

# Minerals Update

Department of Natural Resources, Minerals and Energy Branch

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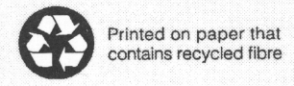
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**If you have any comments or questions about the *Minerals Update* please call or write:**

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## Cretaceous Kaolin Clay and Silica Sand Deposits in Nova Scotia: Opportunities for Development of (Un-)Common Clay

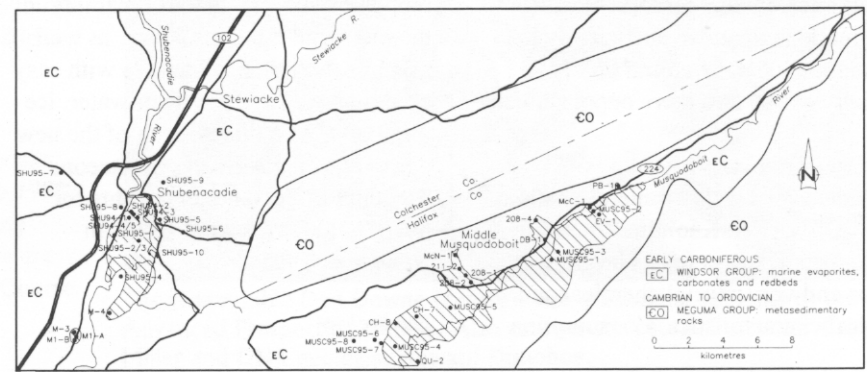
The Mineral and Energy Resources Division has recently been mapping Quaternary and Cretaceous sediments in central mainland Nova Scotia, in cooperation with the Geological Survey of Canada. These deposits are important sources of construction sand and gravel, industrial clay for bricks and related products, and silica sand for abrasives and glass. Shaw Resources Ltd. has developed these deposits to produce a variety of products at Lantz and Shubenacadie for decades.

Early Cretaceous deposits of kaolinitic clay, silica sand and lignite coal have been known in Nova Scotia since the late 1800s. They outcrop along the edges of deep sedimentary basins, river banks and steep-walled valleys. They are interpreted to be preserved in depressions where they were protected from post-Cretaceous and particularly Quaternary glacial erosion. These Cretaceous sediments are the correlatives of similar deltaic sandstone and mudrock sequences of the Missisauga Formation on the Scotian

Shelf, host reservoir to all the significant oil and gas deposits.

Recent mapping, drilling and seismic surveys have substantially expanded the known extent of Cretaceous deposits to an area >60 km<sup>2</sup> in localities from the central mainland through Antigonish to central Cape Breton Island. Deposits include: (1) massive red kaolinitic clay and mottled white to red kaolinitic clay, (2) grey to very light grey, massive kaolin containing blebs of pyrite, (3) light grey to highly coloured, matrix- to clast-supported kaolinitic silica sand, and (4) black, organic-rich kaolinitic clay containing lignite to sub-bituminous grade wood fragments.

Cretaceous sediments in these basins are overlain by an average of 15 m of overburden consisting of glacial till, gravel and sand, and lacustrine sediments. Seismic surveys indicate that the Cretaceous sediments are regionally continuous. Individual massive clay bodies average 2 m in



Cretaceous paleovalleys in the Shubenacadie-Musquodoboit area.

thickness but may be >10 m thick. Total thickness of the Cretaceous sediments in the Shubenacadie and Musquodoboit valleys varies from 40 m to >200 m. These deposits appear to be similar to sedimentary kaolin deposits of Georgia, USA, and the Moose River Basin in northern Ontario.

There are several potential opportunities for industrial clay applications:

**(1) Natural clay seals for civil engineering:** Because of their fine-grained plastic character, clays have significant application as natural, impermeable seals for use in civil engineering or geotechnical projects, such as waste facility liners and cover seals. Current environmental standards demand high impermeability and long-term stability. Cretaceous clays, as well as some Quaternary clays in Nova Scotia, potentially have the high impermeability and plasticity required. They also have a history of thousands to millions of years of *in situ* stability and impermeability. **QUESTION:** Can these special clays be produced and marketed commercially for liner and seal applications in the new generation of waste isolation standards?

