Fire Safety is Everybody's Business

President's Message

I consider it a great honour to be elected President of the Canadian Fire Safety Association (CFSA) and I thank you, the members, for electing me to this position. I will endeavour to give the best of my ability to the CFSA during my term in office.

It was with regret and sadness that the resignations of Mark Regimbald and Brian Murphy were accepted by the Board. During Mark's time on the Board he chaired the Chapters committee. He has now been promoted to the position of Director of Facilities at the Greater Toronto Airport Authority. Brian has been on the CFSA Board since 1990 serving as chair of the Chapters and Membership committees, Treasurer on two occasions, and as President and Past President, while establishing and maintaining CFSA's web site. Brian has been transferred to Underwriters' Laboratories of Canada (ULC), Ottawa office. I thank both for their service to CFSA.

I would like to take this opportunity to welcome new Board members – Allison McLean, Nadine International, Sandy Leva, ULC, Matt Osburn, CASA, and Craig Cunningham, OMFPOA and I look forward to working with them. Thank you for joining the Board.

Congratulations and thanks are due to our Education Forum committee under the chair of Rick Florio. Your hard work in arranging this Forum made it a very successful event.

My interests in Fire Safety lie with the educating of people in life safety, emergency planning and fire prevention. During my 16 years as a member of CFSA, I have gathered invaluable information from our Dinner Meetings, Technical sessions and Education Forum. Over these years I have been, and continue to be, in a position to forward this information to members of the public.

Public and industry interest in fire safety has been heightened by recent disasters, which act as reminders that we are all at risk. As such the CFSA, by way of our Dinner Meetings, Technical seminars and Education Forum, will continue to assist in the unending task of fire safety education.

Alan Kennedy
CFSA President

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Editorial

Editor's Note

It brings me great pleasure to present the first official CFSA newsletter for the 2004/2005 year and the first "Editor's Notes" column. Over the last year, the CFSA newsletter committee has worked diligently to provide columns, dinner and technical session reports and articles that are of interest to the membership, and this edition is no different.

Reviews of the presentations from the annual education forum are featured in this edition, including photographs from the Toronto Fire Service Fire Academy Demonstration, graciously provided by Chris Wood of Response Training Associates. In addition, reviews from the March dinner meeting on Automatic Sprinkler Systems conducted at ULC and the March technical session on the new ULC Standard CAN/ULC-S561 have been provided.

The feature article this month is on Bill C-45, "An Act to Amend the Criminal Code of Canada", which discusses the legal requirements of employers to provide a safe working environment for their employees.

The newsletter is only one way the CFSA continues to fulfill its mission to disseminate fire and life safety information. We look forward to, and appreciate, any comments, article suggestions or submissions that you as corporate, individual, student or associate member might have.

Yours truly,

Janet O'Carroll, C.E.T., CFPS

scheduled events

CFSA Dinner Meetings	Technical Sessions
September 22, 2004	**October 6, 2004**
October 20, 2004	**November, 2004** (TBD)
November 17, 2004	**December, 2004** (TBD)

Other Events for 2004

September 17-20, 2004
42nd Annual Conference, 2004
TIAC
Winnipeg, Manitoba

September 26-29, 2004
Fire Rescue Canada
Annual Training and Education Symposium
St. John's, Nfld

October 3-6, 2004
Ontario Building Officials Association
48th Annual Meeting and Training Session
Kitchener, Ontario

October 3-9, 2004
Fire Prevention Week

visit our Web site at

www.canadianfiresafety.com

for all the latest news and events, including online reservations for:
Dinner Meeting reservations, technical sessions, and much more.

Smoke Control
Design and Commissioning

On February 18, 2004, Mel James of CFMS Consulting presented the topic of smoke control, design and commissioning, referencing the new terminal facility at Lester B. Pearson International Airport in Toronto.

Smoke control is an integral part of life safety and serves as an aid to firefighters during a fire emergency. Since the airport is a federal building, it must comply with the requirements specified in the National Building Code of Canada (NBC), including those for smoke control.

The requirements within the NBC are essentially defined as two categories:

- Smoke control as an integral part of life safety (part of the fire alarm system),
- Smoke control as an aid to the firefighters (not part of the fire alarm system).

The new terminal has large area of interconnected space and contains approximately 240 air handling units (ahu). There are between 1.7 (for larger areas) and 4.7 (for smaller areas) air changes per day. The NBC requires a minimum of 4 air changes per day; however, a lower air volume is permitted due to the large volume of air that the central processor handles. The smoke control system for this facility consists of:

- Fan shut down upon activation of the fire alarm system,
- Stairwell pressurization fans that start upon activation of the fire alarm system,
- **Smoke control** (aid to firefighters), **pressurization** and **evacuation** handled by the building management system (BMS).

Smoke Control (aid to firefighters)

The smoke control system has both automatic and manual operations. Return fans and selected exhaust fans are used to evacuate smoke. Supply fans are used to pressurize the surrounding areas.

Smoke Control Pressurization

Upon selection of the first zone to evacuation mode, the surrounding areas will automatically go to pressurization mode. Once selected, the outside air dampers will open, return dampers will close, exhaust dampers will remain closed, and supply fans will start in order to pressurize the surrounding areas.

Smoke Control Evacuation

Smoke control evacuation is initially selected by the fire department (from an area which to exhaust the smoke). Once selected, all ahu's in that zone will shut off, exhaust dampers will open, return dampers will close, outside air dampers will remain closed, return fans will start and selected exhaust fans will start to evacuate smoke from the area.

Smoke Control Design (Regarding Integration with the Fire Alarm System)

In the design of the smoke control system, the building automation system and fire alarm manufacturers will develop protocols for transferring point data. Data is transferred from the fire alarm system to the building automation system only, because building automation systems are not ULC or UL listed or approved.

Next, interconnectivity shop drawings will be prepared, followed by launch tests and field tests to verify that the building automation system receives the fire alarm and initiating zones. The building automation system manufacturer will use initiating zones to identify which smoke detector zones are activated.

