



groundWORK

Published by Prospectors and Developers Association of Canada Mining Matters

2010/2011

Educator Newsletter



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Mining Matters Far and Wide

Every once in a while, we like to remind educators of all that we can do to help them communicate the importance and wonder of Canada's geology and mineral resources. We offer exceptional educational resources that meet provincial Earth science and geography curriculum expectations. Our curriculum-relevant programs are now available to elementary schools in Ontario, Manitoba, Newfoundland and Labrador, and high schools across Canada. We have plans to expand our elementary units into Québec and Saskatchewan. We run Aboriginal Youth Outreach Programs and showcase the mining world for students and teachers at the annual *Prospectors and Developers Association of Canada (PDAC) International Convention, Tradeshow and Investors Exchange*, as well as the *Canadian Institute of Mining's Mining for Society* shows across the country.

To see all that we offer, go to www.pdac.ca/miningmatters

Here are a few highlights of the last year:

Manitoba

In May 2010, the Manitoba Provincial Government announced the launch of a new curriculum-aligned learning resource developed through the combined efforts of *Mining Matters*, Manitoba Education, and Manitoba Innovation, Energy and Mines. This resource will help students understand the importance of Manitoba's mineral resources, their extraction processes, and their uses in our daily lives. *Mining Matters* also worked with approximately 500 Manitoba students using our specialized learning experiences.

Newfoundland and Labrador

In partnership with the Government of Newfoundland and Labrador Geological Survey, *Mining Matters* developed the *Mineral Resources Student Workshop Series* to assist educators in the province's rural areas. Using learning activities from our unit *Deeper and Deeper*, junior and intermediate students will investigate the importance of rocks, minerals, and mining in their daily lives and explore the costs and benefits of using natural resources. Using material from our unit *Discovering Diamonds*, high school students will study the formation of diamonds, as well as their discovery, extraction, and processing, leading them to understand the Earth's formation, structure, and internal and surficial processes. Teachers will receive the appropriate resource for their classroom and the necessary teaching tools.

Northern Ontario

Mining Matters joined in Timmins' Mining Week, commemorating the social and economic importance of the mining and exploration industry to the area. We challenged visitors to match rocks and minerals to their uses in everyday products, and to match photos of mining sites during operation and after land reclamation. Our games, career information, and *Mining Makes It Happen* poster handouts were a hit with everyone.

In the spring, we helped the District School Board Ontario North East with their annual outdoor science camp, which reaches over 700 grade 6 students. For its new rocks and minerals component, we supplied rock and mineral samples, mineral testing equipment, maps, DVDs, and learning activities about mineral resources and Earth science.

GeoCanada 2010

This year, over 4,600 members of the national Earth science community descended on Calgary to attend GeoCanada 2010, a once-in-a-decade conference. *Mining Matters* was there, helping to bring Earth science to educators and the public.

In the Earth Science for Society program, we delivered hands-on mineral resources programming to over 2,000 students. We also assisted at a pre-conference EdGEO workshop: "Putting the Earth into Science," where teachers learned how to integrate 18 Earth science activities into the subjects of physics, chemistry, biology, and mathematics.

To learn more about the activities, please see page 7 in the newsletter.

MM Resources en Français

Mining Matters now offers two valuable high school resources in French: *Discovering Diamonds and ArcGIS Lessons*.

Discovering Diamonds, available in English since 2006, uses diamonds as an integrating theme through which to study the concepts expected in a senior-level Earth science course. Its learning activities illustrate real-world experience with diamonds, bringing in elements from every area of Earth science, from earthquakes to environment, cratons to chemicals.

Last year, partnering with ESRI Canada, we adapted four hands-on activities from *Discovering Diamonds* into a multi-part lesson that teaches the use of ArcGIS, ESRI's suite of geographic information system (GIS) software products. This lesson is suitable both as a stand-alone task for teachers of geography, computer technology, or Earth science, or as a complement to the hands-on activities in *Discovering Diamonds*.

For more information, contact the *Mining Matters* office at 416.863.6463 or pdacmm@pdac.ca

A Teacher's Take on the PDAC Convention

For the last three years, *Mining Matters* has invited educators to experience the annual *PDAC International Convention, Trade Show and Investors Exchange*, held in March, in Toronto. Our three days of programming—one for teachers and two for students—feature guest speakers, workshops, and visits to the Trade Show Floor.

To register for the 2011 education event at the PDAC Convention on March 6 at the Metro Toronto Convention Centre, please call 416.863.6463 or email pdacmm@pdac.ca.

We thank French immersion teacher Sally Warburton, from the Toronto District School Board, for describing her experience at the 2010 conference:

"This was the first time I'd attended the Mining Matters Workshop offered to teachers, and I was very, very glad that I had signed up, so I'd like to share my thoughts with you.



