

# Logging SEDAR: A Better Access Road to New Mineral-Occurrence Records in British Columbia

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## Background

### National Instrument 43-101 Regulation

In 2007, the Canadian Securities Administrators (CSA) and its provincial member organizations (Figure 1) began to require technical reports conforming to National Instrument (NI) 43-101, the *Standards of Disclosure for Mineral Projects*. These technical, geoscientific reports must be prepared by ‘qualified professionals’ (QP) and filed by companies listed on a Canadian stock exchange, regardless of where in the world the exploration occurs. These reports include data and an interpretation of the geoscience research that contributed to any exploration results they disclose. Along with numerous other financial disclosures, they are posted to the System for Electronic Document Analysis and Retrieval (SEDAR) website (Alberta Securities Commission, 2019), which is managed by the CSA.

### Project Rationale

Even though designed to protect investors (Canadian Securities Administrators, 2011), NI 43-101 technical reports contain exploration data that may be of interest from a geoscience perspective and, in many cases, these reports contain millions of dollars of geoscience research. Mineral claim holders may have copies of all NI 43-101 reports for their claim but they may also be interested in comparing results with nearby exploration projects and even more distant projects believed to share similar deposit features. Mineral exploration by machine learning or artificial intelligence, for example, requires high-quality raw data to train its neural networks. This is the sort of data available in NI 43-101 reports.

SEDAR, unfortunately, provides no online method to spatially locate a NI 43-101 technical report. Moreover, such a feature is not considered to be a necessary addition by the CSA or its users in the finance industry, nor does SEDAR

track other information useful to geoscientists, such as work types or related mineral occurrences.

British Columbia (BC) has an extensive public geoscience database, contained in database systems managed by the BC Geological Survey (BCGS). These include MINFILE, MapPlace 2, ARIS, Property File and COALFILE (BC Geological Survey, 2019a–d; BC Ministry of Energy, Mines and Petroleum Resources, 2019a; Figure 1). Primary data from the mineral exploration industry is collected in ARIS (the assessment report indexing system pertaining to assessment reports submitted by companies and individuals to maintain mineral tenure rights), Property File (geoscience archives that were voluntarily submitted to, or collected by, the BC Geological Survey) and COALFILE (coal assessment reports). These data are aggregated in MINFILE (a provincial-scale database of mineral occurrences, describing the regional and local geological setting as well as the exploration and mining history) and are displayed on MapPlace 2. The NI 43-101 technical reports are thought to be a major source of primary geoscience data that is not automatically included or integrated into the public geoscience database. As previously noted, companies submit assessment reports to the BC Mineral Tenures Branch to keep mineral titles in good standing. These reports might disclose the same information as that contained in an NI 43-101 report for investors. Some mineral-title holders choose to not file assessment reports (and pay cash in lieu), but they are obliged to file NI 43-101 reports if they are public companies. See Table 1 for a comparison of NI 43-101 reports and assessment reports.

### Phase 1

To improve the availability of SEDAR data for BC, Geoscience BC approved Phase 1 of this project in 2016. The initial objective was to gain access to all of the BC-related NI 43-101 technical reports for analysis and gain permission to publish metadata derived from the reports. The provinces and territories have jurisdiction over securities, so each has its own securities regulator, but they co-ordinate policy and harmonize regulations as the Canadian Securities Administrators—the federal government is not di-

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rectly involved. Phase 1 required several years of discussion and negotiations to obtain the approvals from the provincial securities commissions, CSA and CSA's IT Systems Office for feasibility.

In 2018, Phase 1 was completed successfully: reports were released to Geoscience BC and the project team for metadata capture and data mining in order to update the MINFILE database. Phase 1 was not presented in any prior *Summary of Activities* volume because there was no research to report.

