

# Searching for the Source of the Titanic Headstones

T+730 Update: Gabbro Quarries near St. George, NB  
April 15, 2014



Typical appearance of a long-abandoned gabbro quarry, several blocks showing evidence of the old plug-and-feather quarrying technique.

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# Introduction

Since last year's report, there have been several new developments:

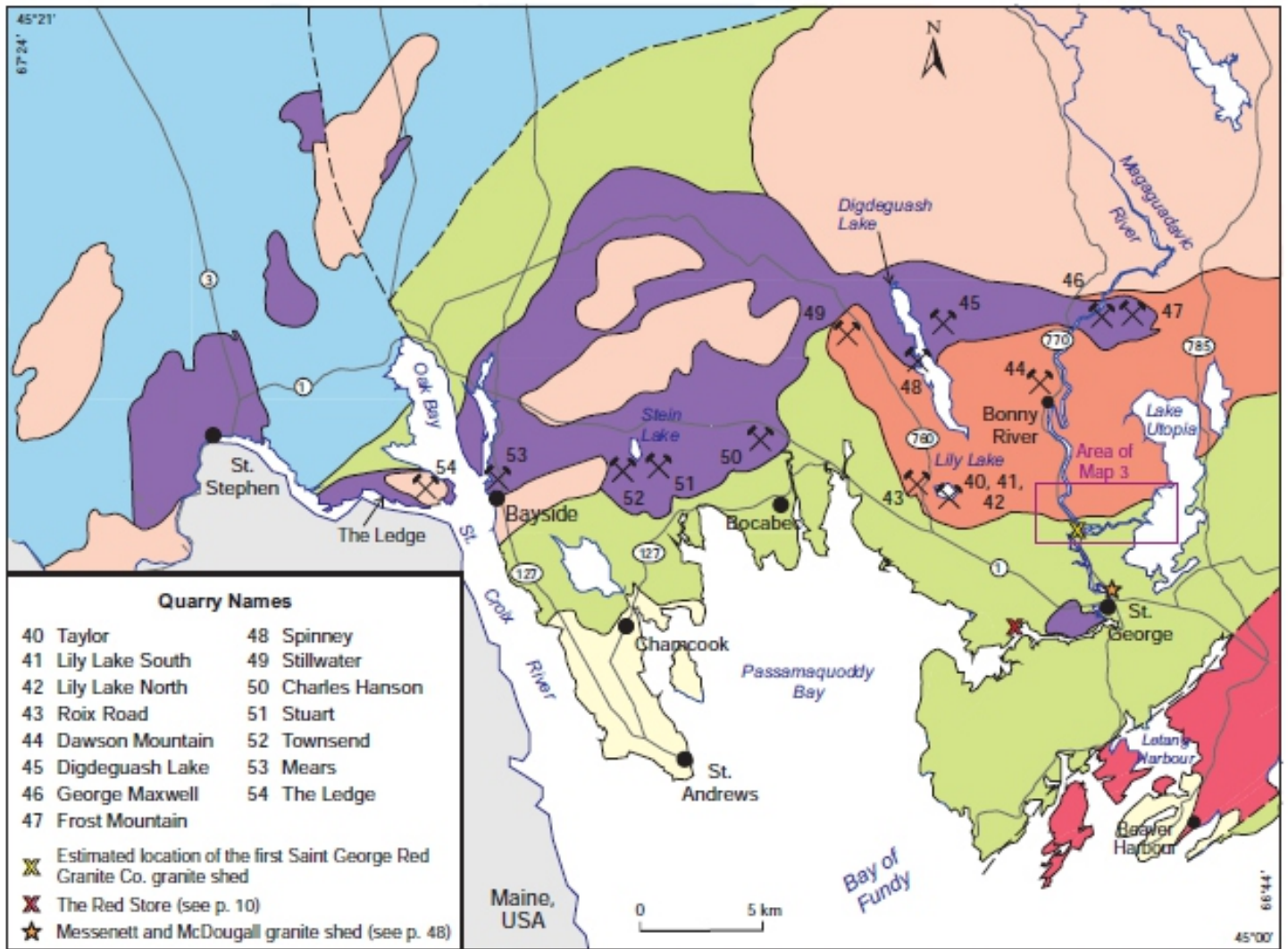
**1 field work** - I went to New Brunswick twice in 2013. In May, I visited Joe McIntosh at NBDNR in Fredericton to use the latest remote sensing techniques to try to locate the old black granite/gabbro quarries in the St. George area. High-tech did not work, but the fuzzy, B&W, 1935 air photographs showed the old quarries very well. I copied the relevant air photos, transferred the locations to Google Earth, read off the lats and longs, and entered those coordinates into my handheld GPS. Then in August, I returned to the St. George area and simply walked through the bush directly to the old quarries (see cover photo of this report). Of the 16 or 17 black granite/gabbro quarries, I have now seen 14 of them - and, thanks to the help of Dave Stevens, Quarry 14 looks promising.

**2 lab work** - After so many failures to find a satisfactory match between Titanic and possible source quarry (too fresh, too altered, too much olivine, no olivine, too coarse-grained, too fine-grained, etc. etc.), now Quarry 14 seems to match the mineralogical and textural criteria, so now I have been able to delve more deeply into making comparisons, principally petrographic, CL, and whole-rock chemical composition, all reported here.

**3 Gwen Martin** - Since my last report, NBDNR has published "The Granite Industry of Southwestern New Brunswick: A Historical Perspective" by Gwen Martin (Popular Geology Paper 2013-1, the pdf of which is available for free download at:

[http://www.gnb.ca/0078/minerals/PDF/PG\\_2013-1.pdf](http://www.gnb.ca/0078/minerals/PDF/PG_2013-1.pdf)

It contains a wealth of information, but alas no new insight into the origin of the Titanic headstones. This is a bit worrying, because if I really am close, the probability of some historical record popping up should increase. So far, nothing.



**Map 2.** Location of the main granite quarries in the greater St. George District. Map 1 shows the outline of this area in southwestern New Brunswick, as well as the colour legend.

Map from Gwen Martin's paper (reproduced with permission) showing the location of 8 of the 16 or 17 black granite/gabbro quarries (in purple lithology). Until the landowner is contacted, the precise location of "Quarry 14" is confidential.

**4 Heritage Stone Task Group** - Since last report, I have become aware of the existence of the Heritage Stone Task Group (HSTG), officially recognized as a task group within the IUGS. Its mandate is to develop a Global Heritage Stone Resource, a catalogue of natural stones that have great significance in human history. The website is:

<http://www.globalheritagestone.org/home>

Stone used for building the pyramids and Stonehenge immediately come to mind, but the 150 black headstones for victims of the world's best-known shipwreck, and their source quarry, should probably also qualify for official recognition. Once a match is confirmed, I hope to work closely with Les Fyffe, Randy Miller, and Alan Ruffman to seek official designation.

