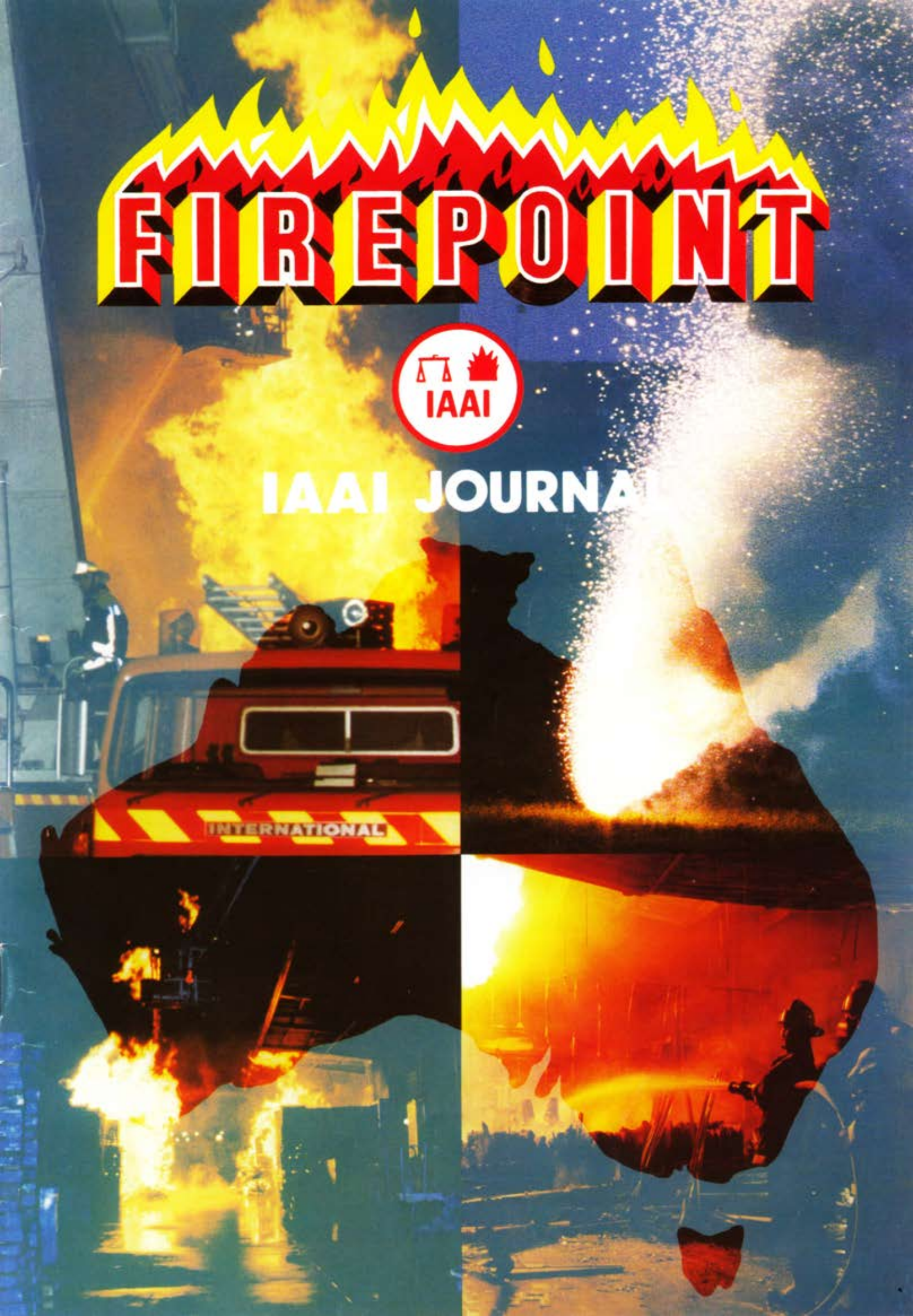
FIREPOINT

IAAI

IAAI JOURNA



September, 1998 Volume 9, No. 3

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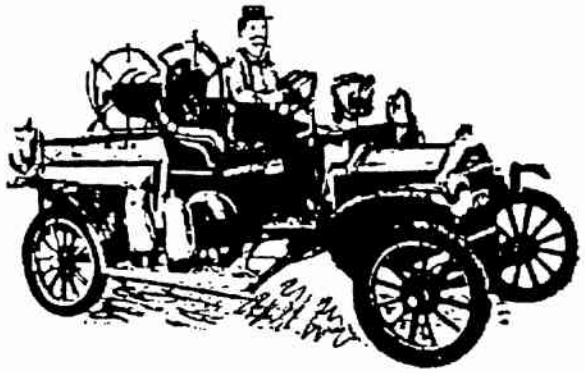
EDITORIAL

This journal has as a prime aim an education and information function. It can also act as a forum for controversial issues. In this issue Ross Brogan and Tony Cafe have raised two issues which invite commentary and criticism. I urge you to read their views, and invite you to respond with your views on the matters raised.

In the last issue we announced a competition for the best article, and best article with photos, to be sent in by members. The entry date has been extended until October 31, 1998. Think about what you can contribute. Remember, there is a prize of $250 for each of the two categories.

Included in this issue is an insert on "Accelerant Evidence Collection". It is between pages 12 and 13. Instructions on how to prepare your booklet are on page 12. I hope you will find the booklet useful.

Wal Stern



CONTENTS

Vol. 9, No. 3, September, 1998

Association and Chapter Details.....3

Editorial.....4

Queensland News.....5

What Happens When You Get Burned?

Hugh Martin.....9

Accelerant Collection Instructions.....12

Cash Prizes.....12

Letter To The Editor
Ross Brogan.....13

Victorian News.....15

IAAI (Brian Neal).....16

Smoke Alarms.....16

The Science and "Art" of Fire Investigation
Tony Cafe.....17

New South Wales News.....19

Fire Modeling: An Introduction
Vytenis Babrauskas.....20

1998 QAFI MAJOR PROJECT - RESCHEDULED

It is official, the "Major Project" that was planned for October this year has had to be postponed. It is now hoped that the project involving practical field days focusing on commercial and industrial premises regarding fire, chemical spillage and, in general, risk management will be conducted in October 1999.

However, the breakfast meeting themes that support this project will continue right through to the new project date in 1999. The main reasons for the postponement are related to the funding and time required to adequately present such a project.

The project team that successfully staged Operation Bright Spark were not prepared to compromise or downgrade the project. In the meantime the project team is now focusing their attention on producing videos from the video footage shot during the Moot Coronial Inquest that the QAFI conducted in 1997.

Valuable staff development videos focusing on the "role and responsibility of a witness" both "lay and expert" in a Coronial Inquiry will be produced.

Hopefully, revenue generated from the sales of these videos can assist in the production of the 1999 major project.

By Tom Dawson, QAFI President

BLAZING THE TRAIL THROUGH EDUCATION

It was a great experience for me in May of this year, to attend the 49th annual education conference run by the IAAI, in Portland, Oregon. This conference was also the annual meeting of the IAAI.

For the first time we saw a lady, Judith Maydew, elected as the president of the IAAI. Judith spoke very well and has demonstrated that she is indeed up to the task of leading the IAAI over the next year.

The election of Directors was an interesting experience, there are five directors elected each year and they stand for a term of two years, giving you fifteen directors in office at any one time. The people who were eligible for election as Directors waged popularity battles with hospitality suites that were well stocked with a good variety of food, beer and wine. The guy who got my vote had even taken the time to have good Australian beverages in stock.

There were five follow Aussies and a couple of Kiwis representing the downunder contingent of the conference. We were treated extremely well by the Americans, their fascination for our country was endless, many members and directors approached and asked when we were going to host a conference so they could come downunder.

The "Operation Bright Spark" videos Tom Dawson gave me to give out on your behalf were very popular, one bought $60 in the charity auction for the local burns unit. It has become very important in the USA to take part in Test Burn situations as expert witnesses are being questioned along the lines of, *"Well Sir, you have just told the court that the fire developed on the bench because of a short circuit in the cordless jug, I ask you, have you ever participated in a Test Burn of a cordless jug that caused a fire in the way you just described to this court".*

You can easily see how your credibility as an expert could be questioned in a like situation.

The subjects covered at the conference were:-

- Interviewing victims of high trauma situations.
- Surface analysis of arc residues in fire investigation.
- Ignition of combustible materials.
- Film and digital camera technologies for fire investigation.
- Juvenile firesetter intervention program interaction with the fire investigator.
- The motives of juvenile firesetters.
- Investigation of marine fires.
- Advanced wildland fire investigation.
- Practical applications of fire modelling.
- Fire investigator occupational health and safety.
- Proving financial motive in arson.
- Forensic mapping.
- Metals in the fire environment.
- Incorporating heat release rates aspects in fire investigation.

You can see there was a wide coverage of sessions that are very relevant to our industry. The most impressive had to be digital camera technology. This area was presented by Kodak, who have developed a digital science program for law enforcement in the USA. The highest courts in the USA are those in California and these courts are accepting digital images as evidence as long as it

has not been altered. When the digital evidence is presented in court the format used has strict protocols that must be adhered to which shows that the photo has not been altered in any way.

I have hand out material on most of the conference sessions so feel free to contact me if you would like any information on a particular session.

The conference next year will be the 50 year celebration of the IAAI and I can tell you that a big bash is planned in Las Vegas, Nevada, the host city. I certainly plan to be there and I do hope some of you can join me.

When ever I travel to the USA I always try to work with various departments or organisations that are willing to have a work experience kid along for a few days. On this trip I was fortunate enough to work with the Bureau of Alcohol, Tobacco and Firearms for a few days in Tulsa, Oklahoma. The investigative techniques used by this agency was very advanced. Getting the phone call records off a car phone computer chip, that had been sold several months ago to convict the previous owner, was an example of what they can do.

I also spent a week with the California Department of Forestry. This is a Federally funded agency and for them to spend $140,000 on two surveillance cameras that monitored all the cars in and out of a forest reserve to catch an arsonist, was chicken feed when the cost of extinguishing a fire on a previous occasion in this reserve was in the vicinity of a million dollars. It was extremely interesting to travel the countryside and learn about wild land arsonists and the devices they use.

Well folks, that is all from me for now, I guess the one thing I learned from my experiences in the USA, is that the wheel has already been invented, we just had to get the right lubrication application to make ours run faster.

By Ted Beitz, Q.F.R.A.
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PRODUCT RECALLS

As some of you may have seen on Brisbane Extra recently, there was a segment on product recalls and their potential dangers within the home. Greg Reynolds (Fire Investigation Unit) and Alan Faulks (Department of Mines & Energy - Electrical Safety Office) were interviewed and highlighted the need for all recall notices to be taken seriously. Loss of life and property can result from faulty appliances and also when a fire occurs the Insurance Industry can sustain some very high losses.

As our Association takes this matter very seriously, we are listing new recalls and also repeating recalls from previous newsletters. This information is made readily available to our Association from Alan Faulks and also Consumer Safety Qld. If any of our members would like any further information on product recalls, please contact Bernice Norman on (07) 3831 1900 who will put you in touch with the right person to help you with your query.

Re-Advertised - TEAC COLOUR TELEVISION

TEAC Aust Pty Ltd is carrying out a safety recall on 48cm (20") and 51cm (21") colour televisions manufactured between June 94 to November 94.

MODELS BEING RECALLED ARE- CTM511s, CTM484, CTM484mkII, CTM496 & CTM486mmkII.

THE MODEL & SERIAL NUMBER ARE LOCATED ON AN IDENTIFICATION PLATE ON THE REAR OF THE SET.

Reason for Recall: The purpose of the recall is to check for possible defects in the electronic joints that could cause arcing and presents a fire risk.

ACTION REQUIRED BY OWNERS

Customers with a model subject to recall should immediately call 1800 656 700 (toll free) to arrange for their television to be inspected and modified. Please have your model and serial number handy. This work will be carried out free if charge to owners. Meanwhile, the television should not be left on whilst unattended. TEAC Australia Pty Ltd apologise for any inconvenience this recall may cause and assure customers of our policy in maintaining the highest quality standards.

ARLEC "PLUG IN NIGHT LIGHT" Product Code NL800

Arlec Australia Limited is conducting a voluntary recall of its "Plug In Night Light", product code NL800. The recall is only applicable to this product with the following batch numbers.

* Date batch no. 0697, sold after 2/4/97

* Date batch no. 1497, sold after 23/6/97

The batch number is located at the base of the product. Arlec has found in a small number of cases, where the product has not been properly used or handled, that the translucent front cover may separate from the base of the product, thereby exposing wiring and other components, which could deliver an electrical shock.

Consumers are requested to please return the product and the sales docket with their full name and postal address to the following free post address for a full refund, ARLEC AUSTRALIA LIMITED, RETURNS DEPARTMENT, REPLY PAID 122, PO BOX 181 LILYDALE VIC 3140. Consumers who are unable to provide a sales docket will receive a $4.00 refund. Products returned must have a date batch no. 0697 or 1497.

We apologise for any inconvenience caused. FURTHER ENQUIRIES CAN BE MADE BY CONTACTING OUR ARLEC "PLUG IN NIGHT LIGHT" INFORMATION LINE ON 1300 368 779.

