

‘MAPPING THE FUTURE AND BUILDING ON STRENGTHS’

British Columbia Geological Survey Workshop Overview (March 11-12, 2008)



INFORMATION CIRCULAR 2009-5



Ministry of
Energy, Mines and
Petroleum Resources

Executive Summary

British Columbia Geological Survey staff and some key guests met for two days in March 2008 to discuss the future for the organization. The Workshop was a particularly timely given the plans to hire more staff and the approaching retirement over the next eight years of a number of staff. The objective was to determine how best to chart the future path of the Survey.

The meeting started with a series of presentations by government and industry leaders to set the stage for the rest of the Workshop. The speakers provided context for how to proceed and presented a variety of visions for the future of the British Columbia Geological Survey. Several speakers spoke about the Survey's mandate. Their recommendations ranged from staying close to the status quo to an ambitious and aggressive approach to responding to emerging societal issues related to geosciences, such as climate change.

The first day concluded with an initial breakout session to analyse gaps in government geoscience delivery relevant to British Columbians. The list was then shortened to reflect only those gaps considered relevant to the British Columbia Geological Survey at the present time. As the Survey frequently works and collaborates with other agencies, the gap analysis included identifying potential partners.

The second day was devoted to a series of targeted sessions for staff participation. These included focus sessions with smaller groups to discuss Survey activities – coal, database management and website, geochemistry, geoscience assistants, industrial minerals, mapping, mineral deposits, publications: products and marketing and Quaternary geology. As well, all participants were included in sessions regarding Clients; GIS, Geomatics and Geophysics and Post-retirement Work Options. Comments and recommendations were recorded for all the sessions. The Workshop ended by compiling a list of the most important recommendations which are profiled in this Overview Report.

The Workshop clearly identified a desire from most staff and some of the invited guests to continue to focus the Branch's efforts on traditional activities with a primary focus on the mineral industry and existing government clients. Several aspects of the Survey were identified as needing new staff and/or enhanced resources, including aggregate, coal, geochemistry and geophysics. The importance of staff succession planning was brought up several times and the need for the coal geologist and geochemist positions were strongly profiled.

The Workshop outlined some of the steps/products that needed to be addressed over the next five years to ensure the Branch continues to innovate and produce more valuable products. For example, the discussions included using Google Earth, presenting 3D geology and starting continuous updates of the province digital bedrock geology map.

All participants left the Workshop with a renewed understanding of some of the geoscience opportunities to be considered and also a clearer sense of geosciences activities that were not projected to be part of the British Columbia Geological Survey's program.

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‘MAPPING THE FUTURE AND BUILDING ON STRENGTHS’

Workshop Overview

Introduction

The British Columbia Geological Survey (BCGS) of the Mining and Minerals Division of the Ministry of Energy, Mines and Petroleum Resources held a two day workshop to review its current situation and map its future. Also known within government as the Geological Survey Branch, the Survey, and its predecessor organizations, have been delivering applied geoscience for the British Columbia government for more than 110 years. The BCGS has a long tradition of providing critical advice to government and attracting mineral exploration to the province.

The workshop brought together 40 employees, alumni, contractors and guests in an interactive workshop designed to give all BCGS staff a chance to help map the Survey’s future.

Tania Demchuk, Paul Schiarizza, Graham Nixon and Tasneem Pirani coordinated the Workshop organization. The workshop was facilitated by Mackenzie Kyle of The Beringer Group and the initial notes were compiled by one of his staff. Unfortunately some of these digital notes from the meeting were lost shortly after the Workshop. The Workshop Overview was completed by the Survey management Team.

The meeting started with a series of presentations by internal government executive and external representatives from industry and other government geoscience agencies (see agenda, Appendix A). These presentations were intended to present a variety of opinions on the forces impacting the BCGS and the opportunities for the future. The rest of the Workshop was designed to capture the staff understanding and suggestions on how the Survey could move forward through breakout sessions with specific topics. Towards the end of the meeting the staff identified the highest priority recommendations for consideration and possible implementation.

Meeting Objectives

The workshop participants reviewed the changing workplace demographics and were asked to contribute their knowledge and ideas to determine how the BCGS should move forward.

The primary driver for the workshop was the changing workplace demographics in the Survey:

- after more than ten years with no new positions, the BCGS is hiring new staff ;
- most of the existing staff will be retiring over the next eight years; and
- all of the management team will have changed in the next five to six years.

It was judged to be time to revisit the road map for the BCGS on how best to serve British Columbians and the government with a new generation of geoscientists. This road map will recognize the many roles a Geological Survey can play in today's modern world and choose the ones that best fit BCGS’ ability to serve government and clients and work with partners. It was also intended to provide the BCGS Management Team with feedback on their recent decisions.



Workshop Participants Enjoying
a Blustery Victoria Day in March

Day 1 – Focus on Clients

Presentations and breakout sessions for the first day of the workshop focused on client service and perspectives on the role and future of the British Columbia Geological Survey. Guest speakers were chosen to reflect the Survey's wide variety of clients and partners. They were invited to challenge the Workshop participants with their vision of how the BCGS could move forward. The opening presentation is included in Appendix A to provide more of the context for the Workshop.

Speakers

Dave Lefebure (BC Geological Survey, Chief Geologist): **Mapping the Future and Building on Our Strengths**

- Reviewed impact on Canadian geological surveys of aging staff
- Outlined BC Geological Survey's current role
- Profiled how other geological surveys are changing
- Explained the importance of the geoscience assistants to the BC Geological Survey
- Discussed the collaborating roles of Geoscience BC and BC Geological Survey

Eric Partridge (Mining and Minerals Division, ADM): **Changing roles of BC Government Ministries, opportunities/challenges and how this relates to BC Geological Survey**

- Spoke to the Williams decision on meaningful consultation with First Nations and how that affects GSB operations.

Tim Sheldon (Ministry of Forests and Range, ADM): **Inter-ministry collaboration and the virtual ministry concept**

- Discussion on staff succession issues (Swiss cheese model) and looking at ways to improve inter/intra-ministry relations (breaking silos)

Ron Smyth (Offshore Oil and Gas Division, MEMPR, Chief Scientist): **Expanding the vision of the BCGS, what happened in the 90's and what could happen now**

- Government support and activities follow cyclical patterns.
- Discussion of the pitfalls of expanded mandates and the need to preserve core activities.
- Small can be beautiful.
- If the need arises, pursue partnerships to deliver secondary activities.



Steve Cook from Teck discussing the relevance of geochemistry to the BCGS.

Vic Levson (Resource Development and Geoscience Branch, Oil and Gas Division, MEMPR, Executive Director): **Provincial geoscience needs and intra-ministry collaboration potential**

- The advantages of being corporate and collaborating with his Branch.
- There are funds in Government – go and get them.
- The importance of value-added products and advertising them.

Dave Caulfield (Rimfire Minerals Corporation, Chairman; Geoscience BC board member) and John Thompson (Teck-Cominco, Vice President, Technology; Geoscience BC board member): **Industry vision of BC Government geoscience: Delivery and its relationship to other geoscience organizations**

- Industry does not care who delivers geoscience as long as quality data is produced.
- Industry supports all geoscience agencies in BC.

Mapping the Future and Building on Strengths

- Industry recognizes the need for the BCGS experts and Geoscience BC does not plan to build their own team of geoscience experts.
- The geoscience agencies need to work together and advocate for each other (Team BC).
- One technical advisory committee is needed for geoscience in BC.

Chris Barnes (Director, NEPTUNE Canada): **What is shaping the geoscience agencies in Canada and globally?**

- Recognised the essential roles of earth-systems science in the modern world.
- Identified the changing societal needs leading to a broader mandate for geoscience organizations.*
- Encouraging diversification of the BCGS to ensure vitality and support growth.
- Recommended that BCGS as the lead geoscience organization in the province should be supporting more geoscience delivery by agencies.

Carmel Lowe (Geological Survey of Canada, Director): **Future outlooks from the GSC and potential for collaboration**

- Emphasised the broad mandate of GSC geoscience.
- History of collaborating with BCGS.
- Current GSC budget increase (GEMS) allows possibility of partnerships, particularly in northern BC.

Ward Kilby (Consultant): **The future of geoscience data, directions for database management No hammer required – go Google.**

- Greater availability of online data sites – no downloads required – go virtual.
- Greater availability of cheap or free data manipulation tools.

Steve Cook (Teck Cominco, Chief Geochemist): **Geochemistry now and in the future: Do surveys still need exploration geochemists?**

- Geochemistry is a cornerstone of mineral exploration.
- Training geologists in geochemical methods and techniques.
- Modern geological surveys should employ two geochemists to achieve productive synergies.

Day 1 - Break Out Session:

Identifying BC Geoscience Gaps

Day 2 – Building the Future

The second day was designed to allow staff to discuss their thoughts and concerns regarding the future of the BCGS within the context of smaller groups to encourage broader participation. For several topics, all participants participated. At the end of the day, there was discussion of the most important recommendations.

