

Enhanced Smoke Alarms: UL Safety Standards 217 and 268

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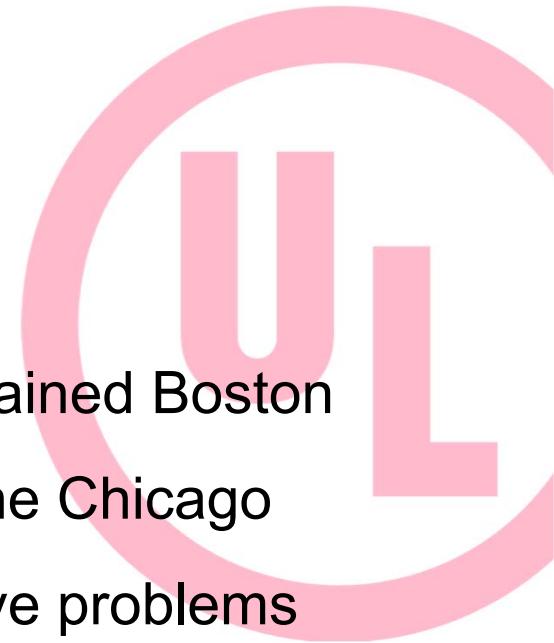
UL's Founder William Henry Merrill



William Henry Merrill

1866-1923

He was a skilled and highly trained Boston electrical inspector hired by the Chicago Underwriters Bureau to resolve problems with automatic fire alarms in the city of Chicago in 1893.

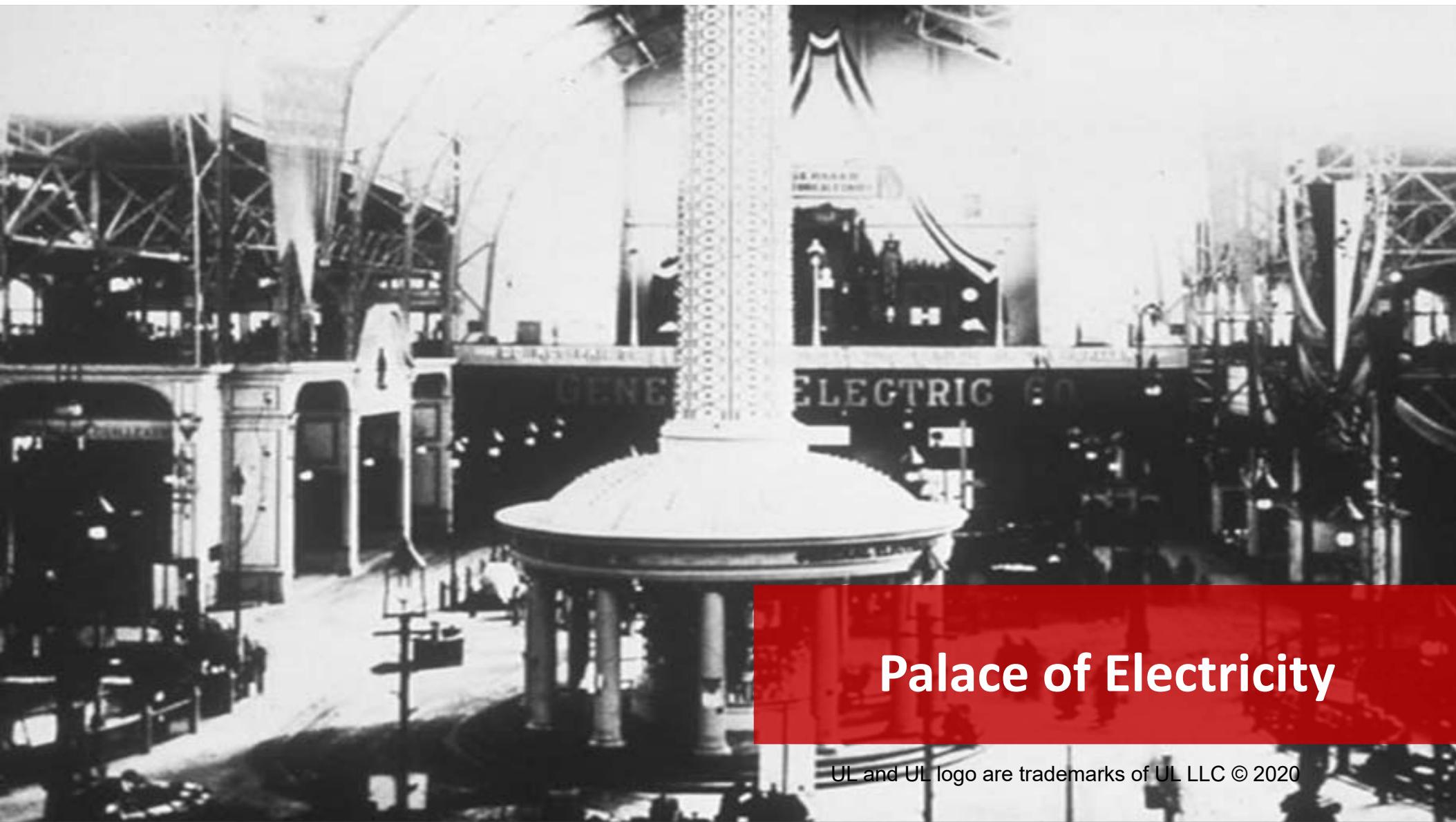




1893 Chicago World's Fair

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ELECTRICITY BUILDING, NORTH FRONT



Palace of Electricity

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Underwriters Electrical Bureau - 1894

