

**Ask Jon Eakes**

# **OVERVIEW: Pyrite**

Last Updated: Thursday, May 6th, 2010, Created: Saturday, June 27th, 2009

Pyrite and the damage it can cause to homes is a worrisome and expensive problem in certain areas of Quebec and is affecting property values. So just what is the problem?

Pyrite is a mineral, also known as Iron Sulfide or more commonly as Fools Gold for it's looking similar to gold specs in rock form. By itself it is not really a problem, but when you combine some very special conditions it can become a problem. It is often accompanied by *Acidithiobacillus* bacteria that can lie dormant for years. When this bacteria and Pyrite are exposed to water and oxygen, the bacteria oxidizes any present ferrous iron to produce ferric iron. The ferric iron attacks the Pyrite to create more ferrous iron, which just feeds the bacteria and the cycle continues until the water, the oxygen or the Pyrite is depleted. The problem with this for us is that all this activity causes the mass of Pyrite to swell.

Unknown to us for many years, there were gravel pits in Quebec that had traces of Pyrite amongst the stones. This got used as granular fill material under household concrete slabs. If this material never got wet, or never had access to oxygen, it just sat there. If years later water and oxygen seeped under these slabs, things started to grow and what would be of no consequence in nature became serious when constrained by the concrete slab -- the concrete would crack and heave.

It is not a simple phenomenon and people keep asking me for detailed information on what to do about it. In new construction the solution is to have gravel fill that does not contain Pyrite. The unfortunate solution in existing houses is the expensive task of removing the concrete slab, cleaning out all the existing gravel and then starting over. So the real questions come down to: do you have Pyrite under your house, does it have a potential for causing damage and how do you figure this all out?

The best information in the province comes from the APCHQ, the Quebec home builder's association, and their warranty programs. The catch is that this information is only available in French. So with their permission, I have translated their Frequently Asked Question section from their website and made it available to you here on my own website, with a few of my comments to make it clear. Click here to see the original text: [www.GoMaison.com](http://www.GoMaison.com). At the end of this text the APCHQ gives a listing of other useful resources.

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My translation from [www.GoMaison.com](http://www.GoMaison.com), a site of the APCHQ.

## **HOW CAN I KNOW IF I HAVE A PYRITE PROBLEM? WHAT ARE THE SIGNS THAT I SHOULD LOOK FOR?**

In new construction, gravel is always placed under concrete slabs in basements and garages. The presence of Pyrite mixed in with this gravel can, when certain conditions are present, cause part or the entire slab to lift several millimeters, causing cracks in the slab. The form of the crack is the clearest indicator as to whether this crack is caused by swelling due to the presence of Pyrite. Cracks caused by Pyrite are generally in the form of an X, a cross or a star, almost as if a tree was trying to push up through the concrete. There is generally the appearance of a fine white powder coming from the cracks as well. These types of cracks take several years to appear; generally a dozen years or so

after the slab was poured.

Another clear sign of the presence of Pyrite in a garage is a swelling that causes cracking and movement of the foundations, particularly in the corners.

I CAN SEE A LONG CRACK IN THE FLOOR OF MY GARAGE. IS THIS A PROBLEM OF PYRITE?

The vast majority of concrete slabs in both garages and basements develop minor cracks. This is completely normal. As concrete dries, it contracts or shrinks, in the same way that hardwood floors will develop openings between boards as they dry out. If the cracks are fine and long, they are most probably not caused by swelling due to the presence of Pyrite.

ALL INDICATIONS ARE THAT I DO HAVE A PROBLEM DUE TO PYRITE. WHAT DO I DO NOW?

In an effort to harmonize test results and make Pyrite tests easier to interpret, in Quebec a diagnostic standard has been established: CTQ-M-200. This work was done by the "Comit  technique qu b cois d' tude des probl mes de gonflement associ s   la pyrite" which would translate as the Quebec technical committee for the study of swelling problems associated with Pyrite. It is sometimes referred to as "le comit  technique" or "the technical committee". This standard permits laboratories that are recognized by the technical committee to make recognized and comparable judgments of specific cases. If you need to sell your house immediately, you may be forced to have a test done. For a list of laboratories to contact, see the end of this web entry.

