NFPA's
One-Stop
Data Shop

Fire Analysis and Research Division Capability Statement

- Statistical Analysis
- Fire Incident Studies
- Risk Anaylsis Research

NFPA
1 Batterymarch Park
Quincy, MA 02269-9101
Phone: 617-984-7450
Email: osds@nfpa.org
www.nfpa.org

TABLE OF CONTENTS

	Page
Table of Contents	i
What is NFPA's One-Stop Data Shop?	1
NFPA's Data Bases	5
NFPA Research	10
The One-Stop Data Shop Staff	13
NFPA Facilities and Equipment	26
NFPA's Other Technical Capabilities	27

WHAT IS NFPA'S ONE-STOP DATA SHOP?

Since the mid-1980s, the NFPA has offered a wide range of statistical and data services through its Fire Analysis and Research Division.

The name One-Stop Data Shop was coined to describe these services. It reflects NFPA's commitment to providing information needed by the fire community, quickly and conveniently.

Our goal is to help you find the best fire experience information available to meet your needs. Whenever possible, we provide the answers you are looking for ourselves. But we have also developed a national network of sources and analysts. Thus, in cases requiring additional expertise, we usually can identify a specific colleague who can help – and eliminate the need for multiple phone calls.

To accomplish our mission, NFPA's One-Stop Data Shop offers information and related services in a variety of forms:

Pre-Packaged Material

The annual order listing of NFPA's One-Stop Data Shop is available free. It lists more than a hundred reports, articles, and packages on topics which have proven to have continuing, substantial interest and value. These include the following types of material:

•*Annual reports published in NFPA periodicals:*

– Overall fire experience.
– Large fires (large dollar loss, catastrophic multiple death).
– On-duty firefighter deaths and injuries.

•*Annual reports published by the division, e.g.:*

– Major causes.
– Fire protection systems.
– Victim patterns.
– Regional and state patterns.
– Fire department resources.

•*Packages of previously published incident descriptions, often with additional statistical material, e.g.:*

– Specific property classes.
– Specific equipment types.
– Socioeconomic factors.

•*One-time special studies and articles of continuing relevance.*

Custom Services

From the moment we pick up the phone, our One-Stop Data Shop customizes services to your needs.

We can answer many of your questions immediately from our pre-packaged reports. Others require only a few moments to consult "quick look-up" references, which have been specially prepared to serve our callers.

NFPA analysts also offer a free initial phone consultation to discuss the match between what we have and what you need. This lets us zero in on the specifications that will provide the most useful, valid information for your purposes. It translates what you're after into the language we use to code and index fires. And this, in turn, helps us to determine how much of what you need we can provide and allows us to suggest alternatives if there is any information we don't have.

Through this exploratory discussion – and, if necessary, more detailed written exchanges – we can give you the specifications of the work we would do. We also can give you accurate project costs and schedules. So before you spend a single dollar, you will know your options and can then make an informed decision on how to proceed.

In general, our callers' needs for custom services fall into the four major categories below. And we've developed special services for each one:

•*Custom Reports*. When you need special statistical analyses, we can accommodate projects of any size. Most jobs are small jobs and do not require a contract. We will discuss various options, since it is often possible to specify several combinations of analysis scope, depth, cost, and speed. You then can choose the combination that is most suitable for you and only then authorize us to begin work.

•*Incident Searches*. Our incident searches are searches of individual fire incident files, specifically our Fire Incident Data Organization (FIDO) data base. FIDO keywords and codes are used to identify specific types of fires. The documentation provided consists of published articles from NFPA publications and/or NFPA reports on major fire investigations.

•*Custom Narratives*. We can prepare custom descriptions of individual fire incidents documented in NFPA's extensive files. These include tens of thousands of computer-indexed incidents since 1971 – and thousands more going back to the last century. The incidents can be selected to illustrate a particular phenomenon, which is especially helpful with audiences who respond better to vivid, specific examples than to summary statistics. On topics where representative statistics are not possible with existing data, this approach may provide the only way to develop exploratory information.

•*Research*. NFPA's Fire Analysis and Research Division has considerable experience with projects involving contract, subcontract, or grant sponsorship and long-term – even multi-year – schedules. Our staff can provide specifications on projects involving collection of special data from third-party sources, field investigations, simple mathematical models, expert judgments by panels, and other appropriate sources. We can then analyze and synthesize the results into the best treatment of the topic. The possibilities are limitless, so the only way to know what we can do is to let us examine your needs.

Models and Methods

Reflecting NFPA's commitment to expanded use of proven research techniques, the One-Stop Data Shop uses a wide variety of modern calculation methods and models in its work. In addition, we offer documentation on five methods:

•*HAZARD I*. This multi-component fire-hazard calculation method was developed and is supported by the National Institute of Standards and Technology's Building and Fire Research Laboratory (NIST/BFRL), formerly the National Bureau of Standards' Center for Fire Research. The necessary computer discs and volumes of supporting documentation are sold through the Fire Analysis and Research Division.

We also offer *HAZARD I – A Guide for Prospective Buyers* free. This guide provides a brief overview of the model – and the capabilities and resources you'll need to make valid and effective use of it.

The model requires a user-specified fire as input. It then calculates the development of fire effects (thermal, toxic gases, smoke) as a function of time...the reactions and movements of occupants...and which occupants will be killed by the fire, how, and when. It also calculates detector activation times, using a thermal-detector approach.

•*FPEtool*. FPEtool, developed by the National Institute of Standards and Technology, is a computerized package of relatively simple engineering equations and models useful in estimating the potential fire hazard in buildings. The calculations in FPEtool are based on established engineering relationships. The FPEtool package addresses problems related to fire development in buildings and the resulting conditions and response of fire protection systems.

In FPEtool, hazardous conditions are expressed in terms of the temperature, location, visual obscuration, latent and potential energy, oxygen content, and carbon monoxide and carbon dioxide concentrations in the smoke and hot gas produced by the fire. FPEtool also includes means for estimating egress time; ignition of exposed items; smoke flows; fire, wind, and stack pressures on a door; activation of sprinklers, and detectors; smoke wave in a long corridor; reduction in burning rate under sprinkler spray; tenability of areas of refuge; and other values useful in the evaluation of fire hazard in building spaces. A complete users' manual is included.

