GEOLOGICAL SURVEY OF CANADA
OPEN FILE 5936

The Canadian Database of Geochemical Surveys: User manual for the metadata website

W.A. Spirito and S.W. Adcock

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Chapter 1 Introduction

1.1 The GDR Metadata Catalogue and its History

Metadata and raw data for geochemical surveys carried out by the Geological Survey of Canada and provincial geological agencies are available via the Geoscience Data Repository (GDR). The GDR is a Natural Resources Canada - Earth Sciences Sector initiative which allows discovery, viewing and download of information from a collection of geoscience databases. The Canadian Geochemical Surveys catalogue contains searchable metadata for approximately 600 geochemical surveys conducted across Canada since the 1950s. Sample media include till and soil, vegetation and lake and stream sediments.

The catalogue was created initially to provide Health Canada with knowledge on the geochemistry of soils and tills in Canada to support risk management decisions as part of the Federal Contaminated Sites Program (see http://www.federalcontaminatedsites.gc.ca/index-eng.aspx and http://www.tbs-sct.gc.ca/fcsi-rscf/home-accueil.aspx?Language=EN&sid=wu51914559140). It has been expanded to include other sample media, links to the original publications and online data, where available, as well as access to NGR data. It is extensively cross-linked to other databases and geological organizations.

1.2 Accessing the Catalogue

There are four ways to look at the contents of the catalogue and each method will be described in its own chapter:

- by VIEWING a map-based interface (Chapter 2);
- by BROWSING index tables organized by category (Chapter 3);
- by QUERYING a periodic table interface (Chapter 4); and
- by USING Internet search engines e.g. Google (Chapter 5).

The URL for the home page of the Canadian Geochemical Surveys catalogue (the starting point for searching the catalogue by the first three of the four methods listed above) is http://gdr.nrcan.gc.ca/geochem/index_e.php .

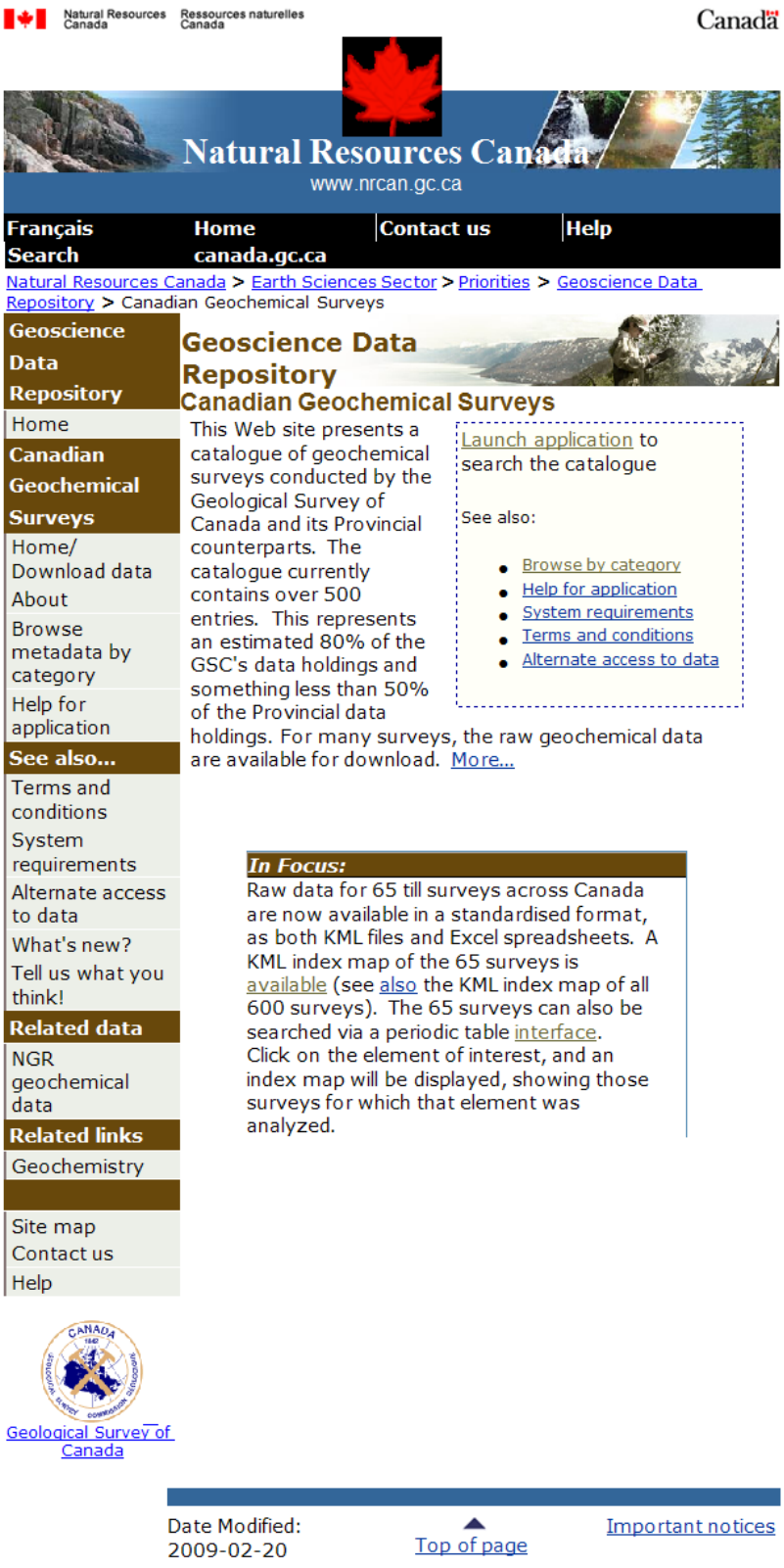


Figure 1. GDR geochemical metadata home page

1.3 PDF Reader Configuration

In the main document (of_5936.pdf), hyperlinks to other PDFs may open those PDFs in the same window as you were originally viewing the main document. As there is no "back" button to return to the main document, you have to click on "File" in the menu bar and select of_5936.pdf from the recently viewed file list at the bottom of the drop-down menu.

Alternatively, you may prefer to open new PDF documents in their own windows. Adobe Acrobat Reader can be configured to open documents in new windows by going to Edit|Preferences|Categories: Documents and unchecking "Open cross-document links in same window".

1.4 Acknowledgements

The authors wish to thank A.N. Rencz for reviewing and improving the manuscript.

Chapter 2 Viewing the Map-Based Interface

2.1 How to Access the Map-Based Interface

To access the metadata by viewing the map-based interface, click on "Launch application" in the box outlined with a dotted blue line (see Figure 1). The application may take several seconds to load. When the interface is loaded, a map of Canada appears with 595 green polygons representing surveys for which metadata exist, shown in Figure 2.

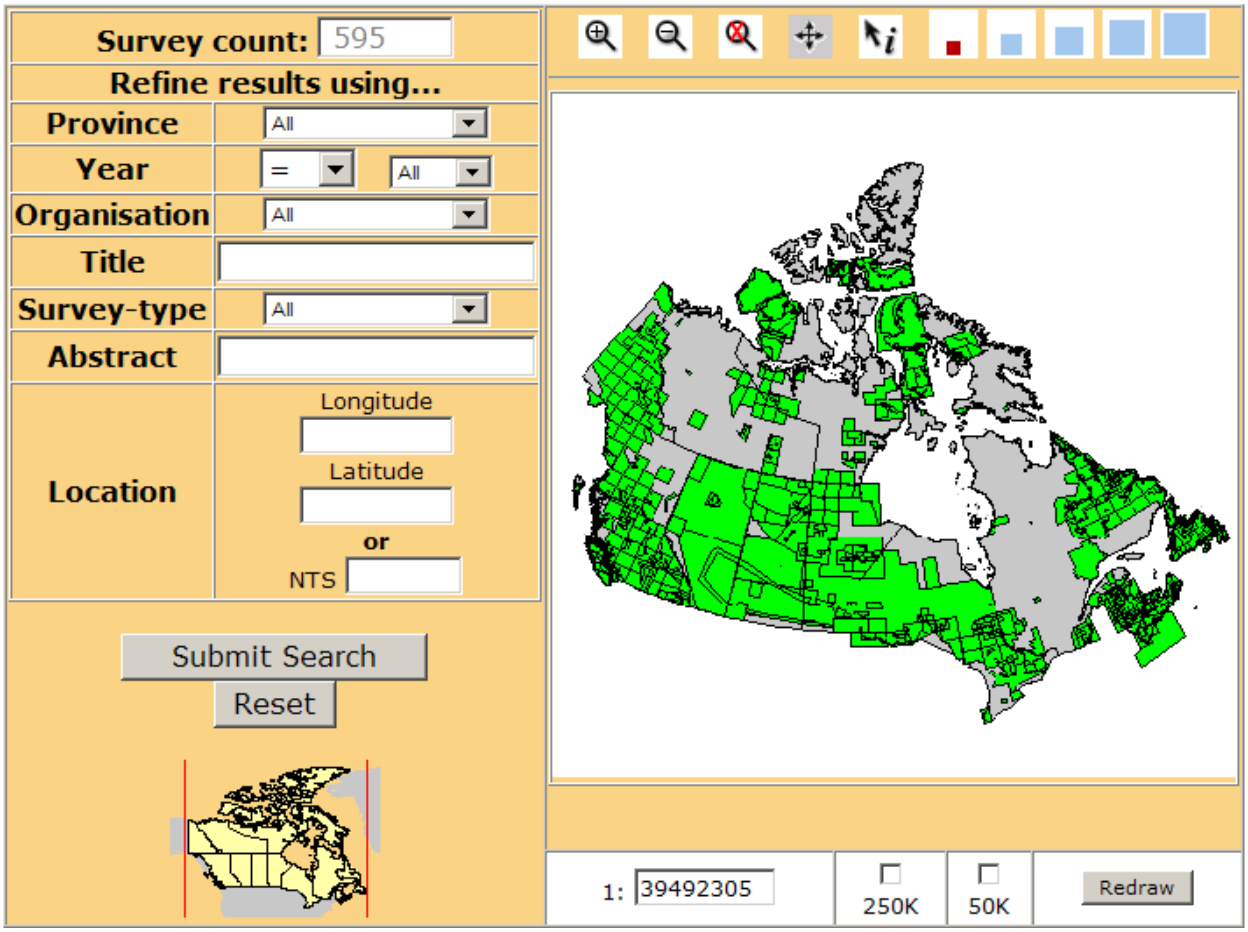


Figure 2. GDR interface showing location of catalogued geochemical surveys

2.2 Features of the Map-Based Interface

2.2.1 Tools

There are several tools shown above the map which allow basic manipulation of views, including zoom in, zoom out, map size as well as access to the metadata. Hovering over the tool icons with the cursor displays a small box indicating the tool's function. These functions are summarized in Table 1.

Table 1. Description of map tools

Tool - Inactive	Tool - Active	Description of Tool	
		Zoom In – choose this tool to view an area in more detail. After clicking on the tool, click on the area you wish to view in more detail and the map will zoom in by a fixed amount. The centre of the new window is located where you have clicked. By holding down the left-hand mouse button, you can also use the tool to draw a rectangle around an area if you wish to have more control over the area that is shown. If you zoom in enough, the 1:250,000 or 1:50,000 topographic base map will be displayed if it exists for that area. This tool can be used successively to keep zooming in. When this tool is active, the box surrounding it is shaded grey instead of white.	
		Zoom Out – choose this tool to expand the area you are viewing. After clicking on the tool, you can click on the area you wish to expand and the map will zoom out by a fixed amount. The centre of the new window is located where you have clicked. This tool can be used successively to keep zooming out. When this tool is active, the box surrounding it is shaded grey instead of white.	
		Full Extent – click on this tool to return to a view of the entire map of Canada, centred. After this function is completed, there is no need for the tool to remain active, so there is no corresponding grey icon.	
		Pan – choose this tool to redraw the map view with a different centre. After clicking on the tool, click on the map where you want the new centre of the map view to be located. When this tool is active, the box surrounding it is shaded grey instead of white.	
		Query – choose this tool to get information about a survey. After clicking on the tool to activate it, single-click on a green survey box (you may want to zoom in to your area of interest first), or click-and-drag to draw a selection box. The map will be redrawn with the selected survey(s) shown in red. An information grid will appear below the map with more information about the survey(s). If survey areas overlap, information about all of the overlapping surveys will be listed in the information grid. If the Query tool is used to draw a box around an area, all of the surveys enclosed within the box will be displayed in red, and they will all be listed in the information grid below the map.	
		Smallest Map Size – this is the default size (390 x 390 pixels).	
		Smaller Map (600 x 450 pixels)	Choose any of these to change the number of pixels the map occupies across the screen. They take a few seconds to load and redraw. The scale* in the left-hand box below the map will change with each size.
		Medium Map (800 x 600 pixels)	
		Larger Map (1000 x 750 pixels)	
		Largest Map (1200 x 900 pixels)	

* The scale located in the left hand box below the map is approximate. The true scale is related to the size of the monitor, which is unknown to the application and can be variable from 3″ (blackberry) to 30″, for example. The monitor can be calibrated to determine the true scale by measuring the screen distance (in mm) between two features for which you know the actual distance (in km). The percentage difference between the scale reported by the application and the scale that you calculated can then be determined and applied to all subsequent screen displays. For example, using a 30” monitor at a resolution of 2560 x 1600, the map on the screen was zoomed in to include both Toronto and Montreal (approximate scale 1:3,500,000 in the box

under the map), and the measured distance on the screen was 140 mm. Using Tools/Ruler in Google Earth, the distance between Toronto and Montreal was determined to be 500 km. This means that 140 mm on the screen represents 500 km, giving an actual scale of 1:3,570,000 (rounded) versus the approximate scale of 1:3,500,000 shown under the map. Different monitors and screen resolutions will produce different results.

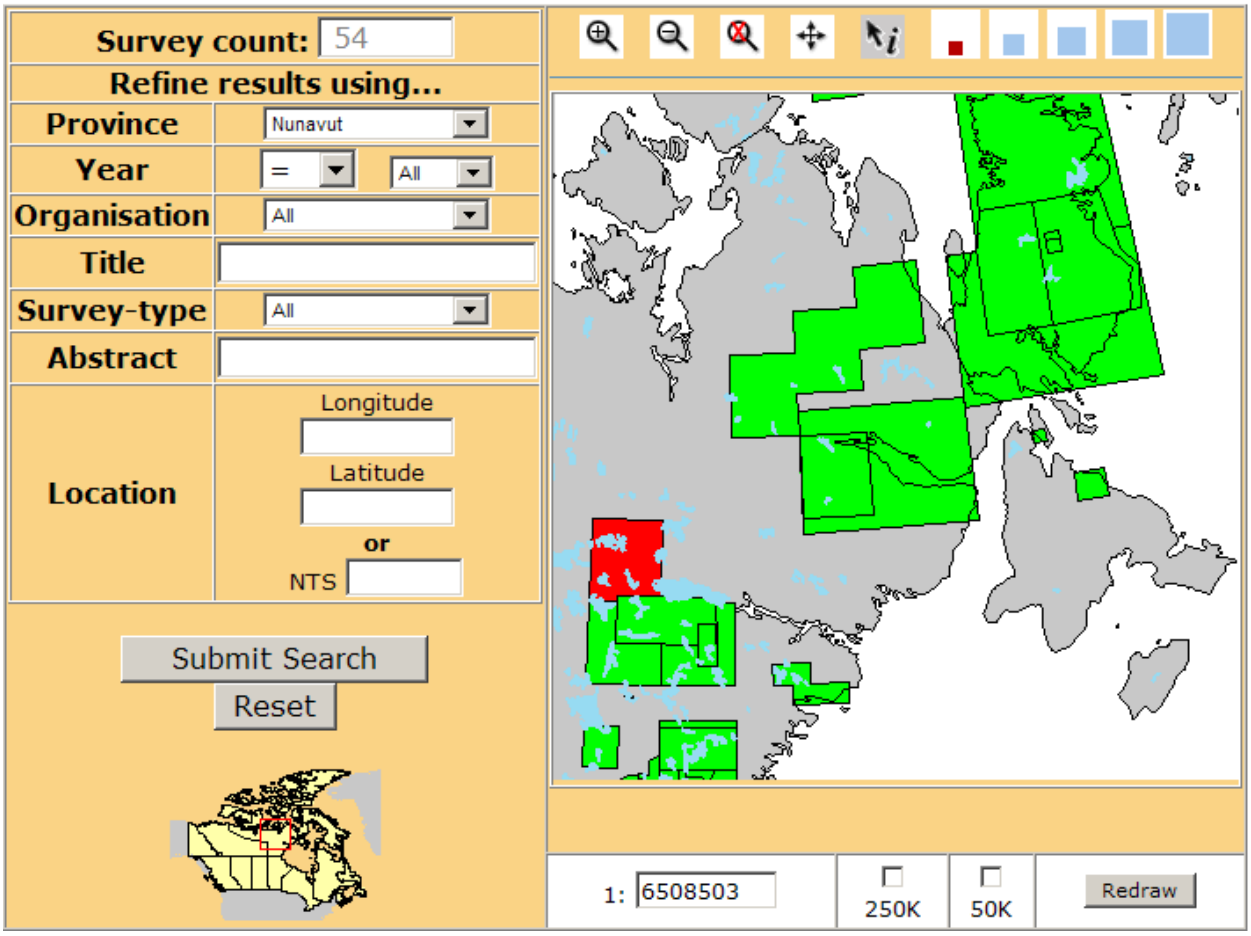
2.2.2 Selecting a Map Scale/Viewing Topographic Base Maps

If a certain map scale is preferred, a value can be entered into the scale box which is located in the left-hand box below the map. At map scales between 100,001 and 600,000 the features from the 1:250,000 base map will be visible at the selected scale. At map scales below 100,001, the features from the 1:50,000 topographic base map will be visible at the selected scale. In areas where no 1:50,000 base map coverage exists (i.e. many parts of Canada north of 60° latitude), the 1:250,000 base map can be viewed by checking the box below the map and then clicking on redraw.

When the base maps are visible for an area (i.e. the level of zoom is high enough), the survey location box is no longer solid green (unselected) or red (selected with the query tool). The survey location box is hatched green or red so that the features from the topographic map can be seen.

2.2.3 Accessing the Metadata

Once the area of interest has been identified and the Query tool ( ) has been used to select a survey or surveys, the metadata can then be examined. As noted above, when the survey is selected with the Query tool, the map is redrawn with the selected survey(s) highlighted in red. If a survey was carried out in more than one area (and therefore has more than one green polygon associated with it), clicking on any one of the survey polygons with the Query tool, will also highlight the other associated polygons. Once the survey is highlighted in red, an information grid is then displayed below the map indicating some basic information about the selected survey(s) as shown in Figure 3:



Info	Grouping	Organisation	Survey Year	Dataset	KML
more	Till	GSC-Northern Div.	2004	Till sampling, NTS 66A, central mainland Nunavut, 2003-2004.	KML

Figure 3. Survey selected with Query tool and corresponding information grid

In this case, the survey selected is a till survey carried out in 2004 by the Geological Survey of Canada, Northern Division. There are three hyperlinks shown in the information grid:

1. The "more" hyperlink goes to three sets of metadata pages describing Surveys, Projects and Publications. They are discussed in Chapter 6 - Description of Metadata Pages.
2. The Organisation hyperlink takes you to the web page of the organization responsible for carrying out the survey.
3. The KML link in the last column launches a KML viewer (e.g. Google Earth) if one is installed, and zooms in to a location map of the survey. An example of a location map is given in Chapter 6, Figure 10, accompanied by an explanation of the map's features, as displayed by Google Earth.

2.2.4 Refining the Metadata Search

To the left of the map are options for refining the metadata search. Instead of zooming in to areas of interest, criteria can be used to narrow the search by using drop-down lists. For example, "New Brunswick" can be selected from the Province drop-down list and a Year "> 1999" can be selected from the Year drop-down list to display only those surveys carried out in New Brunswick after 1999. After pressing the "Submit Search" button under the search criteria, the map will be redrawn to show a Survey count of 13 surveys that meet these criteria, as shown in Figure 4. The Zoom In tool can be used to display the area in more detail.

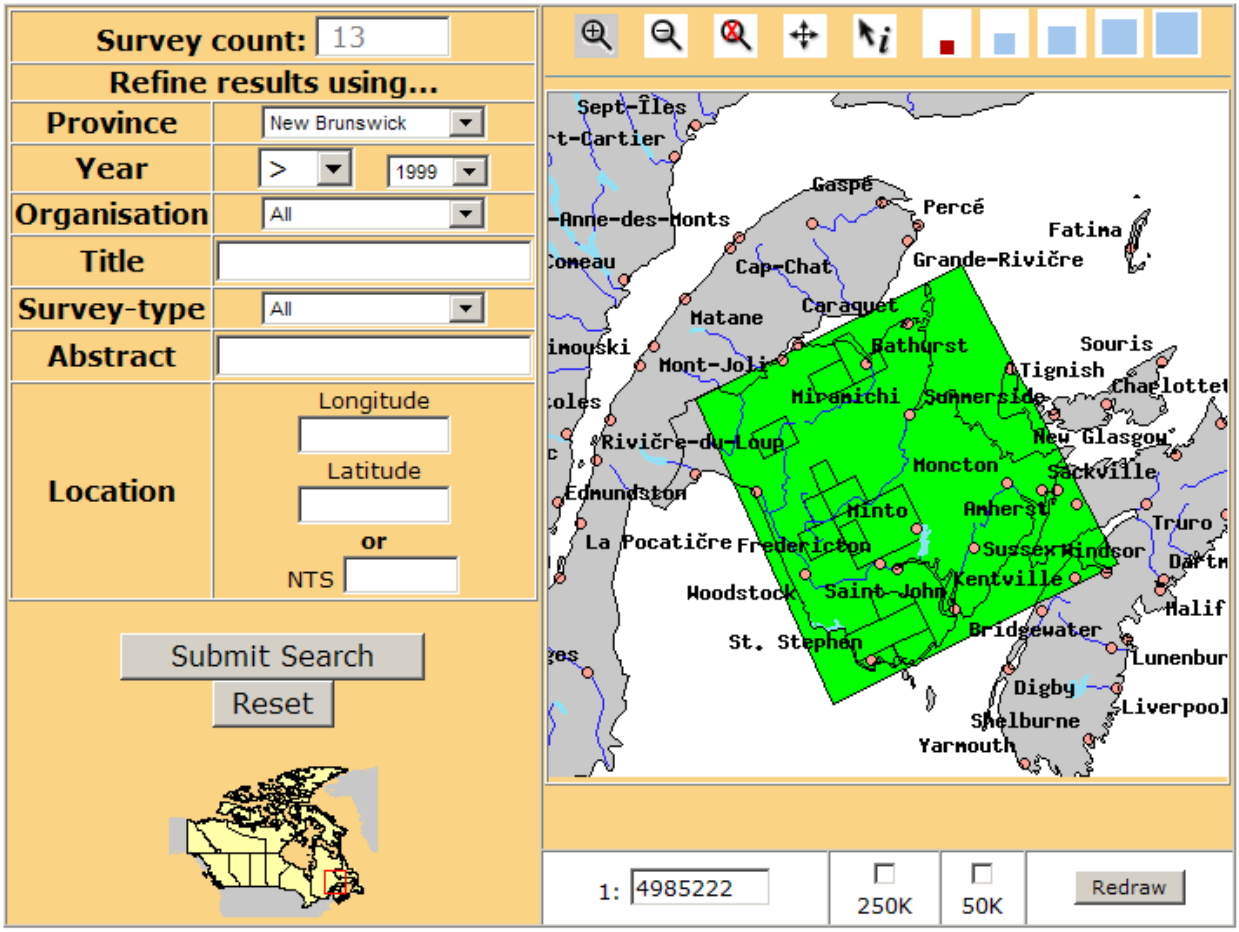


Figure 4. Surveys selected using Province = New Brunswick and Year > 1999

The search can be further refined to display only those surveys in New Brunswick carried out after 1999 by the New Brunswick Department of Natural Resources. Choose "NB Dept. Nat. Res." from the Organisation drop-down list and press "Submit Search" again.

