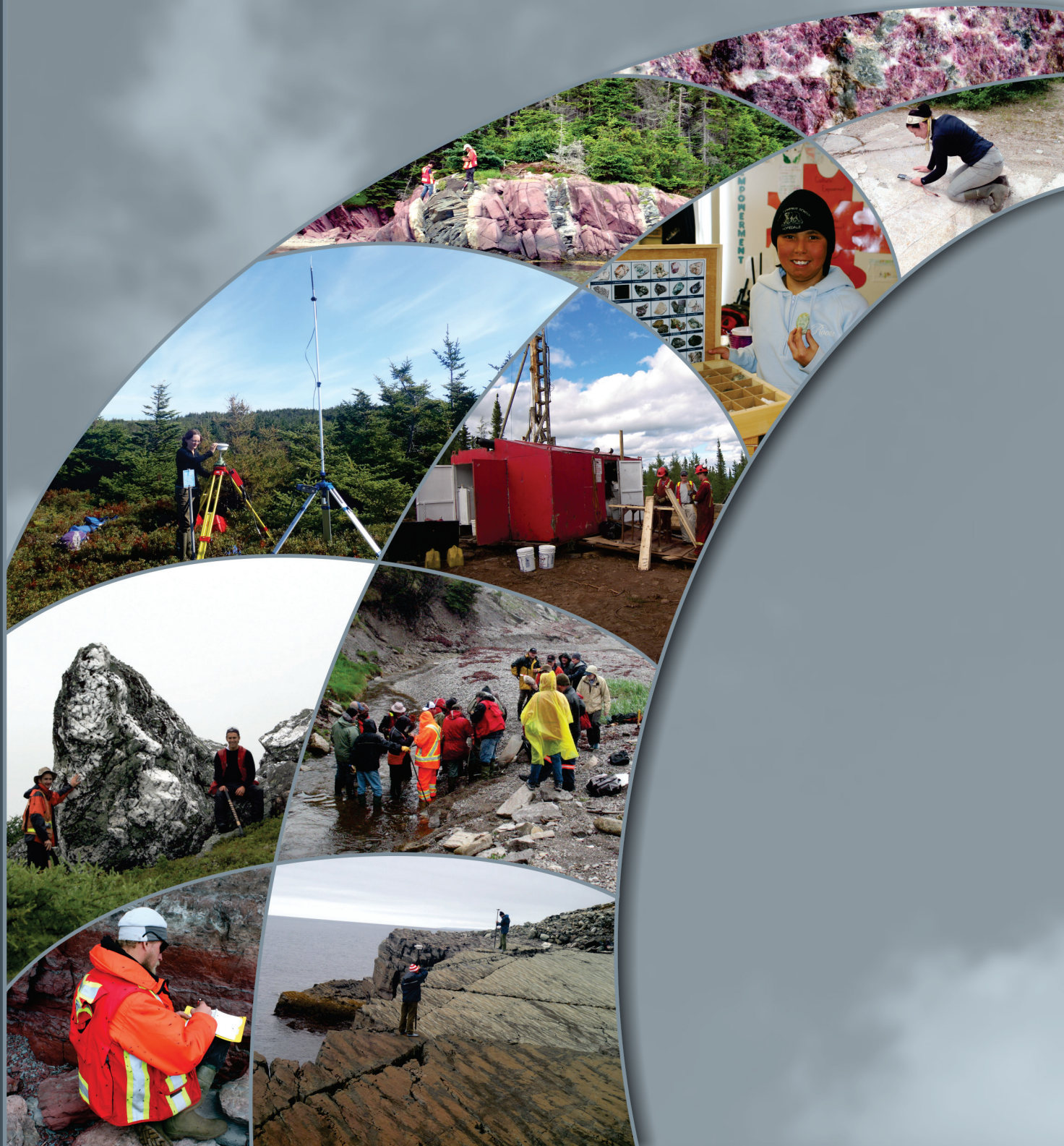


REVIEW 2011

Newfoundland
Labrador

Natural Resources



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DEPARTMENT OF NATURAL RESOURCES

Mines Branch Review 2011

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 mineral sector is forecast to have a record-breaking year. Mineral shipments and exploration expenditures are the highest on record, and employment in the sector is at the highest level in over 35 years. Gross value of shipments is expected to be about \$4.7 billion, compared to \$3.3 billion for 2010 and \$1.9 billion recorded for 2009. Mining-related employment is forecast to be close to 6000 person-years, driven, in part, by the Long Harbour hydromet plant construction but also increased activity across the sector. Mineral exploration continued a strong upswing during 2011. Forecast statistics for exploration indicate that claim-staking and diamond drilling have increased, and that exploration expenditures will be about \$155 million (the highest on record) in 2011 compared to \$105 million in 2009.

The past year has seen staff changes at the executive level, with Richard Wardle being appointed acting Deputy Minister in December before retiring in August. His replacement as Deputy is Diana Dalton. Paul Carter, already very active in the mining sector, joined the Mines Branch full time in September, being appointed Executive Director, iron ore.

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.

Budget 2011 provided an additional \$1.2 million for geo-science mapping, allowing the Geological Survey to consolidate expanded programs following four years of temporary additional funding. Partnerships with the Geological Survey of Canada resulted in significant improvements in geo-science knowledge in western Labrador. Budget 2011 also identified funding for a new project of coastal vulnerability mapping to prepare for storm surges, flooding, coastal erosion and landslides associated with climate change.

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 2011-12. 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 \$510,000 allocated for work on tailings dams at former mines near Baie Verte, Springdale and South Brook; as well as continued maintenance at 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 2011.

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.

2011 has seen several new mining projects moving forward, with one new mine already producing and one scheduled to open shortly. Two more mines are in the construction stage with production slated to start in 2013, while others move to advanced environmental assessment and permitting. In addition, existing mining operations have announced expansion plans. The mineral industry in Newfoundland and Labrador is set to expand in scope and production, and to further confirm our status as a major mineral producer.

David Liverman
Assistant Deputy Minister (Acting)

GEOLOGICAL SURVEY

Three goals of the Departmental Strategic Plan are to enhance the knowledge-base of geoscience data, to identify opportunities for resource development and to improve the promotion of these opportunities. The 2011-12 programs of the Geological Survey of Newfoundland and Labrador (GSNL) directly address these goals mainly through its field programs, retention of qualified staff, and successful promotional activities. Budget 2011 awarded GSNL a long-term funding increase of nearly \$1.2 million. This funding replaced the short-term funding increase that the GSNL had received for the last four years.

