ANNUAL REVIEW

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INTRODUCTION

Geoscience activities in Manitoba this year reflect the completion of some major projects (e.g., Thompson Nickel Belt CAMIRO), the final year of other collaborative ventures (e.g., Western Superior NATMAP) and the start of new projects (e.g., Targeted Geoscience Initiative projects in Lynn Lake–Leaf Rapids and Flin Flon). Organizational changes included the filling of three technical management positions in October 2001. Alan Bailes (Chief Geologist, Precambrian Mapping Section), Ruth Bezys (Chief Geologist, Sedimentary and Industrial Minerals Section) and Mark Fedikow (Chief Geologist, Mineral Deposits Section) will work to ensure that the geoscience program in Manitoba is strong, responsive and relevant.

The 2001–2002 geoscience program reflects a balance between providing support to traditional mining camps, stimulating new exploration and development opportunities in frontier areas, and supporting land-use and development priorities in southern Manitoba. The program is reviewed annually by the Mineral Exploration Liaison Committee (MELC), composed of members of the Mining Association of Manitoba, the Manitoba Prospectors and Developers Association and the Manitoba–Saskatchewan Prospectors and Developers Association, as well as representatives from the University of Manitoba and the Geological Survey of Canada (GSC).

PARTNERSHIPS AND COLLABORATIVE PROJECTS

Partnerships or collaborative projects with external agencies and organizations form an increasing proportion of the Manitoba Geological Survey (MGS) geoscience program. Such partnerships make best use of combined funds and expertise, and result in high-quality, focused, effective programs. The partnered initiatives include contributions from the federal government, the mineral-exploration industry and several Canadian universities (Table 1). These partnerships are expected to add approximately $1.9 million to geoscience programming in Manitoba for 2001–2002, representing significant leverage of the MGS geoscience budget. In recognition of the importance of partnerships, Tim Corkery will assume responsibility for co-ordinating, seeking out and fostering such relationships.

GEOSCIENCE PROGRAM

The MGS geoscience program is designed with a regional emphasis, focusing on those areas most in need of new or updated geological information. In 2001–2002, approximately 31% of the total project-related operating budget was directed toward studies in the northern Superior Province, primarily for programs in support of diamond-related exploration. Approximately 48% of the project-related operating budget was directed toward projects within traditional mining camps: Flin Flon Belt, Lynn Lake Belt, Thompson Nickel Belt and southeastern Manitoba. The remaining 21% supported Quaternary, aggregate, industrial minerals and land-use planning in the south-central part of the province, as well as province-wide projects.

Federal-provincial co-operation and co-ordination of geoscience projects continued with the Government of Canada's $15 million, three-year Targeted Geoscience Initiative (TGI). The Geological Survey of Canada (GSC) is involved in two projects located in Manitoba and adjoining portions of Saskatchewan. Funding from GSC through the TGI is matched by funding and in-kind contributions by MGS and the Saskatchewan Geological Survey (SGS). The mapping projects will significantly increase understanding of the geology and mineral deposits in the Lynn Lake–Leaf Rapids and Flin Flon regions, where there is significant potential for the discovery of new base- and precious-metal deposits.

FLIN FLON–SNOW LAKE

Geoscience investigations in the Flin Flon Belt have been thematic in nature following completion of the regional NATMAP Shield Margin project. In 2001, work was concentrated on TGI projects near Flin Flon, mineral-deposit studies at Snow Lake and a regional mapping project in the Naosap–Wabishkok area.

Nine new projects have been initiated under the Flin Flon TGI. These projects are designed to increase understanding of the volcanic and hydrothermal events influencing the setting of volcanogenic massive sulphide (VMS) deposits in the central Flin Flon Belt. This study brings together geoscientists from the GSC, MGS, SGS, Laurentian University and the University of Manitoba to collaborate with local exploration geologists from Hudson Bay Exploration and Development Co. Ltd., Aur Resources Inc. and M'Ore Resources. The Flin Flon TGI involves separate but integrated subprojects spanning the Manitoba–Saskatchewan border, including alteration-related studies, trace-element geochemistry of VMS deposits, a cross-border geological compilation of the Flin Flon area, and a facies study of the volcaniclastic host rocks to the Flin Flon, Triple 7 and Callinan deposits. Detailed (1:500 scale) mapping of volcanological and structural features along the Flin Flon 'mine horizon' has been initiated through collaboration of geologists from MGS, SGS and Laurentian University.

