An Exploratory and Inferential Analysis of Fire Cause Relative to the Crime of Arson and Its Documentation

by

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An Exploratory and Inferential Analysis of Fire Cause Relative to the Crime of Arson and Its Documentation In The County of Mercer, PA

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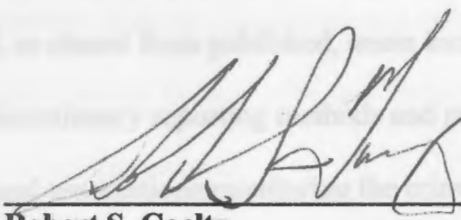

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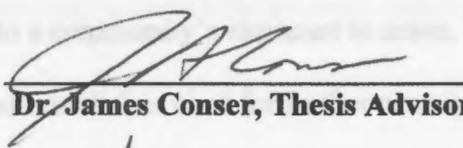

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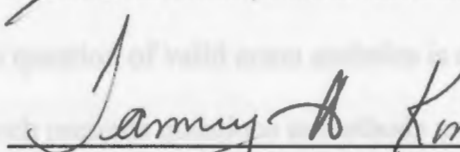

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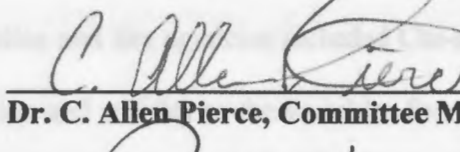

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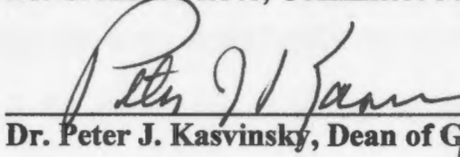

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Abstract

The validity of statistics for fires resulting from arson is questionable. The question arises from methods used to collect fire incident data. Fire, police, and organizations associated with monitoring arson consider it an under-reported crime. It is a crime of questionable arrest rate, prosecution, and adjudication. Consequently, statistics could be skewed, biased, or absent from published, arson incident rates. The statistical flaws commence with discretionary reporting methods and parochial data collecting procedures by agencies and associations monitoring the crime.

An exploration of reporting methods, perpetrators, victims, and law enforcement's investigation of arson was undertaken. The examination included how variables of socio-economics may enter into a community's exposure to arson. The exploration gives insight into the crime and establishes need for further examination of the problem.

Associated to the question of valid arson statistics is a review of literature related to the subject. The research presents questions to methods used to acquire fire cause statistics. The literature review presents reasoning for researching the crime. Validation of data obtained from police and fire agencies included Chi-square testing. The purpose was to establish correlation and validity to the variables found during exploration of the subject.

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Lastly, I dedicate this thesis to my family, my wife Isabel, granddaughter "Lauren", and Grand Dog "Max". They were all a part of my team.

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Chapter I

Introduction

Arson is a neglected crime (Battle & Weston, 1978, p. 9). The Federal Bureau of Investigation (FBI) Crime Index reports that arson fires result in an average of 560,000 fires annually, 750 deaths, 3,700 injuries, and $1.5 billion in property loss. Juveniles under 18 years of age account for 55 percent of all arson arrests in the United States. Half of those juveniles arrested are age 15 or younger with 6.8 percent under the age of 10. Statistics indicate that the crime of arson is perpetrated by juveniles and they represent 50 percent of arrests made for the crime, according to the United Sates Fire Administration. Of the 6,000 structure fire in schools, 37 percent are deemed arson, or suspicious in origin. Fifty- two percent of the reported fires occurred in middle and high school structures (Department of Homeland Security, 2004). In its November 2004 report, the National Fire Protection Association estimated 37,500 fires alone in the year 2003 were intentionally set. The rate of incidence does represent a decrease of 15.7 percent from the 2002 estimate (Karter, 2004, p.70).

How accurate are these reported statistics? It is important to understand that statistical faulting or potential for statistical flaws may not be the result of miscalculation by the reporting repository. The repositories can only accept as fact the information submitted to them by the agency that first documents and then reports the incident. The repositories then formulate the data received into their statistical findings. The primary purpose for gathering this statistical information is to evaluate the fire problem in the United States.

Arson statistics are suspicious to the fire officer, police officer, and officials conducting fire investigations because the data initially submitted by the reporting agency may be incorrect. For many reasons the crime may be under-reported, or reported inaccurately when submitted to the recording repository. Consequently, statistics may range from skewed, to biased, to inaccurate when published by the repositories. Questions debated for decades have related to unrealistic statistics and perpetrator or victim profiling.

Research findings indicate that official statistics can contain biased information. Manipulation of crime statistics offer use for personal reasoning and in establishing government legislations. Statistics, therefore, may be unreliable and invalid as a means to combat crime, including arson.

In reality and theory, when real or personal property loss caused by arson fires is above a community or insurance carrier's tolerance level, the intensity of the investigation is greater. Real property in this statement referred to as real estate with physical structures located thereon, with personal property categorized as material items such as jewelry, clothing, automobiles, and household furniture. The use of investigative tools and resources increases proportionately to abate the actual or potential monetary loss resulting from the incident. The 1987 Grems arson fires in Colorado serve as such an example. A series of four arson fires led to an intensive investigation involving agency task sharing and inter-jurisdictional cooperation in solving and prosecuting the perpetrators of the crime (Stambaugh, 1991). Should civil torts be committed and the possibility for subrogation exists, again the intensity of the investigation to find the cause of the fire is greater. With injury or death resulting from the fire incident, the intensity of

the investigation further expands. Directly corresponding and correlated to the investigative attention given an accidental or arson fire incident is an established threshold of socio-economics. This socio-economic threshold is a value based upon the community's exposure to any further economic loss, or a reduction in the monetary value of real and personal property loss caused by the rate of the fire incidents.

The extent of the fire investigation will vary within different demographic, geographical, and social community settings. This inference establishes that money, injury, or death are the motivating factors to reach a successful fire cause finding and fire incident conclusion. This exploratory research examines the acceptance fire statistics as an accurate and true representation of fire causes. The research addresses the conjecture, correlation, and accuracy of statistics and cause determination by examining the situation in one Pennsylvania county.

It is important to establish a definition of arson and associated fire science terminology to understand what constitutes fire and arson. This knowledge provides the necessary insight to have a comprehension on why arson is a neglected crime and why it is difficult to investigate. For this thesis, the definition for arson comes from The Pennsylvania Consolidated Statutes, which categorizes and defines arson in various sections of the crime code. The statute defines arson as:

> **Arson and related offenses Title 18 Chapter 33, Section 3301.** "A person commits a felony of the first degree if he intentionally starts a fire or causes an explosion, or if he aids, counsels, pays or agrees to pay another to cause a fire or explosion, whether it is his own property or that of another" (Gould Crimes Code, 2000, p. 66).

Other terms, organizations, and definitions of importance that are associated with fire, arson, arson investigation, or statistical fire incident sources are:

National Fire Protection Association (NFPA): A worldwide professional association considered the premier authority on fire and life safety issues The NFPA collects, analyzes, and publishes annually a national fire cause statistical Database.

National Fire Incident Reporting System (NFIRS): The fire incident collection and information reporting system for the United States managed by the United States Fire Administration Federal Fire Prevention and Control Act of 1974 (PL93- 498.

Pennsylvania Fire Information Reporting System (PennFIRS): The fire incident information and collection reporting system used by the Commonwealth of Pennsylvania (Pennsylvania Emergency Management Agency, Office of State Fire Commissioner, 2004).

Area of Origin: "The room or area where the fire began" (NFPA 921 , 2001).

Cause of the Fire or Explosion: "The consideration of the circumstances, conditions, or a situation that bring together a fuel, ignition source agents, and oxidizer resulting in a fire or a combustion explosion" (NFPA 921, 2001)

Data Repository: An entity, public or private that solicits, collects, and receives information: then formulates statistics on fire causes.

Fire Incident Data Organization (FIDO): The National Fire Protection Association data collection system.

Fire Cause Determination: Accepted term in establishing the cause of a fire.

Accidental: Caused by a form of human error or equipment failure.

Arson: Caused by a deliberate fire setting act.

Undetermined: A definitive fire cause not established.

Suspicious: Indicators point to conditions that the fire may be arson.

Provincial: An act of divinity, such as lightning.

Incendiary: Synonymous with the word arson.

Intent: "The deliberate act of setting or causing the fire or explosion" (NFPA 921, 2001).

Motive: "The reason for setting the fire or causing the explosion". (NFPA 921, 2001).

Point of Origin: "The exact location where a heat source, fuel, and oxidizing agent come together with each other and a fire begins" (NFPA 921, 2001).

Arson investigation is a crime solving process that relies on the investigator's field experiences, training, and education. Investigative techniques and associated forensic science disciplines support the final fire cause determinations. The combined tasking of disciplines is required to establish a defensible fire cause determination of arson.

The investigative progression for the crime of arson flows through three phases. The investigation phases are:

1. The fire origin and cause investigator must determine without reasonable doubt that the fire cause resulted from a deliberately set fire. This affirmation of fire cause is required to establish the act of as arson.

2. The law enforcement agency must seek out the perpetrators responsible for the fire, establish a motive, and ultimately determine the fire setter's definitive intent to commit the crime.
3. The prosecutor, must determine if sufficient evidence and finding of fact is present to commence prosecution and ultimate adjudication of the fire incident. To do so the prosecutor should be versed in and have understanding of the fire sciences and prior experience in prosecuting serious crimes.

Each of the three phases integrated together form a competent fire, police, and prosecution investigative team. All parties in the investigative phases must be qualified to conduct an arson investigation. The team objective and goal is concluding the crime investigation thru to adjudication. To complete the final step, the team must be capable of presenting a reconstruction of the fire incident and the fire cause in a criminal court. A skillfully managed presentation of how the fire started, conditions surrounding the fire incident, and that the actor had the motive and intent to cause the demise of the property by setting the fire. The findings and presentation of the investigative findings then placed before the judge or jury in a testimonial manner that is understandable, non-technical, and in lay language.

Statutory law requires in the Commonwealth of Pennsylvania that all fire incidents be investigated. The purpose is to establish the cause as accidental or incendiary. In some communities the local political body enacts ordinances placing into law a requirement that fire cause determinations for all fires are established and recorded by a designated agent of the jurisdiction. The "Authority Having Jurisdiction" (AHJ) are

agents, bureaus, and departments delegated this responsibility and authority by code at the local governmental level (International Fire Code, 2004, p.2).

To confirm that the crime of arson has been committed requires competence, experience, intensive training, and intuitiveness on the part of the fire cause investigators. Ultimately, the investigators require technical support once they have established their initial finding of arson. This technical reinforcement of the fire cause finding is in the form of a forensic examination of the physical evidence obtained from the fire debris, or other physical paper chase findings pertinent to the fire. The purpose of the forensic analysis is to corroborate the fire investigator's initial opinions and hypothesis of the fire cause. The investigator's theory coupled with the findings of the forensic investigation form a realistic and scientific conclusion in establishing the fire cause as incendiary, or arson.

The fire triangle establishes the three elements for ignition of a fire. They are required to be present for a fire to ignite, be it arson, or accidental. The elements are oxygen, which serves as the oxidizer, fuel, the product that will burn, and heat the ignition source for the fuel to burn, or oxidize. Oxygen from the environment serves as the oxidizer. The three elements are required to start the fire. The burning continues in a sustained cycle until the fire is extinguished, or the fuel consumed, or the oxygen diminished to approximately a 6 percent level (Oklahoma State University, IFST Manual 1998 p. 87-88).

Scope of the Problem

It is the scope of this thesis to present a comprehensive analysis on the complexity of investigating and determining fire causes, reporting methods, and documenting the

specific crime of arson. The detection of fire caused by arson confronts the fire and police investigators with numerous problems. One such problem directly aligned with the investigation itself is the submission of accurate and complete information about the fire cause. The data of which are ultimately provided to a designated repository. This data formulates important fire statistics used in developing strategies and tasks needed to reduce the fire problem in the United States (National Commission on Fire Prevention and Control, 1989). A further problem is the uncertainty of the fire investigators correctly determining the fire cause as accidental or arson. These problems broaden the need to explore the subject.

The Exploratory Need

Arson is a complicated crime, difficult to discover and difficult to establish. It is a crime dealing with partially destroyed or contaminated physical evidence, substantiated by circumstances surrounding the fire incident. These conditions make it a complex crime to prove and adjudicate. In the opinion of the researcher, fire cause determination requires exploration to challenge the validation of fire investigative techniques, existing fire cause findings, and arson statistics at the local level. The challenge is whether or not to accept nationally established fire cause findings and statistics for the rate of arson occurrence in the United States. Purportedly the fire cause determinations and statistics presently reported represent the norm for typical American communities. This is a questionable fact in the opinion of the researcher. This national incidence rate sublimely presents profiles of motives and intent for the arson caused fire, which also, may not be accurate. The accepted statistics for the motives and rate of incidence for arson are not accurate in the opinion of the researcher. The causation for these potential statistical

inaccuracies is the result of under-reporting and inaccurate reporting of the crime by public reporting agencies, specifically fire and police agencies. To illustrate this causation is the fact that the determination of a fire incident as suspicious and undetermined is itself dubious. Suspicious fires may be a grouping of fires not scientifically investigated for cause, or inadequately investigated.

Using the word suspicious conceals the cause in lieu of categorizing the real cause as arson. This issue again poses the question of statistical accuracy. Was the fire cause arson or not? This same logic is applicable when the fire cause is undetermined. Numerous repositories receive unverified fire cause information for their statistical data banks. The repository holding the suspicious and undetermined fire statistic has the option to pass this information on as an accurate accounting for arson, or carry the suspicious and undetermined fire causes in a separate category for fire cause classification. This leaves the reviewer of the statistic in a quandary. Is the reported data all inclusive or assumed arson? Should one conclude that arson did in fact occur with the cause not accurately determined? A suspicious fire cause cannot stand the scientific test for categorization as arson. Fire causes documented as suspicious or undetermined in origin to the intuitive investigator represents:

1. A cause cannot be established or determined for the fire incident after a scientific investigation, or
2. A fire incident where supporting evidence, motive, and circumstantial findings imply the cause might be arson.

The arson statistic is therefore not meaningful when considering suspicious and undetermined fire causes. Statistical validity of fire cause determinations, including arson

is important. The statistics become an important management tool for planning or implementing programs used to combat arson. Should the statistics not be accurate there may be a grouping of unaccounted arson fires spiking the statistic when the definitive cause of the fire is inaccurate or not reported. The suspicious or undetermined fire causes not conclusively determined to be arson or that are not properly investigated to a conclusion may include a number of unreported arson caused fires.

It is essential to understand that not only are accurate statistics in question, but to find root causation for the crime. The statistical accuracy question links to these peripheral questions and subject areas concerning arson investigation.

Exploratory Questions

The exploratory research objective includes seeking answers to questions or problems integrated with fire cause investigation in general and arson specifically. These questions are:

1. Who commits arson?
2. Are the established national statistics relatively accurate?
3. What are the perpetrators characteristics?
4. What are the most common motives for the crime of arson?
5. What is the class of material most commonly ignited?
6. What is the relationship, if any, between the arson victim and the arsonist?
7. What month, day, hour, and week is arson most likely to occur?
8. What is the percentage rate of arrest for the crime of arson?
9. What is the arrest rate for the crime of arson?
10. What is the juvenile involvement in fire setting?

11. Does the clearance rate for arson in Mercer County, Pennsylvania reflect the national reported clearance rates for this crime?
12. Do Mercer County Fire Departments actively participate in the Commonwealth of Pennsylvania PennFRIS system?
13. Is there adequate training given at the fire department level to investigate the cause and origin of a fire?
14. Should the fire department and police department, as well as investigative agencies with an interest in the fire loss, be involved in a fire investigation?
15. Do the local political sub-divisions of government sampled have an accurate dollar amount of fire loss for their community?
16. How accurate are fire causes ruled accidental?

Overview

Statistics reported in the literature review of Chapter II identify problems confronting the investigation of arson and the procedures relevant to acquiring arson statistics. Chapter III describes the methodology and scope of the research of this thesis. The scope of research includes an examination of fire incidents investigated by police departments and a convenience survey questionnaire from fire officers concerning the investigation of fire incidents. Chapter IV is a report of the findings and results of the analysis of the data collected from the sampled resources. Expressed in Chapter V are the conclusions, recommendations, and discussion from the research findings.

Chapter II

Literature Review

"Nearly 4000 citizens die in residential fires each year" (United States Fire Administration, 2005 p.1). The crime of arson shares responsibility for this serious loss of life and the fire safety problem. Twenty-two percent of the fatal fires occur in residential structures, were the cause was determined as arson. Other structure fire causes accounted for 74 percent of the total fatal fires in 2002. Ninety- four percent of the fire incidents occurred in residential occupancies. Arson remains the leading cause of residential fire deaths (United States Fire Administration, 2005) USFA.

Though difficult to establish, arson, or fires reported as incendiary in origin are the primary cause of all fires in the United States. The total estimated fire incident rate for all types of reported arson fires in the United States are approximately 550,000 fires per year (USFA, 1997). Arson generates over three billion dollars of property loss annually. This property loss does not include the immeasurable human suffering and economic losses that arson fires cause victims in personal injury, maiming, or death every year (USFA), 1999).

During the year 2000, police agencies in the Commonwealth of Pennsylvania reported over 5,100 arson events. This amounts to 14 arson fires per day and one arson fire occurring within the Commonwealth approximately every one-hour and forty minutes *(The Fraud Report,* 2002). It is important to understand that this statistic may be greatly understated, because of non-mandated reporting requirements for the estimated 2500 volunteer and paid fire departments just within the Commonwealth of Pennsylvania fire protection system.

A definitive lack of standardized reporting methods, formats, and terminology exists in the Commonwealth of Pennsylvania, the nation's governing political jurisdictions, fire and police departments, and private data collection and repository organizations. Adding to the non-standardized reporting formats and investigative mechanisms is the complexity of existing forms and the discretionary human involvement used to compile the needed fire incident information. The present complexity of various computer program formats tends to generate inaccuracy in the reporting system (Firehouse Software, 2004). The insurance industry represents and is considered a private fire data collection special interest group, as are other professional, or investigative organizations such as the International Association of Arson Investigators (IAAI), International Association of Fire Chiefs (IAFC) and the premier National Fire Protection Association (NFPA).

The National Fire Protection Association collects and publishes annual fire cause and origin data. Its work is based on the assumption that the solicited fire causes and rate of fire incidents received by them are accurate and represent fact. The National Fire Protection Associations most recent statistical report on fire incidents *(NFPA Journal* November-December, 2004*)* estimated that there were 37,500 intentionally set structure fires in the United States during the year 2003. This number of set fires represents a 15.7 percent decrease from the year 2002. The set structure fires caused an estimated $692 billion dollar property loss for the reporting year. This represents a decrease of 24.7 percent when compared with the 2002 year. Table 1 illustrates these stated decreases.

The year 2003 shows a 25.6 percent decrease for vehicle arson fires with 30,500 vehicle fire incidents reported. A significant point of interest is the decrease in vehicle

fire financial losses estimated at $132,000,000. This is a 40.5 percent decrease for the year 2003 when compared to the year of 2002 (Badger, Karter, & Molis 2004 pp. 28-71).

Table 1

Estimate of 2003 Fire Losses From Intentionally Set Structure Fires

Category	Number	Percentage of Decrease
Structure Fires Reported	37,500	15.7%
Estimated Civilian Deaths	304	12.9%
Estimated Fire Loss	$692,000,000,000	24.7%

Note: 2004 Fire Incident Rate, *NFPA Journal*, December, 2004)

The National Fire Protection Association survey report uses the National Fire Incident Reporting System (NFRIS) 5.0. The NFRIS 5.0 system includes parameters that reportedly account for suspicious fires. The suspicious fire category was reported eliminated from 5.0 NFRIS, (Karter, 2004, p. 70). To reinforce the confusion of published arson statistics: "While not accepted by NFPA 921 or any other recognized Treatise, the Disclaimers of at least some of the datasets clearly defines the term Arson to include suspicious fires" (Bloom, 2005). The National Fire Protection Association used the new set of parameters to compensate for suspicious fires in their most recent report on fire causes. Arson accounted for an estimated 304 civilian fire deaths in 2003, which represents a relatively low percentage of deaths from the committed, but horrendous crime. This represents a 12.9 percent decrease in fire deaths by arson for the year 2003, compared to the year 2002.

The manner used in the collection of the intentionally set structure fires by the National Fire Protection Association is by random sampling. The sampling formulates a

projection for the national fire incident rate and fire causes. The reporting fire departments submitting information is sample adjusted according to the size of the community protected by the department. The population base used in their sampling was 100,000 with 3,082 fire departments from across the country responding to the 2003 information survey request. For these derived estimates of intentionally set structure fires, a standard error of calculation is included.

The reporting results include only public fire departments that responded to the fire incident or in attendance at a reported fire incident. There were no adjustments made in the estimated figures for unreported arson fires, fires extinguished by private citizens, or fire brigades, industrial, and military installations present at fire incidents. Fire incidents extinguished by automatic fire suppression systems with no public fire department in attendance are also not included in published statistics. It is important to note that fire protection in the United States comes from two primary sectors, public fire departments serving under the arm of local governments and private fire departments functioning as non-profit, or for profit businesses.

The non-public organizations and fire extinguishment systems are a part of the nation's fire protection system. Their fire protection services in reality should be a part of the fire statistics documentation. The principal objective for gathering fire data information is to reduce the rate of fire incidence in the United States. Other important purposes are to identify trends in fire causes, and to maintain public awareness of the fire problems of the United States. The United States, as an industrialized nation, maintains the dubious distinction of having the highest rate of fire incidence in the world and a societal apathy toward fire occurrence and fire safety (Cote & Bugbee, 1998, p. ii)

Collectively organizations providing statistical input into documenting fire cause reported 584,500 arson fires (United States Fire Administration, 1994). This total sum included structures, brush, field, outdoors, and vehicle arson fires in the United States. This statistic is suspect and one should question the accuracy of the estimated figures because not all fire protection services and extinguishing systems are included in the data.

A strong potential exists with the current diverse reporting systems for under-reporting, non- reporting, or inaccurately reported data for fire incidents. This includes the cause determinations for accidental, incendiary (arson), provincial, undetermined, or suspicious fire causes. The fire reporting data forwarded by fire and police departments to state, federal, and private repositories are difficult to validate as accurate when submitted by the generator of the data.

The repositories themselves affirm that the cause of fire, death by fire, or injury by fire cannot always be determined with certainty (USFA, 2001, p.3). This statement references the present data reporting and collection system and its validity seen in the uncertainty of the accuracy for reported fire cause, fire related death and injury. The human discretionary influence in initiating the report aligns directly to the accuracy problem. This discretionary empowerment of the human element in assigning the fire cause classification to the reporting formats may be correct in the eyes of the beholder and documenter, but may not be an accurate recording of the fire cause incident. A classic example of this human discretionary factor is the classification categories (fire cause). Numerous and varying reporting systems are now in place throughout the United States. Computerized reporting systems for the most part accomplish the formulation of the submitted data. A serious problem emerges with the reporting systems. There can be

computer program weaknesses. The weaknesses include program data documentation, entry of comparable and compatible data, and limitations within the system (software programming) used by both the reporting source and the collecting agency. Even with the perfect computer program, the probability of data entry error remains high due to the complexity of numerical codes assigned to the fire incident. The computer program may then reflect an inaccurate cause due to both programming and error limitations. The fire cause categories may not be descriptive, or overly descriptive, therefore, they can be misleading and frustrating when entering the data into the statistic bank.

