When Product Safety and the Environment Appear to Collide:

The Defeat of the Candle Flame Ignition Requirement

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A series of proposed international information and communication technology (ICT), video, and audio equipment safety standards, under development since 2002 and believed certain to be implemented, was voted down in 2008. These proposed standards introduced an "accidentally caused candle flame ignition" provision, requiring that plastic enclosures of consumer electronics products resist external ignition from a small open flame.

Household electronics products are currently well protected against potential ignition from internal heat sources. The candle flame ignition requirement would have, if approved, resulted in the addition of hundreds of millions of pounds of unneeded fire retardant chemicals to consumer electronics each year, based on a poorly documented fire safety risk. Some of the chemicals likely to have been used are known to be toxic and persistent; the rest lack adequate health and environmental data. Finally, these chemicals would have made the recycling and reuse of plastic from consumer electronics more difficult and expensive.

The defeat of these standards prevented a potential human health and environmental catastrophe, and also provides useful insights into why and where improvements in the standard setting process are needed.

The Origins of the Candle Flame Ignition Requirements

The mission of the IEC Technical Committee 108 (TC 108) is to set and maintain product safety standards for audio, video and information technology (IT) equipment. These standards focus broadly on internal sources of hazards, such as heat and fire, electricity and mechanical issues, as well as proper labeling and testing.

Enclosures of consumer electronics are often made from various types of plastic, a petrochemical that is naturally flammable. Flammability can be reduced, either by using different materials (such as metals), different designs, or by adding fire retardant chemicals to reduce the plastic's propensity to ignite.

In 2000, the U.S. National Association of State Fire Marshals (NASFM) began to promote the idea[1] that electronics in the home could be susceptible to ignition by a candle flame, and proposed that electronic enclosures should be designed to resist ignition from such an event. The proposed requirements were not designed to protect against fires the size of a wastebasket or larger, but only against external fires the size of a candle flame, a fire scenario for which incident data was lacking.

Indeed, four separate and independent sources, the U.S. Consumer Product Safety Commission (CPSC), the U.S. National Fire Protection Association (NFPA)[2], the Consumer Electronics Association (CEA)[3], and the Telecommunications Industry Association (TIA)[4] each concluded that the risk of candles igniting consumer electronics was low, with the

last two organizations stating that the potential risk was too low to justify the implementation of a candle flame ignition requirement.

The Push for Inclusion of a Candle Flame Ignition Test

However, undeterred by this data, NASFM continued to push the electronics industry to develop a requirement to make electronics in the home less susceptible to accidental ignition by candle flame. They demonstrated that, under simulated real-life conditions, electronic enclosures could catch fire and "flash over" to set an entire room and structure ablaze.

The NASFM also videotaped tests showing products from specific major manufacturers, and then, according to some reports, used these videos to pressure the companies into supporting such standards. The NASFM also reportedly promised to release print and television advertisements, showing these tests to allege a lack of product safety, unless the manufacturers changed the housings of the products to meet the proposed requirement.

Fear of such potentially adverse publicity may have contributed to some manufacturers agreeing to the development of a candle flame ignition requirement by IEC TC 108. Nonetheless, the committee ultimately developed and issued a standard, TS 62441[5], to determine ignition resistance to a candle-like flame. And in 2004, the NASFM made formal proposals[6] to add candle flame ignition requirements to several IEC standards, as well as standards from Underwriters Laboratory (UL) in the U.S. and the Canadian Standards Association (CSA) in Canada.

Both the CEA and the Information Technology Industry Council (formerly TIA) vehemently contested these proposals. In a letter[4], TIA bluntly and forcefully stated, "the proposal as it currently stands is without merit and should be rejected," and based its rejection of the proposed changes on several key points, including the following:

1. The proposal was based on a claim of "sufficient historical evidence," when little factual data was actually presented or available.

2. The proposal's vague wording asserting that further examination of the issue was unnecessary, while failing to conclusively demonstrate the need to impose such a test.

3. The lack of evidence of fires being started by a candle falling over onto IT or telecommunications equipment (or other electronic equipment for that matter), which was the basis for the claim that such testing was necessary.

4. Holes, logic gaps, and other "deficient and inconsistent" aspects of the proposal.

In response, representatives of the fire retardant chemical industry joined TC 108 national committees around the world and, working with the NASFM, prevailed against repeated attempts to stop the candle flame ignition requirement. Indeed, under heavy pressure from the NASFM and the chemical industry, the manufacturers voted to develop and incorporate these requirements into upcoming revisions of IEC 60065, IEC 60950, and the new IEC 62368 product safety standards.