Table 1: Collaborative geoscience projects in Manitoba, 2001-2002.

PROJECT AND PARTNERS	CURRENT STATUS (2001)
Flin Flon Belt:	
Flin Flon TGI (GSC, SGS, HBED, Aur Resources Inc., M'Ore Resources, Laurentian U.)	Second year of a three-year project; fieldwork at Flin Flon and Baker-Patton; three M.Sc. and two B.Sc. theses in progress; *see* GS-1 and Preliminary Maps 2001F-1 and 2001F-2
Flin Flon Belt geochronology (HBED)	Data collection in progress; preliminary results released in 2001 GAC abstract
Snow Lake gold studies (TVX Gold Inc., U. of Manitoba)	Fifth year of ongoing project; two M.Sc. theses completed; *see* GS-5
Snow Lake base-metal vectors (Callinan Mines Ltd., W. Bruce Dunlop Ltd.)	Third year of ongoing project; data collection dependent upon availability of drill core
PGEs in the Flin Flon Belt (Fort Knox Gold Resources Inc.)	Geological mapping, sampling; geochemical investigations ongoing; *see* GS-4
Lynn Lake-Leaf Rapids:	
Lynn Lake gold studies (U. of New Brunswick, Laurentian U., U. of Manitoba, NSERC)	Second year of a three-year project; part of Manitoba's contribution to the Lynn Lake-Leaf Rapids TGI; one Ph.D. and two M.Sc. theses in progress; *see* GS-11, -12 and -13
Superior Boundary Zone-Reindeer Zone transition (U. of Alberta)	New project; *see* GS-8
Lynn Lake-Leaf Rapids TGI (GSC, HBED, Aur Resources Inc.)	First year of a two-year project; fieldwork in the Rusty Lake belt and Southern Indian Lake; *see* GS-14
Lynn Lake-Leaf Rapids soil gas hydro-carbons (SGH), specifically centred on Ruttan Cu-Zn deposit (HBED, CAMIRO, Activation Laboratories Ltd.)	First year of a two-year project; fieldwork in the Ruttan area
Lynn Lake multimedia geochemistry; devel-opment of surficial-environment exploration geochemistry technique (Strider Resources Ltd., International Curator Ltd., Rare Earth Metals)	First year of a two-year project; fieldwork in the Lynn Lake Belt
Thompson Nickel Belt-Superior Boundary Zone:	
Thompson Nickel Belt CAMIRO 97E-02 (Inco Ltd., Falconbridge Ltd., HBED, Billiton Metals Canada Inc., Western Mining International Ltd., Laurentian U., U. of Manitoba, U. de Québec à Montréal, U. of Alberta, U. of Sask., GSC, NSERC)	Completed; final report, workshop and field trip for sponsors held in August 2001; results to be presented at a proposed special session during the 2002 Manitoba Mines and Minerals Convention
Thompson Nickel Belt compilation (Inco Ltd., Falconbridge Ltd., HBED)	In progress; preliminary maps for the exposed and sub-Phanerozoic portions of the TNB were released in June 2001; *see* GS-7
Fox River Belt geology and metallogeny (Falconbridge Ltd.)	In progress; *see* Preliminary Map 2001S-1
Northern Superior:	
Western Superior NATMAP (OGS, GSC, McGill U., U. of Alberta, ROM, U. of Maryland, LITHOPROBE, NSERC)	Final year of project (1996-2002)
Operation Superior multimedia and kimberlite indicator-mineral surveys (De Beers Canada Corp.)	Sixth year of project (1996-2001); *see* GS-15
Operation Superior geological, geochemical and geophysical data integration (GSC)	Second year of project
Cross Lake structural studies (U. of Maryland, U. of Waterloo)	Final year of an M.Sc. thesis on Pipestone Lake area (*see* Preliminary Map 2001S-2); first year of a Ph.D. thesis on the Central Cross Lake Shear Zone (*see* GS-16)
Island Lake supracrustal studies (U. of Waterloo)	Second year of a structure-geochronology M.Sc. thesis; *see* GS-17
Southeastern Manitoba:	
Bird River Sill (Canmine Resources Corp.)	Core relogging and geochemistry; petrology and thin section studies ongoing; *see* GS-19
Southeastern Manitoba digital compilation (GSC)	Completed; joint GSC-MGS release, November 2001
Western Superior NATMAP (OGS, GSC, McGill U., LITHOPROBE, NSERC)	Final year of project (1996-2002); one M.Sc. thesis completed at Wallace Lake
Precambrian monadnocks apatite fission track dating (GSC-C, U. of Melbourne)	Ongoing; Ph.D. thesis; *see* GS-20