More than \$2 million was again allocated to field activities this year. In Labrador, there were two major projects: a detailed lake-sediment geochemistry study, based out of Mary's Harbour, covered an area of approximately 4000 km²; and a series of short-term studies at the current industry exploration projects for rare-earth-elements in southeastern, central and northern Labrador. On the island, five projects (4 ongoing and one new) included a surficial mapping and till geochemistry project northeast of Gander, a 1:50 000-scale bedrock mapping project in the Random Island area, a mineral deposits study of gold mineralization on the Burin Peninsula, and a regional till-geochemistry survey in the northeast Avalon. A new two-year project, started this year, is a detailed survey of coastal erosion, in vulnerable areas, around the island of Newfoundland.

The results of a major airborne geophysical survey were released this year. This survey was contracted directly by the Geological Survey of Canada (GSC), as part of the Geomapping for Energy and Minerals initiative – GEM. Sixteen detailed aeromagnetic maps, covering 8 NTS map areas at 1:50 000-scale, were released. The areas covered are in western Labrador and adjacent Québec, southwest of Schefferville. The maps, along with the digital data, are available on-line from the GSC, the GSNL and Géologie Québec.

The geoscience program employed twenty summer field and office-support students, most of who are enrolled in earth science degrees at Memorial University. As well as assisting the GSNL, this provides our future geoscientists with a valuable opportunity to train with our experienced field and office staff.

The GSNL leads the minerals promotional efforts of the Mines Branch. The branch had a strong presence at the traditional venues (Mineral Resources Review in St. John's, Baie Verte Mining Conference, Expo Labrador in Happy Valley-Goose Bay, Exploration Round-up in Vancouver, Québec Exploration in Québec City, and the PDAC in Toronto), and again was part of the Canadian delegation at the China

Mining meeting in Beijing and associated meetings in other Chinese cities.

Staff changes

There have been several staff changes this year. In January, **Lisa Connors** joined the GSNL's Geochemistry Laboratory as a chemist. In March, **Monica Squires** joined the Mineral Deposits Section and **Carolina Valverde-Cardenas** joined the Geoscience Publications and Information Section. In March, **Lawson Dickson** was re-appointed Director of the GSNL, temporarily replacing **Dave Liverman** who was appointed as Acting Assistant Deputy Minister for the Mines Branch. **Cordell Deering** was appointed as Administration Officer for the GSNL in May. In June, **Melanie Irvine** joined the Geochemistry, Geophysics and Terrain Sciences Section to start a project studying coastal erosion. In July, **Alana Hinchey** was appointed Senior Geologist for the Regional Geology Section, however, she is on leave until February, 2012; **Larry Nolan** was re-appointed as temporary Senior Geologist of the Regional Geology Section as well as Section Head of the Geoscience Data Management Section. In October, **Heather Rafuse** left the GSNL to join the Mineral Lands Division as their Exploration Approvals Geologist. **Peter Valley** left the GSNL in March to join the USGS in New Hampshire. In December, **James Conliffe** will join the GSNL to work on iron ore deposits in Labrador.

Linkages and Partnerships

The GSNL 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 paleontological and other geotourism resources. The GSNL works closely with the Department of Environment and Conservation on groundwater issues and climate change, and provides advice to Fire and Emergency Services on geological hazards and disasters. The GSNL also provides geological expertise to the Department of Transportation and Works for the assessment of submitted aggregate samples to be used in road construction and asphalt. 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 mainly through our Geoscience Publications and Information Section, GSNL partners with Mining Industry

NL 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 appointments in the Earth Sciences and Geography departments at Memorial University, and serve on supervisory committees for graduate students. A relationship has been established with the Newfoundland and Labrador Research and Development Council (RDC) on a consultative and cooperative basis. We also provide direct and indirect support for research projects at Memorial University, and other academic institutions. The GSNL 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, the Canadian Institute of Mining, Metallurgy, and Petroleum and the Atlantic Geoscience Society.

Organizational Structure

The GSNL is organized into five sections under the direction of **Lawson Dickson**. The sections are Geoscience Data Management (Senior Geologist **Larry Nolan**), Mineral Deposits (Senior Geologist **Andy Kerr**), Regional Geology (Acting 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 GSNL, logistical support of both office- and field-based programs, and liaison with other divisions in the Mines Branch. The Director represents the GSNL on the Committee of Provincial and Territorial Geologists and the National Geological Surveys Committee. With Government's commitment to long-term funding of geoscience, the GSNL can proceed with its plan for the period 2010–2015, a plan that was reviewed and accepted by representatives of the mineral and oil exploration industries and academia.

The Director's office is responsible for the financial operations of the GSNL. **Cordell Deering** looks after requisitions, purchasing and payments. Logistical and communications support of field crews are handled by **Gerry Hickey** (Newfoundland) and **Wayne Tuttle** (Labrador). They also maintain the GSNL equipment and field vehicles. Field safety training courses, including first aid, ATV, boat and helicopter safety, driver education, and chainsaw training are coordinated by **Cordell Deering**. **Gerry Hickey** is our certified ATV safety instructor. During 2010 and to date in 2011, there have been no lost-time incidents.

Geoscience Data Management

The Geoscience Data Management Section is headed by

Senior Geologist **Larry Nolan**. **Loretta Crisby-Whittle** is responsible for the bedrock-geology database for the province. The Geoscience Atlas, on-line delivery of geoscience information, on-line data standards and integration 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. **Harjit Missan** looks after the IT and equipment needs of the GSNL.

The Geoscience Data Management Section is responsible for the organization, management, integration and distribution of the geoscience information collected by the GSNL. 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 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) through the legend integration process have been added to the digital bedrock geology map for Newfoundland. Individual printed (original) maps were scanned and are being posted to the GSNL's webpage in Portable Document Format (.pdf) images and are available for download (211 maps for Labrador and 225 maps for Newfoundland). The maps are also being digitized and stored as vector files (112 for Labrador and 185 for Newfoundland). Many of these GIS-ready vector files are available upon request.

The web-based Geoscience Atlas is continuously being updated and reorganized. New layers consist of Surficial Landforms, UTM Grid Lines, and CanVec topographic data that provides higher quality, detailed topographic data for the province.

