

CGKN Workshop #4
And the
CGKN XML and Web Services Technical Workshop
Toronto, March 2-5, 2004

Making the Connection

**A National Geological Surveys Committee
Canadian Geoscience Knowledge Network
Workshop Report**

Executive Summary

This workshop is the fourth in a series of Canadian Geoscience Knowledge Network (CGKN) workshops, organized by the National Geological Surveys Committee (NGSC) and was held in Toronto in March 2004. The CGKN is designed to create a seamless network of geoscience information from Federal, Provincial, and Territorial agencies in Canada. This workshop resulted in renewed commitment and clarification of priorities for CGKN development by the NGSC.

The workshop was organized for the CGKN Secretariat, (James Rupert, Chair) and the NGSC. It is financially supported by GeoConnections under the Canadian Geospatial Data Infrastructure (CGDI) program.

This year, the workshop was divided into two sessions, a technical session on XML and Web services and a general CGKN activities session. The technical session highlighted the fundamental activities that are required to enable web services that are necessary to join CGKN information to the CGDI. The general workshop included presentations and demonstrations from the Earth Science Sector (ESS) of Natural Resources Canada (NRCan), as well as CGKN activities. These were followed by a discussion of technical and implementation details of the CGKN. The workshop's objectives were to identify and reaffirm priorities for future CGKN development.

The workshop had several outcomes. It enabled participants to gain a clear understanding of what CGKN development has happened at ESS, and the tools and services developed. It also validated that the CGKN Online Data Catalogue is the flagship CGKN project and all agencies committed to its support and improvement.

The participants at the workshop also recognized the need for a clear path for future CGKN development. To address this, the CGKN secretariat will prepare a set of CGKN activities that will be presented to the NGSC for endorsement. Once endorsed, these activities will set the priority for CGKN development.

Introduction

An initial workshop, organized by the National Geological Surveys Committee (NGSC) and held in Ottawa in December 1998, explored and endorsed the concept of the Canadian Geoscience Knowledge Network (CGKN) as a way of providing a consistent Internet Portal that would increase and simplify access to the geoscience information holdings of Canada's federal, provincial and territorial geological surveys.

A second workshop, organized by the Canadian Geoscience Data Model Working group and held in Calgary in June 2000 confirmed the importance of the goals of the CGKN initiative, which are to develop and implement methods to make the geoscience data holdings of the Federal, Provincial and Territorial surveys of Canada interoperable, and to provide access to the data through the Internet. The need for a common geoscience data model was also recognized as central to achieving these goals.

The rapid evolution and revolution of information technology and subsequent management of digital information have opened new avenues for capturing, managing and disseminating geoscience information. Geological surveys now routinely capture field data using digital technology. Laboratory results are recorded automatically in digital form. Geological information is now stored in relational databases and routinely make use of geographical information and satellite imaging systems. This fundamental change in how geoscience data are managed has impacted all geological surveys. As Canadian geological surveys adapt to the management of digital data, it is reasonable to expect that they can benefit by sharing their experiences and knowledge. Making geoscience information available over the Internet is an important way Canada can maintain its global competitiveness in attracting resource exploration. By adopting common CGDI standards and data management tools, data can be more accessible to all.

The complete agenda for the workshop is listed in Appendix 1.

Workshop Objectives

- 1) Review the progress of the CGKN to date
- 2) To identify priorities and issues to be resolved for future CGKN development

Workshop Format

This year, the workshop was comprised of a technical workshop and a general information meeting. The first two days consisted of presentations and hands-on demonstrations of XML and Web Services. These sessions were presented or chaired by Éric Boisvert of the GSC/ESS. The next two days were a combination of information sessions, breakout sessions and discussions, with James Rupert, Eric Grunsky GSC/ESS and Larry Nolan, Newfoundland and Labrador Geological Survey acting as workshop co-chairs and chief facilitators.

The morning of day 1 of the XML and Web services workshop opened with theory sessions on XML and web services. The usefulness of XML was explained as well as a comparison between a web page and a web service. In the afternoon a series of presentations/demonstrations showed

how Web Mapping Services and XML can be used. Also an introduction to a variety of web services was presented.

