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# DEPARTMENT OF NATURAL RESOURCES

## Mines Branch Review 2010

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.

Mining has recovered significantly from the recession. As a result, a gross value of shipments of about \$3.3 billion is forecast for 2010 as compared to the \$1.9 billion recorded for 2009. Mining-related employment also continues to rise, especially as a result of the Long Harbour hydromet plant construction. Mineral exploration has also shown a strong upswing during 2010. Forecast statistics for exploration indicate that claim staking and diamond drilling have increased overall and that exploration expenditures will be around \$72 million in 2010 compared to \$55 million in 2009.

A further important event in 2010 was the launch of a provincial Minerals Strategy to review the policy framework of the mining and mineral exploration sectors. This will commence with the release of a Discussion Paper in Fall 2010 followed by public and industry consultations.

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 and quarry material 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 in western Labrador and western Newfoundland. The increase in funding for Geoscience mapping is currently scheduled to end in March, 2011.

The Mineral Incentive Program continues to provide important financial support to junior exploration companies and prospectors; a total of \$2.9 million was allocated to this program in 2010-11. The branch has a strong commitment to prospector training, and supports an annual training course in Stephenville.

Commitment to sustainable mining practices was demonstrated through \$5.5 million allocated for commencement of repair and rehabilitation work at the former Buchans mine; completion of a remediation project at the Baie Verte and Rambler mines, and ongoing maintenance of the former Hope Brook mine.

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

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 has seen several new mining projects advance towards production. One of these is in the construction stage and three others are in the advanced environmental assessment and permitting stages with production slated to commence in 2011. These will broaden the scope of the mineral industry in Newfoundland and Labrador and contribute further to our growth as major mineral producer.

*Richard Wardle*  
*Assistant Deputy Minister*

## MINERALS STRATEGY

In Budget 2010, the government invested \$235 000 to develop a Provincial Minerals Strategy in consultation with stakeholders, reviewing all aspects of mineral policy with a view to maximizing activity and optimizing wealth. Dave Liverman was appointed to lead the development of the strategy. A discussion paper is being readied for release and will be followed by public and industry consultations.

The development of the strategy was prompted by recognition of the importance of the minerals sector to the economy of the province. It is, thus, important to provide a long-term strategic plan to support and regulate the industry. The last major review of the regulations affecting the sector was in the 1970s, and since then, the sector has changed with interest in new commodities and new markets, and a greater emphasis on sustainability and the environment. The government's Energy Plan, released in 2007, provides clear direction for the management of non-renewable resources.

The minerals strategy will aim to set policy direction for the sector for now and the future, and will ensure that existing policy is aligned with government's strategic direction. It will allow an overview of government's role in minerals and mining, and will identify the resources required to follow the directions established.

The principles and objectives of the strategy will be derived from existing government policy, and from input received during consultations. The major issues for consideration may include:

### **A competitive environment for the minerals industry**

- Promotion and investment attraction
- Exploration and development incentives
- Prospector assistance
- Public geoscience
- Infrastructure
- Regulation and legislation
- Access to land
- Research and development
- Developing new resources

### **Ensuring fair return for the people of the province**

- Taxation
- Benefits

### **Community development**

- Training, education and workforce issues
- Social licence
- Outreach

### **Sustainable mining and the environment**

- Environmental protection and "green" mining
- Orphaned and abandoned mines
- Climate change

### **How to provide input**

The consultation schedule will be posted on the Natural Resources web site. In addition to public meetings, round-table discussions with selected stakeholders are planned. In addition written submissions will be encouraged.

All submissions will be posted on the Natural Resources web site (<http://www.nr.gov.nl.ca/>).

Following consultations, the strategy will be developed for release in 2011.

## GEOLOGICAL SURVEY

The Departmental Strategic Plan for 2008–2011 identifies 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 2010–11 programs of the Geological Survey directly address these goals through another extensive field program, retention of highly qualified staff, and successful promotional activities.

More than \$2 million was allocated to field activities this year. In Labrador, there were six projects: two summer-long, bedrock-mapping projects in the Lac le Sueur and Seal Lake areas, a detailed lake-sediment geochemistry study northeast of Churchill Falls, in western Labrador, and a bedrock and surficial-aggregate assessment study along the Trans Labrador Highway, southeast of Happy Valley-Goose Bay. Several of the known rare-earth-element properties and some of the more recently discovered prospects were examined. A gold occurrence in northern Labrador was also reassessed. The five projects on the island included three full-scale bedrock and surficial mapping projects in central and northeast Newfoundland, and the Bonavista Peninsula, mineral deposits studies of copper on the Bonavista Peninsula, gold in western, central and eastern Newfoundland, and a regional geochemistry survey in central Newfoundland.

The results of major geophysical surveys were released this year. These were contracted directly by the Geological Survey of Canada, as part of the Geo-mapping for Energy and Minerals initiative – GEM. Over 230 detailed aeromagnetic and radiometric maps, at 1:50 000-scale, and 10 com-



pilation maps for the entire surveyed area were released along with the digital data, and are available on-line.

The expanded geoscience field program employed twenty-nine summer field and office-support students, most of whom are enrolled in earth science degrees at Memorial University. As well as assisting the survey, the 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 continued assistance of additional funding initially identified in the 2009-10 budget. The branch had a strong presence at the traditional venues (Mineral Resources Review, Exploration Round-up, Québec Exploration and PDAC), and again was part of the Canadian delegation at the China Mining meetings.

#### **Staff changes**

Staff changes this year have been minimal. In March, 2010, Lawson Dickson was appointed Director of the Geological Survey, temporarily replacing Dave Liverman who was appointed to head up the Minerals Strategy initiative. Larry Nolan was appointed to be the temporary Senior Geologist of the Regional Geology Section as well as retaining the leadership of the Geoscience Data Management Section. In January Krista Hawco joined the Geochemistry Laboratory as a Chemist. Ryan Fearon joined the laboratory on a part-time basis in September. Tara Crewe joined the Mineral Deposits Section as a geologist replacing Jeanette Walsh who returned to the mineral exploration industry. Charles (Chuck) Riley retired during the summer after nearly 35 years as a chemist in the Geochemistry Laboratory.

