

REVIEW 2013



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DEPARTMENT OF NATURAL RESOURCES

Mines Branch Review 2013

The Mines Branch 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 another strong year despite weakening prices for many commodities. Employment in the mining sector is forecast to be at an all time record high of nearly 9000 person years, due to a combination of sustained activity throughout the sector, and construction at the Long Harbour nickel processing plant reaching peak employment.

Mineral shipments and exploration expenditures will remain at very high levels. Gross value of shipments for 2013 is expected to be about \$4.3 billion, compared to \$3.8 billion for 2012 and \$4.5 billion recorded for 2011. Mineral exploration continued to show high levels of expenditure although claim-staking and diamond drilling are forecast to decline.

The past year has seen some major staff changes with the retirements of Lawson Dickson (Director, Geological Survey), Stewart Cochrane (Core Storage Program), Fred Kirby (quarry materials), Catherine Patey (geofiles), Harj Missan (data management), Anne-Marie Bourgeois (geochemistry laboratory) and Keith Thorne (Mineral Lands). This represents a loss of nearly two centuries of corporate knowledge and experience; we are fortunate first in being able to replace most of these positions, and secondly in that we have been successful in attracting well-qualified people to fill these vacancies.

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.

The Geological Survey had an active field program, mounting 11 field programs (2 in Labrador, and 9 on the Island). New initiatives included bedrock mapping in western Labrador and eastern Newfoundland, surficial mapping in the Springdale and Bay d'Espoir areas, and a pilot biogeochemical survey over a buried VMS deposit in central Newfoundland. Partnerships with the Geological Survey of Canada continued to improve our geoscience knowledge in the Province.

The Mineral Incentive Program continues to provide important financial support to junior exploration companies and prospectors; a total of \$2 million was allocated to this program in 2013-14. 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 further work on the tailings dam at Gullbridge, where we are working toward a long-term solution following the collapse of the dam late last year.

The Mineral Lands Division has continued enhanced efforts in ensuring compliance to exploration permit conditions with an inspection program, as well as working with exploration companies to minimize environmental impact through following best practices.

2013 has been challenging for the global mining and exploration industry but several mining projects continue to progress. The future seems promising with other mines or expansions in construction, or in advanced feasibility studies. The Labrador Trough continues to be a focus for exploration, and iron-ore mining promises to remain a major contributor to employment and economic development in the province.

Government's own exploration work on the Julianne Lake iron deposit has identified another significant opportunity for mine development in the Trough. Proposals to bring this project forward are now being evaluated, and the project has potential to realize further benefits for the people of Newfoundland and Labrador.

David Liverman
Assistant Deputy Minister

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 2013-14 programs of the Geological Survey of Newfoundland and Labrador (GSNL) directly address these goals, mainly through its field programs, publications, retention of qualified staff, and successful promotional activities. Budget 2013 awarded GSNL \$5.69 million.

More than \$2 million was again allocated to field activities this year. In Labrador, there are two major projects. These are: 1) a detailed bedrock-mapping program in the north-eastern Archean Ashuanipi Complex of western Labrador; and 2) the continuation of a project to study the iron-ore deposits of western Labrador, from Schefferville to Labrador City.

On the Island, there are nine field projects. These are: 1) gold metallogeny in central Newfoundland; 2) Ni-Cu and Fe-Ti-V potential of mafic intrusions; 3) vulnerability to coastal erosion around the Island of Newfoundland; 4) the study and economic availability of aggregates in the Clarenville area; and 5) bedrock mapping on the lower Paleozoic platform near Corner Brook and Gros Morne National Park. New projects are: 1) surficial mapping and till geochemistry studies in northeast Newfoundland; 2) surficial mapping and till geochemistry in the Bay d'Espoir area; 3) detailed bedrock mapping in the Sweet Bay-Ocean Pond area of eastern Newfoundland; and 4) a pilot biogeochemical survey over a buried VMS deposit in central Newfoundland.

Our geoscience outreach and education program focused on the development of a strategic Outreach plan for the department, which will be implemented over the coming years. In addition, the Survey continued its delivery of educational programing, thanks to continued partnerships with organizations such as the (PDAC) Mining Matters.

Laboratory and office-based research studies continued on the northern Labrador Strange Lake rare-earth-element (REE) deposit and other REE prospects in central and southeastern Labrador; several lake-sediment geochemistry projects; data and map compilation for inclusion in Geoscience Online; geochemistry of Avalon Zone sedimentary rocks; kimberlite indicator mineral sampling in western Labrador, and bedrock geology maps of the Makkovik area and of the Indian River-King's Point map areas.

The results of two, large geophysical surveys were released in 2013. Nearly 160 000 line-km of airborne horizontal magnetic gradient survey was flown over a part of the eastern Gulf of St. Lawrence, offshore western Newfoundland.

This survey was funded by the Offshore Geoscience Data Program (OGDP) and co-administered by NRCan (Geological Survey of Canada), the NL Energy Branch, and Nalcor Energy. Under a second phase of the program, a pilot airborne gravity survey (6600 line-km) was flown in the offshore, St. George's Bay. The results of both surveys were released in 2013.

The geoscience program employed 20 summer field and office-support students, most of whom are enrolled in earth science degrees at Memorial University. As well as assisting the GSNL, this employment with the Survey provides 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 Roundup 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. Visiting delegations from the China Geological Survey and various Chinese minerals industry groups were also assisted by the Survey.

Staff Changes

There have been several staff changes in the Survey this year. Four long-standing members of the Geological Survey retired in the Spring. Lawson Dickson (Director), Harjit Missan (Geoscience Data Manager), Anne-Marie Bourgeois (Chemist) and Catherine Patey (Geoscience Database/Documents Geologist) each had careers spanning over 34 years with the public service, and each made tremendous contributions to the Geological Survey for which they should be duly acknowledged.

Joining the Geological Survey was Rosauro Roldan as a Mineral Laboratory Chemist to replace Anne-Marie Bourgeois, and Andrea Mills as a Project Geologist (Regional Mapping Section) to replace Alana Hinchey following her promotion to Section Manager. In addition, Kim Morgan remained with the Geoscience Data Management Section to replace Gillian Roberts who is on maternity leave. Similarly, Lisa Connors (Laboratory Chemist) is also on maternity leave.

