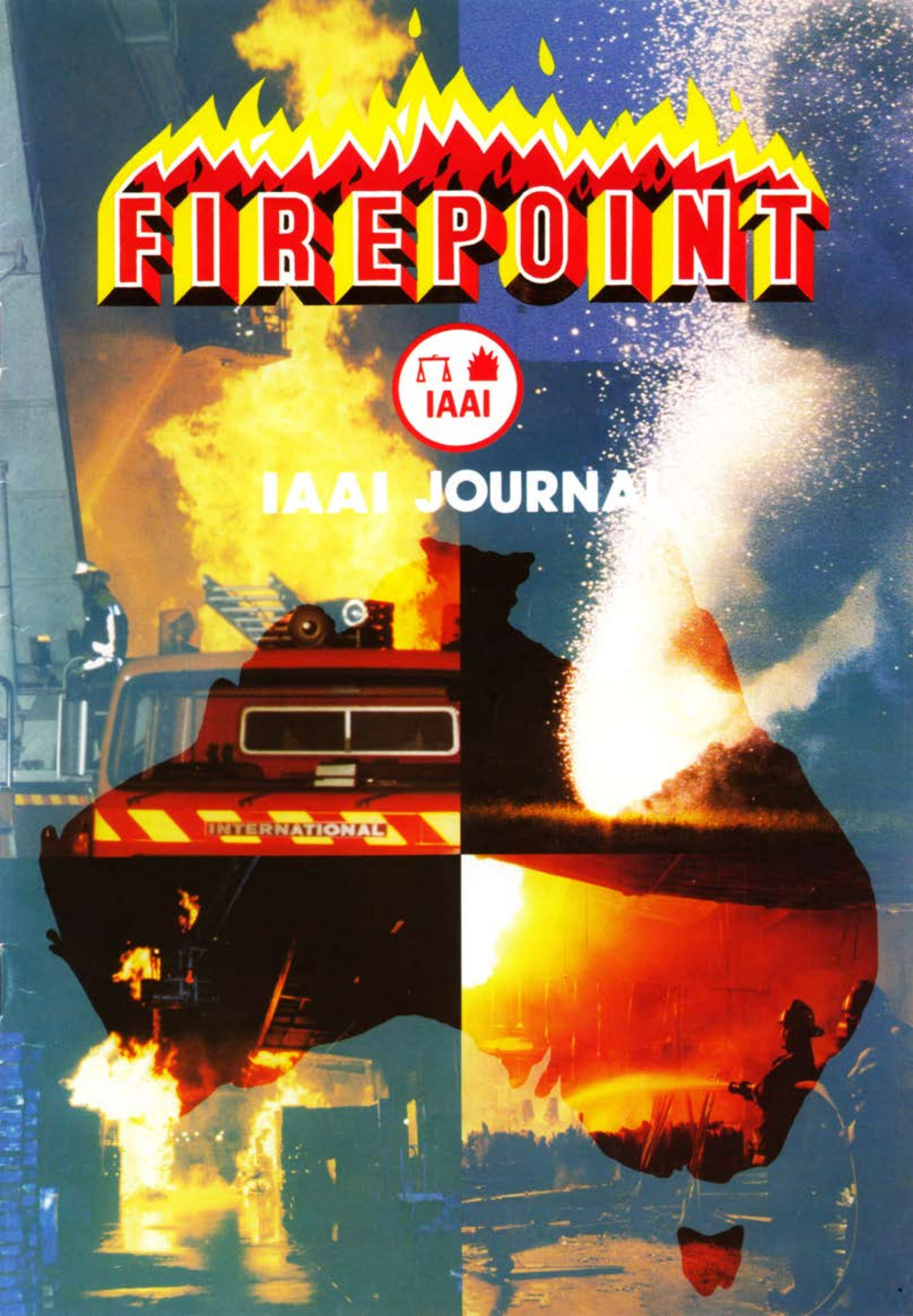
# FIREPOINT

IAAI

IAAI JOURNA



September, 2008 Volume 19, No. 3 Issue No. 75

# Firepoint

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**FIREPOINT: IF YOU HAVEN'T PAID YOUR FEES FOR THE CURRENT YEAR, PLEASE DO SO NOW.**

## EDITORIAL

**Details are supplied in this issue of an imminent important seminar to be held in Queensland.**

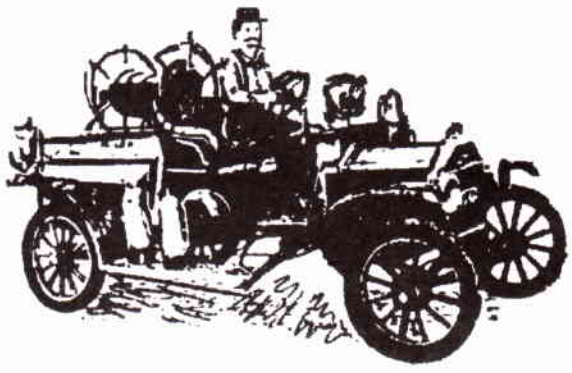
Roger Bucholtz and Ross Brogan are amongst the most experienced fire investigators in NSW, having served together over many years in the NSW Fire Brigades Fire Investigation Unit.