Day 2 - Break Out Sessions:

Coal
Database management and website
Geochemistry
Geoscience assistants

Industrial Minerals
Mapping (2 sessions)
Mineral Deposits
Publications: Products
Publications: Marketing
Quaternary geology



Larry Jones facilitating one of the many breakout sessions where staff tabled their views regarding the way forward for a particular BCGS activity.

Day 2- Group Sessions:

GIS, Geomatics and Geophysics
Post-retirement work options
Gaps and recommendations
Clients

Outcomes

A complete listing of the flip charts of the various group and breakout sessions is presented in Table 2 and Appendix D. The recommendations from these sessions were ranked at the Workshop and the higher priority ones area are listed below in the main body of the report.

List of Clients

The BCGS currently provides services to a wide variety of public and private sector clients (Table 1). The emphasis of the Survey on mineral exploration and mining and government clients reflects its history and the Ministry's mandate.

The BCGS has the potential to expand its services. The BCGS could target specific communities, such as those affected by the Pine Beetle devastation or assist the tourism industry in promoting geotourism.

Table 1. Partial BCGS Client List

Public Sector	Private Sector
BCGS Staff	Agriculture
Coast Guard	Business
First Nations	Consultants
Government	Engineering
Parks (provincial and municipal)	Environmental
Post Secondary Institutions & Students	Industry
Public	Insurance
Search & Rescue	Investors
Tourism	Legal
	Mining
	Prospectors
	Real Estate
	River Rafting
	Tourism

BCGS Gap Analysis and Potential Partnerships

All participants participated in identifying potential geoscience service gaps of relevance to British Columbia and the BCGS. These gaps were analysed to determine potential BCGS activities and partners. The list was not intended to be exhaustive.

This summary does not include geoscience gaps identified by participants that were judged to be unrelated to the BCGS as this list was lost. The BCGS will consider hosting a BC Geoscience Forum at some point to discuss geosciences gaps relevant to British Columbians with other agencies.

Table 2. List of Geoscience Gaps of Particular Relevance to BCGS and Partners

GAP	BCGS	PARTNER
Hazards	Build landslide database and add as layer to MapPlace Keep an 'eye out' during field work Database that drives what mappers do	Seismic program (including compilation of existing geotechnical borehole data)
Analytical Value Added Staff group (branch mtg) to define and review, determine what clients require	Explanation/simplification of data	
Land Use Coordination	Respond to mineral assessment requests (includes treaty assessments)	
Aggregates	RDGB/RSB	
Connection to Prospectors		Mainly carried out by regional colleges and BCIT
Frontier Geoscience and presence in the north	Mainly GSB	Partner with GSC
Databases	Update database Capture new data	
Mapping	More mapping with quaternary and till mapping focus	
Provincial Model	Update provincial model	
Tools	Share data Service oriented architecture	
Strategic Environmental Issues		CO2 sequestration Urban geology?
New Staff	Mentoring	
3D Geology		Use technology that is already succeeding (i.e. petroleum industry, Laurentian University) MOU with other jurisdiction (i.e. Tasmania)
MINFILE	Coding	
Marketing	Primarily with help from regional geologists	
Coal	Follow-up on delinquent reports (not capturing industry data)	

Mapping the Future and Building on Strengths

GAP	BCGS	PARTNER
Mineral Industry		In partnership with Titles, follow-up on Assessment Reports and work on amending legislation for full data disclosure
Closing Mines		In partnership with rest of division, collect information on new mines Waste rock tailings information Collecting data on closing mines and companies leaving
Assay Licenses	Licensing	Advisory council provides funding
Database Links		In partnership with rest of division
Public and other Professionals Education and Explanation of Geochemical Thresholds		Contribution to geochemical baseline data (GSB collects data)



Graham Nixon, Ray Lett and Chris Barnes (UVic) enjoying the chance to talk about staff recognition, succession and the potential for an expanded mandate.

BCGS Workshop Priority Recommendations

Twenty six recommendations were identified as being higher priority by staff at the Workshop and are listed below. A complete list of the recommendations with more detail is given in Appendix E.

Coal

1. Have a coal resource geologist (deposit specific)

Data Management

2. Investigate opportunities for partnerships (environmental, climate change)

Geochemistry

3. Hire a geochemist
4. Maintain assayer certification program
5. Maintain the lab and quality control process

Geoscience Assistants¹

6. Identify two geoscience assistants to organize bi-weekly assistants meetings and coordinate activities within the Branch
7. Encourage geoscience assistants to familiarize themselves with all aspects of the Branch
8. Facilitate overlap among assistants whenever possible
9. Assign a geoscience assistant responsibility for regular updating of the centralized Manifold manual
10. Provide better, more structured feedback and follow-up to geoscience assistants
11. GSB management team to encourage more ideas from the geoscience assistants

GIS

12. Deliver a GIS compatible expert synthesis at the end of every major project

Industrial Minerals

13. Cooperate on Ministry CO₂ sequestration projects

Mapping/Integrated Mapping

14. Deliver strategic mapping with at least one 'Frontier Mapping' project on the go at any given time
15. Re-establish mapping north of 55
16. Re-establish the mapping project cycle that includes time for synthesis including updating corporate databases and maps.

¹ In 2007 the BCGS had a large number of temporary employees, many of whom were students. However, some of these employees were recent graduates. It was decided that we should use the term "Geoscience Assistant" to refer to all these positions to avoid characterizing staff members incorrectly as students.

Mineral Deposits

17. Project geologists to alternate between mapping projects and mineral deposit studies
18. Identify and develop BC focused mineral deposit experts
19. Complete annual mineral deposit field trips

Publications (Products)

20. Continue colour and digital distribution of Geological Fieldwork
21. Proactively organize and deliver client-oriented field trips and workshops
22. Consider a new publication series for outreach-type materials

Publications (Marketing)

23. Develop a marketing strategy to increase awareness of the GSB's products and services
24. Continue support for external publications as a demonstration of GSB expertise

Quaternary

25. Develop a Quaternary layer in the BC Map
26. Disseminate Quaternary knowledge to staff



Break in the Workshop proceedings.

BCGS Workshop Recommendations Initiated March 2008

The following recommendations were adopted by the BCGS Management Team immediately following the Workshop. Many of them are from the priority list given above; however, others are from the more detailed lists and general discussions.

The other Workshop recommendations require more discussion and are subject to determining aspects, such as the source of resources or seeking executive approval. All British Columbia Geological Survey staff are charged with the responsibility of keeping these recommendations on our “radar screen” and looking for ways to make them happen.

Coal

- Have a coal resource geologist (deposit specific)
- Cooperate on Ministry CO₂ sequestration projects

Geochemistry

- Hire a geochemist
- Maintain assayer certification program
- Maintain the lab and quality control process
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- Provide better, more structured feedback and follow-up to geoscience assistants
- GSB management team encourages more ideas from the geoscience assistants

Mapping

- Deliver strategic mapping with at least one ‘Frontier Mapping’ project on the go at any given time
- Re-establish mapping north of 55
- Re-establish the mapping project cycle that includes time for synthesis including updating corporate databases and maps.

Mineral Deposits

- Project geologists alternate between mapping projects and mineral deposit studies
- Identify and develop BC focused mineral deposit experts
- Complete annual mineral deposit field trips
- Investigate opportunities for partnerships (environmental, climate change)

Partnerships

- Partnership projects proceed only with resources from external partners and funding.
- We will supply our expertise (staff, geoscience assistants) to support the project initiation and ongoing oversight
- Projects will be based on available partners and limited to one or two at a time

Publications

- Continue colour and digital distribution of Geological Fieldwork
- Proactively organize and deliver client-oriented field trips and workshops
- Consider a new publication series for outreach-type materials
- Develop a marketing strategy to increase awareness of the GSB's products and services
- Continue support for external publications as a demonstration of GSB expertise

Quaternary

- Develop a Quaternary layer in the BC Map
- Disseminate Quaternary knowledge to staff

Future Path for the British Columbia Geological Survey

The Workshop clearly identified a desire from most staff and some of the invited guests to continue to focus the Branch's efforts on traditional activities with a primary focus on the mineral industry and existing government clients. Several aspects of the Survey were identified as needing new staff and/or enhanced resources, including aggregate, coal, geochemistry and geophysics. The importance of staff succession planning was brought up several times; the positions of coal geologist and geochemist were strongly profiled.

The Workshop outlined some of the steps/products that needed to be addressed over the next five years to ensure the Branch continues to innovate and produce more valuable products. For example, the discussions included using Google Earth, presenting 3D geology and starting continuous updates of the province digital bedrock geology map.

All participants left the Workshop with a renewed understanding of some of the geoscience opportunities to be considered and also a clearer sense of geosciences activities that were not projected to be part of the British Columbia Geological Survey's program.

