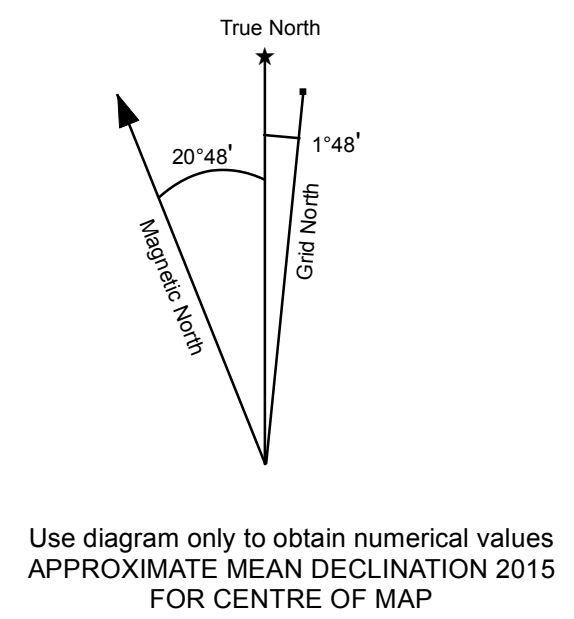
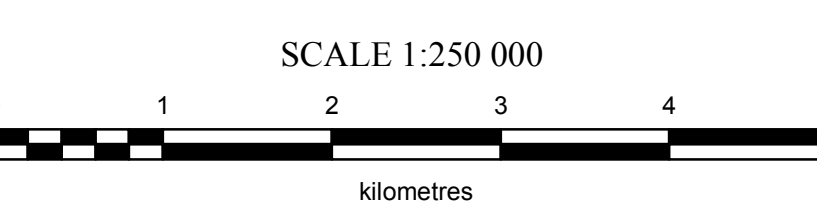


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North American Datum 1983  
Zone 7  
CONTOUR INTERVAL 100 FEET  
Elevations in metres above Mean Sea Level

**Mississippi valley-type Pb-Zn-Ag  
Weighted sums model  
(Geology Levelled)  
Sheet 4 of 16**



|              |               |              |
|--------------|---------------|--------------|
| 116F         | 116G          | 116H         |
| PART OF 116G | OGLIVE RIVER  | HART RIVER   |
| 116C         | 116B          | 116A         |
| THIS MAP     | THIS MAP      | LARSEN CREEK |
| 115N         | 115O          | 115P         |
| PART OF 115O | STEWART RIVER | MCQUESTEN    |

**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 Dawson area (NTS 116B and part of 116C) were collected as part of a reconnaissance scale in 1976 as part of the Federal Uranium Reconnaissance Program (Geological Survey of Canada, 1977). Field descriptions and initial geochemical data for 1129 sites were originally released in Geological Survey of Canada (GSC) Open File 520. Archived sample material was re-analyzed in two subsequent projects and the results were released in GSC Open File 2365 and Yukon Geological Survey Open File 2012-6 (Friske et al., 1991; Jackman, 2012). The reader is referred to these reports for detailed descriptions of sampling techniques, analytical procedures and quality control measures.

**MINERAL OCCURRENCES**

Various types of base and precious-metal mineralization have been identified in the Dawson area as listed in Table 1 (Yukon MINFILE, 2015). The most significant deposits are classed as intrusion-related Au (Brewery Creek deposit), Au skarn (Mam deposit), Mississippi valley-type Pb-Zn-Ag (Og and Wizard prospects), iron oxide copper-gold (Lala and Wizard prospects) and polymetallic Ag-Pb-Zn-Cu (Spotted Fawn, Blackstone, Silvercity and Inset prospects). Other deposit types within the area include sediment-hosted Ni-Zn-Mo (Graps and Taiga prospects), Pb-Zn volcanogenic massive sulphide (Fresno and Top of the world prospects) and quartz-vein Au (Vigrin and Ben Levy prospects). Numerous quartz-vein Au prospects occur in the adjacent NTS map area to the south, including the Lone Star deposit, supporting the prospectivity of the region for this type of deposit.

**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 of 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.

Exploratory data analysis using both raw element data and principal components indicates that lithological variation exhibits a significant control on the distribution of many commodity and pathfinder elements. Importantly, for this area, much of the variability in the data can also be linked to mineralization. The first principal component accounts for ~27% of the total geochemical variation and shows high positive loadings for Al, Ce, Li, Co, La, Th, Ti, Cr, Sc and Fe; and high negative loadings for Cd, Zn, Mo, Se, Ag, Ti and Ba. Respectively, these groupings correspond to the mapped distribution of Hyland group sedimentary, Dempster formation volcanic rocks and Road River group sedimentary rocks. Mafic volcanic rocks of the Dempster formation are also represented in the second component which has high negative loadings in V, Ni, and Cr. The second component, with high positive loadings in Bi and Pb, shows a spatial match with several Pb-Zn-Ag occurrences and thus is interpreted to represent a mineralization signal. The third component has high positive loadings in Cu, Se, Mo, Ni and Ag; and high negative loadings in Mg and Ca. These groupings correspond to areas mapped as slate and dolomite, respectively.