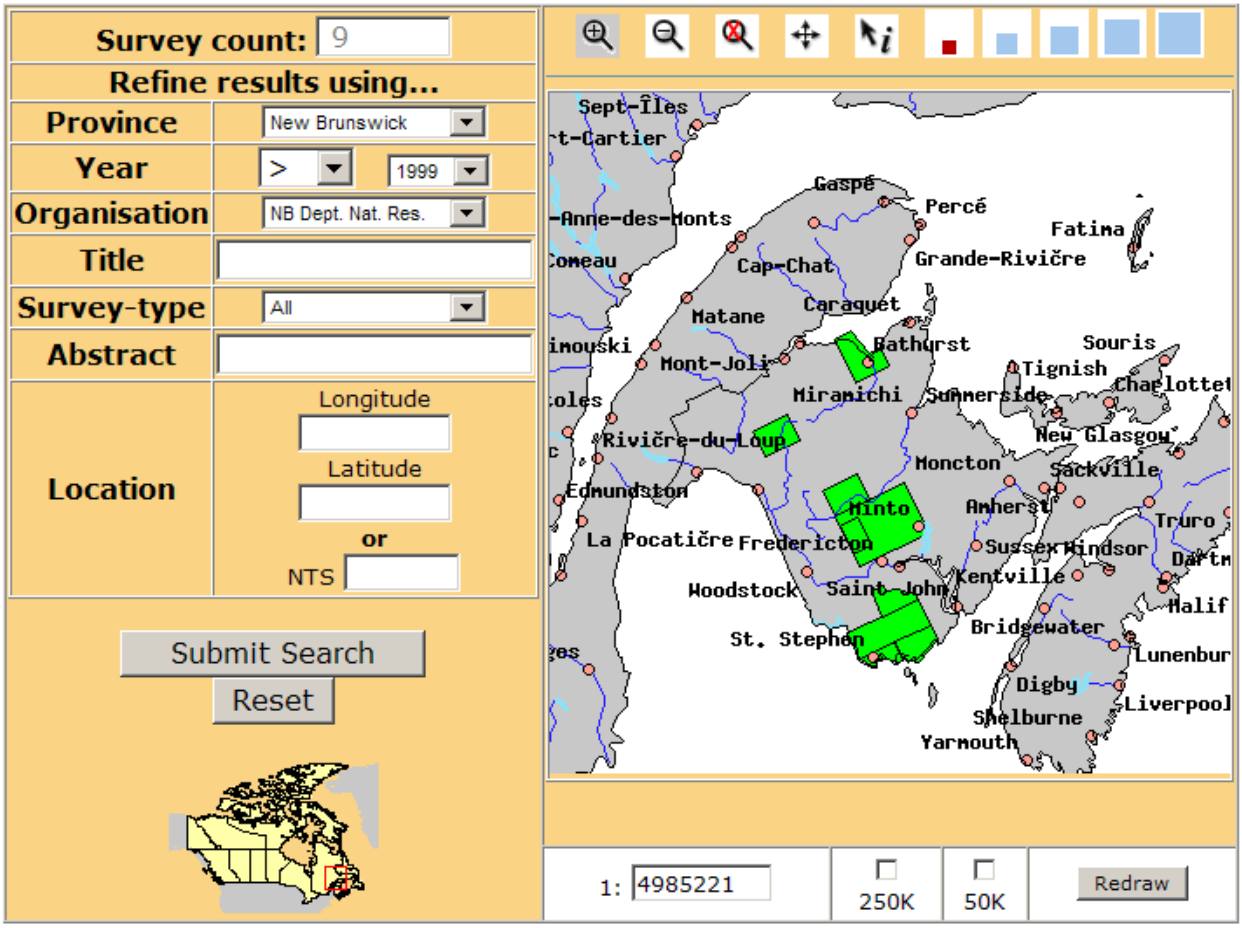


Figure 5. Surveys selected using Province=New Brunswick, Year > 1999 and Organisation =New Brunswick Department of Natural Resources

Figure 5 illustrates that nine surveys meet the three search criteria that were set. The boxes for these surveys are highlighted in green. As noted above, to view the metadata for a survey, use the Query tool ( ) to select the survey. It will then be coloured red and an information grid will appear below the map. Clicking on the "more" button in the left-most column of the grid will link to the survey's corresponding metadata pages. A full description of these pages can be found in Chapter 6.

Another criterion available for narrowing the metadata search is "Survey type". The drop-down list provides sample media including till, vegetation, lake sediment etc. from which to choose. In addition, search terms such as kimberlite or Rottenstone Lake, for example, can be typed into the "Title" and "Abstract" search boxes. "Location" values can be entered as latitude and (negative) longitude. After pressing "Submit Search", the map will be redrawn, showing in green any surveys whose extent includes that point. An NTS map sheet may also be entered. Once again, after pressing "Submit Search", the map will be redrawn and display in green any surveys that were carried out in any part of the requested map sheet.

The "Survey count" box to the left of the tools lists the number of surveys that have been selected, either after using the search criteria, the query tool (to click on a single survey), or by drawing a box with the zoom in /zoom out (/) or query tools ( ). It displays the total

number of surveys in the catalogue, 595, when the application is first launched or any time the Reset button is clicked (below Submit Search).

The "Survey count" box is useful when surveys that meet search criteria cover a very small area. The green survey boxes may not be visible depending on the scale of the map. If the survey count is greater than zero but not all/none of the survey boxes are visible, you can use the Query tool to draw a search box around all of Canada. Even though some surveys are not visible, they all will be contained within the search box and will be listed below the map in the information grid.

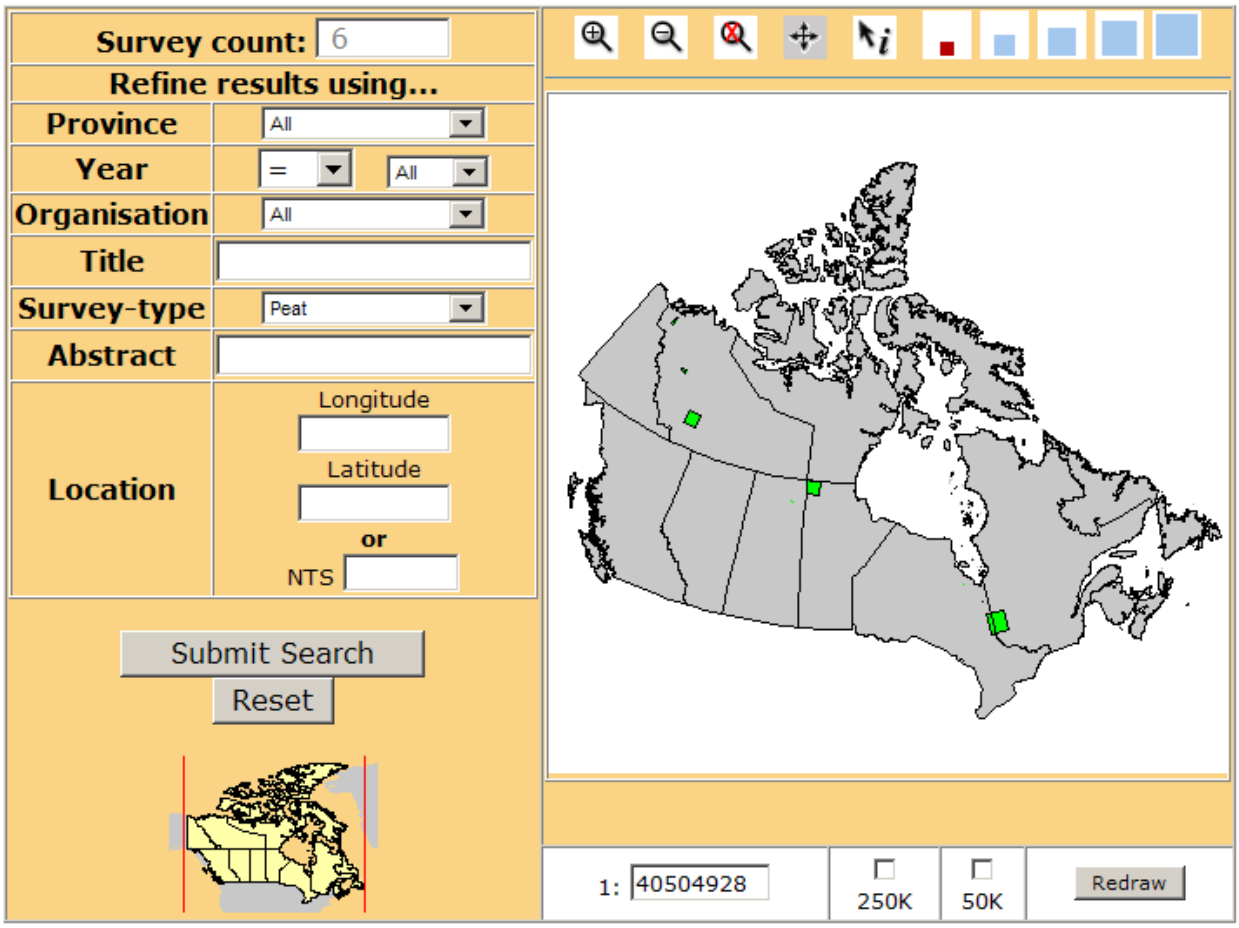


Figure 6. Surveys selected with Survey-type = Peat

In Figure 6, "Survey-type" = Peat was used as the search criterion. Three polygons are clearly visible in green. The "Survey count" indicates that six surveys were found. Therefore, not all of the surveys are easily visible at this scale. By using the Query tool to draw a box around all of Canada, information for all surveys in that box (including the ones that are not visible at this scale) will appear below the map. By looking at the list, the location of the other three surveys can be identified, as shown in yellow in Figure 7.

Query Results

Info	Grouping	Organisation	Survey Year	Dataset	KML
more	Peat, Soil, Till, Vegetation	GSC-Northern Div.	1980	Peat sampling, NTS 74I/8, 64L/5, northern Saskatchewan, 1980.	KML
more	Peat	GSC-Northern Div.	1994	Peat sampling survey, NTS 42N,P, 32E, northeastern Ontario, 1994.	KML
more	Peat	GSC-Northern Div.	1979	Peat sampling, NTS 64C, northwest Manitoba, 1979.	KML
more	Peat	GSC-Northern Div.	1997	Peat sampling survey, NTS 31M, 32D, Rouyn-Noranda area, Ontario and Quebec, 1997.	KML
more	Peat, Soil	NL Geol. Surv.	1978	Peat and soil sampling survey, NTS 13G/14, central Labrador, 1978 and 1979.	KML
more	Peat	GSC-Northern Div.	1994	Peat and mineral sampling survey, NTS 95G, H, I, J, 96E, 106N, 107B, Mackenzie Valley, Northwest Territories, 1994-1997.	KML

Figure 7. Peat surveys identified in the information grid

The surveys from northern Saskatchewan, north eastern Ontario and central Labrador are not visible at the map-of-Canada scale. Note that the 1994 Mackenzie Valley survey is delineated by three polygons, two of which are very small, but just discernible in Figure 6.

Chapter 3 Browsing by Category

3.1 How to Access the Index Tables

The second way to access the metadata catalogue is by browsing index tables organised by category. From the Canadian Geochemical Surveys page on the Geoscience Data Repository (http://gdr.nrcan.gc.ca/geochem/index_e.php), click on "Browse by category". There are several categories of metadata which can be browsed and which make the search for metadata more manageable:

- Surveys
- Projects
- Publications
- NGR Open Files
- GSC Open File Release Notices
- Downloadable Files

The first three index tables (Surveys, Projects, Publications) display lists which link to metadata pages and will be detailed below. These three sets of pages are highly interconnected and can be accessed from each other. Descriptions of the other index tables, which also link to metadata but are not as interconnected, will be given following the sections on Surveys, Projects and Publications.

3.2 Definitions of Surveys, Projects and Publications and Description of Related Index Tables

3.2.1 Surveys

A survey is the principal entity on which the metadata catalogue is based. Everything else relates to the survey. A survey is carried out in a specific geographic area, over a defined period of time and by a certain organisation. A survey generally involves the collection of less than ten to several thousand samples from one or more sample media. In most cases, the data and other information related to the survey have been released in one or more publications.

When the "Surveys" index table is selected, a summary list showing the following information is displayed:

Table 2. Excerpt from the "Surveys" index table

List of Geochemical Surveys				
Key	Group	Prov	Year	Title
130001	Soil	NB	1982	Till and soil sampling survey, NTS 21G/1,2,7,8, southwest New Brunswick
130001	Till	NB	1982	Till and soil sampling survey, NTS 21G/1,2,7,8, southwest New Brunswick
130002	Till	NB	1989	Till and soil sampling survey, NTS 21O/7 (Nepisiguit Lakes), north central New Brunswick, 1989.
130002	Soil	NB	1989	Till and soil sampling survey, NTS 21O/7 (Nepisiguit Lakes), north central New Brunswick, 1989.
130003	Till	NB	1989	Till sampling survey, NTS 21O/3, northwestern New Brunswick, 1989.
130004	Till	NB	1990	Till sampling survey, NTS 21G/12 (Forest City), 13 (Fosterville), southwest New Brunswick, 1990-1995.

(Full Table: www)

Table 2 is an excerpt from the full List of Geochemical Surveys. The Title provides basic information about the location of the survey and the sample material collected. There is a "Key" associated with each survey, that when clicked, links to the corresponding Survey Metadata page. The Key is composed of a 2 digit Organisation ID (e.g. 13 = New Brunswick Department of Natural Resources) and a 4 digit Survey ID that was incrementally assigned at the time of cataloguing. In Table 2, Key = 130004 represents the fourth survey that was catalogued for New Brunswick DNR.

The Surveys table can be sorted based on any of its columns by clicking on a column name in the header. The column (and the table) will first be sorted in ascending order, then in descending order if clicked again. An arrow indicating the direction of the sort will be displayed beside the column name. To see the table in its original sort order, press the back button on the browser until the original table is displayed.

In Table 2, Surveys 130001 and 130002 are each listed twice. This reflects the fact that both soil and till samples were collected in these surveys. Sorting on the "Group" column allows simple identification of all surveys involving a specific sample medium.

The layout and content of the Survey Metadata pages, which are accessed by clicking on the Key associated with each survey, are described in Chapter 6.

3.2.2 Projects

A project can be defined as a body of work (one or more surveys) related by organisation, principal investigator, funding source or any other logical reason why surveys should be grouped together. It is an administrative concept and its form and use may evolve over time. Projects are useful in establishing relationships between different surveys. They also capture information

related to reanalysis of samples and re-publication of data. For example, samples collected in a survey may be reanalysed at a later date. A new survey would not be created because they are the same, original samples already described in a survey. Instead, a new project would be created, to capture information about the reanalysis activity. The survey metadata page would then be linked to two project metadata pages, the first describing the original sampling and analysis program, and the second describing the reanalysis program.

When the "Projects" index table is selected, a summary list showing the following information is displayed:

Table 3. Excerpt from the "Projects" index table

List of Projects			
Key	Name	Organisation	Leader
210001	NATMAP Slave Province Project, Quaternary geology component, 1992-1993	GSC-Northern Div.	Dredge, L.A.
210001	NATMAP Slave Province Project, Quaternary geology component, 1992-1993	GSC-Northern Div.	Kerr, D.E.
210001	NATMAP Slave Province Project, Quaternary geology component, 1992-1993	GSC-Northern Div.	Ward, B.C.
210002	NATMAP Shield Margin Project, 1991-1995	GSC-Northern Div.	McMartin, I.
210003	Central Newfoundland till sampling survey carried out in 1991 and 1992	GSC-Northern Div.	Klassen, R.A.

(Full Table: www)

Table 3 is an excerpt from the full List of Projects. The "Name" column provides basic information such as the name of the project and the year(s) over which the project took place. The organisation and the principal investigator responsible for carrying out the project are also listed. There is a "Key" associated with each project that, when clicked, links to the corresponding Project Metadata page. The Key is composed of a 2 digit Organisation ID (e.g. 21 = Geological Survey of Canada, Northern Canada Division) and a 4 digit Project ID that was incrementally assigned at the time of cataloguing. For example, Key = 210002 represents the second project that was catalogued for Northern Division of the GSC.

The Project table can be sorted based on any of its columns by clicking on a column name in the header. The column (and the table) will first be sorted in ascending order, then in descending order, if clicked again. An arrow indicating the direction of the sort will be displayed beside the column name. To see the table in its original sort order, press the back button on the browser until the original table is displayed.

In Table 3, project 21001 is listed three times. This reflects the fact that there are three principal investigators responsible for the project, each with their own surveys that have been logically grouped within the same project.

The layout and content of the Project Metadata pages, which are accessed by clicking on the Key associated with each project, are described in Chapter 6.

3.2.3 Publications

A publication is a public release of information that results from a specific survey and may or may not include the geochemical data from the survey. It is most often released as a published document, but can be an unpublished thesis or report. A survey may be published in one, many or no publications.

When the "Publications" index table is selected, a summary list showing the following information is displayed:

Table 4. Excerpt from the "Publications" index table

List of Publications				
ID	Year	GSC Open File	Recommended Citation	Org
810	2003	n/a	Seaman, A.A. (2003). Till geochemistry of the McAdam (NTS 21G/11) map area, York County, New Brunswick. New Brunswick Department of Natural Resources Open File 2002-8, 86 p.	NB DNR
935	1989	n/a	Batterson, M.J. (1989). Glacial dispersal from the Strange Lake alkalic complex, northern Labrador. In Drift Prospecting, R.N.W. DiLabio and W.B. Coker (Editors). Geological Survey of Canada, Paper 89-20, p. 31-40.	GSC
936	1966	n/a	Presant, E.W., Tupper, W.M. (1966). The distribution and nature of arsenic in the soils of the Bathurst, New Brunswick, District. Economic Geology and the Bulletin of the Society of Economic Geologists, v. 61, p. 760-767.	-
1394	2008	5800	McClenaghan, M.B., Kjarsgaard, I.M., Kjarsgaard, B.A. (2008). Indicator mineral chemistry of the KL-01 and KL-22 kimberlites, Lake Timiskaming kimberlite filed, Ontario. Geological Survey of Canada, Open File 5800, 1 CD-ROM.	GSC

(Full Table: www)

Table 4 is an excerpt from the full List of Publications. The table provides a recommended citation for the publication, the publication year, the GSC Open File number (if applicable) and a link to the organisation responsible for the publication, if it is a federal or provincial geological agency. There is an ID associated with each publication that, when clicked, links to the Publication Metadata page.

The Publications list is useful if you know of a particular publication but do not know about its corresponding survey or could not find it in the Surveys html Index Table. The Publication metadata page will provide a link to the corresponding survey(s), allowing you to find the survey metadata by searching on the publication first.

The Publications table can be sorted based on any of its columns by clicking on a column name in the header. The column (and the table) will first be sorted in ascending order, then in

descending order if clicked again. An arrow indicating the direction of the sort will be displayed beside the column name. To see the table in its original sort order, press the back button on the browser until the original table is displayed.

The layout and content of the Publication Metadata pages, which are accessed by clicking on the "ID" associated with each publication, are described in Chapter 6.

3.2.4 NGR Open Files

When the "NGR Open Files" index table is selected, a summary list of the open files produced by the National Geochemical Reconnaissance (NGR) group at the Geological Survey of Canada (GSC) is displayed. This list covers NGR surveys carried out from 1974 to 2000.

Table 5. Excerpt from the "NGR Open Files" index table

List of NGR Open Files (1974-2000)		
Number	**Publication**	**Description**
0266	1	The regional lake sediment survey of east-central Saskatchewan (NTS 63M, 64D and parts of 63K, 63L, 63N, 73I, 73O, 73P and 74A) was conducted during the summer of 1974. This report presents analytical and statistical data for 12 variables in lake sediments from 3,844 sample sites, collected at an average density of one sample per 14.3 km².
4410	486	The regional stream survey for central New Brunswick (NTS 21J/11 East and 21J/15 West) was conducted during the summer of 2001. This report presents analytical and statistical data for 52 variables in stream sediments and waters from 366 sites, collected at an average density of one sample per 2.9 km².
RGS 53	467	Geological Survey of Canada (GSC) Open File 562 presented analytical and statistical data for 11 elements in sediments from 802 stream sites. Uranium, fluoride, and pH values in waters from these sites were also included in this report. In 1990, under the British Columbia Ministry of Energy, Mines and Petroleum Resources (BCMEMPR) Regional Geochemical Survey (RGS) Archive Program, the samples collected in 1978 were analyzed by Instrumental Neutron Activation Analysis (INAA). These new data for gold and 25 other elements, along with original survey results, were published in 2000 as BCMEMPR RGS 53.

(Full Table: www)

Table 5 is an excerpt from the full List of NGR Open Files. The value in the "Number" column represents the Open File number. When clicked, it displays metadata for the corresponding NGR survey. The information on the metadata page is served up from a database maintained by the NGR group. These are the same pages that are displayed in the Enhanced

Metadata section under Survey Description on the Survey Metadata page. Enhanced Metadata are available only for NGR surveys.

When values in the "Publication" column are clicked, the Publication Metadata page for the Open File is displayed. The layout and content of this page are described in PUBLICATIONS.

In the final column, a description of the NGR survey as well as some information about the content of the report is provided.

3.2.5 GSC Open File Release Notices

When the "GSC Open File Release Notices" index table is selected, a subset of the release notices published by the Geological Survey of Canada (GSC) is displayed, as shown in Table 6.

