Principles of Fire and Life Safety

First Nations Housing Conference

Thunder Bay

Feb 6, 2018

Fire Protection and Prevention Act, 1997

- Supports addressing observed fire safety issues
- Provides interpretation of “fire safety”
- Provides enforcement options/offences/penalties
- Permits discretion for an inspector to chose options(s) / may combine option(s)
- Outlines some mandatory “components” depending on varying enforcement options
  - Form content, service, posting, copies

The Office of the Fire Marshal and Emergency Management

- The Office of the Fire Marshal (OFM) is a branch of the Community Safety Division of the Ministry of Community Safety and Correctional Services.
- The Fire Marshal is the head of the Office of the Fire Marshal, appointed by the Lieutenant Governor in Council
- Responsible for the administration of;
  - the Fire Protection and Prevention Act, 1997 (FPPA), and
  - the Fire Code, a regulation made under the act that governs fire safety standards for equipment, systems, buildings, structures, land and premises in Ontario.

Field and Advisory Services – Inspection and Enforcement Unit

- Provide ongoing assistance and advisory services to municipal officials and fire department officials regarding the delivery of fire protection services.
- Provide assistance and advisory services to municipal officials and fire department officials on matters concerned with inspections and fire code enforcement.
- Provide training, by way of workshops and courses, to fire prevention personnel across Ontario, on a wide variety of inspection and enforcement topics.

Field and Advisory Services – North and Unincorporated Unit

- Administers the Northern Fire Protection Program (NFPP) to 48 fire departments in unorganized townships.
- Provide ongoing assistance and advisory services in territories without municipal organization to fire department and community officials regarding the delivery of fire protection services.

Public Education Resources

- Aboriginal TAPP-C Program
  - Educational resource manual for stopping juvenile firesetting
  - Overview
- Emergency Planning Guide
  - New to resource on the Emergency Management Ontario site

7 Principles of Fire and Life Safety

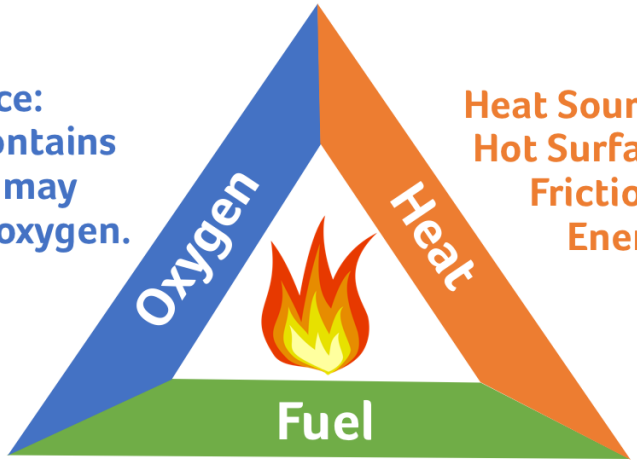
- What are they?
- Why are they important?

7 Principles of Fire and Life Safety

- Means of Egress
- Building Construction
- Compartmentation
- Interior Finish
- Building Services
- Fire Protection Systems
- Fire Alarm and Detection Systems

What is fire?

The Fire Triangle



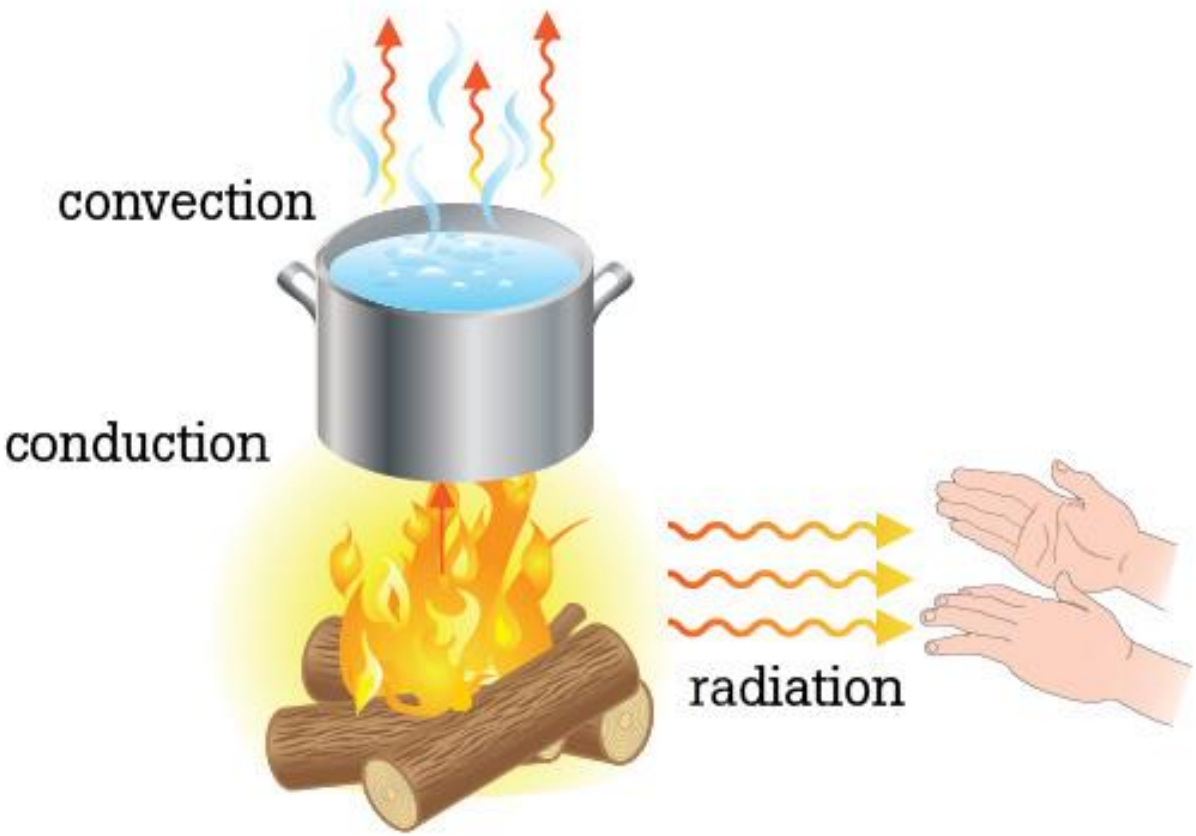
Oxygen Source: Normal air contains 21% O_2. Fuel may also contain oxygen.