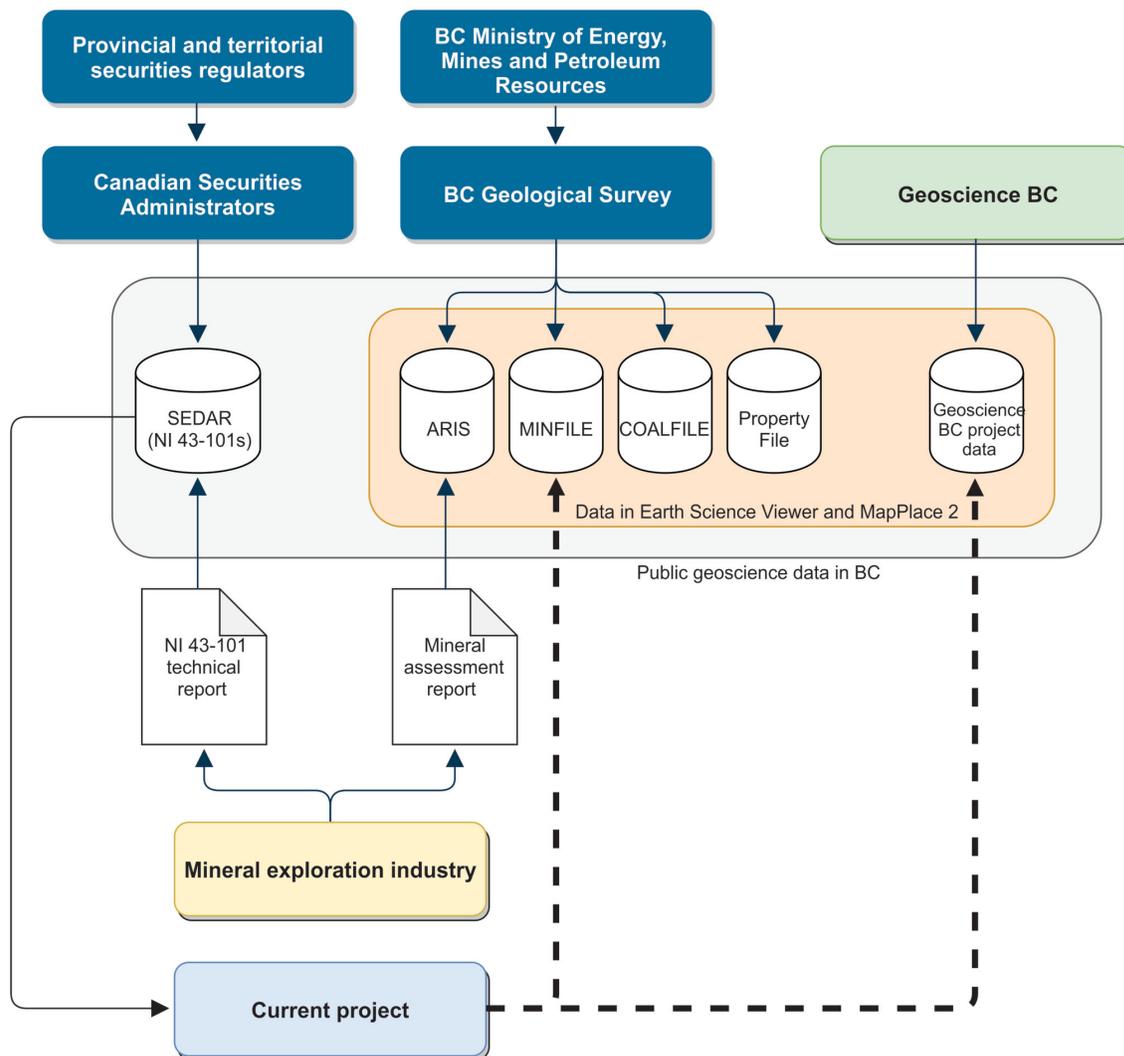
Phase 2 of the project, the current phase, aims to focus on capturing the geoscience data contained in these otherwise difficult-to-access reports.

### Method

The SEDAR website has no project-location index, so the CSA provided a complete collection of all NI 43-101 re-

ports (approximately 11 000 reports and amendments, but excluding the many other report types they collect through their regulation of Canadian public companies). Some early reports contained scanned pages without text recognition, so the authors used OCRmyPDF (Barlow, 2019), a free open-source tool developed by the second author, to insert optical character recognition (OCR) as needed. The authors used Poppler (Poppler Development Team, 2019), a free open-source PDF-to-text extraction tool, to obtain the complete text of all reports (1.7 million pages) and inserted the text into an SQLite (Hipp, 2018) database with a full-text search schema. The resulting database was 6.3 GB.

