Department of Natural Resources, Mines Branch

REVIEW 2009

Newfoundland Labrador

Natural Resources

DEPARTMENT OF NATURAL RESOURCES

Mines Branch Review 2009

The **Mines Branch** of the Department of Natural Resources is responsible for: managing the province's mineral resources to ensure that its contribution to the economic and social well-being of the province is maximized, sustained and enhanced; increasing the body of knowledge on the province's mineral resources; encouraging the orderly exploration and development of these resources; assessing their economic potential and economic contribution to the province; formulating mineral policy and providing advice to government on all mineral related matters. The branch operates under the departmental vision of Newfoundland and Labrador as a province that realizes the full benefit from the sustainable development of its natural resources.

The Mines Branch has three divisions: the Geological Survey, the Mineral Development Division, and the Mineral Lands Division.

The **Geological Survey of Newfoundland and Labrador** is responsible for mapping the geological framework of the province to interpret and explain its geological evolution, and to describe, interpret and explain the distribution, nature, quantity and origin of the province's mineral resources.

The **Mineral Development Division** is responsible for the technical and economic analysis of the mining industry in the province. It also provides training and assistance for prospectors and provides advice to all provincial and federal government agencies that provide financial support or assistance to mining projects.

The **Mineral Lands Division** is responsible for legislation and regulations governing the administration of the province's mineral resources and their exploration and development.

Enhanced funding for geoscience mapping, identified in Budget 2008, continued to allow an expanded field program for the Geological Survey. Partnerships with the Geological Survey of Canada and Nalcor/Energy Branch resulted in significant improvements in geoscience knowledge through major geophysical surveys in western Newfoundland and western Labrador.

The Mineral Incentive Program continues to provide important financial support to junior exploration companies and prospectors; an additional $500 000 was allocated to this program in 2009-10. The branch has a strong commitment to prospector training, and supports an annual training course in Stephenville. Increased funding for mineral promotion was identified in Budget 2008 to expand efforts to attract increased investment within the provincial mining industry and raise the profile of opportunities here. A new outreach program to enhance local public awareness of the earth sciences and the mineral industry was initiated in 2009.

Commitment to sustainable mining practices was demonstrated through $10.4 million allocated for the assessment of former mine sites at Buchans and Whalesback, and the remediation of contaminated sites at the Baie Verte and Rambler mines.

An on-line Mineral Exploration Approval Management System (MEAMS) is in the final stages of development, and is expected to be operational by the summer of 2010.

Mines Branch staff made a major contribution to the organization of the successful Energy and Mines Minister's Conference, held in St. John's in August and September of this year.

Despite low commodity prices and a challenging economic climate, mining in the province has weathered the storm, and we continue to see healthy levels of exploration, albeit down from the highs of 2008.

Recruitment remains a priority for the Mines Branch and we have been fortunate in having some excellent new staff join the Branch this year, thus reducing the vacancy rate significantly.

2010 will bring new challenges to the mineral industry in Newfoundland and Labrador and the branch is ready and willing to support the industry in meeting them.

Richard Wardle
(Assistant Deputy Minister)

Exploration trench, KriASK Syndicate.

GEOLOGICAL SURVEY

Introduction

The Departmental Strategic Plan for 2008-2011 identifies that one of the department's goals is to enhance the knowledge-base of geoscience data to identify opportunities for resource development and to improve the promotion of these opportunities. The 2009-10 programs of the Geological Survey directly address these goals through the most extensive field program in many years, recruitment of highly qualified staff, and successful promotional activities.

Rocky Harbour Formation, Cape Bonavista.

More than $2 million was allocated to field activities this year. In Labrador, there were two bedrock-mapping projects (in the Crossroads Lake and Seal Lake areas), a detailed lake-sediment geochemistry study in western Labrador, and the final year of field work for a study of uranium mineralization in the Central Mineral Belt. The ten projects on the island included six full-scale mapping projects (in western and northeast Newfoundland, the White Bay, Buchans and Gander areas, and the Bonavista Peninsula), mineral deposits studies of copper on the Bonavista Peninsula and gold in central Newfoundland, a palaeontology project in the Port au Port area, and a regional geochemistry survey in central Newfoundland.

The results of three major geophysical surveys were released this year, one contracted directly by the Geological Survey and two in conjunction with our partners (Nalcor/Energy Branch and the Geological Survey of Canada), as part of the Geo-mapping for Energy and Minerals initiative - GEM.

Our expanded field program allowed us to employ twenty-four summer students, most of whom are enrolled in earth science degrees at Memorial University. As well as assisting the survey, the expanded field program provides our future geoscientists with a valuable opportunity to train with our experienced field staff.

This year, the Geological Survey also led promotional efforts in the Mines Branch with the assistance of additional funding identified in the 2009-10 budget. The branch had a strong presence at the traditional venues (Mineral Resources Review, Exploration Round-up, PDAC), and again was part of the Canadian delegation at the China Mining meetings.

Staff changes

Due to concerted recruitment efforts, the Geological Survey has been successful in attracting excellent new staff members to fill vacant positions. We have appointed five geoscientists at the project geologist level since last year's Mineral Resources Review (**Peter Valley** and **Leon Normore** in Regional Geology; **Pauline Honarvar** in Geoscience Data Management; and **Steve Amor** and **Denise Brushett** in Geochemistry, Geophysics and Terrain Sciences).

Quaternary mapping in northeast Newfoundland.

Linkages and Partnerships

The Geological Survey benefits through links and partnerships with other branches of government, both provincially and nationally, with academic institutions, non-governmental organizations and with national and international geoscience organizations. A partnership with the Canadian Institute of Mining, Metallurgy and Petroleum (Newfoundland Branch) and the Department of Education led to the preparation and distribution of '*rock kits*' – teaching material for use in schools. Co-operation with the Department of Tourism, Culture and Recreation is developing geotourism potential as well as continuing work on the province's palaeontological resources. The Geological Survey has been working closely with the Department of Environment and Conservation on groundwater issues and climate change, and provides advice to the Emergency Measures Organization on geological hazards and disasters. A long-standing relationship with the Geological Survey of Canada was enhanced by a multidisciplinary project in western Labrador as part of the GEM initiative.

As well as servicing the exploration and prospecting community through our Geoscience Publications and Information Section, we partner with the Newfoundland and Labrador Chamber of Mineral Resources and Memorial University on the Matty Mitchell Prospectors Resource Room. Some of our staff also instruct at prospecting courses organized by the Mineral Development Division. Several of our geologists have adjunct status in the Earth Sciences and Geography departments at Memorial University and serve on supervisory committees for graduate students. We also provide direct and indirect support for research projects at Memorial University, as well as supporting much academic collaboration with Memorial University, and other academic institutions. The Geological Survey is a strong supporter of the geoscience community in the province, with several staff members holding significant positions in the local branches of the Geological Association of Canada and the Canadian Institute of Mining, Metallurgy, and Petroleum.

The UN General Assembly proclaimed 2008-9 as the International Year of Planet Earth. The Geological Survey's contribution to this international initiative was a partnership with the Johnson GEO CENTRE on a series of twelve public lectures to raise public awareness of the importance of earth sciences to society. Five of these lectures were presented by Geological Survey geologists.

Organizational Structure

The Geological Survey is organized into five sections under the direction of **Dave Liverman.** The sections are Geoscience Data Management (Senior Geologist **Larry Nolan**), Mineral Deposits (Senior Geologist **Andy Kerr),** Regional Geology (Senior Geologist **Lawson Dickson**), Geochemistry, Geophysics and Terrain Sciences (Senior Geologist **Martin Batterson**), and Geoscience Publications and Information (Senior Geologist **Sean O'Brien**).

