0.2	62	540
E019	<5	<0.05	7.0	1.2	5.8	0.1	<0.2	34.0	<0.2	91	440
E020	<5	<0.05	5.0	0.8	5.6	<0.1	<0.2	16.0	<0.2	75	580
E021	<5	0.05	7.6	0.8	11.0	<0.1	<0.2	29.0	0.4	59	740
E022	<5	0.05	24.2	1.0	16.8	<0.1	0.2	24.5	1.2	62	830
E024	<5	0.05	1.4	8.8	7.2	<0.1	<0.2	39.0	<0.2	53	640
E025	<5	0.05	7.8	0.6	11.2	<0.1	<0.2	28.5	0.2	61	780
E026	<5	0.05	0.6	1.2	8.2	0.3	<0.2	31.5	<0.2	54	780
E027	<5	<0.05	25.4	0.8	3.2	<0.1	<0.2	16.5	1.0	33	720
E028	<5	<0.05	5.0	1.4	1.8	<0.1	<0.2	9.5	0.2	27	600
E029	<5	0.05	15.6	0.6	1.8	<0.1	<0.2	11.0	0.6	32	560
E031	<5	<0.05	22.8	0.6	4.4	<0.1	<0.2	17.5	1.6	35	730
E032	<5	<0.05	25.0	1.0	6.4	<0.1	0.4	28.0	0.2	42	1250
E033	<5	0.10	28.4	6.6	10.6	<0.1	0.4	51.5	0.8	53	650
E034	<5	<0.05	23.8	0.8	5.2	<0.1	<0.2	27.5	2.0	42	680
E036	<5	<0.05	20.4	0.6	3.4	<0.1	<0.2	21.0	1.0	38	840
E038	<5	<0.05	20.8	0.8	5.8	<0.1	0.2	24.5	0.2	35	1200
E039	<5	<0.05	12.8	0.6	2.2	<0.1	<0.2	17.5	0.2	26	740
E041	<5	<0.05	22.8	1.0	6.2	<0.1	0.4	28.5	0.2	43	1220
E042	<5	<0.05	17.4	0.4	2.8	<0.1	<0.2	15.5	0.2	25	1040
E043	<5	<0.05	11.6	0.4	3.2	<0.1	<0.2	11.0	<0.2	36	960
E044	<5	<0.05	1.8	1.0	2.8	<0.1	<0.2	8.5	<0.2	45	640
E045	<5	0.05	15.8	0.6	15.0	<0.1	0.2	25.0	1.2	63	820
E046	<5	<0.05	5.2	1.6	5.6	<0.1	<0.2	23.0	<0.2	49	730
E047	<5	<0.05	1.8	0.8	2.4	<0.1	<0.2	20.0	<0.2	47	620
E048	<5	<0.05	13.4	0.4	37.8	0.2	0.2	16.5	1.8	90	940
E049	<5	<0.05	1.6	0.2	5.0	<0.1	<0.2	8.0	<0.2	32	260
E050	<5	<0.05	5.2	0.6	21.8	<0.1	0.2	25.0	0.2	92	1440
E051	<5	<0.05	5.6	0.4	21.0	0.3	0.2	28.5	0.2	117	1240
E052	<5	<0.05	3.4	0.2	20.6	<0.1	0.2	10.5	<0.2	63	140
E053	430	<0.05	5.2	0.4	20.0	<0.1	0.2	13.0	<0.2	87	160
E054	<5	0.70	5.4	0.8	24.4	<0.1	0.2	29.5	<0.2	157	1200
E055	<5	<0.05	0.4	<0.2	30.8	<0.1	<0.2	4.5	<0.2	63	80
E056	<5	<0.05	3.8	0.4	24.8	<0.1	0.4	9.5	<0.2	84	190
E057	<5	0.70	4.4	0.8	24.8	7.3	1.2	37.0	0.2	120	1330
E058	<5	<0.05	5.4	0.4	14.4	<0.1	0.4	16.5	<0.2	77	800
E059	<5	<0.05	6.6	0.4	18.4	<0.1	0.4	26.5	<0.2	93	820
E061	<5	<0.05	10.2	0.2	24.2	0.3	0.2	16.0	<0.2	90	860
E062	<5	<0.05	5.6	0.4	36.8	<0.1	0.4	23.0	<0.2	94	1020
E063	<5	<0.05	4.6	1.2	23.8	<0.1	0.2	26.0	<0.2	85	1460
E065	<5	<0.05	1.2	0.2	7.0	<0.1	0.2	20.5	<0.2	74	860
E066	<5	<0.05	4.8	0.6	19.0	<0.1	0.2	30.0	<0.2	82	1390
E067	<5	<0.05	3.8	0.6	18.0	<0.1	0.2	25.5	<0.2	102	1320

App. 1 Results of Chemical Analysis of Stream Sediments(14/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
E068	<5	0.05	5.2	0.6	16.6	<0.1	1.4	67.0	<0.2	127	1980
E069	<5	<0.05	3.0	0.6	16.6	<0.1	1.0	71.5	<0.2	139	1700
E070	<5	<0.05	4.8	0.4	21.0	<0.1	0.2	26.5	0.2	84	1380
E071	<5	0.05	3.6	0.4	15.4	<0.1	0.8	66.5	<0.2	163	1660
E072	<5	<0.05	2.8	0.6	9.2	0.2	0.4	23.5	<0.2	241	1280
E073	<5	<0.05	11.6	0.2	32.2	<0.1	0.4	18.5	1.2	83	1060
E074	<5	<0.05	4.0	0.4	26.0	<0.1	0.2	17.0	<0.2	68	420
E076	25	<0.05	3.0	0.2	30.2	<0.1	0.2	10.0	<0.2	69	340
E077	<5	<0.05	3.8	0.2	22.4	<0.1	0.2	12.5	<0.2	68	400
E080	<5	<0.05	4.6	0.2	32.6	<0.1	0.4	12.5	<0.2	73	400
E081	<5	<0.05	11.0	0.4	32.0	<0.1	0.4	18.5	1.2	91	1180
E083	<5	<0.05	4.6	0.2	32.4	<0.1	0.6	16.5	<0.2	92	500
E085	<5	<0.05	12.0	0.4	35.6	<0.1	0.4	21.5	2.2	88	1430
E086	<5	<0.05	6.8	0.2	36.4	<0.1	0.4	16.0	0.2	74	620
E087	<5	<0.05	12.4	0.4	34.4	0.1	0.4	19.0	1.4	82	1160
E088	<5	<0.05	7.0	0.4	36.0	<0.1	0.4	14.5	0.2	86	620
E089	<5	<0.05	7.6	0.6	18.4	<0.1	1.0	36.5	0.4	93	1360