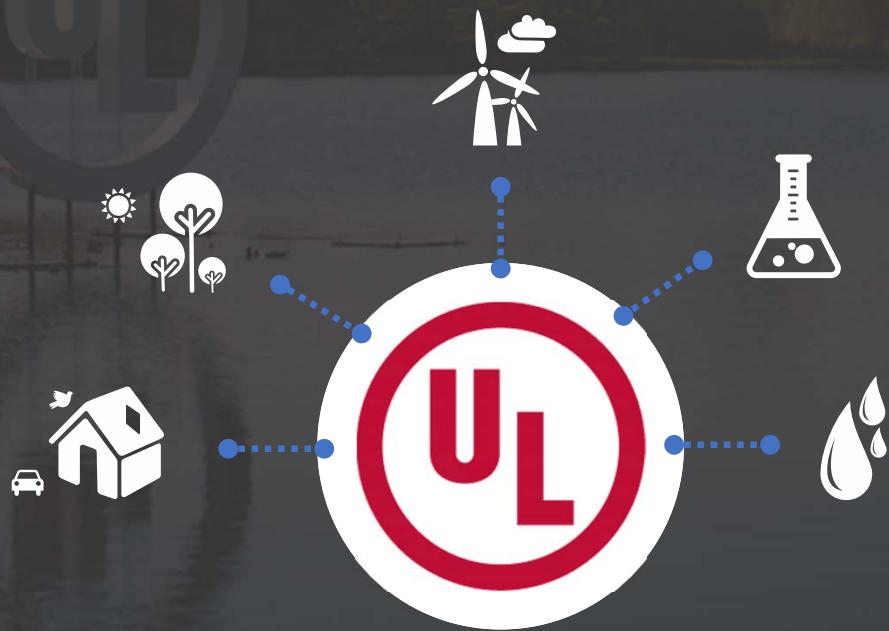
The location was a small one room laboratory above Fire Patrol Station #1 on Monroe St. in downtown Chicago, IL.



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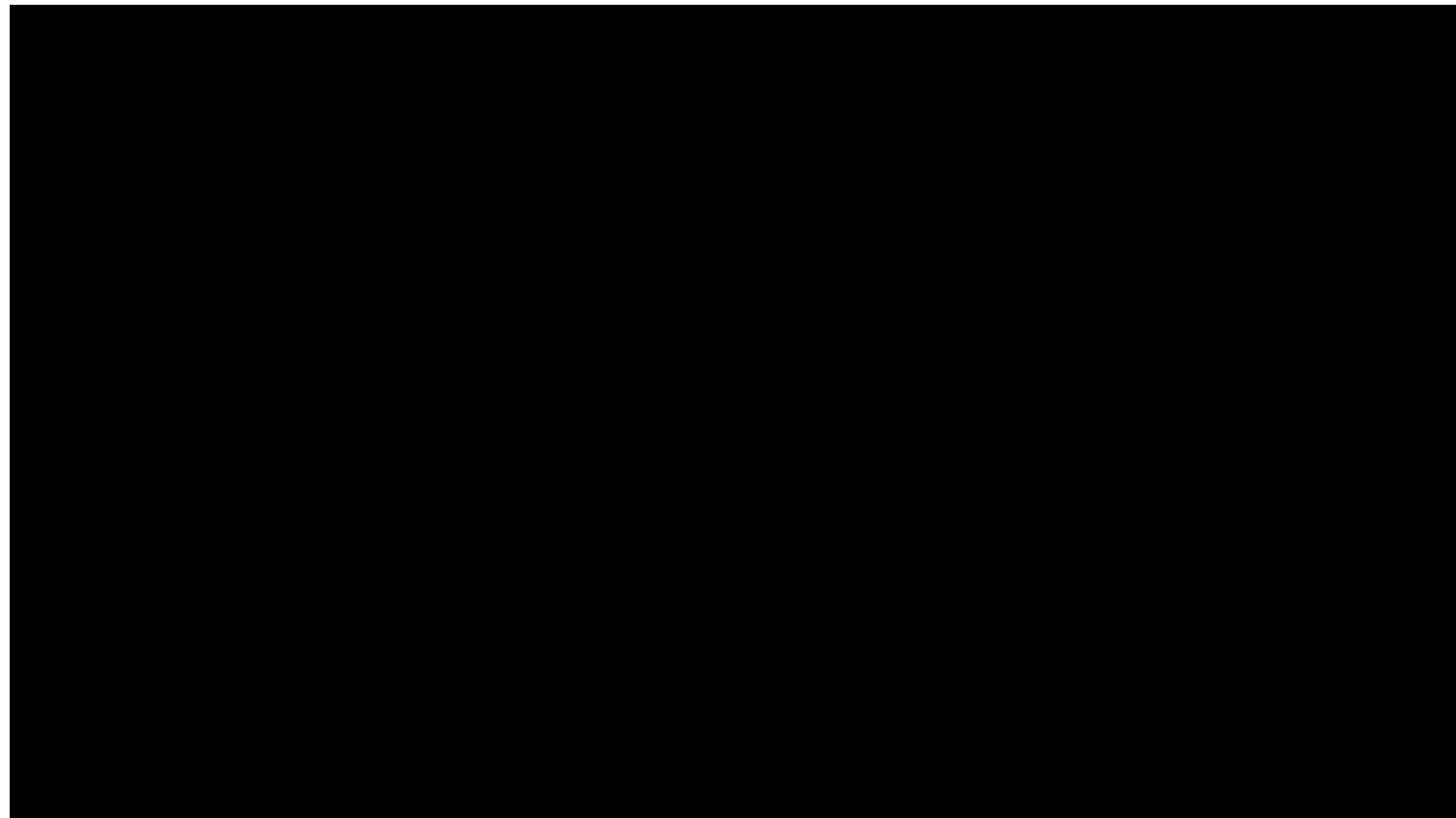
To promote safe living and working environments through the application of safety science and hazard-based safety engineering.



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Empowering Trust



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Enhanced Standards – Effective May 2020



UL 217 – SMOKE ALARMS –

independent, self-contained device with a smoke sensor,
alarm-sounding appliance, commonly used in residential settings



UL 268 – SMOKE DETECTORS –

typically intended for use with a control panel
as part of fire detection within the system



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UL operates
in more than

143
COUNTRIES



and across
more than

20
INDUSTRIES

UL HAS ENHANCED TRANSACTION SECURITY FOR:



500+ banks
20+ payment
schemes

60+ mobile network operators
50+ governments/
transport operators



UL has helped to set
MORE THAN
1,600

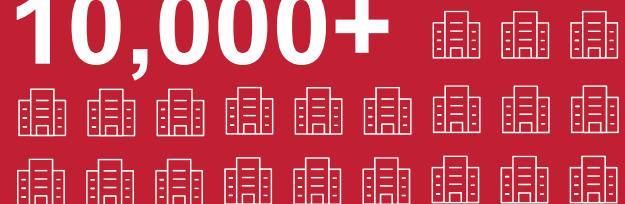
standards defining safety,
security, quality and sustainability



