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INTERNATIONAL ASSOCIATION OF FIRE CHIEFS . INCORPORATED

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

> VOLUME II ARSON DETECTION

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A NOTE TO READERS

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2.0 ARSON DETECTION

2.1 DELECTION ORGANIZATIONAL INFLUENCES

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They range from the institutional questions, such as (what agencies play what role in detecting arson() to the style and atmosphere that establishes the working environment for the fire cause and origin investigators. Ineffect, organizational influences are those that chiefly determine the levels of resources available, set the atmosphere (such factors as access to, and the confidence of, the department head), and provide the structure in which detection operations take place.

It is allow o easy to assume that since the mission of fire cause and origin has been a traditional responsibility of the fire service, the basic ground rules, the strategies, and the tactics have been worked out, proven, and have led to well-established rules of thumb. This is not necessarily the case. The assumption that this is the case and that the real problems lie in the technical aspects of detection or in the troubles downstream in investigation and prosecution will be addressed.

We found that a seldom-mentioned, but important, constraint on detection operational flexibility is the collective bargaining agreement that governs fire cause and origin investigators' work conditions, schedules, career ladders, etc. However,

The key organizational question, however, (remains unquestionably) who have will be assigned primary and back-up detection responsibility? Whether to make the first-in engine company officer, senior fire officer on-duty in the district, or a fire investigator responsible influences the involvement of suppression personnel in the process, the number of fires correctly determined as to cause, and, therefore, the total number of fires satisfactorily investigated.

Resource Allocation

Our consideration of the role of allocation of resources in detection will be combined with that of arson investigation resources in Section 3.1. We have done this to the correspond with the reality that fire department investigators are so heavily involved in arson investigation that considering detection and investigation resource allocation independently would tend to make misleading impressions.

2.2 DETECTION OPERATIONS

While organizational elements can either constrain or contribute to the success of the detection process, it is on the operational level that the overall relative success of a detection program is determined. The organizational elements are like raw materials: they determine what you have to work with, but not how well you are able to make do with them. As in so many other areas of human endeavor, no organizational design can insure success, but poor operational procedures can frustrate the best design and burn up inordinate resources -- and, yet, still not produce acceptable levels of performance.

Detecting arson is not an easy task--it requires dedication and rigorous attention to detail, hard effort, and the cooperation of many parties. Thus, the question becomes -- In what ways can the diverse set of actors be motivated to maintain their effort? Many factors contribute to the overall performance of a detection process; these factors will be specified and related to their antecedent influences and effect. These measures include:

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- discussed in terms of:
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. impact of staffing levels, patterns, scheduling, overtime, and response times.

Other influences to be reported include compliance with observation en route and fireground procedures. Note that compliance is most influenced by the personnel involved--their skills and attitudes and their perceived relationship to the primary mission of fire suppression.

The process of arson detection can involve dozens of actions, scores of factors, and a sizable cast of actors. To highlight the policy, procedures, and actual practices observed in the cities studied, we have divided the process into six major steps and will discuss them in typical order of occurrence. The six steps are:

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Command support (as perceived by subordinates) for thorough fire cause and origin investigation. (Interviews were the primary source of information

 Procedures and compliance with procedures, especially cause determination and investigator call-out procedures, will be depicted. Model and variant procedures will be synthesized, described, and

. criteria for calling out fire cause specialists and/or arson investigators, their variants, and

. improving fire suppression contribution to fire cause determination

2.2.1 Receipt of Alarm and Dispatch

- 2.2.2 Response Fire unit response and observations en route, plus the response of police patrol units
- 2.2.3 Fireground Operations, During Suppression, Salvage, and Overhau]

2.2.4 Cause and Origin Determination

2.2.5 Call-out and Response Procedures

2.2.6 Fire Incident Classification and Reporting

2.2.1 Receipt of Alarm and Dispatch

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The person calling in a fire alarm may be the first, and perhaps the only, witness to the fire's early development. (The caller, indeed, may be the arsonist.) Move commonly, however, the caller may have seen a suspicious person, vehicle, or indicator of arson (smoke, flame, sound of explosion, etc.). For these-reasons, obtaining information about the caller is standard procedure for all eight cities. Beyond the information always sought about the fire, itself, standard information includes the caller's name, address, and telephone number. One city in the study also tries to obtain the caller's telephone number at work as a convenience to investigators.

Each of the eities dispatch centers has tape recorders with time coding features. Investigators can review the tapes made by these units to obtain precise time sequences and study the caller's voice and other clues. Each department has a slightly different procedure for accessing this data. As a practice, some investigators made reviews of such taped calls in some 40 to 50% of their investigations. Other investigators only did so when circumstances compelled. No single reason could be found to explain the wide variance. It would stand to reason that any investigator who enjoys success by pursuing this avenue of inquiry would be more inclined to make it a routine than an investigator, say, in another community, who finds that dispatchers rarely bother to obtain or record data about the caller.

With these variations in procedures and practices in mind, the following points should be considered when standard procedures are reviewed:

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- efforts?

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• Do dispatch centers have a clear set of procedures for:

. insuring that pertinent data about the caller is obtained, if at all possible

preserving tapes for arson trials or notifying investigators before such tapes are erased and

notifying investigators on their own volition when dispatchers believe they have information of interest to the investigators

. submitting witness reports when appropriate

. noting dispatch, on scene, and cleared scene time for investigators?

Do investigators have formal procedures for when, and under what circumstances, they are obliged to interview dispatchers, review dispatch tapes (i.e., for fires in vacant buildings, fires with no on-scene witnesses, etc.), and document their

2.2.2 Response

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Police patrol units can play a wide variety of roles in cause determination. As a minimum, patrol units can provide crowd control and backup fire fighters during initial stages of fire determination. At the other extreme, patrol units can take the lead role in initial arson detection by observing suspicious persons or situations, interviewing witnesses, locating suspects, conducting neighborhood canvasses, filing the original complaint request, and making arrests.

Several factors appear to influence the role of police patrol personnel in arson detection. These include:

dispatch protocol

. training

procedural requirements and options

 role of the rest of the police department in arson investigation

. interagency working relationships.

Dispatch procedures in four jurisdictions called for the collateral dispatch of police units with fire units (Cities 33, 44, 60, 70). In four other cities (17, 24, 57, 87), dispatch was delayed until the officer in charge requested it. Delayed response would suggest reduced opportunities to contribute to the detection effort.

Training in arson is given to patrol personnel in all cities. The amount of training is small, averaging three hours in all departments, with no patrol unit receiving more than four hours. While the adequacy of the amount of time may be questioned, this number of training hours cannot be dismissed as insufficient, in itself, if reinforced by roll call reminders and command emphasis.

Procedural requirements were found to differ greatly. Crowd and traffic control figured in every patrol's procedure. In a few cities, it was normally the sole function performed at a fire. In other cities (as in City 44), police patrol officers actually initiated the complaints. In City 44, patrol officers' activities included assisting in collecting evidence, but normally did not include interviewing suspects. In City 57, patrol officers were restricted to taking the names and addresses of witnesses, while in City 17, patrol officers assisted by interviewing witnesses and suspects as a matter of course. In City 24 where fire investigators are full-fledged police officers, patrol officers restrict their action to holding suspects for questioning and transporting arrestees. In City 24, investigators are so frequently delayed that patrol officers often have to detain suspects. In only one city was it routine procedure to use patrol officers to secure the scene of a suspected arson fire, rather than keeping an on-line fire crew on scene. In particular, City 87 seems to have made the most extensive use of police patrol units in all phases of arson control. One feature of their system (only beginning to be used in other cities visited) was radio communication between fire investigator and patrol units. Whether the radio link was as important symbolically as operationally could not be determined. What was evident was that the frequent interchange between patrol personnel and investigators helped to improve patrol participation during detection.

From our analysis, it was clear that patrol unit involvement should be carefully reviewed. This involvement has the direct potential to increase arson clearances when patrol officers are trained, and positively oriented, to helping the process of arson detection. Such practices can also lead to the improved reporting of "cold fires," intelligence information exchanges, and other tangible benefits. Early involvement in a particular fire may later lead to more diligent follow-through, and perhaps an arrest by the same patrol officer. So, for the forseeable future, the issue will not be, "can patrol officers assist in arson detection or should they?" but "how?" Shrinking police budgets will tend to lessen patrol participation in arson detection. Unless fire officials pursuasively argue for patrol unit participation in arson detection, and unless police management generally begins to appreciate arson as deserving far higher priority, patrol involvement in detection is more likely to wain rather than wax.

Fire Unit Response and Observation En Route

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There can be little doubt but that efforts to make fire fighters observant while en route to the fireground have succeeded. Led by the National Fire Protection Association's "FIFI" courses and reinforced by the recent national consciousness of arson's threat, this element of the process has gained headway. Reports reviewed seldom contained direct testimony to the progress made -- for example, a fire fighter noting a fleeing suspect's vehicle license number. Only in Cities 87 and 44 were more than two examples found in the case sample. This may be due to incomplete reporting--known to the fire fighters and investigator, but not explicitly documented. It may also be true that it is a comparatively rare event to witness suspicious circumstances of sufficient utility to note when reporting a fire incident. Lastly, it may be that more and continued training is needed. Loss of knowledge over time, termed "skill degradation," is a well-documented phenomenon in education. As "witnessing" key arson evidence is a comparatively rare event, frequent reinforcement may be needed. Since training on the topic of en route and on-scene observation by firefighters was reported at between three and twelve hours, it may be that reinforcement training is necessary on a continuing basis to further improvements in this area. Support for this hypothesis may be found in the

A "Cold Fire" is the scene of an already extinguished fire, typically a small fire that self-extinguished, or one set and then put out.

fact that investigators, while praising improvements brought about by training given on this subject within the past three years, almost without exception would spontaneously add that they "would like to see more training given in this area.

While training improvements have occurred in the area, less progress was seen in formalizing these responsibilities into standard operating procedures. Only in three cities, 70, 17, and 87, had the training points been incorporated into standard operating procedures. While no magical claim is made for improving performance merely by codifying these expectations in an S.O.P., when a fire department makes this action part of its doctrine, it serves to promote long-term concern for, and management emphasis on, this aspect of firefighting. In 1979, City 70 departmental guidelines were updated to reflect the increased emphasis on the following responsibilities:

observe license number and vehicle description and/or description of persons leaving the scene

observe smoke and flame character

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note the security elements of the property

note the dress and demeanor of any occupants

- note other suspicious circumstances, i.e., multiple fire sets, holes made between compartments, inoperative sprinklers, containers, unusual residues
- preserve, but not disturb or remove, any evidence found.

Setting forth a bill of particulars of fire fighter responsibilities can signal command emphasis. It can be the basis on which to justify requirements for continuing education. It provides an unequivocal basis for requiring assistance during observation en route.

In the next section, corollary requirements for fire fighter responsibility during fireground operations will be considered in greater depth.

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2.2.3 Fireground Operations

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Detecting arson is not a natural part of firefighting. In fact, it means interrupting the normal firefighting cycle and reforming firefighting tactics. The normal firefighting cycle starts with rescue and moves to extinguishment. salvage and overhaul, and ends with the unit returning to a state of readiness. Detecting arson modifies and complicates this cycle. The way in which the fire is fought, the means used, and even the time taken to complete the cycle change. Instead of attacking the fire with abandon and an abundance of water, fire fighters now have to be retrained to minimize the use of water and, on occasion, to knock down the main fire and let spot fires continue to burn in the debris or material smoulder behind walls and in ceilings until the fire investigator pronounces it okay to go ahead with overhaul. Arson detection also requires fire fighters to refocus and remember details and facts about the fireground not directly connected to either suppression or survival. Whether or not a door was locked or a lamp was on the floor or on the table when firefighters first entered a building are the kinds of details that take a special presence of mind in the chaos of attacking a fire.

Because arson detection runs counter to both the fundamentals of fire suppression and is also foreign to the natural tendency to completely extinguish and swiftly overhaul the fire scene, permanently incorporating its requirements as a part of fireground behavior has proven difficult.

