



UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
4330 EAST WEST HIGHWAY
BETHESDA, MD 20814

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DATE: November 9, 2016

BALLOT VOTE SHEET:

TO: The Commission
Todd A. Stevenson, Secretary

THROUGH: Mary T. Boyle, General Counsel
Patricia H. Adkins, Executive Director

FROM: Patricia M. Pollitzer, Assistant General Counsel
Hyun S. Kim, Attorney, OGC

SUBJECT: Notice of Availability - Regulatory Flexibility Act Section 610 Review of the
Standard for the Flammability (Open Flame) of Mattress Sets
BALLOT VOTE DUE Wednesday, November 16, 2016

The Office of the General Counsel is providing for Commission consideration the
attached draft notice of availability of the Regulatory Flexibility Act Section 610 Review of the
Standard for the Flammability (Open Flame) of Mattress Sets.

Please indicate your vote on the following options:

- I. Approve publication of the attached document in the *Federal Register*, as drafted.

(Signature)

(Date)

II. Approve publication of the attached document in the *Federal Register*, with changes. (Please specify.)

(Signature)

(Date)

III. Do not approve publication of the attached document in the *Federal Register*.

(Signature)

(Date)

IV. Take other action. (Please specify.)

(Signature)

(Date)

Attachment: Draft *Federal Register* Notice of Availability of Regulatory Flexibility Act Section 610 Review of the Standard for the Flammability (Open Flame) of Mattress Sets

Billing Code 6355-01

CONSUMER PRODUCT SAFETY COMMISSION

[Docket No. CPSC-2006-0011]

Notice of Availability of Regulatory Flexibility Act Section 610 Review of the Standard for the Flammability (Open Flame) of Mattress Sets

AGENCY: Consumer Product Safety Commission.

ACTION: Notice of availability.

SUMMARY: The Consumer Product Safety Commission (CPSC) is announcing the availability of a completed rule review under section 610 of the Regulatory Flexibility Act (RFA) for the Standard for the Flammability (Open Flame) of Mattress Sets (Mattress Standard), 16 CFR part 1633. This regulatory review concludes that the Mattress Standard should be maintained without change.

ADDRESSES: The completed review is available on the CPSC Web site at:

_____ . The completed review will also be made available through the Federal eRulemaking Portal at <https://www.regulations.gov>, under Docket No. CPSC-2006-0011, Supporting and Related Materials. Copies may also be obtained from the Consumer Product Safety Commission, Office of the Secretary, Room 820, 4330 East West Highway, Bethesda, MD 20814; telephone (301) 504-7923; email cpsc-os@cpsc.gov.

FOR FURTHER INFORMATION CONTACT: Lisa L. Scott, Fire Protection Engineer, Laboratory Sciences, Consumer Product Safety Commission 5 Research Place, Rockville, MD 20850, Telephone: (301) 987-2064; email: lscott@cpsc.gov.

SUPPLEMENTARY INFORMATION: In 2006, the CPSC issued a Standard for the Flammability (Open Flame) of Mattress Sets under the Flammable Fabrics Act. (71 FR 13472, March 15, 2006). The Mattress Standard set forth test procedures and performance requirements that all mattress sets must meet before being introduced into commerce. These requirements are set forth at 16 CFR part 1633.

On April 3, 2015, the Commission published notice in the *Federal Register* (80 FR 18218) to announce that the CPSC would review the Mattress Standard in accordance with the regulatory review provisions of section 610 of the RFA (5 U.S.C. 610) and sought public comment on the rule review. This document announces the availability of completed regulatory review of the Mattress Standard.

The purpose of a rule review under section 610 of the RFA is to determine whether, consistent with the CPSC's statutory obligations, this standard should be maintained without change, rescinded, or modified to minimize any significant impact of the rule on a substantial number of small entities. Section 610 requires agencies to consider five factors in reviewing rules to minimize any significant economic impact of the rule on a substantial number of small entities including:

- (1) The continued need for the rule;
- (2) The nature of complaints or comments received concerning the rule from the public;
- (3) The complexity of the rule;
- (4) The extent to which the rule overlaps, duplicates or conflicts with other Federal rules, and, to the extent feasible, with State and local governmental rules; and
- (5) The length of time since the rule has been evaluated or the degree to which

technology, economic conditions, or other factors have changed in the area affected by the rule. 5 U.S.C. 610(b).

The CPSC received 16 written comments representing the views of mattress manufacturers, component manufacturers, fire safety representatives, third party testing bodies, environmental groups, trade associations, and consumers. Staff's briefing package reviews these comments and provides staff's analysis applying the factors listed in section 610 of the RFA to the Mattress Standard. As explained in the staff's briefing package, the staff concludes that the Mattress Standard should be continued without any changes. However, staff believes that stakeholders may benefit from additional outreach and training.

The staff's briefing package containing the review is available on the CPSC Web site at: _____, www.regulations.gov, and from the Commission's Office of the Secretary at the location listed in the ADDRESSES section of this notice.

Dated:

Todd A. Stevenson,
Secretary, Consumer Product Safety Commission.



Staff Briefing Package

Rule Review of 16 C.F.R. Part 1633 – Standard for the Flammability (Open Flame) of Mattress Sets

November 9, 2016

For additional information, contact:

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U.S. Consumer Product Safety Commission
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THIS DOCUMENT HAS NOT BEEN REVIEWED
OR ACCEPTED BY THE COMMISSION.

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Executive Summary

The Regulatory Flexibility Act (RFA) requires federal agencies to review regulations for their impact on small business and to consider less burdensome alternatives. Section 610 of the RFA requires federal agencies to review regulations that have a significant economic impact on a substantial number of small entities within 10 years of their adoption as final rules.

In 2006, the U.S. Consumer Product Safety Commission (CPSC) issued the *Standard for the Flammability (Open Flame) of Mattress Sets* (Mattress Standard) under the Flammable Fabrics Act (FFA), codified at 16 C.F.R. part 1633. The effective date was July 1, 2007 for all mattresses manufactured, imported, or renovated on or after that date to comply with the requirements of the Mattress Standard. On April 3, 2015, the Commission issued a notice of section 610 review under the RFA for the Mattress Standard.

The purpose of a rule review under section 610 of the RFA is to determine whether, consistent with the CPSC's statutory obligations, this standard should be maintained without change, rescinded, or modified to minimize any significant impact of the rule on a substantial number of small entities. Section 610 requires agencies to consider five factors in reviewing rules to minimize any significant economic impact of the rule on a substantial number of small entities:

- (1) The continued need for the rule;
- (2) The nature of complaints or comments received concerning the rule from the public;
- (3) The complexity of the rule;
- (4) The extent to which the rule overlaps, duplicates or conflicts with other Federal rules, and, to the extent feasible, with State and local governmental rules; and
- (5) The length of time since the rule has been evaluated or the degree to which technology, economic conditions, or other factors have changed in the area affected by the rule.

The CPSC received 16 written comments representing the views of mattress manufacturers, component manufacturers, fire safety representatives, third party testing bodies, environmental groups, and independent consumers. These also include comments received from several trade associations. Staff believes these comments state the interests of many sectors of the industry, including small entities.

Based on a review of comments received and staff's analysis of the five factors, CPSC staff does not see the need to propose any changes to the Mattress Standard at this time. There is strong support for the Mattress Standard from the regulated industry and other stakeholders. Additionally, two comments received from component manufacturers assert that, since the Mattress Standard was promulgated, the cost of materials used to comply with it has decreased by approximately half.

The Mattress Standard contains provisions to assist in meeting the rule and to reduce the burden on small entities, although a disproportionate impact on small businesses may persist. As a further remedy, the industry could benefit from additional support and outreach from CPSC staff. Mattress producers and importers could use guidance related to the technical and recordkeeping

requirements of the Mattress Standard. CPSC staff could provide test bodies with additional technical details related to the testing procedure. Other outreach could be considered, including providing additional training sessions and workshops to include manufacturers and retailers who are new to the industry and to refresh the knowledge base of stakeholders who have been involved since the publication of the Mattress Standard.

CPSC staff is continuing to monitor the state of the industry and developing responsive advice and guidance to help all segments of the mattress industry work toward our shared goal of protecting consumer safety by reducing mattress fires.



UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
BETHESDA, MD 20814

Memorandum

This document has been electronically
approved and signed.