Table 1: Collaborative geoscience projects in Manitoba, 2001-2002. (continued)

PROJECT AND PARTNERS	CURRENT STATUS (2001)
Southern Manitoba:	
Hydrogeology (GSC, WRB, U. of Manitoba)	Final year of project (1996-2002); four M.Sc. theses, one Ph.D. thesis and two post-docs
Greater Winnipeg NATMAP (GSC, universities)	Final year of project (1997-2002); two M.Sc. theses, two Ph.D. theses and two post-docs; *see* GS-23
Climate change in southern Manitoba during the last millennium (GSC, CCAF)	Completed; final report submitted in June 2001
Paleofloods of the Red River (GSC, IJC, RRFPP)	Third year of project (1999-2003); results presented at scientific conference in Davos, Switzerland (September 2001)
Geochemical Pathways Study (bedrock to vegetation; U. of Manitoba)	M.Sc. thesis
Prairie-type mineralization (U. of Manitoba, U. de Québec à Montréal, U. of Alberta, U. of Brussels, GSC-C)	Ongoing
Black Shale Study (GSC)	Ongoing
Manitoba:	
Aggregate inventory (T&GS)	Ongoing; MGS provides field data to T&GS; T&GS processes aggregate samples; *see* GS-27

Regional mapping in the Wabishkok Lake area has documented a volcanic section dominated by pillowed basalt, derived gneiss and intercalated gabbro, interpreted as arc-type rocks. Most occurrences of surficial mineralization occur within basalt, but one of the most significant economic prospects is associated with felsic volcanic rocks. This lithologically and structurally complex portion of the Flin Flon Belt has not been mapped since the 1950s.

The Josland Lake sill, a differentiated mafic body northwest of Reed Lake, has yielded a U-Pb zircon age of 1886 ± 3 Ma. The sill, 24 km long and up to 2 km thick, belongs to a larger suite that has a unique geochemical fingerprint throughout its regional extent from Snow Lake and Reed Lake to the south flank of the Kisseynew Domain. The sills are interpreted to represent a major igneous province, including the 1881 Ma Mikanagan Lake sill at Flin Flon. Elevated platinum-group element (PGE) concentrations and gold deposits in the sills make them significant exploration targets.

The recently discovered McBratney Lake PGE occurrence, located 7 km east of Flin Flon, highlights the mineral potential for 'contact-type' PGE mineralization associated with the physical and chemical interaction between a gabbroic magma and sulphide-bearing mafic volcanogenic host rocks. The McBratney Lake PGE discovery is significant because of the exceptionally high PGE tenor and significant potential for similar mineralization at gabbro-basalt contacts in the region.

Other activities related to mineral deposits in the Flin Flon Belt included work toward completion of Baker–Patton project reports and maps, ongoing studies of the New Britannia mine, and utilization of rare-earth elements (REE) as exploration tools for precious- and base-metal deposits.

THOMPSON NICKEL BELT

The Manitoba Geological Survey has initiated several new studies to generate geological data and interpretations directly applicable to nickel exploration in the Thompson Nickel Belt (TNB). These studies will also constrain the tectonic evolution of the western margin of the Superior Province and support the ongoing geological documentation of the northern Superior Province and the Superior Boundary Zone.