Linkages and Partnerships

The GSNL benefits through linkages and partnerships with other branches of government, both provincial and national, with academic institutions, Federal Government and non-governmental organizations, and with national and international geoscience organizations. The partnership between the Canadian Institute of Mining, Metallurgy and Petroleum

(Newfoundland Branch) and the Mines Branch of the Department of Natural Resources results in the annual Mineral Resources Review conference. The partnership between the Geological Survey and the Canadian Institute of Mining, Metallurgy and Petroleum (Newfoundland Branch) and the Department of Education continues with the preparation and distribution of 'rock kits', a collection of provincial rocks and minerals for use in schools. The Mines Branch is in partnership with the CIM Newfoundland Branch, Mining Industry NL, and PEGNL for the promotion of Mining Week. With the Department of Tourism, Culture and Recreation, the Geological Survey is helping to develop the province's geotourism potential, as well as continuing work on the province's paleontological and other initiatives such as the World Heritage Status proposal for Mistaken Point and the Bonavista Peninsula Geopark proposal. The GSNL works closely with the Department of Environment and Conservation on groundwater issues, and with the Department of Environment and Conservation and the Office of Climate Change, Energy Efficiency and Emissions Trading on issues related to climate change, and provides advice to Fire and Emergency Services - NL and also to the departments of Transportation and Works and Municipal Affairs, and municipal councils on potential geological hazards. The GSNL also provides geological expertise to the Department of Transportation and Works for the assessment of submitted aggregate samples, used in road construction and asphalt paving. A long-standing relationship with the Geological Survey of Canada continues with the multidisciplinary projects as part of the GEM and TGI-4 initiatives.

As well as servicing the exploration and prospecting community, mainly through our Geoscience Publications and Information Section, GSNL partners with Mining Industry NL and the Earth Sciences Department at Memorial University on the Matty Mitchell Prospectors Resource Room. Some of our staff also instruct at prospecting courses organized by the Mineral Development Division, Mines Branch. Several geologists have adjunct appointments in the Earth Sciences and Geography departments at Memorial University, and serve on supervisory committees for graduate students. A consultative relationship has been established with the Newfoundland and Labrador Research and Development Council (RDC). 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 Martin Batterson. The sections are Geoscience Data Management (Senior Geologist Larry Nolan), Mineral Deposits (Senior Geologist Andrew Kerr), Regional Geology (Senior Geologist Alana Hinchey), Geochemistry, Geophysics and Terrain Sciences (Senior Geologist Martin Batterson (Acting)), and Geoscience Publications and Information (Senior Geologist Sean O'Brien). The Geochemistry Laboratory, part of the Geochemistry, Geophysics and Terrain Sciences Section, is under the direction of Chris Finch.

Director's Office

The Director's office is responsible for the administration of the GSNL, logistical support of both office- and field-based programs, outreach, 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 is proceeding with its five-year 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** is responsible for all requisitions, purchasing and payments. Logistical and communications support of field crews are handled by **Gerry Hickey** (Newfoundland) and **Wayne Tuttle** (Labrador). They also maintain all the GSNL field equipment and 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. Wayne Tuttle also carries out quarry inspections for Central Labrador.

Safety in the field is a prime concern of the Geological Survey, and every effort is made to eliminate accidents through training and awareness initiatives. The Geological Survey was recognised for its safety record by the AMEBC – PDAC "Safe Day Every Day" Award in 2011 and 2012.

Outreach

Geoscience education and public outreach initiatives are coordinated by **Amanda McCallum**. In 2013, Amanda was temporarily reassigned to the Strategic Planning and Policy Coordination Division to evaluate opportunities for enhanced outreach in both mines and energy sectors. She worked toward developing a comprehensive Resource Education and Public Outreach (REPO) guiding document to enhance communication, and increase information output to a broad target audience, including stakeholders, schools and the general public.

Mineral and mining resources outreach involves a partnership with the CIM Newfoundland Branch, Mining Industry NL, PEGNL and industry stakeholders on coordinating Provincial Mining Week. Events include the delivery of the fifth annual Women in Mining Forum, a key educational event bringing together a cross section of women from the mineral resource sector. To commemorate this milestone year, plans are underway to develop Women in Mining Career Connections – a guide for students, teachers and parents about career opportunities in the mining, minerals and exploration industry.

Mining related educational activities were also delivered throughout the year at various events, including the post-secondary level. Outreach support and service delivery is ongoing and reaches a broad client base.

Geoscience Data Management

The Geoscience Data Management Section is responsible for the organization, management, integration and distribution of the geoscience information collected by the Geological Survey. As the size and number of geoscience datasets has grown, it is important that digital techniques are used to manage this information and apply it effectively to mineral exploration. Over the past decade, significant changes in digital information and communications technology have completely transformed 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 and internet tools for the consistent and timely delivery of geoscience information to government scientists and industry clients.

The section is headed by Senior Geologist **Larry Nolan**. **Loretta Crisby-Whittle** is responsible for the bedrock geology database. The Geoscience Atlas, on-line delivery of geoscience information, on-line data standards and integration are coordinated by **Pauline Honarvar**. **Kim Morgan** provides support to all projects as well as to various projects in other sections of the Survey. After a long career with the Geological Survey, building the geoscience knowledge-base for the province, **Harjit Missan** retired in April 2013.

The digital bedrock geology dataset is complete for the island, and work is under way to continue the process of compiling the same for Labrador. The dataset incorporates information from the most detailed bedrock geology maps for the province and applies a common legend series. Updates will be made to the bedrock geology map theme layer on the Geoscience Atlas as newly published maps become available. Images of the original published maps, from which the dataset was built, are available, for download, in Portable Document Format (.pdf) from the Survey's Website Map Index page.

The web-based Geoscience Atlas is continuously being updated and reorganized. Layers which have been updated since last year consist of *Till Geochemistry*, detailed *Bedrock and Surficial Geology*, *Striation* database, and the *Indexes for Bedrock Geology*, *Geochemical Surveys* and *Airborne Geophysical Surveys*. These are in addition to those layers that are updated automatically: *Mineral Claims* are updated in real time, *Mineral Occurrences*, *Quarry Sites* and *Historical Claims* are updated nightly. More layers, including *Map Staked Claims*, *Till Geochemistry*, *Volcanic Field Majors* and *Index to Geochemical Surveys*, have direct links to associated *Geofiles*, with subsequent links to any available digital reports, maps and databases.

A new Petroleum Resources group of layers has been provided by the Energy Branch, to display onshore information consisting of well locations, seismic lines, permits and leases and petroleum basins.

The Geoscience Atlas is presently undergoing an upgrade to its base program. This will enable us to provide new services, including the ability to draw shapes and text on the map and print to scale.