•*ALARM*. ALARM, which stands for Alternative Life Safety Analysis for Retrofit Cost Minimization, was developed by the National Institute of Standards and Technology (NIST) in cooperation with the U.S. Public Health Service and the U.S. Department of Justice.

ALARM generates a set of alternative compliance strategies and each strategy's estimated cost, that meet the requirements NFPA 101, Life Safety Code®. The first version of ALARM, designated 1.0, is available for analyzing buildings with health care occupancies such as hospitals and nursing homes. The second version, ALARM 2.0, is available for analyzing detention and correctional occupancies.

•*CFAST/FAST*. CFAST (v. 4.0.1) and FAST (V. 3.1.6) are engineering tools for estimating fire growth and smoke transport. These packages provide calculations of fire phenomena for use by the building designer, code official, fire protection engineer, and fire-safety related practitioner.

CFAST is the Consolidated Model of Fire Growth and Smoke Transport. It is the kernel of the zone fire models which are supported by BFRL. FAST and FASTLite are data editors and reporting tools which are "front" and "back" ends for the model CFAST, but what they are running is CFAST. The most recent implementation of CFAST itself is 4.0.1. It is a windows application and will run under all versions of Windows. The most recent version which includes a full featured data editor (FAST) is 3.1.6.

•*National Estimates Methods*. These are the most widely used statistical methods for calculating national fire statistics. They were developed by analysts at the U.S. Fire Administration (USFA), the U.S. Consumer Product Safety Commission (CPSC), and NFPA. These techniques are documented in an article that appeared in NFPA's *Fire Technology*. Copies of the article, co-authored by NFPA's John Hall and CPSC's Bea Harwood, are available at no charge from the One-Stop Data Shop.

NFPA'S DATA BASES

Since NFPA's founding the collection and analysis of data concerning the national fire problem has been a major priority. Annual statistical reports on the loss of life and property in fires have been published by NFPA for more than a half a century.

Today, NFPA is recognized worldwide as the leading source of U.S. fire incident data and statistics.

One reason is our long-time – and continuing – role as assembler and source of several of the nation's best-designed and most useful data bases on fire experience. Another is our access to and sophisticated use of other available fire data bases. Both capabilities are well illustrated in the following summary of the major data bases used by NFPA.

NFPA's Annual Survey of Fire Department Experience

Each year, NFPA surveys a large sample of U.S. fire departments to determine their summary fire experience during the previous year.

A stratified random sample, constructed to produce minimum sampling error, assures greater representativeness and accuracy than is available elsewhere. Follow-up calls to non-respondents and other specialized sampling and analysis techniques not used with other national fire data bases result in the best possible estimates of annual fire experience reported to fire departments.

The statistics analyzed each year from the survey include:

•Overall number of fires and associated civilian deaths, civilian and firefighter injuries, and direct dollar damage to property.

•Number of fires, deaths, injuries, and direct dollar damage to property, for major classes of property use.

•Number of incendiary or suspicious structural or vehicle fires and some associated losses.

•Variations of fire experience by community size and region of the country.

•Causes and nature of on-duty injuries to firefighters.

Results of the NFPA survey are available in the fall of the year after the one they describe. Comparable statistics, using the current methodology, are available back to 1977.

USFA's National Fire Incident Reporting System (NFIRS)

The U.S. Fire Administration's NFIRS data base is the most representative national fire data base providing detailed information on individual fires and casualties. Nearly all national estimates of specific aspects of the U.S. fire problem begin with NFIRS. About a third of U.S. fire departments – working through their respective states – participate in NFIRS, which receives reports on an estimated one-third to one-half of each year's fires.

NFPA and most other users of NFIRS combine it with the NFPA survey to produce the best "national estimates" of the specific characteristics of the nation's fire problem. The structure of NFIRS, like that of most other national fire data bases, is based on reporting from local fire departments, who use the categories defined in NFPA 901, *Uniform Coding for Fire Protection*. This permits the matching of categories, as described in the national-estimates methods article cited earlier.

NFIRS was established in the mid-1970s with only a couple of states participating. By 1980, there was sufficient representation from all regions to have high confidence in its representativeness. Thus, most analyses of NFIRS go back only to 1980. NFIRS is usually released on computer tape in the spring of the second year following the year it covers.

NFPA's Fire Incident Data Organization (FIDO)

Many questions of technical interest require a level of detail beyond that available through NFIRS or the NFPA survey. For these, the best approach often is to use exploratory data from a data base with sufficient validated detail to be useful, even though that data base may not be representative of overall U.S. fire experience. The largest such data base is FIDO.

FIDO is an incident-based data base that combines information from fire departments, insurance companies, Federal and state safety agencies, and news sources. NFPA designed and operates FIDO to provide the best examples of fires demonstrating very specific phenomena of high technical interest. Examples include fires with information on the performance of specific types of fire protection systems and features.

When FIDO is not representative of all reported fires, it is primarily because it favors larger, more severe fires, such as fires involving five or more deaths or at least $5 million in property damage. Smaller fires that come to NFPA's attention are included if they have unusually good technical detail or certain characteristics of major interest, such as involvement of high-rise buildings.

FIDO has operated since 1971 as a computerized index to NFPA's well-documented fires. FIDO contains data on almost 92,000 fires and now adds roughly 1,500 fires a year. There are up to 113 separate data elements on each incident, and coverage extends to fires of interest around the world.

FIDO is also the data base of choice when you want validated, well-documented, vivid examples of fire phenomena – even when they can also be addressed by representative national fire statistics. Many audiences respond better to case descriptions than to numbers, and FIDO provides the basis for custom narratives to serve this need. More important, its depth of documentation – and the sophistication of NFPA staff in using it – assure that FIDO incident narratives will be more reliable than second-hand news accounts, which tend to be the exclusive source for most other published accounts of individual fires.