Heat Sources: Sun, Hot Surfaces, Sparks, Friction, Electrical Energy, others

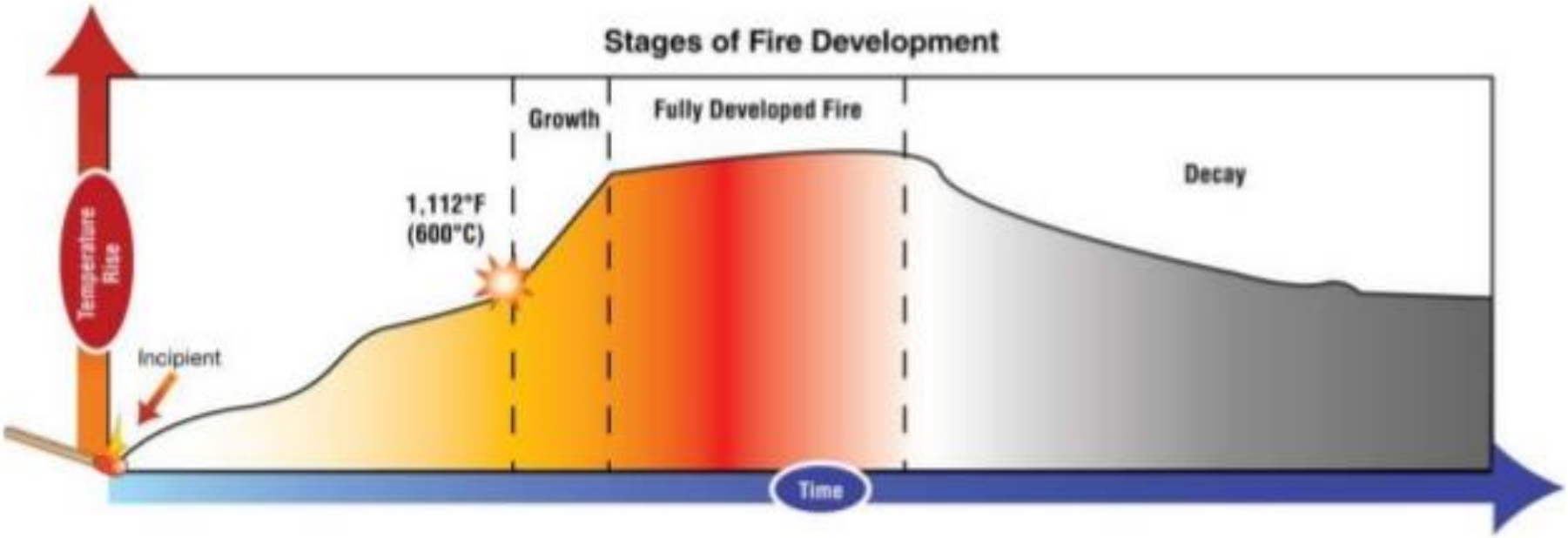
Fuel Sources: Can be a solid, liquid, or gas. Here are some examples.

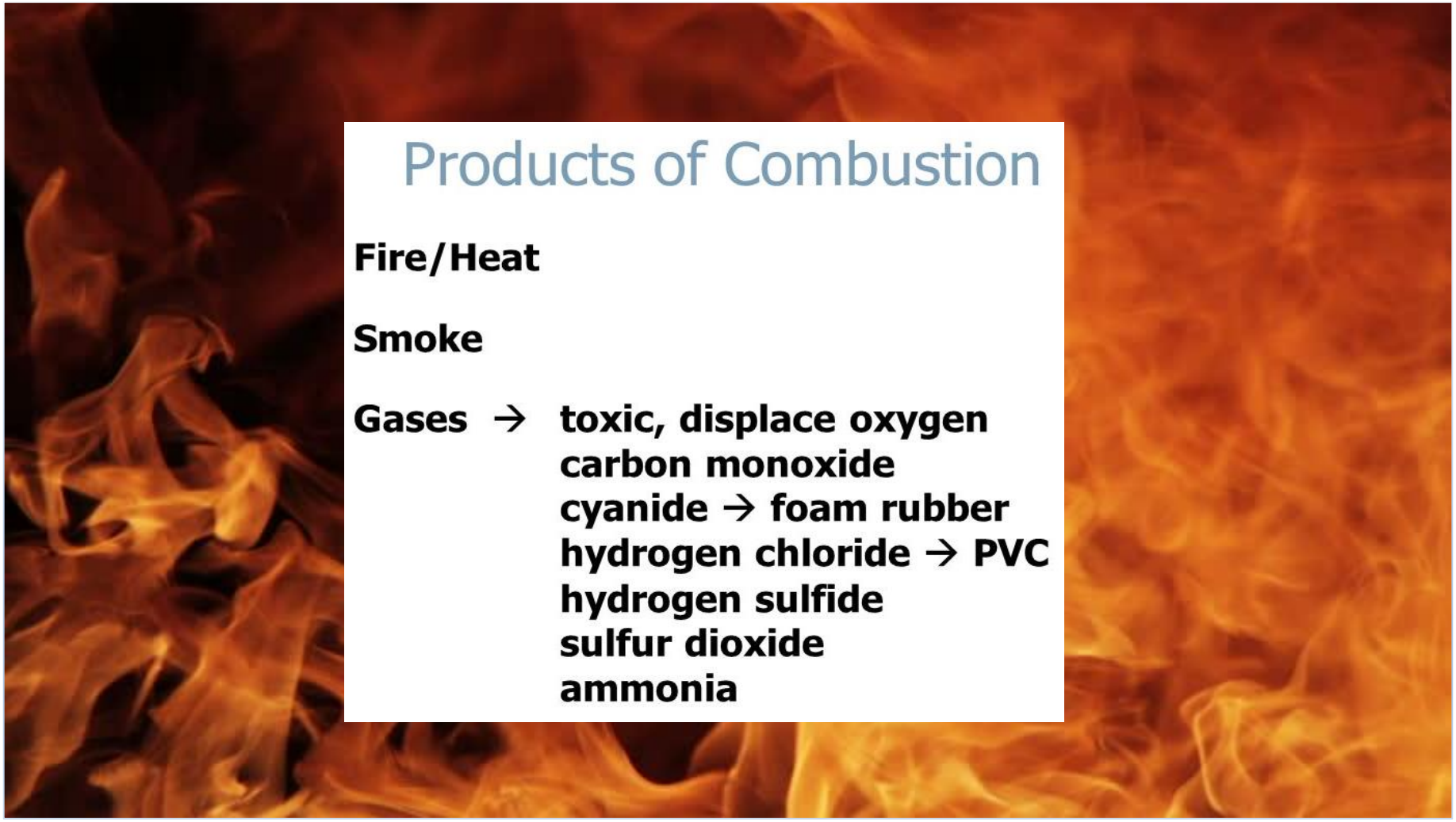
- **Solids:** Coal, Wood, Paper, Leather, Plastic, Sugar, Grain
- **Liquids:** Gasoline, Alcohol, Paint, Olive Oil
- **Gases:** Natural gas, Propane, Hydrogen, Carbon Monoxide,