Table 6. Excerpt from the "GSC Open File Release Notices" index table

List of GSC Information Circular Release Notices		
Link	Open File	Date
of00407ff	408	1977-03-01
of00409ff	409	1977-04-01
of00409ff	410	1977-04-01
of00409ff	411	1977-04-01

(Full Table: www)

The GSC Information Circular Release Notices table displays the GSC Open File number, or the GSC Map number, as well as the date it was released. Links are provided to reproductions of the release notices, which appear exactly as they did originally in the Information Circular, including errors, if any. Early notices are in English only. Some Open Files do not have a link to a release notice because the publication was added to the database after the cataloguing of release notices had ceased.

Release notices were used by the GSC to advertise its publications which include open files, bulletins, maps, current research and other reports. Each month, an "Information Circular" was published and sent to clients and was also available to staff. Until the late 1990s, the Information Circular was published as a paper pamphlet. In 1997, the notices were made available on the web and the paper version was discontinued shortly after. In July 2008, the Information Circular was discontinued and replaced by a real-time publication-release notification on the GSC Bookstore Web site (click on the "ESS New releases" button in the left-hand menu).

The Release Notice table contains the notices for the large majority of regional geochemical Open Files published by the GSC. The notices were typed from the paper monthly release notice circulars until they became available online, at which point they were copied directly from the web pages. The notices were catalogued until Mineral Resources Division was disbanded in March, 2005. For further details on the scope of the release notice catalogue, see

GSC Open File 5314 (Harpell et al., 2007). The Open File contains the same set of release notices, formatted in several different ways, including as a single Word document and a corresponding PDF file.

Initially these release notices were valuable as they included information (metadata) about the publication and survey. Over time, the notices became less informative, with later ones providing only a citation, a description of the format as well as viewing, sales and price information.

3.2.6 Downloadable Files

The "Downloadable Files" Index Table displays a list of all of the files available for download. They include digital data, as well as introductory text, posters and maps in PDF format.

Table 7. Excerpt from the "Downloadable Files" index table

List of Downloadable Files		
ID	Description	File Size
1	Map of mercury concentration in water from Kaminak Lake	2052072
2	Map of mercury concentration in water from Kaminak Lake	2048812
3	PDF of GSC Paper 71-43 (Mercury in Permafrost Regions).	739665
4	Location and Hg data from Kaminak Lake, 1970-71.	56351
5	Digital data for GSC Open File 2002	1895111
6	Introductory text for GSC Open File 2002	1890884

(Full Table: www)

As shown in Table 7, a short description of the file is given, as well as its size in bytes. Hovering with the cursor over the links in the ID column displays the name of the download file in the bottom bar of the browser. Depending on how your computer is configured, clicking on the links in the ID column will either display the file in your browser window, from where it can be saved, or, launch a File Download window from which the file can either be opened or saved.

The download files are also available from:

- the Online Data section of the Survey Metadata page (described here) if they are related to a survey; and
- the Downloadable Files section of the Publication Metadata page (described here) if the file is related to a publication and a survey, or just a publication. This latter situation can exist when a publication is catalogued and has a data download file but does not have a survey defined for the work outlined in the publication.

Sometimes the data were not released digitally with the Open File, and appeared in hard copy only. Sometimes the data were not released with the Open File, in either hardcopy or

digital format. In either of these cases, if we were able to locate the data files, they are provided as a download in the format in which they were received.

Chapter 4 Querying the Periodic Table Interface

4.1 Introduction

For 65 till surveys across Canada, 39 of which are in New Brunswick, the raw data have been compiled. The data are available as both KML files and Excel spreadsheets. To view a KML index map of the 65 surveys, go to the Canadian Geochemical Surveys page on the Geoscience Data Repository (http://gdr.nrcan.gc.ca/geochem/index_e.php), and click on "available" in the In Focus box. To see a KML index map of all 600 surveys in the catalogue, click on "also" in the In Focus box. To view the data as KML files, use the periodic table interface, described below. For information on how to view the data as Excel spreadsheets, see the Analytical History section of Chapter 7.

4.2 How to Access the Interface

The third way to access the metadata catalogue is by using a periodic table interface. From the Canadian Geochemical Surveys page on the Geoscience Data Repository (http://gdr.nrcan.gc.ca/geochem/index_e.php), click on "interface" in the In Focus box.

4.3 Features

4.3.1 The Elements

The periodic table is displayed with the elements coloured in red or blue. The red elements are those for which raw data are available in a standardised format. Data from sixty-five till surveys across Canada have been compiled to date. When one of the red elements is clicked, a KML index map is displayed showing which surveys include data for that element. The blue elements are those for which no raw data exist.

4.3.2 The KML Map

When the KML map is displayed, the extent of each survey that has data for that element (Cu in Figure 8) is shown by a purple rectangle. There is a circled yellow star ( ) in each survey rectangle which denotes the centroid of the survey and it is labeled with the Survey Key. The Survey Key is composed of a 2 digit Organisation ID (e.g. 21 = Geological Survey of Canada, Northern Division) and a 4 digit Survey ID that was incrementally assigned at the time of cataloguing. When the star is clicked, a balloon appears with information about the raw data for that survey:

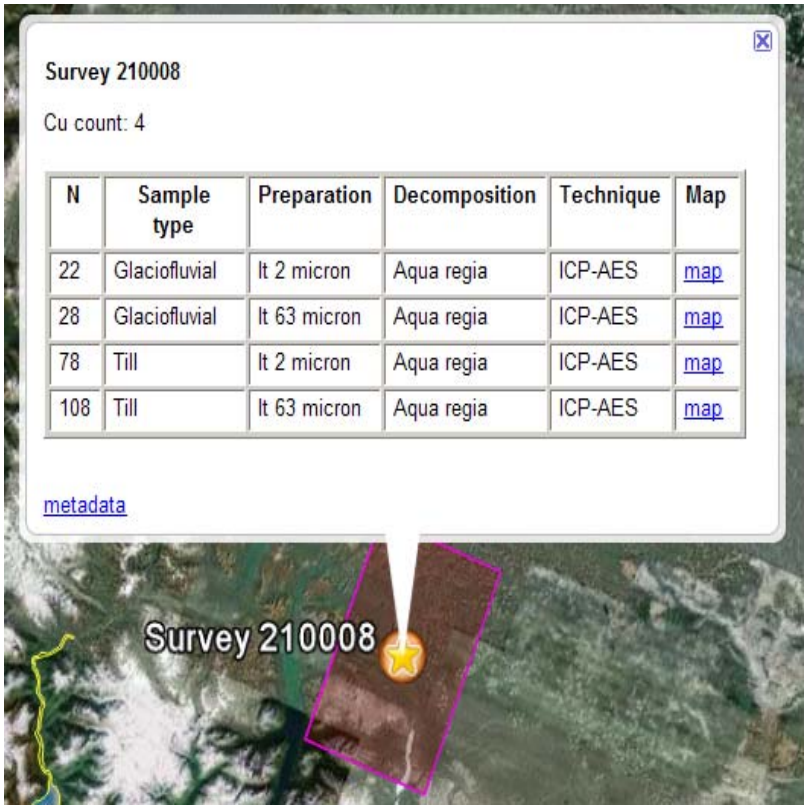


Figure 8. KML map for Cu showing analytical parameters for the survey

There are four copper (Cu) datasets in the compilation, as shown in Figure 8. There are two sample types, glaciofluvial sediments and till, and each sample type has been sieved into two size fractions: < 2 µm and < 63 µm. The table shows the number of samples (N) of each sample type and sample preparation, and also shows that the samples were digested with Aqua Regia before being analysed by ICP-AES.

The "metadata" hyperlink displays the corresponding Survey Metadata Page on the GDR.

The "map" hyperlink in the last column links to a KML map which displays the analytical value for the selected element at each sample site. In addition, the cross symbol marking the location of each sample, is coloured according to its quartile value: (75 -100th), (50th-75th), (25-50th), (0-25th).

See Chapter 9 for additional details about the KML map and legend.

The 65 surveys, for which the raw data have been compiled, correspond to those surveys which have *Extended Metadata* sections on the Survey Metadata web pages as described in Chapter 7 -- Extended Metadata. For all of these surveys, the raw data are available for download as spreadsheets (see Chapter 8) and as KML maps (see Chapter 9). The databases from which the spreadsheets and maps were derived are published in GSC Open Files 5935 (Adcock, 2009a) and 5937 (Adcock et al., 2009).

Chapter 5 Using Internet Search Engines

The metadata pages have been indexed by the major Internet search engines. Judicious selection of search terms will often take you directly to a relevant survey, project or publication web page. Hyperlinks within the web page will then direct you to additional information.

For example, if you know the authors of a publication, then using their surnames as search terms will often result in a link to the publication metadata page. Alternatively, using the phrase “canadian geochemical surveys” as the first search term, in combination with other search terms (authors’ surnames, place names, geochemical terms) should result in several links to pages within the web site.

Chapter 6 Description of Metadata Pages

6.1 Introduction

Each catalogued survey has three basic metadata pages, one for each of Surveys, Projects and Publications. These three sets of pages are highly interconnected and can be accessed from each other. An explanation of each metadata type, the content of each metadata page as well as how the pages are related is described in its own section, below. Some of the sections also provide links to more details about the content of the page. As described earlier, these pages can be accessed in four different ways (a map-based interface, index tables, a periodic table interface, Internet search engines).

- SURVEYS
- PROJECTS
- PUBLICATIONS

6.2 SURVEYS

A survey is the principal entity on which the metadata catalogue is based. Everything else relates to the survey. A survey is carried out in a specific geographic area, over a defined period of time and by a certain organisation. A survey generally involves the collection of less than ten to several thousand samples from one or more sample media. In most cases, the data and other information related to the survey have been released in one or more publications.

6.2.1 Survey Metadata Page

An example of a Survey Metadata page is shown below in sections. At the top of each section are two hyperlinks which provide views of the entire metadata page on the GDR (www) or as a PDF file (pdf). These may or may not open in their own window (see Section 1.3).

There are six (6) sections on the Survey Metadata page and they are described below:

- General Information
- Survey Description
- Publication History
- Project History
- Online Data
- Geographic Extent

1. General Information

(Full Page: www, pdf)

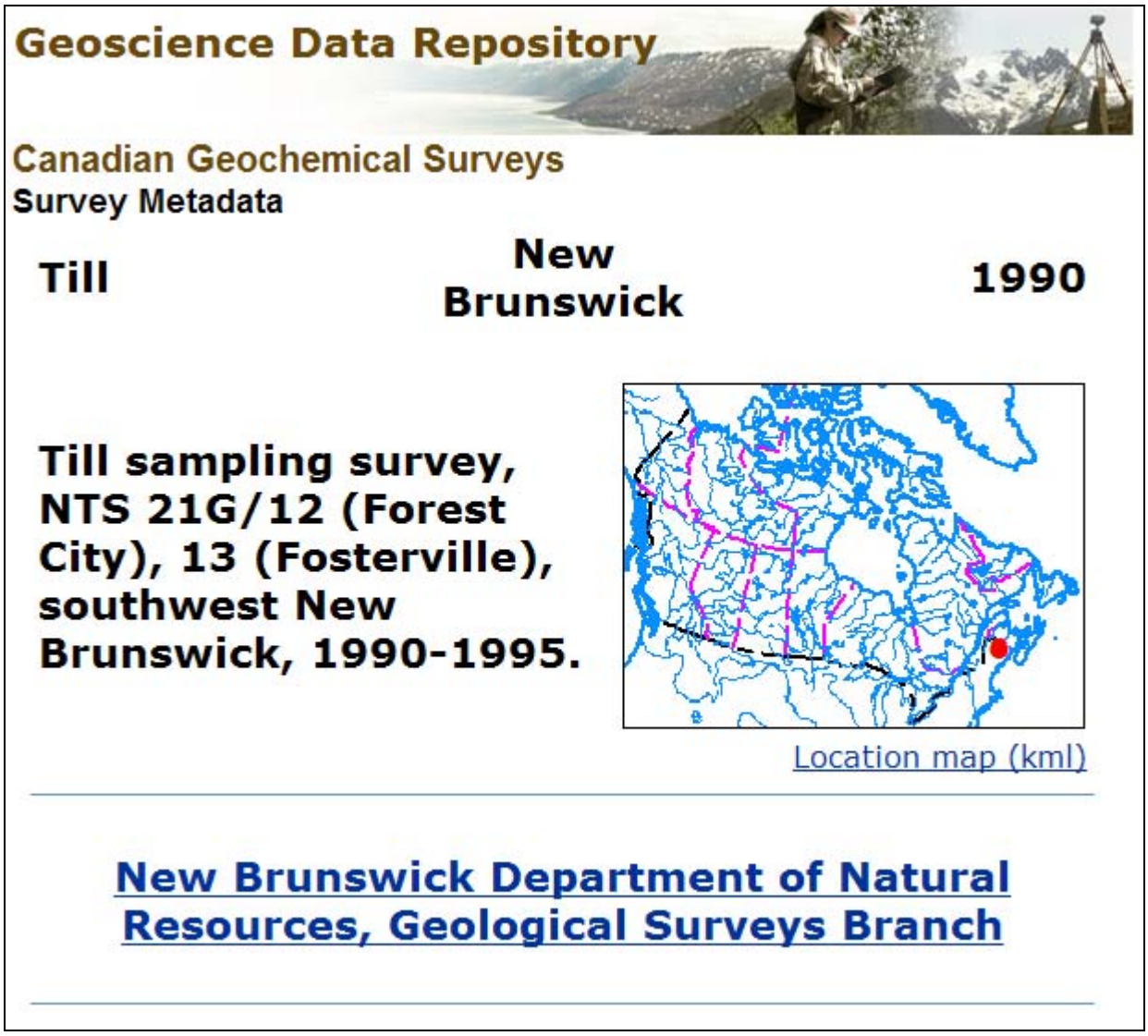


Figure 9. General information section from Survey Metadata page

Figure 9 is an example of the first section of the Survey Metadata page and is shown for Survey Key = 130004, the fourth survey catalogued for New Brunswick Department of Natural Resources (Organisation ID = 13). It provides general information, including the sample medium, the province in which the survey was conducted as well as the year in which the work was carried out. A short title to the left of the location map includes the NTS map sheet(s) covered by the survey. The last item in this section is a link to the organisation responsible for carrying out the survey. This link exists for the Geological Survey of Canada and provincial geological surveys, but not if the survey was carried out by a university or a contractor.

Beneath the location map is a hyperlink to a KML version of the map. To be displayed, it requires a KML viewer, such as Google Earth. Surveys that were more recently added to the

catalogue have only the link to the KML version of the location map; there is no map on the web page. Clicking on the KML link launches Google Earth, if it is installed, and displays the location of the survey, as shown in Figure 10.

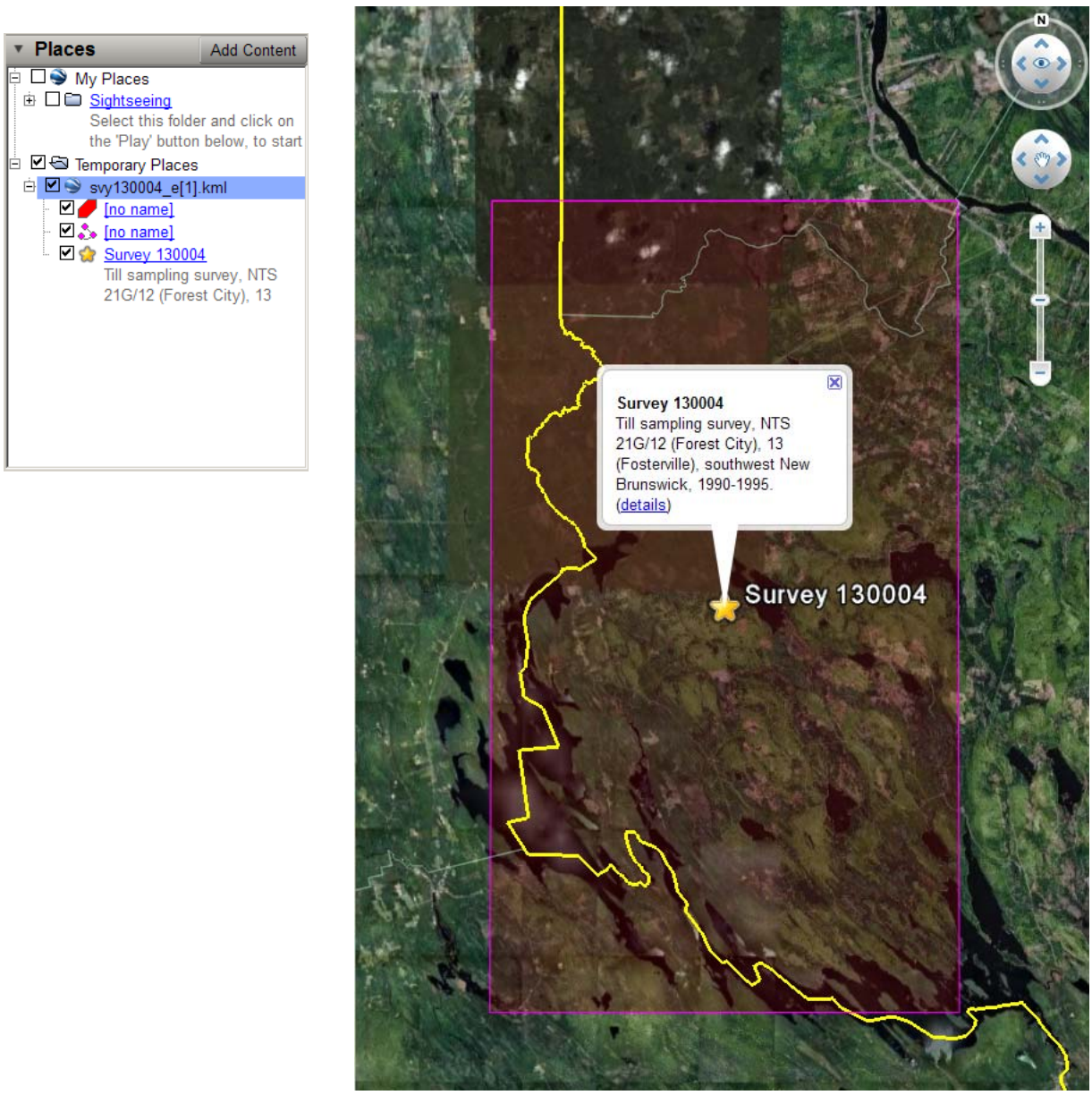


Figure 10. KML location map and legend

On the KML map shown in Figure 10, the survey extent is represented by a purple rectangle called a bounding box. In addition to the bounding box, a polygon may be seen which more closely constrains the extent of the sample sites. In Figure 10, the polygon is the same shape as the bounding box, and only one outline can be seen.

If the survey was carried out in more than one area, it will be represented by more than one polygon on the KML map. These polygons will be contained within one bounding box, representing the maximum extent of the survey.

- The yellow star denotes the centroid of the survey. If the survey is represented by more than one polygon, each polygon will have its own centroid, which means that there may be more than one star in a bounding box. Clicking on the star pops up a balloon with the Survey Key (2 digit Organisation ID and a 4 digit Survey ID) and a survey title. In this example (Figure 10), Survey Key = 130004, which is the fourth survey catalogued for New Brunswick Department of Natural Resources (Organisation ID = 13). Clicking on the "details" hyperlink in the centroid balloon, will display the Survey Metadata page again.

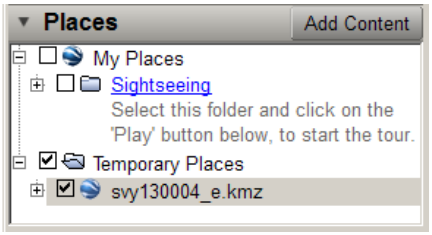


Figure 11. Unexpanded legend for KML location map

On the left-hand-side of the KML viewer (e.g. Google Earth) under Places/Temporary Places, there is a legend referring to items on the KML map. To list the map layers, expand the survey (shown by a .kmz or .kml file; svy130004_e.kmz in Figure 11) listed under Temporary Places by clicking on the "+" symbol. This lists the layers that can be viewed on the map.

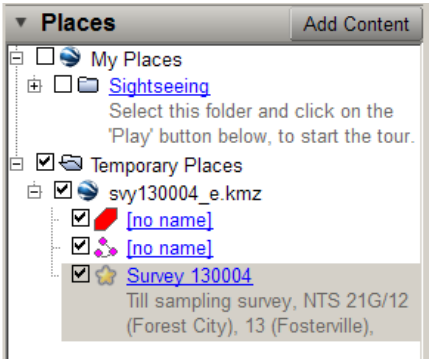


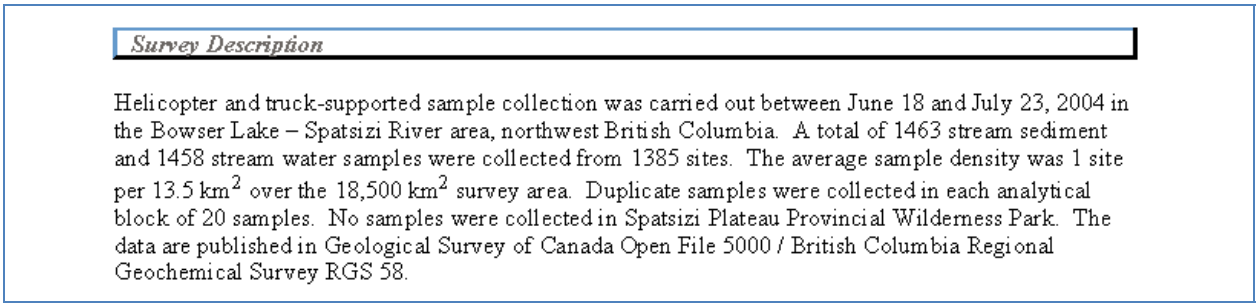
Figure 12. Expanded legend for KML location map

The available layers for this map are shown in Figure 12: the survey extent (red polygon icon), the bounding box (purple line/vertex icon) and the survey centroid (yellow star icon). Each item can be toggled on or off for viewing by clicking the check box beside the layer.

2. Survey Description

The second section of the Survey Metadata page provides a description of the survey, as shown in Figure 13. The level of detail depends on the amount of published information. Typically, this section describes the type of survey, the location of the survey, the number of samples collected and the main published reference. The following description is for Survey Key = 210335, the 335th survey catalogued for Northern Canada Division at the Geological Survey of Canada (Organisation ID = 21).

