Open File 2006-12

Report on the Detailed Mineral Assessment of the Proposed Scottie Creek Special Management Area, Yukon

R. Stroshein

YUKON GEOLOGICAL SURVEY

Yukon Energy, Mines and Resources

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Published under the authority of the Minister of Energy, Mines and Resources,
Government of Yukon
http://www.emr.gov.yk.ca
Printed in Whitehorse, Yukon, 2006.

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In referring to this publication, please use the following citation:
Stroshein, R., 2006. Report on the Detailed Mineral Assessment of the Proposed Scottie Creek Special Management Area, Yukon. Yukon Geological Survey, Open File 2006-12, 47 p.

Preface

This report summarizes the results of geological fieldwork and a detailed mineral assessment of a region of western Yukon that includes the proposed Scottie Creek Special Management Area. This mineral assessment was done in 2002 by the Department of Energy, Mines and Resources of the Government of Yukon (YTG).

The purpose of this mineral resource assessment was to determine the mineral potential of the region and thereby assist with proposed land planning in the area. The Yukon Geological Survey is pleased to release the results in this report.

The information is being released as originally prepared and may not conform to current YGS publication standards. Please note that the report does not include information from any studies that may have been carried out in the area since the mineral assessment was conducted. Special Management Area name and boundaries may have changed since the mineral assessment was completed. This report was not previously released to the public due to the confidential nature of the Land Claim negotiation processes.

Report on the

Detailed Mineral Assessment

of the

Proposed Scottie Creek Special Management Area

Confidential

March 10, 2003

Internal Report
Robert W. Stroshein

YTG, Energy Mines and Resources
Mineral Planning and Development

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Executive Summary

Yukon Government and the White River First Nation agreed to create a 512.4 km^2 Special Management Area, designated as a Habitat Protection Area along Scottie Creek. The Habitat Protection Area designation does not require the withdrawal of the area from mineral staking and withdrawal has not been requested in the Memorandum of Understanding signed between the Governments of Canada and Yukon and the First Nation.

The purpose of this report is to present the results of the detailed mineral assessment of an area of 1248 km^2 that encompassed the proposed Special Management Area. This enlarged area was included to provide some relative context for the assessment.

The proposed area has no advanced mineral properties. The assessment is based on the mineral potential of the geology as identified by a panel of industry experts.

Results shown on the detailed mineral potential map indicates that the southern portion of the proposed Special Management Area has the highest relative mineral potential. This area is underlain by Paleozoic aged metamorphosed sedimentary and volcanic rocks and has potential for hosting economic sedex or VMS type base metal deposits. The plutonic rocks of the northern portion of the proposed Special Management Area have potential for gold and porphyry type deposits. Further evaluation work is recommended for the higher elevations where there is potential for rock formations to outcrop.

Introduction

Land Status

The proposed Scottie Creek Special Management Area (SMA) has been identified as a Habitat Protection Area (HPA) in the Memorandum of Understanding (MOU) with the White River First Nation (WRFN). The MOU was signed on March 31, 2002. The MOU and HPA designation do not require interim protection and therefore the future land use planning will be the purview of the SMA management planning committee.

Fieldwork carried out by EMR, YTG.

During the summer of 2002, the mineral assessment team composed of geologists; Roger Hulstein, Farrell Andersen, Jo-Anne vanRanden and Robert Stroshein spent four days working from fly camp in the Starvation Mountain area. A one-day fly in visit followed this in the late summer. Work included 1:50,000 scale geological mapping, prospecting and collection of rock, soil and silt sediment samples for geochemical analysis. All samples were analyzed for gold plus a suite of 34 elements.

Plate 1. Starvation Mountain Area. Moosehorn Range in the background.

A total of 17 rock, 48 soil and 49 silt sediment samples were collected. 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 ICP-MS using an Aqua Regia digestion. The details of the laboratory procedures are included in Appendix III.

Preliminary evaluation of regional geological and geochemical data indicated that the Klondike Schist Assemblage, a Mid-Cretaceous pluton and the contact zone between these two units in the Starvation Mountain area was a priority area for fieldwork. A fly camp was established on the northwest flank of Starvation Mountain near a reported Minfile occurrence. Traverses were carried out to locate the possible Early Tertiary aged Nisling Alaskite intrusives reported on the northeast side of Scottie Creek as these had been initially identified as being of potential economic interest. A number of tributaries of Scottie Creek were silt sediment sampled to fill in areas not sampled in the original reconnaissance stream sediment survey.

Location, access and physiography

The proposed Scottie Creek Special Management Area is located adjacent the Yukon-Alaska border around the Scottie Creek valley, overlapping NTS map sheets 115 K/10 and 115 K/15. The proposed SMA encompasses an area of 512.4 square kilometers centered approximately 53 kilometers north of the settlement of Beaver Creek. (Figure 1).

Access to the area is by helicopter or the historic winter trail traveling from the Alaska Highway to the Moosehorn Range north of the area.

The proposed SMA covers the extensive wetlands along Scottie Creek that abound with wildlife. The area encompasses the highlands surrounding Starvation Mountain to the west and low-level hills east of Scottie Creek. The region is vegetated with spruce, alder and dwarf birch. The area lies within the portion of the Yukon that was not glaciated during the last period of continental glaciation.

Plate 2. Scottie Creek Wetland with winter access trail.

Plate 3. Scottie Creek wetlands and riparian habitat.

The proposed SMA is located within the Klondike Plateau Ecoregion (#172) (Figure 2) within the Boreal Cordillera ecozone.

Exploration History

The exploration history of the area is focused on gold and placer gold exploration peripheral to more advanced exploration north of the project area, specifically the Moosehorn Range including the headwaters of Scottie Creek.

There is one occurrence reported in the Yukon Minfile (2001) database. The Starvation Occurrence (115 K/087) was first staked in 1956. The property was re-staked in 1976 by the same prospector. No exploration work was reported and the exploration target is not known.

Geology

Regional Setting

The proposed Scottie Creek SMA is located within the Yukon-Tanana Terrane (YTT) of Western Yukon. The YTT is a pericratonic terrane composed of several subterranes with rocks possessing elements of passive margin sedimentation that are stratigraphically and structurally different than rocks of continental North America.

Regional geological mapping was carried out by Tempelman-Kluit (1972) at a scale of 1: 250,000. The geology is reported in GSC Paper 73-41 entitled "Reconnaissance Geology of Aishihik Lake, Snag and Part of the Stewart River Map-Areas, West-Central Yukon (115 H, 115 K-J and 115 N-O)".

Gordey and Makepeace (2001) produced a digital compilation of the bedrock geology of the Yukon from which Figure 4: Geology of the Proposed Scottie Creek Habitat Protection Area and Special Management Area was created.

The metamorphic rocks of the YTT have been intruded by at least two ages of plutonic rocks. Tempelman-Kluit (1972) mapped the area as being underlain by Proterozoic to Paleozoic silvery grey muscovite chlorite quartz phyllite in the southern portion. Tempelman-Kluit mapped four suites of plutonic rocks including; Proterozoic to Paleozoic aged foliated biotite granodiorite, Triassic aged foliated hornblende granodiorite, Mesozoic aged Nisling Range granodiorite and the Tertiary aged Coffee Creek Granite intrude the metamorphic rocks. The plutonic rocks are located in the northern portion of the proposed SMA. Gordey and Makepeace assigned the meta-sedimentary rocks to the Permian (Upper Paleozoic) aged Klondike Schist Subterrane of YTT. Gordey and Makepeace correlated the plutonic rocks with three regional suites including; foliated granodiorite ot the Early Jurrassic Aishihik Lake Batholithic rocks, the mid Cretaceous granodiorite of the Whitehorse Suite and Tertiary aged Nisling Range Alaskite stocks.

Geology of Scottie Creek SMA

Metamorphosed sedimentary and volcanic rocks outcrop in the Starvation Mountain area. Light yellow-orange to buff quartz-muscovite-sericite schist forms a thin veneer of less than 100 meters thickness on the mountain tops in the area. The schist overlies medium, well-bedded meta-sandstone to quartzite with a thin bedded, black, carbonaceous shale horizon that separates the two main units. The quartz-muscovite-sericite schist may represent the thinning southern edge of the Carboniferous to Permian aged Klondike Schist. The medium well-bedded quartzites is similar to the description of the Devonian to Mississippian aged Nasina Assemblage that includes sections of quartz-muscovite (+/-chlorite) schist.

Immediately north of Starvation Mountain the metamorphosed sedimentary rocks are in contact with equigranular, medium grained hornblende granodiorite. The granodiorite is brown weathering, massive and typical of the mid Cretaceous plutonic Whitehorse Suite.

Field traverses in the area of the two Nisling Range intrusions revealed only equigranular, medium grained hornblende granodiorite of the Whitehorse Suite.

Plate 4. Thick bedded quartz-sericite schist of Klondike schist Assemblage. With quartz veinlets.

The hornblende granodiorite was located in small rare outcrops or large angular blocks.

Plate 5. Transitional argillaceous argillite/phyllite

Structural Geology

The metamorphosed strata have a uniform relatively shallow northerly dip. The well-foliated quartz-muscovite schist contact with the underlying well-bedded quartzite was not observed in the field, although an apparently transitional carbonaceous shale unit was observed at one locality in the Starvation Mountain area. Foliation in the metamorphic rocks is a coarse schistosity defined by preferred orientation of micas and parallel with a crude metamorphic compositional layering (Tempelman-Kluit, 1972). The foliation of the schist appears conformable to the bedding of the quartzite. Tempelman-Kluit, (1972) observed that the schistosity is a strongly recrystallized pervaisive crenulation foliation. The medium well-bedded quartzite is similar to the Tempelman-Kluit's description of the Devonian to Mississippian Nasina Assemblage that includes sections of quartz-muscovite (+/-chlorite) schist.

Intrusive contacts would be expected to modify the regional structural trends but this was not observed in the field due to the poor bedrock exposure of the area.
Regional fault structures are parallel to the northwest-trending structural grain that parallels the major Cordilleran fault zones of the Tintina and Shakwak Trenches.

Plates 6 & 7. Well bedded sandstone/quartzite of Nasina Assemblage

Mineralization and Metallogeny

No mineralized occurrences are known in the study area. The Minfile occurrence 115K 087 (Starvation) is reported as an unknown occurrence north of Starvation Mountain. During the fieldwork in 2002 a small hand dug pit was located within a half kilometer of the Minfile occurrence location. A 20 centimeter wide white quartz lens with limonite was exposed in the pit. The vein was discordant to well foliated light yellow-brown quartz-muscovite schist. The rock sample assay of the quartz did not indicate the presence of gold or other metallic minerals. There are several ground disturbances in the vicinity that may indicate exploration activity and it is probable these are basis for the claims staked in the past.

The geological setting of the proposed SMA is permissive for various types of deposits.

The predominance of intrusive rocks in the northern end of the proposed SMA are prospective for plutonic related gold-quartz vein systems, polymetallic veins, porphyry copper-molybdenum deposits and epithermal gold deposits.

Plate 8. Exploration Pit on Starvation Occurrence Quartz vein.

The metamorphic rocks of the Klondike Schist assemblage are favorable for deposition of Sedex or VMS mineralization of the Kuroko and Besshi types. The proximity of these rocks to the intrusive rocks also provides favorable metallogeny for polymetallic vein and plutonic related gold-quartz vein systems.

Alteration and metamorphism

Regional metamorphism is due to multi-phase deformation that took place in Triassic time (Tempelman-Kluit, 1972).

A biotite-rich gneissic zone was observed at the contact of the Mid Cretaceous pluton and meta-sedimentary rocks north of Starvation Mountain. The zone appears to be a narrow (metres wide) phase of the granodiorite pluton composed of biotite-quartz-feldspar.

Geochemistry

The Regional Reconnaissance Stream Geochemical survey (RGS) results for the area were released in the GSC OF 1363, 1985. There were approximately 35 samples collected from the area of the proposed SMA and reported in the Open File.

The proposed SMA is in an unglaciated area of the Yukon. The low-lying areas are prime wetland habitat and the stream sediment quality for sampling is very poor. Streambeds are composed of organic muck with only rare silt sediment accumulations. Locally at higher elevations the stream sediments are of good quality but drain only small basins.

Soils are generally poorly developed. With the vegetative cover, relatively thick humus deposits blanket the soils in the low-lying areas. Loess and frozen soils inhibit sampling at higher elevations, especially early in the summer season.

All of the RGS geochemical analysis pertinent to the area and samples collected in the 2002 Energy Mines and Resourses (EMR) fieldwork were subjected to statistical analysis. The samples were separated into populations of RGS OF 1363, 2002 silt, 2002 soil and 2002 rock samples. Each population was assessed individually. The populations were divided into five categories that identified definitely anomalous, anomalous, above background, below background and low. The categories were defined by visually identifying slope changes in the cumulative frequency plots and/or natural breaks in the histogram plots of the sample results. The definitely and anomalous samples are of greatest economic potential.

Quality control to ensure the integrity of the EMR 2002 geochemical data was done all for all samples, from all projects, submitted by mineral assessments in 2002 as one data set for all the 215 rock samples and one set for the 667 stream sediment and soil samples. Data pertaining to the proposed SMAs is included within these sample sets. Quality control analysis of the data showed that the 2002 analytical results are reliable. Hulstein, et.al, (2002) describe analytical procedures and geochemical statistics for quality control.

Gold is the most significant precious metal in the area (Figure 5) with three anomalous samples in soils near the Minfile occurrence on Starvation Mountain. The soils are generally above background (> 2 ppb) in the area associated with the Klondike Schist unit. Five anomalous silt sediment samples (13 – 42 ppb) occur in the drainages from the contact zone of the Mid-Cretaceous granodiorite pluton and the Klondike Schist Assemblage. There are seven silt sediment samples anomalous in gold (8 – 42 ppb) from drainages included in the detailed mineral assessment study area but not within the proposed SMA.

Potential base metal mineralization is of greatest significance in the southern portion of the study area and the proposed SMA. There are 14 anomalous zinc (> 70 ppm) samples in silt, soil and rock samples collected in the southern area underlain by Paleozoic aged Klondike schist and/or Nasina assemblage rocks. There are 11 anomalous copper (> 35 ppm) and 14 anomalous lead (> 6 ppm) in silt, soil and rock samples in the same area. Many of the three metals are coincidently anomalous in the same sample locations.

There are 20 silt, soil and rock samples anomalous in nickel (>20 ppm) in the southern portion of the study area and proposed SMA. Cobalt anomalous samples correlate very well with the anomalous nickel samples.

Anomalous copper, lead and zinc samples of silt and soil occur sporadically throughout the northern portion of the study area indicating potential for porphyry type or polymetallic vein type deposits but are outside of the proposed SMA.

Airborne Geophysics

The GSC regional total field aeromagnetic survey was plotted as residual magnetics and these results were processed to calculate and plot the first vertical derivative.

The regional aeromagnetic survey map (Figure 6) shows a relatively strong trend south of Starvation Mountain underlain by the metamorphic rocks of the Klondike Schist-Nasina assemblages. This broad anomaly may indicate the presence of volcanic rocks within the metamorphic sequence. That is more likely than an intrusive suite because the anomaly trends through a recessive valley. There is a second distinct positive magnetic anomaly associated with the southern contact zone of the mid-Cretaceous pluton and metamorphic rocks just north of Starvation Mountain. This aeromagnetic trend is moderately broad, weakly linear and trends east-westerly.

Low intensity broadly positively anomalous magnetic rocks are distributed thoughout the area underlain by plutonic rocks outside of the proposed SMA area.

