



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

Stream sediment and water samples from the Watson Lake and Coal River areas (NTS 105A and 95D, respectively) were collected at a reconnaissance scale in 1995 as part of the Canada-Yukon Mineral Resource Development Cooperation Agreement (Friske et al., 1996). Field descriptions and initial geochemical data for 1117 sites were released in Geological Survey of Canada (GSC) Open File 3293. New geochemical data from the re-analysis of archive sample material from 824 sites were released in Yukon Geological Survey (YGS) Open File 2012-10 (Jackman, 2012). The reader is referred to these reports for detailed descriptions of sampling techniques, analytical procedures, and quality control measures. The current assessment includes only those samples that have been re-analyzed by inductively coupled plasma mass spectrometry (ICP-MS) and as such, the eastern half of NTS map sheet 95D is excluded.

MINERAL OCCURRENCES

A variety of types of base and precious-metal mineralization are known to occur in the Watson Lake and Coal River area as shown in Table 1 (Yukon MINFILE, 2015). The most significant deposits are classed as intrusion-related gold (Hyland Deposit), Polymetallic Ag-Pb-Zn manto (past producing Mt. Hundere Mine & McMillan deposit) and W-skarn (Bailey deposit). Other types of mineralization include various Pb-Zn deposits and prospects such as the Riteco (Skarn), Baton (SEDEX), Jet and Jeri-North (SEDEX or MVT), and Sambo (VMS). The volcanic and sedimentary package that hosts VMS mineralization in the Finlayson Lake district extends into the Watson Lake map area indicating a high prospectivity for this style of mineralization.

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 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.

Weighted sums models were not generated for porphyry Cu-Mo and epithermal Au-Ag deposit types because no such deposits are known to exist in the region and exploratory data analysis revealed no obvious anomalies in the expected commodity and pathfinder elements. Similarly, given a lack of evidence for scavenging of metals ions by secondary Fe or Mn-oxides a WSM for hydromorphic anomalies was also not produced.

Exploratory data analysis using both raw element data and principal components indicate that the distribution of many commodity and pathfinder elements is strongly influenced by lithological variation. The first principal component accounts for ~27% of the total geochemical variation and shows high positive loadings for Cd, Se, Sb, Ba, Hg, Zn and Ag, and negative loadings for, amongst other elements, Rb, Al, Sn, La, Co and K. Respectively, these groupings form spatial patterns that match the distribution of chert and clastic sedimentary rocks of the Rabbitkettle Formation and intermediate intrusive rocks of the Hyland Suite. The second principal component, accounting for ~13% of the total variation, shows high positive loadings for Co, Fe and Cu, and high negative loadings for Ti, Nb, Ca, Ti, Na and Sr, and forms domains matching the mapped distribution of clastic sedimentary rocks of the Hyland Group and the carbonate rocks of the Rabbitkettle Formation, respectively. Regression analysis of selected metals against the relevant principal component(s) effectively filters these terrane-effects 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 (e.g., Sb, Ba and Cd). In order to reduce the impact this has on the WSM using this approach, certain elements were given low importance rankings or, in some cases, were omitted for certain deposit types.

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 (15 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 anomalism. 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.

Table 1: List of Mineral Occurrences for NTS map sheet 105A/95D (Yukon MINFILE, 2015)