Date: November 9, 2016

TO: The Commission
Todd A. Stevenson, Secretary

THROUGH: Mary T. Boyle, General Counsel
Patricia H. Adkins, Executive Director
DeWane Ray, Deputy Executive Director for Safety Operations

FROM: George A. Borlase, Assistant Executive Director
Office of Hazard Identification and Reduction

Lisa L. Scott, Project Manager, Rule Review of 16 CFR Part 1633
Directorate for Laboratory Sciences

SUBJECT: Rule Review of 16 CFR Part 1633 –
Standard for the Flammability (Open Flame) of Mattress Sets

Introduction

The Regulatory Flexibility Act (RFA) requires federal agencies to review regulations for their impact on small business and to consider less burdensome alternatives. Section 610 of the RFA¹ requires federal agencies to review regulations that have a significant economic impact on a substantial number of small entities within 10 years of their adoption as final rules.

On April 3, 2015, the U.S. Consumer Product Safety Commission (CPSC) issued a notice of section 610 review under the RFA for the *Standard for the Flammability (Open Flame) of Mattress Sets* (Mattress Standard) codified at 16 C.F.R. part 1633.² The Commission sought comments on the review.

After the end of the 60-day comment period, the CPSC received 16 written comments³ representing the views of mattress manufacturers, component manufacturers, fire safety

¹ Periodic Review of Rules (5 U.S.C. section 610).

² "Regulatory Flexibility Act Section 610 Review of the Standard for the Flammability (Open Flame) of Mattress Sets," (80 *Federal Register* 18218; April 3, 2015). <https://www.federalregister.gov/documents/2015/04/03/2015-07659/regulatory-flexibility-act-section-610-review-of-the-standard-for-the-flammability-open-flame-of>

³ The comments can be found at: <https://www.regulations.gov/docket?D=CPSC-2006-0011>.

representatives, third party testing bodies, environmental groups, and independent consumers. This package presents the staff review of the Mattress Standard's impact on small businesses and an analysis of the comments received.

Background

In 2006, the U.S. Consumer Product Safety Commission (CPSC) issued the *Standard for the Flammability (Open Flame) of Mattress Sets* (Mattress Standard) under the Flammable Fabrics Act (FFA),⁴ codified at 16 C.F.R. part 1633. The effective date was July 1, 2007 for all mattresses manufactured, imported, or renovated on or after that date to comply with the requirements of the Mattress Standard.

CPSC enforces two mandatory federal standards pertaining to mattresses. The Mattress Standard (16 C.F.R. part 1633) sets forth requirements that all mattresses or mattress sets must meet before being introduced into U.S. commerce. It was promulgated to address the hazards associated with the open-flame ignition of mattresses and to reduce the associated deaths and injuries related to that hazard scenario. CPSC's other mandatory standard related to mattresses, 16 C.F.R. part 1632 *Standard for the Flammability of Mattresses and Mattress Pads* (Cigarette Ignition Standard), addresses the hazards related to the smoldering ignition of mattresses and mattress pads. The Cigarette Ignition Standard is not included in this review. An Advanced Notice of Proposed Rulemaking (ANPR) to consider whether the Cigarette Ignition Standard should be revoked or amended was published in the *Federal Register* on June 23, 2005.⁵

The Mattress Standard establishes flammability performance requirements for mattresses and mattress sets. Products that comply with the Mattress Standard limit the size of the fire generated by a mattress set during a 30-minute test. The Mattress Standard establishes two test criteria, which the mattress set must meet to comply with the standard: (1) the peak rate of heat release for the mattress set must not exceed 200 kW at any time during the 30-minute test; and (2) the total heat release must not exceed 15 MJ for the first 10 minutes of the test.

The Mattress Standard requires, with certain exceptions, that mattress manufacturers have three specimens of each prototype tested before introducing a mattress set into commerce. It also includes recordkeeping and labeling requirements. There are specific provisions included in the standard to alleviate the burdens of the Mattress Standard for all businesses, which may be beneficial to large or small businesses in different ways. As noted in the comments, the most significant provision to alleviate the burden on small entities is a pooling provision allowing manufacturers to rely on a qualified prototype produced by another manufacturer or prototype developer to reduce the amount of testing performed by a manufacturer/importer before a prototype is mass produced.

⁴ "Standard for the Flammability (Open Flame) of Mattress Sets" (71 *Federal Register* 13472, March 15, 2006)

⁵ "Advance Notice of Proposed Rulemaking: Possible Revocation or Amendment of Standard for the Flammability of Mattresses and Mattress Pads (Cigarette Ignition)" (70 *Federal Register* 36357, June 23, 2005)

Regulatory Flexibility Act Retrospective Review

The purpose of a rule review under section 610 of the RFA is to determine whether, consistent with the CPSC's statutory obligations, this standard should be maintained without change, rescinded, or modified to minimize any significant impact of the rule on a substantial number of small entities. Section 610 requires agencies to consider five factors in reviewing rules to minimize any significant economic impact of the rule on a substantial number of small entities:

- (1) The continued need for the rule;
- (2) The nature of complaints or comments received concerning the rule from the public;
- (3) The complexity of the rule;
- (4) The extent to which the rule overlaps, duplicates or conflicts with other Federal rules, and, to the extent feasible, with State and local governmental rules; and
- (5) The length of time since the rule has been evaluated or the degree to which technology, economic conditions, or other factors have changed in the area affected by the rule.

The Continued Need for the Rule

The staff's analysis of death and injury data supports a continued need for the Mattress Standard. Mattress and bedding fires are a significant cause of residential fire deaths and injuries. The Mattress Standard was developed in response to the risk of death and injury that mattress fires present. At the time the Mattress Standard was published in 2006, the Commission estimated that the standard could limit the impact of mattress fires to the extent that 240 to 270 deaths and 1,150 to 1,330 injuries could potentially be eliminated annually when fully effective 10 to 14 years (the estimated range of the useful life of a mattress from the rulemaking) after the effective date (approximately 75% reduction).

There is evidence that consumer replacement of post-Mattress Standard mattresses is not keeping pace with the estimates from 2006. The economic recession coincided with the effective date of the Mattress Standard and early years of mattress production under the requirements of the new Mattress Standard, with shipments dropping 23 percent between 2006 and 2009 (see Tab A). As the economy has recovered, mattress sales have rebounded. However, this lower number of sales is expected to have delayed projected benefits as the older, pre-Mattress Standard mattresses were not replaced with post-Mattress Standard mattresses at the rate projected in the 2006 estimates. As such, data to determine whether there exists a corresponding reduction in fire deaths and injuries are not yet available. Memoranda from both the Directorate for Epidemiology in Tab B and the Directorate for Economic Analysis in Tab A discuss these issues in detail.

CPSC staff concludes that there has been a modest improvement in death and injury estimates on a per capita basis, but more time is needed for the market to rebound and for data to become available to realize the full benefits of the Mattress Standard. Given the substantial improvement in fire performance of a post-Mattress Standard compliant mattress compared to a pre-Mattress Standard mattress, staff concludes that the performance criteria ensure a less flammable design that will effectively limit the mattress contribution to a fire and substantially reduce the risks of deaths and injuries in a fire event.

While the top four manufacturers of mattresses comprise approximately 54 percent of the market, and are all large businesses by SBA size standards (>1000 employees), much of the remaining market share is held by small businesses. The continued compliance of small businesses with the requirements of the Mattress Standard is critical to achieving improvements in residential mattress fire safety.

The Nature of Public Complaints or Comments Received Concerning the Rule

In April 2015, the CPSC published a *Federal Register* notice soliciting comments from the public. The CPSC received 16 written comments representing the views of mattress manufacturers, component manufacturers, fire safety representatives, third party testing bodies, environmental groups, and independent consumers. These also include comments received from several trade associations. Staff believes that the comments express the interests of many sectors of the industry, including small entities.

The public comments received were largely supportive of the rule, with only one commenter requesting that the rule be rescinded. Several comments include suggestions for maintaining and improving effectiveness, while possibly reducing the burden of complying with the Mattress Standard's performance benchmarks and recordkeeping requirements. Many of these comments address revisions to CPSC's other mandatory standard related to mattresses: 16 C.F.R. part 1632, the Cigarette Ignition Standard. An ANPR to consider whether the Cigarette Ignition Standard should be revoked or amended was published in the *Federal Register* on June 23, 2005.

Comments that relate to the interaction of the Mattress Standard and the Cigarette Ignition Standard are acknowledged in this package. Comments that relate solely to requested changes to the Cigarette Ignition Standard were not considered as part of this Section 610 rule review of the Mattress Standard.

Several commenters submitted responses to specific questions in the notice of the section 610 review (80 FR 18218, April 3, 2015). Staff's detailed responses to these commenters are provided in Tab C.