**Science and
global expertise**

UL software is used by

10,000+



**ORGANIZATIONS *in*
OVER 10 INDUSTRIES**



UL'S SUSTAINABILITY CERTIFICATIONS are referenced in

900+

sustainable product specifications or
purchasing guidelines around the globe

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UL SERVES

1 OUT OF 3

Fortune 500 companies



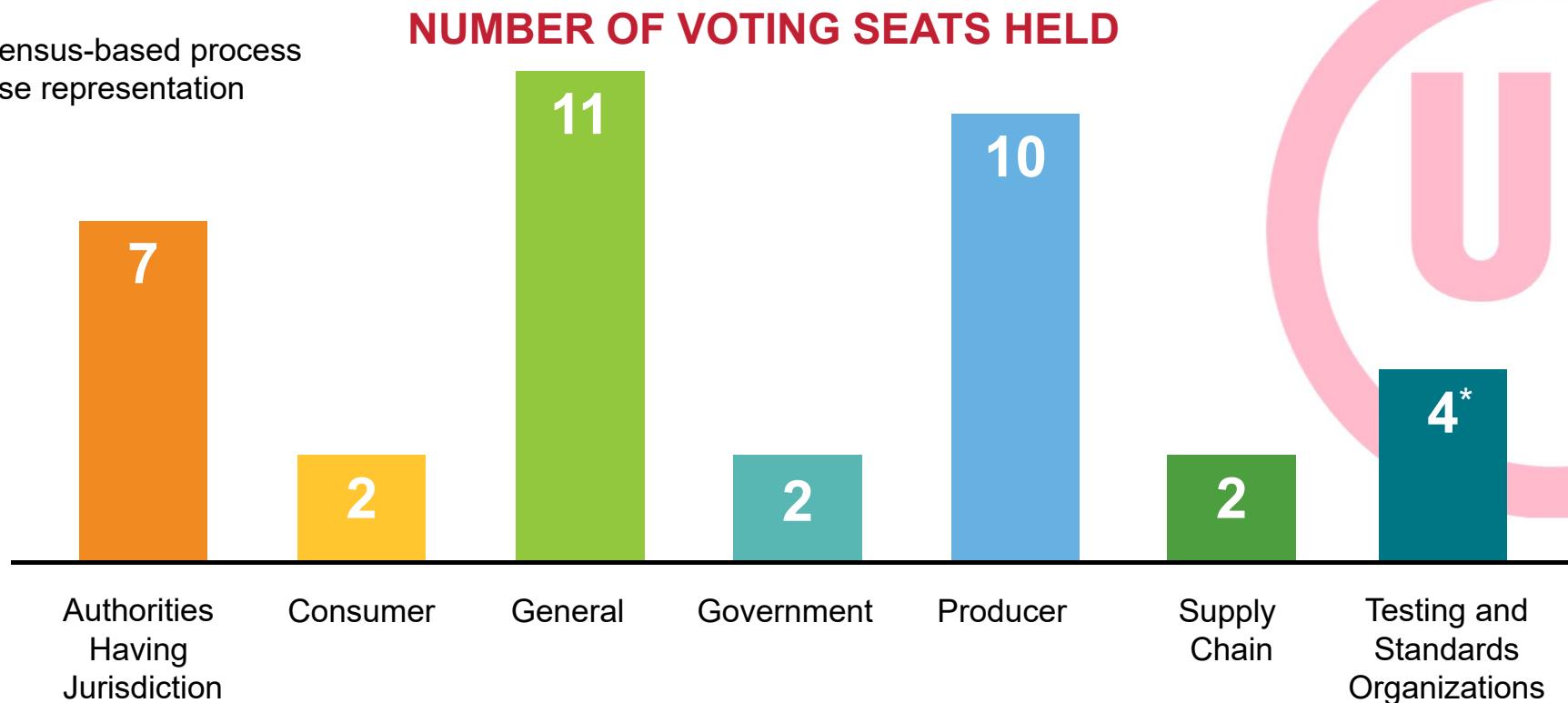
UL Global Security & Brand Protection

For over 20 years, UL has taken an aggressive stance against IP crimes through a comprehensive program



UL Standards Technical Panel (STP)

- Consensus-based process
- Diverse representation



*UL holds one voting seat in this category

A full list of roster members is publicly available at this link: http://csds.ul.com/STPinfo/Roster_list.aspx

How Did We Get Here?



NBS GCR 75-51

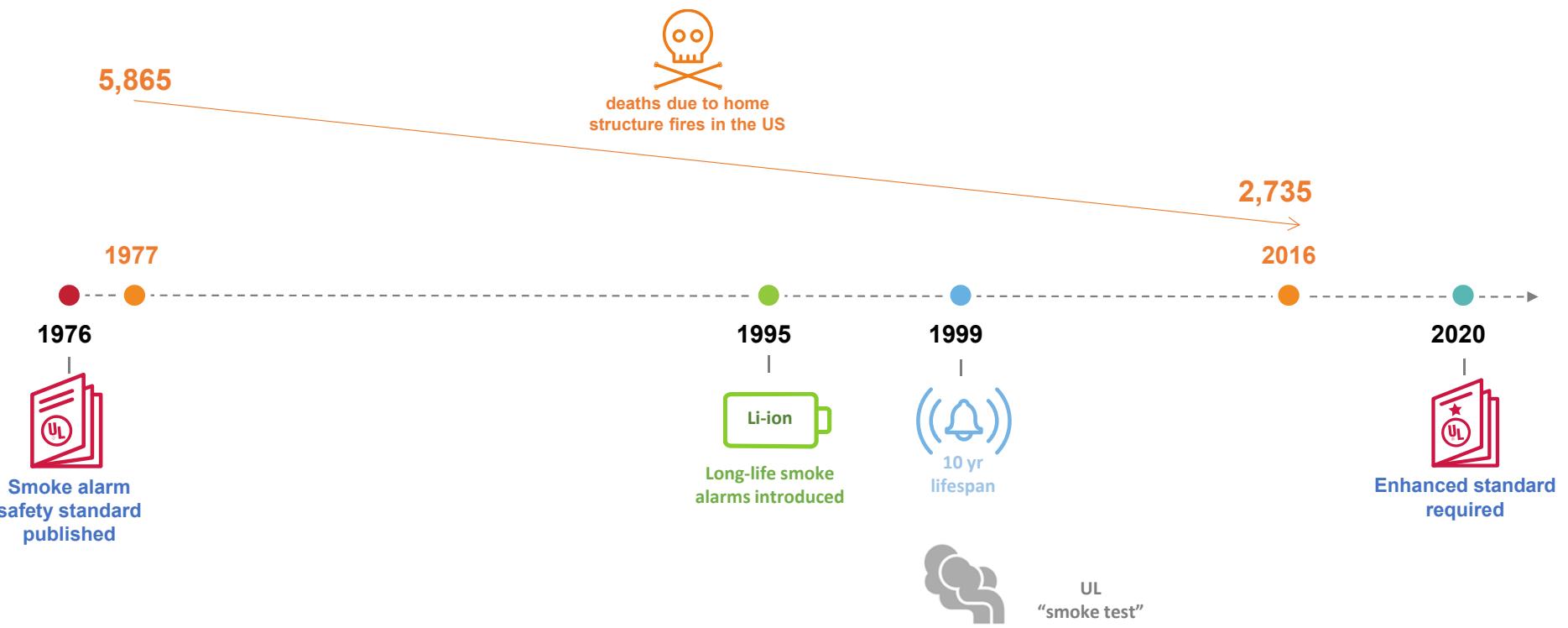
Titled – Detector Sensitivity and Siting Requirements For Dwellings

