Ministry of Community Safety and Correctional Services

Fire Safety in Greenhouses

Presented to: OMFPOA Symposium 2018

Date: September 6, 2018

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Presentation Roadmap

- Definition:
  - What are greenhouses (farm building)
- How they are designed:
  - The Building Code Act & Ontario Building Code
- How they are maintained:
  - The Fire Protection & Prevention Act & Ontario Fire Code
- Greenhouse - Fire Safety Best Practices

Farm Building /Greenhouse

Ontario

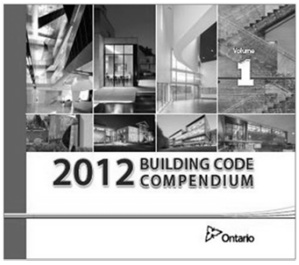
1. What are farm buildings?
   Farm vs. greenhouse
2. Is the Building Code Act & Ontario Building Code applicable?
3. Is the Fire Protection and Prevention Act & Ontario Fire Code applicable?

Farm Buildings (OBC)

1. What are farm buildings?

Farm Buildings (OBC)

- "*Farm building"* means a building or part thereof which does not contain residential occupancy and which is associated with and located on land devoted to the practice of farming, and used essentially for the housing of equipment or livestock, or the production, storage or processing of agricultural and horticultural produce or feeds.

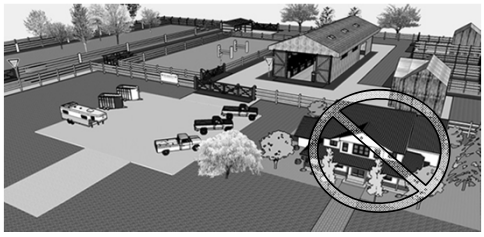


Farm Buildings (OBC)

- Produce storage & packing facilities,
- Live stock and poultry housing,
- Milking centres,
- Manure storage facilities,
- Grain bins,
- Silos,
- Feed preparation centres,
- Farm workshops,
- Greenhouses,
- Farm retail centres,
- Horse riding,
- Exercise and training facilities.

Farm Buildings (OBC)

- Two categories:
  - "*Low human occupancy"* means, when applied to a farm building, an occupancy in which the occupant load is not more than one person per 40m^2 of floor area during normal use
  - Other than "*low human occupancy*"



Farm Buildings (OFC)

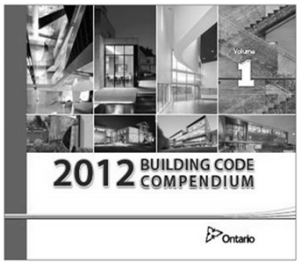
- Similar definition as OBC
- There is no definition for "low human occupancy"…

BCA & OBC

Ontario

2. Is the Building Code Act & Ontario Building Code applicable?

Application of the BCA & OBC



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BCA & OBC

Ontario

Ontario Building Code Act, 1992

https://www.ontario.ca/laws/statute/92b23#BK1

1(1) Definitions

"*Building*" means,

(a) a structure occupying an area greater than ten square metres consisting of a wall, roof and floor or any of them or a structural system serving the function thereof including all plumbing, works, fixtures and service systems appurtenant thereto,

(b) – (d)…

3

BCA & OBC (cont'd)

Building permits

8 (1) No person shall construct or demolish a building or cause a building to be constructed or demolished unless a permit has been issued therefor by the chief building official. 1992, c. 23, s. 8 (1); 1997, c. 30, Sched. B, s. 7 (1).

- There is exemption for demolition on a farm (Division C, 1.3.1.1.(1)(a)).

Change of use

10 (1) Even though no construction is proposed, no person shall change the use of a building or part of a building or permit the use to be changed if the change would result in an increase in hazard, as determined in accordance with the building code, unless a permit has been issued by the chief building official. 2002, c. 9, s. 16.

Change of use permit addressed under **10**(2)…

BCA & OBC (cont'd)

Building permits

- The Ontario Building Code Act will require a permit to be obtained prior to the proposed construction of a building.
- 4 Main building permit categories includes:
  1. Zoning,
  2. Architectural (fire protection),
  3. Mechanical/Electrical, and
  4. Structural
- We will briefly discuss Items 1 and 2.

