

FIREPOINT



IAAI JOURNAL



INTERNATIONAL ASSOCIATION OF ARSON INVESTIGATORS

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We would like to see letters to the editor, so get pen and paper and send to:
The Editor, PO BOX 148, CONCORD NSW 2137

ART DIRECTOR — TONY HANNA

PRINTING — FIRST IMPRESSIONS

Articles appearing in this magazine do not necessarily reflect the view or opinions of I.A.A.I and are entirely the responsibility of the authors.

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**INTERNATIONAL ASSOCIATION OF ARSON INVESTIGATORS
NSW CHAPTER (No. 47) INC. (NSW ASSOCIATION of FIRE
INVESTIGATORS INC.)**

Welcome to our new members who
have recently joined the -----

**NSW ASSOCIATION of FIRE
INVESTIGATORS INC. !!!**

YES! - it is now OFFICIAL

Documents received from the
Department of Corporate Affairs
confirm our change of name -
effective from April 7th., 1995.

DISCUSSION EVENINGS

We have had two successful meetings
this year. The most recent being held
on May 4th. and which was very well
attended.

A most informative talk was presented
on this occasion by Mr. **Mike
ARMSTRONG** of **AMERICAN
RE-INSURANCE**.

He focused on the role of Claims
Managers and Loss Adjusters/Assessors
speaking on the benefits of a course he
attended at the Federal Law
Enforcement Training Centre, Glynco.
GEORGIA, USA.

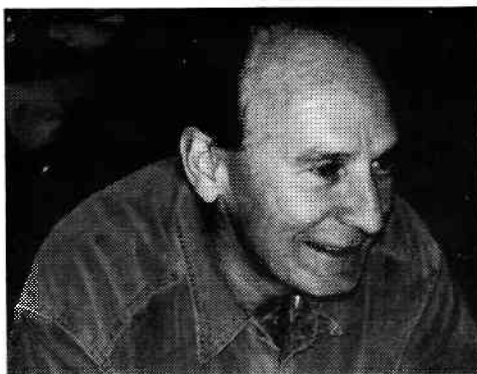
The Course, entitled "ADVANCE
ARSON INVESTIGATIVE
TECHNIQUES for the INSURANCE
INDUSTRY", is directed towards the
full time employees of an Insurance
Company whose workload is primarily
focused upon investigation, control or
management of arson related cases.

The cost of the five day course was
(US) \$450.00

ANNUAL SEMINAR

"**SET TO EXPLODE**" is the theme for
the NSW Seminar this year and it is to
be held at the "**GOLDEN GATE
HOTEL**" 169 - 179 Thomas Street,
SYDNEY, on **THURSDAY, 3rd.
AUGUST, 1995.**

Registration forms are being posted out
now! Register early and benefit by
paying the **reduced Conference Fee** if
you pay prior to **JULY 1st.!**



You will see by the advertised
programme that this is a Seminar which
should not be missed as it concentrates
on a subject which does not seem to get
the 'air-play' that the matters attending
fire and its technology do.

The other two subjects, child fire setting
and burn injuries, also touch on matters
which relate strongly to our interests.

VALE!

*It is with deep regret that I have to
conclude this message by advising
members of the sad passing of Mr.
JACK NUGTER.*

*Jack was a Police Officer of the NSW
Police Service and was stationed at
Inverell where he was a member of the
Crime Scene Unit and he has been a
member of the NSW Chapter for a
number of years as well as the
International body.*

*Unfortunately, he was involved in a
fatal motor vehicle accident where his
car left the road and collided with a
tree.*

*Our deepest sympathy goes to his wife
Ellen, his baby daughter Kate and to
his family and many friends and this
extended on behalf of all our members,
the Executive Committee and myself.*

**ROGER BUCHOLTZ
PRESIDENT,
NSW CHAPTER
ASSOCIATION OF FIRE
INVESTIGATORS INC.**

*(see Valedictory by Carl Cameron to our
departed brother Jack NUGTER on page 7)*

**SEVEN STEPS TO
QUALITY
MANAGEMENT**

- 1. YELL AT ALL TIMES**
- 2. NEVER GIVE A SUCKER
AN EVEN BREAK**
- 3. MAINTAIN THE FEAR**
- 4. WHEN YOU SEE THE
WHITES OF THEIR EYES -
LET 'EM HAVE IT**
- 5. IF THEY THINK THAT
THEY ARE YOUR FRIEND,
SURPRISE THEM!**
- 6. TREAT STAFF LIKE
YOUR FAMILY - HIT 'EM IF
THEY GET UNDER YOUR
SKIN**
- 7. SURPRISE AND
CONFUSE STAFF WITH
SUDDEN BURSTS OF
GENEROSITY**

LAUGH WITH US

The Medical Officer diagnosed the
Indian frontier colonel's infirmity as
hydropsy.

"What's that"? he demanded.

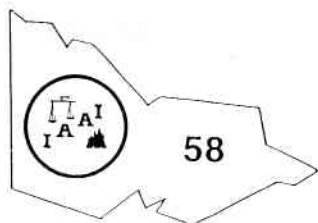
"Over abundancy of water in the body".
the M.O. explained.

"I've never drunk a drop of water in me
life"! Thundered the colonel. Then
calmly reflected; "it must have been the
ice".

An official Angliciser was given the task
of recording some of Sir Winston
Churchill's wartime speeches in Basic
English but was somewhat troubled by
the phrase "blood, sweat and tears".

All that Basic English could come up
with was - "blood, body water and
eyewash".





I.A.A.I. Victorian Chapter 58

Most members of the Chapter would be aware that a policy document has been launched by the Minister for Police and Emergency Services.