The first vertical derivative plot (Figure 7) accentuates the intensity of the magnetic trends. The resultant plot shows a strong persistent positive anomaly trending across the lower portion of the proposed SMA and across the width of the detailed mineral assessment study area. The persistence and breadth of the anomaly suggests that an underlying bedrock formation is responsible for the anomaly. The interpretation of such a formational trend could be of a conformable volcanic horizon. Weaker trends within the metamorphic rocks occur near the intrusive contacts or as linear trends in overburden-covered areas mainly outside of the area of the proposed SMA. Elsewhere in the study area anomalous zones occur within the plutonic rocks mainly outside the area of the proposed SMA. The irregular zones north of Starvation Mountain within the Cretaceous granodiorite and the Early Jurassic foliated hornblende granodiorite are of potential economic interest and remain to be investigated on the ground.

Mineral Assessment

Regional Mineral Potential

The study area of the proposed Scottie Creek SMA was included in the regional mineral potential assessment of Southwest Yukon that was the fifth phase of Regional Mineral Potential mapping of the Yukon Territory carried out by EMR. The proposed SMA is almost wholly within a 1000 km^2 tract (#33) that ranks in the lowest relative category of mineral potential in the regional assessment (Figure 3).

Detailed Mineral Potential Map

A detailed mineral assessment of the proposed Scottie Creek SMA took place in Whitehorse, on December 14th, 2002. 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 (Figure 8). The large section of Carboniferous to Permian aged meta-sedimentary rocks of the Klondike schist was separated into three tracts of similar geology. Areas in Tract 6 had been investigated in the field during 2002 and additional detailed information was available for this tract. Tract 7 and 8 were separated on the basis of overburden cover. Figure 8 shows the resulting mineral potential map of the proposed Scottie Creek SMA and surrounding area.

Methodology

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 Ana Fonseca (consultant).

The Scottie Creek assessment lasted one half day. 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 end 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. At the of the assessment, the panelists ranked the tracts relative to each other unanimously, from highest to lowest mineral potential.

Limitations

Mineral potential maps portray the best estimation at the time of the assessment. Since we are assessing 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 we once thought to have lower potential.

Results and Conclusions

The final ranking of tracts from highest to lowest relative mineral potential is as follows: Tract # 6 (highest), 8, 7, 5, 1, 4, 2, and 3 (lowest).

The detailed mineral potential map displays the relative mineral potential within the SMA and study area. The areas of highest mineral potential reflect the underlying potential of the Nasina Assemblage rocks to host base metal sedex or VMS type deposits.

Recommendations and Future Work

It is recommended that land use planners take into account the results of the mineral assessments of the proposed Scottie Creek SMA and use the mineral potential maps in their planning. Ideally land use planners would avoid alienating exploration ad development in the areas identified as having highest mineral potential.

Traverses within the Paleozoic metamorphic rocks in tracts 6 and 8 to collect lithological data and geochemical soil and silt samples are recommended. Fieldwork should concentrate in the area of the broad positive aeromagnetic anomaly that crosses tract 6, 7 and into tract 8. The aeromagnetic anomaly may reflect a volcanic component in the Klondike Schist-Nasina assemblages that have potential to host VMS type metal deposits.

The irregular aeromagnetic anomalies identified from the first vertical derivative in areas underlying plutonic rocks are areas of potential economic interest possibly representing plutonic phases of the intrusions or structural and/or alteration zones within the plutons. Field traverses collecting lithological data and geochemical soil and silt samples are also recommended in these areas.

Acknowledgements

Amy Stuart, Panya Lipovsky and Gary Stronghill provided technical support on the software programs used to prepare the data for the fieldwork and assessment panel as well as base data maps for the area of interest. Rod Hill and Monique Raitchy performed diplomatic and administrative services that allowed fieldwork to proceed. Trans North Helicopters from Haines Junction and Fireweed Helicopters from Dawson City provided safe, reliable and enjoyable transportation services.

I would recommend my colleagues for their companionship, perserverance and dedication to preparing the best quality work that is possible under all conditions. The fieldwork, mineral assessment workshop and this report wound not have been completed without their expertise, support and help.

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

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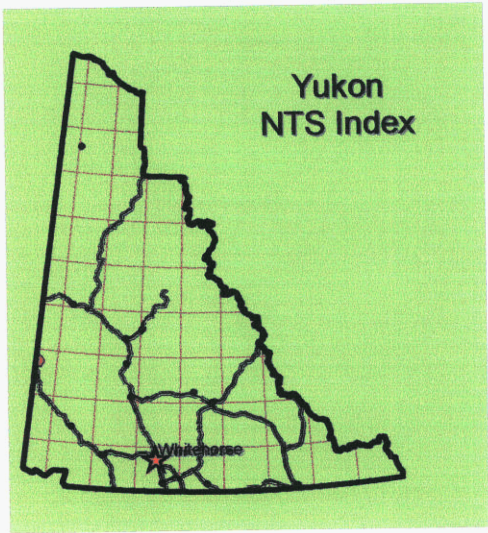

Proposed Scottie Creek Habitat Protection Area Special Management Area (September 2002 outline)

Location Map

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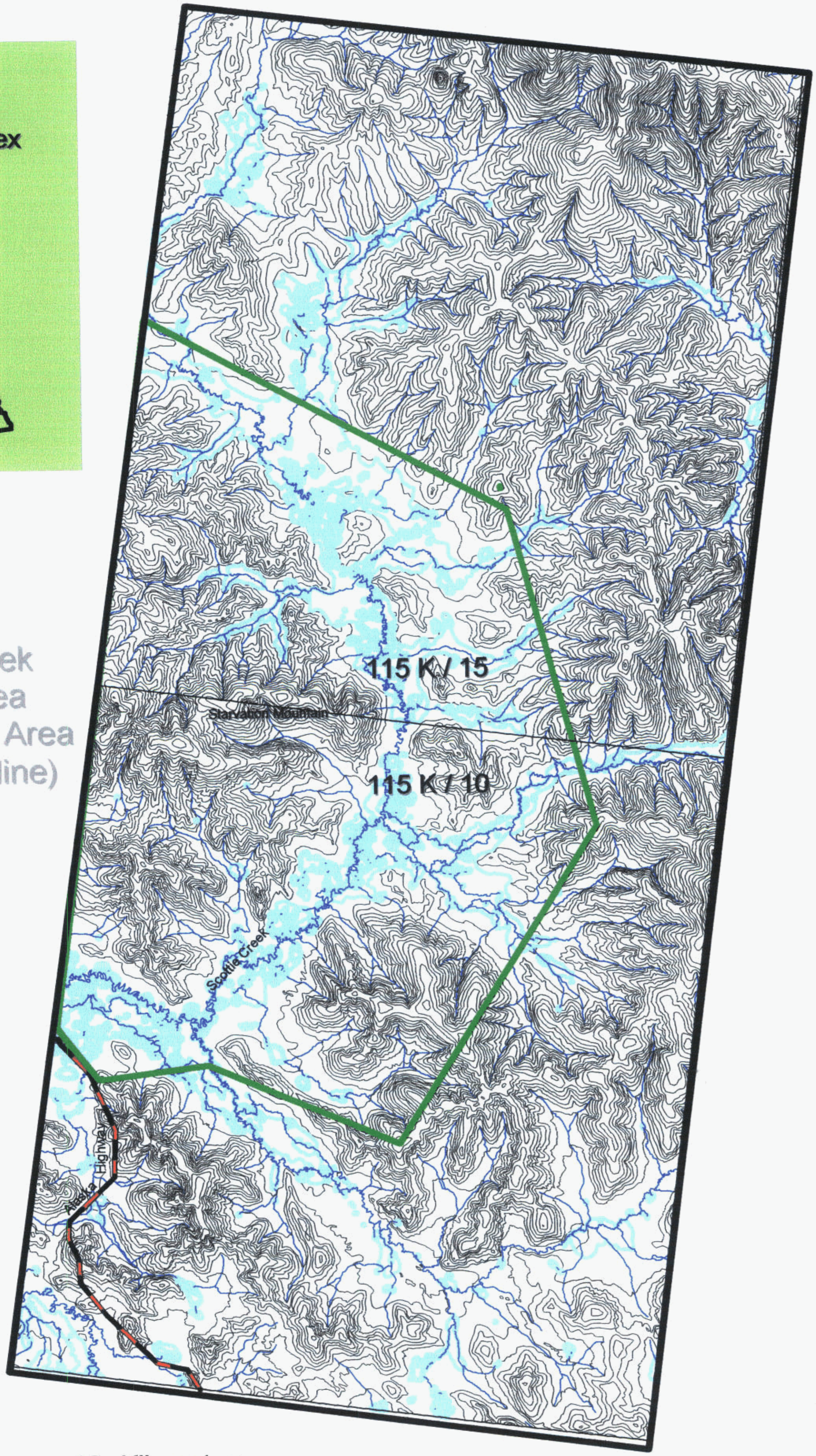


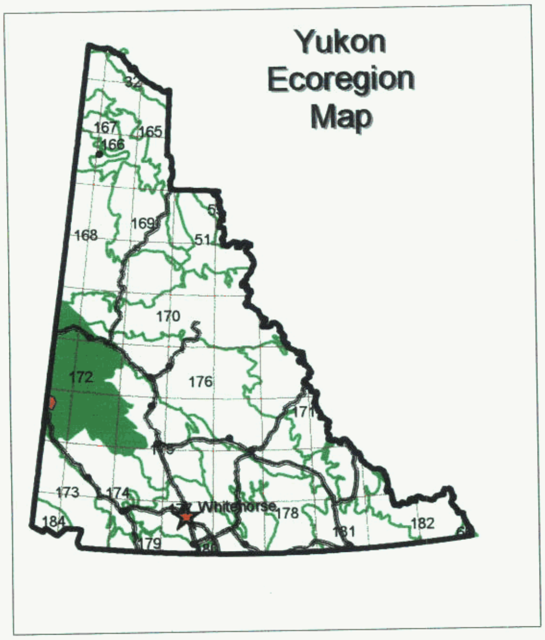
5 0 5 10 Kilometers

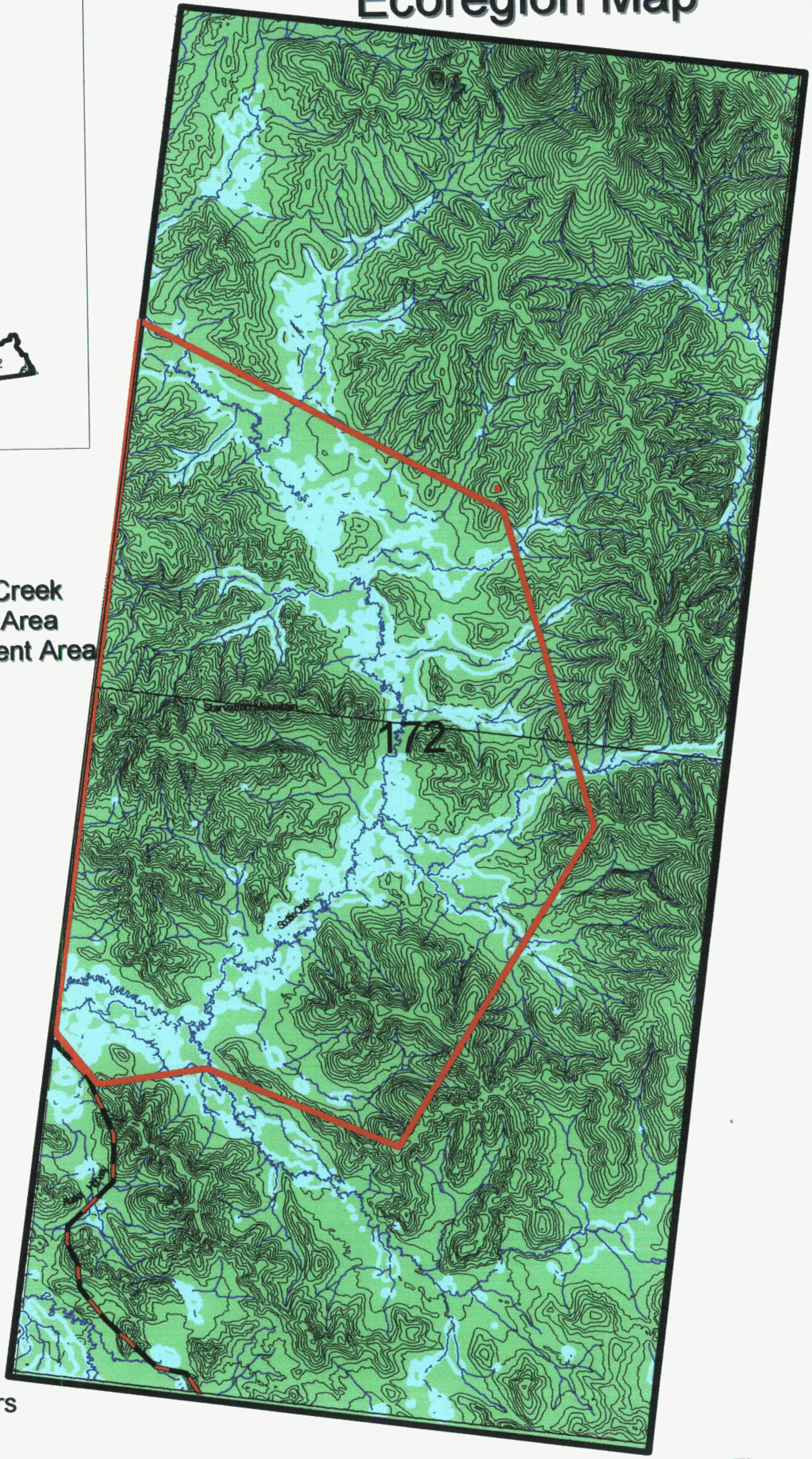
Scale 1 : 250,000

Arcview GIS Version 3.2 - RWS - February 2003

Figure 1

Scottie Creek Area Ecoregion Map





Proposed Scottie Creek Habitat Protection Area Special Management Area

172 Klondike Plateau Ecoregion

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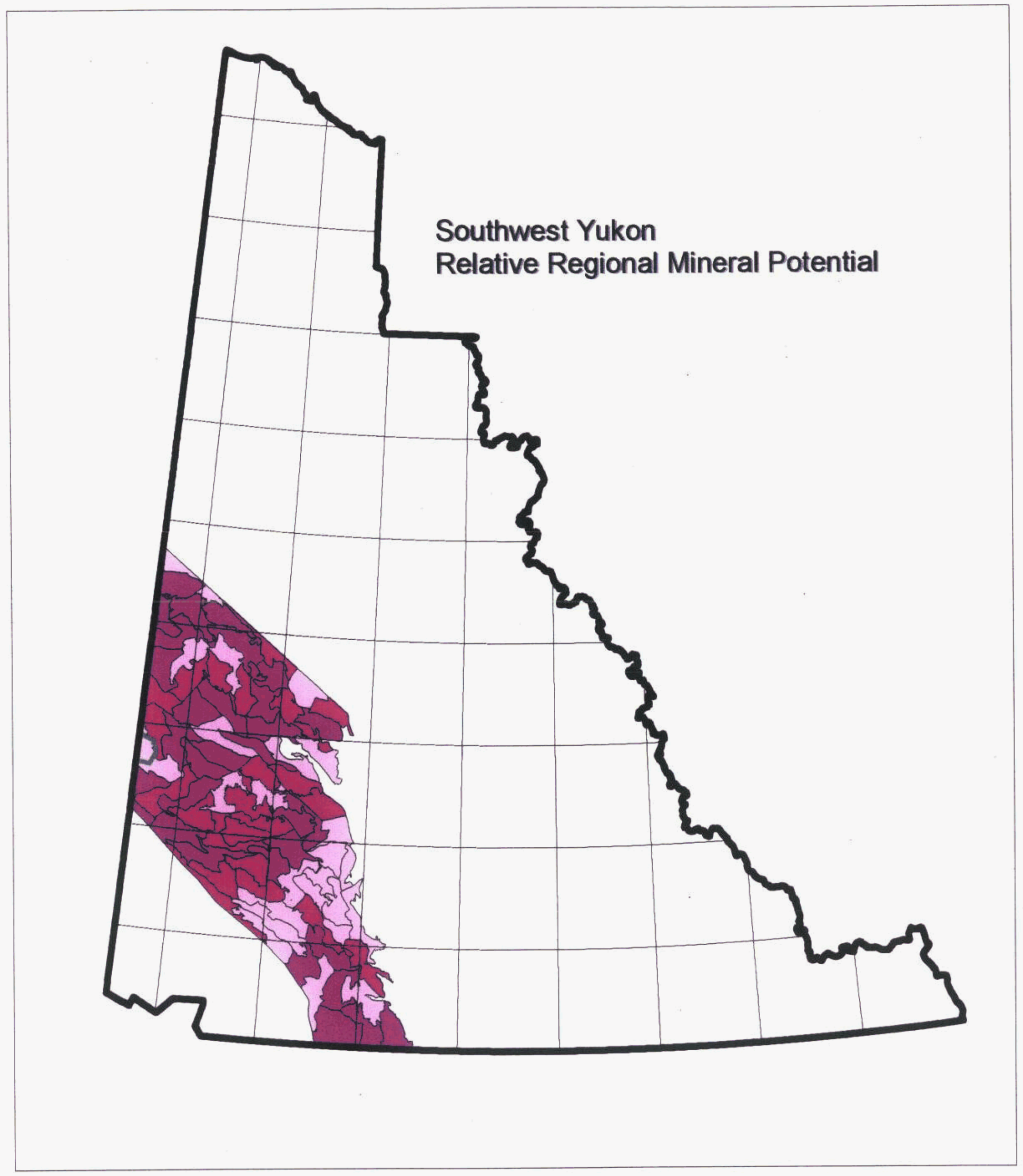
Figure 2



