Geoscience BC Project: 2014-005

Historical Exploration Data Capture Pilot Project, Northwestern British Columbia (NTS 093L)

Project Summary Report

C.E. Kilby P.Geo.

Cal Data Ltd.
Consulting Geologists

18 February 2015

Table of Contents

Summary

A program to convert mineral exploration Assessment Report data of various types from their original analogue form to more useful digital form was undertaken as a pilot project with a fixed budget. The purpose was to undertake this work in order to see what could be accomplished within this budget (time) and what challenges would arise. At the end of the project 81 figures (maps, cross-sections and profiles) had been converted to geopositioned raster images and 2,292 geochemistry analyses from various samples types (soil, stream sediment/silt, rock, and drillhole core) had been captured along with their locations. Numerous challenges were encountered along the way, including high errors encountered during geopositioning of maps and a minimal amount of geochemistry in digital form submitted from property owners. This report documents the work performed and makes recommendations based on the experience gained during the project.

Introduction

This pilot project was undertaken as a first attempt at systematically converting mineral exploration Assessment Report information from analog reports to digital data. NTS map sheet 093L was chosen by Geoscience BC, and several clusters of MINFILE sites were randomly chosen within this map sheet to identify Assessment Reports to review and undertake this work. Ideas from the original project proposal, subsequent concepts and initial progress of the project were the subject of the paper included in Geoscience BC Summary of Activities 2014 (Kilby and Fournier, 2015).

The Assessment Reports from ARIS (the British Columbia Government's Assessment Report Indexing System), in PDF form, were evaluated for their content. The desire was to obtain new primary data which would have formed the basis for submitting the report. Information of interest would be point data with new geochemistry taken from a soil grid, stream silt samples, rock samples, and drillhole cores/chips or trench samples. Geophysical results in the form of maps, sections, and detailed geology maps with significant new information were also of interest. These reports were reviewed with an interest in what material of interest they contained and subsequently, what was the nature of the locational information for this data.

For some Assessment Reports (AR), information was not captured because the maps which contained their locational information could not be geopositioned within an acceptable level of accuracy. The majority of Assessment Reports did have maps which could be geopositioned, or in the case of more recent reports, the locational data could be taken from tables within the report.

Once locations for a sample site (along a grid, creek, road, etc.) was collected, the geochemistry for that site was also converted to digital form. Unfortunately, the optimistic approach in the project proposal, whereby enthusiastic altruistic property owners would share their digital files with the project, did not materialise. Only one property owner contacted under this project elected to share digital files with us.

Ultimately, the majority of the geochemistry was captured using Optical Character Recognition (OCR) software or, particularly for the older reports, was collected manually. Obviously, this had a significant impact on the amount of data which could be collected during this project.

Work Completed

Mineral Assessment Reports, which are required to be filed for work on properties with mineral tenure in BC, as well as the documents in Property File and Prospector's Reports, were initially considered potential sources for this analogue to digital work. However, once the review of reports began, the limited time period of this project forced a decision to focus only on the Assessment Reports of an area. In addition, Assessment Reports by their nature are required to include new work performed on a property, so that by focusing on these reports we minimised the possibility of duplicating our work.

ARIS No.	AR Date	Status	Comment
3064	Jan-72	Not done	No coordinates, no analyses
3096	Jan-72	Not done	No coordinates, no analyses
13096	Nov-84	Not done	Geochemistry not legible
14029	Oct-85	Not done	No geochemistry for DDHs
19458	Nov-89	Complete	
21663	Sep-91	Complete	
22181	Mar-92	Not done	Errors too large to geoposition
23034	Sep-93	Complete	
23048	Jul-93	Not done	Errors too large to geoposition
23769	Feb-95	Complete	
24359	Apr-96	Complete	
24887	Mar-97	Incomplete	Some geochemistry remains to be captured
25507	May-98	Complete	
25909	May-99	Complete	
29792	Mar-08	Complete	
33461	Nov-12	Complete	
33707	Feb-13	Complete	

Table 1. Assessment Reports reviewed for this project.