A 1998 database identified three leading causes of fire. They were 28 percent incendiary or suspicious, 13 percent open flame, and 12 percent cooking. Within these total percentages for leading fire causes, the specific crime of arson by itself accounted for 13 percent of fire recorded fire causes. An interesting finding of fact occurs when arson is cataloged or classified separately. This finding indicated that 28 percent of the arson or incendiary and suspicious fires are accounting for 25 percent of the total dollar fire loss for all fire causes (National Fire Data Center 1989-1998 p.3). The percentages illustrate that proportionally the reported arson fires do not reflect arson to be the leading fire cause.

Using this discovery as an indicator of statistical error, a possibility exists that arson in reality is an under-reported crime. This statistic may only assert that the property targeted by the fire setter is of higher value and a complete loss when burned by the arsonist. Another important example of flawed statistics is the adjudication of juveniles involved with fire setting, but not defined as arson. Criminal law may prohibit

jurisdictions to adjudicate juvenile arsonists or young curiosity fire- setters with the crime of arson because of their juvenile status.

Illustrating this is an incident occurring in Omaha, Nebraska on April 25, 1994, an arson fire caused the line of duty death of a fire officer while fighting a fire set by a fifteen-year-old juvenile. The Omaha Police Department considered the death to be a homicide case for statistical purposes (United States Fire Administration, 1999c p.5). Was the fatal fire reported as arson for statistical purposes, or exclusively a homicide by fire? Realistically and statistically, the fire was an act of juvenile arson. In actuality, the crime of homicide by juvenile had been committed. The juvenile will receive a different due process of law than that of an adult who committed the same crime. The punishment applied for the crime will be dissimilar, due to the age of the perpetrator. A different set of rules and legal guidelines will apply depending on jurisdictional law. Table 2 shows juveniles causing 37 percent of outdoor fires, twenty-six percent involve structure fire and 24 percent of vehicle fires.

Table 2

Juvenile Arson Fire by Category

Outdoors	37%
Structures	26%
Vehicle	24%
Other	13%

Note: United States Fire Administration, 1995

Applying the percentage of estimated juvenile arrests to the total number of undetermined or suspicious fires there is the probability of adding 250,000 fire incidents

for the year 1994. Juveniles contribute to these additional arson fires and are not in existing statistics for the reported crime (Federal Emergency Management Agency, June, 1999, p.5). Is this grouping a missing statistic? Table 3 shows juvenile age ranges charged with arson commence below age 10 and peak at the age of 17. The arrest rate for those juveniles under eighteen years of age accounted for 41.3 percent of the arson arrests in 2003 (Insurance Information Institute, 2005)

Table 3

Juvenile Arsonist Age Range Charged With Arson

Age Range	Percentage Charged
< 10	3 %
10>12	5 %
13>14	8 %
15	10 %
16	13 %
17	15%

Note: From United States Fire Administration, 1999

Fire causes when first documented where collected in a very rudimentary manner. The private insurance industry and the National Fire Protection Association or the FBI Uniform Crime Reports for the most part formed the early database. As computers and net working became the vehicle of choice for obtaining, maintaining, and disseminating statistical data, a new era tool became available to measure the nation's fire causes and problem (United States Fire Administration, 1997). However, the computer as a measurement tool was not a panacea for many problems. Certain circumstances exist

with the current day reporting system that can hinder the accuracy of fire cause statistics. Primarily the problems resulted from human error and inconsistency of local, state, or federal reporting systems. The human error factor brought about by the required intensity of training and the detail involved for program interpretation. The problem is associated with the formats and platforms used for classifying and reporting the crime. In reality, as a modern day civilization and society, the United States does not have a standardized statistical database on the occurrence of arson as a crime. This problem is of particular importance to a typical American city or a fixed regional geographical area (Matthews, 2004).

The exploration revealed questions about the accuracy of the present data collection system. Fire cause trends and rates of fire incidence at the national level are valuable measuring tools, provided they are accurate. However, to be of value to local level fire officials, the trends must be capable of calculation for local and regional areas. Otherwise, national data have little applicability to the local level.

The nationally published data and statistics skew the local level fire incident and arson rate. Metropolitan fire causation and arson rates do not emulate the small town fire problem or arson rate. A readily available arson statistical image for the average American community is more recognizable and a valuable resource to establish a statistical database. The localized information once established provides the single political sub-division with tools for an efficient allocation of their funding resources. This would include targeting specific geographical areas in an effort to reduce not only the rate of the fire incidents, but also the probability of arson.

Another recognizable reason for a non-validated, uniform, and accurate fire reporting method or system is the authority and methodology involved in the investigation process This means that the authority having jurisdiction for conducting fire investigations in the United States within each specific state and political sub-divisions varies. The variance of authority and bureaucratic posturing by the investigators fragment and duplicates the reporting, or non-reporting of fire cause incidents.

Fire Data Collection Systems

A system for reporting fire incidents and fire cause is now in place in most states and private industry concerned with the fire cause issues. Presently two recognized systems are systems in place, one government sponsored and one representing private industry. Representing typical state government repositories are the Pennsylvania Fire Incident Reporting System (PennFris) system utilized by the Commonwealth of Pennsylvania. Implemented at the federal government level is the National Fire Incident Reporting System (NFIRS) system. The private industry system Fire Incident Data Organization (FIDO) managed by the National Fire Protection Association (NFPA). These data collection and repository systems exemplify and highlight the need for exploratory research of typical government and private or professional data collection systems. Legislation mandates the establishment of the PennFRIS and the NFRIS systems to collect fire incident data and fire cause. The FIDO system collects and analyzes fire incident rates as a part of their mission responsibility as a private professional organization.

Pennsylvania Fire Incident Reporting System (PennFRIS)

Under the umbrella of the Pennsylvania Emergency Management Agency, the Office of the State Fire Commissioner manages the rate of fire incident and fire cause data collection system for The Commonwealth of Pennsylvania. The Pennsylvania Fire Incident Reporting System project started in early 1990 and was made available free in 2000 and 2001 to Pennsylvania fire departments (Leid, 2005).

When the free software offer expired, a $2,000 loan package became available to fire departments desiring to join the reporting system. The loan package purpose was an incentive to purchase the needed software package to reduce the financial burden to participating departments. The loan also gave an enticement for participation in the system. Approximately 1400 of the Commonwealths fire departments, paid and volunteer trained their personnel on the use of the software. The software designed to work as a standardized fire incident reporting system for the Commonwealth of Pennsylvania. The issuance and availability of the software programs brought the reporting system (PennFIRS) into existence.

The reporting chain and operational process established that the 1400 fire departments completing the training could now report fire date through a hierarchy structure via a network of computers. The hierarchy calls for the local fire department to document all fire incidents and fire cause information on a formatted and coded matrix to the Commonwealth. The generated incident-reports then forwarded by electronic mail to one of the 67 county designated 911 Emergency Operations Centers. The county repository in turn forwards the incident report to the Pennsylvania Emergency Management Agency in Harrisburg, PA for archiving. (Mercer County Emergency Management, PA, 2005).

The system theoretically should work well. Factually, it contains weaknesses that again raises exploratory need for questioning the validity of the archived statistics. First, the reporting requirements from the local level are not mandated by law, nor are penalties assigned for not reporting to PennFRIS. Reporting of fire incidents and causes is strictly voluntary. In 2001-2002, the system became operational. There were 23 of the 67 county's 911 Emergency Management Agencies initiating the collection of fire data. Twenty-three additional counties expressed their willingness to join the system in 2003, only 705, or 29.4 percent of the Commonwealths 2400 known and registered fire departments are utilizing the reporting system as of March 2005, (Pennsylvania Emergency Management Agency, Office of the State Fire Commissioner, 2004).

In other words 1700 or 70.8 percent of the known fire departments are not participating in the PennFRIS system. This generates the question of statistical accuracy. With 1700 fire departments, not accounted for, an accurate count of fire incidents and arson caused fire is not possible. Pennsylvania fire departments play an important role not only in the PenFRIS reporting system, but also in the national reporting system. Pennsylvania has the largest number of volunteer, or independent established fire departments in the country. It is common in Pennsylvania to have more than one independent fire department serving a single political sub-division.

Each Fire department participating in the system receives a numerical code assigned by PennFRIS to identify their department's fire incident response activity. The possibility of data information duplication exists for incident reporting. Should two or more fire departments respond to the same fire incident and each use their assigned identity code to report the single incident to PennFRIS, duplication of the event may

exist. Staff management from Mercer County 911 Emergency Management Agency, when asked the question of reporting duplication responded that such a possibility exists (Nicklin, 2005). In summary the probability of flawed, missing, or duplication of statistics are a possibility within the PennFRIS reporting system.

The National Fire Incident Reporting System (NFRIS)

The exact number of public fire departments within the United States is unknown. There are presently 23,008 fire departments registered with the United States Fire Administration under a program titled "*National Fire Department Census*"(United States Fire Administration, 1999c). In a cooperative effort under U.S. Public Law 106-398 the Federal Emergency Management Agency accomplished a survey entitled *"A Needs Assessment of the U.S. Fire Service".* The survey identified 26,354 public fire departments of various types (Federal Emergency Management, 2002). The discrepancy between the reported number of fire departments in the United States, again casts on the accuracy of fire statistics.

The National Fire Data Center administers and manages the federal NFIRS system. Their mission and charge is to coordinate, collect, analyze, publicize, and disseminate information relative to the fire problem in the United States. The State of Washington, with 535 known fire departments, encourages use of the system. There are 344 of the fire departments in the state reporting to the NFRIS system. This represents a 60 percent reporting rate. It exemplifies the mediocre compliance to voluntarily reporting of fire incidents and fire cause to both a state and national repository. Dr. John Hall, Assistant Vice President for Fire Analysis and Research for the National Fire Protection Association testified to the Science Committee of the U.S. House of Representatives on

March 23, 1999. He emphasized the importance of the NFRIS incident reporting system and reported the need to control the rate of arson incidents. He informed The Science Committee that since the start of the system, an observed leveling of participation in the system occurred in the 1980s. The leveling of participant input prompted upgrades and improvements to the NFRIS system (Hall, 1999).

To summarize the NFRIS system, there is an issue similar to Pennsylvania and Washington regarding fire incident reporting success. The lackluster interest and participation by both states and their fire departments to utilize the reporting systems again opens the question of statistical accuracy and reliability of published arson rates.

The PennFIRS and NFRIS systems are only two of numerous repository-clearing houses that exist within the United States. Professional organizations, public agencies, and private entities concerned with fire incident information and fire cause also collect and record data. The importance of providing and receiving accurate data is relevant to reducing not only the rate of arson, but also the life hazards of fire.

Other Fire Reporting Systems

Presently, there is a lack of uniformity and standardization in fire incident reporting systems and formats in the United States. Systems exist but they are not always compatible with a centralized clearinghouse serving as the focal point for accurate documentation of the nation's fire incidents. The need exists for this important topic to accurately identify and verify the cause and rate of fire incidents. An equally important component in validating the fire data collection system is a mandatory fire incident cause reporting process, which allegedly exists, but contains legislative enforcement weaknesses.

The Utah State Fire Marshals Office stated that there is a non-mandatory reporting system within the state. The Utah State Fire Marshal's Office is now receiving from fire departments the data for approximately 75 percent of the state fire incidents. This indicates that the system is losing 25 percent of the fire incident data in the state needed to project accurate fire statistics (Fire Chief, 2004). The Utah State Fire Marshal's statement identifies the need for mandatory fire cause reporting and validates the fact that an all encompassing reporting system in reality does not exist for the Untied States.

The state of Wyoming has a mandatory fire incident reporting system by state statue. The Wyoming State Fire Marshal's Office requires reporting of all fire incidents within seven days from the event occurring, specifically when the reporting investigator represents a state agency. When a volunteer fire department is the reporting agency, there is a thirty-day window for reporting the fire incident. There are no government incentives for the mandatory reporting policy by statute. The reporting rate for Wyoming is eighty five to ninety percent reporting compliance (Fire Chief, 2004). New York City had an independent, unrecognized system in place for the interpolation of fire data called "Comstats". It was used as an accountability mechanism and leadership driven for future management decisions to combat the arson problem (Fire Chief, 200442).

Summarizing the Utah and Wyoming compliance rate's for a mandatory and non-mandatory reporting systems, which has an unaccounted fire incident reporting loss of 25 percent. Wyoming has a 10 to 15 percent data loss (Fire Chief, 2004).

The Insurance Company

Insurance companies are stakeholders in the fire occurrence problem. They maintain their own internal and third party actuaries to follow trends of fire causes, primarily for fiscal and risk loss educational purposes. When arson does occur, they may opt to accept the arson fire loss as a nuisance claim. They may pay a claimant, even though a crime has been committed. This approach to closure for the crime of arson by an insurance carrier normally takes place when the claim falls within a tolerable low monetary personal or real property loss. There is the absence of personal injury or death and the cost of litigation exceeds the claim payment. In these situations, insurance companies may opt to pay a claim, rather than pursue an arsonist through civil litigation. When public safety agencies cannot proceed further in their investigation due to a lack of resources in definitively establishing arson as the fire cause and the insurance carrier is unwilling to retain private investigators, or technical expertise is still another example where arson may have been committed but not pursued. This investigative approach includes fire incidents when torts were not committed or the act is committed in the absence of high insurance coverage. It is reasonable to state that when the probability of civil suit does not exist, or no injuries or deaths resulted from the fire incident there is a direct relationship on the intensity of the investigation. Fire incidents of this nature rate a low to no investigative priority. The incident is accepted and remains status-quo and does not receive a comprehensive investigation. There is a definitive lack of follow through to establish a fire cause conclusion, or to seek out the perpetrator if there was one.

The reasoning used to pay the claimant in lieu of pursuing a legal recourse is a matter of economics. It may be more costly for the insurance carrier to pursue criminal or civil litigation than paying the insured the fire loss. This may happen when there is

insufficient evidence to file criminal charges, or file a civil suit, and prove that arson in fact did occur.

The Police and Fire Agency

The investigative method used by law enforcement and fire agency investigators parallels and mirrors that of the insurance company. When the crime of arson occurs and there is no insurance coverage, a low monetary loss involved, and the incident is void of injury, or death the investigation process lacks intensity. An issue and philosophy of economics presents itself. The return of the expended time, money, and related resources to conduct the investigation must justify the investigative results. This course of action for fire investigation establishes and follows the perspective that arson is a victimless crime when there are no aggrieved or injured victims. Even when the fire cause, without equivocation is determined to be arson, the crime of arson, it may go unreported.

In the Commonwealth of Pennsylvania, once arson has been determined as the definitive fire cause, a crime has been committed (Pennsylvania Consolidated Statutes Crimes & Offenses Title 18 Part II Chapter 33; Criminal Mischief and Other Property Destruction). It is the responsibility, under law, that the local authorities report all fire incidents, arson or otherwise within their municipalities to the Pennsylvania State Police Fire Marshal Division. It is important for reliability of arson rate statistics that there is a police presence. Should the political sub-division in which the arson incident occurs not have local level police protection to make the initial crime report, or should the respondent fire department fail to make the required notification to the Pennsylvania State Police; the arson crime in theory or reality will go unreported.

Law Enforcement agencies in the Commonwealth of Pennsylvania fall within distinct categories – local level police agencies and state police. Unlike some states, the authority of county policing agencies varies by government classification and their investigative powers in Pennsylvania will vary county by county. Specifically, Allegheny County and the City of Philadelphia have investigative and enforcement powers separate from the Commonwealth of Pennsylvania's sixty-seven counties. The investigative authority in Pennsylvania is dependent upon county classification and resource availability. The responsibility and authority having jurisdiction for fire cause investigation within Pennsylvania, excluding the previously mentioned first class metropolitan areas, is the Pennsylvania State Police Fire Marshals Division. It is the responsibility of assistant state fire marshals to make notification requesting fire cause investigation for all fire incidents. Administrative Assistant State Fire Marshal's are appointed within each political sub-division in the Commonwealth of Pennsylvania, the appointees sole responsibility is to document and report all fires, arson, or accidental to the, Pennsylvania State Police Fire Marshals Division. Once reported, the Pennsylvania State Police Fire Marshals Division are to follow-up and investigate the incident (Commonwealth of Pennsylvania Act 291).

Arson is the willful and intentional setting of a fire with the intent to damage or defraud (Kirk, 1997 p.482). The uniqueness of the definition of arson is that in its pure form it does not correlate with the specific criminal law code section of Pennsylvania. Article C – Chapter 33 § 3301 Titled Offenses Against Property –Arson, Criminal Mischief, and Other Property Destruction in the Crimes Code of Pennsylvania contains various subsections relating to arson. It was found that arson may be an act of Criminal

Mischief, depending upon the physical or property damage dollar amount incurred, rather than the specific charge of arson. Arson is "Agriculture Vandalism" when it involves the destruction of farmland and crops by fire (PA Crimes Code, 2000 p.66).

Arson is now considered a Part I crime under the Federal Bureau of Investigation (FBI) Uniform Crime Reporting Act (UCR). The UCR describes the willful or malicious burning, or attempt to burn, with, or without intent to defraud the real, or personal property of another to be arson. Based upon the limited reporting of arson by law enforcement the UCR program does not estimate for this offense. Without estimated statistical data; the raw data from the UCR report shows a national clearance, or arrest rate of 16.5 percent in 2002. This was a 12 percent decline from the reporting year 2001. Forty-three percent of those arsons cleared in 2002 involved juveniles. These statistics account for only fires determined arson and exclude all fires of undetermined origin. There were 12,454 law enforcement agencies providing the referenced data, with 12,414 of these agencies providing supplemental information supporting the arson incident. (Crime in the United States, 2002).

Arson as a Crime

Under English common law Arson was the willful burning of the house of another (Columbia Encyclopedia, Sixth Edition, 2001). It was a specific offense against a citizen's security of habitation. It was not an inclusive crime for malicious and wanton burning of property in general as it is in today's society. As society progressed through the ages and became more complex in governing the deeds of its citizens, the importance of expanding the definition of arson followed. The crime of arson paralleled the same societal course of complexity. Today the definition and terms of arson has been expanded

by statute to include, or construed to include the deliberate burning of ones property, or that of another's property for any malicious purpose, or reason. The crime now includes severity of degrees for the deliberate burning of another's property.

Co-mingled and considered an integral part of the crime of arson is the assigned degree of the act. The degree includes an interpretation on the extent of endangerment to the health, welfare, and safety of the citizen. Endangerment ironically includes the dollar value of the property destroyed by the deliberately set fire. If the property burned is insured, the implication is that the insurance carrier is the victim. The victim is the community should the property not be insured, since valuable property tax income to the community has now been lost.

Interestingly, burglary and arson share extraordinary ground in their common law origin. They were such serious crimes they were punishable by death. An explanation for this ultimate punishment rests in our Anglo-American culture and our existing constitutional rights as citizens of the United States. It is our fundamental right to be safe in our homes and residences against unlawful entry, by unwanted person or parties. This includes the entry of government without legal warrant. To do so was a crime against safe habitation. Quoting an excerpt in the year 1575 from the English House of Commons:

> "The poorest man may in his cottage bid defiance to all the forces of the Crown. It (His Home) may be frail, its roof may shake, the wind may blow through it, the storm may enter, but the King of England himself cannot enter. All the King's forces dare not enter, nor cross the threshold of the tenement (Lord Pitt)" (O'Connor, 2004).

The Commonwealth of Pennsylvania presents similar interesting history about 1682 during the convergence from English law. Criminal law and punishment for arson was much milder and humane. Arson was then punishable by a year of imprisonment, double the damages for property destroyed, and corporal punishment at the will of the court. During 1700s, this leniency towards the punishment of arson and other crimes began to change. Imposing more severe punishment and penalties initiated this change. William Penn, then Governor of the Commonwealth, commenced legislative action to bring government into the lives of an advancing society. The Commonwealth's General Assembly began a program updating the Commonwealth's government and legislation. The objective of the legislative programs for governing the province was to impose stronger punishment for crimes to improve the system of orderly governance. This plan involved revising the Commonwealth's laws, including the offense of arson. Punishment for the crime of arson legislated life imprisonment and forfeiture of the offender's entire estate. At this time, arson was a serious offense against property (Kalb.1977).

Who is the Arsonist

Who sets arson fires that result in injury and death? The uninformed citizen would identify the perpetrators as being professional criminals, or individuals with a criminal history, or background. This is an incorrect assumption. Factually, 52 percent of arson arrests include children under the age of 18, with the majority of those juveniles arrested for arson being under the age of 15. Approximately 7 percent are under the age of 10. This finding creates a legal dilemma when one takes into consideration the various state laws governing the age of culpability. The question is the age at which the juvenile be tried as an adult? State statue determines the age for the arrested fire setter charged with

arson to be adjudicated in open court. In the closed juvenile court, public access to the adjudicated actor's records for the crime of arson is not available.

As to what motivated the fire setter to initiate the fire is just as important as reporting and documenting the fire incident (See Figure 1). Identifying the reason for the deviance allows for the profiling of the actor and the perspective fire targets. Profiling allows for the development of an action plan to mitigate and combat future fire setting activities.

Seven standardized motive classifications attributed to and assigned the fire setter, or arsonist (See Figure 1).

Figure 1

Fire Setter – Motives

INDICATOR	MOTIVE
Direct or Indirect Financial Gain	Fraud
Mental Illness on Part of Fire Setter	Pyromania
Individuals Seeking Self-Recognition	Vanity
Destruction of Evidence – Prior Crime	Crime Concealment
Domestic Dispute	Spite – Revenge
Experimentation and Thrill Fires	Juveniles –Adolescents
Acts of Public Violence Using Fire	Civil Disorder

Note: National Fire Academy, Arson Recognition, 2002

The motive contributes to and supports an important part of the fire investigation process. The motives are but one part of the investigative process. Identifying the motive can lead to a determination and conclusion needed to render the fire cause as arson.

Fire Investigation Training

President Richard M. Nixon on September 7 1972, appointed and commissioned a multi-disciplined team of leaders to investigate and report on the fire problem in the United States. The task group was termed as the "National Commission of Fire Prevention and Control". The commission reported its findings back to the President on May 4th 1973, in a comprehensive document entitled "America Burning". The National Commission on Fire Prevention and Control highlighted that arson detection requires considerable training on the part of the local service to address the identification of arson fires in the United States.

A committee report of the International Police Chiefs Association validated the commissions finding with the following report of their own survey of findings and comments:

1. Arson Investigation squads were maintained in 22 of the respondent cities. The arson investigation squads are operational in only ten of the cities.
2. The total number of police officers assigned to police and fire department arson squads within the responding cities in metropolitan areas of the United States were forty-nine.
3, Among states responding to the committee's query, no more than a few had some police officers and firefighters trained in arson investigation. In Montana twenty police officers and seventy-five fire fighters had some training. The State of Illinois reported that two percent of their state police officers were trained for fire investigation. Ten percent of the state firefighters received some training in arson investigation. Louisiana reported less than one

> percent of their state police officers trained and only one percent of the state firefighters received training in fire investigation. The state of Nevada reported that only two of its cities have a few of their police officers to trained conduct fire investigations (Arson Detection and Investigation 1997 p.11).