BREVILLE BREADMAKER

Voluntary Safety Recall - Breadmaker. In keeping with Breville's commitment to quality and customer satisfaction, this notice is important for all customers who have purchased the model BB200 Bakers Oven Breadmaker with a batch number of 744 or lower, BB200 Breadmakers commencing from batch 745 and higher are unaffected.

We have identified a possible problem where, if a fault occurs on the Power Circuit Board, it may result in arcing, which in turn could lead to overheating with risk of serious damage. The potential problem is easily corrected.

Both the model number and batch number appear n the base of the unit. The batch number is a three digit number which is heat stamped into the plastic base, near the Voltage rating label.

Customers with one of these BB200 Breadmakers with a batch number of 744 or lower should refrain from using the unit and take the unit to the nearest Breville Service Centre for free inspect and correction. See your warranty card for service centre listing or in any doubt,

CALL THE BREVILLE CUSTOMER SERVICE CENTRE TOLL FREE BETWEEN THE HOURS OF 8AM TO 8PM (EST), MONDAY TO FRIDAY, 9AM TO 6PM SATURDAY - SUNDAY 1800 702 002.

NOTE: Only Model BB200, as described, is the subject of this recall. No other Breville Breadmaker models are affected.

Information provided by Consumer Affairs (Consumer Safety Old)

QLD INSURANCE / RISK MANAGEMENT BODIES DEVELOP UNITED VOICE

The Queensland Association of Fire Investigators is one of 19 Queensland-based insurance / risk management organisations to join a united group, which will promote seminars and conferences more widely. Bernice Norman and Peter McKeever are our representatives on the new joint initiative. Bernice Norman said the aim was to ensure clashes of events and activities were eliminated. Cross marketing across a united database would ensure braoder representation at events. The informal group is called the Queensland Insurance & Risk Management Associations. Another key aim was to hold joint seminars in regional areas.

"Few of our organisations have sufficient members in regional areas to enable us to organise our own seminars, but with a combined effort, we can put on joint presentations and truly service our membership outside Brisbane," she said.

Queensland Insurance & Risk Management Associations (QIRMA) is also considering establishing a web site which details the organisations' combined calendar and contact details, and links with organisations' sites.

The QIRMA contact person is ARIMA President Brad Greer. He can be reached at: b.greer@mailbox.gu.edu.au or phone (07) 3875 7971.

AUSTRALIAN NATIONAL INSURANCE FRAUD SURVEY

A survey by the Insurance Council of Australia member companies has found that fraud and arson costs Insurers about $500 million a year and adds about $21.00 to every premium.

The class of Insurance most affected by fraud remains domestic motor vehicle, which costs the industry $144 million. Other problem areas are workers' compensation ($71 million, although data is

imited), household Insurance ($53 million) and commercial motor vehicles ($26 million).

Arson involving property and motor vehicles, which can also result in death and injury, has been estimated at $161 million. It includes fraudulent arson (where the owner of the property is involved in the crime) which costs $46 million a year, and non-fraudulent arson (where the owner is not involved and another party caused the damage) which is worth $115 million a year.

ICA chief executive Alan Mason said the survey, of the 1995-96 financial year, was the most comprehensive investigation into Insurance fraud in Australia, and reached its conclusions for the whole industry based on a representative sample of respondents.

Comparison with previous surveys had to be taken with caution because of different methodology, but it appeared that a sustained effort by Insurance companies to fight fraud had brought the figure down from an estimated $1 billion five years ago. However the latest figure was still unacceptably high.

He said Insurers were becoming much more focused on fraud, and surveys would be conducted on a regular basis in order to get a clearer picture of the problem.

"Insurers are now putting considerable resources into this area. Most have dedicated anti-fraud groups working within their claims areas with highly experienced specialists leading the push to cut back on fraud and arson."

"The ICA has initiated successful arson reward and fraud reward schemes in a number of states which has led to Insurers receiving extremely useful information in the fight against fraud and arson."

"People who commit fraud and arson make policies more expensive for the vast majority of honest policyholders. We want to send a message to the minority who commit these crimes that Insurers are now better equipped to detect irregularities and you are most likely to get caught and prosecuted."

In separate research commissioned by the ICA to gauge the community's attitude to Insurance fraud, 97% of respondents either strongly agreed or agreed that Insurance fraud should be punished.

Dollar value of Insurance fraud and arson in Australia in millions

Domestic motor vehicle	$144
Workers' compensation*	$ 71
Household Insurance (building, contents)	$ 53
Commercial motor vehicle	$ 26
Commercial	$ 17
Compulsory Third Party**	$ 17
Marine hull	$ 6
Marine cargo	$ 2
Sickness & accident	$ 2
Travel	$ 1
Sub Total	**$339**
Non fraudulent arson	$115
Fraudulent arson	$ 46
Total	**$500**

* These figures exclude the significant component of workers' compensation underwritten by state governments.

** These figures exclude CTP underwritten by state governments.

Information from The Adjuster - Winter 1998

ITEMS OF INTEREST

"The Strike Zone"

The Massachusetts Coalition for juvenile Firesetter Intervention Programs publishes this quarterly newsletter by and for juvenile firesetter programs. It features news and information on legislation, funding and developments at Coalition program sites, along with information about the latest resources and training programs from around the U.S. There is no cost for the publication, which is sponsored by the Mass. Property Insurance Underwriters Assn. You can be added to the mailing list by sending in a request to: Irene Pinsonneault at Box 416, Westport Pt MA 02791, or, fax it to 508-636-6063, or, email ilp@tiac.net

Finally, there is a website dedicated to the issue of juvenille firesetting that Irene invites people to visit - www.firesolutions.com

UPCOMING EVENT

Member Breakfast Meeting

Date : Tuesday 20th October 1998
Time : 7.00am to 8.45am
Venue : The Brisbane Club

This breakfast meeting is one of the preliminary addresses leading up to our two day seminar. Please diarise this date.

WHAT HAPPENS WHEN YOU GET BURNED?

(An outline of the talk delivered to a meeting of the NSW Chapter on 28 May, 1998, by Dr Hugh Martin, Head of the Burns Unit, Royal Alexandra Hospital for Children).

So that you may understand a little about our work I thought it might be helpful for you to know what actually happens when you get burned. To do this I am going to have to introduce you to some medical concepts and terminology otherwise we will not be talking the same language, and as you know that usually leads to a bad outcome.

The first thing is to explain the basic structure of the skin. The skin consists of two main layers. The thicker layer is the layer which is tough, stretchable, and if you tan a hide, makes the leather. It is composed of cells and material that is very similar to tendons in your body and scar tissue, a material called fibrous tissue.

It varies between about 5mm thick on the back to about 0.5mm in areas such as the eyelids. It is a complex layer which in addition to the fibrous tissue contains blood vessels, nerves, sweat glands and the growing parts of hairs, the hair follicles. It is this layer that is responsible for the texture of the skin, its resilience and its mechanical strength. It is called the dermis.

Covering the dermis is a layer of cells which is structurally much less complex than the dermis, and is very much thinner. This layer of cells continues to grow and produce the surface flakes of skin (keratin) that we lose all the time, most of us not being aware of that loss (but if you have ever had a limb in plaster you will remember the flaking material that was on the surface of your skin after you removed the plaster, and these are the flakes of keratin that accumulated whilst the plaster was on).

Because the surface of this layer is dry it is what makes our skin waterproof. It is normally very closely adherent to the dermis underneath it. The name of this layer is the epidermis. The sweat glands and hair follicles are derived from this layer even though they are embedded deep in the dermis.

The skin from various areas of the body is different. Indeed, no square centimetre of skin is exactly the same as any other square centimetre of skin The changes are gradual so that if you lose a small piece of skin either by accident or because you have to have a mole removed, the edges can be brought together without any obvious change in the type of skin, leaving only the scar where healing has occurred. However, if you lose a large area of skin such as in a significant sized burn, no skin that one has on the rest of one's body can be moved to that place and look the same. The differences from one part to another are due to differences in thickness, colour and texture.

Most of us have suffered minor burns around the household, so you know that pain and redness always occur. Why is that? When a burn occurs there is a local as well as a general response. At the site of the burn there is immediate destruction of some of the body, depending upon the amount of heat applied. For most minor burns, the depth of this immediate destruction is quite shallow. Around this dead material the body sets up a zone of inflammation and this results in extra blood flow to the area which is why the burn looks red.

The chemicals that are produced by the damaged cells cause the inflammation and also stimulate nerve endings in the area, so causing the pain. If the burn is deep enough the dead material covers that and so the centre of the burn will look grey or yellow. In the tissue immediately adjacent to the dead material the degree of inflammation is so severe that it will cause the death of another millimetre or so of tissue if it is not treated.

What treatment will reduce this inflammation? It is quite simple, and this is probably the most useful thing I will tell you tonight. It is nothing more complicated than cold water. The earlier you start the better, but it is useful even up to a

couple of hours after the burn itself. The mistake that most people make is to apply the cold water for too short a time. It must be applied for twenty to thirty minutes and if you do that the next time you get a small burn around the house you will be amazed at how little pain you suffer, and how the next day the burn will look so small.

Of course, if the burn extends into the deep part of the dermis from the very first moments you are not going to resurrect the dead tissue, but most burns that we get around the house are not very deep initially so this treatment is extremely effective. For major bums that are deep from the very first instant it is not as useful, and one has to be careful that the patient doesn't get too cold, particularly if it is a child.

There is always a general response to a burn. An area of inflammation in the body produces chemicals which are released into the bloodstream and if that area of inflammation is big enough, there is a significant effect upon the functioning of the whole body. If a burn occupies more than 20% of the total surface area of the body there is a significant generalised response.

Fluid leaks out of the blood vessels reducing the volume of blood and this is the cause of shock after a burn. The heart muscle does not pump as efficiently as it normally does. The body's ability to fight infection is seriously diminished and this is why patients who die of burns (except those who are immediately overcome at the time of injury) almost all die of infection, not now so often from the burn wound itself, but from chest and bloodstream infection. The gut does not function well and in particular bacteria within the gut can escape through the wall into the rest of the body.

Growth is abnormal, there being loss of calcium from the bones and in children the rate of gain of height is diminished for some years whilst the deposition of fat around the centre of the body is increased. The generalised effects of a burn are life-threatening, requiring expert treatment, and their mechanisms are still far from clear.

All these generalised effects are reversible so that once the person has got over the burn, they all eventually disappear and the body's normal workings are re-established. Thus these serious effects on the body's functions do not persist with only a few exceptions, such as the height of children who have received a major burn. While their rate of growth returns to normal, they do not undergo catch-up growth to make up for the period when their growth was slower.

And that brings me to the long-term effects of a burn. These can be divided into two main categories, the physical and the emotional.

The long-term physical effects are mostly to do with scarring. As I pointed out earlier, each square centimetre of the skin is unique to that part and once destroyed cannot be replaced. It is a common misconception that "plastic surgery" can abolish scars. It can't.

Plastic surgery can change a scar, perhaps make it smaller, or less conspicuous, but it will never make it disappear. Nothing can replace the person's own skin and there is no technology which allows us to grow or replace lost skin. So called cultured skin is only the epidermis, and has proved very disappointing in terms of healing burns. "Artificial skin" is nothing like true skin and only acts as a replacement dermis which is very different from the patient's own, and not nearly as satisfactory. So the bottom line is that once there is a significant sized scar it is always going to be there and the individual needs to adjust emotionally to that fact.

Which brings me to the long-term emotional effects. All burns have a major emotional impact on the patients, their families, and their peers. Like every other major stressful event in our life, it can never leave the individual unchanged. That change can either be for the better or for the worse, and one of our most important tasks is to try to minimise any harmful effect. There are individuals who have received burns who in fact have used this experience in a very positive way, and their burn experience has given them a depth of understanding of themselves and other people which far exceeds most individuals.

So important is the emotional care of the burned patients and their families that it is no exaggeration to say that the correct treatment of this aspect of their injury is as important if not more important, than the physical care of the injury as far as their long-term ability to participate in life.

Complicating treatment of this aspect of the burn injury is the fact that there are social and emotional aspects that are important in the causation of the burn injury. It is easy to imagine how the parent who is trying to do three things at once will not be able to keep the toddler out of the bathroom when the bath is being run and may not have checked the temperature of the water as it goes in.

When the parents are unaware of the dangers of cups of coffee, kettle cords hanging over the sides of cupboards, electrical leads, or the ease with which flammable fluids can be ignited are likely to be the households from which burns patients come.

It is well demonstrated in the scientific literature that burned children tend to come from households where there is a single parent, where the parents have emotional problems of their own that are unresolved, where the education level of the parents is low and there are physical hazards in the household, and households which are noisy and disorganised.

As you probably all know, this sort of social inadequacy tends to be handed from one generation to the next. Children brought up in those sorts of households don't learn the skills which enable them to get out of that environment. It is well demonstrated for instance that most parents who physically abuse their children have themselves been abused when young. Thus this sort of social and emotional impoverishment tends to be cycled from one generation to the next.

This sort of inter-generational impoverishment is extremely difficult to correct. You can probably imagine the sort of reception that you would get if you knocked on the door of such a household and told the parents that you were aware of the fact that they really weren't coping too well and were obviously in need of help. My guess is that the reception that you would get would be a fairly rapidly approaching bunch of fives.

However, when a member of such a family, particularly a child, is burned and admitted to hospital, the family is in crisis. The event is so upsetting to every member of the family that the need for individual help in overcoming this crisis is quickly evident to almost everyone. Since their reaction is very much dictated by their previous experience and personality, helping such a person to deal with the distress of the recent events inevitably involves dealing with their pre-existing psychological make-up and this in turn often enables them to deal with all aspects of life more satisfactorily in the future.

