OUT OF THE LINE OF FIRE

Risk-based Assessment for the U.K. Fire Service

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Part I – Introduction

The British Fire Service has always been proud of its tradition and heritage. This stems from their conglomeration prior to the Fire Services Act 1947 (This act transferred the National Fire Service to fire brigades maintained by County Councils and County Boroughs). Today, we can see these traditions run strong with strict standards (regulating size, speed, equipment and equipment location) for fire appliances and the British Fire Service College (BFSC). The BFSC was set up as the national training center that all firefighters and officers must attend before taking their position at brigade. These similarities between individual brigades allow for national standards to be created and enforced with relative ease. However, recently the British Fire Service has come under fire.

Much of the legislation and risk assessment techniques used by the fire service is currently under speculation for being out of date as well as not conforming to the modern standards set up by the European Union. Several agencies such as the Home Office, the BFSC, and Audit Commission have come forward to help establish suitable regulations which would satisfy the European Union's guidelines, as well as improve firefighter safety. There are three areas of particular interest in regard to the development of risk assessment: workplace safety, fire safety/standards of cover, and firefighting operations.

Professor Fitzgerald teaches courses in Fire Protection Engineering at Worcester Polytechnic Institute where he implements an engineering based system to calculate risk analysis (see Part III). Through colleagues at the BFSC in Moreton-in-Marsh, England, Professor Fitzgerald's "method" is being taught as a possible new means of assessing the risk of buildings in the United Kingdom. Presently the United Kingdom has risk assessment methods, which vary from brigade to brigade and have little to no standard uniformity. With a growing concern for firefighter safety along with a growing pressure from the European Union, England, Scotland, and Wales have to reform their methods of risk assessment. While keeping in touch with the BFSC, Professor Fitzgerald learned of new legislative changes, which were in the

process of becoming effective in the United Kingdom. Considering all of the changes that are now taking place, Professor Fitzgerald suggested that a group of students could investigate exactly what was transpiring within the British Fire Service. As a result an IQP was created with the goal of finding out what caused the need for change and how the agencies were going about this change.

A preliminary survey was started of subject matter on the British Fire Service and surrounding legislation. Not enough information available here in the United States for a complete investigation. A research trip was planned to the British Islands. The project was then broken down into three parts: a literature reviews, the research trip to England, and the compilation of information and writing of the paper.

Our literature review began with *The Development and Trial of a Risk Assessment Toolkit for the United Kingdom Fire Service*, given to us by the BFSC through Professor Fitzgerald. This report explains the work undertaken by Entec UK Ltd for the Joint Committee on the Audit Commission Report (JCACR) (see Part II). This report begins by explaining the history of the national fire cover standards and the risk categorization system. It then explains the Audit Commission's report *In the Line of Fire* and the conclusion that, "although the fire service responds vigorously within the context of the existing national framework to these considerable challenges, a more effective response is constrained by a number of aspects of the framework (explained later in this chapter)." The Entec Report continues to provide a summary of the principles applied to the assessment of risk levels and defines the criteria used for the trial project. It goes on to explain the relationship between emergency response time and the rate of fatality in a fire. From this information, it illustrates the development of the toolkits and how the risk levels relate to the rate of fire casualties. There is also a brief explanation of why certain brigades were being considered for future trials.

From this initial report, additional pertinent reports and information was investigated. Libraries and fire related agencies located within the United States were queried. Little applicable information was available. An in-depth search of the internet produced substantial amount of information. However, during

this legislation search only information that came from reliable sources, such as the Home Office, Firenet, and BFSC web pages, were used. Also much of the information was, in fact, tidbits from the JCACR's (Joint Committee on the Audit Commissions Report) *Out of the Line of Fire*. The best way to explain this particular document is to excerpt the Executive Summary: — here everything from 3 – 10 a direct quote excerpt??

"PLANNING FIRE COVER

Fire creates a risk to life and to property. This risk can be reduced by taking fire safety measures to avoid fire or, in the event of a fire, to mitigate its effects. But we must also reduce the consequences of fire by effective fire fighting intervention. In practice, the bulk of fires can be extinguished by a relatively modest firefighting force, if it is adequately equipped and quick to intervene. Fire cover aims to provide such firefighting intervention.

Planning fire cover therefore has three elements:

-assessing risk,

-reducing risk through fire safety measures, and

-providing firefighting response for the remaining risk.

Accordingly, when we, the members of the JCACR, set out to review fire cover as it is currently provided by the fire service, our work had three themes:

-Risk Assessment

-Fire Safety

-Response Options

These are discussed below.

RISK ASSESSMENT

The current standards of fire cover assess the risk from fire in a given area from a survey of the property to be found there. The Audit Commission pointed out the weaknesses of such an approach; that it

does not adequately take account of the presence of people and their activities. For example, the risk to life may be higher in office property during the day than it is at night. It recommended that fire cover be based on a direct assessment of risk and that research should be carried out to establish how this might be done in practice.

The work we commissioned found that:

-a developed and evaluated risk assessment can be used successfully as the basis of planning fire cover. (Risk assessment was carried out using a number of 'toolkits' developed specially for the purpose.)

-the risk assessment approach can also be applied to special service attendances.

-planning fire cover on the basis of risk assessment may be no more difficult or expensive than using the current standards of fire cover and can be carried out by serving fire officers.

Additionally:

-Both individual and societal risk were taken into account within the toolkits in considering life risk, as was the risk to property.

-A relationship between the risk of death by fire and response time was derived.

We adhere to the overall principle that the new approach should not increase the risk to the public from fire, and that if possible it should reduce risk. Accordingly, we propose that:

-risk to life from fire should be categorized nationally into three regions: intolerable (where risk is so high that society demands new regulations, or emergency cover, regardless of the cost), tolerable (where risk should be reduced 'as low as reasonably practicable' (ALARP)), and negligible.

-The upper limit of tolerability should not be set beyond the highest level of risk currently tolerated by a group of people within society.

-The lower limit of tolerability defines the level below, which would be considered negligible. In other sectors, a risk of death below 1 in 1,000,000 per person per year has been regarded as negligible. (To date no regions have been found where risk in the home was negligible on the basis of this criterion.)

Note: The levels chosen for the upper and lower limits of tolerability not only define the levels of protection afforded to the public, but are also major determinants of the cost of the risk based system

-Within the region of tolerable risk, it would be necessary to drive down the risk as low as reasonably practicable (ALARP). In practice, the ALARP criterion is usually taken to mean that risk must be reduced if this can be achieved cost effectively.

-In recognition of the high proportions of special service calls relative to fire calls, we believe that cover should be provided for those special services where there is a significant risk of harm , and should also be based on the likely risk to life.

-If fire cover is to be based upon risk assessment, the level of risk from fire that society is prepared to tolerate must be defined. The task of fire service will then be, first, to ensure that this level is not exceeded, secondly, to drive down the risk from fire where this can be achieved cost-effectively. We think that the setting of national risk levels should be considered further in the light of more extensive brigade assessments of risk in their respective areas, not least because of the as yet unquantified cost implications. It is vital to get this right before changes are made so that the protection and safety of the public is maintained.

-Brigades will have to establish systems, which are capable of continuously capturing risk information in order that performance can be measured and assurance be given that adequate levels of public protection are being achieved.

United Kingdom:- It is important to recognize the contribution already made by the application of comprehensive fire safety legislation to reduce of the risk of death and injury from fire, although there remains scope for rationalization and simplification. The recommendation by the Audit Commission that the fire service should place more emphasis on fire safety in order that less effort would be absorbed by firefighting was made against that background and seeks additional effort, not merely re-direction of existing fire safety activity.