The MGS and industry partners, Inco Ltd., Falconbridge Ltd. and Hudson Bay Exploration and Development Co. Ltd., have been involved in a multiyear collaborative program designed to create a new compilation map of the TNB. A preliminary version, published in June 2001, includes a set of fifteen maps that cover an area from Moak Lake (northeast of Thompson) to Bracken Lake (north of Grand Rapids). These maps represent preliminary results of the compilation effort and will ultimately be superseded by final maps. During the summer of 2001, diamond-drill core from the southern part of the exposed TNB was examined in Wabowden. Data obtained will be incorporated in the final version of the TNB compilation map.

In the spring of 1997, the Thompson Nickel Belt CAMIRO project, an industry-supported project in support of exploration, was launched in the TNB. This four-year (1997–2001) study, with an industry–NSERC budget of approximately $800 000, is administered by the Canadian Mining Industry Research Organization (CAMIRO) and includes researchers from MGS, GSC, University of Manitoba, Laurentian University, University of Alberta, Université de Québec à Montréal and University of Saskatchewan. The project currently has five industry sponsors (Inco Ltd., Falconbridge Ltd., Hudson Bay Exploration and Development Co, Ltd., Billiton Metals Canada Inc. and Western Mining International Ltd.). The Thompson Nickel Belt CAMIRO project wrapped up with a sponsors' meeting and field trip in August 2001.

SUPERIOR BOUNDARY ZONE

An MGS- and NSERC-supported, integrated mapping, geochemistry and isotopic study of the western Superior craton margin northeast of Thompson has indicated that a re-interpretation is required of the location and nature of the boundary zone between the Archean Superior Province and the Paleoproterozoic Trans-Hudson Orogen. Previous work found evidence for ancient (pre-3.7 Ga) crust in the Assean Lake area of the western Superior Province.

A new project was started to document the geological relations and isotopic ages of rocks north of Thompson, along the complex boundary zone between the northwestern Superior craton and the Trans-Hudson Orogen. In 2001, work proceeded on a 60 km transect from Thompson to Pearson Lake. Samples were collected in this poorly accessible area for a variety of studies, including Sm-Nd isotope systematics and U-Pb age determinations, to be conducted at the University of Alberta. Relogging and sampling of company-owned drill core from an area northwest of Mystery Lake was carried out with the co-operation and help of Inco Ltd. and Nuinsco Resources Ltd.

A study along the east margin of the TNB was undertaken in order to characterize the metamorphic transition from granulite of the Archean Pikwitonei Granulite Domain to amphibolite-grade Paleoproterozoic gneiss of the TNB.

LYNN LAKE–LEAF RAPIDS

A TGI project began in the Lynn Lake–Leaf Rapids area, as a co-operative effort between the GSC, MGS, Hudson Bay Exploration and Development Co. Ltd. and Aur Resources Inc. The MGS component of this TGI project includes mineral-deposit–scale studies, structural mapping of mineralized shear zones and targeted geochemical surveys to aid mineral exploration. The GSC component of the project encompasses field studies in a broad area, regional tectonics and geochronological studies.

The MGS began an integrated study to better understand the gold and base-metal potential of the Lynn Lake Belt in 1999. Two thesis projects were begun in 2000 and continued in 2001. A Ph.D. study of the Agassiz Metallotect involves structural, stratigraphic, mineralogical and geochemical investigations into the genesis of gold mineralization in one of the more significant, regional, gold-bearing structures in the Lynn Lake Belt. The second project, an M.Sc. study concentrating on the BT, Bonanza and McBride deposits, involves structural, mineralogical and geochemical investigations into the genesis of gold mineralization associated with the Johnson Shear Zone. These new studies were augmented by an M.Sc. study at the University of Manitoba, utilizing existing and new digital datasets in the Lynn Lake area to develop a predictive tool for gold exploration.