(Full Page: www, pdf)



Survey Description

Helicopter and truck-supported sample collection was carried out between June 18 and July 23, 2004 in the Bowser Lake – Spatsizi River area, northwest British Columbia. A total of 1463 stream sediment and 1458 stream water samples were collected from 1385 sites. The average sample density was 1 site per 13.5 km^2 over the 18,500 km^2 survey area. Duplicate samples were collected in each analytical block of 20 samples. No samples were collected in Spatsizi Plateau Provincial Wilderness Park. The data are published in Geological Survey of Canada Open File 5000 / British Columbia Regional Geochemical Survey RGS 58.

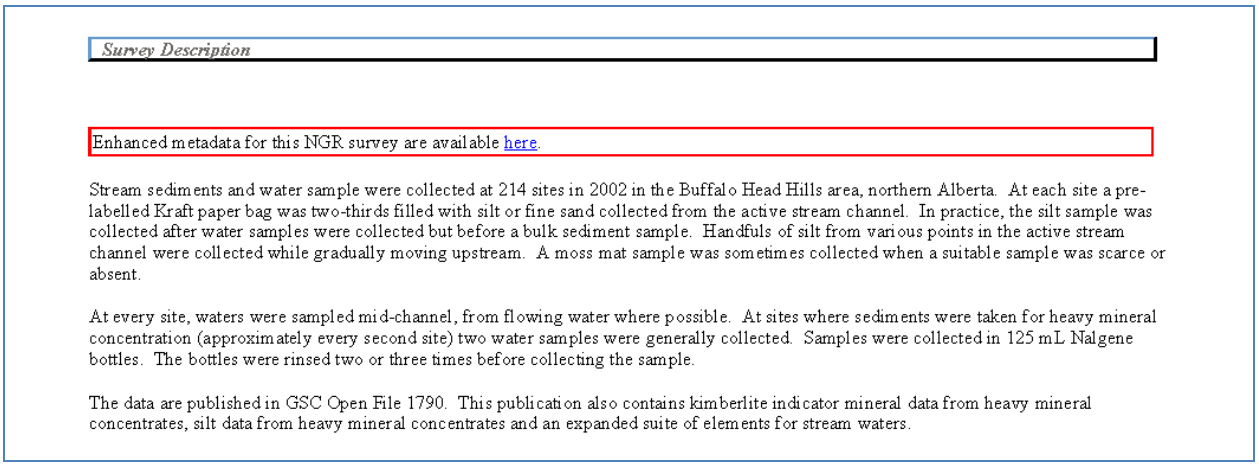
Figure 13. Survey description section from Survey Metadata page

In addition to a basic survey description, some surveys will have enhanced metadata, additional resources or extended metadata and these are described below:

Enhanced Metadata

For surveys carried out by the National Geochemical Reconnaissance (NGR) group at the GSC, the Survey Description section may have more information in addition to the basic survey description. There may be an Enhanced Metadata section that links to more metadata including a list of the elements analysed and a link to download the data in a standardized .xls file, if available, as shown in Figure 14. This description is for Survey Key = 210248.

(Full Page: www, pdf)



Survey Description

Enhanced metadata for this NGR survey are available here.

Stream sediments and water sample were collected at 214 sites in 2002 in the Buffalo Head Hills area, northern Alberta. At each site a pre-labelled Kraft paper bag was two-thirds filled with silt or fine sand collected from the active stream channel. In practice, the silt sample was collected after water samples were collected but before a bulk sediment sample. Handfuls of silt from various points in the active stream channel were collected while gradually moving upstream. A moss mat sample was sometimes collected when a suitable sample was scarce or absent.

At every site, waters were sampled mid-channel, from flowing water where possible. At sites where sediments were taken for heavy mineral concentration (approximately every second site) two water samples were generally collected. Samples were collected in 125 mL Nalgene bottles. The bottles were rinsed two or three times before collecting the sample.

The data are published in GSC Open File 1790. This publication also contains kimberlite indicator mineral data from heavy mineral concentrates, silt data from heavy mineral concentrates and an expanded suite of elements for stream waters.

Figure 14. Enhanced metadata section from NGR Survey Metadata page

The information in the NGR *Enhanced Metadata* pages is taken from a database that is maintained by the NGR group at the GSC in Ottawa.

Additional Resources

Some surveys will have an Additional Resources section. Currently, this is only implemented for Regional Geochemical Surveys (RGS) carried out in British Columbia by the GSC (NGR) or by the British Columbia Geological Survey. The link takes you to a page on the

BC Government website that has more information pertaining to the selected survey. In Figure 15, the survey also has a link to enhanced NGR metadata because it is an RGS survey that was carried out in conjunction with the National Geochemical Reconnaissance group at the GSC (Survey Key = 120024; the 24th survey catalogued for British Columbia Geological Survey (Organisation ID = 12)).

(Full Page: www, pdf)

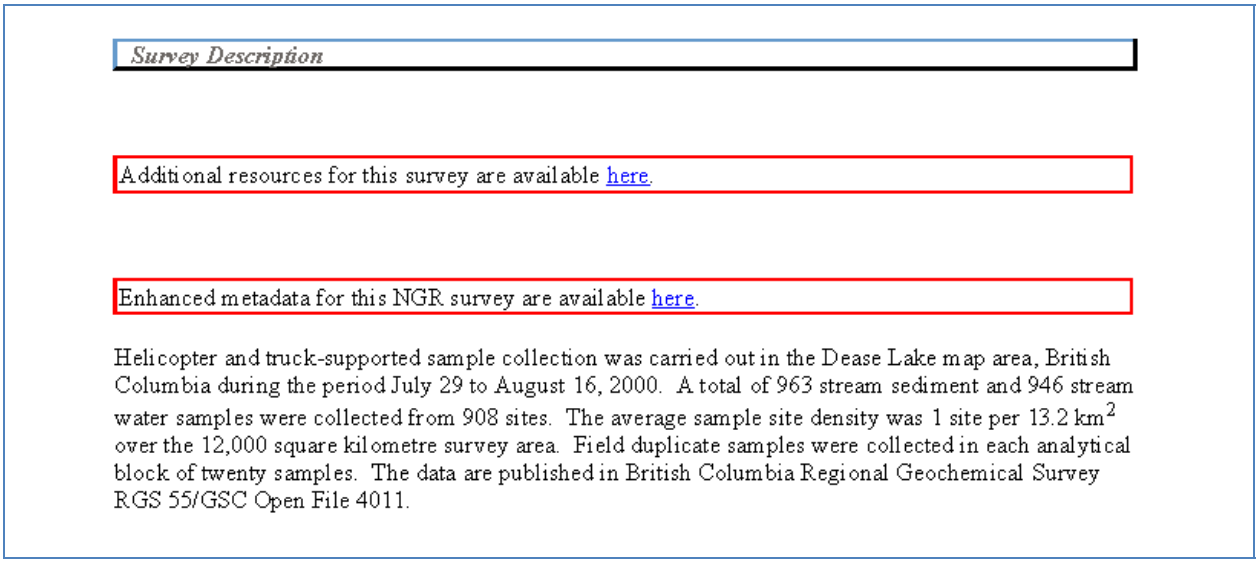


Figure 15. Additional resources section from RGS/NGR Survey Metadata page

Extended Metadata

For 65 surveys across Canada, 39 of which are in New Brunswick, the raw data have been compiled. For these surveys, there is an *Extended Metadata* section on the Survey Metadata page, as shown in Figure 16. This example is for Survey Key = 130004.

(Full Page: www, pdf)

Survey Description

Extended metadata for this survey are available (see below)

Till samples were collected between 1990 and 1995 in the Forest City (FC) and Fosterville (FV) map areas, southwest New Brunswick and are summarized below:

Year	Mapsheet	Count
1990	FC	89
1990	FV	11
1992	FC	5
1992	FV	167
1993	FV	26
1995	FV	2

The data are published in New Brunswick Department of Resources and Energy Open File Reports 92-6, 93-7. Follow-up work for the Forest City and Fosterville areas can be found in Open File Reports 93-8 and 94-8 respectively. A compilation of all the data can be found in New Brunswick Department of Natural Resources and Energy Open File Report 99-7.

Data Description: Paper report. Digital data on diskette.

Quantities Analysed: <0.063 mm fraction by AAS after hot HNO_3 digestion for Ag, Co, Cu, Fe, Mn, Ni, Pb, and Zn; by AAS following HCl-HNO_3 (3:1) extraction for Ag, Bi, and Cd; by CV-AAS after HNO_3-HCl-$SnCl_2$ extraction for Hg; by INAA for 34 elements. Follow-up samples from the Fosterville area were also analysed for Ag, Cd, Cu, Mn, Ni, Pb, Zn by ICP-ES.

Geochem Maps Available: Contour maps showing dispersal of selected elements.

Other Analyses: Grain-size (<2 mm); pebble lithologies.

Extended Metadata

⊞ Sample locations
⊞ Sample material
⊞ Preparation laboratory sample material

⊞ Analytical History

Figure 16. Extended metadata section from Survey Metadata page

The *Extended Metadata* section, shown at the bottom of Figure 16, is divided into four (4) parts: Sample locations, Sample material, Preparation laboratory sample material and Analytical history. Each section can be expanded by clicking on the "+" symbol to the left of the section title. If JavaScript is disabled, the sections will already be expanded.

A full explanation of the *Extended Metadata* section is given in Chapter 7.

3. Publication History

The third section on the Survey Metadata page outlines Publication History, as shown in Figure 17 for Survey Key = 130004. A list of publications associated with the selected survey is given, and the number of published references is variable, occasionally exceeding 100 for a single survey.

(Full Page: www, pdf)

Publication History

Index	Publication
1	Seaman, A.A. (1992). Till geochemistry of part of the Forest City (NTS 21 G/12) map area, York County, New Brunswick. New Brunswick Department of Natural Resources, Geological Surveys Branch Open File Report 92-6. (more)
2	Seaman, A.A. (1993). Follow-up tillgeochemical results for the Forest City (NTS 21G/12) map area, York County, New Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File Report 93-8. (more)
3	Seaman, A.A. (1993). Preliminary report - Au, Ag, As, Hg, Sb and base metal values for till samples from the Fosterville (NTS 21 G/13) map area, York and Carleton counties, New Brunswick. New Brunswick Department of Natural Resources, Geological Surveys Branch Open File Report 93-7. (more)
4	Seaman, A.A. (1993). Till geochemistry maps (Au, Ag, As, Hg, Sb), Forest City (NTS 21 G/12) map area, New Brunswick. New Brunswick Department of Natural Resources, Geological Surveys Branch Map Plate 93-320A. (more)
5	Seaman, A.A. (1994). Follow-up till geochemistry, Fosterville (NTS 21G/13) map area, York and Carleton Counties, Nw Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File Report 94-8. (more)
6	Seaman, A.A., Bell, G., Wood, T.D. (1994). Till geochemistry maps (Au, Ag, As, Hg, Sb), Fosterville (NTS 21 G/13) map area, New Brunswick. New Brunswick Department of Natural Resources, Geological Surveys Branch Map Plate 94-49A. (more)
7	Seaman, A.A. (1996). Till stratigraphy at the Dead Creek Pb-Zn-quartz float occurrence, southwestern New Brunswick: indications for a local source. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File Report 96-10, 17 p. (more)
8	Seaman, A.A. (1999). Till geochemistry of the New Brunswick part of the Forest City (NTS 21G/12) and Fosterville (NTS 21G/13) map areas, York and Carleton Counties: site and geochemical data. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Open File 99-7. (more)
9	Allard, S. (2004). Levelling methods for regional till geochemistry data from southwestern New Brunswick. *In* Geological Investigations in New Brunswick for 2003, G.L. Martin (Editor). New Brunswick Department of Natural Resources, Minerals, Policy and Planning Division, Mineral Resource Report 2004-4, p.1-20. (more)
10	Allard, S., Seaman, A.A., Pronk, A.G., Boldon, G.R. (2005). Till geochemistry of southwestern New Brunswick. New Brunswick Department of Natural Resources, Mineral Resource Report MRR 2005-6 (digital). (more)

Figure 17. Publication history section from Survey Metadata page

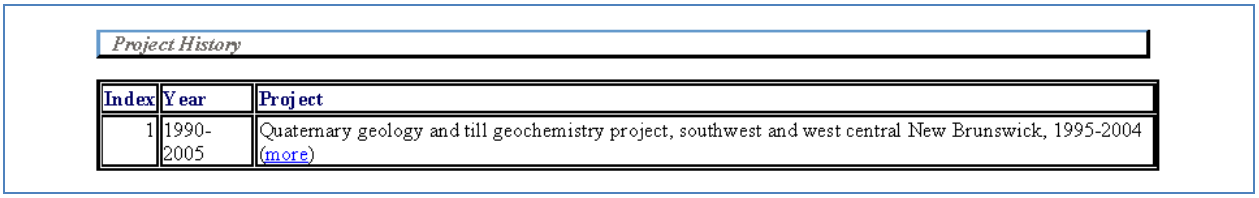
Each publication links to its own Publication Metadata web page which is described more fully in the PUBLICATIONS section later in this chapter. The Publication Metadata page then provides links to the associated Survey Metadata page, which is being described here. This reflects the interconnectivity between Surveys, Publications and Projects discussed at the beginning of the chapter. The list of publications can also be accessed from the Publications html Index Table, as described in the Publications section of Chapter 3.

4. Project History

The fourth section on the Survey Metadata page outlines the Project History. The projects to which the survey is related are listed, as shown in Figure 18 for Survey Key = 130004. In this example, the survey is related to one project. If the samples collected in this

survey were reanalysed, for example, the survey could be associated with two projects: the one listed below, and a reanalysis project.

(Full Page: www, pdf)



Project History

Index	Year	Project
1	1990-2005	Quaternary geology and till geochemistry project, southwest and west central New Brunswick, 1995-2004 (more)

Figure 18. Project history section from Survey Metadata page

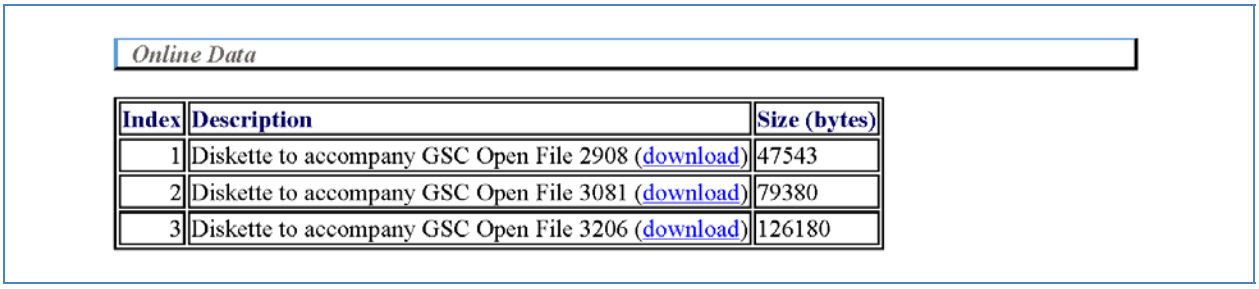
Each entry links to a Project Metadata web page which is described more fully in the PROJECTS section later in this chapter. The Project Metadata page then provides links to the surveys associated with the project which in turn provides links to the associated publications. This reflects the interconnectivity between Surveys, Publications and Projects discussed at the beginning of the chapter. Projects can also be accessed from the Projects html Index Table as indicated in the Projects section of Chapter 3.

The Project History section will not appear if the survey has not been linked to any projects. This is commonly the case for surveys carried out by universities or contractors, for example. In these cases, either not enough information has been provided, or it is a stand-alone study.

5. Online Data

An Online Data section will appear if online data exist. A link is provided from which the data file can be downloaded. Only Geological Survey of Canada data are available for download, but not all GSC surveys have online data. As a result, the Online Data section in Figure 19 is for Survey Key = 210007 (the seventh survey catalogued for GSC Northern Canada Division) instead of for the New Brunswick survey (Key = 130004) that has been used as an example in most other sections.

(Full Page: www, pdf)



Online Data

Index	Description	Size (bytes)
1	Diskette to accompany GSC Open File 2908 (download)	47543
2	Diskette to accompany GSC Open File 3081 (download)	79380
3	Diskette to accompany GSC Open File 3206 (download)	126180

Figure 19. Online data section from Survey Metadata page

6. Geographic Extent

The final section of the Survey Metadata page provides the maximum and minimum latitude and longitude coordinates for the survey area. A detailed location map may also be displayed for some surveys, as shown in Figure 20 for Survey Key = 130004.

(Full Page: www, pdf)

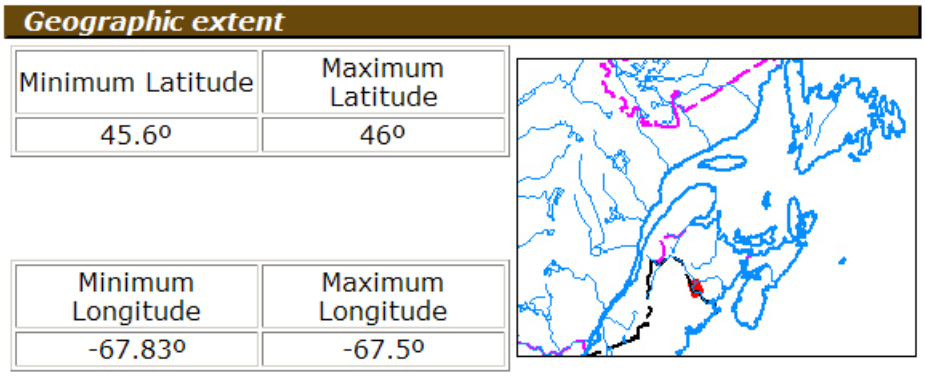


Figure 20. Geographic extent section from Survey Metadata page

6.3 PROJECTS

A project can be defined as a body of work (one or more surveys) related by organisation, principal investigator, funding source or any other logical reason why surveys should be grouped together. It is an administrative concept and its form and use may evolve over time. Projects are useful in establishing relationships between different surveys. They also capture information related to reanalysis of samples and re-publication of data. For example, samples collected in a survey may be reanalysed at a later date. A new survey would not be created because they are the same, original samples already described in a survey, but information about the reanalysis could be recorded in the project description. The project would summarise the original sampling and the reanalysis history.

6.3.1 Project Metadata Page

An example of a Project Metadata page is shown below in sections. At the top of each section are two hyperlinks which provide views of the entire metadata page on the GDR (www) or as a PDF file (pdf). These may or may not open in their own window (see Section 1.3).

There are four (4) sections on the Project Metadata page and they are described below:

- General Information
- Project Description
- Survey History
- Funding Source

1. General Information

(Full Page: www, pdf)

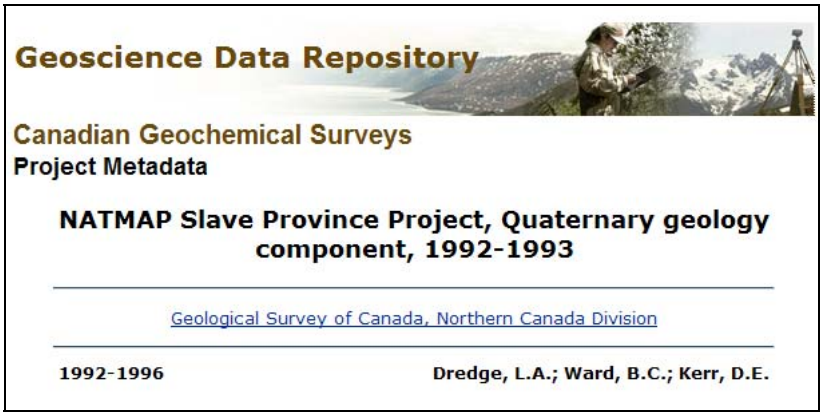


Figure 21. General information section from Project Metadata page

The first section of the Project Metadata page provides general information, including the project title, a link to the organisation responsible for the project, the principal investigator(s) and the year(s) over which the project takes place. Figure 21 displays the project metadata for Project Key = 210001, the first project catalogued for Geological Survey of Canada, Northern Division (Organisation ID= 21).

2. Project Description

The second section of the Project Metadata page provides a description of the project, as shown in Figure 22 for Project Key = 210001. The level of detail depends on the amount of published information. Typically, this section describes the work that was done and the reason for the study and the years over which the work was carried out. If available, a summary list of associated publications is given.

(Full Page: www, pdf)

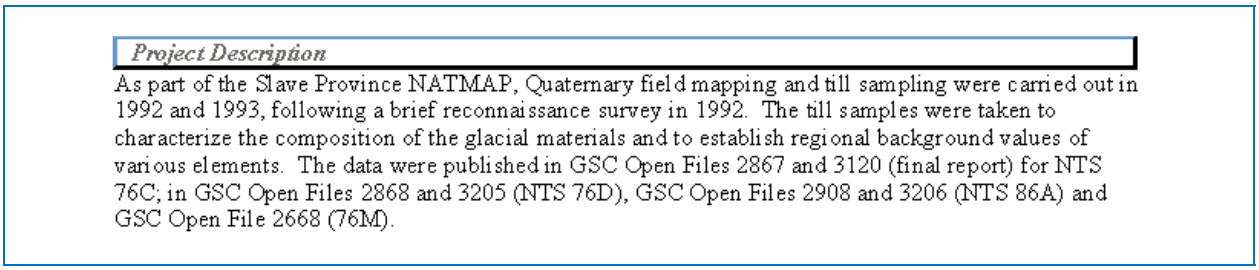


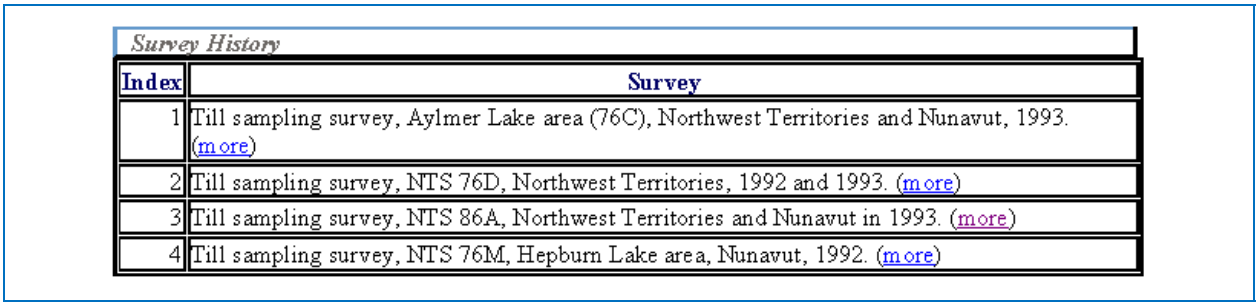
Figure 22. Project description section from Project Metadata page

3. Survey History

The third section of the Project metadata page provides a list of the surveys associated with the project. There may be one or many surveys listed, depending on how many logically belong in the same project. Each survey listed is linked to its corresponding Survey Metadata

page, the contents of which were described in SURVEYS earlier in the chapter. This is the second of three ways that the Survey Metadata page can be accessed.