Mineral Deposits

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. The section also plays a role in resource issues related to aboriginal land claims, and protected areas/land-use discussions.

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** and **Trina Adams**. It is continually updated using available public-domain records. During 2013, NTS map areas 1L, 1M, 1N, 2C, 2D, 2E, 3D, 11O, 12A, 12B, 12H, 13A, 13D, 13E, 13F, 13L, 13G, 23B, 23G, 23H, 23J and 23O were updated, in part. Work on systematic updates for the the Baie Verte Peninsula started in 2013. The MODS is accessible through the survey website and through the Geoscience Atlas. It is a real-time database; new or updated occurrences become available online within 24 hours after input. The MODS project also contributes to the preparation of mineral commodity series reports. New reports on fluorite and barite are currently in preparation, and preliminary versions of these will be available for Mineral Resources Review 2013. These will complete the series of reports for commodities that have been mined in Newfoundland and Labrador, but work will continue on additional reports for commodities of future exploration interest.



Overview of James, Gill and Ruth mines, and Silver Yards processing facility, Schefferville, with trains being loaded with iron ore.

Research on Iron-ore Deposits

The implementation of a new research project on iron-ore deposits in western Labrador started in 2012, and continued in 2013. This project is being carried out by **James Conliffe**. Labrador West is prominent as a world-class iron ore district but there is limited scientific information on these deposits. Regional variations, genesis and controls on iron-ore mineralization are included in this research. Regional field work in 2013 was mostly completed in the areas around Labrador City – Wabush in southwestern Labrador and Schefferville on the Québec-Labrador border. The project now has an interprovincial aspect in that it will include the acquisition of comparative data from deposits in adjacent Québec, and James was joined, at intervals, in the field by Carl Bilodeau of Géologie Québec. Systematic sampling and mapping of the iron-ore deposits across western Labrador will provide a database that can be used to assess variations in their geology and geochemistry, and also evaluate various models for the processes involved in generating these world-class high-grade iron deposits. The recent discovery of significant intersections of high-grade ‘hard’ hematite ore in the Sawyer Lake area of Labrador highlights the potential for deposit types that were not previously exploited, and the character and genesis of these is an important aspect of the research. A preliminary discussion of these new data will appear in Current Research 2014. James also continues to provide technical advice related to the Julienne Lake iron ore deposit, for which development proposals are currently under evaluation by the Mineral Development Division. He will also present an invited paper at the Québec Mines Symposium in November 2013. An invited presentation on iron ore deposits and related research was presented by Andrew Kerr, James Conliffe and John Clarke (Mineral Development) at the 2013 PDAC convention.

Research on Base-metal Mineralization

Field work related to base-metal mineralization in various parts of Newfoundland continued in 2013 under the direction of **John Hinchey**, and includes both volcanogenic massive sulphide (VMS) deposits, and also Cu–Ni–Co mineralization of magmatic affinity. New geological, geochemical and geochronological data from the Long Lake Belt within the Victoria Lake supergroup will be highlighted in



John Hinchey working in the field on a fine summer day near Steel Mountain, western Newfoundland.

Current Research 2014, based on work completed in 2012. The results of these studies should be useful in continued exploration of this high-potential area, which contains known deposits that have locally interesting grades. Field work in 2013 was mostly directed at possible magmatic environments for Ni–Cu–Co sulphide mineralization across the island, most of which are associated with mafic intrusions of mid-Paleozoic age. Some work was also completed on areas that may also have potential for vanadium mineralization, largely in western Newfoundland; this is partially a result of a compilation of information on vanadium initiated in 2010 and published in 2013.

Research on Gold Mineralization

Hamish Sandeman continued field work on gold metallogeny and new gold discoveries mainly in the central Newfoundland region but also elsewhere in Newfoundland. Related laboratory investigations include U–Pb and Ar–Ar geochronology, fluid inclusion studies, lithogeochemistry and image analysis using SEM/MLA (scanning electron microscope/mineral laser ablation) methods. Areas of field activity in 2013 include western White Bay, the Gander Bay area, the Dog Bay Line and also Valentine Lake in central Newfoundland. This work is partly integrated with scientific research underway at Memorial University with funding from the Research and Development Corporation (RDC),



Sampling at the Goldrange showing, west-central Newfoundland.

and will involve a student research project on the Valentine Lake deposit. Reports on ongoing research on the Staghorn Prospect and ^{40}Ar – ^{39}Ar thermochronology on the alteration at the Jaclyn deposit will appear in Current Research 2014.

There was no field work on epithermal-style gold mineralization in eastern Newfoundland in 2013, although Greg Sparkes continues to be involved in associated student research projects, and made short field visits. The 2013 Geological Association of Canada (NL section) field trip includes the areas studied by Greg in previous years, and Current Research 2014 will include a report detailing some of the findings from the project, and also presenting valuable geochronological data on the host rocks.

Research on Rare-earth-elements (REE) and Related Mineralization

Andrew Kerr has continued research on material acquired during earlier field work. The REE resource in the Labrador part of the Strange Lake deposit was reassessed through direct analysis and proxy methods, which suggest that it would be of significant interest should the exempt mineral land (EML) be reopened for exploration. Current Research 2014 will include an article summarizing new geochronological data from intrusive rocks in Labrador that host or have potential for REE mineralization, and also new geological information from the largely unexplored Mistastin Batholith.

Research on Uranium Mineralization

No field work related to uranium mineralization in Labrador was completed in 2013, and industry activity in the Central Mineral Belt was restricted. **Greg Sparkes** continued his work on a comprehensive report on the geology of uranium in this region, to be published in 2014. Uranium remains on our agenda, with plans for more detailed deposit-level assessments of major deposits starting in 2014.

Geochemistry, Geophysics and Terrain Sciences

The Geochemistry, Geophysics and Terrain Sciences Section (**Martin Batterson**, Acting Senior Geologist) covers a range of geoscience, including aggregate resource assessments; till- and lake-sediment geochemical surveys; surficial geological and ice-flow mapping; geophysical compilations and interpretation; and environmental geology, specifically coastal erosion studies and geological hazard mapping.

Quaternary Geology

In north-central Newfoundland, **Jennifer Smith** began surficial mapping and till-geochemistry sampling on the Dawe's Pond, Sheffield Lake and Springdale map areas (NTS 12H/1, 7 and 8). This is the first year of a project that will include surficial geological mapping, describing the stratigraphy of Quaternary sediments, and defining the paleo ice-flow history; the project also includes sampling for till geochemistry.



