Geofile 2005-15

BC Rock Geochemical Database Manual

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2004

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Introduction

Since the 1970's an estimated 200,000 lithogeochemical determinations and mineral identifications have been produced from the analysis of rock samples collected by Geological Survey geologists. While much of these data have been reported in British Columbia Ministry of Energy and Mines publications the lithogeochemical data has, until now, never been collected into a single database. This project was initiated in 2004 by the BC Geological Survey and Development Branch (GSDB) to design and populate a geochemical database that will include all of the element analysis of rock samples carried out by the GSB since the mid 1980's. Currently most of the data used are captured from GSB files and reports. The sources of information are:

1. Digital DBASE format reports in downloaded from the GSDB laboratory information tracking system implemented in 1985.
2. Scanned copies of analytical reports in the laboratory archives. Some of these are pre 1985.
3. Scanned copies of tables and appendices in GSDB papers, Open Files and Bulletins
4. Digital copies of final analytical reports submitted by the laboratory to GSDB staff.
5. In addition, rock geochemical data from other sources such as the Geological Survey of Canada reports and GSDB Assessment reports have also been incorporated into the database.

This document will give a brief background to the data that is compiled in this database and how the database itself is set up. Having a comprehensive knowledge of how a MS Access Database works is major advantage in using this database (Simpson and Robinson, "Mastering Access 2000). The three key components to understanding and using this database are:

1. Structure
2. Information Descriptions
3. Queries

By explaining these three components in detail the user should have enough knowledge to successfully navigate throughout the database while using some key functions to add, find, display, or use data.

Basic Concepts

Primary Key
In databases the most important field of any table is a primary key. This is the unique number given to a record so that the program can find this record and any other records with the same ID number within other tables. Our main primary key is the *Lab ID* that is given to each sample when it is recorded in the laboratory sample tracking system. Using this unique identification as an index almost all the tables are connected and potentially records can be brought together in queries. Those tables that don't have a *Lab ID* field are metadata tables or stand alone tables, both which are used to describe certain information within the database. Most geologists catalogue and reference their samples by a *Field ID*. However due to inconsistency in labeling and duplication of *Field ID's* this could not be used as our primary index.

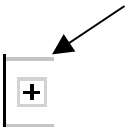
Tables *(Appendix A)*
The main table (**tblMaster Data**) is where most of the relationships stem from and contains key fields such as *Lab ID, Field ID, Batch ID, Rock Type, Latitude* and *Longitude*. (See Appendix B). This table contains all records in the database, whom collected them, the geology, and locations of where they were collected. The other main table in the database (**tblAnalysis**) contains direct information or is linked to tables that describe what elements were analysed, by what method, and by what laboratory. Elements in the tables are grouped according to when the analysis was completed. To accommodate the earlier data (1990 and older) the tables have been split up into major element groups including Oxides, Minor, Minor Neutron Activation, Metal, Assay, SPEC (Spark Emission Spectroscopy) and XRD (Xray Diffraction). These element suites have been determined by analytical requests rather than the expected elements or concentrations (e.g. minor) associated with the names. SPEC has been included as a separate tables even though elements will be included from any group. Similarly, XRD mineral identification information is in a separate table. This is because the SPEC and XRD techniques differ from other methods by being qualitative rather than quantitative. SPEC and XRD has been included as separate tables even though elements will be included from any group. The tables have been set up by common element groups rather than by regular groups of elements that are requested in reports. This is because the analytical requests by GSB staff are so varied that to make a table for each tested group of elements would not be efficient. However, for more recent data, the report requests become fairly uniform. To simplify new data entry these request groups have been made into separate tables combining elements groups differently than the tables that hold the older data.

Structure
The structure of this database groups information together as explained above. This structure is shown in Appendix C and can be accessed from the database by clicking on *Tools* in the menu bar and then selecting *Relationships.* All of the tables that contain

analytical values have been named tblValues. They are related through the *Lab ID* primary key to **tblMaster Data** and are found on the right side of the relationships window (See Appendix C). Ex. **tblValues Metal**. Most of the other tables are connected to the fields found in **tblAnalysis**. The fields *Analysis Code* and *Prep Code* both have tables that explain the codes found in **tblAnalysis**. As the tables move farther outwards from the main table, the information becomes more specific. Metadata tables are not connected by relationships and are supplementary to explaining information found in those named tables. Other tables linked by *Lab ID* include **tblGeologist Information**, **tblReanalysis**, and **tblInteference**. **tblRenalysis** is used to identify analytical data for different elements tested on a previous sample. **tblInterference** flags results that may be unreliable due to inter-element interferences. These tables have been set up in an organized fashion for simplicity. However due to relationships and primary keys we can use queries to bring the data together in almost any fashion that would be desired.

Helpful Hint:

1) Relationships join the tables by fields for queries, but you can also see the evidence of these joins within the tables themselves. Records with this symbol found at the very beginning of them have a direct link to related records. For example in **tblAnalysis Code** if you click on this button all the records that are attached to that code will be displayed.



Selecting Data

Due to the number and complexity of the analysis codes that have been developed, there are some specific methods to obtain useful, accurate queries. Some reports have data from as many as four different tables and four different laboratories, which creates a small but significant overlap when querying for codes. The reference document "*Query Selection Guide*" is a tool that shows you what elements have been analysed by which technique and by what laboratory. It also contains any exceptions you may have to adjust for in creating your queries. By using these parameters and the examples below you will be able to find whatever information you desire.

There can be two major steps to creating queries with this database. Since the data is separated into different tables, you may need to specify what information you are looking for by using a filter of this table and then saving it as a query. This makes it possible to use the filter in a nested query to extract data from numerous tables. The Query Selection Guide shows what criteria to use in a filter and which additional tables and fields you must add to the query to obtain the information you require. Listed below are most of the types of filter requests you may want and how to execute them. You can use these filters on their own to display data or save them and use them as part of a query. The most important thing to remember about queries is including your primary key. This is how MS Access references all other records in different tables with the same ID to display the information as one record.

Main Windows

There are two main windows you will be using to perform selecting, appending and updating records. The Tables window and the Queries window, Fig 1 and Fig 2, are both shown below. It is a good idea to familiarize yourself with these two windows if you are not so already. To select a window, click on the name of the window you want underneath the Objects title bar.

Figure 1: Tables Window

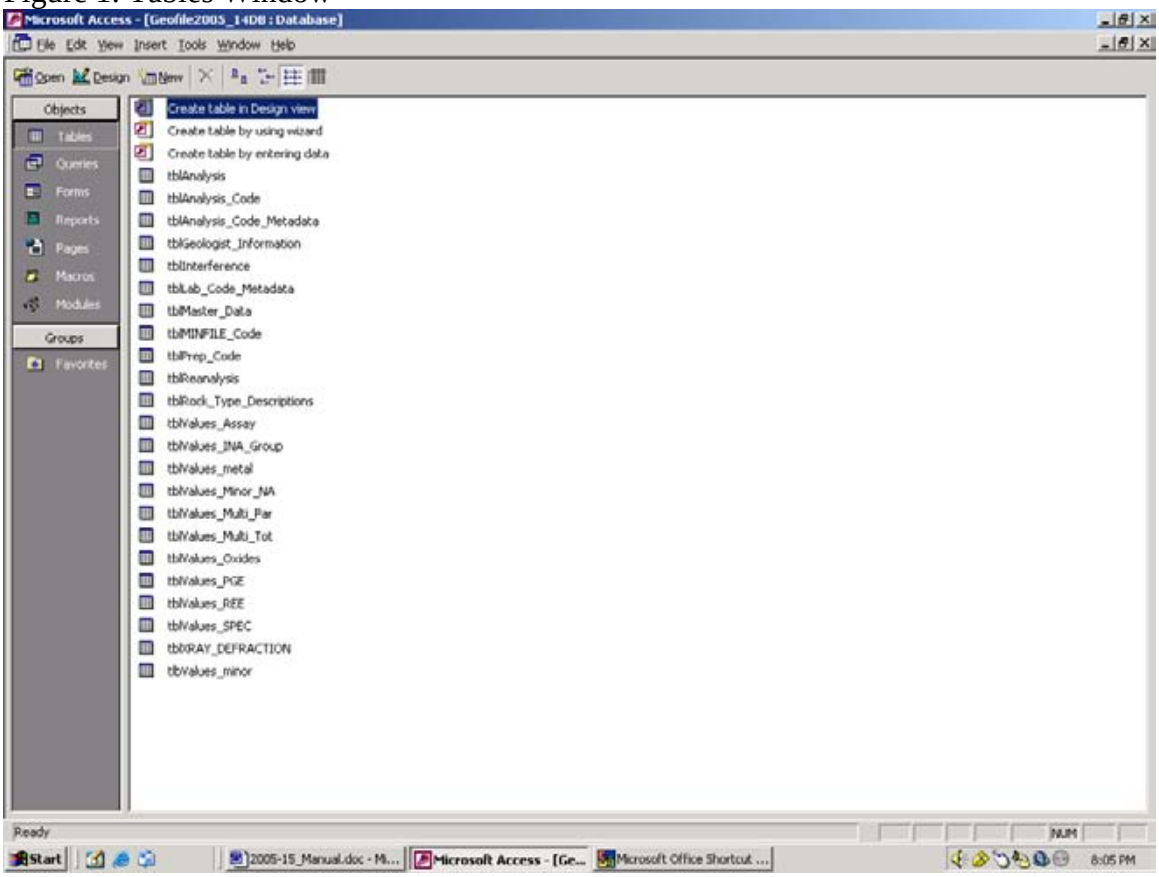
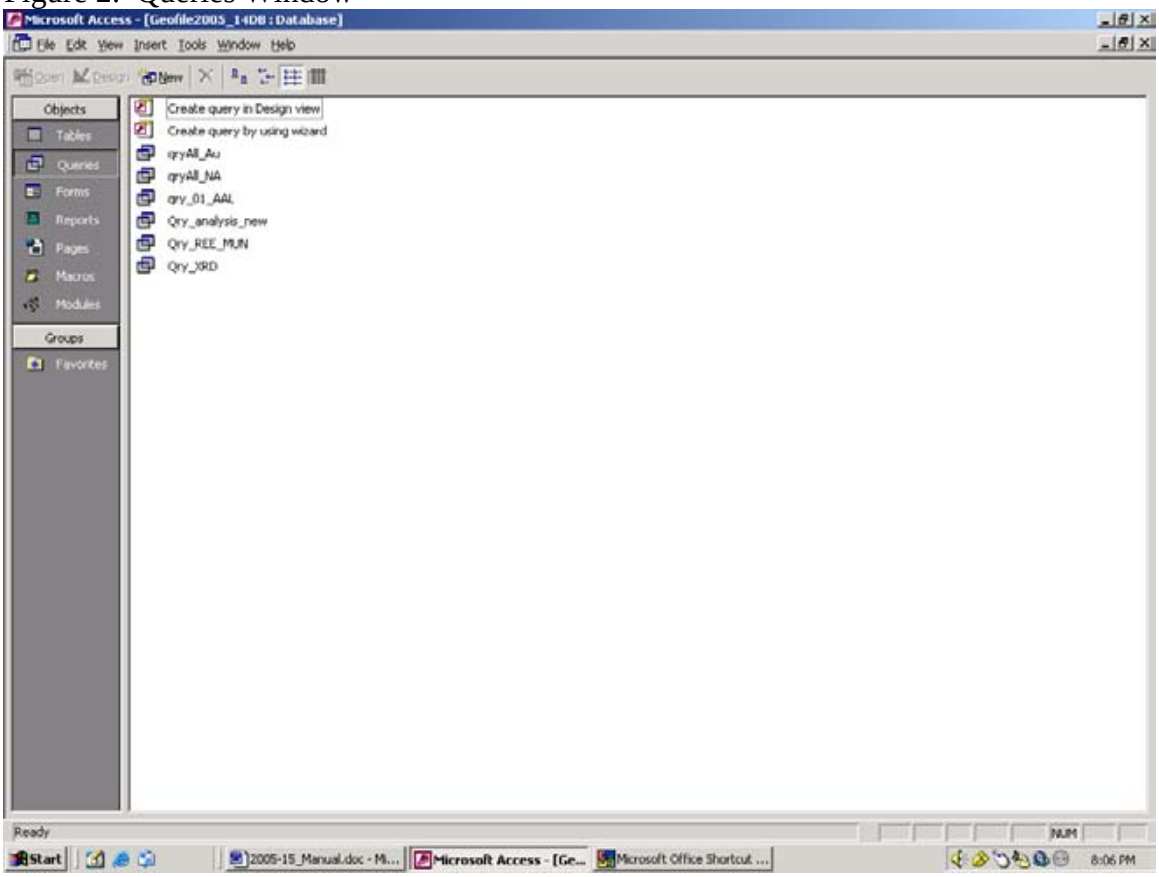


