COMPILATION AND ANALYSIS OF REGIONAL GEOCHEMICAL SURVEYS AROUND THE BOWSER BASIN

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INTRODUCTION

More than two-thirds of British Columbia has now been sampled as part of the jointly funded federal-provincial stream sediment survey program (Figure 1).

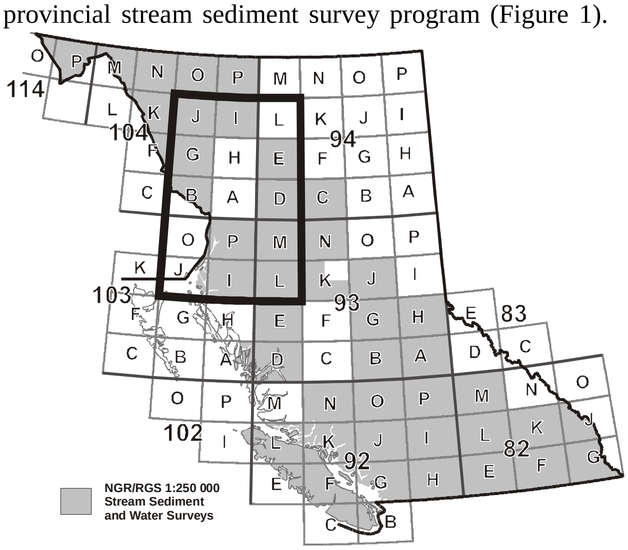

Figure 1. Location of project area.

The database is sufficiently large to begin the assembly of individual mapsheets into seamless provincial-scale maps of survey results for publication in an "atlas" volume. This amalgamation of survey data acquired in different years presents significant challenges due to different sampling intervals, different analytical equipment and techniques, and different detection limits applied since the first regional geochemical survey was completed in 1976.

The Rocks To Riches program (http://www.bc-mining-house.com) has funded a project designed to identify and solve these problems. A large 'test area' with exceptionally high mineral potential was selected for this development work. Ten 1:250,000 mapsheets surrounding the Bowser sedimentary basin in northwestern British Columbia cover a series of island arc complexes hosting an array of important mineral deposit types including epithermal veins, porphyry copper-gold deposits and volcanogenic massive sulphide deposits.

The British Columbia RGS database contains field information and analytical data for up to 50 elements from 48,000 sample sites covering 47 out of the 69 1:250,000 mapsheets that cover the entire province. Planning is now underway for preparation of a full geochemical atlas for British Columbia similar to existing volumes (Webb *et al.*, 1978). These assembled maps will display regional element concentrations reflecting major geological units (strata and plutons) as well as comparing and contrasting the geochemical signatures of different tectonic terranes. Large mineral deposits as well as small mineral prospects with large geochemical footprints, such as showings located near ridge crests, can still be delineated at these smaller map scales. Geochemical anomalies generated by large alteration haloes can also be discerned. Entire mining camps, mineral districts and metallogenic belts can be recognized and delineated due to geochemical anomalies generated by their favourable lithologies.

Development work includes:

- Software preparation, base map acquisition and data compilation for the RGS data from 10 NTS mapsheets.
- "Leveling" of analytical suites of elements between mapsheets to correct for differences in analytical procedures.
- Develop and test discriminant functions for detection of geochemical signatures of particular mineral deposit types.
- Produce final map files incorporating contoured analytical data, various base map layers and reference grids.

RESULTS AND DISCUSSION

There are a total of 11,478 individual stream sediment sample sites located in the 10 survey areas. The area covered is 136,500 km^2 and the average sample density is 1 sample site every 12 km^2. Sampling density is not consistent throughout the study area; increased funding provided a higher sample density for sheets 103I/J and O/P (1 site per 10 km^2).

