Fire Research Report

International Approaches to Reducing Deliberately Lit Fires: Statistical Data and Fire Investigations

UniServices Ltd

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The aim of this research was to review and document for New Zealand and overseas (Australia, UK, USA and Canada) the:

- statistical data for deliberately lit fires including the distribution across different property types and communities;
- fire cause investigation and reporting process including how raw data is collected; and
- to document figures for monetary losses in deliberately fires compared to losses incurred in all fires.

International approaches to reducing deliberately lit fires:

Statistical data and fire investigation

Final Report

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CONTENTS

LIST OF TABLES

ACKNOWLEDGEMENTS

Executive Summary and Recommendations

This report reviews the process of data collection and fire cause investigation and reporting processes for deliberately lit fires, and documents statistical data in New Zealand and overseas (Australia, United Kingdom, United States of America and Canada).

National and international surveys of organisations that collected statistical data on deliberately lit fires and/or were involved in fire investigation were conducted to: document the number of reported deliberately lit fires and arson offences, and review the processes used to collect that data; document the distribution of deliberately lit fires among property types and communities, and the monetary costs associated with deliberately lit fires; and review the fire cause investigation and reporting processes. These organisations typically consisted of fire services and law enforcement agencies, or government departments that collated their data.

Processes and systems used to collect raw data on deliberately lit fires by fire service and law enforcement agencies: New Zealand (NZ) and the United Kingdom (UK) have a nationally coordinated data collection process for fire services. Australia, the United States of America (USA) and Canada can volunteer to transfer their data to organisations for national data reporting. Inaccuracy of the data collection was identified as a major weakness of all systems. Solutions included staff training, manuals, simplified systems with broad rather than detailed categories. A similar picture emerged for the collection of reported arson offences by law enforcement agencies, except that in Australia arson statistics are not collated or reported nationally. Inter-agency cooperation between the fire services and law enforcement agencies was lacking to some degree in all countries surveyed.

Deliberately lit fires and recorded arson offences: All five countries' fire services define deliberately lit fires slightly differently and three countries are currently reviewing the terminology used. Classification of a fire as deliberately lit requires a judgement from fire service personnel about the level of intent. In contrast, for an arson offence to be recorded, a crime must be reported to or detected by the Police. Thus, the number of recorded arson offence offences is always lower than the number of deliberately lit fires. In NZ, UK and Canada the number of deliberately lit fires has increased. In contrast, USA and

Australia have experienced a decrease in deliberately lit fires. All countries experienced a decrease in the number of recorded arson offences, although some states in Australia have experienced increases.

Distribution of deliberately lit fires in different property types and communities: In NZ and Australia deliberately lit rubbish fires, mobile property fires and vegetation fires occurred most often. Deliberate vehicle fires were also common in UK and USA, but so were structure fires. Deliberately lit fires were most common in urban areas for NZ, Australia and USA.

Monetary cost of deliberately lit fires and the number of fatalities that have occurred in deliberately lit fires: The proportion of fatalities in deliberately lit fires ranged from none (NZ) to 20% (UK). The monetary cost of deliberately lit fires accounted for between 26% and 35% of the total cost of all fires for NZ, 32% to 35% for England and Wales, 17% to 28% for Australia (17% to 28%), and 8% to 15% for USA.

Overview of fire cause investigation and reporting processes. The NZFS typically carried out fire investigation and reporting: Determination of origin and cause is made by eliminating possible causes based on physical evidence and witness statements. The fire investigation report is separated from the incident data base and is relatively easy to use. Recommendations from participants include to establish clear lines of responsibility for investigations, to enable the Station Management System to be updated to match the fire investigation report, an improvement to the search function within the reports, and more training (e.g., evidence preservation, report writing). The New Zealand Police support more training in the legalities of fire investigation. The process for fire cause investigation overseas varies but many are conducted within cooperative teams of fire service and law enforcement personnel, which seem to work well.

Project Aims

The aim of this project, as defined by the New Zealand Fire Service (NZFS), was to review and document statistical data for deliberately lit fires and the fire cause investigation and reporting process, in NZ and overseas (Australia, UK, USA and Canada).

The specific aims were:

1.   To review fire service and law enforcement statistical data in NZ and overseas on deliberately lit fires.

2.   To review the process of collecting raw data on deliberately lit fires in NZ and overseas.

3.   To document the distribution of deliberately lit fires in different property types and communities in NZ and overseas.

4.   To document figures for monetary losses in deliberate fires compared to losses incurred in all fires, in NZ and overseas.

5.   To review the fire cause investigation and reporting process in NZ and overseas.

6.   To make recommendations to the NZFS in relation to the above issues.

Introduction

This report focuses on the data collection for deliberately lit fires in NZ and internationally. Data on deliberately lit fires is collected for a variety of reasons. These reasons include elucidating the nature, extent and trends of the deliberate fire problem at local and national levels, to identify emerging fire problems and populations at risk so that prevention campaigns can be initiated and their impact monitored, and to justify the allocation of limited resources to the deliberate fire problem and improve the impact of those resources (e.g., training needs). Data may also be used to monitor the performance of fire services and the policing of arson, to assist in the development of agency goals and practice, to provide a basis of the development of service policy and government legislation, and to fulfil any legal requirements for the documentation of deliberate fire incidents.

For the purposes of this report deliberately lit fires will broadly refer to fires that are started intentionally by someone who is aware of the possible consequences of starting that fire (e.g., harm to persons and/or damage to property). This definition would include all fires that meet the legal definition of arson.

This study is not intended to be a full-scale review of data collection processes and statistics, but rather a general overview of the processes used and a statistical snapshot of deliberate fire incidence in the countries included. The period 2000 to 2005 was selected because three of the organisations identified in this report (NZFS, the National Fire Protection Association and the United States Fire Administration) changed their data collection processes for deliberately lit fires between 1999 and 2001. Although it is problematic to analyse trends over such a short time period, the changes in data collection make more long-term analysis impossible. Statistics provided by each of the countries in this report should not be directly compared to one another because of the international differences in definitions (e.g., of deliberately lit fires) and the collection processes (e.g., counting rules).

This report is divided into six sections. The first part explores the process of collecting raw data by the fire service and law enforcement (e.g., Police). The second section reviews the terminology used by the fire services and law enforcement agencies to describe deliberately lit fires and document their incidence. The third section documents the distribution of deliberately lit fires among property types and

communities. The fourth section documents the monetary loss of deliberately lit fires compared with other fires. The fifth section summarises the fire cause investigation and reporting processes utilised in NZ and overseas. Finally, recommendations are presented based on the aforementioned review.

This project is based on a proactive evaluation model, which is concerned with synthesising what is known about an issue and reviewing the ways it has been addressed in various locations (Owen & Rogers, 1999). This approach involves comparing the practices of one organisation against practices of other organisations anywhere in the world, to gain information that will assist in the development, improvement or justification of current practice.

Research methods included a mixed qualitative and quantitative survey approach (questionnaire and interview) and a review of secondary sources (e.g., published statistical data). This approach enabled the sampling of participants around the world from which statistical and process data was collected. It also allowed the researcher to explore the process issues during in-depth interviews. Data was collected from five countries between June 2005 and July 2006, with supplementary data from participant checks integrated into the study during September 2006.

Method

Participants

Participants were purposefully selected from fire service and law enforcement agencies to provide information about statistical data on deliberately lit fires, the process of collecting the raw data, and fire cause investigation and reporting processes. Participants were drawn from NZ, Australia, UK, USA and Canada. They included analysts, data users, and fire investigators.

Analysts and data users

The term 'analyst' describes participants who were involved in the collation, administration or reporting of statistical data on deliberately lit fires. The term 'data users' refers to the fire personnel (e.g., fire-fighters, administration staff) who are responsible for collecting and recording the raw data.

In NZ, 12 analysts and data users from the NZFS and one analyst from the Police participated in this project. Additionally, 14 of the 17 insurance companies that are members of the Insurance Council of New Zealand (ICNZ) were contacted primarily to determine whether they collected figures for monetary loss due to deliberate fires. The majority of members of the ICNZ spoken to reported that they would not release loss figures to an unknown third party due to commercial confidentiality. Consequently, ICNZ contacted all 17 of its members to participate in the study and collated the data from the three insurance companies that responded. ICNZ reported that data from one of the respondents represented a "fairly significant sector of the marketplace".

In Australia, two analysts from the New South Wales Fire Brigade and one from the Queensland Police Service participated. In UK, one analyst from each of the Department for Communities and Local Government (DCLG; formerly the Office of the Deputy Prime Minister) and the Home Office participated, along with seven analysts and data users from five different fire and rescue services. In USA one analyst from each of the following organisations participated, the National Fire Protection Association (NFPA), the United States Fire Administration (USFA) and the Federal Bureau of Investigation (FBI). Finally, in Canada two analysts from two provincial fire service agencies participated in this project and one provincial fire investigator.

Fire investigators

The term 'fire investigator' describes participants who perform specialist fire cause investigations and reporting. In NZ, these participants are drawn from Fire Safety Officers and Fire Engineers.

In NZ, ten fire investigators from NZFS and one from the Police participated. In Australia and Canada, one fire service based fire investigator participated from each country.

<center>Measures</center>

Five different surveys were developed. They were designed to gather information about statistical data on deliberately lit fires, the process of collecting the raw data, and fire cause investigation and reporting processes. Before developing the surveys, the researchers met with NZFS personnel to acquire a general understanding the processes to be studied and information to be extracted. Experts in the areas targeted by the surveys (e.g., fire investigators) reviewed them to ensure that the items corresponded with the purpose of enquiry. Feedback was received and the surveys were revised accordingly to take into account items that were redundant, and additional information that may be required.

All surveys could be completed as self-report questionnaires or as interviews with the researchers. The surveys each contained between two and six sections that corresponded to key areas of enquiry. Each section requested descriptive information and explored participant perspectives about the strengths and weaknesses of current practice, and recommendations for change. The surveys combined quantitative (forced choice) items and qualitative (open-ended) items. Quantitative items are succinct and facilitated comparison and statistical aggregation of the data, whereas narrative comments from open-ended questions contributed depth and human perspective to the data (Patton, 1987). There was considerable scope within this framework for participants to identify and comment in detail on issues that they considered most relevant and meaningful. Participants were also given the opportunity to forward any documentation and statistical data to assist them in completing the surveys.

Fire cause reporting processes and statistical data for deliberately lit fires: Survey of data analysts/administrators (Appendix A)

This survey was used with analysts and had six sections that gathered information about fire cause investigation and reporting, statistical data collected, including fire cause categories, and the processes used to collect the data, and how data is stored and reported. This survey was available for participants to complete on paper, as a word document, online via a secure internet link or in an interview.

Fire cause reporting processes and statistical data for deliberately lit fires: Survey of data system users (Appendix B)

This survey was used with data users and had two sections that gathered information about fire cause investigation and reporting, the system utilised to enter the data, and fire cause categories. This survey

was available for participants to complete on paper, as a word document, online via a secure internet link, or in an interview.

Fire cause reporting processes and statistical data for deliberately lit fires: NZ Police (Appendix C)

This survey was developed from the 'survey of data system users' specifically for the NZ Police. It included a subset of the items in the 'survey of data system users' that gathered information on fire cause investigation and reporting and the process utilised by the Police to collect data on deliberately lit fires and inter-agency cooperation. Two participants completed this survey, in an interview.

Survey of statistical data for deliberately lit fires: Distribution and monetary loss (Appendix D)

This survey was developed to gather information from NZ insurance companies about the monetary cost of deliberately lit and other fires and the distribution of deliberately lit fires and other fires across property types and communities. This survey was emailed as a word document to the ICNZ.

Fire cause reporting processes and statistical data for deliberately lit fires: Survey fire cause investigators (Appendix E)

This survey was for specialist fire investigators. It has three sections that request information about the fire cause investigation process, the fire cause reporting process, and the systems utilised for reporting. It also includes items about training. This survey was available for participants to complete on paper, as a word document, online via a secure internet link, or in an interview.

Procedures

Ethical approval was obtained from the University of Auckland Human Subjects Ethics Committee (Appendix F).

The literature was reviewed and internet searches conducted to identify relevant fire service and law enforcement agencies in NZ, Australia, UK, USA and Canada. Organisations were contacted by telephone or email and potential participants were identified. Potential participants were also identified by existing contacts in the area and by snowballing of further contacts. Each organisation and participant received a written information sheet and provided consent to participate (Appendix G). The information sheet outlined the research project and included a statement that participation was voluntary and that participation or non-participation would not affect their employment.

Once consent had been obtained the relevant survey(s) was released to participants in the form they requested (e.g., emailed word document) or an interview was conducted. Interviews were conducted both face-to-face onsite at the NZFS or via telephone. All were recorded by hand. Interviews were based on the survey relevant to the participant, excluding redundant items as they became apparent over the interview process, and included exploration of issues the participant raised.

In total, ten interviews were conducted and 22 questionnaires completed and returned. Over the course of data collection, two reminder letters were emailed out to participants. Data collection closed in July 2006. Participants returned completed surveys by email, internet link or post. Posted replies were received at the University of Auckland to ensure security and privacy of responses. In some cases, follow-up contact (email or telephone) was made with participants to gather statistics or provide added depth to their responses. Secondary sources, such as reports and published statistical data, that commented on the areas under study were also reviewed and incorporated into the results of this project.

It was not possible to locate comparable information for all of the countries studied. The distribution of deliberately lit fires among communities in UK, and USA (fire service statistics only) were not available according to rural/urban division. National fire service statistics for Canada were not available after 2001

and did not include distribution according to property type, communities (rural/urban) or monetary loss. Other statistics are presented as they could be located and their limitations are identified.

Data Analysis

A combination of deductive and inductive approaches was utilised. Deductive strategies are driven by existing knowledge in the area being studied and data is coded for specific research questions (Braun & Clarke, 2006). The deductive method used was content analysis. Content analysis involves quantifying data in terms of predetermined categories in a systematic and replicable way (Bryman, 2004). Inductive strategies allow themes or patterns in the data to be identified that may have little to do with the specific questions asked of the participants (Braun et al.). The inductive method used was thematic analysis. Braun and Clarke describe thematic analysis as a 'method for identifying, analysing and reporting patterns (themes) within data' (p. 79). Thematic analysis takes a more interpretative approach than content analysis because patterns in the data are identified after the data has been collected rather than categories being decided prior to data collection and analysis. Themes capture important elements of the data in relation to the aims of the research project.

Questionnaire responses and interview data was reviewed and the researchers familiarised themselves with the data set. A word processor was used to organise responses to the surveys. Participant responses were ordered according to the survey they completed. Word documents were arranged according to aim, then each country and organisation.

Content analysis was used to generate descriptive information, such as the process for collecting data. Broad categories were developed based on the survey items and relevant text from the surveys and secondary sources was inserted under these categories. Analysis of secondary sources consisted of descriptive information relating to the study aims (e.g., published descriptions of data collection processes). The descriptive material was summarised for country, within each aim.

Thematic analysis was used to identify patterns from participants regarding how they perceived the process of data collection and fire cause investigation and reporting. The identified themes were further refined over time and by regular discussion in research meetings, which looked at the quality of the data obtained and checked consistency of the data analysis. Relevant quotes were entered in their entirety.

Participants were also given the opportunity to review the data relevant to them (summarised in narrative form and tables). These participant checks were carried out as a way of checking the accuracy of

factual material (e.g., organisation descriptions and statistics) and validity of data interpretations. This process led to further refinement of the data utilising the participant feedback.

Triangulation was utilised to add validity to the findings by comparing and cross checking the consistency of information across multiple data sources and researchers (Patton, 1990). In this project, the perspectives of analysts, users and fire investigators were compared; questionnaire responses and interview data were compared; and the consistency between published documentation and participant responses was checked.

In reporting the results from participants, the descriptors "a few", "some", "most", "all" are used rather than actual numbers. This is done in recognition that the participants were not necessarily representative of the available population, as would be the case in a randomly selected participant group. Rather they were purposefully chosen, or volunteered, thus comprise a convenience sample.

1. Process of collecting raw data on deliberately lit fires in New Zealand and overseas

This section of the report provides an overview of the processes and systems used to collect data on deliberately lit fires by fire service and law enforcement (e.g., Police) agencies in NZ, Australia, UK, USA and Canada.

NEW ZEALAND

New Zealand Fire Service (NZFS)

Overview of process of collecting data on deliberately lit fires

Prior to 1991 the NZFS collected statistical data using a manual, paper-based system. From 1991 to 2000, statistical data was collected in an Oracle database. In 2000, this system changed to the current dynamic Station Management System (SMS) that is available to NZFS staff on their national intranet. The SMS also has the ability to collect statistical data from the Rural Fire Authorities, whose cooperation is voluntary and not governed by a legal requirement to cooperate.

The NZFS operates a communications centre that receives and responds to emergency notifications of fires. Upon receiving a notification, the communications centre generates an SMS incident report and a message log that tracks the activities of the fire service response. The responding fire station(s) has access to the incidents they have responded to and typically, the Incident Commander (officer in charge) or First-at-Fire Officer completes the SMS incident report at the station. The SMS incident report provides descriptive details of the incident type (e.g., structure fire), such as property use, location of origin and indicated cause. It collects data nationally and in a standardised fashion.

The Data Applications Service Group at National Headquarters is responsible for the management of the data collected by the SMS, including quality assurance. The raw statistical data is extracted for a variety of uses. These include: internal monitoring of incidents requiring operational investigations; monitoring NZFS output and outcome performance; reporting NZFS activities against revenue sources; determining the allocation of resources based on risk; providing notifications of incidents to organisations that have

specific statutory responsibilities (e.g., Energy Safety Service, ERMA Fire Protection Industry); identifying at risk groups within the community for targeting fire safety education and other programmes; research; and to inform the fire engineering design process.

Format of SMS

The SMS incident report can be completed by choosing from a selection of categories relevant to each question that are generated in a series of drop-down boxes. According to the chosen incident type, the selection of some question categories are mandatory and others can be left blank. There is also provision for a narrative style 'Comments' section.

Many participants found the drop-down box format of the SMS incident report easy to use and responsive for the majority of incident types. Typical comments included, "It takes you to another field where you are able to refine your criteria", "The format of system is logical and sequential", "I find the system easy to use, and quick. It flows from building etc. details to cause to extinguishing agents". However, one participant stated that "for some incident types and unusual materials it is inflexible and slow".

Many participants stated that the available categories were not always appropriate to describe the incident, with some categories too detailed (e.g., equipment used, heat source, material made of) and others inadequate (e.g., extent of damage) or too difficult to use meaningfully (e.g., mutually exclusive categories of rescued versus extricated within civilian topic). These difficulties could lead to the selection of inappropriate categories or categories left blank and the loss of meaningful data from the system. One participant commented, "common incidents can be coded in so many different ways [that we] end up loosing data into incident coded that don't make sense, so we have to assume the data is wrong".

Users found the 'Comments' section useful to record any extra information. For example, one participant stated "The notes at the end of the report [are useful]. You can provide details as to what really happened". However, it was noted that in practice this rarely occurs because this section is placed at the end of the SMS incident form and is therefore not always readily accessible when users are having difficulty with the available categories. Additionally, the reporting software cannot access the information in the comments section so it is not included in the statistical reporting.

Despite many participants having an overall positive experience of using the system, most participants recommended further simplifying the format of the SMS incident report, including the available categories. Suggestions for simplifying the system included intuitive software so that only questions relevant to a particular incident are generated and common incidents should contain short-cut functions; a range of broad categories so that less detailed data is collected but more useful data; regular updating of categories to match technological changes; and increased provision for narrative text.

There was also a recognised need for clarification of the terms and categories used, perhaps by introducing a data dictionary and an interactive help function; and staff training on how to best use the system. For example, many participants recommended simplifying and clarifying the indicated cause codes to make them easier to use and to ensure they are used appropriately. The absence of formalised definitions for the cause categories was thought to reduce reliability of coding.

Typical comments included:

> I do not use *unlawful* because to me this would better describe an incident like a burn-off without a permit as opposed to arson.

> We need to clarify and simplify the definition of *unlawful*, and the fire cause fields are not user-friendly.

> We need to prevent inappropriate fire causes being used in the wrong circumstances.
> The whole category of deliberate cause needs to be re-designed to emphasise whether or not the intent was malicious.

Performance based design data captured in the SMS

The NZFS fire engineers use the statistical data collected by the SMS to inform their design process for safer structures. The type of data they utilise includes how the fire occurred, how the design systems reacted (e.g., alarms and sprinklers) and human behaviour in fire (i.e., what people do or do not do in fire situations).

Some participants (including fire engineers and other personnel) stated that the terminology used to describe how the fire occurred was confusing and therefore resulted in unreliable data. They suggested that simplifying the categories by reducing the amount of detail required would facilitate more accurate data. They also recommended the further collection of information on how design systems reacted and how people behaved when they encountered the fire (e.g., process of evacuation). The importance of

making the collection of this information as straightforward as possible was emphasised, as was generating an awareness of why this type of information is collected among those people who input the data.

> Develop facilities to better analyse human responses to emergencies. Who takes charge - Mum or Dad? The anecdotal information I have indicates Dad takes charge at home and mum takes charge in the Supermarket! Why? What happens in a crowd situation? Night clubs, sports stadiums, etc. Do people react to signage (EXIT signs etc), building evacuation warden instructions? Why do they want to get their purse? Is their purse more important at a snapshot in time than their kids? There is little presently to prompt for or collect information regarding human responses - although there's much research been done.

Quality of data

All fields appropriate to the incident type must be entered before SMS will accept completion of the incident report. Typically, the incident report is completed on the day the incident occurs, although it can remain outstanding indefinitely, as one participant commented: "Generally the incident report is completed that day but it may remain outstanding for weeks, months or never be completed. The person assigned to the task may not have been at the incident or not even be a fire fighter". Incomplete incidents remain as incomplete tasks on SMS.

Nevertheless, for the past four years 99.5% of all incident reports have been completed, according to the NZFS. Factors that may contribute to incomplete reports include difficulties with the categories, terminology, training and ownership of the data, and industrial action by paid fire fighters. Until the report is completed, one person is responsible for it at any one time and any change of responsibility is captured in the database. This avoids duplication of data but can also be problematic because unless the incident is assigned to the Fire Safety Officer, he/she cannot access the report to change or add information (e.g., to the indicated fire cause category).

While the system ensures that every incident is captured, the quality of the information is not guaranteed. There are no in-built logic or other quality checks. Some participants identified that non-mandatory questions might be left blank or inappropriate categories selected to hasten completion of the report (e.g., if a hazardous substance is involved).

Once completed, the incident report is quality checked by the Data Applications Service Group at National Headquarters, who liaise with operational fire-fighters to correct any identified errors.

Availability of data

Many participants recognised the importance of collecting and reporting accurate statistical data. However, most of these participants also indicated that the data was not easily accessible to them, that they found it difficult to extract the data they needed at station level (e.g., "I am having difficulty finding incidents and statistics regarding a number of suspicious fires that have occurred in the last 8-10 months"). They suggested improving the SMS search facility to enable all operational staff to search the database effectively and efficiently. One participant suggested "An improved data collection system where tracking of incidents/causes and other details can be available. Currently the existing system lacks the ability to identify specific concerns which may link or be identified with different incidents".