Figure 2: Queries Window



Filters

Any of these filters can be saved as a query to be used in further queries. To save a filter in the Filter by Form window click on t  Save as Query button. It is also possible to use the same requests for a filter, in a query. This is discussed under Query Requests, section C.

Helpful Hints:

1) When closing tables you will automatically be asked if you want to Save Design Changes? If you choose "Yes" the data will not be altered, but the filter you were using will be saved for the next time you open the table. If you choose "No" the filter will default to the last filter used on the table before you opened it.
2) In the **Filter by Form** window the **Clear Grid** button  will clear any requests that were sitting in the grid. It is a good idea to use this button before each filter as not all the fields are visible at once, and sometimes left over requests can confuse users.
3) When typing requests in fields that are lengthy, use **SHIFT F2** to zoom to a bigger window so you can see everything.
4) The **Or Tab** and **Or Operator** are both mentioned below. They are the same function but are used for different things. The **Or Tab** is a physical button you can click on found at the bottom left of the query window screen (See Fig.3). The **Or Operator** is simply the word Or typed in between two attributes you are searching for in the same field. You would use the Or Tab when you are looking for two attributes found in different fields. The concepts will be better understood after reading through the following examples:

A) Example – Filter By Lab
   i) Open up **tblAnalysis Code**
   ii) Click on the **Filter by Form** button  and type in the *Lab Code* of the lab you are looking for. Make sure to type it in using **Like** first and **"*?*"** on either side of the request. For example if looking for records done by GSB, type **Like "*GSB*".** This will bring up any records that have results done by GSB.

   ****** Typing in this request using the *wildcard* operators will bring up all records that have *any* results done by GSB, including records that have some elements done also by other labs. To obtain only elements done by GSB it is necessary to look closer into the codes in tblAnalysis_Codes and only select those elements as listed to be analysed by GSB******

   iii) Click on the **Apply Filter** button  and all the relevant codes will come up.

B) Example – Filter By Element or Method

i) Open up **tblAnalysis Code**

ii) Using the Query Selection Guide Table B, find out what Methods the element you are looking for is done by.

iii) Type : **Like "*?*"** in each method fields the element has been done by. Replace ? with the element you are looking for. If you are looking for more than one element then use **Like "*?*" Or Like "*?*",** adding the **Or Like "*?*"** request for each new element you are searching for. (e.g. **Like "*Cu*" Or Like "*Zn*"**) When typing in the request in each individual field, you *must* click on the **Or** tab found at the bottom left of the window before typing in a new field. This is because the **Or** operator allows records with any of the requests to be selected. If the **Or** tab was not used Access automatically uses an **And** operator and only records with results for that element in all fields will be selected.

iv) To look only by method, type in the element you are looking for in the method you are looking for. For example looking for Au by ICP, type in **Like "*Au*"** under the *ICP* field.

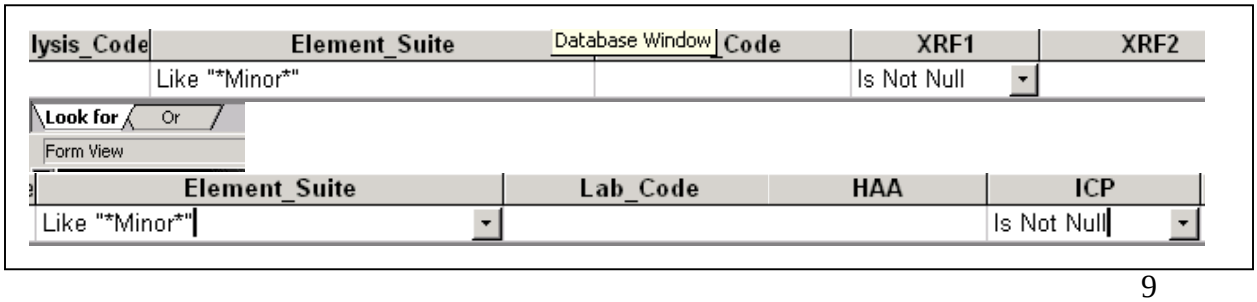
C) Example – Filter By Element Suites by Method

i) Open up **tblAnalysis Code**

ii) In the **Filter by Form** window type in the *Element Suite* you are looking for in the respective field using the wildcard operators**.** For example if you are looking for Minor Suites type in **Like "*Minor*"**

iii) Using the Query Selections Guide Table A, see what methods the Minor Elements Suite can be analysed by and under those Methods Fields you will type: **Is Not Null**. When there is more than one field that you need to use Is Not Null for, you will need to use the Or Tab located at the bottom left corner of the query window. Each time you click the Or tab, you will need to use **Like "*Minor*"** in the *Element Suite* field as well (See Fig. 3). The only time you would not use the request Is Not Null is when codes overlap. In Table E of the Query Selections Guide, exceptions for Element Suites done by different methods are listed along with the given requests to use for selecting the proper records.

Figure 3 : Requests using the Or Tab



D) Example – Filter By Lab by Method

i) Open up **tblAnalysis Code**
ii) In the **Filter by Form** window type in the lab code of the lab you are looking for into the method field you want results for. For example if you are looking for all XRF1 results done by GSB you would type in **Like "*GSB*"** in the XRF1 method field.

F) Example – Filter By Geologist

i) Open up **tblMaster Data**
ii) In the **Filter By Form** window type in the number that corresponds with the Geologist you are looking for in the *Geologist ID* field. For example Larry Daikow is 22 so you would simply type in **22** for all records associated with him. If you want more than one geologist, just use the Or operator. Ex. **22 or 32**. Since you are using the **Or** operator in the same field you have the option of typing it in as above or using the **Or tab button** and entering the number requests separately.

G) Example – Filter By Year

i) Open up **tblMaster Data**
ii) In the **Filter by Form** window type in the last two digits of the year you are looking for by typing in **Like "88*"** in the *Batch ID* field. This will bring up all records from 1988. If looking for more than one year, use the **Or** operator or tab.

H) Example – Filter By Batch ID or Lab ID

i) Open up **tblMaster Data**
ii) In the **Filter by Form** window type in the *Batch ID* or *Lab ID* you are looking for in the respective fields. If you are looking for an unbroken sequence of numbers it's easiest to use the Between operator. For example, **Between 45662 and 45682**.

I) Example – Filter By Field ID

i) We recommend searching by *Field ID* if this is the only option available. It is much easier to search by *Lab ID.*
ii) Open up **tblMaster Data**

iii) In the **Filter by Form** window, type in the *Field ID* you are looking for the same as you would for Lab or Batch ID's.

iv) There is a good chance the *Field ID* won't come up because the program will only identify a match if it is exactly the same. A space, period or dash will result in a non-match.

v) To look for Field ID's choose the first two or three characters in the sequence and use a wildcard operator after to bring up all ID's with those beginning characters. For example **Like "DVL*"** will bring up all records with the prefix DVL. A good idea is to also request the year to cut down on the number of records.

After doing a few filters it becomes quite easy to see how they work. The topics above may not cover specifically what you are looking for but the framework is there. By using substitutions for specific fields and requests or adding more constraints to the filter, you will be able to find the relevant information needed.

The basic idea behind a query is to select the fields from tables that you want to display data for. These tables must be connected either by relationships or joins created in the query window. The next section includes a list for general set up rules of the queries that will be used for this database.

Queries

Some queries such as those looking for Duplicates or Standards, are static and the information requests in them will not change. These queries have been created already and to display information from them simply **right click** on the query name and choose **open.** If you want to use these queries as a base for retrieving other records, save a copy of it and then incorporate it into your own query. These queries are **Select Queries**  in the Query Window.

Helpful Hints:

I) Sometimes the fields from a table you are adding to an existing query don't match most of the fields that are already there. In this case it is easiest to start from scratch so to clear the grid go Edit > Clear Grid

II) When selecting fields from tables to appear in the query grid you can either double click on the individual field; press control and select all the fields you want and then drag them to the grid; click on the star * at the top of the table and then double click on the title bar to select all fields and then drag down; select the table and then field from the drop down lists that show up in the query grid when you click in the cell.

III) To physically move the tables within the query window click and hold on the title bar and drag the table. You may want to do this to see the tables more clearly. To resize the table run your mouse over the table borders until a black arrow comes up and drag to reach your desired size.

As each query is specific a general set of instructions for queries would not be a sufficient explanation.

****** If you are using a filter that has Lab ID in it you can add your values tables directly to this. If not, some additional steps are necessary to complete the query. These instructions are given in Queries A. ******

A) Using a Filter as Part of a Query (Example 1)

i) The filter contains all the codes that you have selected based on criteria for specific data.

ii) To obtain these records the filtered codes (that have been saved as a query) must be run through a select query that only brings up the matching records to the filter.

iii) In the query window choose **create query** in design view.

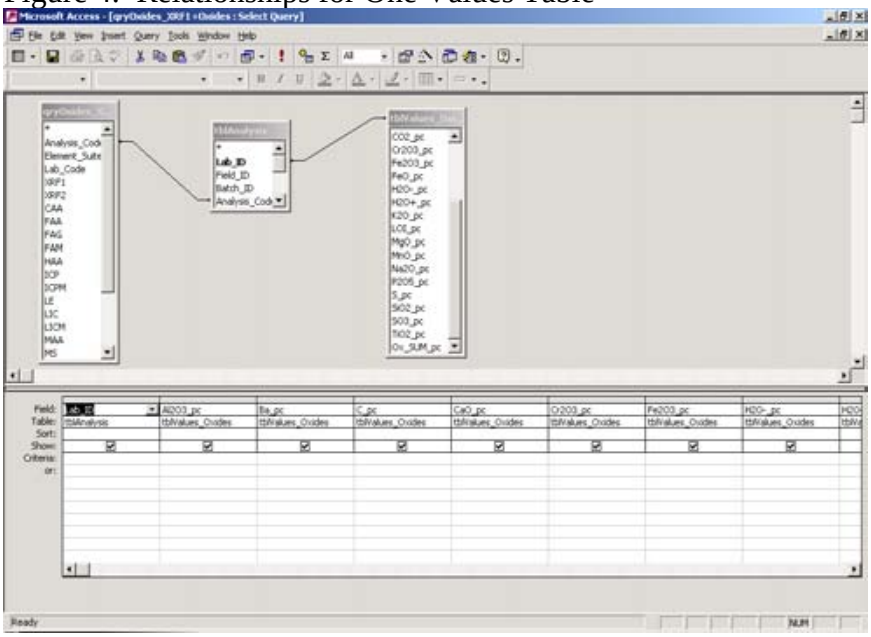
iv) If your filter contains a *Lab ID* field you can add your values tables directly to this query window. Remember to change your join type to **Join Type 2** by right clicking on the line between the tables, if you have more than one values table. If your filter doesn't contain a *Lab ID* follow the remaining steps

v) Select **tblAnalysis Code** and the filter you saved as a query.

vi) To run the query, similar fields must join these two tables. To create the join click on the *Analysis Code* field in either table and **drag** it to the matching field in the other table.

vii) If there is only one values table with data for the query then simply add this table and your query window will look like this: select the fields you want data displayed from.