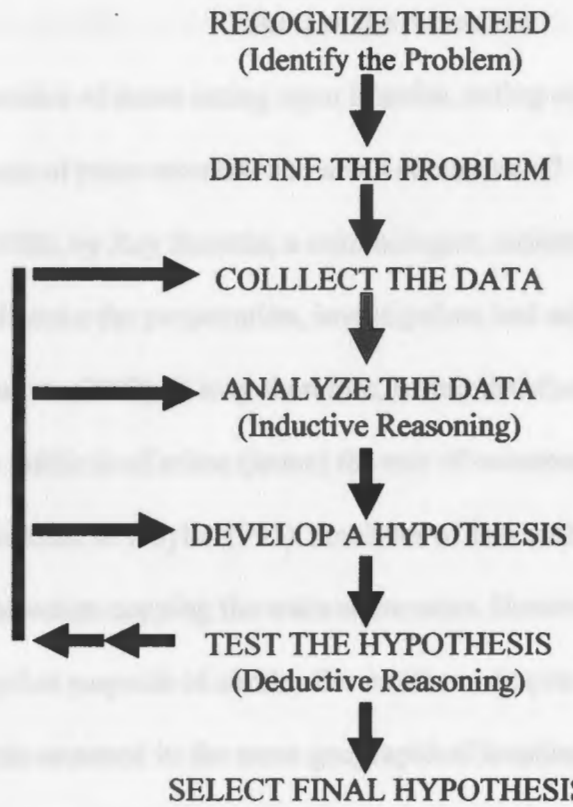
Scientific Methodology for Fire Cause Determination

The professional investigator is encouraged to follow a sequential and scientific deduction process. The investigation process commences with a fire scene visitation by the fire investigator. The purpose is to familiarize the investigator with key information in determining the reason for the fire occurrence. Emphasis on the fire scene inspection is placed on establishing the area, or point of origin, where the fire started. Once established a determination must be made on locating the heat source that started the fire. When these factors are determined, the investigator commences a scientific examination of the scene.

Professionally trained fire origin and cause investigators follow a scientific model in ascertaining the fire origin and cause of a fire. The investigation goal is to arrive at a scientific fire cause defensible by hypothesis on how the fire started. As physical evidence evolves during the investigation, the forensic sciences and associated investigative disciplines become involved. These disciplines are required to validate and assist the investigator in confirming the final hypothesis. When presenting testimony in civil or criminal court, the fire investigator follows the scientific model to maintain credibility in stating the cause and origin of a fire (See Figure 2).

Figure 2

Scientific Method



Note: National Fire Protection Association Standard 921 January, 2001

Establishing the fire cause as arson is the critical step in determining that a crime has been committed. Once the crime of arson is established, the investigation turns toward identifying the actor/s that committed the crime. Doing so involves inherent and costly expenditures. Expenditures include time and energy spent in the form of direct and indirect costs involved with case management of the incident. Specifically, the investigation of arson requires considerable time and extensive investigative resources by the authority having jurisdiction (AHJ). Resources used in this investigative process include specialists in the field of fire origin and cause. Multi- jurisdictional task forces charged with crime investigation unified multi-jurisdictional police agencies, forensic

laboratories, and insurance companies exemplify pools of available resources when specialists are required (Charlotte Fire Department, 2005).

Who are the Arsonists

Is the perpetrator of arson acting upon impulse, acting out in a fit of anger, or copying the attributes of prior arsonists and arson occurrences? Research and studies conducted in mid-1980, by Ray Surettte, a criminologist, indicates that there is potential for the media to influence the perpetration, investigation, and adjudication of all crime, including arson (Surette, 2002). It may therefore, be implied that the more aware and knowledgeable the public is of crime (arson) the rate of occurrence may be increased (Morgan, Cook, Darkens, & Doyle, 1995). Analyses of fire setting incidents indicate they were the result of arsonists copying the traits or mentors. However, the analysis fails to specifically tie together suspects of similar fire incidents despite the fact that all of the studied fire incidents occurred in the same geographical location (Morgan et al., 1995). It is more acceptable to profile and categorize the typical arsonist into a basic grouping. The obscure habits and behaviors of an arsonist are little known. This includes why their demeanor differs from that of the general population.

Variables involved with profiling the fire setters include the home environment, life style, and education relates to fire setting. Is there any effect from positive or negative reinforcement of social and economic values? Do the traditional values found in the mainstream of society assist in preventing fire setting? Alternatively, when there is no parental presence in the situation, does this create a stimulus for fire setting, or does it lower fire setting incidence rates? Is there a correlation connecting education, adequate

income, and home ownership that reflect a higher or possibly lower arson incident rate? In contrast, are there unknown variables that affect the community's arson rate?

Motivational attitudes enter into the psychology, or rationale for the fire setter to accomplish the act. The motivation can be a crime of passion, a personality, or vanity need, an act of civil disobedience, or white-collar crime for financial gain. The crime requires exploring and research to find the logic for its motivational occurrence. To understand arson causation a profiling system can be used by public safety authorities to reduce the arson incidence rate. Information discovered during research can then applied to identify communities, neighborhoods and persons who may become potential arsonist targets.

Established studies have addressed a number of variables in compiling a possible profile of an arsonist. The studies have found that (Doley R.):

1. Gender: Predominantly the male gender commits arson at a ratio rate of 6:1 when compared to female arsonists (Farrington, 1996). A random sampling established that 80 percent or more of the arsonists are male (Stewart, 1993).
2. Age: Readings and literature accept the age of the arsonist as being young and falling within the age brackets between 16 to 25 years of age. However, this possibly is a misconception. A study documented those adolescents who committed most arson fires were within the 4 to 73 year old age range (Baker, 1994). Illustrated by this specific profile study arsonist may be any age.
3. Socio-Economics: Literature research generally and specifically tends to tie crime to socialization, areas of residency, income, and education. Arson as a crime coincides with this research. Arsonists are often associated with a

dysfunctional family setting with one, or both parents absent (Winnipeg, 2005).

4. Social Adjustment: Typically, an abused and neglected child commits the crime. Usually the arsonist is socially maladjusted (Geller, 1987: Inciardi:1970: Rice & Harris, 1991), and educationally disadvantaged (Koson & Dvoskin, 1982: O'Sullivan & Kelleher, 1987), the arsonist may be a substance abuser (Inciardi, 1970). Socialization categorization of individuals may also include being mentally challenged or deficient, but not mentally ill (Levin, 1976; Rasamen et al., 1994; Stewart, 1993; Vreeland & Levin, 1980). Post diagnoses of the arsonist when mental illness is evident found it to be in the form of schizophrenia, mental retardation, and personality order (Barker, 1994). The the representative background of the arsonist is consistently deficient.
5. There are implied and acceptable findings that indicate a viable path between arson and the values of the perpetrator. Fire cause research in Toledo, Ohio indicated that a relationship existed between income and the incendiary fire cause (Gunther, 1981).
6. Research suggests that high rates of arson and suspicious fires within a community are the result of the complex and tremendous problems confronting people residing within depressed inner city neighborhoods. Furthering the argument that arson is a multifaceted, complex, personal, and social issue is the entry of the judicial system into the orderliness of the crime Fay (1989).

Innocent Victims

When the hideous crime of arson takes place, it impacts not only upon the fire victim, but also the economy, and social values of the community. The crime has a

negative public perception and acceptance. The negativity on the part of the public is an assumption of identification, or labeling of the arson prone community. This labeling and identification defines the social order and criminal elements of the community in which it occurs. When the crime of arson occurs, it is also a reflection of a lifestyle within a community. It is implying that the local social order and the governmental body accept the occurrence of arson. In reality, the community and governing law enforcement bodies are sanctioning the act of arson by not recognizing the seriousness of the crime and taking action to reverse or stop an arson trend. Lack of an enforcement and action plan to combat the arson problem identifies the acceptance of fire occurrence in general, including arson, as a part of the community (City of Santa Monica, 2005).

Another implication to the act of arson is the potential of physical injury or death to the victims and any incidental victims of the set fire. Considered innocent victims are the civilians and public safety personnel, who may be at the wrong place at the wrong time, resulting in their personal injury or death at the fire scene.

The uniformed public safety personnel are directly exposing themselves as incidental victims to injury and death when responding to the arson fire scene. Exposure in the form related to the dangers or safety hazards when undertaking rescue of any entrapped fire victims, and the perils incurred during fire extinguishment. The safety issue extends even to the fire investigation process, where the investigators expose themselves to the potential of building collapse, structural deterioration, and inhalation of residual fire gases, all of which causes personal endangerment.

The risks of death or injury to public safety personnel are not in reality considered momentous by the court system considering the personal exposure to danger incurred

when performing rescue, combating, extinguishing, and investigating the incendiary fire. The court system and state law throughout the United States hold different opinions on the perspective of public safety personnel placed in harms way when the fire cause is determined to be arson.

Fire firefighters and public safety personnel incurring injuries or death are not included in the dollar loss of arson fires. Legal opinions consider their exposure to injury or death in responding to, or working at arson scenes an occupational hazard. This presents a question about the death, injury, and suffering by those innocent victims impacted by the arson fire. Is the occurrence truly an occupational hazard or a criminal act, and possibly even a tort act on the part of the arsonist. Statistics indicate that arson fires contribute and account for 22 percent of all firefighter injuries (United States Fire Administration, June 1999 p.2).

Economic Influence

Another facet influencing arson fire leads to the economic influence in the community. The economic disruption is a hidden factor not immediately and readily recognizable by the public. The economic impact is immediately recognized by the victim and those directly affected by the arson incident. This would include insurance carriers, local government costs for providing fire extinguishment, protective safety services, and the direct loss of tax revenue base. It is the unbudgeted cash flow output for the additional services provided and lack of budgeted cash flow income that causes financial interruption to the political sub-division when arson fires occur. Arson fires in any number should be of concern to the elected and governing officials.

Arson fires are definitively an economic draw down on the community tax base and taxable income resource. They produce blighted neighborhoods, lower tax base, and less wage tax income to local government. The community as a whole is effected from the lower property value assessments within arson prone zones or neighborhoods.

The loss of physical structures resulting from any fire cause reduces real taxable property income, removing the property from tax producing roles. Government survives upon tax income, be it real property tax or wage income (City of Santa Monica, 2004).

When an arson fire incident occurs in an entity with employees earning wages, the government is directly affected. The governing body is consequently the loser of wage tax revenues from the employee and employer. It is important to address these innocent victims. The innocent citizen pays for the crime of arson through elevated taxation in the form of higher wage, property tax, and insurance premiums. This is the normal and accepted means applied in a community and business to cover operational expenses, or recover taxable and business income losses. Citizens bear the burden to recover and to meet the financial revenues for governance of the political sub-division and insurance industry.

Secondary to the innocent victim's higher taxation is the issue of personal living expense. Specifically, a property owner's home or business fire and property insurance premium rates reflect the rate of fire occurrence and level of fire protection in a community. The level of public fire protection or classification is related to the capability of the fire department to function efficiently and effectively within he community being protected (Insurance Services Office, NJ, 2004). The insurance company actuarial bureaus then use the fire protection classification as a component,

along with applying the fire incident rate, and dollar loss by fire in factoring and assigning insurance fees (premiums) to a community. Insurance premium rates directly reflect the fire incident rate and property loss of a geographical area. The higher the fire incident rate and the property loss from fire, including the effectiveness of the fire department, establishes the insurance premium rates applied to property owners.

Once the arson phenomenon becomes recognized the responsibility of the reporting actuaries is to flag geographical areas as arson prone targets and regions. The fire loss cost to the insurance industry is then passed on to the private sector consumer (the insured) in the form of higher insurance premiums Ultimately the arson fire rate, including the rate of accidental fire occurrence, begins reflecting and trickling economically upward towards the regional, state, and national levels. Nationally, arson by itself, excluding all other fire causes generate an estimated 1.4 billion dollar loss in property damages each year (United States Fire Administration, December, 2001). One can now identify the need to study and research fire and arson statistics, fire setter profiles, and why the United States accepts fire occurrence, accidental, or arson as a daily life style. The research objective is an endeavor to reduce both the crime and economical impact of arson and fire in general on the citizens of a community and the community itself. In summation arson is a fire event that effects an entire community.

The methodology for studying arson is presented in the following chapter concerning, fire incidents in a local Pennsylvania community. Chapter IV presents the research results. Chapter V offers the findings and discussion from the research.

Chapter III

Methodology

As was discussed in Chapter II there is a lack of understanding concerning the cause of fire incidents. The understanding of fire causation becomes more complicated particularly when applied to the crime of arson. Reinforcing the literature review from the previous chapter, presented in this chapter, is an assessment of the various state and national data collection systems and repositories. Included in this chapter are the procedures and protocol used to obtain the fire cause data.

This research project includes the development of a basic fire setters profile within a researched geographical area and any socioeconomic links to the profile of the fire setters. The purpose of this research is to determine if the life style, education, and social status of fire setters has an impact on their behaviors. The objectives of the research are to identify, at the local and regional level, causation for the occurrence of arson or suspicious fires. To format this comparative reason as listed in Chapter I the fire causation questions established to attain the stated research objective are:

Research Questions

1. Who commits arson?
2. Are the national established statistics accurate?
3. What are the perpetrators characteristic's?
4. What are the common motives for the crime of arson?
5. What is the class of material most commonly ignited?
6. What is the relationship, if any, between the arson victim and the arsonist?
7. When is arson most likely to occur?

8. What is the percentage rate of charges for the crime of arson?
9. What is the arrest rate for the crime of arson?
10. Are juveniles involved in fire setting?
11. Does the clearance rate for arson in Mercer County, Pennsylvania reflect the national reported clearance rates for this crime?
12. Do Mercer County Fire Departments actively participate in the Commonwealth of Pennsylvania PennFIRS system?
13. Is there adequate training given at the fire department level to investigate the cause and origin of a fire?
14. Should the fire department and police department, as well as investigative agencies with an interest in the fire loss, be involved in a fire investigation?
15. Does a political sub-division of government have an accurate dollar amount of fire loss for their community?
16. Are all fires ruled accidental, truly accidental?

The purpose of the research is to analyze the arson problem by obtaining the information from police reports for the arson case history and from the survey of data from the firefighters to substantiate the findings. The reviewed case history provides the varying factors that can enter into the reason for arson or incendiary fires to occur. The final analysis is from a defined geographical area of communities within settings of small urban, suburban, and rural political sub- divisions in Mercer County, Pennsylvania. The communities from which the research data were obtained are identified in Table 4.

Table 4

Communities and Associations Providing Data Base

City of Farrell, Mercer County, Pennsylvania

Township of Jefferson, Mercer County, Pennsylvania

City of Hermitage, Mercer County, Pennsylvania

Mercer County Fire Chiefs Association

City of Sharon, Mercer County, Pennsylvania

Borough of Sharpsville, Mercer County, Pennsylvania

Note: Source Mercer County (2005)

Police departments from each of the listed jurisdictions identified in Table 4 provided arson, suspicious and undetermined fire incident reports for the research project. The police departments providing the reports included departments with full-time officers and smaller departments with part-time personnel. These officers provided policing services in urban, suburban, and rural settings. The data were then compared with statistics that are nationally recognized and accepted for the crime of arson.

The data for the fire causation finding then compiled for the years 2001 thru to 2004 after a review of 64 police department reports from the researched area. The police reports reviewed established the fire cause as arson, suspicious, or undetermined. Thirty-four fire officers and fire chiefs, as a result of a convenience sample provided support to the arson case review, by voluntarily completing a questionnaire. The fire personnel participating in this sampling represented the 26 Mercer County fire departments. The purpose of the survey sample was to determine if their experience levels and training reflected on the investigative management of suspect fires.

The police reports were traditional initial fire incident reports. The fire incident facts were documented on the department's incident reporting forms. Each of the department's reporting forms varied in context and format. There was no standardized information sequence or reporting commonality between departmental forms. The reported information, as found or found to be non-existence in each of the reports reviewed then entered into a data bank. A spreadsheet was developed and the data placed into Software for Social Scientists (SPSS) from the reports. The variables were then analyzed for similarities and differences. The fire officer and firefighter response to the questionnaire, in the format, provided the data necessary to help validate the case report information. The fire officer data compiled from the questionnaire was then analyzed using SPSS. The research survey instrument appears in Appendix A.

The review of the police reports established the needed research fields. The research data then identified and collected from the report. The research fields are:

1. Year, Month, and Day
2. Time of Incident
3. Community of Occurrence and Zip Code
4. Time of Occurrence
5. Property Destroyed, Damaged, Occupied, Unoccupied, Abandoned
6. Income of community setting, or neighborhood, arbitrarily set as:

   High $40,000, Medium $20,000, Low Income $15,000
7. Community Setting, Urban, Suburban, Rural
8. Age of Perpetrator, Gender of Perpetrator, Race of Perpetrator
9. Prior Criminal History of Alleged Perpetrator

10. Residence of Perpetrator, urban, suburban, rural

11. Residence of Fire Victim, Urban, Suburban, Rural

12. Relationship of Actor to Victim – Known – Unknown

13. Property Classification by Occupancy

14. Estimated Dollar Loss of Damaged or Destroyed Property

15. Property Insured

16. Injuries Incurred to Victims, or Public Safety Personnel

17. Material Class Ignited -Ignition Device

Variables

The sampled environment for the research came from selected target areas within Mercer County, Pennsylvania. The areas included a grouping of political sub-divisions identified as the Shenango Valley. The research sampling of 64 confirmed arson, suspicious, or undetermined fire incidents investigated by law enforcement agencies came from the years 2001 to February 2005. The police departments providing the research data represent the most concentrated population cluster and one rural area within Mercer County. The fire officer data represents the county fire services as a whole.

The investigated community's population bases range from 4,000 to 17,000 citizens, (United States Census Bureau, 2002). The selected geographical research area represents a blending of rural, suburban, and urban areas. The research site consists of a grouping of small cities, boroughs, and townships. Thirty-nine percent (n= 46,721) of Mercer County's total population and 82 percent (n= 6,778) of the county's total minority population live within the Shenango Valley (Varro, 2000, p.20). The Mercer County, Pennsylvania population composition by race is shown in Figure 3. The United States

Census Bureau considers the Shenango Valley and Mercer County a part of the metropolitan Youngstown-Warren, Ohio urban area. Recognized experts in the field of social problems describe the adjoining cities of Sharon and Farrell as a microcosm of inner city Philadelphia (Frankenburg, 1977). This statement still holds validity as the demographics of the selected geographical research area has not changed and is still considered by the United States Census Bureau (2004) a segment of the Youngstown – Warren metropolitan region.

Figure 3

Mercer County Demographics

Inhabitants	Composition Make-Up
White	93.1 %
Black	5.3 %
Native	0.1 %
Asian	0.4 %
Hispanic	0.7 %

Note: U.S. Bureau Census, Quick Facts, (2000)

Methodology Summary

The researcher made contact with the Police Chiefs of the communities noted in this Chapter. The incident reports to conduct the research, were provided by the police departments serving communities participating in the research project. The incident reports relate only to fire incidents where the cause had been established as arson, cause undetermined, and suspicious. When obtained by the researcher the investigation report copies were not altered or censored. The fire officer survey was conducted through the

Mercer County, Pennsylvania, Fire Chiefs at a regularly scheduled monthly meeting (January, 2005). The survey instrument then offered for voluntary completion by association members in attendance. Participants returned personally or by mail the completed research instrument to the researcher.

Using the information from the police reports and that obtained from the fire officer's survey questionnaire, the data were then organized and configured into the SPSS program for analysis. The results of which are presented in Chapter IV.

Chapter IV

Findings

The two data sets described in Chapter III were analyzed and the results are presented. Data were collected from police incident reports and survey information from the firefighters. The data were synthesized to answer the following research questions:

1. Who commits arson?
2. Are the national established statistics accurate?
3. What are the perpetrators characteristics?
4. What are the common motives for fire setting?
5. What is the material most commonly ignited?
6. What is the relationship, if any, between the victim and the arsonist?
7. When is arson most likely to occur?
8. What is the percentage rate of charges for the crime of arson?
9. What is the arrest rate for the crime of arson?
10. Are juveniles involved in fire setting?
11. Does the clearance rate for arson in Mercer County, Pennsylvania reflect the national reported clearance rates for this crime?
12. Do Mercer County Fire Departments actively participate in the Commonwealth of Pennsylvania PennFIRS system?
13. Is there adequate training given at the fire department level to investigate the cause and origin of a fire?
14. Should the fire department and police department, as well as investigative agencies with an interest in the fire loss, be involved in a fire investigation?

15. Does a local political sub-division have an accurate dollar fire loss for their community?
16. Are all fires ruled accidental, truly accidental?

The first data set deals with the response from a questionnaire and survey of 35 fire department officers and personnel from Mercer County, Pennsylvania. The participating respondent's members of their community's public fire and life safety force. Volunteer and professional firefighters and fire officers participated in this survey. The second data set consists of information obtained from a review of 64 police department case studies determined to be arson, suspicious in origin, or cause undetermined. For the instruments used for the fire officer survey and the fire incident data and case review matrix see Appendix A.

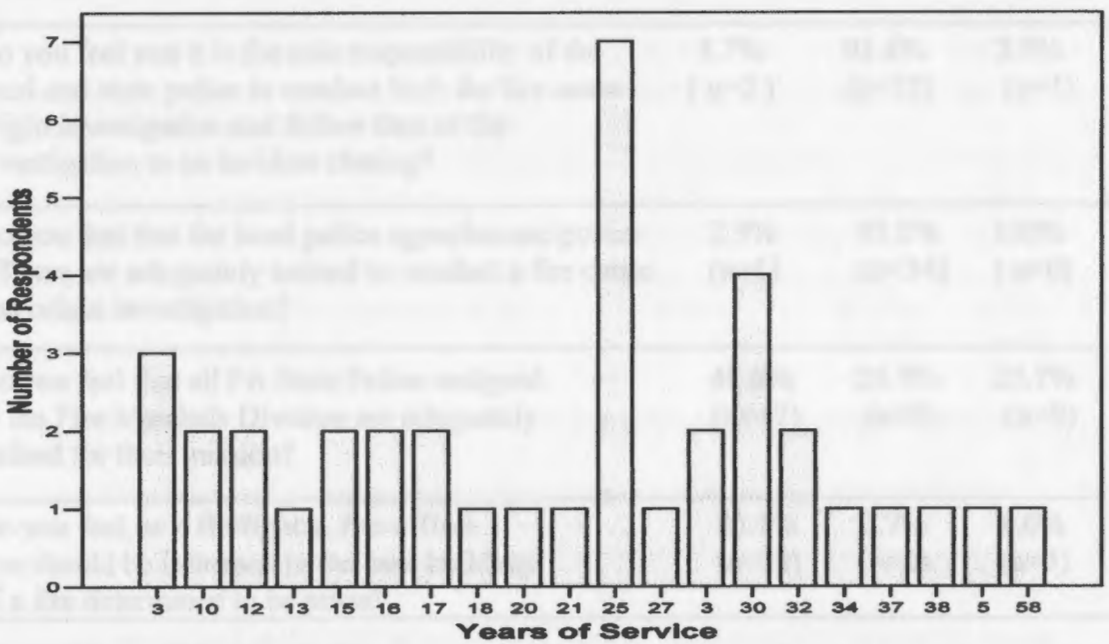
Fire Personnel Survey Data Results

The survey questionnaire design answered exploratory questions regarding, fire investigation, reporting of fire data to central repositories, training of public fire investigators, and related issues surrounding fire investigation. The fire officer survey objective was to obtain opinionated input from individuals actively participating in public fire protection. Thirty-five male fire officers and firefighters from Mercer County, Pennsylvania, who are staff, or line fire officers with investigative and management responsibilities responded to the survey. Please note that there were no female respondents to the survey; presently there is no female line, or staff officers serving in the Mercer County Fire Chiefs Association. Firefighters comprised 22.9 percent of the respondents (n = 8, 22.9%). The responding firefighters are those individuals within the fire department charged with fire extinguishment tasks. Fire officers represented 77.1

percent of the respondents (n = 27, 77.1%). Fire officers fill leadership and management responsibility positions in the fire service. The average years of service for the officers was 22 years and 2 months in length ($\bar{x}$ = 22 years and 2 months, s^2 = 11 years and 3 months). The years of service ranged from 3 years up to 58 years of service. Such tenure and seniority provides credence to the questionnaire. Their worldly experiences and on the job training while assisting in establishing the cause and origin of fire support and reinforce their opinioned response to the questions. Figure 4 graphically displays the respondents years of service.

