

# Barn Fires

## An increasing problem for Ontario Farmers

### Questions and Answers to barn fires and fires in large farm structures

Over the past five years, barn fires and fires in large farm structures have become an increasing concern. The evolution towards large-scale farm operations has further heightened the need to address the problem of barn fires and fires in large farm structures. In response, OMAFRA struck a Technical Advisory Committee on Farm Fires to address the fire safety risks to farm workers and emergency responders. The purpose of the committee is to reduce the potential for life and/or property loss by identifying best practices in the industry and potential changes to regulations.

Members of the committee include:

- Ontario Association of Fire Chiefs
- Ontario Office of the Fire Marshal
- Municipal building officials
- Farm building contractors and farm building design engineers
- Insurance industry
- Canadian Farm Builders Association
- Ontario Pork
- Ontario Ministry of Municipal Affairs and Housing
- Ontario Ministry of Agriculture, Food and Rural Affairs.



Fig. 1 Historic barn on fire, picture courtesy of John Johnson

This document, created by the Technical Advisory Committee provides answers to many industry questions.

#### **Question: Why are there increasing concerns about barn fires?**

As farms have grown larger, associated farm buildings have increased in size and value. As a result, when the large structures catch fire they prove more difficult to extinguish and the financial losses is significantly greater. Data from the Ontario office of the Fire Marshal indicate the following structure fire incidents for the period 2004 - 2007:

- 2004 - 196 (\$30.1 million loss)
- 2005 - 223 (\$25.3 million loss)
- 2006 - 205 (\$34.4 million loss)
- 2007 - 241 (\$57.6 million loss)

These costs include those associated with building structures, but not equipment, agricultural product and livestock. Luckily, to date, there has not been loss of human life associated with any of these fires.

**Question: What are the primary causes of preventable fires?**

The Ontario Office of the Fire Marshal has provided data for the cause of fires for the years 2004-2007. In each year, the leading causes for preventable, determined fires were:

- mechanical/electrical failure
- misuse of ignition source/equipment
- design/construction/maintenance deficiency.

**Question: What are the primary sources of ignition?**

The data suggests that the primary sources of ignition fall within the following classes:

- miscellaneous (chemical reaction for example: spontaneous combustion, lightning etc.)
- electrical distribution equipment (circuit wiring, distribution equipment, extension cords etc.)
- heating equipment (central heating, flue pipe, space heater etc.)
- open flame (cutting/welding, blow torch, smokers articles etc.).

**Question: Why is electrical distribution equipment such a common cause of ignition?**

The Insurance industry, along with the Electrical Safety Authority has investigated this matter. The corrosive environment found inside livestock barns, has been determined to be the leading cause of degradation or failure of electrical equipment. The degradation is typically corrosion of the exposed metal components, i.e. wires, connections, etc. The corrosion increases the resistance at these points reducing the flow of electricity through the circuit. More importantly, the increased resistance results in more of the electrical energy being converted to heat. As the corrosion levels continue to increase the heat generated can rise to ignition temperatures of materials surrounding the equipment.



Fig. 2 Barn on fire, picture courtesy of Randy Drysdale

**Question: What steps can be taken to minimize or eliminate the leading causes of ignition in new and expanding livestock barns?**

The Electrical Safety Authority (ESA) issued Bulletin 22-3-1 in July 2008 requiring all electrical equipment installed in animal confinement areas in barns meet the requirements of Category 1 locations (high humidity) and Category 2 locations (corrosive liquids and vapours). Their bulletin also specifies types of material required in these locations, for example; copper conductors and cable assemblies.

The ESA is also requiring that all non-essential equipment and equipment incorporating over current devices be installed in locations separated from the livestock confinement areas and supplied with clean, dry temperature controlled air. See [www.esainspection.net](http://www.esainspection.net) for more information.

The construction of separate electrical/mechanical rooms to house electrical service panels and similar equipment is a best practice because it achieves the following:

- protects equipment from corrosive humid barn environment
- allows equipment to be housed in a fire proofed room to minimize flame spread should a fire occur.