How does fire spread?



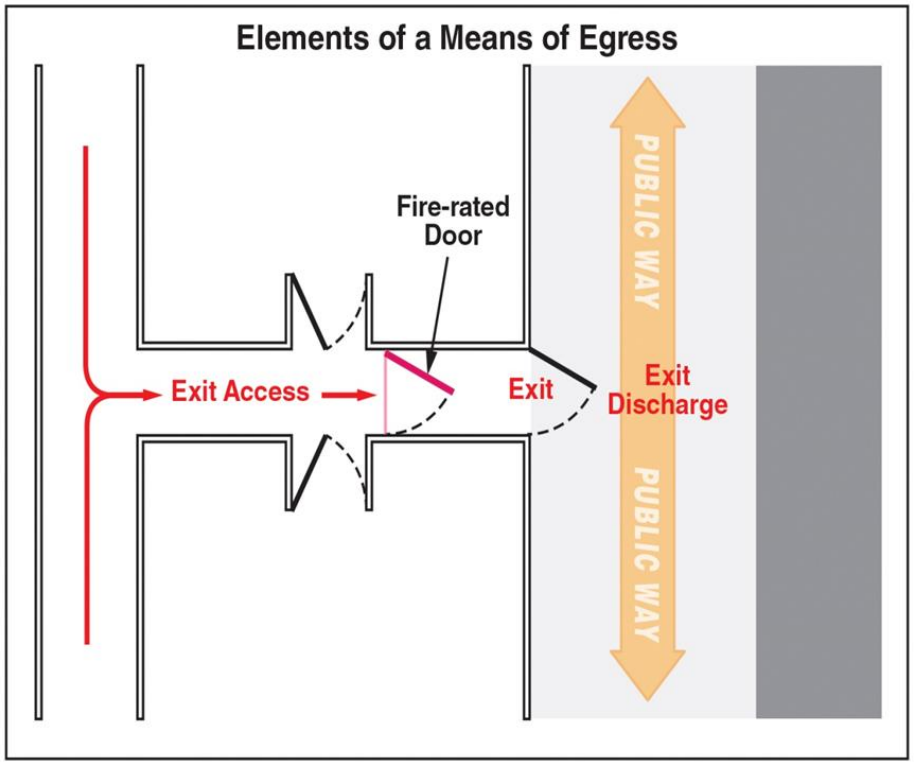
Stages of fire development.




Products of Combustion
Fire/Heat
Smoke
Gases → toxic, displace oxygen
carbon monoxide
cyanide → foam rubber
hydrogen chloride → PVC
hydrogen sulfide
sulfur dioxide
ammonia

Means of Egress

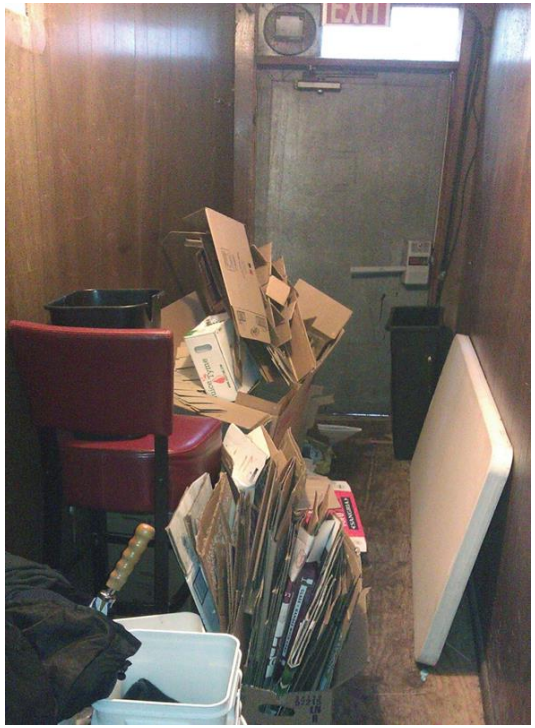
Means of Egress

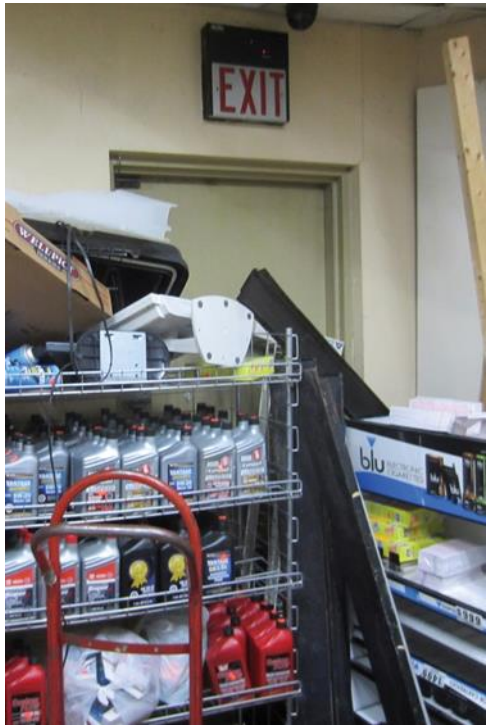


Means of Egress

- Keep clear
- Ensure they work
- Ensure they open into a clear area
- Ensure hardware works properly
- Ensure they are identified
- Home escape planning

