

# NATIONAL FIRE INVESTIGATOR

Spring/Summer

2016



## GUILTY UNTIL PROVEN INNOCENT

Can a manufacturer exist in this era of litigation and multi-million dollar settlements?

## SUPPRESSING THE BURN

Why the NFPA's revised 1033 is the next big thing in fire claims investigations..

## SNEAK PEEK: ISFI 2016

Get the first look at the papers being presented at ISFI 2016.

The official publication of NAFI,  
The National Association of Fire Investigations



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Follow NAFI on



# Chairman's Message



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*John Kennedy's lasting legacy is a financially sound NAFI, with the best and brightest members, and a solid path forward in our leadership team.*

## Welcome Members,

**W**e started the year with some sad news, as you may have heard we lost NAFI's Founder and my father John Kennedy in January. While we are very sad at his passing, we are happy that his legacy lives on at NAFI and is stronger than ever. He leaves a financially sound organization, with the best and brightest members, and a solid path forward in our leadership team. Be assured, NAFI is bigger than any one person and I dare to say even bigger than the sum of our 7000 members around the globe. You are a part of something great, we're working together for a safer world and the advancement of Fire Investigation Science. That is work of which my father, myself and most importantly you the member should be very proud. We will continue his work here at NAFI for another 65 years. (at least!).

2016 is shaping up to be an amazing year – We're unveiling a number of new programs (see page 9 for the first) , hiring some new faces around the office and upping our game for the best summer of training you've ever seen.

Let's get social. Our new social media department is pumping out an amazing amount of valuable content on our Facebook page ([facebook.com/nafi.org](https://facebook.com/nafi.org)) and we're launching new LinkedIn groups and pages in July. Keep checking the social pages for special content, some fun contests and training announcements.

ISFI 2016 is going to be amazing – Maybe you saw the Preview article by Brian Henry and Andrew Smith on our facebook page. If you haven't, you can find a sneak peek on page 18 and on our blog. <http://bit.ly/291QGp6>

Speaking of ISFI – We're having a flash sale. From July 11-15 all the previous additions of the ISFI proceedings will be drastically discounted through the [ISFICongress.com](http://ISFICongress.com) website – watch your email box and social feeds for the announcement.

Take note of the new recertification guidelines on page 6 of this issue. Don't lose your valuable credentials because you didn't keep up with your training or even worse didn't submit the free recertification form in a timely manner.

Patrick M. Kennedy, CFEI,  
Chairman of the Board



# NAFI Life Membership

We're rewarding our most loyal and experienced members with a new Life Member Status.

**A**t the July, 2015 board meeting, the Board of Directors voted to create a special membership category for members over the age of 70. Life members will be exempt from paying dues and will retain all other benefits of membership. A special Life Member Certificate will be issued to Life Members.

You do not have to be retired to take Life Membership – you can continue to work, however, Life Members are not exempt from CFEI recertification. You must recertify by your due date to continue to use the CFEI, CFII and CVFI credentials.

## Life Member Eligibility Requirements:

- Age 70+. You may be asked to provide verification of your age in the form of a copy of your driver's license, birth certificate, or passport.
- 20 years of uninterrupted membership in good standing.
- No disciplinary actions.
- Valid email on file.

If you have reached the age of 70 and have been a member in good standing for at least 20 uninterrupted years, the Board of Directors invite you to apply to convert your membership to a Life Membership. Life Membership will become effective upon the next dues renewal date. No refunds (full or partial) will be made for dues previously paid.

The Life Membership Application can be found at <http://www.nafi.org/forms/>

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*We've had requests over the years for a special status for members who may have left the workforce and I think we can all agree this is a great way to repay our longest serving members for their service and support of NAFI.*

*- Christine Meier, Co-Executive Director*



NAFI strives to treat each and every member as a valued colleague. Rewarding our long serving members is the right thing to do.





FOR BY  
**FI FI**

**PRO PLAN INSURANCE- NAFI**  
fire-investigator-coverage.com  
nafi.org



## Coverage for Fire Investigators By Fire Investigators

- Highest Levels of Protection at the Lowest Rates
- Payment plans available
- Professional Liability/Errors & Omissions
- General Liability - Add on Coverage
- Business Personal Property - Add on Coverage
- Cyber Liability - Add on Coverage
- No Charge for Additional Insureds
- No Charge for Waivers of Subrogation
- Certificates of Insurance within 24hrs

SAVE TIME  
SAVE MONEY  
**GET THE BEST COVERAGE**

Our agent works for you, the NAFI Member. There are no commissions or hard-sell tactics, just great advice, free quotes and the great customer service you expect from NAFI.

# Smart Insurance Great Service

## *Insurance Coverage Built for your business*

Most Fire Investigators think they're fully protected but many common fire investigation functions are not covered by standard professional insurance plans. This may leave you at risk!

Until now...

The NAFI Pro Plan is affordable coverage that protects the Professional Fire Investigator. We partnered with Lloyds of London and industry experts to design a policy that closes gaps, like Evidence Care & Control; Engineering Analysis and Fire Scene Processing, and protects fire investigators.

## *Talk to NAFI's Insurance Pro*

**Paulette Braga, CPCU CIC AAM CPII**  
Toll Free: 877-506-6234 Direct 941-806-0915  
Pbraga@nafi.org National Producer # 16388943

Your **Ultimate** Guide to

# NAFI CFEI Recertification



Recertification is about actively staying on top of the new science, latest codes and standards and court decisions. That is why professional practice isn't considered in the recertification process.

On January 1, 2016 updated recertification guidelines were released. Have you seen them? The two biggest changes are the removal of a grace period for recertification and a change for members lapsed more than 1 year.

1. No grace period: The CFEI credential is removed from your name the day your recert expires.

2. CFEI Reinstatement: If you are more than 1 year late in recertifying, you must reapply and retest.

## Failure to Recertify:

CFEI credentials are immediately suspended once the recertification date has passed. A onetime short extension may be granted by the National Certification Board if requested prior to the recertification date. Members who fail to recertify within one year of their recertification date will be required to submit an application to retest for CFEI Recertification and a retesting fee of \$125. The CFEI Recertification exam will be an advanced exam and will reflect the current theoretical and technological advancements in the field of fire and explosion investigations. This is only available to those members who are a year past due and will not be granted to any other members as a means to recertify.







Did you know being an instructor gives you double credit for recertification? 1 Hour of being the sole instructor = 2 hours of being a student.



This symbol indicates that a training program completely fulfills the recertification requirement. Only NAFI sponsored or pre-approved courses use this symbol.

## Extensions:

Having trouble completing your training before your expiration date? We understand that life does sometimes get in the way. Call Membership Services BEFORE your expiration date and the staff is empowered to grant you a one-time, short (usually 3 month) courtesy extension. No extensions will be given to CFEI's who call AFTER their recert date, unless you are on active military duty or have valid medical reasons.