Appendices

Appendix A: Agenda

Appendix B: Participants

Appendix C: Opening Presentation

Appendix D: Flip Charts

Appendix E: Detailed Recommendations

Appendix A – Workshop Agenda Day One

March 11, 2008		
FOCUSING ON OUR INTERNAL CLIENTS		
8:00	coffee & muffins	Hotel Grand Pacific, Vancouver Island Ballroom, west
8:30	MacKenzie Kyle	Opening - Setting the stage for the day - workshop objectives
8:40	Dave Lefebure	Welcome and how other surveys are changing
9:00	Eric Partridge	Moby Dick
9:15		questions/discussion with Eric and Dave
9:30	Tim Sheldon	Interministry collaboration
9:45	Ron Smyth	Expanding the vision of the BCGS, what happened in the 90's, what might happen now
10:00		questions/discussion with Tim and Ron
10:15		COFFEE (30 minutes)
10:45	Gio Puggioni	First Nations and the GSB
11:00	Vic Levson	Provincial geoscience needs and intra-ministry collaboration potential
11:15	Discussion 1 (group)	What geoscience is needed by government, but not currently being done in BC? How will changing government models influence the BCGS?
IMPROVING CONTACT WITH ALL CLIENTS		
12:00		LUNCH (60 minutes)
1:00	John Thompson Dave Caulfield	The role of geoscience organizations in BC, collaboration among them
1:20		discussion and questions for John Thompson and Dave Caulfield
1:30	Chris Barnes	What is shaping the geoscience agencies in Canada and globally?
1:45	Carmel Lowe	GSC future outlooks and potential for collaboration
2:00		discussion with Chris and Carmel
2:15		COFFEE (15 minutes)
2:30	Ward Kilby	The future of geoscience data, directions for database management
2:45	Steve Cook	Geochemistry now and in the future
3:00	Discussion 2 (group)	What Geoscience should the survey be doing? (same as now / more / selectively more)
4:15	Dave Lefebure	closing for Day 1, what to expect for tomorrow
4:30		END

Appendix A – Workshop Agenda Day Two

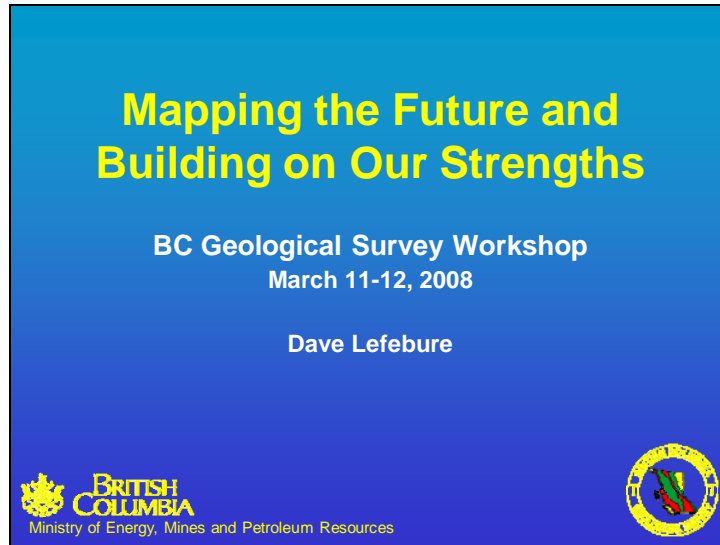
March 12, 2008		
BUILDING FOR OUR FUTURE: breakout sessions		
8:00	coffee & muffins	Hotel Grand Pacific, Vancouver Island Ballroom, west
8:30	Mackenzie	Welcome, what we learned yesterday, the objective for today, questions/feedback
8:40	Breakout	Mapping (max. 6 people) (Saltspring Room) Geoscience Assistants (Vancouver Island Ballroom) Industrial Minerals & Coal (Saturna Room)
9:20	Breakout	Mapping (max. 6 people) (Saltspring Room) Mineral Deposits (Saturna Room) Geochemistry (Vancouver Island Ballroom)
10:05		COFFEE (25 minutes)
10:30	Breakout	Publications & Products (Vancouver Island Ballroom) Quaternary (Saturna Room) Database Management & Website (Saltspring Room)
11:15	Breakout	GIS & Geomatics (everyone) (Vancouver Island Ballroom)
12:00	Dani Alldrick & Richard Booth: Post-retirement work options	
BUILDING FOR OUR FUTURE: issues & priorities		
12:15		LUNCH (45 minutes) Possible attendance by Minister Kruger
1:00	Reporting out (group)	Top 3 priorities from each group (result in a list of issues + solutions)
2:15		COFFEE (15 minutes)
2:30	Discussion and summing up (group)	(Lead by Dave Lefebure and Mackenzie Kyle) * Common objectives for moving forward * Expertise needed in coming years
4:15	Lefebure/Kyle	Closing remarks
4:30		END

Appendix B - Workshop Participants

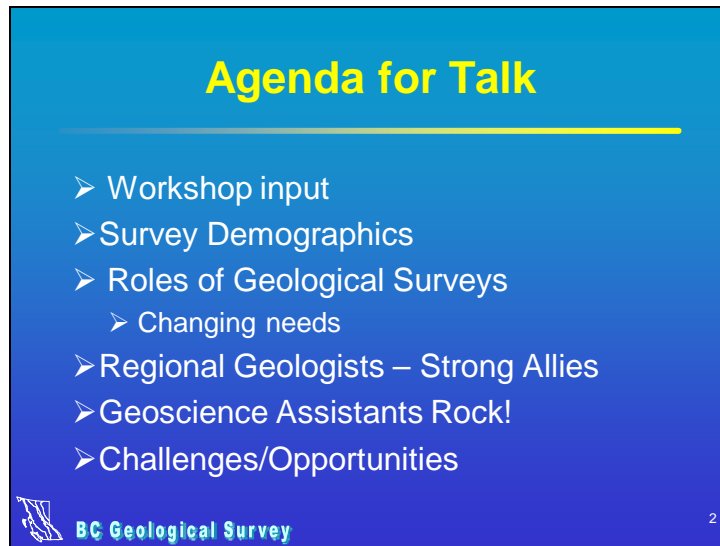
Permanent Staff	Speakers
Dani Alldrick Yao Cui John DeGrace Laura DeGroot Tania Demchuk Travis Ferbey Kirk Hancock Larry Jones Dave Lefebure Andrew Legun Ray Lett Jim Logan JoAnne Nelson Graham Nixon Bruce Northcote Nick Massey Mitch Mihalynuk Taz Pirani Paul Schiarizza Ron Smyth George Simandl Alan Wilcox	Chris Barnes Dave Caufield Steve Cook Ward Kilby Eric Partridge Vic Levson Carmel Lowe Tim Sheldon John Thompson (phone)
Absent	Geoscience Assistants
Pat Dejardins Larry Diakow	Katharine Benning Peter Chan Mandy Desautles Alan Duffy Sarah Meredith-Jones Paul Scott Caiome Peat Tiara

Appendix C – Opening Presentation

Slide 1



Slide 2



Slide 3

BCGS workshop

- Why have a workshop now?
- Why have we invited outsiders?
- What results do we want?
- What is your responsibility?
- How do we stay among the best geological surveys?