Day 2 presented the implementation of a Web Mapping Service server from scratch using both the University of Minnesota MapServer and ArcIMS. Advanced web services, in the form of a Web Feature Service (FMS), were also presented. The afternoon concluded with a poll of the agencies on where they were currently in implementing a WMS. The results of this poll are presented in Appendix 2.

The general CGKN workshop began on Day 3. It opened with an overview and progress report on CGKN activities for the past year. This was followed by a series of sessions on ESS activities that align with CGKN goals. Breakout sessions to deal with sub-groups' issues were held in the afternoon, these involved the Mineral Deposits group (appendix 3), the Geochemistry group (appendix 4) and the Bedrock Mapping Database Group (appendix 5). The leaders of the breakout groups presented a summary of their recommendations and conclusions following the sessions. The day ended with an open session of demonstrations from any agency that wished to show the work being done in their jurisdiction.

Day 4 opened with an overview of the ESS program Consolidating Canada's Geoscience Knowledge (CCGK) and how it is contributing to the goals of the CGKN. This was followed by presentations on the CGKN Data Catalogue web page redesign, the CGKN Mineral Deposit Information System, GeoConnections, the Atlas of Canada and the JUMP project. In the afternoon discussions were held on if / how to connect agencies maps using WMS , as well as, the future plans, priorities, CGKN membership and funding issues.

Participation

The XML and Web Services workshop was very well attended, with representatives from all agencies and GeoConnections for a total 39 people. The general meeting had more than 52 people, including management and technical experts in Geoscience information management. Appendix 6 provides a list of participants for both parts of the workshop.

Action Items

The following action items were identified during the sessions:

- 1) Prepare short business cases for the following possible future CGKN activities:
 - a. Web Mapping services (Nolan)
 - b. Lexicon (Davenport)
 - c. Data Catalogue concise keyword list (Rupert)
- 2) Increase communication of CGKN activities and services. (CGKN secretariat)

Conclusions

Feedback from participants indicated that the XML / Web services workshop was very useful at bringing the all agencies knowledge up to a common level. All agreed that they would like to see this type of training continued at future CGKN workshops. Participants also felt that the ESS information sessions were very informative and briefed them on current ESS activities. There was strong support for future annual CGKN meetings.

There was consensus around the fact that the CGKN Data Catalogue is the number one priority and that all agencies must strive to complete and house their own metadata collections. Most agencies acknowledge that they could meet this goal in 2004.

There also were strong feelings that, with very little effort, the agencies could put up Web Mapping services for selected layers. With the knowledge they gained at the XML / Web Services Workshop, agency participants realized that the work that they already have done on their web map sites could also easily be served as Web Mapping Services. This would allow for a mosaic of the best geological maps to be displayed by a CGKN map client. Appendix 2 outlines a possible schedule for agency WMS layer availability.

The group discussed the time and place for future CGKN meetings. After debate of several ideas it was concluded that just before the March PDAC meeting in Toronto was still the best choice.

There was consensus that the CGKN needs to be promoted in a more proactive manner. More industry conventions and provincial open houses need to be targeted. Several events were suggested including CSPG and Manitoba's Mining and Minerals Convention.

After a lengthy discussion on the CGKN membership and whether it should be opened up to industry and academia, it was concluded that at this time CGKN membership should remain restricted to the current federal, provincial and territorial agencies but the CGKN should promote its services to these groups.

Lastly, the group talked about future funding for the CGKN. Although no conclusions came of this discussion, the possibility of the CGKN being used as the delivery method of the results from any initiatives from the Cooperative Geological Mapping Strategies is promising.