NFPA's Data Base on On-Duty Firefighter Deaths

This data base is a specialized section of FIDO. Each year, NFPA collects detailed technical information on all on-duty firefighter deaths in the United States. The comprehensive coverage and detail provided are the result of NFPA's unique network of cooperating groups – including several Federal agencies, most notably the U.S. Fire Administration and the Public Safety Officers Benefit (PSOB) Program of the U.S. Department of Justice.

Data is collected for both career and volunteer firefighters. Available information includes the type of duty involved, the cause and nature of the fatal injury, the role of all types of protective and other equipment, and other technical details. Over 4,200 firefighter fatalities have been recorded, and a number of 10-year analyses have been performed.

NFPA's Fire Service Inventory (FSI)

The Fire Service Inventory is NFPA's computer file on all fire departments in the United States. We continually review this data base for completeness and accuracy and conduct a comprehensive survey of a third of all departments each year. The approximately 31,000 records in the file include the number of personnel by category, resources and budgetary information, and area of jurisdiction (including population protected).

FSI serves as a sampling frame for the NFPA survey and makes it extremely representative – because no other organization has so complete or accurate a data base on U.S. fire departments.

Each year, we issue a statistical profile of U.S. fire departments, based primarily on FSI. The profile gives numbers of firefighters, pieces of apparatus, and fire stations – overall and relative to population protected – both for the country as a whole and for

particular community sizes. This report is an invaluable planning tool and has also allowed NFPA to spotlight some very different trends in the career and volunteer fire services in recent years.

NFPA's Major Fire Investigations

Our most detailed fire incident data base is compiled by NFPA's Fire Investigations Division and is also indexed in FIDO. Major fires of technical significance are investigated and analyzed so that the lessons gleaned from them may be used to prevent similar incidents in the future.

NFPA investigators document many key factors, including fire ignition (typically provided by the responding fire department); fire growth; and the role of building construction, interior finish, furnishings, and other features in containing or feeding the fire or providing major avenues of spread. The type and role of fire protection systems – including detection and suppression equipment – are also examined, as are the abilities, knowledge, and behavior of the occupants; fire fighting and rescue phases; and the magnitude of loss of life, health, and property.

Relevant codes – including NFPA 101, *Life Safety Code®*, and the three model building codes – are reviewed and their requirements compared to the conditions found at the involved property. In this way, investigators can distinguish problems due to gaps in current codes from those arising from failure to update the codes applied in the field or to comply with the codes in force. This kind of detailed engineering analysis is essential to the identification of practical lessons of each fire.

Every NFPA investigation is, first and foremost, a case study in its own right. But with decades of investigations to draw on – and FIDO to provide less-detailed data on similar fires – NFPA has been able to develop matrix-format and other studies of patterns in major fires for many property-use classes. The One-Stop Data Shop currently offers such studies for hotels and for so-called board-and-care homes. Because each fire investigated is a major fire – typically one of the most serious of the year and, consequently, widely reported – a study of many such fires provides a uniquely powerful combination of statistics and vivid description. These studies have been used to support NFPA's testimony before the U.S. Congress and as an aid to decision-making by Federal agencies.

Death Certificate Data Base

Working primarily with the U.S. Consumer Product Safety Commission (CPSC), NFPA's One-Stop Data Shop uses the National Center for Health Statistics data base on all U.S. deaths for many diverse purposes. In the past we have employed it to:

•Calculate deaths due to carbon monoxide from unvented heating or cooking equipment, as part of risk analyses for those classes of equipment.

•Analyze the relative roles of burns and smoke inhalation as causes of fire deaths and characterize their differing trends.

•Compare fire death rates relative to population for the 50 states.

•And analyze fire death and fire death rate trends in this century.

CPSC's Data Base on Emergency Room Injuries

Through cooperation with CPSC, NFPA has been able to make extensive use of statistics from CPSC's National Electronic Injury Surveillance System (NEISS). This has enabled us to analyze injuries that are not due to fires but are fire-related – such as injuries resulting from fireworks and thermal-burn injuries from equipment that also causes significant fire losses.

FBI's Uniform Crime Reports

NFPA uses these and many special studies from the U.S. Department of Justice to prepare the most extensive analysis of the arson problem in the U.S.

NFPA RESEARCH

Fire Risk Analysis

NFPA's Fire Analysis and Research Division has been a leader in extending the methods, enlarging the use, and expanding the nation's understanding of risk analysis in the area of fire.

Under the sponsorship of The Fire Protection Research Foundation (TFPRF), we have been part of a multi-year project to construct a computerized fire risk analysis model around HAZARD I. The new risk analysis model estimates hazard values (expected life loss) for a large number of appropriately chosen fire scenarios, selected to represent the full range of fire situations in which a particular product may become involved. These hazard values are then weighted by the estimated probabilities of the scenarios they represent to produce fire risk estimates.

In this manner, the effects of proposed changes in product design can be evaluated with respect to likelihood of ignition, fire growth, smoke quantity and toxicity, and so forth. The results provide a best estimate of the net effect.

The methodology has now been documented, and those reports are available from TFPRF.

Dr. John Hall, head of the division, has published and spoken widely on this methodology – and on alternative approaches and basic concepts for fire risk analysis. He shared the Harry C. Bigglestone Award with Dr. Ai Sekizawa for a 1991 article on fire risk concepts. His writings have appeared in the *Fire Protection Handbook* and the publications of NFPA, the American Society for Testing and Materials (ASTM), the International Association of Fire Safety Science, and the U.S./Japan Panel on Fire Research and Safety.

Dr. Hall also was recognized in a 1983 award for "development and documentation of a fire risk analysis framework and methodology" by the National Bureau of Standards' Center for Fire Research. While there, he was a leader or participant in projects to develop and apply fire risk analysis to home sprinkler systems, fire-blocking of seats in passenger aircraft, and integrated modeling for nuclear power facilities.