In this way we believe that help given to the burned patients and their families, particularly the burned child, can help break the vicious circle of social and emotional impoverishment that we can see in our society. It is one of the very few opportunities that we have to make an impact on this unhappy group in our society.

This is why in the Burns Unit at the Children's Hospital we have used donated funds to provide two full-time staff members, one Physiotherapist who deals with the problem of long-term scarring, and the other a Social Worker who deals with the problem of the long-term emotional adjustment of patients. We do a lot of other things with donated money. We provide up-to-date equipment for the treatment of patients including sophisticated equipment for operating on burned children, we provide better facilities in the ward, we help keep the staff of the Burns Unit up-to-date with on-going education, and we run a camp for burn patients each year.

The camp provides an important opportunity to give the patients a sense of independence, gives them an opportunity to recognise that other people share their problems, and brings them together with our own staff so they can address the multitude of emotional problems that they face during their growth and development.

So these are the sorts of activities that we fund with donations. We will be very grateful for any contribution that you make because this will enable us to treat the children and their families more effectively. Not only will their treatment be better but also as they grow they will lead richer, happier lives and in turn they will contribute to our society in a constructive and positive way.

(Editor's Note: The first pleasant duty for incoming NSW AFI President Mitchell Parrish to perform was the donation of $5000 from the NSW Chapter, to Dr. Martin's Burn Unit),

A POCKET GUIDE TO ACCELERANT EVIDENCE COLLECTION

The twelve next insert pages (between pages 12 and 13) can be made into a small pocket sized booklet. To get your booklet:

- Pull out the next 12 pages (these are the pages between numbered page 12 and page 13);
- Cut the pages in half, along the dotted horizontal line;
- Fold the pages in half, so that the right hand side of each page, ends up in the front;
- Make sure your pages are in numerical order (1 through to 44, preceded by the Acknowledgment Page, and the Cover Page.
- Staple your booklet together. That's all there is to it!

CASH PRIZES OFFERED TO MEMBERS

The Association of Fire Investigators is offering:

1. A prize of $250 for the best relevant article submitted to "Firepoint" by December 31, 1998; and

2. A further prize of $250 for the best relevant article with photographs submitted to "Firepoint" by December 31, 1998, both articles to be suited for publication in the journal.

The closing date for these awards has been extended. Any Australian member who is financial at the time they submit their entry is eligible to enter, except for members of the NSW Executive.

The competition will be judged by the Editor, the NSW President, and the NSW Vice President. Their decision will be final.

A Pocket Guide to

Accelerant Evidence Collection

Acknowledgments
Accelerant Evidence Study Committee
of the Massachusetts Chapter
International Association of Arson Investigators
(1AAI)

Chairman:
Robert A. Corry, CFI- Massachusetts State Police, OIC, State Fire Marshal's Office

Members:
Robert T. Callaban, CFI - Arson Unit, Springfield Fire Dept.
Michael F. Cherven -Massachusetts State Police, State Fire Marshal's Office
John E Drugan-Forensic Chemist, Massachusetts State Police Laboratory
Ronald N. Flechtner, CF1-Arson Unit, Fitchburg Fire Dept.
Dennis J. Galvin -Massachusetts State Police, State Fire Marshal's Office
Donald C. Gamer-Factory Mutual Engineering and Research
Lester S. MacLaughlin, C.I.P.E. -Mechanical Consultant
John D. Malcolm, Jr., CF1 -Forensic Consultant
Paul J. Maloney -Forensic Chemist, Massachusetts State Police Laboratory
Brian P. McMahon-CNA Insurance Companies
Wayne M. Miller, CFI-Bureau of Alcohol, Tobacco and Firearms
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Table of Contents

Purpose 1
Overview 1
Symptoms of Accelerant liquid Use in an Arson Fire 4
Accelerant Evidence Collection Techniques 9
The accelerated arson crime scene 9
The most common sampling errors 10
Evidence collection areas 10
Preventing cross-contamination 11
Processing 'cold weather' fire scenes 15
How to get the best results from a canine team 16
Safety for the fire scene investigator 17
Evidence collection from burned vehicles 18
Packaging and Labelling Evidence Containers 19
Liquid accelerant samples 23
Sampling Procedures for Seven Common Floor Types 24
Carpet 26
Glazed ceramic tile 27
Concrete/cement 28
Floor tiles 31
Linoleum/vinyl sheet 33
and/soil or building aprons 34
Wood flooring 36
Appendix 39
Recommended Fire Scene Evidence Collection Kit 39

A Pocket Guide to Accelerant Evidence Collection is out of print.

A new Guide is currently being prepared.

Excavation tools:

- flat-head shovel
- steel-tine garden rake
- hoe
- heavy-duty street broom
- long-handle squeegee

Documentation tools:

- 35min camera with 50mm lens with "macro" capability and 28mm-80mm zoom lens
- flash unit with a guide number of at least 120
- adequate supply of film
- camera case (rigid case if possible)
- magnetic compass
- 25- and 100-foot measuring tapes (metal)
- clipboard with a supply of legal and graph paper

Pocket tools:

- plastic pocket insert
- sturdy tire depth gauge tool (measuring depth of char)
- pencil magnet (to determine the type of metal examined)
- pencil "scribe" for evidence marking on metal, plastic or glass
- 6-inch pocket ruler for detailed measuring and use as a scale in photographs
- one large and one fine-tip permanent marker

Purpose

The Pocket Guide to Accelerant Evidence Collection is a guide to assist fire scene investigators in recognising and collecting accelerant residue evidence in a consistent manner that permits optimum laboratory analysis results. Many of these procedures can be adapted for effective collection and documentation of other forms of physical evidence at fire scenes involving structures or motor vehicles.

Overview

A number of experts who have studied arson ignitions have come to the conclusion that most incendiary fires in structures and motor vehicles are initially set using a flammable liquid and a match. Gasoline is the accelerant most frequently encountered. Arson fires can also be started without the aid of liquid accelerants by using available combustibles, spontaneous ignition or electrical setups. Many common types of physical evidence such as fingerprints, footwear, tyre-track impressions and tool marks are often found by skilled investigators at fire scenes. A trained evidence technician can assist in effective recovery of such evidence.

This manual is offered as an evidence recognition, collection and preservation guide to the fire scene investigator who wants to know if a liquid accelerant may have been used to set or propagate the fire under investigation.

The manual describes a proven accelerant-sampling protocol, which emphasises the need to conduct certain witness interviews before attempting actual evidence collection from specific locations and materials. This sequence takes into

Place emphasis on collecting from absorbent materials on top of the floor within the pour pattern area.

Try to obtain a wood floor comparison sample from the same board from which the suspected residue sample was taken. If this is not possible, then take the sample from a shielded area.

Most woods that are commonly used in building construction contain terpenes or pine oils. When possible, take comparative samples.

accelerant residue will usually be found only where the volatile accelerant was prevented from entering the fire itself. Identifiable accelerant residues will seldom survive where the fire's heat was most intense -such as on the fire-exposed surface of deeply charred wood boards, tiny char embers or grey ash..

In most arson fire scene examinations, the best potential evidence is often shovelled out a window in an effort to see if floor patterns are present. Sampling is then attempted from the floor's surface. This can be a problem, particularly on flooring that is moisture impervious (eg., glazed ceramic tile, sheet vinyl, etc.). Materials placed on the floor (eg., newspaper stacks, clothing piles, cardboard boxes, etc) most often will rep resent the best potential collection sites within the pour pat tem. Liquids contact, and are absorbed by these materials at the lowest levels. The floor area is the last to burn in many fire cases.

Accelerant-residue sampling should be focused on areas where the accelerant liquid has seeped or has been absorbed and is protected from heat or volatilisation. Generally, accelerant sampling should be avoided where heat or hose streams were most intense during a fire.

A well-trained accelerant-detection canine can greatly enhance accelerant-residue sampling. Experience has shown that these canines are capable of quickly searching a fire scene and pinpointing the greatest concentration of remaining residue. The greatest residue concentration presents the best sampling opportunity. Jurisdictions with significant arson problems should work toward having this investigative resource available to assist them.

This guide will be particularly useful for fire investigators who don't have access to an accelerant-detection canine, but

account the fact that certain types of common materials in residential and industrial settings, as well as certain structural features present in most buildings, will tend to absorb and protect any liquid accelerants with which they come into contact.

Kit

Interviewing those who have witnessed the early stages of fire growth can help fire investigators narrow down the area of fire origin. Interviewing those who have detailed knowledge of the structure's layout, furnishings and storage can help pinpoint the exact locations of highly absorbent materials and structural forms. These locations represent key areas from which to take samples in the event indicators of accelerant use are found.

By isolating these areas during site excavation and then taking samples from them, the investigator will sharply increase his chances of obtaining a strong accelerant sample for laboratory analysis.

Fire investigators who have kept abreast of advances in fire research are aware that some of the old fire scene origin and cause "rules of thumb," which were accepted as true 10 years ago, have since been discredited by science. One fact remains: laboratory confirmation of accelerant presence in a debris sample will confirm the investigator's theory of a set fire. A competent investigator will learn to recognise the unique damage patterns created by burning liquid accelerants, and then practice the competent documentation, collection and storage procedures required to preserve this type of evidence for judicial scrutiny.

Volatile accelerants exposed to a fire have a greater tendency to bum than most of the materials to which they are applied. This single point underlies all modern residue sampling procedures. Clearly, after a serious fire has occurred,

Appendix

Recommended Fire Scene Accelerant Evidence Collection

Every fire investigator charged with performing origin and cause examinations should either have, or have ready access to, a basic equipment kit. This listing includes tools to facilitate documentation, excavation and evidence recovery in most fire scenes. Always use appropriate safety gear (safety glasses and helmet).

Hand tools

A steel tool box with a tray at least 18 inches long by 9 inches high by 8 inches deep will hold the following tools:

- mason or brick trowel
- two 12-inch pinch bars
- blade and Phillips head screwdrivers (assorted sizes)
- utility knife with extra blades
- 1-inch wood chisel
- 1-inch cold chisel (concrete)
- hatchet with hammer head
- bench brush, whisk broom or paint brush
- hacksaw with extra blades
- keyhole saw with extra blades
- pliers
- supply of isopropyl alcohol with a supply of clean paper wipes to permit on-site cleaning of blade tools
- supply of latex surgical gloves (two gloves will fit into an empty 35min film container)

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who still must attempt to collect residue evidence. Many of . the evidence collection procedures apply equally to fire scenes that "reek of accelerant" and those that are heavily damaged and so require educated judgments as to the best sampling locations. A limited number of basic tools must be taken to a fire scene to facilitate excavation and evidence sampling. A recommended basic listing is provided in the Appendix on page 39.

As with any type of fire cause investigation, properly managed suppression and overhaul procedures will enhance the probability of evidence recognition and recovery. Time, the elements and temperature are enemies of the fire investigator seeking accelerant-residue samples.

Symptoms of Accelerant Liquid Use in an Arson Fire

Basic rule: when volatile vapours burn above a flammable or combustible liquid-accelerant pool, they leave distinct bum/damage patterns unlike other combustible products normally found in a structure. The earlier a fire is extinguished, the more obvious these patterns will be. Even in the worst cases of destruction, there is a chance of accelerant residue recovery.

(Investigators should note that each symptom listed here could be due to a cause or condition unrelated to arson accelerant use.)

The following are possible indicators of an accelerated fire:

1. Witness observations ("an odour of gasoline," etc.)
2. A low-pressure wave ("boom" or "whomp" sound at ignition)

- hammer
- pinch bar
- wood saw
- latex gloves
- isopropyl alcohol and clean paper wipes

For collection procedures for wood, see the sections on "Accelerant Evidence Collection Techniques" on page 9 and "Preventing Cross-contamination" on page 11.

For tongue and groove or barnboard wood flooring, take a hatchet and chop thin slivers from both sides of many adjoining seams within the accelerant burn pattern (see Fig. 3 on page 21). Place splintered seams vertically in the evidence can until two-thirds of the volume is filled. Since accelerants will not be absorbed very far into wood fibres, try to collect as many of the cut edges of the seams as possible. Try to fill the evidence can to two-thirds volume for best results. If insufficient "hot" splinters cannot be found then use a smaller can.

Use a pinch bar to remove wood floor mouldings or threshold boards. Chop or chisel any part of the bottom or edge where a liquid accelerant could have seeped. Chop or chisel up the floor beneath the moulding. Search for seams beneath the moulding where wood floors from adjoining rooms meet, or where a floor meets a. wall.

When collecting evidence from wooden staircases, use a chisel to cut into the seam between the tread and riser within the pattern on the various steps. Also collect samples beneath any rubber tread or edge cleat. Any carpet presents an excellent collection opportunity. Should the pattern intersect with the side of a stair, additional collection seams are available in the mouldings or baluster seams.

Take a comparison sample away from the pour/drain pattern area. If you sample the top four inches of trailer soil, then do the same when sampling for comparison purposes.

7. Wood flooring

Wood is used in a vast number of residential and commercial construction and cosmetic applications. The most important of these for fire investigators seeking accelerant-residue evidence would seem to be in the use of wood for flooring, floor mouldings, threshold boards, door casings, furniture joints and staircases. Most arsonists pour accelerant liquids on a floor or staircase and ignite it.