#### **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. The partnership with the Canadian Institute of Mining, Metallurgy and Petroleum (Newfoundland Branch) and the Department of Education continues with the preparation and distribution of more '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 and other geotourism 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 continues with the multidisciplinary projects 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 national and local branches of the Geological Association of Canada and the Canadian Institute of Mining, Metallurgy, and Petroleum and the Atlantic Geoscience Society.

#### **Organizational Structure**

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

#### **Director's Office**

The Director's office is responsible for the administration of the Geological Survey, logistical support of both office- and field-based programs, and liaison with other divisions in the Mines Branch. The Geological Survey has developed a plan for the 2010-15 period and this was reviewed and accepted by representatives of the mineral and oil exploration industries and academia. 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.

#### **Geoscience Data Management**

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 on-line delivery of geoscience information is coordinated by **Pauline Honarvar**. **Gillian Simms** provides support to all projects within the section and also to various projects in other sections of the Survey.

The Geoscience Data Management Section is responsible for the organization, management, integration and distribu-

tion 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.

Data for incorporation into the bedrock-geology database is being collated through a process of research and quality assurance. Maps (from NTS map areas 2C, 2D and 1M) have gone through the legend integration process, and are being added to the digital bedrock geology map for Newfoundland. Individual printed (original) maps are scanned and will be available online as PDF images when the survey webpage is updated (121 maps for Labrador and 187 maps for Newfoundland) and are also being digitized and stored as vector (polygon and line) files. These GIS-ready vector files (132 for Labrador and 182 for Newfoundland) are currently available upon request.

The web-based Geoscience Atlas is continuously being updated and reorganized. Under the Geochemistry layer, the “Granite” sites have been renamed “Plutonic” sites and the database, of almost 5000 samples, has been reorganized and standardized. The associated help file provides a description of the database as well as a list of references and selected bibliography. The Till Geochemistry Database has been updated with samples collected along the roads of the Avalon Peninsula in 2008 and 2009. In the Surficial Geology Map Theme section, the Striation Database has been updated with data from sites visited in 2009. The Links section the Map Viewer HELP file has been rewritten to provide a more detailed description of the Geoscience Atlas tools, as well as a brief description of all available layers. Overall, there will be more hyperlinks 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, preliminary metadata (detailed description of the data layer) has been compiled for all layers of geoscience digital information available on the Atlas and will be finalized this year.

## Mineral Deposits Section

The Mineral Deposits Section (**Andrew 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. The MODS is managed by **Greg Stapleton** with the assistance of **Jan Smith**, **Heather Rafuse**, and **Tara Crewe**. The database is continually updated using available public-domain records; during 2010, NTS map areas 2E, 2M, 12A, 12B, 12H, 12P, 13A, 13B, 13G, 13H, 13I, 13J, 14C, 14F, 23A and 23J were updated, in part. Work on systematic updates of NTS map areas 1N, 2D, 11O and 11P continued. The MODS is accessible through the survey website and through the Geoscience Atlas. The system is now effectively a real-time database, and new or updated occurrences become available online within 24 hours. The MODS also provides the foundation for the preparation of Mineral Commodity series reports that summarize the geological aspects of important mineral commodities. In 2010, work continued on reports on rare-earth elements, iron ore, and molybdenum–tungsten. The MODS database also provides data for use in interdepartmental land-use planning, and in land-claims discussions.

## Uranium Mineralization

After three long summer field-seasons in the wilds of the Labrador Central Mineral Belt, **Greg Sparkes** was back on the island in 2010, for a short-duration field program aimed at documenting new zones of uranium mineralization. Although Newfoundland never achieved the high profile of Labrador, in terms of exploration expenditures in the last few years, several new zones were discovered, and these are very diverse in character. This work adds to some initial work in southwestern Newfoundland, completed in fall 2007. However, Labrador remains part of Greg’s agenda, as he has now started the process of assembling a final descriptive report on uranium mineralization in the Central Mineral Belt. Greg presented results of his work at the GeoCanada 2010 geoscience conference in Calgary.

## Sediment-hosted Copper Mineralization across Newfoundland

This was the second 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 activities in 2010 continued on the Bonavista Peninsula; expanded to assess other areas within the Avalon Zone; and also in the Carboniferous sedimentary rocks of western Newfoundland. Work in some of these areas was coordinated with bedrock mapping of the Bonavista Peninsula by Leon Normore (Regional Geology Section). Industry interest in this deposit type was exemplified by the extensive staking in the Bonavista area by Vale Exploration Canada Inc. in late 2009. John’s work will pro-

vide a full assessment of potential host rocks, and technical information on known occurrences. He also presented an overview of the topic at the International Association for the Genesis of Ore Deposits (IAGOD) conference in Adelaide, Australia.

#### ***Magmatic Ni–Cu Sulphide Mineralization in Central Newfoundland***

In addition to working on sediment-hosted copper, **John Hinchey** also spent time examining new examples of orthomagmatic Ni–Cu sulphide mineralization in central Newfoundland. Small occurrences of this deposit type have long been known in the region, but two new discoveries (the Portage and Range prospects) located southwest of Buchans are now being explored through drilling and trenching. Other mid-Paleozoic mafic intrusions in this region of Newfoundland (and elsewhere) may have similar potential. John's work is aimed at documenting the style of mineralization and investigating geochemical indicators within the host rocks.

#### ***Gold across Newfoundland and Labrador***

**Hamish Sandeman** continued his research on gold metallogeny and new gold discoveries across the province. Field work in 2010 included the Viking prospect in western White Bay, the Huxter Lane and Brady prospects in south-central Newfoundland, and also some initial work on archived drill-core from the Valentine Lake deposit. Several other gold prospects in the early stages of exploration were examined over the course of the summer. A B.Sc. thesis has been initiated on a new gold prospect (Staghorn) in southwestern Newfoundland by summer student **Jonathon Hull**. In 2010, work expanded to the Hopedale area of central Labrador, with examination of the Aucoin gold prospect, hosted within the Archean rocks of the southern Nain Province. This is a mesothermal-style gold prospect that locally contains spectacular visible gold. It is typical of gold occurrences in the Archean terranes of the Canadian Shield, and may indicate greater gold potential in underexplored areas of Labrador. Hamish presented results of his work at the GeoCanada 2010 conference in Calgary, where he also participated in a symposium on the geology of the North Atlantic borderlands.