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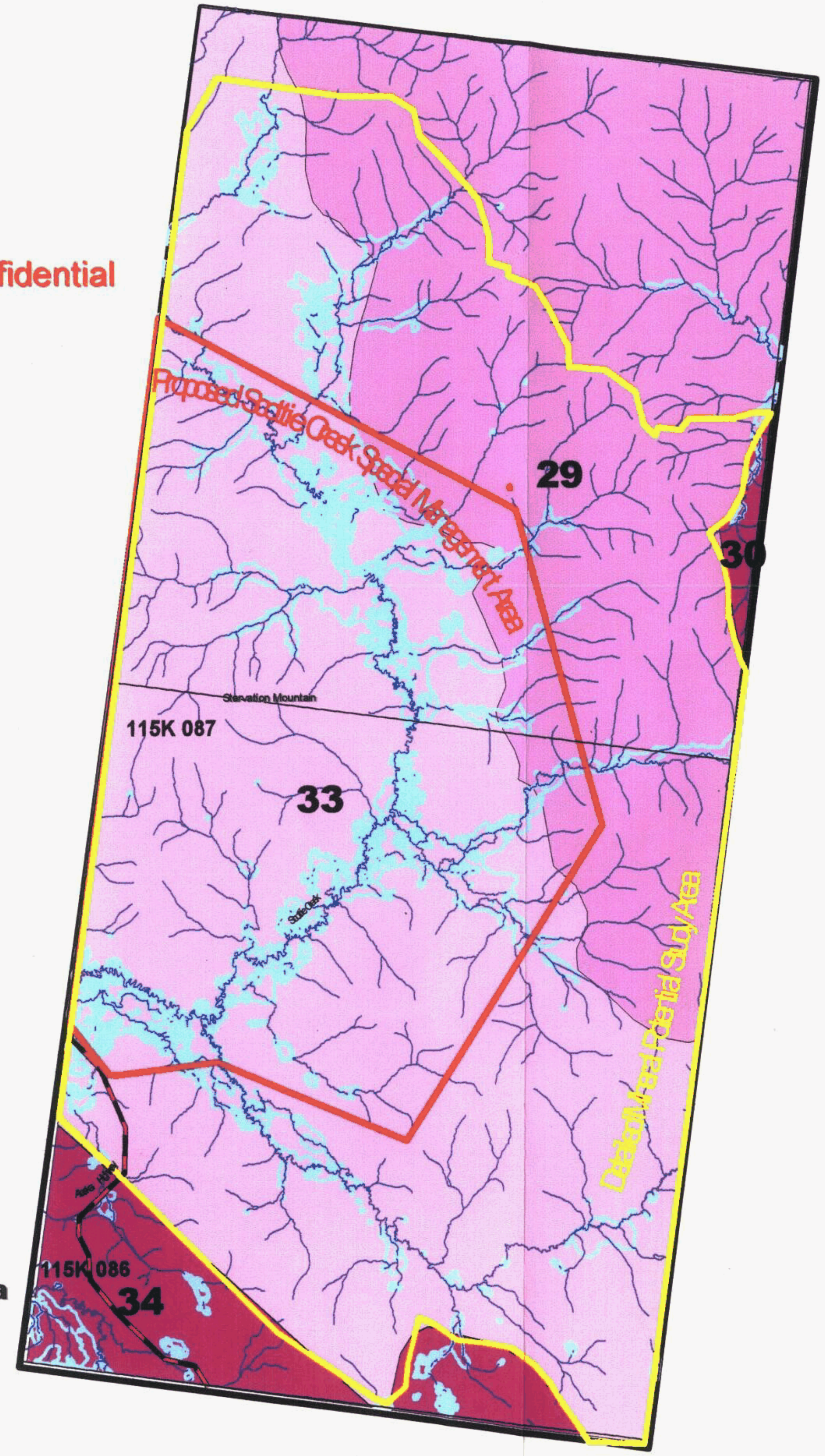

Relative Regional Mineral Potential

(light pink)	**Highest**
(pink)	
(dark red)	**Lowest**

Proposed Scottie Creek Special Management Area
Relative Regional Mineral Potential

2 0 2 4 Kilometers

Scale 1 : 250,000

Arcview 3.2 - GIS - RWS - February 2003

Figure 3

Geology Map

Geological Legend

Q	Quaternary unconsolidated glacial, glaciofluvial and glaciolacustrine deposits
ETqN	Early Teritary - Nisling Range Suite medium to coarse grained, equigranular to porphyritic rocks of intermediate composition
uKC1	Upper Cretaceous - Carmacks Group a volcanic succession dominated by basic volcanic strata including felsic volcanic rocks at the base of succession and locally basal clastic strata
mKgW	Mid-Cretaceous - Whitehorse Suite grey, medium to coarse grained, generally equigranular grantitic rocks of felsic (q), intermediate (g), locally mafic (d),and rarely syenitic (y)
mKqW	Early Cretaceous - Kluane Ranges Suite mid-grey, medium to coarse grained, biotite hornblende granodiorite, quartz diorite, quartz monzonite, and hornblende diorite
EJgA	Early Jurrassic - A - Aishihik Suite - medium- to coarse grained, foilated biotite- hornblende granodiorite biotite rich screens and gneiss schlieren; foliated hornblende diorite to monzondiorite with local K-feldspar megacrysts; may include unfoliated monzonite of the Long Lake Suite L - Long Lake Suite mostly felsic granitic rocks (q) but locally grading to syenitic (y)
CPK3	Carboniferous and Permian Klondike Schist - poorly understood assemblage of metamorphosed pelitic/volcanic rocks and minor marble, and phyllite of uncertain association
PMW1	Pennslyvaninan to Permian - Skolai Group tuff breccia, argillite, agglomerate, augit-phyric basaltic to andesitic flows; succeeded by thin-bedded argillite, siltstone, minor greywacke and conglomerate and thin basaltic flows, breccia and tuff
PMW3	Devonian and Cretaceous Windy Assemblage - oceanic assemblage of ultramafic rocks, greenstone, chert, carbonate, and metamorphosed equivalents
DMgPW	Late Devonian to Mississippian Pelly Gneiss Suite - variably deformed granitic rocks of predominantly felsic to intermediate composition southwest of Tintina Fault

Proposed Scottie Creek Habitat Protection Area Special Management Area (September 2002)

Detailed Mineral Assessment Study Area December, 2003

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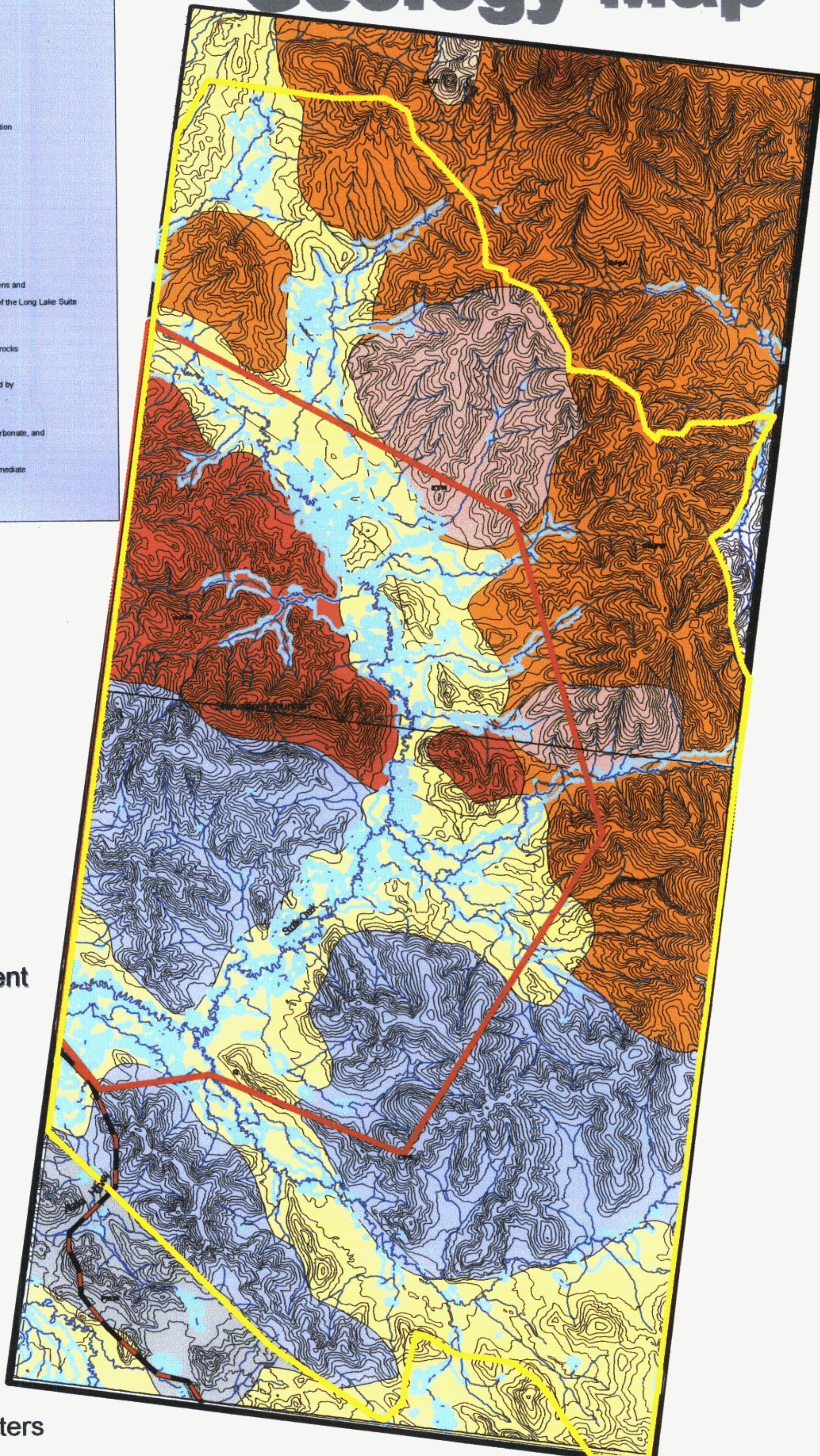

