False/Nuisance Alarms, Causes and Prevention

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False Alarm

A false alarm, also called a nuisance alarm, is the deceptive or erroneous report of an emergency, causing unnecessary panic and/or bringing resources (such as emergency services) to a place where they are not needed.
False Alarm

- A FALSE ALARM IS ANY FIRE ALARM SIGNAL UNRELATED TO A HOSTILE FIRE SITUATION WHICH RESULTS IN RESPONSE OF FIRE DEPARTMENT EQUIPMENT

  - (1) MAN-MADE CONDITIONS such as smoking, cooking, engine exhaust, construction or manufacturing processes, which originate from a non-hostile fire situation (a controlled combustion), OR

  - (2) THE EFFECT OF AN ENVIRONMENTAL CONDITION such as: steam, dust, high air velocity, insects, and the like, which impacts on a detector's principle of operation, OR

  - (3) FAILURE OF AN INTERNAL FIRE ALARM SYSTEM COMPONENT OR

  - (4) POOR DECISION-MAKING!
False Alarm Definitions Ottawa Fire Service

- **Alarm equipment malfunctions**: alarms activated because of an electrical or mechanical equipment failure.

- **Alarm equipment accidental**: alarms activated erroneously during testing or repair of the system where the Ottawa Fire Service has not been advised that such testing and repair is taking place and/or alarms in multi unit or commercial buildings from external conditions – steam, smoke, etc.
False Alarm Definitions Ottawa Fire Service

- **Human malicious**: alarms that are deliberately set by persons who understand that no fire emergency exists.

- **Human perceived emergencies**: fires called in by persons who believe that a fire emergency may exist, but the incident is determined to be unfounded upon inspection (i.e. steam emanating from a building in the winter that is misconstrued as a fire incident).

- **Human accidental activations**: Activations caused by persons erroneously setting off alarms by accidental contact with a sensor or activation device; a small child activating the device (pull station).
### Ottawa 2013 - False/Nuisance Alarms

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm equipment malfunction</td>
<td>2,544</td>
</tr>
<tr>
<td>Accidental alarm activation – human</td>
<td>1,523</td>
</tr>
<tr>
<td>Accidental alarm activation – due to alarm equipment</td>
<td>1,228</td>
</tr>
<tr>
<td>Perceived emergency</td>
<td>896</td>
</tr>
<tr>
<td>Malicious act</td>
<td>704</td>
</tr>
<tr>
<td>Other</td>
<td>335</td>
</tr>
<tr>
<td>CO equipment malfunction</td>
<td>648</td>
</tr>
<tr>
<td>Total false alarms</td>
<td>8,130</td>
</tr>
<tr>
<td>Total fire calls</td>
<td>22,611</td>
</tr>
</tbody>
</table>
Criminal Offence (Malicious)

- False Alarm of Fire

- Everyone who willfully and without reasonable cause, initiates a false alarm is guilty of
  - (a) an indictable offence and is liable to imprisonment for a term not exceeding two years; or
  - (b) an offence punishable on summary conviction.
There is a plethora of Codes and Standards that ALL must follow:

- Building owners and managers
- Safety systems designers
- Building Department
- Installing/Testing personnel
- Fire Service

Total knowledge of Codes and Standards is of paramount importance
Applicable Codes & Standards

NBC – National Building Code
OBC 2012 – Ontario Building Code
  – Additional Requirements Effective Jan. 2015
CAN/ULC-S524-06
Ontario Electrical Code
CAN/ULC-S537-04

NFC – National Fire Code
OFC – Ontario Fire Code
CAN/ULC-S536-04

Manufacturer’s Instructions
Fire Alarm Modifications & Replacement

- Modifications
  - In accordance with CAN/ULC-S537

- Replacement fire Alarm Control Unit
  - Building Permit
  - Qualified Electrician
  - CAN-ULC-S537 & S536

- Notification & Training
  - Alerting building occupants
  - Maintenance Staff
  - Contractor
Service/Installation Procedures

- Notify Building Owner/Manager
- Obtain all information relevant to system
- Notify Central Station
- Notify Fire Department
- Post Signs Stating Fire Alarm System Testing
System Origins of False Alarms

- Manual Pull Station
- Fire Detector
- Smoke Detector
- Heat Detector
- Flame
- Sprinkler
- Fire Alarm Equipment
- Wiring
Common False Alarm Causes

- Cooking fumes
- Steam/High Humidity
- Aerosol sprays
- Vapours
- Start up and or new heating system
- Dust (Drywall) and insects in detectors
- Smoking near detector
- Controlled processes that produce smoke or flame
- Water ingress
- Contractors involved with “hot work”
- Electromagnetic interference
- Mechanical Damage/Disruption
- Cosmetic Smoke
- Incense / joss sticks
- Electrical Storms
- Sprinkler system issues, water surges
- High air velocity
Construction

- Welding
- Painting
- Drywall (Dust)
- Water Leaks
- Damage to fire alarm wiring and devices
- Detectors not protected from dust
- Fumes & vapours
Service/Installation Procedures

- Notify Building Owner/Manager
- Obtain all information relevant to system
- Notify Central Station
- Notify Fire Department
- Post Signs Stating Fire Alarm System Testing
MILITARY