#### ***Rare-Earth Elements (REE) and Related Commodities***

In 2010, there was considerable interest in exploration for rare-earth elements (REE) and related commodities (Zr, Y, Nb, Be) across the province, and notably in Labrador. Deposits of this type were examined in the 1980s and 1990s, and efforts this year focused on assembling unpublished data from this earlier period, so that it can be released as an aid to exploration. The commodity series report on REE is also now being prepared. In view of the exploration activity, **Andrew Kerr** completed a short field season visiting active properties. This included the Strange Lake deposit in northern Labrador, several prospects in the Letitia Lake



*Disseminated eudialyte (pink) in syenitic orthogneiss from central Labrador. Eudialyte is a Na-Ca-Zr-REE silicate.*

area, and new exploration areas in the Grenville Province of southeastern Labrador. The progression from prospecting through trenching to new diamond drilling suggests potential for future field programs on these unusual deposits. A review article on REE mineralization in the province is planned for the upcoming Current Research publication.

#### ***Optical/Infrared Spectroscopy***

Visible/infra-red reflectance spectrometry (VIRS) continues to play a useful role in several of our research projects. The ASD Terraspec Plus finds most application in the study of alteration associated with hydrothermal mineralization, such as that associated with volcanogenic massive sulphide (VMS) deposits. **John Hinchey** became interested in the use of VIRS data to discriminate footwall and hanging-wall alteration signatures following his visit to Australia, where the technique is routinely applied in exploration. A pilot study was completed in 2010 using archived drillcore from previously studied deposits in the Red Indian Lake area, and the results suggest that similar differentiation may be possible. The instrument was also used often 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. We are also interested in the possibility of using the instrument to detect unusual rare-earth-element (REE)-bearing minerals, as many of these have not been examined for their VIRS responses.

#### ***Regional Geology***

The Regional Geology Section (**Larry Nolan**, Temporary Senior Geologist) is responsible for all bedrock mapping in the province. Three field projects were carried out in 2010: one in Newfoundland (**Leon Normore**) and two in Labrador (**Tim Van Nostrand** and **Peter Valley**). **Bruce Ryan**, **Charlie Gower**, **Alana Hinchey**, **Brian O'Brien**, **Ian Knight** and **Doug Boyce** largely focused on data compilation, report writing and office-based studies with limited fieldwork to investigate specific geological relationships in their map areas.



**Leon Normore** continued detailed mapping of the Ediacaran rocks in the Trinity map area (NTS 2C/06), of the Bonavista Peninsula, and immediately south of the Bonavista map area that was mapped in 2009. The Trinity area is underlain by terrestrial to shallow marine Neoproterozoic rocks of the Rocky Harbour Formation containing distinctive glacial deposits that provide excellent marker horizons throughout the central portion of the map area. Intrusive and volcanic components comprise a small portion of the outcrop but add significant information about the proximity of a siliciclastic sedimentary depocentre to an active volcanic island-arc sequence.



*Sinuous, asymmetric ripples, Low Point, Trinity Bay.*

The 2010 field season focused on extending the previously established stratigraphic framework of the Bonavista area to the south into the Trinity area. Major obstacles encountered during this field season include the increase of tectonic deformation of the sequence to the southwest, and the apparent lateral variability of the previously recognized facies of the Rocky Harbour Formation.

The northern part of the Bonavista Peninsula continues to receive extensive industry and academic research due to the sediment-hosted copper potential within the Rocky Harbour and Crown Hill formations and the presence of Ediacaran fossils around the Port Union area. Vale Exploration Canada Inc. staked a large area of the Bonavista Peninsula in December 2009, and their exploration field crews were active in this area during the 2010 field season.

**Brian O'Brien** carried out limited field work in the Sheffield Lake map area (NTS 12H/07) and the King's Point map area (NTS 12H/09) where he sampled a redbed cover sequence of polymict conglomerate, arkosic sandstone and caliché-bearing mudstone that had developed above a basement of altered Silurian volcanic and younger intrusive rocks. The objective is to compare and contrast the syndepositional alteration system present in the plant-bearing redbed succession with that observed in adjacent china clay deposits and their underlying altered and weathered

bedrock.

This past summer, Brian was also involved in the initiation of an Ireland–Newfoundland and Labrador Partnership geoscience project in the Gander Zone.

**Alana Hinchey** finished the last year of the field mapping program for the Makkovik map area (NTS 13O/03). She is undertaking collaborative geochronological and paleomagnetic studies of the Neoproterozoic dykes in the Aillik domain, Makkovik Province, with researchers from the University of Michigan. This research will help to constraint the geological development of the area during the Neoproterozoic. Alana was also involved in collaborative geochemical, isotopic and paleomagnetic study of the mafic dykes in the Hopedale Block with a Ph.D. student, **Tugce Sahin**, at Memorial University. This is part of a global project to understand the location of Archean blocks during the supercontinent cycles of the Precambrian.



*Core sampling, Hopedale area, Labrador.*

Alana is supporting and jointly supervising two Masters theses projects, one by **Andrea MacFarlane** (MUN) and the other by **Crystal Laflamme** (MUN).

**Doug Boyce** and **Ian Knight** collaborated with **Dr. Lucy McCobb** of the National Museum of Wales, Cardiff, compiling, systematically describing and correlating Lower Ordovician fossils of western Newfoundland and northeast Greenland, the latter housed at both The Rooms in St. John's and the National Museum of Wales. With Dr. McCobb, they also studied a number of sections in both the lower and upper St. George Group on the Port au Port Peninsula. A limestone section in the Watts Bight Formation near Ship Cove was measured and collected for macrofossils for the first time. A newly discovered trilobite fauna, along with many other fossils, was collected and allows a striking correlation with similar rocks of northeast Greenland. Fossils were also collected from the Costa Bay Member of the western part of the Port au Port Peninsula. Many fossil

groups were collected from this section and these will allow the definition of a new fauna in western Newfoundland that, in combination with trilobites from northeast Greenland, will collectively form the basis of a new understanding of this part of the Lower Ordovician. Ian Knight also mapped a series of new woods roads southwest and north of Corner Brook infilling and redefining parts of the Goose Arm and Blue Pond thrust stacks in the Corner Brook (NTS 12A/13) and Serpentine Lake (NTS 12B/16) map areas. Structural juxtaposition of parts of the Cambrian–Ordovician thrust stacks with allochthonous rocks indicates that the carbonate thrust stacks must be emplaced above allochthonous rocks. Footwall windows of slate beneath the carbonates are exposed in valleys in the Blue Pond thrust stack.