Layers that have been updated in the Geoscience Atlas are till geochemistry, detailed surficial geology, aggregate database, striation database, drill core database, airborne geophysical surveys index, and quarry sites. Various help files have been updated, including the Drill Core help file with links to maps of the Core Storage Library locations. Note that the Transportation layer is now called the National Road Network with information from the federal government's GeoBase site. The 'Print Map' tool has also been updated to provide maps with better legends.

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 GSNL research reports. The MODS is managed by **Greg Stapleton** with the assistance of **Jan Smith, Heather Rafuse, and Monica Squires**. The database is continually updated using available public-domain records; during 2011, NTS map areas 1L, 1N, 2D, 2E, 2M, 3D, 12A, 2H, 13F, 13K, 13L, 13N, 14C, 14D, 14E, 23B, 23G and 23J were updated. Work on systematic updates of NTS map areas 11O continued and 12H has started. The MODS is accessible through the GSNL website and through the Geoscience Atlas. The system is now effectively a real-time database, and new or updated occurrences become available 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 2011, the commodity series report on rare-earth elements (REE) was finalized and released, and work continued on similar reports for iron ore, and molybdenum–tungsten. The MODS database also provides data for use in interdepartmental land-use planning, and in land-claims discussions.

Research on Uranium Mineralization

After several years of field work directed at uranium mineralization, mostly in Labrador, **Greg Sparkes** moved into a new project in 2011. However, Labrador and uranium remain part of Greg's agenda, and he is now in the process of completing a final report on uranium and associated mineralization in the Central Mineral Belt. Greg's work in further developing a low-cost, high-resolution imaging tech-

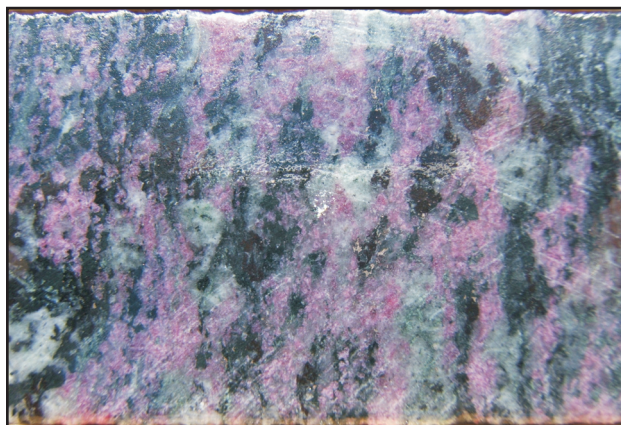


Exposure of shear-zone-hosted pyritic alteration along Route 210 in felsic volcanic rocks of the Marystown Group.

nique for radioactivity in samples using specialized resins is the subject of paper that will appear in *Exploration and Mining Geology*.

Research on Base-Metals Mineralization

Our projects connected to base-metals mineralization continued in 2011, under the direction of **John Hinchey**. The synthesis and publication of results from previous work in the Tulls Volcanic Belt of central Newfoundland is now finalized and release is anticipated for the fall of 2011. This area is a major focus for exploration for volcanogenic copper, zinc and lead deposits. John's work on sediment-hosted copper mineralization in the Avalon Zone continued through laboratory studies, and some of this will be featured in *Current Research 2012*. In time, this project will provide a full assessment of potential host rocks, and technical information on all known occurrences. John presented results of research work at the Ottawa meeting of the Geological Association of Canada in May, 2011. Field work in 2011



Eudialyte in diamond drill core, Red Wine Mountains.

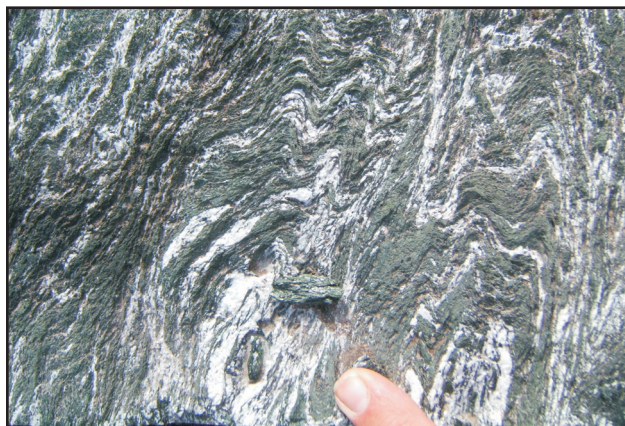
continued efforts initiated last year on a new example of orthomagmatic Ni–Cu sulphide mineralization and an example of Cu–Co mineralization in central Newfoundland. Two new discoveries (Portage and Range prospects) are the subjects of ongoing exploration projects. John's work is aimed at documenting the style of mineralization and investigating geochemical indicators within the host rocks.

Research on Gold Mineralization

In 2011, **Hamish Sandeman** continued his research on gold metallogeny and new gold discoveries across the province, but field work this year was of limited duration. The emphasis was instead toward synthesis of data and the initiation of related laboratory investigations including U/Pb and Ar/Ar geochronology, fluid inclusion studies and image analysis using SEM/MLA methods. A research project by **Matthew Minnett** on the Viking Deposit and related areas continues to be supported by GSNL. Hamish presented results of research work at the Ottawa meeting of the Geological Association of Canada in May, 2011. Industry



Fergusonite (Nb-Y-REE oxide) in pegmatite, southeast Labrador.



Folded aegirine-rich gneisses from the Red Wine Intrusive Complex.

interest in gold remains high in the light of record commodity prices, and areas outside the traditional exploration tract of central Newfoundland are more active. In 2011, a new project was initiated in the Burin Peninsula and adjacent areas. **Greg Sparkes** spent the summer of 2011 exploring this territory, where there are many gold occurrences of both epithermal and mesothermal type, and also potential for porphyry-type systems. A particular focus in 2011 was the active exploration project at the Stewart property, where the potential for porphyry-type systems is considered high. In addition to field mapping, Greg collected systematic data on the nature and distribution of alteration in the area, using the Terraspec VIRS instrument on hand samples and new drill core.

Research on Rare-Earth Elements (REE) and Related Mineralization

REE mineralization in Labrador is widespread and there are several major exploration projects. In 2011, field work by **Andrew Kerr** on REE continued in Labrador, with an emphasis on visiting active exploration projects and examining diamond-drill core from new exploration. This work included both relatively accessible areas such as the Churchill River Valley and southeastern Labrador, and also

remote territory near the Québec-Labrador border between Strange Lake and Mistastin Lake. Work also continued on archived drill core from the Strange Lake Main Zone deposit, which represents a large potential REE resource presently located within Exempt Mineral Lands (EML). Andrew presented results of research work from Strange Lake at the Ottawa Meeting of the Geological Association of Canada (May, 2011) and is preparing an overview paper on the subject for *Ore Geology Reviews*.