Being able to visit the PDAC Trade Show and meet people from all over the world was wonderful. Learning about mines located in Canada and throughout the world and the types of mining done there was fascinating. The whole mining industry was represented—machinery, airplane companies, investors, geologists, map makers, ecologists—which for me, as a teacher, introduced me to the many future job opportunities available to my students. I gathered many resources for use in my class with my students.

The lunch time with the Mining Matters group allowed the teachers to share what they'd seen and learned while visiting the Trade Show. The Keynote Speaker, Eira Thomas, Executive Chairman, Stornoway Diamonds Corp. was excellent. I learned so much from her talk about the diamond mining industry in Canada, about the way mines are constructed in consideration to the environment, and about the many career opportunities for our young students. I felt her excitement and enthusiasm about the mining industry. You couldn't have selected a better speaker to communicate this message to teachers. I feel honoured to have been present when she was speaking.

The afternoon workshop "Deeper and Deeper" for junior teachers was very informative. We did hands-on activities based on the rocks and minerals kit we received for our classrooms. We investigated the importance of rocks, minerals, and mining in our daily lives and explored the costs and benefits of using natural resources.

It was a very beneficial day for me as a grade 4 classroom teacher who teaches the rocks and minerals science topic. Thank you very much for this wonderful professional development opportunity."

Mme Sally Warburton
Sir Adam Beck Junior School

Mining Matters Expands Aboriginal Youth Outreach

Aboriginal peoples are being increasingly recognized by Canadian resource companies for their important role in land and resources management. *Mining Matters* works to build this recognition, especially as the Aboriginal youth in the northern populations reach workforce age.



Now in its third year of offering an Aboriginal Youth Outreach program, *Mining Matters* has considerably expanded its audience. Besides being welcomed back to the First Nations

Natural Resource Youth Employment Program in Upsala, Ontario, and the Manitoba Natural Resource Camp in northern Manitoba, Aboriginal Education Specialist Barbara Green Parker, took the program to three new communities: Baker Lake in Nunavut, and Webequie and Marten Falls in northern Ontario. In all, *Mining Matters* connected with over 160 Aboriginal youth aged 9–19.

The outreach program introduces participants to practical geological and mineral exploration activities, including prospecting, claim staking, and mapping, as well as the use of GPS technology and environmental geochemistry. It also highlights the many job opportunities available in the minerals industry.

Connecting in Nunavut

Fresh from an Aboriginal Youth Outreach Camp at Baker Lake, Nunavut, Barbara Green Parker jotted down some thoughts about the session:

The *Mining Matters* program was very well received. Conducting the program on the Agnico Eagle Meadowback site was amazing! The kids and I established an immediate rapport. On the first day, we attended the mine site orientations together. What a great opportunity to see such state-of-the-art procedures.

When I started the *Mining Matters* program, the kids were attentive, engaged, curious, and so quick to pick up the material; what a pleasure to work with them. The seven boys and seven girls were Inuit from Baker Lake, Rankin Inlet, Whale Cove, Chesterfield Inlet, and Coral Harbour.

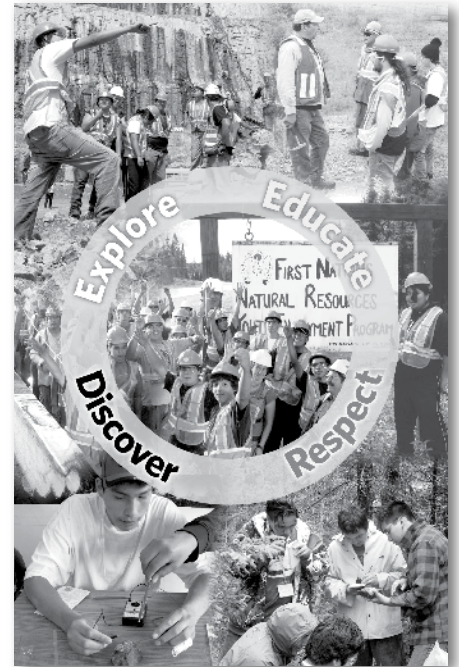
I asked two young mentors (ages 22 and 23) to speak to the kids about IT and Environmental Science. Both had dropped out of school but are now getting university degrees because they love their jobs so much. The kids were very quiet as they “told their story.” I couldn’t have written a better message myself.

Our three Guiding Circle activities went over well. The kids had a great time constructing headframes and naming them. The “Pain Crane” won, with a close second going to the “Tower of Peace.” The “Pyramid of Disaster” lifted the required weight but the too-large skip jammed in the upper portions of the structure!

Exploration mapping on the tundra was a huge hit, and the stone carving at night resulted in some truly beautiful and thoughtful cultural work. Our campers didn’t want to go to bed because they were so enjoying the program.

I introduced a new activity: “Elements for Life.” We talked geochemistry, and then the kids, in three teams, tackled unopened puzzle boxes and raced each other to construct. Competitive but fun, the activity combined lots of laughing with yells of “Where’s carbon?”, “I’ve got zinc!”, or “Hurry with the gold!”