- ✓ Commonly referred to as the “Dunes Study”
- ✓ Conducted in 1975 - 1976
- ✓ Some Key Conclusions

Helped shape the fire science communities
understanding related to

- smoke alarm performance
- and
- escape time needed during fires

Timeline of Smoke Alarms



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Nuisance Alarming and Disabled Smoke Alarms

3 OUT OF 5 HOME FIRE DEATHS

EITHER HAD NO SMOKE ALARM PRESENT
OR NO WORKING SMOKE ALARM PRESENT



NFPA AND THE CPSC

CITE THE LEADING REASON FOR A SMOKE ALARM TO
BE DISABLED IS BECAUSE OF COOKING NUISANCE



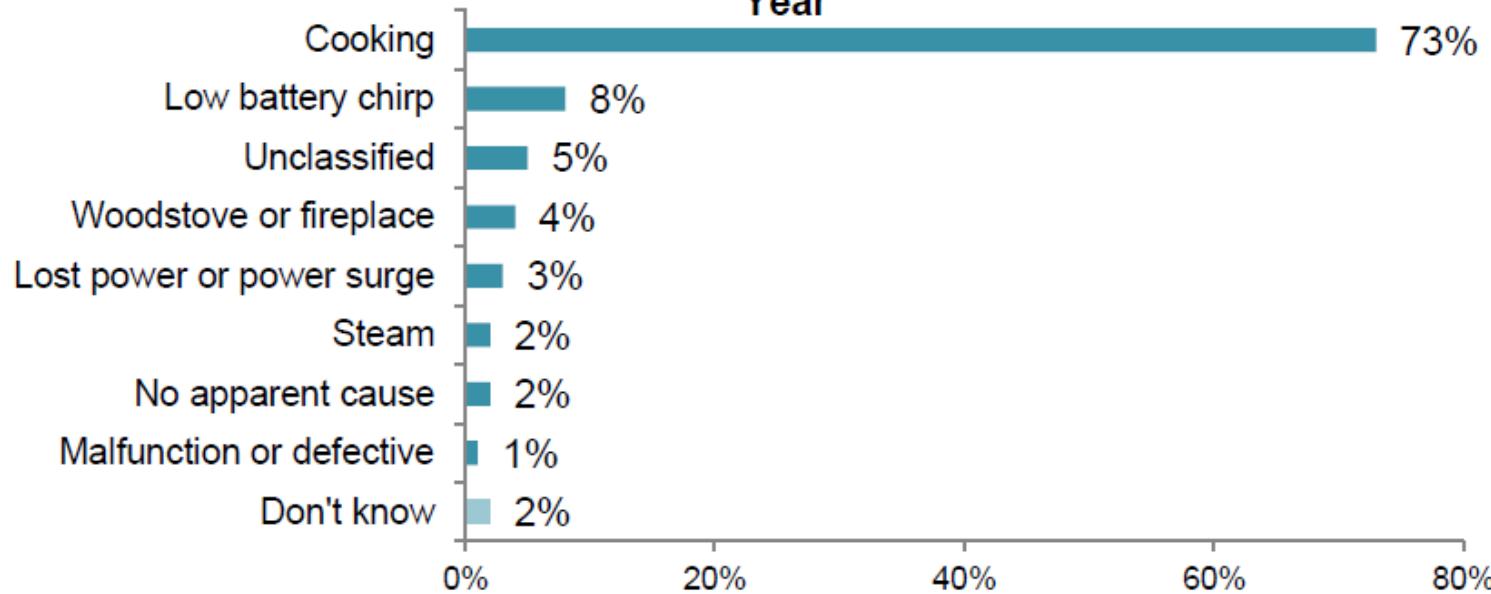
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Common Nuisance Sources

Marty Ahrens March 2014 Report, titled "Smoke Alarms in U.S. Home Fires"

- Steam Nuisance alarms account for no more than 2% of nuisance alarms (down from 5% in 2004)
- Cooking Nuisance alarms account for 73% of nuisance alarms (up from 69% in 2004)

Figure 12. Reasons Given for Smoke Alarm Activations in Past Year



Source: Harris Poll National Quorum. National Fire Protection Association -- Smoke Alarms. 2010.



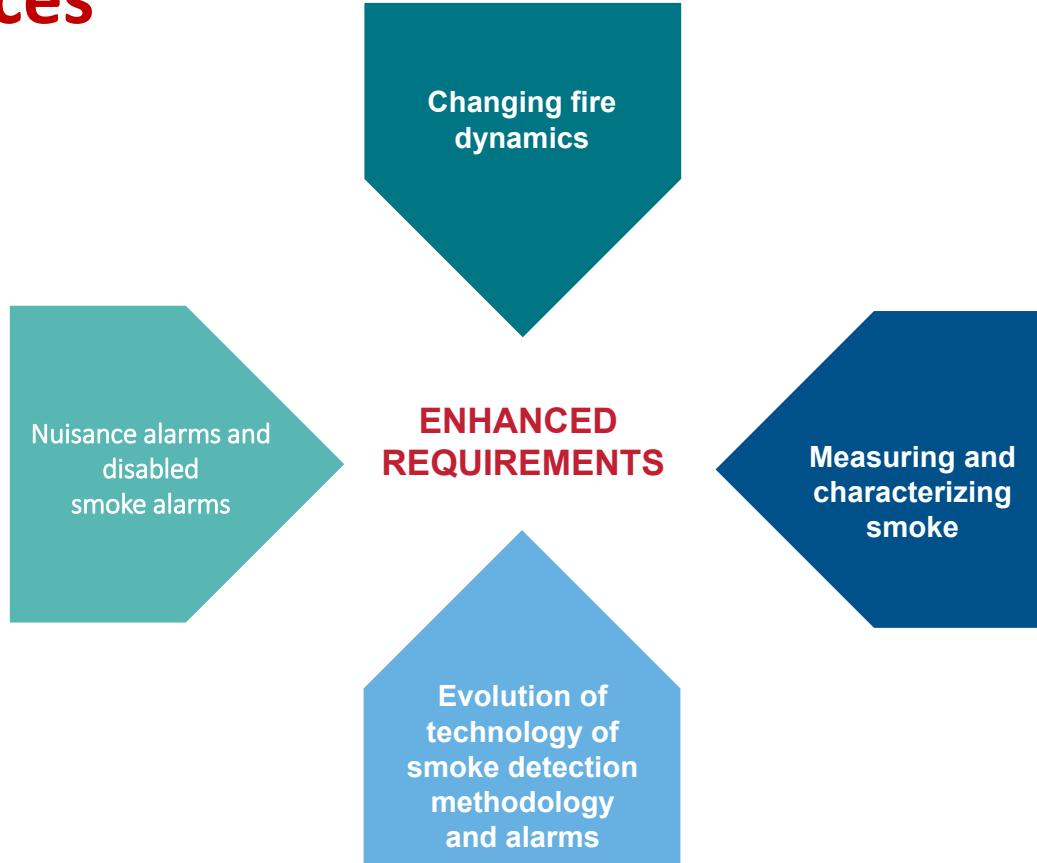
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Literature Review

