

Ionization Smoke Alarms

> A Substantial Product Hazard <

Industry is Complying with a Flawed Standard

Consumer Product Safety Commission

June 24, 2015 Public Notice Hearing

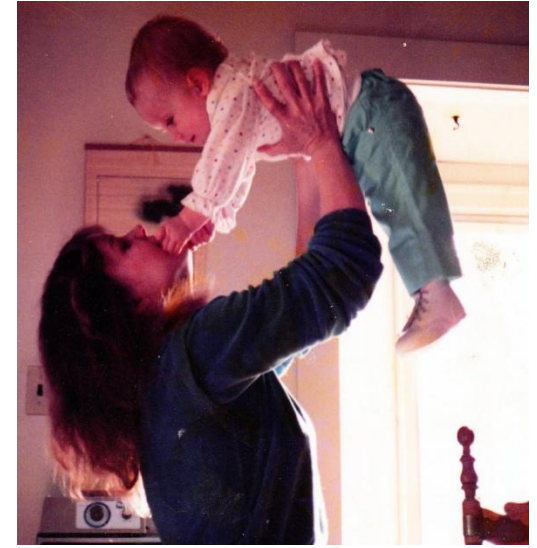
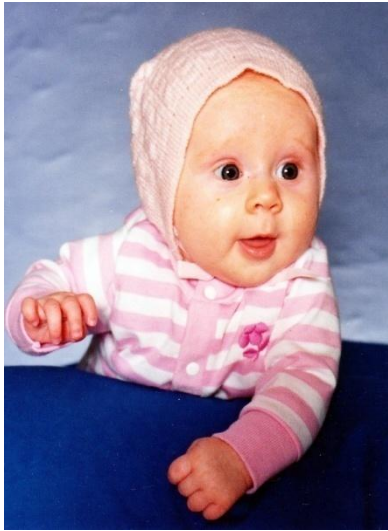
Agenda and Priorities for Fiscal Years 2016 and 2017

Presentation by Dean Dennis



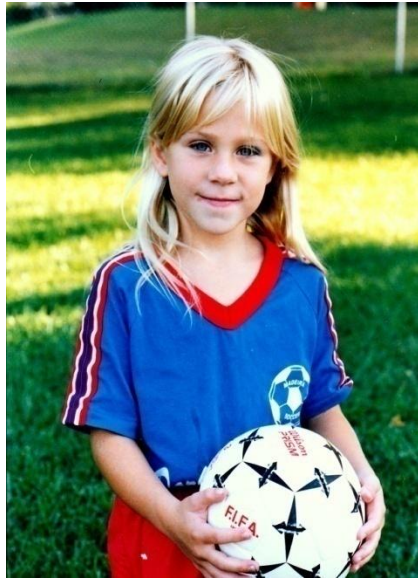
My Family



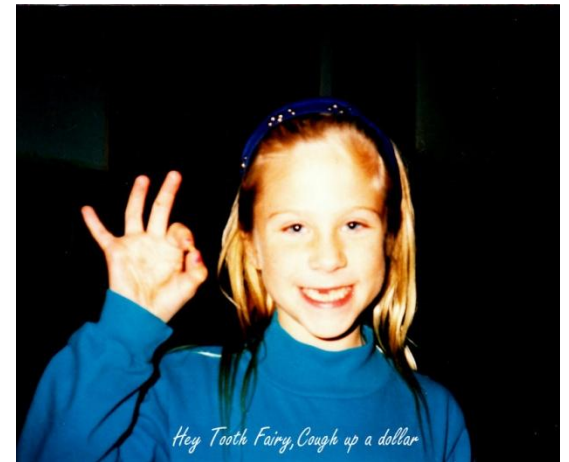
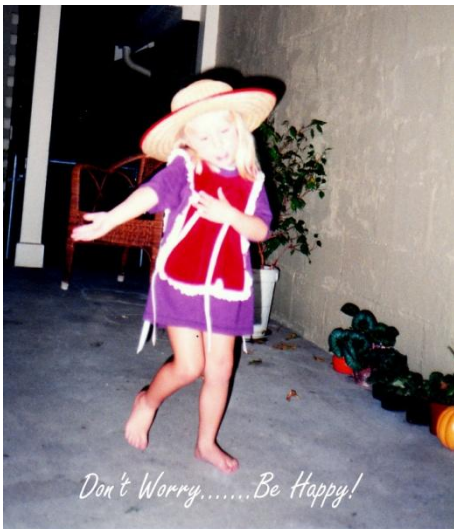