E091	<5	<0.05	6.6	0.4	30.0	<0.1	<0.2	14.5	0.2	83	260
E092	<5	<0.05	16.6	0.4	24.4	<0.1	0.2	14.5	1.2	84	580
E093	<5	<0.05	16.4	0.4	23.6	<0.1	0.2	14.0	1.0	79	540
E094	<5	<0.05	16.8	0.4	23.8	<0.1	0.2	14.5	1.0	82	570
E095	<5	<0.05	15.2	0.6	32.8	<0.1	0.2	15.5	1.0	91	420
E096	<5	<0.05	18.6	0.2	23.4	<0.1	0.2	13.0	1.2	78	720
E097	<5	<0.05	19.4	0.4	22.8	<0.1	0.2	13.5	1.4	78	660
E098	<5	<0.05	17.2	0.4	22.8	<0.1	0.2	14.0	1.2	80	620
E099	<5	<0.05	18.4	0.4	24.6	<0.1	0.2	14.5	1.2	83	640
E100	<5	<0.05	17.4	0.2	26.0	<0.1	0.2	15.5	1.4	84	610
E101	<5	<0.05	15.4	0.2	22.0	<0.1	0.2	14.0	1.2	87	720
E102	<5	<0.05	16.2	0.4	22.0	<0.1	0.2	13.5	1.2	79	680
E103	<5	<0.05	13.0	0.4	28.4	<0.1	0.2	16.5	0.8	79	560
E104	<5	<0.05	15.6	0.2	21.2	<0.1	0.2	14.0	1.2	79	680
E105	<5	<0.05	15.4	0.2	21.8	<0.1	0.2	14.0	1.6	74	770
E106	<5	<0.05	14.2	0.4	21.4	<0.1	0.2	13.0	1.2	75	800
E107	<5	<0.05	15.6	0.4	20.8	0.2	0.2	14.0	1.2	74	760
E108	<5	<0.05	15.2	0.2	25.2	0.1	0.2	13.5	1.2	78	620
E109	<5	<0.05	16.8	0.2	39.0	<0.1	0.2	21.5	4.4	63	2400
E110	<5	<0.05	15.0	0.8	28.8	<0.1	0.2	32.0	5.4	114	1100
E111	<5	<0.05	16.4	0.6	29.0	<0.1	0.2	24.5	5.0	73	2300
E112	<5	<0.05	18.8	1.0	36.8	0.1	0.2	23.0	5.2	70	2300
E113	<5	<0.05	19.6	0.4	35.6	0.1	0.2	24.0	5.8	67	2450
E114	<5	<0.05	16.4	0.4	46.2	<0.1	0.2	22.5	5.4	67	2400
E115	<5	<0.05	13.4	0.2	21.0	<0.1	0.2	14.5	1.2	79	880
E116	<5	<0.05	15.0	0.4	39.2	<0.1	0.2	23.0	3.2	72	1840
E117	<5	<0.05	19.8	0.2	52.2	0.3	0.4	14.0	2.0	102	240
E118	<5	<0.05	20.6	0.4	30.0	<0.1	0.2	24.5	5.6	77	1840
E119	<5	<0.05	16.4	0.2	43.6	<0.1	0.2	24.0	4.2	68	2400
E120	<5	<0.05	14.2	0.2	42.8	<0.1	0.2	23.0	4.0	66	1600
E121	<5	<0.05	13.4	0.4	31.2	<0.1	0.2	21.5	3.2	73	2500
E122	<5	<0.05	16.2	0.4	35.4	<0.1	0.2	23.5	4.0	73	1960

App. 1 Results of Chemical Analysis of Stream Sediments(15/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
E123	<5	<0.05	15.0	0.4	39.2	<0.1	0.2	23.5	3.8	67	2300
E124	<5	<0.05	10.4	0.6	28.4	<0.1	0.2	26.0	0.4	78	900
E125	<5	<0.05	9.4	0.4	26.6	<0.1	0.2	17.0	0.4	77	650
E126	<5	<0.05	18.0	0.4	35.6	<0.1	<0.2	16.0	0.6	80	280
E127	<5	<0.05	20.4	0.6	36.4	<0.1	0.2	17.0	0.8	81	240
E128	<5	<0.05	17.6	0.6	35.4	0.1	0.2	17.0	0.6	81	290
E129	<5	<0.05	18.6	0.4	35.0	<0.1	0.2	17.5	0.6	83	300
E130	<5	<0.05	13.8	0.4	40.4	<0.1	0.2	14.5	0.6	86	240
E131	<5	<0.05	17.2	0.4	38.0	<0.1	0.2	18.5	0.6	84	150
E132	<5	<0.05	18.6	0.4	26.4	0.1	0.2	15.0	1.0	78	630
E133	<5	<0.05	5.0	0.6	20.8	<0.1	0.2	20.5	<0.2	73	980
E134	<5	<0.05	3.2	1.0	20.0	<0.1	0.2	45.0	<0.2	77	2000
E135	<5	<0.05	11.8	0.2	28.0	<0.1	0.2	13.0	0.4	80	350
E136	<5	0.05	66.0	0.8	8.2	<0.1	0.2	20.5	0.6	38	720
E137	690	0.05	12.8	0.4	39.2	<0.1	0.8	18.5	0.2	87	860
E138	<5	0.05	12.0	0.4	39.6	<0.1	0.8	20.0	0.2	88	880
E139	<5	<0.05	11.2	0.6	36.8	<0.1	0.6	16.0	<0.2	83	980
E140	<5	<0.05	5.6	0.2	30.4	<0.1	0.4	11.0	<0.2	62	500
E141	<5	<0.05	11.6	0.6	39.2	<0.1	0.6	16.5	0.4	84	920
E143	<5	<0.05	7.8	0.6	28.2	<0.1	0.4	16.0	<0.2	67	1020
E144	<5	0.05	17.4	1.2	47.0	<0.1	0.8	20.5	0.4	101	850
E145	<5	<0.05	6.2	0.6	25.0	<0.1	0.4	16.0	<0.2	63	1180
E147	<5	<0.05	3.2	0.2	32.2	0.1	0.4	11.5	<0.2	85	700
E148	70	0.05	15.4	0.8	45.4	<0.1	0.8	23.0	0.4	100	930
E149	<5	0.05	15.6	0.6	44.8	<0.1	0.8	20.0	0.4	97	960
E150	<5	<0.05	4.8	0.4	42.6	<0.1	0.4	10.0	<0.2	75	520
E151	<5	0.05	16.8	0.8	43.4	0.1	0.8	21.5	0.4	100	1060