Law Enforcement (Police)

The Police operate a communications centre, where emergency calls are logged on a central computerised system (CARD), assigned priority, and a Police unit is typically dispatched. If an arrest occurs or the Police unit determines that an offence has occurred, this is coded into CARD and an offence report is automatically generated on the National Intelligence Application (NIA). Alternatively, when an offence is reported directly to a Police station an offence report is generated but it will only be entered into CARD if a centralised overview of the Police response to the offence is required. An offence report is generated for every offence where the Police determine that more action than the initial attendance is required. All offence reports must be entered into NIA so that the statistics can be aggregated, although they can be completed on paper initially and then transferred onto NIA. Hard copies of the offence report are often stored along with additional notes, statements and diagrams. Arson offences are coded on the offence report to match the legal definitions of arson, and can be updated. Other statistics collected through the offence report include the date, time and location of the offence; details of offender (e.g., age, ethnicity, gang affiliates), and how the offender was processed.

One participant stated that the majority of deliberately lit fires are reported to the Police, yet are not recorded by the Police as arson, possibly due to the increased paperwork it would create. This, the total number of arson fires appear to be under reported. Participants suggested simplifying and standardising the collection of data so that it is a reliable process with targeted outcomes.

The Police and NZFS data collection and reporting systems are not standardised or consistent with one another (e.g., the indicated fire cause categories and the arson offence codes). Participants identified

that a generic data collection system or information sharing system between multiple agencies, including the NZFS, would be beneficial. Typical comments included:

> We need to agree on what is an arson.
>
> Data sharing with the NZFS wouldn't help improve our statistics…it requires loads of work to do inter-agency sharing with one group…I'd prefer generic changes…establishing good principles so that data sharing and comparing can occur with groups such as the fire service.
>
> We need to have a system of sharing information, for example, once per week the fire service could go though all the fire jobs attended in week put it in a spreadsheet and email it to the strategic analyst to find Police jobs that match and see if there are other fires that the Police need to be involved with.

The Police are currently formulating a new strategic plan that encompasses data collection and reporting practices for arson and other offences. Developments under review include adoption of recording and counting rules that allow for international comparisons, efficiency and productivity; offence codes that are more closely aligned to legal definitions; statistical requirements that are built into the design of the data collection instrument, such as standard categories and mandatory fields; implementation of an improved quality framework and auditing system; and ways to ensure the data is accessible.

AUSTRALIA

Fire Service

There is no national computer application for Australian fire services to report responses to fires and other emergencies, although the Australian Fire Authorities Council (AFAC) currently has a charter to develop a national initiative. Each fire service has developed its own computer system with different processes for collecting data from fire-fighters. Some fire services have computerised systems enabling fire-fighters to complete and submit their reports directly on computers. Other fire services require fire-fighters to submit reports to data entry points, while others communicate their data using call centres. Furthermore, some fire services have integrated their computer-aided dispatch (CAD) systems with their incident reporting systems thereby improving data completeness and quality.

There is however a national agreed data dictionary. This data dictionary is commonly referred to as AIRS (Australian Incident Reporting System). The objectives of the Data Dictionary are to: establish a core set of uniform definitions; promote uniformity, availability, validity, consistency and completeness in the data; accord with agreed protocols and standards wherever possible; and promote the standard definitions by being readily available to all individuals and organisations involved in the generation, use and or development information.

The data dictionary is a national initiative and contains a list of all the data elements and coding schemes available in the computer application, including their definitions. Each State or Territory has its own computer application based on the data dictionary where details of incidents are recorded. The Station Officer of the first arriving fire station to an incident has the responsibility of completing the incident reports.

The New South Wales Fire Brigades (NSWFB) has an agreement with Australian fire services and the AFAC for the management of the AIRS national database. NSWFB is the custodian of the AIRS national database. Once a year, core data is transferred to the NSWFB from the participating fire services, where it is collated and released upon request to research groups and organisations, such as the New South Wales Police and insurance companies. A plan to publish the statistics by the end of 2006 is currently underway by the NSWFB.

Participants reported that the process of collecting raw data described above is well established and comprehensive. However, improvements could be made in the following areas. The accuracy of the data collected could be improved by further training for Station Officers in the system and by simplifying the data elements (e.g., cause categories or ignition factor); the level and type of data collected (e.g., "streamlining the data dictionary", "provide a context to the information…physical, behavioural and environmental aspects"); and the standardisation of systems across stakeholder agencies.   Other recommendations for change included:

Improving the data dictionary and rationalising the coding schemas

Systems integration with other internal and external data collection systems to reduce respondent burden, improve data quality and enhance contentual information. Integration with the Rural Fire Service System to provide State wide picture about fires.

The next generation of the AIRS computer system are to be more than a response incident collection and reporting system. The next generation could focus on the location and provide information about the various prevention, preparedness, response and recovery activities of the location whether it be a single structure, complex or geographic boundary. This will provide improved information to better understand where to allocate investment across the PPRR spectrum to increase community safety and reduce the costs and social effects of emergencies and disasters.

Participants identified the Inter-Agency Arson Committee (IAC) as a useful example of inter-agency cooperation in NSW. IAC membership includes fire services and the police and other stakeholders, such conservation and forensic groups, attend meetings on a needs basis. The goal of the IAC is to reduce the impact of arson on the community by inter-agency communication, a combined approach to investigation and the development of prevention initiatives.

Law Enforcement (Police)

The process for collecting and reporting statistical data regarding arson fires varies according to State/Territory practice. Queensland will be considered as an example. Police officers report on crime information by telephoning a central data entry group who input the information into a computerised database (Crime Reporting Information System; CRISP). The type of information recorded includes offence type, outcome and offender details such as age and gender. This system is currently being replaced with a windows based system that includes features such as geo-coding and data warehousing and it allows data elements, such as offender and locations, to be linked so that patterns can identified.

UNITED KINGDOM

Fire Service

The Department for Communities and Local Government (DCLG; formerly the Office of the Deputy Prime Minister) is the central government department that collates and publishes the statistics from the 59 UK fire services. Each fire service collects its own incident data according to local practice, which they use at a local level for "performance and target setting" and to identify local fire patterns. Primary fire data (i.e., those involving property, causalities or attended by five or more fire appliances) is captured in the Fire Data Report 1 (FDR1) and secondary fire data (i.e., those that do not meet the criteria for a primary fire, such as grassland fires and refuse fires) is captured in the Fire Data Report 3 (FDR3). Fire Data Report 2 (FDR2) records any additional information that becomes available after the FDR1 or FDR3 forms have been completed (e.g., fire cause). These forms are sent to the DCLG, primarily by paper, to be manually entered into a database, checked for quality, adjusted accordingly, and then analysed.

The current incident recording system will soon be replaced with an electronic system (Incident Recording System), which will allow incident reports to be completed by the fire services directly and will enable more versatile and detailed reporting (e.g., information on building evacuations). This will reduce the time it currently takes to code and verify the data and national statistics will be available sooner. However, although the current system is time consuming "it provides an extremely robust and reliable dataset".

At national level, the DCLG cooperates with the Home Office, from a research and Police point of view. At local level, the degree of inter-agency cooperation varies. Some fire services regularly work with local agencies, such as the Police, and share their data although the later is not always reciprocated: "At a local level, fire and rescue services do often work with local authorities and the local police when investigating and preventing arson". Identified barriers to inter-agency cooperation included a lack of understanding about each other's roles, and differences in the data systems and terminology used. Strategic changes were suggested to address the problem, for example, establishment of appropriate service level agreements. Typical comments included:

> The extent of effective organisational cooperation between the police and fire services regarding investigation/arson reduction work varies. Some fire and rescue services complain

that it is difficult to engage the police in arson reduction work. The main reason is that whereas deliberate fires account for over half of all the fire and rescue service incidents, arson only accounts for around 1% of police recorded crimes. However, research shows that where individual police officers are seconded to local fire services (e.g., as part of a dedicated arson task force) the extent of cooperation is improved.

Out of an identified need for an inter-agency response to the problem of deliberately lit fires, in 2001 the UK Government set up the Arson Control Forum. It brought together various public and private agencies (including fire services and the police) to prevent deliberately lit fires. Research indicates that its efforts have contributed to approximately 30% fewer deliberately lit fires than would have been expected otherwise (Office of the Deputy Prime Minister, 2004b).

Law Enforcement (Police)

The Home Office is the central government department that collates and publishes the statistics from each Police force area within UK. Each Police force area records the offence details and then submits their local crime statistics to the Home Office on a monthly basis. The Home Office collates all of the local Police data onto a central database for analysis. The data collected includes the number of arson offences and the method by which the offence was detected. The offence of arson is defined according to legal statutes and arson offences are recorded in accordance with the guidelines outlined in the Home Office Counting Rules (i.e., guidelines for reporting offences to the Home Office). Some of the counting rules that apply to arson are as follows. An offence of arson is counted for each owner of the property damaged (e.g., if two cars are burnt by one person and there are two different owners of those then two offences are counted, but if both cars were owned by the same person, then only one arson offence is counted). If an arson is associated with another crime (e.g., a stolen car) then it is considered a continuation of that crime (i.e., theft) rather than an arson offence. Regular audits are carried out to ensure compliance with these rules and consequently a consistent approach to data recording is purported to occur.

USA

Fire Service

A range of organisations in USA collects fire data. Two of the most well known are the National Fire Protection Association (NFPA) and the United States Fire Administration (USFA).

The USFA is a government agency that oversees an incident-based voluntary fire data reporting system. The USFA began as a part of the U.S. Department of Commerce in the mid-1970s. Within a few years, it was relocated to the new Federal Emergency Management Agency (FEMA), an agency with responsibility for government programmes related to disasters, with special attention to fires (through USFA), floods (a national government insurance program), civil defence, and mitigation of natural disasters (the primary role of FEMA). In the aftermath of the 9/11/2001 attacks, FEMA was itself folded into the U.S. Department of Homeland Security (DHS). Both FEMA and DHS have gone through cycles where their emphasis was more on civil defence and anti-terrorism, or more on natural disasters. In 2006, the USFA was taken out of FEMA and into a new preparedness directorate within DHS.

National Fire Protection Association (NFPA)

The NFPA is a non-profit educational and technical association with the primary objective of preventing loss of life and property by fire. Since 1977, the NFPA has undertaken a voluntary annual survey that collects information from a stratified random sample (roughly 3,000) of the approximately 30,000 fire services throughout USA. The survey is posted to approximately one third of the fire services, including all departments serving populations of at least 100,000. These larger city departments each contribute more to the variation in fire experience, which means estimates are more precise with over-sampling of these departments. After one month, the survey is resent to act as a reminder and two months after this date, data collection closes with a final combined response rate typically in the region of one-fifth to one-fourth. A further sampling of non-respondents' "major numbers (fires, deaths and property damage)" is performed to confirm there are no significant differences between non-respondents and respondents.

The survey collects summary data about fire incidents (e.g., total number, total estimated property damage, deaths) and its coding system is matched to the data collection instrument used by the USFA (i.e., NFIRS) to minimise the workload and increase response rate. The data collected by the NFPA is combined with the data collected by the USFA to produce national estimates of particular fire problems.

United States Fire Administration (USFA)

The USFA collects fire incident data through its National Fire Incident Reporting System (NFIRS), which is currently operational in approximately 19,000 out of a possible 30,000 fire services in the USA. Reporting using NFIRS is voluntary at the federal level, although the USFA offers incentives, such as grants, to increase the number of participating local fire departments. Different states have different reporting requirements, ranging from mandatory for all incidents, to all fires, to all incidents meeting a certain threshold, to completely voluntary reporting. Fiscal, personnel or technical difficulties at the state level sometimes result in data from that state not being included in the national database.

NFIRS classifies fire incident data according to a standard format, originally based on the NFPA Standard 901. NFIRS is more detailed (e.g., eight data elements related to different aspects of fire cause in additions to items related to when and where the fire occurred, fire detection and suppression) than the NFPA survey. However, NFIRS version 5.0, which became operational in 1999, permits abbreviated reporting, omitting most data elements, for certain classes of smaller fires. This is intended to reduce the burden on data collectors, which should result in more accurate reporting about the frequency of these fires (U.S. Department of Homeland Security - USFA, 2004), but at the cost of making the analysis more difficult and in some cases less complete and useful.

Local fire services collect the core NFIRS data and any additional local data. Completed incidents are sent to state fire authorities or to a state partition in a federal server. State authorities compile and edit the data for quality and completeness. The states then transmit data or release the data to the USFA, either through continuous access to a data warehousing facility or as completed data sets on disk, paper or tape on a quarterly basis. Incident reports are validated at state level and they can be sent back to participating agencies for them to check (e.g., if the fire cause category has been updated). The data is compiled annually by the USFA and made available to all interested parties, including the NFPA.

The NFPA and the USFA

The NFPA and the USFA do not have a formal agreement that governs their working relationship. Participants reported that this was not necessary because "both organisations recognise the merits that each brings to the table" and "the systems complement each other".

The NFPA survey and NFIRS were designed for different, but complementary, purposes. The NFPA survey is based on a statistical sample and uses summary data, therefore it allows projections to be made. It was not designed to answer detailed questions about the causes of fires. NFIRS collects detailed information on hundreds of thousands of incidents each year, but it was not designed as a statistical sample. NFIRS can be used to answer many questions because of its size, such as leading causes. The projected totals from the NFPA survey of residential and non-residential structure fires, vehicle fires, and outside and other fires, and losses associated with these fires are divided by the comparable totals in NFIRS to develop scaling ratios that can be applied to the NFIRS data to develop national estimates of specific fire problems.

The geography of the USA fire problem can be analyzed down to the level of the four major regions of the country using the NFPA survey alone, at least for questions that the NFPA survey addresses. The geography of the USA fire problem cannot be analyzed at all with NFIRS alone, because NFIRS is not a statistically valid sample or any parts of the nation, including states and communities.

Law enforcement (FBI)

The Uniform Crime Reporting (UCR) Programme administered by the Federal Bureau of Investigation (FBI) collects information on arson offences from approximately 17,000 law enforcement agencies throughout the USA who voluntarily choose to participate, although not all of these provide data on arson offences. The UCR Program has two methods of collecting this information, the summary UCR system and the more recent National Incident-Based Reporting System (NIBRS).

The summary UCR system is hierarchical, so in a multiple offence situation only one Part I (serious) offence is recorded, except for arson, which is recorded in addition to the offence highest in the hierarchy of offences. NIBRS collects detailed information on crime incidents, which allows for the recording of more than one offence in a multiple offence situation and provides richer and more meaningful data (e.g., when and where a crime has taken place; and characteristics of the victims and perpetrators). Logical error checks that are built into the system are reportedly working well, although participants reported they could be more extensive. Quality audits also occur at various stages of the reporting process and data can be sent back to its original source for correction.

Participating agencies have standardised offence definitions to overcome the problem of different local statutes and provide national uniformity in crime reporting. Training seminars and instructional materials

on crime reporting procedures are supplied to participating law enforcement personnel. Data can be submitted through a state UCR programme or directly to the FBI, it can be entered directly or sent electronically, by paper or data tapes to be transferred onto the mainframe, which can be a "labour intensive process".

The goal is for NIBRS to replace the summary UCR system. However, approximately 75% of the participating law enforcement agencies report using the summary UCR system, possibly because of funding issues and the belief that the summary UCR system provides adequate information. Therefore, NIBRS data is converted to the tradition summary format for reporting purposes (i.e., the hierarchy rule is evoked). The arson data reported is not adjusted for communities that do not report and reflects reported arson offences, rather than suspicious fires or court prosecutions. The FBI publishes arson offence data annually in Crime in the United States, which is available on their website, http://www.fbi.gov/ucr/ucr.htm (U.S. Department of Justice - Federal Bureau of Investigation, 2004). The NFPA also reports UCR Program arson data.

CANADA

Fire Service

A voluntary organisation, the Canadian Council of Fire Marshals and Fire Commissioners collates and publishes statistical data from participating Provinces. However, since 2001 it has not published national fire statistics, possibly because it relies on the provinces prioritising fire reporting, the submission of fire statistics, and funding in order to operate. The collection of fire data varies between provinces and in some cases among municipalities as well. As an example, the data collection process in the province of Ontario will be considered.

Fire statistics are collected at municipal level, by the local fire services on the incidents they attend and at Provincial level, by the Office of the Fire Marshal (OFM) when they are involved in a fire investigation. The data collected at municipal level is transferred to the OFM directly by compatible computer applications or via a secure internet ink, or by paper. Fire services that do not have their own data collection systems (e.g., volunteer fire services) typically transfer their data via the internet or paper. The data is verified with the fire services quarterly and any necessary corrections are made.

The information is collected comprehensively across the province allowing for the analysis of trends. However, the information collected could reportedly be more detailed, for example, to include "the extent of the fire" and to measure "smoke alarm usage and other types of fire suppression (e.g., sprinklers)". One participant also noted, "When there was paper you'd often have people read the report and pick up errors and inconsistencies. So, with the electronic system, there is a need for cross checking to make sure the data is correct and consistent".

Law Enforcement

Police-reported crime data, including arson, have been systematically collected across Canada since 1962 through the Uniform Crime Reporting (UCR) Survey, which was developed by Statistics Canada (Gannon, 2005). The various Police services collect their own data according to local practice, collate it according to national standards and submit it to the Canadian Centre for Justice Statistics (CCJS) for reporting (Gannon). The similarities between the UCR Survey in Canada and the UCR Program in the USA allow comparisons to be made in several offences types including arson (Gannon).

There are currently two versions of the survey. The aggregate UCR survey collects data on 106 distinct incidents that come to the attention of the Police, including reported offences and offences cleared, but not including victim information (Gannon, 2005). Incidents are classified hierarchically (i.e., according to the most serious offence committed in each criminal incident), in a similar fashion to the summary UCR system in USA. Since 1988, Police services have been encouraged to adopt a new Incident-based Uniform Crime Reporting (UCR2) Survey when their local data collection systems can accommodate the change because it captures information on 140 criminal incidents that is more detailed, including victim and information. In 2005, 127 police services in nine provinces (53% coverage) supplied data to the UCR2 Survey (Gannon).

Summary

In all five countries, information about every incident attended by the fire services at local level is recorded using an incident reporting system. The NZFS operates a centralised data collection system that enables incident data to be entered directly into a national database by operational staff. UK operates a mandatory reporting system whereby fire service incident data is recorded using a standardised template and then transferred to a central government agency for collation and reporting. Conversely, Australia, USA and Canada do not have a mandatory collection or reporting system for fire service data. However, all three countries have a centralised system that fire services can voluntarily transfer their data to for the collation and reporting of national fire service statistics. In USA, the USFA NFIRS is closest to NZ in the respect that it allows for the direct input of data into a central database and this was noted as one of its strengths. Participants from these countries reported that a centralised system that allowed for the reporting of national fire service statistics was important. Typical comments included "we need an integrated approach to data collection".

Four countries identified inaccuracy of the data collected as a primary weakness of their respective systems. UK purported to have relatively accurate data primarily due to its centralised system of data entry. However, this manual input is time consuming and they are in the process of adopting an automated system that will bring them in line with the other countries. These are the difficulties in ensuring accurate data when the data is entered at multiple computer stations by staff with different job functions and varying levels of skill and training. Accurate data is vital for the provision of reliable information. Quality assurance measures, including error checking built into system software was commonly recommended. Even with in-built quality control, human resources still need to check reports for incorrect data or logical inconsistencies (Federal Emergency Management Agency - United States Fire Administration, 1995). However, errors may not always be identified. Prevention of these permanent errors or the accurate entry of data is important for the integrity of information.

Suggestions for improving the accuracy of automated reporting included staff training on the importance of accurate data collection, practically using the system of data collection (e.g., SMS), and the availability of reference manuals or automated help functions that include standard definitions of system terminology (e.g., fire cause categories). Training for all system user in the practicalities of operating the reporting

system, and the importance of collecting accurate data has recently been recommended in Australia and UK (Dodhy & Sacco, 2004; Office of the Deputy Prime Minister, 2005c).

Moreover, to facilitate the collection of meaningful data, reports from all of the countries state the importance of having simple systems that were easy to use and navigate, for example, broad categories and systems that were compatible with fire cause reporting systems. A recent report from Australia (Dodhy et al., 2004) found that simplification of data collection processes would contribute to more reliable data. In UK, it was suggested that the amount of detail recorded by the system could vary according to the significance of the incident (Office of the Deputy Prime Minister, 2005c). In addition, NZ, Australia and Canada identified the importance of collecting contextual information, such as the response of design systems, so that the data collected in the incident reports meets the needs of all user groups.

It seems important that any changes to current processes for collecting data on deliberately lit fires meets the need of how the data is to be used but are also practical and realistic for those completing the incident reports.

Law enforcement agencies in all of the countries collect data on arson offences according to their legal definitions of arson. NZ and UK have a nationally centralised collection system, although only UK also reports on national arson statistics. In USA and Canada, arson statistics are also collected nationally from participating agencies and reported. However, participation is not mandatory, which precludes the analysis of national trends. The collection and reporting of arson data in Australia is decentralised and national arson statistics are not currently published.

Fire service and law enforcement processes for collecting data on deliberately lit fires are typically separate and the level of inter-agency cooperation varies. All of the countries studied reported that inter-agency cooperation between the fire services and law enforcement could be improved and research suggests that multi-agency cooperation is essential for the successful prevention of deliberate fire lighting (Home Office, 1999). On a practical level this means improving the compatibility of the data collection processes and terminology used, and strategically in terms of developing an understanding of the respective roles and clarifying the roles and responsibilities of different professional groups.

2. Review of fire service and law enforcement statistical data in NZ and overseas on deliberately lit fires

This section of the report briefly reviews the terminology used by the fire services to define deliberately lit fires and the legal definitions of arson used by law enforcement agencies in NZ, Australia, UK, USA and Canada. Also documented are the fire service incidence of deliberately lit fires and the incidences of arson.

NEW ZEALAND

Fire Service Statistics

The NZFS Station Management System (SMS) groups the following indicated cause categories under the heading of 'deliberately lit' fires: unlawful, lawful, legality not known, suspicious, controlled burn/land clearing fire, deliberate lit fire - not classified above, and unknown. There are no formalised definitions for these cause categories. However, the common understanding of them is as follows. Unlawful is typically used for arson cases and vegetation fires where the person does not have a permit. Lawful is usually used in cases where the fire was lit with a permit or legally (e.g., in a fireplace). Legality not known is for those cases where it is unknown whether the person had a permit and malicious intent is absent. Suspicious is used in arson or suspected arson cases. Controlled burn/land clearing fire is typically used when a land clearing fire has been out of control but there is an absence of malicious intent. Deliberate lit fire – not classified above is used for deliberately lit fires that are not covered by the other indicated cause categories. Unknown may include suspicious fires or where the cause will be determined from an investigation by a Fire Safety Officer. Deliberately lit fires as we have defined them in this report (i.e., fires that have been deliberately lit with malicious intent) are typically categorised as unlawful or suspicious.

