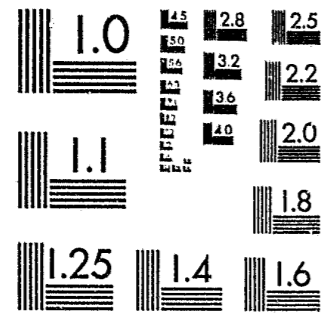


National Criminal Justice Reference Service



This microfiche was produced from documents received for inclusion in the NCJRS data base. Since NCJRS cannot exercise control over the physical condition of the documents submitted, the individual frame quality will vary. The resolution chart on this frame may be used to evaluate the document quality.



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Microfilming procedures used to create this fiche comply with the standards set forth in 41CFR 101-11.504.

Points of view or opinions stated in this document are those of the author(s) and do not represent the official position or policies of the U. S. Department of Justice.

National Institute of Justice
United States Department of Justice
Washington, D. C. 20531

12/2/85

INTERNATIONAL ASSOCIATION OF FIRE CHIEFS • INCORPORATED



"MANAGING ARSON CONTROL SYSTEMS"
A STUDY OF ARSON AND ANTI-ARSON
EFFORTS IN A SELECTED SAMPLE OF
JURISDICTIONS

VOLUME III
ARSON INVESTIGATION

Prepared For
National Institute of Justice
U.S. Department of Justice

Under Grant Award 79-NI-AX-0119

By
Hugh C. McClees
Andrew J. Decker
Daniel J. Carpenter

30 November 1982

International Association of Fire Chiefs
Washington, D.C.

cooperation with the International Association
of Chiefs of Police
Gaithersburg, Maryland

Ryland Research, Inc.
Santa Barbara, California

97631

U.S. Department of Justice
National Institute of Justice

This document has been reproduced exactly as received from the person or organization originating it. Points of view or opinions stated in this document are those of the authors and do not necessarily represent the official position or policies of the National Institute of Justice.

Permission to reproduce this copyrighted material has been granted by

Public Domain/NIJ
US Department of Justice

to the National Criminal Justice Reference Service (NCJRS).

Further reproduction outside of the NCJRS system requires permission of the copyright owner.

DISCLAIMER NOTICE

This project was supported by Grant No. 79-NI-AX-0119 awarded to the International Association of Fire Chiefs by the Community Crime Prevention Unit, National Institute of Justice, Department of Justice, Washington, D.C. Points of view and opinions expressed herein are the authors' and do not necessarily reflect those of the National Institute of Justice, the International Association of Fire Chiefs, or the International Association of Chiefs of Police.

A NOTE TO READERS

This volume is in preliminary draft form. Numerous editorial and typographical errors are therefore present. While the validity of the substance of the research is unaffected, the author's regret that limits in project resources do not presently permit the draft to be revised. We trust that its readers will be able to cope with the report's deficiencies and find its research of value.

VOLUME III
ARSON INVESTIGATION
TABLE OF CONTENTS

3.1	INTRODUCTION	3-1
3.2	EXTERNAL INFLUENCES AND ORGANIZATIONAL FACTORS	3-3
	3.2.1 Socio-Economic Forces	3-3
	3.2.2 Legal Influences	3-10
	3.2.3 Political Factors	3-11
3.3	ON-SCENE PRACTICES	3-21
	3.3.1 Coordination and Control	3-21
	3.3.2 Fire Scene Investigation	3-30
	3.3.3 Special Investigative Issues	3-98
	3.3.4 Report Preparation	3-102
3.4	FOLLOW-UP INVESTIGATION	3-110
	3.4.1 Impact of Organizational Profile	3-111
	3.4.2 Type of Personnel Involved	3-112
	3.4.3 Standard Follow-Up Practices	3-120
	3.4.4 Type of Follow-Up Results Obtained	3-130
	3.4.5 Source and Frequency of Observed Deficiencies	3-140
3.5	MANAGEMENT AND ADMINISTRATION	3-146
	3.5.1 Arson Investigative Unit Management	3-146
3.6	PERSONNEL ISSUES	3-161
	3.6.1 Staffing Arrangements	3-161
	3.6.2 Recruitment	3-167
	3.6.3 Training	3-167
	3.6.4 Retention	3-171

NCJRS

DEC 14 1988

ACQUISITIONS

TABLE OF CONTENTS (CONT'D.)

ILLUSTRATIONS

FIGURE 3.1	Characteristics of the First Three Phases in Arson Control	3-1
FIGURE 3.2	Schematic of Organizational Responsibility for Arson Investigation	3-13
TABLE 3.1	Total Number of Cases Referred to Fire Investigation Unit	3-5
TABLE 3.2	Number of Fires Investigated and Believed to be Arson According to Fire Dept. Reports	3-6
TABLE 3.3	Comparison of Fire and Police Department Arson Data (1979)	3-7
TABLE 3.4	Total Number of Cases Investigated According to Police Dept. Records or UCR Reports (1977-79)	3-7
TABLE 3.5	Arson-Related Offenses Rate Per 100,000 Population 1977-79	3-8
TABLE 3.6	Per Capita Dollar Loss Due to Arson as Reported in 1979 to UCR	3-9
TABLE 3.7	Organizational Factors Impact on Organizational Profile Evolution	3-15
TABLE 3.8	Ratio of Investigation Budget: to Fire Prevention Budget: to Overall Fire Department Budget	3-19
TABLE 3.9	Ratio of Assigned Fire/Arson Investigators to Total Fire & Police Department Sworn Personnel	3-19
TABLE 3.10	Procedural Errors in On-Scene Coordination and Control	3-24
TABLE 3.11	Cross-Tabulation of Type Evidence Collected by Type Personnel for All Cases (N=909)	3-33
TABLE 3.12	Comparison of Fire and Police On-Scene Activities for Fire and Arson Investigation	3-35
TABLE 3.13	Cross-Tabulation of On-Scene Procedural Weaknesses by City	3-42

TABLE 3.14	On-Scene Procedural Error Rate for Cities Grouped by Organizational Profile	3-43
TABLE 3.15	On-Scene Physical Evidence Collection and Analysis Activities by City and Type Personnel Involved	3-51
TABLE 3.16	Type of Evidence Collected by Frequency	3-54
TABLE 3.17	Cross-Tabulation of Evidence Collected by Type and City	3-55
TABLE 3.18	Utility of Physical Evidence in Case Development	3-57
TABLE 3.19	Physical Evidence Collection Flaws Cross-Tabulated by City for All Cases in Sample	3-58
TABLE 3.20	Organizational Profile Comparison of the Amount and Type of Testimonial Evidence with Arrest Rate Data	3-86
TABLE 3.21	Degree of On-Scene Suspect Development by City	3-91
TABLE 3.22	Cross-Tabulation of Assessed Error in Testimonial Evidence Collection	3-93
TABLE 3.24	Cross-Tabulation of Testimonial Evidence Collection by City and Type Personnel	3-95
TABLE 3.25	Cross-Tabulation of Documentation Errors Observed in Fire Investigation Files by City and Type Error	3-103
TABLE 3.26	Impact of Organizational Profile on Follow-Up Activities	3-111
TABLE 3.27	Cross-Tabulation of Documentary Evidence Collection (N=645)	3-113
TABLE 3.28	Cross-Tabulation of Apprehension Activity by Type Personnel Involved and City	3-115
TABLE 3.29	Fire Investigator Involvement in Three Follow-Up Activities Arrayed by City Organizational Profile	3-117
TABLE 3.30	Cross-Tabulation of Follow-Up Investigative Activity by City	3-124
TABLE 3.31	Fire and Police Interrogation Frequency and Facilities	3-126

TABLE 3.32	Frequency Profiles for Grounds for Arrest	3-128
TABLE 3.33	Relationship of the Degree of Fire Department Involvement in Follow-Up Activity to Clearance Data	3-131
TABLE 3.34	Percentage of Cases Terminated by Investigative Phase and Property Loss	3-132
TABLE 3.35	Reported UCR Clearance Rates for Reported Incendiary and Suspicious Fires	3-133
TABLE 3.36	Clearance Rates (by Arrest and Exception Divided by Cases Referred Minus Unfounded)	3-134
TABLE 3.37	Cases Assigned Per Investigator	3-135
TABLE 3.38	Number of Cases Assigned Per Investigator by City Code and Type Organizational Profile	3-135
TABLE 3.39	Clearances Per Investigator	3-136
TABLE 3.40	Relationship Between Investigator Caseload and Clearance Rates	3-138
TABLE 3.41	Arrest Rate Per 100 Investigations	3-138
TABLE 3.42(a)	Cross-Tabulation of Frequency of Deficiencies in Follow-Up Testimonial Evidence Collection by Cities (N=909)	3-142
TABLE 3.42(b)	Cross-Tabulation of Frequency of Deficiencies in Follow-Up Documentary Evidence Gathering by City (N=909)	3-143
TABLE 3.42(c)	Cross-Tabulation of Frequency of Deficiencies in Follow-Up Legal and Procedural Activities by City (N=909)	3-144
TABLE 3.42(d)	Cross-Tabulation of Frequency of Deficiencies in Follow-Up Reporting Procedures by City (N=909)	3-145
TABLE 3.43	Specific Uses of Data	3-148
TABLE 3.44	System Unit Management Practices	3-149
TABLE 3.45	Arson Investigation Organizational Profile and Staffing Patterns	3-164
TABLE 3.46	Source of Investigators, Recruitment, and Selection Criteria	3-168

TABLE 3.47	Training Requirements for Fire and Arson Investigators	3-170
TABLE 3.48	Presence of Career Ladder	3-172
TABLE 3.49	Attrition and Mean Years of Experience for Fire and Arson Investigators	3-176
TABLE 3.50	City 33's Association of Investigator Experience with Unit Arrest Data	3-177
TABLE 3.51	Compensation Incentives for Assignment	3-178
CHART A	Trendline Analysis of Relationship of Average Number of Cases Assigned to Case Clearances	3-138

3.0 ARSON INVESTIGATION

3.1 ARSON INVESTIGATION INTRODUCTION

This second stage of the arson control process is made up of two principal phases:

- on-scene investigation
- follow-up investigation.

At times, it is difficult to clearly differentiate when one phase ends and the next begins. For example, the distinction between arson detection and investigation may be as subtle as the mental shifting of gears in a fire investigator's mind. Similarly, the follow-up phase overlaps the on-scene phase whenever a suspect is arrested on scene. In general, though, the distinction between each of these first three phases serves the useful purpose of pointing out differences in the authority, the personnel, the locus, and the focus of the activities:

Figure 3.1 Characteristics of the First Three Phases in Arson Control

<u>Phase</u>	<u>Responsible Agency</u>	<u>Personnel Involved</u>	<u>Locus</u>	<u>Focus</u>
DETECTION	Fire Dept.	Fire Officer Investigator	Fire Scene	Determine Cause
ON-SCENE	Fire and/or Police	Fire Officer/Inv./Police Patrol/Detective/Evidence Technician	Fire Scene	Determine Crime
FOLLOW-UP	Agency w/ Police or Spec. Pol. Powers	Fire Inv. w/ Police Powers/Police Patrol or Detectives	Field, Office, Lab.	Identify Criminal and Build Case

To establish the influences that shape both on-scene and follow-up investigative performance, we shall first examine the organizational influences that help shape the demands and resources available to each agency. These factors include the external influences like socio-economic forces, legal requirements and constraints, and internal factors like organizational responsibilities and resources. We will move from considerations of the on-scene phase, the policies that shape them, and the practices as they actually appear in retrospect to have taken place.

We will then consider special issues associated with the on-scene phase before turning to the follow-up phase. In our consideration of the on-scene phase, special attention will be given to on-scene investigation, including command and control, the collection of testimonial evidence, physical evidence collection, and initial documentation. Through this analysis, we seek to show the important role that management plays in its investment decisions about the way in which scarce resources are spent--how these decisions influence the soundness and thoroughness of arson investigation in the eight study sites. We will also seek to stress the observed need for greater skills; testimonial evidence collection; and report-writing, particularly for fire investigators.

A similar approach will be made in our review of follow-up investigative policies, practices, and outcomes. Here, too, the role of unit administration and management proves to be a powerful influence on performance. The need to improve investigative unit management of caseloads will be given prominence.

3.2 EXTERNAL INFLUENCES AND ORGANIZATIONAL FACTORS

Introduction

External factors are those societal forces that shape the demand and response of the arson control system. Demand takes the form of the raw number of fires; the fraction that appear to be incendiary; and, of those, the number that are arson-related crimes. Responding to this demand, societal forces:

- establish the organizational responsibilities
- shape the resources that are available to deter the offense
- detect and investigate the occurrence of the offense
- serve to punish and/or reform the offender.

The public attitude towards crime, in general, and arson, in particular, both shapes and, in turn, is shaped by the socio-economic, legal and governmental context. These forces and factors help determine the efficiency and effectiveness with which resources are applied. These external influences can come from the national and state level, as well as the local level. While we normally think of the more direct influences of the local level as being of paramount importance, the national reaction to the increase in arson illustrates how powerful (though diffuse) national sentiments can be in altering attitudes and ultimately reallocating resources on the local political and organizational levels.

In this section, we will consider these influences by examining the following:

Socio-Economic Forces
Legal Influences
Political Factors - assignment of responsibility
- allocation of resources.

3.2.1 Socio-economic Forces

The quantity and quality of the available data limit our ability to add insights to the discussion of the role played by socio-economic factors in the incidence of arson. Few new inferences can be drawn from such a small sample, especially since the study sites were selected on the basis of their exception to the norm in terms of arrest rate, incidence rate, etc. Other studies have implicated demographic influences, such as the ex-migration rates from cities, ethnicity, and age makeup of the population. Arson-for-profit has been linked to deteriorating inner cities; the business cycle (in one city studied, bankruptcy rates strongly correlated with the amount of property lost to arson over a 50-year period); rent-freezes; and organized crime. We found no correlations between population loss and per capita incidence rates. This in no way lessens our belief in the validity of the Abt Associates study findings on the relationship of ex-migration to increased arson incidence rates. A topic for future research in this area is the question of the relationship between demographic makeup of a community and its arson motive profile.

Demand Measures

We use the term "demand" to mean the frequency with which incidents occur that require a system response. Demand rates might be considered a surrogate measure for the sum of the socio-economic incentives and disincentives to commit arson. It is important, therefore, that data that attempts to measure this demand be accurately defined, measured, and reported. We found that the state of arson management information data was frequently so handicapped by one or more limitations that one could easily gain a false impression of demand by relying on one set of numbers. Unfortunately, the preferred alternative--considering a number of related measures--has its own drawbacks in this instance.

We used two methods to measure the reported number of investigations; and two further ways to gauge the arson incident rate. Each method yielded a distinct picture of the demand arson places on these cities' resources over time. Each method can be a useful measure in its own context, but none is wholly satisfactory as the sole measure of demand. Moreover, their degree of divergence emphasizes how important it is for terms to be well-defined and well-understood. Confusion in collecting, recording, or interpreting the data can significantly skew analysis.

We feel that much of the confusion over the number of arsons, clearance rates, and the like, stem from confusion over terms and failure to consistently observe a protocol of use and interpretation. Some of the sharpest disagreements related to us were those between fire and police staff over arson data. We learned that city resource controllers and arson task force members often found it difficult to gain a clear picture of arson demand due to the welter of conflicting measures of demand and their significance. Despite extensive efforts, the research team did not find fire and police department data readily reconcilable.

Exhibited below are four tables that developed from these four different ways of estimating the workload demand that firesetters place on the arson control system.

Table 3.1 measures the number of fires referred or brought to the attention of fire investigation units. This table gives the best available estimate of the number of investigations conducted. However, it is far from a perfect measure in that few systems reconcile the number of cases referred with the number actually assigned to and worked by investigators. Thus, the table gives only the best available estimate of the number of investigations conducted. Individual cities experienced extremes in incident caseload variance over the three-year period from 17% to 204%. However, in aggregate, the cities experienced a fluctuation over the three-year period of only 2.4%

Overall, the cities experienced a mean demand fluctuation of 57% between 1977 and 1979 rates. Individual cities, therefore, have to be prepared to cope with large fluctuations in annual case load, despite the lack of elasticity in the number of investigators assigned. Arson control managers have to be able to buffer the overloads these fluctuations imply;

and arson resource controllers need to be aware of this potential in their manpower planning. Some of the fluctuations may not in fact be due to changes in demand so much as changes among the following:

- . call-out criteria,
- . compliance with call-out criteria by fire officers,
- . variations in records-keeping, and
- . definitions of what constitutes a case referral.

TABLE 3.1
Total Number of Cases Referred
To Fire Investigation Unit
1977 - 1979

	City								Mean
	17	24	33	44	57	60	70	87	
1977	1,520	1,426	488	314	601	176	3,292	770	1,073
1978	1,490	1,697	453	358	550	216	2,857	805	1,053
1979	1,880	2,027	615	396	370	106	2,301	689	1,048
% Fluctuation In Demand:	26%	42%	35%	26%	62%	204%	43%	17%	2.4%

Table 3.2 sets out the number of fires investigated and believed to be arson according to fire department reports. By comparison to Table 3.1, fire departments record as arson approximately 47% of the total number of cases referred to them for potential investigation. In other words, a little more than half of the investigator's workload is expended on non-arson fires.

This relationship might be used to support a number of considerations, including:

- . monitoring fire department responsibility to investigate fires due to the high percentage of non-arson investigations
- . altering call-out procedures
- . improving training of those calling out investigators.

This table suggests that the percentage of cases referred to arson units that turn out to be arsons has increased over the time frame (from 44% in 1977 to 50% in 1979. It was not possible to determine to what

degree the reported increase is due to reporting anomalies, improved investigation, etc. Of the eight cities, two reported increased demands in terms of the number of arson fires worked by the fire departments; four had decreases; and two departments showed large swings with little trend. Note, especially, City 24's large increase in reported arsons during 1979.

TABLE 3.2
Number of Fires Investigated And Believed To Be Arson
According to Fire Department Reports
1977 - 1979

	City								Mean
	17	24	33	44	57	60	70	87	
1977	840	923	441	314	321	176	344-376 ¹	463	478
1978	739	1161	398	358	285	134	458	346	485
1979	801	1413	546	396	205	65-74 ¹	449	361	530

¹ Departmental records could not be reconciled and are, therefore, both given here.

Table 3.3 reflects a noticeable difference between those fire department-generated data and the data on arsons reported to the UCR. UCR-submitted data was apt to be higher. Possibly this was due in part to arson attempts reported to police units, but not requiring fire department response (stripped and burned out cars, Molotov cocktails, extinguished without fire alarm, etc.). There is also the possibility that police patrol complaint reports were completed on fires which were then added on to the number of reported arsons supplied by either the fire or police arson unit. This would double count the number of arsons. A sample of one year's discrepancies in the number of reported arsons will reveal the size of the problem, the degree of divergence, and the need for reconciliation of arson data at the local level.

TABLE 3.3
Comparison Of Fire And Police Department Arson Data (1979)

	City							
	17	24	33	44	57	60	70	87
FD Reported Arson	801	1,413	546	396	205	65	449	361
UCR-Reported Arsons	1,021	1,448	539	40	214	81	547	408

It is hoped that better coordination between units, the use of computer-based editing routines, common reference numbers, and other administrative controls can in the future reduce the uncertainty about the source of these unreconciled differentials and their significance.

Table 3.4 views the workload demand gleaned from arson investigative unit reports and police department records (according to each city's organizational profile). The demand figures are prone to run higher than their counterpart's department figures seen in Table 3.2. In some cases, other crimes may account for the higher figures. In other instances, no satisfactory explanation was either offered or discovered. Compared to 1977, the table reflects an increase in demand of 7%, roughly that suggested by Table 3.2.

TABLE 3.4
Total Number of Cases Investigated
According to Police Department Records or UCR Reports
1977 - 1979

	City								Mean
	17	24	33	44	57	60	70	87	
1977	Unk.	1,426	488	300	321	176	393	463	500
1978	Unk.	1,161	453	350	285	136	414	346	449
1979	1,041	1,464	546	400	360	81	578	408	548

Table 3.5 reflects no significant increase in demand overall (mean per capita rates in 1977-114, 1978-106, 1979-114). Three cities experienced increased rates; three cities fluctuated; and two cities had decreased rates. Table 3.5 reports the number of arsons per 100,000 population based on the best available population projections. Reported rates ranged from 57 per 100,000 to a high of 150. The national average for all communities in 1979 was 55 per 100,000. As the eight sites in the study range in population from just over 100,000 to over 1 million, we would expect somewhat higher figures than the national average. Six cities had rates more than double this national average. Interestingly, four of the six cities initiated joint fire-police arson units either prior to or during the study period.

TABLE 3.5
Arson-Related Offenses
Rate Per 100,000 Population
1977 - 1979

	City								
	17	24	33	44	57	60	70	87	Mean
1977	124	63	104	141	195	125	39	121	114
1978	109	74	94	163	172	97	45	95	106
1979	150	91	130	180	34	57	61	112	114

Table 3.6 reports that per capita dollar loss amounts for 1979 ranged between \$4.41 to \$39.28, with a mean of \$12.42. The upper figure for City 24 is in large part due to one multi-million dollar loss. This loss is higher than the average per capita cost of a fire department in a 250,000 to 450,000 city population in 1976 (34.76). While only a year's losses, in 1978 the same city had a per capita arson loss rate of \$10.64. Note that City 60 recorded a per capita loss rate of \$19.27. This shows that City 24's per capita loss rate, while extreme, is not unique. Similar data for each city for 1978 and 1977 failed to show any clear trends. This may be due in large measure to the lack of consistency in arson reporting definitions, as well as to the variability in fire incidence and loss. Given the small sample size and low reliability/comparability of the reported data, it is difficult to go beyond stating that the medium per capita loss rate is consistent with the range of national experience for per capita loss due to arson.

TABLE 3.6
Per Capita Dollar Loss Due To Arson
As Reported In 1979 To UCR

City								
17	24	33	44	57	60	70	87	Mean
\$6.44	\$39.28	\$4.70	N/A ⁽¹⁾	\$7.54	\$19.27	\$4.41	\$5.30	\$12.42

(1) City 44 did not maintain accurate cumulative records of losses. Its UCR Reports seriously underreport arson offenses. Police department records only assigned case numbers upon the request of the police detective assigned to arson. Best estimates from the fire department place the arson rate at a comparatively high rate of 160 per 100,000 population.

The year-to-year fluctuations in demand rates that we see here reduce the confidence we would place in purported linkages between programmatic changes and arson demand data. We believe that other factors, such as the UCR arson reporting, fire incident classification changes, changes in local usage, and records keeping have played a decisive role in reported results. These changes, more than socio-economic demand or organizational/programmatic responses, are likely to account for a large, but immeasurable shift in reported data.

3.2.2 Legal Influences

The influence of the law pervades the environment and workings of the arson control system. The Constitution and its amendments set forth our basic political and legal structure; we will cite only two examples of this subtle influence. First, the police function is a state power, not a local or federal one. Second, police investigative procedures have to be predicated on compliance with state and federal judiciary interpretation of the Bill of Rights. This deep structure plays a powerful, if overlooked, role in shaping the way in which arson is investigated. Whatever their other differences, all arson systems share this common legal and governmental heritage. Variations in legal procedures, authorities, and process will be examined in Section 4 of this report and its appendices - they will illustrate the common and dissimilar elements of the law and how they affect the arson control process.

Legal Influences on Investigation.

State laws defining criminal burning, their scope and requirements for corpus delicti establishment, influence the number of investigations and whether or not the action constitutes an unfounded incident. Other influences include search and seizure requirements and processing of mental offenders. Federal statutes set conditions for the involvement of ATF, FBI, and postal inspectors, while state laws establish the level of cooperation.

Other State statutory impacts include:

- variations in what constitutes arson-related crimes. What constitutes arson in one site might only constitute reckless burning, a misdemeanor, in another. Age of consent in children, and when a juvenile can be tried in criminal court, are examples of some of the many variations in arson law that influence the investigative workload.
- determination of what agency shall have police powers over what activities. At the state level, the authority to investigate the cause of fire is typically assigned to the state fire marshal. This power is collaterally delegated to the state fire marshal's designees on the local level. The powers delegated usually authorize fire marshals to investigate the cause of all fires; gives them certain rights of access; and may authorize such designees to exercise special powers, such as the use of administrative warrants and the ability to subpoena witnesses. The following examples illustrate the state's range in this regard. Only City 24's arson investigators had full police powers, and fully exercised their authority to carry weapons and make arrests for all types of crimes discovered in the course of their arson investigative duties. City 33 and 87 had limited police powers granted to them as deputy state fire marshals to investigate arson-related crimes. The other cities in the study relied on police personnel to exercise police powers. One site was authorized, but had not

exercised, its right to pass a local ordinance by which police powers could be conferred on fire investigators.

Three sites, Cities 24, 33, and 87, used subpoena authority to cause reluctant or hard-to-locate witnesses to appear to be interviewed. Subpoena powers serve investigators by placing the onus on the witness to appear later, rather than forcing the investigator to track down the witness. The subpoena powers also extend to the fire investigator's ability to conduct more preliminary interviews on-scene with anyone who can shed light on the cause of the fire. The investigator has the additional flexibility to cause an interview to be resumed later. The utility of the subpoena power is primarily determined by the initiative and ingenuity of the investigator. The subpoena power is conferred on fire investigators in these cities as an extension of the state fire marshal's powers.

3.2.3 Political Factors

Assignment of Responsibility.

Local governments have the key responsibilities to:

- assign departmental responsibilities for detection and investigation
- set departmental and programmatic resource levels
- review resulting performance.

Custom and state law make the broad division of fire and police responsibilities clear. Arson investigation responsibilities may be a matter of state law or a local option. However the responsibilities are initially assigned, local government retains the obligation to review performance and take action to improve arson control activities. Local governments, therefore, have considerable discretionary authority to determine the organizational profile and level of resources allocated to the arson control system.

As expected, until and unless pressures build to force its review, the basic organizational responsibilities undergo no further review. At best, the arson unit's performance and resource requirements may be reviewed as an annual agenda item on a city council budget committee's agenda. While individual political decision-makers' awareness of arson control unit performance obviously varied, in general it can be said that interest in, or concern for, the arson control system is a transient, relatively low-level priority concern of local governments' elected and appointed officials.

We found that a variety of pressures, presumably in combination, could trigger increased concern from local government decision makers, including:

- national publicity about "the need to do something about the arson epidemic" may generate local consideration
- one extraordinarily serious arson, or a series of losses
- unfavorable media coverage, especially the unfavorable publicity over fire and police department squabbling
- successful lobbying by fire, police, district attorney, or insurance industry personnel.

From the experience of the eight sites, we concluded that once pressures had grown to the point of forcing local governments to react, changes in the organization, rather than resource levels, are most likely. Organizational changes included changes in unit working relationships, creation of joint fire-police investigative units, and the appointment of arson task forces.

Figure 3.2 depicts the evolution of the arson systems in the study. Overall, fire department involvement in arson control waxed while police department involvement waned. You can see the national trend towards the establishment of joint fire-police arson units emerging from the direction of the movement in the figure. During the 1977-79 period, three of the eight cities made fundamental changes to their organizational profiles. Two other systems developed arson task forces that significantly influenced organization and operations. One city significantly augmented its forces and restructured its operations. The two remaining cities previously had adopted joint fire-police organizations. Change, not stasis, characterized arson control organization in the cities studied.

The direction of the change also follows the national trend towards establishing these units under the aegis of a fire department. What the figure does not show is that, without exception, the joint units are headed by fire officers. The police officers assigned to the unit are non-supervisory police officers. This was true of the three cities in our survey with a joint unit profile during the study period, and in the two units adopting this approach after 1980. To a point, this may represent a healthy rebalancing of interest. As we will show later, fire department involvement in both the initial and follow-up investigative phases appears advantageous to case clearances. Beyond this operational consideration, it would be unnatural to make the senior officer of the unit an appointee of another department. At the same time, we are struck by the missing ingredient of a police supervisor in what is ultimately a police activity. Smaller units may not be able to afford the assignment of a police department supervisor to the unit. In this situation, a detective sergeant would make a sound choice to act as both detective and police work administrator. Units above the size of six or seven investigators merit strong consideration for the units' second-in-command to be a police lieutenant with a flair for both investigation and administration.

3-13

FIGURE 3.2
Schematic of Organizational Responsibility
For Arson Investigation

City Code	Police Department Sole Responsibility	Police Department Managed Joint Team	Shared Management of Joint Team	Fire Department Joint Team	Fire Department Sole Responsibility
17	<u>1979</u>	>>>>>>>>>>	<u>1980</u>		
24					<u>Pre-1960</u>
33					<u>Since April, 1970</u>
44	<u>1978</u>	>>>>>>>>>>>>>>>>	<u>1979</u>		
57			<u>Since Mid 1970's</u>		
60			<u>1977</u>	>>>>>>>>>>	<u>1979</u>
70	<u>Pre-1970</u>				
87				<u>Since Early 1970's</u>	

We observed that joint units tended to develop one or more problem areas that threatened the potential benefits of this organizational profile. Among the difficulties observed in more than one joint unit:

- . administrative discontinuities, such as pay and shift differentials, persisted, in part, due to the difficulty in resolving differences in collective bargaining agreements
- . difficulty developing agreed upon standard investigative procedures and administrative guidelines between fire and police units. A sore point in several joint units was the role fire investigators should play in arson case follow-up
- . lack of common goals and objectives
- . supervision of police investigative activity by fire department supervisors lacking the technical background of an equivalent police department supervisor
- . absence of direct access to senior department management, and lack of senior management sensitivity to, and identity with, the joint unit's mission and requirements
- . traditional fire-police rivalries

While it is true that some of these issues may as easily appear in other organizational profiles, joint units may sharpen the contrast and conflict. We saw no evidence that joint units had special capability to resolve these sorts of issues. Two-tier systems, by comparison, may also have shift and pay differentials and lack of common goals and procedures. Under this arrangement, differences in pay, benefits, and conditions would be far more likely to be found acceptable. By comparison, two-tier systems were far more likely to be strained by interagency disputes and experienced difficulties in smoothly transitioning from initial investigation by fire investigators to follow-up by police detectives. These handicaps might be offset by the stronger ties each unit had to its own resource controllers. Police arson units in these systems were more likely to be able to obtain patrol support and had readier access to support services. By comparison, the two single agency units in our study were wholly fire department operations. The critical tradeoff in this profile is between fundamental integrity of the command and operational structure and the isolation from police resources.

Table 3.7 associates the evolution of each unit over time to influencing factors underlying political action to reorganize the arson control system or appoint an arson task force. In four of the eight cities (17, 24, 57, and 70), city government took special measures to increase funding and/or alter the organizational profile. Political pressures had led to the formation of a fire department-operated joint fire-police unit. In the other three cities no direct political action had been taken by the respective governing bodies to alter the organizational responsibilities. In these cases, the factors that previously influenced their organizational profile are given.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

TABLE 3.7
Organizational Factors Impact On
Organizational Profile Evolution

	City							
	17	24	33	44	57	60	70	87
Type System 1977	Two-tier	Single Agency Fire Department with full Police powers	Single Agency Fire Department with partial Police powers	Two-tier	Joint, since 1976	Joint, since 1974	Two-tier	Joint
Type System 1979	Police Dept. responsible for arson investigation	No change	No change	Joint since Sept. 1979	Joint	In transition to Single Agency (Fire)	Two-tier	Joint
Type System 1980	Joint	No change	No change	Joint	Joint	Single tier	Two-tier	Joint
Organizational Profile Influencing Factors	Skillful lobbying by unit's head of city council members, grantsmanship	State law and		Fire, Police, District Attorney negotiated arrangement	Lobbying by unit's head and the significant losses in 1975 & 1976. New mayor credited with lead role in negotiating new fire-police relationship	Police Department not inclined to provide additional manpower to investigate arson. Fire Department unwilling to do leg work and then turn cases over to Police Department	Losses, mayor's concern, grantsmanship	State law and inability of Police Department to solve several high-publicity cases led to formation of the new unit
Year Task Force Formed	1979	No task force	1979	1979	1979	No task force	1979	1979
Role of Arson Task Force	City Council sponsored. Increased fire department responsibility <ul style="list-style-type: none"> . formed arson task force . increased personnel . moved to joint 		County-wide increased prosecution	County-wide task force with no direct influence on fire or police resources	Task force in planning stage		City-wide appointed by mayor-influential operationally	County-wide advisory task force focus on training and information sharing

3-15

Allocation of Resources.

The relationship between the allocation of resources and arson control system performance is ambiguous. This is necessarily the case given the difficulty in first defining valid measures and then obtaining reliable data to measure either term.

We found the relationship between resources expended and losses and resources expended to clearances obscured by a number of limitations in available data. To cite one difficulty, arson administrators in most fire and police department arson units could only provide rough and partial data on the unit's costs. Typically, unit costs had been folded into the budget figures of larger activities, like a prevention bureau or detective section. Another problem confounding robust analysis is the lagtime between investment in resources and return in the form of results. Moreover, our review of the many substantiative changes that occurred to these systems during this period makes us skeptical of the value and validity of the exercise. Sorting out these and other complicating factors would not have, in our opinion, represented a sound investment of research resources. Further, it would have required going beyond readily-available data, such as comparative data on the number of investigators assigned and reported clearances. Although far from complete or artifact-free, our analysis of the resulting data sets offered no simple relationships likely to lead to a formula to aid decision makers in knowing what kind of return they might expect from increases or decreases in arson unit budgets.

Accordingly, we restricted our data collection and analysis of resource data to:

- measuring whether over-time unit resources were increasing or decreasing
- examining whether allocation of resources appeared to be responding to "demand" or "results"
- testing whether unit resources in terms of personnel assigned or estimated expenditures were increasing or decreasing in relationship to overall unit budgets.

In addition to attempting to obtain or derive budget estimates and staffing information, interviews with both unit and department heads were conducted to obtain insights into these questions of resource allocation. From these two prime sources of information, the following general observations have been derived:

- In terms of resource allocations, both fire and police agencies have a tendency to treat arson units as step-children (in the sense that both parent units have prior commitments to maintain before additional commitments are taken care of)

- Less than one per cent of either fire or police department budgets will go to arson control. Roughly one-half cent of their combined budget dollar or less will go to arson control
- Operational-level perceptions of resource needs may not be shared at the departmental level
- Appeals to reason and solid documentation of arson statistics seemingly play only a secondary role in resource allocation decisions. Local government and departmental resource allocation decisions do not appear fashioned on such an ideal basis. The fact that arson might cost the community more money than other felonies or the fact that an arson unit might have a higher caseload with fewer investigators than more traditional felony units was not likely to enter, let alone alter, resource allocation decisions. Instead, pressure from the business community, the media, or subtle lobbying and confidence-building actions by unit administrators were evident in securing additional resources.
- Senior fire and police officials in the cities studied regarded arson control more as a secondary than a primary mission and made resource allocation decisions accordingly.
- High arson losses, alone, do not necessarily spark city councils into spontaneous action. It is apparent and understandable that arson might appear to be only one face in a mob of social concerns crying for city council attention.

If the perceived threat to the community from a crime, like arson, increases sufficiently, the political pressure to take action may finally overcome organizational or political inertia. However, it is by no means certain that action will take place or that it will be of the degree or type action required. Examples of the forms of action that occurred among the cities studied were: increases in arson unit budgets, passage of special ordinances to establish joint fire-police strike forces, and the setting-up of a multi-agency arson task force. By the same token, we observed the cutbacks in manpower despite growing arson rates and the failure of department heads, city managers, and councils to seek or approve relatively minor expenditures for arson equipment or training funds. In three cities (Cities 57, 70, and 87) since the mid-1970's, the number of detectives assigned to arson has been cut back. What appears to have happened is that the police departments viewed the arson assignment as a temporary priority. When new problems arose, the arson detail was stripped of manpower. Informal inquiries in several cities revealed that, historically, arson control resources lag behind a cycle of rising, then falling, arson frequency.