**(2) Art ceramics and giftware:** Nova Scotia has a talented and growing ceramic craft community. A small quantity of local clay is currently available, but most is imported. Clay from Lantz, Shubenacadie and Musquodoboit is recognized by the Nova Scotia College of Art and Design as a high-quality, unique material for art ceramics. **QUESTIONS:** Has the local market expanded sufficiently to re-examine local development of specialty clays? Are there opportunities for export?

**(3) Kaolin industry:** Kaolin is dominated by the clay mineral kaolinite ( $\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_2$ ). Kaolinite is used in a variety of industries for its bright white colour and very special chemical and physical characteristics. Consumption

is primarily for use as a filler/coater in the paint, paper, rubber, plastics and adhesives industries, and as a component in ceramic-refractory applications (for chinaware, sinks, etc.). The USA is the world's largest producer of kaolin (9 million tonnes in 1994 at a value of \$1 billion US) and more than 90% of this output is from the state of Georgia. Canada has no significant kaolin producers; in 1994 Canada imported \$75 million US worth of kaolin from the USA. Most of the kaolin used in Canada (about 90%) goes to the paper industry. The remainder is used as a filler and extender for rubber, paint, plastics, and ceramics. The market is highly competitive and subject to substantial transport discount. **QUESTION:** Is there a future opportunity to supply part of the regional kaolin market from Nova Scotia sources?

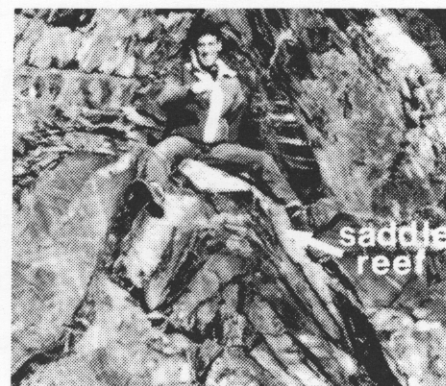
Current projects will identify the broad distribution and character of clay and sand deposits of the Shubenacadie and Musquodoboit valleys. Additional drilling and seismic surveys are planned to delineate basin margins and to better characterize the sediments. Physical and chemical testing of the kaolin clays is also planned. Preliminary results indicate the potential for large-tonnage kaolin deposits. Detailed exploration drilling, sampling and testing will be required by potential developers of specific deposits.

Nova Scotia has an international reputation for quality and reliability in the industrial minerals sector, as well as a transportation advantage with easy access to railways and deep-water, ice-free ports. As a direct result of the new discoveries made by the Cretaceous Mapping Project, mineral rights for over 86,000 acres were issued in November 1995.

Bob Boehner

## Department Geologist Selected for Lecture Tour Across Canada

Dr. Dan Kontak, a geologist in the Minerals and Energy Branch, has been selected by the Mineral Deposits Division of the Geological Association of Canada as their 1996 Robinson Fund Lecturer. Dan toured several of the major universities in Ontario and Quebec, including the University of Toronto, Western, McMaster, Laurentian, McGill, Queen's, Windsor, Brock, Waterloo and Carleton in late November 1995, and will tour western and Atlantic Canadian universities early in 1996.



Dan Kontak riding an auriferous saddle-reef vein at the Ovens near Lunenburg.

Dan will be speaking about gold deposits in the Meguma Terrane of southern Nova Scotia, particularly the factors controlling their formation and distribution. His many presentations will provide an excellent opportunity to promote the gold potential of Nova Scotia. All transportation and accommodation expenses will be funded by the Geological Association of Canada and participating universities.

Dan may be visiting a university near you; if so, don't miss the chance to find out more about the metallogeny of Nova Scotia from an informed and dynamic speaker who we are proud to share with the rest of Canada.