Means of Egress





Building Construction

- Combustible
- Non-Combustible
- Heavy timber

Combustible Construction

- Lightweight framing
  - Structural redundancy is reduced
  - All truss members are critical to maintain the strength and stability of the truss

Wooden I-Beams

- Susceptible to fire damage
- OSB web will fail first

UL – Structural Stability of Engineered Lumber in Fire Conditions – Sept, 2008

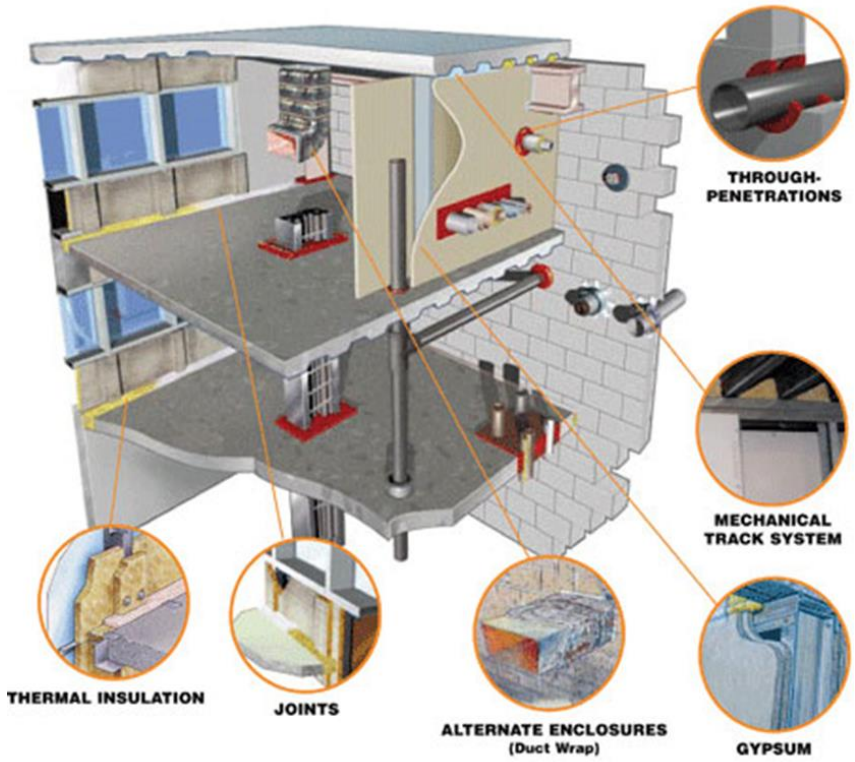
Test Assembly No.	Supports	Ceiling	Floor or Roof
1	2 by 10s @ 16 inch centers	None	1 by 6 subfloor & 1 by 4 finish floor
2	12 inch deep "I" joist @ 24 inch centers	None	23/32 inch OSB subfloor, carpet padding & carpet
3	2 by 10s @ 16 inch centers	1/2 inch regular gypsum wallboard	1 by 6 subfloor & 1 by 4 finish floor
4	12 inch deep "I" joist @ 24 inch centers	1/2 inch regular gypsum wallboard	23/32 inch OSB subfloor, carpet padding & carpet
5	Parallel chord truss with steel gusset plate connections, 14 inch deep @ 24 inch centers	1/2 inch regular gypsum wallboard	23/32 inch OSB subfloor, carpet padding & carpet
6	Parallel chord truss with glued connections, 14 inch deep @ 24 inch centers	1/2 inch regular gypsum wallboard	23/32 inch OSB subfloor, carpet padding & carpet
7	2 by 6s @ 16 inch centers with 2/12 pitch	1/2 inch regular gypsum wallboard	1 by 6 roof deck covered with asphalt shingles
8	2 by 10s @ 16 inch centers	3/4 inch plaster	1 by 6 subfloor & 1 by 4 finish floor
9	Roof truss with steel gusset plate	1/2 inch regular gypsum wallboard	7/16 inch OSB covered with asphalt shingles

Results

Flame passage through floor (min:sec)	Collapse (min:sec)
18:30	18:45
06:00	06:03
44:15	44:45
No fire penetration	26:45

Compartmentation

Compartmentation



Interior Finish

- Wood & plywood
- Drywall
- Wallboard
- Acoustical tile
- Insulating & decorative finishes
- Plastics

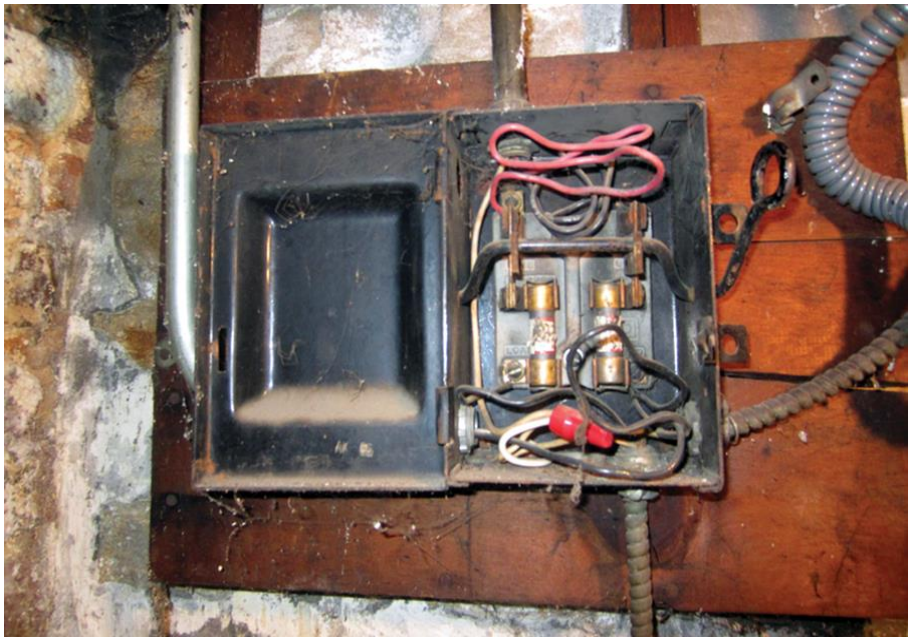
Interior Finish

-interior walls
-interior ceiling
-interior floors

- Contribute to fire spread
- Contribute to fire production of toxic smoke and gas
- Increase fire development speed

Building Services

Building Services



Electrical fires UNPLUGGED

PREVENT ELECTRICAL FIRES

WHAT'S THE RISK?