This document outlines the inter-agencies procedures and protocols for fire investigation within Victoria and is soon to be expanded to involve the needs of other parties involved in fire investigations within the State.

As such, the Committee has arranged for Mr. Graeme **JOHNSTONE**, the **Victorian State Coroner**, to present, at our upcoming Annual General Meeting, advice on the development of these procedures and the reasons for their implementation.

Mr. Johnstone, prior to his appointment as State Coroner, took on the task as the Chairman of the Steering Committee set up to develop those procedures.

In addition, as part of the Chapter's mandate to provide training to our members, the Committee is in the process of setting up a Scholarship which will enable members to undertake studies in areas associated with reducing the impact of arson on the community.

The monies raised from sponsorship at our Annual Seminars will be used to finance this programme.

I look forward to seeing as many of you as possible at the upcoming training session.

GARRY J. MARTIN
PRESIDENT
VICTORIA CHAPTER

IAAI - INTERNATIONAL
SEMINAR, LOS ANGELES,
CALIFORNIA, USA

Editor, Brian **NEAL**, and member of the Chapter Committee, is to mix business with pleasure. He and his family will be holidaying in the States at the time of the Seminar.

So, it's Brian to the Seminar, representing the Victoria Chapter, and the family - to other delights.

Brian will be preparing a paper for the interest of Chapter members and we hope that he and his family enjoy their various pursuits.

THE EVOLUTION OF FIRE

It was reported in the last issue that the Committee placed considerable importance on practical training for members and that a **HOUSE FIRE** was planned.

This is coming to fruition with Committee member, Adrian **EDWARDS**, having negotiated a property at CARRUM DOWNS to be used to demonstrate the evolution of fire from ignition to total involvement.

The Training Day will be preceded by an Introduction Night to be held at:

M.F.B. TRAINING COLLEGE

Thursday, 25th. May, 1995
Commencing 7.00 pm

Presenters will discuss Fire Scene safety, Security and Evidence, Basics of Scene Investigation and Analysis.

The **ACTUAL TRAINING DAY BURN** will be from:

The Carrum Downs Fire Station

Frankston - Dandenong Road
CARRUM DOWNS

Wednesday, 14th. June, 1995
Commencing at 9.15 am.

It will be a highlight of the Victoria Chapter's Training Programme for this year.

COMMITTEE CHANGES

Commitments overseas have compelled Adrian **WAKENSHAW** to tender his resignation from the Committee. Adrian was an inaugural member of the Steering Committee which formed the Chapter and his contribution and commitment over the past three years has been greatly appreciated.

The **ANNUAL MEETING** of the Chapter is to be held in July and for this reason, the Committee decided to co-opt Neil **BARNES**, the Fire Investigation Scientist for the Country Fire Authority, to fill the vacancy.

1995 PROGRAMME

25TH. MAY
INTRODUCTION NIGHT TO :
THE EVOLUTION OF FIRE
MFB Training College

14TH. JUNE
THE EVOLUTION OF FIRE
HOUSE BURN- CARRUM DOWNS
All day - BBQ Lunch

25TH. JULY
CHAPTER AGM & GUEST
SPEAKER
Venue and Speaker to be advised

30TH. AUGUST
DINNER MEETING
Lexa MANN - Presentation
DEATH BY MISADVENTURE
Venue to be advised

12TH. OCTOBER
CHAPTER SEMINAR
One day Seminar

NOVEMBER
CHAPTER GOLF/BBQ DAY

*All members should be aware that notices of coming events are sent to each member giving full details and cost. It is **IMPORTANT**, if you are attending, that notification of such intention is received by the Co-ordinator of the event in sufficient time.*

*This was the reason for the cancellation of two events this year!
When the decision had to be made, there were not enough acceptors to proceed.*

NEW CHAPTER MEMBERS

The Committee has approved the following new members and welcomes them to the Chapter:

Peter SEIZ *Victoria Police*

Dermot AVON *Victoria Police*

John WATSON *Lawsum Pty. Ltd.*

Ivan SAUNDERS *Imperial Adjusters*



INTERNATIONAL ASSOCIATION of ARSON INVESTIGATORS QUEENSLAND CHAPTER No. 59 (*QUEENSLAND ASSOCIATION of FIRE INVESTIGATORS*)

PRESIDENT'S MESSAGE

IAAI INTERNATIONAL CONFERENCE 1998

To demonstrate the commitment of the Queensland Chapter to the International Association, our President, Peter **THOMAS** and a member of our Chapter committee, Perc.

HARTWELL, along with Honorary Member and International Director Bruce **SAINSBURY**, traveled to Los Angeles in May, to present the Queensland Chapter's bid to host the 1998 Conference.

If our bid is successful, it will mark only the second time that the International Conference has been held off North American shores.

While at least some of the Directors of the International Association may be in two minds as to whether such off-shore Conferences are appropriate, it would signal a commitment on behalf of the International Association to be truly international.

Granting of the right to host the International Conference would provide the Queensland Chapter and, in a real way, Australasian Membership the opportunity to build strong links to the International Association.

It is hoped that this would also provide the chance for Australasian fire investigators to demonstrate their competence and highlight that we have a substantial input to make to development of successful fire investigation.

It is hoped that Australasian Chapters will support us in planning and promoting the Conference financially and by providing a substantial input into the technical programme.

QUEENSLAND CHAPTER MEETINGS

1995 AGM

During the AGM, our Chapter, like others in the Association, focused on the need to dispel the image that we are confined to the investigation of

criminally caused fires. Hence, a change of name was moved and passed and the Queensland Chapter be now known as -

QUEENSLAND ASSOCIATION OF FIRE INVESTIGATORS.