Andrea





Allie



Sisters



Our Girls as Young Women



Ohio State University Fire

April 13, 2003



We lose Andrea

The Aftermath



Andrea died along with 4 other students. The house was equipped with approximately 6 ionization alarms. Two years later, 3 more students died at Miami University in Ohio. This house had more than a dozen hard-wired ionization alarms. It is thought that by the time the first detector sounded, the students had little to no time to escape. A disturbing call from a Boston deputy fire chief was received after this fire.

Information Fire Officials Provide to the Public

(NFPA, NIST, USFA)

Everyone needs a smoke alarm.
Maintain your smoke alarm.

Ionization Alarms:

Faster at detecting flaming fires.

Photoelectric alarms:

Faster at detecting smoldering fires.

The “You Just Need A Smoke Alarm Message”

NIST- “FIRE SAFETY’S GREATEST SUCCESS STORY”:

“Smoke Detector usage rose from 10% in 1975 to 95% in 2000, while home fire deaths were cut in half.”

Underwriter Labs Home Page on Smoke Alarms:

“Fire deaths have been cut in half since smoke alarms were introduced in the late 1970s.”





National Fire Protection Association

The authority on fire, electrical, and building safety

The U.S. fire problem

Residential structure fires

Year	Fires	Civilian Deaths
1977	750,000	6,135
1981	733,000	5,540
1989	513,500	4,435
1997	406,500	3,390
2005	396,000	3,055

Source: NFPA survey

Update: In 1980 - 734,000 fires and 5,200 deaths. In 2011 – 370,000 fires and 2,520 deaths.

Source: NFPA Home Structure Fires. Marty Ahrens

WHITE PAPER
HOME SMOKE ALARMS
AND OTHER FIRE DETECTION
AND ALARM EQUIPMENT
Public/Private Fire Safety Council
April, 2006

“The home fire death rate relative to number of fires is essentially unchanged from 1977 to 2003.³”

³ Rates are calculated using fire statistics from reference [1] and previous reports in series, and population data from *Statistical Abstract of the United States 2004-2005*, U.S. Census Bureau, Washington, DC, 2004. *(Quote : page 11 of 61)*

The Problem:

There Are Serious Issues With The Prevalent Technology

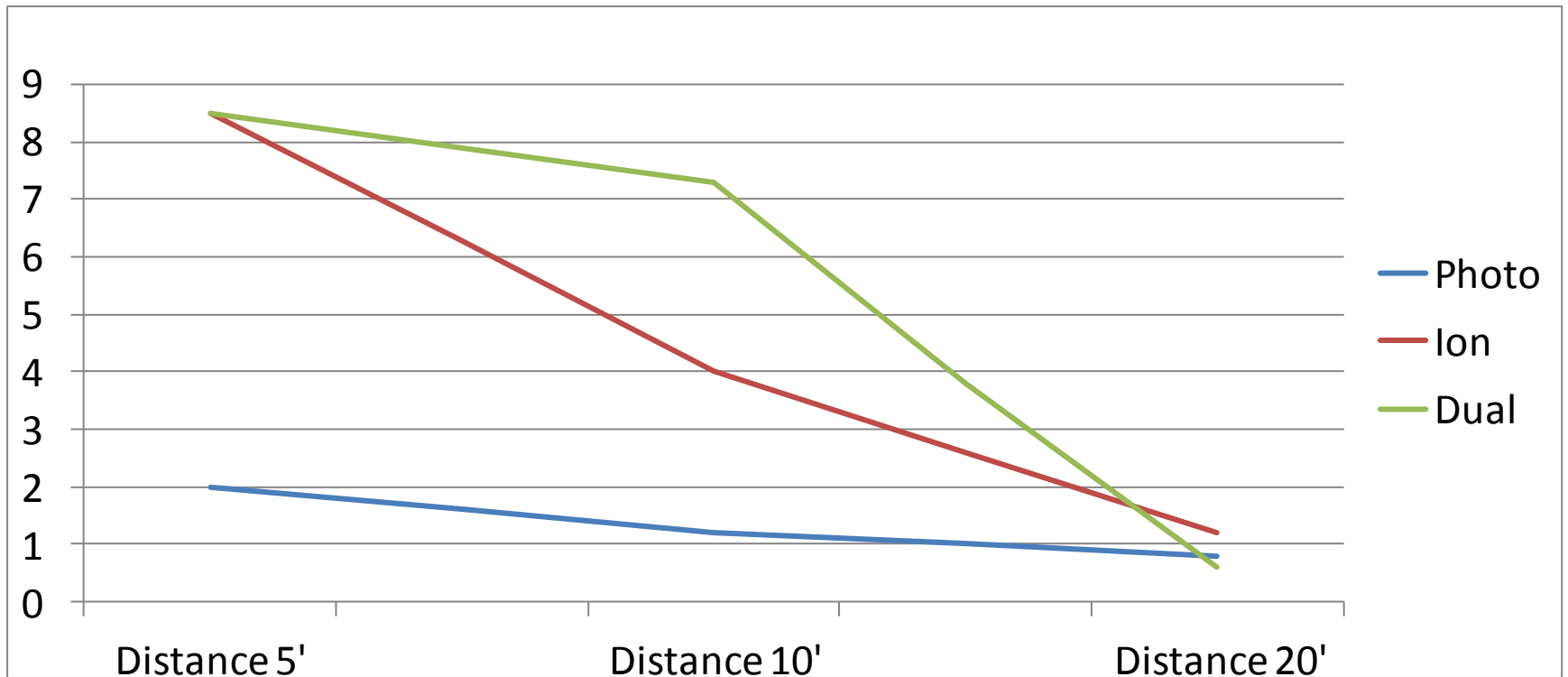
- > Ionization alarms are in the majority of residential housing and the vast majority of people have never heard of photoelectric technology.
- > Ionization alarms have been documented to fail to trigger in time to allow people to escape fires that have an extended smoldering stage and have been known not to sound at all.
- > Ionization alarms are also known to have significant nuisance alarm problems which results in people disabling them.

Visual of unwanted activations from 5, 10, 15, 20 ft.

CPSC

**Smoke Alarms – Pilot Study of Nuisance Alarms Associated with Cooking
March 2010**

Percent of unwanted activations in 8 test houses during 234 cooking events over 30 days



Smoke Alarms best when placed 20 ft. from cooking sources, within 20 ft, only use photoelectric alarms. NFPA 72 states alarms should be 20 feet from cooking sources or use photoelectric/or alarm with hush button. Newer ordinances and statutes are moving to a 20 foot rule. This means only photoelectric alarms within 20 ft of a nuisance source.

U.S. EXPERIENCE WITH SMOKE ALARMS AND OTHER FIRE DETECTION/ALARM EQUIPMENT

Marty Ahrens, Fire Analysis and Research Division
National Fire Protection Association , April 2007

“In more than half of the reported home fires in which the smoke alarms were present but did not operate, batteries were missing or disconnected. **Nuisance alarms were the leading reason for disconnected smoke alarms.”**



for what matters most.



To silence a triggered smoke alarm, **about 22% of consumers will remove the battery**, leaving the alarm inoperable and potentially **putting the residence and its occupants at risk should a true fire occur.**

Considering photoelectric smoke alarms are determined by industry experts to be significantly less prone to nuisance alarm and potential disabling of the batteries by consumers, **we support and encourage fire service administration and lawmakers that are moving toward the use of photoelectric smoke sensing technology.** In addition, First Alert aims to reassure all public safety advocates that ours is an organization that actively supports our consumers amidst this safety-related legislation.

