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**Report on the
Detailed Mineral Assessment
of the
Proposed Snafu/Tarfu
Natural Environment Park
Special Management Area**

Confidential

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Internal Report
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MINFILE
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Introduction

This report briefly describes the geology, known mineral occurrences, regional stream sediment geochemistry, regional geophysical data and the results of the 2002 fieldwork carried out by mineral assessment staff of the Yukon Department of Energy, Mines and Resources. The report presents the results of a detailed mineral assessment panel that evaluated the above data and ranked geological tracts relative to one another according to their potential to host metallic mineral deposits for an area including the proposed Snafu/Tarfu Special Management Area.

Land Status

The Carcross/Tagish First Nation proposed Snafu/Tarfu (also called Agay Mene) as a Chapter 10 special management area (SMA) as early as November, 1998. The area was originally negotiated as a Habitat Protection Area, however government of Yukon has more recently approved the proposed SMA as a proposed Natural Environment Park with no mineral withdrawal upon effective date of a final agreement with the First Nation. Natural Environment Park is a designation under the Parks and Land Certainty Act and the term "mineral withdrawal" refers to a prohibition of entry order under the Yukon Quartz and Placer Mining Acts. This proposed SMA boundary & designation has been negotiated to date without the benefit of any mineral assessment studies.

Yukon Territorial Government's

The most current outline provided (September 2002) by (YTG) Land Claims Secretariat of the proposed SMA covers approximately 733 square kilometers. As of January 2003, the area is not covered by any prohibition of entry orders however, on the Territorial Resource Base Maps at DIAND Lands Resources, two areas are outlined but are not map notations with documented request forms and file numbers. The areas are labeled as "Lubbock River Protection Corridor" located on the western margin of the proposed SMA and "Key Goat Habitat" located over White Mountain in the NW corner of the proposed SMA. An interpretive trail & panels exist on White Mountain as a goat-viewing site.

and

northwest



Plate 1: Interpretive panel @ White Mountain

Plate 2: White Mountain sign

Within the boundaries of the proposed SMA, an active placer operation is located on NTS sheet 105C/4 in the southern portion of the area near the British Columbia/Yukon border.

Carcross/Tagish First Nation currently has site specific land selections interim protected within the proposed SMA along Dalayee Lake, Snafu Lake, and east of the Atlin Road at the northern end of Atlin Lake.

There are private lots (marked on the Territorial Resource Base Maps) located along the western side of the proposed SMA, notable at Hannka Creek and a lot located on the north side of Tarfu Creek where it crosses the Atlin Road.

↑
↑
this is Hannka Creek

Work carried out by Energy Mines & Resources, YTG.



Plate 3: Helicopter staging site

During the summer of 2002, the mineral assessment team, composed of geologists Roger Hulstein, Farrell Andersen, Jo-Anne vanRanden and Robert Stroshein, spent 12 ~~man~~ ^{person}-days working in the area. Fieldwork was conducted from the roads and trails that bound and cross the proposed SMA as well as helicopter supported traverses in the more inaccessible areas.

Work included a compilation of all available geological, geochemical and geophysical data to identify target areas for 2002 fieldwork (vanRanden, 2002). This fieldwork consisted of prospecting and assessing regional stream sediment sample anomalies by the collection of rock, soil and silt sediment samples for geochemical analysis. All samples were analyzed for gold plus a suite of 34 elements. An attempt was made at locating all the mineral occurrences within the proposed SMA, and where found, the occurrence was evaluated and sampled.

A total of 16 rock, 10 soil and 19 silt sediment samples were collected in 2002. The samples were submitted to Northern Analytical Laboratories Ltd. of Whitehorse where they were prepared and the prepared pulp samples were shipped to Acme Analytical Laboratories in Vancouver for analysis. The samples were analyzed by Induced Coupled Plasma – Mass Spectroscopy (ICP-MS) using an Aqua Regia digestion. The details of the laboratory procedures are included in Appendix 1.



Plate 4: Mineral Assessment work

Location, access and physiography



Plate 5: Tarfu Lake looking NW ^{space} northwest

The proposed SMA is located on NTS sheets 105C/3, 4, & 5 southeast of the junction between the Atlin Road (highway # 7) and the Alaska Highway at Jakes Corner. This 733 square kilometer proposed SMA utilizes the Yukon/British Columbia border as its southern extent, Atlin road as its western limit, Alaska Highway as its Northern most extension, and the Western shore of Dalayee Lake as part of its eastern boundary (Figure 1). The proposed SMA encompasses the 5000-foot Mt. White, the Snafu and Tarfu chains of lakes, Snafu Creek, as well as Nokudsay and Hawdt Lakes.

Handwritten notes:
 Atlin Rd
 Tagish Rd
 Jakes Corner
 that junction
 → is actually
 the Tagish
 Road
 + Alaska
 Highway
 thought it
 was
 White
 Mountain

The proposed Snafu/Tarfu SMA is within the Yukon Southern Lakes Ecoregion (#177) and a small portion of the Boreal Mountains and Plateaus Ecoregion (#180) of the Boreal Cordillera Ecozone (Figure 2). Each ecoregion shares distinctive regional ecological factors including climate, physiography, vegetation, soil, water and fauna. Broad valleys and large lakes with a dry and cool climate characterize the Yukon Southern Lakes Ecoregion. Soil types tend to be alkaline with wetlands dominated by marl formation in a discontinuous permafrost zone.



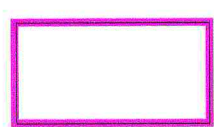
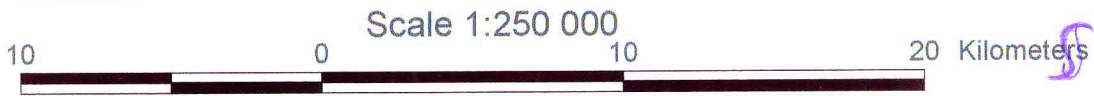
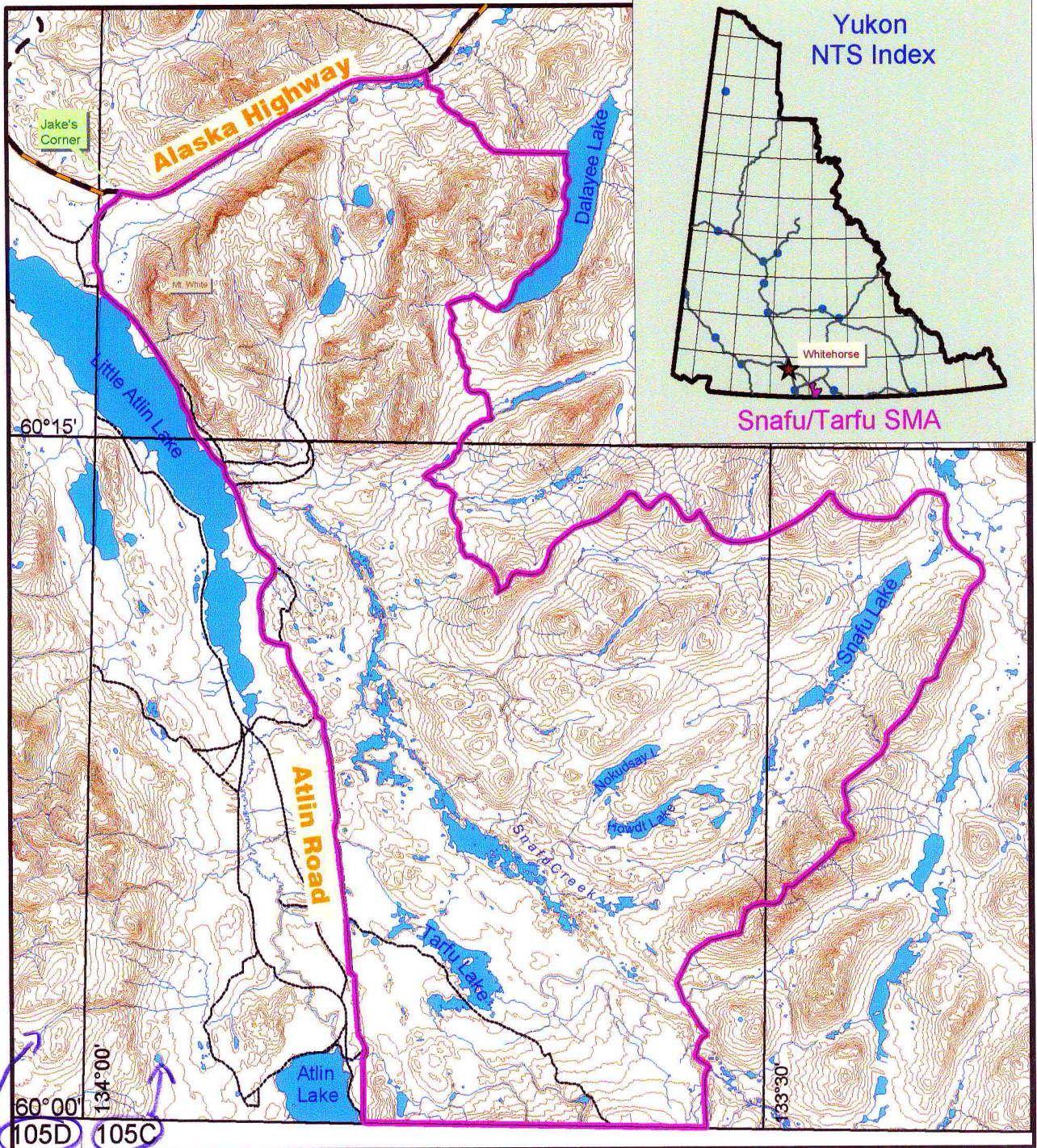
Plate 6: Limestone outcrop in NE of SMA ^{northeast}

Access to the proposed SMA is by helicopter and by foot from both the Atlin Road & Alaska Highway. A four wheel drive road cuts through the southern portion of the proposed SMA from a point approximately 35 kilometers down the Atlin Road and continues past Tarfu Lake south-southeast to the British Columbia border.

Handwritten note:
 do you
 think
 from
 Jakes
 corner?

Location Map

Double lettering

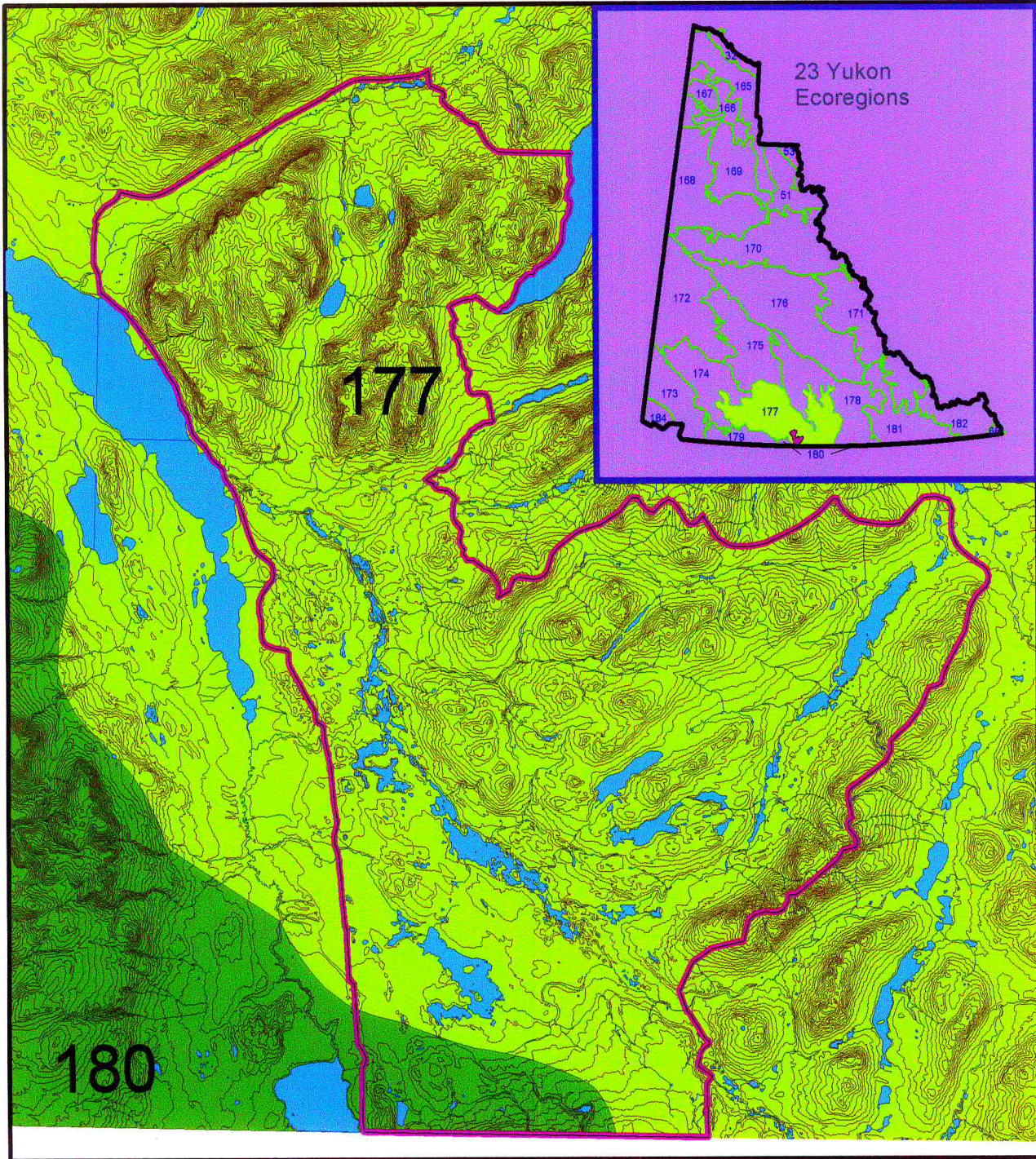


Proposed Snafu / Tarfu
Natural Environment Park
Special Management Area
(September 2002 outline)

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Figure 1

Snafu/Tarfu Area Ecoregions



10 0 Scale 1:250 000 10 20 Kilometers

- 177 Yukon Southern Lakes Ecoregion
- 180 Boreal Mountains & Plateaus Ecoregion

Proposed Snafu/Tarfu Natural Environment Park Special Management Area (September 2002 outline)

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Plate 7: Typical glaciated terrain looking East

Glacial History

The proposed SMA area was glaciated by the McConnell (ca. 22ka) ice sheet. The generalized ice flow directions are to the northwest and melt water flow directions are largely controlled by topography and form repeated sequences of linear valleys with bounding ridges (Duk-Rodkin, 1999 - 1:1 000 000 scale map). Detailed studies of the glacial history have not been carried out or documented in this area.

shouldn't split name

Exploration History

Currently, the proposed SMA area covers the Calahan, Big Sqid, and Adam&Erin placer claims in good standing in the south central portion of the proposed SMA (Figure 3). Decin Guidolin is the registered owner of placer claim P42028 and it has an expiry date of 2006/05/29. Work on these properties to date has been exploratory in nature with no reported production figures. Excavator trenching on the properties was conducted in 2001 (M. Burke DIAND, pers.com).

Geologists Mike Burke and Jeff Bond of the Yukon Geology Program visited the property in 2000. Jeff conducted a simple terrain analysis study, interpreting the aerial photographs to better define the glacial history of the area for the claim owner. The property is located over a glacial outwash channel composed of mostly intrusive rock debris and native gold placers. The source for these coarse grained gold nuggets is not defined and the glacial history of the area is poorly understood.

At the Tarfu Minfile occurrence (#105C007), quartz claims were held by Kerr-Addison in 1963 & 1964.



Plate 8: Tarfu drill collar

The company drilled a geophysical target in 1964 but today no hard rock claims are valid in this area. Quartz claims were staked in 1980 at the Lisa Minfile occurrence (#105C039) however they have since lapsed. In 1987, the Hannka Minfile occurrence (#105C053) was held under valid mineral claim and again in 1997 but there are currently no valid claims in this area. A description of each mineral occurrence is located in Appendix 2.



Plate 9: Drill pad at Tarfu Minfile occurrence



Plate 10: Hannka Minfile area

Geology

Regional Setting

The proposed Snafu/Tarfu SMA is located in oceanic Cache Creek Terrane rocks of south central Yukon. Cache Creek Terrane is composed of a structurally complex succession of Mississippian to Permian basalt, shallow water carbonates, chert and greywacke, and alpine-type ultramafic units. The vast majority of the exotic terrane lies in British Columbia with only the tip of the northern extension exposed in the Snafu area. These rocks are overlain by a package of structurally imbricated interbedded chert and greywacke of Triassic to Early Jurassic age (YEG, 1996). The terrane is bounded on the east by the Teslin and Pinchi faults (Wheeler et al., 1991). *reference?*

Regional 1:250 000 scale bedrock mapping of the area was carried out by the Geological Survey of Canada (GSC) between 1994 & 1997 by S. Gordy and R. Stevens and reported in GSC open file 2886. Their work updated efforts by R. Mulligan in 1950-1953, also 1:250 000 scale mapping (GSC memoir 324). The regional geology is shown on the accompanying Figure 3 and taken from the digital compilation by S. Gordy and A. Makepeace in 2001. To date, no 1:50 000 scale bedrock geological mapping has been carried out in this area. *as well as* *Mulligan, 1963* *1999, 2001*

Geology of proposed Snafu/Tarfu SMA

Locally *ok* crinoidal Carboniferous to Jurassic grey limestone of the Cache Creek Group underlies the northwestern portion of the proposed SMA. A small roof pendant of strongly magnetic ultramafic Cache Creek group rocks (map unit CTRC₁) is exposed in the north-northeast corner of the proposed SMA.

The majority of the proposed SMA is underlain by well-bedded ribbon chert interbedded with shale, siltstone and greywacke that



Plate 11: Brecciated limestone CTRC₁ *subscript?*

is middle Triassic to lower Jurassic in age (mTrIJC). The southwest corner of the proposed SMA is underlain by Mid-Jurassic Bryde Suite granitic rocks predominantly hornblende +/- biotite monzodioritic in composition (MJgB).

The 2002 fieldwork identified previously undocumented quartz stringers and veins hosted within rusty weathering argillaceous siltstone in the *SW southwest* portion of the proposed SMA, as well as altered dykes similar in style to those found at Keno Hill. Felsic submarine volcanic rocks were sampled in the east central portion of the proposed SMA. A sample of a mafic dyke

was collected near the thrust contact between the regionally mapped limestone and chert units of the Cache Creek assemblage. A rock hand specimen of volcanoclastic origin was located near the 1460 ppb gold regional stream sediment survey (RGS) sample in the east central tip of the proposed SMA.

Since the proposed SMA borders the British Columbia/Yukon 60° latitude line, a 1:50,000 scale geology map was created (from the B.C. Geological Survey Map Place Website) on the B.C. side to assist in interpretation of the geology of the proposed SMAs southern region. This compilation work also included displaying B.C. minfile occurrences and searching for all deposits (and associated deposit type classification) within the Cache Creek Terrain lithologies. *Mineral*

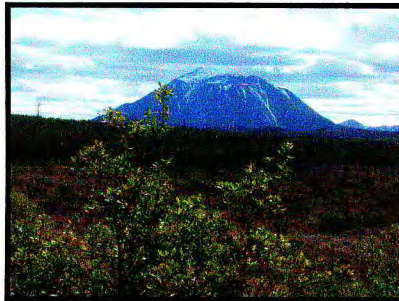


Plate 13: Looking south into B.C.

Mineralization and Potential Metallogeny

(Yukon MINFILE, 2001)

Three Yukon Minfile occurrences are within the boundary of the proposed SMA, and an active placer operation is located on the access road in the southern end of the proposed SMA boundary. The table below summarizes the status and what is known about the occurrences in the area, and a written description from the Minfile database is included in Appendix 2.

Table 1. Minfile Occurrences within the proposed Special Management Area.

Minfile Number	Name	Status	Target	Commodity
105C007	TARFU	Drilled Prospect (Drill core sampled during 2002 work.)	Geophysical anomalies	Unknown
105C039	LISA	Trenched (Occurrence not found in 2002.)	Unknown	Unknown
105C053	HANNKA	Unknown (Occurrence not found in 2002.)	Unknown	Unknown

Mineralization is not well documented for the Minfile occurrences that plot within the proposed SMA boundary however some occurrences located near the area of study have been. At the TOG mineral occurrence (Minfile 105C028), gold bearing quartz veins and quartz carbonate alteration occur in faults associate with tectonically emplaced ultramafic bodies. Visible gold is associated with malachite, azurite, pyrite, galena and sphalerite (Yukon Exploration, 1990). This occurrence is located north of the proposed SMA, but a similar ultramafic body with coincident geochemical anomalies is mapped at the north end of the proposed SMA [Target Area 2, Figure 4].

Diamond drill core (near the bottom of the hole) at the Tarfu occurrence (105C007) was sampled in 2002 and returned anomalous nickel values of 1664 and 1431 ppm Ni with coincident chromium values of 1916 and 1648 ppm Cr respectively from sheared strongly magnetic dark green serpentinite. The Kerr Addison drill hole was designed to test a coincident electromagnetic, self-potential and magnetic anomaly, however according to the Minfile (2001) database "no mineralization was found".



Plate 14: Core box



Plate 15: Drill core sampled in 2002

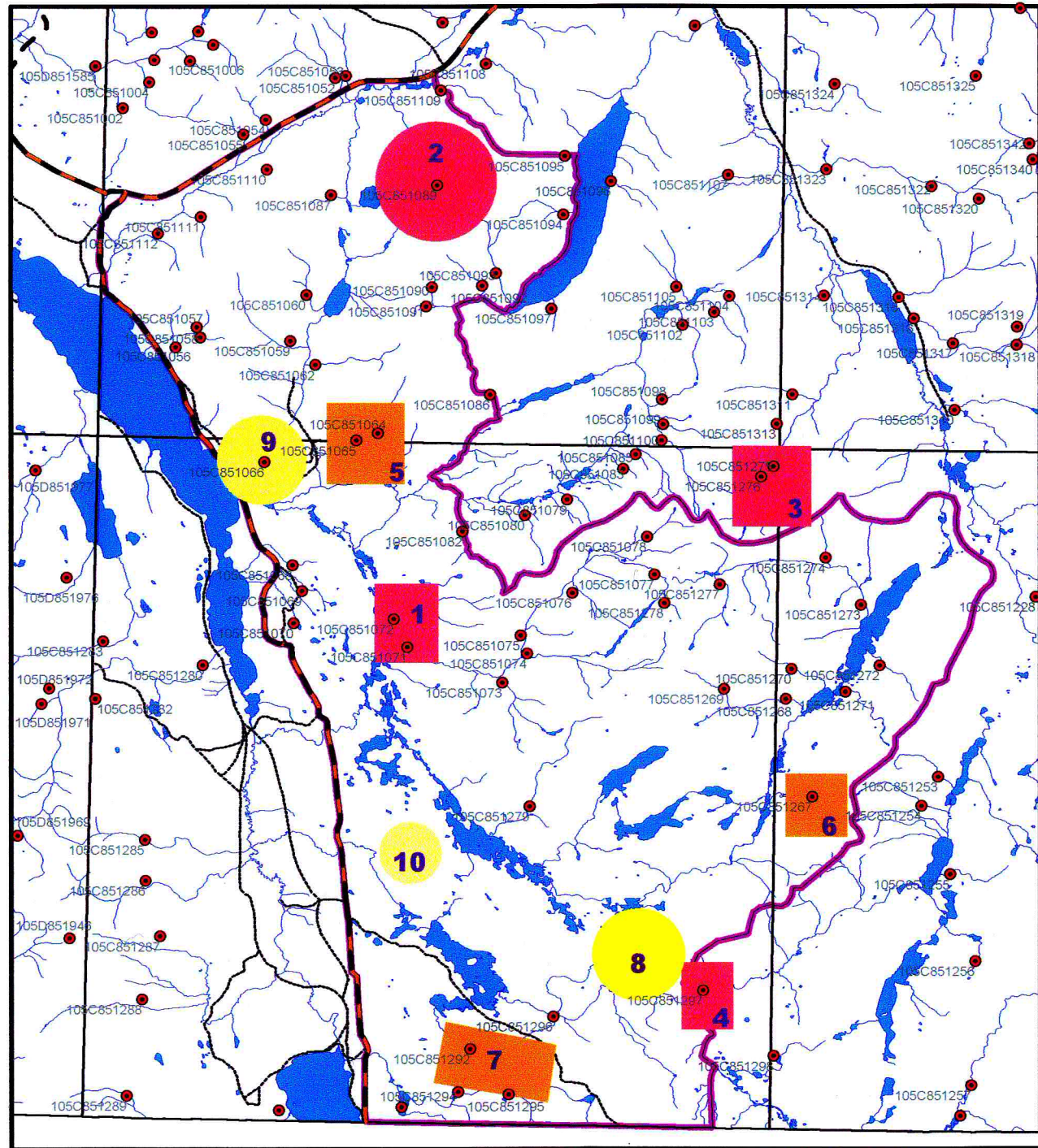
It is probable that the company did not analyze the drill core for nickel or chromium. The assessment report (Sirola, 1964) on exploration activity the property prior to drilling does not list any nickel results. Elevated copper and zinc in soil values were noted from more than 250 soil samples collected in 1963 along 13 miles of cut line. No outcrop was exposed at the drill pad or in the vicinity of the occurrence, only thick glacial drift, and drilling results were not filed with the mining recorders for further assessment credits.

km
↑ must have metric!

The geological setting of the Snafu area is permissive for various types of deposits. The area is considered by experts to have potential to host gold-quartz veins, copper-gold quartz veins, polymetallic veins, epithermal gold-silver veins, copper skarns, gabbroic nickel, minor podiform chromite, and porphyry molybdenum deposits.

The mid Jurassic Bryde Suite intrusive located in the southwestern corner of the proposed SMA has the potential to host polymetallic veins, plutonic related gold quartz mineralization and gold copper molybdenum porphyry style deposits.

Regional Stream Sediment Sample Locations & 2002 Target Areas



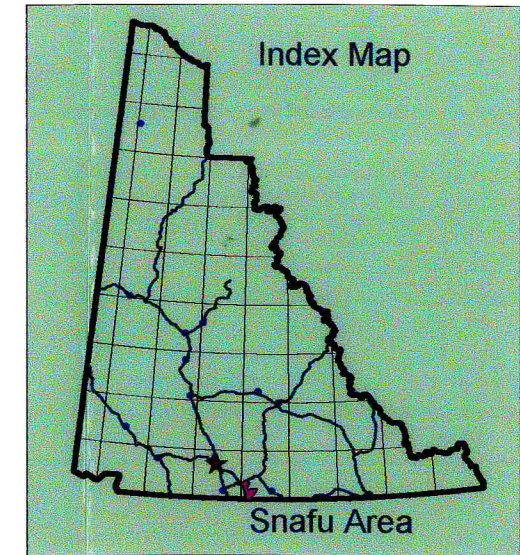
10 0 10 20 Kilometers
1:250 000 Scale

RGS Sample Locations

- Sample Number

2002 Target Areas

- 1** Anomalous Gold (Not visited in 2002)
- 2** Anomalous Au, F, ultramafics rocks & Intense Aeromag Feature *netic*
- 3** Anomalous Gold (outside proposed SMA)
- 4** Anomalous Gold (outside proposed SMA)
- 5** Multi element anomaly (Ni, Cu, Pb, Zn, Fe, As, Sb, F, V, Mo, Ag)
- 6** Elevated Cu & Hg (Au, Zn, Fe, V, U, Mo)
- Proposed Snafu/Tarfu Special Management Area (September 2002 outline)**

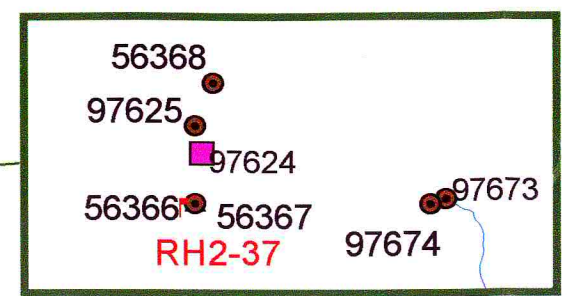
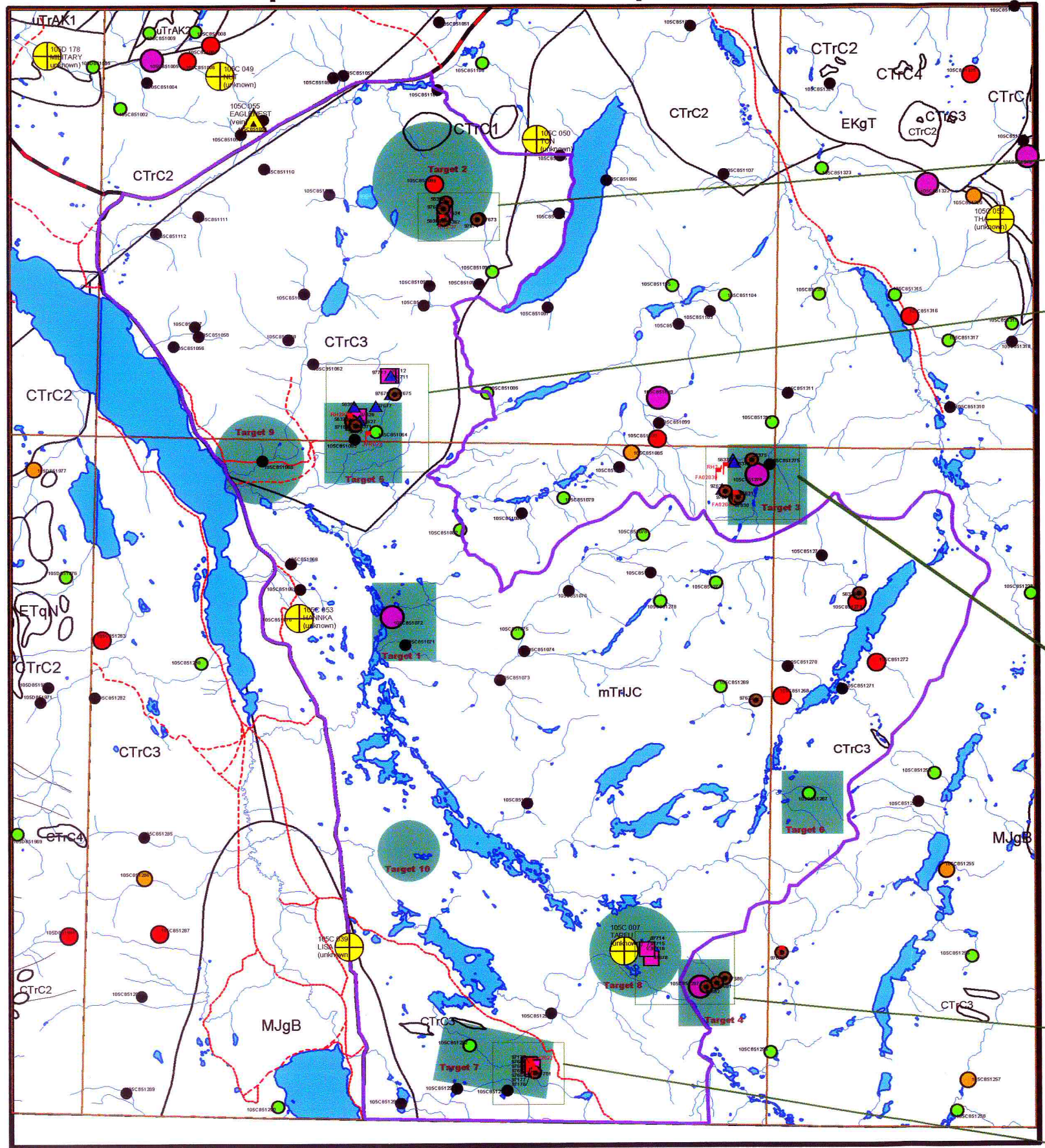
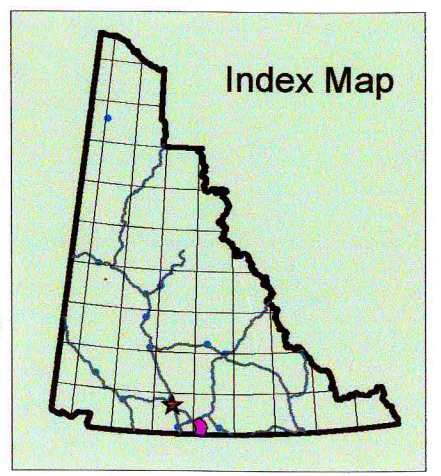


- 7** Multi element anomaly (As, Sb, Ba, V, U, Mo), Placer Claims
- 8** Intense Aeromag Feature *netic* Minfile 105C007
- 9** Moderate Aeromag Feature *netic* (no o/c found in 2002) *outcrop*
- 10** Weak Aeromag Feature *netic* (Not visited in 2002)

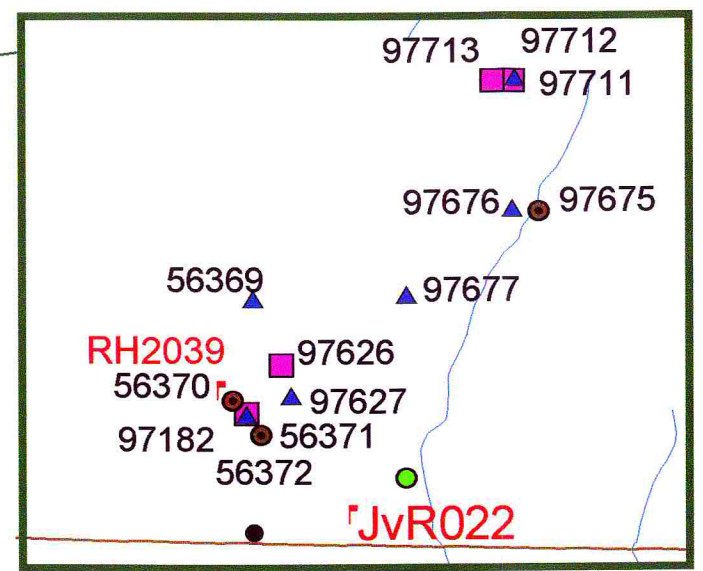
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RGS Sample Locations & 2002 Target Areas *redundant*

Is it possible to increase font of sample #s

2002 Sample Location Map of Snafu /Tarfu SMA Area



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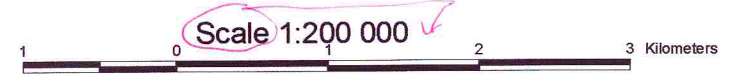
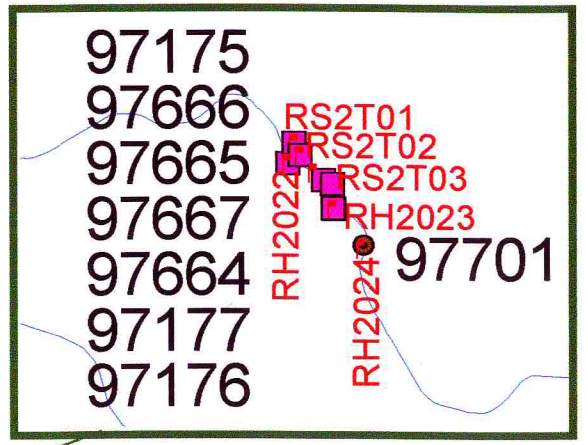
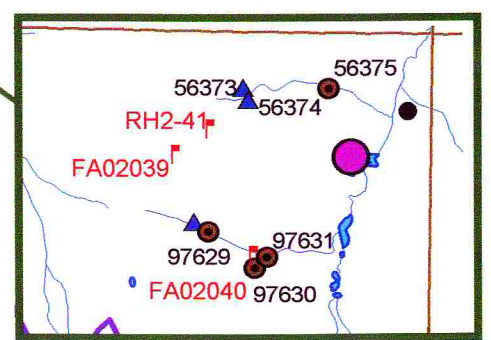


- RGS Geochemistry
Au (ppb)
- 0 - 2
 - 3 - 5
 - 6 - 10
 - 11 - 50
 - 51 - 1460

- Yukon MinFile Occurrence, by deposit model
- ▲ Vein
 - ⊕ Unknown

2002 Target Areas

- 2002 Fieldstation Location
- 2002 silt sample
- ▲ 2002 soil sample
- 2002 rock sample



Sample Location Map
Figure 5

occurring near a mapped intrusion

The proximity to the mapped intrusive of a large section of underexplored and poorly exposed rocks in the southern portion of the proposed SMA provides a potential host for polymetallic vein and plutonic related gold-quartz vein systems. Rusty weathering argillaceous siltstone hosts a 1m wide discontinuous quartz vein at station RSTO2 at target 7 (sample location map, figure 5).

Sheeted quartz stringers were discovered and sampled during the 2002 fieldwork in an area regionally mapped as chert. Bright red-rusty weathering massive chert yielded the highest 2002 gold in rock value of 13.1 ppb and 2317 ppm Ba from an argillaceous clay seam (# 97667). Green chlorite and carbonate altered dykes were also located in this area and appear similar style to those found at the Keno Hill camp. Rock sample 97664 collected in the area yielded the highest lead value of 19.3 ppm Pb and elevated copper of 46.6 ppm Cu.



Plate 16: Sheeted quartz stringers

Near the thrust contact between the limestone and chert units, in the central portion of the proposed SMA, buff pink weathering dolomitized limestone with calcite veinlets yielded values of 10.2 ppb Au and the highest cadmium assay of 5.5 ppm as well as an elevated arsenic value.

of what?

Geochemistry

Regional Stream Sediment Geochemistry (RGS)

At the compilation phase (prior to fieldwork) of the mineral assessment process, a total of 46 stream sediment samples reported in GSC open file 1217 (Friske, 1985) fell within the proposed boundaries of Snafu/Tarfu SMA. An area slightly larger than the proposed SMA boundary (composed of 122 samples) was statistically manipulated to identify anomalous samples within the local area and identify potential 2002 field targets.

Geochemical plots were generated to display the sample location and analytical results for 20 elements, loss on ignition, and pH in the region. Each plot at 1:250 000 scale shows the detection limit & analytical method used, the maximum & median value and a histogram used to determine color ranges for RGS thematic mapping purposes (Appendix 3).

Precious Metals For 2002 Target Areas see Figure 4

southeast

An anomalous gold value of 86 ppb Au is reported in the center of the proposed SMA near a chain of lakes [2002 Target Area 1]. A cluster of detectable gold (11-12 ppb Au) is located around creeks draining into Snafu Lake on the SE arm of the proposed SMA. A further significant result of 19 ppb Au is located at the northernmost point of the proposed SMA in rocks regionally mapped as limestone [2002 Target Area 2].



Plate 17: Target Area 1

Although outside of the proposed SMA boundary, sample 105C851297, located in the extreme southeast corner yielded a value of 761 ppb Au [2002 Target Area 4]. Similarly, a sample just north of the SE arm of the proposed SMA gave a 1460 ppb gold assay [2002 Target Area 3].

southeast

Silver values are generally low and range from 0.1 to a high of 2.0 ppm Ag within the proposed SMA. Only 4 samples are reported higher than 0.2 ppm Ag in the SMA area. Relatively high numbers of 0.6 and 2.0 ppm Ag are located within the limestone unit at its southern contact with the chert. Gold and silver values do not correlate well in this area.

four

Base Metals *lv*

A coincident anomaly of 60 ppm nickel, 45 ppm copper, 75 ppm zinc, 7 ppm lead, and 3.1% iron is located within the central portion of the proposed SMA, north of Haunka Creek [2002 Target Area 5]. This sample site (#105C851064) is at the contact between the limestone and chert +/- shale, siltstone greywacke unit.

The highest copper value of 65 ppm reported within the proposed SMA is on the SE boundary near Snafu Creek. Three other mid-30 ppm range of copper values are reported along the eastern edge of the proposed SMA. *southeast*

An area of elevated copper and mercury values with higher than the median gold, zinc, iron, vanadium, uranium, and molybdenum is located south of Snafu Lake on the eastern side of the proposed SMA [2002 Target Area 6].

The highest zinc value within the east margin of the proposed SMA boundary returned 85 ppm Zn with a cluster of slightly elevated values ~~between~~ 61 – 71 ppm reported for the surrounding samples.

No other anomalous samples for nickel and lead fall within the proposed SMA area, and values are generally between 15 ~~to~~ 20 ppm Ni, and 3 ~~to~~ 4 ppm Pb ~~throughout~~. The highest iron value of 5.6% falls outside the proposed SMA boundary, and values ranging from 0.4% to a high of 3.1% Fe are within the proposed boundary. *and* *and*

Other metals *lv*

An arsenic ~~and~~ antimony anomaly is coincident with the multi element base metal 105C851064 sample previously described as Target Area 5. The same sample produced 1.3 ppm Sb and 11.2 ppm As (both in the highest relative ranges for each element). A second arsenic/antimony anomaly of 9.2 ppm As ~~and~~ 0.8 ppm Sb is located on the eastern margin of the mid Jurassic monzodioritic body. *(-)*

An area of elevated arsenic, antimony, barium, vanadium, uranium, and molybdenum values is located south of Tarfu Lake in the south central portion of the proposed SMA [2002 Target Area 7].

Tin values are very low overall with values of 1 or 2 ppm except for a site north of Snafu Lake that yielded 4 ppm Sn.

Indicators *lv*

The pH values for the area are generally neutral with results ranging from 6 to 8.2 with the vast majority being slightly basic. On the pH figure, blue indicates samples above the neutral level while red indicates samples below the neutral level (all values below neutral plot outside the proposed SMA area). *where is this?*

The Loss on Ignition (LOI) plot shows three sample sites within the proposed SMA as having values greater than 25%, indicating higher organic content at these sites. Two of these sites are located in the central portion of the proposed SMA with a third located on the SE arm of the proposed SMA near Snafu Creek. The vast majority of the sites however, have low LOI values. *southeast*

2002 Geochemistry

During the 2002 field investigations of proposed Snafu/Tarfu area, a total of 16 rock, 10 soil and 19 silt sediment samples were collected and subsequently analyzed. The samples were submitted to Northern Analytical Laboratories Ltd. of Whitehorse where they were prepared, and the pulp samples were shipped to Acme Analytical Laboratories in Vancouver for geochemical analysis. The samples were analyzed by Induced Coupled Plasma – Mass Spectroscopy (ICP-MS) technique using an Aqua Regia digestion. *the* *(see Figure 5 for Sample Location)*

Sample descriptions and analytical results for rock, soil and stream sediment silt samples collected in 2002 are presented in Table 2.

Quality control to ensure the integrity of the 2002 geochemical data was done for all samples, from all projects, submitted by mineral assessments in 2002 as one data set for the 215 rock samples and one set for the 667 stream sediment and soil samples. Data pertaining to the proposed Snafu/Tarfu SMA is included within these sample sets. Analysis of the quality control data showed that the 2002 analytical results are reliable. Analytical procedures and geochemical statistics for quality control are summarized in Appendix 1 and further details can be found in a separate document (Hulstein et al, 2003).



Plate 18: 2002 rock sample

Significant results for rock samples are discussed above in the Mineralization and Potential Metallogeny section of this report.

The results for the soils and silts collected in 2002 are generally low with few elevated values relative to the small population of specimens. A coincident nickel, copper, zinc, arsenic, and antimony soil anomaly (# 56371 - described as containing red hematitic granules at a gossan patch-fault zone, with calcite float) yielded 56.2 ppm Ni, 54.4 ppm Cu, 151 ppm Zn, 57.8 ppm As, and 8.4 ppm Sb. This sample site is located at target 5 on a steep south-facing slope (sample location map, Figure 5).

The highest 2002 gold in soil result of 7.1 ppb Au is within target area 3, in the east central portion of the proposed SMA (designed to investigate the 1460 ppb Au result from a regional stream sediment sample). The sample (# 97628) is described as being collected in a dry stream bed and consisting of brown fine sand. Located further down the same drainage, the highest values for lead and zinc in 2002 silts were collected from the moss mat at the side of the steep grade, fast-flowing creek. This sample (# 97631) yielded 38.4 ppm Pb, 106 ppm Zn, elevated copper at 45.3 ppm Cu, and detectable gold of 5.5 ppb Au.

Geophysics

The regional aeromagnetic survey (as shown in the attached Figure 6) is part of the digital Aeromagnetic Data Over the Yukon Territory included in Yukon Digital Geology CD by Gordey and Makepeace, 2001. The geophysical data pertinent to this report was originally flown as part of the 1961 analogue survey #61-43 at a height of 305m in an East West direction with 1207 meter line spacing. Individual Yukon survey data was subjected to a variety of filtering, processing, and enhancement procedures to generate a single, leveled, seamless residual magnetic anomaly data set for the entire Yukon Territory (Miles, 1999).

Figure 6 displays a strong magnetic high centered over the mapped ultramafic body in the northeast corner of the proposed SMA [2002 Target Area 2]. A positive magnetic halo around the anomalous magnetic feature trends to the south and northeast.

A second smaller zone of increased magnetic susceptibility is located in the south, southeast corner of the proposed SMA [2002 Target Area 8]. This anomaly is coincident with the TARFU minifile occurrence (105C007). This distinct feature has a very weak elevated magnetic halo associated with it that trends north-northwest, which roughly parallels the chain of lakes in the area. No mapped geological feature explains this magnetic signature.

A further notable feature on the aeromagnetic map is a weak magnetic high with an associated 'tail' which trends to the west northwest, located near the Atlin Road north of the southern contact of the limestone and chert units. This feature has a weaker yet similar geophysical signature to the anomaly centered at the Minfile 105C007.

The first vertical derivative thematic map (Figure 7) of the regional aeromagnetic data was used to enhance detail and to allow interpretation of subtle features not visible on the residual magnetics map.

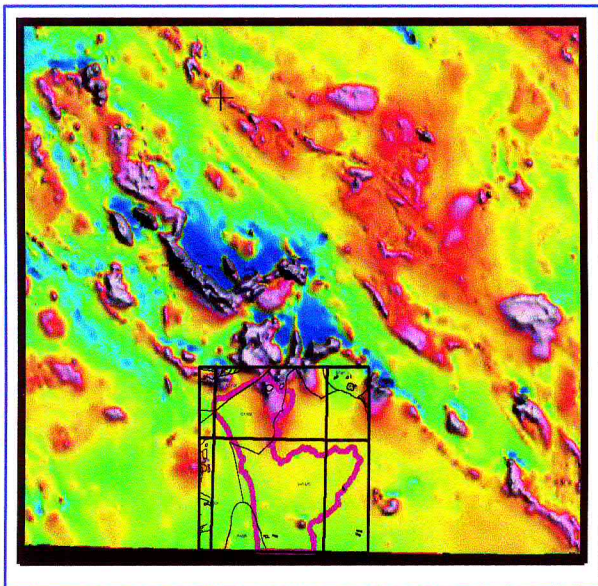
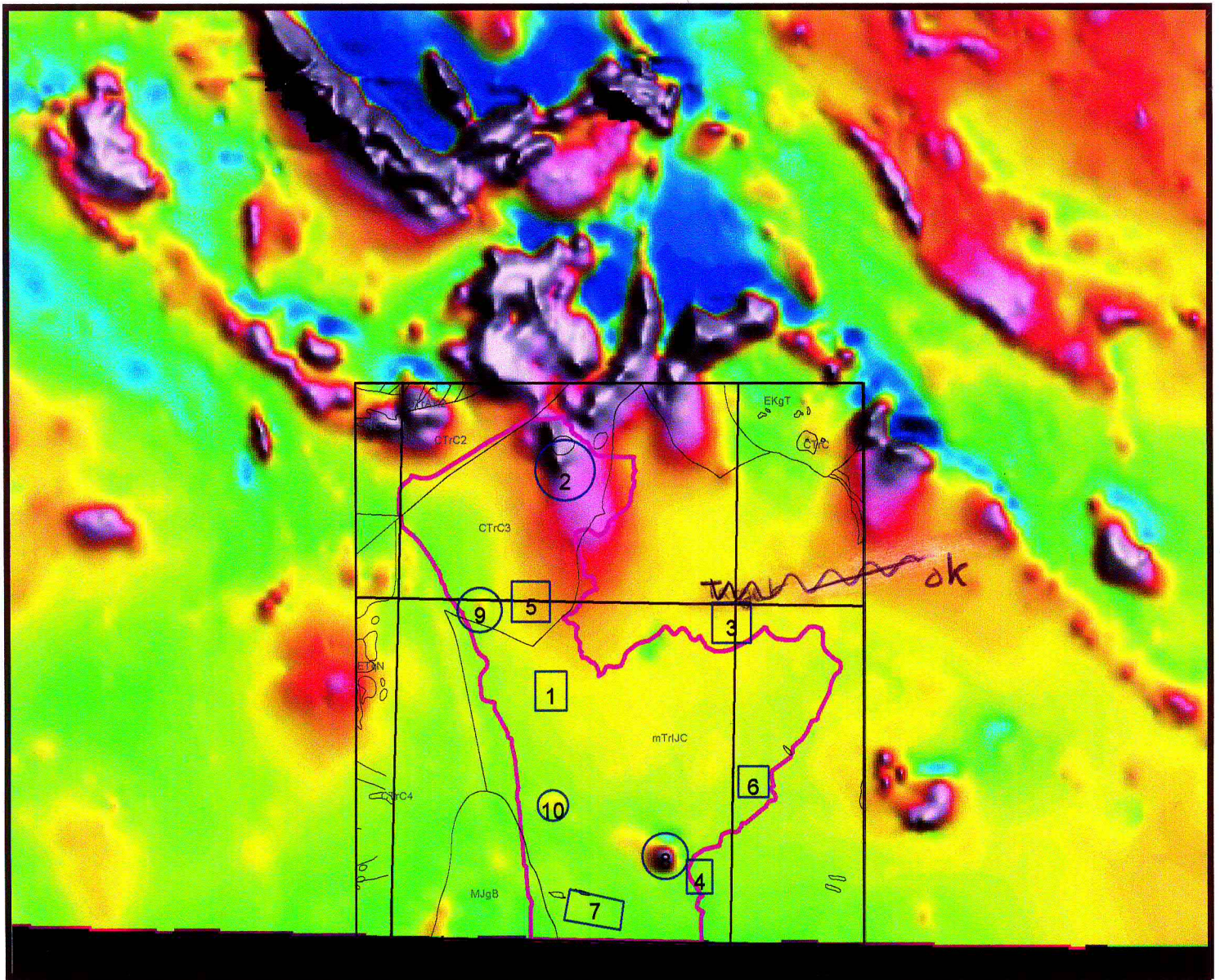
Table 2. 2002 Geochemical Results

Snafu Area 2002 Rock Geochemistry																																				
Number	Ag (ppm)	Al %	As (ppm)	Au (ppb)	B (ppm)	Ba (ppm)	Bi (ppm)	Ca %	Cd (ppm)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe %	Ga (ppm)	Hg (ppm)	K %	La (ppm)	Mg %	Mn (ppm)	Mo (ppm)	Na %	Ni (ppm)	P %	Pb (ppm)	S %	Sb (ppm)	Sc (ppm)	Sr (ppm)	Th (ppm)	Ti %	Tl (ppm)	U (ppm)	V (ppm)	W (ppm)	Zn (ppm)	Description
97175	0.10	0.73	2.1	6.70	3.0	369	0.20	0.06	0.10	2.4	85	60.3	1.610	3	0.03	0.18	13	0.53	103	1.50	0.0050	7.90	0.016	8.2	0.080	0.20	1.6	11	3.80	0.0050	0.1	0.40	12	0.10	38	Grey Mudst-chert, trace-0.5% dis fine grained bright py, hairline fractures.
97176	0.05	0.10	1.0	0.25	1.0	86	0.05	1.31	0.30	1.6	196	7.4	0.580	0	0.07	0.02	1	0.23	314	1.20	0.0030	5.70	0.015	1.9	0.025	0.30	1.0	73	0.10	0.0010	0.1	0.05	4	0.10	27	White quartz veins, <10cm thick, approx horizontal, irregularly spaced and thickness, crossing green carb alt andesite dyke, coxcomb textures, vuggy.
97177	0.10	1.49	2.8	0.25	3.0	511	0.10	1.43	0.40	17.0	213	42.5	3.070	5	0.03	0.16	6	2.31	647	2.60	0.0310	35.10	0.062	2.6	0.260	0.20	4.8	52	1.40	0.0090	0.1	0.70	35	0.10	82	Random grab over 2m width of green ch-carb alt dyke with tr-o.5% dis arspy and ir py. Very similar to dykes in Wend hill camp. u.c.
97182	0.05	0.02	5.2	0.25	0.5	16	0.05	25.27	1.00	1.0	14	2.9	0.040	0	0.06	0.01	3	12.27	124	0.10	0.0070	5.40	0.037	1.1	0.025	0.10	0.1	79	0.05	0.0005	0.1	0.50	1	0.05	33	Subcrop of rusty hem rich-clay alt
97624	0.10	0.06	2.3	0.25	1.0	61	0.05	25.96	0.40	1.5	17	36.5	0.300	0	0.14	0.03	5	0.19	93	0.50	0.0010	5.30	0.011	1.7	0.025	0.50	1.0	269	0.30	0.0010	0.1	1.20	3	0.05	13	Reddish weathering-stained, light-dark grey limestone, locally brecciated with dark grey calcite veinlets.
97626	0.05	1.21	3.7	0.60	1.0	133	0.10	1.92	0.10	6.4	14	23.2	2.890	5	0.50	0.14	27	0.41	464	1.30	0.0400	0.05	0.204	2.2	0.025	0.10	7.4	20	4.60	0.1520	0.1	1.00	47	0.05	92	beige/buff ash luff outcrop. Yellow/orange oxide stains on fractures.
97664	0.50	0.88	5.4	2.70	3.0	1042	0.40	0.06	0.05	1.2	62	46.6	2.400	6	0.06	0.30	23	0.65	125	3.00	0.0110	9.20	0.034	19.3	0.100	0.90	3.2	14	6.50	0.0070	0.2	0.90	41	0.10	65	Carbonaceous rusty weathering black argillite. Mod. Well foliated. Chert bands. Cleavage 85/20s
97665	0.05	0.47	0.9	0.25	1.0	725	0.20	0.09	0.10	3.9	166	44.8	1.230	4	0.02	0.09	5	0.35	338	0.80	0.0110	15.70	0.016	5.6	0.025	0.20	3.3	16	1.40	0.0040	0.1	0.20	11	0.10	37	Discontinuous outcrop of rusty weathering argillaceous siltstone with boudins of chert becoming light grey-green mudstone. Sample of qz veinlets. Foliation 100/?
97666	0.10	0.32	1.7	4.10	1.0	113	0.10	0.16	0.10	4.3	124	35.5	1.190	2	0.04	0.02	5	0.26	338	0.50	0.0200	15.80	0.026	9.9	0.025	0.50	3.6	13	1.20	0.0020	0.1	0.10	23	0.10	36	Grab of 1 cm white qz stringers spaced at 10 - 20 cm in grey banded phyllite (siltstone). Cleavage 70/62s
97667	0.10	0.24	5.5	13.10	1.0	2317	0.30	0.15	0.05	1.0	212	44.9	1.240	3	0.04	0.11	2	0.05	21	5.20	0.0070	6.10	0.008	3.0	0.110	0.90	3.6	18	0.90	0.0010	0.1	0.05	18	0.10	17	Bright Red-rusty weathered massive chert. Argillaceous clay seam
97678	0.20	0.07	6.5	0.25	3.0	353	0.05	0.66	0.10	0.9	232	9.2	0.420	0	0.09	0.02	4	0.29	75	3.90	0.0010	11.90	0.051	1.7	0.025	0.40	0.5	33	0.30	0.0010	0.1	0.70	7	0.10	26	Rusty weathering very fine grained black chert. Massive and massive bedded. Mag sus 0.01.
97712	0.05	1.70	2.3	1.50	3.0	162	0.05	1.27	0.10	40.1	135	47.5	6.320	9	0.50	0.60	20	3.31	999	2.30	0.3270	138.90	0.187	2.3	0.025	0.10	0.9	66	2.40	0.6840	0.1	0.80	108	0.10	105	subcrop of brown weathering dark gray fine grained matrix ?diortite dyke trending 350/40NE
97713	0.10	0.02	4.0	10.20	0.5	21	0.05	41.83	5.50	1.0	9	3.3	0.040	0	0.15	0.01	1	0.37	18	0.10	0.0005	7.50	0.010	0.7	0.025	0.80	0.3	100	0.05	0.0020	0.1	0.20	1	0.10	80	buff pink weathering dolomitized limestone with calcite veinlets and fracture coatings; subcrop
97714	0.05	0.59	0.3	1.50	40.0	2	0.05	0.24	0.05	87.5	1916	9.0	4.470	1	0.50	0.01	0	23.66	598	0.40	0.0010	1664.60	0.003	0.2	0.025	0.05	10.1	1	0.05	0.0030	0.1	0.05	38	0.05	20	grab of drill core at Tarfu Minfile Occurrence (105C007) at bottom of 1964 drillhole, dark green serpentinite, whole 15 cm pieces but ground at ends
97715	0.05	0.72	1.1	0.80	34.0	12	0.05	2.64	0.10	88.3	1648	8.2	4.580	1	0.01	0.01	1	21.62	761	0.30	0.0010	1431.60	0.016	0.4	0.025	0.10	10.8	130	0.20	0.0110	0.1	0.50	42	0.10	27	grab of drill core at Tarfu Minfile Occurrence (105C007) further down hole than 97715 (at very bottom of 1964 drillhole), intensely sheared with fragments <1cm wide
97716	0.05	0.46	3.8	0.70	2.0	357	0.10	5.94	0.40	4.9	109	21.2	1.090	3	0.06	0.06	6	0.74	432	2.40	0.0120	21.20	0.016	4.1	0.710	0.30	2.8	189	1.90	0.0950	0.1	0.40	20	0.30	51	grab of drill core at Tarfu Minfile Occurrence (105C007) further down hole than 97715 (at very bottom of 1964 drillhole), intensely sheared with fragments <1cm wide fine grained felsic intrusion with pervasive rust stain on fractures. 1% py as patches and disseminations.

Snafu Area 2002 Soil Geochemistry																																				
Number	Ag (ppm)	Al %	As (ppm)	Au (ppb)	B (ppm)	Ba (ppm)	Bi (ppm)	Ca %	Cd (ppm)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe %	Ga (ppm)	Hg (ppm)	K %	La (ppm)	Mg %	Mn (ppm)	Mo (ppm)	Na %	Ni (ppm)	P %	Pb (ppm)	S %	Sb (ppm)	Sc (ppm)	Sr (ppm)	Th (ppm)	Ti %	Tl (ppm)	U (ppm)	V (ppm)	W (ppm)	Zn (ppm)	Description
56367	0.20	1.98	11.8	2.70	2.0	327	0.20	0.31	5.60	13.4	16	32.4	2.260	6	0.43	0.03	20	0.09	1581	0.70	0.0050	31.50	0.047	22.1	0.025	1.50	5.4	9	4.60	0.0620	0.3	1.20	38	0.10	115	"red brown soil next to creek. Clay rich, 1st float."
56369	0.20	5.41	7.1	4.30	1.0	496	0.30	0.91	1.70	14.8	23	18.0	3.800	21	0.35	0.04	26	0.09	489	0.80	0.0050	29.60	0.041	32.7	0.025	0.70	9.5	19	11.70	0.0980	0.9	2.50	70	0.05	193	"yellow patch 2X10m of clay rich soil in minor -modest depression with 1st on both sides, trends approx E-W."
56371	0.10	1.14	57.8	1.40	6.0	212	0.20	2.62	1.20	9.4	47	54.4	2.970	4	0.15	0.18	18	0.73	448	0.70	0.0110	56.20	0.142	11.7	0.025	8.40	4.5	43	2.30	0.0400	0.1	0.90	68	1.50	151	"sample of red-hem granules at gossan patch, fault zone, dogtooth calcite float in zone."
56373	0.10	1.13	5.5	2.00	2.0	141	0.10	0.30	0.80	5.8	28	23.9	1.960	4	0.50	0.06	10	0.38	223	1.60	0.0080	25.90	0.049	8.7	0.025	0.50	2.8	16	2.00	0.0680	0.1	0.40	44	0.20	87	"soil-hill, mixed rounded glacial till float."
56374	0.10	0.79	4.7	2.50	2.0	215	0.10	0.37	0.10	5.1	24	21.2	1.430	3	0.03	0.05	11	0.35	231	1.30	0.0110	17.60	0.063	6.7	0.025	0.40	2.4	25	2.20	0.0560	0.1	0.60	37	0.20	34	"sandy till, glacial outwash?"
97627	0.10	1.24	6.4	0.70	5.0	191	0.20	1.09	0.70	7.5	33	22.7	1.970	4	0.03	0.15	14	0.50	380	0.70	0.0150	29.50	0.081	13.1	0.025	0.60	3.9	24	2.50	0.0600	0.1	0.50	45	0.10	67	minor soil from gully overtop limestone bedrock.
97628	0.10	0.78	3.8	7.10	3.0	156	0.10	0.48	0.20	4.9	27	21.0	1.500	3	0.06	0.07	12	0.28	275	0.90	0.0090	18.90	0.085	6.3	0.025	0.40	3.1	31	2.50	0.0600	0.1	0.70	43	0.20	34	dry stream bed. Collected brown fine sand.
97676	0.10	1.41	5.9	2.30	3.0	212	0.10	0.53	0.50	8.3	37	20.4	1.980	5	0.02	0.09	13	0.52	164	0.90	0.0110	28.60	0.049	7.8	0.025	0.50	3.2	23	1.30	0.0650	0.1	1.00	52	0.20	54	"Brown soil in west drainage catchment (no stream bed) Limestone, green volcanics and granodiorite cobbles and pebbles. 30 cm depth"
97677	0.10	1.32	6.6	2.10	3.0	197	0.20	1.13	2.20	8.6	44	23.8	2.170	4	0.02	0.08	14	0.48	434	0.70	0.0140	36.00	0.068	8.2	0.025	0.60	3.3	23	1.30	0.0520	0.1	0.70	53	0.30	109	Brown soil in west drainage catchment (no stream bed) Limestone and calcite cobbles and pebbles. 20 cm depth
97711	0.10	2.23	5.9	0.90	2.0	265	0.20	1.47	6.80	13.3	44	21.2	3.010	8	0.03	0.04	20	0.55	1008	0.60	0.0190	34.60	0.125	9.0	0.070	0.50	3.5	27	1.60	0.1760	0.1	4.60	65	0.20	97	"red and black soil in 10 meter wide gully on ridge line (?fault structure), recessive unit? Trending 360 degrees, 25 cm deep"

Snafu Area 2002 Silt Geochemistry																																				
Number	Ag (ppm)	Al %	As (ppm)	Au (ppb)	B (ppm)	Ba (ppm)	Bi (ppm)	Ca %	Cd (ppm)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe %	Ga (ppm)	Hg (ppm)	K %	La (ppm)	Mg %	Mn (ppm)	Mo (ppm)	Na %	Ni (ppm)	P %	Pb (ppm)	S %	Sb (ppm)	Sc (ppm)	Sr (ppm)	Th (ppm)	Ti %	Tl (ppm)	U (ppm)	V (ppm)	W (ppm)	Zn (ppm)	Description
56366	0.10	0.92	6.2	1.20	2.0	160	0.10	1.26	0.90	6.5	41	18.6	2.250	4	0.08	0.06	15	0.59	282	0.70	0.0120	24.90	0.077	7.6	0.025	0.70	3.0	24	3.10	0.0650	0.1	1.40	65	0.40	65	"Near head of creek, 1st float, 1st brx."
56368	0.10	0.95	8.5	2.70	3.0	164	0.10	3.87	1.60	7.7	27	24.4	1.740	3	0.11	0.07	15	0.50	512	0.90	0.0120	28.50	0.080	9.4	0.025	1.00	2.8	34	2.00	0.0460	0.1	0.80	40	0.20	72	"at base of cliff, very steep creek."
56370	0.10	0.88	7.0	1.60	3.0	164	0.10	1.04	0.20	8.1	36	22.4	1.680	3	0.03	0.10	11	0.66	373	0.60	0.0220	31.70	0.070													

Regional Residual Aeromagnetic Image

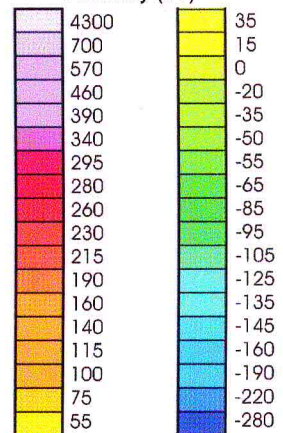


- Proposed Snafu/Tarfu SMA (September 2002 outline)
- 2002 Target Areas, number

Geological Legend (simplified)

- Early Tertiary**
 - ETqN ETqN post accretionary intrusive rocks
- Early Cretaceous**
 - EKgT granite
- Mid-Jurassic**
 - MJgB BRYDE SUITE undeformed granitic rocks from two plutonic bodies
- Middle Triassic to Lower Jurassic**
 - mTrJc CACHE CREEK well bedded ribbon chert
- Carboniferous to Jurassic**
 - CTRC1 CACHE CREEK
 - CTRC2 oceanic assemblage of ultramafic rocks
 - CTRC3 (1) volcanics (2) carbonate
 - CTRC4 (3) and ribbon chert (4)

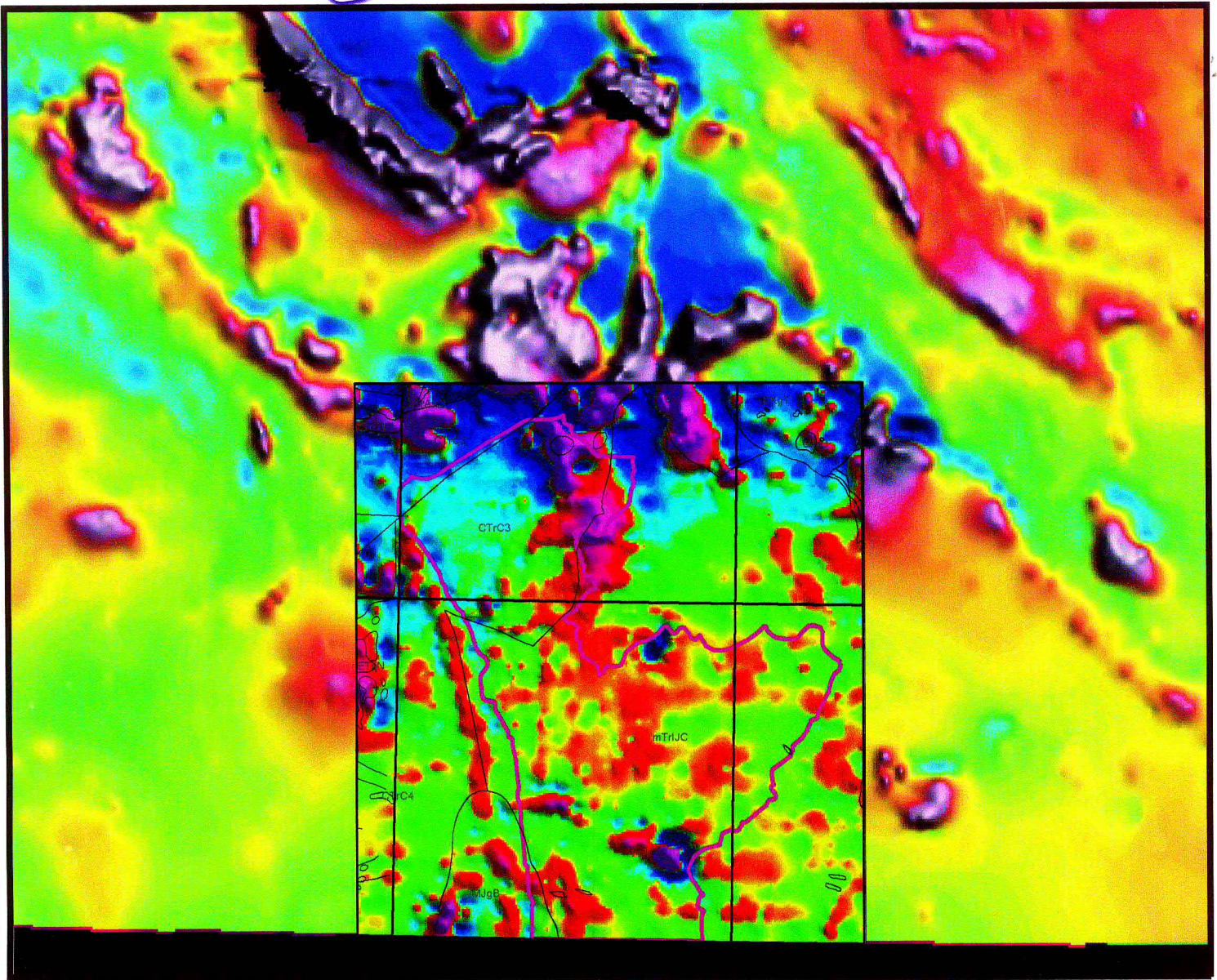
Magnetic Residual Anomaly (nT)



Confidential

a1

First Vertical Derivative & Residual Aeromagnetic Image



Proposed Snafu/Tarfū SMA
(September 2002 outline)

Confidential

Geological Legend (simplified)

- Early Tertiary**
- ETqN ETqN
post accretionary intrusive rocks
- Early Cretaceous**
- EKgT granite
- Mid-Jurassic**
- MJgB** BRYDE SUITE
undeformed granitic rocks from
two plutonic bodies
- Middle Triassic to Lower Jurassic**
- mTrJc CACHE CREEK
well bedded ribbon chert
- Carboniferous to Jurassic**
- CTRc1 CACHE CREEK
- CTRc2 oceanic assemblage of ultramafic rocks
- CTRc3 (1), volcanics (2), carbonate
- CTRc4 (3) and ribbon chert (4)

Magnetic Residual Anomaly (nT)

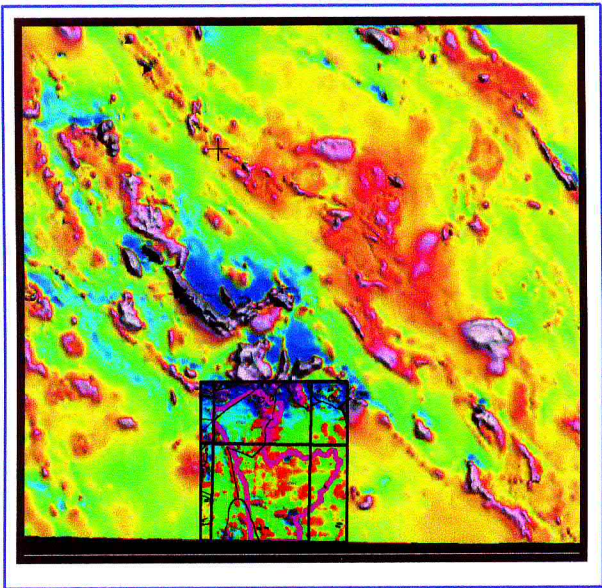
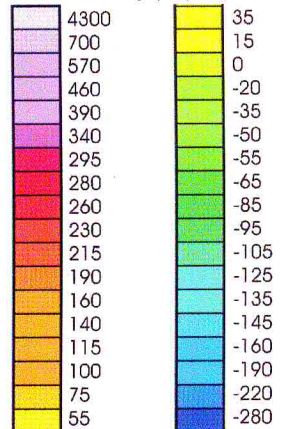


Figure 7

The contact between the chert (mTrIJC unit) and the Cache Creek limestone (CTrC3 unit) near the western boundary of the proposed SMA became a distinct linear magnetic high feature on the first vertical derivative image compared to a subtle and very weak feature on the residual aeromagnetic image.

Indistinct anomalies on the residual image near the Bryde Suite intrusion in the southwestern corner of the proposed SMA are augmented and the area of the placer claims (target 7) are within a band of higher magnetic susceptibility that trends NW-SE from the mapped intrusion. *northwest*

The central portion of the proposed SMA has an uneven magnetic signature on the first vertical derivative image that was interpreted to indicate potential of a more complex bedrock geological history than what is currently mapped.

