



November 14, 2002

Ms. Lynn Morris, Deputy Director
Board Relations
California Department of Consumer Affairs
Executive Office
400 R Street, Suite 3000
Sacramento, CA 95814

Dear Ms. Morris:

It was a pleasure meeting you last month at the Aspen flammability safety conference sponsored by the Sleep Products Safety Council (SPSC) and to discuss our work on mattress fire safety issues. As you are aware, the SPSC is a non-profit organization devoted to creating safer and healthier sleep environments by supporting product safety research, disseminating consumer product safety information and promoting activities aimed at reducing hazards associated with sleep products.

We understand that your staff has received the modified test burner that the National Institute of Standards and Technology (NIST) designed for the SPSC and are pleased your engineers are working with us to further refine the user-friendliness of the test device. As we discussed at the conference, the SPSC believes that the NIST burner is more appropriate than the burner specified in California Technical Bulletin 129 (TB-129) for testing the open-flame resistance of mattresses used in residential settings. This position is unanimously endorsed by the SPSC Board of Directors which is comprised of representatives from the mattress industry, mattress components suppliers, present and former officials from the public safety community and respected scientists, academics and experts that specialize in fire science. The Executive Committee of the International Sleep Products Association, a manufacturing trade association that represents the mattress industry, also supports the SPSC's position.

We have discussed our views on this subject with you and your staff on a number of occasions. We understand that the Bureau remains open to input on this subject and is aware of our reasons for taking this position. Nevertheless, we think that it is appropriate both for the record and the Bureau's ease of reference to summarize our position in writing.

Executive Summary

A recent NIST report concludes that many deaths can be avoided if a bed fire does not "flashover" beyond the bedroom to other rooms in the residence. The best way to improve fire safety by minimizing the risk of flashover is to base the standard and relevant testing equipment on a scientifically sound approach.

In selecting such equipment, the real world "predictive" capabilities of different devices should not be evaluated based on which apparatus "fails" more products, but instead on which burner can better replicate real world fire scenarios. Unlike the TB-129 burner, scientific research documents the NIST burner's relevance for testing the fire performance of mattresses used in residential settings. In particular, the NIST burner was designed to replicate the impact of

burning bedclothes on mattresses and foundations, since this is the ignition source that a residential mattress typically confronts. The SPSC is concerned that a test that arbitrarily uses a TB-129 burner, which was designed to address mattress fires originating in trash cans in a hotel or institutional setting, could unnecessarily reject mattress designs that substantially reduce the likelihood of residential flashovers and may be better suited for the marketplace.

As a result of this research, the NIST burner was designed to focus on several characteristics of a residential bed fire that the TB-129 device does not address. For example, children often ignite that part of a bedclothes comforter that hangs over the side of the bed. The hanging comforter burns quickly up the vertical side surface and then spreads across the top horizontal surface more slowly. Similarly, a pillow's filling material often melts and forms a "pool fire" on the mattress top, presenting a concentrated fire insult to the mattress. To mimic this behavior, the NIST approach uses two burners to apply flames to both the side and top mattress surfaces. The TB-129 burner, however, impinges only the mattress' side surface. As a result, a mattress that has been made flame-resistant only on the product's perimeter might "pass" a TB-129 burner test that presents a flame to the mattress side panels, but might be vulnerable to ignition on the top surface. The top burner on the NIST device, however, simulates this real world situation, and therefore more accurately replicates the true impact of a burning comforter.

Likewise, as a mattress burns, gravity pulls the burning bedclothes into the product. The pivoted NIST burner replicates this action, while the stationary TB-129 device does not, possibly permitting some dangerous mattress designs to pass a TB-129 burner test.

Finally, when the U.S. Consumer Product Safety Commission issues its federal mattress flammability standard, it is more likely to use the NIST burner because science supports its use in residential bed fire scenarios. It would be highly inefficient and costly to the mattress industry and consumers for California to require manufacturers that sell into that state to comply with one standard, only to make them later adjust to a different federal rule that supercedes California's standard. This situation is particularly problematic because the manufacturers that must comply with the Bureau's standard are not limited to companies operating within California, but also to dozens of companies in the western United States and elsewhere that ship into that state, as well as many large national firms that may decide to implement the standard voluntarily for their full product line.