Accelerant sampling techniques with wood floors should concentrate on seams and joints. Among the most important properties of wood is a high resistance to lateral heat conductivity. Every experienced fire investigator has seen many examples of relatively thin wood heavily charred on the fire side and, yet, seemingly unaffected by heat on its opposite side.

Common liquid accelerants poured on wooden floors or staircases often quickly seep down between and beneath seams, casings and beneath floor mouldings and may remain relatively cool during a fire.

Investigators should search within the pour pattern for areas where wood grain is vertically aligned, such as in furniture legs or in doorframe casings. Accelerant liquids reaching such areas are often absorbed into the vertical fibres of the wood boards in much the same way water is absorbed in a tree.

Suggested tools for taking samples of wood surfaces include:

- hatchet
- chisel

3. An explosion
4. Burn injuries to the hands, face, lea or hair of a suspect/ witness
5. Unnatural fire spread (downward. unusually fast, etc.)
6. "Rolling" flames
7. Bright yellow/orange flames accompanied by black smoke
8. Sudden appearance of flames in an entire room fol lowed by heavy, pushing black smoke
9. Flames seen burning directly from the floor
10. Intense localised rusting/warping, especially to the undersides and lower portions of metal appliances and metal objects within the suspected liquid burn-pattern area.
11. Structural damage inconsistent with fire loading.
12. Intermixed light, moderate and intense floor burn patterns in puddle or trailer shapes that correspond to the original shape of the accelerant pool on tight or nonporous floors-the burn pattern appearance will vary with the type of accelerant, surface texture and the amount of ventilation
13. Localised "gapping" of wood or vinyl floor seams within the pour burn pattern, which may be caused by a liquid accelerant burning inside the seam
14. "Rainbow-coloured" sheen on the surface of suppression water over the pour area

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For collection procedures for linoleum/vinyl floor coverings, see the sections on "Accelerant Evidence Collection Techniques" on page 9 and "Preventing Cross-contamination" on page 11.

Look for pre-fire tears, rips or cracks within the pattern, especially near heavy appliances or items that may have been dragged across the floor. Using the utility knife and screwdriver, cut out the remaining surface and underlayer.

Linoleum/vinyl is usually installed in six- or twelve-foot-wide sheets. Locate a seam between two sheets and trace it into the pattern area. Sample from between and beneath the two adjoining sheets in the pattern area.

Identify the edge of the accelerant pool. Cut long, narrow strips of flooring along this periphery zone. Chimney roll and arrange the samples vertically in the evidence can, allowing for one-third volume headspace (see Fig. 3 on page 21).

Always sample absorbent materials (paper/cloth stacks, throw rugs) and bases of any construction materials (floor mouldings, door casings) within the pattern area, using the appropriate tools.

Seek comparison samples outside the pattern area on the same floor in a protected area. Good comparison samples can usually be found beneath heavy appliances, storage or furnature, which sit flush on the floor. Sample both the flooring and adhesive.

6. Sand/soil floors or building aprons

Accelerant liquids draining onto or poured across dug cellars and crawl spaces, or exterior ignitions or liquid-accelerant trailers running out of buildings to adjoining soil aprons are

27. Sharp line of char demarcation in a cross section of wood stud, or a sharp line of calcination (colour change) in plaster or drywall, indicating a rapid (rather than smouldering) heat build up.
28. Window glass that has melted down like "ribbon candy" and has a clean interior face (little or no soot) on the side with the accelerant
29. Spring annealing in furniture/bedding, which can sometimes result from a liquid accelerant being poured on or adjacent to furniture
30. "Inverted cone" burn/scald patterns on vertical surfaces within the pour pattern

Key Properties of Common Accelerant Liquids

Liquids have physical properties that cause them to behave differently from most gases or solids. Most common liquid accelerants have unique characteristics that manifest themselves in both fires and evidence from fire scenes.

1. Liquids flow downgrade and tend to form pools or puddles in low areas.
2. Almost all hydrocarbon liquids are lighter than water, are immiscible, and display a "rainbow" coloration float ing on water. Certain other common accelerant liquids (eg., alcohols, acetone) are water-soluble.
3. Almost all commonly used accelerant liquids tend to form flammable/explosive vapours at room temperature.
4. The vapours of most commonly used accelerants are heavier than air and tend to flow downward into stair wells, cellars, drains, crevices and cracks, etc.

15. Even height of smoke and heat patterns in the room of origin

ratio

16. Accelerant containers in or near the scene
17. Increased burn damage pattern at the bottom of furniture legs, boxes, etc., on the floor in the pour pattern area
18. Burn patterns beneath doors, thresholds or floor mouldings, etc.
19. "Rundown" burn patterns on floor joists beneath loose floorboards, board seams, or edge mouldings
20. Localised staining on the underside of carpet padding
21. Pool-shaped, intermixed, mottled black and brown staining on a concrete floor, together with a tendency for the mottled area to repel water -this area may retain a mild odour of accelerant
22. Fire damage with no identifiable point of origin
23. Wall burn patterns running from the floor seam UP, or appearing in corners
24. Burned-out flooring beneath heavy appliances or furniture that ordinarily would be expected to "protect the floor
25. "Ghost marks" between the seams of floor tiles in the pour area where the accelerant seeped, dissolved and scorched tile adhesive, resulting in a "checkerboard" pattern on the sub-floor
26. Localised "clean burn" areas on a wall, appliance, or similar vertical surfaces above the floor pattern where intense heat burned away soot deposits

frequently encountered. Soil generally provides an excellent sampling opportunity because of its high surface-to-weight

and the fact it often remains moist and cool during an abut ting fire, inhibiting accelerant volatilisation. Soils rich in organic material, loam or clay tend to retain liquid-accelerant samples better than sandy soils.

Suggested tools for sampling sand/soil floors include:

- mason's trowel
- large-blade screwdriver
- gardener's hand shovel
- latex gloves
- isopropyl alcohol and clean paper wipes

For soil collection procedures, see the sections on "Accelerant Evidence Collection Techniques" on page 9 and "Preventing Cross-contamination" on page 11.

Determine the dimensions of the sampling area by lifting the top two inches of soil, or by pulling tufts of grass or other vegetation with root systems to check for odour.

Sample the top four to six inches of topsoil from within the trailer or pour area. Include vegetation roots if they are the dense, surface type.

Fill the evidence can to 2/3 volume. Do not pack down the sample. Clean the V-groove and seal tightly.

When soil evidence is believed to contain accelerant residue, either transport it to the laboratory promptly, or make arrangements to refrigerate or freeze the soil samples. Naturally existing bacteria in soil degrades many common accelerants derived from crude oil and will quickly break down the remaining accelerant unless precautions are taken.

5. Many accelerant liquids are readily absorbed by structural materials, and natural or man-made substances.
6. Many accelerant liquids are powerful solvents which tend to dissolve or stain many floor surfaces, finishes and adhesives.
7. Hydrocarbon accelerants do not ignite spontaneously.
8. Ignition of a given accelerant vapour requires that the vapour be within its flammable/explosive range at the point it encounters an ignition source at or above its ignition temperature.

like asbestos, which increase durability. Many are top-coated

9. When an accelerant liquid is poured on a floor and ignited, two major things occur:
   (a) many types of synthetic surfaces (eg., vinyl) or surface treatments will mollify (soften) beneath the liquid; and
   (b) at the edges of the pool, burning vapours adjacent to the liquid will cause many floor surfaces to char while certain others (such as vinyl) melt then char. As the liquid pool boils off, its edge recedes. Floor surface charring (or melting and charring) follows the receding liquid edge. The floor area under the accelerant liquid is protected from the effects of burning until the liquid boils off that section.

Experiments indicate that the greatest temperatures in a liquid-accelerant fire occur above the centre of the burning liquid pool. Maximum concentrations of accelerant residues are more often found at the edges of the burn pattern and minimum concentrations toward the centre. Some arson investigators believe this is controversial and so take samples from both the edge and the centre.

always take the residue sample. Seek comparative tile samples from protected areas outside the pattern area beneath appliances and floor Storage.

5. Linoleum/vinyl sheet floor coverings

These thin-layer composition products are manufactured from a base of burlap, canvas, or similar material covered by a mix ture of linseed oil, gum, cork dust and/or wood flour (linoleum flooring), or thermoplastic polymers of vinyl compounds (vinyl flooring). Sheet flooring may also contain substances

with a tough, non-absorbent coating, which inhibits absorption into the product. They are often glued to sub-surfaces using epoxy or glues containing hydrocarbon-based adhesives. Com parison sampling is important.

Pouring common accelerant liquids on linoleum/vinyl floor ing will usually have two effects: (1) the surface will often mol lify (soften) and begin to dissolve; (2) once ignited the edge of the accelerant pool will begin to melt, burn and char. As the pool recedes during the fire, the burning and melting will recede with it, resulting in a burn pattern. As with any type of liquid accelerant pattern, the centre of the pattern is ordinarily exposed to the greatest heat and is least likely to produce a valuable sample. .

Tools for sampling linoleum/vinyl floor coverings include:

- utility knife
- . large-blade screwdriver
- latex gloves
- isopropyl alcohol
- clean paper wipes

Suggested tools for sampling floor tiles include:
- cold chisel
- hammer
- large-blade screwdriver or putty knife
- utility knife
- pliers
- latex gloves
- isopropyl alcohol and clean paper wipes

For collection techniques for floor tiles, see the sections on "Accelerant Evidence Collection Techniques" on page 9 and "Preventing Cross-contamination" on page 11.

To start, gently clear and then clean the surface of the tiles with a gentle water rinse until any remaining burn pattern can be photographed. Include photographs of objects within the floor pattern that display damage patterns consistent with burning liquid accelerants such as wall or appliance surfaces.

Photograph "ghost patterns," where accelerant seeped into tile edges and either dissolved or seared the adhesive, leaving a checkerboard-like appearance. Photograph areas on the along
same floor outside the pattern where ghost marks are not present.

Lift the edges of many tiles within the pattern area with screwdriver or putty knife, and break them off about ½-inch from the edge of each seam. Fill the evidence can two-thirds full and seal.

Comparison sampling of floor tile is important. Certain categories of floor tiles (ie., vinyl) and many types of tile adhesives share a common petrochemical origin with accelerant liquids. If an adequate comparison sample is not available,

10. Accelerants with high vapour pressure, such as alcohol or acetone, tend to "flash and scorch" a surface, whereas accelerants with higher boiling components, such as gasoline, tend to "wick, melt and burn," leaving stronger patterns. The amount of ventilation available to the fire is a factor in burn pattern appearance.

Accelerant Evidence Collection Techniques

The Accelerated Arson Crime Scene

Many arsonists employ similar methods when using accelerants to set fires. Some important tips on collecting residue samples follow.

Accelerant containers. If evidence of a flammable liquid is identified, always search for the container. Latent finger prints can often be developed even on scalded or sooty containers. Containers are often found at the end of a pour pattern, thrown back into the "trailer." onto the roof above the egress, into a rubbish disposal, or in nearby vegetation

the escape route.

As a general rule, all fire scenes should be thoroughly photographed outside and inside prior to any debris excavation. As pieces of potential evidence are recovered. photograph each in place and fix its location in a crime scene sketch.

Plants and trailers. Many arsonists "trail" an accelerant pour from a "plant" across a floor toward a secluded building exit or interior barrier to make ignition and escape safe, therefore:

Begin your search for evidence by looking for objects that do not seem to belong.

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is chosen depends on the specific situation. *Direct sampling* from the base of absorbent objects stored on the floor within the pattern area, or from *pre-fire cracks* or *sampling from the concrete* itself may tend to yield stronger *samples than the absorbent technique.*

For collection procedures, see the sections on "Accelerant Evidence Collection Techniques" on page 9 and "Preventing Cross-contamination" on page 11. Emphasise collection of samples from the bottoms and bottom edges of any absorbent materials stored directly on the floor within the suspected pour absolutely pattern area.

Sampling from pre-fire cracks and crevices. Pre-fire cracks in the floor surface within the pour pattern area will usually display interior sooty edges after a fire caused by "wicking" and exposed inefficient burning of fuel vapours. Post-fire expansion cracks will often have relatively cleaner crack edges. Using the cold chisel and hammer, break the edges of pre-fire cracks one-half inch on both sides. Include a sample from the base material (soil, etc.) beneath the crack. Try to identify and sample crack areas where accelerant liquid may have flowed beneath a shielding object. Pulverise the sample concrete into many small pieces. Loosely fill the evidence can to two-thirds volume and seal (see Fig. 3 on page 21).

Direct surface sampling. Lay the cloth section over the *outer edge* (periphery) of the burn pattern. Using the hammer, sharply strike the floor at the accelerant pattern edge to fracture the concrete surface. Thin (I/2-inch thick), small, fractured concrete pieces of the floor surface may retain accelerant residue. Fill the evidence container to two-thirds volume and seal.

better, stronger samples in protected areas and inside absorbent materials within the pattern. (See Figs. 1 and 2 on pages 12 and 11)

Most Desirable Collection Areas	*Least Desirable Collection Areas*
a. lowest areas and insulated areas within the pattern	a. deeply charred wood
b. samples taken from porous plastic or man-made fibres	b. grey ash
c. cloth, paper, cardboard in direct contact with the pattern	c. edge of a hole burned through a floor
d. inside seams, tears, cracks	d. samples from non-porous surfaces
e. the edges of burn patterns	e. the centre of any burn pattern
f. floor drains, bases of load-bearing columns or walls.	f. in general, areas to greatest heat, hose streams

Preventing Cross-contamination

Cross-contamination is the unintentional transfer of accelerant residue from one fire scene or location contaminated with accelerant residue to an evidence collection site.