As local governments pare down fire and police budgets in the face of budget crises, tough choices will again be faced. The newest programs, especially ones that are not traditional elements of either department, are likely to be the first sacrificed. As a staff unit, arson departments do not have the natural constituencies that closing down a fire station or taking patrol cars off the street would generate. Arson units are also vulnerable to either a fire or police department rationalizing a cutback by declaring, "its their responsibility to investigate arson, not ours."

Ratios of Investigation Budget to Overall Fire Department Budgets.

We gathered budget figures for investigation units, fire prevention units as a whole, and fire and police departments. By dividing the estimated budgets for fire investigation units into the total fire prevention and overall departmental figure, we obtained an approximation of fire department resource trends. The results in ratio of investigation unit expenditures to prevention budget, and overall fire department budget, are shown in Tables 3.8 and 3.9.

In 1979, we found that fire prevention unit budgets ran 1.3 to 5.4 times greater than fire investigation units, with a median of 2.5. Similar ratios pertained during 1978 and 1977. In four cities, the ratios lessened, suggesting that fire investigation units were growing with respect to fire prevention units. From 1977 to 1979, the average ratio moved from 3.3 to 2.9. This trend indicates that arson control was gaining resources with respect to fire prevention expenditures as a whole.

This trend is matched by the apparent lessening in the ratio between overall departmental outlays and fire investigation units. During 1979, the ratio between investigative unit costs and department costs ranged from 1:36 to 1:186, with a mean of 107. Four investigative units had improved capture ratios for departmental funds, one lost ground, and two showed slight changes, but no decisive trend. One city could not provide elements of the basic data.

Ratio of Assigned Fire/Arson Investigators to Total Fire and Police Department Sworn Personnel.

Using a similar approach, we examined the ratio of assigned fire and arson investigators to total sworn personnel for 1977-1979. We gathered and analyzed budgetary information on these areas, but felt that manpower ratios would be a more accurate reflection of resources invested in arson control. An analysis based on manpower ratios avoids the marked differences encountered among city accounting practices. However, this methodology is not free from its own drawbacks. It requires accurate data about the number of authorized positions, estimates of full-time equivalency for dual-role personnel, and sound information about the actual number of sworn personnel--data surprisingly difficult to obtain in some communities.

TABLE 3.8

Ratio of Investigation Budget:
To Fire Prevention Budget:
To Overall Fire Department Budget

	City								
	17	24	33	44	57	60	70	87	Mean
1979	1: 3.5: 72	1: 1.8: 36	1: N/A: 78	1: 2.5: 129	1: 5.4: 186	1: 1.3: 69	1: 2.5: 185	1: 3.0: 102	107
1978	N/A	1: 1.5: 39	1: N/A: 108	1: 2.7: 129	1: 5.6: N/A	1: 1.5: 79	1: 2.5: 171	1: 4.3: 149	92
1977	N/A	1: 1.5: 36	1: N/A: 130	1: N/A: 132	1: 4.8: 173	1: N/A: 86	1: 2.8: 205	1: 4.0: 173	133

3-19

TABLE 3.9

Ratio of Assigned Fire/Arson Investigators
To Total Fire & Police Department
Sworn Personnel

	City								
	17	24	33	44	57	60	70	87	Mean
1979	1: 181	1: 91	1: 219	1: 274	N/A	1: 178	1: 329	1: 194	1: 215
1978	1: 175	1: 88	1: 233	1: 340	1: 323	1: 172	1: 394	1: 230	1: 244
1977	1: 196	1: 92	1: 233	1: 339	1: 208	1: 167	N/A	1: 236	1: 210

Our analysis indicates that manpower ratios ranged widely, from a low of 1:88 in City 24 in 1978 to a high of 1:394 in City 70 during 1978. Overall, the mean manpower ratios went from 1:210 in 1977 to 1:244 in 1978 and back down to 1:215 during 1979. In four cities, the ratio closed, indicating arson investigation was commanding greater resources; in two cities, the gap increased; and two varied without developing any trend. Our analysis of budgetary data corroborated our findings here: arson resources are on average increasing relative to combined fire and police department budgets. The mean fire/arson investigation budget to combined department budget ratios moved from 1:250 in 1977, to 1:260 in 1978, before closing with a decided drop to 1:209 in 1979. In other words, we have the encouraging sign that through this three-year period, fire/arson investigation resources have increased compared to combined fire and police department budgets.

3.3 ON-SCENE PRACTICES

On-scene investigative practices strive to achieve two objectives: first, to establish that the burning or attempted burning was of incendiary and malicious origin; and, second, to identify the person(s) with the exclusive opportunity to set the fire.

We will examine the manner in which study sites conducted their on-scene investigations to identify the key actions--how they are carried out, by whom, and with what success. While recent literature has rightfully emphasized the need for improvements in the forensics of evaluating fire scenes and collecting physical evidence, our findings point out that effective testimonial evidence collection and accurate, complete documentation are the skills most frequently utilized. Testimonial evidence and sound documentation are the two basic ingredients. Physical evidence, while sometimes essential, is not a prerequisite to successful prosecution.

On-scene investigative activities can be grouped into four categories:

- . Coordination and Control
- . Fire Scene Investigation, including physical, testimonial, and other evidence collection
- . Special Investigative Issues
- . Report Preparation

We will consider the significance of each of these activities in the sequence that they typically occur.

3.3.1 Coordination and Control

On-scene coordination and control refers here to the need to coordinate and communicate among the many resources that contribute to arson investigation. Bystanders, fire fighters, and police patrol officers are commonly on-scene prior to the investigator's arrival. Each group can contribute essential information; fire and police personnel also aid the investigation. As with physical evidence's chain of custody, there is a chain of information that links these different classes of information providers. One of the investigator's prime missions is to maintain this chain of information. Each time on-scene coordination is correctly performed, it not only links, but efficiently organizes, on-scene activities.

Coordination and control may not only affect the outcome of the case at hand, in aggregate they may tend to strengthen or weaken arson system performance.

This is so in part because the reputation that an investigative unit develops is built by feedback from the "grapevine" reports. Each set of actors--from fire officer to evidence technician--communicates to peers through one of these professional "party lines."

Investigators must do more than be aware of the multiplying effect the grapevines have on any perceived error in on-scene coordination. Like other professionals whose success depends on the more or less voluntary cooperation of others, investigators will need a reservoir of goodwill within each peer group with which they work on-scene to enjoy the maximum benefits of the team work. One investigator makes it a point to stop and pick up donuts and coffee for fire crews before reporting to a major fire. As you can imagine, he enjoys full cooperation from fire crews. Another makes a special point of making rounds to each fire station to chat about the investigative status of fires that shift responded to. Several investigators said that plain courtesy and consideration were all that they found they needed to turn around poor working relationships with fire fighters or police patrol personnel.

These means of promoting good relations are mentioned because there is a tendency to overlook the value of basic courtesies, and because the project team found, time and again, that relationships were strained between one or more groups of on-scene actors because these courtesies had been ignored. The subjective impression gained from the field observations is that the natural state of affairs is for relations to be strained between on-scene personnel groupings. The fact that their mission requirements are frequently at odds or cross-purposes sets the trigger. Ignoring basic courtesies is sufficient to trigger hostilities. When we encountered warm relations between groups on-scene (incidentally, by no means infrequent), inquiry revealed that great care had gone into cultivating the goodwill.

Beyond the general need to maintain good relations, arson investigators' responsibilities include:

- initially exchanging information with the fire officer-in-charge
- coordinating with police department resources
- obtaining consent from owner or occupant to search
- directing debris removal
- providing for scene security
- holding exit briefings with fire officer on findings and further requirements with reference to reporting, overhaul, and scene security.

To evaluate coordination and control practices in the study sites, we audited case documentation (and interviewed personnel involved as necessary and possible) for definite indicators of procedural errors, including:

- failure to request investigation in accordance with local S.O.P.'s
- failure of fire officers to determine cause and origin (if required)

- contamination of fire scene evidence (removal, handling, etc.)
- delayed notification of investigator by fire officer in charge
- allowing witnesses to leave scene prior to investigator's arrival
- premature overhauling of fire scene.

Overall, slightly more than 10% of the case records reviewed had control and coordination problems. As the accompanying table indicates, the most obvious weakness appears to be a failure of fire officers to comply with local S.O.P.'s in 6.4% of the incidents. The allied problem of fire officers failing to document a cause in their incident report was the next most frequent error, flawed 2% of the cases. The other four error sources combined occurred in 2% of the cases. Thus, it appears that incidents involving the contamination of fire scenes, premature overhaul, delayed notification of investigators, or allowing witnesses to leave the scene prematurely were relatively infrequent.

The five cities without complete procedural guides for fire scene coordination with investigators (Cities 24, 33, 44, 57, and 60) had an average of 17.6 errors per city, while those cities with adequate S.O.P.'s to guide fire suppression personnel had an average error rate of 3.25 per city.

We find this to be a significant relationship. We cannot say with certainty that the cause of the higher error rates is the effect of the lack of adequate S.O.P.'s. Other factors, such as lack of training or adequate reinforcement by management, might be intervening factors responsible for the error rate differentials. The connection between the lack of S.O.P.'s and error rates in on-scene coordination points to the need for fire departments to review and update their on-scene investigative S.O.P.'s. At the same time, departments could benefit from reviewing their training and quality control efforts to ascertain if those other program elements need bolstering. Problems in coordination with police patrol, detectives, or evidence technicians indicate a need for joint discussions regarding on-scene practices and policy.

City-Specific Findings

City 17:

City 17's call-out policy (as we have previously noted) resulted in the highest percentage of investigations of any city we studied. There may be an association between this factor and the fact that City 17 had only two observed errors in control and coordination.

The briefings that the fire officers gave the investigators--especially when the cause of the fire was a code violation--were noted as excellent. An inference can be drawn from this City's policies of: a) investigating every fire, and b) citing negligent fire code violators. First, fire officers know that fires will result in appropriate follow-up actions being taken. These two

Table 3.10

Procedural Errors in On Scene Coordination and Control

	17	24	33	44	57	60	70	87	Total
Fire Officer-in-Charge fails to request investigator in accord with S.O.P.	0 0.00 0.00	20 2.20 34.48	3 0.33 5.17	5 0.55 8.62	6 0.66 10.34	22 2.4 37.93	2 0.22 3.45	0 0.00 0.00	58 6.38
Fire Officer-in-Charge fails to determine cause	0 0.00 0.00	6 0.66 30.00	4 0.44 20.00	2 0.22 10.00	4 0.44 20.00	2 0.22 10.00	0 0.00 0.00	2 0.22 10.00	20 2.20
Fire Scene evidence contaminated by fire fighters	1 0.11 16.67	0 0.00 0.00	0 0.00 0.00	1 0.11 16.67	0 0.00 0.00	2 0.22 33.33	1 0.11 16.67	1 0.11 16.67	6 0.66
Fire Officer delays request for Investigator	0 0.00 0.00	0 0.00 0.00	6 0.66 75.00	0 0.00 0.00	1 0.11 12.50	0 0.00 0.00	1 0.11 12.50	0 0.00 0.00	8 0.88
Fire Officer permits premature overhaul of scene	1 0.11 12.50	0 0.00 0.00	2 0.22 25.00	1 0.11 12.50	1 0.11 12.50	0 0.00 0.00	2 0.22 25.00	1 0.11 12.50	8 0.88
Fire Officer allows witnesses/suspects to leave scene	0 0.00 0.00	0 0.00 0.00	1 0.11 25.00	0 0.00 0.00	1 0.11 25.00	1 0.11 25.00	0 0.00 0.00	1 0.11 25.00	4 0.44

Line 1 Frequency
 Line 2 Percentage of all cases
 Line 3 Row Percentage

factors, in combination, may tend to impress upon fire suppression officers that determining cause is truly a part of the department's primary mission. Accordingly, fire suppression officers may be more cause conscious and, therefore, more conscious of their role in gathering facts and preserving evidence.

Offsetting what we observed to be excellent cooperation between fire suppression personnel and fire investigators was the police arson detectives' practice of standing back from a case until there was solid evidence that arson had been committed. This might not have been a problem if either police patrol personnel were available to take testimony or fire investigators were thoroughly versed in interview technique and other police sciences. Lacking either, fire investigators complained that they were often faced with either exceeding their stated bounds of responsibility or allowing a case to prematurely fall through the inter-agency crack. In 1980, the development of a joint team was seen as a possible correction for the coordination problems experienced during 1977 through 1979.

Investigators in City 17 also complained that all too often Battalion Chiefs called them to the scene of a trivial fire that did not warrant their involvement or failed to relate evidence. The lack of sufficient training and basic reference materials (call/don't call check-off sheets) may have made it more difficult for Battalion Chiefs to determine when to call in investigators. These problems were seen by investigators and fire department management as resolvable "growing pains," not intractable problems.

City 24:

City 24's fire department arson investigators have sole responsibility for investigating arson-related crimes. City 24 conducted an ambitious training program for senior fire suppression officers to improve cause determination and on-scene coordination. Despite this program, City 24 recorded the second highest number of apparent errors for failing to request investigators. We found a total of 58 incidents among the eight cities in which fire officers failed to call for investigators. City 24 had 20 or 34.5% of these.

City 24 made excellent use of ladder companies to remove debris and assist investigators in examining the fire scene. We feel that the merits of this approach include building up a core of specialists who can make on-scene coordination easier. As ladder company personnel are often tasked with the responsibility for overhauling the fire scene, premature overhaul might be minimized under this arrangement. (While it may be only a fortuitous coincidence, City 24 was the only city without an observed premature overhaul.)

Ladder company assistance in debris removal will allow engine companies to return to operational readiness, while combining the ladder truck's responsibility for completing overhaul with providing assistance during cause determination. As ladder companies'

responsibilities for rescue, ventilation, and salvage are required in practice far less frequently than engine companies' extinguishment and allied services, utilizing truck companies in this fashion seems eminently practical for more communities to try.

For the same reason, primary fire cause determination might be assigned to ladder truck companies. This is especially true in large cities where ladder companies are usually more plentiful. With their special overhaul skills, availability, and the perception of many observers that ladder truck companies need to improve their productivity, these companies might prove well-suited to this role.

Another feature of note was the standing policy of the chief fire investigator to personally discuss, and attempt to resolve, any fire officer's misgivings about an investigator's fire cause determination.

Police patrol personnel supply traffic and crowd control at fire scenes, but have a passive role in on-scene investigations. The arson unit has its own photographers and fingerprint experts. Police evidence technicians and detectives play only a minor role in on-scene coordination.

City 33:

Like City 24, City 33's arson investigations are conducted exclusively by fire personnel. Coordination with police personnel is minimal. Only in cases involving other crimes, or those when police units are first to investigate, does on-scene coordination regularly take place. Perhaps in part due to this "go-it-alone" situation, friction between fire and police personnel became "front page feuds" in several instances. Fire investigators alleged that arson homicides were written off as accidental fires by police detectives who did not accept the validity of the interpretation of physical evidence offered by fire investigators. This unfortunate friction illustrates how inter-agency conflicts can grow to the point that they compromise case development. The failure of the two agencies to develop and abide by a written understanding of each agency's span of authority seemed symptomatic of the long-standing inability of fire and police senior staff to resolve their respective concerns.

Fire investigators reported that they encountered some difficulties in coordinating on-scene activities with fire suppression crews. Battalion chiefs in City 33 initially determine cause and have the discretionary authority to phone in their reports on minor fires. The chief investigator stated that, in his opinion, a small fraction of the fire incidents that he reviews has been "written off" as accidental when these incidents actually appear to be suspicious. The chief investigator speculated that investigator-delayed response due to the lack of 24-hour staffing weakened both call-out and on-scene coordination.

Overall, City 33 (with 16 errors) ranked 6th in the number of errors observed. This is somewhat above the mean of 13 errors for all eight sites. Experience in City 33 suggests that one of the foundations for improved on scene coordination is the expectation on the part of fire suppression personnel that investigator response will be reasonably rapid.

City 44:

During the period, City 44 employed a two-tiered fire investigation system. Fire prevention specialists, fire investigators, and police detectives rotated the on-call responsibility to respond to call-out requests. In roughly 20% of the cases reviewed, police investigators assisted or made the fire cause determination. Observed errors were below the mean, with only a total of 9 errors. Five of these errors came from fire officers failing to request an investigator as called for in local S.O.P.'s. Most of these ostensible errors were, in fact, in compliance with the informal practice in City 44 of not calling out investigators for fires in abandoned/condemned structures. Through observation, it appeared that relations were cordial between on-scene personnel, despite routine delays by investigative staff and evidence technicians.

City 57:

City 57, like City 44, used a combination of fire marshal's inspectors and assigned fire and police investigators to respond to requests for investigation. On-scene coordination was reported to have improved as arsonists began to be caught in the crackdown on arson that a joint task force initiated in 1976. On-scene cooperation appeared average in most respects. The cooperation shown by evidence technicians in responding to fire scenes appeared particularly commendable in light of high workloads. The involvement of the police department--through its assignment of a sergeant to the joint task force--may have been, in part, responsible for the excellent support provided by the evidence technicians.

City 60:

City 60 recorded the highest number of observed errors in fire scene coordination. This error rate was largely due to fire officers failing to call out investigators in accordance with local S.O.P.'s; 22 of the 27 errors, some 81%, fell into this category. Investigators offered no explanation for the apparent problem beyond noting that, in the event of trivial fires, fire officers were ill-disposed to calling out investigators and, thus, delayed their return to service.

In other respects, investigators praised the support that suppression personnel provided on-scene. They noted that the degree of willingness to cooperate depended greatly on the personalities involved and the circumstances. As one might expect, this observation was true to some degree in all the sites studied. As is true in most work relationships, policy and procedures influence, but do not dictate, the spirit of the cooperation received.

We found that City 60's procedure for conducting on-scene coordination to be typical for all sites. Normally, investigators report first to the officer-in-charge as a matter of courtesy and practicality. The senior officer will give the investigator a brief run-down on the salient elements of the fire's circumstances. The investigator will seek assistance directly from the fire crews for routine matters, for example, shoveling debris. If the investigator requires extraordinary assistance, he will request it through the senior officer-in-charge. (Of course, what constitutes ordinary assistance in one site might be extraordinary in another.) Once the investigator has completed his investigation, he will normally update the officer-in-charge on the cause and origin determination and turn the fire scene back over to that officer for overhaul to be completed and guards to be posted, if necessary.

During the 1977-1979 period, one of the two members of the fire investigation section was detailed from the police department. As in City 57, associating the police department through assigning police personnel to the fire investigation unit may have helped the unit receive better cooperation from the evidence collection technicians. Unlike City 57 where police personnel, evidence technicians, and fire investigators equally shared in evidence collection duties, fire investigators in City 60 were five times more likely to gather evidence than to call in evidence technicians.

City 70:

City 70's on-scene coordination benefits from the long history of an active fire investigation unit. Routine coordination between fire suppression and fire investigation personnel on-scene appears well-established, thus minimizing mistakes of inexperience. Overall, City 70 had the third lowest number of observed errors (less than half the mean rate) of the 8 sites studied.

The only difficulty of note is similar to one in City 17: police investigators may be reluctant to respond to fires to establish that a crime has occurred. The problem extends to police evidence technicians, who respond on request, but are to be called only when the crime of arson has already been established. (This policy serves to conserve strained resources and is appropriate for most types of crime.) Frequently, arson evidence has to be presumed to be evidence of a crime, and so treated, before the crime can definitely be established. This fact has to be taken into account, if detectives or evidence technicians are to play their full role. Rather than restricting their participation to established arsons, these personnel may prove necessary to establish the crime. On-scene coordination problems might be improved by police managers clarifying this situation in their procedures for field personnel.

City 87:

City 87's on-scene coordination benefits from the long tradition of an active fire investigation unit and well-written S.O.P.'s for fire suppression and fire investigation personnel. As a joint unit, with

a detective detailed to the unit and cars equipped with police frequency radios, the unit enjoys excellent working relations with police patrol personnel.

In City 87, police patrol units respond upon request, but are not routinely dispatched to the scene during the daylight hours. As one investigator pointed out, "a fairly large number of 'cold fires' is reported first to the Police Department." In these instances, the Police dispatch a car to the scene and notify the fire dispatchers.

Police S.O.P.'s call for patrol officers responding to fires to be observant; to take responsibility for traffic and crowd control; and, if possible, to establish a traffic cordon two to three blocks away from the fire. While the S.O.P. is entirely sufficient as far as it goes, it does not stress the importance of police patrol observations to successful clearances.

It may be that such emphasis is unwarranted. It could be argued, for instance, that patrol officers need not be told the obvious: that arson requires the same skills and attitude that detecting other suspicious acts and persons require. It may be that while arson needs to be treated no differently, it may require special emphasis because it is a "new crime"; one that differs in several important respects from the normal patrol fare of domestic disputes, street crimes, larceny, break-ins, and the like. Accordingly, police patrol officers may need to be sensitized to the potential importance in solving arson cases and discouraging this activity.

In addition to training, two other factors may also influence the success of police patrol involvement. One possible factor in patrol involvement in arson detection is determining which agency is in charge of investigation (fire, police, joint). A second, and perhaps more important, factor no matter what the agency involvement may be is how well the patrol force is utilized in arson detection and follow-up arson investigation. There may be a correlation between whether the patrol forces operate as a team member in the arson control system (perhaps assigned responsibility for minor arsons, neighborhood-level fire setting activities, auto theft-arsons, etc.) and how well the arson control system, as a whole, functions. One modern police science approach stresses the need to better utilize patrol forces to solve certain categories of crime.

While patrol units were used with considerable success in City 70, in City 87, their role is limited in the main to the identification of witnesses, traffic, and crowd control. One very important difference between the two cities is that in City 70, all arsons are investigated by the Police Department (with the Department calling on support from the patrol and delegating certain investigations to those units); and, in City 87, the Fire Department is responsible for arson investigation (with no direct chain of command access to use of patrol officers for follow-up investigation). The chief of City 87's arson unit, the detective assigned, and other investigators interviewed believe that the unit could be used for motor vehicle criminal burnings and minor arsons.

3.3.2 Fire Scene Investigation

Introduction

What are the weakest links in the investigative process? Does the downfall of most arson investigations lie in the initial investigative procedures employed on-scene? Or, are most of the fatal flaws committed during the follow-on investigation? And, if they lie in on-scene procedures, what are the procedures that appear most frequently to be fatally flawed? Are they, for example, the special technical skills or the fire forensics, as has been so frequently alleged? Or, is the critical weakness the failure to apply standard police investigative skills to arson crimes, once they are established?

To address these complex questions, the research team was first asked to describe and document the actual investigative procedures observed in the cities studied. The research was specifically, and we feel wisely, not intended to "focus on the development of procedures for conducting on-scene fire searches" (Bratt Memo, p. 2). Rather, this section will deal with:

- Organizational Profile
- Personnel Activity Levels
- Standard Procedure for Fire Scene Investigation
- On-Scene Procedural Errors

① Organizational Profile

Characteristics that appeared associated with different organizational profiles include:

Separate Fire and Police Investigative Involvement (Cities 17, 44, 70)

- fire and police investigators tend not to be cross-trained in their respective investigative fields
- relationships between fire and police arson investigative units tend to be strained by "turf" issues and mutual "finger-pointing"
- acquisition of testimonial evidence on-scene is initially gathered by fire investigators without the training or interrogative experience of their counterparts among police arson investigators. (The "Good guy" or less threatening image of fire department investigators is reported to compensate for lesser skills by increasing voluntary
- tendency for police investigators to be assigned part-time to arson investigation

- police patrol and other police support personnel tend to be more available for on-scene duties, back-up assistance, and follow-on investigation
- fire and police officers tend to retain their allegiance to their own agencies and pass through their assignment to arson investigation to other career fields
- each agency is in a better position to monitor its responsibilities.

Single Agency (City 24 and City 33)

- if fire department based, the unit tends to be out of the normal flow of information about police science developments
- if fire department based, may lack both the close scrutiny by, and full support of, senior management
- police assistance is more problematic, more subject to being withheld; for example, police patrol taking active role in on-scene investigation, complaint reporting, etc.
- unity of command should offer better control and coordination of resources
- all investigators tend to have full or special police powers. If fire department based, investigators tend to be locked into this career path.

Joint Agency (City 57, City 60, and City 87)

- personnel assigned to another agency's control may "go native," performance standards and practices tend to degrade due to lack of competent oversight
- difficult to maintain effective commitment from the agency with less control of unit, and difficult to equally share authority and administrative responsibilities. Requires commitment from the two agency heads involved in order to keep their involvement equitable and vital
- cross-training possibilities enhanced, but achievement requires a well-developed formal training program, including screening of personnel.

Personnel Activity Levels

Fire and Police Investigative Staffs.

We tracked the activity levels of fire investigators, police investigators (both detectives and patrol), and evidence technicians to ascertain who performs what functions with what frequency for all 909 cases in our retrospective sampling of fire incidents. Later in this section, we will look at inter-city comparisons of activity levels and clustering of on-scene activities.

We have classified on-scene activities into three primary and three secondary activities. We based this classification on frequency and demonstrated importance to case development. The major activities are:

- Fire scene search and crime confirmation - includes both external and internal searches to confirm the criminal nature of the act.
- Physical evidence collection - includes the identification, collection, labeling, storage, and transportation of items like debris, flammable liquid samples, fingerprints.
- Testimonial evidence collection - includes the collection of statements from firefighters, occupants, and bystanders at the scene; neighborhood canvasses; suspect statements; and confessions.

The three minor activities are:

- On-scene test and analysis of evidence - includes the use of catalytic vapor detectors, gas chromatographs, and like devices, that detect and/or measure the presence of flammables.
- Documentary evidence - includes collection of business, financial, and insurance records; criminal and prior fire setting involvement of possible suspects.
- Other evidence collection - refers to evidence not otherwise covered above, including stolen items.

In Table 3.11 below, we have measured comparative activity levels by counting case file references to the above activities by these three types of personnel (fire investigator, police investigator, and evidence technician). While somewhat brute-force and over-simplified in that it does not discriminate between quality of effort, duration, or sufficiency, this means of measuring work counts should give us a fair approximation of comparative activity levels. Bear in mind, too, that there is an inherent bias in this form of analysis in that the better the documentation standards, the less the undercounting.

TABLE 3.11

Cross-Tabulation of Type Evidence Collected
By Type Personnel For All Cases (N = 909)

Type Evidence Collected	Fire Investigator		Police Investigator		Evidence Technician		Total	Percentage of Total Number of Cases (N = 909)
	#	%	#	%	#	%		
Fire Cause	891	98.0%	61	7.0%	3	0.3%	955	105.0%
Testimonial	478	53.0%	164	18.0%	4	0.4%	646	71.0%
Physical Evidence	247	27.0%	68	8.0%	93	10.0%	408	45.0%
Physical Evidence On-Scene								
Test and Analysis	10	1.0%	4	0.4%	55	6.0%	69	7.6%
Documentary Evidence	45	5.0%	19	2.0%	2	0.2%	66	7.3%
Other Evidence	3	0.3%	2	0.2%	1	0.1%	6	0.7%
Total	1674	77.9%	318	14.8%	158	7.3%	2,150	100.00

3-33

Analysis reveals that fire investigators participate in 78% of all on-scene activities; arson detectives, 15%; and evidence technicians, a little over 7%. Another way to look at the data is that, with the exception of evidence technician's 79.9% share of on-scene physical evidence testing, fire investigators are responsible for the lion's share of all major activities on-scene. Police investigators log second place in each category of activity, with the exception of physical collection and on-scene test and analysis activity, where they place third.

Comparison of Activity Levels for Fire and Arson Investigations.

The following table summarizes and compares the frequency of on-scene activities performed by fire and police personnel for non-arson investigations, arson investigations, and the complete case sample.

TABLE 3.12
 Comparison of Fire and Police On-Scene Activities
 For Fire and Arson Investigation

	Subset of Sample Fire Investigations Only (N = 264)			Subset of Sample Arson Investigations (N = 645)			Whole Sample Both Fire and Arson Investigations (N = 909)		
	Fire	Police	Total	Fire	Police	Total	Fire	Police	Total
Fire/Crime Scene Analysis	260.0 98.5%	1.0 0.4%	261.0 98.9%	631.0 97.8%	60.0 9.2%	691.0 107	891.0 98.0%	61.0 6.6%	952.0 104.7%
Testimonial Evidence	41.0 15.5%	5.0 1.9%	46.0 17.4%	437.0 67.8%	159.0 24.7%	596.0 92.4%	478.0 52.6%	164.0 17.5%	642.0 70.6%
Physical Evidence Collection	5.0 1.8%	1.0 0.4%	6.0	242.0 37.5%	67.0 10.4%	309.0	247.0 27.2%	68.0 7.4%	315.0 34.6%
Documentary Evidence Collection	3.0 1.1%	-- --	3.0	42.0	19.0 2.9%	61.0	45.0 5.0%	19.0 2.1%	64.0 7.0%
On-Scene Test & Analysis of Physical Evidence	-- --	1.0 0.4%	1.0	10.0 1.5%	3.0 0.5%	13.0 0	10.0 1.1%	4.0 0.4%	14.0
Other Evidence Collection	1.0 0.4%	-- --	1.0 0.4%	2.0 0.3%	2.0 0.3%	4.0 0.6%	3.0 0.3%	2.0 0.2%	5.0
Total	310.0	8.0	318.0	1364.0	310.0	1674.0	1674.0	318.0	1992.0

3-35

In both arson and non-arson incidents, fire/crime scene analysis is the most frequent activity. This, and the fact that fire personnel perform these duties in almost all cases, is as expected. Now, however, we have a clearer picture of the extent of on-scene activities. In non-arson investigations, analysis of the scene constitutes 82% of all activities undertaken on-scene; whereas for arson investigations, it constitutes 41.3% or roughly only half this rate.

Physical evidence collection activities took place in 2.3% of the non-arson investigations, but in almost half of arson investigations. This may somewhat overstate the actual percentage of cases during which physical evidence collection took place. In some cases, both fire and police personnel may have participated in the evidence collection, the double counting inflates the figure. For the eight cities studied, fire personnel were almost four times more likely to gather evidence than police personnel. Physical evidence collection comprised some 1.8% of non-arson investigation activity and roughly ten times that level, 18.5%, of arson investigations. Among all on-scene activities, physical evidence collection had the third highest frequency.

After fire/crime scene analysis, testimonial evidence collection is the most frequent on scene activity for both fire and police investigators in non-arson and arson investigations, alike. From the sample, it appears that testimonial evidence is twice as likely to be collected as physical evidence.

As with physical evidence collection, fire investigators undertook this responsibility more frequently than police investigators. In two out of three arson investigations and three out of four of all incidents reviewed, fire investigators performed this function.

The statistic that 92.4% of the arson incidents have testimonial evidence collected probably overstates the real percentage. Once again, the fact that both fire investigators and police investigators may take part in the same investigation makes this figure somewhat optimistic. On the other hand, the apparent tendency for investigators not to completely document their activities may mean that the under-reporting of activities in the case records tends to counterbalance the overcounting. The fact that roughly one-third of the documented fire investigator actions consist of gathering testimonial evidence points to the importance of competency in this task. The data suggests that this aspect of the investigator's role should receive the emphasis, similar to that which physical evidence identification and interpretation have recently been accorded nationally.

The remaining three activity sets play minor roles in on-scene operations. Taken together, on-scene test and analysis, documentary evidence collection, and the collection of other evidence make up less than 5% of all investigative activity. Documentary evidence collection makes up 3.6% of this activity. As with the other activities, fire investigators are principally responsible for carrying out these tasks on-scene. The fact that there are relatively few instances of documentary evidence should not be taken as a reflection on the thoroughness of the investigators, as much as it is a reflection of the paucity of this form of evidence being found on-scene that are germane to the run-of-the-mill arson investigation.

The frequent assertion that, prior to 1980, the use of on-scene test and analysis equipment was generally infrequent is borne out in the finding that in less than 1% of the arson investigations, the use of test equipment was reported in the written documentation.

Standard Procedures for Fire Scene

The term "standard procedures" can refer to either the written guidelines or the typical practices observed. We will consider both of these meanings in regard to arson investigation on-scene.

We were surprised to find that only three arson investigative units had up-to-date standard operating procedures. In a bureaucratic structure, the need for S.O.P.'s cannot be seriously questioned. It is the nature of bureaucracies to order and document their procedures. Fire and police departments are, in general, no exception. Without such official guidance, management would be vulnerable to attack for incompetency. Without S.O.P.'s, management lacks the basis on which to guide standards of performance. For these reasons, most metropolitan police departments have operational procedures that run for hundreds, if not thousands, of pages. Although S.O.P.'s do not guarantee performance, they do set forth basic expectations and standards of performance. Moreover, developing an S.O.P. tends to force its developers to fashion more orderly and soundly-conceived procedures.

In our experience, fire departments do not tend to document their procedures as extensively or as thoroughly as police departments. In police work, legal requirements, alone, make a detailed rulebook an unavoidable element. By comparison, few fire departments have developed comprehensive procedural guides, although most have developed an operations manual that sets forth basic rules of conduct and operations. Moreover, fire fighters are drilled to follow standard practices. These basic practices are called "evolutions" in the fire service. For the tactical aspects of fire fighting, it could be said that these evolutions serve as the equivalent of an S.O.P.

In the field of fire and arson investigation, the fire service neither has the advantage of a set of standard evolutions or the experience that the police service has in developing S.O.P.'s. Thus, when a fire department assumes responsibility for conducting or assisting at arson crime scene investigations, the need to develop or adopt formal Standard Operating Procedures may not be recognized as a critical priority by the fire department's management. The fact that police investigation management practices are far removed from most fire department managers' professional development may be one reason fire chiefs are slow to spot or rectify the inherent weakness of an investigative unit operating without written guidelines.

Other factors may also play a role in the lack of investigative SOP's. One investigative unit manager questioned the practicality of such an S.O.P. to adequately cover investigative procedures. His argument was that each investigation must be treated as unique. True, without considerable thought, an S.O.P. tends to be either too general (and thus fails to deal with important exceptions) or it becomes too detailed and

awkward to use and maintain. Either path can cut down on an S.O.P.'s use. Rather than being used as an important reference, it then becomes a dead letter. Other investigative unit supervisors frankly acknowledged the need to develop or drastically improve their S.O.P., but either could not find the time to work on it or lacked the capability to do so.

Whatever the source(s) of the failure to develop and maintain adequate investigative S.O.P.'s, such failures appear to be a telltale breakdown in the administration of an important social and legal responsibility. To effectively guide the investigative process, each agency with a stake in the process should have an S.O.P. governing its responsibilities. Moreover, each S.O.P. should mesh with that of the other agencies involved.

The process of working out investigative relations through inter-agency consultation might uncover command, control, and communication problems. One example of how essential inter-agency coordination of procedures can prove to be was the situation in one city where juvenile offenders were being released at intake merely because the investigators were not sending over enough copies of the offense report. If the fire department had written up its policies based on police S.O.P.'s or consulted with the juvenile authorities, many juvenile offenders might have received closer judicial scrutiny. The fact that the adjudication depended on such a flimsy procedural point illustrates the danger of informal practices determining critical decision points.

We found that only three of the eight fire departments had more than rudimentary S.O.P.'s for on-scene investigation by either fire suppression or fire investigators. Only two of the four police units primarily involved in arson investigation had adequate S.O.P.'s concerning arson scene procedures.