Electrical distribution equipment is the **fourth leading** cause of home fires.

The average dollar loss per electrical fire is **$73,000**.

In 71% of home electrical fires, the cause is **electrical failure of the equipment**.

The **leading causes** of heating equipment fires are: circuit wiring (copper); cord/cable for appliances; distribution equipment (e.g. panel boards, fuses, circuits)

Arc fault circuit interrupters (AFCIs) shut off electricity when a dangerous condition occurs. Ground fault circuit interrupters (GFCIs) shut off an electrical circuit when it becomes a shock hazard. GFCIs should be installed in bathrooms, kitchens, garages and basements.
Always use a licensed electrician.

How do I prevent an electrical fire?

- **Check cords for damage such as fraying or nicks. A damaged cord can expose wires and result in a potential shock or fire hazard.**
- **Avoid running cords under rugs, which can damage the cord and cause a fire.**
- **Extension cords should be used only as a temporary connection. If permanent wiring is required, have additional outlets installed by a licensed electrician. Extension cords should not be linked together - use an extension cord that is long enough to do the job.**
- **Air conditioners and other heavy appliances should be plugged directly into an outlet.**
- **Avoid overloading a circuit with "octopus outlets". If additional outlets or circuits are required, have them installed by a licensed electrician**

Fire Protection Systems

- Fire extinguishers
  - Maintenance
  - Use

Fire Alarm and Detection Systems

ARE THERE HEROES IN YOUR HOME?

SMOKE ALARMS SAVE LIVES

WHAT'S THE RISK?

Homes today burn up to **8x faster** than 50 years ago.

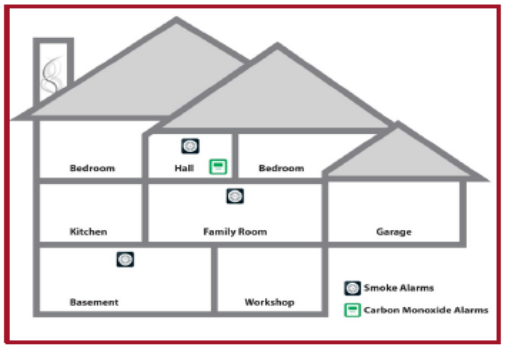
You may have less than **60 seconds** to escape a fire in your home.

There was no smoke alarm warning in **1 out of 3** fatal home fires.

WHAT CAN SMOKE ALARMS DO?

Only **working smoke alarms** give you the early warning you need to safely escape a fire.

Smoke alarms can increase your chances of surviving a fire by up to **50%**

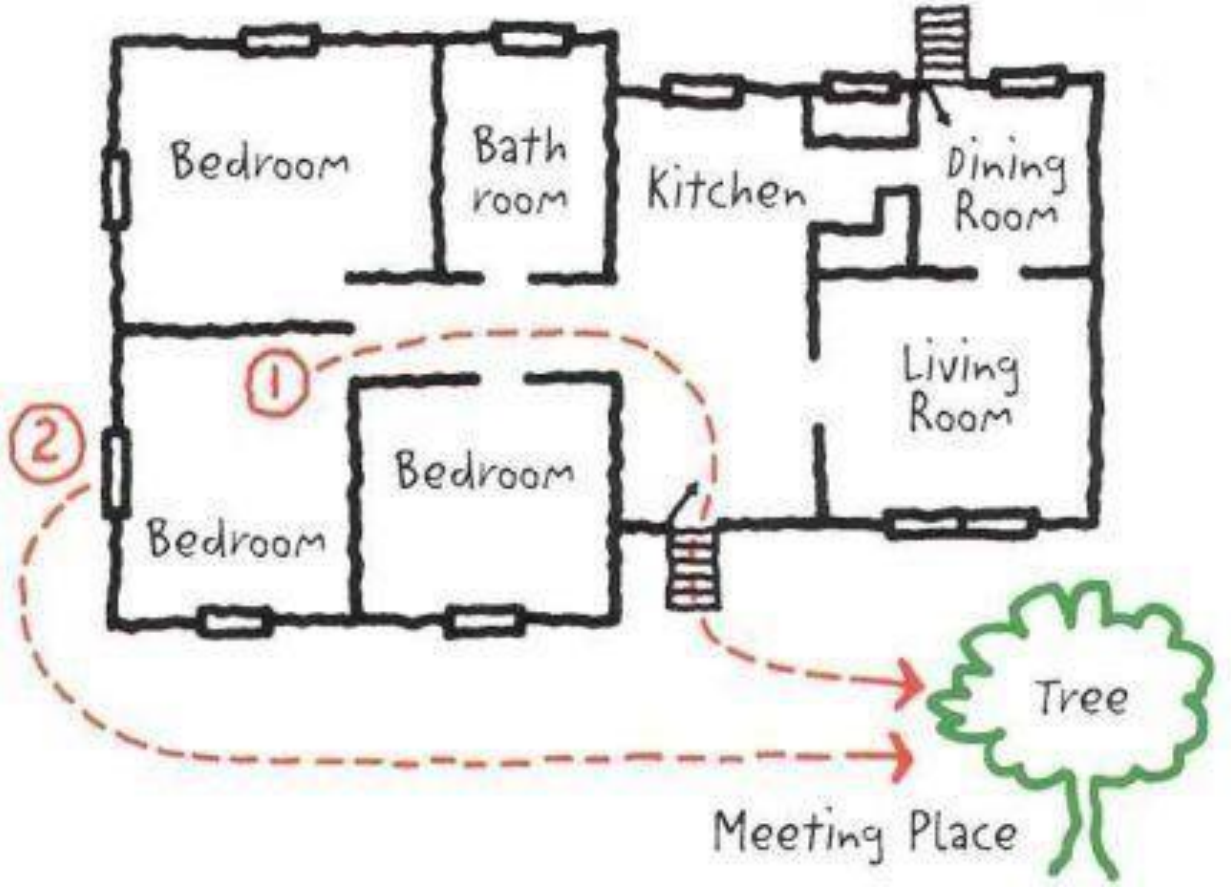


How do I protect my family?