BCA & OBC (cont'd)

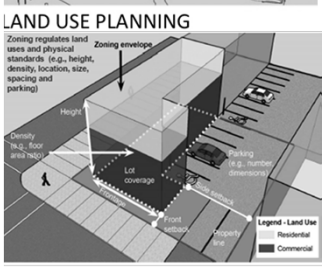
1. Building permits (zoning)

- Issuance of permit under BCA:

  8(2) The chief building official shall issue a permit referred to in subsection (1) unless,

  (a) the proposed building, construction or demolition will contravene this Act, the building code or any other applicable law;

- Applicable law is listed under Division A, Article 1.4.1.3 of OBC
  - It makes reference to the Planning Act and by-laws made by municipalities (and other applicable laws)



BCA & OBC (cont'd)

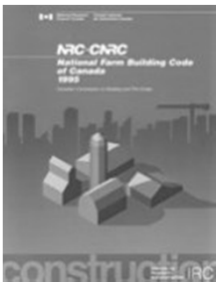
2. Building permits (architectural / fire protection)

- Applicable Construction Articles
- Part 3 fire and life safety requirements

What about greenhouses?

Do these comply with BCA and OBC?

OBC & NFBCC



What about farm buildings (greenhouses)?

- BCA –meet the definition of "building"

⇩

- OBC Division A, 1.3.1.2.

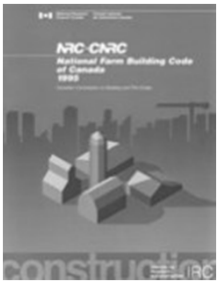
1.3.1.2. Farm Buildings

(1) Except as provided in Sentences (2) to (6), *farm buildings* shall conform to the requirements in the CCBFC NRCC 38732, "National Farm Building Code of Canada".

(2) – (6)…

OBC & NFBCC

LOW HUMAN OCCUPANCY



OTHER THAN LOW HUMAN OCCUPANCY

OBC & NFBCC (cont'd)

1.3.1.2. Farm Buildings (cont'd)

- Not all farms are built under the National Farm Building Code of Canada.
- Reminder:
  1. "*Farm building"* means a building or part thereof which does not contain residential occupancy and which is associated with and located on land devoted to the practice of farming…
  2. BCA makes reference to applicable law – zoning criteria (is it zoned for as farmland, agricultural use…), and
  3. Low human occupancy
- Greenhouses may have been designed under the Ontario Building Code.
- Check with your municipal building department and/or by-laws.

FPPA & OFC

3. Is the Fire Protection and Prevention Act & Ontario Fire Code applicable?

Application of the FPPA & OFC

Fire Protection and Prevention Act, 1997

https://www.ontario.ca/laws/statute/97f04

What about greenhouses?

Do these comply with FPPA and OFC?

FPPA & OFC (cont'd)

Ontario Fire Code

Division A, 1.4.1.2. Farm Building Definition

Farm building means a **building** or part thereof associated with and located on land devoted to the practice of farming, and used primarily for the housing of equipment or livestock or the production, storage or processing of agricultural and horticultural produce or feeds, but is not used for **residential occupancy**.

Division A, 1.3.1.1. Farm Buildings (OFC application)

1.3.1.1. A **farm building** with an **occupant load** of not more than one person per 40 m^2 of floor area during normal use and other premises on a farm used for farming purposes are exempt from the requirements of this Code.

FPPA & OFC (cont'd)

Fire Protection & Prevention Act

FPPA Part VI Inspections

Fire safety includes the following:

1. Safety from the risk that a fire, if started, would seriously endanger the health and safety of any person or the quality of the natural environment for any use that can be made of it.
2. Safety from the risk that the presence of unsafe levels of carbon monoxide on premises would seriously endanger the health and safety of any person. 2013, c. 14, s. 4.

FPPA & OFC (cont'd)

Part VI Inspections (cont'd)

Inspection Orders

21. (1) An inspector who has carried out an inspection of land or premises under section 19 or 20 may order the owner or occupant of the land or premises to take any measure necessary to ensure fire safety on the land and premises and may for that purpose order the owner or occupant,

(a) – (e)…

(f) to do anything respecting fire safety including anything relating to the containment of a possible fire, means of egress, fire alarms and detection, fire suppression and the preparation of a fire safety plan;

(g) to remedy any contravention of the fire code.

Summary

Ontario

1. What are farm buildings?
   Farm vs. greenhouse
2. Is the Building Code Act & Ontario Building Code applicable?
3. Is the Fire Protection and Prevention Act & Ontario Fire Code applicable?