Appendix 1

Agenda for the CGKN XML and Web Services Workshop

March 2 & 3, 2003

Location: Holiday Inn on King, King St. West, Toronto, Room 218

Day 1 : Theory

Morning

- 8:00 Registration & Coffee
- 8:30 Welcome
- Introduction
 - What's wrong with web sites
 - Background (CGDI, GeoConnections, OGC)
- Introduction to XML, and why it's useful
 - Separating content from presentation
 - Schema
 - Style Sheets
 - Parser and validator (balm to programmers)

Break

- Web Services
 - Comparison between a Web Page and a Web Service
 - Examples of Web Service
 - Gazetteer
 - Postal Lookup
 - OGC Style Web Services
 - WMS
 - WFS (maybe)

Afternoon

- Presentation
 - Heryk Julien (using WMS in building a web site)
 - Ross Murray (example of using XML in web service)
 - Stephen Adcock (Demonstration of Geochemistry On-Line Web Service)

Break

- The CGDI zoo
 - Standard development
- The OGC zoo
- The SOAP zoo

Day 2: Pratical

Morning

8:00 Coffee

8:30 Implementing a WMS server from scratch
MapServer (Julien, Murray)

Break

ArcIMS (Julien)

Afternoon

Implementing advances Webservice
(Murray, Boisvert)
a look at WFS servers

4th CGKN workshop: "Making the Connection"

Agenda

CGKN Annual Meeting

Location: Holiday Inn, King St. West, Toronto

Thursday, March 4th - Regency Salon D

8:00 - 8:30 Registration & coffee

8:30 - 9:00 CGKN - An overview and progress report for 2003. - Jamie Rupert

Morning Session: Chair: Larry Nolan

9:00 - 9:25 A Stratigraphic Lexicon for Canada - Peter Davenport

9:25 - 10:50 Map Databases - Peter Davenport

9:50 - 10:15 Search and Discovery of Geoscience Information
- Paul Huppé

10:15 - 10:40 Coffee Break

10:40 - 11:05 The Canadian Geochronology Knowledgebase - Linda Richard

11:10 - 11:35 GDR - The MIRAGE project - Jamie Rupert

11:35 - 12:00 On-line Geophysical Data using DAP - Warner Miles

12:00 - 1:30 Lunch – Canadian Bar & Grill (\$12.95 buffet)

1:30 - 3:30 - Regency Salon D & E

Breakout sessions to deal with sub-group issues

Geology Bedrock/Surficial - Peter Davenport

Mineral Deposits - Lesley Chorlton

Geochemistry - Eric Grunsky

3:30 - 4:00 Breakout Session reports

4:00 - 6:00 CGKN demonstrations and tools exchange
- Brian Fisher

Friday March 5th - Regency Salon D

Morning Session: Chair: Jamie Rupert

8:00 - 8:30 Coffee

8:30 - 8:55 Consolidating Canada's Geoscience Knowledge (CCGK)
- Its links to the CGKN -Mark Williamson

8:55 - 9:20 CGKN Data Catalogue redesign
- Jamie Rupert

9:20 - 9:45 Vision of a distributed mineral deposit information system for the CGKN
- Lesley Chorlton

9:45 -10:20 GeoConnections - Overview and report on activities relevant to CGKN
- Dolores Durant - GeoConnections

10:20 - 10:40 Coffee

10:40 -11:05 The Atlas of Canada - National Scale Frameworks Project
- Anna Regan - GeoAccess Division, Geomatics, NRCan

11:05 - 11:30 The JUMP project - Java applications for GIS
- Eric Grunsky for Mark Sondheim

11:30 Lunch

1:00 - 2:30 CGKN Web Mapping Services tools, connecting the provinces
- Jamie Rupert , Larry Nolan

2:30 Discussion of future directions for CGKN. Plans for 2004/2005
Jamie Rupert, Larry Nolan, Eric Grunsky

- NGSC directions for future projects
- CGKN funding issues
 - Requirements
 - Sources
- Opening up CGKN to industry and academia

Appendix 2

WMS Agency Poll Results

The following table represents the results of a poll of participating CGKN agencies on their preparedness to implement a Web Mapping Service of bedrock geology maps.