Mike MacDonald

# From the Mineral Inventory Files

## Londonderry: Nova Scotia's Giant from the Past May Still Have a Future

Most people involved with exploration and mining in Atlantic Canada are not aware of the importance of the Londonderry Iron Mining District to our region's mining history. For much of Londonderry's period of operation, 1847 to 1906, it was the foremost iron mining district in Canada and one of the more significant districts in the British Commonwealth. Steel made from Londonderry pig-iron enjoyed a very good reputation; in fact, Londonderry pig-iron was often used in the world-renowned steel mills of Sheffield, England. The adjacent map shows the geology of the Londonderry district and locations of the three main sites of ore production: the East Mines, Old Mountain Mine and West or Cumberland Mines. Ore from these sites was transported by a rail and wagon system to furnaces in the town of Londonderry, which had a population of 5000 during peak production.

A visit to the old workings reveals the impressive extent of the former operation. Past mining operations seldom progressed below a depth of 300 feet and focused on what was thought to be the limonitic to hematitic, supergene-enriched cap of fault-controlled ankerite - siderite vein systems. At several locations the

ankerite was also quarried to serve as a flux for the furnaces. The most notable geological features are the continuity and massive size of the ankerite - siderite vein systems and their association with widespread hydrothermal alteration. Veins and breccia zones persist for at least 16 km strike length and separate veins and pods may be 40 m in width. The map shows that veins and breccias

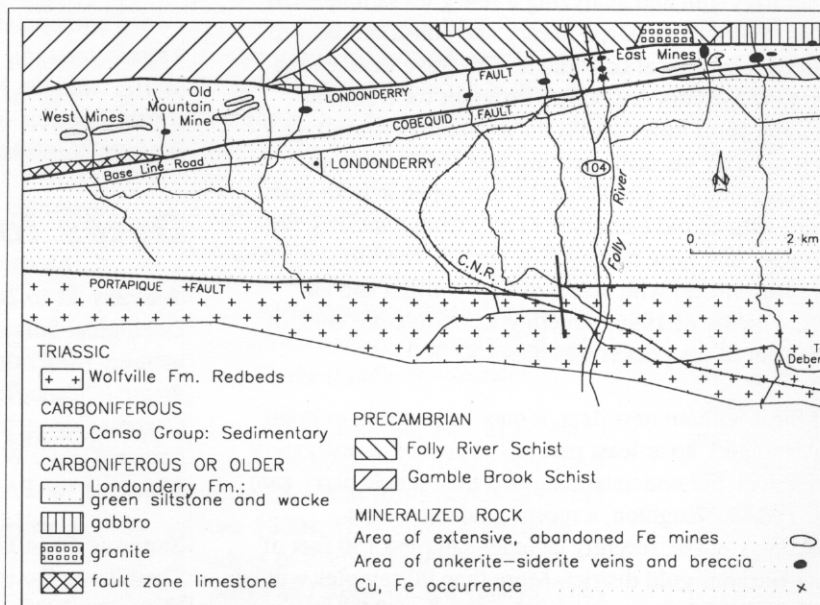
extend to areas far removed from previous mine sites.

The Londonderry vein systems appear to be the best developed of the more than 100 fault-controlled, ankerite - siderite vein and breccia occurrences known to be associated with the Cobequid-Chedabucto Fault Zone. Given that several of the mineral occurrences associated with this

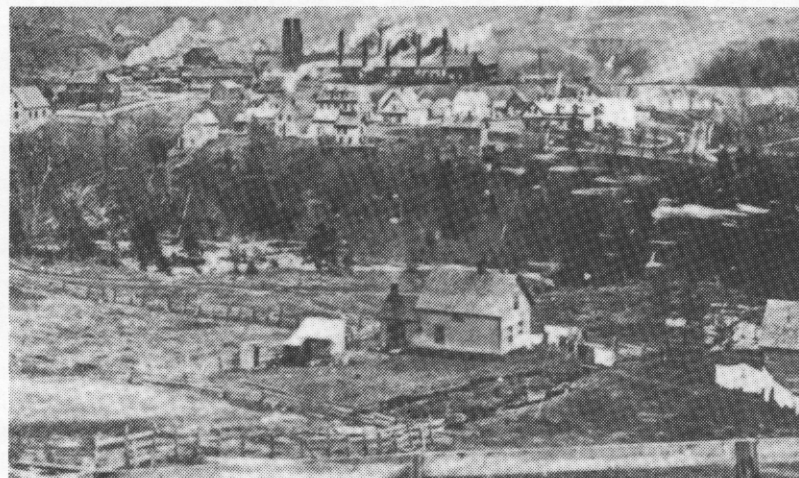
regional fault system have economic concentrations of Cu, Co, Ni and Au, it follows that the Londonderry veins may also have potential for deposits other than iron.