They both retired in the past year.

They share their experience in articles contributed to this issue.

They are both long term members of the NSW AFI Committee.

*Wal Stern*



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# Victorian Association of Fire Investigators Inc.

**Website** www.vicfire.com

## VAFI SCHOLARSHIP OPEN FOR 09/10

The 08/09 VAFI Scholarship closed as at the 1 June 08 and unfortunately no applications were received. The VAFI Scholarship is a program where members can apply for a grant up to the value $1,000 for education and training.

Written applications prior to the 1 June each year are then considered by the committee and a selection made. Full details of the Scholarship are on the VAFI Website. Members should consider their options for the year 09/10.

## VICTORIAN MEMBERSHIP

Victoria Chapter continues to maintain its membership with 07/08 at 201 members. Renewal forms have been distributed to all members for 08/09 with fees of $55.00 due 1 July 08. Any member unsure of his/her membership status please contact Alex Conway, Chapter Registrar at 03 94203883.

The Committee welcome the following new members: W.Cook, G.Davies, A.Budzairski, all from CFA.

## COMMITTEE NEWS

The committee is currently reviewing membership rules and procedures for the Chapter with a presentation and motion to be presented at the AGM. This is to tidy up some discrepancies with the IAAI rules for membership.

Insurance for the Chapter has also been reviewed and a proposal and adoption of insurance is currently being worked through by the committee with a report to be presented at the AGM. The committee always welcomes suggestions from members regarding training sessions and improvements to the Chapter operations.

## TRAINING

## SCENE PHOTOGRAPHY

A session on Scene Photography was held at CFA Huntly Training Ground (just outside Bendigo) on 22 May 08. This was another session by Brad Mason, Crime Scene Examiner – Victoria Police. The night was well attended and provided many of our country members the opportunity to improve there skills with photography.

Many thanks to all those who attended and to the CFA and staff for the use of their facilities. A certificate of appreciation was forwarded to the CFA Huntly Training Ground.

## FIRE INVESTIGATION & THE CORONER

In July, VAFI held a training session at the State Coroner's Office at which 52 members attended. Limited facilities meant that numbers were restricted, but those present found the evening fascinating.

Five speakers provided an insight into how the Coroner's Office operates and how the work of the Coroner regularly involves fire and fire investigators.

The first speaker was Project Officer Michelle Skinner. Michelle provided an administrative viewpoint and outlined how progress is constantly being made, especially in respect to dealing with relatives affected by sudden death. She also outlined the Coroner's role and how the Coroner's Office deals with complaints and concerns.

The second speaker, Assistant Professor David Ranson described his work as Senior Forensic Pathologist, and explained to the members how critical are the actions and observations of those first on the scene of a fatal incident. This was followed by a forensic odontologist, Dr Anthony Hill who indicated with x-ray images how dental examination and records often assist in identifying victims, and how an approximate age of the person can be determined.

Dr Chris Briggs, a forensic anthropologist explained his role, and how he assists in victim identification by examination of bones and joints. He showed examples of male and female bones, and indicated how certain ethnic groups can be identified by differences in bone structure.

Sgt Dave Dimsey of Victoria Police explained the role of the Police in assisting the Coroner and highlighted a number of incidents in which they have carried out investigations on behalf of the Coroner, including aircraft crashes in Victoria. This was followed by a tour and an explanation of the Courts.

Unfortunately the Coroner could not attend, but it was an excellent night that provided members with an informative insight into an area which, fortunately, many do not have the opportunity to attend.

## BACK TO THE BASICS

This session is planned for Saturday 25th October 2008 with a location and timings to be determined, but will include review of investigation techniques and procedures and hands on exposure to all facets of investigations.

Details are being finalized with a flyer to be sent out to all members. Incorporated in the days activities will be the 2008 AGM of the Chapter.

## MARINE FIRES

Due to the current fires involving boats and ships, a session is now being planned for early March 09 to cover marine fires. This will provide some interesting case studies and causes.

# Fire Scene Safety

# Are you at risk?

11 September 2008

Department of Emergency Services Auditorium - Emergency Services Complex
Gympie Road (Corner Park Road), Kedron (Brisbane)

Queensland Association of Fire Investigators Inc.
"One Day Seminar"

ABN. 77 330 409 047
*Chapter No. 59*
*International Association of Arson Investigators Inc.*

**The QAFI is proud to host a one day seminar in Brisbane on Thursday, the 11th September 2008 addressing Fire Scene Safety.**

**Fire scenes are attended by Fire Services, Police Services, other government agencies, loss adjusters, insurance personnel, private fire investigators, factual investigators, engineers, builders, demolishers.....they all have varying degrees of exposure to the risks associated with a fire scene.**