(Full Page: www, pdf)



Survey History

Index	Survey
1	Till sampling survey, Aylmer Lake area (76C), Northwest Territories and Nunavut, 1993. (more)
2	Till sampling survey, NTS 76D, Northwest Territories, 1992 and 1993. (more)
3	Till sampling survey, NTS 86A, Northwest Territories and Nunavut in 1993. (more)
4	Till sampling survey, NTS 76M, Hepburn Lake area, Nunavut, 1992. (more)

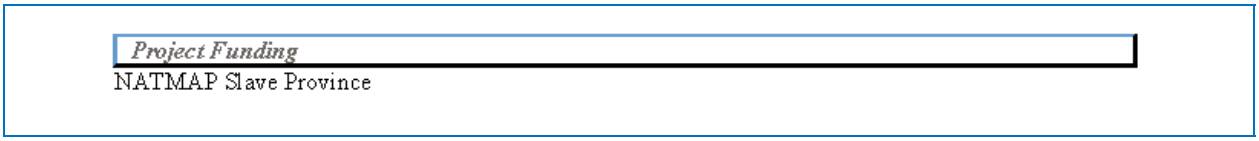
Figure 23. Survey history section from Project Metadata page

In Figure 23 for Project Key = 210001, four surveys are associated with the NATMAP Slave Province Project. They are logically grouped within this project because they are Quaternary studies carried out in the Slave Province, in similar years and with similar funding.

4. Funding Source

The final section of the Project Metadata page, shown in Figure 24 for Project Key = 210001, lists the funding sources for the project. Sometimes this information is not available.

(Full Page: www, pdf)



Project Funding

NATMAP Slave Province

Figure 24. Funding source section from Project Metadata page

6.4 PUBLICATIONS

A publication is a public release of information that results from a specific survey and may or may not include the geochemical data from the survey. It is most often released as a published document, but can be an unpublished thesis or report. A survey may be published in one, many or no publications.

6.4.1 Publication Metadata Page

An example of a Publication Metadata page is shown below in sections. At the top of each section are two hyperlinks which provide views of the entire metadata page on the GDR (www) or as a PDF file (pdf). These may or may not open in their own window (see Section 1.3).

There are up to five (5) sections on the Publication Metadata page. Not every page will contain all five sections. Each section is described below:

- Recommended Citation
- Survey Coverage
- GeoScan Records
- Release Notices
- Downloadable Files

- (Full Page: www, pdf)

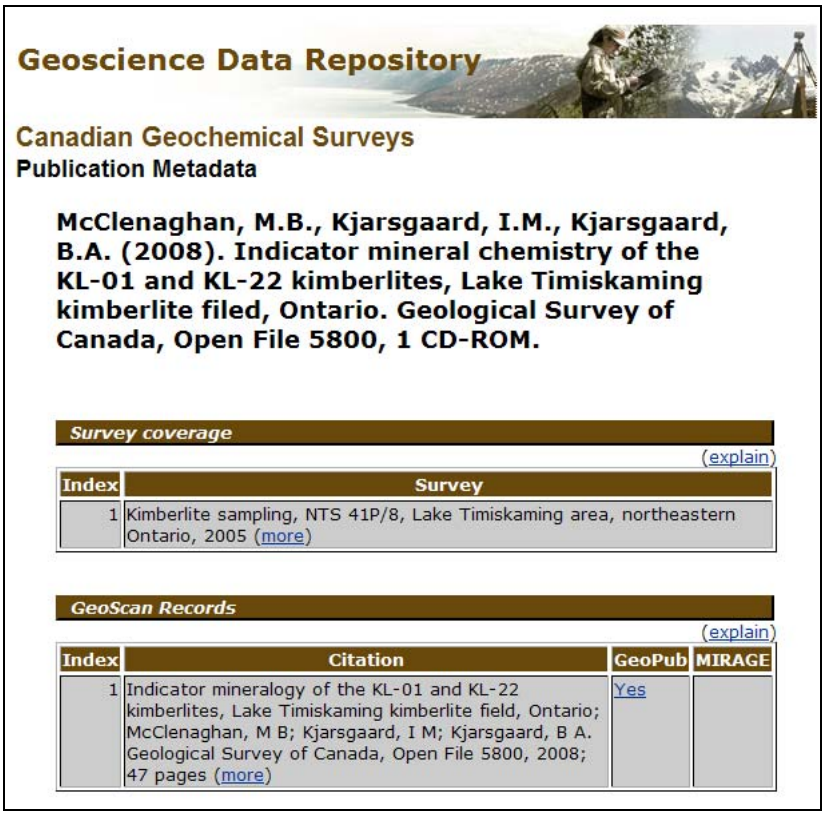


Figure 25. First three sections of Publication Metadata page

The first three elements of the Publication Metadata page for GSC Open File 5800 (Publication ID = 1394, associated with Survey Key = 210331) are shown in Figure 25 and are described below:

1. Recommended Citation

In this section, the citation for the publication is given.

2. Survey Coverage

A short description of the survey described by the publication is provided. It is possible to have more than one survey listed if the data from those surveys were released in the same publication. In the example above, Open File 5800 contains information about only one survey.

At the end of the survey title, a link to the Survey Metadata page is provided. This is the third of three ways to view the survey metadata.

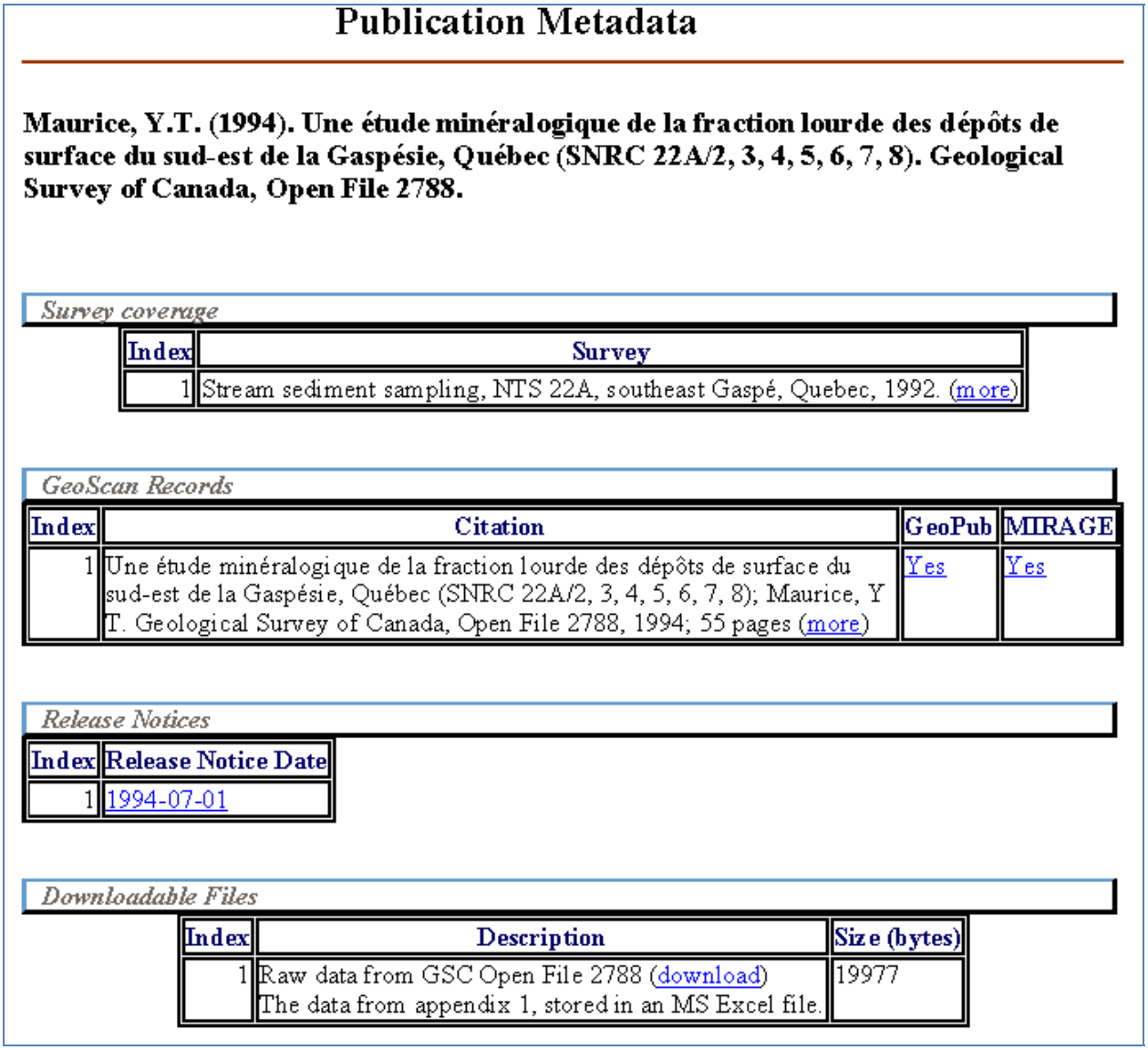
3. GeoScan Records

The next section on the Publication Metadata page is for GeoScan Records. GeoScan is the bibliographic database for scientific publications of the Earth Sciences Sector (ESS) of Natural Resources Canada. This section will appear if the publication was published by ESS or if it was published by another agency but has an ESS Contribution Number. There are rare cases where a publication should be in GeoScan but its entry has been overlooked.

The GeoScan Records table displays the citation for the publication as it appears in GeoScan and provides a link to the full GeoScan record. There are two columns at the end of each row in this table: GeoPub and Mirage. One or both of these columns may be populated with a "yes" link, indicating that there are corresponding entries in the GeoPub and Mirage databases. GeoPub allows free download of the publication and Mirage allows free download of maps associated with the publication. In the example above, the Open File can be downloaded from GeoPub. There are no maps associated with the Open File and therefore no link to the Mirage database.

4. Release Notices

- (Full Page: www, pdf)



Publication Metadata

Maurice, Y.T. (1994). Une étude minéralogique de la fraction lourde des dépôts de surface du sud-est de la Gaspésie, Québec (SNRC 22A/2, 3, 4, 5, 6, 7, 8). Geological Survey of Canada, Open File 2788.

Survey coverage

Index	Survey
1	Stream sediment sampling, NTS 22A, southeast Gaspé, Quebec, 1992. (more)

GeoScan Records

Index	Citation	GeoPub	MIRAGE
1	Une étude minéralogique de la fraction lourde des dépôts de surface du sud-est de la Gaspésie, Québec (SNRC 22A/2, 3, 4, 5, 6, 7, 8); Maurice, Y T. Geological Survey of Canada, Open File 2788, 1994; 55 pages (more)	Yes	Yes

Release Notices

Index	Release Notice Date
1	1994-07-01

Downloadable Files

Index	Description	Size (bytes)
1	Raw data from GSC Open File 2788 (download) The data from appendix 1, stored in an MS Excel file.	19977

Figure 26. Publication Metadata page showing release notice section

Older publications may also have a section called Release Notices, as shown in Figure 26 for GSC Open File 2788 (Publication ID = 237, associated with Survey Key = 210314). There is a link to an exact copy of the release notice as it appeared in the GSC Information Circular. Initially, these release notices were valuable as they included information (metadata) about the publication and survey. Over time, the notices became less informative, with later ones providing only a citation, a description of the format as well as viewing, sales and price information.

5. Downloadable Files

The final section on the Publication Metadata page provides a link to download GSC data if they exist, as shown in Figure 26. Data from newer GSC publications are available through GeoPub. Some earlier Open Files that were released with printed data only, may have a downloadable file in the format in which it was later obtained.

Note: some of these sections are not available for publications from organisations other than GSC and not every GSC publication will have all sections.

6.5 Interconnectivity

The content of the three main metadata pages (SURVEYS, PROJECTS and PUBLICATIONS) have been described in the above sections. As previously noted, these three types of pages are highly interconnected. This allows the related metadata to be viewed independently of where the metadata search began.

In summary, the Survey Metadata pages can be accessed in three ways:

- from the Surveys html Index Table (Section 3.2.1);
- from the Survey History section of the Project Metadata page (Section 6.3.1);
- from the Survey Coverage section of the Publication Metadata page (Section 6.4.1).

The Project Metadata pages can be accessed in two ways:

- from the Projects html Index Table (Section 3.2.2);
- from the Project History section of the Survey Metadata page (Section 6.2.1).

The Publication Metadata pages can also be accessed in two ways:

- from the Publications html Index Table (Section 3.2.3);
- from the Publication History section of the Survey Metadata Page (Section 6.2.1).

Chapter 7 Extended Metadata

7.1 Introduction

For 65 surveys across Canada, 39 of which are in New Brunswick, the raw data have been compiled. For these surveys, there is an *Extended Metadata* description on the Survey Metadata page. This description is divided into four (4) sections: Sample locations, Sample material, Preparation laboratory sample material and Analytical history (Figure 27). Each section can be expanded by clicking on the "+" symbol to the left of the section title. If JavaScript is disabled, the sections will already be expanded.

- (Full Page: www, pdf)

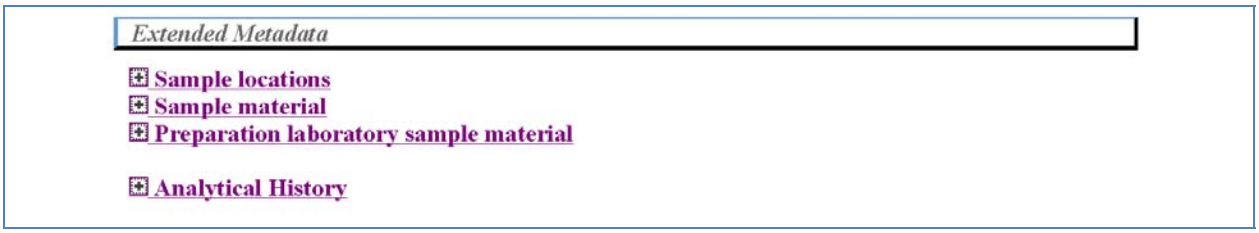


Figure 27. Survey Metadata page showing extended metadata section

7.2 Extended Metadata Sections

There are four (4) Extended Metadata sections. They are described below:

- Sample locations
- Sample material
- Preparation laboratory sample material
- Analytical History

1. Sample locations

For Survey Key = 130004 (the fourth survey catalogued for Organisation ID = 13 = New Brunswick Department of Natural Resources), the following Extended Metadata are available under Sample locations, as shown in Figure 28:

- (Full Page: www, pdf)

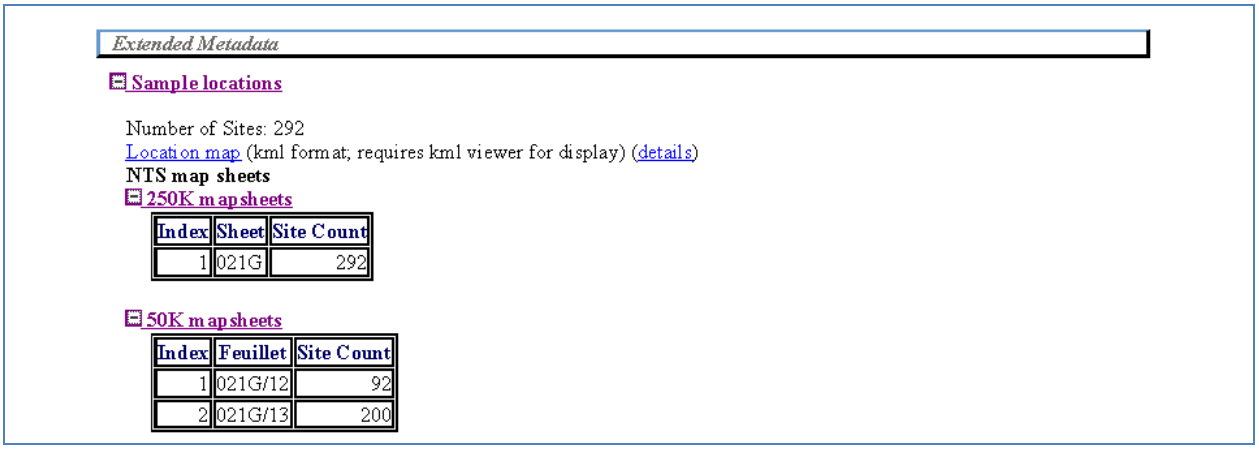


Figure 28. Expanded sample locations section in Extended Metadata

This section displays:

1. the number of sample sites = 292
2. a hyperlink to a location map in KML format (need KML viewer) – described below *
3. the site count for each NTS 250K sheet covered by the survey – in this example all 292 samples were collected in the same 1:250,000 map sheet, NTS 21G
4. the site count for each NTS 50K sheet covered by the survey – in this example, 92 samples were collected in NTS 21G/12 and 200 were collected in NTS 21G/13

* Location Map – A KML version of the location map can be displayed by clicking on the link to "Location map". It requires the installation of a KML viewer, such as Google Earth, before it can be displayed. Clicking on the "details" hyperlink connects to the Google Earth website.

- (KML map: www)

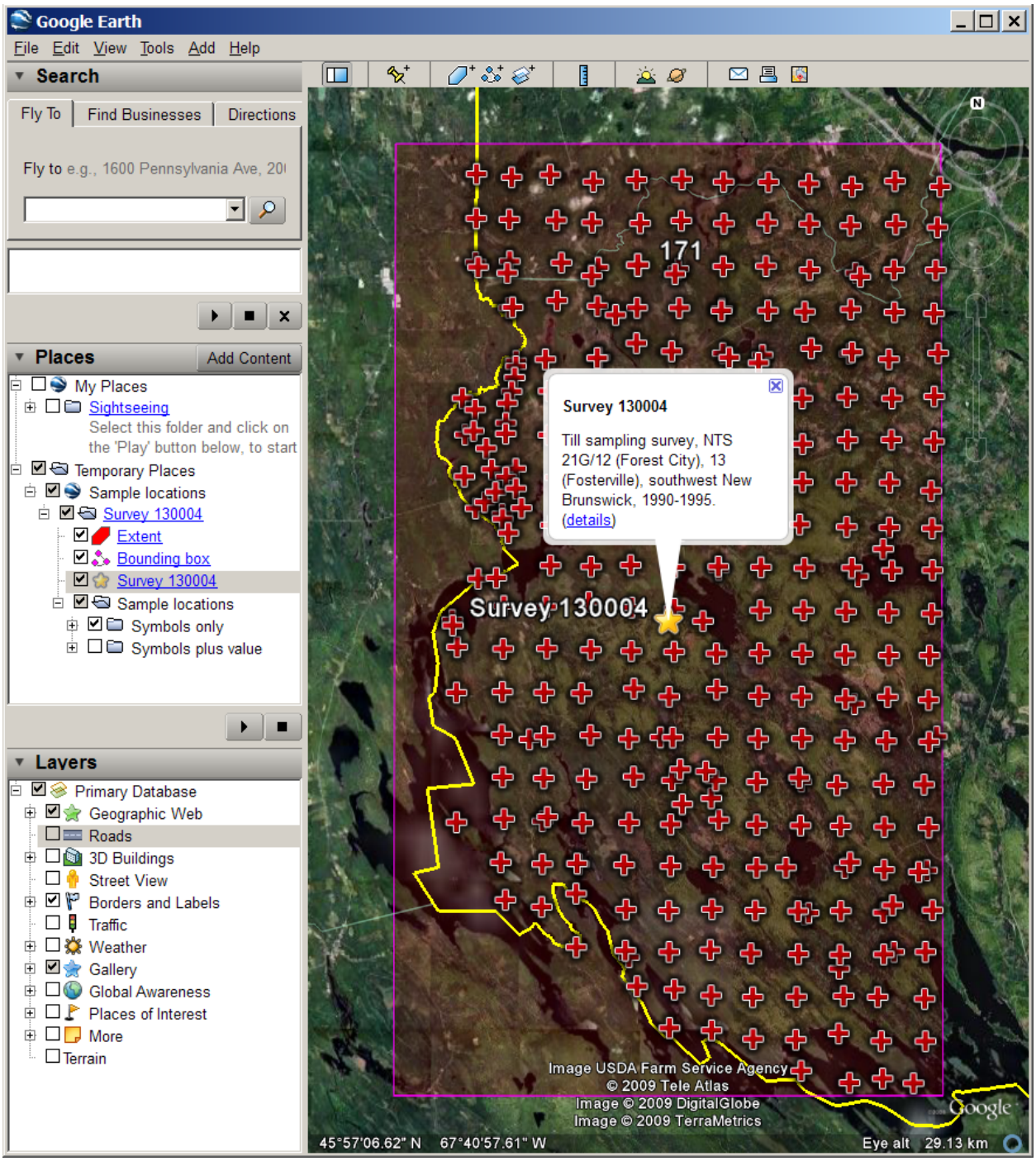


Figure 29. KML sample location map for Survey 130004

On the KML map (Figure 29), the maximum survey limits are represented by a bounding box shown by a purple rectangle. In addition to the bounding box, a polygon may be seen which more closely constrains the extent of the sample sites. Sometimes the polygon is the same shape as the bounding box, and only one outline will be seen (as is the case in Figure 29). The location

of some surveys is represented by several polygons or polygons that contain holes. For example, if the survey was carried out in more than one area, it will be represented by more than one polygon on the KML map. These polygons will be contained within one bounding box, representing the maximum extent of the survey.

The KML map also displays a yellow star which designates the centroid of the polygon. If the survey is represented by more than one polygon, each polygon will have its own centroid, meaning that there may be more than one star in a bounding box. Clicking on the centroid star pops up a balloon with the Survey Key, a title and a link to "details", as shown in Figure 29. If Google Earth is your chosen KML viewer, clicking on "details" in the centroid balloon will display the corresponding Survey Metadata page. In this case, the KML map was opened from the Survey Metadata page and it is not necessary to view the metadata page again. The clickable star is useful if you have begun your search by looking at the KML index maps (available from the In Focus box at http://gdr.nrcan.gc.ca/geochem/index_e.php) instead of starting with the Survey index table as done in this tutorial.

On the KML map, each sample site is represented by a red cross. Hovering over the cross with the cursor displays a unique integer (171 as shown in Figure 29). This integer can be matched to a corresponding record in one or more associated data files as explained in Chapter 9 – How to Use the Spreadsheets. When the red cross is clicked, a balloon displaying the latitude and longitude of that sample site appears.