Regression analysis of selected metals against the relevant principal components effectively filters the interpreted lithological control and consequently enhances responses related to known mineral occurrences. Leveling by mapped geology is less effective at filtering the lithological control for certain elements (e.g., Ag, Zn and Co). In order to reduce the impact this has on the WSM, certain elements were given low importance rankings for certain deposit types. Negative weightings are used to help distinguish between 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 (16 km<sup>2</sup>). 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.

**Table 2: Importance rankings for weighted sums models using data levelled by mapped geology.**

| Target Deposit Type*  | Other Deposit Types*                                     | Mn | Fe | Co | Ni | Cu | Mo | Zn | Pb | Ag | Au | As | Ba | Cd | Sn | Sb | Te | Hg | Tl | Bi | W <sup>1</sup> |    |
|-----------------------|--|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------------|----|
| Polymetallic Ag-Pb-Zn | VMS, SEDEX, Pb-Zn skarn, MVF                             |    |    |    |    |    |    |    | 1  | 4  | 2  | 1  |    |    |    |    |    |    |    |    |                |    |
| MVT Pb-Zn-Ag          | SEDEX, VMS, Pb-Zn skarn, Polymetallic Ag-Pb-Zn           |    |    |    |    |    |    | 2  | 5  | 2  |    |    |    |    |    |    |    |    |    |    |                | -2 |
| IOCG                  | Porphyry Cu, VMS (Cu-rich)                               |    | 2  |    | 4  |    | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |                | 2  |
| Porphyry Cu-Mo        | Cu skarn, Porphyry Mo, VMS (Cu-rich)                     |    |    |    |    | 4  | 2  |    |    |    | 1  | 2  |    |    |    |    |    |    |    |    |                | 1  |
| Au Skarn              | Intrusion-related and orogenic Au, Polymetallic Ag-Pb-Zn |    |    |    |    |    |    |    |    |    | 3  |    |    |    |    |    |    |    |    |    |                | 1  |
| Intrusion-related Au  | Epithermal Au-Ag   |    |    |    | 3  |    | 1  | 3  |    |    |    |    |    |    |    |    |    |    |    |    |                | 1  |
| Shale-hosted Ni-Zn    | SEDEX  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |                | -2 |

\*Polymetallic Ag-Pb-Zn type includes vein and manto styles; SEDEX = sedimentary exhalative; VMS = volcanic-hosted/associated massive sulphide; MVF = Mississippi valley type; IOCG = iron oxide copper gold  
<sup>1</sup>For heavily censored elements and those not strongly controlled by geology as interpreted from principal component analysis, raw data are used following a log<sub>10</sub> transformation.

**RECOMMENDED CITATION**

MACKIE, R., ARNE, D. AND PENNIMPEDE, C., 2016. Weighted sums model for Mississippi valley-type Pb-Zn-Ag deposits levelled by geology. In: Enhanced interpretation of stream sediment geochemical data for NTS map sheet 116B & 116C. Yukon Geological Survey, Open File 2016-32, scale 1:250 000, sheet 4 of 16.

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>.

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**Table 1: List of Mineral Occurrences for NTS map sheet 116B & 116C (Yukon MINFILE, 2015)**

| Number   | Name    | Type           | Status           | Commodities                         |
|----------|---------|----------------|------------------|-------------------------------------|
| 116B 001 | BERNARD | Unknown        | Unknown          | Maydenium                           |
| 116B 002 | GERMANE | Porphyry Sn    | Drilled Prospect | Copper                              |
| 116B 003 | COLLETT | Coal           | Past Producer    | Coal                                |
| 116B 004 | WAGY    | Vein Au-Quartz | Past Producer    | Copper, Silver, Mercury, Gold, Lead |
| 116B 005 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 006 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 007 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 008 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 009 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 010 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 011 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 012 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 013 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 014 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 015 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 016 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 017 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 018 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 019 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 020 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 021 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 022 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 023 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 024 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 025 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 026 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 027 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 028 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 029 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 030 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 031 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 032 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 033 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 034 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 035 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 036 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 037 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 038 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 039 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 040 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 041 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 042 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 043 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 044 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 045 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 046 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 047 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 048 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 049 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 050 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 051 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 052 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 053 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 054 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 055 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 056 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 057 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 058 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 059 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 060 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 061 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 062 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 063 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 064 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 065 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 066 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 067 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 068 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 069 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 070 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 071 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 072 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 073 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 074 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 075 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 076 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 077 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 078 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 079 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 080 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 081 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 082 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 083 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 084 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 085 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 086 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 087 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 088 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 089 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 090 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 091 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 092 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 093 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
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| 116B 095 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 096 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 097 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 098 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 099 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |
| 116B 100 | WAGY    | Vein Au-Quartz | Drilled Prospect | Copper, Silver, Zinc                |

**Weighted sums model for Mississippi valley-type Pb-Zn-Ag deposits levelled by mapped geology (NTS 116B & 116C) Sheet 4 of 16**

Yukon Geological Survey  
Energy, Mines and Resources  
Government of Yukon  
Open File 2016-32  
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