Mineral Assessments

Regional Mineral Potential

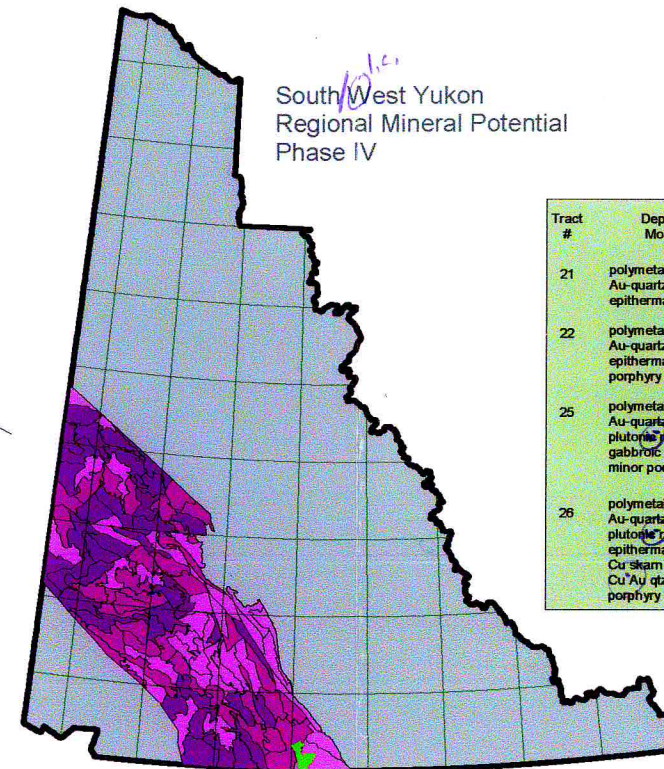
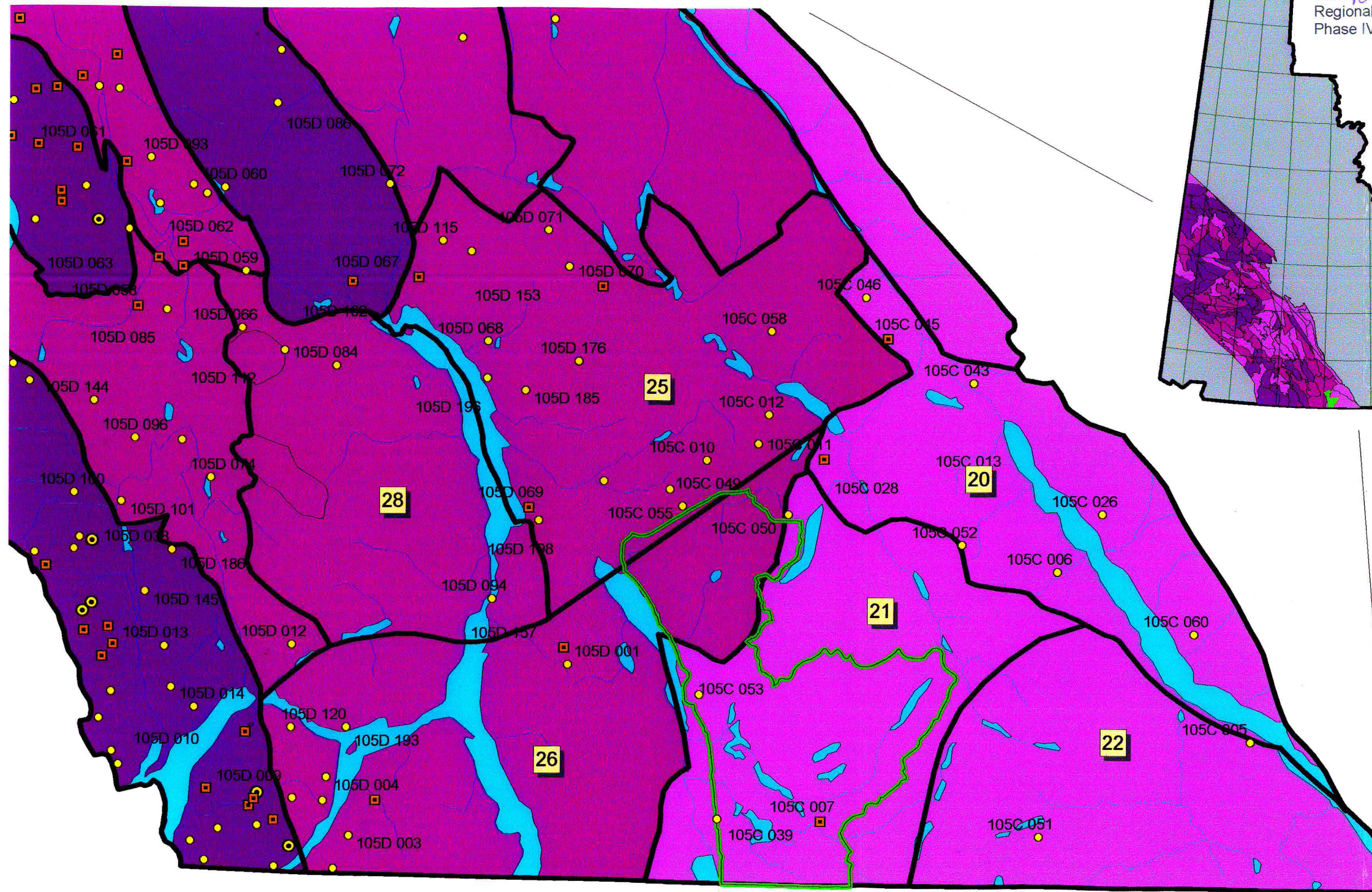
A regional mineral assessment study of the southwest Yukon (including the proposed SMA area) was completed in December of 2001 by YTG's Mineral Resources Branch of the Department of Economic Development. During the regional mineral assessment process, tracks composed of similar geological units (consisting of approximately 1000 km² in area) were ranked with respect to each other. The proposed SMA covers portion of three tracts ranked moderate to lowest relative regional mineral potential (Figure 8).

Expert panelists assessed the area covered by the proposed SMA for the potential to host the following deposit types: gold-quartz vein, copper-gold quartz vein, polymetallic vein, epithermal gold-silver, copper skarn, gabbroic nickel, minor podiform chromite, and porphyry molybdenum deposits. Descriptions of the deposit models used are appended (Appendix 4) to this report (Lefebure and Hoy, 1996).

Table 3. Regional mineral potential tract results for the proposed SMA area.

Tract #	Deposit Model	Median Tonnage	Median Deposit	Relative Tract Rank
21	Polymetallic Veins	160,987	Union - BC	Lowest
	Au-quartz Veins	290,751	Georgia River - BC	
	Epithermal (low S)	1,080,000	Paquilla - Mexico	
22	Polymetallic Veins	160,987	Union - BC	Lowest
	Au-quartz Veins	290,751	Georgia River - BC	
	Epithermal (low S)	1,080,000	Paquilla - Mexico	
	Porphyry Cu-Au (alkalic)	115,000,000	Kemess - BC	
25	Polymetallic Veins	160,987	Union - BC	Moderate
	Au-quartz Veins	290,751	Georgia River - BC	
	Plutonic Related Au qtz	16,500,000	True North - Ak	
	Gabbroic Cu Ni	700,000	Canalask - YT	
	Minor Podiform Cr	13,000	Karageban - Turkey	
26	Polymetallic Veins	160,987	Union - BC	Moderate
	Au-quartz Veins	290,751	Georgia River - BC	
	Plutonic Related Au qtz	16,500,000	True North - Ak	
	Epithermal (high S)	294,500	Black Dome - BC	
	Cu Skarn	323,514	Keewenaw - YT	
	Cu Au quartz	500,000	Golden Stranger - BC	
	Porphyry Mo	76,750,000	Mt. Tomlison - BC	

Regional Mineral Potential



South West Yukon
Regional Mineral Potential
Phase IV

Tract #	Deposit Model	Median tonnage	Median deposit
21	polymetallic veins	160,987	Union - BC
	Au-quartz veins	280,751	Georgia River - BC
	epithermal low S	1,080,000	Paquilla - Mexico
22	polymetallic veins		
	Au-quartz veins		
	epithermal low S		
25	porphyry Cu-Au (alkalic)	115,000,000	Kemess - BC
	polymetallic veins		
	Au-quartz veins		
	plutonic related Au qtz	16,500,000	True North - AK
26	gabbroic Cu/Ni	700,000	Canalask - YT
	minor podiform Cr	13,000	Karageban - Turkey
	polymetallic veins		
28	Au-quartz veins		
	plutonic related Au qtz		
	epithermal high S	294,500	Black Dome - BC
	Cu skarn	323,514	Keewenaw - YT
	Cu/Au qtz	500,000	Golden Stranger - BC
	porphyry Mo	76,750,000	Mt. Thomson - BC

Relative Regional Mineral Potential

- Highest
- Medium
- Lowest

Minfile Occurrences

- deposit, past producer
- drilled prospect
- prospect, showing, unknown

Proposed Snafu/Tarfu Special Management Area (September 2002 outline)

Scale 1:500 000



Confidential

Arcview 3.1 - December 2002 - JvR

Regional Mineral Potential

Figure 8

Detailed Mineral Potential

A detailed mineral assessment of the proposed Snafu/Tarfu area took place in Whitehorse, on December 13th and final analysis concluded in the morning of the 14th, 2002. The detailed mineral potential map (Figure 9) is the result of the assessment workshop.

Methodology

A study area slightly larger than the proposed SMA was demarcated to ensure all portions of the proposed SMA would be assessed during the workshop. The study area was divided into eight tracts, each representing a package of rocks that constitute a domain with unique lithological, geophysical or physiographic characteristics.

Tracts were delineated over the proposed SMA area using primarily bedrock geology, as well as geophysical data and physiographic features such as major drainages. Tracts 1 and 2 are underlain by Carboniferous to Permian aged finely crystalline grey limestone. Tract 2 hosts two mapped ultramafic bodies in the northern portion of the proposed SMA. Tract 7 consists of the northernmost extension of the Fourth of July Batholith and is described as a leucocratic biotite granite body of early Cretaceous age. Tracts 3 to 6 and 8 are mapped regionally as undivided Cache Creek ribbon chert interbedded with shale, siltstone and greywacke. These tracts were separated on physiographic breaks and aeromagnetic features to make 5 tracts of similar size.

Five panelists were chosen for their expertise in the geology and mineral deposits of the Yukon and the study area: Rob Carne (consultant), Gerald Bidwell (consultant), Al Doherty (consultant), Mark Baknes (consultant) and Anna Fonseca (consultant). The Snafu assessment lasted two thirds of one day, with final discussions the following morning. After examining and discussing all the geoscientific information available for each tract, the panelists decided upon a list of deposit models pertinent to the tract and filled in evaluation forms for the likelihood of new

discoveries of the median tonnage for each deposit type in the tract. The forms were utilized to maintain the focus on mineral deposit models and explorability of the tract and to reduce personal biases. The forms are not used for a statistical analysis.



Plate 19: Panelists examine data

At the end of the assessment, the panelists ranked the tracts relative to each other unanimously, from highest to lowest

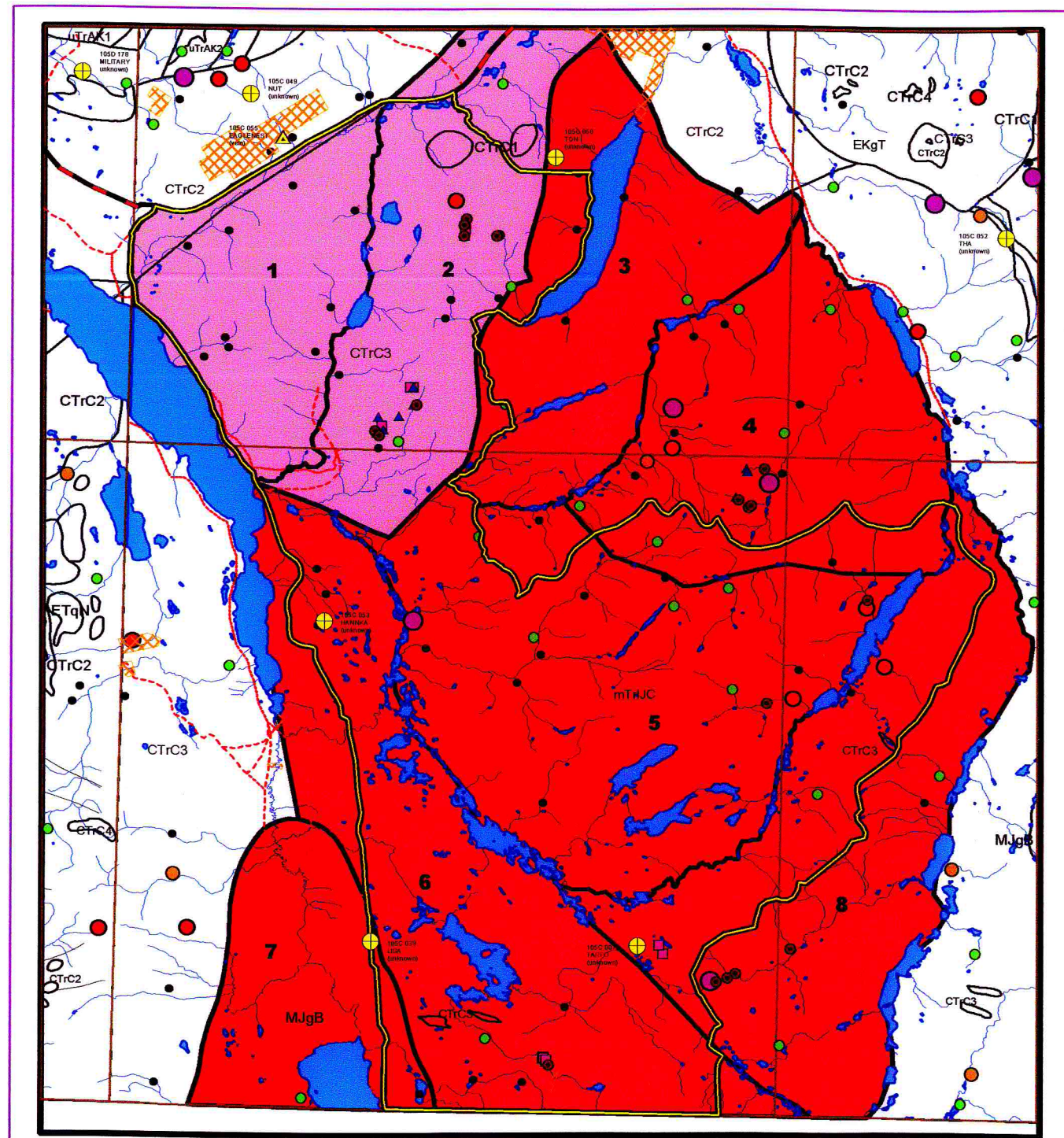


Plate 20: Final ranking of tracts

Limitations

The maps produced by the panelists portray the best estimation at the time of the assessment workshop. Since expert panelists are evaluating a hidden resource, it is important to realize that the geological knowledge base is in a constant state of growth, and mineral deposits may one day be found in rocks that were once thought to have lower relative potential.

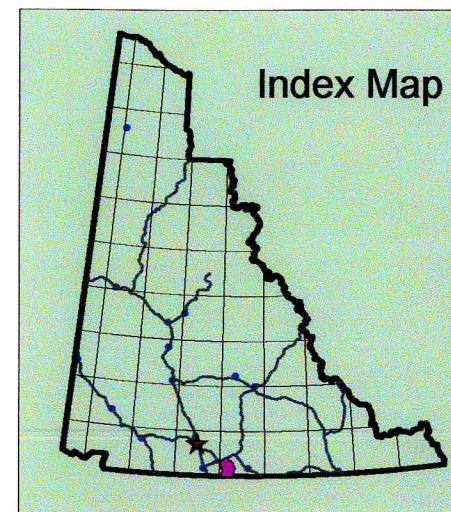
Detailed Mineral Potential Snafu Study Area



Scale 1:250 000



ARC/INFO version 3.1
 Alberta Custom Yukon Projection
 December 14, 2002
 J.R. Yukon Geology Program YTG



Confidential

Yukon MinFile Occurrence, by deposit model

- ▲ Vein
- ⊕ Unknown

3 Tract, number

RGS Geochemistry

Au (ppb)

- 0 - 2
- 3 - 5
- 6 - 10
- 11 - 50
- 51 - 1460

- 2002 silt sample
- ▲ 2002 soil sample
- 2002 rock sample

Qtz & Placer Claims (March 2002)

Proposed Snafu SMA (Sept 2002 outline)

Relative Detailed Mineral Potential

- Highest
-
- Lowest

Geological Legend

Early Tertiary

ETqN ETqN post accretionary intrusive rocks

Early Cretaceous

EKgT EKgT leucocratic biotite granite

Mid-Jurassic

MJgB - BRYDE SUITE
 undeformed granitic rocks from two plutonic bodies one of predominantly felsic (g) and the other of intermediate composition (g)
 g - medium grained, hornblende monzodiorite, hornblende-biotite quartz monzodiorite and minor hornblende; pink, potassium feldspar megacrystic, hornblende granite to granodiorite and associated easterly trending mafic dyke swarms

Upper Triassic, Carboniferous and Older

uTrAK AKSALA
 mixed clastic-carbonate assemblage divisible into three dominant facies including calcareous greywackes (1), locally thick carbonate (2), and red-coloured clastics (3)

- 1. brown shale, black and minor red siltstone, greenish calcareous greywacke and interbedded bioclastic, argillaceous limestone, igneous- or limestone-clast pebble and cobble conglomerate; lahatic debris flows; rare feldspar-augite porphyry flows (Casca mb. of Aksala)
- 2. massive to thick bedded limestone, minor thin bedded argillaceous to sooty limestone; coarsely crystalline, massive dolostone; minor laminated chert; massive to poorly bedded, limestone conglomerate debris flows and fanglomerate (Hancock mb. of Aksala)

Middle Triassic to Lower Jurassic

mTrJc mTrJc - CACHE CREEK
 well bedded ribbon chert interbedded with shale, siltstone and greywacke

Carboniferous to Jurassic

CTrC - CACHE CREEK
 oceanic assemblage of ultramafic rocks (1), volcanics (2), carbonate (3) and ribbon chert (4)

- CTrC1 1. dark rusty to dun brown weathering, strongly magnetic, variably tectonized, serpenitized and chloritized ultramafic rocks including medium to coarse grained hornblende-pyroxene diorite gabbro, peridotite, dunite, serpentinite, and pyroxenite (Cache Creek Gp.)
- CTrC2 2. andesitic and basaltic spherulitic greenstone, locally pillowed; aphanitic, luffaceous (?) greenstone with clasts of limestone and chert; altered volcanic rocks with numerous serpentine bodies; massive, fine-grained metabasite and hornblende diorite (Cache Creek Gp., Nelsina)
- CTrC3 3. massive, finely crystalline, locally crinoidal and fusuline gray limestone; limestone, limestone breccia; massive to poorly bedded, medium-grained, recrystallized white to pale yellow limestone and crinoidal bioclastic limestones; rare dolostone (Cache Creek Gp., Horsfield)
- CTrC4 4. resistant, argillaceous, thin bedded, grey, black, red and brown chert, with lesser cherty sandstone and siltstone; minor thin limestone beds and pillow lava (Cache Creek Gp., Kedahda)

Detailed Mineral Potential Figure 9

Results and Conclusions

The results of the detailed mineral assessment workshop for the proposed Snafu/Tarfu SMA area are summarized in Table 4 below.

Table 4. Detailed mineral potential tract results.

Tract #	Deposit Models considered	Geology	Significant features	Relative Tract Rank
1	Polymetallic Veins Au-quartz Veins	CTrC3 - Limestone; red gossans noted	Ag, Cd, F, Mo, U, Co RGS anomalies	Lowest (8)
2	Polymetallic Veins Au-quartz Veins Pb-Zn Skarn Gabbroic Cu Ni	CTrC3 - Limestone & ultramafic units; 2002 sample 97712 – ?gabbro or lamprophyre	Aeromagnetic feature; Ag, Cd, Co, Cr, F, Mo, Pb, Sb, Ni, V, Zn RGS; Small shear zone	Lowest (7)
3	Polymetallic Veins Plutonic Related Au qtz, Porphyry Cu Mo Au Fluorine Vein	MTrJJC - chert with shale, siltstone, & greywacke; thrust contact with limestone units to north	Minfile 105C 050- unknown status; Highest F RGS value; Sn, Ag, Co, F, U_H2O RGS	Moderate (6)
4	Polymetallic Veins Plutonic Related Au qtz, Porphyry Cu Mo Au	MTrJJC - chert with shale, siltstone, & greywacke; greywacke unit with volcanic component; Possible Cretaceous granite (interpreted from geophysics)	Anomalous geochemistry: 1460 ppb Au RGS; 11 & 81 ppb Au RGS; Cu, Ag, Cd, Hg, Mo, Pb, Sb, U, Zn, F, Fe, low pH; mag low - ? granite body	Highest (1)
5	Polymetallic Veins Plutonic Related Au qtz, Epithermal (low S)	MTrJJC - chert with shale, siltstone, & greywacke; north 1/2 of tract could be related to mag low; possibly related to porphyry in tract number 4	86 ppb Au; 11 & 10 ppb Au RGS; Hg, Pb, Co, Cd, Mn, F_H2O RGS; bumpy magnetic signature	Highest (2)
6	Au-quartz Veins Epithermal (low S)	MTrJJC - chert with shale, siltstone, & greywacke; contact with intrusive MJgB; andesite dykes, qtz veins; thick accumulations of drift/till cover	Minfile 105C 053; Placer claims; 2002 sheeted veins & dykes with qtz/carb alt; Au, As, Ba, Mo, F_H2O, LOI, Mo, U_H2O RGS	Moderate (5)
7	Polymetallic Veins Plutonic Related Au qtz, Porphyry Cu Mo Au	MJgB- biotite granite Correlate with BC geology- lots of porphyries & veins;	Minfile 105C 039; Only 2 RGS samples within tract but weak Au, As, Mo, Pb, Sb, V, Ba, Ni, Pb, Zn anomalies	Highest (3)
8	Au-quartz Veins Minor podiform Cr	MTrJJC - chert with shale, siltstone, & greywacke; Serpentine sampled (2002) in core at Tarfu Minfile occurrence	Minfile 105C 007 – high Ni, Pb Sn in drill core; High aeromag signature; Cu, Hg, LOI, Au, F_H2O RGS anomalies	Moderate (4)

Tracts 4 and 5 were ranked in the highest relative mineral potential category due to unexplained anomalous geochemistry in both regional stream sediment surveys and 2002 samples collected. The aeromagnetic signature over these tracts was interpreted as potential for Cretaceous intrusions with

associated mineralization. The underexplored nature of these tracts and lack of detailed bedrock geology was interpreted as increased mineral potential.

Tract 7 was ranked relatively higher due to the underlying mapped granite with potential to host polymetallic veins, plutonic related quartz veins and gold, copper, molybdenum porphyry deposits and RGS anomalies. The known deposits hosted within the same intrusive package in British Columbia, directly south of the proposed SMA, augmented the tract's potential.

Similar bedrock geology to the highest ranking tracts, geochemical and geophysical signatures and/or proximity to mapped intrusive rocks, resulted in tracts 3, 6, and 8 being ranked relatively higher than tracts 1 and 2 which are underlain by limestone.

Several previously undocumented bedrock units were identified during the fieldwork conducted in 2002 indicating that the geology is far more complex than what is currently mapped. Significant geochemical anomalies were generated from the samples collected in 2002. In target areas of RGS highs, the 2002 follow-up sampling located additional anomalies.

Recommendations and Future Work

It is recommended that all land use planners and the Steering Committees of SMA management plans take into account the results of the mineral assessment of the proposed Snafu/Tarfu SMA and use the mineral potential maps in their planning. Ideally, land use planners would avoid alienating mineral exploration and development in the tracts identified as having high mineral potential.

Any recommendations, by a Steering Committee, respecting prohibition of entry orders under the Quartz and Placer Mining Acts or designation of the proposed SMA as a park, and/or the division of the proposed park into zones should be done only after considering the mineral potential of the area.

Access to the area, existing placer claims, and land adjacent to the proposed SMA which is considered highest relative mineral potential should not be hindered by land use planning decisions without due consideration to the economic impacts.

The following additional research is recommended to better constrain the mineral deposit types applicable to the proposed Snafu/Tarfu SMA.

Numerous RGS stream sediment sample anomalies require follow-up and now, following the 2002 fieldwork, additional anomalies require follow-up. Three of the original targets identified prior to the 2002 fieldwork were not visited during last summer and require investigation. Work in Target areas 3 and 4 is essential to characterize possible mineral deposit models that can explain the anomalous stream geochemistry.

Further study is recommended on the Tarfu Minifile occurrence, including obtaining and reviewing the 1964 Kerr Addison diamond drill logs and mapping the area to better determine their mode and potential of the occurrence and explain the high nickel and chromium 2002 assays from the drill core.

Additional work is required to match aeromagnetic features with geology. Aeromagnetic anomalies cut lithologic units or are found in units mapped as homogeneous and undifferentiated. The chert unit (mTrJJC) for example has unexplained aeromagnetic anomalies and very little geological structure is documented in this area.

Review unclear

mineral work should

style of mineralization and mineral potential?

Management This should help

Acknowledgements

Ratchey
geologists mineral
Amy Stuart, Panya Lipovsky and Gary Stonghill provided technical support during preparation of the data for the fieldwork and assessment panel as well as base data for the areas of interest. Rod Hill and Monique Shoniker performed the diplomatic and administrative services that allowed fieldwork to proceed. Capital Helicopters of Whitehorse provided safe, reliable and enjoyable transportation.

The fieldwork, mineral assessment workshop, and report would not have been completed without the expertise support and help from my colleagues, Robert Stroshein, Roger Hulstein, and Farrell Andersen. I recommend them for their companionship, perseverance and dedication to carrying out the best quality work that is possible.

Thank you to the expert panel, Mark Bakness, Gerald Bidwell, Rob Carne, Al Doherty and Anna Fonseca, for sharing and applying their expertise in Yukon geology and mineral deposits with diligence and good humor.



Plate 21: 2002 Mineral Assessment Crew

○ Can't find these citations within text.

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Exploration and Geological Services Division Yukon Region

Yukon Territory.

← Add

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Appendix I: Analytical Procedures and Quality Control

Report on

**2002 Geochemical Procedures
used during
Mineral Resource Assessments**

March 11, 2003

Internal Report

Roger W. Hulstein
Jo-Anne vanRanden
Robert W. Stroshein
Farrell J. Andersen

YTG, Energy Mines and Resources
Mineral Planning and Development

**Energy Mines and Resources, Yukon Geology Program
2002 Mineral Assessment**

Geochemical Analysis

Laboratory Procedures

Northern Analytical Laboratories Ltd., of Whitehorse, secured the 2002 contract to supply geochemical analysis to the Mineral Assessment branch of the Yukon Geology Program. Northern Analytical Laboratories Ltd. in turn subcontracted Analytical Laboratories Limited, of Vancouver, B.C. to carry out the geochemical determinations. All samples; rock, soil and steam sediment were submitted to Northern Analytical Laboratories Ltd. for sample preparation and then shipped to Acme Analytical Laboratories Limited for analysis by ICP-MS

The attached sheets supplies by Acme Analytical Laboratories Limited and Northern Analytical Laboratories Ltd. summarizes the analytical methodology and sample preparation procedures respectively. Also shown are the elements analyzed for and their detection limits. Gold analysis was ideally done on 30gm pulps but where there was insufficient material Au analysis was done on a 15gm, 7.5gm or 5gm sample (as applicable). Analytical results were sent to the Yukon Geology Program in both digital and paper form. The digital results were merged with the digital sample location data and plotted on the accompanying maps.

Statistical Analysis

Following computer listing of the data, statistical parameters such as arithmetic mean, median and mode, standard deviation and sample variance were calculated using MS Excel. Histograms of selected elements from data subsets were generated by MS Excel for specific projects to aid in establishing five ranges for the results, ideally; background, slightly above background, weakly anomalous, moderately anomalous and anomalous.

The stream sediment data procured from the Geological Survey of Canada's, 'Regional Stream Sediment and Water Geochemical Data', open files were also statistically analyzed in a similar manner using MS Excel. Histograms and calculated thresholds for project areas, where applicable, are attached.

Where Histograms and statistical were not used in generating geochemical plots, ESRI Arview 3.2a was used utilizing natural breaks in the data. Occasionally where there was a large number of values below, at or near the detection limit, or obviously anomalous samples were observed, threshold were adjusted visually, either in Arcview 3.2a or from a MS Excel histogram that was not printed.

Quality Control

In addition to Acme Analytical Laboratories Limited's internal sample standards and duplicates Yukon Geology Program - Mineral Assessments inserted standards prepared by CANMET (Natural Resources Canada) and locally collected material as sample checks. The local material consisted of marble rock (used a blank) and mineralized copper-magnetite skarn used with rock sample submissions. Local material consisting of un lithified silt ('clay cliff') and tailings from the Whitehorse copper mine (milled copper-magnetite skarn rock) were inserted with the soil and stream sediment samples. Duplicates of the soil samples and occasionally the stream sediment samples were collected in the field or a sample was split later and inserted with the same number with a 'B' appended to the sample number denoting a duplicate. The result is that analysis were carried out on duplicate samples approximately every 20-25 samples. Check samples and standards inserted into the sample stream can be determined by the letters appended to the sample number as, where xxx is the sample number:

- XXXa = Whitehorse 'clay cliff' check
- XXXb = duplicate sample split
- XXXc = Whitehorse copper mine tailings check
- XXXd = marble rock, blank (collected at the Grafter occurrence)
- XXXe = magnetite copper skarn rock (collected from Best Chance occurrence)
- XXXf = Canmet standard STSD-3 (derived from stream sediment samples)

In addition Acme Analytical Laboratories Limited carried out their in house internal duplicate checks as; reXXX (re-assay of sample XXX) and inserted their own standard, standard DS4.

Rock Sample Quality Control Results

Marble Blanks

Results from 14 marble blanks show that values are mostly uniform and the variation could be due to the marble rock which had visible impurities (trace sulfides?) once it was crushed and homogenized (using cone on cone method). Variations are restricted to only a few (or one) element per sample. The highest gold value coincides with a high As and Pb value (sample 176535D). For almost all the samples and all elements the samples returned low ('blank') values. The variation in analytical results could be due to contamination or lack of analytical precision.

Magnetite Copper Skarn

Results from the 15 magnetite copper skarn samples show highly variable results for most elements. Following crushing, the sample was homogenized (cone on cone method) but homogeneity was not achieved. The samples do show that anomalous values were determined but precision and accuracy are very questionable due to the variably mineralized material. This results in a very high percent relative standard deviation and shown graphically by univariate scatterplots for 6 selected elements.

Acme Analytical Laboratories Limited – Duplicate Analysis

Most elements for all the splits correlated very closely (visually <10% difference).

Acme Analytical Laboratories Limited – In-house Standard DS4)

The 12 standards analyzed with the rock samples returned very consistent values, so consistent that descriptive statistics were not calculated.

Soil and Stream Sediment Quality Control Results

Over all the analytical results are acceptable although questions about the accuracy and precision of the data are raised by variations in the Canmet standards. The check samples of Whitehorse copper tailings and Whitehorse clay cliff material served their purpose and returned anomalous and low values respectively.

Canmet Standard STSD-4

Results for the Canmet standards show an acceptable range of values. The univariate scattergrams for Au, Cu, Zn, Pb, Ni and As illustrate that it is the occasional and random (not restricted to one sample or sample batch) 'flyer' that results in the higher percent relative standard deviation values (values >10%). Results for Au analysis are disturbing as two samples returned values that could be considered anomalous at 18ppb and 29ppb. Analysis of the standard only tests the analytical techniques for accuracy and precision as the standard is received in a pulped form (-200 meshXX) it is not prepared (dried, sieved or split). The percent relative standard deviation was calculated for Au, Cu, As, Zn, Pb, Ni, and As. Values were below <10% for Z, Pb, Ni (acceptable) and <16% As and Cu (marginally acceptable) and a high 128% for Au due to the two high values mentioned above.

Whitehorse Copper Mine Tailings

A total of 20 copper mine tailing samples were inserted into the sample stream with two purposes in mind; one was to confirm that obviously anomalous samples (for Cu, Au, Ag, Bi) were being detected and secondly, to test for analytical precision and accuracy. As the samples were prepared at Northern Analytical they also test the preparation procedures. All the samples returned anomalous values for the above elements although the variation for Au exceeded the preferred 10% maximum (at 32%) for the percent relative standard deviation. Other elements where the percent relative standard deviation was calculated (Cu, Ag, As, Pb, Zn, Mo, Bi) returned a close to or less than a 10% percent relative standard deviation.

Whitehorse Clay Cliff Silt

A total of 25 clay cliff silt samples were inserted into the sample stream for two purposes; one was to ensure that material considered to have background values did indeed return background values and to test for analytical precision and accuracy. As the samples were prepared at Northern Analytical they also test the preparation procedures. All the samples exceeded the preferred 10% maximum for the percent relative standard deviation for Au (31%), Cu 11%, Pb (38%), Zn (13%), As (26%) and Ni (12%). The variations in the gold values are quite acceptable as the highest value was 4.7ppb. Most of the variation in the other samples is due to two samples that yielded inconsistent values. Variation in the 'clay cliff' material is expected and is likely responsible for the variation. Laboratory error is not suspected as other check samples and standards from the same batches did not produce similar errors.

EMR Duplicate Check Samples

A total of 29 duplicate pairs were submitted to check for reproducibility – accuracy. A visual scan reveals a close approximation. All of the seven elements (Au, Cu, As, Ni, Pb, Zn and U) display a linear trend on scatterplots. The only errant value was for gold in one stream sediment (silt) sample pair. This is not unexpected given gold's nugget effect.

Acme Analytical Laboratories Limited – In-house duplicate pairs

Acme Analytical analyzed 20 duplicate pairs. The scatter plot results are as close for Cu and Pb as for the duplicate pairs submitted by EMR. Gold values were less than 7.4ppb so significant variation for anomalous samples can't be determined. Interestingly, the Acme duplicates included 5 duplicate pairs of clay cliff material, presumably because there was abundant sample to split, but no Whitehorse copper tailing samples.

Acme Analytical Laboratories Limited – In-house Standard DS4)

The 27 standards analyzed with the stream sediment and soil samples returned very consistent values, so consistent that descriptive statistics were not calculated.

Is this necessary?

**2002 Fieldwork, Mineral Assessments
GPS Waypoint and Geochemical Sample Data Handling Protocol**

June 18, 2002 RWH

GPS data

- 1 Create folder with project name in L:\fieldwork\2002fieldwork\GPS coord\ . Dump GPS waypoints in new file, named with GPS owners' initials and date (XX_June18), and place in project folder.
- 2 Open new file in excel, make columns and clean up data; delete extraneous points and place columns in following order: Ident Easting Northing Date. Save as excel file.
- 3 On L:\fieldwork\2002fieldwork\GPS coord\ open: All_dnload_gps_pts.xls, copy from new GPS file data to be added and add appropriate data to complete columns.

Sample data

- 4 Open sample_data.xls in L:\fieldwork\2002fieldwork and copy GPS data with sample numbers over to GPS_all_samples sheet. Fix any problems or add any missing samples to this table.
- 5 Copy GPS data to appropriate sample description sheet (*i.e.,* rock_descriptions).
- 6 Add sample descriptions, notes, etc. in sample description file after sample number and GPS data is appended.
- 7 Other waypoint stations (geology etc.) are copied from All_dnload_gps_pts.xls to Other_Stations sheet and notes, etc. added if required.
- 8 Geochemical data from the lab is added to the geochemical sheet and is merged with the sample descriptions in the merged sample sheet appropriate to each sample type. Sample location data with descriptions are merged with the geochemical data in MS Access.
- 9 The merged samples are used in GIS program of choice
- 10 Problems or questions? See your friendly data guy.

del spca

i.e.,



Acme Analytical Laboratories Ltd.

852 E. Hastings St. Vancouver, BC Canada V6A 1R6

Tel: (604) 253-3158

Fax: (604) 253-1716

Canada & US Toll free: 1-800-990-2263

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Roger

Total # of pages:

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Yukon Government

Fax #:

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Date:

OCT 10 / 2002

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John Gravel

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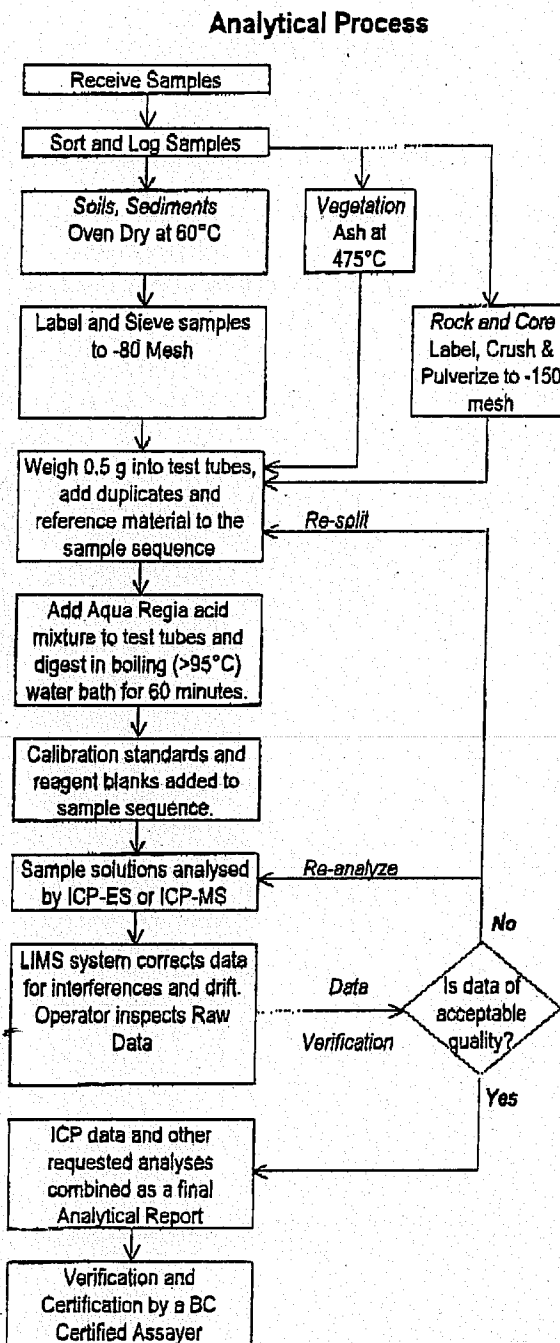
Dear Roger

Here is the information you requested. This is a geochemical analysis. As such our tolerance limits for accuracy and precision is $\pm 10\%$.

Group 10A is the same as 10X Sincerely
except for using a larger sample (i.e. 30g)

** If you do not receive all the pages, please contact us ASAP.

METHODS AND SPECIFICATIONS FOR ANALYTICAL PACKAGE GROUP 1D & 1DX - ICP ANALYSIS - AQUA REGIA



Comments

Sample Preparation

Soil or sediment is dried (60°C) and sieved to -80 mesh (-177 µm). Vegetation is dried (60°C) and pulverized or ashed (475°C). Moss-mats are dried (60°C), pounded and sieved to yield -80 mesh sediment. Rock and drill core is jaw crushed to 70% passing 10 mesh (2 mm), a 250 g aliquot is riffle split and pulverized to 95% passing 150 mesh (100 µm) in a mild-steel ring-and-puck mill. Aliquots of 0.5 g are weighed into test tubes. QA/QC protocol includes inserting a duplicate of pulp to measure analytical precision, a coarse (10 mesh) rejects duplicate to measure method precision (drill core samples only), two analytical blanks to measure background and an aliquot of in-house reference material STD DS3 to measure accuracy in each analytical batch of 34 samples.

Sample Digestion

Aqua Regia, a 2:2:2 mixture of ACS grade concentrated HCl, concentrated HNO₃ and de-mineralised H₂O, is added to each sample. Samples are digested for one hour in a hot water bath (>95°C). QA/QC protocol requires simultaneous digestion of two reagent blanks randomly inserted in each batch.

Sample Analysis

Group 1D: sample solutions are aspirated into a Jarrel Ash AtomComp 800 or 975 ICP emission spectrograph to determine the following 30 elements: Ag, Al, As, Au, B, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, K, La, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Sr, Th, Ti, U, V, W, Zn.

Group 1DX: sample solutions are aspirated into a Perkin Elmer Elan 6000 ICP mass spectrometer to determine the following 35 elements: Ag, Al, As, Au, B, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, La, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Sc, Ti, Sr, Th, Ti, U, V, W, Zn.

Data Evaluation

Raw and final data undergoes a final verification by a British Columbia Certified Assayer who then signs the Analytical Report before it is released to the client. Chief Assayer is Clarence Leong, other certified assayers are Dean Toye and Jacky Wang.

GEOCHEMICAL - ICP by Aqua Regia Digestion

GROUP 1C MERCURY BY COLD VAPOUR AA OR ICP-MS

Accurate, low level determination of Hg by Aqua Regia digestion followed by either cold vapour AA or ICP-MS analysis.

Element	Method	Detection	Cdn	U.S.
Hg	Cold Vapour AA or ICP-MS	10 ppb	\$4.40	\$3.30
Hg	Cetac Cold Vapour AA	1 ppb	\$7.70	\$5.80

Analysis is not suitable for high-grade Au, Pt or elevated Se samples (cold vapour method only). Acme retains the right to select the method of determination.



GROUP 1D, 1DX & 1DA: ICP & ICP-MS ANALYSIS - AQUA REGIA

Now you can choose ICP-ES or ICP-MS analysis at very economical prices to complement your geochemical survey. You can also select a larger split size to *get better Au values without a second, costly analysis*. A 0.5 g split is leached in hot (95°C) Aqua Regia then analysed by ICP-ES (Group 1D) or ICP-MS (Group 1DX). Group 1DA offers a choice of 10 g, 20 g or 30 g splits.

Group 1D	Cdn	U.S.
Any 1 element	\$3.85	\$2.90
Any 5 elements	\$5.20	\$3.90
All 30 elements	\$6.35	\$4.75
#Include Hg and Tl add	\$0.50	\$0.40

Group 1DX	Cdn	U.S.
Any 1 element	\$6.00	\$4.50
Any 5 elements	\$7.50	\$5.60
All 35 elements	\$9.00	\$6.75

Group 1DA	Cdn	U.S.
10 gm split	add \$2.50	\$1.90
20 gm split	add \$3.75	\$2.80
30 gm split	add \$5.00	\$3.75

	Group 1D Detection	Group 1DX & 1DA Detection	Upper Limit
Ag	0.3 ppm	0.1 ppm	100 ppm
Al*	0.01 %	0.01 %	10 %
As	2 ppm	0.5 ppm	10000 ppm
Au	2 ppm	0.5 ppb	100 ppm
B*	3 ppm	1 ppm	2000 ppm
Ba*	1 ppm	1 ppm	1000 ppm
Bi	3 ppm	0.1 ppm	2000 ppm
Ca*	0.01 %	0.01 %	40 %
Cd	0.5 ppm	0.1 ppm	2000 ppm
Co	1 ppm	0.1 ppm	2000 ppm
Cr*	1 ppm	1 ppm	10000 ppm
Cu	1 ppm	0.1 ppm	10000 ppm
Fe*	0.01 %	0.01 %	40 %
Ga*	-	1 ppm	1000 ppm
Hg†	1 ppm	0.01 ppm	100 ppm
K*	0.01 %	0.01 %	10 %
La*	1 ppm	1 ppm	10000 ppm
Mg*	0.01 %	0.01 %	30 %
Mn*	2 ppm	1 ppm	10000 ppm
Mo	1 ppm	0.1 ppm	2000 ppm
Na*	0.01 %	0.001 %	10 %
Ni	1 ppm	0.1 ppm	10000 ppm
P*	0.001 %	0.001 %	5 %
Pb	3 ppm	0.1 ppm	10000 ppm
S	-	0.05 %	10 %
Sb	3 ppm	0.1 ppm	2000 ppm
Sc	-	0.1 ppm	100 ppm
Sr*	1 ppm	1 ppm	10000 ppm
Th*	2 ppm	0.1 ppm	2000 ppm
Ti*	0.01 %	0.001 %	10 %
Tl†	5 ppm	0.1 ppm	1000 ppm
U*	8 ppm	0.1 ppm	2000 ppm
V*	1 ppm	1 ppm	10000 ppm
W*	2 ppm	0.1 ppm	100 ppm
Zn	1 ppm	1 ppm	10000 ppm

See Page 6 for Group 1F-MS Aqua Regia / ICP Mass Spec analysis for ultratrace elements

*Some elements are partially leached

B - IV. ROCKS & DRILL CORE

Review the information under the headings of "Notice" and "Safety" at the beginning of this "Sample Preparation" section of the manual!!

Ensure that the equipment is properly adjusted and lubricated as per the equipment maintenance instructions at the end of this sub-section.

1. Set out the samples on a mobile workbench, making sure they are all present in their proper order and the matching pulp bags are in the exact same order. Locate the workbench near the jaw crusher where the samples can be reached conveniently. However, if there are samples in open containers, make sure they are not located where they could be susceptible to contamination by stray rock chips that may be ejected from the crushers.

2. Ensure that you are wearing the required safety equipment. Ensure that the jaw crusher, cone crusher and riffle splitter and its 3 pans are thoroughly clean.

Start the dust extractor. Start the jaw crusher and run the first sample through it. The best procedure for feeding the sample into the crusher depends on the nature of the sample and you will develop a feel for this with experience. Generally, large samples consisting of relatively small fragments can be poured directly from the sample bag into the crusher, maintaining enough material on top of the jaws to prevent pieces from spitting out. Individual, hard rocks will require quickly covering the opening with a block of wood or a pan to prevent material from ejecting. Some rocks may not crush until they are forced down into the jaws with the block of wood. Large rocks will have to be broken with a sledgehammer before they will go into the jaws.

Try to avoid spilling any sample as you feed it into the crusher. With large samples, be careful that the pan collecting the crushed material does not overflow; frequently shaking the pan to level the contents will help.

3. Brush any loose chips from the crusher (particularly the pan channel) into the pan. Remove the pan and pour the sample into the hopper of the empty, clean cone crusher. Move the empty sample bag along the crushing line, next to the cone crusher to track the sample.

Thoroughly blow the jaw crusher and its pan clean with compressed air. Make sure no sample material remains in hidden nooks and crannies. If sample remains stuck to the jaws it must be brushed away or cleaned by crushing some barren rock and then cleaning with compressed air again. Replace the pan in its slot under the crusher.

4. After the sample has passed through the cone crusher, blow the head of this crusher clean with compressed air. Open the side flap and blow clean the inside of the crusher, paying particular attention to the peak of the slides at the centre of the machine, where material tends to accumulate.

Remove the receiving pan, shake to level the crushed rock in the pan and pour it into the splitter (with empty pans in place on each side). Be careful to hold the pan laterally level so that the sample pours out evenly along the entire width of the slot and through all the vanes of the splitter. Move the sample bag along the line to the splitting hood.

Blow the cone crusher pan clean with compressed air and, after ensuring that the cone crusher is thoroughly blown clean, replace the pan in it. If barren rock was needed to clean the jaw crusher, run it through the cone crusher to clean it too and again blow the unit clean. Be sure to dispose of the cleaning rock so it does not end up in a pulp bag in place of the next sample.

5. Remove one pan from under the splitter and replace it with the third pan. Level the sample in the removed pan and pour it out the wide side into the splitter, again making sure it is distributed evenly into all the vanes. This even distribution of sample through the riffles is critical to obtaining a sample split that is compositionally near identical to the original whole sample. Do not bang the pan against the top of the vanes or they will gradually become burred and splitting efficiency will be lost.

Repeat the splitting process as many times as necessary, resplitting the same side pan until it contains just enough sample to fill the pulp bag about full (about 250 grams). Make sure no sample material is stuck in the riffles; sharply rocking and banging the unit will help clear it.

Pour the sample split into the pulp bag without spilling any of it, making sure you have the right pulp bag labelled to match the original sample bag. If there is a sample tag, place it in the pulp bag. Fold over the top of the bag to prevent contaminants from getting into it and place on a cardboard tray. The bags are arranged in order on the tray in 4 rows of 5 samples (20 per full tray), beginning at the front left.

Pour the sample from the other pan (the reject) into the original sample bag; the splitting hood contains a chute to the floor to facilitate this for larger samples. Fold and staple the top of this bag, making sure the sample label remains visible, and place it in a rice sack that has been marked with the work order number and client name.

Blow the splitter and all three pans clean with compressed air and leave set up for the next sample.

NEVER add or remove sample by hand to adjust the size of a split. If it is too large, resplit the split until one pan contains the right amount. If you have riffled it down too small, resplit the reject to make up the requisite amount.

Note that if a sample is small enough that it will be all used for the pulp, it can be dumped directly from the crusher pan into a splitter pan and then transferred to the pulp bag. Place the empty sample bag in the rejects sack so no one searching through the rejects will think the sample is missing.

5. Continue crushing and splitting the remaining samples.

In practice, for efficient production, you will have consecutive samples in different stages of the process simultaneously and one person may be crushing while another splits and bags the samples. This makes it vital to be well organised and methodically consistent to prevent sample mix-ups. Always remember to double check that each piece of equipment is empty and clean just before you dump in a sample and always move each sample bag along the line with its corresponding sample. If there are sample tags, these also must accompany the samples throughout the process (but don't let them go through the crushers) and end up in the pulp bags as a further check.

When a tray of crushed sample splits is full or completes a work order, place it in a drying oven to ensure that the samples will be completely dry for pulverizing.

6. Turn on the dust extractor for the pulverizing station hood. Ensure that you are wearing the required safety equipment, including safety glasses and a dust mask.

Before starting to pulverize a work order, place a handful of cleaning gravel in each of two pulverizing pots containing their rings and puck. Position the lid on one pot and clamp it in place in the pulverizer, ensuring that it clamps securely with the lid centred so that it seals properly. Close the lid of the pulverizer box and press the start button to begin the pulverizing cycle.

When the machine stops at the end of the timed cycle, unclamp the pot and replace it with the other pot. While the pulverizer is cycling with the second pot, carefully dump the contents of the first pot (including rings and puck) onto a sheet of Kraft paper in the dust hood. Blow the bowl, rings, puck and lid clean with compressed air. Discard the pulverized cleaning gravel in the garbage and blow the sheet of paper clean.

Reassemble the rings and puck in the bowl and dump in the first crushed sample split to be pulverized, distributing it fairly evenly. Continue as above, always having one pot pulverizing while you clean out the other.

With the samples, be careful to minimize sample loss as light components will blow away more readily, changing sample composition. Pour the pulverized sample from the sheet of paper back into the correct pulp bag, replace the sample tag if there is one, fold the top and place it back on the cardboard tray. Blow the sheet of paper clean with compressed air.

Always pulverize the samples in order to facilitate keeping track so you do not put any pulps in the wrong bags.

It is important that the samples be pulverized to the consistency of flour. You should feel no grittiness when you rub some pulp between your thumb and a finger. For average samples, the standard pulverizing time of 80 seconds should be satisfactory. Very hard minerals require longer. If a pulverized sample remains gritty, pulverize it for part of another cycle until it is fine enough; this is a process of trial and error. The timer can be reset for a series of similar samples that require a non-standard pulverizing time.

Soft samples require reduced pulverizing time or they will cake and stick inside the pot. Sticking may still occur even with appropriately less pulverizing. Note that samples will stick if they are not perfectly dry so make sure this is not the problem. Adding a few drops of acetone or ethanol to the crushed sample in the pot just before pulverizing may reduce sticking of hygroscopic samples which always retain some moisture.

Brushing may help remove slightly stuck material. Otherwise, if the bowl, rings and puck do not blow clean they must be cleaned by pulverizing a load of cleaning gravel, the same as at the start of a work order.

Also use cleaning gravel after any sample that has been noted as "high grade" or any sample that has obvious mineralization, especially if the next sample to be pulverized in the same pot is not mineralized.

The friction of pulverizing will heat up the pots until eventually they are too hot to handle comfortably. Switch to another set of cleaned pots when that happens. Samples requiring critical analysis for mercury, arsenic or tellurium may be flagged to be pulverized only in cool pots because there could be significant losses of these elements in hot pots.

Samples that are very high in sulphide minerals also require cool pots and minimum pulverizing time or they may ignite. **DANGER!** Do not let such samples start a fire. Avoid breathing the toxic fumes, which smell like rotten eggs. Burning may not be apparent immediately, as oxidation begins slowly and accelerates, so after pulverizing sulphide-rich samples monitor the bags of pulp for increasing temperature and the smell. Sealing an oxidizing sample in a pulverizer pot may stop the process. However, the composition of the sample will have changed so a new split must be riffled from the crushed reject. Be very careful pulverizing the new split to avoid igniting it too; a series of very brief pulverizing cycles may be necessary. If there is no reject for a new split, notify the senior chemist. He may authorize analysis of an oxidized sample if it is quenched before the pulp shows any lightening of colour, but this must be noted to the client.

7. Occasionally, you may be instructed to "roll" pulps. This is done to ensure that the pulps are homogeneous, without stratification of light and heavy components.

Roll a sample when it is on the Kraft paper after emptying it from the pulverizer pot. Grasp one corner of the paper and pull it gently towards the opposite corner, keeping it low over the surface so that the pulp rolls rather than slides. Before sample spills off the sides of the sheet, return the lifted corner to flat, then roll the sample from the opposite corner but stop when the pulp is centred on the paper. Next, grasp an adjacent corner and repeat the rolling process along the other diagonal. Repeat at least five times in each direction before pouring the pulp into its bag.

8. When preparation of a tray of samples has been completed, take it into the lab. Place the trays in order on the "in" shelves or at a work station where you have been instructed to take them.

When the last tray of a work order is brought into the lab, write the date in the log book by the "X" under "Sample Prep" on the line for that work order. Make sure the work order copy and the Sample Sorting and Preparation form are brought in with the last tray.

9. Equipment Maintenance:

Jaw Crusher: The adjustment of the crusher should be checked before each use. The drive belts should be snug with minimal free play but should not be strung tight. Also check that they are in good condition, free of cracks. The jaws should have a maximum ½ inch gap at the widest opening and the moveable jaw should just contact the stationary plate at maximum closure. If adjustment is needed, it should be done by someone who is familiar with the procedure. Whenever adjustments are made, it should be ensured that the tension spring is adjusted for a gap of _ inch between the coils at maximum compression; if it is too tight the crusher may be damaged by the excessive force, but too little tension will result in inadequate crushing of hard rocks. The crusher must be greased using a grease gun at the three nipples about every two hours of use or whenever there is an apparent increase in noise or heat in the bearing area. Inject grease until it starts to ooze out between the parts, then wipe off the excess so it will not fall into any samples. Failure to inject grease when necessary will result in the bearing being destroyed.

Cone Crusher: Before each use, check the condition and tension of the drive belts. Verify that the machine runs smoothly and quietly when it is not crushing and that the head is not spinning violently and moves freely. If this does not appear to be in order, notify the general manager immediately and do not use the machine as a seized head bearing can lead to much more extensive damage. Ejection of rock chips from the head is another sign of a seized bearing. The crusher should produce a crush of at least 60% minus 10 mesh and a supervisory employee should verify this regularly, at least daily during full production, using cleaning rock for consistency. Run about a kilogram of the rock through the jaw crusher and the cone crusher, sieve it through a 10 mesh screen and weigh the plus and minus fractions. When the crusher needs to be adjusted, this is done by loosening the bolts securing the top plate and rotating the plate, which is threaded. Retighten the bolts and recheck the fineness of crush, repeating the procedure until 60% minus 10 mesh is achieved. Do not tighten the gap more than necessary or the crusher will be more susceptible to failure.

Pulverizer: The only routine maintenance required for the pulverizer is oiling of the joints in the clamping mechanism, daily during full production. Wear eventually will necessitate shimming to keep the mechanism clamping the pots tightly. The O-rings of the pot lids should be monitored closely and replaced if there is visible damage or evidence that any powdered sample is leaking during pulverizing. The components of the pots gradually will wear to the point that they no longer pulverize efficiently and have to be retired. Wear will be obvious as reduced size of the rings and puck and slight concave curvature of the bottom of the bowl and the lid. Pulverizing efficiency for each pot should be checked periodically by pulverizing 250 grams of cleaning gravel for the standard 80 seconds and sieving it thoroughly through a 100 mesh screen. The product should be at least 98% minus 100 mesh. A supervisor also should routinely spot check each employee's pulverizing by screening random pulps to verify they meet the specification of 98% minus 100 mesh, and should check pulps in every tray using the feel test for grittiness. Senior employees performing sample prep without direct supervision must do these tests on their own work.

Dust Collector System:

B - V. REVERSE DRILL CUTTINGS

Generally, these samples are treated the same as rocks and drill core, except they usually do not require jaw crushing. Cone crushing must be done unless they contain no fragments larger than 10 mesh. Drill cutting samples usually are large and most are received wet. You may be given special instructions regarding the recording of wet samples and overweight.

Review the section titled "Rocks & Drill Core".

B - VI. SOILS & SEDIMENTS

1. Set out the dried samples in order by the work location, which preferably should be in a dust hood. Have the corresponding pulp bags at hand in the same order.

Obtain a sheet of Kraft paper and a sieve of the required mesh size, which normally is 80 mesh unless otherwise specified. Inspect the screen to make sure it is in good condition with no tears, distortion or separation at the edge.

Ensure that you are wearing safety glasses and a dust mask.

2. Starting with the first sample, if it has dried into a hardened mass, pound it with a rubber mallet to break up the material, being careful to try to avoid rupturing the sample bag.

Empty the sample into the sieve, which should be sitting on the sheet of paper. Agitate the sieve in a side to side motion to shake the fine material through the screen. An occasional sharp rap may help clear the holes so the material passes through more efficiently. Agglomerated material should be broken up between the fingers or in a separate container such as a mortar and pestle, but do not break down stones or vegetation. Do not rub sample material against a fine screen as these screens are easily damaged; you can stack a 10 mesh screen on top and rub material through it to help break it up.

Do not let any of the sample escape out the top of the sieve onto the paper. If this happens and you cannot separate and remove 100 percent of the coarser material from the pulp, then the pulp has to be returned into the sieve and rescreened.

Fold the paper and pour the screened sample into its pulp bag.

3. Usually at least 30 grams of pulp is required unless you are told differently. A balance is available to check how much you have obtained. Tare the balance with an empty pulp bag before weighing the pulp.

If you cannot obtain enough pulp, first make sure all agglomerated material has been liberated including particles stuck to stones. If you still need more, then transfer the sample oversize from the 80 mesh sieve into a 40 mesh sieve and screen what will pass through that. Transfer this "-40 mesh" fraction into a separate pulp bag that you have marked with the sample number and "-40". Fold this bag tightly and place it inside the bag of -80 mesh pulp after first inspecting it to make sure it will not leak into the finer pulp.

4. Fold over the top of the pulp bag to prevent contaminants from getting into it and place on a cardboard tray. The bags are arranged in order on the tray in 4 rows of 5 samples (20 per full tray), beginning at the front left.

Dump the oversize material from the screen onto the paper and pour it back into the original sample bag. (If the bag is torn, patch or replace it.) Place the bags of oversize in a plastic sample bag and when this is full or the end of a work order is reached, seal the plastic bag with tape and place it in a rice sack that has been marked with the work order number and client name.

5. After each sample, clean the sieve(s) and the sheet of paper with compressed air. Be careful not to damage fine screens when blowing them clean; never contact the screen with the nozzle.

6. When preparation of a tray of samples has been completed, take it into the lab. Place the trays in order on the "in" shelves or at a work station where you have been instructed to take them.

When the last tray of a work order is brought into the lab, write the date in the log book by the "X" under "Sample Prep" on the line for that work order. Make sure the work order copy and the Sample Sorting and Preparation form are brought in with the last tray.

B - VII. CONCENTRATES

Various types of concentrates may be received and their preparation will vary somewhat depending on type. Generally, they require riffle splitting if they are much larger than 300 grams and most require pulverizing. Review these parts of the section titled "Rocks & Drill Core".

Pan concentrates usually are small. Extra care must be taken to avoid loss of sample, not only because there may be no surplus material to waste but also because light or heavy components of the sample may tend to be lost preferentially and this will alter the analysis. Recover all particles of the sample from the bag or other container in which it was received. For this purpose, a wet sample in a non-porous container can be washed into a beaker using a wash bottle and the sample can be dried in the beaker in a drying oven where it is safe from contamination or on a warm hotplate (being very careful not to overheat it). Pulverize cleaning gravel before and after each sample, even if no visible material sticks in the pots. Be sure the lid seal on the pot will not leak and take care to minimize loss of sample when cleaning out the pot.

Placer concentrates also must be thoroughly recovered from their sample containers or small, heavy gold particles may easily be left behind, especially in bag seams. Again, it is important to clean the pulverizing pots with cleaning gravel after every sample. The pulps should be rolled to ensure that the gold grains are distributed as homogeneously as possible.

Mine mill concentrates usually are extremely high grade so the greatest concern with these samples is to not contaminate other samples. They should be prepared away from any other samples and care should be taken to avoid raising dust from them. All equipment must be cleaned meticulously afterwards. These samples also require careful adherence to proper preparation procedures because the utmost accuracy of analytical results is demanded. Pulps should be rolled, especially in the case of gold concentrates.

Mineral Assessments - 2002 Fieldwork																								
Rock Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																								
Marble Blanks - Check Samples																								
Analytical Results																								
ELEMENT	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba
SAMPLES	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm
140304D	11.4	49.2	0.8	6	0.05	0.05	0.6	115	0.43	1.2	1.9	0.25	0.05	444	0.05	0.1	0.05	2	38.93	0.03	0.5	5.2	1.84	8
140312D	9.1	78.9	1.2	4	0.05	0.1	0.5	98	0.23	0.5	1.9	0.25	0.1	355	0.05	0.2	0.1	1	34.13	0.026	0.5	4.5	1.59	9
140357D	9.2	44	2.5	12	0.05	0.05	0.3	87	0.11	0.5	1.7	0.6	0.05	406	0.05	0.1	0.05	2	34.56	0.028	0.5	8.5	1.63	25
140389D	9.1	43.1	1.5	21	0.05	0.05	0.1	88	0.01	0.5	1.7	0.25	0.1	379	0.1	0.05	0.05	1	34.77	0.026	0.5	8.9	1.44	14
176424D	10.3	57.2	2.2	8	0.05	0.05	0.5	114	0.19	1.7	1.7	0.6	0.1	409	0.05	0.2	0.05	2	36.11	0.031	0.5	6	1.61	140
176447D	8.3	108.6	1.9	10	0.05	0.05	0.6	99	0.38	0.5	1.7	0.25	0.1	324	0.1	0.4	0.05	3	32.07	0.023	0.5	6.4	1.5	5
176535D	9	72.8	15.3	17	0.1	0.05	0.3	104	0.21	79.1	1.8	11	0.05	363	0.05	10.5	0.05	1	34.76	0.024	0.5	9.8	1.71	5
343882D	8.8	45.8	2.3	282	0.05	0.05	0.1	97	0.1	0.25	1.6	0.25	0.05	361	1.2	0.1	0.05	2	34.56	0.025	0.5	3.2	1.72	265
344221D	9	43.2	2.3	15	0.05	0.05	0.3	95	0.13	0.5	1.7	0.25	0.1	347	0.1	0.1	0.05	2	33.46	0.024	1	4.9	1.71	39
56420D	10.8	83.6	2.8	8	0.05	0.05	0.4	124	0.27	0.8	1.8	0.9	0.1	418	0.05	0.4	0.05	2	41.04	0.032	0.5	4.6	2.24	6
97601D	10	49.9	1.2	5	0.05	0.05	0.2	112	0.11	2.3	1.7	0.25	0.05	427	0.05	0.1	0.05	2	37.16	0.031	0.5	5.8	1.81	9
97633D	8.4	78	4.1	3	0.05	0.05	0.4	101	0.21	0.5	1.6	0.25	0.05	357	0.05	0.1	0.05	1	36.12	0.025	0.5	2.9	1.66	4
97661D	9.4	76.4	0.8	6	0.05	0.05	0.4	104	0.17	2.1	1.7	0.8	0.05	403	0.05	0.1	0.05	1	35.07	0.034	0.5	5.1	1.84	6
97666D	11.3	178.5	1.5	6	0.05	0.05	0.7	125	0.41	2.1	1.8	0.25	0.05	395	0.1	0.2	0.1	2	39.56	0.035	0.5	9.4	1.93	9

ELEMENT	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga	Work
SAMPLES	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	Order
140304D	0.002	3	0.02	0.0005	0.005	0.4	0.005	0.3	0.05	0.025	0.5	020040R
140312D	0.002	2	0.02	0.001	0.005	0.3	0.005	0.2	0.05	0.025	0.5	020048R
140357D	0.001	2	0.01	0.001	0.005	0.4	0.005	0.2	0.05	0.025	0.5	020051R
140389D	0.001	1	0.01	0.001	0.005	0.2	0.005	0.1	0.05	0.025	0.5	020051R
176424D	0.001	1	0.01	0.001	0.005	0.3	0.005	0.2	0.05	0.025	0.5	020042R
176447D	0.001	2	0.02	0.0005	0.005	0.5	0.005	0.1	0.05	0.025	0.5	020047R
176535D	0.001	2	0.01	0.0005	0.005	0.3	0.01	0.2	0.05	0.025	0.5	020048R
343882D	0.002	2	0.01	0.001	0.005	1.6	0.02	0.2	0.05	0.025	0.5	020051R
344221D	0.002	3	0.02	0.001	0.005	0.3	0.01	0.2	0.05	0.025	0.5	020051R
56420D	0.002	3	0.02	0.001	0.005	0.4	0.005	0.2	0.05	0.025	0.5	020047R
97601D	0.002	3	0.02	0.0005	0.01	0.4	0.005	0.2	0.05	0.025	0.5	020036R
97633D	0.001	3	0.01	0.0005	0.005	0.3	0.01	0.2	0.05	0.025	0.5	020047R
97661D	0.002	2	0.02	0.003	0.005	0.3	0.01	0.3	0.05	0.025	0.5	020036R
97666D	0.001	3	0.02	0.0005	0.005	0.5	0.005	0.2	0.05	0.025	0.5	020041R

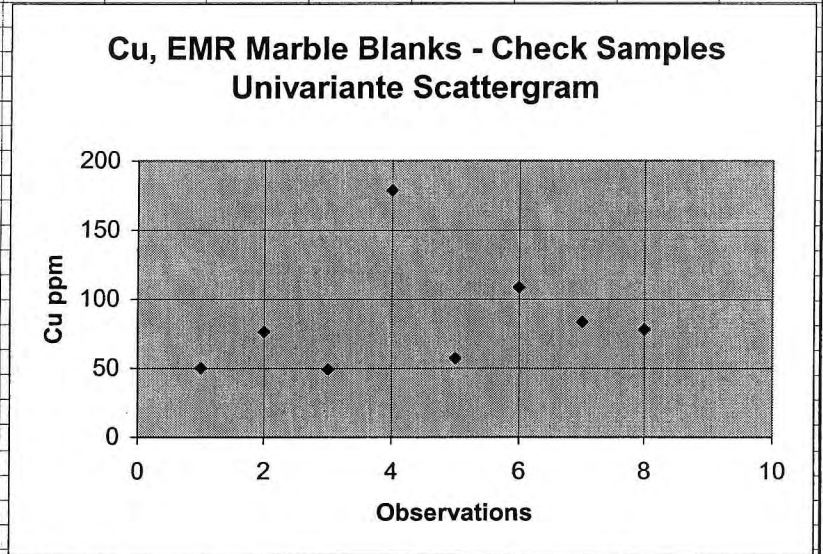
Mineral Assessments 2002 Fieldwork

Rock Geochemistry

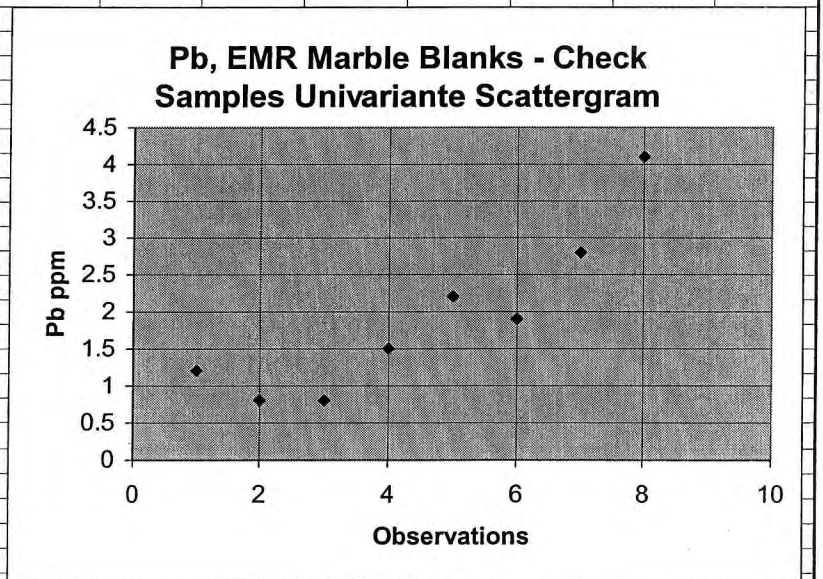
Grafter Occurrence Marble Skarn "Blank" check Samples submitted to Acme Lab. (n=7)

%RSD=Percent Relative Standard Deviation
(Standard deviation divided by the mean of assays.)

Cu ppm	WO#	Cu Descriptive Statistics		
1	49.9	020036R		
2	76.4	020036R	Mean	85.175 %RSD
3	49.2	020040R	Standard Error	15.06555615 50.02856
4	178.5	020041R	Median	77.2
5	57.2	020042R	Mode	#N/A
6	108.6	020047R	Standard Deviat	42.61182767
7	83.6	020047R	Sample Varianc	1815.767857
8	78	020047R	Kurtosis	3.419407457
			Skewness	1.7534772
			Range	129.3
			Minimum	49.2
			Maximum	178.5
			Sum	681.4
			Count	8
			Largest(1)	178.5
			Smallest(1)	49.2
			Confidence Lev	35.62435395



Pb ppm	WO#	Pb Descriptive Statistics		
1	1.2	020036R		
2	0.8	020036R	Mean	1.9125 %RSD
3	0.8	020040R	Standard Error	0.396609515 58.65522
4	1.5	020041R	Median	1.7
5	2.2	020042R	Mode	0.8
6	1.9	020047R	Standard Deviat	1.121781109
7	2.8	020047R	Sample Varianc	1.258392857
8	4.1	020047R	Kurtosis	0.918788336
			Skewness	1.08008769
			Range	3.3
			Minimum	0.8
			Maximum	4.1
			Sum	15.3
			Count	8
			Largest(1)	4.1
			Smallest(1)	0.8
			Confidence Lev	0.937831806



Most other elements were in the below detection to near detection range or had very little analytical variation.