- **CPSC Pilot Study in Homes**
 - Smoke alarm distance with respect cooking appliances influenced activation during normal cooking (nuisance activation).
 - **Both ionization and photoelectric smoke alarms activated; however, ionization smoke alarms were more susceptible to cooking nuisance alarms.**
- **NIST Research**
 - Food items tested by NIST included: Toasted bread, bagel, Fried bacon, Broiled Hamburger, Fried Hamburger, Stir fry vegetables, Baked pizza, Grilled cheese sandwich
 - **Both ionization and photoelectric smoke alarms activated during normal cooking; ionization smoke alarms more susceptible to toasting bread; photoelectric to pan frying hamburgers.**



Converging Forces



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NIST Technical Note 1455-1

Titled - Performance of Home Smoke Alarms, Analysis of the Response of Several Available Technologies in Residential Fire Settings

- ✓ Commonly referred to as the “Dunes II Study”
- ✓ Some Key Conclusions
 1. Smoke alarms to be installed in every bedroom and every level of the home
 2. Bedroom doors should be closed when sleeping
 3. Recommended the use of multiple station smoke alarms
 4. Reduction in escape times
 5. Additional research was needed to understand the fuel sources that were causing the reduced escape times.



Empowering Trust™

Changing Fire Dynamics

1978



*Natural materials
and furnishing*

2018



*Synthetic materials
and open floor plans*

Escape times in a home fire have decreased from approximately **17 minutes** to approximately **3 minutes** over the last 40 years, due to changes in materials and floorplans in modern homes.



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Comparison of modern and legacy home furnishings

<https://ulfiresafety.org/research-projects/comparison-of-modern-and-legacy-home-furnishings.html>

Higher Fuel Load



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Increased Fuel Loads - Experiment



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Comparison of Room Furnishings

Natural Room

Synthetic Room



00:00



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Modern Furniture



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Enhancements to Requirements and Testing



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Smoke Characterization Project Summary

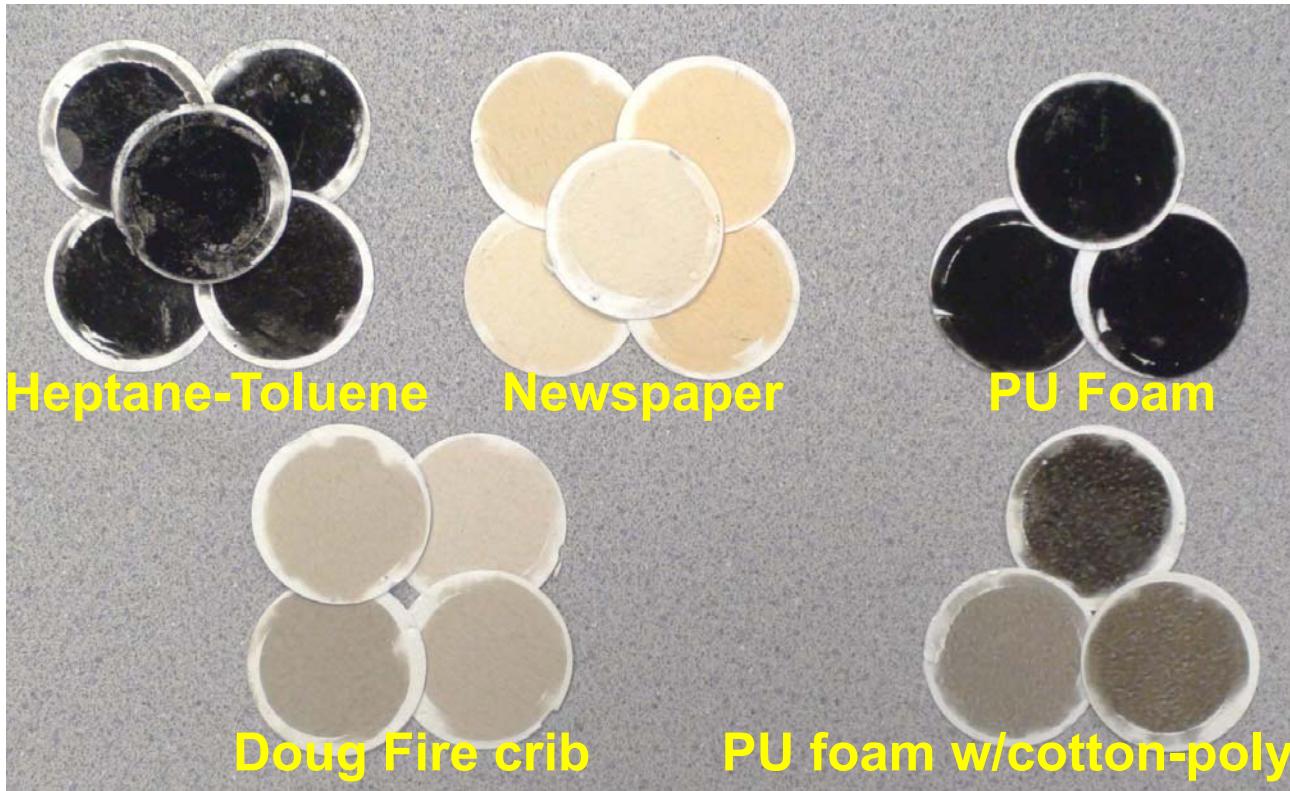
Polyurethane Foam:

- Faster Ignition
- Generated greater heat and smoke release rates than natural materials
- Generated smaller sized particles than most UL 217 test materials
- Accumulated smoke comprised of smaller particles than for the UL 217 test materials
- Produce darker color smoke than UL 217 newspaper or wood
- Prevalent in residences (mattresses, upholstered furniture, etc.)