The committee has relied heavily on the work the Community Fire Safety Task Force to inform it about the potential for using fire safety measures to reduce the risk to life and domestic property. The task force has recommended, amongst other, that a central body should be set up to identify and assess the effectiveness of various fire safety measures that could be implemented by the fire service. Such a source of proven ideas would be of great use to individual brigades when attempting to reduce risk, especially in those circumstances where response along was insufficient to reduce risk to tolerable levels. The brigade trials suggested that brigades could benefit from a wider repertoire of fire safety measures on which to draw beyond their fire education programs for schools.

Overseas:- A short questionnaire was sent to 13 other developed countries in order to establish their respective national policies relating to the use of fire safety measures to reduce the reliance of brigades on firefighting as a means of providing public protection.

In summary the findings were:

-The majority of firefighting is carried out by local authority fire services, mainly locally funded with some additional resources from insurers and central government. Approximate expenditure on fire service per capita of the population ranges from approximately 10 to 100 pounds sterling.

-A maximum of 10% of funds are spent on fire safety and the basis for this expenditure is predominately 'customs and practice'.

-Little research has been carried out on the cost effectiveness of fire safety versus firefighting and where information is available internationally it is not necessarily applicable locally.

RESPONSE OPTIONS

The Audit Commission criticized the current standards of fire cover on the grounds that under some circumstances they required an inappropriate first attendance by the fire service in response to a call for assistance. For example, the response required to a large office block outside working hours, when most of the normal occupants would not be present, was the same as during the daytime when the building would be fully occupied. Clearly, such a state of affairs is not ideal and would not arise if fire cover was related more closely to actual risk.

When planning fire cover, a firefighting response must be provided which meets the local risk. This means that more firefighting resources will be required when there is a high risk of fire than when the risk is low. However, a house fire, say, in a low risk area requires similar firefighting resources to a house fire in a high risk area, which tends to mean in practice that where risk is low the firefighting resources required for a given weight of firefighting intervention will have to cover a greater geographical area than when they are high. In such circumstances, whilst the weight of response for a given type of fire will remain the same, response times will tend to be longer in low risk areas. Two factors must therefore be considered: Weight and type of response and time to respond.

The weight and type of response will depend on the kind of fire likely to be encountered, whilst the response time will depend upon the availability of resources and their disposition relative to the fire. However, these two factors are not independent, since longer response times give greater opportunity for fire to develop.

If longer response times are envisaged, the weight and type of response planned must be adjusted

accordingly, to ensure that firefighter safety is not compromised.

In order to plan a suitable weight and type of response for fire cover purposes, it is necessary to make a judgement about the size and nature of the worst fire for which fire cover is to be planned (the worst case planning scenario') Professional judgement and local knowledge are required to decide the appropriate worst case planning scenario for a particular area.

In order to assess the personnel and equipment needed to deal successfully with a given scenario a comprehensive categorization of all fire and rescue scenarios dealt with by the fire service was undertaken and for each scenario a task analysis was carried out. For each task identified, the personnel and equipment requirements were listed. Then by reference to the task, personnel and equipment lists it was possible to assess the resources necessary to deal with any scenario. (When assessing overall resource requirements, it was necessary to use professional judgement in order to allow for parallel and serial task activity. Tasks carried out in parallel require the sum of their individual resource; tasks carried out serially offer the possibility of re-using existing resources.) It is recommended that the scenario, task and resource information, which is voluminous, should be assembled into a computer database for ease of reference.

We propose that under the revised arrangements for fire cover, brigades should be able to plan a flexible response which they will decide by considering the relevant worst case planning scenarios for the area in question. Therefore, when planning a specific response requirements for a particular area, the chosen worst case planning scenario will determine the overall weight of attack (by reference to the scenario, task and resource database). Knowledge of the local rate of incidence of fire allows an appropriate response time to be determined (using the risk/response time relationship) in order that risk can be held within the tolerable risk (ALARP) region. In some cases, even the fastest response will be insufficient to achieve a tolerable risk. In such circumstances risk must also be reduced by the used of safety measures.

In summary:

-A comprehensive catalogue of firefighting and rescue scenarios has been developed.

-For each scenario a task analysis has been carried out.

-Fore each task the personnel and equipment requirements have been identified and recorded.

-Professional judgement has been used to take account of parallel and serial tasks in assessing the overall personnel and equipment requirements for each scenario.

-The scenario, task and resource information, if incorporated into a computer database, could form the basis of planning flexible response to specific firefighting and rescue scenarios.

-The study of transport requirements fore personnel and equipment has been deferred until later stage when some experience has been accumulated of operating a flexible response system.

Out of the Line of Fire was the official response to the Audit Commission's *In the Line of Fire*.

COSTING

There is no direct relationship between the current standards of fire cover and the proposed risk based approach. First, it is not clear what the risk 'map' will look like when brigades have assessed the variation of risk across their respective areas. Secondly, until the national upper limit of tolerability of risk has been decided, the cost implication for the fire service cannot be fully addressed. A further complication is the proposed freedom of brigades to decide how they will respond to particular risks (flexible response), since this will also potentially affect costs, although the need to follow national safe procedures (defined in the task database) is likely to curtail the potential range of responses to a given scenario.

Whilst the brigade trials of the risk assessment toolkits indicated that the cast of carrying out risk assessment was unlikely to be greater that the cost of implementing the existing standards of fire cover, and might in some cases be less, nevertheless the sample size was too limited to provide a reliable estimate of cost for implementing the new system.

Overall, therefore, it is not possible to draw any firm conclusions about the likely cost of national

implementation of a risk based approach to fire cover. However, there is evidence that existing resources are not being targeted most efficiently with respect to the risk to life. The adoption of more flexible methods of working should allow current levels of fire cover to be provided more cost effectively (and its cost to be driven down, therefore) by matching response to risk more closely than is possible under the present standards.

WAY AHEAD

With our support the Home Office is pressing ahead with arrangements for a series of Pathfinder trials of the proposed scheme to be implemented in a representative number of brigades, so as to predict more reliably the financial and operational consequences of implementing the system nationally."

The *Out of the line of fire* was written to retort the Audit Commission's *In the Line of Fire* report. However, this document was published in 1995 and was not available in electronic form. We had to wait until we reached the BFSC's extensive library to find a hard copy to read. In this report, the Audit Commission "indicated the current national framework and risk categorization system: -placed insufficient emphasis on fire prevention, ignored time related variations in occupation of buildings, such that a building with 1000 occupants is awarded the same risk category as an empty building, -does not take account of demographic factors, -does not allow for the extent to which fire safety precautions are incorporated into buildings, and –response standards are based on precedent rather than research." These deficiencies found by the Audit Commission were all addressed in JCAFCR's retort.

After going to the Fire Service College, we found that all the initial documentation was out of date. Problems and events that we read about during D-term, already had solutions by the time we read about them. The other problem we faced was the fact that no matter how much material there was to read and digest, there was no one source that could answer the many questions that arose or settle a matter of

conflicting interpretation. These reasons reinforced the need to travel to England to discuss with fire officials there, their ideas of risk assessment and what is in store for the future.

We decided a month long trip to England was planned that would allow us enough time to gather all the information needed to write this report. Arrangements were made with the BFSC and with brigades to interview. Two weeks was spent at the college researching their library and interviewing their staff. An additional two weeks of touring and interviewing provided sufficient time to meet with the brigades and understand regional local interpretations and practices.