Figure 4

Fire Officers Surveyed -Years of Service



The survey questions focused on the fire officers department administrative and field operations. The questions identified fire reporting, fire cause investigation, fire investigation training, and arson fire causation. The purpose of the survey was to detect any correlation at the Mercer County, Pennsylvania level with the review of the literature

findings. Table 5 presents the response to certain specific questions asked, not herein discussed. The responses identify diversity of opinion and examples of weaknesses and strengths in the present fire investigation protocol and fire reporting system.

Table 5

Fire Personnel Data Results -Mercer County, PA Fire Officer Survey

Question	Response		
	YES	NO	UNDECIDED
Do you feel that all fire causes ruled accidental by either human error or a form of equipment failure to be truly accidental?	20% (n=7)	74.3% (n=26)	5.7% (n=2)
Do you feel you are adequately trained as a firefighter or a fire office and capable of initiating, conducting, and withstand court testing of your fire investigation?	25.7% (n=-9)	65.7% (n=23)	8.6% (n=3)
Do you feel you it is the sole responsibility of the local and state police to conduct both the fire cause origin investigation and follow thru of the investigation to an incident closing?	5.7% (n=2)	91.4% (n=32)	2.9% (n=1)
Do you feel that the local police agencies and police officers are adequately trained to conduct a fire cause and origin investigation?	2.9% (n=1)	97.1% (n=34)	100% (n=0)
Do you feel that all PA State Police assigned to the Fire Marshals Division are adequately trained for their mission?	48.6% (n=17)	25.7% (n=9)	25.7% (n=9)
Do you feel, as a firefighter, fire officer you should be informed in the case building of a fire determined to be arson?	85.7% (n=30)	5.7% (n=2)	8.6% (n=3)
Do you feel the fire causes determined to be arson in Mercer County are adequately investigated , closed by an arrest, including perpetrator adjudication ?	14.3% (n=5)	45.7% (n=16)	40.0% (n=14)

Table 5 cont. p. 55

Table 5 cont.

Question	Response		
	YES	NO	UNDECIDED
Do you feel that the average victim of an arson fire is known to or by the arsonist. i.e. neighbor relative friend?	54.3% (n=19)	25.7% (n=9)	20.7% (n=7)
Do you report on the proper reporting form every fire incident to the PSP- FM office be the cause accidental, arson, or undetermined?	34.3% (n=12)	40.0% (n=14)	25.7% (n=9)
Does your department participate in and report fire incidents to the PennFRIS system?	60.0% (n=21)	5.7% (n=7)	34.3% (n=12)
Does your department use an accepted standardized fire incident model reporting form to document all fire incidents?	68.6% (n=4)	20.0% (n=7)	11.4% (n=4)
Do you feel that the present fire cause investigation system in the Commonwealth of Pennsylvania is outdate and outmoded?	42.9% (n=15)	11.4% (n=4)	45.7% (n=16)
Do you estimate property fire loss in a dollar amount?	65.7% (n=23)	34.3% (n=12)	100% (n=0)
Does the insurance company advise you of the final fire loss paid claimants?	8.6% (n=3)	82.9% (n=29)	8.6% (n=3)

Interestingly 74.3 percent of the fire department personnel respondents (n-26) indicated they had suspicion that not all fires ruled accidental in origin, are in fact accidental. Only 20 percent of the respondents (n=7) believed that all fires ruled accidental are in fact accidental in origin and involve no conspiracy to commit arson. When asked about local level police officer capability and training to conduct the fire cause investigation, the responses definitively were in the negative. Ninety-seven percent (n= 34) thought that at the local level the police officer was not properly trained to conduct a fire cause investigation. The question relating to estimating fire loss yielded 66

percent (n=23) response that the fire department estimated fire losses. However, 82.9 percent (n=29) of the respondents indicated that they received no information from the insurance company on the actual dollar loss paid the claimant by the insuring company. The positive - negative response to the two questions cloud the accuracy of the dollar loss by fire in Mercer County, Pennsylvania. It is further apparent the respondent fire officers consider the fire investigation system in the Commonwealth of Pennsylvania outdated and outmoded. Forty-two percent (n=15) felt in the affirmative, for improvement and 45.7 percent (n=16), were undecided on the present fire investigation protocol system.

Table 6 reports the findings of the respondents for what they believed were the motives for arson fires within Mercer County. The motive to commit insurance fraud ranks the highest 45.7percent (n=16). It is interesting to note that, as described and discussed in Chapter II, the literature indicates that acts of juveniles, vandalism, and excitement, accounted for 36.8 percent.(United States Fire Administration, 1995) of arson as motives for the crime. However, the fire personnel surveyed felt that the common motive for arson was insurance fraud. The rank order of motives for arson fires in Mercer County, Pennsylvania are stated in Table 6.

Table 6

Mercer County, PA Most Common Arson Motives

Insurance Fraud	45.7%	(n =16)
Spite and Revenge	17.1 %	(n=6)
Vandalism	22.%	(n =8)
Excitement	11.0%	(n = 4)
Acts of Juveniles	2.9 %	(n = 1)

Correlations Between Responses

Since there was a small sample of firefighters (n = 8) it was determined that differences between their viewpoints and those of fire officers, administrators, and could not be determined. Although the differences were not calculated between line staff and administrators, correlations were calculated between training, investigation, and fire causes. A correlation matrix was analyzed. Major correlations are discussed below.

There was a positive correlation between whether the respondent felt if the fire was an accident and if the investigation should be conducted locally ($r^2 = .140$, $p \leq .05$). The respondents believed that if the fire truly was an accident then the investigation should be accomplished at the local level. There was a correlation as to when they reported perceived accidental fires to PennFIRS ($r^2 = -.155$, $p \leq .05$). If they felt it was truly an accidental fire, they were less likely to report the fire to PennFIRS.

A strong relationship existed with the fire investigator's observed fire cause and a potential motive for the fire. In other words, if the fire investigator knew the cause of fire they were able to establish rather easily the motive ($r^2 = .216$, $p \leq .01$). There was also a correlation that all parties involved in the initial fire incident response be involved in the fire investigation and help establishing the final cause determination ($r^2 = .140$, $p \leq .05$). The respondents further indicated that a standardized reporting form was not useful in determining the fire cause ($r^2 = .133$, $p \leq .05$). Respondents reported that if adequately trained they could provide the estimated dollar loss of a fire ($r^2 = .190$, $p \leq .01$).

The majority of the respondents indicated that they did not use a national formula for estimating fire loss. Thirty-four percent indicated they used a standardized formula. The standardized fire loss formula being utilized was not stated. An interesting finding

with this correlation is that the remaining 65 percent of the respondents reported they do estimate dollar fire loss using a known standardized method. This unknown method places the accuracy of their dollar loss estimate in question.

Forty percent of the fire officers surveyed did not report all fire incidents, accidental, or arson to the Pennsylvania State Police Fire Marshals Office. The PennFRIS reporting system is linked to the total incident activity of a fire department. The system documents all fire incidents and emergency incident responses by the reporting department. Consequently a substantial relationship is recognized in this field ($r^2 = .318$, $p \leq .05$) linking the reporting of all fire incidents to attain statistical accuracy. This confirms suspicion that the statistical rate and occurrence of fire incidents presented to the public are incomplete and missing from the database of the system. The PennFRIS system is a voluntary Pennsylvania fire incident reporting system. The only reporting mandate required is that any fire department within Pennsylvania receiving a funding grant from the Commonwealth, must within one year of receiving the grant participate in the system to qualify for future grants. This written mandate to participate in the reporting system to be a grant recipient (Penn FIRS) is not enforced.

A relationship is indicated in the training need of Pennsylvania State Police Fire Marshals and the estimating of fire losses. Respondents to the question felt that if Fire Marshals were properly and adequately trained, they could estimate fire losses if given more training ($r^2 = .173$, $p \leq .01$), but they are already trained in the area and reported they do not use national standards or formulas in estimating fire losses. One might conclude that they are not using already obtained training, why request more? A negative correlation existed between insurance companies and the use of standardized formats.

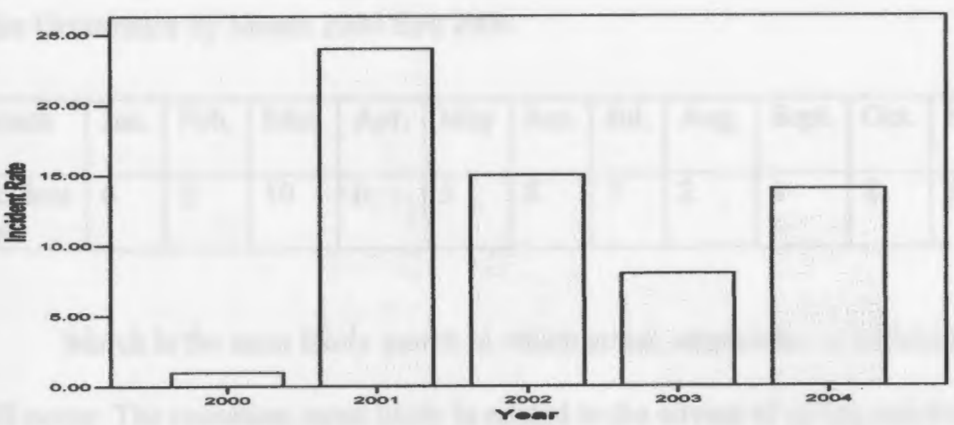
The insurance carriers have no need for standardized forms or follow a pre-established standard in completing forms ($r^2 = .161$, $p \leq .05$). Insurance carriers do, however, recognize the need to use nationally accepted guidelines, or standards when conducting fire investigations ($r^2 = .116$, $p \leq .05$). Nationally accepted guidelines are extremely important to follow when estimates of fire loss are established by the investigator ($r^2 = .298$, $p, \leq .01$). Survey participants affirmed the need to be trained to accurately estimate fire loss ($r^2 = .190$, $p \leq 01$).

Police Department Arson Incident Reports Reviewed

Police case files were reviewed in addition to the firefighter information. The 64 fires determined to be arson, suspicious, or of undetermined origin and cause were studied from the police reports between January 1, 2000 and February 13, 2005. They indicate that the rate of incidence has diminished from 25 incidents (37.5 %), after peaking in the year 2001. The 2004 incident rate diminished to 14 (21.9%) incidents. The data obtained for the year 2005 does not include a full calendar year and is not shown. The incident rate for each of the full calendar year studied are illustrated in Figure 5 and shown in Table 7.

Figure 5

Arson, Suspicious, and Undetermined Caused Fires



Listed in Table 7 is the year, frequency, and valid percent for all fires for which arson was determined the cause, and fires of suspicious or undetermined cause.

Table 7

Year, Frequency, and Valid Percent of Arson Incidents

Year	Frequency	Valid Percent
2000	1	3.1%
2001	24	37.5%
2002	15	23.4%
2003	8	12.5%
2004	14	21.9%
Total	62	98.5%

Note: Year 2005 was incomplete and not included in Frequency

The fire incident rate studied indicate the most vulnerable month for arson, suspicious, and undetermined fires, occurred in March with a frequency rate 15.6 percent, (n=10). An illustration of the data is presented in Figure 6. Table 8 shows the incident rate by month for the years studied.

Figure 6

Fire Occurrence by Month 2000 thru 2004

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Incident Rate	6	5	10	6	5	8	7	2	4	8	3	0

March is the most likely month in which arson, suspicious, or undetermined fires will occur. The causation, most likely is related to the advent of spring and the warmer

weather when individuals begin moving to the outdoors as well as being out and about the community. Traditionally the spring season is the perfect time for wild lands to be both ignited accidentally and serve as prime targets for the arsonists. March weather conditions attribute to the annual start-up of wild land and forest fires. Interestingly the case reviews did not indicate any arson, suspicious, or undetermined fire cause occurrence during the month of December in any of the reporting years reviewed.

Table 8

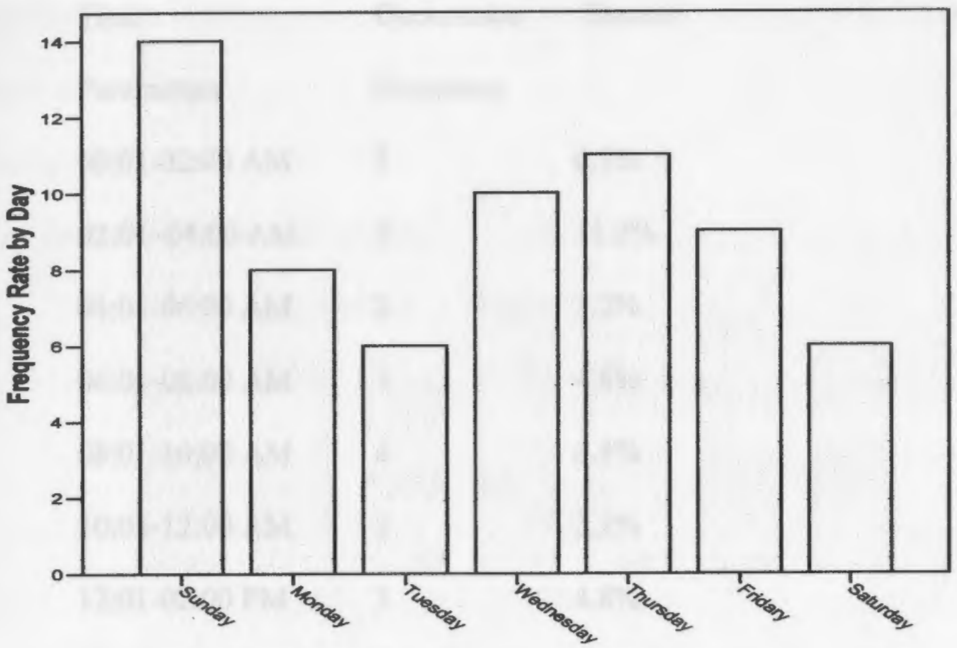
Arson, Suspicious, and Undetermined Fire Cause Frequency Rate by Month

Month	Frequency	Valid Percent
January	6	9.4
February	5	7.8
March	10	15.6
April	6	9.4
May	5	7.8
June	8	12.5
July	7	10.9
August	2	3.1
September	4	6.3
October	8	12.5
November	3	4.7
December	0	0
Total	64	100%

The day of the week when the largest number of fire events happen was Sunday (n=14.22%). The least likely day for arson incidents is Saturday (n=6.9%). Figure 7 illustrates the day of the week in which the studied fires happened.

Figure 7

Rate of Arson, Suspicious, Undetermined Fire Cause Incidents by Day of Week



Time of the fire incident is critical from an emergency response perspective. During certain times throughout a 24-hour period emergency personnel may have encumbrances such as limited staffing, increased traffic slowing down response time in peak traffic periods, or late night and early morning times when emergency personnel may have been retired for the evening. Table 9 identifies the hours in two hour blocks for the frequency, rate of occurrence and valid percent. The spike hours for arson, suspicious, or fires of undetermined origin are 2:00 AM – 4:00 AM for morning fires with an occurrence rate of ten incidents (11.2 valid percent), 2:00 PM to 4:00PM during the afternoon hours, with an incident rate of seven (11.2 valid percent), and, ten incidents

from 4:00PM to 6:00 PM (16 valid percent). The highest frequency rate (11) rests between the hours of 10:00 PM and 12:00 PM with a valid occurrence value of ten percent.

Table 9

Fire Occurrence Time and Frequency

Time Parameters	Occurrence Frequency	Percent
00:01-02:00 AM	5	6.3%
02:01–04:00 AM	7	11.2%
04:01-06:00 AM	2	3.2%
06:01-08:00 AM	3	4.8%
08:01-10:00 AM	4	6.4%
10:01-12:00 AM	2	3.2%
12:01-02:00 PM	3	4.8%
02:01 – 04:00 PM	7	11.2%
04:01-06:00 PM	10	16%
06:01 – 8:00 PM	4	6.4%
08:01 – 10:00PM	5	8%
10:01 – 12:00PM	11	16.9%
Total	63	98.4%
Missing System	1	1.6
Total	64	100.0%

The 64 cases studied for the research involved eight United States Postal Service Zip Code areas, however, 68.8 percent of the incidents occurred in one zip code area, distinctively an urban area. A neighboring community also considered an urban area accounting for 6.3 percent of the incidents, with a suburban area realizing 14.1percent rate, while the rural area was 1.6 percent. Table 10 identifies locations of the fires within the categories of urban, suburban, and rural areas; all of which are situated inside the eight zip code areas.

Table 10

Location of Fire Incidents by Area

Categories	Frequency	Percent
Urban	48	75
Suburban	7	10.9
Rural	9	14.1
Total	64	100%

The literature review implied that financial income is related to the probability of the individual being deviant (Winnipeg, 2005). The fire incident locations reviewed for this study were established as high, medium, and low income. This income relationship to the incendiary fire problem is shown in Table 11.

In establishing the income classification arbitrary values were placed on the incident area. Included in the value and taken into consideration were the type of building and occupancy that was involved in the fire incident. Appendix B provides a listing of the occupancy types and buildings.

Table 11

Frequency of Fire Occurrence by Income

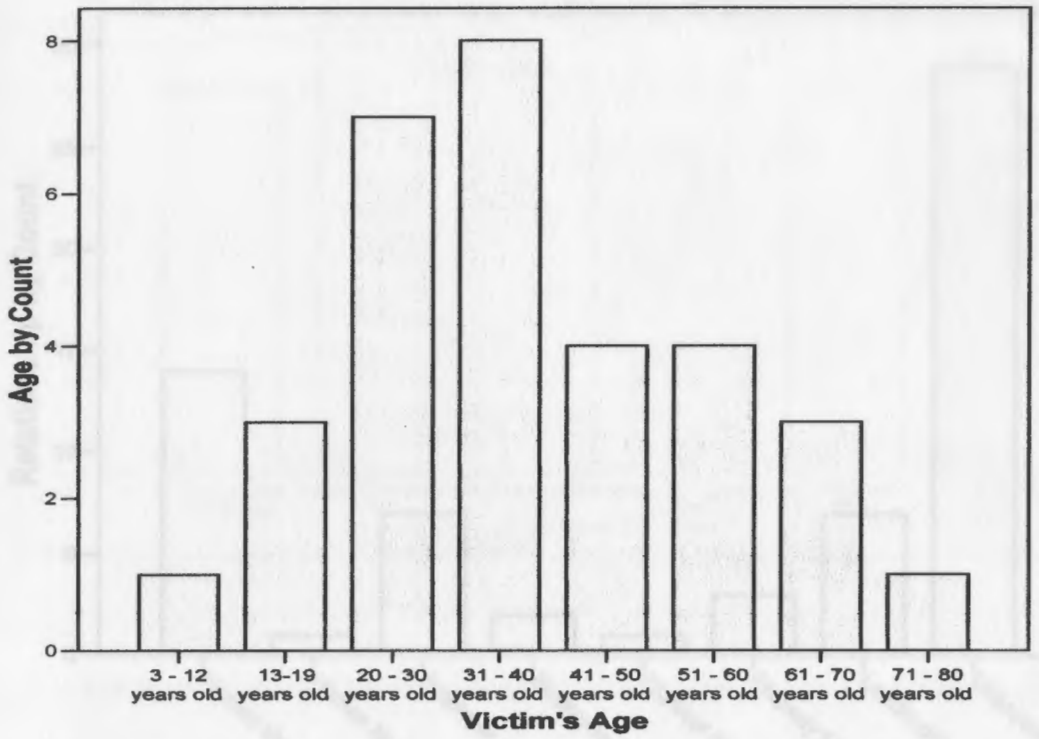
Income Classification	Frequency	Percent
High Income	40	62.5
Medium Income	23	35.9
Low Income	1	1.6
Total	64	100.0

The property destroyed or damaged by the fire was occupied 63 percent of the time of the fire. The structure was in use as a residence, business, storage facility, and considered occupied, but occupants, or building employees were not in attendance at the time of the fire. The owner or occupant of the fire-damaged property indicated that they would file insurance claims 34.4 percent of the time. The amount the insured claimant received from the insurance carrier for the fire loss is unknown. The reviewed case studies indicated insurance coverage to be in force and known to the investigating officer on the incident reporting from. When the investigating officer's report showed no insurance reference, it is not known if insurance claims had been filed. The case study review found that of the 64 cases, that 45 of the fire incidents, (70.3 percent) reported an unknown fire loss amount.

Victim information from the cases was available on 25 percent of the reports, or 16 of the 64 incidents. The victim ages carried a wide range variance, as shown in Table 12. The high frequency age ranges were from 20 to 30 years of age and 21 to 40 years of age.

Table 12

Victim Age Range



The suspect relationship to the victim is an important aspect of the fire investigation. Table 13 identifies these relationships and shows that 41 percent of the time the suspect is unknown. The causation for the high percentage may be because suspects are not developed early on in the fire investigation, or they are not developed at all. However, cumulatively 59 percent of the time, there is a victim suspect relationship.

It is important to note that the police reports contained 34 incidents with the age of the suspects not shown. Table 13 illustrates the suspect, victim relationship.