Our campers loved their *Mining Matters* hats, T-shirts and completion certificates. When the time came to go, I got big hugs from everyone, along with pleas for five days of programming next year!



New Video: Ground Rules

From Caterpillar and Science North comes “Ground Rules: Mining Right for a Sustainable Future,” a video that examines the issues that companies must consider when operating mines or developing new ones.

The video looks at exploration, modern mining, engineering challenges, mining and the community, and reclamation, leading viewers to a better understanding of the various mining processes. Divided into chapters, it lets viewers go to whichever aspects interest them. This resource is free to order as a DVD, or individual chapters can be viewed on YouTube. Lesson plans for different age groups (11–13, 13–15, 15–18) are available on-line.

For more information, go to www.cat.com/groundrules

Universities Highlight Sustainability and CSR

Sustainability and corporate social responsibility (CSR) are key priorities when Canadian mining companies consider developing a mine.

Several departments of mining and mineral engineering, at Canadian universities are preparing students to deal with these priorities by offering mining and sustainability courses.

Courses introduce the evolution of the principles of applied sustainability and their applications in the mining industry. Themes examined include: the mining industry and society; the nature of the mining industry in Canada and around the world; the theory of sustainability and sustainable development; corporate social responsibility, reporting and assessment; mine closure; regulation of mine activities in Canada and elsewhere; mining and indigenous people in Canada and abroad; and future scenarios for the mining industry in North America.

To see a list of universities specializing in CSR fields of study, visit the Centre of Excellence in CSR at www.cim.org/csr/menupage.cfm?sections=126&menu=134

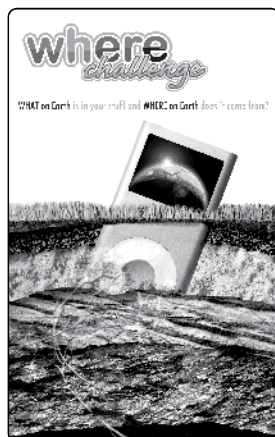
WHERE on Earth

The **WHERE Challenge**, run by the Canadian Federation of Earth Sciences for its first two years, has received rave reviews from hundreds of Canadian teachers and students. Dozens of school classrooms and more than 1,000 students, aged 9 – 14, have participated, investigating the questions “What on Earth is in your stuff?” and “**WHERE** on Earth does it come from?” and creating educational stories about non-renewable Earth resources found in everyday items.

The **WHERE Challenge** returns for its third year, now managed by *Mining Matters* and replacing our long-running Junior Miner Competition. The Challenge, launched in October, will run until April 1, 2011, offering up to \$16,000 in regional and national prizes.

Participating teachers in last year's Challenge say the contest is unique—it presents Earth sciences material to students in a way they can relate to. The **WHERE Challenge** allows for cross-curricular collaboration and thematic teaching; art, English, social studies, technology, and science departments can all get involved.

To learn more, go to www.earthsciencescanada.com/where



Web Sites for You

So You Think You Know Mining

So You Think You Know Mining is a Web-based contest run by the Ontario Mining Association that encourages high school students to create a short video about the importance of mining in society. Prizes are awarded for winning videos. Contest details, helpful hints, and past winning videos can all be accessed from the Web site.

<http://oma.on.ca/en/contestpages/index.asp>

Interactives' Rock Cycle

“Rock Cycle” is one of the **Learner.org** series of Interactives' Web sites that teach concepts through an engaging mix of information and on-line activities. Viewers can read about different rocks, create their own virtual rock collection, and see animations that make it easier to understand how rocks change. Games test them on what they have learned, and a final quiz provides printable results.

Interactives offers a number of engaging sites, covering topics in math, history, arts, language, and science; the science section also looks at volcanoes and dynamic Earth. Interactives' Web sites provide a fantastic resource to help students learn and stay engaged.

www.learner.org/interactives/rockcycle/index.html

Canadian Museums On-line

Available in English and French, **virtualmuseum.ca** is a unique interactive space that showcases Canadian museum collections and treasures through virtual exhibits, an image gallery, learning resources, as well as innovative and collaborative projects. It also offers news in the museum field, as well as a national museum directory.

www.museevirtuel-virtualmuseum.ca

Careers in Mining

A new Web site called **The Earth Series** features the wide range of jobs available in mining. The site provides detailed job descriptions, along with education requirements, career opportunities, possible job locations, and recommended personality characteristics. Developed by Cambrian College in Sudbury and the Ontario Mineral Industry Cluster Council for an Aboriginal audience, the site can help all young people making decisions about courses and directions to take in high school.

www.mininginmind.ca

Everything Dinosaur

Presented as a joint project of **virtualmuseum.ca** and the Royal Tyrrell Museum, in Alberta, **Technosaurs.com** is a new Web site created for kids interested in dinosaurs and palaeontology.

www.technosaurs.ca

Experience the Royal Tyrrell Museum

In 1884, Canadian geologist, cartographer, and mining consultant Joseph Burr Tyrrell made a huge discovery while exploring for coal deposits in Alberta's badlands. Near Drumheller, Alberta, he discovered dinosaur (*Albertosaurus*) bones.