Province/Territory	Contact Person	Action	Time Line
NFLD	Larry Nolan	WMS	fall
NS	Brian Fisher	WMS	fall
NB	Paul Rennick	send SHP	fall
PEI	?		
QU	?		
ON	Ross Kelly	send SHP	fall
MN	Mark Pacey	WMS	fall
SK	Bill Slimmon	WMS	fall
AB	Joan Waters	WMS	fall
BC	Nick Massey	WMS	fall
YK	Amy Stuart	WMS	fall
NWT	Marcy MacDougall	WMS	unsure
NU	Ping Tzeng	WMS	fall
GSC-Q	Heryk Julien	WMS	fall
GSC-C	Ping Tzeng	WMS	fall
GSC-V	Marianne Quat (BC)	WMS	fall
GSC-A	Barb Szlavko	WMS	fall

WMS – Web Map Service

Send SHP – CGKN to host agency maps on a CGKN WMS

Appendix 3

Minutes of the CGKN - Mineral Deposits Subgroup, March 4, 2004

Breakout session from general CGKN meeting, Toronto

Participants: Larry Jones, Paul Rennick, Joan Waters, Reg Olson, Robert Laramée, Beth Sage, Lesley Chorlton, Mark Pacey, Phil Moir

1. Lesley provided a quick explanation/overview of the project for Joan Waters and Reg Olson who are new to the working group.

2. Brief discussion and comments on CGKN workshop, which were favourable.

3. Survey Results. The group reviewed the Survey results draft document.

- This also included a discussion of a few terms such as "profiles and classification".
- It was noted that the document needs an executive summary (interpretation for those outside of the group), as well as the basic summary of the results.
- Next steps: create executive and basic summaries of the Survey results and post on the CGKN web site*.

4. Discussion about posting/sending files.

- Many emailers now filter out Zip files.
- Need ftp downloads or web postings for shared information that should not be sent by email. **
- Need to ensure spreadsheets (such as those correlating commodity listings among databases) are dated with versions. ***.

5. Alberta would like to see a view of what each province is doing, directions in which each are heading, and sharing of ideas with others****.

6. Beth Sage suggested the need to provide maps showing ball-park (gross percentage for instance) estimates of how up-to-date deposit-occurrence databases are relative to the probable number of deposits discovered as a result of field work, visits, exploration activity and other research in each area. The reality is that in order to keep databases up-to-date, a suitably qualified person must keep track of and scrutinize new literature, assessment files and reports to recognize and classify new showings, occurrences, and deposits, and to synthesis new information about them, before entering information in the database. This labour-intensive maintenance has been identified by most provinces and territories as a problem they find hard to address because of scarcity of human/financial resources (CGKN Minutes, October 31, 2002). It is important that end-users of the minerals database realize in what areas available information may be missing and worthwhile trying to retrieve for assessment purposes.

Some provinces already provide maps showing scale and currency of government mapping. This may or may not reflect the currency of the mineral deposit databases however, depending of the

policies of the organization about visiting and reporting mineral showings and the geological focus of the mapping and about inputting that information in the database.

7. The issue of resource estimate misuse from P&T databases was mentioned by Larry Jones in a previous teleconference, and he was asked to comment what would be done by BC. National Instrument 43:101 says that historical resource figures can be cited in a public document if the original reference accompanies the citation and the report is in precisely the terms and units of the original reference. Using MINFILE (or NORMIN) as a reference for a resource figure is therefore not legitimate; the original reference reported within the database must be cited by the end-user. Rolling general figures up for internal purposes or publishing ball-park grade tonnage models without referring to exact deposits is not a problem. This issue does pose a dilemma for geologists who know with certainty that there are major errors in the original source and want to correct the figure in order not to propagate ridiculous information.

8. Next teleconference: sometime near the end of March.

ACTION ITEMS:

* Action item 1. Before posting, Lesley has been circulating draught CGKN report for review by group. When final or nearly final, it will be posted on the members-only page before circulation to CGKN and NGSC managers. It will likely have to be translated before circulation, and if the executive summary of Survey results is to be added to public pages, this also must be translated.

** Action item 2: Lesley will no longer send zipped files of files that may be screened out by email handlers. More of the documents will appear in the Members-Only section of the CGKN minerals web site. However, there are no resources handling the web site, and deletions and replacements of posted documents are performed by James Rupert. Thus it is advisable for the time being to post documents that are nearly final, not under continuing discussion and revision. Thus spreadsheets will be circulated by email for a while.

