INTERNATIONAL CRUMBLING CONCRETE SYMPOSIUM
Ellington-Connecticut
Octobre 5, 2019

The pyrrhotite issue in Quebec
Overview 2009-2019

Prepared by Michel Lemay  Updated 30 Sept. 2019
MAJOR CONSTRUCTION DEFECT IN CANADA
AND THOUSANDS OF VICTIMS

A disaster since 2009 and the victims have regrouped.

Potentially 8000 houses affected in Mauricie and several commercial buildings, public and institutional
The Coalition d'aide aux victimes de la pyrrhotite (CAVP) was created in Quebec in 2009 and was set up by a few victims affected by this problem.

Already 10 years of existence and actions carried out to date.

Our Board of Directors

Name of the coalition from 2010 to 2014

Name since 2014
Problem of pyrite, pyrrhotite and mica
Regions concerned and known

Location of the four coalitions

Affected area in the Mauricie region
Pyrrhotite in Quebec (Mauricie Region)

Trois-Rivières, Shawinigan, MRC de Maskinongé, Bécancour, Nicolet, MRC des Chenaux.

The victims are mainly located in the Trois-Rivières region.

Houses built in 1996 and 2008

About 8000 houses during this period
4000 houses tested to date
2000 houses with pyrrhotite
About 1600 houses repaired
About 400 houses in the grey area
About 4000 houses to be tested
850 victims in the current first trial
Also affects other types of buildings
Damage estimated at $1 billion
Largest construction defect in Canada
Pyrite vs Pyrrhotite

Pyrite problem in Quebec in the 1980s

Buildings built in the 1980s in the Montreal area
Replacement of backfill and slabs
Pyrite vs Pyrrhotite

Pyrrhotite problem in Quebec 1996 to 2008

Buildings built between 1996 and 2008 in the Mauricie region
Reconstruction of foundations and slabs
Physical impacts on properties

Cracking and destruction of concrete
Water infiltration
Moulds and mildew
Potential impacts on the structure

The complete work can take between 1 to 2 years to restore it to its original state.

Destruction and reconstruction of the basement foundations, landscaping, asphalt and sidewalks
Temporary work
Storage of furniture, etc.
Examples of affected buildings

- Multi-unit housing
- Luxury houses
- Institutional
- Condos
Examples of affected buildings

Sportif center

Hospital

University buildings

Commercial buildings
Consequences and steps of the work required

Demolition of basement floors

Complete demolition of the basement

Earthworks, foundations and masonry will be demolished

Temporary accommodations and inconveniences
Consequences and steps of the work required

Basement démolition
Demolition of masonry
Demolition of masonry

Preparing to lift the house
Lifting the house
Lifting the house
Consequences and steps of the work required

Lifting and beginning of new foundations

New foundations

Lifting and beginning of new foundations

Debris and impacts on the field
Consequences and steps of the work required

- House put back on its foundations
- Reconstruction of the basement
- New masonry
- Completion of work and site redevelopment
The CAVP and its partners

Canada

Québec

Municipalités

Governments

Research and standards

Coalition d'aide aux victimes de la pyrrhotite

Others victims' committees

Irlande

Connecticut

Massachusetts
Note:

Today's presentation will focus more on the stages of the work and its impacts, as well as the tools that CAVP has put in place to help victims.

For more information about CAVP, see the attached document in appendix.
Phases of the work carried out

Tools and support for victims

Managing work well
HELP AND SUPPORT FOR VICTIMS

Victims
Pyrrhotite report

Support to victims
Orientation towards the services offered

Adjustment of municipal tax rates
Inform the insurer of the house
Manual help offer - MultiBoulot

Municipalities

Help ($$)

Opening the file
2 submissions required
Carrying out the work
Invoice submission 50% and 100% of the time
Max. reimbursement $75,000

SHQ
Program management

Canada Québec

$30M $52M

Coalition d'aide aux victimes de la pyrrhotite

CDEC de Trois-Rivières

Société d'habitation Québec

MultiBoulot
GUIDES AND SUPPORT FOR VICTIMS

Two ways to follow or contact the CAVP

Website:
(Tools and general information)

Facebook page:
(Activities, media, monitoring of issues)
TOOLS AND SUPPORT ON OUR WEBSITE

Six Tools

Need help?