The Performance of Ionization Smoke Alarms

Texas A&M Study

Risk Analysis of Residential Fire Detector Performance

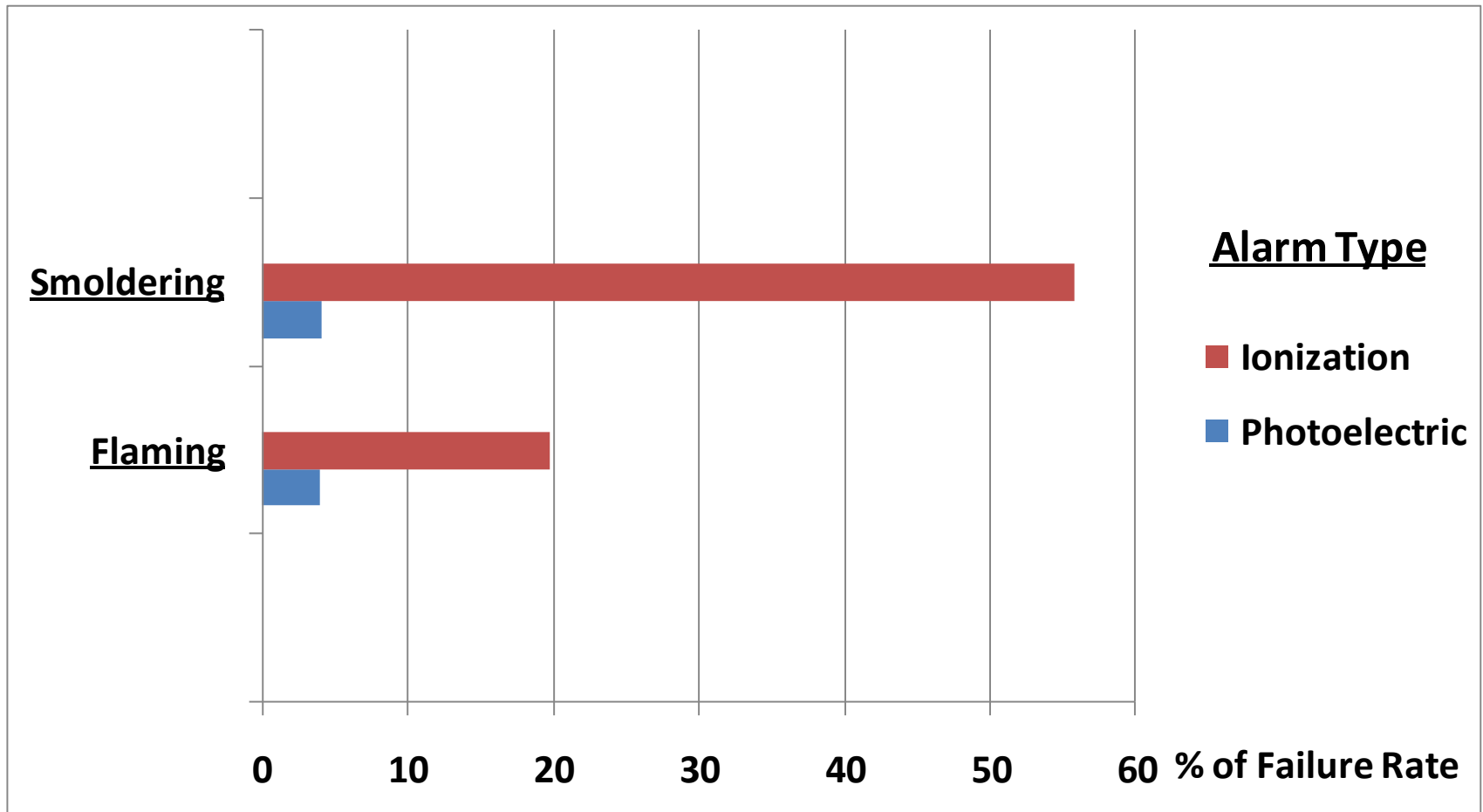
- “The development of the risk analysis offered a clear insight into why **there continues to be a high residential death rate in spite of an increase in the residences reported to have smoke detectors installed.**
- The current thought process demonstrated by fire officials in the position to make recommendations, has been to just install a smoke detector in the home without consideration as to the type of potential fire ignition that most frequently occurs or to the quality of the fire detector.”
- “A review of the risk analysis provides a clear example of the probability of a detector failure if there is no consideration as to the risk involved with the use of the various types of fire detectors.”

