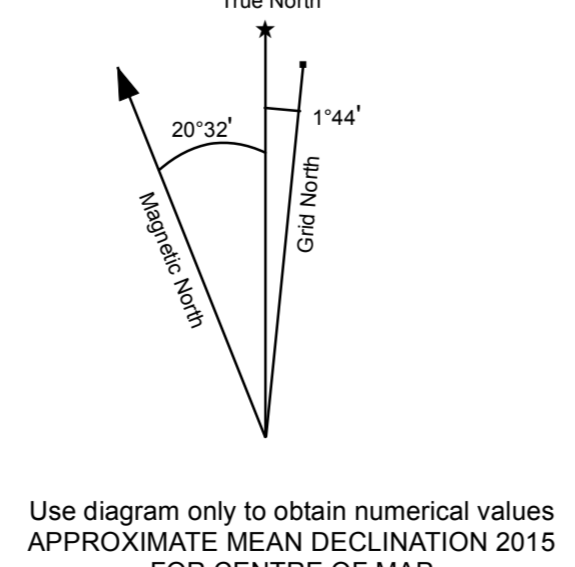


1:250 000-scale topographic base data produced by CENTRE FOR TOPOGRAPHIC INFORMATION, NATURAL RESOURCES CANADA
Copyright Her Majesty the Queen in Right of Canada
ONE THOUSAND METRE GRID
Universal Transverse Mercator Projection
North American Datum 1983
Zone 8
CONTOUR INTERVAL 100 FEET
Elevations in metres above Mean Sea Level

**Epithermal Au-Ag
Weighted sums model
(Principal Component Residuals)
Sheet 9 of 15**
SCALE 1:250 000
kilometres



| | | |
|--------------|-----------------|----------------|
| 105E | 105F | 105G |
| LAKE LABERGE | QUIET LAKE | FINLAYSON LAKE |
| 105D | 105C | 105B |
| WHITEHORSE | THIS MAP | WOLF LAKE |
| 104M | 104N | 104O |
| SKAGWAY | ATLIN | JENNINGS RIVER |

INTRODUCTION

New geochemical data from re-analysis of archived stream sediment samples have been assessed using weighted sums modeling and catchment basin analysis as described in the methodology report that accompanies this map (Mackie et al., 2015). Both commodity and pathfinder element abundances are evaluated to highlight areas that show geochemical responses consistent with a variety of base and precious-metal mineral deposit types. The results of modeling, completed using two approaches, are presented as a series of catchment maps and associated data files. This release is part of a regional assessment of stream sediment geochemistry that covers a large part of Yukon.

SAMPLING AND ANALYSIS PROGRAMS

A variety of types of base and precious-metal mineralization has been identified in the Teslin area as listed in Table 1 (Yukon MINFILE, 2015). Interestingly the Teslin Area contains relatively few mineral occurrences compared to surrounding map areas. The most significant deposits are classed as porphyry Mo (Red Mountain deposit), polymetallic Ag-Pb-Zn (Slate prospect and Sawas showing), unclassified quartz-vein related Au (Dalayee prospect) and volcanogenic massive sulphide (More and Iron Creek showings). Other deposit types within the area include Cu skarn (ORK and Hyder showings) and W-Sn skarn (Mindy and Mulligan prospects). While magmatic Ni-Cu-PGE mineralization has not been documented in the Teslin area, several mafic-ultramafic bodies have been mapped in the region suggesting at least some prospectivity for this deposit type.

MINERAL OCCURRENCES

As described in the methodology report (Mackie et al., 2015), two approaches have been used to subdue the influence of background lithological variation and secondary absorption on the composition of stream sediments. One uses data levelled by the dominant geology mapped within each catchment, while the other

uses residuals calculated from regression against selected principal components. Weighted sums models (WSM) have been generated using the processed data. The importance rankings used in WSMs are summarized in Table 2. Each model is optimized for a target deposit type however other deposit types may be represented in a given model due to similarities in elemental abundances and associations. Importantly, the area of Cu skarn mineralization in the vicinity of Whitehorse has not been effectively sampled which limits the ability to validate the model presented for this deposit type.