Mineral Assessments - 2002 Fieldwork																
Rock Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																
Marble Blanks - Check Samples																
Descriptive Statistics																
	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb
Descriptive Statistics	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm
Mean	9.58	72.09	2.89	28.79	0.05	0.05	0.39	104.50	0.21	6.61	1.74	1.15	0.07	384.86	0.15	0.90
Standard Error	0.27	9.74	0.98	19.53	0.00	0.00	0.05	3.20	0.03	5.58	0.02	0.76	0.01	9.29	0.08	0.74
Median	9.15	65	2.05	8	0.05	0.05	0.4	102.5	0.2	0.65	1.7	0.25	0.05	387	0.05	0.1
Mode	9.1	#N/A	0.8	6	0.05	0.05	0.3	104	0.11	0.5	1.7	0.25	0.05	#N/A	0.05	0.1
Standard Deviation	1.02	36.46	3.68	73.07	0.01	0.01	0.18	11.99	0.12	20.88	0.09	2.84	0.03	34.77	0.30	2.76
Sample Variance	1.03	1329.40	13.55	5339.10	0.00	0.00	0.03	143.65	0.02	435.82	0.01	8.08	0.00	1209.21	0.09	7.64
Kurtosis	-0.66	5.38	12.04	13.82	14.00	14.00	-0.70	-0.72	-0.43	13.96	-0.23	13.77	-2.24	-0.91	13.80	13.94
Skewness	0.73	2.11	3.38	3.71	3.74	3.74	-0.02	0.36	0.51	3.73	0.49	3.70	0.32	-0.01	3.70	3.73
Range	3.1	135.4	14.5	279	0.05	0.05	0.6	38	0.42	78.85	0.3	10.75	0.05	120	1.15	10.45
Minimum	8.3	43.1	0.8	3	0.05	0.05	0.1	87	0.01	0.25	1.6	0.25	0.05	324	0.05	0.05
Maximum	11.4	178.5	15.3	282	0.1	0.1	0.7	125	0.43	79.1	1.9	11	0.1	444	1.2	10.5
Sum	134.1	1009.2	40.4	403	0.75	0.75	5.4	1463	2.96	92.55	24.3	16.15	1	5388	2.05	12.65
Count	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
Confidence Level(95.0%)	0.5863	21.0519	2.1250	42.1889	0.0077	0.0077	0.1059	6.9203	0.0719	12.0536	0.0536	1.6417	0.0148	20.0777	0.1756	1.5960

Bi	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga
ppm	ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm
0.06	1.71	35.88	0.03	0.54	6.09	1.73	38.86	0.00	2.29	0.02	0.00	0.01	0.44	0.01	0.20	0.05	0.03	0.50
0.00	0.16	0.67	0.00	0.04	0.60	0.05	19.82	0.00	0.19	0.00	0.00	0.00	0.09	0.00	0.01	0.00	0.00	0.00
0.05	2	34.92	0.027	0.5	5.5	1.71	9	0.0015	2	0.02	0.001	0.005	0.35	0.005	0.2	0.05	0.025	0.5
0.05	2	34.56	0.026	0.5	#N/A	1.84	9	0.002	3	0.02	0.001	0.005	0.3	0.005	0.2	0.05	0.025	0.5
0.02	0.61	2.50	0.00	0.13	2.24	0.20	74.15	0.00	0.73	0.01	0.00	0.00	0.34	0.00	0.06	0.00	0.00	0.00
0.00	0.37	6.25	0.00	0.02	5.01	0.04	5497.98	0.00	0.53	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00
3.79	-0.26	0.06	-1.26	14.00	-0.94	2.33	7.21	-2.36	-0.73	-2.24	9.22	14.00	11.96	5.30	1.33	#DIV/0!	#DIV/0!	#DIV/0!
2.29	0.19	0.78	0.39	3.74	0.46	1.13	2.70	0.00	-0.52	-0.32	2.80	3.74	3.36	2.15	0.00	#DIV/0!	#DIV/0!	#DIV/0!
0.05	2	8.97	0.012	0.5	6.9	0.8	261	0.001	2	0.01	0.0025	0.005	1.4	0.015	0.2	0	0	0
0.05	1	32.07	0.023	0.5	2.9	1.44	4	0.001	1	0.01	0.0005	0.005	0.2	0.005	0.1	0.05	0.025	0.5
0.1	3	41.04	0.035	1	9.8	2.24	265	0.002	3	0.02	0.003	0.01	1.6	0.02	0.3	0.05	0.025	0.5
0.8	24	502.3	0.394	7.5	85.2	24.23	544	0.021	32	0.22	0.013	0.075	6.2	0.105	2.8	0.7	0.35	7
14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
0.0105	0.3529	1.4437	0.0023	0.0772	1.2918	0.1152	42.8120	0.0003	0.4193	0.0030	0.0004	0.0008	0.1984	0.0025	0.0320	0.0000	0.0000	0.0000

Mineral Assessments 2002 Fieldwork

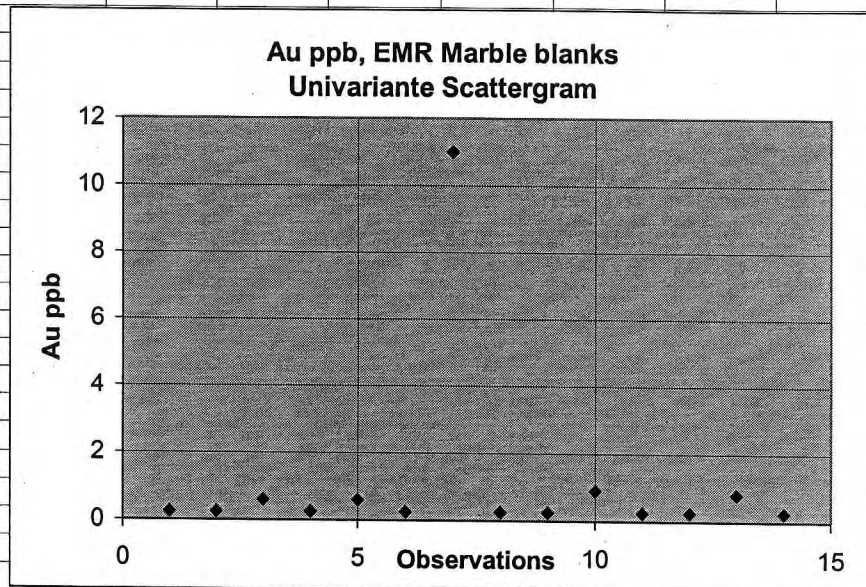
Rock Geochemistry

Grafter Occurrence Marble Skarn "Blank" check Samples submitted to Acme Lab. (n=14)

Au ppb	Work Order	Au ppb Descriptive Statistics	
1	0.25 020040R	Mean	1.153571429 %RSD*
2	0.25 020048R	Standard Error	0.759924524 246.4847
3	0.6 020051R	Median	0.25
4	0.25 020051R	Mode	0.25
5	0.6 020042R	Standard Deviation	2.84337721
6	0.25 020047R	Sample Variance	8.084793956
7	11 020048R	Kurtosis	13.76934871
8	0.25 020051R	Skewness	3.699320629
9	0.25 020051R	Range	10.75
10	0.9 020047R	Minimum	0.25
11	0.25 020036R	Maximum	11
12	0.25 020047R	Sum	16.15
13	0.8 020036R	Count	14
14	0.25 020041R	Confidence Level(95.0%)	1.641716807

*%RSD=Percent Relative Standard Deviation

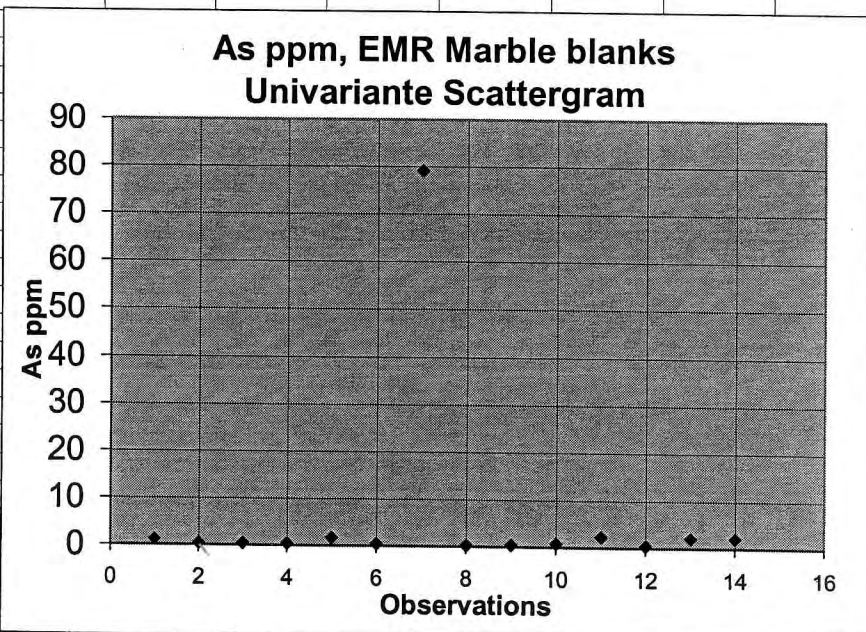
(Standard deviation divided by the mean of assays.)



As ppm	Work Order	As ppm Descriptive Statistics	
1	1.2 020040R	Mean	6.610714286 %RSD*
2	0.5 020048R	Standard Error	5.579412162 315.7941
3	0.5 020051R	Median	0.65
4	0.5 020051R	Mode	0.5
5	1.7 020042R	Standard Deviation	20.87624873
6	0.5 020047R	Sample Variance	435.817761
7	79.1 020048R	Kurtosis	13.95842408
8	0.25 020051R	Skewness	3.733918421
9	0.5 020051R	Range	78.85
10	0.8 020047R	Minimum	0.25
11	2.3 020036R	Maximum	79.1
12	0.5 020047R	Sum	92.55
13	2.1 020036R	Count	14
14	2.1 020041R	Confidence Level(95.0%)	12.05358483

*%RSD=Percent Relative Standard Deviation

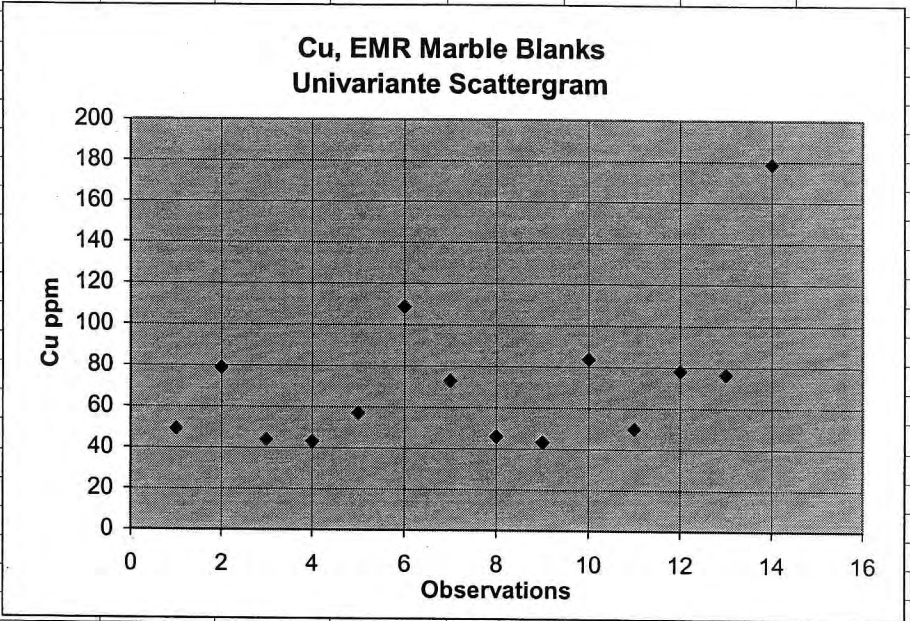
(Standard deviation divided by the mean of assays.)



Mineral Assessments 2002 Fieldwork
Rock Geochemistry
Grafter Occurrence Marble Skarn "Blank" check Samples submitted to Ame Lab. (n=14)

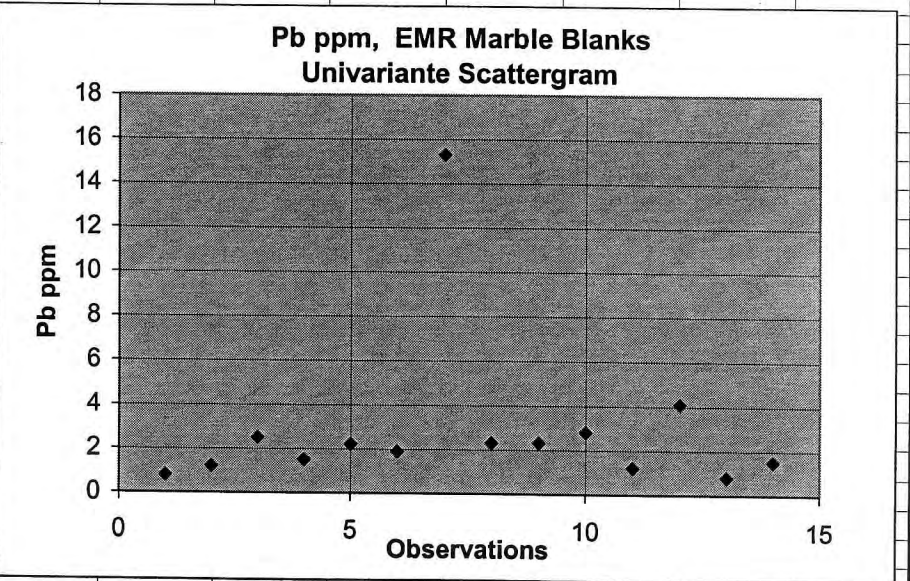
Cu ppm	Work Order	Cu ppm Descriptive Statistics	
1	49.2 020040R	Mean	72.08571429 %RSD*
2	78.9 020048R	Standard Error	9.744611682 50.58006
3	44 020051R	Median	65
4	43.1 020051R	Mode	#N/A
5	57.2 020042R	Standard Deviation	36.46099828
6	108.6 020047R	Sample Variance	1329.404396
7	72.8 020048R	Kurtosis	5.375541383
8	45.8 020051R	Skewness	2.112300094
9	43.2 020051R	Range	135.4
10	83.6 020047R	Minimum	43.1
11	49.9 020036R	Maximum	178.5
12	78 020047R	Sum	1009.2
13	76.4 020036R	Count	14
14	178.5 020041R	Confidence Level(95.0%)	21.05194959

*%RSD=Percent Relative Standard Deviation
 (Standard deviation divided by the mean of assays.)



Pb ppm	Work Order	Pb ppm Descriptive Statistics	
1	0.8 020040R	Mean	2.885714286 %RSD*
2	1.2 020048R	Standard Error	0.983649693 127.5414
3	2.5 020051R	Median	2.05
4	1.5 020051R	Mode	0.8
5	2.2 020042R	Standard Deviation	3.680480141
6	1.9 020047R	Sample Variance	13.54593407
7	15.3 020048R	Kurtosis	12.04300007
8	2.3 020051R	Skewness	3.384537858
9	2.3 020051R	Range	14.5
10	2.8 020047R	Minimum	0.8
11	1.2 020036R	Maximum	15.3
12	4.1 020047R	Sum	40.4
13	0.8 020036R	Count	14
14	1.5 020041R	Confidence Level(95.0%)	2.125045556

*%RSD=Percent Relative Standard Deviation
 (Standard deviation divided by the mean of assays.)



Most other elements were in the below detection to near detection range or had very little analytical variation.

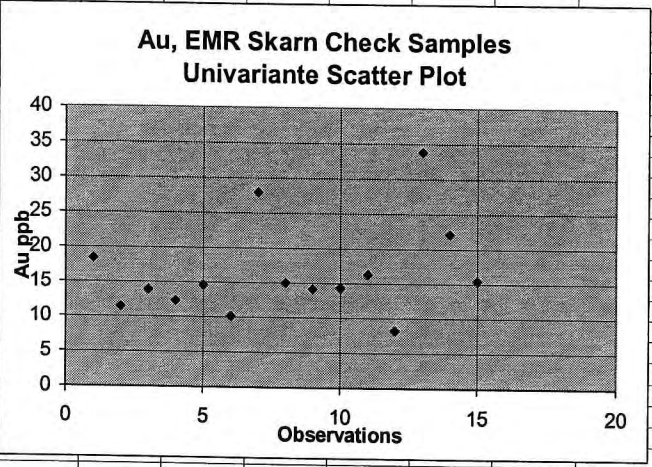
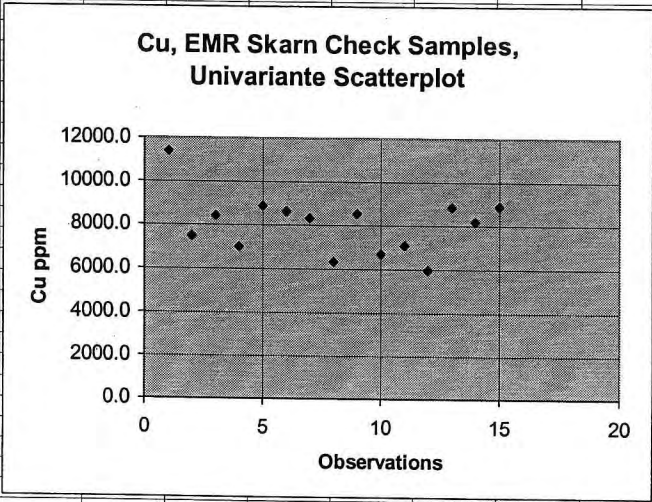
Mineral Assessments - 2002 Fieldwork																						
Rock Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																						
Magnetite Copper Skarn - Check Samples																						
Analytical Results																						
SAMPLES	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppb	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm
97167E	22.2	11404	6.9	198	1.7	12.2	53.4	1158	28.28	24.2	0.6	18.4	0.2	38	0.8	7.1	0.6	24	2.81	0.027	1	28.9
97655E	24.2	7470.5	5.5	151	1.5	10.2	48.6	1064	26.96	16.7	0.6	11.4	0.2	33	0.5	3.5	0.6	21	2.49	0.021	1	24.8
140304E	24.4	8415.5	5.8	155	1.9	8.7	44.7	1009	25.47	17.1	0.7	13.9	0.2	34	0.6	3.7	0.7	21	2.57	0.023	1	17.4
97624E	25.4	6994.4	5.3	163	1.3	8.2	48.1	1116	28.07	16.7	0.7	12.3	0.2	32	0.7	3.5	0.5	22	2.6	0.025	1	28.3
97199E	21.6	8883	6.7	170	1.5	10.3	55.7	1027	34.46	19.8	0.7	14.6	0.3	39	0.7	5.1	0.5	26	2.74	0.022	1	28.4
176384E	23.1	8620	10.9	291	1.6	9.3	53.6	1215	30.25	22.6	0.7	10.1	0.3	36	1.9	6	0.6	23	2.75	0.024	1	23.7
343900E	24.8	8326.5	7.2	636	1.5	9	49.2	1140	25.54	17.1	0.8	27.9	0.3	33	3.2	2.9	0.6	26	2.61	0.024	1	22.8
97611E	22.1	6331	77.7	220	1.2	9.3	50.3	1191	28.05	37.1	0.7	15	0.3	34	1.2	12.5	0.7	23	2.66	0.024	1	24.1
97744E	24.2	8531.2	15.7	1159	1.7	9.5	48.9	1120	24.57	19.9	0.7	14.1	0.2	32	9.8	4.2	0.8	20	2.59	0.02	1	20.9
176467E	19.5	6700.7	6.3	165	1.2	11	51.2	1090	27.69	17.1	0.8	14.3	0.3	28	0.4	4.1	0.7	24	2.46	0.029	1	27.2
176539E	18.8	7086.7	5.9	165	1.1	11.2	53.3	1153	30.06	24.7	0.7	16.3	0.2	31	0.5	6	0.5	25	2.58	0.021	1	31.7
344204E	18.9	5975.5	6.8	179	1.2	9	50.9	1021	29.46	18.2	0.6	8.2	0.3	32	0.8	3.6	0.5	23	2.41	0.02	1	21.1
56423E	24.7	8855.6	16	193	1.7	10.4	51.8	1169	26.67	22.4	0.7	33.8	0.3	38	0.9	3.8	0.7	18	2.89	0.025	1	26.1
56521E	28.9	8186	210.5	458	2	7.7	43	1096	23.98	17.9	0.8	22.1	0.3	35	1.8	4.5	1	17	3.06	0.022	1	20.2
97191E	24.3	8884.8	10.2	159	1.5	11.8	65.1	1312	35.38	21.7	0.9	15.4	0.3	45	0.8	3.4	0.7	20	3.26	0.027	1	50.4

SAMPLES	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Hg ppm	Sc ppm	Tl ppm	S %	Ga ppm	Work Order
97167E	1.68	18	0.018	3	0.74	0.013	0.09	2	0.16	3.6	0.1	0.66	7	020036R
97655E	1.47	15	0.017	2	0.67	0.012	0.09	6.1	0.13	3.2	0.1	0.44	6	020036R
140304E	1.49	20	0.016	2	0.69	0.012	0.07	1.8	0.14	2.8	0.1	0.47	6	020040R
97624E	1.67	16	0.019	3	0.77	0.012	0.1	1.4	0.13	2.8	0.1	0.49	6	020041R
97199E	1.51	55	0.017	3	0.69	0.017	0.08	1.9	0.16	3.5	0.1	0.53	6	020042R
176384E	1.53	13	0.014	3	0.74	0.012	0.07	1.4	0.12	2.7	0.1	0.65	6	020047R
343900E	1.64	21	0.017	3	0.85	0.012	0.09	3.4	0.18	1.3	0.1	0.6	6	020047R
97611E	1.49	13	0.015	2	0.75	0.012	0.07	2.8	0.14	1.1	0.1	0.43	7	020047R
97744E	1.47	12	0.013	2	0.71	0.011	0.06	27.5	0.14	2.4	0.1	0.62	6	020047R
176467E	1.64	22	0.018	3	0.77	0.013	0.07	7.7	0.13	1.9	0.1	0.52	6	020048R
176539E	1.57	17	0.017	4	0.74	0.012	0.07	3.6	0.12	1.8	0.1	0.41	7	020048R
344204E	1.5	238	0.017	3	0.74	0.012	0.07	1.8	0.16	2.2	0.1	0.44	6	020051R
56423E	1.59	19	0.015	3	0.72	0.013	0.08	3.7	0.17	2.5	0.1	0.56	7	020051R
56521E	1.61	15	0.014	3	0.71	0.01	0.08	1.2	0.65	1.1	0.1	0.46	6	020051R
97191E	1.68	262	0.018	3	0.71	0.014	0.09	3.1	0.14	1.2	0.1	0.59	8	020051R

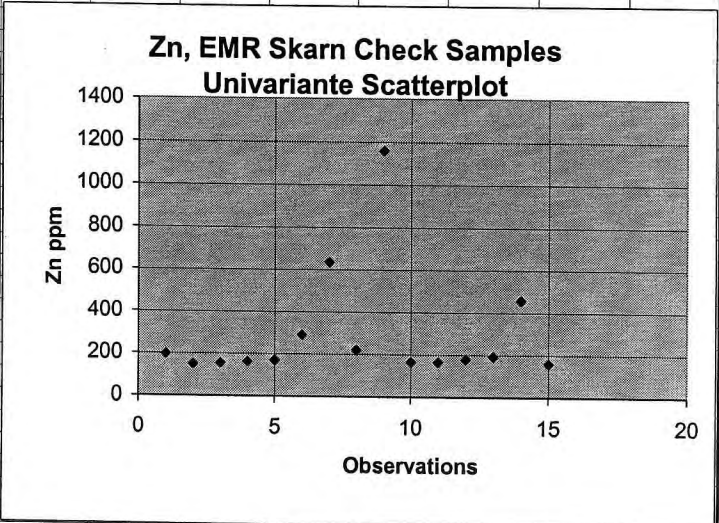
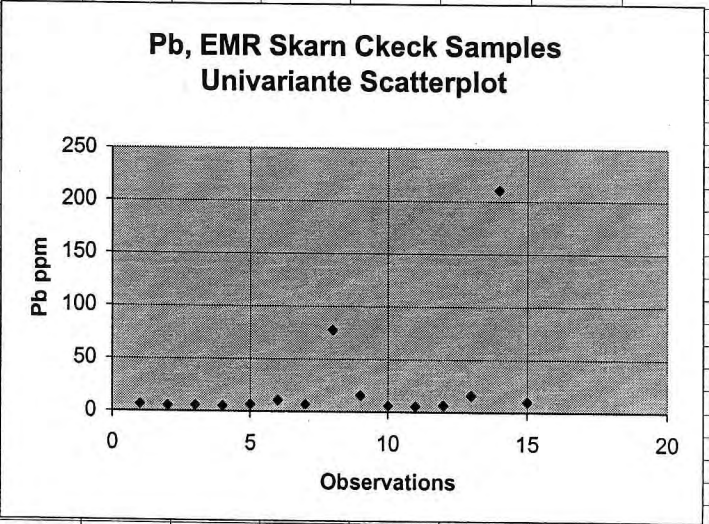
Mineral Assessments - 2002 Fieldwork																	
Rock Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																	
Magnetite Copper Skarn - Check Samples																	
Descriptive Statistics																	
	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
Descriptive Statistics	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
Mean	23.14	8044.36	26.49	297.47	1.51	9.85	51.19	1125.40	28.33	20.88	0.71	16.52	0.26	34.67	1.64	4.93	0.65
Standard Error	0.70	348.68	13.96	70.84	0.07	0.34	1.32	20.84	0.84	1.36	0.02	1.75	0.01	1.06	0.61	0.62	0.04
Median	24.2	8326.5	6.9	179	1.5	9.5	50.9	1120	28.05	19.8	0.7	14.6	0.3	34	0.8	4.1	0.6
Mode	24.2	#N/A	#N/A	165	1.5	9.3	#N/A	#N/A	#N/A	17.1	0.7	#N/A	0.3	32	0.8	3.5	0.7
Standard Deviation	2.71	1350.42	54.05	274.36	0.27	1.31	5.11	80.72	3.27	5.28	0.08	6.77	0.05	4.10	2.37	2.40	0.14
Sample Variance	7.36	1823627.32	2921.53	75274.70	0.07	1.71	26.06	6516.11	10.67	27.90	0.01	45.87	0.00	16.81	5.64	5.77	0.02
Kurtosis	0.30	1.56	11.10	7.24	-0.74	-0.69	3.42	0.67	0.68	6.24	0.50	2.21	-2.09	1.80	11.60	7.28	2.10
Skewness	0.02	0.72	3.28	2.64	0.17	0.25	1.20	0.58	0.96	2.24	0.58	1.51	-0.46	1.02	3.31	2.51	1.17
Range	10.1	5428.5	205.2	1008	0.9	4.5	22.1	303	11.4	20.4	0.3	25.6	0.1	17	9.4	9.6	0.5
Minimum	18.8	5975.5	5.3	151	1.1	7.7	43	1009	23.98	16.7	0.6	8.2	0.2	28	0.4	2.9	0.5
Maximum	28.9	11404	210.5	1159	2	12.2	65.1	1312	35.38	37.1	0.9	33.8	0.3	45	9.8	12.5	1
Sum	347.1	120665.4	397.4	4462	22.6	147.8	767.8	16881	424.89	313.2	10.7	247.8	3.9	520	24.6	73.9	9.7
Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Confidence Level(95.0%)	1.502	747.837	29.933	151.937	0.149	0.724	2.827	44.703	1.809	2.925	0.046	3.751	0.028	2.270	1.315	1.331	0.075

	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga
Descriptive Statistics	ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm
Mean	22.20	2.70	0.02	1.00	26.40	1.57	50.40	0.02	2.80	0.73	0.01	0.08	4.63	0.18	2.27	0.10	0.52	6.40
Standard Error	0.70	0.06	0.00	0.00	1.98	0.02	21.12	0.00	0.14	0.01	0.00	0.00	1.70	0.03	0.22	0.00	0.02	0.16
Median	23	2.61	0.024	1	24.8	1.57	18	0.017	3	0.74	0.012	0.08	2.8	0.14	2.4	0.1	0.52	6
Mode	23	#N/A	0.024	1	#N/A	1.68	15	0.017	3	0.74	0.012	0.07	1.8	0.14	2.8	0.1	0.44	6
Standard Deviation	2.70	0.23	0.00	0.00	7.67	0.08	81.81	0.00	0.56	0.04	0.00	0.01	6.58	0.13	0.85	0.00	0.08	0.63
Sample Variance	7.31	0.05	0.00	0.00	58.90	0.01	6692.69	0.00	0.31	0.00	0.00	0.00	43.34	0.02	0.72	0.00	0.01	0.40
Kurtosis	-0.49	1.31	-0.50	#DIV/0!	7.08	-1.68	4.23	-0.74	0.38	2.85	5.13	-0.84	12.29	14.32	-1.18	-2.33	-1.36	1.26
Skewness	-0.39	1.20	0.44	#DIV/0!	2.30	0.15	2.35	-0.50	-0.11	1.25	1.72	0.30	3.41	3.75	-0.03	-1.11	0.28	1.41
Range	9	0.85	0.009	0	33	0.21	250	0.006	2	0.18	0.007	0.04	26.3	0.53	2.5	0	0.25	2
Minimum	17	2.41	0.02	1	17.4	1.47	12	0.013	2	0.67	0.01	0.06	1.2	0.12	1.1	0.1	0.41	6
Maximum	26	3.26	0.029	1	50.4	1.68	262	0.019	4	0.85	0.017	0.1	27.5	0.65	3.6	0.1	0.66	8
Sum	333	40.48	0.354	15	396	23.54	756	0.245	42	11	0.187	1.18	69.4	2.67	34.1	1.5	7.87	96
Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Confidence Level(95.0%)	1.498	0.128	0.001	0.000	4.250	0.044	45.304	0.001	0.310	0.024	0.001	0.006	3.646	0.073	0.472	0.000	0.047	0.350

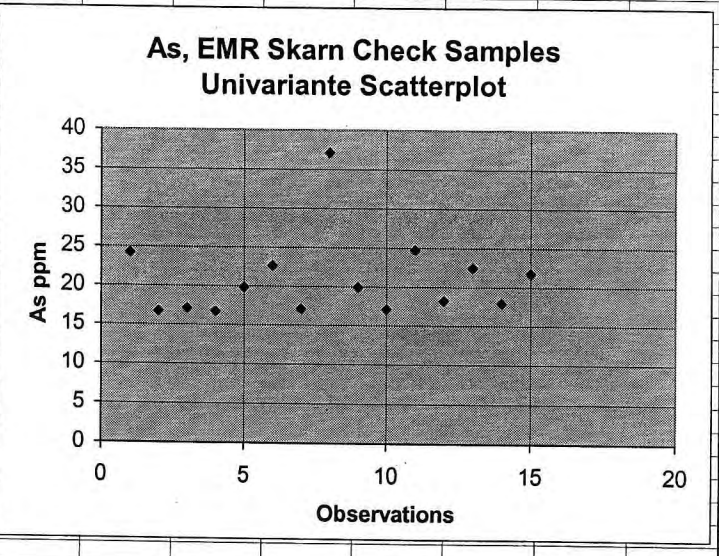
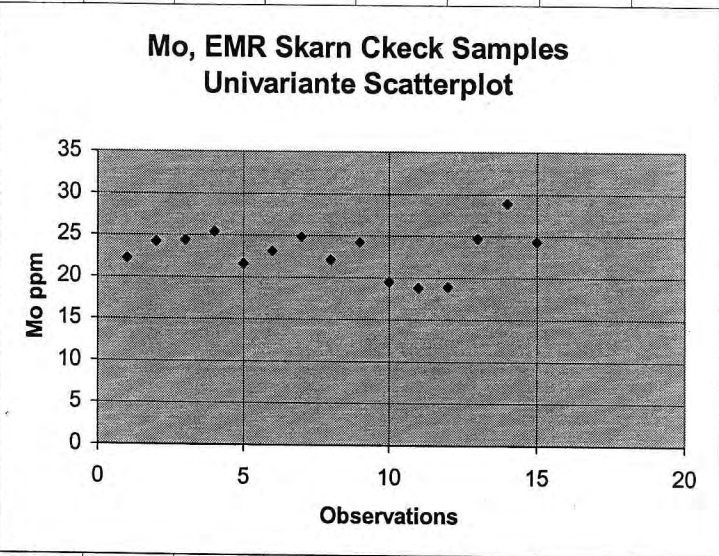
Mineral Assessments 2002 Fieldwork				
Rock Geochemistry				
Best Chance Copper Skarn check Samples submitted to Acme Lab.				
				%RSD=Percent Relative Standard Deviation (Standard deviation divided by the mean of assays.)
CU ppm Descriptive Statistics				
Cu ppm	WO#			%RSD
1	11404.0	020036R	Mean	8044.36
2	7470.5	020036R	Standard Error	348.6762889
3	8415.5	020040R	Median	8326.5
4	6994.4	020041R	Mode	#N/A
5	8883.0	020042R	Standard Deviation	1350.41746
6	8620.0	020047R	Sample Variance	1823627.317
7	8326.5	020047R	Kurtosis	1.563365514
8	6331.0	020047R	Skewness	0.719046855
9	8531.2	020047R	Range	5428.5
10	6700.7	020048R	Minimum	5975.5
11	7086.7	020048R	Maximum	11404
12	5975.5	020051R	Sum	120665.4
13	8855.6	020051R	Count	15
14	8186.0	020051R	Largest(1)	11404
15	8884.8	020051R	Smallest(1)	5975.5
			Confidence Level(95.0%)	747.836928
Au ppb Descriptive Statistics				
Au ppm	WO#			%RSD
1	18.4	020036R	Mean	16.52
2	11.4	020036R	Standard Error	1.748719259
3	13.9	020040R	Median	14.6
4	12.3	020041R	Mode	#N/A
5	14.6	020042R	Standard Deviation	6.772760568
6	10.1	020047R	Sample Variance	45.87028571
7	27.9	020047R	Kurtosis	2.212620304
8	15	020047R	Skewness	1.514524112
9	14.1	020047R	Range	25.6
10	14.3	020048R	Minimum	8.2
11	16.3	020048R	Maximum	33.8
12	8.2	020051R	Sum	247.8
13	33.8	020051R	Count	15
14	22.1	020051R	Largest(1)	33.8
15	15.4	020051R	Smallest(1)	8.2
			Confidence Level(95.0%)	3.750633124



Mineral Assessments 2002 Fieldwork			
Rock Geochemistry			
Best Chance Copper Skarn check Samples submitted to Acme Lab.			
Pb	WO#	Pb ppm Descriptive Statistics	%RSD
1	6.9	020036R	204.0182
2	5.5	020036R	Mean 26.49333333
3	5.8	020040R	Standard Error 13.95596635
4	5.3	020041R	Median 6.9
5	6.7	020042R	Mode #N/A
6	10.9	020047R	Standard Deviation 54.05122526
7	7.2	020047R	Sample Variance 2921.534952
8	77.7	020047R	Kurtosis 11.1002646
9	15.7	020047R	Skewness 3.277248265
10	6.3	020048R	Range 205.2
11	5.9	020048R	Minimum 5.3
12	6.8	020051R	Maximum 210.5
13	16	020051R	Sum 397.4
14	210.5	020051R	Count 15
15	10.2	020051R	Largest(1) 210.5
			Smallest(1) 5.3
			Confidence Level(95.0%) 29.93259747
Zn	WO#	Zn ppm Descriptive Statistics	%RSD
1	198	020036R	92.23297
2	151	020036R	Mean 297.4666667
3	155	020040R	Standard Error 70.84005234
4	163	020041R	Median 179
5	170	020042R	Mode 165
6	291	020047R	Standard Deviation 274.362343
7	636	020047R	Sample Variance 75274.69524
8	220	020047R	Kurtosis 7.238915206
9	1159	020047R	Skewness 2.635071365
10	165	020048R	Range 1008
11	165	020048R	Minimum 151
12	179	020051R	Maximum 1159
13	193	020051R	Sum 4462
14	458	020051R	Count 15
15	159	020051R	Largest(1) 1159
			Smallest(1) 151
			Confidence Level(95.0%) 151.9369364



Mineral Assessments 2002 Fieldwork			
Rock Geochemistry			
Best Chance Copper Skarn check Samples submitted to Acome Lab.			
Mo	WO#	Mo ppm Descriptive Statistics	%RSD
1	22.2	020036R	11.7249
2	24.2	020036R	Mean
3	24.4	020040R	Standard Error
4	25.4	020041R	Median
5	21.6	020042R	Mode
6	23.1	020047R	Standard Deviation
7	24.8	020047R	Sample Variance
8	22.1	020047R	Kurtosis
9	24.2	020047R	Skewness
10	19.5	020048R	Range
11	18.8	020048R	Minimum
12	18.9	020051R	Maximum
13	24.7	020051R	Sum
14	28.9	020051R	Count
15	24.3	020051R	Largest(1)
			Smallest(1)
			Confidence Level(95.0%)
As	WO#	As Descriptive Statistics	%RSD
1	24.2	020036R	25.29858
2	16.7	020036R	Mean
3	17.1	020040R	Standard Error
4	16.7	020041R	Median
5	19.8	020042R	Mode
6	22.6	020047R	Standard Deviation
7	17.1	020047R	Sample Variance
8	37.1	020047R	Kurtosis
9	19.9	020047R	Skewness
10	17.1	020048R	Range
11	24.7	020048R	Minimum
12	18.2	020051R	Maximum
13	22.4	020051R	Sum
14	17.9	020051R	Count
15	21.7	020051R	Largest(1)
			Smallest(1)
			Confidence Level(95.0%)

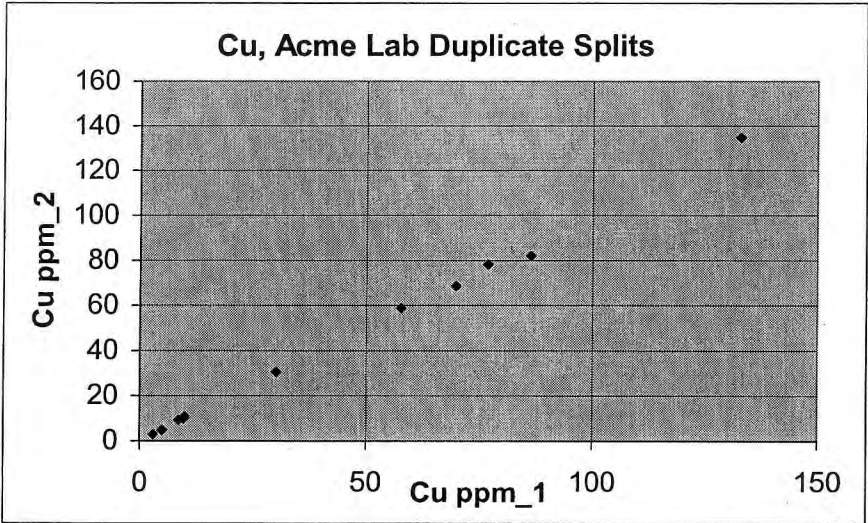


Mineral Assessments - 2002 Fieldwork																					
Rock Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																					
Acme Analytical Laboratory - Duplicate Checks																					
Analytical Results																					
ELEMENT	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La
SAMPLES	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm
RE 97658	0.2	30.4	34.2	141	0.1	50.9	20.8	974	5.08	3.6	1.5	2.2	17.2	15	0.4	0.1	0.3	71	0.38	0.06	37
97658	0.3	30.5	34.6	143	0.1	50.1	20.6	966	5.36	3.2	1.4	0.6	16.5	16	0.4	0.1	0.3	72	0.37	0.059	32
RE 176424	0.6	5	5.8	17	<.1	8.6	4	844	1.52	2.4	0.4	0.9	5.1	7	<.1	0.2	<.1	6	0.33	0.013	4
176424	0.6	4.7	5.6	17	<.1	7.6	3.7	807	1.47	2.5	0.4	0.9	5.2	6	0.1	0.2	<.1	6	0.32	0.012	3
RE 176525	0.3	9.9	3.4	37	<.1	34.8	11.6	279	1.67	1.2	0.2	<.5	1.6	20	<.1	0.4	<.1	49	0.73	0.024	3
176525	0.3	9.8	3.6	39	<.1	37.5	12.1	312	1.68	1.4	0.3	<.5	1.6	20	<.1	0.3	0.1	50	0.75	0.023	3
RE 97678	4	8.8	1.7	24	0.2	11.5	0.9	66	0.42	6.2	0.7	<.5	0.3	34	0.2	0.3	<.1	7	0.54	0.051	4
97678	3.9	9.2	1.7	26	0.2	11.9	0.9	75	0.42	6.5	0.7	<.5	0.3	33	0.1	0.4	<.1	7	0.56	0.051	4
RE 344232	6.6	132.8	77.9	141	1.1	2	2	55	1.52	1.4	1.3	8.6	9.8	5	0.7	0.5	0.7	2	0.11	0.004	10
344232	6.8	134.7	77.9	145	1.1	1.8	2	58	1.54	1.7	1.3	9.9	9.9	5	0.5	0.5	0.7	3	0.11	0.005	10
RE 97184	12.3	69.7	1659.5	263	15.2	3	1.3	43	1.54	195.3	0.5	24	1.7	6	1.5	2.7	1.2	2	0.01	0.005	3
97184	12.1	68.5	1603.6	258	14.4	3	1.2	42	1.48	189.8	0.5	27.6	1.6	5	1.6	2.7	1.2	1	0.02	0.004	3
RE 97704	1.7	76.7	942.4	733	0.9	2.4	5.9	120	2.43	1.4	0.4	1.6	2.1	71	6.5	0.1	0.9	35	0.68	0.056	8
97704	1.7	78.1	992.7	730	0.9	2.5	5.8	119	2.43	0.9	0.4	0.9	2.2	72	6.6	0.1	1.1	36	0.67	0.058	8
RE 176465	0.6	57.6	2558.7	4160	8.1	4.3	6.4	784	2.09	2174.2	0.1	399.1	0.1	65	12.7	2093.2	0.1	47	7.91	0.01	1
176465	0.8	58.7	2505.4	4033	7.9	3.9	6	757	2.03	2119.5	0.1	393.8	0.1	64	12.6	2061	0.1	45	7.85	0.009	1
RE 140392	1	3	6.5	31	0.1	1.7	2.2	35	4.75	<.5	0.1	4.3	0.5	12	<.1	4.3	<.1	5	0.17	0.034	4
140392	1.1	2.9	6.3	29	0.1	1.4	2.2	32	4.7	<.5	0.1	3.5	0.4	11	<.1	4.1	<.1	5	0.17	0.033	4
RE 344220	0.8	10.1	9.1	27	<.1	4.8	1.9	131	1.09	4.1	0.2	<.5	3.3	3	<.1	0.1	0.1	5	0.06	0.018	2
344220	0.8	10.8	9.1	27	<.1	5.1	1.8	138	1.12	3.9	0.2	<.5	3.3	3	0.1	0.1	0.1	5	0.06	0.018	2
RE 56535	7.6	86.3	1145.9	99999	9	22	11.6	804	1.42	310.3	3.4	2	0.1	63	963.9	19.8	<.1	4	10.65	0.014	<1
56535	7.4	82	1087	99999	8.7	21.1	11.3	788	1.44	306	3.2	2.4	0.1	63	962.1	18.5	<.1	4	10.49	0.015	<1

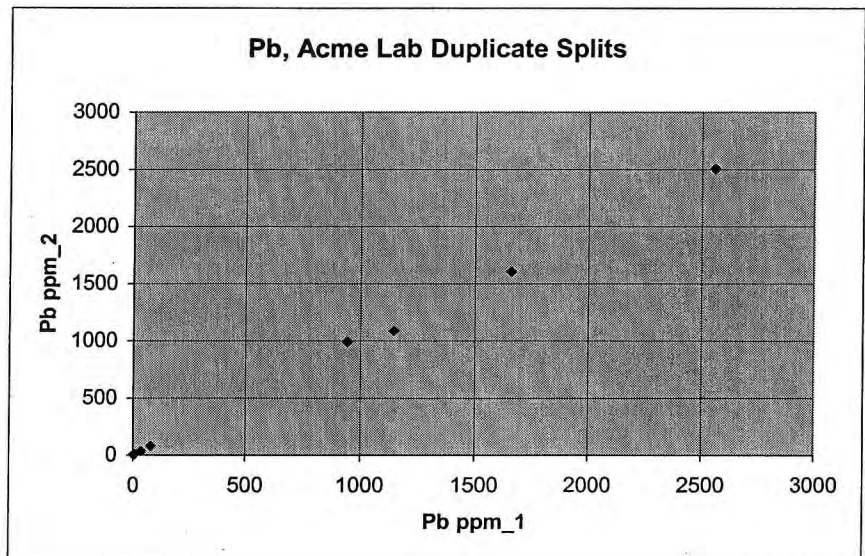
ELEMENT	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga	Work
SAMPLES	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	Order
RE 97658	115.4	2.08	168	0.11	< 1	3.55	0.061	0.63	0.5	< .01	8.9	0.2	< .05	14	020036R
97658	116.8	2.1	175	0.108	1	3.54	0.057	0.6	0.2	0.01	8.5	0.2	< .05	13	020036R
RE 176424	172	0.11	49	0.004	1	0.4	0.017	0.06	0.1	0.01	3	< .1	< .05	1	020042R
176424	173.8	0.11	49	0.004	< 1	0.37	0.02	0.06	0.1	< .01	2.7	< .1	< .05	1	020042R
RE 176525	151	0.88	402	0.111	1	1.17	0.026	0.01	0.2	< .01	4	< .1	< .05	7	020040R
176525	148.8	0.87	388	0.112	1	1.15	0.036	0.01	0.2	< .01	4.5	< .1	< .05	7	020040R
RE 97678	240.1	0.29	366	0.001	2	0.06	0.001	0.02	0.1	0.09	0.6	< .1	< .05	< 1	020041R
97678	232.2	0.29	353	0.001	3	0.07	0.001	0.02	0.1	0.09	0.5	< .1	< .05	< 1	020041R
RE 344232	97.7	0.04	15	0.004	1	0.2	0.037	0.12	0.2	0.04	0.4	0.1	< .05	1	020047R
344232	99.4	0.04	15	0.004	1	0.2	0.038	0.11	0.2	0.01	0.5	0.1	0.07	1	020047R
RE 97184	158.2	0.01	154	0.001	< 1	0.16	< .001	0.14	0.2	0.07	0.2	< .1	0.4	1	020047R
97184	153.7	0.01	153	0.001	< 1	0.15	0.002	0.14	0.2	0.07	0.2	< .1	0.38	1	020047R
RE 97704	82.6	0.64	120	0.073	< 1	1.54	0.163	0.36	< .1	< .01	3.5	0.1	0.78	5	020047R
97704	83.4	0.66	133	0.075	< 1	1.61	0.165	0.37	< .1	< .01	3.9	0.1	0.79	5	020047R
RE 176465	125.7	0.55	27	0.004	2	0.83	0.007	0.08	0.3	0.68	6.7	< .1	0.52	3	020048R
176465	127.5	0.54	26	0.004	2	0.82	0.006	0.07	0.1	0.68	6.7	< .1	0.51	3	020048R
RE 140392	84.5	0.05	20	< .001	1	0.27	0.027	0.14	< .1	0.4	0.5	0.5	4.67	1	020051R
140392	78.6	0.04	21	< .001	< 1	0.24	0.024	0.13	< .1	0.35	0.4	0.5	4.42	1	020051R
RE 344220	166.6	0.11	54	0.001	1	0.38	0.004	0.01	< .1	0.02	0.7	< .1	< .05	1	020051R
344220	171.9	0.11	54	0.001	1	0.38	0.004	0.01	< .1	0.02	0.6	< .1	< .05	2	020051R
RE 56535	7.5	6.43	46	0.001	1	0.04	0.005	0.01	0.2	240.2	1.9	0.9	0.13	29	020051R
56535	6.3	6.31	47	0.001	2	0.04	0.005	0.01	0.2	241.29	1.7	0.8	0.13	28	020051R

*Mean Percentage Di fference $MPD = \frac{\text{assay 1} - \text{assay 2}}{(\text{assay 1} + \text{assay 2})/2} * 100$

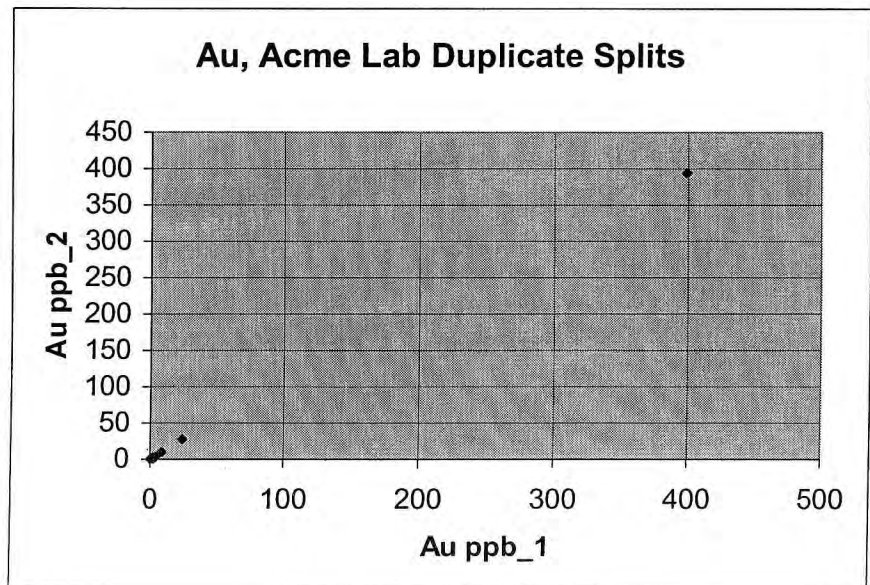
	Cu ppm_1	Cu ppm_2	WO#	MPD*
1	30.4	30.5	020036R	0
2	9.9	9.8	020040R	1
3	8.8	9.2	020041R	4
4	5	4.7	020042R	6
5	132.8	134.7	020047R	1
6	69.7	68.5	020047R	2
7	76.7	78.1	020047R	2
8	57.6	58.7	020048R	2
9	3	2.9	020051R	3
10	10.1	10.8	020051R	7
11	86.3	82	020051R	5



	Pb ppm_1	Pb ppm_2	WO#	MPD*
1	34.2	34.6	020036R	1
2	5.8	5.6	020040R	4
3	3.4	3.6	020041R	6
4	1.7	1.7	020042R	0
5	77.9	77.9	020047R	0
6	1659.5	1603.6	020047R	3
7	942.4	992.7	020047R	5
8	2558.7	2505.4	020048R	2
9	6.5	6.3	020051R	3
10	9.1	9.1	020051R	0
11	1145.9	1087	020051R	5



	Au ppb_1	Au ppb_2	WO#	MPD*
1	2.2	0.6	020036R	114
2	0.9	0.9	020040R	0
3	0.025	0.025	020041R	0
4	0.025	0.025	020042R	0
5	8.6	9.9	020047R	14
6	24	27.6	020047R	14
7	1.6	0.9	020047R	56
8	399.1	393.8	020048R	1
9	4.3	3.5	020051R	21
10	0.025	0.025	020051R	0
11	2	2.4	020051R	18



Mineral Assessments - 2002 Fieldwork																								
Rock Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																								
Acme Analytical Laboratory Standards (DS4)																								
Analytical Results																								
SAMPLES	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppb	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm
stan DS4	6.7	121.6	31.6	152	0.3	35	11.4	763	3.09	23.3	6.5	27.8	3.7	30	5.1	5	5.3	73	0.5	0.086	15	160.5	0.55	144
stan DS4	6.7	121.6	31.6	152	0.3	35	11.4	763	3.09	23.3	6.5	27.8	3.7	30	5.1	5	5.3	73	0.5	0.086	15	160.5	0.55	144
stan DS4	7.1	122.4	32.8	158	0.2	36.4	12.1	843	3.26	23.9	6.3	30.4	3.7	31	5.2	5.2	5.5	78	0.55	0.097	17	166.6	0.59	146
stan DS4	7.2	123.2	32.3	154	0.3	33.8	11.5	813	3.12	23.3	6.6	26	3.6	30	5.2	5	5.3	74	0.58	0.095	17	156.8	0.59	144
stan DS4	6.6	125.6	28.8	158	0.3	33.5	11.6	771	3.18	21.2	6.1	24.9	3.5	27	4.9	4.6	4.9	74	0.51	0.085	16	166.8	0.55	138
stan DS4	6.7	121.8	30.8	156	0.3	34.2	11.8	819	3.19	22.5	6.1	25.2	3.6	28	5	4.9	5	74	0.52	0.083	16	164	0.58	138
stan DS4	7.1	122.9	30.6	161	0.2	34.4	11.9	847	3.19	22.5	6.2	27	3.9	32	4.8	4.8	4.8	78	0.56	0.086	17	175.9	0.6	145
stan DS4	6.8	123.2	29.3	162	0.2	35.3	11.6	770	3.17	21	6	24.2	3.9	30	5.1	4.9	4.8	79	0.55	0.082	18	172.5	0.56	142
stan DS4	6.9	126	30.4	161	0.2	35.5	12.5	777	3.25	23	6.3	26	3.6	29	5.1	5.1	4.9	74	0.54	0.083	16	168.2	0.6	137
stan DS4	6.8	122.2	29.1	160	0.3	34.4	12.3	826	3.18	22.1	6.2	25.4	3.9	32	5.1	5	4.9	78	0.56	0.082	19	177.5	0.59	140
stan DS4	6.9	126	30.4	161	0.2	35.5	12.5	777	3.25	23	6.3	26	3.6	29	5.1	5.1	4.9	74	0.54	0.083	16	168.2	0.6	137
stan DS4	6.3	120.7	28.6	150	0.3	35.4	11.3	812	3.21	21.2	5.9	26.4	3.6	27	5	4.7	4.8	74	0.49	0.086	15	159.9	0.57	136

	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga	Work	
SAMPLES	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	Order	
stan DS4	0.09	1	1.6	0.036	0.15	4.1	0.28	3.5	1.1	< .05	6	020040R	
stan DS4	0.09	1	1.6	0.036	0.15	4.1	0.28	3.5	1.1	< .05	6	020042R	
stan DS4	0.095	3	1.63	0.032	0.16	4.2	0.29	3.7	1.1	0.08	6	020036R	
stan DS4	0.095	2	1.68	0.035	0.17	4.2	0.27	4.1	1.2	< .05	7	020041R	
stan DS4	0.082	2	1.69	0.029	0.14	4.2	0.26	3.5	1.1	0.06	5	020047R	
stan DS4	0.083	1	1.7	0.031	0.16	4.2	0.29	3.6	1.1	0.07	6	020047R	
stan DS4	0.095	1	1.81	0.033	0.17	3.5	0.26	3.9	1.1	0.06	6	020047R	
stan DS4	0.095	2	1.74	0.031	0.16	3.8	0.26	3.8	1.1	0.07	6	020048R	
stan DS4	0.092	2	1.74	0.03	0.15	3.8	0.26	3.7	1.1	0.07	6	020049R	
stan DS4	0.092	1	1.77	0.032	0.17	3.7	0.28	4	1.1	< .05	6	020051R	
stan DS4	0.092	2	1.74	0.03	0.15	3.8	0.26	3.7	1.1	0.07	6	020051R	
stan DS4	0.088	2	1.65	0.032	0.14	3.8	0.27	3.6	1.1	< .05	6	020051R	

Mineral Assessments - 2002 Fieldwork																							
Soil and Stream Sediment Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																							
Canmet (stds-3) Samples - Analytical Results																							
SAMPLE	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%
176414F	6.1	35.3	41.6	169	0.4	26.8	15	2482	3.07	25.3	8.3	4.7	1.3	66	0.9	2.8	1.4	49	1.22	0.141	23	32.1	0.77
176436F	5.8	37.3	41.2	172	0.4	25.6	13.9	2604	2.97	23.1	8.1	2.1	1.6	71	1.1	2.7	1.4	48	1.19	0.134	22	32.2	0.72
176270F	6.2	39.3	42.2	189	0.5	27.4	13.4	2417	2.89	22.1	9.2	4.3	1.7	66	1	2.8	1.5	54	1.25	0.136	25	32.4	0.72
176457F	5.8	58.1	35.4	174	0.4	25.6	12.8	2336	2.9	23.7	6.7	18.3	1.1	61	1.1	2.6	1.3	46	1.14	0.127	21	29.3	0.68
97158F	6.4	38.7	44.4	190	0.4	31	14.7	2626	3.24	29.4	8.9	0.7	1.5	67	1.1	3.1	1.6	57	1.27	0.148	25	33.3	0.83
97711F	5.9	39.3	45.2	192	0.5	30.6	15.2	2776	3.16	25.3	9.4	1.8	1.5	67	1.1	2.9	1.4	56	1.24	0.147	24	34.4	0.76
140355F	5.9	36.1	37.4	185	0.4	27	14.3	2638	3.08	24	7.9	2.8	1.3	66	1.2	2.8	1.3	54	1.2	0.141	25	34.7	0.76
176385F	5.7	37.3	43.5	180	0.4	28.4	14.6	2555	3.17	24.3	8.1	3.1	1.8	66	1.1	2.6	1.4	54	1.29	0.135	24	32.3	0.78
343863F	5.4	35.7	37.1	168	0.4	25	13	2426	2.89	22.2	7.6	3.8	1.4	61	0.9	2.8	1.3	48	1.15	0.118	23	28.2	0.71
344236F	8	47.4	52.1	234	0.5	34.9	18.3	3167	3.89	33.7	10.1	5.8	1.8	88	1.3	3.6	1.8	66	1.51	0.173	30	39.9	0.96
56424F	5.9	33	38.1	173	0.4	25.7	13.5	2195	2.83	21.3	7.8	29.7	1.5	60	0.9	2.2	1.2	47	1.12	0.105	22	26.3	0.71
56458F	5.9	38	43.7	177	0.4	27.6	14.2	2628	3.41	27	8.1	5.2	1.5	67	1	2.8	1.4	54	1.3	0.14	21	31.8	0.8
56551F	6.2	38.3	40.7	182	0.3	27.7	14.5	2635	3.1	24	8.1	2	1.4	73	1.1	2.7	1.4	45	1.24	0.146	24	31.5	0.76
97192F	6	39.4	40.7	180	0.4	26.7	13.5	2552	2.97	25	8.3	2.9	1.3	67	1.1	2.8	1.4	53	1.27	0.148	23	30.5	0.73
97724F	6.1	35.1	40.5	178	0.4	27	14	2503	3	24.1	7.9	2.8	1.8	66	1.1	2.6	1.3	50	1.22	0.136	23	31.5	0.76

SAMPLE	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Hg ppm	Sc ppm	Ti ppm	S %	Ga ppm	Sample gm	Work Order
176414F	561	0.032	5	1.52	0.031	0.13	1.1	0.08	3.4	0.2	0.15	5		020042S
176436F	539	0.029	5	1.43	0.027	0.11	1.2	0.06	3.2	0.2	0.11	5		020042S
176270F	635	0.032	5	1.57	0.031	0.13	0.9	0.08	3.7	0.2	0.17	5		020040S
176457F	524	0.029	5	1.45	0.026	0.11	1.1	0.06	3	0.2	0.14	5		20036S
97158F	698	0.042	6	1.6	0.036	0.15	1.1	0.07	3.5	0.2	0.19	6		20036S
97711F	583	0.033	6	1.5	0.031	0.13	1.2	0.08	3.5	0.3	0.13	5		020041S
140355F	618	0.031	6	1.46	0.03	0.12	0.9	0.07	3.4	0.3	0.26	5		020051S
176385F	578	0.032	4	1.53	0.03	0.14	1.1	0.09	3.6	0.2	0.13	5	7.5	020047S
343863F	585	0.035	6	1.51	0.023	0.11	1.2	0.06	2.8	0.3	0.13	5		020051S
344236F	767	0.037	6	1.94	0.048	0.16	1.8	0.11	4.2	0.3	0.18	7	7.5	020047S
56424F	489	0.027	5	1.37	0.025	0.1	1	0.03	3	0.3	0.12	4		020051S
56458F	579	0.028	6	1.58	0.025	0.12	1	0.05	3.7	0.3	0.19	6		020051S
56551F	666	0.033	6	1.48	0.032	0.13	1	0.05	3.3	0.2	0.16	5	7.5	020047S
97192F	607	0.03	5	1.44	0.028	0.13	1.2	0.08	3.2	0.3	0.3	6		020051S
97724F	543	0.026	5	1.49	0.027	0.13	1	0.06	3.4	0.2	0.14	5	7.5	020047S

Mineral Assessments - 2002 Fieldwork																		
Soil and Stream Sediment Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																		
Canmet (std-3) Samples - Descriptive Statistics																		
Descriptive Statistics	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm
Mean	6.09	39.22	41.59	182.87	0.41	27.80	14.33	2569.33	3.10	24.97	8.30	6.00	1.50	67.47	1.07	2.79	1.41	52.07
Standard Error	0.15	1.58	1.05	4.13	0.01	0.67	0.34	56.39	0.07	0.81	0.21	2.00	0.05	1.71	0.03	0.08	0.04	1.40
Median	5.9	38	41.2	180	0.4	27	14.2	2555	3.07	24.1	8.1	3.1	1.5	66	1.1	2.8	1.4	53
Mode	5.9	37.3	40.7	180	0.4	25.6	13.5	#N/A	2.97	25.3	8.1	2.8	1.5	66	1.1	2.8	1.4	54
Standard Deviation	0.58	6.13	4.06	15.98	0.05	2.60	1.31	218.38	0.27	3.14	0.82	7.74	0.21	6.63	0.11	0.30	0.14	5.40
Sample Variance	0.34	37.61	16.50	255.27	0.00	6.75	1.70	47689.38	0.07	9.84	0.67	59.89	0.04	43.98	0.01	0.09	0.02	29.21
Kurtosis	9.47	6.63	2.21	7.98	1.40	3.08	6.07	3.63	4.99	3.66	1.02	6.66	-0.60	6.77	0.28	4.24	3.37	1.86
Skewness	2.77	2.44	0.99	2.54	0.28	1.68	2.07	1.19	2.01	1.75	0.51	2.61	0.00	2.23	0.05	1.09	1.53	1.06
Range	2.6	25.1	16.7	66	0.2	9.9	5.5	972	1.06	12.4	3.4	29	0.7	28	0.4	1.4	0.6	21
Minimum	5.4	33	35.4	168	0.3	25	12.8	2195	2.83	21.3	6.7	0.7	1.1	60	0.9	2.2	1.2	45
Maximum	8	58.1	52.1	234	0.5	34.9	18.3	3167	3.89	33.7	10.1	29.7	1.8	88	1.3	3.6	1.8	66
Sum	91.3	588.3	623.8	2743	6.2	417	214.9	38540	46.57	374.5	124.5	90	22.5	1012	16	41.8	21.1	781
Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Largest(1)	8	58.1	52.1	234	0.5	34.9	18.3	3167	3.89	33.7	10.1	29.7	1.8	88	1.3	3.6	1.8	66
Smallest(1)	5.4	33	35.4	168	0.3	25	12.8	2195	2.83	21.3	6.7	0.7	1.1	60	0.9	2.2	1.2	45
Confidence Level(95.0%)	0.321	3.396	2.249	8.848	0.029	1.439	0.723	120.934	0.148	1.737	0.454	4.286	0.117	3.673	0.062	0.165	0.080	2.993

Descriptive Statistics	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga	
	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	
Mean	1.24	0.14	23.67	32.03	0.76	598.13	0.03	5.40	1.52	0.03	0.13	1.12	0.07	3.39	0.25	0.17	5.27	
Standard Error	0.02	0.00	0.57	0.80	0.02	18.44	0.00	0.16	0.03	0.00	0.00	0.06	0.00	0.09	0.01	0.01	0.18	
Median	1.24	0.14	23	32.1	0.76	583	0.032	5	1.5	0.03	0.13	1.1	0.07	3.4	0.2	0.15	5	
Mode	1.22	0.141	23	31.5	0.76	#N/A	0.032	5	#N/A	0.031	0.13	1.1	0.08	3.4	0.2	0.13	5	
Standard Deviation	0.09	0.02	2.19	3.10	0.07	71.43	0.00	0.63	0.13	0.01	0.02	0.21	0.02	0.34	0.05	0.05	0.70	
Sample Variance	0.01	0.00	4.81	9.60	0.00	5101.55	0.00	0.40	0.02	0.00	0.00	0.05	0.00	0.12	0.00	0.00	0.50	
Kurtosis	4.96	2.19	4.48	2.52	5.05	1.01	1.65	-0.38	7.93	5.59	0.21	7.63	0.81	1.12	-2.31	2.12	1.84	
Skewness	1.72	-0.06	1.66	0.71	1.91	0.91	1.05	-0.55	2.48	2.04	0.39	2.41	0.15	0.51	0.15	1.54	0.99	
Range	0.39	0.068	9	13.6	0.28	278	0.016	2	0.57	0.025	0.06	0.9	0.08	1.4	0.1	0.19	3	
Minimum	1.12	0.105	21	26.3	0.68	489	0.026	4	1.37	0.023	0.1	0.9	0.03	2.8	0.2	0.11	4	
Maximum	1.51	0.173	30	39.9	0.96	767	0.042	6	1.94	0.048	0.16	1.8	0.11	4.2	0.3	0.3	7	
Sum	18.61	2.075	355	480.4	11.45	8972	0.476	81	22.87	0.45	1.9	16.8	1.03	50.9	3.7	2.5	79	
Count	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	
Largest(1)	1.51	0.173	30	39.9	0.96	767	0.042	6	1.94	0.048	0.16	1.8	0.11	4.2	0.3	0.3	7	
Smallest(1)	1.12	0.105	21	26.3	0.68	489	0.026	4	1.37	0.023	0.1	0.9	0.03	2.8	0.2	0.11	4	
Confidence Level(95.0%)	0.051	0.008	1.214	1.716	0.037	39.554	0.002	0.350	0.072	0.003	0.009	0.119	0.011	0.190	0.029	0.029	0.390	

Mineral Assessments 2002 Fieldwork

Stream sediment and soil geochemistry

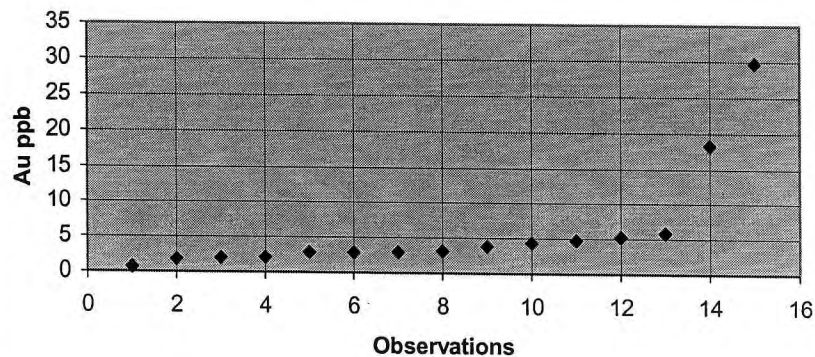
Canmet Standard STSD-4 submitted to Acme Analytical

Canmet Standard xxxxF
Silt and soils

%RSD=Percent Relative Standard Deviation
(Standard deviation divided by the mean of assays.)