Continuing structural analysis of the southern Lynn Lake Belt has delineated six generations of ductile to brittle-ductile fabrics. An intense D_2 transposition-shearing deformation overprints the earliest geometry, producing the east-west geometry of the greenstone belt. Gold mineralization is hosted by mafic and felsic metavolcanic rocks affected by the shear zones. The delineation of these shear zones within the greenstone belt significantly increases the amount of underexplored gold-prospective stratigraphy in the Lynn Lake Belt beyond the Johnson Shear Zone, and is highlighted by the identification of several alteration zones similar to those associated with known gold mineralization.

Deformation structures along the south margin of the Johnson Shear Zone in the Pool Lake–Boiley Lake area southwest of Lynn Lake were subdivided on the basis of overprinting relationships into seven generations. The D_2 shear zones in the Pool Lake area are interpreted to be second- or third-order splays flanking the Johnson Shear Zone and, as such, are highly prospective exploration targets. Splay structures tend to be developed over wide areas (>5 km) along the flanks of the primary shear zone, indicating that most of the southern Lynn Lake Belt should possess excellent exploration potential for mesothermal, shear-hosted gold deposits.

Detailed geological mapping of the western portion of the Agassiz Metallotect near Lynn Lake has documented the stratigraphic constituents of the metallotect and enclosing rocks. The host lithology of the MacLellan gold deposit and other subeconomic deposits is strongly sheared, altered, high–Mg-Ni-Cr basalt (picrite). The picrite was locally intensely sheared during D_2, with attendant gold mineralization and alteration. The textural relationships between deformation structures, and the ore and gangue mineral assemblages suggest an epigenetic, synshear origin for the gold mineralization in the MacLellan deposit.

The Geological Survey of Canada began the first field season of a TGI project aimed at providing a regional tectonostratigraphic context for supracrustal and plutonic rocks along a transect extending from the north flank of the Kisseynew Domain, through the Lynn Lake, Leaf Rapids and Southern Indian domains, to the south margin of the Chipewyan Batholith. This transect is similar in nature to the recently completed transect along the northwestern flank of the Reindeer Zone in Saskatchewan, which led to the discovery of new exploration targets and renewed economic interest in the region. The 2001 field program included a re-evaluation of the lithotectonic framework along a transect from the northwestern margin of the Rusty Lake belt to the Partridge Lake belt, as well as a companion study on the mineral potential of the Rusty Lake belt. Preliminary results show that most of the lithotectonic entities defined along Reindeer Lake in Saskatchewan can be traced into Manitoba. Volcanic and plutonic rocks were sampled for geochemical analysis, U-Pb dating and Sm-Nd tracer-isotope studies. Major sedimentary assemblages were also sampled for U-Pb sensitive high-resolution ion microprobe (SHRIMP) dating of detrital zircons.

NORTHERN SUPERIOR PROVINCE

Manitoba's five-year 'Operation Superior' multimedia geochemical survey began in 1995 and completed its final year of data collection in 2000, but the program's success led to a continuation of the survey in the northern Knee Lake region in 2001. The objectives of this and related initiatives in the northern Superior Province were to 1) identify regional exploration targets through new geochemical and kimberlite indicator-mineral surveys and compilations of geophysical data derived from assessment files; and 2) provide the geological framework for mineral exploration through regional mapping and thematic studies. This program is linked to the larger Western Superior NATMAP project that is focused on defining the crustal evolution and tectonic assembly of the Superior Province west of Lake Nipissing. New 1:250 000 scale bedrock geology compilation maps will be produced in 2001–2002 as contributions to the Western Superior NATMAP project, which has entered its last operating year. Regional mapping conducted under the auspices of the Western Superior NATMAP was limited in 2001, with emphasis placed instead on evaluation and consolidation of data collected during the project.

During Operation Superior, helicopter-supported, multimedia geochemical surveys targeted greenstone belts throughout the northern Superior Province. In 2001, rock, till, b-horizon soil, humus and vegetation samples were collected for multi-element geochemical analysis from 157 sites in the area west, north and east of the northern half of the Knee Lake greenstone belt. The sampling included 150 bulk samples (20–25 kg) of till and beach sand collected for kimberlite indicator-mineral identification and analysis.