Smoke Control Commissioning

During the smoke control commissioning phase, the operation of each ahu and each zone in evacuation and pressurization mode is verified. In addition, the integration points from the fire alarm system are verified.

Once verification of the system has been completed, a final test is conducted in conjunction with the fire alarm system to ensure the operation of all devices.

The CFSA would like to thank Mel James for his interesting and somewhat controversial presentation on smoke control, design and commissioning. Many questions and discussions followed in the subsequent weeks, as a result of this topic.

Automatic Sprinkler Systems 101:

A Refresher For All Fire Protection Enthusiasts

This article was provided by Geoff Bretzler, a recent graduate from the 3-year Fire Protection Engineering and Technology degree program at Seneca College of Applied Arts and Technology.

On March 17, 2004, Mr. John Breen & Mr. Joel Lifschitz, who both work for the Insurer's Advisory Organization (IAO), discussed and demonstrated automatic sprinkler systems at Underwriters Laboratory of Canada (ULC). The IAO specializes in providing risk information, loss prevention and control services, commercial inspections, and other specialized risk management and insurance consulting services.

John and Joel began the presentation by discussing the first automatic sprinkler system that was installed in England in 1723. It consisted of wooden barrels filled with water and located in the building's rafters. The barrels were surrounded by gunpowder and strategically located fuses. The imaginative mind responsible for devising this system anticipated that a fire within the building would ignite one of the strategically placed fuses which would in turn cause the gunpowder to explode. The explosion would shatter one or more of the barrels, causing water to fall from the rafters. Such a system was certainly ingenious, but not without its critics. Even in 1723, when child labour drove the economy, and women were unable to vote, there were many who questioned the logic of scattering gunpowder throughout a building's rafters. Not surprisingly, the "wooden barrels and gunpowder" approach to fire protection was never terribly popular, but it did prompt building owners to explore other active, built-in methods for reducing fire's destructive potential.

In 1852, the first perforated pipe system was installed. This system was manually operated and required water to be pumped into the piping once fire was detected. This system was not able to direct water discharge to a specific area within the building, but it was a considerable improvement over the "wooden barrels and gunpowder" method.

The perforated pipe system begat the perforated pipe and solder system, in which the holes in the pipe were filled with solder. This advancement occurred in the 1870's, and enabled directed water discharge above a fire. Then, in the 1880's, Grinnell developed a lever-operated sprinkler, and in so doing, ushered in the modern age of automatic sprinkler system protection.

John and Joel explained that in the early days, sprinkler heads produced coarse sprays, which directed water down towards the floor, as well as directed up towards the ceiling. This discharge pattern was an intentional feature and it stemmed from the belief that some water should be directed upwards to prevent fire from engulfing ceiling structures. This discharge-pattern philosophy prevailed until the early 1950's until it was decided that the water discharged upwards, was being wasted. Consequently, sprinkler deflectors designed after this change in philosophy directed all of the discharged water down to the floor.

Over the last thirty years there has been a dramatic proliferation in the number of sprinklers available on the open market; including a variety of characteristics that can now be selected from, such as; temperature rating, response time, exterior finish and range of coverage. Similarly, there are a variety of different types of automatic sprinkler systems, which can satisfy a range of wants and needs, such as **wet, dry, pre-action and deluge type systems.**

The most common type of automatic sprinkler system is a wet system. A wet sprinkler system contains water within the distribution-piping network (mains and branch lines) and the sprinkler heads are closed. A wet system has a faster response time than any of the other automatic systems because the system is always primed (there is always water in the system's piping). Once a sprinkler head is activated, water is discharged.

Wet systems are more common than other types of systems because they are less expensive and they are less prone to problems. Furthermore, the testing and maintenance required for such systems is relatively easy in comparison, and corrosion is not as severe as it is with other systems. However, there are disadvantages to wet systems which render them inappropriate in some circumstances, such as locations where temperatures may fall below freezing, and where water damage is a serious concern (art galleries, rare book libraries).

Since wet systems are not appropriate for all situations, three other types of systems were devised: dry systems, deluge systems, and pre-action systems.

Dry systems are typically found in locations where the temperature may fall below freezing. The sprinkler heads in a dry system are closed, and the mains and branch lines contain pressurized air or nitrogen. In the event that temperatures fall below 0°C, a dry system will avoid the damage that might befall a wet system. However, dry systems are more expensive than wet systems, are more prone to the effects of corrosion and respond slower to fires than wet systems. This response time difference stems from the necessity of air or nitrogen to be released sufficiently before water can enter the system. Dry systems contain dry pipe, differential valves. The pressure on the system side of the valve determines whether the valve is open or closed. The surface area on the top of the valve (system side) is greater than the surface area on the bottom side of the valve (city side). Consequently, the air pressure on the system side of the valve can be lower than the water pressure on the city side, yet the valve will remain closed. (Typically, the air pressure on the system side should not exceed 50 psi as too much air pressure can damage the valve.)

A dry pipe valve contains an intermediate chamber that is not pressurized. Once the valve opens, the intermediate chamber is exposed and water enters. The intermediate chamber is connected to the system's alarm line. Once water enters the intermediate chamber it triggers the various alarms attached to the system (water motor gong, water flow switch, etc.).

When testing a dry system, it is important to determine the amount of time for water to reach the most remote sprinkler head; in accordance with NFPA 13, "Standard for the Installation of Automatic Sprinkler Systems", water must reach the most remote sprinkler within 60 seconds. Quick Opening Devices (QOD), like exhausters or accelerators, enable air or nitrogen within the system to be rapidly evacuated, thereby allowing the water to enter the system's piping sooner. These devices can often allow dry systems that would otherwise fail to satisfy the NFPA 13 time requirement, to meet the 60 second rule.