The survey is nearing the completion of a 5-year planning cycle, and is in the process of planning for the 2010-15 period. It is anticipated that this will be a period of major staff turnover, due to retirements, and the survey will need to be able to respond to changing client needs in this period. As part of this effort, an on-line survey was launched in October to seek client feedback and can be accessed via the survey webpage.

Geoscience Data Management

The Geoscience Data Management Section is responsible for the organization, management, integration and distribution of the geoscience information collected by the Geological Survey. As the size and number of geoscience datasets has grown, it is important that digital techniques are used to manage this information and apply it effectively to mineral exploration. Significant changes in digital information and communications technology over the past decade, are completely transforming the way in which geological surveys throughout the world manage and disseminate their geoscience knowledge. In response to these changes and client needs, the section has focused on database management techniques and internet tools for the consistent and timely delivery of geoscience information to government scientists and industry clients.

The section is headed by Senior Geologist **Larry Nolan. Harj Missan** manages on-line data standards and integration; **Loretta Crisby-Whittle** is responsible for the bedrock-geology database for the province; the Geoscience Resource Atlas and online delivery of geoscience information is coordinated by **Pauline Honarvar**, who joined the section last December; and **Gillian Simms** provides support to all projects.

Data for incorporation into the bedrock-geology database is being collated through a process of research and quality assurance. Fourteen maps (from NTS map areas 2C, 2D and 1M) are in the final stages of legend integration, and will be added to the digital bedrock geology map for Newfoundland. Individual printed (original) maps are scanned and made available online as PDF images (118 for Labrador and 187 for Newfoundland) and are also being digitized and stored as vector (polygon and line) files. These GIS-ready vector files (64 for Labrador and 185 for Newfoundland) are available upon request.

The web-based Geoscience Atlas is being updated and reorganized with an anticipated release during the fall of 2009. A new layer, consisting of volcanic rock geochemical data, compiled in 1995 by **Cindy Saunders**, was recently reorganized and standardized for inclusion in the atlas. This includes data from over 5000 samples. Other layers, such as the granite and till-geochemical databases, were reviewed and updated. More detailed documentation will be provided for all the layers over the next year. The appearance and ease-of-use of the atlas will also be enhanced, with new tools on the left side (*e.g.*, 'Zoom to selected records') and new layer options and reorganization on the right side (*e.g.*, check boxes to 'view all' layers). An updated 'Map Viewer Help' file will guide users through descriptions of all the tools as well as a summary of all the layers. More links will be provided to available digital data, maps and help files.

Access to the digital data by all users requires a standardized method of search and retrieval. To provide this standardization, metadata (detailed description of the data layer) is being compiled for all layers of digital information available on the Geoscience Atlas.

Mineral Deposits

The Mineral Deposits Section (**Andy Kerr**, Senior

Geologist) is responsible for the documentation of metallic and non-metallic mineralization, conducting related research studies, and developing assessments of regional mineral potential.

Mineral Occurrence Data System (MODS)

MODS is a detailed database of mineral occurrences that incorporates public-domain information from mineral exploration and Geological Survey research reports. MODS is managed by **Greg Stapleton** with the assistance of **Jan Smith**, **Dorothea Hanchar** and **Heather Rafuse**. The database is continually updated with available public-domain records; during 2009, NTS map areas 1N, 2E, 11P, 12A, 12H, 12I, 13A and 13K were updated. Work on systematic updates of NTS map areas 2D and 13J continued. MODS is accessible through the survey website and through the Geoscience Atlas. The system was enhanced late last year to become a real-time database, and new or updated occurrences are immediately available. MODS also provides the foundation for the preparation of *Mineral Commodity series* reports that summarize the geological aspects of important mineral commodities. In 2009, work continued on reports on uranium, rare metals, iron ore, and molybdenum–tungsten. The MODS database also provides data for use in interdepartmental land-use planning, and in land-claim discussions.

Uranium Mineralization

This summer was the final field season of a project by **Greg Sparkes** aimed at the documentation and metallogenic analysis of uranium mineralization in the Central Mineral Belt (CMB) of Labrador. In 2009, field work ventured to many parts of the CMB, with an emphasis on systematic examination and sampling of diamond drill core, most of which remains at exploration sites. Collaborative research with G.R. Dunning (MUN) and W.J. Davis (GSC, Ottawa) provided an improved geochronological framework, confirming that there were at least two periods of uranium mineralization during the Paleoproterozoic. The CMB has several styles of uranium mineralization. Greg has also been experimenting with specialized radiation-sensitive materials to provide detailed images from mineralized samples containing vital textural information. The method is a simple alternative to more costly image-analysis methods. Greg contributed to a workshop on uranium in the CMB, held in association with the Geological Association of Canada (Newfoundland and Labrador) meeting in February 2009.

VMS Base-metal Mineralization

The VMS base-metal project, led by **John Hinchey,** studied the metallogeny of the Victoria Lake Supergroup of central Newfoundland. Activities in 2009 were office-based, and aimed at the synthesis of results. The documentation of bimodal-felsic, felsic-siliciclastic and hybrid VMS-epithermal systems within the Tulks Group and adjacent rocks is an important outcome from this project.

Field work, Central Mineral Belt.

Sediment-hosted Copper Mineralization in Newfoundland (and Labrador)

This was the first year of a project led by **John Hinchey** to examine sediment-hosted copper mineralization in the Avalon Zone, and the potential for similar mineralization elsewhere in the Province. Field work in 2009 concentrated on the Bonavista Peninsula but also included the Deer Harbour area (southwest Trinity Bay) and the Fortune Bay area of the Burin Peninsula. These activities were coordinated with bedrock mapping of the Bonavista Peninsula by **Leon Normore** (Regional Geology Section). An honours thesis project by summer student Matthew Crocker (MUN) will be completed on the Blue Point copper prospect, using drill core archived from exploration work.

Andy Kerr conducted a short field program in the Mesoproterozoic Seal Lake Group, the location of the best-known native copper mineralization in Labrador. Most mineralization is minor, and considered to be of epigenetic origin, but it remains possible that some prospects represent an earlier syngenetic or diagenetic style of mineralization in sedimentary rocks. This study was coordinated with bedrock mapping by **Tim Van Nostrand** (Regional Geology Section).

Gold

Hamish Sandeman continued his research on gold metallogeny and new discoveries. Field work in 2009 included the Viking prospect in western White Bay, from which encouraging new gold assays have been published. A B.Sc. thesis project on the prospect is being carried out by Matthew Minnett at MUN. Further work was also completed at the Golden Promise prospect, near Badger, and at the Huxter Lane prospect in south-central Newfoundland. Orientation studies were also completed at several prospects within the Avalon Zone, including recent new discoveries on the Burin Peninsula and near Glovertown.

In Labrador, **Andy Kerr** visited and sampled the Aucoin gold prospect (west of Hopedale). This is a mesothermal-style gold prospect typical of Archean terranes across the

Canadian Shield, and may indicate wider potential. Work on direct dating of gold mineralization, using Re–Os geochronology, continued in 2009 with David Selby (Durham University, UK). Results indicate that two important gold deposits on the Baie Verte Peninsula formed during latest Silurian or earliest Devonian times.

Optical/Infrared Spectroscopy

In 2008, the survey purchased a portable spectrometer (ASD Terraspec Plus) to aid in identifying alteration minerals and mapping alteration assemblages in mineralized systems. In 2009, results from the spectrometer were an important component of several of our projects, and the instrument was also used to identify alteration assemblages in mineralized samples collected by local prospectors. **Heather Rafuse** continued to develop her expertise with mineral identifications through spectrometry, and contributed data to several projects.