A new project was undertaken this year to outline the Quaternary stratigraphy and determine the provenance of tills in the northern Superior Province and adjacent Hudson Bay Lowland, in support of diamond exploration. Investigations include a combination of pebble analysis, carbonate analysis, matrix geochemistry, textural analysis, kimberlite indicator-mineral analysis and pebble-fabric analysis. A total of 69 till and 2 alluvial-sand samples were collected from seven sections exposed in river cuts.

Mapping by an M.Sc. student from Waterloo University in the Island Lake greenstone belt has documented the volcanic and volcanogenic sedimentary rocks of the Hayes River Group and the sedimentary rocks of the Island Lake Group. Field mapping and geochronological work in 2001 have helped to define lithologically and chronologically distinct structural panels of Hayes River Group rocks.

A structural study at the University of Maryland, partially sponsored by the MGS, was conducted in the central and southern parts of the Cross Lake greenstone belt, concentrating on the east-southeast-trending high-strain zone. This Ph.D. project will contribute to the growing understanding of Archean tectonics in the northern Superior Province.

SOUTHEASTERN MANITOBA

Geoscience activities in southeastern Manitoba were extremely varied in 2001 and include regional compilations, PGE-related investigations, research into post-Precambrian tectonics and a study on the phytoremediation of mine tailings.

The GSC completed a digital compilation of geological, geochemical and geophysical data sets for southeastern Manitoba, with datasets assembled and provided by both the MGS and GSC. The aim of this collaborative project was to produce a CD-ROM containing all available digital data to aid mineral-exploration activities.

The MGS conducted studies supportive of PGE exploration in the Bird River sill in 2001. Three PGE-bearing stratabound layers, two of them intimately associated with chromitite layers, were defined on the Chrome property in previous studies. A sulphide-bearing layer associated with chromitite layers was defined this summer on the Page property. This sulphide-bearing layer is a conspicuous marker horizon containing disrupted chromitite layers and chromitite 'pebbles', consistent with an at least periodically dynamic magma chamber and highly significant for guiding the search of PGE-bearing layers.

Precambrian monadnocks rising 5 to 20 m above the surrounding prairie level north of Beausejour were visited to collect samples for apatite fission track thermochronology that should provide clues to the origin, tectonics and hydrocarbon–metallic-mineral generation of the Williston Basin.

A new project to determine the potential for phytoremediation of mine tailings and production of bio-ores, through the identification of plant species that can accumulate heavy metals, was initiated in 2000 at the Central Manitoba gold mine site in southeastern Manitoba. Preliminary results have shown that several plant species were able to survive and grow for two growing seasons on two of the three selected sites without any remediation of the soil. Preliminary results from analyses of plants growing on tailings for one growing season indicate substantial enrichment of Au in pine and spruce seedlings, and enrichment of Zn in willow.

SOUTH-CENTRAL MANITOBA

Phanerozoic Studies

The Capital Region Study involves an investigation of the crushed-stone and mineral potential in and around the City of Winnipeg. Preliminary maps for the northern portion of the Capital Region Study, released in printed form in 1999, will have

significant utility for land-use planning in surrounding municipalities. The mapping of the southern portion of the area has been completed and the maps and report for the entire Capital Region are in the final editing stage.

Stratigraphic investigations and drilling programs were carried out for various projects. The Manitoba Stratigraphic Database (MSD) continues to be updated. It now contains 5619 stratigraphic, mineral-exploration, oil-and-gas and other wells, of which 4340 have formation tops. One corehole was drilled at Denbeigh Point (Lake Winnipegosis) to intersect the Precambrian; three coreholes were drilled in the Wekusko Lake–Iskwasum Lake area to test metallic veining in the Red River Formation; and one corehole was drilled at Steeprock River bridge to intersect mineralization within Mesozoic infill. A total of 326.6 m of drilling was conducted this year.

