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Report on the Detailed Mineral Assessment of the Proposed Lewes Marsh/McClintock Bay and Tagish River Special Management Areas, Yukon

R. Stroshein

YUKON GEOLOGICAL SURVEY

Yukon Energy, Mines and Resources

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Preface

This report summarizes the results of geological field work and a detailed mineral assessment of a region of southern Yukon that includes the proposed Lewes Marsh/McClintock Bay and Tagish River Special Management Areas. This mineral assessment was done in 2002 by the Department of Energy, Mines and Resources of the Government of Yukon (YTG).

The purpose of the mineral resource assessment was to determine the mineral potential of the region and thereby assist with proposed land planning. 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 Yukon Geological Survey publication standards. Please note that the report does not include information from any studies that may have been carried out in the areas since the mineral assessment was conducted. Special Management Area names and boundaries may have changed since the study 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

Lewes Marsh/McClintock Bay
And
Tagish River

Special Management Areas

Confidential

March 21, 2003

Internal Report
Robert W. Stroshein

YTG, Energy Mines and Resources
Mineral Planning and Development

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Executive Summary

The Government of Yukon, Government of Canada, the Kwanlin Dun First Nation and the Carcross/Tagish First Nation agreed to create a 20.02 square kilometers Special Management Area designated as a Habitat Protection Area surrounding the Lewes River Marsh wetland below and including the lower end of Marsh Lake. The Government of Yukon, Government of Canada and the Carcross/Tagish First Nation agreed to create a 4.62 square kilometer Special Management Area designated as a Habitat Protection area along the Tagish River including the delta deposits in upper Marsh Lake. The Habitat Protection Area designation does not require the withdrawal of the area from mineral staking but prohibition of entry orders to exclude the mines and minerals and the right to work those mines and minerals has been requested in the Memorandums of Understanding signed between the Governments of Canada, Yukon and the First Nations.

The northern portion of the proposed Lewes Marsh/McClintock Bay Wetland Special Management Area is within the Traditional Territory of the Ta'an Kwach'an Council. The Final Agreement between the Ta'an Kwach'an Council, Government of Yukon and Her Majesty the Queen in Right of Canada was signed on January 13, 2002 and does not include reference to the Lewes Marsh/McClintock Bay Wetland Special Management Area.

The purpose of this report is to present the results of the detailed mineral assessment of an area of 310 square kilometers that encompassed the two proposed Special Management Areas. This enlarged area was included to provide some relative context for the assessment.

The proposed area has no advanced mineral deposits. 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 highest relative mineral potential lies in the tracts east of the Alaska Highway beside the proposed Lewes Marsh/McClintock Bay Wetland Special Management Area. The western tract boundary of the highest ranking coincides with the trace of the Marsh Lake Fault Zone. The Marsh Lake Fault Zone has been identified as gold bearing over a 500-meter strike length at the Rossbank property Creek Zone (Minfile 105D/102). Mid Cretaceous aged mafic to intermediate volcanic rocks, limestone and chert that have the potential for hosting significant economic metal deposits underlie the tracts of relative highest mineral potential.

It is recommended that land use planners and Special Management Area steering committee members consider this mineral potential study and avoid alienating land of high relative mineral potential.

Introduction

Land Status

The proposed Lewes Marsh/McClintock Bay Wetland Special Management Area (SMA) has been identified as a Habitat Protection Area (HPA) in the Memorandum's of Understanding (MOU) with the Carcross/Tagish First Nation (CTFN) and Kwanlin Dun First Nation (KDFN). The MOUs were signed on March 31, 2002. The MOU requested a full up-front mineral withdrawal but allows for future lateral access for underground mining.

The proposed Tagish River Special Management Area has been identified as a Habitat Protection Area in the Memorandum of Understanding for the Carcross/Tagish First Nation. The MOU requested an up-front full mineral withdrawal of the subsurface of the proposed SMA. The future SMA steering committees are responsible for developing management plans for the proposed SMAs and are to consider the resource potential in that planning.

The Yukon Territorial Government's (YTG) Land Claims Secretariat provided the current SMA outlines in September 2002.

Fieldwork carried out by the Department of Energy Mines and Resources, YTG.

In 2002, the mineral assessment team composed of geologists; Roger Hulstein, Farrell Andersen, Jo-Anne vanRanden and Robert Stroshein spent three man-days in the field surrounding the Lewes Marsh/McClintock Bay wetlands and four man-days in and around the Tagish River proposed SMA. Work included examination of mineral occurrences, prospecting and collection of 11 rock, soil, silt sediment and pan samples for geochemical analysis. All samples were analyzed for gold plus a suite of 34 elements.

Preliminary evaluation of regional geological and geochemical data indicated that the areas of the proposed SMAs were indeed wetlands and that there was a paucity of rock ouctcrops. The soil and stream sediments within the proposed SMAs are abundant but due to the widespread provenance are not representative of the local geology. Two one-day field trips were carried out from Whitehorse by road. Traverses were carried out to test stream sediments draining into the areas of the proposed SMAs and to examine historic and recent exploration workings immediately east of the proposed Lewes Marsh/McClintock Bay Wetland HPA. Roger Hulstein, one of the EMR field geologists had directed the exploration program on the Rossbank property during 1990. His experience was invaluable to the economic evaluation. Reports of placer gold and evidence of historic workings led to finding placer gold grains in two creeks draining into the proposed Lewes Marsh/McClintock Bay Wetland HPA and Pennycook Creek that drains into the proposed Tagish River HPA. Rock and soil samples were collected from the old workings on the Rossbank property.

Location, access and physiography

The proposed Lewes Marsh/McClintock Bay Wetland HPA SMA is located adjacent the Alaska Highway covering the lower end of Marsh Lake and downstream portion of Lewes River, overlapping NTS map sheets 105 D/9 and 105 D/10. The proposed SMA encompasses an area of 20.02 square kilometers centered approximately 53 kilometers southeast of Whitehorse. The proposed Tagish River SMA is located on along the Tagish River that connects Tagish Lake (upstream) and Marsh Lake (downstream). The proposed SMA extends to include the delta deposits at the head of Marsh Lake. The proposed SMA encompasses an area of 4.62 square kilometers centered approximately 60 kilometers southeast of Whitehorse on NTS map sheet 105D/8. (Figure 1).

Access to the areas is from the Alaska Highway and the Tagish Road. There are several all weather access roads in the area. The Alaska Highway is the east boundary of the Lewes Marsh/McClintock Bay Wetland and the Tagish Road crosses the Tagish River via the Tagish Bridge.

The proposed Lewes Marsh/McClintock Bay Wetland SMA covers the extensive wetlands along Lewes River and the lower end of Marsh Lake that abound with wildlife. The proposed Tagish River SMA is confined to the river channel between Tagish Lake and the delta in upper Marsh Lake. The region is vegetated with spruce, pine, alder and dwarf birch.

The proposed SMAs are located within the Southern Lakes Ecoregion (#177) (Figure 2) within the Boreal Cordillera ecozone.

Glacial History

The area of the proposed SMAs was glaciated by the McConnell (ca 22ka) ice sheet. The generalized ice flow directions are to the northwest and melt water flow directions are largely controlled by topography. Within the Tagish River the ice flow direction followed the channel to the north.

Exploration History

The exploration history of the area is focused on gold and placer gold exploration that began in the 1800's. Recent exploration began in 1986 with the discovery of historic pits and an adit east of the Alaska Highway along Marsh Lake and Lewes Marsh. The adit and pits were excavated in dark green andesite and focused on rusty weathered shear zones with quartz, pyrite and alteration zones. The overgrowth of trees and other vegetation suggested that the excavations were nearly one hundred years old.

The outlines of the proposed SMAs were drafted to exclude existing mineral claims. Exploration on the Rossbank Minfile occurrence (# 105D/102) began in the 1800's with the development of several rock cuts and a 75-meter long adit. Recent exploration (1988 – 1990) located gold mineralization in a diamond drill hole at depth west of the Alaska Highway associated with the Marsh Lake Fault Zone. The mineralization is projected below the surface of the proposed Lewes Marsh/McClintock Bay Wetland SMA.

Historic gold placer activity located gold in two unnamed creeks on either side of the Lewes Marsh/McClintock Bay Wetland and in Pennycook Creek that drains into the southeast end of the Tagish River. Placer mining claims are still active on "Black Mike's" creek on the east side of the proposed Lewes Marsh/McClintock Bay Wetland SMA. Evidence of the placer activity is still visible in these areas and gold grains were recovered from panning the stream sediments on these creeks. There are no reports of historic placer gold production from these creeks although the activities include periods prior to the Klondike Gold Rush.

Geology

Regional Setting

The proposed Lewes Marsh/McClintock Bay Wetland and Tagish River SMAs are located near the eastern margin of the Whitehorse trough. The Whitehorse Trough represents a Mesozoic fore-arc basin that was obducted over the North American craton in the Mid Jurrassic. Rocks of the Whitehorse Trough consist of Upper Triassic Lewes River Group arenaceous, argillaceous, limestone and conglomerate sedimentary rocks with andesite and basalt in the lower part of the section and Lower Jurassic Laberge Group conglomerate, greywacke, argillite and argillaceous sedimentary rocks.

The eastern boundary of the Whitehorse Trough is a tectonic contact zone that juxtaposes rocks of the Cache Creek Terrane with the Whitehorse Trough rocks across the Marsh Lake Fault Zone. The Cache Creek Terrane rocks are the oldest rocks in the region. The Cache Creek Terrane rocks consist of Permian to Carboniferous serpentinite, oceanic mafic volcanic rocks, limestone and chert.

In the area of the Lewes Marsh/McClintock Bay Wetland SMA, mid Cretaceous aged Mount Nansen Volcanic Terrane cap the accreted terranes and contact zone. The Marsh Lake fault cuts through the Mount Nansen volcanic rocks indicating re-activation of the fault zone after the depositon of the volcanic rocks. Gold-quartz vein mineralization and alteration of the Motherlode type is associated with the Marsh Lake Fault Zone and sub-parallel splay faults.

Granitic plutons of Early and Mid-Createaceous age have intruded the sedimentary and volcanic sequences as isolated stocks in the Marsh Lake area. The Whitehorse Suite is dominantly composed of the granodiorite that is a lesser component of the Teslin Suite that includes compositions of quartz monzonite and monzo-diorite.