Several search queries were used to identify reports pertaining to BC mineral properties and exclude those that were not in BC. 'British Columbia' or 'BC' were not suitable keywords, given the large number of mining companies based in Vancouver with exploration projects in other parts of Canada or the world. MINFILE numbers or NTS



**Figure 1.** Schematic diagram of the sources and providers of public geoscience data in British Columbia. Abbreviation: NI, national instrument.

**Table 1.** Comparison between National Instrument (NI) 43-101 technical reports and mineral assessment reports. Abbreviations: BCSC, British Columbia Securities Commission; CSA, Canadian Securities Administrators.

	NI 43-101 reports	Assessment reports
<b>Submitted to</b>	CSA's provincial member organization (i.e., BCSC)	BC Mineral Titles Branch
<b>Submitted by</b>	Public companies	Mineral tenure owners
<b>Prepared by</b>	A qualified professional independent of the property owner	P.Geo. or P.Eng., may be affiliated with property owner
<b>Reviewed and approved by</b>	CSA's provincial member organization (i.e., BCSC)	BC Geological Survey
<b>Hosted by</b>	www.sedar.com	www.aris.empr.gov.bc.ca
<b>Intended audience</b>	Investors	Mining industry
<b>When filed</b>	Generally, when information that may change the value of a publicly traded company's stock is disclosed	Annual report of mineral exploration on mineral tenures
<b>When published</b>	Upon approval	Held confidential for one year
<b>Total number for BC</b>	870	37 412

map numbers covering BC were reliable indicators of a report being in BC. Latitudes and longitudes were less reliable—for several years, latitude and longitude were not required on a report's cover sheet and errors in co-ordinates were more common than one might expect, especially when given in degrees-minutes-seconds. Occasional novel formatting of degree symbols also contributed to false positives. Finally, a list of place names that are unique to BC within Canada was derived from the Canadian Geographical Names Data Base (Natural Resources Canada, 2016), and these were matched to reports. Geospatial data embedded in PDFs were not checked for because this feature is not commonly used.

A GeoPackage file (Open Geospatial Consortium, 2019) was generated that specified the co-ordinates of all locatable reports, and QGIS (QGIS Development Team, 2019) was used to review and correct the point locations. Reports that gave bounding boxes or polygons were collapsed to the centroid for consistency (Figure 2).

Having narrowed the list of reports to those likely related to BC mineral properties (approximately 870 reports), a spreadsheet was generated consisting of the report's identifier (internal to SEDAR's database and not easily visible to the public), the metadata that could be extracted using scripts, and the contents of the first page (because most other metadata can be pulled from here). A manual review of the reports and organization of the metadata was then completed. Where available, the total expenditure was recorded to give a sense of the scope of a report. The types of work performed were also recorded to help users locate work types of interest to them, such as drilling and geochemistry. See Table 2 for a list of metadata fields that will be captured.