Table 13

Suspect, Victim Relationship

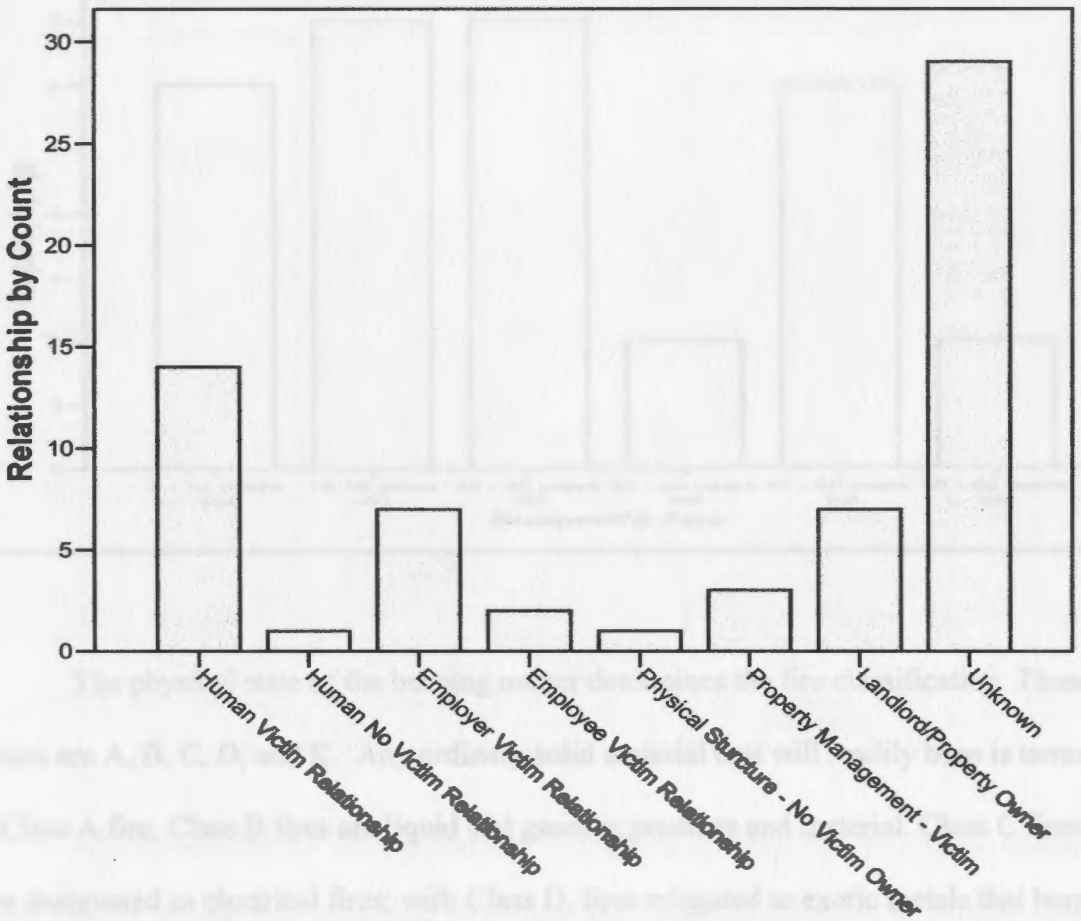
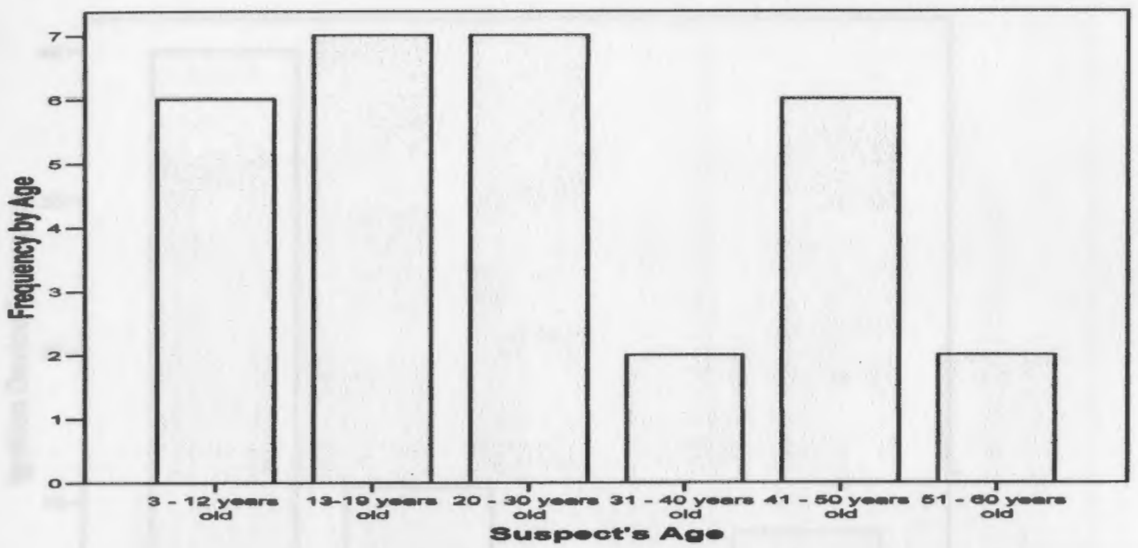


Table 14 shows the age of suspects involved in deviant fire setting. The identifiable critical age rests between 13 and 30 years old based on the police department reports.

Table 14

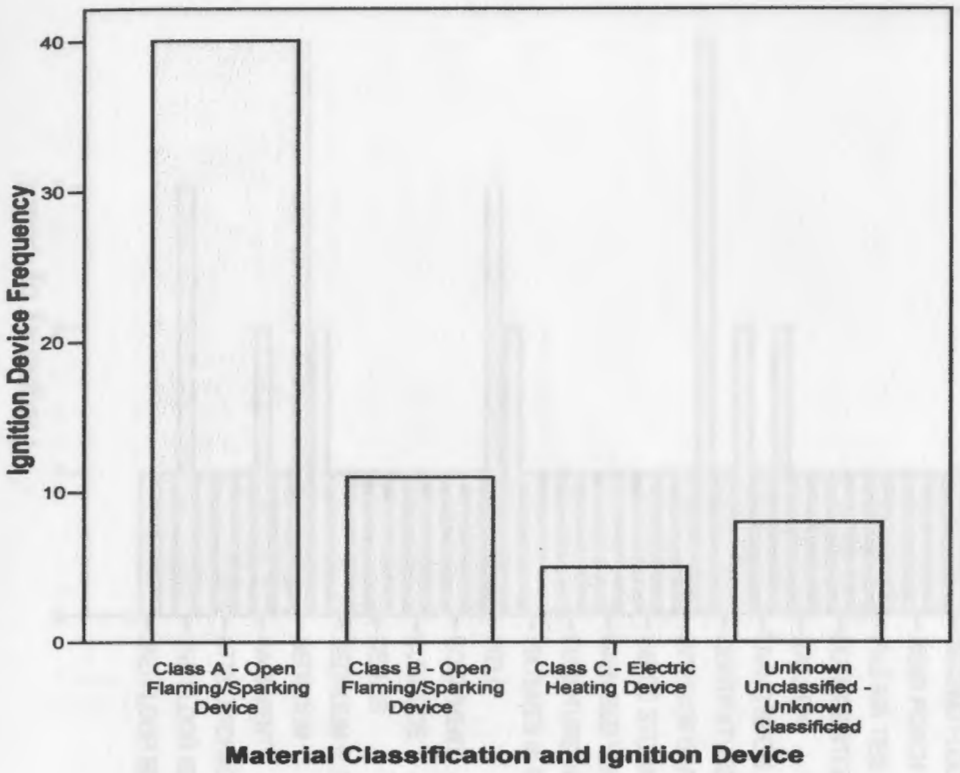
Suspect Age Range



The physical state of the burning matter determines the fire classification. These states are A, B, C, D, and K. Any ordinary solid material that will readily burn is termed a Class A fire. Class B fires are liquid and gaseous products and material. Class C fires are designated as electrical fires; with Class D, fires relegated to exotic metals that burn. Class K is a relatively new class of fire that involves synthetic oils and liquids used in cooking oils, greases, animal fats, and vegetable fats. Table 15 shows the material classification that burned in the 64 cases reviewed. Class A, or ordinary combustible material ignited with a common heat-producing device, such as a match, or candle producing open flaming was the most commonly burned material.

Table 15

Material Classification and Ignition Device

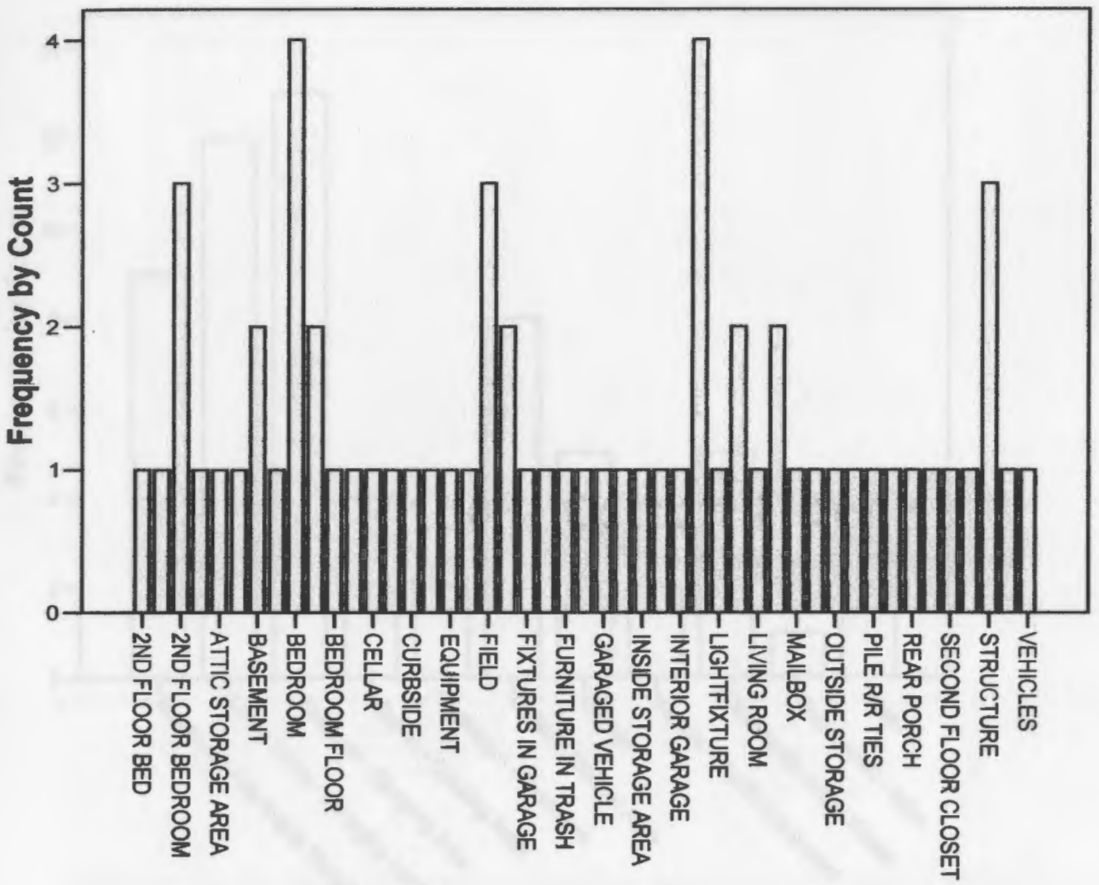


The reports did not differentiate the heat source to ignite the fire and the material class burned. A required component of a cause and origin investigation is the heat source. The reports in sum listed ordinary Class A materials as being the most burned once ignited, with the specific ignition or heat producing source that ignited the fire unknown.

Of importance to the fire investigator is the location where the fire started. Table 16 demonstrates that in the 64 cases analyzed the most probable location for the area of origin is the bedroom and kitchen. Both the bedroom and kitchen had a frequency rate of 4 and a 6.3 valid percentage (n=64).

Table 16

General Areas of Fire



Note: Bedroom and Kitchen Illustrate Same Frequency by Count

Specific common areas for fire cause origin are listed in Table 17. The lead area for the arson, suspicious, or undetermined fire was the bedroom and sleeping area.

Table 17

Specific Areas of Fire Origin

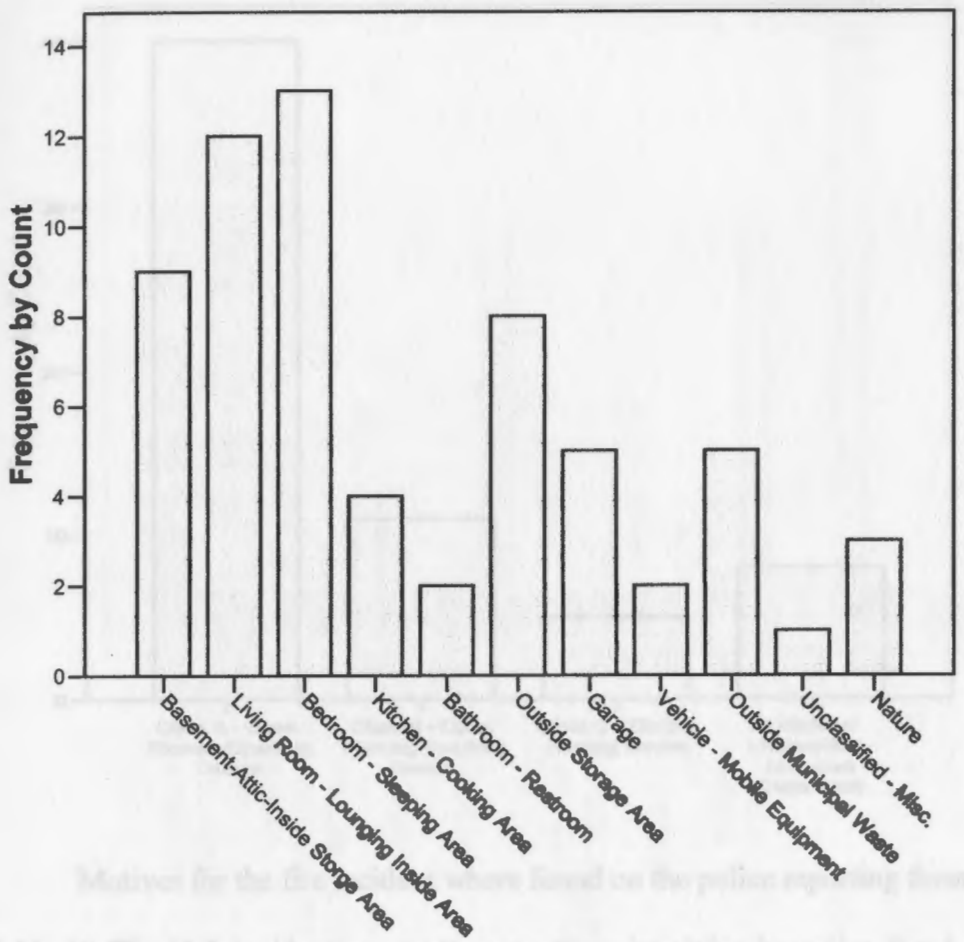
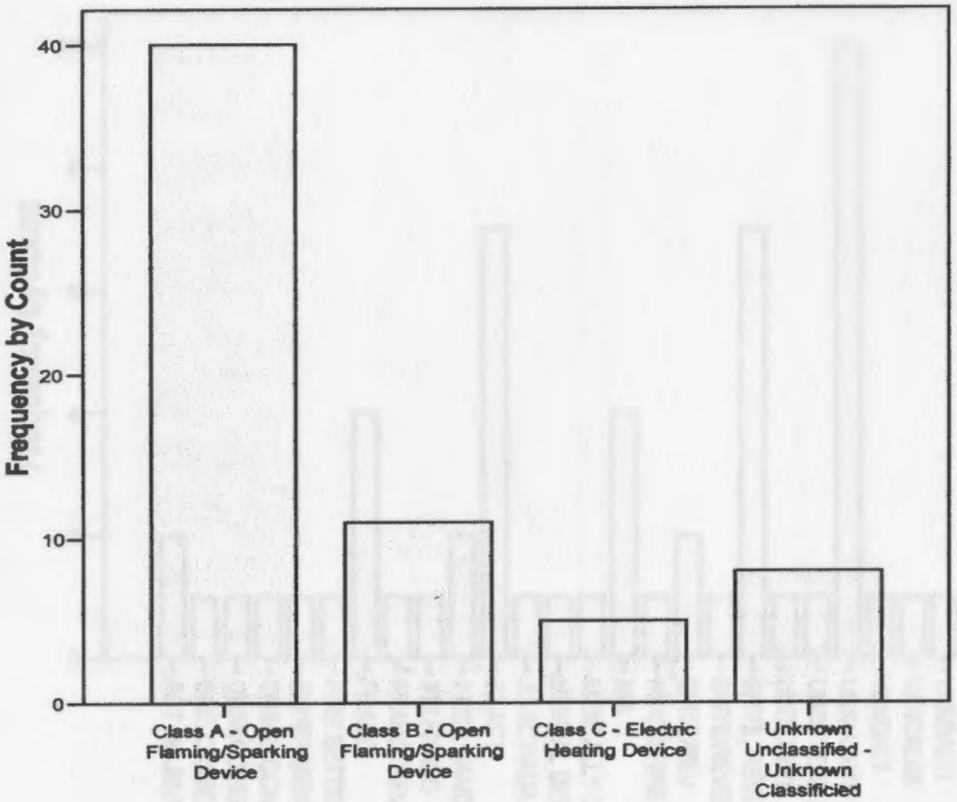


Table 18 indicates the specific class of material ignited and the heat source for material ignition. It should be noted that the majority of the fire incidents do not utilize an exotic material, or assembled ignition device. The fire setter uses available material and common heat producing devices that will produce open flaming, or sparking.

Table 18

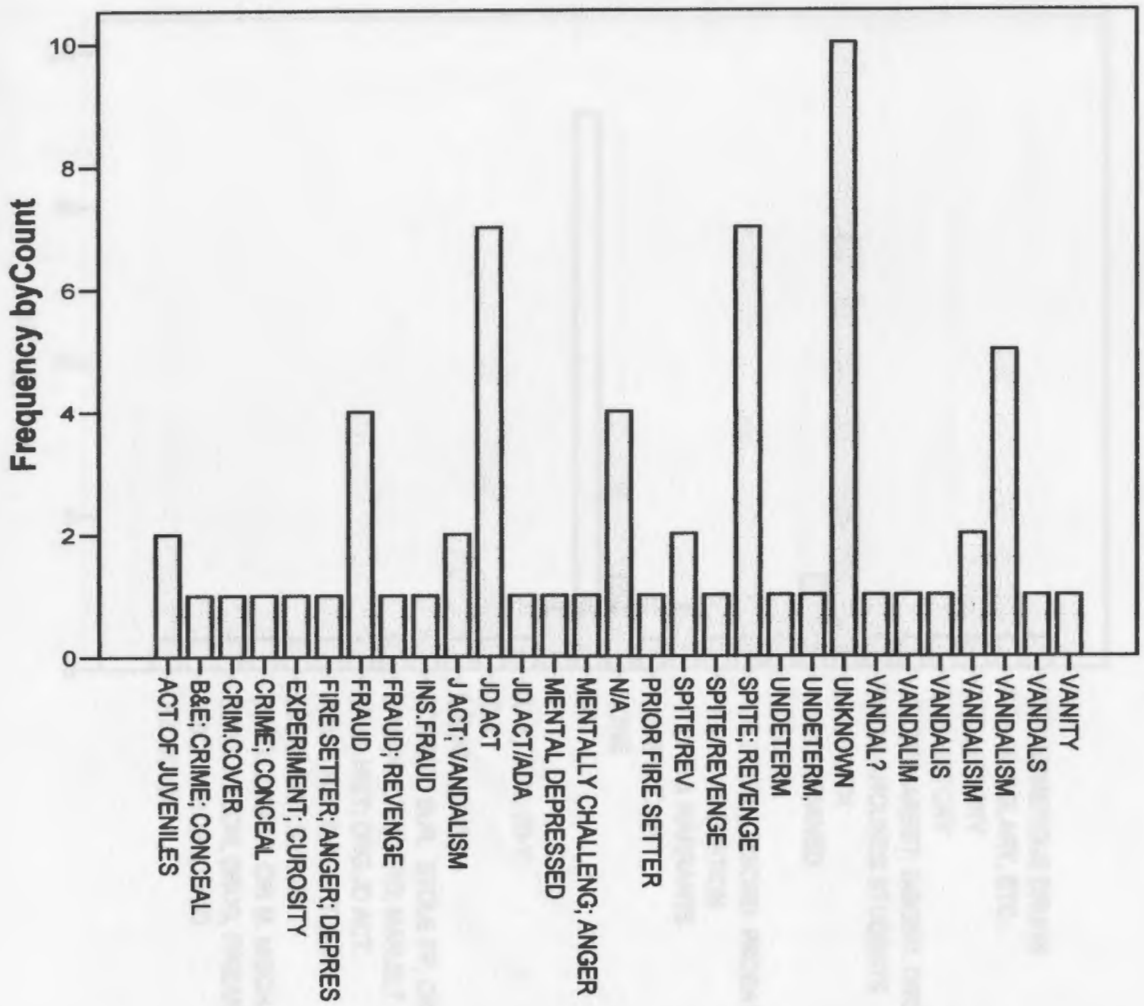
Material Classification & Ignition Device



Motives for the fire incident where found on the police reporting forms listed in Table 19. The high incident rate motives are those involving juveniles, fraud, and spite or revenge. It is important to note that not all the reviewed reports (n=64) listed or indicated a motive for the fire. The table illustrates this information as unknown.

Table 19

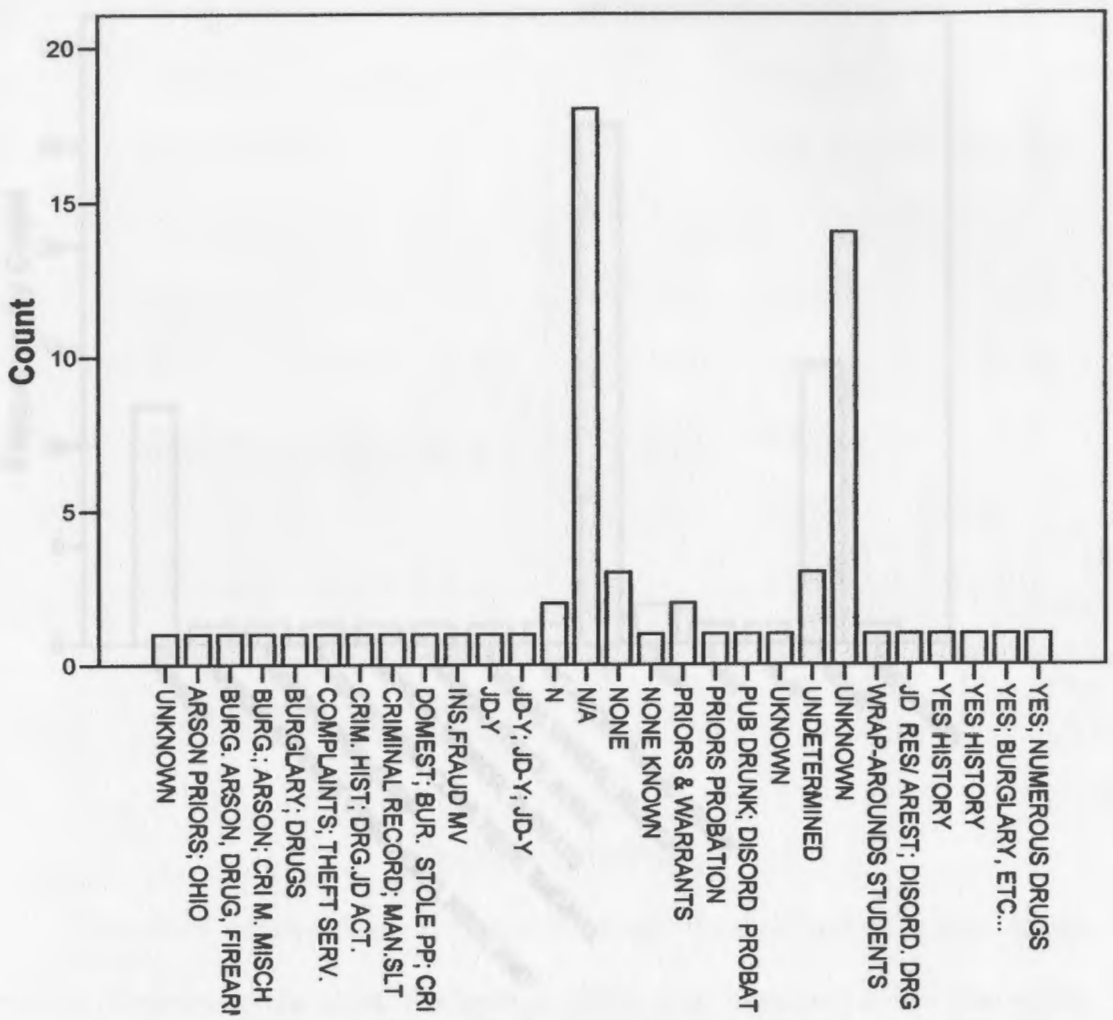
Common Motives



When suspects for the fire setting where identified; the actors had prior criminal records and activity. Table 20 lists the prior criminal history of suspect fire setters. It is important to note that when suspects were identified in the police department reports that in the majority of cases had some form of prior deviant behavior, or police criminal record.