**5. archival work** - Although it has been clear for some time that this problem must be solved scientifically, I continue to search for some historical record of quarrying the Titanic headstones. To this end, I once again read microfiche copies of newspapers from SWNB hoping that there would be some mention of this significant event. (If a newspaper can mention that Mrs. Jones from St. Andrews visited Mrs. Smith from St. George on Thursday afternoon, and that Mrs. Smith poured tea, then surely it could mention the contract to supply the Titanic headstones!)

So, I read:

St. Andrews Beacon - April 1912 - December 1913

St. Croix Courier (St. Stephen) - April 1912 - December 1912

Granite Town Greetings (St. George) - April 1912 - August 1912

Each newspaper contains articles about the Titanic disaster, and occasional articles about the state of the granite works, but no mention of the two together. The worst thing about this search is that the microfiche record of the Granite Town Greetings ends abruptly at the end of August 1912. The next two months were crucial because the headstones arrived in Halifax in early November 1912, but the newspaper record simply stops at the worst possible time.

**6. railway records** - If the St. George area is the source of the Titanic headstones, they probably were shipped to Halifax by rail. The rail company of the day in SWNB was Shoreline and it connected with the CPR in Moncton(?) Perhaps the records of this company are still extant in the CPR archives. I have sought the assistance of Bethany Williams-Hayden at the Railway Museum in NB.

**7. descendant search** - Because Sheriff Robert A. Stuart owned a black granite quarry and is buried beneath a black granite monument that texturally matches Titanic, with the help of Bob MacKay, I have tried to track down Stuart's descendants in the hope that there is some record in the family of his possible involvement in the Titanic headstone contract. So far, no luck.

# Comparing the Texture of a Titanic Headstone with the Ritcey Headstone

In a previous report, I made the case that the headstone for A. Susan Ritcey (1916) is the same in size shape, and texture as the Titanic headstones (1912). What the story is behind this similarity is a mystery that may never be solved, but all I want to do here is to stress the textural similarity between the Ritcey and Baxter (Titanic) headstones.

Thanks to the Ritcey family and Amberlee Chenard of Nova Tile and Marble in Burnside, I now carry with me a polished slab of the Ritcey headstone, so that I can make direct comparisons (same magnification, same lighting) between “Titanic” and comparable headstones anywhere. Here is the side-by-side comparison of Titanic (Baxter) and Ritcey:



If you are satisfied they are texturally “the same”, then we can use the portable polished Ritcey slab as a Titanic proxy for the comparisons on the following pages.

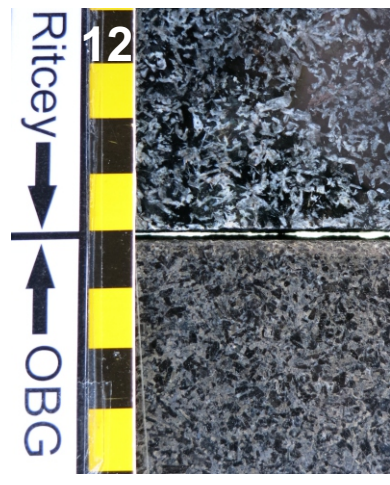
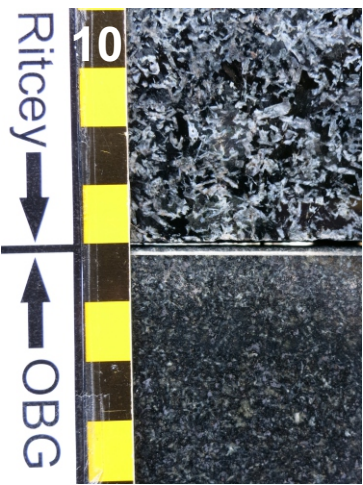
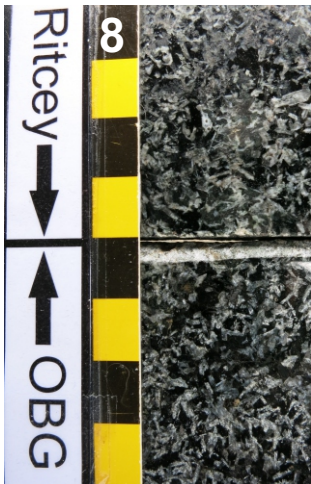
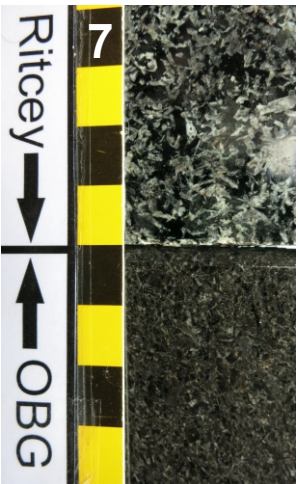
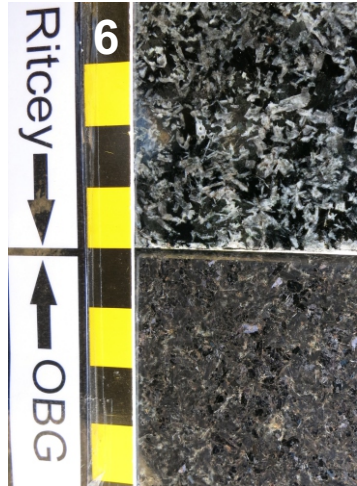
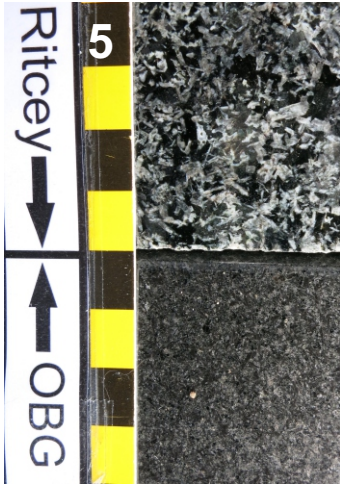
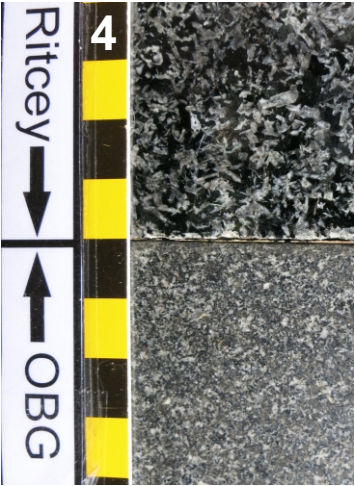
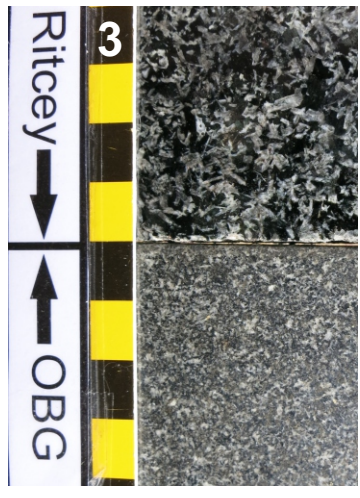
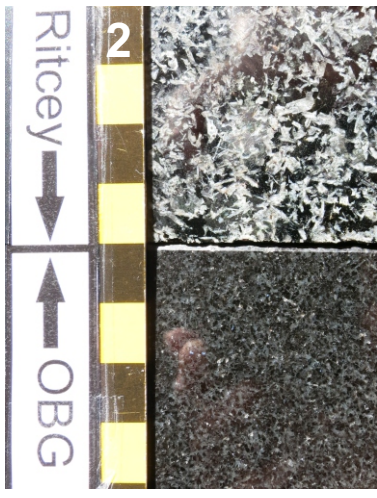
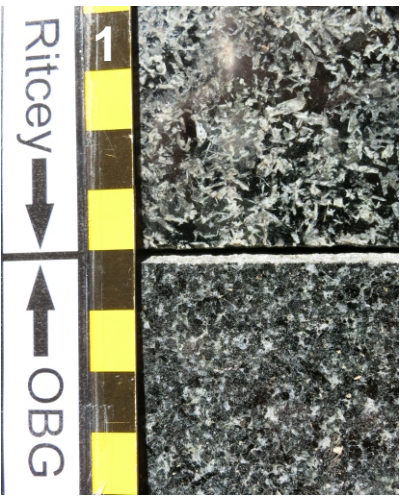
# Comparing the Texture of a Titanic Headstone with a Random Selection of Other “Black Granites”