*** Action item 3: Spreadsheet versions will be dated.

**** Action item 4: Lesley will attempt to collect that information, and provide a brief summary in the CGKN mineral deposit working group report, 2003/2004.

Appendix 4

Minutes of the CGKN Geochemistry Workshop / Breakout Group, March 5, 2004

Attendees:

Steve Adcock (GSC)
Barry Fildes (AB)
Brian Fisher (NS)
Eric Grunsky (GSC)
Steve van Haaften (ON)
Warner Miles (GSC)
Charles Roy (PQ)
Jamie Rupert (GSC)
Bill Slimmon (SK)

Meeting Plan

a report on the current status of the GOLDTools project
each participating province/territory provide a brief report on their activities with geochemical data management.

Update from the provinces:

New Brunswick (Paul Rennick) reported that NB is waiting for GOLDTools to be released. NB has released some geochemistry associated with reports but there is no central geochemistry database at this time.

Nova Scotia (Brian Fisher) reported that NS is gathering metadata for much of its geochemistry. The metadata is stored in Word Perfect along with the data in Excel format. Currently 19 files are available for download from the NS website. A significant amount of effort is being made into recovering the necessary metadata and analytical characteristics from a large legacy of geochemical data that was collected previously. Concerning GOLDTools development, the end of 2004 is acceptable for delivery of the tools.

Ontario (Steve van Haaften) expressed the expectation that the web implementation of GOLDTools would come sooner than the projected delivery date of the end of 2004. Although Ontario's geochemical data is managed through Land Information Ontario (LIO), the data structures and query procedures for geochemical data do not have a high priority for LIO. Within the current LIO geochemical data environment, data loading is tedious and loading all of Ontario's geochemical data will take months. To date, only a few datasets have been loaded. A contractor has been hired to load the data however there are no tools for maintaining the data once they are loaded into the database. Ontario is using a combination of Oracle and Access for the development of their data management tools for geochemistry.

Quebec (Charles Roy) reported that Quebec has created a geochemical database in Oracle that works quite well. Currently, there are 14 million analyses for a total of 600,000 stream and sediments samples. Currently, there is no existing interface with the CGKN however, the possibility for linking with the CGKN could be done using ORACLE. Quebec is proceeding to

providing access to the data. They are interested in sharing the CCGK geochronology data management tools.

Alberta (Barry Fildes for Glen Prior) reported that all geochemical data is currently managed in Excel tables and these tables are then exported into Access in an adhoc data structure for the purpose of central database administration. Alberta is waiting for the GOLDTools products so that they can implement the CGKN geochemistry data model. They are planning on an Access/Oracle architecture. Although there is no critical deadline for the delivery of GOLDTools, sooner is better than later.

Saskatchewan (Bill Slimmon) reported that all geochemical data and laboratory information is managed in flat files using Excel. No metadata records are currently being created.

General Discussion

The timing of the delivery of GOLDTools was discussed in the context of requirements for the program, Consolidating Canada's Geoscience Knowledge (CCGK). Scripts and XML based tools are an important component of the CCGK program and the timeline requires delivery in before the end of 2004.

Warner Miles suggested that the metadata for geochemical surveys should be provided ahead of the actual delivery of the database containing the actual data. Steve Adcock replied that the metadata is already built into the database.

Some discussion focused on abandoning the .NET (XML) based development of GOLDTools over conventional SQL scripts. The advantage of the .NET approach is that it is independent of platform and database type. Steve Adcock indicated that the amount of work required to develop tools in either environment would be about the same.

Jamie Rupert offered the use of GSC servers to host any geochemical data within the GOLDTools data structure if individual agencies are not able to do so.

Steve Adcock suggested that any attempt to load the data at this point would be difficult because of the diversity of data types from the provinces and territories.

Eric Grunsky suggested that in the interim, geochemical survey data should be provided as distinct databases such as those provided in the Open File Reports provided by Peter Friske in the National Geochemical Reconnaissance (NGR) releases. This is what Nova Scotia does now.

INFOPATH was suggested as the tool for providing metadata.

A survey of database types indicated that the following databases are used: Access, SQL server, Oracle, PostGRES.