Table 20

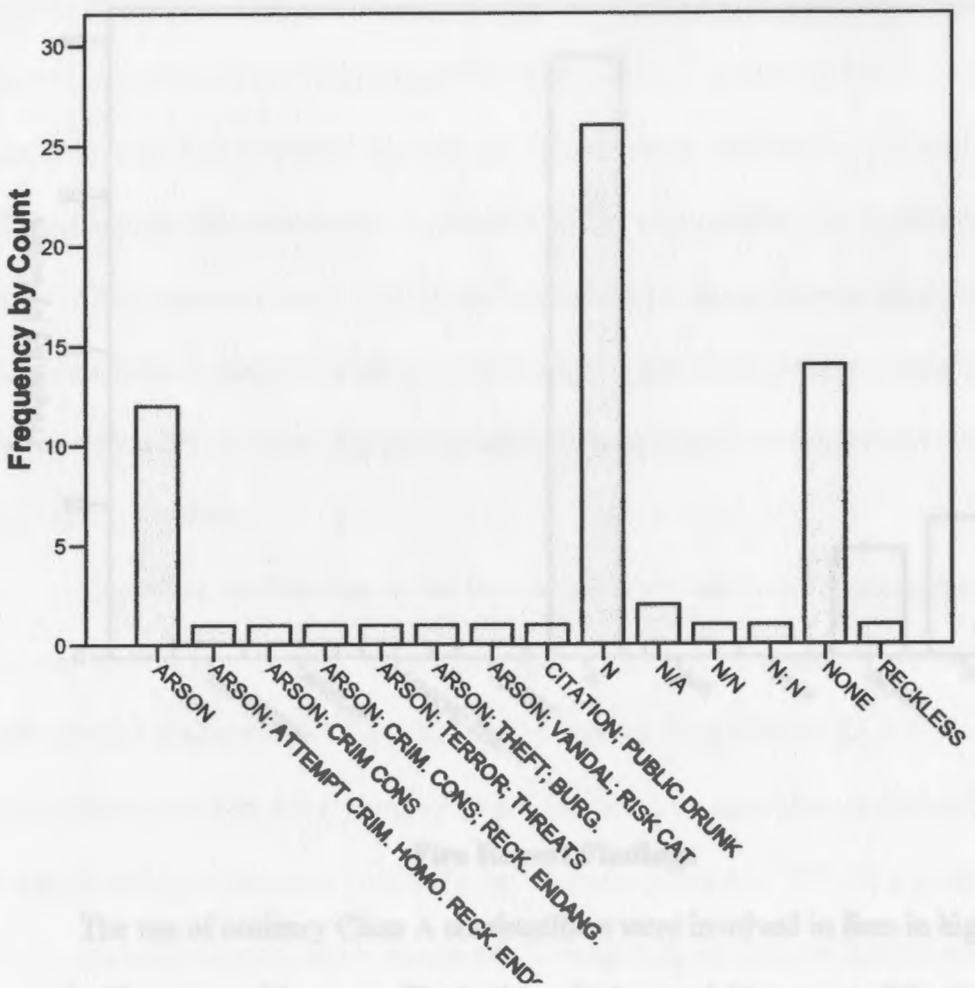
Suspect Criminal History



Though the act of arson was committed, or a suspicious and undetermined cause was assigned to the fire; Table 21 clearly indicates the rate of charges placed on the sample cases for the crime. No Charges had been filed in 67 percent of the fire incidents at the time of the study.

Table 21

Charges Filed



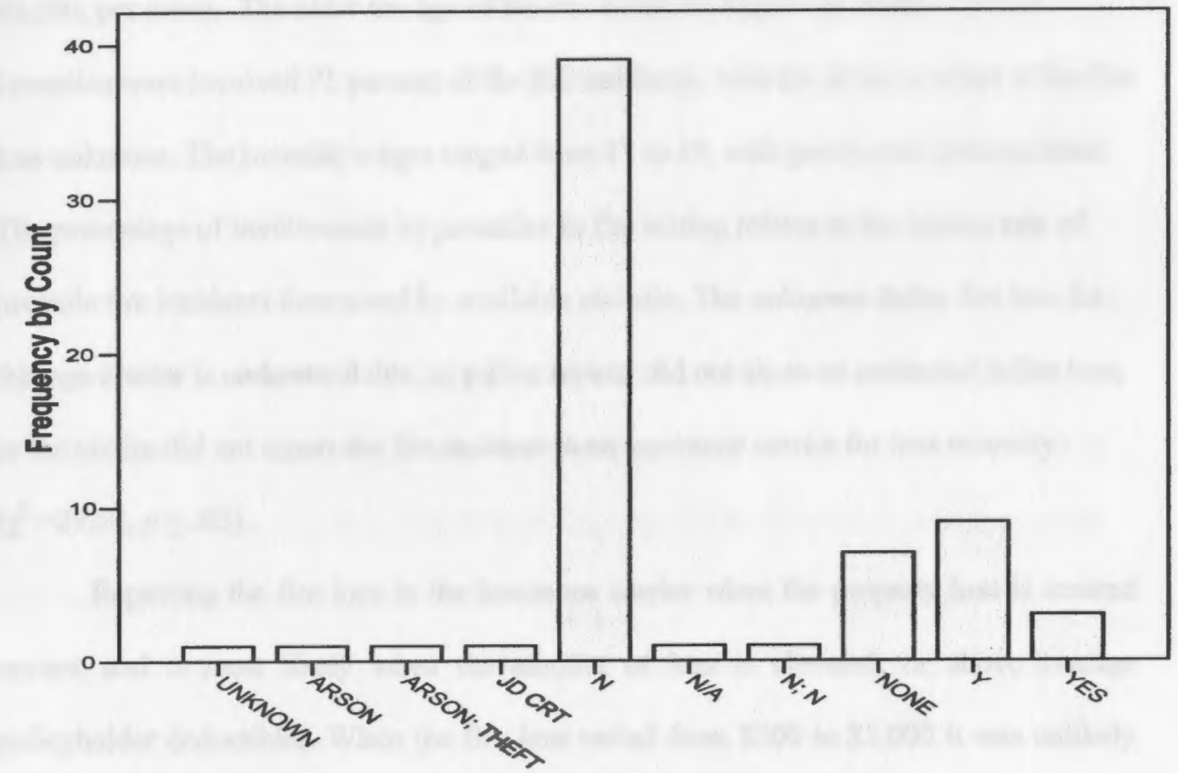
*N/A – Not Available

N/N – Note Noted on Report

Of the cases (n=64) reviewed and studied for the research 60 percent did not result in an arrest for the crime. In only 4.8 percent of the incidents were arrests made for committing arson, crime, with 32 percent of the reports had no disposition. Table 22 exhibits the arrest rate for the 64 cases reviewed.

Table 22

Arrest Rate



Fire Report Findings

The use of ordinary Class A combustibles were involved in fires in high income areas, in 30 percent of the cases. The ignition device used 10 percent of the time within the high income areas was a cigarette lighter. The ignition device again was a cigarette lighter 9 percent of the time in 26 percent of the medium income areas where fire incidents occurred. There was only one low income area fire where the ignition device is unknown and the class material burned is Class C (χ^2=96.44, p $\leq$.05)

The relationship of the actor's age related to the dollar amount of property loss by the occurring fire associated age with the dollar amount of fire loss. In the age grouping of 20 to 30 years of age, 29 percent of the fire incidents generated an estimated dollar loss

per fire range from $500 to $5,000. Fifty percent of the cases studied fires by actors, or suspects from 41 years to 50 years of age generated estimated fire losses of $10,000 to 40,000, per event. The older the age of the fire setter the higher the dollar loss fire. Juveniles were involved 71 percent of the fire incidents, with the dollar amount of the fire loss unknown. The juvenile's ages ranged from 13 to 19, with gender not distinguished. The percentage of involvement by juveniles in fire setting relates to the known rate of juvenile fire incidents forecasted by available statistic. The unknown dollar fire loss for this age cluster is understandable, as police reports did not show an estimated dollar loss, or the victim did not report the fire incident to an insurance carrier for loss recovery ($\chi^2 = 29.54, p \leq .05$).

Reporting the fire loss to the insurance carrier when the property loss is insured occurs, and is most likely when the amount of loss is elevated, or above average policyholder deductibles. When the fire loss varied from $500 to $5,000 it was unlikely that a claim would be filed, however, when the fire loss extended to $40,001 to $80,000 it was probable a claim was filed with the insurance carrier ($\chi^2 = 25.50, p \leq .05$).

An interesting anomaly occurs when comparing the income groups with the dollar loss of the fire. The fire loss in medium income areas illustrated an occurrence rate of 17 percent for fire losses between the dollar ranges of $40,001 thru $80,000, while only 15 percent fell within the high-income range of $10,001 to $40,000 dollar loss. The causation for this most likely is related to inflated insurance coverage, or inflated uncontested claim payments to the insured. ($\chi^2 = 14.93, p \leq .05$)

Within high income, areas the structures that arson, suspicious, or undetermined fires can be expected to occur in are residential structures, apartment dwellings, and

vacant buildings. Thirty-eight percent of the researched police reports showed such events occurred in residential dwellings, 18 percent in apartment or duplex units and 23 percent in vacant buildings. Medium income area fires have a 22 percent occurrence rate in residential structures and a 17 percent rate for storage, or out buildings removed from the main occupancy. The finding in the low-income area was for equipment burned ($\chi^2 = 48.11, p \leq .05$).

The occupancy classification in which the fires occurred most frequently were 48 percent in high income areas and 30 percent in medium income involving residential and apartment, or duplex dwellings, with a utility and garaging structures occurrence rate of 17 percent ($\chi^2=43.83, p \leq .04$). The area of fire origin in the identified structures in the high income areas show the basement, attic, or inside storage rooms having an 18 percent probability; living room, inside lounging area with a 20 percent likelihood; and bedrooms at 28 percent possibility. Medium income areas correlated closely with high income areas for area of fire origin; with the living room, inside lounging area having a 17 percent prospect for the room of fire origin; and 22 percent prone to happen in outside areas such as storage buildings, mailboxes, or other materials stored outside the dwelling ($\chi^2 = 45.50\ p \leq .01$). One automobile fire incident appeared in a low-income area. It is not included when applying the Chi-square tests.

Table 23 illustrates the rate of fire occurrence by day and by military time. Sunday is the most prevalent time for the fire event to occur. Fourteen of the sixty-four surveyed incidents occurred in the mid-afternoon. One incident report contained insufficient information to be included in the sum of reviewed cases (n= 64) for day of week. The time incident is graphically displayed in Table 24. The probable causation for

the specific day and time of day relates to the reasoning that families are at home, and individuals are absent for the most part from their work place. Therefore, there is availability of personal time and freedom from activities to create and generate the fire incident. The total mean time for fire occurrence, or when the fires occur is in the afternoon hours. The rationale for these phenomena relates to the building, or dwelling being occupied. Family and children normally occupy homes by during the afternoon hours. This also presents the opportunity to have the fire occurrence in an unoccupied building or structure, due to availability of people moving about unnoticed within the community.

Table 23

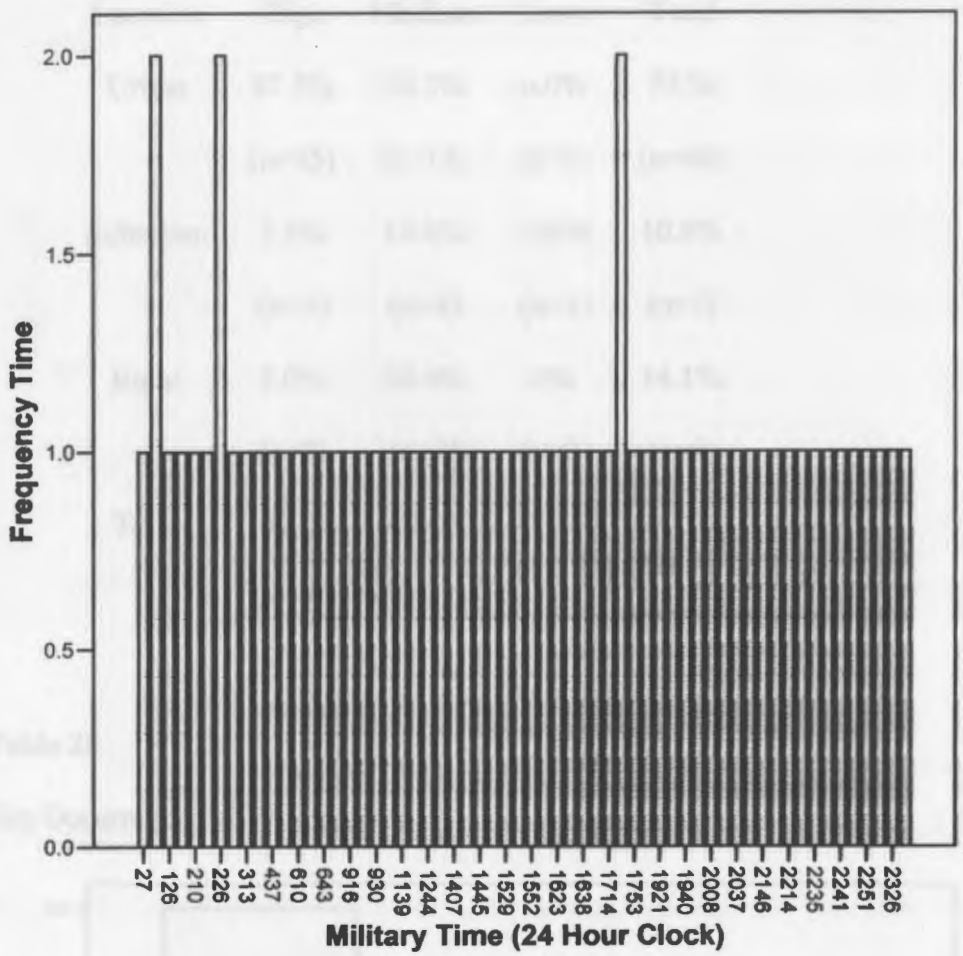
Fire Incidents by Day of Week & Time

Day of Week	Incidents	Average Mean Time
Sunday	14	1446.71
Monday	7	1538.29
Tuesday	6	1144.33
Wednesday	10	1308.10
Thursday	11	1592.36
Friday	9	1251.22
Saturday	6	826.33
Total	63	1344.51

Note: One incident missing system, incident report showed no time

Table 24

Peak Times of Fire Occurrence



The research entailed applying an estimated area income, based upon the observation of neighborhood demographics for each fire incident. Table 25 and Figure 8 identifies that the majority of the fire incidents happen in urban settings of high income. Suburban settings for fire incidents take place mostly in medium income neighborhoods, as does rural fire incidents (χ^2 =17.27 $p \leq .02$). Table 29 displays the ranking by demographic area.

Figure 8

Fire Occurrence by Income Area

Location	High	Medium	Low	Total
Urban	87.5%	56.5%	n.0%	75 %
	(n=35)	(n=13)	(n=0)	(n=48)
Suburban	7.5%	13.0%	100%	10.9%
	(n=3)	(n=3)	(n=1)	(n=7)
Rural	5.0%	30.4%	0%	14.1%
	(n=2)	(n=7)	(n=0)	(n=9)
Total	100.0%	100.0%	100.0%	100.0%
	(n=40)	(n=23)	(n=1)	(n=64)

Table 25

Fire Occurrence by Income Area

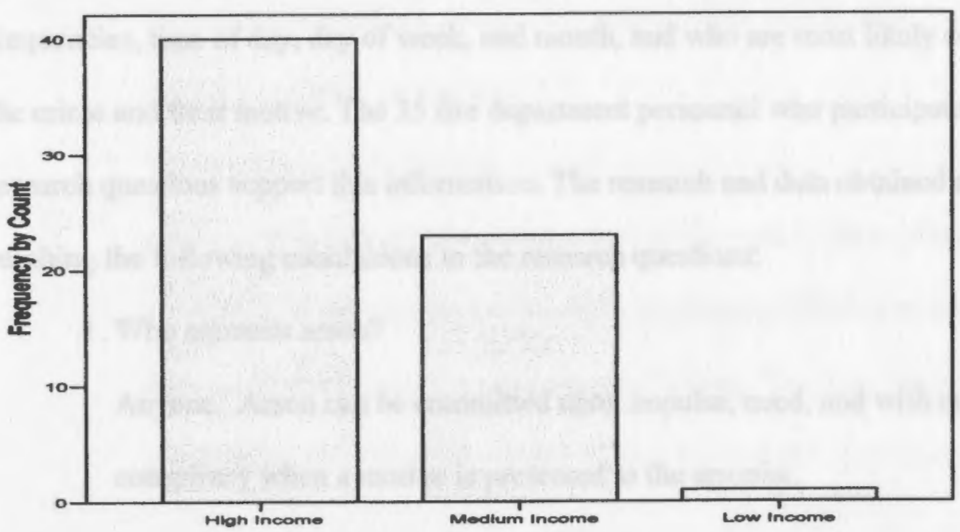
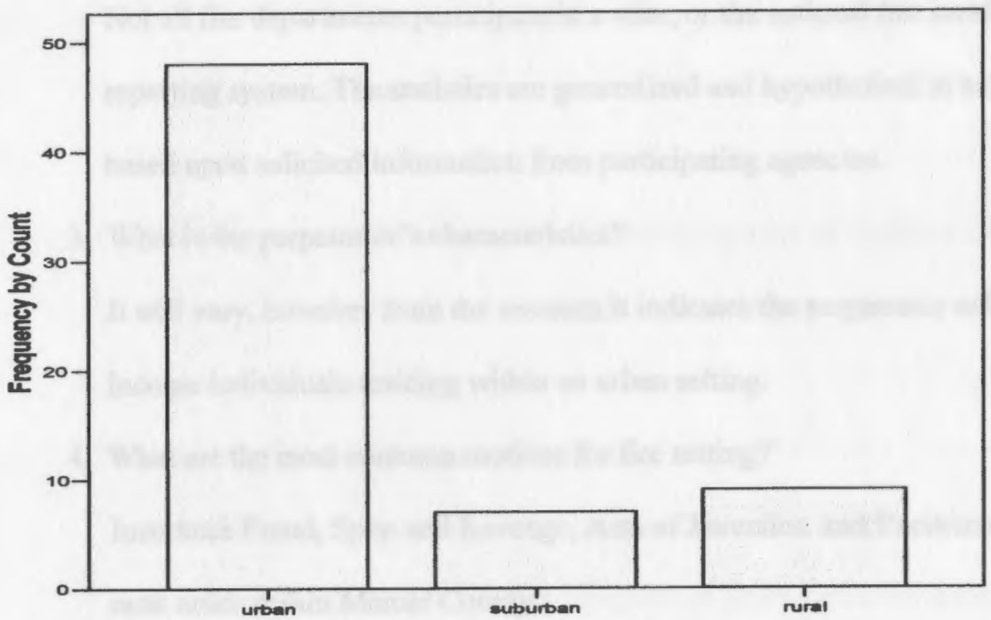


Table 26 identifies the fire incident by demographic area.

Table 26

Location by Demographic Area



Summary

The 64 police department incident reports reviewed contained information and data relating to fire cause demographics. Who is involved in arson fires, arson occurrence frequencies, time of day, day of week, and month, and who are most likely committing the crime and their motive. The 35 fire department personnel who participated in the research questions support this information. The research and data obtained resulted in reaching the following conclusions to the research questions:

1. Who commits arson?

   Anyone. Arson can be committed upon impulse, need, and with criminal conspiracy when a motive is presented to the arsonist.

2. Are the national established statistics accurate?

   No. Nationally there are an unknown number of organized fire departments. Not all fire departments participate in a state, or the national fire incident reporting system. The statistics are generalized and hypothetical in nature, based upon solicited information from participating agencies.

3. What is the perpetrator's characteristics?

   It will vary, however from the research it indicates the perpetrator will be upper income individuals residing within an urban setting.

4. What are the most common motives for fire setting?

   Insurance Fraud, Spite and Revenge, Acts of Juveniles, and Excitement in rank order within Mercer County.

5. What is the class material most commonly ignited?

   Class A - Ordinary materials are most commonly ignited.

6. What is the relationship, if any between the arson victim and the arsonist?

   The victim. is usually known to the arsonist. The relationship is a friend, neighbor, relative, or spouse.

7. When is arson most likely to occur?

   Arson, within Mercer County occurs most frequently during the spring months, with the most active month being March. The day of the week with the highest arson frequency rate is Sunday. The peak frequency times are 2:00 – 2:30 PM, 5:00 – 7:00PM, and 12:46 AM – 2:26 AM

8. What are the percentage rates of charges for the crime of arson?

   Charges were filed against perpetrators for 33 percent of known arson caused fires. Sixty-seven percent of the known arson incidents went uncharged

9. What is the clearance rate for the crime of arson?

   Arrests were made for the crime of arson 4.8 percent of the time. Thirty-two percent of the time police incident reports showed no disposition for the fire incident.

10. Are juveniles involvement in fire setting?

    Yes. Thirty-seven percent of the outdoor fires are set by juveniles. Twenty- six percent of structure fires and 24 percent of vehicle fires involve known to be arson involve juvenile fire setters.

11. Does the clearance rate for arson in Mercer County PA compare with national reported clearance rates for the crime?

    No. The generally accepted clearance rate nationally ranges from fourteen to seventeen percent. In Mercer County the clearance rate is 4.8 percent. This leaves approximately 86 percent of the arson fires not cleared by an arrest.

12. Were Mercer County Fire Departments active participants in the Commonwealth of Pennsylvania PennFIRS system?

    No. Forty percent of respondents to the fire officer's survey were either undecided, or were not reporting fire incidents to the Commonwealth.

13. Is there adequate training given at the fire department level to investigate the cause and origin of a fire?

    No. Seventy-three percent of the fire officers in Mercer County, PA, representing fire departments as Chief Officers, Past Chief Officers, or Staff Line Officers responded to the fire officers survey. They believed they were not adequately trained to investigate fires.

14. Should the fire department and police department, as well as investigative parties with an interest in the fire loss be involved in a fire investigation?