J.O. Wheeler (1963) carried out regional geological mapping at a scale of 1: 250,000. The geology is reported in the 1963 GSC Memoir 312 entitled "Geology of Whitehorse Map-Areas, Yukon Teritory".

Gordey and Makepeace (2001) produced a digital compilation of the bedrock geology of the Yukon from which Figure 4: Geology Map of the Proposed Lewes Marsh/McClintock Bay Wetland and Tagish River Special Management Areas was created.

Geology of Lewes Marsh/McClintock Bay Wetland SMA

There are no outcrops within the proposed Lewes Marsh/McClintock Bay Wetlands SMA. Extrapolation of geological contacts from the regional geology indicates that the mid Cretaceous aged Mount Nansen volcanic rocks underlie the area. The eastern boundary of the proposed SMA broadly coincides with a major regional fault named the Marsh Lake Fault. The Marsh Lake Fault possibly represents a re-activated tectonic boundary fault between the Cache Creek Terrane and the Whitehorse Trough.

Geology of Tagish River SMA

There are no outcrop exposures within the proposed Tagish River SMA. Interpretation of the regional geology indicates Jurassic aged Laberge Group sedimentary rocks of the Whitehorse Trough underlie the area.

Structural Geology

The dominant structural feature in the Marsh Lake area is the Marsh Lake Fault Zone that forms a major tectonic boundary between the Cache Creek Terrane on the east and the Whitehorse trough to the west. The fault is steeply dipping with a probable transcurrent sinistral component. The fault can be traced from the Rossbank area to Jake's corner.

Whitehorse Trough strata were folded about north and northwest trending axes in the Late Jurassic.

Alteration and Metamorphism

Regional metamorphism is not observed and local metamorphism is related to regional structural zones or plutonic intrusions.

Alteration associated with intrusive rocks is generally weak with local biotization of arenaceous rocks and weak metasomatism of limestone.

Lustwanite alteration is closely associated with the mineralized quartz veins at the Rossbank occurrence that is typical of the mesothermal quartz-gold (Motherlode) vein deposit type.

Mineralization and Metallogeny

At the Yukon Minfile (2001) occurrence 105D 102 (Rossbank) on the east side of the proposed SMA gold occurs in mesothermal quartz veins (Motherlode type) and pyritic shear zones related to the Marsh Lake Fault Zone. Pyritic shear zones and quartz veins appear to follow small splays oblique to the major fault. Two mineralized zones have been explored; the Creek and the McClintock zones.

The geological setting of the proposed SMA Lewes Marsh/McClintock Bay Wetland is permissive for several types of base metal deposits. The potential for gabbroic type nickel-copper deposits is highest in the mafic volcanic rocks of the Cache Creek Group (Terrane) as well as for mafic volcanic rocks within the predominantly sedimentary rocks of the Laberge Group (Whitehorse Trough). There is potential for Volcanogenic Massive Sulphide (VMS) deposits of the Cypress-Besshi type in these volcanic rocks.

Geochemistry

The Regional Reconnaissance Stream Geochemical (RGS) survey results for the area were released in the GSC OF 1218, 1985. There were no samples collected from the within the areas or downstream of the proposed SMAs.

The low-lying areas are wetland habitat or river and lake. The sediments in the areas are not representative of the local geology in the proposed SMAs.

A total of three rock, three soil and two pan concentrate samples were collected around the Lewes Marsh/McClintock Bay wetlands. One rock, one silt and one pan concentrate samples were collected at Pennycook Creek that is located southeast of and drains into the Tagish River. 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 digested by Aqua Regia and analyzed by Inductively Coupled Plasma – Mass Spectrometry (ICP-MS). The details of the laboratory procedures are included in Hulstein, et.al., (2002).

The eleven samples collected in the 2002 EMR fieldwork were not subjected to statistical analysis due to small population size. The analytical results and sample descriptions are attached in Appendix II.

Quality control to ensure the integrity of the 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, (2003) describe Analytical procedures and geochemical statistics for quality control.

Gold is the most significant precious metal in the region of the proposed SMAs. Pan concentrates from the three streams draining into the proposed SMAs all contained visible gold grains that were confirmed by the assay results. Rock samples from mineralized zones on the Rossbank property yielded gold values of 5954 and 9231 ppb anomalous arsenic (4148 ppm and 1976 ppm), zinc (1188 ppm and 2589 ppm), copper (185 ppm and 157 ppm), iron (6.11 % and 6.22 %), molybdenum (50 ppm and 45 ppm) and lead (832 ppm and 1174 ppm).

Potential base metal (nickel, copper, zinc and lead) mineralization is of greatest significance in the volcanic rocks of the Cache Creek and Mount Nansen Groups where the RGS analyses reflect anomalous base metals with these formations on a regional scale.

Airborne Geophysics

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

The regional residual aeromagnetic survey map (Figure 6) shows a relatively strong positive linear trend demarking the location of the Marsh Lake Fault separating the Whitehorse Trough and Cache Creek Terrane. There is a broad positive anomaly flanking the east side of the linear zone that indicates the presence of the mafic volcanic rocks of the Mount Nansen Volcanic Group that overlies the terrane boundary. The residual magnetic response over the proposed Tagish River SMA displays little relief with overall lower negative relief.

The first vertical derivative plot (Figure 7) accentuates the intensity of the magnetic trends and to allow interpretation of subtle features not visible on the residual magnetic map. The resultant plot shows a strong persistent positive anomaly corresponding to the Marsh Lake Fault and separates suites of mafic volcanic and plutonic rocks from the sedimentary units. Regionally the different magnetic backgrounds between the Whitehorse Trough and the Cache Creek Terrane are enhanced.

Mineral Assessment

Regional Mineral Potential

The study area of the proposed Lewes Marsh/McClintock Bay wetland and Tagish River SMAs was included in the regional mineral potential assessment of Southwest Yukon that was the fourth phase of Regional Mineral Potential mapping of the Yukon Territory carried out by EMR. The proposed SMAs are in tracts that rank in the highest and intermediately high category of relative mineral potential in the regional assessment (Figure 3). The tracts ranged from # 18 (highest relative ranking), 24, 25, 26 and 28 (intermediate relative ranking).

Detailed Mineral Potential Map

A detailed mineral assessment of the proposed Lewes Marsh/McClintock Bay Wetland and Tagish River SMAs took place in Whitehorse, on December 12th, 2002. The study area made up of two separate blocks that were divided into six tracts, each representing a package of rocks that constitute a domain with unique lithological, geophysical or physiographic characteristics (Figure 8). Tract # 1 is underlain by Cache Creek Terrane rocks east of Marsh Lake. Tract # 2 is underlain by volcanic rocks of the mid-Cretaceous Mount Nansen Group and is bounded on the west by the important mineralized Marsh Lake Fault. Tract # 3 is also underlain by volcanic rocks of the Mount Nansen Group bounded on the east side by the Marsh Lake Fault. Tract # 4 is underlain by sedimentary rocks of the Jurassic aged Laberge Group of the Whitehorse Trough. Tracts # 5 and # 6 are also underlain by the Laberge Group sedimentary rocks. The proposed Lewes Marsh/McClintock Bay Wetland SMA is enclosed in tract # 3 and the proposed Tagish River SMA is enclosed in tract # 5. Figure 8 shows the resulting mineral potential map of the proposed Lewes Marsh/McClintock Bay Wetland and Tagish River SMAs and enclosing areas.

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 detailed mineral assessment lasted one 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 end of the assessment, the panelists ranked the tracts relative to each other unanimously, from highest to lowest relative mineral potential. The tract ranking and deposit models assessed for each tract are tabulated in Appendix I.

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 # 2 (highest), 1, 4, 3, 6, and 5 (lowest).

The detailed mineral potential map displays the relative mineral potential within the SMAs and detailed mineral assessment study area. The areas of highest mineral potential reflect the underlying potential of the rocks of the Mount Nansen and Cache Creek Terrane assemblages to host gold-quartz veins and base metal gabbroic nickel-copper or VMS type deposits.

Results shown on the detailed mineral potential map indicates that the highest relative mineral potential lies in the tracts east of the Alaska Highway beside the proposed Lewes Marsh/McClintock Bay Wetland Special Management Area. The western tract boundary of the highest ranking coincides with the trace of the Marsh Lake Fault Zone. The Marsh Lake Fault Zone has been identified as gold bearing over a 500-meter strike length at the Rossbank property Creek Zone (Minfile 105D/102). Mid Cretaceous aged mafic to intermediate volcanic rocks, limestone and chert that have the potential for hosting significant economic metal deposits underlie the tracts of relative highest mineral potential.

Recommendations and Future Work

It is recommended to define in the SMA schedules, the future parameters to allow for lateral development of potential subsurface deposits within the areas of the proposed SMAs.

It is recommended that land use planners take into account the results of the mineral assessments of the proposed Lewes Marsh/McClintock Bay wetland and Tagish River SMAs and use the mineral potential maps in their planning. Ideally land use planners would avoid alienating exploration and development in the areas identified as having highest mineral potential.

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 areas of interest. Rod Hill and Monique Raitchy preformed the diplomatic and administrative services that allowed fieldwork to proceed.