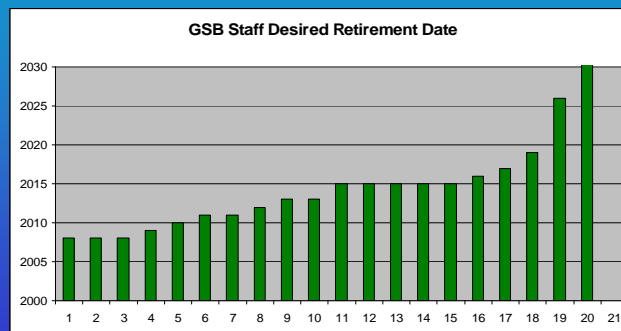


BC Geological Survey

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Slide 4

Fifteen Staff Retiring by 2015

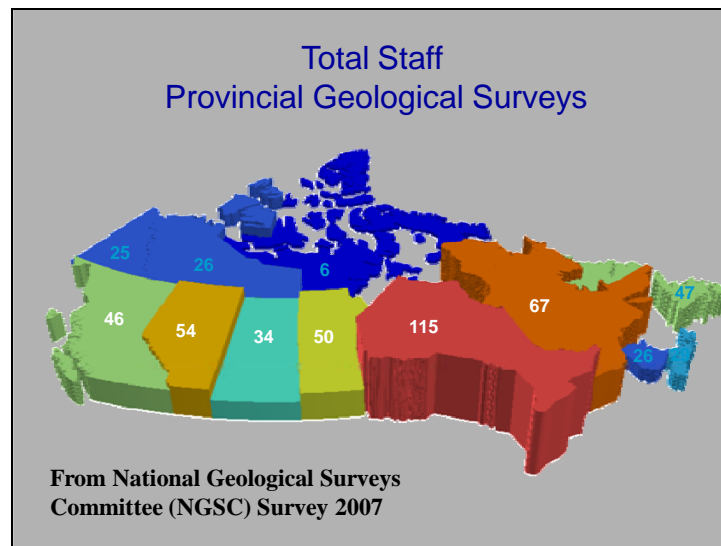


BC Geological Survey

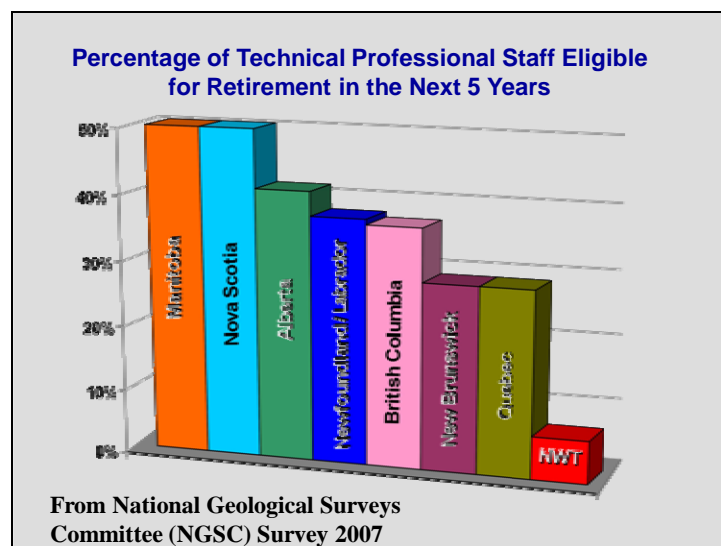
June, 2007

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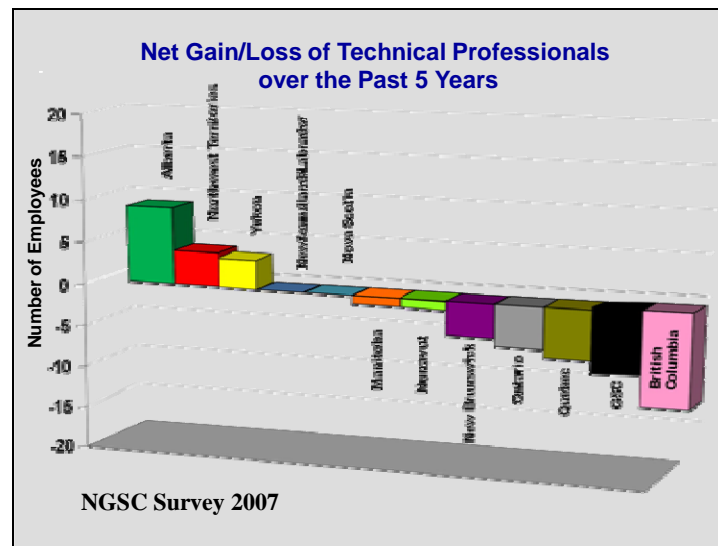
Slide 5



Slide 6



Slide 7



Slide 8

Why Work for Government?

Government

- Serving clients and public good
- Variety of activities
- Mixture of travel and time with family
- Secure job, benefits and pension
- Adequate income

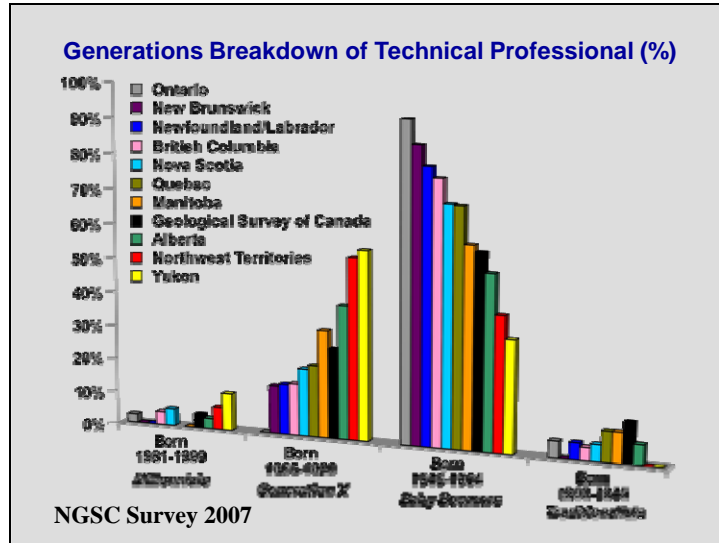
BC Geological Survey

- Recognition for serving clients
- Strong team with common objectives
- Ownership of projects
- Productive workplace
- Fellowship and learning

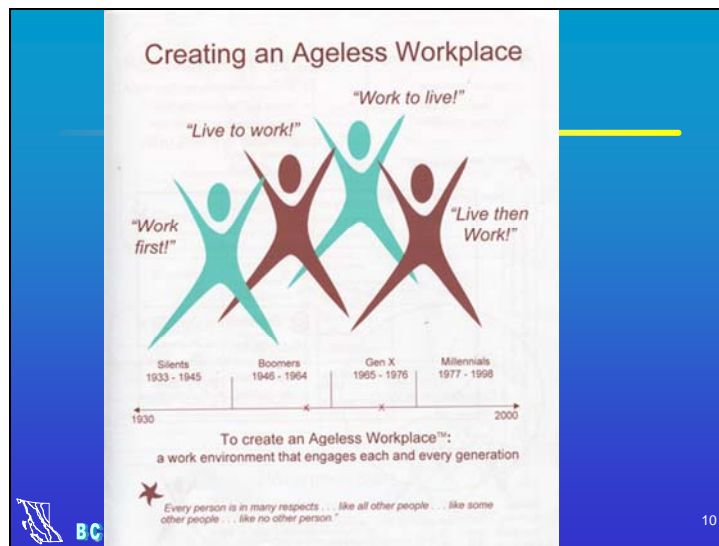
BC Geological Survey

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Slide 9



Slide 10



Slide 11

Why Governments Have Geological Surveys

- Manage Crown resources
 - Minerals, coal, oil and gas, geothermal
 - Ownership or tenure
 - Zoning or land use
 - Attract investment to create wealth
 - Ensure mineral supply essential to developed economy
 - Maximize benefit to British Columbians
- Public Good
 - Infrastructure – roads, dams, buildings
 - Hazards - landslides, earthquakes, floods
 - Environmental and Health - groundwater



BC Geological Survey

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Slide 12

Ministry of Energy, Mining and Petroleum Resources

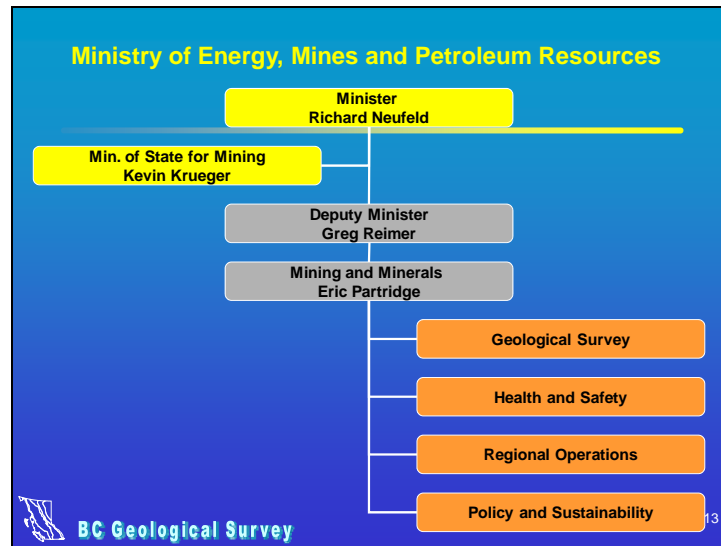
The Geological Survey Branch (GSB) is the agency which links government, the mineral industry and British Columbians to the province's geology and mineral resources.



BC Geological Survey

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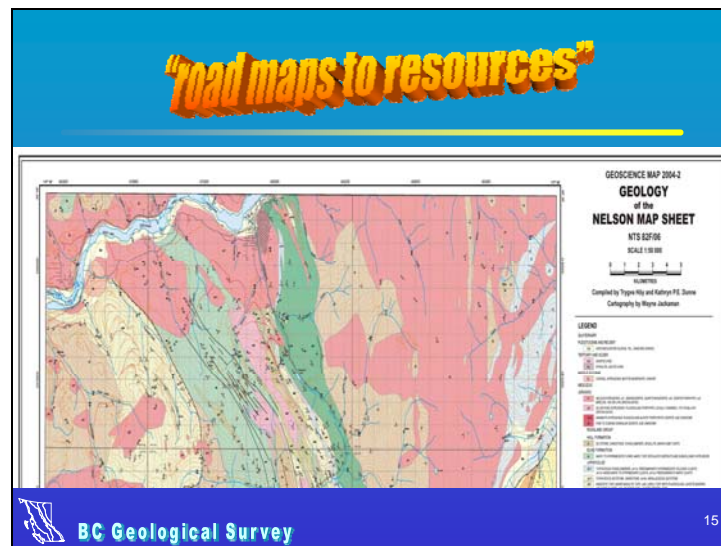
Slide 13



Slide 14



Slide 15



Slide 16

Technical Marketing

Selling BC's Mineral Wealth

Technical marketing – aimed at professional staff and exploration managers who choose the target jurisdictions