E153	<5	<0.05	5.8	0.4	47.2	<0.1	0.8	14.0	<0.2	76	440
E154	<5	0.05	16.4	0.6	40.6	<0.1	0.6	22.5	0.6	108	1280
E155	100	0.05	16.6	0.4	35.0	<0.1	0.6	24.5	0.6	97	1240
E156	<5	0.05	18.6	0.6	58.2	<0.1	1.2	35.0	0.4	147	880
E157	<5	<0.05	10.2	0.4	25.2	<0.1	0.4	20.0	0.2	76	1460
E158	20	<0.05	5.6	0.6	45.0	<0.1	0.8	13.5	<0.2	82	480
E160	<5	<0.05	7.2	0.2	24.2	<0.1	0.4	14.5	0.2	60	1200
E161	<5	<0.05	6.0	<0.2	21.2	0.2	0.4	14.0	0.2	57	1220
E162	<5	<0.05	2.6	<0.2	23.2	<0.1	0.2	9.0	<0.2	56	700
E163	<5	<0.05	4.2	0.4	19.2	<0.1	0.2	15.5	<0.2	63	1260
E165	<5	<0.05	3.0	0.2	33.4	<0.1	0.4	9.0	<0.2	61	370
E166	<5	<0.05	5.0	0.4	39.0	<0.1	0.2	13.0	<0.2	75	490
E167	<5	<0.05	3.4	0.2	18.0	<0.1	0.2	15.5	<0.2	56	1420
E168	<5	<0.05	2.8	<0.2	16.8	<0.1	0.2	14.0	<0.2	50	1400
E169	<5	<0.05	2.6	0.2	14.8	<0.1	0.2	14.0	<0.2	52	1540
E170	<5	0.05	23.2	0.6	57.6	<0.1	1.4	26.5	0.6	130	560
E171	<5	<0.05	8.0	0.2	43.4	<0.1	0.4	11.0	0.4	72	380
E172	<5	<0.05	1.6	<0.2	14.4	<0.1	0.2	12.5	<0.2	45	1430
E173	<5	<0.05	2.2	0.2	14.2	<0.1	0.2	12.0	<0.2	46	1440
E174	<5	<0.05	7.4	<0.2	24.6	<0.1	0.4	13.5	0.2	63	660
E175	<5	<0.05	0.8	<0.2	12.2	<0.1	<0.2	9.5	<0.2	40	1400
E176	<5	<0.05	1.8	<0.2	11.6	<0.1	0.2	14.0	<0.2	46	1660

App.1 Results of Chemical Analysis of Stream Sediments(16/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
E177	<5	<0.05	5.0	0.2	14.6	<0.1	0.4	11.0	<0.2	41	840
E178	<5	<0.05	1.2	0.2	9.8	<0.1	0.2	16.5	<0.2	53	1820
E179	<5	<0.05	0.4	<0.2	9.8	<0.1	<0.2	14.5	<0.2	37	1900
E180	<5	<0.05	0.4	0.2	6.4	<0.1	0.4	18.0	<0.2	66	1720
E181	<5	<0.05	0.8	0.2	5.4	<0.1	<0.2	20.5	<0.2	44	2500
E182	<5	<0.05	1.0	<0.2	8.8	<0.1	<0.2	8.5	<0.2	31	1190
E183	<5	<0.05	0.6	0.2	3.0	<0.1	0.2	22.0	<0.2	50	2650
E184	<5	<0.05	2.2	<0.2	33.4	0.3	<0.2	6.0	<0.2	48	390
E185	<5	<0.05	0.6	<0.2	4.8	<0.1	<0.2	22.0	<0.2	42	2800
E186	<5	<0.05	0.4	<0.2	1.4	<0.1	<0.2	5.5	<0.2	14	1120
E187	<5	<0.05	0.8	0.2	5.6	<0.1	<0.2	16.0	<0.2	34	2100
E188	<5	<0.05	1.2	0.4	5.4	<0.1	<0.2	11.5	<0.2	29	1440
E189	<5	<0.05	15.0	0.4	42.4	<0.1	0.4	13.0	1.4	65	680
E190	<5	<0.05	1.6	0.4	6.0	<0.1	<0.2	13.0	<0.2	22	1700
E191	<5	<0.05	0.2	<0.2	1.4	<0.1	<0.2	8.0	<0.2	15	1840
E192	<5	<0.05	5.0	0.2	9.2	0.1	0.2	15.5	<0.2	33	1300
E193	<5	<0.05	1.6	0.2	2.2	<0.1	0.2	19.0	<0.2	19	2700
E194	<5	<0.05	1.0	0.2	8.4	<0.1	<0.2	15.5	<0.2	53	3000
E195	<5	<0.05	2.0	0.2	8.8	<0.1	<0.2	8.5	<0.2	28	1080
E196	385	<0.05	3.4	0.2	20.6	<0.1	<0.2	16.5	0.2	66	2200
E197	80	<0.05	5.2	0.2	21.8	<0.1	0.2	16.5	0.2	62	1480
E198	70	<0.05	5.2	0.2	18.8	<0.1	0.2	20.0	0.2	58	1580
E199	275	0.05	12.4	0.2	43.8	<0.1	0.6	23.5	0.2	112	1160
E200	<5	0.05	18.6	0.4	54.0	<0.1	0.8	26.5	0.4	125	1100
E201	<5	<0.05	10.2	0.2	28.4	0.1	0.4	21.0	0.6	81	1330
E202	<5	<0.05	3.6	<0.2	16.0	<0.1	0.2	15.0	<0.2	44	1710
E203	505	0.40	8.2	<0.2	67.0	0.1	0.2	8.5	1.6	124	400
E204	<5	<0.05	1.8	<0.2	13.0	<0.1	<0.2	13.0	<0.2	37	1820
E205	<5	<0.05	1.8	0.2	11.0	<0.1	<0.2	13.5	<0.2	37	1960
E206	20	0.05	16.8	0.2	47.4	<0.1	0.4	18.5	1.0	97	980
E207	<5	0.10	13.2	0.4	30.4	0.1	0.4	31.5	1.6	116	1740
E208	<5	<0.05	5.8	<0.2	19.6	<0.1	0.2	12.0	0.4	46	1140
E209	<5	<0.05	1.4	<0.2	10.2	<0.1	<0.2	15.0	<0.2	37	1920
E210	<5	<0.05	1.2	<0.2	3.6	<0.1	<0.2	5.0	<0.2	20	960
E211	<5	<0.05	0.6	<0.2	13.4	<0.1	<0.2	11.0	<0.2	35	1600
F001	<5	<0.05	1.4	0.6	1.8	<0.1	<0.2	12.5	<0.2	25	1480