Figure 4: Relationships for One Values Table



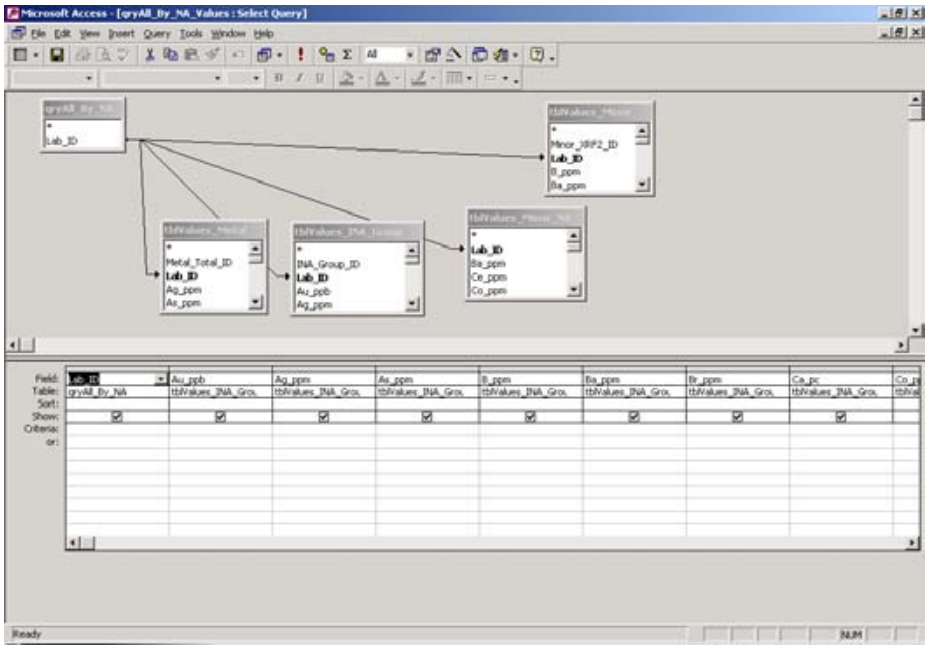
If there is more than one values table, see step vii.

viii) With more than one values table you need to create one more query before adding your values tables. When only **tblAnalysis Code** and the query saved from a filter are showing in the query window click on the *Lab ID* field so it shows in the bottom of the query window, and **save this as another query**. It's from this last query that we can directly link our values tables.

ix) Close out of this window and open a new query window. Select the query you just saved and all the relevant values tables you will be extracting information from.

x) There will automatically be joins between the *Lab ID* fields but these must be edited to display the right information. Edit each join by **right clicking on it and selecting Join Type 2**. So this type of relationship window should look like this:

Figure 5: Relationships for More Than One Values Table



xi) Select the relevant fields and run the query by clicking on the button ! to display records.

C) Using the Query Window to select Criteria (Example 4)

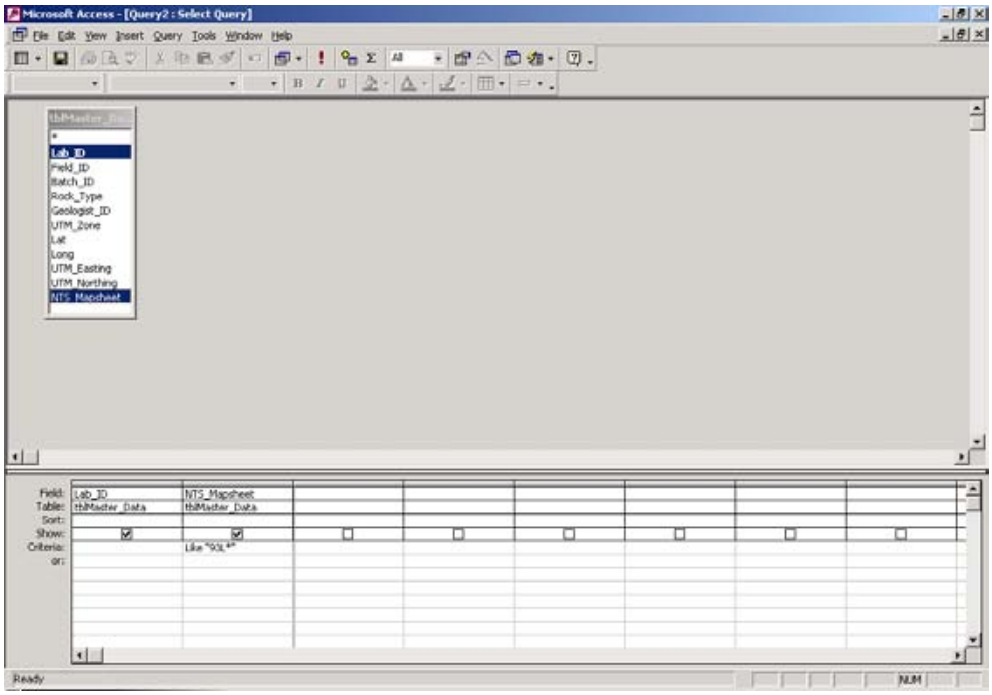
i) Using filters is not the only way to select certain records from a table. It is also possible to type requests directly in the query window using the Criteria box.

ii) To do this open up the query window and select the table you wish to select records from.

iii) Add *Lab ID* and the field(s) you are requesting certain records from. For example if you wanted to select all records from Map Sheet 93L you would add the *NTS Mapsheet* field.

iv) In the **Criteria** row in the *NTS Mapsheet* column type in the same request you would in the **Filter by Form** window, **Like "93L*"** as shown below:

Figure 6: Criteria in Query Design Window



v) To use this request as an index to find records from other tables **Save this as a query.**

Below are some specific examples of possible query requests using a combination of the above methods to describe exactly how to execute the queries.

Example 1: Query by Technique

Retrieving all records where samples were analysed for elements by Neutron Activation

I) Open up the table named **tblAnalysis Code** and click on the **Filter by Form** button.

II) Since *NA* is a field, simply type in *Is Not Null* under the *NA* field and click on the **Apply Filter** button.

III) Go back into the Filter by Form view and go File>Save as Query. Name the query **qryAll_NA**.

IV) Close out of that table and move into the query window. Go to **Create Query** in Design View.

V) Add **tblAnalysis** from the menu and then click on the query tab and add **qryAll_NA**. You will always need to add **tblAnalysis** because this is your link between the query that holds all the selected codes and the values tables.

VI) You will need to create a join between *Analysis Code* fields in **qryAll_NA** and **tblAnalysis**. To do this, click on the field in one table and drag it to the matching field in the other table. Click on the *Lab ID* field so it shows

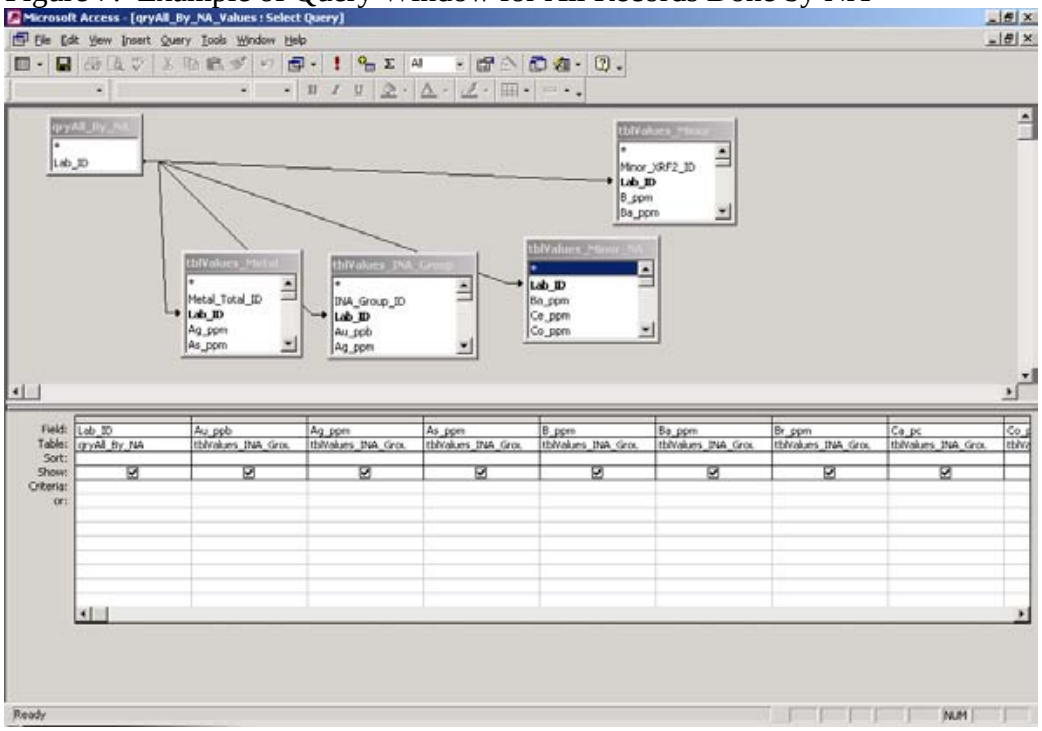
in the bottom of the query window, and save this as another query, **qryAll_BY_NA**. It's from this last query that we can directly link our values tables. Close this window and open a new query window.

VII) By referring to the Query Selection Guide, Table D and looking up *Element Suites* are analysed by the technique NA you will see that **tblValues Metal**, **tblValues Minor**, **tblValues Minor NA** and **tblValues INA Group** all have elements analysed by *NA*.

VIII) Add **qryAll_BY_NA** and your **Metal**, **Minor**, **Minor NA** and **INA Group** values tables.

IX) Your tables will automatically be linked by *Lab ID*, but you need to change the join types. To do this, right click on the join lines and select Join Type 2. When you have a lot of values tables you may want to spread them out within the window so you can more easily distinguish the join lines. To do this click on the title bar and hold and drag your table. Your query window should look similar to this:

Figure 7: Example of Query Window for All Records Done by NA



X) Double click on *Lab ID* from **tblAnalysis** so it appears in the bottom of the query window. The Query Guide Selection Table C will tell you what elements to select from which table to complete the query request.