The Complexity of the Rule

Staff's review found no indication that manufacturers, including small entities, are unable to meet the Mattress Standard due to its complexity. Most commenters indicate that manufacturers have experience with designing, testing and producing mattresses that comply with the Mattress Standard since its promulgation 10 years ago. One commenter states that the Mattress Standard is "the least burdensome requirement that would prevent or adequately reduce the risk of injury for which the regulation was promulgated." Another commenter indicates that once the new standard was in place, industry responded by offering new innovations in mattress design and material selection to meet the Mattress Standard.

In addition, CPSC staff offers support to all segments of the industry to facilitate compliance with the Mattress Standard. When the Mattress Standard was first published, staff conducted a series of informational sessions to explain the requirements of the Standard and address industry concerns. Staff maintains a dedicated page on CPSC.gov for Mattress Flammability Information⁶ and an email listserv⁷ that interested parties may elect to join for periodic updates from CPSC.

CPSC staff reviewed the complexity of the testing requirements. The performance requirements of the Mattress Standard require testing in a facility with specialized instrumentation. When the Mattress Standard was first published, staff conducted a series of informational sessions to address industry concerns. CPSC staff trained the testing bodies that manufacturers use to conduct testing, and CPSC staff visited those facilities when the Mattress Standard was published in 2006. The CPSC Laboratory Test Manual⁸ was published in 2011 to provide guidance on the test procedure for test laboratories. To assist mattress manufacturers in finding a test facility, CPSC staff publishes a list on the Mattress Flammability Information page of the CPSC website of labs that conduct this testing. Participation in this listing is voluntary for both domestic and international laboratories, but advantageous to them and to manufacturers.

The International Sleep Products Association (ISPA) provided a comment requesting that the conditioning period for mattresses prior to testing be reduced from 48 hours to 24 hours. The commenter asserts the burden of manufacturer's personnel waiting at a test site for 2 days before testing could be reduced without impacting the performance of the mattresses in the test process. Staff disagrees with this comment because the conditioning requirements in the Mattress Standard are necessary to control the critical factors of specimen temperature and humidity before testing. Reducing the conditioning requirements could introduce variability to the test results.

CPSC staff also reviewed the complexity of the recordkeeping requirements, which can be complex for firms with multiple mattress designs, particularly small firms. The Mattress Standard contains provisions to alleviate some of the burden of complying with the recordkeeping requirements for small entities. The rule allows two or more establishments (plants within the same firm) or independent firms to "pool" prototypes. Small entities may use a qualified prototype developed by another firm, a prototype developer, or another arrangement and "pool" that prototype. This reduces the cost of testing because only one of the pooling firms is required to test three sets (for a qualified prototype). The remaining firms using that prototype design are required to conduct one confirmation burn test.

Use of prototype pooling across establishments and firms can reduce the impact of the Mattress Standard on small businesses. By pooling prototypes, small manufacturers can resemble a large producer in their prototype development and testing efforts, and therefore, reduce their costs per mattress set. Several commenters specifically highlight the success of the pooling provisions for

⁶ <http://www.cpsc.gov/en/Business--Manufacturing/Business-Education/Business-Guidance/Mattresses/>.

⁷ <http://www.cpsc.gov/Newsroom/Subscribe/>.

⁸ Laboratory Test Manual for 16 CFR Part 1633: Standard for the Flammability (Open Flame) of Mattress Sets, January 2011. https://www.cpsc.gov/s3fs-public/pdfs/blk_media_labmanual.pdf

mitigating the burden of complying with the Mattress Standard. ISPA notes that the prototype pooling provisions in the Mattress Standard “substantially reduced the new product development, testing, and recordkeeping costs that [small entities] ordinarily would have incurred themselves.”

The Mattress Standard also allows entering into commerce mattress sets based on subordinate prototypes that differ from a qualified prototype or confirmed prototype only with respect to size (length and width), and/ or ticking material or other components that do not impact the fire performance of the prototype, without additional testing. This allowance minimizes the testing costs to all manufacturers, especially those whose volume of output is small. Moreover, costs can be reduced if a qualified, confirmed, or subordinate prototype is used to produce mattress set styles for longer than a year.

The Extent to which the Rule Overlaps, Duplicates or Conflicts with other Federal rules, and, to the Extent Feasible, with State and Local Governmental Rules

The Mattress Standard was developed to address the risk of death and injury due to the open-flame ignition of residential mattresses and mattress sets. It is the only standard to address this specific hazard scenario.

The CPSC enforces two mandatory mattress standards under the FFA, the Mattress Standard and the Cigarette Ignition Standard. Each standard has a different scope of included and excluded products and a different hazard scenario that is addressed by the test procedures and performance criteria. This rule review focuses on the Mattress Standard and a flaming ignition hazard scenario.

Several commenters note the additional burden of complying with the Cigarette Ignition Standard. CPSC staff acknowledges that both standards likely affect many of the same suppliers, manufacturers, and retailers. To reduce the testing burden imposed when the Mattress Standard went into effect, the Office of Compliance issued an “Interim Enforcement Policy for Mattresses Subject to C.F.R. Parts 1632 and 1633” dated May 2006.⁹

CPSC staff anticipated that manufacturers would have to redesign their existing mattress prototypes and use new materials to meet the new flammability requirements of the Mattress Standard. In many cases, the new prototypes would also have to be tested to demonstrate compliance with the Cigarette Ignition Standard. Recognizing the short-term burden this would impose on manufacturers, the CPSC Office of Compliance is exercising enforcement discretion to reduce the amount of testing required by the Cigarette Ignition Standard. The published guidance permits manufacturers to reduce testing from six mattress surfaces to two mattress surfaces for mattress prototypes created to comply with the Mattress Standard as part of the requirements for part 1633.

⁹ Interim Enforcement Policy for Mattresses Subject to 16 C.F.R. Parts 1632 and 1633, May 15, 2006, https://www.cpsc.gov/s3fs-public/pdfs/blk_media_InterimMattress.pdf

Since the Mattress Standard became effective, the technical procedures have been adopted as an international standard, ISO 12949 – “Standard Test Method for Measuring the Heat Release Rate of Low Flammability Mattress and Mattress Sets.” CPSC staff views the adoption of the Mattress Standard as an international standard as validation of the science behind the test method as a means of addressing the hazard scenario. In addition, harmonization of the test method with other jurisdictions should reduce the burden of complying with the requirements and facilitate international trade.

California Technical Bulletin 603, a similar standard that went into effect in 2005, was rescinded by the State of California when the federal Mattress Standard became effective. No other similar state or local governmental rules for residential mattresses were identified in the course of this analysis or public comment.

Length of Time since Last Agency Review of the Rule or the Degree to which Technology, Economic Conditions, or Other Factors have changed in the Area Affected by the Rule

This RFA review is the first rule review of the Mattress Standard. However, staff has been continuously engaged with the industry since the Mattress Standard was first published and became effective. When the Mattress Standard was first published, staff conducted a series of informational sessions to address industry concerns. CPSC staff trained the testing bodies that manufacturers use to conduct testing, and CPSC staff visited those facilities when the Mattress Standard was published in 2006.

As stated above, the CPSC Laboratory Test Manual was published in 2011 to provide guidance on the test procedure for test facilities. Staff maintains a dedicated page on CPSC.gov for Mattress Flammability Information and an email listserv that interested parties may elect to join for periodic updates from CPSC.

While one commenter believes the standard is too costly relative to the benefits, several commenters affirm that the economic burden of complying with the Mattress Standard has dramatically decreased since the standard was promulgated. Those commenters assert that the cost of materials, prototyping, and testing have all decreased, while the variety and quality of materials used by many manufacturers to comply with the Mattress Standard have increased. Additionally, new segments of the industry have grown in response to the Mattress Standard.

Five commenters cite performance advantages of natural materials for complying with the Mattress Standard, but they also assert that these same materials often need chemical treatments to comply with the Cigarette Ignition Standard. There are also comments about the unavailability of mattresses without flame-retardant (FR) chemicals. The Mattress Standard is a performance-based standard and does not specify the use of any components to comply with the standard. CPSC staff is aware of many models and prototypes of mattresses that do not use any FR chemicals. There are also commercially available FR-treated barriers that can be used to meet the Mattress Standard that are not expected to pose any appreciable risk of health effects to consumers who sleep on the treated mattresses. These FR-treated barriers were examined in the

“Quantitative assessment of potential health effects from the use of fire-retardant (FR) chemicals in mattresses,” in Tab D of the 2006 briefing package for the Mattress Standard.¹⁰

CPSC staff is continuously monitoring the state of the industry. CPSC staff regularly attends industry events to monitor new developments in the industry. With advances in manufacturing, there has been a shift toward direct shipments of mattresses to consumers and a potentially related increase in mattress imports. Consequently, CPSC staff is considering increased outreach to overseas mattress producers to assure continued compliance with the requirements of the Mattress Standard.