**Charlie Gower** completed 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 work has proven invaluable in enhancing geological maps for the region, especially where previously existing outcrop was sparse. He is also a collaborator in an isotopic project with geoscientists from McMaster University and the University of Witwatersrand aimed at the 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. Charlie Gower has also published 25, 1:100 000-scale maps of eastern Labrador, plus 1:500 000-scale compilation and geology maps of the same area. An open file entitled ‘Mineral Occurrences and Metallogenesis in eastern Labrador’ has also been released.

Following on from the release of non-technical and geoscientific reports on the geology of Battle Harbour in 2009, a geochronological study has been completed (due to be published in the Canadian Journal of Earth Sciences in early 2011).

**Tim van Nostrand** completed his third year of 1:50 000-scale bedrock mapping of the Mesoproterozoic Seal Lake Group in central Labrador. Mapping was carried out in the western and southeastern parts of the group in parts of NTS map areas 13K/3, 4, 5, 6 and 12 and 13L/1, 2 and 8. The main units are gabbro leucogabbro sills, amygdaloidal and porphyritic basalt flows and subaerial to shallow-marine sedimentary rocks including quartzite, siltstone, slate, shale, phyllite and minor volcanoclastic and calcareous rocks. Structures in the area are dominated by southeast- to north-east-trending, south-dipping fabrics and open to isoclinal, southwest- to southeast-plunging folds that outline, in part, the western hinge zone of a regional-scale syncline. Kinematic structures and fold attitudes associated with east- to southeast-trending fault zones along the southern margin



*Seal Lake, Labrador.*

of the Seal Lake Group, indicate a north-directed thrusting of older volcanic and granitoid rocks from the south and overturning of the southern limb of the syncline.

Mineralization includes malachite, azurite, chalcocite, bornite, chalcopyrite, and native copper hosted in quartz  $\pm$  calcite veins and along stratigraphic horizons localized along the contacts of gabbro sills, basalt flows, slates, shales and quartzites. Local, anomalous radioactivity is associated with black shale and quartzite–conglomerate units in the lower stratigraphic levels of the Seal Lake Group. Current industry exploration targets include copper and silver mineralization hosted in clastic sedimentary rocks in the upper stratigraphic levels of the Seal Lake Group. This project is part of the Geological Survey’s contribution to the Geological Survey of Canada’s GEM initiative.

Tim is supporting a B.Sc. (Hons) geology thesis by **Colin Thistle** (MUN) who worked with him in the field.

**Peter Valley** completed the second year of the 1:50 000-scale bedrock mapping project in the Crossroads Lake–Lac Le Sueur area of western Labrador (parts of NTS map areas 23I/10, 11, 14 and 15). This project is part of the Geological Survey’s contribution to the Geological Survey of Canada’s GEM initiative. The region represents the southeastern extension of the Churchill Province and consists of Archean and Mesoproterozoic meta-igneous and metasedimentary rocks. The central portion of the map area is underlain by the De Pas batholith that is composed predominantly of undeformed K-feldspar-megacrystic charnockite. The batholith also contains intrusions of gabbro-norite, monzodiorite and monzonite that are contemporaneous with, or slightly older than, the charnockite intrusions. The early granitic phases of the De Pas batholith are highly deformed. The batholith is flanked on the east and west by Archean granodiorite and tonalite gneisses and lesser amounts of Archean metasedimentary rocks that preserve an east-trending fabric not found in the De Pas batholith. Early north–south right dextral shearing is overprinted by





*Intrusion breccia in the De Pas batholith, Labrador.*

northwest–southeast sinistral shearing and northeast–southwest dextral shearing. Younger brittle faulting is associated with fluid alteration and some iron mineralization. The results of the aeromagnetic survey flown by the Geological Survey of Canada in 2008 have proved quite useful for delineating structures and rock types in poorly exposed areas.

## 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.

### Quaternary Geology

In central Newfoundland, **Jennifer Smith** entered the third season of a multi-year project examining the surficial geology, stratigraphy and till geochemistry of the Red Indian Lake Basin. This summer over 400 sites were visited by truck, ATV and helicopter, and 375 till samples were collected from hand- or backhoe-dug pits.

The Red Indian Lake Basin has a complex glacial stratigraphy that includes multiple till, sand and gravel, and silt units. These sediments represent deposition during glacial advance and retreat. The stratigraphy was exposed during examination of road and natural exposures, and during a backhoe program consisting of 30 sites that was carried out between Victoria River and Star Lake Brook. The depth of the backhoe pits ranged from 2–7 m, and commonly two or three till units were exposed.

A proglacial lake delta was identified at 305 m asl at Costigan Brook at the southwest end of Red Indian Lake. Other deltas identified nearby at approximately the same elevation suggest a contiguous proglacial lake in this part of the basin.