Table 1 shows the number of recorded fires under each cause category. Unlawful and Suspicious fires account for the majority of deliberately lit fires but as a proportion of all deliberately lit fires they have decreased over the period reported, from 81% in 2000 to 74% in 2005, with a range of 81% to 72%.

Table 1

Total recorded fires by the NZFS 2000 to 2005, according to indicated fire cause categories grouped under 'deliberately lit fires' and the percent that are unlawful or suspicious.

Deliberately lit indicated fire cause categories	2000	2001	2002	2003	2004	2005
Unlawful	4,176	5,011	5,301	6,598	5,586	6,409
Lawful	838	1,244	1,473	1,501	1,655	1,689
Legality not known	410	460	531	509	524	543
Suspicious	2,733	1,789	1,799	2,122	1,701	2,108
Controlled burn, land clearing fire	110	492	572	491	491	470
Deliberately lit fire - not classified above	224	162	149	193	185	231
Total deliberately lit fires	8,491	9,158	9,825	11,414	10,142	11,450
% Unlawful / Suspicious	81%	74%	72%	76%	72%	74%

Note. Data supplied by the NZFS (N. Challands, personal communication, October 11, 2006)

Table 2 presents the number of deliberately lit fires, other fires and total fires. Between 2000 and 2005, the number of fires that were deliberately lit increased by 23%, from 2000 (6909) to 2005 (8517), compared with a 5% increase in other fires over the same period. Deliberate fires as a proportion of total fires also increased over the period, from 33% in 2000 to 37% in 2005.

Table 2

The number of deliberate fires, other fires and total fires recorded fires by the NZFS 2000 to 2005.

	b2000	b2001	2002	2003	2004	2005	% overall change
[a]Deliberate Fires	6,909	6,800	7,100	8,720	7,287	8,517	23%
Other fires	13,971	14,808	14,196	14,367	14,096	14,682	5%
Total fires	20,880	21,608	21,296	23,087	21,383	23,199	11%
% Deliberate fires	33%	31%	33%	38%	34%	37%	4%

Note. Data supplied by the NZFS (G. Quigan, personal communication, July 10, 2006)
[a] Includes suspicious fires and unlawful fires, excluding those fires lit outside for a legitimate purpose (e.g., outside rubbish fires, unpermitted controlled burn, camp fires). b In 2000 and 2001has missing data due to industrial action by fire-fighters. In 2000, a new data collection system was introduced, which may have also contributed to under-reporting in that year.

<center>Law Enforcement Statistics</center>

The Crimes Act 1961 ("Crimes Act 1961", 1961) defines the offence of arson as a crime against the rights of property. It can be summarised as intentional or reckless damage by fire or explosive to any property, vehicle, ship or aircraft, which is due to reckless disregard for safety or endangers life. The offender has no interest in and intends to benefit or cause loss to others.

The Police collect statistical data on arson offences as defined by the Crimes Act of 1961. Statistics New Zealand publishes national police statistical data on crime, including arson. The Ministry of Justice publishes an annual report, which includes the outcome of arson prosecutions (e.g., not proved, conviction).

Table 3 presents the total number of arson offences recorded by the Police, the number of arson offenders apprehended and resolved by them and the number of arson convictions. For an arson offence to be recorded, a crime must first come to the attention of the Police (i.e., by being reported to the Police or discovered by them). An incident report will be completed and if an arson offence has occurred (as defined by the Crimes Act of 1961), then it will be recorded. The apprehension statistics reflect the number of arson offenders who have been apprehended by the Police for committing one or more arson offences. A recorded offence is counted as resolved when an offender has been identified and dealt with in some way (e.g., cautioned, prosecuted). As illustrated in table 3, the number of recorded arson offences has decreased by 4% from 2000 to 2005, which might be a slight under representation of the change because of the relatively elevated number of arson offences in 2000, although this figure is still less than 2005.

Table 3

The total number of arson offences recorded by the New Zealand Police, the number of arson offenders apprehended and resolved and the number of arson convictions between 2000 and 2005.

	2000	2001	2002	2003	2004	2005	% overall change
Arson (Recorded)	2100	2016	1752	1954	1843	2022	-4%
Arson (Apprehension)	835	817	634	897	768	832	-.4%
Arson (Resolved)	549	561	451	600	516	551	+.4%
Arson (Convictions)	170	198	213	212	220	238	+40%

Note. Data supplied by the Statistics New Zealand (L. Mackie, personal communication, August 9, 2006) and the Ministry of Justice (personal communication, February 24; Lash, 2006)

The number of offenders apprehended has very slightly decreased, which could reflect a change in the pattern of offending with more arson offences committed by the same offenders, or the unavailability of Police resources for detecting and investigating offending. The number of resolved cases (+.4%) and convictions (+40%) have increased over the years, with the number of convictions following a steady upward trend. Thus, it appears that fewer arson offences are being recorded by the Police and of those offenders that are identified by the Police there are proportionally more being convicted each year. The number of convictions are less than the number of resolved cases, apprehensions and recorded arson offences. This reflects the difficulty in apprehending offenders and attaining convictions. Similar to other property crimes, there are typically no witnesses to arson and although trained investigators can often identify useful evidence (Hall Jr, 2005), fire can also destroy physical evidence (e.g., fingerprints) that can be useful in attaining a conviction (Hart, 1990).

AUSTRALIA

Fire Service Statistics

The cause categories or ignition factors that pertain to deliberately lit fires in the national collection of data from the Australian Incident Reporting System (AIRS) are incendiary and suspicious. Incendiary refers to a "legal decision or when the physical evidence indicates that the fire was deliberately lit". Suspicious refers to "circumstances that indicate the possibility that the fire may have been deliberately set, separate unrelated fires were found or there were suspicious circumstances and no accidental or natural ignition factor could be found". One participant commented:

> Our AIRS manual suggests 'if the intent was malicious, regardless of the age, the ignition factor should be recorded as incendiary or suspicious'. As an example, children playing with matches who accidentally start a fire in a house, wouldn't be recorded as incendiary or suspicious. However if they had taken the matches and set fire to grass with the intention of initiating an uncontrolled fire, the ignition factor would be recorded as incendiary.

In New South Wales, these cause categories are currently under review. In a recent report (Dodhy et al., 2004) it was recommended that deliberately lit fires be referred to collectively as "Intentional". This would most likely increase the reliability of the data collected, shift the focus from completing the report to correctly identifying the ignition factor and bring the coding scheme into line with their fire investigation system.

Table 4 presents the number of deliberately lit fires, other fires and total fires from participating agencies. Between 2000 and 2005 the number of fires that were recorded as deliberately lit decreased by 11%, from 2000 (24149) to 2005 (21618), although 2001 (27130) and 2002 (25668) both had higher numbers than the 2000 figure. The number of other fires followed a similar pattern, with a 6% decrease from 2000 (67164) to 2005 (63258). Deliberately lit fires as a proportion of total fires was fairly stable over the period, with a slight decrease from 27% in 2000 to 26% in 2005.

Table 4

The number of deliberate fires, other fires and total fires recorded fires by participating fire agencies in Australia, 2000 to 2005.

	2000	2001	2002	2003	2004	2005	% overall change
[a]Deliberate Fires	24149	27130	25668	19403	21506	21618	-11%
Other fires	67164	71533	77585	61495	66891	63258	-6%
Total fires	91313	98663	103253	80898	88397	84876	-7%
% Deliberate fires	27%	28%	25%	24%	24%	26%	

Note. Data supplied by the NSWFB (H. Danaskos, personal communication, July 27, 2006). Participating agencies included: New South Fire Brigades, Northern Territory Fire & Rescue Services, Melbourne Metropolitan Fire Brigade, Victorian Country Fire Authority, Tasmanian Fire Service, Queensland Fire & Rescue Service, New South Wales Rural Fire Service.
[a] Includes Incendiary and suspicious fires

Law Enforcement Statistics

Arson is defined by legal statute in the various states and territories and by the commonwealth. In summary, arson can be defined as intentionally, maliciously, wilfully or unlawfully setting a fire to destroy or damage property or person (Australian Institute of Criminology, 2004).

Australia does not currently publish national statistics for arson offences, although some Police jurisdictions publish local information (Australian Institute of Criminology, personal communication, August 8, 2006).

Table 5 presents arson offences recorded by the Police in New South Wales (NSW), Queensland, South Australia, Tasmania, Western Australia, Victoria and Australian Capital Territory (ACT) from 2000 to 2005. Statistics for the Northern Territory were not available from published statistics or personal communication. The number of recorded arsons has increased in NSW (5%), South Australia (10%), Tasmania (7%) and Western Australia (2%). Conversely, the number of recorded arsons has decreased (9%) over the years in Queensland (9%). Similarly, recorded arsons also fell in Victoria (10%) and ACT (37%) from the 2003/04 to 2004/05 period.

Table 5

The total number of arson offences recorded by the Police in New South Wales, Queensland, South Australia, Tasmania, Western Australia, Victoria and Australian Capital Territory, 2000 and 2005.

	2000	2001	2002	2003	2004	2005	Overall % Change
[a]NSW	6157	7399	6816	5448	6226	6443	+5%
[b]Queensland	1629	1697	1531	1477	1498	1481	-9%
[c]South Australia	2724	3005	3120	3050	2994	N/A	+10%
[d]Tasmania	485	605	582	536	489	521	+7%
	2000/01	2001/02	2002/03	2003/04	2004/05		
[e]Western Australia	1065	1279	1181	1111	1083		+2%
[f]Victoria	N/A	N/A	N/A	3075	2781		-10%
[g]ACT	N/A	N/A	N/A	306	192		-37%

Note. N/A – not available at press time
[a]Data from New South Wales in focus: 2006 (Ewing, 2006) [b]Data from Queensland Police (L. LaSpina, personal communication, July 17, 2006) [c]Data from Crime and justice in South Australia 2004: Offences reported to the Police, the victims and alleged perpetrators: A statistical report (Office of Crime Statistics and Research, 2004) [d]Data from Tasmanian Police (S. Steinbauer, personal communication, 9 August, 2006) [e]Data from Facts and figures: Reported crime statistics (Western Australia Police, 2006) [f]Data from Summary of offences recorded and cleared (Victoria Police, 2005) [g]Data from ACT Policing: Annual report 2004/05 (Australian Federal Police, 2005)

The Australian Bureau of Statistics (ABS) publishes Court information for defendants/offenders. However, arson is classified under 'property damage and environmental pollution', along with other offences such as vandalism, so it is currently impossible to extract how many people were processed by the Australian courts for arson offences.

UNITED KINGDOM

Fire Service Statistics

The fire services in UK use the following categories to record deliberately lit fires: malicious, deliberate and doubtful. Malicious cause can be applied when "malicious ignition is established beyond a reasonable doubt". Deliberate refers to a fire "started deliberately (but not with malicious intent) but gets out of control, such as some fires started by children… but not accident fires that have got out of control". Doubtful can be applied when "malicious or deliberate ignition is merely suspected but not established beyond a reasonable doubt". The DCLG typically aggregates these three categories into a single "deliberate" category for reporting purposes. These cause categories are also being revised, with suggested revisions including the elimination of the operationally confusing term 'doubtful' and the legally problematic term 'malicious' (Office of the Deputy Prime Minister, 2005a).

Table 6 presents the number of deliberately lit fires, other fires and total fires in UK between 2000 and 2004. The number of fires that were recorded as deliberately lit increased by 6%, from 2000 (284781) to 2004 (300522). However, 2004 recorded the lowest number of deliberately lit fires since 2000. The overall change in the number of recorded deliberately lit fires between 2000 and the other years ranged between a 21% (2002) and 53% (2003) increase. The number of deliberately lit fires as a proportion of total fires also increased over the period from 60% in 2000 to 68% in 2004. In 2003, the proportion total fires that were deliberate spiked to 92%. This may be an artefact of the data in that the deliberate figures for 2003 were adjusted for the industrial action that took place that year (and associated under-reporting) but the total figures are not. However, the 2002 figures were also adjusted and although the proportion of deliberately lit fires that year is higher than other years, it does not reach 70%. In 2003, there were also a proportionally higher number (74%) of deliberate secondary fires (320992) compared with deliberate primary fires (115098) recorded, which might reflect a high number of derelict buildings and/or vehicles set alight that year.

Table 6

The number of deliberate fires, other fires and total fires recorded fires by fire services in the UK and collated by the DCLG, 2000 to 2005.

	[b]2000	b2001	2002	2003	2004	2005	% overall change
[a]Deliberate Fires	284781	355234	b343302	b436090	300522	N/A	+6%
Other fires	191566	191195	157615	168521	142166	N/A	-26%
Total fires	476347	546429	500917	604611	442688	N/A	-7%
% Deliberate fires	60%	65%	69%	92%	68%	N/A	

Note. Data supplied by the DCLG (D. Sugg, personal communication, June 29, 2006). N/A – not available at press time
[a]Includes primary and secondary deliberate fires (i.e., aggregated deliberate category) [b]Includes estimates for incidents not recorded during periods of industrial action.

Law Enforcement Statistics

The offence of *arson* is defined by the Criminal Damage Act ("Criminal Damage Act 1971"). To summarise: a person without lawful excuse intends to or does destroy/damage any property belonging to himself or another. Alternatively, being reckless as to whether such property would be destroyed or by doing so endangers life. If this is done with fire, it is recorded as arson. The Home Office publishes national statistics regarding the offence of arson.

In 2002, The National Crime Recording Standard (NCRS) was introduced across England and Wales and as a result, the number of crimes recorded by the police increased. In 2001/02, there were 7638 more arson offences recorded. Therefore, the number of recorded arson offences prior to 2002 are not comparable to post-2002 figures. The period 2001/02 to 2004/05 will be considered.

Table 7 presents arson offences recorded by the Home Office for England and Wales for the period 2000/01 to 2004/05. The number of recorded arson offences has decreased by 21% from 2001/02 to 2004/05. However, a pattern of alternating upward and downward trends is apparent, with an increase of 15% from 2000/01 to 2001/02, a decrease of 12% from 2001/02 to 2002/02, an increase of 8% from 2002/03 to 2003/04 and a final decrease of 16% from 2003/04 to 2004/05. Currently, the detection rate (cautioned or convicted) for arson offences is approximately 9%.

Table 7

The total number of arson offences recorded by the Home Office for England and Wales, 2000/01 to 2004/05.

	2000/01	[a]2001/02	[a]2002/03	2003/04	2004/05	% overall change
Arson offences	52818	60456	53192	57162	48030	-9%

Note. Data supplied by the Home Office (D. Sugg, personal communication, August 11, 2006)
[a]Changes in the reporting and recording of crime occurred in 2002. The national impact of recording changes in 2002/03 was estimated to be ten per cent for total recorded crime. The impact will vary for different types of offences.

USA

Fire Service Statistics

Various organisations in USA collect fire data. Two of the most well known are the National Fire Protection Association (NFPA) and the Department of Homeland Security's United States Fire Administration (USFA).

Prior to 1999, NFIRS recorded the intentional status of fires under the data element Ignition Factor, where the choices were Incendiary, Suspicious, any other known value, and Unknown. The term suspicious described a fire that was suspected of being deliberately lit, whereas the term incendiary described a deliberate burning of property (Hall Jr, 2005). During the same period, the NFPA survey collected totals of incendiary and suspicious structure and vehicle fires. Therefore, the NFPA survey provided early numbers for intentional fires excluding outdoor fires and excluding an allocated share of the unknown-cause fires, while NFIRS-based national estimates provided a comprehensive estimate of intentional fires somewhat later. Since 1999, the incendiary and suspicious designations have been dropped by the USFA in favour of Intentional. An intentional fire can be defined as "a fire that threatens harm or is started in a manner inconsistent with the goal of a controlled fire that avoids harm" (Hall Jr, 2005, p. 7). The NFPA survey made the same change, effective in 2001. The suspicious fires – fires without a positively determined cause but considered more likely than not to be intentional – have dropped into the unknown-cause fires. In addition, NFIRS 5.0 no longer requires causal information for contained trash fires in structures or for outdoor rubbish fires. This has required some analytic judgments, not yet standardized among analysts, on whether and how to modify the formulas for allocating unknown- and unreported-cause fires. In particular, NFPA has not yet published estimates of outdoor intentional fires, because of the problem of abbreviated reporting for a large part of the outdoor fires. It is also important to note that fires that were deemed intentional (and for that matter, incendiary also) were not necessarily considered arson from a legal standpoint. Prior to 1999, playing with fire had been captured in the same field as incendiary or suspicious meaning that these categories were mutually exclusive. In NFIRS 5.0, a substantial share of fires in which playing with heat source was a contributing factor were said to be intentionally set. In additions, some of the intentional fires were set by children under 10, and, depending on the jurisdiction, perhaps under the legal age of any responsibility.

Table 8 presents an estimate of the number of deliberately lit fires, other fires and total fires in USA between 2001 and 2004. The number of structure and vehicle fires that were recorded as deliberately lit decreased by 38%, from 2001 (85000) to 2005 (52500). The number of structure and vehicle fires that were not deliberate also decreased over the period (8%), although much less so than deliberate fires which could reflect the success of prevention initiatives, or police detection. Deliberately lit fires as a proportion of total fires also decreased over the period, from 10% in 2001 to 7% in 2005.

Table 8

The number of deliberate fires, other fires and total fires recorded fires by fire services in the USA, 2000 to 2005.

	2001	2002	2003	2004	2005	% overall change
[a]Deliberate Fires	85000	85500	68000	72500	52500	-38%
Other fires	788000	763000	763000	750500	748500	-5%
Total structure and vehicle fires	873000	848500	831500	823000	801000	-8%
% Deliberate fires	10%	10%	8%	9%	7%	

Note. Data extracted from Fire Loss in the United States (Karter, 2001, 2002, 2003, 2004, 2005). N/A – not available at press time. Data does not include allocations of unknown-cause fires. Data from 2000 was not included because NFIRS was upgraded to version 5.0 in 1999 and 2000, and the terms suspicious and incendiary were replaced with 'intentional', thus 2000 data cannot be meaningfully compared with later years.
[a]Deliberate fire totals were derived by adding the incendiary/suspicious/intentional totals for structure and vehicle fires. Figures for incendiary/suspicious/intentional rubbish and vegetation fires were not available.

Law Enforcement Statistics

The Uniform Crime Reporting (UCR) Program managed by the Federal Bureau of Investigation (FBI) defines arson as "any wilful or malicious burning or attempt to burn, with or without intent to defraud a dwelling house, public building, motor vehicle or aircraft, personal property of another etc" (U.S. Department of Justice - Federal Bureau of Investigation, 2005, p. 1). The UCR Program publishes statistical data for arson offences as part of its annual Crime in the United States.

Table 9 presents arson offences reported to the UCR Program by participating law enforcement agencies throughout the USA between 2000 and 2005, who submitted 12 months of complete arson data. In 2000, 11,903 participating agencies reported 68,756 arson offences and a rate of 36.9 arsons

per 100,000 inhabitants was calculated from 8,023 agencies. The number of arson offences remained fairly stable, until 2005 when the number of arson offences reported (59,540) from 13,782 agencies decreased by 13% from the two previous years. The number of arson offences per 100,000 of the population calculated from 10,629 agency reports also decreased from 36.9 to 26.9.

Table 9

The sum of arson offences reported to the UCR Program by participating law enforcement agencies in the USA who submitted 12 months of complete data, 2000 to 2005.

	2000	2001	2002	2003	2004	2005	% overall change
Arson offences	68,756	68,967	66,308	64,043	68,245	59,540	-13%
Arson rate per 100,000 population	36.9	35.5	32.4	30.4	28.2	26.9	-10

Note. Data supplied by the FBI's Crime in the United States (U.S. Department of Justice - Federal Bureau of Investigation, 2000, 2001, 2002, 2003, 2004, 2005). National arson offence rates per 100,000 inhabitants rates are calculated based upon data received from all law enforcement agencies that provide the UCR Program with data for 12 complete months. FBI data includes non-structure fires (e.g., vehicles, vegetation). N/A – not available at press time.

CANADA

Fire Service Statistics

The Council of Canadian Fire Marshals and Fire Commissioners (2002) recommends the use of the 'incendiary' to describe deliberately lit fires. An incendiary fire can be coded as an incendiary fire, a suspicious fire, age of offender, suspect not identified, riot of civil disturbance, and incendiary fire unclassified or not determined.

Table 10 presents an estimate of the number of deliberately lit fires, other fires and total fires in the Canada for 2000 and 2001, and for Ontario, Manitoba and Saskatchewan for 2002 to 2004. In 2001, the number of deliberately lit fires increased by 38% from the year before. The proportion of total fires that were deliberately lit also increased by 5%, from 15% in 2000 to 20% in 2001. The number of deliberately lit fires recorded in Ontario, Manitoba and Saskatchewan did not change significantly between 2002 and 2004 with only a 1% increase over the period. Conversely, the number of other fires fell by 14% from 2000 to 2001.

Table 10
The number of deliberate fires, other fires and total fires recorded fires by fire services in Canada for 2000 and 2001, and for Ontario, Manitoba and Saskatchewan for 2002 to 2004.

	[b]2000	[b]2001	% overall change	2002	2003	2004	2005	% overall change
[a]Deliberate Fires	8192	10876	+33%	4111	4831	4140	N/A	+1%
Other fires	45528	44447	-2%	33903	34815	29179	N/A	-14%
Total fires	53720	55323	+3%	38014	39646	33319	N/A	-12%
% Deliberate fires	15%	20%		11%	12%	12%		

Note. Data extracted from Fire losses in Canada (Council of Canadian Fire Marshals and Fire Commissioners, 2000, 2001), Province of Manitoba fire statistics power point presentation 2004 (Office of the Fire Commissioner, 2004), Annual report 2002, 2003, 2004: Saskatchewan Corrections and Public Safety: Office of the Fire Commissioner (Government of Saskatchewan, 2002, 2003, 2004) and personal communication (A. Wilson, personal communication, July 5, 2006; N/A – not available at press time
[a]Deliberately lit fires refers to incendiary and suspicious fires.

Law Enforcement Statistics

According to the Canadian Criminal Code ("Criminal Code", 1985) arson offences occur when persons intentionally, recklessly or negligently (including non-compliance with prevention laws) causes or intends to cause damage by fire/explosion to property or person (whether or not they own it and whether or not they intend to defraud). Statistics Canada annually publishes statistical data for arson offences, along with other crimes in its Crime Statistics in Canada, available from their website.

Table 11 presents arson offences reported to the UCR Survey by Police services throughout the Canada between 2000 and 2004. The number of recorded arson offences has decreased in a stepwise fashion by 3%, from 2000 (13733) to 2005 (13315). The number of arson offences per 100,000 inhabitants has also fallen over the period.

Table 11
The total number of arson offences reported to the UCR Survey by participating law enforcement agencies in Canada, 2000 to 2005.