• Heat detector activated by space heater turned to max.
• Water leak
• Workers i.e. welding, soldering
• Duct detector activated by slipping belt overheating
• Insects entering smoke detector
• Candlelight dinner
Nuisance/False Alarms
   Accidental
   Construction/Maintenance
      - painting
      - sawing sanding wood
      - welding/soldering
   Dust, insects
   Water leaks
   Malicious
Hospital

- Sprinkler issues – low pressure
- Duct Smoke Detector – steam leak
- Maintenance/Cleaners – Steam cleaning, painting
- Patients activating pull stations
- Construction Related
  - Welding
  - Soldering
  - Water Leak, not always construction related
Industrial

- Water in conduit due to rain and also condensation
- Water leaks due to faulty roof
- Steam tripping smoke detector
- Maintenance, service and construction work

Various solutions – switched multi-criteria to photo, sealing of conduit
Education, safe work permits, hot work permits
Hotel

• Device – Photoelectric smoke detectors – alarms from dust, cleaning, drywall, lint
  • Solution – switched to ionization smoke detector
• Device – Pull station, malicious action
  • Solution – Covers c/w alarm, cameras & legal action.
• Device – Smoke alarm in rooms alarms from smoking
  • Solution – No smoking and fines for smoking in room
Recreational Complex

- Fire alarm activated by kitchen hood suppression system, system activated during cooking
- Pull station, technician replaced glass rod on live system.
- Pull station, rain water entered pull station
- Smoke detector, activated by hair straightener.
Any person who performs work on a fire alarm system shall have successfully completed a program or course acceptable to the Fire Marshal.
Service/Installation Procedures

- Obtain all information relevant to work to be performed
- Notify Building Owner/Manager of work to be done
- Post Signs Announcing timing of Fire Alarm System Testing
- Notify Central Station
- Notify Fire Department
Conventional Fire Alarm
Issues Sprinkler Supervisory/Alarm
Issues Pull Station

![Image of a fire alarm pull station](image)

PULL IN CASE OF FIRE
Problem
Pull Station Cover
Where approved, manual pull stations for a fire alarm system in a building may be relocated if there is a high incidence of false alarms in the building and

Where manual pull stations are relocated, alternate approved measures shall be used to maintain the level of life safety.
Camera
Tamper Dye
Other Pull Station Issues

- Temperature (Addressable Pull Station)
- Water entry
- Condensation
Issues Heat Detector
Heat Detector Rate of Rise & FT
Heat Detector Electronic
Problem

- Malicious Operation
- Ambient & Fluctuating Temperature
- Moisture/Water
- Air Velocity
- Physical Damage
Moisture Proof Heat Detector
Detector Guard
Smoke Detectors

- Ionization
- Photo-electric
- Duct Sampling
- Beam
- Aspiration
1964?
Ionization Smoke Detector
Photoelectric Smoke Detector
Smoke Detector Dust Cover
Requires Service?
A smoke detector whose sensitivity is not within the required operating range shall be cleaned in accordance with the manufacturer’s instructions, retested in accordance with Clause 6.7.4.1.3, and if still not within its rated sensitivity, replaced with a compatible smoke detector. (Refer to Appendix C3.1, Field Device Testing–Legends and Notes.)
CAN/ULC–S536
Acceptable methods of determining the smoke detector sensitivity are:
- Manufacturers recommended test instrument, equipment or method;
- Installed control units or transponders designed to test the sensitivity for individual smoke detectors; and
- Test instrument that provide calibrated sensitivity Standard for Smoke Detectors for Fire Alarm Systems, acceptable to the authority having jurisdiction.

OFC
(2) Despite Clause 5.7.4.1.6. of CAN/ULC–S536, “Inspection and Testing of Fire Alarm Systems”, a UL listed smoke detector sensitivity instrument may be used to conduct annual sensitivity testing of smoke detectors.
The following charts provide the details available for each of the participating manufacturers . . .

- EDWARDS
- HOCHIKI
- SIMPLEX
- SYSTEM SENSOR
- SIEMENS – CERBERUS – PYROTRONICS
Smoke Detector Sensitivity Tester
Detector Test Equipment
Sensitivity Display

Nd 44 Lp 5  Addr 4
Photo Detector
Current level: 811
Percent alarm: 0%
Smoke Detector Features

- Status Change Confirmation (Alarm - Confirmation / Alarm Verification)

- The use of an alarm verification circuit results in a significant reduction in false alarms.
  - NOTE: The use of alarm verification must be approved by the local authority having jurisdiction since it results in delay of the alarm signal.

- Adjustable sensitivity.

- Drift compensation

- Sensitivity compensation to environmental changes
Smoke Detector Variations

- Single Sensor, photo or ion
- Combination – two or more sensors operating independently
- Multi-Criteria – combination of ION / PHOTO / HEAT / CO / Flame in one device + microprocessor
- Multi-Sensor – similar to multi-criteria working as one and/or independently
- Algorithm
Smoke Detector Variations
Multi Criteria/Multi Sensor
Reducing (False) Alarm Success

- Statistics indicate that we have a reduction in false alarms.
- Statistics do not take into consideration that we have more systems and aging systems.
- Can we further reduce false alarms, absolutely.