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Managing Arson Control Systems

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Executive Summary

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Editor

October 1984

U.S. Department of Justice
National Institute of Justice

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This document is based on the final report of "Managing Arson Control Systems," prepared by Hugh C. McClees, Andrew J. Decker, and Daniel J. Carpenter for the International Association of Fire Chiefs and the International Association of Chiefs of Police.

This project was supported by Grant No. 79-NI-AX-0019, awarded to International Association of Fire Chiefs, by the National Institute of Justice, U.S. Department of Justice, under the Omnibus Crime Control and Safe Streets Act of 1968, as amended. 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 U.S. Department of Justice.

Abstract

This document summarizes findings from case studies of arson control systems in eight cities over a three-year period. The study team audited case files, observed fire-scene investigations, interviewed key personnel, and examined standard operating procedures, classification procedures, statutory provisions, and clearance data.

The researchers concluded that, although the cities upgraded their arson-control systems during the period, significant improvements in performance and case outcomes could have been attained if they had taken additional steps to improve system coordination, departmental management, and the administration of investigative units. Specific improvements are suggested in the report; these can be made by applying existing knowledge and techniques. The report emphasizes the need for commitment and involvement on the part of management.

These findings are elaborated in MANAGING ARSON CONTROL SYSTEMS: Vol. II, Arson Detection; Vol. III, Arson Investigation; Vol. IV, Arson Prosecution; and Vol. V, Appendices, available on loan from the National Criminal Justice Reference Service, P.O. Box 6000, Rockville MD 20850.

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1 - INTRODUCTION

Since the early 1970s, the United States has experienced a particularly troublesome outbreak of arson. The U.S. Fire Administration estimates that arsons grew 25 percent each year through the 1970s, until they exceeded 800,000 in 1981, the most recent year for which figures are available. The cost per year: 974 deaths, 3,873 injuries, and a direct loss of \$1.99 billion. Estimates of indirect losses -- i.e., the wages and taxes foregone because of arson -- range from \$6 billion to \$10 billion per year.

Other indicators of arson's impact on the U.S. economy:

* Arson is responsible for 12 percent of all residential fires, and for 17 percent of the dollar losses related to those fires.

* Arson is the leading cause of fire in most non-residential properties, and in 1980 was responsible for 31 percent of dollar losses to those properties.

* Over 400 buildings are damaged by arson each day.

* The average arson loss is twice that of a non-arson fire.

The magnitude of these figures sets arson apart from the "property crimes" with which it is usually grouped. Arson differs in another respect as well: it destroys the property, along with jobs, incomes, and tax revenues. Indeed, arson can be a crime against people, a street crime, a white-collar fraud, or even a terrorist act.

Over the past decade, fortunately, technology has given us a number of new weapons against the arsonist. These include the gas chromatograph to analyze fire debris, computer programs to predict arson and to spot likely occurrences, and "firestarter" profiles to help in the recognition of arsonists. New organizational relationships have also been forged: the arson task force, the arson strike force, special prosecution units, and joint fire-police arson units. New anti-arson programs have been established, ranging from the simplicity of the Neighborhood Watch Program to the nationwide sophistication of the Property Insurance Loss Registry. Reward programs for anonymous witnesses have proved successful against arson, and juvenile firesetter programs offer the promise of deterring young offenders not only from future episodes of arson, but from other criminal activity as well.

The tools of social science research have also been brought to bear against the arsonist. Over the past several years, the National Institute of Justice (NIJ) has sponsored a series of inquiries into the nature of arson control systems. Work commissioned by NIJ has included an excellent monograph on arson research topics ("Arson Control: A Review of the State of the Art with Emphasis on Research Topics," by Stephen J. Tauber, May 1978) and a pioneering statistical survey and appraisal of arson control systems ("A Survey of Arson and Arson Response Capabilities in Selected Jurisdictions," by Stephen H. Webster and Kenneth E. Mathews Jr., February 1979). "Managing Arson Control Systems" is a part of NIJ's research strategy in this area.

Project design and objectives

NIJ chose the case-study approach to provide insights that could not be derived from a broad statistical survey or a narrowly focused experiment. Ten cities were to have taken part in the study. They were chosen to represent all major regions of the country; to exhibit high and low rates for clearances, number of fires, number of suspected arsons, and other published indices; and to provide a diversity of organizational profiles. Because of budgetary limitations, the number of sites was later cut to eight.

In each city, the researchers employed four methods of inquiry:

- * They analyzed the case files of 120 fire incidents, supplemented as necessary by follow-up clarifications.
- * They interviewed fire officers, investigators, and supervisors.
- * They observed fire incident investigations on the scene.
- * They collected and analyzed data relating to the city's arson control system.

The case-study approach provides a unique view of how cases actually develop and terminate. By retrospectively auditing a sample of case files, the researchers gained insights into the real-world performance of fire, police, prosecution, and juvenile probation agencies.

Obtaining a representative sample of cases required a number of steps. First, for each city over a three-year period, the researchers established how many fires had been initially classified as accidental, undetermined, suspicious, or incendiary. Then they made a random selection from each category: 20 accidental, 20 undetermined, 20 suspicious, and 40 incendiary fires. In order to provide information on follow-up investigations and adjudications, an additional sample of 20 cases ending in arrest was drawn from the 1979 files in each city.

A total of 960 incidents were therefore identified in the eight cities. Of these, 909 cases were located, analyzed, and fully processed; the remainder were dropped because of invalid classifications, missing documentation, or other defects. The complete documentation for each case was reviewed by the research team before the key data was coded and keypunched for computer analysis.

Each city was visited by a three-member team consisting of an experienced fire administrator and arson investigator, a former FBI official and practicing attorney, and a public safety researcher. They averaged one worker-month at each city, observing, interviewing, and collecting data. Off-site analysis required an average of five worker-months per city.

Their goal was not to formulate definitive answers to the management and operation of arson-control systems. Rather, they sought to describe and document the features which seemed to contribute to effective and efficient arson-control systems. Interpretations, findings, and recommendations were therefore secondary to the aim of providing an information base upon which others could build. In addition, the methodology developed for this study could be modified by arson-control policymakers interested in conducting their own performance audits.

Not included in the study were "proactive" strategies -- target hardening, computer-based pattern recognition interventions, and insurance reform.

Neither was the study intended to develop procedures for conducting on-scene fire searches.

Because the case study approach depends primarily on synthesizing many sources of information, rather than collecting and analyzing data from a large sample, the data-collection efforts were necessarily limited. In developing the data set, the researchers asked the following questions:

- * Could the data be collected from most of the cooperating cities at a reasonable cost and without overtaxing the hospitality of the local agencies?
- * Was it relevant to the NIJ-approved work plan?
- * Once analyzed, would it add to our knowledge of local arson-control programs, rather than replicating existing information?
- * Would local government decisionmakers benefit from the analyses?

The statistical data was intended to provide an additional channel of reality testing. Rather than an end in itself, the quantitative data was a means to measure, compare, and contrast the qualitative data -- i.e., the on-scene observations and interviews with local personnel.

Specific objectives included the following:

- * To obtain information on the laws, statutes, and ordinances affecting each of the cities and to analyze their effect on arson control, and especially on arrest and conviction rates.
- * To develop an understanding of variations in arson terminology.
- * To obtain information on Federal, state, local, and private resources available for arson control: their scope, their mechanisms and interactions, their policies and procedures, and their impact upon arson control.
- * To improve understanding of how fire incidents are classified, to discover ways to reduce the frequency of "unknown cause" classifications, and to determine the effects of that classification.
- * To improve understanding of the arson investigation process.
- * To improve understanding of procedures for handling physical evidence.
- * To identify various anti-arson efforts and to assess their successes and failures.
- * To obtain information on arson or arson-related arrest rates, and on the factors that influence them.

2 - ARSON DETECTION

RESPONDING TO THE ALARM

Receipt of alarm

The person calling in a fire alarm may be the only witness to the fire's early development -- the caller, indeed, may be the arsonist. Obtaining the individual's name, address, and telephone number is therefore standard procedure in all eight cities. As a convenience to investigators, one city also asks for his or her telephone number at work.

Each dispatch center has a tape recorder with time coding, so investigators can review the tapes for time sequences and other clues. Some investigators made reviews in up to 50 percent of their cases; others did so only when circumstances seemed compelling.

The police role

Police officers can play a wide variety of roles at the fire scene, from crowd control to actively engaging in arson detection.

Dispatch procedures in four cities called for the collateral dispatch of police and fire units; elsewhere, police were dispatched only when the officer in charge requested them. Some arson training (never more than four hours) is given to patrol personnel in all the cities.

Procedural requirements differed greatly. In a few cities, crowd and traffic control was usually the only police function at a fire. In other cities, police officers initiated complaints and assisted fire department investigators by collecting evidence, taking the name and address of witnesses, or even interviewing witnesses and suspects. In one city, fire investigators are full-fledged police officers; the patrol unit's function is restricted to detaining suspects for questioning and to transporting arrestees. In another city, patrol officers were routinely used to secure the scene of a suspected arson, rather than maintaining a fire crew on scene.

Fire unit response

There can be little doubt that efforts to make fire fighters more observant -- en route and on scene -- have been productive. Training in this subject ranges from three to twelve hours, with investigators unanimous in recommending additional time. Reports seldom mention, for example, that a fire fighter has noted the license number of a suspicious vehicle. Such events may be rare, may exist but go undocumented, or fire fighters may indeed require additional, reinforcing training in this area.

Less progress has been made in formalizing observation procedures. Only three cities have standard operating procedures in this area. One city has codified the following responsibilities for fire fighters en route to the scene:

- * Obtain license number and vehicle description or description of persons leaving the scene.

- * Observe smoke and flame character.

- * Note the security elements of the property.

- * Note the dress and demeanor of any occupants.

- * Note other suspicious circumstances: multiple fire sets, holes between compartments, inoperative sprinklers, containers, unusual residues.

- * Preserve (but do not disturb or remove) any evidence found.

FIRE SCENE OPERATIONS

Arson detection modifies and complicates the normal firefighting cycle. Incorporating its requirements into standard behavior at the scene of the fire is therefore difficult.

All eight cities have modified their tactics somewhat, and each has trained fire fighters to contribute to arson detection through their fire scene practices. The amount of training is usually minor -- two to eight hours, for recruits. (In the one city that maintained records of all training aspects, arson detection ranked 15th of 25 subjects in the number of training hours, behind "Ropes and Knots" and "Aircraft Fire Protection and Rescue.") Investigators in all the cities felt that training has improved in recent years but has not eliminated the deficiencies that tend to compromise the evidence of arson. They estimated that fire suppression forces provide significant evidence in many (generally 40-50 percent) cases of arson.

At the fire scene, the challenge is twofold: to channel some of the fire fighter's heightened awareness into arson detection, and to limit the destruction of evidence during fire suppression operations. Investigators were surveyed to determine the reasons for lost or compromised evidence. In order, the reasons seem to be:

- * Premature overhaul. ("Overhaul" is the complete extinguishment of the fire, which typically involves such evidence-destroying activities as pulling down ceilings and shoveling debris out of windows.)

- * Unnecessary fire suppression activity.

- * Failure to note suspicious conditions.

- * Removal of evidence. (Since such removal usually occurs during overhaul, this can be considered an allied problem).

- * Failure of fire fighters to notify investigators.

It is not easy to eliminate destruction of evidence. Interrupting what used to be a continuous operation goes against the fire fighter's nature. Then, too, fire fighters do not enjoy waiting for an outsider to arrive and conduct his or her part of the operation, especially while they are dressed in wet and perhaps freezing turnout gear. Certainly, in the eight cities, there appears to be an association between complaints about improper overhaul and a high frequency of delayed response on the part of arson investigators.