1- Support guide
2- Public health
3- Psychosocial support
4- Guide for tenders
5- Guide to carrying out the work
6- Financial assistance program

General information for victims, in order to understand all the actions and elements to be considered in the management of their case.
Tool-1: Accompanying guide

ACCOMPANYING GUIDE FOR PYRRHOTITE VICTIMS

Since the Coalition's inception in 2009, volunteer members have accumulated expertise in concerning the plague of pyrrhotite and it is now possible for us to share it with the victims. This document, prepared by the Pyrrhotite Victims Assistance Coalition (CAVP), is intended as a guide information to support pyrrhotite victims in the various steps surrounding the management of this major construction defect.

Pyrrhotite is a swelling and undesirable element present in concrete aggregates (rock). Its presence generates significant cracks and progressive deterioration of the foundations. In such cases, new foundations are usually required.

For more information on the subject, you can visit www.cavp.info

Summary of the steps to follow regarding your pyrrhotite file:

Step 1: Is your property at risk?
Step 2: Coverage by a warranty plan.
Step 3: Validate the pyrrhotite level in your foundations
Step 4: Receipt of the pyrrhotite report
Step 5: Action to be taken
Step 6: Document your file
Step 7: Review of property and school taxes
Step 8: Apply for financial assistance
Step 9: Additional help
Step 10: Carrying out the work
Step 11: Technical documents and guides

Appendix A: Become a member and be better informed
Tool-2: Public health

Public health information

For several years, many building owners and managers in the Mauricie and Centre-du-Québec region have been facing a pyrrhotite problem in the concrete foundations of their homes and establishments, mainly in the municipality of Trois-Rivières.

At the request of the Direction of public health, the national health Institut of Québec (INSPQ) prepared a report on "Potential health risks associated with pyrrhotite alterations to building foundations".

The purpose of this document was to present the health risks directly and indirectly associated with the presence of pyrrhotite in the foundations of a building, particularly with respect to the production of sulphur gases.

Pyrrhotite general information:


Mould problem:

Tool-3: Psychosocial support

Consult the brochure below to help you better understand your reactions and how to act, as well as to serve as a guide to recognize the level of support required according to your needs.


To obtain assistance: call 811

Don't forget to mention that you are a person with pyrrhotite in order to properly guide your request.
### Tool-4: Guide for tenders

#### List of the different works to be done

**About 150 items**

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>016</td>
<td>Disconnect natural gas connections</td>
</tr>
<tr>
<td>020</td>
<td>Provide and install a temporary natural gas connection</td>
</tr>
<tr>
<td>021</td>
<td>Remove and install balconies that will not be raised with the building</td>
</tr>
<tr>
<td>015</td>
<td>Temporary connection for overhead electrical entry (if required)</td>
</tr>
<tr>
<td>023</td>
<td>Demolish or remove Masonry / Bricks</td>
</tr>
<tr>
<td>027</td>
<td>Remove the plain pavement or asphalt from the car entrance</td>
</tr>
<tr>
<td>028</td>
<td>Protect the area of the undemolished driveway</td>
</tr>
</tbody>
</table>

**Exemples**

- 016 - Disconnect natural gas connections
- 020 - Provide and install a temporary natural gas connection
- 021 - Remove and install balconies that will not be raised with the building
- 015 - Temporary connection for overhead electrical entry (if required)
- 023 - Demolish or remove Masonry / Bricks
- 027 - Remove the plain pavement or asphalt from the car entrance
- 028 - Protect the area of the undemolished driveway

**Call for tenders**

**CHECK LIST:**

List of elements to be considered during the preparation of the site and the call for tenders and to be included in the list of works


**List of works and persons in charge**

<table>
<thead>
<tr>
<th>Work managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>By owner</td>
</tr>
<tr>
<td>By contractor</td>
</tr>
<tr>
<td>By other</td>
</tr>
<tr>
<td>Work costs</td>
</tr>
</tbody>
</table>

**Etc.**
The guide is divided into 9 sections

Advantages:
This tool makes it possible to avoid forgetting certain jobs, to have a quote and to correctly define everyone’s responsibilities.