There are four potential sources of cross-contamination at a fire scene: tools, turnout gear, evidence cans and emergency equipment. Arson investigators should comply with certain "housekeeping" procedures to prevent possible accelerant cross-contamination from previous accelerated fire scenes.

Tools. An arson squad or fire investigator should be equipped with a special tool kit to process fire scenes (see

-Concentrate the search for accelerant-evidence indicators beginning where any suspected accelerant container was found, or from possible egress areas concealed from view and leading back towards the areas of greatest damage.
-Concentrate the search for remains of the ignition device (matchbook, etc.) at or near the most probable egress point or barrier.
-The best accelerant samples are often found around the point of origin; the best physical evidence proving a forcible entry is usually at the point of entry itself

Small quantities of accelerant. In cases where only a small quantity of accelerant is used, the investigator should search the area of origin for an unusual pattern of localised damage. Some reliable indicators include: an odour of accelerant; intermixed light, medium and heavy floor, or other horizontal burn patterns; and wall char from the floor seam up.

The Most Common Sampling Errors

The most common sampling errors are as follows:
- insufficient samples (too small)
- ineffective sample preservation techniques
- no comparison samples
- not maintaining a "chain of custody"
- taking samples from the wrong places or materials

Evidence Collection Areas

The key evidence collection skill is knowing what to collect what not to collect. Accelerant liquids burn better than most of the surfaces onto which they are poured. Expect to find

Chemical absorbent method. The chemical absorbent method can be used if breaking up the floor's surface is impossible, or if large floor areas are to be sampled. Begin by cleaning the concrete floor where the burn pattern is located with a shovel and broom. Photograph and diagram pattern evidence.

Wet down the entire burn pattern area with a mist of water. Spread a coating of finely ground agricultural lime (40/60 mesh ASTM) approximately V16-inch thick over the pattern area. Let stand for 30 minutes. Recover the absorbent with a shovel or squeegee, and place in an evidence can without packing down. The chemical is more absorbent than concrete and tends to soak up accelerant residues. Non-self-rising flour may be used as a substitute following the same directions. Although flour absorbs as well as lime, it tends to decompose in the can and yield alcohol and carbon dioxide, which may burst the container seal or needlessly contaminate the sample. If flour is used, either have it analysed immediately or freeze it. Agricultural lime is commonly available in lawn and garden or hard ware stores, and non-self-rising flour is available in any supermarket.

4. Floor tiles

Floor tiles may be made from vinyl, ordinary ceramic or other substances. Substances like asbestos are sometimes added to increase durability. This product may offer good residue col lection possibilities because of the abundance of seams into which accelerant liquids may seep or be absorbed. Adhesives used with these products may have a petrochemical basis. and *Comparison sampling is necessary.*

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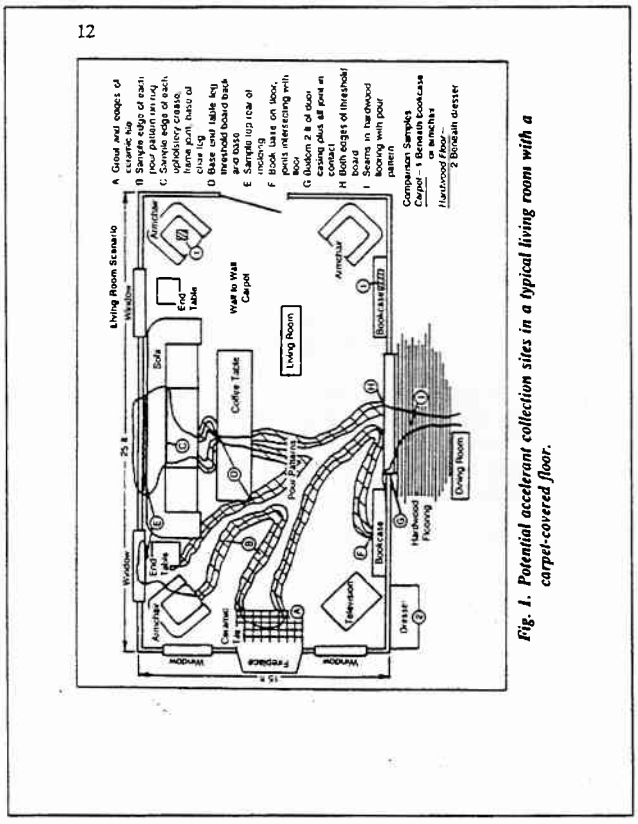

Fig. 1. Potential accelerant collection sites in a typical living room with a carpet-covered floor.

cementing material such as Portland Cement (alumina, silica, lime, iron oxide and magnesia). (Untreated) concrete is some what absorbent depending on its composition.

Focus on isolating the locations of absorbent materials stored directly on the concrete floor in the pattern area. Also search for pre-fire cracks, seams and crevices and areas where the accelerant may have spread under pallets or other objects where temperatures would probably be lower.

Suggested tools for sampling concrete include:
- required chemical absorbents or solvents
- a large section of clean cloth
- concrete "cold" chisel
- hammer
- squeegee
- latex gloves
- isopropyl alcohol and clean paper wipes

Special note: common accelerant liquids poured on concrete and ignited often leave an intermixed and mottled black, brown and grey area of staining that corresponds to the shape of the original accelerant pool. This area often retains a mild odour of absorbed accelerant and may repel a light coat of water.

Concrete spalling from liquid accelerant fires remains a controversial topic. If spalling or any of the other characteristics are present in the suspected pour area, document them. Investigators should take care to maintain objects (eg., pal lets, stored products) in place within the pattern area to document damage and burn-pattern evidence consistent with a floor-burning liquid accelerant.

Several collection techniques are applicable to this type of surface. Which of the techniques or combination of techniques

non-porous and present very poor sampling potential. Emphasise sampling grout, mouldings, surface cracks, and absorbent materials on top of the tile inside the pattern area.

Suggested tools for sampling ceramic tile include:
- hammer
- cold chisel
- large screwdriver
- pliers
- latex gloves
- isopropyl alcohol and clean paper wipes

For collection procedures for sampling ceramic tile surfaces, see the sections on "Accelerant Evidence Collection Techniques" on page 9 and "Preventing Cross-contamination" on page 11.

Emphasise sampling of any absorbent materials located on top of ceramic tile before the fire (throw rugs, piles of laundry, cardboard boxes). Take samples of these as required.

Locate pre-fire cracks or imperfections in the tiles or grout; these may have soot deposition inside the crack or crevice. Collect from both edges and the base of the crack. Collect samples of the baseboard at the edges of the tile surface within the pattern area.

To find comparison samples, locate a protected area of ceramic tile away from the suspected pattern area. Shatter some tiles with a hammer and pry up an appropriate quantity. Collect sections of tile, grout and adhesive.

3. Concrete/cement

Concrete/cement is a hard, strong construction material com posed of a mineral aggregate (sand or gravel), water and a

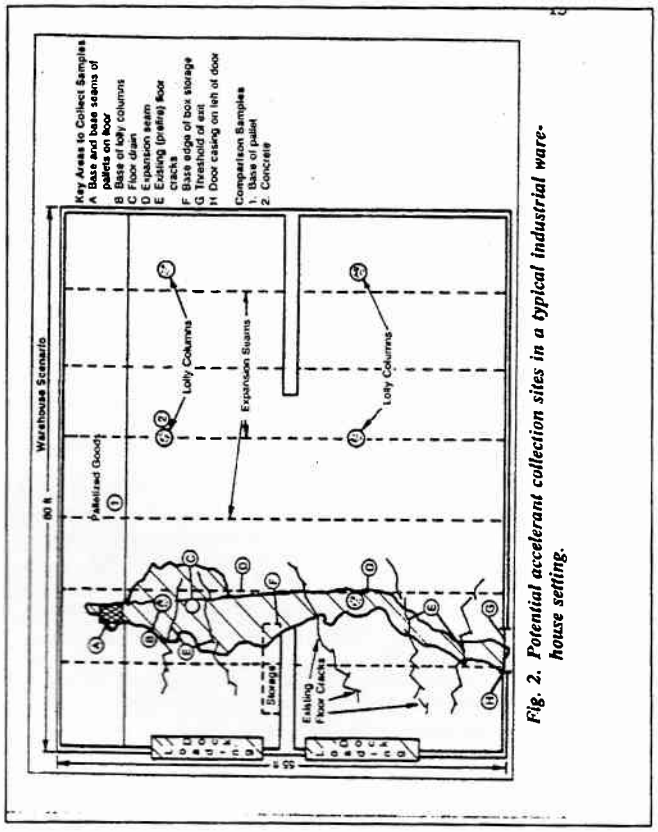

Fig. 2. Potential accelerant collection sites in a typical industrial warehouse setting.

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gloves when physically handling evidence. Change gloves as required. Limit scene access to evidence collection personnel. Wear appropriate eye protection.

Sampling Techniques

1. Carpet

Carpet is a woven composition material manufactured from a variety of materials including wool, rayon, nylon, other synthetics or blends of these products. Many modern carpets and carpet paddings are of petrochemical origin and, thus, share molecular similarities with many hydrocarbon accelerant liquids. Comparative sampling is important. Most of these products have strong absorption and retention qualities, which makes them ideal for accelerant sampling.

Suggested tools for sampling carpet include:
- sharp utility knife
- large-blade screw driver or pry bar
- latex gloves
- isopropyl alcohol and clean paper wipes

For collection techniques for carpet samples, see the sections on "Accelerant Evidence Collection Techniques" on page 9 and "Preventing Cross-contamination" on page 11.

Lift any remaining carpet to check its underside and padding for accelerant odour or staining. Document with a photograph. If a suspect area is located, cut a long strip of carpet and padding along the odour stain. Chimney roll the carpet strip (see Fig. 3 on page 21). Drain excess water. Place as much of the strip sample as possible into the bottom two-thirds of

Processing 'Cold Weather' Fire Scenes for Accelerant-Residue Samples

One of the most difficult problems in northern areas is the snow and ice covering that can occur in cold weather. Although it is not always possible, certain steps can be taken to permit an origin and cause examination and evidence recovery from a winter fire scene.

If the room or area of origin (A0) is known, and there is a ceiling, then consider covering all window and door openings with salvage covers as early as is practical, once the fire is extinguished. This will help retain residual heat. Consider hanging the covers outside of window and door frames to limit the possibility of contamination from possible materials on the covers themselves.

Drain water as quickly as possible away from important areas either by cutting holes in the floor with an axe (away from any suspected pour pattern) or by using squeegees to push water and loose debris outside. Cellar areas below grade must be pumped out before they freeze. Breaking sewer or septic drain pipes in the basement often helps.

Use heavy-duty flood or halogen lighting units with extension cords to help keep the area of origin warm. These units should be cleaned prior to bringing them into the suspected AO.

If the fire scene is covered with ice and snow, be aware of the dangers associated with increased dead load and reduced visibility on a damaged floor. If possible, pull the ceiling in the room below the AO to check for sub-floor structural integrity. Also examine walls and ceilings.

Appendix on page 39). These tools should be kept separate from other fire department equipment and must never be coated with any rust preventive. After a fire scene examination is completed_ these tools should be rinsed clean with a strong stream of water. Before taking any excavation or cutting tools into a fire scene, it is good practice to cleanse each tool with isopropyl alcohol and clean paper wipes or cloth, then flush with fresh water in the presence of a witness. Detergents such as dish-washing soaps are also effective in disolving residues that remain on tools. Note that accelerant liquids derived from *crude oil are generally not soluble in water alone.*

Turnout gear. It is important to clean boots before entering the area where samples are to be taken. Avoid walking through accelerants enroute to the collection site. Do not handle accelerant samples with fire gloves on. Carry several pairs of sterile latex gloves in your pocket or kit. Two latex "surgical type" gloves will conveniently fit into an empty 35min film container with a snap top. Wear latex gloves to handle potential residue evidence.

Evidence cans. It is recommended that fire investigators carry a supply of both one-quart and one-gallon "paint style" evidence cans, or their equivalent, in which to store residue samples. A good practice is to take a sealed two litre can and place it into a one-gallon can and seal that before placing it in your vehicle or kit. This saves space and prevents contamination. Open the cans just prior to physically collecting the sample at the collection site.

Portable generators and power tools. Investigators should work closely with fire fighters to limit potential contamination when possible. Find out where such tools were used or fuelled.

the container. Be sure to leave at least one-third volume head space below the lid. Seal the evidence can tightly, label it with its collection point, etc., and keep it in a cool place (see Fig. 3 on page 21).

Most experts recommend residue sampling along the edge of a suspected accelerant burn pattern since some studies have shown the strongest accelerant residues will usually be found there. This shouldn't preclude sampling from other suspect areas within the pattern when indicators are present. Place samples in containers in the manner described above.

Take samples from carpet remaining beneath furniture legs, metal edge strips between rooms, under carpet tackboards, behind and beneath mopboards and threshold boards where a suspected pour pattern intersects with these areas. The bases of furniture legs, carpet tackboards, mopboards and threshold boards may also present excellent sampling opportunities if they are within the pattern area.