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

Thank you to the expert panel; Mark Bakness, 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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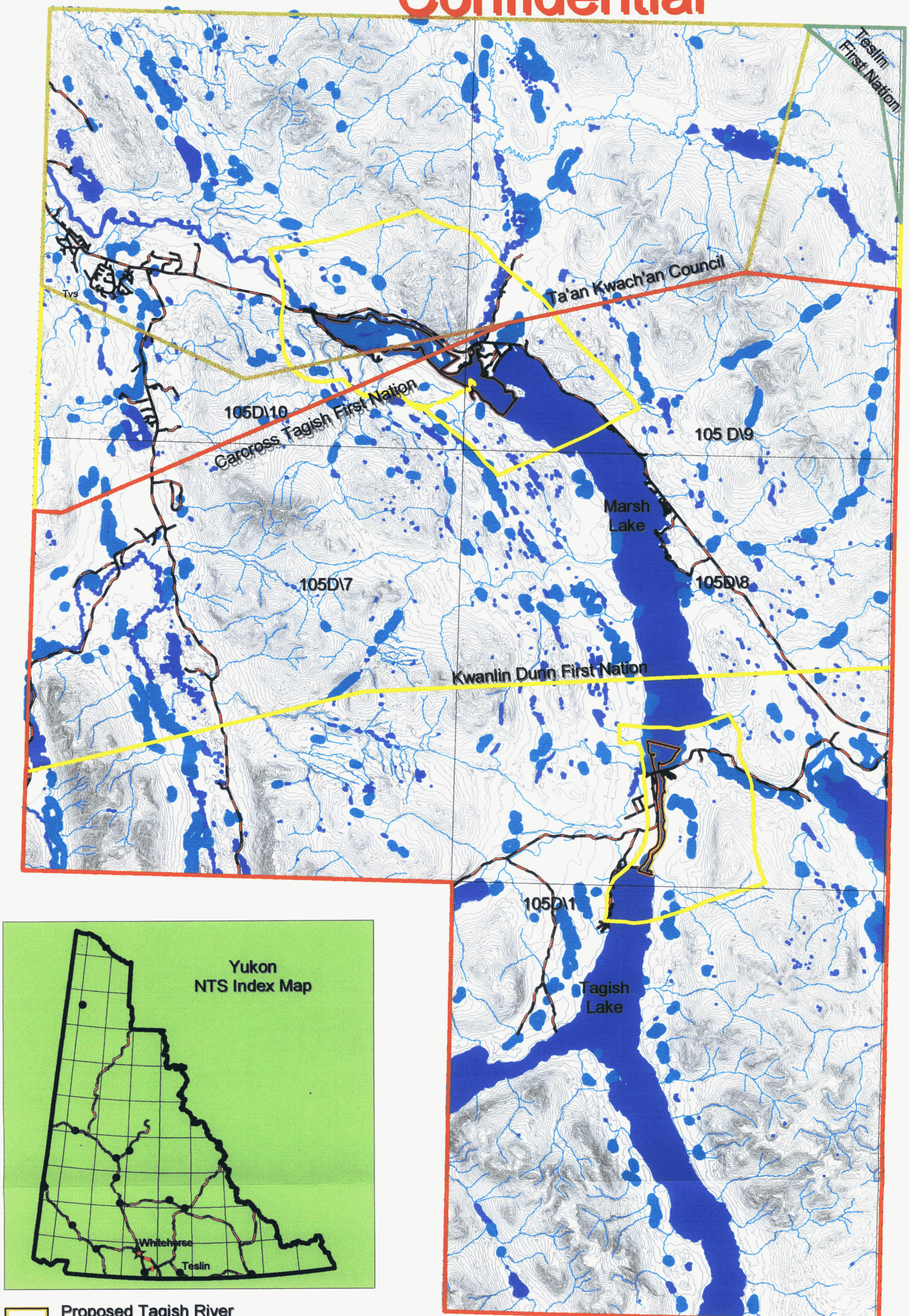


Proposed Tagish River Habitat Protection Area Special Management Area September 2002 outline

Proposed Lewes Marsh/McClintock Bay Wetland Habitat Protection Area Special Management Area September 2002 outline

Detailed Mineral Assessment Outline of Study Area December 2002

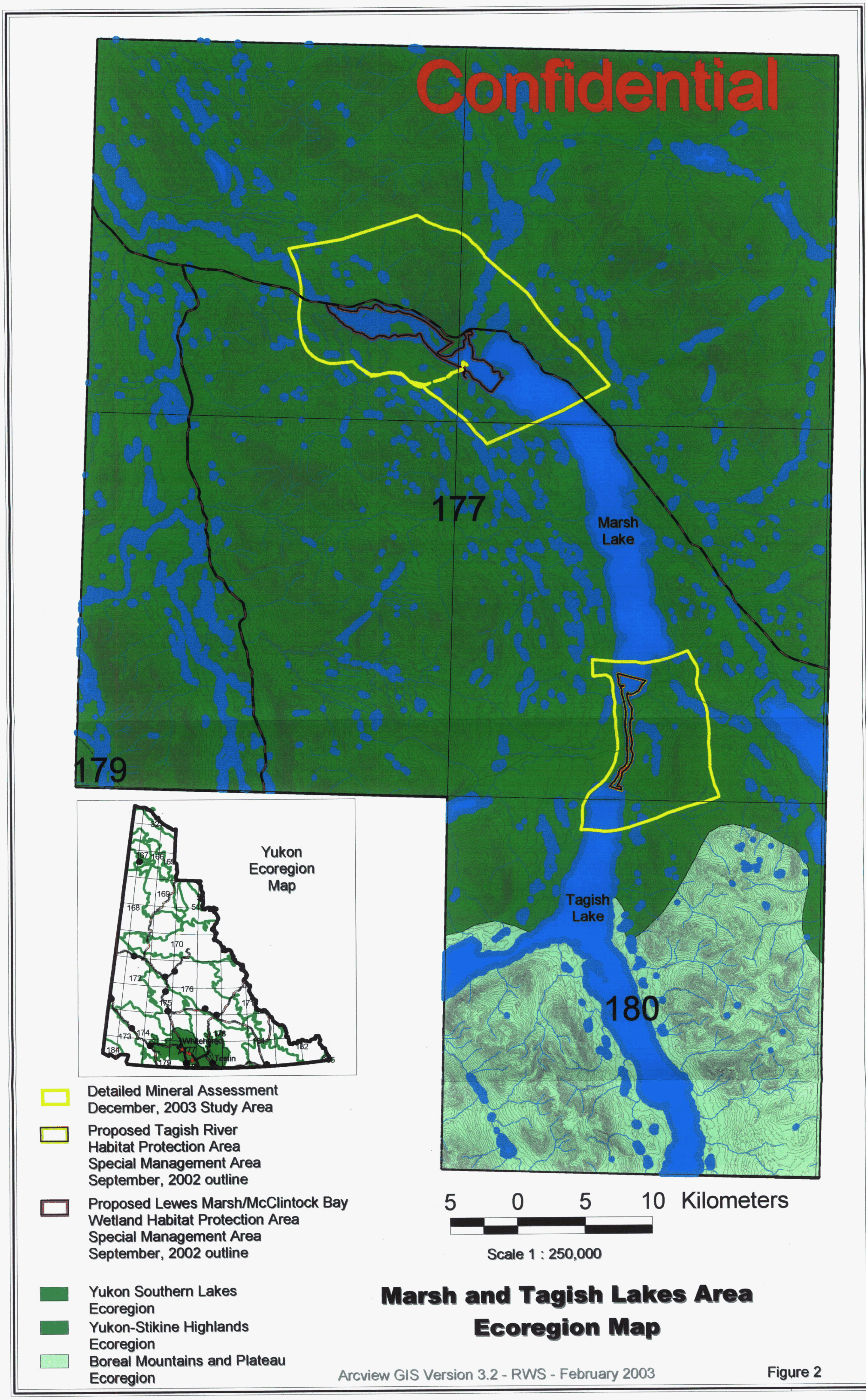
5 0 5 10 Kilometers

Scale 1 : 250,000

Location Map

Arcview GIS Version 3.2 - RWS - February 2003

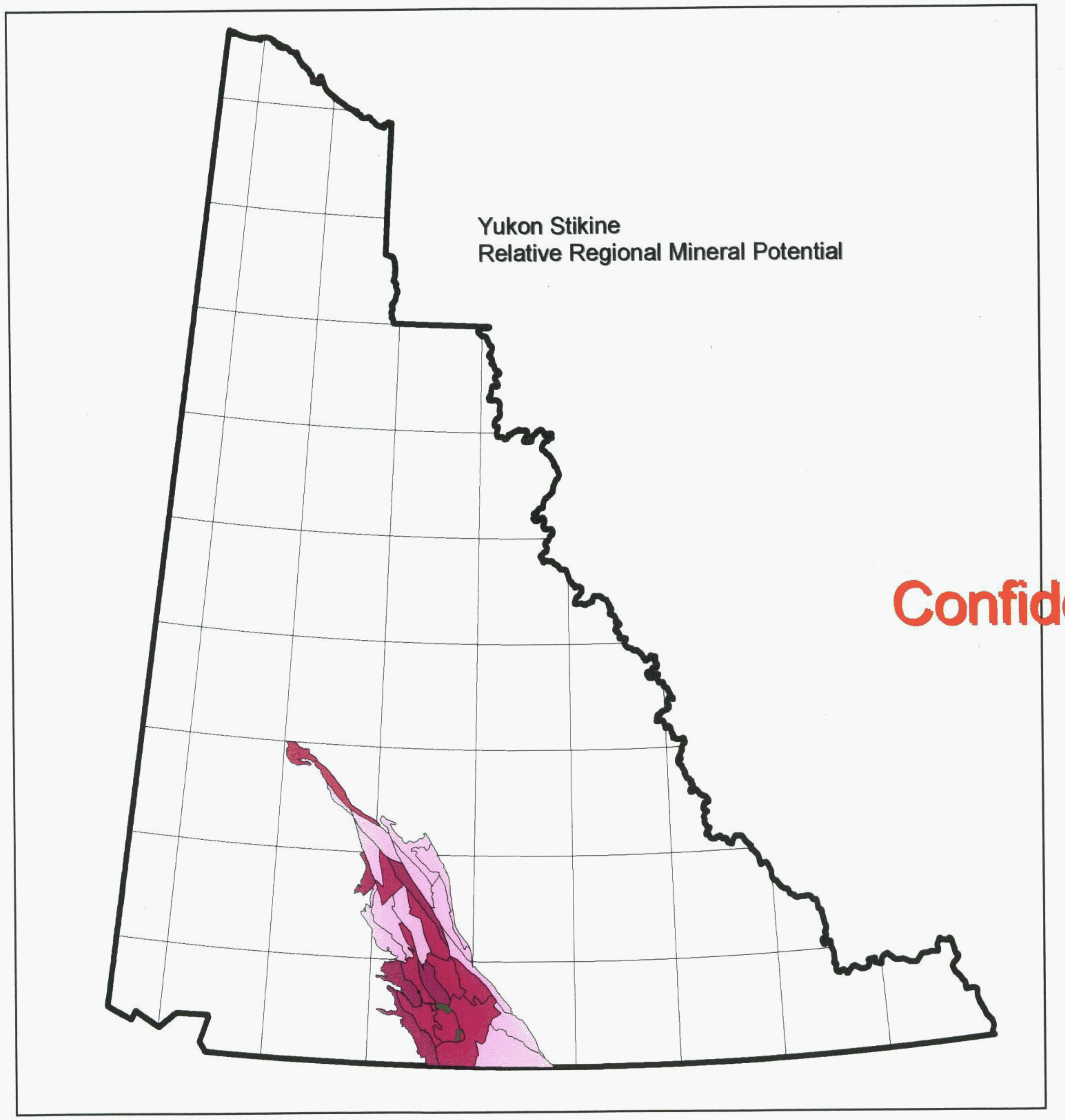
Figure 1



Marsh and Tagish Lakes Area Ecoregion Map

Figure 2

Proposed Lewes Marsh/McClintock Bay Wetland and Tagish River Special Management Areas