Other Projects

Geochronological studies of plutonic rocks linked to magmatic sulphide and granophile mineralization by **Andy Kerr** and Vicki McNicoll (GSC, Ottawa), provided new information on the Michikamau and Evening Lake intrusions (Labrador) and on the Moly Brook Mo–Cu deposit in southern Newfoundland. Additional field work was completed with Edward Lynch (Galway, National University of Ireland) with the objective of obtaining more Re–Os ages from molybdenite prospects across the province. **John Hinchey** continued his evaluation of geochemical data from chert and iron formations in the Makkovik Province of Labrador as potential indicators of VMS and SEDEX deposits. **Hamish Sandeman** contributed his expertise on the geology of Nunavut and other parts of northern Canada to a proposed provenance study of Mesozoic sedimentary rocks in offshore petroleum basins. **Greg Sparkes** is assisting with a M.Sc. thesis project at MUN aimed at improving the geochronological framework for late Proterozoic volcanic rocks and related gold mineralization in the northeast Avalon Peninsula.

Regional Geology

The Regional Geology Section (**Lawson Dickson**, Senior Geologist) is responsible for all bedrock mapping in the province. Seven field projects were carried out in 2009 – five in Newfoundland (**Leon Normore, Alana Hinchey, Brian O'Brien, Ian Knight** and **Doug Boyce**) and two in Labrador (**Tim Van Nostrand** and **Peter Valley**). **Bruce Ryan** and **Charlie Gower** focused on office-based research and data compilation with only limited field work.

Leon Normore started detailed mapping of the Ediacaran and Cambrian rocks in the Bonavista area (NTS 1:50 000 map areas 2C/10, 11), northern Bonavista Peninsula. This region consists of two time-equivalent Neoproterozoic sedimentary basins. The 'Avalon east basin' contains the rocks of the Conception–St. John's–Signal Hill groups; the 'Avalon west basin' in the Bonavista to Plate Cove East area has a similar stratigraphic structure with marginal marine sedimentary rocks of the Rocky Harbour Formation overlain by continental red beds of the Crown Hill Formation. This region has seen extensive research due to the presence of Ediacaran fossils around the Catalina dome area and the sediment-hosted copper potential within the Rocky Harbour and Crown Hill formations.

This field season focused on the Avalon west basin, as well as the temporal relationship of the Avalon east and west sedimentary basins, across the Spillars Cove–English Harbour Fault Zone. The previously established stratigraphic framework of the Avalon west basin was carried to the interior of the map sheet. New discoveries included several east-trending mafic dykes that crosscut the sedimentary rocks of the Rocky Harbour Formation and Bull Arm Formation volcanic rocks in the south-central portion of the Bonavista map area.

Megaripples in the Rocky Harbour Formation, near Knights Point, Bonavista Bay.

Brian O'Brien completed field mapping of the Early Ordovician Catchers Pond Group and adjacent Silurian rocks in western Green Bay District (parts of NTS 12H/08, 09). In the vicinity of White Horn Brook, Black Brook, Indian Brook and Rattling Brook, several Early Silurian terrestrial volcanic units occur tectonically adjacent to an upfaulted block, mainly underlain by regionally metamorphosed marine strata assigned to the VMS-bearing Catchers Pond Group. All of these rock units are crosscut by complexly fractured intrusive bodies of variable size, age and composition.

The primary contacts of the posttectonic plutons and their country rocks are typically offset by conjugate northeast- and northwest-trending brittle faults. Cemented fault gouges and narrow cataclastite zones in carbonitized granodiorite and jasperitized granite are occupied by abundant mafic and felsic porphyritic dykes. The structurally modified intrusive

boundaries of chloritized diorite plutons commonly are veined by quartz or injected by vesicular diabase and, locally, they are base-metal mineralized.

Alana Hinchey started 1:50 000-scale mapping of the Silver Mountain map area (NTS 12H/11), concentrating on the northern part. This area is underlain by granulite- to amphibolite-facies basement rocks that mostly are strongly foliated to gneissic metagranodiorite, strongly foliated to locally gneissic biotite metamonzogranite and foliated metagabbro to metamonzodiorite. These units contain locally preserved narrow screens of paragneiss, typically less than 1 km wide. These basement units were intruded by variably foliated Neoproterozoic–Mesoproterozoic (Grenvillian) augened biotite monzogranite, biotite-hornblende quartz monzonite, charnockite, orthopyroxene tonalite and minor gabbro. The area is intruded by the extensive Silurian Taylor's Brook gabbro that is itself cut by a granitic unit of unknown age. Felsic and mafic, foliated or massive, metamorphosed and unmetamorphosed dykes of various ages intruded most units. A marble–pelite sequence is preserved partially flanking the Taylor's Brook gabbro. The area is known to host numerous gold-bearing quartz veins and several base-metal occurrences.

Alana is supporting and jointly supervising a B.Sc. (Hons) thesis by Andrea MacFarlane (MUN) and a Masters thesis by Crystal Laflamme (MUN).

Doug Boyce and **Ian Knight** studied the West Isthmus Bay section of the Upper St. George Group on the Port au Port Peninsula. This section consists of cyclic carbonates that begin in the uppermost strata of the latest Cambrian Berry Head Formation and continue to the basal part of the Middle Ordovician Table Point Formation. Two long-lived Tremadocian and Arenigian sequences are separated by a significant disconformity including amongst others, the Boat Harbour Disconformity. **Doug Boyce** addressed the poor macrofaunal coverage of this important section with the goal of integrating the trilobite and conodont faunas. Former conodont sample sites were located prior to carrying out a systematic search for macrofossils. Many previously undocumented macrofossils were recovered.

Ian Knight continued detailed mapping the Cambrian to Ordovician carbonate platform sequence along the eastern edge of the Lomond (NTS 12H/05) and adjoining Cormack (NTS 12H/06) map areas. This area is underlain by the Goose Arm Thrust Stack, a complex, polydeformed, tectonic assemblage that lies east of the Humber Arm Allochthon and west of the Long Range Massif of Proterozoic basement (gneiss and granite). The northwest-verging stack is deformed by southeast-verging D2 structures including northeast-trending folds, back thrusts and penetrative cleavage. The Proterozoic Long Range Massif is thrust over the platform sequence in this hinterland part of the stack, and the base of the massif is soled by schistose, chloritic, granulated, granite mylonite. The platform suffered intense deformation and low-grade metamorphism and is dominated by low-angle penetrative fabrics.

Charlie Gower continued his mapping of rock exposures in road cuts and quarries exposed by the construction of the Trans-Labrador highway between Red Bay and Goose Bay. This has proven invaluable in enhancing geological maps for the region, especially where previously existing outcrop was sparse. He was also involved in collaborative Nd–Sm projects with geoscientists from McMaster University and the University of Witwatersrand aimed at isotopic characterization of the Proterozoic crust in eastern Labrador. A better understanding of the distribution of juvenile versus crustal-derived rocks is an under-recognized, but potentially valuable, tool in guiding grassroots mineral exploration.

A study at Battle Harbour was also completed; a non-technical brochure, suitable for visitors to Battle Harbour, and a more detailed report, for geoscientists, were published.

Tim Van Nostrand completed his second year of 1:50 000-scale bedrock mapping of the Mesoproterozoic Seal Lake Group in central Labrador. Mapping was carried out in the eastern and southeastern Seal Lake area in parts of NTS map areas 13K/3, 4, 5 and 6. The main units are intercalated gabbro sills, amygdaloidal and porphyritic basalt flows, quartzite, sandstone, siltstone, slate, shale and minor volcaniclastic and calcareous rocks. Structures are dominated by east- to northeast-trending, south-dipping fabrics that delineate the eastern part of a regional-scale, doubly-plunging syncline. Lineations and minor fold axes mostly plunge towards the south. Kinematic structures along east- to southeast-trending fault zones indicate a north-directed sense of thrusting. Crossbeds, ripple marks and imbricated grains in sedimentary rocks indicate a general easterly direction of deposition. Mineralization in the area includes malachite, azurite, chalcocite, bornite, chalcopyrite, and native copper. These are hosted in quartz ± calcite veins and along fractures localized within the margins of basalt flows, slates and gabbro sills. Anomalous radioactivity is associated with narrow shale units, a volcanic tuff layer and coarse-grained sandstone and conglomerate in the northern part of the map area.