Proposed Research on Iron Ore Deposits

The iron ore Sector in this province was very active vibrant in 2011, with new industry expansion projects and brown-fields and greenfields exploration. Over the years, the GSNL has completed only limited work on iron ore. An iron-ore project will start in early 2012, under the direction of new hire **James Conliffe**. James joins us with an extensive and diverse background in geoscience related to mineral deposits.

Other Projects and Activities

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. *Current Research 2011* featured two reports on this work; an overview of the technique and application, and also a case study documenting its use in discriminating hanging wall and footwall environments in VMS systems. **Heather Rafuse** continued to develop her expertise with mineral identifications, and also initiated a project to collect reference VIRS data from the extensive collection of mineralized and altered rocks held by the Matty Mitchell Prospector's Resource Room. Staff of the Mineral Deposits Section continued their strong involvement in the geoscience community in 2011, working with organizations such as the Geological Association of Canada (GAC) and the Canadian Institute of Mining and Metallurgy (CIMM). **Andrew Kerr and Greg Sparkes** were also involved in the Atlantic Universities Geological Conference, acting as judges and leading a field trip, respectively. The Section staff is also involved in several activities related to the upcoming National Meeting of the Geological and Mineralogical Associations of Canada (GAC-MAC), to be held in St. John's in May 2012.

Geochemistry, Geophysics and Terrain Sciences

The Geochemistry, Geophysics and Terrain Sciences Section (**Martin Batterson**, Senior Geologist) includes aggregate resource assessments; till- and lake-sediment geochemical surveys; Quaternary geology and ice-flow mapping; geophysical compilations and interpretation; and environmental geology, specifically coastal erosion studies.

Quaternary Geology

In central Newfoundland, **Jennifer Smith** focused on surficial mapping, stratigraphy and proglacial lake development in the Red Indian Lake Basin. This is the continuation of a multi-year project that began in 2007 in response to increased mineral exploration activity in the Tulls Volcanic Belt.

A week-long field program reviewed outstanding issues regarding stratigraphy and proglacial lake extent within the area. A backhoe program on the north side of Red Indian Lake between Star Lake and Halfway Mountain Brook Road identified glaciolacustrine sediments at critical elevations, as well as providing additional data on till thickness and composition. A short helicopter survey provided access to remote parts of the basin and gave a unique perspective of the landscape, from which preliminary models of glacial retreat and proglacial lake formation could be assessed.

Denise Brushett continued surficial geological mapping and till geochemistry sampling in northeastern Newfoundland, focusing on NTS 1:50 000 map areas 2E/08, 2F/04, and 2F/05. This was the final field season for a multiyear till-geochemistry and surficial-mapping program started in 2009. The main field objectives were to: collect samples for a regional till-geochemical survey, complete surficial mapping and reconstruct the glacial history of the area, all to support mineral exploration activities.

A total of 549 samples were collected from the C- or BC-horizons of hand-dug pits through a combination of truck, ATV and helicopter-supported work. Samples will be analyzed in preparation for inclusion in an Open File report to be released in 2012.

In addition, 52 previously unrecorded striation sites were located and indicate that the area was affected by three ice-flow phases; an early eastward phase ($104 \pm 30^\circ$) extending over much of the area, and two later northward phases ($036 \pm 28^\circ$ and $343 \pm 15^\circ$) present in the western part of the study area. Clast fabric and clast provenance work were also conducted to provide further details on sediment genesis and paleo-ice flow directions.

David Taylor completed road-accessible till sampling for the northeastern Avalon Peninsula as part of the Eastern Newfoundland Till Geochemistry Program. Geochemistry for the 2010 sampling program on the southern Avalon Peninsula was released. David has also compiled four existing 1:50 000-scale digital surficial geology maps for the province for incorporation into the Geoscience Atlas on the GSNL website: there are now 100 digital 1:50 000-scale surficial geology maps for the Island and 38 for Labrador. Till geochemistry, ice-flow and aggregate databases were updated to reflect the most recent data available. A new surficial



Till Sampling north of Indian Bay Big Pond (Robert Bazeley and Nicole Clowe - field assistants).



Till sampling under a blowdown in the Ten Mile Lake area (Nicole Clowe - field assistant).

landform layer has been added to the Geoscience Atlas, containing 36 200 linear landforms along with 19 375 point landforms for the province.

Aggregate Resources

Jerry Ricketts conducted an aggregate-resource project in the Centreville-Wareham-Trinity area in June 2011. The project was conducted at the request of the Mineral Lands Division to locate an alternate source of gravel to replace quarries that are now used within the community. The study area included the southeast corner of NTS map area 2D/16, the northeast corner of NTS map area 2E/01, the southwest corner of NTS map area 2F/04, and the northwest corner of NTS map area 2C/13. Deposits sampled ranged in size from 100 000 m³ to 500 000 m³. These deposits are located between 1.3 and 4.5 km from Route 320, the major highway through the communities. Based on analyses of samples collected from each deposit, the grain-size and petrographic quality of the surficial aggregate resources identified are suitable for most construction purposes.

Other work included the digital release of six aggregate maps (NTS map areas 13E/1, 13F/3, 13F/4, 13N/10, 13N/15, and 13O/3). This is an ongoing project to digitize

all aggregate map data that were previously available in paper format. To date, approximately 206 of 237 aggregate-resource maps are available in digital form.

Geochemical Studies

Within the past year, **John McConnell** released a report on a lithogeochemical survey of the REE-enriched Flowers River Igneous Suite in northeastern Labrador (Open File 13N/0139) and a Current Research article summarizing highlights of the lake-sediment and water survey in southeastern Labrador, also a REE hotspot. More recently, John released a report on a lake-sediment and water survey conducted in two areas in central and western Labrador (Open File LAB/1585). John is currently preparing a report that will integrate ICP analyses on over 19,000 lake-sediment samples from Labrador as part of the National Geochemical Reconnaissance project, and those collected from earlier surveys. These analyses include several elements not previously determined. Additionally, there will be a web release of all data from the detailed stream-sediment and water surveys conducted in Labrador.