A related problem is abandonment of the fire scene. Common practice in the eight cities is to maintain an engine company at the scene until the investigator arrives, but this policy may be ignored when the fire is minor or involves an unoccupied structure, outdoor property, or a vehicle. It is conceivable that cases might be declined for prosecution because of lax security at the scene.

DETERMINING CAUSE AND ORIGIN

The audit of over 900 cases from the eight cities showed that about 20 percent either lacked a final determination or the determination appeared to be flawed.

Who is responsible for determining cause?

In three communities (the smaller cities, as it happens) responsibility for the initial determination lies with the engine company officer in whose area the fire occurs. In another city, the duty falls to the officer of the first-in engine company. In the remaining cities, the battalion chief is responsible for determining cause.

Making a senior officer responsible for determining cause has many appealing features. It emphasizes the importance of this task, reduces training requirements and skill degradation (since fewer officers are involved), and ties together responsibility for fighting fires, preserving the scene, and determining cause. Not all jurisdictions will find it desirable to make battalion chiefs the primary determiners of cause and origin. However, the researchers recommended that each city at least review this option. In the field, the battalion chief sets the standards for performance, determines what issues are to be emphasized, and is the final arbiter of what gets done.

Standard operating procedures

Standard operating procedures (SOPs) in this area tend to be out of date, to ignore important considerations, or, in several of the cities, to be nonexistent.

An exception is the fire department which directs the officer in charge: "After saving life and controlling fire, begin seeking to determine the point of fire origin and the fire cause as the extinguishment process continues. Use discretion and care in overhauling in the vicinity of the point of origin. When the fire cause is in doubt, overhauling shall be delayed until ordered by the officer in charge." The order goes on to specify criteria for calling the fire investigator, noting that a delayed response can be expected at times. It directs the OIC to cooperate with the investigator before leaving the fire scene, exchanging all pertinent information and providing assistance, if requested, with overhauling the debris. Finally, it specifies how to secure the property, how to treat juveniles, and how to record and report findings.

This process is complicated by the fact that the officer responsible for cause determination must also decide whether or not to call in a fire investigator. Some of the cities resolve this problem by dispatching investigators to virtually all fires. The others typically require the OIC to go through a decisionmaking process which begins with "sizing up" the arson possibilities, much as he or she sized up the fire suppression task.

If this first step does not make the choice clear, the OIC proceeds to "cause exploration," which may involve a survey of the likely scene of origin, discussion with other fire personnel, and interviewing witnesses.

If an investigator is not indicated, the OIC then proceeds to a third phase, making his or her own best determination of fire cause.

Factors in the decision process

Determining cause can be a complex and multi-faceted process, or it may require only a single telltale element. The number of factors, and their weight, varies according to the circumstances of the fire, the nature of the loss, the degree of certainty as to cause, the experience and disposition of the officer, fire department policy, the sanctions for noncompliance, and the time necessary for the investigator to arrive and to conduct an investigation.

In a large percentage of fires, this decision is straightforward. Furthermore, if the decision is not to call an investigator, there will probably be repeated opportunities to reconsider -- say, in 80-90 percent of all fires. The others require closer consideration of the evidence and circumstances, to strike a balance between calling investigators when they are required and not calling them unnecessarily. These judgment calls are easier when the department has a blanket policy of investigating all fires or all fires over a certain dollar loss, or when the investigative unit encourages officers to err on the side of caution.

Among the influences upon the decision are 1) the department's traditions and 2) the officer's motivations, attitudes toward investigation, experience with the pool of investigators on duty, and past experience with the disposition of similar cases.

Evaluation and feedback

Without evaluation and feedback, performance tends to degrade over time, and additional training and reinforcement become less likely. Unfortunately, feedback is used infrequently in most of the cities. Some of the exceptions:

- * One city uses both positive and negative feedback. If an investigator determines that an item has been moved, this fact is noted in the report, and the chief investigator may write a memo that travels down the chain of command to the fire fighter responsible. On the other hand, fire fighters who discover or observe suspicious circumstances are asked to write out their observations, so that the department has a ready mechanism for recognizing their contribution.

- * Another city improves the accuracy of the initial determination by conducting spot checks in about 10 percent of all fires, by providing investigative training to fire officers, and by encouraging information exchange between investigators and fire fighters.

- * In a third city, the battalion chief and the fire investigator work together to determine cause, and overhaul is delayed until both are satisfied. If they disagree as to cause, both reports are forwarded.

INVESTIGATOR CALL-OUT AND RESPONSE

At call-out, responsibility shifts from the fire suppression generalist to the investigative specialist from "downtown." In some departments, this step also marks a transition in responsibility from the fire department to the police department.

Ideally, all fires would be investigated. The reality is that most will receive some degree of investigation and that a fraction will be thoroughly studied. The challenge is to ensure that this fraction is wisely chosen, so that the community uses its resources to the best effect.

Discretion is exercised at three levels -- by the department, by the OIC, and by the responding investigator.

Departmental discretion

Managers can set a conservative call-out policy, relying on the OIC's "size-up" to trigger a call-out. With minor variations, six cities take this approach. It reduces staffing costs, permits the staff to perform non-investigative duties, maximizes the responsibility of the fire suppression officer, and allows resources to be concentrated on the most obvious cases. There are negative consequences as well. Marginal cases are less likely to be investigated, quality control is reduced, more fires are classified as being of undetermined origin, and the importance of arson detection is deemphasized.

Alternately, management can set a liberal call-out policy -- one that aims for virtually all fires to be investigated by assigned personnel. Two cities took essentially this approach. The benefits are increased accuracy in determining cause, routine preservation of evidence, a greater likelihood of detecting and rejecting inflated insurance claims, more experience for investigators, improved data, and fewer errors in determining cause and making call-outs. The drawbacks are also real. They include investigator burnout, pressure to take shortcuts, a reduction in the fire crew's role in determining cause, and fewer resources available for follow-on investigations.

Fire officer discretion

Where the call-out policy is subject to interpretation, or the cause of the fire is clouded, the officer on the scene may well determine whether the fire is to be investigated. Influencing the decision are such factors as:

- * The prospect of delays and complications. Call-out may entail a delay while the investigator arrives (30 to 60 minutes in the smaller cities without 24-hour staffing, and also in the larger cities with long distances to cover), and more delay while the investigation proceeds. If the fire turns out to be arson, the fire officer can expect to write reports and perhaps to appear in court.

- * Previous experience with investigators. In one city, investigators had little expertise and prosecution seldom resulted, giving fire officers little incentive to call them. In several cities, investigators complain of overwork -- a discouraging message to the fire officer.

- * Clarity, consistency, and coherence of call-out procedures. With one exception, SOPs in the eight cities fail to address one or more important

points, such as the situations that call for special handling, the distinctions between juvenile arson and "playing with matches," scene security, and definitions of "incendiary," "suspicious," and "undetermined" cause.

* Reinforcement techniques. Procedures are more likely to be followed when they are reinforced by command emphasis, recognition, peer influence, training, and in-service reminders. For example, one city has space on its incident report form to indicate whether an investigator was needed and called, so that the call-out decision becomes a part of the official record of every fire.

* Incident-specific factors. Among these are the type of property (a fire in a trash container does not normally rate an investigation), its pre-fire condition (a fire in a vacant building is less likely to be investigated, even when incendiary in origin), characteristics of the fire officer (older officers may be less disposed to call an investigator), and such variables as the weather, the time of day, the current workload, and the area of the city.

Investigator discretion

Data from the retrospective audit suggests that investigators failed to respond, or mishandled the request, about as often as fire officers failed to call them. Among the reasons for these failures:

* Workload. The investigator may be committed to another fire or engaged in other duties such as serving an arrest warrant. This factor is frequently cited by the investigators themselves, and is especially likely in larger cities, which are more likely to have simultaneous fires.

* Type of property. Investigators are clearly influenced by the type and condition of the property and by public pressures and concerns. Thus, the analysis showed a 100 percent response to fires in schools, 81 percent to residential fires, 53 percent to fires in automobiles, and 32 percent to trash-container fires.

* Degree of damage. The data shows a 90 percent investigation rate for fires involving more than \$10,000 in damage, 68 percent where the dollar loss ranged from \$100 to \$1,000, and 38 percent where there was no financial loss at all. However, degree of damage appears to be a secondary influence as compared to the type of property.

* Organizational factors. The number of investigators, their shift arrangements and schedules, overtime provisions, other duties, and unit morale -- all influence the response rate. In one city, the night investigator has the option of deferring an investigation to the following morning. Another city recognizes the investigator's right to respond to a fire even when not formally summoned.

* Factors specific to the incident (e.g., a cross-burning may not be investigated) or to the investigator (e.g., an individual near retirement may be less eager to respond to call-out).

* * *

Most of the cities have written call-out procedures that do not conform to current practice. While word-of-mouth modifications have proved effective in some cases, written modifications are probably better.

Once brought up to date, call-out procedures should be adjusted periodically; an annual review should suffice in most jurisdictions. Consideration of overall system objectives should be part of the review. Cities that investigate less than 20 percent of their fires probably need more investigators or a reconsideration of their call-out procedures; the same is true of cities which have a satisfactory investigation rate (say 35 percent of all fires) but are experiencing investigator fatigue, poor clearance rates, or related complaints.

CLASSIFICATION AND REPORTING

The detection phase ends when the incident has been documented. The record serves as an internal archive, is used for the compilation of statistical data, and meets legal and insurance needs.

Seven of the cities have adopted the 902 F form as their basic document for reporting fire incidents. Despite this seeming uniformity, local variations in coding conventions and practices make comparison very difficult. Typically, reporting is a three-step process:

1) At the scene, the OIC notes the fire's circumstances, the names of owners or occupants, insurance circumstances, the estimated loss, the cause and origin if known, and the actions taken to fight the fire. Back at the station, the officer refers to these notes while completing the fire incident report, a process that requires entering short phrases and supplying numerical codes for 21 lines of data. Often enough, the officer may not be trained in this task, not motivated to perform it thoroughly, or delegates it to someone else.

2) The form is reviewed for accuracy and completeness by the reporting officer's superior. Here again, the requirement may be slighted because interest is lacking or training is insufficient.

3) Copies of the report are sent to fire headquarters and routed to the fire prevention bureau, where it is reviewed for coding accuracy before becoming part of the data base. At the same time, information may be updated as a result of the fire investigation.

In the retrospective audit, some 10 percent of the initial fire incident codes did not agree with the written information in the reports. These internal inconsistencies were not caught by superiors or the data specialists, and it is unlikely that they were later detected at the state or Federal level. Quality control seems especially deficient in small cities: three smaller departments accounted for 78 percent of the observed errors. The same cities accounted for about 57 percent of the cases in which the fire officer failed to complete an incident report as required by local procedures.

Beyond the need to document fire incidents for official records and for public information, the fire service can use documentation to measure and improve its own performance. Unfortunately, fire service managers must have confidence in the accuracy of these reports before they can fully utilize the data base. On the other hand, accuracy seems to come only after the managers have used their influence to ensure that the field reports are accurate.

The problem is illustrated by the "undetermined" cause, which is so frequently associated with high-loss fires. Are these successful arsons, or is cause undetermined because the destruction was so complete? The

answer, as it happens, is already in the files. Many "undetermined" fires are resolved by a subsequent investigation, but the jurisdiction lacks any reliable mechanism for updating its records. The procedure in many cities is for fire officers to put down "undetermined" whenever an investigator is called out, thus guaranteeing a high percentage of such findings (36.7 percent in one city). At the other extreme, some cities do not provide a code for "undetermined," thus giving them a rate near zero. These extremes seem unnecessary. Cities that adhere reasonably close to the National Fire Protection Association's coding protocol and updating procedures seem to have little trouble keeping their "undetermined" rates between 1 percent and 3 percent.