- Speak their language
- Add value to their jobs
- Explicit message that government investing in mineral exploration
- **Numerous examples of staff providing key linkage to a mineral discovery**

BC Geological Survey

Slide 17

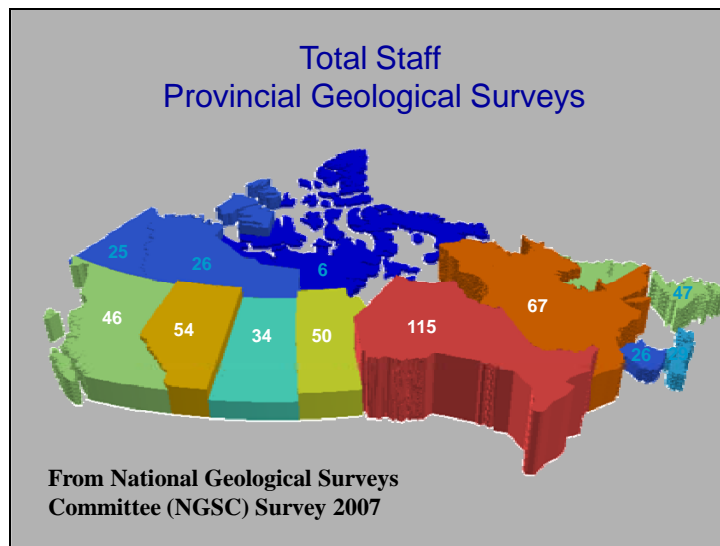
 **How Do We Measure Success?**

- Results
 - Mineral tenure, investment, new players
 - Mine developments and greater minerals production
- Client Approval
 - Industry, government, British Columbians
- Products
 - Maps, reports, presentations, workshops, advice
 - Easy access to datasets and information
- Comparison
 - Productivity and effectiveness
- Recognition













a tradition of excellence and service

 **BC Geological Survey** 17

Slide 18



Slide 19


Provincial/Territorial Geological Surveys	
 New Brunswick Geological Surveys Branch Department of Natural Resources	 British Columbia British Columbia Geological Survey Ministry of Energy, Mines and Pet. Res.
 Nova Scotia Geological Services Division Department of Natural Resources	 Yukon Yukon Geological Survey Department of Energy, Mines and Res.
 Ontario Ontario Geological Survey Ministry of Northern Development and Mines	 Alberta Alberta Geological Survey Energy Resources Conservation Board
 Quebec Direction de Géologie Québec Ministère des Ressources naturelles et de la Faune	 Saskatchewan Saskatchewan Geological Survey Ministry of Energy and Resources
 Manitoba Manitoba Geological Survey Manitoba Science, Technology, Energy and Mines	 Newfoundland and Labrador Geological Survey of Newfoundland and Labrador Department of Natural Resources
 Northwest Territories Northwest Territories Geoscience Office	 Nunavut Canada Nunavut Geoscience Off.

Listed in order of joining Canadian confederation

Slide 20

Jurisdictions with “Classic” Geological Surveys

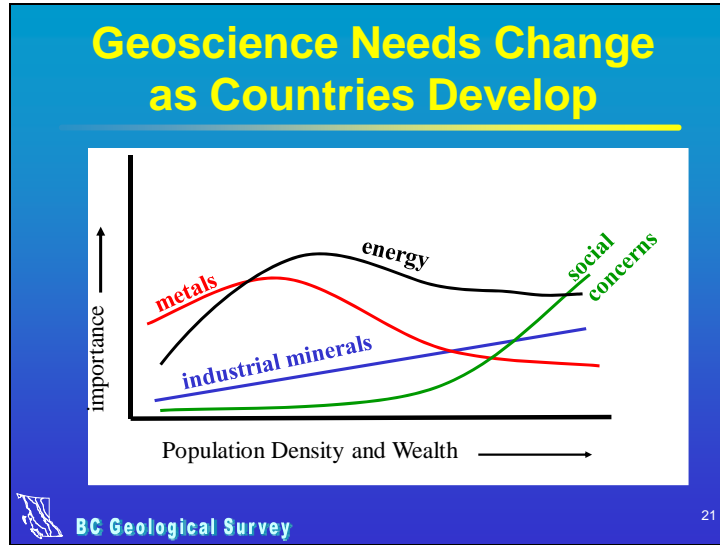
- Australia and most Canadian jurisdictions (British Columbia, Quebec, Yukon), Chile
- Maintain relatively large geological surveys in resource-based ministries or departments
- All, or almost all, A-base funds
- Strong focus new geoscience data to attract mining investments
- Devote little effort to other geoscience services
- Focus on restricted client base



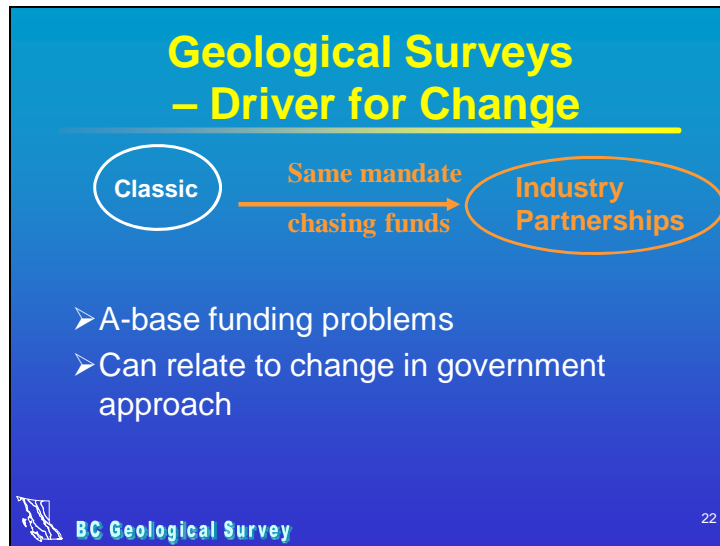
BC Geological Survey

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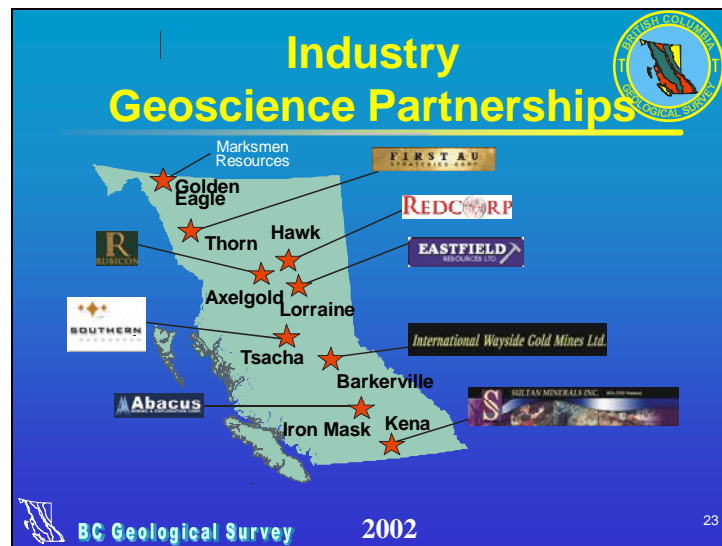
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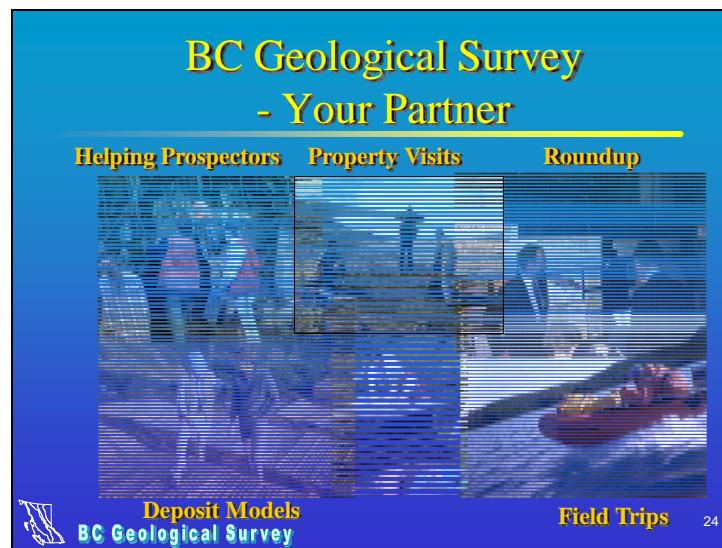
Slide 22



Slide 23



Slide 24



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Private Sector Oriented Geological Surveys

- New Zealand
- Emphasis on services to paying clients
- Industry funds dominant??
- Survey contracts back to government
- Mining investment less important
- Specific and select client base