Deluge systems are used in occupancies where the hazard is considered severe and there is danger that a fire might spread quickly across an entire floor area. The sprinkler heads in deluge systems are open and the branch lines and mains contain unpressurized air. Deluge systems require activation of the local fire detectors for valve operation. Once a fire detector is activated, the deluge valve opens and water discharges from all the sprinkler heads connected to the system. These systems provide a lot of water, and they can be used in areas where freezing might occur. Furthermore, deluge systems can be adapted to discharge foam. The disadvantages of such systems are the considerable maintenance and testing costs (necessary because the system utilizes fire detectors for actuation). In addition, the large amounts of water that these systems discharge can lead to problems related to runoff contamination.

Pre-action systems have closed sprinkler heads and pressurized air within the mains and branch lines. These systems are relatively rare, but they may be found in occupancies where water damage could lead to property damage (i.e. computer rooms, etc). Before such a system will discharge water, both a sprinkler head and a fire detector must be activated. The opening of a sprinkler head will enable the pressurized air within the piping to escape (the pressurized air is present for monitoring purposes), but the fire detector must also be triggered to unlock the mechanical device which holds the pre-action valve closed. Only once both of these things have occurred will water flow from the sprinkler head.

In addition to the four types of automatic sprinkler systems discussed above, John and Joel briefly discussed fire cycle systems, antifreeze systems and tail-end dry pipe valves.

- FIRE CYCLE SYSTEMS: automatically cycle on and off to reduce property damage caused by water.
- ANTIFREEZE SYSTEMS: are generally used where there is a small, unheated area (less than 40 gallons) in an otherwise heated building (i.e. parking garage ramp).
- TAIL-END DRY PIPE VALVES: are fed from a wet system (where only a few sprinkler heads are involved) and all the components are identical to a normal dry pipe system.

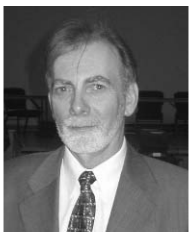
Once John and Joel had finished the lecture portion of their presentation, the assembly of fire protection enthusiasts, were directed towards the laboratory area of the ULC facility, where they were treated to a live display of automatic sprinkler systems in action.

John and Joel explained and demonstrated the differences between wet and dry pipe valves. Various sprinkler heads were activated to demonstrate the amount and pattern of water discharge. This laboratory portion of the program was unquestionably the evening's greatest highlight. Yet, upon leaving the ULC facility and walking towards our various cars, more than one fire protection enthusiast was overheard bemoaning the fact that we were not shown a live demonstration of the "wooden barrel and gun powder" approach to fire protection. Aside from this one lament, those in attendance were treated to a magical and informative evening, and all went home comfortable in the knowledge that automatic sprinkler systems are protecting our future.

The CFSA would like to thank both ULC for providing the use of their facility and John Breen and Joel Lifschitz of IAO for their knowledgeable and informative presentation.

Fire Alarm System **Testing and Verification**

This article was provided by Rocky Mino, Assistant Technical Consultant for Leber/Rubes Inc., Life Safety Services Group.



The presentation regarding fire alarm system testing verification presented by Dave Goodyear, C.E.T. D. touched on the aspects of CAN/ULC-S537 and S536 that will be changing in the editions to be released in the summer of 2004.

CAN/ULC-S537

CAN/ULC-S537, "Standard for Verification of Fire Alarm Systems" has undergone many revisions in the new edition.

Minor Revisions

Several new definitions have been added including annunciator, display and control centre, transponder, response time fault isolation module and degraded mode capability.

Sections were clarified regarding distributed fire alarm systems and multiple annunciators, mainly with respect to documentation.

The wording of Control Panel has been clarified, for example the previous wording, "Input circuit trouble" will change to "Input circuit supervision fault causes a trouble indication operation".

DCL's (data communications links) were also discussed thoroughly in order to clarify them. Other clarifications were added in regard to control panels and ancillary devices.

New Testing Requirements

New testing requirements were added for the purpose of confirming that isolation modules function, and for testing of stand-alone capability. Response times of the fire alarm system were also altered to include the following:

OUTPUT	FIRST OPERATION (seconds)	SUBSEQUENT OPERATION (seconds)
Audible and Visual Signals	10	10
Remote Monitoring Connection	10	N/A
Releasing Device start	10	N/A
Required Annunciation	10	10
Central Control Facility	10	10
Ancillary Circuit	10	30

There now exists a requirement for audible devices in residential suites to be inspected and tested in order to confirm audibility. Where signal circuit fault isolation devices are used in suites of residential occupancies, they shall be inspected and tested to confirm operability.

Major Revisions

A new section has been added for "Large Scale Networks", and as well, new requirements for audibility have been added, which include recording the sound pressure level from the most acoustically remote location within each fire alarm zone, and for each typical suite configuration in residential facilities, including sleeping rooms.

In residential facilities where signal circuit serves more than one suite, a wire-to-wire short circuit fault shall be imposed on each link in the normal (supervisory–non-alarm) and alarm conditions. In addition, in all cases the wire-to-wire short shall not interfere with the ability of devices in other dwelling units, public corridors or suites to sound the alarm.

Finally, items added to the appendix include sound level measurement and measuring meters, measuring methods, the selection of the test suite, and ambient sound level measurements.

CAN/ULC-S536

CAN/ULC-S536, "Standard for Inspection and Testing of Fire Alarm Systems" has also undergone many revisions in the new edition. Firstly, the initial testing and audit section has been eliminated from the document and documentation is now required to be on site for use by building personnel. A better description of the testing of air duct smoke detectors is also provided.

New Testing Requirements

There were no changes to requirements regarding daily or monthly inspection and testing, however, annual inspections and tests must be documented in a report similar to the appendix.

Audible signal devices in residential suites must be inspected and tested for:

- Proper installation,
- Evidence of tampering,
- Intelligibility of voice messages,
- Audibility of the alert and/or alarm signals and voice communication messages,
- Accessibility and clear identification of means of silencing,
- Operation of the silence switch for in-suite signal.