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Figure 4

2002 Sample Location Map for Proposed Scottie Creek Special Management Area

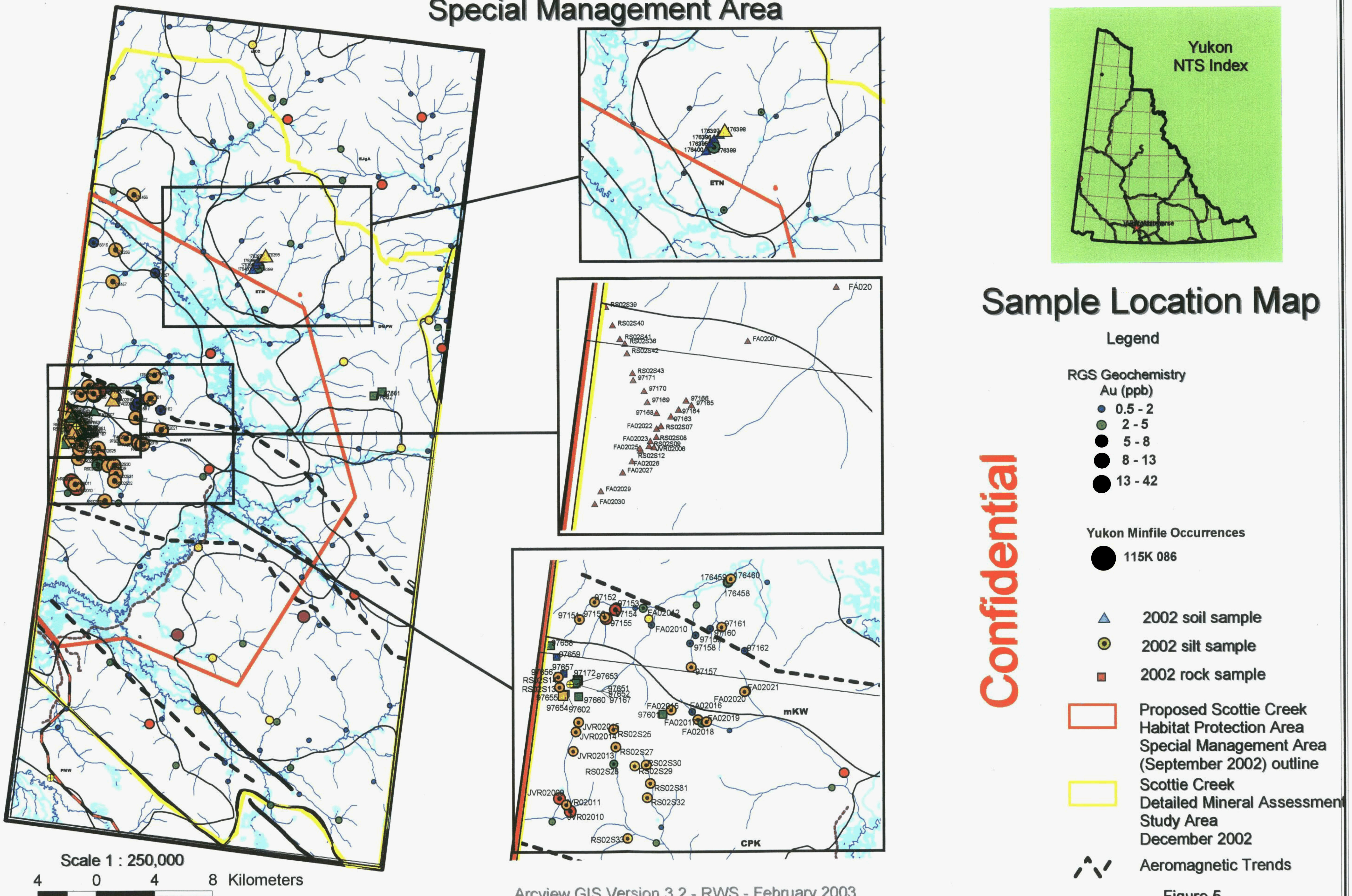


Figure 5

Detailed Mineral Assessment
GSC Aeromagnetics
Residual Magnetics

Confidential

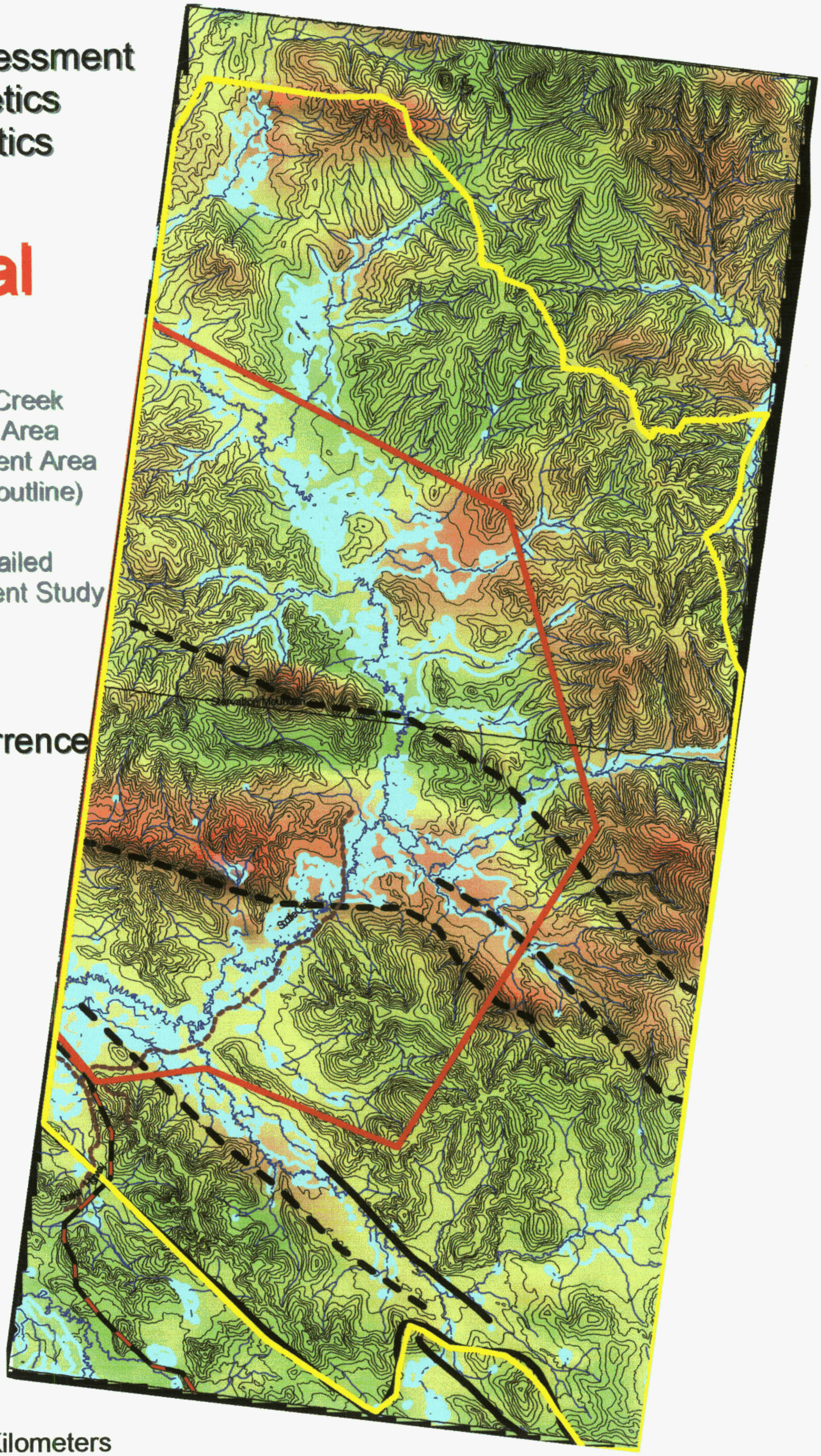
Proposed Scottie Creek Habitat Protection Area Special Management Area (September 2002 outline)

Scottie Creek Detailed Mineral Assessment Study Area Outline December 2003

● 115K 086 **Minfile Occurrence**

Magnetic Residual Anomaly (nT)

4300	35
700	15
570	0
460	-20
390	-35
340	-50
295	-55
280	-65
260	-85
230	-95
215	-105
190	-125
160	-135
140	-145
115	-160
100	-190
75	-220
55	-280



4 0 4 8 Kilometers

Scale 1 : 250,000

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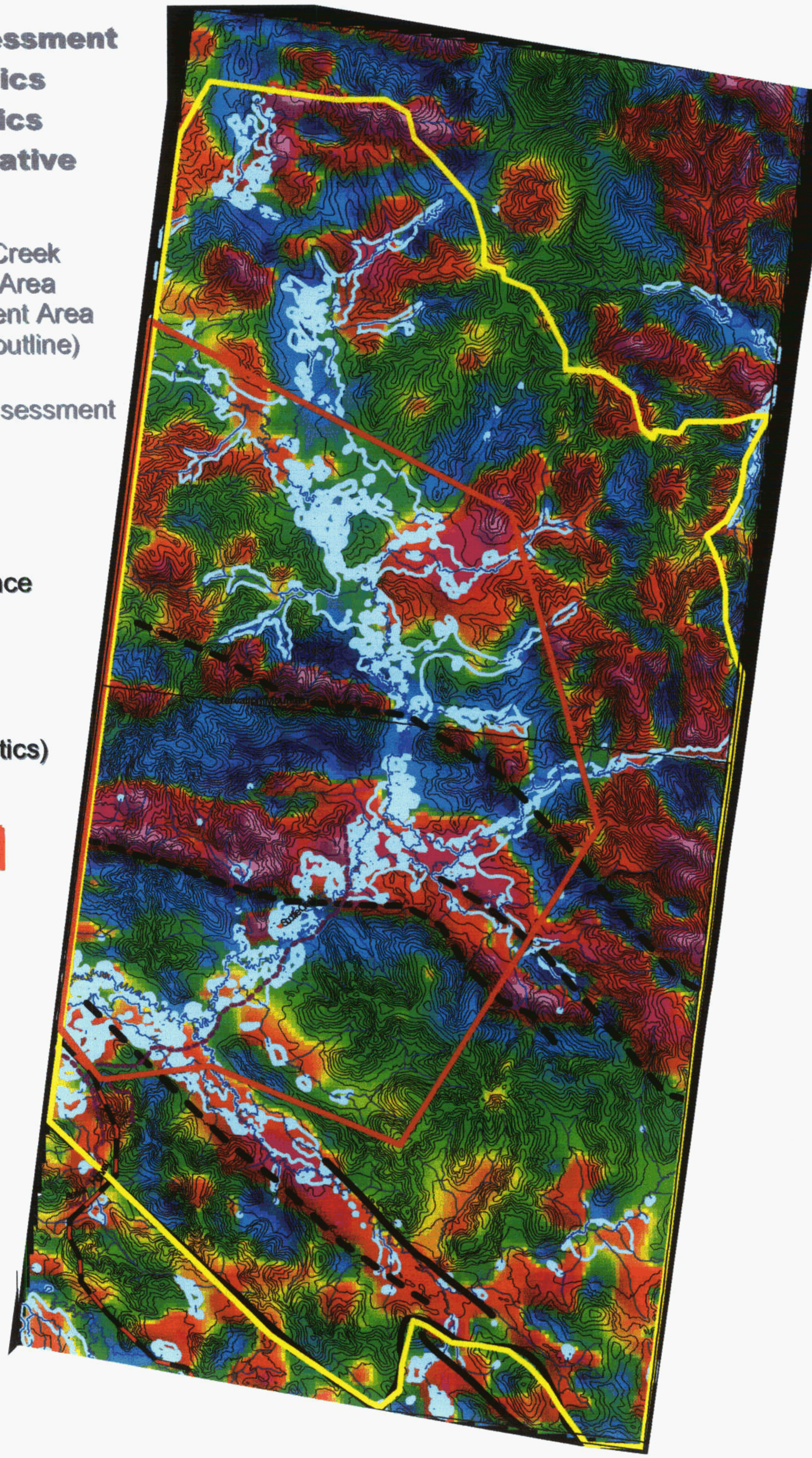
Figure 6

Detailed Mineral Assessment
GSC Aeromagnetics
Residual Magnetics
First Vertical Derivative



Proposed Scottie Creek Habitat Protection Area Special Management Area (September 2002 outline)

Detailed Mineral Assessment Study Area (December 2002)

115K 087 Minfile Occurrrence

Geological Fault

Aeromagnetic Trend (From residual magnetics)

Confidential

Magnetic Residual Anomaly (nT)

4300	35
700	15
570	0
460	-20
390	-35
340	-50
295	-55
280	-65
260	-85
230	-95
215	-105
190	-125
160	-135
140	-145
115	-160
100	-190
75	-220
55	-280

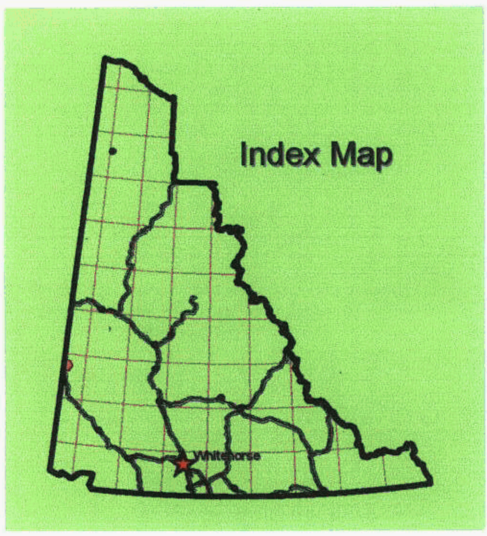
2 0 2 4 Kilometers

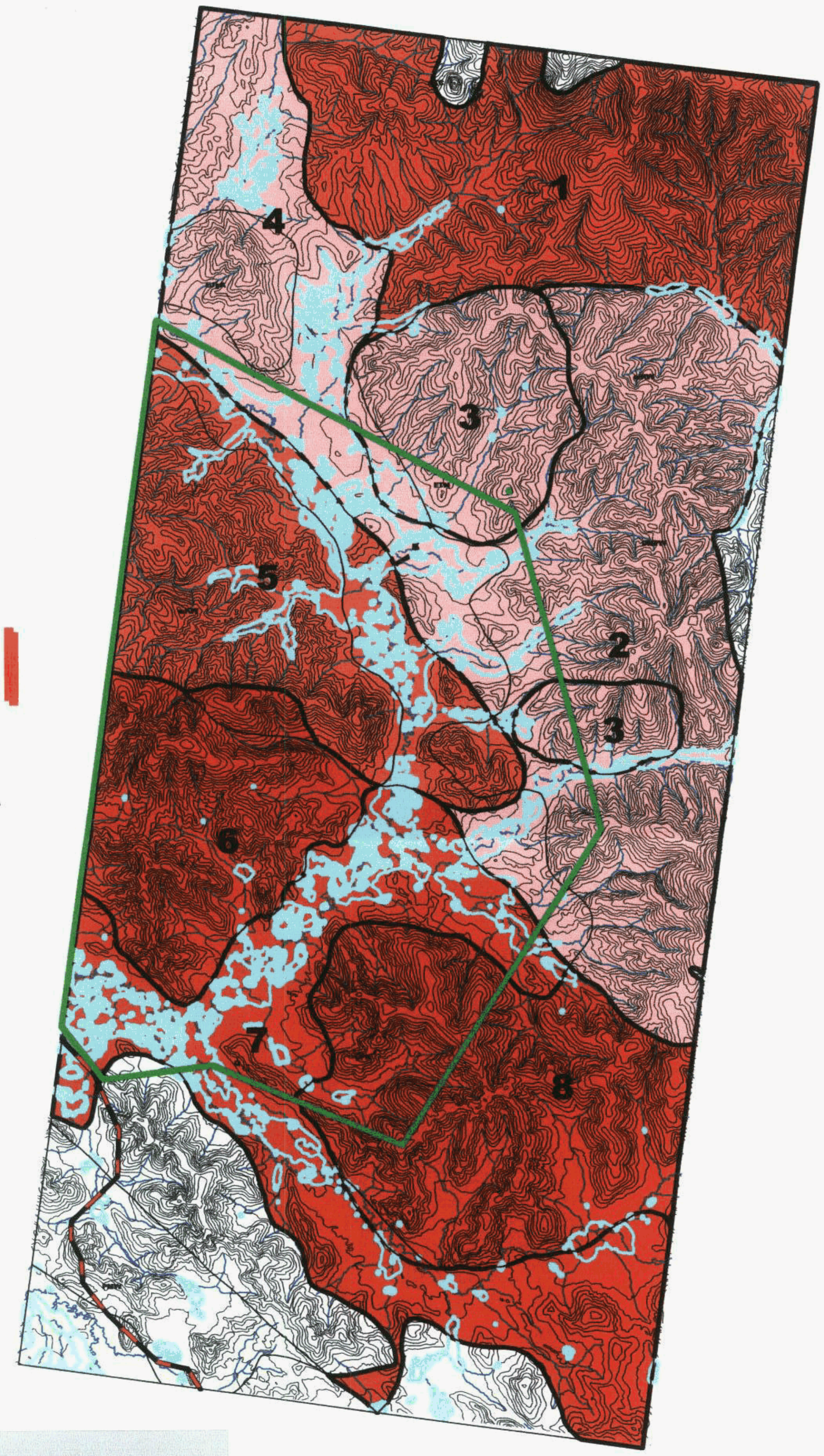
Scale 1 : 250,000

Arcview GIS Version 3.2 - RWS - February 2003

Figure 7

Proposed Scottie Creek Habitat Protection Area
Special Management Area
Detailed Mineral Assessment Study Area





Confidential

Relative Mineral Potential Ranking

- Highest
- Moderate
- Lowest

Proposed Scottie Creek Habitat Protection Area Special Management Area (September 2002 outline)

5 Tract, Number

Geological Legend

Q Quaternary
unconsolidated glacial, glaciofluvial and glaciolacustrine deposits

eTN Early Teritary - Nisling Range Suite
medium to coarse grained, equigranular to porphyritic rocks of intermediate composition

mKw Mid-Cretaceous - Whitehorse Suite
grey, medium to coarse grained, generally equigranular grantitic rocks of felsic (q), intermediate (g), locally mafic (d),and rarely syenitic (y)

eJgA Early Jurrassic - A - Aishihik Suite -
medium- to coarse grained, foilated biotite- hornblende granodiorite biotite rich screens and gneiss schlieren; foliated hornblende diorite to monzondiorite with local K-feldspar megacrysts; may include unfoliated monzonite of the Long Lake Suite
L - Long Lake Suite
mostly felsic granitic rocks (q) but locally grading to syenitic (y)

CPK Carboniferous and Permian
Klondike Schist - poorly understood assemblage of metamorphosed pelitic/volcanic rocks and minor marble, and phyllite of uncertain association

PMW Devonian and Cretaceous
Windy Assemblage - oceanic assemblage of ultramafic rocks, greenstone, chert, carbonate, and metamorphosed equivalents

Kilometers
2 0 2 4

Scale 1 : 250,000

Figure 8

APPENDIX I

MINERAL DEPOSIT MODELS

APPLIED TO

ASSESSMENT TRACTS

Appendix I

Scottie Creek Proposed SMA
Detailed Mineral Assessment
Mineral Deposit Models applied to each tract

Tract 1
Plutonic Related Au-Qz Systems
Polymetallic Veins
Epithermal Au (high S)

Tract 2
Plutonic Related Au
Polymetallic Veins

Tract 3
Polymetallic Veins

Tract 4
Polymetallic Veins
Porphyry Cu-Mo

Tract 5
Polymetallic Veins
Porphyry Cu-Mo
Plutonic Related Au-Qz Systems

Tract 6
Polymetallic Veins
Plutonic Related Au-Qz Systems
VMS – Kuroko Type
VMS – Besshi Type

Tract 7
Polymetallic Veins
Plutonic Related Au-Qz Systems
VMS – Kuroko Type
VMS – Besshi Type

Tract 8
Polymetallic Veins
Plutonic Related Au-Qz Systems
VMS – Kuroko Type
VMS – Besshi Type

APPENDIX II

DETAILED RELATIVE MINERAL

POTENTIAL RANKING

Of

ASSESSMENT TRACTS

Appendix II
Scottie Creek Proposed SMA
Detailed Mineral Assessment
Relative Mineral Potential Ranking of Tracts

Tract	Rank
1	5
2	7
3	8
4	6
5	4
6	1
7	3
8	2

YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE

MINFILE: 115K 087
NAME: STARVATION
DEPOSIT TYPE: UNKNOWN
STATUS: UNKNOWN
TECTONIC ELEMENT: NISLING TERRANE

NTS MAP SHEET: 115K\10
LATITUDE: 62° 44' 29" N
LONGITUDE: 140° 58' 44" W

OTHER NAME(S): HENRY, OLLIE, AHMIL
MAJOR COMMODITIES:
MINOR COMMODITIES:
TRACE COMMODITIES:

CLAIMS (PREVIOUS & CURRENT)

WORK HISTORY

Staked as the Ollie, Henry, etc cl (72564) in Jun/56 by C. Ceebowski, who restaked as the Ahmil cl (YA8196) in Sep/76.