F002	<5	<0.05	1.8	0.8	4.4	<0.1	<0.2	17.0	<0.2	26	1500
F003	<5	0.05	8.8	8.8	11.6	<0.1	0.2	16.5	<0.2	34	640
F005	<5	0.05	7.0	6.8	9.0	<0.1	0.2	16.0	<0.2	32	660
F006	<5	<0.05	0.8	0.6	12.6	0.1	<0.2	4.5	<0.2	14	600
F007	<5	<0.05	2.8	1.6	8.2	<0.1	<0.2	13.5	<0.2	27	1030
F009	<5	0.05	13.6	3.6	8.8	<0.1	0.2	26.0	<0.2	35	640
F010	<5	<0.05	3.4	1.4	15.0	<0.1	<0.2	9.5	<0.2	23	420
F012	<5	0.05	6.0	5.2	6.2	<0.1	<0.2	17.5	<0.2	32	860
F013	<5	0.05	14.4	4.8	7.8	<0.1	0.2	21.0	<0.2	35	620
F014	<5	<0.05	1.2	0.8	14.0	<0.1	<0.2	5.5	<0.2	23	640
F015	<5	<0.05	1.6	1.0	5.0	<0.1	<0.2	12.5	<0.2	39	620
F016	<5	0.05	11.6	2.2	7.4	<0.1	<0.2	19.0	<0.2	36	570
F018	<5	<0.05	1.2	1.0	4.2	<0.1	<0.2	14.5	<0.2	33	660

App.1 Results of Chemical Analysis of Stream Sediments(17/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
F019	<5	<0.05	2.2	2.4	9.0	<0.1	<0.2	7.0	<0.2	20	1000
F020	<5	<0.05	1.0	4.4	4.4	<0.1	<0.2	9.5	<0.2	33	560
F021	<5	0.05	8.6	1.6	9.4	<0.1	0.2	20.5	<0.2	41	700
F022	<5	<0.05	1.0	0.6	4.6	<0.1	<0.2	8.0	<0.2	25	1040
F023	<5	<0.05	1.4	1.0	7.2	<0.1	<0.2	7.0	<0.2	28	840
F024	<5	<0.05	0.6	0.8	4.0	<0.1	<0.2	11.5	<0.2	36	540
F025	<5	0.05	5.4	2.6	7.2	0.1	0.2	25.0	<0.2	37	740
F026	<5	0.05	11.8	2.0	8.8	<0.1	0.2	23.5	<0.2	41	660
F027	<5	<0.05	1.8	0.6	5.8	0.1	<0.2	8.5	<0.2	31	580
F029	<5	0.05	15.6	4.0	9.4	<0.1	0.6	26.0	<0.2	44	640
F030	<5	<0.05	3.2	1.0	5.0	0.2	<0.2	13.0	<0.2	37	550
F031	<5	<0.05	2.6	2.6	3.8	<0.1	<0.2	13.0	<0.2	30	460
F032	<5	0.15	1.6	3.8	13.0	<0.1	2.0	60.0	<0.2	47	640
F033	<5	<0.05	0.8	0.8	3.4	<0.1	<0.2	10.0	<0.2	33	560
F034	<5	0.10	13.8	3.2	9.2	<0.1	0.2	23.5	<0.2	42	700
F035	<5	<0.05	8.4	11.8	7.0	<0.1	<0.2	14.5	<0.2	34	740
F036	<5	0.05	12.2	1.6	8.8	<0.1	0.2	24.0	<0.2	44	650
F037	<5	<0.05	3.2	3.2	6.0	<0.1	<0.2	8.0	<0.2	30	520
F038	<5	0.05	15.0	15.0	8.4	<0.1	0.2	12.0	<0.2	37	660
F039	<5	0.05	19.8	10.8	9.8	<0.1	1.2	30.5	<0.2	44	640
F041	<5	0.10	51.0	10.6	12.0	0.1	0.4	58.0	<0.2	53	740
F042	<5	0.05	2.6	4.8	7.6	0.1	<0.2	11.5	<0.2	33	560
F044	<5	0.10	10.6	2.0	13.8	<0.1	0.2	33.0	<0.2	55	680
F045	<5	0.05	5.6	5.8	11.0	<0.1	0.2	13.0	<0.2	40	600
F046	<5	<0.05	7.8	2.0	6.4	<0.1	<0.2	11.5	<0.2	40	660
F047	<5	0.05	16.4	1.8	9.2	<0.1	0.2	22.5	0.2	39	740
F048	<5	0.05	12.2	1.8	9.8	<0.1	0.2	26.5	<0.2	44	640
F049	<5	<0.05	12.4	2.0	12.6	<0.1	0.2	17.0	<0.2	40	640
F050	<5	<0.05	5.6	0.6	17.0	<0.1	<0.2	7.5	<0.2	43	540
F051	<5	<0.05	7.8	2.0	10.8	<0.1	<0.2	16.5	<0.2	44	660
F052	<5	0.05	7.6	2.0	13.8	<0.1	<0.2	13.0	<0.2	39	640
F053	<5	<0.05	4.8	2.6	35.2	<0.1	<0.2	47.5	<0.2	51	1850
F054	<5	<0.05	5.2	0.6	12.2	<0.1	0.2	15.5	0.2	49	2000
F055	<5	<0.05	5.0	3.0	37.4	<0.1	<0.2	35.0	0.2	30	1680
F056	<5	<0.05	19.8	0.4	105.5	<0.1	2.0	36.5	0.6	118	790
F058	90	<0.05	3.4	1.2	9.6	<0.1	<0.2	26.0	<0.2	60	1800
F059	<5	<0.05	3.0	0.4	5.4	<0.1	<0.2	15.0	<0.2	38	1500
F061	<5	<0.05	5.0	1.6	14.4	<0.1	<0.2	32.0	<0.2	41	1100
F062	45	<0.05	8.4	1.2	38.6	<0.1	0.4	20.5	<0.2	110	1000
F063	<5	<0.05	3.8	1.6	7.0	<0.1	0.2	25.5	<0.2	105	1920
F064	<5	<0.05	2.2	1.6	78.0	<0.1	0.2	25.0	<0.2	107	1760
F065	<5	<0.05	3.6	1.2	8.2	<0.1	<0.2	21.5	<0.2	43	1820
F066	<5	<0.05	2.6	3.0	35.6	<0.1	<0.2	35.0	<0.2	128	2200
F067	<5	<0.05	4.4	0.4	7.2	<0.1	0.2	18.5	<0.2	48	1700
F069	<5	<0.05	8.2	2.6	30.6	<0.1	<0.2	36.5	0.2	46	1620
F070	<5	<0.05	5.0	0.8	11.8	<0.1	0.2	20.5	<0.2	57	1980