Exploratory data analysis using both raw element data and principal components indicate that lithological variation and secondary scavenging affect the distribution of certain commodity and pathfinder elements. The first principal component, accounting for ~30% of the total geochemical variation, high positive loadings for Ni, Cr, Mg, Co, Cu, Sc and Ca and high negative loadings for La, Rb, Ce, U, Th, Ti, Li and Bi. Respectively, these element groupings are consistent with that expected for sediments derived from mafic and felsic rocks, and show a spatial pattern matching their mapped distribution. The second component with high positive loadings for Ag, Cd, Lanthanum (La) and Hg. Using LOI as a proxy for organic carbon it is interpreted that this component represents scavenging by organic material. This interpretation is supported by the fact that positive component two corresponds to area of subdued topography. Similarly, the third component has high loadings in As, Sb, Fe, Pb, Co, Zn and Mn; and is interpreted to represent scavenging by hydrous Fe and/or Mn oxides.

Regression analysis of selected metals against the relevant principal component(s) effectively filters the scavenging and lithological controls while preserving responses related to known occurrences. Leveling by mapped geology has a more subdued effect on filtering the interpreted lithological control on the distribution of certain pathfinder elements. In order to reduce the impact of this effect on the WSM, certain elements were given low importance rankings for certain deposit types. Negative importance rankings are used in both approaches to help distinguish between signatures related to deposit types with similar metal associations. The effectiveness of historical sampling coverage has been assessed empirically using graphs of WSMs plotted against catchment surface area to determine the ideal maximum catchment size (14 km²). Catchments that cover larger areas (shown on the map with bold outlines) are interpreted to have been under-sampled and thus require further sampling to properly evaluate the area for geochemical anomalies. Given the likelihood that a mineralization signal would be progressively diluted with increasing catchment size, marginally high WSM scores in large catchments may also be of interest.

WEIGHTED SUMS MODELING

As described in the methodology report (Mackie et al., 2015), two approaches have been used to subdue the influence of background lithological variation and secondary absorption on the composition of stream sediments. One uses data levelled by the dominant geology mapped within each catchment, while the other

Table 1: List of Mineral Occurrences for NTS map sheet 105C (Yukon MINFILE, 2015)