BC Geological Survey

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New Zealand



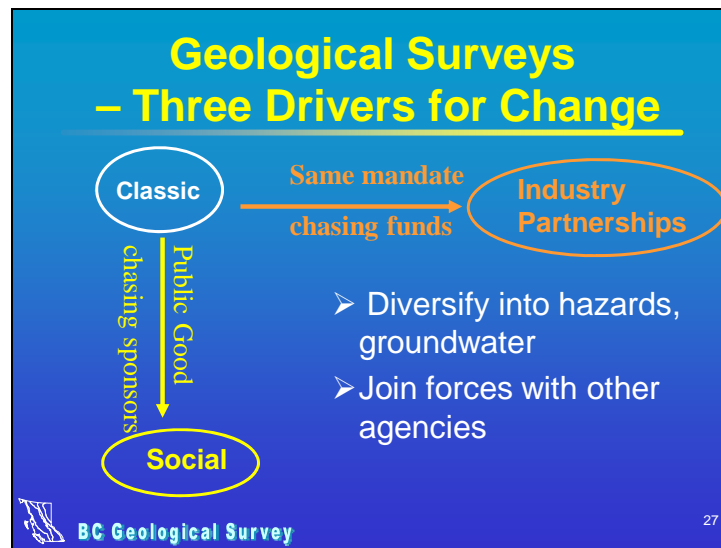
- New Zealand Crown Research Institute
 - a government-owned research company
- Mandate (260 staff)
 - assessing risks and managing impacts of earthquakes, volcanoes, landslides, tsunamis
 - Evaluating/managing oil, gas, geothermal, groundwater & mineral resources using earth science
 - applying isotope chemistry and nuclear technology in biological and medical research, industrial processes, archaeology, fisheries and atmospheric research, oceanography, geology, hydrology, and exploration, and environmental monitoring.



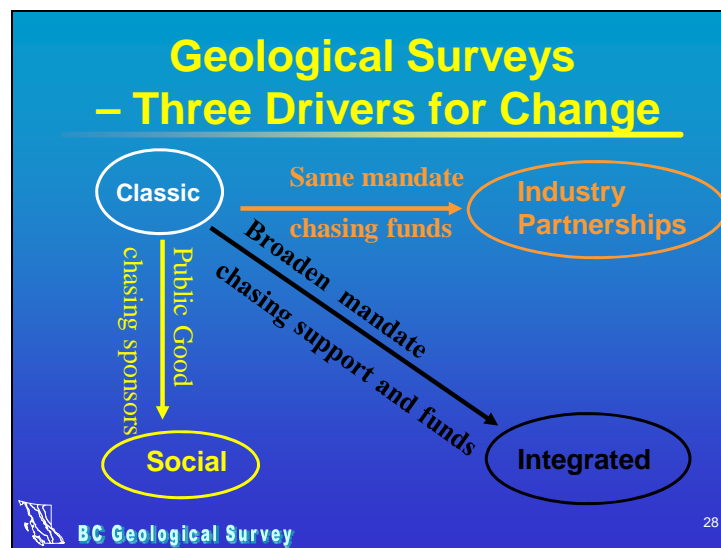
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Integrated Geological Surveys

- Britain, Finland, France, Ireland, Canada, USA
- Many American States, Nova Scotia
- Within a variety of ministries
- A-base funds important
- In some cases 20 to 50% of funds derived from other government agencies/contracts or industry
- Mining investment importance declining
- Emphasis on services to communities; sometimes international in nature
- Have large and diverse client base



BC Geological Survey

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The Mission of the British Geological Survey

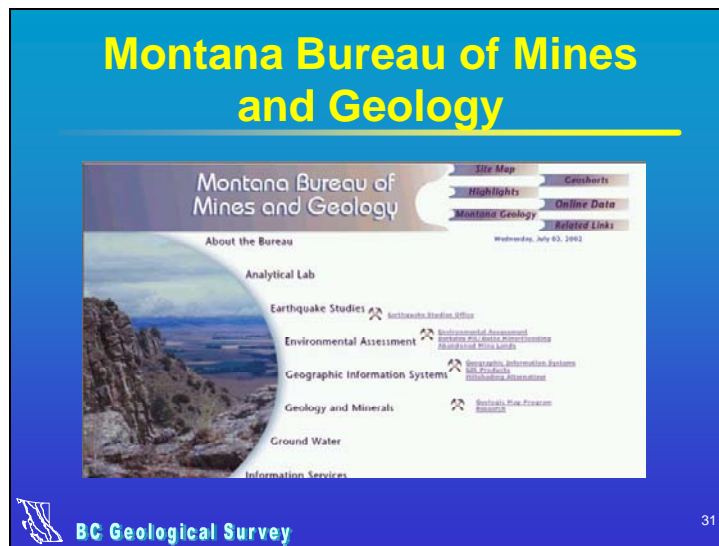
- Advance geoscientific knowledge of the United Kingdom landmass and its adjacent continental shelf by means of systematic surveying and data collection, long-term monitoring and high-quality research.
- Provide comprehensive, objective, impartial and up-to-date geoscientific information, advice and services which meet the needs of customers in the industrial, engineering, governmental and scientific communities of the UK and overseas, thereby contributing to the economic competitiveness of the United Kingdom, the effectiveness of public services and policy, and quality of life.
- Enhance the UK science base by providing knowledge, information, education and training in the geosciences, and promote the public understanding of the relevance of geoscience to resource and environment issues.



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Montana Bureau of Mines and Geology

Serving the citizens of Montana through geologic and hydrologic research and information.

Mandated to conduct research and assist in the orderly development of the state's mineral and water resources. As a non-regulatory agency, the bureau provides extensive advisory, technical, and informational services on geologic, mineral, energy, and water resources in the state. Increasingly, the bureau also is involved in the study of environmental impacts to land and water of any type.


 BC Geological Survey

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How do we stay among the best geological surveys?

- What about TLC?
- Expertise profile
- How is government changing?



BC Geological Survey

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Build on Survey Strengths

"The main strengths of the surveys have been the long-term custodianship of data, the systematic regional scale mapping, *knowledge of energy and mineral resources*, the provision of objective, impartial advice and some limited role in training geoscientists who then move to industry."

(Ovadia, 2004)




BC Geological Survey

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Key Challenges for the Future


- Coordinate data into homogeneous, cross-border, integrated systems
- *Expanding mandate to meet societal needs*
- Expand responsibilities “upstream” into licensing and investment phases and “downstream” into the environmental and social impacts.

 BC Geological Survey (Ovadia, 2004)₃₅

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A Little Help from our Friends

- Understanding – Surveys have to evolve from programs and clients of their past
- Support – Voices that speak to the long term, broad societal needs for geoscience information and expertise in government decision-making

 BC Geological Survey 36

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Who are our clients?

- Geologists, prospectors,
- Students, teachers,
- Ministers, government,
- Other agencies
-

Are our clients changing?





BC Geological Survey

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Your Regional Geologists




BC Geological Survey

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Mentoring Students - Training the Next Generation of Geoscientists



BC Geological Survey

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Geoscience Assistants

- Key part of the BC Geological Survey
- Representing yourselves and future staff
- You can help with suggestions
- Or ask questions?
 - Your perspective is needed

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Challenges/Opportunities Opportunities/Challenges

Internal	External
<ul style="list-style-type: none">➤ Succession➤ Retiring experts➤ New management team➤ Government changing➤ Funding sources➤ MEMPR mandate➤ Space	<ul style="list-style-type: none">➤ Attractive job market➤ Exploring in third dimension➤ Changing industry➤ Busy industry➤ New partner in Geoscience BC➤ More work needed<ul style="list-style-type: none">➤ Aggregate, coal, industrial minerals, mineral deposits, mapping,➤ New information technologies

Big province to cover!

 BC Geological Survey

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BC Geological Survey Staff



 BC Geological Survey *Tradition of excellence and service*

Appendix D – Flip Charts

FLIPCHART

CLIENT LIST

GSB staff!
Industry
Government (provincial, federal, local)
Prospectors
Investors
Consultants
Universities and colleges
Students
General public (requests increasing)
Business
Insurance companies
Coast guard, search & rescue, river rafters
Parks (provincial, municipal)
Tourism (potential for geotourism)
Engineering
Agriculture (vineyards)
Specific communities (i.e. Beetle kill areas, Greenfield sites)
First Nations (asset based info i.e. trap lines)
Legal (expert testimony, 3rd party validations, treaty negotiators)
Real estate (hazards)
Environmental groups (location of mines, baseline geotech)
Mine reclamation (history, hazards)

Summary of Key Points

- Have a coal resource geologist (deposit specific)
 - Re-establish coal assessment report oversight
 - Consider a carbon group task force
 - Cooperate on Ministry CO2 sequestration projects
1. New Geologist assigned to coal
 - MoFR, MoT, BCGS, RDGB
 - Industry \$
 - Ask Barry – where should coal be?
 - Devote more resources to CO2 seq. (e.g. reservoirs, structures)
 2. Coal assessment reports
 - No oversight
 - Delinquency
 - Glen Wonders ‘Coal Man’
 3. Form ‘Carbon Group Task Force’
 - Include CO2 sequestration
 - The ‘All Blacks’ (coal, CBG, CBM, CO2 seq)
 4. New resources for CO2 sequestration

Summary of Key Points

- Maintain an up-to-date catalogue of all geoscience databases
 - Establish a data model group to coordinate databases
 - Establish partnerships and standards for data delivery with geoscience organizations working in BC
1. Update process
 - Old data, new data, corporate data
 - Automated
 2. Design process/structure
 - Data model group
 - Post GLS, SQL (spatial extension), Oracle
 - Link databases
 3. LRDW
 - WMS
 - KML
 - KMZ
 - DIM
 4. Web delivery
 5. Partnerships
 - Ministries
 - GSC
 - GBC
 - Agencies

Summary of Key Points

- Hire a geochemist (2?)
 - Establish and implement a workable physical and digital archival system
 - Update all geochemical databases
 - Maintain assayer certification program
 - Maintain the lab and quality control process
 - Dissemination of geochemistry methodology via training and mentoring
1. Need 'New Ray' to replace 'X-Ray'
 - Technical support with continuity
 2. Funding for archiving
 - Where
 - How to retrieve
 3. Update existing databases

Right Now Fixes

- Geoscience assistants
 - databases
 - historic QC analysis
 - archiving (only if full time resource)
- GBC pays to hire database updater (partnership?)