Reconnaissance exploration has shown that the Londonderry veins, as exposed at surface, have only slightly anomalous concentrations of Cu, Co, Ni and Au. However, the Londonderry veins share the same structural style and elemental associations as the other Cu, Co, Ni and Au occurrences found along the Cobequid - Chedabucto Fault Zone. This suggests the possibility that deeper levels of the Londonderry vein systems may be more sulphide-rich. One indication of such a vertical zonation is provided by old mine reports, which state that the deeper levels of the mine encountered more sulphide-rich ore. To date, this model of vertical zonation has not been fully tested.

George O'Reilly



Map of the Londonderry Iron Mining District, Colchester County.



Londonderry as it looked in the 1880s. Photo from "A History of Londonderry, Nova Scotia" by Trueman Matheson. Reproduced with permission of the author.

## Review of Activities a Success

A total of 329 delegates attended the Nineteenth Annual Minerals and Energy Branch Review of Activities, held November 7 and 8, 1995, at the World Trade and Convention Centre in Halifax. Representation by industry, up this year to a total of 170 participants, was especially encouraging.

A special session entitled *Geology and Mineral Potential of the Avalon Zone of Northern Nova Scotia*, jointly organized by the Minerals and Energy Branch and the Chamber of Mineral Resources of Nova Scotia, was held on the afternoon of November 7. Technical presentations were given by departmental staff, members of the mineral industry, and scientists from the Geological Survey of Canada and Acadia University. These presentations were enthusiastically received by the approximately 150 people present.

Forty-nine poster displays were provided by departmental staff and geoscientists from the Geological Survey of Canada and local universities. In addition, ten displays



The Honourable Don Downe enjoys the opportunity to spread the word during the Tuesday evening Minister's Reception.

were prepared by local prospectors. Posters were displayed throughout the two-day event and stimulated considerable interest and some lively discussion.

The Honourable Don Downe, Minister of Natural Resources, hosted a reception on the evening of November 7 for cabinet ministers, key officials from DNR, other provincial departments and the Geological Survey of Canada, department heads from local universities, and representatives from local and national mining companies. The purpose of the reception was to raise the profile of mining and mineral exploration in Nova Scotia.

Once again this year, grade 4, 5 and 6 students from three metro area schools had the opportunity to tour the displays on both days of the Review of Activities. Special display areas for the students stressed the importance of mining to the economy of Nova Scotia.

A technical session on Wednesday morning, November 8, focused on geoscience projects and activities of DNR staff, and a review of mineral exploration and development activities. The Review of Activities culminated with Wednesday's luncheon, which was attended by 180 people. During the luncheon, Mr. Downe signed a Memorandum of Agreement with the Geological Survey of Canada and was called upon to award certificates to graduates of the first-ever, departmentally funded Advanced Prospecting Course. Mr. Downe was also the guest speaker for the luncheon and took the opportunity to confirm the department's commitment to mining and mineral development in Nova Scotia.

*Mike MacDonald*

## DNR Signs Memorandum of Agreement with GSC

A Memorandum of Agreement between the Nova Scotia Department of Natural Resources and the Geological Survey of Canada was signed at the department's Review of Activities. The agreement was signed by the Honourable Don Downe on behalf of DNR and by Dr. Murray Duke, Acting Director-General of the Minerals and Geoscience Branch, on behalf of the GSC. Nova Scotia is the first province to sign such an agreement.

With the termination of 'Mineral Development Agreements' in March 1996 and current budget constraints, it is increasingly important to establish new mechanisms of cooperation between federal and provincial geoscience agencies. This agreement provides a mechanism to jointly determine the geoscience needs of our clients in Nova Scotia and to deliver effective programs to meet those needs.

*Mike MacDonald*



The Honourable Don Downe and Dr. Murray Duke sign the bilateral Memorandum of Agreement. Looking on are (from L to R): Pat Phelan, Executive Director of DNR's Minerals and Energy Branch; Greg Isenor, President of the Mining Society of Nova Scotia; Bill Mundle, President of the Chamber of Mineral Resources of Nova Scotia; and David Prior, Director of the Atlantic Geoscience Centre.