| Number | Name | Type | Status | Commodities |
|----------|---------------|--|------------------|--|
| 105C 002 | KITCHEN | Vein Polymetallic Ag-Pb-Zn-Au | Showing | Lead, Silver |
| 105C 003 | BAR | Sediment hosted Stratiform Barite | Drilled Prospect | Antimony, Barite, Mercury, Thallium, Zinc, Tin, Silver, Lead, Arsenic |
| 105C 004 | LINCOLN | Unknown | Unknown | Uranium |
| 105C 008 | SLATE | Vein Polymetallic Ag-Pb-Zn-Au | Drilled Prospect | Lead, Molybdenum, Silver, Zinc, Molybdenum Disulfide, Tungsten, Silver, Copper |
| 105C 009 | RED MOUNTAIN | Porphyry Cu-Mo-Au | Deposit | Copper |
| 105C 010 | REBA | Ultramafic-hosted asbestos | Showing | Asbestos |
| 105C 011 | SEAFORTH | Ultramafic-hosted asbestos | Showing | Asbestos |
| 105C 012 | SQUANGA | Ultramafic Mafic Podiform Chromite | Showing | Chromium, Palladium, Platinum |
| 105C 013 | HAYES PEAK | Ultramafic-hosted asbestos | Showing | Chrysotile, Lead, Copper, Silver |
| 105C 021 | IRON CREEK | Volcanogenic Sulphide - type not determined | Drilled Prospect | Copper, Silver, Zinc, Gold, Lead |
| 105C 022 | LINDSAY | Ultramafic Mafic Flood basalt-associated Ni-Cu | Drilled Prospect | Copper, Mercury, Silver, Nickel, Gold |
| 105C 023 | SIDNEY | Unknown | Unknown | Copper |
| 105C 024 | ROSY | Vein Cu-Ag Quartz | Showing | Copper, Silver, Gold |
| 105C 025 | NSUTLIN | Unknown | Unknown | Gold, Silver |
| 105C 026 | DEADMAN | Unknown | Anomaly | Lead, Silver |
| 105C 028 | DALAYEE | Vein Au-Quartz | Drilled Prospect | Chromium, Gold, Silver |
| 105C 029 | MCCLEERY | Skarn Cu | Showing | Cobalt, Fluorite, Tin, Silver, Copper |
| 105C 030 | MUSKRAT | Vein Polymetallic Ag-Pb-Zn-Au | Anomaly | Molybdenum |
| 105C 031 | LAMPERT | Unknown | Unknown | Uranium |
| 105C 035 | ENGLISHMAN | Unknown | Showing | Lead, Uranium, Molybdenum |
| 105C 036 | MULLIGAN | Skarn W | Drilled Prospect | Gold, Silver, Tungsten, Tin |
| 105C 038 | MINDY | Skarn Sn | Drilled Prospect | Barite, Lead, Tin, Tungsten, Zinc, Silver |
| 105C 040 | IKAS | Skarn Sn | Anomaly | Tin, Tungsten |
| 105C 045 | TES | Vein Cu-Ag Quartz | Drilled Prospect | Copper |
| 105C 047 | SAWAS | Vein Polymetallic Ag-Pb-Zn-Au | Showing | Arsenic, Gold, Silver |
| 105C 048 | TOO | Unknown | Anomaly | Arsenic, Gold |
| 105C 055 | EAGLENEST | Vein Au-Quartz | Showing | Antimony, Mercury, Silver, Barite, Gold |
| 105C 059 | HYDER | Unknown | Drilled Prospect | Copper, Silver, Zinc, Gold |
| 105C 061 | MOR | Volcanogenic Sulphide - type not determined | Showing | Gold, Lead, Zinc, Silver, Gold |
| 105C 062 | CARBEOU CREEK | Volcanogenic Sulphide - type not determined | Anomaly | Copper, Silver, Zinc, Gold, Lead |
| 105C 063 | WIR | Unknown | Showing | Copper, Silver, Gold |
| 105C 017 | MARLIN | Sediment hosted Sedimentary Mn | Producer | Manganese, Rhodnite |
| 105C 018 | MT. GRANT | Vein Cu-Ag Quartz | Showing | Copper, Gold, Silver |
| 105C 054 | ORK | Skarn Cu | Prospect | Copper, Tin, Tungsten, Silver |
| 105C 016 | MOOSE HILL | Vein Polymetallic Ag-Pb-Zn-Au | Anomaly | |
| 105C 033 | EASTMAN | Unknown | Unknown | |
| 105C 042 | THOM | Vein Cu-Ag Quartz | Unknown | |
| 105C 056 | IRON | Unknown | Unknown | |
| 105C 019 | EVELYN | Unknown | Unknown | |
| 105C 020 | DRY | Unknown | Unknown | |
| 105C 058 | HOMBRE | Unknown | Unknown | |
| 105C 052 | THA | Unknown | Unknown | |
| 105C 060 | PAULA | Unknown | Unknown | |
| 105C 001 | MORLEY | Unknown | Unknown | |
| 105C 027 | QUIET | Unknown | Unknown | |
| 105C 037 | COYOTE | Unknown | Unknown | |
| 105C 032 | Meadow | Unknown | Unknown | |
| 105C 005 | TESLIN | Unknown | Unknown | |
| 105C 007 | TARFU | Unknown | Drilled Prospect | |
| 105C 050 | TON | Unknown | Unknown | |
| 105C 008 | SEANAW | Unknown | Unknown | |
| 105C 034 | BROPHY | Unknown | Unknown | |
| 105C 051 | BRENDON | Unknown | Unknown | |
| 105C 053 | HANNKA | Unknown | Unknown | |
| 105C 014 | HARLUT | Unknown | Unknown | |
| 105C 046 | BRALUT | Unknown | Unknown | |
| 105C 057 | BIG SALMON | Unknown | Unknown | |
| 105C 044 | SEARS | Unknown | Unknown | |
| 105C 043 | HENRY | Unknown | Unknown | |
| 105C 041 | PESHKE | Unknown | Unknown | |
| 105C 049 | NUF | Unknown | Anomaly | |
| 105C 015 | GUNSIGHT | Unknown | Unknown | |
| 105C 039 | LIGA | Unknown | Unknown | |

Table 2: Importance rankings for weighted sums models using residuals on selected principal components.

