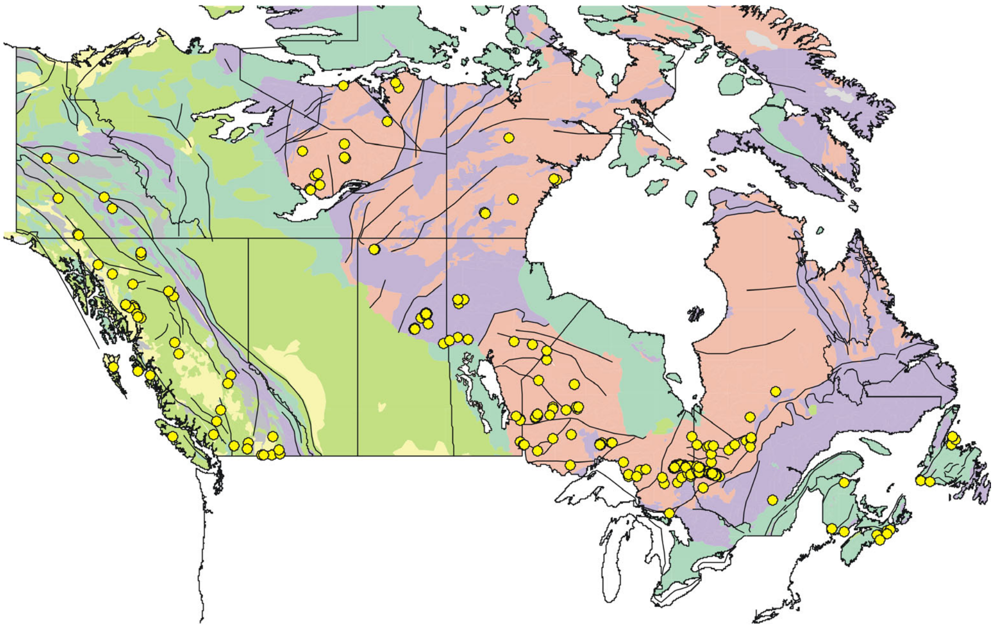
GEOLOGICAL SURVEY OF CANADA

OPEN FILE 4896

Gold deposits of Canada: distribution, geological parameters and gold content

P. Gosselin, B. Dubé



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Foreword

This Open-File report is complemented by a poster-size geological map of Canada, Open-File report 4894: Gold deposits and gold districts of Canada, showing locations and sizes of all gold deposits and gold districts of Canada. It also displays enlargements of key gold districts (such as Timmins and Val d'Or) and detailed economic figures current to at least the end of December 2002.

These products are companions to the Open-File report 4895: Gold deposit of the world, a database comprising referenced and detailed geological, geographical and economical informations on 452 gold deposits spread across the world, and to the Open-File report 4893: Gold deposits and gold districts of the world, a poster-size map of the world showing the location and size of all major gold deposits, as well as enlargements of key gold producing regions.

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Her Majesty the Queen in Right of Canada, represented by the Minister of Natural Resources (NRCan) does not warrant or guarantee the accuracy, completeness or fitness for any purpose of Reserve and Resource information (Data) contained in this database, including whether the Data is compliant with any securities regulations or standards, and NRCan does not assume any liability with respect to any damage or loss incurred as a result of the use made of the Data.

Resource and reserve figures are historical in nature. The Data source provided with each set of figures should be cited if the Data are re-reported.

1. Introduction

Gold deposits are an attractive and major target for many exploration and mining companies in Canada. Although the economics of gold itself has varied, the industry is especially productive in finding new gold deposits and new ways of exploiting them at minimal costs. However, gold deposits are one of the most difficult type of target as they are one of the most geologically complex type of mineral deposits. They can be hosted in a wide variety of rocks, and linked to a broad range of tectonic and geological settings. Thus, with the renewed interest in gold exploration from mineral exploration companies in the past 10 years, the need has risen for detailed geological information pertaining to gold deposits in Canada, which can be readily available on request.

To support this need, the Geological Survey of Canada has launched, with the help of sponsors from the industry, the World Minerals Geoscience Database Project (see the WMGDP website at http://www.nrcan.gc.ca/gsc/mrd/wmgdb/), managed by W.D. Sinclair. The aim of the WMGDP is to produce high-quality, well-organized geoscience data sets that can be used in conjunction with GIS (Geographic Information Systems) and database software to help understand the broad relationships between global tectonics and the regional settings of mineral deposits. The World Gold Database (WGD) project started in 1998 and the database provided herein is an integral part of the WMGDP, and the end-result of research and compilation by the authors during this time. Companies and organizations that have financially supported the WMGDP are BHP World Exploration, Inc., Billiton International Metals B.V. (now merged with BHP World Exploration, Inc. as BHP Billiton Limited), Barrick Gold Corporation, Cominco Ltd., Cyprus Amax Minerals Company, Inco Limited, Metal Mining Agency of Japan, North Limited, Phelps Dodge Exploration Corporation, Placer Dome Exploration Inc., Randgold Resources, Rio Tinto Mining and Exploration Limited, Teck Corporation (now merged with Cominco Limited as Teck Cominco Limited), and WMC International Limited.

The Canadian Gold Database (CGD) contains information about 128 gold deposits of all types (see Appendix 1 for an alphabetical listing by provinces/territories) covering all of Canada's geological provinces. The term gold deposits in this report is restricted to bedrock (commonly "lode") gold deposits and as such does not include placer deposits. The goals of the Canadian Gold Database are:

- to identify and locate important (≥250,000 oz) gold deposits
- to give detailed and referenced geological information
- to give referenced economic (production and resources) figures
- to have the information in a database frame which can be queried and updated by a third party

This database is built on compilation of data from various sources: mainly the available scientific literature, GSC Open Files 3490a and 3490b, and GSC Bulletin 540 (Poulsen et al., 2000), as well as personal observations made by the second author. Field notes and personal records of former GSC colleagues F. Robert and K.H. Poulsen were also consulted.

Deposits considered to be "gold deposits" in this report are those in which the value of contained gold exceeds that of co-commodities (see Poulsen et al., 2000). To calculate this, the following equation was used:

$$\frac{Au(g/t)}{Cu(\%) + Pb(\%) + Zn(\%)} > 1$$

A cut-off factor of 250,000 oz Au was chosen for a number of reasons. As stated above, the economics of gold is a primary determinant in the decision of bringing a deposit into production or not. Although the price of gold is definitely one of the most important factor, certainly another very important factor is the size of the deposit (or total gold content). In Canada, gold deposits with a potential gold content equal to 250,000 oz Au or more stand a good chance of becoming an operating mine. This helped also to confine our research to a reasonable number of important deposits, where otherwise countless hours would be lost in the search and compilation of information on small-scale deposits which would probably never be brought to the production stage.

It is to be noted that the 250,000 oz Au factor represents the total gold content of a deposit. This is calculated by combining the past and current gold production with the latest available reserves figure (reserves means proven & probable reserves according to the Canadian Institute of Mining and Metallurgy Ad Hoc Committee on Ore Reserves, September 1996). Confidence in the reserves figures defined by closely spaced drilling and sampling is high enough that these numbers can be included in the total gold content of the deposit. As such, deposits entered in the database may or may not be actual producers. Past producers with known production exceeding 250,000 oz Au are certainly included in the database. Current producers still active are also included in the database. Finally, deposits which are sufficiently large but have not yet produced sufficient gold, or have not yet produced gold at all, may also be present in the database, providing their reserves are high enough.

2. Structure of the Canadian Gold Database

The CGD is built on Global DB schema, incorporating the index-level data previously released in GSC Open File 3490 by Jenkins et al. (1997), with support from Inmet Mining Corporation. Every deposit from OF 3490 has been exported to the WGD, as was part of the data, now viewable/editable through the GShell program, the WMGDP's data-entry utility described below. Columns of data exported from OF 3490 were the Deposit Number, Name, Country, Near City, Geological Province, Geological Subprovince, District, Longitude & Latitude and Style of Mineralization.

This initial compilation was augmented with data collected by Howard K. Poulsen during his numerous years of service with the Geological Survey of Canada, who compiled a thorough list of deposits complete with some of their geological characteristics, and graciously allowed the use of his data.

Much of the conceptual design and content of the database is based on Poulsen et al. (2000) Geological Survey of Canada Bulletin 540: "Geological classification of Canadian gold deposits", which served as a basis for determining which features were to be compiled and presented in the database, and which features were necessary for classification of a deposit. This publication also served as a guiding tool to classify all gold deposits in the database, and is an essential companion to this database.

The data fields and tables used in the Canadian Gold Database are based on the GlobalDB schema developed for the World Minerals Geoscience Database Project. This schema, and the data-entry and query utilities designed for use in conjunction with the database schema, are described in the accompanying documentation by R.M. Laramée. The following description of database entities and tables in the CGD is based on GShell, the application designed for entering and editing data using the GlobalDB schema.

The opening screen of the GShell program (Figure 1) allows the user to select one of 7 options. The 7 buttons open up 7 different forms listed as follows:

- **Deposit Group**: This entity is not used in the CGD.

- **Deposit**: This form is used to enter and store geographical and geological data for each deposit. Please note that the term "deposit" is not restricted to a single occurrence of metal and may in places apply to a district or an area with multiple genetically-related deposits, particularly for older production areas where production data is difficult to retrieve. It may then be applied to a cluster of mine exploiting the same mineralized structure or orebody, such as Hemlo for example.

- **Mine**: This form is used for associating a mine to a deposit, and enter ownership/operatorship data.

- **Production**: This form is used to enter production data by time period. A deposit may have one or more production record. Deposits with no production records are deposits which have never been in production, or the information is unavailable.

- **Resource**: This form is used to enter reserves and resources figures. In ideal cases, a deposit has one reserve record and one to two resource records, but this may vary. Deposits with no records mean that either the deposit is exhausted or the information was unavailable.

- **References**: This form is used to enter the complete data for a particular reference, which can later be used and linked to from other entities.

- **Lookup Tables**: This form is used to give and/or edit information available in the lookup tables in MS-Access. Entries in the Lookup tables are used as picklists in the **Deposit**, **Mine**, **Production** and **Resources** forms.

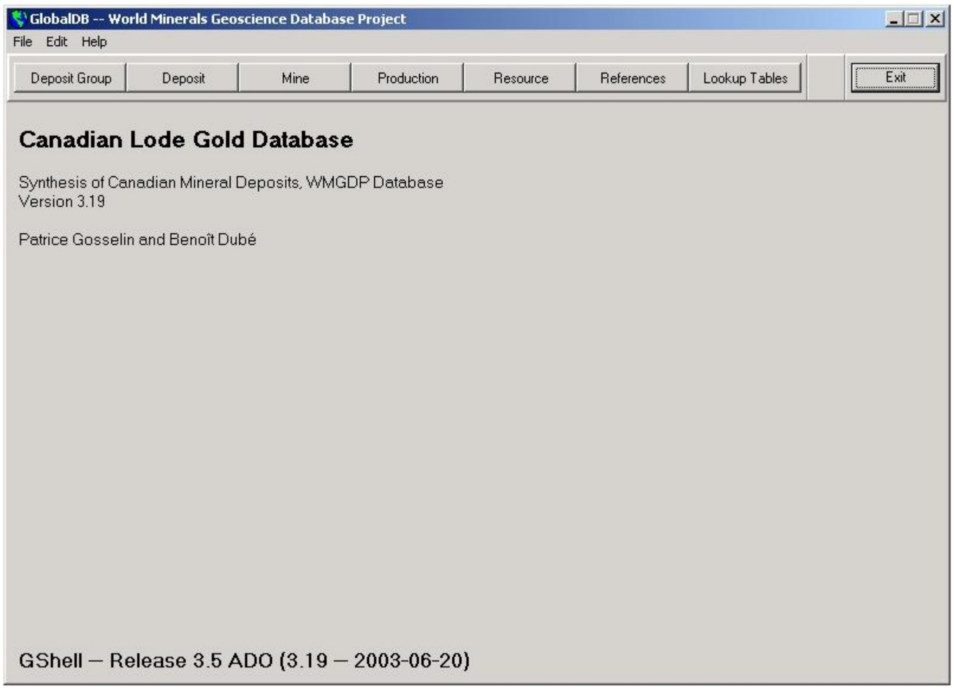

Figure 1: Opening window of the GShell program with CGD loaded

For a complete description of how the GShell program works, the reader should refer to the accompanying documentation by Robert Laramée. For reference to the MS-Access™ tables, the reader should refer to the Documentor program by Robert Laramée and accompanying documentation.

2.1. Deposit Form

A general part fills the upper half of the **Deposit Form** interface (Figure 2). It is static and used for every deposit. Most of the fields of the General part serves for positioning of the deposit both geologically and geographically. There are 11 fields in this part:

DepClan (Deposit Clan): The Deposit Clan is a broad way of classifying deposits on the basis of tectonic environments and crustal depth represented by the host rocks (epithermal, intrusion-related, greenstone and slate belt). These terms refer to a group of deposit types, possibly genetically related, that reflect a particular geological and metallogenic environment (Figure 3; see Poulsen et al., 2000).

DepType (Deposit Type): This field is grayed out, and the tabbed page *Deposit Type* is used to fill it in (see the *Deposit Type* section next page).

GeolProv (Geological Province): This field is used to enter the large-scale geotectonic environment in which the deposit is located (such as Superior Province, Cordillera, etc.).

GSubProv (Geological Sub-Province): Used to enter the large, regional-scale geotectonic environment in which the deposit is located (such as Abitibi belt, Uchi subprovince, etc.).

GDistrict (Geological District): This field is used to enter the name of the local mineral district the deposit is part of, and often bears either the name of the most important deposit in the area or the name of the area itself (such as Timmins or Val d'Or).

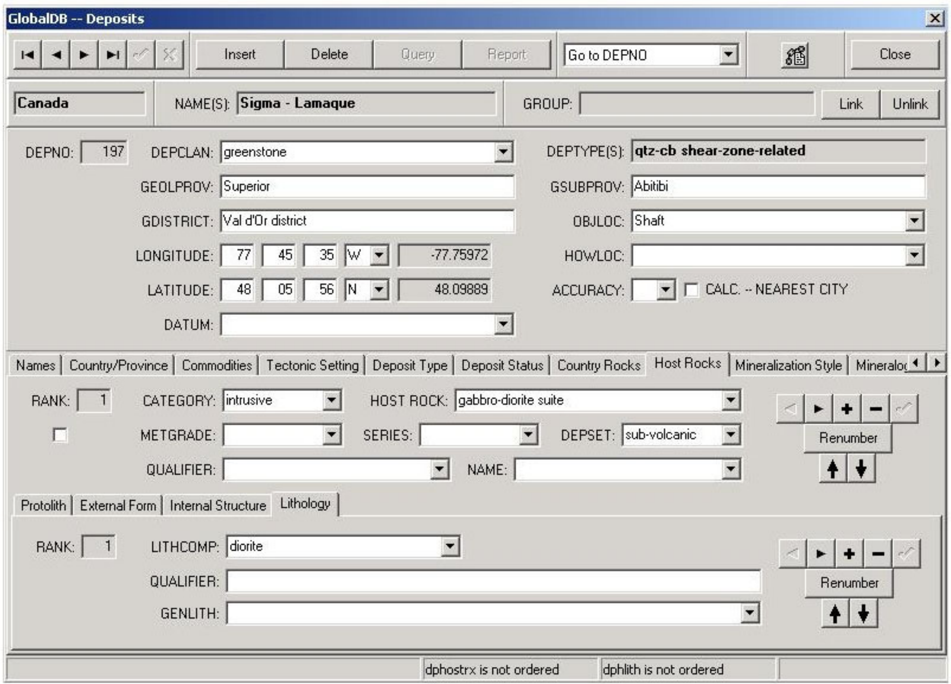

Figure 2: **Deposit Form** with *Host Rocks* tabbed page activated

ObjLoc (Object Located): Describes the corresponding object of which the position was measured and given in the **Longitude** and **Latitude** fields (such as a mine shaft).

Longitude: Longitude coordinates of the deposit or of the object specified in the **ObjLoc** field.

Latitude: Latitude coordinates of the deposit or of the object specified in the **ObjLoc** field.

HowLoc (How Located): Method used for derivation of the **Longitude** & **Latitude** coordinates.

Accuracy: Exactitude of the **Longitude** & **Latitude** coordinates relative to degree (D), minute (M) or second (S), this field is seldom used. Please note that data may not be accurate enough for plotting at large scale (1:100,000 and larger).

Calc. –Nearest City (Calculated from the nearest city): This checkbox indicates if the **Longitude** & **Latitude** coordinates are calculated using the coordinates of the nearest city to the deposit and the distance from this city to the deposit. This field is seldom used.

Datum: Datum and/or spheroid applicable to the **Longitude** & **Latitude** coordinates. This field is not used in the CGD.

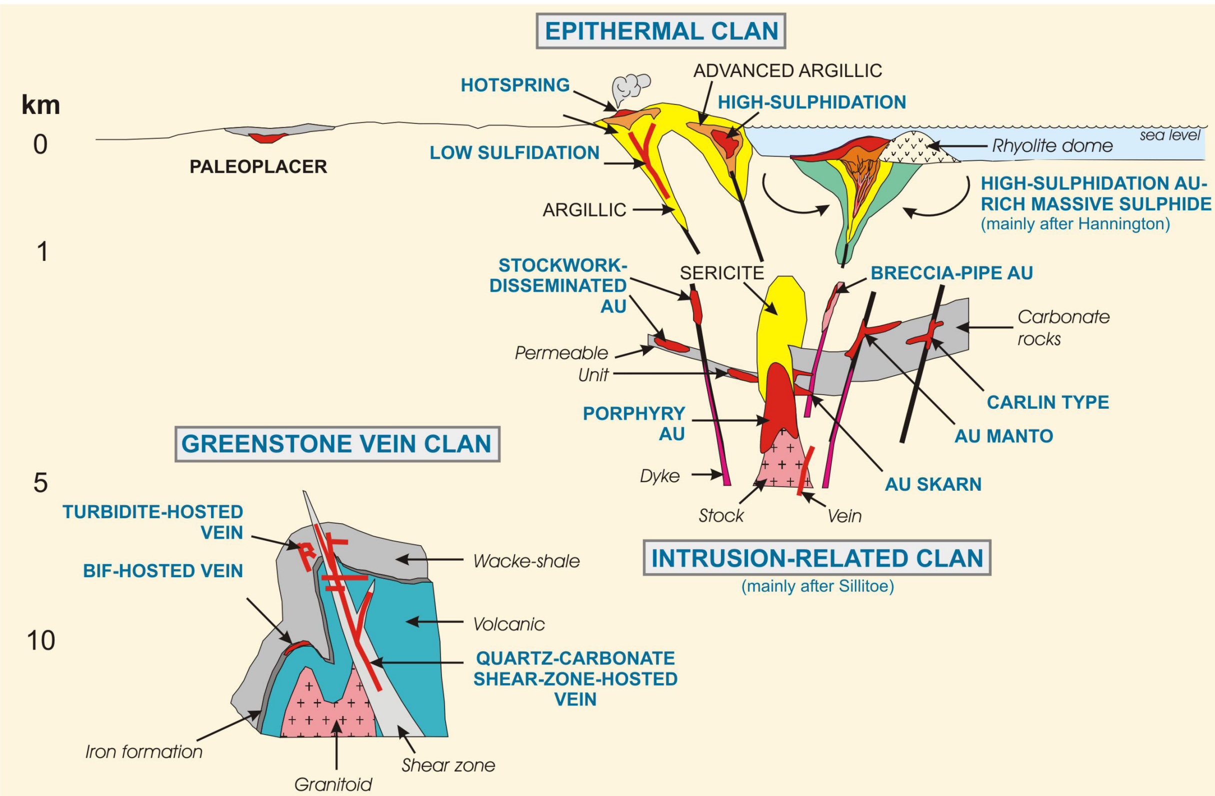

Figure 3: Inferred crustal levels of gold deposition, from Dubé et al. (2001), modified from Poulsen et al. (2000)

The lower half of the **<u>Deposit Form</u>** interface is separated into tabbed pages which can be navigated through using the arrows at the right end of the tab bar (Figure 2). The order in which these tabbed pages appear can be modified using the *Customize Tabs* option in the *Edit* menu of Gshell. Each of the 18 pages allows for precise description of a characteristic of the deposit, and are listed as follows:

Deposit Names: The first name entered in the **DepName** field is usually the name of the deposit most commonly used in recent literature. Additional entries are used to enter previous or alternative names that might have been in use in the past, or may represent different ways of writing the deposit name.

Country/Province: This page is used to further characterize the geographical location at **Country**, state/province (**ProvState** field) and district/county/subprovince scale (**SubProv** field). The last four fields are used to describe the distance (**HowFar** and **FarUnits** fields) and direction (**DirFrom**) of the deposit from the nearest and/or largest and/or most know city or landmark (**NearCity** field) in the area. Additional entries are sometimes used to give the user another city which is situated closer but less known, or to the contrary, to illustrate the distance from a well-known city.

Commodities: This page and the **Commodity** field detail which commodities or metals were exploited during the life of the deposit, though sometimes there are no corresponding production data. The most important commodity is ranked first, and following entries are usually by-products of lesser economic importance.

Tectonic Setting: This page is used to describe the tectonic setting (**TectObj** field) of formation of various geological elements (**SettingOf** field), i.e. of the host rocks, mineralization, alteration, country rocks and related magmatic rocks. This section was enhanced with 4 new fields **(Realm**, **DfRegime**, **TecQual** and **TectName**) during mid-summer 2000; deposits entered prior to this date usually have less data. The **Realm** field defines location of the setting in relation to the continental and oceanic plates. The **DfRegime** field (Deformation Regime) characterizes the deformation regime associated with the tectonic setting of the element's formation. The **TecQual** field (Tectonic Qualifier) further constrains, where necessary, the tectonic setting present in the **TectObj** field. The **TectName** field (Tectonic Name) specifies the name of the tectonic accident specified in the **TectObj** field.

Part of the most critical data to the CGD is the tectonic setting of the mineralization. This parameter, however, may be different from the host rocks tectonic environment of formation. Whereas the latter is generally well-known, the tectonic environment of the mineralization is often ambiguous or poorly described, and may change according to various studies.

Deposit Type: The **DepType** (Deposit Type) field is based on sixteen well-established gold deposit types described by Poulsen et al. (2000). A summary description of each type, as well as the classification parameters used can be found in Poulsen et al. (2000). The decision tree used for classification is illustrated in Figure 4. As some deposits may present ambiguous characteristics, a short comment may be entered in the **Comments** field. Also, when more than one type of ore is present, additional entries may be added, though the initial entry is the one type of mineralization that is predominant in the deposit. This classification should be used with caution, as some deposits may be transitional between two types, atypical or intensively deformed and metamorphosed, and consequently difficult to classify. Terminology defining the "mesothermal lode gold" deposits, first used by Lindgren (1911, p. 600) and Hodgson, (1993), has been defined as "greenstone-hosted quartz-carbonate vein" in Poulsen et al. (2000), whereas Groves et al. (1998) favor the term "orogenic gold" deposits.

Deposit Status: This page and the **DepStat** (Deposit Status) field serves to qualify the operational status of the deposit according to the CIMM (Canadian Institue of Mining and Metallurgy) recommendations. The **Comment** and **EstSize** (Estimated Size) fields were added in January 2001, as such, deposits entered before this date have no data in those fields. The **Comment** field is used to enter useful data pertaining to operational history of the deposit/mine, or to help complement the production or resource data present in the other forms. The **EstSize** field, used mostly with Chinese deposits, represents the estimated total content of gold, or productivity, (production + reserves) in metric tonnes according to the following categories:

- Small: less than 7 metric tonnes Au
- Medium: 7 to 29 metric tonnes Au
- Large: 30 to 99 metric tonnes Au
- Super-large: 100 metric tonnes and over

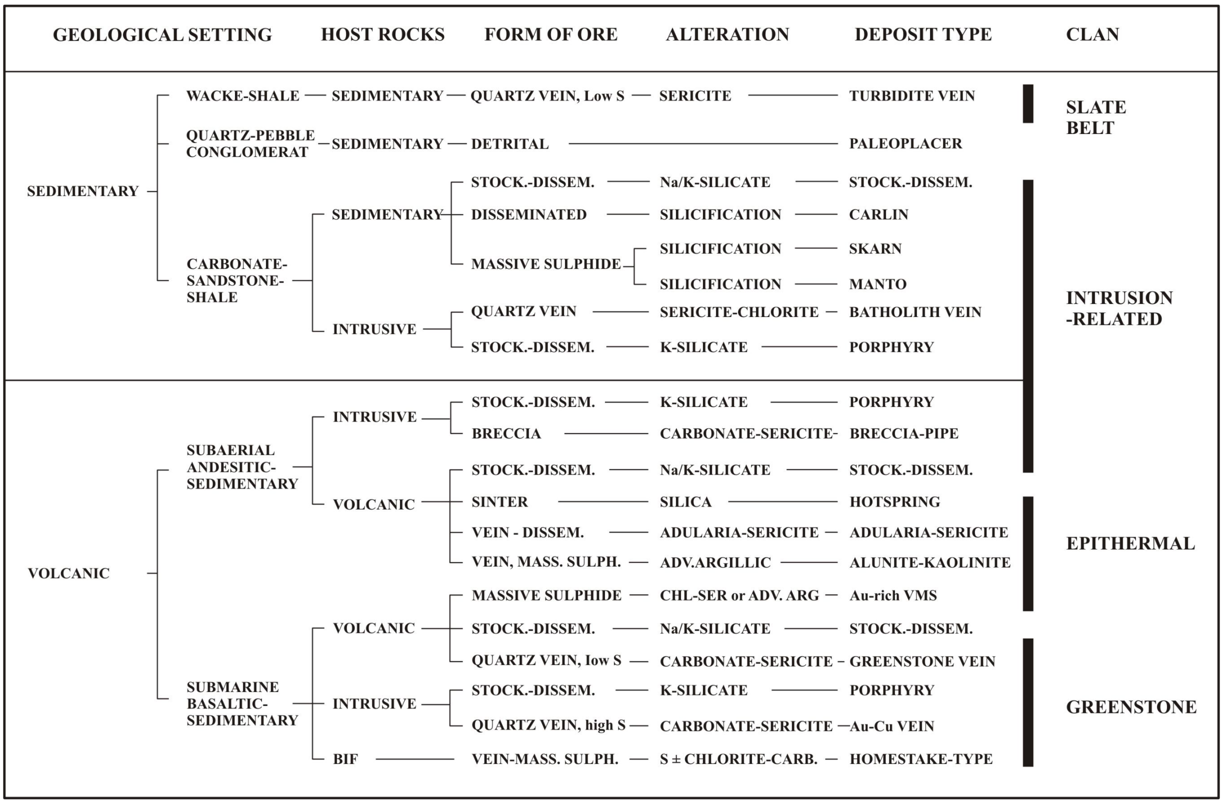

Figure 4: Decision tree showing how sixteen geological types of lode gold deposits can be distinguished from one another from selected geological parametres (adapted from Poulsen et al. (2000) and Robert et al. (1997)

Country Rocks: This page is used to describe the type of rocks around the deposit (on a local scale), or the mine stratigraphy. Only the **Country Rock** and **MetGrade** (Metamorphic Grade) fields are used on a constant basis even though other fields and sub-pages are available. For description of the other fields and pages, please refer to the *Host Rocks* page. The **Country Rock** field gives a list of the rocks present in the area of the deposit. The associated **MetGrade** field gives the metamorphic grade of the rocks associated in the **Country Rock** field. When this field is left blank, it means that no metamorphism is known or was found in the available literature by the compiler. However, metamorphism is at times implied in the literature, especially in greenstone belt settings where most, if not all rocks are of greenschist grade. Also, intrusive rocks in some cases have no accompanying metamorphic grade when all other rocks have one ascribed. This reflects the fact that it is difficult to establish clearly whether the intrusive rocks were pre-, syn-, or post-metamorphism.

A checkbox near the grayed-out **Rank** field indicates whether this entry has a corresponding radiometric age in the *Radiometric Age* page. No importance has been assigned to rank consideration in this category.

Host Rocks: The *Host Rocks* page (Figure 2) is used to give a detailed description of the rocks hosting the orebodies. It is separated in two parts, the first part providing more general information and the second part, with four sub-pages, giving more precise details. A checkbox near the grayed-out **Rank** field indicates whether this entry has a corresponding radiometric age in the *Radiometric Age* page. Please note that, usually, the first host rocks are the most important hosts, whereas the last ones listed host significantly less ore. The first part consists of 7 fields listed as follows:

- The **Category** field is the first step in classifying the host rocks, and uses a broad classification such as: intrusive, volcanic, sedimentary, etc.

- **Host Rock** field goes one step further in the classification of the host rocks using sedimentary assemblages, intrusive suites, mafic/felsic dominated, etc.

- **MetGrade** (Metamorphic Grade) gives the metamorphic grade of the rocks in the **Host Rock** field.

- The **Series** field is used primarily to constrain further intrusive and extrusive rock types with appropriate magmatic affinity (igneous-rock series).

- The **DepSet** (Depositional Setting) field is used to constrain the environment of formation of sedimentary rocks, and is also used to express the level (depth) of intrusive rocks within the crust.

- The **Qualifier** field uses descriptive terms such as calcareous, silty, etc. The **Qualifier** applies in whole or in part to the rocks appearing in the *Lithology* page (see below), and it may reflect lateral changes and variations within the rock formation.

- The **Name** field is used to give the proper stratigraphic or lithostratigraphic name used in the literature for a given rock formation.

The second part comprises 4 sub-pages, each with their own fields, and listed as follows:

- *Protolith*: The protolith page and **Protolith** field are used to give a protolith in the context of a severely metamorphosed or deformed rock. The field **Name** is rarely used as it is redundant with the same field in the first part. The field **Qualifier** is used to enter a short comment of interest.

- *External Form*: This page and the **Hform** (Host Rock Form) field are used to characterize the physical shape of the host rock (dyke, sill, etc.)

- *Internal Structure*: This page and the **HStruc** (Host Rock Structure) field are used to characterize the internal structure of the rock (layering, banding, etc.) and any other noteworthy specific characteristic related to the host rock.

- *Lithology*: This page and the **Lithology** field are used as the final classification step of the host rock and represents the rock itself. The **Qualifier** field is used to enter a short comment of interest.

Mineralization Style: This tabbed page and the **MinStyl** field are used to characterize the physical form or shape of the orebodies (veins, stockworks, breccias, etc.). The first style listed is usually the most important in a particular deposit, and the following styles are listed in order of importance.

Mineralogy: The **Category** field is used to select an element from which the mineralogy can be defined in the **Mineral** field. In most cases, minerals listed on this page are those of the gangue and ore. Mineralogy of the host rocks is rarely used, as it is mostly inferred from the type of rock shown in the **Lithology** field (see *Host Rocks*), and any specific mineralogical characteristic would be written down in the **Qualifier** field of the *Host Rocks* page. Mineralogy of the alteration is also rarely used here as it is generally well-constrained in the **AltSig** field of the *Alteration Signature* page. A checkbox near the grayed-out **Rank** field indicates whether this entry has a corresponding radiometric age in the *Radiometric Age* page.

The list of minerals by category is usually ranked by order of importance, i.e. the first (or the first few) ore mineral is a major ore constituent, and the last ones being minor to rare.

*Coincident Feature (*or *Controlling Structure)*: This tabbed page lists the structures which control the mineralization. The **CFeat** (Coincident feature) field is used to broadly categorize the type of structure that exerts some degree of control over the mineralization. The **Name** field gives that structure its formal name appearing in the literature. The **Qualifier** field is a free-text field used to enter a short description of the structure and the way it affects the orebody. A checkbox near the **Rank** field indicates whether this entry has a corresponding radiometric age in the *Radiometric Age* page. Structures are usually ranked so that the most important ore-controlling structure is ranked first. Structures affecting only the geometry and localization of the orebody and not its emplacement or genesis (such as post-mineral faults) are ranked last. Ore-controlling structures can be linked to the mineralization style that they are controlling or affecting.

Tectonic Structures: This page is used for regional structures having a relation, if sometimes distant, with the deposit and its formation. The **TStruc** (Tectonic Structure) field serves as a broad classification of structure type. The **Name** field reports the name of the structure used in the literature. The **Qualifier** field is a free-text field used to enter a short description of the structure and the way it affects the deposit. Structures are usually ranked in such a way that the most important regional structure is ranked first.

Alteration signature: The **AltCat** (Alteration Category) field (Figure 5) serves as a broad alteration type classification with broad terms like propylitic alteration, and "mineralogic" terms such as carbonate alteration or sericite alteration. The **WhatAlt** (What is Altered) field is used to list the rock types affected by the alteration, the zonality of the alteration and any other short relevant comment. The **AltSig** (Alteration Signature) field serves to further characterize the alteration type mostly by specifying its mineralogy. A checkbox near the grayed-out **Rank** field indicates whether this entry has a corresponding radiometric age in the *Radiometric Age* page.

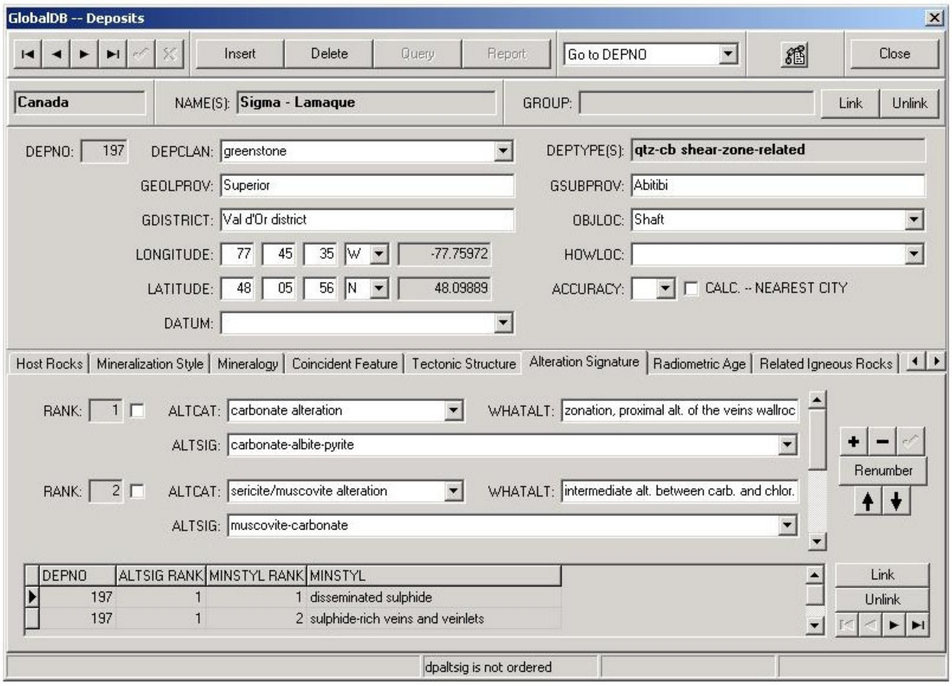

Figure 5: <u>**Deposit Form**</u> with *Alteration Signature* tabbed page activated

The link established between a specific alteration and related mineralization style is often subjective at best. Where possible, the link was restricted to the exact mineralization which can be found in one specific altered zone. However most of the time, the link is more of a "genetic" kind, implying that the alteration and hydrothermalism are broadly related to the mineralization emplacement. For example, it is difficult (if not stated clearly in the reference) to say if any mineralization is found within the distal propylitic alteration of a deposit. As a rule of thumb, if all mineralization styles are attached to an alteration, it usually means the link is "genetic".

Radiometric Age: This page (Figure 6) is used to enter radiometric age data for rocks and/or minerals which have a special meaning to the ore deposit and serve to constrain events in a given time frame. This page consists of 14 fields listed as follows:

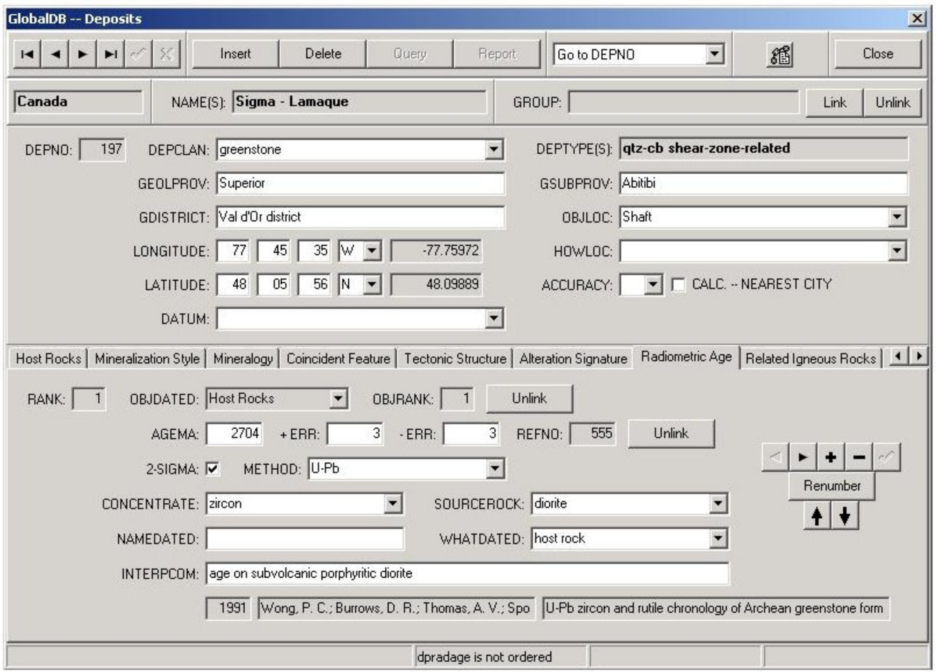

Figure 6: **Deposit Form** with *Radiometric Age* tabbed page activated

- The **ObjDated** (Object Dated) serves to illustrate to which element of the database the age applies to (host rock, alteration signature, etc.)
- The **Link** button is used to link the element chosen in the **Objdated** field to a specific item such as a rock, mineralization style, alteration signature, etc. The lack of linked item means that this degree of precision was unavailable.
- The **ObjRank** (Object Rank) field is used to select a more specific element of the database to which the age applies, i.e. a specific rock type from the country rocks listing.
- **AgeMa** (Age in Million Years) gives the radiometric age in Ma.
- The **+Err** field is used for the upper error limit.
- The **-Err** field is used for the lower error limit.
- The **RefNo** (Reference Number) field and **Link** button are used to assign a specific reference from which the age was taken. Efforts were made to assign the most specific reference where the date was used for the first time and not a paper where reference is made to such a date, however this was not always possible.
- The **2-Sigma** field is rarely used, as it is rarely mentioned if the error on the date is a 2-sigma error.
- The **Method** field states which method was used for dating.
- The **Concentrate** field is used to specify which mineral was dated.
- The **SourceRock** field specifies the rock from which the mineral fraction was extracted.
- The **NameDated** field is used to enter a stratigraphic or lithostratigraphic name for the source rock.
- The **WhatDated** field is used to express which element or event was dated and what is the element's or event's relationship to the mineralization.

- The **InterpCom** (Interpreter's Comment) is a free-text field used to specify any comment of interest pertaining to the determination of the age or source rock, etc.

It is to be noted that ages are also sometimes entered as a "bracket age" without method and concentrate. Such ages give the minimum and maximum ages and are often inferred from the radiometric ages of the rocks over- and underlying the specified element, or from the age of the lowermost and topmost members of a Formation, or from pre-ore and post-ore intrusions.