## NAFI Membership.

Keeping your NAFI membership up to date is a requirement of the CFEI. If your membership expires so does your CFEI. More than that, you lose the right to use the credentials after your name.



## Recertification Process

It is your responsibility to keep track of your own training records (even NAFI sponsored ones). Most members find they must recertify for a number of organizations and having one folder with all their training certificates and transcripts is very helpful. Do not submit the recertification form until you fully meet the requirements.

We will send you your first notice of recertification about a year before it is due. If you've completed the required training, just complete the form and attach the required supporting documents. You may mail or fax the recertification form to the Membership Services Office. If you have not yet completed the necessary hours, you have 1 year to find the classes you need. See the list on page 8 for some great sources of training. We will send a second notice of recertification 1 Month before it is due and will follow up with past due Recertification notices once it has expired.

To meet the CFEI recertification requirements you may:

Attend ONE NAFI Sponsored 3 or 4 Day Training Program. Registration for these programs are found exclusively at NAFI.org. Turn in the Recertification form while you are at the class and you're done.

Attend 40 contact hours of fire investigation training from any other source, such as IAFI, PATC, FESTI, CFI Trainer, etc... This may also be met with one 3 hour college credit course. These can either be live or online training.

Teach 20 contact hours as the sole instructor/lecturer for a Fire Investigation Course, Seminar or Web-based training.

Once your Recertification is received by the membership services office, it will take about 2 weeks for processing and approvals. We will update your records on the website and then about 3 weeks later you should receive your certificate in the mail.

There is no fee for recertification. Yes, you heard that right - Zero, Zilch, NADA. All you have to do is mail in the form. There is no cost beyond your annual (and if we say so - quite affordable) dues.



When you attend a NAFI training program your recertification requirements are completely fulfilled. We make sure our curriculum packs in the quality fire investigation science.



## Burning Questions:

### Why can't I email my recertifications forms?

Would you believe it's more expensive to process email forms? It is. A paid staffer has to take time and resources monitor the email account and print the pages before we can process them for approvals. Mailing or faxing allows us to keep costs low and keep recertification fee free.

### What do you do with all that recert paperwork?

We store it forever. Really. Forever. After your recertification paperwork has been approved, it is scanned and printed in miniature to fit on one or two pages. The originals are shredded and the copies are stored in our archive.

**Why doesn't professional practice or hours worked count toward recertification?** How do you know you're doing it right? We want to know that you are keeping up with rapid advances in fire investigation science.

### What can I do to make my recertification go more smoothly?

- A. Complete the form – both the top address portion AND the listing of courses
- B. Attach legible certificates or other approved supporting documents
- C. Do not staple or bind documents (we just have to take them apart)
- D. Mail or fax your recert at least two weeks before your due date.
- E. Do not mail in the form until you have completed the training.
- F. Have enough hours. Check and make sure you meet 1 of the three ways to qualify.
- G. Make sure your dues are paid. We do not process recert forms on expired memberships.
- H. Choose the easiest option. Take a NAFI course, hand in the form on site and be done with it!



## RECERTIFICATION By the Numbers

# 2.75

# of recert forms received each day, including weekends.

# 5355

# of CFEl's world-wide.

# 82

Average number of recerts due each month.

Largest number of recertification

# 237

due in any month. (March 2018)

# 40

# of Hours of being a student in live or web based training to fulfil the requirement.

# 1

NAFI Sponsored Multi-day Training Course fulfils the requirement.

# 20

# of Hours of being the sole instructor of a fire investigation course to fulfil the requirement.

# 3

# of College Credit hours course in fire investigation that fulfils the requirement (e. g. ECU, University of Maryland, Local or Community College)

# 633

New CFEl's in the last 12 months..

# 170

# of CFEl's who've lost their CFEl this year by not recertifying.

# 0

# of CFEl's who are exempt from recertification.

## GREAT SOURCES OF FIRE INVESTIGATION TRAINING

### NAFI

Live Training Events  
<http://www.nafi.org/learn>  
<http://www.isfconference.com>



### INTERNATIONAL

ASSOCIATION OF FIRE  
INVESTIGATORS (IAFI)  
Recorded webinar training  
<http://www.I-A-FI.org>



### PATC – PUBLIC AGENCY TRAINING COUNCIL

Live and webinars training courses.  
<http://patc.com/>  
<http://www.fsti.com/>

EASTERN KENTUCKY UNIVERSITY -EKU  
College credit courses in Fire Investigation  
<http://fireand arsoninvestigation.eku.edu/>

### NATIONAL FIRE PROTECTION ASSOCIATION - NFPA

Online and live training  
<http://www.nfpa.org/training-and-events/by-type/online>

### Fire & Emergency Services Training Institute - FESTI (Canada)

Live Training  
<https://elearning.festi.ca/festi/views/cart/search/fieldsearch.html?field=productcategory&productcategory.value=fireprevention&operation=exact>

### CFI TRAINER

<https://www.cfitrainer.net/>  
Recorded webinar training

UNIVERSITY OF MARYLAND  
College courses in FPE  
<http://www.fpe.umd.edu/home>



## PRODUCT LIABILITY

# GUILTY UNTIL PROVEN INNOCENT

Daniel L. Churchward, CFEI

Can a manufacturer exist in this era of litigation and multi-million dollar settlements? Yes, but they must go beyond traditional R & D practices to ease the burden of product litigation.

A prominent consumer electronics manufacturer sold an automatic drip coffemaker [ADC] coffeemakers utilizing thermal-cutoffs [TCO] technology [a one-shot temperature sensing device that will open circuit when a specific temperature is reached]. In late 1980's, a fire occurred in a large Midwest city that caused a home to burn that was owned by the Smith family [all names are changed to protect identities]. Mr. Smith witnessed the fire burning on the kitchen counter around where the ADC set. Before the fire was over, two young boys had died and a third child had been severely burned, but lived.

Mr. Smith and his insurance carrier filed suit against the manufacturers of the ADC and TCO. As a consequence of the litigation, both manufacturers settled with the Smiths and their insurer. The amount of the settlement was kept confidential, but the estimate was in the eight-figure range. Also, an extensive recall was instituted for the coffemaker that they manufactured, allegedly several million units. Estimated costs for a 100% recall can routinely amount to tens of millions dollars. This case and many others like it can

discourage manufacturers from entering into any such field.

During the discovery process, inter-department memo were identified in the manufacturer's file. There was a memo from R & D stating that they believed that their TCO's were 90 % reliable, therefore they recommended that two TCO's be placed in series to provide 99 % reliability. The second memo was from Marketing saying that the company could not include a second TCO because it would add an eleven-cent increase to the unit cost. These memos and a video of the burned girl putting on her burn suit were listed as trial exhibits.

Was the manufacturer wrong in their decision to utilize one TCO? Was the manufacturer irresponsible in their decision? These questions were never answered because the case settled before a jury was asked. Any attorney representing the manufacturer would have soon realized that they could lose this case in a court of law based on the emotion of the issues.