XI) Click on the run query button  and all records done by *NA* will show up

Example 2: <u>Query by Element Suite and Technique</u>

Looking for all Major Oxide data done by method XRF1 (fused disc X-Ray fluorescence)

I) Open up the table named **tblAnalysis Code** and click on the **Filter by Form** button. 

II) Since you are looking for all Major Oxides, type in *Like "*Oxides*"* into the Element Suite field. By using the * wild card operators on either side of Oxides ensures any record in *Element Suites* that has the word Oxides in it will be selected. If you do not include these operators only records that have analysed strictly Oxides will come up.

III) Since we are looking for Oxides done by *XRF1* you want to bring up all Oxide elements in that field. Looking at the Query Selection Guide, Table E is an exception table for querying for Element Suite by Method. However *XRF1* is not listed as a problem field so we can use the **Is Not Null** request in the XRF1 field to obtain the correct results. (If the field was listed as a problem field, you would type in the criteria listed in the table from the Query Selection Guide).

IV) Click on the **Apply Filter** button  and all of the relevant codes come up.

V) Go back into the **Filter by Form** view and go **File>Save as Query**. Name the query **qryOxides_XRF1.**

VI) Close out of that table and move into the query window. Go to Create Query in Design View.

VII) When the show table box appears click on the table tab and add **tblAnalysis** and **tblValues Oxides.** Then click on the query tab and add the query you just created (**qryOxides_XRF1**). Close out of the show table box.

VIII) Create a join between **tblAnalysis** and the **qryOxides_XRF1** connecting *Analysis Code* fields, just like in step VII of example number 1.

IX) Select *Lab ID* from **tblAnalysis** by double clicking on it and then add all the elements listed as done by *XRF1* by the Query Selection Guide from the **tblValues Oxides** table.

X) Run the query and all Major Oxides done by *XRF1* will be listed.

Example 3: <u>Query by Elements</u>

Looking for all records with Barium (Ba) data

I) Open up the table named **tblAnalysis Code** and click on the Filter by Form button. 

II) Refer to the Selection Query Guide, Table B and look up what methods Ba is done by. (*XRF1, XRF2, ICP, ICPM, LIC, LICM, MAA, MS, MSM, NA, PMS*)

XI) Under each field listed above type ***Like "*Ba*"*** making sure you click on the **Or** tab at the bottom left corner of the window in between typing in each individual field. If you were looking for Ba data only done by *ICP*, you would only type in the request under that field.

XII) Click on the **Apply Filter** button and all of the relevant codes come up

XIII) Go back into the **Filter by Form** view and go **File>Save as Query**. Name the query **qryAll_BA**.

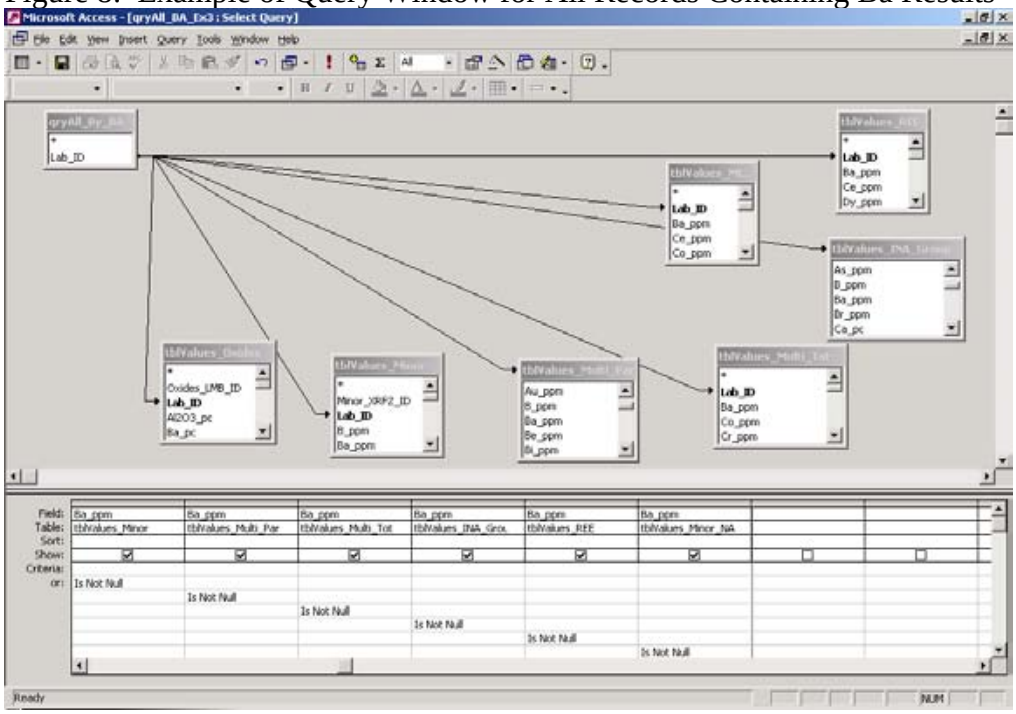
XIV) Close out of that table and move into the query window. Go to **Create Query** in Design View.

XV) When the show table box appears, add **tblAnalysis** and then click on the query tab to add **qryAll_BA.** You will need to create a join between the *Analysis Code* fields as in the above examples. Double Click on *Lab ID* and make sure it appears in the bottom of the query window. Save this query as **qyrAll_BY_BA**.

XVI) Close this down and open a new query window. Add **qryAll_BY_BA** and all the values tables that have Ba data, which you will find by looking at the Query Selection Guide – Table A.

XVII) Edit each join by right clicking on the line and editing to make sure **Join Type 2** is selected. It should look like this:

Figure 8: Example of Query Window for All Records Containing Ba Results



XVIII) Add *Lab ID* from **tblAnalysis** and all Ba fields from the other tables by double clicking on them. In the criteria box, type **Is Not Null** so only those records with values will come up. Using the **Or** field in this window is the same as the **Or** tab in filters, but used in a different format. That means you must make sure the Is Not Null command is not requested for on the same line as another field or it will not work properly. Make sure it cascades as shown above.

XIX) Run the query and all records that contain Ba data will be listed.

Example 4: Query by Lab and Year

Looking for all records done by Acme Analytical Laboratories from 2001

I) Open up the query window and add **tblMaster Data**, **tblAnalysis** and **tblAnalysis Code**

II) Add *Lab ID* and *Batch ID* from **tblMaster Data** and *Lab Code* from **tblAnalysis Code**, to the bottom of the query window.

III) Under *Batch ID* in the Criteria box type **Like "01*"** and under *Lab Code* in the Criteria box type **Like "*AAL*".**

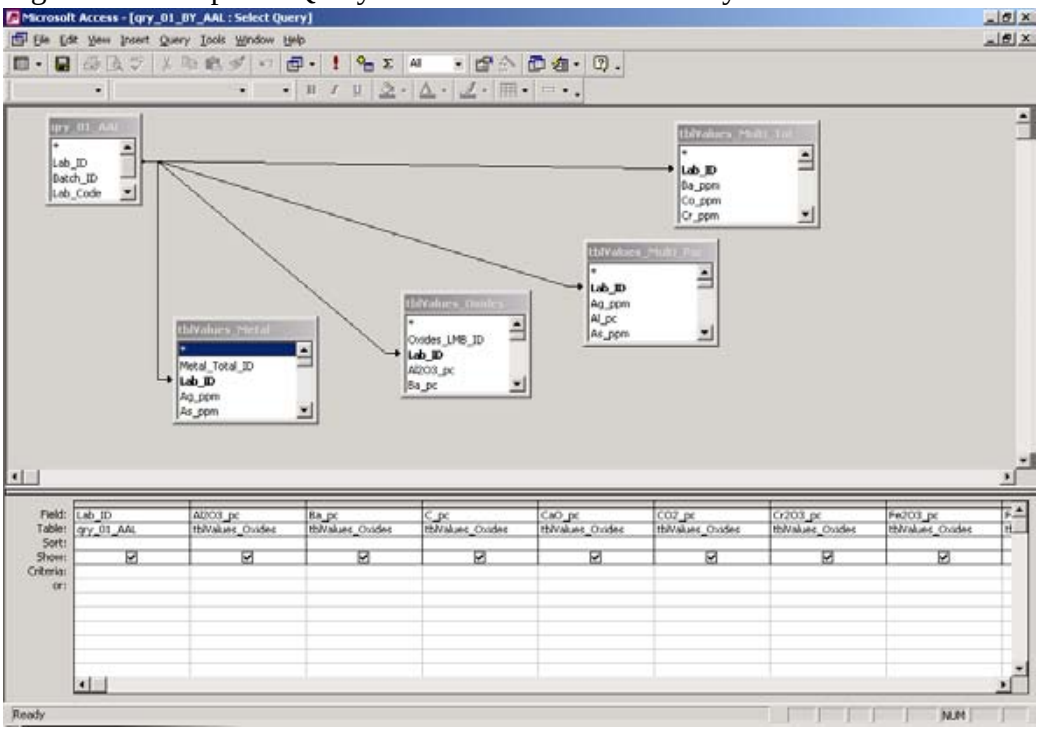
IV) This will select all records from 2001 by Acme Labs. Save this query as **qry_01_AAL**.

> ***Remember that querying for Lab using Like "*AAL*" will bring up all records by AAL and also some by AAL and other labs. If you don't want results from the other labs you will have to look at the codes more carefully and only select those done by AAL.***

V) Open a new query window and add **qry_01_AAL**. By referring to Query Selection Guide Table C you can determine what values tables have data by AAL that you will need to add to the query window (*Metal, Oxides, Multi Par*, *Multi Tot*)

VI) Change the join types by right clicking on the lines between the tables. Your table should look like this:

Figure 9: Example of Query Window for All Records by AAL in 2001



VII) Add *Lab ID* from **qry_01_AAL** and all elements from the other tables that have been done by AAL. You can determine these elements by looking at Query Selection Guide Table C.

VIII) Click on the run query button and all records done by AAL for 2001 will be displayed.

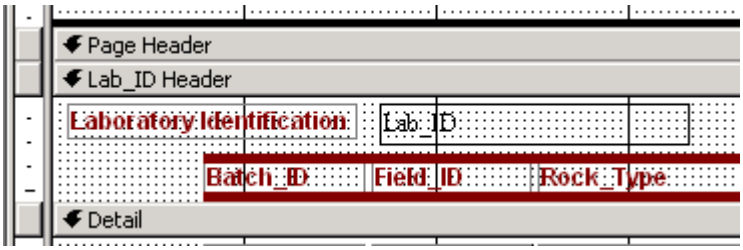
Examples of different queries are included in the database.

Displaying Your Data

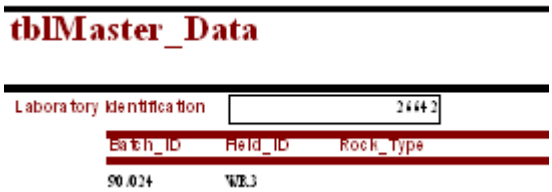
Once you have obtained the records you are searching for you may need to save this as information for reference material. You can keep the data in a table format and export it to another database, you can export it to a Word or Excel file or you can create a report in Access. A report displays your information in an orderly fashion that can by manipulated to emphasize areas of your choice, or just to make the material more presentable. Using Report Wizards are a dummy free way to dump table data straight into generic formats for display.