    Yes. Based upon the Mercer County Fire Officer Survey 85.7 percent indicated the fire department be involved with the investigation.

15. Does a local political sub-division of government have an accurate dollar fire loss for their community?

    No. Insurance companies do not report back to local public safety agencies the actual dollar loss paid to a claimant, upon claim settlement; be it arson, or an accidental fire.

16. Are all fires ruled accidental, truly accidental?

    No. Eighty percent of the Mercer County fire officers responded that not all fires determined and ruled accidental are truly accidental fires.

Public safety is an important responsibility of government. It is important to have an understanding that statistics, due to un-predicted disastrous, or catastrophic occurrences are subject to disruption. Such events may occur unannounced at any given time within a stated reporting period. Examples of this statement are one catastrophic event, a serial arsonist in a specific locale, or civil disorder within a single, or multiple

geographical area can drastically change the values of property loss, death by fire, and total sum of arson related incidents. The correlations of the research data illustrate interfacing subject areas that are open to debate and further research. The objective and purpose of future research is to identify weaknesses or strengths in the present arson investigation and reporting system. As with all research, the findings presented are open to rebuttal, debate, and further research to identify specific underlying issues and conditions for causation of the findings. Chapter V presents a concluding discussion on the findings of the study with recommendations to mitigate and abate the crime of arson.

Chapter V

Discussion

Arson is a serious crime responsible for the majority of residential fire deaths, or twenty-two percent of the fire deaths. It is a difficult crime to solve with the incident rarely observed by witnesses. The ensuing fire results in the destruction of physical evidence adding to the difficulty in determining two important elements needed to determine if arson has been committed. These two elements are the area of fire origin and cause.

Fifty percent of the arson fires occur outdoors, thirty percent in structures, and twenty percent in vehicles. It is interesting to note that outdoor fires set in forested wild lands, fields, and fields growing agriculture products constitute a form of arson. Initially the crime of arson was relegated to ones physical home, or building. Other targets for arsonists are vacant, or abandoned buildings, usually in low income neighborhoods, where the rate of occurrence is estimated fourteen times higher than in higher income neighborhoods (United States Fire Administration, 2001).

The research conducted for this thesis does not concur with the statistics that relate to the higher arson rate for lower income neighborhoods when compared to that of higher income areas. This finding illustrates grouping statistics with national data does not specifically relate to all communities as a whole. Every community has demographic and population characteristic setting them apart, with their probabilities for arson being independent and studied as such. Ideally the use of census tracts by political sub-division illustrating fire occurrence rates and fire causes would be a valuable tool in analyzing fire causes.

Arson-The Definition

The twist to the definition of arson with the Commonwealth of Pennsylvania is the passing of time criminal statutes have moved from the context of burning ones dwelling, or property to a crime of punishment based on dollar value, and public endangerment. These two categories now establish the criteria for the degree of the crime. The intensity of the investigation evolves around financial loss, personal injury, or death. Intentional fire setting still is termed arson, but variables enter into the final charging of the actor. The crime in and by itself may not be as arson in the eyes of the criminal code. An example of which is *People v. Hanson, 9 Cal.4th 300 (1994).* In this adjudicated case the actor while smoking, caused death to an innocent victim in igniting an accidental fire within an occupied boarding house. Based on fire and police investigators findings determined the actor started the fire in a reckless manner, but was not charged with arson for starting the fire, but for felony homicide, second degree murder charge (Fire Code Inspections, Law Bulletin, 2005, p. 7).

Arson in today's world is defined by degrees of dollar loss caused by the fire. This dollar loss based upon the value of property damaged by the fire, or its potential for further fire extension, and exposure to personal injury to the citizenry is now an element to the severity of the crime. The final adjudication and punishment may not be for arson, but a crime of a lesser degree. Provisional that the test for the crime of arson is not established. The true definition being, "The crime of maliciously and intentionally, or recklessly, starting a fire or causing an explosion" does not in reality still apply. It is important to emphasize that within this pure definition of arson reference, or inference is

not made to monetary value, endangerment in and by itself. The circumstances demonstrating this point is offered in a typical fire scene scenario in Appendix C.

Police Reporting Systems

The review of the police reports concluded that there is a definitive inconsistency in the format used by the surveyed agencies for their initial investigative reports. Appendix D provides examples of incident reporting forms. The manner in which the police officers accomplished and completed the investigative report caused concern. A number of the reports reviewed were incomplete. They did not provide specific details needed for investigative purposes regarding the fire incident. The reports lacked basic investigative information such as victim age, gender, insurance coverage, and property value destroyed by the fire. This finding reinforces the question of accuracy of national fire and arson statistics. Should the report sampling reviewed be representative of police department's reports within the United States; it represents a weak link in the reporting system for documenting arson fires. It is essential to understand that the most important t investigative document involving a fire scene, or any crime scene is the first responding fire and police officers initial report. The initial report must be accurate in detail, and provide complete information, as the foundation for further investigation of the incident.

Fire Reporting Systems

Volunteer fire departments protect 65 percent of our nation's rural areas from the hazards of fire. Though no accurate number exists for the total number of fire departments in the United States, the round figure estimated at 30,000 fire departments. Eighty Percent of the volunteer departments are staffed by volunteer personnel and not by on duty firefighters staffing fire stations twenty-four hours a day, 365 days a year to

accomplish their assigned fire protection mission. (National Fire & Rescue March/April 2005, p 18). The on duty and staffed fire departments depend upon their department's size and organizational structure to provide specialized services, such as fire cause and arson investigation. Even with the staffed fire departments there may, or may not be specifically trained fire cause and origin investigators, who can properly conduct an initial fire cause investigation according to nationally accepted standards. The objective of following nationally accepted fire investigation standards is to recognize, read the signs, and signals establishing the fire cause.

Comparatively volunteer fire departments and volunteer personnel who provide the fire protection function in the majority of communities, as private entities outside of government control, lack an understanding of the importance to investigate the cause of a fire. The training in basic fire investigation of the volunteer personnel may not be on a level comparable to the paid fire fighter. One hindrance is the volunteer firefighters underlying occupational mind conditioning. That state of mind conditioning is a traditional in bred attitude that ties the job tasking exclusively towards fire suppression, not fire cause investigation. Therefore, there is no supporting interest to train in the discipline of fire cause origin and cause investigation, unless directed to so. This form of fire protection is illustrative of the deficiency in government, where there is a lack of volunteer fire department control, assigned responsibility by legislation, and answerability to the populace served.

Conversely, the volunteer department can be operating directly under government sanction, or auspices, absent a trained fire investigative staff. The obstacle confronting a volunteer fire investigative staff when functioning under sponsorship of a government

entity is not without legal roadblocks. The barrier confronting their investigation is the responsibility of assignment without the legal authority to conduct the investigation. Arson is a crime, with the investigation authority relegated by law to police agencies and their sworn police officers. It is important to note regarding this point that in some states and city classifications the fire officer is a sworn police officer, with either limited, or full police powers

National - State and Private Reporting Systems

They are very ambiguous, by their own admissions the national fire incident reporting system publicly emphasizes there are limitations to the accuracy of the reporting system. The government sponsored National Fire Information reporting System (NFIRS) system used to document fire incidents may be incomplete for reasons such as smaller fire incidents not reported to the system. A lack of 100 percent participation in the reporting system by all states, non-mandated reporting, and only one-half to one-third of the nations public fire departments participate in the system extenuates the accuracy claim (United States Administration, http://www.usfa.fema.gov).

These same points concerning statistical accuracy follow suit and blend into the Commonwealth of Pennsylvania Fire Information Reporting System (PennFIRS), causing the systems accuracy to be questionable. The Fire Incident Data Organization (FIDO) functioning under the auspices of the National Fire Protection Association in their *Fire Protection Engineering Handbook* also issues cautionary comments on accepting their released fire cause and incident rate, as being the best that could be formulated with the

information received(Fire Protection Handbook, 2003 Chapter 3, pp.15-67). Commentary of these lead agencies supports the hypothesis of this thesis.

Arson Arrest Rates and Prosecution

A significant problem associated to the legal perspective of arson is the ability of the prosecutor to present a winnable arson cases. This problem is partly due to the reluctance of prosecutors' to become educated in the prosecution of arson. The crime has long been tagged as "the most difficult crime to prove"(Fire in the United States – United States Fire Administration June, 1999 pp.35-36). By means of this tagging it is simple to state the need that one must be trained in the prosecution and management of arson cases to combat the crime.

The most commonly suggested and accepted excuse for low adjudication and arrest rates is the nature of the crime requires both fire and police department involvement and cooperation in conducting investigation. The arrest rate ranges will vary, depending upon the source between 16 percent and 22 percent for arson, while a felony crime arrests range between 65 to 90 percent (Scranton Times Tribune, August 24, 2004). This dual responsibility in the investigation generates conflict and turf wars between hometown public safety agencies. The inter-agency controversy can be managed and overcome by initiating a unified command system as established in the National Incident Management System (NIMS) (Federal Emergency Management, Facilitator Guide, August 2004). Illustration of a sample representation is presented of NIMS is presented in Appendix E.

Compounding the bureaucratic hierarchy problem is that evidence preservation such as immediately securing the fire scene for processing of required evidence is

dependent on the availability of local level resources. Analyzing fire scene debris forensically is likewise dependent on accessing the needed scientific equipment as a resource aid to the investigation. The skills required to conduct witness or victim interviews and interrogation vary between locales and involved agencies. The techniques for fire scene examination influence the determination in closing a fire cause investigation. Only properly and efficiently conducted fire cause investigations result in irrefutable conclusions. The positive outcome of a fire investigation is the result of the experience and training level of the investigative agencies personnel. The investigation process requires the willingness on the part of the involved agencies to function as a unified investigative team, or task force. The teams access to resources and required scientific forensic equipment to analyze fire debris evidence is a critical segment of the investigation.

Juveniles

The data and literature review clearly indicates and links juveniles to fire setting at both the national level and geographical area surveyed in this research. Juveniles fire setting motives align primarily to experimentation with fire, excitement, and vandalism, which leans toward criminal mischief. It is interesting to note that the juvenile fire setter problem in the United States is recognized. Both the federal and state governments have in place preventive educational activities termed "Juvenile Fire Setter Programs". The target group being those juveniles who match the demographics and profiles, as high risk individuals for fire setting (Romberg, 2003). Considering there is not arrest clearance for approximately 86 percent of the arson caused fire; the importance for a program objective

to educate the juvenile to the hazards, dangers, and life safety exposure during fire occurrences is critical.

Positive –False Cause Determinations

Should the fire cause be initially determined to be accidental due to human error and the cause findings forwarded to the NFIRS data bank, and other repositories, we now have a statistic identifying an accidental fire with a defined fire cause. Assuming the fire incident later develops into a case, due to evidentiary findings determining the fire to be arson, the statistic becomes positive false. The possibility also exists that the accidental fire, after fire cause determination may have resulted and been caused by a defective product. The fire cause again changes. Subrogation civil suits are now a common recourse for the insurance industry to recover their fire claim dollar losses. A third party product manufacturer, who may have caused the fire with a suspected defective product, or other individuals' accidental action, or inaction will be sued in court of civil law.

This trend and practice of the fire incident through adjudication in a civil court of law again causes the potential to flaw the fire statistics. To move the arguments further the insurance industry actuarial service provider or organizations such as the National Fire Protection Association (NFPA) then have an invalid statistic. The fire information repositories will have been forwarded the erroneous accidental fire cause finding for inclusion in their statistical data banks. The information of which is disseminated nationwide yearly.

An in valid statistic has been generated if not corrected. Also, should the actor later be charged with arson and adjudicated as a criminal act, this simple fire incident

statistic now has the potential to appear in the FBI Uniform Crime Reporting System. as well as the previously identified statistical data banks.

The human element inserts itself in error reporting factors. The human element causes the possibility of a concealed or flawed statistic. This includes the fact that various state and federal agencies charged by law with gathering fire cause facts may be obtaining similar data and / or duplicating the already documented and flawed statistic.

The present lack of uniformity in a standardized fire incident reporting system with a national centralized focal reporting point is an important building block for accuracy in identifying fire causes. An equally important component in validating the present system of fire data collection is mandatory fire incident cause reporting. This purportedly now exists. As further illustrated within this research, mandatory fire cause reporting, or an umbrella system within the United States does not exist.

The key to accurately report fire cause and profile fire setters is to recognize the need for a single centralized mandatory fire incident reporting system within the United States. The existing potential for incomplete, inaccurate, record reporting maintenance and incident record duplication that includes the total receipt of all fire incidents and their cause highlights the questionable accuracy of the country's fire data base. This likelihood will exist until accessibility to a comprehensive and all inclusive participant, full service system is available to all of the nations fire departments. Until such time that an all inclusive system is designed and is implemented for fire cause determination the window is open for skewed and inaccurate statistics.

Reporting the Fire Incident

The investigation of fire cause data at the national level does not relate to the crime of arson within a specific geographical area. It typifies and is representative of mainstream America. Idealistically fire cause data for a localized or specific area as used in this research should not be distorted with fire incident rates from larger metropolitan areas, or distinct cities with dense population bases.

The research did find relationship associated with a standardized reporting format. The authority having jurisdiction, or lead agency should utilize a standardized incident documentation form. However, it is not considered a significant need or responsibility for an initial fire cause and origin investigation process (r^2=.134, $p < .05$).

Reporting of fire incidents to PennFIRS is not a priority to the fire officer seeking the cause of fire incident, even though strongly tied to the officer position and reporting responsibility ($r^2 = .194$, $p<.05$). The use of a standardized reporting form compared to the relationship with the responsible investigating party is of little value, or help during the investigation process. ($r^2 =.134$, $p < .05$). The value is in statistical reporting for accuracy on the cause and rate of fire incidents to a designated repository.

Research Limitations

The research was constrained by incomplete and inconsistent formatting of police reports within the surveyed communities. Complete standardized reports with accurate and definitive details relating to the fire incident would have enabled a more descriptive finding and analysis of the fire problem in Mercer County, PA. Broadening the investigation to include all Mercer County, PA political sub-divisions including both fire and police departments would have reinforced the research results. The research

conducted did not reach out far enough to obtain sufficient data to compare fully and factually the local arson rate with the national level. The research did illustrate viable comparisons and correlation to common topical areas, but in the opinion of the researcher further exploration and a definitive localized data base would have enhanced the resultant findings.

In Retrospect

The research project in retrospect should have been to supplement the present findings and would have been conducted by developing a data spread sheet in a survey format. The formatted survey instrument then provided to each public safety agency within Mercer County, PA., The fire and police departments would have been asked for a response to the requested data and after receipt of the information by the researcher, an interview with each respondent would have been made to review and verify the submitted data. The research would have also, included insurance carriers, as they represent a grouping of participants concerned with fire losses and have experienced arson incidents.

The insurance industry is a source for unique findings, as very little information is provided public safety agencies on their fire claim activity. The supplement data then used for inclusion in a final comparative analysis of the exploration showing the diversity between the private and public sectors.

Future Research

The fire setting problem that requires greater in depth research at the local level, be it Mercer County, PA, or any community with similar representative demographic in the United States, is to further study "why juveniles" are obsessed with fire setting. Research into this area should include family background, work ethics, education,

juvenile delinquency history, personality traits, and life style of associates, plus other traits that can be identifiable with fire setting. It would appear that the juvenile problem with fire setting for any of the accepted motives is a focus group. Identifying why they are involved with fire setting, arson, or experimentation would provide guidance to developing programs to address their obsession with fire.

Summary Statement

It is the opinion of the researcher, after review of the literature and subsequent results from the exploration of the subject. There is concern and inferred weakness in a number of areas involving fire investigation and the crime of arson.

They are:

1. Sufficient evidence was found that tends to invalidate the accuracy of national fire cause statistics.
2. The published fire cause statistics do not presently apply to the investigated area, Mercer County, PA
3. Mercer County PA does not have an identifiable arson problem. However, Mercer County PA has an identifiable problem in arrest rates and adjudication of arson.
4. The problem for the rate arson occurrence centers and focuses on juvenile involvement both nationally and within Mercer, PA.
5. The data base developed from the area studied indicated that high income areas in Mercer County, PA are not immune from arson.
6. There is a form of known relationship between the arsonist and victim.

7. Fire causes determined to be accidental in origin, even after an investigation, may not be accidental.

Consideration for future research should address the need to reduce the rate of fire incidents, seek reasoning for public apathy towards accepting fire occurrence, resolve the juvenile fire setter problem, and understand the cause for arson as a crime in the United States.

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Appendix A

Survey Instruments

Informational Data Sheet Categories applied, when available in reviewing and formatting Data Base Statistic from Police Department Case Histories.

1. Year of incident
2. Month of incident
3. Day of incident
4. Time of incident
5. Community of occurrence
6. Age of actor gender of actor, education of actor, prior criminal history
7. Residence of actor – urban – suburban – rural
8. Residence of victim – urban – suburban – rural
9. Actor acted alone, or with co-conspirator
10. Relationship of actor to victim known – unknown
11. Travel distance from actors domicile to fire incident location
12. Actors means of travel
13. Property destroyed, or damaged – occupied – unoccupied –abandoned
14. Property by classification Residential – commercial – industrial – other
15. Value of property damaged or destroyed
16. Estimate of dollar loss to damaged, or destroyed property
17. Property insured
18. Injuries incurred to victims, or public safety personnel
19. Fire starting device, and, or products ignited
20. Evidence found at fire scene
21. Private fire investigator present

Note: Not all categories were investigated as police reports lacked the needed data

Exploratory Research - Investigation of Incendiary Fires

Mercer County Fire Chiefs

Fire Officer Survey Instrument
(CIRCLE ONE)

1. Do you feel that ALL fire causes ruled accidental by either human error or a form of equipment failure to be truly accidental?
   YES NO UNDECIDED

2. Do you feel you are adequately trained as a firefighter or a fire officer and capable of initiating, conducting, and stand court testing of your fire investigation?
   YES NO UNDECIDED

3. Do you feel it is the responsibility of fire department personnel to seek and be a part of the investigation team to find the Cause & Origin of a fire?
   YES NO UNDECIDED

4. Do you feel it is the sole responsibility of local and State Police to conduct both the fire cause origin investigation and follow thru investigation to incident closing?
   YES NO UNDECIDED

5. Do you feel that local police agencies or police officers are adequately trained to conduct a fire cause and origin investigation?
   YES NO UNDECIDED

6. Do you feel that ALL PA State Police Officers assigned to the Fire Marshals Div. are adequately trained for their mission?
   YES NO UNDECIDED

7. Do you feel as either a firefighter, or a fire officer you should be kept informed in the case building of a fire to be ARSON?
   YES NO UNDECIDED

8. Do you feel that fire causes determined to be ARSON in Mercer County are adequately investigated and closed by arrest, and adjudication of the perpetrator? YES NO UNDECIDED

9. Do you feel that the average victim of an arson fire is known to or by the arsonist- (i.e. – friend- neighbor-relative etc.)?
   YES NO UNDECIDED

10. Do you report on the proper reporting form every fire incident to the PSP Fire Marshals Office be the cause accidental, undetermined, or arson?
YES NO DON'T KNOW

11. Does your department participate in and report all fire incidents to the PennFIRS system?
YES NO DON'T KNOW

12. Does your department use an accepted standardized fire incident model reporting form to document all fire incidents?
YES NO DON'T KNOW

13. Do you feel that the present fire cause investigation system in the Commonwealth of Pennsylvania is outdated and outmoded?
YES NO UNDECIDED

14. Using the arson motives listed, circle the one motive for arson you feel to be most common fire cause occurrence in Mercer County?

INS. FRAUD - SPITE & REVENGE - ACTS OF JUVENILES - CRIME

CONCEALMENT - VANDALISM – EXCITEMENT - PYROMANIA

OTHER_____

15. Do you estimate fire loss of property in a dollar amount?
YES NO

16. If Yes to #15–Do you use a nationally accepted formula/guideline to estimate loss? YES NO

17. Does the insurance company advise you of the FINAL fire loss paid claimants?
YES NO

18. Your fire department position: Firefighter - Past / Present Fire Officer -
(circle one)

19. Years of Service_____ (write years of service)

Appendix B

Building Occupancy Classification

Building Occupancy Classification

Code* Class	Numerical Data Code Assigned**	Building Occupancy Use
A-2	(1)	Assembly, Halls, Night Clubs Restaurants, Taverns, Bars etc.
B	(2)	Business Group Buildings Banks, Clinics, Post Office etc.
E	(3)	Educational Group Buildings 6 or more students – grades K – 12 etc.
F-1	(4)	Factory Industrial – Moderate Hazard
S-1	(4)	Same numerical data code assigned to data base
M	(5)	Mercantile Stores and Sales Rooms
R-2	(6)	Residential Occupancy with two or more dwelling units
R- 3	(7)	Unclassified Dwelling Units
R	(8)	Residential – when not classified as Institutional group
U	(9)	Miscellaneous Buildings and Utility Structures
V	(10)	Vehicles and Mobile Equipment

Note: Building Classification Code, Pennsylvania -International Building Code, 2004

Appendix C

Abandoned Barn Scenario

A group of juveniles set fire to a rural barn abandoned for 20 plus years. The barn is not used for any productive or financial gain purposes. There is no material salvage value to the structure. It is in total disrepair and near a state of collapse. It has been removed from the tax roles. It is located in the middle of an open field, with no endangerment to surrounding buildings, property, or person. The barn is open and accessible to the public.

On a given night, a group of joy riding juveniles set the structure on fire and it is totally destroyed.

The likelihood of the investigative findings and final adjudication, should the perpetrators be found, would in all probability preclude a charge of arson. Arson in the true definition has now occurred. Statistically the fire incident classification is arson. Plea bargaining potential now enters into the incident.

The discretionary prosecutable arson charge could lean toward criminal mischief based on the scenario summary; applicable crimes code statutes, and adjudication process. In a retrospect definition, it was an act of vandalism and criminal mischief. The structure had no value, no surrounding structures, or civilians harmed or exposed to the dangers from the fire. Therefore, the monetary loss and public endangerment test for this event is not valid. The building open for public access served as an enticement for the criminal mischief act.

The incident circumstances highlight the labeling confusion by data entry personnel for a statistical record, juvenile involvement in fire setting, and that the final adjudication may not be for arson.

Appendix C cont.

Homemaker Candle Scenario - Arson, or Accidental Fire

A hypothetical scenario to illustrate the point that all fires ruled accidental may not be accidental!

On a given morning day a female homemaker lights a decorative aromatic candle, the candle is contained in the manufacturer's original candleholder, with no known product recalls issued by the National Consumers Product Safety Commission. The homemaker places the burning and flaming candle in position on a kitchen countertop.

The kitchen is typical with decorative wall hangings and other combustible adornments all in close proximity to the position of the burning candle. Most of which are highly combustible Class A products. The burning candle now situated within the heat convection and heat radiation current range proximate to the Class A products.

The female occupant leaves the residence going about her morning business and chores. Smoke emitted from the unattended residence is seen by a passing motorist, who notifies the fire department. Arriving fire personnel find the residence secured and have to force entry into the home to extinguish the fire.

Was the fire accidental due to human error? The error, placing the candle to close to the combustible Class A material, or was it a deliberate act of arson on the part of the female occupant?