My purpose in this article is to point out some aspects about safety that all manufacturers, large and small, should consider when they delve into the consumer marketplace.

Manufacturers provide consumer goods that they hope the consumers will purchase. Further, manufacturers do not start out designing and manufacturing products that are unsafe or that can put consumers at peril. Any conduct less than these basic tenets would spell quick doom for a manufacturer. Yet, manufacturers are routinely accused in lawsuits of creating, marketing and selling products that are unsafe. Yet, some manufacturers, in turn, routinely turn a blind eye to this litigation peril when they design and manufacture their goods.

R & D, sometimes in conjunction with the Marketing Department, devotes resources to develop a product. They get the concept worked out, develop the strategy to get it into the marketplace, and work with organizations, like Underwriters Laboratories, to insure that their new product meets or exceeds industry standards. So, what more can the manufacturers do? Consider the following suggestions when you answer this question.

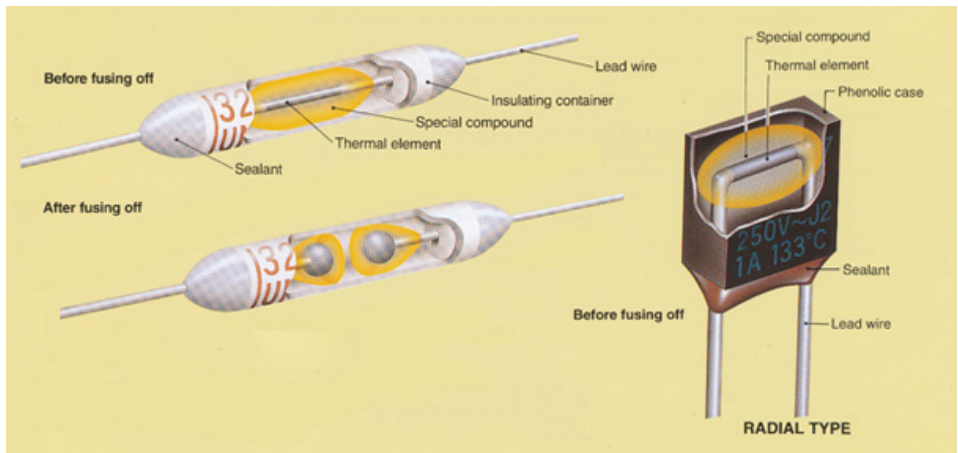
## Safety Before Economics

Safety has to have a prominent position in the company. Since safety costs money, and generally a lot of money, this philosophy must originate with senior management. Someone at the highest level of the company must make a clear declaration that safety will prevail in all aspects of the design, manufacturing and marketing of a product. Once the stance is taken, the R & D and Marketing staffs must adopt this position and adhere to it. One sure way to see safety placed in the forefront is to establish a safety review committee that has a prominent role in the design process. This body of safety advocates can focus attention on safety allowing the R & D team to concentrate on the traditional processes of manufacturing.

## Failure Analyses Techniques:

Utilize proven failure analyses techniques to analyze the product. These can include Failure Mode and Effects Analyses [FMEA's], Fault Tree Analyses and computer modeling. Bring these techniques into the process as early in the design function as possible. End use FMEA's, done at the earliest ideation stages, can serve to initiate the process. These, in turn, lead into Design FMEA's and Production FMEA's. Make sure that all safety-related action items are addressed before progressing to the next step in the device development and particularly before authorization for launch is granted. Insure that the failure analyses that are performed are done in a frank and objective manner by persons that are both

Sample Ttype of TCOs.  
Image courtesy of Chatham Components, Inc.



knowledgeable of the technology and committed to safety. For instance, a member of the safety review committee should chair the FMEA group.

## Real-world R & D

When test criteria are being developed for a new product, do not limit yourself just to those standardized tests that you can use from UL and other standardizing organizations. Develop real-world tests that are related to how the consumer will use your specific product. Anticipate consumer misuse of your product and test accordingly. Trying to determine how the consumer will misuse your product may be the greatest challenge to this goal. Outside consultants that routinely encounter fires, accidents, etc. could add to this discussion. Possibly the next greatest challenge is establishing testing protocols, success criteria and sample sizes for these newly-developed "real world" tests.

## Proactive v. Reactive Safety Function

What is meant by this section is the manufacturers' concern with how the product is being used by the consumer, and how quickly the manufacturer reacts to the news that the consumer has had a problem with the product.

Establishing a consumer hot line to receive complaints and feedback from the public means more than just having a toll-free telephone number. It includes screening and logging significant calls, initiating investigations, gathering evidence and reporting to senior management or the safety committee any significant safety-related issues including the public's perception of an issue that is not really a safety matter. And do all these in a timely fashion. This function is vital and can lead to substantial benefits when dealing with such organizations as CPSC. International markets compound the difficulty in gaining this objective given the uncertainty of effective communication with the consumers, language barriers, differing legal systems, etc.

As a continuation of this approach, the manufacturer should consider establishing a procedure or protocol to respond to safety-related issues in the test-market and post-launch environments. This procedure should identify persons and functions that will be involved in assessing data from the safety committee, consumer feedback system and R & D in times of crisis. This procedure or protocol cannot be established after the onset of a crisis. You can try, but what you end up with will not do the best job compared to having the people and resources in place beforehand.

## Independent Evaluation

As a last discussion point, consider the involvement of an independent evaluation by someone not connected to the manufacturer. The first benefit is you gain someone who has expertise in areas outside the manufacturer's purview. Another, possibly greater, benefit comes when recommendations need to be made that are "politically unpopular." Times will



occur when a perspective must be stated that will affect product developments and, consequently, careers. Employees of the manufacturer will be placed in impossible positions of offering advice that can adversely affect their career. Letting the outside consultant state what needs to be said takes the burden off the shoulders of the employee and allows for a freer exchange of ideas.

Let me sum up what can happen to manufacturers that proves that you will be judged guilty until you prove yourself innocent. Recently, a trial was held in another Midwest city where a consumer sued another-consumer-electronic-product manufacturer because an automatic drip coffeemaker allegedly caused a fire in a kitchen. The plaintiff alleged that the coffeemaker was defective. The insurance company for the plaintiff utilized an expert known for his "expertise" in fire investigation and electric appliances. The expert, in turn, opined that the fire began when the heating element went into "thermal runaway" and ignited the plastic housing. This scenario is consistent with what happens when a TCO fails to operate in time.

The fire was small in nature and involved only the base cabinet countertop and the wall cabinet above. There was collateral damage from smoke and heat, but the actual flaming was limited to a corner of the kitchen.

During pre-trial discovery, the manufacturer's attorney learned that there had been a lit candle on the countertop below the coffeemaker at the time of the fire. Further, witnesses reported hearing a "crack" or "pop" that drew their attention to the kitchen where they discovered the fire. Glass-jar candles during failures can cause the jar to crack loudly.