California has the opportunity to take the lead in setting a science-based mattress flammability standard. For the above reasons, the SPSC urges the Bureau to issue a standard that uses the NIST burner to test the fire performance of mattresses and foundations.

Discussion

The SPSC believes that the modified NIST burner is better than the TB-129 burner for testing the open-flame resistance of residential mattresses for the following reasons:

- 1. Scientific research supports using the NIST burners to test the fire performance of mattresses in residential settings; the TB-129 burner lacks such scientific basis.**

The NIST burners were designed based on extensive objective scientific research to replicate the ignition source that a residential mattress typically confronts. The TB-129 burner, however,

was designed based on substantially less sophisticated and less extensive research to mimic a significantly different ignition source.

Two separate statistical studies, one conducted by the U.S. Consumer Product Safety Commission (CPSC) and a second conducted jointly by the SPSC and the National Association of State Fire Marshals (NASFM) show that the majority of bed fires result from children playing with matches and lighters. The SPSC/NASFM report also found that when children start those fires, bedclothes are usually the first items ignited.

As a result, the SPSC then asked NIST to study how beds burn when different combinations of bedclothes are ignited and the fire spreads to the mattress. Based on those findings, NIST then designed a prototype burner to replicate the impact of burning bedclothes on a mattress and foundation. (This prototype was the basis for the mechanically improved NIST burner that the Bureau has recently received.)

NIST observed how different combinations of typical bedclothing burned on an inert mattress (in terms of the size, duration and propagation of a bedclothing fire on a bed), and developed a burner to mimic that fire. Comparing the fires that result when identical mattress types are ignited by actual bedclothes and the burner, NIST found that the burner in general correlates with how a bed fire progresses when the mattress/foundation are ignited by burning bedclothing. In contrast, the TB-129 burner and test protocol were developed in the early 1990s in response to several deadly hotel fires. That burner was designed to test whether a mattress alone (that is, not a mattress/foundation set) could resist a side ignition from a paper trash fire started when a match or cigarette is carelessly discarded into a wastebasket next to a bed.

Unlike the NIST burner, the TB-129 burner was not designed and built to replicate a bedclothing fire. Furthermore, no studies to date provide any scientific basis for modifying the TB-129 burner or the corresponding test method for this purpose. For example, NIST's research shows that the mattress foundation can have a material impact in a bed fire. Any adjustments to the TB-129 burner itself or its test method (in terms of extending the flame duration, the placement of the burner to impinge on both the mattress and the foundation or any other changes) would at best be arbitrary without scientific evidence to support such changes. In short, using the NIST apparatus to test the flammability of mattress/foundation sets in residential settings is supported by an objective scientific "audit trail"; the TB-129 burner is not.

The SPSC does not want to be misunderstood as supporting the NIST burner for parochial reasons – that is, "We invented it, so our idea must be the best." Like the NIST burner, the TB-129 burner's development was funded and supported by the U.S. mattress industry. The SPSC continues to advocate the use of this device consistent with the purpose for which it was designed – that is, to mimic wastebasket fires in hotel or institutional settings. However, the TB-129 burner should *not* be used in residential settings because no scientific data shows that it accurately replicates a residential bed fire ignited by burning bedclothes. Moreover, as discussed below, the NIST burner has a number of useful features that the TB-129 burner does not.

- 2. The NIST burner applies flames to both the side and top mattress surfaces; the TB-129 burner impinges only the mattress' side surface.**

The NIST apparatus uses two burners: one presents a flame to the top horizontal surface of the mattress, while the second is positioned vertically on a side surface to hit both the mattress and foundation. NIST concluded that two burners are necessary because a bedclothing fire will typically burn quickly on the side of a mattress and for a longer duration across the top surface. NIST timed the flame durations for the side and top burners to correspond to the fire insult presented by the “worst case”, real world bedclothing combination that it tested.

In contrast, the TB-129 burner has a single flame that is applied to the mattress side, and cannot apply a flame to the top horizontal surface. Therefore, the NIST burner better replicates a real world residential fire caused by burning bedclothes that ignite the underlying mattress/foundation.

3. Mattresses with flame-resistant sides might “pass” a TB-129 burner but be vulnerable to top surface ignitions; the NIST burner would be more rigorous.