2. Sample material

- (Full Page: www, pdf)

Sample material

Index	Material	Sample Count	Sample Hierarchy
1	Basal till	248	Sample: Lithosphere: Unconsolidated: Terrestrial: Glacial: Till: Basal till
2	Ablation till	49	Sample: Lithosphere: Unconsolidated: Terrestrial: Glacial: Till: Ablation till
3	Deformation till	1	Sample: Lithosphere: Unconsolidated: Terrestrial: Glacial: Till: Deformation till
4	Glaciofluvial	3	Sample: Lithosphere: Unconsolidated: Terrestrial: Glacial: Glaciofluvial
5	Glaciomarine/lacustrine	1	Sample: Lithosphere: Unconsolidated: Terrestrial: Glacial: Glaciomarine/lacustrine
6	Weathered bedrock	3	Sample: Lithosphere: Rock: Weathered bedrock

Figure 30. Expanded sample material section from Extended Metadata

As shown in Figure 30, the Sample material section provides information on the total number of samples collected in the field for each type of sample material. The sample's hierarchical classification is also shown. In this example, for Survey Key = 130004, there are 305 samples that have been classified. From the Site Count in Section 1 (Sample locations), these 305 samples are from 292 unique sites, meaning more than one sample was collected at several sites.

3. Preparation laboratory sample material

- (Full Page: www, pdf)

Preparation laboratory sample material

Index	Field sample	Prep Lab sample	# collected	# prepared	# sent for analysis
1	Basal till	< 63 micron	248	248	665
2	Ablation till	< 63 micron	49	49	139
3	Deformation till	< 63 micron	1	1	2
4	Glaciofluvial	< 63 micron	3	3	6
5	Glaciomarine/lacustrine	< 63 micron	1	1	3
6	Weathered bedrock	< 63 micron	3	3	7

Figure 31. Expanded preparation laboratory sample material section from Extended Metadata

When this section for Survey Key = 130004 is expanded, a table indicating the type of sample material collected, the size fraction used for analysis, and the number of samples collected, prepared and sent for analysis is shown (Figure 31). There is a complex relationship between these columns meaning that the numbers might not "add up". In some cases, the samples are prepared more than once, or a subset was sent for two sets of analyses. The main purpose of these summary counts is to give the user a sense of the scope of the survey: were lots of samples collected and analysed, or just a few?

4. Analytical History

This is the final section under *Extended Metadata* in the Survey Description portion of the Survey Metadata page, shown for Survey Key = 130004. When this section is expanded, the first of three nested tables is displayed:

- (Full Page: www, pdf)

Analytical History

Index	Year	# analysed	Analytical package	Laboratory	Spreadsheet			Details
					N	H	T	
1		39	ActLabs ICP-AES (7 elements)	Activation Laboratories Limited, Ancaster, Ontario				
2	1994	332	NBDNRE AAS	New Brunswick DNRE Geochemical Laboratory				
3	1994	100	Bondar Clegg /Seaman	Bondar-Clegg and Company Limited				
4	1994	335	ActLabs INA, Hg CV-AAS, Sn fusion ICP-ES	Activation Laboratories Limited, Ancaster, Ontario				
5	2006	16	ActLabs Au+53 (1H2) (v2)	Activation Laboratories Limited, Ancaster, Ontario				

Figure 32. Expanded analytical history section from Extended Metadata

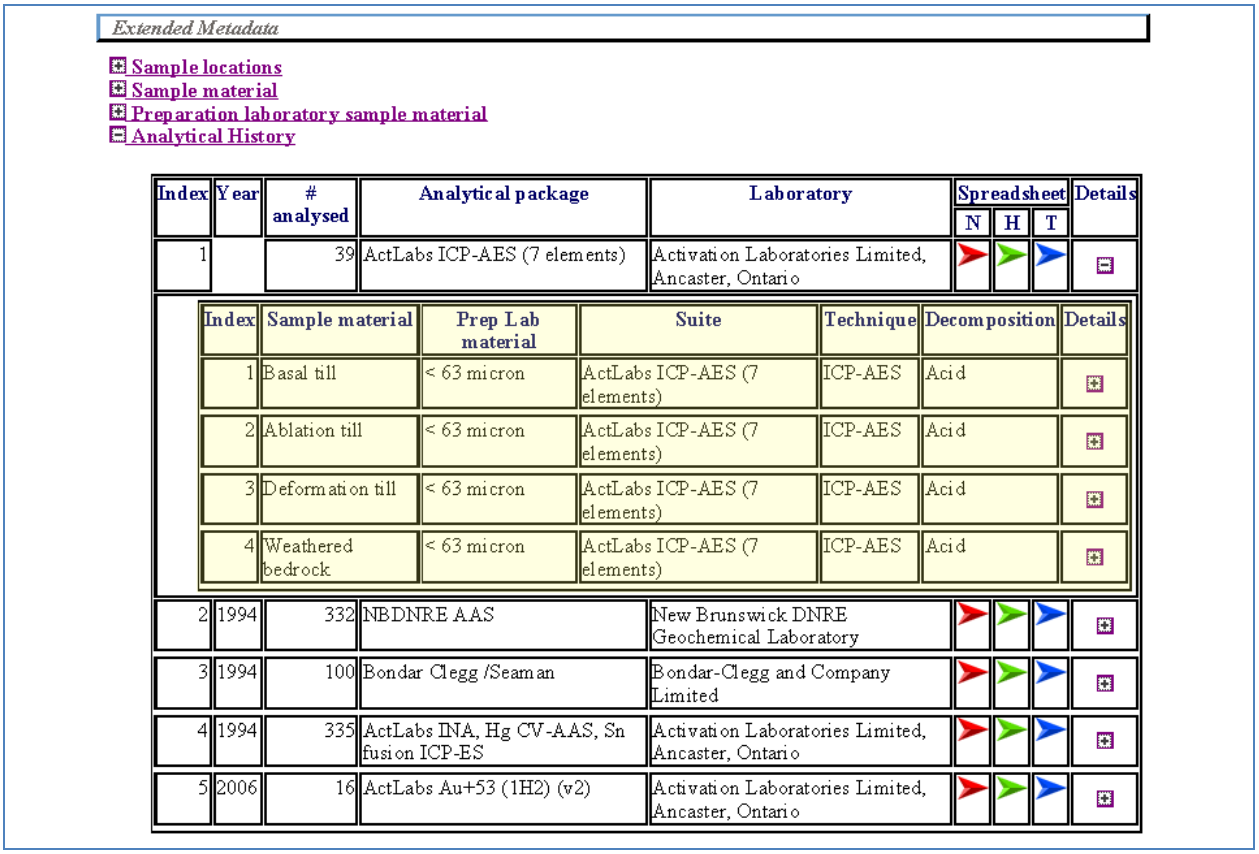
This first table has the following information:

1. the year the samples were analysed; sometimes the year is unknown;

2. the number of samples that were analysed;
3. the analytical package used (see Chapter 10 for a description);
4. the analytical laboratory that carried out the analysis;
5. links to the analytical data in Excel spreadsheets; the spreadsheets for each analytical package can be viewed in three formats, depending on how you want to view data below the detection limit:
   - select "**N**" () to view the spreadsheet with "less than" values reported as **N**egative i.e. <2 becomes -2
   - select "**H**" () to view the spreadsheet with "less than" values reported as **H**alf their value i.e. <2 becomes 1
   - select "**T**" () to view the spreadsheet with "less than" values reported as **T**ext i.e. <2 stays as <2

   The contents of the spreadsheet are explained in Chapter 8. The spreadsheet may (a) open in your browser window, (b) open in a new window, or (c) be downloaded by ftp. If the spreadsheet opens in the same browser window, press the "Back" button to go back to the unexpanded Analytical history section again, to avoid closing the session.
6. more analytical metadata can be viewed by clicking on the "+" symbol under Details in the last column. That row of the first table is then expanded to display the second of the three nested tables:

- (Full Page: www, pdf)



Extended Metadata

Sample locations
Sample material
Preparation laboratory sample material
Analytical History

Index	Year	# analysed	Analytical package	Laboratory	Spreadsheet N	Spreadsheet H	Spreadsheet T	Details
1		39	ActLabs ICP-AES (7 elements)	Activation Laboratories Limited, Ancaster, Ontario				

Index	Sample material	Prep Lab material	Suite	Technique	Decomposition	Details
1	Basal till	< 63 micron	ActLabs ICP-AES (7 elements)	ICP-AES	Acid	
2	Ablation till	< 63 micron	ActLabs ICP-AES (7 elements)	ICP-AES	Acid	
3	Deformation till	< 63 micron	ActLabs ICP-AES (7 elements)	ICP-AES	Acid	
4	Weathered bedrock	< 63 micron	ActLabs ICP-AES (7 elements)	ICP-AES	Acid	

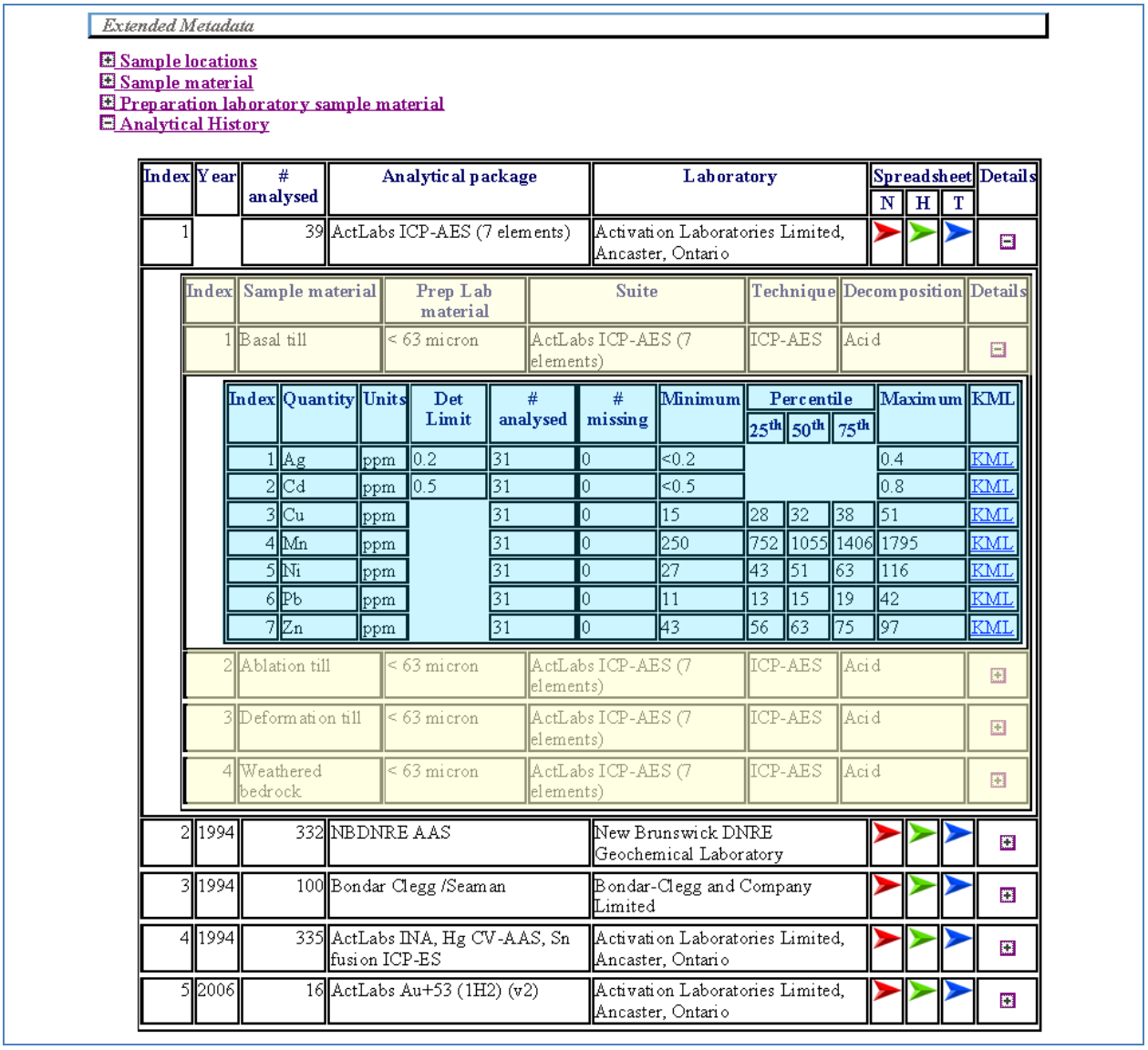
2	1994	332	NBDNRE AAS	New Brunswick DNRE Geochemical Laboratory				
3	1994	100	Bondar Clegg /Seaman	Bondar-Clegg and Company Limited				
4	1994	335	ActLabs INA, Hg CV-AAS, Sn fusion ICP-ES	Activation Laboratories Limited, Ancaster, Ontario				
5	2006	16	ActLabs Au+53 (1H2) (v2)	Activation Laboratories Limited, Ancaster, Ontario				

Figure 33. First row of analytical history table expanded to show second nested table

In Figure 33, the Details section of Index 1 (row 1) was expanded, displaying the second of three nested tables, shown in pale yellow. This second table appears nested between the expanded row and the rest of the rows.

The second table gives more specific information about the sample material, the type of laboratory preparation of the sample material, the suite of elements analysed, the analytical technique used and the method of decomposition, if applicable. By clicking on the "+" symbol at the end of the row, the Details section of this second table can be expanded to give the third of the three nested tables:

- (Full Page: www, pdf)



Extended Metadata

Sample locations
Sample material
Preparation laboratory sample material
Analytical History

Index	Year	# analysed	Analytical package	Laboratory	Spreadsheet N	Spreadsheet H	Spreadsheet T	Details
1		39	ActLabs ICP-AES (7 elements)	Activation Laboratories Limited, Ancaster, Ontario				

Index	Sample material	Prep Lab material	Suite	Technique	Decomposition	Details
1	Basal till	< 63 micron	ActLabs ICP-AES (7 elements)	ICP-AES	Acid	

Index	Quantity	Units	Det Limit	# analysed	# missing	Minimum	Percentile 25th	Percentile 50th	Percentile 75th	Maximum	KML
1	Ag	ppm	0.2	31	0	<0.2				0.4	KML
2	Cd	ppm	0.5	31	0	<0.5				0.8	KML
3	Cu	ppm		31	0	15	28	32	38	51	KML
4	Mn	ppm		31	0	250	752	1055	1406	1795	KML
5	Ni	ppm		31	0	27	43	51	63	116	KML
6	Pb	ppm		31	0	11	13	15	19	42	KML
7	Zn	ppm		31	0	43	56	63	75	97	KML

Index	Sample material	Prep Lab material	Suite	Technique	Decomposition	Details
2	Ablation till	< 63 micron	ActLabs ICP-AES (7 elements)	ICP-AES	Acid	
3	Deformation till	< 63 micron	ActLabs ICP-AES (7 elements)	ICP-AES	Acid	
4	Weathered bedrock	< 63 micron	ActLabs ICP-AES (7 elements)	ICP-AES	Acid	

Index	Year	# analysed	Analytical package	Laboratory	Spreadsheet N	Spreadsheet H	Spreadsheet T	Details
2	1994	332	NBDNRE AAS	New Brunswick DNRE Geochemical Laboratory				
3	1994	100	Bondar Clegg /Seaman	Bondar-Clegg and Company Limited				
4	1994	335	ActLabs INA, Hg CV-AAS, Sn fusion ICP-ES	Activation Laboratories Limited, Ancaster, Ontario				
5	2006	16	ActLabs Au+53 (1H2) (v2)	Activation Laboratories Limited, Ancaster, Ontario				

Figure 34. Analytical history table expanded to show three nested tables

In Figure 34, the Details section of Index 1 (row 1) of the second (yellow) table was expanded, displaying the third of the three nested tables, shown in pale blue. This third table appears nested between the expanded row and the rest of the rows.

The third table indicates the elements analysed, their units of measurement, their determination limits, the number of samples analysed and the number of samples missing. The table also gives the minimum and maximum values for the dataset as well as the 25th, 50th and 75th percentiles, if statistically valid.

The final column of this third table provides a link to a KML map which displays the analytical value for the selected element at each sample site. See Chapter 9 for additional details about the content of the KML map.

Chapter 8 How to Use the Spreadsheets

8.1 Introduction

This chapter describes the structure of the Excel spreadsheets of analytical data available from the Analytical History section of surveys with *Extended Metadata* sections on their Survey Metadata page. As noted at the beginning of Chapter 7, raw data for 65 till surveys from across Canada have been compiled into these spreadsheets.

8.2 Column Structure

The Excel spreadsheets all have the same column structure:

Lab_Key

A unique identifier composed of three integers separated by colons:

1 - the Organisation_ID, which indicates the organisation responsible for the analytical work (e.g. 21 = GSC Northern Canada Division; 13 = New Brunswick Department of Natural Resources); the full list of IDs can be found in the technical documentation for the underlying database (Adcock, 2009b);

2 - the Analytical_Sample_Bundle_ID which is an arbitrary integer and reflects the group with which the sample in question was bundled and sent for analysis;

3 - the Lab_Sample_ID, an arbitrary integer which increases by 1 for each sample analysed within a specific sample bundle

Survey_Key

A unique identifier for each survey, composed of two integers separated by colons:

1 - the Organisation_ID, which represents the organisation responsible for the field work; the full list of IDs can be found in the technical documentation for the underlying database (Adcock, 2009b);

2 - the Survey_ID, which is an arbitrary number specific to an organisation, and which increases by 1 each time a new survey is assigned to that organisation.

Field_Key

In order to create a unique field identifier, the Field_Key is made up of four arbitrary integers separated by colons:

1 - the Site_ID, which is an arbitrary integer that is incremented at each new site visited; this is the integer that is displayed beside the red crosses on the KML location maps that are found under Sample Locations in Extended Metadata on the Survey Metadata pages;

2 - the Field Sample_ID (which usually equals 1 i.e. one sample is collected at the site);

3 - the Preparation_Lab_Sample_ID (which usually equals 1 i.e. the sample is prepared once for analysis);

4 - the Sample_Split_ID which is an arbitrary integer used to indicate whether the sample is the first or second of a duplicate pair (duplicate pairs are used to measure lab precision);

Sample_Type_ID

An integer ID that stores the type of sample (e.g. 45 = basal till); the full list of IDs can be found in the technical documentation for the underlying database (Adcock, 2009b).

Preparation_Method_Type_ID

An integer ID that stores the preparation method for the sample (e.g. 4 = < 63 µm, 14 = HMC table split); the full list of IDs can be found in the technical documentation for the underlying database (Adcock, 2009b).

Control_Reference_ID

An integer ID that stores the reference material used as a laboratory control (e.g. 95 = the international soil/till reference material TILL 4); the full list of IDs can be found in the technical documentation for the underlying database (Adcock, 2009b).

Latitude_NAD83/Longitude_NAD83

Geographic locations of the samples, based on North American Datum 83.

Sample_Type_Name_en

The sample type in English; this is a word or phrase, equivalent to the Sample_Type_ID explained above.

Preparation_Method_Name_en

The method used to prepare the sample for analysis in English; this is a word or phrase, equivalent to the Preparation_Method_Type_ID explained above.

The analytical data are found in the columns following Preparation_Method_Name_en. The column headers include the element symbol and analytical method. The units are not listed in the spreadsheet but can be found in the "Analytical History" section of the Survey Metadata web page (by expanding the Details section for the corresponding "analytical package"). The actual elements will vary depending on the analytical package being viewed. The analytical data columns remain the same in the N, H and T spreadsheets for the same analytical package.

The Lab_Key, Survey_Key and Field_Key are consistent across all of the spreadsheets. They allow the contents of different spreadsheets to be merged together.

8.3 Determination Limits and Detection Limits

The definitions for determination limit and detection limit used in this Open File are those used by J.J. Lynch (pers. comm., 1990). A determination limit represents the lowest value that is obtainable by a particular analytical method. In some situations (low sample weight in INAA, for example), this lowest level may not be attainable for a particular sample, and the laboratory will report a "detection limit" which is greater than the "determination limit". If an analytical measurement does not have variable detection limits, the distinction between detection and determination limits disappears.

In Table 8, Element 1 has undetected values of <10, <20 and <30. Therefore, 10, 20 and 30 are the variable detection limits. The lowest of these is <10, which means that 10 is the determination limit. For Element 2, the only undetected values are all reported as <5. In this case, the detection limit is identical to the determination limit, which equals 5.

Table 8. Detection limits vs. determination limits

Sample#	Element 1	Element 2
1	61	<5
2	<10	41
3	42	23
4	<20	11
5	<30	<5
6	55	<5
7	<20	17
8	19	22
9	52	<5
10	28	9

Analytical values in a dataset that are close to the determination limit are not necessarily reliable. To calculate percentiles when the dataset has variable detection limits, all values below the highest variable detection limit (including those that are considered "detected" values (e.g. 19 and 28 in the Element 1 example above are both below the highest detection limit of 30)) are grouped together in the lowest category (see Helsel, 2005).

Chapter 9 KML Maps of Geochemical Data

9.1 Introduction

This chapter describes how to open a KML map and view the analytical data for a survey. It assumes that your KML viewer is Google Earth. The tutorial demonstrates the steps for viewing the map for one of the surveys catalogued for the Geological Survey of Canada, Northern Canada Division and identifies the features shown on the map. Full descriptions of the tables referred to in this tutorial are available in the Analytical History section of Chapter VI – Extended Metadata.