Analysis of the coffeemaker's remains found several significant facts. The ON/OFF switch was in the OFF position. The thermostat was in the OPEN position. The two series-connected TCO's were OPEN, which is consistent with both operating at some point in time. All four of these circuit components had to be in the opposite positions from what they were found for the coffeemaker to continue heating to the point of igniting the plastic housing. Therefore, the ADC had four safety levels to insure that the appliance could not cause a fire. In other words, there was no physical evidence that the ADC had failed in any fashion.

All of these facts were presented to the jury of eight people along with the alternate potential ignition source of the lighted candle. The jury awarded full damages to the plaintiff. After the trial, several jury members were asked why they

ruled as they did given the facts presented to them. They said that the manufacturer must have "made one in a million," where the coffeemaker was capable of causing a fire even though four essential circuit components apparently functioned as designed. On appeal, the plaintiff's case was reversed by the Court of Appeals and, due to the testimony of the plaintiff's expert; the trial court was prevented from re-trying the case. Judgement was ruled in favor of the defendant.

Can a manufacturer exist in this era of litigation? Yes. Must the manufacturer go beyond traditional R & D practices to ease the burden of product litigation? Yes. The money invested in expanding the safety function within a manufacturer's purview may seem expensive. But it is not by any means near the costs incurred with litigation costs, recall costs, and maybe more than anything else, the costs of lost market share.

## About the Author



Since 1972, Dan has been involved in complex fire investigations, safety inspections, and training. Most significantly, Dan was the chairperson of the NFPA 921 committee for twelve years, stepping down in 2009. His hard work, expertise, and dedication to the advancement of fire investigation is reflected throughout the various revisions of NFPA 921, offering investigators a practical and scientific guide for the proper execution of fire and explosion investigation. Dan obtained an Associate in Applied Science and Bachelor of Science from Purdue University.

## Beyond the Article: FMEA

Failure modes and effects analysis (FMEA) is a step-by-step approach for identifying all possible failures in a design, a manufacturing or assembly process, or a product or service.

"Failure modes" means the ways, or modes, in which something might fail. Failures are any errors or defects, especially ones that affect the customer, and can be potential or actual. Learn more about the FMEA process from the American Society for Quality <http://asq.org/learn-about-quality/process-analysis-tools/overview/fmea.html>

## Appliance Fire Investigation & Product Recalls

You have just finished your fire scene examination. After identifying the area of origin, you identify several powered consumer products, each containing a viable first fuel and a competent ignition source. You then conduct some research and discover that one of the products has been recalled, and the reason for the recall is a potential for causing a fire. So, case closed, time for a cold one?

Not so fast! A Recall does not equal a Fire Cause.

In the US, consumer product recalls are handled by the Consumer Product Safety Commission ([cpsc.gov](http://cpsc.gov)). Vehicle recalls are handled by the National Highway Traffic Safety Administration ([nhtsa.gov](http://nhtsa.gov)). Both handle complaints, investigations, and alerts and recalls in a fairly similar fashion.

In general, a recall can be instituted when there are a number of complaints about low order incidents (i.e. minor damage or injury), or a one or more complaints of a high order incident (i.e. major damage, injury or death). The recall is the result of an investigation which concludes that a product defect was the likely cause, and that the defect is likely to be systemic.

A systemic problem does not mean that the defect is present in every product unit produced. It also does not mean that the defect, if present, will produce the same consequences in every time the product is used. It does mean that if present the defect may produce the undesired effect.

What does that mean to the fire investigator? It means if a recalled product is in your area of origin it definitely deserves a closer look, but don't jump to conclusions without doing a thorough investigation.

# Suppressing the Burn

John W. Reis

Why the NFPA's revised 1033 is the next big thing in fire claims investigations.

Is your fire investigator in your subrogation or arson case qualified? Perhaps your expert is a master of NFPA 921, the premier guideline for fire investigations issued by the National Fire Protection Association (NFPA). But what about NFPA 1033? In the fire litigation world—particularly in subrogation and arson cases—NFPA 1033 is becoming the next big avenue for expert challenges, especially with its recent revision in 2014. Attorneys are increasingly using it to attack opposing experts. Will your expert survive those attacks?

## Unlocking the Power of NFPA 1033

NFPA 1033, first issued in 1987, identifies itself as a “standard,” not just a guide. It requires minimum qualifications, which “shall be followed.” It lists 16 topics that the fire investigator must know. Although 1033 is not a code or statute (unless adopted by a government), it is a standard even in states that have not adopted it by law largely because the document says it is and because the NFPA is so well respected. For example, the courts have long embraced NFPA 921, “Guide for Fire and Explosion Investigations,” as the go-to document for how a fire investigator should investigate a fire, as established in *United States v. Hebshie*.

But NFPA 921 bills itself as a guide, not a standard. That makes NFPA 1033 potentially more powerful. Yet courts rarely ever cite NFPA 1033, despite its prestigious title of “Standard for Professional Qualifications for Fire Investigators,” which seeks to “develop clear and concise job performance requirements that can be used to determine that an individual, when measured to the standard, possesses the skills and knowledge to perform as a fire investigator” in both the private and public sectors.

“

*A failure to document courses and publications covering the 2014 NFPA 1033 and its 16 topics could be a red flag. Better to act on the red flag early than to raise the white flag later.*

# NFPA® 1033 Standard for Professional Qualifications for Fire Investigator 2014 Edition



NFPA®, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02169-7471, USA  
An International Codes and Standards Organization

NFPA 1033's time in the shadows is ending, however. For at least the past year, a working template of questions for fire investigators has been circulating in the fire litigation world, particularly among the defense bar in subrogation cases, using NFPA 921 and 1033, but with special emphasis on 1033 on the front end of the questioning. Fire investigators in subrogation and arson cases can now expect questions such as these:

- Q. Do you agree that NFPA 1033 represents the minimum qualifications for a fire investigator?
- Q. Do you agree that NFPA 1033 is a standard?
- Q. Do you agree that NFPA 1033 applies to you?
- Q. Referring to section 1.3.7, do you possess knowledge of the 16 topics beyond a high school level?
- Q. What courses have you taken [in each topic of the 16 listed]?
- Q. What is your definition of [each topic of the 16 listed]?

Experts are well advised to be able to fully detail the courses and publications that they have attended, authored, or reviewed on the 16 topics covered in NFPA 1033, which are discussed later. A detailed curriculum vitae can be critical. Experts also are advised to be ready with a definition of at least those 16 topics. For reasons that will become clear, however, that is only the beginning of the expert's challenge.