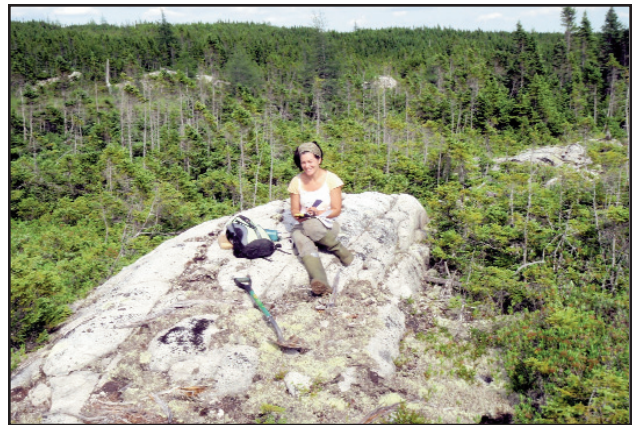


*Fine- to coarse-bedded sand exposed in a 20 m section at Buchans dump.*

Ninety new striation measurements were collected this summer. Ice-flow mapping focused on more accurately defining the location of a late-glacial ice divide, located in the central part of the basin that was a significant feature of the ice-cap during deglaciation. New data constrains the divide to a 6-km-wide corridor southwest of Harbour Round Pond, although lack of bedrock exposure prohibited further refining.

**Denise Brushett** continued surficial mapping and till-geochemistry sampling in northeastern Newfoundland, focusing on NTS map areas 2E/01, 02, 2D/15, and 2F/04. This is the second year of a three-year study. The main objectives of the 2010 field season were to collect samples for a regional till-geochemical survey, complete surficial mapping and reconstruct the glacial history of the area. All these activities will support mineral exploration in the area.

Five hundred and twenty-five (525) sites were visited by truck, ATV and helicopter, and 506 till samples were collected from the C- or BC-horizons of hand-dug pits. Samples will be analyzed in preparation for inclusion in an Open File report to be released in 2011. Ninety-nine (99) previously unidentified striation sites were recorded; these indicate that



*Till sampling in the Wing's Pond area.*



the area was affected by at least two phases of ice-flow; an earlier eastward phase ( $095 \pm 20^\circ$ ) covering much of the area, and a later northward flow recorded in the western part of the study area ( $010 \pm 20^\circ$ ). Clast fabric and clast provenance work were also conducted to provide further details on sediment genesis and palaeo-ice flow directions which will be important for interpretations of till geochemistry and the development of mineral exploration strategies.

**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. 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 for inclusion on the Geoscience Atlas also continued.

#### **Aggregate Resources**

**Jerry Ricketts** continued his regional aggregate assessment program with field work on the southern part of the Trans-Labrador Highway. The overall objective of granular aggregate-assessment projects is to locate, map and sample all sand, gravel and sandy till deposits that may be suitable as granular aggregate resources for use by the construction industry. Results of this project will help determine sources and quality of material available in a given area. Conflicting land-use activities may result in aggregate shortages if specific sites are not identified for aggregate use.

The section of road from the Cartwright junction to Goose Bay is almost 300 km long. Granular-aggregate resource mapping was conducted in a 6-km-wide corridor along parts of NTS map areas 13B/9, 10, 11, 12, 13, and 16, 13C/16, 13F/1, 2, and 13H/4. Although some sections of the road are lacking in low silt-clay aggregate, a large number of deposits were sampled containing medium- to fine-sand and boulder gravels. Two hundred and thirty-eight (238) samples were collected, consisting of 107 till, 88 gravel, 40 sand, and



*Gravel road construction on the Trans Labrador highway.*

3 silt-clay samples. Eskers are the dominant source of low silt-clay aggregate. Samples were collected from eskers along many road cuts, and from 1-m-deep hand-dug pits in areas where the eskers did not intersect the road. Terrace deposits, consisting of fine- to medium-sand, silty sand, and clay were sampled in the Churchill River valley in the west part of the map area. Grainsize data on selected deposits will be published in the Current Research 2011 volume, and 1:50 000-scale aggregate maps will also be released later in 2011.

#### **Geochemical Studies**

**John McConnell** is primarily updating databases and writing open file reports. In June of this year, OF LAB/1538 was released. This 262 page report reviews and interprets the results of a two-year lake sediment and water geochemical survey conducted in southeastern Labrador. It includes geochemical symbol maps of all sediment and water analyses. Currently, John is preparing open file releases of a rock-geochemistry survey over the rare-earth enriched Flowers River Igneous Suite, and another on a lake sediment and water survey conducted in central and western Labrador. Both reports will be released later this year.

**Stephen Amor** continued the program of helicopter-supported lake-sediment and water sampling in western Labrador, as a contribution to the GEM initiative. Coverage this year concentrated on the area to the northeast of the Smallwood Reservoir (NTS map areas 13L/5, 6, 13L/12, 13, 23I/8 and 9). Over a three-week period in July and August, 811 samples were collected. The area is underlain by Archean granite and granitic gneiss, late Paleoproterozoic gabbro and syenite, early Mesoproterozoic granite and charnockite, a mafic intrusion of the same age (the Fraser Lake Gabbro) which hosts a number of subeconomic Ni occurrences, and middle Mesoproterozoic psammitic rocks.

On the island, Steve collected 78 bulk till samples in an attempt to trace the sources of three till anomalies of rare-earth elements (two underlain by late Precambrian sedimentary rocks in the Bay de Verde Peninsula and one by an Ordovician volcanosedimentary sequence southwest of Red Indian Lake), and an unusual polymetallic anomaly dominated by molybdenum, underlain by Ordovician sedimentary rocks south of Millertown. The samples were wet-sieved in the field to create a coarse ( $> 2.5$  cm) fraction suitable for pebble counts, and a fine ( $< 1$  mm) fraction that was processed in a 'Goldhound' rotary panner to concentrate the heavy minerals.

#### **Geophysical Surveys**

**Gerry Kilfoil** continued to provide geophysical support to the mineral industry, either through maintenance and expansion of the Survey's on-line geophysical databases or through individual client consultations. New geophysical data is scrutinized to ensure that it meets the required stan-

dards and formats, before it is integrated with 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.

During the past year, many large and detailed airborne geophysical surveys flown as part of mineral exploration programs have been released. **Robyn Constantine** has been providing technical assistance by standardizing data formats and generating images from this new information as it gained non-confidential status.

In addition to new airborne surveys from the mineral exploration industry, the results of two large government-sponsored surveys were made available via the online Geoscience Atlas: 1) the aeromagnetic gradient survey of sedimentary basins in onshore western Newfoundland by the Energy Branch and Nalcor, and 2) the second phase of airborne magnetic and radiometric surveys flown in 2009 as part of the multidisciplinary GEM initiative in western Labrador.