While there were a few dissenting votes, it was widely accepted that the Association needed to present an image of totally impartial fire investigation without any suggestion that the Association was directly aligned with the criminal justice system.

GUEST SPEAKER

As guest speaker for that meeting, we heard Bruce **SAINSBURY** speak of the growing sense of being an international body and the growing need to establish the Association as the contact body with respect to the investigation of fire

CHAPTER MEETING APRIL 12, 1995

Whilst the number of members who attended was disappointing, the venue, the lunch and the quality of the presentation made by David **MUIR**, Committee Chairman of Crime Stoppers, and Sergeant Trevor **MARKWELL**, officer for Crime Stoppers within the Queensland Police Services, fully compensated.

David Muir gave an insight into the origin of Crime Stoppers, in Texas some fifteen years ago, which highlighted the special impact that a structured mechanism of protected citizen input into the investigation of crime can have.

Sergeant Trevor Markwell provided the impressive statistic of Crime Stoppers leading to the seizure of approximately \$450 million dollars worth of drugs in its initial four years of operation in Queensland.

With similar community input to assist the investigation of fires, it may be expected that substantial results in determining the cause of many of our fires would be achieved.

Crime Stoppers is well established in Queensland, New South Wales, Tasmania and western Australia with expansion soon into South Australia and the Northern Territory.

Sergeant Markwell made the interesting comment that it was not unusual for informants to decide not to collect the appropriate award, highlighting that the disclosures had been made as a matter of principle.

"FIREPOINT"

"**FIREPOINT**" has been a topic discussed in several recent Committee meetings with all members of the view that "**FIREPOINT**" has a continuing role in Australasian chapters which outweighs its financial drain.

Given that "**FIREPOINT**" is now viewed as the Journal of the Australian Chapters of the International Association, members have taken an interest in seeking an alternative, less expensive production of the Journal.

An additional suggestion was that the New Zealand Chapter be approached to seek their interest in subscribing to the Journal. If the Journal could be made truly Australasian, then it could serve as an effective communication media between Chapters and as a link between Chapters and their regional membership.

As is already being done by some Chapters, it is to be hoped that each Chapter would contribute advance notice of their meetings and activities with summaries of their outcomes.

It would be sad to see financial pressures reduce the quality of the Journal and it was strongly suggested that, if the quality of articles was consistently high, reader interest would guarantee its future.

**PETER THOMAS,
PRESIDENT, QUEENSLAND
ASSOCIATION of FIRE
INVESTIGATORS**



VALEDICTORY

JACK ALEXANDER NUGTER

It is with deep regret that I advise of the death of our member **Jack Alexander NUGTER** of the NSW Police Service Crime Scene Unit, Inverell, NSW.

On March 17 of this year he was driving a vehicle which left the road and collided with a tree.

His passing at the age of 33 years is a tragic loss for his family, friends and colleagues.

Jack was an outstanding Officer, professional and exact in Crime Scene Unit duties.

Jack joined the NSW Police Service on the 26th. July, 1982. He commenced Crime Scene Unit duties at Broken Hill in May, 1987. He transferred to Inverell Crime Scene Unit in June, 1990.

Jack was an enthusiastic and tireless worker, a perfectionist in his role as a Crime Scene Examiner and his tenacity for investigating fires is well known.

His dedication was rewarded in 1987 when he and his partner, Constable First Class **PATMORE**, were commended for their courage and devotion to duty. In 1985 they had been confronted by an intoxicated man at Broken Hill who was armed with a loaded rifle. As the man pointed the rifle at them, Jack and Constable Patmore rushed forward and disarmed and arrested him after a lengthy struggle.

Apart from his Crime Scene duties, where he was always willing to discuss aspects of the investigations, his main interests were his family and wood chopping.

Jack began wood chopping in 1984 and participated in the event at the Police Games of 1985.

Unfortunately, when he was transferred to Broken Hill, the axes stayed in the box because of the lack of timber and the distances required to travel to events.

This all changed when he moved to Inverell.

His support for wood chopping saw the event included at the Inverell Show for the first time in more than twenty years, except for demonstration purposes.

Jack's ambition was to start a wood chopping club in Inverell.

He was dedicated to his family first and foremost and lived for his wife, Ellen, and baby daughter, Kate.

Friendship with Jack saw a big heart and a willingness to make sacrifices to assist people personally.

It is extremely difficult to understand why such a person, with so much to live for, has been taken in the prime of his life.

He will be deeply mourned by Ellen, Kate and all his relatives, friends, workmates and members involved in 'origin and cause' investigations.

**DETECTIVE SERGEANT
CARL. G. CAMERON
NSW POLICE SERVICE &
COMMITTEE MEMBER
NSW CHAPTER A.F.I.**

EDITORIAL

As this is the last issue of "FIREPOINT" to appear under my editorship, I take this opportunity to express my thanks to those who have provided the very necessary support that the Journal needs in order to both continue and grow.

On taking over, the publication was well behind the calendar and we have managed to catch up to the point where it at least 'hits the street' in the appropriate month.

In my period as its editor, I have piloted it from the status of a State publication to one of national issue but only with the valuable assistance of the subscribing Chapters and I hereby thank the Editors and Committees of those Chapters for the support received.

The costs involved in its production have proved a serious drain on the NSW Chapter's funds but it is heartening to see the dedication displayed in keeping it going.

When the Journal commenced it was still reasonable to expect support from advertisers but, this disappeared with the passage of time and the advent of 'the banana republic' saw almost total shrinkage of the advertising dollar.