Steve Adcock has provided a preliminary view of the Geochemistry online website where metadata and a sample location map can be queried and displayed. This is done using XML/GML which is subsequently translated into SVG.

Charles Roy noted that business case studies indicate that clients want internet delivery of data

and that professional development was required by Quebec to deliver the products for clients.

In the past, the emphasis within the Geological Survey of Canada was focused on the acquisition of data. Now, the emphasis is on the delivery of data and this requires a significant culture shift.

The initial intent of the XML based geochemical database was to provide internet based and platform independent access and delivery of geochemical data. However, difficulties in the implementation of this technology has delayed the deliverables.

Barry Fildes stated that any delivery mechanism must focus on client requirements. These requirements include data loading/querying and data visualization.

The meeting adjourned at 1530 hrs.

Appendix 5

Notes on the breakout session on Bedrock Map databases CGKN workshop, Toronto, March 5, 2004 Peter Davenport, GSC Calgary

In the breakout session, the purpose of geological map databases was reviewed, and revisions to the data model and user interfaces that the GSC has made over the past two years was presented. These changes were found necessary to better accommodate a wide range of maps, and to develop a logical work flow for loading maps to an NADM database. An annotated copy of the Powerpoint presentation is available at www.CGKN.net.

Data model. The NADM data model has been adapted in a number of ways to accommodate specific collections of map information. Currently there are three main variants in use at the GSC: version 5.1 (CordLink), version 5.2.1 (bedrock geology) and a version for surficial geology. The bedrock geology version has evolved from the CordLink version, and facilitates the application of an unlimited number of classifications to the source map features. These multiple classifications (or ontologies) are key to providing both scalability and interoperability which are the principal reasons for using geologic map databases. These ontologies include regional legends for creating small-scale maps from larger scale source maps, geologic time, rock type, genetic process, material composition, etc., all of which can be used to create derivative, thematic maps.

The NADM data model design team and has developed a conceptual model for geological map databases that will be very helpful in providing an overall framework for reconciling the different variants of the physical NADM databases. The draft document is available at <http://geology.usgs.gov/dm/steering/teams/design>. The conceptual model, which will be open filed jointly by the GSC and the USGS in the summer of 2004, also forms the basis for an XML/GML exchange schema that is being developed by the NADM data exchange technical team.

User interfaces. Geomatter is no longer fully compatible with the new data model, and two new interfaces replace it. The first, MapLith, is designed to allow edits and updates to the database in either MS Access or Oracle, and prototypes have been distributed for testing. The second, a Visual Basic application for ArcGIS allows the database to be queried and the results returned as maps, providing a spatial window on the database for the geologist. This is currently (June 28, 2004) under development, and a prototype should be ready to distribute for testing by July 30. Finally, the ArcIMS prototype will be re-written to work with the new data model.

Appendix 6

List of Participants

CGKN XML and Web Services Workshop – March 2-3, 2004, Toronto, Ontario

Alberta Energy and Utilities Board	Barry Fildes
Alberta Energy and Utilities Board	Desmond Wynne
Alberta Energy and Utilities Board	Joan Waters
British Columbia Energy and Mines	Larry Jones
British Columbia Energy and Mines	Nick Massey
GeoConnections	Brian McLeod
Manitoba Mineral Resources Division	Mark Pacey
New Brunswick Natural Resources	John Langton
New Brunswick Natural Resources	Paul Rennick
Newfoundland and Labrador Mines and Energy	Gerry Kilfoil
Newfoundland and Labrador Mines and Energy	Larry Nolan
Nova Scotia Natural Resources	Brian Fisher
Nova Scotia Natural Resources	Jeff Poole
NRCan / ESS / GSC - Atlantic	Arther Jackson
NRCan / ESS / GSC - Atlantic	Barbe Szlavko
NRCan / ESS / GSC - Atlantic	Phil Moir
NRCan / ESS / GSC - Atlantic	Phil Spencer
NRCan / ESS / GSC - Calgary	Peter Neelands
NRCan / ESS / GSC - Ottawa	Guy Buller
NRCan / ESS / GSC - Ottawa	Jamie Rupert
NRCan / ESS / GSC - Ottawa	Robert Laramée
NRCan / ESS / GSC - Ottawa	Ross Murray
NRCan / ESS / GSC - Ottawa	Steve Adcock
NRCan / ESS / GSC - Quebec	Eric Boisvert
NRCan / ESS / GSC - Quebec	Heryk Julien
NRCan / ESS / GSC - Vancouver	Kaz Shimamura
NRCan / ESS / GSC - Vancouver	Marianne Quat
NRCan / ESS Info	Ben Chagnon
NRCan / ESS Info	Scott Tweedy
NWT - C.S. Lord Northern Geoscience Centre	Beth Sage
NWT - C.S. Lord Northern Geoscience Centre	Marcy MacDougall
Ontario Geological Survey	Brian Berdusco
Ontario Geological Survey	Jim Boyd
Ontario Geological Survey	Ross Kelly
Ontario Geological Survey	Steve van Haften
Ontario Geological Survey	Zoran Madon
Quebec Ministère des Ressources naturelles	Charles Roy
Saskatchewan Northern Geological Survey	Bill Slimmon
Yukon Geological Survey	Amy Stuart