## Bootstrap to NFPA 921

As noted previously, although NFPA 921 is perhaps the best-known resource in fire investigations, it is not a standard like NFPA 1033. Experts who do not agree with a portion of NFPA 921 or have a less than thorough knowledge of it have used its "guide" status for protection, arguing that a guide does not hold the same status as a standard that demands minimum, mandatory requirements. Artful litigators, however, have been using NFPA 1033 to nail down experts on certain NFPA 921 provisions. For instance, NFPA 1033 often refers back to NFPA 921, citing it as a primary source for a fire investigator's knowledge base, skills, and methodology. Does NFPA 1033's reference to NFPA 921 raise it to "standard" status? That is the premise of a line of questioning circulating in the fire world for experts in an effort to bootstrap the importance of NFPA 921 through NFPA 1033, as follows:

- Q. Do you agree that in order to find the requisite knowledge described in section 1.3.7, the NFPA 1033 standard refers you to NFPA 921?
- Q. Do you agree that the NFPA 1033 standard embraces NFPA 921 as a source of knowledge with which all fire investigators should be familiar?

These questions are particularly clever. If the expert answers, "no," then the expert is vulnerable to attack as unqualified under NFPA 1033. If the expert says, "yes," it challenges the expert's ability to downplay NFPA 921 provisions.



To that end, the next line of questions circulating in the fire litigation world would seek to test the expert's knowledge of NFPA 921, with such exam-like questions as the following:

- Q. How is the size of a fire measured?
- Q. What is air entrainment?
- Q. What is a ceiling jet?
- Q. What is the definition of flash-over?
- Q. What is the definition of a fuel-controlled fire?
- Q. What is the definition of a ventilation-controlled fire?
- Q. What is your understanding of the phrase "changes of state"?
- Q. What is the difference between a vapor and a gas?
- Q. What is your understanding of the word "decomposition"?
- Q. What is the definition of combustion?
- Q. What is the definition of pyrolysis? Is it reversible?
- Q. What is the chemical formula for hydrogen gas? For oxygen gas?
- Q. What is the chemical reaction for the combustion of hydrogen?
- Q. What is the concentration of oxygen in air?
- Q. What is the relationship between temperature, volume, and pressure?
- Q. What is the difference between heat and temperature?
- Q. What is radiant heat flux?
- Q. What is your definition of fire?
- Q. What are the basic units of energy?
- Q. What are the basic units of power?
- Q. What is a watt?

The expert facing a deposition is well advised to bring a copy of NFPA 921 and NFPA 1033 since depositions are not necessarily closed-book tests. However, it helps to have studied the texts well in advance.

## New requirements

The 2014 edition of NFPA 1033 amended the 2009 edition, which required knowledge "beyond the high school level" on 13 topics: fire science; fire chemistry; thermodynamics; thermometry; fire dynamics; explosion dynamics; computer fire modeling; fire investigations; fire analysis; fire investigations methodology; fire investigations technology; hazardous material; and failure analysis and analytical tools. The 2009 edition stated that "a post-secondary education level" was required on these topics, which suggested a college degree.

The 2014 version deletes the phrase, taking out the argument that college is required, but now the expert must remain current on the topics "by attending formal education courses, workshops, and seminars, and/or through professional publications and journals." Also, it adds three more heavy-duty topics to the list of 13 stated

in the previous paragraph: fire protection systems; evidence documentation, collection, and preservation; and electricity and electrical systems. To remain current on such significant topics is a boon for course providers but a burden for experts.

The 2014 edition of NFPA 1033 also heightens the standards required of an investigator on such important concepts as the use of the scientific method, avoidance of confirmation bias, the duty of document review when the scene is not available, the duty to interpret fire patterns, and the duty to collect evidence. Let's take a look at these.

### Duty to Avoid Confirmation Bias.

The new section on confirmation bias, at 4.3.9 of NFPA 1033, now can be used to more effectively challenge an expert who has too readily made a final hypothesis. The new language in the 2014 edition is noted in italics:

4.3.9 Confirmation Bias. Different hypotheses may be compatible with the same data. When using the scientific method, testing of hypotheses should be designed to disprove the hypothesis (falsification of the hypothesis). Confirmation bias occurs when the investigator instead tries to prove the hypothesis. This can result in failure to consider alternate hypotheses, or prematurely discounting seemingly contradictory data without an appropriate assessment. A hypothesis can be said to be valid only when rigorous testing has failed to disprove the hypothesis.

This gives savvy litigators more fodder against the "premature expert" who formed the final hypothesis in the first five minutes of the initial scene inspection, despite significant further study that confirmed that hypothesis.

### Duty to Use Scientific Method More Cautiously.

The 2014 NFPA 1033, Annex A amends the scientific method language to match that of NFPA 921. Both now emphasize the need to define the nature of the problem, evaluate the data and hypotheses, and only select a final hypothesis when possible—more fuel for lawyers to test how rigorously the expert fully eliminated all other hypotheses on the fire's origin and cause.

### Heightened Duty of Document Review

When a scene is no longer available, the 2014 NFPA 1033 Section 4.2 now puts a clear burden on the investigator to conduct a comprehensive document review, as shown in

the italicized added language below:

4.2 Scene Examination. Duties shall include inspecting and evaluating the fire scene, or evidence of the scene, and/or conducting a comprehensive review of documentation generated during the examination(s) of the scene if the scene is no longer available, so as to determine the area or point of origin, source of ignition, material(s) ignited and act or activity that brought the ignition source and materials together, and to assess the subsequent progression, extinguishment, and containment of the fire.



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When an opponent complains that a scene's spoliation or cleanup makes it impossible to opine on origin or cause, the opponent cannot play ostrich but must seek and carefully review all documentation of the fire scene.

#### Heightened Duty of Fire Patterns Analysis

Sub-section 4.2.4 of the 2014 NFPA 1033 now requires that "each individual pattern is evaluated with respect to the burning characteristics of the material involved and in context and relationship with all patterns observed and the mechanisms of heat transfer that led to the formation of the pattern." This change likely will be used to attack an expert's report that does not evaluate those particular burn patterns important to the expert's analysis and conclusions.

**Heightened Duty of Evidence Collection.** Sections 4.4 and 4.4.2 of the 2014 NFPA 1033 expand the investigator's duties when collecting relevant evidence, emphasizing the need for documentation, collection, and preservation of the evidence, as follows:

**4.4 Evidence Collection/Preservation.** Duties shall include using proper physical and legal procedures to identify, document, collect, and preserve evidence required within the investigation...

**4.4.2 Locate, document, collect, label, package, and store evidence,** given standard or special tools and equipment and evidence collection materials, so that it is properly identified, preserved, collected, packaged, and stored for use in testing, legal, or other proceedings and examinations, ensuring cross-contamination and investigator-inflicted damage to evidentiary items is avoided and the chain of custody is established.

This addition is consistent with the overall theme of heightening and clarifying the expert's duties of education, objectivity, and rigor of analysis.