**This seminar will highlight specific risks to personal safety at fire scenes, address their identification and provide information on how to deal with them appropriately. Application of the Workplace Health and Safety Act to the fire scene workplace will be addressed, along with other legal obligations and ramifications for not only those who physically attend a scene, but also those who send them to one.**

**This seminar will benefit Police, Fire Service, Electrical Examiners, Gas Examiners, EPA, WH&S, Local Government, Loss Adjusters, Factual Investigators, Insurance Claims personnel and Insurance Lawyers.**

Registration deadline: 5 September 2008

# Provisional Seminar PROGRAM

## Thursday 11 September 2008 – QFRS Auditorium, Kedron Park, Brisbane

0800 *Registration* **Emergency Services Complex Auditorium, Park Road, Kedron**

0830 *Welcome* by **Brian Richardson**, President of the QAFI

0840 *Official Opening – QFRS Assistant Commissioner*

0850 WH&S Legislation–***Qld Govt.t–Workplace Health & Safety*** **Nick Drapes**

0920 Legal Liabilities – ***Cooper Grace Ward*** **Brady Cockburn**, Solicitor (SC).

1005 **Morning Tea**

1030 Risk Management Process – ***QFRS*** **QFRS State Operations Directorate**

1105 Electrical & Gas Hazards–***Electrical Safety Office & Dept of Mines & Safety*** **Brian Richardson & Tony O'Conner**

1140 QFRS Chemical Response Unit–***QFRS*** **Scientific Unit - Michael Ridgway**

1215 Industry Sponsor Presentation

1225 **Lunch**

1315 Testicular Cancer Study – ***QFRS*** **Steve Bunny**

1345 Asbestos Hazards – ***Noel Arnold & Associates*** **Alan Barker**

1420 Structural Hazards – ***John Reid (Consulting Engineer)*** **John Reid**

1450 **Afternoon Tea**

1505 Case Study – ***Sherwood Fire*** **John Reid & Alan Barker**

1550 Case Study – ***Tannery Fire*** **QFRS Scientific Unit - Michael Ridgway**

1615 **Close & Networking**

## Cost to Attend

| | MEMBERS | NON-MEMBERS |
|---|---|---|
| Individual | $165-00* | $209-00* |
| Group (5 or more) | $132-00* | $165-00* |

**Note – including GST*

*Members include – QAFI, AFI NSW, VIC AFI, FIANZ, IAAI*

## Who is the QAFI

The QAFI is a professional, non-profit association, which was founded in 1990. The association is Chapter number 59 of the International Association of Arson Investigators Inc., based in St. Louis, U.S.A. With Chapters throughout Australia and the world, the IAAI develops initiatives & programs which raise the level of expertise and experience of those actively involved in determining the cause and origin of fires.

**Registration cancellation policy** – Registration cancellations will only be accepted when made in writing. The registration fee will be refunded in full if cancellation is received before **5 September 2008.** After this date, an $80 administration fee will be retained or where payment has not yet been received, an $80 fee will be charged and payable. No refunds will be given after **8 September 2008.** As an alternative to cancellation, your registration may be transferred to another person provided we are advised in writing.

## Sponsors

The QAFI wish to thank the following sponsors for their support of this seminar and the association.


24B Austin Street, Newstead QLD 4006

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F 07 3216 1206
E admin2@insightrestorations.com.au

W www.insightrestorations.com.au


PO Box 65 Coopers Plains QLD 4108
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## Registration

The Queensland Association of Fire Investigators Inc. (ABN 77 330 409 047) is now registered for GST, which has been charged on the seminar registration fees. A copy of the registration form (when completed) should be retained as your Tax Invoice. To ensure you are registered for the conference, your completed registration form must be received by the dates specified on the registration form.

**Members** – include financial members of the QAFI, AFI (NSW), VIC AFI, FIANZ and IAAI.

**Registration Fee** - includes session admission, morning and afternoon tea and lunch on the day of attendance. Whilst every effort has been made to ensure the accuracy of all details listed herein, the Conference Organiser reserves the right to alter or make amendments as necessary.

## Venue

**Department of Emergency Services Auditorium**
**Emergency Services Complex**
**Gympie Road (Corner Park Rd), Kedron**

There should be parking on site; however, the site use is being transferred due to the construction of roadworks. Updates will be emailed following registration.

## General Information

**Dress**
The conference dress code is neat casual.

**Payment**
All prices are in Australian Dollars. Payment to be made with registration by cheque, credit card or Government Purchase Order.

**Seminar Managers**
All enquiries should be directed to -
**Queensland Association of Fire Investigators Inc.**

***Administration Officer – Tony Libke***

GPO BOX 1705
BRISBANE QLD 4060

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Fax +61 7 3210 0237

Email QAFI@uttinglibke.com.au

# ELECTRICAL INDICATORS AT THE SCENE

Identification – Recording - Collection

*Russell F Lee FIEAust CPEng*

**STAGES IN AN INVESTIGATION**

- Accept the assignment
- Receive a briefing
- Gather information
- Scene examination
- Debris examination
- Product examination
- Analysis and testing
- Opinion formulation
- Reporting data and opinions to clients

**Speed is the essence. The sooner you get to the scene, the easier your job will be.**

Others may be there before and after you and may still be there. Cooperate & learn.