The timing of this project was very critical since the new legislation had been passed. However, all of the bugs were still being worked out of the system. If the project had been completed in the months prior to the legislation change, no reactions would be available for us to write about. On the other hand, if the project were completed after the dust had settled there would have been nothing noteworthy to write about. The timing of this trip couldn't have been better, since several brigades had been working out their own systems of risk assessment in accordance to the new codes.

We arrived at the BFSC on May 10th, 1999. The first week was spent reading everything available pertaining to the changes in legislation and the risk assessment movement. A number of interviews were held with staff members of the college. These interviews allowed us to focus our search parameters, which led to subject matter that would otherwise have been missed. The politics involved in the recent legislation shifts would not have been understood with out the layman explanations given to us by staff members.

During the following two weeks, we were given the opportunity to meet with many fire officers involved with risk assessment through out England, Wales, and Scotland. We chose South Wales, Kent, West Midlands, North Yorkshire, Lothian and Borders, and Strathclyde Fire Brigades. South Wales was chosen because it is the largest brigade in Wales. Kent, West Midlands, and Lothian and Borders were visited because of their involvement with the Pathfinder Trials (explained in Part III). North Yorkshire and

Strathclyde were interviewed because of their staff members' involvement at the BFSC. The results of these interviews are discussed in Part IV of this report.

Arriving back on June 6th, the information interpretation and compilation was started. There were three sets of notes from over a dozen interviews, some of which lasted up to eight hours. Individual conclusions had already been formed prior to our return, and additional time was spent discussing our thought. Part II of this report describes the current situation that was present upon our arrival in England. In Part III, risk assessment is discussed from birth until its present state. The results of our interview are found in Part IV, and our conclusions make up Part V.

We would like to extend our gratitude to members at the British Fire Service College and to the members we met with from South Wales, Kent, West Midlands, North Yorkshire, Lothian and Borders, and Strathclyde Fire Brigades. Without their insight and first hand knowledge, this project would not have been possible.

Part II - Current Situation

Recent acts of legislation have set the British fire service on a course of change. This course of change began in 1989 when the European Union (EU) called for Britain to comply with fire safety requirements set forth by two European Council Directives. The directives were the (Framework Directive 89/39/EEC) and (The Workplace Directive 89/654/EEC). Their aim was to set forth minimum requirements for the workplace which pertain to health and safety. These "Fire Regulations" make the building owner responsible for the fire safety within their premises. This means that employers must now personally assess the probability of fire and the risk such a fire poses to their employees. Additionally, employees must take action to reduce or eliminate such risks of fire.

The English government felt it already had such a regulation in existence between the Fire Precautions Act 1971 and the Health and Safety at Work Act 1974. However, these regulations failed to provide the legislation the European Commission desired. As a result, by the early 1990's the EU was placing considerable pressure on the English government to comply with their directives. In response to the EU's demands, the British government passed the Management of Health and Safety at Work Regulations 1992 and the Workplace (Health, Safety and Welfare) Regulations 1992. The majority of the directives were met by these two regulations, including the requirement to develop a health and safety risk assessment.

Unfortunately, the European Commission was still not satisfied with the adequacy of the regulations. In another attempt to fulfill the Commissions directives, the British government passed the Fire Precautions (Workplace) Regulations 1997. The regulation makes the employer or landowners personally responsible for:

- Assessing fire risk to identify where a fire can start and who is put at risk by such a fire.
- Ensuring that a fire can be detected and that a warning can be given to employees of the fire.
- All employees have a means of escape in the event of a fire.

- Providing appropriate firefighting equipment.
- Developing an emergency plan which includes action for staff, evacuation procedures and the steps taken to notify the fire brigade.
- Maintenance and testing of fire safety equipment.

Although it was an improvement to the previous regulations, this legislation still left many workplaces exempt from the new fire safety requirements. These workplaces are:

-Workplaces used by the self-employed.

-**Private dwellings.**

-Workplaces covered by a current fire certificate in force under the Fire Precautions Act 1971 or for which an application for a fire certificate is pending (premises with fire certificates issued under the Factories Act 1961 or the Offices, Shops and Railway Premises Act 1963 are not exempt).

-Workplaces to which the Fire Certificates (Special Premises) Regulation 1976 apply.

-Mine shafts and mine galleries.

-Workplaces covered by a safety certificate issued under the Safety of Sports Grounds Act 1975 of the Fire Safety and Safety of Places of Sport Act 1987 whilst they are being used for a purpose covered by the certificate.

-Sub-surface railway stations [any workplace to which the Fire Precautions (Sub-surface Railway Stations) Regulations 1991 apply].

-Ships within the meaning of the Docks Regulation 1998 (including those under construction or repair).

-Means of transport used outside the workplace and the workplace in means of transport.

-Agricultural or forestry land situated away from the undertaking's main buildings.

-Offshore installations [workplaces to which the Offshore Installations and Pipeline Work (Management and Administration) Regulations 1995 apply.

An interesting fact is that most buildings of concern with regard to fire fall within these exceptions. It should be noted that single family dwellings and multi-family dwellings are not considered under any proposed or standing regulation. Coincidentally, in the United Kingdom, eighty percent of deaths and injuries directly related to fire occur in the home and in multi-family dwellings.

The fire brigades in the United Kingdom share a keen interest in fire safety. That is because until the '97 Workplace Regulations (Fire Precautions), the fire brigades were directly responsible for fire inspections of businesses, fire safety for proposed buildings and the issuance of fire certificates for applicable properties. However, the workplace regulations relinquished their responsibility for performing fire safety inspections in places of business and placed it upon the employees of these businesses. The fire brigade now assumes the duty as overseer or guide to these employees who are required to perform risk assessments. This change in the role of the fire brigade has led many brigades to develop very different risk assessment schemes or methods which they use both for their own purposes as well as to educate employees on how to comply with the new regulations.

Prior to the Fire Precautions Act 1997 the Audit Commission for the British government published a report called *In the Line of Fire (1995)*. This report covered a wide range of topics related to Fire Brigades. These topics include operational and corporate management, provisions for support services, and the national structure of Fire Authorities. The primary interest of the Audit Commission was to evaluate the cost effectiveness of resource management in the fire service. "The Commission found a well managed service but identified a number of areas where better value for money might be obtained. In summary, the report called for the following changes:

- a review of fire cover standards;
- a change in the balance between operational and fire safety work in favor of fire safety, with a statutory duty on brigades to promote fire safety;
- a review of fire service pensions;

- a review of the formula for the fire Standard Spending Assessment (SSAs);
- a review of the condition of service of firefighters; and,
- efficiency improvements in individual brigades." (Out of the line of Fire, pg. 1-1)

In the mid and late 1970's a large influx of young firefighters entered into the U.K. fire service. As the natural course of things would have it, most of these firefighters are going to retire within the next several years. This presents a major financial constraint on many of the fire brigades annual budgets. The fire brigades in the United Kingdom base their annual budgets primarily on the total number of calls to which they respond. Ironically, the Audit Commission also is looking for ways to reduce the number of responses by a fire brigade through the modification of the current standards of fire cover.

The British Fire Service uses a risk categorization scheme to establish what number of fire apparatus responds to calls and how long each apparatus has to get to the scene. This standard of cover was reviewed but not modified in 1985. However, resulting from the report *(In the Line of Fire 1995)* were a series of suggestions to the Home Office and the Central Fire Brigades Advisory Council (CFBAC) on ways to manage resources more efficiently. Interestingly, the report called for changes in the Standard of Fire Cover 1985 and suggested a reversal of philosophy in the Fire Brigades from cure to prevention.