Number	Name	Type	Status	Commodities
0950 001	TOGBALLY	Unknown	Showing	
0950 002	COULEY	Volcanogenic Sulphide - type not determined	Showing	Copper
0950 003	IRA	Unknown	Showing	
0950 004	HE	Unknown	Showing	
0950 005	MEI	Sediment-hosted Mississippi Valley Type Pb-Zn (MVT)	Deposit	Barite, Zinc, Lead, Copper
0950 006	MILLER LAKE	Metamorphic Sulphide	Showing	Lead, Zinc, Silver
0950 007	CHU	Skarn Pb-Zn	Showing	Lead, Zinc
0950 008	PLUMMER	Plummet	Showing	Copper, Silver, Barium, Lead, Arsenic
0950 011	HYLAND GOLD	Plummet	Showing	Lead, Silver, Zinc
0950 012	SOUVENIR	Unknown	Showing	Lead, Silver, Zinc
0950 013	BAILEY	Metamorphic Sulphide Ag-Pb-Zn	Showing	Lead, Silver, Zinc
0950 014	WATSON	Unknown	Showing	Lead, Silver, Zinc
0950 015	ASBURY	Unknown	Showing	Lead, Silver, Zinc
0950 017	SPOROK	Unknown	Showing	Lead, Silver, Zinc
0950 018	LUDGER	Unknown	Showing	Lead, Silver, Zinc
0950 019	BERNARD	Unknown	Showing	Lead, Silver, Zinc
0950 020	LODGE	Unknown	Showing	Lead, Silver, Zinc
0950 021	KOONING	Metamorphic Sulphide - type not determined	Showing	Barite, Zinc, Lead
0950 022	HERPES	Skarn W	Showing	Tungsten
0950 023	COY	Unknown	Showing	Copper
0950 028	SHALFETWO	Coal	Showing	Coal
0950 029	PLAY	Sediment-hosted Mississippi Valley Type Pb-Zn (MVT)	Showing	Barium, Lead, Zinc, Silver
0950 030	CH	Sediment-hosted Sedimentary Lubatite Zn-Pb-Ag (Skarn)	Showing	Zinc, Lead
0950 031	CUZ	Unknown	Showing	Antimony, Arsenic, Bismuth, Gold
0950 032	CUZ	Unknown	Showing	Lead, Silver
0950 033	CUZ	Unknown	Showing	Lead, Silver
0950 034	LENDNORTH	Sediment-hosted Mississippi Valley Type Pb-Zn (MVT)	Showing	Lead, Silver, Zinc
0950 035	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 036	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 037	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 038	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 039	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 040	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 041	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 042	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 043	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 044	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 045	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 046	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 047	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 048	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 049	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 050	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 051	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 052	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 053	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 054	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 055	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 056	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 057	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 058	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 059	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 060	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 061	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 062	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 063	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 064	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 065	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 066	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 067	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 068	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 069	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 070	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 071	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 072	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 073	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 074	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 075	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 076	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 077	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 078	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 079	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 080	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 081	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 082	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 083	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 084	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 085	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 086	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 087	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 088	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 089	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 090	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 091	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 092	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
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0950 098	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 099	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 100	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 101	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 102	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 103	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 104	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 105	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 106	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 107	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 108	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 109	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
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0950 111	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 112	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 113	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
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0950 123	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 124	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
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0950 147	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 148	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 149	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 150	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 151	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 152	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 153	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 154	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 155	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 156	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 157	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 158	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 159	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 160	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 161	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 162	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 163	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 164	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 165	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 166	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 167	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 168	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 169	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 170	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 171	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 172	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 173	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
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0950 175	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 176	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
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0950 181	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 182	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
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0950 190	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
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0950 192	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 193	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 194	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 195	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 196	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 197	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 198	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 199	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc
0950 200	LENDNORTH	Unknown	Showing	Lead, Silver, Zinc

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

Target Deposit Type	Other Deposit Types	Mn	Fe	Co	Ni	Cu	Mo	Zn	Pb	Ag	Au	As	Ba	Cd	Sn	Se	Tb	Hg	Ti	Bi	W
Polymetallic Ag-Pb-Zn	SEDEX, VMS (Zn-rich), MVT, Pb-Zn skarn							2	4	2	1			1	1						2
VMS (Zn-rich)	SEDEX, Pb-Zn skarn, MVT, VMS (Cu-rich), Polymetallic Ag-Pb-Zn					2		4	3	1				1	1						1
VMS (Cu-rich)	Cu skarn		2			3		1	1												1
Porphyry Mo	Porphyry Cu					2	4	1	1					2	1						1