The resulting queries produced by this database can be large with undefined titles. Access does not allow two fields to be named the same way. So when a query displays the same element from two or more tables, the table name is put in front of the element. In reports it is possible to change the title heading without changing the field the data is coming from. To do this, in the design view of a report simply click on the Label for the Field and change it (See Fig.13).

Figure 10: Example of Changing Labels and Not Data Source



Design View of Report



Report

APPENDIX A

Table Descriptions

Table Name	Table Description
tblMaster Data	This is the main table in the database. Contains main indexing fields and location data. All analytical tables are attached and tblAnalysis where the descriptive and reference tables are linked
tblAnalysis	This is the main table for the analytical data. It compliments each Lab ID with information that can link it to field data and contains key information on each lab sample; such as prep code, analysis code, sample type and indication of interference
tblAnalysis Code	This shows what lab did the analysis, what suite of elements were involved and what method was used for each individual element.
tblAnalysis Code Metadata	Describes the method codes in detail
tblLab Code Metadata	Shows the name of the lab associated with the tblAnalysis Code
tblPrep Code	Describes the prep codes that are listed in tblAnalysis
tblGeologist Information	Identifies geologists to code given in tblMaster Data. Gives full name and work organization
tblInterference	Linked to tblAnalysis this table lists what elements in a report encountered interference during analysis; gives the reason why if noted on report
tblReanalysis	This table listed any sample batches that have been reanalyzed. It includes the original batch analysed and differentiates between original and additional Lab ID's, Batch ID's, Prep Code, Analysis Code and Additional Elements
tblValues Assay	Contains gold, platinum and palladium by fire assay methods
tblValues Metal	Contains analyses and assays for base & precious metals

tblValues Minor	Contains analyses for minor elements generally by XRF
tblValues Minor NA	Contains analyses for minor elements by neutron activation only
tblValues Minor QC	Contains the analytical variability (if measured). All values are +/- of the measured analysis
tblValues Oxides	Contains Major Oxide analyses (XRF and fusion ICPES)
tblValues INA Group	Contains analytical results for neutron activation Group elements
tblValues Multi Par	Contains Multi Par element analyses (e.g. aqua regia-ICPMS)
tblValues Multi Tot	Contains Multi Tot analyses (e.g. HF-ICPES)
tblValues PGE	Contains Platinum Group element analyses
tblValues REE	Contains Rare Earth element analyses
tblValues SPEC	Contains all elements that have been determined by SPEC.
tblXray Diffraction	Lists all minerals identified by X-Ray Diffraction for each sample. (Generally measured with a PW 1140 Spectrometer)
tblRock Type Descriptions	Describes the full rock names for the rock type codes used in tblMaster Data

Individual elements found in the Values tables are listed in The Query Selection Guide, Table A.

APPENDIX B

Field Descriptions

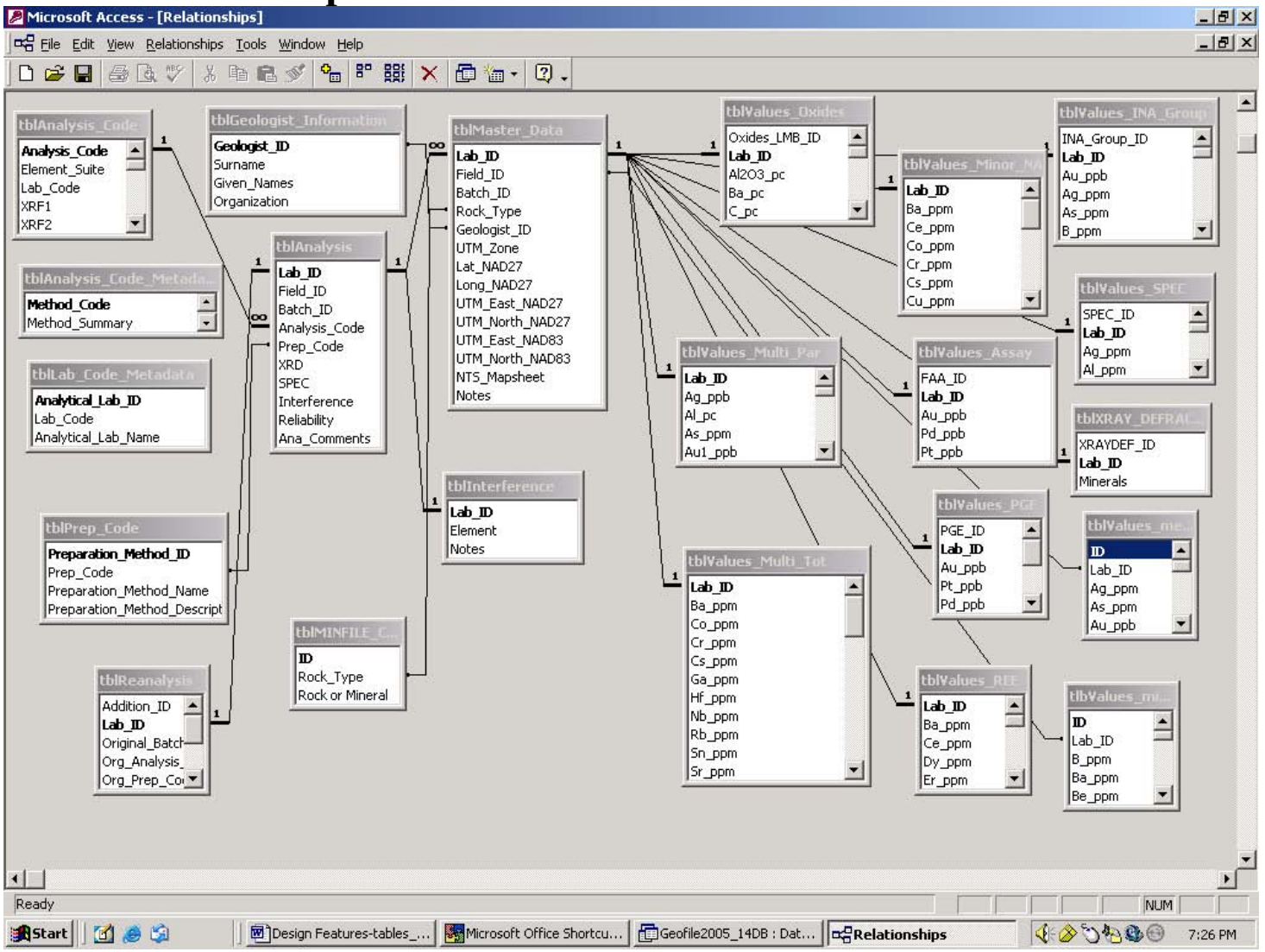
Field Name	Field Description
Field ID	The Field ID is typically composed of numbers and letters given to a sample in the field. Most geologists catalogue and index their data using this identification
Batch ID	The number given to a group of samples submitted to the GSDB laboratory for analysis. The first two numbers identify the year
Rock Type	The MINFILE code that identifies rock type. (e.g.BSLT = Basalt)
Rock Type Description	Rock Type code Legend
Geologist ID	Geologist ID number including GSC and other survey members
UTM Zone	The UTM Zone of the sample location
Lat_NAD 27	Latitude of the sample location – North American Datum 27
Long	Longitude of the sample location – North American Datum 27
UTM Easting_NAD 27	UTM Easting of the sample location – North American Datum 27
UTM Northing_NAD 27	UTM Northing of sample location– North American Datum 27
UTM Easting_NAD 83	UTM Easting of the sample location – North American Datum 83
UTM Northing_NAD 83	UTM Northing of sample location– North American Datum 83
NTS MapSheet	The NTS Mapsheet of the sample location
Data Source	Used to identify where data comes from, mostly GSB
Analysis Code	Numeric code given to each record that is linked to tblAnalysis Code Metadata containing description on analysis
Prep Code	A character code linked to tblPrep Code describing types of preparation

XRD	A Yes/No field identifying XRD analysis
SPEC	A Yes/No field identifying SPEC analysis
Interference	Yes/No field identifies if elements have recorded interference
Reliability	Gives a general idea of data reliability
Element Suite	Relatives group of elements the analysed elements to a table
Lab Code	Abbreviated character code identifies lab or labs doing analyses
XRF1	Elements analysed by this method are listed in this field
XRF2	Elements analysed by this method are listed in this field
CAA	Elements analysed by this method are listed in this field
FAA	Elements analysed by this method are listed in this field
FAG	Elements analysed by this method are listed in this field
FAM	Elements analysed by this method are listed in this field
GRAV	Elements analysed by this method are listed in this field
HAA	Elements analysed by this method are listed in this field
ICP	Elements analysed by this method are listed in this field
ICPM	Elements analysed by this method are listed in this field
LE	Elements analysed by this method are listed in this field
LIC	Elements analysed by this method are listed in this field
LICM	Elements analysed by this method are listed in this field
MAA	Elements analysed by this method are listed in this field
MS	Elements analysed by this method are listed in this field
MSM	Elements analysed by this method are listed in this field
NA	Elements analysed by this method are listed in this field
NFNA	Elements analysed by this method are listed in this field
PMS	Elements analysed by this method are listed in this field
SE	Elements analysed by this method are listed in this field
TI	Elements analysed by this method are listed in this field
Analytical Lab ID	Access index to identify records within tblLab Code Metadata
Analytical Lab Name	Laboratory that did the analysis and associated Lab Code
Preparation Method ID	An index for Access to identify records within tblPrep Code

Preparation Method Name	Name for the preparation method associated with Prep Code
Preparation Method Description	Description of the preparation method
Method Code	The codes for all the analytical methods used for element analysis. Listed as fields in tblAnalysis Code
Method Summary	A summary of the methods used
Method Description	A detailed description of the methods used
Method Overlap	Shows what data, if any, can be compared based on method type
Lab Overlap	Shows what data, if any, can be compared based on lab
Element	The listed element contains data that could be unreliable
Notes	Describes why element data could be unreliable
Addition ID	When samples with the same Field ID are analysed twice and have 2 Lab ID's this is the additional one.
Additional Batch No	Reanalysed batches have additional Batch ID's that are listed in this field
Add Analysis Code	Reanalysed batches have additional analysis codes that are listed in this field
Add Prep Code	Reanalysed batches have additional prep codes that are listed in this field

There are many more fields, but they are all element value fields. To list them all would be extremely repetitive so they are mentioned here instead. Each field is followed by the measurement unit the element is measured by. pc > percent ; ppm > parts per million ; ppb > parts per billion.