All field devices shall be tested on a yearly basis, except in the event that a device cannot reasonably be made accessible for safety considerations such as continuous process operations, energized electrical equipment or areas with radiological concerns. The non tested device and its location must be recorded and identified as inaccessible in the annual report. Regardless, all field devices shall be tested at least once every two years.

Also new is the use of a battery capacity meter in place of the previous lengthy testing. This testing requirement was changed because it was found that the lengthy testing was not being completed. If the batteries are replaced this testing requirement is eliminated, a fact that is made clear in the new standard.

Added to the test sheets will be the battery manufacturer's date code and in service date, along with a separate record sheets for the inspection and testing of the operability of each addition annunciator where multiple annunciators are installed. Data communication links must now be tested for a trouble condition when an open circuit is present on the DCL.

Finally, the appendix has been revised, modifying the diagram for the heat detector test apparatus.

The CFSA would like to thank David Goodyear for his very informative update on the modifications and alterations to both CAN/ULC-S537 and S536.

Code Corner

Public Review of ULC Standards

The following ULC Standards are available for public review for 60 dates from the date they were posted (June 6, 2004):

- CAN/ULC-S612, First Draft, Proposed Fourth Edition, "Standard for Hose for Flammable and Combustible Liquids".

- CAN/ULC-S620, First Draft, Proposed Third Edition, "Standard for Hose Nozzle Valves for Flammable and Combustible Liquids".

The review period for both of these standards ends August 2, 2004. For more information, visit their website at http://www.ulc.ca/standards/public_comment.asp.

New Director of Facilities for the GTAA

The CFSA would like to congratulate Mark Regimbald of the GTAA for his recent promotion from Fire Chief to Director of Facilities.

As we wish Mark the best of luck in his new position, we also say goodbye to a valuable Director. Mark was a director for the CFSA for the last term, recently chairing the chapters committee.

Fire Protection of Electrical Wiring

Peter Papadakis, P.Eng of Toronto Urban Development Services; Nick Carter, P.Eng. of H.H. Angus and Barry O'Connell, P.Eng. of Tyco Thermal Controls gave a presentation on various aspects of fire protection of electrical wiring, including an overview of the regulating standards and design and installation issues.

Wiring is tested to establish its ability to retain electrical properties under test conditions. Wiring is tested for circuit integrity and IR properties using one of two broad types of fire tests: North American or European.

North American Testing

In North America (US & Canada), a building materials fire test (UL2196 or ULC S139-00) is used to test cables based on the standard time temperature curve, which can include an optional impact hose stream test (optional at ULC only). The cables/wiring are tested for mainly 2-hour fire ratings, however 1-hour fire ratings can be tested for as well.

European Testing

In Europe (England, Germany, France, etc.), many laboratory tests (BS8434, EN50200, DIN4102, etc.) are used to test cables at varying temperatures for various levels of fire rating.

Fire protection of electrical wiring is mandated by the OBC, but can also be mandated by CSA 282-00, "Standard for Emergency Electrical Power Supply for Buildings (not currently referenced in the OBC), the authority having jurisdiction or by the engineer responsible for the design.

The following chart describes which types of wiring require a fire rating under the various codes and standards:

Wiring	OBC	CSA282 (2000)	NBC	NFPA	British Standards
Up to automatic transfer switches	No	2 hrs, all bldg types	No	2 hrs, all bldg types	2 hrs, all bldg types
To emergency lighting panels	2 hrs, high-rise bldgs only	2 hrs, all bldg types	No	1 hr or sprinklered	Fire resistant wiring or rated enclosure
To essential life safety loads (excluding lighting)	1 hr for FD elev & 2 hrs for hr bldgs	2 hrs, all bldg types	1 hr, high-rise bldgs only	1 hr or sprinklered	2 hrs, all bldg types
To required egress lighting	No	2 hrs, all bldg types	No	No	1 hr, all bldg types

There are ideally four (4) methods of achieving the code and standards requirements for fire protection of electrical wiring: running the cables below a floor slab, concrete encasement, running cables through a protected space, or using fire rated cables.

Running cables below a floor slab – The thickness of the floor slab plus enough additional depth of cover will provide adequate protection of the cables. However, wiring should be suitable for wet conditions.

Concrete encasement - In the past, 2 in. of concrete has been considered adequate protection for cables, however, this can be problematic for two reasons: wiring can end up too close to the top or bottom of the slab during installation, decreasing the level of protection, and circuits can be cut when holes are drilled through the concrete.

Running cables through a protected space – Running cables through a protected space works well if the space is large enough to accommodate a riser and does not contain any materials that could become a fire hazard. Very small protected spaces can be a problem, as they are constructed to prevent the spread of fire and smoke and may not provide enough air circulation to keep the cable insulation cool enough.

Fire rated cables – Fire rated cables have a proven fire rating, are labeled accordingly and are independent of other construction, which may not be of adequate quality. Also, the fire rating cannot be affected on site short of destroying the cable itself.

It is obvious that the protection of wiring for essential emergency systems from fire exposure is important in order to promote their continued operation during a fire emergency. Advances in technology, testing and standards relating to the protection of wiring will only help to increase the reliability of these essential systems in the future.

The CFSA would like to thank Peter Papadakis, Nick Carter and Barry O'Connell for their cooperative and insightful presentation.

Emergency Power Systems: A Practical Review

Bill Powell, P.Eng of McGregor Allsop presented the topic of Emergency Power Systems respective to CSA C282-M89, "Standard for Emergency Electrical Power Supply for Buildings" as referenced in the Ontario Building Code (OBC).

CSA C282-M89 covers the design, installation, operation and maintenance of equipment required to provide emergency electrical power when the normal power source fails. The OBC specifies the types of systems that require emergency power. They include (but not limited to):

- Fire alarm system and voice communication,
- Elevators,
- Fire pumps,
- Smoke control,
- Emergency lighting.

Emergency power is generally provided by an engine driven generator set located on site in a rated enclosure. The generator is required to start and provide emergency power to the fire alarm and voice communication system and emergency lighting within 15 seconds of normal loss of power, and to connect all of the remaining essential loads in 2 minutes or less.