#### ***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. Progress in this program was reported at the European Geoscience Union meeting in Vienna in May. This project will help to ensure that development avoids hazardous areas, and that planning considers the potential effects of climate change. The significance of this area of research was highlighted in the recent Public Discussion Document 'Responding to Climate Change' which included work from the Geological Survey. 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.

A component of the hazards work is liaison with the Department of Municipal Affairs, and a trip to the west coast of the province included visits to Trout River, Hampden, McIvers and Englee, all of which had reported landslide, rockfall or coastal erosion issues.

Martin Batterson 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 four staff, *viz.*, the Laboratory Director (**Chris Finch**) and three mineral laboratory chemists (**Anne-Marie Bourgeois**, **Krista Hawco** and, until recently, **Charles Riley**). Krista Hawco was hired in January to fill the vacant position of Mineral Laboratory Chemist, resulting from the departure of Kieran Miller. Charles Riley recently retired following over forty years of civil service, mostly at the laboratory. This again leaves a vacant Mineral Laboratory Chemist position. In the meantime, **Ryan Fearon** has joined the staff in a part-time capacity to assist with sample preparation.

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. In addition, the laboratory is also responsible for the preparation of all samples submitted for external analyses, and also maintains an archive of all samples submitted for analysis.

With staff shortages over the last year backlogs in some aspects of the laboratory's work grew. The backlog of most analyses was cleared with the exception of fluoride analysis. Preparation of samples collected from the 2010 field season is well underway with some analyses already completed.

#### ***Geoscience Publications and Information***

The Geoscience Publications and Information Section (**Sean O'Brien**, Senior Geologist) is organized around six principal lines of business indicated below. 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 industry associations. 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. Other section responsibilities include geoscience outreach, public and private sector geoscience documents and collections (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' assis-

tance 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 and Stephanie Neary**) represents the initial point of contact for most of the Geological Survey's clients, and for many other clients of the Branch. There has been a significant increase in the number of companies, organizations and individuals availing of the Survey's information and services. The group processed more than 1200 information requests (made via email, phone, or through office visits) from the private sector in 2009; this number excluded prospectors. A further 250 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 40 companies, yet to acquire mineral rights in the province, contacted the survey for information.

Staff increased its level of interaction with Regional Zone Boards in 2009, and delivered invited presentations and workshops in northeastern Newfoundland and southeastern Labrador. The group continued its usual participation in career fairs and government's public service initiatives, in conjunction with the section's outreach project.

This group provided logistical and promotional support for local, national and international mining and investment conferences and trade shows, including Mineral Resources Review. Daily liaison with the Matty Mitchell Prospectors Resource Room and the Prospectors Assistance Program continued throughout the year. Staff also provided logistical and technical support for the survey's outreach efforts. Staff maintains the survey's client databases and mailing lists, and has expanded efforts to target new mineral industry contacts worldwide, including those in the mining supply and service sector. This has resulted in a doubling of the Branch's mailing list, and is translating into an increase in the numbers and diversity of companies participating in Mineral Resources Review.

#### ***Promotion, Geoscience Marketing and Investment Attraction***

The Geoscience Publications and Information section has overall responsibility for development and implementation of a wide array of promotion and investment attraction initiatives designed to encourage growth in the mining and mineral exploration sectors. Staff work with other Branch divisions on many of these projects; on occasion, work is done in collaboration with other line departments, the federal government and other Canadian jurisdictions.

Increasing exposure to Asia-Pacific markets remains a priority, and was addressed overseas through: i) participation in Canada-China mineral forums in Beijing and Tianjin, ii) by giving presentations at the China Mining Conference

(Tianjin), and iii) via a trade show booth at the China Mining Exposition. The promotions group also coordinated our local junior exploration sector's participation in Chinese investment events both nationally (e.g., PDAC) and internationally (China Mining Conference and related forums in Beijing and Hong Kong). The group helps coordinate local mineral industry involvement in inbound trade missions. In addition, materials and presentations were prepared and delivered to individual investors and larger delegations visiting the province from the Asia-Pacific region. This group coordinated and helped deliver the Branch's promotional initiatives at all major national venues as well as some local ones: Mineral Exploration Roundup, Québec Exploration, Northern Lights Conference, the Baie Verte Mining Conference and Labrador Expo. Staff provided its usual input into Mineral Resources Review and developed promotional materials.

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. New for 2010 was the launch of a series of 4-page print-on-demand commodity flyers (gold, iron). These summaries, which include details on resources, are updated on a regular basis. An "Explore Newfoundland and Labrador" area – a virtual trade show booth – was developed for the new Natural Resources website. A Mandarin-language area, targeting potential mineral sector investors from China, was also introduced to the website.

#### ***Publications and Cartographic Services***

Publications and cartography includes editorial (**Chris Pereira** and **Des Walsh**), cartographic/GIS (**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 Geoscience Publications and Information section published about 60 maps, open files and other publications in the past year, including the annual Current Research volume, and assisted in production of joint GSNL-GSC open file geophysical releases. Staff also provided graphic design and related cartographic support for trade magazines, a wide variety of Branch presentations, and for Mines Branch or the Mines Branch's world-wide promotions and investment initiatives at mining trade shows, conferences and symposia and for the outreach projects.

#### ***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 9000 of these are currently available via the internet. This represents about 93% of the collection that is currently non-confidential. More than 200 new reports were filed in 2009. As reports are indexed and released from confidential status, their metadata and full text is made available online.

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

Geoscience outreach and education initiatives are coordinated by **Amanda McCallum**. In 2010, the Geological Survey initiated a new partnership with the PDAC Mining Matters to develop a series of Earth Science and Mineral Resources student workshops in rural Newfoundland and Labrador with delivery planned for the 2010/2011 school year. Other collaborative initiatives include work with the Department of Tourism, Culture and Recreation, the Department of Innovation, Trade and Rural Development and local partners on a geotourism project, the Discovery Trail Geotour on the Bonavista Peninsula. A field survey of potential sites was completed in 2010 and work with stakeholders and a geological consultant on developing background geoscience resources continue. The project provides ongoing technical support and logistical advice to the stakeholders and government partners, and helps develop community support via participation in a regional steering committee.