A related problem is abuse of terminology, especially "children playing with matches." Other terminology abuses are using "suspicious" when the situation clearly calls for "incendiary," and the use of the latter term when the fire is a non-hostile violation such as burning leaves or rubbish.

These are classification problems which can be eliminated by training and quality control. Fire departments might well ask the following questions of their review procedures:

- * Is the procedure for classifying and reporting fire cause complete, and does it accord with state and national protocols?
- * Does practice conform with the procedure?
- * Do fire officers have access to state or local references, and do they have qualified assistance, when a question arises about coding?
- * Are quality control measures in place, and what types of errors are they catching or missing?
- * Does the editing process ensure that the initial report is updated and the updated information forwarded to the state data collection agency?
- * Are battalion officers trained to assist the command in acquiring reliable data about fires, and do they play an active role in the quality control process?
- * Is the resulting data used by management for planning, budgeting, and evaluation -- and if not, why not?
- * Are those who report and interpret data given training, orientation, refresher courses, and proficiency testing in coding and editing data?
- * Is fire reporting part of the promotional exams for fire fighters?
- * Does command enforce quality-control improvements?

3 - ARSON INVESTIGATION

The investigative process can be divided into on-scene and follow-up phases. In the first phase the investigator attempts to establish that the fire was of incendiary and malicious origin, and if possible to identify the person or persons with the exclusive opportunity to set the fire.

COORDINATION AND CONTROL AT THE SCENE

Bystanders, fire fighters, and police officers are commonly at the scene when the investigator arrives. One of the investigator's prime missions is to maintain and enhance this reservoir of information. For example, one investigator routinely picks up coffee and doughnuts for the fire crew while en route to the scene; another makes a point of visiting fire stations from time to time, to talk about the investigative aspects of fires they have responded to. The study team also found repeated instances where the courtesies had been ignored and relations were strained.

Once at the scene, the investigator exchanges information with the fire officer in charge, coordinates with the police, obtains the owner's or occupant's consent for a search, directs removal of debris, provides for scene security, and briefs the fire officer on the preliminary findings and on requirements for reporting, overhaul, and security.

The researchers found that slightly more than 10 percent of the cases in the audit had control and coordination problems. The most obvious weakness is the fire officer's failure to comply with SOPs (6.4 percent of cases). Allied to this is the failure of the fire officer's report to document cause (2 percent). Flaws involving fire scene contamination, premature overhaul, delayed notification of investigators, and allowing witnesses to leave the scene prematurely (totaling 2 percent) appear to be relatively infrequent.

The cities with complete procedural guides for fire-scene coordination averaged 3.25 errors in the retrospective audit. Cities without adequate SOPs had an average of 17.6 errors -- a significant difference. However, it is possible that insufficient training or inadequate reinforcement contributed to the error rate in these cities.

THE FIRE SCENE INVESTIGATION

Three cities have separate fire and police investigative units, two have a single arson unit (based either in the fire department or the police department), and three have joint agencies. Each of these organizational profiles has its own advantages and disadvantages.

In the survey of 906 cases, fire investigators collected the lion's share of all evidence -- about 78 percent. In collecting evidence of incendiary origin, they were active in virtually every instance. (Note that the sample includes cases which were not determined to be instances of arson. The police activity level rises when only arson cases are considered, but never approaches that of fire investigators.)

Only three of the arson units had up-to-date SOPs, probably because of the fire department tradition of relying on drill instead of written guidelines. Among the candidates for SOP coverage:

- * Call-out procedures.
 - * Standards for coordinating with fire suppression personnel, police patrol officers, and evidence technicians.
 - * Standards for on-scene investigation, including exterior and interior search and special practices for vehicles and other non-structural property.
 - * Interview procedures.
 - * Evidence collection, preservation, handling, testing, and custody.
 - * Processing juveniles, including those below the age of intent.
 - * Processing subjects who are mentally ill.
 - * Documentation standards (report writing; photographing and diagramming the scene).
 - * Search and seizure.
 - * Subpoena powers, if any.
 - * Arrest procedures.
 - * Scene security.
 - * Multiple crime scene responsibilities and other special circumstances.
 - * Involvement of special resources such as the district attorney, arson task force, and the FBI.
- As a starting point, fire department investigative units might review police department SOPs, as an aid in formulating procedures specific to the arson unit.

The audit of cases revealed a number of procedural errors in on-scene investigative practices. The most common (15.2 percent of the sample) were inconsistencies between statements of fact and the reported conclusions about cause and origin. These inconsistencies, however, did not routinely thwart development of the case. A second and more important error was not following a preliminary determination of cause with a further investigation. Related to this was the lack of any investigative response whatsoever. When combined with follow-up failures, aborted investigations occurred in 19.2 percent of the sample. Cities with separate fire and police arson units had an average of 22 coordination failures; those with a single unit lodged in the fire or police department averaged 13.5 failures; and those with a joint arson agency average 9.9. However, the sample is too small to draw the obvious conclusion.

Collecting physical evidence

Physical evidence can establish the fire's cause, identify the person who set it, and speed prosecution and conviction. However, it is also true

that few arson cases are solved on the basis of physical evidence alone. Many arsons leave no physical evidence; the results of evidence testing may not be available until the active investigation is over; and only a small fraction of case files show defense attorneys questioning the physical evidence or the investigator's finding of arson. Improvements in collection and testing techniques, therefore, will not always translate into improved clearance and conviction rates. They are useful mostly as a tool to open a case, seldom to dispose of it.

Single-agency communities appear to be slightly more active in collecting physical evidence, while two-agency cities appear to be least active. In four cities, fire department investigators were more active in recovering physical evidence; three cities maintained a rough balance between fire and police personnel; and the remaining city relied almost exclusively on evidence technicians to perform this task. There appears to be a correlation between fire department dominance and a high activity level in the collection of evidence, but this high activity level does not necessarily result in more items of evidence being discovered.

The researchers concluded that ignorance of investigative procedure is less of a problem than in the past. However, carrying out these procedures still leaves something to be desired. Coffee cans are still frequently used for the storage of flammable liquids. On the whole, storage practices were marginal in the units operated by fire departments; these units might well seek guidance from a law enforcement agency, a sister arson unit, or the guidelines published by national anti-arson organizations.

The following evidentiary items were collected in the eight cities:

	NUMBER	PERCENT
Flammable liquid container	50	25.0%
Debris with hydrocarbon	46	23.0%
"Miscellaneous other"	40	20.0%
Flammable liquid sample	23	12.5%
Fire bomb components	14	7.0%
Match or hand-held lighter	12	6.0%
Latent fingerprints	11	5.5%
Explosive device	5	2.5%
Electrical appliance	1	0.5%
Electrical cord	1	0.5%

Note that arson investigators are far more likely to obtain flammable liquid materials (evidence pointing to cause) than they are to discover fingerprints (evidence pointing to identity).

Of the 200 items, testing was not required in 42 instances, and there were 75 instances in which the required tests were not performed, not reported, or not retained in the files. Thus, firm outcomes were obtainable in only 82 instances -- a finding suggesting room for improvement in the maintenance of records. The researchers found that, of every 10 instances of positive test results, 4 aided in determining cause and origin, 2 assisted in follow-up investigation, 2 promoted prosecution, 1 did not materially aid the investigation, and in 1 case the evidence was compromised.

The audit indicated that insufficient physical evidence was collected in 83 of the 909 cases -- a deficiency rate of about 9 percent, third highest in the on-scene phase of arson control. Another 50 cases were flawed by the failure to gather sufficient evidence in follow-up investigations, failure to use analysis equipment, or contamination of the evidence (usually by fire fighters).

In summary, the researchers found definite improvements in the collection and processing of physical evidence, in large part because of Federal help with training, equipment purchase, testing service, and how-to aids. Nevertheless, the error rate can be further reduced. Stronger unit administration and closer supervision of investigative practices will help, as will additional equipment. Unit administrations should review their files to identify on-scene investigative procedures that need reinforcing, additional training, or command directives. The review may also reveal the need for better maintenance of test results in the files. The use of evidence technicians, if dependably available to the unit, can supplement fire investigators' skills in fingerprint collection, photography, and like specialties.

Collecting testimonial evidence

Testimonial evidence -- an eyewitness account, a confession, or inconsistencies in defendant's account -- is prized for its legal weight. Indeed, some prosecutors refuse to go to trial without an eyewitness or a confession. Testimony is also important to the arson unit manager. Next to determining cause and origin, collecting testimonial evidence is the most frequent, difficult, and energy-intensive on-scene activity.

Of the organizational profiles in the study, cities with two distinct arson units show the greatest success in gathering testimonial evidence (143 items per city). Those with a single unit lodged in the fire or police department gather the least (102 per city). Two-tier systems also average more on-scene and follow-up arrests than do single-agency or joint units.

The researchers also counted the number of witness statements in the case files in an effort to determine the activity levels of fire and police investigators. Of 647 recorded interviews and statements, fire investigators took part in 74 percent, a ratio which suggests that considerable stress should be placed on the testimonial collection skills of fire investigators. Suggestive, too, is the fact that the city in which police investigators are most active (collecting 46 percent of all testimonial items) shows a high arrest level. What is not known is whether the arrest level is cause or effect.

Questioning witnesses and suspects requires the mastery of several legal issues, the skilled employment of psychology, and a salesman's intuition about which contacts to pursue. Typically, the process begins with an informal interview with the fire suppression officer, who may identify fire fighters with specific information and report conversations with the property owner, occupants, witnesses, or bystanders. The investigator must then decide which of these leads to follow up, who should conduct the interview or whether the interview should perhaps be delayed to a later time (prompt interviews are more productive, but this must be weighed against the need to evaluate the scene and let fire crews complete their duties). Then, too, the investigator must know the fine line between an interview and an interrogation, and when Miranda warnings become necessary.

Once the "hot" testimonial leads are completed, the investigator must consider the benefits of a neighborhood canvass. The audit showed many instances, usually involving fire department personnel, where the investigator appeared reluctant to take on this chore. It appears that canvasses may be more productive in smaller communities, and that such programs as Neighborhood Watch are beginning to increase the citizen's role in crime control. In any event, all cities need careful management to get the best return on the effort required for a neighborhood canvass.

Overall, the better-performing cities exhibit some or several of these features: use of personnel with a talent for interviewing, police participation, extensive training, intensive management of resources, and a policy of allowing testimonial collection skills to mature on the job. Situations tending to jeopardize case development include: 1) failure to respect the suspect's right to have a lawyer present and 2) threats to delay insurance payments unless occupants agree to a polygraph test. Indeed, fire investigators appear to rely too heavily on polygraph examinations as opposed to on-scene interrogation, with consequent scheduling problems, no-shows, and cases that cool off for lack of follow-up.

What form does testimonial evidence take? The table shows how often 11 types of testimonial evidence were reported in the 909 cases in the audit:

	NUMBER	PERCENT
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 statement	37	3.6%
Informant statement	26	2.6%
Police patrol statement	16	1.6%
Employee statement	6	0.6%
Surveillance report	3	0.3%

Of the total number of investigations, 646 are arson incidents; the number of testimonial items therefore averages out to approximately 1.5 per case. It appears that activity is concentrated in cases that seem important to the investigator. Cases that strike the investigator as having little prospect of solution are less likely to have testimonial evidence taken, and even less likely to have the evidence documented.

The main value of testimonial evidence is to develop one or more suspects in the case. In the eight cities, 247 suspects were identified through on-scene testimony, 231 were actually named by the statement givers, 86 were arrested at the scene, and 64 were interrogated there. This indicates that statement givers possess a high degree of familiarity with the suspects, and that a significant portion of arrest and interrogation activity takes place at the scene.