Summary

1. What are farm buildings?
   - Farm building is a defined term under the OBC and OFC.
   - A greenhouse can be considered a farm building if located on land devoted to the practice of farming.
   - Applicable regulations for greenhouses also dependent on occupant load

Summary

Greenhouse on farmland (low human occupancy)

Farm building

Greenhouse on farmland (not low human occupancy)

Farm building

Greenhouse not on farmland

Not a farm building

Summary

2. Is the Building Code Act & Ontario Building Code applicable?
   - Meets definition of “building” under the BCA
   - Building permit required and is reviewed either under the OBC or NFBCC

Summary

Greenhouse on farmland (low human occupancy)

BCA & NFBCC applies

Greenhouse on farmland (not low human occupancy)

BCA & OBC applies

Greenhouse not on farmland

BCA & OBC applies

Summary

3. Is the Fire Protection and Prevention Act & Ontario Fire Code applicable?
   - FPPA applies to fire safety
   - OFC – applies to farm buildings with occupant load greater than 1 in 40 m^2 of floor area during normal use
   - OFC – not applicable to farm buildings with occupant load not more than 1 in 40 m^2 of floor area during normal use

Summary

Greenhouse on farmland (low human occupancy)

FPPA applies

Greenhouse on farmland (not low human occupancy)

FPPA & OFC applies

Greenhouse not on farmland

FPPA & OFC applies

Summary

- Not all greenhouses are the same – different regulations are applicable
- A greenhouse in one municipality may be different from a greenhouse in another municipality.
- Check the definition of "***farm building***" and review with your municipal building and zoning department.

Jay's Focus

Greenhouse on farmland (low human occupancy)

FPPA applies

Greenhouse on farmland (not low human occupancy)

FPPA & OFC applies

Greenhouse not on farmland

FPPA & OFC applies

Jay's Roadmap

- Topics To Discuss Include:
  - Exiting – Farm Buildings & NFBCC
  - Greenhouse Fire Hazards
    - Plastics
    - Boilers
  - Control of Potentially Hazardous Activities
  - Fire Safety Planning

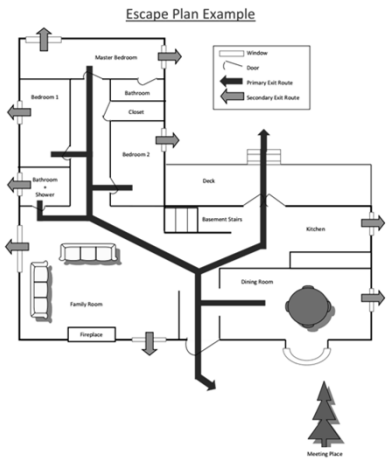
Exiting Requirements

Required Egress under NFBCC:

- Subsection 3.2.1. Exits – Selected Extracts/Paraphrases Include:
  - At least 2 exits, spaced remotely from each other at opposite ends of the building. (NFBCC – 3.2.1.1.)
  - Exits in farm buildings shall consist of:
    - An exterior doorway
    - Where two exits required, one exit can be an openable window (NFBCC – 3.2.1.3)
  - Exits described in Article 3.2.1.3. shall be
    - Located and arranged so that they are clearly visible. (NFBCC – 3.2.1.4.(1))
    - Accessible at all times. (NFBCC – 3.2.1.4.(2))
  - Travel distances waived → exits 60 m along building perimeter (NFBCC – 3.2.1.5.(2))

Exiting Requirements (cont'd)

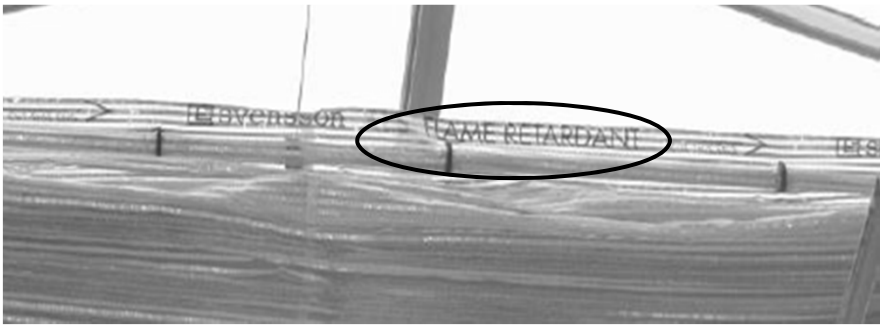
- Extracts from:
  - 3.2.1.4.
    - Exit Doors *Accessible*
    - Exit Doors *Clearly Visible*
  - Upkeep required to maintain these [NFBCC required] exits in a state that will help them to serve their specific intended fire safety function