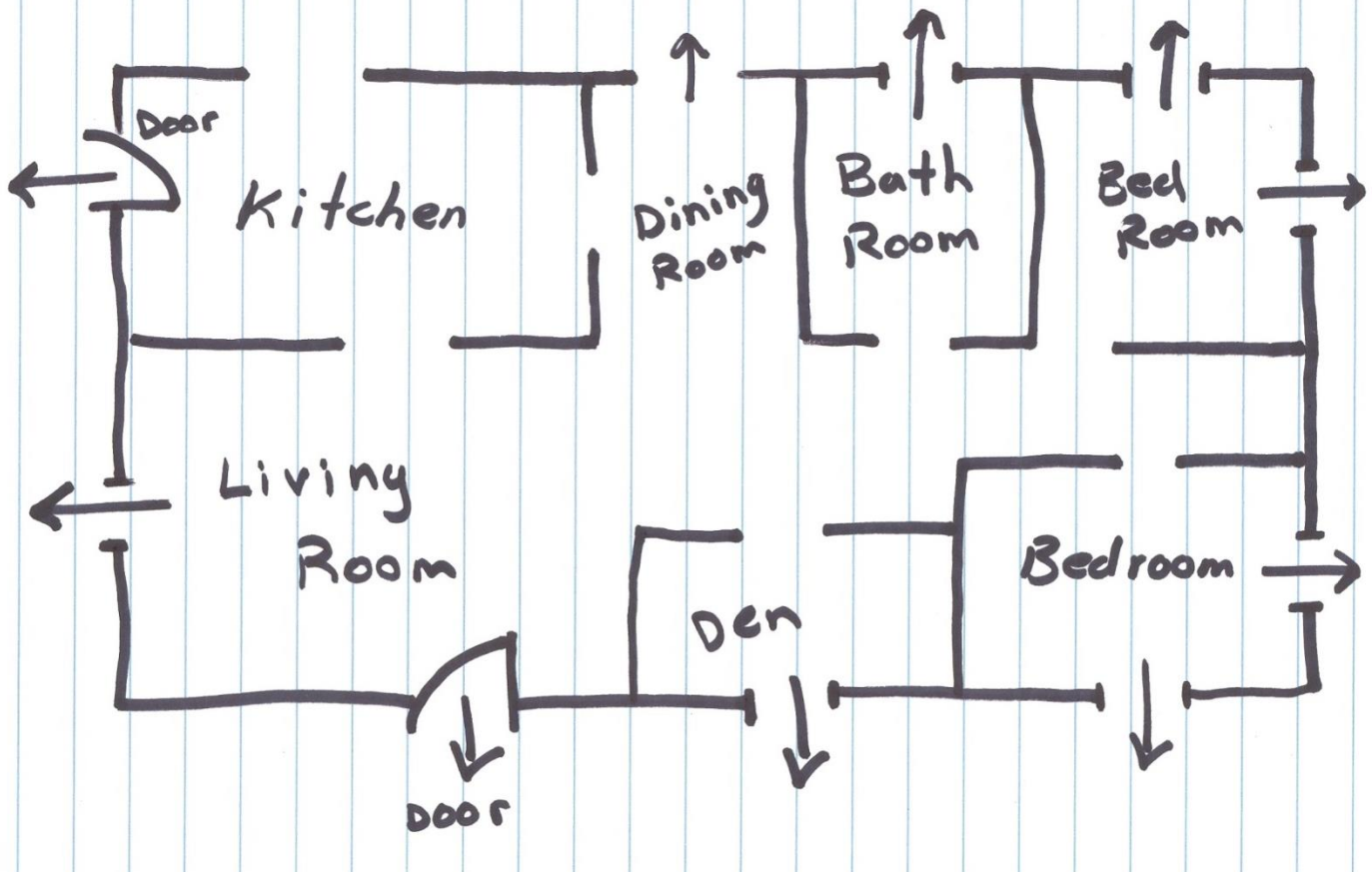
- Install smoke alarms on every storey of your home and outside all sleeping areas.
- For best protection, install smoke alarms in every bedroom.
- Test smoke alarms monthly and change the batteries at least once a year.
- Develop and practice a home fire escape plan.

Office of the Fire Marshal & Emergency

Home Fire Escape Planning



Identify All Possible Exits...



Involve everyone…

Help those who need help!

Determine who will assist:

- Small children?
- Older adults?
- Others requiring assistance to evacuate?

Smoke Alarm Installation

On the ceiling…

Smoke Alarm Installation

Or high on a wall…

"Recommended" Locations

- **Each bedroom***
- **Areas separated by a door from the required location**

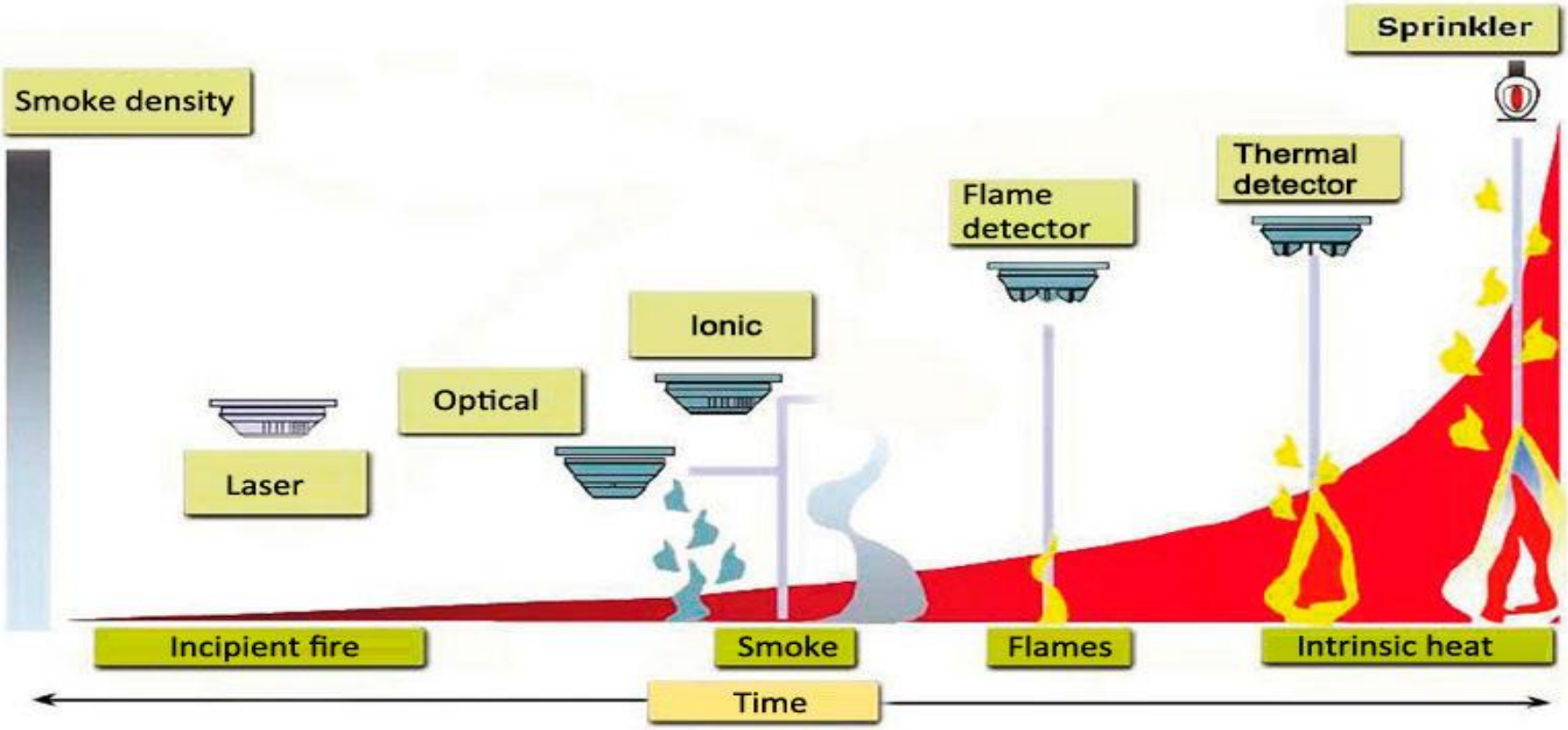
Locations To "AVOID"