Relative Regional Mineral Potential

- Highest
-
- Lowest

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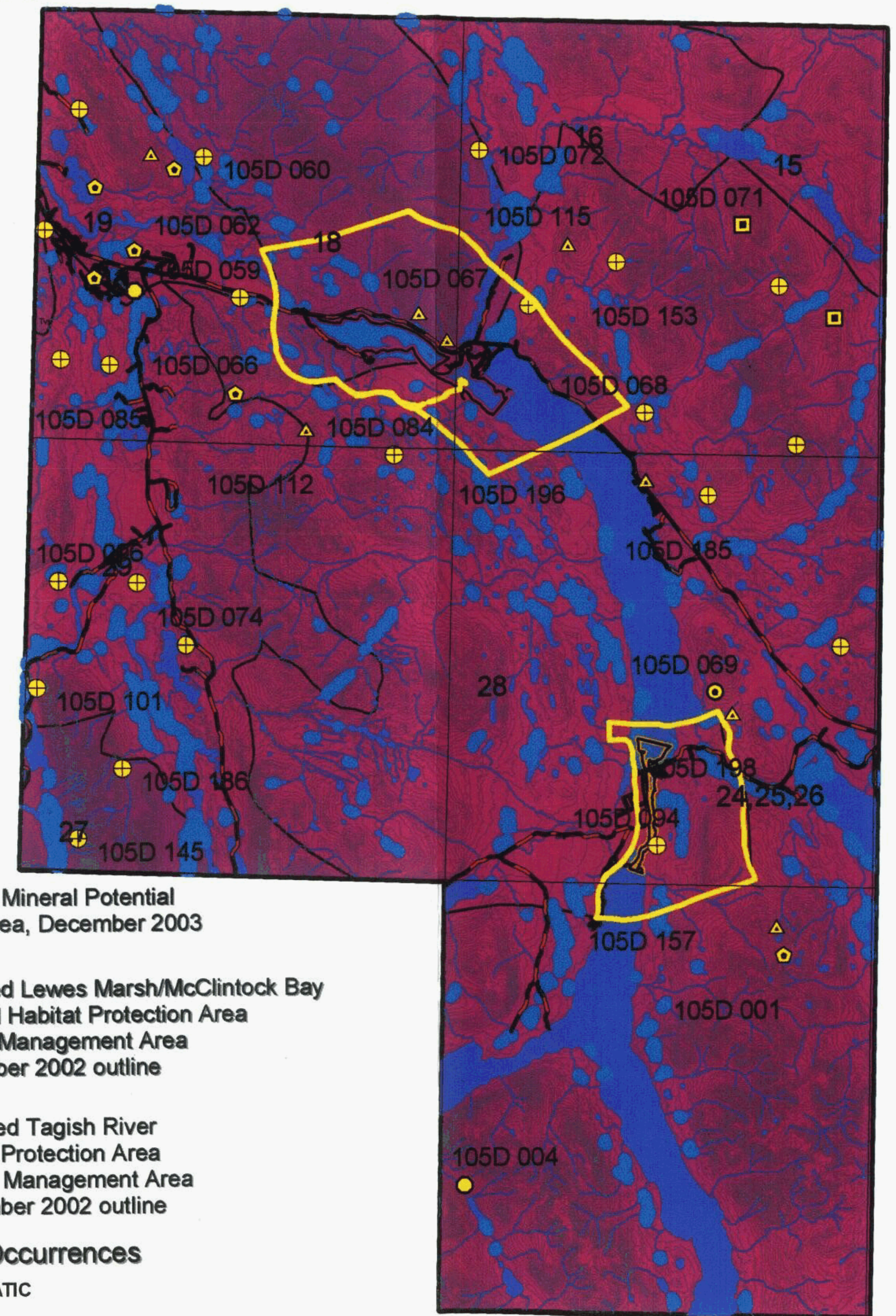


Detailed Mineral Potential Study Area, December 2003

Proposed Lewes Marsh/McClintock Bay Wetland Habitat Protection Area Special Management Area September 2002 outline

Proposed Tagish River Habitat Protection Area Special Management Area September 2002 outline

Minfile Occurrences

- MAGMATIC
- PORPHYRY
- SKARN
- ULTRAMAFIC
- UNKNOWN
- VEIN

4 0 4 8 Kilometers

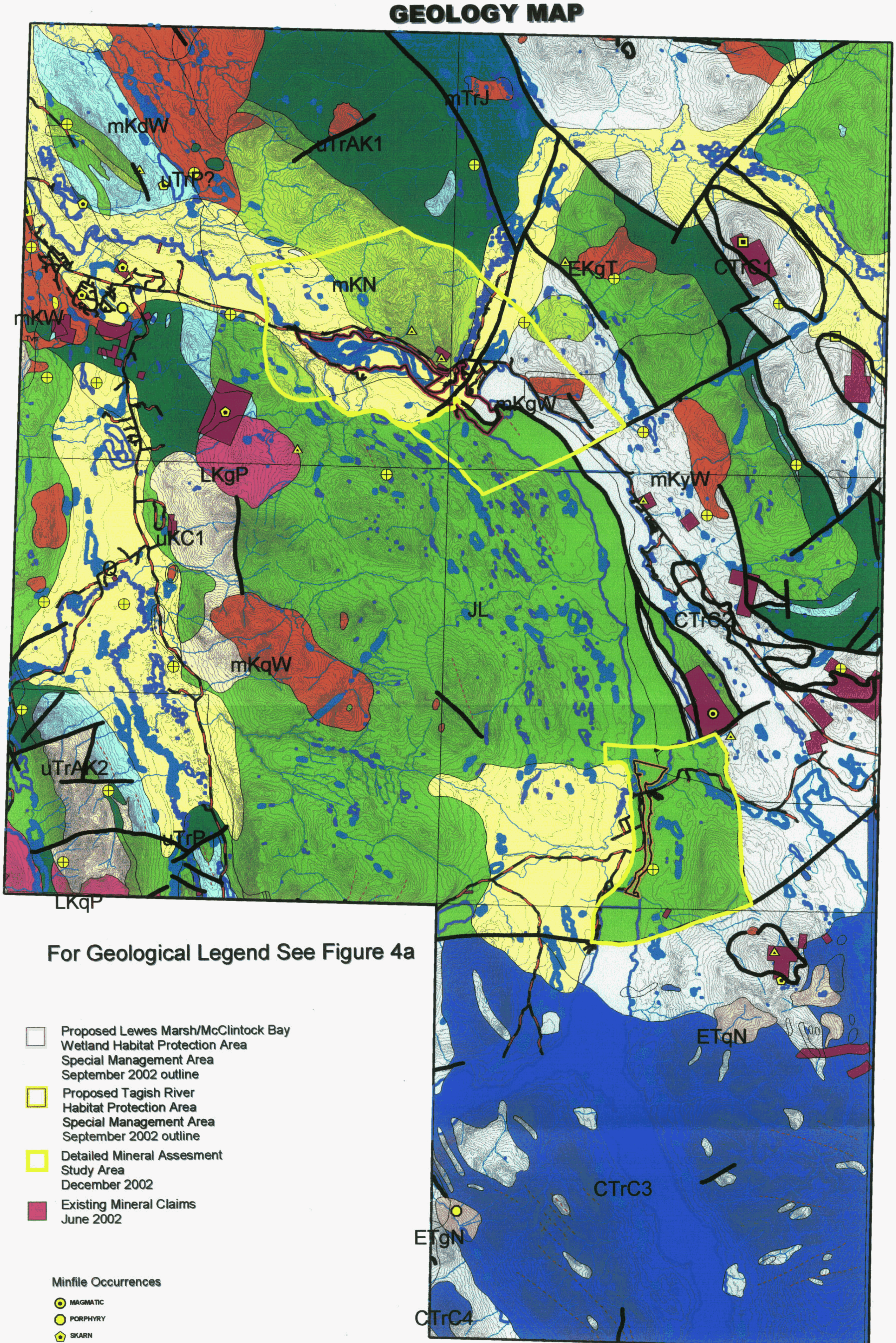
Scale 1 : 400,000

Arcview 3.2 - GIS - RWS - February 2003

Figure 3

Proposed Lewes Marsh/McClintock Bay Wetland and Tagish River Special Management Areas

GEOLOGY MAP



For Geological Legend See Figure 4a

- Proposed Lewes Marsh/McClintock Bay Wetland Habitat Protection Area Special Management Area September 2002 outline
- Proposed Tagish River Habitat Protection Area Special Management Area September 2002 outline
- Detailed Mineral Assesment Study Area December 2002
- Existing Mineral Claims June 2002