The following are some important considerations when installing a generator:

- Providing adequate space around the generator for maintenance, repair or removal.
- Including vibration in the structural design and vibration isolation where required.
- Providing adequate ventilation to ensure the safe operating temperature of the engine.
- Ensuring that the rated enclosure does not reach a temperature less than 10°C.

There are many other design and installation considerations that can help to alleviate common pitfalls experienced in the field, such as:

- **Engine** – Discharging exhaust away from air intakes and people, insulating the exhaust to protect building components and people, providing a muffler to reduce disturbances, providing a drain to remove water and allowing for thermal expansion and vibration.
- **Fuel Supply** – Providing enough fuel for a minimum of 2 operating hours, providing a day tank for each engine permitting 4 hours of full load operation, providing automatic filling of day tanks from a main fuel supply, and fire protecting a propane fuel supply.
- **Control Panel** – Providing automatic remote start capability and run-off-automatic switch.
- Storage Batteries – Batteries should provide sufficient capacity for two compete crank cycles at 10C with a battery end voltage not less than 80%, and provide an automatic battery charger capable of charging a discharged battery to 80% in 4 hours and to 100% in 12 hours.
- **Generator Controls** – Should include overcurrent protection, voltmeter/ammeter phase selector switches, current/potential transformers, frequency meter, automatic voltage regulator, voltage adjust control and elapsed time meter.
- **Transfer Switches** – The voltage rating should be suitable for the circuit connected, current rating not less than the normal transferred load, capable of withstanding transients and have a manual transfer capability and bypass.

In order for the installation to be accepted, several tests must be passed, including opening the main breaker (cold start), full load testing (4 hours at 100% and 1 hour at 110%), cycle crank tests (2 cranks at least every 60 seconds), testing safety shutdowns and demonstrating that the ventilation system will maintain the specified room temperature. Once the system has been accepted, monthly and annual testing must be completed, including operating the generator for 60 minutes under 30% load (monthly test) and operating the generator for 2 hours on full load (annual test).

The CFSA would like to thank Bill Powell for the overview of CSA C282-M89 requirements and discussion of practical design and installation considerations for emergency power systems.

TOP TEN PROBLEMS

10. Interfacing to Elevator Controllers
9. Transfer Switch Problems
8. Fuel Delivery Problems
7. Exhaust Problems
6. Inadvertent Overloading
5. Generator Fails to Operate Reliably
4. Inadequate Cooling Air
3. Operator Error
2. Battery Problems
1. Running Out of Fuel

CFSA Annual Education Forum April 21, 2004

The CFSA Annual Education Forum 2004 proved to be a very successful day packed with informative sessions including a fire service perspective of the blackout in 2003, a tour of the Toronto Fire Services Fire Academy and demonstration, overview of emergency power systems, panel discussion on fire protection of electrical wiring, an update on Bill 124, and a review of the forthcoming changes to CAN/ULC S537 and 537.

This year's forum would not have been possible without the support and contribution from the Toronto Fire Services. We extend our gratitude to all those involved, including Deputy Chief Rick Simpson, District Chief Scott Cowden and District Chief Peter Sells.

Special thanks goes to Jon Winton, Rick Simpson and Rick Florio of the CFSA Education Forum and Tradeshow Committee for bringing us yet another successful seminar.

We would also like to thank the following companies who donated door prizes:

- NFPA International,
- Firetronics 2000 Inc.,
- Toronto Fire Services,
- Underwriters' Laboratories of Canada (ULC).

CFSA Scholarships

The Canadian Fire Safety Association, Education and Scholarship Committee has worked diligently over this last year to secure adequate funding for scholarships that are given out to the top fire protection students each year.

Three notable and generous fire protection consulting companies stepped forward to donate funds for the scholarships:
- Leber/Rubes Inc.
- Randal Brown & Associates
- Nadine International Inc.

Due to the assistance from these three companies, the CFSA is able to offer five substantial scholarships, to be given to the top fire protection students under the following categories:

CFSA Leber/Rubes Inc. Award

Presented to: Ashley Konidis – Seneca College
Presented to a TOP year 2 STUDENT of a 3 year Fire Protection Technology Course with exceptional overall skills in Fire Alarm Technology and an academic proficiency of 3.25/4.00.

CFSA Randal Brown & Associates Award

Presented to: Pavlo Babayev – Seneca College
Presented to a TOP year 2 STUDENT of a 3-year Fire Protection Technology Course with exceptional overall skills in Codes/Standards Technology and an academic proficiency of 3.25/4.00.

CFSA Nadine International Inc. Award

Presented to: Michael Thomas – Seneca College
Presented to a TOP year 2 STUDENT of a 3 year Fire Protection Technology Course with exceptional overall skills in Fire Suppression Technology and an academic proficiency of 3.25/4.00.

CFSA Fire Safety Award

Presented to: Jake Meder – Seneca College
Presented by the CFSA and funded by Leber/Rubes Inc., Randal Brown & Associates and Nadine International Inc. to the TOP STUDENT having completed year 2 of a 3-year Fire Protection Course with outstanding leadership, motivational and technical skills and overall academic proficiency.

CFSA Peter Stainsby Award

Presented to: Rocky Mino – Seneca College
Presented by the CFSA to the TOP GRADUATE of a three-year fire protection technology course, who has excelled with outstanding leadership, motivation and technical skills, and overall academic proficiency.

Due to the unfortunate timing of the annual education forum, only one student was able to attend the awards presentation. We apologize to those students who were not able to attend the forum but we will be extending an invitation to all the students, sponsors and CFSA members to attend the September dinner meeting, where an additional awards ceremony will take place.

Since the inception of the CFSA, and for years to come, we have and will continue to support those top students who show leadership, motivational and technical skills entering into the field of fire protection in order to continue to create a safe environment for Canada.

Blackout 2003:
A Fire Service Perspective

Scott Cowden, District Chief for the Toronto Fire Service (TFS) presented the perspective of the fire service on the significant electrical power failure that occurred in the summer of 2003 in the northeastern US and portions of eastern Canada.