In July, **Steve Amor** carried out a lake-sediment and water sampling survey in southeastern Labrador, over the Exterior Thrust Belt and Interior Magmatic Belt of the Grenville Province; these included areas on NTS 13A/02, 13A/07, 13A/08, 13A/10, 13A/14 and 13A/15. Operations were based out of Mary's Harbour and a total of 854 lakes were sampled by a three-person crew.

During the summer, Steve worked on data compilation and interpretation, presented a paper on Labrador lake-sediment geochemistry at the 25th International Geochemical Symposium in Rovaniemi, Finland, and released Open File report 14E/0229, describing a coincident geochemical and geophysical anomaly in northern Labrador that suggested the presence of significant rare-earth element mineralization.

Personnel at the geochemical laboratory completed heavy-liquid separations for all till samples collected in central Newfoundland and the Bay de Verde Peninsula during the 2010 field season. These samples will be analyzed by ICP-MS.

Geophysical Surveys

Gerry Kilfoil continued to provide geophysical support to the mineral industry, as well as assuring that new geophysical data submitted to the department met the required standards and formats. The index of airborne surveys, available through the on-line Geoscience Atlas was updated at intervals to include releases of airborne data flown by mineral exploration companies.

During the past year, the results of several detailed airborne

geophysical survey programs, flown as part of mineral exploration programs was released. **Robyn Constantine** provided technical assistance by standardizing data formats and generating images from this new information as it gained non-confidential status. This has allowed these data to be made available digitally in a much more timely fashion.

In addition to new airborne surveys from the mineral exploration industry, the digital products from a large government-sponsored survey were made available via the online Geoscience Atlas. Phase III of aeromagnetic surveys (Shabogamo Lake Aeromagnetic Survey) was flown over the Ashuanipi Complex, immediately north of Labrador City/Wabush in western Labrador in early 2011 as part of a multidisciplinary program (Geoscience for Energy and Minerals – GEM), a joint federal-provincial mapping initiative with the Geological Survey of Canada and Québec.

Geological Hazards and Climate Change

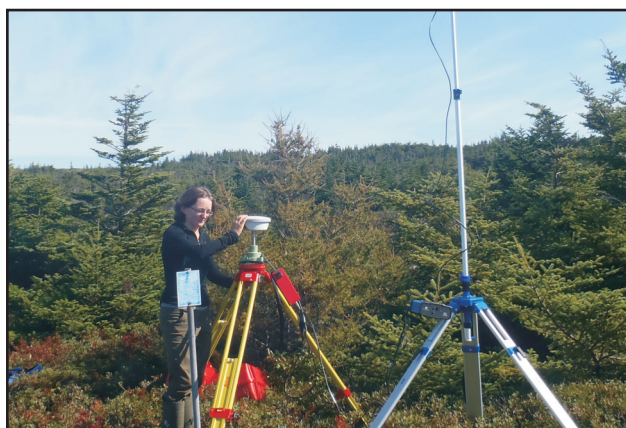
Melanie Irvine (new hire) established over 40 coastal erosion monitoring sites on the Island of Newfoundland, as part of a new initiative, funded through the Office of Climate Change and Energy Emissions Trading at Executive Council. These areas will be revisited annually or bi-annually to increase the understanding of current conditions, how coastal areas are changing over time and their sensitivity to environmental change, including climate change. Sites varied in terms of location, geomorphology, orientation, type, size and sediment characteristics and included bluff and beach locations. Coastal monitoring included the establishment of permanent survey markers, and Real Time Kinematics (RTK) surveying of transects and site characteristics, such as turf lines, sediment change, cusps and crests. This information can provide guidance to community decision making and planning, and decrease the vulnerability towards coastal issues.



Real Time Kinematic surveying at Mistaken Point Ecological Reserve to monitor rates of coastal erosion.

Martin Batterson, in conjunction with **Neil Stapleton** (Geoscience Publications and Information Section) and

Gillian Roberts (Geoscience Data Management Section), continued work on hazard-mapping projects in the north-east Avalon and Humber Valley Peninsula, in support of regional municipal planning. Hazard vulnerability reports were completed for the towns of Conception Bay South and Portugal Cove–St. Philip's; individual reports were provided to the respective communities for their input. This project will help to ensure that future 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 the flood risk in those communities located at sea level and susceptible to flooding.



Set up of Real Time Kinematic survey equipment over a monument at Portugal Cove South.

Laboratory Services

The Geochemical Laboratory of the Department of Natural Resources is mandated with the task of performing all analytical requirements of the GSNL. The laboratory is located in the Howley Building, Higgins Line, in St. John's. The laboratory has four staff, viz., the Laboratory Director (**Chris Finch**) and three mineral laboratory chemists (**Anne-Marie Bourgeois**, **Krista Hawco** and **Lisa Connors**).

The laboratory carries out analysis for approximately 40 elements with an annual production of over 200 000 determinations. Most of the analyses are carried out by Inductively-Coupled Plasma Optical Emission Spectrometry (ICP-OES) 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. These include rock, drill core, lake sediment, stream sediment, till and water. The laboratory also maintains an archive of all samples collected by GSNL geologists that were submitted for analysis.

This past year saw the replacement of the laboratory's ICP-OES instrument with a new state-of-the-art instrument. In addition, there is a new ICP-MS (Inductively-Coupled Plasma Mass Spectroscopy), a first for the GSNL. This will greatly increase the type of analyses that the laboratory can perform, and will reduce the need for external contract analyses.

Regional Geology

The Regional Geology Section (**Larry Nolan**, Acting Senior Geologist) is responsible for all bedrock mapping in the province. There was one full field project carried out in 2011: Leon Normore mapped the Random Island area of Trinity Bay. **Bruce Ryan**, **Charlie Gower**, **Brian O'Brien**, **Ian Knight**, **Doug Boyce** and **Tim van Nostrand** largely focused on data compilation, report writing and office-based studies with limited fieldwork to investigate specific geological relationships in their map areas. **Alana Hinchey** is on leave until early 2012 and she was the successful candidate for the position of Senior Geologist for the Regional Mapping Section. She will begin her new duties when she returns.

Leon Normore continued 1:50 000-scale bedrock mapping in the Avalon Zone of eastern Newfoundland with the Random Island map area (NTS 2C/04). This area is to the south of the Trinity and Bonavista map areas (NTS 2C/06, NTS 2C/11) that were mapped during the 2009 and 2010 field seasons. The Random Island map area contains a greater variety of rock types compared to areas to the north and includes sedimentary, volcanoclastic, volcanic and plutonic rocks. Field work focused on extending the previously established stratigraphic framework of the Bonavista Peninsula to the southwest into the Random Island area.