	2000	2001	2002	2003	2004	2005	% overall change
Arson offences	13733	14484	13131	13875	13148	13315	-3%
Arson rate per 100,000 population	45	47	42	44	41	41	-6

Note. Data extracted from Crime Statistics in Canada (Gannon, 2005; Sauve, 2004). N/A – not available at press time.

Summary

Fire service agencies in NZ, Australia and UK are either currently revising, or recommend revising, the available fire cause categories, in order to clarify how types of fires are to be recorded and bring them into line with fire investigation or stakeholder reporting processes. In USA, the USFA and the NFPA recently assumed the term 'intentional' to encompass all deliberately lit fires. Australia are considering simplifying their cause categories to the term 'intentional' and UK is considering adopting the term 'deliberate' to replace the three cause categories that they currently aggregate to report statistics on deliberately lit fires (Office of the Deputy Prime Minister, 2005a). Similarly, NZ recognises the need to simplify its current classifications of fire cause.

In NZ, the incidence of deliberately lit fires and deliberately lit fires as a proportion of all fires has increased between 2000 and 2005. Taking into account the industrial action in 2000 and 2001 and the introduction of a new data collection system in 2000, the 2005 incidence of deliberately lit fires and proportion of total fires is still higher than all other years except for 2003. Deliberate fires as a proportion of total fires ranged from 31% to 38%.

In Australia, the incidence of deliberately lit fires fluctuated slightly over the period (range 19403 to 27130) with an overall decrease of 11%. Deliberate fires as a proportion of total fires ranged from 24% to 28%. In UK, the number of deliberately lit fires increased by 6% over the period and deliberate fires as a proportion of total fires was typically within the 60th percentage. In US, the incidence of deliberate fires fell significantly over the period and as a proportion of total fires remained relatively stable with a range of 7% to 10%. In Canada, the national incidence of deliberate fires and proportion of total fires increased from 2000 and 2001. Between 2002 and 2004 the three provinces we have data for, also shows a slight increase in the incidence and proportion of deliberate fires, while other fires decreased.

Arson as a criminal offence is defined according to government legislation, which varies among the countries studied, and within countries with separate legal jurisdictions, such as Canada. Arson commonly refers to the intentional damage by fire or explosion to property of any kind or person. For an arson offence to be recorded a crime must be reported to or detected by the Police.

In NZ, the number of recorded arson offences fluctuated slightly over the period 2000 and 2005, with a range between 2100 (2000) and 1752 (2002) and an overall decrease of 4%. In Australia, four

states/territories witnessed increases in the number of recorded arsons over the period that they had data available. Three states/territories witnessed decreasing rates. However, two of these only had data available for 2003/04 to 2004/05. Arson offences in England and Wales fluctuated from year to year with an overall decrease of 9% although this was the first time recorded arsons dipped below the 2000/01 rate. In USA, the arson rate per 100,000 population fell steadily over the period. The arson rate per 100,000 inhabitants also fell in Canada, although it followed a more fluctuating trend.

The incidence of deliberately lit fires recorded by the fire services is higher than the number of arson offences recorded by law enforcement agencies in all of the countries studied. This may reflect the difference between the fire service definition of a deliberately lit fire and the more circumspect legal definition of arson.

3. Distribution of deliberately lit fires in different property types and communities in NZ and overseas

This section of the report documents the distribution of deliberately lit fires in different property types and communities in NZ, Australia and UK. The distribution of arson offences in different communities is presented for the USA. Relevant statistics for Canada were not available or according to communities (rural/urban) in UK.

NEW ZEALAND

The distribution of deliberately lit fires among different property types

The NZFS distinguishes between *structure fires* (e.g., houses, factories); *mobile property fires* (e.g., cars, trucks, boats, aeroplanes); *vegetation fires; fires involving chemicals, flammable liquids and gases* (e.g., LPG or CNG fire); and other *miscellaneous fires* (e.g., rubbish bins, playground, camp fire). Detailed statistics regarding these fire incidents can be found in the NZFS Emergency Statistics published annually on their website.

Table 12 shows the number of deliberate and other fires across property types, including property use for structure fires between 2000 and 2005. The number of deliberately lit structure fires has decreased 13% between 2000 (970) and 2005 (844). The number of deliberately lit fires in buildings (residential and non-residential) has decreased while the number of deliberately lit fires in structures that do not appear to be buildings has increased by 51% from 2000 to 2005, and by 67% from 2004 to 2005. These include fires in rubbish tips, conservation areas and other public areas. The number of deliberately lit fires from the other categories has increased between 5% (vegetation fires) and 46% (miscellaneous fires) over the same period. However, the number of chemical fires experienced in 2005 represents the first increase from the 2000 figure. Deliberate structure fires as a proportion of total fires has remained fairly stable over the period with 15% in 2000 and 13% in 2005 (range 11% to 15%). Residential and non-residential deliberate fires as a proportion of total fires have been consistent over the period. However, the proportion of deliberate 'other' fires in 2001 was 20% less than the next highest year (2000), apparently due to the disproportionately high number of non-deliberate fires in the 'other' category that

year. Deliberate mobile property fires as a proportion of total fires increased from 49% in 2000 to 52% 2001; these include cars. Similarly, the proportion of deliberately lit miscellaneous fires (e.g., skip fires) has increased from 44% in 2000 to 51% in 2005. The proportion of deliberate vegetation fires has decreased from 34% in 2000 to 31% in 2005. The proportion of chemical fires has also decreased from 14% in 2000 to 12% in 2004.   Deliberate mobile property fires and miscellaneous fires are proportionately higher than the other categories; it is likely that this may reflect cars set alight to hide evidence of their theft and nuisance fires often lit by young people.

Table 12

Total recorded fires by the NZFS 2000 to 2005, according to property types, including general property use for structure fires.

		Structure Fires				Mobile Property Fires	Vegetation Fires	Chemicals, Flammable Liquids and gases Fires	Miscell-aneous fires
		General Property Use							
		Residential	Non-Residential	Other	TOTAL				
2000	Deliberate	472	455	43	970	1531	1460	15	2997
	Other	4203	1412	127	5742	1580	2826	95	3860
	TOTAL	4675	1867	170	6712	3111	4286	110	6857
	% deliberate	10%	24%	25%	15%	49%	34%	14%	44%
2001	Deliberate	309	378	40	727	1362	1283	8	3496
	Other	3688	1162	806	5656	1798	3075	75	4263
	TOTAL	3997	1540	846	6383	3160	4358	83	7759
	% deliberate	8%	25%	5%	11%	43%	29%	10%	45%
2002	Deliberate	348	428	67	843	1567	1397	12	3363
	Other	4567	1571	109	6247	1549	2762	57	3677
	TOTAL	4915	1999	176	7090	3116	4159	69	7040
	% deliberate	7%	21%	38%	12%	50%	34%	17%	48%
2003	Deliberate	399	468	54	921	1780	1704	13	4442
	Other	4229	1528	101	5858	1612	3305	93	3753
	TOTAL	4628	1996	155	6779	3392	5009	106	8195
	% deliberate	9%	24%	35%	14%	53%	34%	12%	54%
2004	Deliberate	387	385	39	811	1674	1215	13	3680
	Other	4265	1492	84	5841	1499	2870	112	4023
	TOTAL	4652	1877	123	6652	3173	4085	125	7703
	% deliberate	8%	21%	32%	12%	53%	30%	10%	48%
2005	Deliberate	367	412	65	844	1853	1531	18	4386
	Other	3871	1475	100	5446	1691	3368	139	4293
	TOTAL	4238	1887	165	6290	3544	4899	157	8679
	% deliberate	9%	22%	39%	13%	52%	31%	12%	51%
	% change in deliberate	-22%	-10%	+51%	-13%	+21%	+5%	+20%	+46%

Note. Data supplied by the NZFS (G. Quigan, personal communication, July 10, 2006). Other structure fires refers to general property use that does not involve buildings (e.g., rubbish tips, conservation area, mine, road, defence area, forestry). Mobile property fires refers to car, van, truck, boat, plane, train fire; mobile home fire; mobile shop/office fire. Vegetation fires refers to single tree fires, hedge, shelterbelt fire, and vegetation fires. Chemicals, Flammable Liquids and Gasses Fires (Hazardous Fires) refers to chemical fires, flammable liquid, gas fire, LPG fire, CNG fire. Miscellaneous fires refers to outside rubbish fire, rubbish bin, skip fire, cultural cooking fire, barbeque fire, Outside fire: e.g., mailbox, playground; and suicide by fire

The distribution of deliberately lit fires among different communities

Table 13 shows the urban and rural distribution of fire incidents recorded by the NZFS between 2000 and 2005. The number of deliberately lit fires in urban areas has increased 24% between 2000 (5864) and 2005 (7270). The increase has been consistent over the years except 2001 (5659), where there was a 4% decrease in the number of deliberately lit fires from the previous year. In contrast, the number of other fires in urban areas has remained relatively stable from 2000 to 2005. From 2000 to 2001 there was a 5% increase in the number of other fires in urban areas. However, the years 2002 to 2002 witnessed a decline in the number of other fires lit in urban areas. Thus, the increase in total fires lit in urban areas appears to be a product of increasing deliberately lit fires. The proportion of total fires that were deliberate ranged between 33% (2001) and 41% (2003), with a 5% increase over the period.

The number of deliberately lit fires in rural areas has increased 23% from 2000 (1109) to 2005 (1362). Each year represents an increase from the 2000 figure, although a pattern of alternating increase and decrease in the number of deliberately lit rural fires is apparent. Deliberately lit fires as a proportion of total rural fires remained stable over the period, with a 24% to 27% range. The number of other fires also increased over the period by 25%, from 3274 in 2000 to 4103 in 2005. Each year experienced an increase on the previous one except for 2004 (3933), which witnessed a 3% decrease from the year before.

Table 13
Total recorded fires by the NZFS 2000 to 2005, according to community type (urban/rural).

	Urban				Rural			
	Deliberate	Other	Total	% Deliberate	Deliberate	Other	Total	% Deliberate
2000	5864	10829	16693	35%	1109	3274	4383	25%
2001	5659	11318	16977	33%	1217	3549	4766	26%
2002	5974	10662	16636	36%	1208	3630	4838	25%
2003	7329	10564	17893	41%	1531	4057	5588	27%
2004	6170	10412	16582	37%	1223	3933	5156	24%
2005	7270	10834	18104	40%	1362	4103	5465	25%
% change deliberate fires	+24%	+.05%	+9%	+5%	+23%	+25%	+25%	No change

Note. Data supplied by the NZFS (G. Quigan, personal communication, July 10, 2006). The NZFS uses the term 'Urban' as it is defined under the Fire Services Act 1976, as an area of significant residential, commercial or industrial risk over which the NZFS provides cover. The Term 'Rural' refers to any area not specifically covered by the NZFS.

AUSTRALIA

The distribution of deliberately lit fires among different property types

Table 14 shows the number of deliberate and other fires across property types between 2000 and 2005. The number of deliberately lit structure fires has increased 6% between 2000 (1719) and 2005 (1829). However, deliberately lit structure fires as a proportion of total structure fires decreased over the same period from 14% in 2000 to 12% in 2005. The number of deliberately lit fires in residential structures has increased by 17% over the period, although for the last three years the number of deliberate lit residential fires has been declining. Deliberately lit fires in other structure types has decreased by 2% from 927 in 2000 to 905 in 2005, although 2001 (1261), 2002 (1131) and 2004 (940) all experienced increases from the 2000 figure.

The number of deliberately lit mobile property fires decreased by 4% between 2000 (4608) and 2005 (4428). Deliberate fires as a proportion of total fires also decreased over the period from 50% in 2000 to 38% in 2005. The proportion of deliberate mobile property fires is the highest of all the categories.

Deliberately lit vegetation fires (13%), outside rubbish fires (23%) and other types of fires (3%) have all increased between 2000 and 2005. Deliberate fires as a proportion of total fires for these categories have also decreased. Vegetation fires as a proportion of total fires have decreased from 30% in 2000 to 24% in 2005; outside rubbish fires have decreased from 36% in 2000 to 32% in 2004 and 2005; deliberate other fire types as a proportion of total fires has fallen from 18% in 2000 to 8% in 2005.

Table 14

Total fires by recorded by participating fire agencies in Australia, according to property types, including general property use for structure fires, 2000 to 2005.

		Structure Fires			Mobile Property Fires	Vegetation Fires	Outside Rubbish Fires	All Other Fire Types
		General Property Use						
		Residential	Other structure fires	Total				
a2000	Deliberate	792	927	1,719	4,608	6,765	4,328	1,100
	Other	6,701	3,313	10,014	4,625	15,765	7,689	5,123
	TOTAL	7,493	4,240	11,733	9,233	22,530	12,017	6,223
	% deliberate	11%	22%	15%	50%	30%	36%	18%
2001	Deliberate	1,061	1,261	2,322	5,852	10,739	6,641	1,576
	Other	9,611	4,754	14,365	7,917	34,507	10,000	10,672
	TOTAL	10,672	6,015	16,687	13,769	45,246	16,641	12,248
	% deliberate	10%	21%	14%	43%	24%	40%	13%
2002	Deliberate	1,110	1,131	2,241	5,081	10,535	6,158	1,705
	Other	10,165	5,061	15,226	8,074	37,873	10,793	14,639
	TOTAL	11,275	6,192	17,467	13,155	48,408	16,951	16,344
	% deliberate	10%	18%	13%	39%	22%	36%	10%
2003	Deliberate	991	896	1,887	4,502	6,280	5,486	1,217
	Other	10,328	4,634	14,962	7,630	24,210	9,874	13,711
	TOTAL	11,319	5,530	16,849	12,132	30,490	15,360	14,928
	% deliberate	9%	16%	11%	37%	21%	36%	8%
2004	Deliberate	957	940	1,897	4,679	8,147	5,337	1,464
	Other	9,800	4,628	14,428	7,823	28,518	11,281	14,372
	TOTAL	10,757	5,568	16,325	12,502	36,665	16,618	15,836
	% deliberate	9%	17%	12%	37%	22%	32%	9%
b2005	Deliberate	924	905	1,829	4,428	7,649	5,319	1,130
	Other	9,211	4,515	13,726	7,230	24,348	11,157	13,411
	TOTAL	10,135	5,420	15,555	11,658	31,997	16,476	14,541
	% deliberate	9%	17%	12%	38%	24%	32%	8%
	% change in deliberate	+17%	-2%	+6%	-4%	+13%	+23%	+3%

Note. Data supplied by the NSWFB (H. Danaskos, personal communication, July 27, 2006). Participating agencies included: New South Fire Brigades, Northern Territory Fire & Rescue Services, Melbourne Metropolitan Fire Brigade, Victorian Country Fire Authority, Tasmanian Fire Service, Queensland Fire & Rescue Service, New South Wales Rural Fire Service.
aFigures do not include the number of deliberate and other fires for the Victorian County Fire Authority or the Queensland Fire & Rescue Service bFigures do not include the number of deliberate and other fires for the Tasmanian Fire Service.

The distribution of deliberately lit fires among different communities

Table 15 shows the urban and rural distribution of fire incidents recorded by participating fire services in Australia, between 2000 and 2005. The number of deliberately lit fires in urban areas has decreased 20% between 2000 (16826) and 2005 (13541). The number of deliberately lit urban fires fell each year except for 2001 (18456) and 2004 (14164), when there were 10% increases from the previous year. The number of other fires in urban areas also fell over the period (7%), from 32847 in 2000 to 30700 in 2005, although 2002 (35273) and 2004 (30837) experienced an 8% and 7% increase on the previous years. Deliberately lit fires as a proportion of total urban fires ranged from 31% (2003, 2005) to 36% (2004)

The number of deliberately lit fires in rural areas has increased 1% from 2000 (1606) to 2005 (1626). Between 2000 and 2002 deliberate urban fires were increasing from previous years, 22% from 2000 to 2001, and 7% from 2001 to 2002. In 2003 (1321) and 2004 (1476) deliberately rural fires declined, before increasing again in 2005 (1626) by 10% from the previous year. Other fires lit in rural areas follow a similar patter to deliberate fires with an over 4% increase for the period. Deliberately lit fires as a proportion of total rural fires remained stable over the period, with a 20% to 24% range.

Table 15
Total recorded fires by participating fire agencies in Australia 2000 to 2005, according to community type (urban/rural).

	[a]Urban				[b]Rural			
	Deliberate	Other	Total	% Deliberate	Deliberate	Other	Total	% Deliberate
2000	16,826	32,847	49,673	34%	1,606	5,682	7,288	22%
2001	18,456	32,739	51,195	36%	1,955	6,092	8,047	24%
2002	17,100	35,273	52,373	33%	2,090	6,692	8,782	24%
2003	12,929	28,825	41,754	31%	1,321	5,215	6,536	20%
2004	14,164	30,837	45,001	32%	1,476	5,733	7,209	21%
2005	13541	30700	44241	31%	1626	5920	7546	22%
% change deliberate fires	-20%	-7%	-11%	-3%	+1%	+4%	+4%	No change

Note. Data supplied by the NSWFB (H. Danaskos, personal communication, July 27, 2006). Participating agencies included: New South Fire Brigades, Northern Territory Fire & Rescue Services, Victorian Country Fire Authority, Tasmanian Fire Service
a Major cities and inner regional; Tasmanian Fire service defines urban as career brigade areas and larger town brigades b Outer regional, remote and very remote; Tasmanian Fire service defines rural as all non-urban brigades

UNITED KINGDOM

The distribution of deliberately lit fires among different property types

Table 16 shows the number of deliberate and other primary fires in UK, across property types between 2000 and 2004. The number of deliberately lit structure fires has decreased 13% between 2000 (32082) and 2004 (28045). Deliberately lit structure fires as a proportion of total structure fires increased from 2000 (29%) to 2001 (31%), 2002 (30%) and 2003 (32%). However, by 2004 the proportion of deliberate structure fires reflected the 2000 figure of 29%. The number of deliberately lit fires in dwellings (16%) and other buildings (10%) decreased over the period, with a similar pattern as is apparent for total structure fires.

The number of deliberately lit fires in vehicles decreased by 22% between 2000 (70806) and 2004 (55000). Deliberate fires as a proportion of total fires increased over the period from by 1%, from 75% in 2000 to 76% in 2004. However, the proportion of deliberately lit vehicle fires ranged from 77% in 2001 to 82% in 2002. The proportion of deliberate mobile property fires is the highest of all the categories and it experienced the largest overall decline in total number of cases.

Other outdoor fires increased over the period by 0.4%. However, from 2000 to 2001 there was a 17% increase, from 2000 to 2002 there was a 7% increase and from 2000 to 2003 there was an 18% increase in the number of deliberately lit outdoor fires. Thus, the change from 2000 to 2004 represents the smallest change in deliberately lit outdoor fires over the period examined. This is a pattern apparent in all categories.

Table 16

Total fires by recorded by fire services in the UK, according to property types, including general property use for structure fires, 2000 to 2005.

		Structure Fires			Vehicles	Other outdoors
		General Property Use				
		Dwellings	Other buildings	Total		
[a]2000	Deliberate	14242	17840	32082	70806	8152
	Other	56655	23907	41747	24021	3912
	TOTAL	70897	41747	112644	94827	12064
	% deliberate	20%	43%	29%	75%	68%
2001	Deliberate	14769	19587	34356	79241	9520
	Other	54245	23972	78217	23180	3994
	TOTAL	69014	43559	112573	102421	13514
	% deliberate	31%	45%	31%	77%	70%
2002	Deliberate	13706	17423	31129	a80205	8749
	Other	49253	22184	71437	17876	4022
	TOTAL	62959	39607	102566	98081	12771
	% deliberate	22%	44%	30%	82%	69%
2003	Deliberate	13645	18268	31913	a 72869	9655
	Other	49266	19957	69223	18607	4751
	TOTAL	62911	38225	101136	91476	14406
	% deliberate	22%	48%	32%	80%	67%
2004	Deliberate	11974	16071	28045	55000	8186
	Other	47769	21511	69280	17785	3462
	TOTAL	59743	37582	97325	72785	11648
	% deliberate	20%	43%	29%	76%	70%
[b]2005	Deliberate	N/A	N/A	N/A	N/A	N/A
	Other	N/A	N/A	N/A	N/A	N/A
	TOTAL	N/A	N/A	N/A	N/A	N/A
	% deliberate	N/A	N/A	N/A	N/A	N/A
	% change in deliberate	-16%	-10%	-13%	-22%	+.4%

Note. Data supplied by the DCLG (D. Sugg, personal communication, June 29, 2006). N/A – not available at press time. Fire incidences refer to primary fires only (information on chimney fires and secondary fires e.g., derelict building and cars according to property type is not available).
[a] Includes estimates for incidents not recorded during periods of industrial action.

UNITED STATES OF AMERICA

The distribution of deliberately lit fires among different property types

Table 17 shows the estimated number of fires in USA from the fire services and the number of arson offences reported by participating law enforcement agencies, across property types between 2000 and 2005.

The number of deliberately lit structure fires recorded by the fire services has decreased 20% between 2001 (45500) and 2004 (36500). Deliberately lit structure fires as a proportion of total structure fires has also decreased from 9% in 2001 to 7% in 2004. The number of deliberately lit fires in vehicles decreased by 9% between 2001 (39500) and 2004 (36000). Deliberately lit vehicle fires as a proportion of total fires decreased from 11% in 2001 to 12% in 2002 and 2004, although in 2003 (10%) there was proportionately less deliberate vehicle fires.

The number of arson offences in residential (12%), non-residential (17%) structures decreased between 2000 and 2005. The number of arson offences that targeted structures as a whole also decreased by 14% over the period. The number of arson offences in mobile property (e.g., vehicles) decreased by 19%. The decreasing number of arson offences across these categories was reasonably stable over the years. However, the number and origin of participating agencies changed from year to year. Therefore, caution must be exercised in making comparisons from year to year, and accordingly to the quality of data does not permit comparisons between proportions of fire types.

Table 17

The number of fire incidents and arson offences recorded in the USA according to property types, 2000 to 2005.

| | | Number of fire incidents according to property type | | Number of arson offences according to property type | | | | |
| | | | | Structure Fires | | | | |
		Structure	Vehicle	Residential	[a]Non-residential	Total	Mobile	[b]Other fires
2000	Deliberate	75000	46500	18162	11954	30116	21442	17198
	Other	430500	302000					
	TOTAL	505500	348500					
	% deliberate	15%	13%					
2001	Deliberate	45500	39500	17613	11475	29088	22381	17498
	Other	476000	312000					
	TOTAL	521500	351500					
	% deliberate	9%	11%					
2002	Deliberate	44500	41000	16610	10763	27373	21920	17015
	Other	474500	288500					
	TOTAL	519000	329500					
	% deliberate	9%	12%					
2003	Deliberate	37500	30500	16470	10524	26994	21310	15739
	Other	482000	281500					
	TOTAL	519500	312000					
	% deliberate	7%	10%					
2004	Deliberate	36500	36000	17531	10671	28202	19088	15925
	Other	489500	261000					
	TOTAL	526000	297000					
	% deliberate	7%	12%					
2005	Deliberate	N/A	N/A	16,025	9,927	25,952	17,274	16,314
	Other	N/A	N/A					
	TOTAL	N/A	N/A					
	% change in deliberate, since 2001	-20%	-9%	-12%	-17%	-14%	-19%	-5%

Note. Data for number of fire incidents according to property type extracted from Fire Loss in the United States (Karter, 2001, 2002, 2003, 2004, 2005) and data for the number of arson offences according to property type extracted from Crime in the Unites States (U.S. Department of Justice - Federal Bureau of Investigation, 2000, 2001, 2002, 2003, 2004, 2005). N/A – not available at press time.
[a] Includes storage, industrial/manufacturing, community/public and other structures [b]Other fires includes property not classified as structural or mobile, such as crops, timber, fences and signs.