Like many other fire service personnel, Scott was at home on August 14, 2003. In attempting to turn on his computer, he found that it wasn't working, and nor was the telephone. He continued to check to ensure that the power failure was not contained only to his home, when he heard sirens sounding from the local fire hall.

In 20 minutes (once the blackout occurred), the TFS was in full emergency response mode. The number of emergency calls increase to 25 dispatches per minute for approximately 7 hours. Traffic lights were out, elevators were stuck and communication systems (cellular and paging) were down in the northeastern US, Ontario and parts of Quebec. It was 1 to 2 hours before TFS personnel were able to determine what type of situation they were dealing with.

Initial activation of the Emergency Operations Centre (EOC) for the City of Toronto failed because the EOC members (such as the Chiefs of Services, Toronto Hydro, Enbridge, etc.) were paged, as no one had yet realized that the paging system was down. The EOC was enacted 3 hours later.

Several internal issues arose as a result of the incident, including:

- Fire halls are seen by the public as a focal point of the community. Many fire halls were empty, with some minor exceptions, due to the sheer number of calls received and only eight (8) of the fire halls were supplied with a generator. Now, all new fire stations and those under retrofit are being equipped with an emergency generator.

- Due to the number of emergency calls, there were staffing issues, and day crewmembers had to be held over for several hours.
- There were contract issues regarding the new trunk radio system. There are 12 repeaters located throughout the city and each repeater is provided with emergency power by a generator, except for one location where a generator was installed but fuel was not permitted to be stored within the building. TFS staff had to supply fuel to the generator in 20 L (5 us gal) containers, on two occasions during the evening.
- A need to educate those in the community regarding personnel emergency preparedness.

Labelling the Toronto Fire Service a fire department is a misnomer, as they actually perform (in addition to fire services) rescues, and deal with both hazardous materials incidents and medical calls (over 50% of all calls), providing "one stop shopping" for emergency response.

Members of the community, whether their interests are commercial or personal, need to take responsibility in preparing for emergencies. This includes commercial buildings providing more than just a fire safety plan for their facility (as required under section 2.8 of the Ontario Fire Code) but also providing business continuity plans that deal with other types of risks, including environmental, meteorological, financial and political. For example, although Ontario is not known for having major meteorological events in comparison to places such as California or Texas, every year there are approximately 100 tornados and the Don Valley in Toronto floods at least once a year. Every member of the community is personally responsible to ensure that they and their families are prepared to deal with any type of emergency, in ways such as ensuring there is an adequate supply of essential items in the home (food, water, flashlights, batteries, etc.).

The fire service (along with many others) has learned a lot from the events (Ice Storm, Y2K and the 2003 blackout, etc.) over the last few years and has identified that some of the best weapons used to deal with emergency situations before they occur are information, education and preparedness.

The CFSA would like to thank Scott Cowden for his overview of the impact that the 2003 Blackout has had on the City of Toronto emergency services, and the lessons learned during this event. For more information regarding emergency preparedness, visit the Toronto Fire Service website at www.city.toronto.on.ca/fire.

Who's Monitoring The Monitoring Stations?
ULC Standard CAN/ULC-S561

This article was provided by Geoff Bretzler, a recent graduate from the 3-year Fire Protection Engineering and Technology degree program at Seneca College of Applied Arts and Technology.

So, who's keeping an eye on the people who are supposed to be keeping an eye on our fire detection and suppression systems? Well, the honest and selfless folks at the Underwriter's Laboratory of Canada (ULC), that's who. But how exactly does the ULC accomplish such a feat; how does the ULC ensure that the guy who's supposed to be monitoring my system is actually doing so? Well that's easy – "Standards" my friend, it's all about standards.

Still confused?

The CFSA hosted a breakfast meeting on March 10, 2004, at which Bruce Paterson, P. Eng., Program Manager for the Fire and Security Systems Group at ULC, eradicated confusion by precisely explaining the role of ULC regarding monitoring stations. Mr. Paterson also discussed the most recent ULC standard for monitoring stations: ULC/CAN S561-03,"Standard for Installation and Services for Fire Signal Receiving Centres and Systems". But, before we go too far, let's explain the basic function of a monitoring station.

Monitoring stations supervise fire protection systems (detection and suppression) and may be located on-site or remote. Furthermore, monitoring stations may be owned and operated by the same group or individual that owns the building being monitored (proprietary station), or they may be run by an independent organization, unrelated to the building being monitored. Ideally, any change in the operation of a monitored fire protection system will be recognized by the monitoring station and the monitoring station will then alert the appropriate personnel or authorities.

Prior to the development and release of CAN/ULC S561-03, the standards that dealt with the operation of monitoring stations were found in NFPA 72 (National Fire Alarm Code) and ULC ORD (Other Recognized Document) 693. The 1994 edition of ULC ORD 693 dealt with the physical construction and operation of monitoring stations, and the monitoring of sprinkler risers; however, it failed to address the monitoring of fire alarm systems. CAN/ULC S561-03 specifically addresses this omission, while also incorporating the information found in ULC ORD 693. As such, CAN/ULC S561-03, issued in September of 2003, became the first Canadian standard that deals with the physical construction and operation of monitoring stations, the monitoring of sprinkler risers, and the monitoring of fire alarm systems.

ULC has determined that most of the requirements found in CAN/ULC S561-03 will become effective as of December 2004, with major construction issues effective as of December 2006. In addition, CAN/ULC S561-03 will be referenced in the forthcoming National Building Code of Canada, 2005 Edition.

Here are some of the highlights:

1. Construction Requirements for Monitoring Stations:

- Not to be located in Group F, Division 1 and 2 Major Occupancy,
- Minimum of 2 accesses to exit building,
- Diesel generator for standby power,
- Proprietary (on-site) stations must have a 2 hour fire separation from the remainder of building (1 hour if the building is sprinklered),
- Unless two operators are present (24/7), proprietary (on-site) stations must be supervised by a remote station.