The well known copper-bearing Blue Point Horizon of the Crown Hill Formation was found in several new localities across the entire eastern edge of the map area. Copper mineralization also occurs in the chilled margins of the Herring Cove Facies pillow lavas located between the Crown Hill and Rocky Harbour formations.

Brian O'Brien produced a new 1:50 000-scale bedrock geological map of the Sheppardville region (part of NTS 12H/08 map area), digitally archived geological data previously collected from the Western Notre Dame volcanic belt, and published on the regional development of arc complexes in central Newfoundland. Brian organized several field trips for earth science students and mining industry geologists. Micropaleontological investigation of china clay deposits located near Rattling Brook and King's Point resulted in the recovery of terrestrial palynomorphs; the separation and preparations of samples were done at Memorial University's CREAT laboratory; however, the resultant data were not biostratigraphically useful.

Ian Knight and **Doug Boyce** continued their collaboration with **Dr. Lucy McCobb** of the National Museum of Wales, Cardiff, compiling, systematically describing and correlating Lower Ordovician fossils of western Newfoundland and North-East Greenland. Ian logged and collected macrofossils from several sections in the Watts Bight Formation near Ship Cove in western Newfoundland for this study. Ian also logged and sampled complexly folded and faulted deep-water shale-dominated shelf rocks of the upper Labrador Group in the Gros Morne area. The study is part of a cooperative study of Early Cambrian shelly faunas of western Newfoundland in collaboration with **Dr. Christian Skovsted** of the Swedish Museum of Natural History. Ian mapped some new woods roads southwest of Corner Brook 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

Following the release of complete 1:100 000-scale geological map coverage for eastern Labrador in late 2010, **Charlie Gower** delivered a Current Research 2011 article entitled 'The Making of the Geological Map of eastern Labrador'. He also enhanced awareness of the new maps by participating in both industry- and research-related conferences. Awareness of the mineral potential of eastern Labrador was also promoted through ongoing interaction with mineral explorationists working in the region. A field excursion for prospectors and mineral exploration personnel was carried out in September. The excursion guide is available as an open file. Planning is also in progress for a post-conference excursion in connection with the GAC-MAC national meeting to be held in St. John's in May 2012. Field work was also carried out in conjunction with geoscientific personnel from McMaster University, Ontario, and St. Andrews University, Scotland, both projects aimed, in different ways, at isotopic characterization of Proterozoic crust and events in Labrador. An isotopic project in the Mealy Mountains in conjunction with geoscientists from Witwatersrand University is continuing. Charlie is currently jointly supervising two graduate student projects in eastern Labrador. A geochronological study on rocks at Battle Harbour was published in the *Canadian Journal of Earth Sciences* early in 2011.

Tim van Nostrand carried out office-based studies during 2010-2011 including interpretation of geochemistry and geochronology data, petrographic analyses, and compilation of 1:50 000-scale geological bedrock maps of the eastern and central Mesoproterozoic Seal Lake Group. Tim supported and jointly supervised a B.Sc. honours project by MUN student **Colin Thistle** which involved analyses of fabric-forming processes of low-grade metamorphic assemblages from the eastern Seal Lake Group. Tim is also involved with a detrital zircon provenance study of sedimentary rocks of the Seal Lake Group as part of a regional Labrador project which is being carried out by **Dr. Paul**

Sylvester of Memorial University of Newfoundland. Geochronology rock samples from all six formations of the group were collected and are in the process of being analyzed by Dr. Sylvester with the intent to determine the source rocks for the sedimentary units of the Seal Lake Group.

A final three-month field season is planned for the summer of 2012 to complete 1:50 000-scale bedrock mapping of the Seal Lake Group which will focus on compilation of the western part of the group.

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. As in previous years, many of the Section's goals were 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 GSNL 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 responsibilities include geoscience outreach, public and private sector geoscience documents and collections (Geofiles), prospector mentoring, the Mines Branch area of the 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** and **Stephanie Neary**) represents the initial point of contact for most of the GSNL's clients, and for many other clients of the branch. Staff processed more than 1000 information requests (made via email, phone, or through office visits) from the private sector in 2011; this number excludes 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 this office for information.

Staff continued a high level of interaction with a number of Regional Zone Boards in 2011. In September, the Mineral Exploration Consultant, **Norm Mercer**, along with **Charlie**

Gower, helped organize and deliver a week-long geological field trip for prospectors and junior exploration company personnel. This geological field trip was sponsored by the two zone boards based in this region of Labrador.

Staff continued their participation in career fairs and government's public service initiatives, in conjunction with the Section's Outreach Geologist **Amanda McCallum**. Norm Mercer participated, as a presenter, in a Water Well Drillers Workshop hosted by the Provincial Department of Environment in early April of this year. Staff also provided logistical and promotional support for local, national and international mining and investment conferences and trade shows, including Mineral Resources Review and also provided logistical and technical support for the GSNL's Outreach efforts.

The Geoscience Publications and Information Section maintains the GSNL's client databases, publications inventory, and mailing lists and continues to expand efforts to target new mineral industry contacts worldwide, including those in the mining supply and service sector. This has resulted in a tripling of the branch's mailing list, and has translated into a significant increase in the numbers (250 in 2010) and diversity of companies participating in the annual Mineral Resources Review.

Promotion, Geoscience Marketing and Investment Attraction

The 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 the other two Mines 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. A new technical position of Promotions Geologist (**Carolina Valverde Cardenas**) was added to the Section this year.

Increasing exposure to Asia-Pacific markets is a departmental priority, and was addressed through: organization of, and participation in Canada-China mineral forums in Hong Kong and Beijing, presentations at the China Mining Conference (Tianjin), and staffing a trade show booth at the Exposition at China Mining. The promotions team also coordinated local junior exploration sector participation in these events. In 2011, the Mines Branch helped organize inbound trade missions to Canada headed by the Chinese National Development and Reform Commission (NDRC) in Toronto and Vancouver, and by the China Iron and Steel Association (CISA) in Montreal, and coordinated local mineral industry involvement there. The CISA mission also included a field visit to Labrador West iron ore district, organized by Mines Branch staff. In addition, materials and

presentations were prepared and delivered to individual investors and companies visiting the province from the Asia-Pacific region.