DOES A STANDARD EXIST FOR NEW FILL MATERIAL?

Yes. On April 15, 1999 the Minister Louise Harel announced that "the technical committee" had perfected a method of analysis, called CTQ-M-100, to eliminate the risks of swelling associated with fill material. This certification permitted gravel producers to guarantee their clients that they were providing gravel that could be used without risk under concrete slabs for both construction and renovation. This gravel must have been analysed by one of the independent laboratories recognized by the technical committee and then designated "concass  certifi  DB" (meaning DB certified gravel with the DB standing for Dalle de B ton, French for Concrete Slab).

IS THERE A SUBSIDY PROGRAM TO HELP HOMEOWNERS CONCERNED BY THIS PROBLEM?

The governments of Quebec and of Canada, as well as certain municipalities, offer significant financial support to repair damage caused by Pyrite.

This aid is subject to certain restrictions. The agents of the Soci t  d'habitation du Qu bec (SHQ) are qualified to aid you in evaluating if your project meets the requirements. For example:

-- Are your house, its location and the part of the work chosen eligible?

-- How much aid can you receive?

(a little publicity from the APCHQ): "Choose a contractor accredited by the La Garantie R no -

Pyrite de l'APCHQ, that is the key to your peace of mind."

Financial aid will not be accorded unless your contractor is a member of an approved guarantee program. "La Garantie R&eacute;no-Pyrite de l'APCHQ" is one of the approved programs, and the cost of the program is one of the expenses that are accepted in the governmental aid programs.

## IS IT USEFUL TO GO TO COURT?

It is possible to appeal to a court of law to obtain damage payments, but it is never guaranteed that the results of a law suit will be favourable to a consumer who feels abused. As well, in certain cases, the legal costs risk to be more expensive than the repair work. It is prudent to seek legal advice before thinking about initiating legal action. The APCHQ does not furnish legal advice as they work with both consumers and contractors and cannot be both judge and plaintiff.

## ARE PROBLEMS CAUSED BY PYRITE COVERED BY THE APCHQ NEW HOME AND RENOVATION WARRANTEE PROGRAMS?

Both programs cover major vices for a period of five years. The definition of a major vice is a problem that affects the structure and the stability of the building. Hence for these programs one must discover and denounce a manifestation of the problem within the limits of the guarantees. If you think that you see actual damage caused by Pyrite and wish to know more about how to file a claim with one of the APCHQ guarantee programs, telephone (514) 353-9960 or 1-800-361-2037 and ask for a customer service agent with the Guarantee program.

(Yes I did notice the contradiction between this 5 year warrantee limit and the 12 year probability before the crack appears with Pyrite -- hence the reason for the government subsidies to help out. Jon)

## WHO SHOULD PAY FOR THE LABORTARY TESTS IN THE CASE OF THE RESALE OF A HOUSE?

The buyer can demand that the seller undertake an analysis to determine if there is a risk of swelling under the basement slab or garage slab and, if the test says there is a risk, is it likely to cause damage. The buyer can demand that the seller cover the costs of the test but there is no legal obligation for the seller to do so. In refusing to undertake tests, the seller only exposes himself to the possibility of losing the sale. It is a simple question of negotiation between the buyer and the seller.

## WHERE ARE THE ZONES AT RISK?

The entire Saint-Laurence valley is considered a zone at risk. However, the Association des courtiers et agents immobiliers du Qu&eacute;bec (ACAIQ), recommend that their members inform both buyers and sellers that they would be wise to proceed with soil tests in the following specific areas: between l'Île-Perrot and Sorel, notably Boucherville, Brossard, Laprairie, Longueuil, Montreal, Repentigny, Saint-Bruno, Saint-Hubert and Varennes. Other regions could be affected as well.