“The probability of the failure of the photoelectric detector to detect a smoldering ignition fire is 4.06% while the ionization detector provided a 55.8% probability of a failure in a similar type of fire. This high probability of a failure of the ionization detector can be contributed to a number of factors such as performance under normal conditions and an inability to consistently detect smoldering smoke particles. **This is a very important consideration since most of the fires that occur in residences start out as smoldering ignition fires.”**

“During a flame ignition fire, the photoelectric smoke detector had a 3.99% probability of a failure to detect the fire while the ionization smoke detector probability of failure to detect the fire is 19.8%.”

Risk Analysis of Residential Fire Detector Performance

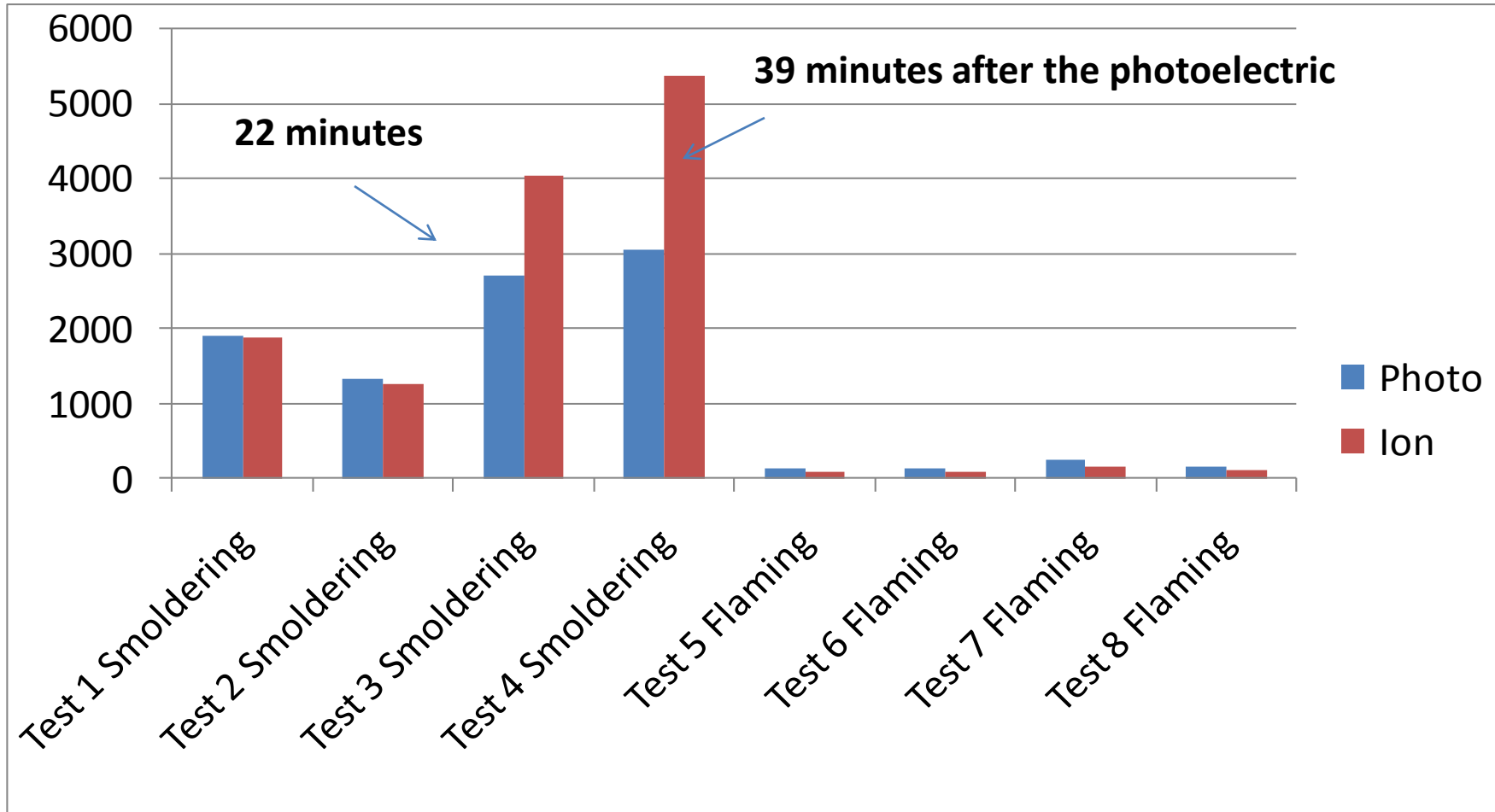
Larry Grosse Ph.D., Texas A&M University, Jac DeJong Ph.D. Texas A&M University, and John Murphy Ph.D., Colorado State University