## Minerals and Mining - The Educational Imperatives

For the past ten years DNR has been involved in education projects about minerals and mining, mainly funded under the federal-provincial Mineral Development Agreements. These projects have encompassed teacher training workshops, Mining Week, printed material, videos, programs for students at schools and other locations, and cooperative projects with museums and other groups.

One recent success was the *Discover Minerals and Mining!* schools program at the Review of Activities. This year, approximately 280 grade 4-6 students, teachers, and chaperones from three metro schools were our guests. They learned about the work of geologists, minerals in their lives, and mining and the environment.

Helping the students and teachers of Nova Scotia to appreciate minerals, mining, and the role of geoscientists in government service is important for the department and for the mineral industry. Look for the smiles and enthusiasm of more students at next year's Review.

Howard Donohoe

## October-December Open Assessment Reports

Report	Claim Ref. Map	Licensee
89-163	011J/05B 011K/01C 011K/01D 011K/08A 011K/08B	Cape Breton Development Corporation
90-081	011J/05B 011K/01C 011K/01D 011K/08A 011K/08B	Cape Breton Development Corporation
93-043	011E/01A	Grant, S
93-044	011E/02B	Grant, S
93-045	011F/04D	Boddy, D
93-046	021A/07C	Baker, R
93-047	021A/02B	Little Lake Gold Mines Limited
93-048	021A/07B 021A/07C	Tri-Explorations Limited
93-049	021A/06A	Smith, R E
93-050	011E/02A	Smith, R E
93-052	011K/02A 011K/02B	Jensen, L R
93-053	021A/07A	Harrigan Ventures Limited
93-054	011E/02B 011E/02C	Hudgins, A D
93-055	011D/13D	MacDonald, M W
93-056	021A/07C	Burrill, H C
93-058	021A/07C	Gold Bank Resources Incorporated
93-059	011D/14C	DeBay, A
93-061	011D/15B	Myers, J C
93-062	011E/05A	Balcom, B M
94-038	011F/11A 011F/11B	Nova Scotia Resources Limited
94-055	021H/01D	Metall Mining Corporation

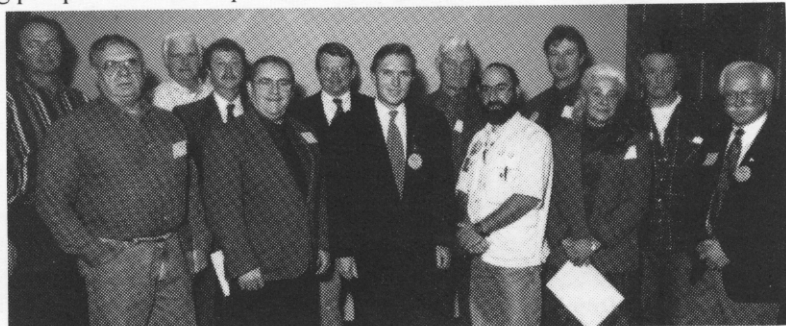
Susan Saunders and Norman Lyttle

## Prospectors Graduate and More Will Be Trained

On November 8, the first graduating class of the Advanced Prospecting Course received their certificates from the Honourable Don Downe at the Review of Activities luncheon. Helping prospectors is an important role for DNR. Not only does the department provide the basic and advanced prospector training courses, it has also provided help through the Prospectors Assistance Program and through office and field consultations with staff.

Prospectors are on the forefront of grass roots exploration. In Nova Scotia, many mineral deposits have been discovered by prospectors. In March 1996, the department will again offer basic prospecting courses at various locations in the province. We are also hoping to offer an Advanced Prospecting Course in Sydney.

Howard Donohoe



The Honourable Don Downe (centre) with graduating students of the first Advanced Prospecting Course. Also present are course instructor Craig Miller and DNR geologist Howard Donohoe.