GEOLOGY

The claims are underlain by Paleozoic? metasedimentary rocks near a granodiorite contact.

REFERENCES

APPENDIX III

TABLES OF EMR 2002 SAMPLES AND RESULTS

And

ANALYTICAL PROCEDURES

Proposed Scottie Creek SMA
EMR 2002 Rock Sample Results

Number	Ba_ppm	Cr_ppm	Ga_ppm	La_ppm	Mn_ppm	Sr_ppm	V_ppm	Zn_ppm	Al__	Ag__ppm	As__ppm	Au__ppb	B__ppm	Bi__ppm	Ca__	Cd__ppm	Co__ppm	Cu__ppm
140304	111	71	10	11	1074	57	114	80	1.71	0.05	3.1	1.3	3	0.05	2.13	0.1	14.9	32.9
140305	41	85	2	7	103	11	9	15	0.37	0.1	0.8	2.2	2	0.05	0.3	0.05	1.9	29.9
140306	19	55	9	6	318	25	43	34	2.69	0.1	0.3	0.5	4	0.1	3.63	0.05	10.1	57.8
140307	60	107	4	2	246	14	55	28	1.28	0.1	0.5	0.6	1	0.3	1.01	0.05	18.5	185.6
140308	7	47	10	3	936	94	69	75	3.64	0.05	29.7	2.2	4	0.1	14.13	0.2	10.9	11.8
140309	240	127	7	10	312	20	62	71	2.24	0.2	0.3	0.25	0.5	0.2	0.99	0.05	13	119.6
140310	46	112	3	9	126	6	12	18	0.35	0.05	1	1.7	1	0.1	0.52	0.1	3.8	22.9
140311	38	160	3	3	348	17	37	28	0.46	0.6	1.9	5.2	0.5	0.1	0.84	0.1	4.6	64.8
140312	20	44	7	17	340	218	24	33	2	0.05	0.3	0.25	0.5	0.05	7.65	0.1	3	6.1
176462	78	71	11	13	609	126	110	71	2.66	0.1	1.8	1.7	2	0.1	3.49	0.2	16.5	34
176463	43	107	3	7	256	22	13	18	0.6	0.1	2.3	9.7	1	0.4	0.71	0.05	2.2	35.4
176464	14	58	3	7	157	6	1	16	0.86	0.05	1.6	1.5	0.5	0.1	0.74	0.05	0.6	8.8
176465	26	127	3	1	757	64	45	4033	0.82	7.9	2119.5	393.8	2	0.1	7.85	12.6	6	58.7
176466	505	195	6	8	170	14	61	53	1.48	0.1	8	5	1	0.05	1.51	0.05	17.6	127.4
176467	45	219	1	1	55	4	6	10	0.19	0.05	1	0.25	1	0.05	0.09	0.05	1.2	8
176523	12	156	2	0	116	248	35	5	0.58	0.05	0.7	0.25	0.5	0.05	0.89	0.05	1.3	5.5
176524	41	69	12	2	1124	11	190	77	3.18	0.05	1.7	0.25	10	0.05	2.21	0.05	34.2	17.5
176525	388	148	7	3	312	20	50	39	1.15	0.05	1.4	0.25	1	0.1	0.75	0.05	12.1	9.8
176526	651	34	13	3	779	18	34	78	1.68	0.05	1.8	0.6	6	0.05	1.57	0.05	11.1	3.2
176527	952	48	8	14	2729	23	55	70	1.07	0.05	2.5	3.3	0.5	0.1	0.35	0.05	12.4	44.9
176535	5	153	2	1	1074	102	7	1475	0.41	7.5	14758.3	2154.5	2	0.1	4.75	4.1	4.4	48.8
176539	102	263	10	13	363	21	130	120	2.16	0.2	13.2	2	1	0.3	0.61	0.3	30.3	200.4
97167	34	148	3	8	311	12	8	1731	0.76	0.3	2.3	8.9	1	0.8	0.48	8.7	3.4	266.2
97172	14	162	1	10	83	1	9	29	0.23	0.05	1.4	0.6	1	0.05	0.01	0.05	1.6	8.5
97174	509	183	3	6	111	11	50	19	0.79	0.1	7	0.25	1	0.1	0.16	0.05	9.2	74.7
97601	45	45	2	23	588	15	20	42	0.75	0.05	5.4	1	2	0.1	0.24	0.05	9.9	7.4
97602	14	128	3	9	245	3	9	31	0.82	0.05	3.8	0.25	2	0.2	0.04	0.05	2	53.3
97651	23	149	2	11	93	1	9	16	0.67	0.05	1.3	0.25	1	0.05	0.01	0.05	2.4	5
97652	20	167	1	9	56	2	23	46	0.34	0.05	84.5	2.6	1	0.1	0.01	0.1	2.1	9.3
97653	13	145	1	3	73	2	3	8	0.21	0.05	2.5	1.4	1	0.2	0.03	0.05	1.4	12.3
97654	7	186	1	3	100	1	3	24	0.26	0.05	3.3	0.25	1	0.1	0.01	0.05	2.4	13.1
97655	46	145	0	3	180	3	3	23	0.12	0.1	17	6	1	1.9	0.01	0.1	3.6	22.9
97656	8	210	1	3	170	1	3	8	0.15	0.05	10.3	0.25	0.5	0.1	0.04	0.05	1.7	9
97657	23	218	1	10	66	1	5	8	0.23	0.05	1.3	0.25	0.5	0.05	0.01	0.05	2.7	10.9
97658	175	116	13	32	966	16	72	143	3.54	0.1	3.2	0.6	1	0.3	0.37	0.4	20.6	30.5
97659	10	219	0	1	5	1	2	5	0.07	0.05	1.3	0.25	0.5	0.05	0.01	0.05	1.1	10.5
97660	17	164	1	6	47	2	2	13	0.19	0.05	0.8	1	0.5	0.1	0.01	0.05	0.8	9
97661	847	100	7	14	645	52	86	76	2.17	0.05	1.7	1.1	0.5	0.05	0.78	0.1	12.6	8.5
97662	977	81	9	23	839	46	119	81	2.29	0.05	1.9	0.5	0.5	0.05	0.66	0.1	11.4	11
97663	494	495	6	10	976	361	84	65	2.16	0.1	2.7	0.25	9	0.05	0.95	0.05	58.4	111.6
JVR001	218	136	3	14	304	75	33	65	0.69	0.1	2.3	2.5	7	0.1	3.09	0.2	9.7	37.4
JVR002	118	9	4	13	379	126	99	45	1.05	0.3	3.3	1.5	3	0.4	7.92	0.2	20.8	108.2
JVR003	259	124	2	9	192	141	165	465	0.31	0.5	68.3	0.9	2	0.2	2.53	5.8	6.4	75.3

Appendix III

Proposed Scottie Creek SMA
EMR 2002 Rock Sample Results

Number	Fe__	Hg__ppm	K__	Mg__	Mo__ppm	Na__	Ni__ppm	P__	Pb__ppm	S__	Sb__ppm	Sc__ppm	Th__ppm	Ti__	Tl__ppm	U__ppm	W__ppm
140304	3.69	0.01	0.12	1.26	0.2	0.049	22	0.103	7.4	0.025	0.2	8.6	1.7	0.235	0.1	0.8	0.3
140305	0.65	0.5	0.1	0.16	0.4	0.025	2	0.007	6.2	0.025	0.1	1.5	10.6	0.048	0.1	5.5	0.2
140306	2.26	0.01	0.06	0.39	1.3	0.041	8.3	0.05	1.4	0.34	0.2	5.7	1.3	0.099	0.1	2.7	0.8
140307	2.5	0.5	0.1	0.99	0.5	0.106	22.5	0.028	1.4	0.73	0.1	6.9	0.9	0.102	0.1	0.4	1.2
140308	2.34	0.03	0.01	0.69	0.2	0.002	5.8	0.134	9.9	0.07	0.2	15.3	0.2	0.106	0.1	0.1	1.4
140309	3.33	0.5	0.74	1.58	1.3	0.03	30.9	0.036	5.8	0.84	0.1	4	4.6	0.18	0.2	1.2	0.1
140310	0.91	0.5	0.04	0.29	1.8	0.083	23.7	0.014	8.4	0.07	0.1	2.2	10.2	0.075	0.1	2.1	0.1
140311	2.87	0.01	0.06	0.26	2.3	0.005	23.5	0.019	2.6	1.1	3.6	2.7	1	0.044	0.4	0.4	0.1
140312	1.13	0.5	0.04	0.37	0.4	0.013	2.7	0.038	6.9	0.025	0.05	2	5.9	0.091	0.1	1	0.3
176462	3.68	0.01	0.09	1.58	2.8	0.03	13.5	0.111	8.2	0.025	0.2	8.3	3.9	0.206	0.1	3.2	0.1
176463	0.67	0.5	0.12	0.18	3.7	0.086	2.6	0.01	14.2	0.025	0.1	4.4	17.6	0.044	0.1	6.8	0.2
176464	0.47	0.5	0.06	0.05	0.4	0.025	0.7	0.004	11	0.025	0.5	1.6	5.8	0.016	0.1	1.9	0.1
176465	2.03	0.68	0.07	0.54	0.8	0.006	3.9	0.009	2505.4	0.51	2061	6.7	0.1	0.004	0.1	0.1	0.1
176466	2.01	0.5	0.27	1.51	0.6	0.128	114	0.112	17.2	0.025	12.4	5.5	1.4	0.153	0.1	0.3	0.1
176467	0.42	0.5	0.06	0.12	0.5	0.005	9.3	0.022	2.2	0.025	1.6	1.7	0.3	0.014	0.1	0.1	0.05
176523	0.81	0.01	0.01	0.04	0.4	0.005	3.5	0.004	0.8	0.025	0.05	2.2	0.05	0.038	0.1	0.05	0.1
176524	6.16	0.5	0.01	2.53	0.1	0.051	46.3	0.07	1.3	0.025	0.1	10.5	0.1	0.347	0.1	0.05	0.1
176525	1.68	0.5	0.01	0.87	0.3	0.036	37.5	0.023	3.6	0.025	0.3	4.5	1.6	0.112	0.1	0.3	0.2
176526	4.99	0.01	0.07	0.63	0.2	0.108	0.05	0.182	0.8	0.025	0.05	7.4	0.1	0.139	0.1	0.05	0.05
176527	2.92	0.04	0.05	0.84	0.2	0.061	18.4	0.066	5.8	0.025	0.1	6	1.7	0.018	0.1	0.2	0.1
176535	3.02	0.26	0.02	0.48	0.5	0.002	4.1	0.012	1579.5	1.19	1215.5	2.5	0.1	0.001	0.1	0.1	0.5
176539	5.27	0.02	1.07	1.92	2	0.089	130.1	0.132	6.2	1.88	1.9	9.1	4.9	0.252	0.3	2	0.1
97167	1.12	0.02	0.17	0.28	1.1	0.019	6.2	0.017	16.3	0.18	0.05	2.9	4.9	0.027	0.1	0.8	0.3
97172	0.75	0.1	0.07	0.08	0.6	0.022	7.4	0.004	2.5	0.025	0.1	1.1	3.7	0.008	0.1	0.3	0.1
97174	1.7	0.5	0.5	0.67	6.4	0.046	36.8	0.045	2.4	0.6	0.2	4.9	2.3	0.036	0.3	1.5	0.1
97601	2.12	0.5	0.08	0.15	0.4	0.102	15.8	0.042	15.4	0.025	0.1	5.1	13.6	0.007	0.1	0.6	0.05
97602	2.47	0.5	0.03	0.3	0.4	0.006	9.9	0.005	4.3	0.06	0.2	4.3	3.2	0.01	0.1	0.3	0.1
97651	0.9	0.01	0.26	0.3	0.4	0.016	7.3	0.002	1.8	0.025	0.1	2.2	4	0.023	0.1	0.4	0.1
97652	7.93	15.02	0.04	0.02	1.5	0.001	12.4	0.037	2.5	0.025	1	3.3	3.5	0.006	0.1	1.5	2.1
97653	0.65	0.21	0.06	0.08	0.5	0.003	4.1	0.013	2.4	0.025	0.1	0.7	1.2	0.007	0.1	0.2	0.2
97654	1.01	0.05	0.01	0.14	0.6	0.001	6.9	0.005	5.7	0.025	0.1	1	1	0.001	0.1	0.1	0.1
97655	1.69	1.29	0.05	0.01	0.7	0.002	5.5	0.008	4	0.025	0.4	1	1.5	0.002	0.3	0.2	0.1
97656	1.05	0.5	0.04	0.05	0.7	0.003	5.3	0.005	1.6	0.025	0.1	0.6	1.4	0.003	0.1	0.2	0.3
97657	0.59	0.04	0.11	0.08	0.8	0.008	8.2	0.004	3.1	0.025	0.1	0.8	2.8	0.01	0.1	0.2	0.1
97658	5.36	0.01	0.6	2.1	0.3	0.057	50.1	0.059	34.6	0.025	0.1	8.5	16.5	0.108	0.2	1.4	0.2
97659	0.34	0.02	0.02	0.01	1	0.002	5.2	0.002	2	0.025	0.1	0.4	0.4	0.002	0.1	0.1	0.1
97660	0.48	0.5	0.07	0.04	0.6	0.003	4.4	0.002	2.4	0.025	0.1	0.6	1.8	0.004	0.1	0.2	0.05
97661	3.43	0.01	1.28	1.24	0.3	0.121	5.4	0.101	5	0.025	0.1	6.4	4.1	0.28	0.4	0.5	0.1
97662	3.87	0.01	1.4	1.42	2.4	0.179	4.8	0.084	3.4	0.025	0.05	10.9	6.6	0.26	0.6	0.6	4
97663	5.11	0.5	1.09	9.52	0.4	0.727	689.1	0.233	4.4	0.025	0.1	2	2.3	0.122	0.1	1.2	0.1
JVR001	1.67	0.01	0.19	0.39	2.7	0.049	32.7	0.041	3.4	0.28	0.4	5.6	5.7	0.071	0.1	2	0.3
JVR002	4.06	0.41	0.15	0.68	1.1	0.026	10	0.119	5	1.38	0.3	8.1	4.4	0.068	0.1	4.8	0.3
JVR003	1.48	0.06	0.11	0.54	25.8	0.005	110.4	0.385	8.6	0.84	13	2.2	3.8	0.004	0.1	6.5	0.7