To examine the efforts made by the jurisdictions under study, we sought information on training, authorized procedures, and actual practices. Through survey instruments and interviews, the following findings have emerged:

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all eight sites have modified their tactics to a degree and have trained their fire fighters to contribute to arson detection through fireground practices

the amount of training varies, as does whether the training is given to recruits, fire fighters, and company-level officers as part of in-service training, or as part of new officer orientation programs

in all eight cities, investigators gauged that arson training has improved, but has not eliminated deficiencies in procedures and practices that tend to compromise the evidence of arson. Firefighting procedures have proven easier to improve than evidence development and preservation procedures

the amount of training hours devoted to arson detection represents a minor, not a major, training commitment (between 2-8 hours for recruits)

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in the majority of sites visited, ini efforts were not systematically bolst techniques to reinforce performance a changes.	itial training tered by proven and attitudinal		 training, exp of fire suppr officer in ch out of invest
Such techniques might include:		· · · · · · · · · · · · · · · · · · ·	the individua
 clear and complete incorporation performance requirements in stand procedures 	of arson detection lard operating	- "I	e investigators estil
. command emphasis through written tions and critiques of arson dete	and spoken commenda- ection activities		provide significan percentage of case 70% in City 57 to estimates may be y
 systematic refresher training of all ranks of field officers 	fire fighters and		be the result of a questions. By con grouped tightly wi
. incorporation of arson detection promotional materials	question matter in		them. The estimat important as the p fire suppression f
. full exploitation of informal fea reinforce contribution to arson of firefighting personnel (feedback or station visits by fire investi after-action critiques, etc.)	edback channels to detection by field at scene, by memo igators, newsletters,		to cause determina
 compliance with training and proc as expected, varies with 	cedural guidelines	a sa	Table 2.
personalities involved (the cont of the company officers involved their own attitudes towards arso that of their superiors)	trolling influence i reflected both on detection and		<u>City 17 24 3</u>
type of property involved (vehic in vacant structures were most l potential evidence compromised) property	cle fires and fires likely to have and location of		* 48% 38% 4
use of structure (vacant, due fo commercial)	or demolition,		Training in Fire Deter
burn time to detection, degree of	of destruction	ni, and characteristics	The subject of turinin
weather, time of day			terms of the number of hours
competing priorities - perceived activity vs. other activities, s service, food, sleep, training,	d importance of this such as return to recreation		in the study maintained reco arson-related training, but five-year comparison chart i
expectation of fire fighters the worthwhile	at effort would be		all levels that it had a maj detection-related training of areas. More hours were give
·			detection had moved to the 6
. 2-9		• •	
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erience, background, skill, attitude ression personnel, especially the fire marge of initial investigation and call igator

al investigator's rapport with fire the respect enjoyed by the investigator espond.

mate that fire suppression forces t evidentiary material in a significant es. Estimates vary between a high of a low of 10% in City 87. These two valid, but appear to be outriders that may a misunderstanding of the terms of the ntrast, the remaining six cities were ith a 12 percentage point spread between es' individual accuracy may not be as pattern they collectively portray that forces can and do contribute significantly ition.

b]	e 2.1 Estimated % of Investigations in Which Fire Suppression Crews Provide Significant Evidentiary Material								
	33	44	57	60	70	87			
	45%	50%	70%	45%	40%	10%			

ction

ing for fire detection is usually reported in rs of instruction. But, rarely can the subject other training subjects. Fortunately, one city cords for not only the number of hours of t for other courses as well. The accompanying illustrates the relatively low priority that d, even though the city (since 1976) realized at ajor arson epidemic on its hands. Arson occupied 15th place on the list of 25 subject ven, for example, to "Aircraft Fire Protection Knots" than arson detection. By 1980, arson 6th ranked subject area. 5th ranked subject area.

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SUBJECT	1976	1977	1978	1979	1980
Dept. Organiz., Rules & Regulations			933	749	380
Forcible Entry-Hand Tools	594	365.5	715	413	453
Ropes & Knots	218	440.5	389	347	168
Portable Exting. & Systems			109.5	185	111
Ladder & Life Belt Practices	760	629	539.33	428.6	607
Hose Practices	752	1515	2416.83	1654.6	846
Salvage & Overhaul, Tarps	650	247 [.]	308.75	409.5	344
Fire Streams & Foam Appliances	0	117	296.5	614.5	188
Fire Apparatus, Pumps, Aerials	750	789.5	1541	3095	1334
Ventilation	616	873.5	280.33	269.8	527
Rescue & Protective Breathing	1547	1243	1563.5	523.1	381
First Aid	4699	2421.5	2172.25	1725.5	1934
Inspection & Investi- gation Practices	0	0	160.5	141.6	76
Water Supplies & Pumping	95	158	284	497	60
Sprinkler Systems	0	0	312	78.5	39
Aircraft Fire Protection & Rescue	125	1013	458.5	333	276
Fire Science	0	0	809	256.5	182
Alarm & Communications	0	0	174.5	168	115
Community & Public Relations	0	٥	280.5	143	96
Civil Disorders	0	0	20	6	772
Arson Responsibilities & Detection	10	72	159.5	108.7	771
Territory	0	0	929.5	1591.5	1150
Utilities	0	0	40	167.5	34
Building Codes & Construction	0	0	117	43	133
Fire Prevention	16	72.5	140	43	34

Fireground Failure Modes Two challenges confront the fire department manager here: First, channeling some of the heightened awareness that fire fighters possess during fireground operations to arson detection, and, secondly, limiting the destruction of evidence during these operations. To measure the success of the eight sites in meeting these challenges, investigators were asked to estimate the percentage of cases they investigated in which evidence was lost or compromised by: . unnecessary fire suppression activity removal of evidence overhaul before cause and origin determined . failure to note suspicious conditions . failure to notify investigators Results, while varying greatly due to the subjectivity of the estimating process, showed that premature overhaul was the most frequent source of compromise. Comments from all sources tended to bear this out. While 4th overall, "removal of evidence," as it usually occurs during overhaul, can be considered a closely-allied problem. Together, these two failure modes seem to be the most recalcitrant problem in fireground operations. In the opinion of the investigators, the next ranked problem was "unnecessary fire suppression activity." The third ranked area of concern was "failure to note suspicious conditions" (such as the condition of locks). Of least concern to investigators was "failure of fire fighters to

The table below ranks the five failure modes as derived from the combined percentage estimates given by investigators in each site. The numerous ties are believed to reflect the natural tendency to estimate frequencies in terms of 5%, 10%, 25% increments. Given the limitations inherent in this method for gauging relative failure frequencies, more emphasis should be accorded the extremes between first and last ranking, while the rankings in the middle positions may be thought of as more subject to small differences in percentages greatly affecting the ranking.

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notify investigators." Overall, this problem occurred in some 10% of the cases investigated, compared to 18% for the instance of premature overhaul.

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	17	24	33	44	57	60	70	87
Unnecessary fire suppression activity	1	1	4	2	3	4	1	3
Failure to note suspicious conditions	3	2*	3	5	2	1*	3*	1*
Unnecessary removal	2	5	1	1*	4*	1*	3*	4
Premature overhaul	4	2*	2	1*	4*	2	2	1*
Failure to notify investigator	5	2*	5	4	1	5	5	5

Table 2.2 Failure Mode Rankings for Fireground Operations

From our review of fireground procedures and on-scene observations, we find fire suppression tactics greatly improved. The better cities are approaching technical limits in their fire fighting tactics to minimize destruction of evidence. Ironically, these same cities may still be compromising evidence by too quick and too enthusiastic overhaul practices.

What can be inferred from this is that there is room for both further improvement and concern. The room for improvement is an oft voiced sentiment of investigators. Even when praising improvements in this area, investigators would postscript this thought with, "but they need more training," or similiar phrases. Thus, it appears that there are grounds for concern that obtaining high compliance in sound overhaul procedures is a recalcitrant problem.

Many reasons suggest themselves as possible explanations for why the salvage and overhaul phase of fireground operations appears so problematic. First, interrupting what used to be one continuous operation goes against human nature, in general, and fire fighter nature, in particular. Few people enjoy delays or waiting for an outsider to arrive and conduct his part of the operation. For fire fighters accustomed to extirpating the last vestige of the fire and returning to quarters, the wait, in wet and perhaps freezing turnout gear, will never be an easy one. We did overlook the possibility that other factors might tend to explain the seemingly across-the-board concern about unsatisfactory overhaul. It may be that with the small number of cities involved, the concern with overhaul practices was merely chance and is not indicative of a general problem in this field. Or to take another tack, the dissatisfaction may be general, but falsely based on the greater apparentness of, say, a yard full of bedroom debris, rather than whether in the same incident, fire fighters had not minimized water damage.

Securing the Fire Scene

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While no cases in our sample were declined by prosecutors for problems of scene security or challenged in court on this ground, future defense may thoroughly exploit this "angle." As we found written procedures on scene security generally silent and practices lax and in need of review, fire and police departments may wish to review their procedures. A review should be undertaken with an eye to first minimizing the manpower tied up by this requirement and, second, to insuring that manpower and procedural guidelines are adequate to secure property until evidence can be properly assessed and the scene analyzed.

While competing theories do exist, we find the association between the degree of investigation concern about improper overhaul and the frequency of delayed response to be strong. At the same time, it suggests that even with increased levels, training alone is not likely to sufficiently motivate fire fighters.

Two alternative solution strategies may prove more effective. One tact would increase command enforcement to levels sufficient to deter officers from permitting premature overhaul. An alternative tact would provide sufficient investigative personnel (either in the form of assigned personnel or task-qualified suppression officers) with the responsibility to determine without delay whether, and to what degree, overhaul should be conducted prior to completing the cause determination. Either tact would tend to take the delay out of the present situation. Present economic constraints suggest the latter approach.

A problem related to delayed overhaul concerns scene abandonment. Common practices in the cities visited is to maintain an engine company on scene until the investigator's arrival. When the property involved is the typical occupied structure and the loss is significant, guarding the scene does not pose much of a problem, as all units are seldom able to return to service before the investigator is summoned. However, if the fire is minor, occurs in an unoccupied structure, outdoor property, or vehicle, securing the scene is more likely to be ignored.

2.2.4 Cause and Origin Determination

Change was the byword in cause and origin practices. All the cities visited had taken some action to strengthen their cause and origin practices. In some cities, standard operating procedures were revised; in others, responsibilities reassigned or training hours increased. Whether these changes were taken because of locally-perceived needs or because of the influence of a national awareness of the need to improve arson detection, or a combination of the two, it demonstrates that the fire service is willing to reconsider its procedures and priorities.

This willingness to change is an essential precursor to further improvements. That further improvements are warranted can be seen in interview data, on-scene observation reports, and retrospective case data. For example, our retrospective audit of over 900 cases from the 8 cities indicated that some 20% of all cases in the sample either lacked a final determination or the determination (based on the facts reported in the files) appeared to be flawed. (It should be quickly pointed out that a flawed cause and origin determination does not necessarily mean that no case will develop, nor, paradoxically, does it mean that an arrest and even conviction may follow.) Both prosecution and conviction were observed in cases in the sample despite the seeming lack of critical evidence to establish the crime. (More will be said about this in discussing case documentation and arson investigation.) What the 20% error rate does suggest is that, while changes have been made, the changes were not sufficient to reform cause determination to a point that any of the cities could rest on their laurels.

At the risk of over-simplifying a complex issue experienced in separate ways by the eight sites studied, one feature missing from all eight sites was a thorough. comprehensive analysis of the performance of the arson detection operation. Instead of an integrated and multifactorial improvement package, the cities in the study tended to alter one or two elements while leaving the others unchanged or even in decline. This is akin to tuning up a car's engine by changing the spark plugs, but not checking the distributor, points, or condenser. In cause and origin, three central issue areas interact in such a way that they cry out for consideration and attention as associated parts of the cause determination subsystem. These issue areas are:

- who is to participate in the cause determination process, when, and how?
- what procedures will guide the fire suppression and investigation participants?
- what performance evaluation and feedback mechanisms will be used to insure that training is acceptable and performance adequate?

To describe and analyze cause and origin determination policies. these three issue areas will be used to organize discussion.

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(1) proportionate to either their number or importance to the determination process.

Personnel Responsible for Cause Determination

In each city visited, fire suppression officers were assigned at least an initial responsibility for cause determination:

. in Cities 44, 57, and 60 (not perhaps coincidentally, the smaller cities in our study), the company officer of the engine in whose area the fire occurs is responsible for making the initial determination

. in City 17, while the first-in engine company's officer is responsible according to S.O.P., investigators are called in so often under the ground rules of the same S.O.P. that they, in fact, perform this role

. In the remaining four cities, a battalion chief, rather than an engine company officer, is the primary cause determiner for all fires or for all "working" fires.

While a great deal of attention and resources have been devoted nationwide, as well as in the cities under study, to upgrade the skills of the company-level officer and fire fighter, a proportionate (1)amount of attention has not been given to the engine company's supervisor, the battalion chief. Because four cities in the study had assigned battalion chiefs primary roles in cause determination and City 60 was considering this option, and because the four cities used their battalion chiefs to different degrees and with different success, the following excerpt from our study team report on City 24 is given:

Involvement of Battalion Chiefs in Fire Cause Determination (City 24).

