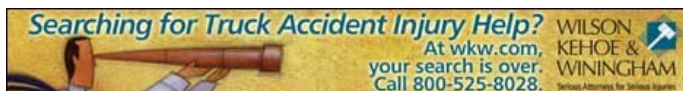




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13 Investigates

UL smoke detector test "must move forward"

July 30, 2007 07:50 PM

[Bob Segall](#)/13 Investigates

Safety organization cannot explain why some smoke detectors did not detect smoke

It's a serious problem that affects millions of smoke detectors, and it probably affects the ones in your home right now.

Tests conducted by WTHR and area fire departments have shown in slow-burning smoky fires, the most popular type of smoke detector in the United States may NOT detect smoke.

The testing showed some ionization smoke alarms (the least expensive kind which is now estimated to be in more than 90% of all U.S. households) did not sound until long after they were surrounded by thick smoke and dangerous carbon monoxide gas. In some of the tests, they did not activate at all.

So then how did those smoke alarms get a seal of approval from [Underwriters Laboratories](#), one of the world's leading testing and safety organizations?

A UL seal means a smoke alarm is "listed" by the organization which has determined the smoke detector meets industry standards for safety and effectiveness. The UL seal is very powerful. It is considered proof that a product works, and the nation's largest smoke alarm manufacturers defend their ionization smoke alarms by pointing out they've been tested and approved by Underwriters Laboratories.

"The reality is, if it's a UL listed smoke alarm, when that smoke hits the alarm, it will sound the alarm," said UL consumer affairs manager John Dregenberg.

Dregenberg told 13 Investigates that all UL-approved smoke alarms work because they are tested inside UL's 1.5-million-square-foot testing facility near Chicago to make sure they meet strict standards.

But UL admits it cannot explain why multiple tests conducted by WTHR and fire departments from Indianapolis, Wayne Township, Brownsburg and Speedway showed ionization smoke detectors that did not activate in rooms full of heavy smoke.

The following exchange is from a conversation between Dregenberg and 13 Investigates:

Segall: Do we agree that in a situation like that the smoke alarms should be going off?
Dregenberg: There should be an alarm sounding... what we're really looking at is when the smoke concentration in a room is a hazard to human life,

UL smoke detector update



Dr. Don Russell tests smoke alarms at his lab in College Station, Texas.



John Dregenberg could not explain WTHR's test results but says UL-listed approved smoke alarms will work.



UL tests smoke alarms at a 1.5 million square foot testing lab near Chicago.



This symbol means a smoke detector has been tested and approved by UL.

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that's when the smoke alarm should go off.

Segall: But we're talking about a room full of smoke.

Dregenberg: The fact is we know if it's a working smoke alarm, when the smoke hits that alarm, it will sound.

Segall: That just doesn't make sense. You stated when the smoke hits the alarm, we know it's going to go off. But yet we see situations where that doesn't happen.

Dregenberg: I'm talking about from a scientific standpoint, when the smoke gets to the alarm in the proper density in the proper concentration, it will go off.

Segall: Is there any scientific explanation for why, in this real world situation, we have smoke detectors that are not going off in a room full of smoke?

Dregenberg: I really don't know.

Dregenberg did point out all of the tests conducted by WTHR and Indiana fire departments are considered unscientific. And he is right.

Scientific testing

That is why WTHR visited the laboratory of Dr. Don Russell in College Station, Texas. His lab is inside an old home on the campus of Texas A&M University, and it is where Russell has tested hundreds of smoke alarms over the past ten years.

"This is science," said Russell, a professor of electrical and computer engineering. "I've been doing this a long time."

During WTHR's visit, Russell and some of his engineering graduate students set slow smoky fires on polyurethane couch cushions inside the lab to test the response time of six ionization and six photoelectric smoke alarms.

The tests were conducted in a dark room so the researchers could scientifically monitor smoke levels with light obscuration meters -- the same way UL tests smoke levels. Infrared cameras and high-tech computer programs constantly monitored the smoke and the alarms, and allowed the research team and 13 Investigators to watch the tests on a computer monitor from a nearby room -- safe from smoke and toxic gasses.

The results of the Texas A&M tests were nearly identical to those in Indiana.

The average activation time of the photoelectric smoke alarms was 10 minutes and 32 seconds faster than that of the ionization smoke alarms. Three of the ionization detectors did not activate until well after the amount of smoke in the room exceeded acceptable UL levels. Those three alarms sounded at an average smoke obscuration level of 14.9%, which means if you were in the room at the time the smoke detectors sounded, thick smoke would have prevented you from seeing an object -- such as a door or a person -- seven feet away from you.