With only a single side flame, mattresses could be designed that survive ignition by a TB-129 burner, but still present a significant public safety risk if ignited on the top surface. For example, a mattress could be constructed with significant fire barriers on only the product’s side perimeter to deflect the flame from the TB-129 burner. If the outer materials of the mattress spread flames enough to reach the unprotected top surface, then the design would still fail a side-only ignition test.

For example, a pillow’s filling material when exposed to heat will often tend to melt and “pool” on the top surface of the mattress. This flaming pooled material presents a relatively concentrated fuel source that is a significant challenge to the barrier design. The top burner on the NIST apparatus mimics this real world fire condition, thereby minimizing the risk of a top surface ignition from a burning pillow and other top-of-bed accessories.

4. As a mattress burns, gravity pulls the bedclothes into the product; the pivoted NIST burner replicates this action, but the stationary TB-129 device does not.

NIST found that gravity tends to pull the burning bedclothes into the mattress as its core material is consumed. This occurs more with mattress components (like polyester) that “melt away and pool” when first exposed to flame, yet burn intensely in liquid form. To mimic this behavior, NIST designed the top burner to move downward and follow the fire into the burning mattress.

Without this feature, the impact of a “sinking” ignition source would be lost. Such an omission could allow the use of “melt and pool” components that might “pass” a stationary burner test, but nevertheless lead to a large bed fire once the pooled molten material is ignited by the sinking bedclothes. Since the stationary TB-129 burner lacks the pivoted burner feature, potentially dangerous mattresses that contain melt away components could still pass a test using this device.

- a) **Whether one burner is more “predictive” of real world fire risks than another depends on which has better scientific support, not on which “fails” more products.**

The Bureau reports that it ignited 13 sets of identical mattresses and foundations using both the TB-129 and NIST burners to compare the resulting fires. (For the TB-129 burner, the Bureau used the corresponding test method; for the NIST burner, it used flame times based on NIST's bedclothes fire tests.) The Bureau found that in most cases, the fires were comparable.

Specifically, most mattresses lit by the NIST burner that produced relatively small fires also produced small fires when ignited by the TB-129 burner. Likewise, all mattresses that proceeded to a very large fire when ignited by the NIST burner performed similarly when the TB-129 burner was used. For two "borderline" mattresses the Bureau tested, however, the TB-129 burners caused substantially larger mattress fires than the NIST burner. Based on these observations, the Bureau concluded that the TB-129 burner is a better predictor of when mattresses are unsafe.

The SPSC respectfully disagrees with this conclusion. Whether a burner is predictive of real world ignition behavior depends on:

- a) How well it replicates the burning of bedclothes, and
- b) How well the performance of ignited mattress constructions replicates a real world setting (i.e., ignition by burning bedclothes).

Determining which burner shows better predictive qualities requires data not included in the information that the Bureau has presented. Thus, it is not clear whether the more severe fires observed with the TB-129 burner reflect expected "real world" mattress performance or a consequence of the burner's design and function. No valid scientific claims can be made about the predictive qualities of the TB-129 burner on a residential mattress without answering this question.

6. A test that improperly uses a TB-129 burner to simulate residential mattress fires could unnecessarily reject a mattress design that actually reduces flashover risks.

The mattress industry's goal is to sell a safe and comfortable product at a reasonable cost while the consumer's goal is to buy a mattress that allows him or her to enjoy a safe and comfortable night's sleep at a reasonable price. A tougher flammability standard will improve consumer safety if it:

- a) Is technically feasible
- b) Allows industry to make products that the consumer wants, and'
- c) Is commercially viable

If any of these criteria cannot be met, the standard will fail, either because the product cannot pass the test, the consumer will not want the product, or it is too expensive.

No one knows whether a new open-flame standard will work because the Bureau has announced neither its pass/fail criteria nor the test method. What is known, however, is that substantial changes in some mattress components are likely, those new components may affect the comfort and durability of the finished product and these changes will increase mattress production costs. Once the Bureau sets the pass/fail target, the industry will use its expertise and creativity to determine whether and how manufacturers can produce and sell mattresses

that comply with this standard. To be sure, this will be a major undertaking, but the industry has met similar challenges in the past.