Gravel pit at Baie Verte junction showing laminated muds overlain by dipping gravels, deposited in a proglacial lake.

Nine hundred and seventy three sites were visited by truck, ATV or helicopter, and 921 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 2014. Forty-one new striation measurements were collected in 2013. Of these, 5 were multi-directional from which relative age relationships were determined for 3. These new striation data are similar to those observed by previous researchers and are consistent with regional ice-flow trends that indicate a single dominant north to north-east ice flow over most of the area.

Thick deposits of locally derived glacial diamicton form blankets and hummocky terrain on the Topsails Plateau and adjacent areas, however towards the coast bedrock is more prevalent and deposits of diamicton form thin layers (<2 m) overlying bedrock or pockets between bedrock outcrops. Valleys leading from the Topsails Plateau northward toward

the coast contain sand and gravel, commonly in the form of eskers and hummocks, produced in a glaciofluvial environment during deglaciation. The Birchy Lake–Indian Brook valley, a deep, narrow northeast-oriented valley extending from Grand Lake to the coast at Springdale, not only contains abundant glaciofluvial material, and eroded diamicton produced during deglaciation, but also glaciolacustrine muds. These muds may represent localized ponding, but could have been deposited in glacial Lake Howley, a large proglacial lake previously described from the Grand Lake basin. The significance of glaciolacustrine muds identified in the adjacent Sheffield Lake basin remains to be determined. Marine limit in the area, at 75 m asl, is defined by the maximum elevation of ice-contact deltas at Springdale, and deltas forming part of graded glaciofluvial systems identified at South Brook.

Denise Brushett conducted surficial geological mapping and till geochemistry sampling in the St. Alban's and Cold Spring Pond map areas (NTS map area 2M/13 and 12A/01). This field season marked the first season for a multiyear till geochemistry and surficial mapping program in the Bay d'Espoir area. 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 to support mineral exploration activities. Two hundred and thirty three samples were collected from the C- or BC- horizons of hand dug pits. Nine previously unrecorded striation sites were recorded and indicate that the area was affected by southward ice flow ($\sim 179^\circ$), ranging from 110 to 280° . Raised deltas were also examined; samples were taken for micro-fauna analysis and elevations were measured to help constrain the marine limit in the area, which averaged 21 m asl. Clast fabrics were measured from diamiction exposures, and the lithology of clasts retrieved from diamictions will provide an indication of provenance. These data will provide further details on sediment genesis and paleo-ice flow directions.

David Taylor continued to coordinate the integration of digital data with the on-line Geoscience Atlas. Four new 1:50 000 digital surficial geology maps have been added to the Geoscience Atlas on the Survey's website, bringing the total to 106 for the Island of Newfoundland and 38 for Labrador. The striation database has been extensively edited with duplicate sites removed and previously incorrectly located sites repositioned. New striation data from the 2013 field season has also been edited and added to the database. Similar updates, to include the most recent data, have been made to the till geochemistry, aggregate resources and surficial landform databases. Work continues on updating the Carbon-14 database with completion expected before 2014.

Aggregate Resources

Jerry Ricketts conducted granular-aggregate resource mapping on the Sweet Bay and Port Blandford map areas (NTS



A 6-m high exposure of sand and gravel near Port Blandford.

map areas 2C/5 and 2D/8) during the 2013 field season. This was a continuation of 2012 fieldwork on the adjacent NTS map areas 2C/4 and 2D/1.

In 2013, sampling was concentrated on the Port Blandford map area where large sand and gravel deposits were sampled along the Terra Nova North River, Sams Brook, Terra Nova River, near the south side of Terra Nova Lake, and southwest of Northwest Pond. Sand and gravel deposits were sampled on the Sweet Bay map area, but these are small, or have been depleted by past quarry activity. Till deposits throughout the Sweet Bay and Port Blandford map areas were sampled.

When laboratory analyses are completed, sand, gravel and till deposits, with low silt/clay content suitable for aggregate use, will be outlined on granular aggregate-resource maps. These maps will be published in early 2014.

Geochemical Studies

John McConnell has principally been involved in three areas of geochemical data preparation and report writing. He has been digitizing three years of stream-sediment, stream-water and rock analyses from several areas on the south coast of Newfoundland. Field work was completed in 1982, 1983 and 1984 and the data released in analogue form. The areas are primarily underlain by granophile rocks and are characterized by tin, tungsten and molybdenum mineralization. Recently new analyses have been performed on approximately 1200 samples of stream sediment from this project. These new data will be interpreted and released together with the previous analyses in an open file report.

John has prepared digital field and geochemical data for rock samples collected in 1991 and 1992 in northern Labrador. Most of these data were not available previously and were released as Open File LAB/1621 to accompany the stream sediment and water data already available for Open File LAB/1016.

Finally, John has worked in conjunction with Pauline Honarvar to release geochemical data of various types as part of updating the Geochemical Index and Atlas.

Steve Amor collected till samples in central Newfoundland from previously sampled sites that had returned anomalous responses in elements suggestive of gold and rare-metal mineralization, and that had not been followed up by the private sector. In the current program, the coarsest clasts were retained for analysis in an attempt to identify the rock-types that have produced the anomalies.



Till sampling pit showing a typical soil profile in Newfoundland.

A pilot biogeochemical survey, sampling spruce twigs and bark, was carried out along a transect over the buried Lemarchant VMS deposit in central Newfoundland. A real-time mercury-vapour analyzer was also tested along the same transect line.

Geophysical Surveys

Gerry Kilfoil continued to provide geophysical guidance to the mineral industry, as well as assuring that new geophysical data submitted to the department meet the required standards and formats, and preparation of geophysical data for the survey website. The index of airborne surveys, available through the on-line Geoscience Atlas, has been 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 have been released. **Robyn Constantine** has provided technical assistance by standardizing data formats and generating images from this new information as it gained non-confidential status. During the past year, the results of several older surveys were digitized from paper maps.

In addition to new airborne surveys from the mineral exploration industry, the digital products from government sponsored surveys were made available via the online Geoscience Atlas. During 2012, nearly 160 000 line-km of airborne horizontal magnetic gradient survey was flown over a large part

of the eastern Gulf of St. Lawrence, offshore western Newfoundland. This survey was funded by the Offshore Geoscience Data Program (OGDP) of our Energy Branch and co-administered by NRCan (Geological Survey of Canada), the Energy Branch, and Nalcor Energy. Under a second phase of that program, a pilot airborne gravity survey (6600 line-km) was flown in the offshore, St. George's Bay. The results of both surveys were released in 2013.