(UL's safety standard for smoke alarms indicates that a smoke alarm must activate before 10% smoke obscuration. That means the smoke density surrounding the smoke alarm must not exceed 10% per foot or, put another way, you could still see an object ten feet away.)

"A big problem"

"After an hour, we had fifty percent of the smoke detectors -- ionization smoke detectors -- not sounding," Russell said. "You saw it. I saw it. Our eyes didn't lie. The smoke was there. It was scientifically measured on both side of the smoke detectors. It's clearly thick and those smoke detectors were not going off. I call that a big problem."

It's a problem Russell has seen with ionization smoke alarms since he first began testing smoke detectors a decade ago. He says in smoldering fires, his tests show at least one in five ionization smoke alarms never sounds at all.

And yet those alarms are approved by UL. Doctor Russell says he thinks he knows why:

"Their science isn't any good, frankly. As a scientist, practicing science that doesn't replicate what the world really is in terms of physics is worthless."

Russell and other critics of UL say for decades, smoke detectors have been tested in laboratory settings that do not reflect real-life scenarios. They also argue UL's testing standard is outdated.

Some of the people who help design the standard for Underwriters Laboratories agree



Members of the UL 217 Standards Technical Panel met in June to discuss smoke alarms.

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the current testing process for smoke alarms is long overdue for change.

"We must move forward."

"We must move forward," said Jim Roberts, chief code consultant in the North Carolina State Fire Marshal's Department of Insurance and a member of UL's standards technical panel for smoke alarms.

"No test is perfect and what we have now is far from perfect, but it's the best we could develop in the era it was developed," Roberts said.

That era was the 1970s.

In 1975, UL and the National Bureau of Standards (now a government agency called the [National Institute of Standards and Technology](#)) conducted a comprehensive project known as the Indiana Dunes tests. The government-sponsored tests along Indiana's northern lakeshore examined, among other things, how smoke alarms responded to different types of fires in real furnished homes. According to UL, the tests showed both ionization and photoelectric smoke alarms responded well to all types of fires.

The results of the Indiana Dunes tests were used by UL and other organizations to help develop the current set of testing standards and code requirements for smoke alarms, and smoke alarm manufacturers still cite those test results thirty years later to assure the public that their ionization smoke alarms perform well.

But times have changed. Specifically, the couches, chairs, beds and other furnishings found in today's homes are made of much different materials than those UL burned in northern Indiana houses thirty years ago to study the performance of smoke alarms.

"Those mattresses were not going to be representative of the mattresses we would see in houses in ten and twenty years," Roberts told 13 Investigates. "I don't think it dawned upon them at the time that the results of that test would not be as relevant as they could be to future smoke detectors detecting future materials."

Roberts and other members of UL's standards technical panel for smoke alarms are now considering changes to how smoke detectors are tested based on a recent study that proves what critics had suggested: that modern materials do produce much different types of smoke and burn much quicker than those used in the 1970s.

[The Smoke Characterization Report](#) sponsored by UL, the U.S. Centers for Disease Control and several smoke alarm manufacturers, provides new information about the smoke created by various materials found in today's homes. Based upon that report, smoke alarms could soon be in for tougher testing.

"We are very excited about this report," said Dregenberg. "Now we're looking at the possibility of making changes that would possibly enhance public safety."

"Progress is inevitable and in this case it's a matter of life and death," Roberts added. "That's driving all of us until we get the best possible smoke detector we can to put in your house."

In the meantime, Roberts says he is protecting his family with combination smoke alarms that contain both photoelectric and ionization technology.

"I wouldn't rely on just ionization," Roberts said. "If you can only have one technology, I personally would favor the photoelectric ... because we know it has a large advantage in detecting a smoldering fire. I have combination -- ionization and photoelectric in one unit -- to have the advantages of both in detecting fire."

After reviewing recent test results and [WTHR's Deadly Delay](#) reports, Indiana's fire marshal is recommending all Hoosiers install photoelectric smoke alarm technology in their homes, and he is expressing concern about the ability of ionization smoke alarms to provide adequate warning time during slow-burning fires.

"I think the general public assumes that UL means that Underwriters Laboratories has checked this product and it's safe, but right now we have some very serious concerns about ionization smoke detectors," fire marshal Roger Johnson said. "I think we have a false sense of security. We don't want anyone to throw out the ionization smoke detector, but the photoelectric smoke detector is crucial to your survival."

WTHR and HH Gregg have partnered to offer a significant discount on combination smoke alarms (which include both ionization and photoelectric technology). First Alert dual sensor smoke alarms are available now at central Indiana HH Gregg stores for \$19.97, a ten dollar discount off the suggested retail price.

[Smoke Detector Tips](#)

[Engineering Works](#): "Many people do not realize that their detector is old and needs to

be replaced."



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