Related Igneous Rocks: This page (Figure 7) is used for entering intrusive rocks having a link to the deposit, wheter spatial or genetic. A checkbox near the grayed-out **Rank** field indicates whether this entry has a corresponding radiometric age in the *Radiometric Age* page. There are 6 fields and one sub-page with 2 fields, listed as follows:

- **The Category** field is the first step in classifying the related magmatic rocks, and uses a broad classification such as intrusive, volcanic, etc. In most cases, only intrusive rocks are entered in this field.
- The **RIgneous** field specifies the type of intrusive suite the rocks belong to (alkaline, tholeiitic, etc.)
- The **MSeries** (Magmatic Series) field is used to relate the intrusive rock to the appropriate magmatic affinity (igneous-rock series).
- The **DepSet** (Depositional Setting) is used to express the level (depth) of intrusive rocks within the crust (near surface, mid-level, etc.).
- The **Qualifier** field is a free-text field used for a short comment describing the relationship of the intrusive rocks to the deposit.
- The **Name** field is used to give the proper lithostratigraphic name used in the literature for the intrusive rocks.

The *Lithology* sub-page has 3 fields:

- The **LithComp** field is used as the final classification step of the intrusive rocks and gives a precise rock name.
- The **Qualifier** field is a free-text field used for entering a short comment about any specific characteristics (mineralogy, texture, etc.) of the intrusive rocks.
- The **Genlith** field is not used in the CGD.

General Shape: This tabbed page is not used in the CGD.

Geological Age: This page is used to give the geological or stratigraphic age of an element of the database. It is mostly used to give a stratigraphic age to the host rocks and to the mineralization. The first four fields (**StartAge**, **StartAge Qualifier**, **EndAge**, **EndAge Qualifier**) are grayed out and serves only to illustrate the values chosen in the following fields. The **CtryHost** field is used to determinate which element of the database the stratigraphic age refers to. The **StartAge** and **Endage** fields are used to assign an age to the chosen **CtryHost** element.

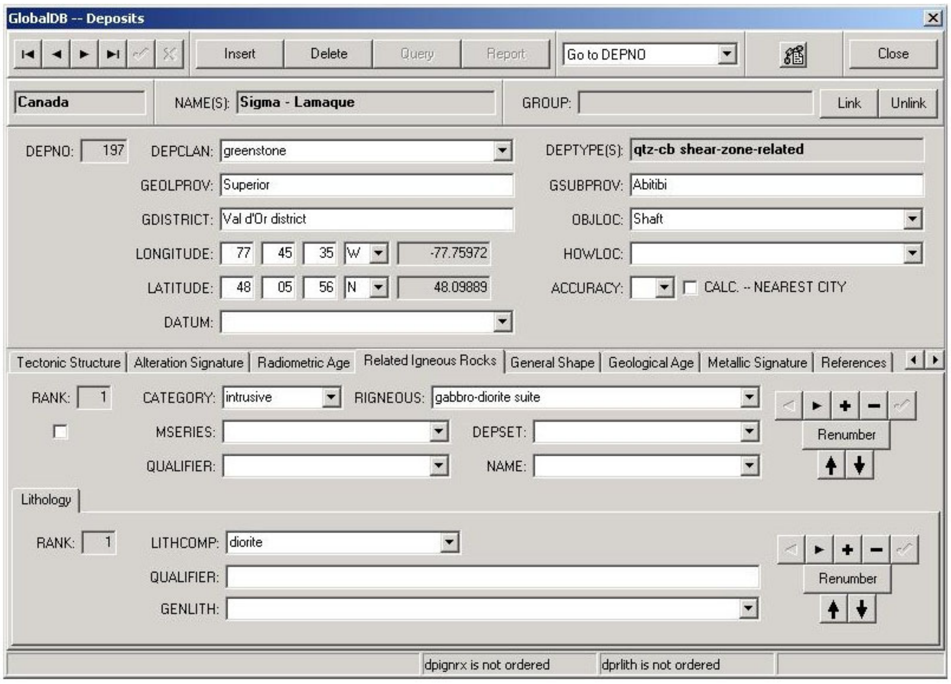

Figure 7: **Deposit Form** with *Related Igneous Rocks* tabbed page activated

In some cases, only the **StartAge** or the **EndAge** are entered. This means that the age is unconstrained in one direction, and gives the maximum or the minimum age of the element.

Metallic Signature: This page and the **MetSig** (Metallic Signature) field describe the suite of metallic elements which can be found associated with the mineralization. A checkbox near the grayed-out **Rank** field indicates whether this entry has a corresponding radiometric age in the *Radiometric Age* page. Systematical ranking of the elements of a signature by decreasing order of abundance was attempted but proved difficult to do, as such the actual order of the elements should not be seen to reflect any importance of one element over another. When no geochemical data was available, the suite was inferred from the gangue and ore minerals. The metallic signature can be linked to the mineralization style with which they are associated.

References: References entered through the **References Form** can be linked (or unlinked) to a specific deposit with the use of the **Link Ref./Unlink Ref.** buttons (Figure 8). The references are not linked in order of importance. The + button allows the compiler to specify which information was taken from the selected reference, by giving access to a number of checkboxes. Note that if two different references have checkmarks in the same boxes, this means that either both references gave the same information or that, more likely, the data used is a combination of the two references. Also, for a listed reference that has no checkmarks in any boxes, this means that the reference was added as an additional reference of interest although no specific data was extracted from that reference. Additional information on the exact location of the data in a reference may be available from the **Chapter**, **StartPage** and **EndPage** fields, although these are rarely, if at all, used.

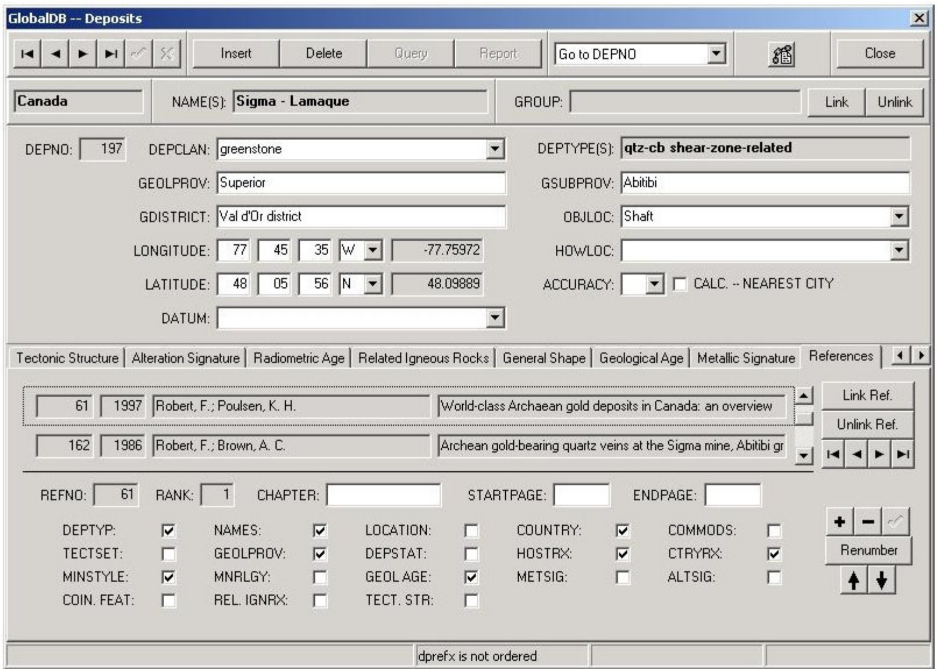

Figure 8: **Deposit Form** with *References* tabbed page activated

2.2. Mine Form

The **Mine Form** (Figure 9) describes ownership/operatorship and limited data on the years of operation of a mine. A deposit may have one or more mines, each mine with one or more shaft. A mine thus mainly refers to the "company" sense of the word describing an entity which exploits parts of, or the totality of an orebody, and most of the time has installations (grinding/milling/leaching circuits) to treat the ore extracted from that orebody. In a few cases, a deposit will be broken down into zones, each zones entered as a mine in the **Mine Form**.

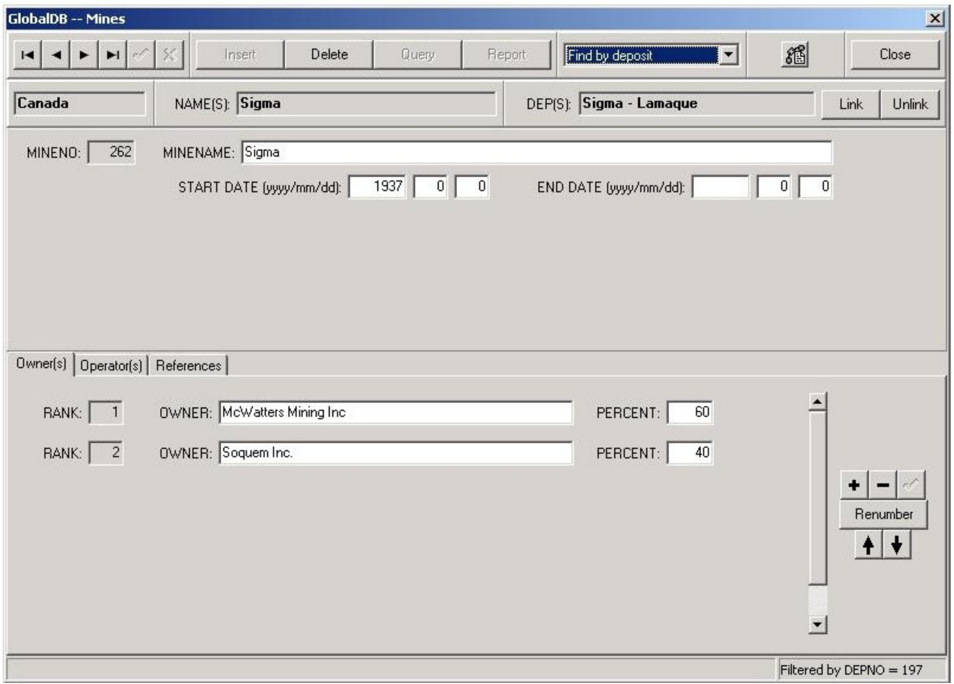

Figure 9: **Mine Form** with *Owner(s)* tabbed page activated

There are three general fields and 3 pages in the **Mine Form**:

The topmost buttons are the **Link** and **Unlink** buttons which allow the linking (or unlinking) of a mine and a deposit. Mines should not be linked to more than one deposit.

MineName: This field is used to enter the name of the mine. In (rare) special cases where historical production data of a deposit is particularly nebulous, an additional mine entry will be added (named "xxx-remaining") and will cover the leftover unaccounted for, or unreferenced, production. Difficulties to separate production figures between the mines, may also be solved by combining all mines into one record with all the names into the **MineName** field.

Start Date: This field is used to specify the date of first recorded production for a specific mine. A blank in the **Start Date** field means that either: 1) the data was not available, or 2) the mine has not come into production yet.

End Date: This field is used to specify the date of last recorded production for a specific mine. A blank in the **End Date** field means that the mine is still active and producing.

Owner(s): This page and the **Owner** field (Figure 9) are used to list the present owners of the mine. The **Percent** field represents the share of the listed owner in the mine. Three-digit numbers such as 38,5% in the **Percent** field were rounded to the nearest 2-digit numbers. Owners are listed in order of importance.

Operator(s): This page and the **Operator** field specify which company actually operates the mine.

References: This page is used to reference the data about the owners and operators of the mine. The dates of production can sometimes be found within this reference, but some other times not; in the latter case the user is referred to the *References* page of the **Production Form**. The **Chapter**, **StartPage** and **EndPage** fields can be used to further constrain the exact location of the data extracted from the reference.

2.3. Production Form

Production figures attributable to mines and deposits appear in this form. Wherever possible, production data is broken down into separate production periods (in the case of a deposit with multiple production periods) and each periods have their own production numbers and specific references. The **Production Form** has 7 general fields and 6 pages (Figure 10). The fields are listed as follows:

Start Date: This field is used to enter the start of a production period in the year/month/day format.

End Date: This field is used to enter the end of a production period in the year/month/day format.

Tonnage: The tonnage field serves to enter a number that is associated with the weight unit in the Tonnage Units field.

TonUnits (Tonnage Units): This field gives the unit associated with the tonnage figure entered in the Tonnage field.

Product: This field is used to specify the type of product (i.e. ore, concentrate, metal, tailings) to which the tonnage applies.

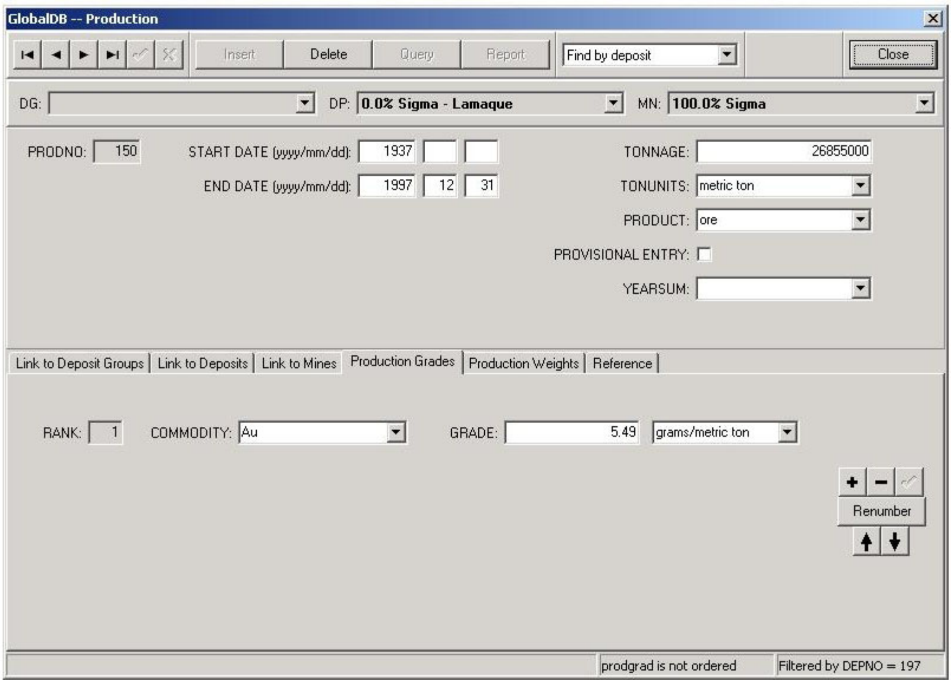

Figure 10: **Production Form** with *Production Grades* tabbed page activated

Provisional Entry: When a checkmark is present in the box, this means that the current production record is part of a another, larger production record (used in special cases only, e.g. production for the East Rand has one record as an overall figure covering up to year 2000, and several other records detailing production by mines up to year 2000 which are included in this overall figure).

YearSum (Yearly or Summary): This field is used to specify if the production data of the current record is estimated, in which case the sources or reasons of the estimation are explained in the **Deposit Form** under the *Deposit Status* page in the **Comment** field.

The six pages and their respective fields are listed as follows:

Link to Deposit Groups: As the **Deposit Groups Form** is not in use in the CGD, this field is blank.

Link to Deposits: This page and the **Link/Unlink** buttons allow a production record to be linked to a deposit. Production records should always be linked to one deposit, but never to more than one.

Link to Mines: This page and the **Link/Unlink** buttons allow a production record to be linked to a specific mine. A blank in this field means that the production figure applies to the whole deposit (i.e. represents the overall production figure). Mine specific data always have a link established in this field.

Production Grades: This page (Figure 10) is used to define the grade of the commodity exploited for the current production record. The **Commodity** field specifies to which commodity the grade applies to, the **Grade** field is the actual grade figure followed by the units in which the grade is reported. The most economically important commodity is usually ranked first.

Production Weights: This is used to define the weights of the commodity exploited for the current production record. The **Commodity** field specifies the commodity to which the weight applies, the **Weight** field is for the actual weight figure followed by the units in which the weight is reported. The most economically important commodity is usually ranked first.

Reference: This page is used to link (through the **Link** button) a specific reference to each figure entered for the current record. For a full description of the Reference page, the reader should refer tothe **Deposit Form** section above.

2.4. Resource Form

This form is used to store the latest reserves and resources figures available at the time of the compilation. The **Resource Form** consists of 9 general fields and 7 tabbed pages (Figure 11). The fields are listed as follows:

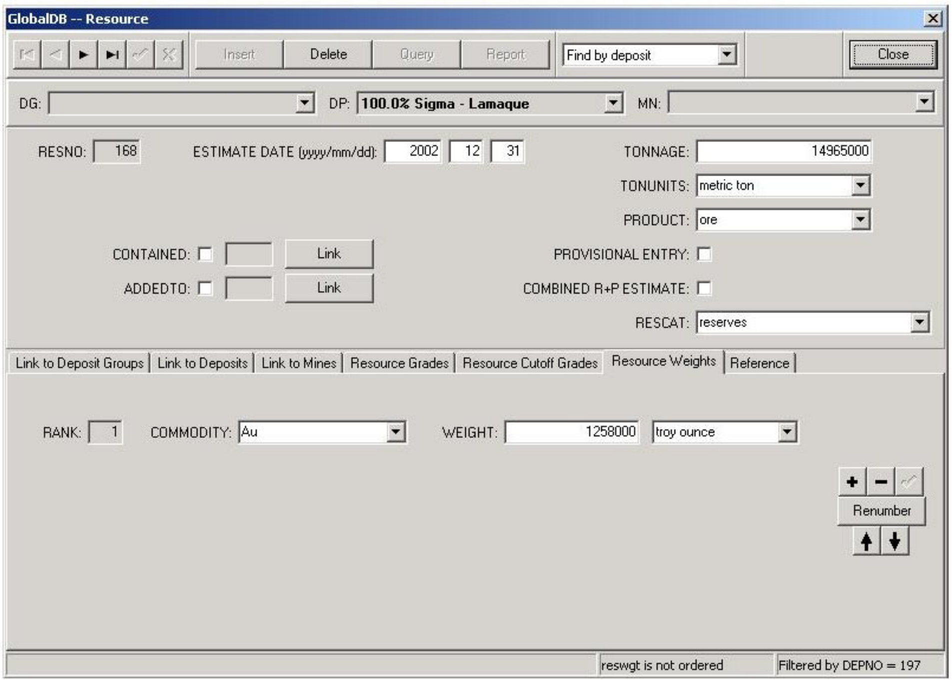

Figure 11: **Resource Form** with *Resource Weights* tabbed page activated

Estimate Date: This field gives the date (in year/month/day format) of the estimate.

Tonnage: The tonnage field serves to enter a number that is associated with the weight unit in the Tonnage Units field.

TonUnits (Tonnage Units): This field gives the unit associated with the tonnage figure entered in the Tonnage field.

Product: This field is used to specify the type of product (i.e. ore, concentrate, metal, tailings) to which the tonnage applies.

Provisional Entry: This checkbox is not used.

Combined R+P Estimate (Combined Resources and Production Estimate): This checkbox is not used in the CGD, but would signify that information entered for the current record is included in the corresponding production record.

ResCat (Resource Category): This field is used to indicate whether the data corresponds to reserves or resources. The term reserves includes proven and probable reserves, wheras the term resources covers measured and indicated resources (these 4 terms were defined by the Canadian Institute of Mining and Metallurgy Ad Hoc Committee on Ore Reserves, September 1996). Inferred resources are also routinely entered. Other resource terms and categories that are unclear or unfamiliar to the compiler were entered using the term used by the author of the paper, and are accordingly referenced.

Contained: A checkmark in this box means that the resource data entered for the current record are contained within another, larger resource figure and linked to it using the **Link** button.

Added To: This checkbox is not in use in the CGD.

The 7 tabbed pages and their respective fields are listed as follows:

Link to Deposit Groups: As the **Deposit Groups Form** is not in use in the CGD, this field is unused.

Link to Deposits: This page and the **Link/Unlink** buttons allow a resources record to be linked to a deposit. Resources records should always be linked to one deposit, but never to more than one.

Link to Mines: This page and the **Link/Unlink** buttons allow a production record to be linked to a specific mine. A blank in this field means that the resource figure represents an overall figure that applies to the whole deposit. Mine specific data always have a link established in this field.

Resource Grades: This page is used to define the grade of the commodity exploited for the current resources record. The **Commodity** field specifies the commodity to which the grade applies; the **Grade** field is for the actual grade figure followed by the units in which the grade is reported. The most economically important commodity is usually ranked first.

Resource Cutoff Grades: This page is used to indicate the cutoff grade used to calculate the corresponding resource figure. The **Commodity** field specifies the commodity to which cutoff grade applies; the **Grade** field is for the actual cutoff grade figure followed by the units in which the cutoff grade is reported. The most economically important commodity is usually ranked first.

Resource Weights: This is used to indicate the weight of the commodity exploited for the corresponding resources record. The **Commodity** field (Figure 7) specifies the commodity to which the weight applies; the **Weight** field is for the actual weight figure followed by the units in which the weight is reported. The most economically important commodity is usually ranked first

Reference: This page is used to link (through the **Link** button) a specific reference to each figure entered for the current record. For a full description of the Reference page, the reader should refer to the **Deposit Form** section above.

2.5. Reference Form

The **Reference Form** (Figure 12) is used to enter complete reference data that can be linked to the other forms. Most of the fields in this form are intuitive. The **Preview** field allows the compiler to select the type of reference (journal article, map, etc.), which will in turn bring up in the lower part of the form various sets of pre-determined fields.

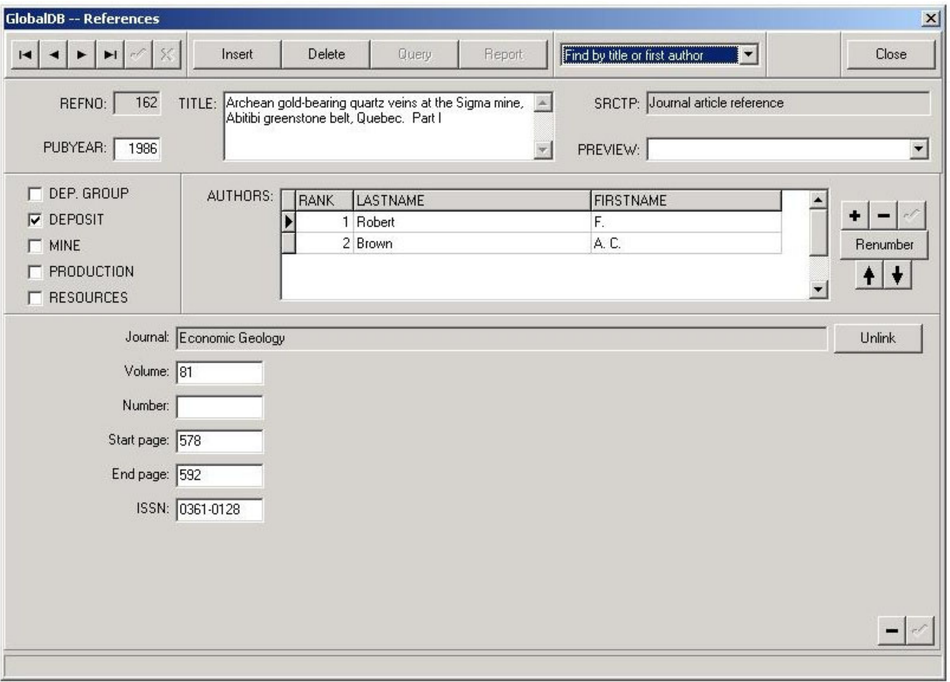

Figure 12: **Reference Form**

2.6. Lookup Tables Form

This form is used to access the lookup tables that contain value selections (pick lists) for many fields throughout the database (Figure 13). The upper half of the interface allows for table selection, whereas the lower half presents the list of values available. A short description is associated with each value, along with the name of the person who entered or revised the value and the date of latest revision and release.

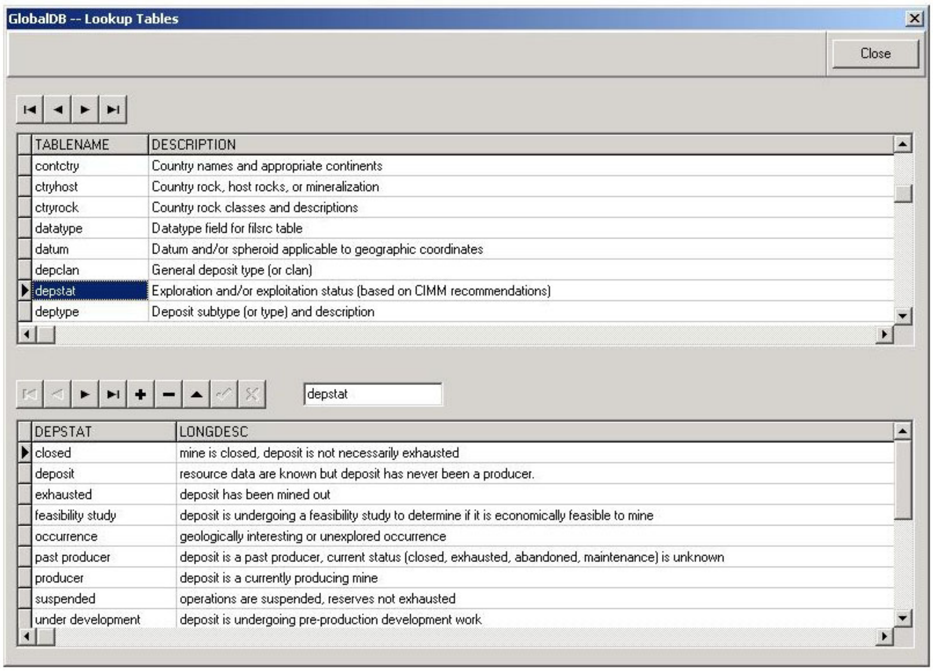

Figure 13: **Lookup Tables Form** with a look at the **DepStat** field (Deposit Status page) value list

3. Deposit Summaries

A short (non-queryable) paragraph providing a summary of the geological characteristics of each deposit is presented in Appendix 2, listed alphabetically by province first, and by deposit numbers second. The purpose of these paragraphs is to provide the user with a concise description of the main characteristics of each deposit.

4. Reserve/Resource Terms Definitions

The following is a list of the terms used in the **ResCat** field of the **Resource Form** and their respective definitions. These definitions were established by the Canadian Institute of Mining and Metallurgy Ad Hoc Committee on Ore Reserves of September 1996.

Proven Reserve
Proven Reserve is the estimated quantity and grade of that part measured resource for which the size, grade, and distribution of values, together with technical and economic factors, are so well-established that there is the highest degree of confidence in the estimate. The term should be restricted to that part of a deposit being mined, or being developed and for which there is a mining plan.

Probable Reserve
Probable Reserve is the estimated quantity and grade of that part of an indicated resource for which the economic viability has been demonstrated by adequate information on engineering, operating, economic and legal factors, at a confidence level which will allow positive decisions on major expenditures.

Possible Reserve
Possible reserve is the estimated quantity and grade of that part of an inferred resource that are determined from limited sample data for which geology, grade continuity, and operating parameters are based, to a large extent, on reasonable extrapolations, assumptions, and interpretations. A possible reserve does not stand alone, and must be an extension or addition to probable or proven reserves. Also, a possible reserve may not be used in a economic analysis or feasibility study.

Measured Resource
Measured resource is the estimated quantity and grade of that part of a deposit for which the size, configuration, and grade have been very well-established by observation and sampling of outcrops, drill holes, trenches, and mine workings.

Indicated Resource
Indicated resource is the estimated quantity and grade of part of deposit for which the continuity of grade, together with the extent and shape, are so well-established that a reliable grade and tonnage estimate can be made.

Inferred Resource
Inferred resource is the estimated quantity and grade of a deposit, or a part thereof, that is determined on the basis of limited sampling, but for which there is sufficient geological information and a reasonable understanding of the continuity and distribution of metal values to outline a deposit of potential economic merit.

Mineral Resource
Mineral resource is a deposit or concentration of natural, solid, inorganic or fossilized organic substance in such quantity and at such grade or quality that extraction of the material at a profit is currently or potentially possible.

Geological Resource is a term of unknown origin believed to be similar to the *Mineral Resource* term.

5. Acknowledgments

Many people have contributed to this database on gold deposits of Canada. Special thanks for financial, logistical and technical support, and many critical reviews of the data, go to the Worlds Minerals Geoscience Database Project staff, particularly the project coordinator, W.D. Sinclair, GIS coordinator L.B. Chorlton, and database applications developer R.L. Laramée, along with B. Hillary and D. Power-Fardy for various logistic support. Financial support from the industry sponsors, as well as helpful comments for improvements of the database, are gratefully acknowledged. Helpful comments from former colleagues F. Robert, as well as critical reviews of part of the data by K.H. Poulsen, improved the database. Thanks go to GSC-Québec staff, particularly K. Lauzière for her computing skills, and to the library staff S. Dupuis and A. Robitaille for their logistic support.

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Appendix 1: Deposit list

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Dep#	Deposit Name	Prov.	Deposit type
453	**Phoenix**	**BC**	**skarn**
454	Ymir	BC	turbidite-hosted vein
455	**Sheep Creek**	**BC**	**turbidite-hosted vein**
456	Dome Mountain	BC	qtz-cb shear-zone-related
458	Spectrum	BC	porphyry gold
459	SIB;Silver Butte	BC	low-sulphidation
460	Scottie;Salmon Gold	BC	Au-Cu sulphide-rich vein
462	QR;Dome;Quesnel River	BC	stockwork-disseminated
463	**Blackdome**	**BC**	**low-sulphidation**
467	**Elk;Siwash North (Ward?)**	**BC**	**low-sulphidation**
469	Big Missouri;Province	BC	gold-rich VMS
470	**Ladner Creek;Carolin;Aurum;Idaho Zone**	**BC**	**turbidite-hosted vein**
472	Goldwedge	BC	low-sulphidation
473	Erickson Creek;Jennie;Erickson Gold	BC	qtz-cb shear-zone-related
474	**Golden Bear;Muddy Lake;Bear-Totem**	**BC**	**Carlin type**
475	Warman;Brandywine;Northair;Willa	BC	low-sulphidation
476	**Josie;Le Roi No.2**	**BC**	**Au-Cu sulphide-rich vein**
478	Privateer;Zeballos	BC	batholith-associated vein
479	Banks;Banker;Tel;Yellow Giant	BC	batholith-associated vein
480	Tillicum	BC	skarn
481	Lawyers	BC	low-sulphidation
482	**Surf Inlet;Pugsley**	**BC**	**batholith-associated vein**
483	**Cariboo;Aurum**	**BC**	**qtz-cb shear-zone-related**
484	**Johnny Mountain;Stonehouse**	**BC**	**Au-Cu sulphide-rich vein**
485	**Equity Silver;Sam Goosly**	**BC**	**high-sulphidation**
486	Hedley	BC	skarn
487	**Snip;Twin Zone**	**BC**	**Au-Cu sulphide-rich vein**
489	**Red Mountain;Marc Zone**	**BC**	**Au-Cu sulphide-rich vein**
490	**Polaris-Taku;Whitewater;New Polaris**	**BC**	**qtz-cb shear-zone-related**
492	**Nickel Plate**	**BC**	**skarn**
493	**Cinola;Harmony;Specogna;Babe**	**BC**	**low-sulphidation**
494	**Silbak Premier;Premier;Bush;Silbak;**	**BC**	**low-sulphidation**
495	**Centre Star Group**	**BC**	**Au-Cu sulphide-rich vein**
496	**Bralorne-Pioneer**	**BC**	**qtz-cb shear-zone-related**
2165	Motherlode	BC	qtz-cb shear-zone-related
2166	Table Mountain;Cusac;Cordoba	BC	qtz-cb shear-zone-related
2167	Taurus	BC	qtz-cb shear-zone-related
2204	Brucejack Lake;Sulphuret;West Zone	BC	high-sulphidation
2205	**Eskay Creek;Iskut River**	**BC**	**gold-rich VMS**
4215	**Kemess**	**BC**	**porphyry gold**
130	Central Manitoba;Wadhope	MB	qtz-cb shear-zone-related
150	Dot Lake	MB	qtz-cb shear-zone-related
162	Farley	MB	Homestake (BIF-hosted)
171	God's Lake	MB	qtz-cb shear-zone-related
177	Gunnar	MB	qtz-cb shear-zone-related

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217	MacLellan	MB	Homestake (BIF-hosted)
232	**New Brittannia;Nor-Acme**	**MB**	**qtz-cb shear-zone-related**
254	**Puffy Lake**	**MB**	**stockwork-disseminated**
260	Rusty Point	MB	qtz-cb shear-zone-related
262	**San Antonio;Bissett**	**MB**	**qtz-cb shear-zone-related**
264	**Seeber;Twin Lakes;Monument Bay**	**MB**	**qtz-cb shear-zone-related**
280	Sunbeam-Kirkland;Waverley	MB	breccia pipe
282	Tartan Lake	MB	qtz-cb shear-zone-related
2182	BT;Burnt Timber	MB	Homestake (BIF-hosted)
4274	Clarence Stream	NB	turbidite-hosted vein
4275	Elmtree	NB	qtz-cb shear-zone-related
4277	Cape Spencer	NB	turbidite-hosted vein
441	Stog'er Tight	NF	qtz-cb shear-zone-related
442	Hammer Down;Rendell-Jackman	NF	qtz-cb shear-zone-related
444	Pine Cove;Lightning Zone	NF	qtz-cb shear-zone-related
448	Nugget Pond	NF	Homestake (BIF-hosted)
450	Cape Ray;Main Shear	NF	turbidite-hosted vein
452	**Hope Brook;Chetwynd**	**NF**	**high-sulphidation**
4278	Rambler	NF	gold-rich VMS
138	**Colomac;Hydra**	**NWT**	**qtz-cb shear-zone-related**
146	**Discovery**	**NWT**	**qtz-cb shear-zone-related**
163	**Tundra;FAT**	**NWT**	**qtz-cb shear-zone-related**
169	**Giant-Lolor-Supercrest**	**NWT**	**qtz-cb shear-zone-related**
184	Kim	NWT	qtz-cb shear-zone-related
203	**Lupin**	**NWT**	**Homestake (BIF-hosted)**
204	Mac;Southwin;Cache Zone	NWT	qtz-cb shear-zone-related
226	**Negus - Nerco Con;NERCO Con**	**NWT**	**qtz-cb shear-zone-related**
230	**Nicholas Lake**	**NWT**	**turbidite-hosted vein**
261	Salmita;Taurcanis	NWT	qtz-cb shear-zone-related
2169	Tundra	NWT	qtz-cb shear-zone-related
443	Tangier	NS	turbidite-hosted vein
445	Goldenville;Sherbrooke	NS	turbidite-hosted vein
446	Cochrane Hill	NS	turbidite-hosted vein
447	Forest Hill	NS	turbidite-hosted vein
449	Beaver Dam	NS	turbidite-hosted vein
451	Caribou;Herman Hall	NS	turbidite-hosted vein
104	Arcadia;Coronation Gulf	NU	batholith-associated vein
141	Cullaton Lake B Zone	NU	Homestake (BIF-hosted)
168	**George Lake;Goose Lake**	**NU**	**Homestake (BIF-hosted)**
266	**Shear Lake;Cullaton Lake South**	**NU**	**turbidite-hosted vein**
284	Turquetil	NU	qtz-cb shear-zone-related
4059	**Meadowbank**	**NU**	**Homestake (BIF-hosted)**
4060	Boston	NU	qtz-cb shear-zone-related
4061	Meliadine Discovery;Meliadine East-(Aquarius)	NU	Homestake (BIF-hosted)
4062	**Meliadine West;Wesmeg;Tikiuniak**	**NU**	**Homestake (BIF-hosted)**
4211	**Hope Bay**	**NU**	**qtz-cb shear-zone-related**
103	**Buffalo Ankerite;Ankerite**	**ON**	**qtz-cb shear-zone-related**

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107	**Aunor;Pamour No. 3**	**ON**	**qtz-cb shear-zone-related**
110	Bankfield - Magnet Consolidated	ON	qtz-cb shear-zone-related
113	Bell Creek;North Zone;Marlhill	ON	qtz-cb shear-zone-related
115	Berens River;Golsil	ON	qtz-cb shear-zone-related
117	Bidgood;Bidgood Kirkland	ON	qtz-cb shear-zone-related
122	Brookbank	ON	qtz-cb shear-zone-related
126	Cameron Lake;Nuinsco	ON	qtz-cb shear-zone-related
128	**Campbell Red Lake;Arthur White;Robin Red Lake**	**ON**	**qtz-cb shear-zone-related**
129	Cornucopia;Cedar Island Extension;Cedar Island	ON	qtz-cb shear-zone-related
131	**Central Patricia**	**ON**	**Homestake (BIF-hosted)**
133	**Chesterville**	**ON**	**qtz-cb shear-zone-related**
136	Clavos	ON	qtz-cb shear-zone-related
137	**Cochenour Willans**	**ON**	**qtz-cb shear-zone-related**
139	**Consolidated Professor;Duport;Cameron Island**	**ON**	**qtz-cb shear-zone-related**
142	**Delnite**	**ON**	**qtz-cb shear-zone-related**
143	DeSantis	ON	qtz-cb shear-zone-related
145	**Detour Lake**	**ON**	**qtz-cb shear-zone-related**
147	**Dome**	**ON**	**qtz-cb shear-zone-related**
148	Dona Lake	ON	Homestake (BIF-hosted)
156	**Eagle River**	**ON**	**qtz-cb shear-zone-related**
159	Edwards	ON	qtz-cb shear-zone-related
170	**Glimmer;Black Fox**	**ON**	**qtz-cb shear-zone-related**
172	Gold Hawk;Lakefield	ON	qtz-cb shear-zone-related
173	**Golden Patricia;Meen Lake**	**ON**	**qtz-cb shear-zone-related**
176	Goldlund;Newlund	ON	qtz-cb shear-zone-related
179	**Hard Rock - McLeod-Cockshutt - Mosher**	**ON**	**qtz-cb shear-zone-related**
180	**Hemlo**	**ON**	**stockwork-disseminated**
181	Hislop East;New Kelore;Goldpost	ON	porphyry gold
182	**Howey - Hasaga**	**ON**	**qtz-cb shear-zone-related**
183	**Pamour**	**ON**	**qtz-cb shear-zone-related**
188	Jerome	ON	qtz-cb shear-zone-related
191	**Kerr Addison**	**ON**	**qtz-cb shear-zone-related**
193	**Kirkland Lake**	**ON**	**qtz-cb shear-zone-related**
199	**Leitch**	**ON**	**qtz-cb shear-zone-related**
200	**Holt-McDermott**	**ON**	**stockwork-disseminated**
201	Lingman Lake	ON	qtz-cb shear-zone-related
202	**Little Long Lac**	**ON**	**qtz-cb shear-zone-related**
205	**MacKenzie Red Lake**	**ON**	**qtz-cb shear-zone-related**
206	**Madsen**	**ON**	**stockwork-disseminated**
207	**Magino**	**ON**	**qtz-cb shear-zone-related**
208	Magnacon;Michibishu Lake	ON	qtz-cb shear-zone-related
212	**Matachewan Consolidated**	**ON**	**porphyry gold**
214	McBean;Queenston	ON	qtz-cb shear-zone-related
215	McFinley Red Lake	ON	qtz-cb shear-zone-related
216	**McIntyre - Hollinger - Coniaurum**	**ON**	**qtz-cb shear-zone-related**
218	McMillan;House Lake	ON	qtz-cb shear-zone-related
221	Moneta Porcupine;Moneta	ON	qtz-cb shear-zone-related