The researchers also looked at on-scene errors in collecting testimony. They found 165 errors, the most common being the failure to conduct interviews in a timely manner (71 cases). Second is failure to canvass the fire environs for witnesses (69 cases). Third is permitting witnesses to leave the scene before being interviewed (25 cases). The smaller cities seem to have fewer problems in these areas, especially the first, perhaps because the greater anonymity of larger cities hampers the interview process, or because arson units in larger cities are hindered by greater travel distances, more simultaneous fires, and similar difficulties posed by size.

Collecting circumstantial evidence

One of the most enduring myths relating to arson is that investigation and prosecution are extremely difficult because the evidence is consumed in the fire. In fact, arson -- especially arson linked to insurance fraud -- can successfully be combatted by technical expertise in analyzing incendiary

materials and determining point of origin, coupled with the investigative techniques traditionally used in solving complicated fraud cases.

Among the leads that can enable an arson investigator to develop and establish circumstance evidence that a fire was deliberately set:

- * The presence of incendiary material.
- * Multiple points of origin. (Insurance policies generally provide for repair or renovation unless the property is a total loss; the owner who wants to "sell the property to the insurance company" will usually start several fires in order to ensure a total loss.)
- * Fire origin in the middle of a room (away from combustible materials) or in the attic (insurers often declare the structure a total loss if the roof has been destroyed).
- * Fires on holidays or at hours when occupants are normally away (the arsonist tends to shun witnesses and avoid injuries that could trigger a more intensive investigation).
- * Fires in vacant buildings (which seldom burst spontaneously into flame). An arson investigation is indicated when tenants have recently been evicted or an owner-occupant has recently vacated the premises.
- * Recent removal of valuable objects (sometimes including electrical and plumbing fixtures).
- * A recent sale (property values are often inflated through repeated "paper" transactions which can be detected through an examination of public records).
- * Habitual or multiple claims by the same individual.
- * Recently obtained insurance or mortgage loans (in the latter case, insurance is payable to the lender, and the owner receives the "profit" before the fire occurs).

A review of appellate cases from the jurisdictions covered by this study shows that circumstantial evidence is frequently sufficient to support and sustain a conviction for arson. In one Texas case, for example, the reviewing court affirmed a conviction of a restaurant owner where the evidence showed that 1) he was present just before the restaurant burned, 2) he told customers and employees that his restaurant would be closed that day, 3) he was seen to leave the fire scene hurriedly, 4) he tried to conceal his whereabouts on that day, 5) there was insurance coverage on the building, and 6) volatile material was found at the scene.

Report preparation

Too often, investigative reports are either nonexistent or seriously deficient. In their survey, the researchers noted the following problems:

- * Report incomplete or missing.
- * Failure to document corpus (the facts of the crime) and the investigative activities that eliminated accidental causes.
- * Documentation that is internally inconsistent or which contains conflicting statements of fact.

- * Failure to update or close out case file.
- * Inadequate file maintenance.

In one of the study sites, fully 25 percent of the files are incomplete or missing. Few of the existing reports are dated; others show delays of up to four months between the investigation and the write-up. At another site it was noted that the fire investigators seem to lack a basic understanding of the rules of evidence and probable cause, and are thus unable to prepare adequate follow-up reports. Since probable cause is necessary to obtain an arrest warrant, search warrant, or indictment, the entire prosecution may be jeopardized by failing to set forth the necessary evidence. Elsewhere, the investigators reach conclusions unsupported by the evidence; take a res ipsa loquitur ("the thing speaks for itself") attitude toward the probable cause; or fail to document their observations and the steps they took to pursue leads, thus prompting the prosecutor to decline the case.

To be sure, most cases presented to the prosecutor need no finely argued exposition of cause. They end in arrest because the suspect is identified by an eyewitness or because the suspect confesses. Even in these cases, however, well-organized and well-developed reports help supervisors evaluate solvability factors, monitor case developments, and assess investigator performance.

THE FOLLOW-UP INVESTIGATION

Follow-up investigation is the fourth stage of the arson control process. In the sample of cases, 43 percent entered this phase, and about half of these were eventually cleared by arrest or other disposition. The analysis revealed several factors bearing upon case outcome.

With respect to organizational profile, two-tier systems have a slightly higher percentages of cases reaching the follow-up stage and of cases ending in clearance.

In one city, fire investigators customarily handled all aspects of the follow-up investigation. Elsewhere, they often played a leading role in searching for documentary evidence, interviewing witnesses, and interrogating suspects. In all but two cities, it was common for fire investigators to take part in arrests and in search and seizure activities. The high level of fire investigator involvement underlines the need for these individuals to be qualified through training and experience in what are usually considered to be police procedures:

	ON-SCENE ARRESTS		FOLLOW-UP ARRESTS	
	Number	Percent	Number	Percent
Fire suppression personnel	5	3%	--	--
Fire investigators	24	12%	47	24%
Police investigators	15	7%	34	18%
Police patrol officers	39	20%	22	11%
Joint or unknown	--	--	8	4%
TOTALS	83	42%	111	57%

There is a clear association between organization profile and the degree of fire investigator involvement. With exceptions, fire investigators make the most arrests in single-agency units and the least in two-tier systems.

Civilian personnel may in the future play an increasing role in the follow-up investigation. In states with immunity statutes, insurance adjusters can provide much useful information: the name of the building's owner, the amount of insurance in force, the date insurance coverage was obtained, and the history of premium payments and previous claims. An accountant can review such matters as financial statements, tax returns, assets under lien, liquidity and current earnings ratio, source of funds, changes in inventory levels, internal loans, delays in paying bills or taxes, increases in bank overdrafts, and issues of improper invoices for the purpose of obtaining funds.

A danger to specialized investigative units is that they can become isolated from other criminal justice resources. Arson units might well arrange with other units to handle overflow situations (one city in the study has a standing arrangement to borrow burglary unit personnel when arson investigators are overloaded) or to take over certain types of routine cases (another city reassigns minor cases of youthful arson to juvenile detectives).

Complex, economically-motivated arsons compose a small fraction of all cases -- about 6 percent in the case sample. For this reason, the collection of documentary evidence is the exception rather than the rule, with the most frequent activity being the search for a criminal record (43 percent of such actions). Other activities include reviews of recent business history (14 percent), recent legal actions (9 percent), and insurance coverage (7 percent). Overall, these activities involve only 10 percent of the arson investigations sampled.

Fire investigators and police investigators are equally likely to interrogate suspects, although the ratio varies from city to city. Only two units have qualified polygraphers assigned to them. Three units (all based in fire departments) lack adequate interview facilities.

Search and arrest warrants are normally prepared by police personnel and submitted through police channels. However, fire investigators often accompany the patrol officers or detectives when they execute the warrants.

When the researchers analyzed grounds for arrest, they found that physical evidence is the basis for only 15 percent of all arrests. (More likely: a positive identification of a suspect and/or a confession.) The time between the initial investigation and the arrest is generally short -- of all cases ending in arrest, 62.5 percent are cleared in less than six days, 77.5 percent in less than ten days. As for the time required to complete the arson investigation, 14.5 percent of the cases for which this information was available require less than an hour, 30 percent require less than four hours, and 69 percent take ten hours or less. Of cases requiring extended investigation, the largest share (13.6 percent) took between 21 and 40 man-hours of work.

The researchers then "worked the data" to learn more about the results obtained in follow-up investigations, with the following tentative conclusions:

* When ranked by degree of fire department involvement, the best performers tend to be found in the middle of the ranking. Specifically, the sites where fire investigators account for between 40 percent and 70 percent of follow-up activity tend to have the most cases cleared by arrest or otherwise. The sites with higher or lower levels of fire department involvement tend to have lower clearance rates. This may be another way of saying that those units in which investigative chores are shared by police and fire personnel tend to show the best results.

* Case outcomes do not seem to be strongly related to the dollar value of the loss. For example, cases with losses of \$10,000 or more are only one percent more likely to end in clearance than are those with nominal losses.

* Over the three-year period there is a decline in of clearances, despite an increase in fires reported to be of suspicious or incendiary origin. This apparent anomaly may be the result of better record-keeping and greater interest in arson.

* While the unit workload is going up, the individual workload is declining as new investigators are added. The decline in clearances is therefore even more striking on an individual basis. A possible explanation is that new investigators are less productive than their more experienced colleagues. Other possible contributing factors: arsonists are more sophisticated, investigators are working more difficult cases, or investigators are relying less on such explanations as "children playing with matches."

* Variances in individual workload are greater than expected, with yearly averages ranging from 28 to 199 cases per investigator. Individual workloads were lowest in single-agency cities (46.5 cases per investigator) and highest in cities with separate fire and police arson units (144 cases per investigator).

* There is a positive correlation [.57] between high clearance rates and high investigator caseload averages.

* The cities with the highest and lowest arrest rates per 100 investigations are both major metropolitan areas with two-tier arson units and similar manpower levels. Thus, organizational profile is less important than the way in which personnel are managed.

Finally, the researchers evaluated the cities' follow-up investigative practices to determine the source and frequency of errors. Missing records proved to be the most frequently observed error, at 11.4 percent -- a considerable deficiency, and one which can distort the data, since the missing files may contain other deficiencies. The second most frequent error is the failure to interview suspects (8 percent of the cases). Third is failure to review file records or otherwise check for a tie-in when the circumstances warranted such a check (7.4 percent of the cases). Fourth is the failure to gather sufficient testimonial evidence (4.2 percent of the cases). Errors in this final category seem to be most common in those cities with low involvement by police detectives.

STANDARD FOLLOW-UP PRACTICES

A complex arson case may require the investigator to perform many or all of these follow-up procedures:

- * Visit the fire scene
- * Confer with insurance company
- * Determine motive
- * Prepare evidence and test requirements; submit to lab
- * Confer with prosecutor
- * Obtain search warrant
- * Give Miranda warning to suspect
- * Obtain statement
- * Obtain evidence from lab; maintain chain of custody
- * Prepare prosecutorial file
- * Testify at preliminary hearings
- * Issue subpoenas to individuals and institutions
- * Testify in court
- * Update case records
- * Review and analyze financial records
- * Obtain police records of possible suspect
- * File supplementary reports
- * Submit complaint request and supporting evidence
- * Locate suspect
- * Serve search warrant
- * Interrogate suspect; administer polygraph test
- * Arrest suspect; arrange for booking
- * Obtain photographs of scene
- * Attend arraignment and bond hearings
- * Testify before grand jury
- * Review notes and confer with prosecutor
- * Dispose of evidence as directed by court

ARSON-FOR-PROFIT

Cases of arson-for-profit may require the investigator to perform the following additional tasks:

- * Requisition insurance information
- * Confer with experts in insurance, finance, and related fields
- * Obtain other financial, title, and mortgage information
- * Develop investigative flow charts

MANAGEMENT AND PERSONNEL ISSUES

One of the clearest findings from this research is the need to improve the management of arson units at all levels -- system, department, unit, and case. Ideally, arson control would be planned, managed, and evaluated as a cooperative system. The reality is otherwise. Some of the cities have one or more aspects of a modern management system; others lack even rudimentary administrative tools. Most units are without specific goals and objectives, basic performance data, or routine mechanisms to evaluate performance. Where written goals exist, they tend to be merely a paper exercise. Only one unit reports its progress toward goals on a quarterly basis, and even these measures do not appear to be used by the department to monitor unit performance.

Personnel management issues include staffing arrangements, recruitment, training, retention, and assessing performance.