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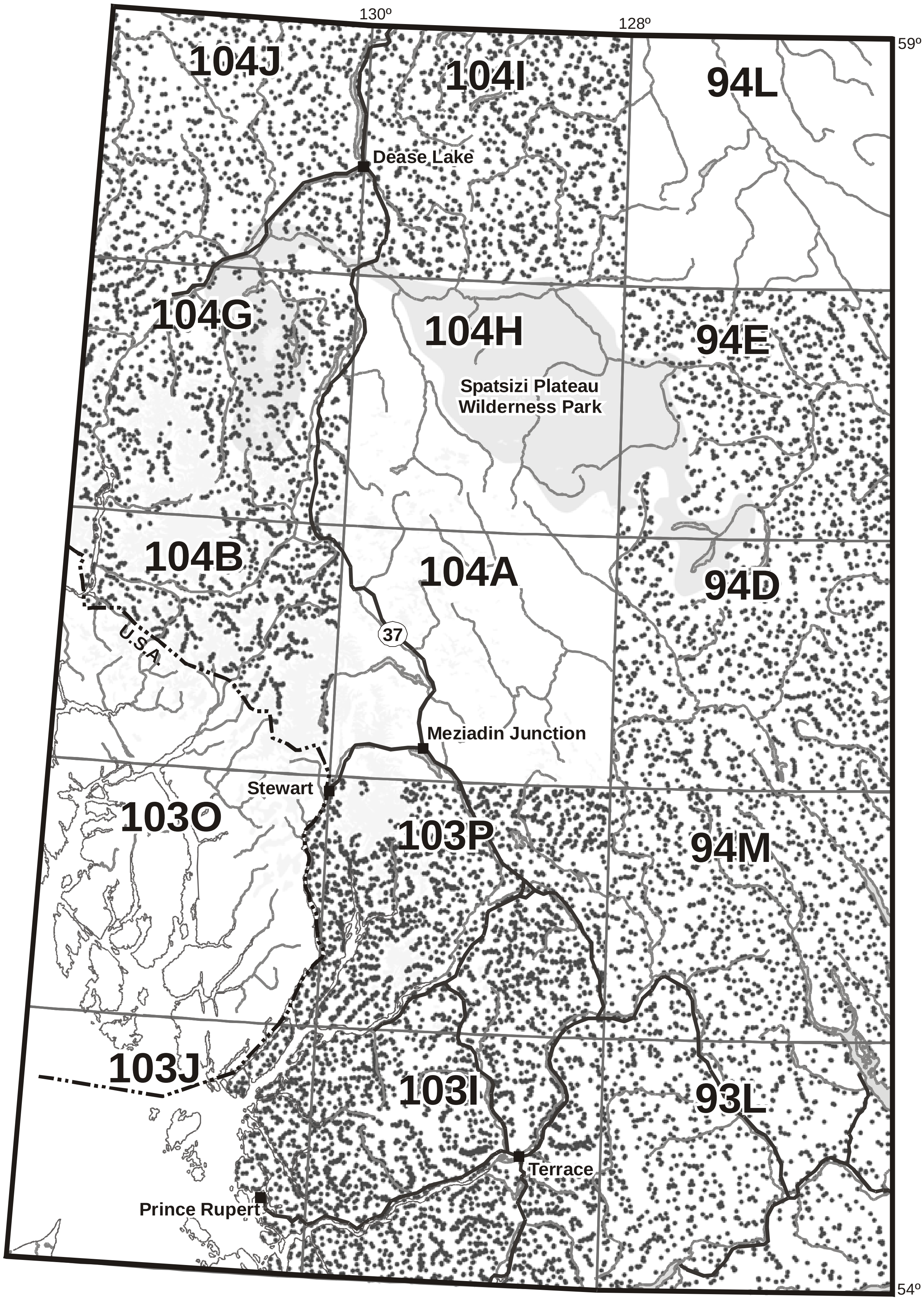

Figure 2. Distribution of 11,478 sample sites contoured in this study.