Plastic Furnishings – Shade Cloth

- Primary Function: Regulate building temperature in greenhouses

Plastic Furnishings – Shade Cloth



Plastic Furnishings – Planters Boxes

Plastic Furnishings – Planters Boxes

Greenhouse Fire – Case Study

Greenhouse Fire – Case Study

- Features of Building:
  - Land was zoned agricultural and the buildings were subject to NFBCC
  - Hydroponics
    - Plant growth *without* soil
  - Area affected by fire had two occupancies and two types of construction:
    - Greenhouse portion - aluminum frame & **transparent corrugated acrylic** walls & roofs
    - "Warehouse" portion - steel framed & steel sheathing for the roof & walls
      - Office, seeding, pump, electrical, boilers, sorting, packing, delivery trucks
    - 200,000 sq ft of the building completely destroyed

Greenhouse Fire – Case Study

- Features of Fire:
  - Detected from a call made by a passing motorist. (12:57 am)
  - 30 fire apparatuses and over 100 firefighters responded to this incident which was fought from a defensive attack
  - Fire was suppressed 18 hours from the time of discovery
  - Area of fire origin was approximated & ignition source could not be determined.
    - Severity of fire damage only certain areas of the greenhouse could be accessed by investigators
  - MOE attended the scene → air quality & water run-off

Greenhouse Fire – Case Study

- Observations & Interpretations
  - Extent of the damage (200,000 sq ft)
  - Hydroponic operation & greenhouse construction
  - Number of firefighters involved and duration of suppression efforts
    - Firefighter's description of the intensity of the blaze
  - MOE attending the scene for smoke and water run-off
- These observations suggest that a combustible and/or flammable material propagated fire spread
  - Working Hypothesis: Plastics - ?

"Greenhouse portion - aluminum frame & **transparent corrugated acrylic** walls & roofs"

Plastics - Conclusions

- Plastics - hiding in plain sight
  - Serve as fuel to a major fire
  - Plastics Can Be Used in Building Construction
- Explain the fire hazard to make the greenhouse owner more informed about existing hazards

Heating Systems

- Boilers are **appliances:**
  - Ensure minimum clear space between heated elements from combustible materials.
    - Shade Clothes
    - Thimbles
    - Heat Shields
  - Diligence with housekeeping
    - Dusts
    - Combustible Residues
  - Adherence to boiler manufacturer's maintenance instructions.
  - TSSA/ESA

Hot Works

- Agricultural operations leverage technology → automation






Hot Works

- Sophisticated Automated Processes Leads to Need for:
  - Emergency repairs
    - Cutting to remove seized bearings
    - Welding to repair damage track
    - Grinding to remove rusted or corroded bolts
    - Soldering to repair leaking pipe

    → Hot Works
  - Maintenance
- Spectrum of Effective Hot Works Management:
  - Hot Works Supervision Process (permit system, fire watch, etc.)
  - Scenario specific safeguards
  - Blankets, shields, tarps, screens, fire watch
  - Use of well maintained equipment

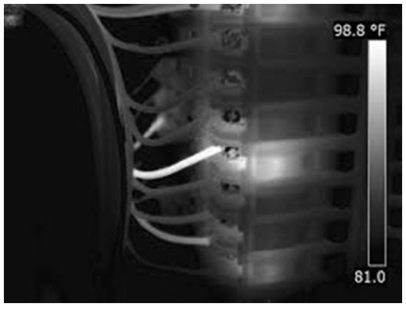
Electrical Hazards




Mechanical Systems → Electrical Systems

- Water → High moisture content of air → Potential fire & electrocution hazards
- ESA

Electrical Hazards

Other Hazardous Activities & Materials

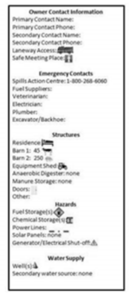
- Use of cabinets for the storage of small amounts of combustible & flammable liquids
- Securing cylinders of compressed gas
- Containers for oily rags (spontaneous combustion hazard)



Pre-Fire & Fire Safety Planning

- *Product* = Fire Safety Plan & Procedures
- *Process* = Chance to discuss the issues that drive fire safety in greenhouses
- While the *product* is mutually beneficial, the real value to the owner may be going through the *process*
- Establish reasonable expectations of each others'
  - Capabilities… "what **can** we do?"
  - Responsibilities… "what **are** we going to do?"
- Creates awareness!

