Meet-up at first site (Royal Green Marble) @ 9 am
OR meet-up at Loon Lake campground @ 8:30 am

My email address is: npgstrips@gmail.com.
My cell number for the field trip is: 905-246-2056.
If you wish to call me before the trip, my land line is: 905-687-6503.
Thanks, Ashley

CCFMS Field Trip Director & trip leader for the Madoc trip.

We will also have walkie talkies on this trip.

Day 3 - 3 sites
If you’re going to be late, please call Ashley on her cell phone 905-246-2056.
Driving directions - in order of sites to be visited

getting to the campground
- 44.462496, -77.467187 Turn-from Hwy 62 onto Quin Mo Lac Rd
- 44.466663, -77.449300 Turn right into Loon Lake Resort campsite from Quin Mo Lac Rd

getting to Royal Green Marble Quarry
- 44.466663, -77.449300 Turn left out of Loon Lake onto Quin Mo Lac Rd
- 44.462496, -77.467187 Turn right onto Hwy 62
- 44.499890, -77.472070 Turn left onto Seymour St West / Old Marmora Rd
- 44.477305, -77.549746 Turn right into laneway / gate entrance
- 44.478280, -77.549746 parking & “honey” pile
- 44.478387, -77.550188 mid-site

getting to Tweed marble
- Backtrack to Old Marmora Rd
- 44.477305, -77.549746 Turn left onto Old Marmora Rd
- 44.495210, -77.489863 Turn left onto Atkinson Rd
- 44.505172, -77.495107 Turn right onto Hwy 7
- 44.544655, -77.341178 Turn right onto Genereaux Rd / Price Rd
- 44.545455, -77.328622 Turn right onto Skootamatta Lane / Byers Lane (more-or-less turns into a logging-type road at the end)
- 44.527916, -77.335753 “honey pile” + blue marble & parking
- 44.527833, -77.335032 drill cores - some marble, some Tudor volcanics

- 44.527983, -77.336566 “lookout” onto marble quarry - huge blocks & nearby parking
- 44.527050, -77.336836 blocks where amazonite can be found & parking

getting to Crookston Quarry mid-Ordovician fossils
- Backtrack to Byers Lane
- 44.534752, -77.334072 Turn right from Byers Lane onto Hawkins Bay Rd
- 44.535298, -77.331330 Turn right onto Hwy 37
- 44.474755, -77.310320 Turn right onto River St West in Tweed - changes name to Crookston Rd
- 44.429349, -77.451853 Turn right into Crookston Quarry
- 44.430575, -77.451539 parking & mid-site

And then everyone gets to go home!!!!!!!!!!!!
- Backtrack to Crookston Rd
- 44.429349, -77.451853 Turn right out of Crookston Quarry onto Crookston Rd
- 44.430458, -77.463002 Turn onto Hwy 62 - left is south to the 401, right is north to Madoc & Hwy 7
From Loon Lake to Royal Green Marble

From Royal Green Marble to Tweed Marble
From Tweed Marble to Crookston Quarry for Mid-Ordovician fossils!!
Royal Green Marble Quarry - we have permission
44.477305, -77.549746 laneway / gate entrance
44.478280, -77.549746 “honey” pile
44.478387, -77.550188 mid-site

From Peter Le Baron, Ontario Geological Survey OGS:
Upper Canada Stone Company, Green Marble Quarry, Madoc area

The marbles of the Madoc-Marmora area are host to green marble deposits that have been quarried as decorative stone since the 1930s. One of these, currently operated by Upper Canada Stone Company Ltd.in Huntingdon Township about 9 km west of the Canada Talc Mine, was described by Hewitt (1964) as “a remarkably strong and hard marble” consisting of calcite, chlorite and serpentine grains with “serrate irregular borders which contribute to high strength”. Petrographic thin section examination by Wilson (2014) of a sample of green marble from the Huntingdon quarry (TW-14-01, photo 1) indicated tremolite content of 88%, giving a more accurate explanation for the strength and hardness of the green marble and indicating the potential for the discovery of nephrite jade zones.