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223	Moss Lake	ON	qtz-cb shear-zone-related
225	Naybob;Hayden;Kenilworth	ON	qtz-cb shear-zone-related
227	New Jason;Argosy;Casey Summit	ON	Homestake (BIF-hosted)
229	Newfield;JP Zone	ON	porphyry gold
231	**Nighthawk Lake;Porcupine Peninsular**	**ON**	**qtz-cb shear-zone-related**
236	Northern Empire;Beardmore	ON	qtz-cb shear-zone-related
238	**Omega**	**ON**	**stockwork-disseminated**
239	**Musselwhite;Opapimiskan Lake**	**ON**	**Homestake (BIF-hosted)**
241	Orofino	ON	qtz-cb shear-zone-related
242	Owl Creek	ON	qtz-cb shear-zone-related
246	**Paymaster**	**ON**	**qtz-cb shear-zone-related**
249	**Pickle Crow**	**ON**	**Homestake (BIF-hosted)**
251	Porcupine Reef	ON	qtz-cb shear-zone-related
253	**Preston;Preston East Dome**	**ON**	**qtz-cb shear-zone-related**
257	**Renabie**	**ON**	**qtz-cb shear-zone-related**
258	**Ross**	**ON**	**qtz-cb shear-zone-related**
259	Royado;Cathroy Larder	ON	qtz-cb shear-zone-related
273	Snoppy Lake	ON	Homestake (BIF-hosted)
274	**Springpole Lake**	**ON**	**low-sulphidation**
275	St Anthony	ON	qtz-cb shear-zone-related
276	St. Andrew Goldfields;Stock Tp;N2;West Zone	ON	qtz-cb shear-zone-related
278	Starratt - Olsen	ON	stockwork-disseminated
281	Surluga;Jubilee;Minto;Citadel	ON	qtz-cb shear-zone-related
285	Tyranite;Hedlund	ON	qtz-cb shear-zone-related
286	Uchi;Jalda;Hanalda;Grassett	ON	qtz-cb shear-zone-related
287	Upper Beaver;Beaverhouse Lake;Argonaut	ON	Au-Cu sulphide-rich vein
288	**Upper Canada**	**ON**	**qtz-cb shear-zone-related**
289	Vedron;Cincinnati-Porcupine	ON	qtz-cb shear-zone-related
291	**Vipond-Crown;Mace**	**ON**	**qtz-cb shear-zone-related**
295	**Young-Davidson**	**ON**	**porphyry gold**
4063	Victoria Creek	ON	qtz-cb shear-zone-related
4122	**Hoyle Pond**	**ON**	**qtz-cb shear-zone-related**
4259	**Holloway;Lightning Zone**	**ON**	**stockwork-disseminated**
4272	Sturgeon River	ON	qtz-cb shear-zone-related
105	Astoria;Yorbeau	QC	qtz-cb shear-zone-related
108	Bachelor Lake;Quebec Sturgeon	QC	porphyry gold
111	**Beattie-Donchester;Duparquet-01;Duparquet-02**	**QC**	**stockwork-disseminated**
112	**Beauchastel;Wasamac no. 1**	**QC**	**stockwork-disseminated**
114	**Belleterre;Guillet-05**	**QC**	**qtz-cb shear-zone-related**
116	**Bevcon - Buffadison - Lencourt**	**QC**	**qtz-cb shear-zone-related**
118	Black Cliff;Vinray;Gold Cliff	QC	qtz-cb shear-zone-related
120	**Bousquet No. 1;Thompson-Bousquet**	**QC**	**gold-rich VMS**
125	**Callahan**	**QC**	**qtz-cb shear-zone-related**
127	**Camflo - Malartic Hygrade**	**QC**	**qtz-cb shear-zone-related**
132	Chadbourne	QC	breccia pipe
135	**Chimo**	**QC**	**qtz-cb shear-zone-related**
140	**Cooke**	**QC**	**Au-Cu sulphide-rich vein**

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144	Destor;Thurbois;Yvan Vezina	QC	qtz-cb shear-zone-related
149	Donalda;Kerralda Deka	QC	qtz-cb shear-zone-related
151	**Douay (Main, West, 531);Zone 52**	**QC**	**porphyry gold**
152	**Doyon;Silverstack**	**QC**	**Au-Cu sulphide-rich vein**
153	Duquesne	QC	qtz-cb shear-zone-related
154	**Duvay-Obalski**	**QC**	**qtz-cb shear-zone-related**
155	**Agnico-Eagle;Telbel**	**QC**	**gold-rich VMS**
157	**East Malartic;Barnat-Sladen;Canadian Malartic**	**QC**	**stockwork-disseminated**
158	**Eastmain**	**QC**	**qtz-cb shear-zone-related**
160	El Coco;Russian Kid	QC	qtz-cb shear-zone-related
161	**Elder;Peel-Elder;Aunore**	**QC**	**qtz-cb shear-zone-related**
164	**Ferderber;Belmoral**	**QC**	**qtz-cb shear-zone-related**
165	**Francoeur - Wasamac No. 2**	**QC**	**stockwork-disseminated**
166	**Troilus;Lac Troilus**	**QC**	**porphyry gold**
174	**Casa Berardi;Golden Pond**	**QC**	**qtz-cb shear-zone-related**
175	**Goldex**	**QC**	**qtz-cb shear-zone-related**
189	**Joe Mann;Chibex**	**QC**	**qtz-cb shear-zone-related**
192	**Kiena**	**QC**	**stockwork-disseminated**
195	**Donald J. La Ronde 1 - Bousquet 2;Dumagami**	**QC**	**gold-rich VMS**
197	**Sigma - Lamaque**	**QC**	**qtz-cb shear-zone-related**
210	**Malartic Gold Fields;Goldstack**	**QC**	**qtz-cb shear-zone-related**
211	**Marban**	**QC**	**qtz-cb shear-zone-related**
219	McWatters	QC	qtz-cb shear-zone-related
220	Mic Mac;Goldhurst	QC	Au-Cu sulphide-rich vein
222	Montauban;Muscocho	QC	gold-rich VMS
224	**Mouska**	**QC**	**Au-Cu sulphide-rich vein**
228	New Pascalis;Lucien C. Beliveau	QC	qtz-cb shear-zone-related
233	Norbeau;Mckenzie-07	QC	qtz-cb shear-zone-related
234	Norlartic - First Canadian	QC	qtz-cb shear-zone-related
237	**O'Brien;Darius**	**QC**	**qtz-cb shear-zone-related**
240	Orenada Zone 4	QC	qtz-cb shear-zone-related
244	**Consolidated Central Cadillac;Wood**	**QC**	**qtz-cb shear-zone-related**
247	Pelletier Lake	QC	qtz-cb shear-zone-related
248	**Perron - Beaufort;North Pascalis**	**QC**	**qtz-cb shear-zone-related**
250	**Pierre Beauchemin;Eldrich**	**QC**	**qtz-cb shear-zone-related**
252	**Powell Rouyn**	**QC**	**qtz-cb shear-zone-related**
255	Pusticamica Lake	QC	Au-Cu sulphide-rich vein
256	Remnor	QC	gold-rich VMS
265	**Senator Rouyn**	**QC**	**qtz-cb shear-zone-related**
267	**Shortt Lake;Gand**	**QC**	**qtz-cb shear-zone-related**
268	Sigma-2;Vicour	QC	qtz-cb shear-zone-related
269	**Silidor**	**QC**	**qtz-cb shear-zone-related**
270	Simkar;Louvicourt Goldfields	QC	qtz-cb shear-zone-related
271	**Siscoe**	**QC**	**qtz-cb shear-zone-related**
272	**Sleeping Giant;Gééant Dormant**	**QC**	**qtz-cb shear-zone-related**
277	**Stadacona**	**QC**	**qtz-cb shear-zone-related**

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279	**Sullivan;Sullivan Consolidated**	**QC**	**qtz-cb shear-zone-related**
290	Vezza	QC	qtz-cb shear-zone-related
294	Wesdome;Western Quebec	QC	stockwork-disseminated
2184	Ellison	QC	gold-rich VMS
2185	Dumont;Bras d'Or;Payore	QC	qtz-cb shear-zone-related
4064	**East Amphi**	**QC**	**stockwork-disseminated**
4173	**Horne**	**QC**	**gold-rich VMS**
4223	**Copper Rand**	**QC**	**Au-Cu sulphide-rich vein**
4258	**Donald J. La Ronde 3;Penna Shaft;LaRonde**	**QC**	**gold-rich VMS**
4273	Pandora;Lapa;Tonawanda	QC	qtz-cb shear-zone-related
4276	**Quéémont**	**QC**	**gold-rich VMS**
106	Athona	SK	qtz-cb shear-zone-related
109	Bakos;Contact Lake	SK	qtz-cb shear-zone-related
121	Box	SK	qtz-cb shear-zone-related
187	Jasper;Forks Lake;Transom	SK	qtz-cb shear-zone-related
190	Jolu;Rod;Mahogan;Decade	SK	qtz-cb shear-zone-related
194	Komis;Partridge	SK	qtz-cb shear-zone-related
198	Laurel Lake	SK	low-sulphidation
235	North Lake;Radcliffe	SK	qtz-cb shear-zone-related
245	**Pap SW;Preview Project**	**SK**	**qtz-cb shear-zone-related**
263	**Seabee;Laonil Lake**	**SK**	**qtz-cb shear-zone-related**
283	Tower East	SK	qtz-cb shear-zone-related
292	Wedge Lake	SK	qtz-cb shear-zone-related
293	Weedy Lake;Keewatin;Golden Heart;B z.	SK	qtz-cb shear-zone-related
461	Mount Skukum	YK	low-sulphidation
464	Ketza River;Boom	YK	manto
465	Mount Nansen;Webber;Huestis	YK	low-sulphidation
466	Skukum Creek;Mt. Reid;Berney	YK	low-sulphidation
468	Grew Creek	YK	low-sulphidation
4123	**Dublin Gulch;Eagle Zone**	**YK**	**porphyry gold**
4124	**Brewery Creek**	**YK**	**stockwork-disseminated**

Deposits in **bold script** have been described in the database and have a corresponding summary (see Appendix 2).

Appendix 2: Deposit summaries

Appendix 2

BRITISH COLUMBIA

453 Phoenix is a Jurassic-Cretaceous intrusion-related Au-Ag-Cu skarn with a total gold content of 33 metric tons. It is located in the Boundary-Greenwood mining district, within the Quesnel Terrane of the Omineca Belt, Canadian Cordillera, British Columbia, Canada. N- to NNE-trending faults (which may be related to post-Laramide orogeny extensional collapse) are the dominant regional tectonic structures in the area. Faults of the Republic (Granby fault) and the Toroda graben bound the mining camp to the east and west, respectively. Replacement and disseminated sulphides are hosted by impure limestone of the Middle to Late Triassic Brooklyn Group. Ore mineralogy consists of pyrite, chalcopyrite, magnetite and specular hematite. Mineralization is lithologically controlled by the relatively impure limestone unit. This unit overlies the footwall argillite, which focused fluid flow into the limestone. A well-developed fault system structurally localized the orebodies. An EW-oriented thrust fault makes a sharp bend in the Phoenix mine area, and NS-oriented faults are conspicuous. In places, the latter have infillings of weakly-mineralized, banded quartz-calcite-pyrite-chalcopyrite. Skarn alteration consists of a chlorite-epidote-garnet-calcite-quartz assemblage. Silicification (jasperoid) of limestones and limestone breccia also occurs. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Pb-Zn. Due to the lack of any granitic intrusions in the vicinity of the deposit, it has been proposed that the Phoenix deposit is related to a deep-seated granitic body that produced mineralizing solutions, which were then channelled by the faults to the favorable limestone units for replacement and ore deposition.

455 Sheep Creek is an Early Cambrian(?) or younger, turbidite-hosted quartz-carbonate Au-Ag-Cu-Pb-Zn-Hg district with a total gold content of 23 metric tons. It is located in Omineca belt, within the Kootenay teranne of the Canadian Cordillera, British Columbia, Canada. Two doubly-plunging, N-trending, overturned tight to isoclinal anticlines (the Western and Eastern anticlines) are the dominant regional tectonic structures in the area. Massive and laminated quartz veins and associated disseminated sulphides are hosted by quartzite, argillaceous quartzite and argillite of the Late Proterozoic to Early Cambrian Quartzite Range and Reno formations. Minor quartz veins are also hosted by the overlying limestone of the Laib Formation, gold grades are similar to other veins but zinc and lead are much more concentrated. Quartz is the main gangue mineral, with minor calcite and sericite. Ore mineralogy is dominated by pyrite, with lesser pyrrhotite, chalcopyrite, galena and sphalerite, and minor amounts of wolframite, scheelite, arsenopyrite, marcasite and magnetite. Mineralization is structurally controlled by NE- to ENE-trending, steeply-dipping to subvertical dextral strike-slip faults with a small normal component; the veins are frequently gouge-rich and include wallrock fragments. Quartz veins are localized mainly in brittle and competent quartzite beds, or along their lithological contacts with argillaceous sediments. Veins in argillaceous hosts are irregular in thickness and strike. Particularly productive ore shoots are located at the intersection of NE-trending faults with the axis of regional anticlines. NW-trending, sinistral strike-slip faults, N-trending normal faults and flat-lying faults with displacement toward the west, post-date the orebodies. Hydrothermal alteration consists of strong silicification in the footwall rocks (especially in the Zn-Pb rich limestone-hosted orebodies), and of kaolinite-sericite argillic alteration adjacent to the veins. Local chlorite alteration is associated with veins hosted by argillaceous rocks. Supergene oxidation of the sulphides occurs down to depths of 1500 feet. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Pb-Zn. Orebodies occur in quartzites on both sides of an extensive quartz porphyry dyke related to the Nelson batholith; Walker (1969) has suggested a structural and genetic relationship exists between the dyke and the vein orebodies.

Appendix 2

463 Blackdome is an Eocene low-sulphidation epithermal Au-Ag deposit with a total gold content of 7 metric tons. It is located in the Clinton district of the Stikine Terrane, Intermontane Belt, Canadian Cordillera, British Columbia, Canada. The Fraser River Fault, a NNW-trending, steeply-dipping dextral fault zone, is the dominant regional tectonic structure in the area. Banded, vuggy and drusy quartz-feldspar veins and breccias are hosted by Middle Eocene andesite, dacite, rhyolite and associated volcaniclastics. Quartz is the main gangue mineral, with abundant adularia, lesser calcite, clay minerals (montmorillonite, illite/smectite, kaolinite), and minor chlorite. Ore mineralogy consists of fine-grained electrum, native gold and silver, aguilarite, naumannite, tennantite-tetrahedrite, polybasite, stephanite, freibergite, and minor sulphides such as pyrite, chalcopyrite, galena, sphalerite, marcasite, pyrrhotite, arsenopyrite, and bornite, with supergene digenite, covellite and pyrolusite. Mineralization is structurally controlled by NE-trending, steeply-dipping normal faults and tension fractures which may be related to doming in the area (Vivian *et al.*, 1987). Hydrothermal alteration consists of proximal and pervasive potassic alteration and silicification characterized by an assemblage of quartz-adularia-calcite-clay minerals, which grades outward to extensive propylitic alteration, consisting of epidote-chlorite-calcite. Strong, local argillic alteration is not confined to the spatial extent of the ore zones and consists of montmorillonite-illite-kaolinite. The metallic signature of the bulk of the ore is Au-Ag-Sb-Cu-Fe-Zn-Pb-Se-As.

467 Elk is a Tertiary Au-Ag deposit of probable low-sulphidation epithermal style with a total gold content of 2 metric tons. It is located in the Similkameen district within the Quesnel Terrane, Intermontane Belt, Canadian Cordillera, British Columbia, Canada. The Fraser River Fault, a NNW-trending, steeply-dipping dextral fault zone, is the dominant regional tectonic structure in the area. Quartz veins and associated disseminated sulphides are hosted by quartz monzonite to granodiorite of the Midde Jurassic Osprey Lake batholith, and by mafic volcanic rocks (basalt, basaltic andesite and andesite) of the Late Triassic Nicola Group. Quartz is the dominant gangue mineral, with lesser ankerite and calcite and minor barite and fluorite. Ore mineralogy is dominated by pyrite, with lesser chalcopyrite, sphalerite, galena, tetrahedrite, maldonite and pyrrhotite. Mineralization is structurally controlled by ENE-trending, shallowly- to steeply-dipping shear zones. It is also spatially (and possibly genetically) associated with dioritic feldspar porphyry and QFP dykes or the Tertiary Otter intrusions. Hydrothermal alteration is symmetrically zoned around the quartz veins; it consists of proximal advanced argillic alteration (mineralogy unknown) that grades progressively outward to phyllic (quartz-sericite-pyrite) alteration, to argillic (with kaolinite?) and then to distal propylitic (with extensive chlorite) alteration. An interim stage of K-feldspar-stable phyllic alteration unrecognized in the volcanic rocks is present between the phyllic and argillic alteration. Volcanic rocks of the Nicola Group elsewhere in the area are locally affected by silicification, carbonatization and epidotization. Dykes of the Otter intrusions have been affected by argillic/sericite alteration, characterized by a muscovite-illite-clay assemblage. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Zn-Pb-Bi-Sb.

470 Ladner Creek (also known as Carolin and Aurum) is a Late Cretaceous to Middle Eocene turbidite-hosted Au-Ag quartz-carbonate vein deposit with a total gold content of 11 metric tons. It is located in the Hozameen district of the Coquihalla gold belt, within the Coast Belt of the Canadian Cordillera, British Columbia, Canada. The NNW-trending, steeply-dipping to subvertical Hozameen crustal fault, with a complex movement history (presumably early thrusting and later dextral transcurrent), and large scale upright to asymetric F_2 folds are the dominant regional tectonic structures in the area. Quartz veins and associated disseminated sulphides at the Carolin mine and disseminated sulphides at the Aurum mine are hosted respectively by greenschist grade turbiditic greywacke, lithic wacke, conglomerate and siltstone beds of the Mesozoic Ladner Group and by tectonized and talcose serpentinite of the Coquihalla serpentine belt. Quartz is the dominant gangue mineral in the veins, with lesser albite and carbonate, and minor chlorite and sericite. Ore mineralogy is dominated by pyrrhotite, pyrite, and arsenopyrite, with minor to trace amounts of chalcopyrite, bornite, sphalerite and millerite. Mineralization at the Carolin mine (and Idaho zone) is structurally controlled by tectonically thickened F_2 fold hinge areas of disrupted, asymetric anticlines and forms typical saddle-reef orebodies. It is also preferentially hosted by competent and permeable layers such as the coarser-grained wacke, lithic wacke and conglomerate layers. The late W-trending Richardson normal fault and other NW-trending high-angle normal and reverse faults cut through the deposit. Mineralization at the Aurum mine occurs as polished films on slickensided surfaces of serpentinite and talc in a NW-trending, variably-dipping shear segment of the East Hozameen fault. Hydrothermal alteration of vein wallrocks (at the Carolin mine) consists of an inner zone of intense and pervasive albitization (of at least 3 distinct episodes), which can extend up to 60 meters beyond the mineralization. This is accompanied by weak silicification. This grades progressively outward to fine-grained and pervasive sericitic alteration (chlorite-sericite), and to distal pervasive and fine-grained chloritic alteration (dominant chlorite, sericite-kaolinite-epidote) which merges into the regional greenschist facies. Locally, disseminated carbonate alteration forms an envelope around veins. Manganese and iron oxides also occur near the surface. At the Aurum mine, “listwaenite”-type carbonate alteration has affected the serpentinite in the shears and created a talc-carbonate-quartz assemblage, locally fuchsite-bearing. The metallic signature of the bulk of the ore is Au-Ag-As-Cu-Zn-Mo-Sb-W. Mineralization is related to the F2 folding, which is believed to be a post-Mid Cretaceous to pre-Late Eocene event (Ray *et al.*, 1986).

474 Golden Bear is a Late Triassic to Early Jurassic sediment-hosted micron gold (Carlin-type) Au-Ag deposit with a total gold content of 15 metric tons. It is located in the Atlin mining district, within the Intermontane Belt of the northern Canadian Cordillera, British Columbia. The dominant regional tectonic structure in the area, the Bear Fault, is a crustal-scale transcurrent fault with early sinistral-reverse movement and later dextral movement. Disseminated sulphides and hydrothermal breccias are hosted by Permian to Triassic limestones (graphitic in places) and mafic crystal and lapilli tuffs. Ore mineralogy is dominated by pyrite, with minor amounts of arsenopyrite, scorodite, native gold, pyrrhotite, chalcopyrite, stibnite, tetrahedrite and hessite. Gangue mineralogy consists of quartz and dolomite, locally accompanied by gypsum. Mineralization is structurally controlled by the N- to NW-trending Ophir Break Zone, and its subsidiary anastomosing faults within a fault-bounded limestone lens of the Ophir Break fault zone. Dilatant zones along the contact between the altered mafic tuffs and the limestone is also a favored site for gold deposition. Folding of the limestones is related to the Bear Fault and smaller-scale Ophir Break Zone, and in the Golden Bear area is represented by the W-verging, slightly overturned, shallowly-N-plunging Tatsamenie antiform. Hydrothermal alteration consists of proximal silicification (represented by the quartz-dolomite-pyrite assemblage) in the limestones, with sugary and vuggy silica especially within the breccia zones, grading to intermediate and distal carbonatization (with the dolomite-quartz assemblage). Mafic volcanics and pyroclastic rocks have been affected by variably intense sericitization, characterized by an assemblage of Fe-dolomite-kaolinite-sericite-illite-chlorite-pyrite. Hematite and limonite (supergene oxidation?) occur within faults associated with ore zones. The metallic signature of the bulk of the ore is Au-Ag-As-Sb-Hg-Te.

476 Josie is a Middle Jurassic, intrusion-related, Au-Cu-Ag sulphide-rich vein deposit with a total gold content of 9 metric tons. It is located in Rossland area of the Omenica Belt (Quesnel Terrane), Canadian Cordillera, British Columbia, Canada. The Rossland Break, an E-trending regional thrust fault, is the dominant tectonic structure in the area. Sulphide-rich veins and veinlets and wallrock replacement mineralization are hosted by the greenschist grade, 167 Ma Rossland monzonite, and by enclosing augite porphyry of the Early Jurassic Rossland sill (Elise Formation, Rossland Group). Veins consist mainly of pyrrhotite and chalcopyrite, with minor amounts of pyrite and sphalerite. Gangue minerals consists of quartz and calcite. En echelon vein mineralization is structurally controlled by WSW-trending, steeply-dipping shears, and is commonly located along the contact between monzonite and the augite porphyry sill. Hydrothermal alteration consists of proximal sericitization and sulphidation (pyritization), which are associated with vein emplacement, and grades to distal chloritization of regional scale. Silicification and carbonatization occur at depth along the mineralized structures. Skarn alteration of the Rossland monzonite and sill is associated with the mineralization, and characterized by an amphibole-calcite-garnet assemblage. The metallic signature of the bulk of the ore (partly inferred from its mineralogy) is Ag-Au-Cu-Mo-Zn.

482 Surf Inlet (Pugsley) is a Late Cretaceous batholith-associated quartz vein (Korean type) Au-Ag-Cu deposit with a total gold content of 12 metric tons. It is located in the Skeena mining division, Princess Royal Island, Coast Belt, Canadian Cordillera, British Columbia, Canada. The NNW-trending Coast Range Megalineament is the dominant tectonic structure in the area. Quartz veins are hosted by hornblende-biotite quartz diorite porphyry and dioritic gneiss of the Tertiary-Jurassic Coast Plutonic Complex. Quartz is the dominant gangue mineral, with lesser ankerite and minor amounts of calcite, dolomite and chlorite. Ore mineralogy is dominated by pyrite, with minor chalcopyrite, native silver, chalcocite, bornite, covellite and molybdenite. Mineralization is structurally controlled by a large (at least 4,5 km long) and complex S-trending fault zone composed of several S-trending, moderately-dipping sinistral-oblique smaller shear zones (9 m thick, 45 to 60 m apart). Ore shoots are localized in flexures along the shears, and in extension fractures linking shears and faults. Hydrothermal alteration consists of common proximal sericitization (represented by a sericite-carbonate assemblage) and chloritization near the veins, with minor local silicification in the wallrocks. The metallic signature of the bulk of the ore is Au-Ag-Cu-Mo-Te.

483 Cariboo (Aurum) is a Mesozoic, intrusion-related gold manto and superposed quartz-carbonate shear-zone-related gold mineralization (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 40 metric tons. It is located in the Cariboo district within the Barkerville Terrane of the Omineca Belt of the Canadian Cordillera, British Columbia, Canada. Rocks in the area are metamorphosed to the greenschist facies and are folded on a regional scale by the Cunningham and Island Mountain anticlinoria. Quartz vein mineralization is hosted within competent, carbonaceous quartzite beds; massive sulphide lenses are hosted by or at the contact of limestones and limy rocks and represents about one third of the total gold production. Gangue minerals of the veins are quartz and ankerite, with minor sericite. The main ore mineral is pyrite, with abundant arsenopyrite and scheelite, and less common chalcopyrite, galena, sphalerite, tetrahedrite, cosalite and bismuthinite. In places, the veins connect with the massive sulphide lenses, which are masses of fine grained pyrite with minor amounts of scheelite, galena, sphalerite and arsenopyrite. F_2 fold noses and drag folds commonly localized sulphide lenses, which are intensely transposed when located in the hinges. Limestone beds and their contacts are preferentially mineralized by the manto-style ore. F_2 folds are also responsible for the opening of extension fractures and controlled the emplacement of mineralized quartz veins. Quartz veins are also preferentially located in competent quartzite beds, which localized fracture deformation during folding. Late, NE-trending, dextral strike-slip faults affected and displaced the folds. Carbonate-sericite alteration is most intense in the footwall of the massive sulphide lenses and also surrounds the quartz veins. A narrow fringe of silicification typically affects the limestone units on the boarder of the sulphide lenses. Skarn-type, calc-silicate alteration occurs higher in the stratigraphic succession. The metallic signature of the bulk of the ore is Au-Ag-As-Bi-W. Alldrick (1982) proposed a model of gold-bearing fluids of metamorphic origin circulating through the folded rocks, precipitating mineralized quartz veins in open fractures and reacting with carbonate bed along dilatant fold noses and troughs to form massive sulphide lenses. However, Poulsen *et al.* (2000) clearly distinguished two distinct stages of mineralization: pyritic orebodies are transposed by S_2 cleavage and predate the development of F_2 folds, whereas quartz veins have formed late in the development of these folds. The two styles of mineralization are considered as independent by Poulsen *et al.* (2000).

484 Johnny Mountain is an Early Jurassic intrusion-related, Au-Ag-Cu sulphide-rich vein type deposit with a total gold content of 3 metric tons. It is located in the Iskut River area, part of the Stikine Terrane within the Intermontane Belt, Canadian Cordillera, British Columbia, Canada. Regional N- to NNW-trending thrust faults and NE- and NW-striking normal block faults are the dominant tectonic structures in the area. Sulphide-rich veins, quartz veinlets and associated disseminated sulphides are hosted by Early Jurassic andesite, dacite, volcanic breccia and lapilli tuff of the Hazelton Group. Sulphide-rich veins are composed mainly of pyrite, with lesser pyrrhotite, chalcopyrite, sphalerite, magnetite and galena, and minor to rare amounts of pyrargyrite, arsenopyrite, bornite, covellite, electrum, enargite, hematite, ilmenite, marcasite, molybdenite, argentite, stephanite, and tetrahedrite. Gangue minerals are mainly orthoclase and quartz, with minor chlorite, sericite and calcite. Quartz-pyrite veinlets with chlorite occur in the wallrocks of the sulphide-rich veins and carry high gold grades. Mineralization is structurally controlled by broadly extensional, SW-striking, steeply-dipping faults and fractures. Two pre- to syn-mineralization feldspar porphyry dykes are spatially associated with the mineralization. Hydrothermal alteration consists of a proximal envelope (up to several metres wide) of potassic alteration characterized by an orthoclase-sericite assemblage. This grades to distal biotite-chlorite alteration. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Zn-Pb-As-Sb-Mo. According to Rhys (1996), structural relations suggest that the Johnny Mountain deposit formed at a higher level than the stratigraphically deeper Snip deposit, as a result of more brittle response to the same deformational event that produced the Snip deposit.

485 Equity Silver is a Late Paleocene Au-Ag-Cu (As-Sb) deposit of possible high-sulphidation epithermal affinity with a total gold content of 16 metric tons. It is located in the Buck Creek Basin, within the Intermontane Belt of the Stikine Terranne, Canadian Cordillera, British Columbia, Canada. The NE-trending Skeena Arch is the dominant regional tectonic structure in the area; it provided control for intrusion emplacement and forms the boundary between the Bowser Successor basin to the North, and the Nechako Trough to the South. The deposit is located inside the Buck Creek caldera. The deposit is comprised of two ore zones: the Main zone, consisting of disseminated sulphides, as well as lenses and pods of massive sulphides, and the Southern Tail zone, which consists of sulphide-rich veinlets and stringers-stockworks. Field evidences suggest that the

Southern Tail zone formed later than the Main zone (Wojdak and Sinclair, 1984; Cyr *et al.*, 1984). Both ore zones are hosted by dacitic to andesitic lapilli and ash tuffs correlative with the Lower to Upper Cretaceous Skeena Group. Ore mineralogy is dominated by pyrite, with abundant chalcopryite and tetrahedrite (the main Ag-bearing mineral), lesser arsenopyrite sphalerite, pyrrhotite, and minor galena, marcasite, specular hematite, bournonite, boulangerite, jamesonite, berthierite, pearceite, pyrargyrite, tennantite, freibergite, bismuthinite and magnetite, and (in some areas) molybdenite and scheelite. Gangue minerals are mainly quartz and lesser calcite, with minor chlorite. Mineralization is lithologically controlled by the tuffaceous host rocks, due to the massive, brittle very fine-grained and porous nature of the fine-grained tuffs and lapilli tuffs. Hence, ore zones are tabular and roughly parallel to the stratigraphy. An impermeable welded ash-flow tuff caps the system. The East dyke, part of a 48 Ma gabbro-monzonite complex, remobilized and concentrated sulphide mineralization along its contacts. Dextral faulting locally offset the ore zones. Hydrothermal alteration at the Southern Tail zone consists of a proximal, intense quartz-sericite alteration, grading away to a chlorite-magnetite alteration zone. This overprints an earlier zone of aluminous andalusite-pyrophyllite-corundum-scorzalite alteration which is the main ore-associated alteration in the Main zone. Erratically distributed tourmalinization (represented by tourmaline-dumortierite-quartz-sericite-K-feldspar) is intense in certain areas of the volcanic and pyroclastic host rocks. Quartz monzonite dykes and stocks have been affected by intense potassic (K-feldspar-kaolinite-sericite-chlorite-biotite) alteration. Phyllic aleration (sericite-quartz-pyrite) has also been noted in the intrusions. Late-stage argillic alteration characterized by the assemblage sericite-kaolinite-chlorite-carbonate±albite± epidote has overprinted the aluminosilicate alteration and the ore zones. The metallic signature of the bulk of the ore is Au-Ag-As-Sb-Cu-Pb-Zn-B. An uneconomic Cu-Mo-bearing stockwork of quartz-pyrite-chalcopyrite-molybdenite is hosted by (and adjacent to) a quartz monzonite stock related to the Nanika group of intrusives. K-Ar age dating of this stock and of sericitized tuffs at 58 Ma (Cyr *et al.*, 1984) and fluid inclusion studies (Wojdak and Sinclair, 1984) suggest that intrusive activity of quartz monzonite age heated acidic meteoric water and contributed a saline magmatic component to create ore-bearing fluid.

487 Snip is an Early Jurassic intrusion-related, Au-Ag-Cu sulphide-rich vein type deposit with a total gold content of 32 metric tons. It is located in the Iskut River area, part of the Stikine Terrane within the Intermontane Belt, Canadian Cordillera, British Columbia, Canada. Regional NS- to NNW-trending thrust faults and NE- and NW-striking normal block faults are the dominant tectonic structures in the area. Banded and laminated sulphide-rich veins, quartz veins, and disseminated sulphides in biotite-rich and carbonate replacement zones are hosted by greywacke, feldspathic wacke, and feldspathic siltstone correlative of the Late Triassic to Middle Jurassic Hazelton Group. Minor ore is hosted by quartz diorite, quartz monzonite and granodiorite of the Early Jurassic Red Bluff porphyry. Gangue minerals proportions vary according to the ore type, calcite and quartz are nevertheless the most dominant gangue minerals, with sometimes abundant biotite and chlorite, and minor amounts of ankerite and K-feldspar. Pyrite is the dominant ore mineral, with lesser pyrrhotite and sphalerite, and minor magnetite, galena, molybdenite, chalcopyrite, hessite, cosalite, tellurobismuthite, volynskite, altaite, tetrahedrite and native Bi. Mineralization is structurally controlled by the Twin Zone, a SW-trending, moderately- to steeply-dipping, brittle-ductile oblique-reverse shear zone, and its subsidiaries. The Twin Zone has a pronounced internal banding of four different ore types: foliation-parallel sulphide-rich veins (almost massive sulphides veins) and quartz veins, grades outward to carbonate ore, and to biotite ore. Gradation from quartz vein to sulphide-rich vein implies a genetic relationship between these two ore types (Rhys, 1992). Two sets of NW-and NE-trending, moderately-dipping extension veins cut accross the Twin Zone and define a conjugate set indicating later reverse shearing. Late brittle faults with variable displacements occur throughout the area. Hydrothermal alteration around the sediment-hosted vein type ore consists of a thin proximal envelope of biotite alteration, grading to a potassic alteration assemblage of quartz-K-feldspar-biotite-carbonate. The complete gradation from carbonate to biotite ore indicate they are closely related genetically and may have formed by progressive wallrock alteration of the Twin Zone (Rhys, 1992), with the vein-type ore being the youngest mineralization. The Red Bluff porphyry is affected by intense potassic alteration (represented by a quartz-magnetite-sericite-K-feldspar-biotite assemblage) associated with Au-Cu-Mo mineralization. This is overprinted by a phyllic (sericite-pyrite-quartz) alteration associated with quartz veins. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Zn-Pb-Mo-Te-Bi.

489 Red Mountain is an Early Jurassic Au-Cu sulphide-rich vein type gold deposit with a total gold resource of 15 metric tons. It is located in the historic Stewart mining camp of the Iskut River area, which is part of the Stikine Terrane within the Intermontane Belt, Canadian Cordillera, British Columbia, Canada. The nearby NNW-trending Bitter Creek Antiform is the dominant regional tectonic structure in the area. Densely disseminated to semi-massive sulphide lenses with pyrite stringers and veinlets are hosted by the Goldslide Intrusion, a porphyritic granodiorite to diorite suite, and by intermediate pyroclastics, tuffs and argillites at the contact. Quartz and tourmaline are the main gangue minerals. Pyrite is the dominant ore mineral, with important pyrrhotite and sphalerite, and minor chalcopyrite, arsenopyrite, galena and tetrahedrite. Telluride minerals such as petzite, calaverite, sylvanite and aurostibnite are closely associated with gold. Most of the mineralization is structurally controlled by the brecciated, and locally sheared, intrusive contacts of the Goldslide Intrusion with the volcano-sedimentary package. Two sets of conjugate strike-slip(?) faults (oriented NNE-NNW and ENE-ESE) are also associated with sulphide mineralization and alteration. Hydrothermal alteration consists of moderate silicification and associated tourmalinization, pervasive sericitization and moderate chloritization of the breccia zone and surrounding rocks. Local potassic alteration and albitization also occur. Advanced argillic alteration (alunite-jarosite) occurs at the surface of the deposit and is of probable supergene (gossan) origin. The metallic signature of the bulk of the ore is Au-Ag-Pb-Sb-Bi-Te.

490 Polaris-Taku (now known as New Polaris) is a Late Paleozoic (Permian?) quartz-carbonate shear-zone-related Au-Ag-Cu deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 7 metric tons. It is located in the Stikine Terrane of the northern Coast Belt, Canadian Cordillera, British Columbia, Canada. The Llewellyn Fault and Tulsequah synclinorium are the dominant tectonic structures in the area. Quartz-carbonate veins and associated disseminated sulphides are hosted by upper greenschist to lower amphibolite grade tuffs and andesites near the base of the Permian Stuhini Group, and by minor serpentinized bodies (from probable ultramafic intrusives). Gangue minerals are mainly quartz, dolomite and ankerite, with lesser fuchsite. Ore mineralogy consists of abundant arsenopyrite, with lesser pyrite, stibnite and pyrrhotite. Mineralization is structurally controlled by WNW-trending sinistral-reverse and NS-oriented dextral-reverse shear zones. NE-trending dilatant zones, formed by arcuate shears and faults, host the largest and most productive veins. The tuff lithology, due to its more brittle nature, localized most of the fracturing, and allowed the formation of well-developped veins. The NW-trending, oblique-dextral Limestone Zone and the WNW-trending Whitewater Creek Zone bound the deposit to the SW and NE, respectively. Late oblique-reverse faults offset the orebodies. Hydrothermal alteration consists of a proximal envelope of carbonate alteration (ankerite-sericite-sulphides) envelope and associated silicification along shear zones and the enclosed associated quartz-carbonate veins. This grades outward to distal chlorite-calcite alteration. Lenses and fragments of wallrock within the veins are partly replaced by gold-bearing pyrite and arsenopyrite. The metallic signature of the bulk of the ore is Au-Ag-As-Cu-Sb.

492 Nickel Plate a Late Triassic to Early Jurassic intrusion-related gold skarn deposit with a total gold content of 66 metric tons. It is located in the Hedley district of the Intermontane Belt, Canadian Cordillera, British Columbia, Canada. A regional anticline is the dominant tectonic structure in the area. Semi-massive sulphide ore is hosted by limestones and limy siltstones of the Lower to Middle Jurassic Nicola Group. Sedimentary rocks are intruded by the Toronto stock, a diorite to quartz diorite batholith part of the Hedley intrusions, a group of 206±1 Ma dioritic to gabbroic plutons. The main ore minerals are arsenopyrite and pyrrhotite, with lesser chalcopyrite, pyrite, sphalerite, gersdorffite and hedleyite. Native bismuth and Bi-tellurides, along with arsenopyrite, are closely associated with gold. Mineralization is confined to shallow marine, carbonate-rich sediments affected by small, gently plunging, NW-striking folds that are related to the regional anticlinal. An early-stage of alteration is characterized by the development potassic alteration in the intrusions and of biotite-K-feldspar-quartz hornfels in the sediments. Main-stage skarn formation is characterized by a prograde assemblage of hedenbergite-garnet-biotite-orthoclase-quartz-wollastonite. This is overprinted by the ore-stage skarn assemblage of sulphides-scapolite-axinite-epidote. A retrograde skarn assemblage of chlorite-epidote-sericite-prehnite assemblage overprints all previous assemblages. The metallic signature of the bulk of the ore is Au-Ag-As-Bi-Te-Cu-Pb-Zn-Co-Ni. Nickel Plate is a reduced, calcic skarn deposit and isconsidered as one of the best examples in the world of a gold skarn deposit (Poulsen *et al.*, 2000).