NIST 2008

ALARM TIMES IN SECONDS

*Results from a Full-Scale Smoke Alarm Sensitivity Study



The photoelectric is blue

The ionization is red

ASET

Available time you have to escape a fire (in seconds)

	PHOTOELECTRIC	IONIZATION	DUAL ION/PHOTO
<u>FLAMING</u>	<u>FLAMING</u>	<u>FLAMING</u>	
Living Room	108	152	
Living Room (Rep)	134	172	
Living Room (FF)	144	172	
Bedroom	350	374	
Bedroom (Closed)	3416	3438	
<u>SMOLDERING</u>	<u>SMOLDERING</u>	<u>SMOLDERING</u>	<u>SMOLDERING</u>
*Living Room	3298 (55 min.)	16	3332
*Living Room (AC)	2773 (46 min.)	(-54)	2108

NIST Technical Note 1455-1 (page 243 and is two story, alarm on each level, ASET in seconds) February 2008 Revision.
 Performance of Home Smoke Alarms Analysis of the Response of Several Available Technologies in Residential Fire Settings

Statement for the Record
National Institute of Standards and Technology
to the
Boston City Council Committee on Public Safety
August 6, 2007

The general trends from a 2004 NIST experimental study into the behavior of smoke alarms are consistent with several previous scientific studies showing that properly installed and maintained ionization and photoelectric alarms provide enough time to save lives for most of the population under many fire scenarios. **However, ionization detectors have been shown to sometimes fail to alarm in a smoldering fire even when visibility in the room is significantly degraded by smoke.** Most photoelectric detectors alarm substantially sooner in these situations.

In the NIST experiments the photoelectric detectors sensed smoldering fires on average 30 minutes earlier than the ionization detectors. The same study demonstrated that ionization detectors responded, **on average, 50 seconds** earlier than photoelectric detectors during flaming fire experiments. The relative margins of safety associated with a 30 minute earlier warning in a slow growing smoldering fire compared to a 50 second earlier warning for a fast growing flaming fire is difficult to determine.

From: NIST

(Questions and Answers Clarifying Findings of NIST Home Smoke Alarm Study^{1,2})

“Specifically, smoldering smoke tests utilize cotton wicks or wood pieces on a hotplate (UL217/2686 and EN54/ISO TS7240-97) as sources, and these were used by NIST as detailed in the report. The Underwriters Laboratories (UL) smoldering test with wood on a hotplate was developed by UL in the late 1970’s to mimic the smoldering mattresses and furniture.....”

Home Fires That Began With Upholstered Furniture

Marty Ahrens, [NFPA](#), Quincy, MA May 2008

In 2002-2005, U.S. fire departments responded to an average, of 7630 home structure fires per year in which upholstered furniture was the first item ignited. These fires caused an annual average of 600 civilian fire deaths, 920 civilian fire injuries, and \$309 million in direct property damage.

On average, one of every 13 upholstered furniture fires resulted in death.