The Audit Commission created the Joint Committee on the Audit Commissions Report (JCACR) to undertake the task of researching possible solutions to the problems which were unearthed from *In the Line of Fire (1995).* The JCACR felt it would best fulfil their mission by undertaking the recommendations by the Audit Commission that related to standards of fire cover. These areas are risk-based fire cover, the impact of fire safety measures on the need for fire cover, and firefighting intervention – response options. The JCACR reported its progress to the Central Fire Brigades Advisory Committee in a publication called

Out of the Line of Fire (1998). Their main conclusion was that "fire cover can be successfully based on the techniques of risk assessment".

> "The Audit Commission criticized the current standards of fire cover on a number of counts. It was noted that no account was taken of the variation of fire risk with time of day, day of week, etc. Also, by assessing fire risk on an area basis, the current risk assessment tended to be rather coarse grained. If buildings which represented little fire risk adjoined high risk premises, the low risk premises were likely to receive attendance appropriate to the high risk premises since, otherwise, the brigade would be deemed to have failed to meet the standards of fire cover. Nor was account taken of existing fire safety measures within buildings when planning fire cover." (Out of the Line of Fire, pg. 3-1)

The Audit Commission suggested that consideration for actual risk should be integrated into the present standards of fire cover. This was to counter the fact that, "the present standards of fire cover gave no incentive to the fire service to reduce risk by deploying fire safety measures since they take no account of such measures in categorizing risk." (Out of the Line of Fire, pg. 4-1) Their primary concern was to develop a risk-based approach which takes into account the effects of fixed fire safety measures and the effectiveness of the building management. They sought the advice of consultants who already perform risk assessment for industry. The Audit Commission was interested to see if such a risk-based approach was applicable to the fire service. After the consultants agreed that such an approach was fitting, the committee had the consultants come up with proposals in 'toolkit' format, to layout what the method would necessitate.

Out of the Line of Fire establishes a framework for the development of risk assessment toolkits. A consulting company called ENTEC was contracted to undertake the development of the toolkits. These toolkits are currently under development and are in the trial stage with several brigades throughout England. The brigades involved with the trials are Lothian and Borders, West Midlands and Kent. If

accepted by the Government, the toolkits will be used by the fire brigades to help determine fire cover. Although the toolkits will vary, they will all possess three elements; risk assessment, reducing risk through fire safety and firefighter response options.

The risk-based method outlined by the consultants take into account variable types of risk, including, risk to life (individual or societal), property, environment, and heritage. Foremost, their main focus is on the risk to life. Risks related to rescue and special service activities also are included in the studies. Public fire education has also been suggested as an additional variable that can help reduce the occurrence of fires and raise awareness.

What has evolved with this chain of events is a new fire regulation and research towards a new risk based standards of fire cover methodology. Neither of these items are currently linked to one another. Fire Brigades have been left virtually unassisted as to how to assist the public with the new regulations. Similarly, the government has not alluded to coupling any of the results of the risk-based research into the new fire regulations. Although they are both using a risk assessment scheme, neither has collaborated with the other in an attempt to develop a unified risk assessment that can be used for any fire related subject matter.

A "One Stop Shop" type of legislation would be highly beneficial for agencies having interests or concerns for fire related topics. Such a piece of legislature would combine all the fragmented regulations that had anything to do with fire prevention, protection and risk assessment. Instead of having to refer to several regulations, which can vary in ideology, format and emphasis, one would only have to consult the fire regulation for guidance on fire related topics. Ideally, this regulation would use a unified risk assessment methodology to tie together the aspects of risk assessment during the planning of buildings/fire safety along with risk assessment for employees, risk assessment for the development of standards of cover/response options, risk assessment for community fire education and dynamic risk assessment for fire brigade operations.

Fortunately, several persons form the Fire Service College, Home Office and the Fire Brigades have recognized the need for a collaborative effort to develop such a risk assessing methodology. This body of people is known as the Risk Assessment Working Group and was created in May 1999. Their emphasis will be on guidance to occupiers/fire officers on the application of the "Workplace Regulations", guidance to the fire authorities in determining fire safety inspection frequencies, developing standards of fire cover, and formulating safe fire fighting procedures and practices. The long-term goal for the group is to provide a generic fire risk assessment methodology that can be used for reference and guidance for both the fire service and the community.

Part III – Risk Assessment

In 1958 the Joint Committee determined the first attendance speeds and weights of fire attack. These are summarized in Table 3.1. 'A' (high) risk through 'D' (low) risk are determined by individual risk assessments of buildings, performed by each individual brigade. Currently in Great Britain, there is no standard risk assessment method. Each Brigade throughout the country is responsible for coming up with their own way of assessing risk. In the 1995 Audit Commission's *In the Line of Fire*, three of the problems highlighted related to these risk assessments. "The current system: ignores time related variations in occupation of buildings, does not take account of demographic and socio-economic factors, does not allow for the extent to which fire safety precautions are incorporated into buildings."(Development and Trial of a Risk Assessment Toolkit for the UK fire service, May 1998) Due to the Audit Commission's findings, the Fire Research and Development Group of the British Home Office is currently developing "Risk Assessment Toolkits" for the UK Fire Service. However, until the toolkits are completed, each brigade will continue using their own risk assessment methods described below.

Risk Category	No. of pumps in first attendance	Approximate time limits for attendance (in minutes)		
		1st	2nd	3rd
A	3	5	5	8
B	2	5	8	-
C	1	8-10	-	-
D	1	20	-	-
High Risk	Predetermined Attendance		-	-

Table 3.1

The above mentioned toolkits were developed by an outside consulting firm called ENTEC. They developed the toolkits to quantify key factors that can affect the risk from fire in a building. These were fire safety measures, standards of cover, and socio-economic and demographic factors. The toolkits all use historical statistical data concerning numbers of fires and fire-related deaths in an area. They then

determine how fire safety and fire department response times can drive these risks down. This system for risk assessment is currently undergoing trials, known as the Pathfinder Trials. "The brigade trials, undertaken by the Kent, Lothian and Borders, and West Midlands Fire Brigades, were designed to provide a test of the toolkits across the full range of areas and incidents encountered in the United Kingdom, including: city centres, remotes rural areas, non-metropolitan residential and commercial areas, and metropolitan residential and commercial areas." (Out of the Line of Fire, July 1998) These tribulations are currently under going the third and last segment of the Pathfinder Trials.

The British Fire Service College (FSC) is actively pursuing a different approach to risk assessment. They are currently instructing courses on a "watered-down" version of Robert W. Fitzgerald's Building Firesafety Engineering Method, know simply as the Method. "The Method is composed of an organized set of procedures for understanding and describing the fire performance of buildings that: (a) organizes the complete building firesafety system into discrete components that are based on their functional performance, (b) integrates the discrete components into a complete, holistic systems representation, (c) incorporates state-of-the-art deterministic fire science with traditional practices, standards, experience, and engineering judgment into performance evaluations, and (d) provides an organization and descriptive format that enhances communication with other individuals in the building industry." (The Anatomy of Building Firesafety, Robert W. Fitzgerald, September 1997) A number of brigades throughout England and Northern Ireland have shown interest in the Method, as it continues development.