493 Cinola (also known under the names of Harmony, Specogna or Babe deposit) is a Cenozoic, low-sulphidation epithermal Au-Ag deposit with a total gold resource of 98 metric tons. It is located on Graham Island, in the Insular Belt of the Canadian Cordillera, British Columbia, Canada. The deposit is situated near the NNW-trending Sandspit Fault, a regional dextral strike-slip fault part of a major dextral strike-slip fault system linked to the Queen Charlotte transform fault. Banded and ribbon-textured quartz-feldspar veins and stockworks, and associated disseminated sulphides are hosted by hydrothermally-brecciated conglomerates and calcareous mudstones of the Miocene-Pliocene andesite-derived Skonun Formation, and by rhyolite dykes. Gangue mineralogy consists mainly of quartz and adularia. Pyrite, marcasite and pyrrhotite are the dominant ore minerals, with minor cinnabar and very minor chalcopyrite and sphalerite. The Specogna Fault, a N-trending parallel dextral strike-slip segment of the Sandspit Fault, forms the western boundary of a half-graben and is an important feeder structure. The major part of the mineralization occurs in NE-trending, subvertical extensional fractures located between the Specogna and Sandspit faults. Early hydrothermal alteration is represented by high temperature sericitic (quartz-sericite-pyrite) alteration in the hanging wall of the Specogna Fault, which is associated with low-grade disseminated gold. Vein-related alteration consists of extensive proximal potassic alteration and silicification, characterized by quartz-adularia-pyrite±illite. This grades outward to a barren argillic alteration halo of kaolinite-illite/smectite-quartz-pyrite±alunite±sericite which extends laterally from the hydrothermal breccias and the potassic-silicic alteration zone. Distal propylitic alteration is characterized by an assemblage of chlorite-smectite/illite-quartz-pyrite. The partial metallic signature of the bulk of the ore is Au-Ag-Hg-As-Sb. Champigny and Sinclair (1982) have proposed a Carlin-type model for the formation of the Cinola deposit, in which the rhyolite intrusions are thought to have originated the brecciation and initiated the movement of meteoric water and the development of the hydrothermal system. More recently, Madeisky (1995) has proposed an epithermal environment of formation.

494 Silbak Premier is a Mesozoic hybrid deposit type transitional between a porphyry Au-Ag deposit and an epithermal, low-sulphidation Au-Ag deposit, with a total gold content of 65 metric tons. It is located near the regional Long Lake-Fish Creek Fault Zone, a major N-trending fault zone in the Stikine Terrane of the Intermontane Belt, Canadian Cordillera, British Columbia, Canada. Quartz veins, quartz stockworks, siliceous breccias and locally concordant and layered semi-massive sulphides (15-75% sulphides) are hosted by Early Jurassic, greenschist grade andesite flows and lapilli tuffs, and by porphyritic granodiorite and tonalite intrusions. Quartz veins and breccias gangue minerals are dominated by quartz and K-feldpar, with minor chlorite and carbonate. Ore minerals are pyrite, sphalerite, galena, tetrahedrite, chalcopyrite, arsenopyrite and silver sulphosalts such as pyrargyrite, polybasite, and argentite. Native silver locally occurs inside veins. Mineralization is structurally controlled by NE-trending, moderately- to steeply-dipping sinistral and dextral faults and shears. Breccias are typically localized at the porphyry/andesite contacts. Hydrothermal alteration consists (up to 10 meters wide) of intense proximal silicification and potassic alteration of the breccias (adularia-sericite±silica). This grades outward into peripheral propylitic alteration composed of an inner carbonate alteration halo, and an outer chlorite-pyrite alteration halo. Peripheral propylitic alteration is most intense in the volcanic rocks. The mineralization is spatially and probably genetically related to the Premier Porphyry, a K-feldspar, granodioritic/tonalitic porphyry intrusion. The metallic signature of the bulk of the ore is Ag-Au-Cu-Pb-Zn-Ba-As.

495 Centre Star Group is a Cenozoic, intrusion-related, Au-Cu-Ag sulphide-rich vein deposit with a total gold content of 74 metric tons. It is located in Rossland area of the Omenica Belt, Canadian Cordillera, British Columbia, Canada. The deposit consists of 3 mines situated near the major Rossland Break (a regional thrust fault); the Center Star, Le Roi and War Eagle mines, the last one closing in 1942. Sulphide-rich veins and veinlets are hosted by greenschist grade intrusive rocks of the Rossland monzonite and Rossland sill; the latter consisting of diorite, augite porhyry and monzonite. Minor volcanic rocks also host some mineralization. Veins consist mainly of pyrrhotite and chalcopyrite, with lesser pyrite, minor molybdenite and sphalerite, and trace amounts of native silver and stromeyerite (a silver bearing mineral). Gangue minerals consist of quartz and calcite, with minor actinolite, garnet and magnetite. Structural control on the mineralization is exerted by minor faults and intrusion contacts. Proximal sericitization and sulphidation (pyritization) are associated with vein emplacement. Distal chloritization can be observed on a regional scale. Vein-related calc-silicate alteration of the host rocks is indicated by the development of grayish, banded wollastonite. The metallic signature of the bulk of the ore is Ag-Au-Cu-Mo+/-Pb+/-Zn.

496 Bralorne-Pionner is a Mesozoic, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 129 metric tons. It is located near the regional tectonic contact between the Cadwallader and Bridge River terranes, Bridge River district of the Coast Belt, Cordillera, British Columbia, Canada. The deposit occurs within a block of sub- to lower greenschist grade, steeply-dipping turbidites, argillites and basaltic andesites bounded by the Fergusson and the

Cadwallder faults, two regional, NW-trending, steeply-dipping, dextral strike-slip faults. Quartz-carbonate veins are hosted by dioritic and sodic granitic rocks of the Bralorne intrusions (Bralorne mine), and by peridotitic and mafic volcanic and volcaniclastic rocks (Pioneer mine). Gangue mineralogy consists mainly of quartz and carbonate, with lesser sericite, fuchsite, scheelite, tourmaline and rutile. Ore minerals are pyrite, arsenopyrite and pyrrhotite, with minor chalcopyrite, sphalerite, galena, stibnite and tetrahedrite. Sphalerite and galena are particularly important as they are associated with gold-rich portions of the veins. Mineralized veins are mainly shear veins, hosted by narrow, ductile-brittle, reverse to reverse-oblique shear zones. Other quartz-carbonate veins are tension veins linking the shear veins. Ore-related alteration is wide (up to 10 meters) and zoned, with a proximal assemblage of quartz-sericite-ankerite-(fuchsite)-(pyrite), grading outward to an assemblage of carbonate-albite-(sericite), and to a distal assemblage of chlorite-epidote. The metallic signature of the bulk of the ore is Au-Ag-As-Zn-Pb-W-Sb-Cu.

2205 Eskay Creek is a Mesozoic, high-grade gold-rich Au-Ag-Zn-Cu-Pb volcanogenic massive sulphide deposit with a total gold content of 110 metric tons. It is located in Lower to mid-Jurassic rocks of the Iskut River area, in the Intermontane Belt of the Canadian Cordillera, British Columbia, Canada. The mine sequence is folded along the Eskay anticline, an assymetric, gently-plunging anticline, and mineralization is localized near the hinge zone of the fold. A monzodiorite porphyry, the Eskay porphyry, is exposed near the core of the anticline. The South Unuk-Harrymel shear zone is a major sinistral strike-slip fault zone in the area, with a displacement of nearly 20 km in some parts of the fault. Altered, massive, flow-banded and brecciated Eskay rhyolite hosting stockwork mineralization is overlain by argillite and carbonaceous mudstone hosting massive and disseminated sulphide lenses. Massive and pillowed basalts overlying the clastic rocks are weakly altered and mineralized. Mineralization can be divided into three distinct zones: the 21A and 21B zones, and the Pumphouse/Pathfinder zone. The 21A zone is a small lens of Au-Ag-rich stibnite-realgar-cinnabar mineralization at the base of the "contact argillite", with disseminated stibnite-arsenopyrite-tetrahedrite in the rhyolite footwall. The 21B zone consists of beds of clastic sulphides and sulphosalts, mainly sphalerite, tetrahedrite, Pb-sulphosalts such as boulangerite and bournonite, freibergite, galena and minor pyrite and chalcopyrite. The Pumphouse/Pathfinder zone is a zone of stockwork and disseminated sulphides containing veins of sphalerite-pyrite-galena-tetrahedrite with some silica flooding in the pervasively chloritized (Mg-chlorite) footwall rhyolite. This stockwork zone is considered to be the feeder system for the deposit, as it is situated beneath the sulphide lenses. Lithological contacts (rhyolite-mudstone and basalt-mudstone) are the main ore-controlling structures. The late, NE-trending Pumphouse Creek fault and related splays offset the 21B zone, and minor, NNW-trending faults affected the Eskay anticline. Quartz-sericite-pyrite-(K-feldspar) alteration of the rhyolite-mudstone-argillite sequence is pervasive. The footwall rhyolite and mudstone near the Pumphouse/Pathfinder zone is also pervasively (Mg-)chloritized, and locally pervasively silicified. The metallic signature of the sulphide ore lenses is Au-Ag-As-Sb-Hg-Ba-Cu-Pb-Zn-Rb, whereas the vein mineralization has a distinctive Au-Fe-Zn-Pb-Cu signature. The deposit shows composite characteristics of kuroko-type VMS and high-sulphidation epithermal gold-rich VSM deposits.

4215 Kemess is an Early Jurassic, intrusion-related porphyry Au-Cu-Ag deposit with a total gold content of 104 metric tons. It is located in the Kemess-Toodoggone district of the Stikine Terrane, Intermontane Belt, Canadian Cordillera, north-central British Columbia, Canada. The dominant regional tectonic structure in the area is the N-trending, dextral strike-slip Finlay-Ingenika fault system. Quartz stockworks and associated disseminated sulphides are hosted by porphyritic quartz monzonite to quartz monzodiorite sills of the Early Jurassic Maple Leaf Intrusion at Kemess South, and by the surrounding felsic volcaniclastic ash-flows and crystal tuffs (associated with quartz monzodiorite dykes) of the Late Triassic to Early Jurassic Takla Group at Kemess North. Quartz is the dominant gangue mineral of the stockwork. Hypogene ore mineralogy is dominated by pyrite and chalcopyrite, with minor molybdenite, magnetite and hematite, and trace amounts of bornite, pyrrhotite and tetrahedrite. A zone of supergene ore (20% of the deposit) with high Cu grades in the upper portion of the deposit is composed of chalcocite, native Cu, bornite, hematite and goethite, with rare jarosite. The primary ore control is lithological, with mineralization confined to the SE-trending, shallowly-dipping tabular body of the Maple Leaf quartz monzonite sill. SE-trending, high-angle normal faults (such as the Kemess and Duncan faults) define large valleys and ridges in the area. The E-trending, steeply-dipping, sinistral-normal North Block Fault bounds the deposit to the north, whereas the N-trending, dextral strike-slip (unmineralized) 10-180 Fault cuts and displaces the orebody. SE-trending asymmetric folds have also affected the sedimentary and volcaniclastic rocks. Hydrothermal alteration consists of intense potassic alteration (K-feldspar-sericite-calcite-magnetite) in the groundmass and along stockwork selvages, grading downward to pervasive biotitization at the bottom of the intrusion and in the underlying volcanic rocks. Pervasive sericitic alteration (sericite-quartz-pyrite) is the dominant alteration type outside the potassic zones and upward in the intrusion, and have also affected the volcaniclastic rocks hosting the Kemess North deposit. In the upper part of the deposit, sericitic alteration is overprinted by a clay-carbonate-silica-hematite argillic alteration assemblage formed during supergene weathering. Distal, unmineralized propylitic alteration (epidote-chlorite-calcite) has affected the volcanic rocks of the Takla Group. Patchy grey silicification is also locally present. The metallic signature of the bulk of the ore is Au-Ag-Cu-Mo.

MANITOBA

232 New Britannia (formerly known as Nor-Acme) is an Early Proterozoic, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 47 metric tons. It is located in the Snow Lake area of the Flin Flon-Snow Lake greenstone belt, Churchill Province, Manitoba, Canada. The McLeod Road Thrust is a the main regional tectonic structure in the area. Quartz veins and breccia zones are hosted by greenschist grade basalts and felsic pyroclastic rocks of the Early Proterozoic Snow Lake arc assemblage. Gangue mineralogy consists of quartz, carbonate, tourmaline and axinite. Ore mineralogy is dominated by arsenopyrite, pyrrhotite and pyrite, with minor chalcopyrite, cubanite, sphalerite, galena, ilmenite and scheelite. The highest grades occur where acicular arsenopyrite forms radiating masses on wall rock fragments. Mineralization is structurally controlled by the Nor-Acme Fault (formerly called the Howe Sound Fault), an arcuate brittle-ductile shear splay from the McLeod Road Thrust, that is parallel to the contact between the mafic volcanics and the felsic pyroclastics. Galley *et al.* (1989) suggested that the mineralization may occur where the Nor-Acme Fault truncates the nose of the Nor-Acme anticline. Hydrothermal alteration consists of intense silicification and carbonatization zone sheared or brecciated basaltic and felsic pyroclastic rocks. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Cu-Pb-Zn-B-W.

254 Puffy Lake is an Early Proterozoic(?), probable non-carbonate-hosted stockwork-disseminated gold deposit with a total gold content of 13 metric tons. It is located in the Sherridon district of the Kisseynew Belt, Churchill Province, Manitoba, Canada. A regional uncomformity indicated by the Missi Suite basal conglomerate and an E- to ENE-trending shear zone at the limit between the Kisseynew and Flin Flon belts are the dominant regional tectonic structures in the area. Disseminated to semi-massive sulphides, sulphide-rich veins and minor quartz veins with associated disseminated sulphides are hosted by Early Proterozoic, middle to upper amphibolite facies quartzo-feldsphathic biotite paragneiss of the Amisk Group, which is correlative with the volcanic-sedimentary rocks of the Amisk Group in the Flin Flon greenstone belt to the south. Quartzo-feldspathic gneisses of the Missi Suite also host small mineralized lenses. Probable tonalitic-granitic synvolcanic intrusions within the Amisk Group have been dated at 1873 +/-4 and 1892 +66/-25 Ma (Hunt and Zwanzig, 1990). Ore mineralogy consists of dominant arsenopyrite, with lesser pyrrhotite and pyrite, and minor to trace amounts of chalcopyrite, sphalerite, galena, marcasite, loellingite, pentlandite and native Bi. Gangue mineralogy consists of diopside, biotite, feldspar and quartz. Disseminated to semi-massive sulphide mineralization (with minor associated quartz veins) structurally occurs in parallel to sub-parallel sheets conformable with layering and the W-trending, moderately- to steeply-dipping S_1 regional foliation. Sulphide-rich veins and associated disseminated sulphides crosscut S_1 foliation and do not appear to have been folded or lineated by ENE- to E-trending D_2 folds and are thus post-D_2. Minor F_3 folds with shallow E-plunging axes and steeply-dipping axial planes contain remobilized gold mineralization in dilatant zones parallel to F_3 fold axes. Hydrothermal alteration consists of extensive silicification of the host gneiss in the conformable mineralized zones, with weak and local diopside and calcite in vein selvages. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Cu-Zn-Pb-Ni-Bi. Classification of the deposit is uncertain due to the intensity of deformation and high metamorphic grade. Based on its mineralogy and its metallic signature (Bi), this deposit shares analogies with Au-rich skarns located in mafic volcanics.

262 San Antonio (Bissett) is an Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 44 metric tons. It is located in the Rice Lake area of the Rice Lake greenstone belt, Uchi subprovince, Superior Province, Manitoba, Canada. The transcurrent, dextral strike-slip Wanipigow fault is the dominant regional tectonic structure in the area. Quartz-carbonate veins and overprinting stockwork zones are hosted by a unit of tholeiitic composition, the San Antonio Mine Unit, interpreted as either a gabbroic sill or a mafic flow. Gangue mineralogy of the veins is dominated by quartz, ankerite and albite, with minor tourmaline and iron oxides. Ore mineralogy consists of dominant pyrite, with lesser chalcopyrite, sphalerite and galena, and minor tellurides. Mineralized veins are structurally controlled by en echelon sinistral-reverse shear zones confined to the San Antonio Mine Unit and related to the Normandy Creek shear zone, a ductile sinistral-reverse fault. The veins are commonly internally zoned. They are composed of a quartz-albite-ankerite fringe, an internal contact and a central quartz core with ribbon structures. Stockworks are zones of intense fracturation and mineralized host rock with an en echelon distribution and are composed of three structural elements: an inner central quartz vein; a central breccia zone of angular wallrock fragments cemented by quartz veins; and a peripheral zone of arrays of extensional, sigmoidally shaped “ladder veins”. Hydrothermal alteration consists of a proximal albite-muscovite assemblage, which grades progressively outward to a carbonate alteration assemblage of ankerite-paragonite, to a chlorite-calcite assemblage, and to a distal actinolite-epidote alteration assemblage. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Zn-Pb-Te-B.

264 Seeber (Twin Lakes, Monument Bay) is an Archean (Middle Archean?) quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold resource of 9 metric tons. It is located in the Stull Lake greenstone belt, Gods Lake domain, Sachigo subprovince, Superior Province, Manitoba, Canada. The EW-trending Twin Lakes-Monument Bay deformation zone is the dominant regional tectonic structure in the area. Quartz veins and disseminated sulphides are hosted by upper greenschist grade felsic to intermediate volcanic and pyroclastic rocks of the Middle Archean Hayes River Group. Quartz is the dominant gangue mineral. Pyrite and arsenopyrite are the main ore minerals. Mineralization is structurally controlled by shear zones. Areas of intense silicification are associated with the disseminated sulphide mineralization. Zones of intense and pervasive sericitization and silicification are associated with the mineralized quartz veins. The metallic signature of the bulk of the ore is unknown.

NEWFOUNDLAND

452 Hope Brook is a Late Proterozoic, high-sulphidation epithermal Au-Cu deposit with a total gold content of 23 metric tons. It is located in the Avalon Zone of the Appalachian Orogen, Newfoundland, Canada. The major regional tectonic structure in the area is the Cinq Cerf fault zone, a late Silurian, ductile high strain zone postdating the mineralization by about 150 Ma. Mineralization at Hope Brook is hosted by greenschist grade, altered and deformed felsic volcaniclastic White Hill Sandstone (>583 Ma) intruded by the Late Proterozoic quartz-feldspar porphyry sill-dyke complex of the Roti Intrusive Suite. Orebodies consist of disseminated sulphides, replacement zones, vuggy silica and late, sulphide-rich veins and veinlets cutting the vuggy silica zones. Ore mineralogy is charaterized by several percent pyrite, with smaller amounts of chalcopyrite, bornite, tennantite and galena, and lesser enargite, tellurides and bismuthinite. There are no structural controls on the mineralization; however, orebodies are in places offset by late, dextral strike-slip faults. Advanced argillic alteration (sericite-quartz±pyrophyllite-andalusite-kaolinite) affected schistose QFP and volcaniclastics. Advanced argillic alteration also occurs associated with silicic lenses and in such cases is characterized by an alunite-andalusite-pyrophyllite-muscovite-kaolinite-natroalunite assemblage. Massive silicic alteration of the QFP and volcaniclastics is of two types. The first type is a buff-colored, massive, barren to weakly mineralized silicic alteration zone that is more regional in extent. This buff-colored massive silicic alteration is overprinted by the second type, which consists of grey, pyrite and gold-rich massive silicic and vuggy silica. Late, ore-grade quartz-sulphide veinlets cut across the grey silicic alteration zones. The metallic signature of the bulk of the ore is Au-Cu-As-Sb-Bi-Pb. Cross-cutting relationships and U-Pb geochronology indicate that the deposit was formed between 578 and 574 Ma. Hope Brook represents one of the best examples of ancient and metamorphosed high-sulphidation epithermal deposit.

NORTHWEST TERRITORIES

Appendix 2

138 Colomac (Hydra) is an Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 18 metric tons. It is located in the Indin greenstone belt of the Slave province, Northwestern Territories, Canada. The dominant tectonic structures in the area come from two episodes of regional folding. Quartz veins and associated disseminated sulphides are hosted by the Colomac Dyke, a N-trending, steeply-dipping, 6 km-long quartz-feldspar porphyry/quartz diorite dyke. Gangue mineralogy of the veins is mainly quartz, with lesser chlorite, carbonate and tourmaline. Ore mineralogy consists of pyrrhotite, pyrite, arsenopyrite, chalcopyrite, sphalerite, scheelite and magnetite. Mineralization consists of quartz veins associated with several shear zones related to regional-scale deformation, within the Colomac Dyke. The brittle and competent Colomac dyke localized fracture development, hence it controls the distribution of the ore. Hydrothermal alteration consists of chlorite-carbonate alteration of the quartz-feldspar porphyry, which is closely associated with gold. Ore-related silicification also occurs. Local K-metasomatism is rare and unrelated to the mineralization. The metallic signature of the ore (inferred from its mineralogy) is Au-Ag-As-Cu-Zn-B-W.

146 Discovery is an Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 32 metric tons. It is located in the MacKenzie district of the Sedimentary Domain of the Yellowknife Greenstone Belt, Slave geological province, Northwest Territories, Canada. The NE-trending, shallowly-dipping sinistral-reverse(?) Discovery fault is the dominant regional tectonic structure in the area. Banded quartz veins and stockworks and associated disseminated sulphides are hosted by amphibolite grade quartzose greywacke, argillite (in places graphitic) and argillaceous greywacke of the Archean Burwash Formation, Yellowknife Supergroup. A minor part of the mineralization is hosted by metamorphosed andesite volcanic rocks also belonging to the Yellowknife Supergroup. Banding in the quartz veins is defined by biotite. Gangue mineralogy consists of quartz with lesser biotite, oligoclase, muscovite, calcite, sericite amphibole and chlorite, with rare andalusite. Ore mineralogy is dominated by pyrrhotite, with lesser pyrite and minor to trace amounts of galena, arsenopyrite, chalcopyrite, sphalerite, scheelite and pentlandite. Mineralization is structurally controlled in the sedimentary rocks by NNE-oriented, steeply N-dipping drag folds (with high-grade zones in the hinge area) with steeply W-dipping limbs, whereas in the volcanic rocks, control by NNE-trending shear zones (such as the Lux Lake Shear Zone) is more important. At the newly discovered Ormsby zone, mineralization is associated with tension fractures. The volcanic rocks unit acted as a butress during deformation and localized most of the deformation and folding within the softer greywacke-argillite sediments. Hydrothermal alteration consists of intense biotite-chlorite alteration adjacent to the veins, chlorite±sericite±carbonate alteration assemblage are also present around quartz veins. Silicification, potassic metasomatism and sulphidation occur along the Discovery fault and other related structures. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Pb-As-Cu-Zn-W.

163 Tundra (FAT) is an Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold resource of 234 metric tons. It is located in the MacKenzie area of the Courageous Lake greenstone belt, Slave Province, Northwest Territories, Canada. Quartz veins and associated disseminated sulphides are hosted by sheared and altered, Archean felsic volcanics and pyroclastics rocks. Gangue mineralogy consists of quartz, with lesser tourmaline. Ore mineralogy is dominated by arsenopyrite, pyrite and pyrrhotite, with rare amounts of chalcopyrite, sphalerite and scheelite. Mineralization is structurally controlled by a series of parallel, subvertical, conformable shear zones. Hydrothermal alteration consists of sericitization and sulphidation of the felsic rocks along the shear zones. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Cu-Zn-W.

169 Giant-Lolor-Supercrest is an Archean quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 246 metric tons. It is located in the Yellowknife area, Yellowknife greenstone belt, Slave geological province, Northwest Territories, Canada. The Campbell Shear and the Con Shear are the main regional tectonic structures in the area. Quartz-carbonate veins and stockworks, and sulphide-rich siliceous replacement zones are hosted by amphibolite grade quartz-ankerite-sericite schists derived from basalts of the Kam Group. Quartz and ankerite are the dominant gangue minerals. Ore mineralogy consists of pyrite, arsenopyrite, pyrrhotite, stibnite and scheelite. Mineralization is structurally controlled by SW-NE-trending, steeply-dipping, brittle-ductile, reverse D_1 anastomosing shear zones (Giant deformation zone) that are subsidiaries of the Campbell shear. These have been deformed by D_2 coaxial folding and mullioning (synchronous to D_2 reverse-dextral shearing at the Con deposit). The deposit is then offset and dislocated by the NS-oriented sinistral strike-slip and NE-trending dextral, Proterozoic West Bay and Akaitcho D_3 faults, which bound the deposit to the north and south respectively. Hydrothermal alteration is confined to shear zones, and grades laterally from a proximal sericite-ankerite assemblage near the vein orebodies to a distal zone of chlorite-calcite alteration. Silicification is associated with ore-bearing zones of sulphide-rich replacement. The metallic signature of the bulk of the ore is Au-Ag-As-W-Sb-Zn-Cu. Siddorn and Cruden (1999) suggested a model whereby the Giant and the Con deposits consist of a once-linked Archean deposit. In this model, evidence linking free gold precipitation and depth, a lower metamorphic grade at Giant (compared with the grade at Con) and the apparent increase in pyrrhotite abundance with depth indicate that the Giant deposit may represent an upward extension to the Con deposit. Metamorphism of the Burwash Formation turbidites (Van Hees *et al.*, 1999), or of the Yellowknife greenstone belt (Boyle, 1951), are thought to have originated the mineralizing fluids.

203 Lupin is a LateArchean iron formation-hosted vein and disseminated (Homestake type) deposit with a total gold content of 105 metric tons. It is located in the MacKenzie district of the Contwoyto Sedimentary Domain, central Slave Province, Nunavut, Canada. NE-trending F_1 folds affected by N-trending, steeply-plunging, tight to isoclinal F_2 folds are the major regional tectonic structures in the area. Massive to disseminated sulphides and discordant quartz veins are hosted by amphibolite grade sulphide-, oxide- and silicate-facies iron formation in turbiditic rocks of the Late Archean Contwoyto Formation. Orebodies consist of pyrrhotite-rich layers, with lesser arsenopyrite, loellingite and scheelite. Late quartz veins are fringed with gold-bearing arsenopyrite-loellingite haloes, the veins themselves containing only minor amounts of gold. The regional F_2 folds and associated S_2 foliation control the shape and distribution of the iron formation and enclosing rocks. The deposit is centred on a steeply-plunging anticline-syncline pair, and mineralization is confined to F_2 fold noses. Hydrothermal alteration consist of a proximal sulphidation zone of As-sulphides-hornblende-quartz-hedenbergite-epidote-actinolite. This grades outward to a Fe-sulphides-hornblende-quartz-hedenbergite-epidote-actinolite zone, to a distal amphibole alteration zone represented by a grunerite-quartz±magnetite assemblage. Pyroxene-chlorite and hedenbergitequartz±epidote±scheelite±grossular garnet calc-silicate alteration assemblages occur in haloes adjacent to veins. The metallic signature of the bulk of the ore is Au-Ag-As-Cu+/-W. The genesis of the Lupin deposit is controversial. Kerswill (1993, 1996) proposed a syngenetic origin of the sulphide mineralization hosted by the iron formation. However, Bullis *et al.* (1994) showed that pyrrhotite distribution, as well as gold and arsenopyrite distribution, appears to be controlled by the late discordant quartz veins. The latter strongly supports an epigenetic origin for the gold and (at least) some part of the sulphide mineralization (Bullis *et al.*, 1994). In this case, pyrrhotite-rich BIFs would represent coalesced, gold-rich, pyrrhotite-replacement zones around the late veins and the Lupin deposit would be akin to manto-type deposits (Poulsen *et al.*, 2000).

226 Negus-Nerco Con is an Archean quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 187 metric tons. It is located in the Yellowknife area, Yellowknife greenstone belt, Slave Province, Northwest Territories, Canada. The Campbell Shear and the Con Shear are the main regional tectonic structures in the area. Quartz-carbonate veins and sulphide-rich zones of siliceous replacement are hosted by sheared and altered basaltic rocks of the Kam Group and tuffaceous cherts. Quartz and ankerite are the dominant gangue minerals. Ore mineralogy consists of pyrite, arsenopyrite, sphalerite, pyrrhotite, stibnite, chalcopyrite, scheelite and diverse sulphosalts. Mineralization is structurally controlled by SW-NE-trending, moderately- to steeply-dipping brittle-ductile, reverse/reverse-dextral D_1 anastomosing shear zones (Campbell, Con and Negus-Rycon shears). These have been deformed and reactivated by D_2 EW-shortening mainly represented by reverse-dextral shearing and F_2 eastward west-over-east vergence folds and associated schistosity. The deposit is offset and dislocated by the Proterozoic NS-oriented, sinistral strike-slip West Bay and Pud D_3 faults, which bound the deposit to the east and west respectively. Hydrothermal alteration is coincident with the shear zones, and consists of zoned carbonate alteration of carbonate-sericite-quartz-pyrite-arsenopyrite assemblage near the orebodies, and grading outward to a distal chlorite-carbonate assemblage. The metallic signature of the bulk of the ore is Au-Ag-As-W-Sb-Zn-Cu. Siddorn and Cruden (1999) suggested a model whereby the Giant and the Con deposits consist of a once-linked Archean deposit. In this model, evidence linking free gold precipitation and depth, a lower metamorphic grade at Giant comparatively to a higher one at Con, and the apparent increase in pyrrhotite abundance with depth indicates that the Giant deposit may represent an upward extension to the Con deposit. Metamorphism of the Burwash Formation turbidites (Van Hees *et al.*, 1999), or of the Yellowknife greenstone belt (Boyle, 1951), are thought to have originated the mineralizing fluids.

230 Nicholas Lake is a Late Archean turbidite-hosted quartz-carbonate-vein gold deposit with a total gold resource of 8 metric tons. It is located in the MacKenzie district of the Yellowknife Sedimentary Domain (Yellowknife Basin), Slave Province, Northwest Territories, Canada. The NE-trending Ormsby Break deformation zone and the D3 Nardin Front mylonitic shear zone are the dominant regional tectonic structures in the area, and intersect near the deposit. Quartz vein mineralization is hosted by a granodiorite plug (or quartz monzonite according to Duke et al., 2003) and adjacent amphibolite grade turbiditic graywacke, mudstone, sandstone and siltstone of the Archean Burwash Formation (Yellowknife Supergroup). Quartz is the dominant gangue mineral. Ore mineralogy consists of arsenopyrite, pyrite, pyrrhotite, sphalerite and galena. Mineralization is structurally controlled by EW-oriented, subvertical shear zones. SW-trending F_2 folds also appear to have exerted a degree of control on the gold mineralization. The granodiorite intrusion acted as a competent body and localized most of the fracturing associated with the quartz veins. The intrusive contact with the metasediments is also a favoured sites for ore deposition. The granodiorite host has been affected by a chloritic retrograde alteration. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Zn-Pb. According to Duke *et al.* (2003), gold was initially concentrated at F_2 hinges, and later remobilized during D_3 retrograde mylonitic shearing along the Nardin Front.

NUNAVUT

168 George Lake is an Archean, iron-formation-hosted vein and disseminated (Homestake type) gold deposit with a total gold resource of 31 metric tons of gold. It is located in the Back River area of the Slave Structural province, Northwest Territories, Canada. Folded turbidite sequences of the Yellowknife Supergroup host silicate and oxide facies iron formation, of which granulestone interbeds have been dated at 2690 ± 7 Ma by U-Pb on zircon. The iron formation is cut by quartz-feldspar porphyry intrusions dated at 2883 ± 2 Ma. Disseminated sulphides and quartz veins are hosted by upper greenschist grade silicate and oxide facies iron formations occurring along the western limb of a tightly folded syncline. Ore mineralogy consists of pyrite, pyrrhotite and arsenopyrite. Sulphidation of the iron oxide facies iron formation occurs as a halo around quartz veins. This illustrates that availability of iron-rich species within the iron formation is a key factor in the control of gold deposition (Henderson and Nesbitt, 1993). Chloritic alteration is also present. The metallic signature of the bulk of the ore is Au-Ag-As-Ba-Cd-Co-Cu-Mo-Ni. Spatial relationships between disseminated gold-bearing sulphides and quartz vein mineralization suggest an epignenetic process of Au deposition (Henderson and Nesbitt, 1993).

266 Shear Lake is an Early Proterozoic turbidite-hosted quartz-carbonate vein gold deposit with a total gold content of 3 metric tons. It is located in the Cullaton Lake area of the Keewatin district, Churchill Structural Province, Northwest Territories, Canada. Regional D_1 thrust faults related to regional shortening and an associated W- to NW-trending D_1 synclinorium are the dominant regional tectonic structures in the area. Quartz veins, breccias and minor associated disseminated sulphides are hosted by greenschist grade orthoquartzite of the Early Proterozoic Hurwitz Group. Underlying turbiditic greywacke and schistose greywacke of the Henk Group host a minor part of the orebodies. Quartz is the dominant gangue mineral, with lesser Fe-dolomite and minor chlorite, phlogopite, muscovite and barite. Ore mineralogy is dominated by pyrite, with trace amounts of chalcopyrite and rare sphalerite. Mineralization is structurally controlled by a flat-lying ductile thrust fault (with a mylonite/cataclasite zone) at or near the Archean-Proterozoic boundary, and by related EW-oriented, subvertical to steeply S-dipping 'extension' faults. This latter brittle fault set localized veins and breccia orebodies. Unmineralized, late, NNW-trending subvertical normal faults have also affected the area. Hydrothermal alteration is vertically zoned, and consists of an upper zone of kaolinite alteration (characterized by an assemblage of quartz-kaolinite$\pm$anhydrite), which grades progressively downward to a chloritic zone (Fe-chlorite-Fe-dolomite-kaolinite-muscovite$\pm$barite$\pm$scheelite), and a biotitic alteration zone (biotite/phlogopite-Fe-carbonate-barite$\pm$Fe-chlorite$\pm$muscovite) at depth. The area within and adjacent to ductile faulting in the flat-lying thrust was affected by intense and massive semi-concordant albitization, represented by an albite-K-feldpsar-phlogopite-pyrite assemblage. Thin sericitic alteration lines the selvages of gold-bearing quartz veins hosted in greywacke of the Henik Group. The metallic signature of the bulk of the ore is Au-Ag-Cu-Zn-B-Zr-Sr-Ba-Ti.

4059 Meadowbank is an Early Proterozoic(?) iron-formation-hosted vein and disseminated (Homestake-type) deposit with a total gold resource of 101 metric tons. It is located in the Keewatin district of the Rankin Subprovince, western Churchill Province, Nunavut, Canada. The EW-oriented, dextral strike-slip Wager Shear Zone is the dominant regional tectonic structure in the area. Semi-massive to disseminated sulphides and narrow quartz veins are hosted by altered, greenschist grade oxide facies iron formation and felsic to intermediate volcaniclastic rocks of the Archean Woodburn Lake Group. Pyrrhotite and pyrite are the dominant ore minerals, with minor chalcopyrite and arsenopyrite. Iron formation hosts were affected by a NNE-trending D_1 event of shallowly-plunging, isoclinal-recumbent anticlinal folding and associated S_0/S_1 cleavage, which is the dominant fabric. Ultramafic volcanics form the core of the anticlinal. D_2 deformation consists of refolding of the first fabric in tight to isoclinal folds, and the development of high-strain zones of layer-parallel shears that focused fluid flow along lithological contacts (ultramafic-volcaniclastics) and permeable felsic volcaniclastic layers. D_2-related shear zones in the hinge area cut the BIF at low to high angles, and these are the loci of intense alteration and mineralization. Hydrothermal alteration consists of auriferous cummingtonite-biotite amphibolitization of the iron formation, with which sulphidation and replacement of the oxides with pyrrhotite-pyrite is associated. Weakly auriferous to barren BIF has been affected by grunerite-hornblende-stilpnomelane amphibolitization, which may be related to regional metamorphism. Mineralized felsic volcaniclastics at the Third Portage deposit are altered to an epidote-tourmaline-carbonate assemblage, whereas at the Vault deposit, sericitic alteration (characterized by sericite-quartz-carbonate-pyrite) is predominant. Ultramafic volcanics near the mineralized BIFs have been affected by two types of alteration; 1) amphibolitization with calcic amphibole-biotite/phlogopite-carbonate, and 2) carbonate alteration with talc-chlorite-calcic amphibole-dolomite-calcite-biotite-quartz. The metallic signature of the bulk of the ore is Au-Ag-As-Cu. According to Armitage *et al.* (1995), mineralization is of epigenetic origin.

4062 Meliadine West (Wesmeg) is an Early Proterozoic iron formation-hosted vein and disseminated (Homestake-type) deposit with a total gold resource of 140 metric tons. It is located in the Keewatin district of the Rankin Subprovince, Churchill Province, Northwest Territories, Canada. The ESE-trending, ductile to brittle, dextral Pyke Fault Zone, considered to be an Archean thrust reactivated during the Archean to the Proterozoic, and an ESE-dipping F_1 homocline refolded by a shallow SE-plunging F_2 syncline are the dominant regional tectonic structures in the area. Quartz-carbonate veins and disseminated sulphides are hosted by lower to mid-greenschist grade, deformed sulphide facies(?) iron formation and pillowed basalts of the Late Archean to Early Proterozoic Rankin Inlet Group. Quartz and carbonate are the dominant gangue minerals. Sulphide minerals occur in and around the veins hosted by the iron formation, and consist of dominant arsenopyrite, with lesser pyrrhotite, chalcopyrite, pyrite, sphalerite and galena. Mineralization is structurally controlled by the Pyke Fault Zone itself, and by the Wesmeg Cross Fault, a W-trending, ductile-brittle, dextral strike-slip fault splay of the Pyke Fault Zone. EW-oriented, moderately-plunging folds formed in response to dextral shearing on the fault and affected the iron formation host. Quartz-carbonate veins are preferentially located in shears in, or near, iron formation contacts with metabasalts. Hydrothermal alteration consisting of iron-rich dolomite-ankerite carbonate alteration, chloritization, muscovite-biotite alteration and silicification has affected the iron formation and the metabasalts. The iron formation has also been affected by amphibolitization (with grunerite).

The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Cu-Zn-Pb. Alignment of muscovite and biotite alteration minerals within the S_2 foliation suggests that alteration/mineralization is syn- to late-D_2 deformation (Miller *et al.*, 1995).

ONTARIO

103 Buffalo Ankerite is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 32 metric tons. It is located in the Porcupine mining camp (near Timmins) of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The deposit is on the southern limb of the Porcupine Syncline and just north of the Destor-Porcupine Fault, a crustal-scale fault of possible sinistral-reverse motion. Banded quartz veins and associated disseminated sulphides are hosted mainly by greenschist grade amydaloidal pillow basalt flows of the Late Archean Tisdale Group (Hersey Lake Formation). Quartz-feldspar porphyry bodies and syn- to post-porphyry heterolithic breccia host a minor part of the ore. Cr-rich tourmaline (chromian dravite) is the dominant gangue mineral (up to 65%), with abundant quartz and ankerite, and lesser albite. Ore mineralogy is dominated by pyrite, with lesser chalcopyrite, sphalerite, pyrrhotite, and arsenopyrite. Mineralization is structurally controlled by competency contrasts along litholgical contacts, such as at the basalt flows interface, and along the basalt-quartz-feldspar porphyry intrusion. The mine area is on the southern limb of the NNW- to NW-trending Karoyum syncline, and mineralized quartz veins in conglomerate are located in fractured hinge areas. Orebodies are cut by the Spur fault, a NNW-trending, moderately- to steeply-dipping fault splaying from the Destor-Porcupine fault. Hydrothermal alteration consits of intense carbonatization adjacent to the veins. Areas of disseminated sulphide mineralization and small-scale veining in the heterolithic breccia, the QFP and in the basalts adjacent to the porphyry bodies are bleached and affected by sericitization, silicification and pyritization. Carbonate-sericite alteration also affects the ultramafic rocks. A tourmalinized breccia dyke has been recognized in the QFP bodies but its economic significance is unclear. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-B-Cu-Zn-As.