Several years ago, a special program was set up in City 24 to train Battalion Chiefs to perform fire cause and origin.

This program assigned the cause determination directly to the Battalion Chief and provided far more hours of training than that normally provided to fire suppression officers in any other sites visited or known. Because of this fact, it serves as a model for one school of thought that this alternative to company officer-level handling of cause determination offers the best trade-offs in terms of quality control, economy, efficiency, practicality, and results.

Making the most senior officer in a district responsible for determining cause has many appealing features:

> it squarely puts the responsibility on the most senior officer, rather than delegating it to a less-experienced officer. By reserving the responsibility for those of higher rank, it promotes the importance of the task.

it reduces training requirements to a lesser group of officers than if the responsibility lay with more junior officers

- it ties together the responsibilities for fighting fires, preserving the scene, and determining cause to operations, rather than bucking the investigation over to a staff function
- . it reduces skill degradation by concentrating the workload on a smaller number of personnel.

Eighteen Battalion Chiefs received between 70 and 480 hours of instruction in cause and origin. This is a sizable investment in terms of time, roughly equivalent to the range of training hours between basic emergency medical technician and paramedic training.

Before any judgments are made on how well City 24's program achieves these aims, it is important to distinguish between potential standards and those achieved. Even initial success does not guarantee long-term institutionalization. As in any similar innovative program, adequate training is only the first step; there needs to be clear and continued command emphasis on implementation, to imbed the program in the overall priority structure and operational procedures of the department. For example, if Battalion Chiefs were already over-committed or some senior chiefs routinely caused the Battalion Chiefs to be taken off their on-scene cause determination activities, the program would be more failure-prone. Then, too, the individual recipients would have to accept the additional responsibility.

Despite the ambitious training goal of 480 hours of training for each Battalion Chief, these standards have never been achieved. To date, only a small fraction has been trained, and at present there are no plans to revive the experiment. That improvements were desirable could be surmised from the case review data. In some 17% of the incidents reviewed, fire officers failed to call out investigators as required under their S.O.P.'s. In 13% of the incidents reviewed, the initial fire cause reports were either not satisfactorily completed or the cause of the fire was miscoded.

By 1981, the program had died back, the instructor returned to full-time investigative duties, and the future of this training goal in doubt. Whether the program achieved even its immediate ends is hard to objectively evaluate because it was not set up in a manner that permitted pre- and post-evaluation of skills, knowledge, or performance.

The program has succeeded to the degree that those Battalion Chiefs so trained are more likely to accurately assess whether arson has occurred, to call for investigators, and to minimize scene-destroying firefighting factors. Thus, the program could be, and has been, deemed by local Officials a success.

While not all jurisdictions over 100,000 population might find it desirable to make battalion chiefs the primary cause and origin determiners, the project team recommends that each city review this option. Increasing the battalion chief's involvement in, and responsibility for, cause determination would be both feasible and (the project team proposes) desirable. At the heart of this is the belief that the battalion chief in the field sets the standards for performance. He determines what issues are emphasized. In the long run, the battalion chief is the final arbiter of what gets done among all things that are "supposed" to get done.

Cause and Origin Standard Operating Procedures - Official and Actual

Cause and origin procedures are established to quickly, economically, and reliably determine the point(s) of origin, the source of ignition, the material ignited, and the actor(s) or factor(s) responsible for ignition. These procedures require both technical skills and actions and discipline in their execution. Without downplaying the importance of technical factors (procedures, equipment, knowledge, and skills), the research team was asked specifically to concentrate on the operational elements that strengthened or weakened the local state-of-the-art. Accordingly, this section will not examine the appropriateness of the standard procedures and actual practices observed. In passing, however, we will state that our review confirms the assumptions that shaped this study - that improvements in the technical approach, while possible and desirable, do not appear to be the limiting factors that operational elements can be. Because the technical skills required to detect arson are statisfactorily described in many books and articles on arson investigation, we will not engage in a clause-by-clause review or comparison of standard procedures. We did note that standard operating procedures did not tend to be up-to-date, did not address important considerations in cause and origin procedures, and in several cities were nonexistent.

Procedural Guidelines

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Few S.O.P.'s were as well thought out or covered the issues as the one reviewed in City 87. There, a Fire Department General Order, "Fire Reports and Investigation," dated October 11, 1978, specifically directs the OIC:

"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 General Order goes on to specify the following:

the criteria for calling for the fire investigator

delayed investigator response can be expected at times

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the OIC should coordinate, cooperate, and exchange all pertinent information with the investigator before leaving the fire scene

- the investigator should be assisted with the physical overhauling of the debris when requested
- how to secure property and restrict entry
- how to treat (questioning procedures, legal considerations) juveniles above and below eight years of age
- records and reporting procedures.

As a minimum, procedures should address themselves to these general considerations; few did, and fewer still tended to be closely adhered to.

Operational Issues

One operational issue that complicates the process is that the officer(s) responsible (whether captain, battalion chief, or both jointly) are, in reality, trying to decide two issues. The first, and often overlooked issue, is that the officer must first determine who is supposed to make the determination. Does the nature of the cause (accidental, suspicious) or does the nature of the fire (single or multi alarm, above or below a specific dollar amount) make him responsible, or someone else?

In one city--representative of all the cities studied that did not almost always automatically dispatch investigators -- the process can be summarized as follows:

During the fire, and thereafter, the senior officer goes through a decision process to fulfill his fire cause and origin responsibility. He chooses among four options:

- Option 1. The fire's cause is clearly accidental, no investigator needed. Routine confirmation and reporting.
- Option 2. The fire's cause is uncertain. Investigator needed.
- Option 3. The fire's cause is uncertain. Further preliminary evaluation is required, before an option is selected.
- Option 4. The fire's cause or circumstances require investigation by an investigator.

could be termed: 1) cause size-up

2) cause exploration, and 3) cause determination.

The process begins with the responsible senior officer attempting to ascertain whether investigators should be called in to further investigate the fire. In other words, the fire officer does not initially try so much to determine cause, rather he assesses the available information to decide how clear the cause and origin is and whether an investigator will be needed. In this sense, the OIC "sizes up" the cause and origin phase in much the same manner that he "sized up" the suppression requirement.

If the "cause size up" does not make the choice clear, the next step the OIC takes is "cause exploration." The exploration may include a "once over" of the likely area of origin, discussion with other fire personnel, and interview of witnesses.

of the fire.

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Describing the determination of the cause and origin as a "procedure" can be misleading. Perhaps, it would be more accurate to call it a "process." To call it a procedure suggests it has the quality of a sequential, step-by-textbook-step activity. Like many other decision processes, the situation--not the desired end result--decides the degree of difficulty and suggests several possible approaches. Deciding how to discharge this responsibility can be a complex multi-factorial weighing of circumstances or it may take the presence of a single telltale element to make up an officer's mind. The actual number of influences needed will vary, as will the weight each influence will have, according to:

- nature of the loss
- cause or another

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The decision can entail from one to three steps. The three steps

If, upon completing the exploration, there does not appear to be the need for an investigator, the officer will attempt to proceed with the third step and determine to the best of his ability the most probable cause

Factors in the Decision Process

circumstances surrounding the fire

degree of certainty that the fire is of one

experience and disposition of the fire officer

policy and policy sanctions for non-compliance

perceived inconvenience of waiting for the investigator to arrive and the investigation to be completed.

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It is for this reason that the choice may be made in the first minute of the fire or it may only come to the fire officer after conducting a very thoughtful and thorough search of the supposed area of origin, talking to bystanders, or checking with fire fighters for possible leads.

In most instances, the process, while it does not follow a necessarily orderly decision procedure, does tend to be relatively easy to carry out in a large percentage of fires. The decision normally turns on fairly clear information and involves a fairly straightforward decision tree. Since an investigator can be called in at any stage, there are repeated opportunities to reconsider this option--perhaps this is true for some 80-90% of all fires. The balance of fires requires closer consideration of the evidence and circumstances if investigators are to be called when warranted, but not unnecessarily depended upon. If the department has a blanket policy to investigate all fires or all fires over a certain dollar loss, or if the investigative unit encourages erring on the side of caution, the decision in these marginal cases becomes easier to make.

However, the decision is not a purely rational decision process. Instead, the following influences perturb the process:

- tradition
- personal motivations
- attitudes about fire investigation's utility and centrality to the Fire Department's mission
- experience with the pool of investigators on duty
- past experience in the ultimate disposition of cases of this sort will tend to influence the degree of compliance with procedures.

Without effective evaluation, performance tends to naturally degrade. Without evaluation, training requirements and reinforcement techniques can only be surmised. Feedback--whether formal or informal--is the authenticating voice that exhorts the majority of us through praise or criticism to perform at our highest possible level.

It is disturbing, therefore, to see these basic motivational tools mothballed in most of the cities studied.

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Those responsible for managing cause and origin have a wide choice of mechanisms and procedures used to evaluate performance and give feedback. including at-the-scene, in-station, during and after action critiques, and formal channels, to name but four. The evaluation or feedback can be given both formally and informally. Recounted below are some examples from the cities studied:

In City 17, both positive and negative feedback mechanisms are used. If it is detected by an investigator that an item has been moved, this is noted in the investigator's report. If the situation warrants further action, the Chief Investigator will write a memo that can be handed down the chain of command to the individual responsible. Positive feedback can be given using the same communication channel. Since fire fighters who discover or observe suspicious circumstances are asked to write out in longhand what they witness, the City has a ready source for documenting fire fighters' contributions which can then be recognized by superiors.

Jurisdictions that have not developed such mechanisms to this degree may lack the "carrots" and "sticks" that can reinforce command interest in arson detection and reduce the number of failures in evidence detection and preservation. While many other factors contribute to the strength of this link in the system, these reinforcement mechanisms are likely to play some role in the very high regard that investigators at present hold for fire suppression crews. (Investigators estimated that fire crews contributed significant information in more than 60% of the incidents to which they responded, concerning the nature of the general condition of the building, presence of flammable liquid containers, and multiple sets, etc.)

Backstopping Initial Cause Determination in City 87.

In terms of cost and benefit, there are many options that management can consider for improving the accuracy of initial cause determination. (At one end of the continuum, fire investigators could respond to all fires. This would then significantly drive up the cost of the initial determination or reduce the time available for follow-on investigations.) Options include:

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Performance Evaluation and Feedback

City Specific Analysis of Cause Determination

City 17's Use of Positive and Negative Feedback Mechanisms.

random spot check investigations (+ -10%)

more training of fire officers (involving both initial and continuing development and staffing costs, as well as the opportunity cost of investing in this activity, as compared to other alternatives)

better training of chief officers.

One potential benefit of training fire officers, as opposed to dedicating more manpower solely to investigation, is that it broadens the awareness base and improves the ability of fire officers to communicate more effectively at the same time that it cuts down on the number of unnecessary investigation responses.

Informal Interaction Between Investigators and fire Suppression Personnel in City 87.

As one investigator remarked,

"It is important for the investigator and the company officer to communicate freely (also with the firefighters, of course). Pride and resistance to discuss the basis for a fire cause determination should be discouraged. If a company officer is operating within a non-judgmental climate, he will often feel free to discuss a fire with the investigator, thus furthering his own expertise. As a matter of practice. I always made a point of getting back with the fire company after a fire cause had been determined (if they had left the scene before I had). I think this practice helps to develop interest and alertness to fire cause and promotes increased cooperation between fire suppression people and the fire investigator. To further develop this idea of teamwork, I composed a simple report form with which I could send a brief written explanation of the fire cause, any arrests-convictions-sentences, etc. I would send this to the Battalion Chief (if he was present at the fire) and let him distribute it to the companies present at the fire scene."

Joint Determination and Conflict Resolution in City 70.

Both the Battalion Chief and the Fire Investigator work together to determine the cause and origin of the fire. Overhaul is delayed until both are satisfied with the conclusion. The Fire Investigator conducts any subsequent interviews with owners, occupants, etc. If a fire is determined to be accidental, a delayed report is not required and the investigation is concluded at that time.

If an Investigator does not agree with the Battalion Chief's "cause and origin" determination, both reports are forwarded and compared as to "points of origin." If any doubts continue to exist, the Battalion Chief's report will be classified as "under investigation" or "not fully ascertained" until the Chief Investigator can make a determination. In 1978, every fire house was visited in an effort to sensitize fire suppression crews to the need to observe the scene and preserve evidence. Fire investigators noted a marked improvement in cooperation and understanding. Despite this impression, detectives indicate that there continue to be problems, principally during the overhaul phase, including:

> unnecessary fire suppression premature overhaul unnecessary removal of evidence.