Tim is supporting a B.Sc. (Hons) thesis by Megan Reardon (MUN) who worked with him in the field.

Peter Valley started a 1:50 000-scale bedrock mapping project in the Crossroads Lake area of western Labrador in the central parts of NTS map areas 23I/10, 11, 14 and 15. This project is part of the Geological Survey's contribution to the GEM initiative. The region represents the southeastern extension of the Churchill Province and consists of

Archean and Mesoproterozoic meta-igneous rocks. The central part of the map area is dominated by the megacrystic charnockite of the De Pas batholith. Parts of the charnockite are fine to medium grained and contain dismembered mafic dykes, enclaves and schlieren. There are a number of regional north- and northwest-trending shear zones. Within the shear zones, megacrystic feldspars were highly deformed to produce an augen gneiss. The charnockite is in intrusive contact with metamorphosed gabbro. Blocks of gabbro occur within the charnockite and mafic minerals are contaminants of the charnockite near the contact of the two units. The oldest unit in the map area is granitic gneiss that is highly deformed, contains a diagnostic quartz-ribbon lineation, and may be migmatitic. Kinematic indicators suggest that the region experienced north–south or northwest–southeast dextral transpression. A new airborne geophysics survey flown by the Geological Survey of Canada in 2008 proved useful in the delineation of structures and rock types when combined with collected information on the ground.

Deformed megacrystic charnockite and attenuated mafic dyke of the De Pas batholith Crossroads Lake.

Geochemistry, Geophysics and Terrain Sciences

The Geochemistry, Geophysics and Terrain Sciences Section (**Martin Batterson**, Senior Geologist) covers a range of geoscience, including aggregate resource assessments; till and lake sediment geochemical surveys; Quaternary geology and ice-flow mapping; geophysical compilations and interpretation; and environmental geology. The section currently has a staff of twelve: **Denise Brushett** (who joined us in February) and **Jennifer Smith** (Quaternary geology and ice-flow mapping); **Dave Taylor** (databases/map compilation); **Jerry Ricketts** (aggregate resources); **Steve Amor** (who joined us in January) and **John McConnell** (surficial geochemistry); **Gerry Kilfoil** and **Robyn Constantine** (geophysics); and **Chris Finch** (Laboratory Director), **Anne Marie Bourgeois** and **Chuck Riley** (geochemical laboratory).

Quaternary Geology

In central Newfoundland, **Jennifer Smith** focused on surficial mapping and stratigraphy in the southwestern part of the Red Indian Lake basin, plus in-fill till-geochemistry sampling. This is the continuation of a multi-year project that began in 2007 in response to increased mineral exploration activity in the Tulks Volcanic Belt. Over 270 sites were visited by truck, ATV and helicopter, and 227 till samples were collected from hand- or backhoe-dug pits.

Existing sections and backhoe- or hand-dug pits show the basin has a complex glacial stratigraphy that includes multiple till, sand, gravel and silt units. Interpretation of clast fabrics will help determine the type of depositional environment and the ice-flow directions associated with the till units. Sand, gravel and silt deposits are related to either glaciofluvial sedimentation (mostly found within existing valleys) or deposition within proglacial lakes. Deltas identified at 200 and 300 m asl, as well as the elevation and spatial distribution of silt and fine-grained sand units (found between 188 and 302 m asl), indicate that the basin contained either a series of small ice-marginal proglacial lakes or one large contiguous lake. The identification of the extent of proglacial lakes and their associated sediments has implications for drift prospecting within the basin.

Denise Brushett started surficial geological mapping and sampling for till geochemistry in northeastern Newfoundland. The first field season concentrated on the area between Benton and Wesleyville, covering two 1:50 000 map areas (NTS 2D/16 and 2E/4), and will extend north and west of these areas in future years. Till sampling yielded 502 samples that will be analyzed in preparation for inclusion in an Open File report to be released in 2010. Forty-five previously unidentified striation sites aid in defining ice flow in the area. Till exposures were described, with clast fabrics producing data on sediment genesis as well as palaeo-ice flow directions. The area was affected by two phases of eastward-flowing ice ~ 120° +/- 20 and ~80° +/- 10, the latter of which is consistently younger where both were observed. During deglaciation, drainage from ice within the valley at the eastern end of Gander Lake flowed eastward into Freshwater Bay at Gambo producing a delta, the surface of which is now 43 m asl, the marine limit for the area.

Dave Taylor continued a till geochemistry sampling program for the Eastern Newfoundland Till Geochemistry Program. He also compiled existing 1:50 000-scale surficial geology maps for the province for incorporation in the Geoscience Atlas on the survey's website. Although province-wide mapping is not yet complete, users of the website will be able to examine and download the most recent surficial geological mapping in their area of interest. Compilation of aggregate resource maps continues.

Aggregate Resources

Jerry Ricketts continued granular aggregate-resource assessments on the Avalon Peninsula and adjacent areas, focusing on NTS 1:50 000 map areas 1M/1, 1N/12 and 1N/13. The objective is to locate, map and sample sand, gravel and sandy till deposits in this area.

The Avalon Peninsula has the greatest demand for aggregate in the province. Defining areas of aggregate potential may ensure that sites do not become sterilized due to development for other purposes. Conflicting land uses that restrict aggregate resource development commonly result in longer trucking distances and increased construction costs. The construction industry is experiencing shortages of higher quality aggregate, such as blending sand for use in concrete.

In the NTS 1M/1 map area, potential deposits were sampled near Angels Cove, Patrick's Cove, Gooseberry Cove, Ship Cove, Little Barasway and Great Barasway. Some of these may prove to be substantial enough for economic exploitation. In NTS map areas 1N/12 and 1N/13, numerous small gravel deposits were sampled, mostly in shoreline areas. Many till samples were collected in an attempt to locate tills low in silt and clay that can be used if sand and gravel aggregate is not available.

Geochemical Studies

John McConnell focused his attention on surficial geochemical databases. In April, he released Open File LAB/1465 that provides all analytical data and selected field data obtained from twelve detailed-scale lake sediment and water surveys conducted in Labrador by the Geological Survey from 1978 to 2005. About 6300 samples were collected at an average site density of one per 4 to 5 km^2. Although most of these data were released previously as individual reports by the Geological Survey, there are also many new data provided, particularly for some of the early surveys.

An open file report on the results of a multi-year lake-sediment and lake-water survey in southeastern Labrador will be released this autumn. The survey area borders the Labrador Straits and extends from Cartwright in the north to the Quebec border in the southwest. The area is of exploration interest for uranium and base metals.

Steve Amor carried out two field programs during the summer. As part of the province's contribution to the North American Geochemical Soils Landscape Project, low-density (one sample per 1600 km^2) soil sampling was carried out in Newfoundland with 64 sites sampled. Detailed soil logs were completed and large (10 kg) samples collected from all soil horizons present. The samples are being analyzed under the direction of the Geological Survey of Canada in Ottawa and it is expected that results will be available in the second half of 2010. The soil sampling was accompanied by measurements of gamma-ray spectra and radon-in-oil gas. The project, which will eventually total over 13 000 samples in Canada, the USA and Mexico, is intended to provide a continent-wide soil geochemical dataset, useful for a wide range of applications and disciplines.