The low spark of the 2014 NFPA 1033 is now catching fire. Before hiring an expert with whom you are unfamiliar, it is wise to obtain and review a copy of the expert's curriculum vitae. A failure to document courses and publications covering the 2014 NFPA 1033 and its 16 topics could be a red flag. Better to act on the red flag early than to raise the white flag later.

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#### About the author.



John W. Reis is an attorney with Smith Moore Leathewood LLP. John W. Reis litigates subrogation and commercial claims involving loss or damage to structures, heavy equipment, trucks,

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# Fitting a Square Peg Into a Round Hole

## Fire Classification Under NFPA 921

Brian P. Henry and Andrew L. Smith

**T**his article will explore an important, but largely ignored, topic in NFPA 921 – should fire investigator experts classify fires? Does a classification of a fire as incendiary serve a purpose? Why did the NFPA implement authoritative guidelines permitting fire investigators the ability to separate fires into one of four distinctly defined categories? These important questions will be explored in detail below.

To begin, we must first ask ourselves why we investigate fires. As a society, we investigate a fire to find the root cause to prevent the fire from happening again. Public welfare and safety are huge concerns. Fire investigation implicates potential criminal responsibility. Some say the purpose of fire and explosion investigations is much broader than just determining the cause of a fire or explosion incident. The goal of any particular fire investigation is to come to a correct conclusion about the features of a particular fire or explosion incident that resulted in death, injury, damage, or other unwanted outcome.

### State of MN v. Steven Edwards – A sign of the Future?

The case of *State of Minnesota v. Steven Edwards*, is an interesting criminal case from 2016 involving a charge of arson, stemming from a single-family home fire.<sup>1</sup> This is one of the few cases in the country addressing the above implications and determination of an incendiary fire by an origin and cause expert. In the case, Denise Bryn, a fire investigator for the Minnesota Fire Department, concluded the fire originated in the kitchen, but she classified the fire as undetermined. To the contrary, the homeowner's insurance carrier Country Financial Claims retained certified fire investigator Mark Bishop, who opined the fire was "the result of a deliberate incendiary act by a person or persons unknown." He further concluded the fire started

above the electric range in the kitchen using available combustibles in the form of letters and bills, which had originally been on top of the refrigerator.

Mr. Edwards filed a motion to exclude the origin and cause report and expert testimony of Mr. Bishop, relying on the following arguments:

1. His opinions were not based on scientifically reliable methodology, the requirement for any forensic expert opinion;
2. The Minnesota Supreme Court has repeatedly recognized expert testimony concerning mens rea intent is not helpful to the factfinder and the expert simply acts as a "thirteenth juror;" and
3. His opinions were based on assumptions and common inferences rather than scientific methodology, and have little probative value with substantial potential for prejudice since jurors give significant weight to expert testimony.

Just recently, on March 29, 2016, the court released an order granting the motion to exclude Mr. Bishop's expert testimony, reasoning his testimony about the incendiary classification of the fire and opinions regarding human intervention with the first fuel would not assist the trier of fact and lacked foundational reliability. First, the court reasoned "the jury is equally capable of making these common sense observations of the natural world and human behavior" as to whether "the fuel met the burner by human hands and thus the fire was deliberately set."<sup>2</sup> Next, the court concluded the fire classification was not based on Mr. Bishop's specialized knowledge. "Instead, he used a process of elimination, of which any lay juror is capable, to imagine the various ways the fire could have started accidentally, and then rule out each of those possible scenarios."<sup>3</sup>

Although Edwards is a criminal arson case, the decision on the motion to exclude



the State's origin and cause expert's testimony could possibly provide a roadmap for how future courts will rule on this issue across the country in the civil context as well. Be on the lookout for more and more Daubert challenges and motions in limine seeking to exclude fire classification expert opinions as this issue gains recognition in both arson and bad faith cases alike.

### Conclusion

In sum, permitting origin and cause experts the ability to classify a fire as accidental, natural, incendiary, or undetermined has significant ramifications in any fire investigation. These issues go far beyond potential criminal exposure for arson as in the Edwards case. Arguments can be made for and against inclusion of fire classification in NFPA 921, as detailed above. Because of the implications for assessment of human behavior throughout NFPA 921, if you are of the opinion fire classification is outside the purview of an origin and cause expert, as an industry we may need to reconsider not only eliminating Chapter 20, but also overhauling the remainder of NFPA 921.

So what side of the fence are you on? What do you believe is the true scope and province of a fire investigator's expertise and purpose in evaluating a fire scene? This topic is sure to "heat up" in the future as fire investigators continue to expand their purported "expert" knowledge in addressing incendiary fire classifications. Will courts follow Edwards lead and exclude fire classification testimony? Only time will tell.

<sup>1</sup> Hennepin County Circuit Court, *State of Minnesota*, Case No. 27-CR-15-6336.

<sup>2</sup> March 29, 2016 Court Order, p. 4.

<sup>3</sup> *Id.* at p. 6.



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Process of Origin Determination Through Using Fire Patterns  
**Greg Gorbett**

Protected Area Fire Patterns-Patterns Persistence  
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So, You Found Arc Melting...Now What?  
**Michael Keller**

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A Methodology for Determining Ignition Source  
Probability using Categorical Analysis -  
**Christopher F. Schemel**

A Study of Wildland Fire Direction Indicator  
Reliability Following Two Experimental Fires  
-**Albert Simeoni**

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# Anatomy of a Kitchen Fire

**According to estimates by the US Fire Administration, cooking fires account for 45.7 percent of household fires between 2007 and 2011.**

**That's almost half. As fire investigators, it would therefore be a wise decision to have a good understanding of the phenomenon, of the fuels involved, the source of ignition, fire growth, and subsequent fire spread.**