107 Aunor (also known as Pamour #3) is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 78 metric tons. It is located in the Timmins district of the Abitibi greenstone belt, Superior province, Ontario, Canada. The regional Destor-Porcupine fault is the main tectonic structure in the area. Quartz vein mineralization is hosted by greenschist grade, pillowed komatiitic basalts and overlying mafic tuffs of the Late Archean Tisdale Group. Quartz is the dominant gangue mineral, with lesser but abundant ankerite and tourmaline, and minor fuchsite, stilpnomelane and mariposite. Ore minerals are sulphides such as pyrite, pyrrhotite, sphalerite, arsenopyrite and chalcopyrite. Quartz-ankerite veins are comformable to the stratigraphy, and are also boudinaged in places. These veins could be structurally related to a SE-trending syncline in the area, and to lithological contacts and competency contrasts between the different volcanic flows and beds. Quartz-tourmaline veins are subparallel to normal faults, to which they are most likely linked. Hydrothermal alteration consists of carbonate alteration of the wallrocks, and restricted (3 to 5 cm-wide) sericitic alteration along the vein selvages. The metallic signature of the bulk of the ore is Au-Ag-Cu-Cr-Ni-Co.

128 Campbell Red Lake- Arthur White - Robin Red Lake is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 663 metric tons. It is located in the Red Lake greenstone belt of the Uchi subprovince, Superior Province, Ontario, Canada. The major regional tectonic structures in the area are the SE-trending Cochenour-Gullrock Lake Deformation Zone (or 'Red Lake mine trend'), correponding to a zone of heterogeneous, protracted D_2 strain, and SE-trending, SE-plunging F_{2a} folds, which form an antiform-synform pair. Sheeted, banded and colloform-crustiform-cockade-textured carbonate veins, sulphide-rich siliceous replacement along veins, and disseminated sulphides are hosted by middle greenschist to amphibolite grade (the latter caused by contact metamorphism due to emplacement of the nearby Walsh Lake Pluton), altered and deformed, Fe-rich tholeiitic basalt and basaltic komatiites of the Middle Archean Balmer assemblage. Gangue mineralogy consists dominantly of dolomite, chert and quartz. Ore minerals are mainly arsenopyrite and pyrite, with lesser pyrrhotite, stibnite, magnetite and sphalerite. Alteration and mineralization are controlled by two parallel, SE-trending, steeply-dipping reverse-sinistral dip-slip D_2 faults, the Campbell fault zone and the Dickenson fault zone. These faults flattened F_{2a} folds, and strained and transposed limbs. A W-plunging, F_{2b} fold with NE vergence compatible with reverse movement along the Campbell fault affects the veinlets and the foliation. Carbonate veins are deformed (boudinaged) and affected by S_2 foliation; boudinage is thought to be contemporaneous with folding (Dubé *et al.*, 2002). Intersecting SE-, E- and SSE-oriented high-strain zones control W-plunging, spectacular geometric ore shoots at the Arthur White mine (renamed Red Lake mine), with an average grade of 88 g/t gold. Lower pressure F_{2a} fold hinges focused the mineralizing fluid in the high-grade zones, and the overlying carbonatized ultramafic rocks are thought to have played a role in the ponding of ore fluid, mechanically acting as a less permeable barrier controlling fluid migration along or near the contact with the folded basalts (Dubé *et al.*, 2001). E- to SE-trending, brittle, barren millimetre-wide faults filled by tourmaline and quartz cut across the alteration and ore zones. Hydrothermal alteration consists of proximal (along the margins of carbonate veins), gold-bearing silicic replacement (silicification) and sulphidation (arsenopyrite) of strongly foliated basalts. This alteration overprints a biotite-carbonate alteration, with disseminated pyrite and carbonate veinlets in well foliated basalts. This alteration is considered as a key vector for high-grade ore by Dubé *et al.* (2002). This in turn grades away to (and overprints) distal carbonate-chlorite alteration and aluminous alteration. The latter alteration is also zoned, with a bleached zone of quartz-andalusite-sericite±margarite±chloritoid±cordierite grading outward to a more chloritic zone of quartz-chloritoid-chlorite±sericite and to a distal chloritic garnetiferous zone of quartz-chlorite-garnet±chloritoid±sericite±cordierite±cummingtonite. Chloritization is associated with carbonate veins at the Campbell mine. Silicification and sericitic alteration (quartz-sericite-pyrite-arsenopyrite) are associated with sulphide-rich siliceous replacement of wallrocks. The metallic signature of the bulk of the ore is Ag-Au-As-Sb-Hg-Zn-K. Many features (alteration mineralogy, vein textures and metallic signature) and structural compatibility with D_1 structures suggest that this deposit is a metamorphosed, low-sulphidation epithermal deposit (Penczak and Mason, 1999). This scenario is considered unlikely by Dubé *et al.* (2002), who favor a progressive and syn-D_2 mineralization event dominated by silicification of carbonate veins, with some late, post-D_2 local remobilization of gold in fractures.

131 Central Patricia is a Middle to Late Archean iron-formation-hosted vein and disseminated (Homestake-type) Au-Ag deposit with a total gold content of 21 metric tons. It is located in the

Pickle Lare area of the Uchi subprovince, Superior Province, Ontario, Canada. The Pickle Crow syncline, a NE-trending, moderately- to steeply NE-plunging isoclinal fold, and the NE-trending, steeply-dipping Pickle Crow fault, are the dominant regional tectonic structures in the area. Quartz-carbonate veins and zones of sulphide-rich siliceous replacement are hosted by greenschist grade laminated and banded carbonate-oxide iron formation (in sheared greenstones) that is part of the Middle Archean Pickle Crow assemblage. Quartz is the dominant gangue mineral of the veins, with lesser chlorite and carbonates. Chlorite is intimately associated with gold. Ore mineralogy is dominated by pyrrhotite and arsenopyrite, with lesser pyrite and chalcopyrite. Rocks in the mine area are affected by a NE-trending anticline. Quartz-carbonate veins are confined to the iron formation beds, which acted as a structural trap due to its competency contrast with the enclosing greenstones during deformation and buckling, and as a chemical trap, due to the availability of iron. The veins occur in NW- to N-trending, moderately- to steeply-dipping extension(?) fractures. Post-ore dextral faulting displaced the iron formation and the orebodies by 1 to 1.5 metres. Hydrothermal alteration consists of carbonatization (ankerite-calcite-siderite) along fault and shear zones, and also affected the iron formation. Silicification and sulphidation of selected (oxide-rich?) layers of the iron formation is associated with gold mineralization. Intrusive rocks have been affected by sericitic alteration. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Cu. It is still unclear whether the deposit is pre- or syn-Kenoran orogeny; it could be contemporaneous with the 2741 Ma Ochig Lake pluton, or possibly pre-date intrusive activity (Fyon *et al.*, 1992).

133 Chesterville is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 11 metric tons. It is located next to the Kerr Addison mine in the Larder Lake district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The deposit is situated on the southern limb of a large EW-oriented synclinorium, and occurs directly within or adjacent to the EW-oriented reverse-sinistral Cadillac-Larder Lake fault. Quartz-carbonate veins and stockworks ("carbonate ore") and disseminated sulphides ("flow ore") are hosted by intensely altered and sheared greenschist grade schists derived from basalt and komatiite flows and interflow sediments of the Late Archean Larder Lake Group. Diorite-syenite dykes related to the Chesterville Plug also host disseminated sulphide mineralization ("albitite ore"); they are approximately co-extensive with the main Au-related alteration stage (Smith *et al.*, 1993). Gangue mineralogy of the carbonate ore consists of quartz and carbonate. Ore mineralogy is dominated by pyrite, with minor amounts of chalcopyrite, sphalerite, arsenopyrite, marcasite, galena, gersdorffite and scheelite. "Flow ore" consists mainly of quartz, chlorite and carbonate (iron-bearing dolomite and ankerite) with variable amounts of sericite, albite, pyrite and graphite. The gold in flow ore is mainly associated with fine-grained pyrite. The distribution of the alteration and mineralization is controlled by the main Cadillac-Larder Lake fault zone, and minor SW-trending, steeply-dipping to subvertical reverse-sinistral splay faults (such as the Kerr Fault) and NE- to E-plunging folds. Orebodies are roughly stratabound, indicating a lithological control (in part due to rheological properties): carbonate ore occurs dominantly in komatiitic units, whereas flow ore is hosted by basaltic units. Hydrothermal alteration consists of a proximal carbonate-albite-pyrite assemblage affecting the tholeiithic to ultramafic volcanic rocks, and grading progressively outward to a carbonate-muscovite (fuchsite) zone and to a distal carbonate-chlorite assemblage. Diorite-syenite dykes are pervasively albitized and silicified (and mineralized) to an assemblage of albite-quartz-carbonate-pyrite. Flow ore also exhibits pronounced silicification. The metallic signature of the bulk of the ore is Au-Ag-As-Sb-B-W-Rb-Sr. Carbonate ore is regarded as a good example of a Mother Lode-type deposit (Poulsen et al., 2000), but the origin of the disseminated pyrite flow ore remains enigmatic. Flow ore has been regarded as having the same origin as the quartz-carbonate veins (Kishida and Kerrich, 1987; Hodgson and Hamilton, 1989), or as having a pretectonic, exhalative origin (Ridler, 1970; Hutchinson, 1993).

137 Cochenour Willans is an atypical Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 39 metric tons. It is located in the Red Lake greenstone belt of the Uchi subprovince, Superior Province, Ontario, Canada. The major regional tectonic structures in the area are the SE-trending ‘Red Lake mine trend’ (Cochenour-Gullrock Lake Deformation Zone), corresponding to a zone of heterogeneous, protracted D_2 strain, SE-trending, SE-plunging F_{2a} folds, and a regional unconformity underlined by the Huston conglomerate. Sulphide-poor siliceous replacement zones, cockade and colloform-crustiform carbonate veins, and hydrothermal breccias are hosted by highly deformed and altered Fe-rich tholeiitic basalt and basaltic komatiites of the Middle Archean Balmer assemblage, and by crosscutting felsic dykes, interflow cherts and sedimentary rocks. Throughout the Cochenour Mine, gold mineralization is related to “cherty” silicification of basaltic rocks and carbonate veins, the latter occurring exclusively within highly-strained, hanging wall mafic volcanic rocks. Within the carbonate veins, gold is concentrated in crosscutting quartz veins and zones of silicified carbonate breccias. Ferroan carbonate (ankerite), quartz and calcite are the main gangue minerals of the veins, with lesser chlorite, muscovite and biotite. Ore mineralogy consists of common arsenopyrite, pyrrhotite, pyrite and chalcopyrite, with lesser stibnite, sphalerite and magnetite occurring within the most pervasively silicified material. Mineralization is located on the southern limb of the EW-trending F_2 Cochenour Anticline, overturned to the N and moderately- to steeply-plunging to the W. Orebodies are associated with the ESE-trending D_2 Cochenour shear zone, developed along the south limb and hinge zone of the Cochenour Anticline. Subsidiaries of the Cochenour shear zone, such as the West Carbonate shear zone, are SSE-trending reverse-dextral high-strain zones that localized some of the carbonate veins. Subvertical brittle faults (“black line faults”) of various orientations and of dextral or sinistral movement transect the D_2 structures and offset the orebodies (late- to post-D_2), they may have contributed to the mineralization of the brittle interflow cherts. Hydrothermal alteration consists of proximal (along the margins of carbonate veins), gold-bearing silicic replacement (silicification) and sulphidation (arsenopyrite-pyrite-sphalerite-stibnite-pyrrhotite-chalcopyrite) of strongly foliated basalts. A sericite-fuchsite-quartz-ankerite forms the proximal envelope to this gold-bearing silicified zone. This grades outward to (and overprints) pervasive carbonate alteration. Felsic dykes are intensely sericitized. The metallic signature of the bulk of the ore is Au-Ag-As-Cu-Sb-Zn.

139 Duport is a Late Archean quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 12 metric tons. It is located in the Shoal Lake area of the Lake of the Woods greenstone belt, Wabigoon Subprovince, Superior Province, Ontario, Canada. The Shoal Lake Deformation Zone (a NE-trending reverse high strain zone with limited sinistral movement), the Crowduck Lake-Witch Bay Shear Zone (a major E-trending D_2 zone of high strain with dextral movement) and the NE-trending, D_1 Gull Bay-Bag Bay Anticline are the dominant regional tectonic structures in the area. Disseminated sulphides, quartz veins and breccias are hosted by greenschist grade, pillowed basalt and komatiitic basalt flows, as well as talc-chlorite schist and amphibolite derived from basalts, of the Late Archean Upper Keewatin Supergroup. The deposit occurs within the amphibolite grade contact metamorphic aureole, (but overprinted by greenschist facies metamorphism) of the Snowshoe Bay batholith. Quartz is the main gangue mineral, with varying amounts of feldspar, sericite, biotite, epidote, actinolite, chlorite and carbonate, and lesser fluorite, sphene, tourmaline, rutile, ilmenite and hematite. Ore mineralogy is dominated by arsenopyrite and pyrite, with lesser pyrrhotite and minor chalcopyrite. Mineralization is structurally controlled by the Duport Deformation Zone; a SW-trending, steeply-dipping reverse-(sinistral) shear zone that is part of the Shoal Lake Deformation Zone. Gold-bearing veins and lenses are distributed in en echelon, oblique fault-fill veins and other minor Riedel shears consistent with reverse movement. The competency contrast between the mafic-ultramafic host rocks and quartz porphyry-diorite dykes of the Stevens Island Complex localized gold mineralization and fluid flow within the dykes and along their margins. Hydrothermal alteration consists of intense proximal biotitization, and arsenopyrite-pyrite sulphidization. Silicification of mafic-ultramafic rocks along veins occurs together with arsenopyrite, whereas pyrite extends in a broader halo. Minor carbonatization (dolomite-calcite) also occurs adjacent to mineralized rocks. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Cu. The age of mineralization has been constrained by Davis and Smith (1991) between 2716±2 and 2709±2 Ma. Smith (1986) suggested that the gold mineralization is likely contemporaneous with the late cooling stages of the Snowshoe Bay batholith, which may have acted either as a thermal source (in the case of gold-bearing metamorphic fluids) or a source of gold-bearing magmatically-derived fluids.

142 Delnite is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 29 metric tons. It is located in the Porcupine district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The NE- to ENE-trending reverse and sinistral oblique-slip Destor-Porcupine fault zone, and the E- to NE-trending, doubly- (moderately-) plunging Porcupine syncline are the dominant regional tectonic structures in the area. Quartz-carbonate vein mineralization is hosted by greenschist grade pillowed basalts of the Late Archean Tisdale Group (Hersey Lake Formation). Quartz is the dominant gangue mineral, with lesser (but abundant) ankerite and tourmaline. Ore mineralogy is dominantly pyrite and arsenopyrite. The deposit is located on the south limb of a moderately- to steeply-plunging E-trending drag fold. Mineralization consists of a set of 'ladder veins' subparallel to the stratigraphy. Lithological contacts and competency contrasts between basaltic and komatiitic flows may have played a role in localizing the individual veins, as they die out in the altered komatiite. Post-ore normal faults and WNW-striking shear zones crosscut and offset the orebodies. Hydrothermal alteration consists of a broad zone of intense and pervasive carbonatization (ankerite) of the host basalts around the veins. Zones of silicification and sericitic alteration (represented by a sericite-chlorite-pyrite assemblage) occur in the immediate vein selvages. The ankerite alteration grades outward to a distal chlorite-calcite alteration assemblage. Quartz porphyry intrusions and adjacent areas at the Delnite mine have been affected by pervasive albitization. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-B.

145 Detour Lake is a Late Archean(?), quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 55 metric tons. It is located 250 km N of the Porcupine District, in the Chibougamau-Mattagami Belt of the Abitibi Subprovince, near its contact with the Opatika Subprovince, Superior Province, James Bay area, Ontario, Canada. The dominant tectonic structures in the area are a W-trending, overturned, isoclinal regional syncline and the NW-trending Sunday Lake Deformation Zone, which strongly affects the northern limb of the syncline. Locally folded quartz-carbonate stockworks and veins are hosted by tholeiitic basalts and ultramafic volcanics of the Detour assemblage, and by quartz-feldspar porphyry and mafic intrusions. Gangue mineralogy consists of quartz, carbonate, actinolite and tremolite. Ore minerals are mainly pyrrhotite, pyrite and chalcopyrite, with minor sphalerite, pentlandite and tellurides. The Sunday Lake Deformation Zone is a high-strain zone of intense brittle and ductile faulting/shearing and mylonitization. Mineralization is structurally controlled by NW-trending, high-angle parallel shears forming the SLDZ, and by lesser EW-oriented thrust shears and NE-trending sinistral strike-slip shears in the SLDZ. Volcanic rocks are highly silicified and may be mistaken for a chert unit or an exhalite. Potassic alteration (quartz- K-feldspar -chlorite-sericite) forms the core of the alteration system, grading outward into sericitic (quartz-sericite-epidote-biotite-chlorite) and biotitic (quartz-plagioclase- K-feldspar -biotite-phlogopite) zones of alteration. Schistose units are chloritized, epidotized and carbonatized, and ore-hosting felsic intrusions are affected by weak carbonate and sericitic alterations near the veins. The metallic signature of the bulk of the ore (partly inferred from its mineralogy) is Au-Ag-Cu-Zn-Ni-Te. The QK zone is a recent (1995) discovery consisting of stockworks and quartz-K spar veins hosted near the folded contact between massive and pillowed basalts, and spatially associated with a swarm of porphyritic felsic dykes. This zone, and the overall alteration styles of the Detour Lake deposit, share similarities with intrusion-related porphyry deposits. A model of gold remobilization and relocation near the intrusions has also been proposed (Placer Dome, 1997).

147 Dome is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 493 metric tons. It is located in the Abitibi greenstone belt, Superior Province near Timmins, Ontario, Canada. The deposit is on the south limb of the Porcupine Syncline, north of the Destor-Porcupine Fault, a crustal scale fault of possible sinistral-reverse motion. Different styles of ore are exploited including 1) boudinaged concordant ankerite interflow veins cut by gold-bearing en enchelon extensional quartz veins confined within Fe- tholeiitic flows and 2) carbonate and quartz-fuchsite-tourmaline veins hosted by greenschist-grade basaltic and komatiitic rocks of the Tisdale Group, sediments of the Timiskaming Group, and also by the sericitized Preston and Paymaster (the latter to a lesser degree) quartz-feldspar porphyries. Whereas the concordant ankerite interflow veins are mostly restricted to Fe-tholeiitic rocks, gold also occurs in disseminated sulphides zones, extensional en echelon vein arrays and in stockworks inside the Timiskaming sedimentary through and porphyry units. Gangue mineralogy is dominated by quartz and ankerite, with lesser fuchsite, chlorite, tourmaline, apatite and albite. Ore mineralogy (sulphides <5%) consists of pyrite, pyrrhotite, galena, chalcopyrite and sphalerite. High-grade zones are marked by chlorite-fuchsite ribbons and the presence of galena in laminated quartz veins. The reverse Dome Fault is the focus of intense fluid flow and alteration. Lithologic/competency contrasts between interflow sediments and volcanic flows at least partly controlled the distribution of the mineralized veins. Hydrothermal alteration consists of sericite-carbonate alteration in the Dome Fault and the surrounding volcanic rocks and quartz-feldspar porphyries. This alteration grades outward into zones of intense chloritization. QFPs are also affected by intense albitization. Sulphidation of the host metavolcanics extends up to 1 metre away from the veins. The metallic signature of the bulk of the ore is Au-Ag-Cr-Pb-Zn-B. Presence of concordant ankerite interflow veins cut by quartz-tourmaline veins and their confinement underneath the Timiskaming sedimentary trough, and variably deformed, mineralized quartz veins hosted by the folded Timiskaming sediments and 2690 Ma porphyry stocks, illustrate the complex and multistage nature of the Dome Mine.

156 Eagle River is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 25 metric tons. It is located in the Mishibishu greenstone belt of the Wawa subprovince, Superior Province, Ontario, Canada. The E- to SE-trending Mishibishu Deformation Zone and the E-trending, moderately- to steeply- E-dipping Kink antiform are the dominant regional tectonic structures in the area. Laminated, ribbon- and sugary-textured quartz veins are hosted by a quartz diorite stock, and by the enclosing greenschist grade tholeiitic basalts of the Late Archean Catfish assemblage. Quartz is the dominant gangue mineral. Ore mineralogy consists of chalcopyrite, galena, pyrite, pyrrhotite and sphalerite. Mineralization is structurally controlled by an EW-oriented, subvertical shear zone that transects the quartz diorite host. The competency contrast between the quartz diorite and the surrounding volcanic rocks localized most of the fracturing and veining within the competent quartz diorite stock. Hydrothermal alteration consists of an assemblage of sericite, chlorite and K-feldspar confined within the shear zones. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Pb-Zn.

170 Glimmer is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 20 metric tons. It is located in the Matheson district of the Abitibi greenstone Belt, Superior Province, Ontario, Canada. The Destor-Porcupine Fault, an EW-oriented crustal scale reverse and sinistral oblique-slip fault, is the dominant regional tectonic structure in the area. Quartz veins and associated disseminated sulphides are hosted by greenschist grade altered ultramafic komatiite flows of the Late Archean Stoughton-Roquemaure Group and by a crosscutting felsic dyke (trondhjemite?). Quartz and pyrite are the dominant gangue and ore minerals. Mineralization is structurally controlled by SW-trending(?) subvertical faults and fractures bounded by shear zones. Hydrothermal alteration consists of intense and pervasive carbonate alteration of the host komatiites and felsic dykes. The metallic signature of the bulk of the ore is unknown.

173 Golden Patricia is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a resource of 19 metric tons of gold. It is located in the Pickle Lake area of the Meen-Dempster greenstone belt, Uchi Subprovince, Superior Province, Ontario, Canada. The EW-oriented Sydney Lake-Lake St- Joseph Fault (southern boundary between the Uchi and the English River subprovinces) and the dextral Bear Head fault zone (northern boundary between the Berens River and Sachio subprovinces) are the dominant regional tectonic structures in the area. Quartz veins and associated disseminated sulphides are hosted by greenschist grade tholeiitic basalt flows and tuff and felsic pyroclastics of the Late Archean Woman Assemblage. Quartz is the main gangue mineral. Ore mineralogy is dominated by pyrite, with lesser chalcopyrite, galena, pyrrhotite and sphalerite. Mineralization is structurally controlled by an E- to ESE-trending dextral shear zone (a splay of the Bear Head fault zone) located along the contact of the volcanic rocks with the tonalite of the 2747 Ma syntectonic Dobbie Lake pluton. Hydrothermal alteration consists of a 50-cm-wide zone of carbonatization, sericitization and sulphidation (represented by a calcite-muscovite-pyrite-pyrrhotite-sphalerite assemblage) along vein selvages. Silicification has also been reported. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Pb-Zn.

179 The Hard Rock - McLeod-Cockshutt - Mosher gold deposit is an Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 65 metric tons. It is located in the Geraldton-Beardmore area of the Wabigoon greenstone belt, Superior province, Ontario, Canada. The major regional tectonic structures in the area are the Bankfield-Tombill dextral strike-slip fault, and the Hard Rock Synclinorium. Quartz-carbonate veins and stockworks, and sulphide-rich siliceous replacement mineralization are mainly hosted by oxide facies iron formations, greywacke and intrusive rocks (quartz-feldpar porphyry-diorite). Quart-carbonate veins and stockwork zones crosscut many lithologies, whereas the replacement ore is confined to iron formation adjacent to the veins. Gangue mineralogy is dominated by quartz and ankerite, with lesser calcite, tourmaline and fuchsite. Pyrite is the dominant ore mineral, with lesser arsenopyrite, chalcopyrite, galena and some minor tellurides. Shear zones are a major component of the deformation in the sedimentary rocks, and veins commonly follow those shears. Shears are also localized at lithological contacts such as the sediment-porphyry and sediment-ironstone contacts, which are also important ore-controlling structures. Quartz-carbonate veins and related sulphide-rich lenses also occur within noses of drag folds in the iron formation. Hydrothermal alteration consists of carbonate alteration of the host greywackes and iron formation, greywackes are also affected by sericitic alteration adjacent to the veins. Pyritization of the iron oxides and silicification around the veins in the iron formation are thought to be responsible for the sulphide-rich siliceous replacement ore. The metallic signature of the bulk of the ore (derived from its mineralogy) is Au-Ag-Cu-Pb-W-B.

180 Hemlo is an intensely deformed and highly complex, Late Archean, probable non-carbonate-hosted stockwork-disseminated gold deposit, with a total gold content of 671 metric tons. It is located in the Hemlo-Heron Bay greenstone belt of the Wawa Subprovince, Superior Province, Ontario, Canada. Hemlo is currently the largest gold producer in Canada. The main tectonic structure in the area is the E- to SE-trending, ductile, sinistral transpressional Hemlo Shear Zone. Disseminated sulphides and stockworks are partly hosted by the Moose Lake quartz-feldspar porphyry (2722$\pm$2 Ma), whereas most of the ore is hosted by the adjacent amphibolite-grade, 2694 to 2688 Ma clastic feldspathic sedimentary and mafic fragmental rocks (greywackes, mudstones and minor conglomerates) on the northern margin of the porphyry. Gangue mineralogy consists of barite, vanadian muscovite, scapolite, rutile, titanite, calcite and fluorite. Ore mineralogy is dominated by pyrite and molybdenite, with minor cinnabar, stibnite, realgar, chalcopyrite, roscoelite and tellurides. The ore zones are located inside the Hemlo Shear Zone, where the deformation is the strongest. F_2 (S-shaped) folding, the Moose Lake Fold, has strongly affected the host units; moreover, the disseminated ore and veinlets of pyrite-molybdenite-vanadian muscovite are transposed by the main S_2 foliation. The folded lower porphyry contact acted as a mechanical trap for the ore fluids by concentrating fluid flow in the more permeable, underlying fragmental units, whereas the barite horizon served as a chemical trap by oxidizing the ore fluids. Hydrothermal alteration consists of a proximal, ore-related, zone of silicification (restricted to porphyry unit) and K-metasomatism, grading away to distal biotite alteration in the sedimentary rocks and muscovite alteration in the porphyry unit. Local albitization, chloritization, carbonatization, tourmalinization and pyritization also occur throughout the deposit. The metallic signature of the bulk of the ore is Au-Mo-V-Ag-As-Sb-Hg-Te. Many models have been proposed to explain the genesis and deformation history of the Hemlo deposit (see Lin, 2001). The occurrence of pyrite and molybdenite veinlets transposed parallel to the S_2 foliation, of late- to post-ore 2677.2±1.5 Ma aplite dikes deformed by S_2 and F_2, and the particular metallic signature of the ore all suggest that the Hemlo deposit represents a deformed and metamorphosed deposit, transitional between a porphyry and epithermal system, and emplaced pre- to early- main phase of D_2 deformation.

182 Howey-Hasaga is a Late Archean(?), quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 23 metric tons. It is located in the Red Lake greenstone belt of the Uchi subprovince, Superior Province, Ontario, Canada. The major regional tectonic structure in the area is the NE-trending Flat Lake-Howey Bay Deformation Zone, consisting of many smaller sinistral shear zones. Quartz veins and stringers are hosted by a greenschist grade quartz porphyry dyke of probable Late Archean age. Quartz is the dominant gangue mineral, with lesser tourmaline and ankerite, and minor to trace amounts of albite, calcite, orthoclase, sericite and rutile. Ore mineralogy is dominated by pyrite, with lesser arsenopyrite and sphalerite, and minor chalcopyrite, galena, pyrrhotite, scheelite, krennerite, petzite, altaite, sylvanite, tetradymite, aikinite, polybasite, cubanite, loellingite, ilmenite and specular hematite. Localization and distribution of the mineralization is controlled by the rheologic contrast between the quartz porphyry dyke and the enclosing volcaniclastic rocks and basaltic rocks. The dyke is notably more fractured and mineralized when wholly enclosed in the volcaniclastic rocks, whereas the basalts and the Howey diorite seem to have accomodated more of the deformation through shearing. The dyke itself is intruded along a NE-trending, steeply-dipping sinistral shear zone, and its contacts are heavily sheared. Mineralized fractures within the dyke are oriented at 20 and 80 degrees. Hydrothermal alteration consists of intense and pervasive sericitization along the vein selvages, and dies out progressively away from the veins. Weak silicification and carbonatization occur in places along the veins. The metallic signature of the bulk of the ore is Au-Ag-Pb-Cu-Bi-Te-Zn-As-Sb-B-W.

183 Pamour is a Late Archean quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 247 metric tons. It is located in the Timmins district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The Destor-Porcupine fault zone and a NE-trending syncline are the dominant regional tectonic structures in the area. The host sequence is overturned to the south and forms the north limb of a syncline which has been truncated by the Destor-Porcupine Fault (Poulsen et al., 2000). The deposit is spatially distributed along the Timiskaming unconformity over a strike length of more than 5 km. Steeply- to moderately-dipping laminated quartz-carbonate sheeted veins, en echelon shallowly-dipping extensional quartz-carbonate veins and associated disseminated sulphides are hosted mainly by folded but low-strain Late Archean Timiskaming Group conglomerates and greywackes near the base of the sequence, which rests unconformably on Late Archean Tisdale and Deloro Group mafic and ultramafic volcanic rocks. The structurally controlled quartz-carbonate veins are hosted by all rock types. Gangue mineralogy consists of dominant quartz, with lesser tourmaline and ankerite and minor amounts of albite, calcite and chlorite. Ore mineralogy is dominated by pyrite, with lesser pyrrhotite and minor amounts of arsenopyrite, sphalerite, galena and chalcopyrite. Abundance of pyrite and/or pyrrhotite, as well as presence of sphalerite and/or galena, are commonly indicative of high-grade mineralization.

Laminated quartz veins are associated with EW-oriented and NE-trending, moderately- to steeply-dipping, reverse shear zones. Flat extensional veins locally fringe the laminated quartz veins. Late NW- and NNE-trending, dextral and sinistral faults cut and offset the orebodies. Hydrothermal alteration around veins hosted by volcanic rocks consists of a proximal zone of carbonate alteration characterized by an assemblage of chlorite-carbonate±albite, grading outward successively to carbonate-sericite±chlorite, to carbonate-chlorite, to carbonate-chlorite-sericite, and finally to a distal zone of chlorite-carbonate alteration. Alteration around veins hosted in sedimentary rocks consists of a proximal zone of arsenopyrite-sericite-dolomite-magnetite (the latter grading to pyrrhotite away from the veins), which grades outward to a sericite-dolomite-pyrrhotite zone, and to a distal zone represented by a sericite-chlorite-albite-dolomite-pyrite assemblage. The metallic signature of the bulk of the ore is Au-Ag-Zn-As-Pb-W. Gray and Hutchinson (2001) have proposed that the presence of auriferous clasts derived from older rocks at the base of the Timiskaming conglomerate prove the existence of pre-Timiskaming gold concentrations.

191 Kerr Addison is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 327 metric tons. It is located in the Abitibi greenstone belt, Superior Province, Ontario, Canada. The deposit is localized on the southern limb of a large EW-oriented synclinorium, and occurs within or near the regional, NE-trending, reverse Kirkland Lake-Larder Lake Fault Zone. Quartz-carbonate stockwork veins (“carbonate ore”) and disseminated sulphides (mainly pyrite, called “flow ore”) are hosted by intensely altered and sheared, greenschist grade schists derived from tholeiitic and ultramafic flows (and interflow sediments) of the Late Archean Larder Lake Group. Diorite-syenite dykes also host disseminated sulphide mineralization. Gangue mineralogy of the “carbonate ore” consists of quartz and carbonate. Ore mineralogy is dominated by pyrite, with lesser scheelite and gersdorffite. “Flow ore” consists mainly of quartz, chlorite and carbonate, with variable amounts of sericite, albite, pyrite and graphite. The gold in “flow ore” is mainly associated with fine-grained pyrite. The distribution of the alteration and mineralization is controlled by the main Kirkland Lake-Larder Lake fault zone, and its minor splay faults (such as the Kerr Fault) and folds. Orebodies are roughly stratabound, suggesting some degree of lithological control of the mineralization. Hydrothermal alteration consists of a proximal carbonate-albite-pyrite assemblage that has affected the volcanic-derived schists and volcanic rocks, and which grades outward to a carbonate-muscovite zone and to a distal carbonate-chlorite assemblage. Diorite-syenite dykes are pervasively albitized. The metallic signature of the bulk of the ore is Au-Ag-W-As-Sb. “Carbonate ore” is regarded as a good example of a Mother Lode-type deposit (Poulsen et al., 2000), but the origin of the disseminated pyrite ores remain enigmatic. “Flow ore” has been regarded as having the same origin as the quartz-carbonate veins (Kishida and Kerrich, 1987; Hodgson and Hamilton, 1989), or as having a pretectonic, exhalative origin (Ridler, 1970; Hutchinson, 1993).

193 Kirkland Lake is a large scale (5 km long X 2 km deep), Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 758 metric tons. It is located 2 km north of the regional EW-oriented reverse Cadillac-Larder Lake fault in the south-central Abitibi greenstone belt, Superior Province, Ontario, Canada. The last operating mine in the area, the Macassa mine, suspended its operations in June 1998 due to low gold price. High-grade quartz-carbonate fault-fill and breccia veins, sheeted veinlets and stockwork/breccia zones containing minor sulfides are mainly hosted by a steeply-dipping composite stock of syenite, porphyritic syenite and augite syenite intruded within folded volcaniclastic and sedimentary rocks of the Late Archean Timiskaming Group and trachyte tuffs. Locally, gold-bearing quartz-carbonate fault-fill veins are hosted by brittle-ductile shear deforming the Timiskaming conglomerate. Gangue mineralogy is dominated by quartz and carbonate, with lesser sericite, chlorite and actinolite. Pyrite is the dominant ore mineral, with lesser altaite, calaverite, chalcopyrite, sphalerite and molybdenite. The orebodies are structurally controlled by, and occur inside, the Kirkland Lake Main Break and its subsidiary NE-trending faults and folds. The Kirkland Lake Main Break consists of a set of discrete ENE-trending, steeply-dipping reverse brittle faults cutting across the syenite stocks. Hydrothermal alteration associated with the veins and stockwork/breccia zones consist sof widespread Fe-carbonate alteration, and local, vein-scale, sericitization (±K-feldspar), silicification and pyritization. Fault zones have been locally affected by chloritic and weak sericitic alteration. The metallic signature of the bulk of the ore is Au-Ag-Te-As-Sb±W±Mo. A magmatic-hydrothermal origin for the fluid and a genetic connection between ore and syenite plutonism was proposed by Cameron and Hattori (1987), based on sulphur isotopic composition of pyrite and the presence of (largely post-ore) hematite and sulphate minerals. This is in contrast to Kerrich and Watson (1984), who suggested (based on oxygen isotopic composition of silicates and the CO_2-rich nature of the fluids) a possible metamorphic origin for the ore fluids, produced during a period of late ductile deformation and batholithic granitoid emplacement.

199 Leitch is an Archean, quartz-carbonate shear-zone-related Au-Ag(-W) deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 26 metric tons. It is located in the Geraldton-Beardmore area of the Wabigoon greenstone belt, Superior Province, Ontario, Canada. The EW-oriented Watson Lake dextral strike-slip fault is the major regional tectonic structure in the area. Banded quartz veins are hosted by sheared greywacke of Archean age. Quartz is the dominant gangue mineral. Ore mineralogy is dominated by arsenopyrite and pyrite, with lesser scheelite, sphalerite and tetrahedrite. Mineralization is structurally controlled by a steeply N-dipping and plunging gently to the W overturned syncline (drag fold?) and NE-trending shears parallel to the fold axis. The greywacke beds acted as a competent and brittle rock, thus focusing fracturation and fluid flow. Post-ore faults crosscut and displace the orebodies. Hydrothermal alteration consists of carbonatization, sericitization and silicification. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-W-Zn-Pb.

200 Holt-McDermott is a Late Archean, intrusion-related, non-carbonate-hosted stockwork-disseminated deposit with a total gold content of 40 metric tons. It is located in the Harker-Holloway district of the Abitibi greenstone belt, Superior province, Ontario, Canada. The EW-oriented D_2 Porcupine-Destor fault zone is the major regional tectonic structure in the area. Disseminated sulphides and quartz stockworks are hosted by altered tholeiitic basalts and ultramafic volcanics of the Late Archean Kinojevis Group. Syenite dykes also carry ore-grade mineralization. Gangue mineralogy is dominated by quartz, with lesser albite, scheelite, carbonate and sericite. Pyrite is the dominant ore mineral, with lesser arsenopyrite and chalcopyrite. Orebodies are structurally controlled by EW- to ENE-trending, steeply-dipping, brittle or brittle-ductile reverse faults such as the McKenna and Ghostmount faults, (which may represent splays of the Destor-Porcupine fault zone) along which syenite dykes were emplaced. Mineralization is centered on altered basalts surrounding the syenite dykes. Hydrothermal alteration consists of intense and pervasive albite and carbonate (ankerite) replacement, grading outward to distal carbonate (calcite) alteration. Oxidation (represented by disseminated specular hematite) commonly occurs in mineralized alteration zones. The metallic signature of the bulk of the ore is Au-Ag-Cu-As-Te-W-Mo. Robert (2001) suggested an intrusion-related, syenite-associated model for the Holt-McDermott deposit, whereby mineralization is related to satellite dykes at variable distances from the parent stocks. The relative age of the ore is uncertain, but seems to predate the development of the penetrative D_2 foliation, as is also indicated by syntectonic, barren D_2 extension quartz veins cutting the mineralization (Robert, 2001).

202 Little Long Lac is an Archean, quartz-carbonate shear-zone-related Au-Ag(-W) deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 19 metric tons. It is located in the Geraldton-Beardmore area of the Wabigoon greenstone belt, Superior Province, Ontario, Canada. The major regional tectonic structures in the area are the ESE-trending, steeply-dipping Bankfield-Tombill dextral strike-slip fault, and the Hard Rock Synclinorium. Quartz-carbonate veins are hosted by a massive arkose bed of the Archean Group A unit of the central sedimentary sequence (“Timiskaming-type”). Quartz is the dominant gangue mineral, with minor calcite and ankerite. Ore mineralogy is dominated by pyrite and arsenopyrite, with minor amounts of (in no particular order) bournonite, chalcopyrite, stibnite, bornite, berthierite, sphalerite, galena, pyrrhotite, tetrahedrite, scheelite, hematite and magnetite. The major synclinal structure is complicated by a large EW-oriented, moderately to steeply W-plunging drag fold in the mine area. Mineralization is structurally controlled by this drag fold, and by EW-oriented shear zones parallel to the axial plane of the drag fold. These shears are mineralized almost exclusively in the massive arkosic host unit, which acted as a competent and brittle unit during deformation, focusing fluid flow. SE-trending, shallow-dipping post-ore faults cut and displace the ore. Hydrothermal alteration consists of silicification and sericitization of the host arkose. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-W-As-Sb-Cu-Zn-Pb-Bi.