I agree with the sentiments expressed in the Queensland Chapter's columns that a journal of high and informative quality is something which provides both a technological and social link for the members of the Association and should be 'afforded'.

There is no shortage of material suitable for publication but it has been a little disappointing that more good old original Australian input has not been forthcoming. The skills existing among the various disciplines associated with fire investigation and its complicated peripherals exist in our land to as high a value as anywhere else and the artisans should publish for the good of all.

Ladies and gentlemen, you need to drop your reticence and send in your thoughts, your experiences, your humorous anecdotes, your criticisms and your downright argumentative and mildly insulting comments! Otherwise, your Magazine talks exactly the way your editor does.

I have on many occasions heard members say that we ought to have more input from the other members. I have been keeping rough count but to date, the people who said this have not led the way either.

I am saddened to hear of the loss of our member Jack Nugter, it is a tragedy, but also for us as Jack contributed and stirred up at least one reply! We need more like him!

I wish the new Editor well and every success to "FIREPOINT" in the future.

**JOHN BOATH
EDITOR**



FIREPOINT

ANATOMY OF FIRE AND DETERMINING YOUR EXPERT

Ross BLOWERS is the Groups Claims Investigations Manager for CIC INSURANCE LIMITED where he works out of that firm's Head Office in co-ordinating investigations into claims resulting from fire losses.

Although he has the responsibility for ensuring quality and thoroughness of investigations into claims Australia wide, he is still a 'hands on' operator who is not afraid to get those hands (and other parts) dirty in the pursuit of truth on the fire scene.

He can speak with due authority on his chosen subject matter having made a long and continuing study of it both in Australia and overseas where he has undertaken fire investigation courses which included practical involvement in the day to day examination of fire scenes in locations which send shivers up and down the spines of people at the mere mention of them!

He has long recognised the decided advantage which exists in the 'team' approach to fire investigation and is responsible for setting up his company's Select Panel of operatives employed according to their expertise in the varying disciplines.

Ross is a foundation member of the NSW Chapter of I.A.A.I. and has filled several Executive Committee positions, including that of Secretary, and is at present the Senior Vice President of the Chapter.

THE EXPERT/SPECIALIST

When dealing with a difficult or questionable claim insurers generally need the assistance of 'specialists' to discover or interpret the factual matrix from which the claim arises.

But the question of 'specialisation' or 'expertise' can be problematical, especially in an area of particular professional interest to me - the 'Origin and Cause' of fires.

Fire investigation is a difficult pursuit requiring both skill and insight. In this article, I seek to demonstrate some features of the phenomenon of fire and to discuss how 'specialists' or 'experts' in the investigation of the origin and cause

of fires can be utilised by insurers to maximum benefit.

THE GIFT OF FIRE

Along with Earth, Air and Water, Fire is one of the great gifts of Nature which we accept with little regard to its complexity. The existence of each gift is interdependent upon the other for its continuation and evolution.

How often do we benignly accept the existence of these forces of nature without truly understanding the complex and intricate web of chemical reactions which take place? Each and every chemical reaction which occurs does so within pre-determined parameters and ought to be considered in toto, not as isolated, disparate events.

The first part of this paper is to examine, from a simplified, wholistic viewpoint, the existence of fire.

One might ask - "Why wholistic?" For the simple reason that to examine fire scenes and recognise the dynamics which have taken place and then, form an opinion as to where the fire started, what caused such ignition and what were the propagation factors, we need to understand what Fire is and why it does what it does.

The essential ingredient to understanding the dynamics is to recognise that the sum of the parts is actually far greater than the whole. The crucial component of this ingredient is to know and understand the inter-relatedness of the parts.

The second part of this paper examines the qualification and use of the 'expert witness' in fire claims from an insurer's viewpoint. It is important to understand what it is that allows a person to be qualified as an expert from a legal perspective.

Taking a step into the field of Fire and Origin Cause Examination, it is necessary to review the background and experience of those persons who promote themselves as - "Experts".

It is simply not a matter of having the appropriate academic qualifications; it is the ability to view the scene examination with an open mind and present that information objectively to a court. Before the 'expert' is appointed, it is important that the insurers clearly and concisely identify their requirements.

This should have the effect of alleviating any misunderstandings at some later stage of the claim enquiry.

PHYSICS AND CHEMISTRY OF FIRE

Fire could euphemistically be described as 'advanced rust'. The crucial component to the process of rusting is oxygen. The actual process which causes rusting is known as "Oxidation".

Rust is commonly observed in ferrous metals and, depending on the state and composition of the metal in question, can occur either relatively quickly or; may take a protracted period of time.

Fire or combustion is also a result of an oxidation process, however, the process is much more rapid.

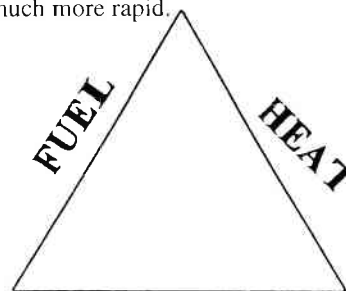


fig. 1. **OXYGEN**

A suitable working definition of fire is - "a rapid self-sustaining oxidation process with the evolution of heat and light to varying degrees of intensity. The working definition captures not only the process of combustion but, identifies the by-products of same.

The by-products of combustion are simply heat, light, smoke and gas.

Fire or combustion is normally the result of fuel, oxygen and an initial source of heat combining in suitable quantities. Over twenty years ago in the United States of America, a model was developed which adequately explained the relationship between the three elements and became known as the "Fire Triangle".



The idea was that all three 'sides' of the triangle were needed for a fire to start and to continue burning. If one or more of the three were not present or was removed, the fire could not start or; if started, could not sustain itself.