Conclusion

CPSC staff does not recommend any changes to the Mattress Standard at this time. There is strong support for the Mattress Standard from the regulated industry and other stakeholders. Since the Mattress Standard was promulgated, according to staff analysis and two comments from component manufacturers, the cost of materials typically used to comply with the standard has decreased significantly. There are provisions in the Mattress Standard to assist with meeting the rule and reducing the burden on small entities, although a disproportionate impact on small businesses may persist.

The Mattress Standard is still needed to address the hazards associated with mattress fires. The projected reduction in fire deaths and injuries attributed to open-flame ignition of mattresses has not yet been fully achieved. With an estimated useful life of a mattress set of 14 years, there were still pre-Mattress Standard mattresses in use in an estimated 67 percent of the market as of 2013. The U.S. economic recession coincided with the effective date of the Mattress Standard, delaying the saturation proportion of post-Mattress Standard mattresses in use today compared with the projection when the rule was promulgated. CPSC staff concludes that there has been a modest improvement in death and injury estimates on a per capita basis, but that more time is needed for the market to rebound and data to become available to realize the full benefits of the Mattress Standard. Given the substantial improvement in fire performance of post-Mattress Standard compliant mattress compared to a pre-Mattress Standard mattress, staff concludes that the performance criteria ensure a less flammable design that will effectively limit the mattress contribution to a fire and substantially reduce the risks of deaths and injuries in a fire event.

The industry could benefit from additional support and outreach from CPSC staff to maintain awareness and compliance with the Mattress Standard. This could include guidance related to the technical and recordkeeping requirements of the Mattress Standard. CPSC staff could provide testing bodies with additional technical details related to the testing procedure. Other outreach could be considered, including providing additional training sessions and workshops to include manufacturers and retailers who are new to the industry and to refresh the knowledge base of stakeholders who have been involved since the publication of the Mattress Standard.

¹⁰ Thomas and Brundage. Quantitative assessment of potential health effects from the use of flame retardant (FR) chemicals in mattresses. Briefing Package. Final Rule for the Flammability (Open Flame) of Mattress Sets. Tab D. 2006. <http://www.cpsc.gov/PageFiles/88208/matttabd.pdf>

CPSC staff is continuing to monitor the state of the industry and to develop responsive advice and guidance to help all segments of the mattress industry work toward our shared goal of protecting consumer safety by reducing mattress fires.

Appendices

Tab A: Memorandum from Robert Squibb, “Open Flame Flammability Standard for Mattresses and Mattress Sets Rule Review,” August 24, 2016

Tab B: Memorandum from David Miller, “Mattress Fire Loss Estimates for Open Flame Mattress 1633 Rule Review,” November 2, 2016

Tab C: Memorandum from Lisa Scott, “Staff Response to Comments Received in Response to Federal Register Notice ‘Regulatory Flexibility Act Section 610 Review of the Standard for the Flammability (Open Flame) of Mattress Sets,’” August 31, 2016

TAB A: Memorandum from R. Squibb, “Open Flame Flammability Standard for Mattresses and Mattress Sets Rule Review,” August 24, 2016



**UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
BETHESDA, MD 20814**

Memorandum

Date: August 24, 2016

TO : Lisa Scott,
Project Manager
Mattress Flammability Standard Rule Review

THROUGH : Gregory B. Rodgers, Ph.D.
Associate Executive Director,
Directorate for Economic Analysis

Robert Franklin
Senior Staff Coordinator
Directorate for Economic Analysis

FROM : Robert Squibb
Economist
Directorate for Economic Analysis

SUBJECT : Open Flame Flammability Standard for Mattresses and Mattress Sets Rule Review

Background

The Regulatory Flexibility Act (RFA) requires federal agencies to review regulations for their impact on small business and to consider less burdensome alternatives. Section 610 of the RFA requires federal agencies to review regulations that have a significant economic impact on a substantial number of small entities within 10 years of their adoption as final rules.

The purpose of a rule review under section 610 of the RFA is to determine whether, consistent with the CPSC's statutory obligations, this standard should be maintained without change, rescinded, or modified to minimize any significant impact of the rule on a substantial number of small entities. Section 610 requires agencies to consider five factors in reviewing rules to minimize any significant economic impact of the rule on a substantial number of small entities:

- (1) The continued need for the rule;
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- (4) The extent to which the rule overlaps, duplicates or conflicts with other Federal rules, and, to the extent feasible, with State and local governmental rules; and

(5) The length of time since the rule has been evaluated or the degree to which technology, economic conditions, or other factors have changed in the area affected by the rule.

The Open-Flame Flammability Standard for Mattresses and Mattress Sets (Mattress Standard) was published as a final rule in March 2006, and became effective in July 2007.¹¹ On April 3, 2015, the CPSC issued a notice in the *Federal Register* (FR) of its intent to conduct a section 610 review for the Mattress Standard and solicited comments. (80 FR 18218) This memorandum provides an analysis of the impact the standard has had on small businesses and an update to the product information, market information, and societal costs associated with fires where mattresses were the first item ignited.

Impact of the Standard on Small Businesses

When the final rule was published promulgating the standard, the Commission also published a final regulatory flexibility analysis (FRFA), detailing the requirements of the standard and the burden those requirements create for small manufacturers and importers associated with the standard. The Commission did not certify that the rule would not have a substantial impact on a significant number of firms. The conclusion of the FRFA included staff's analysis that the material and labor costs of compliance with the standard would be borne proportionally across manufacturers of all sizes, but the requirements for testing, record keeping, and quality control/quality assurance may have a disproportionate impact on small manufacturers because they generally have fewer units over which they can spread these per-prototype or per-firm costs. Staff concluded that the final rule, as published, minimized the impact on small firms yet maintained the standard's aim of reducing fires, deaths, and injuries associated with mattress fires ignited by an open-flame source.

Validity of the Final Rule Cost Estimates

In preparing this review of the Mattress Standard, staff solicited feedback from several small mattress manufacturers regarding the accuracy of the cost estimates in the FRFA, in addition to the FR notice requesting comments. In the final regulatory analysis, baseline estimates were created using a queen-size mattress. After being adjusted for inflation, total costs, which included costs for materials and labor, testing, record keeping, and quality assurance, were estimated to be centered on \$17.41 per mattress set, with a lower bound of \$8.66 and an upper bound of \$25.95 in 2013 dollars.¹²

Two comments on the FR notice announcing the rule review were made by the Association of the Nonwoven Fabrics Industry (INDA) and Tintoria Piana, a manufacturer of flame-resistance products for bedding. These comments specifically addressed the costs as estimated in the FRFA. In their comments, they suggested the cost of flame-resistant components has decreased by about half since publication of the final rule. The International Sleep Products

¹¹ The rule is codified at 16 C.F.R. part 1633.

¹² Adjusted for inflation using the Consumer Price Index for all urban households.

Association (ISPA) commented that the standard requirements for testing may impact smaller firms disproportionately, but the allowance in the standard for “pooled prototypes” reduces the disproportionate burden on small firms.

Only one additional small, domestic manufacturer provided information regarding the costs they have faced due to the adoption of 16 C.F.R. part 1633. This manufacturer estimated that their materials and labor costs per queen mattress set were \$40 for the required flame-resistant materials over the non-flame-resistant materials permissible before the regulation was in place. This manufacturer estimated total quality assurance program costs to be around \$1 per mattress set, compared with the final rule estimate of \$0.075 per mattress set. The manufacturer commented that testing costs were significantly higher when they first switched to flame-resistant materials, but currently their testing costs are around \$0.17 per mattress, some of which is borne by their materials providers. This is lower than the \$0.82 per mattress set estimated in the FRFA. The manufacturer commented that because they used different materials than assumed in the CPSC analysis, there were “no surprises” to them in the materials cost; however, the quality assurance program they put into place was more rigorous and more expensive than originally anticipated. To the extent this experience is generalized to other small manufacturers, the higher-than-expected costs of quality assurance programs may disproportionately affect small firms. Because they have smaller annual production, the fixed costs of the quality assurance programs are distributed over fewer mattresses for small firms. This point was also addressed in the comment by ISPA. Based on the feedback from Tintoria Piana and ISPA, as well as this manufacturer, it appears that the cost estimates in the FRFA were reasonable. Although the responding small manufacturer did note significantly higher materials costs, this is due to a strategic choice, rather than lack of available materials at the estimated cost.