"Roasting the Chestnuts" in City 33

The Chief Investigator makes it a point to try to discourage fire officers from relying on crutch codes, such as "children with matches" and "careless smoking." For instance, in a Fire Science class he teaches at the local community college, each class member is challenged in an experimental setting to devise a way to get a wastebasket with normal refuse materials to burst into flames by dropping a lit cigarette into the basket. In several years of teaching the course, only one of the Chief Investigator's wastebaskets full of carbon paper has gotten past the smoldering stage and burst into flames. Such practical demonstrations of how old chestnuts, such as "carelessly discarded smoking materials in a wastebasket," are likely to be in error can lead to more thoughtful examination of a fire's circumstances by future suppression officers.

A review of City 33's statistics does seem to offer hope that the course is having its effect. There has been a remarkable decrease in fires attributed to careless disposal of smoking materials and similar ignition sources - 500 fewer incidents per year between 1976-1979.

Cause and Origin Process in City 24.

In City 24, the Fire Department has invested heavily in fire cause and determination and arson investigation. Despite the fact that a most comprehensive training program in cause determination has been developed for battalion chiefs and fire investigators are both qualified fire and police officers, cause determination is not highly formalized, nor is it a priority for management evaluation.

Preliminary assessment of most fires is conducted by the Battalion Chief. No set procedure is followed. Instead, investigators described the process as a walk-around with the Battalion Chief looking for signs of suspicious activity. The routine is reported to be well-established. For Battalion Chiefs who mastered the extensive training, the lack of formal procedures would not pose much of a potential problem; after this amount of training, the procedural steps should come automatically. For Battalion Chiefs who did not take the course or who failed to observe the steps taught in the course, the presence or absence of procedures may not be as important as command review and emphasis on making them follow correct procedure. To put it simplistically, departments that make cause and origin one of the two or three top priorities for a battalion chief to perform are likely to find battalion chiefs who will learn correct procedures whether the department has them written down, develops a course,

or trains the officers on the job. For fire departments that do not make cause determination a matter of command emphasis, no method or combination of methods to convey "correct procedure" is likely to be sufficient to sustain consistent performance.

Standard Procedures and Evaluation Needs in City 60.

Prior to 1980, engine company personnel had no set procedure for conducting fire cause and origin procedure. Instead, they were expected to draw upon their training experience in the field and the circumstances of the fire. In general, the officer was expected to determine a point of origin, ascertain an ignition source, and talk to witnesses.

A Fire Department General Order, effective February 1980, established a more uniform procedure for determining cause and origin. The order reaffirmed the company officer's responsibility for determining fire cause and outlined a set procedure containing four main topic areas:

- Observations En route to and at the Scene of a Fire
- . Care in Salvage and Overhaul
- . Guard Premises and Evidence
- . Call Investigator.

Perhaps as important as technical content, the policy statement clarified fire management's expectations and demonstrated their concern in this area. This policy statement should tend to reinforce the progress in fireground procedures that fire investigators have noted in the past five years.

Notwithstanding this progress in making a preliminary investigation, the fire officer then, and still, basically follows his own routine. Investigative style varies not only between individuals, but also by the circumstances of the fire. The more serious the officer perceives the fire, the more likely he is to comply with sound practices; this is apparent in the reports written and corroborated during the interviews. In City 60, no investigative aids, such as forced choice questionnaires or pocket-sized procedural guides, were supplied by the department to the engine company officers. The role of heating devices in starting a fire was reported by the investigators to be the most frequent source of mistakes when identifying the fire cause.

One critical feature of the present practice of arson detection is that if a fire is initially classified as accidental (as in the 20 cases reviewed, 2 of which were over \$10,000 in loss), apparently no investigator is called. What this data suggests [and is borne out by interview data (n=26) and policy statements] is that the system is entirely dependent on the determination of the officer-in-charge. While it should be kept in mind that a great proportion of the larger fires in City 60 are classified as "undetermined" or "suspicious," and therefore are likely to be investigated, the fact remains that there is only a single line of defense here by which to detect arson when the fire's circumstances and appearances mimic an accidental fire. As it is reasonable to speculate that arsonists will increasingly camouflage their fire sets to escape detection and/or successful prosecution (leaving a reasonable doubt in the jury's mind as their last gambit), such a practice may now or in the near future be considered a "weak link." Investigating a percentage of all accidental fires over a certain dollar loss or damage level is a potential way to shore up this possibly weak link in the system. Under such a system, the major arsons that are carefully camouflaged to look like accidents (i.e., bed pushed up against a heater by a "tenant" vacating an apartment) might be detected.

Frequently-abused cause determinations, such as carelessly discarded cigarettes or electrical fires, might also benefit from corroboration by two officers, for example, a senior fire combat officer and investigator, working either independently or together. Photographing the scene might also prove a way to review and critique such findings. (Because fire officers in City 57 had a bad tendency to write off large loss commercial fires as electrically caused, the fire marshal made it a blanket policy that all commercial losses would require an investigator to be called out. Unfortunately, in reality such calls might have gotten a response from only a marginally-trained fire inspector, but it was a "quick and dirty" fix to the symptom.)

In City 60, we found training, improvement in the quality of the investigation, and feedback concerning case disposition to be powerful, synergestic influencing agents toward establishing and maintaining interest in arson detection.

The number of incendiary fires detected may be a function of the number of successful prosecutions, when and if they are known. More than one fire officer remarked, "several years ago ('77 & '78), engine company personnel received regular updates on the disposition of investigation." Recently (over the last year to 18 months), updates have been sporadic, if at all. This may be due in part to personnel turnover in the arson unit or it may be a function of caseload. Certainly, the current investigators express sensitivity to, and appreciation of, the need to provide feedback to the firefighters during their interviews, and refer to the need for such a program in their report (a state of the bureau report). Their suggested concept of rotating engine company officers through the bureau is another idea worth serious consideration, if it does, in fact, sensitize field personnel to staff requirements.

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2.2.5 Call-Out and Response Procedures

Call-out and response practices for investigators form the critical bridge between fire suppression and arson investigation. It is at this point that responsibility shifts from the fire suppression generalist in the field to the staff specialist from "downtown"; in some jurisdictions, this step marks the transition of responsibility from the fire to the police department. The role that call out and response practices plays in arson detection and investigation strongly influences not only what fires will be investigated, but also how investigative resources will be allocated.

Ideally, fire departments would like to be able to thoroughly investigate all fires. The reality is that most fires will receive some degree of investigation. Only a fraction will be thoroughly studied by assigned investigators. Because fire service management is not willing or able to allocate the resources necessary to investigate all fires, it has the implicit task of investing its limited resources wisely. At stake are both risks and rewards. Investing in a policy that calls out investigators either to too many or to the wrong types of fires wastes limited resources. But, a policy that overly restricts the conditions under which an investigator can be called risks letting arson go undetected. Hanging in the balance between the risks and the rewards are:

- how scarce resources are invested
- how well fire fighters, their officers, investigators, and law enforcement resources are utilized
- how the public at large is influenced by anti-arson efforts
- which fires are investigated by assigned investigators. •

Investigative call-out practices go beyond policy-setting. In fact, bound up in the event of a fire officer radioing in for an investigator are three levels of discretionary decision making. The first level of this decision making occurs when fire service management sets the general call-out policy and allocates resources to accomplish the task. In carrying out these policies, field fire suppression officers exercise a second form of discretion in their evaluation of the fire's circumstances and departmental policy. Once the officer decides to call out the investigator, the investigator exercises the third form of discretionary decision making by deciding whether and when to respond.

In this section, we will consider in turn each of these types of discretionary decision-making. In looking first at management discretion, we will discuss the formulation of policy and compare the policies developed in each site. Then, we will consider how and why fire officers conform with these policies and how and why investigators do not automatically respond to each request. Next, we will assay some of the results of these practices and conclude with recommendations for those desiring to review their own jurisdiction's call-out and response practices.

Management's Discretion

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Call-out policy has important consequences beyond arson detection. Beyond its basis for which type fires are investigated and ultimately result in arson clearances, call-out policy influences how investigative resources are invested, how fire fighters regard their involvement in arson control, how much risk potential fire setters may perceive their acts run, and even how soundly fire prevention data is gathered.

Fire service managers have wide latitude in the discretion they exercise in setting call-out policies. At one extreme, management can set a highly conservative call out policy that limits investigator response to the most certain and most damaging arson fires. Advocates of this mode point out that it conserves scarce investigative resources by targeting them against only the most socially-threatening fire setters. At the other extreme, management can set a liberal call-out policy that aims for practically all fires of any size or cause to be investigated by assigned investigators. Advocates of this "universal" call-out policy point to the association between higher clearance and detection rates for arson following the adoption of liberal call-cyt policies.

The terms "liberal" and "conservative" are deliberately used here to underscore the similarity of the choices presented with the countless other public policy debates that arise in the attempt to decide how to rationally allocate resources in public systems whose outcomes can only be imperfectly measured and interpreted. The debate is far from an idle one. As the table shown below will amplify, both extremes have their valid appeals. As the table also shows, both extremes can have unintentional consequences. These "side effects" should not only be considered in formulating policy, but should, in most cases, be avoided or minimized.

Table 2.3 Potential Consequences of Conservative and Liberal Call-Out Policies TABLE 2.4 Formal Call-Out Criteria Lon Line Investigate Intentional Unintentional Call Out Criter Consequences Consequences **CONSERVATIVE** When fire officer CALL-OUT POLICY: determine cause Reduce staffing costs Reduce liklihood that marginal When believed susp Continue staff's ability cases will be adequately to perform other, noninvestigated When believed inco investigative duties Reduce quality control Maximize fire suppression Increase undetermined cause All "working fire: officer's responsibility fire classifications Concentrate on most obvious De-emphasize importance of All Multi-Alarm arson cases arson detection When damage goes LIBERAL specified amount CALL-OUT POLICY: Serious injury Increase accuracy of all Increase Investigator "burnout" fire cause determinations Reduce fire crew's role to Fatality Routinize fire fighter one of only minor involvement preservation of evidence in fire cause Explosion/natural Increase risk that inflated Reduce resources available to insurance claims can be do follow-on investigations Valuables missing detected and rejected Increase pressure on investi-Increase investigative experience gator's to short-cut on scene Upon special reque Reduce fire officer error in investigations or complaint cause determination and callout policy All commercial Improve fire reporting data When individual detained As the Table above illustrates, at present there is no "one size fits At the discretion all" answer to the liberal vs. conservative call-out issue. Rather than one investigator truth, there are many trade-offs in choices and consequences. At the discretion To further complicate the selection of a call-out policy, a fire officer department's management has the responsibility maintaining the resources and a performance-monitoring mechanism suited to the written call-out policies selected. Before discussing the other factors that may be associated with the (1) Response criteria fluctuated with the monthly balance in the development of call-out policy, let us consider the common and distinctive overtime funds elements of the policies in effect during 1977-1979. Formal, written (2)_{If significant loss over \$1,000} policies changed little during this period in terms of the triggering circumstances under which fire officers were to call out fire or arson (3)_{Night} response optional investigators. As the first table below shows, six of the cities (with (4) Even accidental, if above \$1,000 minor variations) relied on the fire suppression officer's initial "size-up" of the fire to trigger the call-out. Two other cities, 17 and 70, 2-30 2-29

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essentially required investigators to be called out on all working fires. In these cities, the fire officer's on-scene discretion substantially reduced by management's policy. City 87 went far beyond the basic trio of undetermined, suspicious, and incendiary fires to specify a list of more than a dozen circumstances requiring fire officers to call in investigators.

From Tables 2.5 and 2.6, one can make a comparison of the criteria for call-out of fire investigators and peace officer-qualified arson investigators. Cities that have both fire and police investigators assigned to investigate arson showed distinct improvement in police detective involvement at the fire scene between 1977 and 1980. Notwithstanding this change, a marked division of labor remains in initial call-out responsibilities.