****Overall, fires beginning with upholstered furniture accounted for 2% of reported home fires but 21% of home fire deaths***

Smoking materials remain the leading cause of upholstered furniture fires and losses. **One of every seven upholstered furniture fires started by smoking materials resulted in death.**

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“However, more than one-fourth of home fire deaths (all or nearly all of those involving smoking materials and some others) involve an extended initial smoldering phase. ¹⁶ A recent study found unsatisfactory performance (available escape time was less than estimated required escape time) by ionization-mode smoke alarms against fire scenarios that involved 30 to 120 minutes of initial smoldering. ¹⁵ There is insufficient data to determine whether the fires that smolder long enough to defeat ionization-mode smoke alarms are closer to 3% or 25% of the total.”

Smoke Characterization Project

April 24, 2007

See Table 25 on page 109 (Non-Flaming Tests). Ionization failed 20% (one out of 5) of UL's own smoldering Ponderosa pine test by not activating. The photoelectric passed all current UL tests.

Ionization alarm only triggered in 1 out of 11 smoldering tests involving foam, nylon and foam board insulation before the sample size burned out, which was 100% failure rate factoring in by the time the ionization sounded a 10% OBS had already been reached. The photoelectric alarm sounded in 8 of 11 tests before sample size burned out (it was noted that the sample size for three of the tests the photoelectric and ionization didn't trigger was thought to be too small). In the singular test the ionization activated, the photoelectric alarm had activated 42 minutes prior.

Smoke Alarm Failure

Chickasaw, Alabama

(May 28, 2008)

11-year-old Kentarian Williams died after he could not make it out of the family house.

The Williams family blames **smoke detectors that never went off.**

“they do not work when a house fills with smoke or they sound very late..”..Williams attorney Richard Taylor

Smoke Alarm Failure

Nashville, TN

(posted, Nov. 5, 2007)

Debuty family loses three of their children in a fire.

Reporter Krause: **“At what point did you hear your smoke detector?”** Amanda Debuty: **“Never. They never went off.”**

*Please watch: [NBC TODAY Show Rossen Reports "Some smoke detectors may not go off in time" - 10/03/2012](#)
(You can find this on YouTube)

Smoke Alarm Failure

Ft. Wayne, IN

(January 23, 2009)

Three college girls die from smoke inhalation after being rescued from apartment complex.

“at least two residents of the apartment told the News-Sentinel they woke around 5 a.m. not to a smoke alarm but to a roommate coughing...**Heidi said she heard from other students whose apartment was completely full of smoke and their alarms did not sound either.**”



TAYLOR ♦ MARTINO

51 Saint Joseph Street, Mobile, **Alabama** 36602

One of the best theories of recovery against a smoke alarm manufacturer is failure to warn. **It can be easily proven that the smoke alarm manufacturer knows that the ionization smoke alarm has a history of failure and defect.** The manufacturer will admit the delay in sounding and will have to admit its knowledge of the consumer complaints. However, despite this knowledge, the manufacturers do not warn about the hazard. Purchase an ionization smoke alarm at a local retail store and read the package front and back before opening it. Typically, the only information pertaining to the limitation (defect) of the smoke alarm is wording such as:

“XXXXX recommends for maximum protection that both ionization and photoelectric smoke alarms be installed. Ionization technology is faster at detecting fast flaming fires that give off little smoke. Photoelectric technology is faster at responding to slow smoldering, smoky fires.”

There is no warning on the package telling the purchaser how much faster the photoelectric is at detecting a slow smoldering fire. The manufacturer knows the ionization alarm has a 15-30 minute delay in sounding when compared to the photoelectric. However, this is not revealed. In fact, the smoke alarm manufacturers have testified that they do not warn about the substantial delay in sounding or the risk of not sounding. They must admit this because there are no “warnings” concerning this defect in the packaging or on the alarm.

Two East Coast Cities

Comparing Residential Fire Fatalities

Baltimore & Boston

Pop. 600,000

Pop. 650,000

Fire Fatalities From 2009-2012

Baltimore

Boston

75

Fire Fatalities From 2009-2012

Baltimore

75

Boston

4

Why Aren't Ionization Smoke Alarms Properly Labeled?

Shouldn't Parents Be Given Critical Information To Protect Their Families?