9.2 Where to Start

To begin this tutorial, go to http://gdr.nrcan.gc.ca/geochem/index_e.php and click "Browse by category". Then choose the Surveys index table. Once you have selected the Surveys index table, click on the "Key" column header. This will sort the column in ascending order. Find Key = 210038 and click on it. This opens up the Survey Metadata page for that survey (shortcut). Scroll down to the Extended Metadata section and expand Analytical history by clicking on the "+" symbol. This opens the first of three nested tables, shown in Figure 35:

- (Full Page: www, pdf)

Extended Metadata

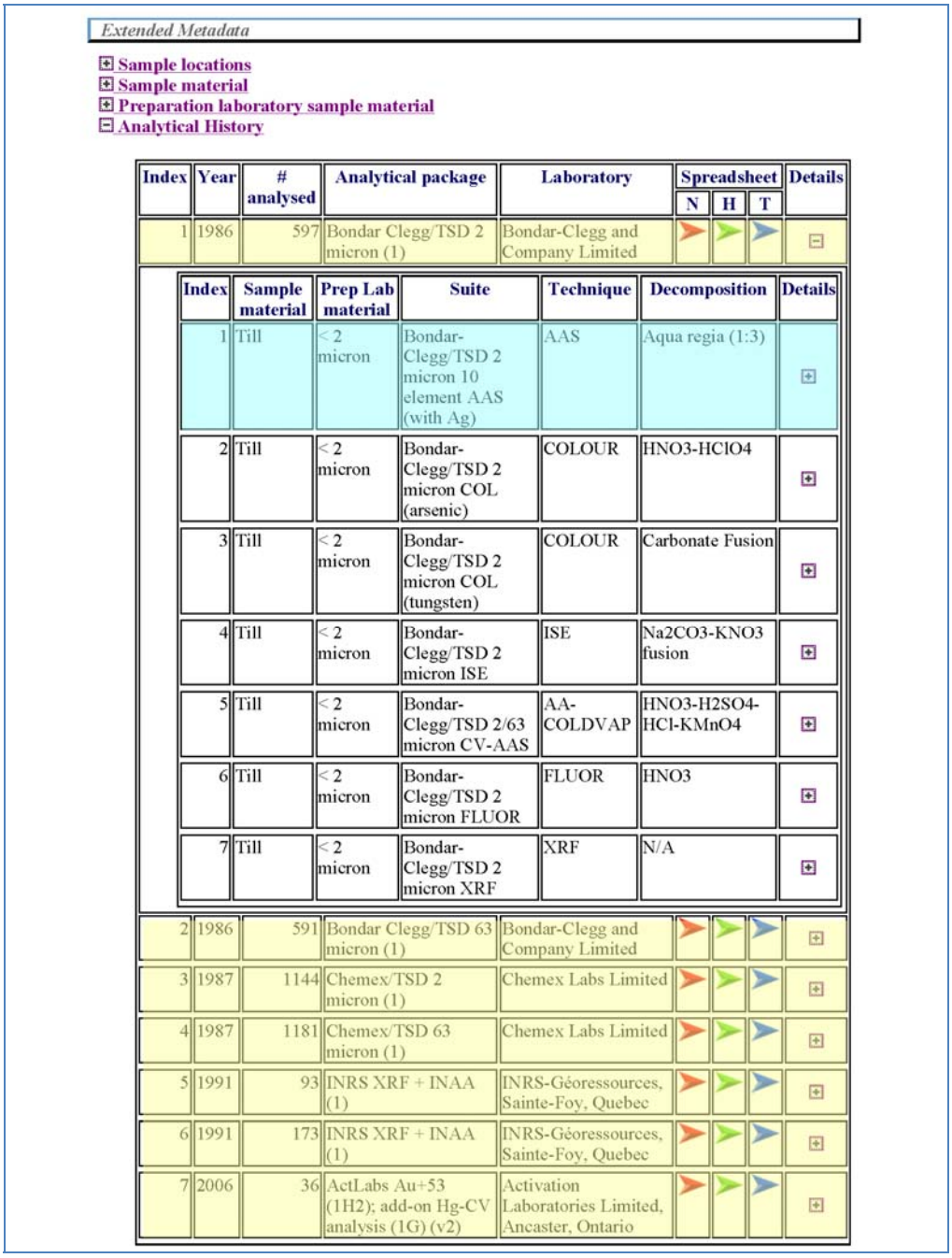
⊞ Sample locations
⊞ Sample material
⊞ Preparation laboratory sample material
⊟ Analytical History

Index	Year	# analysed	Analytical package	Laboratory	Spreadsheet			Details
					N	H	T	
1	1986	597	Bondar Clegg/TSD 2 micron (1)	Bondar-Clegg and Company Limited				
2	1986	591	Bondar Clegg/TSD 63 micron (1)	Bondar-Clegg and Company Limited				
3	1987	1144	Chemex/TSD 2 micron (1)	Chemex Labs Limited				
4	1987	1181	Chemex/TSD 63 micron (1)	Chemex Labs Limited				
5	1991	93	INRS XRF + INAA (1)	INRS-Géoressources, Sainte-Foy, Quebec				
6	1991	173	INRS XRF + INAA (1)	INRS-Géoressources, Sainte-Foy, Quebec				
7	2006	36	ActLabs Au+53 (1H2); add-on Hg-CV analysis (1G) (v2)	Activation Laboratories Limited, Ancaster, Ontario				

Figure 35. Analytical history - first table

Next, expand the “Details” section for Index = 1 by clicking on the “+” symbol in the last column of the row highlighted in yellow. This opens up the second nested table:

- (Full Page: www, pdf)



Extended Metadata

Sample locations
Sample material
Preparation laboratory sample material
Analytical History

Index	Year	# analysed	Analytical package	Laboratory	Spreadsheet N	Spreadsheet H	Spreadsheet T	Details
1	1986	597	Bondar Clegg/TSD 2 micron (1)	Bondar-Clegg and Company Limited				

Index	Sample material	Prep Lab material	Suite	Technique	Decomposition	Details
1	Till	< 2 micron	Bondar-Clegg/TSD 2 micron 10 element AAS (with Ag)	AAS	Aqua regia (1:3)	
2	Till	< 2 micron	Bondar-Clegg/TSD 2 micron COL (arsenic)	COLOUR	HNO3-HClO4	
3	Till	< 2 micron	Bondar-Clegg/TSD 2 micron COL (tungsten)	COLOUR	Carbonate Fusion	
4	Till	< 2 micron	Bondar-Clegg/TSD 2 micron ISE	ISE	Na2CO3-KNO3 fusion	
5	Till	< 2 micron	Bondar-Clegg/TSD 2/63 micron CV-AAS	AA-COLDVAP	HNO3-H2SO4-HCl-KMnO4	
6	Till	< 2 micron	Bondar-Clegg/TSD 2 micron FLUOR	FLUOR	HNO3	
7	Till	< 2 micron	Bondar-Clegg/TSD 2 micron XRF	XRF	N/A	

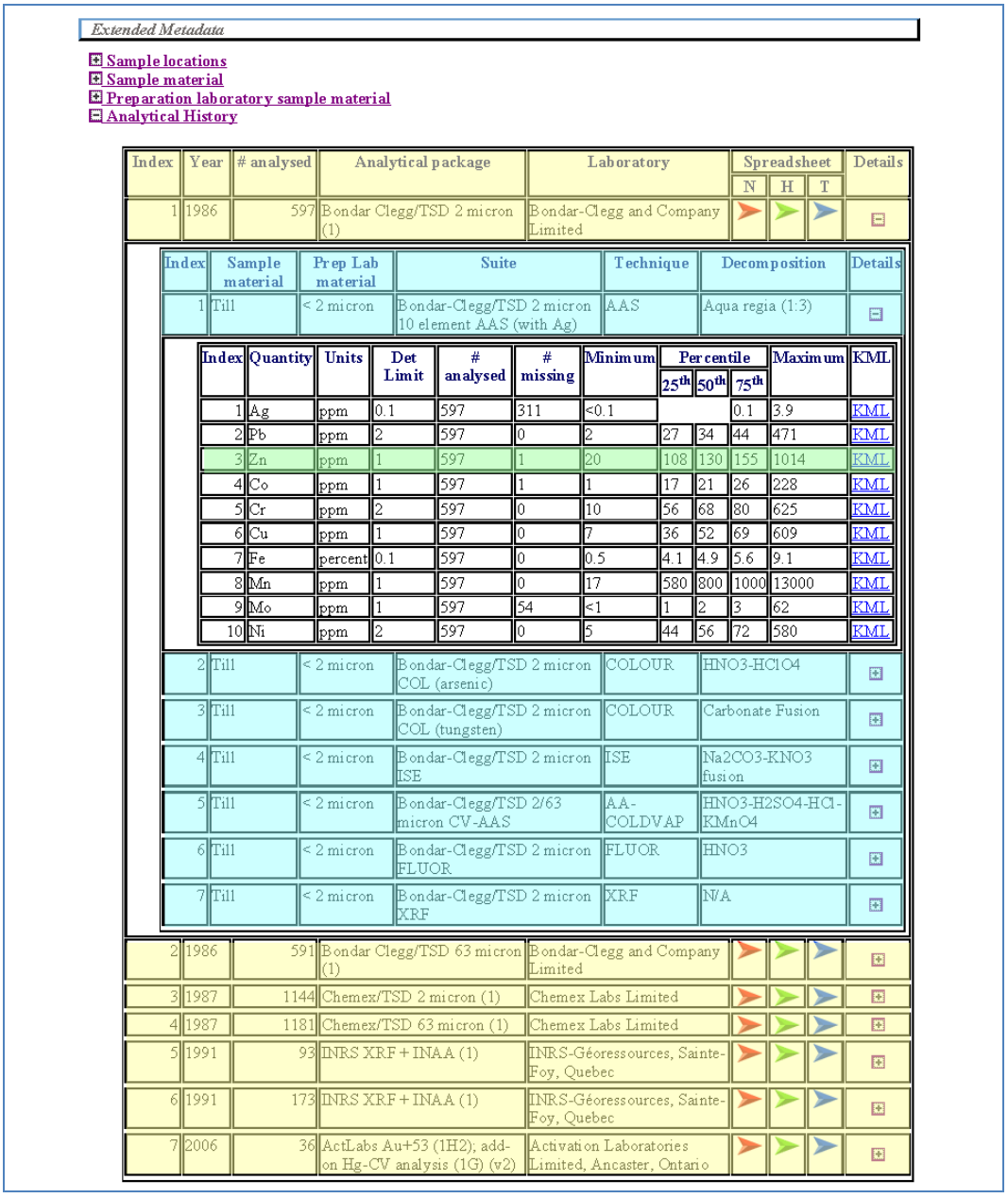
2	1986	591	Bondar Clegg/TSD 63 micron (1)	Bondar-Clegg and Company Limited				
3	1987	1144	Chemex/TSD 2 micron (1)	Chemex Labs Limited				
4	1987	1181	Chemex/TSD 63 micron (1)	Chemex Labs Limited				
5	1991	93	INRS XRF + INAA (1)	INRS-Géoressources, Sainte-Foy, Quebec				
6	1991	173	INRS XRF + INAA (1)	INRS-Géoressources, Sainte-Foy, Quebec				
7	2006	36	ActLabs Au+53 (1H2); add-on Hg-CV analysis (1G) (v2)	Activation Laboratories Limited, Ancaster, Ontario				

Figure 36. Analytical history - second table

The second table is nested within the first table under the row that was expanded. In Figure 36, all of the rows of the first table are now shown in yellow to illustrate the table nesting. The first row of the second table is highlighted in blue.

Next, expand the "Details" section for Index = 1 of the second table, by clicking on the "+" symbol in the last column of the row highlighted in blue. The analytical suite we have selected is from Bondar-Clegg's 10 element AAS package, and the samples were sieved to < 2 µm by Terrain Sciences Division (TSD), the predecessor to Northern Canada Division. Expanding the "Details" section opens the final of the three nested tables:

- (Full Page: www, pdf)



Extended Metadata

Sample locations
Sample material
Preparation laboratory sample material
Analytical History

Index	Year	# analysed	Analytical package	Laboratory	Spreadsheet N	Spreadsheet H	Spreadsheet T	Details
1	1986	597	Bondar Clegg/TSD 2 micron (1)	Bondar-Clegg and Company Limited				

Index	Sample material	Prep Lab material	Suite	Technique	Decomposition	Details
1	Till	< 2 micron	Bondar-Clegg/TSD 2 micron 10 element AAS (with Ag)	AAS	Aqua regia (1:3)	

Index	Quantity	Units	Det Limit	# analysed	# missing	Minimum	Percentile 25th	Percentile 50th	Percentile 75th	Maximum	KML
1	Ag	ppm	0.1	597	311	<0.1			0.1	3.9	KML
2	Pb	ppm	2	597	0	2	27	34	44	471	KML
3	Zn	ppm	1	597	1	20	108	130	155	1014	KML
4	Co	ppm	1	597	1	1	17	21	26	228	KML
5	Cr	ppm	2	597	0	10	56	68	80	625	KML
6	Cu	ppm	1	597	0	7	36	52	69	609	KML
7	Fe	percent	0.1	597	0	0.5	4.1	4.9	5.6	9.1	KML
8	Mn	ppm	1	597	0	17	580	800	1000	13000	KML
9	Mo	ppm	1	597	54	<1	1	2	3	62	KML
10	Ni	ppm	2	597	0	5	44	56	72	580	KML

2	Till	< 2 micron	Bondar-Clegg/TSD 2 micron COL (arsenic)	COLOUR	HNO3-HClO4	
3	Till	< 2 micron	Bondar-Clegg/TSD 2 micron COL (tungsten)	COLOUR	Carbonate Fusion	
4	Till	< 2 micron	Bondar-Clegg/TSD 2 micron ISE	ISE	Na2CO3-KNO3 fusion	
5	Till	< 2 micron	Bondar-Clegg/TSD 2/63 micron CV-AAS	AA-COLDVAP	HNO3-H2SO4-HCl-KMnO4	
6	Till	< 2 micron	Bondar-Clegg/TSD 2 micron FLUOR	FLUOR	HNO3	
7	Till	< 2 micron	Bondar-Clegg/TSD 2 micron XRF	XRF	N/A	

2	1986	591	Bondar Clegg/TSD 63 micron (1)	Bondar-Clegg and Company Limited				
3	1987	1144	Chemex/TSD 2 micron (1)	Chemex Labs Limited				
4	1987	1181	Chemex/TSD 63 micron (1)	Chemex Labs Limited				
5	1991	93	INRS XRF + INAA (1)	INRS-Géoressources, Sainte-Foy, Quebec				
6	1991	173	INRS XRF + INAA (1)	INRS-Géoressources, Sainte-Foy, Quebec				
7	2006	36	ActLabs Au+53 (1H2); add-on Hg-CV analysis (1G) (v2)	Activation Laboratories Limited, Ancaster, Ontario				

Figure 37. Analytical history – third table

Figure 37 shows the third table nested within the second table under the row that was expanded. All of the rows of the second table are now shown in blue, the rows of the third table

are shown in white (one is highlighted in green) and the rows of the first table are shown in yellow.

Now, in the third table, click on the KML link for Zn in the last column of the row highlighted in green (Index = 3). This opens the KML map of the zinc AAS analytical data produced by Bondar-Clegg for Survey 210038. The features of the KML map as they appear in Google Earth are described in the next section.

9.3 Features of the KML Map

9.3.1 Survey Limits

When the KML map displays, the survey extent is shown by a purple rectangle called a bounding box, which represents the minimum and maximum latitude and longitude. For this survey, a polygon which more tightly constrains the extent of the sample sites is also seen.

9.3.2 Survey Centroid

The centroid of the survey is indicated by a yellow star (). If the survey is represented by more than one polygon, each polygon will have its own centroid. Hovering over the star with the mouse displays the Survey Key. The Survey Key is composed of an Organisation ID (e.g. 21 = GSC-Northern Division at the Geological Survey of Canada) and a 4 digit Survey ID assigned to the survey as it was catalogued. For example, Survey Key = 210038 represents the thirty-eighth survey catalogued for GSC-Northern Division. Clicking on the centroid star displays a balloon with a title for the survey. Clicking on the "details" link (you may have to use the side arrows to see it) in the balloon will display the corresponding Survey Metadata page if Google Earth is your chosen KML viewer. As you have linked to this map from the Analytical History section of the Survey Metadata page, linking to it again does not bring you more information. The clickable star is useful if you began your metadata search by looking at the KML index maps (available from the In Focus box at http://gdr.nrcan.gc.ca/geochem/index_e.php) and had not yet viewed the actual Survey Metadata page.

9.3.3 Analytical Data

The location of each sample site is represented by a coloured cross, which provides information about the analytical data for the selected element, zinc in this example. The crosses are coloured according to the quartile values for the dataset, as shown in Table 9:

Table 9. Quartile ranges for analytical data

Colour of Cross		Quartile Range
blue		0 - 25th
green		25 - 50th
yellow		50 - 75th
red		75 - 100th
grey		missing data

Hovering over the crosses on the map displays the zinc analytical value for the sample at that site. Clicking on a cross displays a balloon with the value of zinc at the site, the latitude and longitude of the site, as well as the Lab_Key, Survey_Key and Field_Key which help relate the sample to the MS-Excel files described in Chapter 8 - How to Use the Spreadsheets.

These crosses can be turned on and off as can the actual analytical values at each site. This will be described more fully when the map is explained in more detail below.

As noted above, the information in this section is specific to Google Earth. Other KML viewers may display map legends differently, or not at all.

9.3.4 The Map Legend

You are currently viewing the zinc analytical map for Survey 210038 carried out in New Brunswick by the GSC-Northern Canada Division, as shown in Google Earth. On the left-hand side of the screen, under Places, there is a section called Temporary Places. This is where information related to the KML map is found. This legend allows layers on the KML map to be turned on or off. The legend is hierarchical and will be explained for the Zn map for Survey 210038.

- (KML map: www)

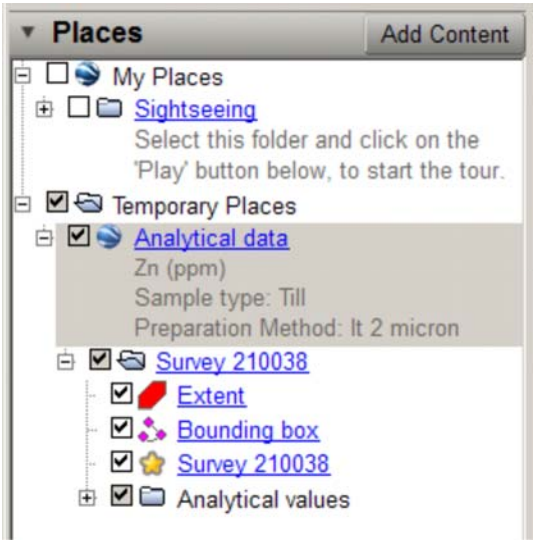


Figure 38. Legend for Zn map for Survey 210038

In Figure 38, under Temporary Places, there is a label in blue called Analytical data. This refers to the file that contains all of the layers related to the analytical data. Beneath this label are three lines explaining the content of the file. In this example, the data are for Zn in till with a size fraction of < 2 µm. When the "+" symbol beside Analytical data is expanded (as shown in Figure 38), a section for each survey whose samples have been analysed in the package we originally chose (in this case Bondar-Clegg/TSD 2 micron (1)) will be shown. In this example, only Survey 210038 is listed, indicating that only samples from Survey 210038 are in our chosen analytical package.

When Survey 210038 is expanded, by again clicking on the "+" symbol, four items are shown (Figure 38): Extent, Bounding box, Survey 210038 and Analytical values. Any of these items can be toggled off by clearing the check box beside its name. When "Extent" is toggled off, the polygon that more closely constrains the extent of the sample sites disappears. When "Bounding box" is toggled off, the rectangle that defines the minimum and maximum latitude and longitude disappears. When "Survey 210038" is toggled off, the yellow centroid star disappears. Finally, if the box for "Analytical values" is toggled off, the coloured crosses representing sample sites and the zinc data disappear.

9.4 Viewing Analytical Values

When the Analytical values section is expanded by clicking on the "+" symbol, two entries are displayed beneath it, as shown in Figure 39 (left). The first, "Zn: n=597, Symbols only", displays just the sample location crosses coloured by quartile values of the zinc dataset. As a default, this is toggled on when the map is first loaded, as seen in the map (Figure 39, right). The second entry, "Zn: n=597, Symbols plus value", when toggled on, will display the actual Zn value at each site beside the coloured crosses. With this view toggled on, the map can become cluttered, depending on your level of zoom. As a default, this entry is toggled off when the map is first loaded.

- (KML map: www)

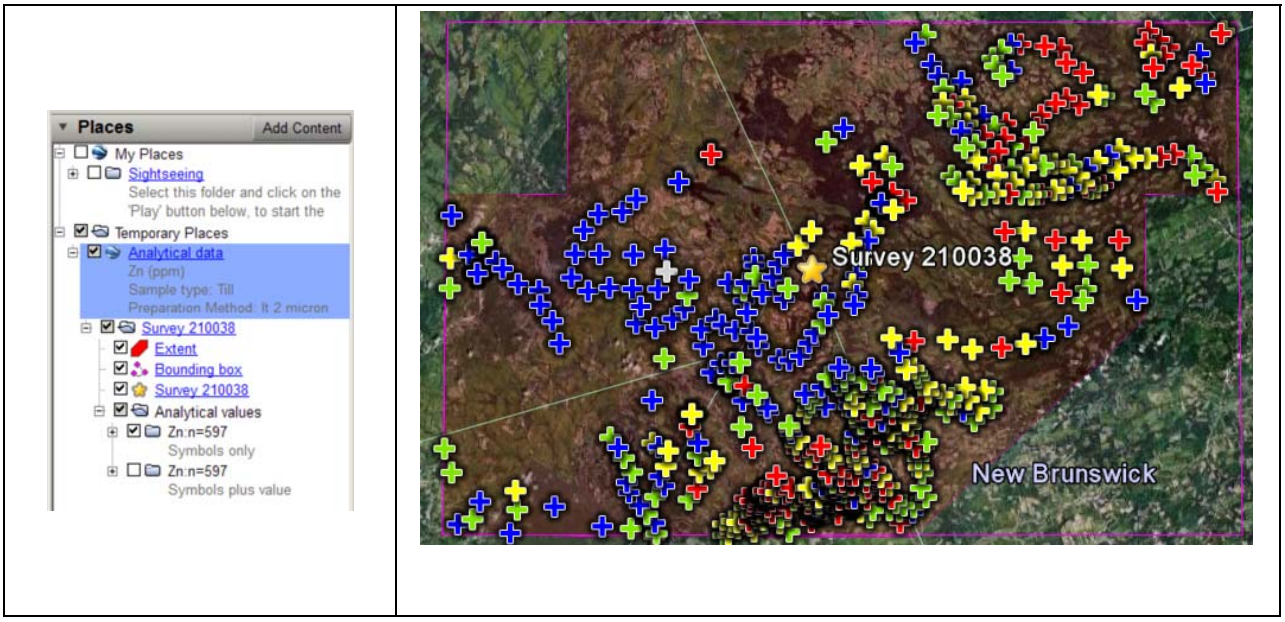


Figure 39. Expanded legend for Zn analytical values for Survey 210038 (left) and corresponding Zn map showing values coloured by quartile (right)

When the "Zn: n=597 Symbols only" section is expanded by clicking the "+" symbol, a list of zinc values classified into percentile ranges is displayed, as shown in Figure 40. There is also a category for missing data at the top of the list, and in this example, only one sample has no zinc data. Sites with missing data are indicated by a grey cross on the map. There is one grey cross on the map above representing the sample with no zinc data. It is located due west of the centroid star, approximately half way to the west edge of the map (Figure 39, right). Although

the crosses are coloured according to quartiles, the data shown in the legend in Figure 40 have been divided into 20 percentile groups (0-5th, 5-10th, 10-15th etc.). Each of the four quartile ranges covers five of these percentile groups.