APPENDIX C -Relationships Window



APPENDIX D - Database Metadata Tables

tblPrep Code

Prep Code	Preparation Method Name	Preparation Method Description
NA	Not Applicable	
S	Jaw Crush-Steel Mill	Jaw crush & steel mill
W	Jaw Crush-WC Mill	Jaw crush & tungsten carbide mill
NS	Not Specified	
Z	Jaw Crush-ZR Mill	Jaw Crush & zirconium mill

tblLab Code Metadata

Analytical Lab ID	Lab Code	Analytical Lab Name
1	GSB	Geological Survey Branch
2	AAL	Acme Analytical Laboratory
3	BEC	Bequerel
4	BBC	Bondar and Clegg
5	CHM	Chemex
6	COM	Tech Cominko
7	BAR	Barringer Research
8	ACT	Activation Labs
9	ECO	Eco-Tech Laboratories
10	MUN	Memorial University of Newfoundland
11	TML	Terramin Research Labs
12	UBC	University of British Columbia
13	SSC	Sharpshooters Consultants

tblGeologist Information

Geologist_ID	Surname	Given_Names	Organization
75	Addie	George	British Columbia Ministry of Energy & Mines
27	Alldrick	Dani	British Columbia Ministry of Energy & Mines
39	Ash	Chris	British Columbia Ministry of Energy & Mines
72	Bloodgood	Mary Ann	British Columbia Ministry of Energy & Mines
69	Britton	JIm	British Columbia Ministry of Energy & Mines
35	Brown	Derek	British Columbia Ministry of Energy & Mines
73	Butrenchuck	S.	British Columbia Ministry of Energy & Mines
29	Church	Neil	British Columbia Ministry of Energy & Mines
78	Desardins	Pat	British Columbia Ministry of Energy & Mines
22	Diakow	Larry W.	British Columbia Ministry of Energy & Mines
74	Ettlinger	Art	British Columbia Ministry of Energy & Mines
44	Faulkner	Ed	British Columbia Ministry of Energy & Mines
24	Ferri	Fil	British Columbia Ministry of Energy & Mines
52	Gaba	Bob	British Columbia Ministry of Energy & Mines
76	Glover	J.K.	British Columbia Ministry of Energy & Mines
79	Grieve	David	British Columbia Ministry of Energy & Mines
62	Hancock	Kirk	British Columbia Ministry of Energy & Mines
23	Hora	Dani	British Columbia Ministry of Energy & Mines
30	Hoy	Trygve	British Columbia Ministry of Energy & Mines
57	Kilby	Ward	British Columbia Ministry of Energy & Mines
21	Lefebure	Dave	British Columbia Ministry of Energy & Mines
55	Legun	Andrew	British Columbia Ministry of Energy & Mines
38	Logan	Jim	British Columbia Ministry of Energy & Mines
33	MacIntyre	Don	British Columbia Ministry of Energy & Mines
41	Malott	Mary Lou	British Columbia Ministry of Energy & Mines
28	Massey	Nick	British Columbia Ministry of Energy & Mines

Geologist_ID	Surname	Given_Names	Organization
36	McLaren	Grahame	British Columbia Ministry of Energy & Mines
34	Meyers	Rick	British Columbia Ministry of Energy & Mines
37	Mihalynuk	Mitch	British Columbia Ministry of Energy & Mines
81	Moore	John	British Columbia Ministry of Energy & Mines
26	Nelson	JoAnne	British Columbia Ministry of Energy & Mines
65	Nixon	Grahame	British Columbia Ministry of Energy & Mines
25	Panteleyev	Andre	British Columbia Ministry of Energy & Mines
58	Pell	Jennifer	British Columbia Ministry of Energy & Mines
84	Pinsent	Robert	British Columbia Ministry of Energy & Mines
53	Preto	Vic	British Columbia Ministry of Energy & Mines
32	Ray	Gerry	British Columbia Ministry of Energy & Mines
71	Ryan	Barry	British Columbia Ministry of Energy & Mines
66	Schiarizza	Paul F.	British Columbia Ministry of Energy & Mines
48	Schmitt	Rolf	British Columbia Ministry of Energy & Mines
20	Schroeter	Tom	British Columbia Ministry of Energy & Mines
47	Simandl	George	British Columbia Ministry of Energy & Mines
77	White	G	British Columbia Ministry of Energy & Mines
31	Wilton	Paul F.	British Columbia Ministry of Energy & Mines

tblAnalysis Code Metadata

Method Code	Method Summary	Method Overlap	Lab Overlap	Method Descriptions
__XRF1	X-ray fluorescence - fused disc	None	GSB_COM	Typically a 1 to 2 g sample is mixed with a lithium metaborate-tetraborate flux, and fused in a platinum crucible. Major oxides are determined by x-ray fluorescence. Typical spectrometers used are Phillips (GSB) and Siemens (COM).

Method Code	Method Summary	Method Overlap	Lab Overlap	Method Descriptions
__XRF2	X-ray fluorescence - pressed pellet	None	GSB_COM	Typically milled rock pulp with boric acid for 3 minutes. The milled samples are then pressed at high pressure to produce 40 mm pressed pellets. The pellets are analysed for trace metals by x-ray fluorescence.
_AAS	Aqua Regia-Flame atomic absorption spectometry	ICP	CHM_COM_TML	Typically a 1 g sample is digestion in aqua regia and minor and trace elements (e.g. Ag, Cu, Pb, Zn, Mo) determined by flame atomic absorption spectrometry.
_CAA	Cold vapour - atomic absorption spectrometry	None	GSB_CHM_BBC_AAL	Used for mercury only. After aqua regia digestion Hg is reduced to with stannous chloride. The elemental Hg is measured using flameless atomic absorption spectrometry.
_FAA	Lead fire assay_atomic absorption finish/ICP	None	GSB_AAL_CHM_BBC_ECO_TML	A 15g or 30 g milled rock sample is mixed with a lead oxide flux and fused in a fire clay crucible ate > 1000^{o}C. The lead is separated from the slag and cupelled in a bone ash cupell to recover the gold bead. The bead is digested in nitric acid and the gold content measured by flame atomic absorption (AAS) or inductively coupled plasma emission spectrometry (ICP/ES)
_FAG	Lead fire assay_graphite furnace atomic absorption finish	FAM	GSB_CHM	A 15g or 30 g milled rock sample is mixed with a lead oxide flux and fused in a fire clay crucible at > 1000^{o}C. The lead bead is separated from the slag and cupelled in a bone ash cupell to recover a gold bead. The bead is digested in nitric acid and the gold content measured by graphite furnace atomic absorption spectrometry.
_FAM	Lead fire assay_atomic absorption finish/ICPM	FAG	CHM, AAL	A 15g or 30 g milled rock sample is mixed with a lead oxide flux and fused in a fire clay crucible ate > 1000^{o}C. The lead is separated from the slag and cupelled in a bone ash cupell to recover the gold bead. The bead is digested in nitric acid and the gold content measured by inductively coupled plasma mass

Method Code	Method Summary	Method Overlap	Lab Overlap	Method Descriptions
				spectrometry (ICP/MS).
_GRAV	Gravimetric determination	None	GSC_COM_CHM_BBC	Determination of loss on ignition at 1100^{o}C.
_HAA	Hydride generation atomic absorption spectrometry (HAAS)	None	GSB_CHM_BBC	Hydrofluoric+/- nitric+-hydrochloric_/-perchloric acids or aqua regia digestion followed by hydride generation atomic absorption spectrometry to determine As, Sb, Bi, Se, Tl. Typical detection levels are in the 0.5 to 1 ppm range.
_ICP	Aqua regia digestion-Inductively Coupled Emission Spectrometry (ICP/ES)	_AAS	AAL_CHM_BBC_ECO	Aqua regia (HNO_3+HCl) digestion followed by inductively coupled plasma mass spectrometry (ICP/MS) to determine up to 40 minor and trace elements.
_ICPM	Mixed acid (HF) digestion (ICP/ES)	_MAA	AAL_CHM_BBC_ECO	Hydrofluoric+/- nitric+-hydrochloric_/-perchloric acids digestion followed by inductively coupled plasma mass spectrometry (ICP/MS) to determine up to 40 minor and trace elements. This is a "near total" decomposition.
_LE	Leco combustion	None	GSB_COM	Typically a 0.5 or 1 g milled sample is mixed with a tin-copper conductor and heated in an oxygen stream in a closed system induction furnace. The SO_2 and CO_2 evolved are measured by an IR sensor or by volumetric/titametric methods.
_LIC	Lithium metaborate fusion-Inductively Coupled Emission Spectrometry (ICP/ES)	_LICM	BEC_CHM_ECO	Typically a 0.5 or 1 g milled sample is mixed with lithium metaborate flux, fused and the residue leached with dilute hydrochloric acid. Major oxides, minor and trace elements are determined by inductively coupled plasma emission spectrometry (ICP/ES)

Method Code	Method Summary	Method Overlap	Lab Overlap	Method Descriptions
_LICM	Lithium metaborate fusion-Inductively Coupled Mass Spectrometry (ICP/MS)	_LIC	BEC_CHM	Typically a 0.5 or 1 gram milled sample is mixed with lithium metaborate flux, fused and the residue leached with dilute hydrochloric acid. Major oxides, minor and trace elements are determined by inductively coupled plasma mass spectrometry (ICP/MS)
_MAA	Mixed acid (HF) digestion-Flame stomic absorption spectrometry (FAAS)	_ICPM	COM_CHM	Typically a 0.5 or 1 gram samples is digested in hot, concentrated hydrofluoric_nitric_ perchloric acids and trace or minor elements (e.g. Ag, Cu, Pb, Zn, Co, Ni, Mo, Mn, Fe, Cd, Bi, As, Sb) determined by flame atomic absorption spectometry.Typical detection levels are in the 0.5 to 10 ppm range. This is a near total determination.
_MS	Aqua regia digestion -Inductively Coupled Mass Spectrometry (ICP/MS)	None	AAL_CHM	Typically a 0.5 or 1 gram milled sample is digested with aqua regia or a hot HCl+HNO3+H2O mixture and up to 45 minor and trace elements determined by inductively coupled plasma mass spectrometry (ICP/MS). This a "partial" determination for refractory elements (e.g. Cr, Ba). Detection limits are in the order of 0.1 to 1 ppm.
_MSM	Mixed acid (HF) digestion (ICP/MS)	None	AAL_CHM	Typically a 0.5 or 1 gram milled sample is digested with aqua regia or a hot HF+HCl+HNO3+H2O+HCLO4 mixture and up to 45 minor and trace elements determined by inductively coupled plasma mass spectrometry (ICP/MS). This a near total determination for most elements.
_NA	Instrumental neutron activation (INAA)	None	BEC_ACT	A 2 or 15 or 30 g sample is sealed in a PVC vial, irradiated in a nuclear reactor and elements determined by counting the short lived daughter isotope decay products. Up to 33 elements including Au can be determined. This is a "near total" determination.