In the practical realm, this meant that a fire could be prevented or extinguished by taking away any of the elements of fuel, oxygen or heat. The practicality of this model is open to question when one considers that, in most circumstances, the very criteria said to be needed; i.e., fuel, oxygen and heat, are present at all times yet, we do not see fire or combustion taking place.

From a 'wholistic' viewpoint, the Fire Triangle was incomplete.

RECENT STUDIES

More recently, those who study fire and its effects use a different geometric model to explain the elements which combine to make fire.

This model is known as the "FIRE TETRAHEDRON"

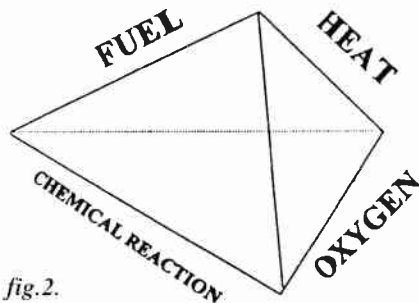


fig. 2.

According to this new model, four 'ingredients' are necessary for a fire to start and to continue to burn. These four are fuel, oxygen and heat - the elements contained within the Fire Triangle - and uninhibited chain reactions.

Put simply, this last element means that fire consists of molecular chain reactions, a continuous chemical process. If this process is interrupted, the fire will be extinguished.

Examination of the logic associated with this model satisfies a more complete idea of what fire is. However, from a 'wholistic' perspective, there is something missing - something absent which causes the 'chorus' to be 'out of key'.

Essentially, one is left with a problem similar to that exhibited in the Fire Triangle; that is, the criteria needed for

fire to occur and be sustained was present at most times and yet, we are not surrounded by objects igniting or staying alight.

Consideration of the issues caused me to realise that the 'grail' for which I was searching was a unification of elements.

The question to be asked is - "what is needed to unite all the components of the Fire Tetrahedron so that fire or combustion can take place?"

The answer quite simply is; 'an event'.

Suddenly, the 'chemical chorus' had harmony - it had a beginning.

THE FIRE DIAMOND

From a 'wholistic' perspective, I believe that the geometric model which most aptly fits the causation and sustaining of fire or combustion might be known as the "Fire Diamond".

EVENT - INITIATOR / UNIFIER

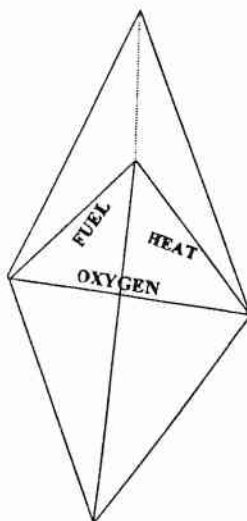


fig. 3. UNINHIBITED CHEMICAL CHAIN REACTION

Interestingly, 'the event' is the only element which can be removed from the process after commencement which does not inhibit combustion.

Conversely, 'the event' is the crucial ingredient necessary for the process to commence in the first place. The 'event' could easily be the striking of a match, mixing or combining of chemicals, arcs and sparks or; the simple discarding of a cigarette.

FACETS OF THE 'DIAMOND'

Having identified the harmony of the Fire Diamond, it is worth considering the four 'chorus' components.

FUELS

The fuel for a fire can be almost anything which is combustible. Among the common fuels are wood, petrol and gas.

As these examples clearly point out, fuel can be solid, liquid or gaseous.

Solids and liquids do not burn, only their heat released vapours ignite in air and support the combustion process.

SOLIDS:

Ordinarily, combustible solids do not combine directly with oxygen when they burn. They give off vapour and gaseous decomposition products when they are heated and it is these vapours or gases which actually burn in the characteristic form of flames. Therefore, before a solid can be ignited, it must be heated sufficiently for it to give off flammable concentrations of vapours.

LIQUIDS:

As with solids, a vapour has to be produced at the surface of a liquid before it will burn.

in the case of petrol, vapours are present in ignitable concentrations at approximately -45 degrees Celsius. Therefore, ambient air temperature has a relationship to the vaporisation process. The rate of vapour evolution is also related to the surface area of liquid exposed.

OXYGEN:

In a fire, air acts as an oxidising agent. Air contains approximately 21% oxygen and it is that oxygen which promotes the combustion process.

Other oxidisers may be chemicals such as chlorates or hydrogen peroxide.



HEAT:

The sources of heat generation are limited to four specific categories; chemical, electrical, mechanical and nuclear.

A fifth source warrants a mention; that of direct heat, however, this source is still being debated.

DIRECT:

The direct application of heat which is sufficient to cause combustion to commence, is the most obvious, yet often forgotten, form of heat generation.

Direct application of heat could be by way of a person exposing a naked flame to a piece of paper or some other combustible product. It could also be the impinging flame of an existing fire on nearby combustibles.

Although direct application of heat could be considered a form of heat generation, its origins stem from the four forms mentioned below.

CHEMICAL:

The mixing of certain chemicals can cause an exothermic reaction to take place.

Environmental factors and the volatility of the chemicals will determine the amount of heat generated.

Spontaneous combustion is another form of chemical heat and has been attributed as the likely cause of some haystack fires.

ELECTRICAL:

As an electrical current flows through a conductor, electrons are transferred from one atom to another. In the process, they collide with other atomic particles producing heat.

Arcing causes another form of electrical heat and occurs generally when a circuit carrying a current is severed or when there is a poor or intermittent connection,

Temperatures generated by arcs and sparks are in the vicinity of 1100 - 3800 degrees centigrade.