205 MacKenzie Red Lake is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 20 metric tons. It is located in the Red Lake greenstone belt of the Uchi subprovince, Superior Province, Ontario, Canada. The major regional tectonic structure in the area is the SE-trending Cochenour-Gullrock Lake Deformation Zone (or ‘Red Lake mine trend’), which correponds to a zone of heterogeneous, protracted D_2 strain. Quartz veins are hosted by diorite and granodiorite of the Late Archean McKenzie-Gold Eagle stock. Quartz is the dominant gangue mineral, with lesser ankerite and tourmaline. Ore mineralogy is dominated by pyrite, with lesser arsenopyrite, pyrrhotite and sphalerite, and minor amounts of chalcopyrite, galena, krennerite, petzite, altaite, jamesonite and scheelite. Mineralization is structurally controlled by S-trending, moderately-dipping dextral-reverse shear zones (such as the Main and North shears), and SW-trending, moderately- to steeply-dipping shear zones such as the West Mine shear. The NS-oriented contact between the diorite and granodiorite intrusions localized the Main shear; highest grade and best developed orebodies are located along changes in strike or dip of this contact. Hydorthermal alteration consists of chloritization, carbonatization, silicification and sericitization. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Zn-Cu-Pb-Te-W-B.

206 Madsen is an Archean, high-temperature, non-carbonate-hosted stockwork-disseminated replacement type deposit with a total gold content of 76 metric tons. It is located in the Red Lake district of the Red Lake greenstone belt, Uchi subprovince, Superior Province, Ontario, Canada. Disseminated sulphide mineralization is hosted by two altered and deformed Archean “tuff” horizons (the McVeigh and Austin tuffs) consisting of massive and pillowed basaltic rocks and mafic volcaniclastic and related epiclastic rocks. A single quartz vein with high-grade gold values is hosted by a talc schist; is the only example of vein-type ore in the deposit. Ore mineralogy consists of dominant pyrite, with lesser pyrrhotite, arsenopyrite, chalcopyrite and sphalerite. The deposit occurs at the deformed unconformity between the Balmer and the Confederation assemblages. Ore is structurally controlled by the competency contrast between the Austin tuff and a quartz-feldspar porphyry, and by the F_2 fold hinges affecting the tuff horizons. Small-scale, moderate strain sinistral shear zones in the Austin tuff are also important structures. D_2-related folds and shears appear to have affected both the mineralization and its alteration, suggesting that the deposit formation is pre- to early-D_2. U-Pb ages of 2744$\pm$1 Ma on a pre-mineralization quartz-feldspar porphyry unit and 2699$\pm$4 Ma on a post-ore granodiorite-diorite dyke further constrain the timing of the deposit formation. Hydrothermal alteration consists of a proximal zone of biotite-rich, siliceous bands with microcline-quartz-muscovite, alternating with amphibole-rich bands with actinolite-hornblende-clinopyroxene-zoisite, and is notoriously andalusite and staurolite-free. This grades outward to a zone of barren aluminous alteration characterized by an assemblage of andalusite-garnet-biotite-staurolite-amphibole. Presence of strong carbonate alteration with a calcite halo is commonly indicative of proximity to a higher grade zone. At the contact with the orebodies, the tuffs are typically affected by sericitic alteration. Tourmaline-rich layers occur inside and outside of the aluminous alteration zone. The metallic signature of the bulk of the ore is Au-Ag-As-Sb-Cu-Hg$\pm$Zn. The Madsen deposit shares strong analogies with high-temperature (400 to 600^{o}C) gold deposits hosted by mafic rocks in Australia. The deposit also shares analogies, especially in terms of alteration and mineralogical assemblages, with gold skarns hosted by mafic rocks. Its relationship with the nearby Killala-Baird Batholith (2704$\pm$1.5 Ma) remains ambiguous.

207 Magino is a Late Archean quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 3 metric tons. It is located in the Goudreau-Lochalsh district of the Michipicoten greenstone belt, Wawa Subprovince, Superior Province, Ontario, Canada. The ENE-trending, gently arcuate, brittle-ductile dextral Goudreau Lake Deformation Zone is the main regional tectonic structure in the area. Quartz veins and zones of silica replacement are hosted by the greenschist grade, Late Archean Webb Lake composite granodiorite stock. Quartz is the dominant gangue mineral, with minor fuchsite and chlorite. Ore mineralogy is dominated by pyrite, with minor scheelite and trace amounts of sphalerite. Local Mo-Cu mineralization (with molybdenite and chalcopyrite) also occurs in the granodiorite stock, but appears to be unrelated to the gold mineralization (Deevy, 1994). Mineralization is structurally controlled by the WSW-trending, steeply-dipping to subvertical dextral shearing and foliation. Gold is notably concentrated in the nose of Z-shaped folds occuring between shear zones. Extensive post-mineral faulting has disrupted the orebodies. This comprises SW-trending, gently-dipping thrust faults (with throws of up to 2 metres), E-trending, subvertical sinistral strike-slip faults (with displacements of up to 20 metres), and vertical faults follow the diabase dyke contacts, with vertical movement up to 60 metres. Limited hydrothermal alteration consists of sodium metasomatism in the form of paragonite, and silicification (silica flooding) of the granodiorite in the mineralized areas. Chloritic alteration of quartz vein selvages is present locally. Weak and local hematite staining of the granodiorite is associated with the Mo-Cu mineralization. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Zn-W.

212 Matachewan Consolidated is a Late Archean porphyry Au-Ag deposit with a total gold content of 12 metric tons. It is located in the Matachewan district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone and an E- to NE-trending syncline are the dominant tectonic structure in the area. Quartz veins and stockworks and associated disseminated sulphides are hosted by a Late Archean porphyritic trachytic syenite stock, and by adjacent basalt flows and tuff-agglomerate interflows of the Late Archean Larder Lake Formation. Quartz and carbonate are the dominant gangue minerals, with lesser tourmaline. Ore mineralogy is dominated by pyrite, with lesser chalcopyrite and minor galena, scheelite, molybdenite, and specular hematite. Mineralization within the syenite porphyry occurs at the stock margins where differential movement has occured, and is structurally controlled by the stock contacts with the volcanic rocks, and by W- to NW-trending, gently-dipping extension fractures. The latter are also important controls in volcanic-hosted mineralization. Other controls in volcanic rocks are the NE-trending, steeply-dipping sheared bedding surface along volcaniclastic interflows and flow tops, and a poorly developed set of E-trending, steeply-dipping fractures. Post-ore, S-trending, steeply-dipping to subvertical normal faults are common in the porphyry. Hydrothermal alteration consists of potassic alteration (represented by K-feldpar and hematite) and pyritization in the syenite, and of carbonatization-sericitization (carbonate-green micas assemblage), albitization and pyritization in the volcanic rocks. Local silicification also occurs along veins hosted by volcanic rocks. The metallic signature of the bulk of the ore is Au-Ag-Cu-Pb-Mo-W-B.

216 The McIntyre-Hollinger-Coniaurum complex is a Late Archean, quartz-carbonate shear-zone-related Au-Cu-Ag-Mo deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) and the largest gold deposit in Canada, with a total gold content of 987 metric tons. It is located in the Timmins district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The NE-trending Destor-Porcupine fault zone and the Central Tisdale Anticline are the major regional tectonic structures in the area. Extensive quartz-ankerite veins and associated disseminated sulphides (covering an area of 2 by 1 km on surface and plunging to a depth of 2.4 km) are hosted by folded basaltic rocks of the Late Archean Tisdale Group, wedged between steeply-plunging, ore-bearing quartz-feldspar porphyry stocks of the 2690 Ma Pearl Lake Porphyry. Gangue mineralogy of the veins is dominated by quartz and ankerite, with lesser albite, tourmaline and hematite. Pyrite is the dominant ore mineral, with lesser scheelite and tetrahedrite. However, stockworks of quartz-anhydrite-chalcopyrite-pyrite-galena-molybdenite and associated pink anhydrite alteration occur at depth in the Pearl Lake Porphyry, and are associated with an early porphyry-style Cu-Au-Ag-Mo mineralization overprinted by 2673 Ma albitite dykes. Overprinting the porphyry mineralization and the albitite dikes is the main (extensive) gold-bearing vein system, mostly of extensional styles, which represents the bulk of the gold mineralization. Structural control of the ore is related to the NE-trending Hollinger-McIntyre Shear Zone, which transects the three mine properties, and lithological competency contrasts such as the mafic volcanics-porphyry interface and the mafic volcanics-interflow sediments interface. The top of the volcanic flows and breccia zones also focused Au mineralization. The veins are parallel to the main regional foliation, and are associated with a sericite-ankerite alteration. Hydrothermal alteration consists of an extensive zone of carbonate alteration centred on the quartz-ankerite veins system within the core of a doubly plunging anticline, grading laterally into distal chlorite-calcite alteration. The metallic signature of the bulk of the ore is Au-Ag-W±B±Zn±Te±Bi.

231 Nighthawk Lake (Porcupine Peninsular) is a Late Archean(?) quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 5 metric tons. It is located in the Timmins district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The EW-oriented reverse-sinistral oblique-slip Destor-Porcupine Fault is the dominant regional tectonic structure in the area. Quartz veins and stockworks, and associated disseminated sulphides, are hosted by a porphyritic albite syenite plug and surrounding andesite flows of Late Archean age. Quartz is the main gangue mineral. Ore mineralogy is dominated by pyrite, with lesser arsenopyrite and minor chalcopyrite, sphalerite, pyrrhotite and galena. Three sets of faults have affected the mine area: 1) pre-ore ENE-trending, steeply-dipping reverse faults with heavy gouge and parallel shearing, 2) post-ore WNW-trending, moderately-dipping reverse faults that have affected mainly the syenite intrusion, and 3) late WNW- to NW-trending, steeply-dipping normal faults that displaced the orebodies. Mineralization is structurally controlled by, and associated with, the ENE-trending fault set. The syenite-andesite contact localized deformation and ENE-trending faulting, and is preferentially mineralized. Competency contrasts between the syenite and the andesite localized brittle deformation within the the syenite, which was made more permeable through brecciation and is more mineralized than the surrounding andesite, which was more prone to shearing and ductile deformation. Hydrothermal alteration consists of a proximal zone of intense carbonatization along faults and breccias within both the syenite and the andesite, and characterized by an assemblage of carbonate-sericite-fuchsite-pyrite. This grades to an outer halo of intense chloritization. Local silicification also occurs in the carbonatized area. The metallic signature of the bulk of the ore (partly inferred from its mineralogy) is Au-Ag-As-Cu-Zn-Pb.

238 Omega is a Late Archean non-carbonate-hosted stockwork-disseminated Au-Ag deposit with a total gold content of 10 metric tons. It is located in the Larder Lake district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The ENE-trending, steeply-dipping Cadillac-Larder Lake reverse-oblique fault zone is the main regional tectonic structure in the area. Disseminated sulphides and quartz veins are hosted by rhyolite flows (termed 'dacite' by mine personnel and in the literature) and minor tuffs of the Late Archean Larder Lake Group. A minor part of the ore is also hosted in intensely carbonatized rocks. Quartz, albite and carbonate are the dominant gangue minerals, with lesser orthoclase and minor magnetite, the latter altered to limonite and leucoxene in places. Ore mineralogy is dominated by pyrite, with lesser amounts of arsenopyrite and chalcopyrite. A NE-trending, tightly folded overturned anticline has affected rocks of the mine area. Talc-chlorite schist units are in fact NE-trending, moderately- to steeply-dipping shear zones that are part of the Cadillac-Larder Lake Fault Zone. The host dacite horizon is localized between shear zones and affected by a similarly-oriented (NE-trending, moderately- to steeply-dipping) gouge-filled and graphitic thrust fault and related splays. Movement history appears complex, and a horizontal component is probable, as well as later post-mineralization brittle deformation. Orebodies occur either at the dacite-schist (shear zone) contact, tuff-dacite contact, or along graphitic faults within the dacite horizon. Compentency contrast between the talc-chlorite schist (basaltic?) protolith and the dacite probably localized fracturing within the dacite whereas ductile shearing was accomodated by the talc-chlorite schist protolith. Also, the less permeable tuff unit may have ponded the fluids within the dacite. Late NS-trending faults with limited movement crosscut the mineralization. Hydrothermal alteration consists of intense carbonatization (ankerite-quartz-fuchsite) in the hanging wall of the orebodies and faults (similar to the 'green carbonate ore' in carbonatized ultramafic volcanics at the Kerr Addison deposit) and of carbonatization, silicification, albitization, sericitization and pyritization within the ore zones. Widespread sericitization also occurs in the mine area. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Cu.

239 Musselwhite is a Middle Archean, iron-formation-hosted vein and disseminated (Homestake-type) deposit with a total gold content of 103 metric tons. It is located in the North Caribou-Weagamow greenstone belt of the Sachigo subprovince, Superior Province, Ontario, Canada. Rocks in the area are folded along NW-trending synform/antiform pairs with a shallow to moderate plunge to the NW. Mineralized zones of silica flooding and disseminated sulphides are hosted by amphibolite-grade silicate and oxide facies iron formation, consisting of chert, amphibole, garnet, grunerite, magnetite and chlorite. Quartz-albite-almandine-calcite-pyrrhotite veins are a very minor part of the ore. The dominant ore mineral in the disseminated/silicified zones is pyrrhotite, with lesser arsenopyrite and chalcopyrite, and minor pyrite, sphalerite, scheelite and altaite. Mineralization and D_2 deformation are syn- to post-peak metamorphism, and mineralization is commonly associated with F_2 fold hinges, which acted as structural traps for the mineralizing fluids. Hydrothermal alteration consists of ore-related silicification and sulphidation of the iron formation (magnetite converted to pyrrhotite). Arsenic-rich metasomatism is characterized by the development of arsenides in and outside the host rocks. Some local biotite and phlogopite attest to restricted potassic metasomatism. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Cu-Zn-W-Te.

246 Paymaster is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 37 metric tons. It is located in the Timmins district of the Abitibi greenstone belt, Superior province, Ontario, Canada. The Destor-Porcupine fault zone and the Porcupine Syncline are the main regional tectonic structures in the area. Quartz-carbonate veins, quartz stringers and associated disseminated sulphides are hosted by lower greenschist grade, altered and pillowed basaltic and komatiitic flows. Although no ore is hosted by the nearby Paymaster Porphyry, a porphyritic quartz-feldspar intrusion, quartz content and gold grades of veins decrease away from the porphyry, implying a spatial and possibly genetic link. Gangue mineralogy consists of ankerite, quartz, albite, sericite and tourmaline. Ore minerals are pyrite, pyrrhotite, sphalerite, chalcopyrite, galena, molybdenite and scheelite. Mineralization is structurally controlled by the Porcupine Creek Fault, and by its EW-oriented shear splays. Cross-anticline and minor folds are also associated with the Porcupine Creek Fault, and localized some of the ore. Late, EW-oriented normal faults offset the orebodies. Hydrothermal alteration consists of carbonatization of mafic and ultramafic rocks in and along shear zones, represented by a chlorite-carbonate-talc assemblage. The Paymaster porphyry is affected by sericitization and carbonatization, and is also silicified and albitized. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Pb-Zn-Mo-B-W.

249 Pickle Crow is an Archean iron-formation-hosted vein and disseminated (Homestake-type) Au-Ag deposit with a total gold content of 43 metric tons. It is located in the Pickle Lake area of the Uchi subprovince, Superior Province, Ontario, Canada. The Pickle Crow syncline (part of an isoclinally-folded anticlinoria-synclinoria), and the NE-trending Pickle Crow fault and Highland

Crow shear zone, are the dominant regional tectonic structures in the area. Quartz-carbonate veins and associated disseminated sulphides are hosted by upper greenschist grade iron formation, porphyritic quartz-feldspar intrusions and pillowed basalt flows. Some minor stratiform sulphides are also hosted by the folded iron formations. Gangue mineralogy of the veins is dominated by quartz and carbonate, with lesser tourmaline. Ore mineralogy consists of pyrite, arsenopyrite, pyrrhotite and lesser scheelite. The most productive veins are localized in anticlinal areas associated with metabasalt and iron formation, and also inside subsidiaries of the Pickle Crow fault. However, some veins are confined within sericitized faults and shears located in the Pickle Crow porphyry stock. Hydrothermal alteration consists of large, ore-related zones of ankerite alteration, chloritization and silicification of the iron formation and basalts, and of sericitic alteration of the quartz-feldpar porphyry. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-B-W.

253 Preston is an Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 48 metric tons. It is located in the Timmins district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The deposit lies on the northern limb of the Porcupine syncline, close to the Destor-Porcupine fault zone, which is a major regional tectonic structure in the area. Quartz veins, quartz stockworks and associated disseminated sulphides are hosted by lower greenschist grade quartz-feldspar porphyry of the Preston and Preston West stocks, and by altered tholeiitic basalt flows of the Late Archean Tisdale Group. Stockwork zones are hosted exclusively by the porphyry stocks. The gangue mineralogy of the veins is dominated by quartz, with lesser tourmaline and minor chlorite, albite, ankerite and calcite. Ore minerals are pyrite, chalcopyrite, pyrrhotite, sphalerite and scheelite. Mineralization is structurally controlled by faults, which induced fracturing and vein emplacement. Quartz-tourmaline veins are commonly affected by folding. Hydrothermal alteration consists of chlorite-carbonate alteration envelopes surrounding veins hosted in mafic volcanic rocks. Carbonate and tourmaline alteration zones are associated with porphyry-hosted veins. Quartz stockworks in pyritized porphyry are associated with bleaching and sericitic alteration. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Zn-B-W.

257 Renabie is a Late Archean, quartz-carbonate shear-zone-related Au-Ag-Cu deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 40 metric tons. It is located in the Michipicoten district of the Wawa subprovince (Wawa Domal Gneiss Terrane), Superior province, Ontario, Canada. Banded and ribonned quartz veins and associated disseminated sulphides are hosted by gneissose trondhjemite (2728 Ma) and hornblende-biotite tonalite (2722 Ma) of the Late Archean Missinabi Lake Batholith. Quartz is the dominant gangue mineral, with lesser sericite, ferrugineous carbonate, tourmaline, rutile, anhydrite and hematite. Ore mineralogy is dominated by pyrite, with minor galena, molybdenite, chalcopyrite, bornite, sphalerite and Pb-Bi-Au-Ag tellurides such as altaite, hessite, petzite, tellurobismuthite and rucklidgeite. Mineralization is structurally controlled by two sets of oblique-reverse (sinistral) shear zones; 1) a SE-trending, moderately- to steeply-dipping shear zones subparallel to the contact between the volcanic rocks of the Michipicoten greenstone belt and the intrusions of the Wawa Domal Gneiss Terrane, and 2) an EW-trending, steeply-dipping to subvertical set of en echelon ductile-brittle shear zones. Younger NNW- to N-trending subvertical sinsitral dip-slip faults affect the rocks in the mine area. Hydrothermal alteration consists of a sericite-carbonate-chlorite-albite assemblage near the veins, along with silicification, pyritization, hematization and anhydritization confined to the host shear zones. The metallic signature of the bulk of the ore is Au-Ag-Cu-Pb-Mo-Bi-Te-B.

258 Ross is an Archean, quartz-carbonate shear-zone-related Au-Ag-Cu deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 35 metric tons. It is located in the Matheson district of the Abitibi greenstone belt, Superior province, Ontario, Canada. The Destor-Porcupine fault zone is the dominant regional tectonic structure in the area. Quartz veins and stringers and associated disseminated sulphides, as well as local breccias, are hosted by lower greenschist grade sericite-carbonate and chlorite-carbonate schists (after basaltic flows). Breccias consists of mineralized quartz vein clasts in a matrix of extensively milled and broken altered rock. Gangue minerals of the veins are dominantly quartz and carbonates (ankerite-dolomite-calcite), with lesser chorite, sericite, epidote, plagioclase and kaolinite. Ore mineralogy consists mainly of tennantite, pyrite, chalcopyrite, proustite and pearceite, with minor sphalerite, galena, bornite, chalcocite and nickeline, and rare calaverite. Mineralization and alteration are structurally controlled by EW- and NW-oriented sinistral shear zones. Post-ore NS-oriented, brittle, dip-slip faults have displaced and offset vein mineralization, and are related to the development of breccia ore. Hydrothermal alteration is extremely intense, obliterating the original nature of the host rock, and is highly variable. Basaltic rocks and schists are affected by sericitization and ankeritization. Intense silicification and albitization, with associated pyritization, occur in the core of the stringer zones. Chloritization, hematization, anhydritization and epidotization also occur. The metallic signature of the bulk of the ore is Au-Ag-Cu-Zn-Pb-As-Te.

274 Springpole Lake is a Late Archean(?) gold deposit of probable epithermal low-sulphidation affinity with a total gold content of 17 metric tons. It is located in the Birch Lake area of the Birch-Uchi greenstone belt, Uchi subprovince, Superior Province, Ontario, Canada. The EW-trending Sydney Lake-Lake St. Joseph Fault and a NW-trending anticline are the dominant regional tectonic structures in the area. Quartz-carbonate veins are hosted by alkalic volcanics (trachyte flows), pyroclastics (various tuffs), and subvolcanic porphyritic syenite dykes of the Late Archean Spingpole Lake Complex. Quartz is the dominant gangue mineral, with lesser ferroan dolomite, orthoclase, biotite, sericite, barite, scheelite and fluorite. Ore mineralogy consists of arsenopyrite, chalcopyrite, galena, molybdenite, pyrite, tetrahedrite, electrum, tennantite, argentite, hessite, altaite, petzite and calaverite. Mineralization is structurally controlled by NW-trending sinistral-oblique faults and shear zones, and is also related to pipe-like diatreme breccias. Hydrothermal alteration consists of widespread potassic alteration (characterized by K-feldspar and muscovite) and carbonatization in the groundmass of the alkalic volcanics. Silicification and argillic alteration are associated with the mineralization. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Sb-Cu-Pb-Te-Mo-W.

288 Upper Canada is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 47 metric tons. It is located in the Kirkland Lake district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. Fault-fill quartz veins and veinlets are hosted by Late Archean Timiskaming Group trachytic volcanic and pyroclastic rocks and arkosic sediments, and by syenite porphyry sills and dykes. Due to their similar mineralogy and alteration mineralogy, the trachytic rocks (the surface expression of the syenites) are typically difficult to distinguish from the syenite intrusions. Gangue mineralogy is dominated by quartz, with lesser calcite and feldspar. Ore minerals are pyrite, tellurides, sphalerite, tennantite, chalcopyrite, galena, arsenopyrite and molybdenite. Orebodies are structurally controlled by, and confined to, the Upper Canada shear zone, which is a system of branching, subparallel, gouge- and vein-filled fractures. Silicified lithological contacts between tuffs, trachytes and syenite bodies are the loci of quartz vein emplacement. Quartz veins are in places affected by drag folds, and offset by late, (dextral) strike-slip faults with relatively small displacement. Hydrothermal alteration consists of silicification of the host rocks, with disseminated pyrite and arsenopyrite in the veins selvages. Tourmaline development (in places massive) also occurs adjacent to the veins. This grades outward to a carbonate alteration halo represented by calcite. In some orebodies, intense sericitization-carbonatization is related to ore-bearing shear zones. Minor chlorite alteration and anhydrite also occur. The metallic signature of the bulk of the ore is Au-Ag-As-Pb-Zn-Sb-W-Mo.

291 Vipond-Crown is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 21 metric tons. It is located in the Timmins district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The NE-trending, reverse-sinistral oblique-slip Destor-Porcupine Break and the ENE-trending, doubly-plunging Porcupine Syncline are the major regional tectonic structures in the area. Quartz veins and associated disseminated sulphides are hosted by massive (in places pillowed and/or variolitic) basalt and andesite flows and deformed carbonaceous argillite beds of the Late Archean Vipond Formation (Tisdale Group), and by a heterolithic intrusive breccia along the contact of the 2688 Ma Crown quartz-feldspar porphyry stock. Quartz is the dominant gangue mineral, with lesser calcite and chlorite, and tourmaline at the Crown mine. Ore mineralogy is dominated by pyrite. Arsenopyrite, pyrrhotite, sphalerite, chalcopyrite, galena and various tellurides are also common in veins of the Hollinger-McIntyre-Coniaurum complex, and may be present in the Vipond-Crown deposit as well. Mineralization is structurally controlled by ENE-trending shear zones and lithological contacts, especially flow contacts marked by a layer of carbonaceous argillite (interflow sediment), with which 80% of the ore at the Vipond mine is associated. The eastern contact between the Crown porphyry and the Tisdale Group volcanic rocks localized the intrusive-hydrothermal heterolithic breccia, and hosts the Crown mine ore. Gold-bearing quartz veins also occur in the nose and on the limbs of ENE-trending folds. The Vipond Fault is a N-trending, moderately-dipping dip-slip fault which cuts and offsets the ore zones at the Vipond mine. Hydrothermal alteration consists of carbonatization, sericitization and pyritization along vein selvages and shear zones. The Crown porphyry has been affected by early albitization and carbonate-sericite alteration. The metallic signature of the bulk of the ore is unknown.

295 Young-Davidson is a Late Archean, syenite-associated porphyry Au-Ag deposit with a total gold content of 30 metric tons. It is located in the Matachewan district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The Kirkland Lake-Larder Lake fault zone is the major regional tectonic structure in the area. Disseminated sulphides, quartz stockworks and veins are hosted exclusively by a large, lenticular stock and associated dykes of highly fractured, porphyritic syenite of Late Archean age, which has intruded Timiskaming conglomerates at the contact of the andesitic-basaltic volcanic domain of the Upper and Lower Supergroup. Gangue minerals of the stockworks and veins are quartz, carbonate, tourmaline and K-feldspar. Ore minerals are mainly pyrite and chalcopyrite, with lesser galena, molybdenite, scheelite and specular hematite. The mineralization is overprinted by the deformation, and thus predates it. Hydrothermal alteration consists of potassic alteration (K-feldspar-hematite) of the syenite and of zoned carbonate alteration represented by ankerite near the core of the system and by peripheral dolomite and calcite. The metallic signature of the bulk of the ore is Au-Ag-Cu-Pb-Mo-W-B.

4122 Hoyle Pond is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 62 metric tons. It is located in the Timmins District of the Abitibi greenstone belt, Superior province, Ontario, Canada. The Destor-Porcupine fault zone, an ENE- to NE-trending, steeply-dipping sinistral zone of shearing and ductile deformation focussed mainly within ultramafic flows and intrusions is the main regional tectonic structure in the area. Quartz veins and associated disseminated sulphides are hosted by massive to pillowed, variolitic Mg-rich tholeiitic basaltic flows of the Late Archean Tisdale Group. Gangue mineralogy of the veins is dominated by quartz, with lesser albite and tourmaline, and minor calcite, chlorite, sericite, and carbon. Pyrite is the dominant ore mineral, with minor amounts of sphalerite, chalcopyrite and scheelite. Stratigraphy in the mine area defines an ESE-trending F_1 fold with a closure in the 1060 Zone. The main cleavage (S_2) is axial planar to WSW-trending F_2 folds. Quartz veins occur in a variety of settings, they are: 1) folded about the F_2 axial plane, 2) sub-parallel to the S_2 cleavage and 3) shallow-dipping veins perpendicular to the S_2 cleavage (extension veins). This indicates that the veins occured either pre- or syn-D_2 (Pressaco, 1999). Other ore-controlling structural features are the EW-trending shear zones at the contact between the graphitic argillites and the Mg-rich tholeiites, the basalt flow tops which served as loci for dilational fracturing and part of the mineralization, and the fact that the basaltic unit acted as the most competent and brittle unit in the mine area. Late (D_4?) WNW- and NE-trending subvertical brittle dextral-reverse faults cut through the orebodies. Hydrothermal alteration consists of a proximal carbonatization (termed “gray zone”) characterized by an inner assemblage of ankerite-calcite-Fe chlorite-muscovite-carbon-quartz-pyrite±paragonite± rutile. This grades into an outer gray zone of ankerite-chlorite-paragonite-calcite-quartz-carbon± albite. Farther away, the host basalts are affected by propylitic alteration (chlorite-clinozoisite-actinolite-quartz-dolomite-calcite±sphene± rutile). Sericitic alteration (sericite-pyrite assemblage) is also associated with mineralized veins in the 1060 Zone. Ultramafic rocks are affected by ankerite-carbonate-fuchsite-pyrite carbonate alteration. The metallic signature of the bulk of the ore is Au-Ag-As-Sb-Cu-Ni-W-Ba-Te-Bi-Hg.

4259 Holloway is a Late Archean, non-carbonate-hosted stockwork-disseminated deposit with a total gold content of 37 metric tons. It is located in the Harker-Holloway district of the Abitibi greenstone belt, Superior Province, Ontario, Canada. The EW-oriented Porcupine-Destor fault zone and a similarly oriented synclinorium are the major regional tectonic structures in the area. Quartz vein stockworks are hosted by mafic and ultramafic flows of the Late Archean Kidd-Munro assemblage, Stoughton-Roquemaure Group. Sulphide veinlets and stringers and disseminated sulphides (“Lightning Zone-type mineralization”), and later, minor (though higher grade) gold bearing quartz veins, are hosted mainly by a variolitic, brecciated to hyaloclastic high-Fe tholeiitic basalt-dacite-rhyolite sequence. Pyrite is the dominant ore mineral, with minor arsenopyrite and chalcopyrite, and trace amounts of sphalerite, scheelite and pyrrhotite. Gangue mineralogy of the veins is dominated by quartz, with lesser albite and ankerite, and minor chlorite and sericite. Mineralization is structurally controlled by E- to ENE-trending, steeply-dipping anastomosing brittle or ductile-brittle D_1 reverse shear zones that are splays of the Destor-Porcupine fault zone. Those are contempareous with deposit-scale tight and isoclinal EW-oriented F_1 folds (steeply-plunging to the E) with penetrative S_1 foliation subparallel to lithological contacts but steeper than bedding. W-striking, shallowly W-plunging asymetric F_2 folds with non-penetrative S_2 cleavage have affected the orebodies. Mineralization occurs mainly along zones of competency contrasts such as those zones structurally prepared and hardened by albitization-silicification and at the basalt-basaltic komatiite contact. It is also lithologically controlled by the variolitic, Fe-rich tholeiithic units which channeled fluid flow. Gold-bearing extension quartz veinlets (D_2?) crosscut the orebodies. The deposit is crosscut by ENE-trending, steeply-dipping dextral strike-slip D_3 faults and by N-striking, subvertical D_4 faults. Hydrothermal alteration consists mainly of pervasive and widespread (Fe)dolomite-ankerite replacement. Early and intense albitization and silicification, characterized by a quartz-albite-pyrite-sericite assemblage, have affected the variolitic basalts and the basalt-ultramafics contact and associated with the bulk of the ore. Patchy zones of early hematite alteration also occur throughout the deposit. This alteration grades outward to a low-grade sericitic alteration zone of sericite-(fuchsite in komatiites)-ankerite-pyrite, and to distal, barren propylitic chlorite-calcite-epdote alteration. A 2672±2 Ma (lamprophyric?) intermineral dyke cutting the Lightning Zone-type mineralization has been affected by intense chlorite alteration. The metallic signature of the bulk of the ore is Au-Ag-Cu-As-W-Rb-Ba-Cs-Sb. Robert (2001) suggested Holloway is an intrusion-related, syenite-associated deposit model similar to the nearby Holt-McDermott deposit, but in a more distal setting due to the lack of intrusions in the deposit area.

QUÉBEC

111 Beattie-Donchester is an Archean, intrusion-related non-carbonate-hosted stockwork-disseminated deposit proximal to a syenite porphyry stock, with a total gold content of 44 metric tons. It is located in the Duparquet area of the Abitibi greenstone belt, Superior province, Quebec, Canada. The major regional tectonic structures in the area are the Destor-Porcupine Fault, and an E-plunging, overturned syncline. Mineralized hydrothermal breccias, disseminated sulphides and quartz-carbonate stockworks are mainly hosted by altered and brecciated, finely banded, intermediate tuffs horizons, and by a syenite porphyry stock. Quartz and carbonate are the dominant gangue minerals, with minor chlorite and fluorite. Ore minerals are mainly pyrite and arsenopyrite, with lesser chalcopyrite, sphalerite, galena and molybdenite. Orebodies are restricted to a short distance from the syenite porphyry. The major part of the mineralization is represented by tuff-hosted hydrothermal breccia, and is described as a bleached and altered tuffs cemented by tiny quartz-carbonate stringers. Stockwork and disseminated ore occurs along steeply-dipping to vertical shear zones localized within the syenite body and along its contact. Other gangue minerals include minor chlorite and fluorite. Minor, steeply-dipping (normal-dextral?) faults offset the orebodies. The syenite porphyry (mainly hornblende) is altered to a chlorite-carbonate assemblage. Intense sericite-carbonate alteration affected the brecciated tuffs and the sheared metasediments and syenite. Albitization of the syenite porphyry and potassic alteration (K-feldspar) near the orebodies are also noted. The metallic signature of the bulk of the ore is Au-Ag-As-Te-Cu-Zn-Pb-Mo-Ga.

112 Beauchastel-Wasamac No.1 is a Late Archean, non-carbonate-hosted stockwork-disseminated gold deposit with a total gold content of 8 metric tons. It is located in the Rouyn-Norande area of the

Abitibi greenstone belt, Superior Province, Quebec, Canada. The ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake Fault is the dominant regional tectonic structure in the area. Disseminated sulphides are hosted by tectonized, lower greenschist grade calc-alkaline andesites of the Blake River Group, and also by albitite and gabbro intrusions. Albitite dykes are straight and unfoliated and postdate much (but not all) of the deformation. Gangue mineralogy consists of carbonates, albite, quartz, rutile and sericite. Pyrite is the main ore mineral. Orebodies are structurally controlled by the EW-trending Francoeur-Wasa shear zone, a second order ductile-brittle, dip-slip reverse shear zone possibly related to the Cadillac-Larder Lake Fault. Late normal faults with minor movement affected the area. Hydrothermal alteration within the shear zone was intense and pervasive, with two ore-related stages and one post-ore stage. The first ore-related alteration consists of carbonate alteration (represented by a carbonate-hematite-muscovite-quartz$\pm$Ti oxides assemblage) overprinting the metamorphic assemblage. Oxidation is thought to be contemporaneous with the albitite dyke intrusion. The second ore-related alteration consists of an overprinting Na-metasomatism alteration (characterized by a carbonate-albite-pyrite assemblage) with which ore zones are closely associated. A post-ore gypsum-carbonate$\pm$hematite assemblage occurs in barren fibrous extension veinlets restricted to the shear zone. The metallic signature of the bulk of the ore is Au-Ag-Zn-W. Couture and Pilote (1993) suggested a model whereby the Francoeur-Wasa shear zone operated as a permeable fluid conduit with near-constant hydraulic gradient. This promoted fluid-rock chemical exchanges and favored gold deposition by fluid oxidation and wall-rock sulphidation.

114 Belleterre is a Late Archean (?), quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 25 metric tons. It is located in the Belleterre district, Belleterre-Anglier greenstone belt (Pontiac subprovince), Abitibi greenstone belt, Superior Province, Quebec, Canada. The ENE-trending, steeply-dipping Sand Lake Fault, a reverse D_1 fault with minor sinistral strike-slip movement, and the steeply ENE-plunging, slightly overturned to the NNW F_2 Belleterre anticline are the dominant regional tectonic structures in the area. Quartz-carbonate fault-fill veins are hosted by greenschist grade, layered gabbro sills and pillowed basalt flows of the Late Archean Belleterre Group. Quartz and calcite are the dominant gangue minerals, with lesser sericite and minor chlorite and epidote. Ore mineralogy is dominated by pyrite, with lesser chalcopyrite, pyrrhotite, sphalerite, galena, pilsenite, tetradymite, altaite, hessite, magnetite and stibnite. The main orebody (the No. 12 vein) is structurally controlled by a NE-trending, high-angle reverse shear zone, which is probably a subsidiary of the nearby Mill Creek Fault. E- to ENE-trending, steeply-dipping ductile-brittle dextral shear zones and their conjugate (usually barren) NE-trending, subvertical ductile-brittle sinistral shear zones, also controlled the distribution of the smaller orebodies. Lamprophyre dykes, due to their competency contrast with the enclosing rocks, are closely associated with shear zones and veins in the smaller orebodies. Hydrothermal alteration of the wallrocks adjacent to the veins consist of an assemblage of carbonates, sericite, biotite and pyrite. The metallic signature of the bulk of the ore is Au-Ag-Cu-Zn-Pb-Bi-Te.

116 Bevcon-Buffadison-Lencourt is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 14 metric tons. It is located in the Val d'Or district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Quartz veins and veinlets are hosted mainly by greenschist grade quartz diorite of the 2681 Ma Bevcon pluton. Intruded volcanic and volcaniclastic rocks of the Malartic Group host minor veins. Quartz is the dominant gangue mineral, with lesser ferrodolomite and tourmaline, and minor sericite and chlorite. Ore mineralogy is dominated by pyrite, with lesser chalcopyrite and minor scheelite, sphalerite and tellurides. Mineralization is structurally controlled by an EW-oriented, subvertical shear zone. Mineralized EW-oriented fault-fill veins which dip moderately both to the south and the north, and flat-lying extension veins are related to the main EW-oriented shear zone. The Bevcon pluton, due to its competency contrast with the volcanic rocks of the Malartic Group, localized most of the fracturing and hence, mineralization. Hydrothermal alteration of the Bevcon pluton consists of chloritic alteration. The quartz diorite is also sericitized along shear zones, with additional tourmaline and carbonate alteration along vein selvages. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Zn-Te-W-B.

120 Bousquet No.1 (Thompson-Bousquet) is a Late Archean, epithermal volcanogenic massive sulphide deposit with a total gold content of 36 metric tons. It is located in the Bousquet district of the Abitibi greenstone belt, Superior province, Quebec, Canada. The deposit is situated near the major regional Cadillac-Larder Lake fault zone, and lies in the Dumagami-Bousquet deformation zone, an intense, 500-metre wide, ductile to brittle deformation zone characterized by intense S_2 mylonitic foliation. Disseminated sulphides and quartz veins within shears and faults are hosted by greenschist grade quartz-muscovite schists, andalusite schists, mylonites and phyllonites probably derived from Late Archean Blake River Group felsic and mafic volcaniclastic rocks. Gangue mineralogy of the veins consists of quartz, rutile, muscovite, chlorite, calcite and ankerite. Ore mineralogy is dominated by pyrite and chalcopyrite, with lesser magnetite, sphalerite, pyrrhotite, arsenopyrite, bornite, galena, gudmundite, stannite and tellurides, such as altaite and calaverite. There are two types of mineralized quartz veins: foliation-oblique veins and foliation-parallel veins. The foliation-oblique vein set is controlled by steeply-dipping conjugate shear fractures related to the competent protoliths, and by S- and Z-shaped folds, which created extension fractures and focused fluid flow. Ductile and reverse shears and faults, and openings created by decoupling schistosity laminae and irregular surfaces, controlled the distribution of foliation-parallel veins. Hydrothermal alteration consists of a pre-metamorphic aluminous alteration (andalusite-quartz-kyanite-white mica-diaspore) affecting the host schists, retrograded to an advanced argillic assemblage (pyrophyllite-kaolinite-diaspore-muscovite). Faults and shears and their related quartz veins have developed post-metamorphic “retrograde” alterations represented by the chlorite-carbonate-pyrite assemblage and by sericitization.. The metallic signature of the bulk of the ore (partly inferred from its mineralogy) is Au-Ag-Cu-Zn-As-Pb-Sb-Sn-Te. Tourigny *et al.* (1992) suggested that the genesis of the gold mineralization is a multi-stage process. The mineralogy of the ore, its metallic signature and the nature of alteration strongly suggest an early, synvolcanic, Au-bearing sulphide mineralization which has been remobilized and deposited in structural traps during D_2 deformation greenschist metamorphism (Tourigny *et al.*, 1992).