The initial part of the search for the source quarry of the Titanic headstones depends fundamentally on two criteria, one highly quantitative and the other purely qualitative:

1. radiometric age to get into the right geological domain - it is principally for this reason that I had to abandon Ireland and Scotland and move into the belt of gabbroic igneous rocks in Maine and New Brunswick; and
2. macroscopic texture of black granite headstones in cemeteries to find the right part of the geochronologically correct domain - it is for this reason that I had to abandon Maine for SW New Brunswick.

Although an assessment of texture is purely qualitative, one cannot underestimate the power of the human brain as a pattern-recognition machine. During evolution, the ability to recognize patterns became a matter of survival. The brain is particularly highly developed to recognize faces, even as they change with age, but it can recognize all sorts of other patterns, as demonstrated even in very young children by Sesame Street’s game - “one of these things is not like the other”.

To demonstrate this pattern-recognition, picture-matching, power again, compare the macroscopic textures of a random selection of 12 Other Black Granites (OBG), mostly from the Fairview Lawn Cemetery, on the next page. Only one of the 12 is a true Titanic black granite. Can you pick it out? The important criteria are grain size, grain shape, inter-grain relationships, and proportions of light and dark minerals. Enlarge the magnification for a closer view. The correct answer is on page 20 of this report.



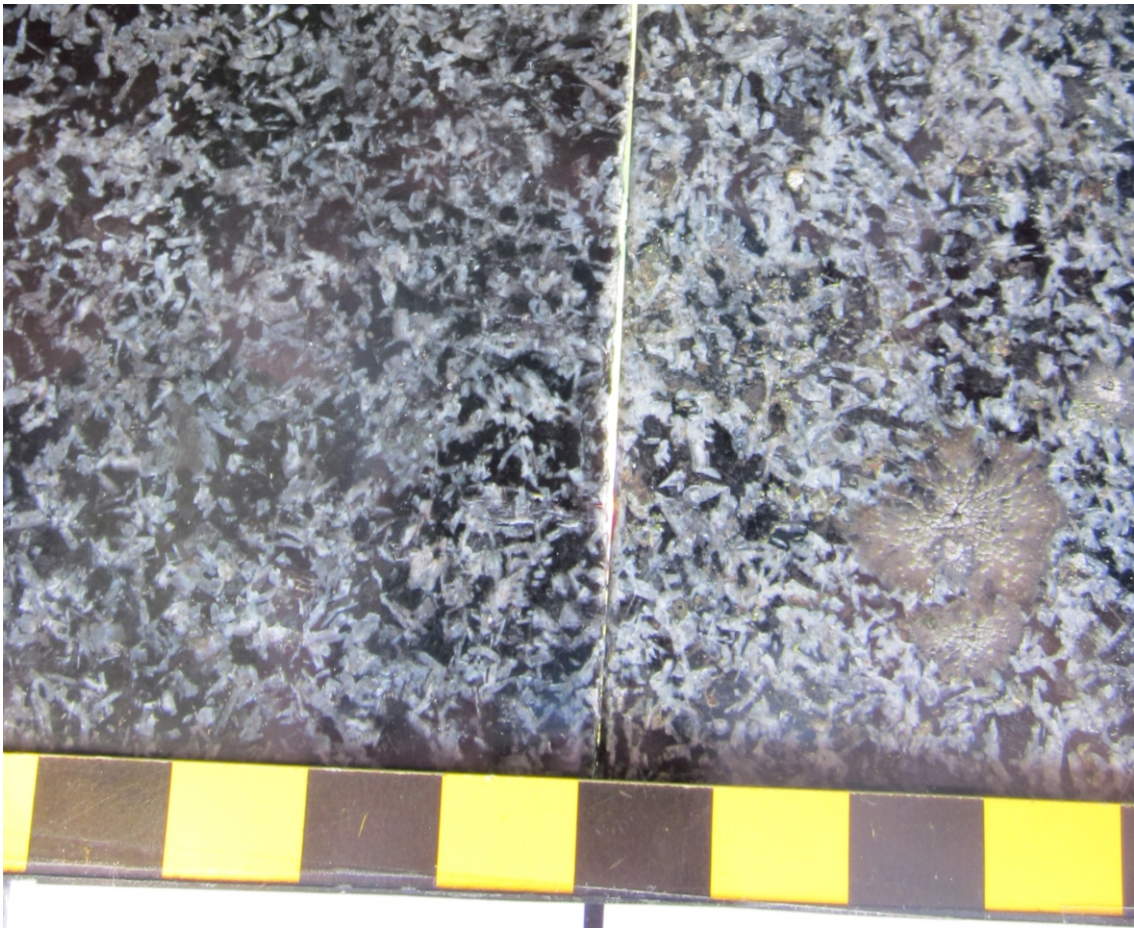
## Comparing the Texture of a Titanic Headstone with Headstones in SWNB

Again, as previously mentioned, the only place I have found textural matches for the rather distinctive Titanic headstones is in SW New Brunswick. To reinforce this point, this time using the polished Ritcey slab as a standard, I present a few examples from cemeteries in the St. George - St. Stephen - St. Andrews triangle.