Mineral resources outreach involves a partnership with the CIM Newfoundland Branch and the Newfoundland and Labrador Chamber of Mineral Resources on coordinating Provincial Mining Week. This event includes the delivery of

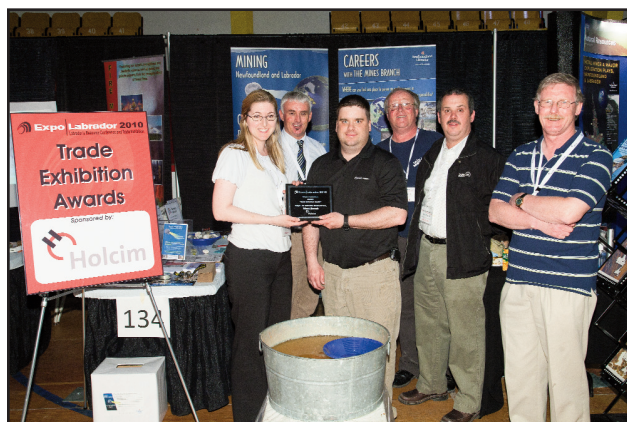
Mining in Society 2010, a hands-on, interactive show about the mining and minerals industry, teacher workshops delivered by the PDAC Mining Matters in conjunction with Mineral Resources Review and the Women in Mining Forum. Mining related educational activities were also delivered throughout the year at various events, including the PDAC, GeoCanada and Expo Labrador. Additional Provincial Rock and Mineral Kits were sent to companies and post-secondary educational institutions due to overwhelming interest in these resource kits.

### Matty Mitchell Prospectors Resource Room

The Matty Mitchell Prospectors Resource Room, a private-public partnership between the Geological Survey, the Newfoundland and Labrador Chamber of Mineral Resources and Memorial University, again supported and mentored a large number of prospectors from Newfoundland and from Labrador. The Resource Room provided varying levels of technical support that helped in the discovery and advancement of prospecting properties. 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 the daily operation of the project. In 2010, the project continued to take part in the training course in Stephenville and helped to deliver a prospector workshop in Baie Verte.

The Resource Room develops paper and digital posters to help prospectors promote their properties. Booklets, maps and CDs containing information on "Properties Available for Option" were updated in 2010. The Resource Room played a major role in assisting prospectors at Mineral Exploration Roundup, PDAC and Mineral Resources Review. Several prospectors availed of the opportunity, while at the national conferences, to initiate or finalize deals which led to option agreements both in Labrador and on the Island of Newfoundland.



*Expo Labrador Trade Exhibition: Mines Branch staff accepting the "Most Creative Booth" Award.*



*Matty Mitchell Prospectors Resource Room / Chamber of Mineral Resources: Helping prospectors promote their properties at the PDAC, Toronto, 2010.*

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 new mineral discoveries and subsequent claim staking and option agreements with junior mining companies.

## MINERAL DEVELOPMENT DIVISION

**John Davis** retired in May and **Alex Smith** has since been appointed as his replacement. 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

After several frustrating years of attempting to attract mining engineers to the Mines Branch of the department, we have had some recent success. **Paul Philpott** was hired in January 2010 as an open-pit mineral development engineer and **Muhammad Qureshi** was hired in July 2010 as an underground mineral development engineer. As well, **Len Mandville** has been appointed as the new Manager of Engineering Analysis. With competitions ongoing to fill Len's former job as Manager of Mineral Incentive Program as well as for an environmental engineer, we anticipate being fully staffed by year's end.

The division continues to emphasize awareness of occupational health and safety requirements, especially for field personnel. Training has taken place in safety related courses such as First Aid, CPR, hazard awareness and ATV operation.

### 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. Staff liaises with industry by attending technical conferences, trade shows and investment seminars.

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.

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 administration of the Mining Act and inspection of current mine operations for compliance with the Act. Staff evaluate and review development plans, rehabilitation and closure plans and financial assurance proposals for proposed mining operations as well as modifications/updates for existing operations. Development and/or Rehabilitation and Closure Plans have been received from IOCC, Labrador Iron Mines, Rambler Metals & Mining Canada Limited and Tenacity Gold Mining Company Limited. Once released from Environmental Assessment, Development Plans and Rehabilitation and Closure Plans will be received from Canada Fluorspar and New Millennium Capital Corporation. For every active mine project, annual reports on the past years operation, and operational plans for the current year, are reviewed. Inspection of each site is completed at least once yearly.



*Atlantic Minerals loadout.*

### Orphaned and Abandoned Mines

The section manages major projects on Orphaned and Abandoned Mines in the province. At Buchans, \$5 million has been budgeted for design and construction of repairs to the tailings dams at the former mine site. SNC Lavalin prepared the design and is administering the contract for the dam repairs. In addition, this spring, the tailings were sprayed with a dust suppressant to mitigate dust generation in the short term and will be covered to establish a stable vegetative cover to permanently resolve the dust problem.

At Baie Verte, a three-year, \$10.1 million partial rehabilitation program for the former Baie Verte asbestos mine and



the Consolidated Rambler copper mines was extended by one year to allow for completion of fencing and air-quality monitoring at the Baie Verte asbestos mine. The goals of the program are to mitigate public safety and health hazards through the removal of PCBs, chemicals and underground storage tanks; demolition of all buildings and infrastructure; isolation of fall hazards by fencing off open-pit mine areas; and capping shafts and underground mine openings. Once this year's fencing is complete, these goals will have been accomplished at a cost of \$6.4 million.

The section continues to monitor the water quality at the former Hope Brook gold mine with continued good results. This year, as a result of recommendations from the Dam Safety Review completed at the site in 2009, a contract was awarded to remove vegetation from the tailings dams.



*Emergency dam repair.*

The section, in particular **Ned Vukomanovic**, **Darren Pittman** and their co-op student **Tyler Ledrew**, is also responsible for continuing rehabilitation work at various other orphaned and abandoned mine sites. In addition to administering and inspecting: the fence construction at Baie Verte; spraying of dust suppressant at Buchans; and the vegetation removal at Hope Brook, they will oversee the repairs to culverts at several sites to ensure proper flow was maintained and the repairs to fencing at Tilt Cove this year.