Standard operating procedures, particularly in fire investigative units, suffered from three basic limitations. These limitations might be dubbed the three missing "C's" of arson unit S.O.P.'s: Consistency, Completeness, and Currency.

The first missing "C", consistency, indicates that S.O.P.'s should, as far as practical, be consistent with other procedures internal and external to the organization. More than 10 separate S.O.P.'s may require coordination to prevent mis-coordination. Agencies with more than one type of personnel may have several standard operating procedures to orchestrate. Types of personnel that would be governed by S.O.P.'s include fire combat personnel and their supervisors, fire investigators, police patrol personnel, arson investigators (if different from fire investigators), and special personnel (examples include prosecutors, coroners, physical evidence technicians, and dispatchers). As fire scene investigation activities can differ in significant ways from each of the above-mentioned personnel's regular activities, special provisions may be necessary to aid each type of personnel in coordinating with others to meet any unusual circumstances presented by on-scene fire investigation.

Completeness is the second missing "C". Among the procedures that need to be considered for S.O.P. coverage are:

- . call-out procedures
- . standards for coordinating with fire suppression, police patrol, and evidence technicians
- . standards and requirements for on-scene investigation, including exterior and interior search standards and requirements and special practices for vehicles and other non-structural properties
- . interview procedures
- . evidence collection techniques
- . evidence preservation, handling, testing, and custody
- . juvenile processing for both children below and juveniles above the age of intent
- . mental subject handling
- . documentation standards, including report writing and requirements for photographing, scene diagramming, fire reporting
- . search and seizure
- . subpoena powers (if any)
- . arrest procedures
- . scene security
- . multiple crime scene responsibilities and other special circumstances
- . involvement of special resources: District Attorney, ATF, FBI, special local or state task forces, etc.

Because procedures need to be updated to remain valid, currency is the third missing "C". The unit should review procedures at least annually. Of the three fire investigative units with S.O.P.'s, the two most current dated from 1978.

As a starting point, fire department investigative units might review police department S.O.P.'s. These could serve as a framework for review and as a basis for arson unit-specific S.O.P.'s. Although some might feel that this point is so obvious that it need not be made, several fire department investigative units had little or no written procedural guidelines, while the police department guidelines in these communities would

have served them well with few changes. Even in several of the joint units, no apparent effort was made to adapt or adopt police department procedures. Asking all personnel to participate in the S.O.P.'s development and review by police administrators and prosecutors should be considered.

W On-Scene Procedural Errors

To assess the extent of weaknesses in various aspects of on-scene investigative practices, the following error codes were drawn up and their observed frequency noted.

- a. Cause and origin flawed by inconsistencies in statements of fact and reported conclusions
- b. Cause and origin investigation not followed up by further investigation.
- c. Request for arson investigation mishandled -- No investigation.
- d. Inability to determine cause and origin
- e. Failure to establish the crime of arson -- No follow-up investigation
- f. Control of fire scene lost
- g. Investigation not performed as S.O.P. required

This assessment of weaknesses in on-scene procedures is drawn from our analysis of the retrospective audit of cases. Judgments are inferred from the facts as they are presented in the reports and as represented during follow-up interviews. If the reported facts of the case did not add up to the conclusions reached, say, in cause determination, and, indeed, stood in apparent contradiction to one or more of the conclusions, we recorded a Type (a.) (see above). We attempted to resolve by follow-up interviews that the error occurred as a result of the investigation, rather than as the result of documentation. Our ability to pinpoint the source of the error was often not successful; the attempt to interview did not always resolve ambiguities. Hence, we can say that an apparent error occurred, but not with certainty whether it was an error of less than competent investigation or an error of less than thorough reporting efforts.

Our position in this might be likened to that of an assistant district attorney reviewing the case without benefit of an oral presentation, relying on the case documentation to logically lay out the facts against an accused arsonist. The assistant district attorney may fail to recognize the weakness, spot the flaw and attempt to get the inconsistency cleared up, or, based on the material, decide to proceed or decline to prosecute. Thus, we focused on the apparent flaws in a case's development that would stand out as "red flags" to an arson unit manager or prosecutor.

- a. Cause and origin flawed (by inconsistencies in statements of fact and reported conclusions).

Flaws in on-scene cause determination were the most frequent error factor, being observed 138, or in 15.2% of the sample. The error rate for this flaw ranged from a low of 8 to a high of 30, with a mean of 17 errors per site. No pattern was discerned among the errors scored by the various sites. Smaller cities tended to experience fewer errors than larger cities, although City 24, the largest city among the sites, had a relatively low error rate of 10. Although frequent, errors of this type did not routinely thwart further case development. Many of these cases with adjudged flaws moved through to prosecution and even conviction unimpeded by this defect. This should not be interpreted as indicating that such flaws are trivial. What this may mean is that errors have not as yet been seized upon by defense counsels. However, defense counsels may sometime in the future have a field day when they are able to expose the inconsistencies in an investigator's report. Fortunately, many of these flaws result from a failure to document findings logically and completely. This is believed to be a tractable problem as discussed in greater detail later in this section.

- b. Cause and origin investigation not followed up by further investigation

The second greatest source of perceived errors is the instance of case development jeopardized by coordination failures between fire and arson investigators, on the one hand, and between initial investigators and those subsequently reassigned the case, on the other. This defect looms as a major and consistent, across-the-board problem. Explanatory factors for this defect include communication breakdowns, case assignment and management weaknesses, scheduling and shift problems, case overload, and failure to close out investigation by adequate documentation. Error rates ranged from 5 in City 60 to 38 in City 17.

- c. Request for arson investigation mishandled - no investigation

This deficiency is distinguished from (b.) above by the apparent lack of any response whatsoever.

As Table 3.13 (Cross-Tabulation of On-Scene Procedural Weaknesses by City) reveals, the combined total of mishandled requests for investigations and failure to follow-up initial investigations affected 166 cases within the sample of 909, or some 19.2%.

Table 3.14 (On-Scene Procedural Error Rates for Cities Grouped by Organizational Profiles) shows the average number of errors recorded by city and type of organizational profile (Joint, Two-Tier, and Single Agency). As one would expect, two-tier agency profiles averaged a higher number of errors in tasks requiring coordination between investigative units than either single agencies or joint team systems. Can we then say that the two-tier agency approach has an inherent weakness in interagency coordination? The sample represented here is too small to more than suggest this as a likelihood. Empirical observation reinforces this

TABLE 3.13

Cross-Tabulation of On-Scene
Procedural Weaknesses By City

	City								Total
	17	24	33	44	57	60	70	87	
Cause & Origin Flawed	30 3.30 21.74	10 1.10 7.25	30 3.30 21.74	14 1.54 10.14	5 0.55 3.62	8 0.88 5.80	22 2.42 15.94	19 2.09 13.77	138 15.18
Cause & Origin Investigation Not Followed Up By Further Investigation	38 4.18 31.40	16 1.76 13.22	11 1.21 9.09	16 1.76 13.22	10 1.10 8.26	5 0.55 4.13	12 1.32 9.92	13 1.43 10.74	121 13.31
Request For Arson Investigator Mishandled - no investigation	1 0.11 2.22	0 0.00 0.00	12 1.32 26.67	13 1.43 28.89	8 0.88 17.78	3 0.33 6.67	5 0.55 11.11	3 0.33 6.67	45 4.95
Unable to Determine Cause and Origin	9 0.99 8.41	4 0.44 3.42	0 0.00 0.00	2 0.22 1.89	1 0.11 0.88	0 0.00 0.00	13 1.43 10.74	15 1.65 12.82	44 4.84
Failure To Establish the Crime of Arson; No Follow-Up	2 0.22 22.22	0 0.00 0.00	0 0.00 0.00	5 0.55 55.56	0 0.00 0.00	0 0.00 0.00	2 0.22 22.22	0 0.00 0.00	9 0.99
Control of Fire Scene Lost	2 0.22 40.00	1 0.11 20.00	1 0.11 20.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 0.11 20.00	0 0.00 0.00	5 0.55
Investigation Not Performed as S.O.P. required	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 0.22 66.67	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 0.11 33.33	3 0.33

TABLE 3.14

On-Scene Procedural Error Rate for Cities Grouped
By Organizational Profile

Single Agency	Overall On-Scene	Failure to Follow Up Cause and Origin
City 24	17	16
City 33	24	11
Total	41 (avg. 20.5)	27 (avg. 13.5)

Joint Team	Overall On-Scene	Failure to Follow Up Cause and Origin
City 57	18	10
City 60	8	5
City 87	17	13
Total	43 (avg. 14)	28 (avg. 9.9)

Two-Tier Agency	Overall On Scene	Failure to Follow Up Cause and Origin
City 17	43	38
City 44	36	16
City 70	20	12
Total	99 (avg. 33)	66 (avg. 22)

interpretation. Confirmation, however, awaits a larger sample of cities, a more robust set of controls, and multiple regression analyses.

The data raises a related question: Why should single agency units have on average more (20.5) coordination errors than joint teams (14.0)? For, if the argument that a "seamless" system should offer the strongest proof against coordination errors is valid, then single agency units should on average yield fewer errors. A number of factors may explain the anomaly, including:

- small sample distortions
- City 24 and 33 are large cities where investigator response is typically delayed
- as part of arson operations overhaul, cities with joint units tend to have increased training and involvement of field personnel in arson investigation.

For the reasons mentioned earlier, it is not possible to wholly resolve the questions raised; however, we do feel that they merit deeper analysis. At issue are important questions of the relationship between error rates and organizational profiles. The attention focused on these issues should not obscure the understanding that each system profile has its pros and cons; and, as we see from the data, both strong and weak performers among each type of profile. This suggests that each type of profile can be made to work, and to work more satisfactorily, if problem areas associated with each type receive careful scrutiny and remedial action.

d. Inability to determine cause and origin

This error was observed in 4.8% of the entire sample of cases. Two cities, 33 and 60, had no errors observed, while City 44 and 57 had two and one errors, respectively. (These cities are the four smaller cities in the study.) The data suggest a correlation between city size and this type of error. Observe that the four largest cities in the sample also recorded notably higher incident rates for this error (City 17: 9 errors, City 24: 4, City 70: 13, City 87: 15). Together, these four cities registered two-thirds of the errors. Potential explanations for this error concentration among the larger cities include: the workload demands in larger cities forced investigations to be closed before a cause could be determined; increased need for command support for definitive cause determination and greater selectivity in cases investigated in smaller communities may have freed personnel to give more time to difficult cause determinations.

e. Failure to establish the crime of arson -- no follow-up

Overall, the number of cases lost in limbo between a suspicious fire (the responsibility of the fire unit) and an established crime of arson (the takeover point for some police arson units) was few. Less than 1% of all cases fell through this crack. Only Cities 17, 44, and 70, with two-tier agency profiles, were found to have this error source.

f. Control of Fire Scene Lost

The identification of premature loss of crime scene control was based on statements to this effect in the record or in follow-up interviews. Actual occurrences may, in fact, be higher than this reported figure, but are either not recognized or explicitly reported (for very understandable reasons, some investigators might only note such occurrences in their informal notes, rather than weakening a case by formally documenting their concerns). Three types of fires--vegetative, vehicular, and abandoned structure--were said by investigators to be the most susceptible to this difficulty.

g. Investigation not performed as S.O.P. required

Only instances of self-evident and serious breaches of fundamental standards of practice earned this error code. In City 44, an experienced investigator was reassigned after repeated failures to exercise even minimum performance standards, such as in the two instances noted here in which he failed to investigate. Overall, this problem appeared to be a minor one.

Physical Evidence Collection

Why is arson so hard to detect, investigate, and prosecute? One of the most familiar assertions is that shortcomings in physical evidence collection and testing detract significantly from each stage of the process. For years, the voices have been crying in the wilderness for greater expertise and more advanced equipment for identifying, interpreting, preserving, and testing physical evidence. In response, a number of federal initiatives have been undertaken. Advances in equipment and techniques have occurred, and, what is more, they have reached the average arson unit. Today, a much improved array of technical tools and procedures exists, such as:

- Excellent basic and advanced evidence collection training
- Recommended basic equipment and standard hand tool lists
- Clear evidence packaging and preservation guidelines and materials
- Standard procedures for gathering various types of evidence
- Special equipment, e.g., portable gas chromatographs
- Improved lab procedures and processes.

These technical improvements are now within the grasp of any city willing to allocate the resources. However, beyond these technical improvements, cities that are earnest about improving their evidence collection capability must take into account organizational and human factors. Evidence collection skills can be taught and equipment bought, but more is required, including:

- allocation of sufficient personnel slots to give investigators time to "work" the scene to develop the physical evidence present
- provision of needed equipment, budgeting for adequate training and other resources
- selection of personnel with the innate talent to use the training
- development of experience among investigators sufficient to employ skills to the best advantage
- enhancement of investigator motivation by down-from-the-top recognition, positive and negative reinforcements based on performance, clear statement of expectations
- management of arson investigations to improve case and work loads, performance, and outcomes.

The collection and testing of physical evidence serves two chief purposes. First, physical evidence can establish the facts of the fire's cause. Second, physical evidence can point to the identity of the person responsible.

The most immediate impact that physical evidence collection has is that its presence acts as a powerful incentive to continue to investigate (canvass neighborhood, track down eyewitnesses, etc.). The long-term physical evidence can go on to influence:

Case managers -- to continue the investigation
Magistrates -- to issue search and arrest warrants
Suspects -- to confess
Prosecutor -- to charge
Defense Counsel -- to plea bargain
Judge and/or jury -- to convict and sentence.

Experts in the field of arson investigation contend that limitations in physical evidence collection are responsible for the ostensibly low clearance and conviction rates. They have postulated that physical evidence collection, its storage and testing, is a significant, if not the most significant, drawback to better investigative outcomes. The argument is that with better physical evidence, more cases would be identified as arson, more cases would be pursued longer and with greater diligence, and more arsonists would be arrested and successfully prosecuted. Although this contention is valid in principle, it is worth cautious consideration before estimating the impact of improved evidence collection on clearance and conviction rates. True, investigators fail to correctly identify evidence and to properly collect, label, maintain custody, preserve, and request analysis of the evidence gathered. True, these flaws in evidence collection have stymied some investigations. True, in the most sophisticated arsons, establishing the fact that a crime occurred is the "sine qua non" without which the possibility of developing a winning prosecution is near nil. But, what must be borne in mind are these realities:

- arson cases are rarely solved on the basis of physical evidence
- a high percentage of arsons has no physical evidence that requires sophisticated collection or testing requirements. (For example, fires started by an open flame igniting a paper product may leave little in the way of collectable or testable debris.)
- In cases where physical evidence of accelerants or similar materials takes place, it is likely that these advanced procedures support basic physical evidence "reading" (such as, burn patterns) and "figuring" (such as, the elimination of accidental cause possibilities).

- the mere fact that evidence is collected may be sufficient to cause arson investigators to decide to pursue follow-on investigations. Results of the evidence testing may not be available until long after the active investigation is over. In other words, the case is often pursued due to evidence collection, not results.
- only a small fraction of the case files shows defense attorneys even questioning the physical evidence or the investigator's findings of arson.

What this means is that despite these improvements, only a few of the improvements will likely translate into improved clearance or conviction rates. The effect of better physical evidence collection is likely to be attenuated by these realities. The disappointing reality is that physical evidence can play a significant role in all phases of arson control, but, by itself, is like a corkscrew waiting for a bottle of wine, useful chiefly as a tool to open (get at), but not finish (dispose of) the enterprise.

Section Outline.

To assess physical evidence collection practices in the eight sites, we will begin by describing the general features and overall results and then consider each city with reference to the following points:

Type Organization: organizational profile

Type Personnel Involved: activity levels of fire and police staff

Standard Procedures: practices, documentation

Type Evidence Recovered: tabulations of 10 common forms of evidence

Type Equipment Used: use of basic and advanced tools

Type Results Obtained: laboratory test findings

Evidence Utilization: ultimate contribution of evidence

Source and Frequency of Observed Errors: procedural flaws,

Assessment based on the available case records and interviews.

We will then take up consideration of the legal issues involved in handling, logging, and disposition of evidence and search and seizure considerations. Findings and conclusions will complete this section.

Type of Organization

Recall that the organizational profiles can be broadly characterized as single-agency, two-tier, or joint-agency responsibility. Of the eight

cities, two were single agency; three had responsibility split between fire and police; and three were joint fire-police investigative units. The table below contrasts the organizational profiles to the degree of physical evidence gathering activity and the number of items of evidence recovered as documented in the case records. An average for each characteristic is computed for each type of profile.

Type Profile	City:	# Actions	# Items of Evidence
Single Agency:	24	65	20
	<u>33</u>	<u>52</u>	<u>36</u>
	Sub-Total	117	56
	Average	58	28
Two-Tier:	17	58	23
	44	20	13
	<u>70</u>	<u>49</u>	<u>24</u>
	Sub-Total	127	70
Average	42	23	
Joint:	57	47	43
	60	43	21
	87	<u>74</u>	<u>20</u>
	Sub-Total	164	84
Average	54	28	
	Total	408	210
	O/A Average	51	28

Overall, the single-agency profile appears to be slightly more active in terms of evidence collection. Joint units appear to have been slightly less active, but collected on average the same number of items of evidence. Two-tier units appeared to be the least active and collected on average the least number of items of evidence.

The results here are interesting, but far from definitive - the sample is too small and non-random. If a larger, random sample of sites could be surveyed, it would possibly reinforce the impression that our observation leaves that the chief weakness of a two-tier system is the tendency for delays and problems in coordination and follow-through, resulting in fewer items of evidence being recognized and collected.

Type of Personnel Involved

In the 909 cases of the overall sample, fire and police personnel took part in 408 physical evidence collection activities. (Note: Due to the fact that two or more different types of personnel may have taken part in on-scene collection activities at a single incident and the fact that, in many instances, no evidence was recovered, there are roughly twice as many counts of activity [408] as there are evidentiary materials recovered [200].)

Fire investigators were 3.6 times more likely to take part in collecting evidence than police arson investigators. Bear in mind that there is a selection bias in the eight sites chosen. A different set of cities would no doubt provide a different ratio. Despite this bias, it is likely that fire department investigators would collect more physical evidence than police investigators in a representative random sampling of like-cities. The rationale for this assertion is that they have greater involvement in, and experience with, fire scene evaluations.

TABLE 3.15

On-Scene Physical Evidence Collection and Analysis Activities
by City and Type Personnel Involved

On-Scene Physical Evidence Collection	City								Total	Per cent
	17	24	33	44	57	60	70	87		
Fire Investigator	19	60	50	7	14	27	1	69	247	60.0
Police Arson Investigator	20	2	2	8	16	11	5	4	68	16.8
Evidence Technician	19	3	0	5	17	5	43	1	93	22.4
Total Physical Evidence Collection Activity	58	65	52	20	47	43	49	74	408	
On-Scene Physical Evidence Test & Analysis	City								Total	
	17	24	33	44	57	60	70	87		
FD Investigator	2	3	1	2		1		1	10	
PD Investigator	2	1							3	
Evidence Technician	7	1	12	2	15	5		6	55	
Total On-Scene Physical Evidence Test and Analysis	11	5	13	4	15	6	7	7	68	

3-51

In reviewing the table above, bear in mind the following artifact sources:
 . failure to fully document activities undertaken . each city's mix of cases is different
 . data recording and data entry artifacts
 Note that the cities with active police investigative involvement received far greater on-scene support from evidence technicians (City 17, 57, 70) than fire department-staffed units (City 24 and 33).

Fire department investigators were clearly the most active in attempting to recover physical evidence in four cities (24, 33, 60, and 87). In three cities (17, 44, and 57), there was a rough balance between fire and police investigators and evidence technicians in their evidence collection contributions. In marked contrast, City 70 relied almost exclusively on evidence technicians to collect evidence. As the table below illustrates, there appears to be a strong correlation between the relatively high frequency of evidence collection activity and fire department investigators playing a predominant role in evidence collection. However this activity does not necessarily result in proportionally more evidence discoveries:

<u>Strong Fire Department Involvement</u>	<u>Activity Ranking</u>	<u># of Items of Evidence</u>	
City 87	1	16	.8
City 24	2	20	.9
City 33	4	36	.7
City 60	7	21	.9
<u>Strong Evidence Technician</u>			
City 70	5	24	.4
<u>Balanced Involvement by Fire and Police</u>			
City 17	3	23	.6
City 57	6	43	.8
City 44	8	13	.3

Standard Procedures

City-specific details will be discussed below. The general impression gained from all eight sites is that knowing proper procedures is no longer the barrier that it had been in the past. But, knowledge and practice are two separate realities no less here than in other human endeavor; for instance, the difference between knowing and practicing the Ten Commandments.

A collection practice that might improve success is daylight revisits of night fire scenes.

Preservation practices were observed to be in general conformance with national standards. However, the ideal of unused, non-coated paint cans for collection of flammable liquid debris was more often than not supplanted in practice by used coffee cans. (This rough and ready

alternative should be adequate when coupled with inner-sealing and timely processing.) It is encouraging to note that the critical requirement that volatile evidence be preserved in a sealed, uncontaminated container has become the accepted practice among these sites.

On the whole, storage practices in fire department-operated units were marginal to inadequate in terms of records maintenance, storage procedures, and custody safeguards. While this has not been, as far as we could detect, a factor in case development, it is indicative of less than desirable standards. If needed, assistance could be sought from a law enforcement agency (or written guidelines sought from a law enforcement national anti-arson organization) to properly establish and administer an evidence control unit. Regular courtesy inspections from a sister arson or law enforcement unit might also prove useful in maintaining good storage practices. It should be pointed out that chain-of-evidence custody was not identified by the records or in interviews as having compromised any case's development or outcome. While the potential exists, it does not appear to presently constitute a significant problem.

As a matter of preference, evidence for testing was hand-delivered by an investigator whenever possible. Depending on the proximity of the first-choice laboratory and the evidence in question investigators either hand-carried or mailed evidence for testing. Both hand-carrying and registered mailing of evidence for testing have their advantages and drawbacks. Investigators who regularly hand-carried evidence (some first-choice labs were up to a day's drive away) pointed out that this method gave the investigator the opportunity to go over the evidence and the tests to be conducted with the laboratory technician in person. Other pluses were that this practice built better rapport, got faster turn-around time, enhanced effort from the laboratory technicians, and minimized custody and communication problems. Managers have to balance these advantages against the time lost from investigation. Both alternatives have their place and perhaps work best in a judicious combination when non-local labs must be used.

Type of Evidence Recovered

Table 3.16 Type of Evidence Collected by Frequency

<u>Type Evidence Collected</u>	<u>Frequency</u>	<u>%</u>
Flammable Liquid Container	50	25.0
Debris w/ Hydrocarbon	46	23.0
Miscellaneous Other	40	20.0
Flammable Liquid Sample	23	12.5
Fire Bomb Components	14	7.0
Match/Lighter/Hand-held	12	6.0
Latent Fingerprints	11	5.5
Explosive Device	5	2.5
Electrical Appliance	1	.5
Electrical Cord	1	.5
Total	200	100 %

Our retrospective audit of case files indicates that arson investigations are 10 times more likely to obtain flammable liquid materials than latent fingerprints. This ratio suggests that evidence pointing to cause is far more likely than evidence pointing to the perpetrator. The fact that the single most frequent type of evidence recovered is flammable liquid containers underscores the promise of the new technique developed to wash smoke and soot from containers to reveal fingerprints. If this technique proves its promise, investigators will have a double-barreled weapon for bagging the corpus of the crime and the criminal (or to link the criminal to the corpus of the crime).

TABLE 3-17

Cross-Tabulation of Evidence Collected
by Type and City

Type 1	City								Total
	17	24	33	44	57	60	70	87	
Other	3	6	5	1	10	7	3	5	40
Flammable liquid sample	3	1	1	4	6	2	5	1	23
Flammable liquid container	3	7	16	2	5	4	7	6	50
Bomb	1	3	1	1	2	1	1	1	11
Electrical wiring	1	0	0	0	0	0	0	0	1
Match/lighter hand held flame device	2	3	1	0	0	2	2	3	13
Firearms lighter	4	1	1	1	3	0	0	0	10
Electrical Appliance	1	0	0	0	0	0	0	0	1
Bomb component	2	0	1	0	0	0	2	0	5
Debris w/hydro-carbon residues	3	0	10	3	17	5	4	4	46

3-55

FREQUENCY
PERCENTAGE
ROW PCT
COL PCT

Type of Results Obtained

Physical Evidence Analysis Results for the Presence of Flammable Liquids.

We analyzed the physical evidence test results from the 200 cases with flammable liquid samples taken during on-scene investigation. In 42 instances, no testing was required or otherwise did not apply. In 75 instances, or 37.5% of the sample, the tests were either never performed or never reported, or not retained in the files. Thus, from the original population of 200 items, firm outcome information was obtainable in only 82 cases. Of the known test results, 63% were positive and 37% negative.

These results indicate room for improvement in the maintenance of complete records on physical evidence test requests and results. Some explanations for the lack of results maintained in the files are: evidence samples submitted, but not tested until and unless an arrest was made; test reports forwarded to prosecutor's office; telephonic reports; or tests results learned in person.

We also analyzed the physical evidence results and case file information to learn the validity and usefulness of the physical evidence test results. Table 3.18 below gives exact data on the efficiency of the collected physical evidence, but the results can be summarized as follows:

Out of every 10 investigations with known positive test results, the physical evidence in 4 cases will aid the development of cause and origin, 2 cases will assist follow-up, 2 cases will promote prosecution, 1 case evidence will be compromised, and 1 case will not materially aid case development.

TABLE 3-18

Utility of Physical Evidence in Case Development

Utility	Total for all Outcomes (n=200)		Subtotal of known utility (n=109)
	#	%	% of unknow utilization
Compromised	9	4.5	8.3
Aided Cause and Origin	47	23.5	43.0
Follow-On Investigation	22	11.0	20.2
Aided Prosecution	18	9.0	16.5
Did Not Aid Case Development	9	4.5	8.3
Not Applicable	4	2.0	3.6
Unknown	91	45.5	
	200	100%	100

Evidence Utilization

Physical evidence collection deficiencies assessed by city for all cases in sample.

Insufficient physical evidence collection during on-scene investigations could be inferred in 83 of the 909 cases or some 9% of all fire scenes reviewed. This was the third highest overall deficiency observed for the on-scene phase of the arson control process. The number of deficiencies ranged from 4 to 37. The remedies for failing to collect evidence samples when they are reported in the documentation boils down to better training and supervision. City 17 experienced some 45% of the failures observed in this regard. The antecedant conditions of poor motivation and ineffective supervision were evident in this community.

Three other deficiencies--insufficient physical evidence gathered by arson investigators during follow-up activity, failure to employ available analysis equipment, and physical evidence contamination--collectively affected another 5.4% of the cases, as can be seen from the accompanying table (3-19). The fact that investigators mentioned in their reports only 11 instances of physical evidence contamination (chiefly by fire fighters), we take as a heartening harbinger.

TABLE 3.19

Physical Evidence Collection Flaws Cross-Tabulated
by City for All Cases in Sample

Frequency Percentage Row PCT	17	24	33	44	57	60	70	76	Total
Insufficient Physical Evidence Collected by Fire Investigator	37 4.07 44.58	7 0.77 8.43	7 0.77 8.43	4 0.44 4.82	4 0.44 4.82	4 0.44 4.82	13 1.43 15.66	7 0.77 8.43	83 9.13
Insufficient Physical Evidence Gathered	2 0.22 7.69	7 0.77 26.92	1 0.11 3.85	5 0.55 19.23	1 0.11 3.85	7 0.77 26.92	1 0.11 3.85	2 0.22 7.69	26 2.86
Analysis Equip- ment Not Used	2 0.22 15.38	1 0.11 7.69	1 0.11 7.69	1 0.11 7.69	3 0.33 23.08	0 0.00	0 0.00	5 1.43 38.46	13
Physical Evidence Contaminated	1 0.11 9.09	1 0.11 9.09	2 0.22 18.18	2 0.22 18.18	0 0.00	1 0.11 9.09	1 0.11 9.09	3 0.33 27.27	11 1.21
Total Error Rate Observed	42	16	11	12	8	12	15	17	133

3-58

In summary, we can say that definite improvements have taken place in on-scene physical evidence collection procedures. Nevertheless, the error rates that remained could be further reduced by stronger unit administration and supervision of case practices. Other improvements in the quality of and the amount of physical evidence gathered will require cities to provide units with additional equipment (both basic equipment levels as recommended by the USFA and advanced instruments of the new generation of physical evidence sampling and on-scene analytical devices).

Unit administrators should review representative selections of files to observe what aspects of the standing operating procedures for fire suppression or investigative personnel need reinforcement. Command assistance may need to be sought to obtain additional training. A directive from the fire and/or police chief may also prove helpful to bring critical and chronic problems to a halt.

On review, unit administrators may also recognize the need to improve the maintenance of test requests and results in case files. The more complete the reporting/documentation of the physical evidence, the easier it would prove for supervisors and prosecutors to note the strengths and weaknesses of the evidence.

The use of trained evidence collection technicians, if dependably available to the unit, can supplement fire investigators' skills, especially in fingerprint collection, photography, and allied skills.

In only one case did we note a serious problem in obtaining competent laboratory analysis of evidence. Once again, we note how important the growing national awareness of arson--that can become translated into a number of federal initiatives-- has been to overhauling the arson control support system. Perhaps nowhere else in the arson control field has the federal presence proven such a certifiable boon as in the improvements seen in physical evidence recognition, collection, preservation, and testing. Federal sponsorship of training, equipment purchase, testing service, and how-to aids have considerably brightened this once dismal area of arson control performance.

City-Specific Analysis

City 17

Type System: Two-Tier Agency

Type Personnel Involved:

Fire investigators, arson detectives, and evidence technicians appear to participate equally in physical evidence collection responsibilities. Police investigators were more active in evidence collection here than in any other city audited. Evidence technicians also showed relatively high involvement as they were principally responsible for registering the second highest number of on-scene test and analyses.

Standard Procedures:

The responsibility for conducting fire investigations was split between the fire and police investigative units at the point where the crime of arson had been established. In practice, fire investigators often continued their efforts past this point. Detectives would be called in to arson scenes when the presence of a large loss, suspect, or good lead upped the case's importance. Otherwise, a patrol officer would be summoned to initiate the offense report.

From a review of fire investigation activity logs for a five-month period in 1980, the following activity levels were drawn:

		% of All Incidents	% of All Criminal Offenses
Total No. Investigations	595		
Complaint Reports Initiated	185	31%	
Photos Taken	207	34%	
Drawings	4	0.7%	2.1%
Witness Statements	7	1.1%	3.8%
Evidence Taken	20	3.3%	10.8%
Evidence Submitted	10	1.7%	5.4%

This data suggests the degree to which physical, testimonial, and documentary evidence is actually taken. We believe that these rates fall far below what many observers would generally estimate them to be.

Type Evidence Collected:

City 17 logged the fourth highest number of items of evidence collected. Evidence technicians collected a total of 41 fingerprint impression sets, the most of any city, and more than a third of all such items found in the case sample.

Type Equipment Used:

City 17 equips its fire investigative vehicles with a full range of hand tools and a catalytic vapor detector. The unit has a large van that is sent to the site of major arsons.

Type Results Obtained:

Of the 23 items of evidence recovered, only 10 had results recorded in the file or recalled by interviewers. Five of the 10 were positive, five negative. In seven instances, the evidence did not require testing, and the remaining six items had results unknown.

Evidence Utilization:

No reported instances of prosecution being compromised by problems of obtaining laboratory analysis.

The police crime lab performs the examinations requested by the paperwork accompanying the evidence. Turnaround time from the lab varies from two days to two weeks, depending on the current workload and the priority of the case. By comparison, private labs' turnaround times required as much as four to six weeks, while BATF averaged two weeks.

No evidence samples or potential samples were compromised during collection. Five items of evidence aided cause determination; two provided a basis for the follow-on investigation; and two were material to the decision to prosecute the suspect(s). In one instance, the physical evidence appeared to be of no direct advantage to the investigation. In 11 instances, results were unknown, at least suggesting a weakness in documentation.

Source and Frequency of Observed Errors:

City 17 had the highest number of adjudged errors (42) in on-scene evidence collection and handling. Fire investigators were responsible for the bulk of these errors. Indeed, fire investigators in City 17 chalked up 45% of all the failures by fire investigators to collect sufficient evidence.

Changes since the study period appear to have substantially improved their evidence collection procedures and skills. Notably, the crime lab staff assisted the establishment of new procedures late in 1979. Investigators have also received training through U.S. Fire Administration and BATF training courses.

City 24

Type System:

Single agency, Fire Department operated

Type Personnel Involved:

Essentially all evidence is collected by fire department arson investigators. The unit is solely responsible for arson investigation. Three of its five on-scene tests and analyses were performed by them, as well.

Standard Procedures:

Each two-man team of investigators collect its own evidence. All evidence is supposed to be secured in appropriate evidence containers, then locked in the trunk of the team car. The evidence is logged into the unit's evidence room or hand-carried to the police department laboratory. When the examination is completed, an investigator will return and pick up the results and carry the evidence back for storage at the unit. If the evidence cannot be directly transported to the police lab, it is stored in the evidence safe until a later shift can turn it in for processing. The unit performs its own fingerprint analyses, as well as polygraph and photography services.

Type Evidence Collected:

City 24 was sixth overall in the number of items of evidence collected. It was the only city in our study that had no cases in which debris with residues was recovered. The average for this type of evidence was five, with extremes as low as three and as high as 17.

Type Equipment Used:

Each team car is supposed to be fully equipped with the basic investigative tools. Catalytic vapor detectors were not employed in any case reviewed. Despite the fact that the unit is well-staffed and has more than 20 investigators, perceived equipment shortages were repeatedly pointed out by investigators. Investigators brought up the irony that of the three hydrocarbon units in the fire department, two were assigned to fire prevention officers and only one to the arson unit. The unit possesses only one ultraviolet light unit. This unit recorded the only on-scene use of a gas chromatograph.

Type Results Obtained:

Of the 20 items of physical evidence recovered, 12 did not require processing, five test results were unknown, and three items were positive for flammable liquid presence.

Evidence Utilization:

The principal utilization of the evidence was in 14 out of 20 instances to help establish the corpus of the arson.

Source and Frequency of Observed Errors:

Overall, the unit recorded the fewest number of adjudged flaws in evidence collection and handling. The fact that investigators are fully trained police officers and many have received advanced instruction in evidence collection is believed to account in large part for this fact.

A senior member of the unit expressed his belief that arson unit investigators needed to further strengthen their skill and perseverance in gathering evidence.

City 33

Type system:

Single agency, Fire Department operated

Type Personnel Involved:

Fire department arson investigators collected physical evidence in 96% of the incidents investigated. Fire Department investigators were the third most active of any studied. Evidence technicians serve primarily for on-site test and analysis of latent fingerprints. These technicians performed 12 on-scene tests and analyses. This number is nearly one-third of all those mentioned in reports from the eight sites, and made evidence technicians in City 33 the most active in performing on-scene tests.

Standard procedures:

All evidence is supposed to be photographed in place before it is moved. As in all other unit procedures, this standard is not formally explicated in an S.O.P. Instead, the unit depends on "O.J.O" (on-the-job osmosis) to inculcate novice investigators with standard procedures.

Investigators secure evidence in their assigned vehicles. The evidence is subsequently either taken to the lab for analysis or stored in the property room.

Chain-of-custody procedures are simple, and documentation is minimal. Documentation begins when the evidence is logged in or out of property room.