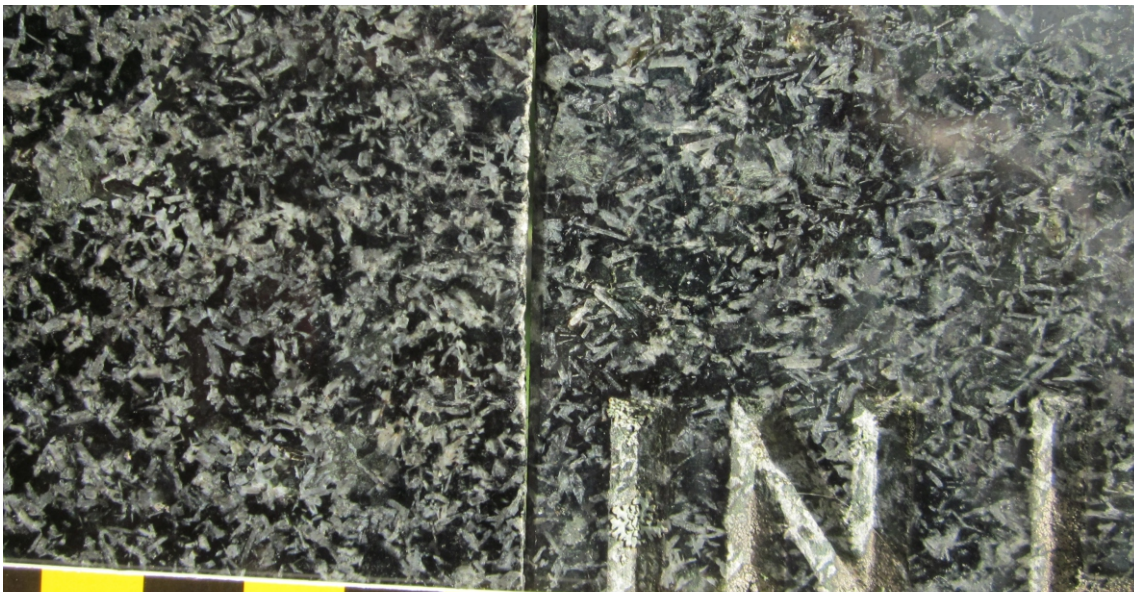


As always, you can enlarge the image along the boundary for closer inspection.





Ritcey → ← McCulloch 1936



Ritcey → ← Hatch 1898

And finally, the mysterious McGrattan & Sons polished slab donated to the NB Museum in 1913. Why would McGrattan make this donation unless there was some significance to this particular stone? Was that significance the fact that this material had been used for the Titanic headstones?



# Comparing the Texture of a Titanic Headstone with Quarry 14 in SWNB

On p.14 of last year's report, I showed a "Petrographic Family Portrait" of Titanic vs. various samples from SWNB, and lamented that "cousins and siblings are nice, but we are looking for identical twins!"

How's this for identical twins? Bax-3 and Bax-4 are new polished thin sections from the Titanic Baxter headstone, whereas 104D and 104E are two different samples from Quarry 14. Are they similar enough that they could have been collected from the same gabbro outcrop?

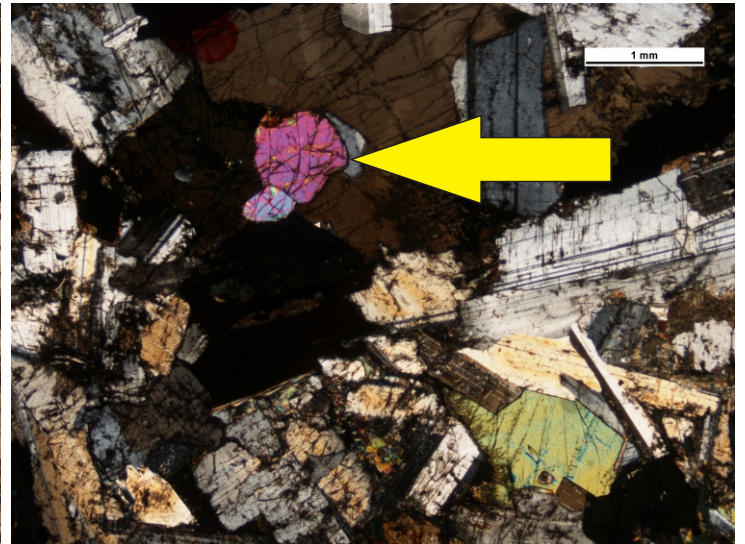
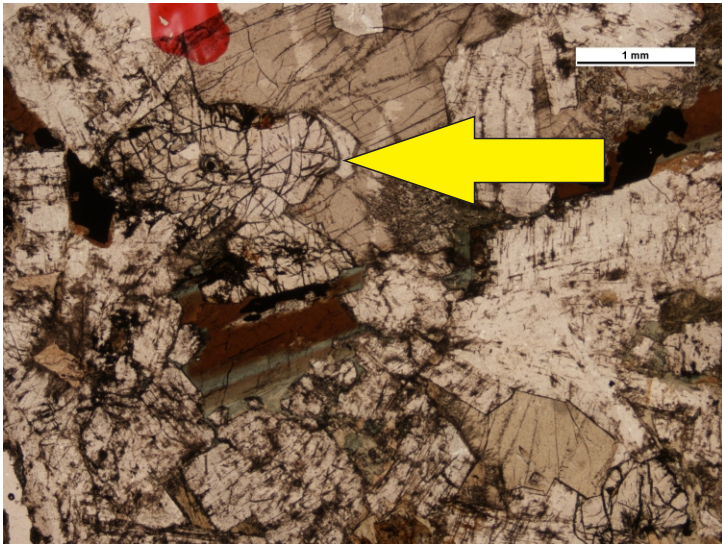


the long side  
of a thin section  
is 4.5 cm

# Comparing the Olivine Compositions in the Baxter Headstone with Quarry 14 in SWNB

The Baxter Titanic headstone contains 1-2% modal olivine. The olivine is anhedral, and commonly surrounded by augite. As noted in previous reports, many gabbros in the St George area either contain no olivine (like the Ritcey headstone), or contain high modal abundances.

Some samples from Quarry 14 contain olivine, modally and texturally similar to the Baxter headstone, others contain none, like the Ritcey headstone.