F071	<5	<0.05	3.8	2.0	37.4	17.1	<0.2	31.0	0.2	50	2000
F072	<5	<0.05	8.0	0.8	27.6	<0.1	0.6	28.0	<0.2	68	2100
F073	<5	<0.05	3.2	2.0	37.4	0.2	<0.2	26.5	0.2	46	1780

App. 1 Results of Chemical Analysis of Stream Sediments(18/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
F074	<5	<0.05	31.4	0.8	160.5	0.3	3.4	51.0	1.0	170	780
F075	<5	<0.05	3.8	1.8	17.6	<0.1	<0.2	36.0	0.4	58	1640
F076	<5	<0.05	4.8	1.2	46.4	0.7	<0.2	21.0	0.2	67	1840
F078	<5	<0.05	21.6	2.2	35.0	<0.1	0.2	24.0	1.0	63	1600
F079	<5	<0.05	23.0	1.2	37.6	<0.1	0.2	25.0	1.2	71	1660
F080	<5	<0.05	2.2	1.6	54.2	<0.1	<0.2	22.0	<0.2	72	2000
F083	<5	<0.05	41.8	0.8	20.8	<0.1	0.4	24.0	1.8	66	1530
F084	<5	<0.05	11.2	1.2	27.8	<0.1	<0.2	23.5	0.4	62	2800
F085	<5	<0.05	42.6	1.2	20.8	<0.1	0.4	24.5	1.8	68	1760
F086	<5	<0.05	9.6	2.0	45.6	<0.1	<0.2	24.5	0.6	60	2600
F088	<5	<0.05	47.4	2.2	20.2	<0.1	0.4	27.0	2.0	67	1620
F089	<5	<0.05	4.8	1.8	34.0	<0.1	0.2	33.5	<0.2	95	3900
F090	<5	<0.05	4.2	0.6	8.2	<0.1	0.2	22.5	0.2	52	1820
F092	<5	<0.05	4.8	0.2	8.4	<0.1	<0.2	8.0	<0.2	46	200
F093	<5	<0.05	4.6	0.2	15.2	<0.1	0.2	5.5	0.4	56	280
F094	<5	<0.05	3.2	0.2	7.4	0.4	0.2	10.5	<0.2	73	200
F095	<5	<0.05	3.6	0.8	10.4	9.8	0.2	24.5	<0.2	69	1780
F097	<5	<0.05	6.6	0.4	25.6	0.1	0.4	29.0	0.2	75	700
F098	<5	0.05	13.0	0.8	40.0	0.1	0.2	42.5	0.4	94	500
F099	<5	<0.05	10.4	0.8	36.2	0.2	0.2	40.5	0.4	87	380
F101	<5	<0.05	9.2	0.6	37.8	<0.1	0.6	22.0	0.2	122	710
F102	170	<0.05	2.8	1.2	36.2	<0.1	<0.2	26.5	<0.2	147	980
F103	35	<0.05	12.2	0.4	34.2	<0.1	0.2	16.5	2.6	82	1440
F104	<5	<0.05	6.2	0.4	33.0	<0.1	0.2	18.0	<0.2	113	630
F105	<5	<0.05	9.2	0.8	39.0	<0.1	0.4	21.0	0.2	96	600
F106	<5	<0.05	7.6	0.6	36.8	<0.1	0.4	20.0	0.2	90	700
F107	<5	<0.05	10.2	0.6	36.4	<0.1	0.2	18.0	0.8	80	1120
F108	<5	<0.05	9.8	0.6	35.6	<0.1	0.8	25.0	0.4	96	640
F109	<5	<0.05	4.2	0.6	27.0	<0.1	0.6	18.0	<0.2	82	830
F110	40	<0.05	8.2	0.6	37.2	<0.1	0.4	16.5	<0.2	87	520
F111	<5	<0.05	47.4	0.8	59.6	<0.1	0.6	17.5	0.6	104	560
F112	40	<0.05	76.0	0.8	37.8	0.1	1.4	29.0	1.4	96	580
F113	<5	<0.05	21.2	0.4	21.8	<0.1	0.8	27.5	0.2	118	680
F114	<5	0.05	42.4	0.6	44.2	<0.1	1.2	29.0	1.0	124	620
F115	<5	0.05	35.6	0.6	52.8	<0.1	1.0	27.5	0.8	135	560
F116	75	<0.05	10.4	1.2	85.0	<0.1	1.4	22.0	<0.2	101	740
F117	1060	<0.05	15.2	1.2	36.0	<0.1	0.4	22.0	2.2	86	1420
F118	<5	<0.05	13.6	0.4	35.8	<0.1	0.2	16.5	1.8	81	1280
F119	<5	<0.05	7.4	1.0	24.4	<0.1	0.4	21.5	0.2	62	820
F120	<5	<0.05	13.8	0.2	20.8	<0.1	0.6	18.0	0.6	64	520
F121	<5	<0.05	3.8	0.4	17.0	<0.1	0.2	15.5	<0.2	72	840
F122	<5	<0.05	7.6	1.8	23.0	<0.1	0.6	19.0	0.2	54	760
F123	<5	<0.05	9.6	0.4	38.4	<0.1	0.2	14.0	0.2	75	490
F124	10	<0.05	9.6	1.6	25.2	<0.1	0.6	19.5	0.2	62	820
F125	<5	<0.05	15.4	0.4	35.0	<0.1	0.2	23.0	0.4	71	500
F126	<5	<0.05	8.4	2.0	23.6	<0.1	0.6	16.5	0.4	53	800
F127	<5	<0.05	8.6	1.6	21.6	<0.1	0.4	17.5	0.2	56	740
F128	1530	<0.05	7.0	2.4	20.4	<0.1	0.2	13.5	0.2	48	730
F129	<5	<0.05	2.8	0.6	18.2	<0.1	0.2	20.5	<0.2	54	720

App.1 Results of Chemical Analysis of Stream Sediments(19/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
F130	55	0.05	41.6	2.2	77.2	<0.1	1.8	36.5	2.2	58	1350
F131	<5	<0.05	2.4	0.6	20.4	<0.1	<0.2	11.5	<0.2	52	460
F132	140	<0.05	10.6	3.0	22.0	<0.1	0.4	32.5	0.2	43	1540
F133	<5	<0.05	5.4	1.4	18.4	<0.1	0.2	11.0	0.2	54	580