Pre-Fire & Fire Safety Planning


Owner Contact Information
Primary Contact Name:
Primary Contact Phone:
Secondary Contact Name:
Secondary Contact Phone:
Laneway Access:
Safe Meeting Place:

Emergency Contacts
Spills Action Centre: 1-800-268-6060
Fuel Suppliers:
Veterinarian:
Electrician:
Plumber:
Excavator/Backhoe:

Structures
Residence
Barn 1: 45
Barn 2: 250
Equipment Shed
Anaerobic Digester: none
Manure Storage: none
Doors:
Other:

Hazards
Fuel Storage(s)
Chemical Storage(s)
Power Lines:
Solar Panels: none
Generator/Electrical Shut-off

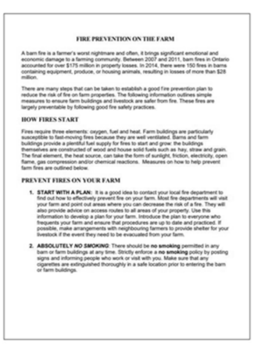
Water Supply
Well(s)
Secondary water source: none

- Key Issues to Discuss:
  - What's the address?
  - How do we get there?
  - Details of Combustible Loading
    - Building Construction
    - Everything Else
  - Boilers
    - Natural Gas, Propane
    - CO_2 Enrichment
  - Fertilizers, Flammable Liquids, Compressed Gases, Special Hazards
    - Quantities? Location? Storage Configuration?
  - Water Supply Availability
    - Tanks on-site, mutual aid agreement, nearby ponds, creeks, etc.

Additional Resources

- Farm Fire Safety - Communiqué 2016-07 – January 29, 2016

  https://www.mcscs.jus.gov.on.ca/english/FireMarshal/FireServiceResources/Communiques/OFM_Com_2016-07.html


FIRE PREVENTION ON THE FARM

A barn fire is a farmer's worst nightmare and often, it brings significant emotional and economic damage to a farming community. Between 2007 and 2011, barn fires in Ontario accounted for over $175 million in property losses. In 2014, there were 150 fires in barns containing equipment, produce, or housing animals, resulting in losses of more than $28 million.

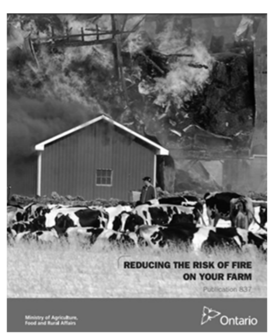
There are many steps that can be taken to establish a good fire prevention plan to reduce the risk of fire on farm properties. The following information outlines simple measures to ensure farm buildings and livestock are safer from fire. These fires are largely preventable by following good fire safety practices.

HOW FIRES START

Fires require three elements: oxygen, fuel and heat. Farm buildings are particularly susceptible to fast-moving fires because they are well ventilated. Barns and farm buildings provide a plentiful fuel supply for fires to start and grow: the buildings themselves are constructed of wood and house solid fuels such as hay, straw and grain. The final element, the heat source, can take the form of sunlight, friction, electricity, open flame, gas compression and/or chemical reactions. Measures on how to help prevent farm fires are outlined below.

PREVENT FIRES ON YOUR FARM

1. **START WITH A PLAN:** It is a good idea to contact your local fire department to find out how to effectively prevent fire on your farm. Most fire departments will visit your farm and point out areas where you can decrease the risk of a fire. They will also provide advice on access routes to all areas of your property. Use this information to develop a plan for your farm. Introduce the plan to everyone who frequents your farm and ensure that procedures are up to date and practiced. If possible, make arrangements with neighbouring farmers to provide shelter for your livestock if the event they need to be evacuated from your farm.
2. **ABSOLUTELY *NO SMOKING*:** There should be **no smoking** permitted in any barn or farm buildings at any time. Strictly enforce a **no smoking** policy by posting signs and informing people who work or visit with you. Make sure that any cigarettes are extinguished thoroughly in a safe location prior to entering the barn or farm buildings.



Summary

- Collaboration / partnerships with greenhouse owners
- Major fire safety issues :
  - Exiting required by NFBCC
    - Discretion needed in how to determine maintenance of exiting
  - Awareness of plastics
    - Configuration and use in greenhouses
  - Other existing hazards found in agricultural sector include:
    - Boilers
    - Hot Works
  - Mutually beneficial to develop pre-fire plan and fire safety plan.

Questions…