This document should be part of the contract signed with a contractor or supplier and reduces the risk of disputes during the project.

<table>
<thead>
<tr>
<th>Contractor name:</th>
<th>Guide Sections</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>By owner</td>
</tr>
<tr>
<td></td>
<td>By contractor</td>
</tr>
<tr>
<td>Dismantling and preparatory work</td>
<td>x</td>
</tr>
<tr>
<td>Excavation and demolition</td>
<td>x</td>
</tr>
<tr>
<td>New foundation, waterproofing and storm drain</td>
<td>x</td>
</tr>
<tr>
<td>Structure</td>
<td>x</td>
</tr>
<tr>
<td>Openings and exterior finishing</td>
<td></td>
</tr>
<tr>
<td>Interior finishing</td>
<td>x</td>
</tr>
<tr>
<td>Work not eligible for the SHQ assistance program</td>
<td></td>
</tr>
<tr>
<td>Reconstruction of basement rooms</td>
<td>x</td>
</tr>
<tr>
<td>Other work</td>
<td></td>
</tr>
<tr>
<td>Sub-Total</td>
<td></td>
</tr>
<tr>
<td>GST (5%)</td>
<td></td>
</tr>
<tr>
<td>QST (9.975%)</td>
<td></td>
</tr>
<tr>
<td>Other expenses</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>
Tool-5: Guide to carry out the work

Check list for victims:

1. Are your foundations affected by pyrrhotite
2. Assistance program managed by the SHQ
3. Quotes in accordance with the SHQ assistance program
4. Steps before work begins
5. Dismantling work
6. Preparatory work for lifting.
7. Excavation / Demolition
8. Lifting the building
9. New Foundations
10. Waterproofing, rainwater drainage and foundation backfilling
11. Building structure
12. Lowering the building
13. Repair of openings
14. Exterior finishing
15. Interior Finishing
16. Optional work for your quotes
17. Warranty (see our Civil code)
18. Terms of payment
19. Signing of the agreement
20. Obtaining a grant from the SHQ assistance program

This document allows the victims concerned to have an overview of the elements, steps and questions to be validated throughout their reparation project.
Examples of information in the guide  (Tool-5)

1- Are your foundations affected by pyrrhotite?

Consult your municipality or RCM regarding the assistance program managed by the Corporation of housing in Quebec. It is possible to obtain financial assistance for the rehabilitation of foundations of the building up to a maximum of $75,000. It should be noted that all or part of this financial assistance may be repayable, depending on the outcome of legal proceedings. The information is available in the explanatory documents of the assistance program.

Check list for the owner

For each stage of the project, a list of validations is proposed to the owners, in order to avoid forgetting certain elements required during all the stages of realization.

This guide describes in detail the preparatory elements, certain legal aspects, elements that will form part of the overall work to be done and the mechanisms affecting the financial assistance program.
Tool-6: Details of the financial assistance program

How to access the assistance program

- Program eligibility
- Assistance provided
- Eligible work
- Ineligible work
- Registration in the program
- Frequently asked questions

Program manager

Assistance program

Reimbursement of 75% of costs or $75,000 max. Foundation work, basement finishing and front gallery

According to the trial, the owner should reimburse the aid program for the equivalent of the amounts obtained for the work eligible for the program.
Carrying out repair work