Where possible, NFPA's approach emphasizes simple statistics: rates of losses relative to exposure. Where these cannot be calculated directly, other approaches, of the type developed by Howard Raiffa of Harvard University and others, are used to build estimates.

At its most elaborate, this is illustrated by Dr. Hall's work at NBS/CFR on airline seat-blocking, done for the Federal Aviation Administration. An existing data base provided extensive detail on the circumstances of deaths in relevant fires. Simple models

helped translate this information into estimates of the number of deaths where changes in seat-blocking, by delaying the onset of a lethal atmosphere, would have made a difference. Full-scale tests of the new seats then provided quantitative estimates of the new fire-hazard time-curves. Finally, consensus estimates of evacuation speeds permitted estimation of the number of lives that would have been saved with seat-blocking.

The One-Stop Data Shop has conducted similarly complex analyses on the possible effects of changes in cigarettes on smoking-material fire deaths. We also have incorporated simple measures of fire risk into studies of heating and cooking equipment, smoke detectors, sprinklers, manufactured vs. conventional housing, and comparisons of different age and sex groups.

In addition, the division's Rita Fahy maintains NFPA's Building Fire Simulation Model (BFSM), a probabilistic state-transition model of fire development in buildings. This was one of the earliest fire-specific risk analysis models, developed in the 1970s by an NFPA team including Ms. Fahy. The BFSM is recommended only as a research tool, because it depends on a large number of empirically based parameters, estimated from very limited data whose scope of valid application was undetermined. It remains a useful tool for setting up models and exploring logical and qualitative relationships.

Human Behavior and Evacuation

NFPA is knowledgeable on the latest developments in fire evacuation models and related research on human behavior in fires. Two such models are installed at NFPA, and a third is in development at NFPA.

EXITT – a sub-model of HAZARD I – models the behavior of individual occupants. It is practical primarily for dwelling-size properties with small numbers of occupants. *EVACPC* – the microcomputer version of *EVACNET*, an evacuation network model developed at the University of Florida – uses a quasi-hydraulic approach, based on occupant speeds through the building. It calculates evacuation times and bottlenecks but does not follow individual occupants.

NFPA's Rita Fahy has developed – and is continuing to test and refine – *EXIT89*. This new model tracks the behavior of individual occupants until they join evacuating crowds, then tracks group movement, thus capturing both phenomena important in the evacuation of larger buildings.

Working with Dr. John Bryan of the University of Maryland, NFPA also conducted studies of human behavior in three of the deadliest hotel fires in recent history. Follow-up interviews with guests and staff on site at the time of the fire were performed. The interview instrument and the conceptual models have since been applied in studies around the world, including the 1993 and 2001 evacuation of the World Trade Center in New York City, New York.

Economic Analysis and Operations Research

Each year, the One-Stop Data Shop estimates the "total cost" of fire in the United States. We use formulas developed by Worcester Polytechnic Institute students and refined by NFPA and others through conversations with experts in affected industries. This calculation pulls together costs of local fire departments, insurance, and fire-related construction, as well as the monetary equivalents of direct and indirect, reported and unreported loss of life, health, or property to fire.

Working with the Urban Institute, NFPA also has collected special data from more than a dozen cities and used it to analyze the key elements of success in programs of fire-code inspection. Other studies provided insights into key factors in home inspections.

Research Skills and Networks

In the course of NFPA analysis and research projects, as well as previous experience, division staffers have developed state-of-the-art skills in data collection and analysis projects. Our expertise extends from sound designs for sampling frames to design of questionnaires and analysis plans to imaginative techniques for interpreting and presenting results.

We are also knowledgeable on developments in other sectors of the fire research community. As Executive Secretary of NFPA's Research Section, Dr. John Hall helps this member subgroup as it seeks to expand the valid use of fire research and foster more frequent and useful exchanges between researchers and users of research. A Contributing Editor for NFPA's fire science journal, *Fire Technology*, Dr. Hall also has written chapters in the *SFPE Handbook of Fire Protection Engineering*, as part of NFPA's extensive cooperative work with the Society of Fire Protection Engineers. And both Dr. Hall and Ms. Fahy have authored research articles that have appeared in the fire research literature around the world.

In addition, division staffers also participate in many major national and world organizations involved with fire and related research. Some of these are the Fire Model Applications Users Group, ASTM, the International Association of Fire Safety Science, the American Statistical Association, the Operations Research Society of America, The Institute of Management Sciences, and the Fire Hazard Modeling Users Group.

THE ONE-STOP DATA SHOP STAFF

NFPA's Fire Analysis and Research Division is unique, to our knowledge, in the size and quality of staff devoted entirely to analysis of U.S. fire experience.

Our backgrounds range from fire service experience to analysis and research in many areas of Federal, state, and local government. And we have an extensive range of professional training in mathematics, statistics, operations research, and other branches of science.

What's more, when specialized knowledge is needed in other areas – such as fire science and engineering, public fire protection, or firesafety education – we can call on other members of NFPA's diverse and capable staff for immediate answers. In fact, one big reason the One-Stop Data Shop is able to live up to its name is that it is a gateway to all the expertise of NFPA.

Division Overview

The first voice you hear when you call NFPA's Fire Analysis and Research Division will belong to **Nancy Schwartz**. Ms. Schwartz is the One-Stop Data Shop Administrator and will assist you with your questions and fire information needs. Using the "quick look-up book" and our annual reports and packages, she is able to answer the most frequently asked questions. If referrals are needed, she will fulfill our One-Stop Data Shop philosophy by connecting you to the right person to help with your special requirements.

Laurie Eisenhauer, **Helen Columbo**, **Norma Candeloro**, or **Debbie Connell** can also assist you with your questions and fire information needs. Laurie Eisenhauer is Secretary to the One-Stop Data Shop. Laurie works with different staff members on projects, fills orders and supports the many different operations that the One-Stop Data Shop is involved in. Ms. Columbo is Secretary to the Assistant Vice President for Fire Analysis and Research and, as such, the division's lead secretary. Many of the division's major studies and reports pass through her hands. Ms. Candeloro is Secretary to the Manager of Fire Data Bases and Systems and provides support for that area. She also supports NFPA's Senior Statistician, Mike Karter, and so nearly all the fire data we collect passes through her hands. Ms. Connell is Fire Data Processor, the usual point of entry for a new fire incident into NFPA's Fire Incident Data Organization (FIDO) data base. She sets up the incidents identified by our news clips and also scans the flow for events or patterns that may be worthy of special attention by NFPA's analysts and other staff.