Geological Hazards and Climate Change

Melanie Irvine continued studying coastal areas in the province as part of the Coastal Monitoring Program, an initiative funded through the Office of Climate Change and Energy Emissions Trading. Fifty-six sites were monitored in 2013, bringing the total number of sites to 104 for the Island of Newfoundland and southern Labrador. During the 2013 field season new sites were established in: Sandbanks Provincial Park, Cheeseman Provincial Park, Point au Mal, Motion Head, Middle Cove, Norris Point and Parsons Pond. Rates of shoreline change vary across the province; areas of high erosion include Holyrood Pond and Point Verde which are eroding at rates of over 1 m/a. Wave action, groundwater flow, surface run-off, and wind are the main causes of coastal erosion in the province. Analysis of data collected from repeated long-term surveys of monitoring sites will quantify rates of coastal change, identify processes resulting in coastal change, and identify areas at risk from coastal erosion, slope movement and flooding.



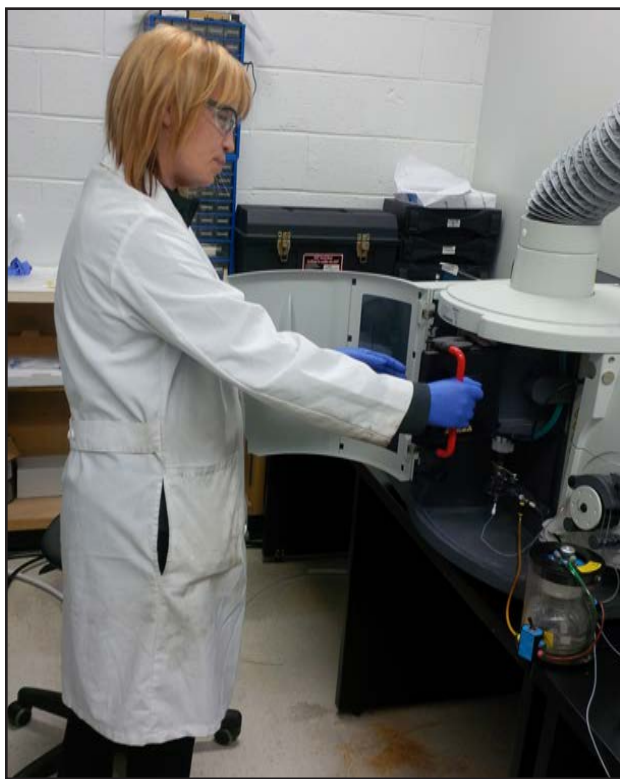
Surveying the coastline in Conception Bay South.

Martin Batterson, in conjunction with **Neil Stapleton** (Geoscience Publications and Information Section) continued work on hazard mapping projects in the northeast Avalon Peninsula in support of regional municipal planning. Hazard vulnerability reports were completed for the towns of Conception Bay South, Portugal Cove–St. Philip's, Torbay and Bauline; individual reports were provided to the respective communities for their input. This project will help

to ensure that development avoids hazardous areas, and that planning considers the potential effects of climate change. Much of the province is likely to experience sea-level rise of up to 100 cm over the next century, through a combination of global sea level rise and isostatic adjustment. A rise of this magnitude will affect coastal development in some places, and increase flood risk in those communities located at sea level and susceptible to flooding. In addition, Martin was requested by the Department of Municipal Affairs to conduct site assessments on several hazardous areas in the province.

Laboratory Services

The Geochemical Laboratory of the Department of Natural Resources is mandated with the task of performing all analytical requirements of the Geological Survey. The Geochemical Laboratory is located in the Howley Building, Higgins Line, St. John's. It consists of four staff: Laboratory Director (**Chris Finch**) and Mineral Laboratory Chemists, **Krista Hawco**, **Rosauro Roldan**, and **Lisa Connors** (currently on maternity leave).



Laboratory chemist using the Inductively Coupled Plasma Mass Spectrometer.

The laboratory carries out analysis for approximately 65 elements with an annual production of over 200 000 determinations. Most of the analyses for trace and major elements are carried out using Inductively Coupled Plasma Emission Spectrometry (ICP-ES) and Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Other selective methods for

LOI, FeO, Fluoride, Conductivity and pH are also used. The laboratory also maintains an archive of all samples collected by Survey geologists that were submitted for analysis.

This past year with the introduction of the laboratory's new ICP-MS, trace element analysis has expanded to provide a full suite of rare earth elements. In the coming year procedures for the analysis of vegetation and water samples by ICP-MS will be developed and implemented.

Regional Geology

The Regional Geology Section (**Alana Hinchey**, Senior Geologist) is responsible for all bedrock mapping in the province. Two full field projects were carried out in 2013: Tim van Nostrand started mapping in the northeastern Ashuanipi Complex of western Labrador and Andrea Mills started mapping in the Sweet Bay area of Bonavista Peninsula. Bruce Ryan, Charlie Gower, Brian O'Brien, Ian Knight and Doug Boyce focused mainly on data compilation, report writing and office-based studies with limited fieldwork to investigate specific geological relationships in their map areas. Monica Squires provides assistance to project geologists and is currently focused on data management projects dealing with the paleontology collection housed at The Rooms Natural History Annex.

Brian O'Brien worked on a preliminary version of a 1:25 000-scale geological map of the middle part of the Buchans–Robert's Arm volcanic belt in central Newfoundland (NTS map area 12H/01). The area surveyed includes numerous base-metal and gold prospects situated in lithotectonic sequences of Middle Ordovician and Late Ordovician ages. A co-authored report on the relationship of the mineralized Hammerdown volcanic belt (NTS map area 12H/01) to the Cambrian Lushs Bight Group and the Early Ordovician Catchers Pond Group was also drafted.

Ian Knight continued geological studies of the lower Paleozoic platform of western Newfoundland focusing on stratigraphic studies in Gros Morne National Park, and mapping of some recent woods roads in the vicinity of Corner Brook. The systematic stratigraphic studies along Route 430 in Gros Morne concentrated on rocks of the Hawke Bay Formation of the Labrador Group. Mapping near Corner Brook occurred in polydeformed rocks of the Pinchgut Lake Group and basal strata of the lower Paleozoic shelf sequence.