MECHANICAL:

This heat form results from the

transformation of mechanical energy into heat energy.

When two surfaces are rubbed together, resistance in the form of friction is created.

Another form of mechanical heat is that generated by compression. Compression of gases within a compartment causes the generation of heat. Conversely, release of compressed gases causes heat to be absorbed.

NUCLEAR:

The most common and least recognised form of nuclear heat energy is generated by the sun.

Nuclear heat generated by power plants converts water to steam which is then used to generate electricity.

FACTORS AFFECTING THE INTENSITY OF A FIRE

The intensity, or rate of heat production of a fire, determines its effect on the surrounding structure, contents and atmosphere.

THE FIRE LOAD:

This is the total amount of combustible material available to the fire. Some materials release more heat than others when they burn and so, contribute more to the fire load.

SURFACE AREA OF COMBUSTIBLE MATERIALS:

In the case of solids and liquids, fire can only occur at or near the surface.

Materials, such as textiles or foam plastic, with large surface areas in relation to their volume, ignite readily and burn more rapidly.

ADEQUACY OF OXYGEN SUPPLY:

Combustible materials burn freely in normal air which contains approximately 21% oxygen.

But oxygen is consumed by a fire and, if the oxygen content of the air is reduced to 16% or less, it will not normally sustain further combustion.

Exceptions include petrol or kerosene vapours which will burn in 15% oxygen and baled cotton waste which burns in 8% oxygen.

Some materials can smoulder for relatively long periods at even lower concentrations. Just to complicate matters, combustion can take place in non-oxygenated atmospheres. This process involves materials which contain inorganic nitrates, chlorates, perchlorates and permanganates.

These types of chemicals are known as oxidising agents and either contain oxygen or combine with other chemicals to give off heat.

When oxidising agents come in contact with organic fuels, spontaneous heating or ignition may occur.

THE SPREAD OF FIRE

Heat energy always passes from hotter to cooler regions by one of the following three methods -

CONVECTION, CONDUCTION and RADIATION.

CONVECTION:

- is the mass movement of a hotter, less dense gas through its cooler, denser surroundings (*hot air rises.*)

Convected heat is the **primary** agent of fire spread. Usually, **about 75%** of the combustion products of a fire are dissipated in rising convection currents of hot gases at temperatures of 800 - 1000 degrees centigrade which heat anything in their path.

CONDUCTION:

- is the movement of heat through a material. Some materials; e.g., metals, are better conductors than others.

Conducted heat can travel through walls, floors and ceilings to adjacent rooms, especially through metal partitions or along pipes and joists.

RADIATION:

- is the transfer of heat energy as electromagnetic waves.

Radiation does not heat gases which it passes through but does heat solids and liquids it impinges upon.



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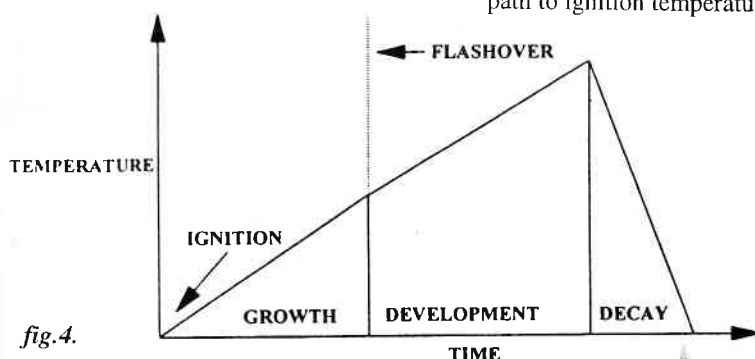
The intensity of radiation decreases with
the square of the increasing distance
from the flames but is often sufficient to
ignite combustible materials in nearby
buildings.

When two areas of combustion are in
close proximity, mutual radiation
between them intensifies the fire..

THE STAGES OF A FIRE

A fire passes through a number of stages
from ignition to decay.

The temperature/time curve below
typifies those stages.



IGNITION:

Combustion can be very rapid, as in a
gas explosion, steady, as with a bonfire,
or it can be a slow, smouldering process.

The initial source of heat, which causes
ignition in the presence of fuel and
oxygen, can take a number of forms.
These were discussed earlier.

GROWTH:

Fire creates the conditions for its own
growth. Once a fire has started, it can
grow rapidly. Burning materials
become a new source of ignition,
heating combustible materials in their
path to ignition temperature.

If this process continues, a phenomenon
known as "Flashover" may occur.
Flashover may be defined as the stage of
a fire where a compartment or other
areas become heated to the point when
flames flash over the entire surface or
area.

It is caused by heat from the fire
collecting at ceiling level and returning
to lower levels by thermal radiation.
Combustible materials within the
compartment are heated to their ignition
temperatures and fire flashes over large
areas.

DEVELOPMENT:

After its initial rapid growth, the fire
passes through a development stage
during which, its temperature increases
more slowly.

The fire continues to grow, possibly
spreading to adjacent buildings, which
then, in turn, pass through the stages of
rapid initial growth and development.

DECAY:

During the final decay stage, the fire is
running out of fuel or oxygen and

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eventually burns out unless more fuel or oxygen becomes available to it.

If a fire in an enclosed compartment is decaying because its supply of oxygen has become limited, the fire may appear to burn out. However, combustion can continue at a reduced rate at very low oxygen concentrations and a fire may smoulder for a long period.

If the full oxygen concentration is returned quickly, (such as by the breaking of a window or by opening a door) combustion may be re-established with explosive violence.

SUMMARY

It ought to be understood that this paper does not in any way constitute as a guide to fire investigation.