The Chief and Assistant Chief Fire Officer's Association (CACFOA) with the support of the Home Department and Construction & Building Control Group of the Scottish Office have developed a Risk Assessment Scheme to be used in conjunction with the Fire Precautions (Workplace) Regulations 1997. The assessment scheme incorporates eight worksheets into a summary sheet that is used to assess risk in a building. "The first worksheet examines the life risk in the premises. The second and third worksheets consider the possible fire hazards, and the remaining five worksheets consider what fire precautions, if any, have been provided." (Scottish Fire Brigades Risk Assessment Scheme, Version Four

1999) A diagrammatic flow chart showing progression through the worksheets can be found in Appendix B.

Many brigades are using a standard Risk Assessment Proforma. There are many variations (explained in more detail in the reference section) with the following being the most common. This is a ten-page checklist that breaks risk down into three sub-categories. The first is the Potential for Ignition, and incorporates occupant actions and tendencies and installation of utilities. The second sub-category is the Potential for Development and embodies building construction, housekeeping, and firefighting. The last sub-section is Life Risk Consequences and includes areas such as travel distance, visibility, and management.

Part IV – Interviews

Since the 1995 publication of "In the Line of Fire," the British Fires Service has undergone many significant changes. Different brigades have decided that some changes are more important than others, and have focused their efforts in these areas. This, in turn, creates strong opinions of opposing ideas from other brigades. In this chapter, these opinions will be presented as the authors interpreted them.

The first area of conflict was in the push for risk assessment techniques by the Home Office. Many brigades felt that there was so much confusion in this area because the Home Office never published any worthwhile reading. "We are lacking training in that aspect." Not only is this felt by the brigades, but also by the business owners who have to assess the risk in their buildings. "There are not enough directives for risk assessment for the Workplace Regulations 1997." It was evident that the Home Office needs to clarify or create good standard procedures to risk assess a building. Other brigades felt that they were lowering their standards by going to risk assessment methods. When discussing this with other brigades it was simply said, "It is hard to teach an old dog new tricks." Many are more comfortable following a prescriptive code, and "there is a reluctance to leave them behind."

We found that many of the problems that have developed while trying to produce a standard risk assessment had to do with British politics. Back in the late eighties when the European Council (EC) made directives to have fire safety regulations in place for buildings of occupation, the government at the time felt that what they had in place covered it (as discussed in Part II). It was felt that it would cost too much money to business owners, and this went against the platform of the party. "The Government wants to reduce the burden on business." The EC countered the UK's money-motivated decision by warning that if nothing were done, the UK would find itself in court. By this time, a new party dominated politics, and they were more concerned with the workers than the owners of business. In 1997 the Fire Precautions (Workplace) Regulations were hastily put together in order to satisfy the EC's demands. Unfortunately, these regulations were basically older legislation re-written with a new title. Many types of buildings were

exempted. The Home Office was asking the brigades to do more, with the same power and authority. To get around this problem, many brigades have had to turn to being very diplomatic in their approach to business owners. It is not an uncommon practice to send out letters to companies stating, "If the fire brigade responds to a fire at your location, and everyone in the building is accounted for, we will not enter your building to extinguish the fire." This was until whatever problem the brigade found when it went to inspect the location was resolved. This manner of dealing with business owners tends to be quite effective.

Fire Brigades were then asked to make changes to their current station locations and manpower assignments to "make the brigades more efficient." In other words, save the government some money. A brigade in Wales stated that they would like the luxury of sending more trucks than prescribed and sending back those ultimately not needed. In order to make the first assignment requirements (explained in Chapter III), metropolitan brigades are sometimes forced to send five or six appliances to circumvent traffic problems. Many departments feel that the current standards of cover need to be fixed. The Home Office is working on the problem, as part of the Risk Assessment Toolkit solution, but nothing has come of it as of yet. The problem brigades have with standards of cover today is a simple one. A building that is given an 'A' risk during the day when thousands of employees are present, retains its 'A' risk at night when the building is predominately empty. Eighty percent of fire deaths in the UK occur in single dwelling buildings at night. A single dwelling only gets one appliance within twenty minutes under the current regulations (if it is in a 'D' risk area). Brigades in the south of England ask why aren't the appliances moving with the people, bringing them into the cities during the day, and sending them out into the countryside at night?

Many brigades today are now also using their fire engineering departments for fire safety education. It was found that brigades that have started educating students in school have found a gross reduction in fires in those areas. This is a sore subject with many members of the Fire Brigade Union (FBU). This is because brigade budgets take into account the number of incidents to which a brigade responds. So, if using money to begin fire education programs leads to a reduction in call volume, the budget for the following year is reduced, effecting brigade job security. Therefore the FBU is anti-fire-

safety-education until budget decision making removes call volume from the equation. The other problem that was pointed out to us is the fact there is no fire education for the lower class middle aged person, the one that is statistically the most commonly killed in a fire.

The Home Office created the Joint Committee on the Audit Commission Report (JCACR) to research the problems presented in the "In the Line of Fire Report." Their findings were published in the 1998 report, "Out of the Line of Fire." The JCACR hired the outside consulting firm, ENTEC, to create a risk assessment method. These are known as the Risk Assessment Toolkits, and are presently under trials in the UK (discussed in Chapter III). There is quite a bit of controversy surrounding the ENTEC Toolkits, and opinions on the Toolkits are quite diverse. As explained before, the Toolkits use historical statistical data in order to determine risk in a particular area. This information, along with census information determines the location and strength of fire companies within a brigade. Though this sounds good on paper, in application it isn't working as well as they thought. Professors at the FSC have found that by the time the Toolkits are implemented, the information in them will be a decade old. In ten years, certain areas have grown and others have gotten smaller, making the toolkits ineffective and obsolete. The other large problem found is that many brigades lack the ability to recall previous years run data with ease, creating a large amount of paperwork/data input no one has time to do.

ENTEC has created a number of computer programs to help aid departments with the Toolkits. These include WINGS, RATKS, Bronsen and Brave, and the Fire Cover Modeling Program. We found that many brigades lack the education and equipment needed to utilize such programs. In one brigade in Scotland, we found that the computer system was so old and unstable that they had to employ a full time computer technician who battles daily to keep the system up and running. These programs again need historical data in order to work, and this creates hundreds of hours of data input which brigades cannot afford to do. We were also told that the members of the Home Office/ENTEC team feel that that the third tier of Pathfinder trials will fail, and that the project will be shelved. They have founded a new team incorporating members of the FSC and CACFOA to start working on a contingent plan incase the trials are in fact unsuccessful.

The British Fire Service College has been working on a different approach to risk assessment. This approach, derived from Professor Robert W. Fitzgerald's Method (of Worcester Polytechnic Institute), has been worked on for a number of years. The Home Office actually investigated this method prior to hiring ENTEC, but found at the time it still needed more work. We were told that it is unfortunate that more money and people are unable to work on this Method to date, but with the possibility of failure on the part of ENTEC, this money may be found in the future.

Many Brigades have sent officers through the weeklong course that the FSC offers on the Method. The opinions of the Method varied greatly from one brigade to the next. Talking to professors at the FSC, we started to understand why. Again, we find that there is a reluctance to try to learn new tricks by many brigades. Those brigades feel that if there is a fire in a building, they have already failed in their duty to create a fire safe atmosphere. When asked to decide what would happen to a room if a one-foot high flame were free burning in the center, the biggest problem for the students is to understand how the flame got there. British Fire Brigades are more interested in ignition sources and their elimination, rather than how a building and the people in that building will react to a fire. This is where the method comes into play and unfortunately many brigades miss this point completely.