Method Code	Method Summary	Method Overlap	Lab Overlap	Method Descriptions
_NFNA	Nickel sulphide fire assay_neutron activation finish	None	ACT	A 30 g milled rock samples is fused with a nickel sulphide flux, the bead dissolved in acid and concentration of Pt, Pd, Os, Ir, Ru, Rh, Re determined by either INAA or ICP/MS. Typical detection limits are in the 1 to 0.1 ppb range depending on the detection method.
_PMS	Peroxide fusion_Inductively Coupled Mass Spectrometry (ICP/MS)	None	MUN	A 0.2 g sample is sintered with sodium peroxide, the sinter cake leached and the REE hydroxide-bearing precipitate separated from the sinter, dissolved and the solution analysed for Y, Zr, Nb, Nd, Ba, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Hf, Ta & Th by ICP-MS using the method of internal standardisation to correct for matrix and drift effects. Y, Zr, Nb & Ba should be confirmed by XRF.
_SE	Ion selective eletrode	None	BAR_COM_AAL	Fluoride determined using a sodium carbonate flux and ion selective electrode.
_SPEC	Spark emission spectroscopy	None	GSB	Semi quantitative method used to determine up to 50 elements using a spark source to vaporize the sample and an optical emission spectrometer to detect elements. Detection limits in the 10 to 100 ppm range.
_TI	Titration	None	GSB_COM	A 1 g milled rock sample is heated in a Pt crucible with concentrated HF and H_2SO4. The solution is neutralized with boric acid and the dissolved Fe2+ measured by potassium permanganate titration. Detection limit for FeO is 0.04%.

tblRock Type Descriptions

Rock_Type_ID	Rock_Type	Rock_Type_Description

Rock_Type_ID	Rock_Type	Rock_Type_Description
1	UMFC	Ultramafic
2	ANDS	Andesite
3	BSLT	Basalt
4	CRBN	Carbonatite
5	DCIT	Dacite
6	DORT	Diorite
7	GBBR	Gabbro
8	GRNT	Granite
9	GRDR	Grandiorite
10	GRNS	Greenstone
11	MNZN	Monzonite
12	OBSD	Obsidian
13	PNLT	Phonolite
14	QZPP	Quartz porphyry
15	RYLT	Rhyolite
16	SRPN	Serpentinite
17	SYNT	Syenite
18	TRCT	Trachyte
19	TUFF	Tuff
20	AMPB	Amphibolite
21	CLCC	Calc-silicate
22	GNSS	Nneiss
23	MRBL	Marble
24	PLLT	Phyllite

Rock_Type_ID	Rock_Type	Rock_Type_Description
25	SCST	Schist
26	HRFL	Hornfels
27	SKRN	Skarn
28	GOUG	Gouge
29	ARGL	Argillite
30	CHRT	Chert
31	COAL	Coal
32	DLMT	Dolomite
33	LMSN	Limestone
34	MARL	Marl
35	QRTZ	Quartzite
36	SNDS	Sandstone
37	SHLE	Shale
38	SLSN	Siltstone
39	MRLZ	Mineralization
40	MVSP	Massive sulphide
41	DISS	Disseminated
42	SCKK	Stockwork
43	VEIN	Vein
44	ALRZ	Alteration
45	NOID	No rock ID available

APPENDIX E

Query Selection Guide

Table A- Possible Labs, Elements and Methods by Element Suite

Element Suites	Possible Labs	Possible Elements	Possible Methods
Oxides	GSB, AAL, BBC, CHM, COM	Al_2O_3, B, Ba, C, CaO, CO_2, Cr_2O_3, Fe_2O_3, FeO, H_2O+, H_2O-, K_2O, LOI, MgO, MnO, Na_2O, P_2O_5, S, SiO_2, TiO_2, SUM	XRF1, LIC, LE, TI, GRAV
Metal	GSB, AAL, BBC, CHM, COM, BAR, ECO, TML	Ag, As, Au, Bi, Cd, Co, Cr, Cu, Fe, Ga, Ge, Hg, Li, Mn, Mo, Ni, Pb, Sb, Se, Te, Zn	MAA, LIC, NA, CAA, FAA, HAA
Minor	GSB, BEC, BBC, CHM, COM, ACT, ECO	B, Ba, Be, Bi, Ce, Co, Cr, Cs, Cu, F, Hf, La, Mo, Nb, Nd, Ni, Pb, Rb, Sc, Sn, Sr, Ta, Th, Ti, U, V, W, Y, Yb, Zn, Zr	XRF2, ICP, MAA, NA, SE
Minor NA	BEC, ACT	Ba, Ce, Co, Cr, Cs, Cu, La, Mo, Ni, Pb, Rb, Ta, Th, U, V, W, Yb, Zn	NA
Assay	GSB, BBC	Au, Pd, Pt	FAG, FAA
Multi Par	AAL, CHM, COM, ECO	Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Ga, Ge, Hg, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, Os, P, Pb, Pd, Pt, Rb, Re, Rh, S, Sb, Sc, Se, Sn, Sr, Ta, Te, Th, Ti, Tl, U, V, W, Y, Zn, Zr	CAA, FAA, FAG, FAM, ICP, ICPM, MS, MSM
Multi Tot	AAL	Ba, Co, Cr, Ga, Hf, Nb, Rb, Sn, Sr, Ta, Th, Tl, U, V, W, Zr, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Mo, Cu, Pb, Zn, Ni, As, Cd, Sb, Bi, Ag	LIC, LICM
INA Group	BEC, ACT	Au, Ag, As, B, Ba, Br, Ca, Co, Cr, Cs, Fe, Hf, Hg, Ir, Mo, Na, Ni, Rb, Sb, Se, Sn, Sr, Ta, Th, U, W, Zn, La, Ge, Nd, Sm, Eu, Tb, Yb, Lu, Mass	NA
PGE	BBC, ACT	Au, Pd, Pt, Rh, Os, Ir, Ru, Re	NFNA
REE	MUN	Ba, Ce, Dy, Er, Eu, Gd, Hf, Ho, La, Lu, Nb, Nd, Pr, Sm, Ta, Tb, Th, Tm, Y, Yb, Zr	PMS

Table B- Possible Elements and Labs by Method

Method	Possible Elements	Possible Labs
XRF1	Al_2O_3, Ba, CaO, Cr_2O_3, Fe_2O_3, K_2O, MgO, MnO, Na_2O, P_2O_5, SiO_2, TiO_2	GSB, COM, CHM, BBC
XRF2	Ba, B, Ce, Cs, Cr, Cu, Hf, La, Mo, Ni, Nb, Pb, Rb, Sb, Sn, Sr, Ta, Th, U, V, W, Y, Zn, Zr	GSB, BBC, CHM, COM, ACT
CAA	Hg	GSB, AAL, CHM
FAA	Au, Pt, Pd, Rh, Sb	GSB, AAL, BBC, CHM, ECO
FAG	Au, Pd, Pt	GSB, AAL, BBC, CHM
FAM	Au, Pt, Pd, Rh	AAL
GRAV	H_2O-, H_2O+, LOI, Sum	GSB, AAL, BBC, BEC, CHM, COM
HAA	Ge, Se, Te	GSB, AAL, CHM
ICP	Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Ge, Hg, K, La, Mg, Mn, Mo, Na, Ni, P, Pb, Pd, Pt, Rb, S, Sb, Sc, Se, Sr, Te, Th, Ti, Tl, U, V, W, Zn, Zr	BBC, CHM, AAL
ICPM	Ag, Al, As, Au, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, La, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, S, Sb, Sc, Sn, Sr, Th, Ti, U, V, W, Y, Zn, Zr	CHM, ECO, AAL, COM
LE	C, CO2, S	GSB, CHM, COM, BBC, AAL
LIC	Al_2O_3, C, CaO, Cr_2O_3, Fe_2O_3, K_2O, MgO, MnO, Na_2O, P_2O_5, S, SiO_2, Ag, As, Ba, Cu, Nb, Ni, Pb, Sb, Sc, Sr, Y, Zr, Zn	CHM, BEC, AAL
LICM	Ba, Bi, Cd, Co, Cr, Cs, Cu, Ga, Hf, Nb, Pb, Rb, Sb, Sn, Sr, Ta, Th, Tl, U, V, W, Zr, Y, La, Ce, Pr, Nd, Ni, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Be, Zn, As, Mo, Ag	AAL
MAA	Ba, Bi, Ce, Co, Cr, Cs, Cu, Hg, La, Mo, Nb, Ni, Pb, Rb, Sb, Se, Sn, Sr, Ta, Th, U, V, W, Y, Yb, Zn, Zr, Ag, As, Cd, Fe	GSB, BAR, CHM, COM
MS	Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Ga, Hg, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Rb, S, Sb, Sc, Se, Sn, Sr, Ta, Th, Ti, Tl, U, V, W, Y, Zn, Zr	AAL, CHM
MSM	Ag, Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Ge, Hg, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Rb, Sb, Sr, Ta, Te, Th, Ti, Tl, U, V, W, Y, Zn	CHM

NA	Au, Ag, As, Ba, Br, Ca, Cd, Co, Cr, Cs, Fe, Hf, Hg, Ir, Mo, Na, Ni, Rb, Sb, Sc, Se, Sn, Sr, Ta, Te, Th, U, W, Zn, La, Ce, Nd, Sm, Eu, Tb, Yb, Lu	BEC, ACT, GSB
NFNA	Au, Pt, Pd, Re, Rh, Os, Ir, Ru	BBC, ACT
PMS	Ba, Ce, Dy, Er, Eu, Gd_160, Hf, Ho, La, Lu, Nb, Nd, Pr, Sm, Ta, Tb, Th, Tm, Y, Yb, Zr	MUN
SE	F	GSB, ECO
TI	FeO	GSB, COM, CHM

Table C: Elements by Element Suite done by Lab and Method

Element Suite	Laboratory	Elements	Method
Oxides	GSB	Al_2O_3, Ba, CaO, Fe_2O_3, K2O, MgO, MnO, Na_2O, P_2O_5, SiO_2, TiO_2	XRF1
		CO_2, S	LE
		FeO	TI
		H_2O-, H_2O+, LOI, Sum	GRAV
	BEC	Al_2O_3, Ba, CaO, Fe_2O_3, K_2O, MgO, MnO, Na_2O, P_2O_5, SiO_2, TiO_2	LIC
		LOI, Sum	GRAV
	AAL	C, S	LE
		Al_2O_3, C, CaO, Cr_2O_3, Fe_2O_3, K_2O, MgO, MnO, Na_2O, P_2O_5, S, SiO_2, TiO_2	LIC
		LOI, Sum	GRAV
	BBC	Al_2O_3, CaO, Fe_2O_3, K_2O, MgO, MnO, Na_2O, P_2O_5, SiO_2, TiO_2	XRF1
		S	LE
		LOI, Sum	GRAV
	CHM	Al_2O_3, CaO, CR_2O_3, Fe_2O_3, K_2O, LOI, MgO, MnO, Na_2O, P_2O_5, SiO_2, TiO_2	XRF1
		C	LE
		Al_2O_3, Ba, CaO, CO_2, Fe_2O_3, K_2O, MgO, MnO, Na_2O, P_2O_5, SiO_2, SO_3	LIC
		FeO	TI
		H_2O-, H_2O+, LOI, Sum	GRAV
	COM	Al_2O_3, Ba, CaO, CR_2O_3, Fe_2O_3, K_2O, MgO, MnO, Na_2O, P_2O_5, SiO_2, TiO_2	XRF1

		C, CO_2, S	LE
		FeO	TI
		H_2O-, H_2O+, LOI, Sum	GRAV
Metal	GSB	Hg	CAA
		Au	FAA
		Se, Te	HAA
		Ag, As, Bi, Cd, Co, Cu, Fe, Ga, Mn, Mo, Ni, Pb, Sb, Zn	MAA
	AAL	Hg	CAA
		As, Au, Sb	FAA
		Ge, Se, Te	HAA
	BBC	Hg	CAA
		Au	FAA
	CHM	Au	FAA
		Se, Te	HAA
		Ag, As, Cu, Pb, Sb, Zn	LIC
		Au, As, Cu, Mo, Pb, Sb, Zn	MAA
	COM	Au	FAA
		As, Cu, Fe, Pb, Sb, Zn	MAA
	BAR	Ba	MAA
	ECO	Au	FAA
	TML	Ag, As, Bi, Cd, Co, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Zn	MAA
	ACT	Au	NA
Minor	GSB	Ba, Be, Bi, Ce, Co, Cr, Cs, Cu, La, Mo, Nb, Ni, Pb, Rb, Sc, Sn, Sr, Ta, Th, Ti, U, V, W, Y, Yb, Zn, Zr	XRF2
		Cr, Ba, Rb, Sc, U	NA
		F	SE
	BEC	Ba, Ce, Co, Cr, Cs, Cu, La, Mo, Ni, Pb, Rb, Ta, Th, U, V, W, Yb, Zn	NA
	BBC	Ba, Cr, Nb, Sn, Sr, V, Y, Zr	XRF2
		Ba, Nb, Sr, Rb, V, Y, Zr	ICP