The intention is to raise the level of awareness of those persons who may be involved in examining reports from fire investigators and provide some basis on which to judge the understanding and competency of the investigator.

Fire investigation involves a broad spectrum of experience based on theory and practical training.

Understanding what "FIRE" is, provides the initial springboard to accurately determine its "ORIGIN AND CAUSE".

WHAT QUALIFIES AN EXPERT

As a society, we seem to be constantly caught between the two tyrannies - the need to know and the need to prove.

In insurance, we have to understand claims before we can pay them. In more difficult claims, we generally do not have sufficient resources 'in-house' to do this and we have to appoint "experts" to do this.

Often, the primary reason for using an "expert" is that they may be called as a witness in court and be asked to offer an opinion as to what may have occurred during a particular event.

It is not unusual for the qualification process of the so-called "expert witness" to be given insufficient consideration and we run the risk of accepting that the "expert" is what they purport to be.

A poorly qualified "Expert Witness" can be less than useless in court.

THE COURT VIEW

It ought to be remembered that it is the courts in the Civil and Criminal Jurisdiction that determine whether a person is qualified to form an opinion as to when, where and how a fire commenced and continued to propagate. Qualifications and experience certainly provide assistance in allowing a court to determine whether a person is qualified as a "specialist", however, it is my belief that a true "specialist" is one who is able to blend qualifications and experience with the ability to communicate a clear, concise and cogent argument as to what most probably occurred.

Regardless of the semantic argument on the use of the term "Expert" or "Specialist", the basic underlying issue is what is expected and accepted by the courts.

Courts look to "Experts" to assist in drawing appropriate inferences.

ANDREW LIGERTWOOD (1993 at 379) expresses the value of "Expert Testimony":

"Ultimately, whether an opinion given on the basis of a recognised field of Knowledge can assist the trier of fact depends on the precise issue before the court and the precise Knowledge the expert offers on that issue".

In establishing expertise, **LIGERTWOOD (ibid)** states:

"Expertise in a field may be acquired through formal study or practical experience.

The High Court makes this clear in Weal -v- Bottom (1966) 40 ALJR 436, where the tendency of semi-trailers to slew could be established as a general proposition by experienced semi-trailer drivers. The crucial question is whether the expert has the requisite Knowledge of a particular field, not on how that Knowledge was acquired".

When a person is identified as an "expert" a common view is that the person knows everything about the chosen subject.

I reject this view because it is simply not true.

It is inconceivable that any single person could be the font of all knowledge on a specific subject and, with this view in mind, I am more comfortable with the term "specialist".

ORIGIN AND CAUSE EXPERTS

Fire investigation requires the services of a "specialist" particularly when determining origin and cause.

Some operating within the field of Forensic Fire investigation advocate that only scientists can truly be objective when determining the origin and cause of a fire.

A good proportion of those who support this view have a background in academia with strong connections to the physical sciences of metallurgy, chemistry and electrical engineering.

There is little doubt that such a background provides valuable insight into what occurs to material before, during and after a fire, however, being a scientist does not necessarily equate with being a specialist in fire origin and cause determination.

Unfortunately, my experience is that this view is not always shared by the courts or by our legal advisors who can rely heavily - rightly or wrongly - on recognition of academic awards as the basis for "specialist" credibility.

Academic awards certainly provide some comfort in determining a "specialist", however, it ought to be considered as only a factor making up part of the whole, not as the sole determining factor.

OTHER FACTORS

To be valuable as a "specialist" in fire investigation requires far more than having academic qualifications. Certainly, the understanding and a working knowledge of the physical sciences is critical and relevant. However, equally important is a solid working knowledge of building construction, building codes, experience in fighting fires, understanding what fire is and why it does what it does.

Being a "specialist" in fire investigation draws on many disciplines.

Some have argued that fire investigation is a science. If the truth be known, it

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would be better described as an inexact science based upon an understanding of the physical laws governing nature (science) and reconstruction and interpretation (art).

The special combination of science and art should combine to give the investigator an understanding of what was present at the time the fire started, what unified the fundamental elements and why the fire continued to propagate.

The thoroughness of the "specialist" in his or her investigation will go a long way to reducing the risks of cross examination. If the "specialist" has pursued all reasonable avenues of enquiry, with diligence and application, a skilled cross examiner can be thwarted because the "specialist" can rebut damaging propositions or suggestions on the basis of considered and reasoned conclusions drawn during the investigation process.

WHAT ELSE SHOULD WE LOOK FOR IN AN EXPERT

Qualifications and experience amount to nothing if the person who is charged with the responsibility of interpreting a fire scene is unable to communicate their thoughts in a logical and coherent manner.

The "specialist" ought to have a reasonable working knowledge of the legal system, in particular, the Rules of Evidence, evidence collection and storage as well as sample analysis and presentation.

Above all else, the "specialist" must keep an open mind.

I believe there are very few things we can deem as absolute yet, we often observe "specialists" being snared by very skilled lawyers who paint hypothetical situations in order to elicit definitive statements from which there is no retreat and thus, damaging their credibility when an alternative hypothesis has to be conceded as possible.

I believe that there are four words which ought not feature prominently in an investigator's vocabulary, they are; Never, Always, Impossible and Can't

These words are absolutes and in the field of fire investigation, the special bond between science and art will

constantly be thwarted by the nemesis of absolutes.

HOW TO GET THE BEST FROM YOUR EXPERT

This can be a tricky and tedious task made all the more difficult by egos hindering common sense.

There are several prime elements which need due consideration:

1. What is it you want to know?

The simple and indisputable answer to this question is the **TRUTH**.

It is essential that you and your organisation have all the facts and accept those facts regardless of the outcome.