No chain-of-custody problems were found in the sample or recollected by any investigator or prosecutor in the course of our inquiries. A disorganized evidence storage room suggests a lack of administrative

emphasis on the part of the officer in charge. Access to the evidence room is controlled by limiting key holders to the chief investigator and his deputy.

Type Evidence Collected:

City 33 recorded the second highest frequency of evidence collection. Sixteen of the 36 items of evidence were flammable liquid containers (the most of any city in the study) and 10 were debris with suspected hydrocarbon residues (second highest in this category).

Type Equipment Used:

The unit uses both catalytic vapor detectors and a newly-acquired gas chromatograph.

Investigators complained that they had to lug their investigative equipment from their office to the on-duty investigator's car due to lack of equipment and lack of space in the compact cars they are assigned.

Type Results Obtained:

At least 11 of the 36 items of evidence collected were submitted to the laboratory for analysis, and had known results: eight tested positive for presence of flammable liquids, three negative. Twenty-one items of evidence had no known disposition, and three did not require testing.

Evidence Utilization:

City 33 had five of the six incidents of compromised evidence. One probable source of these problems was the transition from a contract to a county-wide laboratory. For the remainder of the 36 items of evidence: one helped cause and origin determination; three principally helped the arson investigation; four helped prosecution; and 22 had unknown influence.

Source and Frequency of Observed Errors:

Fire investigators in City 33 had the second fewest number of assessed errors. Fire investigators logged some seven of the 11 errors for failure to collect evidence reported to be at the scene.

City 44

Type system:

Two-tier system

Type Personnel Involved:

The police detective assigned to the case participates in the collection of evidence 40% of the time. Evidence technicians are called in to participate in roughly 25% of the evidence collection activities, compared to the fire investigators who take part in 35% of the instances. In only four instances were on-scene tests conducted. Fire investigators and evidence technicians each took part in two.

Overall, City 44 had the fewest number of on-scene evidence collection activities.

Standard Procedures:

Investigative responsibilities were split between fire and police departments. Responsibility shifted at the point in time that fire investigators on-scene believed that circumstances suggested that the fire was a "police matter." The police investigator or a police patrol officer would take charge at this point. If the police investigator was otherwise engaged, the on-scene investigation might not conclude for several days. Fire investigators only possessed a minimum of training, experience, and equipment. Not surprisingly, their efforts to secure evidence were perforce rudimentary.

Associated with the disjointed nature of the investigative activity was a weak chain-of-custody process. Investigators stated that the routine for evidence recovered at the scene was for it to be placed in coffee cans and stored in the investigator's automobile until the next work day. An evidence locker was maintained in the arson unit's office and a flammable liquid storage bin at a downtown fire station. The storage bin at the fire station had a lock, but access to the bin was open to all fire fighters on duty who had keys. Ironically, the detective assigned to handle arson did not have a key and had to ask one of the fire fighters on duty to open the locker. If no suspects developed, the evidence was retained for only one year (not the statute of limitation), otherwise it was kept for five years.

A number of explanations vie to explain the seemingly low activity level. The explanation with the strongest coherence to all the known facts suggests that the procedures in force during this time, as well as the personnel assigned to investigate and responsible for supervising fire and police investigators, collectively caused the low evidence collection rate.

City 44 used a state-consolidated forensic lab, and occasionally a private lab for testing. Turnaround time at the state lab required several weeks, and occasionally months, unless the district attorney made a priority request.

Type Evidence Collected:

City 44 had the lowest number of items of evidence recovered. (The investigative standard practices and relatively low level of training of the part-time investigators/fire marshall inspectors may have resulted in this low number.)

Type Equipment Used:

Fire and arson investigators possessed basic hand tools. No use of catalytic vapor detectors or similar equipment was noted in the sample.

With the development of a county-wide arson task force and the subsequent outfitting of a county arson van, more sophisticated testing equipment became, in theory, available on request. The unit never has made such a request and appears reluctant to exercise this option.

Type Results Obtained:

Of the items of evidence with recorded results from testing flammable liquids, two tested positive, three negative, and six had unknown results.

Evidence Utilization:

The 13 items of evidence recovered in the cases in our sample made the following contributions to case development: the utility of two items was compromised; three helped determine cause; one assisted follow-on investigation; three were of no apparent assistance; and four were of unknown aid.

Source and Frequency of Observed Errors:

Overall, City 44 had a below average number of observed errors, 12, as compared to the mean of 17. As would be expected, given the skill level of fire investigators, three-quarters of their error rates were due to failure to collect physical evidence alluded to in their reports. The lack of congruence between evidence stated as present and the evidence reported as processed could not be wholly resolved during follow-up inquiries. It appears that both haphazard documentation and lack of evidence recovery due to shortcomings in investigator's performance played a role.

City 57

Type System:

Joint unit

Type Personnel Involved:

Evidence collection responsibilities are shared by fire investigators (30%), arson detectives (34%), and evidence technicians (36%). Evidence technicians figured strongly in this activity and performed more on-scene test and analysis (dusting for prints, etc.) than any other site studied.

Standard Procedures:

Fire investigators collect, label, and preserve evidence using satisfactory techniques. Evidence technicians are supposedly called in on all major arson scenes to dust for fingerprints, take photographs, and secure evidence. Evidence can thus be turned directly over to technicians for preservation, thus removing one potentially weak link from the chain of evidence. Debris believed to contain flammable liquid is subsequently checked out from the police evidence room and hand carried to the state-operated regional crime detection laboratory. No written procedures exist that explicitly establish this procedure. Police department S.O.P.'s, in effect, guide the two-man joint fire-police arson unit. Evidence property accountability documentation was exemplary.

Type Evidence Collected:

Of the cases studied, City 57's personnel recovered the largest amount of evidence. This leadership may be due in part to the excellent records kept; other cities may not be as fairly reflecting their efforts. Among the leading categories in City 57 were: debris with hydrocarbon residue (17) (nearest rival 10); flammable liquid samples (6), and in the "Other" category (10).

Type Equipment Used:

Equipment in all Fire Marshal's vehicles: shovels, mops, brooms, axes, gas detector, hand lights, tapes, coffee can containers for evidence, and a gas detector. A special arson unit van was also equipped with the above. In addition, the arson van was equipped with a generator for portable lighting, tape recorder, camera, forms, and office supplies. The arson van was starting to be used more frequently as it encouraged longer on-scene time (due to the availability of creature comforts - especially important in snowbelt states) and its expanded scene support capability.

The unit does not own an advanced flammable vapor detector.

Type Results Obtained:

The results of 13 samples submitted were positive, 9 were negative, 18 with no known result, and for 3 items no testing was necessary. No cases were reported to have been compromised by loss of chain of custody.

Evidence Utilization:

Due to extremely spotty case documentation, no judgement could be made as to the utility of 38 of the 43 items collected; two items aided follow-on investigation; one was of no apparent aid; and in two instances, the evidence was not submitted for testing.

Source and Frequency of Observed Errors:

City 57 was found to have the fewest errors (8) of any city studied. This may accurately reflect the evidence collection errors. On the other hand, meager documentation makes it difficult to interpret the circumstances surrounding a potential error. Consequently, the lack of documentation may indeed conceal evidence of missteps.

City 60

Type System:

Joint unit, Fire Department administered

Type Personnel Involved:

Fire investigators participate in 63% of the collection efforts; the police investigator assigned to the unit, 26%; and evidence technicians respond to 12%. Evidence technicians performed five of the six on-scene tests identified in the entire case sample. This is the second lowest rate observed.

Standard Procedures:

The present physical evidence and storage procedure appears adequate. The practice is to collect fire debris (especially suspected samples of accelerants) by sealing them in large glass jars with ring gaskets and screwtop closing. Standard practice is to follow the State's crime requests to mark containers and describe the area from which the evidence was taken, and to request testing. Evidence is transported by one of the investigators to the location of the state crime laboratory. This practice has the advantage of minimizing the possibility of damage or chain of custody questions, and permits quick turnaround time when needed. As evidence is hand-delivered, lab technicians may be willing to run tests at that time. If not, time delays are frequently 2-4 weeks; and in one case, the evidence took several months to process (with negative finding of accelerants). State crime laboratory technicians will testify as expert witnesses on the procedures used and their interpretation. No cases among those sampled were compromised by a defect in evidence collection handling or processing, but it is likely that a percentage of the cases was not fully developed because evidence was not properly obtained.

The benefits obtained from hand-carrying evidence to the State Bureau of Identification (some 100 miles distant) are undeniable. However, management must also consider the cost. Can this city afford the loss of investigator time (estimated to be 24 round-trips per year or some 12 man days)? Would this time be better used in training? While arson evidence undoubtedly requires special handling, other avenues might be explored that could hasten turnaround time, while not degrading the quality of the evidence chain or costing so much investigator time. Shipping by registered mail to either the FBI or state crime lab is one option.

Type Evidence Collected:

City 60 recorded 21 items of physical evidence collected. This ranked City 60 fifth from the top in frequency. A little more than half of the items recovered were flammable liquid-related.

Type Equipment Used:

Arson investigators repeatedly pointed out that they felt handicapped by the lack of more advanced equipment. For the past three years, they have unsuccessfully sought a mobile arson investigation van. No advanced flammable liquid sampling or testing equipment is presently available to them.

Type Results Obtained:

City 60's investigators enjoyed a favorable ratio of positive to negative results for flammable liquid samples submitted for laboratory analysis. Of nine items with known results, only two failed to disclose the presence of hydrocarbon residues. Three other items had no known results, and nine required no testing.

Evidence Utilization:

Fourteen of the 21 items of evidence collected proved beneficial to determining cause and origin; one furthered the follow-on investigation; and two aided prosecution. Only one item of evidence appeared to have been compromised, while two did not appear to help the case development, and one item was of unknown value.

Source and Frequency of Observed Errors:

Eleven of the twelve physical evidence-related errors observed in City 60's case sample entailed insufficient evidence gathering.

No instance was noted of cases dismissed for lack of physical evidence.

City 70

Type System:

Two-tier system

Type Personnel Involved:

City 70 is unique among the cities in this study in that evidence technicians perform almost 90% of the evidence collection activities. Police investigators take part in 10%, while fire investigators take part in only 2%. Evidence technicians exclusively performed the seven on-site tests and analyses recorded.

Standard Procedures:

Evidence procedures are clearly set forth and strictly adhered to. Because of the exemplary nature in which these procedures are performed, we will detail them as follows:

Physical evidence handling procedures are the responsibility of the crime technicians. Mobile crime lab units are dispatched around the clock by police communications. All incendiary fires are to be photographed and processed by a crime lab technician.

Sketches or scene diagrams are made only if the case's seriousness and complexity require it. Investigators maintain that they normally lack the time to complete this work. The district attorney's office will prepare diagrams for court cases as the need arises.

Evidence is normally collected as soon as possible, and as appropriate to the situation. Evidence is either: a) placed in a paper shopping bag; b) sealed in a cleaned coffee can with aluminum foil and evidence tape; c) placed in a "zip lock" bag; or d) wrapped in visquine sheeting.

Standard practices include:

- Fire scene is extensively photographed. Evidence is photographed in situ
- Evidence (and comparison samples if available) is then tagged/marked with the investigator's name, date, case number, victim's name, and address of incident
- property evidence receipt is completed
- property transfer slip is completed

- evidence is logged in the evidence control unit, with a lab analysis request form specifying what the evidence consists of and the tests requested
- a copy of the documentation is forwarded to the investigating officer
- the appropriate crime lab technician picks up the item for examination (fingerprint, chemical analysis, etc.) and returns the item to the evidence control unit
- results of the analysis are forwarded to the arson unit for the case file or prosecutor's report
- the investigator signs out the evidence for court presentation, and returns same.

Because of the backlog of cases, crime lab technicians are frequently delayed. On several occasions, our team observed fire investigators photographing the evidence and the scene in lieu of waiting further for the technician's arrival. In these cases, investigators would leave instructions with the uniformed police officers left at the scene. Additional photographs would be at the discretion of the technician. When the investigator cannot wait any longer and the technician cannot come any quicker, there is a higher risk that something will go amiss in the recording and collecting of evidence.

If fully trained and equipped, fire or police investigators might take over some of the responsibility for evidence collection at uncomplicated scenes, and, thus, reduce the demand on technicians and the wait entailed. Fire investigative and arson unit personnel recognized that deficiencies exist in the technical evidence acquisition capabilities of the unit.

Type Evidence Collected:

City 70 ranked third overall in the number of items of evidence

Type Equipment Used:

City 70 recorded two of the four uses of a catalytic vapor detector documented in the 909 case files.

In 1979, City 70 sought to equip the three on-duty investigative units with complete arson investigative kits. The specifications for the kits complied with U.S. Fire Administration's recommendations and included electronic gas and hydrocarbon detectors; Polaroid Camera (due to the ease of use, immediate results, and unalterability of the print); tape recorder (for investigators to use to summarize their observations, record their findings and

statements; portable transceivers (to call for assistance, respond to requests for investigation); paging units (to maintain contact without monitoring unwanted radio traffic); and a complete hand tool set.

In 1979, City 70's lab purchased an advanced gas chromatograph; and it is otherwise extremely well-equipped to process all of the usual types of evidence.

Type Results Obtained:

Despite the involvement of evidence technicians, City 70 apparently did not have much better luck with hydrocarbon residue testing than other cities in the study. Of the 11 known outcomes, five tests were positive and six negative for the presence of hydrocarbon residues. It is possible that the equipment or techniques used during this period have subsequently been upgraded with the introduction of the gas chromatograph. The sometimes lengthy delays (up to eight weeks) due to a heavy backlog in the lab may have led to the attenuation of some of the samples. While these are likely suppositions, no conclusions can be drawn.

Evidence Utilization:

The breakdown of the 23 items submitted shows that eight had an unknown impact; seven primarily aided cause determination; five aided follow-on investigation; and two were useful in prosecution. While no item of evidence was compromised, one item was apparently of little benefit.

Source and Frequency of Observed Errors:

Thirteen of the 15 errors assessed were for the fire investigators failing to secure sufficient evidence. No other problems were observed.

City 87

Type System:

Joint, Fire Department administered

Type Personnel Involved:

The joint fire-police unit in City 87 assigns fire investigators the responsibility for identifying and securing evidence. Accordingly, fire investigators handled 93% of the evidence-gathering activity. Police investigators took part in some 5%, and evidence technicians were called into only one crime scene in the case sample. Evidence technicians performed six of the seven on-scene tests.

CONTINUED

1 OF 3

Standard Procedures:

Investigators followed an informal, though basically sound, evidence collection procedure. Investigators were aware that custody documentation and storage facility procedures were inadequate. During the research team's visit, improvements in procedures were undertaken in the two storage facilities.

Type Evidence Collected:

The raw amount of evidence collected was slight. Only one other city collected fewer items of evidence.

Type Equipment Used:

Standard field equipment was in use during the period.

The local crime lab uses both steam distillation and gas chromatography. This enables the crime lab to better fit the testing procedure to the type of evidence recovered.

Type Results Obtained:

Balancing the low number of items of evidence recovered was the fact that City 87 had the best ratio of items of evidence submitted to items testing positive results for the presence of flammable liquid residues. Of the 10 items submitted for flammable liquid residue, nine were positive. One item did not need testing, and several items had no known results/disposition.

Evidence Utilization:

The excellent results from the lab were echoed in the utility of the evidence. Five of the items of evidence contributed to prosecution; five to the follow-on investigation; and three to determining cause. One piece of evidence was compromised. Seven items had no recorded disposition.

Source and Frequency of Observed Errors:

Fire investigators, who were responsible for on-scene evidence collection, had the second highest error rate observed. Their errors ranked third overall in insufficient evidence collection, highest in failure to utilize on-scene analysis equipment, and highest in evidence being compromised through contamination.

Handling, Logging, and Disposition of Evidence

In the course of an arson investigation, charred or scorched wood, ashes, embers, chemical substances, possible accelerants, and other objects are routinely taken from the fire scene for analysis. These articles or objects must be carefully handled, logged, and chain of custody established in preparation for prosecution. It is well-established in the law that articles or objects which relate to an issue in the case are admissible in evidence only when properly identified and shown to be in substantially the same condition as they were at the time in question. State v. Price, 265 P.2d 244, (Ariz.); Washburn v. State, 318 SW2d 627 (Texas Crim.); 29 Am. Jur. 2d, Evidence, Sec. 774. In most criminal investigations, and especially arson where materials may be taken from the fire scene by a firefighter and subsequently delivered to a laboratory technician for analysis, it is not possible to establish the identity in question by a single witness since the object or article has usually passed through several hands before being analyzed or examined or before being produced in court. 29 Am. Jur. 2d, Evidence, Sec. 774. Under such circumstances, it is therefore necessary to establish a complete chain of evidence, tracing the possession of the object or article to the final custodian; and if one link in the chain is missing, courts have on occasion ruled that the object or article may not be introduced into evidence. People v. Chapman, 3388, P.2d 428 (Cal.); People v. Morse, 388 P.2d 38 (Cal.); 29 Am. Jur. 2d, Evidence, Sec. 774. The party offering the object or article in evidence must also show that:

. . . taking all the circumstances into account, including the ease or difficulty with which the particular object or article could have been altered, it was reasonably certain that there was no material alteration. It is not necessary that an object or article which is offered in evidence should be in precisely the same condition at the moment of its offer as at the time when it played a part in the occurrence or transaction which gave rise to its offer in evidence, but the change in its condition must not have been wrought for unjustifiable purposes, and it must not be of sufficient moment that the exhibit will mislead. 29 Am. Jur. 2d, Evidence, Sec. 774; State v. Hood, 356 P.2d 1100 (Ore.); Levy v. State, 12 SW 596 (Tex. App.)

In more recent cases, courts have held that the fact that the chain of custody has not been established does not render an exhibit inadmissible if it has been otherwise properly identified as being the same object and in the same condition as it was when it was initially acquired by the offering party. State v. Tollett, 528 P.2d 497 (Wash.). The courts have ruled that the absence of evidence concerning each step in the chain of custody goes to the weight, and not admissibility, of the exhibit. Although there is a more liberal trend concerning chain of custody in criminal prosecutions, the better practice would dictate that the chain of custody be strictly accounted for in a criminal prosecution. Not only will such a showing present a more persuasive case to a jury, but it will also eliminate any possibility that a trial court may eliminate a sample, object or article

taken from a fire scene because the prosecution has not shown that the offered exhibit was not altered or tampered.

In Commonwealth v. Greenburg, 17 A.2d 698 (Penn.), the court reviewed custodial procedures used by the prosecution. The procedures described in this case may serve as a model or guideline for the preparation of forms and logs that would adequately document the chain of custody in a criminal prosecution. In this case, jars of an oily, combustible material were found at the fire scene. The prosecution presented testimony that:

1. A member of the fire suppression team took custody of the jars and marked them for identification, showing his name, the date and location where found.
2. The prosecution showed an unbroken continuity of possession of the jars from the time they were discovered by a member of the fire suppression team until they were delivered to the laboratory for analysis.
3. The records of the laboratory showed a satisfactory reason given for each occasion in which there was access to the jars, and the purpose for such access.
4. The custodian of the jars and the person performing the laboratory analyses testified as to the identify of the jars, method and time of acquisition of the jars, and condition at the time of acquisition by each person in the chain of custody.

In one state jurisdiction, arson investigators noted that the investigation and detection of arson would be greatly aided by better physical evidence handling and equipment. A mobile arson investigation van, for example, would provide better safeguards for the acquisition, labeling, identification, sealing, and storage of physical evidence taken from debris at the fire scene.

Arson Laboratory Facilities

Laboratory facilities relating to scientific analysis of materials taken from a fire scene where arson is suspected were not examined in depth in the course of this study. Rather, we were interested in the experiences and perception of arson investigators regarding laboratory support of their efforts. With one exception, investigators were generally satisfied with their laboratory support.

Research materials obtained in the course of preparing this report suggest that in some state jurisdictions, a problem exists in the timely and expeditious analysis of fire scene materials in order to prepare for court cases. In December 1979, one arson investigator testified before the

Permanent Sub-Committee on Investigations of the United States Senate. The following excerpt from his testimony reveals part of the problem concerning scientific analyses of materials taken from a fire scene:

The arson investigator, when it comes time to testify about the nature of the substance he discovered at the fire, is, therefore, unable to offer laboratory proof that the material was flammable. If he testifies that the substance smelled like gasoline, a smart defense attorney can quickly destroy the investigator's credibility with a series of questions designed to show that, without chemical analysis of the material, it cannot be shown to a certainty that the material was, in fact, gasoline. (Hearing by Permanent Subcommittee on Investigations, "Arson in America," page 174, December 20, 1979).

The excerpt from the foregoing subcommittee hearing not only highlights a potential problem existing in state jurisdictions with reference to accurate arson laboratory analyses, but also suggests that delays in analyzing evidence taken from fire scenes may give rise to speedy trial problems in many cases, resulting in dismissal of an otherwise strong case.

Search-Seizure Considerations

The provision of the Fourth Amendment generally governs the manner, method, and availability of searches and the related seizure of evidence. The Fourth Amendment provides that:

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated; and no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

Until fairly recently, the provisions of the Fourth Amendment and the related exclusionary rule were not binding upon the States, in Wolff v. Colorado, 338 U.S. 25 (1949), Justice Frankfurter speaking for the court stated that in a prosecution in a "state court for a state crime, the Fourteenth Amendment does not forbid the admission of evidence obtained by an unreasonable search and seizure.

Since Mapp v. Ohio, 367 U.S. 643 (1961), the law of the land, of course, has been that the Fourth Amendment and the related exclusionary rule are binding upon the states, thereby overruling Wolff v. Colorado.

In numerous cases, the Supreme Court has referred to the necessity that warrants be issued by a "judicial officer" or a "magistrate". United States v. United States District Court, 407 U.S. 297, 321 (1972). The Court has stated that the protection of the Fourth Amendment "consists in requiring that those inferences justifying issuance of a warrant be drawn

by a neutral and detached magistrate instead of being judged by the officer engaged in the often competitive enterprise of ferreting out crime." Johnson v. United States, 333 U.S. 10 (1948).

Although the Fourth Amendment speaks in terms of unreasonable searches and seizures and the warrant requirement, the United States Supreme Court and the various state and federal courts have ruled that warrantless searches or seizures are per se unreasonable unless there are special circumstances which excuse compliance with the warrant requirement of the Fourth Amendment. The Supreme Court has expressed the strong policy that warrants are favored in the law, and utilization of them will not be thwarted by a hyper-technical reading of the supporting affidavit and supporting testimony. United States v. Ventresca, 380 U.S. 102 (1965). It is only under very special circumstances, such as a search incident to a lawful arrest, that the warrant requirements of the Fourth Amendment will be dispensed with. U.S. v. Rothman, 492 F.2d 260, Calif. C.A. (1973). Even in situations involving an arrest, for example, warrantless searches are justified only to the extent that they are necessary to prevent destruction of evidence or to protect the arresting officer.

Generally, the special or exigent circumstances exception to the Fourth Amendment search warrant requirement requires that the officer conducting a search have reasonable or probable cause to believe that he will find evidence pertaining to a crime. U.S. v. Halliday, 487 F.2d 1215 (Tex. C.A. 1973).

The concept of "probable cause" is central to the meaning of the warrant clause. Neither the Fourth Amendment nor the federal statutory provisions relevant to this subject define "probable cause." The phrase "probable cause" has been defined entirely through judicial construction. In Dumbra v. United States, 268 U.S. 435 (1925), the United States Supreme Court stated that the term "probable cause" means less than evidence which would justify conviction and may rest upon evidence which is not legally competent in a criminal trial or would be sufficient to prove guilt in a criminal trial. The Court in the Dumbra case stated that:

In determining what is probable cause . . . we are concerned only with the question whether the affiant had reasonable grounds at the time of his affidavit . . . for the belief that the law was being violated on the premises to be searched; and if the apparent facts set out in the affidavit are such that a reasonable discreet and prudent man would be led to believe that there was a commission of the offense charged, there is probable cause justifying the issuance of a warrant." Id.

The Courts have uniformly stated that mere conclusory allegations or assertions are not enough. Since many cases involved in arson investigation may depend in one way or another on confidential informants, a brief examination of those Fourth Amendment cases concerning probable cause in connection with information furnished by a confidential informant will be considered. Presentation of information by an affiant received from an informant to establish probable cause has resulted in a number of divided

decisions from the United States Supreme Court. In Draper v. United States Supreme Court, 358 U.S. 307 (1959), a previously reliable, named informant reported to an officer that the defendant would arrive with narcotics on a particular train and described the clothes that he would be wearing and the bag he would be carrying, but the informant gave no basis for his information. FBI agents met the train and observed the defendant who fully answered the description. The Court held that the corroboration of part of the informant's tip established probable cause to support the arrest. The Draper case involved a warrantless arrest. In Arkansas v. Sanders, 422 U.S. 753 (1979), the United States Supreme Court apparently receded from its ruling in the Draper case. In the Sanders case, police officers in Arkansas received information from an informant that the defendant would arrive at an airport at a certain date and time carrying a green suitcase containing marijuana. The same informant had previously provided information that had led to the arrest and conviction of the defendant on possession of marijuana. Acting on the information received, the state officers set up a surveillance at the airport and awaited the defendant's arrival. As the officers watched, Sanders arrived and went to the baggage claim area retrieving a green suitcase matching the description furnished by the informant. The defendant got into a taxicab and drove off from the airport. The officers pursued the vehicle, stopped it on the highway, and requested the taxi driver to open the trunk where the green suitcase was stored. The green suitcase was removed from the trunk by the police, opened immediately, revealing a large quantity of marijuana which was introduced at Sanders' trial for possession. The defendant's conviction was appealed to the Arkansas Supreme Court which reversed, holding that even though there was ample, probable cause to believe that contraband was located in the suitcase, there were no exigent circumstances justifying a warrantless search.

Investigating officers may be guided in their investigation of cases and the arrest of suspects and seizure of evidence by the general guidelines set forth in the decision, Aguilar v. Texas, 378 U.S. 108 (1964). In this case, the Court held insufficient an affidavit which merely asserted that the police had "reliable information from a credible person" that narcotics were in a certain place and held that when the affiant relies on an informer's tip, he must present to the magistrate two types of evidence. First, the affidavit must indicate the circumstances from which the informer concluded that evidence was present or that crimes had been committed; and, second, the affiant must present information which would permit the magistrate to decide whether or not the informer was trustworthy.

These decisions show the need to maintain accurate and complete reports and documentation on an investigation in the event that an arrest or search warrant is desired by the person supervising the on-going investigation. The policy behind the Fourth Amendment strongly favors obtaining a warrant and the presentation of corroborating evidence to establish probable cause.

In addition to the requirement that police officers obtain a warrant, the Fourth Amendment also requires that warrants particularly describe the things to be seized under a search. "Requirement that warrants shall particularly describe the things to be seized makes general

searches under them impossible and prevents the seizure of one thing under a warrant describing another. As to what is to be taken, nothing is left to the discretion of the officer executing the warrant." Marron v. United States, 275 U.S. 192 (1927); Stanford v. Texas, 379 U.S. 476 (1965). This requirement thus acts to limit the scope of the search, inasmuch as the executing officers should be limited to looking in places where the described object could be expected to be found and not in others. A warrant authorizing a search of premises does not support the arrest or search of persons on the premises when the warrant is executed. United States v. DiRe, 332 U.S. 581 (1948). However, if after entry to execute the warrant the officers observe contraband in plain view or if facts become known which give them probable cause to believe that a person present has committed a crime, they may seize the contraband or arrest the person. Marron v. United States, 275 U.S. 192 (1927).

In addition to situations where the accused or suspect may have abandoned any reasonable expectation of privacy in certain property, there are also other exceptions to the warrant requirement of the Fourth Amendment. Where the accused had not expressly or impliedly given his consent to search, valid third party consent may support a search without a warrant. In some situations involving joint ownership or control of property, one party in possession may validly consent to a governmental search and thereby negate the opportunity for an objection to such search by the party against whom the evidence is offered. The question in such case is whether the defendant reasonably could have anticipated such consent by a third party or whether the defendant must be presumed to have assumed the risk that such third party would allow someone else to search the property. U.S. v. Kahan, 350 F. Sup. 784 (D. New York 1972), affirmed in part, reversed in part, 479 F. 2d 290, reversed for other reasons, 415 U.S. 239.

There may be circumstances involving a fire in an apartment complex, for example, in which persons other than the owner/suspect may be able to provide consent to a search conducted without a warrant. Courts have held that a person may provide consent to a search or provide access to the area to be searched where such person has a substantial interest in or permission to exercise a right of access to property whether such right is expressed or implied. Such consent will validate a search. U.S. v. Gradowski, 502 F. 2d 563 (C.A. N.Y. 1974); Commonwealth v. Platou, 312 Atl. 2d 29 (Penn. 1973); People v. Reynolds, 127 Cal. Rptr. 561 (Cal. 1976); State v. Gavin, 365 N. E. 2d 1263 (Ohio 1977); People v. Langley, 234 N. W. 2d 513 (Mich. 1975); In Re: Dwelling located at 728 Belmont Avenue, Charlotte, 210 S. E. 2d 73 (N.C. 1974). Under these cases, a person living in an apartment complex could authorize a search by governmental authority without a warrant regardless of whether the person authorizing the search owns the property or jointly owns the property. U.S. v. Woods, 560 F. 2d 660 (Ala. 1977). Although an apartment manager, for example, may give consent to a warrantless search of apartment building common areas over which the landlord-suspect had joint access or control, U.S. v. Kelley, 551 F. 2d 760 (Minn. 1977), a landlord cannot give consent to a warrantless search of specific leased premises. U.S. v. Williams, 523 F. 2d 64 (Mo. 1975), certiorari denied 423 U.S. 1090. Again, as in cases dealing with abandonment, the key question in cases dealing with third party consent to searches is whether the defendant had a reasonable expectation of privacy

in certain property. Where common areas in an office or apartment complex are accessible to the public, where property is jointly owned or jointly possessed, third party consent will generally be valid.

Fire Scene Searches: Michigan v. Tyler

One of the most relevant decisions to come down from the United States Supreme Court concerning arson investigations and the Fourth Amendment was the decision in Michigan v. Tyler, 56 L.Ed 2d 486 (1978). In Michigan v. Tyler, an arson investigator employed by the Michigan State Police was assigned to assist local authorities in the investigation of a fire suspected of being of incendiary origin. The arson investigator arrived at the fire scene four days after the fire and proceeded to collect physical evidence at the site and take photographs. The court was confronted with questions concerning the validity of the entry and search performed by the State Arson Investigator. In analyzing this question, the United States Supreme Court concerned itself with the applicability of the Fourth and Fourteenth Amendments to entries and searches of fire-damaged premises by fire service and law enforcement officials.

Shortly before midnight, January 21, 1970, a fire broke out in a furniture store which was leased by Laurin Tyler and operated by Tyler and a business partner. The local fire department responded and had succeeded in getting the fire under control, although not entirely extinguished, by the time the fire chief arrived at about 2:00 a.m. Upon his arrival at the burning building, the chief's attention was immediately directed to two plastic containers of flammable liquid which the firemen had noticed during the course of fighting the fire. After examining the containers, the chief concluded that the fire could possibly have been arson and called a detective from the local police department. The detective who arrived on the scene shortly thereafter took several photographs. The fire chief and the detective then removed the containers from the premises. Further investigation by the police and fire officials was discontinued at that time because smoke, steam, and darkness hampered the search. By approximately 4:00 a.m., the fire was extinguished and the premises were secured. The firemen and police left the building unattended. At approximately 8:00 a.m., fire officials returned to the building for a cursory examination, but no evidence was obtained. At 9:00 a.m., the detective and an assistant fire chief returned to the premises and conducted a more thorough inspection. Burn marks of a suspicious nature were found on the carpets, as well as other evidence indicating the possibility of arson. Portions of the carpet and other evidence were seized without a search warrant and removed from the premises at that time. In addition to the searches conducted on the morning the fire was extinguished, a Michigan State Police Arson Investigator and other officials re-entered and searched the premises on at least three other occasions; four days, seven days, and twenty-five days after the fire. Each of these searches was made without a warrant and without the consent of Tyler or his business partner.

It should be noted that although the walls of the store were still standing, the store itself was gutted by the fire.

The defendant and his business partner were convicted of conspiracy to burn real property and related offenses.

On appeal, the Supreme Court of Michigan reversed the convictions holding that:

1. The initial entry to fight the fire and the discovery and seizure of the evidence while the fire was still burning were proper, but
2. Once the fire was extinguished and the officials had left the premises, any subsequent re-entry to the premises should have been made pursuant to a search warrant.

The United States Supreme Court largely agreed with the Michigan Supreme Court, but declined to adhere to the narrow requirement that any subsequent re-entry to the premises required a search warrant. The United States Supreme Court in explaining its view of the function of fire-service personnel states in part that:

Fire officials are charged not only with extinguishing fires, but with finding their causes. Prompt determination of a fire's origin may be necessary to prevent its recurrence, as through the detection of continuing danger such as faulty wiring or a defective furnace. Immediate investigation may also be necessary to preserve evidence from intentional or accidental destruction. And, of course, the sooner the officials complete their duties, the less will be their subsequent interference with the privacy and the recovery efforts of the victims. For these reasons, officials need no warrant to remain in a building for a reasonable time to investigate the cause of the blaze after it has been extinguished. And, if the warrantless entry to put out the fire and determine its cause is constitutional, the warrantless seizure of evidence while inspecting the premises for these purposes also is constitutional.

The Tyler decision indicates that officials should, if possible, remain on the fire scene premises to inspect the debris for evidence, determine the fire origin and cause, and complete their investigation. The Court has ruled that fire personnel and officials need no warrant to remain in a building or on real property for a reasonable period of time to complete this work. The Court also found that no warrant would be required to re-enter premises where circumstances render a fire cause and origin determination impossible at the time of the original entry. For example, in the Tyler case, the fire personnel re-entered the premises approximately 6-7 hours after the fire had been extinguished and the officials had left. The Court, however, found the morning re-entries to be legal, based in large part on the fact that a continuation of the initial search and fire cause origin determination was made impossible by the smoke, steam, and darkness and related conditions encountered by fire personnel at night.

One problem that has arisen concerns how a fire marshal or other official may satisfy the traditional probable cause standard necessary to obtain a criminal search warrant where such official has no substantial indication or proof of arson, but needs to enter the premises to determine the cause of the fire and whether the fire is of incendiary origin. In a series of previous cases involving administrative inspections made pursuant to housing codes, fire codes, and other health and safety regulations, the Supreme Court has established the principle that such "administrative inspections" are "searches" within the meaning of the Fourth Amendment. Therefore, the Court has ruled that such inspections are required to be conducted pursuant to a warrant, unless consent of the proper party is obtained. Camera v. Municipal Court, 387 U.S. 523 (1967); CSEE v. City of Seattle, 387 U.S. 541 (1967); Marshall v. Barlow's Inc., 56 L.Ed. 2d 305 (1978). Although the Supreme Court has imposed warrant requirements with respect to administrative inspections, the Court has applied a reduced, less rigorous standard of probable cause to justify the issuance of a warrant for such inspections. In explaining this reduced standard which must be met to justify the issuance of a warrant, the United States Supreme Court has stated that "probable cause to issue a warrant to inspect . . . exists, if reasonable legislative or administrative standards for conducting an area inspection are satisfied with respect to a particular dwelling . . . (They will not necessarily depend upon specific knowledge of the condition of a particular dwelling). Camera v. Municipal Court, 387 U.S. 523 (1967).