Accessing the mineral potential of Phanerozoic rocks and underlying Precambrian basement is an important facet of MGS work. In June and July 2001, a gravity and magnetic survey was completed along The Pas Moraine. The purpose of this survey was to investigate the gravity and magnetic field of the Superior Boundary Zone in this region, and to obtain more information on the possible southern extension of the Thompson Nickel Belt.

Quaternary Studies

In addition to the multimedia and diamond-indicator studies in the northern Superior Province, two Quaternary research topics are being investigated in Manitoba. The first project is studying the influence of recent geological and climatological processes on flood frequency in the Red River valley, while the second deals with the compilation of digital datasets in support of a three-dimensional (3-D) digital geological model for southern Manitoba. Both projects represent collaborative efforts with the Geological Survey of Canada.

Research on the long-term sustainability of the fresh groundwater resource in southern and central Manitoba is addressing the protection of recharge and ensuring that extraction does not lead to unacceptable lateral migration of saline waters. Three-dimensional (3-D) modelling is a key element of this strategy, with applications ranging from basic science to groundwater-flow modelling and livestock management. The intention of this study is to construct a 3-D geological model for the Phanerozoic terrane of southern Manitoba, south of latitude 55°N and west of longitude 95°W. The Phanerozoic sequence, comprising Quaternary sediments and Phanerozoic sedimentary rocks, down to and including the Precambrian surface will be modelled, requiring the acquisition of all readily available, nonconfidential, drillhole databases that can be utilized in a geographic information system (GIS) environment.

AGGREGATE

Aggregate-resource inventories are being updated for a number of Rural Municipalities in southern Manitoba. In the Capital Region area, the long-term objective is to update 1:100 000 scale aggregate resource maps. In 2001, assessment of aggregate resources was carried out in a number of candidate sites proposed under the Protected Areas Initiative. Aggregate inventories were carried out in the Churchill area, the Rural Municipality of Grandview and several crown-land parcels (Areas of Special Interest) in southern Manitoba. Approximately 300 sites were visited and 100 samples taken. This year, some of the new pits, quarries and access roads were mapped digitally, using a global-positioning system (GPS) unit.

LAND USE

The Manitoba Geological Survey conducts a number of activities related to sound land-use management: 1) provision of mineral-resource assessments in candidate sites under the Protected Areas Initiative; 2) identification of potential geological hazards (shoreline erosion, neotectonics, landslides); 3) review of land-use planning submissions; 4) examination of applications for surface use of crown land to ensure that access to mineral occurrences is not adversely affected; and 5) collaborative programs with Manitoba Conservation, Manitoba Hydro and the GSC to evaluate geological hazards and potential impacts on development.

GEOSCIENCE INFORMATION

The Geoscience Information Services Section has worked extensively on digital conversion of both bedrock and surficial geology maps. Geographic Information System (GIS) and data-management support has been given to the Western Superior NATMAP project, Flin Flon TGI and compilation of digital geological data for southeastern Manitoba. New presentations were developed for the Internet map server system on the departmental Web site.

REGIONAL OFFICES

The Flin Flon office continues to provide assistance to the mineral-exploration and mining communities in the Flin Flon–Snow Lake region, including recording new mineral claims, maintaining an up-to-date library of provincial claim and land-status maps, dealing with claim-status inquiries, accepting assessment-work submissions, and maintaining an up-to-date core-library database. The present staff of two geologists will be augmented by a Mining Claims Inspector, to be transferred

from The Pas to Flin Flon. An inventory is in preparation of the core repository at the Centennial mine site and all core piles have been reorganized and stabilized. The mine-documentation project is proceeding with the addition of new ore samples from a number of now-closed mines and the establishment of a database for the core repository at the Stall Lake mine near Snow Lake.

Staff in the Thompson regional office respond to a range of inquiries, including regional geology, potential of mineral properties and mineral identifications. The Thompson office provides Mining Recording services to the community, including data on the status and registration of claims, access to and sales of maps and reports, and access to electronic databases. In July 2001, Scott Anderson joined the MGS and is currently working out of the Thompson office. Scott brings considerable skills and experience to mineral-deposit and structural studies in the Lynn Lake Belt and in southeastern Manitoba.

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