The distribution of deliberately lit fires among different communities

Table 18 shows the distribution of arson offences recorded by law enforcement agencies participating in the UCR Program in USA, between 2000 and 2005. The national rate of arson fell by 10.0 arsons per 100,000 inhabitants. The rate of arson offences fell steadily in all areas over the period. The highest rates of arson were recorded in the cities, with a range of 29.7 (2005) to 40.3 (2000). Suburban/metropolitan counties had the next highest rates with a range of 22.8 (2005) to 33.9 (2000). The NFPA also report that rates of intentional structure fires relative to the population are highest in large cities and have a secondary peak in rural communities (Hall Jr, 2005).

Table 18

The arson offence rate per 100,000 population based on arson offences recorded in the USA by participating agencies who submitted 12 months of complete data, 2000 to 2005.

	Total cities	Suburban/Metropolitan Counties	Rural/Non-metropolitan Counties	a Suburban area	National Rate
2000	40.3	33.9	17.7	27.4	36.9
2001	38.8	32.1	19.1	26.7	35.5
2002	36.5	27	16.6	24.2	32.4
2003	33.6	25.8	17.7	23.4	30.4
2004	31.2	24.1	17.1	21.9	28.2
2005	N/A	N/A	N/A	N/A	N/A

Note. Data extracted from Crime in the Unites States (U.S. Department of Justice - Federal Bureau of Investigation, 2000, 2001, 2002, 2003, 2004, 2005).

aSuburban area includes law enforcement agencies in cities with less than 50,000 inhabitants and county law enforcement agencies that are within a Metropolitan Statistical Area. Suburban area excludes all metropolitan agencies associated with a principal city.

Summary

In NZ, typically the miscellaneous fire category (e.g., rubbish bins) recorded the highest number of deliberately lit fires, followed by mobile property and vegetation. Over the period, the number of deliberately lit fires in each of these categories increased as did their proportion of total fires. This contrasts with other (or non-deliberate) fires that are typically the most common in structures.

Australia demonstrated a similar pattern for deliberately lit fires with the same three most common property types, although vegetation fires typically occurred most often, followed by rubbish fires and then mobile property. Mobile property fires decreased over the period as did deliberate vegetation and rubbish fires as a proportion of total fires, although the incidence of these fires actually increased over the period. Other fires also typically occurred in structures although the incidence of non-deliberate vegetation fires was highest, which may reflect the higher rate of bush fires in Australia.

The distribution of fire among property types in UK was different in that the highest number of deliberately lit fires occurred in vehicles, then structures and finally outdoor fires. Both deliberate vehicle and structure fires decreased over the period but increased as a proportion of total fires. In contrast, the number of outdoor fires increased over the period. Similar to Australia and NZ, non-deliberate (other) fires in structure fires were most common.

In USA, the incidence of vegetation or other outdoor fires (including rubbish) were not available. The distribution of deliberate fires was different from the other countries studied in that deliberate fires typically occurred most often in structures and then vehicles. The number of recorded arson offences also most commonly occurred in structures, followed by mobile property. The number of deliberately lit fires in all property types decreased over the period and as a proportion of total fires. Non-deliberate fires typically occurred most often in structures.

In NZ and Australia, the incidence of deliberately lit fires and other fires was highest in urban areas. However, in NZ the incidence of deliberately lit fires in both urban and rural areas was increasing whereas in Australia rural deliberate fires only were on the rise by 2005. In USA, the arson rate per 100,000 inhabitants was also highest in the cities and lowest in rural/non-metropolitan counties. The

relatively higher number of fires in urban areas may reflect the association between social deprivation and fire (Office of the Deputy Prime Minister, 2004a).

4. Monetary losses in deliberate fires compared to losses incurred in all fires.

Fire, including deliberately lit fire, represents a significant financial cost to individuals and society (Office of the Deputy Prime Minister, 2006). Calculating the cost of deliberately lit fires and total fires can assist policy makers in allocating resources and balancing prevention and response initiatives. In USA (Hall Jr, 2001) and UK (Office of the Deputy Prime Minister, 2006) published reports about the cost of fire have used different statistical tools for estimating cost. To date there is no internationally agreed methodology for calculating the cost of fire based on established best practice. The difficulty lies both in deciding what impacts should be counted as costs, and finding valid ways of estimating such costs. Typically, the monetary cost of deliberately lit fires are calculated from estimates of property damage (e.g., NZ and Australia). However, there are other costs associated with deliberate fires, including fire prevention and protection, response and suppression by the fire services. Moreover, there are indirect costs such as temporary housing, healthcare, human suffering and the loss of conservation or public areas that are not easily quantifiable.

This section of the report documents the available monetary cost of deliberately lit fires in NZ, Australia, England and Wales, USA and Canada.

Table 19 shows the estimated cost of structure fires and the number of fatalities between 2000 and 2005.

Table 19

The estimated monetary cost of structure fires and the number of fatalities recorded by the NZFS, 2000 to 2005.

	Total monetary loss for deliberate fires (NZ$m)	Total monetary loss for Other fires (NZ$m)	Total monetary losses due to ALL fires (NZ$)	% Deliberate	Fatalities due to deliberate fires	Fatalities due to Other fires	Total Fatalities	% Deliberate
[a]2000	13	25	38	34%	2	29	31	7%
[b]2001	28	81	109	26%	0	43	43	0%
2002	54	101	155	35%	6	35	41	15%
2003	37	100	137	27%	4	36	40	10%
2004	35	88	123	29%	2	33	35	6%
2005	33	91	124	27%	2	30	32	6%

Note. Data supplied by the NZFS (N. Challands, personal communication, August 7, 2006). Monetary loss figures reflect structure fires only. Vegetation, vehicle, chemical and miscellaneous fires were not included. Additionally, the cost of smoke damage to the structure was not included in the cost analysis. All deliberate fire cause categories were used to calculate the figures for monetary loss.
[a]2001 was used as the base year for analysis because 2000 figures are based on data for the last three months of that year due to introduction of a new data collection system that allowed estimates of the area of flame damage to be collected (and used to calculate monetary loss). It also includes a period of industrial action. This period also includes Guy Fawkes, which means deliberate fires will be overrepresented. [b] Industrial action also took place in 2001, resulting in relatively more missing data.

A recent report published by the New Zealand Fire Commission analysed the cost of fire in NZ (Goodchild, Sanderson, Leung-Wai, & Nana, 2005). The total annual cost of fire in NZ, taking into account costs of risk reduction; readiness and response; and recovery and consequence was estimated to be about $1,02bn per annum (0.79% of total Gross Domestic Product). Overall, risk reduction was the most expensive (44% of total cost), followed by recovery and consequence costs (32%). Fire protection measures in buildings ($285m) were the most costly, with fire emergency services ($197m) next and then property damage ($164m).

ICNZ estimated the cost of all fires between 2000 and 2005 to be approximately $336 million. This figure is considerably lower than other estimates but it is based solely on insurance claims, therefore does not include those fires without insurance, those that have private insurance, and only represents three of the 17 members of ICNZ. In addition, not all insurers differentiate between deliberately lit fires

and other fires. If we want to consider the monetary loss of deliberately lit fires in NZ relative to other fires, then we must turn to a review of property damage estimated by the NZFS.

Table 19, shows the estimated monetary cost of deliberate fires in New Zealand, according to calculations from the NZFS based on damage to structures, ranged from 26% (2001) to 35% (2002) of the cost of all fires. In 2005, the estimated total cost of all fires was $124m, with $33m accounted for by deliberately lit fires. This represents a 6% decrease in the cost deliberate fires from the previous year ($35m). In addition, the proportion of deliberate fire cost in 2005 (27%) was slightly lower than in 2004 (29%). Despite the relatively lower cost of deliberate fires in 2005, there were 1239 more deliberate fires than the year before, suggesting that the burnt area was less. The distribution of deliberate fires according to property type appears to support this. In 2005, there were 706 more miscellaneous deliberate fires (i.e., mainly rubbish fires) than in 2004 and little change in the number of dwelling fires between the years.

Between 2000 and 2005 there were 222 fire related deaths recorded by the NZFS in NZ. Of these 222 fatalities, 7% of these occurred in deliberately lit fires. The number of fatalities in deliberately lit fires ranged from 0 in 2001 to 6 in 2002 and the number of fatalities in deliberately lit fires as a proportion of all fire-related deaths ranged from 0% to 15% over the period. The majority of fatalities occurred from structure fires. Between 2000 and 2004, 49% (2000/2001) to 71% (2002/2003) of the fatalities from all fires took place within structures. Between 18% (2001/2001) and 44% (2003/2004) of fatalities occurred in vehicles, such as cars and campervans. Other fatalities over the period occurred outside or were a result of suicide by fire. The majority of fire-related fatalities between 2000 and 2004, were from the 30 39 year old age group and were male (New Zealand Fire Service, 2004).

Table 20 shows the estimated cost of structure fires and the number of fatalities between 2000 and 2005, as recorded by participating agencies in Australia.

Table 20

The estimated monetary cost of structure fires and the number of fatalities recorded by participating fire service agencies in Australia, 2000 to 2005.

	Total monetary loss for deliberate fires (A$m)	Total monetary loss for Other fires (A$m)	Total monetary losses due to ALL fires (A$)	% Deliberate		Civilian fatalities due to deliberate fires	Civilian fatalities due to Other fires	Total Civilian fatalities	% Deliberate
2000	133	342	475	28%		11	172	183	6%
2001	143	541	684	21%		10	212	222	5%
2002	124	626	750	17%		22	344	366	6%
2003	119	558	677	18%		25	350	375	7%
2004	145	513	658	22%		15	366	381	4%
2005	155	482	637	24%		16	344	360	4%

Note. Data supplied by the NSWFB (H. Danaskos, personal communication, July 27, 2006). Figures rounded up to the nearest million; estimated by fire. Participating agencies included: New South Fire Brigades, Northern Territory Fire & Rescue Services, Melbourne Metropolitan Fire Brigade, Victorian Country Fire Authority, Tasmanian Fire Service, Queensland Fire & Rescue Service, New South Wales Rural Fire Service.

The estimated monetary cost of deliberate fires in Australia ranged from 28% (2000) to 17% (2002) of the cost of all fires. In 2005, the estimated total cost of all fires was $637m, with $155m accounted for by deliberately lit fires (24%). This represents a 7% increase in the cost deliberate fires from the previous year ($145m), although there were only 112 more deliberately lit fires. An increase in the monetary cost of deliberately lit fires also occurred in 2001 (8%) and 2004 (21%). These corresponded with increases in the number of deliberately lit fires in 2001 (2981) and 2004 (2103). A recent report published by the Australian Institute of Criminology (Mayhew, 2003) estimated the total cost of arson as $1,35bn, which included property loss, indirect costs and intangible losses, the cost of the fire service, ambulance service and volunteer effort.

Between 2000 and 2005 there were 1887 fire related civilian deaths recorded by participating fire services in Australia. Of these fatalities, 5% (99) of these occurred in deliberately lit fires. The number

of fatalities in deliberately lit fires ranged from 10 in 2001 to 25 in 2003 and the number of fatalities in deliberately lit fires as a proportion of all fire-related civilian deaths remained stable over the period (range 4% to 7%).

ENGLAND AND WALES

Table 21 shows the estimated cost of structure fires and the number of fatalities between 2000 and 2004, as recorded by the fire services in the UK.

Table 21

The estimated monetary cost of structure and vehicle fires and the number of fatalities recorded by the fire services in England and Wales, 2000 to 2005.

	Total monetary loss for deliberate fires (£m)	Total monetary loss for Other fires (£m)	Total monetary losses due to ALL fires (£m)	% Deliberate	Fatalities due to deliberate fires	Fatalities due to Other fires	Total fatalities	% Deliberate
2000	1,29	2,78	4,07	32%	93	520	613	15%
2001	1,51	2,97	4,48	34%	77	529	606	13%
2002	1,59	3,08	4,67	34%	111	451	562	20%
2003	1,69	3,11	4,80	35%	117	476	593	20%
2004	1,37	2,90	4,26	32%	88	420	508	17%
2005	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note. Data extracted from The economic cost of fire: Estimates for 2004 (Office of the Deputy Prime Minister, 2003, 2005b, 2006). Total cost includes costs as a consequence (property losses, lost output, healthcare costs and loss of business). Total cost excludes anticipation costs (i.e., fire protection in buildings, fire safety equipment, fire safety activity –including fire investigations, insurance administration)

The estimated cost of deliberately lit fires increased 31% between 2000 (£1,29bn) and 2003 (£1,69bn), before decreasing in 2004 to £1,37bn (6% increase from 2000). The cost of other fires broadly followed a similar pattern over the period. The estimated cost of deliberate fires as a proportion of total cost remained stable over the period (range 32% to 35%).

Property damage represented 20% of the total cost of arson in 2004 (£501m); this was the highest consequence related cost (Office of the Deputy Prime Minister, 2006). If we include all of anticipation, response and consequence costs, property damage was second only to the cost of fire protection (£895m), which accounted for 37% of the total cost for deliberately lit fires (Office of the Deputy Prime

Minister, 2006). In 2004, 21% of deliberate fire incidents in dwellings and non-dwellings spread beyond the room of ignition, compared with a lower fire spread in accidental dwellings (6%) and non-dwellings (11%) (Office of the Deputy Prime Minister, 2006). This suggests fire damage is more significant in deliberate fires possibly due to the use of accelerants in these fires and more time for these fire to be detected and attended by fire services. In 2004, the value of property damage for all fires was valued at £1.3bn, which was 12% and 26% lower than 2000 and 2003 respectively (Office of the Deputy Prime Minister, 2006). This change was largely accounted for by a decrease in the number of commercial building and vehicle fires. Similarly, the number of deliberate vehicle and secondary fires can account for the some of the changes in the cost of deliberately lit fires. There was a 35% decrease in deliberate secondary fires between 2003 and 2004. The majority of these secondary fires are refuse or grassland fires.

Between 2000 and 2004 there were 2882 fire–related deaths recorded by fire services in the UK. Of these fatalities, 17% (486) of these occurred in deliberately lit fires. The number of fatalities in deliberately lit fires ranged from 77 in 2001 to 117 in 2003 and the number of fatalities in deliberately lit fires as a proportion of all fire-related deaths ranged from 13% (2001) to 20% (2002, 2003).

UNITED STATES OF AMERICA

Table 22 shows the estimated monetary cost of structure fires and the number of fatalities in the USA between 2000 and 2004 (Karter, 2001, 2002, 2003, 2004, 2005).

The estimated cost of deliberately lit fires decreased 37% between 2001 ($1,23bn) and 2005 ($777m). In 2003, property damage in structure fires accounted for US$692m and property damage in vehicle fires accounted for US$132m (Hall Jr, 2005). This represents a large decline from 2002 in both structure fires (25%) and vehicles (41%) (Hall Jr, 2005). By 2005, the cost of intentional structure fires ($664m) and vehicle fires ($113m) had declined even further. In contrast to the declining cost of deliberately lit fires, the cost of other fires increased over the period by 7%. The estimated cost of deliberate fires as a proportion of total cost declined over the period, from 12% in 2001 to 7% in 2005, the lowest proportion recorded during the five years studied.

Table 22

The estimated monetary cost of structure fires and the number of fatalities for structure fires according to the NFPA Survey, 2000 to 2005.

	Total monetary loss for deliberate fires (US$m)	Total monetary loss for Other fires (US$m)	Total monetary losses due to ALL structure & vehicle fires (US$m)	% Deliberate	Civilian fatalities due to deliberate fires	Civilian fatalities due to Other fires	Total Civilian fatalities	% Deliberate
2001	1,23	9,14	10,37	12%	330	2890	3220	10%
2002	1,14	8,99	10,13	11%	350	2425	2775	13%
2003	824	9,20	10,03	8%	305	3080	3385	9%
2004	879	8,74	9,62	9%	320	2985	3305	10%
2005	777	9,73	10,51	7%	315	2790	3105	10%

Note. Data extracted from Fire Loss in the United States (Karter, 2001, 2002, 2003, 2004, 2005). Data does not include allocations of unknown-cause fires. Data from 2000 was not included because NFIRS was upgraded to version 5.0 in 1999 and 2000, and the terms suspicious and incendiary were replaced with 'intentional', thus 2000 data cannot be meaningfully compared with later years. Monetary cost of fires are taken from estimates of the property damage incurred. Cost and loss figures exclude disasters: 2000 Mexico wildland fire; 2001 9/11 attacks; 2003 Southern California wildfires.

Between 2001 and 2005 there were 15,790 fire related deaths recorded by fire services in the USA. Of these fatalities, 10% (1,620) of these occurred in intentionally lit fires. The number of fatalities fires recorded as intentional ranged from 305 in 2003 to 350 in 2002 and the number of fatalities in deliberately lit fires as a proportion of all fire-related deaths remained fairly stable over the period (range 9% to 13%).

CANADA

The cost of deliberately lit fires for Canada is only available for 2000 and 2001, and is drawn from Fire Losses in Canada (Council of Canadian Fire Marshals and Fire Commissioners, 2000, 2001).

In 2000, total fires had a cost of $1,19bn, with deliberately lit fires making up 9% of that total cost ($110m). In 2001, there was $1,42bn recorded monetary loss from all fires and $252m monetary loss attributed to deliberately lit fires (18%), which represents a 129% increase on the previous year.
In 2000, there were 327 deaths as a result of fire, and 27 of these occurred in deliberately lit fires. In 2001, there were 338 fire related deaths, 70 of these in deliberately lit fires (21%), 43 more than the previous year.

The difference in the number of fires may account for the dramatic increase of dollar loss and fatalities in 2001. In 2001 there were 10876 deliberately lit fires compared with only 8192 in 2000, a difference of 2684 (32%).

Summary

In NZ, Australia and USA the proportion of fatalities that occurred in deliberately lit fires was typically 10% or less. In England and Wales, deliberate fires accounted for 20% or less of total fire related fatalities. In Canada, data was only available for 2000 and 2001, but over this period deliberate fire fatalities accounted for between 7% and 12% of total fire related fatalities.

In NZ, the monetary cost of deliberate fires, based on damage to structures, accounted for between 26% and 35% of the total cost of all fires. This was similar to England and Wales (32% to 35%) and followed by Australia (17% to 28%). The monetary cost of deliberately lit fires in USA was relatively low, with only 8% to 15% of the total cost accounted for by deliberate fires. In Canada, the cost of deliberate fires ranged from 8% to 21% between 2000 and 2001, largely accounted for by the large disparity in deliberate fire incidents between those years.

5. Fire cause investigation and reporting process

Fire investigation takes place so that the origin and cause of fire can be determined. It is particularly important that deliberately lit fires are identified early so that the offender(s) can be detected before going on to light more fires (Technical Working Group on Fire/Arson Scene Investigation, 2000, June) and their motives and behaviours can assist us to anticipate future problems (Munday, 2000). The role of the fire investigator includes the collection of evidence and adequate documentation of procedure and findings. The investigators actions and reporting can affect any legal proceedings that follow from the investigation (Technical Working Group on Fire/Arson Scene Investigation, 2000, June).

This section of the report provides an overview of the fire cause investigation and reporting processes used in NZ and overseas (Australia, UK, USA and Canada). It does not attempt to describe the complexities of fire investigations; there is a plethora of textbooks that fulfil that function. Rather, what follows is a simple outline of the investigation and reporting processes carried out in NZ and overseas, reported by and highlighting the perspectives of the people who do the work.

> A fire investigation is like a picture puzzle. Everyone involved with it has some of the pieces, but no one has the whole picture. It is up to the investigator to gather enough of these pieces together to solve the puzzle (Technical Working Group on Fire/Arson Scene Investigation, 2000, June, p. 1).

NZFS fire cause investigation process

The Incident commander or other first-at-fire officer has the initial responsibility for determining fire cause. If there is uncertainty as to the cause or there are extenuating circumstances, such fatalities, the use of accelerants, or it is a large structure fire, a Fire Safety Officer (i.e., a specialist fire investigator within the fire service) assumes responsibility for the investigation. If the Fire Safety Officer perceives the fire to be particularly serious or unusual, or is unsure of the cause, a second Fire Safety Officer may also be called to assist. A Fire Engineer may also take part in the investigation. Fire cause determination includes a process of information gathering and systematic elimination of possible causes. If the cause is determined to be unlawful, suspicious or the legality is not known, the Police may also conduct a criminal investigation.

Fire cause and origin is determined through a systematic process of elimination

Both physical evidence and the information gathered from witnesses and fire fighters first at the scene facilitate this process. Additionally, hypothetical scenarios based on the evidence collected can be tested to rule out all possible causes. Documentation of the evidence typically occurs, including photographs, diagrams and witness statements.

The physical evidence of smoke and fire damage is examined, including burn patterns and flame travel to determine the most likely area of origin. The area is inspected for likely ignition sources, which may also involve a process of elimination.

> First wander through the premises to determine where there is fire damage as opposed to smoke/heat damage. Having determined the area of fire damage you then look for the signs that show fire travel and follow them back. When one has found the seat of the fire one then has to find why the fire started in that spot (i.e., the cause).

Most participants reported that the process of elimination of the range of possible causes using the physical evidence worked well because it was logical, thorough and allowed the ongoing collection of facts to determine reliable origin and cause. Typical comments included "The process of elimination works well because we are looking at all aspects and because you can determine what was and wasn't involved in the ignition of the fire", and "the process facilitates an ability to go back and collect more

facts, develop additional scenarios without losing your place (in the process) and without accidental destroying evidence."

However, some participants noted that "sometimes it is easier to determine the seat of fire than others" and that significant damage can hinder an accurate determination of the cause. One participant noted that "readily available devices to seek out flammable fuel deposits/vapour" may assist this process.

Interviews with fire fighters first at the scene and other witnesses provide valuable information
Most participants reported that interviews with fire fighters first at the scene and other witnesses provided valuable information when used in conjunction with the physical evidence to determine origin and cause of the fire. However, some problems with this process were noted including the integrity of the statements taken, the interviewing skills of the fire personnel and the usual absence of any witnesses at the scene.

> Very often when I arrive there is someone at the scene who knows or thinks they know how a fire started (e.g., owner, witness, fire-fighter). When they have relayed their information, it then becomes a process of elimination of other possible causes. Assuming the first story is credible.