Evidence may be destroyed, moved or lost.

The owner will be anxious to clean up.

A demolition order may be in place.

**Remember the owner and tenant are still the owner and tenant.**

- Examine the scene
- Take a broad walk around
- Take a close in walk round.
- Enter the scene
- Broad inspection
- Detailed inspection
- Detailed inspection of the area of origin.
- Broad view
- Detailed view

**RECORDING THE SCENE**

- Always sketch the scene, and particularly the area of interest.
- Show all switchboards, meters, main cable runs, lights if of interest, power outlets and switches.
- Photograph the scene. Take photos before evidence is moved.
- Take more photos rather than fewer photos.
- If scene reconstruction is used, record the existing scene first.

**A SINGLE LINE DIAGRAM**

- Where-ever it is possible produce a

single line diagram for the installation or in the case of larger installations, obtain the site drawings.

- The data may enable a more detailed understanding of the advance of the fire by reference to the protection arrangements.
- Simple diagrams help place faults
- Determine the area of origin and the origin of fire first. Then look for ignition factors.

**FUSES, CIRCUIT BREAKERS & RCDs**

- Over-wired fuses
- Wired cartridge carrier
- Circuit breaker toggles
- CB toggle positions

Horizontal mounting. Open is downwards.

Vertical mounting. Open is away from busbars

- Hot Connection at a fuse
- Don't forget the fuses in electric stoves and ovens, microwave ovens, TV sets, DVD & CD players, stereo amplifiers, clock radios, projectors, computer power supplies.
- Don't forget the thermal overloads and cutouts in refrigerator motors, dryer motors, washer motors, dryer heater elements, coffee machines, water heaters, hot water boilers.
- Don't forget the capacitors in single phase motor systems, the capacitors in light fittings, fluorescent ballasts, in electronic transformers and ballasts
- Check for arc & other melts.
- Check the supply.

DO NOT BELIEVE ANYONE WHEN THEY SAY THE SUPPLY IS OFF. ALWAYS CHECK IT YOURSELF. IT IS YOU WHO WILL BE HANDLING THE CIRCUITS.

**Finally,**

- Much of the debris and many of the artefacts you discover will be fragile and fire-damaged, with often some parts missing.
- Treat such items with care. Photograph first. Bag carefully.
- If you are unfamiliar yourself with the artefacts, save them for someone who does know what they are and mean.
- Unless you are electrically qualified, the best thing you can do is preserve the evidence.

# Fire Investigation – Vapour Explosions

*Ross Brogan*
AFSM, MA, CFI

An explosion is defined as "*The sudden conversion of potential energy (chemical or mechanical) into kinetic energy with the production and release of gases under pressure, or the release of gas under pressure. These high-pressure gases then do mechanical work such as moving, changing, or shattering nearby materials*". **(NFPA 921 - 2008)**

As a fire investigator explosions are part of the role played in conducting an investigation into origin and cause of a fire. With an explosion there is an added dimension, and the role extends to, determining what caused the explosion, what fuel was involved, the extent of the damage, what the ignition source was, and, how the ignition source and the fuel came together to cause the explosion.

[The detonation of explosives is a specialised field and requires the attendance of experts in the field of explosive detonation and military ordinance handling procedures – usually Army Bomb Disposal].

Safety of the investigator, and other personnel at the scene after an explosion, is paramount, as the physical forces involved in an explosion may very well have caused damage to the structure and may lead to safety risks involving collapse, puncture injuries, disruption of electrical or gas supplies and the risk of falling objects or debris.

A full risk assessment of the property, and surrounds, is essential for the safety of all involved; with solutions determined for eliminating the risks that have been found. One of the particular risks, in today's unfortunate world, is the threat of terrorism and associated bombings, with the warning that there is always the threat of a second device designed to catch emergency services as they arrive.

Be Aware! And Be Alert!

Explosions can be caused by all types of materials, not only flammable liquids and their associated vapours, but gases escaping from pipework or from cylinders, and, from overheated substances such as water [in closed vessels], heated to steam with associated pressure build-up.

Late one evening an explosion occurred that tore apart a shopping centre and severely disrupted the inhabitants of the Sydney suburb of Lane Cove. The explosion occurred inside a take-away food shop in the main street.

The subsequent force of the explosion physically threw a police officer out of his seat in the nearby police station. The front alloy doors and window frames were blown out of their location at the front of

the shop, across the road, with one door wrapped around a metal light pole some fifteen metres away; a one square metre sized pane of door glass was found sixty-four metres away in an adjacent street, intact.

The street in front of the shop resembled a snowscape, with white paper food bags scattered over many square metres of the roadway. One double-brick side wall had been blown down, causing the upper storey of the building to collapse into the ground floor shop. The pressure from the explosion had vented via the ceiling and traveled into the shop on the other side causing the ceiling to be blown down and the force then blew out the glass of the front windows, into the street.