Many brigades felt that the Method is too complex for smaller buildings, but could be used for special instances. This however goes against the point of creating an all-encompassing methodology for risk assessment. Some departments are simply scared of this new "high tech" approach, and thought that it might be good for corporations that need to risk assess themselves. We found that this in fact had already happened and was working up to the corporation's expectations. Other brigades told us that they didn't like it because "it was American". What they meant was that the language and terminology used in the manuals were too American and the students just found it too hard to comprehend. Also the idea that it wasn't British, and therefore wasn't worth looking at was also put across to us. It was the opinion of brigades that until something more concrete and complete was published, the Method wasn't even worth looking at.

Though there are some bad feelings about the Method, some brigades have started to use a modified version to pre-plan areas. These brigades, with guidance from the FSC are creating their own Method and once it is established, the FSC will have a stepping stone from which to work. What it came down to was that most brigades just wanted something that works. Many showed interest in the Method, but would not grab hold of it until it was proven to be valid and functional for fire safety risk assessment.

Part V – Discussion

During our research and travels to the British Isles we found well maintained and organized fire brigades. The British Fire Service College was one of the best firefighting educational facilities in the world. With this in mind, we did find a few areas of uncertainty within the field of fire safety. The three areas of concern for us were the lack of sprinkler systems, the chaotic mess that makes up the fire safety regulations, and the lack of a standardized risk assessment scheme.

One of the biggest differences between fire safety in Britain and America is the lack of sprinklered buildings. All the brigades we talked with felt that sprinklers were great at saving buildings and occupants from fire. However, due to the fact that there is no monetary advantage to having sprinklers and no legislation that forces their use, businesses feel there is no need for them. Businessmen in England look at fires as a likely event that will occur approximately every ten years. In ten years, the building in question may no longer be in a prime location, or may be in such bad shape that if a fire occurs in the building there is no purpose in saving it. It is cheaper and easier to not sprinkler the building and build a new one (possibly in a new location) if a fire occurs. Another problem is there are no incentives from insurance companies to install sprinkler systems in buildings. Many brigades expressed a frustration with this and wanted to see more of a push from insurance companies to compel companies to sprinkler their buildings.

Many employees of the British fire brigade are confused and dumbfounded by the fire safety regulations that are currently in use. We found that a possible solution to this problem is to sort out and unify the fire safety regulations in to one piece of legislation that encompasses what is currently in use. At the moment there are almost seventy different regulations that deal with fire safety dating back as far as WWII. This makes it difficult for the community and fire brigades to cooperate when it comes down to making buildings safe from fire. If there were one code that could be used by both the community and the fire brigade to create fire safe buildings, there would be less conflict and better communication. This would save both time and money of both businesses and the fire brigade.

The research that was conducted clearly presents that a standardized risk assessment for both the community and the fire service is in great demand. Presently there are a number of solutions being worked on. However it appears that none of these will do what the fire brigades need. As stated earlier the ENTEC approach will be almost obsolete if it even passes the third tier of the Pathfinder Trials. The Method that is being promoted by the FSC is presently incomplete and would need more work before it would be ready for such trials. Other solutions, such as individual department check box risk assessments are not able to fully encompass all the different types of construction and other areas of fire brigade responsibility. These check box systems also ask questions that could be interpreted differently by different people, leading to confusion down the road. A new risk assessment method should be developed which would encompass all types of construction for both industrial and private occupancies.

Overall there seems to be a gallant effort in the United Kingdom to increase fire safety and risk assessment provisions in an attempt to create a safer country. However, there is still much to be done legislatively, educationally and practically. It will be the task of the future fire service to provide a skilled fire fighting force that is well-versed in risk assessment schemes. The advantages of such a technologically advanced fire service will be seen in with an increased public safety awareness and a reduction of fire related deaths and injuries to both civilians and firefighters. A uniform risk assessment method will provide the much-needed bridge between industry, community and fire safety authorities.

References:

-IN THE LINE OF FIRE, Home Office Audit Commission, 1995.

-OUT OF THE LINE OF FIRE, *Modernizing the Standards of Fire Cover*, Report of the Joint Committee on the Audit Commission Report to the Central Fire Brigades Advisory Council, 1998.

-DEVELOPMENT AND TRIAL OF A RISK ASSESSMENT TOOLKIT FOR THE UK FIRE SERVICE, Michael Wright, Entec UK Ltd, 1998.

-STATUTORY INSTRUMENT No. 1840, The Fire Precautions (Workplace) Regulations 1997.

-THE ANATOMY OF BUILDING FIRESAFETY, Robert w. Fitzgerald, Center for Firesafety Studies, Worcester Polytechnic Institute, 1997.

-HOME OFFICE, FIRE COVER MODELING FOR BRIGADES, Cath Reynolds and Jim Pedroza, Systems Options LTD, 1998

Note: The following appendices are a continuation of the literature review. These appendices do not accompany this version of the report.

Appendix E

FIRE RISK ASSESSMENT IN THE WORKPLACE (FIRE SAFETY ENGINEERING). This risk assessment workbook is used in conjunction with a risk assessment course taught by the BFSC. It presents a generic format for conducting a tick box type fire risk assessment

Appendix F

WEST YORKSHIRE FIRE SERVICE (FIRE SAFETY GROUP), RISK ASSESSMENT PROFORMA. A standardized performance worksheet, which uses a scoring system to rate the fire, risk in buildings. A building is given a total score based on the composite score of specific risk assessments. The final score determines whether the building passes as fire safe or not.

Appendix G

SCOTTISH FIRE BRIGADES, RISK ASSESSMENT SCHEME, VERSION IV FIELD TRIALS The scheme was developed to be used with the Fire Precautions (Workplace) Regulations 1997. It evaluates which areas of fire risk are acceptable or unacceptable. Depending on what rating each area receives, will govern what action should be taken to raise those risk areas to acceptable levels.

Appendix H

KENT FIRE BRIGADE, FIRE PRECAUTIONS (WORKPLACE) REGULATIONS 1997, RISK ASSESSMENT PRO-FORMA. A risk assessment developed by the Kent Fire Brigade which determines risk through a series of yes/o questions. Then a low, medium, or high risk is assigned to categories determined by the number of no answered questions. Areas labeled as high are subject to further action.

Appendix I

THE PLNNING PROCESS FOR FIRE SERVICE EMERGENCY COVER
Provides an overview to the current efforts by the Home Office to revise the standards of fire cover. The article lays out the framework for the Entec Pathfinder Trials and establishes projected results and time frames.

Appendix J

NOTE BY THE HOME OFFICE, FIRE COVER REVIEW, A REVIEW OF PROGRESS AND FUTURE PLANS. Provides a solid background as to who the JCACR is and what function it serves. Additionally, it covers the committees plans for the future and summarizes the *Out of the Line of Fire*.

Appendix K

NEW FIRE REGULATIONS (www.lawrite.co.uk/firegs.htm)
A short write up about the current fire regulations in the U.K. This brief introduces the 1997 workplace regulations from a legislative view point.

Appendix L

Letter to ACO G Winkworth explaining the first meeting of the Risk Assessment Work Group. This group was developed while the IQP was in its interview stage in England. The group is an attempt to collaborate the Home office, CACFOA, the Fire Brigade Union, and the Scottish Office into a unified task force aimed at developing a unified risk assessment methodology.