The Court in Tyler held that the reduced administrative search warrant rationale would apply to fire scene searches and inspections. The Court stated:

To secure a warrant to investigate the cause of a fire, an official must show more than the bare fact that a fire has occurred. The magistrate's duty is to assure that the proposed search will be reasonable, a determination that requires inquiry into the need for the intrusion on the one hand, and the threat of disruption to the occupant on the other . . . the number of prior entries, the scope of the search, the time of day when it is proposed to be made, the lapse of time since the fire, the continued use of the building, and the owner's efforts to secure it against intruders might all be relevant factors. Even though a fire victim's privacy must normally yield to the vital social objective of ascertaining the cause of the fire, the magistrate can perform the important function of preventing harassment by keeping that invasion to a minimum.

The reduced probable cause standard discussed above is, according to the Supreme Court, applicable only when there is not probable cause to believe an arson has occurred. Once officials have probable cause to believe arson has been committed, any subsequent re-entry to search for

evidence must be made pursuant to a criminal investigative search warrant which may issue only upon a traditional showing of probable cause. The Supreme Court explained its holding as follows:

In summation, we hold that an entry to fight a fire requires no warrant, and that once in a building, officials may remain there for a reasonable time to investigate the cause of the blaze. Thereafter, the additional entries to investigate the cause of the fire must be made pursuant to the warrant procedures governing administrative searches. Evidence of arson discovered in the course of such investigations is admissible at trial, but if the investigating officials find probable cause to believe that arson has occurred and require further access to gather evidence for a possible prosecution, they may obtain a warrant only upon a traditional showing of probable cause applicable to searches for evidence of crime.

The Michigan v. Tyler case will have considerable effect on state statutes and procedures authorizing inspection. Most states have statutes which charge state or local officials, such as fire chiefs or fire marshals, with the duty of investigating and establishing the cause of fires. Many of these statutes also authorize the official or his assistants to enter fire-damaged premises any time after the fire to investigate the cause. For example, Chapter 476.070, 476.080, Oregon Revised Statutes (1980), provides that: The State Fire Marshal, his deputies or assistants, or any of them, may: (1) at all reasonable hours, in performance of the duties imposed by the provision of ORS 476.030, enter upon and examine any building or premises wherein fire has occurred, and other buildings or premises adjoining or near the scene; and (2) for just cause and for the purpose of examination, enter, at all reasonable hours, in and upon all buildings and premises within their jurisdiction. The other jurisdictions visited in this study have similar statutes. As may be noted from a review of the above statute from Oregon, the law generally places no time limitation upon entries or re-entries and makes no mention of the requirement that a search warrant be obtained. The Michigan v. Tyler decision would render these statutes constitutionally defective if challenged in the context of Fourth Amendment searches or seizures at a pre-trial suppression hearing. Although the Michigan v. Tyler decision did not specifically deal with statutes such as the one cited from Oregon, the Supreme Court in Marshall v. Barlos, Inc., has rejected the argument that a statutory grant of authority to inspect can substitute for the detached and neutral judgment of a judicial officer or magistrate in determining the necessity for searches of premises protected under the Fourth Amendment. Such statutes may not be constitutionally defective on their face if, by judicial construction, Courts read into such statutes the general requirement that a warrant be obtained before the inspection can be performed, except under special exigent circumstances. This approach has been approved by the United States Supreme Court in previous cases where such interpretation, when if possible, provides a way to avoid having to declare a statute or law unconstitutional. G.M. Leasing Corporation v. United States, 429 U.S. 338 (1977).

The purpose of the Fourth Amendment, which applied solely to governmental action and not to the actions of private individuals, is to protect citizens from governmental invasions of privacy. U.S. v. Tripp, 468 F.2d 569 (Washington C.A. 1972). The Supreme Court and other state and federal courts have interpreted the Fourth Amendment as protecting people and their privacy and not property; thus, wherever an individual may harbor a reasonable expectation of privacy, he is entitled to be free of unreasonable governmental intrusion. U.S. v. Kelley, 393 F. Sup. 575 (D. Okla. 1975). Therefore, courts have ruled where a person has abandoned certain property or may not under a subjective test entertain a reasonable expectation of privacy in property and its contents, a warrantless search will not be ruled invalid. The Court has stated that this amendment has as its purpose the protection of those areas where individuals have some reasonable expectation of privacy. The interest protected is an interest in privacy rather than a property interest in the things seized. State v. Wright, 537 P.2d 130 (Ore. 1975); State v. Johnson, 530 P. 2d 910 (Ariz. 1975); People v. Oliver, 234 NW 2d 679 (Mich. 1975); City of Centerville v. Smith, 332 NE 2d 69 (Ohio 1973); People v. Sneed, 108 Cal. Rptr. 146 (Cal. 1973).

Testimonial Evidence Collection

If the bedrock of arson investigation is fire cause determination, then the foundation for solid cases is testimonial evidence collection. Testimonial evidence is prized by prosecutors for its legal weight: be it an eyewitness account, a confession, or material inconsistencies in a defendant's statements. Testimonial evidence is so important to prosecution that in some jurisdictions, prosecutors are loath to go to court without either a confession or an eyewitness. Testimonial evidence collection is also important from the perspective of the arson unit manager. Next to fire cause and origin, testimonial evidence collection is the most frequent on-scene activity. Reaping information from questioning is in its own way as complex and subtle as reading fire signs; its cost in effort is greater than any other facet of arson investigation.

Given the importance, difficulty, and costs associated with testimonial evidence collection, it is ironic that physical evidence collection has captured so much attention and testimonial so little.

In this section, we will try to do our part to rebalance the emphasis by examining the following:

- the relationship between the organizational profile of the local system and the level of testimonial evidence collected
- activity levels of fire and police investigators
- selected standard procedures
- frequency of collecting various types of testimonial evidence
- testimonial evidence utilization
- assessed errors in testimonial evidence collection.
- city-specific summaries.

Relationship Between the Organizational Profile of the Local System and the Level of Testimonial Evidence Collected.

Of the three profile types represented in our population of eight cities, two-tier cities averaged the highest number of items of testimonial evidence in the cases sampled (143 per city), while joint units averaged twenty fewer items (123 per city), and single units averaged the least (102 per city). This is suggestive that two-tier systems expend the most effort to gather testimonial evidence. Two-tier systems averaged both more on-scene arrests and more total arrests than either single or joint units.

TABLE 3.20
Organizational Profile Comparison of the
Amount and Type of Testimonial Evidence
With Arrest Rate Data

Type Profile	Total Amount Testimony (inc. sworn Fire Personnel)	Lay Testi- mony	On-Scene Arrests	Total Arrests In Sample
Single:				
City 24	153	118	5	20
City 33	51	46	13	23
Average	102	82	9	21.5
Joint:				
City 57	120	98	5	23
City 60	117	99	7	17
City 87	132	119	7	26
Average	123	105	6.7	22
Two-Tier:				
City 17	138	114	9	17
City 44	102	85	16	23
City 70	171	143	24	42
Average	143	114	16.3	27.3

Note: Correlation Coefficient between total amount of testimonial evidence and total arrest in sample is .39.

Activity Levels of Fire and Police Investigators.

We counted the number of witness statements present in the case files of the 909 sample incidents. Undocumented interviews or statements missing from the files at the time of our review were not tallied. Of 647 recorded participations in testimonial evidence collection, fire investigators took part in some 477 or 74%. Police patrol and detectives took part in 165 or 26%. Inter-city variation ran from a low of 54% in City 70 to a high of 97% in City 24, for fire investigators conducting or assisting in interviewing. These data reflect the importance of training fire investigators to a degree commensurate with their heavy responsibility in collecting testimony.

Police investigator activity levels varied from as few as two interviews in City 24 and City 33 to a high of 65 in City 70. Police testimonial actions averaged 20 for all sites. City 70's rate was nearly twice the next highest city and three times the mean. City 70's police gathered more than half of all the testimonial evidence collected by police in the sample. Police investigators and patrol officers in City 70 performed 58% of all the testimonial activities observed in the sample. This underscores the distinctive nature of City 70's operations. This feature explains, in part, City 70's high on-scene arrest and overall arrest rate. We cannot rule out the possibility that it is an effect, rather than a cause, of the high arrest rate. We note that the association exists, but it awaits a more rigorously-focused study to resolve which way the arrow points in this causal relationship.

Compare the activity rates for fire and police investigators in City 17 with those in City 70. These two cities are comparable in terms of organizational profile, staffing ratios of fire and police investigators, city size, and other factors. The level of fire investigative activity is roughly comparable (84 vs. 77). City 70 almost doubles City 17's rate (65 vs. 34).

Standard Procedures.

Proper and productive questioning requires the mastery of a number of legal issues, the skilled employment of psychology, and a salesmaster's intuition about what contacts to pursue and which to pass up. These combined requirements make interviewing witnesses and interrogating suspects the most rewarding or the most frustrating aspect of field work.

Actual procedures and the order in which they are performed vary with the fire investigator and the fire's circumstances. Typically, the testimonial evidence collection process begins with an informal interview of the fire suppression officer in charge. From this interview, the investigator may obtain both direct evidence and leads for additional interviews. The officer-in-charge may point out fire fighters with specific information, the gist of any contact with the property owner occupant, witness, or bystander. Armed with this information, the investigator must make decisions about whom to interview, whether the investigator or police patrol officer conducts the interview or just screens witnesses and takes names and follow-up contact information for later interviewing. Investigators must balance the higher productivity of prompt interviewing against the need to evaluate the fire scene and let fire crews complete their responsibilities and return to service. If the "dig" will be lengthy; other fires are waiting to be investigated; or the investigator is unable to locate one or more interviewees, testimonial evidence collection may perforce be delayed.

Like playing a hand of bridge, there are an infinite number of ways in which to assess the outcome and play the hand, but only a limited number of ways to maximize the results. Knowing the order in which to play the hand, who and what to finesse, and who should play the hand have their direct counterparts in arson investigation testimonial collection. When interviewing, fire investigators walk a fine line between interviewing and interrogating a suspect. Fire investigators have to observe the distinction between interviewing to determine the facts of cause and interrogating to determine involvement. If an investigator questions a subject (who later becomes a suspect) about a fire's cause, the investigator does not have to Mirandize the subject. However, when in the mind of the investigator the subject becomes a suspect, or is substantially detained by the investigator, the Miranda warning is a necessary safeguard against violating the suspect's rights. We observed several instances in which investigators knowingly glossed over this distinction.

Once the "hot" testimonial leads are completed, investigators must consider the value of conducting a neighborhood canvass. An evaluation of solvability factors and case importance should precede this decision. Our review turned up many instances (especially involving fire department investigators) where there appears to have been a reluctance to canvass the neighborhood. In the opinion of those interviewed, smaller communities may enjoy an advantage over larger ones in the productivity of neighborhood canvasses. (It appears that neighborhood watch programs and like citizen participation programs are beginning to reclaim the citizen's necessary role in crime control.) All cities need to carefully manage canvassing to get the best return on their time investment.

Police participation, selection of naturally-gifted personnel, extensive training, intensive management of patrol and investigative resources, and the ability to allow testimonial collection skills to season to full maturity in each investigator's tenure appear to be elements of the better performing cities.

We observed other situations which tended to jeopardize case development, including failure to abide fully with a suspect's constitutional rights to request the presence of a lawyer, and improper threats to cause delays in insurance payments if the occupants would not agree to submit to polygraph examination. These procedural weaknesses signal the need to strengthen unit quality-control measures. One practice that we observed to be a frequent dead end was fire investigators relying on the power of the polygraph as an interviewing medium, rather than relying on immediate interrogation. All too frequently, polygraph appointments end in scheduling and no show problems. Consequently, cases "cool off," side-tracking follow-up efforts on the case to the likely detriment of the case outcome.

Frequency of Collecting Various Types of Testimonial Evidence.

Caution should be used in reviewing the data from the table below. The apparent collection rate for the various types of testimonial evidence may vary the actual number of these activities that actually occurred. Necessarily, the data in the following table is derived from the case file documentation and may represent only a partial inventory. Some investigative units may have failed to document certain types of activities in their case files. The failure to fully document activities suggests that this accounting of testimonial evidence collection is conservative. It may be a truer indicator of the relative frequency of the various forms of testimonial evidence, than the absolute numbers.

The table below tracks 11 different sources of testimonial evidence. Overall, the 994 items found in the 909 cases in the sample translate into slightly over one item of testimonial evidence per fire incident. If it is assumed that most items were taken in arson investigations (N=646), then the average number of items would increase to 1.5 per incident.

What does this data suggest about optimal effort levels of testimonial evidence collection? It is difficult to derive an ideal per case average. It appears that cases which appear to investigators to have little prospect of solution are less likely to have testimonial evidence taken, and even less likely to have testimonial evidence documented. The amount of testimony tends to vary with the importance of the case in the eyes of the investigator, rather than on the basis of the needs of the case.

Unit supervisors who find upon review of a representative sample of cases that investigators average less than 1.5 items of testimonial evidence per case may wish to delve deeper into this aspect of unit performance.

Type Testimonial Evidence	Frequency	Per Cent
Owner/Occupant Statement	281	28.3
Witness Statement	221	22.2
Fire Fighter Statement	157	15.8
Suspect Interview	110	11.1
Out-of-Court Confession	77	7.9
Bystander Statement	60	6.0
Other Statements	37	3.6
Informant Statement	26	2.6
Police Patrol Statement	16	1.6
Employee Statement	6	.6
Surveillance Report	3	.3
Total	994	100%

Testimonial Evidence Utilization.

Testimonial evidence's main value is to develop the suspect(s) in the case. We reviewed each case to see what information was available from persons on-scene that would help establish the solvability of the crime. We looked at five degrees of information about the suspect. Degrees of suspect development included whether a suspect was any of the following:

- identified
- described
- named
- interrogated
- arrested.

A total of 247 suspects was identified in the eight sites through on-scene testimonial gathering activity. Of this number, 231 were named, indicating a high degree of familiarity with a suspect by statement givers. A little less than one-third this number, 86, were eventually arrested on-scene (out of 191 total arrests) and, of the 86, 64 were interrogated on-scene. This data is distorted by the subset of each city's sample of cases (20 of 120 nominally) that were specifically tracked because they were known to have ended in arrest. Table 3.21 below (On-scene Suspect Development) displays this cross-tabulated data by city. Unfortunately, we were not able to program the statistical output to track cases through to correlate the cases with suspects named at the scene to determine how many of these ended in arrest, trial, and conviction.

Unit managers interested in conducting a retrospective audit may wish to sample case files to compare the ratio of suspects named on-scene to the number of suspects ultimately arrested to determine whether there is a satisfactory capture ratio for the unit or exhibited by a particular investigator. This method may help deepen the insight into unit and individual performance by looking at antecedant conditions as opposed to end-result clearances.

TABLE 3.21

Table Showing Degree of On-Scene
Suspect Development By City

	City								Total
	17	24	33	44	57	60	70	87	
Described	13	9	18	6	12	6	9	9	82
	15.85	10.98	21.95	7.32	14.63	7.32	10.98	10.98	100.00
	15.85	10.98	21.95	7.32	14.63	7.32	10.98	10.98	
Identified	20	27	26	27	37	23	48	39	247
	7.87	10.63	10.24	10.63	14.57	9.06	18.90	15.35	97.24
	8.10	10.93	10.53	10.93	14.98	9.31	19.43	15.79	
Named	18	27	28	26	36	19	43	34	231
	7.79	11.69	12.12	11.26	15.58	8.23	18.61	14.72	100.00
	7.79	11.69	12.12	11.26	15.58	8.23	18.61	14.72	
Interrogated	6	10	8	13	7	4	10	6	64
	9.38	15.63	12.50	20.31	10.94	6.25	15.63	9.38	100.00
	9.38	15.63	12.50	20.31	10.94	6.25	15.63	9.38	
Arrested	9	5	13	16	5	7	24	7	86
	10.47	5.81	15.12	18.60	5.81	8.14	27.91	8.14	100.00
	10.47	5.81	15.12	18.60	5.81	8.14	27.91	8.14	

3-91

Assessed Errors in Testimonial Evidence.

In connection with testimonial evidence collection, we looked at three on-scene error modes observed in the retrospective analysis of fire incident files. The three error modes were defined as follows:

- 1) Interviews not conducted in a timely manner
- 2) Fire environs not canvassed for witnesses
- 3) Witnesses allowed to depart scene before being identified.

Among the eight sites, 165 errors were adjudged to have occurred, or an average of 20 such errors per site. The failure to conduct interviews in a timely manner marred 71 cases. Failure to canvass the fire environs for witnesses occurred in 69 cases. Permitting witnesses to leave the fire scene before being interviewed evidently took place in 25 cases.

For unknown reasons, the smaller cities (44, 57, and 60) appeared to have far fewer problems than larger cities on these particular points. As you will note from the table below, the failure to conduct interviews in a timely manner is primarily a difficulty experienced by the larger cities. Cities 17, 24, 33, 70, and 87 experience error rates two to six times the rate for the smaller cities. Similar, but less striking, correlations occurred between city size and the increased incidence of failures to canvass the area for witnesses. The tendency of arson investigations in large cities to experience a disproportionately higher incidence of these errors raises two questions. Is the error rate related to city size and social factors (less cooperation from citizens who may not wish to be involved; citizens in smaller communities more approachable; investigators know smaller cities more intimately)? Or, is the error rate related to operational handicaps of large city arson units (greater travel distances, lack of staff, more simultaneous calls, etc.)?

The available data does not permit us to answer whether these or other factors account for the relationship between city size and error rates.

3-93

TABLE 3.22
 Cross-Tabulation of Assessed Error
 in Testimonial Evidence Collection

	City								Total
	17	24	33	44	57	60	70	87	
Interviews Not Conducted In Timely Manner	13 18.31	15 21.13	12 16.90	3 4.23	2 2.82	4 5.63	12 16.90	10 14.08	71 80%
Fire Environs Not Canvassed For Witnesses	26 37.68	11 15.94	7 10.14	7 10.14	1 1.45	0 0.00	10 14.49	7 10.14	69
Witnesses Allowed To Leave Scene	9 36.00	2 8.00	2 8.00	0 0.00	0 0.00	1 4.00	7 28.00	4 16.00	25

City-Specific Summaries.

References in the following city-specific summaries are to Table 3.24 (Cross-Tabulation of Testimonial Evidence Collection by City and Type Personnel).

City 17:

Overall, City 17 was the third most active city in the sample of physical evidence, while experiencing the highest number of defects. Fire department investigators were the most active, collecting 84 items of testimony; this represents 70% of all the testimonial evidence collected. City 17 collected an average number of statements from bystanders, witnesses, and suspects and was above average in terms of owner/occupant, informant, and fire fighter testimony found in the files.

City 24:

Overall, City 24 ranked second in the amount of testimonial evidence collected, but had the highest number of deficiencies related to failure to conduct interviews in a timely manner and recorded the second highest rate of deficiencies in canvassing the fire environs. Suspect interviews were conducted in an exemplary manner. Unlike City 33's fire department that reassigned its only interrogation room to other activities, suspects in City 24 were interviewed in special rooms by one investigator inside and by one investigator taking notes in an observation room. The interviews were well-conducted and documented. (However, it appears that a number of investigations were abbreviated.) The thoroughness may be due in part to their operation as two-man teams. These fire department investigative teams accounted for 94% of the evidence gathered. Some investigators serve as polygraph examiners.

City 24 logged above average rates for fire fighter statements (1st place overall), bystander (1st), witness, informant, and out-of-court confession testimony. City 24's rate for owner/occupant statements and suspects was average.

City 33:

City 33's reporting and filing weakness may account in large measure for the ostensibly low collection rate. The files contained the least amount of testimony from fire fighters, bystanders, witnesses, owner(s)/-occupant(s), and suspects. City 33's files were below average in all other categories. Testimonial collection deficiencies were average. Fire department personnel collected 95% of the testimonial evidence.

City 44:

City 44 ranked third in the fewest number of assessed deficiencies and seventh lowest in the amount of testimonial evidence collected. Fire department personnel collected 60% of the testimonial evidence in the files. Below average collection rates were found in the fire fighter, bystander, owner/occupant, and informant class. Average collection rates were observed for witness and suspect. In the number of out-of-court confessions taken and miscellaneous sources, City 44 was above average.

TABLE 3.24

Cross-Tabulation of Testimonial Evidence
Collection by City and Type Personnel

Testimonial Evidence Taken By:	17		24		33		44		57		60		70		87		Total	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Fire Investi- gator	84	69.4	63	97	35	95	42	60	50	60.5	59	92	77	54	67	88	477	73.7
Police Department Investigator	34	28	2	3	2	5	26	37	22	30	5	7.9	65	46	9	12	165	25.6
Testimonial Col- lection By Others	3	2.5	0	0	0	0	2	3	1	1.5	0	0	0	0	0	0	6	0.7
# Total For All Personnel	121		65		37		70		73		64		142		76		647	
% Total For All Personnel		18.4		10.1		5.8		10.6		11.2		10.0		22.0		11.8		100.0

3-95

City 57:

City 57 was observed to have the fewest number of deficiencies in on-scene testimonial evidence collection. Some 70% of the testimonial evidence was collected by fire department personnel. In terms of volume, City 57 occupied 5th place. City 57 scored above average in the number of informant statements and took first place in suspect interviews. Average rates were observed for fire fighter, witness, and owner/occupant statements. The fact that there were only two principal investigators (one fire and one police) and that both were well trained, experienced, and motivated may account for the lower error rate. The amount of documentation missing from City 57's case files may have perturbed the error rate and potentially might weaken this potential association.

City 60:

City 60 ranked sixth overall in volume of testimonial evidence gathered. Fire department investigators gathered 92% of the testimony. City 60 ranked first in the number of bystander statements obtained and average in the rate for fire fighter, witness, owner/occupant, informant, and suspect testimony. City 60 had the fewest out-of-court confessions. Several cases had workable leads requiring interviews with identified suspects or witnesses with potentially valuable material and relevant information about the fire, and yet these interviews apparently never occurred. The arson investigators tended to rely heavily on polygraph examinations. Few reports indicated that investigators conducted thorough neighborhood canvasses for leads or conducted interviews of identified suspects.

The Fire Department uses Police Department polygraph examiners. Fire investigators stated that it averaged one month to get a polygraph appointment set up. (One suspect died in a plane crash and another repeatedly cancelled the appointment until the investigators eventually stopped pursuing the case.) The difficulties with interview procedures may be a reflection of a need for more investigators, more careful case management, better training of investigators, or all of these.

City 70:

City 70 had the highest percentage of police involvement and seemingly was the most effective system in gathering testimony in terms of volume. Balancing this performance is its ranking as having the second highest number of errors observed.

From on-site evaluation, City 70 appears to expend the most effort to collect testimony and is rewarded with the best results of any city visited. City 70 ranked first in the amount of witness, owner/occupant, out-of-court confession, and police statements. Average or slightly below average rates were observed for bystander, informant, and suspect interviews. The involvement of patrol personnel and the strong administration present in the police arson unit appear to be linked to the overall excellence of the performance and the clearance rates.

City 87:

City 87 collected an above average amount of testimonial evidence while experiencing an average error rate. Categories in which above average collection rates took place include owner/occupant testimony and suspect interrogation (1st place overall). Average rates were experienced for bystander, witness, informant statements, and out-of-court confessions. Fire fighter testimony ran below average.

3.3.3 Special Investigative Issues

Arson Investigative Techniques

As previously noted, one of the most frequently repeated myths is that arson investigation and prosecution are extremely difficult because the evidence has been destroyed by the fire, virtually eliminating any proof of the crime. Too often this myth has served as an impediment to successful arson prosecution and has a self-fulfilling prophecy precluding further investigatory effort in the use of imaginative, resourceful legwork that would lead to an arrest and conviction. A review of arson investigative techniques and appellate decisions concerned with the sufficiency of evidence presented to sustain a conviction clearly establishes that technical expertise in the analysis and determination of incendiary materials and points of origin, coupled with traditional investigative techniques that have been used in the past to solve complicated fraud cases, can successfully combat arson. This is especially so in cases concerning the crime of arson with intent to defraud an insurer.

As noted by one writer on the subject, "one of the most widespread and difficult types of arson to prove is inner-city arson for insurance fraud."

The classic pattern of inner-city arson starts with the purchase of real estate for the purpose of a rental property investment. Inner-city real estate has always been considered an excellent investment. Inflation, which caused most investment properties to double and triple over the last ten (10) years, has had a much smaller impact on inner-city property, and the increase in rental income has added to the attractiveness of this investment. Most inner-city real estate investors can completely retrieve their initial investment in less than three years, not including the excellent tax advantage real estate offers. There is one catch, however, to making inner-city real estate profitable - the landlord (property investor) must maintain the building in a livable condition. . . . But once the building becomes run down . . . the inner-city real estate investment is no longer profitable.

At this time, a greedy property investor initiates his scheme to "sell his property to the insurance company."

There are many leads that will enable an arson investigator to develop and establish circumstantial evidence that a fire was set for the purpose of defrauding an insurance company. It is possible to prove an arson-fraud scheme without necessarily establishing direct evidence linking a suspect to the fire scene or to the initiation of the fire, itself. Some of these leads and investigative avenues that should be explored are as follows:

1. The presence of incendiary material.

2. Multiple points of origin of the fire. (Under most insurance policies, the building or structure must be totally destroyed or destroyed to the point where renovation, replacement, or repair is not physically or economically feasible. Therefore, a property owner or other interested party will usually initiate multiple fires in a building or structure to assure a total loss.)
3. Location of the origin of a fire in a building or structure. (Fires that appear to have been started, for example, in the middle of a room away from combustible material that may support conflagration could indicate that the fire was of incendiary origin. In addition, by common practice, many insurance adjustors will declare a fire a total loss if the roof has been destroyed.)
4. Holiday fires and suspicious hours. (Fires occurring during occasions when tenants, occupants or others are away may be indicative of arson. A person committing arson with intent to defraud an insurer, either as a principal or accessory, will try to avoid any witnesses or any injuries or fatalities that may trigger a high-priority investigation by law enforcement personnel.)
5. Vacant building and/or recent departure of occupants. (In the absence of some showing of accidental or providential cause, a vacant building or recently vacated building should not simply spontaneously burn. A fire in a vacant building should be thoroughly investigated to determine if there is an incendiary origin. Circumstantial evidence of arson with intent to defraud may be shown where a landlord or property owner orders a building to be vacated by its tenants or occupants shortly before a fire occurs. Again, a property owner intending to defraud an insurance company through arson will try to avoid any injuries or fatalities that may trigger a full-scale investigation.)
6. Removal of objects and valuables from building. (As noted by one writer, "property investors who . . . involve themselves in this type of criminal activity often give themselves away by demonstrating their greed in removing all valuables from the property before the arson is set." There are some salvage theft rings that will pay a "torch" for the opportunity to strip a building of plumbing, electrical and other fixtures before a fire.)
7. Recent sales and insurance coverage. (In order to obtain the maximum possible proceeds from an insurance company, a property owner or other interested party may arrange a number of "paper" sales through a succession of dummy corporations or straw men inflating the purchase price successively higher with each transaction. An examination of deeds or other instruments recorded in the public records of a municipality or county may show, for example, that only

the minimum documentary or surtax stamps were affixed to the succession of deeds indicating a "paper" transaction. In addition, an examination of records from the Secretary of State of a particular jurisdiction or corporation counsel for a city may show that the principals involved in a "shell" corporation are the same persons who owned the property before the series of transactions leading up to insurance coverage and the fire, itself.)

8. Habitual claimant or multiple claims. (A property owner or other interested party who has sustained fire losses on insured property in the past would probably be a good target for investigative effort.)
9. Recently obtained insurance. (Evidence that a property owner or other interested party has recently obtained insurance is circumstantial evidence pointing toward arson with the intent to defraud where the fire follows closely after the insurance coverage was obtained. In addition, another fact that may be correlated with recently obtained insurance coverage may be a situation where the property owner has mortgaged the property and obtained loan proceeds secured by a building or other property. In such a case, the insurance proceeds may be payable directly to the bank or lending company. And in this case, the property owner may contend that there was no profit motive in obtaining the insurance, but in actual fact the owner has received his "profit" prior to the fire.)

All of the foregoing factors are indications which may be considered by an arson investigator in evaluating a fire of suspect incendiary origin. Often in situations where an investigator is unable to initiate an arson investigation for many months following a fire, the records and paper trail established in deeds, mortgages, insurance policy applications, and other evidence will remain on the record and be available for consideration. It should be kept in mind, however, that it is still necessary that the state establish that the fire or burning was of an incendiary origin.

A review of appellate cases from the jurisdictions covered by this arson research study shows that, through conscientious investigative effort and legwork, sufficient circumstantial evidence can be easily obtained to support and sustain a conviction. In Commonwealth v. Smallwood, 350 A. 2d 827 (Penn.), the reviewing court found that evidence showing that the defendant was observed only a few doors from the fire scene within ten to twenty minutes following discovery of the fire, coupled with rebuttal of the defendant's alibi, was sufficient evidence to support a conviction of arson. This case should highlight in some respects the importance of fire suppression personnel observing the fire scene and immediate environs when responding to a call, as well as concentrating on the immediate goal of extinguishing the fire.

In Miller v. State, 566 SW 2d 614 (Texas CR. App. 1980), the reviewing court affirmed a conviction of guilt for the crime of arson with intent to defraud where the evidence presented at trial showed that:

1. The defendant/owner was present shortly before his restaurant was observed to be on fire.
2. The owner tried to notify customer and employees that the restaurant would be closed on the day that the restaurant burned.
3. The owner was observed to have left the fire scene hurriedly.
4. There was insurance coverage on the restaurant.
5. The owner tried to cover up his whereabouts on the day of the fire.
6. Volatile, combustible material was found at the fire scene.

It will be noted from a review of the foregoing case, that no direct positive evidence either of the eyewitnesses or extrajudicial admissions, were present. The case turned on circumstantial evidence that was developed by the investigators through the interview of employees, patrons and others. There will be few cases in which the accused is found "with the smoking pistol" in his hand. Although the defendant will not be observed holding a gas container, investigative efforts culminating in the development of circumstantial evidence as described above can be used to sustain a conviction.

Another case serves as an example of how circumstantial evidence can be developed to sustain a conviction. In People v. Starke, 60 P. 2d 595 (Cal. 1936), the reviewing court found the evidence sufficient to sustain a conviction of guilt where the prosecution's case established that:

1. The defendant's cafe was insured at the time of the fire.
2. The defendant's financial records showed that he had lost money on the operation of the cafe.
3. The defendant was alone in the cafe before the fire.
4. Petroleum products were found at the fire scene and an expert witness identified the cause of the fire as being due to the ignition of the petroleum products.
5. The defendant provided conflicting statements concerning his whereabouts at the time of the fire.

3.3.4 Report Preparation

Equally as important as the thorough investigation and analysis of an arson fire scene and the pursuit of leads and suspects is the preparation of reports detailing a fire investigator's progress in the course of handling a case. Too often, however, reports detailing what has been done in the course of an investigation and developments to be pursued are either seriously deficient or non-existent.

Problems encountered in reviewing reports included:

- Failure to document corpus (establish the facts of the crime and the investigative activities that eliminated accidental causes)
- Inconsistent documentation (internally inconsistent or conflicting statements of fact)
- Incomplete or missing reports (inability of unit to locate documentation after a substantial waiting period)
- Failure to update/close out case files
- Inadequate file maintenance

Table 3.25 displays the relative frequency of observed documentation deficiencies among the study sites.

In addition to poor report preparation, studies of arson investigative units in the selected jurisdictions covered by this study showed that file maintenance was also a serious problem. For example, in one of the study sites, it was observed that 25% of the files were incomplete or missing. Inadequate file maintenance and preparation of reports may result in poor follow-up or no follow-up with respect to cases that might otherwise have led to successful prosecution.

Again, with respect to this study site, it was observed that few reports were dated; and of those that were dated, several showed significant delays between the initial investigation and ultimate write-up (a four-month delay was the longest observed, and two others were written up several months after the last action taken on the cases). It is difficult to understand how supervisors can maintain effective control over the investigation of cases and suggest appropriate investigatory follow-up when arson reports and file maintenance are incomplete or non-existent.

In another study site, it was found that where the team concept was utilized, involving fire personnel and police detectives, proper report writing was a problem for both fire investigators and police. On the fire investigators' side, it was found that these investigators were usually unable to prepare a follow-up investigative report. The fire investigators--principally because of their lack of training in criminal law and investigatory procedures--lacked a basic understanding of the rules of evidence and probable cause. Where fire personnel fail to understand that

TABLE 3.25

Cross-Tabulation of Documentation Errors Observed In Fire Investigation Files By City And Type Error

	City								Total
	17	24	33	44	57	60	70	87	
Corpus Not Established in Fire Investigation Reports	4 .4 36.4	0 0 0	0 0 0	1 .1 91	0 0 0	3 .3 27.3	3 .3 27.3	0 0 0	11
Inconsistent Documentation	6 .7 25	1 .1 4.2	1 .1 4.2	6 .7 25	3 .3 12.5	1 .1 4.2	6 .7 25	0 0 0	24
Investigative Records Incomplete, Missing	7 .8 6.7	7 .8 6.7	18 2 17.3	11 1.2 10.6	33 3.6 31.7	12 1.3 11.5	13 1.4 12.5	3 .3 2.8	104 11.4
Fire Incident Reports Not Updated	1 .11 2.6	1 .11 2.6	9 23.7	8 .9 21.1	10 1.1 26.3	3 7.9	4 .4 10.5	2 .22 5.3	38 4.2
Total Documentation Errors (%)	18 10.1	9 5	27 15.3	26 14.7	46 26	19 10.7	26 14.7	5 2.8	177 100

NOTE: This table attempts to quantify the quality control of the documentation. While based upon a degree of subjectiveness, the numberings agree with the research team's impressions. Note that a data analyst (not a member of the team, or with privity to the research team's opinions), concurred with our evaluation.

probable cause is necessary to obtain an arrest, search warrant or an indictment, the entire prosecutive process may be jeopardized by failure to set forth the necessary evidence.

Reviews of arson investigation reports from several study sites showed that the investigators reached conclusions unsupported by the evidence and had a tendency to bridge the chasm between suspicion and proof without adequate evidentiary support. In some instances, the reports revealed a res ipsa loquitur attitude toward establishment of probable cause in an arson investigation. Even in cases where the fire personnel and police detectives have received proper training in evidence and probable cause requirements, inadequate reports which fail to document the observations made and the steps taken to pursue leads may result in a prosecuting attorney reviewing the reports and declining prosecution.

But, the bulk of the cases presented to the prosecutor needed no finely argued exposition of cause. The cases ended in arrest because the suspect could be identified by an eyewitness or the suspect had confessed. An investigator can be lulled into poor practices by a case load that seems to break cleanly into two unequal parts: the unsolvable and the "gimmies." Cases without leads are unlikely to benefit from the most exhaustive detailing of the establishment of the corpus of the crime, while the "gimmies" turn on the direct evidence; the investigator's report can afford to be perfunctory.

We reviewed reports (even by trained detectives in some instances) that were poorly organized; lacked adequate documentation; and would have been very difficult for a prosecutor to use to evaluate the merits of a complaint request, or in planning strategy.

What may be more important, case managers cannot fully evaluate the solvability factors of a case based on poorly-organized and developed statements of fact. The supervisor is also at a disadvantage in monitoring case developments and investigator performance.

A proposed format for an arson investigation report should set forth and contain the following information:

FIRE REPORT NO. _____ CASE NO. _____ DATE _____

Subject: Owner:

Occupant:

Address:

County:

Telephone No.:

Fire: Date:

Time of Fire:

INVESTIGATION

REQUESTED BY: Name:

Address:

Telephone No.:

REASON(S) FOR

INVESTIGATION:

BACKGROUND

INFORMATION:

1. Dispatching agency.
2. Time and date dispatched.
3. Time of arrival on scene.
4. Custody of fire scene.
5. Conditions on arrival.
6. Estimated extent of damages.
7. Assisting agency.
8. Weather conditions.