Many synthetic carpets and carpet pads share a petrochemical origin with the accelerants derived from crude oil. Seek comparison samples from protected areas on the same floor. Suitable comparison samples can be obtained from unburnt carpet beneath file cabinets, dressers, or piles of books that are distant from the accelerant pattern.

2. Glazed ceramic tile

Glazed ceramic tile is a product made essentially from a non metallic mineral (clay) by firing at a high temperature. Glazing is a second step where a mixture of oxides (silica or alumina) is applied to form a moisture-impervious surface. Typically found in kitchens and bathrooms, these products are

If a snow- or ice-covered area is safe, clear as much snow as possible to within a few inches from the floor surface. Hang salvage covers over windows and doors, and heat with portable lights. For even faster results, locate chairs, tables or other objects around suspected pour areas and arrange salvage cover(s) like a tent over them. Place portable light(s) inside the tent area. Locate key collection areas, and take samples as required.

Another possibility is to use flooding amounts of hydrant water to help melt snow and ice down to a point where the lights and salvage cover arrangement can melt off the last two inches of ice. Leaving an engine in station overnight warms tank water to room temperature for even faster results.

How to Get the Best Results from an Accelerant-Detection, Canine Team

Fighting a fire is an emergency situation. Oftentimes, ordinary fire department tools and apparatus, such as K-12 saws, portable generators and the like, are fuelled by gasoline. Keep track of where this equipment was used or set down. Advise the canine handler on his or her arrival.

Find out if any dangerous chemicals (eg., insecticides, chlorine) are stored within the area to be searched, and advise the handler regarding their location. Also inform the handler of any structural weaknesses.

Accelerant detection canines are trained to search items on the floor and floor surfaces to locate remaining accelerant residue areas. Collapsed walls or ceiling structural members

in a trial. Basic crime scene procedures also require a photographic record of important areas within the fire scene prior to any excavation.

Gently, remove debris from the floor, keeping in mind that absorbent materials lying flush on the accelerant burn pat tern, such as acoustical tile or drywall, may present outstand ing sampling potential, as do absorbent materials sitting on the floor (eg., stacks of laundry, newspapers). ,

Consider the fact that floors are seldom perfectly level. Human and other consistent traffic patterns create wear depressions over time. People tend to walk or move supplies down the centre of an narrow staircase or corridor and along the side of a wide staircase or corridor. Any area where consistent impact occurs, such as at the base of 'a staircase, is likely to become locally depressed from wear over time. Liquids tend to flow to, and pool in low areas. For best results, sampling strategies should take this into consideration.

Conceptualise how the scene was constructed and what objects and materials were in the area where the accelerant was poured. An interview with the person most familiar with the area of origin's pre-fire layout is a recommended first step to prepare for an origin and cause examination. A map of the suspected area of origin drawn by the investigator, showing the room shape, windows and doors and major appliances, can be filled in by the interviewee along with any target collection areas indicated. (See "Evidence Collection Areas" on page 10).

Assemble all collection and documentation equipment into a crime scene headquarters convenient to the area of origin. Clean all tools before going into the area of origin. Wear latex

suppression water in the pour pattern area. If sanitary napkins must be used as a substitute absorbent, then use the non-deodorant, individually wrapped type. Paper towelling should not be used unless no other alternative is available. Be certain to submit a comparison sample of any absorbent material used so the laboratory can identify any additives present. Drain excess water from the absorbent material, and seal in a container of an appropriate size.

If a suspected accelerant container is found at the fire scene, it is recommended that the investigator take a small quantity of suspected accelerant from the fire scene and perform a test ignition in a safe location. This allows the investigator to later testify to the physical properties of ignition and the burning of the suspected liquid.

Never place a pure liquid accelerant sample in a metal can. Should the can become heated, internal vapour pressure could pop off the cover.

Sampling Procedures for Seven Common Floor Types

Photograph any pattern before sampling it. Based on practical experience (and taking into consideration potential inefficiencies of evidence collection and analysis methods), it is recommended that the fire scene investigator photograph and sketch any flammable liquid pour pattern and related damage. Photograph any pattern prior to any destructive sampling that might alter the appearance of the pattern.

Photographing a suspected accelerant pattern after sampling damage has occurred may not represent a "fair and accurate representation of the evidence" and may not be admissible

must be removed to permit the canine team to enter the suspecked AO. Sharp metal, nails, wire, and jagged glass shards present a danger to canines.

Where hazardous conditions prevent the canine team from entering the fire scene, materials to be searched can be re moved to a safe, adjacent area by a crane or other method.

Certain types of ceiling finish materials, such as Celotex tiles, drywall and plaster, may collapse early into accelerant pools. These materials may present excellent sampling opportunities and should be left on the floor for the canine search.

If the fire scene reeks with accelerant odour, then the ca nine is not needed. Experience shows that accelerant detection dogs are most useful in scenes where accelerant indicators are present, but accelerants cannot be smelled by investigators. Dogs have successfully searched even the most damaged, collapsed scenes and found laboratory-confirmed traces of accelerant. In these cases, canines are an extremely valuable potential resource.

Safety for the Fire Scene Investigator

Structural collapse, asbestos dust, sharp nails, and chemical poisons are a few of the unique hazards encountered. As a rule, fire scene investigators should never work alone. If this is unavoidable, make sure a responsible person knows the investigator's location and timetable. Learn the signs of structural fatigue and failure. Do not go onto a floor or beneath a wall or ceiling unless it is safe. Always wear a helmet, boots and other protective gear when on scene.

Anticipate problems with potentially poisonous substances such as insecticides and chemicals by interviewing owner/

A sample should be placed in the container closest to its size without packing down. Do not dilute the sample by adding material that is not suspected of containing accelerants just for the sake of filling the can; use a small container.

If a strong accelerant odour is present in the sample, take a normal-sized sample whenever possible (at least 1 quart); when a weak accelerant odour or no discernible odour is present, then take large-size samples as required (not more than 1 gallon each). If small objects such as matchbooks are found to contain accelerant odour, seal the object in aluminum foil. Further seal this evidence in a suitable evidence container. Be sure to advise the chemist.

Accepted crime scene procedure requires that, prior to collection of physical evidence, the condition and location of the evidence must be documented with a photograph and then fixed in a line drawing. It is considered good practice to include a permanent feature (eg., radiator, wall, valve, or door casing) in each evidence photograph. The basic rule with line drawings is to measure the location of any movable item of evidence from two or more fixed, permanent objects whenever possible. Always include a magnetic compass indicator showing north in each drawing.

After taking the sample, seal it by firmly tapping the V-groove lid onto the can top. Try not to distort the sides of the can as this could lead to seepage of volatile gases. Some agencies require investigators to further secure the lid with tamper-resistant tape. Always place the identification mark or label on the side of the evidence can, not on the lid.

After collecting and sealing the container, a good practice is to put the container adjacent to its collection point and photograph it with reference to a permanent structural feature

tear the floor covering up. Collect carpet/felt as indicated in "Collection of Carpet Samples" on page 26.

Ideally, investigation of a vehicle fire should occur where the burning took place. Many arsonists will trail an accelerant path from the vehicle to a safer distance for ignition. Examination of burn patterns on vehicle doors will ordinarily indicate which door was ajar and where the trailer is probably located. Collect soil samples as indicated in "Collection of Soil Samples" on page 34.

Always do a thorough search of the immediate area around the burned vehicle for fresh footwear and tire track evidence. Other types of evidence often found at vehicle arson scenes include cigarette butts and wrappings, liquor containers, and accelerant containers. Process such evidence as required.

Packaging and Labelling Evidence Containers

Accelerant residue sampling at a fire scene can be done in a way that maximises laboratory identification of accelerant residues. Most of the laboratory procedures involve testing "headspace" vapour in various ways. Headspace is the zone inside a sealed evidence can between the top of fire debris and the bottom of the lid. Fire/arson chemists generally recommend that evidence containers be filled to two-thirds volume with debris samples, leaving the top one-third volume as empty, air headspace.

To achieve the best laboratory results, samples suspected of containing accelerant residue should always be collected and packaged into an evidence can in a way that permits

occupants as to storage. Wear an appropriate air filter or self-contained breathing apparatus (SC13A) if the situation indicates.

Generally, a good practice is to delay excavation until heavy smouldering ceases. Allowing fresh air to circulate will help dissipate carbon monoxide and other toxic gases. Delaying excavation also provides time for drainage. Burn patterns on metallic surfaces become more apparent as they begin to rust.

Evidence Collection from Burned Motor Vehicles

Modern motor vehicles are approximately 30 percent plastic by weight. Plastics increasingly substitute for metals or composition materials in body panels, suspension and drive-train assemblies, and interior furnishings. Any fire may eventually involve the entire vehicle. Experience shows that many arsonists use large amounts of accelerant - ordinarily gasoline - to propagate vehicle fires. If the arsonist neglected to allow for sufficient ventilation, the fire will sometimes self-extinguish. Accelerant evidence collection then may involve samples from seats, dash assemblies or floor coverings as indicated following normal procedures (see the section on "Packaging and Labelling Evidence Containers" on page 19)

Experience with heavily fire-damaged vehicles has shown that excellent accelerant samples are often found in the footwells in front of seats, where accelerants are absorbed by the carpet and felt floor coverings. With automobiles and trucks, the vehicle's headliner, and the dash and panel assemblies often melt and collapse to the floor early in the fire, inhibiting accelerant volatilisation. Use a clean, heavy wrecking bar to

(door jam or radiator), if possible. Place a large, permanent, unique mark on the outside of the can for the photograph (ie., LR #3 means living room sample, number 3), allowing for later identification in court. Attach an appropriate evidence label on the side of the container listing the case number or incident address, date, time, location where the evidence was collected, and the name of the evidence officer.

Maintain the chain of custody from the evidence collection site to the courtroom.

Evidence cans containing suspected accelerant residue should not be exposed to direct sunlight or intense heat because this may cause volatile hydrocarbon vapours to form inside the container and, possibly, compromise the seal. Some agencies, including the Royal Canadian Mounted Police, recommend refrigeration of accelerant samples pending examination. If refrigeration is not feasible, then try to store debris samples in a darkened space at not more than 60*-70`17. Samples, such as soil, containing suspected accelerant liquids must be frozen, refrigerated or rushed to the laboratory for immediate processing since natural bacteria in the soil actually degrades many petroleum products.

Liquid Accelerant Samples

Sterile, three- or four-ounce (90 to 118 nil) pharmacy bottles with hard, plastic caps (not glued cap liners) are recommended for collection of suspected pure liquid accelerants. Using a sterile eyedropper, collect about two to three ounces (60 to 90 ml) of the liquid. Place a piece of aluminum foil over the bottle top and screw down the cap.

Sterile gauze bandages are recommended for skimming suspected accelerant residue (rainbow colours) off the surface of

volatiles to migrate and gather in the headspace. Following a few basic procedures at the fire scene will facilitate this.

If an investigator has evidence to suspect that a specific type of accelerant was used to set a fire (from the odour in debris, or accelerant can left behind), he or she should inform the chemist.

Modern laboratories use different procedures for analysing samples suspected of containing light petroleum distillates (swept headspace) and samples suspected of containing medium/heavy distillates (solvent wash), resulting in an improved sensitivity with each type. Certain specialty solvents such as acetone, alcohols, and lacquer thinner do not produce complex laboratory gas liquid chromatograph (GLC) patterns. It is particularly important to notify the chemist when such an accelerant is suspected.

New, unlined, uncoated steel paint cans with "V"-groove lids are usually recommended for the collection, preservation and analysis of fire debris suspected of containing accelerant residue.

Some agencies are suggesting that their investigators use lined Teflon-coated paint cans for arson evidence. The lined cans are less apt to rust, but are much more expensive. Consult with your chemist.

The latest generation of heat-sealed, plastic evidence pouches has eliminated earlier problems according to a 1991 laboratory test conducted by the Bureau of Alcohol, Tobacco and Firearms. This type of evidence container has many important advantages, but remains puncture prone. Consult with your laboratory for its recommendation. Whichever you choose, submit a sample container for testing and comparison.

Whenever possible, always try to pulverise, shred or splinter potential evidence material. Breaking a large solid sample into many smaller pieces dramatically increases the surface area from which to extract residue. Drain excess water.

Fill the evidence container to two-thirds of its volume loosely **(Do not pack down!)** and vertically (ie., "chimney roll") whenever the type of sample permits (eg., carpet/pad samples, linoleum, paper or cardboard, or cloth). Sample specimens from wood or concrete floors should be splintered or pulverised and loaded vertically aligned whenever possible. When collecting sample material that you want to stack vertically, lay the evidence can on its side when loading it.

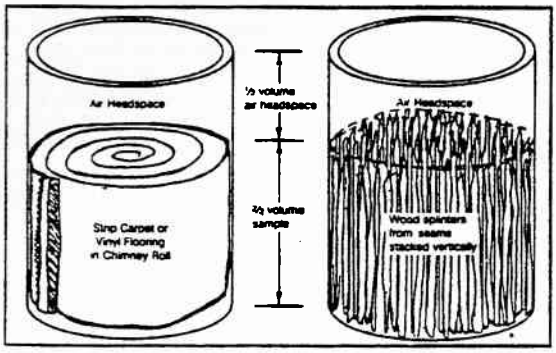

Fig. 3. Examples of suggested loading techniques for wood samples and for carpet or vinyl flooring (chimney roll).