Olivine in Baxter headstone  
ppl

xpl

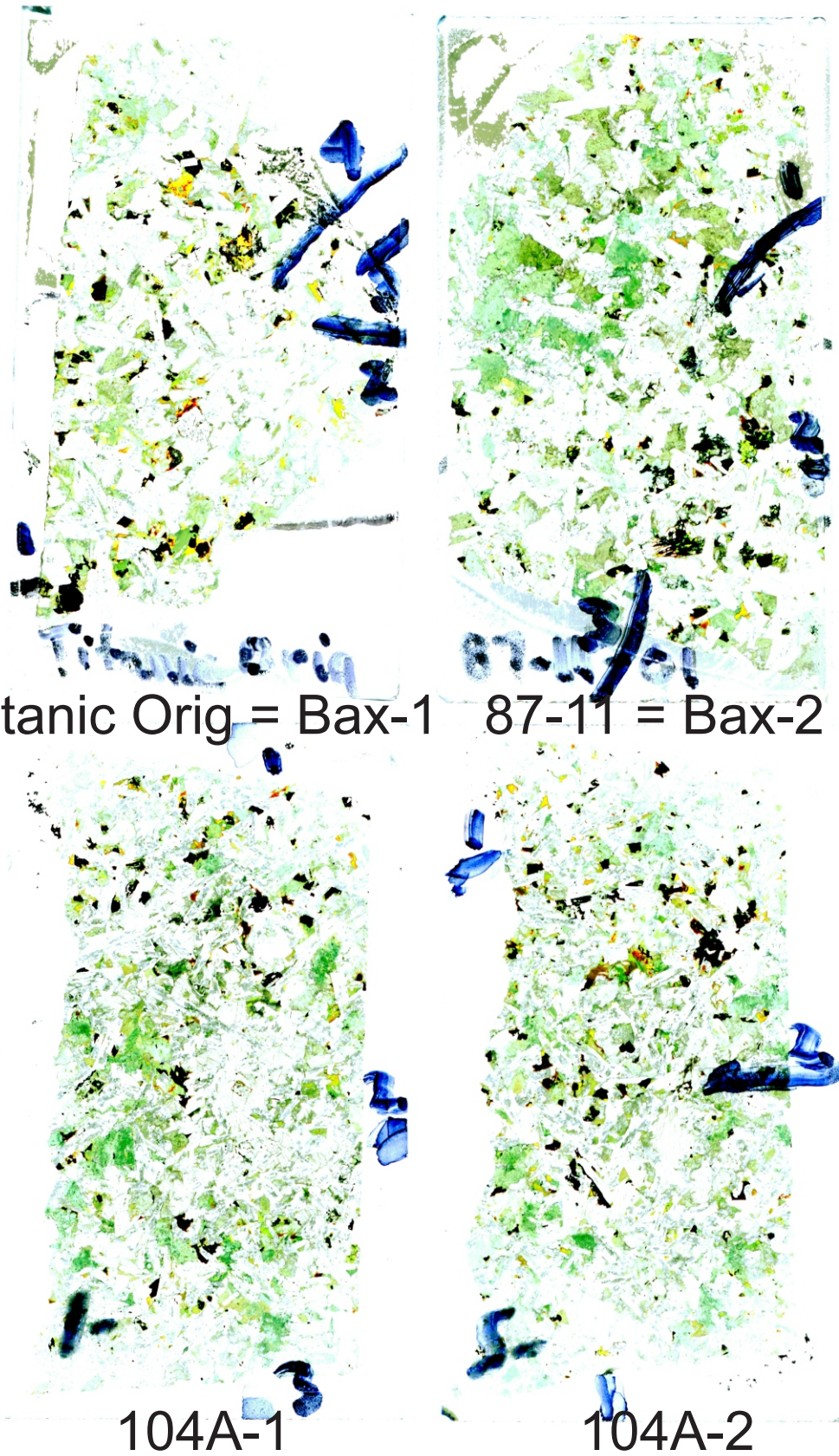
The Baxter headstone contains olivine.

The Ritcey headstone does not contain olivine.

Three of the five samples from Quarry 14 contain olivine.

Two of the five samples from Quarry 14 do not contain olivine.

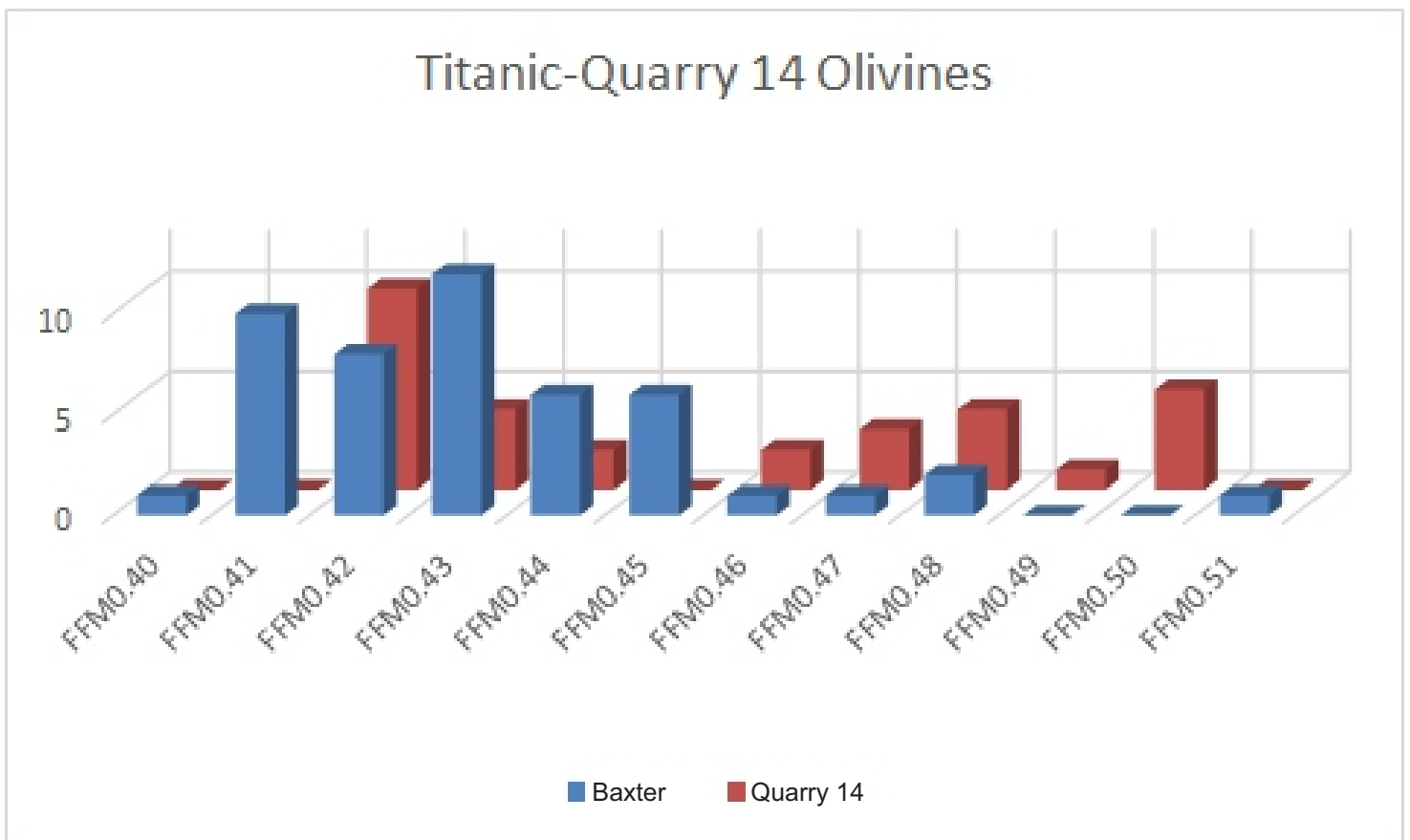
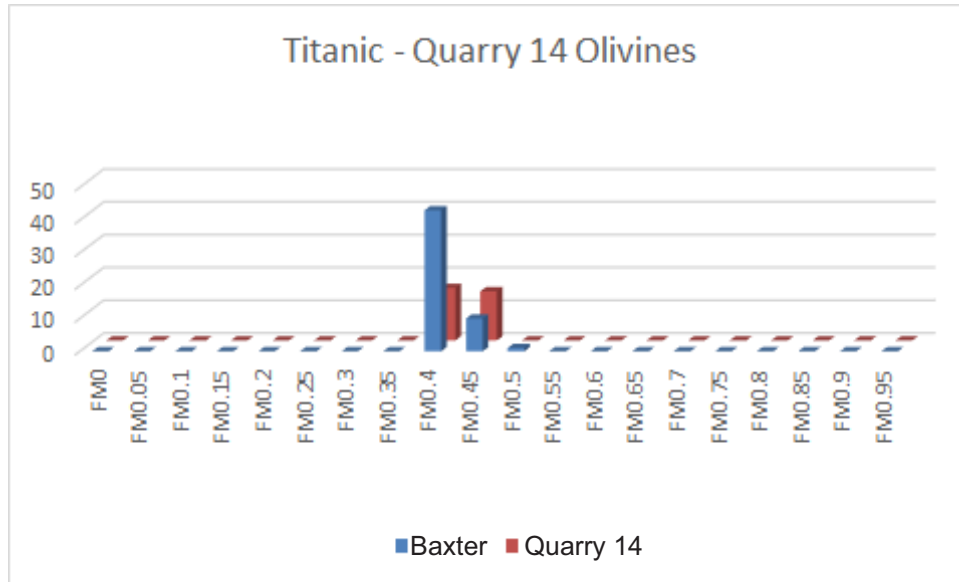
Significant?