> Generally, a good relationship with the New Zealand Police allows this process to work well. That is, they have an expertise in interview techniques therefore, we utilise that expertise and allow them to do the interviews. With regard to other incidents where police are not involved then the interviews with personal knowledge and skills is all that is available.

The expertise Fire Safety Officers have is important to the investigation
Most fire fighting personnel identified that the facility to call on the Fire Safety Officers to investigate fire cause was important because of their expertise. However, both fire fighting personnel and Fire Safety Officers noted that the process would benefit from more "clearly defined roles and responsibilities" and the increased availability of investigation staff. Typical comments included, "Specialists have greater knowledge and experience and can provide more continuity in a long investigation, plus they will be the ones to give evidence in any court proceedings", and "The incident controller can call on specialist fire investigators and is largely relieved of the work of investigating the cause".

Fire Investigation skills were developed through formal training and practical experience
All Fire Safety Officers reported that their fire investigation skills were developed through a combination of formal fire investigation training and practical experience. Participants reported that their training assists them to determine the origin and cause of fire by acquiring "knowledge of how fire travels", the

"performance of buildings and materials in fire", and other "investigation theory and practice". Some participants also reporting building on their knowledge by personal research, including "possible fire causes through trade magazines, product information etc". Participants also reported that practical experience of fire scenes further developed the knowledge acquired during formal training.

> The training that I have received was only sufficient to know how an investigation should be carried out. I believe that as time has gone on my processes, observations, interpretations have improved.

> Operational fire-fighting for 18 years (prior to taking on the current role) allowed a better understanding of fire development and extinguishing methodology. Combined with investigation training and ongoing maintenance of personal knowledge on the subject has been most advantageous.

Further training of fire investigators

Recommendations for further training of specialist fire investigators for fire cause investigation included interview techniques and technical knowledge of current electronics and other possible points of origin. Many participants also noted that the training of operational staff in basic cause and origin skills such as evidence preservation and observation would facilitate the investigation process by increasing the quality of the information collected and ensuring that a fire investigation is triggered when appropriate.

> Recent training of operational and volunteer staff on basic cause and origin techniques has enabled a better identification and gathering of information by those members which in turn enables an accurate determination to be made…this training is not seen as a priority but should be stepped up or increased to ensure all that should be investigated are being investigated. Currently there are a number of incidents that are not investigated because of lack of knowledge by fire-fighters on the scene.

Fire cause reporting can occur in the SMS incident report and the fire investigation report. The Incident Commander or First-at-Fire Officer completes the SMS incident report. A Fire Safety Officer or Fire Engineer will complete the fire investigation report if a fire investigation has taken place. Alternatively, in the case of some minor fires they can add their findings to the SMS incident report. The NZFS intranet contains a template for the fire investigation report. The template supplies broad headings that apply to various aspects of the investigation, such as area of origin and indicated cause, and space for the insertion of narrative style text. Photographs and diagrams can also be included in the report. A documented set of guidelines, practical experience and professional judgement inform the completion of the fire investigation report. Once the report is completed and reviewed, a copy is attached to the SMS incident report and it is released to authorised interested parties, such as the Police.

SMS and the fire investigation reports work well together and the system for investigation reports is generally easy to use

Many participants noted that that overall the SMS incident report and fire investigation reports work well together: "[they] work well together", "they attempt to provide consistency", and "once one learns to sort the wheat from the chaff they work very well". Most also noted that the available system for fire investigation reporting was easy to use: "[I can] access information quickly", "[the] template leads me through the steps I need to take for the report", and "It's all set out ready to go".

Unclear lines of responsibility for reporting compromise the quality

However, one participant reported that quality of information is compromised by the fact that different people have responsibility for completing different parts of the process and it is not always clear when the various people should become involved. Once the SMS incident report has been completed by the first-at-fire personnel, the Fire Safety Officer or Fire Engineer cannot update the information to incorporate any new evidence they have uncovered during the course of their investigation, which will be in the fire investigation report. Any changes to the SMS incident report need to be made by National Headquarters. Additionally, operational staffs are typically unaware of the conclusions of the fire investigation report. Many participants reported that more communication between the operational staff and fire investigators and between fire investigators would improve the consistency of the information collected and facilitate their learning.

Fire investigation reporting in the field using portable reporting equipment

Some participants also noted that the ability to complete SMS incident reports and fire investigation reports in the field using a portable device, such as a lap top, would provide a more efficient use of their time and more reliable data.

> An incident report is completed by a different person to the person who carried out the investigation, and in a different time frame (often completed well before the investigation is conducted). Often responsibility for completing the incident report is delegated to a person who was not at the incident and is not trained in investigation or fire-fighting.

The fire investigation report were easy to compete

Most participants stated that they found the fire investigation report easy to complete, primarily because of its standard format, the flexibility to add information as required in both narrative and photographs, and the automatic population of the fire investigation report with some of the basic incident details (e.g., location) from SMS. Following on from this, one participant also suggested standardising the form used to take statements from witnesses.

Specific difficulties in using the fire investigation report were noted

Some participants stated that the fire investigation report was not always easy to use, primarily for technical reasons, such as difficulties saving the document to SMS or attaching photographs and diagrams. Typical comments included "we've trialled several different reporting templates. This one is easy to follow, it leads you through the fire and allows for an adequate conclusion", and "the SMS failure to accept all types of fire reports is annoying and means that a lot are never put in the system".

Improved search and data retrieval abilities within the fire investigation report

Many participants reported that they would like improved search and data retrieval abilities within the fire investigation reports, to track common elements of fires such as cause and the people involved and to enable the early identification of patterns.

> The reports have limited searching capabilities. We need a document search engine and standard proforma with keywords that are defined. There is no easy way of retrieving the data but it is important to get the data so we can identify trends early on and address them.

> Of the 370 plus incidents I have investigated during my time in this department 190 were treated as deliberately lit or at least unlawful and involved police. Of those only 33 incidents resulted in arrests of one or more individuals. I am aware, although there is no way of quantifying it, that a number of those incidents were connected through the fire-lighter in some form or another. A better retrieval data system would have picked up   more   connections through witnesses and/or those present at the incident.

Improving the reliability of the data in SMS would assist fire investigation reporting

Some participants noted that increasing the reliability of the information entered into the SMS incident report would assist fire investigation reporting by providing "the story of what has happened before [they] arrive" and facilitating consistency between the reports. Many participants suggested simplifying and clarifying the format of the SMS incident report to increase its reliability and to enable it to encompass fire investigation reporting, directly or by automatically triggering the need for a more detailed investigation and report.

Training in fire cause reporting

Most participants stated that they had completed formal training in writing fire investigation reports. Only three participants stated that they had not and most of these participants stated that they would find it useful to have formal training in writing fire investigation reports. Only one participant disagreed. The most prominent theme identified for future training was the writing of legally credible reports. Typical comments included "How to write a report that is credible in court", and "Depth of reporting for adequacy in challenged situations such as court", and "The legal implications of the report so they stand in criminal or civil court. The NZFS is a no blame organisation but if the report lays blame it can be problematic on the stand for the prosecution".

Some participants also stated that further training in content and structure of report writing would be useful.

New Zealand Police fire cause investigation and reporting

The NZFS typically determines cause and origin of the fires relevant to the Police and writes the fire investigation report. In some Police districts where there is Police expertise in fire cause investigation, such as Canterbury, a joint investigation might take place. In these cases, the NZFS fire investigation report would still be used unless the Police conclusions were significantly different from the NZFS's, in which case a separate Police report would be prepared, although this has reportedly not occurred.

Fire investigation reporting is a sound process

The Police reported that the discussion process involved in writing the fire investigation reports and the final reports themselves were generally sound. However, they would benefit from the NZFS being more aware of the legal obligations of report writing, including laws of disclosure, and there being more detail on how fire cause was determined in the report.

Inter-agency coordination of fire cause investigation works well

The Police reported that overall the inter-agency coordination of fire cause investigation works to well particularly when the Police are involved early on in the investigation process. This allows them to quickly start a criminal investigation, maintain the chain of evidence and integrity of the forensic scene. The Police were concerned that many fires (particularly minor fires) were not being reported to the Police and that an education initiative regarding the role of the Police and definitions of arson may improve this under-reporting. Conversely, they identified the importance of ensuring that there was adequate Police expertise on fire investigation in all districts.

Overseas fire cause investigation and reporting

In Australia, Canada and UK fire cause investigations are typically carried out by a specialist fire investigator at a local fire service and if the fire appears to be deliberate or is suspected of being so, by local law enforcement. In Canada and UK, fire investigations can be transferred from the local level to provincial or regional investigation units if local expertise is absent or if the fire is considered to be serious (e.g., fatal fires). In USA, responsibility for fire cause investigation varies depending on jurisdiction. Local fire services or law enforcement, combined fire and law enforcement investigative teams at local or State level or multi-jurisdictional teams may investigate them. In all countries, specialist fire investigators can be utilised to determine fire cause. Cooperation between fire services and law enforcement agencies exists in all countries, with varying levels of involvement at national and local level. For example, in USA, combined taskforces might investigate a fire; in some Canadian provinces the Police might have their own arson investigative units that conduct an independent investigation while working along side fire service investigators. A systematic process of alternative cause elimination typically determines fire cause (e.g., "Deductive reasoning, eliminate possible causes until you are left with the most probable").

A combination of documented guidelines or standards and professional judgement typically informed the completion of fire investigation reports. Fire cause reporting is typically completed electronically by the attending fire investigators. In the Canadian province of Ontario, provincial fire investigators can complete their reports in the field by way of a laptop and remote internet connection. UK participants also coveted this system. In Australia and Canada, fire investigation reports are completed and stored on a separate system from other incident data. However, some participants reported that inconsistencies between databases can occur because of the difference in the systems and the people who have entered the data. A "centralised user friendly system" or improved quality assurance measures and the implementation of standard terminology between these parallel systems could improve their accuracy. Fire investigation training for front line fire staff was recommended and the benefits of a reporting system that could "meet the court challenges of the scientific method" was espoused.

> One of the issues we uncovered when we moved to a standard data base was that there was no standard language or set of terms for fire behaviour. Different people used different terms to describe the same thing. Formal training helps ensure investigators use the correct terms to describe what they are seeing.

To describe oneself as an "arson investigator" would be frowned upon in our courts as it would imply a bias. We are "fire investigator's" and by following the scientific method we are able to present ourselves as unbiased experts within the court system.

Summary

In NZ, the NZFS typically carries out fire investigation and reporting, although this can occur in cooperation with or alongside a parallel police process. Within the NZFS, fire investigations are typically carried out by specialist Fire Safety Officers or less typically by Fire Engineers. A combination of formal training and experience informs their practice. The determination of origin and cause involves a combination of information gathering from first at the scene fire fighters and other witnesses, and a systematic process of eliminating possible causes based on physical evidence (e.g., flame travel) that reportedly worked well. Establishing clearer lines of responsibility among the various personnel involved in fire investigation (e.g., first-at-fire personnel, fire safety officers and fire engineers) was recommended along with targeting training in evidence preservation. Evidence is documented (e.g., photographs and witness statements) and included in an automated report completed away from the site of the fire. Fire investigations are typically documented in a report separate from the SMS incident report. It has a narrative format with the facility to attach photographs and other documents. Overall, participants found this reporting system easy to use although some problems were identified including the inability of operational staff to update the SMS incident report to match any emerging findings from the fire investigation; the poor dissemination of the investigation findings; and the limited search facility within the narrative report. Participants also identified that training in report writing would be useful, particularly around legal issues. The NZ Police also identified that increased fire service awareness of arson and the affect of fire investigation procedures on legal proceedings would be of benefit. They reported that overall practical cooperation between the Police and NZFS worked well.

Jurisdictional issues typically determine who will conduct fire investigations overseas. Typically, investigations are conducted at local level first and then passed up to state/territory/provincial or national level depending on factors such as seriousness of the fire. Investigations might be carried out by fire services, law enforcement or a combination of both depending on the area. A UK report (Home Office, 1999) identified the importance of inter-agency cooperation in fire investigation for the prevention of deliberately lit fires and the Arson Control Forum was established to support and encourage inter-agency cooperation. While law enforcement is primarily interested in investigating crimes and fire services have the primary responsibility of saving lives and protecting property against damage. The future reduction of deliberately lit fires or arson offences relies on the function of both groups and can only be assisted by their cooperation and understanding of each others roles.

Overseas, fire investigations reports are automated and typically completed away from the fire ground, although portable reporting devices were reportedly popular and increasingly being used. Suggestions for improvement included standard terminology between different reporting systems, the ability to update the first line reporting system to match the fire investigation findings (e.g., if the fire cause changes) and ensuring that fire investigation reports and compatible with the legal requirements of them.

Conclusions

Fire services and law enforcement agencies collect data on deliberately lit fires in NZ, Australia, UK, USA and Canada. NZ and UK have mandatory national data collection while the other countries, who all have state or provincial governments, rely on voluntary reporting for national statistics. The majority of data is recorded by automated systems with the ongoing goal of their simplification, training of users and development of quality assurance measures to ensure the production of reliable information from the data. Currently, there is less multi-agency working than is preferred, possibly due to different systems of collection, ways of defining the deliberate fire problem and responsibilities.

Deliberately lit fires are defined differently in each of the countries studied and often by the various fire service agencies within these countries. The need for simple and clear definitions was universally recognised. Arson is a criminal offence and is defined by the prevailing legislation of the area. It typically involves and intentional act of damage to property or person by fire or explosion. The differences in terminology between fire services and law enforcement accounts for the relatively higher incidence of deliberately lit fires recorded by the fire services.

In NZ, the incidence of deliberately lit fires has increased while the arson rate has decreased. This may be due to differences in data recording process and reflect the high rate of vegetation and miscellaneous fire, which do not always get reported to the Police. In Australia, the arson rate has increased overall while the incidence of deliberately lit fires has decreased. In UK and Canada, the incidence of deliberate fires increased, with a fluctuating arson rate. While in USA both the arson rate and incidence of deliberate fires fell.

Typically, the incidence of deliberate fires and recorded arsons fluctuated slightly from year to year. Fluctuations in the number of recorded arsons can occur for a variety of reasons that act in isolation or can be connected. These include changes in the processes used to record crime data, changes in reporting crime, shifts in the societal response to crime, the availability of police resources for the detection of crime, legislative changes that affect the boundaries of crime definition, social change (e.g., inflation and unemployment) and an actual change in offending. Fluctuations in the incidence of

deliberately lit fires can also occur because of changes in data collection processes and terminology, industrial action, public reporting practice, ease of reporting and actual change in the number of fires occurring.

Deliberately lit fires in NZ and Australia occurred most often outside, such as in rubbish bins, in vegetation and mobile property. However, miscellaneous fires (including outside fires) and vehicle fires were more common in NZ whereas vegetation fires were more common in Australia. UK and USA both had high rates of deliberate fires in structures and vehicles, although vehicles were more common in UK and deliberate structure fires were more common in USA. Other (or non-deliberate) fires were most common in structures in all countries except for Australia, where vegetation fires were most prolific.

Urban fires were most common, deliberate or non-deliberate. However, in NZ the incidence of deliberately lit fires in urban areas was increasing whereas the other countries studied were experiencing a downturn in the rate of deliberate or arson fires in urban areas.

In general, there are fewer fatalities in deliberately lit fires than other fires, possible because these fires occur proportionately less often in structures, and when they do, they often involve unoccupied structures. However, despite the lower rates of structure fires the monetary cost of deliberate fires accounts for up to a third of the total cost associated with all fires. This suggests that fire damage is more extensive in deliberate fires possibly due to the use of accelerants, and extra time taken to detect these fires that are often lit to avoid witnesses (Office of the Deputy Prime Minister, 2006).

Fire cause investigation and reporting is typically carried out by fire services, or a combination of fire services and law enforcement. Fire cause and origin is determined through a combination of information gathering from witnesses and the systematic elimination of causes from physical evidence. The importance of compatible reporting systems and terminology and an awareness of the affect fire investigation reports may have on legal proceedings was identified as important by NZ and overseas participants.

Recommendations

These recommendations are only an outline of possible avenues of development. Further investigation and discussion will be necessary before changes are decided and the invalidation of historical data as a result of changing the system must act as a cautionary voice.

SMS - Overview

1. Maintain a centralised approach to data collection within the NZFS.
2. Simplify SMS (e.g., fire cause category) by reducing the level of detail required by the system and review the current format so that it efficiently meets the needs of all groups of users (e.g., adequately records human behaviour).
3. Improve the search function of SMS to allow operational staff to access data more easily.

The information collected by SMS

4. Revise the current fire cause categories so they:
   - (a) are clear and simple – easy to understand and are not confusing
   - (b) have standardised definitions available to all system users
   - (c) are compatible with Police requirements or at least are not problematic for them (e.g., legal proceedings)
   - (d) are compatible with other in house reporting systems (e.g., fire investigation).
5. Review other categories under which data is currently being collected to ensure that appropriate and relevant data is being collected, and ensure that detail that is not required, is complex or is confusing does not get collected.
6. Collect information on the cost of deliberately lit fires, including the monetary loss associated with property damage.
7. Provide staff with standardised definitions for system terminology (e.g., fire cause categories) and work towards inter-agency compatibility.

Staff training

8. Provide ongoing staff training on how to use the system, including manuals (or inbuilt help functions) and the importance of collecting statistical data.

9. Train staff in standardised definitions devised for system terminology (e.g., fire cause categories).

10. Train targeted personnel in evidence preservation, interviewing techniques, and the legal issues relevant to fire investigation report writing.

Compatibility of systems within the NZFS and between stakeholders

11. Enable the SMS incident report and the fire investigation process to work alongside one another.

12. When revising SMS, keep in mind the importance of the compatibility of data collection systems with stakeholder agencies, such as the Police (e.g., fire cause category).

13. Develop a more cooperative relationship with the Police through education and clarification of respective roles, and conduct regular meetings.

Fire investigation and reporting

14. Establish clearer lines of responsibility among the various personnel involved in fire investigation (e.g., first-at-fire personnel, fire safety officers, and fire engineers).

15. Develop systems for the dissemination of fire investigation report findings to interested parties within the investigating organisations.

16. Improve the ability to key word search within fire investigation reports.

17. Allow the SMS incident reports to be updated by operational staff to match emerging fire investigation findings.

18. Develop a more cooperative relationship with the Police in fire investigations, possibly by establishing arson taskforces.

APPENDICES

APPENDIX A

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FIRE CAUSE REPORTING PROCESSES AND STATISTICAL DATA FOR DELIBERATELY LIT FIRES: SURVEY OF DATA ANALYSTS/ADMINISTRATORS

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The Contestable Research Fund of the New Zealand Fire Commission is sponsoring the University of Auckland (Samantha Haines and Dr Ian Lambie) to conduct a survey of fire cause reporting processes and statistical data for deliberately lit fires, in order to acquire an understanding of current 'best practice' in the area. The information from this survey will be disseminated in the hope of enhancing practice, policy, research and legislation in this area.

A copy of the report provided to the New Zealand Fire Service can be accessed from the New Zealand Fire Service website from 2007: http://www.fire.org.nz

- Please answer as many questions as you can. If questions do not apply to your experience, please indicate this where possible.
- The researcher(s) can telephone/email you to discuss any questions that are unclear or that you would prefer to answer verbally.
- Feel free to make qualifications or additional comments on this form, where applicable.
- In completing the survey, please refer to any documentation or other staff necessary to provide as accurate information as possible.
- All survey items relate specifically to deliberately lit fires, unless stipulated.

Thank you in advance for participating in this vital research.

A. BACKGROUND INFORMATION

Name of the organisation:

Telephone number of the organisation: (include country & area code):

Website address:

Postal address of the organisation:

Your first name:

Your last name:

I give permission for the Researchers to contact me for further information relating to this survey

(check the best answer):   ☐Yes   ☐No

      (i) If you checked 'Yes', please complete the following questions:

      Preferred contact telephone number:

      Preferred email address:

Your position/role in the organisation:

Number of years/months you have been performing this role (or similar):

Are you *(check the best answer)*:☐Full-Time   ☐Part-Time   ☐Volunteer   ☐Consultant

B. FIRE CAUSE

B1.   According to your organisation, who determines that a fire has been deliberately lit? *(check all that apply)*

☐Fire department arson investigator

☐Regional arson task force investigator

☐State arson investigator

☐Incident commander or other first-in fire officer

☐Police department

☐Contract investigator

☐Insurance investigator

☐Other (please specify)

B2. Briefly describe the steps in the fire cause reporting process:

B3. What parts of this process work well? Any why?

B4. In what ways could this process be improved? *(try to think of at least two ways)*

(i)

(ii)

Others

C. DATA COLLECTION

C1. What departments or services within your organisation collect data on deliberately lit fires?

C2. What personnel are responsible for collecting the data?

C3. What data is collected on deliberately lit fires?

C4. What computer software and/or manual systems are used to collect the data?

C5. Is there any data that is collected but does not get entered into the database?

(check the best answer) ☐Yes ☐No

If you checked 'Yes', please answer the following questions:

What data?

State the main reason why the data does not currently get entered:

C6. Briefly describe the process for data collection? *(include a description of a typical scenario)*

C7. What improvements could be made to data collection processes? *(try and think of at least two improvements)*

(i)

(ii)

Others:

C8. What are the strengths of current data collection processes? *(try and think of at least two strengths)*

(i)

(ii)

Others:

C9. To what extent does your organisation coordinate and cooperate with other organisations that collect data on deliberately lit fires? *(please specify the other organisations e.g., law enforcement, fire authorities, mental health)*

C10. What are some of the barriers to inter-organisation cooperation and coordination? *(try and think of at least two)*

(i)

(ii)

Others:

C11. In what ways/how could inter-organisation coordination and cooperation be improved? *(try and think of at least two ways)*

(i)

(ii)

Others:

D. *DATA STORAGE*

D1. Once the data is collected, is it collated together and stored on a central organisational database? *(check the best answer)* ☐Yes ☐No

If you checked 'Yes', please answer the following questions:

(i) What computer software/database is currently used to store data on deliberately lit fires?

(ii) What are the benefits of the current system/database used to store data on deliberately lit fires? *(try to list at least two)*

(iii) What are some problems with how the data is currently stored?

(iv) Describe how the data from different sources is collated together?

(v) How is duplication of data avoided?

(vi) What is the extent of non-reporting of data?

(vii) What are some of the barriers to full reporting?

(viii) What are your suggestions for improving the reporting processes?

(ix) What personnel are currently responsible for managing the data?

(x) What specialist training have they received in regards to data management?

D2. What computer software (or other system) was used to store data on deliberately lit fires, prior to the current system?

(i)   When did it change to the current one? *(check the best answer)*

☐ 2000 – 2006   ☐ 1983 – 1988

☐ 1994 – 1999   ☐ Before 1983

☐ 1989 – 1993   ☐ N/A

(ii)   Were there any problems transferring to the new system (e.g. lost data)?