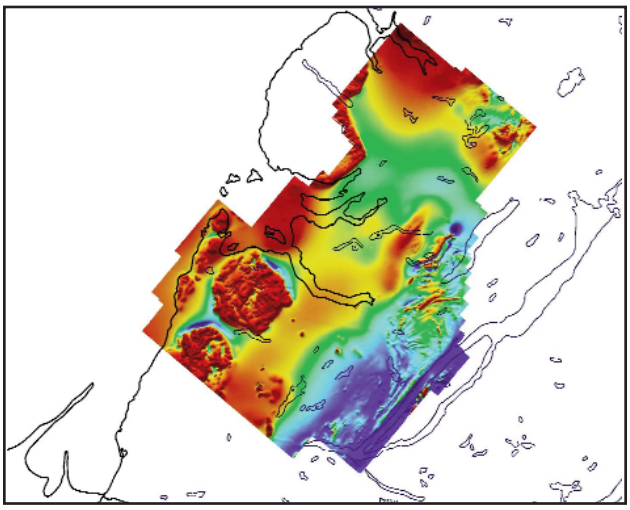
Array of samples collected from a single soil pit.

A detailed helicopter-supported lake-sediment and water-sampling program was completed over seven 1:50 000-scale map area in western Labrador (NTS 23I/6, 7, 10, 11, 13, 14 and 15), a component of the western Labrador GEM initiative. This area is underlain mainly by Archean and Paleoproterozoic gneisses, granitic rock, gabbro and anorthosite of the southeastern Churchill Province, and supracrustal rocks of the Middle Proterozoic Labrador Trough in the west. A total of 1069 samples was collected.

Geophysical Surveys

Gerry Kilfoil continued to provide geophysical support to the mineral industry, as well as developing and monitoring geophysical tenders, and preparation of geophysical data for the survey website. The index of airborne surveys, available through the on-line Geoscience Atlas, was updated several times during the past year to include releases of airborne data flown by mineral exploration companies. **Robyn Constantine** provides technical assistance.

A detailed airborne survey in the Corner Brook area, commissioned by the Geological Survey, started in November, 2008, was completed in March, 2009. About 25 000 km of magnetic gradient survey were completed with a fixed-wing aircraft along flight lines spaced at 200 m and oriented NW–SE. With the assistance of **Lori Cook** (Energy Branch), the results were released this summer.



Aeromagnetic survey, Corner Brook area.

The release consists of maps, showing the residual magnetic field and the first vertical derivative results, for each of seven 1:50 000-scale map areas of the survey block – fourteen maps in total. These maps can be accessed in PDF format from the survey's website. As well, these maps, together with a more extensive archive of digital results from this survey and the contractor's report, are available as links in the airborne index metadata within the on-line Geoscience Atlas. Lori is now working with the Energy Branch and has coordinated the release of results from adjacent aeromagnetic surveys, flown by the Energy Branch and Nalcor under PEEP (Petroleum Exploration Enhancement Program) funding. These surveys provide complete and continuous magnetic coverage of a crucial area of structurally complex Appalachian geology, with significant mineral and hydrocarbon potential.

The survey is partnering with the Geological Survey of Canada on a multidisciplinary project in western Labrador. The federal contribution was a major regional aeromagnetic survey with the results of the first phase released jointly by the Survey and GSC in June, 2009. The second phase was flown this year and results will be released in 2010.

A gravity compilation of the Bay St. George Carboniferous Subbasin is nearing completion and will be released this fall. Gravity data were collected in exploration for potash in several onshore surveys within the subbasin, but the results can also provide constraints on the basin architecture and thicknesses of sedimentary fill, useful for ongoing petroleum exploration in the area.

Geological Hazards and Climate Change

Martin Batterson, in conjunction with **Neil Stapleton** (Geoscience Publications and Information Section), continued work on hazard mapping projects in the Humber Valley and northeast Avalon Peninsula in support of regional municipal planning exercises. The objective is to ensure that development avoids hazardous areas, and that planning considers the potential effects of climate change. Much of the province is likely to experience sea-level rise of up to 100 cm over the next century, through a combination of global sea level rise and isostatic adjustment. A rise of this magnitude will affect coastal development in some places, and increase flood risk in those communities located at sea level and susceptible to flooding. The continuation of a coastal monitoring program, in cooperation with the Geological Survey of Canada (Atlantic) supports this work. Research into past and present geological disasters also continued. The recent landslides at Daniel's Harbour and Trout River provided the opportunity to work with other government divisions and departments (Fire and Emergency Services, Municipal Affairs, Environment and Conservation, and Transportation and Works) and geotechnical consultants, to determine the causes of the landslides and the potential for further landslides.

Martin Batterson, in his capacity as an Adjunct Professor at Memorial University, is on the supervisory committee for two Master's students: Phil Blundon (Ice streams from the Newfoundland Ice Cap) and Melissa Putt (Deglacial history at the tip of the Great Northern Peninsula).

Laboratory Services

The geochemical laboratory provides analytical support to the programs of the Geological Survey. The laboratory has three staff, *viz.*, the Laboratory Director (**Chris Finch**) and two Mineral Laboratory Chemists (**Anne Marie Bourgeois** and **Chuck Riley**). One additional Mineral Laboratory Chemist will be hired this autumn to fill the position recently vacated.

The laboratory carries out analyses for approximately 40 elements with an annual production of over 200 000 determinations. Most of these analyses are carried out by Inductively Coupled Plasma Emission Spectrometry for trace and major elements. Other selective methods for LOI, FeO, Fluoride, Conductivity and pH are also carried out; the laboratory is also responsible for the preparation of all samples submitted for external analyses. The laboratory maintains an archive of all samples that were submitted for analysis.

October 2008 saw the completion of renovations to the perchloric fume hood laboratory and replacement of the fume hood. The laboratory had operated on a limited basis whilst renovations progressed. The backlog of trace-element analysis was cleared and preparation of samples collected from the 2009 field season is well underway.

Geoscience Publications and Information

The Geoscience Publications and Information Section (**Sean O'Brien**, Senior Geologist) is organized around six principal lines of business. These focus on the communication of public- and private-sector geoscience and related mining-sector information to current stakeholders and future investors. Many of the section's goals are achieved in partnerships with other sections, divisions, departments, governments, and, in the case of the Matty Mitchell Prospectors Resource Room, the Newfoundland and Labrador Chamber of Mineral Resources. The section currently has eighteen professional, technical and clerical staff.

The section is responsible for the provision of publishing, editing, design and cartographic support to the Geological Survey and other divisions of the Mines Branch. It also directs the development and implementation of plans to promote opportunities for mineral exploration in the province. In doing so, it builds on other survey efforts by helping market the wide array of information and data available to support exploration. Other section responsibilities include geoscience outreach, public and private sector geoscience documents (Geofiles), the branch website, and liaison with the mining industry.

Industry Information and Client Services

Staff provided exploration consultation and information services to a wide client base via 'over-the-counter' assistance and community-based outreach, and in partnership with the Matty Mitchell Prospectors Resource Room. The Industry Information and Client Services group (**Norm Mercer, Randy Meehan, Stephanie Neary** and **Debbie Downey**) represents the initial point of contact for most of the Geological Survey's clients, including many of the province's several hundred prospectors. The group processed more than 1000 information requests from the private sector (excluding prospectors) in 2009; a further 200 requests from within government were also addressed. More than 100 exploration companies active in the province are users of this group's services; an additional 30 companies, yet to acquire mineral rights in the province, contacted the survey for information. Staff also maintains the survey's client databases and mailing lists, and assists in client notifications.

The group provides logistical and promotional support for local, national and international mining and investment conferences and trade shows, including our flagship conference

Booth at Labrador Expo.

Mineral Resources Review. They liaise daily with the Matty Mitchell Prospectors Resource Room and the Prospectors Assistance Program and provide regular logistical and technical support for the survey's outreach efforts.