The section coordinated and helped deliver the branch's promotional initiatives (including trade show booths) at all major national venues as well as some local ones: Mineral Exploration Roundup, PDAC, Québec Exploration, the Baie Verte Mining Conference and Expo Labrador. Staff provided its usual input into Mineral Resources Review. A wide array of targeted promotional materials was prepared for each of these events.

The section, in partnership with the Mineral Lands Division, developed industry information packages, special publications on the provincial mineral exploration sector, and a database of current exploration projects. The series of 4-page print-on-demand commodity flyers, launched last year, was expanded, and now includes gold, iron (in English and Mandarin), rare earths and VMS. These summaries, which include details on resources, are updated on a regular basis in advance of each conference that the branch attends. The "Explore Newfoundland and Labrador" area of the department's website was expanded significantly, as was that site's Mandarin-language area. An Asian Investment Initiatives area was also introduced to the website, to encourage industry participation in these events.

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 (**Beverly Strickland** and **Joanne Rooney**). They are responsible for report and map preparation and production for the GSNL, and provide cartographic, graphic design and desktop publishing services to other divisions and branches of the department, on an opportunity basis.

In the past year, the Section published in excess of 89 maps, final project reports, open file releases, and other documents including the annual Current Research volume. It also assisted in production of joint GSNL-GSC open file releases of geophysical data collected under the GEM program. Staff provided graphic design and related cartographic support for trade magazines, a wide variety of branch presentations, for promotions and investment initiatives at mining trade shows, conferences and symposia, and for the outreach projects. **Beverly Strickland** and **Joanne Rooney** update the Mines Branch area of the website and manage the web-based release (timed and otherwise) of all GSNL publications.

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**, and **Paula Bowdridge** with assistance from **Desirée King**. The Geofiles collection includes over 10 000 mineral exploration assessment reports; 9550 of these are currently available via the internet. This represents about 95% of the collection that is currently non-confidential. Over 300 new assessment files were acquired since last year's reporting. As assessment reports are indexed and released from confidential status, their metadata and full text is made available online. Government's web statistics indicate that over 430 000 Geofiles pdf. files were downloaded from our website by clients in the past year.

pdf. files for GSNL 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. This work is carried out in collaboration with the Industry Information and Client Services group.

Outreach

Geoscience outreach and education initiatives are coordinated by **Amanda McCallum**. In 2011, the Geological Survey continued its partnership with Mining Matters to develop and deliver the *Mineral Resources Student Workshop Series* in rural Newfoundland and Labrador. Workshops included visits to four schools on the Burin Peninsula, working with 13 teachers and 249 students. The series continued with the delivery of workshop programs on the north coast of Labrador, with visits to four schools, working with 8 teachers and 88 students. 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. The project provides ongoing technical support and logistical advice to the local steering committee and government partners.

Mineral resources outreach involves a partnership with the CIM Newfoundland Branch, Mining Industry NL and PEGNL on coordinating Provincial Mining Week. Events include the delivery of Career Expo 2011, an interactive exhibition showcasing the diverse career opportunities in the mining and minerals industry, teacher workshops delivered by 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, GAC-MAC 2011, Expo Labrador and school presentations. Plans are also underway to develop and coordinate outreach and education initiatives in conjunction with St. John's 2012, the GAC-MAC Joint Annual Meeting.



Students from Amos Comenius Memorial School, Hopedale, Labrador exploring samples from the NL Rock and Mineral Kit.



Outreach Geologist, Amanda McCallum, delivers interactive workshops in partnership with (PDAC) Mining Matters to schools on the north coast of Labrador as part of the Mineral Resources Student Workshop Series.

Matty Mitchell Prospectors Resource Room

The Matty Mitchell Prospectors Resource Room, a private-public partnership between the GSNL, Mining Industry NL and Memorial University, supported and mentored a large number of prospectors from Newfoundland and Labrador during the past year. The Resource Room provided varying levels of technical support that helped in the discovery and advancement of prospects, managed by prospectors. The project is overseen 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.

The Resource Room developed paper and digital posters to help prospectors promote their properties. Booklets, maps and CDs containing information on "Properties Available for Option" were updated in 2011. The Resource Room plays 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 Newfoundland.

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. Numerous property visits have been made or are planned by junior companies with prospectors and new option agreements will undoubtedly be generated. In addition, the project continued its participation in the annual prospector's training course in Stephenville. The Resource Room also continued its prospector training and outreach initiatives in support of Regional Zone Boards via delivery of a prospector workshop delivered at Marystown.

MINERAL DEVELOPMENT DIVISION

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. The division administers the Mineral Incentive Program. **Alex Smith** is the Director of the division.

Staff

During the past year, the division was successful in attracting several new employees. We are pleased that **Abigail Steel**, who has a Ph.D. in mining-related environmental issues, accepted a position as the division's environment engineer. **John Clarke** is now the Manager of the Mineral Incentive Program and is joined by **Byron Waight** as Geologist 1, who will work with prospectors in the



Abigail Steel overlooking a sedimentation pond at Voisey's Bay.

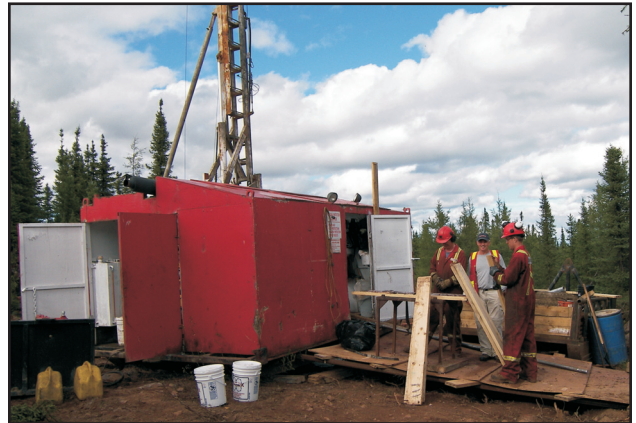
Prospector Assistance Program. **Brad Way** has accepted the Geologist III position with Engineering Analysis and **Bernadine Lawlor** has filled Brad's old position as Mineral Industry Analyst.

The biggest change within the division has been the retirement of **Ned Vukomanovic**, after 27 years of service to the mining industry. Ned's vast experience, accrued knowledge of the province's mining industry and his unique view on life will be missed. The division is now actively recruiting to fill Ned's position, but realizes that finding someone with similar knowledge and experience will be a challenge.

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, defensive driving and ATV operation.