For this project 17 Assessment Reports were reviewed. Table 1 lists these reports along with comments for those which were ultimately excluded from capture. After significant trial the maps for two reports could not be geopositioned with <100 m error with confidence. These Assessment Reports are spread over forty years and allow some assessment of the difficulty of this work for reports written at various periods in the past.

In the initial stages of the project the process of geopositioning a report map containing sample sites *drove* the project. Once a map could be geopositioned within a reasonable error, then the quest began to reach out to property owners (present and past) to obtain the geochemistry in some useful digital form. When it became apparent that there was not going to be an avalanche of digital geochemistry, we began testing the use of OCR software on geochemistry certificates from the various reports. Older laboratory certificates were rarely amenable to this software. Ultimately, a combination of OCR work and manual capture was used to complete the geochemistry conversion to digital form. We did receive some digital geochemistry from the owner of the property for AR 33707.

An example of lost opportunity (time) was the dilemma which developed where significant time was expended on a soil sample grid found in AR 24887 which contained 2,355 samples. This grid was geopositioned and all sample sites were digitized. However, as no reply had been received from past (or present) owners, no digital geochemistry was available. The geochemistry for these samples were included on 50 laboratory certificates which were not amenable to the OCR program we were using. Four laboratory certificates were completed manually and the data capture for this report remains incomplete.

Inevitably, we found the more recent reports, using more current software, were most amenable to conversion as sample site location coordinates were often provided in tables. These tables of coordinates, along with the tables of geochemistry analyses were OCR amenable. This focussed the work more towards building spreadsheets and away from geopositioning of maps and manual data entry.

Total data capture in this project included 81 geopositioned raster images of geology and geophysical maps, sections and profiles; and 2,292 sample locations with geochemistry for rock, soil and silt samples, from a variety of sample collection procedures and including 100 drillholes. Tables 2a and 2b detail the distribution of the data collected by Assessment Report and the breakdown of sample types captured for each report. Only sample locations with geochemistry provided in the reports were digitized.

All items captured were given a level of locational accuracy (Table 3). In a comment field for each data item, information from the AR was provided for all samples which included basic details of that data-type's field collection, brief information on the geochemistry performed and PDF pages in the Assessment Report where the user could find further information about the samples.

ARIS	Shape files	Excel & CSV	Raster Images	Total Rasters	Samples with Geochemistry			
					Rocks	Soils	Silts	Total
19458	3 - Sample Sites only; Sample Sites w Geochem; Sample Sites w Geochem HM	3 and 3	1 - P22 Sample Location Map	1	23; 23 HM	0	14; 14 HM	**74**
21663	2 - Sample Sites; Sample sites w geochem	2 and 2	9 - Sample Location map; 8 VLF-EM profiles	9	24 (2 HM)	108 (8 HM)	68 (5 HM)	**200**
23034	2 - Sample Sites; Sample sites w geochem	2 and 2	8 - 2 Sample Location maps; 6 VLF-EM profiles	8	30	162	6	**198**
23769	2 - Sample Sites; Sample sites w geochem	2 and 2	6 - Sample Location map; 5 VLF-EM profiles	6	38	22	0	**60**
24359	2 - Sample Sites; Sample sites w geochem	2 and 2	none	0	25	0	0	**25**
24887	2 - Sample Sites; Sample sites w geochem	2 and 2	2 Maps	2	0	2355 (192 w geochem)	0	**192**
25507	2 - Sample Sites; Sample sites w geochem	2 and 2	1 Map	1	0	223	0	**223**
25909	2 - Sample Sites; Sample sites w geochem	2 and 2	3 Maps	3	9 (1 dup)	26 (2 dups)	0	**35**
29792	2 - Sample Sites; Sample sites w geochem	2 and 2	1 Map	1	38	224	0	**262**
33461	2 - Sample Sites; Sample sites w geochem	2 and 2	none	0	9	5	16	**30**
33707	3: 1 - DH collars; 2 - Rock Chips; Rock Chips w geochem.	3 and 3	50: 2 - Geophysics maps; 4 - Geology maps; 8 - IP profiles; 36 - IP cross-sections	50	65 (rock chips)	0	0	**65**
			Totals	**81**				**1364**

Table 2a. Historic Data Capture Pilot Project data statistics for images and non-drillhole samples.