Titanic Orig = Bax-1    87-11 = Bax-2

For the record only - the locations of the olivine grains analyzed in the Baxter headstone and from two Quarry 14 samples.

Olivine compositions can have FeO/(FeO+MgO) ratios that range from 0.00 (forsterite, Fo<sub>100</sub>) to 1.00 (fayalite, Fo<sub>0</sub>). For both Baxter (Titanic) and Quarry 14, the F/FM ratio in olivine grains ranges from 0.40-0.51. A reasonable match?



The average composition of Titanic olivine is ~Fo<sub>70</sub>.

# Comparing Apatite Cathodoluminescence (CL) of the Baxter and Ritcey Headstones with Quarry 14 in SWNB

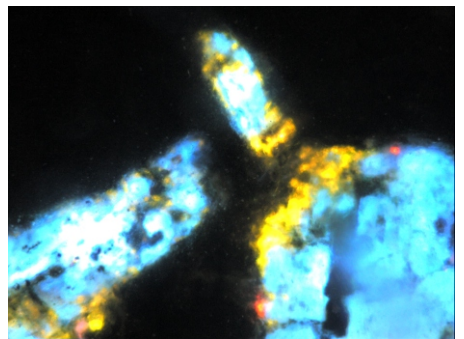
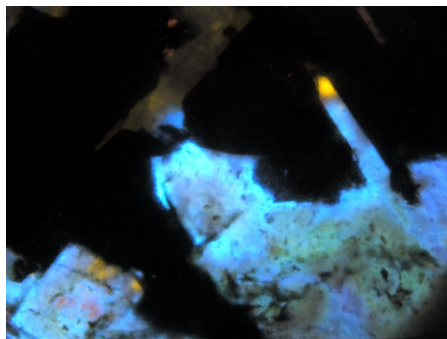
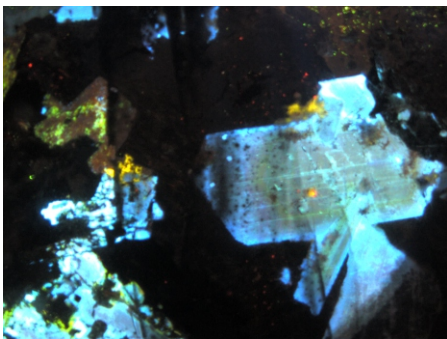
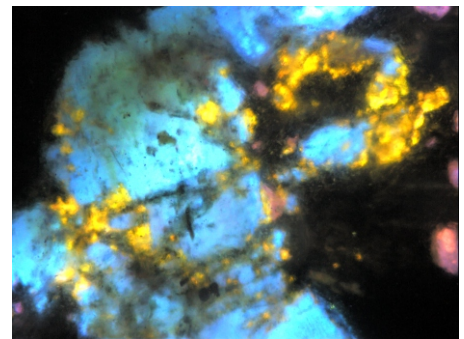
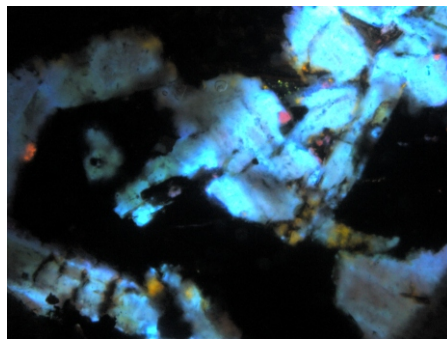
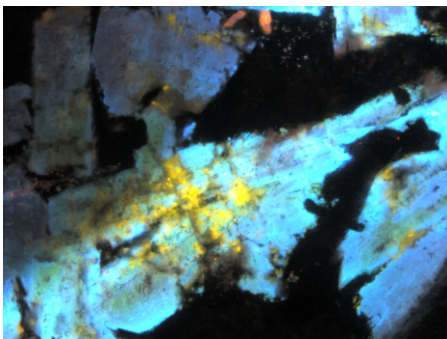
All igneous rocks contain small modal abundances of apatite, the texture of which is highly variable. Below is a small collage of CL images showing apatite (yellow) and its relation to plagioclase (blue) in the Baxter (Titanic) headstone, the Ritcey headstone, and Quarry 14.

There is no objective way to compare these qualitative features, but in all samples, the apatite occurs as inclusions in, or along the outer margin of, plagioclase. Either you believe they are similar, or you don't.

Baxter

Ritcey

Quarry 14



all 2.5x  
FoV = 3.6 mm

# Comparing the Bulk Chemical Compositions of Titanic Headstones with Quarry 14 in SWNB

As stated previously, one of the parameters that must match between headstone and source quarry is the bulk chemical composition (majors, traces, isotopes). This aspect of the work is expensive and time-consuming, so until a candidate quarry could be identified using other criteria (mineral assemblage, mineral modal proportions, mineral composition, texture, and radiometric age), it did not seem sensible to try analyzing the bulk chemical composition of the rocks.

But two things have now changed. First, on the basis of mineral assemblage, mineral proportions, mineral composition, texture, and age, Quarry 14 qualifies as a reasonable candidate. Second, the availability of a table-top XRF (InnovaXSystems Model X-500) at NSDNR that can analyze rock slabs made exploratory investigation of this parameter possible.