An alternative assessment of the validity of the cost estimates used in the FRFA for the rule can be made by comparing prices before and after the rule went into effect. Adjusted for inflation, the average wholesale price for an adult innerspring mattress was \$213.41 in 2006 and \$235.24 in 2013, a difference of \$21.83 (in 2013 dollars).¹³ In the case of non-innerspring mattresses, adjusted for inflation, wholesale prices actually fell, from \$630.81 (in 2013 dollars) in 2006 to \$568.11 in 2013.¹⁴ Many factors influence changes in prices including changes in the cost of raw materials, labor, and transportation, as well as changes in demand and the regulatory environment. However, given that the cost of compliance with the mattress standard was estimated in the FRFA to be between \$8.66 and \$25.95 (in 2013 dollars) per mattress the observed changes in real wholesale prices do not provide evidence that CPSC substantially underestimated the cost of compliance with the standard.

Alternatives to Reduce Burden

Multiple commenters responding to the FR notice for the rule review suggested that CPSC could drop the requirements of 16 C.F.R. part 1632, the Standard for the Flammability of

¹³ The wholesale price of innerspring mattresses was \$184.68 in 2006 (ISPA 2014). The consumer price index was used to inflate this value to 2013 dollars.

¹⁴ The unadjusted wholesale price was \$545.90 in 2006 (IPSA 2014).

Mattresses and Mattress Pads (Cigarette Ignition Standard), or integrate the requirements with those of the Mattress Standard to reduce burden on industry. The Commission published an Advanced Notice of Proposed Rulemaking (ANPR) for a possible revocation of, or amendment to, the Cigarette Ignition Standard in 2005. There is also a current Interim Enforcement Policy for Mattresses Subject to C.F.R. Parts 1632 and 1633, dated May 2006. The CPSC Office of Compliance is exercising enforcement discretion to reduce the amount of testing required by the Cigarette Ignition Standard. The published guidance permits manufacturers to reduce testing from six mattress surfaces to two mattress surfaces for mattress prototypes created to comply with the Mattress Standard as part of the requirements for part 1633. These efforts have been undertaken to address the concerns in the comments; beyond this, comments regarding the Cigarette Ignition Standard have been treated as beyond the scope of this rule review, but the issues raised may be addressed in rulemaking concerning the Cigarette Ignition Standard.

One commenter, ISPA, suggested reducing the required conditioning time for temperature and relative humidity of mattress samples to be tested from 48 hours to 24 hours. The commenter suggested that costs for small manufacturers could be reduced because many manufacturers have personnel transport the mattress to the testing facility and then stay to observe the entire testing process. The commenter suggests that this is especially burdensome in instances where the mattress is delivered on a Thursday or Friday, the testing facility is closed over the weekend, and the testing is not conducted until the following Monday. The commenter suggests that having a 48-hour conditioning period, rather than 24 hours, increases the costs of observation (which the commenter suggests is useful for promoting safety and compliance), with no benefits for consumer safety. CPSC staff disagrees that there would be no effect on consumer safety. The required conditioning period is longer for mattresses than for other products referenced by the commenter because mattresses may require a longer period of time to stabilize to the required testing conditions. Consistency in testing conditions is required for the effectiveness of the Mattress Standard.

One commenter suggested that the Mattress Standard be rescinded because the costs of compliance with the standard far exceed the benefits, citing an understanding “that fewer than a dozen people a year perish in fires that are started when a mattress catches fire.” CPSC staff disagrees with the commenter’s assertion; CPSC epidemiological data suggest a far greater number of annual deaths. Staff acknowledges the costs associated with the requirements, but believes they bear a reasonable relationship to the potential benefits associated with the Mattress Standard.

Product Information

The standard applies to all mattress sets, where the term “mattress set” means either a mattress and foundation labeled for sale as a set by the manufacturer, or a mattress labeled for sale without a foundation. “Mattresses” are defined in the standard as a resilient material or combination of materials enclosed by a ticking (used alone or in combination with other products) intended or promoted for sleeping upon. This includes, but is not limited to, adult mattresses, youth mattresses, crib mattresses (including portable crib mattresses), bunk bed mattresses, futons, flip chairs without a permanent back or arms, sleeper chairs, and water beds or air mattresses, if they contain upholstery material between the ticking and the mattress core.

Mattresses used in or as part of upholstered furniture are also included; examples are convertible sofa bed mattresses, corner group mattresses, day bed mattresses, roll-away bed mattresses, high risers, and trundle bed mattresses. The standard excludes mattress pads, mattress toppers (items with resilient filling, with or without ticking, intended to be used with or on top of a mattress), sleeping bags, pillows, liquid and gaseous filled ticking, such as water beds and air mattresses that contain no upholstery material between the ticking and the mattress core, upholstered furniture that does not contain a mattress, and juvenile product pads, such as car bed pads, carriage pads, basket pads, infant carrier and lounge pads, dressing table pads, stroller pads, crib bumpers, and playpen pads.

Market Information

Sales and Number in Use

After the publication of the final rule in 2006, unit sales of mattresses declined 23 percent from 2006 to 2009 (see Table 1). The decline in shipments was likely due to the recession and the associated decline in new housing starts and sales of existing homes that occurred in the same period. Although unit sales began increasing in 2010, as of 2013, unit sales had not reached the same level as in 2000.

Table 1: Mattress Shipments* : 2000 – 2013, (in ‘000’s)

Year	Conventional	Unconventional	Total
2000	21,675	2,408	24,083
2001	21,233	2,359	23,592
2002	21,484	2,387	23,871
2003	22,022	2,447	24,469
2004	22,481	2,498	24,979
2005	23,985	2,665	26,650
2006	23,609	2,623	26,232
2007	21,766	2,418	24,184
2008	19,587	2,176	21,763
2009	18,134	2,015	20,149
2010	19,257	2,140	21,397
2011	19,453	2,161	21,614
2012	19,874	2,208	22,082
2013	20,077	2,231	22,308

Source: International Sleep Products Association (2015) and Tohamy (2006)

*Total shipments are calculated assuming that unconventional shipments (e.g., futons, crib mattresses, juvenile mattresses, sleep sofa inserts) are 10 percent of the total market.

To estimate the number of mattresses in use, staff used the CPSC Product Population Model. The model estimates the number of products currently in use based on historical sales data, an estimated distribution describing the rate at which products are retired from use, and the expected useful life of the product. In the final regulatory analysis of the mattress rule (Tohamy, 2005), two estimates of useful life were used, 10 years and 14 years, based on industry

recommendations of how often to change mattresses (10-12 years) and a previous study conducted for CPSC (14 years). However, based on the mattresses in use, estimates modeled with a 10-year product life duration would indicate that the number of mattresses in use declined each year between 2008 and 2013, an effect driven by the large decline in sales from 2007 to 2009. Because it seems unlikely that the number of mattresses in use would have actually declined, when coupled with a constantly growing population, staff concludes that the 10-year product life estimate was low. Therefore, this analysis assumes only a 14-year average product life. Using the methodology from the final regulatory analysis, updated with more recent sales data, staff estimates that the average number of mattresses in use (conventional and nonconventional) in the 3-year period from 2011 through 2013 was 312.6 million. In the 3-year period from 2002 through 2004, which is the last 3-year period before a California standard (California Technical Bulletin 603) that is similar to the Mattress Standard went into effect, there was an average of about 275.2 million mattresses in use.

Of the approximately 312.6 million mattresses in use in the period 2011 to 2013, staff estimates that 111.7 million, or about 36 percent, likely complied with the Mattress Standard. This estimate is based on the assumption that all mattresses sold in 2008 and later complied with the standard, about 11 percent of all mattresses sold in 2005 and 2006 complied with California Technical Bulletin 603, and about one-half of the other mattresses sold in 2007 complied with the standard. (The Mattress Standard became effective on July 1, 2007.)

Market Shares of Innerspring and Non-innerspring Mattresses

The market share of non-innerspring mattresses (*e.g.*, foam mattresses and air- and water-filled mattresses) has significantly increased since 2004, when they made up about 7.5 percent of all adult mattress sales. In 2013, non-innerspring mattresses made up about 15.3 percent of adult mattress sales. During this time, the average wholesale price of non-innerspring mattresses has declined relative to the average wholesale prices of innerspring mattresses. In 2004, the average wholesale price of a non-innerspring mattress was 3.6 times the average wholesale price of an innerspring mattress. In 2013, the average wholesale price of a non-innerspring mattress was just 2.4 times the average wholesale price of an innerspring mattress (ISPA, 2015).