Why was the NASFM so committed to the passage of this requirement? One possible explanation is the connection between NASFM and the fire retardant chemical industry, a connection detailed in an article published in the *Washington Post* in January 2008[9]. NASFM was also housed at the same address and suite in Washington DC as Sparber & Associates[7], a lobbyist for flame retardant chemical companies, and shared some employees.

Opposing Views

Meanwhile, Dr. Arlene Blum, a biophysical chemist (and co-author of this article), was working with other scientists,

physicians, firefighters, and non-governmental organizations (NGOs) to support proposed legislation in California that would stop the addition of toxic fire retardants to furniture sold there. In order to comply with the requirements of California TB 117, which came into effect in 1980, manufacturers have added brominated fire retardants (BFRs) and chlorinated fire retardants (CFRs) to the polyurethane foam used for furniture cushions and padding, as well as in juvenile products.

However, there was insufficient data to show that the presence of these chemicals in furniture sold in California actually led to a reduction of fires, injuries and deaths when compared to other states. In fact, many fire scientists believed that the similar rate of decline in fire deaths in all states, including California, was explained by the decrease in cigarette smoking, the increased use of smoke detectors, and by increased enforcement of fire safety standards, etc. The major support for continuing to add potentially toxic fire retardant chemicals to furniture in California primarily came from the flame retardant chemical companies that profited from selling the chemicals, and their allies such as NASFM[8].

In November 2007, Blum learned about the IEC candle flame ignition requirement that had been proposed and promoted by NASFM. She was concerned by an electronics industry estimate that as much as 1.7 billion pounds of additional fire retardant chemicals would be required annually to deal with the undocumented hazard of candle fires igniting consumer electronics, without adequate information on the impact that the addition of such a large quantity of potentially toxic chemicals would have on consumer health and on the environment.

When, in December 2007, she asked a TC 108 voting representative about health and environmental impacts of the proposed changes, she was told "IEC 62368 is being voted on right now in thirty countries. You can see it in April after it passes." Separately, a report from Pure Strategies[10] to the NGO community stated that, "the (standard development) process is far enough along and sufficiently isolated to preclude the NGO community from influencing the standard."

In a separate conversation, a chemist from one of the voting member companies told Blum there would be no health or environmental problems from the new candle flame ignition requirement, since three previously banned fire retardants would not be used.

But Blum was not reassured, since neither federal nor state governments have the authority to ensure that fire retardant chemicals are safe for human health. Further, she knew of many dozens of animal studies that had shown adverse health impacts from exposure to some fire retardant chemicals, including cancer, harm to reproduction, and scrambling of brain development, as well as persistence, and bioaccumulation of the chemicals in humans, animals, and the environment.

For Blum, adding hundreds of millions of pounds of such chemicals to consumer electronics to achieve an undocumented fire safety benefit seemed like an enormous gamble with human and environmental health worldwide.

Determined to either stop the development of the candle ignition requirement part of the standards or to add consideration of health and environmental impacts of the chemicals most likely to be used to meet them, she contacted colleagues in academia and environmental NGOs from around the world to assemble a coalition of indisputable expertise.

At the same time, Blum recruited Michael Kirschner (co-author of this article), based on his knowledge of the electronics industry and his company's membership in the American National Standards Institute (ANSI). Kirschner joined the U.S. national committee for TC 108 and began researching the proposed requirement.

Among other things, he learned that, despite the high cost of implementation and the lack of a proven fire safety benefit, electronics manufacturers were resigned to approving the candle flame ignition requirement. They had been unable to accumulate adequate technical information to counter the NASFM's push, and appeared unwilling to face potential negative publicity about their products. Kirschner was told, "unless you have a silver bullet" there's nothing that can be done about this.

Turns out there was a silver bullet. But getting it loaded, pointed, and fired at the target in a short amount of time would take substantial effort.

The Strategy

The key challenges facing Blum and Kirschner were to build a defensible argument against the candle flame ignition requirement based on actual fire and toxicology data, and defuse the perceived threat of negative publicity against manufacturers unwilling to go along with the proposed requirement.

Blum identified leading researchers in chemistry and toxicology at distinguished institutions to help assess specific chemical substances most likely be used to meet this requirement. She recruited environmental NGOs, such as Friends of the Earth (FoE) and the Center for Environmental Health (CEH), groups that were already working with her on the problem of toxics in furniture. These NGOs connected her to international networks including the Chemical Secretariat (ChemSec) and the European Environmental Citizens' Organization for Standardisation (ECOS), and added the voice of international "civil society," that is, the very consumers who buy electronic products, and who were being targeted by the NASFM with misleading information about the safety of those products[12]. Her work on the furniture issue had also introduced her to fire safety and fire-fighting organizations that could help assess the validity of the fire data.