Explosion pressure also traveled toward the rear of the shop and blew down a double-brick wall of an adjoining office, with further pressure blowing out the glass from the windows into a rear carpark; some glass over twenty metres distant. A small fire ensued which was extinguished by the attending fire brigades a short time later.

The local hotel, next door to the shop, was evacuated, much to the chagrin of the drinkers. Fortunately no persons were injured, that were known of at the time, with the risk of decapitation to any person who may have been at the front of the shop at the time of the explosion extremely high.

During the examination of the scene it became patently obvious that a flammable liquid vapour had been responsible for the explosion. The reticulated gas supply was eliminated as a source of fuel, according to Gas Company representatives, having been disconnected some time prior to the fire.

Several metal fuel cans were uncovered amongst the debris. Subsequent scientific analysis proved the presence of petrol, both in the cans and amongst the fire/explosion debris.

The next morning a woman arriving for work found a severely injured, and burnt, man behind the shops involved in the fire and explosion. He insisted on hailing a taxi and going to his home to clean up, prior to attending a hospital. This person was subsequently charged and convicted of lighting a fire and causing an explosion, related to insurance fraud.

According to the Massachusetts IAAI Pocket Guide (2nd edition) petrol vapour is a highly explosive substance and is produced from petrol at a rate of 230:1 [= 230 litres of vapour from 1 litre of liquid petrol (*assume perfect vaporization at normal temperature and pressure*].

DeHaan, in Kirk's Fire Investigation (2007) has produced a formula to enable one to work out the production of vapour from a liquid. (6th Edition, p.82) This formula is important when attempting to determine the amount of liquid that may have been present to cause the explosion,

**What are we attempting to prove??** Can the suspected offender physically carry this amount of fuel to the scene, to cause the explosion

evidence found? OR, What physical characteristics for the fuel containerisation do we need to have this amount of fuel available at the scene?

## Formula

Cubic metres ($m^3$) vapour = 0.85 x Specific Gravity / Vapour Density

* Calculate cubic volume of area subject to explosion

* Ascertain type of vapour present as fuel e.g. Petrol

* Determine LEL

* Calculate m3 of vapour for LEL

* M3 x 1,000 = litres

* Divide Litres (vapour) by m3 vapour produced = liquid

*** From my perspective, there are only two formulae that an investigator needs to remember to be certain of doing the job properly – one is the Fire Triangle – The other is this formula ****

There are other liquids that can produce vapours capable of fuelling an explosion; according to the Mass. IAAI pocket guide:
Ethyl Alcohol = 1 : 425
Flammability Range = 3.5% to 19%

Fuel Oil No. 1 (kerosene) = 1 : 153
Flammability Range = 0.7% to 5%

Once the fuel liquid amount has been determined ask yourself "can this amount of liquid be carried to the scene by one person?"

Would it take more than one person to carry this amount of fuel?

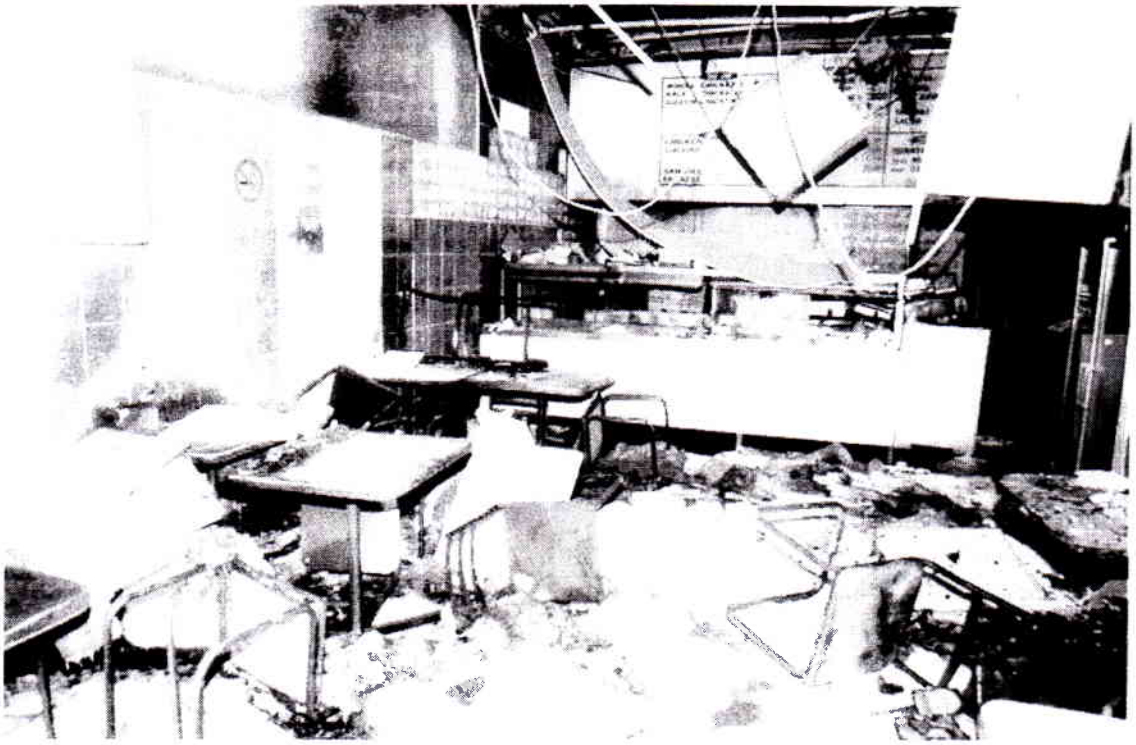
What containers are available that one could use to carry this amount of liquid?