E.   Data FIELDS/CATEGORIES

E1.   Do you have a field(s) for fire cause? *(check the best answer)*   ☐ Yes   ☐ No

If you checked 'No': How is the cause of a fire represented in your data system?

If you checked 'Yes', please answer the following questions:

(i)   List the categories that are available within the field for fire cause?

(ii)   List the categories that can be used to refer to deliberately lit fires (e.g., deliberate, suspicious):

(iii)   What are the definitions for each fire cause category that refers to *deliberately lit fires*?

(iv)   How are 'arson' fires differentiated from other deliberately lit fires?

E2.   Do you have a field(s) for incident type or a field to identify the type of object set alight (e.g., vegetation, structure)? *(check the best answer)*

☐ Yes   ☐ No

If you checked 'Yes', please answer the following questions:

(i)   List the categories that are available within this field(s). And how they are defined:

(ii)   List some changes that could be made to improve this field and/or the associated categories?

E3.   Do you have a field(s) to identify the specific object that was lit?

(check the best answer)   ☐ Yes   ☐ No

If you checked 'Yes', please answer the following questions:

(i)   List the categories available within this field(s)?

(ii)   List some changes that could be made to improve this field and/or the associated categories?

E4.   Do you have a field(s) to identify what material the ignited object was made of?

(check the best answer)   ☐ Yes   ☐ No

If you checked 'Yes', please answer the following questions:

(i)   List the categories are available within this field(s)?

(ii)   List some changes that could be made to improve this field and/or the associated categories?

E5.   Do you have a field(s) to identify general and specific property use?

(check the best answer)   ☐Yes   ☐No

If you checked 'Yes', please answer the following questions

(i)   List the categories that are available within this field(s):

(ii)   List some changes that could be made to improve this field and/or the associated categories?

E6.   What other fields/categories do you use that is specifically relevant to the issue of deliberately lit fires?

E7.   Are there any provisional fields where data is temporarily stored and then reassigned (e.g., assigning fires as 'unknown origin' until confirmation of cause has been determined)?
(check the best answer)   ☐Yes   ☐No
If you checked 'Yes', list any problems you have with this system:

E8.   Are use of any of the fields restricted by legal definitions or requirements?

(check the best answer)   ☐Yes   ☐No

If you checked 'Yes', state the fields and the corresponding legal definitions or requirements that restrict them:

E9.   Is there any data collected that does not easily fit into the database fields or categories?

E10.   What fields or categories are not used very often or at all?

E11.   What fields or categories could be *added* to increase the usefulness of the system to deal specifically with deliberately lit fires?

E12.   What fields or categories could be *changed* to increase their usefulness? And how?

E13.   What other problems do you encounter with the data fields and categories currently available and how would you solve those problems?

E14.   What is the procedure for recording data on a deliberately lit fire when there is more than one fire offence?

E15. What is the procedure for recording data on a deliberately lit fire when the same person committed other non-fire offences?

E16. Do fields/categories require an answer (i.e., can not be left blank)?

F. DATA REPORTING

F1. List the ways that the data is currently used:

F2. How could its current use be improved?

F3. List the agencies or organisations that currently *use* the data? And in what ways?

F4. What agencies or organisations currently *report* the data? And to what groups?

F5. Is there a central organisation that reports the data nationally? (please specify)

F6. In general, what data is most often reported by your organisation and others who report data on deliberately lit fires?

F7. Is any of the data collected and stored, but not reported?

F8. What are some problems with the way the data is currently being used?

F9. How are errors in the data anticipated and dealt with?

G. STATISTICAL DATA

The following questions refer to statistical data for the last five years (please stipulate if your answers refer to more than five years or less than five years). Please list annual figures where possible. Feel free to forward any statistical data to assist with answering the questions below.

G1. What have been the figures for monetary losses (property damage) in deliberately lit fires compared to other fires?

   (i) How are the figures for monetary losses from deliberate fires arrived at?

G2. What is the percentage (%) of fire spread in deliberately lit fires compared with other fires?

G3.   How many human fatalities from deliberately lit fires have there been compared with other fires? *(in relation to total number of deliberately lit and other fires)*

G4.   How many non-fatal injuries from deliberately lit fires have there been compared with other fires?   *(in relation to total number of deliberately lit and other fires)*

G5.   What has been the cost of time spent attending to malicious false alarms compared with other false alarms?

G6.   What has been the cost of protection and prevention measures in anticipation of deliberately lit fires compared with other fires?

G7.   What have been the various costs of responding to deliberately lit fires (e.g., extinguishing and clearing up; investigation; prosecution) compared with compared with other fires?

G8.   What has been the total cost of deliberately lit fires compared with other fires? *(specify how figure is derived)*

G9.   How have deliberately lit fires been distributed between different property types?

G10.   How have deliberately lit fires been distributed between different communities?

Do you have any other comments or suggestions for the field?

FIRE CAUSE REPORTING PROCESSES AND STATISTICAL DATA FOR DELIBERATELY LIT FIRES: SURVEY OF DATA SYSTEMS USERS

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A. BACKGROUND INFORMATION

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Website address:

Postal address of the organisation:

Your first name:

Your last name:

I give permission for the Researchers to contact me for further information relating to this survey *(check the best answer)*: ☐ Yes ☐ No

   (i) If you checked 'Yes', please complete the following questions:

   Preferred contact telephone number:

   Preferred email address:

Your position/role in the organisation:

Number of years/months you have been performing this role (or similar):

Are you *(check the best answer)*: ☐ Full-Time ☐ Part-Time ☐ Volunteer ☐ Consultant

B. FIRE CAUSE

B1.   According to your organisation, who determines that a fire has been deliberately lit? *(check all that apply)*

☐ Fire department investigator

☐ Regional arson task force investigator

☐ State arson investigator

☐ Incident commander or other first-in fire officer

☐ Police department

☐ Contract investigator

☐Insurance investigator

☐Other (please specify)

B2.   Briefly describe the steps in the fire cause reporting process:

B3.   What parts of this process work well? Any why?

B4.   In what ways could this process be improved? *(try to think of at least two ways)*

(i)

(ii)

Others

B5.   In your opinion, how well do the aspects of fire incident reporting (e.g., incident report, communication log, fire investigation report) work together?

(i). How could this system be improved?

C. DATA SYSTEM

C1.   What type of computer software/database do you use when entering information on deliberately lit fires? *(if you use more than one please list both and the different uses for each)*

C2.   What fields and/or categories do you use to report the cause of a fire as deliberate or arson?

C3.   Why do you use these fields and/or categories as opposed to others?

C4.   Are there any other fields and/or categories you could use to report the fire as deliberately lit but don't? *(check the best answer)*   ☐Yes   ☐No
If you checked 'Yes', please answer the following questions:

(i)   What fields and/or categories are they?

(ii)   What are your reasons for not using them?

C5.   What fields and/or categories do you use to report the object that was set on fire?

C6.   In your opinion, is this system easy to use?
(check the best answer)   ☐Yes   ☐No
If you checked 'Yes', what makes it easy to use?

If you checked 'No', what makes it difficult to use?

C7. What parts of this system/database **help** you to do your job? And how?

C8. What parts of this system **do not help you** to do your job? And why?

C9. What fields or categories do you find **useful**? And why?

C10. What fields or categories are **not useful**? And why?

C11. Are there any fields or categories that you do not fill out? And why?

C12. What suggestions do you have for improving the system? (try and think of at least two)

(i)

(ii)

Others:

Do you have any other comments or suggestions for the field?

FIRE CAUSE REPORTING PROCESSES AND STATISTICAL DATA FOR DELIBERATELY LIT FIRES: NEW ZEALAND POLICE

The Contestable Research Fund of the New Zealand Fire Commission is sponsoring the University of Auckland (Samantha Haines and Dr Ian Lambie) to conduct a survey of fire cause reporting processes and statistical data for deliberately lit fires, in order to acquire an understanding of current 'best practice' in the area. The information from this survey will be disseminated in the hope of enhancing practice, policy, research and legislation in this area.

A copy of the report provided to the New Zealand Fire Service can be accessed from the New Zealand Fire Service website from 2007: http://www.fire.org.nz

Thank you in advance for participating in this vital research.

Samantha Haines and Dr Ian Lambie

Psychology Department

University of Auckland

Private Bag 92019

Auckland

New Zealand

s.haines@xtra.co.nz or i.lambie@auckland.ac.nz

A. BACKGROUND INFORMATION

Your first name:

Your last name:

      Preferred contact telephone number:

      Preferred email address:

Your position/role in the organisation:

Number of years/months you have been performing this role (or similar):

Are you *(check the best answer)*: ☐ Full-Time   ☐ Part-Time   ☐ Volunteer   ☐ Consultant

B. FIRE CAUSE

B1.   According to your organisation, who determines that a fire has been deliberately lit?

B2.   Briefly describe the fire cause *investigation* process

B3.   What parts of this process work well (i.e., strengths)? Any why?

B4.   In what ways could this process be improved?

B5.   Briefly describe the fire cause *reporting* process

B6.   What parts of this process work well (i.e., strengths)? Any why?

B7.   In what ways could this process be improved?

C. DATA

C1.   What statistical data is collected on deliberately lit fires?

C2.   How is the data collected?

C3.   Describe the process for reporting on the data, including any external groups that may be involved.

C3.   What parts of this process work well (i.e., strengths)? Any why?

C4.   In what ways could this process be improved?

C5.   What are some of the barriers to inter-agency data sharing? And how could they be addressed?

Do you have any other comments or suggestions for the field?

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SURVEY OF STATISTICAL DATA FOR DELIBERATELY LIT FIRES: DISTRIBUTION AND MONETARY LOSS

</div>

The Contestable Research Fund of the New Zealand Fire Commission sponsors this project. The New Zealand Fire Service and the University of Auckland (Samantha Haines and Dr Ian Lambie) are collaborating to conduct a survey of the statistical data collected for deliberately lit fires. The analysis of statistical data is essential for the proper administration of any fire prevention strategy and can be used to reveal specific problem areas toward which prevention initiatives can be directed. Understanding the scope of the problem of deliberately lit fires is the first step in developing effective measures to prevent it.

A copy of the report provided to the New Zealand Fire Service can be accessed from the New Zealand Fire Service website from 2007: http://www.fire.org.nz

- Please answer as many questions as you can.
- Box D asks for background information. The completion of this box is optional.
- The researcher(s) can telephone/email you to discuss any questions that are unclear or that you would prefer to answer verbally.
- Feel free to make qualifications or additional comments on this form, where applicable.
- In completing the survey, please refer to any documentation or other staff necessary to provide as accurate information as possible.

Thank you in advance for participating in this vital research.

A. THE COST OF FIRES

A1.   Does your organisation collect figures for monetary losses from fire?

(check the best answer)   ☐ Yes   ☐ No

If you checked 'Yes':
(i)   What has been the total monetary loss from fire, over the last five years (if you do not have data for the last five years please indicate monetary losses for the time period you have data)

A2.   In collecting figures for monetary losses, does your organisation differentiate between deliberately lit fires (e.g., arson, suspicious, deliberate) and other fires?
(check the best answer)   ☐ Yes   ☐ No

If you checked 'Yes':
(i)   What have been the figures for monetary losses in deliberately lit fires compared to other fires, over the last five years? (if you do not have data for the last five years please indicate monetary losses for the time period you have data)

(ii)   How are the figures for monetary losses from deliberate fires arrived at?

B. PROPERTY TYPES AND COMMUNITIES – DELIBERATELY LIT FIRES

B1.   Does your organisation collect data on how *deliberately lit fires* are distributed between different property types (e.g., structures, vegetation, vehicles)?
(check the best answer)   ☐ Yes   ☐ No

If you checked 'Yes':
(i)   List the distribution of *deliberately lit fires* across the property types you have data for, for the last five years (if you do not have data for the last five years please indicate monetary losses for the time period you have data)

(ii)   How are deliberately lit fires distributed across the property types compared with other fires?

B2.   Does your organisation collect data on how deliberately lit fires are distributed between different communities (e.g., geographical, rural/urban, socioeconomic)?
(check the best answer)   ☐ Yes   ☐ No
If you checked 'Yes':

(i)   List the distribution of deliberately lit fires across the communities you have data for, for the last five years *(if you do not have data for the last five years please indicate monetary losses for the time period you have data)*

C1.   Does your organisation collect data on how fires are distributed between different   property types?
(check the best answer)   ☐Yes   ☐No
If you checked 'Yes':
(i)   List the distribution of fire across the property types you have data for, for the last five years *(if you do not have data for the last five years please indicate monetary losses for the time period you have data)*

C2.   Does your organisation collect data on how fires are distributed between different communities?
(check the best answer)   ☐Yes   ☐No
If you checked 'Yes':
(i)   List the distribution of fire across the communities you have data for, for the last five years *(if you do not have data for the last five years please indicate monetary losses for the time period you have data)*

Do you have any other comments or suggestions for the field?

FIRE CAUSE REPORTING PROCESSES AND STATISTICAL DATA FOR DELIBERATELY LIT FIRES: SURVEY OF FIRE CAUSE INVESTIGATORS

The Contestable Research Fund of the New Zealand Fire Commission is sponsoring the University of Auckland (Samantha Haines and Dr Ian Lambie) to conduct a survey of fire cause reporting processes and statistical data for deliberately lit fires, in order to acquire an understanding of current 'best practice' in the area. The information from this survey will be disseminated in the hope of enhancing practice, policy, research and legislation in this area.

A copy of the report provided to the New Zealand Fire Service can be accessed from the New Zealand Fire Service website from 2007: http://www.fire.org.nz

- Please answer as many questions as you can.
- The researcher(s) can telephone/email you to discuss any questions that are unclear or that you would prefer to answer verbally.
- Feel free to make qualifications or additional comments on this form, where applicable.
- In completing the survey, please refer to any documentation or other staff necessary to provide as accurate information as possible.
- All survey items relate specifically to deliberately lit fires, unless stipulated.

Thank you in advance for participating in this vital research.

Samantha Haines and Dr Ian Lambie
Psychology Department
University of Auckland
Private Bag 92019
Auckland
New Zealand
s.haines@xtra.co.nz or i.lambie@auckland.ac.nz

Name of the organisation:

Telephone number of the organisation: (include country & area code):

Postal address of the organisation:

Your first name:

Your last name:

I give permission for the Researchers to contact me for further information relating to this survey *(check the best answer)*: ☐Yes ☐No

    (i) If you checked 'Yes', please complete the following questions:

      Preferred contact telephone number:

      Preferred email address:

Your position/role in the organisation:

Number of years/months you have been performing this role (or similar):

Are you (check the best answer): ☐Full-Time ☐Part-Time ☐Volunteer ☐Consultant

B. FIRE CAUSE

B1.   According to your organisation, who determines that a fire has been deliberately lit? (check all that apply)

☐Fire department investigator

☐Regional arson task force investigator

☐State arson investigator

☐First-in fire officer

☐Incident commander

☐Police department

☐Contract investigator

☐Insurance investigator

☐Other (please specify)

B2. How have you developed your fire investigation skills? *(check the best answer)*

☐ Formal fire investigation training

☐ Practical experience

☐ All of the above

(i) What aspects of your training and /or practical experience have you found most useful in carrying out fire investigations?

B3. How do you determine the cause of a fire? (e.g., process of elimination, judgement etc., please elaborate on the process you use)

B4. What parts of this fire cause determination process work well? Any why?

B5. In what ways could this fire cause determination process be improved? *(try to think of at least two ways)*

(i)

(ii)

Others

C. FIRE INVESTIGATION REPORTING

C1. Once fire cause is established, describe the steps in the fire investigation reporting process:

C2. What parts of this fire investigation reporting process work well? Any why?

C3. In what ways could this fire investigation reporting process be improved? *(try to think of at least two ways)*

(i)

(ii)

Others

C4 Do you complete your fire investigation reports according to: *(check all that apply)*

☐ A documented set of guidelines

☐ Professional experience and judgement

☐ Other *(please elaborate)*

C5. Have you had any formal training in writing fire investigation reports? *(check the best answer)* ☐ Yes ☐ No

C6. Do you think formal training in writing fire investigation reports would be useful?

(check the best answer) ☐ Yes ☐ No

If you checked 'Yes', what important topics would you like the training to include?

C7.   In your opinion, how well do the aspects of fire incident reporting system (incident report, communication log, fire investigation report) work together?

(i) How could this system be improved?

D. REPORTING SYSTEMS

D1.   What computer and/or manual reporting systems assist you in completing a fire investigation report?

D2.   In your opinion, is this system easy to use?
(check the best answer)   ☐Yes   ☐No

(i)   If you checked 'Yes', what makes it easy to use?

(ii)   If you checked 'No', what makes it difficult to use?

D3.   What parts of this system **help** you to do your job? And how?

D4.   What parts of this system **do not help** you to do your job? And why?

D5.   What suggestions do you have for improving the systems currently operating? *(try and think of at least two)*

(i)

(ii)

Others:

Do you have any other comments or suggestions for the field?

Once again, thank you for your time and participation.

APPENDIX F

THE UNIVERSITY SECRETARIAT
Office of the Vice-Chancellor
Research Ethics and Biological Safety Administration

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

Room 001, The Registry
Alfred Nathan House
24 Princes Street, Auckland
Telephone: 64 9 373 7599
Extension: 87830 / 83711
Facsimile: 64 9 373 7603

UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE

The University of Auckland
Private Bag 92019
Auckland, New Zealand

23 September, 2005

MEMORANDUM TO:

Dr Ian Lambie

Psychology

Re: Change to application

I wish to advise you that the Committee met on 21 September , 2005 and reviewed the request for change to your application titled "International approaches to reducing deliberately lit fires" (Our Ref. 2005 / 334).

The Committee approved the change.

If the project changes significantly you are required to resubmit your appplication to the Committee for further consideration.

In order that an up-to-date record can be maintained, it would be appreciated if you could notify the Committee once your project is completed.

Please contact the Chairperson if you have any specific queries relating to your application. He and the members of the Committee would be most happy to discuss general matters relating to ethics provisions if you wish to do so.

Margaret Rotondo
Executive Secretary
University of Auckland Human Participants Ethics Committee

c.c.   Head of Department, Psychology

Samantha Haines

1. All communications with the committee regarding this application should indicate this reference number - (2005/334).
2. At the end of the three years, or earlier if the project is completed, you are requested to advise the Committee of its completion.

3. Normally projects are approved for three years. Should you require an extension to your applications write to the UAHPEC giving full details.Extensions me be granted for up to 6 years in total, after which time you must make a new application.

4. Should you need to make and further changes to the project write to the UAHPEC giving full details including any appropriately revised accompanying documentation such as PISs and CFs.

5. Do not forget to fill in the 'approval wording' on the Participant Information Sheets and Consent Forms giving the dates of approval and the reference number before you send them out to your subjects

Note: Approval of this change does not constitute an extension of the project approval period.

PARTICIPANT INFORMATION SHEET

International approaches to preventing deliberately lit fires.

Invitation

To the Chief Executive Officer, Director or Manager of organisations that collect, store and/or report statistical data on deliberately lit fires.

We would like to invite your staff to be part of a research study run by the Psychology Department of the University of Auckland, with support from the New Zealand Fire Service.

Who is organising the study?

The study has been organised by people from the Psychology Department at the University of Auckland and is sponsored by the New Zealand Fire Service. The researchers involved are Samantha Haines, who is a Clinical Psychology Doctorate student at the University of Auckland and Dr Ian Lambie, who is the Director of the Clinical Psychology programme at the University of Auckland.

What is this study about?

This study has two main objectives:
(i)   To explore the statistical data and data systems used internationally to collect, store and/or report information on deliberately lit fires.
(ii)   To explore the implementation and operation of International prevention/intervention programmes for people who deliberately light fires.

From this exploration we will extrapolate International 'best practice', which will be disseminated in the hope of enhancing current practice, policy and legislation in the area. A copy of the final report can be downloaded in 2007, from the official website of the New Zealand Fire Service (http://www.fire.org.nz).

Participation in this study

Participants were purposively chosen for their expert knowledge in the area of statistical data and data systems relating to deliberate fire setting:

(i)   Data analysts/administrators and data users
While it may be possible to collect information from the literature and programme documentation these do not tell the whole story. Therefore, it is important to learn from the experience and insight of people who work with the data and the systems used to collect it.

Giving consent for your staff to participate in this study means that their participation will not affect their employment within your organisation or their relationship with you as their employer. Participation in this

study is voluntary. Participants who decide to take part in this study can pull out at any time and withdraw their data without giving reasons up until 1 April 2006, Participants do not have to answer all the questions; they may stop the interview at any time and /or decide not to return their questionnaire.

What does this study involve doing?

After the researchers have received written consent that your staff can take part in this study, staff will be given information about the study and also asked to provide written consent to participate.

This study involves filling out a questionnaire and for some people it will also involve providing additional detail or depth to their responses. The questionnaire will give the option of providing contact details so that the researchers can collect additional information they believe will enrich the study. This is purely voluntary and all contact details will be kept under lock and key and be accessed by the researchers only.

The questionnaire entitled 'Fire cause reporting processes and statistical data for deliberately lit fires: Survey of data system users', will take approximately 20 minutes to complete. This questionnaire explores perceptions of the current data system used to collect, store or report data on deliberately lit fires. This information will be used to inform the further development of user friendly data interfaces within New Zealand.

The questionnaire entitled 'Fire cause reporting processes and statistical data for deliberately lit fires: Survey of data system administrators/analysts', will take approximately 40 minutes to complete. This questionnaire explores the operation of the data systems used to collect, store or report data on deliberately lit fires from the perspective the data analyst/administrator. This information will be used to inform the further development of effective and efficient data systems and collection/reporting processes within New Zealand.

Any additional discussion undertaken directly with the researcher(s) may take anywhere between 10 and 20 minutes, depending on the richness of detail required.

What happens to participant information?

All completed questionnaires can be returned directly to the researchers. All information is kept under lock and key at the University of Auckland for a period of six years after which the data will be destroyed by wiping floppy/compact disks and shredding data sheets. Only the researcher will have access to this information. Anonymity on the web based survey can be guaranteed to the extent that Secure Sockets Layer (SSL) encryption is used. SSL is a protocol developed by Netscape for transmitting private documents via the Internet. It uses a cryptographic system that uses two keys to encrypt data − a public key known to everyone and a private or secret key known only to the recipient of the message. All information from the web based survey will be extracted by the researcher. No information that could personally identify participants will be used in any discussion, reports or publications about the study.

What if I have questions about the study?

If you wish to know more about the study or discuss your participation, feel free to contact:

- Samantha Haines, s.haines@xtra.co.nz, telephone/facsimile (07) 839 3803, telephone (09) 373 7599 extension 86755 or 021 422 421.
- Dr Ian Lambie, i.lambie@auckland.ac.nz, telephone (09) 373 7599 extension 85012.
- The Head of the Psychology Department is Associate Professor Fred Seymour, f.seymour@auckland.ac.nz, telephone 09 373 7599 extension 88414.
- Samantha Haines, Dr Ian Lambie and Associate Professor Fred Seymour can also be contacted by mail to the Psychology Department, University of Auckland, Private Bag 92019, Auckland, New Zealand or by facsimile on (09) 373 7450.