Proposed Scottie Creek SMA
EMR 2002 Silt Sediment Sample Results

Number	Ba_ppm	Cr_ppm	Ga_ppm	La_ppm	Mn_ppm	Sr_ppm	V_ppm	Zn_ppm	Al__	Ag__ppm	As__ppm	Au__ppb	B__ppm	Bi__ppm	Ca__	Cd__ppm	Co__ppm	Cu__ppm	Fe__	Hg__ppm
176256	157	27	5	8	2059	59	63	58	1.56	0.1	6.1	3.2	2	0.1	0.96	0.1	14.1	19.5	2.67	0.02
176257	133	29	5	8	785	42	70	55	1.56	0.1	6	0.25	2	0.1	0.72	0.1	12.8	21.9	2.74	0.02
176399	106	23	4	11	240	38	63	43	1.33	0.05	4.2	1.4	2	0.1	0.61	0.1	9.6	13.4	2.23	0.02
176456	194	27	5	10	622	54	62	52	1.59	0.1	5.4	3.8	1	0.1	0.84	0.1	10.4	24.1	2.47	0.03
176457	107	29	5	8	322	42	79	54	1.49	0.05	4.3	6.4	1	0.1	0.77	0.1	9.8	18.2	2.52	0.04
176458	135	25	4	7	307	39	65	49	1.51	0.05	3.8	2.3	2	0.1	0.66	0.1	9.1	22.1	2.25	0.01
176459	144	26	5	8	353	38	65	51	1.5	0.05	4	1.8	1	0.1	0.64	0.1	9.9	19.9	2.33	0.02
176460	148	26	5	7	283	35	49	59	1.47	0.05	1.9	5	2	0.05	0.62	0.1	8.2	12.7	1.88	0.02
176461	74	58	5	7	435	34	99	53	1.26	0.05	4.9	0.25	5	0.05	0.74	0.1	13.8	29.6	3.23	0.09
176528	123	32	4	9	344	39	63	58	1.44	0.1	4.6	2.2	1	0.1	0.8	0.1	10.6	25.7	2.34	0.03
176529	133	34	5	9	636	51	69	61	1.49	0.1	5.6	2.6	2	0.1	1.19	0.1	12.3	33.4	2.54	0.03
176530	98	25	4	9	232	34	51	51	1.22	0.05	14.6	12.4	0.5	0.1	0.68	0.1	8.5	16.1	1.88	0.02
176531	101	37	5	10	314	38	61	53	1.39	0.1	7.2	1.7	1	0.1	0.77	0.1	10.4	23.6	2.2	0.02
176532	119	59	5	9	667	46	78	75	1.55	0.1	7.4	2.1	6	0.1	0.97	0.2	16	50.6	3.04	0.02
176536	53	88	6	7	391	28	251	56	0.85	0.05	4.9	0.9	5	0.1	0.64	0.1	14.6	23.6	6.02	0.5
176615	164	24	4	8	683	44	64	48	1.49	0.05	4.5	0.25	2	0.05	0.75	0.1	10.1	13	2.59	0.01
176620	115	33	5	10	468	40	70	56	1.32	0.1	5.8	237.5	1	0.1	0.91	0.1	11.2	24.1	2.41	0.03
176621	95	26	4	8	250	38	58	52	1.28	0.05	3.1	4.3	1	0.05	0.81	0.05	8.6	15.4	1.97	0.02
97151	163	25	5	9	450	37	81	56	1.51	0.05	4.4	11.4	1	0.1	0.58	0.1	9.9	14.1	2.84	0.01
97152	118	24	4	8	324	37	74	46	1.35	0.05	3.8	11.5	3	0.1	0.69	0.1	8.1	12.3	2.58	0.02
97153	127	26	5	10	401	41	80	51	1.42	0.05	5	5.7	2	0.1	0.76	0.1	9.9	17.2	2.85	0.01
97154	151	27	5	10	368	34	95	51	1.35	0.05	3.8	15.9	1	0.1	0.62	0.1	9.2	13	3.02	0.02
97155	196	18	5	12	429	27	83	57	1.34	0.05	4	26.6	2	0.1	0.53	0.1	8.8	8.4	3.1	0.03
97156	183	25	5	9	418	41	85	59	1.53	0.05	4.5	9.2	2	0.1	0.6	0.1	9.8	13.8	2.98	0.01
97157	130	42	8	17	767	25	88	83	2.07	0.1	29.6	4.9	1	0.2	0.42	0.2	17.2	18.9	3.19	0.05
97158	160	30	7	13	526	30	82	60	1.74	0.1	20.1	0.25	1	0.1	0.47	0.1	11.8	17.3	3.03	0.02
97159	302	19	7	15	508	50	74	57	1.89	0.05	9.4	0.25	0.5	0.1	0.49	0.1	10.8	10.1	3.35	0.01
97160	297	34	8	12	442	33	91	56	1.91	0.05	10.7	0.25	0.5	0.1	0.48	0.1	12.4	14.9	3.37	0.01
97161	195	20	6	13	298	29	75	46	1.44	0.05	4	7.8	2	0.1	0.35	0.05	8.1	8	2.69	0.01
97162	220	38	8	16	774	31	90	71	2.1	0.1	26.5	0.5	1	0.1	0.53	0.1	14.2	20.2	3.53	0.04
97173	145	29	4	9	1662	50	61	68	1.36	0.1	8.2	1.9	3	0.1	1.24	0.2	12.2	18.4	2.36	0.04
97604	142	34	5	10	1686	56	69	80	1.63	0.1	8.1	3.1	2	0.1	1.23	0.1	16.5	25	2.98	0.03
97605	72	25	4	9	264	40	55	48	1.18	0.05	1.9	8.1	2	0.1	0.91	0.1	6.9	11.2	1.82	0.01
FA02010	126	27	5	10	401	34	72	51	1.46	0.05	6.1	0.25	2	0.1	0.61	0.1	9.9	15.6	2.74	0.03
FA02012	124	24	5	9	316	36	73	48	1.35	0.05	3.5	0.8	2	0.1	0.65	0.1	8.7	13.1	2.55	0.01
FA02015	96	28	6	14	487	25	61	59	1.58	0.1	10.1	2.1	2	0.2	0.38	0.1	11.1	19.6	2.78	0.03
FA02016	88	26	5	16	380	21	52	58	1.52	0.05	9.5	0.25	2	0.1	0.36	0.1	11.1	17.5	2.79	0.01
FA02017	124	38	6	11	576	36	71	62	1.76	0.1	7.6	2.4	2	0.1	0.53	0.2	14.2	21	2.56	0.02
FA02018	98	30	6	15	417	32	70	58	1.59	0.1	18.5	1.3	2	0.1	0.57	0.1	10.8	17.9	2.85	0.03
FA02019	66	25	4	8	265	29	67	48	1.25	0.05	4.5	6.9	1	0.1	0.59	0.1	8.4	13.9	2.42	0.02
FA02020	78	26	5	11	412	35	63	58	1.47	0.1	12.7	2.6	2	0.2	0.71	0.1	9.9	17.7	2.5	0.03
FA02021	67	27	5	11	617	30	70	68	1.4	0.1	7.5	5.8	2	0.1	0.62	0.1	10.9	16.3	2.6	0.03
JVR02009	58	32	5	17	353	51	59	50	1.53	0.1	6	24.2	2	0.1	0.77	0.1	9.7	17.4	2.22	0.03
JVR02010	82	34	6	12	379	44	87	57	1.64	0.1	5.5	13.4	2	0.1	0.87	0.1	11.2	20.6	2.8	0.04
JVR02011	82	31	5	13	368	43	70	57	1.63	0.1	7.2	3.5	3	0.1	0.74	0.1	10.2	21	2.55	0.02
JVR02013	102	32	7	12	422	35	73	49	1.8	0.1	8.4	2.6	2	0.2	0.55	0.1	10.5	21.7	2.71	0.03
JVR02014	165	60	7	14	464	63	87	74	2.19	0.1	9.1	4.3	2	0.1	0.84	0.2	16	32.3	2.96	0.06
JVR02015	162	59	7	10	349	88	103	78	2.27	0.1	4	3.7	1	0.1	0.7	0.2	16.3	33.4	2.97	0.04
JVR02020	114	30	4	10	387	81	64	47	1.23	0.1	4.2	4.3	3	0.1	2.55	0.2	10.2	28.6	2.25	0.01
RS02S13	158	29	6	17	394	23	68	61	1.72	0.1	6.8	4.8	3	0.4	0.34	0.1	13.5	19.3	2.73	0.03
RS02S14	267	25	9	13	753	49	92	81	2.63	0.2	8.9	5.3	1	0.3	0.51	0.2	13.2	62.9	3.61	0.26
RS02S25	60	19	5	18	440	16	45	51	1.42	0.1	10.4	6.2	2	0.1	0.45	0.1	9.2	13.7	2.27	0.01
RS02S27	81	25	5	17	586	23	59	64	1.52	0.1	15.3	4.9	2	0.2	0.47	0.1	12.7	22.3	2.73	0.01
RS02S28	120	36	6	16	603	35	86	59	1.83	0.1	10.7	1.5	3	0.1	0.65	0.1	14.1	24.1	3.09	0.01
RS02S29	167	43	6	9	383	42	89	54	1.78	0.1	3.3	9.5	2	0.2	0.57	0.1	10.4	16.5	2.6	0.05
RS02S30	135	31	7	13	542	47	81	63	1.86	0.1	6.2	3.4	3	0.5	0.75	0.1	12.4	24	2.91	0.03
RS02S31	95	31	5	10	523	45	90	57	1.52	0.05	8.4	9.2	2	0.2	0.76	0.1	10.5	16.8	2.89	0.02
RS02S32	96	35	4	7	305	38	87	48	1.56	0.05	3.7	4.2	2	0.1	0.76	0.1	9	14.7	2.64	0.03
RS02S33	116	31	5	8	382	38	93	52	1.52	0.05	4.3	10.8	3	0.1	0.74	0.1	10.2	17.9	2.88	0.03

Proposed Scottie Creek SMA
EMR 2002 Silt Sediment Sample Results

Number	K__	Mg__	Mo__ppm	Na__	Ni__ppm	P__	Pb__ppm	S__	Sb__ppm	Sc__ppm	Th__ppm	Ti__	Tl__ppm	U__ppm	W__ppm
176256	0.07	0.61	0.4	0.042	20.8	0.063	4.9	0.025	0.3	4.3	2.2	0.119	0.1	0.5	0.1
176257	0.06	0.6	0.2	0.039	20.8	0.069	4.4	0.025	0.3	4.4	2	0.122	0.1	0.5	0.2
176399	0.05	0.5	0.2	0.033	14.2	0.056	5.7	0.025	0.2	3.8	4.8	0.115	0.1	2.1	0.2
176456	0.04	0.59	0.4	0.035	18.8	0.06	6	0.025	0.3	5.1	2.2	0.111	0.1	1.1	0.1
176457	0.06	0.67	0.5	0.039	19.9	0.066	4	0.025	0.4	4.4	1.8	0.129	0.1	0.6	0.4
176458	0.08	0.65	0.3	0.034	17.3	0.062	3.4	0.025	0.2	4.1	1.7	0.129	0.1	0.4	0.2
176459	0.09	0.68	0.2	0.031	18.2	0.065	3.6	0.025	0.3	4.2	1.8	0.123	0.1	0.4	0.1
176460	0.08	0.66	0.2	0.034	15.2	0.064	3.6	0.025	0.2	3.5	1.6	0.136	0.1	0.3	0.1
176461	0.06	0.95	0.4	0.027	28	0.092	2.3	0.025	0.3	3.3	1.6	0.095	0.1	0.4	0.1
176528	0.05	0.6	0.4	0.035	23.5	0.079	6.1	0.025	0.4	4.3	1.9	0.103	0.1	1.4	0.1
176529	0.06	0.67	0.4	0.044	25.6	0.077	4	0.025	0.3	4.6	1.6	0.109	0.1	0.6	0.1
176530	0.04	0.55	0.3	0.032	21.1	0.104	3.7	0.025	1.6	3.4	2	0.106	0.1	0.5	0.2
176531	0.07	0.7	0.4	0.038	28.6	0.095	3.6	0.025	0.3	3.9	2	0.128	0.1	0.5	0.1
176532	0.09	1.11	0.5	0.04	35.2	0.105	4.2	0.07	0.4	4.7	1.8	0.101	0.1	0.7	0.1
176536	0.04	0.69	0.4	0.015	22.3	0.099	2.2	0.025	0.3	2.3	2.1	0.12	0.1	0.3	0.2
176615	0.05	0.61	0.3	0.034	16	0.062	3.9	0.025	0.4	4	2	0.12	0.1	0.4	0.2
176620	0.06	0.67	0.5	0.039	23.9	0.082	4.3	0.025	0.3	3.8	2.2	0.101	0.1	0.6	0.2
176621	0.05	0.62	0.2	0.04	17.7	0.073	3.4	0.025	0.1	3.3	1.8	0.105	0.1	0.4	0.2
97151	0.14	0.69	0.3	0.033	16.3	0.065	5.3	0.025	0.2	3.9	2.2	0.16	0.1	0.6	0.3
97152	0.08	0.66	0.2	0.042	15.3	0.069	3.5	0.06	0.2	3.9	1.9	0.151	0.1	0.4	0.1
97153	0.09	0.7	0.3	0.044	18.8	0.069	3.6	0.025	0.2	4.3	2.5	0.153	0.1	0.7	0.1
97154	0.14	0.65	0.3	0.033	15.4	0.072	3.5	0.025	0.2	3.6	2.8	0.156	0.1	0.9	0.2
97155	0.25	0.65	0.3	0.031	10.1	0.069	3	0.025	0.4	4.1	4.6	0.162	0.1	1.3	0.5
97156	0.19	0.71	0.4	0.038	14.6	0.061	4.6	0.025	0.2	3.9	2.6	0.16	0.1	0.6	0.2
97157	0.27	1.03	0.9	0.02	21.3	0.063	17.1	0.025	0.4	5.6	5.9	0.146	0.2	1.2	0.2
97158	0.25	0.87	0.8	0.028	16.4	0.053	7.2	0.025	0.3	5.5	4.5	0.161	0.2	1	0.2
97159	0.5	0.92	0.5	0.019	11.8	0.063	5.1	0.025	0.3	6.5	5.1	0.145	0.2	0.8	0.1
97160	0.5	1.08	0.7	0.025	20	0.068	4.1	0.06	0.2	6.5	4.4	0.197	0.2	0.7	0.2
97161	0.37	0.72	0.3	0.024	9.8	0.055	3.1	0.025	0.2	4.7	5.1	0.175	0.1	0.8	0.2
97162	0.25	1.1	1:1	0.02	21.3	0.06	7.3	0.025	0.4	7.5	4.4	0.152	0.2	1	0.1
97173	0.07	0.59	0.6	0.043	22.9	0.086	3.6	0.025	0.3	4	1.6	0.114	0.1	0.5	0.2
97604	0.1	0.74	0.7	0.048	26	0.09	5.4	0.025	0.5	5.3	2.2	0.134	0.1	0.7	0.1
97605	0.06	0.53	0.3	0.041	15.4	0.078	3	0.025	0.2	3.3	1.8	0.121	0.1	0.5	0.2
FA02010	0.15	0.68	0.4	0.038	16.4	0.059	4.7	0.025	0.3	4	2.8	0.146	0.1	0.7	0.2
FA02012	0.1	0.63	0.3	0.036	16.3	0.067	3.6	0.025	0.2	3.6	2.4	0.147	0.1	0.5	0.2
FA02015	0.18	0.63	0.6	0.016	20.9	0.044	10.2	0.025	0.3	3.5	4.4	0.117	0.1	0.7	0.1
FA02016	0.27	0.57	0.4	0.015	21.9	0.05	6.9	0.025	0.2	3	6.1	0.119	0.1	0.6	0.2
FA02017	0.16	0.87	0.4	0.029	19.7	0.049	8	0.025	0.2	4.7	2.9	0.144	0.1	0.6	0.1
FA02018	0.16	0.72	0.4	0.027	18.2	0.054	7.1	0.025	0.4	4.6	5	0.129	0.1	0.9	0.2
FA02019	0.08	0.6	0.2	0.029	16.3	0.056	4	0.025	0.2	3.2	2.5	0.139	0.1	0.6	0.2
FA02020	0.13	0.72	0.3	0.033	18.6	0.051	8.9	0.025	0.3	3.9	3.1	0.126	0.1	0.5	0.2
FA02021	0.1	0.63	0.3	0.027	18.5	0.048	9	0.025	0.2	3.6	3.2	0.138	0.1	0.6	0.2
JVR02009	0.13	0.81	0.4	0.03	18.3	0.047	6.8	0.025	0.2	4.2	3.1	0.118	0.1	1.9	0.1
JVR02010	0.13	0.76	0.4	0.037	22.5	0.067	6.1	0.025	0.2	4.6	3.1	0.154	0.1	1.6	0.2
JVR02011	0.16	0.76	0.5	0.034	18.3	0.058	8	0.025	0.3	4.5	3.8	0.128	0.1	1.3	0.2
JVR02013	0.13	0.65	0.9	0.021	20.2	0.042	7.4	0.025	0.4	4.3	3.2	0.136	0.1	1	0.1
JVR02014	0.25	1.34	0.6	0.038	30.9	0.047	8.5	0.025	0.4	6.5	3.1	0.11	0.2	1	0.1
JVR02015	0.32	1.49	0.5	0.032	26.8	0.05	6.6	0.025	0.4	6.7	1.8	0.112	0.3	0.6	0.05
JVR02020	0.09	0.8	0.6	0.051	26.4	0.08	4	0.025	0.4	4	2.1	0.12	0.1	0.6	0.1
RS02S13	0.1	0.57	0.8	0.016	21.5	0.051	13.8	0.025	0.2	3.4	3.3	0.102	0.1	0.6	0.2
RS02S14	0.21	0.79	1.1	0.022	17.4	0.061	8.4	0.025	0.3	5.1	2.4	0.109	0.1	0.9	0.3
RS02S25	0.28	0.64	0.4	0.011	14.4	0.039	9.9	0.025	0.3	3.6	6.2	0.096	0.2	0.9	0.1
RS02S27	0.23	0.6	0.4	0.014	24	0.041	13.8	0.025	0.5	3.6	6	0.102	0.2	0.8	0.1
RS02S28	0.33	0.96	0.6	0.029	22.3	0.048	8.3	0.025	0.3	5.4	4.7	0.129	0.2	1	0.1
RS02S29	0.26	0.82	0.4	0.028	19.4	0.043	4.6	0.025	0.2	4.7	2.7	0.146	0.3	0.6	0.6
RS02S30	0.31	0.89	0.8	0.033	21.7	0.044	7.7	0.025	0.3	5.3	4.3	0.138	0.2	1.3	0.6
RS02S31	0.16	0.78	0.5	0.036	20.1	0.062	4.7	0.025	0.3	4.3	3.3	0.138	0.1	0.9	0.3
RS02S32	0.07	0.75	0.2	0.039	17.5	0.069	3.3	0.025	0.3	3.7	1.9	0.137	0.1	0.4	0.5
RS02S33	0.08	0.72	0.3	0.035	18.7	0.07	4	0.025	0.3	4	1.9	0.135	0.1	0.4	0.1