These questions can be answered by conducting this mathematical equation, and can be useful in reaching a hypothesis in regard to the cause of the explosion and fire.

Several years later a similar explosion caused damage to a take-away food shop with the most notable factor being the expulsion of a one metre square piece of front door glass into the street. The glass was blown sixty-four metres (sound familiar?) from the doorway onto the roadway adjacent to the shop. The front of the shop was found over seventeen metres away on the roadway and the back door had been torn from its' hinges, the metal hinges actually torn in half.

A subsequent search found a large amount of petrol had been spread throughout the shop with some still intact and protected beneath ceiling linings that had come down in the explosion. Two males were later charged and convicted of setting fire to the shop and causing the explosion. These males had presented at a hospital several kilometres away from the scene, suffering severe burn injuries.

In court, in relation to the latest incident, the earlier incident was able to be used as an example of the use of the vapour production equation, as similar circumstances existed; the fact of the sixty four metre distance that the glass from the front doors had been blown and the similar internal volume of both properties, given the



vapour production equation and explosion damage factors evident in both incidents.
Here again the gas supply company was consulted and was able to offer valuable evidence to show no reticulated gas was supplied to the property, and therefore no gas was available as a fuel for the explosion.

By comparing the two incidents an estimate of the amount of liquid used in the later incident could be made. Both incidents involved burn injuries to suspects, and, both incidents involved trading problems with the business.

One of the investigation techniques used, for any fire investigation, is to set a perimeter for a search for evidence at approximately the distance at which the furthest piece of evidence has been found, away from the incident site.

With an explosion this distance has to be extended, to approximately 50% further than the furthest piece of explosion debris (evidence); this allows for any evidence expelled away from the site to be discovered. Remember, if an explosion has occurred, debris (evidence) may have been expelled, by the forces of the explosion, and land on top of buildings or other high objects some distance from the site.

## Reference List


DeHaan, J.D. 2007. Kirk's Fire Investigation. Sixth Edition. Pearson Education, Brady. USA.

Massachusetts Chapter IAAI (2000). *A pocket guide to Accelerant Evidence Collection.* 2nd Edition. Factory Mutual Engineering and Research, Mass. USA.

National Fire Protection Association. 2008. *NFPA 921 Guide for Fire and Explosion Investigation 2008 Edition.* NFPA, Quincy, Massachusetts.


## Bin Arsonist Gets Life Sentence

An 18year old man has been jailed for life after setting fire to two wheelie bins in Devon, England. Homeless Christopher Brown only caused a few pounds of damage when he set fire to the bins. But Judge Graham Cottle gave him an indeterminate sentence after hearing brown threatened to commit more crimes if he was released.

Judge Cottle said: "This is a highly unusual case. He says he is doing something very serious if released".

He had a number of previous convictions for offences of destruction and damage to property. Brown indicated if he were subject to a community order he would commit a serious offence in order for a long sentence to be imposed.

Brown's lawyer said Brown was looking for a sentence which was as long as possible, because he could not countenance living in the community at all.

# Queensland Chapter

**Queensland's Presidents Report: Brian Richardson**

The QAFI committee have been working hard at consolidating and reinvigorating the association over the last few months.

There has been a breakfast presentation, finalising details for the upcoming one day seminar and work on future presentations and training seminars, as well as ensuring the association complies with statutory requirements.

On the issue of statutory requirements the QAFI is to hold an extraordinary General Meeting on **9th September 2008** at 9.30 am on 6th floor, Department Industrial Relations Building, 75 William St, Brisbane 4000.

The meeting is being held to ensure the classes of membership in the constitution are defined in such a way that members and organisations can comply with the requirements to meet the declared classes of membership.

Members are invited to attend, but if that is not possible it is important that you have your vote on the proposed changes to the constitution.

Members should have received a notice of meeting and ballot paper via email. Members are urged to return the ballot papers as soon as possible.