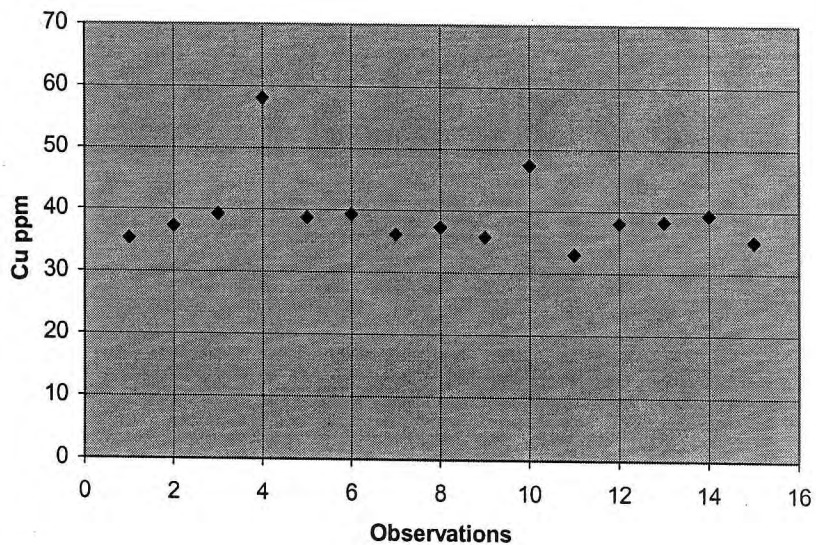
Au		<i>Au ppb</i>		%RSD
1	0.7			
2	1.8			
3	2	Mean	6	128.9857
4	2.1	Standard Error	1.998237	
5	2.8	Median	3.1	
6	2.8	Mode	2.8	
7	2.9	Standard Deviation	7.73914	
8	3.1	Sample Variance	59.89429	
9	3.8	Kurtosis	6.65758	
10	4.3	Skewness	2.611701	
11	4.7	Range	29	
12	5.2	Minimum	0.7	
13	5.8	Maximum	29.7	
14	18.3	Sum	90	
15	29.7	Count	15	
		Largest(1)	29.7	
		Smallest(1)	0.7	
		Confidence Level(95.0%)	4.285797	

Au Canmet Standards, Univariate Scattergram



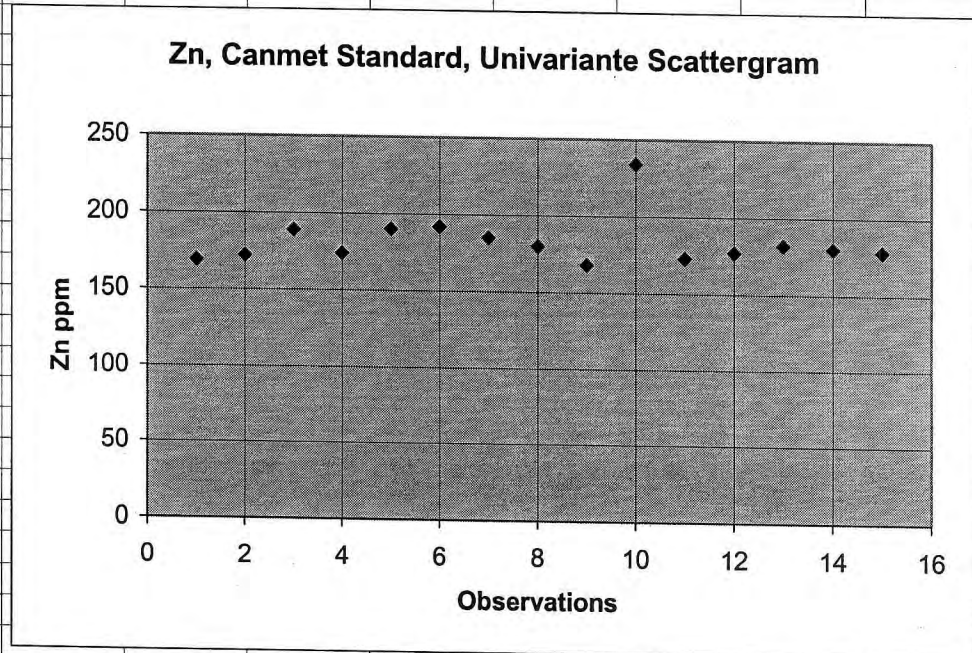
Cu		<i>Cu ppm</i>		%RSD
1	35.3			
2	37.3	Mean	39.22	15.63672
3	39.3	Standard Error	1.583462	
4	58.1	Median	38	
5	38.7	Mode	37.3	
6	39.3	Standard Deviation	6.132723	
7	36.1	Sample Variance	37.61029	
8	37.3	Kurtosis	6.628055	
9	35.7	Skewness	2.435336	
10	47.4	Range	25.1	
11	33	Minimum	33	
12	38	Maximum	58.1	
13	38.3	Sum	588.3	
14	39.4	Count	15	
15	35.1	Largest(1)	58.1	
		Smallest(1)	33	
		Confidence Level(95.0%)	3.396192	

Cu Canmet Standards, Univariate Scattergram

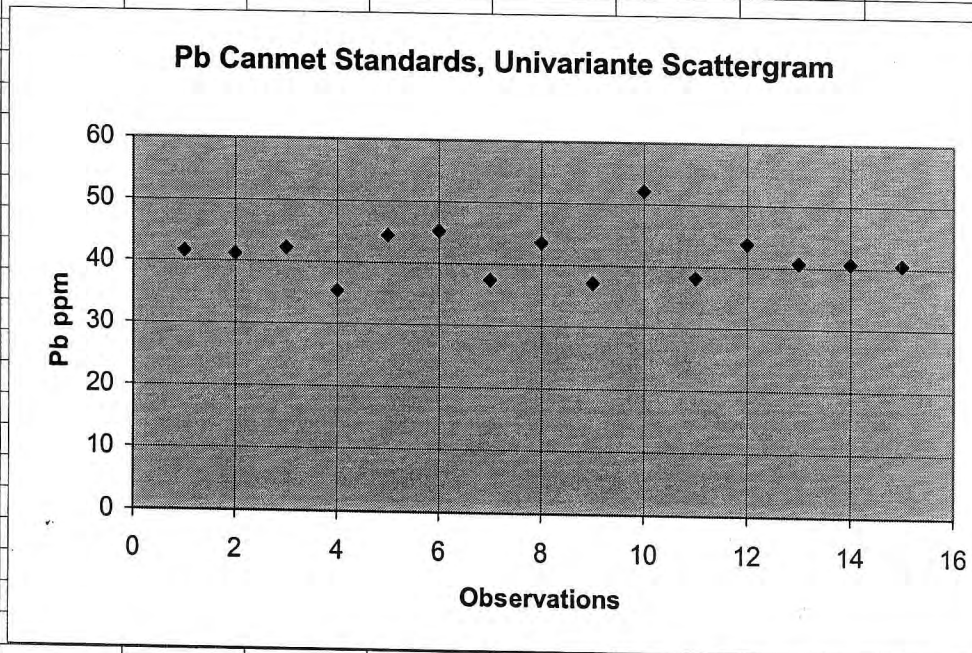


Mineral Assessments 2002 Fieldwork
Stream sediment and soil geochemistry
Canmet Standard STSD-4 submitted to Acme Analytical

Zn		Zn		%RSD
1	169			
2	172	Mean	182.8667	8.737003
3	189	Standard Error	4.125261	
4	174	Median	180	
5	190	Mode	180	
6	192	Standard Deviation	15.97707	
7	185	Sample Variance	255.2667	
8	180	Kurtosis	7.975992	
9	168	Skewness	2.542229	
10	234	Range	66	
11	173	Minimum	168	
12	177	Maximum	234	
13	182	Sum	2743	
14	180	Count	15	
15	178	Largest(1)	234	
		Smallest(1)	168	
		Confidence Level(95.0%)	8.847813	

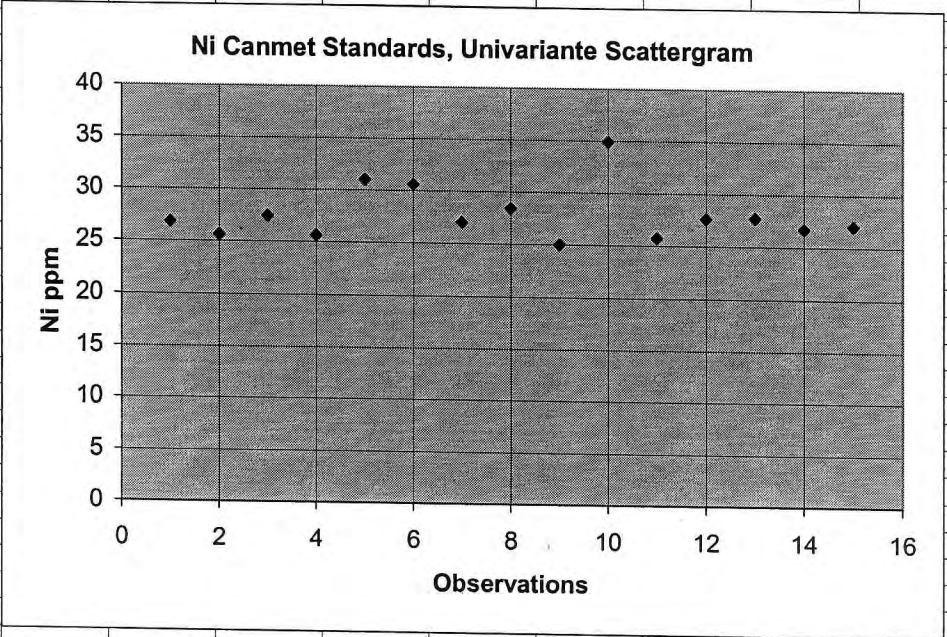


Pb		Pb		%RSD
1	41.6			
2	41.2	Mean	41.58667	9.767543
3	42.2	Standard Error	1.048803	
4	35.4	Median	41.2	
5	44.4	Mode	40.7	
6	45.2	Standard Deviation	4.061996	
7	37.4	Sample Variance	16.49981	
8	43.5	Kurtosis	2.209327	
9	37.1	Skewness	0.986889	
10	52.1	Range	16.7	
11	38.1	Minimum	35.4	
12	43.7	Maximum	52.1	
13	40.7	Sum	623.8	
14	40.7	Count	15	
15	40.5	Largest(1)	52.1	
		Smallest(1)	35.4	
		Confidence Level(95.0%)	2.24946	

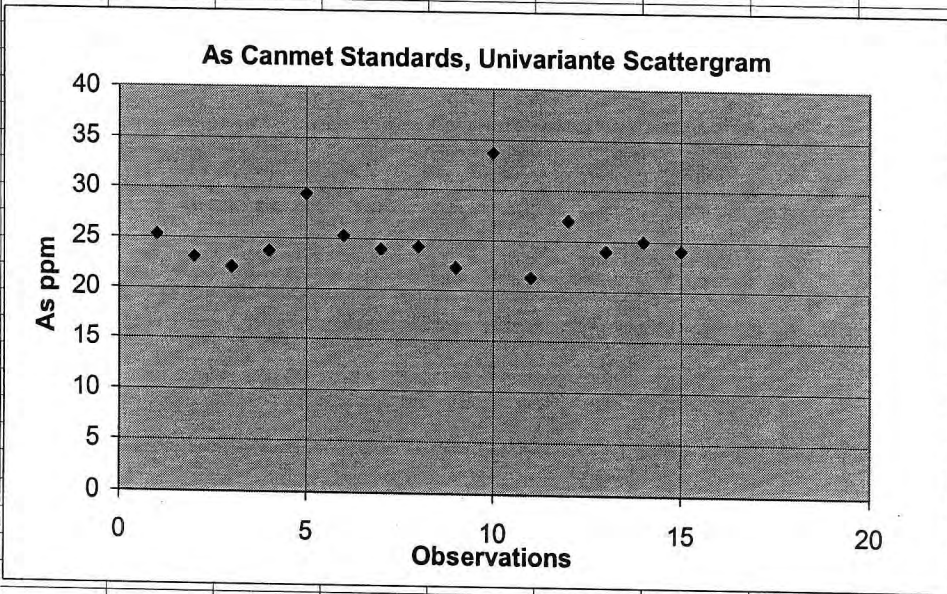


Mineral Assessments 2002 Fieldwork
 Stream sediment and soil geochemistry
 Canmet Standard STSD-4 submitted to Acme Analytical

Ni		Ni		%RSD
1	26.8			9.344609
2	25.6	Mean	27.8	
3	27.4	Standard Error	0.670749	
4	25.6	Median	27	
5	31	Mode	25.6	
6	30.6	Standard Deviation	2.597801	
7	27	Sample Variance	6.748571	
8	28.4	Kurtosis	3.08019	
9	25	Skewness	1.67788	
10	34.9	Range	9.9	
11	25.7	Minimum	25	
12	27.6	Maximum	34.9	
13	27.7	Sum	417	
14	26.7	Count	15	
15	27	Largest(1)	34.9	
		Smallest(1)	25	
		Confidence Level(95.0%)	1.438616	



As		As		%RSD
1	25.3			12.56396
2	23.1	Mean	24.96667	
3	22.1	Standard Error	0.809919	
4	23.7	Median	24.1	
5	29.4	Mode	25.3	
6	25.3	Standard Deviation	3.136802	
7	24	Sample Variance	9.839524	
8	24.3	Kurtosis	3.659363	
9	22.2	Skewness	1.752766	
10	33.7	Range	12.4	
11	21.3	Minimum	21.3	
12	27	Maximum	33.7	
13	24	Sum	374.5	
14	25	Count	15	
15	24.1	Largest(1)	33.7	
		Smallest(1)	21.3	
		Confidence Level(95.0%)	1.737104	



Mineral Assessments - 2002 Fieldwork
Soil and Stream Sediment Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM
Whitehorse Copper Tailings Check Samples
Analytical Results

ELEMENT	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg	Ba
SAMPLES	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%	ppm
176457C	52.4	7333.3	11.3	79	4.8	13.5	23.6	532	10.51	20.2	2.9	446	1.9	158	0.4	2.4	23.2	26	5.59	0.05	3	19.3	3.91	65
97170C	43	6938.6	9.9	65	4.2	12.6	21.3	488	10.1	18.2	2.9	419.7	1.8	130	0.3	2.1	20.9	21	4.89	0.043	3	17.9	3.82	66
FA02030C	53.1	6673.1	11.2	81	5.1	14.3	28.3	604	12.7	19.1	3.2	449.6	1.7	160	0.4	2.2	23.3	32	5.36	0.053	4	20.4	4.37	71
176270C	47.4	6988.7	11.8	74	4.2	14.3	25.6	572	13.05	17.8	3.7	692.7	2.3	142	0.4	2.4	24.4	28	5.22	0.042	4	20	3.81	73
97603C-1	48.9	7055.5	11.6	74	4	14.9	24.6	571	12.18	19.1	3.5	431.2	2.1	144	0.5	2.3	24.3	27	5.09	0.045	4	18.2	4	74
56371C	50.3	6815.6	11.4	79	4.8	15.6	26	596	11.95	19.9	3.4	441.2	2	146	0.2	2.4	22.9	32	5.14	0.05	3	21.2	4.25	70
176364C	51.7	7082.8	11.3	71	4.8	13.7	23.2	552	10.86	19.9	3.1	570.1	1.8	147	0.3	2.5	22.9	25	5.49	0.052	3	19.3	4.32	61
176510C	51.4	6943.5	11.6	73	4.5	13.9	24.3	566	11.52	18	3.1	880.2	1.9	165	0.3	2.2	23.3	28	5.36	0.049	3	19.6	4.19	70
56480C	53.6	7064.5	12.6	86	5.5	16.2	27.4	606	12.92	21.8	3.7	776.9	2	155	0.4	2.5	26.7	30	6.05	0.052	4	22.7	4.54	72
176394C	50.6	6658.4	10.4	77	4.6	14	28	581	12.53	17.5	2.7	328.9	1.8	147	0.4	2	21.4	29	4.93	0.046	3	19.1	3.9	67
343898C	50.6	7080.8	12.3	82	5	15.2	26.3	577	11.81	20.4	3.3	319.4	2.1	165	0.3	2.4	24	29	5.37	0.053	3	20.1	4.15	71
344250C	49.2	6972.2	11.3	73	4.6	14.3	25.3	560	11.32	18.5	3.1	560.7	1.9	137	0.3	2.2	21.9	28	5.22	0.05	3	19.4	3.88	68
56515C	46.9	7095.3	11.6	72	3.6	13.6	25.2	541	11.03	18.1	3	398.7	2.1	151	0.4	2.2	23.3	27	5.27	0.053	4	19.1	4.26	67
56568C	47.7	6811.3	10.7	72	4.6	13.2	23.5	525	10.69	17.7	2.8	433.3	1.9	147	0.4	2.1	21.7	26	5.01	0.047	3	18	3.89	67
97650C	45.3	66684.7	10.2	68	4.2	14.4	26.3	553	11.98	17	2.9	459.9	1.8	150	0.3	1.9	22.9	27	5.09	0.05	3	17.8	4.05	65
97693C	50.3	6652.7	10.7	79	4.8	15.5	26.6	572	12.44	19.8	3	363.8	2	155	0.4	2.1	21.8	31	5.21	0.051	4	19.5	4.2	70
97710C	50.4	6464.1	10.5	79	4.8	14.2	26.1	563	11.88	18.8	2.8	365.4	1.9	150	0.4	2.1	21.3	30	4.99	0.05	4	19.2	4.02	68
176536C	55.2	7702.9	12.2	83	5.3	16	27.3	599	12.34	22.5	3.3	419.6	2.1	154	0.5	2.3	24.7	37	5.62	0.053	4	21.5	4.3	72
344211C	46.2	5657.7	10	76	4	14.9	26.7	578	11.43	17.6	3.1	625.7	2.1	140	0.3	2	22.2	30	4.61	0.043	3	19.6	3.94	67
56443C	46.4	6896	10.4	77	4.1	13.3	23.8	488	9.89	16.4	3	289.7	1.9	140	0.2	2	20.9	26	4.84	0.04	3	18	3.77	59
56533C	41.5	6951.4	10.5	70	4.1	13.4	23.3	550	11.82	19.6	2.8	293	1.8	140	0.4	2	20.8	30	5.18	0.048	3	18.9	4.01	66
97245C	47.6	6612.4	10	74	4.4	13.1	24.5	566	11.6	17.8	2.9	446.1	1.7	151	0.4	2.2	22.5	28	5.09	0.05	3	20.1	4.08	67

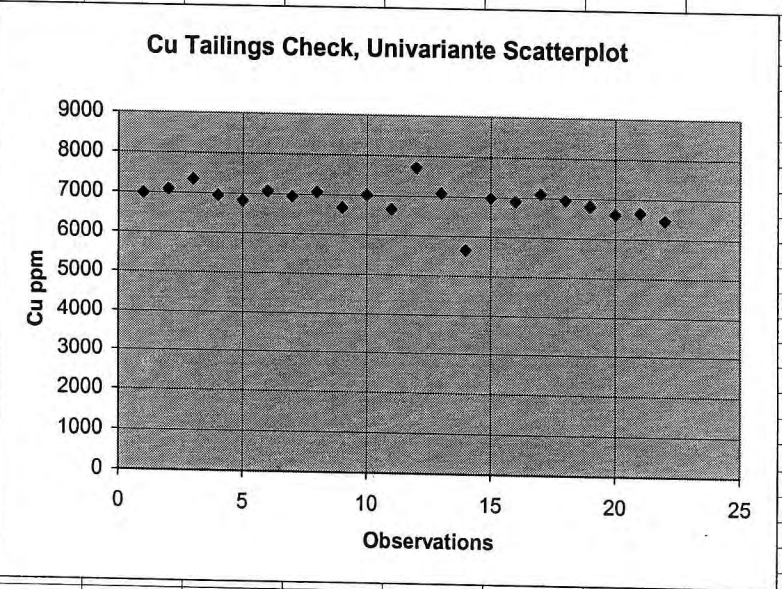
ELEMENT	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga	Sample	Work
SAMPLES	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	gm	Order
176457C	0.025	22	0.76	0.004	0.12	4.2	0.01	1.2	< .1	0.31	6		20036S
97170C	0.03	17	0.77	0.004	0.11	4.1	0.01	0.9	< .1	0.17	5		20036S
FA02030C	0.034	24	0.83	0.005	0.12	5.1	0.02	1.3	< .1	0.25	6		20036S
176270C	0.035	21	0.76	0.004	0.11	4.6	0.01	1.3	< .1	0.19	6		020040S
97603C-1	0.033	21	0.81	0.005	0.11	5.1	0.01	1.2	< .1	0.22	6		020040S
56371C	0.032	23	0.82	0.005	0.12	4.5	0.01	1.4	< .1	0.26	6		020041S
176364C	0.027	22	0.74	0.004	0.12	5.3	0.01	1.3	< .1	0.26	6		020042S
176510C	0.031	23	0.77	0.004	0.12	4.8	< .01	1.2	< .1	0.26	6		020042S
56480C	0.036	25	0.83	0.006	0.13	4.7	< .01	1.6	< .1	0.27	7		020042S
176394C	0.033	17	0.77	0.005	0.11	4.6	0.01	1.5	< .1	0.25	6	30	020047S
343898C	0.027	19	0.77	0.005	0.13	5.1	0.01	1.4	< .1	0.27	7	30	020047S
344250C	0.03	23	0.74	0.004	0.12	5.3	< .01	1.4	< .1	0.28	6	30	020047S
56515C	0.029	19	0.77	0.005	0.13	4.6	< .01	1.2	< .1	0.31	6	30	020047S
56568C	0.028	21	0.75	0.005	0.11	3.9	< .01	1.3	< .1	0.22	6	30	020047S
97650C	0.03	17	0.72	0.005	0.11	4.5	0.02	1.3	< .1	0.3	6	30	020047S
97693C	0.034	21	0.83	0.005	0.13	4.6	< .01	1.3	< .1	0.26	7	30	020047S
97710C	0.033	20	0.81	0.005	0.12	4.5	0.01	1.2	< .1	0.25	6	30	020047S
176536C	0.033	27	0.79	0.004	0.12	4.9	< .01	1.6	< .1	0.33	6		020048S
344211C	0.032	23	0.79	0.004	0.1	4.2	< .01	1.3	< .1	0.26	6		020051S
56443C	0.024	22	0.7	0.007	0.1	4.7	0.01	1.3	< .1	0.23	6		020051S
56533C	0.03	25	0.79	0.004	0.11	4.3	0.04	1.3	< .1	0.28	7		020051S
97245C	0.026	26	0.75	0.004	0.11	5.1	0.01	1.3	< .1	0.27	6		020051S

Mineral Assessments - 2002 Fieldwork																			
Soil and Stream Sediment Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																			
Whitehorse Copper Tailings Check Samples																			
Descriptive Statistics																			
	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%
Mean	49.22	9843.18	11.12	76.00	4.55	14.40	25.62	566.00	11.80	18.87	3.12	477.31	1.95	149.30	0.36	2.20	22.86	29.00	5.21
Standard Error	0.71	2992.88	0.17	1.06	0.11	0.21	0.35	6.21	0.18	0.35	0.06	36.07	0.04	1.79	0.02	0.04	0.33	0.61	0.07
Median	49.75	6947.45	11.25	75	4.6	14.3	25.8	568.5	11.85	18.65	3.1	437.25	1.9	148.5	0.4	2.2	22.9	28.5	5.195
Mode	50.3	#N/A	11.6	74	4.8	14.3	26.3	572	#N/A	19.1	3.1	#N/A	2.1	147	0.4	2.2	23.3	28	5.09
Standard Deviation	3.20	13384.56	0.78	4.74	0.48	0.93	1.55	27.79	0.79	1.56	0.29	161.33	0.16	8.01	0.08	0.18	1.47	2.71	0.30
Sample Variance	10.22	179146525.50	0.61	22.42	0.23	0.87	2.40	772.42	0.63	2.42	0.08	26026.84	0.02	64.22	0.01	0.03	2.16	7.37	0.09
Kurtosis	0.56	19.96	-0.95	-0.48	-0.34	-0.75	-0.98	2.16	0.36	0.39	-0.21	0.84	-0.25	-0.27	-0.07	-0.93	0.91	2.78	2.48
Skewness	-0.36	4.47	0.25	0.39	0.07	0.46	0.00	-1.03	-0.56	0.76	0.68	1.16	0.33	0.52	-0.36	0.19	0.81	1.26	0.84
Range	13.7	61027	2.6	18	1.9	3.1	5.1	118	3.16	6.1	1	590.5	0.6	28	0.3	0.6	5.9	12	1.44
Minimum	41.5	5657.7	10	68	3.6	13.1	23.2	488	9.89	16.4	2.7	289.7	1.7	137	0.2	1.9	20.8	25	4.61
Maximum	55.2	66684.7	12.6	86	5.5	16.2	28.3	606	13.05	22.5	3.7	880.2	2.3	165	0.5	2.5	26.7	37	6.05
Sum	984.3	196863.6	222.3	1520	91	288	512.3	11320	235.94	377.3	62.4	9546.1	38.9	2986	7.2	44	457.2	580	104.14
Count	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Largest(1)	55.2	66684.7	12.6	86	5.5	16.2	28.3	606	13.05	22.5	3.7	880.2	2.3	165	0.5	2.5	26.7	37	6.05
Smallest(1)	41.5	5657.7	10	68	3.6	13.1	23.2	488	9.89	16.4	2.7	289.7	1.7	137	0.2	1.9	20.8	25	4.61
Confidence Level(95.0%)	1.496	6264.170	0.365	2.216	0.225	0.437	0.725	13.007	0.371	0.728	0.135	75.504	0.074	3.751	0.038	0.083	0.688	1.270	0.142

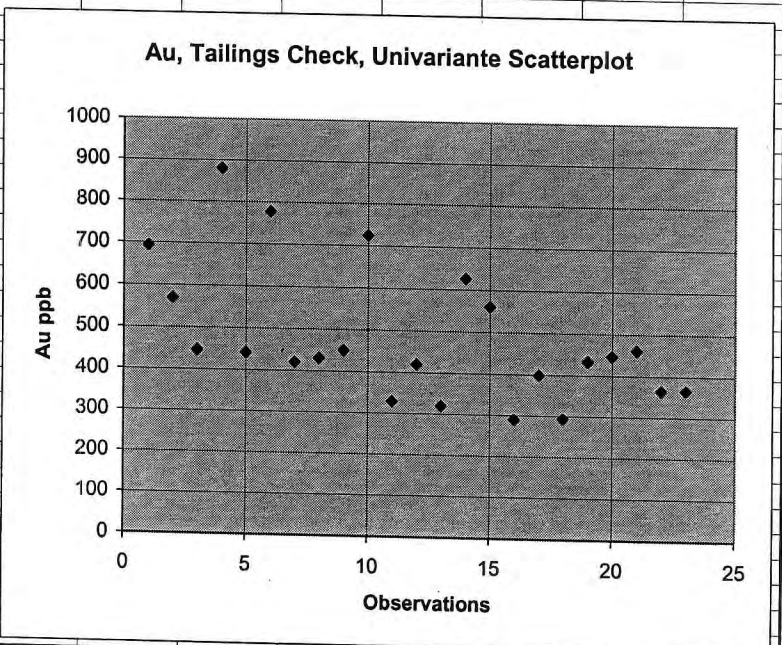
Mineral Assessments 2002 Fieldwork
Stream sediment and soil geochemistry

Whitehorse Copper Tailings - Checks submitted to Acme Analytical.

Submitted with Silt and Soil samples Acme Lab		%RSD=Percent Relative Standard Deviation (Standard deviation divided by the mean of assays.)	
Cu	Cu		%RSD
1	6988.7		
2	7082.8	Mean	6884.354545
3	7333.3	Standard Error	80.7792041
4	6943.5	Median	6947.45
5	6815.6	Mode	#N/A
6	7064.5	Standard Deviation	378.888052
7	6938.6	Sample Variance	143556.1559
8	7055.5	Kurtosis	5.149447557
9	6673.1	Skewness	-1.247477794
10	7005	Range	2045.2
11	6658.4	Minimum	5657.7
12	7702.9	Maximum	7702.9
13	7080.8	Sum	151455.8
14	5657.7	Count	22
15	6972.2	Largest(1)	7702.9
16	6896	Smallest(1)	5657.7
17	7095.3	Confidence Level(95.0%)	167.9895803
18	6951.4		
19	6811.3		
20	6612.4		
21	6652.7		
22	6464.1		
23	66684.7	value taken out and not used in calc's.	



Au	Au		%RSD
1	692.7		
2	570.1	Mean	484.2043478
3	446	Standard Error	33.23817302
4	880.2	Median	441.2
5	441.2	Mode	#N/A
6	776.9	Standard Deviation	159.4046779
7	419.7	Sample Variance	25409.85134
8	431.2	Kurtosis	0.454304706
9	449.6	Skewness	1.062069247
10	724.9	Range	590.5
11	328.9	Minimum	289.7
12	419.6	Maximum	880.2
13	319.4	Sum	11136.7
14	625.7	Count	23
15	560.7	Largest(1)	880.2
16	289.7	Smallest(1)	289.7
17	398.7	Confidence Level(95.0%)	68.93182582
18	293		
19	433.3		
20	446.1		
21	459.9		
22	363.8		
23	365.4		

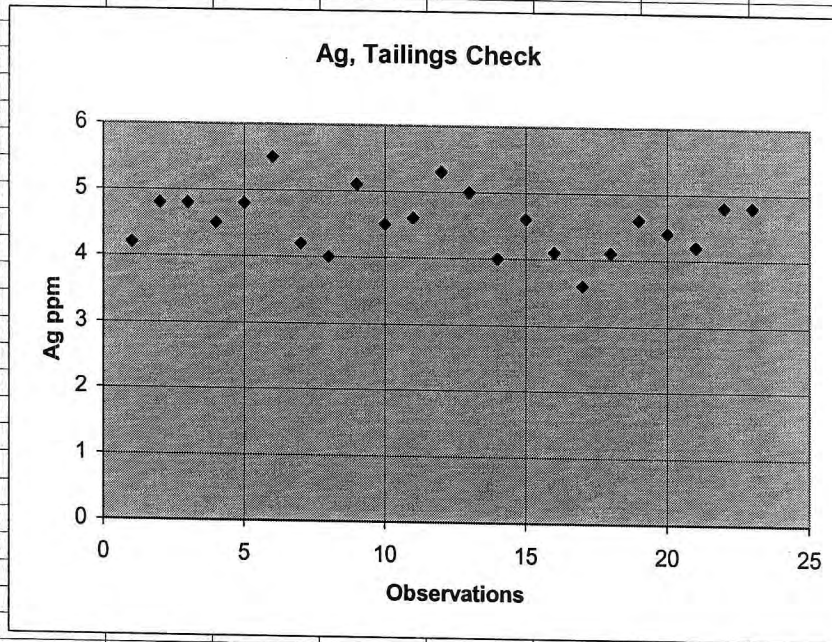


Mineral Assessments 2002 Fieldwork

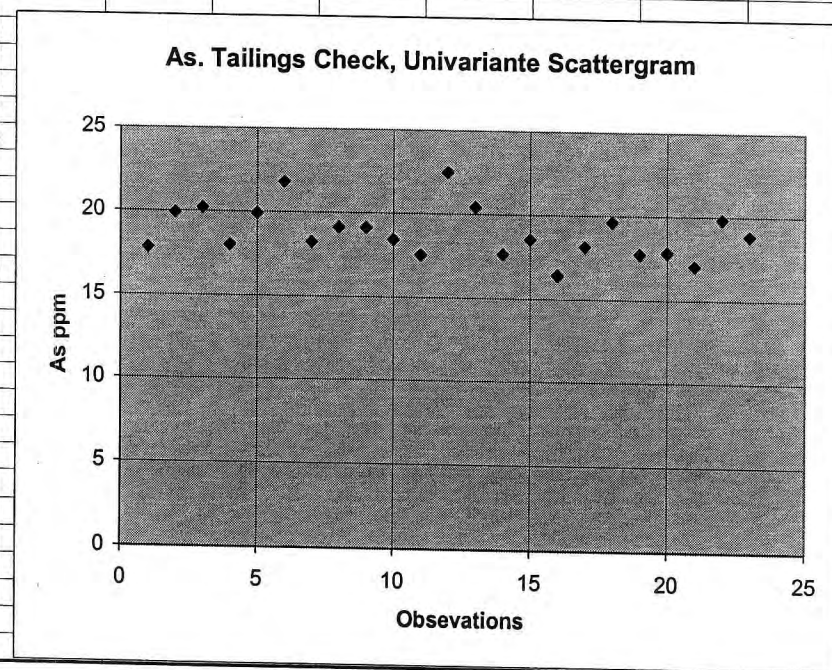
Stream sediment and soil geochemistry

Whitehorse Copper Tailings - Checks submitted to Acme Analytical.

	Ag		Ag	%RSD
1	4.2			
2	4.8	Mean	4.543478261	10.06
3	4.8	Standard Error	0.095310204	
4	4.5	Median	4.6	
5	4.8	Mode	4.8	
6	5.5	Standard Deviation	0.457091683	
7	4.2	Sample Variance	0.208932806	
8	4	Kurtosis	-0.156111585	
9	5.1	Skewness	0.104550817	
10	4.5	Range	1.9	
11	4.6	Minimum	3.6	
12	5.3	Maximum	5.5	
13	5	Sum	104.5	
14	4	Count	23	
15	4.6	Largest(1)	5.5	
16	4.1	Smallest(1)	3.6	
17	3.6	Confidence Level(95.0%)	0.197661478	
18	4.1			
19	4.6			
20	4.4			
21	4.2			
22	4.8			
23	4.8			



	As		As	%RSD
1	17.8			
2	19.9	Mean	18.87391304	7.859
3	20.2	Standard Error	0.309290747	
4	18	Median	18.5	
5	19.9	Mode	17.8	
6	21.8	Standard Deviation	1.483306316	
7	18.2	Sample Variance	2.200197628	
8	19.1	Kurtosis	0.488283468	
9	19.1	Skewness	0.761261174	
10	18.4	Range	6.1	
11	17.5	Minimum	16.4	
12	22.5	Maximum	22.5	
13	20.4	Sum	434.1	
14	17.6	Count	23	
15	18.5	Largest(1)	22.5	
16	16.4	Smallest(1)	16.4	
17	18.1	Confidence Level(95.0%)	0.64143044	
18	19.6			
19	17.7			
20	17.8			
21	17			
22	19.8			
23	18.8			



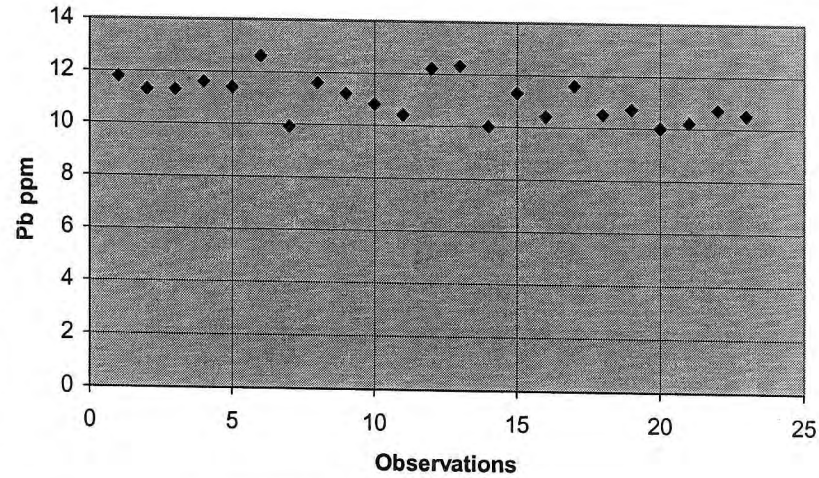
Mineral Assessments 2002 Fieldwork

Stream sediment and soil geochemistry

Whitehorse Copper Tailings - Checks submitted to Acme Analytical.

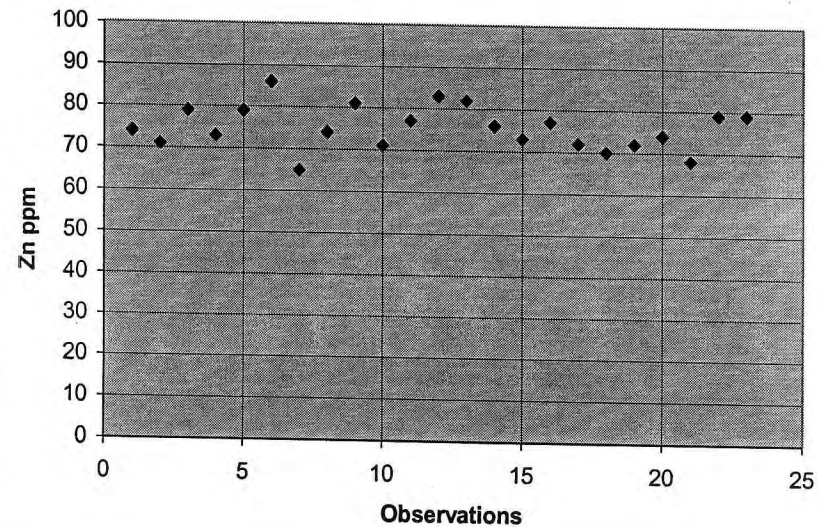
Pb		Pb		%RSD
1	11.8			
2	11.3	Mean	11.05652174	6.9783
3	11.3	Standard Error	0.160880247	
4	11.6	Median	11.2	
5	11.4	Mode	11.3	
6	12.6	Standard Deviation	0.771554562	
7	9.9	Sample Variance	0.595296443	
8	11.6	Kurtosis	-0.795735642	
9	11.2	Skewness	0.273371854	
10	10.8	Range	2.7	
11	10.4	Minimum	9.9	
12	12.2	Maximum	12.6	
13	12.3	Sum	254.3	
14	10	Count	23	
15	11.3	Largest(1)	12.6	
16	10.4	Smallest(1)	9.9	
17	11.6	Confidence Level(95.0%)	0.333645571	
18	10.5			
19	10.7			
20	10			
21	10.2			
22	10.7			
23	10.5			

Pb, Tailings Check, Univariate Scatterplot



Zn		Zn		%RSD
1	74			
2	71	Mean	75.43478261	6.7693
3	79	Standard Error	1.064753468	
4	73	Median	74	
5	79	Mode	79	
6	86	Standard Deviation	5.106378248	
7	65	Sample Variance	26.07509881	
8	74	Kurtosis	-0.282625684	
9	81	Skewness	0.09566704	
10	71	Range	21	
11	77	Minimum	65	
12	83	Maximum	86	
13	82	Sum	1735	
14	76	Count	23	
15	73	Largest(1)	86	
16	77	Smallest(1)	65	
17	72	Confidence Level(95.0%)	2.208165912	
18	70			
19	72			
20	74			
21	68			
22	79			
23	79			

Zn, Tailings Check, Univariate Scatterplot



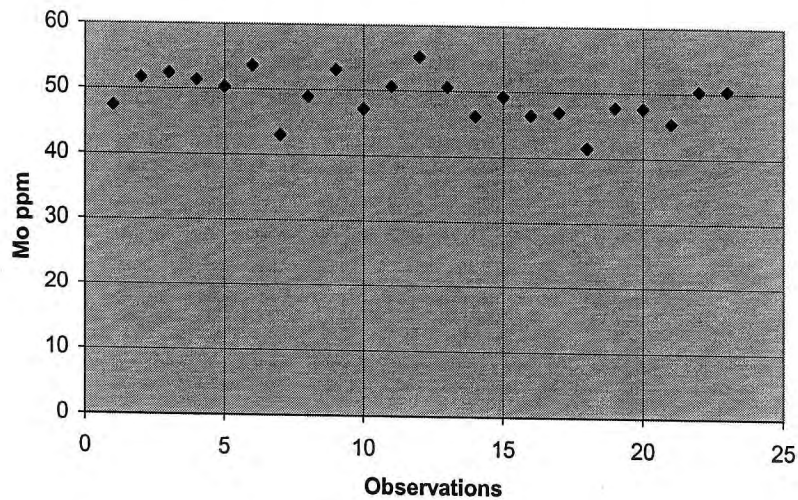
Mineral Assessments 2002 Fieldwork

Stream sediment and soil geochemistry

Whitehorse Copper Tailings - Checks submitted to Acme Analytical.

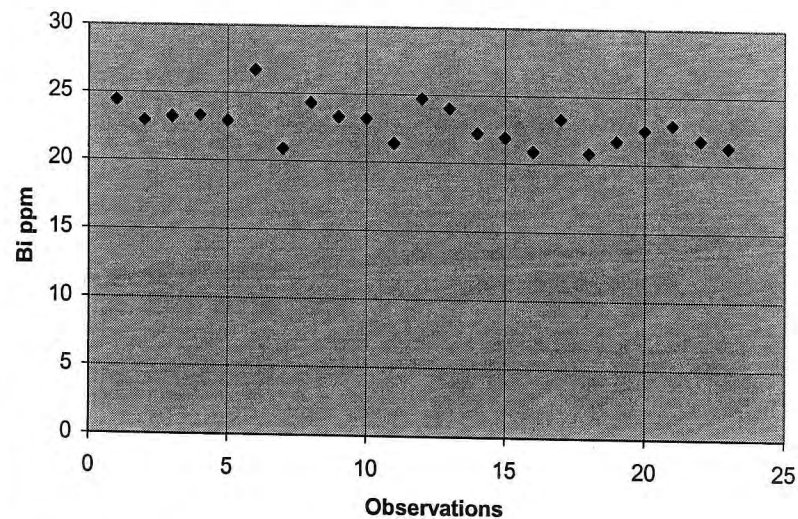
Mo		Mo		%RSD
1	47.4			
2	51.7	Mean	48.99130435	6.8297
3	52.4	Standard Error	0.69767862	
4	51.4	Median	49.2	
5	50.3	Mode	50.3	
6	53.6	Standard Deviation	3.345949117	
7	43	Sample Variance	11.19537549	
8	48.9	Kurtosis	-0.005322479	
9	53.1	Skewness	-0.337641088	
10	47.1	Range	13.7	
11	50.6	Minimum	41.5	
12	55.2	Maximum	55.2	
13	50.6	Sum	1126.8	
14	46.2	Count	23	
15	49.2	Largest(1)	55.2	
16	46.4	Smallest(1)	41.5	
17	46.9	Confidence Level(95.0%)	1.446898452	
18	41.5			
19	47.7			
20	47.6			
21	45.3			
22	50.3			
23	50.4			

Mo, Tailings Check, Univariate Analysis



Bi		Bi		%RSD
1	24.4			
2	22.9	Mean	22.80434783	6.2764
3	23.2	Standard Error	0.298446456	
4	23.3	Median	22.9	
5	22.9	Mode	22.9	
6	26.7	Standard Deviation	1.431298921	
7	20.9	Sample Variance	2.048616601	
8	24.3	Kurtosis	0.980613341	
9	23.3	Skewness	0.749680196	
10	23.2	Range	5.9	
11	21.4	Minimum	20.8	
12	24.7	Maximum	26.7	
13	24	Sum	524.5	
14	22.2	Count	23	
15	21.9	Largest(1)	26.7	
16	20.9	Smallest(1)	20.8	
17	23.3	Confidence Level(95.0%)	0.618940731	
18	20.8			
19	21.7			
20	22.5			
21	22.9			
22	21.8			
23	21.3			

Bi, Tailings Check, Univariate Scatterplot



Mineral Assessments - 2002 Fieldwork																							
Soil and Stream Sediment Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																							
Whitehorse Clay Cliff Check Samples																							
Analytical Results																							
SAMPLE	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%
176270A	0.6	24.8	6.5	49	0.1	36.6	8.9	421	1.98	6.5	1	2.2	3.6	62	0.2	0.7	0.1	44	2.14	0.075	11	39.5	0.85
176359A	0.8	25.2	7.3	49	0.1	41.2	9.8	441	2.05	9.5	1.2	3.3	3.9	68	0.3	0.7	0.1	46	2.34	0.078	12	45.4	0.96
176395A	0.6	23.6	6.8	47	0.1	35.4	9.4	388	2	9.2	1	3.1	3.9	68	0.2	0.7	0.1	43	2.23	0.074	11	43.1	0.9
176515A	0.6	26.5	7.5	49	0.1	37	9.7	443	2.04	9	1	3.6	3.8	70	0.2	0.6	0.1	44	2.18	0.078	11	40.9	0.93
56472A	0.7	27	7.1	49	0.1	38.8	9.6	409	2.02	9.5	1.2	3.2	3.8	67	0.2	0.7	0.1	44	2.31	0.075	12	42.6	0.94
97158A	0.7	23.7	6.5	44	0.1	36.2	8.9	389	1.97	9.8	1	1.8	3.9	63	0.3	0.7	0.1	37	1.86	0.07	11	38.7	0.84
97603A	0.6	22.8	6.4	45	0.1	34	8.8	389	1.87	6.6	1.1	3.4	3.7	64	0.2	0.7	0.1	42	2.26	0.075	12	39.1	0.86
97679A	0.6	25.2	7.2	46	0.1	36	8.9	404	1.87	8.8	1.1	2.4	3.6	63	0.2	0.6	0.1	45	2.03	0.072	11	40.3	0.86
FA02028A	0.5	32.9	14.3	58	0.1	21.8	10.6	543	3.79	19.1	0.9	1.6	7.5	28	0.1	1	0.2	58	0.38	0.057	19	27	0.53
176515A	0.6	26.5	7.5	49	0.1	37	9.7	443	2.04	9	1	3.6	3.8	70	0.2	0.6	0.1	44	2.18	0.078	11	40.9	0.93
RS02S14A	0.8	24.1	6.7	47	0.1	35.8	9.2	413	1.95	8.4	1	4.7	3.7	66	0.2	0.6	0.1	44	2.18	0.078	11	40.9	0.93
140381A	0.7	23.3	7.7	64	0.1	36	9.3	428	1.94	7.8	1	3.1	3.5	62	0.3	0.6	0.1	43	2.03	0.074	11	38.8	0.89
176377A	0.7	24.5	6.4	48	0.1	36.6	9.5	411	1.98	9	0.9	3.3	3.6	69	0.3	0.6	0.1	45	2.06	0.076	11	42.2	0.9
176405A	0.7	25.2	6.9	49	0.1	36.6	9.7	414	2.02	9.1	1	1.9	3.8	65	0.3	0.6	0.1	44	2.14	0.081	11	39	0.92
176446A	0.7	25.5	6.9	47	0.1	35.3	9.5	431	2.06	8.7	1.1	3.7	3.8	68	0.2	0.6	0.1	44	2.08	0.075	12	39.3	0.91
176461A	0.5	25.7	6.6	49	0.1	34.3	9.3	423	2	9.7	1	3.1	3.8	63	0.3	0.6	0.1	44	2.1	0.077	10	41.1	0.91
344203A	0.8	25.8	6.3	47	0.1	35.8	9	415	1.92	7.8	1	3.4	3.8	63	0.2	0.5	0.1	42	2	0.066	11	40.3	0.9
56390A	0.8	24	9.7	49	0.1	36.4	9.4	422	2.02	8.5	1.1	4	3.7	66	0.2	0.6	0.1	44	2.16	0.077	12	39.4	0.92
56408A	0.7	23	6.4	47	0.1	35.3	9.1	383	1.86	8.7	0.9	1.8	3.5	62	0.3	0.6	0.1	42	1.94	0.071	11	35.8	0.86
56428A	0.7	25.6	19.5	74	0.1	39.3	10.2	424	2.16	8.8	1.1	3.2	4.2	67	0.2	0.7	0.1	48	2.2	0.066	12	39.9	1
56455A	0.8	25.3	7	55	0.1	38.8	10.3	437	2.22	8.7	1.1	1.7	4.1	69	0.3	0.7	0.1	47	2.24	0.07	13	44.9	1.01
97216A	0.7	24.4	7	48	0.1	35.2	9.1	405	1.94	9	1.1	2.5	3.9	68	0.2	0.6	0.1	42	2.05	0.074	10	38.7	0.9
97672A	0.6	23.7	6.3	43	0.1	35.6	9.8	417	1.97	8.7	1	1	3.8	73	0.2	0.6	0.1	44	2.13	0.079	11	39	0.94
97710A	0.9	36.7	5.6	48	0.1	22.2	5.8	308	1.58	4.9	0.7	3.4	2.4	32	0.7	0.5	0.2	39	1.83	0.075	13	26.8	0.45
97741A	0.6	24.9	6.6	49	0.1	37.7	9.7	422	2.02	9.1	1	4.1	3.8	70	0.2	0.6	0.1	45	2.14	0.08	12	38.9	0.94

SAMPLE	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Hg ppm	Sc ppm	Tl ppm	S %	Ga ppm	Sample gm	Work Order
176270A	150	0.09	2	1.15	0.025	0.11	0.2	0.02	3.6	0.1	0.11	4		020040S
176359A	156	0.096	2	1.1	0.028	0.12	0.2	0.02	4.2	0.1	0.07	4		020042S
176395A	153	0.085	2	1.13	0.024	0.11	0.2	0.02	3.9	0.1	0.05	4		20036S
176515A	151	0.078	1	1	0.024	0.1	0.2	0.01	3.5	0.1	0.11	4		020042S
56472A	159	0.092	1	1.11	0.029	0.12	0.2	0.01	4.1	0.1	0.14	4		020042S
97158A	158	0.087	2	1.06	0.029	0.11	0.2	0.01	3.7	0.1	0.12	4		20036S
97603A	150	0.09	2	1.13	0.025	0.11	0.2	0.03	3.5	0.1	0.08	4		020040S
97679A	155	0.084	3	1.03	0.027	0.11	0.3	0.02	3.7	0.1	0.07	4		020041S
FA02028A	66	0.096	1	1.22	0.018	0.16	0.1	0.02	4.2	0.1	0.05	5		20036S
176515A	151	0.078	1	1	0.024	0.1	0.2	0.01	3.5	0.1	0.11	4		020042S
RS02S14A	142	0.081	2	1.04	0.022	0.12	0.2	0.01	3.5	0.1	0.07	4		20036S
140381A	139	0.068	1	0.98	0.023	0.1	0.2	0.02	3.5	0.1	0.13	4		020051S
176377A	146	0.08	2	1.05	0.026	0.11	0.2	0.01	3.6	0.1	0.09	4	30	020047S
176405A	154	0.079	1	1.06	0.023	0.11	0.2	0.02	3.5	0.1	0.08	4	30	020047S
176446A	150	0.08	2	1.06	0.025	0.11	0.2	0.01	3.7	0.1	0.07	4	30	020047S
176461A	148	0.078	3	1.01	0.022	0.1	0.2	0.01	3.4	0.1	0.1	4		020048S
344203A	145	0.08	2	1.07	0.021	0.09	0.2	0.01	3.2	0.1	0.08	4		020051S
56390A	153	0.086	3	1.12	0.027	0.11	0.2	0.03	3.6	0.1	0.07	4	30	020047S
56408A	136	0.072	2	0.99	0.025	0.11	0.2	0.02	3.3	0.1	0.07	4	30	020047S
56428A	150	0.084	3	1.14	0.025	0.1	0.2	0.03	4	0.1	0.08	4		020051S
56455A	155	0.084	1	1.16	0.026	0.1	0.2	0.01	3.8	0.1	0.07	4		020051S
97216A	154	0.078	1	1	0.027	0.1	0.2	0.02	3.4	0.1	0.11	3	30	020047S
97672A	153	0.081	2	1.03	0.027	0.11	0.2	0.02	3.6	0.1	0.1	3	30	020047S
97710A	138	0.052	2	0.81	0.01	0.06	0.2	0.07	2.6	0.1	0.05	3	30	020047S
97741A	148	0.081	2	1.05	0.027	0.11	0.2	0.01	3.7	0.1	0.1	4	30	020047S

Mineral Assessments - 2002 Fieldwork																	
Soil and Stream Sediment Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																	
Whitehorse Clay Cliff Check Samples																	
Descriptive Statistics	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
Mean	0.68	25.60	7.71	49.96	0.10	35.40	9.33	416.92	2.05	8.96	1.02	2.92	3.88	63.44	0.25	0.64	0.11
Standard Error	0.02	0.61	0.59	1.32	0.00	0.87	0.17	7.59	0.08	0.48	0.02	0.18	0.16	2.10	0.02	0.02	0.01
Median	0.7	25.2	6.9	49	0.1	36	9.4	417	2	8.8	1	3.2	3.8	66	0.2	0.6	0.1
Mode	0.7	25.2	6.4	49	0.1	36.6	9.7	443	2.02	9	1	3.1	3.8	68	0.2	0.6	0.1
Standard Deviation	0.10	3.03	2.96	6.62	0.00	4.34	0.87	37.95	0.38	2.38	0.10	0.91	0.82	10.52	0.11	0.10	0.03
Sample Variance	0.01	9.18	8.77	43.87	0.00	18.83	0.75	1439.99	0.14	5.68	0.01	0.83	0.67	110.76	0.01	0.01	0.00
Kurtosis	-0.31	8.16	11.41	7.22	-2.18	6.58	11.80	6.86	20.11	14.70	2.74	-0.47	17.61	7.81	12.96	7.86	9.64
Skewness	0.16	2.73	3.32	2.56	-1.06	-2.47	-2.81	0.55	4.23	3.17	-0.92	-0.34	3.64	-2.84	3.14	2.17	3.30
Range	0.4	13.9	13.9	31	0	19.4	4.8	235	2.21	14.2	0.5	3.7	5.1	45	0.6	0.5	0.1
Minimum	0.5	22.8	5.6	43	0.1	21.8	5.8	308	1.58	4.9	0.7	1	2.4	28	0.1	0.5	0.1
Maximum	0.9	36.7	19.5	74	0.1	41.2	10.6	543	3.79	19.1	1.2	4.7	7.5	73	0.7	1	0.2
Sum	17	639.9	192.7	1249	2.5	884.9	233.2	10423	51.27	223.9	25.5	73.1	96.9	1586	6.2	16	2.7
Count	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Largest(1)	0.9	36.7	19.5	74	0.1	41.2	10.6	543	3.79	19.1	1.2	4.7	7.5	73	0.7	1	0.2
Smallest(1)	0.5	22.8	5.6	43	0.1	21.8	5.8	308	1.58	4.9	0.7	1	2.4	28	0.1	0.5	0.1
Confidence Level(95.0%)	0.041	1.251	1.222	2.734	0.000	1.791	0.357	15.664	0.157	0.984	0.043	0.376	0.338	4.344	0.045	0.040	0.011

	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga
	ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm
Descriptive Statistics																		
Mean	44.24	2.04	0.07	11.72	39.23	0.88	146.40	0.08	1.84	1.06	0.02	0.11	0.20	0.02	3.61	0.10	0.09	3.92
Standard Error	0.73	0.07	0.00	0.34	0.85	0.02	3.56	0.00	0.14	0.02	0.00	0.00	0.01	0.00	0.07	0.00	0.00	0.08
Median	44	2.13	0.075	11	39.4	0.91	150	0.081	2	1.06	0.025	0.11	0.2	0.02	3.6	0.1	0.08	4
Mode	44	2.14	0.075	11	40.9	0.9	150	0.078	2	1	0.025	0.11	0.2	0.01	3.5	0.1	0.07	4
Standard Deviation	3.67	0.37	0.01	1.70	4.25	0.12	17.79	0.01	0.69	0.08	0.00	0.02	0.03	0.01	0.33	0.00	0.02	0.40
Sample Variance	13.44	0.14	0.00	2.88	18.09	0.02	316.58	0.00	0.47	0.01	0.00	0.00	0.00	0.01	0.33	0.00	0.02	0.40
Kurtosis	8.36	18.94	3.58	14.92	4.65	7.50	18.95	3.95	-0.73	2.76	6.78	6.72	12.00	11.01	2.65	-2.18	-0.59	3.92
Skewness	1.95	-4.12	-1.63	3.49	-1.90	-2.70	-4.13	-1.28	0.22	-0.84	-2.18	0.36	0.00	2.90	-0.66	-1.06	0.37	-0.75
Range	21	1.96	0.024	9	18.6	0.56	93	0.044	2	0.41	0.019	0.1	0.2	0.06	1.6	0	0.09	2
Minimum	37	0.38	0.057	10	26.8	0.45	66	0.052	1	0.81	0.01	0.06	0.1	0.01	2.6	0.1	0.05	3
Maximum	58	2.34	0.081	19	45.4	1.01	159	0.096	3	1.22	0.029	0.16	0.3	0.07	4.2	0.1	0.14	5
Sum	1106	51.1	1.85	293	980.7	21.97	3660	2.04	46	26.5	0.609	2.69	5	0.47	90.3	2.5	2.18	98
Count	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Largest(1)	58	2.34	0.081	19	45.4	1.01	159	0.096	3	1.22	0.029	0.16	0.3	0.07	4.2	0.1	0.14	5
Smallest(1)	37	0.38	0.057	10	26.8	0.45	66	0.052	1	0.81	0.01	0.06	0.1	0.01	2.6	0.1	0.05	3
Confidence Level(95.0%)	1.513	0.152	0.002	0.700	1.756	0.051	7.345	0.004	0.284	0.033	0.002	0.007	0.012	0.005	0.138	0.000	0.010	0.165

Mineral Assessments 2002 Fieldwork

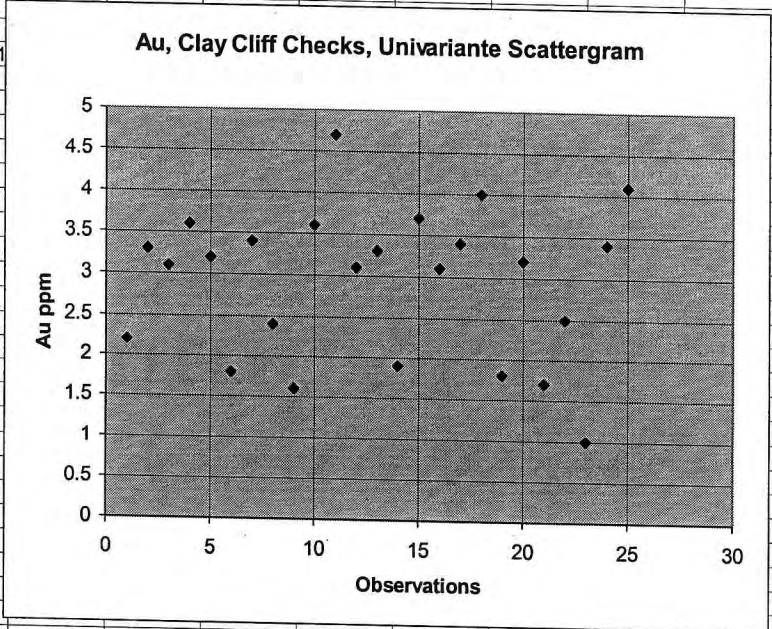
Stream sediment and soil geochemistry

Whitehorse Clay Cliffs - Checks submitted to Acme Analytical.

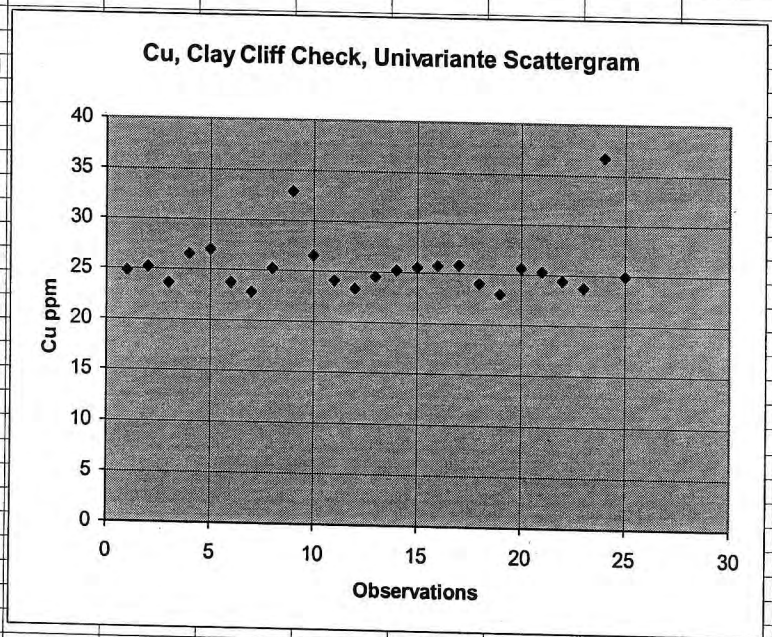
Submitted with EMR Silt and Soil samples to Acme Lab

%RSD=Percent Relative Standard Deviation
(Standard deviation divided by the mean of assays.)

Au		Au		%RSD
1	2.2	020040S		
7	3.4	020040S	Mean	2.924
8	2.4	020041S	Standard Error	0.18223428
2	3.3	020042S	Median	3.2
4	3.6	020042S	Mode	3.1
5	3.2	020042S	Standard Deviation	0.91117141
10	3.6	020042S	Sample Variance	0.83023333
13	3.3	020047S	Kurtosis	-0.4731477
14	1.9	020047S	Skewness	-0.3438259
15	3.7	020047S	Range	3.7
18	4	020047S	Minimum	1
19	1.8	020047S	Maximum	4.7
22	2.5	020047S	Sum	73.1
23	1	020047S	Count	25
24	3.4	020047S	Largest(1)	4.7
25	4.1	020047S	Smallest(1)	1
16	3.1	020048S	Confidence Level(95.0%)	0.37611299
12	3.1	020051S		
17	3.4	020051S		
20	3.2	020051S		
21	1.7	020051S		
3	3.1	20036S		
6	1.8	20036S		
9	1.6	20036S		
11	4.7	20036S		



Cu		Cu		%RSD
1	24.8	020040S		
7	22.8	020040S	Mean	25.596
8	25.2	020041S	Standard Error	0.6060935
2	25.2	020042S	Median	25.2
4	26.5	020042S	Mode	25.2
5	27	020042S	Standard Deviation	3.03046751
10	26.5	020042S	Sample Variance	9.18373333
13	24.5	020047S	Kurtosis	8.16399624
14	25.2	020047S	Skewness	2.73142786
15	25.5	020047S	Range	13.9
18	24	020047S	Minimum	22.8
19	23	020047S	Maximum	36.7
22	24.4	020047S	Sum	639.9
23	23.7	020047S	Count	25
24	36.7	020047S	Largest(1)	36.7
25	24.9	020047S	Smallest(1)	22.8
16	25.7	020048S	Confidence Level(95.0%)	1.25091525
12	23.3	020051S		
17	25.8	020051S		
20	25.6	020051S		
21	25.3	020051S		
3	23.6	20036S		
6	23.7	20036S		
9	32.9	20036S		
11	24.1	20036S		

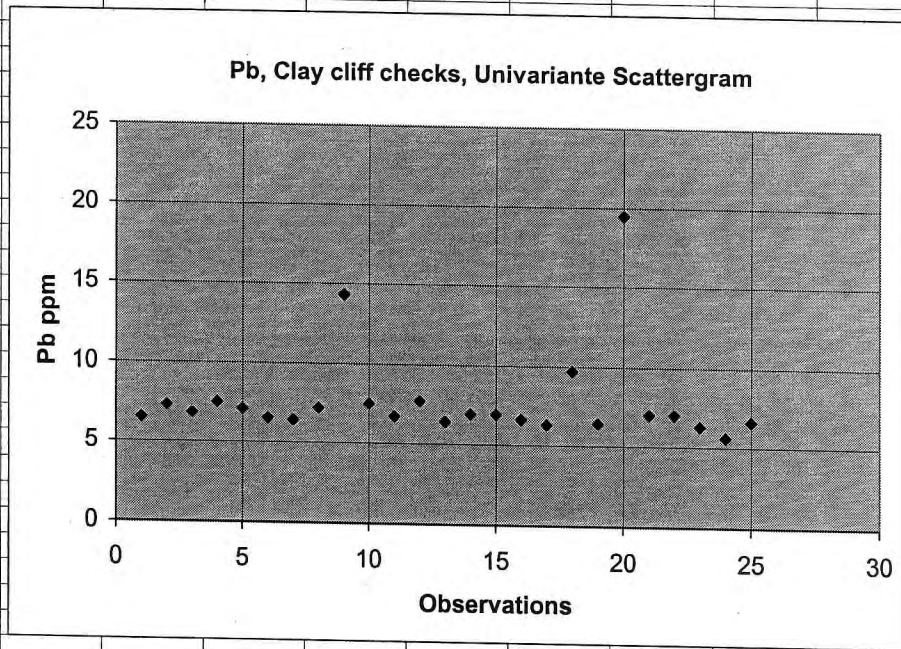


Mineral Assessments 2002 Fieldwork

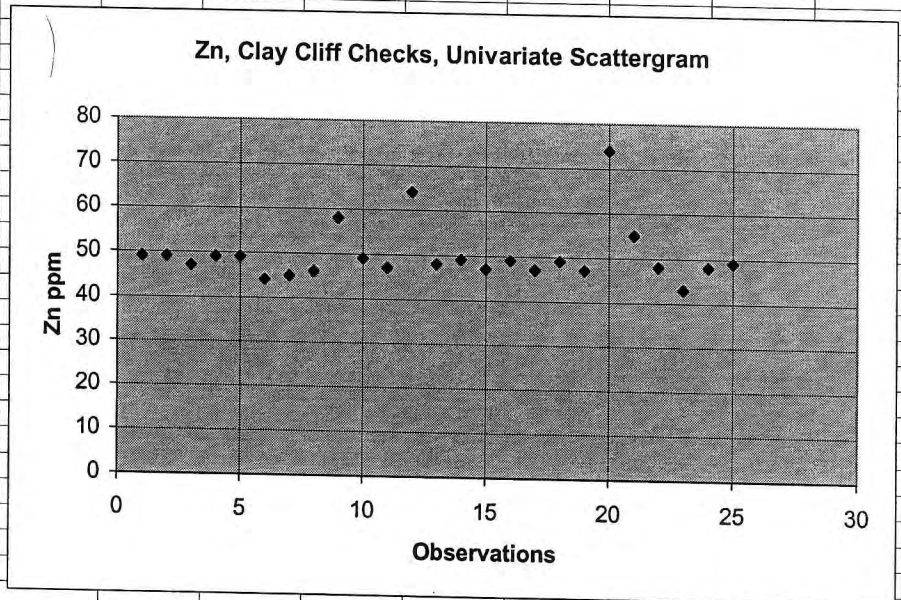
Stream sediment and soil geochemistry

Whitehorse Clay Cliffs - Checks submitted to Acme Analytical.

Pb		Pb		%RSD
1	6.5	020040S		
7	6.4	020040S	Mean	7.708
8	7.2	020041S	Standard Error	0.59219704
2	7.3	020042S	Median	6.9
4	7.5	020042S	Mode	6.4
5	7.1	020042S	Standard Deviation	2.9609852
10	7.5	020042S	Sample Variance	8.76743333
13	6.4	020047S	Kurtosis	11.4069481
14	6.9	020047S	Skewness	3.31848039
15	6.9	020047S	Range	13.9
18	9.7	020047S	Minimum	5.6
19	6.4	020047S	Maximum	19.5
22	7	020047S	Sum	192.7
23	6.3	020047S	Count	25
24	5.6	020047S	Largest(1)	19.5
25	6.6	020047S	Smallest(1)	5.6
16	6.6	020048S	Confidence Level(95.0%)	1.22223437
12	7.7	020051S		
17	6.3	020051S		
20	19.5	020051S		
21	7	020051S		
3	6.8	20036S		
6	6.5	20036S		
9	14.3	20036S		
11	6.7	20036S		



Zn		Zn		%RSD
1	49	020040S		
7	45	020040S	Mean	49.96
8	46	020041S	Standard Error	1.32473897
2	49	020042S	Median	49
4	49	020042S	Mode	49
5	49	020042S	Standard Deviation	6.62369484
10	49	020042S	Sample Variance	43.8733333
13	48	020047S	Kurtosis	7.22299298
14	49	020047S	Skewness	2.55829316
15	47	020047S	Range	31
18	49	020047S	Minimum	43
19	47	020047S	Maximum	74
22	48	020047S	Sum	1249
23	43	020047S	Count	25
24	48	020047S	Largest(1)	74
25	49	020047S	Smallest(1)	43
16	49	020048S	Confidence Level(95.0%)	2.73412629
12	64	020051S		
17	47	020051S		
20	74	020051S		
21	55	020051S		
3	47	20036S		
6	44	20036S		
9	58	20036S		
11	47	20036S		

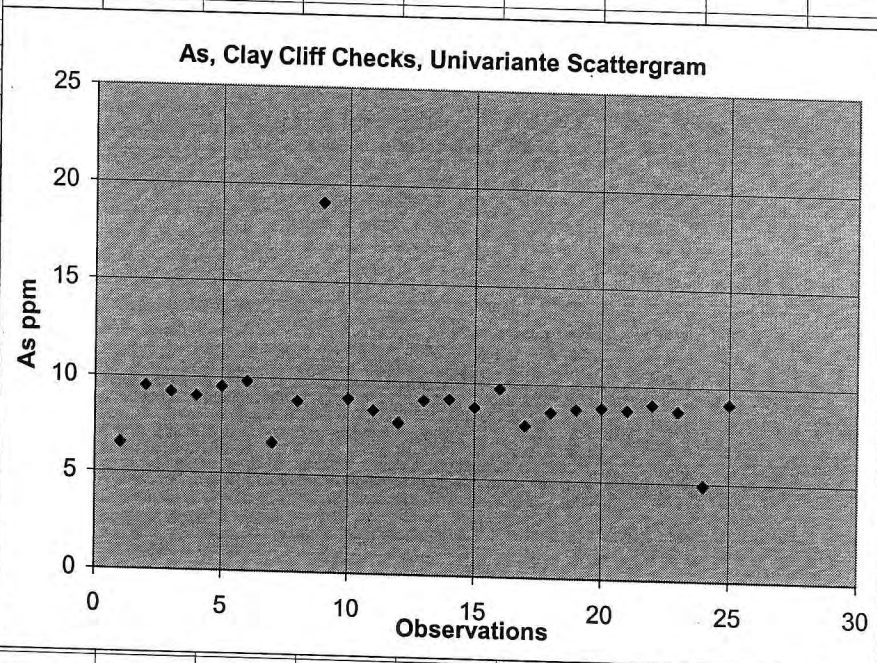


Mineral Assessments 2002 Fieldwork

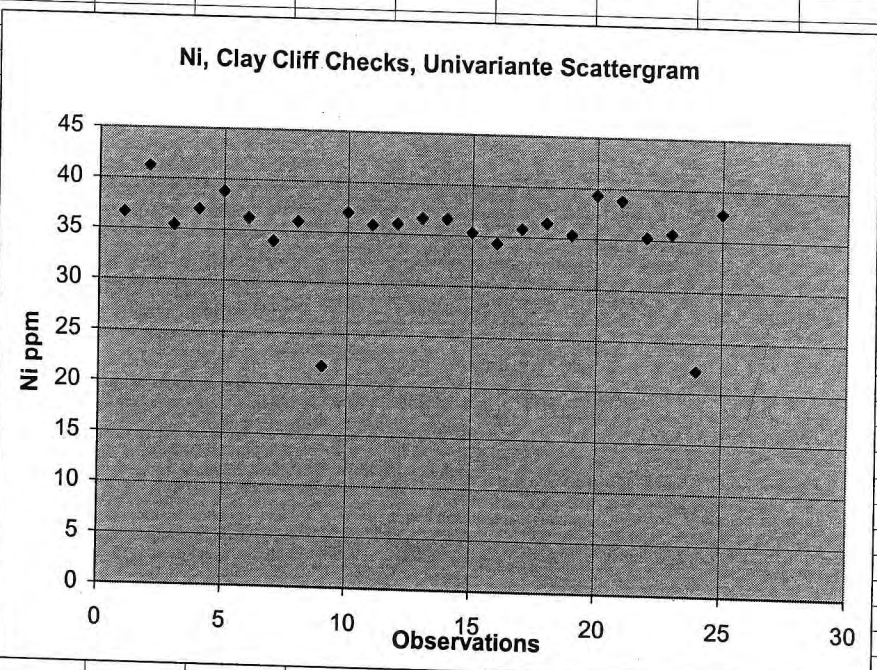
Stream sediment and soil geochemistry

Whitehorse Clay Cliffs - Checks submitted to Acme Analytical.

As		As		%RSD
1	6.5	020040S		
7	6.6	020040S	Mean	8.956
8	8.8	020041S	Standard Error	0.47679765
2	9.5	020042S	Median	8.8
4	9	020042S	Mode	9
5	9.5	020042S	Standard Deviation	2.38398826
10	9	020042S	Sample Variance	5.6834
13	9	020047S	Kurtosis	14.6983708
14	9.1	020047S	Skewness	3.16591442
15	8.7	020047S	Range	14.2
18	8.5	020047S	Minimum	4.9
19	8.7	020047S	Maximum	19.1
22	9	020047S	Sum	223.9
23	8.7	020047S	Count	25
24	4.9	020047S	Largest(1)	19.1
25	9.1	020047S	Smallest(1)	4.9
16	9.7	020048S	Confidence Level(95.0%)	0.98406178
12	7.8	020051S		
17	7.8	020051S		
20	8.8	020051S		
21	8.7	020051S		
3	9.2	20036S		
6	9.8	20036S		
9	19.1	20036S		
11	8.4	20036S		



Ni		Ni		%RSD
1	36.6	020040S		
7	34	020040S	Mean	35.396
8	36	020041S	Standard Error	0.86780336
2	41.2	020042S	Median	36
4	37	020042S	Mode	36.6
5	38.8	020042S	Standard Deviation	4.33901679
10	37	020042S	Sample Variance	18.8270667
13	36.6	020047S	Kurtosis	6.57884048
14	36.6	020047S	Skewness	-2.4689999
15	35.3	020047S	Range	19.4
18	36.4	020047S	Minimum	21.8
19	35.3	020047S	Maximum	41.2
22	35.2	020047S	Sum	884.9
23	35.6	020047S	Count	25
24	22.2	020047S	Largest(1)	41.2
25	37.7	020047S	Smallest(1)	21.8
16	34.3	020048S	Confidence Level(95.0%)	1.79105773
12	36	020051S		
17	35.8	020051S		
20	39.3	020051S		
21	38.8	020051S		
3	35.4	20036S		
6	36.2	20036S		
9	21.8	20036S		
11	35.8	20036S		



Mineral Assessments - 2002 Fieldwork																						
Soil and Stream Sediment Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																						
EMR Duplicate Check Samples																						
ELEMENT	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	
SAMPLES	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	
97168	0.6	28	5.7	51	<.1	30.8	16.2	545	3.26	7.9	0.5	2.3	3.2	31	0.1	0.3	0.3	81	0.47	0.057	12	
97632B	0.5	27.3	5.9	49	<.1	28.2	15.6	533	2.97	6.8	0.5	3.2	3	25	0.1	0.3	0.3	82	0.41	0.053	11	
FA02022	0.4	28.5	9.1	52	<.1	27.3	11.7	435	3.22	6.7	0.6	2.2	5	33	0.1	0.2	0.4	82	0.47	0.034	21	
FA02022B	0.4	27.8	8.7	51	<.1	27.2	11.2	429	3.1	6.3	0.6	5.1	4.8	32	0.1	0.3	0.4	79	0.44	0.032	20	
FA02028A	0.5	32.9	14.3	58	0.1	21.8	10.6	543	3.79	19.1	0.9	1.6	7.5	28	<.1	1	0.2	58	0.38	0.057	19	
FA02028B	0.5	33.1	14.5	60	0.1	21.9	10.8	563	3.85	19	1	0.8	7.5	27	0.1	1.2	0.2	61	0.38	0.058	20	
RS02S41	0.6	27.9	7.3	61	0.1	26.1	12.1	409	3.12	7.1	0.5	9.4	2.9	29	0.1	0.3	0.1	81	0.37	0.026	7	
RS02S41B	0.6	29.4	7.5	60	0.1	26.7	12.4	407	3.33	7.6	0.4	4	2.9	29	0.1	0.3	0.1	80	0.35	0.027	7	
176280	0.9	24.1	7.7	58	0.2	24.2	12.7	310	3.27	191.8	0.7	55.3	3.4	26	0.1	10.9	0.1	74	0.3	0.033	10	
176272	0.9	27.6	8.6	65	0.3	25.4	12.6	316	3.28	210.3	0.9	56.7	3.5	31	0.1	12.5	0.2	81	0.37	0.033	11	
176270	0.7	40.8	6.1	60	0.1	31.2	14.5	531	3.29	7.4	0.6	5.7	2.8	30	0.1	1	0.1	92	0.42	0.019	13	
176264	0.7	40	5.8	58	<.1	32.6	14	491	3.19	7.3	0.6	5.4	2.6	29	0.1	1.1	0.1	90	0.38	0.018	13	
56474	0.7	4.3	6.5	50	0.1	10.8	2.8	502	0.9	3.6	0.6	68	1.7	94	0.3	0.3	<.1	19	13.47	0.072	11	
56473	0.5	4.3	5.6	43	<.1	9.3	2.5	417	0.74	3.1	0.6	<.5	1.4	80	0.2	0.3	<.1	16	11.08	0.061	9	
97164	1.1	37.1	7.3	104	0.1	29.5	15.3	662	3.79	9.8	0.9	6.7	3.4	27	0.4	0.4	0.2	100	0.36	0.059	14	
97164B	0.9	35.4	7.7	102	0.1	28.2	14.8	628	3.6	10.1	0.9	4.7	3.1	27	0.4	0.4	0.2	94	0.35	0.058	13	
97165	0.7	23.3	6.6	66	0.1	22.3	12.2	474	3.48	11.5	0.6	<.5	2.7	33	0.1	0.4	0.1	91	0.46	0.046	8	
97605B	0.8	22.6	6.3	68	0.1	22.5	11.3	466	3.45	10	0.6	6.8	2.4	33	0.1	0.4	0.1	94	0.54	0.048	8	
56379	0.2	6.4	5.1	101	0.1	3.2	6.9	490	2.5	2.7	1.5	<.5	3.9	38	0.2	<.1	<.1	38	0.58	0.171	15	
56379B	0.2	6.3	4.8	103	0.1	3.1	6.9	498	2.56	2.4	1.5	0.5	4	37	0.3	<.1	<.1	40	0.59	0.175	15	
56387	0.8	21	24.1	86	0.2	18.9	10.1	473	2.54	7	1.8	2.2	5.1	48	0.5	0.3	0.2	54	0.5	0.112	19	
56387B	0.9	20.2	24	81	0.2	17.7	9.9	462	2.47	6.5	1.6	1.7	4.8	45	0.4	0.3	0.2	53	0.5	0.109	18	
56390	196.3	187.8	2639.6	594	8.8	6.4	5.5	636	2.38	105.1	17.2	29.1	15.2	27	1.5	3.8	1	18	0.32	0.059	40	

ELEMENT	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga	Sample	Work
SAMPLES	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	gm	Order
97168	36	0.78	134	0.154	2	2.37	0.02	0.09	0.1	0.02	4.9	0.1	<.05	7		20036S
97632B	33.1	0.71	122	0.136	2	2.18	0.018	0.09	0.1	0.01	4.5	0.1	<.05	6		020041S
FA02022	39	0.88	179	0.149	2	2.16	0.017	0.09	0.2	0.03	5.8	0.1	<.05	7		20036S
FA02022B	37.7	0.87	174	0.144	3	2.09	0.018	0.09	0.2	0.04	6	0.1	<.05	7		20036S
FA02028A	27	0.53	66	0.096	1	1.22	0.018	0.16	0.1	0.02	4.2	0.1	<.05	5		20036S
FA02028B	28.3	0.54	65	0.099	2	1.23	0.017	0.15	0.2	0.03	4.3	0.1	<.05	4		20036S
RS02S41	39.2	0.89	156	0.165	2	2.71	0.017	0.1	0.2	0.02	5	0.1	<.05	7		20036S
RS02S41B	38.2	0.88	152	0.161	2	2.82	0.019	0.1	0.1	0.02	4.9	0.1	<.05	7		20036S
176280	39.1	0.6	297	0.065	1	2.39	0.021	0.05	0.2	0.03	5	0.1	<.05	7		020040S
176272	40	0.64	314	0.087	1	2.78	0.026	0.06	0.1	0.03	5.4	0.1	<.05	8		020040S
176270	49.3	0.7	472	0.155	1	2.43	0.019	0.06	0.1	0.02	8.6	0.1	<.05	7		020040S
176264	49.2	0.7	467	0.146	1	2.35	0.02	0.05	0.1	0.02	8.3	0.1	<.05	7		020040S
56474	12.6	4.39	59	0.01	4	0.41	0.009	0.05	0.1	0.01	1.5	0.2	<.05	1		020042S
56473	10.8	3.43	54	0.008	2	0.35	0.007	0.05	0.1	0.01	1.4	0.1	<.05	1		020042S
97164	40	0.71	141	0.132	2	2.17	0.017	0.1	0.1	0.34	4.5	0.1	<.05	8		20036S
97164B	38.7	0.67	131	0.129	2	2.11	0.016	0.1	0.2	0.34	4.3	0.1	<.05	7		20036S
97165	33.4	0.85	192	0.159	1	2.29	0.019	0.1	0.1	0.06	4.5	0.1	<.05	8		20036S
97605B	35.2	0.78	178	0.17	1	2.57	0.021	0.1	0.2	0.06	5	0.1	<.05	8		020040S
56379	11.5	0.82	372	0.26	1	1.41	0.046	0.81	<.1	0.01	4.4	0.3	<.05	7	15	020047S
56379B	11.6	0.83	373	0.266	2	1.42	0.039	0.83	0.1	0.01	4	0.3	<.05	7	15	020047S
56387	29	0.7	143	0.129	2	1.99	0.028	0.14	0.2	0.03	4.1	0.1	<.05	6	30	020047S
56387B	28.1	0.68	138	0.123	1	1.9	0.025	0.13	0.2	0.02	4	0.1	<.05	7	30	020047S
56390	9.7	0.27	115	0.014	1	1.14	0.006	0.15	1	0.03	2.1	0.1	<.05	5	30	020047S