Doug Boyce, Ian Knight, Lucy M.E. McCobb (National Museum of Wales, Cardiff) and Svend Stouge (Natural History Museum of Denmark – Geological Museum) continued their collaboration on Early Ordovician fossils and carbonate rocks of western Newfoundland and North-East Greenland. Doug Boyce is writing up the systematic taxonomy and biostratigraphy of late Early Cambrian (Dyran) to



*Latex cast of *Polypleuraspis* sp. nov. pygidium (length = 12 mm), Middle Cambrian (Delamaran), Hawke Bay Formation, Bridge Cove member, Canada Bay..*

Middle Cambrian (Delamaran) trilobite faunas from mixed siliciclastic–carbonate facies within the Labrador Group, in conjunction with the lithostratigraphic studies of Ian Knight. Prior to 1986, the Hawke Bay Formation was presumed to be devoid of trilobites, and Delamaran faunas were not recognized in western Newfoundland.

Tim van Nostrand began a 1:50 000-scale bedrock mapping project of the northeastern Archean Ashuanipi Complex in western Labrador. The complex is underlain by granulite facies migmatitic paragneiss and orthogneiss, diatexite, variably deformed granitoid rocks and subordinate gabbro and pyroxenite. The region is recognized for its potential to host gold mineralization associated with sulphide-bearing gossan zones in gneissic units and mafic and ultramafic layers. In addition, galena and molybdenite indications occur within late quartz-calcite veins cutting migmatitic gneisses directly underlying the unconformity with Proterozoic sedimentary rocks of the Labrador Trough. Office work during the winter months will include compilation and interpretation of field data. Tim will also be acting as the second reader for Memorial University student (and field assistant) Marina Schofield, who is currently working on a B.Sc. (Hons.) thesis, with supervisor, Dr. G. Dunning. Her project focuses on a petrographic study of an ultramafic body in the study area.

Andrea Mills started a 1:50 000 scale bedrock mapping project in the Sweet Bay area of Bonavista Bay (parts of NTS map areas 2C/5E and 2C/12SE). This project complements recent regional bedrock mapping in Bonavista Peninsula and will generate an updated regional geological map of the region. The Sweet Bay area is underlain by Neoproterozoic siliciclastic rocks of the marine-dominated Connecting Point Group to the west, terrestrial-dominated Musgravetown Group to the east and a shale-dominated Cambro-Ordovician platformal succession in the south-cen-



Rock sampling in western Labrador.

tral part of the study area. Ongoing analytical work includes structural analysis of a composite dataset, petrography, geochemistry, geochronology and provenance studies.

Alana Hinchey continued collaborating with Christian Knudsen (Geological Survey of Denmark and Greenland – GEUS) on a project to determine the source and provenance of the continental shelf sediments. These onshore provenance studies will be used to finger-print distinct sediment sources that have fed the deep offshore basins in the Labrador Sea. Other collaborative projects include working with the Department of Tourism, Culture and Recreation and local partners on a variety of geotourism projects, including the aspiring Discovery Geopark on the Bonavista Peninsula.

Monica Squires continued work on the substantial paleontology collection housed at The Rooms Natural History Annex, an essential component of which is the incorporation of Geological Survey data and functionality in the new electronic collections management system being developed for The Rooms. In the past year, with the summer assistance of Adrienne Nofall, approximately 47 buckets and 15 drawers of bulk material was examined, prepared, documented and moved into permanent storage; all fossil material from the Forteau and Hawke Bay formations has now been processed and archived. Additionally, 34 boxes and 82 over-



Sampling a DSO iron deposit, Labrador Trough.

sized samples of material were moved from undocumented bulk storage into systematic, inventoried bulk storage. This project is ongoing and the final outcome will be the integration of the Geological Survey's paleontology collection and associated data with The Rooms Provincial Museum Division's permanent collection

Charles Gower has been dividing his time between preparing a synthesis of the geology of eastern Labrador and providing input into various graduate student research projects being conducted in the region (Memorial University, Newfoundland; St. Andrew's University, Scotland; McMaster University, Ontario; Carleton University, Ontario). The geological synthesis is progressing steadily and, in the process, is generating significant new insights into some aspects of the geological evolution of the region. An extensive supporting digital database is almost complete. At present, five students have either recently completed or are carrying out research projects in eastern Labrador. All projects are progressing well and Gower's involvement has ranged from relatively peripheral to in-depth. During the year, Gower also attended the European Geological Union meeting in Vienna and the Friends of the Grenville field excursion in New York State, USA.

Geoscience Publications and Information

The Geoscience Publications and Information Section

(**Sean O'Brien**, Senior Geologist) is organized around five 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. The section currently has 16 professional, technical and clerical staff.

The section provides publishing, editing, design and cartographic support to Mines Branch, and oversees all aspects of the department's promotion of mineral exploration and development opportunities. Other responsibilities include liaison with the mining industry, management of public and private sector geoscience documents and collections (Geofiles), prospector mentoring, maintenance of client databases, client notifications, and overall responsibility for the Mines Branch website. The section regularly provides information and advice to other line departments concerning international investment and inter-governmental cooperation related to the mineral sector.

Industry Information and Client Services

The Industry Information and Client Services group (**Phil Saunders, Randy Meehan and Stephanie Neary**) represents the initial point of contact for most clients of the GSNL, and for the Mines Branch in general. They provide information and consultation services to a broad client base including companies, prospectors, industry associations, other government departments and agencies (both federal and provincial) and the general public. The Information group has a close working partnership with the Matty Mitchell Prospectors Resource Room (see below) and with Geofiles staff. The group collectively handles a large volume of requests for information, help and advice made through office visits, phone calls and emails.

As Mineral Exploration Consultant, Phil Saunders provides independent advice and information to clients relating to mineral exploration investment decisions. He maintains a key role as industry liaison, and tracks exploration trends and activities in support of promotional activities and to provide strategic advice to clients. He co-authored articles on the mineral potential of the province for publication in *Engineering & Mining Journal* and *ResourceWorld Magazine*, and for distribution at *Mineral Resources Review 2013*. As part of his organizational role in *Mineral Resources Review*, he initiated a new feature (the Service Providers Forum), in collaboration with colleagues in the Department of Innovation, Business and Rural Development. This provides mining suppliers and service providers an opportunity to showcase their company's products, services or technologies to industry players.