Number	Ba_ppm	Cr_ppm	Ga_ppm	La_ppm	Mn_ppm	Sr_ppm	V_ppm	Zn_ppm	Al__	Ag__ppm	As__ppm	Au__ppb	B__ppm	Bi__ppm	Ca__	Cd__ppm	Co__ppm	Cu__ppm	Fe__	Hg__ppm
176258	322	40	9	10	243	11	94	77	2.32	0.2	39.2	2.2	0.5	0.2	0.13	0.1	9.4	65.4	3.71	0.02
176259	268	49	9	8	339	17	98	59	2.84	0.2	38.8	5.4	2	0.2	0.24	0.1	15	38.3	3.97	0.02
176260	253	41	9	12	353	22	91	50	2.46	0.5	10.8	3.7	1	0.2	0.25	0.1	9.5	33.4	3.37	0.04
176261	893	30	8	15	570	17	75	66	2.42	0.1	74.5	7.3	1	0.2	0.24	0.1	10.5	61.8	2.92	0.01
176262	343	49	8	8	525	21	100	68	3.05	0.2	32.6	3.1	1	0.2	0.3	0.2	17.5	34.3	4.76	0.02
176263	235	51	8	9	362	22	87	68	3.45	0.4	15	4.5	1	0.2	0.31	0.1	15.1	32.8	3.93	0.03
176264	467	49	7	13	491	29	90	58	2.35	0.05	7.3	5.4	1	0.1	0.38	0.1	14	40	3.19	0.02
176265	297	42	8	9	471	34	88	49	3.03	0.1	40.5	4.5	1	0.2	0.39	0.1	16.8	51.6	3.07	0.01
176266	292	43	8	8	418	22	87	60	2.98	0.1	65.3	5.1	1	0.2	0.33	0.1	15.1	36.1	3.92	0.02
176267	335	49	8	9	523	27	103	58	2.53	0.1	67.3	33.5	1	0.2	0.38	0.1	15.6	40.2	3.47	0.02
176268	387	41	10	7	427	22	109	93	2.41	0.1	29.5	7.3	1	0.2	0.26	0.4	12.8	25.6	4.26	0.03
176269	355	48	8	8	336	27	92	62	3.09	0.1	24.7	3.8	2	0.2	0.36	0.1	18.7	24.1	3.84	0.02
176270	472	49	7	13	531	30	92	60	2.43	0.1	7.4	5.7	1	0.1	0.42	0.1	14.5	40.8	3.29	0.02
176271	355	32	6	13	551	19	53	62	1.99	0.1	82.7	3	2	0.3	0.25	0.05	12.9	87.1	2.7	0.01
176272	314	40	8	11	316	31	81	65	2.78	0.3	210.3	56.7	1	0.2	0.37	0.1	12.6	27.6	3.28	0.03
176273	577	34	11	9	593	26	130	79	3.48	0.1	103.7	3.4	1	0.1	0.48	0.1	13.6	15.9	5.04	0.01
176274	222	40	7	8	385	22	90	82	2.4	0.3	27.3	3.7	1	0.2	0.26	0.3	12.5	27.8	3.1	0.02
176275	438	45	9	9	560	21	94	64	2.9	0.1	12.7	6.8	1	0.2	0.25	0.1	16	34.2	4.15	0.03
176276	540	48	8	8	312	19	82	59	3.01	0.2	24.5	4.3	2	0.1	0.26	0.2	14.2	33	3.5	0.02
176277	483	44	8	9	682	28	97	84	2.18	0.2	13	4.9	1	0.2	0.38	0.2	13.5	27.2	3.64	0.01
176278	292	46	7	10	427	35	93	70	2.34	0.1	30.3	6.1	2	0.2	0.56	0.2	13.4	28	3.49	0.02
176279	447	38	5	8	620	41	76	54	1.79	0.1	13.1	6.8	2	0.1	0.67	0.2	12.9	27.4	2.82	0.02
176280	297	39	7	10	310	26	74	58	2.39	0.2	191.8	55.3	1	0.1	0.3	0.1	12.7	24.1	3.27	0.03
176395	140	28	13	23	416	23	89	131	3.53	0.1	9.1	0.25	3	0.3	0.48	0.1	12.4	24.5	5.15	0.03
176396	165	32	9	21	342	26	82	82	2.45	0.05	5.9	0.25	2	0.2	0.32	0.05	11.5	22.3	4.04	0.01
176397	130	32	6	10	252	24	74	54	2.09	0.05	5	0.25	3	0.1	0.33	0.1	10	18.4	2.86	0.01
176398	167	46	7	8	289	32	100	59	2.86	0.1	9.2	3.5	1	0.1	0.34	0.1	11.6	20.9	3.51	0.01
176400	377	23	8	6	556	23	88	94	2.5	0.1	4.8	0.25	1	0.1	0.27	0.1	13	16.2	3.39	0.01
176534	117	29	5	10	688	94	101	65	1.15	0.1	7.3	1.1	5	0.1	4.52	0.1	15.1	36.2	3.47	0.01
176616	182	66	8	8	445	28	94	58	2.88	0.1	10.5	2.9	1	0.2	0.45	0.1	17.7	56.1	3.88	0.02
176617	201	39	7	10	360	32	78	51	1.95	0.1	8.4	6.9	1	0.1	0.52	0.1	12.5	28.7	3.06	0.01
176618	160	43	8	7	346	24	92	61	2.82	0.1	10.1	2.9	1	0.2	0.34	0.2	14.5	25.4	3.62	0.02
176619	186	36	7	11	280	36	75	46	2.29	0.1	8.5	4.8	1	0.2	0.46	0.1	11.8	26.8	2.81	0.02
97163	140	47	9	14	416	20	98	61	3.18	0.05	16.8	1.1	1	0.5	0.28	0.1	15	32.3	3.86	0.03
97164	141	40	8	14	662	27	100	104	2.17	0.1	9.8	6.7	2	0.2	0.36	0.4	15.3	37.1	3.79	0.34
97165	192	33	8	8	474	33	91	66	2.29	0.1	11.5	0.25	1	0.1	0.46	0.1	12.2	23.3	3.48	0.06
97166	254	37	8	11	457	54	91	57	2.88	0.05	9.4	3.4	1	0.1	0.63	0.1	11.8	30.3	3.47	0.04
97168	134	36	7	12	545	31	81	51	2.37	0.05	7.9	2.3	2	0.3	0.47	0.1	16.2	28	3.26	0.02
97169	124	41	9	11	511	27	101	64	2.46	0.1	18.4	9.2	1	0.4	0.34	0.2	17.2	83	4.03	0.03
97170	176	43	9	19	443	34	96	60	2.88	0.1	8.1	1.1	2	0.2	0.38	0.1	14.8	39.3	3.83	0.07
97171	168	54	8	17	481	39	90	84	2.74	0.05	8.5	7.4	2	1	0.47	0.1	13.5	42	3.83	0.02
FA02007	276	57	8	6	351	31	96	50	3.51	0.05	7	1	2	0.1	0.34	0.1	18.3	39.7	3.63	0.02
FA02009	311	26	8	7	424	29	88	58	2.68	0.05	7.1	2.6	2	0.1	0.39	0.05	11.2	29.5	3.98	0.5
FA02022	179	39	7	21	435	33	82	52	2.16	0.05	6.7	2.2	2	0.4	0.47	0.1	11.7	28.5	3.22	0.03
FA02023	174	37	7	8	380	26	85	55	2.73	0.1	14.4	71.1	3	0.3	0.37	0.1	15	37.8	3.28	0.02
FA02025	195	37	9	11	506	28	98	57	2.61	0.1	12.2	5.3	2	0.2	0.33	0.2	13.3	32	3.48	0.08
FA02026	124	32	5	40	644	31	64	67	1.63	0.05	8.2	2.6	1	0.3	0.41	0.1	14.1	30.2	3.19	0.03
FA02027	160	39	9	8	491	29	97	70	3.92	0.2	10.7	2.3	2	0.3	0.31	0.2	18.2	28.6	4	0.05
FA02029	173	42	8	8	442	27	100	56	3.28	0.1	9.6	2	3	0.1	0.35	0.2	16.7	27.7	3.78	0.03
FA02030	179	48	8	8	431	27	96	58	2.87	0.1	8.8	1.7	2	0.1	0.37	0.1	16.2	34.7	3.61	0.03
JVR02006	111	42	10	6	865	20	121	64	2.24	0.2	13.8	4	2	0.4	0.28	0.4	24.2	81.9	4.57	0.06
JVR02017	165	47	6	10	408	35	77	47	1.9	0.05	7.5	12.6	1	0.1	0.73	0.1	12.7	30	3.03	0.01
JVR02018	126	37	5	15	385	37	78	44	1.79	0.05	5.1	1.5	2	0.1	0.76	0.1	11.5	36.1	2.9	0.01
JVR02019	135	42	6	15	381	36	79	49	1.87	0.1	9.3	4.8	2	0.2	0.71	0.1	14.5	43.6	3.16	0.02
RS02S07	135	33	8	11	371	22	86	55	2.69	0.1	11.1	3.2	2	1.1	0.32	0.1	12.1	23.1	3.36	0.02
RS02S08	160	35	7	19	325	32	76	52	2.06	0.1	5.3	3.3	2	0.2	0.46	0.05	11	29	3.12	0.01
RS02S09	163	40	10	10	333	22	99	66	2.94	0.2	10.8	3.9	2	0.2	0.21	0.2	12.1	30.7	3.71	0.03
RS02S12	59	34	8	13	282	17	83	51	2.55	0.2	11.6	3.4	2	1.6	0.23	0.2	10.8	29.8	3.54	0.04
RS02S36	155	43	9	9	494	28	92	75	2.76	0.1	7.5	1.6	1	0.2	0.35	0.2	12.6	25.7	3.63	0.01
RS02S38	197	30	8	9	493	30	96	62	3.15	0.05	7.7	1.1	1	0.1	0.37	0.1	14	24.9	3.87	0.02
RS02S39	235	31	6	8	470	33	84	55	2.48	0.05	5.9	4.9	1	0.1	0.4	0.1	11.9	20.3	3.53	0.03
RS02S40	268	56	10	10	1167	54	110	171	3.44	0.6	6.7	3.7	2	0.4	0.52	0.4	21.7	95	4.22	0.04
RS02S41	156	39	7	7	409	29	81	61	2.71	0.1	7.1	9.4	2	0.1	0.37	0.1	12.1	27.9	3.12	0.02
RS02S42	124	32	7	7	344	27	83	64	2.06	0.1	7.6	3	3	0.2	0.33	0.3	9.5	24	3	0.03
RS02S43	110	34	6	8	407	28	78	337	1.99	0.1	5.4	1.7	2	0.5	0.4	1.6	10	68.3	2.78	0.02
RS02W04	222	286	8	17	653	171	133	60	2.75	0.1	4.7	6.7	5	0.1	0.84	0.05	31	83.9	4.1	0.02
RS02W06	226	219	7	17	768	158	112	63	2.57	0.1	6.1	15.4	4	0.1	0.82	0.1	29.9	72.2	4.18	0.02