PROPERTY

DISCRIPTION:

BUILDING

1. Occupancy Classification.
2. Construction type.
3. Number of stories.
4. Overall dimensions.
5. Diagram (Figure 1).
6. Legal ownership.
7. Code violations noted.

VEHICLE

1. Type of vehicle.
2. Make, year and model.
3. VIN or serial no.
4. Overall dimensions
5. Diagram (Figure 1).
6. Legal ownership.

INSURANCE:

1. Full name(s) of insured.
2. Policy number.
3. Insurance company.
4. Inception dates of policy.
5. Coverage under policy.
6. Adjuster*.
7. Agent*.
8. Mortgage.

*Name, address, telephone

FIRE CAUSE:

1. Level of fire origin.
2. Area of fire origin.
3. Point of fire origin.
4. Construction and contents of area of fire origin.
5. Itemized fact statements:
 - Burn patterns.
 - Evidence locations.
 - Natural/accidental causes.
6. Progression of fire.
7. Diagram of fire scene.

EVIDENCE:

1. Itemized evidence:
 - Description.
 - How marked.
 - Location found.
2. Laboratory used and case number.
3. Photographic data.
4. Disposition of evidence.
5. Chain of custody.

CASUALTY:

1. Name, address, telephone.
2. Date and place of birth.
3. Description of injury.
4. Hospital transported to.
5. Notification of relative (when and by whom).

INTERVIEWS:

1. Witness
2. Fire officer.
3. Owner/occupant.
4. Oral interview statement.
5. Suspect information (identification, location, description, suspect's vehicle) and statement
6. Fire Marshal's hearing

For each interviewee:

- Name, sex, date of birth.
- Home address.
- Home and work telephone.

MOTIVE:

The reason the suspect committed the incendiary crime. State conflicting motives if different from confession or rumors.

METHOD OF OPERATION:

Describe the method, system or manner by which the arsonist entered the building or vehicle and set the fire. Include other actions committed before, during or after the fire. Link other similar cases for possible correlations.

PROPERTY:

List an inventory made by investigator of the property found in the building or vehicle during examination of the fire scene. List items reported stolen or removed prior to the fire. Cross reference the above two lists with the Proof of Loss and include a copy.

BACKGROUND

REPORT:

Report background fire history and criminal history. Obtain the financial status of owners, occupants and suspects using financial waiver or subpoena.

1. Bank accounts and balances.
2. Outstanding loans or debts.
3. Credit bureau check.
4. Property listed for sale?
5. Warranty and trust deeds.
6. Federal tax liens.
7. Better business bureau reports.

Prosecution

Report:

1. Name, sex, date of birth.
2. Home address.
3. Home and work telephone.
4. Social security number.
5. Statute charged with and by whom.
6. Date of preliminary hearing.
7. Attorney for suspect.

COURT ACTION:

Defendant's name, date of hearing(s), charges (by section number), presiding judge, prosecutor and status and/or disposition of the case, including sentence.

3.4 FOLLOW-UP INVESTIGATION

Introduction

Follow-up investigation is the fourth stage of the arson control process. This stage marks the passage from the esoterica of arson forensics back to the application of the fundamentals of detective skills to solve and prove criminal conduct. Our task here, as in on-scene investigation, was to review the procedures employed at the eight sites and to identify and analyze the technical, administrative, political, and attitudinal factors. To the degree possible, the intent was to separate the plausible from the definitive factors bearing on case outcome. Based on this analysis, we were to recommend model methods, procedures, and system elements. The factors of greatest interest to us are the elements of the case, or the critical functions in its handling, that shunt the case either to continued success or failure.

With reference to the case sample, 43% of the cases entered the follow-up investigative phase. Less than half of the 43%, some 21%, continued on to the clearance phase. This case "mortality" rate of 22% compares to a "mortality" rate of 28% during the third phase, the on-scene investigation phase.

Our analysis implicated several major factors that compete in their explanatory power. Among these factors are the relative ratio of resources to case load, the organizational profile, the soundness of the procedures, and unit management. We find each of these factors plausible as contributing factors to case outcome, but only two of them--procedures employed and unit management--appear to be definitive factors. We will consider these factors in the following section outline order:

- Impact of Organizational Profile
 - Type of Personnel Involved
 - Standard Follow-up Procedures
 - Type of Follow-up Results Obtained
 - Source and Frequency of Observed Follow-up Procedures
 - City-Specific Analysis of Follow-up Practices
-
- Management and Administration
 - Personnel

3.4.1 Impact of Organizational Profile:

A comparison of process measurements: the percentage of cases receiving follow-up investigation and the percentage of cases ending in clearance were calculated for all eight sites from the retrospective audit of cases. Based on our reading of the data, two-tier systems emerged as having a slightly higher percentage of cases reaching the follow-up stage (46.8%), as compared to 40.9% for joint units and 37.4% for single agency systems. By a smaller amount, the percentage of cases ending in clearance is larger in two-tier systems (23.9%) than joint units (19%) or single agencies (19.4%). These data are weakly suggestive of better capture and throughput of cases by two-tier systems. Given the potential artifacts in the sample, it is plausible to argue that these findings are the result of chance or due to factors not otherwise controlled or accounted for.

TABLE 3.26
Impact of Organizational Profile
on Follow-Up Activities

	% Of cases Receiving Follow-Up Investigation	% Of Cases Ending In Clearance
<u>Single Agency Systems</u>		
City 24	42	16.9
City 33	32.7	21.9
	<u>37.4 (Average)</u>	<u>19.4 (Average)</u>
<u>Joint Units</u>		
City 57	42	20.5
City 60	26	14.7
City 87	53	22
	<u>40.3 (Average)</u>	<u>19.0 (Average)</u>
<u>Two-Tier Systems</u>		
City 17	38	16
City 44	50	21.7
City 70	52.5	34
	<u>46.8 (Average)</u>	<u>23.9 (Average)</u>

3.4.2 Type of Personnel Involved

The type of personnel involved in follow-up investigation is a function of the nature of the case (motive, severity); nature of the suspect (juvenile, mental, adult); organizational profile of the system; the extent of police powers and law enforcement training of fire department investigators; case management strategy (utilization of police patrol personnel, reassignment of case based on type crime); and the involvement of FBI, ATF, and local and state crime task forces.

In general, fire investigator involvement in follow-up investigation among the eight sites expanded during the study period. By the end of 1979, fire investigators participated to some degree in follow-up activities in all sites. In City 24, fire investigators customarily handled all aspects of the investigation. In the other seven sites, fire investigators often played a lead or co-equal role in documentary evidence searches, witness interviews, and suspect interrogations. In all but two of the cities (17 and 44), it was common for fire investigators to take part in arrest and search and seizure activities.

We have constructed three tables to illustrate the degree of fire department personnel involvement in documentary evidence gathering, suspect apprehension and interrogation. The third table summarizes fire investigator involvement in these first two activities and adds the third, suspect interrogation. Each of these activities is a milestone in investigative activity. We have combined measures of these milestones to build a composite picture of fire investigator involvement. The actual degree of involvement is difficult to measure directly, but, together, these measures serve as surrogates to suggest the degree of fire investigator involvement. In this manner, we seek to stress the importance of qualifying all participants in these activities through training and experience.

This section concludes with a prospective treatment of the involvement of other personnel in follow-up activities, such as insurance adjusters and investigative accountants.

Table 3.27 (Cross-Tabulation of Documentary Evidence Collection) notes that fire investigators take part in 68% of documentary evidence gathering compared to police investigator involvement of 28.8%. The percentages ranged from 16.7% in City 44 to 100% in Cities 24, 33, and 60. Fire investigator involvement in this phase was higher for this activity than for participation in either follow-on arrest or interrogation (44% and 48%, respectively). The table makes another point by showing that the frequency of documentary evidence collection only averages eight cases per site.

TABLE 3.27

Cross-Tabulation Of Documentary Evidence Collection (N=645)

	City								Total	%
	17	24	33	44	57	60	70	87		
Fire Investigators	7	13	5	1	3	10	1	5	45	68
Police Investigators	6	0	0	5	3	0	3	2	19	28.8
Evidence Technicians & Others	1	0	0	0	0	0	1	0	2	3
Totals	14	13	5	6	6	10	5	7	66	100

3-113

In Table 3.28 (Cross-Tabulation of Apprehension Activity by Type Personnel Involved and City), we looked at who apprehended suspects at that stage in the investigative process. Overall, 42% of those arrested were taken into custody on-scene: 3% by fire suppression personnel, 12% by fire investigators, 7% by police detectives, and 20% by patrol personnel. Paradoxically, fire investigators made more arrests (24%) during the follow-up phase than on-scene (12%). Not so surprising is the finding that police investigators raised their percentage of arrests made from 7% on-scene to 18% during follow-up investigations. Police patrol involvement dropped to 11% compared to the 20% patrol personnel involvement in on-scene clearance.

Involvement Of Insurance Industry Resources

Non-public resources may, in the future, contribute greatly to follow-up investigation. The need for better coordination with insurance adjusters, investigators, and sources of information has been recognized previously. The insurance industry and fire and law enforcement personnel may expand information sharing under new immunity legislation. During the period of our site visits, only one city, 17, had hired a civilian to maintain liaison with local and national insurance organizations.

The city-specific analyses that follow later in the section will provide details of fire and police follow-up responsibility on each site.

TABLE 3.28

Cross-Tabulation Of Apprehension Activity
By Type Personnel Involved And By City

	City								Totals #	Totals %
	17	24	33	44	57	60	70	87		
At Scene										
Fire Suppression	0	0	1	0	2	1	0	1	5	3%
Fire Investigators	1	4	6	2	0	4	3	4	24	12%
P.D. Investigators	1	0	0	7	2	1	4	0	15	7%
Other (Police Patrol)	4	1	7	8	3	1	12	3	39	20%
Sub Total #	6	5	14	17	7	7	19	8	83	42
% Of On-Scene Arrests	35%	26%	56%	71%	30%	39%	46%	30%	43%	
During Follow-Up										
Fire Investigators	0	12	3	0	8	9	2	13	47	24%
P.D. Investigators	7	1	0	5	6	1	13	1	34	18%
Other (Police Patrol)	3	1	5	1	1	1	6	4	22	11%
Joint (Fire & Police)	0	0	0	1	0	0	1	0	2	1%
Unknown	1	0	3	0	1	0	0	1	6	3%
Sub Total	11	14	11	7	16	11	22	19	111	57
% Follow-Up Arrests	65%	74%	44%	29%	70%	61%	54%	70%	57%	
Grand Total	17	19	25	24	23	18	41	27	194	
% Of Arrests By City	8.8%	9.8%	12.9%	12.4%	11.9%	9.3%	21.1%	13.9%	100%	

3-115

The clear association between organizational profile and the degree of fire investigator involvement is shown in Table 3.29. Although exceptions exist (for example, City 33's fire investigators involvement in only 2.7% of apprehensions), it can generally be said that the degree of fire investigator involvement is highest in single-agency units and lowest in two-tier systems. Overall, fire investigator involvement is significant, even in two-tier systems. If system managers find and accept similar involvement patterns by fire department personnel in their own system's follow-up activities as being beneficial, they should review the formal training that fire investigators receive in related law enforcement courses to insure that basic proficiency is achieved. On-the-job training and in-service training periods should be seen as supplements to, rather than substitutes for, formal training. A "horror story" encountered in the course of this study drives home this point:

"A fire investigator without formal law enforcement training in interrogation techniques had to fill in for the law enforcement-trained investigator one weekend. A multi-million dollar fire was set to cover a \$30 in coins vending machine robbery. A suspect was detained on the scene due to his suspicious behavior; and a legal search of his room in a nearby hotel yielded physical evidence sufficient to justify the arrest and interrogation of the individual. In the course of the investigation, the inexperienced fire investigator made a passing reference to "things would be easier for you if you'd come clean." The investigator neither amplified nor made further reference to this point. Sometime later, and apparently unassociated with this off-hand remark, the witness gave a full confession. During the preliminary hearing, and throughout the case, the judge cited that improper inducements were made by the investigator during the course of the interrogation, referring to the quote above. Released, the same suspect returned several months later to the city and burned down a drug treatment center, killing one staff member and one patient. It was the second fatal fire and third major fire known to have been set by the individual. The inexperienced investigator, soured by the experience, requested reassignment."

The city-specific analyses that follow later in the section will provide details of fire and police follow-up responsibility on each site.

TABLE 3.29

Fire Investigator Involvement In Three Follow-Up
Activities Arrayed By City Organizational Profile

	Fire Investigator Involvement in Documentary Evi- dence Collection	Fire Investigator Involvement in Apprehensions During Follow-Up	Fire Investigator Conducted Interro- gation Of Suspect
<u>Single Agency</u>			
City 24	100%	85.7%	100%
City 33	100%	2.7%	81%
<u>Joint Unit</u>			
City 57	50%	50%	34%
City 60	100%	81.2%	78%
City 87	71.4%	68.4%	87.8%
<u>Two-Tier System</u>			
City 17	50%	0%	20%
City 44	16.7%	14%	18.5%
City 70	20%	13.6%	11.9%

Consultation With Insurance Adjusters

As an additional matter, arson investigators working in states with arson insurance immunity reporting statutes should consult with the insurance company and the adjuster who is handling a fire loss claim. Consultation with the insurance company and its adjuster may yield the following information:

1. Name of the owner of the building
2. The amount of insurance in force. If the insurance policy is for a large amount and the building is in a run-down neighborhood, or there exist other circumstances to show that the insurance coverage is in an amount in excess of the fair market value of the property, this may suggest investigative follow-up by the arson investigator.
3. The date the insurance coverage was obtained. If the fire follows only a short time after the insurance coverage was obtained, this may suggest that the fire, if of incendiary origin, was started to defraud an insurance company. The person obtaining the insurance should be questioned and other leads pursued.

Unfortunately, very few states have laws providing for uniform reporting of fires and exchange of information between insurance companies and law enforcement authorities. One of the major problems that insurance companies face in trying to assist law enforcement authorities in combatting arson has been the threat of civil suit and resulting liability where confidential information about an insured is disclosed to law enforcement personnel. In all but a handful of states, legislation has been enacted to grant insurance companies immunity from suit when they share arson-related information with law enforcement officials. This law, and others like it enacted in other state jurisdictions, will allow authorized agencies and arson investigators to obtain relevant information from an insurance company concerning a policy holder involved in a fire loss. As noted above, the arson investigator will be able to obtain information concerning history of premium payment and previous claims, as well as other investigatory information contained in an insurance company's files.

Participation of Investigative Accountants in Arson Cases

Another area of arson investigation that has only recently been explored concerns the role to be played by accountants engaged for the purpose of analyzing business and financial records to determine a possible motive for arson. (Fire Insurance Counsel Quarterly, Winter, 1981, p. 162.)

In the course of his investigation of a case, a Certified Public Accountant may review the following matters:

1. Frequency of preparation of financial statements, those for internal purposes and those that are audited.
2. Receivables, assets, stocks that are factored, pledged, or assigned as liens.
3. A review of local, state and federal income tax returns for preceding years. Tax returns prepared after the arson loss.
4. Performance of an analysis of the various liquidity and current earnings ratios to evaluate the insurer's ability to continue operations and pay off debts, as well as to obtain an indication of the amount and degree of financial leveraging in the company.
5. Statement or summary of the source and application of funds, increases in borrowings, possible fire collections of proceeds from insurance companies on other claims.
6. Analysis of inventory levels and a review of records for any significant changes in inventory levels.
7. Analysis of loans to or from officers, directors, or family members of the insured company.
8. Increase in the number of C.O.D. purchases, an inability to pay current bills, and tardiness in making deposits of employee withholdings, payroll, sales or other taxes.
9. Increase in the number of bank overdrafts, the issuance of improper sales invoices for the purpose of obtaining advances from factoring companies or banks.

Through an accountant's role in an arson investigation, objective data may be obtained that will be helpful to the attorney and insurance adjuster in their handling of the case. Given constitutional considerations, the role of a Certified Public Accountant lends itself more readily to a civil arson insurance defense case. However, with the passage in time of arson immunity reporting statutes, state prosecutive teams will also be able to take advantage of the pooled information obtained from such studies.

3.4.3 Standard Follow-up Practices

The confluence of many currents has brought about a noticeable improvement in on-scene arson investigation. We have observed that, without exception, arson investigative units in the eight cities studied have made advances in their on-scene skills. From a variety of sources, it appears that progress in this aspect of arson investigation is also occurring throughout America's medium and larger-sized cities. With on-scene practices improving, follow-up practices logically stand as the next area for improvement. Pressure to improve follow-up practices may come from:

- improvements in on-scene procedures should add to follow-up workloads
- UCR crime reporting has made arson clearance a higher priority
- municipal budget constraints in the near term are likely to decrease, rather than increase, the resources available. Thus, increased effectiveness through productivity may be one of the few avenues left open. Better follow-up procedures can compensate to a degree for lack of resources.
- newly-developed techniques, and new technologies, increase the likelihood that cases which were previously dead-ended can be solved through intensive and rigorous investigative follow-up.

Our observations disclosed numerous opportunities for improving clearance rates through the application of established practices. In some cases, investigators lacked the knowledge, but frequently they failed to apply skills that were apparently known to them and that they had demonstrated in previous investigations.

- closer scrutiny by arson managers will tend to reduce the number of cases without justified closures. From the retrospective sample, it appears that 13.3% of the sample (121 cases out of 909) received inadequate follow-up

Improving follow-up practices will not cure one over-arching difficulty investigators find all too common in follow-up criminal investigations. One investigator summed up this reality as:

"Its nothing like on TV, where the crime is solved in 60 minutes. It's tedious. You are bogged down with other cases and can't devote enough time to any of them. You end up compromising cases when you know if you had the time, you could have made a tight case."

This detective's words captures the essence of why the follow-up phase is at heart the exercise of discretionary authority. It's exercise has been a theme throughout this report. We have done this to stress the

need for managers at all levels to fulfill their responsibility for actively and knowingly involving themselves in the ongoing process of improving the exercise of discretionary authority. In the follow-up phase, discretionary decisions that are made include: what cases to work, who to assign, when to suspend an investigation, when to apprehend, and what changes to seek. A large responsibility is placed on each investigator and unit supervisor to ensure that the exercise of discretion contributes as a rational framework for arson control. Without matching effort to likely result and, in turn, likely result to its potential deterrent value, the managers in an arson control system are not likely to maximize their return on investment. Without a planned system, case follow-ups are likely to be catch-as-catch-can, with their potential to deter future arson a fortuitous by-product, rather than a planned end result.

The remainder of this section will consider the following

- Standard Elements of Follow-up Investigative Procedures
- Case Reassignment Policies,
- Use of Information Sources, and
- Interrogation and Apprehension.

Standard Elements of Follow-up Investigative Procedures

Among the standard elements of a complex arson case are:

Standard Procedures.

Follow-up Investigation

Investigator visits fire scene during natural visit conditions
Investigator reviews and analyzes financial records
Investigator confers with insurance company
Investigator obtains police record of possible suspects
Investigator determines presenting motives
Investigator files supplementary reports as necessary
Investigator prepares evidence and test requirements and submits evidence to laboratory

Investigator submits complaint request and supporting evidence for complaint
Investigator confers with prosecutor as necessary
Investigator locates suspects
Investigator obtains search warrants
Investigator serves search warrant
Investigator Mirandizes suspects
Investigator interrogates/polygraphs suspects
Investigator obtains statements
Investigator arrests suspects and arranges booking

Investigator obtains evidence from lab and maintains chain of custody
Investigator obtains photographs of scene
Investigator prepares prosecutorial file
Investigator attends arraignment and bond hearings
Investigator attends and testifies at preliminary hearings
Investigator attends and testifies before Grand Jury
Investigator issues subpoenas (including TV videotapes, insurance company, telephone, and financial institutions, as well as individuals)

Investigator reviews notes and confers as necessary with prosecutors
Investigator testifies in court

Investigator updates case records on trial outcomes
Investigator arranges to dispose of evidence as directed by court

Arson-for-Profit Special Follow-Up Procedures

Requisitions insurance information
Searches for, and obtains, other financial, title, mortgage information
Confers with experts in financial, insurance, and related fields
Develops investigative flow charts
Conducts consensual monitoring

Most cases require far fewer steps to resolve than the listing given here. The complexity and diversity of the possible assignments indicate why investigators require well-rounded experience and training in order to make the most of the few leads that the majority of case files contain upon assignment to the investigator.

Case Reassignment Policies

A sound reassignment policy should give clear guidance on what types of cases should be followed-up, and if followed-up, by whom.

The jurisdictions in this study resorted primarily to working the cases with solid leads. It appears that more consideration was given to who should be assigned to a case than whether or not it should be worked. Some jurisdictions, like Cities 24 and 87, reassigned a case based on the complexity of the case. The more complicated or sensitive the case, the less likely the next investigator in rotation would be reassigned the case. Those making reassignment decisions relied primarily on a seat-of-the-pants judgment.

A danger to specialized investigative units is that they can become isolated from other resources of the crime control system. Arson units display this isolation in being unable or unwilling to reassign a portion

of their caseload to other units. Arson units might, for example, arrange with other units to handle "overflow" situations, or take over certain types of routine cases. The following examples illustrate reassignment techniques:

- City 70, more than any other unit reviewed, made the most effective use of patrol personnel to handle minor arsons
- City 70 was in the process of developing both a proactive juvenile arson education program and a reactive juvenile counselling program
- City 87 made standing arrangements to borrow burglary unit personnel during overload situations
- City 24 made arrangements with juvenile detectives to reassign minor arsons to them
- Philadelphia and the Bronx borough practice "distributive" case management. Supervisors determine which general or major crime unit will get a case based on its type, motive, and suspect. The arson unit handles the more complex arsons, such as arson-for-fraud cases.
- In Cities 17, 60, and 24, units permitted Bureau of Alcohol, Tobacco, and Firearm (BATF) agents to assume follow-up responsibility for certain cases

One of the most intriguing questions in follow-up practice is - Why are certain cases pursued and others not? Is there a rational, explicit basis for each unit's decision? Do units weigh the evidence, the severity of the crime, or the amount of property loss in their equation? And, in what ways do arson investigation units differ from police department special investigative units in their decision-making framework?

The type and amount of evidence are factors in follow-up investigation. Their presence can motivate the investigator to dig deeper to build a solid case, and can influence the granting of search and seizure and arrest warrants.

Use of Information Sources

The accompanying table (Cross-Tabulation of Follow-Up Investigative Activity by City) tracks the number of attempts to secure documentary information as recorded in the sample of case files. The reader should factor into his/her assessment the distortions inherent in the stratified case sampling technique; in the distortions involved when investigators have not fully documented their follow-up activities; and the unknown number of attempts to secure documentary evidence not reported by investigators. Given the lack of precision due to these factors, the data can only be termed suggestive of an apparent absence of significant differentials among the sites in the types and frequency of documentary evidence collection. Due to the mix of cases, documentary evidence collection was the exception rather than the rule for the vast majority of cases.

TABLE 3.30

Cross-Tabulation Of Follow-Up Investigative Activity By City

Frequency Row %	17	24	33	44	57	60	70	87	Total
Recent Business History	1 7.1	2 14.3	1 7.1	1 7.1	0 0.0	5 35.7	0 0	4 28.6	14 100.0
Recent Insurance Changes	1 14.3	1 14.3	0 0.0	1 14.3	1 14.3	1 14.3	0 0.0	2 28.6	7 100.0
Recent Legal Action	0 0.0	2 22.2	1 11.1	1 11.1	2 22.2	2 22.2	0 0.0	1 11.1	9 100.0
Prior Criminal Records	0 0.0	6 13.6	7 15.9	5 11.4	5 11.4	6 13.6	4 9.0	11 25.0	44 100.0
Surveillance/Stakeout	0 0.0	1 20.0	0 0.0	1 20.0	1 20.0	0 0.0	2 40.0	0 0.0	5 100.0
Other	6 26.1	1 4.4	3 13.0	4 17.4	0 0.0	3 13.0	4 17.4	2 8.7	23 100.0
Total	8 7.8	13 9.8	12 11.7	13 12.7	9 8.8	17 16.7	10 9.8	20 19.6	102 100.0

Complex, economically-motivated arsons compose a small fraction of any arson unit's case load (only 6% of the known motives in our case sample were believed to be arson-for-profit). Given this background, the analysis showed that, as expected, criminal history review was the most frequent document search conducted, accounting for 43% of all actions. Other actions in order of decreasing frequency were: "miscellaneous," with 22.5% of the total; "recent business history," with 13.7%; "recent legal action," with 8.8%; and "insurance coverage review," with 6.8%. Overall, these activities were undertaken in only 10% of the arson investigations sampled.

With the exception of City 17, information exchange with the insurance industry was atypical of most follow-up investigations.

Only City 17 had sent investigators to the BATF course on sophisticated case follow-up techniques, such as following "paper trails" and pattern analysis.

According to the case sample, fire investigators were as likely as police investigators to conduct suspect interrogations (111 to 106). The table below gives the ratio of fire and police investigator participation. This table shows that five of the eight sites experienced fire investigators conducting the majority of the interrogations. In Cities 44, 57, and 70, police detectives took the most active roles. In all three cities, fire investigators assisted in roughly half of the interrogations. Only City 24 recorded no police involvement.

Only two units had qualified polygraphers assigned to the unit. Three fire department-based units lacked appropriate interview facilities. In other cities, the unit primarily responsible for interrogations had facilities, or there were adequate police interview facilities available within the same building.

Table 3.31

Fire and Police Interrogation Frequency and Facilities

CITY	FIRE:POLICE INTERROGATION RATIO	REMARKS
17	1:4	Police interview facilities housed in same building
24	All Fire	Arson Unit has interview facilities
33	4:1	Police Interview facilities used, short travel involved
44	1:4	Police interview facilities housed in same building
57	1:2	Police Interview facilities used, same complex
60	3:1	Police Interview facilities used, lengthy travel involved
70	1:7	Police Interview facilities used, short travel involved
87	7:1	Police Interview facilities used, lengthy travel involved
8 Sites	1:1	7 police, 1 fire interrogation facility

Apprehension.

As in the case of search warrants, arrest warrants normally would have been prepared by police personnel and submitted through regular police channels. Investigators mentioned three reasons for fire investigators to depend on police personnel to perform this function:

- the legal powers of fire investigators to obtain arrest warrants or complaint requests may have been limited in certain jurisdictions
- even if authorized, some fire investigators preferred to let those more experienced individuals avoid the pitfalls
- police personnel were likely to have easier access to forms, facilities, etc., and desired the credit for the arrest.

Fire investigators frequently accompanied patrol or detectives to effect the execution of search and arrest warrants, although leaving the law officers to get credit for the "collar" and to get the dubious pleasure of taking the suspect through the booking procedure.

As mentioned earlier in this section, some 45% of the arrests occurred on-scene, and 57% during follow-up investigation. The cities varied in the percentage of follow-up arrests from a low of 29% in City 44 to a high of 74% in City 24. Differences in arrest requirements, the nature of the cases investigated, and the type of firesetters involved are believed to be the main influences that account for the differences found among the sites.

Fire investigators, including fire arson investigators, were responsible for 24% of the arrests; detectives, 18%; police patrol 10%; and joint arrests and unknown accounted for 3%.

Table 3.28 (Page 3-115) summarizes data from the sample concerning the percentage of arrests on-scene versus the percentage of follow-up arrests. Additionally, the table provides details about what types of personnel were involved in making the arrest.

Grounds for Arrest.

Figure 3.32 shows the frequency profiles for grounds for arrest in 185 cases in which conclusions could be made. From one to three grounds could be assigned for any case. We tracked six common grounds for arrest in the sample. The three most common grounds for arrest were: confession, positive identification by a witness, and physical evidence. We observed three less frequent grounds: similarity of M.O., suspect confessed or accused while under detention for other crimes, and a miscellaneous category to cover other exigencies.

The analysis provided few surprises. As one would expect, the most frequent ground or contributing ground for the arrest was positive identification of the suspect by a witness (involved in 58% of the arrests). The second most frequent ground was a confession (53%). These two grounds combined in 27% of the cases as the foundation for the arrest. In only 2% of the cases were positive identification, confession, and physical evidence all present.

Physical evidence was a basis for arrest in only 15.7% of the arrests. An intriguing question concerning the modest role that physical evidence played is whether this rate reflects inadequate evidence collection and processing skills or whether it indicates that the typical cases cleared, in truth, have little in the way of associated physical evidence. We speculate that the answer to the question is that physical evidence may become related to more grounds for arrest in the future, but that in the foreseeable future, it is not likely to rival positive identification or confession as a grounds for arrest. The characteristics of the majority of arsonists and their means of firesetting, the requirements for prosecution, and the present state of fire forensics militate against physical evidence more than doubling its present "share" of the grounds for arrest.

TABLE 3.32

Frequency Profiles for Grounds for Arrest

Positive Identification of Suspect (all comb.)	107	58%
Confession (all comb.)	98	53%
Positive Identification + Other	68	37%
Confession + Other	65	35%
Positive Identification + Confession	50	27%
Miscellaneous Other	43	23%
Positive Identification + Confession (Only)	41	22%
Positive Identification (Only)	39	21%
Confession (Only)	32	17%
Physical Evidence (All comb.)	29	16%
Positive Identification of Suspect + Physical Evidence (all comb.)	15	8%
Under detention for other crimes/multiple clearances	8	4%
Similarity of Modus Operandi (all comb.)	5	3%
Positive Identification of Suspect + Confession + Physical Evidence	4	2%

(1) Note: Includes circumstantial (5), implication (6), Other (16), Unknown (16).

Time Interval until Arrest.

The interval between initial investigation and arrest was broken down into five periods: 1-5, 6-9, 10-19, 20-29, and 30+ days. The number of cases with reliable data on the date of arrest was regrettably small (N=40). Based on this small number of cases, the following interval frequencies were derived:

1 - 5 Days	62.5%
6 - 9 Days	15.0
10 - 19 Days	5.0
30 + Days	17.5

The limited data suggest that nearly two-thirds of all arrests occur within five days of the initial investigation. This finding is consistent with other sample data that indicate that most arrests occur on-scene, and are due to high solvability factors presenting themselves to the initial investigator (confessions, eyewitnesses, or suspect and obvious fire setting). Approximately one-fifth of the cases took longer than 10 days to clear.

Investigative Man-Hours.

We were able to derive reasonably well-documented estimates of the number of man-hours taken to complete the arson investigation phase of 83 case histories (report files and follow-up interviews in 562 instances did not provide sufficient, timely data from which to develop an estimate). From this subset of the sample, the following man-hour ranges and percentages were calculated:

Man-hour Range	%	Cumulative %
1 Hour or Less	14.5	14.5
2- 3 Hours	16.5	30.0
4- 6 Hours	20.6	50.6
7-10 Hours	18.1	68.7
11-20 Hours	7.3	76.0
21-40 Hours	13.6	90.4
41 Hours or More	9.6	100.0

3.4.4. Type of Follow-Up Results Obtained

We will use a number of measures to try to picture the nature of the results of investigative process. Like explorers of any new frontier, our methods may seem elementary and our findings, at best, only approximations of realities and relationships that later researchers will find.

We have used a number of measures of process and outcomes in an attempt to compensate for the limited perspective each single measure provides and to compensate for the limitations inherent in the data sources. The multifactorial analysis we discuss below has the disadvantage of presenting data that may appear, and, indeed, in some cases is, inconsistent.

In reviewing the tables bear in mind that different data sources had to be relied upon in the cities to compile the basic data. Often, these different sources reported contradictory data. Even the same data source for the same time period might give two different data. Two or more decidedly different interpretations could emerge on a fundamental measure, like clearance rate, by reviewing the same department's internal and external reports (for example, an annual report versus a UCR report). Even more likely is that the definitions, usages, and records-keeping system over a three-year period have changed sufficiently to distort the consistency of the data.

We transformed the raw numerical data into percentages or rates to make it easier to compare data among the sites. Transforming the data also serves to protect the anonymity of the departments.

To begin this section on perhaps a controversial note, Table 3.33 associates the relationship of the degree of fire department involvement in follow-up activity with clearance data. The cities are ranked in ascending order of their degree of fire department involvement. Note that the best performers, in terms of the four measures tabulated, can be found in the middle of the ranking. Irrespective of the type of profile, the systems that have the most consistent results in these four measures have percentages of fire department involvement ranging from 40% to 70%. Cities 87, 33, 70, and 57 maintained significant participation by both fire and police agencies. Systems with too little police or fire department involvement proved weaker in these and other measures.

This finding directs our attention away from a discussion of the type of profile to the more important question of what the profile obtains in terms of both agencies' involvement. To illustrate this point, consider that the three two-tiered units' degree of fire department participation ran from 45.5% to 23% and 16.4%. Joint-agency units formed a mirror image with predominate fire department involvement (86.4%, 75.9%, and 44.6%). Table 3.33 also shows that the term "single agency" is somewhat of a misnomer, as both City 24 and 33 were assisted by police departments in the conduct of their follow-up efforts.

The table underlines the criticality of the follow-up phase. The remainder of this portion of the report will again take up this point.

TABLE 3.33

Relationship Of The Degree of Fire Department Involvement
In Follow-Up Activity To Clearance Data

City	Type Organizational Profile	% Of FD Involvement	% Of Cases Ending In Clearance From Retrospective Case Sample	Arrests From Case Sample	% 1979 UCR Clearances	% 1980 UCR Clearances
24	Single	95.0	16.9	20	14.3*	11.1*
60	Joint	86.4	14.7	17	8.0	35.1
87	Joint	75.9	22.0	26	8.6	12.7
33	Single	61.0	21.9	24	11.1	9.2
70	Two-Tier	45.5	34.0	42	41.0**	32.1
57	Joint	44.6	20.5	23	18.7**	17.9
17	Two-Tier	23.0	16.0	17	6.8*	11.1*
44	Two-Tier	16.4	21.7	23	55.0	37.2

* Other data strongly conflicts with the validity of these data. It appears these two cities underreported the number of cases found to be arson.

** 1979 UCR data not reported by City 57. Estimate based on best available derivative data

We evaluated the cases in our retrospective sample to attempt to detect relationships between the terminal point in the losses and the property loss involved. Does the amount of loss influence how hard a case is worked, all other things being equal? In Table 3.34, we consolidated the 13 investigative termination points we have used throughout our analysis of the case sample into seven phases and presented the cumulative percentage totals for each phase according to six classes of loss (missing, \$0, \$1-99, \$100-999, \$1,000-9,999, \$10,000 +).

The data convey the impression that case termination outcomes are not dependant variables of the amount of property loss. Only slight and inconstant differentials exist among loss classes for the various termination points. Comparing the \$10,000 + termination point percentages to the \$1-99 range, we see that by a slim margin more of the large-loss cases receive follow-up investigation; fewer are cleared without an arrest;

more have suspects arrested; and more end with suspects charged. Trial rates for these two ranges were virtually identical. The percentage of suspects charged reveals the most positive association between size of loss and the termination point: 10.6 per cent of the cases with losses below \$1,000 reached this point versus 14.6% of the cases over \$1,000.

Considering all cases ending in clearances (total of lines d.- g. in the table), cases with losses of \$10,000 + were less than 1% more likely to end in clearance than cases involving \$0 or nominal losses. An explanation for this may be that minor offenses which reach the prosecution phase tend to be strong in their evidence and resisted less vigorously. By comparison, more serious cases are likely to be resisted by the defendant. This possibility would account for the like percentages for both minor and major cases reaching the prosecutorial stage.