Nevertheless, the industry is deeply concerned that unless public safety decisions (including the selection of test devices) are based on good science, the Bureau's standard might arbitrarily reject mattress designs that can both achieve the goal of minimizing "real world" flashover risks and be commercially viable. No one would be served by such a result.

7. The U.S. Consumer Product Safety Commission is more likely to use the NIST burner (than the TB-129 device) because science supports its use in residential bed fires.

In tandem with the Bureau's mattress flammability work, the U.S. Consumer Product Safety Commission (the Commission) has begun the process of issuing a federal open-flame mattress standard. That federal standard will preempt the Bureau's rule, but the timing of the Commission's regulatory action is undefined at present. No final federal standard is likely until after the Bureau issues its standard.

In the meantime, the Commission has decided neither how it intends for manufacturers to comply with its future mattress standard, nor what test devices manufacturers must use for that purpose. Nevertheless, the SPSC infers that the Commission will most likely use the NIST burner in such a standard rather than the TB-129 device for two simple reasons.

First, the Commission's statutory authority for issuing a mattress flammability standard (that is, the Flammable Fabrics Act) requires the agency to consider, among other things, the likely costs and benefits of such a standard, and whether the standard imposes the least burdensome alternative for addressing a particular risk (15 USC § 1193). These requirements strongly favor the Commission's selection of a standard and related test apparatus that are based on good science. The NIST burner meets these criteria better than the TB-129 burner because extensive scientific research supports the NIST burner's relevance for testing the flammability of mattresses used in residential settings.

Second, the Commission itself has contracted with NIST to develop a screening test apparatus for use in the field to test whether finished products sold at retail are likely to comply with the federal standard. Although that work has not yet been completed, the device under development is based largely on the burner prototype that NIST designed for the SPSC and on NIST's bedclothing fire research. As a result, the SPSC believes there is a reasonable likelihood that if asked to choose between the NIST or TB-129 burners, the Commission would require that flammability of mattresses be tested using the NIST burner.

The Bureau's standard will apply to all California manufacturers, regional producers domiciled elsewhere that ship into California and a number of national brands that may apply the California standard to their full product line. As a result, the Bureau's standard will have a broad reach, given that the major national brands alone account for about 60% of total U.S. mattress shipments. The Bureau's standard will become effective before any federal open-flame rule, but California's regulation must yield to federal preemption. Therefore, it would be highly inefficient for California to require producers to incur the significant costs (new components, product testing, worker training, and possibly new equipment) necessary to comply with a state standard in 2004, only to have them incur *added* costs to meet a different federal standard a short time

later. To avoid such an undesirable outcome, the SPSC urges the Bureau to specify the NIST burner for testing compliance with California's open-flame standard.

Conclusion

The outcome of the product safety proceedings now underway at both the Bureau (under AB 603) and the Commission (under the Flammable Fabrics Act) can raise bedroom fire safety standards to the highest level in the world. The potential improvements in life safety and reduced property damage from these efforts are enormous. The manufacturing challenges that the resulting product standards create will also be substantial.

Nevertheless, the U.S. mattress industry, through the SPSC, has been an active force in funding scientific research to assist regulators and industry in understanding how and why these fires start, how the products burn once ignited, how this behavior can be reproduced consistently using a mechanical device, the secondary impact of bed fires on other objects within the bedroom and the life saving implications of reducing the size and intensity of bed fires to a level that avoids flashover. The SPSC's support for using the NIST burner to test the open-flame resistance of mattresses used in residential settings is based on the sum of this research and the belief that the use of this device will enhance public safety, not diminish it. If a serious regulatory effort is to be made to make meaningful and lasting progress in this regard, the means for accomplishing that end should likewise be based on science.

California has the opportunity to set an example by developing an open-flame standard for mattress and foundations that can become the basis for a national product standard. Using the NIST burner as the fire performance test apparatus for the California standard will support that result because that device was developed based on sound scientific research.

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Please contact me should you have any questions regarding this letter.

Sincerely,

Patricia A. Martin
Executive Director

cc: John McCormack, California Bureau of Home Furnishings
Hal Stratton, U.S. Consumer Product Safety Commission
Margaret Neily, U.S. Consumer Product Safety Commission