If you have not received a notice of meeting or ballot paper please contact *QAFI@uttinglibke.com.au*

**New Memebrs**

QAFI would like to welcome the following new members to the association:

- Adrian Brock (Qld Police Service)
- Michael Everingham (Qld Fire & Rescue Services)
- Katherine Kirk (Qld Fire & Rescue Services)
- Peter Lehmann (Qld Fire & Rescue Services)
- Bevan Manktelow (Qld Police Service)
- Wanda Schuetz (GAB Robins Australia Pty Ltd)
- Michael Skinner (GAB Robins Australia Pty Ltd)
- Lian Phillips (GAB Robins Australia Pty Ltd)

**Breakfast Functions**

The QAFI held its July breakfast function on Wednesday 16th July at the Paddington Tavern. It was an excellent morning with some sage members noting that the place looked different at that time of day (well different with eyes that could focus properly).

The function was well attended by over 40 people who were privileged to see video of Queensland police Service experimentation of interior and exterior accelerant and test burn patterns in motor vehicles.

Alison Jewell of the Scientific Section of the Queensland Police Service presented the video and explained the testing and discussed the outcomes, with some fine insights into what a witness may say compared to what an investigator may find actually happen if the scenario is recreated.

This was followed by Chris Markwell of the Queensland Fire & rescue Service who presented a case study on a fire investigation involving several prime movers. Chris gave an excellent overview of the investigation, explaining burn patterns, observations made and evidence obtained that lead the investigators to conclude the fire was deliberate.

Issues such as the travel of fire, locating evidence of several seats of fire and fuel caps on the prime movers appearing to have been removed rather than blown off were interesting observations on the investigation process.
The next breakfast presentation is scheduled for November – will keep you posted on details for that.

**ONE DAY SEMINAR**

**Fire Scene Safety – Are You At Risk**
11th September 2008.

This seminar will canvass topics such as workplace health and safety legislation (including who is in control of safety at a fire scene, the obligations of the various agency and private fire scene investigators and loss adjustors, their supervisors and the companies responsible for sending people onto fire scenes or engaging people to enter fire scenes on their behalf), fire scene investigation risk assessment and possible hazards to consider (asbestos, airborne and chemical hazards and structural safety), and the availability and use of personal and protective equipment. The registration brochure is out now.

Contact QAFI@uttinglibke.com.au if you have any questions about the day. Hope to see you there.

## NSW AFI

The NSW AFI held its AGM on 14.8.08 and elected the following new Committee:

President:
Greg Kelly

Senior Vice President:
Mark Pollard

Junior Vice President:
Kate Grimwood

Treasurer:
Taylor Pallaton

Secretary:
Mark Black

Committee:

John Paull
Melissa Salmon (Ruser)
Penelope Brown
Michael Forbes

Immediate Past President:
Roger Bucholtz

IAAI National Liaison Officer:
Ross Brogan

Editor Firepoint:
Wal Stern

# IT MUSTA BEEN THE PASTA

*Roger Bucholtz*

**Abstract:**

Fires involving electrical equipment are not rare, however detecting/locating a similar cause in the same type of electrical equipment twice within six weeks could be classed as unusual or rare.

The following article will describe how the investigator was able to determine the origin and cause, then the actions that followed to minimise the possibility of further fires originating in the equipment.

**Fire 1.**

On New Years Day 1996 a fire occurred in the Woolworths supermarket at Baulkham Hills. The New South Wales Fire Brigades (NSWFB) received a call via the Automatic Fire Alarm , sprinkler system, at 5:32PM, and on arrival the first crew noticed greyish smoke inside the shop. They then forced entry inside to commence fire fighting operations.

Following the extinguishment of the fire, contained to an area of shelving at the end of an aisle, the Station Officer called for the Fire Investigation Unit to attend, as Police at the scene requested the FIU assistance to determine the cause of the fire.

The store manager had stated the premises were locked at 8:30pm on 31 December, and this was confirmed by security records.

Nothing was amiss at the premises at the time the shop was locked, and no breach of the security system had occurred.

**Investigation.**

An initial walk around the shop provided the investigator with the necessary information required to ascertain the area of origin (AOO).

Shelving at the end of an aisle was identified as the most probable AOO. All the usual fire indicators, smoke and char patterns, were evident leading to/from this area.

The fire crews had maintained the scene as best they could during the extinguishment, there being minimal disturbance of goods in the fire area, making the task for the investigators slightly easier.

An "archaeological dig" commenced and as each shelf and items contained thereon were removed, from the least to most amount of damage, burn and char patterns were noted.

The shelves were of metal construction with lightweight combustible goods stored on them, paper products such as party hats, pop outs; blowout whistles balloons, typical of fun items used at parties.

Given the ease of combustion of these goods, initial investigations centred around the possibility that some smoking material, cigarette, may have been accidentally, or deliberately, dropped into the goods the previous evening, prior to closing.

This hypothesis failed; there was not the level of fire damage in this area to indicate it as the actual point of origin. This work also ruled out any use of an incendiary device as a possible cause in this area.

The investigation then centred on and around the refrigerator freezer unit.