- (KML map: www)

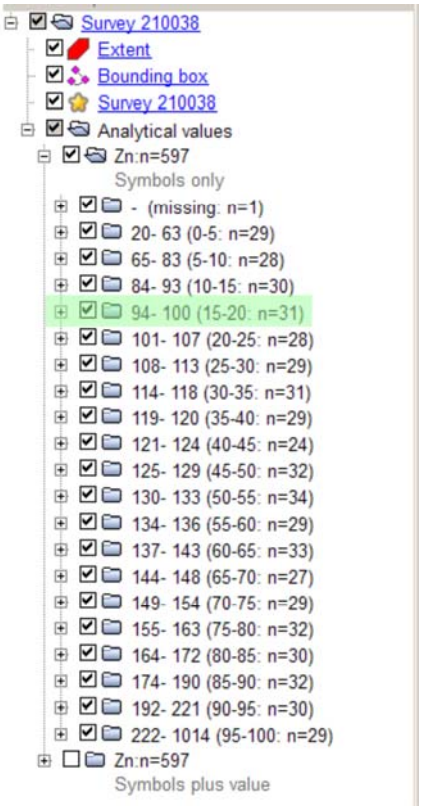


Figure 40. Zn analytical values broken down into percentile ranges

This expanded section also displays the zinc values for each range as well as the number of samples that fall into that range. For example, on the line highlighted in green (Figure 40), "94-100 (15-20: n=31)" indicates that there are 31 samples that fall into the 15-20th percentile range which includes zinc values from 94-100 ppm. Even though there are five categories representing the 0-25th quartile range, all of the samples that fall in these categories are coloured blue on the map. The samples that fall into the five categories representing the 25th -50th quartile range, are all coloured green; the samples that fall into the five categories representing the 50th - 75th quartile range, are all coloured yellow; and, the samples that fall into the five categories representing the 75th – 100th quartile range are all coloured red.

The coloured crosses can be turned off by toggling off the box beside the categories. For example, if you were interested in the location of samples where Zn values are above the 75th percentile, you could turn off all other categories and display only the red crosses.

Each percentile category can be expanded by clicking on the "+" symbol beside it. Each sample in the category will have an entry. For example, if the 10-15th percentile section "84-93 (10-15; n=30) is expanded as shown in Figure 41, each of the n=30 zinc values in that category will be listed. These individual samples can then be toggled on or off by checking or unchecking

the box beside it. If the actual Zn value for a sample is clicked, a balloon will appear on the map (Figure 41) giving details about that sample, including Zn value, latitude and longitude and Lab Key, Survey Key and Field Key which help relate the sample to the MS-Excel files described in Chapter 8 - How to use the spreadsheets.

- (KML map: www)

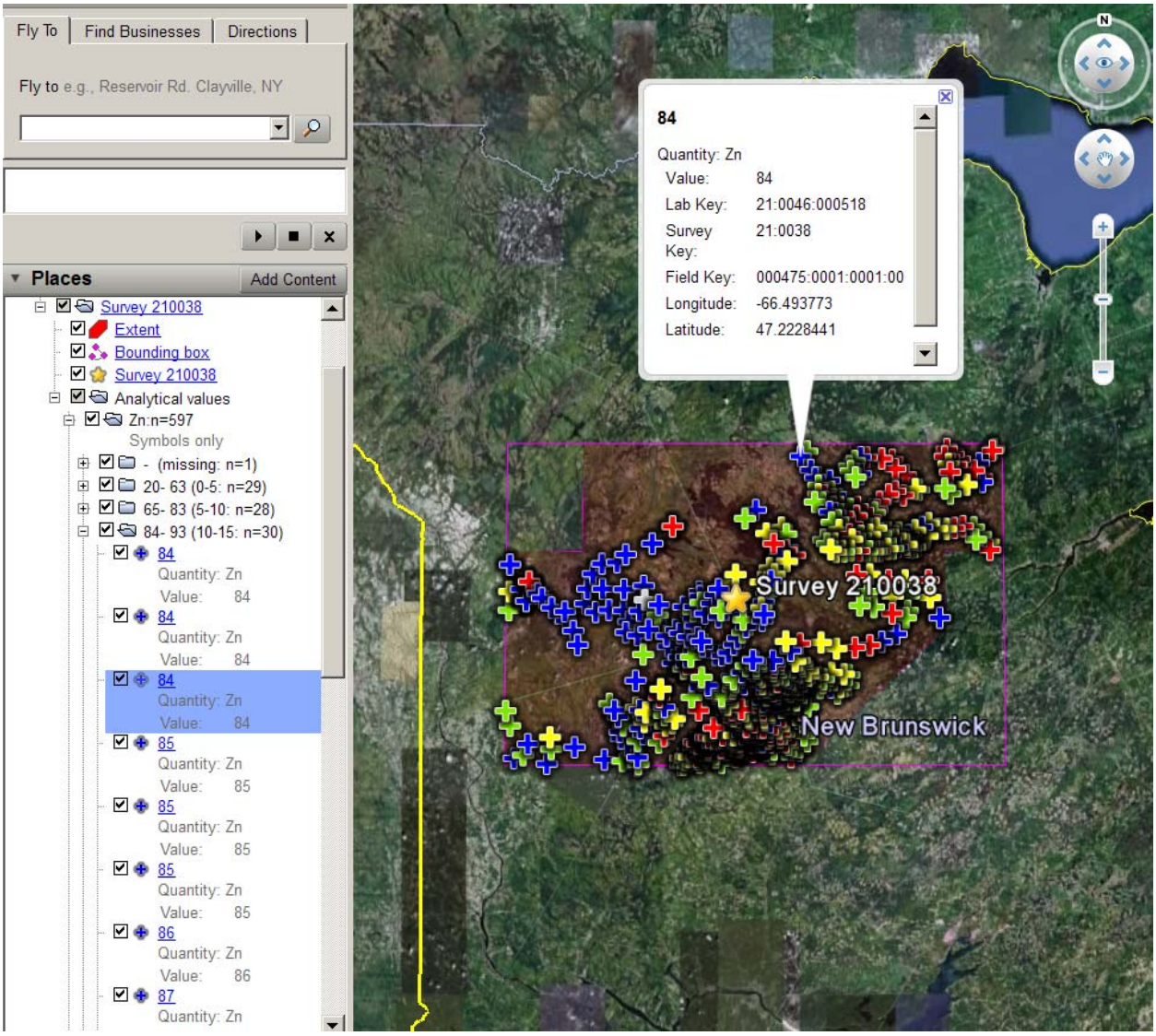


Figure 41. Zinc value from 10-25th percentile range and associated metadata

Now, toggle off the section we have been viewing, "Zn: n=597 Symbols only" by unchecking the box beside it. This turns off that analytical layer and all of the coloured crosses will disappear. Next, toggle on the second section beneath Analytical Values, "Zn: n=597 Symbols plus value", by checking the box beside it. The map now displays the zinc values at each site. The sample location crosses coloured by quartile are also shown. Depending on the zoom factor, the map may appear cluttered. Use the zoom in feature in the top right hand corner of Google Earth (the plus sign) to allow you to see a more detailed view of the sites.

When the "Zn n=597 Symbols plus value" section is expanded by clicking on the "+" symbol, the same list of Zn values broken down into percentile ranges described above for "Zn n=597 Symbols only" is shown. Sometimes two or more values are shown at the same site. This means that multiple Zn analyses were done on the same sample, or that two or more samples were collected at the same site and each has a value. In this case, the two crosses would overprint as they are at exactly the same location and appear as a single cross.

9.4.1 Samples from More than One Analytical Package

Sometimes the Analytical package you choose contains samples from more than one survey. To illustrate this, first close Google Earth (you don't need to save anything) and go back to the Analytical History section of Survey 210038 (shortcut) in your browser. Close all of the nested tables by clicking on the "-" symbols in the Details columns.

Now, instead of choosing Index = 1 from the first table as we did for zinc, choose Index = 5 (Analytical package = INRS XRF + INAA (1)) and expand the Details section for that row by clicking on the"+" symbol. As we have previously seen in the Zn example, this opens a second table, shown in blue in Figure 42. It is nested within the first table, shown in yellow, beneath the row that was expanded. Next, expand the Details for Index Key = 1 (Suite = INRS XRF (1)) of this second table. This opens a third table, shown in white, which is nested within the second table under the row that was expanded (Figure 42). From this third table, select the KML map for barium (Ba) by clicking on the link in last column of the row where Index = 1, highlighted in green in Figure 42. Once again, the map will display in your chosen KML viewer and will be described as it appears in Google Earth.

- (Full Page: www, pdf)

Extended Metadata

Sample locations
Sample material
Preparation laboratory sample material
Analytical History

Index	Year	# analysed	Analytical package	Laboratory	Spreadsheet N	Spreadsheet H	Spreadsheet T	Details
1	1986	597	Bondar Clegg/TSD 2 micron (1)	Bondar-Clegg and Company Limited				
2	1986	591	Bondar Clegg/TSD 63 micron (1)	Bondar-Clegg and Company Limited				
3	1987	1144	Chemex/TSD 2 micron (1)	Chemex Labs Limited				
4	1987	1181	Chemex/TSD 63 micron (1)	Chemex Labs Limited				
5	1991	93	INRS XRF + INAA (1)	INRS-Géoressources, Sainte-Foy, Quebec				

Index	Sample material	Prep Lab material	Suite	Technique	Decomposition	Details
1	Till	< 63 micron	INRS XRF (1)	XRF	N/A	

Index	Quantity	Units	Det Limit	# analysed	# missing	Minimum	Percentile 25th	Percentile 50th	Percentile 75th	Maximum	KML
1	Ba	ppm	50	93	0	251	356	409	505	1006	KML
2	Ga	ppm	2	93	0	11	16	18	21	38	KML
3	Nb	ppm	2	93	0	10	20	22	25	68	KML
4	Ni	ppm	3	93	0	<3	19	29	43	67	KML
5	Pb	ppm	5	93	0	10	23	27	34	72	KML
6	Rb	ppm	3	93	0	41	89	126	157	238	KML
7	Sr	ppm	3	93	0	58	79	99	112	175	KML
8	V	ppm	5	93	0	31	90	110	130	274	KML
9	Y	ppm	4	93	0	23	32	38	50	132	KML
10	Zn	ppm	5	93	0	26	53	67	79	184	KML
11	Zr	ppm	3	93	0	158	338	385	469	845	KML
12	Co	ppm	2	93	0	<2	10	15	19	43	KML
13	Cr	ppm	4	93	0	14	59	80	94	126	KML
14	Cu	ppm	4	93	0	<4	14	18	27	61	KML

2	Till	< 63 micron	INRS/McMaster INA (low DL)	INAA	N/A

6	1991	173	INRS XRF + INAA (1)	INRS-Géoressources, Sainte-Foy, Quebec			
7	2006	36	ActLabs Au+53 (1H2); add-on Hg-CV analysis (1G) (v2)	Activation Laboratories Limited, Ancaster, Ontario			

Figure 42. Expanded analytical history section for analytical package "INRS XRF + INAA"

To summarise, we chose barium from an analytical package ("INRS XRF + INAA (1)") that contains X-ray fluorescence (XRF) data produced by the INRS lab in Quebec for samples in Survey 210038 which was carried out by the GSC – Northern Canada Division.

- (KML map: www)

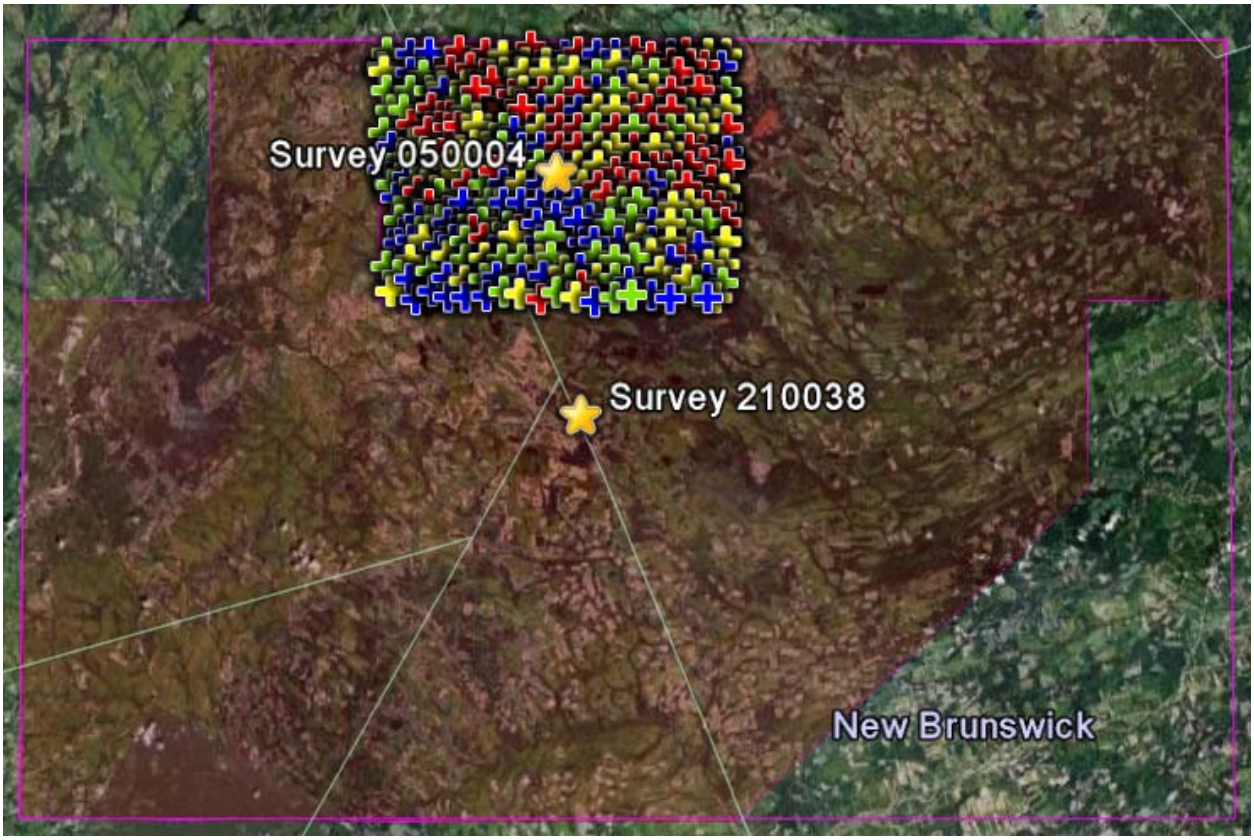


Figure 43. Ba map showing relationship between surveys and analytical packages

On the map shown in Figure 43, you will see the survey centroid, the bounding box and the polygon that more closely constrains the samples, all of which were seen on the zinc map for Survey 210038 (Figure 41). You will notice that the crosses representing the sample locations are no longer scattered throughout the extent of Survey 210038 but are clustered in a box that has a centroid labelled Survey 050004, the fourth survey catalogued for the Quebec office of the Geological Survey of Canada. This is because we chose an analytical package ("INRS XRF + INAA (1)") that contains samples from both Survey 210038 and Survey 050004. The location of Survey 050004 overlaps with the area covered by Survey 210038 and samples that were originally collected by the Northern Canada Division of GSC were reanalysed by GSC Quebec with samples they collected in Survey 050004. As a result, data from the two surveys are contained in a single analytical package.

Although we started looking at metadata for Survey 210038, the only samples from that survey that occur in the analytical package we chose are those that were reanalysed along with new samples from Survey 050004. Therefore, this analytical package is also listed in the Analytical history section of the Survey Metadata page for Survey 050004.

The legend on the left-hand side of Google Earth is shown in Figure 44 and contains the same features as described for the Zn map for Survey 210038. The difference is that when the Analytical data section is expanded, there are two surveys listed: 210038 (highlighted in yellow)

and 050004 (highlighted in pale blue), indicating that samples from both of these surveys are included in the analytical package we chose. Each of these surveys can again be expanded, showing the four categories described above: Extent, Bounding box, Survey 210038/Survey 050004, (depending on what one you are looking at) and Analytical values. These can be toggled on and off depending on what layers you want to display on the map.

- (KML map: www)

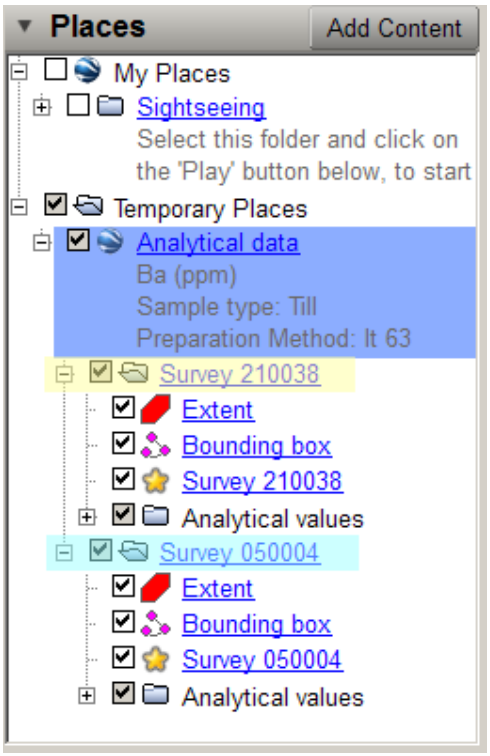


Figure 44. Legend for Ba showing two surveys in one analytical package

Expanding the Analytical values section for Survey 210038 (shown in yellow in Figure 45) indicates that 93 samples from this survey are included on the map. Expanding the Analytical values section for Survey 050004 (shown in pale blue) indicates that 247 samples from this survey are included on the map.

- (KML map: www)

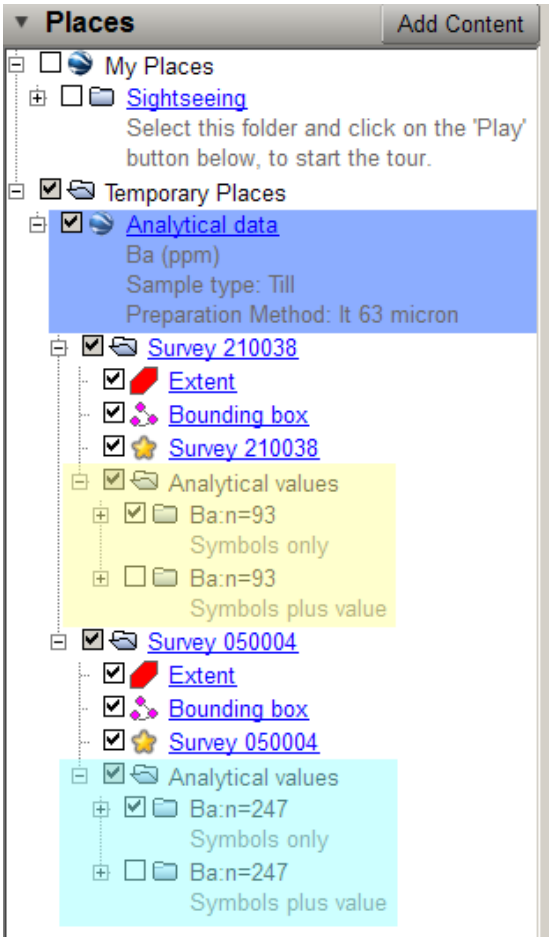


Figure 45. Expanded Ba legend showing number of samples from each survey plotted on the map in Figure 41

As we saw in the Zn example above, the sample locations for each survey can be displayed with or without the Ba values. The default is to have only the coloured crosses appear when the map is first opened. You can toggle on the "Symbols plus value" if you would like to see the barium value displayed beside each sample location. Once again, the crosses are coloured with respect to their quartile ranges, as described in Section 9.3.3 .

When any of the items below Analytical values is expanded by clicking the "+" symbol, a list of the barium values classified into percentile ranges is displayed, as explained in Section 9.4 for zinc. These ranges can be toggled on or off to see only certain ranges or to see the distribution of samples from just one survey. For example, if you turn off all analytical values for Survey 050004, only samples from Survey 210038 will remain.

Chapter 10 What is an "Analytical Package"?

10.1 Introduction

When samples are sent for analysis, a particular analytical package is requested from the laboratory. Each laboratory has packages using different digestion methods and analytical techniques, which produce a specific set of analytical values that have specific detection limits. The end result is that many packages have been used over the years, which have evolved as new techniques became available, as the detection limits were lowered and as new elements were added.

The analytical history of samples can become quite complex if samples are later reanalysed. It is straightforward when samples are collected in a survey and are sent for analysis to a single laboratory. In the simplest example of reanalysis, the entire set of samples is sent for reanalysis some years later because a new technique has become available. It becomes more complex if some samples from a survey were collected in an area where someone else does a later survey and they decide to reanalyze some of the previously collected samples along with their newly collected ones. This means that the analytical package was applied to samples from two different surveys and any data displayed from that package would be for samples collected at different times. An example of an extremely complex reanalysis history occurred with samples collected in New Brunswick. Fifteen samples from each of ten different surveys were reanalyzed in 2005, so the resultant analytical package has samples from ten different surveys associated with it.

The maps used to display analytical data are based on these analytical packages. Therefore, if a survey is selected (from the Surveys html Index Table), and one of the maps available from the Analytical history tables is viewed, samples from another survey may also be displayed. This reflects the fact that previously collected samples were reanalysed with samples from the survey that was originally selected. More details on the content of the analytical maps are available in Chapter 9 - KML Maps of Geochemical Data.

10.2 Examples of Analytical Packages

Some examples of analytical packages defined within the database can be found in Table 10. The organisation that is requesting the geochemical analyses may request one of the standard packages provided by the laboratory, or it may request a customised set of analyses. As a result, some analytical packages may be requested repeatedly by different scientists in different organisations, while other packages are unique to a single geochemical survey. These packages are found by expanding the tables in the Analytical History section of Extended Metadata for 65 surveys across Canada.

Table 10. Examples of analytical packages

Laboratory Name	Analytical Package Name	Analytical Package Description
Activation Laboratories Limited, Ancaster, Ontario	ActLabs INA, ICP-AES, Hg FIMS	ActLabs INA enhanced (35 elements) + ICP-AES (19 elements; 4-acid) + Hg ICP-ES FIMS
GSC: Geological Survey of Canada, Ottawa	GSC Leco	GSC Ottawa Leco induction furnace, carbonate analysis
X-Ray Assay Laboratories, Toronto (XRAL)	XRAL INA + Hg CV-AAS + XRF	XRAL INA + Hg CV-AAS + XRF (Bi, Sn)
Becquerel Laboratories Inc., Mississauga, Ontario	Becquerel INAA (34 elements, Ag:5, Ce:3, Ir:5)	Becquerel INAA (34 elements, Ag dl=5ppm, Ce dl=3ppm, Ir dl=5ppm)
Bondar-Clegg and Company Limited	Bondar-Clegg Au FA-AAS	Bondar-Clegg Au fire assay with atomic absorption finish
Chemex Labs Limited	Chemex AAS, U NADNC, As col	Chemex AAS (Ag, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Zn), U NADNC, As colorimetry

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