Today, visitors to Drumheller (138 km from Calgary, AB) can visit the Royal Tyrrell Museum to see one of the world's largest collections of dinosaur skeletons. They can also experience the underwater world of prehistoric creatures in the Burgess Shale, wander through over 300 species of prehistoric plants in the Cretaceous Garden, uncover a fossil, or see museum staff prepare fossils in the Preparation Lab.

Celebrating its 25th anniversary in 2010, the Museum proudly declares its position as Canada's palaeontological authority. A special anniversary exhibit, **Alberta Unearthed**, currently showcases 25 of the most significant specimens and recounts rarely told stories of discovery.

School Programs

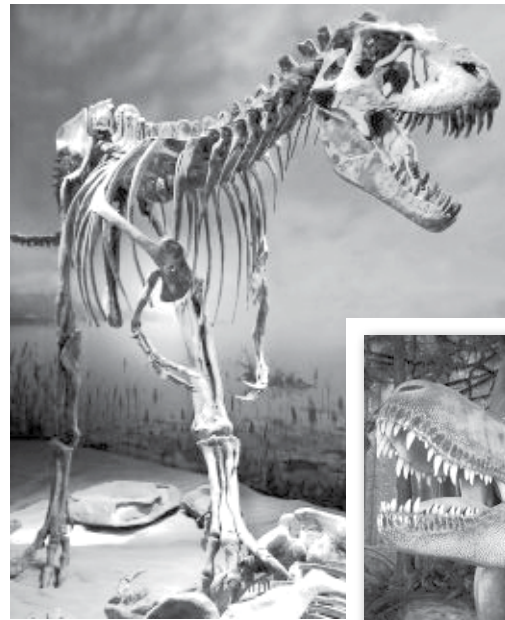
Teachers who can get to the Museum, or better yet take their classes there on a field trip, can access a wealth of information, resources, and learning programs that dovetail with school curriculum at all levels.

To see all that the Museum has to offer, go to www.tyrrellmuseum.com/programs/school_programs.htm

Distance Learning Programs

For those who can't get there, the Museum offers an award-winning Distance Learning Program with curriculum-connected content delivered from the ATCO Tyrrell Learning Centre right into the classroom. With the use of videoconferencing equipment (camera, microphone, and internet connection), teachers can access eight distance learning experiences:

- Grades K–3 students try to escape extinction at the hands of a deadly volcano in "PIQ: Test your Palaeo Intelligence"
- Grades K–9 pose palaeontological questions to an expert in "Up Close and Palaeo Jr."
- Grades K–12 experience the Museum's galleries and exhibits through the "Royal Tyrrell Museum Virtual Visit"
- Grades 2–12 discover "Secrets of the Lost Quarry," employing detective skills to locate a forgotten excavation site in the Canadian Badlands
- Grades 3–6 explore geography, geology, and palaeontology while learning about ecozones, rock types, and fossils in "Rockin' Alberta Resources"
- Grades 7–12 see "A Museum at Work," learning about various museum careers, including fossil preparators, educators, designers, and more



- Grades 9–12 go "Up Close and Palaeo," asking questions of a real palaeontologist and receiving answers through animations, images, video clips, and real fossils
- Grades 10–12 explore "Applied Science in Palaeontology: Physics," learning how high school physics solves real world questions like, "What was the bite force of the T. Rex?"

Student Info

Students can also get homework help from the Royal Tyrrell Museum. The experts there can help with research questions.

Go to www.tyrrellmuseum.com/homework.aspx

Students fascinated by a career in palaeontology can learn more at www.tyrrellmuseum.com/research/palaeontology_as_a_career.htm

Prehistoric Arts Contest

And finally, the museum is running a Prehistoric Arts Contest! Canadian students of all ages can enter, using their artistic skills and imaginations to win cash prizes or the grand prize of an art supply package valued at \$1,000. There are five age categories covering Kindergarten to Grade 12, so encourage your students to go for it!

Learn more at www.tyrrellmuseum.com/programs/school/prehistoric_arts_contest.htm

Treasure in the Burgess Shale

Canadians have a rare treasure sitting right out in the open in Yoho National Park, B.C. The Burgess Shale, considered one of the most important fossil locations in the world, provides an amazing window into what the world looked like half-a-billion years ago.

Discovered in 1909 by Charles Doolittle Walcott, the Burgess Shale contains fossils from the Cambrian period (505–510 million years ago) that display amazingly well-preserved details of the area's ancient marine animals. The fossils reveal important clues to the nature of evolution; all of the major types of animals (phyla) known today are represented in the Burgess Shale, plus others that cannot be placed in our modern classification system.