Manufacturing

According to the U.S. Census Bureau, there were 358 companies, spread across 430 establishments, engaged in manufacturing mattresses in the United States in 2013.¹⁵ The final regulatory analysis estimated a total of around 522 firms and 571 establishments based on the 2002 Economic Census and the 2003 County Business Patterns report, respectively. The January 2016 IBIS World “Mattress Manufacturing in the US” report lists 323 companies manufacturing mattresses in the United States. The decline in the number of mattress producers is due to some mattress producers closing and some mattress manufacturers being acquired by others as the industry consolidated considerably during and after the economic recession.

¹⁵ U.S. Census Bureau, 2013 County Business Patterns, Number of Firms, (accessed from <https://www.census.gov/econ/susb/> on May 5, 2015).

Mattress manufacturers with fewer than 1,000 employees are classified by the U.S. Small Business Administration (SBA) as small.

The top mattress producers are Serta International (17.6 percent market share), Select Comfort Corporation (15.8 percent), Simmons Bedding Company (10.8 percent) and Tempur Sealy International Inc. (9.7 percent) (Rivera, 2016). None of the top four mattress producers is a small manufacturer per SBA size classifications. In the final regulatory analysis for the rule, the top four manufacturers of mattresses held around 57 percent market share (Tohamy 2006), compared with 53.9 percent at present. Although the market concentration among the top four firms has not changed considerably since publication of the final rule, the firms that comprise the top four have changed. The industry has consolidated in recent years in response to the slowing unit sales during the economic recession. Tempur Sealy International was created when Tempur-Pedic acquired competitor Sealy, which previously had long been the industry market share leader. Serta and Simmons are both owned by AOT Bedding Super Holdings but are currently operated independently.

Imported Mattresses

Since publication of the final rule, the share of imported mattresses in the market has increased. Unit imports have increased from about 3.0 million in 2007 to 5.2 million in 2014. (ISPA, 2015) As a percentage of total mattress unit sales, this represents an increase from 13.5 percent of total shipments to 24.7 percent. Chinese imports represent approximately 54 percent of imported units; imports from Mexico represent an additional 28.6 percent. Canada is the third largest provider of imported mattresses, representing 7.4 percent of total imported units. No other country represents more than 1 percent.

Projected Benefits of Rule and Benefits Achieved to Date

The potential benefits described in the mattress final rule briefing package were based on a reduction in societal costs from injuries and deaths associated with fires where mattresses or bedding were the item first ignited. Casualties were sorted based on features including age of the victim, location of the victim when the fire started (*e.g.*, in the same room in which the fire started or outside of it), and whether the victim was asleep. These conditions were then used to determine the probability that a death or injury would have been prevented had the standard been in place and a compliant mattress in use. According to data provided by the Directorate for Epidemiology (Miller, 2016), there were an average of 1.18 addressable deaths per million persons and an average of 4.51 nonfatal injuries per million persons associated with mattress fires in the 3-year period from 2002 to 2004 (the 3-year period before California Technical Bulletin 603, took effect). In the final regulatory analysis for the rule, the percent reduction in deaths was estimated to be between 69 percent and 78 percent of addressable deaths, and 73 percent to 84 percent of addressable injuries.

Based on recent sales data, staff estimates that about 36 percent of the mattresses in use complied with the mattress standard during 2011 to 2013, the latest set of years for which

casualty information is available. Therefore, holding all other factors constant, one would have expected the number of addressable deaths per million people to have decreased by at least 25 percent and nonfatal injuries per million people to have decreased by at least 26 percent, or 36 percent of the low-end estimates of the projected reductions in deaths and injuries that were used in the final regulatory analysis of the rule (*i.e.*, .36 x .69 for deaths and .36 x .73 for injuries).

According to the Directorate for Epidemiology, there were an average of 0.99 deaths and 3.53 nonfatal injuries per million people associated with addressable mattress fires in the 3-year period from 2011 through 2013. The decline in deaths and injuries per million people suggests a reduction of about 16 percent in deaths per million people and a reduction of about 22 percent in nonfatal injuries per million persons, which is short of the expected reductions of 25 percent and 26 percent, respectively. Staff does not have sufficient information to determine the reason (or reasons) for the difference between the predicted reduction and the observed reduction in addressable deaths and injuries.

Conclusion

Staff has no evidence that the total costs of the Mattress Standard were significantly different from those projected in the FRFA. Similarly, the Mattress Standard does not appear to have had an impact on small businesses beyond that described in the FRFA, which accompanied the final rule. According to comments and staff research, costs for flame-resistant materials have gone down since the publication of the Mattress Standard. As stated in the FRFA, costs for quality control and testing may pose a disproportionate impact on smaller manufacturers. One small manufacturer suggested that quality control, in particular, may have been significantly costlier in some cases to small businesses on a per-mattress basis than estimates in the FRFA indicated. One commenter, ISPA, proposed an alternative to reduce the testing burden on small manufacturers to reduce the conditioning time required for testing mattresses. For the reasons described in Tab C, staff did not concur with this alternative.

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Tohamy, Suomaya. 2005. *Final Regulatory Flexibility Analysis of Staff's Draft Final Standard to Address Open-Flame Ignition of Mattresses*. US Consumer Product Safety Commission.

TAB B: Memorandum from D. Miller, “Mattress Fire Loss Estimates for Open Flame Mattress 1633 Rule Review,” November 2, 2016



UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
BETHESDA, MD 20814

Memorandum

Date: November 2, 2016

TO: Lisa Scott
Open-Flame Mattress 1633 Rule Review Project Manager

THROUGH : Kathleen Stralka
Associate Executive Director
Directorate for Epidemiology

Stephen Hanway
Division Director
Division of Hazard Analysis

FROM: David Miller
Division of Hazard Analysis

SUBJECT: Mattress Fire Loss Estimates for Open-Flame Mattress 1633 Rule Review

Purpose:

This memorandum provides National Fire Incident Reporting System (NFIRS) estimates of fire deaths and injuries associated with mattresses to help examine the issue of mattress fire deaths and injuries before and after the implementation of a Standard for the Flammability (Open-Flame) of Mattress Sets (16 CFR Part 1633) (Mattress Standard). On April 3, 2015, the Commission issued a notice of section 610 review for the Mattress Standard under the Regulatory Flexibility Act in the *Federal Register* 80 FR 18218.

The purpose of a rule review under section 610 of the RFA is to determine whether, consistent with the CPSC's statutory obligations, this standard should be maintained without change, rescinded, or modified to minimize any significant impact of the rule on a substantial number of small entities. Section 610 requires agencies to consider five factors in reviewing rules to minimize any significant economic impact of the rule on a substantial number of small entities, as discussed in the executive memo in the briefing package.

Background:

The Commission adopted 16 CFR part 1633 in March 2006 to reduce the risk to consumers of death and injury due to mattress fires. It went into effect on July 1, 2007. Although it is referred to as an "open-flame" standard, it addresses fires caused by many different heat sources. In a typical mattress fire, bedding is the first item that ignites. The bedding can be ignited by a smoldering cigarette, a small open flame, or something else; regardless of how the bedding ignites an open flame on or near the mattress results.

Mattresses are one of the consumer products most involved in home fire deaths and injuries. A mattress or bedding was the item first ignited in an estimated annual average of 350 deaths and

1,310 injuries from 2004 to 2006,¹⁶ and involved in other fire deaths and injuries (for incidents where something other than the mattress or bedding ignited first but the mattress later became involved). The Commission issued the mattress open-flame standard to help reduce the number of deaths and injuries due to mattress and bedding fires.

Some mattress fires are considered *addressable* by the standard and some are not. When a fire is said to be *addressable* by the standard, this means that it is of a type that *could* be mitigated by a compliant mattress. It does not mean that all deaths and injuries that occur in addressable fires would not have occurred had the mattress been compliant. We expect that compliant mattresses will prevent many, but not all, deaths and injuries from addressable fires.

Estimates:

CPSC staff uses NFIRS data, in conjunction with the National Fire Protection Association's (NFPA) national fire loss estimates, to produce estimates of residential structure fires and associated losses where a mattress or bedding was the *Item First Ignited*. NFIRS has a variable called *Item First Ignited*, and the following codes are counted as mattress and bedding fires:

'31 – Mattress, pillow'

'32 – Bedding; blanket, sheet, comforter'

These estimates exclude intentionally set fires (except for child-play fires) and non-civilian casualties. Table 1 includes fire, death, and injury estimates from 2000 to 2013, which is the most recent year available. They include fires and losses from both addressable and non-addressable fires.