An easy fire cause for the fire investigator to solve! The physical evidence is in place, the ignition source identified and the fuel to burn is present. During the interview process, all the victim (homemaker) has to provide to the fire cause investigator is a realistic and believable accounting of her actions prior to the fire occurrence. The fire scene supports the interview and the fire cause is accidental, due to human error.

The positive false indicators of the fire cause that appeared during the investigation with the assumptions and final cause determination may be incorrect. The fire cause investigator received the believable truth. The investigator cannot look into the human mind to determine the truthfulness of the statements. A simple fire incident, but possible a wrong cause determination.

The occupant's intent when positioning and lighting the candle may have been deliberate. Knowing the candle would ignite nearby combustible material, burning the kitchen, or entire residence? The perceptive truth told. A nationally recognized ignition source and the fire cause present. All supported by a fire cause statistic that candles have started and do start both accidental and incendiary fires.

The interview with the victim and fire scene viewed by the investigator coincided. The story and fire scene match. The required elements for a fire to start accidentally are present. The ignition source found at the point of origin, readily ignited Class A materials present, and a believable story. Together they exhibit an accidental cause for the fire.

Given these facts, the fire investigator rules the fire accidental resulting from human error. The error, leaving an open flaming device burning unattended and placing the device to close readily ignited material.

Could the homemaker's motive been to burn the kitchen for remodeling purposes, using monies received in the insurance settlement? Now the accidental caused fire is a crime of arson. The motive insurance fraud

Supporting the accidental fire finding is that 12 percent of the fire incidents are caused by open flame devices, a category into which candles fall. The candle can be an ambiguous accidental fire cause indicator.

The question that leads to the ambiguity of the cause finding is the statement that open flame devices cause 12 percent of the fire incidents. The ignition device correctly identified in the scenario by the fire investigators as the fire cause, but was the fire in reality accidental or arson?

The circumstances illustrate that not all fires ruled accidental are true accidents. Fire cause investigations require more than cursory inspections of the fire scene and intuitiveness by the investigator. Again, possibility exists for a flawed statistic. A guilt complex on the part of the actor may enter into the incident a year, or years later, admitting to deliberately setting the fire.

Appendix D

Reporting Forms

Sample of Fire Incident Reporting Forms

SPFP-4 (7-87)

APPOINTMENT NO. _____

FIRE REPORT

(Print Legibly)

PENNSYLVANIA STATE POLICE
FIRE MARSHAL DIVISION
1800 ELMERTON AVENUE
HARRISBURG, PA 17110

County _____ City, Borough of _____ Township of _____

Date and hour of fire, Month _____ Date _____ 19 _____ Hour _____ A.M. _____ P.M.

Name of Owner _____ P.O. Address _____

Name of Occupants _____

_____

_____

_____

_____

Street and Number _____

Class of Structure Mark X opposite.	Number of Stories Mark X opposite.	Construction Mark X opposite.	Kind of Roof Mark X opposite.
Dwelling _____	One _____	Wood _____	Shingle (wood) _____
Store _____	Two _____	Brick _____	Tin _____
Manufactory _____	Three _____	Stone _____	Slate _____
Barn _____	Four _____	Concrete _____	Slag _____
Vehicle _____	_____	_____	_____

_____ Fill in blank space when Structure, Number of Stories, Construction of Roof, is other than those specified.

If Store of Manufactory _____
NAME KIND OF STORE OR MANUFACTORY

Cause of Fire _____

_____

If suspicious or of undetermined origin please complete the following:

_____
TIME AND DATE STATE POLICE NOTIFIED

Estimated value of building $_____ Estimated damage to building $_____

Estimated value of contents $_____ Estimated damage to contents $_____

Total $_____ Total $_____

Insurance on building $_____

If Available - Insurance on contents $_____

Total $_____

Name of Insurance Companies _____

_____

MILEAGE TRAVELED TO PLACE OF FIRE -ONE WAY ONLY-

Signature _____

_____
POST OFFICE ADDRESS

If death or injury result from fire give details on other side, including Name, Age and Occupation of those killed or injured.

PLACE REMARKS ON REVERSE SIDE

FIRE REPORT

NATIONAL FIRE PROTECTION ASSOCIATION

ymarch Park, Quincy, MA 02269

	Use this space to correct label and provide missing information

What was property used for? (Single family dwg., Apt. [How many units], Dept. store, Mfg. plant [include type], etc.)

DETECTION AND ALARM

How was fire detected? (Occupant, passerby, automatic detection, etc.)	How was fire department notified?
Time from ignition of fire to detection – If delay, explain.	Time from detection to notification of fire department – If delay, explain.
Was automatic detection system present? Describe type of system.	
Location and coverage of detectors	
Was performance of detection system satisfactory? Explain.	

ORIGIN AND DEVELOPMENT

Where did fire start? (Area and level of fire origin)

What material (Fuel) was first ignited	Describe the ignition sequence and the spread of the fire in detail
What supplied the heat for the ignition	
Describe how the heat and fuel came together: (Check one and explain) ☐ Accidental ☐ Incendiary ☐ Other	

BUILDING CONSTRUCTION

Type of construction (Wood frame, ordinary, heavy timber, etc.)	Length	Width	Ground floor area (sq ft)	Height/number of stories

Walls (Wood, brick, concrete, etc.)	Floor framing (Wood joist, Heavy timber, etc.)	Roof framing (Wood, steel, etc.)

Roof deck (Wood, concrete, metal, etc.)	Roof covering (Asphalt shingle, built-up, etc.)

Was property operating, closed for the night, vacant, under construction or demolition etc.?

AUTOMATIC SUPPRESSION SYSTEMS

Was an automatic sprinkler system present? Describe type of system. (Wet, dry, pre-action, etc.)

Where was alarm received? (F. D., central station, etc.)	No. of sprinklers that opened	Describe coverage of system.

over →

AUTOMATIC SUPPRESSION SYSTEMS (cont.–)

Was sprinkler system effective? Explain.

Were other fire protection systems present? If yes, describe type of system, how activated, coverage, effectiveness. (Halon, CO_2, extinguishers, fire walls etc.)

CASUALTIES:

(Please provide information on each individual casualty. Check the appropriate box to indicate whether the individual was a FATALITY or an INJURY and if he was a CIVILIAN or a FIRE FIGHTER. List FATALITIES first. If more space is needed please list additional information on separate sheet.)

✓ Fatality	✓ Injury	✓ Civilian	✓ Fire Fighter	Age	Sex	Causes of Death/Injury	Were there physical conditions that prevented escape? (Handicapped, intoxicated, etc.)

DIRECT PROPERTY DAMAGE (DOLLARS)

Value of buildings	Value of contents	Total value
Estimated building loss	Estimated contents loss	Estimated total loss
Insurance carrier		Insurance paid

REMARKS

Use this space to give narrative details that will contribute to an understanding of factors responsible for this fire. Please include information on fire department operations at the incident and sketches of the incident scene.

Reporting Official | Rank or Title | Organization | Telephone (area code and num

FIRE DEPARTMENT INCIDENT REPORT

Date_____ Time_____ Incident Type_____ Incident #_____

Incident Location _____ Incident Code # _____

Occupant _____ Phone _____

SS# _____ DOB _____ white / black (circle) male / female

Owner _____ Address _____ Phone _____

Mobile Property: Year_____ Make _____ Model_____ State _____

License # _____ VIN #_____ Insurance Co _____

Cause ["x" one]: Human Error_____ Equip Malfunction_____ Incendiary _____ Undetermined_____

*Area of Fire Origin:*_____ *Ignition Source* _____

Materials Ignited: _____

No. of Stories: _____ *Detector Performance:* Operable_____ Inoperable _____ None Found _____

Dollar Loss: Property...$ _____ Contents.....$_____ *Citation #* _____

Injuries: Civilian...#_____ Fire Fighter...#_____ *Fatalities:* Civilian...# _____ Fire Fighter...#_____

Mutual Aid Given....Yes / No *Rcvd From:* _____

Utilities Notified: Cable _____ Electric_____ Gas_____ Phone _____ Cable_____

Police Unit Assigned _____ *Fire Marshal Notified?* _____

Narrative: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Report Submitted By:_____ Date _____

ADDITIONAL INFORMATION

Additional Occupants: _____

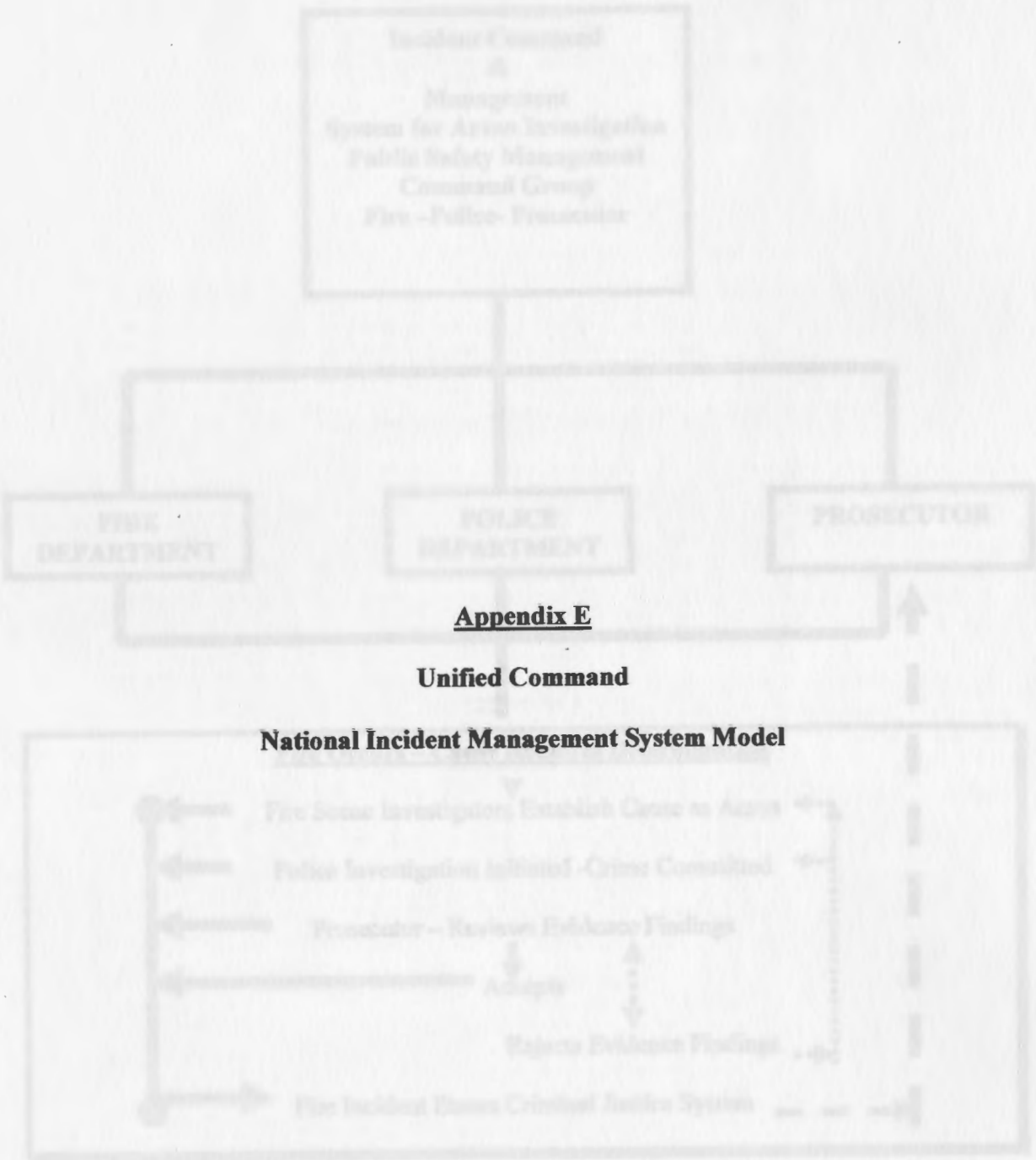
Evidence Collected? Yes / No By Whom? _____

List Evidence Collected: _____

Photos Taken? Yes / No By Whom? _____

Videos Taken? Yes / No By Whom? _____

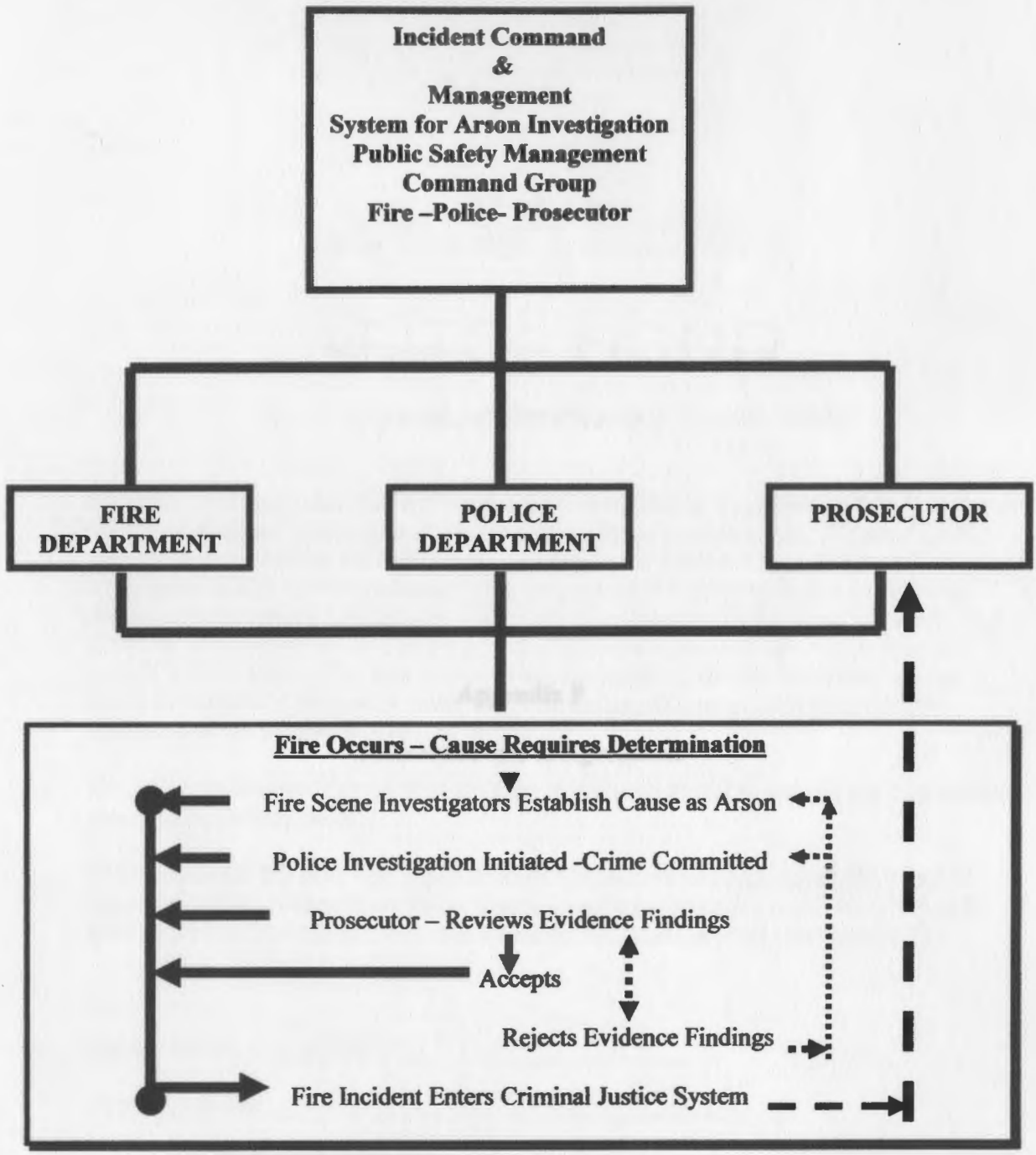
Incident Closed _____ Incident Under Investigation _____ FM File? _____



Appendix E

Unified Command

National Incident Management System Model


Incident Command
&
Management
System for Arson Investigation
Public Safety Management
Command Group
Fire –Police- Prosecutor
FIRE DEPARTMENT
POLICE DEPARTMENT
PROSECUTOR
Fire Occurs – Cause Requires Determination
Fire Scene Investigators Establish Cause as Arson
Police Investigation Initiated -Crime Committed
Prosecutor – Reviews Evidence Findings
Accepts
Rejects Evidence Findings
Fire Incident Enters Criminal Justice System

Appendix F

Memorandums of Agreement

Robert S. Goeltz
P. O. Box 1263
1146 N. Buhl Farm Drive
Hermitage, PA 16148
Ph. Office 1-724-342-0669 Fax 1-724-981-7461
Ph. Home 1-724-981-0339 E-Mail hfdfm110@hotmail.com

Memorandum of Agreement

Regarding Our Agency's Involvement in Research Project

It is agreed that researcher **Robert Goeltz** (graduate student at Youngstown State University) has our consent and cooperation in reviewing our agency's existing data, documents, and records that are available for inspection. It is understood that the information recorded by the investigator will be used in his research for the purpose of analyzing factors and criteria related to fire investigations and any related indictments and/or prosecutions that have occurred. It is understood that no persons identified in the relevant data, documents, or records will be contacted or interviewed by the researcher or that the researcher will not reveal any names or personally identifying information of those persons named in the documents in his published results or reports.

It is further understood that we have the right to withdraw from the study at any time without any negative consequences.

I understand that if I have any questions about this matter that I can contact Dr. James A. Conser, Criminal Justice Department, Youngstown State University (330-941-2381) or Dr. Edward Orona, Director of Grants and Sponsored Programs at YSU (330-941-2377).

Agency Name: Sharon Police Dept.

Agency Address: 155 W. Connelly Blvd
Sharon Pa 16146

Debra L Mack — 11-24-04

Agency Official — Date

Robert S. Goeltz
P. O. Box 1263
1146 N. Buhl Farm Drive
Hermitage, PA 16148
Ph. Office 1-724-342-0669 Fax 1-724-981-7461
Ph. Home 1-724-981-0339 E-Mail hfdfm110@hotmail.com

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It is further understood that we have the right to withdraw from the study at any time without any negative consequences.

I understand that if I have any questions about this matter that I can contact Dr. James A. Conser, Criminal Justice Department, Youngstown State University (330-941-2381) or Dr. Edward Orona, Director of Grants and Sponsored Programs at YSU (330-941-2377).

Agency Name: Jefferson Mark Regional Police Commission

Agency Address: 7407 Lamor Road

Mercer PA 16137

[signature] Secty/Treasurer — 2/17/05

Agency Official — Date

Robert S. Goeltz
P.O. Box 1263
1146 N. Buhl Farm Drive
Hermitage, PA 16148
Ph. Office 1-724-342-0669 Fax 1-7245-981-7461
Ph. Home 1-724-981-0739 E-Mail hfdfm110@hotmail.com

Memorandum of Agreement

Regarding Our Association's Involvement in Research Project

It is agreed that researcher Robert Goeltz (graduate student at Youngstown State University) has our consent and cooperation in obtaining our memberships opinions about the investigation of incendiary fires. It is understood that the information recorded by the investigator will be used in his research for the purpose of analyzing factors and criteria related to fire investigations and their documentation. It is understood that persons participating in the survey will not be identified by, name or personally identifying information in the documents in his published results or reports.

It is further understood that we have the right to withdraw from the study at any time without any negative consequences.

I understand that if I have any question about this matter that I can contact Dr. James A. Conser, Criminal Justice Department, Youngtown State University (1-330-941-2381) OR Dr. Edward Orona, Director of Grants and Sponsored Programs at YSU (1-330-941-2377).

Agency Name: Mercer County Fire Chiefs Assoc

Agency Address: PO Box 1263

Hermitage, PA 16148

Phillip P. Steele, Pres — 1-18-05

Agency Official — Date

Robert S. Goeltz
P. O. Box 1263
1146 N. Buhl Farm Drive
Hermitage, PA 16148
Ph. Office 1-724-342-0669 Fax 1-724-981-7461
Ph. Home 1-724-981-0339 E-Mail hfdfm110@hotmail.com

Memorandum of Agreement

Regarding Our Agency's Involvement in Research Project

It is agreed that researcher **Robert Goeltz** (graduate student at Youngstown State University) has our consent and cooperation in reviewing our agency's existing data, documents, and records that are available for inspection. It is understood that the information recorded by the investigator will be used in his research for the purpose of analyzing factors and criteria related to fire investigations and any related indictments and/or prosecutions that have occurred. It is understood that no persons identified in the relevant data, documents, or records will be contacted or interviewed by the researcher or that the researcher will not reveal any names or personally identifying information of those persons named in the documents in his published results or reports.

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Agency Name: Hermitage Police Dept

Agency Address: 800 N. Hermitage Road
Hermitage, PA 16148

Larry D. Matchett 24 SEPT 04
Agency Official Date

Deputy Police Chief

Robert S. Goeltz
P. O. Box 1263
1146 N. Buhl Farm Drive
Hermitage, PA 16148
Ph. Office 1-724-342-0669 Fax 1-724-981-7461
Ph. Home 1-724-981-0339 E-Mail hfdfm110@hotmail.com

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Agency Name: _____

Agency Address: SHARPSVILLE POLICE DEPARTMENT
1 SOUTH WALNUT STREET
SHARPSVILLE, PA 16150

_____

_____ 11-16-04
Agency Official Date

Robert S. Goeltz
P. O. Box 1263
1146 N. Buhl Farm Drive
Hermitage, PA 16148
Ph. Office 1-724-342-0669 Fax 1-724-981-7461
Ph. Home 1-724-981-0339 E-Mail hfdfm110@hotmail.com

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I understand that if I have any questions about this matter that I can contact Dr. James A. Conser, Criminal Justice Department, Youngstown State University (330-941-2381) or Dr. Edward Orona, Director of Grants and Sponsored Programs at YSU (330-941-2377).

Agency Name: Southwest Mercer Co. Regional PD

Agency Address: PO Box 70, 500 Roemer Blvd
Farrell PA 16121

Riley Dimeo Jr
Agency Official

10.15.04
Date

Appendix G

Human Subjects Research Committee

Approval Letter

Youngstown
STATE UNIVERSITY

One University Plaza, Youngstown, Ohio 44555
School of Graduate Studies and Research
Office of the Dean
330.941.3091
Fax 330.941.1580
graduateschool@cc.ysu.edu

July 15, 2005

Dr. James Conser, Principal Investigator
Mr. Robert Goeltz, Co-investigator
Department of Criminal Justice
UNIVERSITY

RE: HSRC Protocol Number: 01-2006
Title: An Exploratory and Inferential Analysis of Fire Cause Related to the Crime of Arson and Its Documentation

Dear Dr. Conser and Mr. Goeltz:

The Human Subjects Research Committee has reviewed the abovementioned protocol and determined that it is exempt from full committee review based on a DHHS Category 5 exemption.

Any changes in your research activity should be promptly reported to the Human Subjects Research Committee and may not be initiated without HSRC approval except where necessary to eliminate hazard to human subjects. Any unanticipated problems involving risks to subjects should also be promptly reported to the Human Subjects Research Committee.

The HSRC would like to extend its best wishes to you in the conduct of this study.

Sincerely,

Peter J. Kasvinsky
Dean, School of Graduate Studies
Research Compliance Officer

PJK/cc

c: Dr. Tammy King, Chair
Department of Criminal Justice