Minfile Occurrences

- MAGMATIC
- PORPHYRY
- SKARN
- ULTRAMAFIC
- UNKNOWN
- VEIN

Geological Fault

Geological Fold

3 0 3 6 Kilometers

Scale 1 : 250,000

Arcview GIS Version 3.2 - RWS - February 2003

Figure 4

Geological Legend

Q	Quaternary: unconsolidated glacial, glaciofluvial and glaciolacustrine deposits; fluviatille silt, sand, and gravel, and local volcanic ash, in part with cover of soil and organic deposits
MPMC	Miocene to Pliocene. Miles Canyon: *dark red to brown weathering, columnar jointed olivine basalt flows, commonly amygdaloidal* and vesicular; ultramafic xenoliths (Miles Canyon Basalt)
ETgN, ETqN	Early Tertiary. Nisling Range Suite: medium to coarse grained equigranular to porphyritic rocks of intermediate compositio (g), fine to coarse grained, equigranular and porphyritic granitic rocks of felsic composition (q) g. biotite-hornblende granodiorite (locally K-feldspar megacrysts), quartz monzonite, quartz diorite; minor granodiorite-gneiss; hornblende and biotite hornblende diorite; biotite quartz feldspar porphyry and porphyritic giotite quartz monzonite (Ruby Range Suite) q. leucocratic, biotite granit; *miarolitic alaskite; saccharoidal textured, mafic-poor biotite* granite; biotite-hornblende granite to leucocratic granodiorite with sparse, white, alkali feldspar phenocrysts; biotite quartz monzonite (Nisling Range Suite, Nisling Range Alaskite, Coffee Creek Granite, Annie Ned Granite)
uKC1	Upper Cretaceous. Carmacks: a volcanic succession dominated by basic volcanic strat (1), but including felsic volcanic rocks dominantly (?) at the base of the succession (2) and locally, basal clastic strat (3) 1. augite olivine basalt and breccia; hornblende feldspar porphyry *andesite and dacite flows*; vesicular, augite phyric andesite and trachyte; minor sandy tuff, granite boulder conglomerate, agglomerate and associated epiclastic rocks (Carmacks Gp., Little Ridge Volcanics, Casino Volcanics)
LKgP, LKqP	Late Cretaceous to Tertiary. Prospector Mountain Suite: grey, fine to coarse grained, massive, granitic rocks of felsic (q) intermediate (g) rarely mafic (d) composition and related felsic dykes (f) g. hornblende-biotite granodiorite, hornblende diorite, quartz diorite (Wheaton Valley Granodiorite) q. quartz monzonite, biotite quartz-rich granite; pophyritic alaskite and granite with plagioclase and quartz-eye phenocrysts; bitotie and hornblende quartz monzodiorite, granite and leucocratic granodiorite with local alkali feldspar phenocrysts (Prospector Mountain Suite, Carcross Pluton)
mKN	Mid-Cretaceous. Mount Nansen: massive aphyric or feldspar-phyric andesite to dacite flows, breccia and tuff; massive, heterolithic, quartz- and feldspar-phyric, felsic lapilli tuff; flow-banded quartz-phyric rhyolite and quartz-feldspar porphyry plugs, dykes, sills and breccia (Mount Nansen Gp., Byng Creek Volcanics, Hutshi Gp.
mKW, mKdW, mKgW, mKqW, mKyW	Mid - Cretaceous. Whitehorse Suite: greymedium to coarse grained, generally equigranular granitic rocks of felsic (q), intermediate (g), locally mafic (d) and rarely syenitic (y) composition d, hornblende diorite, biotite-hornblende quartz diorite and mesocratic, often strongly magnetic, hypersthene-hornblende diorite, quartz diorite and gabbro (Whitehorse Suite, Coast Intrusions) g, biotite-hornblende granodiorite, horblende quartz diorite and hornblende diorite; leucocratic, biotite hornblende granodiorite locally with sparse grey and pink potassium feldspar phenocrysts (Whitehorse Suite, Casino granodiorite, McClintock granodiorite, Nisling Range granodiorite) q, biotite quartz-monzonite, biotite granite and leucogranite, pink granophyric quartz monzonite, porphyritic biotite leucogranite, locally porphyritic (K-feldspar) hornblende monzonite to syenite, and locally porphyritic leucocratic quartz monzonite (Mt. McIntyre Suite, Whitehorse Suite, Casino Intrusions, Mt. Ward Granit, Coffee Creek Granite) y, hornblende syenite, grading to granite or granodiorite (Whitehorse Suite)
EKgT	Early Cretaceous. Teslin Suite: leucocratic, fine to coarse-grained, equigranular, hornblende-biotite granit, granodiorite, quartz monzonite and quartz monzodiorite, locally with sparse grey and pink potassium feldspar phenocrysts; associated apilitic phases and dykes (Teslin Suite)
JL	Lower and Middle Jurassic. Laberge: poorly sorted, medium bedded to massive arkosic sandstone and minor shale with interbeds and thick members of resistant heterolithic pebble and boulder conglomerate; recessive, dark brown weathering, thin bedded, dark brown to greenish silty shale (Laberge Gp.)
uTrAK1, uTrAK2	Upper Triassic. Aksala: mixed clastic-carbonate assemblage divisible into three dominant facies including calcareous greywacke (1), locally thick carbonate (2), and red-colored clastics (3) 1. brown shale, black and minor red siltstone, greenish, calcareous greywacke and interbedded bioclastic, argillaceous limestone; igneous- or limestone-clast pebble and cobble conglomerate; laharic debris flows; rare feldspar-augite porphyry flows (Casca mb of Aksala) 2. massive to thick bedded limestone; minor thin bedded argillaceous to sooty limestone; coarse crystalline, massive dolostone; minor laminated chert; massive to poorly bedded, limestone *conglomerate* debris flows and fanglomerate (Hancock mb. of Aksala)
uTrP, uTrP?	Upper Triassic. Povoas: augite or feldspar phyric, locally pillowed andesitic basalt flows, breccia, tuff, sandstone and argillite; local dacitic breccia and tuff with minor limestone; greenschist, chlorite schist, chlorite-augite-feldspar gneiss, amphibolite (Povoas)
mTrJ	Middle Triassic. Joe Mountain: massive basalt flows; fine- to locally medium-grained feldspar and pyroxene?-phyric, pillowed andesite; variably altered massive microdiorite; heterolithic diamictite; coarse-grained and locally pematitic, hornblende gabbro and diorite Joe Mountain Volcanics)
CTrC1, CTrC2, CTrC3, CTrC4	Carboniferous to Jurassic. Cache Creek: oceanic assemblage of ultramafic rocks (1), volcanics (2), carbonate (3), and ribbon chert (4) 1. dark rusty to dun brown weathering, *strongly magnetic, variably tectonized, serpentinized* and chloritized ultramafic rocks including medium to coarse grained hronblende-pyroxene diorite gabbro, peridotite, dunite, serpentinite, and pyroxenite (Cache Creek Gp.) 2. andesitic and basaltic spherulitic greenstone, locally pillowed; aphanitic, tuffaceous (?) greenstone with clasts of limestone and chert; altered volcanic rocks with numerous serpentine bodies; massive, fine-grained metabasite and hornblende diorite (Cache Creek Gp.) 3. massive, finely crystalline, locally crinoidal and fusiline grey limestone; limestone, limestone breccia; massive to poorly bedded, medium-grained, recrystallized white to pale yellow limestone and crinoidal bioclastic limestone; rare dolostone (Cache Creek Gp., Horsefeed) 4. *resistant, well bedded, thin bedded, grey, black, red and brown chert, with lesser cherty sandstone* and siltstone; minor thin limestone beds and pillow lava (Cache Creek Gp., Kedahda)

Proposed Lewes Marsh/McClintock Bay Wetland Tagish River Special Management Areas

Figure 4a

Geological Terrane and Sample Location Map

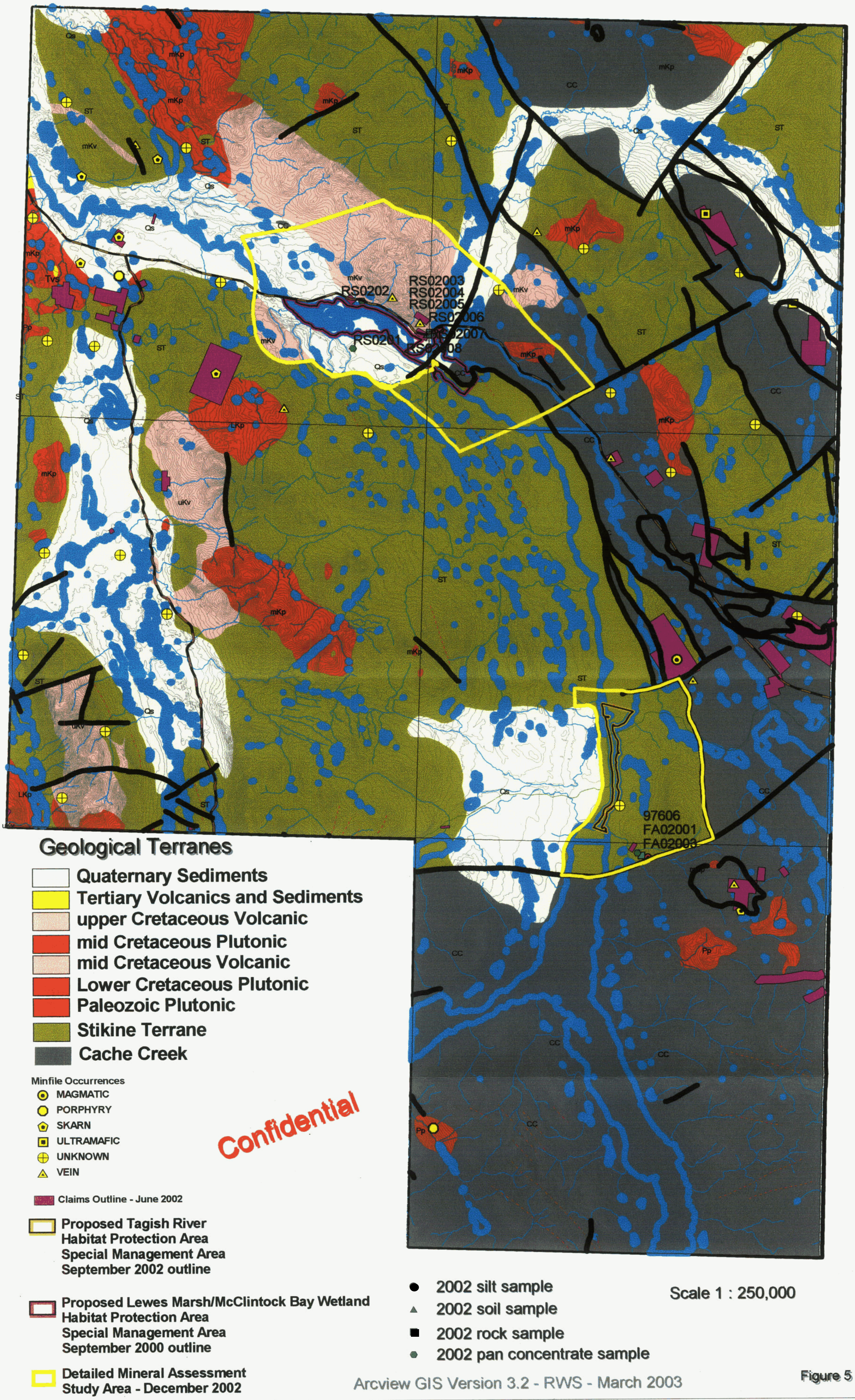
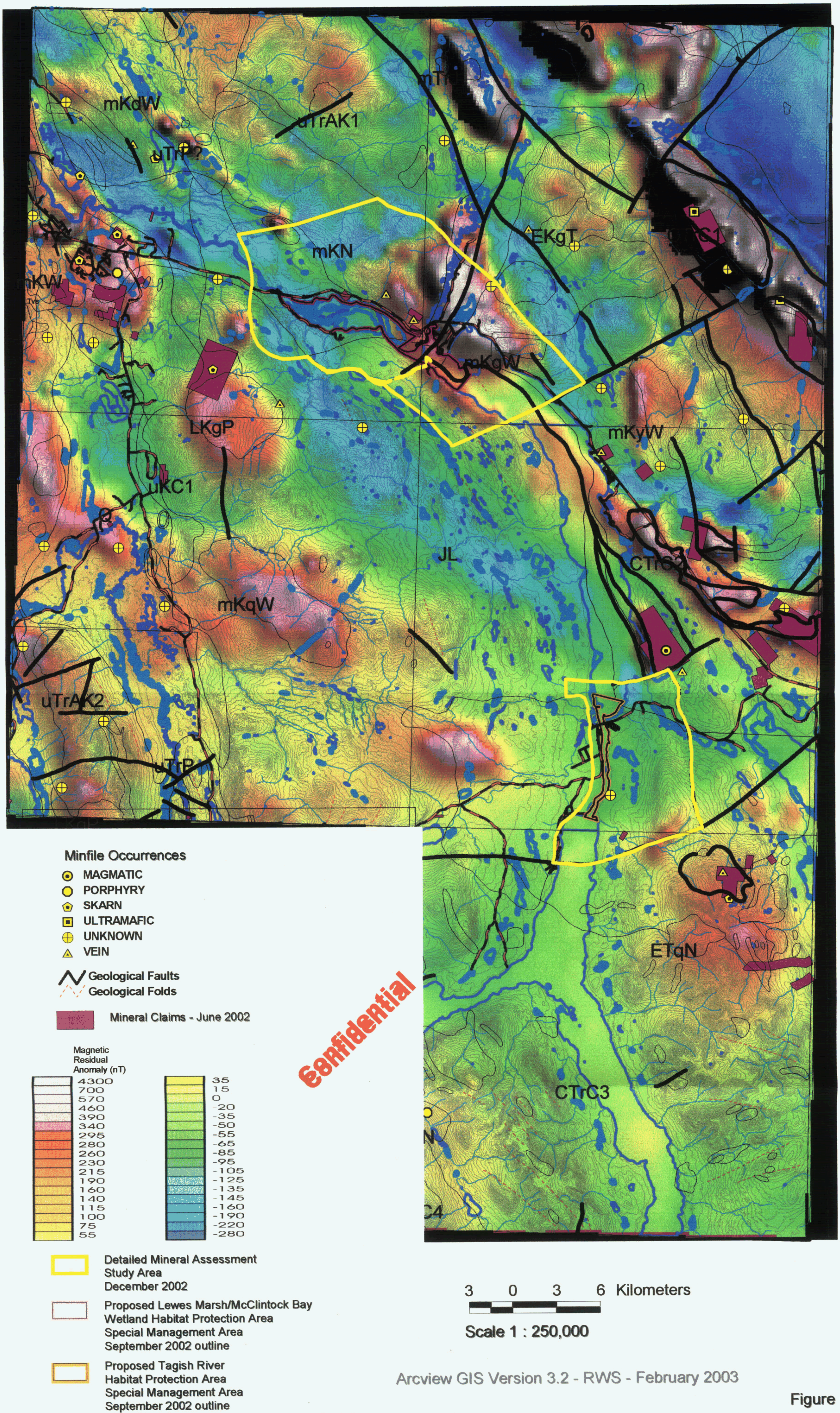