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Table 2.5 Criteria for Calling Out Fire Investigator

	City 70	City 33	City 57	City 24	City 17	City 87	City 44	City 60
2-32	When officer-in charge cannot determine cause, the cause is suspicious, all multi- alarms and fatal fires	When fire officer in charge (usually Battalion Chief) defines fire undetermined, suspicious, or incendiary in origin	All incendiary, suspicious, and undetermined, with significant losses (above several hundred dollars), serious injuries or deaths and all commercial Note: response varies with overtime fund balance	All suspicious, incendiary, and undetermined fires; when called out by fire officers on scene or by "special com- plaint" request from private citizens, police patrol, or other agency personnel	All fires with injury or significant burning	 explosion evidence of/ suspicion of fire setting undetermined 2nd or greater alarm natural gas individual detained valuables missing death/serious injury upon special request of fire fighters, citizens, police, insur- ance adjusters, etc. at the discre- tion of the investigator 	All non- accidental and accidental above 1,000+ loss, multi-alarm, serious injury, or death	At the discretion of the fire officer on scene and/or when the cause is incen- diary, suspicious, and undetermined



	Criteria for Calling out Arson Investigator												
	City 70	City 33	City 57	City 24	City 17	City 87	City 44	City 60					
2-33	Must respond to 3-alarm or greater fires, fatal fires, bombings, exploding or incendiary devices, fires involving police or fire depart- ment property, racially inspired incidents, pattern fires in public assembly areas, or fraud fires, and when in doubt	Fire investigators are arson investi- gators	 all significant commercial fires all multi-alarm residentials all established arsons involv- ing significant \$ losses all arson fires where there is a definite subject all serious injuries or death attempted use of incendiary devices, accelerants, malicious burn- ings, etc. 	Fire investigators are arson in- vestigators	Upon request of fire investigators, police patrol unit, or citizen's re- quest; specifically to respond to multiple alarms, death or serious injury, when a suspect has been taken into custody or a serious fire has been deter- mined to be arson	One detective assigned to fire investigation unit. No special guide- lines in effect	Serious arson fire and in the event fire investigator felt the fire was a "police matter"; only one police detective assigned	1977-1979, one police officor assigned to fire investigation joint unit; both fire and police officer followed the same call- out response procedures					

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Table 2.6

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certainly have the population base and the departmental size, fire frequency, and like factors to warrant 24-hour staffing of the fire investigation unit. With 24-hour staffing and the larger investigative staff, it would follow that management would tend to liberalize its call-out policies because the resources appear available. Smaller cities, on the other hand, might be disposed to set higher thresholds for call-out to reduce the justification for round-the-clock staffing of the unit with its associated costs.

In the formulation of call-out policy, therefore, we see that limits to management's discretion are both internal and external to the department. If, indeed, call-out policy does play a role in reducing arson fires, as well as in increasing the likelihood of detecting arson, these benefits were either not apparent or persuasive enough to significantly alter management call-out procedures or capability in six of the cities studiad.

Fire Officer Discretion

Clear call-out policy does not guarantee good performance. The fire officer responsible for following out the policy may weigh other factors and be influenced by other concerns as he decides whether the situation calls for an investigator to be called out. Indeed, in those instances where an S.O.P. is subject to varying interpretations or the nature of the fire such that the cause is clouded, the fire officer's discretion may be the decisive factor in whether the fire is investigated.

The forces that influence this decision may be as numerous as the workings of human nature are mysterious. The influences that were discernible to the study team, however, could be grouped as:

- prospects of delays and complications
- past experience of officers with investigators' attitudes and actions
- clarity, consistency, coherency of guidelines
- presence of reinforcement techniques
- incident-specific factors

In the remainder of this section, each of these sets of incentives and disincentives will be expanded upon.

Prospect of Delays and Complications.

To call-out an investigator often requires fire officers to overcome the natural disinclination to wait an indefinite period of time before he and his crew can return to quarters. The decision to call for an investigator may entail waiting for the investigator, waiting for the investigation to be completed, and then completing overhaul. As it is fire service custom for the "first-(due) in" company to be the last unit to leave, the decision may extend the officer and his crew's time on scene by many hours. Further, if the fire turns out to be arson, the fire officer can look forward to writing additional reports and statements, and perhaps answering questions from a badgering defense attorney if the case goes to court.¹

This problem may be particularly acute in small fires where the evidence can be interpreted to be accidental (e.g., "children playing," "vagrants," "careless use of flame," "possible electrical," etc.) and the fire officer has reason to believe the investigator's response will be delayed. For example, in the smaller cities of our study that do not staff their units 24 hours per day (44, 57 and 60), and in large cities with long travel time (e.g. City 24), the delays experienced were 30 to 60 minutes. The long wait, coupled with the low probability that an investigation will produce any leads, is a powerful disincentive to call-out an investigator. In City 33, investigators respond from home after normal duty hours, even though it is a large enough city to warrant around-the-clock staffing. As a result, a 30-minute to an hour delay can be expected from the time an investigator is reached at his home. Even though the call-out responsibility is assigned to battalion chiefs in City 33, several of these officers candidly admitted that they were often tempted (and sometimes succumbed) to giving a potential fire setter a "free ride" and calling it accidental, rather than waiting for an investigator. The senior fire investigator estimated that some 10% of the fires deemed accidental in these circumstances were, in fact, arson.

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Although in reality the likelihood of being a court witness is small, one training film makes the point that the fire officer in charge can be embarassed in court by a hostile defense attorney. While true in rare cases, we speculate that the message getting through to fire fighters may be counter-productive - "don't get involved if you can help it, especially if you feel you or your crew erred in any way on the fireground." Officers' Past Experience with Investigators' Attitudes and Actions.

When questioned about why they failed to follow S.O.P.'s and call out investigators (as happened in a number of the cases we audited), officers rationalized their actions in a number of ways:

- In City 60, an officer candidly recounted that before the arson unit was formed, the expertise among the investigators was so scant, and the possibility of a prosecution so remote, that he saw no reason to "waste time all around to call out the investigator."
- In several of the cities, on-scene investigators conspicuously (though probably unwittingly) complained of being over-worked. Such negative messages could be interpreted by field officers as, "don't bother me unless you've got something." Compare this message to the type that some investigators make a point to give at every opportunity: "Thanks for calling us out. Maybe next time we'll be able to take what we got here with some more information and make a case." The difference between the "don't bother me" and the "call me for anything" message can influence the field officer's readiness to call-out an investigator, as surely as the policy not to insure prompt 24-hour a day response times.

Clarity, Consistency, and Coherency of Call-Out Procedures.

With only one exception, the S.O.P.'s reviewed in the course of this study failed to cover one or more important points in call-out procedure, such as:

- exceptions types of properties or situations for special handling
- what constitutes juveniles playing with matches vs. arson, and what actions to take
- scene security and permissible activities until investigator arrives
- definitions and examples of what constitutes incendiary, suspicious, and, most importantly, undetermined cause

We concluded that lack of clarity, internal consistency, completeness, and currency compromised the usefulness of these procedures as references for fire officer or researcher, alike. In every city visited, unwritten modifications to the call-out procedures were evident. While sound procedural guides may not be a panacea, they have repeatedly been shown to be one foundation for consistent performance.

Presence of Reinforcement Techniques.

To keep policy vital requires continuing attention. The customary means that bureaucratic organizations use, such as command emphasis (especially the personal emphasis of each shift's chief officer), recognition, peer influence, and training indoctrination and in-service reminders should prove effective in eliciting greater cooperation in call-out procedures.

Cities 87 and 17 have built a simple reminder into their incident report forms - a check-off space to indicate whether an investigator was needed and called. While this requirement guarantees neither good judgement nor better compliance, the fact that the response becomes a part of the official record of every fire and reinforces consideration of this decision on the fireground can do little harm. The chief investigator in City 87 pointed to this as one factor that contributed to his city being the only one in our study in which fire officers followed their call-out procedures without major exception.

Incident-Specific Factors:

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Among the incident-specific factors that were noted in previous studies and tended to be confirmed in this one are:

 Different types of property involved. For example, in most cities, a fire in a Dempster Dumpster does not normally rate the calling-out of an investigator. Leaf, grass, and rubbish fires seldom lead to a call-out. However, if a rash of any of these types of fires occurs, or if strong leads or a suspect has been detained, a call-out is likely.

Condition of the property. Fires in condemned structures or vacant buildings proved less likely to rate an investigator call-out. Even in neighborhoods where fire frequency might be high, if past experience in similar circumstances has proven futile (such as occurred in Cities 44, 60, and 70 in a large redevelopment area), fire officers may use their discretion and ignore the call-out S.O.P. This can be true even if the fire's cause was incendiary and the fire sizable.

 Individual differences in training, perception, attitudes, and experience have been implicated by investigators as accounting for the reason some fire officers consistently fail to comply with call-out procedures. Several investigators spoke of a generation gap between the "old dogs" (many of whom were uninterested in fire cause) and the younger officers (typically neutral or favorably disposed to the concept of fire investigation).

Weather, time of day, workload, and area of the city are pointed to regularly in other research. With the exception of the area of the city, our sample failed to show firm evidence of these factors, although interviewees readily acknowledged that these factors did, indeed, influence fire officers' discretion.

From the retrospective audit of case files, we observed that in 58, or 5%, of the cases, fire officers failed to request an investigator in accordance with local procedures. City 24 (20) and City 60 (22) had the highest frequency of failure, while City 17 and City 87 had no failures of this kind noted. The number of fire officer call-out failures in the remaining cities were: City 33 (3), City 44 (5), City 57 (6), and City 70 (2).

Investigator Discretion

Several authorities have pointed out that fire officers who fail to call out investigators are often a weak link in an arson control system. The corresponding failure of investigators to respond when requested (or decline to respond within a reasonable time frame) has not received as much attention. Data from our retrospective audit of records from over 900 fires suggest that investigators failed to respond or mishandled the request to investigate about as often as fire officers failed to properly request them. In roughly 10% (90) of the cases sampled, the investigation was not initiated or could not be documented.

This finding raises two immediate questions:

What is the significance of these "failures"?

What factors contribute to investigators failing or declining to respond when requested?

The answer to the first question can only be hazarded. Although the data suggested that the bulk of these non-responses was to fires with little dollar loss, and usually involves non-structural properties, such as vehicles, dumpsters, and vegetative fires, investigators occasionally failed to respond to fires causing extensive damange and/or dollar loss. But, the issue of significance involves more than property type or dollar loss. For instance, are the arsonists that go undetected in these mostly "small" fires enboldened to try their hand at "bigger" fires? Not only would an answer be speculative, its import would be largely rendered moot by the inability of the cities we studied to effectively handle their present caseloads. Their most unarguable significance is that these failures to respond may be valuable telltales of problems in workload, procedures, or fire officer-fire investigator communications.

The question raised about the contributory factors is easier to assay; it may also may be a more critical concern to management, as it may lead to development of new compliance and performance measures for arson detection and investigation.

Arson investigators and managers cited the following factors as contributing to investigative "no shows":

workload

- type of property involved
- degree of damage
- organizational
- incident-specific and investigator-specific factors.

Workload Factors.

Workload interferes with investigative response in two ways. A frequent reason recalled by investigators was prior commitment to an on-going investigation. A second reason cited was that the nature of an on-going follow-up investigation, such as serving an arrest warrant, forced the investigator on duty to decline to respond or delay the response. Fires that did not appear to warrant the call-back of additional off-duty investigators, and yet would have been investigated if the investigator on-duty had not already been committed, seemed most likely to be written off. Even if these marginal cases were investigated, a heavy workload might result in their receiving only peremptory investigation (to establish the cause and secure the evidence with no attempt made to canvass the neighborhood or conduct similar investigative efforts). The validity of claims that "workload" prevented response is difficult to verify. It is interesting to note that the larger cities in the study recorded disproportionate percentages of call-out/investigation prevented by workload. Larger cities would tend to have more simultaneous fire incidents and, therefore, greater likelihood that investigative resources might be overwhelmed. Unfortunately, the data do not permit conclusions to be drawn on this question. Data point out that a not inconsequential percentage, 8% of the sample, is affected either by failure to respond and investigate, or workload conflict. Wherever the truth lies between these possibilities, it deserves to be brought to light.

Type of Property Involved in Fire.

The second most frequent reason cited by investigators for their failure to respond to a request for call-out was the type of property involved, its condition at the time of the fire, or its use. An analysis of the sample data showed the following frequencies for investigation:

What these figures suggest is that fire investigative call-out is predicated on, or at least influenced by, factors other than the apparent arson potential of the incident. Investigators stated that call-out influences included public pressure and investigative concerns for high life-loss potential (Educational, Institutional, Public Assembly properties may reflect this), and potential impact on the tax rolls and business

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We will consider each of these factor types in sequence.

Educational	•	•	•	•	100%
Store and Office					94
Institutional	•	•	•		86
Storage					85
Public Assembly .			•		85
Residential		•			81
Trucks					78
Manufacturing					76
Special Properties			•	•	57
Passenger Vehicles			•	•	53
Dumpsters	•	•			32
Other Mobile	•		•	•	24

(Store and Office percentage seems to reflect this, as does the low investigative rate for vehicles which are rarely either a life or tax roll concern).

Investigators also pointed to whether the property was in use at the time or vacant/condemned/abandoned, and its condition. In several communities, fires in condemned buildings in urban redevelopment areas (even when they were part of systematic "demolition" or vandalism patterns) did not receive investigation as a matter of course.

The following table indicates that variations in call-out policies are discernible, even in special, non-structural fires.