2. Ensure your Expert is aware of your philosophy

Prior to enlisting the services of your "expert", discuss full your beliefs and views. It provides comfort for you in the knowledge that your "expert" has been provided with clear and concise guidelines and knows what you require.

3. Establish the credibility of your Expert

Before appointing an "expert", establish what it is you want to achieve.

Make contact with other organisations or people in the market who have had a need for these services and request referrals.

Identify knowledge levels, experience, court manner and background.

Discuss with your lawyers as to who they believe will best serve your organisation and question them as to why they have a particular view.

Be aware of the communication style of the "expert" - is it clear, concise and cogent? Do you feel comfortable with the person and do you believe that they understand your philosophy and will conduct themselves in an ethical and moral manner?

4. Review their work

After your "expert" has concluded an

examination of a scene and prepared a detailed report as to the "origin and cause" of fire, it is essential that a person knowledgeable within your organisation, either alone or in company with your appointed lawyer, attend the scene and examine same in conjunction with the "expert".

Continually challenge the findings and keep asking - "What if?" - "What about?" - "Have you considered?" - and, most importantly, ***"Is there an alternative explanation?"***

The challenge process helps solidify ideas and facts in the mind of the "expert" and allows you to form an objective opinion as to the strength and credibility of arguments put forward and how the "expert" will present in court.

It will, most importantly, identify weaknesses in arguments earlier rather than later!

5. If in doubt

It does not harm your enquiry to seek an alternative opinion. The adage - "two heads are better than one" - may serve you extremely well when faced with difficult and/or complex fire scenes.

As mentioned earlier in this paper, no single person can know everything and it is often refreshing to listen and learn from others who may address the enquiry from a different perspective.

REMEMBER

Fire scene examination is a combination of science and art.

True exponents are able to combine the many disciplines required and keep an open mind so that they are able to make an objective interpretation of the evidence and, hence, draw a valid conclusion.


All opinions expressed in this paper are my own.

ROSS BLOWERS

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FIREPOINT



(I wish to acknowledge the valuable assistance of ALAN CONOLLY of A. R. CONOLLY & CO. and; ROBERT CAMERON of ABBOTT TOUT, SOLICITORS)

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Andrew LIGERTWOOD

AUSTRALIAN EVIDENCE

Second Edition
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(For readers who are having trouble about the spelling of the word "wholistic", your Editor was having a similar problem having exhausted his supply of accepted lexicons until a computer search of Groliers Encyclopedia showed it to be a medical term and thus, an acceptable spelling of the word- I apologise Ross for doubting you!)

It was a typical stormy night as the grim-faced butler led the rather nervous guest to his room high in the old castle.

"Has anything strange ever happened here"? he asked the butler in a tremulous voice.

"Not for forty years".

With a relieved sigh the guest asked; "What happened then"?

The butler's eyes gleamed as he hissed; "A guest who stayed overnight turned up in the morning".

WHO OR WHAT BROKE THAT GLASS ? HOW CAN I TELL ?

This is an extract from an address delivered by Rodger IDE, Principal Scientific Officer, Home Office Forensic Laboratories, United Kingdom. to the NSW Chapter Seminar held in July of 1994.

The address was entitled - "DEDUCTIVE EVIDENCE AT FIRE SCENES" and the extract on the breaking of glass and the evidence it produces is reproduced as a type of "refresher" for those who may have forgotten or ; as new information for those who did not attend the Seminar

GLASS

Glass is an amorphous, super-cooled liquid and, for this reason, fracture surfaces exhibit very characteristic evidence as to the nature of the forces involved in its breaking.

Examination of the fracture surfaces of glass broken by impact can reveal the side from which the impact occurred and, sometimes, evidence as to the amount of force which has been used.

Such investigations may be of importance when distinguishing between windows broken from the outside by a criminal, and those broken from the inside by fire fighters ventilating the smoke filled building.

In addition, a number of crimes have been committed by the occupant or key-holder of the premises from which goods have been removed and then evidence has been fabricated to suggest that an external criminal has been involved.

It is not infrequent to find that the alleged point of entry, the broken window, has been broken from the inside and this can be conclusively demonstrated by examination of the fractured glass.

Glass is also broken by the heat of the fire. As the temperature rises, sheets of glass, which have poor thermal conductivity, suffer strains induced by the differences in temperature.

Typical soda glass is unable to withstand temperature differences greater than approximately 70 degrees Centigrade. Cracks produced by differential rising temperatures are characteristically curved and the fracture surfaces show little evidence of the hackle or rib marks which are so characteristic of impact fractured glass.

This, in itself, can be used as evidence to establish the rate of propagation of the crack in the glass.

Glass, which has been raised in temperature by the fire and then suddenly cooled and by fire fighting jets of water, cracks in a different but characteristic manner in which conchoidal fractures appear on the surface which has been cooled.

Glass can also be broken by explosions and, depending upon the nature of the shock wave, so the shape and size of the glass fragments will alter.

Glass broken by a gas explosion is likely to form long, sharp shards of glass which may travel distances of, perhaps, 100 metres.

Glass broken by a high explosive device is likely to assume an appearance which mimics that of broken toughened glass.

DID YOU KNOW ?

Building Regulations in NSW do not permit the use of fire prone material - such as bituminous jointed sarking - in any classification of occupancy but this does not apply to such material used as ceiling insulation in a free-standing private dwelling. You just can't use it as sarking under roof covering ! Strange thinking !

Over the entry threshold of a taxation office there is a notice which reads; "Watch Your Step".

On the way out there is another notice inside the door which reads; "Watch Your Language".

FIREPOINT