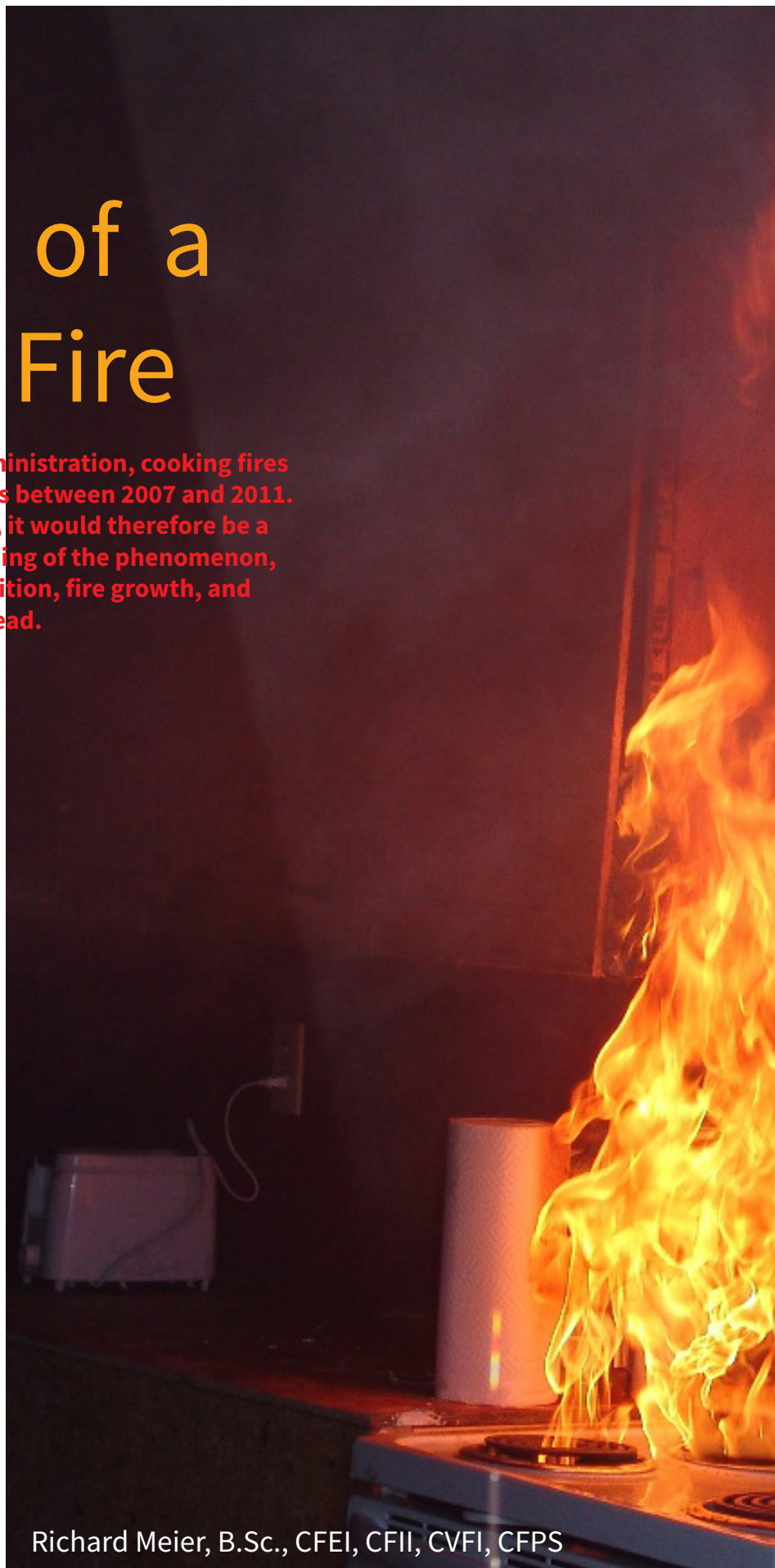
## Fire Chemistry and Dynamics

To understand how most kitchen fires occur, one must have a basic understanding of fire chemistry and fire dynamics of cooking fires and the fuels involved.

The time required for a cooking fire to occur once set in motion will vary greatly, depending on a number of variables:

- The size of the burner (diameter, wattage or BTU)
- The heating method (open calrod burner, ceramic glass cooktop)
- The setting of the burner (high, medium, low)
- The size of the cooking pan (diameter, depth)
- The material/fuel in the pan (cooking oil, fatty meat, other)
- The volume and depth of fuel in the pan

Cooktop burners can vary in size for 4 to 12 inches (10 to 30 cm), although 6 and 8 inch (15 and 20 cm) are typical. Common electric cooktops burners range from 800 to 1800 Watts, although larger and smaller are also available. Although ceramic glass cooktops have thermostats to prevent breakage of the glass, most will still produce enough heat to cause ignition. Gas burners in general will produce more heat than the equivalent sized electric burner. Rule of thumb – if it can blacken a fish, it can cause ignition.



Richard Meier, B.Sc., CFEI, CFII, CVFI, CFPS



1. If the contents of the pan have a high water content and are low in fats and oils, the time to first dehydrate the fuels can take a number of hours. Until at least a portion of the contents are dried, the temperature of the material will not climb above 212°F (100°C), the boiling point of water. Once a portion of the material is dried, however, the temperature can begin to rise again, eventually reaching its ignition temperature. Such a fire typically starts as a smoldering fire, as the burning portions of the fuel can still be covered with wet fuel and there is no mixing action which brings the burning fuel in contact with fresh air.

A fire of this type can produce a lot of smoke damage before any significant fire damage occurs. Unfortunately, it can also cause carbon monoxide fatalities if the home is not equipped with an adequate smoke/carbon monoxide detectors, particularly if the occupants are in the habit of cooking overnight.

If the contents of the pan are high in fats or oils, the fire will become a flaming fire much more quickly. Little or no evaporation is required to dry the fuel, and the fuel is exposed to fresh air from the start. The rest of this article will focus on cooking oils, as to minimize the effects of other variables in the discussion.

The most common cooking oils are soy oil (generically referred to as vegetable oil) and corn oil. These account for approximately 80% of cooking oil produced and used in the U.S. Other types of oil used for cooking are: palm oil; canola (rapeseed) oil; sunflower oil; peanut oil; cotton seed oil; coconut oil; and olive oil.

Some of the characteristics and properties of common cooking oils are:

- Cooking oils have medium to high viscosities which prevents rapid mixing and heat dissipation.
2. The smoke point of common cooking oils range between 425°F and 450°F.
  3. The piloted ignition temperature of corn oil is approximately 550°F.
  4. Both vegetable (soy) and corn oil have autoignition temperatures of ranging from 625 to 675°F.
  5. The boiling point of the oil is higher than the auto-ignition temperature. (Corn oil approximately 685°F.)

For those who have conducted studies and analyses of kitchen fires, the phenomenon is fairly straight forward and predictable. A pan of oil is placed onto a heating surface, such as the heater coil on a kitchen range or the flat surface burner of a glass cooktop. The rate at which the oil heats depends on the size of the pan, the size and power of the burner, the burner setting, and the amount and type of oil in the pan. The oil will heat relatively quickly at first, but the rate of heating will slow as the temperature increases. This is due to the increase in radiant and convection heat losses as the temperature of the oil increases.