- Kitchens
- Bathrooms
- Attics
- Garages
- Ceiling fans
- Areas of extreme temperature or humidity

Replacing smoke alarm batteries

Install new batteries at least once a year

Different detectors for different stages



Beat the Silent Killer

Make sure **YOUR** household is safe from carbon monoxide poisoning.

Ensure all fuel-burning appliances and vents in your home are inspected annually. Find a registered contractor at **COsafety.ca**

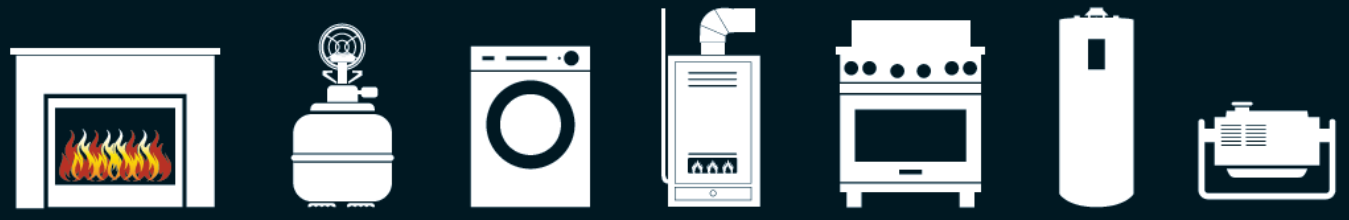
Install and regularly test carbon monoxide alarms

of all carbon monoxide deaths and injuries in Ontario occur in homes

Symptoms of carbon monoxide poisoning are similar to the flu without the fever

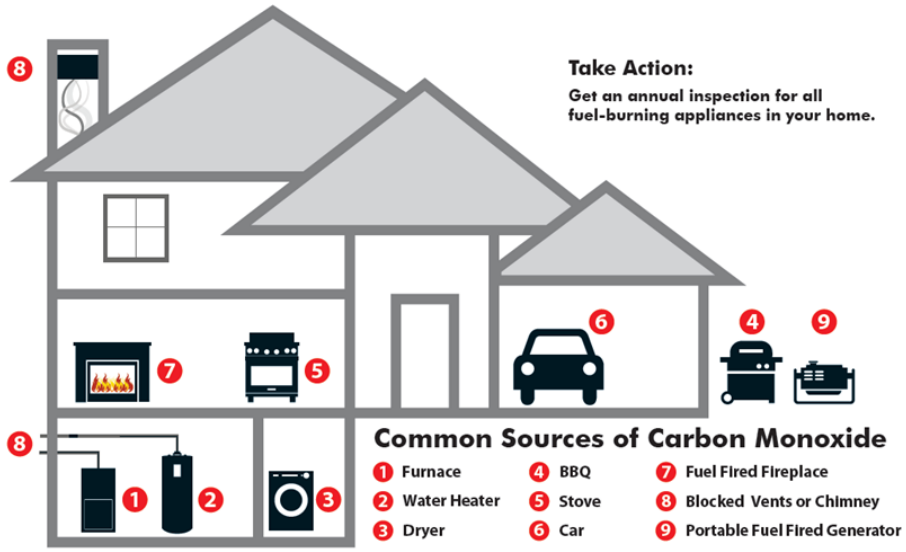
It is often referred to as The Silent Killer

Many Ontario homes have on average **4–6 fuel-burning appliances** that produce carbon monoxide



Carbon Monoxide (CO2)

Beat the Silent Killer
Carbon Monoxide Prevention



COSafety.ca

ontario.ca/firemarshal

ARE THERE HEROES IN YOUR HOME?

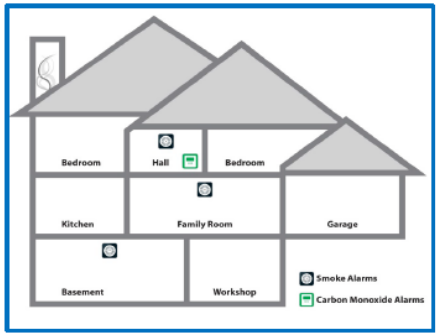
CARBON MONOXIDE ALARMS SAVE LIVES

WHAT'S THE RISK?

Over 65% of all carbon monoxide (CO) deaths & injuries in Ontario occur in homes.

Many homes in Ontario have on average 4-6 fuel-burning appliances that produce CO:

- fireplace
- gas dryer
- furnace
- stove
- water heater
- portable fuel heater



WHAT CAN ALARMS DO?