Staffing arrangements

Shift scheduling is the most common concern among investigators, affecting not only morale but also case integrity. Fire department arson units tend to follow the 24-hour shifts of their parent organizations; police units tend to use 8-hour shifts. The 24-hour shift can lead to unsound investigative practices in high-run units, as investigators tire toward the end of the shift; it also increases the likelihood that a case will grow cold before the investigator returns to duty, or be lost in the course of assignment to another investigator. In two-tier cities, different shifts for fire investigators and police detectives can lead to coordination problems. Finally, seniority and other restrictions may complicate the ability of unit managers to assign personnel to particular teams or shifts.

A related question is what constitutes adequate staffing levels, especially in units whose investigators have multiple job assignments. The difficulty of obtaining adequate staff may be compounded when arson control is not a top priority for the parent organization.

Recruitment

Fire and police departments commonly post department-wide announcements of vacancies in arson units; some seek bids by seniority, and others simply assign personnel. None advertises openings outside the department. The usual prerequisites: that the new fire investigator have specified time in service (5 departments), be a volunteer (5), pass a written test (3), possess seniority (1), or have previous experience in fire prevention (1). None of the units attempts to assess investigative aptitude in any real sense, and the effectiveness of a new investigator seems to be unrelated to previously-demonstrated capabilities. Thus, fire departments should consider adopting probationary periods and measures for rookie investigators. Police arson investigators, by contrast, are easier to evaluate on the basis of past performance.

Training

Six of the eight fire investigative units lack formal standards for initial and continuing education; five of the six police agencies have no specific training requirements for arson investigators. In-service refresher training, such as that presented during roll call in some police departments, would be an inexpensive place to start.

One city embarked on a cross-training program during the study, and both the fire investigators and police detectives noted improvements in their working arrangements as a result. However, they did not feel that a simple "ride-along" program was enough to yield investigators that are truly cross-trained in fire and police procedures.

Retention

Ideally, investigators would stay on the job long enough to pass the threshold of competency, but not so long that their performance begins to drop off. The present study suggests that five years of investigative experience results in the largest number of arrests -- more time on the job than the average investigator possesses. Yearly attrition rates for fire investigators range from 10 percent to 100 percent; for police arson detectives, the turnover ranges from 50 percent to 100 percent over the three years of the study.

The question of promotion is likely to be high in the investigator's mind. Generally, police detectives in two-tier systems are least likely to have their careers suffer from assignment to arson investigation; investigators assigned to joint arson units tend to view their jobs as a calculated risk. Fire investigators, by contrast, are much more likely to find themselves in a dead-end career path. The top rank in the smaller fire department arson units is captain; in most larger units, it is battalion chief. Qualified investigators must therefore leave the unit in order to accept a promotion. Establishing equitable promotion and career ladders for investigators is likely to remain a problem for fire departments.

Compensation is another important incentive, but managers are likely to be constrained by the department's career ladder and labor contract. This is especially true in fire departments. Managers unable to effect fundamental changes may be able to offer such "sweeteners" as high visibility and prestige for the arson unit. The most frequently observed incentives in the study cities are overtime pay, take-home cars, and proficiency pay or automatic promotion. Other incentives include clothing allowances, desirable shift arrangements as compared to fire suppression personnel, greater independence, and the potential for a second career upon retirement. Indeed, one of the major incentives to remain in an arson unit is the widely held belief that, after retirement, a lucrative position can be found as an insurance investigator.

4 - ARSON PROSECUTION

Prosecution is an integral part of the arson control process, and managers must look beyond clearances to ultimate case outcomes. If the case is eligible for prosecution, will it in fact successfully prosecuted -- and if not, why not? Prosecution may also have an effect upon the arson investigator and fire scene manager, by encouraging them to perform better, and can even serve to discourage firesetters from future incendiary episodes.

PRE-ARREST INVOLVEMENT BY THE PROSECUTOR

In seven of the cities, pre-arrest involvement by prosecutors is infrequent. In the eighth city, a unit in the District Attorney's office is charged with handling all arson cases (it handles other cases as well.) This arrangement probably accounts for the high level of pre-arrest consultations. All investigators maintain that they regularly consult with attorneys from the special unit, and the Assistant District Attorney in charge of the unit estimates that fire investigators do indeed seek legal assistance before presentation in about 50 percent of the cases that are eventually brought before the unit. This individual is available for telephone consultation both day and night, and has requested that he be notified when significant arson fires are being fought, so that he can visit the scene. According to investigators, their reasons for requesting legal advice included the Miranda warning, what constitutes probable cause for arrest, search and seizure situations, warrants for material witnesses, and issuance of Grand Jury subpoenas. Despite this level of interaction, the prosecutors point to several cases compromised by insufficient Miranda warnings. Further, at least one fire investigator feels that the unit could have made better use of this legal resource; and the actual involvement of arson prosecutors in the pre-trial investigative stage is minimal and limited to cases going to the grand jury, or to those of public interest.

In any event, as compared to the other cities in the study, this city has the second highest number of arrests, the highest trial rate for those arrested, the second highest conviction rate, and the highest absolute number of convictions. Of the cases reviewed, 100 percent were charged; none of the other cities show a charge rate higher than 87 percent.

By sharp contrast, the city where arson investigators have the least direct association with prosecutors also shows the lowest conviction rate. In this city, police make arrests and seek complaints without assistance from the prosecutor's office; and magistrates, rather than district attorneys, determine whether there is probable cause to prosecute.

Pre-arrest involvement by the district attorney's office is logically linked with having one or several prosecutors who are specialists in arson prosecution. Without such a designated contact, investigators are far less likely to seek assistance -- and it is abundantly clear that they are frequently in need of assistance, especially those investigators without career backgrounds in law enforcement. Assistance is useful, not only for questions of law, but also in terms of prosecutorial discretion and case priority. Sorting out cases likely to result in successful prosecution is an important aspect of results-oriented (as opposed to clearance-oriented) investigative policy.

Obviously, fire investigators can increase their clearance rates by arresting persons against whom there is reasonable evidence, but evidence insufficient for purposes of a trial; or they can concentrate upon small-fry offenders. Similarly, prosecutors can increase conviction rates by going after minor but iron-clad cases. What is needed is a joint understanding of which cases need to be pursued, and with what level of energy, and pre-arrest consultation is the prime means for obtaining such an understanding. The result might well be a decrease in the number of clearances, or indeed convictions. However, the jurisdiction should experience an increase in the cases that need to be prosecuted most -- cases with the potential to deter future arsons, whether on the part of the individual being brought to trial, or on the part of those who hear about the trial and are thereby discouraged from seeking this form of economic or emotional reward.

DOCUMENTING ARSON

Field observation confirms the conventional wisdom, that the best investigations can be jeopardized by a poorly documented case. The reasons are threefold. First, the crime itself must be established, in a manner that will convince the prosecutor that the evidence satisfies the requirements of a statutory offense. Second, the suspect must be linked to the crime -- again to the satisfaction of the prosecutor. Third, for the roughly 50 percent of cases in which no confession has been obtained, there must be a compelling presentation of eyewitness testimony, the suspect's testimony, and the circumstantial evidence. Complicating the presentation is the fact that each of these elements may rest upon reports written by three or more individuals. Cause and origin may be documented by a fire suppression officer, the main investigation by a fire investigator, and supplementary reports by a police officer or arson detective.

In the study, almost all documentation establishing the crime, and most if not all of the investigative reports, were filed by fire officers. Most of these officers have not received any formal training in law enforcement report writing. (Indeed, it has been only within the last few years that local law enforcement managers have committed significant resources to improving the quality of case documentation, through report writing classes, case management review, and the like. It is hardly surprising that these reforms have not yet reached many fire department arson units, where investigative courses tend to deal with technical, legal, or forensic issues. Report writing and case documentation are still a negligible part of even the most modern arson course.) Prosecutors, however, are accustomed to documentation prepared by detectives experienced in writing up evidence. They may be forgiven for deducing that a case is weak on its merits, not because it was documented by personnel inexperienced in crime reporting.

Only three of the eight units routinely prepare case documentation in a format designed to 1) tell the story of the case in an orderly fashion and 2) efficiently establish its factual corroboration. However, at the time of the study, several other cities were in the process of developing such formats.

The special arson prosecutor in one city developed a format for such documents, even though in that city police detectives are responsible for completing every arson investigation. The recommended contents, in order:

- * Prosecution report, listing witnesses and defendant information.
- * Copy of all complaints (police reports) and supplementals prepared by any member of the department concerning the arson.

- * Copy of the defendant's local and FBI arrest records.
 - * Copy of the defendant's arrest register.
 - * Copy of all office reports written as a result of the investigation. (These are especially important to the trial assistant because they often contain detailed information not in the original police reports. Such reports are generally not discoverable by defense attorneys under the state's rules of procedure.)
 - * Copy of all laboratory reports related to the arson.
 - * Copy of all photographs taken by any lab technician or investigator. (Photographs have special significance in arson cases because points of origin, burn patterns, and degree of destruction are critical issues.))
 - * Copies of all written or oral statements made by the defendant.
 - * Copies of all witness statements taken during the investigation.
 - * Copy of the Fire Investigative Report prepared by the fire department.
 - * Copies of all search warrants and affidavits executed during the investigation.
 - * Any other information relevant to the prosecution, such as line-up photos, insurance records, land records, names of agents, corporate names, financial records, schematic diagrams, and the like.
- In addition, the arson prosecutor requires that the following information appear on the outside cover of the folder: defendant's full name, sex, race, and date of birth; the charge or charges; the victim (owner or occupant of the building); date and time of crime; central complaint number; the bureau of identification's number for the defendant; date of preliminary hearing (an indictment is sought before the preliminary hearing); and location of the offense.

CASE SCREENING PROCEDURES

Case screening is the interface between investigation and prosecution. Curiously, data on the screening process -- such as turnaround rates and reasons -- are not maintained by any arson investigative unit in the eight cities, and by only a few of the prosecutors. Perhaps they found the information too difficult to gather. However, under new data systems such as the Prosecutors Management Information System (PROMIS), case screening statistics require no special effort to generate or collect. Jurisdictions with such data systems can easily analyze the outcomes of, say, felony arson cases as opposed to other crimes. Fire and police agencies alike should find this information helpful in tracking the results of arson cases.

More likely, something deeper is at the root of this failure. One or both parties may be reluctant to track the data too closely, for fear that their units might come under fire if arrests appear weak or prosecution lax. More fundamentally, arson investigators and prosecutors may not regard screening as a valid measure of their performance levels. None of the agencies in the study had developed system-wide goals, objectives, or measures, so it may have been premature to establish a mechanism to collect this data.

Finally, and perhaps most important, measuring performance across two or more agencies is an uncomfortable notion for those accustomed to minding only their own agency's output. Gathering and interpreting case-outcome data implies a concern for the arson control process as a whole; unit managers are typically concerned with measures tied to and influenced by their own unit's performance.

Because this information is not routinely collected, our discussion of the screening process is necessarily qualitative. These points are suggested by the data:

- * No obvious relationship exists between the method of complaint review and the percentage of cases charged, with one exception. The city that uses magistrates instead of district attorneys to review complaints has the lowest percentage of arrestees brought to trial (48 percent of arrestees are charged; only 26 percent are tried.) The magistrate charging system apparently leads to a rather high proportion of not-prossed cases.

- * The same city, of course, shows a rather low rate of convictions (22 percent of all arrestees). However, an even lower conviction rate (17 percent) is registered by another city in which prosecuting attorneys do not specialize in arson cases, and where personal relations between investigators and attorneys play a large role in whether a case is reviewed. Until recently, investigators were not formally advised of declinations; and there is no mechanism for providing investigators with the results of prosecution, plea bargaining, or other dispositions.

- * When case disposition data are averaged for the eight cities, it appears that 66 percent of all arrestees are charged, 55 percent are tried, and 40 percent are ultimately convicted.