TABLE 3.34

Percentage of Cases Terminated
By Investigative Phase and Property Loss

	Property Value					
	No Property Value Given	\$0	\$1-99	\$100-999	\$1,000-9,999	\$10,000 +
A. No Case Developed Post Cause Investigation On-Scene	%	%	%	%	%	%
	70	73	56	60.5	41.6	45.9
B. Follow-Up Investigation Conducted	90	79	74	75.4	73.8	72.2
C. Cleared Without Arrest	90	82.2	80	83.1	81.5	76.3
D. Suspect Arrested	100	88.9	84.7	87.5	84.9	81.3
E. Suspect Charged		91.5	89.3	89.9	85.4	85.4
F. Suspect Tried		94.1	90.7	93.2	89.4	90.3
G. Suspect Convicted		100	100	100	100	100
All [Clearances (D-G)]	10	17.8	15.3	12.5	15.1	18.7

Study site clearance rates as a function of the number of incendiary, and suspicious fires dropped from 21.6% in 1977 to 15.5% in 1979. Workload, as measured by the reported number of incendiary and suspicious fires rose some 8% from an average of 437 to 474 per site. It does not appear that there is a direct, inverse relationship between incendiary and suspicious fire workrates. In absolute terms there appears to have been a general decline in the reported number of clearances and an increase in number of fires reported to be suspicious or incendiary.

TABLE 3.35

Reported UCR Clearance Rates For
Reported Incendiary And Suspicious Fires

Year	City								Overall
	17	24	33	44	57	60	70	87	
1977	11.4	N/A ⁽¹⁾	21.0	15.0	50.0 ⁽¹⁾	28	27.4	18.0	21.6
1978	7.8	21 ⁽¹⁾	13.8	7.5	22.0 ⁽¹⁾	16	19.0	16.2	14.2
1979	18.6	17 ⁽¹⁾	14.0	5.5	18.7 ⁽¹⁾	12	26.0	12.7	15.5

(1) Approximations only - incendiary and suspicious fire data not clearly maintained.

For the three-year study period, the total number of reported clearances dropped from a combined total of 988 in 1977 to 748 (75.7%) in 1978. The decline in clearances continued in 1979 to 689 (69.7%). The number of cases dipped slightly from 3,873 in 1977 to 3,797 in 1978 before rising to 4,671 in 1979. The reported combined clearance rate across all sites dropped from 25.5% in 1977 to 19.7% in 1978 and 14.8% in 1979.

Study site clearance rates, as a fraction of the number of incendiary and suspicious fires, dropped from 21.6% in 1977 to 15.5% in 1979. Workload, as measured by the reported number of incendiary and suspicious fires, rose some 8% from an average of 437 to 474 per site. While it does not appear that there is a direct inverse relationship between clearance rates and incendiary and suspicious fire workrates, in absolute terms there appears to have been a general decline in the reported number of clearances and an increased number of fires reported to be suspicious or incendiary.

As Table 3.36 below shows, we should distinguish between unit and individual workload figures. Unit workloads went up, but per investigator workloads went down.

TABLE 3.36

Clearance Rates (Clearances by Arrest and Exception Divided By Cases Referred Minus Unfounded)

	City								Overall
	17	24	33	44	57	60	70	87	
1977	11.4	33.0	18.6	22.0	40.0	39	47.0	16.4	25.5
1978	7.8	25.6	8.8	6.4	19.6	26	46.5	16.8	19.7
1979	6.7	14.3	11.1	5.5	19.1	22	41.0	18.6	14.8

For the three-year study period, the total number of reported clearances dropped from a combined total of 988 in 1977 to 748 (75.7%) in 1978. The decline in clearances continued in 1979, reaching 689 (69.7). The number of cases dipped slightly from 3,873 in 1977 to 3,797 in 1978 before rising to 4,671 in 1979. Considering all sites, the reported clearance rate dropped from 25.5 in 1977 to 19.7 in 1978 and, finally, 14.8 in 1979.

Does this apparent decline in clearances mean that despite all the recent advances, arson investigators are losing an uphill battle? Can it really be that only 58 clearances were made in 1979 for every 100 in 1977? If so, this would be alarming news. There may be a general decline in clearances, although it is unlikely that it is as dramatic as the data suggest.

One probable explanation is that six of the eight sites may be reflecting only declines on paper. As the UCR reporting requirement changed and interest in arson grew, better records-keeping has begun to take place. With better adherence to clearance and arson definitions would come fewer invalid arson-related clearances. Another explanation, although, perhaps less likely, is that such factors as the increased caseload experienced by five of the eight sites account for the smaller clearance rates. Instead, all but one of the sites with increased rates of reported arson showed declining clearance rates. This explanation does not account for the 1978 decline in clearances of 23, and the 76 fewer arsons. Moreover, higher workloads have been associated with more clearances here and in the Abt study that trailblazed the study of the relationship of clearances to workload.

As can be seen in Table 3.37, the cases per assigned arson investigator have dropped in five jurisdictions; fluctuated in one; and risen in two. Overall, the number of cases per assigned investigator has dropped from 116 to 95.5.

TABLE 3.37

Cases Assigned Per Investigator

	17	24	33	44	57	60	70	87	Overall Average
1977	126	26	70	105	200	59	235	110	116.0
1978	115	27	57	119	117	45	219	134	104.0
1979	145	31	68	92	123	46	144	115	95.5
3 year Average	130	28	65	105	146	50	199	120	105

City 24 consistently had the fewest number of cases per assigned investigator (3-year average = 28) and City 70 had the highest with an average of 199. This range is far higher than we had imagined. The trend toward reducing the caseload per investigator implies that new investigators may prove initially less productive. If this has occurred, it, rather than the absolute increase in the overall caseload, may prove a stronger explanatory factor in the apparent decline in the number of clearances. Observe the apparent relationship between organizational profile and workload.

TABLE 3.38

Number Of Cases Assigned Per Investigator By City Code and Type Organizational Profile

Single Agency:		
	City 24	28.0
	City 33	65.0
	Average	46.5
Joint Unit:		
	City 57	146
	City 60	50
	City 87	120
	Average	105
Two-Tier:		
	City 17	130
	City 44	105
	City 70	199
	Average	144

TABLE 3.39

Clearances Per Investigator

	City								Overall
	17	24	33	44	57	60	70	87	
1977	8.0	6.0	12	16.0	42	21	11.6	11.0	9.6
1978	4.5	6.0	7	9.0	19	10 ⁽¹⁾	13.0	9.6	7.6
1979	5.3	4.2	9	5.5	14	7	14.0	10.0	5.0
3-yr. Av.	5.9	5.4	9.3	10.2	25	12.6	12.8	10.2	7.1

A finding we had not bargained for is the data from all sites that indicates that the clearances per investigator began in 1977 at a relatively low level (compared to the average property crime detective) and declined at all sites. Overall, the average number of clearances per investigator was 9.6 in 1977, 7.6 in 1978 and 5.0 in 1979. Among the eight sites, there were only 9 positions added to the corps of investigators assigned to arson detection and investigation in 1978. From 1978 to 1979, an additional 53 investigators, or a better than 50% increase over the three-year period, were added to the corps. Perhaps it is this large increase that accounts for the precipitous fall-off in clearance rates.

Other possible explanatory or continuity factors include:

- smaller caseloads have been associated in this and other studies to lower clearance rates
- investigators working more difficult cases
- improved sophistication in arsonists
- reformation of clearance definitions to conform with UCR records-keeping (misuse of "exceptional clearance" and "children playing with matches" might have constituted a large number of % clearances in 1977).

City clearance rates per investigator ranged from a low of 4.2 in 1979 in City 24 to a reported high of 42 in City 57 in 1977. Averaging each city's clearance rates for 3 years damps the variation from 5.4 to 25, with a mean of 7.1 for all sites over the three-year period.

It is interesting to note that there is a positive correlation coefficient of .57 between high investigator caseload averages and high clearance rates. Look at the graph below that plots this relationship and Table 3.40 that follows.

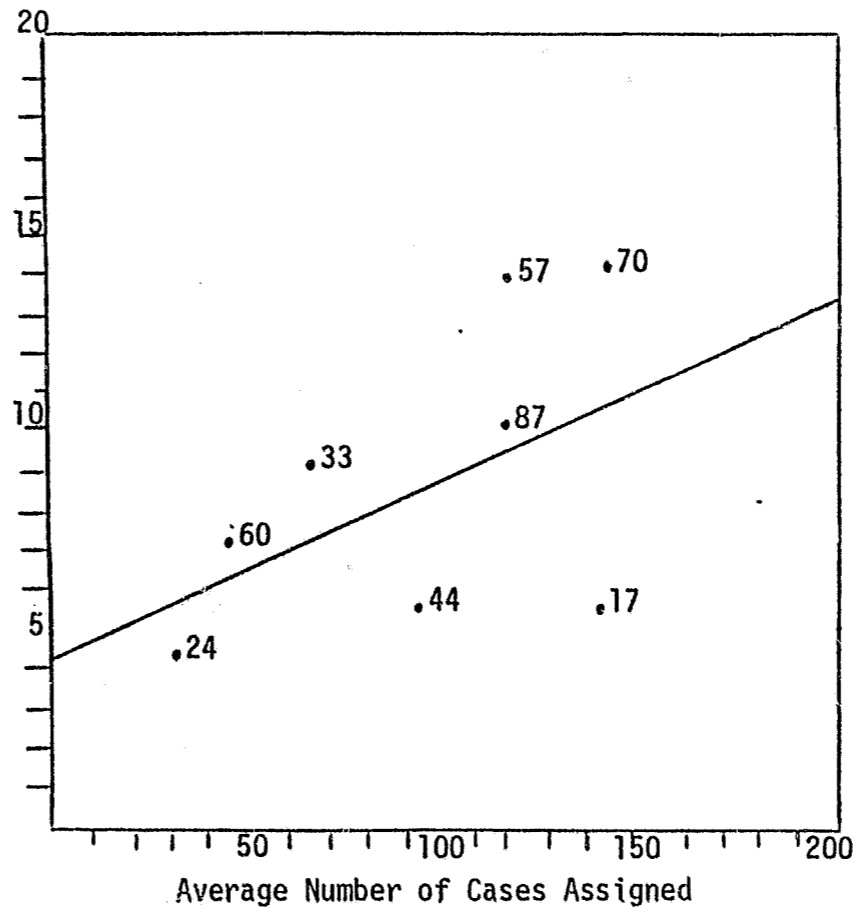
CHART A

TRENDLINE ANALYSIS OF RELATIONSHIP OF AVERAGE NUMBER OF CASES ASSIGNED TO CASE CLEARANCES

3-137

Number of Clearances

X



Notes: Correlation coefficient .54 (a coefficient slightly higher than the correlation between poverty and crime)

See also Table 3.40 for numerical values

TABLE 3.40
Relationship Between Investigator Caseload
and Clearance Rate

City	Cases Assigned Per Investigator		Clearances Per Investigator	
	1979	Three-Year Average	1979	Three-Year Average
17	145	130	5.3	5.9
24	31	28	4.2	5.4
33	68	65	9.0	9.3
44	92	105	5.5	10.2
57	123	146	14.0	25.0
60	46	50	7.0	12.6
70	144	199	14.0	12.8
87	115	120	10.0	10.2

TABLE 3.41
Arrest Rate Per 100 Investigations

	17	24	33	44	57	60	70	87
1977	6.3	24.5	18.3	15 ⁽¹⁾	39.8	39	40.2	9.9
1978	3.9	17.6	12.1	7.5	19.6	13	41.0	16.8
1979	6.8	15.0	11.7	4.9 ⁽¹⁾	20.5	15	39.0	11.0
3-Year Average	5.6	19.0	14.0	9.1 ⁽¹⁾	26.7	13.9	40.0	12.6

(1) Based on reported UCR data/police annual data/best available other.

It will aid in reviewing the data from Table 3.41 to bear in mind that the term "investigation" has not commonly shared definition among the sites. City 17, for example, routinely investigates a high percentage of all fires. Accordingly, we would expect the city to record lower arrest rates per investigation than other cities that use the term to refer to fully-established arson investigations. We have repeatedly referred to the similar problem in interpreting the meaning of the term "arrest" (does it refer to arson-related, all arrests for any crime, non-criminal clearances, children below the age of 8, etc.). Despite the drawbacks and the undoubted artifacts that perturb the precision of the data, we find the arrest rate data reflects a downward trend. Five of the arrest rates declined, while two held their rate steady and one city had a fluctuating rate.

On one end of the spectrum, City 17 rested with 5.6; and at the other end, City 70 had 40. Cities 17 and 70 are two major metropolitan cities with two-tier, fire-police systems with similar manpower levels. The difference in their arrest rate can best be explained by the difference in the management of the arson detectives and the significant utilization of police patrol personnel. (These may be twins in outward appearances, but they are unrelated in performance measures or reported results.)

But, the indicators have presented themselves throughout this study that the involvement of both fire and police departments in a variety of modes can function well. There are two major corollaries to this statement. The first is that both fire and police investigative personnel should be heavily involved in follow-up, and both should be effectively managed. Just as a winning golf game is made up of power in the driving and finesse in the putting, so arson investigation involves finesse in fire investigation, while follow-up requires power in the form of manpower strength, speed in follow-up, endurance in the pursuit of the suspect, and balance in the development and coordination in the presentation of the evidence. Taken together, these skills reinforce a case to make prosecution robust and certain.

The second corollary is that these skills are best nurtured by experience and the coaching of naturally-talented personnel.

Good management turns the potential for achievement into efficient and kinetic ability. Harnessed to a tightly-reined program, this ability can achieve unit objectives for system-wide goals.

3.4.5 Source and Frequency of Observed Deficiencies

We evaluated city follow-up investigative practices in five areas:

- Interview and Interrogation Practices
- Documentary Evidence Acquisition
- Compliance With Legal Procedures
- Apprehension Practices
- Reporting Practices

In overall frequency, missing records proved to be the most frequently-observed error in follow-up activity. This is understandable, given the fact that the basis for our observations are case files. The level of missing documentation, 11.4% of the entire sample, is considerable. This constitutes a serious deficiency and should not be dismissed due to the lack of effort or ability to locate the files on either the team's part or the host cities. We repeatedly asked the cities for any missing documentation. Be assured that we did not judge file material as missing until it could not be located after repeated and lengthy searches. Missing file records may have contained other errors; thus, the anomaly might exist that a study site with excellent files, few errors, and a high clearance rate would look as if it had the most error-filled practices because of the full documentation of more cases reaching the follow-up phase. For this reason and others mentioned previously, the data given in Table 3.42 (a-c) must be treated as indicative of general tendencies, and not definitive.

The second most frequent error rate is the failure to interview suspects. Deficiency was assessed when a suspect was named; there appeared to be a reasonable prospect of locating the suspect; and documentation failed to indicate any overt act by investigators to interview the suspect. Table 3.42 gives a city-by-city frequency cross-tabulation that shows failure to interview a known suspect occurred in 8% of the cases.

The third most common error observed in follow-up activity was the failure to review file records or otherwise check for tie-ins when the case's circumstances warranted it. The criterion for this was the actions expected of a reasonable and prudent investigator. This deficiency was observed in some 64 cases, or 7.4% of the whole case sample. Four cities, (17, 24, 33 and 44) together accounted for 80% of these errors. We found no relationship between these four sites that would explain the higher error rates.

The fourth most frequent error observed was the failure to gather sufficient testimonial evidence during follow-up efforts. This deficiency was observed in 4.2% of the cases as shown in Table 3.42. (Note: do not confuse this table with the tables regarding on-scene testimonial efforts reported earlier.) City 60 had 32% of the observed errors. Errors in this category appear related to the cities with weak police detective involvement (City 24, 33, 60, and 87) either in terms of numbers or actual activity levels.

On the following pages (Table 3.42 a-d) observed error rates are given for 12 distinct error categories consolidated into four fields of interest: testimonial errors, documentary, legal and procedural, and reporting errors.

Appendix 5.0 displays the observed frequency rate of cases with multiple error codes for all cases investigated. Up to three error codes could be assessed against any incident's handling. In cases where more than three errors were indicated, the three errors most likely to jeopardize case development were selected.

TABLE 3.42 (a)

Cross Tabulation Of Frequency Of Deficiencies
In Follow-Up Testimonial Evidence Collection
By Cities (N = 909)

Frequency Percentage Of Sample Row Percentage	City								Total
	17	24	33	44	57	60	70	87	
Suspects Not Interviewed	7.0	3.0	12.0	4.0	10.0	10.0	10.0	15.0	71.0
	0.8	0.3	1.3	0.4	1.1	1.1	1.1	1.7	7.8
	9.9	4.2	16.9	5.6	14.1	14.1	14.1	21.1	
Insufficient Testimonial Evi- dence Gathered	4.0	6.0	6.0	0	3.0	12.0	1.0	6.0	38.0
	0.4	0.7	0.7	0.0	0.3	1.3	0.1	0.7	4.2
	10.5	15.8	15.8	0.0	7.9	31.6	2.6	15.8	
Violates Suspect's Rights	0	1.0	0.0	0.0	1.0	2.0	1.0	0.0	5.0
	0.0	0.1	0.0	0.0	0.1	0.2	0.1	0.0	0.6
	0.0	20.0	0.0	0.0	20.0	40.0	20.0	0.0	

3-142

TABLE 3.42 (b)

Cross-Tabulation Of Frequency Of Deficiencies
In Follow-Up Documentary Evidence Gathering By City (N = 909)

Frequency Percentage of Sample Row Percentage	City								Total
	17	24	35	44	57	60	70	87	
Insufficient Documentary Evi- dence Gathered (Financial, Ins. etc.)	1.0 0.1 7.7	1.0 0.1 7.7	0 0.0 0.0	1.0 0.1 7.7	1.0 0.1 7.7	7.0 0.8 53.9	1.0 0.1 7.7	1.0 0.1 7.7	13.0 1.4
Files or Records Not Checked For Tie-Ins	17.0 1.9 25.4	15.0 1.7 22.4	9.0 0.9 13.4	12.0 1.3 17.9	3.0 0.3 4.5	2.0 0.2 2.9	4.0 0.4 5.9	5.0 0.6 7.5	67.0 7.4

3-143

TABLE 3.42 (c)

Cross-Tabulation Of The Frequency Of
Deficiencies In Follow-Up Legal And
Procedural Activites By City (N = 909)

Frequency Percentage of Sample Row Percentage	City								Total	
	17	24	33	44	57	60	70	87		
Violates Suspect's Search & Seizure Rights	0 0.0 0.0	0 0.0 0.0	0 0.0 0.0	0 0.0 0.0	0 0.0 0.0	0 0.0 0.0	0 0.0 0.0	1 0.1 100.0	0 0.0 0.0	1 0.1
Suspect Flees Or Not Located	2 0.2 12.5	3 0.3 18.8	1 0.1 6.3	1 0.1 6.3	1 0.1 6.3	2 0.2 12.5	5 0.6 31.3	1 0.1 6.3	16 1.8	
Fails To File Charges In Timely Fashion	1 0.1 11.1	0 0.0 0.0	0 0.0 0.0	0 0.0 0.0	1 0.1 11.1	1 0.1 11.1	5 0.6 55.6	1 0.1 11.1	9 0.9	

3-144

TABLE 3.42 (d)

Cross-Tabulation of Frequency of Deficiencies
in Follow-Up Reporting Procedures by City (N = 909)

	City								Total
	17	24	33	44	57	60	70	87	
Records Missing	7.0	7.0	18.0	11.0	33.0	12.0	13.0	3.0	104.0
Or Not Completed	0.8	0.8	1.9	1.2	3.6	1.3	1.4	0.3	11.4
	6.7	6.7	17.3	10.6	31.7	11.5	12.5	2.9	
Inconsistent	6.0	1.0	1.0	6.0	3.0	1.0	6.0	0.0	24.0
Investigative	0.7	0.1	0.1	0.7	0.3	0.1	0.7	0.0	2.6
Reports	25.0	4.2	4.2	25.0	12.5	4.2	25.0	0.0	
Reports Not	1.0	1.0	9.0	8.0	10.0	3.0	4.0	2.0	38.0
Updated	0.1	0.1	0.9	0.9	1.1	0.3	0.4	0.2	4.2
	2.6	2.6	23.7	21.1	26.3	7.9	10.5	5.3	
Report Not	2.0	1.0	6.0	3.0	0	0	1.0	3.0	16.0
Updated	0.2	0.1	0.7	0.3	0.0	0.0	0.1	0.3	1.8
	12.5	6.3	37.5	18.8	0.0	0.0	6.3	18.8	

3-145

3.5 MANAGEMENT AND ADMINISTRATION

3.5.1 Arson Investigative Unit Management

One of the most definitive findings from this research is the need to drastically improve arson unit management. Without sound management and administration, other improvements that have and will be made in counter-attacking arsonists cannot reach their full effectiveness. Sound management is necessary at four operational levels: system, departmental, unit, and case.

At the system level, the U.S. Fire Administration and others have urged that common goals and objectives be established among all affected agencies through a consensus process. The arson task force concept is an ideal vehicle for this undertaking when it is correctly constituted and effectively led. There is an unfortunate, but common, tendency in arson task forces (as is true among similar special-purpose task forces) to become lost in the clouds of lofty aspirations or in the fog of case specific details. To steer clear between these two extremes requires:

- . a clear mandate
- . careful selection of appointees with committal authority for their agency/organization
- . staff support to carry out the leg work for a system plan
- . consensus on key problems, or a means of arriving at a consensus
- . dedication to a long-haul, cooperative, public-private venture
- . expectation on the part of task force members that their recommendations will be implemented in most cases.

At the departmental level, fire and police departments alike tend to treat arson control as secondary missions. If by some magic, fire and police administrators were able to reprogram their departments' allocation of resources based on a rigorous analysis that is free from traditional constraints, arson control resources would in all probability fare better. In reality, reallocating existing resources is a painful process, and rethinking priorities is an unpleasant prospect for most agencies. Only occasionally does concern about arson reach a level of public or institutional awareness to force fire and police management to alter their traditional allocation of resources. Since arson has been popularly regarded as a sophisticated crime requiring special programs and techniques to control, as relatively rare, and as a minor felony, there has been little in the way of incentive strong enough to alter organizational (especially those of fire, police, and adjudicatory agencies) attitudes towards its importance.

Even when the calls for action have been heard, there has not been a planning mechanism versatile or persuasive enough to carry out a wholesale review of past practices and workable alternatives. Among the requirements for a wholesale arson control system review would be changes for:

- . problem analysis, including a review of existing plans, procedures, responsibilities, deficiencies
- . development of goals and objectives
- . design of programs and development of procedures
- . review and revision of case, individual, unit, and system performance measures
- . establishment of retrospective internal and external audit mechanisms to measure performance at all levels.

In the ideal, the arson control system would be planned, managed, and evaluated as a cooperative system--a "Theory Z" system. The reality is that actual unit and system management practices among the sites studied ranged from systems with one or more aspects of a modern management system to those that lacked even rudimentary administrative tools. Most of the units lacked a set of specific goals and objectives, basic performance data, or routine mechanisms to evaluate performance. For the units that had written goals, they tended to be phantoms, part of a paper exercise in service to the budget approval process. Only one system reported progress toward goals on a quarterly basis. Review of these quarterly reports and follow-up interviews disclosed that these measures were not actively used by the department's management to monitor unit performance.

As we have pointed out elsewhere in the report, the absence of rules of procedures and clearly-articulated standard policies and standards of performance indicates either that administrators doubt their value or have been unable to develop them. We realize that such written standards are not a panacea and, indeed, have their drawbacks, including:

- . staff effort to develop and maintain
- . subject to multiple interpretations
- . tendency to either be too vague to be helpful or too detailed to be readily referred to
- . misconstruction by some personnel that anything not specifically covered is "fair game".

By the same token, the benefits of written procedures for improved unit and system management include better accountability measures, clear assignment of responsibility, specific technical standards, basis for performance evaluation, basis for training, ground rules for command, response, safety, documentation, etc.

Table 3.43 below summarizes present case, unit, and departmental, and system management practices.

TABLE 3.43
Specific Uses Of Data

	17	24	33	44	57	60	70	87
Annual Reports	x	x	x	No	x	x	x	x
Early Warning Systems	In	x	No	No	No	No	No	No
Crime Pattern Analysis	x	x	No	No	No	x	Yes	Yes

We have selected the following three accounts from City 24, 17, and 60 as representative of the range of management issues present in all eight sites. City 17 is representative of large cities with a two-tier unit; City 24 of large cities with a single agency unit; and City 60 of medium cities with a joint unit system administered by a fire department.

Investigative Unit Management in City 24

In City 24, goals and objectives for the unit had never been formally considered, until an LEAA grant application had to be prepared. As one investigator put it, goal and objective-setting is an "individual" thing. When questioned, investigators gave a number of general interpretations of unit goals and objectives, including:

- . "first priority, put a cause to every fire and, second, work investigations"
- . "do better in clearances, arrests, and convictions"
- . "investigate all fires of a suspicious or undetermined nature"

TABLE 3.44

System Unit Management Practices

	17	24	33	44	57	60	70	87
Case Management	Until late 1980, investigators discretion	Limited supervisory review	Unit supervisor and assistant monitor case assignments informally	Investigator's discretion	Investigator's discretion	Investigator's discretion	Supervisory review	Since 1981
Unit Management	Fire Department MBO system; Police Department did not closely monitor arson performance 1977 - 1979	Not guided by MBO or similar management tools	"Seat-Of-The-Pants"	1977-1979, separate units, neither with cognizant supervision	No cognizant review	No, during period; Fire Marshal attempted during 1981	Excellent unit management	Unit management centered on fire investigative, not criminal aspects
Departmental Review	Fire investigation unit part of departmental MBO system; but not closely monitored. Police arson unit not regularly reviewed by an inspection team of similar audit	Planned review and reorganization to be scheduled	Departmental review; informal - not tied to defined goals and objectives	Fire & police departmental heads did not audit either unit's performance	Joint unit not effectively monitored by either department	No departmental unit by fire or police of joint unit	Within fire department, no formal program police department arson unit given standard management review since 1980	Fire department management - no formal program
System-Wide Coordination	None	None	County wide task forces	None	None	None	City-wide task force since 1980; reviewing all agencies' performance	None

3-149

CONTINUED

2 OF 3

Investigator-Performance Assessment

Senior investigators perform a review of investigators' performance every six months. Review of case reports was intended to be a key element of this assessment process. An immediate superior first reviewed the report, followed next by an assistant chief, and finally the Chief Investigator. A reviewer was supposed to assign a numerical scale of 1 to 30 points. Investigators reported that almost every investigator received the same grade - 26 points. This one-size-fits-all grading system is a pro forma response to civil service-based promotional requirements. As a harmless mechanism for promotions, it may be a necessary evil. However, its impact on individual performance was counterproductive.

City Size Compounds Management Problems

City 24's expanding size and population made it easier for common-variety management problems to grow unchecked into serious performance handicaps. The Fire Chief's first concern was the professionalization of the fire suppression unit. He acknowledged that several years later, he would direct his emphasis to fire prevention and arson investigation. This special situation appears to be responsible, in part, for the less than expected performance. For example, the day shift supervisor slot was rotated between a number of senior investigators. Therefore, there was no continuity between the investigator, the case, or the case supervisor. To further complicate matters, this senior investigator was assigned 23 investigators to supervise. This represents a span of control range far wider than most supervisors could be expected to handle. Rotating the responsibility made the assignment unworkable, as well as unwieldy.

Another supervisory problem that surfaced during 1980 was that certain senior investigators with supervisory responsibilities were found to lack the discipline expected of them by senior fire department staff.

The Department's administration has tried to deal with the resulting problem by establishing stricter accountability and by putting investigators "on a shorter leash." Unfortunately, this has served to further alienate the investigators, but not measurably improve the performance of their supervisors. When management has trouble depending on supervisors--but, in response, cracks down on investigators--it follows that morale among the rank and file suffers. Clouding senior management's judgment is their lack of personal experience in the field. Without this personal experience as a basis for comparison, management may have the tendency to assume that discipline problems are due in part to the nature of the job. Because investigators "act like cops" and work independently of close supervision, they tend to be considered half breeds ... part-police, part-fireman, and trusted by neither service.

The same phenomenon has plagued paramedic services in many communities. Because paramedics are often away from their base stations for extended periods, some fire officers are uncomfortable with supervising them. Paramedics conversely feel under-trusted and over-scrutinized. This same dynamic of "distrust-eying-paranoia" may develop between the arson unit headquarter's staff and the personnel at the substations. Such mistrust tends to be infectious and, to a degree, often seems to be a self-fulfilling prophecy.

These dynamics may be symptomatic of a deeper organization malaise. To the normal amount of office politics is added the uncertainty that in City 24, the fire chief serves at the pleasure of the mayor. The resulting stress can interfere with open communications and stifle innovation. During several discussions with investigators, the team gained the distinct impression that displays of initiative and "gung-ho-ness" met with peer pressure to "relax, take things easy" and "good-ole-boy it", rather than press to improve performance.

Investigator Performance Assessment

Individual performance assessment is scheduled to be reviewed every six months. Several sources confirmed that the performance assessment system has become a pro forma exercise. Almost automatically, every investigator receives precisely the same numerical rating.

The practice may have grown in this manner due to the nature of the civil service system.

No effective rewards and punishments exist. It was alleged that suspensions are unheard of, as they require a prohibitive amount of documentation. As competitive exams really determine eligibility lists for promotion, supervisors are effectively denied this most powerful goad. Pay and benefits are a matter of union negotiation skills versus city management. Thus, normal incentives/disincentives have little practical impact on performance.

Management Information System

City 24's arson unit is developing an advanced management information system. The system will be a stand-alone system from either fire or police department data bases, but will tie in with these systems. On the law enforcement side, the arson unit will tie into state and federal criminal information data bases. On the fire department side, the system--although not interfaced with the new computerized dispatch and management information system--can utilize the capability of this system to supplement its own program.

It is too early to determine the success of this stand-alone arson information and management system, as it is still under development. It is important to note that in the earlier development of fire and police computer systems, the arson unit's needs were not included in the initial requirements, nor later in program modifications. The arson unit has not even had significant input to the present multi-million dollar development for the fire department's own computer system, nor have its requirements been considered in the hardware or software packages. No rational explanation was forthcoming to explain why the unit was not considered a prime user of the system. Whether by design or oversight, it left the unit with the need to develop its own capability. The point illustrated is that even in a large arson unit that has been organized for over 20 years wholly within the fire department, its need and activities seem to still be regarded as something separate--to be dealt with after more prime missions are first taken care of.

Nevertheless, the justification for a stand-alone system can be argued. The possible redundancy and cost inefficiencies that might be associated with this system are balanced by the past experience of the arson unit depending on outside A.D.P. services, for example:

- the police computer system consistently failed to provide investigators with timely "wants and warrant" data on subjects through state and local criminal information programs
- the regional ADP center erased seven months of fire incident data, and was unresponsive to requests for program software changes.

Arson Incidence and Clearance Data

A common problem throughout the cities visited has been the difficulty of establishing an accurate UCR reporting procedure for arson cases. The Fire Department's arson unit maintains responsibility for developing the data reported to the UCR and sent away one investigator to attend a UCR familiarization course. This step speaks well of the unit's intent to improve its reporting procedures.

Before the UCR reporting requirements, the unit (since 1976) has maintained a charge log. The log gives the name of the defendant, charge(s), age, sex, race, and (since 1979) the \$ loss for each fire. Given the existence of this log, it might be expected that data maintained by this unit and reported through them to the UCR would track closely.

Compare the following data as was reported by City 24:

Month	1979 Estimated Incendiary Fire Loss	UCR Reported Incendiary Losses
January	4,981,035	2,673,795
February	1,554,600	2,051,700
March	1,575,625	1,044,830
April	2,604,000	2,582,815
May	1,054,487	1,054,487 (same)
June	771,340	N/A
July	831,400	35,800,000 (est)
August	1,108,905	1,158,200
September	1,627,365	1,627,365 (same)
October	1,939,800	1,969,800
November	2,138,250	2,138,250 (same)
December	2,212,250	3,054,355
Total Reported Actual Report or Monthly Estimates	22,397,057	55,147,833
	22,399,057	55,155,597

How these data could be so far off in some months, and yet in 3 months be identical, defies a consistent explanation. In fact, no explanation was ever provided although it was repeatedly sought. Yet, both sets of data come from official reports. Some of the difficulty may have been caused by evolving interpretations of whether UCR wanted all incendiary fires or merely criminal and incendiary set fires reported. The spectacular loss in July that was not reported to the UCR may be due to uncertainty of how to handle such a large-loss conflagration, especially in light of the tentative cause and origin finding of incendiary that was subject to review.

These data remind us of how difficult it is to measure performance, let alone compare performance among different units or even by the same arson unit over time.

Comparisons between selected data reported by the arson unit for local use and UCR for 1979 further illustrates the discrepancies and shows the difficulty in interpreting the data:

	ARSON BUREAU	UCR ⁽¹⁾
Total Arsons	1352	1446
Total Offenses Cleared	306	206
Total Adult Clearances	198	153
Total Juvenile Clearances	46	53

(1) 12-Month projection based on 11 months report

Many causes for the apparent data discrepancies suggest themselves:

- definition and usage variance
- reporting inconsistencies due to such factors as offenses and clearances reported by police patrol officers that were unknown to arson investigators
- editing revisions downstream from the origin of the report resulting in two different sets of processes
- data manipulation to improve the impression of progress.

The first of these factors is likely to account for the major differences. Once again, it is not the error factors in and of themselves that are the only disturbing element; it is their implication that management standards or practices are not sufficient to catch and connect the inconsistencies.

Investigative Unit Management in City 17

In 1975, the previous head of the fire investigation unit retired. The newly-appointed unit chief aggressively set forth plans to improve arson detection and investigation. He met little support either in his own chain of command or in his counterpart in the Police Department. Undaunted, he developed support for the program outside his own agency. When stymied in his drive to reconstitute the unit, he went over or around his own superiors.

Through these efforts, he succeeded in getting the unit redirected and himself replaced. In effect since 1975, the unit had drawn away to become a distinct organization, separate from its brother elements of the fire prevention bureau. An exposed position on an organizational chart is usually tenable only if the unit is strong in both its internal operations and linkages to its own and other agencies.

Several critics of the arson unit's actions pointed out that:

- . The unit appeared to be divorced from the normal purview of its superiors in the chain of command.
- . The unit's leadership was unable to keep amicable relations with its counterparts in the Police Department, with the result that key issues remained unresolved and heated exchanges between fire and police management occurred too frequently for the comfort of their superiors.
- . The unit leader's loyalty to those assigned to his unit made it appear to some that he failed to effectively discipline some unit members.
- . The unit failed to provide stronger administrative direction.
- . The unit leader failed to "mind the store" by being absent too often on arson-related training, policy, and state and national arson matters.

These criticisms were not resolved to the satisfaction of the fire department's senior management, and they replaced the unit's administrative head. It seems axiomatic that any innovative leader will attract criticism. Activist arson units and their leaders may encounter more critical scrutiny than other more traditional activities in either the police or fire department operations.

The fire department is on a management by objective program that is linked to the budget and program review of the City Council. Goals and objectives are reported on a quarterly basis, and during 1980, the arson unit developed programmatic initiatives in 17 separate areas. This is a meritorious undertaking. The performance indicators used to monitor progress toward these goals more often measured inputs and irrelevant outputs.