The Burgess Shale Geoscience Foundation (TBSGF), established in 1989 in Field, B.C., interprets the Burgess Shale to the world. Its mandate is to increase public understanding of Earth science, thereby enabling better judgement of the validity and importance of environmental issues.

TBSGF offers a number of educational programs for the general public, including guided hikes to the Burgess Shale fossil quarry. It also promotes integrating Earth sciences into the K-12 curriculum so that today's students will be prepared to deal with global, Earth-related issues. It partners with schools, universities, institutions, and organizations locally, nationally, and internationally to promote the development of Earth science education programs.

The foundation focuses on communicating five themes in all of its educational programming:

- The History and Evolution of Life (including the story of the Burgess Shale fossils)
- Rocks and Mountain Building
- Climate Change and the Evolution of Landforms
- Geohazards
- The Canadian Rocky Mountain Parks—UNESCO World Heritage Sites

Educators from across the country can take advantage of TBSGF's Annual Teachers' Workshop, offered in the summer and featuring four days of lectures, hikes, and field trips. Speaking of a past workshop, one teacher said, "This was a very rewarding experience, jam-packed with knowledge, presented with an enthusiasm I envied, and rounded-out with field experience that made me feel like a kid again!"

To learn more about the Burgess Shale, the TBSGF, and the available learning opportunities, go to www.burgess-shale.bc.ca



Stonehammer Geopark

New Brunswick has hit the big time in the Earth science world. At a recent Geoparks Conference in Greece, Stonehammer Geopark was declared the first North American member of the UNESCO-supported Global Geoparks Network (GGN).

Stonehammer Geopark encompasses 2,500 square kilometres of land in southern New Brunswick. Its geology, studied by researchers for almost two hundred years, includes a billion years of geological and paleontological stories that are considered internationally unique. The region also has a vibrant human and cultural heritage, as well as active educational, tourism, and community development sectors, all vital elements for a Global Geopark.

“New Brunswick has hit the big time in the Earth science world.”

“The designation of the Stonehammer Geopark as North America's first Global Geopark is wonderful recognition of the significant geological heritage of the region, as well as its great potential for sustainable economic development,” says Dr. Godfrey Nowlan, Chair of the Canadian National Committee for Geoparks.

The GGN guidelines for Global Geopark status state that the area must comprise several internationally important geological heritage sites or geological entities of special scientific importance, rarity, or beauty. These features would represent the region's geological history and the events and processes that formed it. The GGN has 77 members in 24 countries throughout Europe, Asia, South America, Australia, the Middle East, and now North America.

Field Trip Subsidies

Mining Matters offers a Field Trip Subsidy Program to enrich Earth science learning. Teachers who have completed an in-service workshop and use a *Mining Matters* resource kit are eligible to apply for the field trip subsidy. The program currently has a \$1,500 budget for applications. *Mining Matters* will provide three \$500 subsidies to help offset field trip costs to stone, sand, and gravel; mining; and geoscience venues. Applications will be considered on a first-come, first-served basis. Teachers and students are asked to submit a summary of their experiences.

For further information, please call us at 416.863.6463 ext. 321 or e-mail pdacmm@pdac.ca

For field trip suggestions and to download an application form, go to www.pdac.ca/miningmatters/educators/resources.aspx

EdGEO: Putting the Earth into Science

EdGEO, initiated in the early 1970s and coordinated by the Canadian Geoscience Education Network of the Canadian Federation of Earth Sciences, aims to cultivate a heightened awareness and appreciation of our planet. *Putting the Earth into Science* is a new EdGEO teaching resource designed to integrate Earth science topics into the high school core subjects of physics, chemistry, biology, and mathematics, as well as general and environmental science. Through this interdisciplinary approach, EdGEO hopes to expand Earth science content in Canadian high schools and show students how Earth science impacts their daily lives.

Each activity targets particular fundamental principles about the Earth and includes a teacher's section describing the task, the "core curriculum skills" and the "Earth science literacy principles" covered. Activities include reproducible student-ready pages, notes about necessary advance preparation, hints for classroom delivery, and solutions to questions on the student pages. Some include additional ideas for related learning experiences. Student tasks include experimental investigation, data interpretation, field study, and theoretical calculations.

This resource is available for FREE on the EdGEO Web site; you can download individual activities or the entire package of activities.

For these and other valuable resources, go to www.edgeo.org

Activities				
	Biology	Chemistry	Physics	Mathematics
Physiology and Habitat	X			
Tree Growth	X			X
The Water Cycle	X			
Carbon Cycle	X	X		
Our Water Supply		X		
Limestone		X		
Rocks and Minerals		X	X	
Earth's Magnetism			X	
River Flow			X	X
Tsunami			X	X
Landslides			X	X
Supercontinent Cycles				X
Glacial Retreat				X

Miller Museum of Geology

Teachers in the Kingston area are lucky to be situated close to an Earth science teaching museum located in Miller Hall, home of the Department of Geological Sciences at Queen's University. The Miller Museum, opened in 1931, displays an extensive collection of minerals from around the world and includes exhibits on the geology and fossils of the Kingston area and on the dinosaurs of Alberta. It is free to the public and offers educational programming, including hands-on geology activities, to school groups for \$40 per group.