Impacts and preparation
## Socioeconomic Impacts

### Repairing houses simultaneously has several impacts

### Elements to consider:

- The overbidding of repair costs
- The arrival of new entrepreneurs and consortia
- A lack of capacity of entrepreneurs to carry out their work
- A limited number of houses can be repaired in the same year
- Victims are solicited by entrepreneurs
- On a street or neighbourhood, the work can take several years
- This is an opportunity for the CCACB to negotiate discounts for material vendors
- Timeframe for implementation, sometimes not respected
- Material prices during this crisis could be on the rise
- There are risks of opportunism in this type of disaster
- Environmental management of demolition debris must be provided
**Important actions for owners**

**Important elements for the realization of the work:**

- Identify the overall impact of the repair work
- Make a detailed list of the work and define responsibilities
- Include this document in the contractor's contract
- Ensure that you have detailed and clear quotes
- Request the same type of bid from different contractors
- Shop and negotiate entrepreneurs
- Validate their skills and accreditations
- Agree on a timetable
- Take indoor and outdoor photos before starting work
- Be present during the work
- Request copies of each concrete delivery note
- Write down any changes during the work and the agreed price
- Avoid making prepayments before the work is carried out
- Agree on the payment method
- Take pictures during and after the work
- Make a full inspection before making the final payment

**Victims must be careful and have clear contracts**

**Check list**

**Guide for tenders**

**Use the same Guide for calls for tenders**

**Very important**

**Be well prepared!**
Work in complete neighbourhoods

Example of the ratio of homes repaired in residential neighbourhoods

In Mauricie, more than 50% of the population of houses built between 1996 and 2008 in the new districts have been affected by pyrrhotite.

In Quebec, almost all houses have basements and walls made of poured concrete.

Real example in Mauricie
Work generated by the pyrrhotite problem

Examples of elements affected by the work

Preparatory work before demolition

1- Inform the neighbours that you will be doing work
2- Remove landscaping
3- Hang the water heater under the house
4- Temporary electrical connection if required
5- Locate underground electrical wires
6- Protect or relocate the pool
7- Demolition or relocation of the patio
8- Disconnect the heat pump
9- Remove gutter downspouts
10- Relocation of the washer and dryer of the subsoil

A- Remove fences
B- Demolition of sidewalks and steps
C- Demolition of the parking lot and curbs
D- Empty the basement and store the furniture
E- Recovery of basement elements by the owner

Next step, start of repair work by a contractor
Overview of the repair work to be done

1- Demolition of the basement
2- Temporary electrical and plumbing connections
3- Removal of exterior masonry, if required
4- Installation of lifting systems
5- Digging around the building
6- Demolition of foundations, galleries and patios
7- Demolition of the basement slab and garage
8- Lifting the house
9- Soil preparation
10- Installation of formwork - footings and walls
11- Pouring of the new concrete
12- Repositioning on the new foundations
13- Waterproofing of French foundations and drains
14- Foundation backfilling
15- Plumbing under the slabs
16- Basement and garage slab
17- Insulation and finishing of the basement
18- Redevelopment of the garage, if applicable
19- Repair of exterior facades, galleries, patios, etc.
20- Site redevelopment, asphalt, sidewalks, etc.

It is also a great opportunity to plan elements that would make you happy, it makes the project less difficult.
In summary

KEY ACTIONS CONCERNING WORK

Use a check list to make sure you don't forget anything
Be well prepared and define the work you will do yourself

Plan all the steps to be carried out
Validate the contractor's skills
Have clear contracts
If feasible, group together for tenders

Include a clause in the contract regarding pyrrhotite
Write your requests to the contractor in writing
Negotiate well
Take pictures before and during the work.
Price is not the only element to consider

Be present during the work
Maintain good relations with the contractor
Make sure everything is finished before you make the final payment

Do not hesitate to consult your coalition!
Pyrrhotite, a social problem to be solved together!

Ten years is too long already!
Thank you!

See more information in the appendix

Coalition d’aide aux victimes de la pyrrhotite coalition@cavp.info Tel: 819-448-0500
Do not hesitate to contact us!