The high tremolite content of the Upper Canada green marble is approaching that of nephrite jade, defined below. Nephrite was identified by staff of the Tweed Resident Geologist’s Office in 2014, in waste rock from the Canada Talc Mine site in Madoc, about 9 km east of the green marble quarry. Some of the darker green patches in the sample shown below probably contain over 90% tremolite and could be classified as lower quality nephrite jade.

Photo 1. Green, tremolitic marble, Upper Canada Stone Company Ltd. quarry, Huntingdon Township; white mottling is calcitic marble, sample width 16 cm.
**Definition of Jade**

There are two forms of jade, nephrite and jadeite, consisting of distinct minerals. Nephrite consists of massive, micro- to cryptocrystalline intergrowth of grains of the tremolite–actinolite series of the amphibole group, Ca$_2$(Mg,Fe)$_5$(OH)$_2$[Si$_8$O$_{22}$]; jadeite is a clinopyroxene with composition Na$_2$(Al,Fe)$_2$[Si$_4$O$_{12}$]. Although jadeite can be slightly harder than nephrite (Moh’s scale hardness of 7.0 and 6.5, respectively), nephrite is the tougher variety as a result of the development of an interlocking felted mass of fibrous tremolite-actinolite crystals. Jadeite is an aggregate of interlocking monoclinic crystals which are more granular than fibrous. Nephrite jade can range in colour from nearly white when composed of magnesium-rich tremolite, to dark green or nearly black when iron-rich actinolite is the predominant component. The white variety, commonly known as "mutton-fat" is more highly valued than the darker green "spinach jade". Some inconsistency of colour and spottiness due to impurities such as calcite, diopside, garnet, magnetite, pyrite, graphite, talc, and serpentine are acceptable in the lapidary and jade art industries (Harlow *et al* 2007).

**Geological Setting**

Nephrite jade can be produced by 1) the metamorphism of dolomite and silica to form tremolite or 2) the alteration of serpentinite by calcium metasomatism at contacts with more silicic rock (Harlow *et al* 2007). The southeastern Ontario occurrence is of the dolomitic nephrite model.

Talc is the first mineral to form during progressive metamorphism of siliceous dolomitic limestone, according to the reaction: 3 dolomite + 4 quartz + l H$_2$O = l talc + 3 calcite + 3 CO$_2$. With increasing temperature, tremolite is formed from the talc-calcite assemblage, followed by diopside-tremolite-quartz at higher grade metamorphism. The presence of thin quartzite beds and stromatolitic marble consisting of alternating quartz and dolomite laminae in the Madoc area is evidence of a pre-metamorphism environment with the ingredients necessary for the formation of talc and tremolite.

**Reference**

Niagara club collected here in 2018 - they think this is a spectacular site.

Loads & loads of pale green with hints of blue-grey marble
- often with streaking from the tremolite
- sometimes hematite.

Size ranges from little, itty-bitty chunks right up to giant boulders.
Picking up is very easy to do (vs hammering).

2018 field trip GPS locations
Royal Green Marble Quarry
44.477305, -77.549746 laneway / gate entrance
44.478280, -77.549746 “honey” pile
44.478387, -77.550188 mid-site

“In-situ green marble bounder at Royal Green Marble quarry
- pic by A Pollock, 2018

prepared by NPGS Niagara Peninsula Geological Society
**Tweed marble** - *we have permission*

44.527916, -77.335753 “honey pile” + blue marble

44.527833, -77.335032 drill cores - some marble, some Tudor volcanics

44.527983, -77.336566 “lookout” onto marble quarry - huge blocks

44.527050, -77.336836 blocks where amazonite can be found

*From Peter Le Baron, Ontario Geological Survey OGS: Tweed Marble Quarry*

The Tweed Marble Quarry was discovered in the early 1960s by Marmora area prospector, Roger Young and subsequently operated by Vermont Marble Company through a subsidiary, the Ontario Marble Company. The company produced polished tiles and slabs which were used in several significant buildings such as the Royal Alberta Museum in Edmonton and the Canada Trust Building and St. Lawrence Centre in Toronto. The quarry has been largely inactive since the 1970s but was operated for a short time in the 1990s by Senator Stone Supply. In addition to white marble, a variety of colours can be seen in the quarry, including pink, salmon, green, and blue. Other minerals present are tremolite, wollastonite, diopside, serpentine, and pyrite. A narrow pegmatite dike cutting through the quarry area contains quartz, feldspar, amphibole, garnet, tourmaline and amazonite.