Promotion, Geoscience Marketing and Investment Attraction

The section is responsible for the implementation of the branch's minerals promotion plan that encourages further growth in the mining sector by capturing external investment. Highlights for 2009 include increased exposure to Asian markets through participation in the China Mining Conference and Expo in Beijing, the China Mining Association Meeting in Toronto and the China Government–Industry Mission in Montreal.

The section also coordinated trade show booths and exhibits at Mineral Exploration Roundup, Québec Exploration and PDAC, as well as local venues such as the Baie Verte Mining Conference and Labrador Expo. Work continued throughout 2009 on further expansion and integration of public and private sector elements of Mineral Resources Review.

The section, in partnership with the Mineral Lands Division, developed a variety of industry information packages and special publications on the provincial mineral exploration sector. The most notable of these was a special supplement in the Mining Journal. Staff also made presentations on the mining sector, including exploration activity, to community councils and regional Economic Zone boards province-wide. Staff continued its usual participation in career fairs and government's public service initiatives.

Publications and Cartographic Services

The Publications and Cartographic Services group includes editorial (**Chris Pereira** and **Des Walsh**), cartographic (**Dave Leonard, Tony Paltanavage, Terry Sears** and **Neil Stapleton**), and desktop publishing and design staff (**Debbie Downey, Beverly Strickland** and **Joanne**

Rooney). They are responsible for report and map preparation and production for the Geological Survey, and provide cartographic, graphic design and desktop publishing services to other divisions and branches of the department, on an opportunity basis.

The section published in excess of sixty Geological Survey maps, open files and other publications in the past year, including the annual Current Research volume. Staff also provided graphic design and related cartographic support for several special publications, including the Mining Journal supplement on Newfoundland and Labrador. Similar support was provided for Mines Branch world-wide promotions and investment initiatives at mining trade shows, conferences and symposia, and for the Geological Survey's outreach program.

Geoscience Documents Collections and Databases

The Geofiles (with over 20 000 documents relating to the province) and Library collections and related metadata are maintained by **Catherine Patey**, **Cindy Saunders, Paula Bowdridge and Desirée King**. The Geofiles collection includes over 10 000 mineral exploration assessment reports; about 7000 of these are currently available via the internet. More than 500 new reports were filed in 2009. As reports are indexed and released from confidential status, their metadata and full text is made available online. The final phase of OCIO-sponsored assessment report scanning was completed in 2009.

The goal is to have most of the non-confidential assessment reports online before the end of the fiscal year. PDF files for Geological Survey publications, including maps, continue to be made accessible online from the Geofiles database. Staff provides customized searches of the Geofiles, library and various in-house databases, including mining company archives; they also assist clients (in-house or by phone) in doing their own on-line searching.

Outreach

Outreach initiatives are coordinated by **Amanda McCallum**. In 2009, the Geological Survey continued its partnership with the Johnson GEO CENTRE and Memorial University on the International Year of Planet Earth (IYPE) project through a series of public lectures. Other collaborative initiatives include working with the Department of Tourism and local partners in creating a development strategy for the Discovery Trail Geotour on the Bonavista Peninsula, a geotourism project.

Mineral resources outreach involves a partnership with the CIM-NL Branch and the Newfoundland and Labrador Chamber of Mineral Resources on the re-establishment of Provincial Mining Week. This event included the delivery of 'Mining in Society', a hands-on, interactive show about the mining and minerals industry, teacher workshops delivered by the nationally acclaimed PDAC Mining Matters, and the Women in Mining Forum. The latter is a panel discussion and Q and A special event that brought together six women from the province's mining and minerals industry. Mining Week also saw the launch of the Provincial Rock and Mineral Kits in collaboration with the CIM-NL Branch and the Department of Education. Each kit features a selection of more than forty rocks and minerals showcasing Newfoundland and Labrador's world-class geology and mineral deposits.

Rock and mineral kits.

Matty Mitchell Prospectors Resource Room

This partnership project between the Geological Survey and the Newfoundland and Labrador Chamber of Mineral Resources continued to supply mentoring, technical support and promotional assistance to a large number of prospectors across the province, including an increasing number of First Nations prospectors from Labrador. The Resource Room project is managed by a joint government–industry committee chaired by **Sean O'Brien**.

Resource Room geologist **Pat O'Neill** is responsible for day-to-day operation of the project. In 2009, the project continued to take part in training courses in Stephenville and delivered prospector workshops in rural parts of the province.

The Resource Room developed paper and digital posters to help prospectors promote their properties across Canada. The Properties for Option booklets were updated in 2009 and the Resource Room played a major role in assisting prospectors at Mineral Exploration Roundup, PDAC and Mineral Resources Review.

The Resource Room continues in its collaboration with the Mineral Incentive Program, whereby prospectors without grants can avail of funding to have promising mineralized samples assayed. In many instances, as in previous years, this arrangement has resulted in claim staking and option agreements with junior mining companies.

MINERAL DEVELOPMENT DIVISION

Introduction

The Director of the Mineral Development Division is **John Davis**. The division is responsible for both the technical and economic analysis of the mining industry and its commodities in the province, as well as the monitoring and analysis of all phases of individual mining and quarrying operations. This is the key division for liaison with other federal and provincial government departments on mining matters.

Staff

The upswing in mineral commodity revenue in the past two fiscal years, until September 2008, has had a major impact on workload and workforce performance in the division. To counteract the loss of engineering capability, **Darren Pittman** was hired in December 2007 as an Engineer I, and has received on-the-job training and attended work-related courses in reclamation work and quarry development approvals. In mid August 2009, Darren applied for, and was accepted for, the temporary position of Engineer II. In mid December 2008, **Karen Dumarasque** returned from leave to fill the vacant permanent analyst position in Labrador West. In late December 2008, **Valerie Feltmate** joined the division as a clerk in the Mineral Incentive Program. In early February, **John Clarke**, formerly an analyst, returned to the division following a leave-of-absence in the uranium exploration industry. He is now working as a geologist with Alex Smith in Engineering Analysis.

For several years, the division has been actively recruiting for two mining engineers (with 5 years industry experience in either open pit and/or underground mining) to fill current vacancies before facing the retirement of two more engineers within the next year. Over the past two years, the division has emphasized more awareness of occupational health and safety requirements, especially for field personnel, and has participated in off-season training courses such as First Aid, and CPR, ATV operation, asbestos awareness, radiation safety and WHMIS.

Operations

The division encourages the development of the province's mineral resources by providing training and financial assistance to prospectors and junior exploration companies under the Mineral Incentive Program. It also provides advice to all provincial and federal government agencies that provide support or assistance to mining projects. The division is responsible for administering the Mining Act, and thus ensuring that mineral resources are responsibly developed and that end-of-life operations are properly closed down and monitored. It is also responsible for rehabilitating legacy orphaned and abandoned mines to ensure they do not present safety hazards.

Rehabilitation at the former Whalesback Mine site.

Staff liaised with industry by attending technical conferences, trade shows and investment seminars, and made presentations on regional strategic-planning sessions on mineral resource development requirements. In the spring of 2009, Mines Branch personnel facilitated a visit to the Beaver Brook Antimony Mine for Thomas Seifert and Dirk Sandmann of the Institute of Mineralogy, Freiberg University, Germany. Ore body sampling for age-dating and SEM analysis was undertaken as part of a study of the genesis of the various antimony deposits, and additionally to improve ore-body knowledge for the mine operator and our staff geologist.

The division's activities are organized into three units by major work functions: Engineering Analysis, Mineral Industry Analysis, and the Mineral Incentive Program.