Future Fixes

- Ground truthing
-
- Focus on training – internship with help for courses, encourage people to run external geochem courses
 - Explain what geochemical numbers mean (to internal/external clients)
 - Develop partnerships
 - Digital database of samples (where, how to retrieve) with georeferences

Geochemist's Activity List

- Look after geoanalysis (geochemical) *The Lab*
- Geochron contracts
- CSA agreements (set-up, \$, monitoring, invoices)
- Assayers certification (mandated)
- QC (internal & RGS)
- Focused/development geochem
- Training (students)
- Standards development
- THE LAB (archival, organization, sample prep)
- Safety
- Databases (lithogeochem, TGS, till, focused studies) – update, maintenance

Wish List/Future Work

- To do more training
- Researching analytical techniques
- Geochemical modeling (predictive)
- Ground truthing/remote sensing
- Partner for applied research (GBC)

Summary of Key Points

- Identify the derivative products and construct databases to support them
 - Data needs to be accurate, fresh and alive
 - See points listed in GIS
-
- Wrapped up with GIS – same issues
 - Not only data, but is done with data
 - Include analysis of geo-spatial data (will come with derivative products)
 - Self organizing maps
 - Map worming
 - Queries – what are the significant questions?
 - Clients – GSB is its own largest client
 - Data needs to be accurate, fresh and alive (many 20 years old)
 - GIS & Geomatics - Significant effort into data capture in application
 - Convert all old data/maps into current databases (Coop students or contracts?)
 - Standard legends
 - Standard cartographic presentation

Summary of Key Points

- Identify two geoscience assistants to organize bi-weekly assistants meetings and coordinate activities within the Branch
- Encourage geoscience assistants to familiarize themselves with all aspects of the Branch
- Facilitate overlap among assistants whenever possible
- Assign a geoscience assistant responsibility for regular updating of the centralized Manifold manual
- Provide better, more structured feedback and follow-up to geoscience assistants
- GSB management team encourages more ideas from the geoscience assistants

1. Internal Job Shadowing

- Bi-weekly assistants meeting
- Overlap between assistants (half or full day overlap to transfer knowledge)

2. Feedback & Follow Up

- Mid and end of term debriefs

3. Standardized Mapmaking Manifold Manual

- Mapping standards
 - Template
-

- Encouragement and more follow through with projects
- Not enough working with different people in the resource information side
- No opportunity to move up the ladder
- Team projects between assistants (e.g. see Vancouver office for a day as an add-on at Roundup)
- Better planned job descriptions and follow up (especially in resource management)
- Mitch – coffee meeting once a week
- Share workload
- More geology talks and being able to go to other talks
- 2-3 page orientation package before even coming into the office (e.g. what rocks to expect, etc)
- Better job description
- Pay

Summary of Key Points

- Data standardization is essential
 - Establish a uniform geological lexicon
 - Updating process tied to project cycles
-
- IT - hardware, software, application, network speed
 - Network – speed, distribution, space
 - Central – distributed
 - Systematic data capture
 - Training
 - Field mapping specification
 - GPS
 - Lexicon very important!
 - Tools – ENVI, Manifold
 - Updating process

Summary of Key Points

- Hire an aggregate geologist
- Complete more provincial aggregate assessments
- Continue focused studies on strategic commodities
- Investigate opportunities for partnerships (environmental, climate change)

1. Need Aggregate Geologist
 2. Ramp up Resource Assessments (aggregate inventory)
 3. Specific review of road construction to Resources
 - O&G, Stewart Omineca, SYD, NW porphyries, Klappan
 4. Focused Study on individual commodities
 - Germanium
-

Sustaining coastal communities

Mapping reservoirs for CO2 sequestration

- RDGB, BCGS
- Lime production
- CO2 emission reduction
- Resource assessment

Summary of Key Points

- Deliver strategic mapping with at least one ‘Frontier Mapping’ project on the go at any given time
 - Re-establish mapping north of 55
 - Partner with Geoscience BC, GSC, and Universities to deliver the mapping component of strategic projects
 - Re-establish the mapping project cycle that includes time for synthesis including updating corporate databases and maps
1. Mapping Areas
 - Strategic targets
 - More mapping north of 55
 2. Joint projects with Geoscience BC, GSB and TAC
 - Joint planning meetings and retreat
 - GSB’s main contribution: detailed geological mineral deposit studies, expert advice, mapping and surficial studies.
 3. Devote resources to synthesize products after season/project
 - Update ‘Massey Map’ at end of every project
 - Must be jointly owned, dynamic map
 - Updated in timely fashion from new projects
 - It is the responsibility of the submitter of updated geodata to ‘fix’ border problems (this is a last-year-of-project task – necessary)
 - Need to convert ‘flat’ database behind map to relational database
-
- We continue to need mix of strategic/targeted with frontier geologic mapping. This will be a core GSB priority for the branch.
 - Strategic programs to respond to political, economic and social needs.
 - We need a manager!
 - The present support level of geological associates is good.
 - Need to assure ongoing project support so that MSc students (2 year commitment) can be involved.
 - Aiming at GIS database that can be queried to construct derivative maps. Manage in such a way that updates can be incorporated easily.
 - Authoritative sources. Maintain necessary degree of data for public release. We store all data – they can selectively download.

Summary of Key Points

- Work with resource information section at data capture to prepare for field projects
 - Consider value-added options when producing additional maps
 - Pursue a seamless digital data flow from outcrop to dynamic map of BC and databases
 - Pursue integration of 3-D technology into interpretations and products
1. Geophysics, geochemistry, surficial recent activity, remote sensing, past activity
 - Increase impact of mapping recognized
 - Mapping is still needed
 - Compilation maps (multi-themed)
 2. 3D Maps
 - Good digital database
 - BCGS needs to increase tech to be competitive (internal or contract out?)
 - More frontier mapping
 - Make maps interactive, dynamic
 - Create a seamless view of data from fieldwork to maps to compilation maps, etc.
 - Be able to view raw data that makes up compilation maps or whatever it may be
 3. Communication with other ministries, agencies, companies, social capital
 - Using same maps

Summary of Key Points

- Project geologists alternate between mapping projects and mineral deposit studies
- Identify and develop BC focused mineral deposit experts
- Reassign existing staff and hire new resources
- Update deposit models and MINFILE
- Complete annual mineral deposit field trips

1. Develop Mineral Deposit Experts

- Porphyries
- Epithermal
- Manto – PbZ
- VMS
- Deposit experts for clients
- Alternate/oscillate geologist roles

2. More Support Staff and dedicated computers/network/IT

- Not project specific

3. Reinstate Project Cycle

- Mapping: 3+1
- Mineral deposits: 2+1
- Alternate/oscillate geologist roles

4. Update and Upgrade Deposit Models & MINFILE

- Don't do enough – reassign people and hire new people
- Annual group field trip (RGS)

Summary of Key Points

- Deliver a GIS compatible expert synthesis at the end of every major project
- Continue colour and digital distribution of Geological Fieldwork
- Establish a partnered outreach program through the geoscience assistants program
- Establish a process for GIS compatible Geoscience Maps
- Proactively organize and deliver client-oriented field trips and workshops
- Consider a new publication series for outreach-type materials

1. Bulletins

- Integrated document complete with GIS compatibility
- More people to aid Travis (job description too large)
- High long-term impact, profile expertise
- Integrate external papers
- Specific, thematic, important – need dedicated support (senior) plus 1 year “in” – no field commitment for first author
- Note increased efficiency of ongoing digital maps compilation.