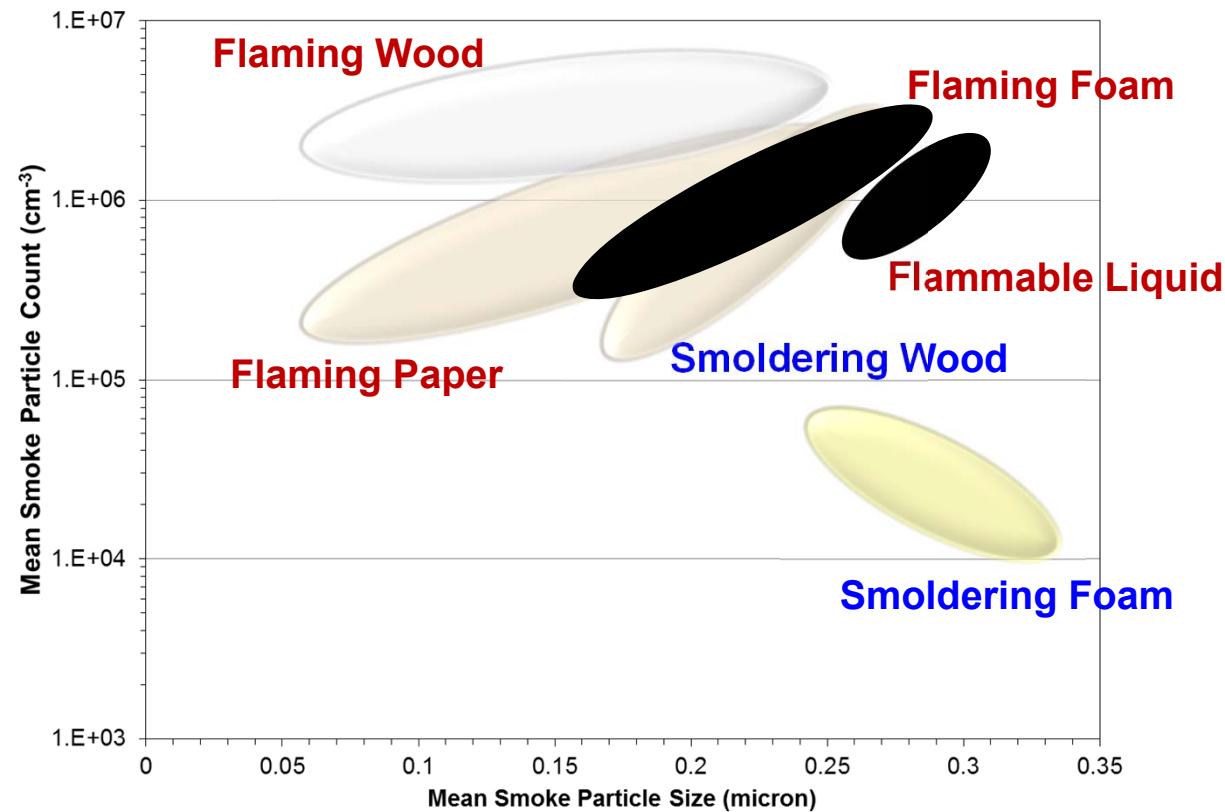
SMOKE CHARACTERIZATION PROJECT SUMMARY

ANSI/UL 217, ANSI/UL 268 FIRE TEST ROOM



Smoke Characterization Project Highlights

UL 217/268 Fire and Foam Signatures





• Standards and Technology

- Performance-based, technology agnostic
- Sensing technology and innovation
- Reliability and repeatability



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Messaging – What Does the Public Hear

A nonprofit organization of dedicated professionals devoted to fire safety through education and code enforcement

NEOFPA
North Eastern Ohio
Fire Prevention Association

50 YEARS
1964-2014

POSTS COMMENTS

Home | News | Events | Inspector Resources | **Public Fire Safety** | Contact | RFA | Store | Members | Search this website **Search**

Photoelectric Smoke Alarms Save More Lives

- Install wired or wireless interconnected smoke alarms for greater protection!

Earl Lee Warning

click for more information •

ALERTS

18,000 Counterfeit Smoke Detectors Recalled
Recently the Atlanta (GA) Fire Rescue Department was forced to recall more than 18,000 smoke alarms after... [more]

Announcements

Northeast Ohio Firefighters Receive Awards from the State Fire Marshal

Fire Safety Tips

Smoke Alarms
The Basics

Photoelectric smoke alarms should be placed, at a minimum, on every floor level including the basement, inside every sleeping room, and outside of every sleeping area of all dwellings. Interconnected photoelectric smoke alarms, either wired or wireless, should be strongly considered. With interconnected alarms, when one smoke alarm sounds, all other smoke alarms in the home [more...]