2. Fire Detection Requirements for Monitoring Stations:

- Smoke detectors, pull stations, and heat detectors are required in the station, and must be connected to building's fire alarm system,
- Building annunciator is required in the station,
- Fire alarm system is to be added if one is not already present.

3. Training Requirements:

- Operations and training manuals are to be available to station and installation staff,
- Station is required to provide subscriber training on system operation.

4. Signaling Services:

- Monitoring of sprinkler riser switches (water flow switch, pressure supervisory switch, gate valve control switch),
- Monitoring of fire alarm control unit (alarm outputs, supervisory outputs, trouble outputs).

5. Disposition of Signals:

- Contact Fire Department within 30 seconds of receiving alarm[1],

- No premise verification, unless AHJ authorized,
- Recognized electronic re-transmission of alarm to Fire Department to satisfy time requirement,
- Station must investigate unrestored alarms (8 hours for alarm, 12 hours for trouble),
- Owner to be advised of transmitter trouble,
- Owner to be advised of communication failure.

6. Inspection and Testing:

- Does not cover building system tests as per CAN/ULC S536,
- Water flow switches: tested at 2 month intervals,
- Pressure and gate supervisory: tested at 6 month intervals,
- Fire alarm control unit outputs, water flow from inspector's test valve, troubles, transmitter operation and power supply, field device inspection: at 12 month intervals.

In addition to these requirements, CAN/ULC S561-03 will differentiate between the communication systems that monitoring stations employ by means of the following two terms: **ACTIVE** and **PASSIVE**.

An **Active** system provides constant communication between the building being monitored and the monitoring station.

A **Passive** system provides communication on demand between the building being monitored and the monitoring station.

Regardless of the communication system being employed, CAN/ULC S561-03 requires that no more than 60 seconds elapse between the initiation of an alarm signal and the recording of that alarm signal at the monitoring station. Furthermore, no more than 90 seconds may elapse between the initiation of any other signal and the recording of that signal at the monitoring station.

Communication faults that occur must be recorded within 180 seconds for Active communication systems. For Passive communication systems, when communication faults occur, transmission on a second system must occur within 180 seconds. Therefore, Passive systems require two separate means of transmission (unless impossible). Each system is to be tested within 24 hours.

After explaining these various requirements, Mr. Paterson took great pains to explain that the fact that a monitoring station is ULC listed should not be taken to mean that the system being monitored is itself ULC certified. For a fire alarm system to meet ULC requirements, that system must meet the conditions contained in the various ULC standards that cover fire alarm system installation, verification and maintenance. Furthermore, the components contained in that system must be ULC listed. Therefore, building owners and operators must not assume that their fire alarm systems meet the requirements of the ULC just because the monitoring stations they employ are ULC listed.

To remedy this often confusing predicament, ULC has established a Fire Alarm Certificate Program. The goal of this program is to ensure that fire alarm systems are installed and monitored properly.

Specifically, the ULC certificate implies:

1. Installation meets CAN/ULC S561-03 requirements.
2. Equipment meets National Standards.
3. Monitored by ULC listed monitoring station that meets the requirements contained in CAN/ULC S561-03.
4. Care contract in place for service and testing.
5. ULC will randomly audit premises.

In establishing this certification program, the ULC has assumed third party auditing authority. In this capacity, ULC is able to assist the AHJ in monitoring fire alarm systems and the companies, which monitor those systems. In addition, ULC will investigate fire alarm systems and monitoring stations on behalf of the AHJ, thereby enabling the AHJ to direct its resources elsewhere.

The costs of these ULC initiatives that must be borne by the monitoring companies are as follows:

- Alarm company listing - $2000 to $4000,
- Annual audit fee - $1200 to $1400,
- Certificates (per premise) - $18 per year.

Since the ULC Fire Alarm Certificate Program has been in place, ULC has become aware of two practices that pervert the program's entire intent. First, alarm companies are garnering certificates in order to obtain occupancy, and then shortly thereafter canceling those certificates. In so doing, the alarm company rids itself of ULC supervision and is able to operate its monitoring stations however it pleases (barring AHJ involvement). Second, alarm companies are promoting their ULC listing as meeting all the ULC requirements for fire alarm systems, thereby deceiving customers into believing that by signing on, their fire alarm system will become ULC certified. Building owners and operators should be made aware that such duplicitous tactics are used.

Thanks to Mr. Paterson and the tireless men and women at the ULC, awareness is spreading; and the rest of us can sleep easy knowing that the monitoring stations are sure and truly monitored.

But this begs an obvious question:

Who's monitoring the monitoring stations' monitors?

For more information concerning the ULC and its role in supervising monitoring stations please visit their website; www.ulc.ca.

The CFSA would like to thank Bruce Paterson, P.Eng for his insightful overview of the new CAN/ULC S-561, "Standard for Installation and Services for Fire Signal Receiving Centres and Systems".

[1] Monitoring stations may be located in areas far removed from the building being monitored. Therefore, when contacting the Fire Department, the Monitoring Station must call the Fire Department Dispatch Centre within the jurisdiction of the building being monitored.

Fire Academy Tour and Demonstration

This article was provided by Rocky Mino, Assistant Technical Consultant for Leber/Rubes Inc., Life Safety Services Group.

At this years annual education forum, the Toronto Fire Services (TFS) provided a tour of their recently renovated fire academy facilities located at 895 Eastern Avenue in Toronto for CFSA members and guests, to obtain a better understanding of the training capabilities that the facility possesses.

The tour began with a simulation of a vehicle fire. The vehicle was constructed of a metal shell in a typical form of a car. A pan of water was located under the vehicle and propane was piped into the pan. Once the propane was turned on by the control centre, it would bubble to the surface of the water, which was then ignited.