¹⁶ These are the most recent three full years before the standard took effect. Some compliant mattresses were sold in the years before the standard took effect.

Table 1. NFIRS Mattress and Bedding Total Fire Death and Injury Estimates 2000 – 2013

Year	Fires	Deaths	Injuries
2000	16,700	410	2,250
2001	15,800	330	1,690
2002	13,700	440	1,310
2003	12,200	380	1,470
2004	11,700	300	1,450
2005	10,200	370	1,240
2006	10,000	370	1,250
2007	9,500	360	1,200
2008	8,900	310	1,140
2009	7,800	360	1,220
2010	7,800	300	1,190
2011	7,800	360	1,250
2012	7,300	350	1,090
2013	7,700	310	1,110

Note: Fire estimates are rounded to the nearest 100. Death and injury estimates are rounded to the nearest 10.

Figure 1 shows the total mattress and bedding fire death estimates by year. This includes deaths from both addressable and non-addressable fires.

Figure 1. NFIRS Mattress and Bedding Total Fire Death Estimates 2000 – 2013

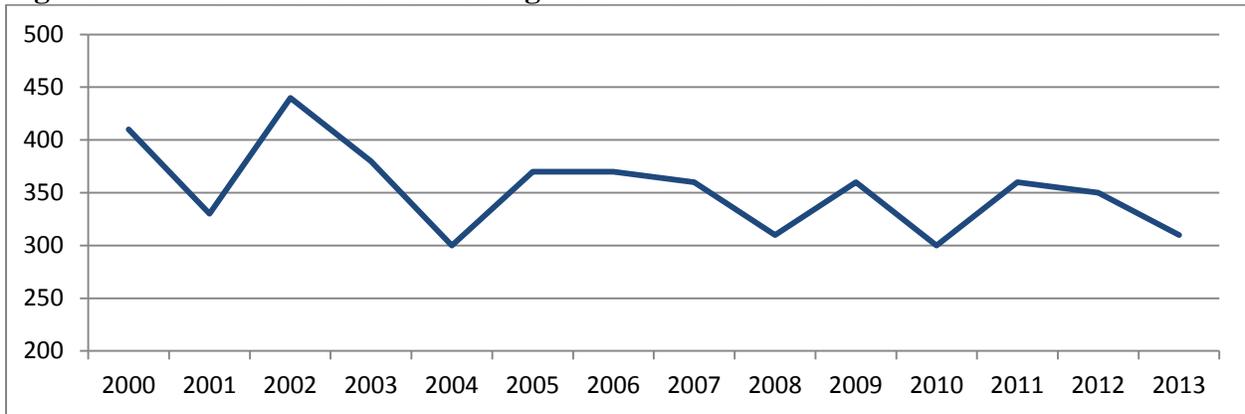
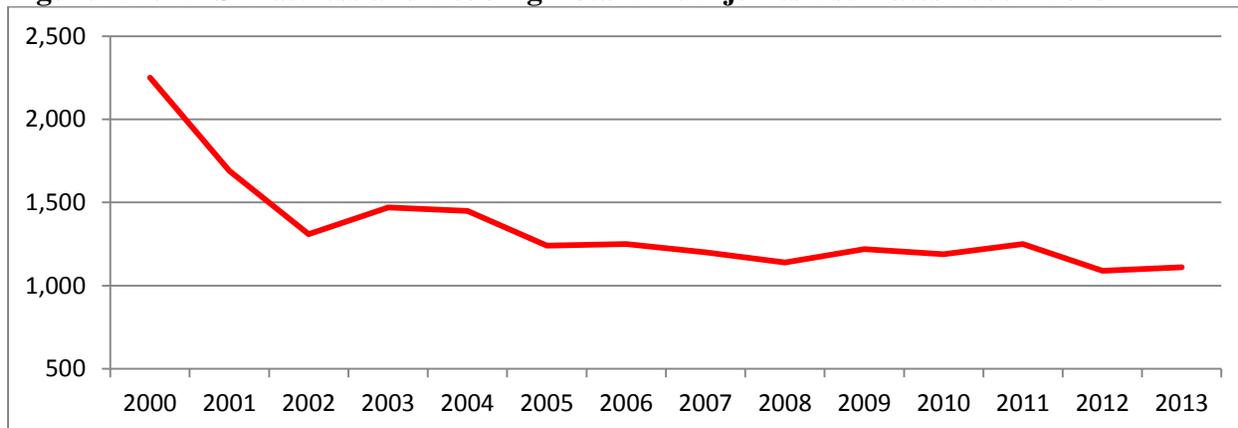


Figure 2 shows the total mattress and bedding fire injury estimates by year.

Figure 2. NFIRS Mattress and Bedding Total Fire Injuries Estimates 2000 – 2013



There is considerable year-to-year variability in the estimates, particularly the ones for deaths. NFIRS is not a probability sample. Therefore, it is not possible to use statistical inference to determine if apparent trends are statistically significant. It can be helpful to use 3-year average estimates to reduce some of the year-to-year variation and give a clearer picture of long term trends in the graphs. Figures 3 and 4 show 3-year average estimates for mattress and bedding fire deaths and injuries, respectively.

Figure 3. NFIRS Mattress and Bedding Fire Death Estimates 2000 – 2013, 3-year Averages

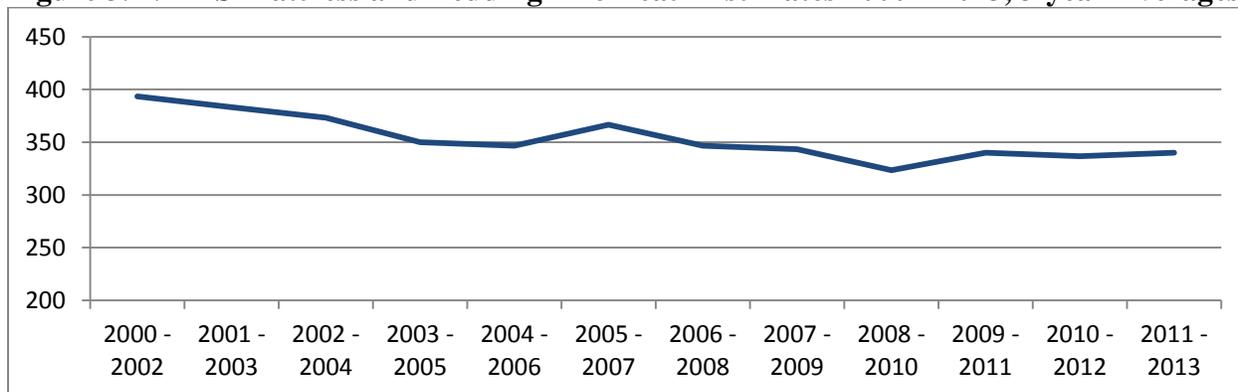
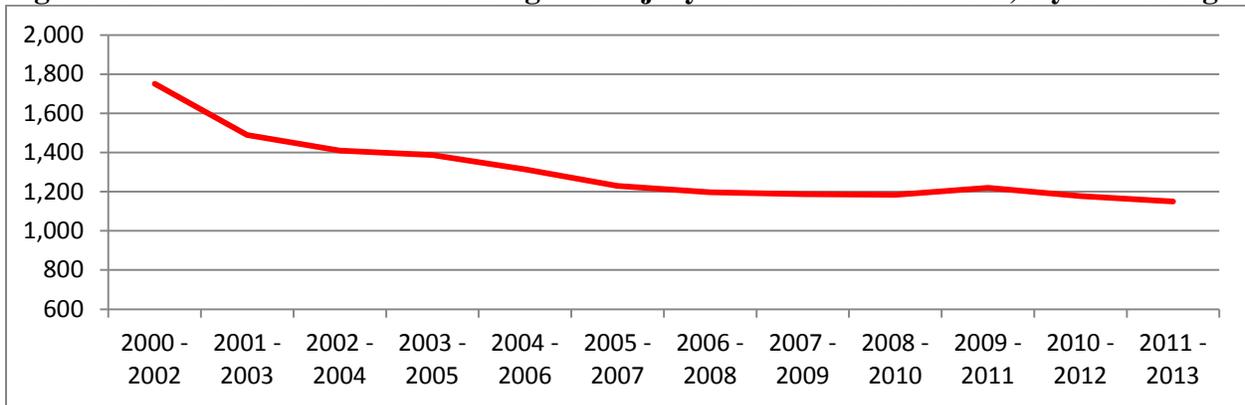