Once new FIDO incidents leave Ms. Connell's hands they go to the Fire Data Assistants, **Paul LeBlanc**, **Stephen Badger, Gary Stein**, and **Joe Mollis** to maintain and update our FIDO and Fire Service Inventory (FSI) data bases.

These part-time Fire Data Assistants are also Boston-area fire officers and firefighters that bring a hands-on perspective and exceptional depth of experience to our organization. Collectively, they represent over 50 years of service at NFPA and over 100 years of fire service experience. Mr. LeBlanc has been an author on all four of the FIDO-based annual studies, and for several years, he has been part of all NFPA's firefighter health and safety studies. Stephen Badger works on the annual large-loss fires report. Mr. Stein has run FSI and its associated surveys since joining NFPA in 1980. Mr. McCarthy is the author of the annual catastrophic fire deaths report. Joe Mollis is the author of the annual firefighter injury report.

The division is led by **John Hall**, Assistant Vice President for Fire Analysis and Research. Dr. Hall has been active in fire analysis and research for roughly 30 years. His special expertise and interests lie in issues of program analysis and evaluation, cost-effectiveness analysis, fire risk analysis, and the effectiveness of fire service management practices.

The other half of the division's management team is **Rita Fahy**, Manager of Fire Data Bases and Systems. Active in fire analysis and research for a decade and a half, Dr. Fahy manages FIDO, FSI, and all third-party data bases and computer analysis programs. She has special expertise and interest in computer modeling, data base and computer analysis techniques, human behavior with respect to fire, and socioeconomic factors in fire risk.

Michael Karter is the division's Senior Statistician. He, too, has been active in fire analysis and research since the early 1970s. Mr. Karter runs NFPA's annual survey of fire experience and produces all the statistics based on it. He also has special expertise and interest in sampling and statistical methods as applied to fire problems generally, fire department resource patterns, and socioeconomic factors in fire risk.

Marty Ahrens, Fire Analysis Specialist, and **Kimberly Rohr**, Fire Data Specialist, handle the technical work in the One-Stop Data Shop. If you have a need that requires specialized knowledge, especially if custom work is required, they are the ones to assist you.

Ms. Ahrens was a research analyst with a State Fire Marshal's Office and coordinated the fire incident and burn injury reporting systems. She has over 10 years experience working with the fire service and burn statistics. Ms. Rohr's previous experience has been in accounting for private companies.

What follows is additional detail on staff education, experience, affiliations and publications.

Biographical Sketches

John R. Hall, Jr., Ph.D.
Assistant Vice President
Fire Analysis and Research

EXPERIENCE: NFPA (1984-present)
NBS, Center for Fire Research (1982-84)
FEMA, U.S. Fire Administration (1979-82)
Urban Institute (1973-79)
Resource Management Corporation (1972-73)

EDUCATION: Ph.D., Operations Research, University of Pennsylvania, 1972
B.A., Mathematics, Brown University, 1967

AFFILIATIONS: Institute for Operations Research and the Management Sciences, Member, Past Board Member
International Association for Fire Safety Science, Member
American Society for Testing and Materials, Member
E-5 and E-6 Committees
Society for Risk Analysis, Member
American Association for the Advancement of Science, Member

PUBLICATIONS: Annual reports on home heating and cooking equipment, arson, total cost of fire, fireworks, child fireplay, age and sex patterns of home fire casualties, international comparisons, state-to-state fire death rate comparisons, manufactured housing, computer equipment and areas, high-rise buildings, burns vs. smoke inhalation, non-fire burns and non-fire asphyxiation from gases.

Other publications, including:

"Challenges to Safety in the Built Environment," *Fire Protection Handbook*, Nineteenth Edition, Chapter 1-1, 2003.

"An Overview of the Fire Problem and Fire Protection," *Fire Protection Handbook*, Nineteenth Edition, Chapter 2-1, 2003 (with Arthur E. Cote).

Hall (Continued)

"Fire Risk Analysis," *Fire Protection Handbook*, Nineteenth Edition, Chapter 3-8, 2003.

"Using Data for Public Education Decision Making," *Fire Protection Handbook*, Nineteenth Edition, Chapter 5-2, 2003.

"Evaluation Techniques for Fire and Life Safety Education, *Fire Protection Handbook*, Nineteenth Edition, Chapter 5-6, 2003, (with Karen Frush).

"Probability Concepts," Chapter 1-11 of the 2002 edition of *SFPE Handbook of Fire Protection Engineering*, published by NFPA.

"Statistics," Chapter 1-12 of the 2002 edition of *SFPE Handbook of Fire Protection Engineering*, published by NFPA.

"Product Fire Risk," Chapter 5-11 of the 2002 edition of *SFPE Handbook of Fire Protection Engineering*, published by NFPA.

"Data for Engineering Analysis," Chapter 5-5 of the 2002 edition of *SFPE Handbok of Fire Protection Engineering*, published by NFPA (with Marty Ahrens).

"Using Fire Scenarios Properly – A Challenge for Performance-Based Design," *Proceedings of Third International Conference on Fire Research and Engineering*, published by Society of Fire Protection Engineers, 1999 (with Jennifer Sapochetti).

"America's Fire Problem and Fire Protection," *Fire Protection Handbook*, Eighteenth Edition, Chapter 1-1, 1997 (with Arthur E. Cote).

"Using Data for Public Education Decision Making," *Fire Protection Handbook*, Eighteenth Edition, Chapter 2-2, 1997.

"Use of Fire Incident Data and Statistics," *Fire Protection Handbook*, Eighteenth Edition, Section 11, Chapter 3, 1997.