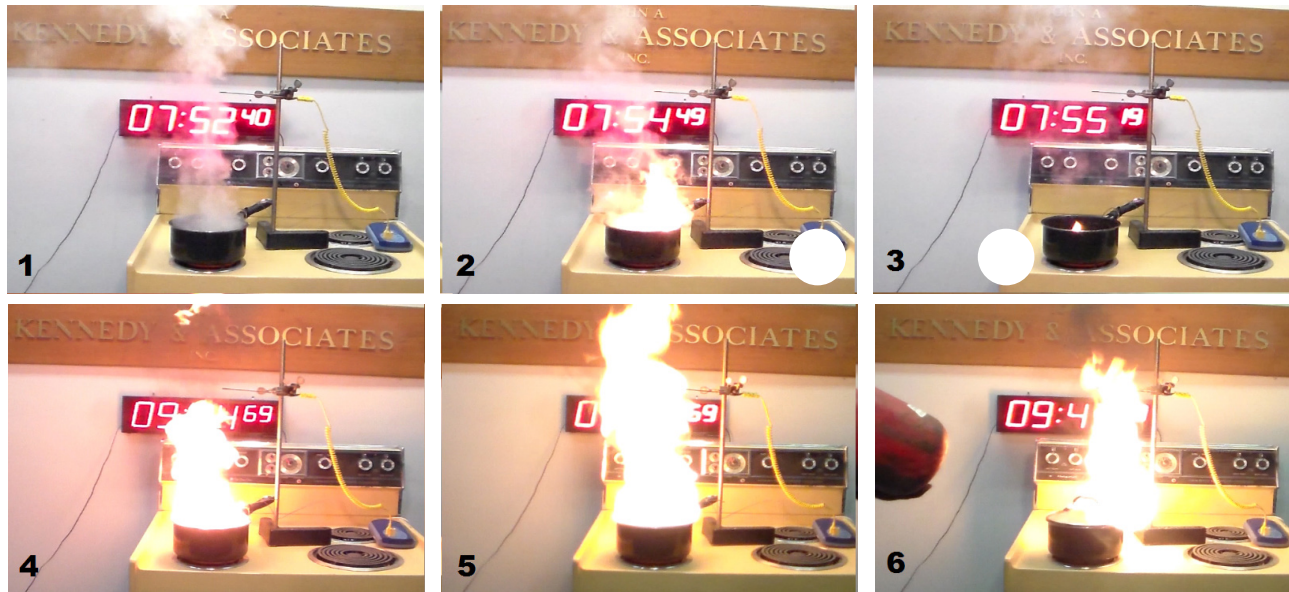


Figure 1. Cooking oil kitchen fire at Eastern Kentucky University Fire Science Department test burn building, March 2014. (R. Meier photo)



➔ Figure 2. Stills from a cooking fire demonstration. (L-R)

- 1) Oil past its smoke point.
- 2) Ignition flash.
- 3) Initial fire.



- 4) Fire growth.
- 5) Even covered with a lid, fire continues to grow.
- 6) Knocking down the fire with a CO<sub>2</sub> extinguisher.

The oil will first reach its smoke point, or the temperature at which visible smoke is emitted from the oil. Even before any ignition occurs, the air can become extremely smoky. The smoke can be quite unpleasant and can cause difficult breathing in those affected. Smoking oil may go unnoticed if confined in a separate room or if a vent fan is operating.

The temperature of the oil will continue to rise until it reaches its autoignition temperature. At this point the oil will spontaneously ignite without the aid of an external source of ignition. The time it takes for the oil to heat from room temperature to autoignition temperature can vary greatly, due to several previously discussed. Depending on these variables, general estimates of 10 to 60 minutes are quite reasonable. –

There may be a flash as the collected vapors above the oil ignite, but then the flames will generally start small. The oil will continue to heat from below. The fire plume interferes with the transfer of heat away from the oil by convection, and some additional radiant heat is added from above. The temperature of the oil begins rise rapidly. The preheated fuel causes the flame height will grow quickly. Depending upon the depth of the pan and the amount of oil in it, the oil may spill over from simple expansion as the oil heats, or boil over when hot enough. The oil can then spread well beyond the pan.



Figure 3. Major fire patterns extending from cooktop in the corner of a kitchen. Clean burn patterns on stone backsplash (yellow), and missing drywall and charred wood above (orange). Red arrows indicate initial fire growth and movement. (R. Meier photo)



Once the flame plume has developed, it may come into contact with another fuel load above. This may be an overhead microwave oven, and exhaust hood or kitchen cabinets and their contents. The fire would continue to spread as additional fuel loads are encountered. Depending on available fuel loads, fire growth, vents, construction materials and many other factors, it may take anywhere from a few minutes to over an hour for the fire would be noticeable from outside of the house.

## Ignition Sequence & Fire Spread

Typically, a kitchen fire starts, grows and spread in the following sequence:

1. A pan of oil is placed upon the burner of the cooktop.
2. The burner is turned on in preparation of cooking.
3. The oil will reach its smoke point, generally 100 to 150°F (56 to 83°C) below the auto-ignition temperature.
4. The oil in the pan heats until it reached its auto-ignition temperature (600 to 700°F, 315 to 370°C).
5. Once ignited, the flames reached a height of 4 feet (1.3m) or more, based on the pan diameter.
6. The oil may spill out of the pan from expansion, boiling over, or both. The flame height would increase significantly if spill over occurs.
7. Convective and radiant heating then spreads to objects above or near the cooktop.

In an accidental kitchen fire, fire patterns are generally speaking, fairly predictable. One might expect a "V" pattern on the wall behind the cooktop, and a semi-circular pattern on the ceiling above. These patterns may become obscured if the fire spreads significantly beyond the cooking area, especially if flashover occurs in the room of origin.

If you find fire patterns that vary greatly from these, consider things that may have affected fire growth and movement. Ventilation from windows, doors and vents can cause patterns to shift. Fuel loads on adjoining countertops can ignite and cause other patterns which obscure the original patterns or seem to indicate a different origin. Firefighting activities can also cause change in the fire patterns. If, after taking all of this into account, the patterns still don't make sense, you may have to start looking for another origin and cause.

## About the Author



Richard J. Meier has been a full time Staff Expert with John A. Kennedy and Associates since 2011. He is a professional Fire and Explosion Investigator and Analyst, a degreed Mechanical Engineering Technologist, and has been engaged in design and manufacturing engineering, failure analysis, and fire and explosion investigation for thirty years.

Richard Meier is a Certified Fire and Explosion Investigator (CFEI), a Certified Fire Investigation Instructor (CFII), and Certified Vehicle Fire Investigator (CFVI) through the National Association of Fire Investigators (NAFI). He is also a Certified Fire Protection Specialist (CFPS), certified by the Certified Fire Protection Specialist Board and the National Fire Protection Association (NFPA). In addition, he is a Certified Fire Investigator by the International Association of Arson Investigators (IAAI).

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Richard Meier serves on the Board of Directors of NAFI and teaches various aspects of fire investigation at NAFI and other training programs. He has taught for the International Association Fire Investigators (IAFI), the Broward County Fire Inspectors Association, the Florida Fire Marshals and Inspectors Association, and NASA. Richard Meier is a member of the Technical Committee for NFPA 1033 – Standard for Professional Qualifications for Fire Investigator representing the National Association of Fire Investigators, and on several task groups for NFPA 921 – Guide for Fire and Explosion Investigation. He continually engages in advanced education in fire investigation, and conducts research in fire investigation and material science as it relates to fire investigation. He has presented his research at international fire investigation, and fire science and technology conferences.

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