More safety tips →

Hazards & Violations

Links

Photo Galleries

Member Resources

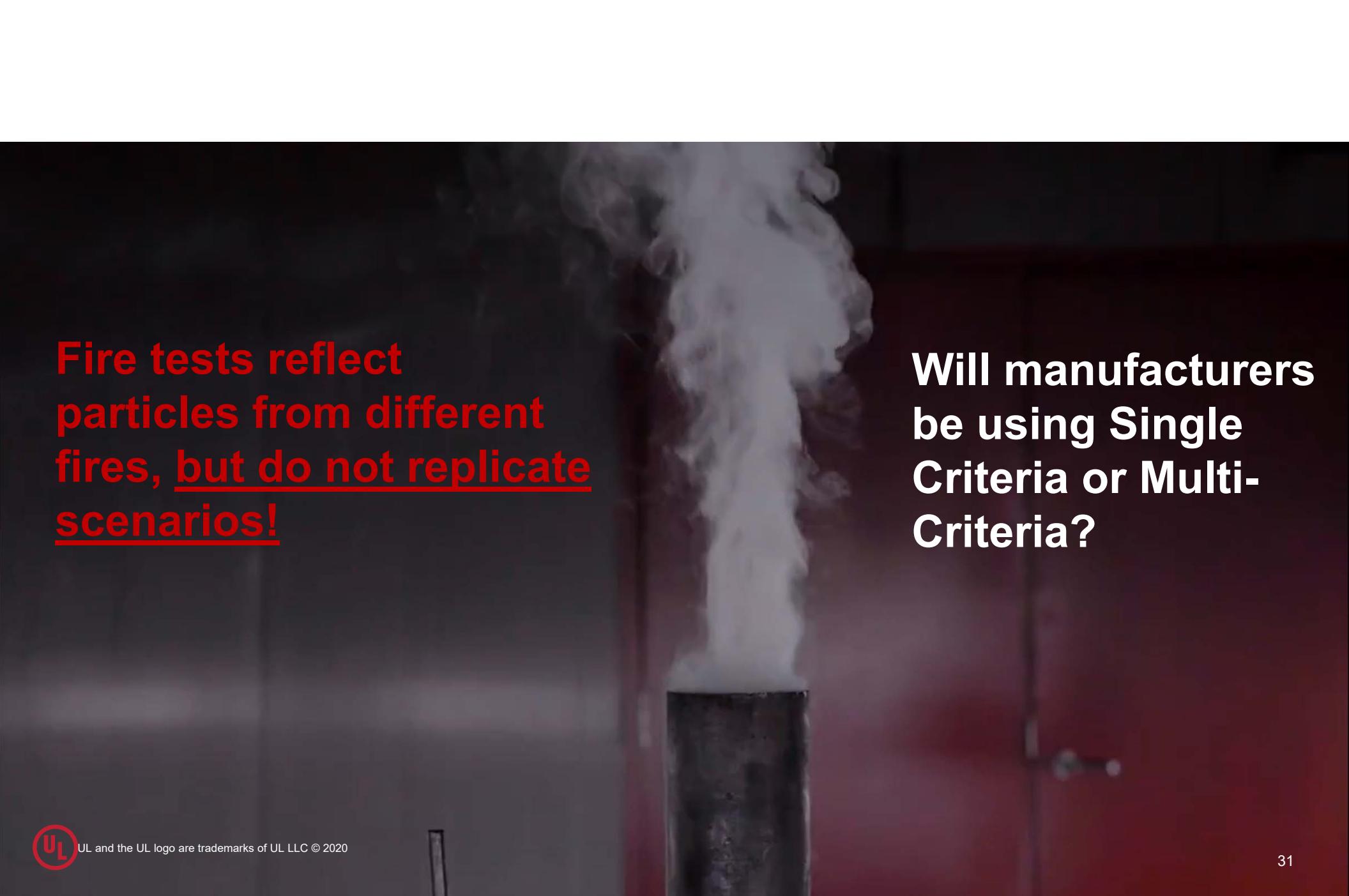
Smoke Alarms

Join NEOFPA!
To join or renew your membership, download and submit this form: [Membership Form 2018 \(297 downloads\)](#)

About NEOFPA
The NEOFPA's mission is to



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**Fire tests reflect
particles from different
fires, but do not replicate
scenarios!**

**Will manufacturers
be using Single
Criteria or Multi-
Criteria?**



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But How Will Alarms Perform?

Research Objectives

- How will new tests affect current smoke alarms.
- What is the potential performance enhancement for new smoke alarms.
- Can a single nuisance test represent the broad range of cooking scenarios?



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NIST Technical Note 1947

A Study on the Performance of Current Smoke Alarms to the New Fire and Nuisance Tests Prescribed in ANSI/UL 217-2015

Thomas G.Cleary

This publication is available free of charge from:
<https://doi.org/10.6028/NIST.TN.1947>

NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

But How Will Alarms Perform?

Summary

- Ionization alarms performed well when subject to flaming PU Foam.
- Photoelectric alarms performed well when subject to Smoldering PU Foam.



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NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

But How Will Alarms Perform? NIST Technical Note 1947

- No current smoke alarm would meet the new requirements
 - Three model photoelectric alarms came closest
- An across the board change to comply with UL 217/268 would “.... Significantly improve the overall performance...”
- New fires and nuisance tests “... make it challenging for manufacturers to meet the requirements by simply using a combination of photoelectric and ionization sensor,”



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But How Will Smoke Alarms Perform?

NIST Technical Note 1947

“it is concluded that smoke alarms meeting the performance criteria in ANSI/UL 217-2015 would demonstrate significantly improved overall performance by expanding range of fire scenarios alarms must respond to while requiring greater resistance to nuisance alarms than a wide range of currently available models.”



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NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

Approximate Number of Standard Revisions

How many revisions were incorporated into the standard between the 5th and 8th edition of ANSI/UL 217 and ANSI/UL 268?

251

- Revisions to the standard-most requiring testing, or engineering assessment

800+

- Total Revisions



Additional Key Changes to ANSI/UL 217 and ANSI/UL 268

- ✓ Multi-Criteria
- ✓ End-of-Life
- ✓ Alarm Silence
- ✓ Wireless Supervision
- ✓ Firmware Updates
- ✓ Flaming PU Foam after Cooking Nuisance
- ✓ Polyurethane (PU) Foam
- ✓ Cooking Nuisance Alarm Requirements



UL 217

STANDARD FOR SAFETY

Smoke Alarms

*UL, LLC - Effective date for the 8th edition
of ANSI/UL 217 is May 2020.*



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Enhanced Product Certification Mark and Promotional Marking

SMOKE ALARMS CERTIFIED BY UL TO UL 217 8TH EDITION

Product



Package and
promotion



Helps Reduce Cooking
Nuisance Alarms
UL 217 8th Ed.

SMOKE DETECTORS CERTIFIED BY UL TO UL 268 7TH EDITION

Product



Package and
promotion



Helps Reduce Cooking
Nuisance Alarms
UL 268 7th Ed.



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Key Messages for the Public and Actions You Can Take



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smokealarms.ul.com



SAFETY STANDARDS

FACTS & TIPS

PRESS CENTER

RESOURCES



SMOKE ALARMS SAVE LIVES.
IT'S IMPORTANT THAT THEY
WORK WHEN YOU NEED
THEM TO.