Figure 5

Detailed Mineral Assessment
GSC Aeromagnetics - Residual Magnetics



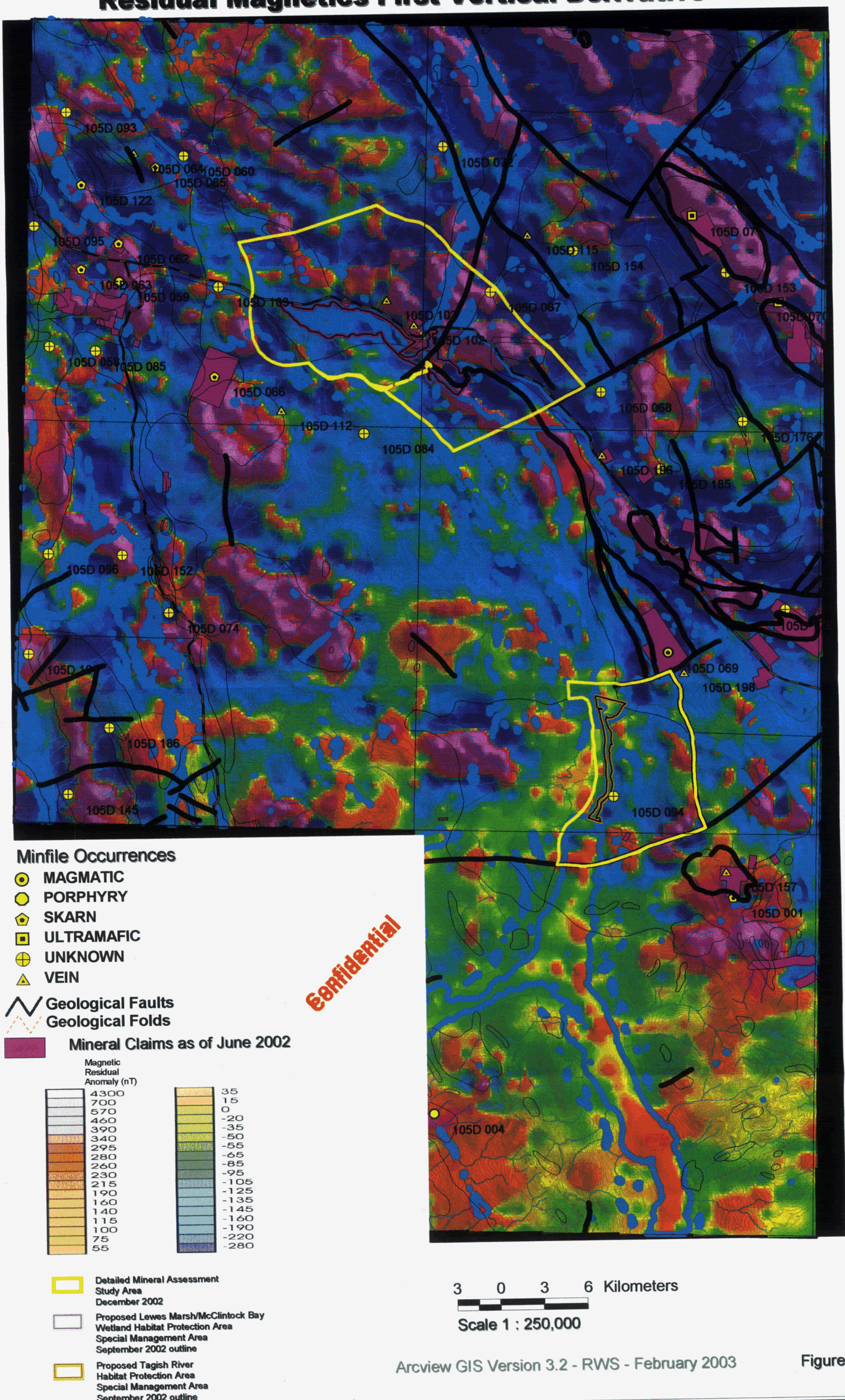
3 0 3 6 Kilometers

Scale 1 : 250,000

Arcview GIS Version 3.2 - RWS - February 2003

Figure 6

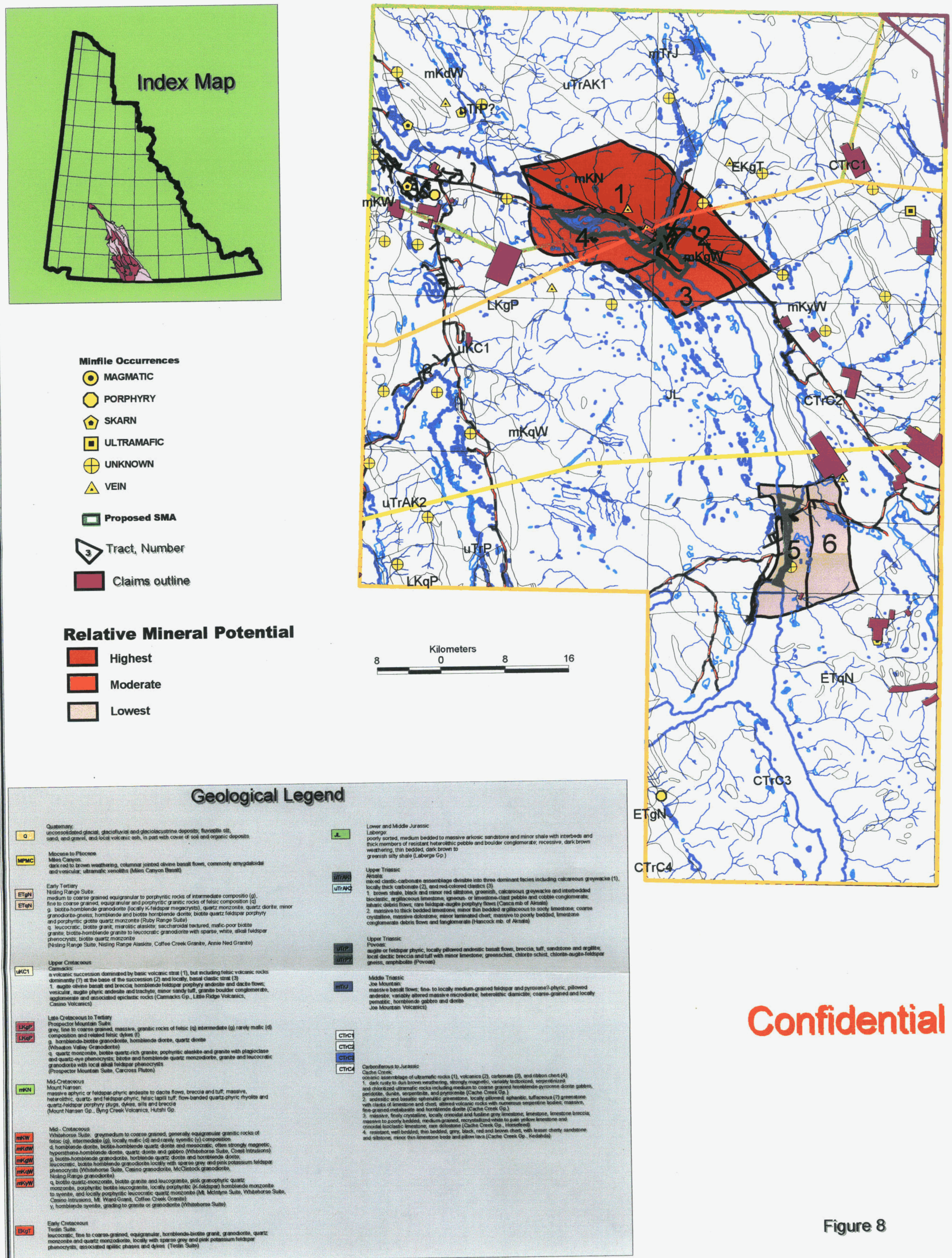
Detailed Mineral Assesment GSC Aeromagnetics
Residual Magnetics First Vertical Derivative