The progress reported toward meeting these objectives did not provide a coherent picture of the unit's success. But this -- if a shortcoming -- is one that bedevils many programs. Moreover, the fact that an attempt was made to set goals and measure progress is a necessary and commendable step.

The nature of support from the department heads, as well as independent sources of "clout," appear to be necessary elements of a successful revitalization program. If internally within the organization, the unit leader is vulnerable, office politics, may as in this case, result in the unit leader's replacement. If the unit's leader is not as strong in administration as in innovation, changing unit leaders may be harsh treatment to the individual, but helpful to the long-term interests of the unit.

One aspect of the unit's relationship with the rest of the department--which was expected to improve as a result of the change in arson unit leadership--is the reestablishment of a clear chain of command, both within the unit and to the department's superstructure. The Fire Marshal is expected to exercise far tighter control over the unit's activities. Administrative staff will be expanded and their duties clarified. For example:

- . The unit head will be responsible for coordinating the unit's overall activities, the task force, and the establishment of an internal management information system.
- . An assistant will be responsible for direct supervision of the cause and origin investigators, including review of reports and on-scene follow-up activities. Daily unit supervision will also be a responsibility.
- . A direct supervisor will be assigned to supervise investigators and detectives and will be in charge of the "Strike Force".

Investigative Performance Assessment

Fire investigators appear not to have had effective supervision of performance assessment during this period. Fire officers completed activity checklists that counted the number of activities. The supervisor was supposed to review this and active case files and observe the individual on the scene and at the office. Quarterly reports were forwarded through the chain of command. These activities appeared to be perfunctory. As one investigator pointed out, none of his superiors had even gone to court to hear him testify and only occasionally appeared on the fire scene.

Police arson detectives do not seem to have enjoyed much greater supervision. Clearance productivity was the sole criteria. This form of "body counting" does not discriminate in the type of clearances or the type (and, hence, difficulty) of offenders. This mechanism was certainly not effective when it was coupled with supervisors in the Police Department who possessed neither the background in arson investigation nor the supervisory skills to assess performance. One arson detective had an

aversion to affecting an arrest, which was well-known to all his peers. Despite this fact, the officer was removed from the position only after many strenuous objections to his performance.

In both departments, neither the mechanisms nor those responsible for assessing performance seemed to have contributed to investigative performance during the three-year study period.

Investigative Unit Management in City 60

The fire marshal is responsible for policy development for the arson unit. Administrative policy needs of the arson unit differ considerably from those of other sections of the fire marshal's Office. Due to the special nature of arson investigation, normal fire department administrative guidelines and practices do not apply satisfactorily. Such fundamental policies as selection criteria for assignment to the unit, career ladder policies, shift length and work house, and overtime provision merit special consideration. Since administrative policies can impact both morale and performance, they need to be reviewed regularly, and, if at all possible, by someone with experience in arson investigation or police unit administration.

In City 60, the fire marshal was responsible for managing the arson unit. Neither the past nor the present fire marshal had any extensive training or experience with reviewing and developing administrative policy for an arson unit. In essence, what this means is that a law enforcement activity has been orphaned and placed under an agency with inadequate management, training, and experience to prepare personnel to make administrative decisions. An example of this includes:

Case Management - At no point in the process is a case reviewed to determine if it is worth expending additional effort and, if so, for how long and on what grounds?

City 60 has no such management mechanism or triage system in the Fire Department. It is unlikely that innovations in law enforcement management will be learned of, let alone taken advantage of, as long as the arson unit's law enforcement responsibilities are not recognized by positive measures to insure that the unit does not become isolated from law enforcement advances.

The standard operating procedures were originally adopted from the police department. These procedures were not incorporated into a departmental manual or standard of procedures. Gradually, practices diverged from these sound procedures. Over a five-year period, required procedures became optional; investigative reports were not always written. As personnel rotated out of the unit, ad hoc practices and short-cuts replaced the formerly-prescribed investigative follow-up methods. By 1979, the police investigator was replaced by a fire officer. At this point, neither investigator was qualified as a peace officer or possessed extensive training or experience in investigative procedure or police sciences. Astonishingly, both investigators were required to complete an 81-hour emergency medical technician training course during this period despite their self-evident need to be trained in arson and law enforcement techniques. Despite these handicaps, through hard work and dedication, these officers have persevered in their attempts to improve their investigative skills and procedures while "on the job."

Apparently, workload pressures have frustrated these individuals' attempts to attend advanced training in arson investigation or to complete basic police recruit training. Workload pressures have also been mentioned repeatedly as the reason that cases with workable leads have had to be foregone. Although unit members complained of being overworked, their average caseload was below the average.

Evaluating Performance - The Key to Arson Control System
Success Under any Operation Division of Responsibility

City 60's experience illustrates the contention that arson control has been the bastard child of two separate parent agencies. As the lack of policies and shortcomings in practices have implied, effective management and oversight of the arson investigation unit remains an unmet challenge. Potential management evaluation strategies might include:

- performance audits of case handling
- review of daily activity reports
- review of monthly or quarterly activity reports
- regularly-scheduled investigator-supervisor-management meetings
- performance contracts between management and investigators
- pre-budget performance reviews and planning analysis
- staff meetings.

It is interesting to note that neither these, nor any other systematic review of individual or unit performance, seem to have been conducted. A daily report submission was discontinued in September, 1979, in anticipation of a new reporting system "designed for investigators," but this new reporting system was never implemented.

Another fairly simplistic management tool suffered a similar fate. A three-page quarterly report format that indicated budgetary expenditures for the period and summarized several workload measures, such as investigation conducted, cases cleared, etc., was submitted through channels. Present and past investigators agreed that they received no knowledgeable review of their performance based on this report; indeed, it was submitted without comment from superiors. This situation may have been due in part to the fact that those responsible for managing the unit were unable to recognize that the data which appeared on first blush to read so well, only appeared so because of the way the data were presented and by the unorthodox manner in which the data were computed. Since management had no independent reference point or standard by which they could evaluate the sufficiency of the data or its true significance, attention could be easily diverted to other matters known to require attention.

Management is under the misperception that most of the arsons are for profit. This indicates that they may be drawing improper inferences about the performance or utility of the unit. The arson unit has no firm understanding of how to monitor or improve performance and whether, indeed, resources are adequate. In short, there is a "Mexican standoff" between the arson staff departmental management.

The impact of management's inability to effectively monitor performance should be considered in at least two lights. First, the investigative unit was allowed to drift. Morale and performance often suffer under such circumstances, and this seems to be the case in City 60. As important is the second point, management lost sight of the needs of the arson unit or the nature of the arson problem. As a consequence, arson did not receive the concern it should have and, as a result, the additional resources it might have commanded did not occur. One indicator of this problem is our finding that management and operational personnel have a vastly different perception of the problems and opportunities in arson investigation.

Recently, new management personnel in the Fire Department have begun to appreciate the arson unit's backlog of cases. Rather than agreeing with unit members that workloads are suffering from a shortage of resources, management's opinion is that the arson unit has adequate resources, but, because the two unit members insist on operating in tandem, they cannot cover their caseload. Fire Department management was not so unmoved during the 1980-81 budget request cycle. During the past year, the arson unit successfully argued for a manpower increase in its budget in the departmental review of the budget request. However, this was a short-lived victory as the request was red lined during review by city management. The "bottom line" is that Fire Department management may be willing to ask for more manpower overall, but will not go to the extreme of reallocating existing resources to the arson unit.

Generally, it can be argued that arson investigation budget requests are currently at a disadvantage because traditional resource allocations appear as continuing requests, whereas requests for expansion of the arson unit appear as new obligations. In today's era of sharply constrained municipal financing, even established programs may have to be tenaciously fought for by the parent agency. New programs which cannot command the enthusiastic support of the agency head that submits them cannot hope to do well in this environment. As this may be a common problem among arson units throughout the 80's, innovative and cogent cost benefit presentations will be needed in many communities to garner the necessary financial support to effectively deter the potential arsonist.

Evaluation is a necessary precursor of management appreciation of needs. Systematic evaluation practices are designed to provide this two-way dialog between needs and expectations. Common to most approaches are regular documentation and review of activities. A balance must necessarily be sought between performance and monitoring performance. It is naive to suggest that much closer scrutiny or daily documentation of activity would, by its very nature, improve performance. Indeed, it often seems the case that the ordinary fare of time sheets and activity reports is counter-productive; neither measuring performance nor improving

management's ability to monitor activity. And, whereas the very nature of arson investigation carries with it the natural need to thoroughly document activity, it appears that little use is made of a ready-made basis for evaluating the effectiveness, efficiency, and efficacy of both a unit's or an individual's performance.

Special reports and studies may also be needed to evaluate arson unit performance. If accomplished in-house, personnel with knowledge of both fire and police sciences, as well as sound investigatory and supervisory practices will have to be found to perform this review. Even if experienced personnel perform this review, the availability of a well-documented guide to arson unit performance and sound practices on which to structure such a review appear necessary. The same guide would, of course, assist both new and experienced arson unit supervisors in improving performance.

In the Spring of 1980, the arson unit prepared a report of its activities and its appreciation of arson control system needs. This report is a very worthwhile effort. This document - contains much useful information, recognizes and discusses key problems, and offers many worthwhile suggestions. Unfortunately, the report is handicapped by the fact that it was prepared by the members of the unit and may be reviewed and even discounted by some readers on these grounds. The same basic information developed and reported by, say, a joint fire/police/city management performance audit team, and substantiated by more rigorous analysis of case clearance rate and case backlog (cases not fully followed up even though they had workable leads), might have headed off some of the problems that have developed in the near absence of effective management and evaluation.

3.6 PERSONNEL ISSUES

In the welter of technical issues, it is easy to overlook the underlying issue of personnel management factors in arson control performance. Personnel management issues include staffing arrangements, recruitment, training, retention, and performance assessment. These factors impact the net quantity of investigative resources available and the quality of their performance. Ironically, the connection between arson investigation's special technical and organizational needs has been widely recognized, while the corollary that arson investigation may require special personnel requirements has gone largely unnoticed and unmet. Time and again, we found personnel issues to be serious enough to have affected arson investigation.

Arson investigative units require special consideration on a number of personnel issues. On the organizational level, special policy consideration may need to be extended to arson investigation unit personnel. If fire departments administer these units, their normal personnel practices may not be appropriate. For example, standard personnel policies may need to be augmented by special rules, such as weapons-carrying powers; exceptions to general practices, such as overtime practices and separate shift patterns; or special considerations, such as incentive pay, separate career ladders, etc. On the level of unit supervision, special performance assessment mechanisms need to be developed to upgrade unit effectiveness.

This section of the report will consider the status of personnel selection, recruitment, and retention in an attempt to associate features of personnel management with arson unit performance. The research was not intended to focus on developing information on personnel or training needs (Bratt Memorandum, p. 2). The issues in arson unit personnel management problems found to be most frequent and critical to unit performance have been grouped and discussed under the following headings:

- 3.6.1 Staffing Arrangements
- 3.6.2 Recruitment
- 3.6.3 Training
- 3.6.4 Retention

3.6.1 Staffing Arrangements

Major issues associated with staffing arrangements consisted of:

- . Determining Shift Scheduling

Shift scheduling was the most common concern among investigators. Investigators are frequently pressed, caught, and ground down between the millstones of inconvenient shift schedules and work overload.

More than morale was at stake; case integrity regularly suffered from investigators rotating off-shift. The case could grow "cold", waiting for the investigator to return to duty; or it could get "lost" on reassignment to another investigator.

We noted that fire investigative unit schedules tended to follow the department's overall shift pattern. As few fire departments work the same 8-hour shift arrangements as their counterparts in the police department, coordination was problematical.

In departments with a low daily average of fire investigations, the 24-hour shift may have few apparent drawbacks. In high-run units, the 24-hour shift can be inimical to sound investigative practices. This is especially the case at low energy points at the end of a busy shift. It should also be noted that shift timing usually conforms to departmental custom. This means that it is unlikely that, over time, shift changes have been matched to optimum case clearance time frames or scheduled to increase investigator coverage during peak periods.

One unit attempted to solve its shift coverage by using four separate shift patterns. As one might expect, coordination problems existed, as did the tendency for cases to be worked for several days and then frozen for several days until the team came back on shift. A "weekend shift" for 50 straight hours (with 10 hours off during the period) was an unusual feature of the unit. Once again, the risk with this marathon shift is that sleep deprivation research has shown that with increasing fatigue comes the tendency to slough off routine "ought to's." For soldiers in combat, the "ought to" may be changing into dry socks to prevent trench foot. For arson investigators deprived of sleep, it might be the failure to eliminate all potential sources of accidental cause or proper execution of a search and seizure warrant.

Another unit developed an innovative way around the expense of maintaining 24-hour staffing. All investigators nominally work a 40-hour shift, but four of the seven investigators actually only work four eight-hour days. They then rotate the responsibility to respond to after-duty hour investigations. The eight hours not regularly worked serves as compensatory time for the inconvenience of being on-call.

Units not staffed around-the-clock must work out equitable and effective call-back mechanisms and develop fair compensation practices.

Small units tend to have less flexibility in shift scheduling and cannot staff around-the-clock. Larger units with around-the-clock staffing run into a number of barriers, including investigators who do not want to work shift schedules and opposition from labor or management bargaining elements unwilling to exempt fire investigation units from general contractual provisions. Two-tier systems have the problem of shift differentials. Both parent agencies may be unwilling or unable to develop mutually-acceptable shift arrangements.

. Determining Adequate Staffing Levels

A related problem to shift scheduling is the difficulty of defining adequate staffing levels. Without a convincing methodology (cost-benefit, etc.) or a compelling rationale (political pressure), arson unit managers can be forced to resort to the awkward shift patterns and risk compromising cases due to excessive case workloads mentioned above. One complication is that many units depend in whole or in part on staff with multiple job assignments.

Systems with part-time investigators face special difficulties in determining the adequacy of their staffing levels. Effective full-time equivalencies are difficult to measure for dual-role personnel. Sudden demands from other activities can drastically reduce effective staff levels.

. Obtaining Adequate Staffing Levels

Comparisons of arson case work and case loads with other criminal investigative activities or equivalent fire service activities are not available to the arson unit manager. Without such guides, selling the need for more staff can be difficult.

Fire department investigative units tend to experience this difficulty due to the lack of precedence and experience in developing manning levels for fire and arson investigative activities. Police units may also tend to be understaffed due to the lack of traditional emphasis in arson. Parent organizations can be expected to be naturally reluctant to reallocate existing staffing patterns to provide additional staffing for arson investigative units. Thus, the problem can extend beyond convincing departmental superiors to convincing city council that the additional positions are needed. City council may interpret the agency's reluctance to reallocate existing resources to be a sign that increased arson investigation staffing is not as critical as the department implies. Holding these hands, all players in the resource allocation game can stand pat. It is a particular irony to the research team to observe that City 24, with the lowest caseload rate, had the largest increase in staffing.

. Assigning Investigators to Shifts

Seniority and other restrictions may complicate the ability of an arson unit manager to effectively assign the right personnel to the right team, shift, etc. The question of the efficacy of one- vs. two-man teams appears to resist definitive study. Beyond the efficacy, the natural desire to "work a case with a partner," whatever its efficiency, is strongly endorsed by the majority of investigators with an opinion on the question. The fact that the one city in the study with permanent two-men teams had one of the lowest clearance rates and workload rates suggests that two-men teaming is far from an automatic guarantee of increased productivity.

TABLE 3.45

Arson Investigation Organizational Profile and Staffing Patterns

	City							
	17	24	33	44	57	60	70	87
Fire								
Duty Week	24 - 28	4 10-hour days scheduled by seniority	nominally a 40-hour week	56-hour week (until 1979) 40-hour week (after 1979)	nominally, 40-hour week five 8-hour days	40	48 hours for 6 investigators 40 hours for 2 supervisors	(until 1980) investigators worked 24-hour shifts; (since 1980) 4 10- hour days, 14 hour for 42 total
Around-The- Clock Scheduling	yes	yes	4 10-hour days with 2 hours duty day comp. time for on- call response	no, on-call	no	no	1 3-man day shift; three 2-man shifts	24 on; 48 off
Fire Investi- gator Duty Schedule	24	combination, see note	every 8th day and every 8th weekend	24	40 hours + rotation every 7th week on- call	5 8-hour days	24	24
Overtime Provisions	yes	yes, 4-hour minimum	no	no	yes, limited	yes	yes	yes

3-165

TABLE 3.45 (Cont'd.)
Arson Investigation Organizational Profile and Staffing Patterns

	City							
	17	24	33	44	57	60	70	87
Police								
Organizational Profile	Two-tier (joint since 1980)	FD only	FD only	Two-tier (joint 10/79)	Joint since 1976	Joint, fire dept. responsible for operational and	Two-tier	Joint
Duty Week	42.5	40	40	40	40	40	40	40
Shift Schedule	8-hour, 5-day	4 separate shifts	4 10-hour days with 2 hours per duty day taken off as compensatory time for on-call response	(until 1979) 5 8-hour days (after 1979) 2 8-hour days	+ duty, on call once every 6th week, and 5 8-hour days	40	flexible 40	investigators 10 & 14 detectives 5 8-hour days
Overtime Provisions	yes	yes, overtime + 40 at time 1/2 or comp. time	every 8th night and every 8th weekend	yes	yes, limited	yes	yes	yes

"The Tale of Two Cities" illustrates the range of requirements and constraints encountered in shift scheduling. A major concern in unit administration was the hours and shift differential between fire and police personnel. When the unit was first organized, fire department personnel worked a 56-hour week vs. 40 hours for the police department. Problems in operations, coordination, and overtime management occurred until fire investigators were placed on a 40-hour work week and a new staffing schedule could be worked out. As of September 1980, an investigator was to have been placed on duty from 1000 to 2400 hours and one was to have been placed on standby from 2401 to 0800. Under this arrangement, on Tuesdays, Wednesdays, and Thursdays, 3 of the 4 investigators would rotate to be out during the day shift. This complicated timing arrangement was worked out to suit the constraints of the two agencies involved while allowing for limited coordination. To cite one constraint, the Fire Bureau cannot pay detectives overtime. Therefore, each week, the detectives assigned to the arson unit sign up for overtime in the Detective Division. There, they are assigned to rapid turnover cases, such as petty larceny or misdemeanors. We were assured that this extra duty did not materially alter police investigator performance.

In another city during the study period, fire investigators worked 24-hour shifts while detectives worked 8-hour shifts. This shift differential exaggerated normal coordination problems. The team concept cannot be expected to work under such dissimilar working schedules, particularly when much of the training will be "on-the-job." It is very difficult to conduct follow-up investigations and interviews after being on duty 24 hours and, if the investigation is held in abeyance for 48 hours, the leads will be stale and evidence perhaps destroyed or altered. In addition, much of the required investigation will, of necessity, be handled during normal working hours, such as record searches, interviews, etc.

This problem was finally addressed in 1980 by a change in shift assignments. Currently, four investigators are assigned to flip flop between 10- and 14-hour shifts to provide 24-hour coverage. Two of the five remaining investigators have been teamed with detectives for cross-training and work 8-hour shifts. The remaining three investigators have also been placed on 8-hour shifts. The shift change is reported to have given investigators greater flexibility to pursue a complete initial investigation of a fire scene while fresh.

3.6.2 Recruitment

Fire and police departments commonly post department-wide position vacancy announcements. Four of the eight fire departments published department-wide notices, two requested personnel to bid for the position based on seniority, and two assigned personnel. Of the police departments, four circulated departmental notices, one sought bids by seniority, and one detailed a detective to the position.

None of the departments advertised openings for investigators outside the department.

Selection Criteria

Prerequisites for fire investigator selection included: time in service requirements (5), volunteering (5), previous experience in fire prevention (1), written test (3), and seniority (1). One unit had no explicit requirements. Selection criteria for fire investigators do not attempt to assess investigative aptitude in any real sense. Test criteria for promotional exams consisted of the conventional promotional examination questions for fire suppression positions. The long-term effectiveness of an individual in performing tasks unrelated to previously-demonstrated capability is not likely to be measured using the selection criteria represented in the study sites. Fire departments should give consideration to probationary periods and measures for rookie investigators to after one year.

A more advanced selection mechanism worth developing for arson investigators is an "assessment center" approach that would test candidates in simulated investigative activities to measure their ability to respond to the requirements and constraints typical of investigative activities.

Police arson investigators are far easier to evaluate on the basis of their past performance. This is especially true for units with experienced detectives who routinely investigate cases that initially present little direct evidence and depend on investigators achieving clearances based on circumstantial evidence.

3.6.3 Training

Training is a key element in a personnel development program. Recent advances in the availability, quality and variety of training in arson investigation-related courses make it difficult to justify formal training requirements for initial and continuing education.

The accompanying table (3.47) shows that six of the eight fire investigative units lack formal initial and continuing education minimum standards. Five of the six law enforcement agencies have set no special training requirements for arson investigators. Minimum training standards are far from a perfect guarantee of adequate performance. Among the imperfect alternatives, minimum training standards appear a necessary, but not sufficient, element of what must be a multi-factorial strategy to maintain quality in investigative performance.

3-168

TABLE 3.46
Source of Investigators, Recruitment, And Selection Criteria

	17	24	33	44	57	60	70	87
<u>Source of Investigators</u>				City				
A. Fire Inv.	Firefighters after 2 years service	Fire suppression or fire prevention	Fire dept. personnel	Fire suppression or fire prevention	Fire prevention officers with captain's rank	Fire suppression or fire prevention	Senior fire captains with 12 to 18 years service	Fire prev. or inv.
B. Arson Inv.	Detective ranks	N/A	N/A	N/A	Detective with rank of sergeant	N/A	Police patrol division	Detectives
<u>Recruitment Techniques</u>								
A. Fire Inv.	Department-wide notice	Department-wide notice	Department-wide notice 2 years firefighter	Promotional appointment	Seniority bid list	Assignment	Transfer request by seniority	Nomination by superiors
B. Arson Inv.	Department wide notice	N/A	N/A	Department wide notice	Seniority bid list	N/A	Department wide notice	Department-wide notice

TABLE 3.46 (Cont'd.)

Source of Investigators, Recruitment, And Selection Criteria

	17	24	33	City			70	87
				44	57	60		
Selection Criteria								
A. Fire Inv.	2 years service	2 years experience as fire-fighter and 2 as fire engineer and competitive written examination, and successful completion of investigator training	Promotional examination	Most desirable candidate interviewed - no explicit criteria	Rank of fire captain; 1 year experience fire prevention	None	Most senior bidder	<ul style="list-style-type: none"> . willingness to accept position . test . probation
B. Arson Inv.	Request interview; detective rank; interview successfully;	Must qualify as peace officer within 2 years of appointment and successfully complete 1-year probation	N/A	Volunteer	Rank of police sergeant	N/A	<ul style="list-style-type: none"> . 2 years in department . volunteer . test . interview 	<ul style="list-style-type: none"> . (until 1981) by assignment; (after 1981) by volunteering . detective . interview by selection board

3-169

TABLE 3.47
Training Requirements For Fire And Arson Investigators

	17	24	33	44	57	60	70	87
Fire Inv. gators	No set requirement, investigators averaged 237 hours of training	Basic law enforcement officer's course, plus special arson courses required; formal training hours ranged between 200-462 hours	No formal requirements; Most investigators sent to USFA's basic arson course; law enforcement academy courses are selectively audited and average 135 hours per	No formal requirements	No formal requirements; but investigator has taken USFA's 80-hour arson course and completed basic law enforcement course	No formal requirement	Fire investigators averaged 181 formal training hours, but standards not formally set	240-hour basic police standards course
Police Inv.	No special training for arson investigator; standard police detective training	N/A	N/A	Basic law enforcement standards; no formal requirement for arson	Standard is training normally required of a detective sergeant	Standard law enforcement courses	120-basic law enforcement and 100 hours of arson training	240-hour basic police standards and training required for detective

3-170

Continuing education standards for arson investigation were not present in any site studied. Cost and administrative problems may be legitimate inhibiting forces in some communities. In-service refresher training, such as that presented during some police department roll calls, would be a starting point for unit administrators to consider.

City 17 embarked on a cross-training program during the study period. Involved fire investigators and police detectives praised the improved working relationships that resulted. Neither police nor fire investigators felt that the instructional program, consisting primarily of "ride-along," had much potential for creating truly cross-trained investigators competent in both fire and arson investigation. City 17's experience suggests that other departments interested in setting up cross-training programs first evaluate the need for a formalized instructional course development (detailed analysis of needs, developing learning performance objectives, course content, etc.). Cross-training appears to be a desirable goal frustrated by competing scheduling, resource, and workload priorities.

3.6.4 Retention

We have identified four factors linked to retention of investigators. If the experience in other career fields holds true for arson investigation, there is a learning curve for arson investigators (especially fire service investigators) before the combination of training and experience meld sufficiently to bring investigators to their optimal productivity. It is also possible that there is the investigative equivalent of half-life after performance begins to drop off. Ideally, retention of investigators would be geared to maximizing the number of investigators who can be retained between the threshing of competency and the drop-off point in productivity.

Promotion and Career Ladders

The question of promotion and career ladder has major implications for the desirability of being assigned to arson investigation. In general, it can be said that police arson investigators in two-tier systems are the least likely to have their careers suffer from being assigned to arson investigation. Never having left the department's mainstream, arson detectives in Cities 57 and 70 expressed no perceived loss of promotional opportunities. On the whole, arson investigators assigned to joint units (City 17, 44, and 87) viewed their assignment to the arson unit as a calculated risk; they knew that they were reducing their chance of career advancement and had factored this trade-off into their overall decision.

In contrast to arson detectives, fire investigators are far more likely to find themselves in a short, dead-end career path. Only the three largest fire investigative units had three or more promotional levels. For all other units, investigators desiring to advance their careers at the same pace as their peers would have to seek promotion and accept reassignment outside the unit. Even the largest unit lacked the relative promotional opportunities open to fire suppression personnel (measured by the ratio of the number of personnel within each rank cohort to the number of higher slots). Smaller units offered few or virtually no promotional opportunities within the fire investigation unit.

TABLE 3.48
Presence of Career Ladder

	17	24	33	44	57	60	70	87
Fire Investigators	Yes (4 ranks)	N/A	N/A	No	No	No	No, not formally, though at present, 4 ranks represented	No
Arson Investi-	Yes (4 ranks) (within unit only 2-3 slots)	Yes, between 30-100 slots range of rank within unit from engineer to battalion chief	No	Yes, not within unit	Yes, assignment to unit only short-term and a part of overall is within the normal career ladder of detectives	If detective assignment is temporary and detective career ladder can be resumed upon rejoining police department	Yes, not within unit, except from detective to sergeant; promotions are for both fire and police investigators outside the unit	Yes, not within unit, 2-3 city slots upon reassignment

3-172

The top rank in most units was Fire Captain for smaller units and Battalion Chief in the larger units (more than 10 slots). Thus, opportunities within units are circumscribed. In most units, if investigators take a promotional examination and make the list, they will have to leave the unit to accept the promotion. Thus arson investigators are, in effect, paralyzed. If they stay, and if they leave, the unit tends to lose its most ambitious achievers. As more than one chief investigator reflected, if they had known the long-term impact on their careers when they had joined the unit, they would not have accepted the transfer.

Thus, the career ladder limitations affect retention, the promotional opportunities of those who remain in the unit, and the pool of prospective members.

One of the few positive incentives to remain in an arson unit is the widely-held belief that following retirement, lucrative positions can be found as insurance investigators.

In most cities, the absence of career ladders within a unit or back into departmental mainstreams in fire departments is not limited to fire investigation. Other specialty areas like fire prevention and emergency medical services are likely to be one-way shunts away from career advancement, unless personnel maintain their promotional examination proficiency in fire suppression and accept reassignment outside their specialty field. Lateral mobility is also constrained and, in some cases, prohibited; so if an investigator receives promotion to the rank of Captain within the fire investigation unit, upon transferring out, he will be demoted to the last rank held in fire suppression.

Establishing equitable promotional and career ladders for investigators is likely to remain a recalcitrant problem for fire departments. Overhauling an investigator career path is typically tied into the labor contract, and altering one career path may mean opening up consideration of all career paths and dealing with the prickly issues of promotional policy, specialty equivalency to fire suppression, maintenance of core capability in fire suppression skills, etc. Both management and labor have to be willing to risk tackling these fundamental issues in order to overhaul career paths.

The experience of one of the larger departments in forming a joint unit illustrates some of the difficulties that have to be surmounted:

City-Specific Examples

The size of the unit permits a limited career ladder to exist -- a three- or four-step ladder. No clear plans exist for development. The new requirement that investigators have already passed a Captain's exam based on fire suppression knowledge may help captains to more easily move laterally into other career fields. Detectives may also move out of the unit. Once assigned, however, there is no move under consideration to advance up a rank in the unit.

In the past, fire investigators received pay equivalent to a captain's salary upon their assignment to the unit. They have been repeatedly assured that they would not have to qualify for this pay by passing a promotional examination. Last year, this assurance was vacated when senior fire administrators decided that all investigators would have to pass the exam for Captain. Furthermore, several months prior to the examination date, they were told that if they failed the test they would be reassigned from the arson unit or lose their salary benefits above their actual rank and longevity.

All investigators taking the test failed. The failures affected morale across the board. Fire investigators felt that clear understandings were reneged on without cause and that they were informally asked to take an examination biased heavily in favor of those gaining daily experience in fire suppression skills. Detectives were placed in the awkward position of training those with far more pay and rank in skills. In seeking at least equal pay, the detectives were opposed by other police detectives and senior staff who felt that a salary range for arson detectives higher than other detectives was unfair. At the same time, some captains in the field lost respect for the investigators who failed. Finally, the failure of the fire investigators to attend, let alone pass the police academy, further clouds the respect of those outside the unit.

This issue must be seen in the context that many fire departments have not yet successfully developed balanced multi-track career paths. Rather than being seen as a core capability to be tested along with fields of knowledge in a particular career path (emergency medicine, fire prevention, and fire suppression), fire suppression is often set out as the almost sole criterion for promotions. While this favoritism is also seen in the military, where combat command is still the only sure road to advancement, or business where sales is the usual path of glory, it can have a chilling effect on fairly and equably matching skills with job needs.

Given the issues, stakes, and the management labor factors involved, it is unlikely that arson investigators will get a soundly-developed career path until all career paths and promotional requirements are reviewed together.

The recent handling of the pay, promotion, and career ladders for this city's fire and police arson team members points to a critical problem -- rather than being treated as elite to attract and maintain the best-qualified and motivated personnel, they are being treated as exceptions who need to be brought into conformance with the mainstream. Affording investigators more job-related qualifying and promotional exams might improve performance and morale.

Attrition Rates.

As the accompanying Table (3.49) indicates, attrition rates ranged from less than 10% per year in two sites to 100% per year for fire investigators. For arson detectives, turnover rates ran between 50 to 100% in three years.

TABLE 3.49
Attrition And Mean Years of Experience
For Fire And Arson Investigators

	City							
	17	24	33	44	57	60	70	87
Fire Investigator Attrition Rate	Less than 10%	Less than 10%	61% in 3 years	100% in 5 years	300% in 3 years	100% in 3 years	60% in 3 years	71% in 3 years
Average Years of Experience (1979)	3.4 years	5 years	3.2 years	3 years	9 months for Fire Marshal Investigators and 5 years for Fire-Arson Investigators	3.3 years	5.5 years	5 years
Arson Detective Attrition Rates	50% in 3 years	N/A	N/A	100% in 4 years	50%	100% in 3 years	Frequent turnover	100% in 3 years
Average Years of Experience	8.8 years	N/A	N/A	3 years	3 years	3.3 years	1 year	4 years

Based on a correlation between the mean man months of investigative experience and the annual number of arrests, we have a provisional indication that, overall, an average of five years of investigative experience per investigator results in the largest number of arrests.

Data and resource constraints did not permit a more robust examination of this relationship, although we believe that a tightly-designed test of the hypothesis deserves serious consideration. If a relationship can be validated between mean months of investigator experience and clearance data, unit managers will have a stronger foundation for developing personnel procedures to retain investigators for longer periods than commonly found in the cities surveyed. It stands to reason that fire investigators, in particular, require seasoning, especially in non-fire science related investigation and follow-up techniques. As it takes police personnel several years to develop the skills and become seasoned to the point that they are ready to be promoted to detective, fire investigators are likely to warrant similar development.

TABLE 3.50

City 33's Association of Investigator
Experience With Unit Arrest Data

Average Man Months Experience	41	43	60	61	32	41	38
Total Arrests			80	82	55	72	64

Compensation and Other Incentives.

Compensation is one of the most visible and material personnel matters. For those departments trying to attract and retain the most effective investigators, careful consideration must be given to compensation and other incentives. While this is true irrespective of the organizational profile, joint units are likely to encounter the most difficulty developing equitable compensation packages for fire and police personnel, as City 17's account suggests.

As the accompanying Table (3.51) indicates, the five most frequently observed incentives were overtime (seven of the eight fire departments and all of the five police departments); providing "take-home" cars to investigators (five of the eight fire departments and two of the five police departments); and giving proficiency pay or automatic promotions (3 of the eight fire departments). Other incentives were clothing allowances; different shift arrangements from those assigned to fire suppression duties (in some cases five-day forty-hour weeks rather than round-the-clock shifts); greater freedom of movement and independence; and the second career potential (after retirement or part-time fire investigative expert).

TABLE 3.51

Compensation Incentives For Assignment

			City							
			17	24	33	44	57	60	70	87
Overtime	Fire	Captain's pay for investigators		Or Compensatory time	Yes	No	Yes	Yes	Yes	Yes
	Police	Yes	N/A	N/A	No	Yes	Yes	Yes	Yes	
Proficiency Pay	Fire	Captain's pay for investigators				15% of base salary	Yes	Yes	Yes	Yes
	Police		N/A	N/A				N/A		
Clothing Allowance	Fire		Yes							
	Police		N/A	N/A						
"Take Home" Assigned Vehicle	Fire	Yes	Yes			Yes	Yes	Yes		
	Police		N/A	N/A		Yes	Yes	N/A		
Promotion	Fire				1/2 step promotion					
	Police		N/A	N/A				N/A		

3-178

Departmental managers may find it difficult to develop a fair compensation package in light of the larger requirements and constraints of the department's career ladder and labor contract. Fire departments have the built-in problem that their compensation packages are not likely to be suited to the needs of investigators.

The fundamental question that fire department managers must ask themselves is whether the compensation package attracts and maintains a satisfactory contingent of investigators for a desired period, with career development opportunities that are in the best interest of the department and the individual. The police department manager has a much easier question to ask: Are our regular compensation and career incentives sufficient to attract detectives to specialize in arson investigation as a part of their career? A manager, without means or measures to weigh the facts, cannot judge the cost or the benefit of alternative compensation mechanisms. In this case, the decision about compensation levels would be made under conditions of great uncertainty on a question without precedence in the manager's experience. Under such conditions, managers may be loath to act boldly to either secure just compensation or restructure career ladders to achieve open and fair mobility for a handful of individuals (typically, less than 1% of the employees of a fire or police department). Rather than "opening the whole can of worms" concerning career ladders and compensation, managers (in this scenario) are likely to opt for continuation of past practices. At risk is investigator morale and performance. Managers temporarily unable to effect fundamental changes may be able to "patch" the situation indicated by resorting to other "sweeteners," such as high visibility and prestige for the unit.

Several fire department managers did not appear to be fully cognizant of the impact of compensation on investigator morale. Management may need additional information to be sensitized to the need of evaluating their investigative unit's compensation situation and alternatives. Management's efforts to establish fair compensation and career ladders must be perceived by investigators as earnest. Unless these conditions are met, investigative unit performance may be adversely affected.

END