For information on other general maintenance/fire prevention steps that can be taken in and around farm buildings, refer to the following Communiqué from the Office of the Ontario Fire Marshal:

<http://www.ofm.gov.on.ca/english/publications/communiques/2007/2007-11.asp>

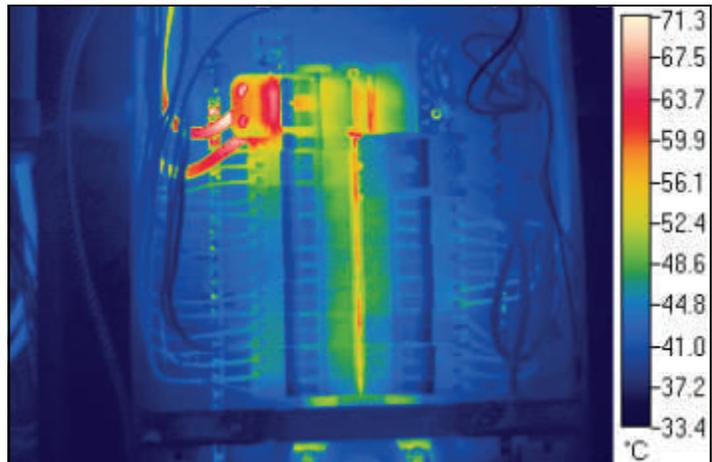


Fig. 3 Infrared picture of electrical box components. This picture appears courtesy of Randy Drysdale

**Question: What equipment maintenance steps can be taken within existing livestock buildings?**

Regular inspection of electrical and mechanical equipment by a qualified electrician to check for signs of deterioration and / or corrosion of equipment in livestock confinement buildings. All items that are deemed to be unsafe or questionable should be repaired or replaced immediately.

**Question: What general maintenance steps can be taken around existing livestock buildings?**

Regular housekeeping activities around buildings to remove potential combustible materials. Examples include; mowing of vegetation around buildings, regular removal of rubbish inside and around buildings, etc. As well, all trees that are in close proximity to the structures should be trimmed or removed.

Proper siting and management of on-farm fuel storage facilities away from buildings. This ensures flammable vapours released during refuelling of vehicles or filling storage are not drawn into the farm buildings but dissipate into the atmosphere. Please refer to the following OMAFRA factsheets for additional information on building code regulations:

- <http://www.omafra.gov.on.ca/english/engineer/facts/07-007.htm>
- <http://www.omafra.gov.on.ca/english/engineer/facts/07-063.htm>
- <http://www.omafra.gov.on.ca/english/engineer/facts/97-013.htm>

**Question: What steps can be taken to minimize fire spread in large farm buildings to aid firefighters in containing and extinguishing the fire?**



Fig. 4 After the fire. Note the size of the excavator in relation to the barn. This picture appears courtesy of Randy Drysdale

The inclusion of effective fire stops in large farm buildings and the provision of an all season road around the entire building site to allow good access for fire fighting equipment are two initial steps that can be taken.

The National Farm Building Code of Canada (NFBC) specifies a maximum floor area for farm buildings with low human occupancy. For a single storey barn, the maximum floor area is 4,800 m<sup>2</sup> (51,600 sq ft). For a two storey barn, the maximum floor area is 2400 m<sup>2</sup> (25,800 sq ft). Compartment size must be restricted to these sizes by incorporating appropriate fire separations having a rating of at least one hour.

The NFBC (1995) also specifies that concealed spaces in ceilings, roof or attics shall be separated by fire stops so that no dimension of such space exceeds 30 m (100 ft).

The Ontario Building Code prohibits the use of exposed foamed plastic insulation on interior surfaces of buildings. This combustible material must be covered or protected by an appropriate fire rated material if it is employed in a building.

An all season roadway capable of supporting weight of heavy equipment should be constructed around the farm building site and maintained so that it is accessible 365 days of the year.

All buildings should be equipped with a minimum five pound ABC fire extinguisher at each exit and in all mechanical and feed rooms. If there is a standby generator housed in the building, the room housing the generator should be equipped with a minimum 10 pound ABC fire extinguisher.

**Question: Will the committee produce more information? And if so, what can I expect them to be about?**

Information produced by the committee will explain several best practice options that you can implement during new construction or renovation of farm buildings to:

- minimize the potential for fire. For example; construction technique, material selection and regular maintenance and/or house keeping activities
- prevent the spread of fire within a structure and allow the firefighters a better chance to fight the fire should one occur.