F134	<5	<0.05	2.6	2.0	13.2	<0.1	0.6	13.0	<0.2	30	1920
F135	<5	<0.05	1.6	0.2	20.2	<0.1	<0.2	11.5	<0.2	59	420
F136	<5	<0.05	2.4	0.2	22.6	<0.1	<0.2	11.0	<0.2	60	340
F137	<5	<0.05	6.0	1.2	21.4	<0.1	0.2	11.5	0.2	66	590
F138	<5	<0.05	2.8	2.4	12.0	<0.1	0.4	14.5	<0.2	33	2000
F139	<5	<0.05	1.8	0.2	7.8	<0.1	<0.2	4.0	<0.2	33	180
F140	<5	<0.05	2.8	2.8	13.0	<0.1	0.4	16.0	<0.2	38	1640
F141	<5	<0.05	3.0	2.6	15.2	<0.1	0.4	13.5	<0.2	34	1540
F142	<5	<0.05	4.6	<0.2	22.0	<0.1	<0.2	9.5	<0.2	63	280
F143	<5	<0.05	8.0	0.4	24.8	<0.1	0.2	12.0	0.4	74	340
F144	<5	<0.05	3.6	<0.2	25.0	<0.1	<0.2	10.5	<0.2	64	200
F145	<5	<0.05	3.8	4.0	12.6	<0.1	0.2	13.5	<0.2	32	1960
F146	<5	<0.05	9.8	0.8	23.0	<0.1	0.2	15.5	0.2	87	360
F147	<5	<0.05	3.8	0.2	18.4	<0.1	<0.2	6.5	<0.2	55	160
F148	<5	<0.05	10.4	0.4	29.4	<0.1	<0.2	11.5	0.8	75	220
F149	<5	<0.05	13.4	0.2	32.0	<0.1	0.2	14.5	1.4	85	260
F150	<5	<0.05	6.8	0.2	22.0	<0.1	0.4	17.5	<0.2	63	1660
F151	<5	<0.05	4.8	0.4	22.2	<0.1	0.2	15.5	<0.2	58	1600
F152	<5	<0.05	5.0	0.4	27.0	<0.1	0.4	12.0	<0.2	61	460
F154	<5	<0.05	7.6	1.2	22.2	<0.1	0.2	18.5	<0.2	66	1840
F155	<5	<0.05	6.4	0.4	38.6	<0.1	0.4	17.5	<0.2	83	700
F156	<5	<0.05	11.2	0.4	18.6	<0.1	0.4	23.0	<0.2	71	2100
F157	<5	<0.05	0.4	0.4	33.2	<0.1	<0.2	2.5	<0.2	42	140
F158	<5	<0.05	13.0	0.8	20.2	<0.1	0.4	28.0	<0.2	85	2200
F159	<5	<0.05	7.6	0.2	19.0	<0.1	0.4	23.0	<0.2	66	2300
F160	<5	<0.05	1.0	0.2	33.8	<0.1	<0.2	5.0	<0.2	48	260
F161	<5	<0.05	0.2	0.4	41.2	<0.1	<0.2	4.5	<0.2	52	160
F163	<5	<0.05	2.4	0.6	30.8	<0.1	0.2	9.5	<0.2	55	1200
F164	<5	<0.05	7.8	0.6	20.2	<0.1	0.4	23.5	<0.2	82	2200
F165	<5	<0.05	13.8	0.6	19.2	<0.1	0.4	35.5	<0.2	103	2400
F166	<5	<0.05	13.4	2.0	18.6	<0.1	0.4	25.0	<0.2	76	2150
F167	<5	<0.05	1.8	0.2	48.6	<0.1	0.2	8.0	<0.2	61	320
F169	<5	<0.05	5.2	0.2	24.6	<0.1	0.2	12.5	<0.2	63	860
F170	420	<0.05	12.0	0.6	19.8	<0.1	0.4	26.5	<0.2	79	2200
F171	<5	<0.05	10.0	0.4	17.4	<0.1	0.6	37.0	0.2	103	2700
F172	<5	<0.05	14.2	0.4	15.2	<0.1	0.6	34.0	<0.2	92	2800
F173	<5	<0.05	3.2	<0.2	21.6	<0.1	<0.2	10.5	<0.2	57	800
F174	<5	<0.05	13.6	0.6	17.4	<0.1	0.6	37.0	0.2	89	2800
F175	<5	<0.05	10.8	0.4	16.2	<0.1	0.6	31.0	<0.2	85	2700
F176	<5	<0.05	1.8	0.2	32.0	<0.1	0.2	10.0	<0.2	73	420
F177	<5	<0.05	19.2	0.6	17.2	<0.1	0.6	41.0	0.2	116	2600
F178	<5	<0.05	13.8	0.4	17.2	<0.1	0.6	35.5	0.2	102	2600
F179	<5	<0.05	10.2	0.4	16.6	<0.1	0.4	31.5	<0.2	84	2450
F180	<5	<0.05	5.8	0.4	30.6	<0.1	0.4	30.0	<0.2	98	1630
F181	<5	<0.05	12.2	1.0	16.2	<0.1	0.6	39.0	0.2	102	2750

App. 1 Results of Chemical Analysis of Stream Sediments(20/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
F182	<5	<0.05	9.4	0.4	34.6	<0.1	0.4	21.0	0.2	106	720
F183	<5	<0.05	7.0	0.4	29.8	0.1	0.4	21.5	0.2	85	1440
F184	<5	<0.05	11.8	0.4	15.2	<0.1	0.6	30.0	0.2	83	2800
F185	245	<0.05	2.0	2.8	5.2	<0.1	0.2	23.5	<0.2	57	3600
F186	<5	<0.05	7.8	0.8	14.8	0.1	0.6	31.0	0.2	117	2000
F187	<5	<0.05	16.0	0.4	15.6	<0.1	0.6	44.0	0.2	116	3000
F188	<5	<0.05	3.8	0.4	31.0	<0.1	0.4	9.5	<0.2	48	700
F189	<5	<0.05	3.4	0.2	30.8	<0.1	0.2	9.5	<0.2	50	700
F190	<5	<0.05	3.2	0.2	32.0	<0.1	0.2	9.0	<0.2	52	660
F191	<5	<0.05	3.8	0.2	34.8	<0.1	0.4	9.5	<0.2	55	640
F192	<5	<0.05	7.6	0.6	33.2	<0.1	0.8	17.5	<0.2	91	500
F193	<5	<0.05	3.2	0.2	32.6	<0.1	0.2	9.5	<0.2	52	700
F194	<5	<0.05	6.8	0.4	28.6	<0.1	0.4	14.0	0.2	67	360