Educational programs include:

- Introduction to Geology, General interest
- Dinosaurs, Kindergarten to Grade 3
- Mineral Identification, Grade 4
- Meteorites, Grade 6
- Earth through Time, Grade 11
- Earth and Space Systems, Grade 12

Need to know something specific or want an opinion on a geological specimen? You can "Ask a Geologist." The museum also offers a display of exhibits on-line. The two exhibits currently available are "Dawn of Animal Life," and "Geology of the Kingston Area."

To learn more about the museum and all it has to offer, go to www.geol.queensu.ca/museum

Match Made in Earth Science

Scientists in School (SiS), a charitable organization founded in 1989, is dedicated to igniting passion for science and technology in elementary-aged children, and their teachers and parents. Students become the scientists in fun and exciting curriculum-aligned workshops. Led by enthusiastic knowledgeable SiS presenters, a

“SiS is raising the level of science literacy one classroom at a time.”

SiS visit provides not only the opportunity for a rich hands-on experience but also the opportunity to introduce students to science role models and future career possibilities. Teachers appreciate the opportunity to tap into the knowledge and ideas of science and engineering experts. Each school year, over 575,000 young scientists and their teachers participate in

SiS workshops. SiS reaches out to over 200 Ontario communities and recently reached a new milestone of opening its first outside-of-Ontario branch in Lethbridge, Alberta. SiS is raising the level of science literacy one classroom at a time.



Recently, *Mining Matters* and SiS joined forces to provide exceptional Earth science and mineral resources education to elementary students. Our role will be to:

- Provide training support to the SiS network of Earth science presenters
- Act as a resource for SiS workshop and activity development in Earth science
- Provide teacher resource materials, including rock and mineral samples, to enhance the SiS classroom workshop follow-up package
- Co-facilitate teacher professional development sessions with SiS

Together, *Mining Matters* and SiS will reach more teachers and students with the wonder of Canada's geology and mineral resource endowment.

To learn more about the SiS program, go to www.scientistsinschool.ca

GAC® – MAC Teachers' Workshop May 2011

From May 25 to 27, the University of Ottawa will host the Joint Annual Meeting of the Geological Association of Canada, the Mineralogical Association of Canada, the Society of Economic Geologists, and the Society for Geology Applied to Mineral Deposits (GAC® – MAC – SEG – SGA).

Teachers are invited to take advantage of an associated two-day teachers' workshop on Friday, May 27 and Saturday, May 28, which will also include access to the conference, entitled *Navigating Past & Future Change*. Registration fees are not yet set but will be invitingly low to encourage participation.

Participants will be able to talk with conference delegates, scientists, and researchers. On Friday, at the Department of Earth Sciences at Carleton University, they will be able to attend French and English Earth science lectures and experience hands-on resources and activities aimed at elementary or secondary students. On Saturday, a "Geological Highlights of the National Capital" field trip will showcase some great outcrops and emphasize the value of field trips to teaching Earth science.

To see the conference Web site, go to www.gacmacottawa2011.ca

To learn more, contact Beth McLarty Halfkenny at 613.520.2600 ext. 8520 or bhalfk@earthsci.carleton.ca



Teacher's Mining Tour at the Canadian Ecology Centre

In August, more than 30 teachers met at the Canadian Ecology Centre (CEC) to take part in a sold-out Teacher's Mining Tour designed to examine modern, environmentally responsible mining in Ontario. The CEC, situated in Samuel de Champlain Provincial Park, near Mattawa, is one of Canada's leading environmental and experiential learning centres.

Teachers were introduced to contemporary prospecting and development through classroom learning and field trips, including a geology tour, a trip to Dynamic Earth in Sudbury, and an eye-opening underground visit to Xstrata's Nickel Rim South mine, one of the world's most modern and environmentally responsible mining operations. They met professional geologists, miners, environmental technicians, and prospectors, and visited mine supply and service operations in North Bay. In *Mining Matters* training workshops, they experienced the hands-on learning style and rich resources of the curriculum resources *Deeper and Deeper* and *Discovering Diamonds*.

According to Bill Steer, CEC's General Manager and a professor at Nipissing University's Schulich School of Education, the professional development opportunity allows educators to see mining as a sustainable activity and the industry as a source of a wide array of jobs. He says, "Teachers and their students need to know more about this within the curriculum where mining is identified directly and indirectly. At the same time, we as consumers need to know more about the mining products that are part of our everyday lives."