LETTER TO THE EDITOR

I am an investigator (Inspector by rank) with the NSW Fire Brigades' Fire Investigation Unit (FIU). I have been in the NSWFB for 28 years and with FIU for the past ten. Being a member of the International Association of Arson Investigators (IAAI), international body, I am a keen reader of the *Fire & Arson Investigator* (F&AI).

I would like to make comment on a letter from Bernard A. Schwartz which appeared in the Readers Comments section of the March 1998 edition of F&AI, regarding NFPA 921.

I agree with Bernard Schwartz in relation to his comment "It would appear that the determination of an origin and cause of a fire without physically visiting the scene is an area of considerable interest to investigators." He goes on to say that he has failed to find any major discussion on the issue in the F&AI.

I wholeheartedly agree with Mr. Schwartz on the issue of physically attending fire scenes and the matter of offering opinions on the cause and origin, remotely. I too have wondered why no discussion (major or minor) has been undertaken on this issue.

I may be naïve, but to my mind one cannot offer opinion regarding a fire scene, and hope to successfully argue a case on the determination of cause and origin of that fire without actually attending the scene.

As an investigator with the fire service in NSW, my role involves investigating fires throughout the entire state, working very closely with the Police crime scene investigators. From my experience, over the past ten years as an investigator.

I know that people who follow me from the insurance industry are at a distinct disadvantage because of the fact of time lapse (from fire, to notification of the insurance company and instructions received to investigate) and scene security. Keeping this in mind, everything is done to minimise damage to the scene and evidence.

After the fact, our office provides information to the insurance investigators regarding the scene and evidence found. Similarly, the Police provide assistance to the industry with evidence and scientific analysis.

I have been involved in cases where so-called experts have been called by the defence to disprove my theory of cause determination where, not only didn't they attend the scene to view the actual fire damage, but, didn't actually attend the scene AT ALL.

In one matter of a house fire, the expert, being a professor of fuel technology, gave comment on the fire origin and cause (some 2-3 years after the fire) based on photographs taken at the scene, by me. And, after some discussion on the matter had the hide to describe the photographs as being "not very clear and poorly framed in the context of the fire." He went on to give an opinion on actual point of origin and cause for the fire, where in my evidence I stated that due to the extreme amount of fire damage I was unable to determine an actual ignition source.

In another matter I received a document and was asked to provide comment regarding a fire that I had investigated some four years earlier. The document was a report prepared by a professor of electrical engineering on the fire in question. Again, this document was based on evidence produced by me to the insurance company shortly after the fire occurred; photographs and a written report on the basic facts.

The professor had never attended the scene, based his reply on my BASIC facts regarding the fire, and, my photographs taken at the time of the fire. I wonder whether they read the same manual, as again the comment was made that the photographs weren't succinct enough in context with the matter of the ignition source? Opinion was offered regarding the actual ignition source for the fire, contrary to my opinion.

I don't really have a problem with that, I am not a professor nor have I any university qualifications, but, I was there! I saw the evidence in-situ; I saw the damage in context with the point of origin and I believe without that scene evidence it becomes a bit difficult to offer an opinion.

One thing that amazes me is the courts allow this type of evidence to be offered in the first place. The prosecutor should be offering very strong objections to the fact that the opinion is based on so-called "questioned" evidence (photographs) and that the expert did not, at any time, visit the scene of the fire.

Conversely, how do these "experts" place themselves in such a position where they could be questioned on the ethics of offering such opinion in these circumstances. The question of their own ethical background is one which would make for considerable debate.

It is interesting to read, in *The Aftermath of Death* (1992) a quote from Best (1911) which states " There can be no doubt that testimony is daily received in our courts as "scientific evidence" [authors emphasis] to which it is almost profanation to apply the term; as being revolting to common sense, and inconsistent with the commonest honesty on the part of those by whom it is given" (p48).

In that same text, Freckelton (1992) provides a quote by Francis Wellman in his 1903 text, *The Art of Cross-Examination,* which states " The professional witness is always partisan, ready and eager to serve the party calling for him." (p48)

I raise these matters in the hope that discussion on the topic will answer some of my questions and hopefully has answered some of Mr. Schwartz's.

I believe that if people who perform such acts are members of the IAAI, or other similar professional bodies, the ethics of such actions should be questioned by the appropriate committee. It is my opinion that they do this to further their own ends by hoping to curry the favour of the insurance company, and, in the long run all they do is "muddy the waters" in the search for the truth.

Reference – Selby, H. (1992). *The Aftermath of Death*. Ch.6 Expert proof in the Coroners' jurisdiction (Ian Freckelton) p48. The Federation Press, Sydney.

Ross Brogan
18 July 1998.

(Ross Brogan, an experienced member of the NSW Fire Brigade Fire Investigation Unit, was the founding Editor of "Firepoint" magazine, when it commenced publication in 1990).

The letter of Bernard Schwartz referred to by Ross Brogan includes the following section:

"What is the fire scene? If the room has been rebuilt when you visit the scene, have you met the requirements? If the first investigator piled all the contents in the front yard and washed down the floors prior to your arrival, have you "visited the scene".

What are the legal rights of a defendant who is charged, only after the scene is completely destroyed? Is the defendant to be denied the right to utilize an expert to show an alternate cause because the fire scene no .longer exists? If photographs cannot stand alone to show origin and cause, is removal of the fire scene spoliation of evidence"?

VICTORIAN NEWS

SIXTH AGM 1998

On Wednesday 29th July 1998, the Victorian Chapter , at Bells Hotel in South Melbourne, held the sixth Annual General Meeting. All members were welcomed and reports received. Comments regarding reports showed although some problems occurred through the year, all have been resolved and the Chapter should continue to provide for its members. Congratulations to those committee members returning and also to Gerry Nealon, our new President.

Following the formalities, Jarrod Edwards from the Community Safety Section, MFESB gave an entertaining and informative talk on Computer Fire Modelling discussing the different types available and the results that can be obtained. As was highlighted, this is another tool for the investigator and the results should be used to complement the investigation. Jarrod's talk did raise some interesting points and the committee is considering a return performance in the future. Thanks to Jarrod for his time and presentation.

At the conclusion of the AGM, members then divided into groups at the bar for in-depth discussions. This is an important part of any meeting, that is interaction between members and the exchange of ideas and information. Our thanks to Bells Hotel for their hospitality.

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COMMITTEE FOR 1998/1999

President: Gerry Nealon
Fire Investigation Services
Vice-President: Brian Neal
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Commercial Union Insurance.
John Kelleher
Victoria Forensic Science Centre
Tony Mandarano
EISA.
Colin Brown
CFA

ROYAL JOMTIEN RESORT FIRE - PRESENTATION

On the 16th July 1998 at the MFESB Training College in Abbotsford, a presentation of the fire, fire investigation and related investigations into the fire at the Royal Jomtien Resort in Thailand which happened on 11th July 1997. Our thanks to Gary Martin and the MFESB for a great presentation and venue.

Approximately 60 attended and for those who were unable to attend a video was made and is available to members by contacting Alex Conway at FIA MFESB 0450 3883.

MEMBERSHIP & FEES

A reminder to all members that memberships fees ($30.00) were due as of 1st July 1998. Currently about 60% of members have renewed membership. For those still to renew please return with the Membership Renewal form to confirm details. From 30th September 1998 all non financial members will be withdrawn from the membership list and lists will be forwarded to members.

QLD. CHAPTER WEBSITE

Queensland Chapter now has a website. Congratulations on getting on the internet and hope that this might improve communications between our chapters and members.

EVENTS PROGRAM

Due to commitments and availability the scheduled night at the Coroner's Court has been postponed to a later date. As stated at the AGM, the committee will be presenting training sessions monthly throughout the year, thus giving more variety and limits the time commitment for members during business hours. Events will be preceded by flyers through the mail and it is essential that bookings be made to attend or sessions will be cancelled.

International Association Of Arson Investigators (IAAI)

by Brian Neal

This is a short article on the IAAI as a world wide organisation. Some Chapter members may not be aware of the organisation they are affiliated through the State Chapters. The IAAI organisation consists of a Board with 63 Chapters (52 USA based and 11 non USA) In Australia there are three Chapters, New South Wales (47), Victoria (58) and Queensland (59) the numbers referring to Chapter Number. The Headquarters is located at 300 s.Broadway Suite 100, St Louis, MO 63102-2808 USA having phone, fax and internet address. Membership of the IAAI is limited to those in the field of Arson/Fire Investigation, but you don't have to belong to a Chapter.

From the Board of Directors there are several committees which cover Appellate Review, Attorney's Advisor, Audit, Awards, Budget & Finance, Certified Fire Investigator, Chapters & Liaison , Constitution & By-Laws, Engineering, Ethical Practice & Grievance, External Affairs, Fire & Arson Investigator Editorial, Fire Investigation Standards, Forensic Science, Fraud Fire, Historical/Photographic, Independent Investigators Advisory, Insurance Advisory, Juvenile Firesetter, Legislative, Management & Operations Review, Marketing, Membership, Nominating, OHS, Past Presidents Council, Public Relations, Seminar Site Selection, Training & Education, Wildland Arson and Election Committee. Membership of the IAAI world wide stands at 7,853 members with approximately 110 members in Australia. Membership cost is US$50.00.

Each year, apart from individual Chapters having Seminars, the IAAI conducts a Major Seminar in the month of May for a week together with the AGM, investiture of Office Bearers and entertainment. For those who have attended it is a worthwhile and informative. The next Seminar will be in Las Vegas from 17-21 May 1999; details can be obtained from Chapter Committees.

The value of belonging to the International body has always been an interesting debate. For your membership you receive, 4 Fire & Arson Investigator Magazines, notification of major seminars throughout America, contact with members through the world, ability to vote at AGM, access to information and contacts.

The International Body has the same aims and objectives as the Australian Chapters and although brief shows that the IAAI is a world wide organisation and worthwhile to belong.

TWICE THE CHANCE TO SURVIVE. SMOKE ALARMS

Legislation in Victoria making smoke alarms compulsory, at least one fitted, will come into effect on 1st February 1999. Already about 80% of Victorian homes have one smoke detector fitted.

It should be noted that some homes have smoke detectors installed that do not work. A smoke detector that does not work is useless and people who rely on them may die in a house fire.

Smoke alarms are inexpensive and easy to install with a choice of hard wired or battery operated.

A Joint Victorian & Tasmania fire services survey shows since the introduction of smoke alarms, more than 500 lives have been saved and, potentially millions of dollars in property damage annually. In each case an early warning from a smoke alarm has resulted in the fire being restricted to a single room.

Advice : Protect yourself - install a couple of smoke alarms. One near the cooking area and the other near the bedrooms. With double storey houses make certain that alarms are installed **ON BOTH LEVELS.**

THE SCIENCE & "ART" OF FIRE INVESTIGATION

by Tony Cafe

Some time ago I received an e-mail from a 34 year old American law student called Terri Strickland who had been charged with the murder of her 4 year old son after a fire at her home. She was in jail awaiting trial and she asked me if I could help her because she had no money to hire a fire expert for her defence.

She believed that the fire was accidental and that the fire investigator was wrong in his claim that it was a deliberately lit fire. I offered to help her because I know from experience that there is a greater probability of a fire investigator getting it wrong than there is for a woman to murder her child by fire.

One of the main reasons why fire investigators get it wrong is because much of the information and education they have received over the years is not based on tested scientific methodology. Consider the claims made in the literature 10-20 years ago that collapsed bed springs, concrete spalling and crazed glass indicate a hot fire and therefore an accelerant. In recent years there have been many articles published which debunk these theories. Think about all the fires during the intervening years where investigators relied on these indicators and said there was an accelerant present without positive laboratory proof and imagine the damage they have done to people's lives. What was their testimony in court - "Yes your honour, I read it in the fire investigation literature and so it must be true."

Consider the theory made many years ago that the level of copper oxide in an arc bead could be used to determine whether the arc caused the fire or was a consequence of the fire. Recent literature suggests that making conclusions from such tests is simplistic because the level of copper oxide in an arc bead can rise or fall during a fire.

I often wonder how qualified scientists who conducted these tests for so many years could do so without asking themselves the fundamental question - how stable is copper oxide during a fire?

Even to this day I often receive reports by other fire investigators who state that a floor burn through indicates an accelerant even though they have not even taken a sample for laboratory analysis. In most of these fires the roof had collapsed and continued to combust at floor level.

Did any of these investigators consider that floors will eventually burn through during a fire with or without the use of an accelerant?

Why is it that the information that fire investigators rely upon is often later proven to be wrong? It is probably because the people who publish the original information are poor scientists or they are not scientists at all and the work is not scientifically scrutinised.

Scientific research is based on a methodology which firstly makes a full review of the scientific literature, then the research work is conducted in carefully controlled tests and then the results are scientifically scrutinised before publication. The results are then published in refereed journals or presented at conferences where peers can question the work or make comment.

There is little information produced by scientists in local magazines such as "Firepoint" which leaves it up to the other fire investigators to contribute. One possible reason for this is because scientists aren't encouraged to contribute.

There are too few scientists asked to speak at our conferences which makes the conferences very unappealing for other scientists to attend.