Engineering Analysis

The Engineering Analysis Section is responsible for admin-

istration of the Mining Act and compliance of current mine operations with the Act by way of site visits throughout the year. To date, most site inspections have been completed by **Alex Smith**, **Ned Vukomanovic**, **John Clarke** and **John Davis**, with the exception of Vale Inco's mine operation and the Iron Ore Company of Canada's Carol Lake operations. The section provides technical monitoring of work proposals by operators, such as proposed changes to milling operations (including economic feasibility; impact on the environment; financial assurance implications; and influence on life of mine). Staff performed technical evaluations and reviewed proposal requirements for development plans, rehabilitation and closure plans and financial assurance needs to aid in work planning, as well as permitting and development of former operating properties. Examples include Nugget Pond, Anaconda Mining Inc. and the Schefferville iron ore deposits.

The section is also responsible for continuing rehabilitation work on orphaned and abandoned mine sites (**Ned Vukomanovic** and **Darren Pittman** and a co-op student), and works with the Department of Environment and Conservation on contaminated mine sites (chemical and toxic material spills; acid-rock drainage–water treatment; and hazardous airborne particulate matter/asbestos). Work valued at over $25 000 has been completed at five sites, ranging from disposal of acid-generating concentrates, to improving site fencing and backfilling openings. Additional work remains to be tackled at the Terra Nova cave-in in Baie Verte, and remediation work at the tailings ponds in Buchans. Our co-op engineering student (**Stephanie Lundrigan**) is developing a system that will integrate the present Abandoned Property Database (APD) of orphaned and abandoned mines in Newfoundland and Labrador with the existing mine development monitoring system, and incorporate information from the MODS system, on a real-time interactive basis. To date, all sites on the island part of the province have been captured, resulting in over 2000 additional sites being added to the mine development monitoring system, along with the estimated 6000 mineral occurrences in the MODS database. From January to April 2010, the extraction from MODS of sites from Labrador will be completed and ArcGIS will be incorporated as the site-analysis tool.

Government's concern about the problem of abandoned mines in the province is best demonstrated by a three-year $10.1 million partial remediation program for the former Baie Verte asbestos mine and the Consolidated Rambler copper mines. This program is supervised by **Alex Smith**. Phases I, II and III Environmental Site Assessments (ESAs) have been completed and Jacques Whitford Limited–Stantec is managing the project. The immediate work plan is to eliminate public safety and health hazards by the removal of underground storage tanks, demolishing the remaining buildings and infrastructure, to isolate fall hazards by fencing off areas, and to cap shafts and openings to the sub-surface work areas.

The project is over 80% through the 3-year work period and current total project expenditures are estimated at $7.0 million. Water-quality monitoring at Consolidated Rambler is completed, while the air-quality survey at Baie Verte Mines and the town of Baie Verte will extend into the winter. Building demolition at both sites will be completed by the end of the autumn. The second phase of the slope stability will extend into the winter, followed by fencing along Highway 410 at Baie Verte Mines.

The goals for the 3-year work period is to eliminate public health hazards and safety hazards, and gather sufficient information to support further evaluation of the long-term remediation methods and costs.

Mineral Industry Analysis

The Mineral Industry Analysis Section (**Tony Burgess, Brad Way, Keith Bradbury, Gord Button, Lew Higdon, Karen Dumaresque** and **Brenda Kelly**) is responsible for economic and business research, Mines Branch statistical and analytical functions, and the development and co-ordination of policy and program matters related to the mining industry. This section publishes 'Mining in Newfoundland and Labrador' three times a year and the brochure 'MINFO'. Direct liaison with the mining industry in Labrador West is maintained by our analyst in Wabush. A mineral statistics database includes value of mineral shipments, employment, and exploration expenditures. The value of mineral shipments for 2008 is estimated at C$4.65 billion and the 2009 value is estimated at C$2.20 billion.

Mineral Incentive Program

The overall budget for the Mineral Incentive Program was expanded to $3.0 million for 2009-10. This was a response to the economic downturn starting in Q4-2008 and the reduction of corporate exploration expenditures. The program is under the administration of **Len Mandville** and **Justin Lake**.

Program	**2008-09**	**2009-10**
Prospector Assistance (number)	*54*	*75*
Prospector Assistance – grants	$192 000	$400 000
Natural Stone (number of grants)	*2*	*1*
Natural Stone – grants	$100 000	$50 000
Junior Exploration (number)	*21*	*23*
Junior Exploration – grants	$2 100 000	$2 400 000
Prospecting Schools (number)	*2*	*1*
Total Budget	$2 392 000 $2 500 000	$2 850 000 $3 000 000

The table above compares the estimate spending by program for 2008-09 and for 2009-10. The shift in emphasis for

Prospector Assistance from last fiscal year (75 versus 54) should be noted. There is a similar shift in the Junior Exploration Assistance Program. Due to the low demand for support during the past two years, unexpended funds from the Prospector Assistance and Natural Stone Assessment categories were directed to the Junior Exploration Assistance Program.

A two-week prospector training course was held in Stephenville; interest levels were such that no course was offered in Labrador in 2009. It is anticipated that field visits to prospector work-sites will be the focus for the autumn, and the final proposals for assistance will be assessed.

MINERAL LANDS DIVISION

Introduction

The Mineral Lands Division is responsible for a number of essential regulatory functions and information services that contribute to orderly and sustainable development of the province's mineral resources. These include administration and management of mineral-land tenure, quarry materials and mineral-exploration permitting, retrieval and storage of core from exploration drilling sites, and monitoring the type and amount of exploration activity. The division has extensive contact with most other departments and levels of government through referrals for various permits and approvals, and represents the Mines Branch on the Interdepartmental Land Use Committee. The Director of the Mineral Lands Division is **Ken Andrews**.

Mineral Rights

The Mineral Rights Section (**Jim Hinchey, Phil Saunders, Andrea Mills, Laurie Hennessey** and **Charles Newhook**) administers all aspects of the acquisition, maintenance and regulation of mineral rights in the province. Many of these functions are performed through the Mineral Rights Administration System (MIRIAD). MIRIAD provides full time, on-line, map-based claim staking. It integrates mineral rights information with the province's geographic information and financial management systems.

Mineral rights are also managed through several key hard-copy registries that record transfers, confidential agreements, mineral licenses issued, and mining and surface leases. These consist of over fifty volumes of documents containing some 6100 individual folios. They are extensively used by the legal community as well as by mineral exploration clients. To make these registries more accessible, a new project (the Registry Project) was started in 2008, with three stages as follows:

Stage 1) Scanning of the historical registry documents and the collection of metadata: 5034 folios have been scanned and verified to date;
Stage 2) Development of an internal automated mechanism of maintaining registry data; and
Stage 3) Development of web-based tools to allow the public to search and retrieve registry documents.

It is anticipated that Stage 1 will be completed in early 2010, and stages 2 and 3 completed by mid 2011. The completion of this project will result in improvements in the internal business operations of the registration process and in client services, particularly to the legal community. It will also provide data protection as electronic documents will be backed up regularly and copies stored offsite.

The Historical Mineral Tenure Project, started about 5 years ago, is scheduled to be completed by December 31, 2010. This involves the creation of digital files for all historical mineral lands, including ground- and map-staked licenses, fee simple mining grants and concession lands. Once this information is deployed to the department's website, clients will be able to retrieve historical claims information from any location in the province and review any associated mineral exploration assessment reports.

In addition, the Mineral Rights Section monitors exploration activity and related expenditures in the province. Expenditures are surveyed annually in cooperation with Natural Resources Canada. The results are analyzed internally and reported to various branches of government and other agencies, and in industry publications. The section also provides input and assistance in the department's promotional and investment attraction efforts at national and international mining conferences and other venues.

Quarry Materials

Quarry materials literally form the foundation for all other developments in the province. The administration and management of quarry materials is challenging as a result of increasing land-use conflicts, and environmental and social concerns.