Hall (Continued)

"Fire Risk Analysis," *Fire Protection Handbook*, Eighteenth Edition, Chapter 11-8, 1997.

"Whatever Happened to Combustion Toxicity?," *Fire Technology*, November/December 1996.

"It Takes an NFPA Nation to Save a Life," *Fire News*, October/November 1996.

"A Tale of Fire Safety Programs That Work - Two Decades of Hotel/Motel Fires," *NFPA Journal*, July/August 1996.

"A Fire Risk Analysis Model for Assessing Options for Flammable and Combustible Liquid Products in Storage and Retail Occupancies," *Fire Technology*, November 1995.

"Fiddling While Rome Burns...And Other Myths About Fire," *NFPA Journal*, November/December 1994.

"How to Tell Whether What You Have is a Fire Risk Analysis Model," *Fire Hazard and Fire Risk Assessment*, STP 1150, ASTM, Philadelphia, June 1992.

"Fire Risk Analysis: General Conceptual Framework for Describing Models," *Fire Technology*, February 1991 (with Dr. Ai Sekizawa).

"The Hunt for Red Hot Home Hazards in October," *Fire Journal*, September/October 1990.

"The Elderly, the Sick, and Health Care Facilities," *Fire Journal*, July/August 1990.

"Decision Analysis Model for Passenger-Aircraft Fire Safety with Application to Fire-Blocking of Seats," NBSIR 84-2817, National Bureau of Standards, January 1984 (with S. Wayne Stiefel).

"Analysis of Electrical Fire Investigations in Ten Cities," NBSIR 83-2803, National Bureau of Standards, December 1983 (with Richard Bukowski and Alan Gomberg).

Hall (Continued)

"Fire Risk Analysis," *Fire Protection Handbook*, Eighteenth Edition, Chapter 11-8, 1997.

"Whatever Happened to Combustion Toxicity?," *Fire Technology*, November/December 1996.

Rita F. Fahy, Ph.D.
Manager
Fire Data Bases and Systems

EXPERIENCE: NFPA (1977-present)

EDUCATION: DPhil for Published Work, University of Ulster, 2000
M.S., Industrial Engineering (Operations Research), Northeastern University, 1989
B.S., Mathematics, Northeastern University, 1978

AFFILIATIONS: International Association for Fire Safety Science, Member

PUBLICATIONS: Annual reports on on-duty firefighter fatalities.
Formerly annual study of catastrophic fire deaths.

Other publications, including:

"Tools for the Simulation of Human Behavior," *Fire Protection Engineering*, Issue No. 16, Fall 2002, pp. 28-31.

"A Comparison of the 1993 and 2001 Evacuations of the World Trade Center," *Proceedings of the 2002 Fire Risk & Hazard Assessment Research Application Symposium*, Fire Protection Research Foundation, Quincy MA, 2002, (with G. Proulx).

"Update on the Features and Demonstrated Predictive Capability of EXIT89," *Proceedings of the International Conference on Engineered Fire Protection Design*, Society of Fire Protection Engineers, Bethesda, Maryland, 2001.

"Toward Creating a Database on Delay Times to Start Evacuation and Walking Speeds for Use in Evacuation Modeling," *Proceedings of the 2nd International Conference on Human Behavior in Fire 2001*, Interscience Communications Ltd., London, 2001 (with G. Proulx).

Fahy (Continued)

"Verifying the Predictive Capability of EXIT89," *Proceedings of the 2nd International Conference on Human Behavior in Fire 2001*, Interscience Communications Ltd., London, 2001.

"New Developments in EXIT89," U.S./Japan Government Cooperative Program on Natural Resources (UJNR), 13th Joint Panel Meeting, *NISTIR 6588*, 2000.

"Human Behavior Modeling as Part of an Engineered Design," *Conference Proceedings of the 8th International Interflam Conference*, Interscience Communications Ltd., London, 1999 (with J.I. Sapochetti).

"Balancing Fire Prediction and Egress Prediction," *Proceedings – Third International Conference on Fire Research and Engineering*, Society of Fire Protection Engineers, Maryland, 1999 (with J.I. Sapochetti).

"A Practical Example of an Evacuation Model for Complex Spaces," *Proceedings of the First International Symposium on Human Behaviour in Fire*, ed. T.J. Shields, Fire SERT Centre, University of Ulster, 1998.

"High-Rise Evacuation Modeling: Data and Applications," U.S./Japan Government Cooperative Program on Natural Resources (UJNR), 13th Joint Panel Meeting, *NISTIR 6030*, 1997.

"The Time Delay to Start Evacuation: Review of Five Case Studies," *Fire Safety Science: Proceedings of the Fifth International Symposium*, Ed. Y. Hasemi, International Association for Fire Safety Science, 1997 (with G. Proulx).

"Human Behavior in the World Trade Center Evacuation," *Fire Safety Science: Proceedings of the Fifth International Symposium*, International Association for Fire Safety Science, 1997 (with G. Proulx).

"EXIT89 - High-Rise Evacuation Model - Recent Enhancements and Example Applications," *Conference Proceedings of the Seventh International Interflam Conference*, Interscience Communications Ltd., 1996.

Fahy (Continued)

"A Study of Occupant Behavior During the World Trade Center Evacuation," *Conference Proceedings of the Seventh International Interflam Conference*, Interscience Communications Ltd., 1996 (with G. Proulx).

"The Study of Occupant Behavior During the World Trade Center Evacuation -- Preliminary Report of Results," *Proceedings: International Conference on Fire Research and Engineering*, Society of Fire Protection Engineers, 1995.

"Study of the New York World Trade Center Evacuation," *Proceedings - ASIAFLAM '95 International Conference on Fire Science and Engineering*, Interscience Communications Ltd., 1995 (with G. Proulx).

"EXIT89 - An Evacuation Model for High-Rise Buildings – Recent Enhancements and Example Applications, "Proceedings - International Conference on Fire Research *and Engineering*, Society of Fire Protection Engineers, 1995.