ELEMENT SAMPLES	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppb	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm
56449B	202.2	192	2698.9	598	8	6.7	5.9	612	2.49	104	17.9	18	15.8	26	1.5	3.8	1	21	0.31	0.054	40
56397	2.5	20.6	17.9	105	0.1	11.6	9	450	2.35	5.5	9.8	2.8	10.9	44	0.4	0.1	0.6	55	0.54	0.164	24
56549B	2.4	23.2	18	104	0.1	11.8	8.6	460	2.7	3.2	9.3	3	10.3	47	0.4	0.2	0.6	55	0.62	0.179	23
56559	0.9	10.5	15.3	64	0.1	8.1	5.1	434	2.28	6.5	1.5	2.6	4.8	43	0.3	0.1	0.1	35	0.38	0.086	51
56559B	0.8	10.1	14.9	62	0.1	8.2	5.2	416	2.23	6.1	1.4	3.9	4.5	41	0.2	0.1	0.1	34	0.37	0.086	49
56575	1.3	22.7	6	97	0.1	10.3	9.8	505	2.99	9.3	1.6	1.2	4.9	25	0.1	0.1	0.1	56	0.41	0.141	19
56575B	1.2	23.4	5.8	94	0.1	10.3	10	528	3.06	9.2	1.7	1.9	4.8	26	0.2	0.1	0.1	55	0.41	0.137	19
97685	0.9	22.7	13.8	78	0.1	8.1	4.7	366	1.96	10.3	5.7	<.5	15.5	13	0.2	0.2	1.1	28	0.2	0.076	28
97685B	0.9	21.8	13.4	76	0.1	8.2	4.7	375	1.97	9.9	5.4	<.5	15.2	13	0.3	0.1	1.7	29	0.18	0.077	28
97688	0.8	20.9	12.5	87	0.1	6.8	4.6	454	2	10.4	6.7	<.5	15.6	11	0.2	0.1	1.4	26	0.14	0.073	25
97688B	0.9	21.1	12.2	86	0.1	6.3	4.8	470	2.08	10.5	6.9	<.5	15.9	12	0.2	0.1	1.6	27	0.14	0.073	25
97719	1.6	5.3	6.2	80	0.1	2.2	5	681	2.6	3.5	8.8	<.5	33.8	41	0.1	<.1	0.1	34	0.38	0.095	38
97719B	1.6	4.6	6.5	79	<.1	2.1	5	686	2.63	3.3	9.1	0.9	35	41	0.1	<.1	0.1	33	0.37	0.093	37
97728	0.4	25.1	8.9	64	0.2	40.8	17.5	602	3.01	3.7	0.7	1.9	9	111	0.2	0.1	0.1	78	2.53	0.092	18
97733B	0.4	25.7	9	66	0.2	42.6	18.3	627	3.12	3.4	0.7	3	9	113	0.2	0.1	0.1	80	2.57	0.091	18
56490	2	3.8	25.9	99	0.1	2.8	1.6	223	1.26	4.5	4.9	1	15.7	8	0.1	0.1	0.2	7	0.1	0.012	54
56491	2.1	3.5	26.8	108	0.1	2.8	1.5	231	1.32	3.9	5.8	<.5	16.6	9	0.1	0.1	0.2	5	0.1	0.011	60
56457	0.6	12.7	116.4	4721	0.4	14	5.2	1210	2.96	54.6	1.5	1	1.2	34	12.5	9.1	0.1	27	9.07	0.082	8
56458	0.6	14.8	121.5	5311	0.5	13.1	4.6	1328	3.12	65	1.6	1.9	1.4	37	13.6	9.8	0.1	29	10.48	0.1	7
140378	0.9	111.6	19.3	107	0.1	45.3	30.7	861	5.51	17.8	0.3	3.4	2.9	15	0.5	0.7	0.3	73	0.4	0.062	18
140379	1	116.6	18.2	101	0.1	45.1	30.3	865	5.49	18	0.3	1.8	3.1	16	0.8	0.7	0.2	75	0.46	0.062	19
140380	1	102.8	19.2	95	0.1	42	29.7	1006	5.12	18.6	0.4	2.6	2.9	15	0.5	0.8	0.3	64	0.29	0.064	19
140381	1	98.1	19	94	0.1	40	29.5	934	4.94	18.6	0.4	2.5	2.5	14	0.5	0.6	0.3	63	0.28	0.064	11
140383	1	100	20.4	95	0.1	40.5	29	980	5.16	19.6	0.4	3.3	3.2	17	0.6	0.8	0.3	64	0.31	0.067	19
140384	1	97.6	19.9	95	0.1	40.7	28.5	953	5.09	19.8	0.4	2.1	3.1	17	0.5	0.8	0.3	62	0.3	0.067	19

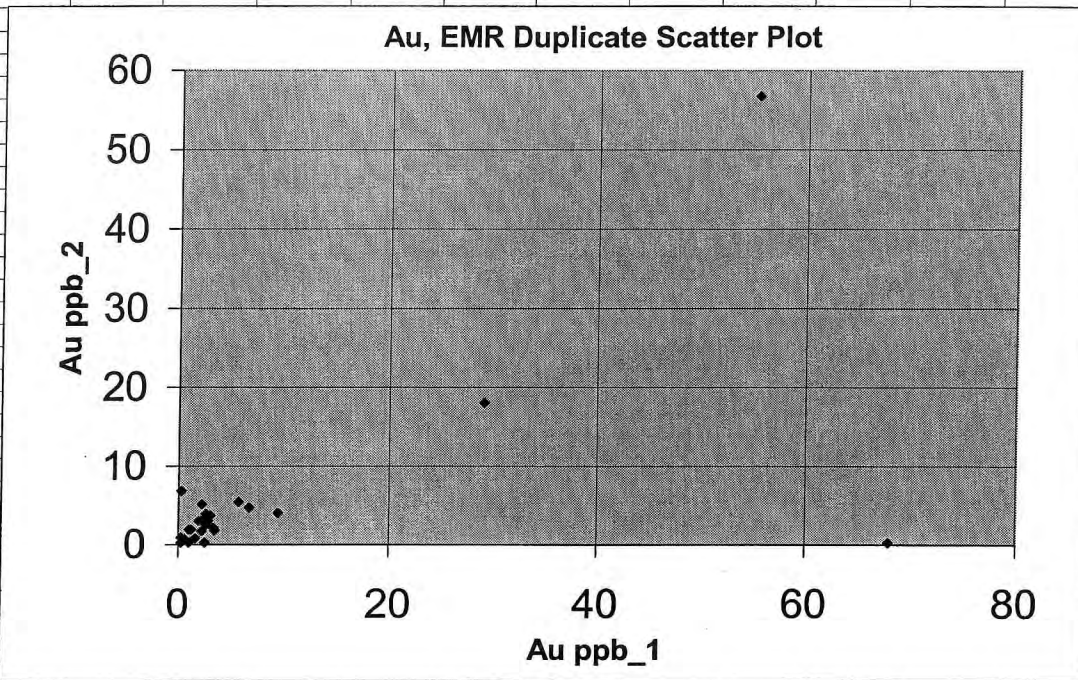
ELEMENT	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga	Sample	Work
SAMPLES	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	gm	Order
56449B	12.1	0.27	117	0.013	< 1	1.1	0.005	0.12	1.1	0.03	2.5	0.1	< .05	5		020051S
56397	29	0.7	139	0.115	< 1	1.24	0.018	0.16	0.4	0.02	3.2	0.2	< .05	5	30	020047S
56549B	32.6	0.77	157	0.12	1	1.41	0.018	0.17	0.3	0.01	3.7	0.2	< .05	6		020051S
56559	16.9	0.39	164	0.056	1	1.52	0.011	0.12	0.2	0.01	2.8	0.1	< .05	6	30	020047S
56559B	15.9	0.38	152	0.056	1	1.45	0.011	0.11	0.2	< .01	2.7	0.1	< .05	6	30	020047S
56575	23.3	0.9	251	0.263	1	2.2	0.019	0.51	0.1	0.01	4.1	0.4	< .05	9	30	020047S
56575B	23.7	0.87	258	0.254	1	2.24	0.017	0.51	0.1	0.02	3.8	0.3	< .05	9	30	020047S
97685	11	0.34	208	0.123	1	1.41	0.018	0.23	1.3	0.01	3.5	0.2	< .05	6	30	020047S
97685B	11.3	0.34	196	0.123	1	1.43	0.015	0.21	1.2	0.02	3.1	0.2	< .05	6	30	020047S
97688	9.1	0.34	303	0.14	1	1.62	0.012	0.3	1.3	< .01	3.3	0.3	< .05	6	30	020047S
97688B	8.6	0.34	319	0.144	1	1.67	0.013	0.3	1.3	0.02	3.5	0.3	< .05	7	30	020047S
97719	6.7	0.52	389	0.199	1	1.31	0.014	0.59	0.2	0.01	3.2	0.4	< .05	7	7.5	020047S
97719B	6.9	0.51	387	0.198	2	1.33	0.02	0.59	0.2	0.01	3.2	0.4	< .05	7	7.5	020047S
97728	80.7	2.32	888	0.219	1	4.62	0.153	0.7	0.3	< .01	8.3	0.5	< .05	14	30	020047S
97733B	84.3	2.35	919	0.224	2	4.65	0.153	0.72	0.3	< .01	8.4	0.5	< .05	14	30	020047S
56490	6.1	0.12	24	0.009	< 1	0.64	0.004	0.09	0.2	0.01	1	0.1	< .05	3	30	020047S
56491	5.7	0.11	26	0.007	< 1	0.68	0.004	0.1	0.1	0.02	1.1	0.1	< .05	3	30	020047S
56457	15.6	4.95	183	0.006	2	0.74	0.005	0.02	0.1	11.8	2.8	0.1	< .05	3		020051S
56458	15.1	5.73	205	0.005	3	0.77	0.006	0.03	0.1	12.56	3.2	0.2	0.1	4		020051S
140378	41.7	1.6	92	0.005	5	2.09	0.004	0.06	< .1	0.09	7.2	0.1	< .05	7		020051S
140379	42.4	1.66	99	0.004	5	2.18	0.004	0.07	< .1	0.07	7.3	0.1	0.16	8		020051S
140380	35.6	1.35	97	0.004	4	1.92	0.004	0.06	< .1	0.07	7.3	0.1	< .05	7		020051S
140381	35.8	1.3	86	0.003	2	1.78	0.003	0.04	< .1	0.06	6.8	0.1	0.07	6		020051S
140383	36.4	1.29	97	0.005	3	1.9	0.004	0.07	< .1	0.43	7.4	0.1	< .05	6		020051S
140384	34.5	1.3	100	0.005	4	1.84	0.004	0.06	< .1	0.07	7.1	0.1	0.16	6		020051S

ELEMENT SAMPLES	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppb	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm
140387	3.7	4	2883.4	32657	0.3	1.7	1.1	3196	20.63	9.1	0.9	<.5	0.5	41	58.5	0.1	<.1	1	9	0.047	4
140388	3.7	4.1	3090.5	30188	0.3	2.1	1.1	3091	20.24	9.4	1	<.5	0.6	43	62.6	0.1	<.1	1	9.77	0.055	4
176252	3.8	8.3	23.9	112	0.2	5.2	5	503	1.94	2.1	6.5	2.5	8.7	62	0.5	0.1	0.4	22	0.29	0.057	15
176253	3.6	13.9	24.2	116	0.2	5.7	5.2	519	2.01	2.1	6.8	<.5	9.4	65	0.6	0.1	0.5	22	0.31	0.063	17
176389	0.2	17.4	5.4	49	<.1	18.5	8.4	288	2.16	1.7	1.2	<.5	7.7	25	0.1	<.1	0.1	46	0.42	0.058	21
176390	0.2	19.3	5	52	0.1	19.9	9.3	309	2.33	1.9	1.4	<.5	7.8	26	0.1	<.1	0.1	49	0.41	0.062	21
176444	1.2	40.8	12.9	227	0.1	15.5	5.8	450	1.73	4.5	6.7	3	15.5	46	1.5	0.1	0.5	42	0.45	0.067	22
176445	1	40.9	13.2	230	0.2	15.3	5.9	462	1.79	4.6	7.4	3.7	15.3	48	1.4	0.1	0.5	43	0.47	0.066	22
176606	2.1	80.1	157	300	2	0.8	3.9	886	1.74	22.8	8.1	0.6	13.2	83	2.5	0.3	1.4	11	0.41	0.044	23
176607	2	80.9	154.9	302	1.9	1.1	3.9	886	1.75	22.5	8.1	0.7	12.9	80	2.5	0.3	1.3	11	0.38	0.042	22

ELEMENT SAMPLES	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Hg ppm	Sc ppm	Tl ppm	S %	Ga ppm	Sample gm	Work Order
140387	1.4	4.93	12	0.001	1	0.05	0.005	0.01	<.1	1.4	1.1	86	0.59	2		020051S
140388	1.6	5.36	13	0.001	1	0.06	0.005	0.02	0.1	1.38	1.1	82.7	0.64	2		020051S
176252	9.4	0.39	404	0.104	3	1.38	0.017	0.24	0.3	0.01	2.6	0.2	<.05	6	1	020047S
176253	9.4	0.4	404	0.105	3	1.43	0.018	0.25	0.3	0.03	2.8	0.2	<.05	7	1	020047S
176389	36.5	0.77	120	0.145	< 1	1.65	0.026	0.33	0.3	0.01	4.6	0.2	<.05	6	15	020047S
176390	39.6	0.81	126	0.149	1	1.73	0.03	0.36	0.2	0.01	4.8	0.2	<.05	7	30	020047S
176444	18.6	0.43	107	0.051	1	1.33	0.017	0.17	0.3	0.02	3.2	0.2	<.05	6	30	020047S
176445	18.4	0.44	108	0.052	1	1.41	0.014	0.17	0.4	0.01	3.1	0.2	<.05	6	30	020047S
176606	2.2	0.24	328	0.059	1	1.01	0.012	0.22	0.4	0.02	2.3	0.1	<.05	4	15	020047S
176607	2.3	0.23	311	0.058	< 1	1	0.011	0.21	0.3	<.01	2.3	0.1	<.05	4	15	020047S

Mineral Assessments 2002 Fieldwork
Stream sediment and Soil samples; Duplicate pairs (1 site, 2 samples), n=29 pairs.

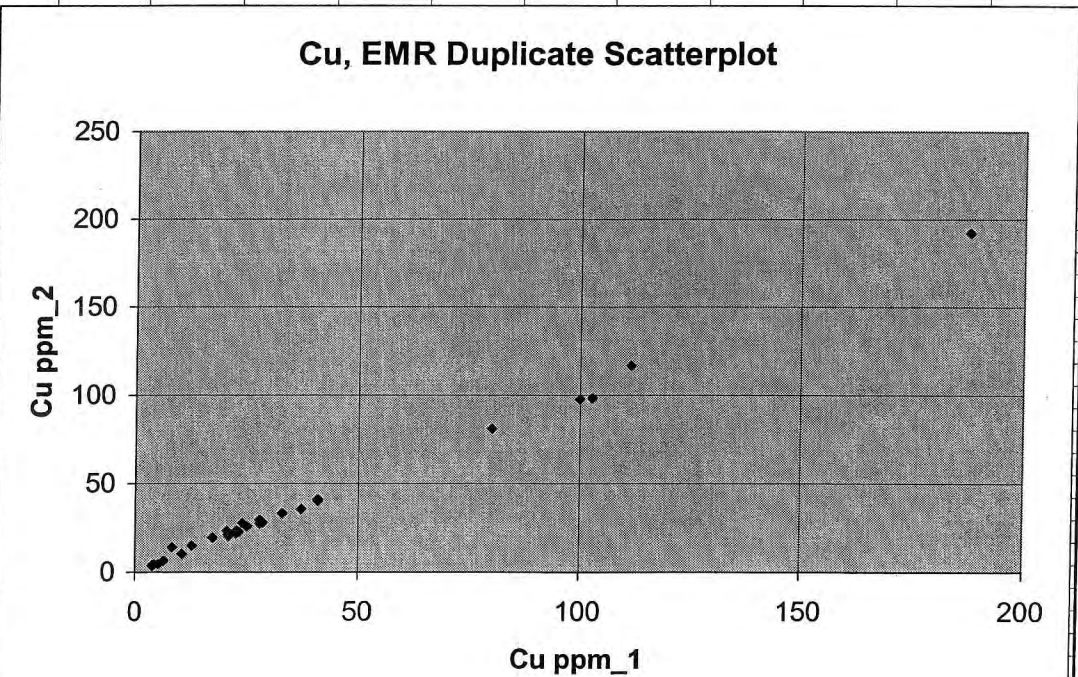
Au_1	Au_2	MPD*
0.25	6.8	186
0.25	0.25	0
0.25	0.25	0
0.25	0.25	0
0.25	0.9	113
0.25	0.25	0
0.25	0.25	0
0.6	0.7	15
1	0.25	120
1	1.9	62
1.2	1.9	45
1.6	0.8	67
1.9	3	45
2.2	5.1	79
2.2	1.7	26
2.3	3.2	33
2.5	0.25	164
2.6	3.9	40
2.6	2.5	4
2.8	3	7
3	3.7	21
3.3	2.1	44
3.4	1.8	62
5.7	5.4	5
6.7	4.7	35
9.4	4	81
29.1	18	47
55.3	56.7	3
68	0.25	199



*Mean Percentage Difference MPD=assay 1-assay2/((assay 1+assay2)/2)*100

Mineral Assessments 2002 Fieldwork
Stream sediment and Soil samples; Duplicate pairs (1 site, 2 samples), n=29 pairs.

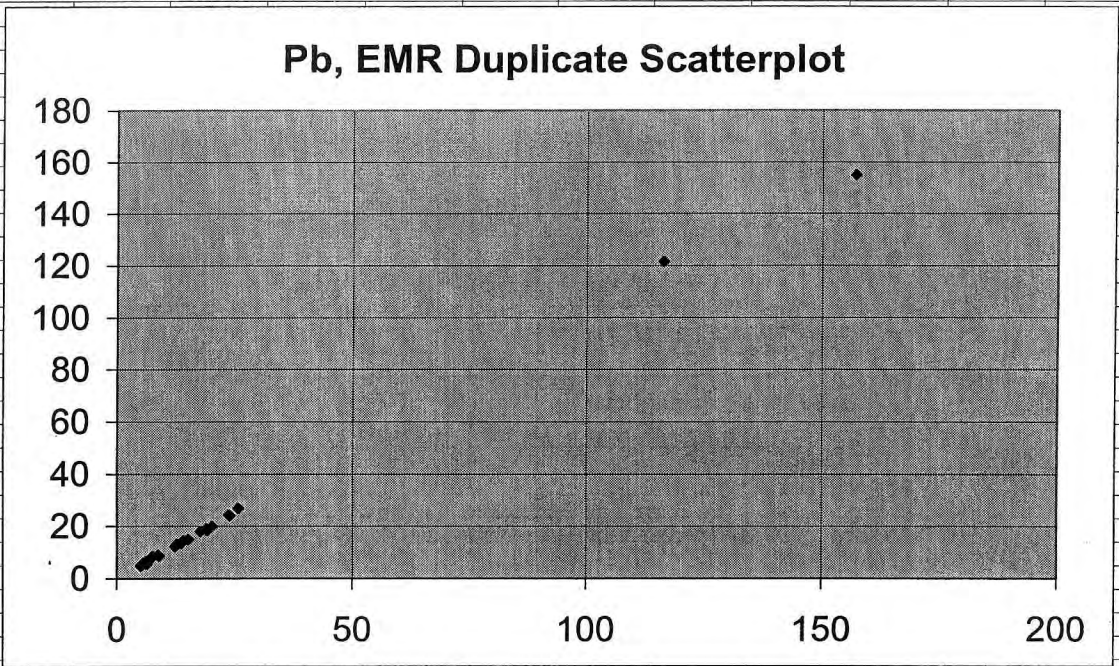
Cu_1	Cu_2	MPD*
3.8	3.5	8
4	4.1	2
4.3	4.3	0
5.3	4.6	14
6.4	6.3	2
8.3	13.9	50
10.5	10.1	4
12.7	14.8	15
17.4	19.3	10
20.6	23.2	12
20.9	21.1	1
21	20.2	4
22.7	23.4	3
22.7	21.8	4
23.3	22.6	3
24.1	27.6	14
25.1	25.7	2
27.9	29.4	5
28	27.3	3
28.5	27.8	2
32.9	33.1	1
37.1	35.4	5
40.8	40	2
40.8	40.9	0
80.1	80.9	1
100	97.6	2
102.8	98.1	5
111.6	116.6	4
187.8	192	2



*Mean Percentage Difference MPD=assay 1-assay2/((assay 1+assay2)/2)*100

Mineral Assessments 2002 Fieldwork
 Stream sediment and Soil samples; Duplicate pairs (1 site, 2 samples), n=29 pairs.

Pb_1	Pb_2	MPD*
5.1	4.8	6
5.4	5	8
5.7	5.9	3
6	5.8	3
6.1	5.8	5
6.2	6.5	5
6.5	5.6	15
6.6	6.3	5
7.3	7.5	3
7.3	7.7	5
7.7	8.6	11
8.9	9	1
9.1	8.7	4
12.5	12.2	2
12.9	13.2	2
13.8	13.4	3
14.3	14.5	1
15.3	14.9	3
17.9	18	1
19.2	19	1
19.3	18.2	6
20.4	19.9	2
23.9	24.2	1
24.1	24	0
25.9	26.8	3
116.4	121.5	4
157	154.9	1
2639.6	2698.9	2
2883.4	3090.5	7

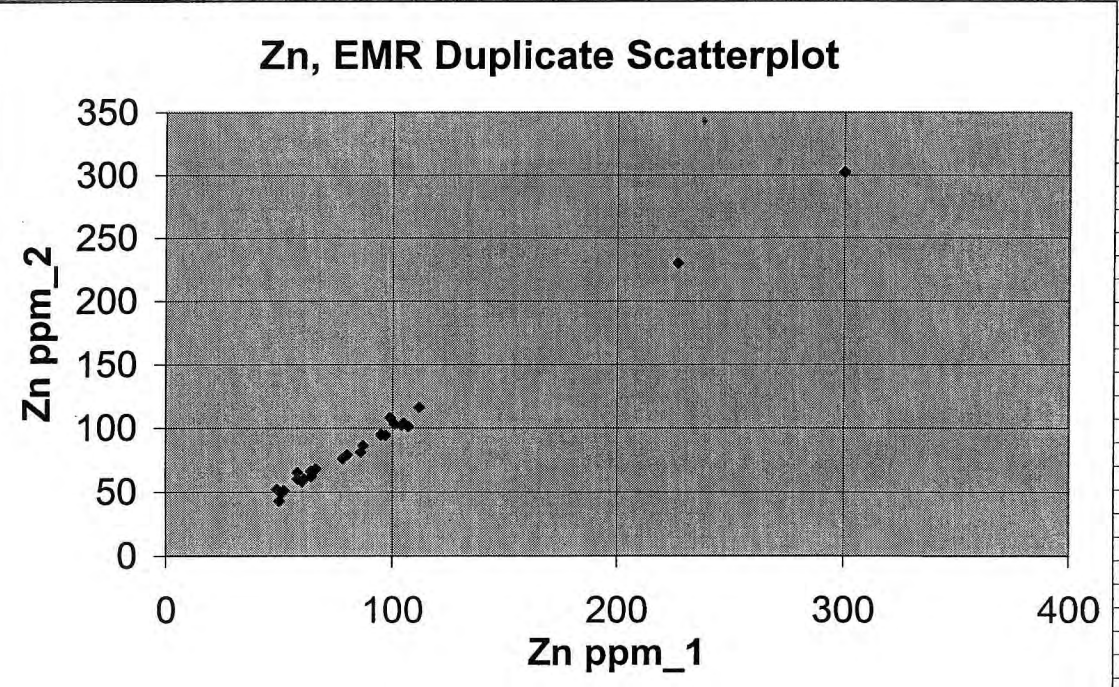


Note: Pb values >200 not plotted.

*Mean Percentage Difference MPD=assay1-assay2/((assay1+assay2)/2)*100

Mineral Assessments 2002 Fieldwork
 Stream sediment and Soil samples; Duplicate pairs (1 site, 2 samples), n=29 pairs.

Zn_1	Zn_2	MPD*
49	52	6
50	43	15
51	49	4
52	51	2
58	60	3
58	65	11
60	58	3
61	60	2
64	62	3
64	66	3
66	68	3
78	76	3
80	79	1
86	81	6
87	86	1
95	94	1
95	95	0
97	94	3
99	108	9
101	103	2
104	102	2
105	104	1
107	101	6
112	116	4
227	230	1
300	302	1
594	598	1
4721	5311	12
32657	30188	8

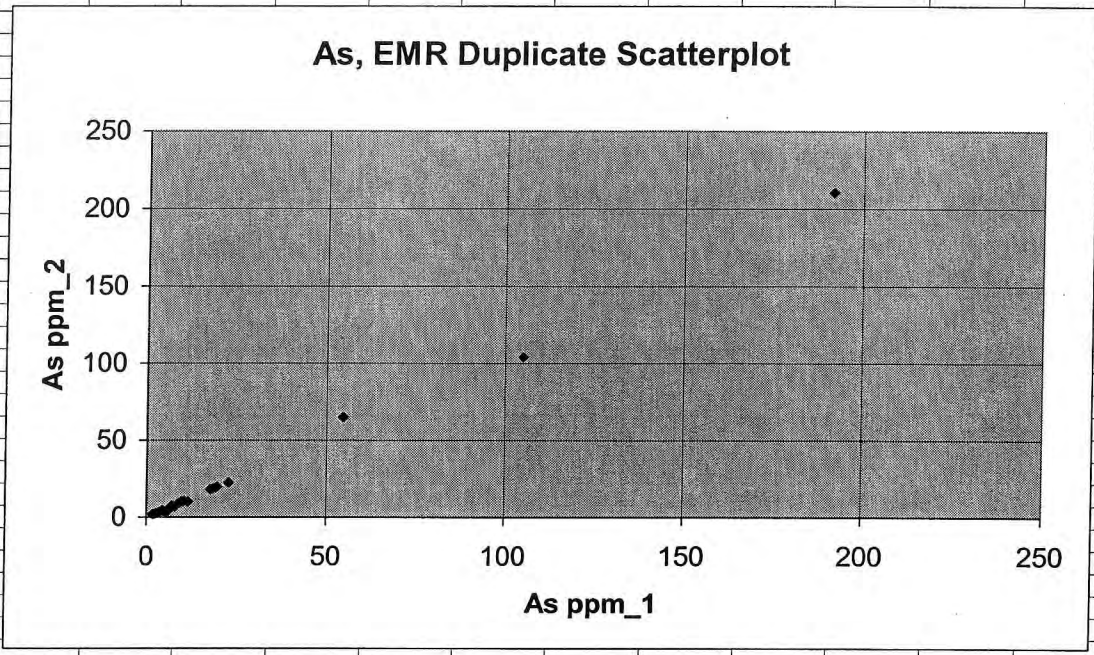


Note: Zn values >400 not plotted.

*Mean Percentage Difference MPD=assay1-assay2/((assay1+assay2)/2)*100

Mineral Assessments 2002 Fieldwork
 Stream sediment and Soil samples; Duplicate pairs (1 site, 2 samples), n=29 pairs.

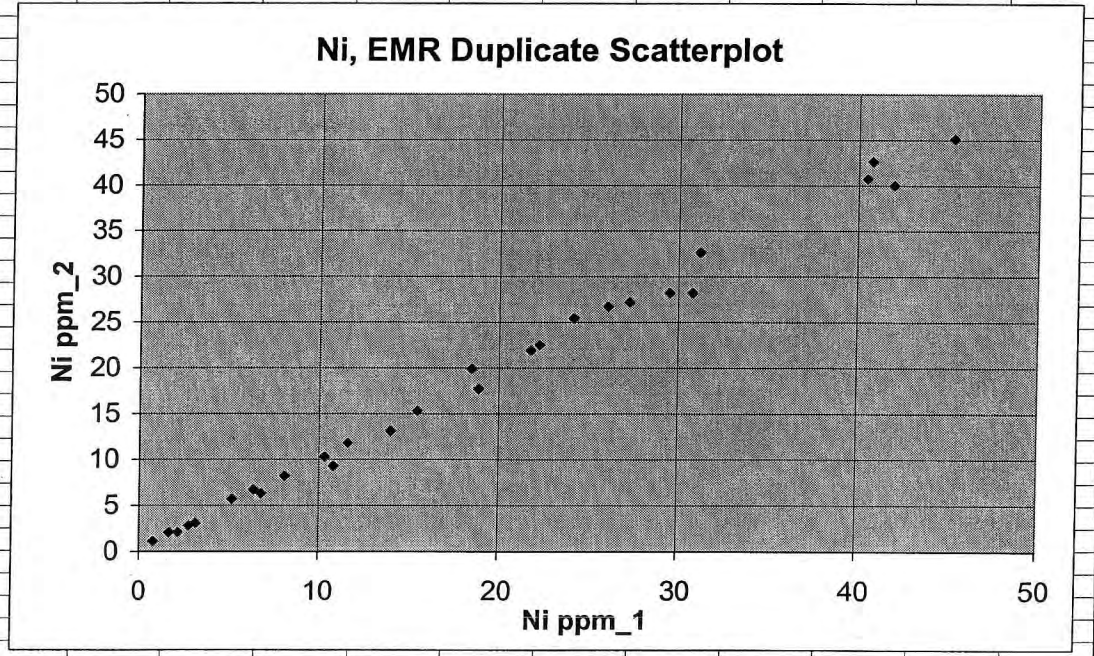
As_1	As_2	MPD*
1.7	1.9	11
2.1	2.1	0
2.7	2.4	12
3.5	3.3	6
3.6	3.1	15
3.7	3.4	8
4.5	3.9	14
4.5	4.6	2
5.5	3.2	53
6.5	6.1	6
6.7	6.3	6
7	6.5	7
7.1	7.6	7
7.4	7.3	1
7.9	6.8	15
9.1	9.4	3
9.3	9.2	1
9.8	10.1	3
10.3	9.9	4
10.4	10.5	1
11.5	10	14
17.8	18	1
18.6	18.6	0
19.1	19	1
19.6	19.8	1
22.8	22.5	1
54.6	65	17
105.1	104	1
191.8	210.3	9



*Mean Percentage Difference MPD=assay 1-assay2/((assay 1+assay2)/2)*100

Mineral Assessments 2002 Fieldwork
 Stream sediment and Soil samples; Duplicate pairs (1 site, 2 samples), n=29 pairs.

Ni_1	Ni_2	MPD*
0.8	1.1	32
1.7	2.1	21
2.2	2.1	5
2.8	2.8	0
3.2	3.1	3
5.2	5.7	9
6.4	6.7	5
6.8	6.3	8
8.1	8.2	1
8.1	8.2	1
10.3	10.3	0
10.8	9.3	15
11.6	11.8	2
14	13.1	7
15.5	15.3	1
18.5	19.9	7
18.9	17.7	7
21.8	21.9	0
22.3	22.5	1
24.2	25.4	5
26.1	26.7	2
27.3	27.2	0
29.5	28.2	5
30.8	28.2	9
31.2	32.6	4
40.5	40.7	0
40.8	42.6	4
42	40	5
45.3	45.1	0

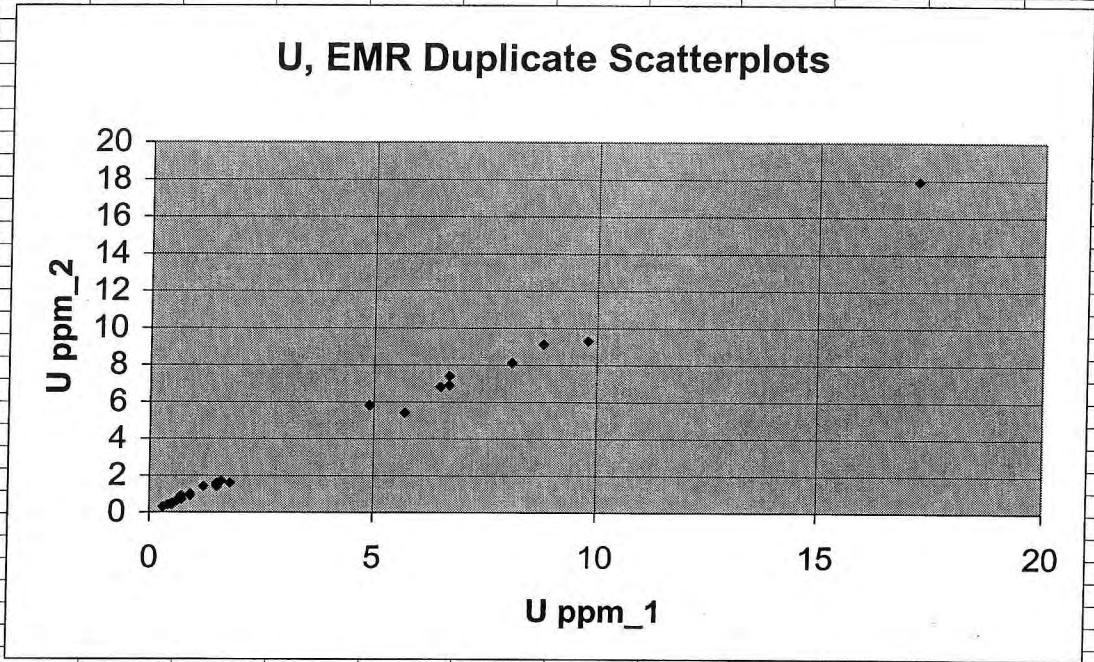


*Mean Percentage Difference MPD=assay 1-assay2/((assay 1+assay2)/2)*100

Mineral Assessments 2002 Fieldwork

Stream sediment and Soil samples; Duplicate pairs (1 site, 2 samples), n=29 pairs.

U_1	U_2	MPD*
0.3	0.3	0
0.4	0.4	0
0.4	0.4	0
0.5	0.5	0
0.5	0.4	22
0.6	0.6	0
0.6	0.6	0
0.6	0.6	0
0.7	0.9	25
0.7	0.7	0
0.9	1	11
0.9	0.9	0
0.9	1	11
1.2	1.4	15
1.5	1.5	0
1.5	1.4	7
1.5	1.6	6
1.6	1.7	6
1.8	1.6	12
4.9	5.8	17
5.7	5.4	5
6.5	6.8	5
6.7	6.9	3
6.7	7.4	10
8.1	8.1	0
8.8	9.1	3
9.8	9.3	5
17.2	17.9	4



*Mean Percentage Difference $MPD = \frac{assay1 - assay2}{((assay1 + assay2)/2)} * 100$

Mineral Assessments - 2002 Fieldwork																						
Soil and Stream Sediment Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																						
Acme Analytical Lab (in house) Duplicate Check Samples																						
ELEMENT	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr
SAMPLES	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm
176270A	0.6	24.8	6.5	49	0.1	36.6	8.9	421	1.98	6.5	1	2.2	3.6	62	0.2	0.7	0.1	44	2.14	0.08	11	39.5
RE 176270A	0.7	24.1	6.3	48	0.1	37.3	9	419	2.02	6.7	1	2.5	3.6	64	0.2	0.6	0.2	44	2.16	0.07	11	37.9
176359A	0.8	25.2	7.3	49	0.1	41.2	9.8	441	2.05	9.5	1.2	3.3	3.9	68	0.3	0.7	0.1	46	2.34	0.08	12	45.4
RE 176359A	0.7	27.3	7.3	54	0.1	40.4	10.3	411	2.13	9.9	1.3	5.1	3.9	71	0.1	0.8	0.1	47	2.5	0.08	12	44.9
176457	0.5	18.2	4	54	<.1	19.9	9.8	322	2.52	4.3	0.6	6.4	1.8	42	0.1	0.4	0.1	79	0.77	0.07	8	29.5
RE 176457	0.5	18.1	3.8	56	<.1	19.6	9.8	314	2.48	4.1	0.5	2.3	1.7	39	0.1	0.3	0.1	75	0.7	0.07	8	28.2
176515A	0.6	26.5	7.5	49	0.1	37	9.7	443	2.04	9	1	3.6	3.8	70	0.2	0.6	0.1	44	2.18	0.08	11	40.9
RE 176515A	0.7	27.8	7.4	53	0.1	39.5	10	472	2.19	8.8	1.1	3.7	4.1	76	0.2	0.7	0.1	46	2.15	0.08	12	43.9
176531	0.4	23.6	3.6	53	0.1	28.6	10.4	314	2.2	7.2	0.5	1.7	2	38	0.1	0.3	0.1	61	0.77	0.1	10	37.1
RE 176531	0.4	22.4	3.5	54	0.1	28.1	10.3	290	2.15	7.3	0.5	5	1.9	38	0.1	0.3	0.1	59	0.73	0.1	10	35.1
97171	0.7	42	6.1	84	<.1	35.5	13.5	481	3.83	8.5	0.8	7.4	4.9	39	0.1	0.4	1	90	0.47	0.03	17	54.7
RE 97171	0.7	39.9	5.5	85	<.1	35.1	13.9	478	3.76	8.3	0.8	6.5	5	39	0.1	0.3	0.9	88	0.47	0.03	18	54.1
RS02S14A	0.8	24.1	6.7	47	0.1	35.8	9.2	413	1.95	8.4	1	4.7	3.7	66	0.2	0.6	0.1	43	2.03	0.07	11	38.8
RE RS02S14A	0.7	24.2	6.5	47	0.1	35.5	9.5	429	2	8.5	1.1	3.5	3.6	65	0.2	0.6	0.1	44	1.99	0.08	11	38.7
140353	11.9	11.3	7.3	22	0.3	10.8	0.8	11	0.39	3.6	2	0.6	1	117	0.3	1.9	0.1	28	0.24	0.01	2	2.7
RE 140353	11.7	11.3	7.3	21	0.3	10.7	0.7	11	0.38	3.3	1.9	0.8	0.9	117	0.3	1.9	0.2	28	0.24	0.01	2	2.6
176405	1.9	2.6	19.4	180	0.1	4.8	12.1	1228	6.03	4.7	4.2	<.5	15	126	0.2	<.1	0.3	39	2.21	0.26	49	6.9
RE 176405	1.7	2.3	19.2	176	0.1	4	11.4	1169	5.86	4.2	4.1	<.5	14.5	119	0.3	<.1	0.3	36	2.13	0.25	46	6.4
176453	1.5	19.8	29.3	98	0.2	12.7	8.2	601	2.37	6.6	8.8	1.7	13.4	25	0.4	0.2	0.2	37	0.25	0.08	19	18
RE 176453	1.4	20.5	27.8	91	0.2	11.7	7.6	555	2.2	5.9	8.3	1.5	12.3	24	0.5	0.2	0.2	35	0.22	0.08	18	16.7
56365	0.4	17.7	4.8	36	<.1	7	4.7	312	1.3	2.3	1.8	<.5	8.5	24	0.1	0.1	0.2	25	0.32	0.06	13	12.5
RE 56365	0.3	16.7	4.5	32	<.1	6.6	4.7	288	1.26	2.2	1.7	<.5	8.2	23	0.2	0.1	0.2	24	0.29	0.06	13	11.4

ELEMENT SAMPLES	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Hg ppm	Sc ppm	Tl ppm	S %	Ga ppm	Sample gm	Work Order
176270A	0.85	150	0.09	2	1.15	0.03	0.11	0.2	0.02	3.6	0.1	0.11	4		020040S
RE 176270A	0.86	158	0.09	1	1.17	0.03	0.1	0.2	0.02	3.6	0.1	0.09	4		020040S
176359A	0.96	156	0.1	2	1.1	0.03	0.12	0.2	0.02	4.2	0.1	0.07	4		020042S
RE 176359A	0.97	170	0.1	2	1.12	0.03	0.13	0.2	0.01	4.3	0.2	0.06	4		020042S
176457	0.67	107	0.13	1	1.49	0.04	0.06	0.4	0.04	4.4	<.1	<.05	5		20036S
RE 176457	0.68	105	0.12	2	1.45	0.04	0.05	0.4	0.02	3.8	<.1	<.05	5		20036S
176515A	0.93	151	0.08	1	1	0.02	0.1	0.2	0.01	3.5	0.1	0.11	4		020042S
RE 176515A	0.95	164	0.09	2	1.12	0.03	0.11	0.2	0.01	3.6	0.1	0.06	4		020042S
176531	0.7	101	0.13	1	1.39	0.04	0.07	0.1	0.02	3.9	<.1	<.05	5		020040S
RE 176531	0.7	101	0.12	1	1.39	0.04	0.07	0.1	0.02	3.7	<.1	<.05	5		020040S
97171	1.01	168	0.19	2	2.74	0.02	0.23	0.2	0.02	7.3	0.2	<.05	8		20036S
RE 97171	1.01	168	0.19	1	2.64	0.02	0.23	0.1	0.02	7.6	0.2	<.05	8		20036S
RS02S14A	0.89	142	0.08	2	1.04	0.02	0.12	0.2	<.01	3.5	0.1	0.07	4		20036S
RE RS02S14A	0.89	143	0.08	1	1.04	0.02	0.11	0.2	0.01	3.5	0.1	0.06	4		20036S
140353	0.02	1771	0	3	0.1	0	0.06	0.1	0.14	0.7	1	0.08	<1		020051S
RE 140353	0.02	1737	0	2	0.1	0	0.06	0.1	0.13	0.8	1	0.13	<1		020051S
176405	1.14	115	0.05	<1	0.54	0.01	0.24	<.1	<.01	5.8	0.1	<.05	4	30	020047S
RE 176405	1.1	109	0.04	<1	0.5	0.01	0.21	<.1	0.01	5.6	0.1	<.05	3	30	020047S
176453	0.51	246	0.12	1	1.55	0.02	0.22	0.3	0.02	4.1	0.2	<.05	6	30	020047S
RE 176453	0.47	235	0.12	1	1.39	0.01	0.21	0.3	0.01	3.8	0.2	<.05	6	30	020047S
56365	0.36	105	0.08	1	0.79	0.01	0.15	0.5	0.01	1.9	0.1	<.05	3	30	020047S
RE 56365	0.33	96	0.07	<1	0.76	0.01	0.14	0.5	<.01	1.8	0.1	<.05	3	30	020047S

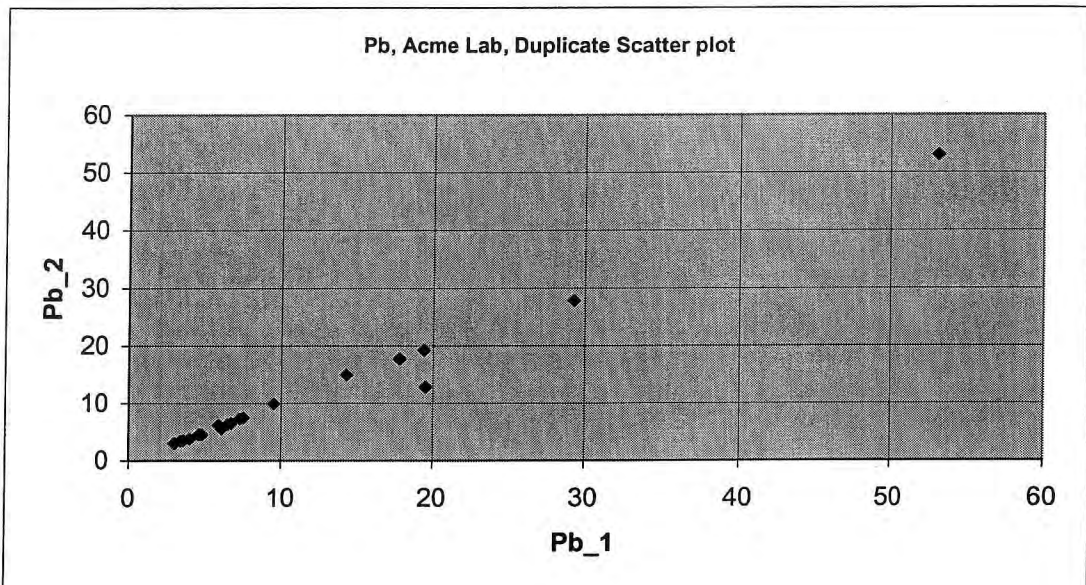
ELEMENT SAMPLES	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppb	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm
56399	6.3	16.1	17.8	73	0.1	10.7	6	290	1.97	7.3	7.3	< .5	16.3	14	0.2	0.2	0.3	38	0.16	0.07	22	22.2
RE 56399	6.8	16.2	17.7	70	0.1	10.6	5.8	287	1.95	7.5	7.4	< .5	15.4	14	0.2	0.2	0.3	39	0.16	0.07	22	22.2
56428A	0.7	25.6	19.5	74	0.1	39.3	10.2	424	2.16	8.8	1.1	3.2	4.2	67	0.2	0.7	0.1	48	2.2	0.07	12	39.9
RE 56428A	0.7	24.8	12.8	62	0.1	37.3	9.4	405	2.06	8.1	1	2.2	3.9	64	0.2	0.5	0.1	45	2.08	0.06	11	39.5
56514	0.2	15.6	3	31	< .1	10.6	7.9	198	1.82	2.1	0.8	0.5	4.3	58	0.1	0.1	< .1	68	0.49	0.13	12	30
RE 56514	0.2	15.8	3	31	< .1	9.8	8.1	187	1.74	1.9	0.8	< .5	4.3	59	0.1	0.1	< .1	67	0.47	0.12	12	28.4
56543	36.2	56.9	9.5	885	0.6	141	8.6	152	1.98	25.7	3.3	1.5	2.1	179	15.2	15.9	0.1	229	3.94	0.09	7	15.1
RE 56543	36.3	56.4	9.9	906	0.6	141	8.8	153	2	25.3	3.5	1.3	2.2	186	15	16.8	0.1	227	4.06	0.09	7	14.8
56576	0.4	8.7	3.4	72	0.1	4.7	6.5	394	2.2	9.3	1.6	1.5	6.6	26	0.1	0.1	0.1	36	0.54	0.19	25	12.4
RE 56576	0.4	9.5	3.4	74	0.1	4.7	6.5	398	2.26	9.5	1.6	2.1	6.7	27	0.1	0.1	< .1	37	0.55	0.19	25	12.3
97234B	0.5	21.8	5.9	55	< .1	23	11.9	468	3.25	5.3	0.6	1.6	3	31	0.1	0.3	0.1	82	0.39	0.04	8	30.7
RE 97234B	0.5	21.4	6.2	58	< .1	22.4	11.5	459	3.24	5.6	0.6	2	3.3	33	0.1	0.3	0.1	85	0.41	0.04	9	27.5
97644	1.4	20.9	53.2	125	0.3	15	9.1	446	2.5	10.3	5.6	1.6	9.8	32	0.5	0.3	0.6	44	0.29	0.09	36	23.7
RE 97644	1.2	20.7	53	124	0.3	13.9	8.7	439	2.4	9.9	5.7	1.2	9.8	32	0.5	0.3	0.5	45	0.28	0.09	35	22.8
97700	0.3	7.5	4.6	48	< .1	6.4	4	291	1.53	3.4	2.3	2	7.2	21	0.1	0.1	0.1	29	0.33	0.1	23	11.1
RE 97700	0.4	7.5	4.5	49	< .1	6.3	4.2	298	1.54	3.4	2.3	< .5	7.3	21	0.2	0.1	0.1	31	0.34	0.1	24	11.5
97750	0.1	13.8	14.3	64	0.1	6.1	7.6	291	1.56	1.5	1.2	< .5	4	36	0.2	< .1	0.2	42	0.41	0.13	11	15.2
RE 97750	0.1	12.3	14.9	61	0.1	5.7	7.8	280	1.55	1.4	1.2	< .5	4	35	0.1	< .1	0.2	41	0.41	0.13	11	15.4

ELEMENT	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga	Sample	Work
SAMPLES	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	gm	Order
56399	0.4	92	0.09	1	1.45	0.01	0.12	0.5	0.02	3.3	0.2	<.05	6	30	020047S
RE 56399	0.41	92	0.09	< 1	1.46	0.01	0.12	0.5	0.02	3.3	0.2	<.05	6	30	020047S
56428A	1	150	0.08	3	1.14	0.03	0.1	0.2	0.03	4	0.1	0.08	4		020051S
RE 56428A	0.93	142	0.08	2	1.06	0.02	0.1	0.2	0.06	3.7	0.1	0.07	4		020051S
56514	0.48	100	0.07	< 1	1.1	0.04	0.07	0.1	0.01	1.4	<.1	<.05	3	30	020047S
RE 56514	0.46	96	0.08	1	1.08	0.04	0.07	0.1	0.01	1.4	0.1	<.05	3	30	020047S
56543	0.18	1082	0	6	0.36	0	0.1	0.2	0.11	4.4	1.3	0.13	1		020051S
RE 56543	0.19	1060	0	6	0.36	0	0.09	0.1	0.13	4.4	1.3	0.1	1		020051S
56576	0.68	227	0.22	1	1.33	0.02	0.5	0.1	<.01	3.1	0.3	<.05	6	30	020047S
RE 56576	0.69	230	0.23	< 1	1.37	0.02	0.49	0.1	<.01	3.3	0.3	<.05	7	30	020047S
97234B	0.77	210	0.11	1	2.07	0.02	0.1	0.1	0.02	4.3	0.1	<.05	7		020051S
RE 97234B	0.78	227	0.12	1	2.2	0.01	0.11	0.1	0.03	4.6	0.1	<.05	6		020051S
97644	0.57	155	0.1	1	1.86	0.02	0.13	0.2	0.02	3.9	0.2	<.05	7	30	020047S
RE 97644	0.55	151	0.1	1	1.76	0.02	0.13	0.2	0.02	3.7	0.2	<.05	7	30	020047S
97700	0.32	121	0.11	< 1	1.12	0.02	0.17	0.2	0.01	2.8	0.2	<.05	4	30	020047S
RE 97700	0.34	125	0.11	1	1.13	0.02	0.17	0.2	<.01	2.7	0.2	<.05	5	30	020047S
97750	0.6	126	0.1	< 1	1.62	0.02	0.11	0.1	<.01	2.3	0.1	<.05	5	30	020047S
RE 97750	0.6	127	0.1	1	1.53	0.01	0.1	0.1	<.01	2.2	0.1	<.05	5	30	020047S

Mineral Assessments 2002 Fieldwork

Stream sediment and Soil samples; Acme Lab Duplicate pairs (1 sample, 2 splits), n=22 pairs.

Pb_1	Pb_2	MPD*
6.5	6.3	3
7.3	7.3	0
4	3.8	5
7.5	7.4	1
3.6	3.5	3
6.1	5.5	10
6.7	6.5	3
7.3	7.3	0
19.4	19.2	1
29.3	27.8	5
4.8	4.5	6
17.8	17.7	1
19.5	12.8	41
3	3	0
9.5	9.9	4
3.4	3.4	0
5.9	6.2	5
53.2	53	0
4.6	4.5	2
14.3	14.9	4

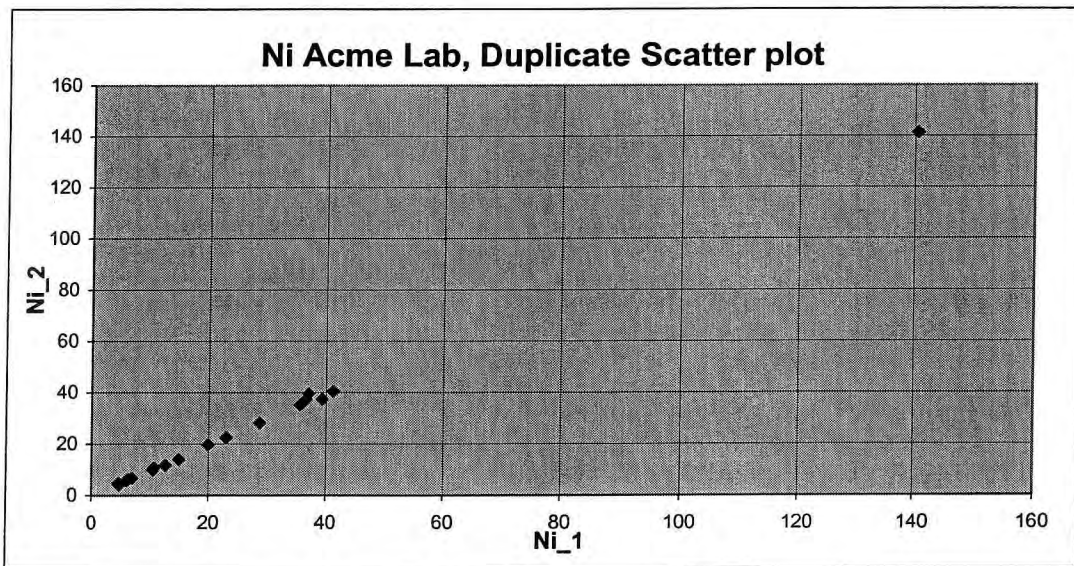


*Mean Percentage Difference $MPD = \frac{assay1 - assay2}{(assay1 + assay2)/2} * 100$

Mineral Assessments 2002 Fieldwork

Stream sediment and Soil samples; Acme Lab Duplicate pairs (1 sample, 2 splits), n=22 pairs.

Ni_1	Ni_2	MPD*
36.6	37.3	2
41.2	40.4	2
19.9	19.6	2
37	39.5	7
28.6	28.1	2
35.5	35.1	1
35.8	35.5	1
10.8	10.7	1
4.8	4	18
12.7	11.7	8
7	6.6	6
10.7	10.6	1
39.3	37.3	5
10.6	9.8	8
140.5	141.3	1
4.7	4.7	0
23	22.4	3
15	13.9	8
6.4	6.3	2
6.1	5.7	7

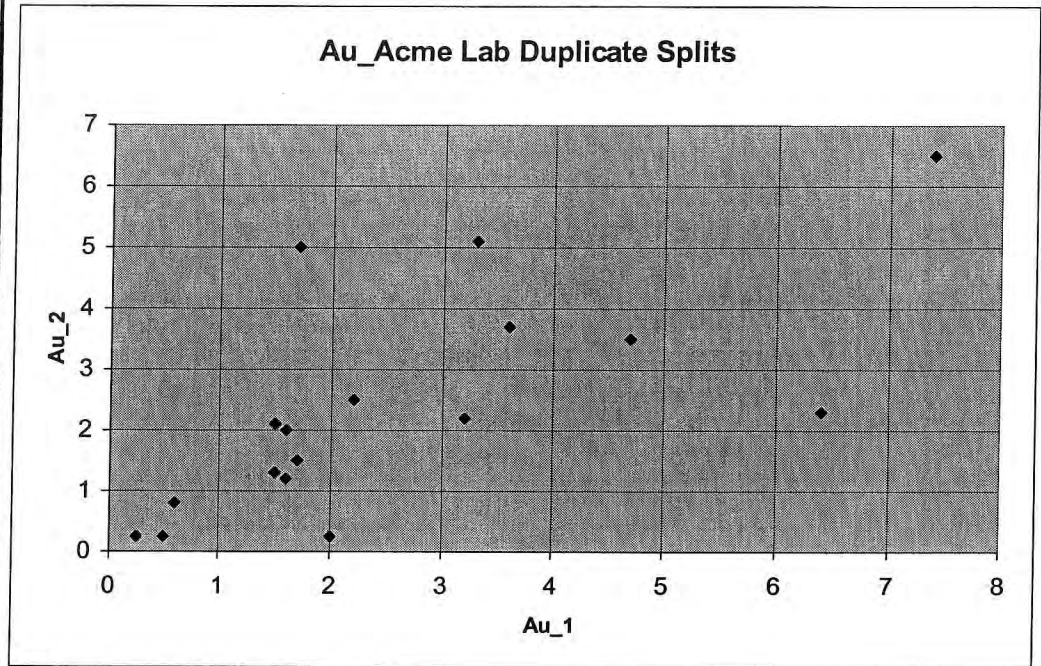


*Mean Percentage Difference $MPD = \frac{assay1 - assay2}{(assay1 + assay2)/2} * 100$

Mineral Assessments 2002 Fieldwork

Stream sediment and Soil samples; Acme Lab Duplicate pairs (1 sample, 2 splits), n=22 pairs.

Au_1	Au_2	MPD*
0.5	0.25	67
0.6	0.8	29
1.5	1.3	14
1.5	2.1	33
1.6	2	22
1.6	1.2	29
1.7	5	99
1.7	1.5	13
2	0.25	156
2.2	2.5	13
3.2	2.2	37
3.3	5.1	43
3.6	3.7	3
4.7	3.5	29
6.4	2.3	94
7.4	6.5	13
0.25	0.25	0
0.25	0.25	0
0.25	0.25	0
0.25	0.25	0

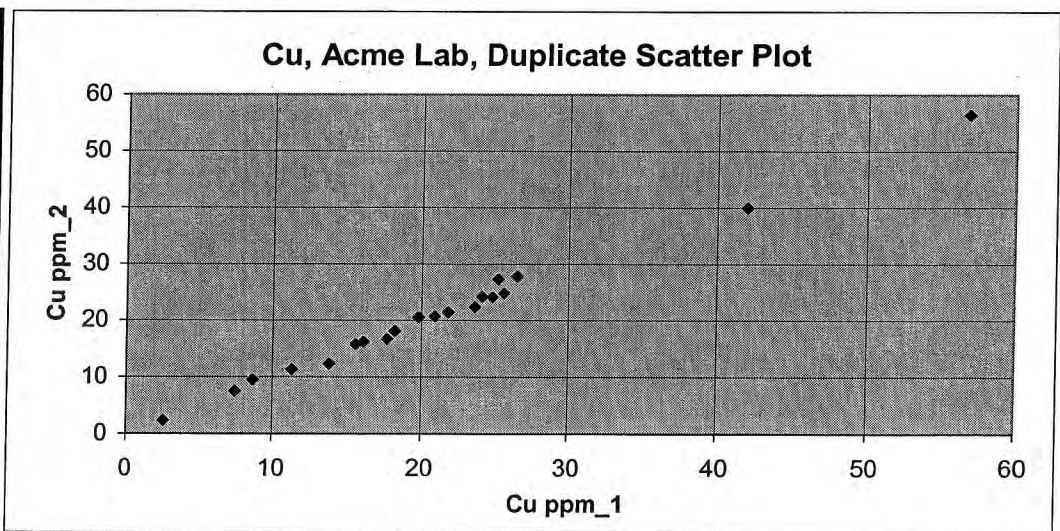


*Mean Percentage Difference $MPD = \frac{assay1 - assay2}{((assay1 + assay2) / 2)} * 100$

Mineral Assessments 2002 Fieldwork

Stream sediment and Soil samples; Acme Lab Duplicate pairs (1 sample, 2 splits), n=22 pairs.

Cu_1	RE Cu_2	MPD*
2.6	2.3	12
7.5	7.5	0
8.7	9.5	9
11.3	11.3	0
13.8	12.3	11
15.6	15.8	1
16.1	16.2	1
17.7	16.7	6
18.2	18.1	1
19.8	20.5	3
20.9	20.7	1
21.8	21.4	2
23.6	22.4	5
24.1	24.2	0
24.8	24.1	3
25.2	27.3	8
25.6	24.8	3
26.5	27.8	5
42	39.9	5
56.9	56.4	1



*Mean Percentage Difference $MPD = \frac{assay1 - assay2}{((assay1 + assay2) / 2)} * 100$

Mineral Assessments - 2002 Fieldwork																							
Soil and Stream Sediment Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																							
Acme Analytical Lab. - Inhouse Standard (DS4) Analytical Results																							
ELEMENT	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr	Mg
SAMPLES	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm	%
Stan DS4	6.7	126.5	28	162	0.3	37.1	12.8	846	3.26	21.5	6.1	27.8	3.7	28	5.5	4.7	5	75	0.57	0.093	16	165.8	0.53
Stan DS4	6.4	123.4	28.8	160	0.3	35.1	11.7	785	3.07	20.8	6	28.5	3.5	29	5.3	5.1	5	75	0.59	0.083	17	165.4	0.52
Stan DS4	6.5	125.2	33.1	147	0.3	35.7	12	833	3.15	22.2	6.3	25.9	3.7	30	5.4	5	5.5	72	0.53	0.092	15	157.1	0.58
Stan DS4	6.7	124.8	32.1	152	0.3	35.4	11.9	763	3.02	23.1	6.9	25	3.5	29	5	5.1	5.5	71	0.54	0.089	16	164.2	0.56
Stan DS4	6.7	124.6	32.5	151	0.3	35.1	12.3	832	3.26	23.3	6.6	30	3.5	1	5.4	5.4	5.5	71	0.53	0.095	16	163.6	0.62
Stan DS4	6.3	125.9	32.7	155	0.3	33.9	11.3	797	3.07	23.6	6.7	24.4	3.8	30	5.2	5.3	5.3	76	0.52	0.097	16	162.5	0.58
Stan DS4	7.1	127.7	32.8	159	0.3	36.1	12.2	817	3.28	24	6.4	30	3.8	31	5.7	5.4	5.7	73	0.55	0.093	17	172.2	0.61
Stan DS4	6.5	126	31.9	154	0.3	33.7	12.1	838	3.17	23.2	6.5	27.7	3.8	31	5.5	5.2	5.3	75	0.54	0.095	17	164.2	0.58
Stan DS4	6.7	125.6	32.3	153	0.3	33.4	11.2	775	3.07	23.2	6.3	29.7	3.9	30	5.4	5.2	5.5	71	0.53	0.089	16	163.6	0.56
Stan DS4	6.5	121.3	31.9	159	0.3	35.6	11.8	803	3.2	22.9	6.4	29	3.9	30	5.3	5.1	5.3	75	0.56	0.092	16	160.7	0.58
Stan DS4	6.8	124.6	31.2	156	0.3	33.1	11.7	813	3.11	22.6	6.1	29	3.8	30	5.5	4.9	5.2	76	0.54	0.09	17	158.2	0.59
Stan DS4	6.8	124.7	31.2	157	0.2	34.5	12.3	829	3.11	23.5	6.4	29	3.5	30	5.6	5	5.3	76	0.51	0.099	16	157.3	0.58
Stan DS4	6.7	122.9	31.2	155	0.3	35.1	12.3	845	3.17	23.5	6.3	27.1	3.6	28	5.3	4.9	5.1	73	0.53	0.093	15	157	0.57
Stan DS4	6.7	127.4	31.2	160	0.4	35.6	12.2	830	3.19	24.7	6.4	25.8	3.6	31	5.6	4.9	5.3	75	0.56	0.095	16	156.6	0.6
Stan DS4	6.6	125.6	32.2	161	0.3	36.6	12.3	838	3.2	23.6	6.3	27.1	3.9	31	5.3	5.1	5.1	79	0.54	0.095	17	164	0.6
Stan DS4	7	128.7	30.8	157	0.3	35.7	12.1	836	3.18	24	6.3	29.8	3.6	32	5.4	4.8	5.2	78	0.54	0.098	16	158.2	0.6
Stan DS4	6.6	129.5	31.2	157	0.3	35.2	12.1	833	3.16	23	6	25.4	3.6	30	5.3	4.9	5	77	0.52	0.09	16	158.1	0.57
Stan DS4	6.5	127	32	161	0.3	35.4	12.4	828	3.08	23.9	6.1	26.6	3.6	30	5.3	4.9	5.2	75	0.52	0.096	16	159.1	0.59
Stan DS4	6.7	127.8	31	152	0.3	34.5	12.1	812	3.17	22.9	6.4	28.4	3.6	27	5.4	4.8	5.2	71	0.53	0.093	15	158.1	0.59
Stan DS4	6.7	127.8	31.1	157	0.3	34.5	12.1	812	3.17	22.9	6.1	29.5	3.6	27	5.4	4.6	5	71	0.53	0.093	15	166.7	0.59
Stan DS4	6.7	127.8	31	152	0.3	34.5	12.1	812	3.17	22.9	6.4	28.4	3.6	27	5.4	4.8	5.2	71	0.53	0.093	15	158.1	0.59
Stan DS4	6.8	124.5	30.5	160	0.3	35.3	11.9	761	3.19	21.5	6.4	29.6	3.6	28	5.1	4.7	4.9	75	0.51	0.079	17	163.7	0.58
Stan DS4	6.4	127.3	30.6	151	0.3	32.4	11.3	802	3.34	24.3	6.1	26.9	3.5	29	5.7	5	5.2	75	0.54	0.096	14	166	0.62
Stan DS4	6.6	131.1	30.2	159	0.3	33.5	12.1	797	3.2	23.2	6.4	26.7	3.7	28	5.4	4.7	5.2	74	0.54	0.096	16	165.9	0.57
Stan DS4	6.9	128.6	29.8	160	0.3	35.4	12.5	840	3.25	23.3	6.4	27.7	3.8	29	5.5	5.1	5.3	79	0.54	0.099	18	167.6	0.61
Stan DS4	6.5	127.5	29	153	0.3	33.3	11.3	793	3	21.1	6.1	24.9	3.7	27	5.4	4.9	5.2	72	0.52	0.081	16	161.2	0.56
Stan DS4	6.5	127.7	29.2	151	0.3	33.5	11.5	807	3.16	21.1	6	26	3.6	27	5.2	4.9	5	72	0.5	0.087	16	164.6	0.55

ELEMENT	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga	Sample	Work
SAMPLES	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm	gm	Order
Stan DS4	145	0.092	1	1.66	0.035	0.16	3.6	0.25	3.9	0.9	0.07	6		020040S
Stan DS4	145	0.093	1	1.69	0.032	0.16	3.7	0.26	3.6	1	0.05	6		020040S
Stan DS4	144	0.09	2	1.67	0.033	0.16	4.2	0.26	3.5	1.1	0.06	6		020042S
Stan DS4	142	0.096	1	1.61	0.036	0.17	3.9	0.27	4	1.1	0.05	6		020042S
Stan DS4	146	0.09	1	1.77	0.033	0.16	4	0.28	3.6	1.1	0.05	6		020042S
Stan DS4	148	0.094	2	1.78	0.037	0.17	4.1	0.28	3.8	1.1	0.06	6		020041S
Stan DS4	157	0.104	2	1.72	0.037	0.18	4.2	0.28	3.5	1.1	0.05	6		20036S
Stan DS4	138	0.098	2	1.68	0.033	0.18	4.3	0.29	3.8	1.1	0.06	6		20036S
Stan DS4	143	0.091	2	1.74	0.033	0.16	4.2	0.3	3.6	1.2	0.05	6		20036S
Stan DS4	137	0.092	1	1.71	0.038	0.18	4.2	0.28	3.9	1.1	0.05	6	30	020047S
Stan DS4	139	0.091	2	1.72	0.038	0.18	4	0.28	3.8	1.1	0.05	6	30	020047S
Stan DS4	145	0.091	1	1.66	0.037	0.16	4.2	0.27	3.4	1.1	0.07	6	30	020047S
Stan DS4	137	0.085	1	1.7	0.034	0.16	4	0.28	3.7	1.1	0.06	6	30	020047S
Stan DS4	151	0.088	2	1.69	0.037	0.16	4.2	0.29	3.5	1.1	0.05	6	30	020047S
Stan DS4	141	0.098	3	1.8	0.041	0.18	4.2	0.3	3.7	1.1	0.05	6	30	020047S
Stan DS4	143	0.091	2	1.75	0.037	0.16	4.1	0.28	3.7	1.1	0.05	6	30	020047S
Stan DS4	139	0.088	2	1.7	0.037	0.17	3.9	0.27	3.6	1.1	0.05	6	30	020047S
Stan DS4	142	0.081	1	1.73	0.034	0.17	4.2	0.28	3.8	1.1	0.07	6	30	020047S
Stan DS4	143	0.087	3	1.69	0.038	0.17	4.3	0.27	3.7	1.1	0.07	6	30	020047S
Stan DS4	143	0.087	3	1.69	0.033	0.16	4.1	0.26	3.8	1.1	0.06	6		020048S
Stan DS4	143	0.087	3	1.69	0.038	0.17	4.3	0.27	3.7	1.1	0.07	6		020049S
Stan DS4	135	0.085	1	1.7	0.03	0.14	4.4	0.27	3.8	1.2	0.06	6		020051S
Stan DS4	147	0.085	2	1.82	0.032	0.16	4.2	0.27	3.9	1.2	0.06	6		020051S
Stan DS4	146	0.087	1	1.67	0.033	0.16	4.3	0.28	3.7	1.2	0.07	6		020051S
Stan DS4	143	0.081	1	1.75	0.032	0.16	4	0.29	3.8	1.2	0.07	6		020051S
Stan DS4	140	0.087	2	1.75	0.028	0.14	3.9	0.27	3.5	1.1	0.06	6		020051S
Stan DS4	140	0.086	1	1.73	0.028	0.14	3.9	0.29	3.7	1.1	0.05	5		020051S

Mineral Assessments - 2002 Fieldwork																	
Soil and Stream Sediment Geochemistry: Acme Analytical; Analysis: GROUP 1DA - 30.0 GM																	
Acme Analytical Lab. - Inhouse Standard (DS4)																	
Descriptive Statistics																	
	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi
Descriptive Statistics	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm
Mean	6.65	126.35	31.09	155.96	0.30	34.79	11.99	813.96	3.16	22.96	6.31	27.63	3.67	28.15	5.39	4.98	5.23
Standard Error	0.04	0.41	0.25	0.76	0.01	0.22	0.08	4.65	0.02	0.19	0.04	0.33	0.03	1.08	0.03	0.04	0.04
Median	6.7	126.5	31.2	157	0.3	35.1	12.1	813	3.17	23.2	6.3	27.7	3.6	29	5.4	4.9	5.2
Mode	6.7	127.8	31.2	160	0.3	34.5	12.1	812	3.17	22.9	6.4	29	3.6	30	5.4	4.9	5.2
Standard Deviation	0.18	2.15	1.29	3.97	0.03	1.14	0.40	24.14	0.08	1.01	0.22	1.72	0.13	5.62	0.16	0.21	0.19
Sample Variance	0.03	4.63	1.67	15.73	0.00	1.29	0.16	582.58	0.01	1.01	0.05	2.96	0.02	31.59	0.03	0.04	0.04
Kurtosis	0.40	0.24	0.04	-0.81	13.00	-0.41	-0.16	-0.25	0.09	-0.01	0.67	-1.12	-0.92	23.02	0.52	-0.34	0.09
Skewness	0.42	-0.18	-0.67	-0.34	0.00	-0.18	-0.46	-0.70	-0.06	-0.72	0.61	-0.26	0.45	-4.63	-0.16	0.34	0.50
Range	0.8	9.8	5.1	15	0.2	4.7	1.6	85	0.34	3.9	0.9	5.6	0.4	31	0.7	0.8	0.8
Minimum	6.3	121.3	28	147	0.2	32.4	11.2	761	3	20.8	6	24.4	3.5	1	5	4.6	4.9
Maximum	7.1	131.1	33.1	162	0.4	37.1	12.8	846	3.34	24.7	6.9	30	3.9	32	5.7	5.4	5.7
Sum	179.6	3411.5	839.5	4211	8.1	939.2	323.6	21977	85.4	619.8	170.4	745.9	99	760	145.5	134.4	141.2
Count	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Confidence Level(95.0%)	0.072	0.851	0.511	1.569	0.011	0.449	0.158	9.548	0.031	0.398	0.087	0.681	0.051	2.223	0.064	0.083	0.076

	V	Ca	P	La	Cr	Mg	Ba	Ti	B	Al	Na	K	W	Hg	Sc	Tl	S	Ga
Descriptive Statistics	ppm	%	%	ppm	ppm	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	ppm	%	ppm
Mean	74.19	0.54	0.09	16.04	162.21	0.58	143.04	0.09	1.70	1.71	0.03	0.16	4.10	0.28	3.70	1.11	0.06	5.96
Standard Error	0.48	0.00	0.00	0.16	0.78	0.00	0.88	0.00	0.14	0.01	0.00	0.00	0.04	0.00	0.03	0.01	0.00	0.04
Median	75	0.53	0.093	16	163.6	0.58	143	0.09	2	1.7	0.034	0.16	4.2	0.28	3.7	1.1	0.06	6
Mode	75	0.54	0.093	16	158.1	0.58	143	0.087	1	1.69	0.033	0.16	4.2	0.28	3.8	1.1	0.05	6
Standard Deviation	2.50	0.02	0.01	0.85	4.06	0.02	4.59	0.01	0.72	0.05	0.00	0.01	0.19	0.01	0.15	0.06	0.01	0.19
Sample Variance	6.23	0.00	0.00	0.73	16.45	0.00	21.11	0.00	0.52	0.00	0.00	0.00	0.04	0.00	0.02	0.00	0.00	0.04
Kurtosis	-0.79	1.61	1.15	0.54	-0.44	0.65	2.19	0.98	-0.85	0.33	-0.28	0.27	0.55	-0.04	-0.49	4.56	-1.46	27.00
Skewness	0.25	0.84	-1.16	-0.07	0.33	-0.64	0.94	0.72	0.53	0.32	-0.30	-0.48	-0.87	0.00	-0.15	-1.10	0.37	-5.20
Range	8	0.09	0.02	4	15.6	0.1	22	0.023	2	0.21	0.013	0.04	0.8	0.05	0.6	0.3	0.02	1
Minimum	71	0.5	0.079	14	156.6	0.52	135	0.081	1	1.61	0.028	0.14	3.6	0.25	3.4	0.9	0.05	5
Maximum	79	0.59	0.099	18	172.2	0.62	157	0.104	3	1.82	0.041	0.18	4.4	0.3	4	1.2	0.07	6
Sum	2003	14.46	2.491	433	4379.7	15.68	3862	2.425	46	46.27	0.934	4.42	110.6	7.47	100	29.9	1.57	161
Count	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Confidence Level(95.0%)	0.988	0.008	0.002	0.338	1.604	0.010	1.818	0.002	0.286	0.018	0.001	0.005	0.076	0.005	0.059	0.024	0.003	0.076

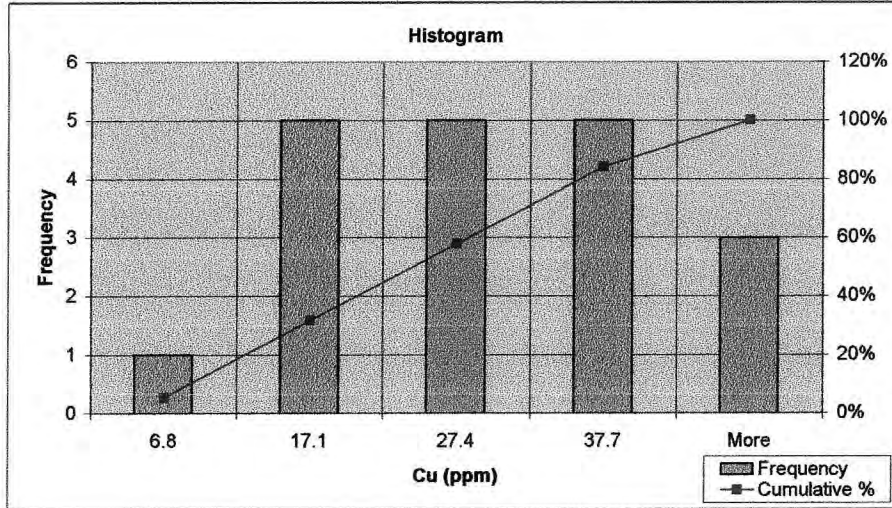
Proposed Snafu/Tarfu SMA - 2002 Silt Geochemical Statistics

Copper ppm

Cu_ppm	
Mean	25.4
Standard Error	2.736055
Median	24.4
Mode	#N/A
Standard Deviation	11.92619
Sample Variance	142.234
Kurtosis	-0.56937
Skewness	0.540609
Range	41.2
Minimum	6.8
Maximum	48
Sum	483
Count	19

Bin	Frequency	Cumulative %
6.8	1	5.26%
17.1	5	31.58%
27.4	5	57.89%
37.7	5	84.21%
More	3	100.00%

Percentile	Cu ppm
>99%	47.5
>98%	47.0
>95%	45.6
>90%	45.1
>80%	34.6
>75%	31.6
>50%	24.4
>25%	16.2

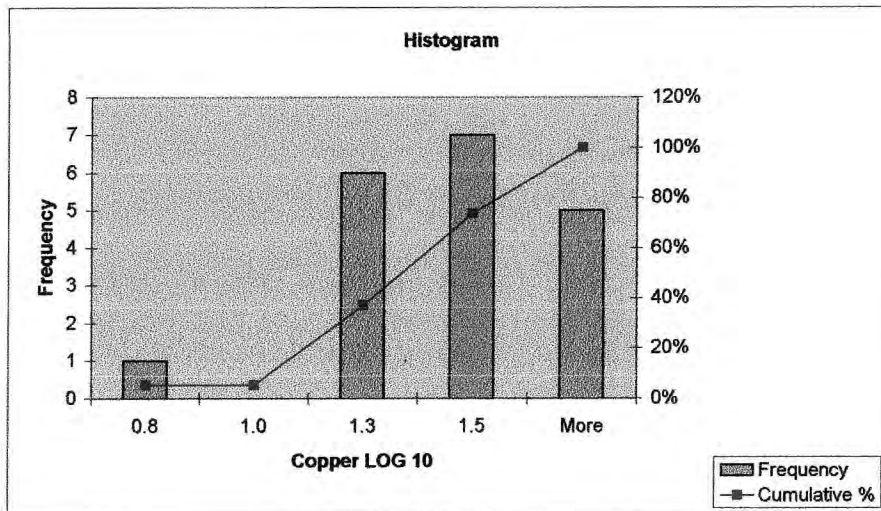


Copper Log 10

Mean	1.355818
Standard Error	0.050781
Median	1.38739
Mode	#N/A
Standard Deviation	0.22135
Sample Variance	0.048996
Kurtosis	0.163082
Skewness	-0.48453
Range	0.848732
Minimum	0.832509
Maximum	1.681241
Sum	25.76054
Count	19

Bin	Frequency	Cumulative %	Cu (ppm)
0.8	1	5.26%	6.8
1.0	0	5.26%	11.1
1.3	6	36.84%	18.1
1.5	7	73.68%	29.4
More	5	100.00%	

Picked Threshold	Cu ppm
<10	
10.1 - 20	
20.1 - 30	
>30	



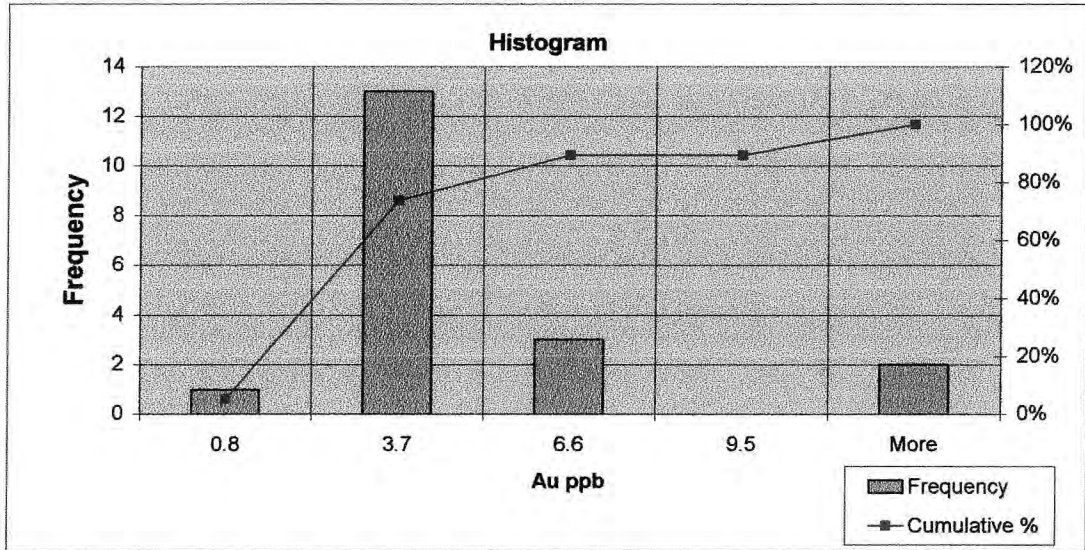
Proposed Snafu/Tarfu SMA - 2002 Silt Geochemical Statistics

Gold ppb

Au_ppb	
Mean	3.43
Standard Error	0.730619
Median	1.8
Mode	1.2
Standard Deviation	3.184695
Sample Variance	10.14228
Kurtosis	2.716615
Skewness	1.765433
Range	11.6
Minimum	0.8
Maximum	12.4
Sum	65.2
Count	19

Bin	Frequency	Cumulative %
0.8	1	5.26%
3.7	13	73.68%
6.6	3	89.47%
9.5	0	89.47%
More	2	100.00%

Percentile	Gold ppb
>99%	11.9
>98%	11.4
>95%	10.0
>90%	7.1
>80%	5.5
>75%	4.5
>50%	1.8
>25%	1.4

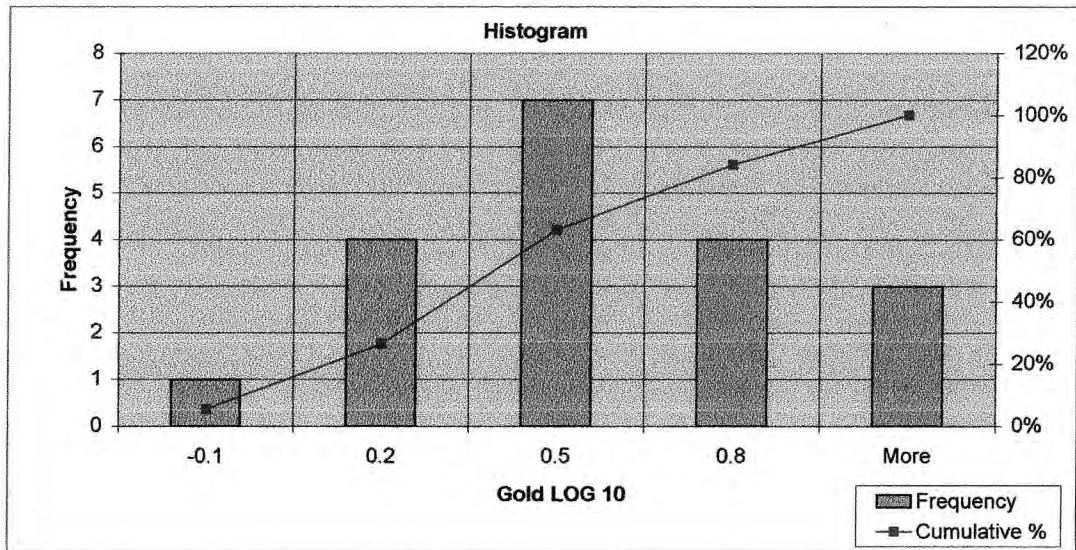


Gold Log 10	
Mean	0.394687
Standard Error	0.078898
Median	0.255273
Mode	0.079181
Standard Deviation	0.34391
Sample Variance	0.118274
Kurtosis	-0.59583
Skewness	0.630866
Range	1.190332
Minimum	-0.09691
Maximum	1.093422
Sum	7.499061
Count	19

Bin	Frequency	Cumulative %	Au (ppb)
-0.1	1	5.26%	0.8
0.2	4	26.32%	1.6
0.5	7	63.16%	3.1
0.8	4	84.21%	6.2
More	3	100.00%	

Picked Thresholds

Au ppb
<1
1.1 - 3
3.1 - 6
6.1 - 12
>12



Appendix II: Minfile Descriptions

MINFILE: 105C 007
PAGE: 1 of 1
UPDATED: 4/10/1991

**YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE**

MINFILE: 105C 007
NAME: TARFU
DEPOSIT TYPE: UNKNOWN
STATUS: DRILLED PROSPECT
TECTONIC ELEMENT: CACHE CREEK TERRANE

NTS MAP SHEET: 105C\4
LATITUDE: 60° 3' 48" N
LONGITUDE: 133° 36' 27" W

OTHER NAME(S):
MAJOR COMMODITIES:
MINOR COMMODITIES:
TRACE COMMODITIES:

CLAIMS (PREVIOUS & CURRENT)

WORK HISTORY

Staked on a GSC aeromag anomaly as Cat and Work cl (85016) in Jan/63 by Kerr-Addison ML, which explored with SP, mag and EM surveys in 1963 and one hole (77.1 m) in 1964.