Drillholes			
Diamond DHs	RevCirc holes	Geochem samples	Total DHs
4	96	928	**100**

Table 2b. Historic Data Capture Pilot Project data statistics for drillhole samples, all from AR 33707.

Challenges Encountered

Several major challenges were encountered during the course of this work. These were: 1) capturing historical geochemistry; 2) geopositioning historical maps; and to a slightly lesser extent 3) errors contained within reports.

1) Capturing historical geochemistry

The primary purpose of this entire project could be ascribed to the desire for more readily available geochemistry analyses. As mentioned earlier, requests for any digital files from property owners for reports were largely ignored. From the few comments which were received this would seem to likely be related to the nature of mineral exploration itself.

A significant amount of work is performed on properties by consultants and consulting companies, or under option agreements (or both). In these situations the actual owner of a property often only receives the final report, and often does not ask for or obtain the data itself. Then, after even only a few years the project may be dropped and subsequently picked up by a new party, and the earlier data may or may not be retrieved. If a consultant must be approached for the data, it will likely incur a cost. That could preclude its use. And finally, in the last twenty years information technology has changed so many times that much data, even in digital form, may be archived on old floppy disks or on storage medium inaccessible with current operating systems. Even tech savvy property owners may find that data more than ten years old may pose a significant amount of work (time & cost) which must be balanced against the potential usefulness of the data itself.

This project represents a only small sample number of Assessment Reports which prevents meaningful statistical analysis of the possible future participation of owners. It is possible that alternative approaches may result in better participation by mineral tenure owners who have submitted Assessment Reports. Some ideas are discussed under Recommendations.

2) Geopositioning historical maps

Once the decision had been made to capture the data from an Assessment Report, all reasonable measures were taken to geoposition the maps of interest from that report with minimal error. The presence of coordinates in either UTM, X_coord & Y_coord, or latitude/longitude were viewed along with a number of other data layers which were all used to assess the accuracy of a map. Often the Datum used was not indicated anywhere in the report and those options had to be assessed.

Considering the historical context of these maps it was not uncommon, pre-hand held GPS units, for only claim posts and boreholes to have surveyed coordinates. Often sample locations from mapping or along a grid might be tied by chain to a surveyed claim post, and locations for field samples drawn onto field maps using the chaining distances to locate sites. These could be reasonably accurate, especially when the chained area was tied off by returning to the origin. Along with air photos and topographical maps, the sample grid or other chained sample sites could be placed quite accurately. With this in mind we sought out and were able to obtain copies of the historical tenure maps for NTS 093L, which are not generally available to the public. In some instances it was possible that all data was tied to mineral tenure corner post data.

Ultimately, despite a significant amount of information from different layers, it was not possible to geoposition some maps where the estimate of error was < 100 m. From Table 3 it can be seen that 100 m was the largest error that could be considered for this work. The use of this table was discussed in the Geoscience BC Paper (Kilby and Fournier, 2015). This did occur several times. Maps were encountered with no locational data whatsoever, except a north arrow, as well as maps with coordinates which were obviously placed in error.

Locational confidence category	Estimate of possible error	Data type
A	0–5 m	borehole collars, geopositioning of maps, grids
B	5–10 m	borehole collars, geopositioning of maps, grids
C	10–50 m	borehole collars (?), geopositioning of maps, grids
D	50–100 m	geopositioning of maps, grids

Table 3. Locational confidence categories for historical exploration data capture pilot project (Kilby and Fournier, 2015)

3) Errors contained within reports

The purpose of Assessment Reports are to present the information acquired from work performed on a property and to therefore obtain credit for that work. The reports are not necessarily meant to be used as a full disclosure of all the work performed in a season which is outside the work for credit. The reports often cover only specific portions of the work performed on the ground. With this in mind it is not surprising that many reports contain errors of omission or discrepancies between sample names and sample analyses submitted, and many other minor errors. Sometimes these errors are much larger, such as missing laboratory certificates, the wrong lab certificates, and so forth. These omissions and errors of various sizes were commonly found in these reports and usually result in lost time while they are assessed. There is no guessing, the information is dropped when there is any doubt about the results of analyses, sample names which are not obvious errors, and so forth.