- * In the eight cities, the loss rate between charge and trial ranges from zero to 22 percent, with the worst record in the city with the magistrate system. In the no-loss city, fire investigators are police officers and have authority to write up the complaint. Only a few attorneys are involved in reviewing and prosecuting arson cases. They use an Intake and Screening Fact Sheet to review the case folder and the charges sought; the fact sheet lists the charges actually preferred and indicates whether they are accepted as drawn. The police department receives a copy of the fact sheet in order to track the disposition of the case.

- * Between charge and conviction, the loss ranged from 17 percent to 43 percent. Once again, the city using a magistrate charging system shows the worst record. The city faring best in this respect previously had a prosecuting attorney review each felony complaint with the detective presenting it, to see if the charges could be substantiated with the evidence at hand; this occurred before the preliminary hearing. This approach has since been strengthened by designating three attorneys to handle all arson cases. (In fairness, it should be pointed out that 38 percent of arrestees could not be tracked because of records-keeping limitations in this city; its loss rate may well be higher than the data indicates.)

From the study, it seems clear that there is an association between active arson task forces and improvements in the screening of arson cases. Apparently, communications barriers between investigators and prosecutors can be overcome.

That arson cases receive prejudicial screening, while often alleged, cannot be confirmed by the data or the case reviews. The allegation may have been true at one time, but now it appears that the national attention

focused on arson over the past several years has reduced this problem. To further enhance the screening of arson cases, the researchers suggested attention to the following:

- * Improvements in investigative practices.

- * Improvements in case documentation.

- * Improvements in case screening procedures by separating case review from prosecution, as is done in the two low-loss cities cited above. Alternately, experienced attorneys can be assigned to a case-screening liaison program, as is done in a third city whose Central Intake Office is manned around the clock by attorneys with a minimum of six months' experience (these attorneys, of course, are not specialists in arson prosecution, and there is no vertical handling of arson cases).

Because case screening is so central to the process, it behooves every agency in the system to monitor this interface. Careful review and discussion of past cases can reveal problems in the existing screening mechanism and reduce any tensions these problems may have caused. Prosecutorial leadership is probably essential for such a review.

PRE-TRIAL PROCEDURES

For both prosecutor and defendant, a trial is the last resort. Most cases receive another form of disposition, after charging and before trial. Disregarding the nature of the case and the personalities involved, and excluding such external variables as the prosecutor's workload, six factors influence this process:

- * Prosecutorial discretion.

- * Charging practices.

- * Whether vertical or horizontal prosecution operates.

- * Plea bargaining usage and custom.

- * The pre-trial modalities (i.e., grand jury presentment, preliminary hearing).

- * How mental cases are handled.

- * The legal statutes of the state.

The analysis shows that first- or second-degree arson charges are sought in 68 percent of the cases, and only 3 percent are not issued as requested. Thus it appears that it is not charging practices but case screening before charging, and plea bargaining afterward, that causes most interagency disputes over case handling.

The legal literature has given extensive consideration to whether it is preferable to proceed by grand jury or preliminary hearing in cases of arson. In four of the cities, the case must first go before the grand jury, unless the defendant waives this right. In a fifth city, the defendant has no right to indictment by a grand jury, and a preliminary hearing is almost always used. Elsewhere, the path taken is left to the prosecutor, who generally opts for a preliminary hearing except in extremely complex cases, or those requiring secrecy or the preservation of testimony.

In today's overcrowded courtrooms, plea bargaining -- the reduction of the charge or the punishment to the satisfaction of the prosecutor, defense counsel, and judge -- is a necessary expedient. In many jurisdictions it is the main track for criminal prosecution. The analysis suggests that plea bargaining in the eight cities ranges from 42 percent to over 90 percent. In three cities, those familiar with prosecution practices believe that plea bargaining was once more common for arson than for like offenses, but has since declined. (The change generally coincided with a review of arson practices, the formation of an arson task force, and prosecutor participation in it.) In the other cities, plea bargaining rate is described as high but in step with like crimes.

Comparing arson to any other felony is difficult because so many crimes are called arson, yet differ in their seriousness, and because arson is often a crime both against property and against persons. Perhaps a more valid yardstick would be to compare the disposition of felony arsons to overall felony dispositions.

Cities in the study deal with mentally disturbed offenders in widely differing ways. While the true pyromaniac is rare, firesetters motivated by emotional or irrational needs are not: in the case sample, mentally disturbed firesetters made up 18 percent of the known motivations for arson. These offenders pose special requirements on investigators and prosecutors. In one city, an investigator spent an entire day trying to get a former mental patient institutionalized -- after commitment had been approved. A more general problem arises with post-custody record keeping. When mental commitment appears to terminate the case, investigators may tend to minimize documentation; if the offender is later returned to stand trial, vital testimony or physical evidence may not be available.

Another consideration: if a large percentage of arrestees is classified as mentally disturbed, clearance and outcome data may be skewed. Clearance rates may be overstated, or clearance to conviction ratios understated.

ADULT PROSECUTION

The prosecution process in one of the cities is outlined below; it is typical of practices in the other seven.

* Arrest. The suspect is arrested, booked, and arraignment set in district court on the next judicial day.

* Arraignment -- district court. The assistant district attorney either drafts an information (charging instrument) or declines to prosecute, in which case the suspect is released. At the arraignment, the suspect is informed of the charges, re-advised of rights, and, if indigent, has defense counsel appointed. Bond is set, usually amounting to the statutory bail, although it may be higher if circumstances warrant. A plea is entered only if an attorney is present.

* Preliminary hearing -- district court. A hearing for probable cause is held within five judicial days; if probable cause is found, Circuit Court arraignment is set for the next judicial day.

* Arraignment -- circuit court. The district attorney drafts a new information; arraignment proceeds as in district court.

* Pre-trial conference. Prosecution and defense disclose the witnesses to be called, furnish all written or oral statements, produce physical evidence and reports of lab examinations, and produce criminal records of

defendant and witnesses. Discovery is liberal and not limited to an investigator; police reports are furnished to the defense by custom. The district attorney makes a formal plea bargaining offer and sentence concession. (About 80 percent of cases are settled at the conference.)

* Trial. Speedy trial decision requires that the defendant be tried within 60 days of arrest, or else be released. However, the State can again proceed against the defendant if it so chooses.

* Sentencing. Possibilities include an indeterminate jail sentence, a fine up to \$2,500, or a prison term, depending on class of felony. A matrix (i.e., risk history or severity of crime) is used in sentencing, and is adjusted according to the prison space available. Once sentenced, the defendant is placed under the control of the Corrections Division.

* Appeal. Appeal is automatically filed with the Court of Appeals within 30 days of conviction.

In this jurisdiction, there is no right to a grand jury. The district attorney uses this option in complex or sensitive cases; if a true bill is returned, an indictment is filed and a bench warrant issued for arraignment in superior court.

Over the three-year study period, successful dispositions in this city (taking into account both convictions and mental commitments) ranged from 66 percent to 75 percent. It can be hypothesized that the factors working for success include: 1) arson cases are assigned to a four-attorney prosecution unit, 2) investigators frequently consult with prosecutors before filing, and 3) cases are routinely returned to investigators for strengthening.

The three other cities that can provide equivalent data show approximately the same ranges -- a far higher rate of successful disposition than is commonly supposed.

JUVENILE ADJUDICATION

In the solution to the problem of juvenile firesetting may lie the prevention of many future adult arsons. On the surface, the problem is simple: how to distinguish between the curiosity seeker, the juvenile firesetter in need of counseling, and the juvenile arsonist in need of adjudication. In practice, matters are not nearly so straightforward.

None of the eight cities use any formal guidelines for determining which juveniles are to be counseled, counseled and released to parents, or bound over to juvenile authorities. Yet juvenile offenders comprise about one-third of all clearances for arson offenses in the cities, and this figure in turn represents only a portion of the actual caseload. For each reported juvenile arson, as many as five incidents are reported and handled as "juvenile playing with matches."

What constitutes a juvenile varies greatly between jurisdictions. Two of the cities use a range of 7 to 17 years, others have lower and higher thresholds, and two define a juvenile as "under 18." Each of the jurisdictions also provides that at some intermediate age -- commonly 15 -- the juvenile can be tried as an adult, and one permits those over 10 to be confined. The presence of age limits directly affects the number of cases that can be adjudicated as arson, or even defined as such. For those below the age of reason, the fundamental question is whether there is a systematic evaluation and counseling program. The same is true for many firesetters of an age for juvenile adjudication. At the upper end of the range, the

question is raised of whether to try the juvenile as an adult . . . although officials in the eight cities agree that resorting to this practice is extremely rare.

A typical juvenile adjudication system is described below. In this jurisdiction, a juvenile is between the ages of 6 and 16; a child under 10 can be judged a delinquent but cannot be confined to a training school.

* Intake. The case is presented to the juvenile counselor by the investigating officers, who review the current and any prior investigations.

* Social investigation. A counselor has 15 days to investigate family background, education, "priors," etc. If juvenile proceedings are approved, the social investigator prepares a petition which is signed by the investigating officer or victim. With two weeks, the probation officer docket the case for a juvenile hearing. (The petition serves the function of an arrest warrant; if a serious crime is involved, the petition is handled without awaiting the social investigation.)

* Bond. Bond is largely based on the investigating officer's recommendation, taking into consideration the youth's danger to self or community. If ordered detained, the youth is not entitled to bond.

* Juvenile hearing. District court judges handle juvenile hearings on a rotating basis. An attorney is appointed to represent the juvenile, if indigent. The State is represented by an assistant district attorney. The juvenile hearing is in three stages: arraignment, adjudication, and disposition. In passing sentence on a youth found to be a delinquent child, the judge relies to a large extent on the recommendation of the probation officer. Sanctions include confinement for an indeterminate period; full or partial restitution; a fine related to the seriousness of the offense; supervised community service, consistent with the juvenile's age and abilities and the seriousness of the offense; performance within a supervised day program, a community-based program of academic or vocational education, or professional treatment program; intermittent confinement (night custody for no more than two weekends) in an approved detention facility; probation under the supervision of the court counselor; revocation of driver's license; or commitment to the Division of Youth Services. Thus, a wide range of sanctions is available in the juvenile justice system, but it remains a fact that most juvenile firesetters are sentenced to probation at most.

* Appeal. Juveniles can appeal directly to the Court of Appeals.

* Diversion. Exists, but is not applicable to serious felonies, including arson.

A juvenile over the age of 14 who has committed a felony can be tried as an adult at the discretion of the court. If the probation officer declines to approve the petition, the district attorney can overrule, but this has occurred only twice in the past five years. In any event, a first offender would not normally be tried as an adult.

Coping with juvenile firesetting

The importance of juvenile firesetting and arson can scarcely be underestimated. Many incidents written off as "playing with matches" are both intentional and malicious. If juvenile firesetters received appropriate treatment, some unknown but significant number of adult arsonists could be deterred at the source.

The researchers concluded that a range of punishments -- restitution, fines, alternative service, confinement -- would deter more firesetting than the probations generally meted out even to second or multiple offenders. Publicity is a necessary component of such a policy. The deeper the public consciousness that society will detect and deal with instances of juvenile firesetting or arson, the greater the likelihood that this option will not be chosen by the curious child or delinquent.

These assumptions are speculative, of course. They are brought up to contrast with the assumptions that seem to undergird the juvenile adjudication system actually observed in the eight cities.

5 - SUMMARY AND IMPLICATIONS

The problems hampering arson control are numerous and complex. During the period of the study, a recessionary economy may have added to these problems by increasing the incentive to arson-for-profit and by limiting the resources that local government could draw upon to combat the problem.

Certainly the resources are limited: arson control typically commands less than one percent of a community's budget for fire and police protection. Further, these resources tend not to be effectively managed, so that the cities often receive less capability than they should from the money they spend.