*Photos 1 & 2 Tweed Marble Quarry, 1967 and 2007.*
Photo 3 Marble from the Tweed quarry, Royal Alberta Museum, Edmonton.

Photo 4 Amazonite-bearing pegmatite, Tweed Marble Quarry

Blue marble from Tweed quarry - blue colouration is caused by graphite inclusions - collected 2018 - pic by A Pollock

White marble from Tweed quarry - collected 2018 - pic by A Pollock
Byer Lane

Byer Salvage

Byer Metals

“lookout” onto marble quarry - huge blocks

“honey pile” + blue marble + drill cores - some marble, some Tudor volcanics

blocks where amazonite can be found

2018 field trip GPS locations
Tweed Marble
44.527916, -77.335753 “honey pile” + blue marble
44.527833, -77.335032 drill cores - some marble, some Tudor volcanics
44.527983, -77.336566 “lookout” onto marble quarry - huge blocks
44.527050, -77.336836 blocks where amazonite can be found
Crookston Quarry mid-Ordovician fossils - we have permission
44.430575, -77.451539 MDI
44.43005, -77.45174 AMIS

Limestone Industries of Ontario; Volume II - Limestone Industries and Resources of Eastern and Northern Ontario; Derry Michener Booth, Wahl, staff of the Engineering and Terrain Geology Section, Ontario Geological Survey; MNDM; 1989
Paleo Pompeii; Genesis and Preservation of an Upper Ordovician Mounded Hardground with a Diverse Encrusting Community; Timothy R Paton; Master of Science Thesis, Department of Geology, McMicken College of Arts and Sciences; 2017

Paleozoic Geology
- Paleozoic-Precambrian (Grenville Province) contact is found on southern boundary of the Tweed Geological District, contact is scattered, and often covered by glacial debris
- Paleozoic rocks are Middle Ordovician (occur in the extreme southern part of the district) - fossil beds are:
  Bobcaygeon Formation, Simcoe Group carbonate rocks - sporadic outcrops - subdivided into three members, based primarily on their shale content - Lower & Middle Members are exposed at Crookston Quarry - correlated with Great Ordovician Biodiversification Event

  - Lower Member - medium to dark grey micro/fine crystalline limestone; weathers light grey; thick to massive bedded
    - some interbedded, very thin, dark grey shale; abundant black chert nodules; thin calcite veins; bentonitic clays (indicative of Taconic magmatic arc volcanic activity)
    - some beds very fossiliferous with very large tabulate corals, rugose corals, stromatoporoids (sea sponges), stromatolites, bryozoans, brachiopods, gastropods, bivalves, nautiloids, trilobites; calcarenite storm beds (crinoidal grainstones with tabulate corals & stromatoporoids); algal coated debris; trace fossils
    - fauna and sedimentary features indicate deposition in shallow offshore shoals
  - Middle Member - grey-brown limestone; weathers light brown; thin to medium bedded; contact with Lower Member is very sharp
    - significant amounts of thin interbedded green shale (with sharp contacts); numerous nodules of hard, black chert nodules; calcite veins; mudstones
    - fossiliferous - echinoderms & crinoids, trilobites, bryozoans, brachiopods, gastropods, nautiloids, cephalopods, worms, corals, ; calcarenite storm beds (crinoidal grainstones with tabulate corals & stromatoporoids); trace fossils
    - mudstones and shales indicate a marine transgression & flooding
    - considered poorly defined
Google Earth, MDI, & AMIS GPS locations
Crookston Quarry
44.429349, -77.451853 Turn right into Crookston Quarry
44.430575, -77.451539 parking & mid-site, MDI
44.43005, -77.45174 AMIS