Table 2.7

Inter-City Comparison in Call-Out Frequency for Three Property Classes

				U1	ITY				
	17	24	33	44	57	60	70	87	Total
Passenger Vehicle Residential Special Properties	16/16 100% 46/47 98% 15/16 94%	2/28 7% 36/48 75% 16/18 88%	13/21 62% 35/46 76% 5/11 45%	10/20 50% 35/46 65% 16/22 73%	11/26 423 25/34 653 13/21 423	7/13 54% 22/34 65% 2/38 5%	8/9 89% 24/37 96% 15/15 100%	15/23 65% 72/75 81% 11/13 85%	82/156 53% 293/362 81% 93/164 57%

How wide the range in call-out frequency can be for these property classes can be seen in the frequency of passenger vehicle call-outs between Cities 17 and 24 and in special properties between Cities 60 and 70. Note also that, the range for residential properties was only 23% between all cities.

Degree of Damage.

Table 2-8 on Pages 2-41/42 presents our analyses of the frequency of investigative call-outs for the combined eight sites, cross-tabulated by NFPA property classes and six ranges of property damage. From this table, it is evident that there are significant differences in the percentage of investigations by degree of destruction, as well as by property type (see above). The table suggests that there is a sensitivity to certain property types, such as educational structures, which leads to fires in these



Table 2.8 (\mathbb{N})

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Number and Frequency of Investigations By Property Type and \$ Loss Range From Fire Incident Case Sample

Property Type		0	Loss Estimate Missing	1-99	100-999	1,000-9,999	10,000	Total
Public Assembly	1	1/1 100	2/2 100	5/5 100	4/6 60	4/5 80	7/8 94	23/27
Educational	7	2/2 100		11/11 100	5/5 100	5/5 100	4/4	27/27
Institutional	# %	1/1 100	*** ••••	4/6 66	6/6 100			12/14
Residential	#	14/20 70	2/3 67	36/54 67	81/101 80	99/115 86	61/67 91	293/360
Store, Office	1 7	3/3 100	1/1 100	-375 60	10/10 100	4/4 100	8/8 100	31/33
Agriculture	# %					· 1/1 100	ن. مع مع	1/1
Manufacturing	X		*	3/3 100	5/8 63	6/8 75	5/6 83	19/25
Storage	8	1/1 100	1/1 100	4/4 100	6/11 55	16/17 94	6/6 100	34/40
Special Property (Unoccupied, vacant, outdoor)	1	16/69 23	22 m	14/21 67	23/30 77	29/33 88	11/11 100	93/164
						4.~~.		

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60.5

Average X	RD 3	
85	6	
100	100	
86	4	
81.4	7	
94	3	
100	2	
76	a	
85	5	
51	10	
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Number and Frequency of Investigations By Property Type and \$ Loss Range From Fire Incident Case Sample

Property Type		0	Loss Estimate Missing	1-99	100-999	1,000-9,999	10,000	Total	Average 🐒	RD 3
Mobile Properties: - Passenger	ë X	3/5 60	1/1 100	12/27 44	22/60 37	41/59 70	3/4 75	82/156	53	11
- Trucks	# %	1/1 100	39 - 44	2/3 67	4/7 57	9/9 100	2/3 67	18/23	78	8
- Dumpsters	8 7	3/12 25		2/4 50	1/3 33	-	44 1 80	6/19	32	12
- Other Mobile (heavy equip., rail, water, other)	# %	• •	0/1 0	2/2 100	1/11 100		1/3 33	4/17 [.]	24	13
Number Invest./ Total Number	4	5/118	7/9	98/149	168/249	215/257	110/122	643/904	71%	
% Investigated		38%	78%	66%	68%	84%	90%			

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structures being investigated more frequently than, say, mobile or special properties at any observed level of property damage. Thus, the degree of property damage appears to be an influence, but a secondary one, compared to type of property. Note the steady increase in percentage of fires investigated and the degree of property damage:

DOLLAR LOSS	% OF FIRES OF ALL CAUSES						
\$0	38%						
\$1-99	50%						
\$100-999	60% 629						
\$1,000-9,999	9/9						
\$10,000 or over	00%						
· · · · · · · · · · · · · · · · · · ·	9U &						

For a city-by-city breakdown on the frequency of fires vs. the number investigated by property type and dollar loss range, see Appendices, Section 5.

Organizational Factors.

Organizational factors, such as number of investigators, whether they are paired or work alone; shift schedules; duty week, overtime provisions; number and type of other duties assigned; and the section's professional pride collectively establish the morale of the unit. Investigators often singled out the relationship between the fire chief and the investigative section as a key parameter in their performance. As these factors influenced the full course of the unit's activities, they will be more fully considered again in the Arson Investigation section of the report.

City 70 was the only city that officially recognized and permitted investigators to exercise discretion in responding to requests for investigation. After midnight, the sole on-duty investigator had the option to respond or defer investigation to the following morning. Other departments in the study may (as a matter of informal practice) have tolerated discretion.

While some departments made it clear that unless requested, investigators were not welcomed at the scene, City 87 formally recognized the obligation of the investigator to initiate a response to a fire scene even though not formally summoned. Although such voluntary responses call for tact, a policy that officially or unofficially discourages investigators from pursuing their professional judgments should be viewed for its negative impact on investigative morale and discretion.

Incident-Specific and Investigator-Specific Factors.

We observed several instances in which the nature of the case (such as a cross-burning) or the individual character of the investigator (poor motivation, "near retirement-itis", etc.) seemed to greatly influence the investigator's decision to respond to a request to investigate.

gative discretion.

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consideration:

analyze by responses by different personnel to fires by property type, dollar loss ranges, cause type, outcomes of investigation cross-tabulated to these and other pertinent data elements to evaluate both process, function and outcome

response time for investigators, means and extremes for each shift and each investigator

stipulations as to property type-based call-out requirements (when and under what circumstances are responses to vehicle fires, vacant building fires, etc. warranted and whether certain property classes such as schools should be always investigated in the event of fire)

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The presence of the human factor and incident-specific factors does from time to time appear to determine whether or not a particular fire is investigated. Accordingly, we acknowledge their presence, but conclude that the previously-mentioned factors predominate in influencing investi-

Recommendations for Policy Review

As we have just seen, official policy is the product of discretion exercised by management that is then shaped by discretion exercised by fire officers and investigators. We have seen that formal policy is modified through official means, for example, by staff meetings, and by the informal "grapevine." These modifications solve the immediate need to adjust policy and its interpretation, but also diminish the pressure to revise policy and procedures in light of reality. Though, as we found in City 33, word-of-mouth down through the chain of command can be an effective means to communicate changes to S.O.P.'s, written modifications to the call-out S.O.P. is probably to be preferred in most jurisdictions. We observed that most S.O.P.'s in force did not represent the current practices. Many were out-dated and of little practical utility to guide performance. This may have been due to the typical problems encountered by many organizations in trying to maintain up-to-date, accurate S.O.P.s. It may also be due in part to the fact that many fire administrators acknowledged they did not know how to rationally review present call-out policies and formulate more

For cities wishing to review their call-out procedures, the following considerations (among others) should be given explicit and thorough

stated call-out policy utility vs. actual call-out practices

stated response policy for fire investigators, if different, arson investigators, and police patrol personnel vs. actual response history

examine for exceptions, deviations, and their contributing factors; their impact on investigative soundness

 workload, staffing levels, shift scheduling, overtime provisions should be reviewed in light of past performance, response times, performance objectives before setting triggering points based on dollar loss, size of fire, number of alarms, suspected cause, etc.

 special attention to "problem fires" - those fires involving children playing with matches, adults carelessly discarding smoking materials, spontaneous ignition, fires in Dempster Dumpsters soon after school is let out, electrical fires, etc. may be desirable to consider

 the use of radio-phone patch technology makes it increasingly attractive to consider developing procedures to permit field fire officers to call-in investigators and consult with them before calling them out. Over-the-telephone triage of borderline judgment calls about whether or not to call-out investigators could assist all parties through permitting the investigator to advise

- what overhaul would be permissible to begin with

- whether to ask witnesses to stand by
- whether special equipment should remain or be sought
- how many fire crews to hold

 security and posting requirements in the event the fire company returns to quarters prior to the investigataors arrival.

Such call-in protocols might tend to reduce the number of errors in call-out and fire ground procedures and improve the spirit of partnership between fire officer and investigator.

- balance between the resources invested in initial scene investigation and the needs of the current case backlog should be sought. The potential use of police patrol personnel to take over a portion of the on-scene activities should be given consideration.
- quality control mechanisms to check compliance with the S.O.P. and the need to modify it should be developed in concert with the review of the S.O.P. Battalion Chiefs could check the performance of company-grade officers and random spot checks by investigators could monitor call-out compliance.

No call-out procedure can be expected to work well without periodic adjustment. Annual review should be sufficient in most jurisdictions. Input from field fire suppression officers and investigators should be sought. Consideration of overall system objectives should be part of this review. Arson control systems experiencing fewer than a 20% rate of investigation for all fires appear prime candidates for review. Those cities that routinely investigate more than 35% of their fires, but that are experiencing investigator fatigue, poor clearance rates, or related complaints should examine their call-out practices to see whether adjustments are indicated. Cities unable to achieve a minimum rate of 20% of fires investigated may either need to increase staffing of investigators and carefully consider whether their call-out procedures optimize their investigative resources.

2.2.6 Fire Incident Classification and Reporting

The fire detection phase of arson control concludes with the documentation of the fire incident. Documentation is important for three main reasons. As an internal document, it serves as an archival record. (From the report data about the fire, its circumstancs, cause, loss, and fire combat operations are preserved for management use.) Local, State, and National users compile data from this valuable source document. Finally, as an official record, the report serves both legal and insurance industry needs. The results of fire cause determination are commonly reported using the standard forms and formats developed by the National Fire Protection Association's 901 Code, The Uniform Fire Information Reporting System. The forms and formats have been adopted with slight modifications by the U.S. Fire Administration in the development of the National Fire Information Reporting System (NFIRS). This System was developed for multiple uses and users. Arson control was one area of interest considered among others in developing the system, its forms and formats.

The basic reporting form, completed by the fire officer in whose primary response area the incident occurred, is known as the 902 F Form. Seven of the eight fire departments have adopted (and in some cases adapted) this form as their basic fire incident reporting form. The eighth city, 70, retains a reporting system that has evolved over the course of 40 years. Even though seven of the systems share a common fire incident reporting system, the many local variations in coding conventions and practices, compounded by major variations in the reliability and validity of the resulting data, have rendered both year-to-year and inter-city comparisons of dubious utility. Accordingly, this section will concentrate on case documentation practices, while a later section (Fire Incident, Classification, <u>Recording</u>, and Reporting) will consider the issues and the results of these data collection efforts in greater detail.

Documentation Process

Before identifying some of the individual features of the documentation process in each city, the following overview is given to show the typical steps involved in the process:

 While on scene, the responsible officer takes notes about the fire's circumstances, names of owners and/or occupants, insurance data, estimate of loss, cause and origin if known, plus information about the actions taken to fight the fire. Once back at the station, the officer refers to these notes while completing the fire incident report. Incident reporting requires completing short phrase responses and supplying associated numerical codes for 21 lines of requested data entries.

In theory, the officer (or member formally assigned this duty) completing this report has been thoroughly trained to fulfill this role, understands its many utilities, and is motivated to complete the form accurately and completely. The reality is that one or more of these conditions are usually not satisfactorily present. Often the responsible officer delegates the responsibility to an unqualified subordinate and fails to even check the accuracy or completeness of the report.

2. The fire incident report was designed to be reviewed for accuracy and completeness by the reporting officer's superior. Here again, practice does not live up to theory. Review at this level was generally inconsistently performed, and it appears that either reviewers were not very thorough or were not familiar with the conceptual basis of the 901 System or the coding procedures.

It can be inferred from the seemingly casual attention given to what is the basic document in the fire incident reporting field, and by the delegation of the responsibility for completing the report, that incident reporting is a low-status, low-priority task. Given the fact that the process requires a fair degree of discrimination in the choice of codes and a faithfulness to what is considered by fire service personnel to be a convoluted process, careful training and qualification of those allowed to generate the data, followed up with command emphasis on quality control, seem to be minimal prerequisites.

3. Copies of the report are then sent to fire headquarters and routed to the fire prevention bureau. There, the report is to be reviewed for coding accuracy before being entered as part of the local and/or state data base. As part of this process, any updated information from fire investigation concerning the cause, origin, size of loss, etc., is to be substituted for the original data the fire officer reported.