| Target Deposit Type ^a | Other Deposit Types ^a | Mn | Fe | Co | Ni | Cu | Mo | Zn | Pb | Ag | Au | As | Ba | Cd | Sn | Sb | Te | Hg | Tl | Bi | W | | |
|----------------------------------|--|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|----|---|
| Porphyry Mo | Cu skarn; Porphyry Cu; W skarn | | | | -2 | 2 | 3 | | | 1 | | | | | | | | -2 | | | | 1 | |
| Cu skarn | Porphyry Cu; Porphyry Mo; W skarn | | | | -2 | 4 | 1 | | | 1 | 1 | 2 | | | | | | | -2 | | | 1 | 2 |
| Polymetallic Ag-Pb-Zn | SEDEX, VMS, Pb-Zn skarn; Epithermal Au-Ag | | | | | | 2 | 2 | 4 | | 2 | | 1 | | 1 | | | -2 | | | | | |
| Epithermal Au-Ag | Orogenic Au; Intrusion-related Au; Polymetallic Ag-Pb-Zn | | | | | | | | | 4 | 3 | 3 | 1 | | | | 2 | | 1 | | | -2 | |
| Orogenic Au | Intrusion-related Au; Epithermal Au-Ag | | | | | | | | | 1 | 4 | 3 | | | | | | | 1 | | | 1 | |
| Magmatic Ni-Cu | Cu skarn | | | | 1 | 4 | 3 | | -2 | -2 | | | | | | | | | | | | | |
| Hydromorphic Anomaly | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | |

^aPolymetallic Ag-Pb-Zn type includes vein and mantle styles; SEDEX = sedimentary exhalative Pb-Zn-(Ag); VMS = volcanic-hosted/associated massive sulphide deposits; hydromorphic anomaly = inverse principal component 3
^bRaw data following a log₁₀ transformation

LEGEND

- Town
 - Mineral Occurrence
 - Road
 - Contour
 - River
 - Water Body
 - Wetland
 - Sample Location
 - Catchment
 - Catchments > 14 km²
- Weighted sums model (PC residuals)**
- Epithermal Au-Ag deposits**
- incomplete element suite
 - 0-50th percentile
 - 50-75th percentile
 - 75-90th percentile
 - 90-95th percentile
 - 95-98th percentile
 - 98-100th percentile

REFERENCES

Geological Survey of Canada, 1986. Regional Stream Sediment and Water Geochemical Reconnaissance Data, Yukon (105C). Geological Survey of Canada, Open File 1217.
Jackman, W., 2015. Regional Stream Sediment Geochemical Data, Teslin Area, southern Yukon (NTS 105C). Yukon Geological Survey, Open File 2015-11.
Mackie, R., Arne, D. and Brown, O., 2015. Enhanced interpretation of regional stream sediment geochemistry from Yukon: catchment basin analysis and weighted sums modeling. Yukon Geological Survey, Open File Report 2015-10.
Yukon MINFILE, 2015. Yukon MINFILE - A database of mineral occurrences. Yukon Geological Survey, www.data.geology.gov.yk.ca, accessed May 2015.

RECOMMENDED CITATION

MACKIE, R., ARNE, D. AND PENNIMPEDE, C., 2016. Weighted sums model for Epithermal Au-Ag deposits using principal component residuals. In: Enhanced interpretation of stream sediment geochemical data for NTS 105C. Yukon Geological Survey, Open File 2016-12, scale 1:250 000, sheet 9 of 15.

Catchment basin polygons generated by the Yukon Geological Survey (J. O. Bruce).
Any revisions or additional geological information known to the user would be welcomed by the Yukon Geological Survey.

Paper copies of this map and the accompanying report may be obtained from the Yukon Geological Survey, Energy, Mines and Resources, Government of Yukon, Room 102-300 Main St., Whitehorse, Yukon, Y1A 2B5. Ph. 867-667-3201, Email geology@gov.yk.ca.

A digital PDF (Portable Document File) file of this map may be downloaded free of charge from the Yukon Geological Survey website: <http://www.geology.gov.yk.ca>.

Yukon Geological Survey
Energy, Mines and Resources
Government of Yukon

Open File 2016-12

**Weighted sums model for Epithermal Au-Ag deposits
using principal component residuals (NTS 105C)
Sheet 9 of 15**

by
Rob Mackie, Dennis Arne,
and Chris Pennimpede