## EVERYONE TALKS ABOUT "IPPG". WHAT IS THIS?

The IPPG stands for the "indice p&eacute;trogaphique du potentiel de gonflement" (the index of the potential for swelling of stone). The laboratories use the IPPG unit of measure for both the CTQ-M-

100 (new gravel) and the CTQ-M-200 (soil tests from under an existing structure).

For new material, if the IPPG index is less than 10, the material is immediately certified "DB", which means it is without any potential for swelling under a concrete slab. If the index is higher, the laboratory will continue with other tests before accepting or refusing a DB certificate to the gravel pit.

When the fill material being analysed came from under a concrete slab, the IPPG index has much less importance. In reality, a used material that has a high IPPG index could never swell, or could have already completely oxidized at the moment of the analysis without having caused any damage to the slab. What is important in this case is the judgment of the professional who is applying the CTQ-M-200 standard.

Hence we recommend that you work with a professional who works with the CTQ-M-200 standard when you want to establish a link between cracks or heaving of the slab and Pyrite, or when you want to verify if the fill material that was used under your slab presents a real risk of swelling.

The APCHQ is not in a position to comment or to confirm the analysis reports beyond what we have written here. You should contact a professional who uses the CTQ-M-200 standard for evaluation of all laboratory reports.

#### IS A BUILDER REQUIRED TO UNDERTAKE SOIL TESTS PRIOR TO BUILDING?

Nothing in the law obliges a builder to undertake soil tests. However, the Civil Code holds builders legally responsible for the home they deliver. Hence it is up to the builder to assure that the foundations are paced on an appropriate and stable soil, and if such is not the case, to take the actions necessary to fulfill this requirement.

#### WHAT ARE THE MINIMAL REQUIREMENTS FOR CONCRETE?

The concrete slab must be from 4 to 6 inches thick. The strength of the concrete must be 20Mpascals.

#### IS IT ADVANTAGEOUS TO USE SAND RATHER THAN GRAVEL UNDER THE SLABS IN THE GARAGE OR THE BASEMENT?

Yes, for the garage slab using sand rather than gravel could be advantageous. For the basement we must always use clean 3/4" (20mm) gravel.

#### IF THE GRAVEL AROUND THE FOUNDATION, OVER THE PERIMETER DRAINS, CONTAINS PYRITE, CAN THIS BE DANGEROUS FOR THE FOUNDATIONS?

No. It is not dangerous for the foundations whether the gravel has a potential for swelling or not. Only fill material that has a swelling potential associated with Pyrite that is under a garage or concrete slab can represent a potential danger for the foundations. The same applies to the structural columns holding up the primary house beam as they are supported directly on undisturbed soil where no swelling can occur.

## DO CONTRACTORS EXIST WHO ARE QUALIFIED TO MAKE REPAIRS?

Of course. The reference service of La Garantie r&eacute;novation de l'APCHQ can give you a list of qualified contractors who have received the necessary training to treat Pyrite problems. Call (514) 353-9960, ext. 222.

## USEFUL CONTACTS

-- Reference service of the APCHQ Renovation Guarantee program:  
(514) 353-9960 or 1 800 361-2037 ext. 222

-- Customer Service for the APCHQ New Home Guarantee program:  
(514) 353-9960

-- Association des laboratoires d'essai -- Testing laboratory association  
(514) 253-2878

-- Barreau du Qu&eacute;bec  
(514) 954-3400

## RECOGNIZED LABORATORIES

In order to qualify for subsidies from la Soci&eacute;t&eacute; d'habitation du Qu&eacute;bec, it is required that your laboratory is a member of:

l'Association des consultants et laboratoires experts  
6360, rue Jean-Talon Est.  
Bureau 211  
Saint-L&eacute;onard (Qu&eacute;bec)  
H1S 1M8  
Telephone: (514) 253-2878  
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### **Keywords:**

Basement, Concrete, Cracks, Damage, Garage, Gravel, Overview, Pyrite, Slab