125 Callahan is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 15 metric tons. It is located in the Val d'Or district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Ribon-textured quartz veins and associated disseminated sulphides in graphitic shear zones are hosted by a greenschist grade quartz diorite, diorite and trondhjemite pluton of Late Archean age that has intruded volcanic rocks of the Malartic Group. Quartz is the main gangue mineral. Ore mineralogy is dominated by pyrite, with minor to trace amounts of chalcopyrite, sphalerite, petzite, tellurobismuthite, altaite and calaverite. Mineralization is structurally controlled by E- to ESE-trending, moderately- to steeply-dipping shear zones parallel to the regional trend. These shear zones affected the generally NE-SW oriented competent intrusion, which localized brittle fracturing and focussed fluid flow. Hydrothermal alteration consists of proximal albitization, carbonitization (ankerite-ferroan dolomite-calcite) and pyritization, which grades outward to a distal carbonate alteration characterized by calcite, with trace amounts of albite and pyrite. Sericitization has also been reported in the proximal alteration zone. The metallic signature of the bulk of the ore (partly inferred from its mineralogy) is Au-Ag-W-Pb-Te-Bi.

127 Camflo-Malartic Hygrade is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 59 metric tons. It is located in the Malartic district of the Abitibi greenstone belt, Superior province, Quebec, Canada. The regional Cadillac-Larder Lake Fault Zone is the main tectonic structure in the area. Quartz veins, stockworks and disseminated sulphides are mainly hosted by the 2685 ± 10 Ma Camflo monzonite-diorite stock. Other hosts are oxide facies iron formations (also hosting semi-massive sulphides), calc-alkaline andesites, basaltic rocks and conglomerates of the Late Archean Kewagama Group. Gangue minerals are quartz, microcline, calcite, fluorite, titatine, rutile, tourmaline and anhydrite. Pyrite is the main ore mineral, with lesser galena, chalcopyrite, molybdenite, tellurides, scheelite, pyrrhotite and arsenopyrite. The Marban-Nolartic corridor affects the local structure. Minor thrust faults control the mineralization outside the intrusive rocks. The Camflo stock is in a small EW-trending, Z-shaped F_2 folds and is a brittle, highly fractured porphyritic intrusion. The monzonite-metasediment contact is another controlling structure, and hosts ore-grade quartz veins. Sericite-pyrite alteration and K-metasomatism are associated with gold-bearing quartz veins and also occur along shears and faults and adjacent wallrocks. Local albitization also occurs near quartz veins. Semi-massive sulphide mineralization occurs where faults cut across the iron formations, and is the result of intense pyritization of the oxides. The metallic signature of the bulk of the ore is Au-Ag-As-Sb-W-Ba-Rb. The 2621 ± 4 Ma age on titanite obtained from a gold-bearing quartz vein precludes a genetic link between the Camflo stock and the veins. Gold mineralization is more likely associated with deep metamorphism and related fluid circulation.

135 Chimo is a Late Archean, quartz-carbonate shear-zone-related (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) and iron-formation-hosted vein and disseminated gold deposit with a total gold content of 11 metric tons. It is located in the Val d'Or district of the Abibiti greenstone belt, Superior Province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Sulphide-rich veinlets and stockworks are hosted by upper greenschist grade magnetite-bearing iron formation and adjacent mudstone and siltstone beds of the Late Archean Trivio Group, and by basalt and andesite flows of the Chimo lavas unit. Quartz veins and associated disseminated sulphides (mainly arsenopyrite) are hosted by schistose pyroclastic rocks, graphitic schists, and basalt and andesite flows (Chimo lavas unit). Quartz is the main gangue mineral, with lesser chlorite and tourmaline. Ore mineralogy is dominated by arsenopyrite and pyrrhotite, with lesser pyrite and chalcopyrite, and minor sphalerite, marcasite and pentlandite. Mineralization is structurally controlled by WNW-trending, steeply-dipping dextral shear zones with a dominant vertical component, splaying from the regional Cadillac-Larder Lake fault. Orebodies are also localized at the contacts between lithologies of contrasting rheological properties (iron formation-sediment, sediment-volcanic and volcanic-pyroclastic contacts). Semi-massive sulphide lenses in the (sulphidized) iron formation have subeconomic gold grades, unless cut by sulphide-rich arsenopyrite veinlets. These sulphide-rich veinlets are locally folded by (probably) D_2 deformation. Hydrothermal alteration of the sedimentary rocks and iron formation consists of proximal silicification, chloritization and biotitization of the vein selvages (over a few metres). In the volcanic rocks, carbonatization (calcite) is the dominant alteration type, accompanied by chloritization and sericitization, the latter grading away to biotitization. Tourmalinization of variable intensity occurs in the mineralized areas and locally along vein selvages. The metallic signature of the bulk of the ore is Au-Ag-As-Cu-Ni-Te-Cr-V-B. The higher metamorphic grade in the mine area (up to amphibolite) has been attributed to contact metamorphism resulting from the nearby Pershing batholith emplacement (Rocheleau *et al.*, 1998). Plouffe and Goulet (1991) suggest a post-peak metamorphism timing for gold mineralization.

140 Cooke is a Late Archean intrusion-related Au-Cu-Ag sulphide-rich vein deposit with a total gold content of 10 metric tons. It is located in the Chapais-Chibougamau district of the Chibougamau-Matagami greenstone belt, Abitibi greenstone belt, Superior Province, Quebec, Canada. The SW-trending, moderately- to steeply-dipping, ductile-brittle oblique-normal Gwillim Lake fault and the E-trending, steeply-dipping, ductile reverse Kapunatogen fault are the dominant regional tectonic structures in the area. Sulphide-rich veins and veinlets (fault-fill veins) are hosted by leucogabbro and quartz ferrogabbro of the 2717 Ma Bourbeau sill (part of the Cummings Complex). Chalcopyrite is the dominant ore mineral, with lesser pyrrhotite, pyrite and arsenopyrite, and minor marcasite, sphalerite, cobaltite, gersdorffite, pentlandite, nickeline and native gold. Gangue mineralogy (10% of the vein total) is dominated by quartz, with lesser calcite, albite, microcline and axinite, and minor K-feldspar, chlorite, leucoxene, rutile, tourmaline stilpnomelane, epidote, actinolite and sericite. Mineralization is structurally controlled by W- to NW-trending, steeply-dipping brittle-ductile reverse (dextral) shear zones that are probably related to the regional Gwillim Lake fault (Dubé and Guha, 1992). The rheological and chemical properties of the iron-rich Bourbeau sill also played a key role in localizing brittle deformation and mineralization. Late SW- to WSW-trending, steeply-dipping oblique sinistral faults (with gouge) and NS-oriented dextral brittle faults crosscut the mineralized shears. Hydrothermal alteration consists of pervasive chloritization and carbonatization, which is restricted mainly to the shear zones, and which grades outward to sericite alteration, widespread in gabbroic rocks. Axinite, a boron calc-silicate, occurs within the mineralized veins as well as in their selvages, along their borders. The mineralized signature of the bulk of the ore is Au-Ag-Cu-As-B.

151 Douay is a Late Archean porphyry gold deposit with a total gold resource of 4 metric tons. It is located in the Douay district area of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The EW-oriented Cameron-Casa Berardi deformation corridor is the dominant regional tectonic structure in the area. Disseminated sulphide mineralization is hosted by polymictic conglomerate and mudstone of the Douay sedimentary domain, and by intermediate volcaniclastic rocks of the Cartwright volcanic domain. Quartz stockworks, breccias and associated disseminated sulphides are also hosted by Late Archean syenite dykes (porphyritic in places) and surrounding Cartwright basalts. Ore mineralogy is dominated by pyrite, with minor chalcopyrite and rare molybdenite. The deposit is located along the NW- to WNW- trending Douay deformation corridor, part of the regional Cameron-Casa-Berardi corridor. Mineralization is structurally controlled by 2 factors: the angular unconformity at the contact between rocks of the sedimentary and volcanic domains (Main zone) and (sometimes fault-intruded) syenite dykes (531 zone). The permeable conglomerate and tuff horizons along the unconformity also played a role in localizing mineralization in the two units. Hydrothermal alteration in the orebodies located along the unconformity consists of carbonatization of both the volcanic and sedimentary rocks, characterized by an assemblage of ankerite-sericite-pyrite-fuchsite. Orebodies located within and around the syenite dykes have been affected by albitization-carbonatization, with a proximal halo in and around the dykes (in surrounding volcanic rocks) of albite-ankerite-hematite-Mg-carbonate, grading to a distal halo of albite-ankerite-hematite-chlorite-muscovite-calcite-leucoxene. Chlorite alteration also occurs in places. The metallic signature of the bulk of the ore is Au-Cu-F.

152 Doyon is an Archean, Au-Cu sulphide-rich vein (Au-Ag) deposit with a total gold content of 177 metric tons. It is located in the Bousquet district of the Abitibi Belt, Superior Province, Quebec, Canada. The dominant tectonic structures in the area are the regional Cadillac - Larder Lake Fault Zone (just S of the deposit) and the Destor-Porcupine Fault. Disseminated sulphides and sulphide-rich (10 to 75%) veins and veinlets are hosted by upper greenschist grade felsic volcanic and volcaniclastic rocks of the Late Archean Blake River Group, and by the tonalitic part of the synvolcanic Mooshla pluton. Gangue mineralogy of the veins is mainly quartz, dolomite and calcite, with other rare minerals such as muscovite, rutile and tourmaline. Ore mineralogy consists of dominant pyrite and chalcopyrite, with lesser sphalerite and tellurides (such as calaverite, tellurobismuthite, petzite, altaite), and minor tennantite, bornite, chalcocite, tetradymite, pyrrhotite, galena and arsenopyrite. EW-trending, subvertical to steeply S-dipping reverse D_2 shear zones (such as the Dumagami Fault) are the main ore-controlling structures. The Mooshla pluton has also been affected by brittle faulting and fracturing. Late NE-trending sinistral-normal dip-slip faults (such as the Doyon Fault) offset the orebodies. Alteration associated with mineralization is both intense and extensive, with a proximal aluminous alteration (quartz-andalusite±kyanite) grading outward to a more distal quartz-sericite (retrogade metamorphism-related?) assemblage. Weak vein-scale aluminous alteration is noted in the tonalitic body. The metal signature of the bulk of the ore is Au-Ag-Cu-Zn-Pb-Te-As. The genesis of the Doyon mine is controversial. Most of the deposit (zones 1 and 2) is compatible with deformed non-carbonate stockwork-disseminated style of mineralization, whereas mineralized veins in the West Zone are cut by pre-D_2 deformation diorite dykes. These features suggest that the mineralization is pre- or early D_2 main-stage deformation, and the deposit could be intrusion-related and associated with the emplacement of a late magmatic phase (tonalite) of the multistage Mooshla pluton.

154 Duvay-Obalski is an Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold resource of 12 metric tons. It is located in the Val d'Or district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Quartz veins and veinlets are hosted by intensely-altered mafic volcanics (basalts?) of various textures (pillowed, massive, brecciated). Quartz is the main gangue mineral. Pyrite is the main ore mineral. Mineralization is structurally controlled by 2 sets of ductile to ductile-brittle shear zones: 1) a SE-trending, steeply-dipping shear zone and 2) a SW-trending, moderately-dipping shear zone.

The bulk of the mineralization occurs in fault-fill and extension veins related to the shear zones and, for the latter extension veins, emplaced during the later, brittle stage of deformation. Hydrothermal alteration consists of extensive and intense carbonatization of the mafic hosts, characterized by an assemblage of ankerite-quartz-pyrite. Near and within the shear zones; sericitic alteration is superimposed on the carbonatization and denotes even more intense alteration (Couture, 1991). The metallic signature of the bulk of the ore is unknown.

155 Agnico-Eagle is an Archean gold-rich (Au-Ag) VMS deposit with a total gold content of 36 metric tons. It is located in the Joutel district of the Harricana-Turgeon belt, Abitibi belt, Superior province, Québec, Canada. The Harricana River Tectonic Zone is a SE-trending, steeply-dipping regional shear zone and the dominant tectonic structure in the area. Another similar SE-trending, steeply-dipping shear zone at the contact between rhyolite-mafic intermediate lavas and a NW-SE oriented anticlinal centered on the Joutel pluton are also important regional structures. Disseminated to semi-massive sulphide lenses (locally massive) are hosted by an Archean sedimentary breccia (with volcanic clasts), greywacke, conglomerate and siltstone. Stockwork-stringer mineralization is hosted by felsic tuffs, tuff breccia, lapilli tuffs and basalts. Gangue mineralogy is dominated by siderite with lesser ankerite and minor dolomite, quartz, chalcedony, calcite and feldspar. Ore mineralogy is mainly pyrite, with minor pyrrhotite and magnetite. Some pyrite bands, particularly in argillite sediments, are of diagenetic origin and are always sterile. Gold mineralization is overprinted and structurally controlled by SE-trending, steeply-dipping shear zones broadly conformable with lithologies, but which are crosscutting in detail. The shears are most probably splays of the Harricana River Tectonic Zone. A penetrative schistosity crosscut, folded and transposed stockwork mineralization. Late, NE- to ENE-trending faults offset lithologies. Hydrothermal alteration mainly consists of intense carbonate alteration. Siderite-ankerite impregnations occurs in tuffs and volcanics hosting slightly auriferous but often sub-economic stringer ore, and total replacement of the sedimentary breccia, greywacke, conglomerate and siltstone hosting sulphide lenses. Sericitization of the felsic tuffs also occurs. Siderite is progressively replaced by chalcedony during a later silicification stage, to which is associated fine-grained auriferous pyrite. A later diabase dyke induced contact metamorphism and proximal calc-silicate alteration (calcic pyroxene-amphiboles-chlorite), and remobilized and concentrated a part of the ore in pyrrhotite and magnetite. This contact metamorphism metasomatism grades into distal chloritization. The metallic signature of the bulk of the ore is Au-Ag-As-Sb-W-Cr. Multiple genetic hypothesis exist, from syngenetic exhalative deposit (Barnett *et al.*, 1982; Dubé *et al.*, 1991) to epigenetic (Wyman *et al.*, 1986). Presence of (non-mesothermal) colloform textures and mineralized breccias in the main ore zone, below a ribboned sulphide facies, lead Gauthier *et al.* (2000) to suggest a gold-rich VMS Mattabi-type for the Agnico-Eagle deposit.

157 The East Malartic - Barnat-Sladen - Canadian Malartic deposit is an Archean, non-carbonate-hosted stockwork-disseminated gold deposit with a total gold content of 160 metric tons. It is located in the Malartic district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The major regional tectonic structure in the area is the Cadillac-Larder Lake Tectonic Zone. Disseminated sulphides, stockwork zones and minor quartz veins (<5%) are hosted by intensely sheared and dislocated, upper greenschist to lower amphibolite grade greywackes of the Pontiac Group, and by monzodioritic intrusions and komatiites of the Piché Group. Gangue mineralogy is dominated by quartz, with lesser albite, K-feldspar and tourmaline. Ore mineralogy consists of dominant pyrite and lesser tellurides, chalcopyrite, sphalerite and scheelite. Orebodies are structurally controlled by ESE- to E-trending sets of faults (such as the steeply-dipping Barnat and Sladen faults) which are considered by Sansfaçon and Hubert (1990) to be broadly synchronous with S_2-parallel faults. Monzodiorite stock and dike contacts are also important controls on the localization of orebodies. Pervasive potassic alteration (characterized by microcline and biotite) affected all rock types near the ore zones. Prominent silicification occurs in the host intrusions and greywackes along faults, whereas carbonate alteration occurs in host intrusions and komatiitic rocks. Oxidation (represented by hematite) is commonly associated with potassic alteration in dioritic rocks. Local sericitization and chloritization also occur. The metallic signature of the bulk of the ore is Au-Ag-Te-Cu-W. The genesis of the Malartic deposit is still controversial, mainly because the chronological relationships between the ore and faults (especially the Sladen Fault) and intrusions remain unclear. Post-ore faulting has also obscured the original nature and distribution of the ore. Proposed models range from a porphyry-type model (Issigonis, 1980) to a syngenetic origin for sediment-hosted ore (Kerrich, 1983). Robert (2001) proposed a proximal, possibly syenite-associated model for the Malartic deposits.

158 Eastmain is a Late Archean, quartz-carbonate shear-zone-related Au-Cu deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 1 metric ton. It is located in the Mistassini area (north of Chibougamau), Upper Eastmain River greenstone belt, Superior Province, Quebec, Canada. A WNW-trending anticline is the dominant regional tectonic structure in the area. Laminated quartz veins, quartz-sulphide breccias and associated disseminated sulphides are hosted by amphibolite grade, tholeiitic mafic and calc-alkalic felsic volcanic and volcaniclastic rocks (and minor komatiitic rocks) of the Archean René sequence. Quartz is the main gangue mineral, with minor to trace amounts of biotite, amphibole, garnet, K-feldspar, actinolite, chlorite, carbonate and magnetite. Ore mineralogy is dominated by pyrrhotite and chalcopyrite, with minor pyrite, arsenopyrite, sphalerite, electrum, tetrahedrite and stephanite. Mineralization occurs within, and is structurally controlled by, the Eastmain deformation zone. It consists of a NW-trending, moderately-dipping zone of ductile, then later brittle deformation with a dominantly reverse movement and a small dip-slip component. Hydrothermal alteration consists of a prograde potassic alteration assemblage of garnet-hornblende-biotite-K-feldspar-sulphides restricted to the shear zone. This assemblage is overprinted by a belt-wide retrograde propylitic alteration characterized by an assemblage of chlorite-epidote-actinolite-sericite-carbonate. The metallic signature of the bulk of the ore is Au-Ag-Cu-As-Zn-W-B-Ni. The timing of gold introduction is still uncertain, but Couture and Guha (1990) suggested it may have been relatively late (gold in fractures within quartz and sulphides). Furthermore, they suggest that Eastmain represents a deeper structural level of emplacement than typical shear zone-related gold deposits (corresponding to an hypozonal orogenic gold deposit in Groves *et al.* classification) and formed from a syntectonic hydrothermal system during peak metamorphic conditions (Couture and Guha, 1990).

161 Elder is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 11 metric tons. It is located in the Rouyn-Noranda district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Gold-bearing quartz veins with ribbon and breccia textures and associated disseminated sulphides are hosted by trondhjemite, tonalite and hybrid rocks of the Late Archean Flavrian pluton, and by an intensely-altered diorite dyke at the contact between the trondhjemite and the tonalite/hybrid rocks. Quartz is the dominant gangue mineral, with lesser carbonates and chlorite. Ore mineralogy is dominated by pyrite, with minor amounts of chalcopyrite, hematite, magnetite, ilmenite, molybdenite and galena. Mineralization is structurally controlled by the NE- to ENE-trending, gently- to moderately dipping reverse-oblique (sinistral) Elder shear zone. The contact between the hybrid rocks and the trondhjemite controlled the intrusion of the dioritic dyke. In turn, the dioritic dyke acted as a less competent body during deformation, and consequently became the locus of shearing and mineralization. A single, minor vein is emplaced along a NW-trending, gently- to moderately-dipping shear zone. Hydrothermal alteration consists of proximal carbonatization, represented by an assemblage of quartz-ankerite-hematite-specular magnetite-rutile, with intense albitization and pyritization. This proximal zone grades outward to a chloritic alteration zone, characterized by the presence of chlorite and sericite, with lesser carbonate and albite. The trondhjemite was also affected by a carbonate-biotite alteration along the borders of a lamprophyre dyke. The metallic signature of the bulk of the ore is Au-Ag-As-Cu-Sb-W-Pb-Co-Ni-Cr-Be-V-Cd-Rb. According to Gaulin and Trudel (1990), the important geochemical differences between the Ag and As contents of the mineralized veins suggest different ore-forming solutions.

164 Ferderber is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 11 metric tons. It is located in the Val d'Or district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Massive and deformed quartz-carbonate veins are hosted by chlorite schist (thought to represent a mafic intrusive dyke, Vu *et al.*, 1987), and by quartz diorite of the Late Archean Bourlamaque Batholith. Quartz is the dominant gangue mineral, with abundant carbonates (mainly calcite, with lesser dolomite and ankerite) and minor tourmaline, chlorite and sericite. Ore mineralogy is dominated by pyrite and chalcopyrite, with minor to trace amounts of pyrrhotite, tetradymite, tellurobismuthinite and hessite. Mineralization is structurally controlled by the NE- to ENE-trending, moderately- to steeply-dipping Ferderber shear. This shear zone has a complex structural history, starting with brittle, sinistral strike-slip movement, followed by protracted ductile reverse movement synchronous with emplacement of gold-bearing quartz veins. An ENE-trending, steeply-dipping sinistral shear zone, which also hosts gold-bearing ores, is a subsidiary to the Ferderber shear. Vein mineralization is hosted mainly by chlorite schist, due to the competency contrast between the mafic dyke protolith and the enclosing batholith, the former localizing brittle deformation. Post-ore ENE-trending gouge-filled brittle faults, NE- and NW-trending subvertical conjugate faults, and EW- to NS-oriented minor faults affect the batholith and cut across the mineralized shear zone. Hydrothermal alteration consists of weak chloritization and moderate carbonatization up to 5 metres away from the shear zone, represented by an assemblage of chlorite-carbonate-sericite-leucoxene. Local hematitization also occurs in the dioritic rock and the shear zones, but may be of supergene origin. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Te.

165 Francoeur-Wasamac No.2 is an Archean, non-carbonate-hosted stockwork-disseminated gold deposit with a total gold content of 17 metric tons. It is located in the Rouyn-Norande area of the Abitibi greenstone belt, Superior province, Quebec, Canada. The deposits occur along the EW-trending Francoeur-Wasa shear zone, a ductile-brittle, dip-slip reverse shear zone possibly related to the nearby regional Cadillac-Larder Lake Fault. Disseminated sulphides are hosted by mylonitic schists derived from lower greenschist grade calc-alkaline andesites of the Blake River Group, and also by albitite and gabbro intrusives. Albitite dykes are straight and unfoliated and postdate much (but not all) of the deformation. Gangue mineralogy consists of carbonates, albite, quartz, rutile and sericite. Pyrite is the dominant ore mineral. Orebodies are structurally controlled by the Francoeur-Wasa shear zone. Late, normal faults with minor movement affected the area. Hydrothermal alteration within the shear zone was intense and pervasive, with two ore-related stages and one post-ore stage. The first ore-related alteration consists of carbonate alteration (represented by a carbonate-muscovite-hematite assemblage) that overprinted the metamorphic assemblage. Oxidation is thought to be contemporaneous of the albitite dyke intrusion. The second ore-related alteration consists of an overprinting Na-metasomatism alteration (characterized by a carbonate-albite-pyrite assemblage) with which ore zones are closely associated. A post-ore gypsum-carbonate±hematite assemblage occurs in barren fibrous extension veinlets restricted to the shear zone. The metallic signature of the bulk of the ore is Au-Ag-Zn-W. Couture and Pilote (1993) suggested a model whereby the Francoeur-Wasa shear zone operated as a permeable fluid conduit with near-constant hydraulic gradient. This promoted fluid-rock chemical exchanges and favored gold deposition by fluid oxidation and wall-rock sulphidation.

166 Troilus (or Lac Troilus) is a Late Archean, pre-metamorphic intrusion-related porphyry Au-Cu deposit with a total gold content of 66 metric tons. It is located in the Chibougamau district, Frotet-Evans greenstone belt, Opatica subprovince, Superior Province, Quebec, Canada. The Frotet Anticline is the dominant regional tectonic structure in the area. Disseminated sulphides and sulphide-rich veins and veinlets are hosted by lower amphibolite grade 2782 Ma feldspar porphyry dykes and sills, by felsite dykes and basalt, and by in-situ breccias along the contact between intermediate and mafic rocks. Pyrite is the dominant ore mineral, followed by chalcopyrite; the latter is the only major copper mineral. Other ore minerals are pyrrhotite, sphalerite, galena, bornite, cubanite, molybdenite, tetrahedrite, tennantite and tellurides (such as calaverite). Sulphide mineralogy is zoned from chalcopyrite-pyrrhotite in the structural footwall, to an intermediate zone of pyrite-chalcopyrite and a hanging-wall assemblage dominated by pyrite. Mineralization is structurally controlled by the dykes and hydrothermal breccia zones, and by the dyke-breccia contact. Sulphide-rich veinlets or seams locally follow fractures and foliation. Zoned hydrothermal alteration consists of a core of potassic alteration (biotite-actinolite-K-feldspar) centered on a large felsic dyke, and grading successively outward to an inner propylitic alteration zone (actinolite-albite-epidote), an outer propylitic zone (albite-epidote-calcite), and a distal phyllic alteration zone (sericite-quartz±albite). The metallic signature of the bulk of the ore is Au-Cu-Ag-Pb-Zn-Mo-Bi-Te. Felspar porphyry dykes injecting the breccias are cut by cooling fractures which are mineralized, suggesting that 2782 Ma dykes are synchronous with the mineralization event (Boily, 1998).

174 Casa Berardi is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 72 metric tons. It is located in the Casa Berardi district of the Abitibi Subprovince, Superior province, Quebec, Canada. The 3 mines of the Casa Berardi deposit are located near the Casa Berardi (D_4) fault, an EW-trending, brittle, reverse fault that crosscuts the major regional D_1 Casa Berardi Deformation Zone, which is characterized by intense mylonitic foliation. Banded, en echelon quartz and quartz-carbonate veins, stockworks and associated disseminated sulphides are hosted by lower greenschist-grade clastic rocks (siltstones, mudstones and greywackes) and minor volcanic rocks (basalts, andesites and pyroclatics) of the Taïbi Domain. Gangue minerals are mainly quartz and ankerite, with minor graphite, sericite and tourmaline, and trace amounts of fuchsite, chlorite and leucoxene. Pyrite and arsenopyrite are the dominant ore minerals, with trace amounts of chalcopyrite, pyrrhotite and sphalerite. EW-oriented, ductile to brittle-ductile, high-angle reverse shear zones (splays of the Casa Berardi fault) are the major ore-controlling structures in the emplacement of the mineralized shear veins. ENE-trending F_2 and F_3 folds have significantly modified the initial geometry of the orebodies and the F_1 folds. Post-mineral EW-oriented brittle strike-slip D_3 faults, EW-oriented reverse D_4 faults, and NS-oriented, normal dip-slip D_5 faults affect the area. Hydrothermal alteration consists of sericitic (quartz-sericite-pyrite-arsenopyrite) alteration of the veins selvages, and graphitic alteration (development of graphite). Carbonatization is centered on the deposit, grading inward from distal calcite, to dolomite, to proximal ankerite near the gold-bearing veins. The metallic signature of the bulk of the ore is Au-Ag-As-Bi-Pb-Sb-W. Pilote et al. (1990) and Théberge (1997) proposed a syn-tectonic model of vein formation during late ductile to brittle-ductile D_1 deformation. In this model, vein emplacement is synchronous with mylonitic foliation and late D_1 folding, which are related to N-S shortening linked with the Casa Berardi Deformation Zone evolution.

175 Goldex is an Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a resource of 53 metric tons of gold. It is located in the Val d'Or district of the Abitibi greenstone belt, Superior province, Quebec, Canada. The Cadillac-Larder Lake fault zone is the dominant regional tectonic structure in the area. Quartz veins and related disseminated sulphides are hosted by a granodiorite sill at the contact between ultramafic and intermediate volcanic rocks. Gangue mineralogy of the veins is dominated by quartz, with lesser tourmaline and carbonates. Pyrite is the main ore mineral. Two types of veins can be distinguished: 1) steep to vertical veins typical of “shear veins” with ribbon textures and variably sheared walls; 2) moderately-dipping extensional veins with characteristic open-space filling textures. Quartz veins are structurally controlled by E- to ESE-trending, steep to subvertical shear zones (related to type shear veins), linking EW-oriented extensional fractures zones (related to extension veins). The deposit is located in between two NW-trending, dextral (second-order?) shear zones, the Marban and the Western Quebec shear zones. Hydrothermal alteration consists of a broad, ore-bearing halo of chlorite+/-carbonate adjacent to the quartz veins, giving the granodiorite a darker color (which is then termed quartz diorite). Disseminated pyrite is associated with bleaching of the veins selvages. Ultramafic volcanics south of the deposit have been affected by silicification. The metallic signature of the bulk of the ore is unknown. Robert (unpublished field notes, 1987) suggested that the deposit may be located in an extensional jog between the Marban and Western Quebec shear zones.

189 Joe Mann (ex-Chibex mine) is a Late Archean, quartz-carbonate shear-zone-related Au-Cu deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 42 metric tons. It is located in the Chibougamau district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The Opawica-Guercheville deformation zone is the main regional tectonic structure in the area. Ribbon-textured, laminated or brecciated quartz veins and associated disseminated sulphides are mainly hosted by sills of gabbroic rocks and felsic tuffs of dacitic composition, all metamorphosed to upper greenschist facies. Gangue mineralogy consists of quartz, plagioclase and ankerite. Ore minerals are pyrite, pyrrhotite, chalcopyrite, and lesser arsenopyrite. Mineralization is structurally controlled by

EW-oriented, brittle-ductile, high-angle reverse shears that are part of the Opawica-Guercheville deformation zone. The shears are sub-parallel to one another, and to the stratigraphy. Z-shaped drag folds related to reverse shearing have affected both the foliation and the quartz veins. Quartz veins are associated with EW-oriented porphyritic and fine-grained felsic dykes; the former are undeformed whereas the latter are moderately to strongly sheared. The geometry and location of the mineralized veins and shears are controlled by the competency contrast between the host gabbro sill and the felsic dykes. Late NE-trending, sinistral strike-slip faults offset the orebodies. Sheared gabbro near the veins is altered to chlorite-ankerite schists (chlorite-ankerite-plagioclase-sericite-sulphides) or biotite schists (biotite-sulphides-ankerite-plagioclase). Sheared tuff have been affected by sericitic (sericite-pyrite) alteration. The metallic signature of the bulk of the ore is Au-Cu-Ag-As-Ba-Bi-Rb.

192 Kiena is a Late Archean, intrusion-related, non-carbonate-hosted stockwork-disseminated gold deposit with a total gold content of 47 metric tons. It is located in the Val d'Or district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The Cadillac-Larder Lake fault zone and a regional Z-shaped fold are the major tectonic structures in the area. Hydrothermal breccias (in part stratiform) and multistage carbonate-albite-pyrite stockworks are hosted by greenschist grade, deformed, brecciated and altered 2697 Ma albitite dykes and sills (previously known as diorite dykes), tholeiitic basalt flows and komatiitic volcanic rocks of the Late Archean Jacola Formation. The breccia consists of albitite dyke fragments separated by vein material. Gangue minerals are carbonate, quartz and albite, with rare tourmaline and stilpnomelane. Ore minerals are pyrite, pyrrhotite, chalcopyrite and scheelite, with minor pentlandite, galena and sphalerite, and rare arsenopyrite and cobaltite. The breccia is located in the nose of a Z-shaped fold, the latter on the NS-oriented limb of the regional fold. The orebodies are thought to represent tectonically-separated boudins (Morasse *et al.*, 1995). Small-scale NW-trending, brittle-ductile faults offset the orebody. A pervasive, pre-ore texture-destructive albitization is the earliest hydrothermal event and obscures the real nature of the albitite dykes. Hydrothermal alteration consists of intense carbonatization and pyritization of the ore-bearing breccia and enclosing rocks. Nearby calc-alkaline intrusions have been affected by potassic and propylitic (sericite-chlorite) alterations. Basaltic and komatiitic rocks Basaltic and komatiitic rocks are deformed and altered to a talc-carbonate-chlorite schist in the area adjacent to the orebodies are deformed and altered to a talc-carbonate-chlorite schist. The metallic signature of the bulk of the ore is Au-Ag-As-Zn-Ba-Hg. Granodiorite dykes coeval with the intermineral feldspar porphyry dykes hosting mineralization have been dated at 2686 ± 2 Ma by U-Pb on zircon, and show that the albitite dykes emplacement, brecciation and part of the stockwork mineralization are older than 2686 Ma, whereas some stockwork veining and alteration of calc-alkaline intrusions are younger than 2686 Ma. The Kiena deposit shares analogies with the Holloway deposit, especially in terms of alteration and chronology relative to deformation.

195 Bousquet 2 - LaRonde 1 (Dumagami) is an Archean, Au-Ag-Cu volcanogenic massive sulphide deposit with a total gold content of 120 metric tons. It is located near the regional Cadillac-Larder Lake fault zone in the Abitibi greenstone belt, Quebec, Canada. Massive sulphide lenses, semi-massive and disseminated sulphides, and late sulphide-rich veinlets are hosted by deformed, altered and schistose rhyolitic and dacitic volcanic rocks of the Blake River Group. Metamorphic grade of the rocks is between greenschist and lower amphibolite grade. Mineralogy of the sulphide lenses is pyrite, chalcopyrite, bornite, chalcocite, sphalerite, tennantite, galena and minor tellurides. High-grade auriferous zones are associated with bornite. The massive sulphide lenses are bounded in the footwall by the South Fault, a steeply-dipping reverse shear with late sinistral movement. A similar shear, the North Fault, occurs higher in the stratigraphical succession and bounds the upper part of the deposit in the hanging wall. The Au-Ag-Cu sulphide-rich veinlets are associated with discordant, foliation-oblique extension fractures. NNE-trending faults are locally coated with gold. Hydrothermal alteration consists of a proximal, pervasive aluminous alteration assemblage of quartz-sericite-andalusite±kyanite especially well-developed in the footwall of the ore zone. Massive silicic alteration has affected the immediate footwall of the massive sulphides in the core of the hydrothermal system. Massive silicic clasts are also present in the sulphide lenses. Aluminous alteration grades outward to a distal sericitic alteration characterized by a quartz-sericite-feldspar assemblage. An advanced argillic alteration assemblage of muscovite-kaolinite-pyrophyllite-quartz is associated with retrograde metamorphism to lower greenschist grade. Presence of a similar retrograde mineral assemblage within the late Au-Ag-Cu veins indicates that they are related to the same event. The metal signature of the bulk of the ore is Au-Ag-Cu-Zn-Pb-Te-Sb-Sn-As-Cd-Se-Ge-V. Gold and sulphides were deposited during felsic volcanism, and later remobilized within late extension fractures during subsequent deformation and metamorphism (Poulsen and Hannington, 1996). The nature of alteration (advanced argillic and massive silicic), the Cu and Au association and metal distribution, and the geological setting demonstrate that the deposit corresponds to a shallow marine, high-sulphidation epithermal gold-rich VMS deposit.

197 Sigma-Lamaque is a typical Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 358 metric tons. It is located in the Val d'Or district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. A large network (extending over an area of 2 x 1.5 km and to depths of almost 2 km) of quartz veins and associated disseminated sulphides are mainly hosted by 2705±1 Ma andesitic flows and volcaniclastic rocks of the Late Archean Malartic Group, and by 2704±3 Ma dioritic intrusions. Quartz is the dominant gangue minerals, with lesser tourmaline and minor calcite, chlorite, ankerite, white mica, biotite (at depth) and apatite, and trace amounts of plagioclase and epidote. Ore mineralogy is dominated by pyrite, with lesser scheelite, pyrrhotite, chalcopyrite, tellurides (calaverite, petzite, tellurobismuthite), sphalerite and galena. Distribution of laminated fault-fill veins and jigsaw-puzzle breccias is controlled by numerous reverse-oblique 2^{nd} and 3^{rd} order conjugate sets of D_2 shear zones. Extension veins extend laterally away from shear zones into less strained rocks. Zoned hydrothermal alteration consists of a proximal carbonate-albite-pyrite zone (commonly carrying gold-grade mineralization), which grades progressively outward into a muscovite-carbonate zone, and to an outer chlorite-muscovite-carbonate halo. The metallic signature of the bulk of the ore is Au-Ag-B-W+/-Te. A late, post-peak metamorphic emplacement is interpreted from the fact that mineralized veins and their host structures clearly cut across all intrusive types, and that wallrock alteration minerals replace metamorphic minerals (Poulsen *et al.*, 2000). Robert (1990) suggested that the compatibility between vein geometries, structures, and kinematics of the host shear zones indicate that the veins were formed in late, active shear zones with only minor degree of overprinting by late transcurrent deformation.

210 Malartic Gold Fields is an Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 53 metric tons. It is located in the Malartic district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The Cadillac-Larder Lake fault zone is the main regional tectonic structure in the area. Disseminated sulphides and minor quartz veins are hosted by Archean diorite lenses and quartz-feldspar porphyry dykes intruding the diorite; the intersection of these two units generally results in high-grade geometric ore shoots. The diorite lenses are set within zones of talc-chlorite schist that are the result of alteration and shearing of komatiitic volcanics of the Archean Piché Group. The gangue mineralogy of the veins consists of quartz and tourmaline. The main ore minerals are pyrite and arsenopyrite, with trace amounts of chalcopyrite and galena. The Malartic Gold Fields Fault and its subsidiary structures are closely associated with the development of the fracturing. The competency contrast between the diorite lenses and the enclosing schists confined the development of fracturing and mineralization to the diorite lenses. Likewise, small diorite lenses of less than 10 meters width are more fractured and mineralized than the larger ones. Hydrothermal alteration of the diorite is intense, and consists of ore-related pyritization, silicification, biotite, carbonate and tourmaline alteration. Quartz-feldspar porphyry dykes have been affected by albitization, which varies according to the intensity of fracturing. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-As-Cu-Pb.

211 Marban is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 10 metric tons. It is located in the Malartic district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The ENE-trending, steeply-dipping Cadillac-Larder Lake reverse-oblique fault zone is the main regional tectonic structure in the area. Quartz-carbonate veinlets are hosted by upper greenschist grade, massive to schistose tholeiitic basalt flows of the Late Archean Jacola Formation. Quartz and calcite are the main gangue minerals. Ore mineralogy is dominated by pyrite and pyrrhotite, with minor to trace amounts of chalcopyrite, molybdenite and ilmenite. Mineralization is structurally controlled by the ESE-trending and steeply-dipping Marban-Norlartic D_2 Deformation Corridor and related splays. The main local control on mineralization at the Marban mine is the Marbénite shear zone, a SE-trending, moderately- to steeply-dipping D_2 shear zone that is part of the deformation corridor. Late NNE-trending, steeply-dipping kinks and faults cut through and deform the mineralization. Hydrothermal alteration consists of carbonatization, silicification, chloritization and pyritization of host basalts in and around the shear zone. Sheared intrusions have been affected by silicification and albitization. Sheared komatiites have been affected by carbonatization (characterized by a talc-carbonate assemblage). The metallic signature of the bulk of the ore (partly inferred from its mineralogy) is Au-Ag-As-Cu-Mo.