Ethical approval

This study has received ethical approval from the University of Auckland Human Participants Ethics Committee on 21/09/2005 for a period of 3 years, from 21/09/2005. Reference no. 2005 / 334.

If you have any concerns of an ethical nature contact: The Chair, The University of Auckland Human Participants Ethics Committee, Office of the Vice Chancellor, Research Office, Level 2, 76 Symonds Street, Auckland.   Telephone: 373-7599 extension 87830.

THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF SIX YEARS

International approaches to preventing deliberately lit fires.

Researchers

Samantha Haines and Dr Ian Lambie from the Psychology Department of the University of Auckland and sponsored by the New Zealand Fire Service.

To

The Chief Executive Officer, Director or Manager of organisations that collect, store and/or report statistical data on deliberately lit fires.

Please read the following statements

- I have read and understood the Participant Information Sheet.
- I have had the opportunity to discuss this study with the researchers and I am satisfied with the answers I have been given.
- I give permission for the researchers to access employees of my programme/organisation.
- I guarantee that participation or non-participation of employees will not affect their employment in any way.
- I will give all relevant staff the opportunity of taking part in this study and will pass on the participant information sheets, consent forms and questionnaires provided by the researchers.
- I understand that participation in the study is voluntary.
- I understand that participants can withdraw their data up until 1June 2006.
- I understand that the data will be kept under lock and key at the University of Auckland, separate from the consent forms, for a period of six years after which it will be destroyed.
- I understand that the information from this study will be presented to the New Zealand Fire Service in report format and may be published in academic journals and other outlets considered suitable by the researchers.
- I understand that if the information provided is reported or published, it will be done in a way that does not identify any individual as its source.

Please sign the consent form below if you give permission for your employees to take part in this research

Date: Organisation Name:

Name: Signature:

Ethical approval

This study has received ethical approval from the University of Auckland Human Participants Ethics Committee on 21/09/2005 for a period of 3 years, from 21/09/2005. Reference no. 2005 / 334.

PARTICIPANT INFORMATION SHEET

International approaches to preventing deliberately lit fires.

Invitation

To the staff of organisations that collect, store and/or report statistical data on deliberately lit fires.
We would like to invite you to be part of a research study run by the Psychology Department of the University of Auckland, with support from the New Zealand Fire Service.

Who is organising the study?

The study has been organised by people from the Psychology Department at the University of Auckland and is sponsored by the New Zealand Fire Service. The researchers involved are Samantha Haines, who is a Clinical Psychology Doctorate student at the University of Auckland and Dr Ian Lambie, who is the Director of the Clinical Psychology programme at the University of Auckland.

What is this study about?

This study has two main objectives:

(i)   To explore the statistical data and data systems used internationally to collect, store or report information on deliberately lit fires.
(ii)   To explore the implementation and operation of International prevention/intervention programmes for people who deliberately light fires.

From this exploration we will extrapolate International 'best practice', which will be disseminated in the hope of enhancing current practice, policy and legislation in the area. A copy of the final report can be downloaded in 2007, from the official website of the New Zealand Fire Service (http://www.fire.org.nz).

Participation in this study

Participants were purposively chosen for their expert knowledge in area of statistical data and data systems regarding deliberate fire setting:

(i)   Data analysts/administrators and data users

While it may be possible to collect information from the literature and programme documentation these do not tell the whole story and it is important that people such as yourself are surveyed to gain from your experience and insight.

Permission to participate in this study has been granted by your employer and they have guaranteed that if you take part in this study or choose not to, it will not affect your employ within your organisation or your relationship with your employer. Participation in this study is voluntary. If you decide you do not want to take part in this study you can pull out at any time and withdraw your data without giving reasons, up until 1 June 2006. Participants who decide to take part do not have to answer all the questions; you may stop the interview at any time and /or decide not to return your questionnaire.

What does this study involve doing?

This study involves filling out one of the questionnaires listed below and for some people it will also involve providing additional detail or depth to their responses. The questionnaire will give you the option of providing your contact details so that the researchers can contact you for additional information they believe will enrich the study. This is purely voluntary and your contact details will be kept under lock and key and be accessed by the researchers only. After the researchers have received your written consent to participate in the study, the questionnaire can be completed in three different ways: online by accessing a website address the researchers will provide; via an MS Word document that the researchers can email to you; by pen and paper. The completed questionnaire can be returned to the researchers via email or mail. The researchers are also happy to conduct the questionnaire entirely as a telephone interview, if you would prefer. The accompanying consent form asks you to choose how you intend to complete and return the questionnaire, so the researchers can organise this for you.

The questionnaire entitled 'Fire cause reporting processes and statistical data for deliberately lit fires: Survey of data system users', will take approximately 20 minutes to complete. This questionnaire explores perceptions of the current data system used to collect, store or report data on deliberately lit fires. This information will be used to inform the further development of user friendly data interfaces within New Zealand.

The questionnaire entitled 'Fire cause reporting processes and statistical data for deliberately lit fires: Survey of data system administrators/analysts', will take approximately 40 minutes to complete. This questionnaire explores the operation of the data systems used to collect, store or report data on deliberately lit fires from the perspective the data analyst/administrator. This information will be used to inform the further development of effective and efficient data systems and collection/reporting processes within New Zealand.

Any additional discussion undertaken directly with the researcher(s) may take anywhere between 10 and 20 minutes, depending on the richness of detail required.

A reminder letter will be sent out to participants three weeks after giving consent and then again after a following two weeks. Those participants who have already completed the questionnaire should ignore the reminder letters.

What happens to information about me?

All completed questionnaires can be returned directly to the researchers. All information is kept under lock and key at the University of Auckland for a period of six years after which the data will be destroyed by wiping floppy/compact disks and shredding data sheets. Only the researcher will have access to this information. Anonymity on the web based survey can be guaranteed to the extent that Secure Sockets Layer (SSL) encryption is used. SSL is a protocol developed by Netscape for transmitting private documents via the Internet. It uses a cryptographic system that uses two keys to encrypt data − a public key known to everyone and a private or secret key known only to the recipient of the message. All information from the web based survey will be extracted by the researcher. No information that could personally identify you will be used in any discussion, reports or publications about the study.

What if I have questions about the study?

If you wish to know more about the study or discuss your participation, feel free to contact:

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CONSENT FORM

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International approaches to preventing deliberately lit fires.

Researchers

Samantha Haines and Dr Ian Lambie from the Psychology Department of the University of Auckland and sponsored by the New Zealand Fire Service.

To

The staff of organisations that collect, store and/or report statistical data on deliberately lit fires.

Please read the following statements and sign the consent form if you agree to take part in this research

- I have read and understood the Participant Information Sheet.
- I have had the opportunity to discuss this study with the researchers and I am satisfied with the answers I have been given.
- I understand that participation in the study is voluntary.
- I understand that I can withdraw my participation and my data up to 1 June 2006.
- I understand that the data will be kept under lock and key at the University of Auckland, separate from the consent forms, for a period of six years after which it will be destroyed.
- I understand that the information from this study will be presented to the New Zealand Fire Service in report format and may be published in academic journals and other outlets considered suitable by the researchers.
- I understand that if the information provided is reported or published, it will be done in a way that does not identify any individual as its source.
- I understand my employer has given permission for me to participate in this study.
- I understand that my employer has guaranteed that my participation in this study will not affect my employment or my relationship with my employer.
- I agree to take part in this research.

Date: Organisation Name:

Name: Signature:

___   Please email me the website link so I can complete the questionnaire online

___   Please email me the questionnaire as a MS Word document so I can complete it on my computer and return it via email (please specify an alternative format if required)

___ Please email me the questionnaire as a MS Word document so I can print it out, complete it and return it in a self-addressed envelope (please specify an alternative format if required)

Please specify your email address and/or your postal address according to your chosen option:

Ethical approval

This study has received ethical approval from the University of Auckland Human Participants Ethics Committee on 21/09/2005 for a period of 3 years, from 21/09/2005. Reference no. 2005 / 334.

PARTICIPANT INFORMATION SHEET

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(ii)   To explore the implementation and operation of International prevention/intervention programmes for people who deliberately light fires.

From this exploration we will extrapolate International 'best practice', which will be disseminated in the hope of enhancing current practice, policy and legislation in the area. A copy of the final report can be downloaded in 2007, from the official website of the New Zealand Fire Service (http://www.fire.org.nz).

Participation in this study

Participants were purposively chosen for their expert knowledge in area of statistical data and data systems regarding deliberate fire setting:

(i)   Fire Investigators

While it may be possible to collect information from the literature and programme documentation these do not tell the whole story and it is important that people such as yourself are surveyed to gain from your experience and insight.

Permission to participate in this study has been granted by your employer and they have guaranteed that if you take part in this study or choose not to, it will not affect your employ within your organisation or your relationship with your employer. Participation in this study is voluntary. If you decide you do not

want to take part in this study you can pull out at any time and withdraw your data without giving reasons, up until 1 June 2006. Participants who decide to take part do not have to answer all the questions; you may stop the interview at any time and /or decide not to return your questionnaire.

What does this study involve doing?

This study involves filling out one a questionnaire listed below and for some people it will also involve providing additional detail or depth to their responses. The questionnaire will give you the option of providing your contact details so that the researchers can contact you for additional information they believe will enrich the study. This is purely voluntary and your contact details will be kept under lock and key and be accessed by the researchers only. After the researchers have received your written consent to participate in the study, the questionnaire can be completed in three different ways: online by accessing a website address the researchers will provide; via an MS Word document that the researchers can email to you; by pen and paper. The completed questionnaire can be returned to the researchers via email or mail. The researchers are also happy to conduct the questionnaire entirely as a telephone interview, if you would prefer. The accompanying consent form asks you to choose how you intend to complete and return the questionnaire, so the researchers can organise this for you.

The questionnaire entitled 'Fire cause reporting processes and statistical data for deliberately lit fires: Survey of fire cause investigators', will take approximately 25 minutes to complete. This questionnaire explores fire cause investigation and reporting processes. This information will be used to inform current practice and policy within New Zealand.

Any additional discussion undertaken directly with the researcher(s) may take anywhere between 10 and 20 minutes, depending on the richness of detail required.

A reminder letter will be sent out to participants three weeks after giving consent and then again after a following two weeks. Those participants who have already completed the questionnaire should ignore the reminder letters.

What happens to information about me?

All completed questionnaires can be returned directly to the researchers. All information is kept under lock and key at the University of Auckland for a period of six years after which the data will be destroyed by wiping floppy/compact disks and shredding data sheets. Only the researcher will have access to this information. Anonymity on the web based survey can be guaranteed to the extent that Secure Sockets Layer (SSL) encryption is used. SSL is a protocol developed by Netscape for transmitting private documents via the Internet. It uses a cryptographic system that uses two keys to encrypt data − a public key known to everyone and a private or secret key known only to the recipient of the message. All information from the web based survey will be extracted by the researcher. No information that could personally identify you will be used in any discussion, reports or publications about the study.

If you wish to know more about the study or discuss your participation, feel free to contact:

- Samantha Haines, s.haines@xtra.co.nz, telephone/facsimile (07) 839 3803, telephone (09) 373 7599 extension 86755 or 021 422 421.
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CONSENT FORM

THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF SIX YEARS

International approaches to preventing deliberately lit fires.

Researchers

Samantha Haines and Dr Ian Lambie from the Psychology Department of the University of Auckland and sponsored by the New Zealand Fire Service.

To

The Fire Investigators.

Please read the following statements and sign the consent form if you agree to take part in this research

- I have read and understood the Participant Information Sheet.
- I have had the opportunity to discuss this study with the researchers and I am satisfied with the answers I have been given.
- I understand that participation in the study is voluntary.
- I understand that I can withdraw my participation and my data up to 1 June 2006.
- I understand that the data will be kept under lock and key at the University of Auckland, separate from the consent forms, for a period of six years after which it will be destroyed.
- I understand that the information from this study will be presented to the New Zealand Fire Service in report format and may be published in academic journals and other outlets considered suitable by the researchers.
- I understand that if the information provided is reported or published, it will be done in a way that does not identify any individual as its source.
- I understand my employer has given permission for me to participate in this study.
- I understand that my employer has guaranteed that my participation in this study will not affect my employment or my relationship with my employer.
- I agree to take part in this research.

Date: Organisation Name:

Name: Signature:

___   Please email me the website link so I can complete the questionnaire online

___   Please email me the questionnaire as a MS Word document so I can complete it on my computer and return it via email (please specify an alternative format if required)

___ Please email me the questionnaire as a MS Word document so I can print it out, complete it and return it in a self-addressed envelope (please specify an alternative format if required)

Please specify your email address and/or your postal address according to your chosen option:

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PARTICIPANT INFORMATION SHEET

International approaches to preventing deliberately lit fires.

Invitation
___

To the Chief Executive Officer, Director or Manager of organisations that collect, store and/or report statistical data on deliberately lit fires.

We would like to invite your staff to be part of a research study run by the Psychology Department of the University of Auckland, with support from the New Zealand Fire Service.

Who is organising the study?
___

The study has been organised by people from the Psychology Department at the University of Auckland and is sponsored by the New Zealand Fire Service. The researchers involved are Samantha Haines, who is a Clinical Psychology Doctorate student at the University of Auckland and Dr Ian Lambie, who is the Director of the Clinical Psychology programme at the University of Auckland.

What is this study about?
___

This study has two main objectives:
(i)   To explore the statistical data and data systems used internationally to collect, store and/or report information on deliberately lit fires.
(ii)   To explore the implementation and operation of International prevention/intervention programmes for people who deliberately light fires.

From this exploration we will extrapolate International 'best practice', which will be disseminated in the hope of enhancing current practice, policy and legislation in the area. A copy of the final report can be downloaded in 2007, from the official website of the New Zealand Fire Service (http://www.fire.org.nz).

Participation in this study
___

Participants were purposively chosen for their expert knowledge in the area of statistical data and data systems relating to deliberate fire setting:

(ii)   Data analysts/administrators and data users

While it may be possible to collect information from the literature and programme documentation these do not tell the whole story. Therefore, it is important to learn from the experience and insight of people who work with the data and the systems used to collect it.

Giving consent for your staff to participate in this study means that their participation will not affect their employment within your organisation or their relationship with you as their employer. Participation in this study is voluntary. Participants who decide to take part in this study can pull out at any time and withdraw their data without giving reasons up until 1 April 2006, Participants do not have to answer all the questions; they may stop the interview at any time and /or decide not to return their questionnaire.

What does this study involve doing?

After the researchers have received written consent that your staff can take part in this study, staff will be given information about the study and also asked to provide written consent to participate.

This study involves filling out a questionnaire and for some people it will also involve providing additional detail or depth to their responses. The questionnaire will give the option of providing contact details so that the researchers can collect additional information they believe will enrich the study. This is purely voluntary and all contact details will be kept under lock and key and be accessed by the researchers only.

The questionnaire entitled 'Fire cause reporting processes and statistical data for deliberately lit fires: Survey of data system users', will take approximately 20 minutes to complete. This questionnaire explores perceptions of the current data system used to collect, store or report data on deliberately lit fires. This information will be used to inform the further development of user friendly data interfaces within New Zealand.

The questionnaire entitled 'Fire cause reporting processes and statistical data for deliberately lit fires: Survey of data system administrators/analysts', will take approximately 40 minutes to complete. This questionnaire explores the operation of the data systems used to collect, store or report data on deliberately lit fires from the perspective the data analyst/administrator. This information will be used to inform the further development of effective and efficient data systems and collection/reporting processes within New Zealand.

Any additional discussion undertaken directly with the researcher(s) may take anywhere between 10 and 20 minutes, depending on the richness of detail required.

What happens to participant information?

All completed questionnaires can be returned directly to the researchers. All information is kept under lock and key at the University of Auckland for a period of six years after which the data will be destroyed by wiping floppy/compact disks and shredding data sheets. Only the researcher will have access to this information. Anonymity on the web based survey can be guaranteed to the extent that Secure Sockets Layer (SSL) encryption is used. SSL is a protocol developed by Netscape for transmitting private documents via the Internet. It uses a cryptographic system that uses two keys to encrypt data − a public key known to everyone and a private or secret key known only to the recipient of the message. All information from the web based survey will be extracted by the researcher. No information that could personally identify participants will be used in any discussion, reports or publications about the study.

What if I have questions about the study?

If you wish to know more about the study or discuss your participation, feel free to contact:
- Samantha Haines, s.haines@xtra.co.nz, telephone/facsimile (07) 839 3803, telephone (09) 373 7599 extension 86755 or 021 422 421.
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CONSENT FORM

THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF SIX YEARS

International approaches to preventing deliberately lit fires.

Researchers

Samantha Haines and Dr Ian Lambie from the Psychology Department of the University of Auckland and sponsored by the New Zealand Fire Service.

To

The Chief Executive Officer, Director or Manager of organisations that collect, store and/or report statistical data on deliberately lit fires.

Please read the following statements

- I have read and understood the Participant Information Sheet.
- I have had the opportunity to discuss this study with the researchers and I am satisfied with the answers I have been given.
- I give permission for the researchers to access employees of my programme/organisation.
- I guarantee that participation or non-participation of employees will not affect their employment in any way.
- I will give all relevant staff the opportunity of taking part in this study and will pass on the participant information sheets, consent forms and questionnaires provided by the researchers.
- I understand that participation in the study is voluntary.
- I understand that participants can withdraw their data up until 1June 2006.
- I understand that the data will be kept under lock and key at the University of Auckland, separate from the consent forms, for a period of six years after which it will be destroyed.
- I understand that the information from this study will be presented to the New Zealand Fire Service in report format and may be published in academic journals and other outlets considered suitable by the researchers.
- I understand that if the information provided is reported or published, it will be done in a way that does not identify any individual as its source.

Please sign the consent form below if you give permission for your employees to take part in this research

Date: Organisation Name:

Name: Signature:

Ethical approval

This study has received ethical approval from the University of Auckland Human Participants Ethics Committee on 21/09/2005 for a period of 3 years, from 21/09/2005. Reference no. 2005 / 334.

PARTICIPANT INFORMATION SHEET

International approaches to preventing deliberately lit fires.

To the staff of organisations that collect, store and/or report statistical data on deliberately lit fires.

We would like to invite you to be part of a research study run by the Psychology Department of the University of Auckland, with support from the New Zealand Fire Service.

Who is organising the study?

The study has been organised by people from the Psychology Department at the University of Auckland and is sponsored by the New Zealand Fire Service. The researchers involved are Samantha Haines, who is a Clinical Psychology Doctorate student at the University of Auckland and Dr Ian Lambie, who is the Director of the Clinical Psychology programme at the University of Auckland.

What is this study about?

This study has two main objectives:
(i)   To explore the statistical data and data systems used internationally to collect, store or report information on deliberately lit fires.
(ii)   To explore the implementation and operation of International prevention/intervention programmes for people who deliberately light fires.

From this exploration we will extrapolate International 'best practice', which will be disseminated in the hope of enhancing current practice, policy and legislation in the area. A copy of the final report can be downloaded in 2007, from the official website of the New Zealand Fire Service (http://www.fire.org.nz).

Participation in this study

Participants were purposively chosen for their expert knowledge in area of statistical data and data systems regarding deliberate fire setting:

(ii)   Data analysts/administrators and data users

While it may be possible to collect information from the literature and programme documentation these do not tell the whole story and it is important that people such as yourself are surveyed to gain from your experience and insight.

Permission to participate in this study has been granted by your employer and they have guaranteed that if you take part in this study or choose not to, it will not affect your employ within your organisation or your relationship with your employer. Participation in this study is voluntary. If you decide you do not want to take part in this study you can pull out at any time and withdraw your data without giving reasons, up until 1 June 2006. Participants who decide to take part do not have to answer all the questions; you may stop the interview at any time and /or decide not to return your questionnaire.

What does this study involve doing?

This study involves filling out one of the questionnaires listed below and for some people it will also involve providing additional detail or depth to their responses. The questionnaire will give you the option of providing your contact details so that the researchers can contact you for additional information they believe will enrich the study. This is purely voluntary and your contact details will be kept under lock and key and be accessed by the researchers only. After the researchers have received your written consent to participate in the study, the questionnaire can be completed in three different ways: online by accessing a website address the researchers will provide; via an MS Word document that the researchers can email to you; by pen and paper. The completed questionnaire can be returned to the researchers via email or mail. The researchers are also happy to conduct the questionnaire entirely as a telephone interview, if you would prefer. The accompanying consent form asks you to choose how you intend to complete and return the questionnaire, so the researchers can organise this for you.

The questionnaire entitled 'Fire cause reporting processes and statistical data for deliberately lit fires: Survey of data system users', will take approximately 20 minutes to complete. This questionnaire explores perceptions of the current data system used to collect, store or report data on deliberately lit fires. This information will be used to inform the further development of user friendly data interfaces within New Zealand.

The questionnaire entitled 'Fire cause reporting processes and statistical data for deliberately lit fires: Survey of data system administrators/analysts', will take approximately 40 minutes to complete. This questionnaire explores the operation of the data systems used to collect, store or report data on deliberately lit fires from the perspective the data analyst/administrator. This information will be used to inform the further development of effective and efficient data systems and collection/reporting processes within New Zealand.

Any additional discussion undertaken directly with the researcher(s) may take anywhere between 10 and 20 minutes, depending on the richness of detail required.

A reminder letter will be sent out to participants three weeks after giving consent and then again after a following two weeks. Those participants who have already completed the questionnaire should ignore the reminder letters.

What happens to information about me?

All completed questionnaires can be returned directly to the researchers. All information is kept under lock and key at the University of Auckland for a period of six years after which the data will be destroyed by wiping floppy/compact disks and shredding data sheets. Only the researcher will have access to this

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CONSENT FORM

THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF SIX YEARS

International approaches to preventing deliberately lit fires.

Researchers

Samantha Haines and Dr Ian Lambie from the Psychology Department of the University of Auckland and sponsored by the New Zealand Fire Service.

To

The staff of organisations that collect, store and/or report statistical data on deliberately lit fires.

Please read the following statements and sign the consent form if you agree to take part in this research

- I have read and understood the Participant Information Sheet.
- I have had the opportunity to discuss this study with the researchers and I am satisfied with the answers I have been given.
- I understand that participation in the study is voluntary.
- I understand that I can withdraw my participation and my data up to 1 June 2006.
- I understand that the data will be kept under lock and key at the University of Auckland, separate from the consent forms, for a period of six years after which it will be destroyed.
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- I understand that if the information provided is reported or published, it will be done in a way that does not identify any individual as its source.
- I understand my employer has given permission for me to participate in this study.
- I understand that my employer has guaranteed that my participation in this study will not affect my employment or my relationship with my employer.
- I agree to take part in this research.

Date: Organisation Name:

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___   Please email me the website link so I can complete the questionnaire online

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<u>*Invitation*</u>

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<u>*What is this study about?*</u>

This study has two main objectives:
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