Arcview GIS Version 3.2 - RWS - February 2003

Figure 7

Proposed Lewes-Marsh and Tagish River SMAs
Detailed Mineral Assessment



Confidential

Figure 8

APPENDIX I

DETAILED MINERAL POTENTIAL ASSESSMENT

TRACT RANKING

And

DEPOSIT MODELS

Lewes Marsh/Tagish River proposed SMAs

Proposed Lewes Marsh/McClintock Bay Wetland
And Tagish River
Habitat Protection Areas
Special Management Areas

Mineral Deposit Models by Tracts and Relative Ranking

Tract 1 — Rank 2nd
Copper-Gold quartz veins
Gold-Quartz veins
Gabbroic Nickel-Copper Deposits
Plutonic-Related Gold Deposits

Tract 2 — Rank 1st
Gold-Quartz veins
Copper-Gold quartz veins
Gabbroic Nickel-Copper Deposits
Plutonic-Related Gold Deposits
VMS – Cypress-Besshi type Deposits
Placer Gold deposits

Tract 3 — Rank 4th
Gold-Quartz veins
Copper-Gold quartz veins
Gabbroic Nickel-Copper Deposits
Plutonic-Related Gold Deposits
VMS – Cypress-Besshi type Deposits

Tract 4 — Rank 3rd
Gold-Quartz veins
Copper-Gold quartz veins
Gabbroic Nickel-Copper Deposits
Plutonic-Related Gold Deposits
VMS – Cypress-Besshi type Deposits
Coal Deposits

Tract 5 — Rank 6th
Gold-Quartz veins
Copper-Gold quartz veins
Plutonic-Related Gold Deposits

Tract 6 — Rank 5th
Gold-Quartz veins
Copper-Gold quartz veins
Plutonic-Related Gold Deposits

YUKON MINFILE
YUKON GEOLOGY PROGRAM
WHITEHORSE

MINFILE: 105D 102
NAME: RESORT
DEPOSIT TYPE: VEIN
STATUS: DRILLED PROSPECT
TECTONIC ELEMENT: CACHE CREEK TERRANE

NTS MAP SHEET: 105D\10
LATITUDE: 60° 34' 42" N
LONGITUDE: 134° 32' 54" W

OTHER NAME(S): ROSSBANK
MAJOR COMMODITIES: SILVER, GOLD
MINOR COMMODITIES: LEAD
TRACE COMMODITIES:

CLAIMS (PREVIOUS & CURRENT)

ROSSBANK, RSBK

WORK HISTORY

Gold-bearing quartz veins were first discovered in this area in the late 1800's. A tree growing on the waste dump of the old adit at the north end of the property was at least 100 years old in 1987. The southern occurrence was staked as Dat claims (Y80326) in Aug/74 by G. Harris and J. Suits.

Both occurrences were restaked as Rossbank claims (YA86001) in Aug/84 and Jul/85 by B. Cofer & R. Holway, who trenched in 1985 and 1987. L. Lebedoff added Fox claims (YA94145) to the north in Feb/86 and performed mapping and geochem sampling in 1987. Cofer & Holway added Donny claims (YB20232) and more Rossbank claims to the east in 1988 and performed additional trenching on both occurences.

The Rossbank claims were transferred to D. Duensing in Sep/89, who optioned them to Inco Ltd in January 1990. Inco added more Rossbank claims in Jan and Jun/90 and performed out prospecting, a magnetometer survey and diamond drilling (3 holes - 582.5m), before dropping its option in Feb/92.

GEOLOGY

Gold occurs in mesothermal quartz veins and pyritic shear zones near the faulted contact between sedimentary rocks of the Laberge Group (Jurassic) to the west and serpentinite, chert, andesite, greywacke and limestone of the Cache Creek Group to the east. The major contact is marked by a conspicuous zone of quartz- carbonate-green mica (listwanite) alteration and lenses of sheared serpentinite. Pyritic shear zones and quartz veins appear to follow small splays oblique to the major fault. Two mineralized zones have so far been investigated: the Creek zone at the north end of the property, near an old 75 m long adit, and the McClintock zone, which is located at the south end of the property and contains a shaft about 3 m deep, a 7 m open cut and several hand pits which expose shear zones cutting altered volcanic rocks.

Trenching on the McClintock zone in 1990 exposed four mineralized shear zones ranging from 0.2 to 3.5 m wide. The shear zones strike ESE and dip steeply south. Mineralization consisting of pyrite, galena and minor malachite and azurite appears to be concentrated along the hanging wall and footwall contacts. A sample from trench 90-3 returned 14 936 ppb Au, 11.3 ppm Ag, 5101 ppm As, 1295 ppm Pb and 45 ppm Sb over 0.6 m. Drillhole 90-2 intersected serpentinite, sheared tuffaceous sediments and brecciated dacite and agglomerate showing phyllic and propylitic alteration. Nine core samples returned gold values in excess of 500 ppb, over widths ranging from 0.92 to 3.67 m. A 2.5 m intersection of the agglomerate assayed 1989 ppb Au. Drillhole 90-3 intersected alternating layers of basalt, andesite and tuff showing weak phyllic to potassic alteration. Eleven samples returned geochemical values in excess of 500 ppb Au over 0.2 to 2.54 m widths. A sample of bleached tuff assayed 24 243 ppb Au over 0.2 m.

REFERENCES

INCO LTD, Dec/90. Assessment Report ##092888 by R.A. Doherty and R.Hulstein.

YUKON MINING AND EXPLORATION OVERVIEW 1988, p. 22.

APPENDIX II

LIST OF EMR 2002 SAMPLES AND RESULTS

And

ANALYTICAL PROCEDURES

Detailed Mineral Assessment
Sample Assay Results - 2002 EMR Sampling

Appendix II

Lewes Marsh/McClintock Bay Wetland and Tagish River SMAs

Number	Albers_x	Albers_y	Sample_ty	Project	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
RS02006	389893.1	674719.8	soil	Lewes_Marsh	171	36	4	36	1588	130	106	92	1.21	0.4	61.8	95.6	3	0.2	4.98	0.3
RS02007	389903.9	674712.7	soil	Lewes_Marsh	178	36	4	23	560	33	58	33	1.13	0.1	86.9	14.3	4	0.1	0.6	0.1
RS02008	389921.1	674720	soil	Lewes_Marsh	188	23	1	20	1850	66	55	106	0.31	0.3	749.3	39.1	4	0.2	1.39	0.4
FA02003	404674.7	639265.8	silt	Tagish Narrows	107	31	2	8	231	38	42	27	0.6	0.1	7.9	20.6	2	0.1	2.98	0.2
97606	404682.8	639260	rock	Tagish Narrows	4	128	3	1	1001	3	6	24	0.05	1.1	8.5	5.4	0.5	3.2	4.91	0.3
RS02003	390111	674869.9	rock	Lewes_Marsh	24	66	2	10	1120	198	28	1188	0.37	3.2	4147.8	5954.4	6	0.2	2.94	12.6
RS02004	390126.8	674881.6	rock	Lewes_Marsh	17	108	1	5	1511	125	18	2589	0.2	7.7	1975.8	9231.1	5	0.05	2.73	21.4
RS02005	389894.8	674723	rock	Lewes_Marsh	69	30	3	19	2822	532	70	102	0.68	0.4	28.7	7.3	2	0.1	16.76	0.3

Detailed Mineral Assessment
Sample Assay Results - 2002 EMR Sampling

Appendix II

Lewes Marsh/McClintock Bay Wetland and Tagish River SMAs

Number	Co__ppm	Cu__ppm	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	Utm_zone	X
RS02006	30.8	130.2	4.82	0.38	0.12	0.82	3.5	0.009	17.1	0.248	60.1	0.09	3.2	12	4.1	0.013	0.1	1.8	0.9	08V	527138
RS02007	12.8	17.4	3.53	0.08	0.07	0.69	2	0.016	19.8	0.079	13.7	0.07	2.1	13.7	3.1	0.029	0.3	3.8	0.3	08V	527149
RS02008	36.6	117	9.15	0.69	0.1	0.15	10.4	0.004	20.5	0.151	35.9	0.59	14.8	15.5	3.9	0.007	2.2	2.1	0.6	08V	527166
FA02003	6.4	23.2	1.42	0.5	0.07	0.84	0.5	0.018	27.2	0.05	3.6	0.09	0.4	2.1	2.8	0.06	0.1	0.5	1	08V	543266
97606	169.9	2367.1	27.69	0.12	0.01	0.02	1.5	0.001	63.5	0.01	8.4	7.53	0.4	2.1	0.05	0.001	0.1	0.4	181.8	08V	543274
RS02003	29.2	184.6	6.11	2.27	0.21	0.22	50	0.003	15.1	0.116	832.4	5.94	40.9	3.4	2.3	0.003	1.3	0.6	0.9	08V	527350
RS02004	11	156.8	6.22	6.21	0.14	0.68	45	0.004	5.9	0.069	1173.8	4.27	36.9	2.9	1.5	0.002	0.5	1.4	0.8	08V	527365
RS02005	15	212.5	3.15	0.12	0.09	1.31	1.6	0.006	5.8	0.114	30.9	0.13	2	6.4	2.8	0.004	0.1	1	0.4	08V	527140