#### **Julienne Lake Deposit**

The Julienne Lake iron deposit is a Crown property in western Labrador estimated to contain about 460 million tonnes of iron ore. A \$2.1 million exploration and economic assessment of the Julienne Lake iron deposit has been commissioned by the department and is being done by MPH Consulting Limited. This is administered by **John Clarke**. Drilling is ongoing and the final report is scheduled to be delivered in March 2011.



*Wabush Mines.*

## **Mineral Industry Analysis**

The Mineral Industry Analysis Section **Tony Burgess**, **Brad Way**, **Keith Bradbury**, **Gord Button**, **Lew Higdon**, **Karen Dumaesque** and **Bernie Brazil** 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 Karen in Wabush. A mineral statistics database is maintained which includes value of mineral shipments, employment, and exploration expenditures. The value of mineral shipments for 2009 is estimated at \$1.94 billion and the 2010 value is forecast to be \$3.34 billion.

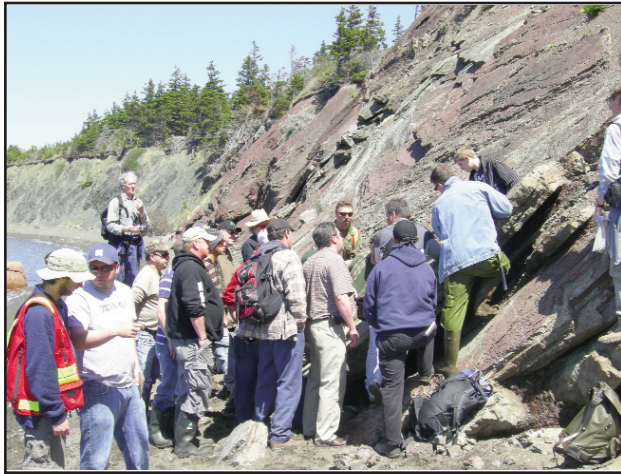
## **Mineral Incentive Program**

The overall budget for the Mineral Incentive Program is \$2.9 million for 2010-11. The table below compares the spending by program from 2008-09 to the present.

<b>Program</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11 (projected)</b>
Prospector Assistance number	54	75	80
Prospector Assistance – grants	\$192 000	\$360 000	\$400 000
Natural Stone number of grants	2	1	4
Natural Stone – grants	\$100 000	\$50 000	\$125 000
Junior Exploration number	21	23	24
Junior Exploration – grants	\$2 100 000	\$2 400 000	\$2 375 000
Prospecting Schools number	2	1	1
<b>Total</b>	<b>\$2 392 000</b>	<b>\$2 850 000</b>	<b>\$2 900 000</b>
Budget	\$2 500 000	\$3 000 000	\$2 900 000



There has been continued interest in Prospector Assistance; the number of prospector grants and the total amount spent are on par with the numbers seen in 2009-2010. This increased activity over the past two years has led to a number of significant discoveries and stimulated greater interest from Junior Companies. There were over 40 applications for assistance under the Junior Exploration Program; this is a significant increase of applications over last year and is evidence of the effectiveness of the Mineral Incentive Program to attract exploration companies to the province.



*Prospector Training Program.*

A two-week prospector training course was held in Stephenville; interest levels were such that no course was offered in Labrador in 2009 or in 2010. It is anticipated that field visits to prospector and junior company work-sites will be the focus for the autumn, and the final proposals for assistance will be assessed.

Along with his new duties as Manager of Engineering Analysis, Len Mandville will continue to manage this program, with the assistance of **Justin Lake** and **Sharon Tracey**, until the new manager is hired through a job competition.

## MINERAL LANDS DIVISION

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: 7000 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 by the end of 2010; stages 2 and 3 are contingent upon IT funding approval and could be completed in 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 were 1533 quarry permits and 70 quarry leases issued in the province in 2009. Total production for the province in 2009 was 3 309 332 m<sup>3</sup>. During the 2010/11 fiscal year quarry inspectors have completed 1000 inspections. Increased inspection activity has led to better compliance with the Quarry Materials Act, but serious violations still occur. To date, inspection activities have led to one conviction for illegal quarrying, and five other cases are pending.

## Core-storage Program

The Core-Storage Program, according to exploration personnel that have worked in other jurisdictions, is one of the best run programs of its kind to be found anywhere. It is managed by **Alvin Harris** who, with the assistance of **Stewart Cochrane**, operates six core-storage libraries located throughout the province. These libraries house more than 1.2 million metres of drill-core samples from 9000 drill holes collected from various exploration projects located in Newfoundland and Labrador. These core samples are available for inspection by any interested parties and are used extensively by the mineral exploration industry. Sampling of the core sample collection is permitted where there is sufficient core available to allow removal of some material and with the proviso that all unused material is to be returned to the core library along with a copy of analytical results obtained from the core samples. Utilization of the core-storage libraries by industry continues at a steady pace with 51 separate visits and 21 646 m of core samples examined during the first nine months of 2010.



*Core storage facility, Buchans, and boxed cores waiting to be catalogued and stored.*

The salvaging of core samples stored outside the Baie Verte and St. John's core libraries and storage of selected core samples inside the Buchans core library were the priorities during summer 2010. At the Buchans site 11 213 boxes of core samples were secured for long term outdoor storage and an additional 1973 boxes of core samples were moved indoors. The Buchans buildings currently have indoor rack space available for an additional 6640 boxes of core samples. Drill core acquisition continues with approximately 18 092 m of core samples from 141 separate drill holes added this year.

The core-storage database is available on-line via the Resource Atlas under the Mineral Lands tab.

## Exploration Approvals

Applications for exploration approval in the province are processed by **Heather Hickman** and **Bernadine Lawlor**. There have been 256 applications to date; this is an increase compared to the record total of 233 in 2008. On-site monitoring of exploration activity expanded this year with 49 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.

The on-line Mineral Exploration Approval Management System (MEAMS) is in the final stages of development; it 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.

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# 2010 PROJECTS

## NEWFOUNDLAND & LABRADOR