The Teacher's Mining Tour is a professional development program for Ontario teachers and teachers in training. Participating teachers can use it to earn part of their Environmental Science Additional Qualification through Nipissing University and the Ontario College of Teachers.

"Teachers and their students need to know more about this within the curriculum where mining is identified directly and indirectly."

Junior Miner Competition 2010

Junior Winners

(Grades 4 to 6)

Diamond Prize

Christa Reitter

Mazo de la Roche Public School

Platinum Prize

Mitziana Pilla

Mazo de la Roche Public School

Gold Prize

Jaidyn Lunn

Mazo de la Roche Public School

Daniel Forster

Mazo de la Roche Public School

Intermediate Winners

(Grades 7 to 9)

Diamond Prize

David Shalemon

St. Theresa Catholic School

Platinum Prize

Tess Kosakowski

St. Theresa Catholic School

Gold Prize

Alexandra Gratton

St. Theresa Catholic School



Activities:

#1. Crayon Rock Cycle Simulation

The rock cycle is the most basic principle of geology. All rocks relate to each other and may be transformed from one kind of rock to another. In its simplest form, the rock cycle describes the relationships between the three major types of rock.

Objective

To describe the three major rock types (sedimentary, metamorphic, and igneous), discuss their relationships, and diagram the stages of the rock cycle.

Procedure

1. Shave crayons into small pieces using the plastic knife and/or vegetable peeler. Collect the shavings in an aluminum plate. Keep the colours separate.
2. Pile the shavings, in coloured layers, at the centre of the sheet of aluminum foil.
3. Carefully fold the aluminum foil in half, trapping the loose crayon layers inside.
4. Place the wooden block on top of the folded aluminum foil and press down hard for at least one minute. Unfold the aluminum foil and observe the “sedimentary” crayon rock.
5. Break off a piece of the crayon rock produced in step 4 and set it aside for later.
6. Place ice and cold water into the beaker, making an ice bath. Place an aluminum plate in the beaker. If necessary, bend the sides to make it fit.
7. Plug in and turn on the hot plate. Set it to medium heat.
8. Place the crayon rock that was set aside into a small aluminum plate and place it on the hot plate. Observe the crayon product as it melts.
9. Remove the aluminum plate from the hot plate when the wax is soft to the touch. Do not allow the wax to melt completely. Allow the “metamorphic” crayon rock to cool and examine it.
10. Return the “metamorphic” crayon rock to the hot plate. Stir the melting rock with the Popsicle stick until the entire product has melted. Using tongs, pour the melted sample into the aluminum plate in the ice bath.
11. Turn off the hot plate.
12. Once the “igneous” crayon rock has cooled, break off pieces and examine carefully.
13. Discuss and clean up!

Materials

- Aluminum foil (15–20 cm square sheet)
- Small aluminum pie plates (3)
- Wooden block (1)
- Large beaker (400 ml / 600 ml)
- Plastic knife
- Tongs
- Vegetable peeler
- Popsicle stick
- Water
- Ice
- Different colours of wax crayons (3–4)



Discussion

Ask students if they think the igneous rock could be turned into sedimentary rock? Encourage them to explain how. Or, could a metamorphic rock turned into a sedimentary rock?

Have students draw and label what they observed during the demonstration/simulation.

Going further

See if students can offer explanations as to what other Earth processes are occurring that allows the rock cycle to continue.

#2. Concrete: Hard as Rock – or Not?

(Condensed from the EdGEO resource *Putting the Earth into Science*)

The Earth's rocks are continually being formed, changed, and destroyed. Solidified lava and ocean floor sediments create new rocks, while water, wind, and ice erode exposed ones. A rock's resistance to chemical weathering is determined by how susceptible the minerals in the rock are to water or acids. Rocks rich in quartz, such as granite, are highly resistant to chemical weathering. Marble and limestone, which consist of soluble calcite, are more easily weathered by rain and snow.

What about concrete? Chemically, it is considered to be very durable. For example, it is used for pipes in water treatment plants where it has to withstand both the water and the processing chemicals. Over time, however, acids can chemically weather concrete by dissolving the calcium in the cement and the aggregates which hold it together. Once the cement is weakened, the concrete loses its strength. Concrete structures are also vulnerable when water infiltrates and corrodes the internal metal used to reinforce the concrete.

In this activity, you'll examine the physical and chemical weathering of limestone (calcium carbonate), both in the laboratory and in the natural environment.

Investigation

1. View a video slide show (approximately 4 minutes) with a stonemason's commentary about repairs to the cathedral in Worcester, United Kingdom. The images show the effect of weathering on this building and the steps taken to restore the structure.
http://news.bbc.co.uk/2/hi/uk_news/8582504.stm
2. Take a close look at the effects of weathering on local buildings or headstones in a cemetery. Sketch some examples of weathering and record the following details based on your field observations:
 - Age of the structure
 - Signs of weathering: e.g., rounded corners or edges, pitted surfaces, loss of detail in carvings
 - Material (concrete, rock type, physical description)

Activity: Thermal Decomposition of Limestone

Safety

- Wear safety goggles throughout the investigation.
- Use one straw per person. Throw the straw away after one person has used it. Only blow through the straw; do not suck up any solution.
- Do not touch the lime (calcium oxide) that is formed from heating limestone. It will be hot after heating. It is also corrosive.
- Calcium oxide causes burns and irritates eyes, skin, and the respiratory system. The reaction of calcium oxide with water is vigorous and exothermic.