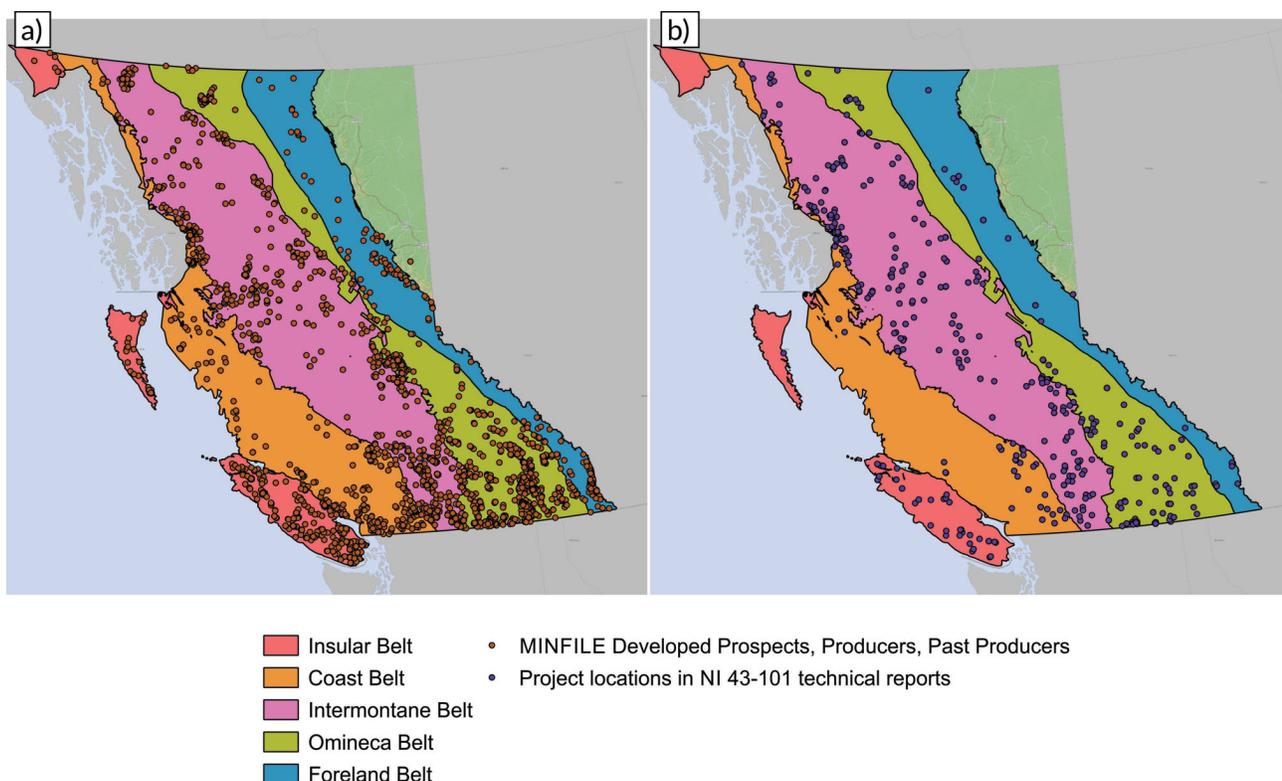
Work is in progress to review the NI 43-101 reports for updates to the MINFILE database (whether new occurrences or updates to existing occurrences).

## Discussion

### Contents of NI 43-101 Reports

The authors are not aware of any previous effort to analyze or summarize the contents of NI 43-101 reports in existence, including those pertaining to BC projects. As a general observation, an NI 43-101 report encompasses a wider project area and usually involves several MINFILE occurrences, as defined by the BC Geological Survey. Projects typically involve multiple mineral land titles. Out of 870 reports, 147 reported total property expenditures directly (a total is only reported if it was given in the report; no attempt was made to calculate or estimate it). The property expenditures reported in the 147 reports amounted to \$67 million in exploration activity, or approximately \$500 000 per report. This figure is surprisingly low considering the levels of exploration activity between 2007 and 2018 (\$5.0 billion; BC Ministry of Energy, Mines and Petroleum Resources, 2019). It can safely be assumed that using only those reports that disclosed total expenditures is only a partial reflection of the true total.

The CSA and securities regulators caution that the content of all NI 43-101 technical reports is the responsibility of the company filing the report; although CSA checks that submitted reports conform to NI 43-101 standards, the reports are not 'audited' for scientific accuracy. As with other sources of industry-derived public geoscience data, they may contain errors and, as such, are distributed without warranty.



**Figure 2.** Locations of a) MINFILE occurrences labelled 'Developed Prospect', 'Producer' or 'Past Producer'; and b) National Instrument (NI) 43-101 reports relating to BC. Base map from DataBC (2019), morphogeological belts from Cui et al. (2017) and MINFILE locations from BC Geological Survey (2019c).

## Future Work

Following completion of the metadata index, the intent is to update all MINFILE occurrences referenced in the NI 43-101 reports, to ensure that NI 43-101 research is integrated into the public geoscience database. A geospatial layer will also be available on Geoscience BC's Earth Science Viewer and the BC Geological Survey's MapPlace 2.

Once the MINFILE portion of Phase 2 is completed, the authors will comment on the value and findings of the project in *Summary of Activities 2020*.

**Table 2.** Metadata fields captured from National Instrument (NI) 43-101 reports relating to BC.

Metadata fields
SEDAR Number
Title
Date
Project name
Primary company
Secondary company
Latitude
Longitude
Related MINFILE number(s)
NTS map sheet(s)
Total expenditures
Work types

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