224 Mouska is a Late Archean, Au-Cu sulphide-rich vein gold deposit with a total gold content of 27 metric tons. It is located in the Bousquet district of the Abitibi Belt, Superior Province, Quebec, Canada. The ENE-trending, steeply-dipping Cadillac-Larder Lake reverse-oblique fault zone and the SE- to E-trending, steeply-dipping Parfouru Lake (reverse?) fault are the dominant regional tectonic structures in the area. Banded sulphide-rich veins and veinlets and associated disseminated sulphides, as well as minor laminated quartz veins, are hosted by greenschist grade, foliated to schistose phyllonite from pillowed andesite and basalt flows of the Late Archean Hébécourt Formation (correlative of the Kinojevis Group of northern Ontario as described by Jensen, 1986). Gangue mineralogy of the veins is mainly quartz. Ore mineralogy consists of dominant pyrrhotite and chalcopyrite, with lesser pyrite and minor magnetite, ilmenite, hematite, sphalerite, electrum and tellurides of Au, Ag, Pb, and Bi. Mineralization is structurally controlled by a main W-trending, subvertical to steeply-dipping ductile, reverse anastomosing (D_2) shear zone, which controls most of the ore distribution in the deposit. Sulphides have been remobilized into the hinges of F_{2a} folds, which represent low-pressure areas and consist of W-trending, open and isoclinal to sheath folds with variably plunging axes. Another E-trending, steeply-dipping ductile shear zone controls a smaller orebody, as well as a W-trending brittle-ductile shear zone within massive andesites. The latter shear zone occurs at the contact between a microdiorite dyke and a massive andesite flow. Quartz veins generally occur as later fault-fill and extension veins crosscutting the earlier sulphide orebodies and injected along their sides, where deformation and circulation of fluid have been important. Hydrothermal alteration associated with mineralization is limited primarily to the confines of the shear zones and phyllonites, which consists of an assemblage of quartz-biotite-chlorite-calcite-sericite-magnetite. This grades outward to a chlorite alteration zone. The metal signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Zn-Pb-Te-Bi. Belkabir and Hubert (1995) suggest that sulphide mineralization is dominantly pre-tectonic owing to the marked deformation (parallel to S_1 and S_2), overprinting by metamorphism and remobilization textures. The sulphide bodies would have softened the strain in certain lithological contacts or in confined weak units, and would be responsible for their tectonic instability and activation as shear zones. However, results of an oxygen isotope study by Hoy et al. (1994) dismisses the synvolcanic origin of the sulphide mineralization. Galley and Pilote (2002) proposed a model whereby early VMS stringers are transposed into shear zones, and remoblized sulphides are included into syn-kinematic quartz veins.

237 O'Brien is a Late Archean(?), quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 19 metric tons. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. It is located in the Cadillac districit of the Abitibi greenstone belt, Superior Province, Quebec, Canada. Gold-bearing quartz veins and associated disseminated sulphides are hosted by upper greenschist grade tuff, basalt, basaltic andesite and andesite of the Late Archean Blake River Group, and by conglomerate and greywacke of the Cadillac Group. Veins generally pinch out in porphyritic diorite, in which case they are host to only a minor part of the ore. Blueish, sacharroidal quartz is the dominant gangue mineral, with lesser albite, tourmaline, calcite, dolomite, apatite, rutile and chlorite. Ore mineralogy is dominated by arsenopyrite and pyrite, with lesser chalcopyrite, galena, pyrrhotite, scheelite and native gold. Quartz veins are generally sub-parallel to bedding and regional foliation. Mineralization is structurally controlled by 3 sets of shear zones: 1) ENE-trending, steeply-dipping shears, 2) ESE-trending, subvertical to steeply-dipping shears, and 3) EW-oriented subvertical shears. Bends and intersections of the different shear zone sets localized ore shoots. Small-scale S (in ENE shears) and Z (in WNW shears) folds localized the highest grade ore shoots. The contact between the conglomerates and felsic tuffs is also an important ore-controlling structure. NE- and NW-trending faults with small displacements, dextral and sinistral strike-slip respectively, cut across the orebodies. Hydrothermal alteration consists of an assemblage of carbonate-sericite-biotite-tourmaline restricted to vein selvages. The metallic signature of the bulk of the ore is Au-Ag-As-Cu-Pb-W-B-Sb-Hg.

244 Consolidated Central Cadillac/Wood is a Late Archean(?), quartz-carbonate shear-zone-related Au-Ag-W deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 3 metric tons. It is located in the Cadillac districit of the Abitibi greenstone belt, Superior Province, Quebec, Canada.

The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Gold-bearing ribbon-textured quartz veins and associated disseminated sulphides are hosted mainly by volcanic tuff of the Late Archean Blake River Group, and also by iron formation and biotitic sediments (greywacke?) of the Pontiac Group. Quartz is the dominant gangue mineral, with lesser tourmaline. Ore mineralogy is dominated by pyrite and arsenopyrite, with lesser scheelite. Mineralization is structurally controlled by ENE- to E-trending, steeply-dipping to subvertical subsidiary shear zones splaying from the Cadillac-Larder Lake fault zone. According to Koulomzine (1948), the competency of the host tuff was intermediate between the rigid iron formation layers and the ductile talc schists, so that it fractured more readily than the former, and did not flow like the latter, thus localizing the bulk of the mineralization. Post-ore normal faults affected the area. Hydrothermal alteration consists of silicification, which is associated especially with the disseminated sulphide orebodies hosted by the iron formation and sedimentary rocks. The metallic signature of the bulk of the ore is Au-Ag-As-W-B

248 Perron-Beaufort/North Pascalis is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 32 metric tons. It is located in the Val d'Or district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Gold-bearing laminated and ribbon-textured quartz veins are hosted by quartz diorite of the 2700 Ma Bourlamaque batholith. Quartz is the dominant gangue mineral, with lesser tourmaline, ankerite, calcite, chlorite et rutile. Ore mineralogy is dominated by pyrite, with minor to trace amounts of chalcopyrite, scheelite, tetradymite (and other tellurides), molydenite, pyrrhotite and sphalerite. The two mines are located in a highly fractured zone set between two EW-oriented faults: the N-dipping Perron Fault to the north, and the S-dipping South Fault to the south. Mineralization is structurally controlled by W-trending, moderately- to steeply-dipping reverse shear zones developed along mafic dykes, and by ESE-trending, moderately-dipping reverse shear zones also developed along mafic dykes, but generally thinner. Orebodies are also associated with NS-oriented, subhorizontal to gently W-dipping extension fractures. Moreover, SW- to WSW-trending, poorly-developed conjugate reverse shear zones at Perron are also gold-bearing (Tessier, 1990). The competency contrast between the Bourlamaque batholith and the surrounding volcanic rocks of the Marlartic Group probably played a key role in localizing deformation and mineralization. According to Tremblay (2001), E-trending reverse shear zones initially served as fluid conduits and were later reactivated as post-mineral faults. W-trending, steeply-dipping to subvertical dextral strike-slip faults with local reverse movement crosscut the orebodies. Hydrothermal alteration consists of proximal, centimetre-wide bleaching (sericitization) of the quartz diorite that is characterized by the sericite-albite-calcite assemblage. This grades outward to a metre-wide chloritic alteration envelope represented by a chlorite-carbonate sericite assemblage. The metallic signature of the bulk of the ore is Au-Ag-As-Cu-Bi-Te-W-Ni-Co.

250 Pierre Beauchemin (formerly Eldrich) is a Late Archean quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 8 metric tons. It is located in the Rouyn-Noranda district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Quartz veins and associated disseminated sulphides are hosted by diorite dykes and tonalite/trondhjemite of the 2700 Ma (Mortensen, 1993) Flavrian Pluton. Ore mineralogy is dominated by pyrite (with native gold), and minor amounts of hematite (commonly specular hematite) and chalcopyrite. Early extension fractures within the tonalite/trondhjemite batholith localized intursion of diorite dykes. The competence contrast between the diorite and the tonalite/trondhjemite localized most of the ductile deformation within the diorite. Mineralization is structurally controlled by the NE- to NNE-trending, moderately-dipping reverse-sinistral Eldrich fault. This fault consists of anastomosing shear zones of varying orientations: NE- to NNE-trending and NE- to ENE-trending, moderately-dipping reverse-sinistral shears, and N-trending, shallowly- to moderately-dipping dextral-reverse shears. The latter shear zones are NE-trending shears that have been refracted/deflected within the tonalite/trondhjemite. Mineralized lenses occur along all shear zones and at the contacts of tonalite/trondhjemite and diorite rocks. Early (1955-1962) production was mainly from dilational jogs between diorite zones in the tonalite/trondhjemite. Hydrothermal alteration consists of carbonatization (characterized by a calcite-Fe-dolomite-chlorite-quartz assemblage), silicification and intense albitization within and surrounding the mineralized zones. The metallic signature of the bulk of the ore is remarkably poor (Trudel, 1989). No other elements but Au and Ag can be correlated with mineralized zones.

252 Powell Rouyn is a Late Archean, quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 12 metric tons. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. It is located in the Rouyn-Noranda district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. Quartz veins and associated disseminated sulphides are hosted by a diorite dyke and surrounding trondhjemite and tonalite of the Late Archean Powell pluton, and by andesitic volcanic rocks of the Blake River Group. Gangue mineralogy is dominated by quartz, with minor amounts of calcite and ankerite. Pyrite is the dominant ore mineral, with lesser chalcopyrite and specular hematite, and minor to rare tellurides: sylvanite, tetradymite, calaverite and krennerite. The Powell plution is bordered on its northern and southern limits respectively by the Beauchastel and Horne creek faults, which are complex WSW-trending, subvertical or steeply-dipping brittle ductile second-order faults parallel to the Cadillac Break with an initial reverse movement and a subsequent sinistral movement. Mineralization is structurally controlled by a NW-trending, moderately- to steeply-dipping dioritic dyke. The competency contrast between the dioritic dyke and the surrounding trondhjemite localized most of the deformation, brecciation and mineralization within the dyke. The NE-trending, moderately- to steeply-dipping dextral strike-slip Héré fault, which shows late brittle movement, disturbs the continuity of the ore zone. Hydrothermal alteration consists of proximal carbonatization of the dioritic dyke into an ankerite-calcite-chlorite-fuchsite assemblage. The trondhjemite/tonalite near the ore veins has been affected by silicification. Specular hematite also occurs in the wallrock. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Te.

265 Senator Rouyn is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 8 metric tons. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. It is located in the Rouyn-Noranda district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. Mineralized quartz veins are hosted by quartz diorite (tonalite) of the Late Archean Powell pluton. Gangue mineralogy is dominated by quartz, with lesser ankerite, fuchsite, sericite, chlorite, tourmaline and graphite. Pyrite is the dominant ore mineral, with accessory chalcopyrite. Mineralization is structurally controlled by a NW-trending, moderately- to steeply-dipping reverse shear zone which is the main locus of deformation, alteration and mineralization on the property. Lesser NNW-trending, moderately- to steeply-dipping shears also host some mineralization. Minor transverse faults cut through the orebodies. The NW-trending orebodies and shears are distributed along a NE-trending axis, which corresponds to a NE-trending fault or shear zone. Hydrothermal alteration consists of proximal, intense carbonatization within and around the shear zone. This grades into a distal, pervasive chlorite alteration zone. Sericite and green micas (fuchsite) are also noted in the carbonate alteration zone. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-B.

267 Shortt Lake is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 11 metric tons. It is located in the Chapais-Chibougamau district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The W- to WSW-trending, steeply-dipping reverse-dextral Opawica Lake Fault (the SW extension of the Campbell-Gwillim-Waconichi Fault in the Chibougamau area) and the NE-trending sinistral strike-slip Lamarck Fault are the dominant tectonic structures in the area. Regional EW-oriented subvertical isoclinal folds have also affected the area. Replacement-style, disseminated sulphides (and minor quartz vein mineralization) are hosted by greenschist grade, tectonized comagmatic gabbro sills and pillowed basalt flows of the Late Archean Obatogamau Formation, and by a tectonized syenite and carbonatite sill complex. Gangue mineralogy is dominated by microcline and Fe-dolomite, with minor sericite, hematite and fluorite. Pyrite is the dominant ore mineral, with minor amounts of magnetite, sphalerite, pyrrhotite, hematite and galena. Mineralization in the main ore zone occurs in a mylonitized area of the WSW-trending, steeply-dipping reverse-dextral Shortt Lake Fault (subparallel to the regional Opawica Lake Fault), which follows the contact between the Obatogamau and Dalime Formation. Subsidiary ENE-trending ductile shear zones in intermediate tuffs (South Fault), as well as N- to NNE-trending tension fractures also carry ore-grade mineralization. High-grade ore shoots are localized at the intersection of the Shortt Lake Fault and southerly-trending splays, and where the Shortt Lake Fault intersects gabbro sills. The South vein is a quartz vein localized by NE- and SW-trending, reverse-dextral steeply-dipping conjugate faults. Mineralization occurs as disseminated pyrite within vein selvages, the vein itself is devoid of gold. Hydrothermal alteration in the volcaniclastic rocks of the hangingwall (north) of the Shortt Lake Fault consists of distal carbonatization represented by an assemblage of Fe-carbonate-sericite, which grades to a proximal Fe-carbonate-sericite-fuchsite assemblage. The basalts and gabbros in the footwall of the fault are altered by a distal carbonate alteration (biotite-magnetite-calcite), which grades progressively inward to a carbonatization-albitization zone of Fe-carbonate-albite-pyrite, and a proximal zone of potassic alteration and hematization characterized by Fe-carbonate-pyrite-K-feldspar-hematite-quartz. The metallic signature of the bulk of the ore is Au-Ag-Cu-Zn-Pb-W-Sb. Brisson (1998) suggested that the emplacement of the syenite-carbonatite complex was contemporaneous with the main reverse ductile deformation phase of the Shortt Lake Fault, prior to the dextral movement. The link between the alkaline intrusive rocks and the mineralization is unclear, and may be either spatial or genetic (heat sources, fluid sources, competency contrasts). The ribbon-textured appearance of disseminated pyrite mineralization suggest that their emplacement is pre- or syn- reverse ductile deformation (Brisson, 1998).

269 Silidor is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 14 metric tons. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. It is located in the Rouyn-Noranda district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. Quartz veins and associated disseminated sulphides are hosted by a diorite dyke and surrounding trondhjemite and tonalite of the Late Archean Powell pluton. Gangue mineralogy is dominated by quartz, with lesser fuchsite, sericite, dolomite, calcite and graphite. Barite and gypsum occur as late minerals in veins. Pyrite is the dominant ore mineral, with lesser hematite, tellurobismuthinite, galena, sphalerite, chalcopyrite, melonite, rutile, molybdenite, gold, electrum, hessite, freibergite, petzite, proustite, and pyrargyrite. The Powell pluton is bordered on its northern and southern limits respectively by the Beauchastel and Horne creek faults, which are complex WSW-trending, subvertical or steeply-dipping brittle ductile second-order faults parallel to the Cadillac Break, with an initial reverse movement and a subsequent sinistral movement. Mineralization is structurally controlled by NW-trending, moderately- to steeply-dipping dioritic dykes parallel to the nearby NW-trending Smokey Creek fault. The competency contrast between the dioritic dyke and the surrounding trondhjemite localized most of the deformation, brecciation and mineralization within the dyke, forming a gold-bearing, elongated linear structure called the 'Silidor structure'. A study of the structural evolution by Carrier *et al.* (2002) determined that the Silidor structure evolved from a ductile, dextral strike-slip fault regime to a syn-ore ductile-brittle reverse fault regime. The NE-trending, moderately- to steeply-dipping dextral strike-slip Héré fault, which shows late brittle movement, disturbs the continuity of the ore zone. Hydrothermal alteration consists of "proximal" carbonatization-brecciation of the dioritic dyke, which is characterized by a carbonate-sericite-fuchsite-chlorite assemblage. The trondhjemite/tonalite on both sides of the dyke is affected by albitization (albite-carbonate-magnetite) and sulphidation (with disseminated pyrite-chalcopyrite-sphalerite). This grades outward into an earlier hematite alteration halo, and to a distal chloritic alteration of the intrusions. The metallic signature of the bulk of the ore (partly inferred from its mineralogy) is Au-Ag-W-Pb-Cu-Zn-Bi-Te. Carrier *et al.* (2002) suggested oxidizing conditions for gold deposition at Silidor, which may explain the lack of B and As in the deposit.

271 Siscoe is a Late Archean, quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 27 metric tons. It is located in the Val d'Or district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Early quartz-carbonate, and younger, crosscutting quartz-tourmaline veins and associated disseminated sulphides are hosted mainly by quartz gabbro and diorite dykes of the Late Archean Siscoe stock. Metabasalts of the Duibuisson Formation in fault contact with the Siscoe stock have provided very little ore. Quartz and tourmaline are the dominant gangue minerals, with lesser calcite, rutile, scheelite, apatite, chlorite and muscovite. Ore mineralogy is dominated by pyrite, with minor amounts of chalcopyrite, tetradymite, native gold, pyrrhotite, petzite, galena and sphalerite. The K zone is a (second-order?) NW- to WNW-trending, steeply-dipping D_2 shear zone which hosts quartz-carbonate veins and lenses of disseminated sulphides in talc-chlorite-actinolite schistose material. Early quartz-carbonate vein mineralization is structurally controlled by the K zone and its subsidiaries; fault-fill veins are subparallel, and folded extension veins are normal to the K zone. A younger, SSW-trending, moderately-dipping late to post-D_2 reverse shear zone (with subsequent strike-slip movement) cutting the D_2 regional foliation controls the distribution of the higher-grade quartz-tourmaline veins. The lack of veins in the greenstones bordering the Siscoe stock indicates that the latter behaved as a more competent, brittle body and thus localized fracturing and veining. Hydrothermal alteration asssociated with the first stage quartz-carbonate veins consists of a proximal chloritic alteration, characterized by an assemblage of chlorite-epidote-zoisite-carbonate-quartz-plagioclase-rutile. The younger quartz-tourmaline vein selvages have been affected by albitization and silicification (albite-quartz-chlorite), as well as tourmalinization and carbonatization (calcite). The metallic signature of the bulk of the ore is Au-Ag-Cu-Bi-Te-B-W.

272 Sleeping Giant is a Late Archean Au-Ag sulphide-rich vein deposit with a total gold content of 26 metric tons. It is located in the Joutel area of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The regional EW-oriented, reverse Laflamme shear zone, EW-oriented folds and the NW-trending dextral Harricana deformation zone are the dominant tectonic structures in the area. Massive, comb-textured gold-bearing quartz veins are hosted mainly by lower greenschist grade tholeiitic mafic sills. Smaller quartz veins and disseminated to massive sulphide replacement layers are hosted by magnetite-bearing iron formation, and uneconomic disseminated sulphides and sulphide stringers are hosted respectively by Late Archean dacitic volcanic and volcaniclastic rocks and by QFP dykes. Quartz is the dominant gangue mineral, with minor amounts of calcite, chlorite, sericite and metamorphic actinolite. Ore mineralogy is dominated by pyrite and pyrrhotite, with lesser chalcopyrite, sphalerite and marcasite, and trace amounts of galena and arsenopyrite. Mineralization is structurally controlled by 4 sets of extension fractures: 1) an E-trending, steeply-dipping set, 2) a N-trending, moderately-dipping set, 3) a NW-trending, moderately-dipping set, and 4) a NE-trending, moderately-dipping set. Massive vein mineralization occurs in and along the contacts of the mafic sill, which probably acted as a brittle and competent unit localizing fracturing and fluid flow. NW-trending, steeply-dipping synvolcanic faults were intruded by QFP and FP dykes and served as conduits for the hydrothermal fluids. Rheological (bedding, competency contrasts) and compositional (silica- and magnetite-rich) characteristics controlled the distribution of the replacement and vein mineralization hosted by iron formation. NW-trending, moderately- to steeply-dipping brittle-ductile shear zones cut across the orebodies. The earliest mineralization stage consists of sulphide disseminations and stringers in the dacitic rocks and replacement of the iron formation. This is associated with sericitic and chloritic alteration, the latter overprinting flow banding in the dacitic rocks. Volcaniclastic rocks are also silicified. Intense and pervasive chloritic alteration of the dacite dome is associated with the second mineralization event, which consists mainly of disseminated pyrite. The main stage massive quartz vein mineralization is associated in places with mm-scale sericitization consisting of sericite and/or chlorite. Mineralized QFP dykes have been affected by intense sericitic alteration, characterized by a quartz-sericite-pyrite assemblage. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Zn-As-Pb-Hg. Gaboury and Daigneault (2000) have suggested a synvolcanic model of ore formation for the Sleeping Giant deposit rather than a shear zone-related model. This is based on structural incompatibility of the orebody with the regional deformation, different alteration and ore textures, and higher sulphide-base metal content of the veins. Isotopic signature of the 3 mineralization stages suggest they are genetically related to a volcanogenic hydrothermal system, with some magmatic input for sulfur (Gaboury *et al.*, 1999).

277 Stadacona is a Late Archean(?), quartz-carbonate shear-zone-related Au-Ag deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in

Groves *et al.*, 1998) with a total gold content of 15 metric tons. It is located in the Rouyn-Noranda district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Quartz-carbonate veins and associated disseminated sulphides are hosted by a diorite sill and pillowed andesite, rhyolite, rhyolite tuff and agglomerate of the Late Archean Blake River Group. Quartz is the dominant gangue mineral, with lesser ankerite and calcite, and minor tourmaline, talc and fuchsite. Ore mineralogy consists of pyrite, petzite, arsenopyrite, chalcopyrite and galena. Mineralization is structurally controlled by the NE- to ENE-trending, steeply-dipping to subvertical reverse Stadacona Fault and the E- to ENE-trending, subvertical Pelletier Lake Fault. Orebodies are localized at competency contrast along the diorite sill-volcanic rocks contact, and at the intersection of the two faults, where the Stadacona Fault also steepens from 70^{o} to a subvertical dip. Post-ore brittle faults crosscut the orebodies. Hydrothermal alteration in the vein wallrocks consists of carbonatization, which is mostly restricted to the Stadacona Fault, and chloritization. The metallic signature of the bulk of the ore is Au-Ag-As-Cu-Pb-Te-B.

279 Sullivan is a Late Archean, quartz-carbonate shear-zone-related Au-Ag(-W) deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 35 metric tons. It is located in the Val d'Or district of the Abitibi greenstone belt, Superior province, Quebec, Canada. The Cadillac-Larder Lake fault zone (just south of the deposit) is the major regional tectonic structure in the area. Quartz-carbonate veins and associated disseminated sulphides are hosted by a quartz diorite phase of the 2700$\pm$1 Ma Bourlamaque batholith (at its westernmost extremity), and by crosscutting diorite dykes. Gangue mineralogy consists mainly of quartz, carbonate, tourmaline and chlorite, with minor ablite, epidote and sericite. Ore minerals are pyrite, chalcopyrite, sphalerite, scheelite, molybdenite, galena and tellurides. Mineralization is structurally controlled by NW-SE- and E-W-trending, moderately-dipping reverse-oblique shears, which are spatially coincident and overprint mafic dykes. The latter, due to their competency contrast with the batholith host, behaved as weak layers in an isotropic body, and focused deformation and fluid flow. Hydrothermal alteration consists of an assemblage of chlorite-ankerite-plagioclase-sericite-sulphides, which has affected the diorite dykes and the quartz diorite along the mineralized shear zones. Albitization of the quartz diorite along the veins selvages is also noted. The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-B-W+/-Te.

4064 East Amphi is an Archean, non-carbonate-hosted stockwork-disseminated gold deposit with a total gold content of 6 metric ton. It is located in the Malartic district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The deposit is situated in the Cadillac-Larder Lake Fault Zone, the major regional structure in the area. Disseminated sulphides (up to 15%) and quartz veins are hosted by greenschist grade diorite and porphyritic monzonite intrusions. The dioritic intrusion occurs within a barren chlorite-carbonate schist, at the contact of mafic volcanics and the porphyritic monzonite. Quartz is the dominant gangue mineral, with lesser calcite and chlorite. Ore mineralogy is mainly pyrite, with minor magnetite. Both veins and alteration are affected by foliation, which is evidence that they predate at least some of the deformation. Hydrothermal alteration haloes are generally restricted to 2-10 cm around the veins, and consist of pyritization (replacing biotite) of the diorite and monzonite, and potassic alteration (K-feldspar) of the monzonite. There is possibly some albitization accompanying alteration. Carbonate-sericite alteration of the monzonite is also noted. The metallic signature of the bulk of the ore is unknown.

Appendix 2

4173 Horne is a Late Archean, Au-Cu-Ag volcanogenic massive sulphide (VMS) deposit with a total gold content of 331 metric tons. It is located in the Rouyn-Noranda district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The nearby Cadillac-Larder Lake faut zone is the major regional tectonic structure in the area. Massive to semi-massive sulphide lenses, disseminated sulphides and sulphide-rich veinlets are hosted by rhyolite flows (of tholeiitic affinity) and felsic pyroclastic rocks of the Late Archean Blake River Group. The deposit occurs in a fault-bounded block between the Horne Creek and the Andesites faults, two dextral strike-slip faults. Otherwise, with the exception of the rocks near the faults and a few local shear zones, rocks around the deposit are only weakly strained and display a weak EW-oriented, subvertical S_2 foliation. Ore mineralogy is dominated by pyrite, pyrrhotite and chalcopyrite, with lesser magnetite, sphalerite and tellurides. Hydrothermal alteration of the rhyolitic rocks is characterized by proximal and intense sericitic alteration (quartz-sericite±pyrite), which grades outward to distal and weak sericitization and silicification. Chloritization is restricted to the immediate footwall and sidewalls of the orebodies. Chloritization (Fe-chlorite) has also affected the sulphide-rich veins selvages, but the deposit lacks a well defined stringer zone and alteration pipe. The metal signature of the bulk of the ore is Au-Ag-Cu-Zn-Pb-Te-Se-As. The origin of the gold mineralization is interpreted to be synvolcanic (Poulsen *et al.*, 2000

4223 Copper Rand is a Late Archean, intrusion-related Au-Cu-Ag sulphide-rich vein deposit with a total gold content of 42 metric tons. It is located in the Doré Lake mining camp of the Chibougamau District, Chibougamau-Matagami greenstone belt, Abitibi Belt, Superior Province, Québec, Canada. The Chibougamau anticline, a regional EW-oriented D_2 anticline, and the Lac Sauvage Fault, an EW-oriented, steeply-dipping reverse shear zone, are the dominant tectonic structures in the area. Sulphide-rich veins and veinlets and disseminated sulphides are hosted by greenschist grade anorthosite of the Late Archean Doré Lake Complex. Two types of veins are present; 1) quartz-pyrite-chalcopyrite-pyrrhotite-sphalerite-galena veins, and 2) siderite-pyrite-chalcopyrite-magnetite-hematite veins. Mineralization distribution is structurally controlled by SE-trending, moderately- to steeply-dipping reverse shears such as the Doré Lake Fault and other subsidiaries of the Lac Sauvage shear system. Ore lenses are typically located at, or near, the contacts with Late Archean diorite to QFP dykes. The dykes mark a competency contrast that has resulted in large, ore-filled dilation zones at their contacts. Hydrothermal alteration consists of proximal chlorite alteration (chlorite-chloritoid-sericite) and carbonatization, especially intense in mafic dykes, grading outward to a distal sericitic alteration (sericite-chlorite-chloritoid). The metallic signature of the bulk of the ore (inferred from its mineralogy) is Au-Ag-Cu-Zn-Pb. The complex structural and magmatic history of the area has led authors to suggest various models for the origin and timing of the emplacement of the Copper Rand deposit. Veins occur mostly as crosscutting porphyry dykes related to the Chibougamau Pluton and thus are syn- or post-dyke emplacement, but occurrences of dykes crosscutting the veins are also known. The latter are deformed by D_2, and thus predate shearing. Daigneault and Allard (1990) proposed an early, pre-metamorphic event for the setting of the vein mineralization in the Doré Lake Complex, a conclusion similarly reached for the Copper Rand deposit by Magnan and Blais (1995). The presence of chloritoid also indicates metamorphism of a previous aluminous alteration zone (Pilote and Guha, 1998). Porphyry-style mineralization has been found at Clark Lake (among others) in the Doré Lake Complex (Sinclair *et al.*, 1994) and is thought to predate shear deformation. This porphyry-style mineralization is also associated closely in time with the Chibougamau Pluton. Magnan and Blais (1995) suggested that ore deposition took place in synvolcanic extensional structures associated with the intrusion of the Chibougamau Pluton into the Doré Lake Complex. This was afterward remobilized or reworked during regional metamorphism and shear deformation (Pilote and Guha, 1998). The short time period between emplacement of the dykes associated with both the vein-style and porphyry-style mineralization strongly suggests that the two types of mineralizations are products of the same district-scale magmatic-hydrothermal event (Pilote and Guha, 1998).

4258 Donald J. LaRonde 3 (Penna Shaft) is a Late Archean, gold-rich volcanogenic massive sulphide Au-Ag-Cu-Zn-Pb deposit with a total gold content of 184 metric tons. It is located in the Bousquet district of the Abitibi greenstone belt, Superior Province, Quebec, Canada. The EW-oriented D_2 Cadillac-Larder Lake fault zone is the dominant regional tectonic structure in the area. Stacked semi-massive to massive sulphide lenses and sulphide stringers (stockworks) are hosted by upper greenschist grade to lower amphibolite basaltic andesites and rhyodacites of the Bousquet Formation, part of the Late Archean Blake River Group. Ore mineralogy is dominated by pyrite, with abundant sphalerite, chalcopyrite, pyrrhotite and galena. An EW-oriented D_2 high-strain zone is superposed on, and spatially coincident with, rocks affected by quartz-sericite-aluminous alteration. Penetrative S_2 foliation related to the high-strain zone deformed and has transposed the orebodies. Two generations of folds associated with the high-strain zone also affected the mineralization. Hydrothermal alteration at the 20N lens consists of zones of quatz-garnet (Mn-rich)-biotite-chlorite alteration in the footwall and of biotite-rutile/titanite-pyrrhotite-pyrite alteration in the hanging wall. To depth, these alteration zones grade into aluminous quartz-kyanite-pyrite$\pm$Au-bearing chalcopyrite, which is thought to be the metamorphosed equivalent of an advanced argillic alteration assemblage typically associated with gold-rich VMS (Dubé *et al.*, 2001). This aluminous alteration is surrounded by an assemblage of quartz-staurolite (Zn-rich)-sericite-garnet-biotite-pyrite. Hydrothermal alteration at the 20S lens consists of a zone of green micas-sericite-titanite-pyrrhotite-pyrite in both the footwall and hanging wall. The metallic signature of the bulk of the ore is Au-Ag-Zn-Cu-Pb-As-Sb-Sn-B-Bi. Gold and base metals are syn-volcanic, and have been remobilized and concentrated during deformation (Dubé *et al.*, 2001). The deposit is thought to be, at least in part, genetically related to the rhyodacitic to rhyolitic calc-alkaline domes and to the presence of gabbroic to dioritic high-level sills and dikes in its hanging wall, which may have acted as a less permeable cap (Dubé *et al.*, 2003). The mineralogical variations in alteration and ore styles with depth suggest a transition from a "low-sulphidation" VMS in the upper levels to a "high-sulphidation" VMS at depth (Dubé *et al.*, 2003). Relative proximity of the precipitation site from the hydrothermal fluid and head sources were implicated, at least in part, in these variations.

4276 Quémont is a Late Archean, Au-Cu-Ag-Zn volcanogenic massive sulphide (VMS) deposit with a total gold content of 66 metric tons. It is located in the Rouyn-Noranda district of the Abitibi greenstone belt, Superior province, Quebec, Canada. The regional ENE-trending, steeply-dipping reverse-oblique Cadillac-Larder Lake fault zone is the dominant tectonic structure in the area. Massive to semi-massive sulphides lenses and disseminated sulphides are hosted by brecciated rhyolite, and porphyritic rhyolite and rhyodacite flows (of tholeiitic affinity) of the Late Archean Blake River Group. Ore mineralogy is dominated by pyrrhotite and pyrite, with lesser sphalerite and chalcopyrite, and trace amounts of molybdenite and selenite. The deposit occurs in a fault bounded block between the NE- to ENE-trending, steeply-dipping to subvertical reverse-sinistral Horne Creek fault, and the W-trending, steeply-dipping to subvertical revere-sinistral Andesite fault. Otherwise, with the exception of the rocks near the faults and a few local shear zones, rocks around the deposit are only weakly strained and display a weak EW-oriented, subvertical S_2 foliation. Sulphide lenses occur along the lithological contact between the Amulet rhyolite and the rhyolite-andesite flows of the Horne sequence. Hydrothermal alteration consists of intense chloritization (with a chlorite-carbonate assemblage) of the hanging-wall rhyolite, particularly of the brecciated rhyolite matrix. Sericitization is widespread throughout the mine felsic volcanics and also within the intrusive rocks. It is associated tyo silicification (especially within breccias and vesicular flows) and is characterized by an assemblage of sericite-quartz-albite-epidote-chlorite. The metallic signature of the bulk of the ore is Au-Ag-Cu-Zn-Pb-Te-Se-As.

SASKATCHEWAN

245 Pap SW/Preview Lake is an Early Proterozoic quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 11 metric tons. It is located in the MacKay-Sulphide Lakes area of the Central Metavolcanic Belt, La Ronge Domain, La Ronge-Lynn Lake Belt, Churchill Province, Saskatchewan, Canada. The NE-trending Rattler Creek Fault Zone, an early thrust fault, and the NNE-trending Stanley Shear Zone at the SE margin of the La Ronge Domain, are the dominant regional tectonic structures in the area. Quartz veins and associated disseminated sulphides are hosted by Early Proterozoic gabbro and diorite sills intruding metavolcanics and greywacke. Quartz is the dominant gangue mineral, with lesser carbonate and sericite and minor tourmaline. Ore mineralogy is dominated by arsenopyrite and pyrite, with minor to trace amounts of chalcopyrite, galena and sphalerite. Mineralization is structurally controlled by NE-trending, steeply-dipping narrow and intense shear zones, and is restricted to gabbro-diorite sills and their contacts with enclosing rocks. Hydrothermal alteration consists of biotitization, silicification and carbonatization within shear zones and along vein wallrocks. The metallic signature of the bulk of the ore is Au-Ag-As-Cu-Fe-Ni-Zn-Co-Mn.

263 Seabee is an Early Proterozoic quartz-carbonate shear-zone-related gold deposit (also known as "greenstone-hosted quartz-carbonate vein" in Poulsen *et al.*, 2000, or "orogenic gold" in Groves *et al.*, 1998) with a total gold content of 24 metric tons. It is located in the Tabbernor Lake greenstone belt, Glennie Domain, Churchill Province, northern Saskatchewan, Canada. The NE- to SE-trending, curved, regional D_2 or post-D_2 Laonil Lake Shear Zone is the dominant regional tectonic structure in the area. Shear, extension and breccia quartz veins and associated disseminated sulphides are hosted by lower to middle amphibolite grade, deformed, fine-grained gabbro of the Early Proterozoic Laonil Lake Intrusive Complex, and locally by later feldspar and quartz-feldspar porphyry dykes. The dykes are thought to be intruded within shear zones (Schultz and Kerrich, 1991). Quartz is the dominant gangue mineral, with lesser tourmaline and minor chlorite, muscovite and albite. Ore mineralogy is dominated by pyrrhotite and pyrite, with lesser chalcopyrite and minor sphalerite, galena, scheelite and Bi tellurides. Late quartz veins crosscutting the mineralization are composed of clay minerals and barite. Ore-bearing quartz veins are structurally controlled by the Seabee Shear Structure, which consists of 2nd order, NE- and ENE-trending and EW-oriented, steeply-dipping, brittle-ductile dip-slip shears that are subsidiaries of the regional shear zone. The highest grades occur at the intersection of oblique NE-trending shears and EW-oriented shears. Ore-bearing structures developed at rheological contrasts provided by less competent mafic dykes. Hydrothermal alteration consists of a general chlorite alteration (characterized by a biotite-actinolite-chlorite-carbonate assemblage) in and along shear zones in the gabbro. Potassic alteration and silicification (quartz-K-feldspar-muscovite-biotite-pyrite) occur in an intense halo in the wallrocks of the breccia veins and around the felsic dykes. Actinolite alteration (actinolite-chlorite-pyrite) affected shear vein selvages. The metallic signature of the bulk of the ore (partly inferred from its mineralogy) is Au-Ag-B-Bi-Te-Se-W.

YUKON

4123 Dublin Gulch is a Late Cretaceous porphyry gold deposit with total gold resources of 47 metric tons. It is located in the Selwyn Basin (or fold belt) in the northern Canadian Cordillera, Yukon Territory, Canada. Regional structure is dominated by the NE-trending, high-angle dextral strike-slip Tintina fault system which bounds the Selwyn Basin to the south, and by the Robert Service Thrust, related to Early Cretaceous nappe thrusting. Two important phases of folding affected the area: the Lynx Creek antiform is an EW-oriented, W-plunging, broad and open D_2 fold which might have controlled intrusion emplacement. Quartz veins, quartz stockworks and related disseminated sulphides are hosted by the Late Cretaceous Dublin Gulch granodiorite stock (part of the Tombstone intrusive suite), and by adjacent Late Proterozoic to Early Cambrian hornfelsed sedimentary rocks (quartzite and phyllite). Gangue mineralogy consists of K-feldspar, quartz, and lesser albite. Arsenopyrite and pyrite are the dominant ore minerals, with subordinate pyrrhotite, chalcopyrite, bismuthinite, tetradymite, tellurobismuthite, native Bi, and rare molybdenite and scheelite. Silver-bearing base metal veins occur in quartzite and phyllite peripheral to the deposit; e.g. the Rex and Peso No. 1 veins, composed of quart, siderite, pyrite, jamesonite, arsenopyrite and scorodite. Mineralization is structurally controlled by a NE-trending system of en echelon to sub-parallel faults and fissures which crosscut the granodiorite and sedimentary rocks. The northern contact of the Dulbin Gulch stock is particulalry favorable to NE-trending, steeply-dipping veins. Late NS-oriented normal faults displaced the Dublin Gulch stock and the mineralized fractures. Hydrothermal alteration consists of a potassic K-feldspar±sericite assemblage associated with the early mineralization stage, and of sericitic alteration (sericite-sulphide assemblage) along selvages of the later veins. Local skarns (with associated tungsten mineralization) occur near the Dublin Gulch granodiorite stock. The metallic signature of the bulk of the ore is Au-Ag-Bi-As-W-Mo. Thompson and Newberry (2000) have associated the Dublin Gulch deposit to the “reduced intrusion-related gold deposit” class, along with Fort Knox and other deposits in the Fairbanks district, Alaska.

4124 Brewery Creek is a Late Cretaceous intrusion-related, non-carbonate-hosted stockwork-disseminated gold deposit with a total gold content of 9 metric tons. It is located in the Selwyn Basin (or fold belt basin) northern Canadian Cordillera, Yukon Territory, Canada. Regional structure is dominated by the NE-trending, high-angle dextral strike-slip Tintina fault system which bounds the Yukon Tanana Terrane to the north, and by the Robert Service Thrust, related to Early Cretaceous nappe thrusting. Two important phases of folding have affected the area; the Lynx Creek antiform is an EW-oriented, W-plunging, broad and open D_2 fold which might have controlled intrusion emplacement. Gold ore occur in three settings. The principal type consists of quartz veins and associated disseminated sulphides hosted by porphyritic biotite monzonite sills of the Late Cretaceous Tombstone intrusive suite (forming the “Reserve Trend”); the second type consists of quartz veins and breccia zones hosted by greywack and shale of the Devono-Mississippian Earn Group, and the last type consists of disseminated sulphide ore hosted by dolomitic mudstone of the

Ordovician to Silurian Road River Group. Quartz and carbonate are the dominant gangue minerals. Ore mineralogy is dominated by pyrite and arsenopyrite, with minor roscoelite, stibnite, realgar and orpiment. Mineralization in the monzonite sills is structurally controlled by E-trending, moderately-dipping faults with apparent normal offset, and is generally restricted to the hanging walls. NE- to E-trending thrust faults might have played a role in localizing mineralization. Hydrothermal alteration consists of sericitization of the monzonite host along vein selvages. Supergene oxidation is pervasive down to 60-70 metres below surface and has obscured the hypogene ore mineralogy. The metallic signature of the bulk of the ore is Au-Ag-As-Sb-Hg-Ba. Poulsen *et al.* (2000) have classified Brewery Creek as a "Carlin-like" deposit due to its As-Sb-Hg mineral association, the presence of micron-sized gold and the carbonate-hosted ore.