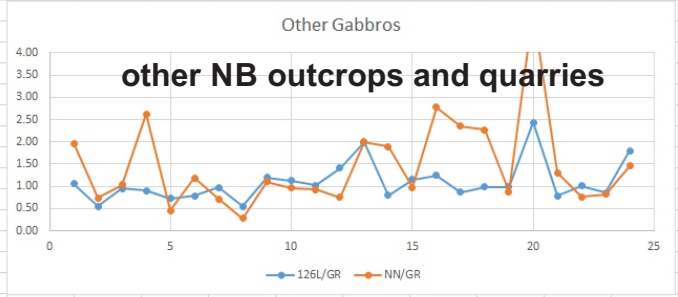
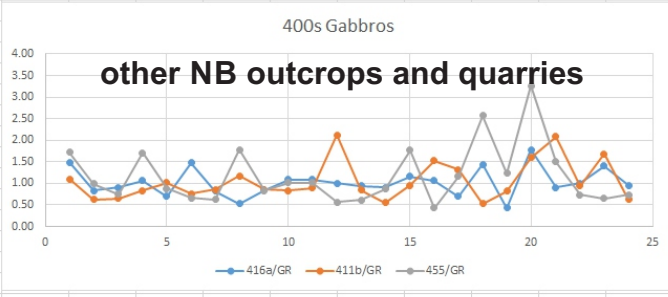
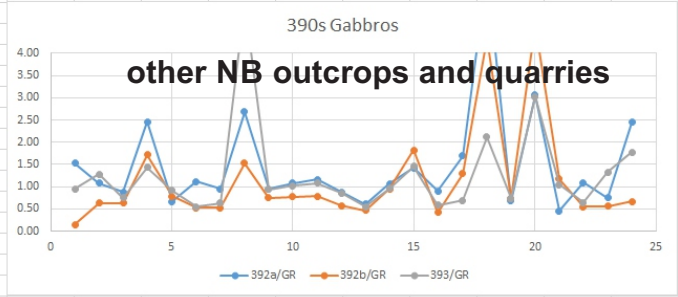
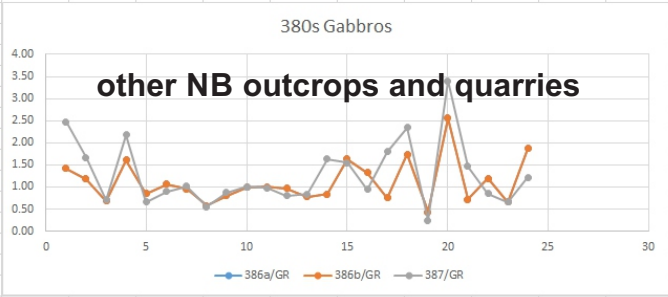
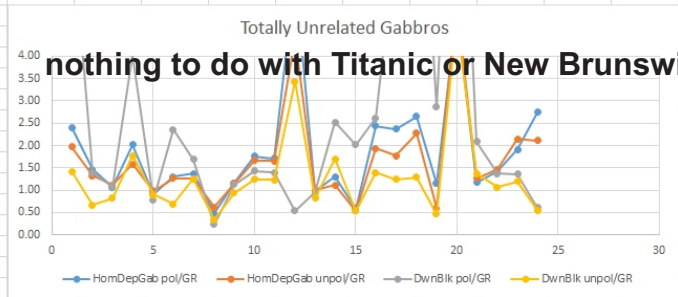
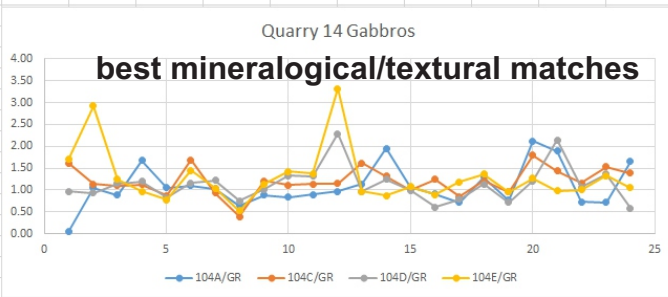
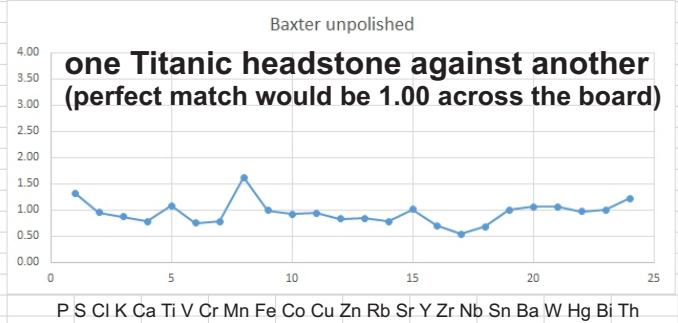
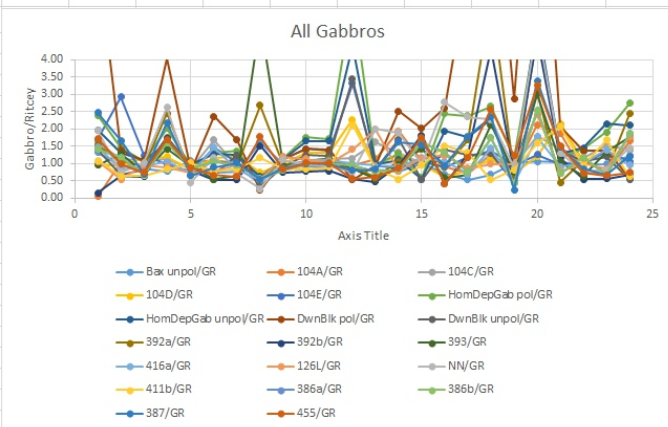
The limitation of this technique is that, with an irradiation area that is only about  $0.65 \text{ cm}^2$ , the coarser grained the rock, the less reproducible are the analyses. To compensate for this problem, every sample was analyzed 3 times and the average was used. The Baxter headstone was analyzed 7 times and only the average was used. The Ritcey headstone was analyzed 15 times and only the average was used.

All the results are on the next page. Every plot is the same, meaning that every average composition was divided by the average composition of the Ritcey headstone. If a sample has the same composition as Ritcey, the quotients for all elements will be 1.00. By this measure, Baxter and Ritcey are similar, Quarry 14 samples are not bad (particularly 104A and 104C), and everything else is worse. The Home Depot gabbro (probably from India or China) and the Dawn Black gabbro from Erinville, NS are poor matches.



# Gabbro XRF Comparison

all horizontal axes are the same - P S Cl K Ca Ti V Cr Mn Fe Co Cu Zn Rb Sr Y Zr Nb Sn Ba W Hg Bi Th  
 all vertical axes are the same - gabbro/Ritcey