"Collective Common Sense: A Study of Human Behavior During the World Trade Center Evacuation," *NFPA Journal*, March/April 1995 (with G. Proulx, NRCC).

"EXIT89 - An Evacuation Model for High-Rise Buildings – Model Description and Example Applications," *Proceedings of the Fourth International Symposium*, International Association for Fire Safety Science, 1994.

"Who Died in Fires in the United States?," *NFPA Journal*, May/June 1994 (with Christopher J. Conley).

"Leaving Children Unsupervised is Playing with Fire," *NFPA Journal*, May/June 1993.

"An Evacuation Model for High-Rise Buildings," *Interflam '93 Proceedings*, Interscience Communications, Ltd., London, 1993.

Fahy (Continued)

"EXIT89: An Evacuation Model for High-Rise Buildings," *Fire Safety Science – Proceedings of the Third International Symposium*, Elsevier Applied Science, New York, 1991.

"How Being Poor Affects Fire Risk," *Fire Journal*, January 1989 (with Alison L. Norton).

"Fatal Fires and Unsupervised Children," *Fire Journal*, January 1986.

"Building Fire Simulation Model: An Overview," *Fire Safety Journal*, 1985.

"An Examination and Analysis of the Dynamics of the Human Behavior in the Westin Hotel Fire," unpublished NFPA project report, 1985.

"Building Fire Simulation Model," *Fire Journal*, July/August 1983.

Final Technical Report on Building Fire Simulation Model, 2 volumes, Quincy, MA: National Fire Protection Association, May 1983 (revised) (with J.A. Swartz et al).

Michael J. Karter, Jr.
Senior Statistician

EXPERIENCE: NFPA (1974-present)
Maine Employment Security Commission (1971-72)

EDUCATION: M.S., Communications Research and Applied Statistics, Boston University, 1974
B.A., Mathematics, University of Maine, 1971

AFFILIATIONS: American Statistical Association, Member

PUBLICATIONS: Annual studies of overall U.S. fire losses, on-duty firefighter injuries, fire department resource profile, nuisance alarms. Biennial studies of regional patterns in fire experience, detailed patterns of firefighter injuries.

Karter (Continued)

Other publications, including:

A Needs Assessment of the U.S. Fire Service, unpublished final report for U.S. Fire Administration funded project, 2002 (with others).

"Cigarette Characteristics, Smoker Characteristics, and the Relationship to Cigarette Fires," *Fire Technology*, 1994 (with others).

"NFPA Surveys U.S. Fire Departments," *NFPA Journal*, July/August 1993.

Fire Code Inspections and Fire Protection: What Methods Lead to Success?, Boston: National Fire Protection Association, 1979 (with others).

"The Effect of Demographics on Fire Rates," *Fire Journal*, January 1978 (with Allan Donner).

Procedures for Improving the Measurement of Local Fire Protection Effectiveness, Boston: National Fire Protection Association, 1977 (with others).

Marty Ahrens
Fire Analysis Specialist

EXPERIENCE: NFPA (1997-present)
State Fire Marshal's Office (1986-1997)
Abt Associates (1983-1986)
Social Worker (1980-1983)

EDUCATION: Master of Social Work, Boston University, 1980
B.A., Psychology, University of Connecticut, 1978

AFFILIATIONS: National Fire Information Council, (NFIC), Associate Member and Member of Spin Committee, Past Member and Board Member

PUBLICATIONS: Annual reports on smoke alarms, vehicle fires, U.S. fire problem overview and a special report on home fires resulting from misusing or mishandling.

Ahrens (Continued)

Annual special data packages on candles, service stations nursing homes, LP-Gas, torches, wood shingle roofs, religious properties, refineries, tank farms, vacant, abandoned & under construction properties.

Other publications, including:

"Use of Fire Incident Data and Statistics," *Fire Protection Handbook*, Nineteenth Edition, Chapter 3-3, 2003, (with Patricia Frazier and Jim Heeschen).

"Fire Data Collection and Databases," *Fire Protection Handbook*, Nineteenth Edition, Chapter 3-2, 2003, (with Stan Stewart and Paul L. Cooke).

"Data for Engineering Analysis," Chapter 5-5 of the 2002 edition of *SFPE Handbok of Fire Protection Engineering*, published by NFPA (with John R. Hall, Jr.).

"Candle Fires: A Growing Problem," Ashore, Winter 2001-2002

"Risky Behavior," *NFPA Journal*, January/February 1999.

"All Fired Up," *NFPA Journal*, May/June 1998.

"Batteries Not Included," *NFPA Journal*, May/June 1998.

"A Special Study of Massachusetts Candle Fires During 1999," unpublished study, (with Jennifer Mieth).

Annual Reports for Massachusetts' Burn Injury Reporting System and Massachusetts Fire Incident Reporting System.

Kimberly D. Rohr
Fire Data Specialist

EXPERIENCE: NFPA (1997-present)
Amerimortgage (1995-1997)
Physicians Optical (1993-1995)
Rohr's Carpentry (1989-1993)

Rohr (Continued)

EDUCATION: Credits toward B.S., Mathematics, Northeastern University

PUBLICATIONS: Annual reports on sprinklers, home product reports (forms/types and appliances/equipment).

Annual special data packages on school, college and university dormitories, and fraternity and sorority houses, educational facilities, facilities that care for the sick, prison & jails.

Articles on "An Update to What's Burning in Homes"

Paul R. LeBlanc
Fire Data Assistant

EXPERIENCE: NFPA (1978-present)
Boston Fire Department (1972-present)
U.S. Marine Corps (1966-68)

EDUCATION: A.S., Fire Science, Bunker Hill Community College, 1975
Certified Fire Investigator

AFFILIATIONS: International Association of Firefighters, Member
Professional Firefighters of Massachusetts, Member
International Association of Arson Investigators, Member
Massachusetts state Chapter of Association of Arson Investigators
Rhode Island state Chapter of Association of Arson Investigators
International Association of Bomb Technicians and Investigators

PUBLICATIONS: Annual study of on-duty firefighter deaths.
Formerly annual studies of on-duty firefighter injuries, multiple-death fires and large-loss fires.