Blum labored for several months pulling together and condensing research, and finding experts around the globe to author sections of what would eventually become a 46-page dissertation on fire data and the health, environmental, and recycling impacts of flame retardants use in plastics. This study was published as "The Case against Candle Resistant Electronics."[11]

The Challenge

IEC standards are international, and each IEC member country has a single vote. The ability to contact TC 108 national committees in each of the voting countries was therefore essential. With some ingenuity, the NGOs and their international networks were able to get Blum's paper out to representatives in most of these countries.

The NGOs had never before tried to impact an industry standard of this type or magnitude. Representatives of FoE, the CEH, ChemSec and ECOS worked to identify points of contact for each TC 108 National Committee, and then educated people on how to discuss these complex issues with the committee members. In the end, scientists, doctors, fire fighters, and a variety of NGOs in 30 separate countries petitioned their national committees for TC 108 to consider the human health and the global environmental consequences of the proposed candle flame ignition requirement.

The Results

With objective and compelling scientific, technical, and environmental arguments against the proposed candle flame ignition requirement in hand, and backed by an international coalition of scientists, physicians, firefighters, and environmental NGOs representing the public, enough of the TC 108 committee members voted against incorporation of the candle flame ignition requirement in each of the three proposed standards to defeat them. National standards based on these requirements in the U.S. and Canada (via UL and CSA) were also defeated. In fact, many comments requested that the section on candle ignition be removed in order to enable passage of a revised standard in a future vote.

The Lessons

There are a number of lessons to be learned from the successful effort to defeat the candle flame ignition requirement. First, environmental and health issues should be considered in the standards development processes. While the IEC has a policy that environmental impact of standards must be assessed, the capabilities of the technical committees to conduct this assessment can be inadequate. This is not the fault of the individuals on the committees or the IEC itself. But environmental impact is a specialty in and of itself, and there are few, if any, safety experts who are also supply chain and environmental experts.

Second, the case of the candle flame ignition requirement is one in which both industry and the environmental community were on the same side. This need not be a unique situation. The electronics industry can do a better job of understanding and improving the environmental impact and performance properties of its products, a job which can best be achieved in partnership with scientists and physicians, as well as health and environmental NGOs.

Third, this story provides a dramatic example of how special interest groups can sometimes heavily influence the standards development process in pursuit of their own marketing objectives. The authors believe that better safeguards are required in the standards development process to provide effective checks and balances.

Finally, the electronics industry should consider how similar situations have been resolved in other industries. In a separate situation in 2007, the CPSC decided to not move forward with an open flame standard for foam in furniture, based in part on health and environmental concerns about the fire retardant chemicals that would be likely to be used to meet the standard. CPSC Commissioner Thomas Moore said, "No one wants to trade fire risks for chemical toxicity risks."

Conclusion

Safety is of paramount importance to the electronics industry. Trading off health and environmental safety is a bad bargain, especially in the face of a poorly documented fire safety risk and rising pressure on the industry to improve product environmental performance. Now more than ever, industry leaders need to be mindful that concerns about safety are extended to include the long-range public health and environmental effects of their products, and to ensure that the process of developing product standards mirrors those concerns. □

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Notes

1. "Draft Candle Fire Safety Analysis and Recommendations," Consumer Product Safety Task Force of the NASFM, November 13, 2000.

2. Hall, John R, "Fires involving appliance housings – is there a clear and present danger?," *Fire Technology 38*, 2002, pp179-198.

3. Dave Wilson, "Electronic Equipment Ignition By Candle – Recent Incident Reports," Consumer Electronics Association, October 1, 2002.

4. TR41.7 Comments on the Proposal for Adding Candle Flame Test to UL 60950-1, March 31, 2005; TR41.7 letter to UL Objecting to the Preliminary Proposal for Candle Flame Requirements UL 60950-1, December 14, 2007, or www.conformity.com/2531.

5. See publication details for TS 62441 at www.conformity.com/2532.

6. For example, see IEC document 108/109A/DC, dated 2004-06-25, which proposed to add the candle flame ignition requirements to IEC 60950.

7. Sparber has reportedly now retired.

8. Technical Bulletin 117; see www.conformity.com/2533 for more information.

9. Annys Shin, "Fighting for Safety: Your Couch Is Caught in a Flammable Regulatory Battle Between the Chemical and Furniture Industries," *Washington Post*, Saturday, January 26, 2008; pD01.

10. "New Flame Retardant Standards for Plastic Enclosures," Pure Strategies, www.purestrategies.com, November 2007.

11. See the final paper, The Case against Candle Resistant Electronics: MASTER Whitepaper, at www.conformity.com/2534. Note that an additional paper discussing specific issues related to televisions was also published and distributed. See www.conformity.com/2535.

12. See, for instance, the NASFM's press release on no-name Chinese-made toys at www.conformity.com/2536.

FAST Link www.conformity.com/2530