## The Business of Prospecting

Would you take up running and never buy running shoes? How about skydiving without a parachute? It costs money to get involved in just about anything these days. With prospecting, however, there is the possibility that it will pay for itself (and then some!). But, wait! Would you register a mining claim and never do an assay? Getting your property to the next level requires a degree of commitment in order to raise the level of interest for potential investors. The bottom line is: investors want proof, and proving and promoting a claim cost money.

Brad Langille, a local airline pilot, needed something to do with his spare time. The geology degree he was toting around from his pre-flying days led him back toward the mining industry. Staking ground in the Lawrencetown gold district, he spent about a year just getting a feel for his claim and analyzing a few grab samples that returned encouraging gold values. Visits to the DNR library and consultation with staff geologists led to further surveys by a local consultant. This gave Brad enough data to approach the Nova Scotia Prospectors Assistance Program for a \$5,000 grubstake which he spent on drilling short holes across his anomalous stratigraphy. He again reached into his pocket to assay his drill core and was rewarded with a stratabound target of quartzite, averaging 4.5 g/ton over 11 feet, open at both ends and at depth. Forming a company with an old classmate (Terry Coughlan, Jr.), the pair proceeded to approach investors and raise money. The result? The birth of a new junior company (Gammon Lake Resources) with assets of \$1/4 million and an exploration program slated for the spring of 1996, targeting a possible ore zone of vat-leachable material. Total cost out of his pocket was about \$2,500.

If a claim has something going for it without new data, it may be possible to invite someone with financial resources to pick up at least part of the cost of investigating the claim's potential. This is done with the understanding that the outside party gain an interest if anything is found. Ted McNaughton, a recent graduate of the department's Advanced Prospecting Course, recently channel-sampled 150 feet of strata in the vicinity of the Wine Harbour gold district. More than 90 samples will be assayed by an interested party. What did the property have going for it? Wine Harbour produced more gold in 1864 than any other place in Canada. Obviously the cost to Ted was minimal in this case, but you can't dismiss the long distance phone calls, travel expenses, or time incurred on this type of venture.

Scott Grant has recently been investigating markets for limestone from one of his claims. Shoehorning open markets for limestone in building stone and industrial applications is no small financial task. His phone bill regularly tops several hundred dollars a month. He attends the Prospectors and Developers Association of Canada conference every year in Toronto. Add in analysis fees, heavy equipment costs and time spent and it all adds up to commitment. Of course, the possible return on investment for Scott could also be impressive.

Prospecting and staking can be enjoyable, challenging and rewarding, but commitment on the part of the claim holder, both financial and otherwise, is what separates the true prospector from the hobbyist. After all, you can't find a mine without an assay any more than you can skydive without a parachute.

Ron Mills

## Special Notes

### Regional Geologists Appointed

Three regional geologists were appointed on October 1, 1995, as part of the department's strategic planning process. They are Gordon Adams, Western Region, Bridgewater; Bob MacDonald, Central Region, Bible Hill; and Don MacNeil, Eastern Region, Coxheath. Look for more details in the spring edition.

### Strait Aggregate Quarry Sold

Porcupine Mountain Quarry, formerly owned and operated by Construction Aggregates Ltd., was recently sold to Martin Marietta Materials, Inc., of Raleigh, North Carolina, the second largest producer of construction aggregates in the US.

## Dates to Remember

### January 22 to 24, 1996

Geological Survey of Canada's fourth biennial Minerals Colloquium. Special theme - "Canadian Mineral Deposit Types: Current Concepts". For more information contact Dr. C. W. Jefferson, phone 613-996-4561 (or FAX 613-996-9820).

### January 30 to February 2, 1996

Cordilleran Roundup, Hotel Vancouver, Vancouver, British Columbia. For more information call Sheila Holmes at the B. C. & Yukon Chamber of Mines, 604-681-5328 (or FAX 604-681-2363).

### February 2 and 3, 1996

Atlantic Geoscience Society Annual Meeting, Bathurst, New Brunswick. For more information contact Mike Parkhill, New Brunswick Department of Natural Resources and Energy, phone 506-547-2070 (or FAX 506-547-7694; e-mail langton@nbnet.nb.ca).

### March 10 to 13, 1996

Prospectors and Developers Association of Canada Annual Convention and Trade Show, Royal York Hotel, Toronto, Ontario. For more information call the PDAC, 416-362-1969.