Actual Practices Observed in Study Cities

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From the retrospective audit of fire incident files in each study city, we have compiled the following observation of errors in coding and completing fire incident reports. The study team finds it important to note that some 10% of the initial fire incident codes did not agree with the written information provided in the same report. These internal inconsistencies were not caught and corrected by superiors or fire report data specialists. In the main, it is likely that these errors were not subsequently detected or corrected at the state or federal level. This degree of error suggests that quality control in fire incident reporting is especially important in the smaller cities, such as City 60 (40 errors or an error rate of 34.8%), City 57 (23 errors or 20.4%), and City 44 (5) errors or 8.5%). These cities constituted 78% of thhe total observed error rate. Frequency Percentage

Row Pct Col Pct	17	24	33	City 44	57	60	70	87	Total
Fire Report Cause Code Miscoded	4 0.44 4.35 3.74	5 0.55 5.43 4.27	4 0.44 4.35 3.54	9 0.99 9.78 8.49	23 2.53 25.00 20.35	40 4.40 43.48 34.78	0 0.00 0.00 0.00	7 0.77 7.61 5.98	92 10.12
Fire Officer Failed to Complete Report	1 0.11 2.17 0.93	15 1.65 32.61 12.82	2 0.22 4.35 1.77	2 0.22 4.35 1.89	13 1.43 28.26 11.50	11 1.21 23.91 9.57	0 0.00 0.00 0.00	2 0.22 4.35 1.71	46 5.06

Another indicator of quality control needs in initial documentation can be found in the number of incidents in which the fire officer fails to complete the incident report as required by local procedures. Here, too, the smaller cities (City 57, 60, and 44) apparently experience more problems than their larger counterparts. The three smaller cities accounted for 56.5% of the failures to complete incident reports. The one large city, 24, that had 15 failures, despite an excellent editing procedure, suggests lack of command interest in full fire documentation.

The following accounts are abstracted from more detailed accounts of each system's reporting practices to show special situations, factors, or inter-relationships observed in each city.

Fire Incident Classification, Recording, and Reporting Practices in City 87.

By statute, the State Fire Marshal must be provided with a complete report of every fire within one week after its occurrence. As a matter of routine, the State Fire Marshal's Office contacts the department after 30 days if incident reports have not been filed. While this and other aspects of the law are not rigidly enforced, the law is the basis for the fire incident reporting system, and it is under statute that the State Fire Marshal's Office developed one of the earliest statewide fire incident reporting systems.

The Fire Department's general order calls for either the company officer in charge or the district chief to prepare a fire report (a modified 902 F

"It is recognized that the reporting officer, in most cases, will not have definite information on each cause factor, but he should give the best opinion he can based on what information he has at the time of reporting."

All too often, the importance of this expectation is not sufficiently emphasized. The result is that fire officers often operate out of the fear of being wrong about a fire's cause; operate over-cautiously by not committing to the most likely cause; or maintain an exaggerated fear that some day, some lawyer will make them appear ridiculous in court. It appears that it can never be over-emphasized that all fire cause determinations are subject to revision, even as all scientific inquiry has to be regarded as provisional pending additional information.

The 902 Incident Reports are to be completed as soon as the fire company returns to quarters, and, at the latest, before going off shift. It is the usual practice for fire incident reports to be completed by company grade officers, then routed to battalion headquarters to be checked for accuracy and completeness by the Battalion Chief. In multi-alarm cases, the District Chief may prepare the incident report. Reports should then be forwarded to the Fire Marshal's Office within 72 hours after the fire. The Fire Investigation Unit's secretary checks the reports for accuracy on an "as available" basis. The report receives final review by the Chief Fire Investigator prior to being sent to the state for keypunching and analysis.

If the officer in charge at the fire scene feels that the fire is accidental, he will complete the form to the best of his knowledge. (A simplified coding reference manual is provided.) If the fire investigation is still pending, the company officer is to leave the fire cause and origin data blank. The report is then routed to the investigator who responded to that fire. The investigator fills in or corrects entries as appropriate for the cause and origin. Once completed, the form is submitted to the Chief Investigator for final review before submission to the State Fire Marshal's Office. Fire investigators termed the procedure one that is rigidly enforced.

Indeed, the Chief Investigator emphasized his concern for the high degree of quality control. This is an exemplary attitude that is unfortunately all too often missing in other jurisdictions visited. In part, fire incident recording and reporting is more of a tradition in this state than many others visited. The importance of personal commitment and personal contact should not, however, be underestimated. In terms of efficiency, if sufficiently high quality clerical personnel could be groomed for the routine editing function, this might free up the Chief Investigator to reallocate his time to work on other aspects of his job responsibilities.

Form) after all fires. Instructions for completing the form point out the importance of accurate fire cause determination to "meaningful evaluation of fire cause." The instructions go on to emphasize that,

Total processing time for the incident reports to flow through this system and reach the Chief Investigator's desk can run four weeks. This means that any review is primarily for administrative, and not investigative, purposes. Other cities appear to exert considerable effort to insure that fire incident reports are reviewed the following morning by fire investigators. The justification for this overnight transmittal procedure has been that fire investigators could review the reports and, if they decided an investigation was necessary after all, could get out to the scene before (Michigan vs. Tyler) the loss of the fire scene made follow-up a futile exercise.

The Chief Investigator considers this one of the most serious problems. Several "horror stories" were related that highlighted the problem of relying on a slow paper trail to try to learn about fires that had been misdiagnosed as accidental by either suppression personnel or investigators. Different call-out procedures or better training of initial cause determiners tend to be the only cure for this problem, as fire scene control is usually broken and, therefore, the ability to establish deliberate and malicious fire setting by a particular individual is more difficult.

For this reason, some cities (e.g., City 33) require fire incident reports to be available for review by the fire investigation section the next morning. In City 87's case, such follow-up would not be feasible. It is unrealistic to rely on this procedure to detect and correct defects in fire cause and origin determinations by field personnel after the fact-morning-after visits to fire scenes offer far less for prospects of successful prosecutions.

Fire Incident Classification, Recording, and Reporting Practices in City 33.

City 33, as part of one of the statewide fire information systems, uses the standard 902 F format for its fire incident forms and the associated 1976 edition of the 901 Coding System. The department has modified the standard 902 F by adding a remarks section at the bottom of the form to facilitate typed comments.

As one of the earliest of the statewide reporting systems, we could expect that City 33's system has been in operation long enough to be mature to the point that acceptable levels of quality control are in place. Indeed, City 33 practices quality control checks, such as editing and updating fire investigation data. In this regard, they have a control check system of equivalent quality to that in City 87.

Editing and updating of the 902 F Form is performed by the clerical staff in the Fire Prevention Unit. The already low rate of undetermined fire cause reports (only 69 in 1979, fewer in earlier years) was reduced during this editing phase (to 12). Other cities misuse the term "undetermined" and its codes (00, 90, or 99) to mean "under investigation" and then compound the problem that this creates by not later updating the cause when known. City 33's fire officers appear to use the term more appropriately than some of the other jurisdictions we have visited, but, as importantly, the Fire Prevention staff then updates cause code when an investigator later determines a fire's cause.

The fire incident reporting system is used primarily to describe the department's workload for budgetary and annual reporting purposes. The department's annual report contains far more useful and detailed statistical data than most department reports.

Fire Incident Classification, Recording, and Reporting Practices in City 44.

In 1974, City 44 adopted the 901 Coding System. Despite this relatively early adoption of the system (or perhaps because of it), the fire department deviates in a number of important respects:

Standard 901 reporting practices call for officers to use short phrases to summarize each data element and to then select the appropriate code that most closely corresponds to their narrative expression. City 44 varies from this practice by requiring officers to leave blank the narrative spaces next to the coding blocks. Instead, the officers type an extremely brief narrative on the back of each incident form, summarizing the action taken, \$ loss, and other notes. This practice makes both edit and review of the documents far more difficult because the number codes are not accompanied by a phrase or word.

As in other jurisdictions, there appears to be no rigorous editing procedure to root out miscodings. As a matter of practice, the Fire Prevention Division staff conducts a limited edit of the incident reports. If, for example, a code field is initially left blank pending completion of an investigation or requires revision due to investigative findings, the Fire Prevention staff will fill in the missing data elements or correct the fire officer's initial codes. Despite this editing procedure, several incorrect reporting practices were found, including:

> substantial variation in the use of terms such as "suspicious." Often the term "suspicious" and its associated code, 21, are used interchangeably with the term "incendiary." Even though the officer may clearly indicate that multiple sets were found, he may use Code 21, denoting a suspicious fire as the ignition factor.

The term and code for "undetermined" are rarely used; on average, only once in a hundred fire reports. No doubt this is due to the fact that the locallyprepared coding handbook does not mention this term. Officers have to refer to a station copy of the 901 Pamphlet to look up a code to cover a fire with two or more equi-potential accidental causes.

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Once the reports are edited, data is entered into a minicomputer system that belongs to another city department some blocks away. Because the computer is somewhat dated and belongs to another department, both the utility and versatility of the system are restricted. As a result, Fire Prevention staff maintains many manual logs for entering running totals of losses and breakdowns of incidents by type, property, etc.

> the fire department has not updated its system to the current edition of the 901 Code.

. As in City 60, the code for incendiary, 11, was used to describe a controlled burn situation for which no fire incident report, Part II, should have been completed.

 Two instances of fire incident reports coding the action taken as "extinguishment" when the fire was out on arrival or no fire actually occured.

Note: Fire Incident reports are filed by census tract and date. Each station maintains its own incident numbering system. Maintaining data by census tract might be worth the extra trouble caused retrieving the data, if this is the only way the department can manually sort and retrieve the information and good use is made of the census tract as a fire management area. This method of referencing fire incidents makes it both difficult to retrieve and far easier to misplace fire reports. With automatic data processing, this incident numbering system becomes obsolescent.

Fire Incident Classification, Recording, and Reporting Practices in City 24.

Standard departmental procedure calls for fire company officers to fill out fire incident reports. The report format is the 902 F series form. Editors check forms for coding errors and omissions and either return for correction or correct errors, themselves.

The fire captain in charge of the fire records system has made a standing offer to teach correct fire cause reporting procedures to any station or battalion requesting this assistance. Through such efforts, the initial fire incident records have improved, but not to a point that satisfies the fire captain responsible for data management. Stronger command emphasis and the conversion to an in-house fire department computer data base were believed by this officer to upgrade quality. At present, the fire department uses the Uniform Fire Information Reporting System (UFIRS) to analyze and format data.

Fire cause and origin supplements from investigators are used to update information supplied by fire suppression officers. Like City 87, updating is the rule rather than the exception in City 24. Nevertheless, stronger supervisorial emphasis could further improve accuracy and report timeliness.

The next report filed on the fire would be made following the fire cause investigation. Investigators first write up initial reports. Standard police complaint reports are initiated when arson or other crimes are detected. Reports are dictated and then transcribed and reviewed. Cases requiring further documentation have supplementary reports completed on them. While City 24's Fire Depart terminology, some investigators of definition between fires classifi "Undetermined" is used in some in (the investigator) take on the cl cause and origin on a troublesome used both in the sense of not bet still under investigation and the investigation. The head of the arson unit mined and unknown fire classification chiefs in fire cause and origin. In critiquing the quality of investigator described the proble aren't able to put a cause to the incorrect determination." He we feels it is to overcome this finiinvestigators face hurry-up condbefore starting out - perhaps act

In critiquing the quality of the initial investigation, one investigator described the problem as "alot of the [battalion] chiefs aren't able to put a cause to the fire or blow it and make an incorrect determination." He went on to point out how difficult he feels it is to overcome this initial setback--how, "the night investigators face hurry-up conditions to complete one investigation before starting out - perhaps across town - to begin another. When to top everything, the car breaks down for the umpteenth time, my morale hits bottom. The Battalion Chief and the fire crew don't know our problems. They just want to turn the fire over to us and go home." In this officer's opinion, better training of battalion chiefs is a top priority for cutting down on the undetermined and mis-determined fires. Only the department's senior management could make the changes.

In support of the hypothesis that initial cause determination requires improvement, the following instances were cited. On several occasions, private investigators/adjusters have embarassed the department by pointing out obviously "blown" cause determinations:

> In one instance, the battalion chief labeled the cause as "lightning" when the floor had classical flammable liquid charring.

A cellotex ceiling was completely consumed and other evidence overwhelmingly pointed to a flammable liquid accelerated fire, yet an accidental cause was determined by an investigator. The next day a routine check by an untrained insurance adjuster made him challenge the fire investigator's account. Upon checking, the supervisor found the cause was obviously non-accidental.

 Evidence of hastily-investigated fires - we found that fire reports failed to give owner's name or other basic data.