Analysis of Data Collection

This pilot project has begun data capture of some small portion of a vast amount of data locked in ARIS reports, and in other filed reports. However, the most useful thing about this project may be learning what went well and what did not work well. To assist in this analysis Table 4 provides a general breakdown of total hours worked into five broad categories. Short, more specific, descriptions of the first three work types are provided. The recommendations which follow may help future endeavours in this area.

Work Description	Hours
1. Geopositoning & location capture / all GIS work	182.65
1a. Database work (also could be considered GIS work)	68.50
2. Geochemistry - capture into tables / including all OCR work	81.28
3. Review Assessment Reports	28.37
4. Work on Geoscience BC paper + Poster for Roundup	82.45
5. Project management, planning, discussion of GIS issues, all communications	72.30
Total Hours	515.55

Table 4. The general allocation of total hours broken into five broad areas.

1. *Geopositioning*: the largest share of hours were concentrated on this work. This was because we undertook predominantly older reports (> 10 years) and often poor and confusing maps had to be geopositioned (repositioning iterations to test the error).

Sample sites listed in the text had to be found & digitized (and had to match the named samples on the laboratory geochemical sheets). The database work included bringing all the various types of data together including the geochemistry spreadsheet once completed.

2. *Geochemistry:* we received a portion of geochemistry from one assessment report in digital form, the remainder of all geochemistry for that one AR, and a few other recent reports was captured table by table with OCR software. Data was then combined in spreadsheets, page by page. Alternatively, when OCR did not work at all or worked partially, data was entered manually and then needed to be verified.

3. *Review Assessment Reports*: in this initial stage reports were studied to reveal what was new information which we would want to capture, and whether there was sufficient information to at least try to geoposition the maps with sample locations (when locations were not provided in tables).

Recommendations

In hind sight there are several measures which could be taken to dramatically improve the *amount* of historical data collected from Assessment Reports in future projects of this nature. These are explained in the recommendations below, along with some comments about potential pitfalls related to the *quality* of data collected.

1. To acquire the most data from Assessment Reports in a future program: limit the reports to those having been submitted in the last ten years. These reports will likely include locational data in tables and will be written with more recent software which will allow tables to be easily acquired using OCR software.

2. To continue from No.1, an attempt *can* be made to acquire data in digital form from the owners, and because these are more recent reports, they may more likely pertain to reports from companies and people who are currently still active, or at least remember having done the work and where the data might be. Any data already in a digital form, such as in a digital spreadsheet, is a step ahead of the work one still needs to do using OCR software. One other possible approach would be to send out a vast number of invitations (e.g. with some geographic parameter) for digital submissions from property owners and then proceed to work primarily on those reports for which one receives any useable data.

3. The decision to review multiple reports over several years for one MINFILE area was based on the idea that information from reports between years in one area would add synergy and speed the geopositioning. This did not occur as well as had been hoped. However, it may prove to be true elsewhere. In Assessment Reports submitted *after* the common use of hand held GPS this may not be relevant.

4. The older reports often provide a significant challenge to geoposition, so that GIS skills are very important to this work. However, a knowledge of general mineral exploration field techniques, particularly before the common use of hand held GPS, can not be underestimated. The *quality* of the data obtained from a report may relate strongly to field experience which is brought into use to understand the nature of any problems encountered.

References

Kilby, C.E. and Fournier, M.A. (2015): Historical exploration data capture pilot project, northwestern British Columbia (NTS 093L); *in* Geoscience BC Summary of Activities 2014, Geoscience BC, Report 2015-1, p. 79-84.