Promotion, Geoscience Marketing and Investment Attraction

This group has overall responsibility, within the Mines Branch, for a wide array of promotion and investment

attraction initiatives designed to encourage growth in the mining and mineral-exploration sectors. The Mines Branch promotion program is the responsibility of **Carolina Valverde Cardenas, Sean O'Brien** and **Phil Saunders**. The group provides technical information on current exploration activity, geological context of exploration trends, opportunities for new project generation, and information on Mines Branch programs to support the industry.

In 2012-13, the group organized and delivered promotional initiatives at Mineral Exploration Roundup, PDAC, and Québec Exploration, as well as at local venues such as Mineral Resources Review, and the Northern Exposure conference. The group began a new collaboration with the Department of Innovation Business and Rural Development promoting opportunities in the mining supply sector at local mining conferences (Mineral Resources Review, Baie Verte Mining Conference and Expo Labrador).

Increasing exposure to Asia-Pacific markets and developing relationships in the region remains a priority for government. To this end, the group coordinated a week-long fact-finding mission on gold by a delegation from the China Ministry of Land and Resources. It also organized an event in Beijing, where the Premier hosted representatives of major Chinese mining companies with recent investment in, and partnerships with, Newfoundland and Labrador companies. More traditional initiatives included participation in Canada-China mineral forums and related events in Beijing and Toronto, and at the China Mining conference and trade show in Tianjin. In 2013, the group also hosted incoming Chinese delegations from private and state-owned companies seeking investment opportunities in the province.

Web-based promotional initiatives continue to target both traditional and emerging markets. The 'Explore Newfoundland and Labrador' and the 'Asian Investment



Mines Branch promotions team with Chinese Ministry of Lands and Resources during a 2013 visit to Newfoundland gold projects.



Newfoundland and Labrador promoted in the Atlantic Canada Pavilion at PDAC 2013.

Initiatives' areas of the website were updated and expanded to encourage and facilitate industry participation in this area.

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 (**Joanne Rooney** and **Bev Strickland**). 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, as needed.

In the past year, the section published in excess of 38 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 and TGI-4 programs. 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. Updates of the Mines Branch area of the website and the web-based release (timed and otherwise) of all GSNL publications are also handled by this group.

Geoscience Documents Collections and Databases

The Geofiles and Library collections, with related metadata, are maintained by staff of the Geoscience Publications and Information Section (**Cindy Saunders** and **Paula Bowdridge**).

The Geofiles collection is a growing, digital and hard copy collection of private- and public-sector mineral exploration and geotechnical/geoscientific documents (currently 22,000+ items) relating to the province. Many of these doc-

uments are exclusive to this collection. Metadata describing the Geofiles are searchable online at <http://gis.geosurv.gov.nl.ca/minesen/geofiles/default.asp>. The Geofiles collection includes over 10 000 non-confidential mineral exploration assessment reports. About 95% of these are now available online in .pdf format. The Mines Branch is now receiving and archiving most assessment files in digital-only format. The Geofiles collection also includes Geological Survey (and predecessor organizations) publications dating from 1873 to the present. Metadata for these 4900 documents (including articles in volumes such as Current Research) are searchable online. About 38% of these documents are also available online as .pdfs.

During this past year an external consultant reviewed and culled our collection of donated mineral exploration company archives “P-files”. As a result of this review an assortment of new geofiles were assembled and posted online. Government web-use statistics indicate that during the past year over 50 000 .pdfs were downloaded and there were over 21 000 Geofiles metadata queries. Geofiles staff provide customized searches of the Geofiles, Library, P-files and various in-house databases, and also assist clients (in-house and by phone) doing their own online searching.

Matty Mitchell Prospectors Resource Room

The Matty Mitchell Prospectors Resource Room is a private–public partnership with funding and in-kind support provided by the Mines Branch and Mining Industry NL. 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.

A large number of prospectors from Newfoundland and Labrador received support and mentoring from the Resource Room geologist during 2013. Varying levels of technical support were provided that helped in the discovery, promotion and advancement of prospectors’ properties. In 2013, the Resource Room played a major role in assisting prospectors at Mineral Exploration Roundup, PDAC and Mineral Resources Review. Paper and digital posters were compiled to help prospectors promote their properties at these events. A booklet, maps and CDs containing information on “Properties Available for Option in Newfoundland and Labrador” were updated several times during the year and are available on the Matty Mitchell website www.nr.gov.nl.ca/nr/mines/pro prospector/matty_mitchell/index.html

In 2013, the project participated in the annual prospectors’ training course in Stephenville and attended the annual Mining Conference in Baie Verte.

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.

The Resource Room maintains a good working relationship with the “Newfoundland and Labrador Prospectors Association” (NLPA). The Resource Room geologist participates in its annual meetings, to meet with prospectors in the regions, and display promotional material, technical literature, and rock and mineral samples.

MINERAL DEVELOPMENT DIVISION

The Mineral Development Division administers the Mining Act and is responsible for approval of the development, operation and closure of mines; development of mineral policy; monitoring and economic analysis of the mining industry; management of financial incentive programs for exploration; and management of orphaned and abandoned mines. This is the key division for liaison with other federal and provincial government departments on mining matters. **Alex Smith** is the Director of the division.

Operations

The division’s activities are organized into three sections 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. The staff ensures that all submitted plans are in compliance with this legislation and that operators are developing projects according to the approved plans. Despite the market conditions, development of projects continues, particularly in the Labrador Trough, and staff continue to work with these companies as they advance their projects to production. Reports on the past year’s operation, and plans for the current year are submitted by each mining operation in accordance with the Mining Act and must be reviewed. It is important to meet with operators on site; staff also performs inspections at each active site twice yearly.

The section also manages the orphaned and abandoned mines in the province.

In early December 2012, while repairs were being carried out, there was a major breach of the tailings dam at the former Gullbridge mine. As a result of significant efforts by the



Gullbridge dam failure December 17, 2012.

Engineering Analysis staff, government was able to complete emergency repairs to the dam in the Spring of 2013 to close the breach and stabilize the tailings in the tailings pond.

A consultant has since been engaged to evaluate and make recommendations on long-term solutions at the site through a phased approach. Phase 1 work has been tendered with plans to complete the work by year's end. The division will continue to monitor conditions at the site and work towards closure as funds are identified.

Work continues with the development of a GIS-based database of orphaned and abandoned mines. The database will incorporate risk based assessment, using selected criteria, to prioritize where government funds can best address liabilities associated with these sites.

Mineral Industry Analysis

The Mineral Industry Analysis Section is responsible for



Duck Pond Operations Boundary Deposit - North pit (ore mucking after the bench blast).

economic and market research; 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' annually.