Appendix A

Quotations

"With CACFOA pushing, along with the Fire Service College, we will get the method approved, determined." Kieth Isaac

"We are trying to teach an old dog new tricks." KI

"I'm not sure how builders will react [to risk assessment]." KI

"We will not turn back, no way, Jose." KI

"Leicestershire Fire Brigade has grabbed [the Method] hook line and sinker." KI

"Would like to see an insurance push." Pete Gage

"We have to change from holding back on trucks to send more than enough trucks to a fire, and send back the extra." PG

"There were not enough directives for risk assessment for the work place regulations." PG

"[The Method] is too complex for the smaller buildings that we look at." Alan Richardson

"Very interested in ignition sources, not fire growth. Means of escape is what is important." AR

"Government wants to reduce the burden on business." PG

"Maybe looking too much at the present, not enough at the future." PG

"The method is good for specifics yet may not be as applicable to a large number of buildings." Martin Thomas

"Problems: American, British politics." Tony Barnes

"There is a slow progression, much skepticism from people from industry not just firefighters, will it work?" TB

"Tweak the method, lessen engineering thought process. Create lists of possibilities, ie...(+) Beneficial effect, (-) Negative effect, (0) No effect. A tick system." TB

"Cathe Reynolds gave the opinion that [the Pathfinder Trials] weren't going to work. If it doesn't work at the third tier, the project will be shelved." TB

"ACO Winkworth really stuck his neck out with his backing of the method." TB

"Even if ENTEC does pass, it doesn't mean that it will be the only way to do things." Geoff Winkworth

"The whole country is confused as to how risk assessment is to be promoted and carried out." GW

"Things that slow down process of method promotion: Availability of a published document, availability of staff to pursue rewriting documents." GW

"Reluctance of home office to leave behind prescriptive code." Colin Swaden

"There is a fear that we are lowering the standards by going to risk assessment." Martin Adams

"We are lacking training in that aspect [Risk Assessment]." MA

"Found ENTEC's philosophy really good." MA

"There was no method to follow." Dave Cotton

"We would like to see a common baseline methodology." DC

"Pitfalls found by pathfinder trials (18 brigades): Data collection, interpolation, sorting, interpretation, and entering data into computer system/program." DC

"Using watered down version of ENTEC's reports for risk assessment." DC

"An A risk shop in a predominately B risk area, B risk times are allowed." John Longfield

"Sent letters out prior to release of Workplace Regulations 1997 to inform businesses regulations would soon take affect." Brian Chisholm

"[The Method] is a good operational tool, less so for fire safety." BC

"I don't think there can be an all encompassing method that will be of great effect on what is going on." BC

"Would promote [the Method] with business, not with fire safety." BC

"Until [the Method] is proven, will take statistics instead." BC

"Don't want a fire, the Method starts with a fire, no good." BM

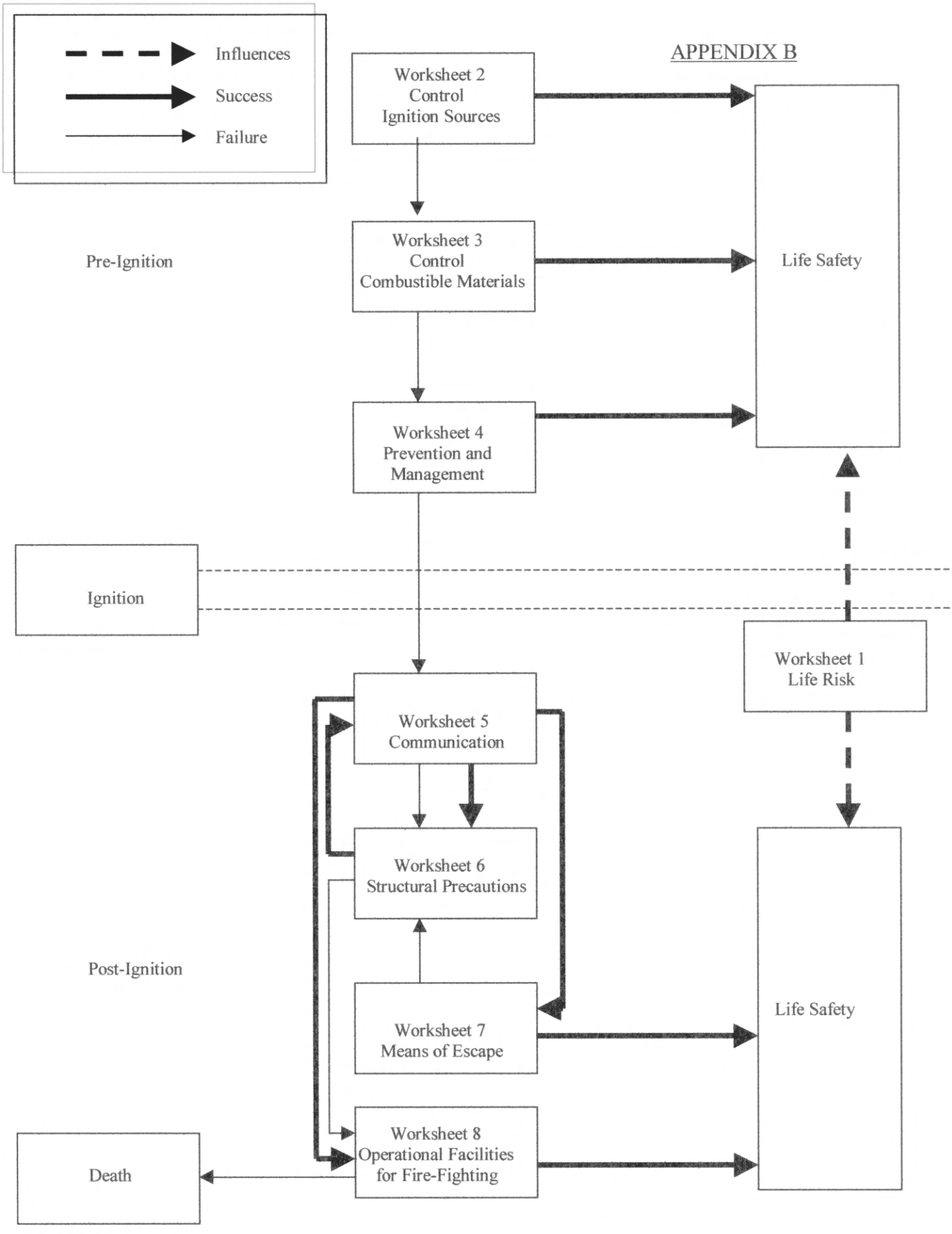
"[The Method is] more an operational tool than a fire safety tool." BM