F195	<5	<0.05	3.0	0.4	23.4	<0.1	0.2	8.0	<0.2	46	460
F196	<5	<0.05	7.2	0.2	46.6	<0.1	0.6	12.0	0.2	77	450
F197	<5	<0.05	2.6	0.4	28.6	<0.1	0.2	8.5	<0.2	46	720
F198	<5	<0.05	5.6	0.4	48.4	<0.1	0.2	11.5	<0.2	74	340
F199	<5	<0.05	3.2	0.2	36.6	<0.1	0.2	8.5	<0.2	61	400
F200	<5	<0.05	2.6	0.4	23.4	<0.1	0.2	9.5	<0.2	42	920
F201	<5	<0.05	2.2	0.2	16.6	<0.1	<0.2	10.0	<0.2	40	1140
F202	<5	<0.05	3.8	0.4	33.2	<0.1	0.2	8.0	<0.2	45	740
F203	<5	<0.05	4.2	0.4	34.2	<0.1	0.2	9.0	<0.2	52	740
F204	<5	<0.05	1.8	0.8	36.8	<0.1	<0.2	6.5	<0.2	58	280
F205	<5	<0.05	5.0	0.4	38.0	<0.1	0.4	11.5	<0.2	78	440
F206	<5	<0.05	3.2	0.2	35.4	<0.1	0.2	9.5	<0.2	54	730
F207	25	<0.05	1.4	0.4	46.2	<0.1	<0.2	3.5	<0.2	59	220
F208	<5	<0.05	6.2	0.2	48.4	<0.1	0.4	12.5	<0.2	77	380
F209	<5	<0.05	3.8	0.2	33.6	<0.1	0.2	10.0	<0.2	49	780
F210	<5	<0.05	<0.2	0.2	10.4	<0.1	<0.2	8.0	<0.2	26	770
F211	<5	<0.05	2.2	0.2	16.6	<0.1	0.2	9.0	<0.2	37	1140
F212	<5	<0.05	2.0	0.2	16.8	<0.1	<0.2	9.5	<0.2	42	1120
F213	<5	<0.05	8.2	0.4	44.2	<0.1	0.4	14.0	0.2	75	500
F214	<5	<0.05	0.8	<0.2	7.6	<0.1	<0.2	8.0	<0.2	26	1300
F215	<5	<0.05	4.2	0.2	34.6	<0.1	0.4	8.5	<0.2	49	660
F216	<5	<0.05	1.2	<0.2	5.6	<0.1	<0.2	9.0	<0.2	28	1440
F217	<5	<0.05	0.6	<0.2	5.0	<0.1	<0.2	9.5	<0.2	27	1640
F218	<5	<0.05	0.8	0.2	5.2	<0.1	<0.2	9.0	<0.2	27	1400
F219	<5	<0.05	1.0	0.2	5.0	<0.1	<0.2	8.0	<0.2	24	1320
G001	<5	<0.05	2.6	1.0	5.6	<0.1	<0.2	24.0	<0.2	52	1080
G002	<5	<0.05	3.4	1.0	4.6	<0.1	0.2	21.5	<0.2	51	1280
G003	<5	<0.05	3.0	0.8	4.4	<0.1	0.2	19.0	<0.2	48	1400
G004	<5	<0.05	25.2	2.2	12.2	<0.1	1.0	49.5	0.6	70	920
G005	<5	<0.05	3.8	0.6	5.4	<0.1	0.2	22.0	0.4	53	1260
G006	<5	<0.05	2.8	0.6	4.4	<0.1	<0.2	20.5	0.4	45	1460
G009	<5	<0.05	2.8	1.0	5.0	0.6	0.2	20.0	<0.2	58	1430
G010	<5	<0.05	12.4	2.6	43.0	<0.1	<0.2	25.0	0.4	71	1930
G011	<5	<0.05	66.4	0.6	31.4	<0.1	0.2	10.0	13.8	80	360
G012	<5	<0.05	14.4	2.4	41.8	<0.1	<0.2	23.5	0.4	66	1760
G013	<5	<0.05	13.4	2.6	41.4	<0.1	<0.2	22.5	0.8	68	1720

App. 1 Results of Chemical Analysis of Stream Sediments(21/21)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
G014	<5	<0.05	51.8	0.6	12.6	<0.1	<0.2	3.5	4.8	65	140
G015	<5	<0.05	255	1.2	29.0	<0.1	0.2	19.5	160.5	57	1800
G016	<5	<0.05	12.6	1.4	25.0	<0.1	<0.2	33.5	3.6	65	3100
G017	<5	<0.05	49.4	1.8	37.2	<0.1	0.2	22.5	25.0	69	1940
G018	<5	<0.05	19.0	1.2	11.0	<0.1	0.2	25.0	3.4	46	2800
G019	<5	<0.05	7.6	0.6	18.8	<0.1	0.2	7.5	2.6	60	190
G020	<5	<0.05	17.2	1.8	23.2	<0.1	<0.2	27.5	5.8	60	3100
G021	<5	<0.05	18.2	2.0	21.0	<0.1	<0.2	17.5	5.4	75	120
G022	<5	<0.05	19.2	2.8	22.6	<0.1	<0.2	25.0	6.0	62	2650
G023	<5	<0.05	4.2	0.6	15.8	<0.1	<0.2	14.0	0.4	60	1360
G027	<5	<0.05	6.2	0.8	22.2	<0.1	<0.2	11.0	0.4	68	240
G029	<5	<0.05	11.4	0.8	28.6	<0.1	0.2	17.0	0.8	73	770
G030	<5	<0.05	1.8	0.6	13.2	<0.1	<0.2	14.0	0.2	52	2200
G031	<5	<0.05	2.6	0.6	19.6	<0.1	<0.2	4.0	0.8	50	260
G032	<5	<0.05	22.4	2.6	27.8	<0.1	<0.2	24.0	5.2	66	1970
G033	<5	<0.05	12.0	0.2	27.8	<0.1	0.2	11.0	0.6	76	480
G034	<5	<0.05	14.8	0.6	24.2	<0.1	0.2	13.5	1.0	81	700
G035	<5	<0.05	14.2	1.6	27.8	<0.1	0.2	21.0	2.6	69	1480
G036	<5	<0.05	12.2	0.6	56.0	3.0	0.4	14.5	0.8	101	360
G037	<5	<0.05	15.2	2.2	28.4	<0.1	<0.2	20.0	3.0	69	1560
G038	<5	<0.05	8.2	0.8	34.4	<0.1	<0.2	13.0	0.4	75	440
G039	10	<0.05	4.6	0.8	42.4	0.1	<0.2	6.5	0.4	70	300
G040	<5	<0.05	2.2	0.8	30.6	<0.1	<0.2	18.0	<0.2	66	1300