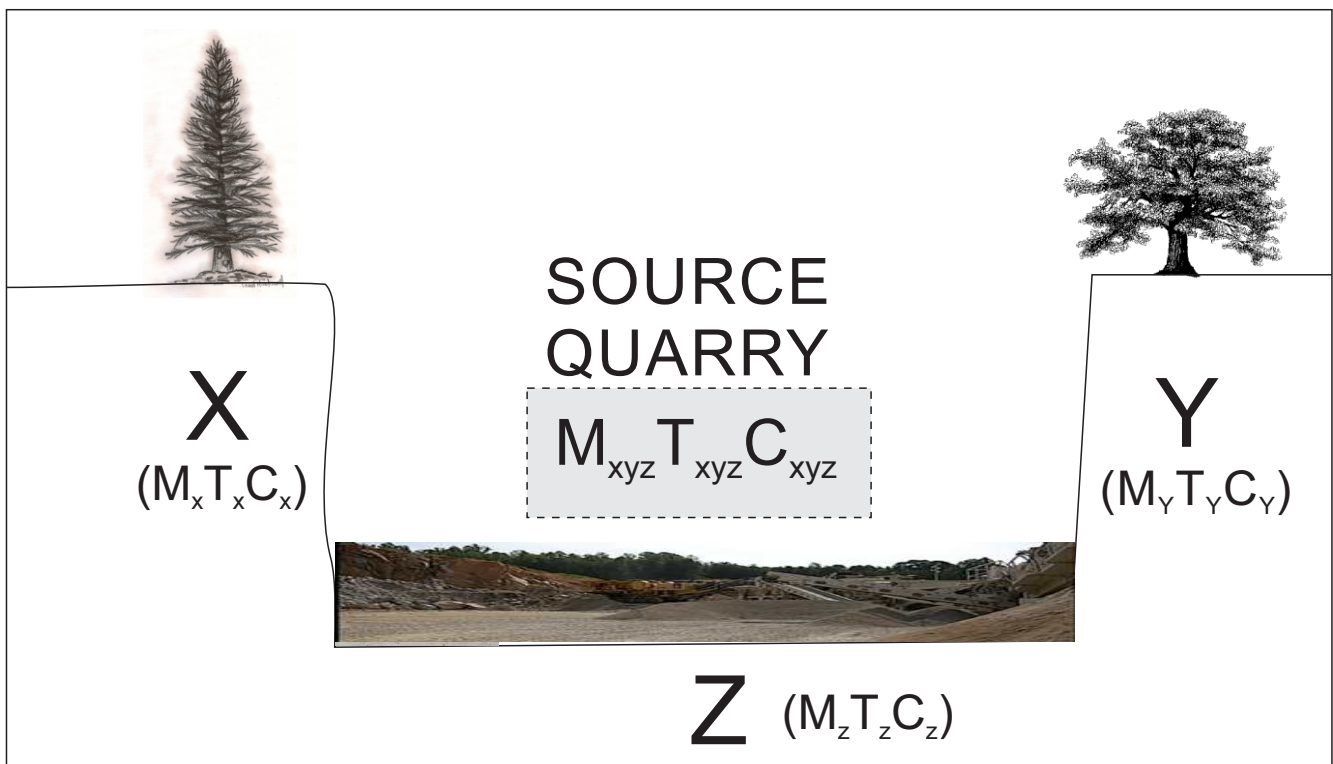
Acknowledgement: Chris White, Nova Scotia Department of Natural Resources

# What is Becoming Clear

In terms of olivine compositions, apatite textures, and bulk chemical compositions, Quarry 14 looks like a reasonable match for Titanic.

Now that I am beginning to think on a quarry scale of tens of metres rather than a regional scale of tens of kilometres, it is becoming clear what the next aspect of the problem is. Only if there is no mineralogical, textural, or chemical variation in the source quarry will samples now taken from the quarry perfectly match the headstones that were removed long ago. If there is any mineralogical, textural, or chemical variation in the source quarry, then all I can do is sample the walls and floor of the quarry and hope that their parameters bracket the parameters of the headstone material that was removed.

In the sketch below, the quarry shows monotonic variation in mineralogy, texture, and composition (MTC). The material removed for headstones (shaded) has intermediate values of MTC and does not precisely match the MTC values currently exposed in the quarry walls and floor.



## **Preliminary Conclusion**

The mineralogical, textural, and chemical characteristics of the five samples from Quarry 14 so far provide a reasonable match to the Titanic headstones (Baxter and Ritcey) in Halifax. This apparent match warrants more detailed investigation.

## **Next Steps**

1. for completeness, check out remaining two or three known gabbro quarries in the St. George area of SWNB
2. systematically map and sample the walls and floor of Quarry 14
3. obtain detailed textural and age comparison of Baxter/Ritcey/Q14 zircons and baddeleyites with Chris McFarlane in Fredericton
4. do high-precision bulk chemical compositions of powdered samples of Baxter, Ritcey, and Q14 candidates

Depending on the results of these investigations, the next 12 months could be very interesting.

# Acknowledgements

As usual, many people have generously given of their knowledge, expertise, and time over the past year, including:

Wayne Beaumaster  
Kathy Bockus  
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Amberlee Chenard  
Susan Clarke  
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Bill Gardiner  
Doug Hatt  
Michelle Hebert  
Dan MacDonald  
Bob MacKay  
Gwen Martin  
Joe McIntosh  
Joan Miller  
Randy Miller  
Georgia Pe-Piper  
Alan Ruffman  
Rob Seely  
Steve Spires  
Dave Stevens  
Elizabeth Stevens  
David Sullivan  
Charlie Walls  
Chris White

Sincere apologies to anyone I have inadvertently left out.



It's a tradition to end these reports with this image of a Titanic headstone. On letter-size paper, it prints ~1:1 and is useful to take into cemeteries to compare with other headstones. Let me know if you find any good matches, especially in areas remote from SWNB!

# Appendix

If the scientific case for Quarry 14 being the source quarry can eventually be made, then it may help to further focus the search for any historical records. Just so these notes won't get lost, here is some information in case the shipment of headstones from St. George to Halifax was by rail.

[http://en.wikipedia.org/wiki/New\\_Brunswick\\_Railway](http://en.wikipedia.org/wiki/New_Brunswick_Railway)

Grand Southern Railway -- This line was built between 1876 and 1881 from the connection with the "Carleton, City of Saint John Branch Railroad" at Lancaster to St. Stephen, connecting with the NBCR near Elmwood and at St. Stephen. Acquired by CPR in 1911.

Sale of NBR to K.C. Irving[edit]

In the 1940s, CPR sought to reduce non-railway properties in New Brunswick and entered into an agreement with industrialist K.C. Irving, whereby the entire NBR was sold to his forestry subsidiary J.D. Irving Limited, while CPR would remain the operator of the railway tracks and other surface assets but J.D. Irving Ltd. would own the land including the railway rights of way. In this fashion, Irving was able to secure some of the most extensive timber holdings in the province.

Abandonment by CPR[edit]

In 1988, citing declining traffic, CPR grouped all of its lines east of Montreal into a new internal marketing and business unit called Canadian Atlantic Railway (CAR). Also beginning in 1988 and extending through to 1993, CAR began the process of abandoning much of the trackage of the former NBR system, citing declining traffic and bridges at Woodstock and Perth-Andover which were washed away in the spring freshet and ice jams of 1987. CPR completely removed itself from operations east of Montreal in 1994 when CAR trackage was sold to shortline operators. The only remnant of the NBR system is a short segment of trackage in Grand Falls, operated by Canadian National.

Continuation as holding company[edit]

J.D. Irving Ltd. continues to retain ownership of the NBR to this very day. The NBR functions in two different but inter-related ways:

It functions as a land holding company, owning the railway rights of way and timber holdings in New Brunswick that were part of the NBR when it was sold by CPR to K.C. Irving in 1941.

also, I left a question about 1912 rail shipping routes at:  
<http://www.nbrailways.ca/html/contact.html>