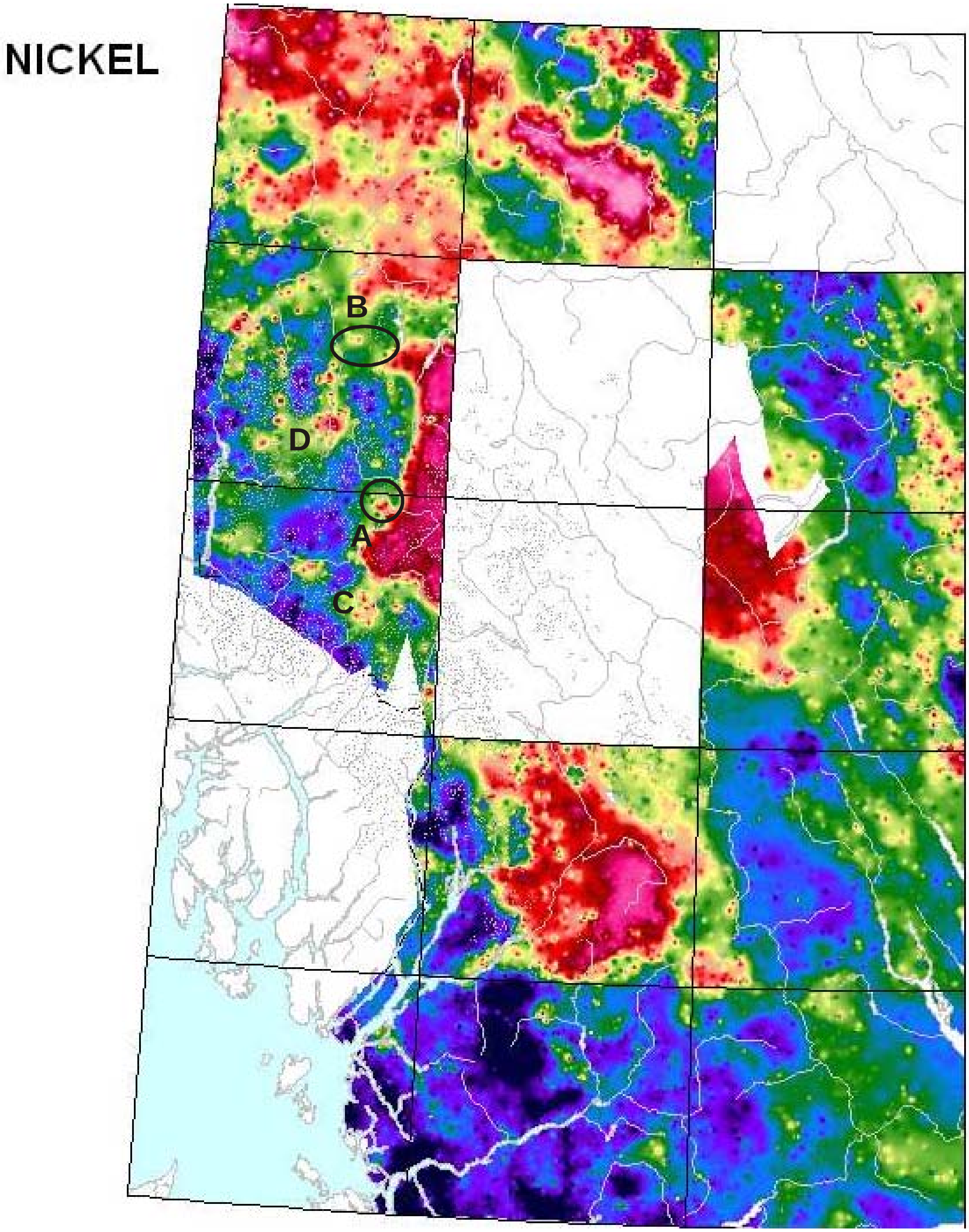

Figure 3. Nickel in RGS samples.

In contrast, mapsheets 104B, 104G and 104J tend to have a lower sample density (1 site per 14 km^2) due to factors that limited sample availability (i.e. ice, or low-lying heavily overgrown terrain).

A single composite mapsheet has been contoured in grayscale (Figure 3) to illustrate some of the capabilities and applications of contouring the 'leveled' RGS dataset at these small scales. The RGS dataset for nickel in northwestern BC shows large-scale and small-scale features, all of which have implications for mineral potential and mineral exploration.

A strong, regional-scale nickel anomaly is associated with the fine clastic carbonaceous sedimentary rocks of the Bowser Basin of north-central British Columbia. The elevated nickel concentrations in these rocks is similar to other regions of the world where nickel accumulates in fine-grained, reduced clastic rocks (Lefebure and Coveney, 1995).

The distribution of strongly anomalous nickel signatures sheds new light on existing regional-scale geology maps. In the northeast corner of NTS 104B an area of anomalous nickel values (Area A on Figure 3) indicates terrain likely underlain in part by an outlier of strata of the Bowser Lake Group. The most recent geology map (Logan *et al.*, 1997) published for this area identifies sedimentary units as part of the underlying Hazelton and Stuhini Groups. In contrast, sedimentary strata exposed along the deeply eroded Raspberry Pass (Area B of Figure 3) that cuts through the Mount Edziza Volcanic Complex has historically been correlated with Bowser Lake Group rocks (Souther, 1972). The lack of a similar anomalous nickel signature in this area suggests that these sedimentary units may be exposures of older Triassic strata that have been identified elsewhere underlying the Late Miocene to Recent Edziza volcanics.

On the eastern side of the composite map area, strata of the Bowser Lake Groups and Sustut groups both display high nickel concentrations and the two stratigraphic packages are indistinguishable using nickel RGS data. The eastern perimeter of the Sustut Basin is as sharply defined against older arc rocks as the perimeter of the Bowser Basin on the west side of the map area.

E & L Nickel (MINFILE 104B 006) is the largest nickel deposit in northern British Columbia. A series of moderate RGS nickel anomalies are scattered over the area (Area C on Figure 3) surrounding the string of small gabbroic stocks which host E & L Nickel (Alldrick and Britton, 1992; Britton et al., 1989). In contrast, in the centre of the next NTS mapsheet to the north (104G), the Hickman Ultramafic Complex generates a much broader and stronger RGS nickel anomaly (Area D on Figure 3) even though there is no documented nickel mineralization (Nixon *et al.*, 1989).

Readers can also compare and contrast the effectiveness of the processing and presentation of RGS data using computer contouring or drainage basin plots by comparing Figure 3 with illustrations in Lett and Jackaman (this volume).

CONCLUSIONS

Compilation and contouring of regional stream sediment survey data provides new perspectives on the extent of regionally distributed lithologic units and reveals areas of interest for mineral exploration.

ACKNOWLEDGEMENTS

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