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Alberta Energy and Utilities Board	Barry Fildes
Alberta Energy and Utilities Board	Desmond Wynne
Alberta Energy and Utilities Board	Joan Waters
British Columbia Energy and Mines	Larry Jones
British Columbia Energy and Mines	Nick Massey
Canadian Geoscience Council	Bob Mummery
Canadian Geoscience Council	Alan Morgan
GeoConnections	Dolores Durant
Manitoba Mineral Resources Division	Mark Pacey
Manitoba Mineral Resources Division	Paul Lenton
New Brunswick Natural Resources	John Langton
New Brunswick Natural Resources	Paul Rennick
Newfoundland and Labrador Mines and Energy	Gerry Kilfoil
Newfoundland and Labrador Mines and Energy	Larry Nolan
Newfoundland and Labrador Mines and Energy	Loretta Crisby
Nova Scotia Natural Resources	Brian Fisher
Nova Scotia Natural Resources	Jeff Poole
Nova Scotia Natural Resources	Mike Cherry
NRCan / ESS / GSC - Atlantic	Arther Jackson
NRCan / ESS / GSC - Atlantic	Barbe Szlavko
NRCan / ESS / GSC - Atlantic	Mark Williamson
NRCan / ESS / GSC - Atlantic	Phil Moir
NRCan / ESS / GSC - Atlantic	Phil Spencer
NRCan / ESS / GSC - Calgary	Chris Harrison
NRCan / ESS / GSC - Calgary	Peter Davenport
NRCan / ESS / GSC - Calgary	Ping Tzeng
NRCan / ESS / GSC - Ottawa	Dave Viljoen
NRCan / ESS / GSC - Ottawa	Eric Grunsky
NRCan / ESS / GSC - Ottawa	Guy Buller
NRCan / ESS / GSC - Ottawa	Jamie Rupert
NRCan / ESS / GSC - Ottawa	Lesley Chorlton
NRCan / ESS / GSC - Ottawa	Linda Richard
NRCan / ESS / GSC - Ottawa	Robert Laramee
NRCan / ESS / GSC - Ottawa	Ross Murray
NRCan / ESS / GSC - Ottawa	Steve Adcock
NRCan / ESS / GSC - Ottawa	Warner Miles
NRCan / ESS / GSC - Quebec	Kathleen Lauziere
NRCan / ESS / GSC - Vancouver	Kaz Shimamura
NRCan / ESS Info	Andy Moore
NRCan / ESS Info	Paul Huppe
NRCan / ESS Info	Scott Tweedy
NRCan / ESS Info	Terry Houlahan
NRCan / GeoAccess Division	Anna Regan
NWT - C.S. Lord Northern Geoscience Centre	Beth Sage

NWT - C.S. Lord Northern Geoscience Centre	Marcy MacDougall
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Ontario Geological Survey	Steve van Haften
Ontario Geological Survey	Zoran Madon
Quebec Ministère des Ressources naturelles	Charles Roy
Saskatchewan Northern Geological Survey	Bill Slimmon
Yukon Geological Survey	Amy Stuart