**Refrigerator/Freezer**

The refrigerator freezer unit was open fronted with four shelves plus a base shelf. Frozen goods packed in plastic bags and containers were stored on each of the shelves, none of the packets had suffered any fire damage, with only minor smoke damage on the front packets. The unit stood on four legs, approximately 100 mm. high, with a metal tray situated on the floor beneath the unit.

Having discarded the first theory, the new one developed that the fire was the result of a malfunction behind the unit. It was decided to move the unit to check behind it for any electrical wiring that may be damaged. Once the unit was moved fire and heat patterns were observed indicating the greatest heat had been beneath the unit.

The unit was then placed on its side to enable a closer inspection to be undertaken of its underside. On the underside a portion of Masonite sheeting was burnt away immediately above a heater element in the metal tray, known as an evaporative tray.

The Masonite sheeting had been attached to the base of the unit. The metal tray was used for the purpose of collecting water from the unit.

A small hole was located in the centre of the base of the main unit which allowed for condensed water from the frozen goods to fall through into the tray.

It was established that the water would fill to a set depth in the tray then, by way of a float system, an electric motor would cut in, activating a heater and fan, which would heat the water so that it turned to steam and evaporated.

When the water dropped to a predetermined level, dropping the float, the motor would cut out until the float rose again.

A reconstruction of the scene was then undertaken, with each item placed in its original position. This further verified that the fire originated in the evaporative unit.

Burn patterns, charring, and discolouration on metal surfaces all indicated the path of fire and heat travel back to the evaporative tray.

Fire damage to the motor was severe, with the plastic fan blades melted and sheathing around the wiring destroyed.

**Determination.**

The cause of the fire was determined to be a malfunction in the evaporative tray motor, and was thus classified as an accidental fire.

With the cause being determined as an electrical malfunction, or fault, the NSW Dept. of Energy were notified, and began preliminary inquiries prior to undertaking an investigation of the cause.

**Fire 2**

At 3.21am on Thursday 8 February 1996, the NSWFB Wollongong Control Centre received a 000 call to the Payless Superbarn, Mittagong. On arrival at the scene fire-fighters observed smoke issuing from the building, and on gaining access they requested further assistance and additional breathing apparatus due to the thick smoke in the building.

The fire was confined to the rear area of the shop and involved food items on shelves, with severe heat and smoke damage to remaining stock throughout the shop.

The premises had been locked at 7:20 pm the previous evening and there was no indication of forced entry at any point.

The FIU were called in to assist with the cause determination, and after gaining the necessary details from the first arriving officer, the investigation commenced.

Working from least damage to greatest damage, the area of origin was quickly determined to be around a refrigeration unit situated against the rear wall of the shop.

The unit was identical to the one involved in the earlier fire. With a feeling of "déjà vu" setting in I retraced the fire patterns to ensure no preconceived thoughts could be influencing my hypothesis re the area of origin and cause.

Having retraced the indicators and confirming the AOO was as originally thought, goods and shelving surrounding the fire area were inspected and gradually removed, and then re examined outside. This confirmed the fire commenced beneath the refrigeration unit.

An inspection of the rear and base of the unit revealed the following;

- Fire and heat patterns on the base of the unit vectored to the evaporative tray,
- Heat patterns on the adjacent wall rose from the tray,
- Plastic stripping on the AOO side of the unit destroyed by fire,
- The plastic base beneath the water outlet in centre of unit, was destroyed,

- Flooring beneath evaporative tray heat damaged,
- Remnants of masonite base from the underside of the unit were located in the tray, with burn and char damage,
- The motor of the evaporative fan was severely fire damaged,
- The plastic fan destroyed,
- Goods on the lowest shelf in the unit heat damaged,
- Shelving and goods on the fan side of the evaporative tray had fire and heat damage patterns consistent with the fire from the fan.

It was noted that a few pieces of pasta, the packaged goods stored on the shelves of the unit, were amongst the debris in the evaporative tray.

It was ascertained from an employee of Payless that packets of pasta products occasionally broke open, with the contents often falling to the base of the unit. A check was made to determine if the product could fall through the opening, and this proved in the affirmative.

**Determination.**

With the knowledge gained from the previous fire regarding the operation of the fan motor in the evaporative tray it was determined that the cause of the fire was due to the fan motor in the evaporative tray overheating, and igniting lightweight combustibles in the near vicinity.

The cause of the overheating was due to loose pasta product that had fallen into the tray becoming wedged under the float, thus preventing the float from reseating, returning to its shut off position, which allowed the fan motor to overheat.

**Outcome.**

The Dept. of Energy was again notified of this incident and continued inquiries into the operations of these units.

Since these two incidents the motors in the evaporative trays have been fitted with a cut out timer switch which is designed to stop the motor running after a period of time.

This should prevent any reoccurrence of these types of overheating in this equipment.

*Roger Bucholtz, recently retired from the NSW Fire Brigade after a distinguished career, including a considerable period of time in the NSW Fire Brigade Fire Investigation Unit.*

*The incidents described in this article occurred during his stay at the FIU.*

*Roger has been a long time supporter of the NSW AFI, and served as the Chapter President in 2007-2008.*