The recruit firefighters attacked the fire using two hose lines. As narrated by the TFS, the first hose line used is considered the attacking line, which is located close to the vehicle. The 2nd hose line is considered the back up safety line which is located several steps back from the vehicle. The recruit firefighters participating in the scenario, provided a text book attack and extinguishment of the fire, according to the Toronto Fire Services.

The training scenario using the new propane based vehicle fire is considered better then the traditional training style, which involved the ignition of a real car, for three reasons;

- it is better for the environment,
- if is safer and
- it is less time consuming.

The TFS is planning to expand the vehicle fire training simulations by providing different vehicle shells, such as buses or

SUV's, to allow for a more diverse training program.

The next simulation demonstrated extinguishments of a split flange fire. The split flange was comprised of piping and a barrel, which contains the pilot. The purpose of this exercise for TFS personnel is to provide training for high pressure chemical and oil fires. Firefighters will experience an increase in the pressure released from the split flange in relation to the duration of time required to extinguish the fire.

The simulation requires the recruit firefighters to approach the piping using hand hose lines in order to reach the fire and close the shut off valve. The hose lines are held to the outside of the group, so that if the line fails, the hose will not cause a tripping hazard.

As the firefighters approached the fire, they widen their hose streams to cool the surrounding area, providing more protection to the firefighters.

As the tour continued, the next exercise was a high angle rescue performed on the training tower. The firefighter repelled from the 7th floor down to the victim on the 4th floor. TFS noted that the repeller does not bounce off the walls during decent, as is done during rock climbing, in order to retain a controlled decent. The repelling equipment used by the TFS is very similar to rock climbing equipment.

The victim was placed in a rescue basket and strapped in. Once the victim was secured in the basket, the firefighter guided the basket down to the base of the building to safety.

The last exercise of the tour was a Rail car fire exercise. This exercise simulated a liquid propane fire on a rail car using an aerial truck to attack the fire. The rail car had two flaming areas, one main supply flame, and flames protruding from the pressure relief valve. The firefighters were not trying to extinguish the fire, but rather they were trying to keep the tanker cool and prevent a possible BLEVE. In a real scenario, the firefighters would have been located further away, anywhere from 100 m to 1 km away.

The tour and demonstration included a stop at the TFS 7-storey training tower displaying the current technology used within

the tower, a current project. Captain Ken MacMillan stated that the future of the fire service is in fire prevention and therefore, the TFS is retrofitting the tower to meet the current Ontario Fire and Building Code requirements. The tower will consist of two exit stairwells, three floors of residential apartments units, 4th floor office, a small restaurant which will contain a wet chemical kitchen extinguishing system and a fire alarm system equipped with voice communication.

Also within the tower will be wet, dry and pre-action sprinkler systems. The tower will provide firefighters with hands on training on fire equipment such as emergency communication, etc. Any companies or persons interested in assisting the TFS or has any suggestions please contact Chief Simpson of the TFS.

A special thanks goes to Chris Wood, of Response Training Associates for the use of the photographs presented throughout the article.

CFSA Lifetime Membership

A CFSA lifetime membership is an honour bestowed upon few people, and requires years of dedication and service within the Canadian Fire Safety Association. Only nine other people currently hold this membership.

At the 2004 Annual Education Forum, Brian Murphy of Underwriters' Laboratories of Canada (ULC) was presented with this membership for his dedication and service to the association. Brian has greatly contributed to the success of the CFSA and over the last 14 years has filled many of the director and executive positions within the board including president, past president and most recently treasurer and internet director.

On behalf of the Board of Directors, I would also like to extend Brian a fond farewell, as his position of Manager of Standards at ULC will be relocating to Ottawa in the fall of this year.

CFSA Committee Participation

Ontario Fire Code Technical Committee

On May 17, 2004, Bernard A. Moyle, Fire Marshal and Doug Crawford, Deputy Fire Marshal from the Ministry of Community Safety and Correctional Services, Office of the Fire Marshal, extended their appreciation to everyone who contributed and supported the development of and technical changes to, the *Objective Based Ontario Fire Code* over the last three (3) years.

Including none other than CFSA's Past President, David Johnson, C.E.T., Senior Project Manager for Randal Brown & Associates Ltd.

Bill C-45 – An Act to Amend the Criminal Code (Criminal Liability of Organizations)

Bill C-45 is an act amending the criminal liability of organizations under the criminal code of Canada. Simply stated, it requires employers to take steps to provide a safe workplace for their employees.

The Bill received Royal Assent in November 7, 2003 and was proclaimed into force on March 31, 2004. Section 217.1 defines the new legal duty, which states, "Everyone who undertakes, or has the authority, to direct how another person does work or performs a task is under a legal duty to take reasonable steps to prevent bodily harm to that person, or any other person, arising from that work or task." This duty applies to both organizations and individuals.

Some of the key amendments are:

• The criminal liability of corporations and other organizations will no longer depend on whether a senior member of the organization with policy making authority has committed the offence.

• The physical and mental elements of criminal offences attributable to corporations and other organizations will no longer need to be derived from the same individual.

• The criminal act attributed to a corporation or organization has been expanded to include all employees, contractors and agents.

• Negligent based crimes – the mental element of the offense can occur through the combined fault of the corporations or organizations senior officers; those with policy making and operational authority.

• Crimes of intent or recklessness – criminal intent will occur when a senior officer or the corporation or organization is a party to the offense and where a senior officer has knowledge of the commission of the offense by others and fails to take all reasonable steps to prevent or stop the commission of the offense before it occurs.

• Sentencing principles specifically designed for corporate/organizational offenders will be adopted.

• Special rules of criminal liability for corporate executives will be rejected.

• An explicit legal duty will be established on the part of those with responsibility for directing the work of others, requiring such individuals to take reasonable steps to prevent bodily harm arising from such work.

For more information regarding Bill C-45 refer to website:
http://www.parl.gc.ca/37/2/parlbus/chambus/house/bills/summaries/c45-e.htm.

Editor: Janet O'Carroll

The CFSA Newsletter is published 4 times per year – June, September, December, March

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Call CFSA at (416) 492-9417.

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