2. Future Fieldwork

- This is our key annual release.
- Product in colour and digital
- Distribution – how many copies – look at additional distribution opportunities

3. Partnered outreach program

- Tourism
 - Industry
 - Signage in parks and roads (cool project for Geo Asst)
 - Road signage – proximal mine sites (e.g. Similco, Britannia)
 - Other signage on interesting geology
-
- Workshops, field trips for industry clients (at price of other commitments)
 - Presentations at community colleges as well as universities on geology as career.
 - Ensure we have a person whose job is at least 40% marketing
 - Maintain a presentation file appropriate for public (non-technical) that could be drawn on by projects
 - Jazz up release notifications
 - Internal marketing – talks open to Ministry
 - Need publication type for educational products to differentiate them from Geofiles with other technical products (e.g. geotours, geoscapes, etc)
 - Geoscience maps: move to cartographic plus GIS product
 - Take community map and reassign to ‘general’ series

Summary of Key Points

- Develop a marketing strategy to increase awareness of the GSB's products and services
- Continue support for external publications as a demonstration of GSB expertise
- Identify and pursue alternative forms of data distribution (e.g. webcasts, podcasts)

1. Conference Budget

- Early budgeting, planning and commitment

2. External Advertising

- Activities such as the past web map promotion for shale
- Northern Miner

Marketing Tools

- Conferences
- Trade missions
- Website
- Participation in external events
- Video conferencing
- Online workshops
- Alternative forms of data distribution (podcasts, webcasts)
- Glossies
- Release notification
- Workshops/short courses
- Field trips

Consensus of 6 people in breakout session	Client Ranking	Scientific Impact
Bulletin?	-	-
Open File	2	3
Paper	5	
Fieldwork	3	2
GeoFile	1	4
External Publications	6	1
Geoscience Maps	4	4

1=high; 6=low

Summary of Key Points

- Hire an aggregate geologist
- Develop a Quaternary layer in the BC Map
- Re-establish partnered hazards assessment
- Disseminate Quaternary knowledge to staff
- British Columbia needs geoscience around flood plains and urban geology

1. New Aggregate Geologist

- More people to aid Travis (job description too large)

2. Hazards

- Raise GSB profile
- Seismic (funded externally)
- Slope stability
- GSC hazard mapping available?
- Regional hazard mapping (not specific projects)

3. Decent Quaternary layer in BC Map

- Take small scale layer and start compiling
- Soil maps from 80's that data needs to be taken from.

-
- Where to go in the future – focus on urban geology
 - Quaternary geos within Ministry
 - Geoscience BC to do a Compilation Map? Or Co-op student (info already digitised, just need to be sorted)
 - Tippers 1:250K maps have info (pdf's)
 - Geochemistry (Till) – Lake Seds – different techniques
 - Surficial mapping
 - Heavy minerals
 - MMI
 - Dispersal of Quaternary knowledge from Travis to other GSB geologists (see if there is any interest – yes)
 - 2 day field trip/talk (short course)
 - Incorporate quaternary onto Bedrock Map (rather than just QAL) and into projects (like with Mitch's project summer 2007)
 - Municipalities (UNBC), MoT, Bc hydro, Industry, Insurance Companies
 - GSB – seismic (generic uses for maps), slope, flood (too far beyond mandate – outside group?)
 - Datasets – GSB as repository, Wells dataset imp (capturing info from co's)

Appendix E Building on BCGS Strengths – Detailed Recommendations

The following list profiles the suggestions tabled by BCGS staff during the various breakout and group sessions. These suggestions are often recorded on the flip charts although the actual descriptions may vary.

Additional Resources

- The BCGS would benefit from the addition of a Coal Resources Geologist, an Aggregate Geologist, one or two Geophysicists, and additional Geoscience Assistants.
- The BCGS should look to industry for partial funding of some or all of these resources.

Coal

- The BCGS would benefit from the addition of a Coal Resources Geologist with deposit specific responsibilities and the ability to devote time to CO₂ sequestration. This new resource would work with the Ministries of Transportation and Forestry as well as the BCGS and Resource Development and Geoscience (RDGB). The BCGS should look to industry for partial funding of this new resource.
- A Carbon Group Task Force, comprised of representatives from BCGS, other ministries and industry, is an ideal example of a potential partnership between government and industry. This task force could focus on ‘all blacks’ (coal, CBG, CBM and CO₂ sequestration).
- The current lack of oversight of coal assessment reports is leading to delinquency. The re-establishment of coal assessment oversight would ensure that the BCGS is kept up to date on coal activities throughout the province.
- CO₂ sequestration is a Ministry of Energy, Mines and Petroleum Resources priority. The BCGS has an opportunity to provide leadership in this area.

Data Management

- The BCGS and other ministries and agencies utilize a number of geosciences databases that are inconsistent and out of date. In order to ensure that the appropriate and current data is available, the BCGS should create a Geoscience Database Catalogue and establish a Data Model Group to coordinate the databases.
- In addition, the BCGS should establish partnerships and standards for data delivery with geosciences organizations working in British Columbia.

Geochemistry

- BCGS' resident geochemistry expert is scheduled to retire in approximately one year. In order to provide continuity and transfer of knowledge, one or two Geochemists should be hired.
- The establishment and implementation of a workable physical and digital archival system is key to the continuing success of the BCGS. This project could be funded in partnership with industry.
- The BCGS and its clients rely on the geochemical database to provide appropriate and current data. The current database should be updated and, resource permitting, be expanded to include a digital database of samples, historical quality control analysis, and archiving. Once again, this project could be funded in partnership with industry. In the future, ground truthing could be added to the database.
- Reductions to funding in past years have affected the maintenance of the Assayers Certification Program. Funding for this program should be included in annual budgets.
- The BCGS has an opportunity to disseminate geochemistry methodology to internal and external clients through training and mentoring.

Geoscience Assistants

- The BCGS has an opportunity to improve the Geoscience Assistant program. This could be achieved by the establishment of bi-weekly assistants meetings, activity coordination, and internal job shadowing.

In addition, the Geoscience Assistants would benefit from increased feedback, perhaps in the form of mid and end of term debriefs.

- The BCGS could benefit from the Geoscience Assistants standardizing mapping standards and templates (i.e. Mapmaking Manifold Manual).

GIS, Geomatics and Geophysics

- The BCGS should identify derivative products and construct databases to support them. This should include the analysis of geo-spatial data.
- The standardization of data is essential to the success of both internal and external clients. Data needs to be fresh, accurate and alive and presented in a standard format.
- The establishment of a uniform geological lexicon will ensure consistency throughout industry.

- In order to ensure that the BCGS databases capture current data, the updating process should be tied to project cycles. This could be achieved by staggering field and office time.

Industrial Minerals

- The BCGS would benefit from the addition of an Aggregate Geologist who could focus on provincial aggregate assessments.
- BCGS would benefit from the continuation of focussed studies on strategic commodities such as Germanium.
- The BCGS should investigate opportunities for partnerships in such areas as the environment and climate change.

Mapping

- The BCGS should deliver strategic mapping with at least one 'Frontier Mapping' project undertaken at any given time. This would include a focus on mapping north of 55.
- The BCGS should also consider value-added options when producing additional maps and pursue a seamless digital data flow from outcrop to dynamic maps and databases.
- The BCGS should host joint planning meetings and/or retreats to investigate joint projects with Geoscience BC, GSB and GTAC.
- The BCGS should re-establish a mapping project cycle that includes time for synthesis, including updating corporate databases and maps. The BCGS should also work with the resource information section at data capture to prepare for field projects.
- In order to remain competitive, the BCGS should pursue integration of 3D technology into interpretations and products. 3D technology will allow for interactive and dynamic maps that create a seamless view of data from fieldwork.

Mineral Deposits

- The BCGS may benefit from the rotation of project geologists between mapping projects and mineral deposit studies.
- In addition, the BCGS should identify and develop BC focused mineral deposit experts. This could be achieved through the reassigning of existing staff or the hiring of new experts.
- BCGS experts may benefit from annual mineral deposit field trips.
- The BCGS should develop deposit models such as porphyries, epithermal, manto, and VMS.

Mapping the Future and Building on Strengths

- In order to ensure accurate and up to date data, the BCGS should update deposit models and MINFILE.

Publications

Products

- A GIS compatible expert synthesis should be delivered at the end of every major project.
- The colour and digital distribution of geological fieldwork is very important to BCGS' clients. It should be continued.
- The BCGS should establish a partnered outreach program through the Geoscience Assistants' program that focuses on tourism. The program could include signage in parks and roads that provides information on proximal mine sites and interesting geology.
- The BCGS should establish a process for GIS compatible geoscience maps.
- The BCGS should proactively organize and deliver client-oriented field trips and workshops.
- The BCGS should consider a new publication service for outreach materials.

Marketing

- The BCGS needs to develop a marketing strategy to increase awareness of its products and services. This strategy should include continued support for external publications and the identification and pursuit of alternate forms of data distribution.

Quaternary Geology

- The BCGS would benefit from the addition of an Aggregate Geologist. This new resource would work with the Quaternary Geologist.
- The BCGS should develop a Quaternary layer in the BC Map. This would include the compiling of a small scale layer and the addition of data from 1980's soil maps.
- The BCGS should re-establish partnered hazards assessments. These have the potential to raise BCGS' profile.
- In-house quaternary experts should disseminate their knowledge to staff.

Summary of Key Points (non breakout session specific)

- BCGS needs to do more group field trips.