A mineral statistics database is maintained that includes value of mineral shipments and employment. The value of mineral shipments for 2012 is estimated at \$3.8 billion and the 2013 value is forecast to be \$4.3 billion.

Mineral Incentive Program

The overall budget for the Mineral Incentive Program (MIP) is \$2.0 million for 2013-14. The table below summarizes the spending by program from 2011-12 to the present.

Program	2011-12	2012-13	2013-14 (projected)
Prospector Assistance			
Grants approved	80	86	75
Amount spent	\$246 000	\$255 000	\$350 000
Natural Stone			
Number of grants	0	0	0
Amount	\$0	\$0	\$0
Junior Exploration			
Number of grants	25	15	22
Amount	\$2 550 000	\$1 560 000	\$1 500 000
Prospecting Schools			
Number	1	1	1

The number of prospector grant applications is down slightly so far this year but the projected dollar amount to be expended by the prospecting community is expected to increase slightly. MIP continues to support prospector promotion through annual \$48 000 grants to Mining Industry NL to help fund the Matty Mitchell Prospector Resource Room as well as for prospector travel to national conferences.

In late May, the annual two-week prospector training course was held in Stephenville. 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.

There were 33 applications for assistance under the Junior Exploration Program. Due to increased demand for assistance and a decrease in program budget, funding has been proportionately dispersed to all successful applicants who submitted applications by April 1.

The Auditor General's Office performed a review of the Junior Exploration Assistance Program in 2012. There were concerns identified regarding documentation of the applica-



2013 prospector's course.

tion and project review process and the practice of retroactively funding projects. The department continues to implement measures to address the AG's concerns.

MIP will be consulting Junior Exploration companies during this year's Mineral Resources Review to get views on how the program can be improved to better meet its objective of furthering the sustainability of the mining industry in the province by encouraging exploration at all stages through financial assistance, making exploration projects in this jurisdiction more competitive globally and focusing wherever possible on green-field targets.

Julienne Lake Deposit

In 2010, government spent \$2.6 million on exploration of the Julienne Lake iron deposit, a Crown property (Exempt Mineral Land where government holds the mineral rights) in western Labrador. This program demonstrated the Julienne Lake property to be a significant iron ore deposit that might attract interest from industry. In October 2012, the government announced a call for Expressions of Interest in the property.

After reviewing the expressions of interest, several companies were invited to submit a proposal detailing how to advance the deposit to a mining project while maximizing benefits to the province. These detailed proposals have been reviewed and government is in discussions heading to final negotiations on transfer of the mineral rights of the property.

The Division is heavily involved in this process with **John Clarke** and **Paul Philpott** providing technical advice and **Gord Button** providing his expertise and analysis related to the iron ore industry.

Staffing

Darren Pittman was successful in the competition for

Mineral Development Engineer (Orphaned and Abandoned Mines). His former position of Engineer II was temporary and will not be filled.

MINERAL LANDS DIVISION

The Mineral Lands Division are jointly with Mineral Development responsible for the essential regulatory functions and information services that contribute to 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 drillcore from exploration drilling sites, and monitoring the type and amount of exploration activity in the province. 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 **Jim Hinchey**.

Staff Changes

There have been several staff changes in the Mineral Lands Division this year. In December 2012, **Justin Lake** was appointed Manager of Mineral Rights and Mineral Claims Recorder. In February 2013, **Andrea Mills** left the division to take a position in the Regional Mapping Section of the Geological Survey. In March 2013, **Fred Kirby** and **Stewart Cochrane** retired after many years of service. In August 2013, **Gerald Kennedy** was appointed Manager of Quarry Materials, **Stephen Hinchey** was appointed Assessment Report Review Geologist, and **Glen Penny** was appointed as manager of the Core-Storage Program. Several positions are vacant and are the subject of ongoing job competitions.

Mineral Rights

The Mineral Rights Section (**Laurie Hennessey**, **Stephen Hinchey**, **Justin Lake**, **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 real-time, online, 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 hardcopy 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. Work continues on a project to digitize

all of these records and make them available to the general public via a web-based application.

The Historical Mineral Tenure Project, started about 5 years ago, is scheduled to be completed by mid-2014. 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 uploaded to the department's website, clients will be able to retrieve historical claims information and view any associated mineral exploration assessment reports.

The section also 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 cited in many industry publications.

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 (**Gerald Kennedy, Ges Nunn, 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 1748 quarry permits and 88 quarry leases issued in the province in 2012 for a total reported production of 4 575 247 m³. As of October 4, 2013, inspection staff have completed 1183 inspections, and issued 11 stop-work orders. One charge of illegal quarry activity, laid in 2012, resulted in a conviction and a fine was imposed by the courts.

Funding has been secured to begin the development of a new Quarry Management System. It is anticipated that this new system will contain an on-line quarry permit application component, which should decrease the turnaround time of permit referrals and generally improve the regulation of quarry materials in the province.

Core-Storage Program

Glen Penny is manager of the Core-Storage Program and is responsible for six core-storage libraries located throughout the province. The core libraries house more than 1.29 million metres of drillcore samples from 9588 drillholes, collected from various exploration projects located in the

province. Samples are available for inspection by interested parties and are used extensively by the mineral exploration industry. Sampling of core is permitted, where sufficient core is available to allow removal of some material and with the proviso that all unused material is returned to the core library along with copies of analytical results.

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

Exploration Approvals

All exploration work requires approval by the division and this involves a referral process whereby certain government and non-government agencies must be notified of work intent, and are given the opportunity to provide feedback. **Heather Rafuse** administers the exploration approvals process and, to date, there have been 194 applications processed in 2013, compared to a total of 261 by year-end in 2012.

Exploration site inspections are conducted on a full-time basis and companies are advised to be diligent in following all regulations and conditions governing their exploration approvals. Exploration Site Inspector **Stephen Hinchey** completed on-site inspection of 30 exploration project sites by mid-September with inspections ongoing into the fall. Of the 30 project sites inspected, 9 are historical sites where ground conditions and natural re-vegetation in areas disturbed during past exploration activity are documented.

The on-line Mineral Exploration Approval Management System (MEAMS) is in the final stages of development. MEAMS has two GIS-supported components: an on-line application for mineral exploration approval and an in-house database. MEAMS will be the single on-line portal for all permitting required by any exploration program and will enable quicker turnaround times for all permits and approvals for mineral exploration. Development of the system is proceeding but a launch date has not yet been finalized.

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