G041	<5	<0.05	2.0	0.6	32.4	<0.1	0.2	7.0	<0.2	58	1080
G042	<5	<0.05	2.0	1.0	28.4	<0.1	<0.2	19.0	<0.2	66	1260
G043	<5	<0.05	1.6	1.0	34.8	<0.1	<0.2	10.0	<0.2	58	1080
G044	<5	<0.05	2.4	1.6	27.2	<0.1	<0.2	18.0	<0.2	62	1380
G045	<5	<0.05	1.8	1.2	26.4	<0.1	<0.2	16.5	<0.2	63	1160
G046	<5	<0.05	1.8	1.2	29.8	<0.1	<0.2	3.5	<0.2	42	260
G047	<5	<0.05	1.8	1.2	26.2	0.1	<0.2	20.0	<0.2	64	1360

App. 2 Results of Chemical Analysis of Soil Samples(1/11)

Sample No.	Au (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cu (ppm)	Hg (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)	Ba (ppm)
A.01.S	<5	0.05	28.4	0.2	31.0	<0.1	0.8	25.0	1.8	79	480
A.02.S	<5	0.15	49.0	<0.2	24.4	<0.1	0.6	30.0	1.0	77	560
A.03.S	<5	0.15	41.0	0.2	16.2	0.1	0.4	59.0	1.2	111	520
A.04.S	<5	<0.05	105.5	0.2	14.2	<0.1	0.8	21.5	1.6	40	380
A.05.S	<5	<0.05	20.4	0.6	39.8	<0.1	1.2	33.0	0.6	97	440
A.06.S	<5	0.10	20.6	0.8	55.6	<0.1	1.0	55.0	0.6	125	610
A.07.S	<5	0.05	13.8	0.4	46.8	<0.1	1.2	34.0	0.6	103	600
A.08.S	<5	0.05	51.2	0.4	49.0	<0.1	2.4	27.0	0.6	73	520
A.09.S	<5	0.15	107.0	0.2	36.4	<0.1	1.2	21.0	1.8	80	640
A.10.S	<5	0.10	123.5	0.4	34.4	<0.1	1.6	21.5	1.6	64	420
A.11.S	<5	0.10	19.6	0.4	80.4	<0.1	1.2	16.5	0.8	79	430
A.12.S	<5	0.05	6.6	0.2	79.2	<0.1	4.4	14.5	0.2	100	630
A.13.S	<5	0.10	10.6	0.4	54.8	<0.1	1.0	24.5	0.6	79	400
A.14.S	<5	0.05	9.6	0.2	26.0	<0.1	0.4	12.5	1.8	47	250
A.15.S	<5	<0.05	2.2	<0.2	61.4	<0.1	0.2	3.0	0.4	88	80
A.16.S	<5	0.05	3.6	<0.2	58.4	0.4	0.4	2.0	0.4	82	40
A.17.S	<5	<0.05	1.2	<0.2	53.6	0.1	0.2	1.0	0.6	76	30
A.18.S	<5	<0.05	1.8	0.2	60.0	0.1	0.4	2.5	0.4	99	40
A.19.S	<5	0.05	1.6	<0.2	45.8	0.1	0.6	2.5	0.4	80	60
A.20.S	<5	0.05	2.2	0.2	120.5	<0.1	0.2	2.0	<0.2	181	30
A.21.S	<5	<0.05	10.6	0.2	25.0	<0.1	0.2	12.5	0.4	68	180
A.22.S	<5	0.05	7.6	0.2	31.8	0.1	0.2	21.0	0.2	75	320
A.23.S	<5	0.05	10.8	0.2	31.4	<0.1	0.2	18.5	0.4	73	580
A.24.S	<5	0.05	12.6	0.4	193.0	<0.1	0.4	9.5	0.4	91	180
A.25.S	<5	<0.05	3.6	0.6	24.8	<0.1	<0.2	2.5	<0.2	39	40
A.26.S	<5	0.05	1.4	0.2	180.0	<0.1	<0.2	1.0	<0.2	155	40
A.27.S	<5	<0.05	3.0	<0.2	52.4	<0.1	<0.2	9.0	<0.2	73	180
A.28.S	<5	0.10	2.4	0.2	47.6	<0.1	0.4	10.0	0.2	67	120
A.29.S	<5	0.10	1.2	0.2	113.0	<0.1	0.2	1.5	<0.2	238	40
A.30.S	<5	0.05	2.6	<0.2	157.5	0.1	<0.2	1.0	<0.2	245	40
A.31.S	<5	<0.05	3.4	0.2	107.0	<0.1	0.2	2.0	0.6	115	20
A.32.S	<5	<0.05	10.6	0.6	60.4	<0.1	0.4	17.5	0.8	105	340
A.33.S	<5	<0.05	53.0	0.8	10.2	<0.1	0.2	26.0	0.8	46	770
A.34.S	<5	0.10	5.4	0.2	66.0	<0.1	0.4	16.5	0.4	122	500
A.35.S	<5	<0.05	12.6	0.4	26.0	<0.1	1.0	20.0	0.4	30	360
A.36.S	<5	<0.05	9.4	0.2	14.6	<0.1	0.8	12.5	<0.2	20	350
A.37.S	<5	0.20	7.4	0.4	36.8	<0.1	0.6	16.0	0.4	79	440
A.38.S	<5	0.05	3.0	0.2	18.2	<0.1	0.2	8.5	<0.2	34	220
A.39.S	<5	0.05	9.2	0.2	56.0	0.6	0.6	15.5	0.2	94	400
A.40.S	<5	0.05	1.8	0.2	57.4	<0.1	<0.2	8.5	0.6	74	320
A.41.S	<5	<0.05	9.0	0.2	58.8	<0.1	<0.2	14.0	<0.2	74	260
A.42.S	<5	0.10	11.2	0.2	56.6	<0.1	0.4	12.5	<0.2	78	520
A.43.S	25	0.05	1.6	0.2	46.8	<0.1	<0.2	5.0	<0.2	71	240
A.44.S	<5	0.05	0.8	<0.2	53.2	<0.1	<0.2	3.5	<0.2	54	360
A.45.S	<5	0.05	7.4	0.2	44.6	<0.1	0.8	19.5	<0.2	74	380
A.46.S	<5	<0.05	2.4	<0.2	26.4	<0.1	0.2	8.0	<0.2	48	220
A.47.S	<5	0.10	5.2	0.2	53.8	<0.1	0.2	11.5	0.6	86	480
A.48.S	<5	<0.05	5.0	0.4	8.0	<0.1	0.4	42.5	<0.2	35	990
A.49.S	<5	0.05	2.6	0.6	8.4	<0.1	<0.2	23.0	<0.2	48	1100