The level of management concern necessary to increase resources (or even to increase the effectiveness of the resources presently allocated) also seems to be missing. For one thing, neither police nor fire department managers are likely to have the interdisciplinary background to make them comfortable evaluating the arson unit's performance. In addition, arson control in the communities studied appears to be a secondary mission in both departments. Finally, fire and police chiefs are inevitably the captives of their public duties and administrative chores. The average tenure of a fire chief today is 3.3 years. With such a time frame, it is understandable that many administrators do not find the time, let alone the inclination, to undertake a wholesale review of their arson control operations.

A final impediment is the lack of any widely accepted, systematic guide to evaluating the performance, resource requirements, and related issues in arson control.

Given this environment, it is not surprising that the researchers observed a pattern of deficiencies which, to varying degrees, impaired arson unit management and administration in the eight cities. Specific problems differed from city to city, but the pattern of organizational deficiencies was common to them all. Most immediately apparent was the lack of quality-control mechanisms to monitor the procedural steps in fire and arson investigation. The researchers felt that the investigative unit performance was seldom systematically monitored, either within the unit or by the upper echelons of the department to which it was attached.

They concluded that fire and police managers should take a hard and long look at the way their departments are contributing to arson control. Management -- at all levels -- is the key ingredient. With it, the efficiency of existing resources can be improved; without it, no amount of additional resources is likely to have the intended impact. This conclusion challenges that of many previous studies; namely, that the main problems in arson lie beyond the control of local authorities -- with the insurance industry, the courts, arson laws, prosecutors, and forensics laboratories. Unquestionably, outside agencies contribute to the difficulty of controlling arson, but the present study suggests that they are not the determining factor. More to the point is how well fire and police departments are organized and operated to control arson, and how willing they are to make the changes necessary to achieve fundamental improvements in arson control.

System coordination

The study cities do not rigorously examine arson control requirements, resources, and alternatives. Goals are not laid out after careful planning and full participation of the fire and police departments, with the result that the objectives, policies, strategies, and tactics of the various elements of the system often fail to complement each other.

Several of the cities developed arson task forces during the study, and inter-agency coordination did improve in these forums. However, without a specific mandate from city management, none of the task forces undertook any long-range planning, and in no city did a task force attempt an in-depth evaluation of unit performance.

If these eight cities represent a cross-section of medium- and large-sized U.S. communities, there are substantial opportunities to improve the performance of arson control systems. Excellent returns for relatively minor investments await department heads willing to professionalize their system and unit administration and to develop their planning and evaluation programs.

Unit administration

Of the eight cities, two have single-agency arson control systems (responsibility for both fire and arson investigation vested in a single department), three have joint-agency systems (fire and police departments contributing personnel to a unit lodged within one of them), and three have two-tier systems (the fire department responsible for fire investigation, the police department for arson investigation). The researchers identified no "best" profile. Regardless of organization, it appears that when fire and police investigators work together during the follow-up phase, the result is better clearance rates and improvements in other performance characteristics. Both two-tier and joint-agency systems appear able to achieve this type of cooperation. Single-agency systems, however, seem to have an inherent disadvantage in this respect. Arson control by a fire or police department, to the near exclusion of the other agency, is associated both in the project data and in Uniform Crime Reports data with fewer clearances.

The researchers concluded that both fire and police personnel should be involved in the follow-up phase of arson investigation, or else that the skills present in each department should be fully represented in a single-agency investigative unit. As a corollary, arson control personnel must stress old-fashioned, methodical investigation during the follow-up phase. Advanced forensics cannot compensate for weaknesses in the daily application of investigative skills.

Collectively, the eight cities reflected the national trend toward fire departments assuming greater responsibility for arson control. Whatever the advantages and disadvantages of this approach, it tends to put an administrator without police training in charge of a unit which has special and difficult law enforcement responsibilities. This individual typically has excellent credentials as a fire investigator and manager of a fire investigative unit -- a background which does not necessarily equip him or her to manage arson investigations, which require advanced police administrative skills if they are to be managed efficiently and effectively.

Over the past 10 years there has been a knowledge explosion in arson control and law enforcement management techniques. Unit managers face a considerable task in staying abreast of these developments. If located in a

fire department, the manager faces the additional difficulty of isolation from the normal channels of law enforcement literature. Compounding this problem is the high turnover of unit managers: in the eight cities, half the managers in the fire department units, and all of those in the police department units, left their positions during the 18-month period of this study.

These special circumstances argue strongly for the appointment of a unit supervisor with the demonstrated ability to manage criminal investigations. The ideal candidate might be a police sergeant or recently promoted lieutenant who is in line to be assigned to a squad or investigative unit. Assigning such an individual to supervise arson investigators and to manage the caseload should benefit all parties: the fire department would gain needed expertise; the police department would eventually get back a seasoned supervisor, ready for additional responsibility; arson investigators would receive skilled coaching and case management; and the supervisor would gain a career background in an inter-agency position. All of this could be accomplished while still retaining a fire department officer as the unit's Officer in Charge.

Fire scene procedures

The researchers were surprised to find that only three of the units had up-to-date Standard Operating Procedures. In a bureaucratic structure, the need for SOPs cannot seriously be questioned. While they do not guarantee performance, they do set forth the basic expectations for performance. Moreover, developing an SOP tends to force the developers to fashion procedures that are more orderly and soundly conceived. And a comprehensive, authoritative SOP provides new personnel at all levels with a guide as to what practices should be.

Fire departments tend to document their procedures less extensively than do police departments. In law enforcement, legal requirements alone make a detailed rulebook unavoidable. Most metropolitan police departments have SOPs running for hundreds if not thousands of pages; fire departments, by contrast, seldom have more than an operations manual setting forth basic rules of conduct and operations. As a result, fire department managers may be slow to recognize the inherent weakness of an investigative unit which operates without complete guidelines.

One unit manager questioned the feasibility of SOPs for investigation, on the basis that each investigation is unique. It is true that there is a danger of SOPs becoming too general (and therefore failing to deal with important exceptions) or too detailed (and therefore awkward to use and maintain). Other supervisors acknowledged the need to develop SOPs, or to drastically improve the ones they have, but lacked either the time or the capability.

In any event, the failure to develop and maintain adequate SOPs signals a breakdown in the administration of an important social and legal responsibility. Each agency with a stake in arson investigation should have a procedure governing its activities, and each of these SOPs should mesh with those of the other agencies involved. (In one city, juvenile offenders were being released at intake because the investigators weren't forwarding enough copies of the offense report. If the fire department had modeled its procedures on police department SOPs, juvenile offenders might have received closer judicial scrutiny.)

As a starting point, fire department investigative units might review police department SOPs. These could serve as a framework for review and as

a basis for arson-specific procedures. Personnel from all levels of the department might well be asked to take part in the development process, and police administrators and prosecutors could review the results.

The three requirements of any SOP are that it be consistent, complete, and current. Consistency requires that, as far as possible, the SOP is consistent with all other procedures internal and external to the organization. Agencies with several types of personnel -- fire fighters and their supervisors, fire investigators, police patrol officers, arson investigators, prosecutors, coroners, physical evidence technicians, and dispatchers -- may have several SOPs to orchestrate. Fire-scene investigation can differ significantly from these individuals' regular activities, so it may be necessary to make special provision for coordinating their activities with the others during an on-scene fire investigation.

With respect to completeness, the SOP should cover the fire fighter's responsibilities, en route and at the scene; fire incident report writing, coding, and editing; calling out investigators; coordinating with fire fighters, police patrol officers, and evidence technicians; on-scene investigation, including exterior and interior search and special practices for vehicles and other non-structural properties; interviews; evidence collection, preservation, handling, testing, and custody; juvenile processing, both below and above the age of intent; mental subject handling; report writing, photographing, scene diagraming, updating reports, and report filing and maintenance; search and seizure; subpoena powers, if any; arrest; multiple crime scene responsibilities and other special circumstances; and involvement of outside agencies (insurance industry, district attorney, juvenile justice, FBI, arson task forces, juvenile firesetter counseling, neighborhood watch, special witness programs, etc.).

The final requirement is currency. Once formulated, SOPs should be reviewed at least annually.

Information and training

Before 1977, five of the eight arson unit managers in the study cities were police officers; by the time the site visits were completed, seven of them were fire officers. This accords with national trends toward appointing arson unit OICs with fire department backgrounds. Such individuals are likely to lack a basic familiarity with the requirements for managing a criminal investigative unit.

What is needed, therefore, is a management handbook which assumes that the unit administrator does not have extensive experience in law enforcement, either as practitioner or administrator. Such a handbook would provide capsule commentary on the utility of various information sources, reference works, management and administrative techniques, standard practices, and evaluative techniques ranging from basic rules of thumb to the use of advanced management information system data.

Most unit managers would also benefit from continuing education programs, including regional seminars for unit managers, self-instructional texts, computer-assisted programmed learning modules, cassette texts, and special publications on unit management.

There is also need for a manual on advanced management information systems. During the study, advanced systems were under development in two of the cities, three cities had assembled basic data on system workload, and three more were developing basic systems. Nevertheless, meaningful insights

were hard to obtain. A new manual would significantly enhance the unit manager's capability to analyze performance and results.

Over the past several years, Federal support for improved fire-scene forensics has had a dramatic effect on the cities' ability to improve detection and prosecution of these cases. Overshadowed by this progress is a continuing weakness in the application of fundamental police skills by fire and arson investigators. In particular, investigators require greater skill in collecting testimonial evidence, without which they may be unable to establish the corpus of the crime.

Personnel management

Personnel management practices in arson units tend to be inhibited by departmental tradition, management's unwillingness to alter standard practices to accommodate the specific needs of a fire investigative unit, and external constraints such as labor contracts and civil service regulations. In the study cities, investigators and their supervisors frequently attributed low morale and performance to inappropriate personnel policies. Among the handicaps faced by fire investigative units in attracting qualified personnel: shift scheduling problems; recruitment and assignment practices not based on objective and relevant performance measures; promotional testing that emphasizes fire suppression or prevention, while ignoring investigative skills; the lack of a career ladder for fire investigation specialists; collective bargaining agreements which do not recognize the special requirements of investigators; and the practice of assigning additional tasks to investigators without considering the impact on investigative workloads.

The study turned up other personnel practices that deserve review. Among them:

- * Long-term assignment of investigators seems essential if their investigative skills are to mature fully. This finding argues strongly for a special career ladder for fire investigators.

- * Use of two-investigator teams throughout a case may not prove efficient as a standard practice.

- * Rather than treat each investigator as an independent agent handling a specific set of cases, there is merit in assigning all cases to team captains, who then parcel them out to individual team members, monitor their progress, and ensure that time-critical activities go forward despite shift changes, illness, or other breaks in continuity.

- * Incentive plans for superior performance should be considered. One possibility: achievement awards for arson investigators, sponsored by local insurance associations.

Case management

System performance and clearance rates could be improved through better assignment of cases. Juvenile units, patrol officers, and the auto theft squad (for stripped and burned cars) can handle many cases expeditiously, while reserving more complex situations (arson-for-profit, pattern arsons) for the most qualified fire investigators.

Retrospective case audits uncovered numerous cases with workable leads that were not followed up. Better management can improve clearances among high-priority, difficult-to-clear cases.

Often cited as a reason for not following up workable leads are case-load fluctuations that threaten to swamp the investigative unit. The unit should develop mechanisms to assist or augment investigators when they are overburdened. For example, a fire department unit might temporarily reassign former investigators who are now performing other duties. Police department units have the same potential, or they can call upon detective sections or channel more cases to the patrol force.