In the case of electrical engineers who are frequently called from the universities to investigate fires, not one has ever been

invited to speak at any of our recent conferences which is a pity because this is one area of fire investigation where we really need expertise. Of course scientists should not wait to be asked to contribute, they should want to contribute to journals and conferences.

They do however seem to be reluctant, possibly because as one scientist warned me before writing an article some time ago - "It would be giving up the secrets."

We all know that he was implying that if all people had this information then the work for qualified experts could dry up. Never underestimate self interest in discussions such as these.

Fire investigation is a branch of forensic science and so the scientific methodology outlined above should apply to fire investigation literature, but it isn't. Using a strict scientific methodology for fire investigation literature would mean that only scientists with tertiary qualifications are allowed to publish research and opinions and the implications of this is that only scientists are allowed to investigate fires.

This topic has always been a very prickly one here in Australia and I remember a conference many years ago where a scientist was literally howled down after asking a prominent barrister what formal qualifications should a fire investigator have.

Recently in the USA a huge row has erupted on the Internet bulletin boards concerning the Daubert issue where the qualifications of fire investigators has been questioned. In the end, the judgement of who should investigate fires is up to the government and the courts and also our own organisation because of its role in collectively representing fire investigators in Australia.

There are many sides to the story and this magazine is an excellent way of putting forward your opinions.

The second reason why fire investigators get it wrong is that they believe that fire investigation is an art. Art is about creativity and fire investigators are not at fire scenes to ponder creativity but are there to physically find and interpret the evidence which will indicate the cause of the fire.

Fire investigators who believe in art are often found at the fire scene, or worse in court, talking about the fire as if they were actually present during the fire. They are using their imagination rather than the part of their brain which controls logic and reasoning.

So why do some fire investigators and more importantly their educators believe that there is an art to fire investigation? Its probably because they have no scientific qualifications and they need to justify to themselves and to others of their presence at a fire scene.

They see themselves as having a sixth sense which makes them an extraordinary human being. The most vital sense of all is common sense and the investigator needs to couple this with the ability to observe, reason and deduce.

Having said what I have so far, it would seem that scientists with their fantastic abilities make great fire investigators however this is not always the case. I frequently come across fire reports written by qualified scientists who believe that floor burn throughs solely indicate accelerants.

Another problem with scientists is that they never seem to agree on anything. The reasons why scientists never seem to agree is that they rely too much on opinion evidence and there are the hired guns who show a lack of ethical considerations.

Opinion evidence will always be a part of fire investigation especially when opposing barristers produce their experts in court. Ways of avoiding expert's dissenting on opinion evidence is to provide as much irrefutable evidence as possible. For example, laboratory proof of an accelerant is always a good indicator of a deliberately lit fire. Also, lots of good photographs in a report should be used in a systematic way to prove every point the investigator wishes to make.
The investigator should avoid making claims of how the fire progressed unless they actually witnessed the fire or spoke to

eyewitnesses or they are experienced fire brigade investigators who have witnessed many similar fires in progress and so feel confident in giving an opinion.

Ethics are constantly talked about in the fire investigation literature and should be uppermost in our minds when preparing our reports so that they are unbiased and independent. The IAAI has its own ethical code which does not seem to bear any resemblance to those used by scientists.

For example the line "I will regard my fellow investigators with the same standards as I hold for myself" has nothing to do with science and resembles something used by the RSL or as one prominent USA investigator puts it, "the IAAI is becoming a church."

Compare the IAAI code of ethics ("Firepoint", December 1995) with those of the Californian Association of Criminalistics ("Firepoint", March 1997). The reason why the IAAI code does not have anything to do with science is because it should not be the expert's character which is under scrutiny but it should be the expert's evidence and their reasoning.

Finally I will get back to Terri Strickland who wrote to me recently after spending 18 months in jail for a crime she was found totally innocent of. She is going to finish her law studies and then open a legal reference centre to help people and prevent them from going through the same awful mess she went through.

Her hopes are "That maybe one day the "experts" will stop doing what they are doing and ruining peoples lives." I believe we can help her by being more scientific in our approach and by leaving the art to the artists.

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NSW NEWS

The NSW Association held its AGM on 23 July 1998 at the Swiss Grand Hotel, Bondi.

The elected office bearers were:

President: Mitchell Parish
Secretary: Robert King
Treasurer: Trent Tosh

The Association's two day seminar was held at the same venue on 23 and 24 July.

The seminar was opened by the Commissioner of Police, Mr Peter Ryan, who indicated that for him arson was not a major concern compared with drugs and abuse, and that it was his view that a separate arson group was probably not warranted.

Mr Nicholas Cowdery, Director, D.P.P. followed, and explained his role and functions: to prosecute criminal offences, conduct criminal appeals and appear in related litigation. He too said there was no need in his Department to have specialists to deal with arson offences.

There were two main speakers at the conference, Robert Corry and Peter Beering, both from the U.S. The former stressed the importance of intra/inter agency co-operation. The latter lectured on computers and technology, and on Arson Immunity legislation.

Other speakers dealt with Bushfire Investigation (Neil Barnes), a legal case study (Jennifer Wright) and the IAAI AGM (Roger Bucholtz.

There was also time for discussions with the speakers and with colleagues, informally as well as at the formal dinner.

Fire Modeling: An Introduction.

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Introduction

Fire modeling is something which is often found to be mysterious. The purpose of this note is to present the basic ideas so that they are understandable by the non-scientist. Thus, the information should be of value to lawyers, fire investigators, claims adjusters, and other individuals involved with fire losses. Most of them are not aware of either the strengths or the limitations of the fire modeling. Thus, in this note the objective is to explain the process in simple terms, so that a clear picture will emerge how fire modeling can and cannot be used.

What is a model?

Before we can discuss fire models, we must explain what a scientist means by 'model.' The meaning of this crucial term is essential to understand. A model of anything is, simply, a systematic representation of that thing. Thus, for example, we can have

- thought models (or conceptual models)
- scale models, and
- mathematical models.

The above three examples are probably the main 'representation' which are used by scientists. A thought model is simply a proposed schema explaining how something works. Scale models are often used in structural engineering, fluid dynamics, and have occasionally been used in fire science. Model trains are familiar to all. A scale model in scientific work is simply a reduced-size object on which certain measurements will be made. The category which we want to discuss in this Note is the last type, the mathematical model. In general, a mathematical model will be a series of equations which describe a certain process. If the equations are simple enough, they can be solved on the hand calculator. More commonly, the equations are not so simple.

Consequently, a computer is required for their solution. Thus, in the fire field, we would speak of "computer fire models." Nowadays, when one speaks of a "fire model," it is usually understood that one is referring to a "computer fire model." This is unnecessarily restrictive, however, and other types of models (such as scale models) remain legitimate scientific forms of model.

A "computer fire model" is normally realised as a "computer program". This again, is most common, but not necessarily always true. A computer fire model, for example, could be realised as only a flowchart. From the above, one can understand why fire modeling is often taken to mean "use of computer programs for predicting fire," although this would be too restrictive a definition.

What do fire models do?

By now, fire modeling has been in use for more than two decades. This author's computer program COMPF was released in 1975 [1] and was the first computer program for predicting room fires to be developed in the U.S. Research in several other countries, however, goes back further. During the subsequent two decades, tremendous progress was made in the field. Today, many persons who have only a limited knowledge of fire science have already had a slight exposure to fire modeling. From this, they are apt to conclude that fire modeling is something which allows scientists or engineers to 'wave a magic wand' and to calculate the history of a fire just by working at their computer. On rare occasions, this can be true. But normally, the situation is not so straightforward.

The function of COMPF was to predict the fire history within a single room. The history was represented only after the time of 'flashover' within the room. "Flashover" is the point in a fire (it does not occur in all fires) when the room "fills with flames." The hazard greatly increases from that point on. Nowadays, various other types of computer fire models are also available to the scientist. What kind of fire characteristics, then, can a fire model predict? The list is limited only by the ingenuity of scientists, but we can cite characteristics which are already routinely being computed:

- gas and surface temperatures
- flow rates of gas through openings
- heat fluxes impinging on surfaces
- smoke obscuration
- production of certain toxic gas species

- strength reduction and structural failure of building elements
- activation times for sprinklers and detectors.

It can be noted that this list is weighted towards fluid mechanics and related themes. This is not surprising, since a majority of the researchers creating fire models have been fluid mechanics specialists. Models also exist for certain human behaviour aspects (e.g., exiting through corridors and stairs) although these have so far been very little used for practical problem solving; thus their validity is generally unknown.

It should be noted that certain characteristics are usually **not** being computed. These include:

- the ignitability of objects from small flames
- the spread of fire over surfaces
- the actual 'size' of the fire, that is, its heat release rate.

A list of other fire characteristics that we cannot yet routinely predict has recently been publicised [2]. The three characteristics above are three exceedingly important aspects of fire, indeed heat release rate (HRR) has been referred to as the single most important variable in describing fire hazard [3]. Likewise, there will not be a fire without ignition and, in most cases, flame spread is also an essential trait of fire. The way that today's fire models normally solve a problem is by being given the HRR as input. The flame spread aspects are usually not made explicit. The most important role of flame spread is to progressively involve greater areas in burning, that is, to cause a growth of HRR. Thus, if we have a HRR versus time curve, the flame spread issue has already been solved. The initial ignition is, simply, assumed to have taken place, so no computation is made there either.

To make a computation using one of our state-of-the-art models, such as HAZARD [4], then requires that the modeler supply a HRR curve as input. In some cases, the HRR curve may already have been published in the literature for a 'similar' burning object. Compendia of data are available which present some useful, non-proprietary data [5]. However, the variety of items which can burn is essentially infinite, while the amount of publicly available data is quite tiny.

The situation is even more complicated when one realises that more than one item can burn. Methods have been suggested for estimating second-item involvement [6]. However, under most conditions, such procedures entail a great deal of uncertainty. This can be due to: (a) irregular geometry of the item in question; (b) not well enough studied ignition response of the item; (c) inadequately detailed knowledge of local heat fluxes, etc. When one contemplates the uncertainties then associated with estimating the ignition for the third, fourth, etc. item, it becomes clear that the ignition sequence of a roomful of diverse items cannot be predicted with a reasonable degree of confidence.

Fire testing

The solution to the above difficulty is actually straightforward: when data are not available, run a fire test. Model development is a difficult, specialist task. Thus, one cannot expect to say "improve the models," since progress could hardly be made on a time schedule to suit fire litigation needs, even if the resources were available. What is possible to do on relatively short notice is to organise fire tests.

Fire tests have their limitations, too. The largest fire that can be conducted indoors in a laboratory, under controlled and instrumented conditions is about 20 megawatts. Physically, this corresponds to one room or a couple of smallish rooms joined together. Fire models are much less restricted in that respect. They are available for computing multi-story, multi-room arrangements, and the rooms do not have to be small enough to fit under a laboratory's exhaust hood.

Thus, the practical solution is to combine fire modeling with fire testing.

Normally, the objects, walls, etc. associated with ignition and early fire growth are directly reconstructed in the laboratory by procuring exemplars and creating what is normally termed a *sectional full-scale mockup*. Full-scale denotes that real appliances are used, real wall thicknesses are employed, etc. Sectional denotes that only a slice out of the building is constructed in the laboratory and not the whole fire environment.

The presumed or alleged ignition sequence is then started in the laboratory test and measurements are taken of HRR, smoke production, temperatures, heat fluxes, and other fire variables. Fire

modeling is then used to take the laboratory data of the initial fire stages as an input and to compute the subsequent stages of fire development. Thus, fire modeling can be viewed as a direct extension of fire testing, or vice versa.

The confidence in the results produced by the fire model is normally greater for the intermediate stages of the fire than for the late stages. During the late stages of fire, a number of additional events can happen. These include burn-through of partitions, collapse of beams, collapse of occupant goods (e.g., rack storage) and similar. Also, it may be expected that firefighting will make some difference on the outcome of the fire, and this may not be reasonable to try to predict mathematically.

Models do exist which can allow the prediction of the collapse of structural members, but these require input data which may often be unavailable.

Tests vs. demonstrations

It is important to distinguish between a field demonstration and a large-scale laboratory test. Both involve setting up of an environment intended to recreate the scene of the fire origin. Both can be used to produce videos for jury viewing. However, a field demonstration does not collect HRR nor other fire data which could usefully serve as input to a fire model.

Thus, demonstrations can **only** be used for video purposes. The advantage of a demonstration is that it can be conducted in every town and city. A laboratory test, by contrast, requires use of a fire testing laboratory, and there are only a handful of such facilities in the country.

The **costs,** however, are not necessarily much lower for a demonstration. The bulk of the cost is normally associated with procuring exemplars, constructing the mockup, setting up video and other documentation, and witnessing of the test.

Since a fire test laboratory already has the HRR and other instrumentation necessary, the marginal cost is small for setting up the instrumentation and collecting the necessary data. The actual laboratory test procedures [7] are, by now, quite well worked out, and time does not need to be allocated to research in this area.

Conclusions

Fire modeling can normally be considered as the prediction of fire characteristics by the use of a mathematical method which is expressed as a computer program.

The needs of fire litigation from fire modeling are specialised. Usually, there is a great deal of specificity about the sequence of fire ignition and the materials involved in the process. This commonly precludes the use of handbook data as input to fire models.

Instead, it will usually be necessary to conduct a sectional full-scale mockup to obtain appropriate data describing the initial part of the fire. This information then serves as input to a fire model, using which the later fire development can be approximately predicted.

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