GEOLOGY

The hole was drilled to test a coincident SP, mag and EM anomaly. The hole intersected brecciated serpentinite body in graphite schist, but no mineralization was found.

REFERENCES

KERR ADDISON ML, Jul/64. Assessment Report #017623 by W.M. Sirola.

MINFILE: 105C 039

PAGE: 1 of 1

UPDATED:

**YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE**

MINFILE: 105C 039

NAME: LISA

DEPOSIT TYPE: UNKNOWN

STATUS: UNKNOWN

TECTONIC ELEMENT: CACHE CREEK TERRANE

NTS MAP SHEET: 105C\4

LATITUDE: 60° 3' 48" N

LONGITUDE: 133° 48' 30" W

OTHER NAME(S):

MAJOR COMMODITIES:

MINOR COMMODITIES:

TRACE COMMODITIES:

CLAIMS (PREVIOUS & CURRENT)

WORK HISTORY

Staked as Lisa cl (YA48562) in Mar/80 by N. Naharniak, who trenched later in the year.

GEOLOGY

The claims are probably underlain by Permian siltstone and greywacke near the contact with Cretaceous granodiorite.

REFERENCES

MINFILE: 105C 049

PAGE: 1 of 1

UPDATED:

**YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE**

MINFILE: 105C 049

NAME: NUF

DEPOSIT TYPE: UNKNOWN

STATUS: ANOMALY

TECTONIC ELEMENT: CACHE CREEK TERRANE

NTS MAP SHEET: 105C\5

LATITUDE: 60° 23' 0" N

LONGITUDE: 133° 54' 54" W

OTHER NAME(S): NUT

MAJOR COMMODITIES:

MINOR COMMODITIES:

TRACE COMMODITIES:

CLAIMS (PREVIOUS & CURRENT)

WORK HISTORY

Staked as NUF cl (YA95503) in Aug/86 by Hudson Bay Mg & S CL, which transferred them to Mingold Res Inc in Mar/87. In Dec/92 R. Hamel staked Ore cl (1-36) (YB37691) 1 km northwest of the anomaly. The following March, Hamel added Ore cl (37-80) (YB37932) which covered the area of the anomaly. In May/94 Hamel added Ore cl (81-108) (YB47848) to the western side of the claim block.

GEOLOGY

The claims, which cover Permo-Triassic volcanic rocks, were staked to cover a 45 ppb gold silt geochemical anomaly located by DIAND sampling.

REFERENCES

MINFILE: 105C 050

PAGE: 1 of 1

UPDATED: 2/8/1996

**YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE**

MINFILE: 105C 050

NAME: TON

DEPOSIT TYPE: UNKNOWN

STATUS: UNKNOWN

TECTONIC ELEMENT: CACHE CREEK TERRANE

NTS MAP SHEET: 105C\5

LATITUDE: 60° 21' 43" N

LONGITUDE: 133° 40' 53" W

OTHER NAME(S):

MAJOR COMMODITIES:

MINOR COMMODITIES:

TRACE COMMODITIES:

CLAIMS (PREVIOUS & CURRENT)

NITA

WORK HISTORY

Staked as Ton & Tom cl (YA96664) in Jan/87 by the Dunvegan Synd. T. Thompson staked Nita cl 1-12 (YB57301) 5 km northwest of occurrence in Nov/94.

GEOLOGY

The claims overlie the north-trending faulted contact between limestone (to the west) and conglomerate and greywacke (to the east).

REFERENCES

MINFILE: 105C 052

PAGE: 1 of 1

UPDATED:

**YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE**

MINFILE: 105C 052

NAME: THA

DEPOSIT TYPE: UNKNOWN

STATUS: UNKNOWN

TECTONIC ELEMENT: CACHE CREEK TERRANE

NTS MAP SHEET: 105C\6

LATITUDE: 60° 20' 4" N

LONGITUDE: 133° 20' 17" W

OTHER NAME(S):

MAJOR COMMODITIES:

MINOR COMMODITIES:

TRACE COMMODITIES:

CLAIMS (PREVIOUS & CURRENT)

WORK HISTORY

Staked as THA cl (YB8283) in Sep/87 by Tha Res L.

GEOLOGY

The claims are underlain by sedimentary rocks of the Permian Cache Creek Group.

REFERENCES

MINFILE: 105C 053
UPDATED: 28-May-98
Page 5 of 7

YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE

MINFILE NUMBER: 105C 053	NTS MAP SHEET(1:250000): 105C
DEPOSIT TYPE: UNKNOWN	NTS MAP SHEET(1:50000): 105C14
STATUS: UNKNOWN	LATITUDE: 60° 11' 04' N
TECTONIC ELEMENT: CACHE CREEK TERRANE	LONGITUDE: 133° 50' 51' W
NAMES: HANNKA	MAJOR COMMODITIES:
	MINOR COMMODITIES:
	TRACE COMMODITIES:

CLAIMS (PREVIOUS AND CURRENT):

WORK HISTORY:

Staked as Quartz cl (YB8529) in Oct/87 by K. Landsman. Restaked as Sasha cl 1-37 (YC08207) by L. Diduck in Sept/97.

GEOLOGY:

The claims are underlain by Permian Cache Creek sedimentary rocks.

REFERENCES:

MINFILE: 105C 055

PAGE: 1 of 1

UPDATED: 3/9/1993

**YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE**

MINFILE: 105C 055

NAME: EAGLENEST

DEPOSIT TYPE: VEIN

STATUS: SHOWING

TECTONIC ELEMENT: CACHE CREEK TERRANE

NTS MAP SHEET: 105C\5

LATITUDE: 60° 22' 2" N

LONGITUDE: 133° 53' 22" W

OTHER NAME(S):

MAJOR COMMODITIES: GOLD, SILVER

MINOR COMMODITIES: ANTIMONY, BARITE, MERCURY

TRACE COMMODITIES:

CLAIMS (PREVIOUS & CURRENT)

EAGLE, NEST

WORK HISTORY

Staked as Eagle and Nest cl (YB20183) in June and Aug/88 and Jun/90 by E. Johnson, who performed blast trenching in 1989 and road work in 1992. D. MacDonald staked Cus cl (YB13964) 5 km to the east in Jun/88.

D. Gilbert staked Gopher cl (YB24610) less than 1 km southwest of the Eaglenest property in Dec/88, and sampled in 1989, and L. Gilbert added Jake cl (YB35647) in Mar/91. The Ore cl (YB37932) were added to the northwest side of the Eagle cl by R. Hamel in March/93. In Jun/93, E. Johnson performed trenching and drilling on the Eagle and Nest claims. R. Hamel trenched on the Ore cl in Dec/93.

GEOLOGY

On the Eagle and Nest claims, quartz veins containing fine grained sulphides occur in silicified greenstone along a northeast-trending lineament which cuts chert and metavolcanic rocks of the Cache Creek Group. Johnson obtained assays of up to 0.41 g/t Au and 2.4 g/t Ag.

Blast trenching on the west end of the property in 1989 exposed quartz-calcite veins 1.2 to 3 m wide which contain variable amounts of sulphide minerals, barite and magnetite. The veins have minor clay alteration haloes, and appear to form two sets, related to the dominant northeast lineament and crosscutting north and northwest-trending fractures. The dominant northeast veins have a slickensided hanging wall and greenstone in the footwall is silicified. Specimens of quartz and calcite vein material and silicified pyritic wall rock contained up to 21 ppm Sb, 3100 ppm Ba and 310 ppb Hg.

On the Gopher property, quartz-carbonate veins cutting metavolcanic rocks are exposed in the floor of a gravel pit. Samples contained up to 44 ppb Au.

REFERENCES

**YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE**

MINFILE: 105D 178
NAME: MILITARY
DEPOSIT TYPE: VEIN
STATUS: ANOMALY
TECTONIC ELEMENT: CACHE CREEK TERRANE

NTS MAP SHEET: 105D\8
LATITUDE: 60° 23' 22" N
LONGITUDE: 134° 2' 38" W

OTHER NAME(S): PHIL
MAJOR COMMODITIES:
MINOR COMMODITIES:
TRACE COMMODITIES:

CLAIMS (PREVIOUS & CURRENT)

BON, ICO, LYNN, MART, MEX, NLC, ORE, PHIL

WORK HISTORY

Staked as Phil cl 1-12 (YA96636) in Jan/87 by the Dunvegan Syndicate, which prospected and sampled later in the year. The Phil claims were transferred to Dunvegan Explorations Ltd in May/89; restaked by A. MacDonald as Phil cl 1-12 (YB36191) in Jul/91; transferred back to Dunvegan in Jan/92 and allowed to lapse in Aug/92.

L. Lebedoff staked the NLC cl 1-52 (YB24538) 6 km to the south in Nov/88 and carried out magnetic surveying in 1989. B. Kreft staked the Lynn cl 1-4 (YB27704) 1 km to the east in Jul/90. R. Hamel staked Ore cl 1-36 (YB37691) immediately east of the former Phil claim block in Dec/92 and performed a ground magnetic survey in the winter of 1992-93. In Jul/94, Hamel staked Bon cl 1-14 (YB46944) 5 km northwest of the occurrence.

In April and May/94 M. Sherman staked the Mex cl 1-10 (YB46669) and Ico cl 1-10 (YB46750) 3 km to the south. In Apr/95 Mex cl 1-7 (YB46669) and Ico cl 1-10 (YB46750) were transferred to Wilson Creek Placer Ltd. Sherman carried out VLF-EM and magnetic geophysical surveying on the Mex and Ico claims between March and May/95. In May/95 Sherman restaked Mex cl 8-10 (YB57515). In Jun/95 Mex cl 1-7 (YB46669) and Ico cl 1-10 (YB46750) were transferred back to Sherman. In May/96 and Aug/99 Sherman carried out additional VLF-EM and magnetic geophysical surveying on the Mex and Ico claims.

Restaked as Mart cl 1-44 (YB97705) in Jun/97 by High Valley Explorations Ltd, which immediately constructed an access road to the claims and carried out VLF-EM and magnetic surveying, geological mapping, prospecting, rock geochemical sampling and bulldozer trenching later in the year.

GEOLOGY

Glaciofluvial sediments cover most of the area. Bedrock consists of Permian to Triassic Cache Creek Terrane volcanic rocks, serpentinite and sedimentary rocks, mainly dolomite with minor chert.

The Phil claims covered a magnetic high and scattered gold soil geochemical anomalies. Near the south end of the property, serpentinite containing minor magnetite and chromite outcrop along the banks of a small stream. In 1987 soil sampling returned several anomalous values up to 510 ppb Au, but re-sampling failed to confirm these anomalies. In 1998 mapping and geophysics

identified an area of interest near the fault contact between ultramafic rocks to the north and dolomite and chert to the south. Trenching exposed a 40 m by 15 m area containing chert hosting seams of black graphitic clay and quartz-carbonate breccia veins with graphite-mariposite-ankerite alteration halos. Chip sampling in the area produced erratic, weakly anomalous gold values.

The Ore claims cover a 1 000 gamma aeromagnetic anomaly and an area of elevated gold values in soil in an area of outcropping volcanic rocks. A ground magnetic survey in the winter of 1992-93 indicated a magnetic structure trending north-northwest which coincides with a structural lineament along the creek.

Sherman's geophysical program on the Mex and Ico claims, outlined 9 geophysical anomalies of varying strength. Anomaly G was located near a bedrock anomaly identified in a government airborne EM and magnetic survey. Three additional conductors were identified but their exact location could not be determined because two VLF stations required to accurately locate the position of the conductors, were off the air for an indefinite period of time. The 1996 geophysical survey covered areas missed in the 1995 survey, while the 1999 survey covered the central section of the claim group.

REFERENCES

DIGHEM I POWER, 1994. Airborne EM and MAG Surveys, Jakes Corner Project. DIAND Open File 1994-10 (G).

DUNVEGAN EXPLORATIONS LTD, May/88. Assessment Report #092134 by G.S. Davidson.

DUNVEGAN EXPLORATIONS LTD, Sep/89. Prospectus Report #092869 by D. Copeland et al.

HIGH VALLEY EXPLORATIONS LTD, May/98. Assessment Report #093841 by M.A. Beauregard.

HUNT, J.A., et al., 1995. Interpretive Geology of the Jakes Corner Geophysical Survey (105 C 5, 105 D 8, and 105 D 9). DIAND Open File 1995-6 (G).

WILSON CREEK PLACERS, Jun/95. Assessment Report #093285 by G.C. Lee.

WILSON CREEK PLACERS, Jun/96. Assessment Report #093483 by G.C. Lee.

WILSON CREEK PLACERS, Aug/2000. Assessment Report #094177 by G.C. Lee.

YUKON EXPLORATION 1989, p. 35.

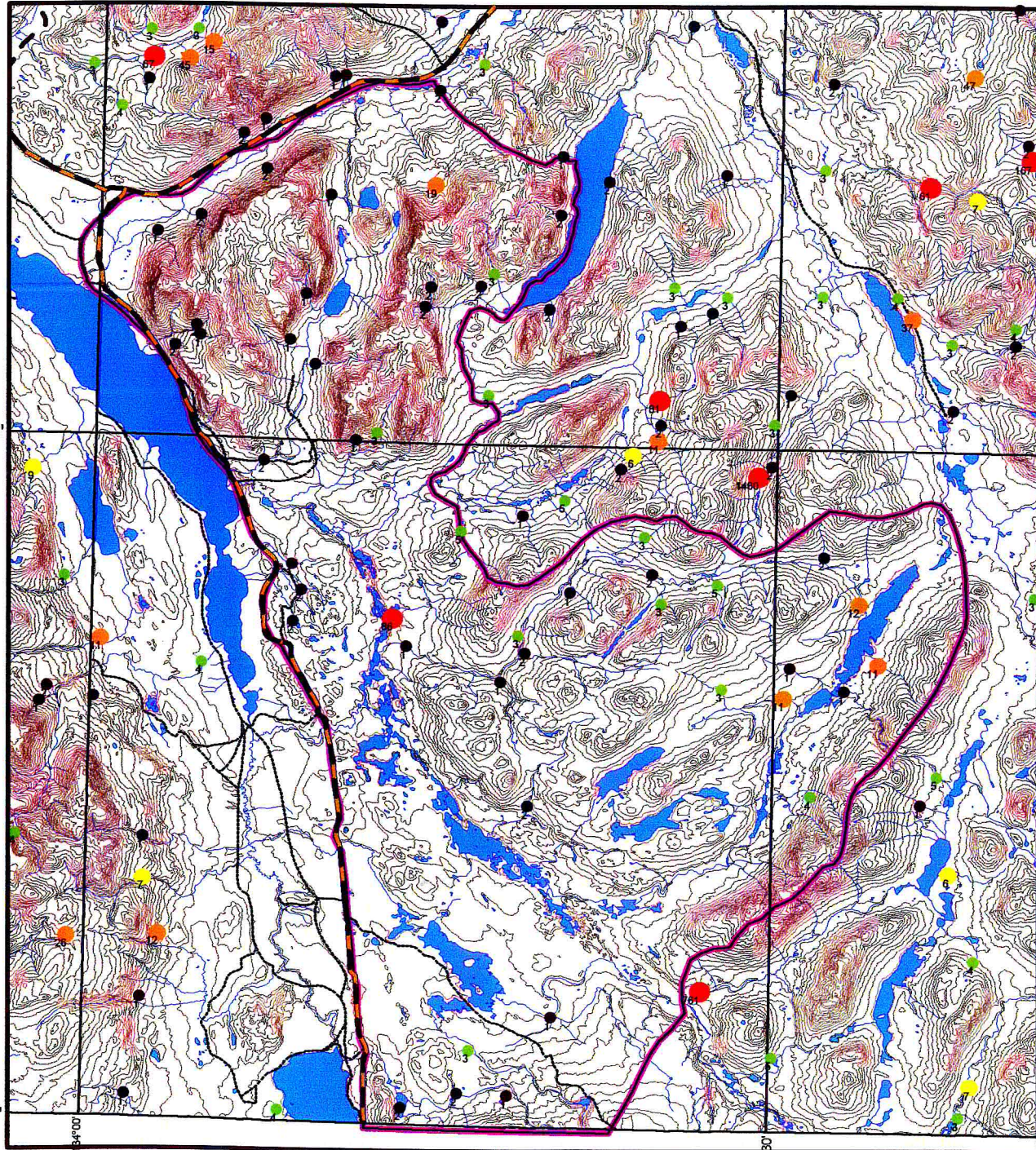
YUKON EXPLORATION AND GEOLOGY 1997, p. 36.

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Appendix 3: RGS Geochemical Plots

For all maps

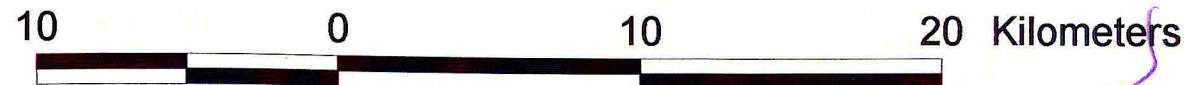
Regional Stream Sediment Geochemistry in Proposed Snafu SMA Area



60°15'

60°00'

Scale 1:250 000



Gold - Au

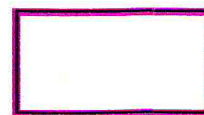
- 0 - 2 ppb
- 3 - 5 ppb
- 6 - 10 ppb
- 11 - 50 ppb
- 51 - 1460 ppb

Detection Limit: 2 ppb

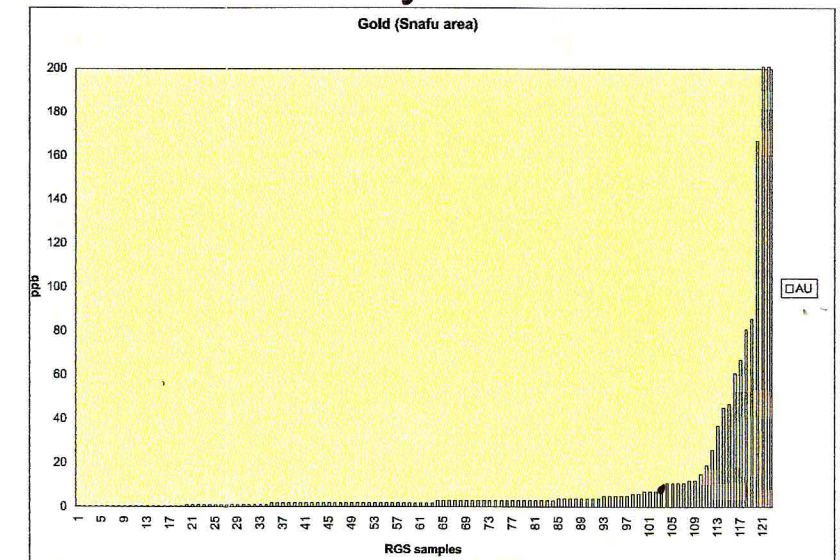
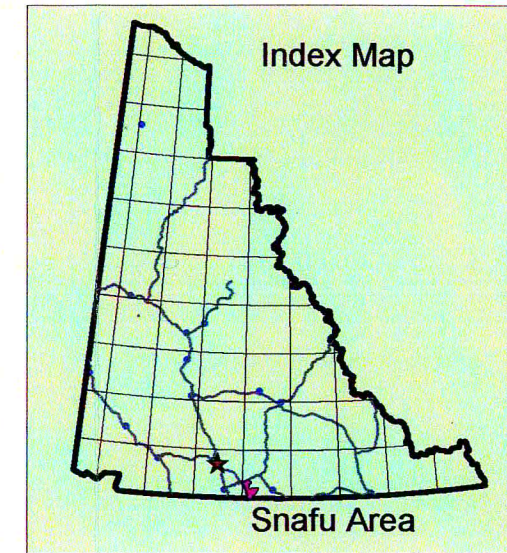
Method: INAA- instrumental neutron activation analysis

# Samples (n)	122
Maximum	1460
Median	2

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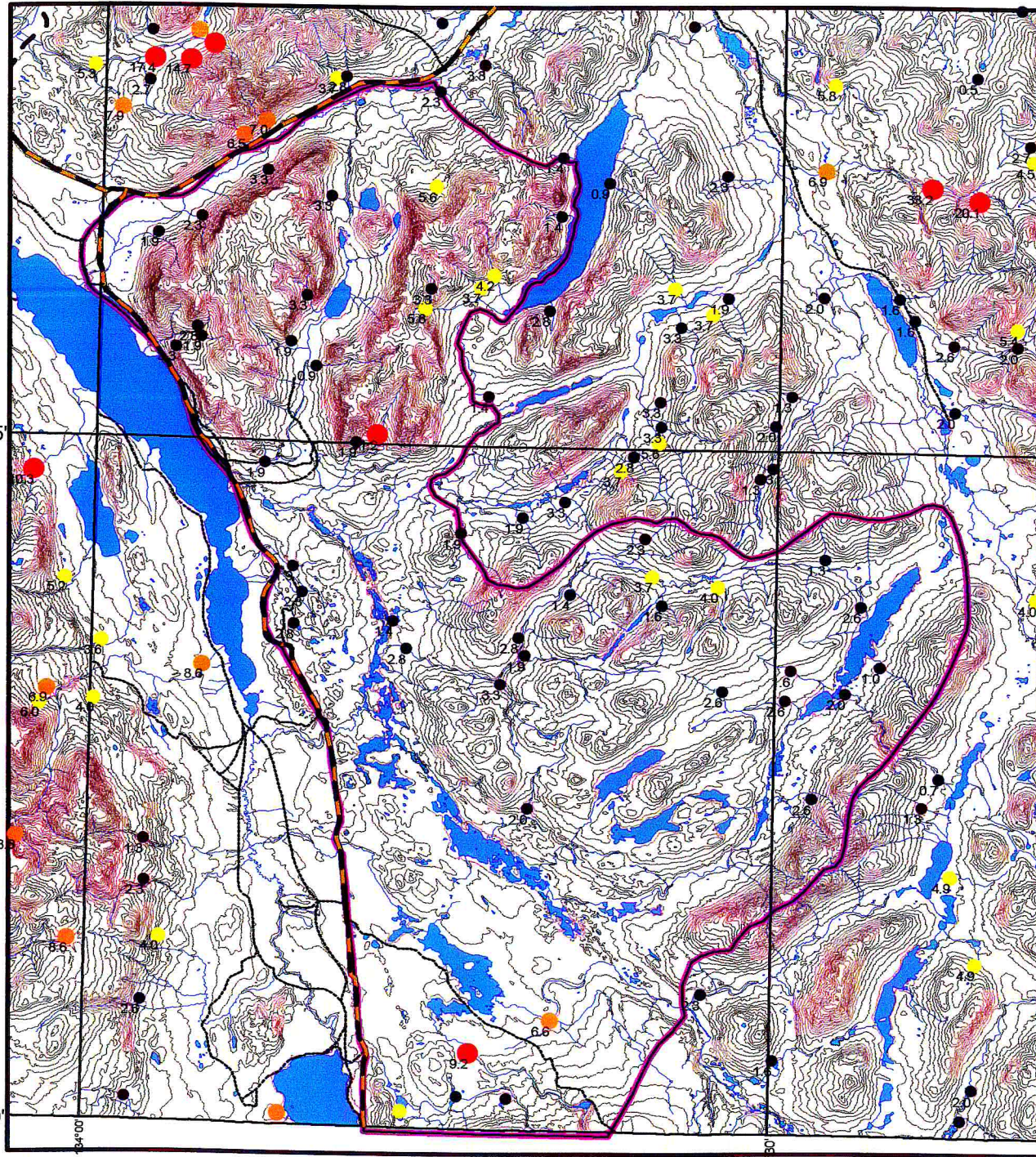
Proposed Snafu / Tarfu
Natural Environment Park
Special Management Area
(September 2002 outline)



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RGS
Gold - Au

Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area



60°15'

60°00'

Scale 1:250 000



Arsenic - As

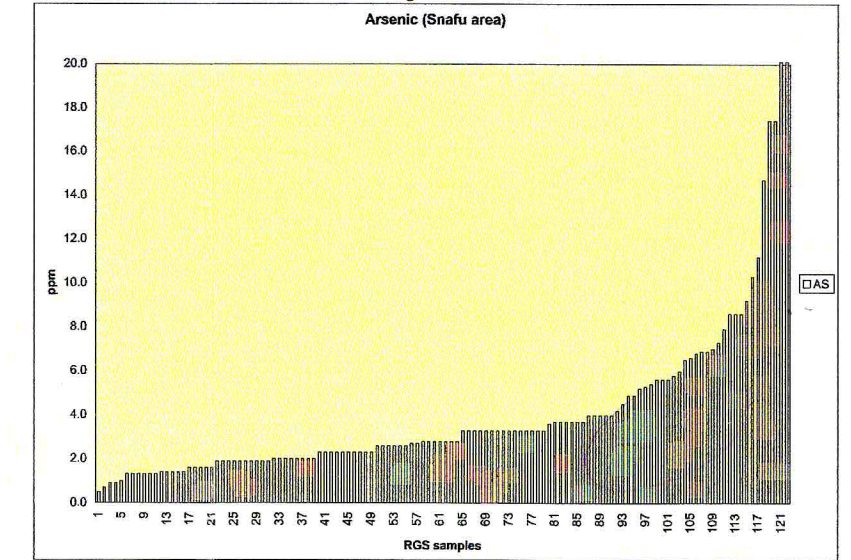
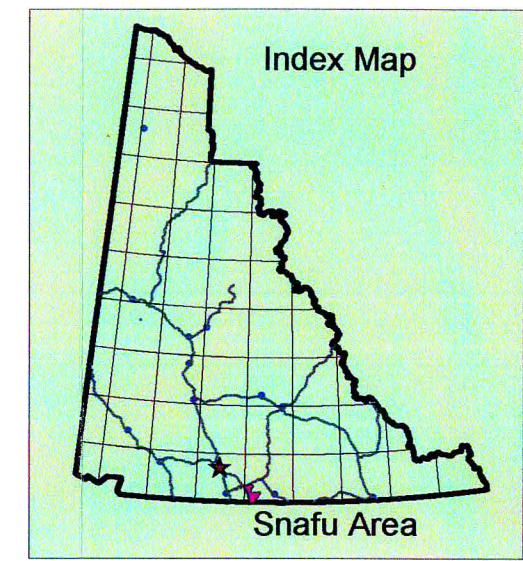
- 0 - 3.5 ppm
- 3.5 - 6 ppm
- 6.1 - 9 ppm
- 9.1 - 33.2 ppm

Detection Limit: 0.5 ppm
 Method: INAA- instrumental neutron activation analysis

# Samples (n)	122
Maximum	33.2
Median	2.8

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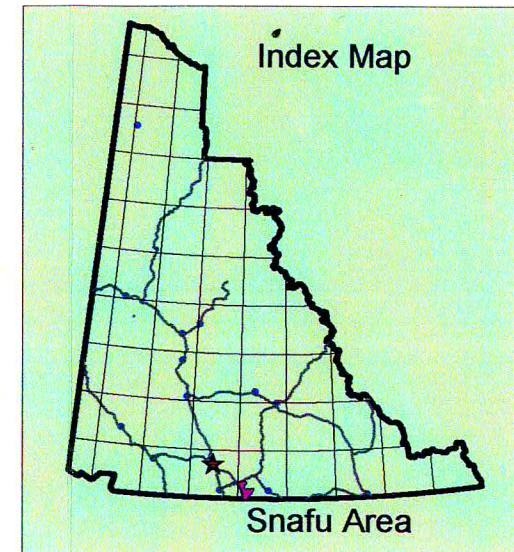
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Arsenic - As

Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area

Barium - Ba

- 0 - 1300 ppm
- 1301 - 1500 ppm
- 1501 - 1700 ppm
- 1701 - 2060 ppm

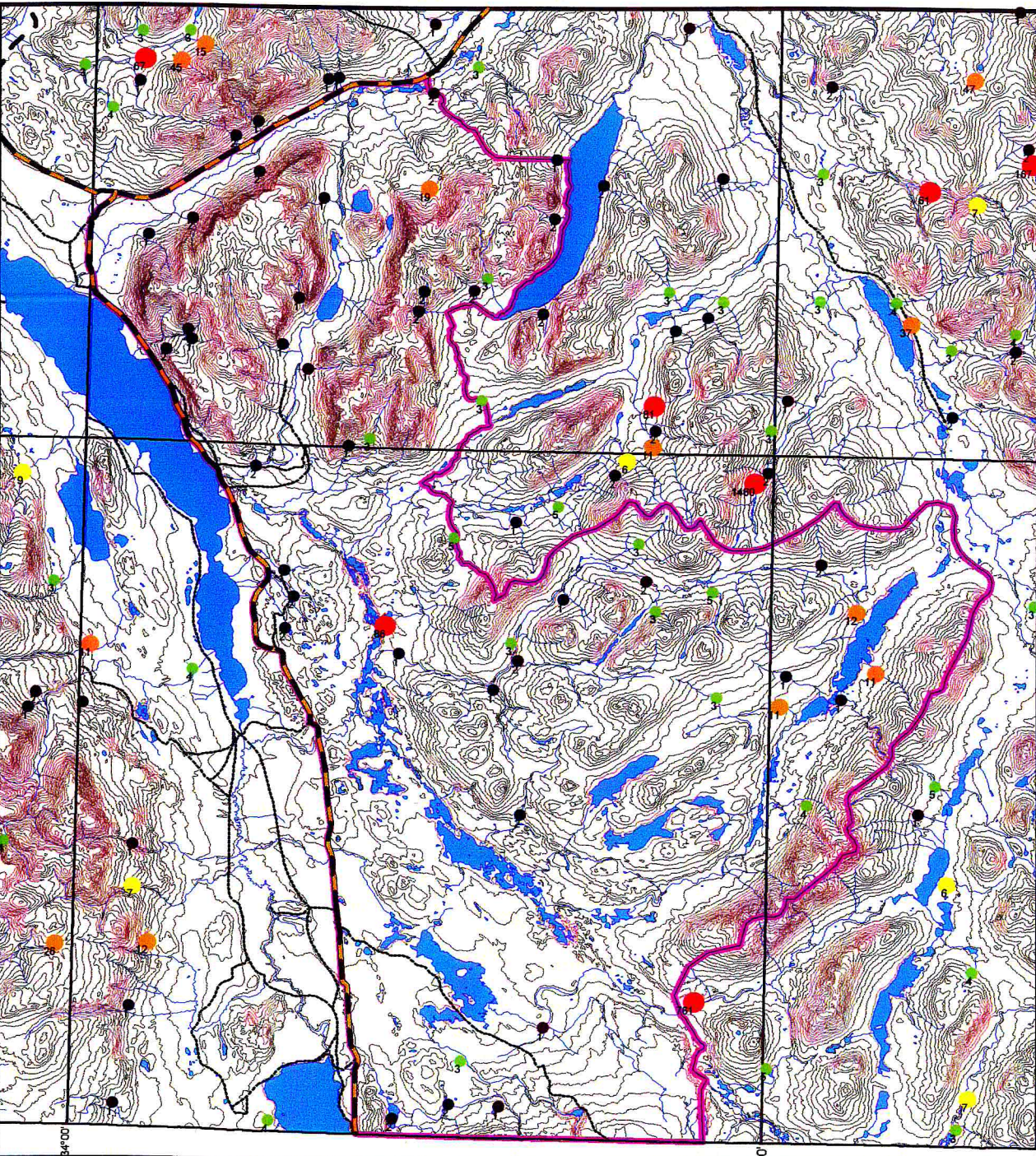
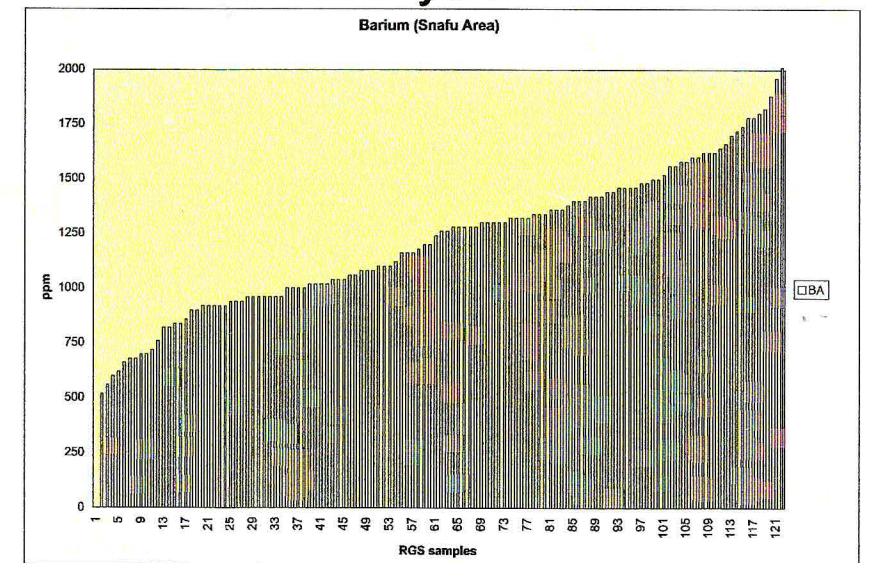


Detection Limit: 50 ppm
Method: INAA- instrumental neutron activation analysis

# Samples (n)	122
Maximum	2060
Median	1250

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Proposed Snafu / Tarfu
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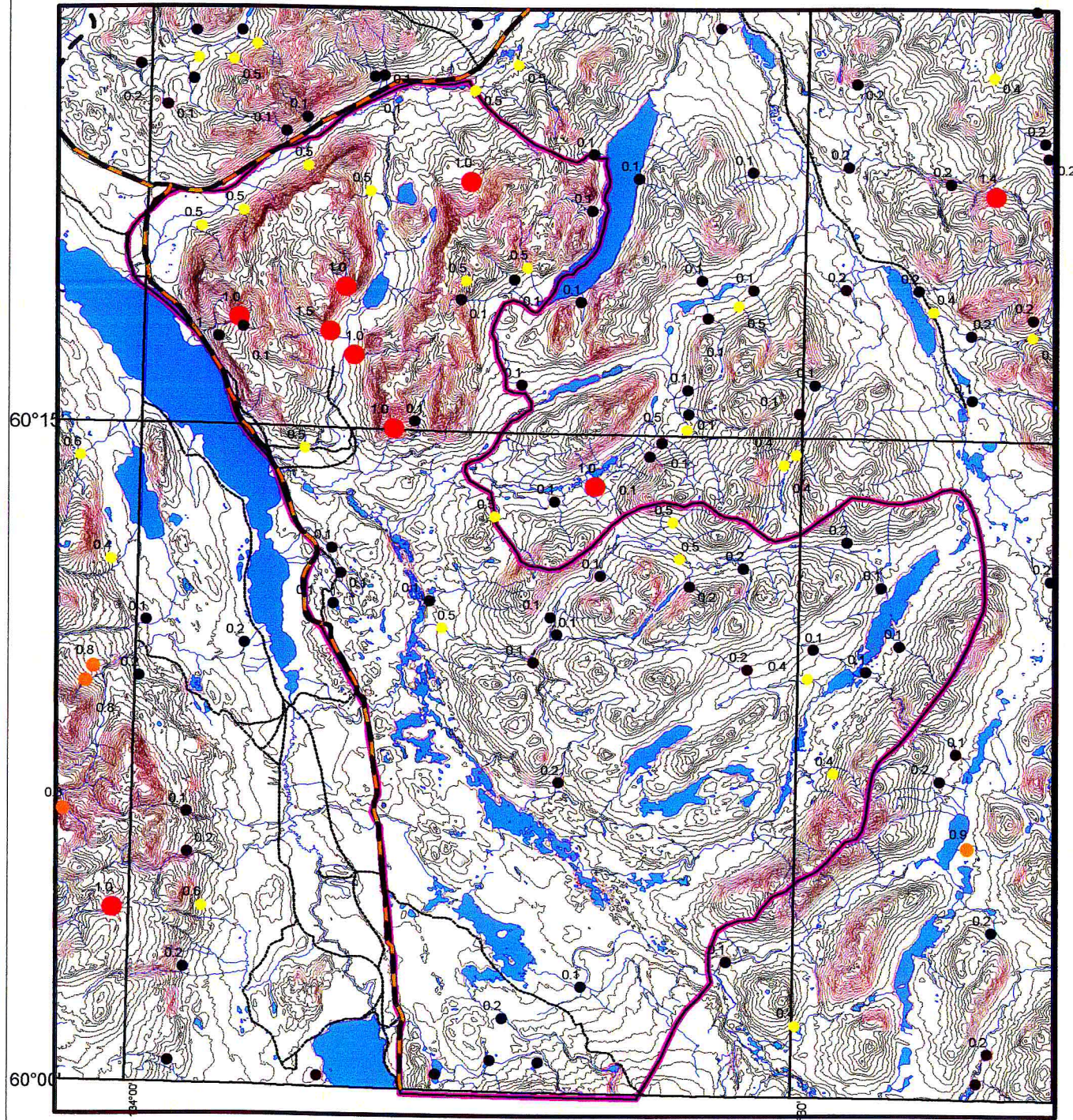
Scale 1:250 000

10 0 10 20 Kilometers

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Barium - Ba

Regional Stream Sediment Geochemistry in Proposed Snafu /Tarfus SMA Area



Scale 1:250 000



Cadmium - Cd

- 0 - 0.3 ppm
- 0.31 - 0.6 ppm
- 0.61 - 0.9 ppm
- 0.91 - 1.5 ppm

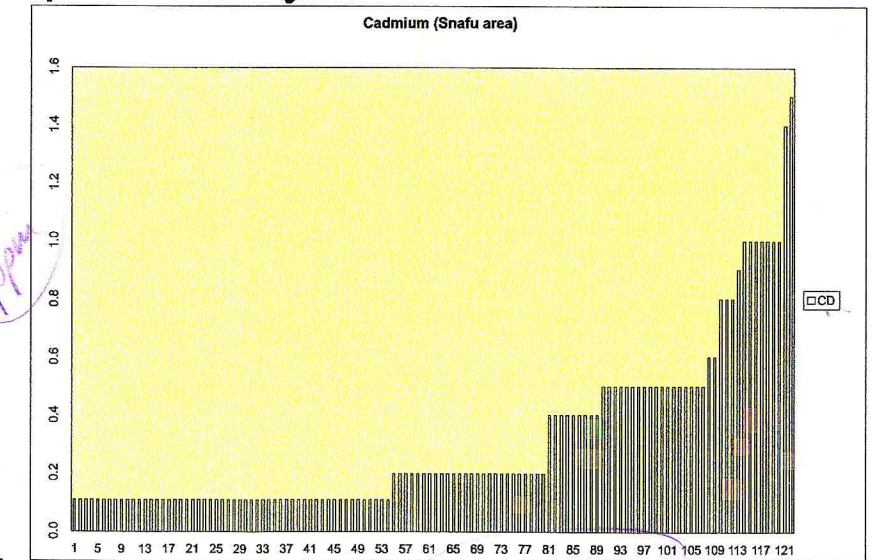
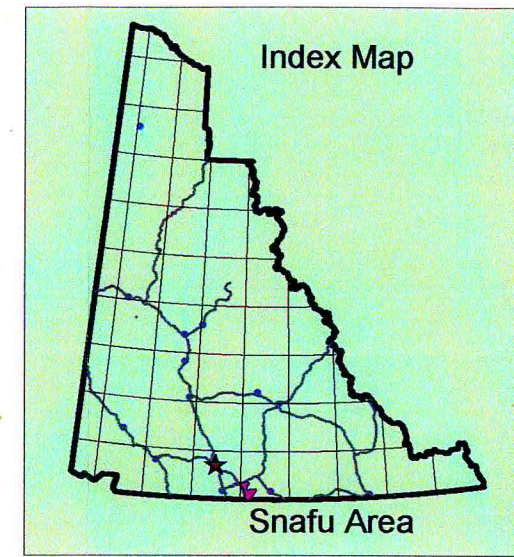
Detection Limit: 0.2 ppm

Method: AAS - atomic absorption spectrometry

# Samples (n)	122
Maximum	1.5
Median	0.2

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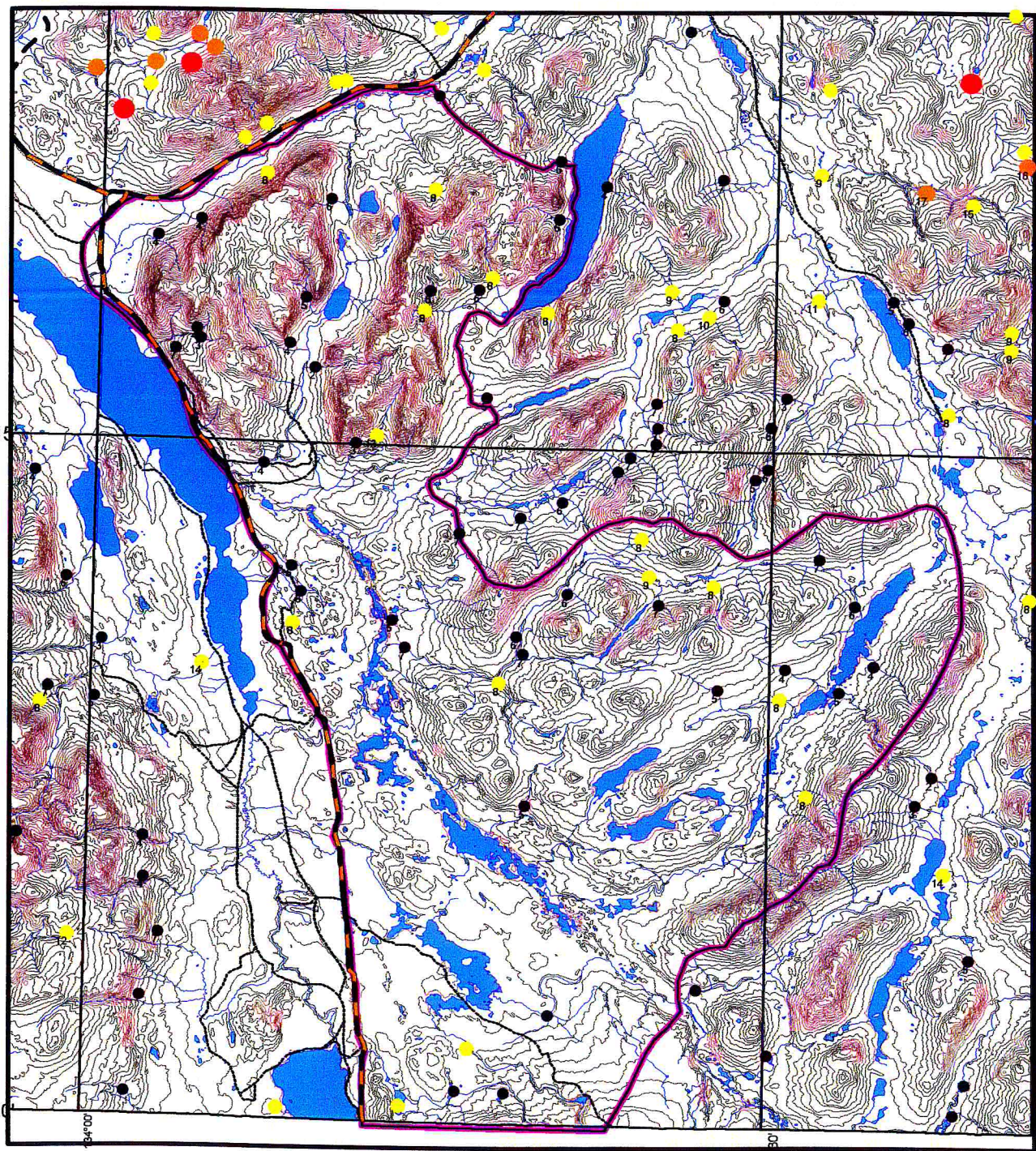
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RGS
Cadmium - Cd

Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area

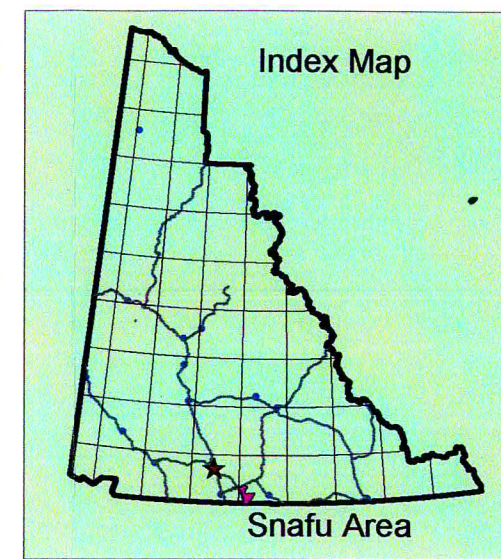


Scale 1:250 000



Cobalt - Co

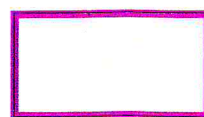
- 0 - 7 ppm
- 7.1 - 15 ppm
- 15.1 - 20 ppm
- 20.1 - 30 ppm



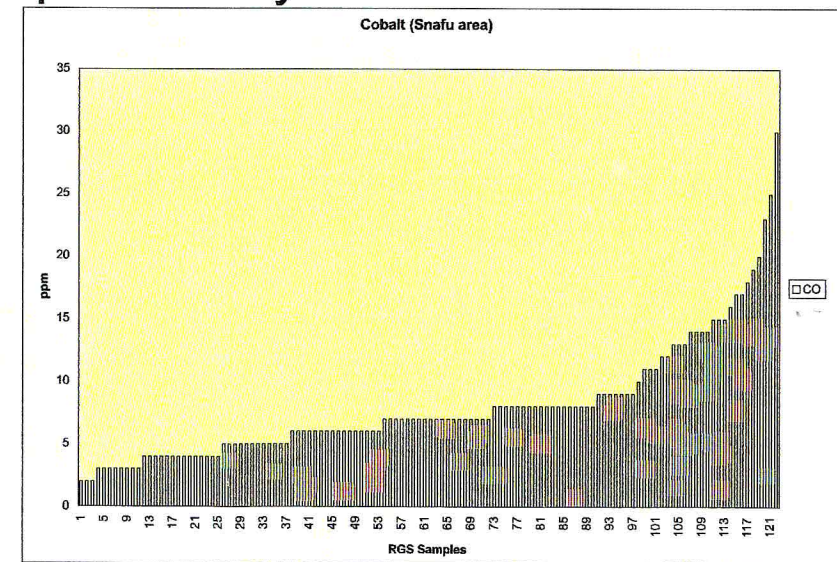
Detection Limit: 2 ppm
 Method: AAS- atomic absorption spectrometry

# Samples (n)	122
Maximum	30
Median	7

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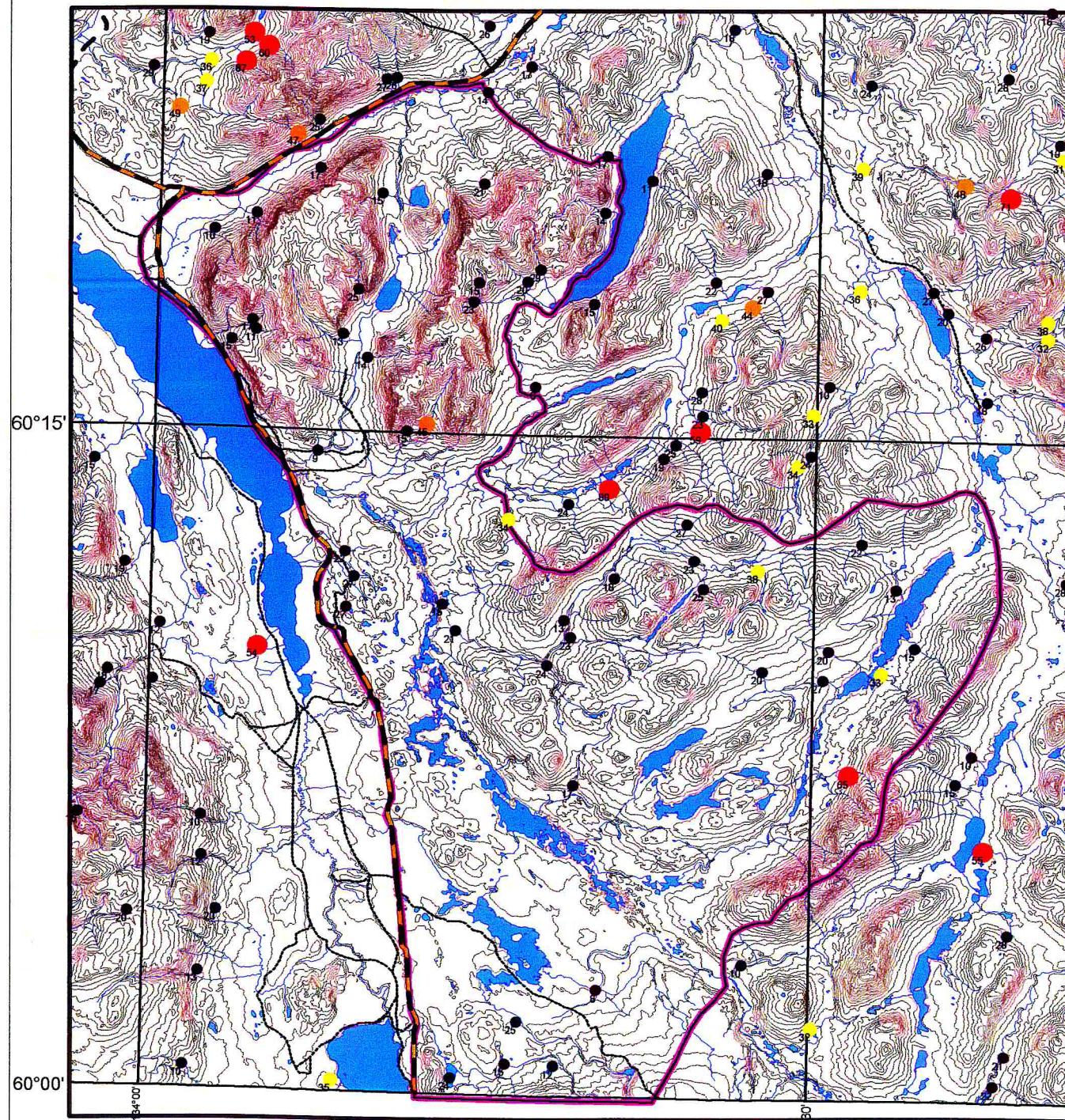
Proposed Snafu / Tarfu
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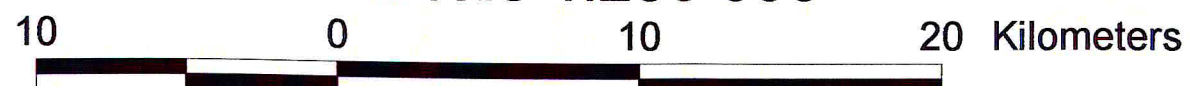
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RGS
 Cobalt - Co

Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area

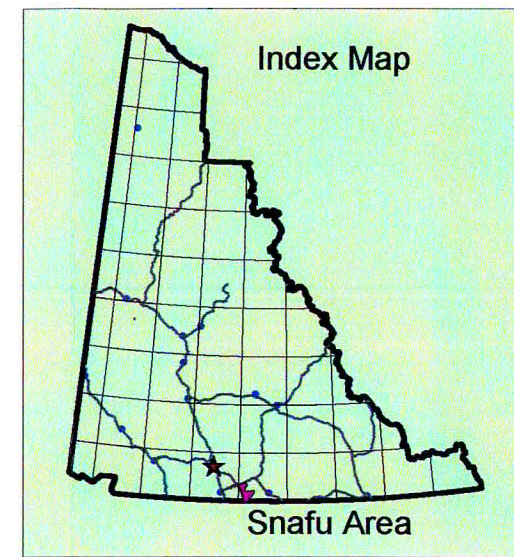


Scale 1:250 000



Copper - Cu

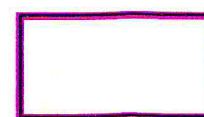
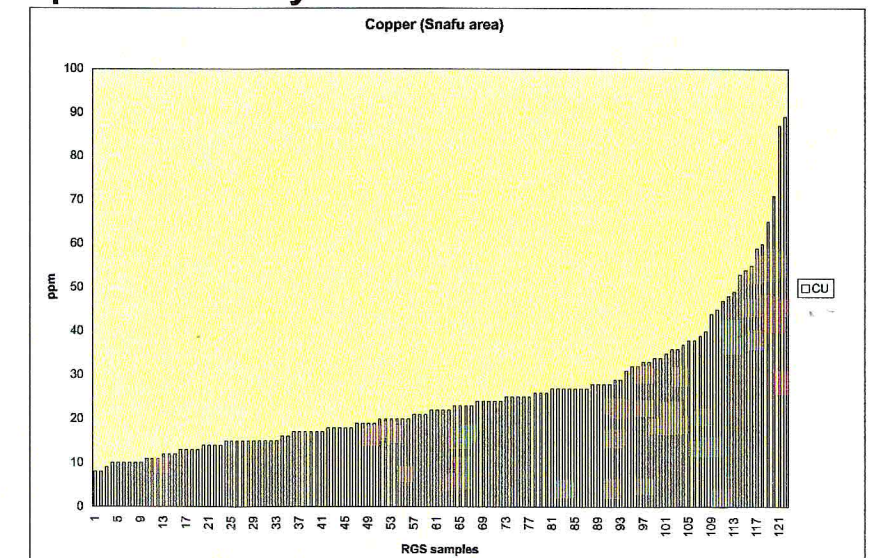
- 0 - 30 ppm
- 30.1 - 40 ppm
- 40.1 - 50 ppm
- 50.1 - 89 ppm



Detection Limit: 2 ppm
Method: AAS- atomic absorption spectrometry

# Samples (n)	122
Maximum	89
Median	22

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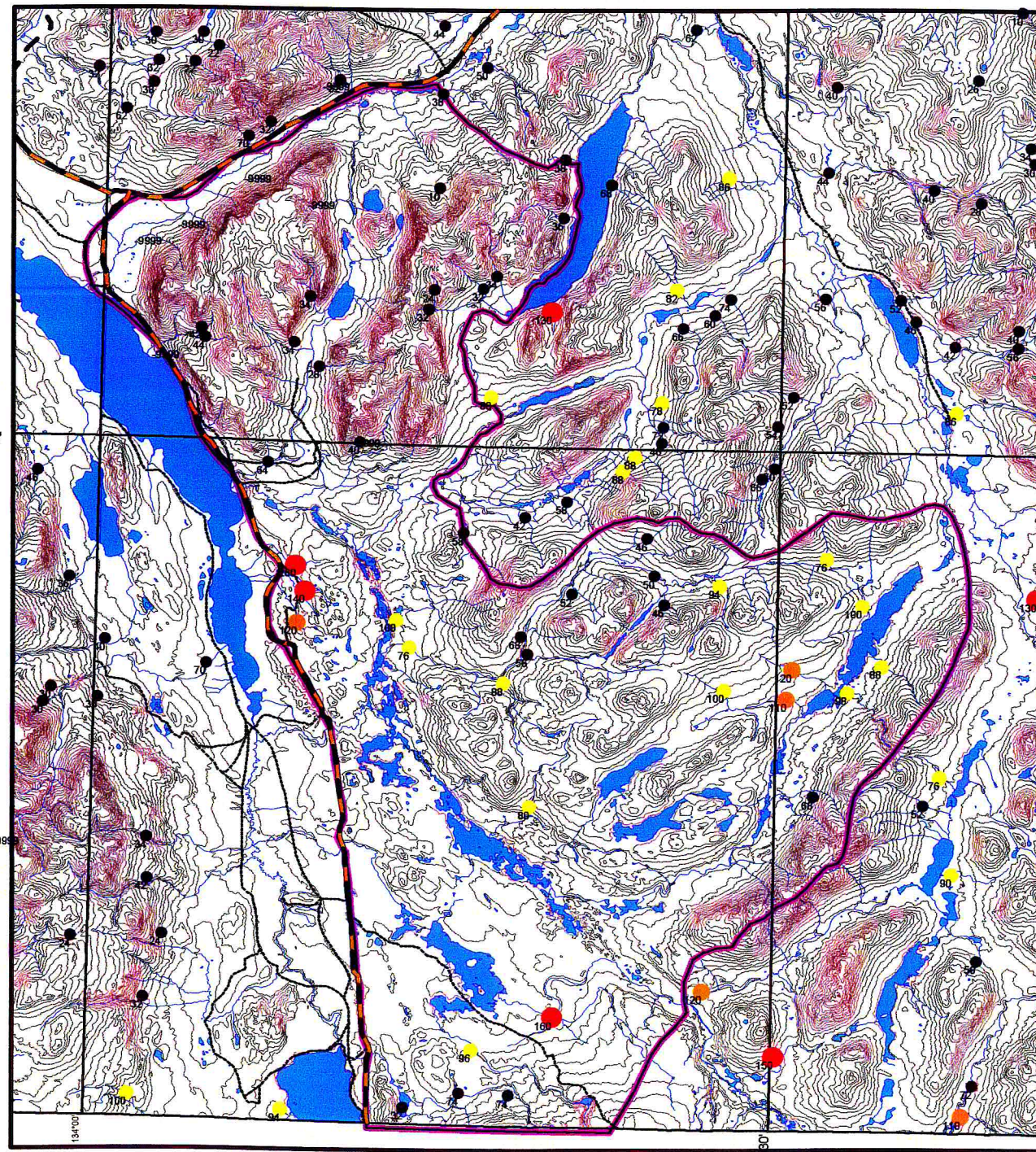


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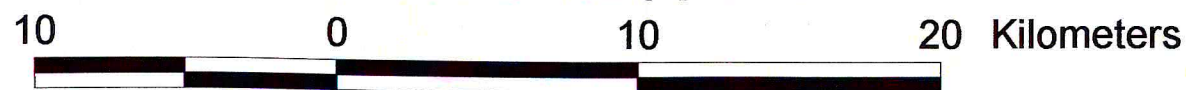
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RGS
Copper - Cu

Regional Stream Sediment Geochemistry in Proposed Snafu /Tarfu SMA Area

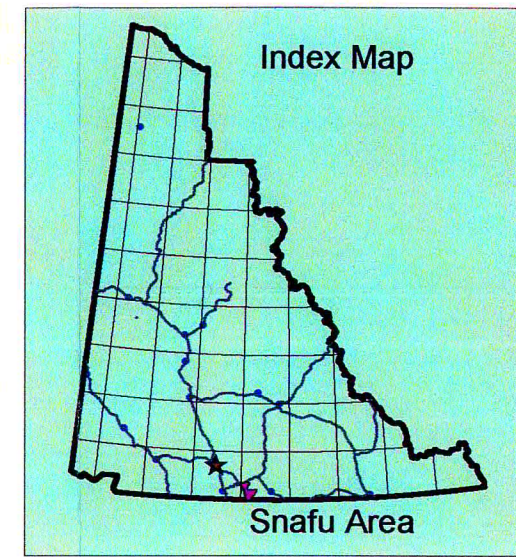


Scale 1:250 000



Fluorine in water - F_w

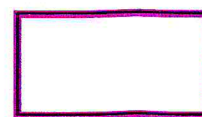
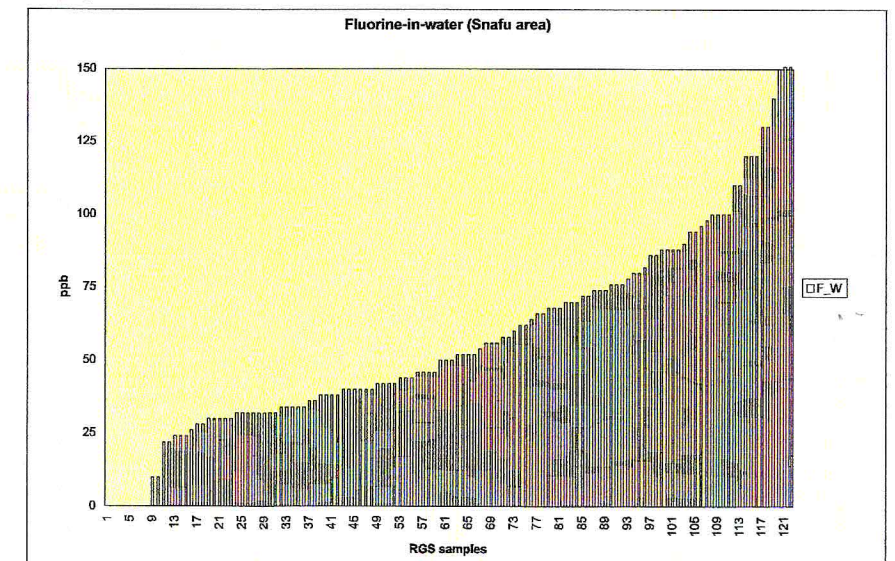
- 0 - 75 ppb
- 75.1 - 100 ppb
- 100.1 - 125 ppb
- 100.1 - 260 ppb



Detection Limit: 20 ppb
Method: ISE - ion selective electrode

# Samples (n)	122
Maximum	260
Median	50

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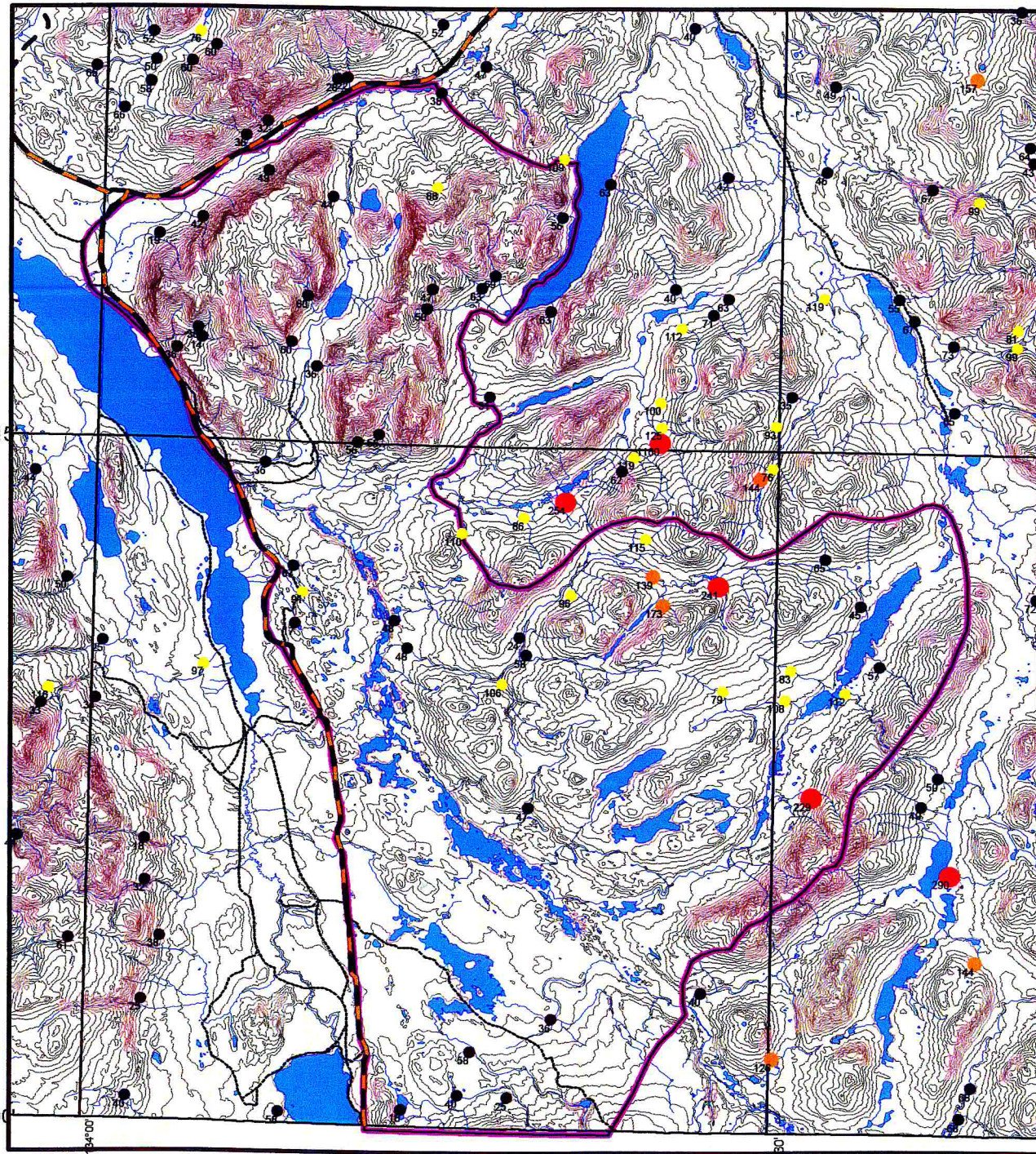