Only working CO alarms give you the warning of the presence of CO you need to keep your family safe.

Exposure to CO can cause flu-like symptoms.

If your CO alarm sounds and you or other occupants suffer from symptoms of CO poisoning, get everyone out of the home immediately. Call 9-1-1 or your emergency number from outside the building.

HOW DO I PROTECT MY FAMILY?

- Ensure all fuel-burning appliances and vents are inspected annually. Find a registered contractor at cosafety.ca.
- Install CO alarms outside all sleeping areas if your home has a fuel-burning appliance, fireplace or attached garage.
- For best protection, install CO alarms on every storey of the home.
- Test CO alarms monthly and change the batteries at least once a year. Replace alarms according to manufacturers' recommendations.

Home Escape Planning

- Develop a home fire escape plan.
- Practise your escape plan with everyone in your home.
- Make sure everyone knows two ways out of each room, if possible.
- Choose a meeting place outside, a safe distance from your home.
- Get out, stay out.

Wood Heating

- Burn dry, well-seasoned wood to reduce risk of excessive creosote build-up.
- Check chimneys and flue pipes often for creosote and soot build up
- Store wood outdoors, stacked in an open area
- Keep combustible materials a safe distance away from woodstoves and fireplaces.
- Allow ashes from woodstoves or fireplaces to cool before emptying them into a metal container with a tight-fitting lid. Keep the container outside.

WHAT'S THE RISK?

Heating equipment fires account for **1 in 10** home fires.

Heating equipment is the **second leading** cause of home fires.

In 29% of home heating fires, the cause is **lack of routine maintenance** of heating equipment.

The average dollar loss per heating equipment fire is **$53,000**.

The leading causes of heating equipment fires are:

1. **woodstoves**
2. **fireplace/fireplace inserts**
3. **chimneys.**

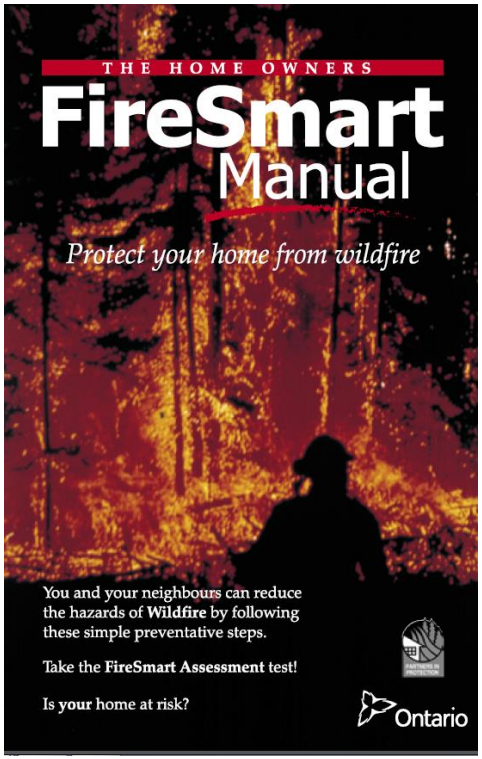
Statistics for Ontario between 2010-2014. Provided by the Office of the Fire Marshal and Emergency Management

How do I prevent a heating fire?

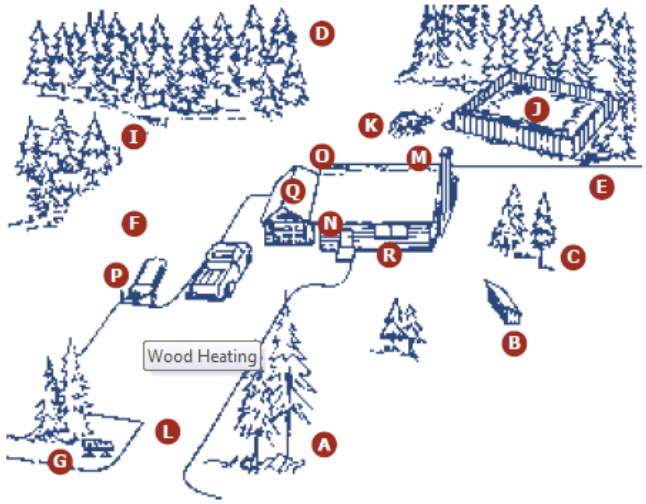
- **Have your heating system and chimneys inspected and cleaned annually by a qualified service technician.**
- **Ensure all outside heating vents are not blocked.**
- **Ensure woodstoves, fireplaces and fireplace inserts are installed by a qualified technician according to manufacturer's instructions.**
- **Always use a fire screen around the fireplace.**
- **Allow ashes from your woodstove or fireplace to cool before emptying them into a metal container with a tight-fitting lid. Keep the container outside.**

All homes with a fuel-burning appliance, fireplace or attached garage must have a working carbon monoxide alarm installed outside all sleeping areas.

Outdoor Burning



A Well Thought Out FireSmart Protection Plan



- **A** Prune tree branches to a height of 1 or 2 metres
- **B** Store fire wood well away from the house
- **C** Remove trees within 10 metres of house
- **D** Trees thinned (crowns don't touch) for at least 30 metres from the house
- **E** Branches are clear of power lines (if possible bury power service)
- **F** Remove brush, mow and water lawn
- **G** Your name and lot number clearly visible for quick identification
- **H** Driveway is wide enough to accommodate emergency vehicles
- **I** Provide additional emergency exit
- **J** Pond or cistern with emergency water supply
- **K** A FireSmart ash pit or burning barrel
- **L** Driveway clear of trees to a distance of at least 3 or 4 metres
- **M** Chimney installed to code complete with spark arrestor screens
- **N** All soffit vents and gutters should be screened
- **O** Porches and balconies screened, crawl spaces enclosed
- **P** Position propane tank with valve pointing away from house
- **Q** Fire resistant exterior roof and walls
- **R** Protective drapes and or shutters on windows to protect interior from radiant heat

Larger Building Fire Safety Plans

- Community halls
- Nursing homes
- Health care

Future concepts

- Lighter construction
  - Early failure
- Desire for increased energy efficiency
  - Airtight structures
- Increased use of plastics/synthetics
  - Higher heat, fast fire spread, aggressive fire behaviour, deadly gases

QUESTIONS?

. . . and Thank you!