Materials

- Safety goggles
- 3 Pieces of limestone, about 1 cm cubes
- Dropping pipette
- Bunsen burner
- Tripod
- Gauze
- Heatproof mat
- Tongs
- 2 Boiling tubes
- Universal Indicator solution
- Drinking straw

Procedure

1. Take one piece of limestone. Add a few drops of water and note any reaction.
2. Place two pieces of limestone on a tripod and gauze, and heat with a roaring Bunsen flame for 15 minutes.
3. What changes do you observe, particularly in colour?
Optional: Darken the room and note what happens when the flame is trained directly on the limestone.
4. Use tongs to place one of the heated pieces onto the heatproof mat. Gently try to crush it with the tongs. Try the same with a piece that has not been heated. Record what you find.
5. Use tongs to place one piece of heated limestone into a test tube. With a dropping pipette, add a few drops of water. Record what happens.
6. Now add more water to the test tube until it is about half full. Shake the test tube and pour off the clear liquid, half into one test tube and half into another. Add a few drops of Universal Indicator to one tube and record the pH using a colour chart.
7. Place a straw into the solution in the second tube and blow gently through the straw. Note what happens.

Discussion/Questions

1. What differences are there in the limestone before and after heating?
2. The heated limestone has decomposed to lime. What is the pH of the solution produced when lime reacts with water?
3. Name the solution produced.
4. The formula for limestone (calcium carbonate) is CaCO_3 and for lime (calcium oxide) is CaO . Write a balanced equation for the reaction when limestone is thermally decomposed.



Truth vs. Fiction

Kids aren't in school 24/7. Outside of school, they have all kinds of activities, including watching TV and movies. Movies offer worlds to explore, real and imaginary, but what appears on the screen needs to be balanced with solid facts. Hollywood science can be pretty shaky.

Take disaster movies featuring natural catastrophes, for example. Blockbuster disaster movies became big in the 1970s, including *Earthquake* (1974) and *Meteor* (1979). A new collection appeared in the '90s, including volcano stories like *Volcano* (1997) and *Dante's Peak* (1997). In the last few years, disaster films have again filled the screens, and with amazing computer graphics, given audiences a full sensory experience of explosions, eruptions, and wide-spread destruction.

Why not critique a movie with your friends, family and, if appropriate, your students, for its real or not-so-real depiction of Earth science. *The Core* (2003), *Journey to the Center of the Earth* (2008), 2012 (2009), *The Road* (2010) and *The Book of Eli* (2010) also offer opportunities for discussion. To offer contrast you can view a documentary film, such as *Inside Planet Earth* (2009), or *Supervolcanoes*, both available free at <http://topdocumentaryfilms.com>

Truth is often better than fiction!

The Book of Eli (2010)

After apocalyptic events, a lone man fights his way across America, protecting a book that could hold the secrets to saving humankind.

The Road (2010)

A father and son walk for months across a ravaged, post-apocalyptic landscape in search of civilization.

2012 (2009)

A scientist detects shifting continental plates and sun flares and realizes that this foretells the imminent destruction of the planet.

Journey to the Center of the Earth (2008)

On a quest to find his brother, a scientist, his nephew, and their guide discover a fantastic and dangerous world in the centre of the Earth.

The Core (2003)

A team of experts pilot an earth-boring ship to jump-start the planet's spinning molten interior, now stalled by a military secret that could seal the fate of all humankind.

Dante's Peak (1997)

A volcanologist predicts a 4000-year dormant volcano will erupt in the American Pacific-Northwest, threatening to destroy the nearby town, and no one wants to listen to him.

Earthquake (1974)

The citizens of Los Angeles brace for the Big One—an earthquake that rattles the city to its crumbling foundation.

Volcano (1997)

From beneath the La Brea Tar Pits in Los Angeles, a volcano pushes to the surface, raining a storm of fire bombs and a tide of lava upon the city.

Meteor (1979)

After a collision with a comet, a nearly 8 km wide piece of an asteroid heads towards Earth.

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Mining Matters creates exceptional educational resources to meet provincial Earth science curriculum expectations. Since 1994, this charitable organization has reached more than 400,000 teachers and students through resources that promote awareness of the importance of rocks, minerals, metals, mining, and Canada's geology. *Mining Matters* prides itself on building long-term partnerships with teachers by providing relevant, accurate, and authentic Earth science resources for the classroom, designed by teachers for teachers.

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