	CHM	Ba, Bi, Ce, Co, Cr, Cs, Cu, La, Mo, Nb, Ni, Pb, Rb, Sn, Sr, Ta, Th, U, V, W, Y, Yb, Zn, Zr	XRF2
		Ba, Se	MAA
	COM	Ba, B, Ce, Cs, Cr, Cu, Hf, La, Mo, Ni, Nb, Pb, Rb, Sb, Sn, Sr, Ta, Th, U, V, W, Y, Zn, Zr	XRF2
	ACT	Nb, Y, Zr	XRF2
		Ba, Ce, Cr, Cs, La, Rb, Sn, Ta, Th, U, W, Yb	NA
	ECO	F	SE
Minor NA	ACT	Ba, Ce, Cr, Cs, La, Rb, Sn, Ta, Th, U, W, Yb	NA
	BEC	Ba, Ce, Co, Cr, Cs, Cu, La, Mo, Ni, Pb, Rb, Ta, Th, U, V, W, Yb, Zn	NA
Assay	GSB	Au, Pd, Pt	FAA
		Au, Pd, Pt	FAG
	BBC	Au, Pd, Pt	FAG
Multi Par	AAL	Hg	CAA
		Au1, Pt, Pd, Rh	FAA
		Au1	FAG
		Au1, Pt, Pd, Rh	FAM
		Ag, Al, As, Au, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, La, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, S, Sb, Sc, Se, Sn, Sr, Te, Th, Ti, U, V, W, Y, Zn, Zr	ICP
		Ag, Al, As, Au, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, La, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, S, Sb, Sc, Sn, Sr, Th, Ti, Tl, U, V, W, Y, Zn, Zr	ICPM
		Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Ga, Hg, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Rb, S, Sb, Sc, Se, Sn, Sr, Ta, Th, Ti, Tl, U, V, W, Y, Zn, Zr	MS
	CHM	Hg	CAA
		Au, Pd, Pt	FAG
		Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Ge, Hg, K, La, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Sc, Sr, Te, Ti, Tl, U, V, W, Zn	ICP
		Ag, Al, As, Au, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Ge, Hg, K, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Sb, Sc, Sn, Sr, Ti, V, W, Zn	ICPM

		Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, P, Pb, Sr, Te, Ti, Tl, V, W, Zn	MS
		Ag, Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Ge, Hg, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Rb, Sb, Sr, Ta, Te, Th, Ti, Tl, U, V, W, Y, Zn	MSM
	COM	Ag, Al, As, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, K, La, Mg, Mn, Mo, Na, Ni, Pb, Sb, Sn, Sr, Ti, V, W, Y, Zn	ICPM
	ECO	Au1	FAA
		Ag, Al, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mo, Na, Ni, P, Pb, Sr, Ti, V, W, Y, Zn	ICPM
Multi Tot	AAL	Ba, Bi, Co, Cr, Cs, Cu, Ga, Hf, Nb, Rb, Sn, Sr, Ta, Th, Tl, U, V, W, Zr, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Mo, Cu, Pb, Zn, Ni, As, Cd, Sb, Bi, Ag	LICM
INA Group	BEC	Au, Ag, As, Ba, Br, Ca, Co, Cr, Cs, Fe, Hf, Hg, Ir, Mo, Na, Ni, Rb, Sb, Sc, Se, Sr, Ta, Th, U, W, Zn, La, Ce, Nd, Sm, Eu, Tb, Yb, Lu	NA
	ACT	Au, Ag, As, B, Ba, Br, Ca, Co, Cr, Cs, Fe, Hf, Hg, Ir, Mo, Na, Ni, Rb, Sb, Sc, Se, Sn, Sr, Ta, Th, U, W, Zn, La, Ce, Nd, Sm, Eu, Tb, Yb, Lu	NA
PGE	BBC	Au, Pt, Pd, Rh, Os, Ir, Ru	NFNA
	ACT	Au, Pt, Pd, Re, Rh, Os, Ir, Ru	NFNA
REE	MUN	Ba, Ce, Dy, Er, Eu, Gd_160, Hf, Ho, La, Lu, Nb, Nd, Pr, Sm, Ta, Tb, Th, Tm, Y, Yb, Zr	PMS

Table D – What Elements and Element Suites are done by Method and Lab

Methods	Elements	Element Suite
XRF1	Al_2O_3, Ba, CaO, Cr_2O_3, Fe_2O_3, H_2O+, H_2O-, K_2O, LOI, MgO, MnO, Na_2O, P_2O_5, SiO_2, TiO_2, SUM	Oxides
XRF2	Ba, Be, Bi, Ce, Co, Cr, Cs, Cu, Hf, La, Mo, Nb, Ni, Pb, Rb, Sc, Sn, Sr, Ta, Th, Ti, U, V, W, Y, Yb, Zn, Zr	Minor
CAA	Hg	Metal, Multi Par
FAA	As, Au, Sb	Metal, Multi Par,

		Assay
FAG	Au, Au1, Pd, Pt	Multi Par, Assay
FAM	Au1, Pt, Pd, Rh	Multi Par
GRAV	H2O-, H2O+, LOI, Sum	Oxides
HAA	Ge, Se, Te	Metal
ICP	Ag, Al, As, Au, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, La, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Rb, S, Sb, Sc, Se, Sn, Sr, Te, Th, Ti, U, V, W, Y, Zn, Zr	Minor, Multi Par
ICPM	Ag, Al, As, Au, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, La, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, S, Sb, Sc, Sn, Sr, Th, Ti, Tl, U, V, W, Y, Zn, Zr	Multi Par
LE	C, CO2, S	Oxides
LIC	Al_2O_3, Ba, CaO, CO_2, Fe_2O_3, H_2O+, H_2O-, K_2O, LOI, MgO, MnO, Na_2O, P_2O_5, SiO_2, SO_3, Sum	Oxides
LICM	Ba, Bi, Co, Cr, Cs, Cu, Ga, Hf, Nb, Rb, Sn, Sr, Ta, Th, Tl, U, V, W, Zr, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Mo, Cu, Pb, Zn, Ni, As, Cd, Sb, Bi, Ag	Multi Tot
MAA	Ag, As, Bi, Cd, Co, Cu, Fe, Ga, Mn, Mo, Ni, Pb, Sb, Zn, Ba, Se	Metal, Minor
MS	Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Ga, Hg, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Rb, S, Sb, Sc, Se, Sn, Sr, Ta, Th, Ti, Tl, U, V, W, Y, Zn, Zr	Multi Par
MSM	Ag, Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Ge, Hg, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Rb, Sb, Sr, Ta, Te, Th, Ti, Tl, U, V, W, Y, Zn	Multi Par
NA	Au, Ba, Ce, Co, Cr, Cs, Cu, La, Mo, Ni, Pb, Rb, Ta, Th, U, V, W, Yb, Zn, Ag, As, Br, Ca, Fe, Hf, Hg, Ir, Na, Sb, Sc, Se, Sr, W, La, Nd, Sm, Eu, Tb, Yb, Lu	Metal, Minor, Minor NA, INA Group
NFNA	Au, Pt, Pd, Re, Rh, Os, Ir, Ru	PGE
PMS	Ba, Ce, Dy, Er, Eu, Gd_160, Hf, Ho, La, Lu, Nb, Nd, Pr, Sm, Ta, Tb, Th, Tm, Y, Yb, Zr	REE
SE	F	Minor
TI	FeO	Oxides

This next table is given to use when querying for tables by Element Suite and Method. Most of the time you would search for your element suite by typing it into the Element Suite field using the * operators, and then using the request Is Not Null in the method field you are searching for. However due to some query overlap, the below method field requests should be substituted for Is Not Null. For example if you are looking for Metals done by LIC, type in Like "*Ag*" under the LIC field instead of Is Not Null

Table E-Exceptions to *Is Not Null* when querying by Element Suite and Method

Element Suites	ICP	LIC	MAA	NA	Comments
Assay	Like "*Pd*"				
INA Group					
Metal		Like "*Ag*"		Like "*Au*" and Not Like "*Fe*"	Au in code 63 is the only metal done by NA
Minor	Like "*Zr*" or Like "*Rb*"		Like "*Ba*"	Not Like "*Fe*"	
Multi Par	Like "*Ag*"				

APPENDIX F

Miscellaneous Notes

- Some field numbers have a D but the original is not in the database yet or cannot be found. These are written in the "Comments" field simply as *Duplicate of*
- All less than signs have been converted to -.
- Batches that have been given a W/S code is kept at only W. UNLESS Tungsten (W) is being tested for and then code is left at W/S.

- Some samples were reanalyzed later for additional elements. In this case an R is placed at the end of the lab number and a new batch number is assigned to the samples. We have taken out the R because Access does not allow text in primary key fields. Batches are listed as entered into the database, but in the Comments field any additional batch or batches are listed. For consistency the original batch number is listed in the *Batch ID* field and any additional analysis is mentioned in the *Ana Comments* field. Also, to allow information from **tblReanalysis** to be queried with others it has been put into the main analysis table with a false Lab ID. It is the same as the original but with an extra number being either a 0 or 1 at the end of it so it will be 6 numbers instead of 5. This means that these records can only be accessed by *Lab ID* using wildcard operators or the *Batch ID*.

- We have created **tblReanalysis** to list the original batch and new batch numbers along with the analysis code for each. This allows completely different suites of elements to be identified as the later analysis. When additional elements have been added to a sample with the same field number but not identified as reanalysis the field number stays the same, but there is two lab numbers. The original is listed under *Lab ID* and new is listed under *Additional ID*. With reanalyzed samples the field number stays the same.

- For reports that contain the same elements twice with different values, we entered the value found for the originally requested elements, not additional values that are found attached on a different sheet.

- Some geologists have entered separate batches for elements with the same field number but are prepared by different methods. This results in 2 lab numbers for 1 field number. When this occurs both preparation techniques are listed in the prep code column and the element prepared by S is mentioned in the 'Comments' field. From there the batches are treated as a reanalysis and all relevant attributes are listed in tblReanalysis.

- When samples have been retested for the same element in two different batches the newest data updates the old data as this is probably more reliable.

- Values that are >1 are entered as 1,000,000 because we can't use <> signs and – represents <.

- After 1991 the Spark Emission Spectroscopy Analysis was discontinued. Therefore Spec results are only recorded for 87, 88, 89, 90, and 91. Any pre 87 has not been entered in the database because priority has been given to entering quantitative data. The coding will still show that Spec analysis was done, but there will be no analytical data.

- Any reanalyzed samples done in ’86 haven’t been entered as reanalysis. This is because details of the analytical method are absent or unreliable. However the additional analysis is, so it has been entered as original results.

- If a batch doesn’t have a Geologist ID and is a reanalysis batch, the original batch probably is tagged with a geologist. We are going to tag all batches with Geologist ID regardless of reanalysis or not.

- Because in the Multi Par suite it is common for the AAL lab to analyse Au by ICP and by FAA we have included a Au1 column that is for Au by FAA, FAG or FAM.

- If it doesn’t have an analysis code then it is XRD, SPEC or both

- When we know there is no location data all zero’s are entered into the record to tag it as being complete