Number	K_	Mg_	Mo_ppm	Na_	Ni_ppm	P_	Pb_ppm	S_	Sb_ppm	Sc_ppm	Th_ppm	Ti_	Tl_ppm	U_ppm	W_ppm
176258	0.07	0.4	1.4	0.011	62.6	0.027	6.6	0.025	5.1	4.7	3	0.085	0.1	0.4	0.2
176259	0.06	0.53	1.4	0.011	39.4	0.036	6.6	0.025	2.4	5	2.2	0.115	0.1	0.5	0.1
176260	0.04	0.46	2	0.014	23.9	0.035	9.5	0.025	1.3	5	1.8	0.089	0.1	0.7	0.1
176261	0.18	0.78	0.5	0.011	35.4	0.021	5.1	0.025	4.4	7.7	3.3	0.125	0.1	0.5	0.3
176262	0.06	0.62	1.6	0.019	40.4	0.046	8.4	0.025	4.4	5.2	2.1	0.111	0.1	0.5	0.1
176263	0.04	0.67	2	0.019	35.4	0.076	9	0.025	1	5	2.5	0.097	0.1	0.7	0.1
176264	0.05	0.7	0.7	0.02	32.6	0.018	5.8	0.025	1.1	8.3	2.6	0.146	0.1	0.6	0.1
176265	0.04	0.7	0.8	0.023	32.9	0.029	6.6	0.025	1.1	4.6	2.2	0.116	0.1	0.5	0.2
176266	0.06	0.67	1	0.015	41.1	0.031	7.3	0.025	2.7	5.3	2.1	0.127	0.1	0.4	0.1
176267	0.06	0.68	1	0.015	35.4	0.024	6.9	0.025	41.9	5.3	1.8	0.137	0.1	0.4	0.2
176268	0.06	0.54	1.9	0.01	34.2	0.05	9	0.025	4.7	3.6	1.3	0.1	0.1	0.4	0.1
176269	0.07	0.7	1.3	0.018	43.7	0.035	8.5	0.025	1.6	5.1	2.3	0.131	0.1	0.5	0.1
176270	0.06	0.7	0.7	0.019	31.2	0.019	6.1	0.025	1	8.6	2.8	0.155	0.1	0.6	0.1
176271	0.04	0.46	1	0.007	32	0.019	10.3	0.025	5.7	5.4	3.1	0.052	0.1	0.4	0.2
176272	0.06	0.64	0.9	0.026	25.4	0.033	8.6	0.025	12.5	5.4	3.5	0.087	0.1	0.9	0.1
176273	0.56	1.36	0.5	0.016	18.7	0.031	6.6	0.025	1.4	10.2	5.7	0.28	0.3	0.7	0.2
176274	0.05	0.55	1.1	0.014	34.6	0.021	7.7	0.025	3.8	3.7	2	0.069	0.1	0.5	0.2
176275	0.06	0.61	1.7	0.014	36.8	0.036	11.9	0.025	1.6	5.2	3	0.083	0.1	0.5	0.1
176276	0.06	0.66	1	0.012	39.2	0.029	10	0.025	1.5	4.4	2.6	0.077	0.1	0.4	0.1
176277	0.05	0.62	1.6	0.016	29.9	0.033	8.8	0.025	1.4	3.8	1.9	0.082	0.1	0.4	0.1
176278	0.09	0.74	2.1	0.025	31.7	0.057	7.9	0.025	1.3	5.1	2.6	0.097	0.1	0.4	0.1
176279	0.06	0.59	0.6	0.034	24	0.047	6	0.025	0.6	4.5	2.1	0.119	0.1	0.4	0.1
176280	0.05	0.6	0.9	0.021	24.2	0.033	7.7	0.025	10.9	5	3.4	0.065	0.1	0.7	0.2
176395	0.51	0.94	5.3	0.017	15.7	0.194	8.4	0.025	0.3	6.6	7.2	0.322	0.6	0.7	0.1
176396	0.17	0.73	4	0.014	20.6	0.025	9.1	0.025	0.3	5.4	6.1	0.144	0.3	0.7	0.1
176397	0.08	0.57	0.7	0.015	19.4	0.024	14.5	0.025	0.3	3.6	7.3	0.132	0.2	0.8	0.1
176398	0.06	0.63	0.9	0.014	26.5	0.018	9.7	0.025	0.5	3.9	6.2	0.11	0.1	0.7	0.1
176400	0.16	0.79	0.7	0.019	16.2	0.048	7.1	0.025	0.3	4.8	2.3	0.163	0.2	0.4	0.6
176534	0.07	1.36	0.7	0.088	29.3	0.089	4.2	0.025	0.4	6.3	1.7	0.12	0.1	0.5	0.1
176616	0.07	0.84	1.1	0.017	36.5	0.027	6.2	0.025	0.6	6.4	2.7	0.115	0.1	0.5	0.4
176617	0.04	0.55	1.2	0.022	26.9	0.037	7.4	0.025	0.3	4.4	2.3	0.088	0.1	0.6	0.1
176618	0.05	0.67	1.2	0.014	31.7	0.037	7.9	0.025	0.3	4.3	2.2	0.106	0.1	0.4	0.1
176619	0.04	0.55	1.2	0.024	25.8	0.035	8.2	0.025	0.4	4.4	2.7	0.081	0.1	0.6	0.1
97163	0.11	0.96	0.9	0.013	34	0.031	8	0.025	0.5	5.2	5.3	0.151	0.1	0.7	0.1
97164	0.1	0.71	1.1	0.017	29.5	0.059	7.3	0.025	0.4	4.5	3.4	0.132	0.1	0.9	0.1
97165	0.1	0.85	0.7	0.019	22.3	0.046	6.6	0.025	0.4	4.5	2.7	0.159	0.1	0.6	0.1
97166	0.18	0.98	0.5	0.034	23.9	0.054	5.2	0.025	0.3	6.9	2.7	0.156	0.1	0.6	0.2
97168	0.09	0.78	0.6	0.02	30.8	0.057	5.7	0.025	0.3	4.9	3.2	0.154	0.1	0.5	0.1
97169	0.06	0.71	1.2	0.016	27.5	0.044	15.7	0.025	0.5	4	3.1	0.143	0.1	0.6	0.2
97170	0.22	0.87	0.9	0.017	35.9	0.041	8.1	0.025	0.4	6.3	4.2	0.149	0.2	0.9	0.2
97171	0.23	1.01	0.7	0.024	35.5	0.032	6.1	0.025	0.4	7.3	4.9	0.191	0.2	0.8	0.2
FA02007	0.06	0.99	0.7	0.028	45.8	0.022	5	0.025	0.3	5.1	2.1	0.164	0.1	0.4	0.1
FA02009	0.31	0.88	0.7	0.021	14.9	0.011	5.1	0.025	0.3	4.7	3.9	0.192	0.2	0.5	0.2
FA02022	0.09	0.88	0.4	0.017	27.3	0.034	9.1	0.025	0.2	5.8	5	0.149	0.1	0.6	0.2
FA02023	0.08	0.79	0.6	0.021	32.7	0.019	6.8	0.025	0.5	5.1	3.3	0.145	0.1	0.5	0.1
FA02025	0.08	0.62	1.6	0.016	25.6	0.045	11.3	0.025	0.5	5.1	2.4	0.109	0.1	0.7	0.1
FA02026	0.13	0.72	0.7	0.018	26.3	0.04	23.5	0.025	0.3	5.4	8.9	0.123	0.1	1	0.2
FA02027	0.07	0.72	1.3	0.018	30.7	0.059	8.7	0.025	0.5	6.1	2.7	0.118	0.1	0.6	0.3
FA02029	0.08	0.74	1	0.016	32.3	0.029	8.4	0.025	0.4	5.1	3	0.144	0.1	0.5	0.1
FA02030	0.07	0.87	0.6	0.016	37.8	0.025	9.5	0.025	0.4	4.7	3.4	0.144	0.1	0.5	0.1
JVR02006	0.06	0.66	2.3	0.015	21.6	0.049	11.4	0.025	0.7	3.5	1.7	0.142	0.1	0.5	0.1
JVR02017	0.11	0.66	0.6	0.036	31.6	0.024	4.8	0.025	0.4	7	2.7	0.136	0.1	0.3	0.1
JVR02018	0.08	0.71	0.5	0.051	33.2	0.025	4.2	0.025	0.4	6.7	3	0.137	0.1	0.4	0.1
JVR02019	0.07	0.69	0.8	0.037	40.1	0.016	8	0.025	0.6	6.8	3.1	0.136	0.1	0.4	0.2
RS02S07	0.07	0.76	1	0.012	23.9	0.027	13.2	0.025	0.3	4.4	4.6	0.116	0.1	0.6	0.1
RS02S08	0.09	0.81	0.5	0.017	27.4	0.042	8.1	0.025	0.3	5	5.2	0.144	0.1	0.6	0.1
RS02S09	0.04	0.52	1.8	0.016	23.1	0.03	11.7	0.025	0.7	5.7	2.5	0.108	0.1	0.8	0.05
RS02S12	0.08	0.57	1.1	0.015	23	0.092	9.3	0.025	0.4	4	3	0.105	0.1	0.7	0.1
RS02S36	0.15	1.02	1	0.015	25.6	0.035	9.7	0.025	0.4	4.9	3.4	0.179	0.1	0.5	0.2
RS02S38	0.19	0.89	0.6	0.016	23.1	0.045	6.3	0.025	0.4	4.9	4.7	0.176	0.2	0.6	0.1
RS02S39	0.11	0.8	0.5	0.016	23.6	0.038	6.2	0.025	0.3	4.4	3.4	0.128	0.1	0.6	0.1
RS02S40	0.13	0.84	1.5	0.024	29.9	0.056	48	0.025	0.3	6.4	2.7	0.156	0.1	0.9	0.3
RS02S41	0.1	0.89	0.6	0.017	26.1	0.026	7.3	0.025	0.3	5	2.9	0.165	0.1	0.5	0.2
RS02S42	0.07	0.61	1.2	0.018	20.6	0.047	11.5	0.025	0.4	3.7	1.5	0.114	0.1	0.5	0.3
RS02S43	0.09	0.67	0.6	0.019	20.3	0.046	41.8	0.025	0.3	3.8	2.6	0.144	0.1	0.4	0.3
RS02W04	0.24	2.75	0.4	0.076	219.5	0.166	5.2	0.025	0.3	6	3.2	0.174	0.1	1	0.2
RS02W06	0.23	2.5	0.6	0.042	225.7	0.099	5.2	0.025	0.4	6.5	2.8	0.161	0.1	0.8	0.1

Energy Mines and Resources, Yukon Geology Program
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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 supplied 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 converted from MS Excel file to an MS Access database.

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 unlithified 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 univariante 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 Cannmet 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 mesh, -74um) 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.

Statistical Analysis Procedures used in 2002

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.

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 (ie. 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.

N.A.L.

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.

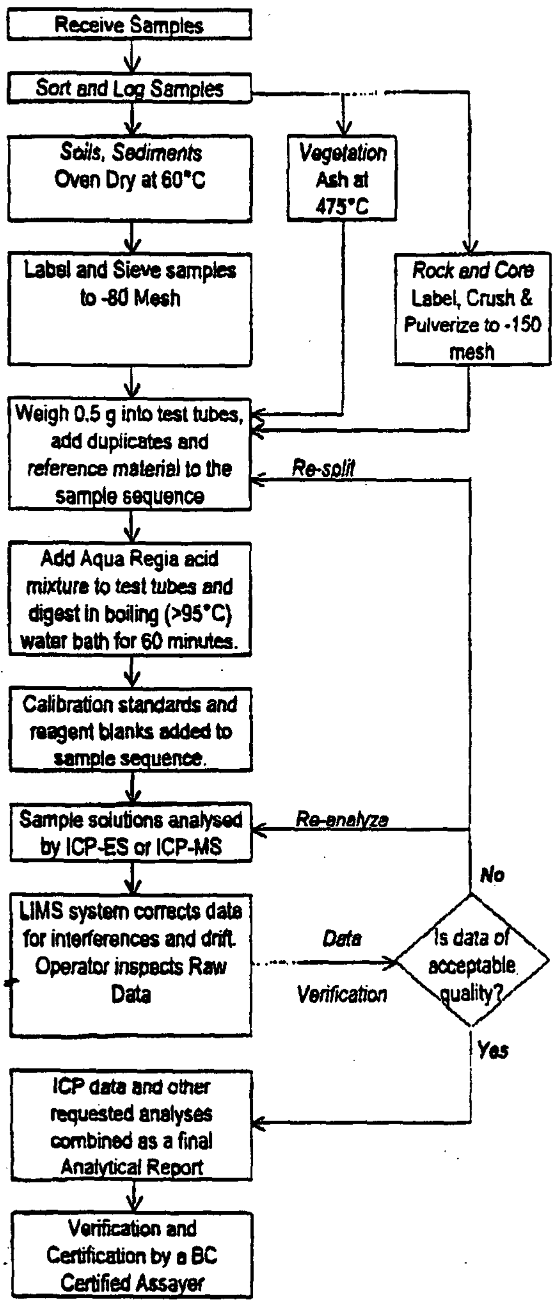
Mine mill concentrates usually are extremely high grade so the greatest concern with these samples is to not contaminate other samples. They should be prepared away from any other samples and care should be taken to avoid raising dust from them. All equipment must be cleaned meticulously afterwards. 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.

ACME Analytical Laboratories Ltd. ISO 9002 REGISTERED

852 East Hastings Street, Vancouver, British Columbia, Canada V6A 1R6 info@acmelab.com
Telephone: (604) 253-3158 • Facsimile: (604) 253-1716 • Toll free: 1-800-990-ACME (2263) • e-mail: [redacted]

Methods and Specifications for Analytical Package
Group 1D & 1DX • ICP Analysis – Aqua Regia

Analytical Process



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 HNO_3 and de-mineralised H_2O, 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 regent 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*, *Tl*, 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

NEW!

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	**$6.25**	**$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**

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

	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

*Some elements are partially leached

APPENDIX IV

PHOTOGRAPHS OF PROPOSED SMAs

And SURROUNDING AREA

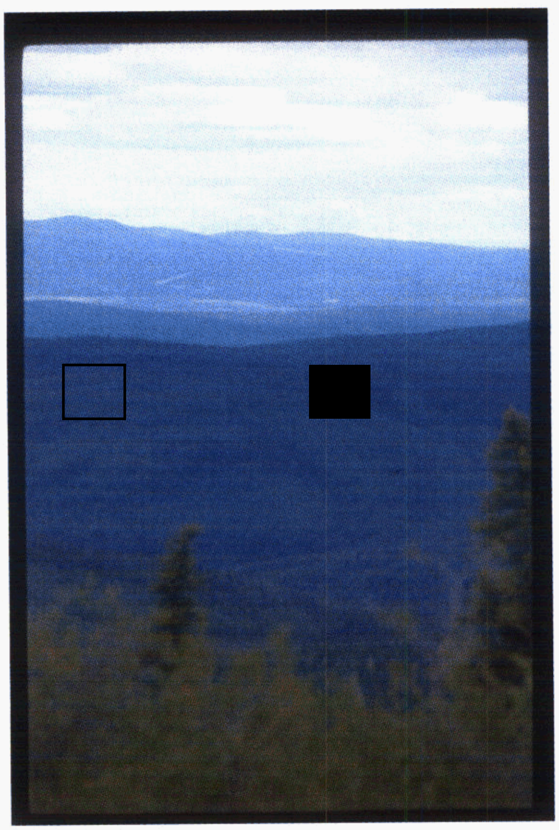
EMR 2002

Proposed Scottie Creek SMA

Field camp with Starvation Mountain looking east

Alaska/Yukon border monument
west side of proposed SMA

Campsite on west flank of Starvation Mountain



View northward to Moosehorn Range with evidence of placer mining on creeks.

Scottie Creek in mid-distance with low well vegetated highlands.

Helicopter access to proposed SMA from Snag Airstrip.