Warning: The National Institute of Science and Technology (NIST) has determined that ionization alarms sound an average of 30 minutes slower in smoldering fires than photoelectric alarms and may not always alarm even when a room is filled with smoke from a smoldering fire.

Statement for the Record, National Institute of Science and Technology to the Boston City Council on Public Safety, August 6, 2007

Warning: The National Fire Protection Association has determined that ionization smoke detectors that use ionization smoke detection have been shown to be more susceptible to cooking nuisance alarms than those that use photoelectric smoke detection.

NFPA 2013, 29.8.3.4 Specific Location Requirements, 1.A29.8.3.4(4)

Thank You For The Opportunity To Present

Dean Dennis

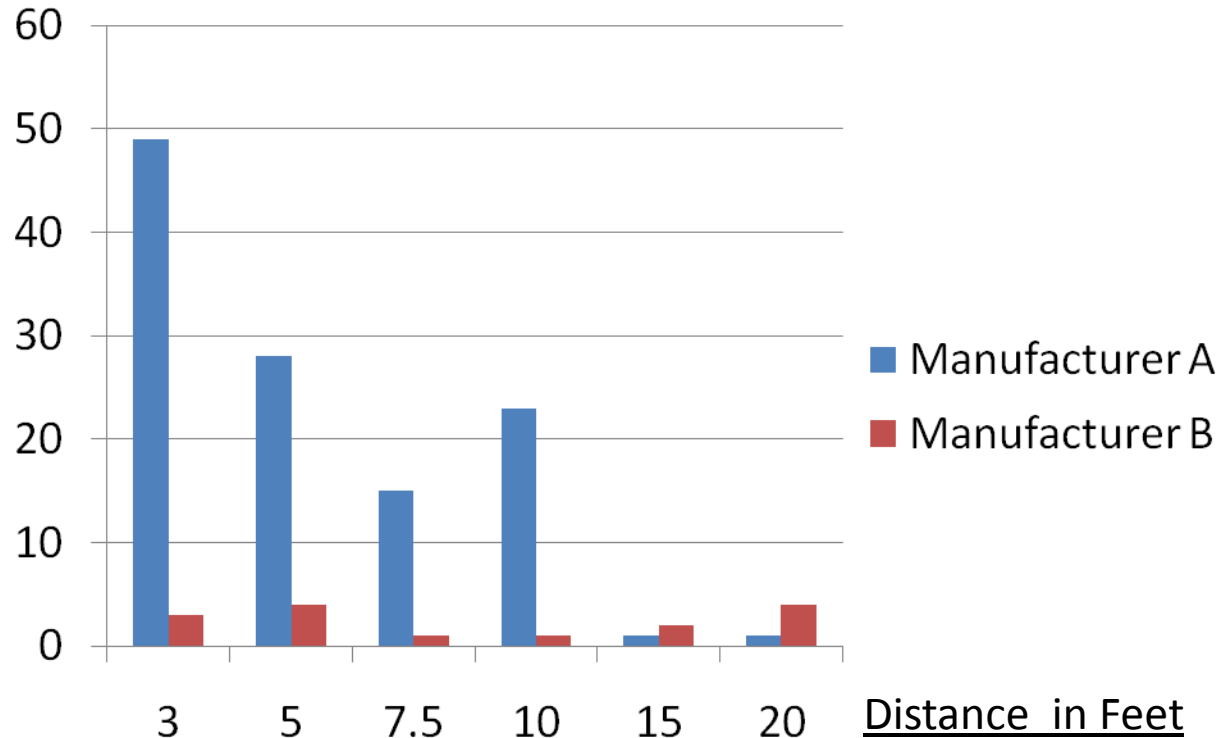
Nuisance Activations between Manufacturers

Consumer Product Safety Commission – March 2010

Smoke Alarms – Pilot Study of Nuisance Alarms Associated with Cooking

Raw number of unwanted cooking activations in test house #9 from Dual Sensor alarms, side by side comparison of Dual Sensor alarms between two manufacturers.

Manufacturer “A” had 117 nuisance activations out of the 125 total.



The ionization sensor is often adjusted in dual sensor alarms to reduce nuisance alarms.