One way to discourage such incompetent performance would be random spotchecks of fire determinations, automatically performed to silence complaints that a particular shift or individual is being picked on.

While City 24's Fire Department had adopted the standard 901 terminology, some investigators did not understand the distinction in definition between fires classified as incendiary and suspicious. "Undetermined" is used in some instances because it lets someone else (the investigator) take on the chore and responsibility of determining cause and origin on a troublesome scene. The term "undetermined" is used both in the sense of not being fully ascertained as to cause and still under investigation and the sense of not determined even after

The head of the arson unit attributed the decline in undetermined and unknown fire classifications to the training given battalion chiefs in fire cause and origin.

A series of graduated disciplinary steps could be developed to emphasize command's firm determination that fire officers exercise reasonable prudence and competence in one of their most important job functions. Initial warnings could be followed by formal letters of reprimand and finally disciplinary proceeding for flagrant violation of standard procedures.

Fire Incident Classification, Recording, and Reporting Practices in City 57.

The statewide fire incident reporting system utilized in City 57 began in 1976. This system is run by the State Police, as they have Fire Marshal powers. A modified "902 F" Form is completed by the officer and then sent to the Fire Marshal's Office for review. The statewide staff has provided some first-rate support to system users in terms of training classes, simplified coding manuals, improved 902 F Forms, and informative annual reports.

Notwithstanding this excellent support, quality control must be a local capability, as well as a state agency concern. For example, the state fire incident reporting clearinghouse sent back printouts of the results of edit routine to City 57 and other reporting jurisdictions. These routines are designed to catch only the most data inconsistencies or missing values. In City 57, the Fire Marshal first attempted to clip out the error code queries by incident to send to the reporting officer to correct. This procedure met with little response, due, in part, to the lack of effective command support. Now, corrections are made by the Fire Marshal's secretary and returned to the State. The secretary sends a copy of the original incident report, with the entries or errors circled in red, to the reporting officer. As a follow-up to a major error (one example cited was reporting an obvious arson fire as accidental-electrical), the Fire Marshal may choose to discuss the error with the reporting officer. These are laudable efforts and are especially creditable considering the severe economic constraints under which the municipality must operate. At the same time, the quality controllers have shown that they need greater knowledge of the reporting system procedures. To cite only one example, the Fire Marshal's staff did not know the correct procedure for amending the basic 902 F Fire Incident Reporting Form.

The Fire Marshal has also stressed to field officers that he would prefer, "if they aren't certain (about the cause), to put down undetermined." This guidance would tend to push up the number of undetermined, while holding down the number of initial fires classified as suspicious or incendiary. The Fire Marshal's primary concern was to halt the previous practice of "putting down anything." His lack of familiarity with the system probably accounts for the well-intentioned substitution of this lesser evil for the former. However, the available data does not show that this request has altered the number of fires classified as undetermined. The absolute number of undetermined fires during the 1977-1979 period held fairly constant. The relative percentage of undetermined fires, after moving from 4.3% in 1977 to 3.9% in 1978, moved back up to 4.9% in 1979. The Fire Marshal assumed office in 1979, but the one per cent increase could be due to random fluctuation. Fire Incident Classification, Recording, and Reporting Practices in City 70.

City 70 is singular in this study in that it has yet to adopt the 901 coding system and its associated 902 fire incident form. The trouble involved in overhauling the present system, as well as the concern that the 901 would increase the paperwork effort, were two reasons cited by senior fire officials for not making the changeover. Even when the State Fire Marshal's Office adopted the system, the department elected to report only on a selective basis.

The nearest equivalent to the 902 F Form is City 70's "Record of Fire." The form is completed by a battalion chief upon return to quarters after each fire. The fire investigation unit which responds to a high percentage of working fires supplements this line with at least one, and as many as eight, independent records of the incident. Six of the reports are card-sized cross reference aids for duration of fire, owner-occupant, suspect, witness, etc. This investigative documentation set effectively supplements the incident "report of fire," and as a locally-developed system refined over more than 40 years, has proven to be an extremely capable manual system.

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Engine company personnel are instructed to determine self-evident, simple-to-detect-cause fires; for example, when the only item involved is a TV set that has obviously had an electrical failure. Investigators say that, in the main, compliance has been good. This instruction may be ignored in certain instances; for example, fires in vacant structures and minor fires that appear incendiary, but would entail a considerable wait for an investigator to arrive on scene, were written off as accidental.

Despite these "marginal calls," investigators felt that the situation as a whole had improved significantly since 1975. Before 1976, investigators were on call from home. And, because delays at night were so long, and command emphasis was not being tuned to arson as a priority, fire officers on the scene were likely to discretely develop a cause for a fire at night that did not require a wait for an investigator.

City 70's number of undetermined fires has dropped from 432 in 1977 and 407 in 1978 to 0 in 1979. Incendiary fires have doubled and suspicious fires have risen. The development of 24-hour staffing, increased training, and fire fighter support were believed by investigators to play a role in this improvement in cause identification and arson detection. It is likely that the reduction to zero in the number of undetermined fires is due to arbitrary reclassifications.

While strides had been made, a day-long orientation program for fire suppression officers was planned to continue the improvement of fire suppression crews and arson detection.

Fire Incident Classification, Recording, and Reporting Practices in City 60.

It is interesting to note that interviewees in City 60 attributed real improvements in arson detection to the adoption of the 901 reporting

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system because it forced fire officers to make fine distinctions in specifying the form of heat of ignition, the type of material ignited, and the causative ignition factor, among other factors. By necessity, fire officers were pressured by the paperwork to more thoroughly and logically reconstruct the fire's cause and origin. Despite this progress, it should be noted that for the period under study, City 60's frequency of miscodes was 65% higher than the next highest city and three times the average.

Training preceded the initiation of the original 901 coding system. Once again, in 1979 when a revised coding routine was adopted, firefighters and officers received in-service training on coding the incident forms. Despite this training, in a sample of 100 incidents, a 40% coding error on ignition factor classification was noted. It should be pointed out that here, as in other fire departments, there is no certification or proficiency standard that must be passed before an individual begins completing fire incident reports.

While mistakes in completing reports will only occasionally affect the initiation or outcome of an investigation or even a trial, cumulatively they can skew and distort data analysis and interpretation. While City 60 had the highest percentage of miscodes, the kinds of miscodes proved typical of those found in our review of other sites and are, therefore, offered as representative of common miscoding errors.

The most commonly occurring miscodes in the sample of 100 retrospective cases reviewed were:

> 8 instances of coding a fire's ignition factor as (21) suspicious when the fire was known to be of incendiary origin

13 instances of reporting fires as either suspicious (8) or incendiary (5) when, in fact, a hostile fire report should not have been completed as the fires were controlled burns

5 instances of coding a fire undetermined when the fire was known to be suspicious - in other words, the exact factor was not known, but the circumstances in some respects appeared suspicious.

The following miscodings and inconsistencies were observed in the sample.

Ignition Factor listed as:

- Undetermined, when cause of a wood chip pile fire was known to be spontaneous combustion
- 90 insufficient info (2 cases) when fire clearly suspicious
- Undetermined (Code 90) when careless smoking thought to be cause

Incendiary when fire, in fact, was a controlled burn and, therefore, should not (by 901 Coding Procedure) have had a fire section completed on the Incident Report, as they were service

Short circuit (54) when incident later determined arson for profit Insufficient information 90 (\$130,000 loss) although fire "looked

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Children playing with matches (should be 36), but incorrectly

21 suspicious, when clearly incendiary fire with four separate sets in a vacant dwelling (2nd case had two separate points of origin and same coding)

2 vehicle fires with identical fire causes: backfiring through carburetor; one coded 59 (carb malfunction), one 51 (part failure).

Suspicious when cause clearly incendiary (leaf piles set on fire

Suspicious when car vandalized and set on fire

Coded as 21 suspicious when fire officer reported two separate

Coded as 21 suspicious when fire set in two places in a vacant house with disconnected utilities

Incendiary, yet presence of smoking materials might mean fire accidental or suspicious; no justification for incendiary

Incendiary, yet officer suggests children with matches

46 combustibles too close - should, by narrative, have been coded

Undetermined 99, yet fire suspected to be incendiary

Undetermined 99, yet described as suspicious rubbish fire

Intentional burning as 99 when, in fact, should not have had a fire incident report completed on this service call

21 suspicious, yet officer reported in narrative that the fire was intentionally set

The Undetermined Fire Cause "Problem" - the question raised by the question answered.

Beyond the necessity to maintain some record of the fire incident for official records and the public's information, the fire service has the option to use incident documentation to improve and measure its performance. During the last decade, the groundwork has been laid for developing incident reporting and analysis systems that fire managers can use on local, state, and national levels. Leading fire departments in this field have just begun to demonstrate the power of units that can utilize fire incident, arson information systems, law enforcement and insurance industry data bases to detect and clear arson incidents. Behind the leaders, the rest of the field is hampered by what seems to be a "chicken or the egg" problem - before fire incident data bases can be fully utilized, fire service managers must have confidence in their accuracy and utility, but the accuracy tends to come only when the managers use their clout to get accurate data input from the field reports.

The problem is perhaps best captured in the "undetermined" fire problem. Fires reported as being of undetermined cause frustrate fire managers at all levels. What does their relative high frequency in large loss fires and those involving serious injury or death mean? Are these fires, in fact, arson or are they declared undetermined due to such a high degree of destruction that any evidence is lost or trapped in debris so that the cause cannot be determined or is beyond the present competency level of most investigators today. At stake in resolving this question at all levels of government are investment decisions that may greatly affect the campaign against arson.

As it turns out, the answer for cities over 100,000 is not in the fires, but in the files. In the experience of the research team, in most cases the undetermined fire is a fire whose cause is determined through fire investigation. Thus, a determination is likely to be made, but in many jurisdictions, there is no reliable mechanism by which the original fire report is updated from undetermined to the cause ascertained by the investigator.

How big this problem is depends on local policy regarding the use of "undetermined" as a cause code. Some jurisdictions make it a standard practice for fire officers to record the cause as undetermined if they called an investigator to the scene. The result is an exceptionally high percentage of fires initially termed undetermined. In 1978, the undetermined cause was routinely used in 37.6% of all reported fires in City 24. At the other extreme, some cities (e.g., City 44) omit undetermined cause from their list of acceptable codes; hence, their reported rate approaches zero. Cities in between these two extremes that

Less-noticed problems exist in the way in which the study cities abuse codes like "children playing with matches," the use of the term "suspicious" when the situation clearly calls for "incendiary," and the use of "incendiary fire" when the fire is a non-hostile violation of open burning laws for rubbish, leaves, etc. Like the undetermined cause problems, these problems are products of a lack of training, understanding, and quality control in the classification process, rather than the determination process. Solve these problems and the problems associated with intentional and unintentional coding abuses will shrink dramatically.

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If, as the "undetermined fire cause problem" indicates, fire departemnts need to review their documentation procedures, questions they mgiht beginw ith include:

(1)Cities that report no undetermined cause fire can be suspected of unduly forcing their cause determiners to "come up with" a cause to fit policy more than reality. This practice was justified by one chief investigator as, "better a little fudge than a whole lot of sludge." (As a temporary forcing policy, it has some valididy when more direct quality control improvements in cause classification are not practical.)

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adhere reasonably close to 901 coding protocol and updating procedures seem to have little trouble keeping their undetermined cause rate to tolerable levels of from 3% to less than 1%.

Left unsolved, these problems will continue to daunt the use of initial fire incident data for management studies.

Some Quality Control Options

. are standard procedures for cause classification and reporting complete, and in accord with state and national protocols?

do practices conform with these procedures?

can fire officers resort to state or locally promulgated references and do they have access to qualified assistance when a question arises about proper coding?

are quality control measures in place, what types of errors are they catching and/or missing?

does the editing process have a fail-safe set of procedures to insure that cause determination updates and other changes to the initial incident report are made and forwarded to state data collection agencies? What is the frequency rate and trends for undetermined fires? Does the rate permit acceptable interpretation of the nature of the fire causes in the community or is the question mark it leaves too large to permit useful interpretation?

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do battalion chiefs play an active role in the quality control process? Are they adequately trained to assist the command in acquiring <u>accurate</u>, valid, and reliable data about fires?

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- . Is the data used by management for planning, master planning, budget and MBO evaluation? If not, why not? (Is it due to error rate, lack of computer responsiveness, flexibility of access, command apathy and lack of familiarity with potential uses, lack of city management demand, etc.?)
- Are training, orientation, and in-service refresher courses given to those reporting and interpreting data? Are personnel proficiency-tested and qualified to code and edit data? Is fire reporting an element of promotional examinations for combat personnel?

. Will command enforce quality control improvements?



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