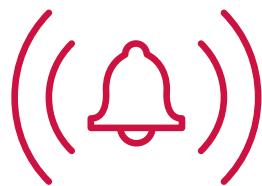


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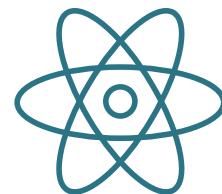
Governor's Island



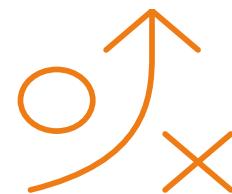
Key Messages for the Public



Working smoke alarms
will continue to provide protection
through the end
of their 10-year life span



At the end of the 10-year span,
install an alarm with enhanced
technology

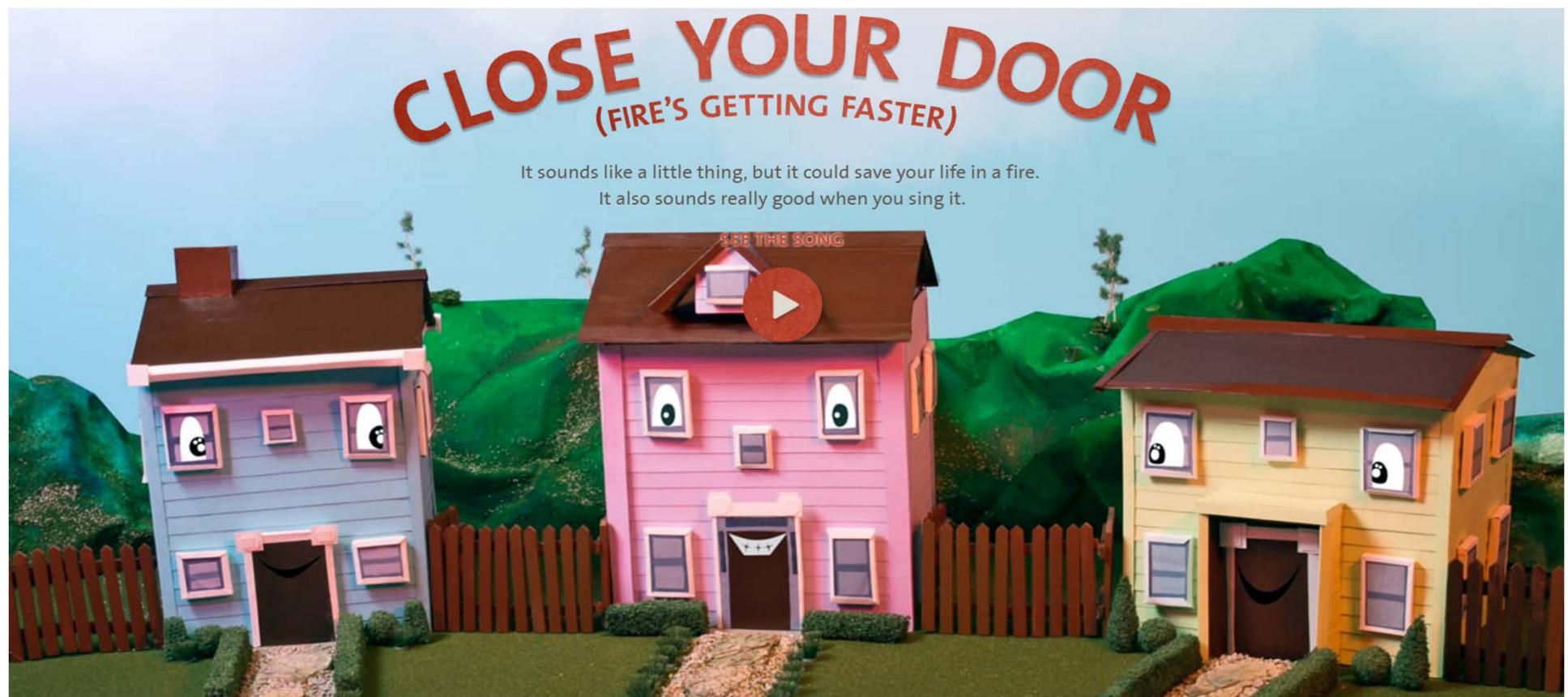


Have an escape plan
and act on it when a
smoke alarm sounds



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www.closeyourdoor.org



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Best Case Success Story

4 y/o Child Saved and Successfully Revived After a Successful Transitional Attack that was Initiated from the Front Yard



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Isolation Saves Lives

Even Hollow Core Doors Help!

Hollow Core Door



Bedroom with Child



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UL Offers Potentially Life-Saving Tip For Home Fire Safety: Close Before You Doze



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ULfirefightersafety.org

The screenshot shows the homepage of the UL Firefighter Safety Research Institute (FSRI) website. The header features the FSRI logo and navigation links for HOME, ABOUT US, RESEARCH, RESOURCES, TRAINING, NEWS, and MEMBERS. A banner image of firefighters in action is overlaid with the text "ADVANCING FIRE SAFETY SCIENCE". Below the banner, a mission statement reads: "UL FSRI is dedicated to increasing firefighter knowledge to reduce injuries and deaths in the fire service and in the communities they serve." A horizontal menu bar below the banner includes categories such as VENTILATION, SUPPRESSION, BUILDING CONSTRUCTION, FIRE DYNAMICS, FIRE INVESTIGATION, HEALTH, DATA, NEW TECHNOLOGY, PUBLIC SAFETY, and TRAINING. At the bottom of the page, there is a "RECENT NEWS" section with three items: "Closed Doors Can Save Lives" (October 6, 2017), "FSRI Contributes to NFFF Fire Service Health & Safety Report" (October 3, 2017), and "Julie Bryant Joins FSRI on Research Fellowship" (October 2, 2017). The UL logo is located in the bottom left corner.

RECENT NEWS

All General Updates Research Training Where To Find Us

READ MORE

Closed Doors Can Save Lives
October 6, 2017

FSRI Contributes to NFFF Fire Service Health & Safety Report
October 3, 2017

Julie Bryant Joins FSRI on Research Fellowship
October 2, 2017

ardiovascular and mical Exposure Ris

Additional Resources

Additional Scientific Resources:

- 1. UL FSRI Comparison of Modern and Legacy Home Furnishings** <https://ulfightersafety.org/research-projects/comparison-of-modern-and-legacy-home-furnishings.html>
- 2. Smoke Characterization Project Report**
<https://www.nfpa.org/-/media/Files/News-and-Research/Archived-reports/smokecharacterization.ashx?la=en>
- 3. Cooking Nuisance**
https://library.ul.com/wp-content/uploads/sites/40/2015/06/Characterization-of-Smoke-Alarm-Nuisance-Sources-from-Cooking-Events_Final.pdf



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Thank You

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