Appendix II

Detailed Mineral Assessment
Sample Assay Results - 2002 EMR Sampling

Lewes Marsh/McClintock Bay Wetland and Tagish River SMAs

Number	Y	Datum	Date	Person	Quality	Descriptio	Duplicate	Width_m_	Attitude	Modifier									
RS02006	6713208	NAD27	20020529	RH	good	Fe colored 'soil' collected 5m below rock RS02-005.													
RS02007	6713201	NAD27	20020529	RH	good	Rusty soil collected from shear/fracture zone cutting basalt -andesite in wall of excavator trench.													
RS02008	6713209	NAD27	20020529	RH	good	Rusty soil collected from N-S shear/fracture zone cutting basalt -andesite in wall of excavator trench.													
FA02003	6678532	WGS84	20020605	RS	Good	Pennycook Creek, sample from small bar behind pyrrhotite skarn boulder (rock sample FA2-002). Same area where pan sample FA2-001 was collected.													
97606	6678526	WGS84	20020605	RS		Massive po rich band 1		grab	032/31n	float									
RS02003	6713366	NAD27	20020529	RH		qz-ca stockworked bla		2.5	bed 100/21	grab									
RS02004	6713379	NAD27	20020529	RH		In bulldozer clearing. E		0.25	040/60s	grab									
RS02005	6713211	NAD27	20020529	RH		Calcite veining in shea		grab		float									

Appendix II

Detailed Mineral Assessment
Pan Concentrate Sample Analytical Results

Lewes Marsh/McClintock Bay Wetland and Tagish River SMAs

Number	Utm_zone	X	Y	Datum	Date	Person	Project	Sample_typ	Long	Lat	Albers_x	Albers_y	Mo_ppm	Cu_ppm	Pb_ppm	Zn_ppm	Ag_ppm	Ni_ppm	Co_ppm	Mn_ppm
FA02001	08V	543269	6678529	NAD83	06/05/2002	RS	Tagish River	pancon	-134.219	60.24119	404677.8	639262.7	3.9	21.4	70	45	1.1	46.2	11.3	377
RS0201	08V	521794	6712444	NAD27	05/29/2002	RH	Lewes_Marsh	pancon	-134.603	60.54926	384937.6	673829.1	2.3	23.5	199.4	73	2.2	37.6	14.1	407
RS0202	08V	522307	6715687	NAD27	05/29/2002	RH	Lewes_Marsh	pancon	-134.593	60.57835	385575.8	677040.7	0.7	20.1	12	46	2.5	55.9	11.8	438

Detailed Mineral Assessment
Pan Concentrate Sample Analytical Results

Appendix II

Lewes Marsh/McClintock Bay Wetland and Tagish River SMAs

Number	Fe_	As_ppm	U_ppm	Au_ppb	Th_ppm	Sr_ppm	Cd_ppm	Sb_ppm	Bi_ppm	V_ppm	Ca_	P_	La_ppm	Cr_ppm	Mg_	Ba_ppm	Ti_	B_ppm	Al_	Na_
FA02001	7.38	12.3	3.9	13931.4	21	30	13.9	1	16.5	208	2.11	0.073	47	102.3	1.01	459	0.103	4	0.74	0.018
RS0201	10.11	14	1.5	45546.3	16.5	26	50.5	2.2	36.8	296	0.68	0.096	47	181	0.45	45	0.137	11	0.72	0.016
RS0202	6.81	7.7	1.1	64619.2	7.3	34	1.1	1.1	0.8	193	1	0.054	31	248.3	0.71	173	0.156	6	0.92	0.012

Detailed Mineral Assessment
Pan Concentrate Sample Analytical Results

Appendix II

Lewes Marsh/McClintock Bay Wetland and Tagish River SMAs

Number	K_	W_ppm	Hg_ppm	Sc_ppm	Tl_ppm	S_	Ga_ppm	Samp_gm	Descriptio			
FA02001	0.05	26.5	0.05	2.5	0.1	0.1	6	22.09	6 pans of -2mm	12 colors.	feld porph	and.
RS0201	0.05	2.2	0.11	2.4	< .1	0.09	6	7.02	5 pans of -2mm	11 colors.	Kgd	shl
RS0202	0.03	0.5	0.06	2.8	< .1	0.08	5	3.18	3 pans of -2mm	5 colors	small colors	hem specks. Creek 2m wide

Detailed Mineral Assessment
Pan Concentrate Sample Analytical Results

Lewes Marsh/McClintock Bay Wetland and Tagish River SMAs

Appendix II

Number					
FA02001	lmst	cht	marble	black feld porph.	syenite and dark rusty hornfelsed boulder with mass. Bnds of po w/py.
RS0201	limy mudst. Rare qtz-carb vein with limonite in vugs. Creek 2.5m wide cutting glacial outwash.				
RS0202	cutting glacial till. Boulders >.5m with fine grey silt.				

Energy Mines and Resources, Yukon Geology Program
2002 Mineral Assessment

Geochemical Analysis

Laboratory Procedures

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

The attached sheets 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.

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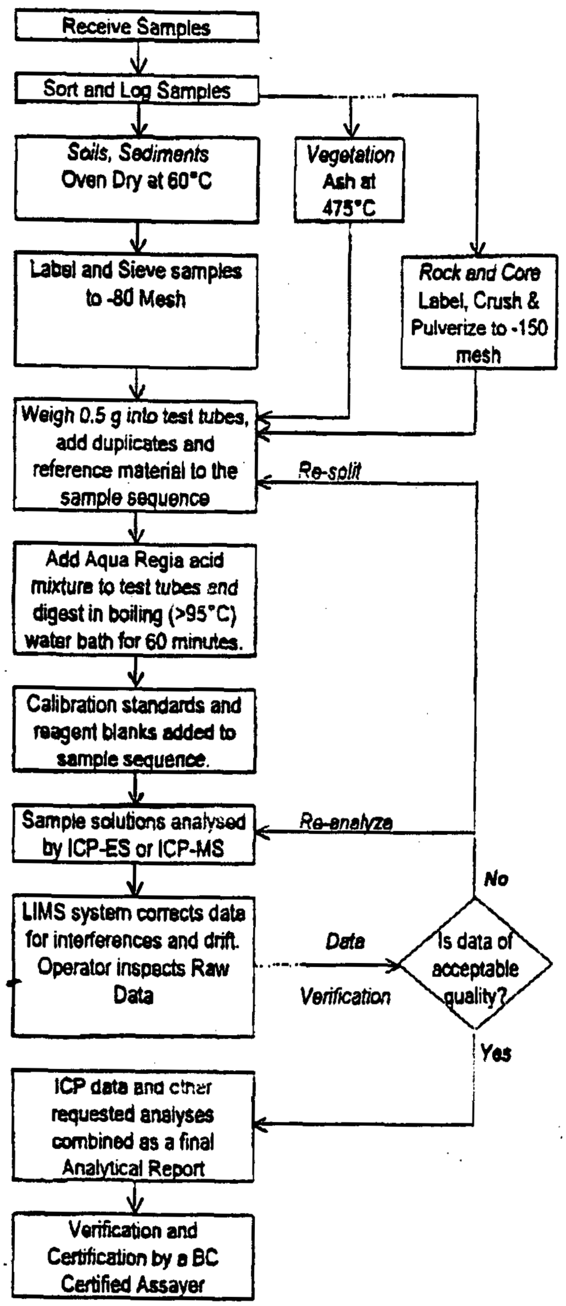
METHODS AND SPECIFICATIONS FOR ANALYTICAL PACKAGE
GROUP 1D & 1DX - ICP ANALYSIS – AQUA REGIA

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.

NEW!

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

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

Group 1D

	Cdn	U.S.
Any 1 element	**$3.85**	**$2.90**
Any 5 elements	**$5.20**	**$3.90**
All 30 elements	**$6.25**	**$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 III

PHOTOGRAPHS OF PROPOSED SMAs

And SURROUNDING AREA

EMR 2002

Lewes Marsh/Tagish River proposed SMAs

Appendix III

Photographs 2002 of
Lewes Marsh/McClintock Bay and Tagish River SMAs

Plate 1. Lower Marsh Lake with Yukon River outlet.

Plate 2. Lewes Marsh and Yukon River

Plate 3. Lewes Marsh wetlands, looking south.

Plate 4. McClintock Bay and Swan Haven lookout.

Plate 5. Gold panning on creek west of Lewes Marsh.

Plate 6. Evidence of historic placer mining east of highway, upstream of Black Mike's claims.

Plate 7. Marsh Lake Fault zone exposed along Alaska Highway.

Plate 8. Dr. Hulstein and assisstant at historical workings on Rossbank property.

Plate 9. Trench workings on Rossbank Property east of Lewes Marsh proposed SMA

Plate 10. Swan Haven lookout on McClintock Bay

Plate 11. Tagish River outlet and delta in Marsh Lake. Tagish Bridge crossing.

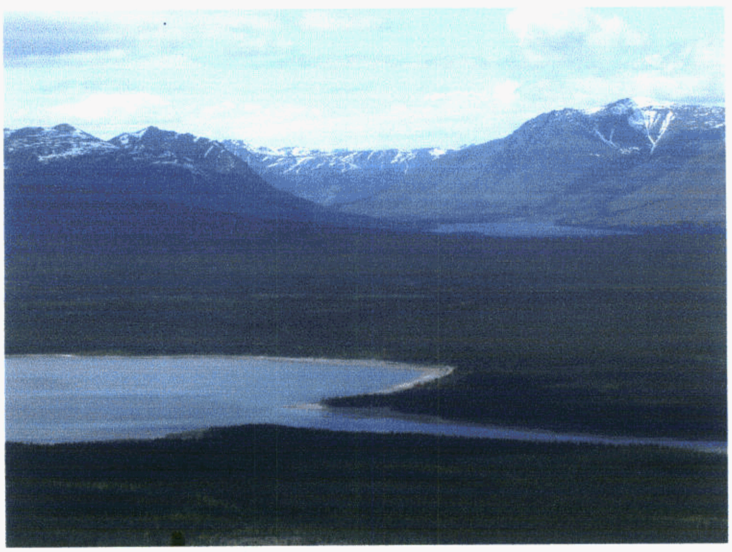


Plate 12. Upper Tagish River at Tagish Lake outlet.

Plate 13. Tagish River flats at lower water levels.

Plate 14. Historic placer mining on Pennycook Creek.

Plate 15. Trench on placer workings, Pennycook Creek.