Operations

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.



John Clarke inspecting a drill rig at Julianne Lake.

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 liaise with industry by attending technical conferences, trade shows, and investment seminars.

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



Mineral Development staff prepare to go underground at Rambler Metals and Mining Canada Limited's Ming Mine.



Drill core at Julianne Lake.

Engineering Analysis

The Engineering Analysis Section is responsible for the 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 reviewed or are under review from Vale Newfoundland and Labrador Limited, IOCC, Tata Steel Minerals Canada, Rambler Metals & Mining Canada Limited, Anaconda Gold, Canada Fluorspar and Beaver Brook Antimony. For every active mine project, annual reports on the past year's operation, and operational plans for the current year, are reviewed. We strive to perform an inspection of each active site twice yearly.

Orphaned and Abandoned Mines

The Engineering Analysis Section also manages the orphaned and abandoned mines in the province; however, this year, activity has been at a reduced level. The Buchans dam repair contract was completed. As a result of the poor condition of the Buchans dams prior to last year's repairs, the department began an investigation of the condition of tailings dams at other orphaned and abandoned mines in the province. Stantec was hired to perform detailed dam safety reviews, including intrusive testing of dam construction materials, at the former Rambler, Gullbridge and Whalesback mines. It is expected that repair of these structures will be required in the coming years.

Julienne Lake Deposit

The Julianne Lake iron deposit is a Crown property in western Labrador. A \$2.6 million exploration and economic assessment of the Julianne Lake iron deposit was commissioned by the department with the final report from MPH Consulting Limited received in early April, 2011. This was administered by John Clarke in addition to his duties with the Mineral Incentive Program.

Mineral Industry Analysis

The Mineral Industry Analysis Section 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. The section publishes 'Mining in Newfoundland and Labrador' three times a year and the brochure 'MINFO'. A mineral statistics database is maintained that includes value of mineral shipments, employment, and exploration expenditures. The value of mineral shipments for 2010 is estimated at \$3.73 billion, and the 2011 value is forecast to be \$4.74 billion.

Mineral Incentive Program

The overall budget for the Mineral Incentive Program is \$2.9 million for 2011-12. The table below compares the spending by program from 2009-10 to the present.

Program	2009-10	2010-11	2011-12 (projected)
Prospector Assistance			
Number of grants	75	80	85
amount	\$360 000	\$400 000	\$400 000
Natural Stone			
number of grants	1	4	0
amount	\$50 000	\$125 000	\$0
Junior Exploration			
number of grants	23	24	25
amount	\$2 400 000	\$2 375 000	\$2 500 000
Total amount of grants	\$2 850 000	\$2 900 000	\$2 900 000
Budget	\$3 000 000	\$2 900 000	\$2 900 000

There was continued interest in prospector assistance; the number of prospector grants and the total amount spent are on par with the numbers seen in 2010-11. This increased activity in recent years has led to significant new interest from junior companies in a number of properties. There were 37 applications for assistance under the Junior

Exploration Program; this is at a similar level as last year but is a significant increase in number of applications over historic levels.

A two-week prospector training course was held in Stephenville; interest levels were such that no course was offered in Labrador in 2011. 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.



2011 Prospector Training Course attendees.

MINERAL LANDS DIVISION

The Mineral Lands Division is responsible for the 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 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, Justin Lake, Laurie Hennessey, Charles Newhook and Brenda Lynch**) 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. They are extensively used by the legal community as well as by mineral exploration clients. To make these registries more accessible, a 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 2012; stages 2 and 3 are contingent upon IT funding approval and could be completed in 2012 or 2013. 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 mid 2013. 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.

Also, 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 1649 quarry permits and 82 quarry leases issued in the province in 2010. Total production for the province in 2010 was 4 774 148 m, a 44% increase over the 3 309 332 m produced in 2009. During the 2011/12 fiscal year quarry inspectors have completed 1120 inspections. Increased inspection activity has led to better compliance with the Quarry Materials Act, but serious violations still occur. Currently court dates are pending for two incidents where charges have been laid for illegal quarrying.

A significant enhancement was completed in July for Quarry Permit/Lease information displayed on the Geoscience Atlas. It is now possible to identify sites where new applications for a Quarry Permit are located before the permit is issued. As well, Subordinate Quarry Permit locations, Quarry Leases and archived expired quarry permit locations can now be identified and distinguished on the Geoscience Atlas; a mine of useful information for groups in the construction business!

Core-Storage Program

The Core-Storage Program 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 1.27 million metres of drill-core samples from 9445 drill holes collected from various exploration projects located from the Avalon Peninsula, to Okak Bay in northern Labrador. These samples are available for inspection by any interested parties and are used extensively by the mineral exploration industry. Sampling of cores 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. Utilization of the core-storage libraries by industry continues at a steady pace with 27 separate visits and 38 716 m of core samples examined during the first ten months of 2011.

Maintenance of core samples stored outside the Baie Verte, St. John's, Pasadena and Buchans core libraries and storage



Core collection, Tasisuak Lake, Labrador, 2011.

of collected core samples inside the Goose Bay core library were the priorities during summer 2011. Drill core acquisition continued in both Labrador and insular Newfoundland with approximately 24 663 m of core samples from 176 separate drill holes added this year.

The core-storage database is available on-line via the GeoScience Atlas.

Exploration Approvals

Since mid-December, 2010, applications for exploration approval in the province were processed by **Bernadine Lawlor**; in October **Heather Rafuse** accepted the vacant Exploration Approvals position. There have been 255 applications to date, more than the previous total of 249 in 2010.

On-site monitoring of exploration activity continued this year with 46 inspections of exploration project sites performed so far, and more planned for the fall. **Stephen Hinchey** joined the division in July as the Mineral Exploration Inspector. Inspections are now conducted on a full-time basis, and companies are advised to be diligent in following all regulations governing their exploration approvals. Of the 46 sites inspected, 16 were historical sites inspected to document the condition and natural regeneration of vegetation of areas disturbed during past exploration activities. The 35 current exploration sites were inspected

for compliance with the conditions of the Exploration Approval. An annual summary report will be prepared of the 2011 inspection activities.

The on-line Mineral Exploration Approval Management System (MEAMS) is in the final stages of development. MEAMS 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. In preparation, all 2011 applications and some older camp and fuel cache locations have been documented in the respective GIS layers as part of the MEAMS system. This information will be incorporated into the Geoscience Atlas and available for planning purposes by explorationists.

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