Stephen Badger
Fire Data Assistant

EXPERIENCE:	NFPA (1990-present) Quincy Fire Department (1970-present) U.S. Army (1965-1969)
EDUCATION:	A.S., Fire Science, Massasoit Community College, 1975 Emergency Medical Technician, Bunker Hill Community College, 1977 American Heart Association Basic Life Support Instructor, 1993
AFFILIATIONS:	International Association of Firefighters, Member Professional Firefighters of Massachusetts, Member Boy Scouts of America, Troop committee member and first aid instructor
PUBLICATIONS:	Annual study of large-loss fires.

Gary P. Stein
Fire Data Assistant

EXPERIENCE:	NFPA (1980-present) Tunnel Rescue Coordinator (1992-present) E-911 Coordinator (1997-1998) MSHA/OSHA Mine/Tunnel Rescue Instructor (1992-present) Quincy Fire Department (1974-present) U.S. Air Force (1966-69)
EDUCATION:	A.S., Fire Science and Safety Technology, Bunker Hill Community College, 1978
AFFILIATIONS:	Professional Firefighters of Massachusetts, member Boston Computer Society, Member Massachusetts Association of EMT's National Association of EMT's International Association of Firefighters, Past Member and Local E Board Member for 20 years
PUBLICATIONS:	Maintenance of Fire Service Inventory and conduct of annual survey of fire department resources and identifiers.

Joseph L. Molis
Fire Data Assistant

EXPERIENCE:	NFPA (2000-present) Providence Fire Department (1991-Present)
EDUCATION:	B.S., Fire Science Providence College, 1999
AFFILIATIONS:	International Association of Firefighters Rhode Island Fire Academy, Instructor
PUBLICATIONS:	Annual study of firefighter injuries.

NFPA FACILITIES AND EQUIPMENT

The National Fire and Incident Reporting System (NFIRS) system is a custom developed application running on an IBM AS400/170. The One-Stop Data Shop staff have on-line access to the more than 15 years worth of fire incident data and can interactivcely run reports and also download data extracted from NFIRS to their local microcomputer for analysis or report creation.

Other systems that support the Fire Analysis and Research Division are run from NFPA's local area network. These include the Fire Incident Data Organization (FIDO), Fire Service Inventory (FSI) word processing, graphics generation, administrative and budgetary tracking, and specialized statistical and spreadsheet analyses that go beyond our mainframe programs.

NFPA has a local area network supporting more than 300 microcomputer clients, using Windows NT as its primary network operating system.

NFPA'S OTHER TECHNICAL CAPABILITIES

NFPA seeks to develop and distribute technical information on firesafety in all the forms that may be useful to members of the fire community. In every area, NFPA's programs, services, and capabilities are the best you can find.

Technical Materials

•Call *NFPA Customer Service* at 1-800-344-3555 or visit our on-line catalog at www.nfpa.org for the following:

– The latest consensus codes and standards on firesafety, electrical safety, or relate subjects;

– Handbooks or other guides elaborating on those codes and standards;

– Other scientific and engineering reference materials;

– Firesafety educational materials; or

– Other instructional brochures or films.

And whatever you need, NFPA has the information you want in the form you want, ready to send.

Technical Advice

•Call, e-mail or write NFPA staff for follow-up questions on any of NFPA's technical materials.

– The *Public Affairs Division* oversees all NFPA's information dissemination activities and is the place to go when you aren't sure where to begin. Phone: 617-984-7275 or e-mail: public_affairs@nfpa.org

– The *Engineering Division* has a large staff of engineers and technical specialists knowledgeable to answer questions on firesafety and electrical safety related codes and standards and matters of scientific or engineering fact. This includes electrical systems, fire protection systems and features, hazardous materials, life safety design features and fire protection of special systems and occupancies. Phone: 617-770-3000

– The *Public Fire Protection Division* is staffed by professionals with extensive experience in the public fire service. They can answer questions on codes, standards, and other issues related to the public fire service – from organization...to equipment...to protective clothing...to health and safety...to training and certification. Phone: 617-770-3000

– The *Public Education Division* can answer questions on firesafety and injury prevention education in all its forms, particularly the *Learn Not to Burn® Curriculum* and *Risk Watch®*. Phone: 617-984-7285 or e-mail education@nfpa.org

– The *Charles S. Morgan Technical Library* is one of the world's leading libraries on fire, with materials going back a century or more. It has the largest collection of fire-related materials in the U.S. and offers access to a diverse and growing assortment of on-line literature search services. The library is available to students, researchers, the press, and anyone else interested in exploring fire-related topics. Electronic literature searches are available, as well. Phone: 617-984-7445 or e-mail library@nfpa.org

Technical Forums

•NFPA's Spring *Meetings* and *Fall Meetings* provide outstanding forums where a diverse cross-section of the fire community can exchange ideas. New discoveries and developments are showcased in every aspect of the field of fire.

•*Continuing Education* organizes, contracts, and coordinates seminars and workshops that give you in-depth training in the most technically complex codes, standards, fire protection systems, and other aspects of fire protection and the fire service.

•NFPA's *Member Sections* provide technical programs, newsletters, and other forums for exchanging ideas and views with other NFPA members who share a special interest in a particular aspect of firesafety.

Special Research

•*The Fire Protection Research Foundation (TFPRF)* coordinates a wide-ranging program of major sponsored-research projects. Cutting-edge issues with immediate practical impact are examined, from specialized fire protection system needs to more sophisticated methods of measuring fire risk.
Phone: 617-984-7283 or e-mail nfparesfdn@nfpa.org

•The *Center for High-Risk Outreach* addresses the needs of people at greatest risk from fires and burns; young children, older adults, and people in low-income communities. The center looks for emerging issues that relate to factors that cause people to be at higher risk to fire deaths and injuries and works to provide solutions through engineering, enforcement, and education.
Phone: 617-984-7826 or e-mail sgamache@nfpa.org