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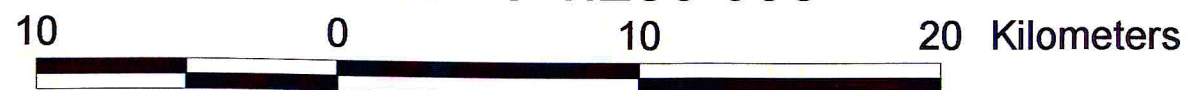
Confidential

RGS
Fluorine in water - F_w

Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area



Scale 1:250 000



Mercury - Hg

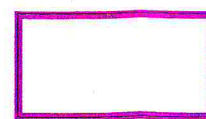
- 0 - 75 ppb
- 76 - 125 ppb
- 126 - 175 ppb
- 176 - 1160 ppb

Detection Limit: 5 ppb

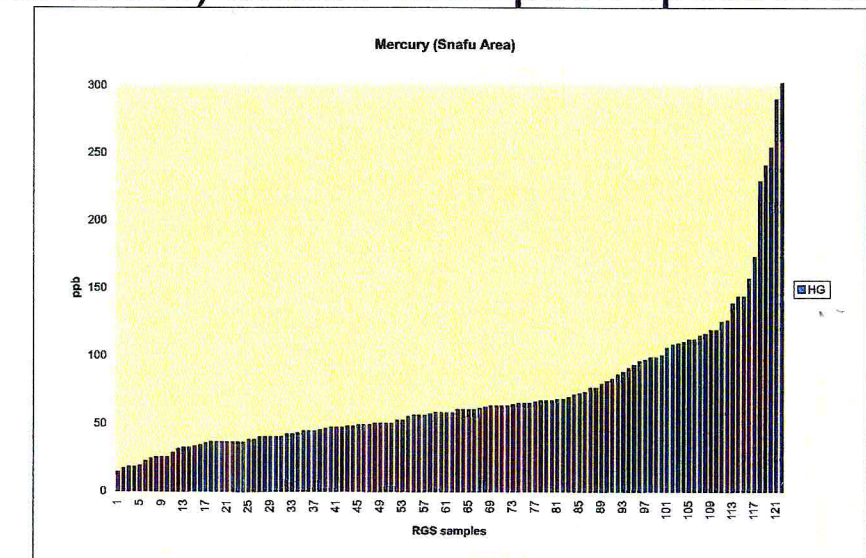
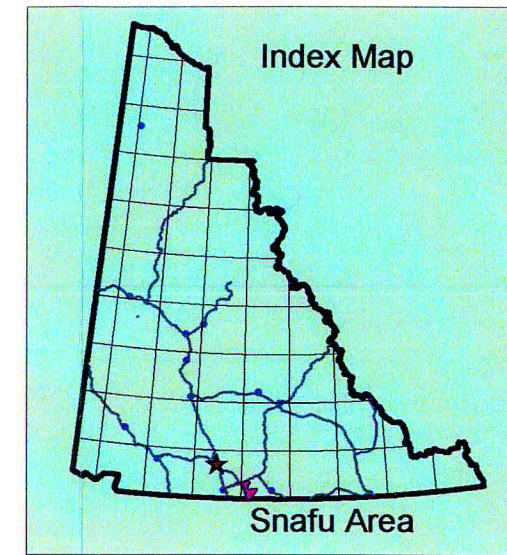
Method: CV-AAS - cold vapour (flameless) atomic absorption spectrometry

# Samples (n)	122
Maximum	1160
Median	58

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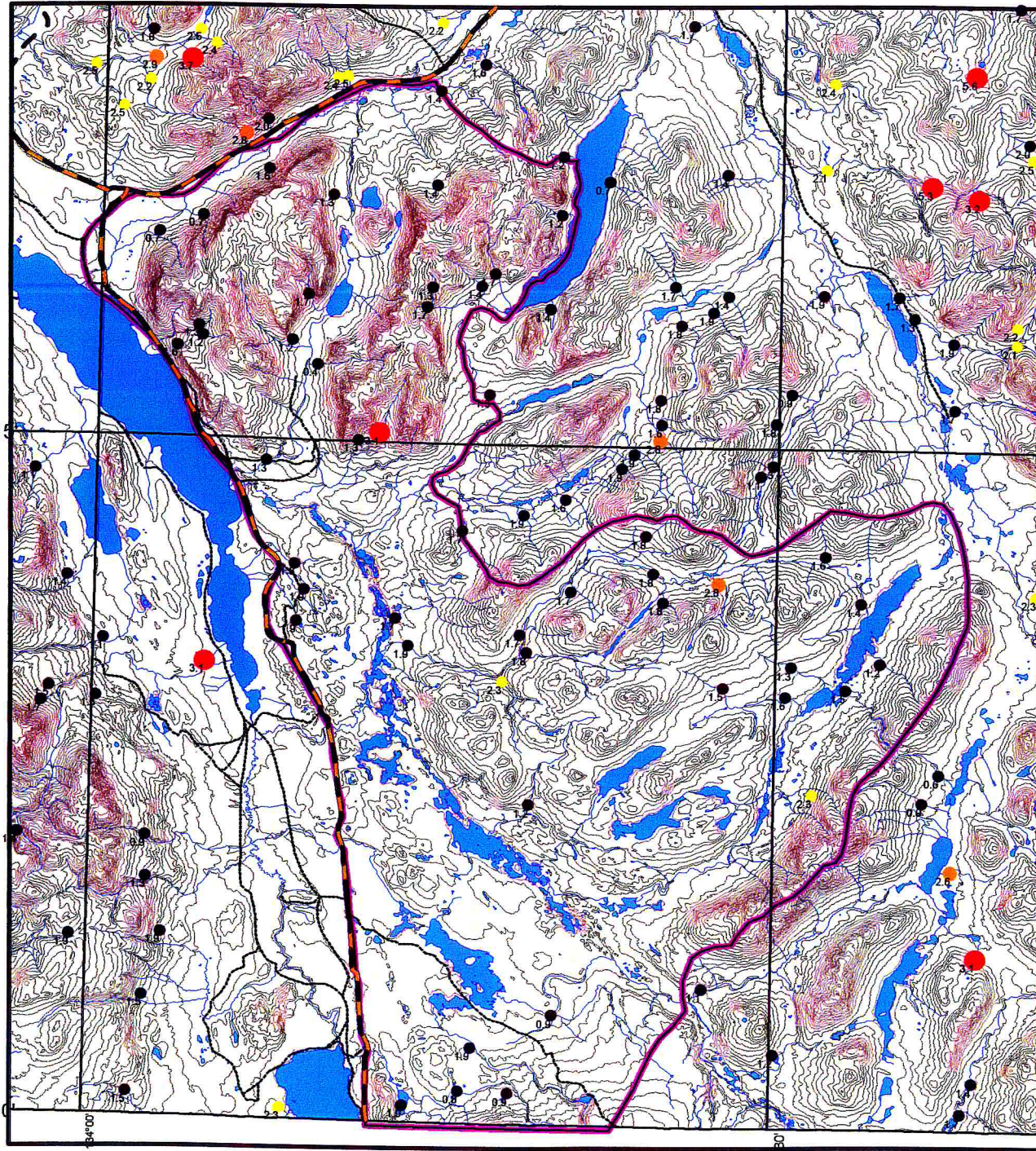
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RGS
Mercury - Hg

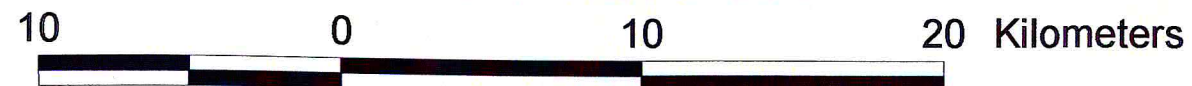
Regional Stream Sediment Geochemistry in Proposed Snafu /Tarfus SMA Area



60°15'

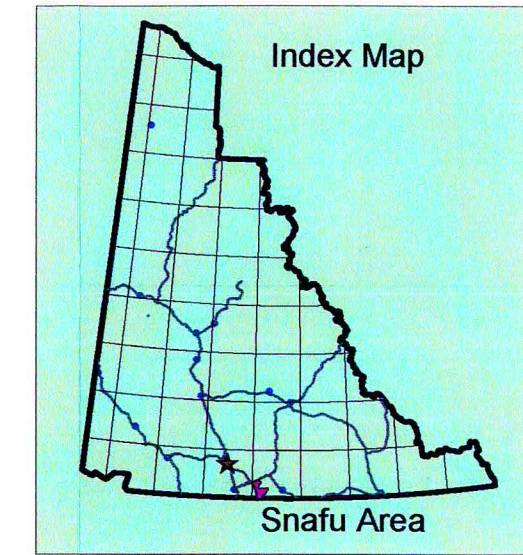
60°00'

Scale 1:250 000



Iron - Fe

- 0 - 2 %
- 2.1 - 2.5 %
- 2.6 - 3 %
- 3.1 - 5.6 %

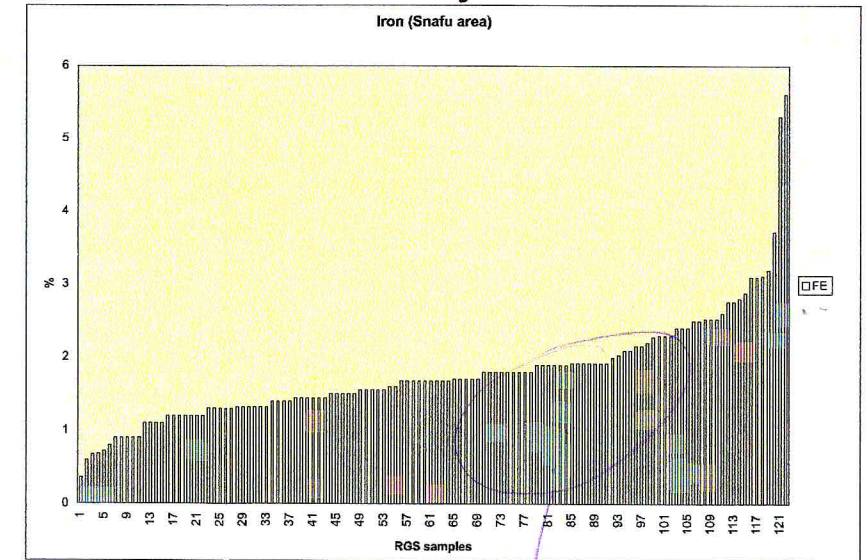


Detection Limit: 0.2 %
Method: INAA - Instrumental Neutron Activation Analysis

# Samples (n)	122
Maximum	5.6
Median	1.68

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Proposed Snafu / Tarfu Natural Environment Park Special Management Area (September 2002 outline)

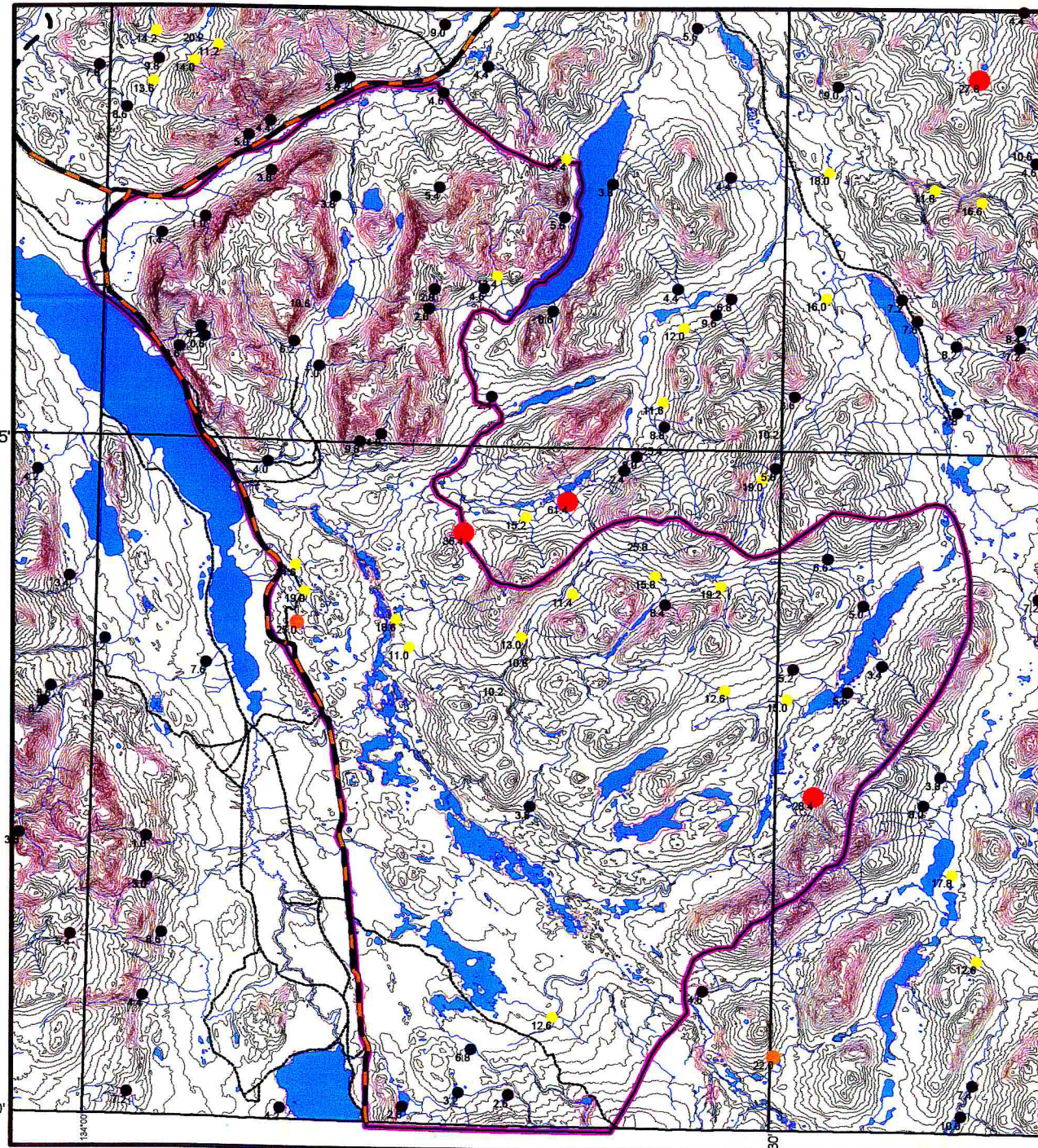


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File on 2 printers?

RGS Iron - Fe

Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area



Scale 1:250 000



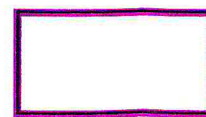
Loss-on-ignition

- 0 - 10 %
- 11 - 20 %
- 21 - 25 %
- 26 - 62 %

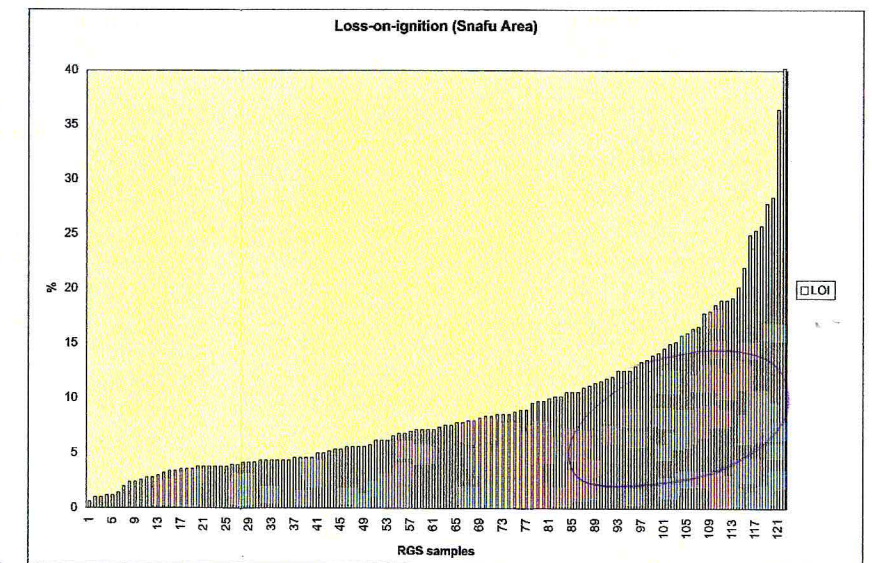
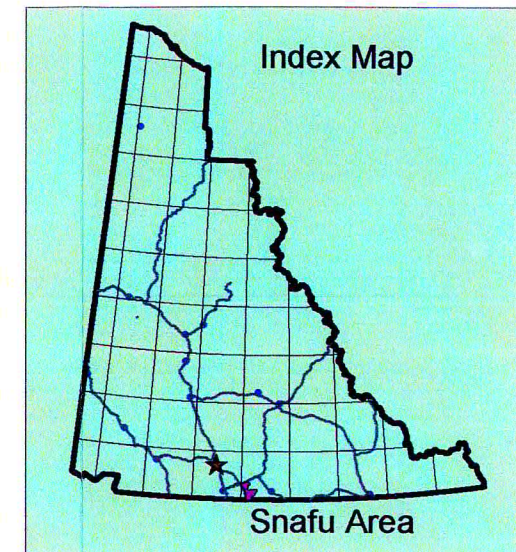
Detection Limit: 1 %
Method: GRAV - gravimetry

Samples (n) 122
Maximum 61.4
Median 7.3

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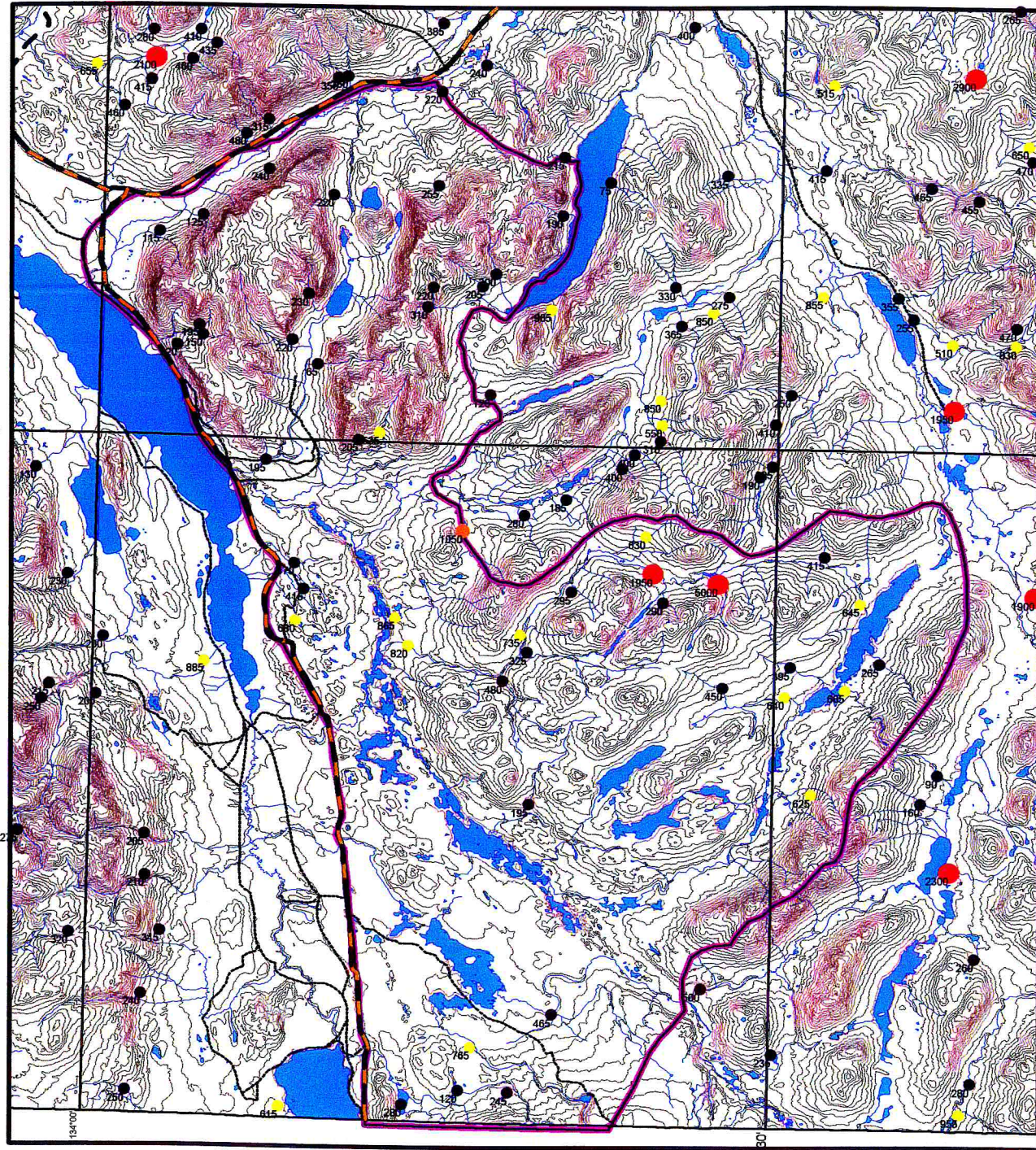
Proposed Snafu / Tarfu
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Loss-on-ignition

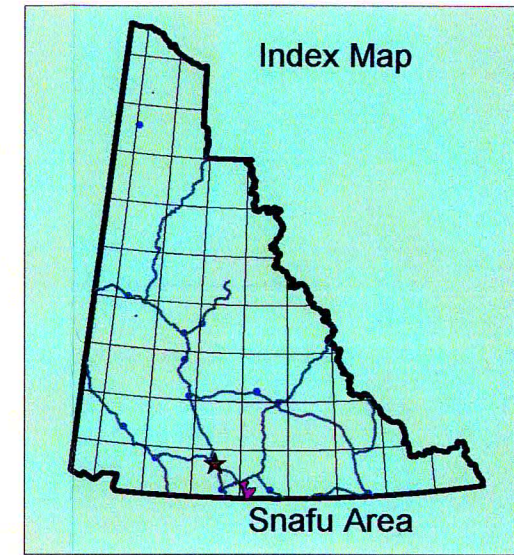
Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area



Scale 1:250 000
 10 0 10 20 Kilometers

Manganese - Mn

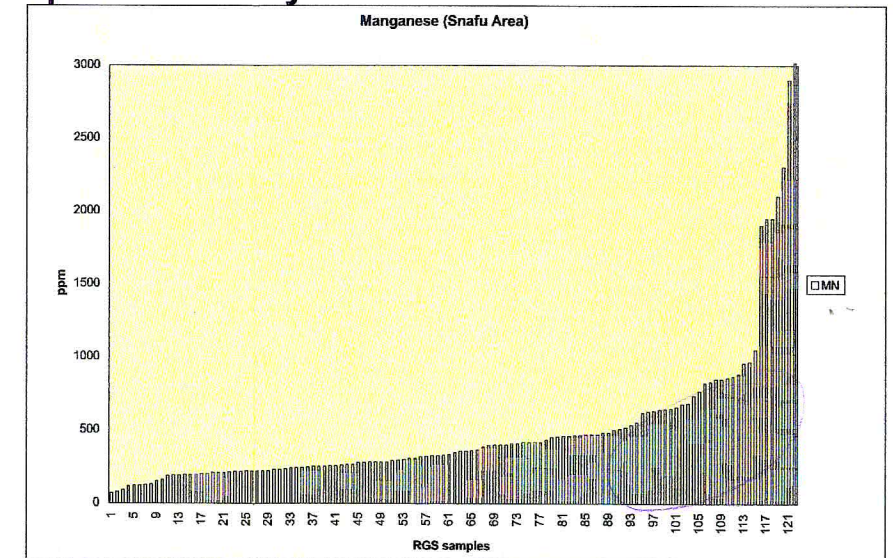
- 0 - 500 ppm
- 501 - 1000 ppm
- 1001 - 1500 ppm
- 1501 - 5000 ppm



Detection Limit: 5 ppm
 Method: AAS- atomic absorption spectrometry

# Samples (n)	122
Maximum	5000
Median	340

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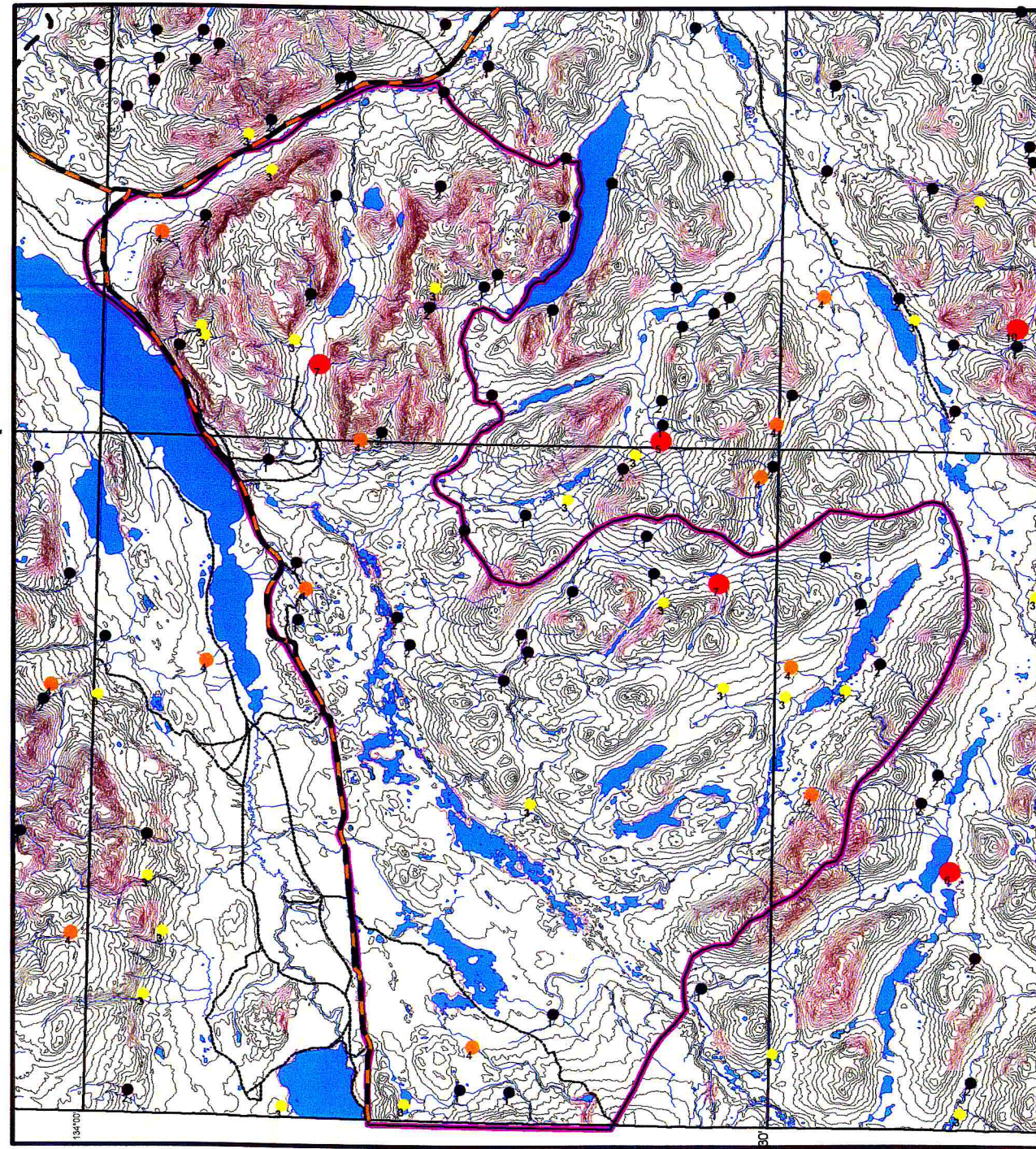


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 Manganese - Mn

Regional Stream Sediment Geochemistry in Proposed Snafu /Tarfus SMA Area

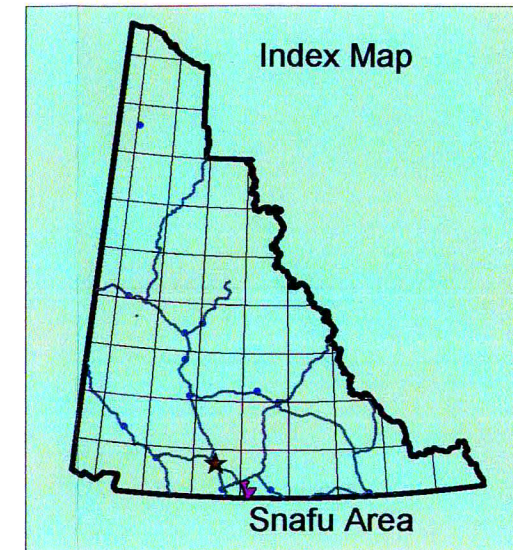


Scale 1:250 000

10 0 10 20 Kilometers

Molybdenum - Mo

- 0 - 2 ppm
- 2.1 - 3 ppm
- 3.1 - 4 ppm
- 4.1 - 10 ppm



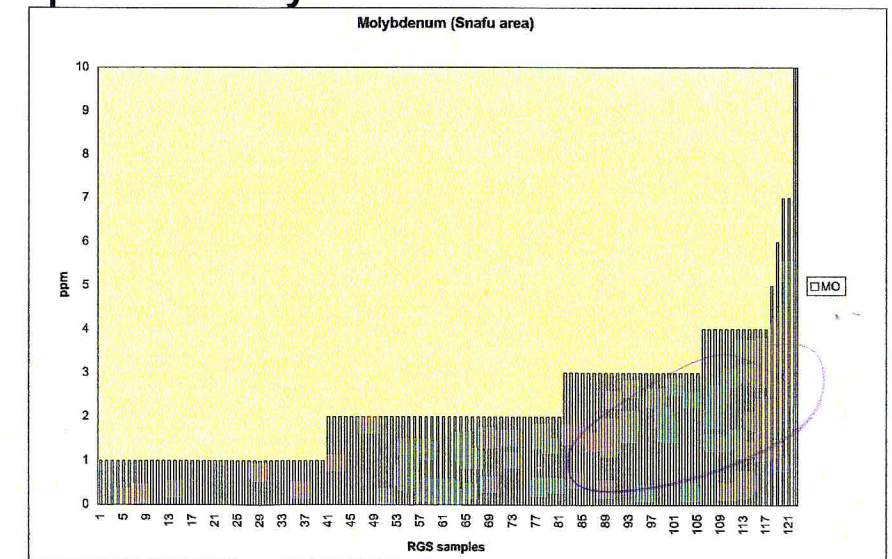
Detection Limit: 2 ppm
Method: AAS- atomic absorption spectrometry

Samples (n) 122
Maximum 10
Median 2

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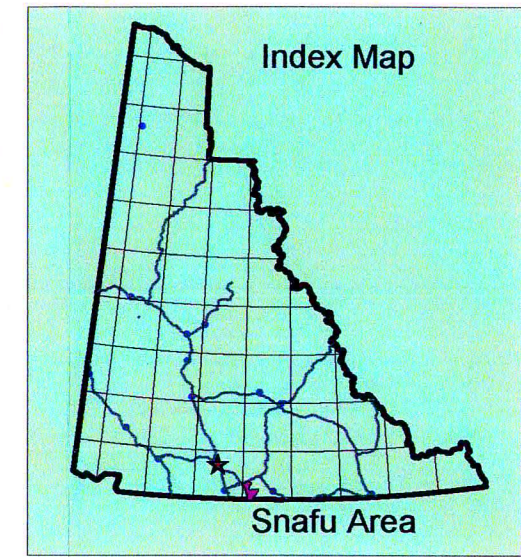
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Molybdenum - Mo

Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area

Nickel - Ni

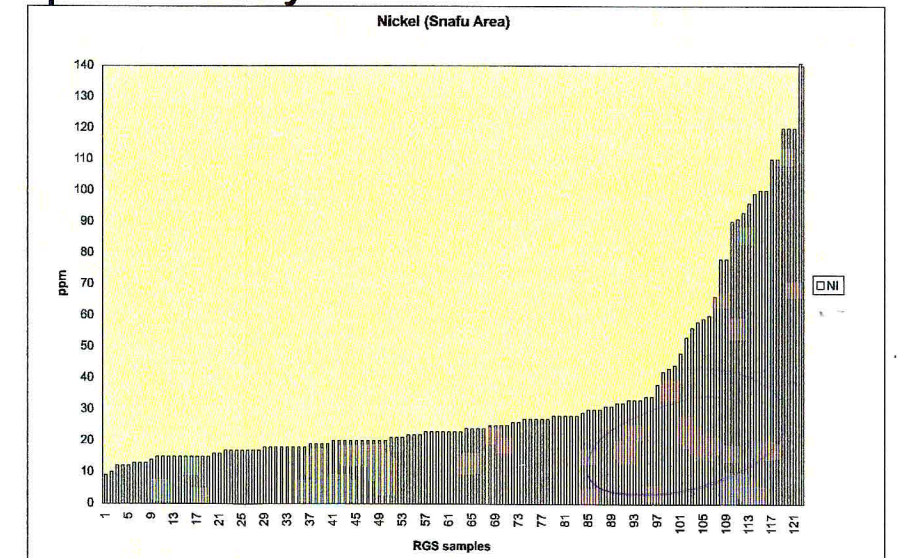
- 0 - 40 ppm
- 40.1 - 70 ppm
- 70.1 - 100 ppm
- 100.1 - 250 ppm



Detection Limit: 2 ppm
Method: AAS- atomic absorption spectrometry

# Samples (n)	122
Maximum	250
Median	23

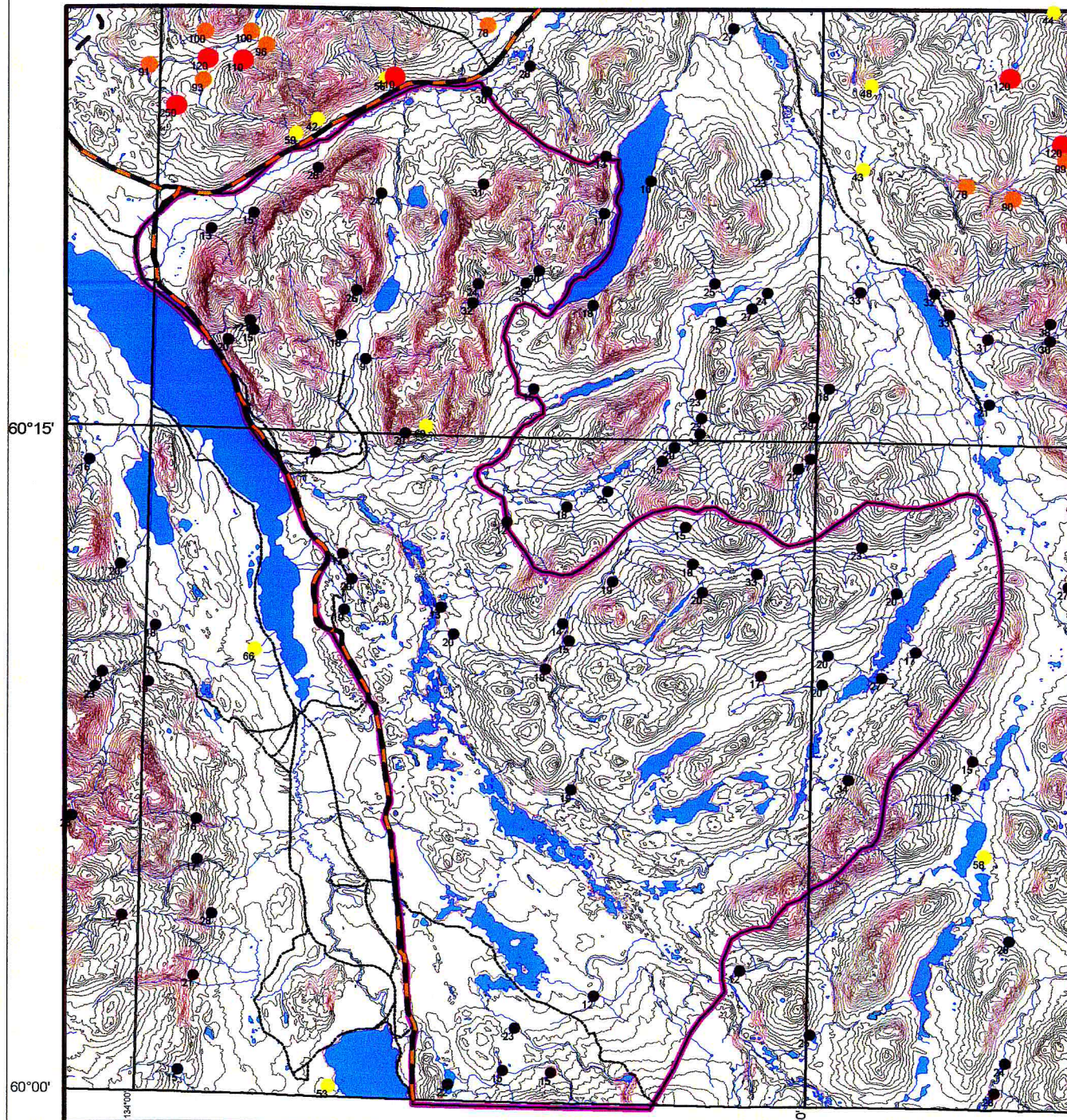
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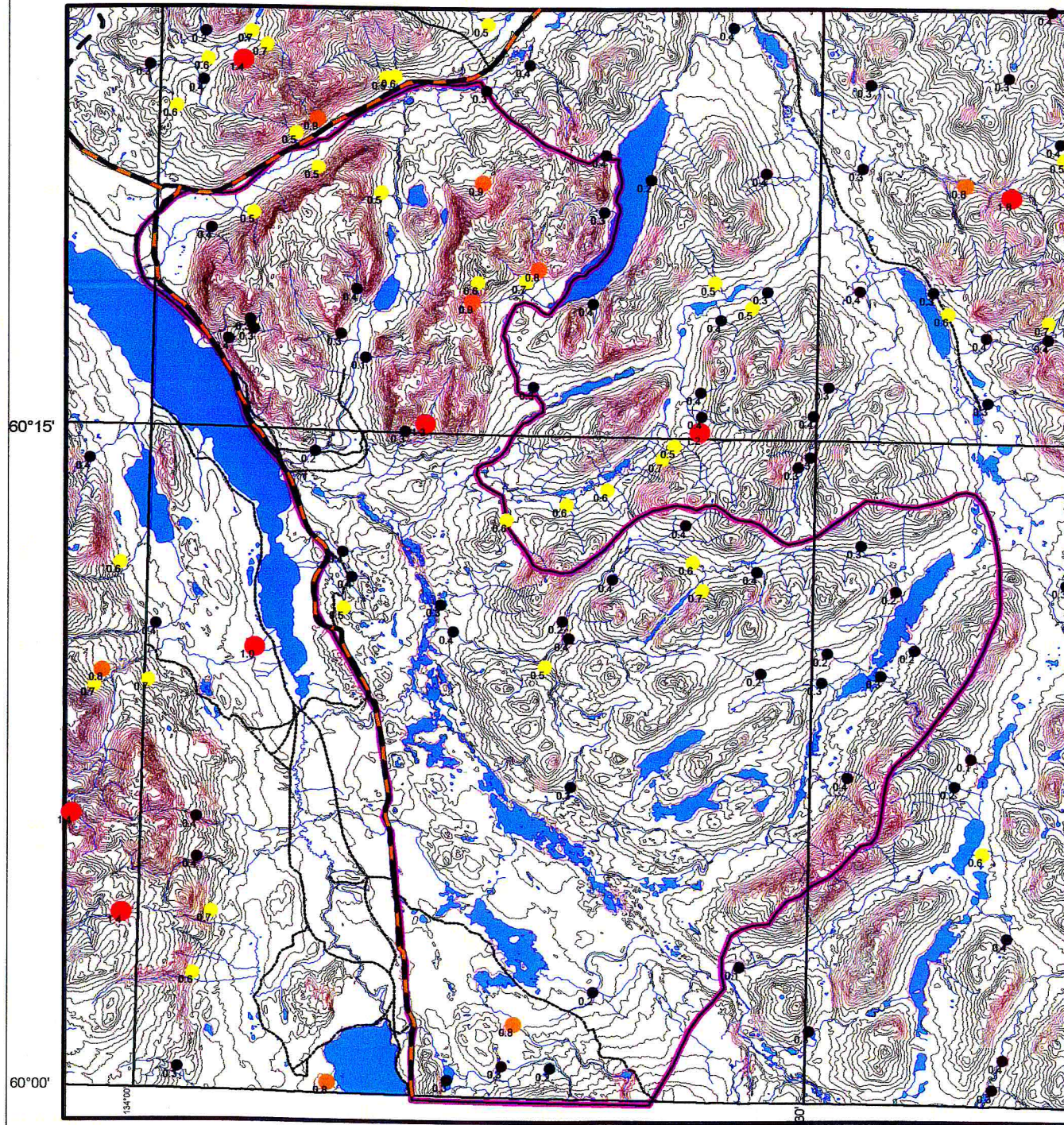
RGS
Nickel - Ni



Scale 1:250 000

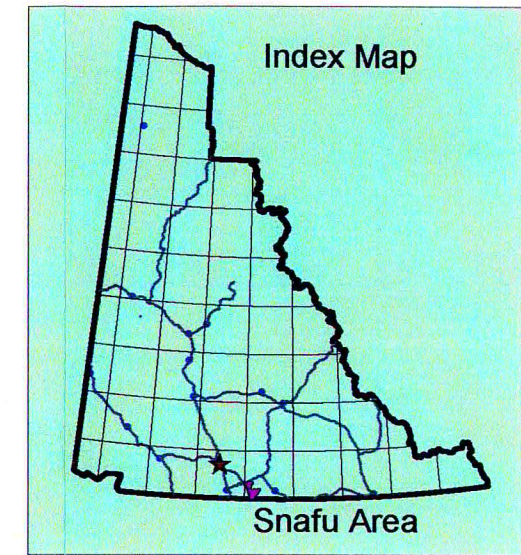


Regional Stream Sediment Geochemistry in Proposed Snafu /Tarfus SMA Area



Antimony - Sb

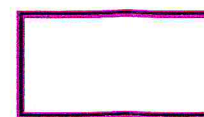
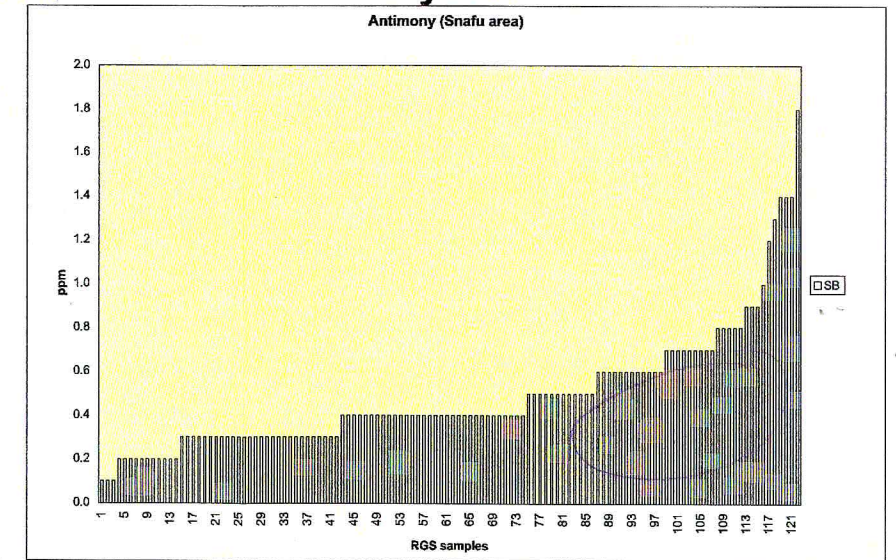
- 0 - 0.4 ppm
- 0.41 - 0.7 ppm
- 0.71 - 0.9 ppm
- 0.91 - 1.8 ppm



Detection Limit: 0.1 ppm
 Method: INAA- instrumental neutron activation analysis

Samples (n) 122
 Maximum 1.8
 Median 0.4

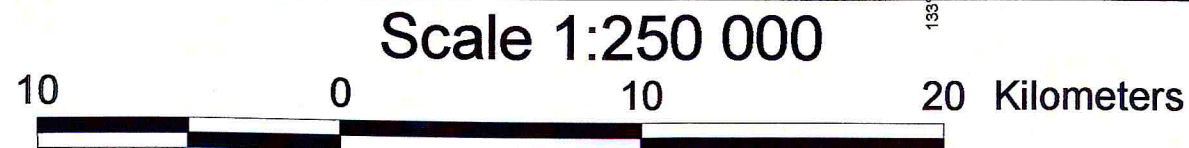
GSC Open File 1217



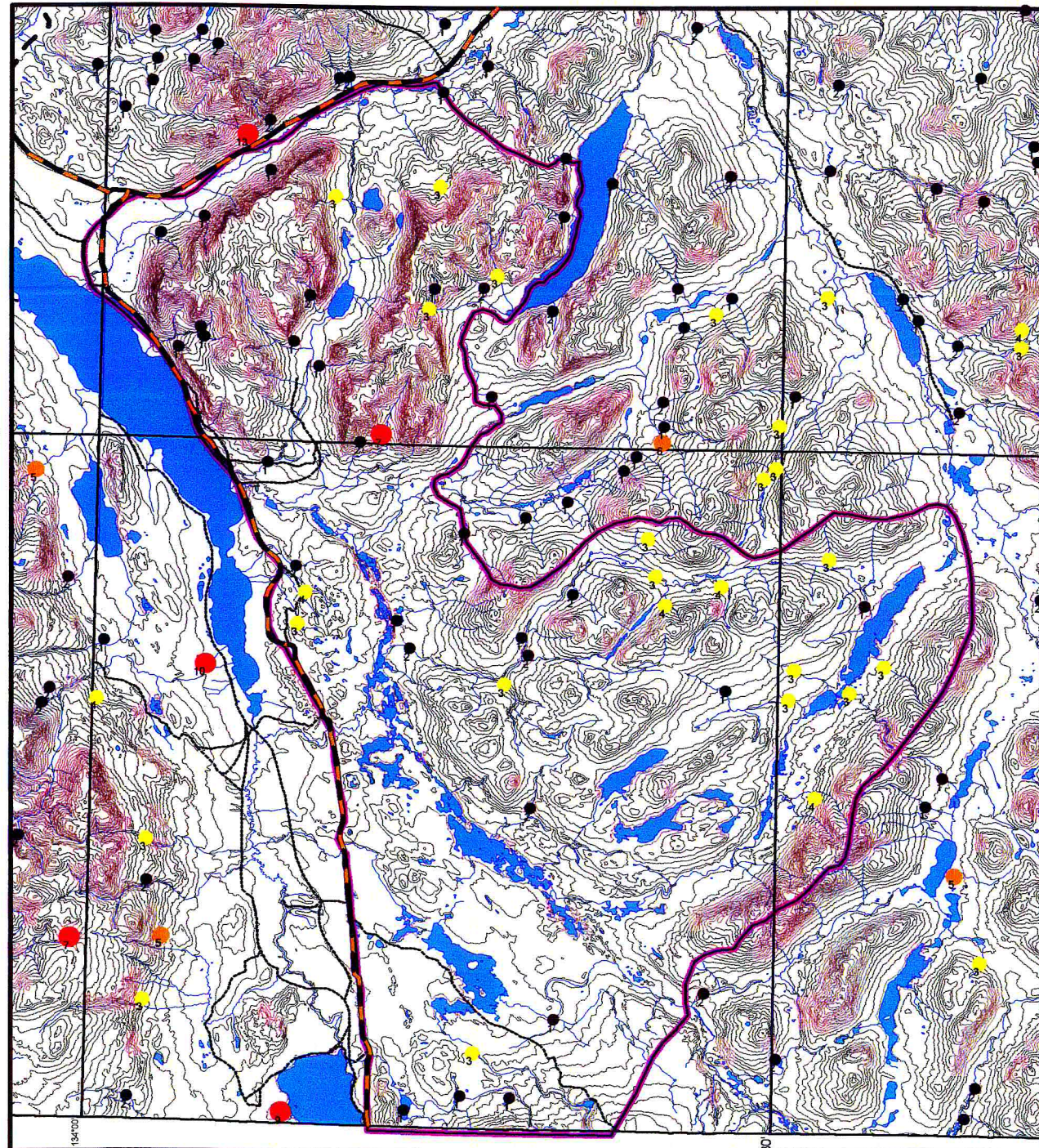
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RGS
 Antimony - Sb



Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area

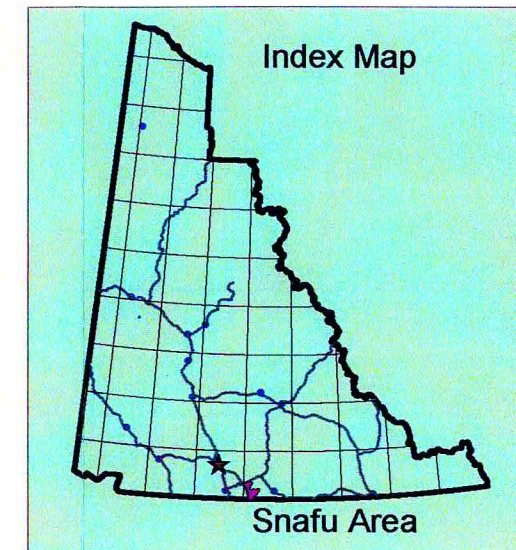


Scale 1:250 000



Lead - Pb

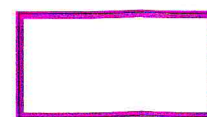
- 0 - 2 ppm
- 2.1 - 4 ppm
- 4.1 - 6 ppm
- 6.1 - 13 ppm



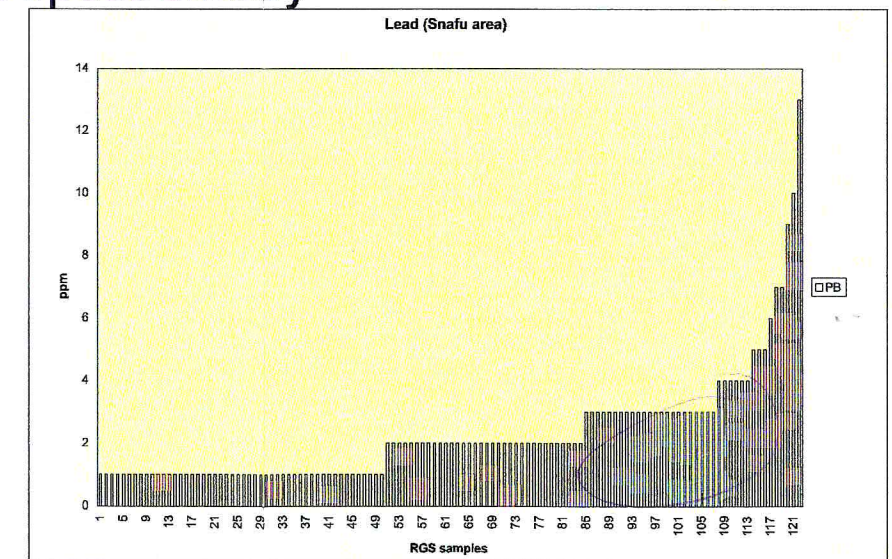
Detection Limit: 2 ppm
Method: AAS- atomic absorption spectrometry

# Samples (n)	122
Maximum	13
Median	2

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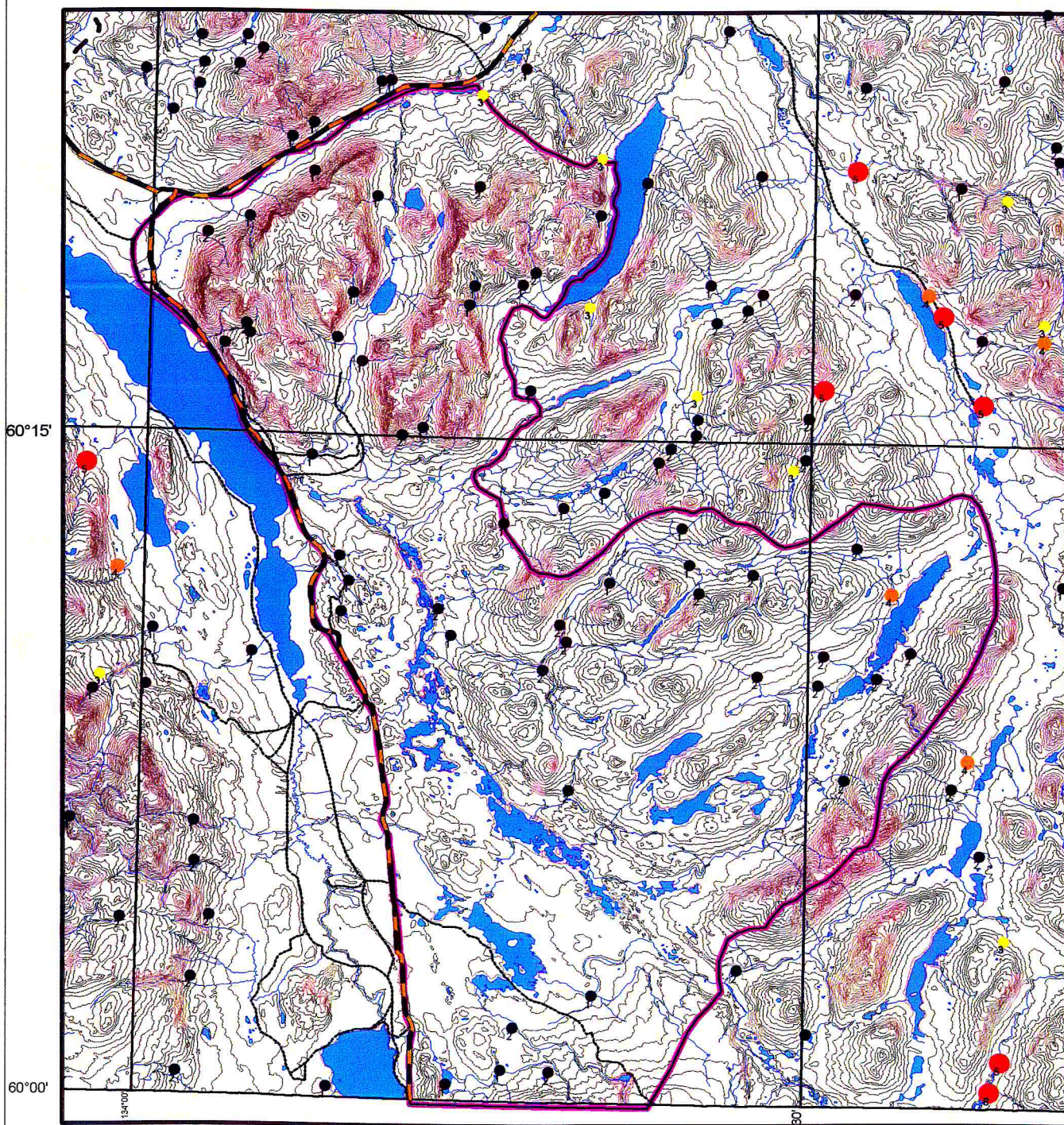
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Lead - Pb

Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area



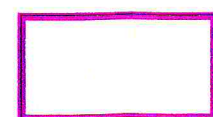
Tin - Sn

- 0 - 2 ppm
- 2.1 - 3 ppm
- 3.1 - 4 ppm
- 4.1 - 8 ppm

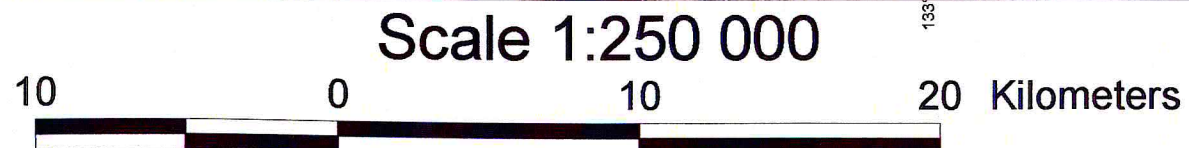
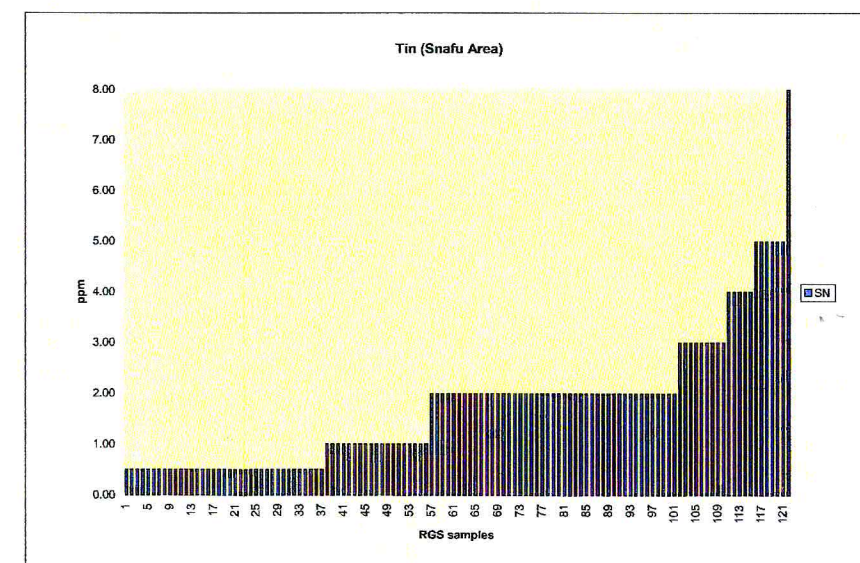
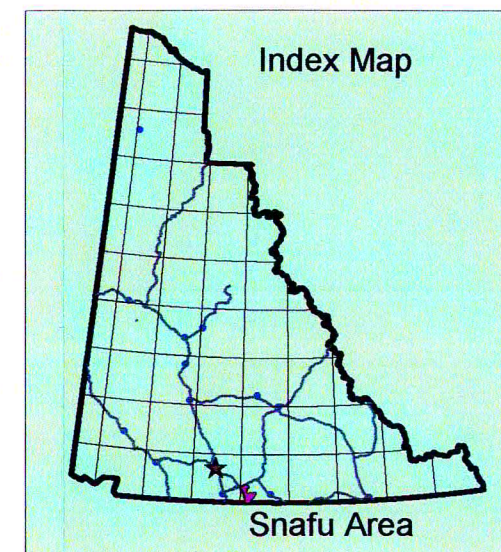
Detection Limit: 1 ppm
Method: FUS - NH4I fusion

Samples (n) 122
Maximum 8
Median 2

GSC Open File 1217



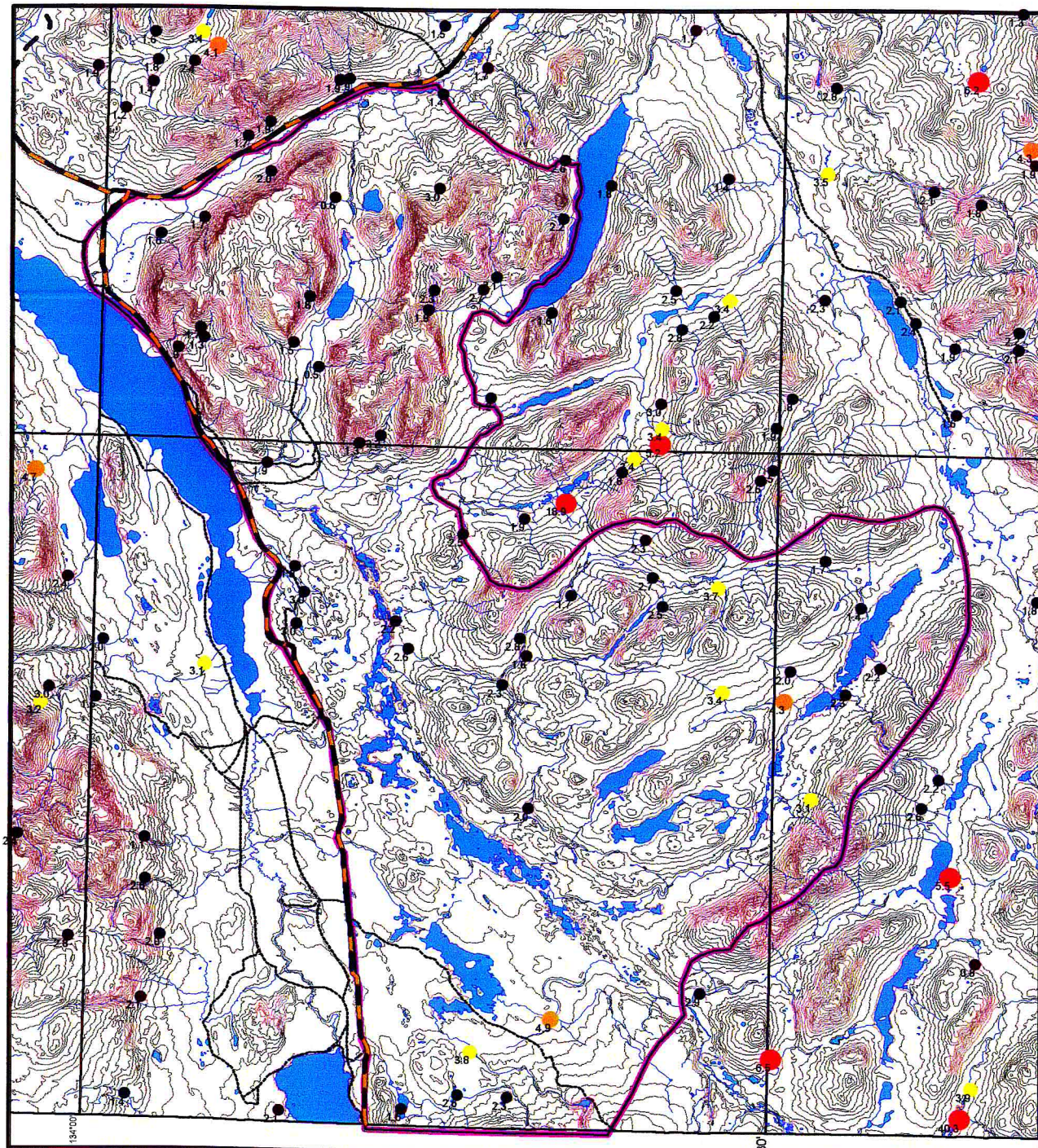
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RGS
Tin - Sn

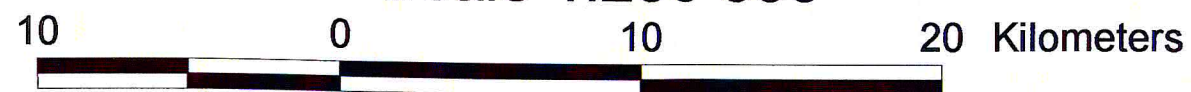
Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area



60°15'

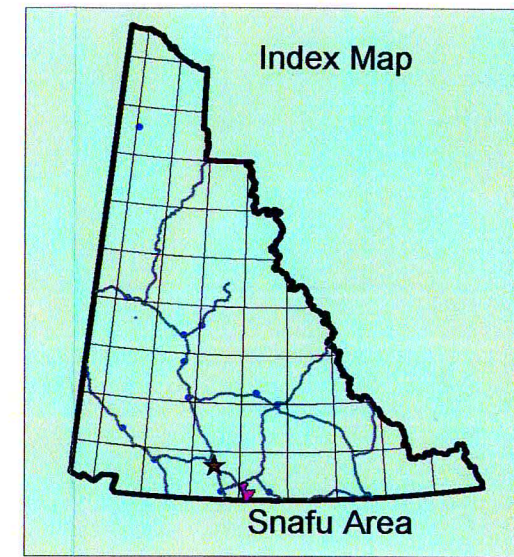
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Scale 1:250 000



Uranium - U

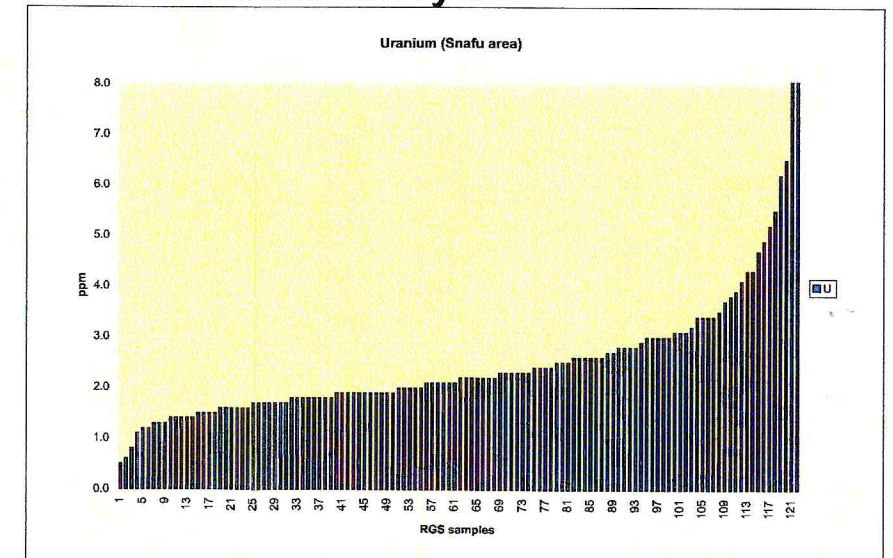
- 0 - 3 ppm
- 3.1 - 4 ppm
- 4.1 - 5 ppm
- 5.1 - 40.3 ppm



Detection Limit: 0.2 ppm
Method: INAA - instrumental neutron activation analysis

Samples (n) 122
Maximum 40.3
Median 2.2

GSC Open File 1217



Proposed Snafu / Tarfu
Natural Environment Park
Special Management Area
(September 2002 outline)

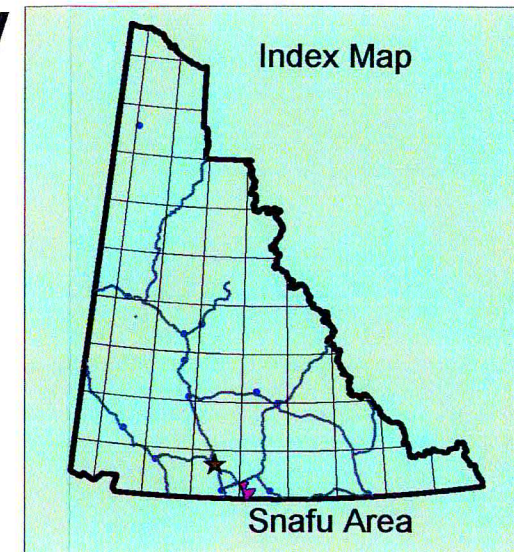
Confidential

RGS
Uranium - U

Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area

Uranium in water - U_w

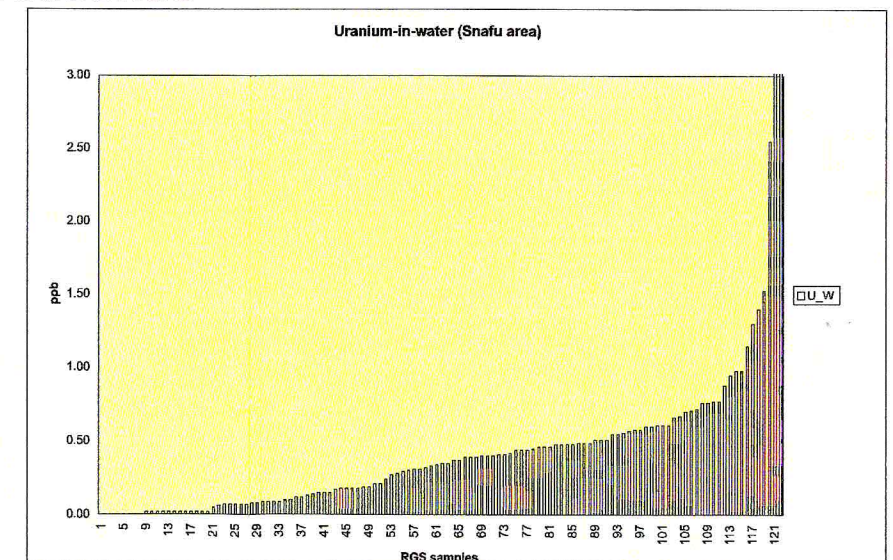
- 0 - 0.5 ppb
- 0.51 - 1.0 ppb
- 1.01 - 1.5 ppb
- 1.51 - 4.25 ppb



Detection Limit: 0.5 ppb
Method: LIF - laser-induced fluorescence

Samples (n) 122
Maximum 4.25
Median 0.34

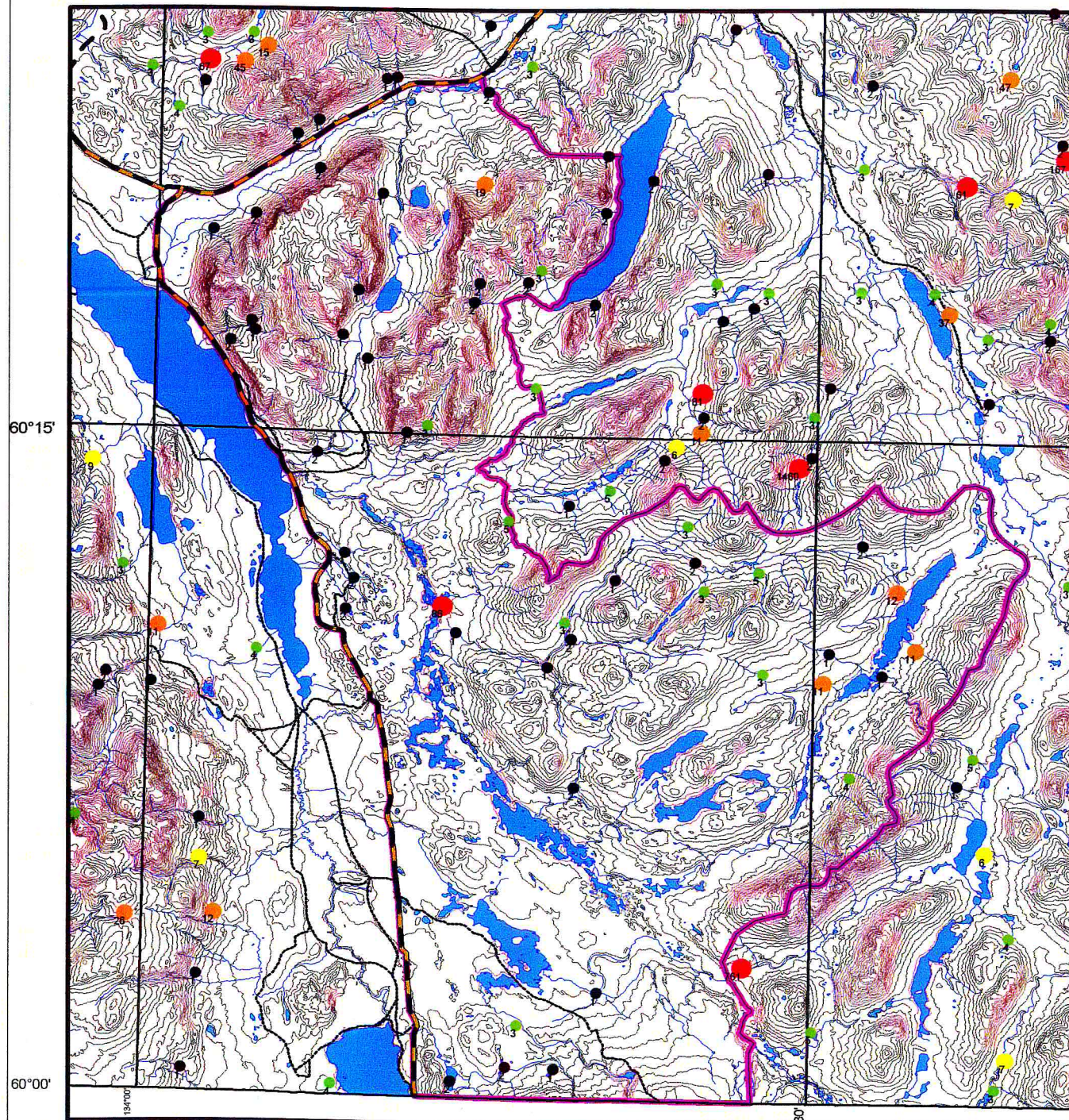
GSC Open File 1217



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Natural Environment Park
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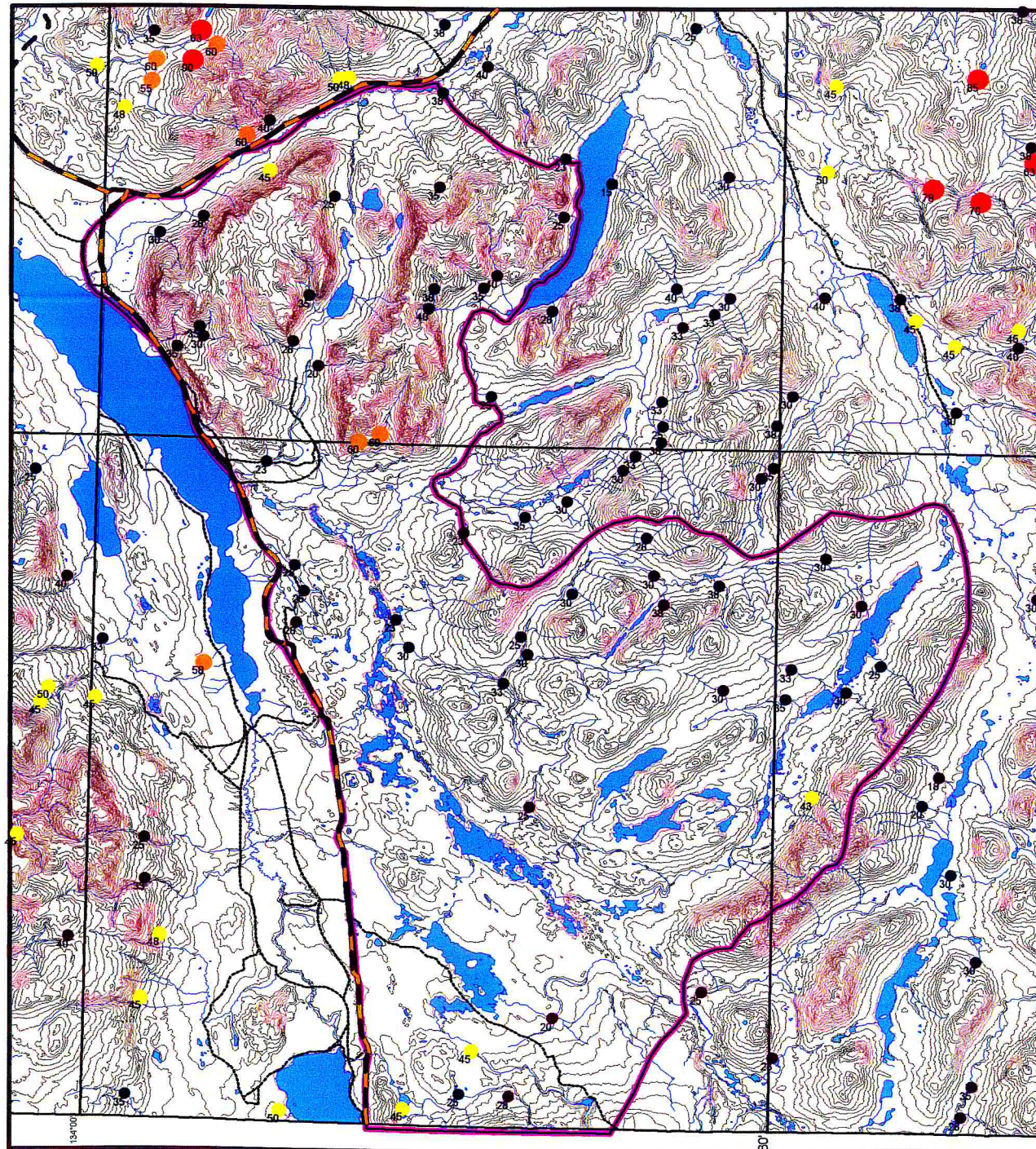
RGS
Uranium in water - U_w