The Quarry Materials Section (**Fred Kirby, Ges Nunn, Gerald Kennedy, Joanne Janes, Kirby Way** and **William Oldford**) is responsible for administration and enforcement of the Quarry Materials Act and associated regulations. The section is also responsible for the review of all municipal plans to ensure these do not have a negative impact on the mineral and aggregate resources of the province.

There are currently 1339 quarry permits and 70 quarry leases issued in the province. Total production for the province

in 2007 was 3 335 413 m^3. To date, quarry inspectors have completed 1800 inspections in 2009-10 fiscal year. Increased inspection activity has led to better compliance with the Quarry Materials Act, but serious violations still occur. To date, this year, inspection activities have led to one conviction for illegal quarrying, one case is before the courts, and three other cases are pending.

Rehabilitated quarry.

Core-storage Program

The Core-storage Program in Newfoundland and Labrador is highly regarded in the exploration industry as one of the most useful of its kind. **Alvin Harris** (Manager) and **Stewart Cochrane** operate six core-storage libraries located through the province. These facilities house more than 1 million metres of core from almost 9000 drill holes collected from various exploration projects from throughout the province. Drill-core acquisition continues with approximately 7066 m of core samples from 27 separate drill holes added this year. Drill core is available for inspection and is used extensively by the mineral exploration industry. Sampling is permitted where there is sufficient core remaining to allow removal of some material. All unused material is to be returned to the core library along with a copy of analytical results obtained. The core-storage database is available on-line.

Exploration Approvals

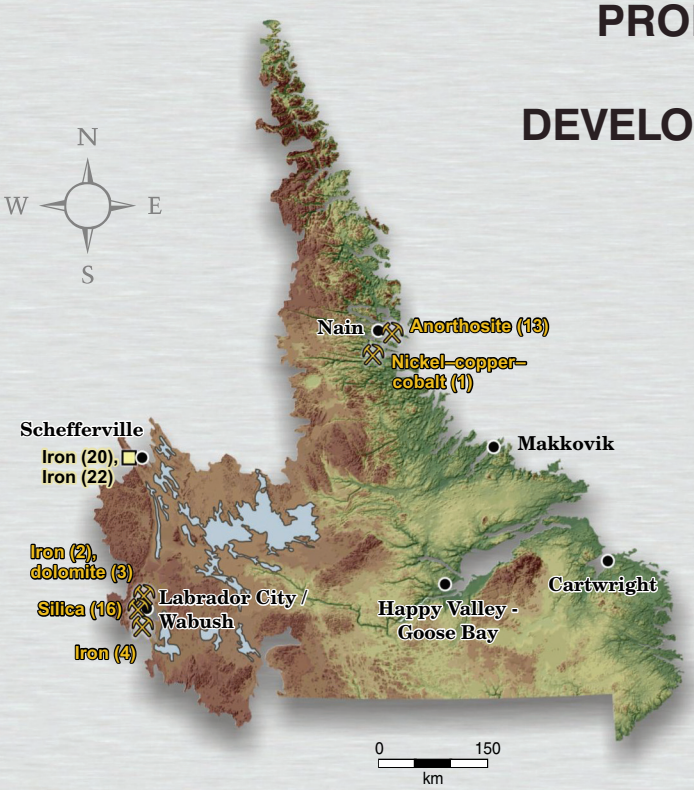
Applications for exploration approval in the province are processed by **Heather Hickman** and **Bernadine Lawlor**. The demand has decreased in 2009 with 196 requests to date, compared to a total of 233 in 2008. On-site monitoring of exploration activity expanded this year with 33 inspections performed so far, and more planned for the fall. Inspections are now conducted on a full-time basis, and companies are advised to be diligent in following all regulations governing their exploration approvals. This year also saw improved screening of applications for exploration approval, and better communication with clients over potential land-use conflicts.

Retrieval of core, Labrador.

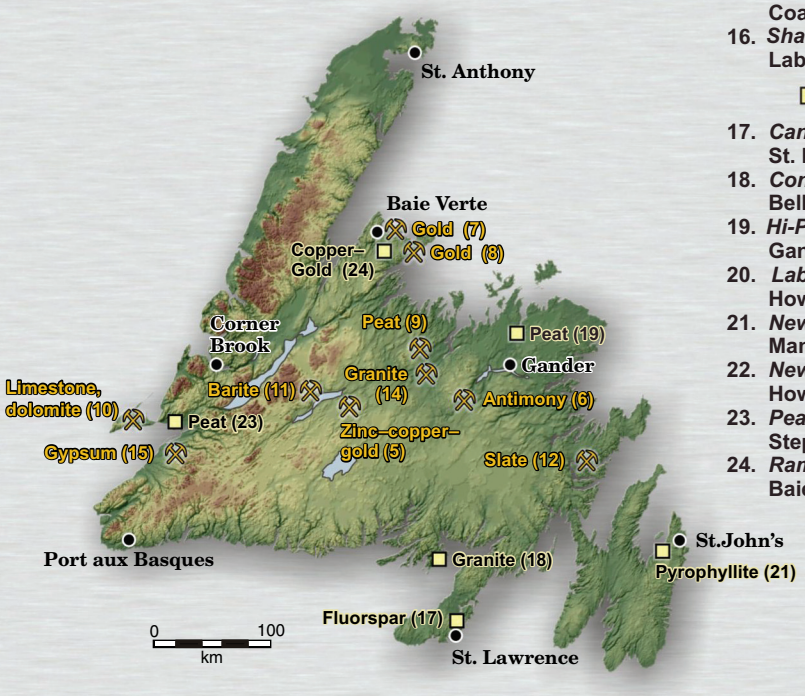
An on-line Mineral Exploration Approval Management System (MEAMS) is in the final stages of development, and is expected to be operational by the summer of 2010. The system has two components: an on-line application for mineral exploration approval and an in-house database; both incorporate GIS technology. The system will enable quicker turnaround times for all permits and approvals for mineral exploration. MEAMS will be the single on-line portal for all permitting required by any exploration program. It will also improve the monitoring and inspection of exploration sites.

PRODUCING MINES AND DEVELOPING PROPERTIES

FALL 2009



** Note scale differences of Labrador and Newfoundland maps*



Producers

1. *Vale Inco Newfoundland & Labrador Limited,* Voisey's Bay
2. *Iron Ore Company of Canada,* Labrador City
3. *Iron Ore Company of Canada,* Labrador City
4. *Wabush Mines Limited,* Wabush
5. *Teck Duck Pond Operations,* Duck Pond
6. *Beaver Brook Antimony Mine Inc.,* Beaver Brook
7. *Anaconda Mining Inc.,* Pine Cove
8. *Rambler Metals and Mining Plc.,* Nugget Pond Mill
9. *Hi-Point Industries (1991) Limited,* Bishop's Falls
10. *Atlantic Minerals Limited,* Lower Cove
11. *Atlantic Barite Limited,* Buchans
12. *Hurley Slate Works Company Inc.,* Burgoynes Cove
13. *Torngait Ujaganniavingit Corporation,* Ten Mile Bay
14. *Terra Nova Granite (2007) Inc.,* Jumpers Brook
15. *Galen Gypsum Mines Limited,* Coal Brook
16. *Shabogamo Mining & Exploration Limited,* Labrador City

Under development

17. *Canada Fluorspar (NL) Inc.,* St. Lawrence
18. *Continental Stone Limited,* Belleoram
19. *Hi-Point Industries (1991) Limited,* Gander Bay
20. *Labrador Iron Mines Holdings Limited,* Howells River
21. *Newfoundland Pyrophyllite,* Manuels
22. *New Millennium Capital Corp.,* Howells River
23. *Peat Resources Ltd.,* Stephenville
24. *Rambler Metals and Mining PLC,* Baie Verte

2009 FIELD PROJECTS
NEWFOUNDLAND & LABRADOR