* * * *

In summary, one of the clearest findings from this research project was the need to improve the management of arson units at all levels -- system, department, unit, and case. Ideally, arson control should be planned, managed, and evaluated as a cooperative system. The reality is otherwise. Some of the eight cities have one or more aspects of a modern management system, but others lack even rudimentary administrative tools. Most units are without specific goals and objectives, basic performance data, or routine mechanisms to evaluate performance. Where written goals do exist, they tend to be merely a paper exercise. Only one unit reports its progress toward goals on a quarterly basis, and even these measures do not appear to be actively used by the department's management to monitor unit performance.

IMPLICATIONS

The research suggests that U.S. communities can indeed achieve significant improvements in arson control, simply by applying existing knowledge and techniques. Central to any such improvement process, however, is the need for commitment and involvement on the part of fire and police managers.

Among the specific steps a community might take to improve its arson-control capabilities:

- * Increase the funding of its arson-control unit (which typically commands less than one percent of the community's public-safety budget).

- * Impress upon both fire and police managers that arson control is a high-priority activity of their departments, and that it is within their power to achieve fundamental improvements in arson control.

- * Establish mechanisms for inter-agency coordination. An arson task force may be a useful first step, but even more important is a system for institutionalizing cooperation between the agencies involved in arson control.

- * Ensure that both fire and police personnel are involved in the investigative process. Communities in which arson control is assigned to one department, to the virtual exclusion of the other, seem to have an inherent disadvantage in arson control.

- * Consider assigning a police sergeant or lieutenant as the supervisor of the arson-control unit, regardless of where the unit may be lodged.

- * Develop consistent, complete, and up-to-date SOPs to coordinate the responsibilities of dispatchers, fire fighters, police patrol officers, investigators, evidence technicians, and all other individuals who may become involved in the arson-control process.

- * Establish a career ladder and other incentives for arson-control personnel.

- * Develop case-management systems to channel complex investigations to the more experienced investigators and provide backup personnel when case-loads are high.

The research also suggests a need for handbooks and training materials that can be used by arson-control units. In particular, arson-control units appear to need information on the use of advanced management information systems, and on the application of routine police investigative skills -- especially the collection of testimonial evidence -- by fire and arson investigators.

APPENDIX

Managers of arson control systems, no less than prosecuting attorneys, should be familiar with the statutes governing arson in their jurisdictions. What follows is a layman's review, and is necessarily superficial.

ARSON LAW

In common law, arson involves the malicious burning of another person's dwelling. Statutes can enlarge upon this definition -- by applying it to uninhabited buildings, for example, or by making property owners subject to prosecution for burning their own buildings. (Burning with intent to defraud an insurer may also be defined as a crime distinct from arson, as is the case in Ohio. In Texas, however, burning one's own property is not a crime if no insurance claim is filed.) More severe punishment may be legislated for burning a dwelling, for nighttime arson, or in situations "where it is foreseeable that human life might be endangered." Federal statutes apply to certain cases of arson, notably those taking place within U.S. jurisdiction or involving interstate flight to avoid prosecution.

Generally speaking, kindling a blaze is not enough to constitute arson -- the building must actually take fire, although material damage is not necessary, and the fire need not continue for any length of time. (Narrowing the definition even further, it is often held that if the wood is charred, arson has taken place, but that mere scorching or discoloration does not constitute arson.) It is usually immaterial how the fire began, if there was intent for the fire to be communicated to the building in question. Criminal intent is an essential element of the crime, but not all statutes agree that there must be an intent to destroy the building. Motive is not an element in arson, though it can be important in states which distinguish arson from the offense of setting a fire for the purpose of defrauding an insurer.

A case of arson may be a single offense even though several buildings are burned. Similarly, an indictment may charge the burning of a house and the burning of its contents, or the defrauding of two different insurance companies in a single fire. By contrast, the indictment may contain separate counts charging 1) arson and 2) intent to defraud, or conspiracy to commit arson, or murder resulting from arson. In states where procuring another person to set fire to a dwelling is to become a principal in the crime, it is possible to indict an individual both as accessory and as principal.

The indictment must give all details necessary for the defendant to make his defense, and it should allege all the essential elements of the crime, which vary from state to state. It is especially important to identify the property that has been burned, usually by alleging ownership or possession, or by including language that will fix the building's location. Where statutes distinguish between degrees or types of burning, it may be important to specify whether the building was owned by another, whether it was a dwelling place, whether the damage was beyond a stated amount, whether the fire took place at night, or whether the building was occupied at the time.

The indictment must allege that the burning was done "willfully and maliciously." Statutory provisions may also make it necessary to allege that the fire was set "with intent to burn," or to distinguish between "burn" and "set fire to." Some variances between the pleading and the proof may be disregarded -- a difference in ownership, for example, unless ownership is material to the offense charged. Similarly, a conviction may be upheld when the accused is charged with one degree of arson and the evidence shows he is guilty of another degree. This does not hold true, however, when the variance concerns a difference in the act committed: a person charged with first-degree arson cannot be convicted of burning with intent to defraud an insurer.

The corpus delicti in arson consists of 1) the burning of the property in question and 2) a criminal agency as the cause of the burning. If the prosecution fails to prove either element, the accused is entitled to an acquittal. Where the prosecution is for burning with intent to defraud an insurer, it must also be shown that the property was insured at the time, possibly that the insurance policy was enforceable, and that the accused intended to defraud the insurer, even though another person was to receive the insurance money.

In a trial court, the corpus delicti is ordinarily the first point to which evidence is directed. After it has been proved that the property was burned, any legal and sufficient evidence may be introduced to prove that the act was committed by the accused and that it was done with criminal intent. Since arson is usually committed alone and in secret, the corpus delicti and the criminal agency of the defendant are usually proved by circumstantial evidence.

Many arson investigators believe that, unless they have ruled out all possible accidental or natural causes, they have not established a corpus delicti. Actually, in most jurisdictions, the State meets its burden by showing that a fire resulted from human intervention, even though the evidence may also be consistent with accidental burning. Investigators and fire suppression personnel should be trained in this point, so that the prosecution team does not labor under an unnecessary burden.

It is, of course, necessary to go on to prove the corpus delicti. Proof of incendiary origin is important, since there is a presumption that any fire was the result of accidental or providential cause. Incendiarism may be proved by the manner in which the fire burned, by the odor of inflammable liquid, or by the presence of human footprints, combustible materials, or flammable liquids or their containers. Proof may also take the form of demonstrating the improbability that the fire resulted from natural or accidental causes. Expert opinion is often used to provide information which would otherwise be beyond the jury's knowledge and experience -- for example, that circumstances suggest that a time-delay device was used to start the fire, even though no such device was found.

In addition to proving the corpus delicti, the prosecutor must show the criminal connection of the accused with the burning. Where identity is at issue, any fact or circumstance tending to identify the person who set the fire is admissible -- for example, testimony that the defendant was seen in the vicinity of the fire before or after it occurred, or that footprints corresponding to the defendant's were found near the burning building. Where there is corroborating evidence, an extra-judicial confession is also admissible; the amount of corroboration varies with the jurisdiction. Generally, evidence relating to another crime is inadmissible, except where it tends to identify the accused as the person who committed the crime in question -- by way of showing his "signature," as it were.

To be guilty of arson, a person must have the capacity to perform a criminal act. Generally there is no criminal responsibility if the accused did not know the nature and quality of the act or did not know it was wrong. In most jurisdictions a person between the ages of 7 and 14 is considered incapable of arson, but there are instances where children as young as 8 have been found competent to commit the offense. In some jurisdictions, the owner's consent may bar prosecution for arson. Double jeopardy may bar prosecution on a second charge (e.g., burning the contents of a building) when the same evidence has failed to establish guilt on the first charge (burning the building itself). There is no double jeopardy, however, where a single burning leads to separate crimes and there is distinct evidence of each.

Arson for profit

In common law, an owner who sets fire to his own house while occupying it is not guilty of arson. Statutes in most states, however, provide that a person who burns property with the intent to defraud an insurance company is guilty whether the property belongs to himself or another person. The overt act is the burning, which may be done with the specific purpose of defrauding the insurer. It does not matter who is to receive the money, or (in most jurisdictions) whether the policy is in fact enforceable. The proof necessary to establish the corpus delicti varies with the circumstances of the case, but generally these elements constitute evidence that a fire was set for an insurance fraud:

- * The presence of incendiary material.
- * Multiple points of origin.
- * Fire origin beneath the roof.
- * Fire at night or when few persons might be expected to be present.
- * Fire in a vacant building or one undergoing renovation.
- * Fire in a building whose occupants have recently departed, or where woodwork, plumbing, wiring, or other objects have recently been removed.
- * Fire in a property for sale, or which has recently been sold, particularly if the building is over-insured.
- * Fire occurring shortly before an insurance policy expires, or immediately after insurance has been obtained or increased.

Attempts to commit arson

Attempting to commit arson may be punishable by statutes dealing expressly with that crime, or under a general statute embracing all attempts to commit a crime. As a general proposition, an indictable attempt consists of two elements: 1) an attempt to commit the crime and 2) a direct, ineffectual act toward its completion.

TRENDS IN ARSON LEGISLATION

The jurisdictions covered in the study operate under widely varying statutes. Volume IV of this report contains a discussion of arson laws in Arizona, California, Maryland, Michigan, North Carolina, Ohio, Oregon, Pennsylvania, Texas, and Virginia. Though differing widely, they are all based either on the Model Arson Law, published by the National Fire Protection

Association in 1931 and adopted by 27 states; or on the Model Penal Code, proposed by the American Law Institute in 1960 and adopted by 23 states. The model laws suffer from a number of deficiencies, including verbose and vague language and poor treatment of related offenses.

The Alliance of American Insurers, the American Insurance Association, and the National Association of Independent Insurers have developed a new Model Arson Penal Law, as a guide to legislators and other organizations interested in revising current statutes. The new model law provides penalties for 1) engaging in acts that endanger both life and property, 2) damaging real and personal property by either fire or explosion, 3) damaging an occupied building, 4) conspiring to cause a fire or explosion, 5) damaging or destroying the property of another person, 6) damaging or destroying property to collect insurance proceeds, 7) using fire or explosives in a reckless or negligent manner, 8) making false reports concerning the placement of incendiary or explosive devices or other destructive substances, 9) failing to control or report a dangerous fire, 10) attempting to start a fire or cause an explosion, 11) causing or risking a catastrophe or failing to mitigate a catastrophe, 12) possessing explosives or incendiary devices, and 13) arranging or placing explosive or incendiary devices in a building.

The new model law provides stricter penalties for fires resulting in death or injury, or which threaten the lives of fire fighters and other innocent victims; penalizes those who intentionally cause explosions or bombings; and provides greater latitude for prosecuting those who hire an arsonist or participate in a conspiracy to burn or bomb. It does, however, have potential flaws of its own, which are discussed in Vol. IV of this report.

Several states have enacted model reporting and immunity laws in order to obtain the active cooperation of insurance companies in arson cases. Under such laws, insurance companies are given immunity from civil or criminal prosecution for informing investigatory officials of fires that appear suspicious in origin. The advantages of such a law are obvious. A potential disadvantage is that unsubstantiated personal information may be disclosed and privacy rights impaired.

Other recent statutory enactments provide that only the actual cash value of destroyed property can be recovered, thus discouraging arson for profit. Some states have amended their laws to give insurers more time to pay claims, to permit a more thorough investigation in a suspected arson case.

The 1979 Arson Report to Congress, the Tauber and Abt studies, and earlier commentaries have pointed out the need to toughen laws, remove loopholes, and take the profit out of arson through statutory means. Certainly the states should consider amendments to their arson laws, and to related property and insurance laws, that will increase the penal and economic disincentives to this crime. In fairness, however, it must be pointed out that existing loopholes neither drastically interfere with arson investigations nor regularly undermine prosecution. Far more important is the quality and the quantity of the investigations that do take place, and of the prosecutions that follow them.

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