Scale 1:250 000

10 0 10 20 Kilometers

Regional Stream Sediment Geochemistry in Proposed Snafu /Tarfus SMA Area

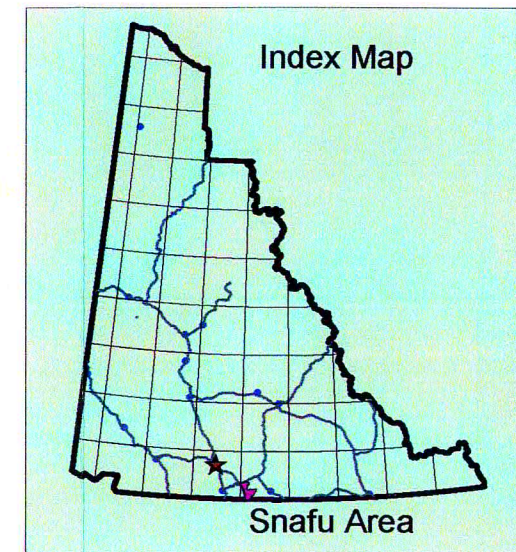


Scale 1:250 000



Vanadium - V

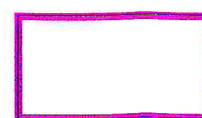
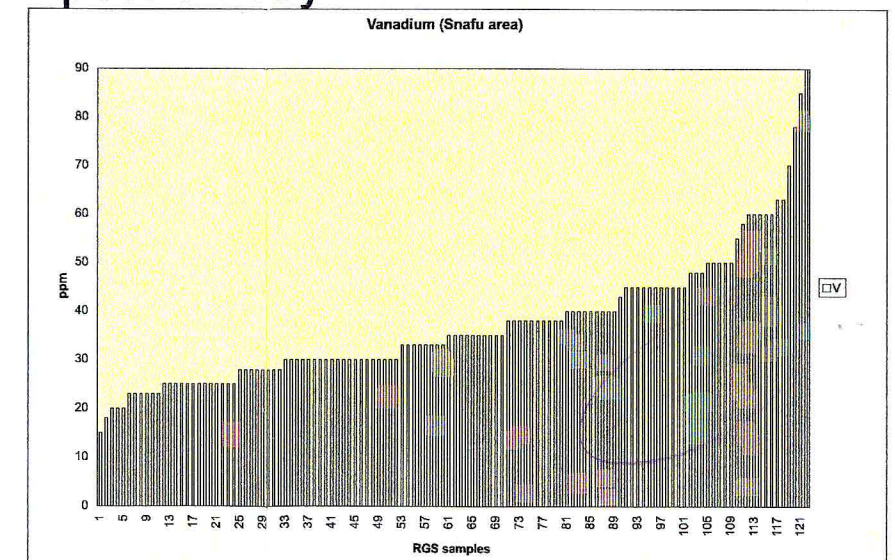
- 0 - 40 ppm
- 40.1 - 50 ppm
- 50.1 - 60 ppm
- 60.1 - 90 ppm



Detection Limit: 5 ppm
Method: AAS - atomic absorption spectrometry

# Samples (n)	122
Maximum	90
Median	35

GSC Open File 1217

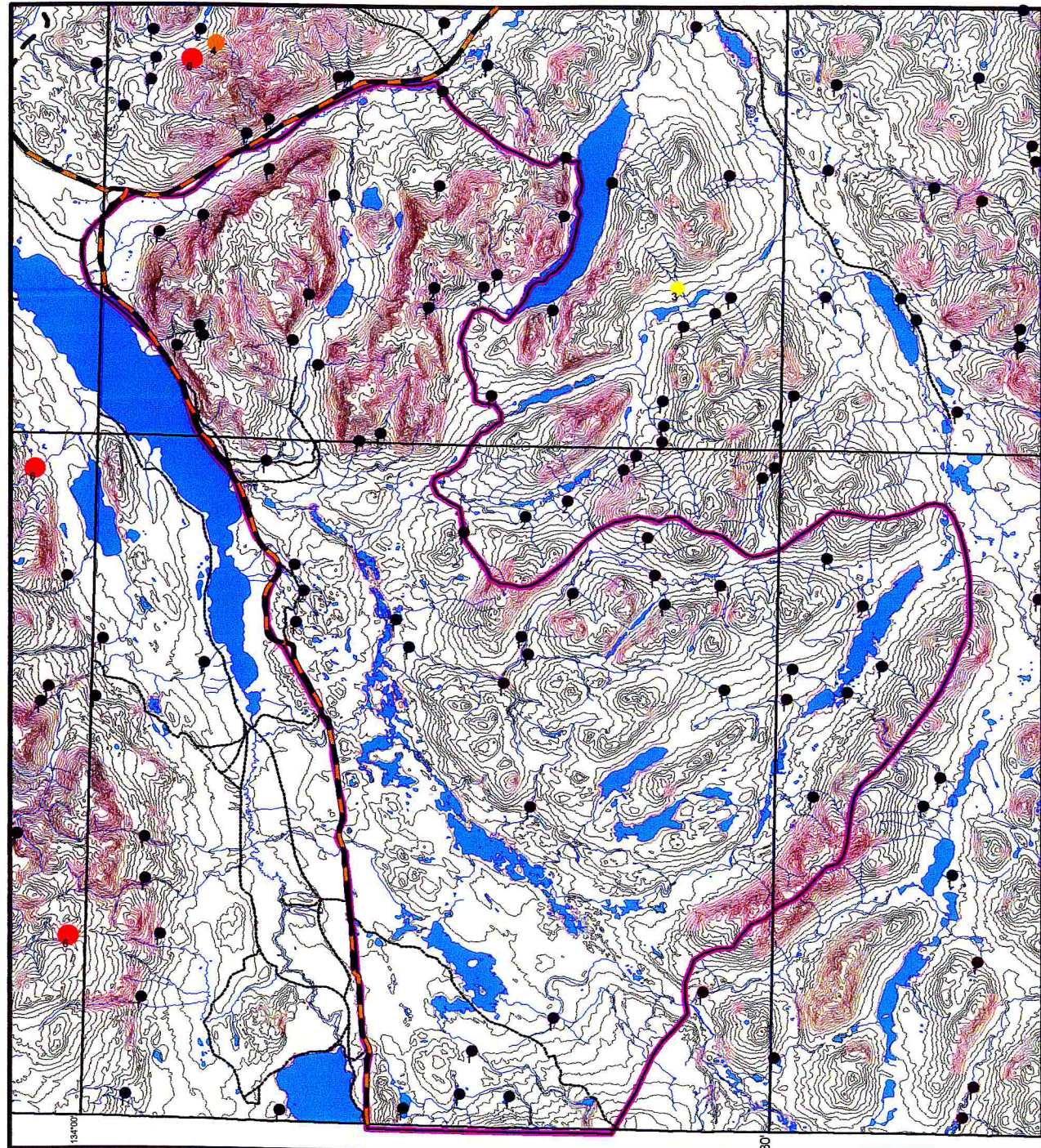


Proposed Snafu / Tarfus
Natural Environment Park
Special Management Area
(September 2002 outline)

Confidential

RGS
Vanadium - V

Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area



60°15'

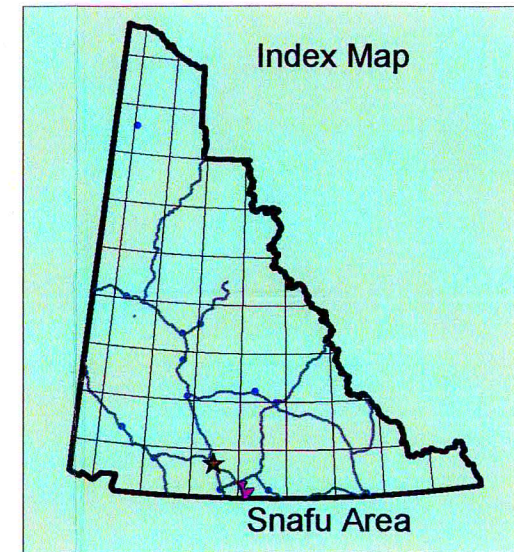
60°00'

Scale 1:250 000



Tungsten - W

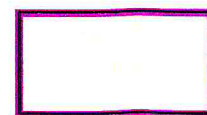
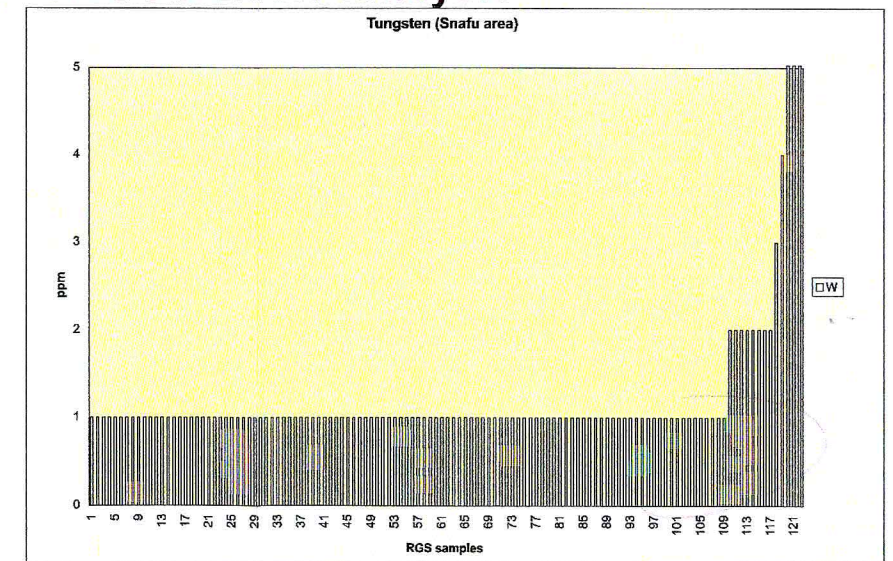
- 0 - 2 ppm
- 2.1 - 3 ppm
- 3.1 - 4 ppm
- 4.1 - 6 ppm



Detection Limit: 1 ppm
 Method: INAA - instrumental neutron activation analysis

Samples (n) 122
 Maximum 6
 Median 1

GSC Open File 1217

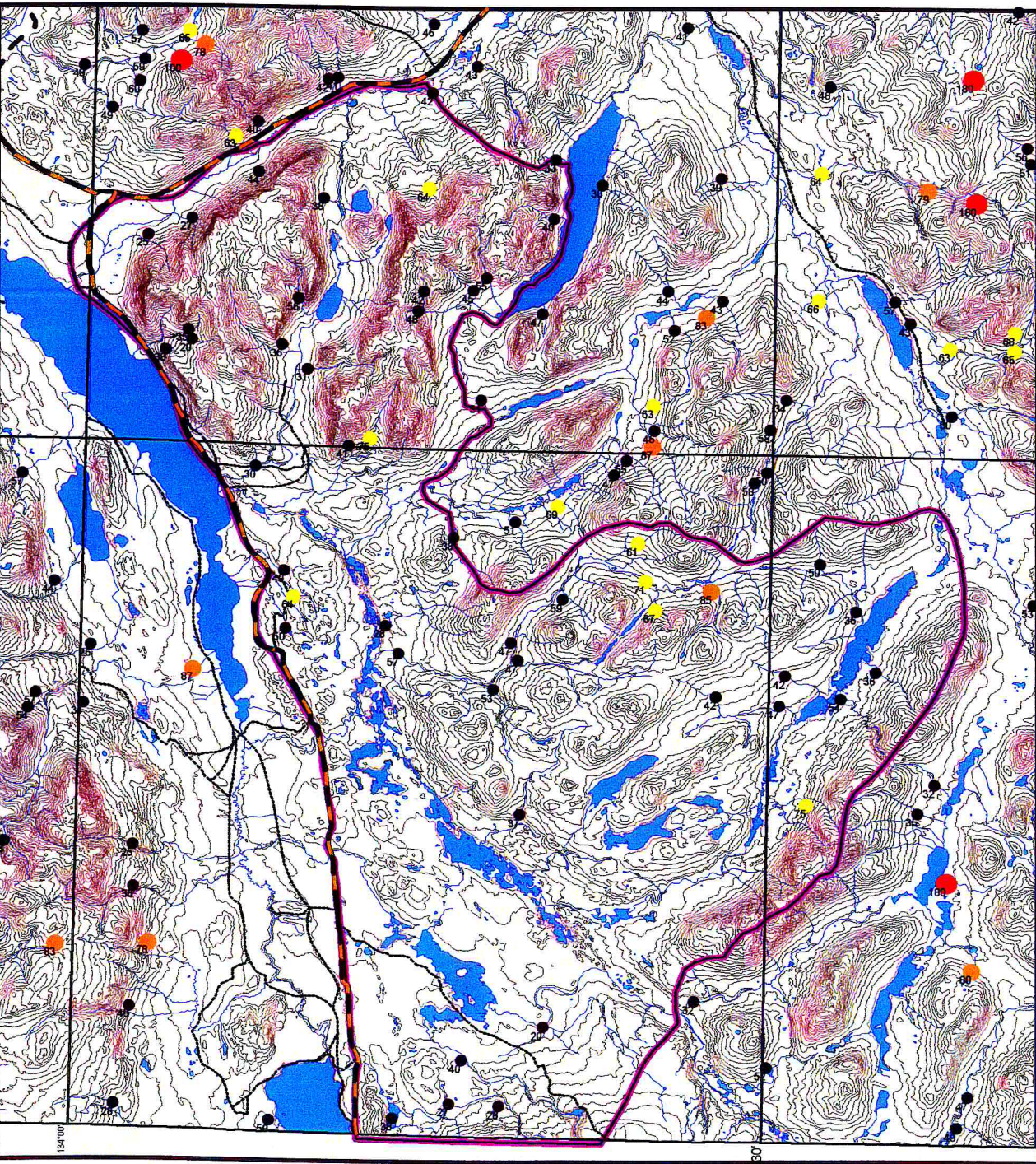


Proposed Snafu / Tarfu
 Natural Environment Park
 Special Management Area
 (September 2002 outline)

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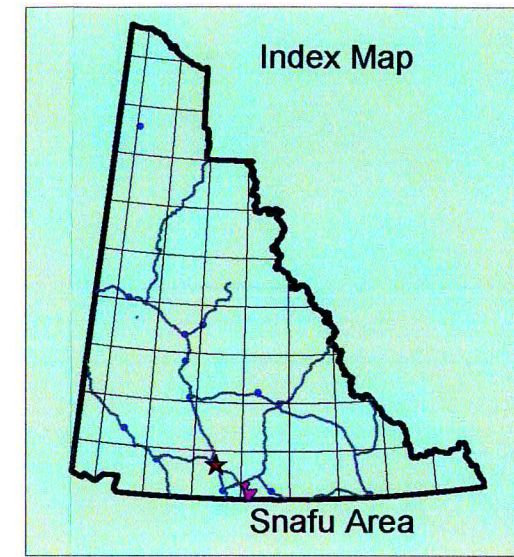
RGS
 Tungsten - W

Regional Stream Sediment Geochemistry in Proposed Snafu/Tarfu SMA Area



Zinc - Zn

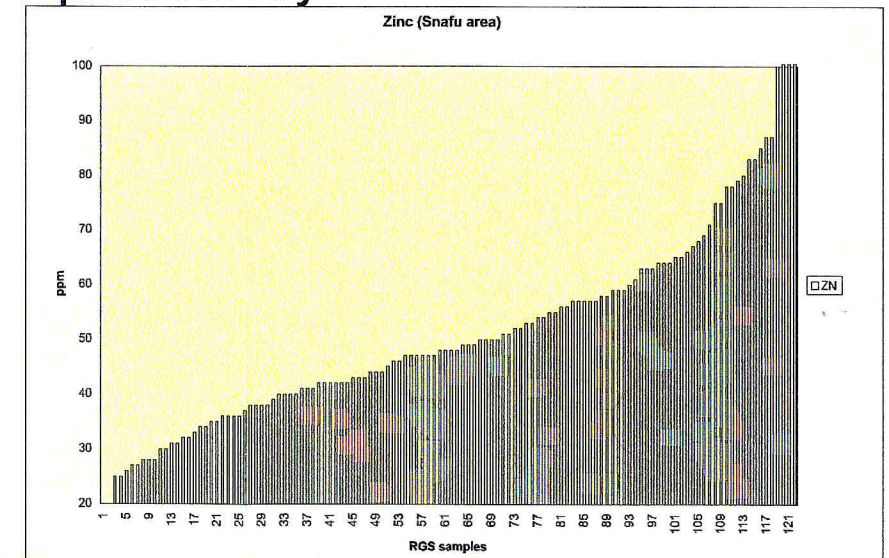
- 0 - 60 ppm
- 60.1 - 75 ppm
- 75.1 - 90 ppm
- 90.1 - 180 ppm



Detection Limit: 2 ppm
 Method: AAS - atomic absorption spectrometry

# Samples (n)	122
Maximum	180
Median	48

GSC Open File 1217



 Proposed Snafu / Tarfu Natural Environment Park Special Management Area (September 2002 outline)

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RGS
Zinc - Zn

Appendix IV: Mineral Deposit Models

by Chris Ash and Dani Alldrick



IDENTIFICATION

SYNONYMS: Mother Lode veins, greenstone gold, Archean lode gold, mesothermal gold-quartz veins, shear-hosted lode gold, low-sulphide gold-quartz veins, lode gold.

COMMODITIES (BYPRODUCTS): Au (Ag, Cu, Sb).

EXAMPLES (British Columbia (MINFILE #) - Canada/ International):

- **Phanerozoic:** Bralorne-Pioneer (092JNE001), Erickson (104P029), Taurus (104P012), Polaris-Taku (104K003), Mosquito Creek (093H010), Cariboo Gold Quartz (093H019), Midnight (082FSW119); *Carson Hill, Jackson-Plymouth, Mother Lode district; Empire Star and Idaho-Maryland, Grass Valley district (California, USA); Alaska-Juneau, Jualin, Kensington (Alaska, USA), Ural Mountains (Russia).*
- **Archean:** *Hollinger, Dome, McIntyre and Pamour, Timmins camp; Lake Shore, Kirkland Lake camp; Campbell, Madsen, Red Lake camp; Kerr-Addison, Larder Lake camp (Ontario, Canada), Lamaque and Sigma, Val d'Or camp (Quebec, Canada); Granny Smith, Kalgoorlie and Golden Mile (Western Australia); Kolar (Karnataka, India), Blanket-Vubachikwe (Zimbabwe, Africa).*

GEOLOGICAL CHARACTERISTICS

CAPSULE DESCRIPTION: Gold-bearing quartz veins and veinlets with minor sulphides crosscut a wide variety of hostrocks and are localized along major regional faults and related splays. The wallrock is typically altered to silica, pyrite and muscovite within a broader carbonate alteration halo.

TECTONIC SETTINGS:

- **Phanerozoic:** Contained in moderate to gently dipping fault/suture zones related to continental margin collisional tectonism. Suture zones are major crustal breaks which are characterized by dismembered ophiolitic remnants between diverse assemblages of island arcs, subduction complexes and continental-margin clastic wedges.
- **Archean:** Major transcrustal structural breaks within stable cratonic terranes. May represent remnant terrane collisional boundaries.

DEPOSITIONAL ENVIRONMENT / GEOLOGICAL SETTING: Veins form within fault and joint systems produced by regional compression or transpression (terrane collision), including major listric reverse faults, second and third-order splays. Gold is deposited at crustal levels within and near the brittle-ductile transition zone at depths of 6-12 km, pressures between 1 to 3 kilobars and temperatures from 200° to 400 °C. Deposits may have a vertical extent of up to 2 km, and lack pronounced zoning.

AGE OF MINERALIZATION: Mineralization is post-peak metamorphism (*i.e.* late syncollisional) with gold-quartz veins particularly abundant in the Late Archean and Mesozoic.

- **Phanerozoic:** In the North America Cordillera gold veins are post-Middle Jurassic and appear to form immediately after accretion of oceanic terranes to the continental margin. In British Columbia deposits are mainly Middle Jurassic (~ 165-170 Ma) and Late Cretaceous (~ 95 Ma). In the Mother Lode belt they are Middle Jurassic (~ 150 Ma) and those along the Juneau belt in Alaska are of Early Tertiary (~56-55 Ma).
- **Archean:** Ages of mineralization for Archean deposits are well constrained for both the Superior Province, Canadian Shield (~ 2.68 to 2.67 Ga) and the Yilgarn Province, Western Australia (~ 2.64 to 2.63 Ga).

Au-QUARTZ VEINS**101**

HOST/ASSOCIATED ROCK TYPES: Lithologically highly varied, usually of greenschist metamorphic grade, ranging from virtually undeformed to totally schistose.

- **Phanerozoic:** Mafic volcanics, serpentinite, peridotite, dunite, gabbro, diorite, trondhjemite/plagiogranites, graywacke, argillite, chert, shale, limestone and quartzite, felsic and intermediate intrusions.
- **Archean:** Granite-greenstone belts - mafic, ultramafic (komatiitic) and felsic volcanics, intermediate and felsic intrusive rocks, graywacke and shale.

DEPOSIT FORM: Tabular fissure veins in more competent host lithologies, veinlets and stringers forming stockworks in less competent lithologies. Typically occur as a system of en echelon veins on all scales. Lower grade bulk-tonnage styles of mineralization may develop in areas marginal to veins with gold associated with disseminated sulphides. May also be related to broad areas of fracturing with gold and sulphides associated with quartz veinlet networks.

TEXTURE/STRUCTURE: Veins usually have sharp contacts with wallrocks and exhibit a variety of textures, including massive, ribboned or banded and stockworks with anastomosing gashes and dilations. Textures may be modified or destroyed by subsequent deformation.

ORE MINERALOGY: [Principal and subordinate]: Native gold, pyrite, arsenopyrite, *galena*, *sphalerite*, *chalcopyrite*, *pyrrhotite*, *tellurides*, *scheelite*, *bismuth*, *cosalite*, *tetrahedrite*, *stibnite*, *molybdenite*, *gersdorffite* ($NiAsS$), *bismuthimite* (Bi_2S_2), *tetradymite* (Bi_2Te_2S).

GANGUE MINERALOGY: [Principal and subordinate]: Quartz, carbonates (ferroan-dolomite, ankerite, ferroan-magnesite, calcite, siderite), *albite*, *mariposite* (*fuchsite*), *sericite*, *muscovite*, *chlorite*, *tourmaline*, *graphite*.

ALTERATION MINERALOGY: Silicification, pyritization and potassium metasomatism generally occur adjacent to veins (usually within a metre) within broader zones of carbonate alteration, with or without ferroan dolomite veinlets, extending up to tens of metres from the veins. Type of carbonate alteration reflects the ferromagnesian content of the primary host lithology; ultramafics rocks - talc, Fe-magnesite; mafic volcanic rocks - ankerite, chlorite; sediments - graphite and pyrite; felsic to intermediate intrusions - sericite, albite, calcite, siderite, pyrite. Quartz-carbonate altered rock (listwanite) and pyrite are often the most prominent alteration minerals in the wallrock. Fuchsite, sericite, tourmaline and scheelite are common where veins are associated with felsic to intermediate intrusions.

WEATHERING: Distinctive orange-brown limonite due to the oxidation of Fe-Mg carbonates cut by white veins and veinlets of quartz and ferroan dolomite. Distinctive green Cr-mica may also be present. Abundant quartz float in overburden.

ORE CONTROLS: Gold-quartz veins are found within zones of intense and pervasive carbonate alteration along second order or later faults marginal to transcrustal breaks. They are commonly closely associated with, late syncollisional, structurally controlled intermediate to felsic magmatism. Gold veins are more commonly economic where hosted by relatively large, competent units, such as intrusions or blocks of obducted oceanic crust. Veins are usually at a high angle to the primary collisional fault zone.

- **Phanerozoic:** Secondary structures at a high angle to relatively flat-lying to moderately dipping collisional suture zones.
- **Archean:** Steep, transcrustal breaks; best deposits overall are in areas of greenstone.

ASSOCIATED DEPOSIT TYPES: Gold placers (C01, C02), sulphide manto Au (J04), silica veins (I07); iron formation Au (I04) in the Archean.

GENETIC MODEL: Gold quartz veins form in lithologically heterogeneous, deep transcrustal fault zones that develop in response to terrane collision. These faults act as conduits for CO₂-H₂O-rich (5-30 mol% CO₂), low salinity (<3 wt% NaCl) aqueous fluids, with high Au, Ag, As, (±Sb, Te, W, Mo) and low Cu, Pb, Zn metal contents. These fluids are believed to be tectonically or seismically driven by a cycle of pressure build-up that is released by failure and pressure reduction followed by sealing and repetition of the process (Sibson *et al.*, 1988). Gold is deposited at crustal levels within and near the brittle-ductile transition zone with deposition caused by sulphidation (the loss of H₂S due to pyrite deposition) primarily as a result of fluid-wallrock reactions, other significant factors may involve phase separation and fluid pressure reduction.

The origin of the mineralizing fluids remains controversial, with metamorphic, magmatic and mantle sources being suggested as possible candidates. Within an environment of tectonic crustal thickening in response to terrane collision, metamorphic devolatilization or partial melting (anatexis) of either the lower crust or subducted slab may generate such fluids.

COMMENTS: These deposits may be a difficult deposit to evaluate due to "nugget effect", hence the adage, "Drill for structure, drift for grade". These veins have also been mined in British Columbia as a source of silica for smelter flux.

EXPLORATION GUIDES

GEOCHEMICAL SIGNATURE: Elevated values of Au, Ag, As, Sb, K, Li, Bi, W, Te and B ± (Cd, Cu, Pb, Zn and Hg) in rock and soil, Au in stream sediments.

GEOPHYSICAL SIGNATURE: Faults indicated by linear magnetic anomalies. Areas of alteration indicated by negative magnetic anomalies due to destruction of magnetite as a result of carbonate alteration.

OTHER EXPLORATION GUIDES: Placer gold or elevated gold in stream sediment samples is an excellent regional and property-scale guide to gold-quartz veins. Investigate broad 'deformation envelopes' adjacent to regional listric faults where associated with carbonate alteration. Alteration and structural analysis can be used to delineate prospective ground. Within carbonate alteration zones, gold is typically only in areas containing quartz, with or without sulphides. Serpentinite bodies, if present, can be used to delineate favourable regional structures. Largest concentrations of free gold are commonly at, or near, the intersection of quartz veins with serpentinized and carbonate-altered ultramafic rocks.

ECONOMIC FACTORS

TYPICAL GRADE AND TONNAGE: Individual deposits average 30 000 t with grades of 16 g/t Au and 2.5 g/t Ag (Berger, 1986) and may be as large as 40 Mt. Many major producers in the Canadian Shield range from 1 to 6 Mt at grades of 7 g/t Au (Thorpe and Franklin, 1984). The largest gold-quartz vein deposit in British Columbia is the Bralorne-Pioneer which produced in excess of 117 800 kilograms of Au from ore with an average grade of 9.3 g/t.

ECONOMIC LIMITATIONS: These veins are usually less than 2m wide and therefore, only amenable to underground mining.

IMPORTANCE: These deposits are a major source of the world's gold production and account for approximately a quarter of Canada's output. They are the most prolific gold source after the ores of the Witwatersrand basin.

Au-QUARTZ VEINS

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by David V. Lefebure and B. Neil Church



IDENTIFICATION

SYNONYMS: Clastic metasediment-hosted silver-lead-zinc veins, silver/base metal epithermal deposits.

COMMODITIES (BYPRODUCTS): Ag, Pb, Zn (Cu, Au, Mn).

EXAMPLES (British Columbia (MINFILE # - Canada/International):

- **Metasediment host:** Silvana (082FNW050) and Lucky Jim (082KSW023), Slocan-New Denver-Ainsworth district, St. Eugene (082GSW025), Silver Cup (082KNW027), Trout Lake camp; Hector-Calumet and Elsa, Mayo district (Yukon, Canada), Coeur d'Alene district (Idaho, USA), Harz Mountains and Freiberg district (Germany), Příbram district (Czechoslovakia).
- **Igneous host:** Wellington (082ESE072) and Highland Lass - Bell (082ESW030, 133), Beaverdell camp; Silver Queen (093L002), Duthie (093L088), Cronin (093L127), Porter-Idaho (103P089), Indian (104B031); Sunnyside and Idorado, Silverton district and Creede (Colorado, USA), Pachuca (Mexico).

GEOLOGICAL CHARACTERISTICS

CAPSULE DESCRIPTION: Sulphide-rich veins containing sphalerite, galena, silver and sulphosalt minerals in a carbonate and quartz gangue. These veins can be subdivided into those hosted by metasediments and another group hosted by volcanic or intrusive rocks. The latter type of mineralization is typically contemporaneous with emplacement of a nearby intrusion.

TECTONIC SETTINGS: These veins occur in virtually all tectonic settings except oceanic, including continental margins, island arcs, continental volcanics and cratonic sequences.

DEPOSITIONAL ENVIRONMENT / GEOLOGICAL SETTING:

- **Metasediment host:** Veins are emplaced along faults and fractures in sedimentary basins dominated by clastic rocks that have been deformed, metamorphosed and intruded by igneous rocks. Veins postdate deformation and metamorphism.
- **Igneous host:** Veins typically occur in country rock marginal to an intrusive stock. Typically veins crosscut volcanic sequences and follow volcano-tectonic structures, such as caldera ring-faults or radial faults. In some cases the veins cut older intrusions.

AGE OF MINERALIZATION: Proterozoic or younger, mainly Cretaceous to Tertiary in British Columbia.

HOST/ASSOCIATED ROCK TYPES: These veins can occur in virtually any host. Most commonly the veins are hosted by thick sequences of clastic metasediments or by intermediate to felsic volcanic rocks. In many districts there are felsic to intermediate intrusive bodies and mafic igneous rocks are less common. Many veins are associated with dikes following the same structures.

DEPOSIT FORM: Typically steeply dipping, narrow, tabular or splayed veins. Commonly occur as sets of parallel and offset veins. Individual veins vary from centimetres up to more than 3 m wide and can be followed from a few hundred to more than 1000 m in length and depth. Veins may widen to tens of metres in stockwork zones.

POLYMETALLIC VEINS Ag-Pb-Zn±Au

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TEXTURE/STRUCTURE: Compound veins with a complex paragenetic sequence are common. A wide variety of textures, including cockade texture, colloform banding and crustifications and locally drusy. Veins may grade into broad zones of stockwork or breccia. Coarse-grained sulphides as patches and pods, and fine-grained disseminations are confined to veins.

ORE MINERALOGY [Principal and *subordinate*]: Galena, sphalerite, tetrahedrite-tennantite, *other sulphosalts including pyrargyrite, stephanite, bournonite and acanthite, native silver, chalcopyrite, pyrite, arsenopyrite, stibnite*. Silver minerals often occur as inclusions in galena. *Native gold and electrum in some deposits*. Rhythmic compositional banding sometimes present in sphalerite. Some veins contain more chalcopyrite and gold at depth and Au grades are normally low for the amount of sulphides present.

GANGUE MINERALOGY [Principal and *subordinate*]:

- **Metasediment host:** Carbonates (most commonly siderite with minor dolomite, ankerite and calcite), quartz, *barite, fluorite, magnetite, bitumen*.
- **Igneous host:** Quartz, carbonate (rhodochrosite, siderite, calcite, dolomite), *sometimes specular hematite, hematite, barite, fluorite*. Carbonate species may correlate with distance from source of hydrothermal fluids with proximal calcium and magnesium-rich carbonates and distal iron and manganese-rich species.

ALTERATION MINERALOGY: Macroscopic wall rock alteration is typically limited in extent (measured in metres or less). The metasediments typically display sericitization, silicification and pyritization. Thin veining of siderite or ankerite may be locally developed adjacent to veins. In the Coeur d'Alene camp a broader zone of bleached sediments is common. In volcanic and intrusive hostrocks the alteration is argillic, sericitic or chloritic and may be quite extensive.

WEATHERING: Black manganese oxide stains, sometimes with whitish melanterite, are common weathering products of some veins. The supergene weathering zone associated with these veins has produced major quantities of manganese. Galena and sphalerite weather to secondary Pb and Zn carbonates and Pb sulphate. In some deposits supergene enrichment has produced native and horn silver.

ORE CONTROLS: Regional faults, fault sets and fractures are an important ore control; however, veins are typically associated with second order structures. In igneous rocks the faults may relate to volcanic centers. Significant deposits restricted to competent lithologies. Dikes are often emplaced along the same faults and in some camps are believed to be roughly contemporaneous with mineralization. Some polymetallic veins are found surrounding intrusions with porphyry deposits or prospects.

GENETIC MODELS: Historically these veins have been considered to result from differentiation of magma with the development of a volatile fluid phase that escaped along faults to form the veins. More recently researchers have preferred to invoke mixing of cooler, upper crustal hydrothermal or meteoric waters with rising fluids that could be metamorphic, groundwater heated by an intrusion or expelled directly from a differentiating magma. Any development of genetic models is complicated by the presence of other types of veins in many districts. For example, the Freiberg district has veins carrying F-Ba, Ni-As-Co-Bi-Ag and U.

COMMENTS: Ag-tetrahedrite veins, such as the Sunshine and Galena mines in Idaho, contain very little sphalerite or galena. These may belong to this class of deposits or possibly the five-element veins. The styles of alteration, mineralogy, grades and different geometries can usually be used to distinguish the polymetallic veins from stringer zones found below syngenetic massive sulphide deposits.

ASSOCIATED DEPOSIT TYPES:

- **Metasediment host:** Polymetallic mantos (M01).
- **Igneous host:** May occur peripheral to virtually all types of porphyry mineralization (L01, L03, L04, L05, L06, L07, L08) and some skarns (K02, K03).

EXPLORATION GUIDES

GEOCHEMICAL SIGNATURE: Elevated values of Zn, Pb, Ag, Mn, Cu, Ba and As. Veins may be within arsenic, copper, silver, mercury aureoles caused by the primary dispersion of elements into wallrocks or broader alteration zones associated with porphyry deposit or prospects.

GEOPHYSICAL SIGNATURE: May have elongate zones of low magnetic response and/or electromagnetic, self potential or induced polarization anomalies related to ore zones.

OTHER EXPLORATION GUIDES: Strong structural control on veins and common occurrence of deposits in clusters can be used to locate new veins.

ECONOMIC FACTORS

TYPICAL GRADE AND TONNAGE : Individual vein systems range from several hundred to several million tonnes grading from 5 to 1500 g/t Ag, 0.5 to 20% Pb and 0.5 to 8% Zn. Average grades are strongly influenced by the minimum size of deposit included in the population. For B.C. deposits larger than 20 000 t the average size is 161 000 t with grades of 304 g/t Ag, 3.47 % Pb and 2.66 % Zn. Copper and gold are reported in less than half the occurrences, with average grades of 0.09 % Cu and 4 g/t Au.

ECONOMIC LIMITATIONS: These veins usually support small to medium-size underground mines. The mineralization may contain arsenic which typically reduces smelting credits.

IMPORTANCE: The most common deposit type in British Columbia with over 2 000 occurrences; these veins were a significant source of Ag, Pb and Zn until the 1960s. They have declined in importance as industry focused more on syngenetic massive sulphide deposits. Larger polymetallic vein deposits are still attractive because of their high grades and relatively easy beneficiation. They are potential sources of cadmium and germanium.

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ACKNOWLEDGEMENTS: Georges Beaudoin and Don Sangster are thanked for their suggestions to improve the profile.

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POLYMETALLIC VEINS Ag-Pb-Zn±Au**105**

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by David V. Lefebure



IDENTIFICATION

SYNONYMS: Churchill-type vein copper, vein copper

COMMODITY (BYPRODUCTS): Cu (Ag, rarely Au).

EXAMPLES (British Columbia (MINFILE #) - *Canada/International*): Davis-Keays (094K012, 050), Churchill Copper (Magnum, 094K003), Bull River (082GNW002), Copper Road (092K060), Copper Star (092HNE036), Copper Standard (092HNE079), Rainbow (093L044); *Bruce Mines and Crownbridge (Ontario, Canada), Blue Wing and Seaboard (North Carolina, USA), Matahambre (Cuba), Inyatii (Zimbabwe), Copper Hills (Western Australia), Tocopilla area (Chile), Burgas district (Bulgaria), Butte (Montana, USA), Rosario (Chile).*

GEOLOGICAL CHARACTERISTICS

CAPSULE DESCRIPTION: Quartz-carbonate veins containing patches and disseminations of chalcopyrite with bornite, tetrahedrite, covellite and pyrite. These veins typically crosscut clastic sedimentary or volcanic sequences, however, there are also Cu quartz veins related to porphyry Cu systems and associated with felsic to intermediate intrusions.

TECTONIC SETTINGS: A diversity of tectonic settings reflecting the wide variety of hostrocks including extensional sedimentary basins (often Proterozoic) and volcanic sequences associated with rifting or subduction-related continental and island arc settings.

DEPOSITIONAL ENVIRONMENT / GEOLOGICAL SETTING: Veins emplaced along faults; they commonly postdate major deformation and metamorphism. The veins related to felsic intrusions form adjacent to, and are contemporaneous with, mesozonal stocks.

AGE OF MINERALIZATION: Any age; can be much younger than hostrocks.

HOST/ASSOCIATED ROCK TYPES: Cu±Ag quartz veins occur in virtually any rocks although the most common hosts are clastic metasediments and mafic volcanic sequences. Mafic dikes and sills are often spatially associated with metasediment-hosted veins. These veins are also found within and adjacent to felsic to intermediate intrusions.

DEPOSIT FORM: The deposits form simple to complicated veins and vein sets which typically follow high-angle faults which may be associated with major fold sets. Single veins vary in thickness from centimetres up to tens of metres. Major vein systems extend hundreds of metres along strike and down dip. In some exceptional cases the veins extend more than a kilometre along the maximum dimension.

TEXTURE/STRUCTURE: Sulphides are irregularly distributed as patches and disseminations. Vein breccias and stockworks are associated with some deposits.

ORE MINERALOGY (Principal and subordinate):

- Metasediment and volcanic-hosted: Chalcopyrite, pyrite, chalcocite; bornite, tetrahedrite, argentite, pyrrhotite, covellite, galena.
- Intrusion-related: Chalcopyrite, bornite, chalcocite, pyrite, pyrrhotite; enargite, tetrahedrite-tennantite, bismuthinite, molybdenite, sphalerite, native gold and electrum.

GANGUE MINERALOGY (Principal and subordinate): Quartz and carbonate (calcite, dolomite, ankerite or siderite); hematite, specularite, barite.

Cu±Ag QUARTZ VEINS**106**

ALTERATION MINERALOGY: Wallrocks are typically altered for distances of centimetres to tens of metres outwards from the veins.

- Metasediment and volcanic-hosted: The metasediments display carbonatization and silicification. At the Churchill and Davis-Keays deposits, decalcification of limy rocks and zones of disseminated pyrite in roughly stratabound zones are reported. The volcanic hostrocks exhibit abundant epidote with associated calcite and chlorite.
- Intrusion-related: Sericitization, in places with clay alteration and chloritization.

WEATHERING: Malachite or azurite staining; silicified linear "ridges".

ORE CONTROLS: Veins and associated dikes follow faults. Ore shoots commonly localized along dilational bends within veins. Sulphides may occur preferentially in parts of veins which crosscut carbonate or other favourable lithologies. Intersections of veins are an important locus for ore.

GENETIC MODEL: The metasediment and volcanic-hosted veins are associated with major faults related to crustal extension which control the ascent of hydrothermal fluids to suitable sites for deposition of metals. The fluids are believed to be derived from mafic intrusions which are also the source for compositionally similar dikes and sills associated with the veins. Intrusion-related veins, like Butte in Montana and Rosario in Chile, are clearly associated with high-level felsic to intermediate intrusions hosting porphyry Cu deposits or prospects.

ASSOCIATED DEPOSIT TYPES:

- Metasediment and volcanic-hosted: Possibly related to sediment-hosted Cu (E04) and basaltic Cu (D03).
- Intrusion-related: High sulphidation (H04), copper skarns (K01), porphyries (L01?, L03, L04) and polymetallic veins (I05).

COMMENTS: Cu±Ag quartz veins are common in copper metallogenetic provinces; they often are more important as indicators of the presence of other types of copper deposits.

EXPLORATION GUIDES

GEOCHEMICAL SIGNATURE: High Cu and Ag in regional silt samples. The Churchill-type deposits appear to have very limited wallrock dispersion of pathfinder elements; however, alteration halos of silica and carbonate addition or depletion might prove useful. Porphyry-related veins exhibit many of the geochemical signatures of porphyry copper systems.

GEOPHYSICAL SIGNATURE: Large veins with conductive massive sulphides may show up as electromagnetic conductors, particularly on ground surveys. Associated structures may be defined by ground magnetic, very low frequency or electromagnetic surveys. Airborne surveys may identify prospective major structures.

OTHER EXPLORATION GUIDES: Commonly camp-scale or regional structural controls define a dominant orientation for veins.

ECONOMIC FACTORS

GRADE AND TONNAGE: Typically range from 10 000 to 100 000 t with grades of 1 to 4% Cu, nil to 300 g/t Ag. The Churchill deposit has reserves of 90 000 t of 3 % Cu and produced 501 019 t grading 3% Cu and the Davis-Keays deposit has reserves of 1 119 089 t grading 3.43 % Cu. The Big Bull deposit has reserves of 732 000 t grading 1.94% Cu. The intrusion-related veins range up to millions of tonnes with grades of up to 6% Cu. The Butte veins in Montana have produced several hundred million tonnes of ore with much of this production from open-pit operations.

ECONOMIC LIMITATIONS: Currently only the large and/or high-grade veins (usually associated with porphyry deposits) are economically attractive.

IMPORTANCE: From pre-historic times until the early 1900s, high-grade copper veins were an important source of this metal. With hand sorting and labour-intensive mining they represented very attractive deposits.

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ACKNOWLEDGEMENTS: This deposit profile represents the results of a literature review. It benefited from comments by David Sinclair and Vic Preto.

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EPITHERMAL Au-Ag-Cu: HIGH SULPHIDATION H04

by Andre Panteleyev



IDENTIFICATION

SYNONYMS: (Epithermal) acid-sulphate, quartz-alunite Au, alunite-kaolinite \pm pyrophyllite, advanced argillic, Nansatsu-type, enargite gold. The deposits are commonly referred to as *acid-sulphate* type after the chemistry of the hydrothermal fluids, *quartz-alunite* or *kaolinite-alunite* type after their alteration mineralogy, or *high-sulphidation* type in reference to the oxidation state of the acid fluids responsible for alteration and mineralization.

COMMODITIES (BYPRODUCTS): Au, Ag, Cu (*As, Sb*).

EXAMPLES (British Columbia (MINFILE #) - International): Mt. McIntosh/Hushamu (EXPO, 92L240), Taseko River deposits - Westpine (Empress) (92O033), Taylor-Windfall (92O028) and Battlement Creek (92O005); *Goldfield and Paradise Peak (Nevada, USA), Summitville (Colorado, USA); Nansatsu (Japan), El Indio (Chile); Temora (New South Wales, Australia), Pueblo Viejo (Dominica), Chinkuashih (Taiwan), Rodalquilar (Spain), Lepanto and Nalesbitan (Philippines).*

GEOLOGICAL CHARACTERISTICS

CAPSULE DESCRIPTION: Veins, vuggy breccias and sulphide replacements ranging from pods to massive lenses occur in volcanic sequences associated with high level hydrothermal systems marked by acid-leached, advanced argillic, siliceous alteration.

TECTONIC SETTING: Extensional and transtensional settings, commonly in volcano-plutonic continent-margin and oceanic arcs and back-arcs. In zones with high-level magmatic emplacements where stratovolcanoes and other volcanic edifices are constructed above plutons.

DEPOSITIONAL ENVIRONMENT / GEOLOGICAL SETTING: Subvolcanic to volcanic in calderas, flow-dome complexes, rarely maars and other volcanic structures; often associated with subvolcanic stocks and dikes, breccias. Postulated to overlie, and be genetically related to, porphyry copper systems in deeper mineralized intrusions that underlie the stratovolcanoes.

AGE OF MINERALIZATION: Tertiary to Quaternary; less commonly Mesozoic and rarely Paleozoic volcanic belts. The rare preservation of older deposits reflects rapid rates of erosion before burial of subaerial volcanoes in tectonically active arcs.

HOST/ASSOCIATED ROCK TYPES: Volcanic pyroclastic and flow rocks; commonly subaerial andesite to dacite and rhyodacite, and their subvolcanic intrusive equivalents. Permeable sedimentary intervolcanic units can be sites of mineralization.

DEPOSIT FORM: Veins and massive sulphide replacement pods and lenses, stockworks and breccias. Commonly irregular deposit shapes are determined by hostrock permeability and the geometry of ore-controlling structures. Multiple, crosscutting composite veins are common.

TEXTURE/STRUCTURE: Vuggy 'slaggy' silica derived as a residual product of acid leaching is characteristic. Drusy cavities, banded veins, hydrothermal breccias, massive wallrock replacements with fine-grained quartz.

ORE MINERALOGY (Principal and subordinate): pyrite, enargite/luzonite, chalcocite, covellite, bornite, gold, electrum; *chalcopyrite, sphalerite, tetrahedrite/tennantite, galena, marcasite, arsenopyrite, silver sulphosalts, tellurides including goldfieldite.* Two types of ore are commonly present: massive enargite-pyrite and/or quartz-alunite-gold.

GANGUE MINERALOGY (Principal and subordinate): Pyrite and quartz predominate. Barite may also occur; carbonate minerals are absent.

EPITHERMAL Au-Ag-Cu: HIGH SULPHIDATION H04

ALTERATION MINERALOGY (Principal and *subordinate*): Quartz, kaolinite/dickite, alunite, barite, hematite; sericite/illite, amorphous clays and silica, pyrophyllite, andalusite, diaspore, corundum, tourmaline, *dumortierite*, *topaz*, *zunyite*, *jarosite*, *Al-P sulphates (hinsdalite, woodhouseite, crandalite, etc.)* and native sulphur. Advanced argillic alteration is characteristic and can be areally extensive and visually prominent. Quartz occurs as fine-grained replacements and, characteristically, as vuggy, residual silica in acid-leached rocks.

WEATHERING: Weathered rocks may contain abundant limonite (jarosite-goethite-hematite), generally in a groundmass of kaolinite and quartz. Fine-grained supergene alunite veins and nodules are common.

ORE CONTROLS: In volcanic edifices - caldera ring and radial fractures; fracture sets in resurgent domes and flow-dome complexes, hydrothermal breccia pipes and diatremes. Faults and breccias in and around intrusive centres. Permeable lithologies, in some cases with less permeable cappings of hydrothermally altered or other cap rocks. The deposits occur over considerable depths, ranging from high-temperature solfataras at paleosurface down into cupolas of intrusive bodies at depth.

GENETIC MODEL: Recent research, mainly in the southwest Pacific and Andes, has shown that these deposits form in subaerial volcanic complexes or composite island arc volcanoes above degassing magma chambers. The deposits can commonly be genetically related to high-level intrusions. Multiple stages of mineralization are common, presumably related to periodic tectonism with associated intrusive activity and magmatic hydrothermal fluid generation.

ASSOCIATED DEPOSIT TYPES: Porphyry Cu±Mo±Au deposits (L04), subvolcanic Cu-Ag-Au (As-Sb) (L01), epithermal Au-Ag deposits: low sulphidation type (H05), silica-clay-pyrophyllite deposits (Roseki deposits) (H09), hot spring Au-Ag (H03), placer Au deposits (C01, C02).

COMMENTS: High-sulphidation epithermal Au-Ag deposits are much less common in the Canadian Cordillera than low-sulphidation epithermal veins. However, they are the dominant type of epithermal deposit in the Andes.

EXPLORATION GUIDES

GEOCHEMICAL SIGNATURE: Au, Cu, As dominate; also Ag, Zn, Pb, Sb, Mo, Bi, Sn, Te, W, B and Hg.

GEOPHYSICAL SIGNATURE: Magnetic lows in hydrothermally altered (acid-leached) rocks; gravity contrasts may mark boundaries of structural blocks.

OTHER EXPLORATION GUIDES: These deposits are found in second order structures adjacent to crustal-scale fault zones, both normal and strike-slip, as well as local structures associated with subvolcanic intrusions. The deposits tend to overlie and flank porphyry copper-gold deposits and underlie acid-leached siliceous, clay and alunite-bearing 'lithocaps'.

ECONOMIC FACTORS

TYPICAL GRADE AND TONNAGE: There is wide variation in deposit types ranging from bulk-mineable, low-grade to selectively mined, high-grade deposits. Underground mines range in size from 2 to 25 Mt with grades from 178 g/t Au, 109 g/t Ag and 3.87% Cu in direct smelting ores (El Indio) to 2.8 g/t Au and 11.3 g/t Ag and 1.8% Cu (Lepanto). Open pit mines with reserves of <100 Mt to >200 Mt range from Au-Ag mines with 3.8 g/t Au and 20 g/t Ag (Pueblo Viejo, Dominica) to orebodies such as the Nansatsu deposits, Japan that contain a few million tonnes ore grading between 3 and 6 g/t Au. Porphyry Au (Cu) deposits can be overprinted with late-stage acid sulphate alteration zones which can contain in the order of ~1.5 g/t Au with 0.05 to 0.1% Cu in stockworks (Marte and Lobo) or high-grade Cu-Ag-Au veins (La Grande veins, Collahausi). More typically these late stage alteration zones carry <0.4 to 0.9 g/t Au and >0.4 to 2% Cu (Butte, Montana; Dizon, Philippines).

EPITHERMAL Au-Ag-Cu: HIGH SULPHIDATION H04

ECONOMIC LIMITATIONS: Oxidation of primary ores is commonly necessary for desirable metallurgy; primary ores may be refractory and can render low-grade mineralization noneconomic.

IMPORTANCE: This class of deposits has recently become a focus for exploration throughout the circum-Pacific region because of the very attractive Au and Cu grades in some deposits. Silica-rich gold ores (3-4 g/t Au) from the Nansatsu deposits in Japan are used as flux in copper smelters.

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by Andre Panteleyev



IDENTIFICATION

SYNONYMS: (Epithermal) adularia-sericite; quartz-adularia, Comstock, Sado-type; bonanza Au-Ag; alkali chloride (hydrothermal).

COMMODITIES (BYPRODUCTS): Au, Ag (*Pb, Zn, Cu*).

EXAMPLES (British Columbia (MINFILE #) - *International*): Toodoggone district deposits - Lawyers (94E066), Baker (94E026), Shas (94E050); Blackdome (92O050-053); Premier Gold (Silbak Premier), (104B054); Cinola (103F034); *Comstock, Aurora (Nevada, USA), Bodie (California, USA), Creede (Colorado, USA), Republic (Washington, USA), El Bronce (Chile), Guanajuato (Mexico), Sado, Hishikari (Japan), Colqui (Peru), Baguio (Philippines) Ladolam (Lihir, Papua-New Guinea)*.

GEOLOGICAL CHARACTERISTICS

CAPSULE DESCRIPTION: Quartz veins, stockworks and breccias carrying gold, silver, electrum, argentite and pyrite with lesser and variable amounts of sphalerite, chalcopyrite, galena, rare tetrahedrite and sulphosalt minerals form in high-level (epizonal) to near-surface environments. The ore commonly exhibits open-space filling textures and is associated with volcanic-related hydrothermal to geothermal systems.

TECTONIC SETTING: Volcanic island and continent-margin magmatic arcs and continental volcanic fields with extensional structures.

DEPOSITIONAL ENVIRONMENT / GEOLOGICAL SETTING: High-level hydrothermal systems from depths of ~1 km to surficial hotspring settings. Regional-scale fracture systems related to grabens, (resurgent) calderas, flow-dome complexes and rarely, maar diatremes. Extensional structures in volcanic fields (normal faults, fault splays, ladder veins and cymoid loops, etc.) are common; locally graben or caldera-fill clastic rocks are present. High-level (subvolcanic) stocks and/or dikes and pebble breccia diatremes occur in some areas. Locally resurgent or domal structures are related to underlying intrusive bodies.

AGE OF MINERALIZATION: Any age. Tertiary deposits are most abundant; in B.C. Jurassic deposits are important. Deposits of Paleozoic age are described in Australia. Closely related to the host volcanic rocks but invariably slightly younger in age (0.5 to 1 Ma, more or less).

HOST/ASSOCIATED ROCK TYPES: Most types of volcanic rocks; calcalkaline andesitic compositions predominate. Some deposits occur in areas with bimodal volcanism and extensive subaerial ashflow deposits. A less common association is with alkalic intrusive rocks and shoshonitic volcanics. Clastic and epiclastic sediments in intra-volcanic basins and structural depressions.

DEPOSIT FORM: Ore zones are typically localized in structures, but may occur in permeable lithologies. Upward-flaring ore zones centred on structurally controlled hydrothermal conduits are typical. Large (> 1 m wide and hundreds of metres in strike length) to small veins and stockworks are common with lesser disseminations and replacements. Vein systems can be laterally extensive but ore shoots have relatively restricted vertical extent. High-grade ores are commonly found in dilational zones in faults at flexures, splays and in cymoid loops.

TEXTURE/STRUCTURE: Open-space filling, symmetrical and other layering, crustification, comb structure, colloform banding and multiple brecciation.

EPITHERMAL Au-Ag: LOW SULPHIDATION**H05**

ORE MINERALOGY (Principal and *subordinate*): Pyrite, electrum, gold, silver, argentite; *chalcopyrite, sphalerite, galena, tetrahedrite, silver sulphosalt and/or selenide minerals*. Deposits can be strongly zoned along strike and vertically. Deposits are commonly zoned vertically over 250 to 350 m from a base metal poor, Au-Ag-rich top to a relatively Ag-rich base metal zone and an underlying base metal rich zone grading at depth into a sparse base metal, pyritic zone. From surface to depth, metal zones contain: Au-Ag-As-Sb-Hg, Au-Ag-Pb-Zn-Cu, Ag-Pb-Zn. In alkalic hostrocks tellurides, V mica (roscoelite) and fluorite may be abundant, with lesser *molybdenite*.

GANGUE MINERALOGY (Principal and *subordinate*): Quartz, amethyst, chalcedony, quartz pseudomorphs after calcite, calcite; *adularia, sericite, barite, fluorite, Ca-Mg-Mn-Fe carbonate minerals such as rhodochrosite, hematite and chlorite*.

ALTERATION MINERALOGY: Silicification is extensive in ores as multiple generations of quartz and chalcedony are commonly accompanied by adularia and calcite. Pervasive silicification in vein envelopes is flanked by sericite-illite-kaolinite assemblages. Intermediate argillic alteration [kaolinite-illite-montmorillonite (smectite)] formed adjacent to some veins; advanced argillic alteration (kaolinite-alunite) may form along the tops of mineralized zones. Propylitic alteration dominates at depth and peripherally.

WEATHERING: Weathered outcrops are often characterized by resistant quartz \pm alunite 'ledges' and extensive flanking bleached, clay-altered zones with supergene alunite, jarosite and other limonite minerals.

ORE CONTROLS: In some districts the epithermal mineralization is tied to a specific metallogenic event, either structural, magmatic, or both. The veins are emplaced within a restricted stratigraphic interval generally within 1 km of the paleosurface. Mineralization near surface takes place in hot spring systems, or the deeper underlying hydrothermal conduits. At greater depth it can be postulated to occur above, or peripheral to, porphyry and possibly skarn mineralization. Normal faults, margins of grabens, coarse clastic caldera moat-fill units, radial and ring dike fracture sets and both hydrothermal and tectonic breccias are all ore fluid channeling structures. Through-going, branching, bifurcating, anastomosing and intersecting fracture systems are commonly mineralized. Ore shoots form where dilational openings and cymoid loops develop, typically where the strike or dip of veins change. Hangingwall fractures in mineralized structures are particularly favourable for high-grade ore.

GENETIC MODEL: These deposits form in both subaerial, predominantly felsic, volcanic fields in extensional and strike-slip structural regimes and island arc or continental andesitic stratovolcanoes above active subduction zones. Near-surface hydrothermal systems, ranging from hot spring at surface to deeper, structurally and permeability focused fluid flow zones are the sites of mineralization. The ore fluids are relatively dilute and cool solutions that are mixtures of magmatic and meteoric fluids. Mineral deposition takes place as the solutions undergo cooling and degassing by fluid mixing, boiling and decompression.

ASSOCIATED DEPOSIT TYPES: Epithermal Au-Ag: high sulphidation (H04); hot spring Au-Ag (H03); porphyry Cu \pm Mo \pm Au (L04) and related polymetallic veins (I05); placer gold (C01, C02).

EXPLORATION GUIDES

GEOCHEMICAL SIGNATURE: Elevated values in rocks of Au, Ag, Zn, Pb, Cu and As, Sb, Ba, F, Mn; locally Te, Se and Hg.

GEOPHYSICAL SIGNATURE: VLF has been used to trace structures; radiometric surveys may outline strong potassic alteration of wallrocks. Detailed gravity surveys may delineate boundaries of structural blocks with large density contrasts.

EPITHERMAL Au-Ag: LOW SULPHIDATION

H05

OTHER EXPLORATION GUIDES: Silver deposits generally have higher base metal contents than Au and Au-Ag deposits. Drilling feeder zones to hot springs and siliceous sinters may lead to identification of buried deposits. Prospecting for mineralized siliceous and silica-carbonate float or vein material with diagnostic open-space textures is effective.

ECONOMIC FACTORS

TYPICAL GRADE AND TONNAGE: The following data describe the median deposits based on worldwide mines and U.S.A. models:

- Au-Ag deposits (41 Comstock-type 'bonanza' deposits) - 0.77 Mt with 7.5 g/t Au, 110 g/t Ag and minor Cu, Zn and Pb. The highest base metal contents in the top decile of deposits all contain <0.1% Cu, Zn and 0.1% Pb
- Au-Cu deposits (20 Sado-type deposits) - 0.3 Mt with 1.3% g/t Au, 38 g/t Ag and >0.3% Cu; 10 % of the deposits contain, on average, about 0.75% Cu with one having >3.2% Cu.

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Cu SKARNS**K01**

by Gerald E. Ray

**IDENTIFICATION**

SYNONYMS: Pyrometamorphic and contact metamorphic copper deposits.

COMMODITIES (BYPRODUCTS): Cu (*Au, Ag, Mo, W, magnetite*)

EXAMPLES (British Columbia - Canada/International): Craigmont (092ISE 035), Phoenix (082ESE 020), Old Sport (092L 035), Queen Victoria (082FSW 082); *Mines Gaspé deposits (Québec, Canada), Ruth, Mason Valley and Copper Canyon (Nevada, USA), Carr Fork (Utah, USA), Ok Tedi (Papua New Guinea), Rosita (Nicaragua).*

GEOLOGICAL CHARACTERISTICS

CAPSULE DESCRIPTION: Cu-dominant mineralization (generally chalcopyrite) genetically associated with a skarn gneiss (includes calcic and magnesian Cu skarns).

TECTONIC SETTING: They are most common where Andean-type plutons intrude older continental-margin carbonate sequences. To a lesser extent (but important in British Columbia), they are associated with oceanic island arc plutonism.

AGE OF MINERALIZATION: Mainly Mesozoic, but may be any age. In British Columbia they are mostly Early to mid-Jurassic.

HOST/ASSOCIATED ROCK TYPES: Porphyritic stocks, dikes and breccia pipes of quartz diorite, granodiorite, monzogranite and tonalite composition, intruding carbonate rocks, calcareous volcanics or tuffs. Cu skarns in oceanic island arcs tend to be associated with more mafic intrusions (quartz diorite to granodiorite), while those formed in continental margin environments are associated with more felsic material.

DEPOSIT FORM: Highly varied; includes stratiform and tabular orebodies, vertical pipes, narrow lenses, and irregular ore zones that are controlled by intrusive contacts.

TEXTURES: Igneous textures in endoskarn. Coarse to fine-grained, massive granoblastic to mineralogically layered textures in exoskarn. Some hornfelsic textures.

ORE MINERALOGY (Principal and subordinate): Moderate to high sulphide content. Chalcopyrite ± pyrite ± magnetite in inner garnet-pyroxene zone. Bornite ± chalcopyrite ± sphalerite ± tennantite in outer wollastonite zone. Either hematite, pyrrhotite or magnetite may predominate (depending on oxidation state). Scheelite and traces of *molybdenite, bismuthinite, galena, cosalite, arsenopyrite, enargite, tennantite, loellingite, cobaltite and tetrahedrite* may be present.

ALTERATION MINERALOGY: Exoskarn alteration: high garnet:pyroxene ratios. High Fe, low Al, Mn andradite garnet (Ad35-100), and diopsidic clinopyroxene (Hd2-50). The mineral zoning from stock out to marble is commonly: diopside + andradite (proximal); wollastonite ± tremolite ± garnet ± diopside ± vesuvianite (distal). Retrograde alteration to actinolite, chlorite and montmorillonite is common. In British Columbia, skarn alteration associated with some of the alkalic porphyry Cu-Au deposits contains late scapolite veining. Magnesian Cu skarns also contain olivine, serpentine, monticellite and brucite.
Endoskarn alteration: Potassic alteration with K-feldspar, epidote, sericite ± pyroxene ± garnet. Retrograde phyllic alteration generates actinolite, chlorite and clay minerals.

ORE CONTROLS: Irregular or tabular orebodies tend to form in carbonate rocks and/or calcareous volcanics or tuffs near igneous contacts. Pendants within igneous stocks can be important. Cu mineralization is present as stockwork veining and disseminations in both endo and exoskarn; it commonly accompanies retrograde alteration.

Cu SKARNS**K01**

COMMENTS: Calcic Cu skarns are more economically important than magnesian Cu skarns. Cu skarns are broadly separable into those associated with strongly altered Cu-porphyry systems, and those associated with barren, generally unaltered stocks; a continuum probably exists between these two types (Einaudi *et al.*, 1981). Copper skarn deposits related to mineralized Cu porphyry intrusions tend to be larger, lower grade, and emplaced at higher structural levels than those associated with barren stocks. Most Cu skarns contain oxidized mineral assemblages, and mineral zoning is common in the skarn envelope. Those with reduced assemblages can be enriched in W, Mo, Bi, Zn, As and Au. Over half of the 340 Cu skarn occurrences in British Columbia lie in the Wrangellia Terrane of the Insular Belt, while another third are associated with intraoceanic island arc plutonism in the Quesnellia and Stikinia terranes. Some alkalic and calcalkalic Cu and Cu-Mo porphyry systems in the province (e.g. Copper Mountain, Mount Polley) are associated with variable amounts of Cu-bearing skarn alteration.

EXPLORATION GUIDES

GEOCHEMICAL SIGNATURE: Rock analyses may show Cu-Au-Ag-rich inner zones grading outward through Au-Ag zones with high Au:Ag ratios to an outer Pb-Zn-Ag zone. Co-As-Sb-Bi-Mo-W geochemical anomalies are present in the more reduced Cu skarn deposits.

GEOPHYSICAL SIGNATURE: Magnetic, electromagnetic and induced polarization anomalies.

ASSOCIATED DEPOSIT TYPES: Porphyry Cu deposits (L04); Au (K04), Fe (K03) and Pb-Zn (K02) skarns, and replacement Pb-Zn-Ag deposits (M01).

ECONOMIC FACTORS

GRADE AND TONNAGE: Average 1 to 2 % copper. Worldwide, they generally range from 1 to 100 Mt, although some exceptional deposits exceed 300 Mt. Craigmont, British Columbia's largest Cu skarn, contained approximately 34 Mt grading 1.3 % Cu.

IMPORTANCE: Historically, these deposits were a major source of copper, although porphyry deposits have become much more important during the last 30 years. However, major Cu skarns are still worked throughout the world, including in China and the U.S.

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PORPHYRY Mo (LOW-F-TYPE)¹

L05

by: W. David Sinclair²



IDENTIFICATION

SYNONYMS: Calcalkaline Mo stockwork; Granite-related Mo; Quartz-monzonite Mo.

COMMODITIES (BYPRODUCTS): Mo (Cu, W)

EXAMPLES (British Columbia - Canada/International): Endako (093K006), Boss Mountain (093A001), Kitsault (103P120), Adanac (104N052), Carmi (082ESW029), Bell Moly (103P234), Red Bird (093E026), Storie Moly (104P069), Trout Lake (082KNW087); *Red Mountain (Yukon, Canada), Quartz Hill (Alaska, USA), Cannivan (Montana, USA), Thompson Creek (Idaho, USA), Compaccha (Peru), East Kounrad (Russia), Jinduicheng (China).*

GEOLOGICAL CHARACTERISTICS

CAPSULE DESCRIPTION: Stockwork of molybdenite-bearing quartz veinlets and fractures in intermediate to felsic intrusive rocks and associated country rocks. Deposits are low grade but large and amenable to bulk mining methods.

TECTONIC SETTING(S): Subduction zones related to arc-continent or continent-continent collision.

DEPOSITIONAL ENVIRONMENT / GEOLOGICAL SETTING: High-level to subvolcanic felsic intrusive centres; multiple stages of intrusion are common.

AGE OF MINERALIZATION: Archean (e.g. Setting Net Lake, Ontario) to Tertiary; Mesozoic and Tertiary examples are more common.

HOST/ASSOCIATED ROCK TYPES: All kinds of rocks may be hostrocks. Tuffs or other extrusive volcanic rocks may be associated with deposits related to subvolcanic intrusive rocks. Genetically related intrusive rocks range from granodiorite to granite and their fine-grained equivalents, with quartz monzonite most common: they are commonly porphyritic. The intrusive rocks are characterized by low F contents (generally <0.1 % F) compared to intrusive rocks associated with Climax-type porphyry Mo deposits.

DEPOSIT FORM: Deposits vary in shape from an inverted cup, to roughly cylindrical, to highly irregular. They are typically hundreds of metres across and range from tens to hundreds of metres in vertical extent.

TEXTURE/STRUCTURE: Ore is predominantly structurally controlled; mainly stockworks of crosscutting fractures and quartz veinlets, also veins, vein sets and breccias.

ORE MINERALOGY (Principal and subordinate): Molybdenite is the principal ore mineral; *chalcopyrite, scheelite, and galena are generally subordinate.*

¹ Geological Survey of Canada contribution number 61494

² Geological Survey of Canada, Ottawa

PORPHYRY Mo (LOW-F-TYPE)**L05**

GANGUE MINERALOGY: Quartz, pyrite, K-feldspar, biotite, sericite, clays, calcite and anhydrite.

ALTERATION MINERALOGY: Alteration mineralogy is similar to that of porphyry Cu deposits. A core zone of potassic and silicic alteration is characterized by hydrothermal K-feldspar, biotite, quartz and, in some cases, anhydrite. K-feldspar and biotite commonly occur as alteration selvages on mineralized quartz veinlets and fractures but may be pervasive in areas of intense fracturing and mineralization. Phyllic alteration typically surrounds and may be superimposed to various degrees on the potassic-silicic core; it consists mainly of quartz, sericite and carbonate. Phyllic alteration is commonly pervasive and may be extensive. Propylitic alteration consisting mainly of chlorite and epidote may extend for hundreds of metres beyond the zones of potassic-silicic and phyllic alteration. Zones of argillic alteration, where present, are characterized by clay minerals such as kaolinite and are typically overprinted on the other types of alteration; distribution of argillic alteration is typically irregular.

WEATHERING: Oxidation of pyrite produces limonitic gossans; oxidation of molybdenite produces yellow ferrimolybdate.

ORE CONTROLS: Quartz veinlet and fracture stockwork zones superimposed on intermediate to felsic intrusive rocks and surrounding country rocks; multiple stages of mineralization commonly present.

GENETIC MODEL: Magmatic-hydrothermal. Large volumes of magmatic, highly saline aqueous fluids under pressure strip Mo and other ore metals from temporally and genetically related magma. Multiple stages of brecciation related to explosive fluid pressure release from the upper parts of small intrusions result in deposition of ore and gangue minerals in crosscutting fractures, veinlets and breccias in the outer carapace of the intrusions and in associated country rocks. Incursion of meteoric water during waning stages of the magmatic-hydrothermal system may result in late alteration of the hostrocks, but does not play a significant role in the ore-forming process.

ASSOCIATED DEPOSIT TYPES: Ag-Pb-Zn veins (I05), Mo-bearing skarns (K07) may be present.

EXPLORATION GUIDES

GEOCHEMICAL SIGNATURE: Mo, Cu, W and F may be anomalously high in hostrocks close to and overlying mineralized zones; anomalously high levels of Pb, Zn and Ag occur in peripheral zones as much as several kilometres distant. Mo, W, F, Cu, Pb, Zn and Ag may be anomalously high in stream sediments. Mo, W and Pb may be present in heavy mineral concentrates.

GEOPHYSICAL SIGNATURE: Magnetic anomalies may reflect presence of pyrrhotite or magnetite in hornfels zones. Radiometric surveys may be used to outline anomalous K in altered and mineralized zones. Induced polarization and resistivity surveys may be used to outline high-pyrite alteration zones.

OTHER EXPLORATION GUIDES: Limonitic alteration of pyrite can result in widespread gossan zones. Yellow ferrimolybdate may be present in oxidized zones. Ag-Pb-Zn veins may be present in peripheral zones.

PORPHYRY Mo (LOW-F-TYPE)**L05*****ECONOMIC FACTORS***

GRADE AND TONNAGE: Typical size is 100 Mt at 0.1 to 0.2 % Mo. The following figures are for production plus reserves.

Endako (B.C.): 336 Mt at 0.087 % Mo; Boss Mountain (B.C.): 63 Mt. at 0.074 % Mo;
 Kitsault (B.C.): 108 Mt at 0.115 % Mo; Lucky Ship (B.C.): 14 Mt at 0.090 % Mo;
 Adanac (B.C.): 94 Mt at 0.094 % Mo; Carmi (B.C.): 34 Mt at 0.091 % Mo;
 Mount Haskin (B.C.): 12 Mt at 0.090 % Mo; Bell Moly (B.C.): 32 Mt at 0.066 % Mo;
 Red Bird (B.C.): 34 Mt at 0.108 % Mo; Storie Moly (B.C.): 101 Mt at 0.078 % Mo;
 Trout Lake (B.C.): 50 Mt at 0.138 % Mo; Glacier Gulch (B.C.): 125 Mt at 0.151 % Mo;
 Red Mountain (Yukon): 187 Mt at 0.100 % Mo; Quartz Hill (Alaska): 793 Mt at 0.091 % Mo;
 Thompson Creek (Idaho): 181 Mt at 0.110 % Mo; Compaccha (Peru): 100 Mt at 0.072 % Mo;
 East Kounrad (Russia): 30 Mt at 0.150 % Mo.

IMPORTANCE: Porphyry Mo deposits associated with low-F felsic intrusive rocks have been an important source of world molybdenum production. Virtually all of Canada's Mo production comes from these deposits and from porphyry Cu-Mo deposits.

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