"I think we will be in court a lot more." BM

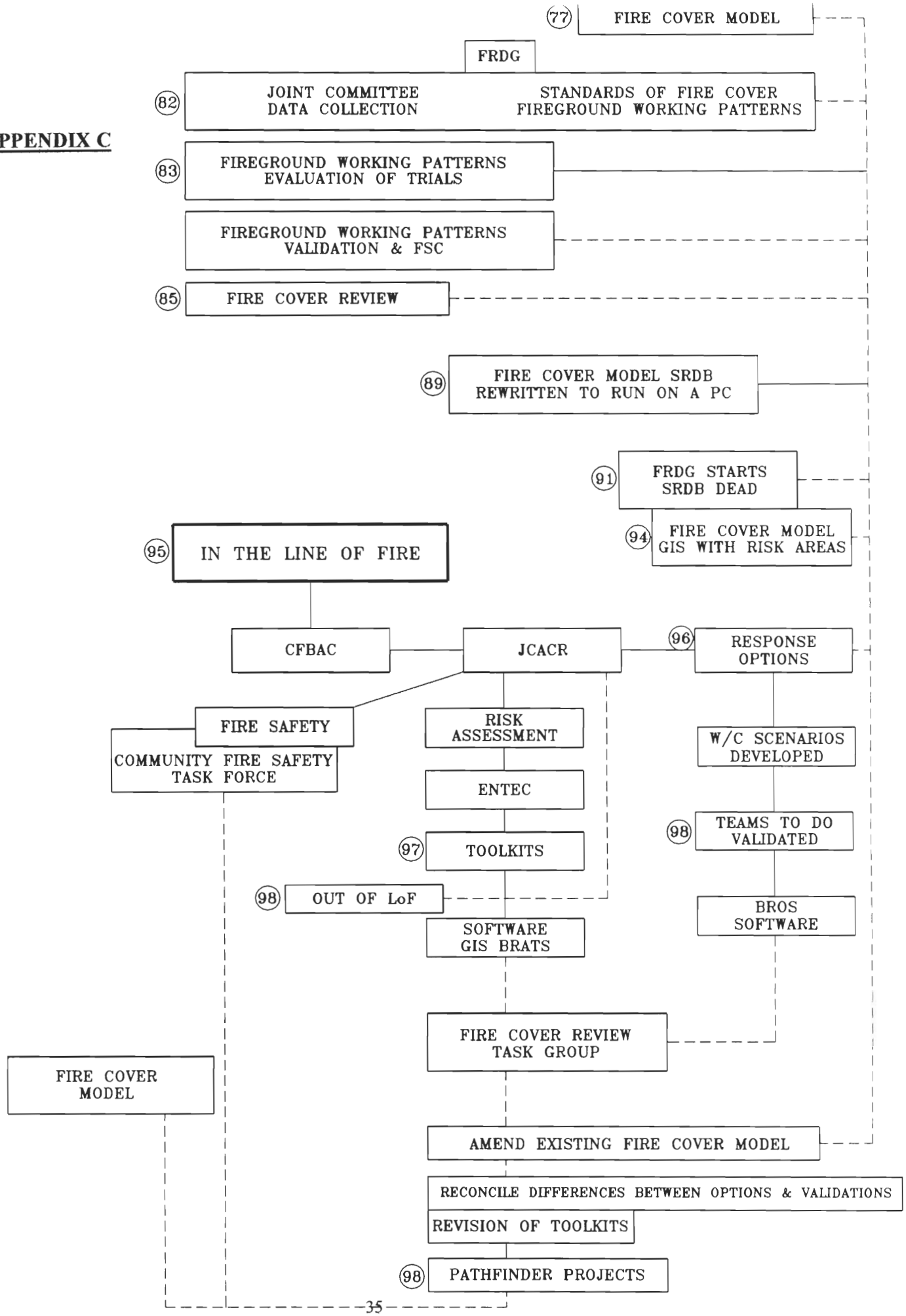
"If [the Method] works, we will take it." BM

"Industry produces risk assessments, therefore the Method might not be accepted." BM

APPENDIX B


Influences
Success
Failure
Worksheet 2
Control
Ignition Sources
Worksheet 3
Control
Combustible Materials
Worksheet 4
Prevention and
Management
Life Safety
Pre-Ignition
Ignition
Worksheet 1
Life Risk
Worksheet 5
Communication
Worksheet 6
Structural Precautions
Worksheet 7
Means of Escape
Worksheet 8
Operational Facilities
for Fire-Fighting
Life Safety
Post-Ignition
Death

APPENDIX C


(77) FIRE COVER MODEL
FRDG
(82) JOINT COMMITTEE DATA COLLECTION
STANDARDS OF FIRE COVER FIREGROUND WORKING PATTERNS
(83) FIREGROUND WORKING PATTERNS EVALUATION OF TRIALS
FIREGROUND WORKING PATTERNS VALIDATION & FSC
(85) FIRE COVER REVIEW
(89) FIRE COVER MODEL SRDB REWRITTEN TO RUN ON A PC
(91) FRDG STARTS SRDB DEAD
(94) FIRE COVER MODEL GIS WITH RISK AREAS
(95) IN THE LINE OF FIRE
CFBAC
JCACR
(96) RESPONSE OPTIONS
FIRE SAFETY
COMMUNITY FIRE SAFETY TASK FORCE
RISK ASSESSMENT
ENTEC
(97) TOOLKITS
(98) OUT OF LoF
SOFTWARE GIS BRATS
W/C SCENARIOS DEVELOPED
(98) TEAMS TO DO VALIDATED
BROS SOFTWARE
FIRE COVER REVIEW TASK GROUP
FIRE COVER MODEL
AMEND EXISTING FIRE COVER MODEL
RECONCILE DIFFERENCES BETWEEN OPTIONS & VALIDATIONS
REVISION OF TOOLKITS
(98) PATHFINDER PROJECTS

APPENDIX D


1. WEST DUNBARTONSHIRE
2. EAST DUNBARTONSHIRE
3. NORTH LANARKSHIRE
4. CITY OF GLASGOW
5. EAST RENFREWSHIRE
6. RENFREWSHIRE
7. INVERCLYDE
8. CLACKMANNAN
9. FALKIRK
10. WEST LOTHIAN
11. CITY OF ABERDEEN
12. DUNDEE CITY
13. CITY OF EDINBURGH
14. MIDLOTHIAN
15. EAST LOTHIAN
16. NEATH PORT TALBOT
17. RHONDDA CYNON TAFF
18. MERTHYR TYDFIL
19. CAERPHILLY
20. BLAENAU GWENT
21. TORFAEN
22. BRIDGEND
23. VALE OF GLAMORGAN
24. CARDIFF
25. HARTLEPOOL
26. STOCKTON ON TEES
27. MIDDLESBROUGH
28. REDCAR AND CLEVELAND
29. KINGSTON UPON HULL
30. CITY AND COUNTY OF BRISTOL
ORKNEY
SHETLAND
WESTERN ISLES
SCOTLAND
MORAY
ABERDEEN-SHIRE
ANGUS
PERTH & KINROSS
STIRLING
SOUTH LANARKSHIRE
BORDERS
DUMFRIES AND GALLOWAY
NORTHUMBER-LAND
DURHAM
NORTH YORKSHIRE
EAST RIDING OF YORKSHIRE
LANCASHIRE
WEST YORKSHIRE
SOUTH YORKSHIRE
NORTH LINCOLN
NORTH EAST LINCOLN
LINCOLN-SHIRE
CHESHIRE
STAFFORD-SHIRE
LEICESTER-SHIRE
NORFOLK
SUFFOLK
WARWICK-SHIRE
HEREFORD AND WORCESTER
BERKSHIRE
SURREY
KENT
HAMPSHIRE
WILT-SHIRE
DORSET
DEVON
CORNWALL
EAST SUSSEX
WEST SUSSEX
ISLE OF WIGHT
UNITED KINGDOM
ENGLAND
WALES
IRELAND
DONEGAL
LONDON-DERRY
ANTRIM
Belfast
DOWN
ISLE OF MAN
SLIGO
MAYO
CAVAN
LOUTH
MEATH
WESTMEATH
GALWAY
OFFALY
DUBLIN
Dublin
LAOIS
KILDARE
WICKLOW
CARLOW
KILKENNY
TIPPERARY
LIMERICK
WEXFORD
WATERFORD
KERRY
CORK
Scilly Isles
The map shows the 32 unitary authorities in Scotland, the 22 unitary authorities in Wales and the 13 unitary authorities in England, which come into effect on 1st April 1996.
• London Capital cities
Metropolitan counties (in England)