Mineral Resource Assessment Process

1. INTRODUCTION

In the Yukon Protected Areas Strategy, the Yukon Government committed to avoid areas of high mineral potential and development activity where options exist; carry out Mineral Resource Assessment at a reasonable level of detail, and within a prudent time frame; and to carry out Mineral Resource Assessments at regional (YPAS step 1) and detailed (YPAS steps 3 and 5) scales.

2. REGIONAL MINERAL POTENTIAL MAPS

Yukon Government Mineral Resources Branch carries out Mineral Resource Assessment at two scales: regional and detailed (or site-specific).

Regional mineral resource assessments are carried out in support of YPAS step 1 (identifying areas of interest). The **methodology** used by YTG to produce regional mineral potential maps was developed by the U.S. Geological Survey (Drew and others, 1986), and refined by BCGS (Kilby, 1995) to best fit the geology and mineral deposit types of the Canadian Cordillera. The original USGS and improved BCGS methods were used extensively for land use planning in Alaska and British Columbia, which have similar geological environment as Yukon.

The production of regional mineral potential maps involves the following **5 steps**: digital compilation of all existing public data in GIS format (4 months); sub-division of the area into large tracts of approximately equal areas (2 weeks); mineral assessment workshop (3 to 6 days); computer statistical simulation (1 month); digital and hard-copy map and report production (1 month).

The **mineral assessment workshop** consists of a three- to six-day estimation workshop. Three to five reputable members of the mineral exploration industry, government, or academia, considered to have the greatest experience in the area under consideration are invited to attend the workshop. The panelists examine all maps and data, one tract at a time. For each tract, panelists record their estimations of potential for undiscovered metallic mineral deposits, and evaluations of their peer estimators' experience, and of their confidence in the existing data. To reduce personal biases, no comparisons are made with other tracts. Regional geochemical surveys (RGS), and mineral occurrences database (MINFILE) are the most critical data for regional assessments. Consequently, the evaluation of tracts lacking RGS data results in their ranking in a low mineral potential category strictly due to lack of data.

The data recorded by the panelists is entered into a Monte Carlo statistical simulator that was customized by the U.S. Geological Survey for mineral deposit simulations. The **statistical simulator** compares the evaluations recorded by the expert panelists against world-wide grade and tonnage curves of existing mineral deposits located in similar geological environments to those of the Yukon. The final product of the simulation is a **relative rank** for the tracts, from highest to lowest potential.

Figure 1 shows completed and outstanding regional mineral potential maps of the Yukon.

The **basic requirements** to produce regional mineral potential maps are: an appropriate time-frame (minimum 6 winter months); ability to convene a three- to six-day panel with the most experience members of industry, government, or academia (approximate cost: $16,000 to $30,000); appropriate GIS capability for the data compilation and map production.

3. SITE-SPECIFIC MINERAL POTENTIAL MAPS

Site-specific, or detailed mineral resource assessments are carried out in support of YPAS Step 3 (identifying study areas) and Step 5 (identifying final boundaries). The **methodology** employed by YTG follows that developed by the Geological Survey of Canada (MERA Process) for the creation of National Parks. This methodology is also used in the Northwest Territories, where, similarly to Yukon, there are vast areas of poorly defined geology, and wide ranges of mineral deposit types.

The following **5 steps** are involved in the production of a site-specific mineral potential map: initial digital compilation of all exploration and geological data, including confidential data and identification of data gaps (2 months); data collection to fill major gaps (1 to 2 field seasons, if necessary); final compilation and sub-division of the area into small tracts of similar geology (2 months); assessment workshop (1 to 2 days); digital and hard-copy annotated map production (1 month).

The **mineral assessment workshop** is similar to that held for regional mineral assessments. However, at the end of the workshop, the expert estimators **rank the tracts by consensus**. No statistical simulation is performed.

The **minimal requirements** to perform site-specific mineral resource assessments are: an appropriate time-frame (May through November, if RGS data exists; up to 20 months if RGS data is lacking); reasonably accurate 1:250,000 scale geological mapping (Figure 3 shows the various ages of regional geological maps); RGS coverage (Figure 4 shows areas covered by RGS survey, and areas where RGS is not effective); ability to perform field work to fill in data gaps. Other, **desireable data** include: airborne geophysical surveys (Figure 5 shows areas covered by airborne geophysics); 1:50,000 scale geological mapping of critical areas; till geochemical surveys for areas covered by thick glacial veneer (shown in Figure 4).

The **costs** of producing site-specific mineral potential maps includes: $8,000-10,000 for a one to two day assessment panel; up to $150,000 per camp for a full season of field work; up to $750,000 per 1:250,000 scale map sheet for collection and analysis of RGS samples.

3. SUMMARY

YTG Mineral Resources Branch makes use of scientifically rigorous methodology for the production of regional and site-specific mineral potential maps. This methodology is considered to be the most effective and reproducible for frontier lands, where regional geology is poorly constrained, and mineral potential is widespread. It is the methodology of choice of B.C., Alaska, NWT, and of our Federal Government. The method has buy-in from the mineral industry, as their best expertise participates in the assessment workshops.

Mineral Resource Assessments are an important step in the Yukon Protected Areas Strategy, as they promote consensus between resource development and conservation interests. Resource Assessments are also necessary to perform Multiple Accounts and Socio-Economic analyses.

References

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