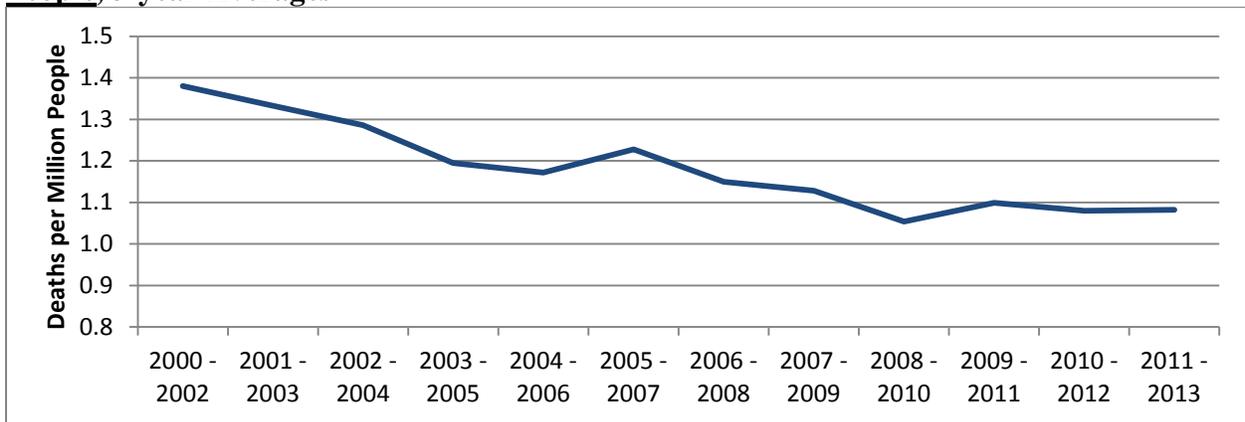
Figure 4. NFIRS Mattress and Bedding Fire Injury Estimates 2000 – 2013, 3-year Averages



The most recent 3-year average estimates of mattress and bedding fire deaths and injuries are for 2011 to 2013. There are an estimated annual average of 340 deaths and 1,150 injuries. This is an estimated 16 percent of the total residential structure fire deaths and 9 percent of the total residential structure fire injuries during this period.

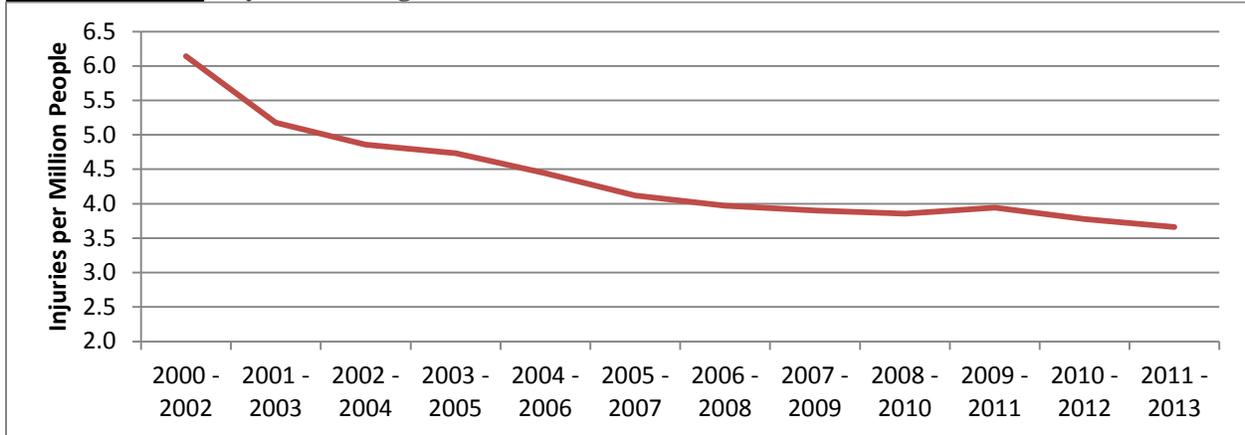
During the period from 2000 to 2013, the U.S. population increased by approximately 12 percent. One way to consider the safety of mattresses is to consider the fire deaths and injuries on a per capita basis. Figures 5 and 6 show the estimated mattress and bedding fire deaths and injury 3-year averages per million people,¹⁷ respectively.

Figure 5. NFIRS Mattress and Bedding Total Fire Death Estimates 2000 – 2013 per Million People, 3-year Averages



¹⁷ U.S. population estimates for each year are taken from U.S. Census Bureau estimates of the population on July 1st of each year.

Figure 6. NFIRS Mattress and Bedding Total Fire Injuries Estimates 2000 – 2013 per Million People, 3-year Averages



Not all mattress and bedding fires are considered addressable by the standard (16 CFR Part 1633). There are five NFIRS variables that are used to determine addressability for mattress and bedding fires: *Heat Source*; *Type of Material First Ignited*; *Area of Origin*; *Factors Contributing to Ignition*; and *Equipment Involved in Ignition*. The specific codes that would render a fire addressable (or not addressable) for each variable are listed in the Appendix. There are many examples of fires that are not addressable, including a fire whose *Heat Source* is coded as “56 – Incendiary device,” one whose *Type of Material First Ignited* is coded as “54 – Hay, straw,” or one with a *Factor Contributing to Ignition* coded as “14 – Flammable liquid or gas spilled.”

All of these NFIRS variables, in addition to *Item First Ignited* and *Cause of Ignition*,¹⁸ are included in the process of estimating addressable mattress and bedding fires casualties. Table 2 shows estimates for addressable fire deaths and injuries from 2000 to 2013.

¹⁸ Cause of Ignition has codes for intentionally set, as well as unintentionally set fires. This is used to exclude intentionally set fires. Child play fires are counted as unintentional and are included in the estimates.

Table 2. NFIRS Mattress and Bedding Addressable Death and Injury Estimates 2000 – 2013

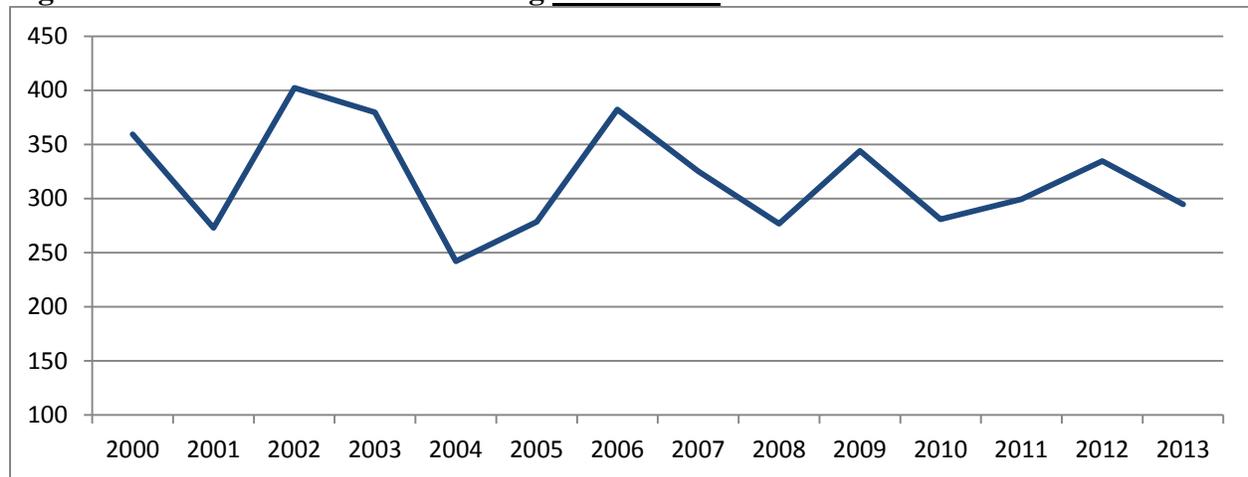
Year	Deaths	Injuries
2000	360	2,120
2001	270	1,530
2002	400	1,210
2003	380	1,350
2004	240	1,370
2005	280	1,170
2006	380 [#]	1,180
2007	330	1,040
2008	280	950
2009	340	1,120
2010	280	990
2011	300	1,090
2012	330	1,090
2013	290	1,150 [#]

Note: Death and injury estimates are rounded to the nearest 10.

Although addressable fires and fire losses are a subset of total fires and fire losses, the estimate can be higher than the total estimates from the residential fire loss report because there are different variables included in the raking procedure.

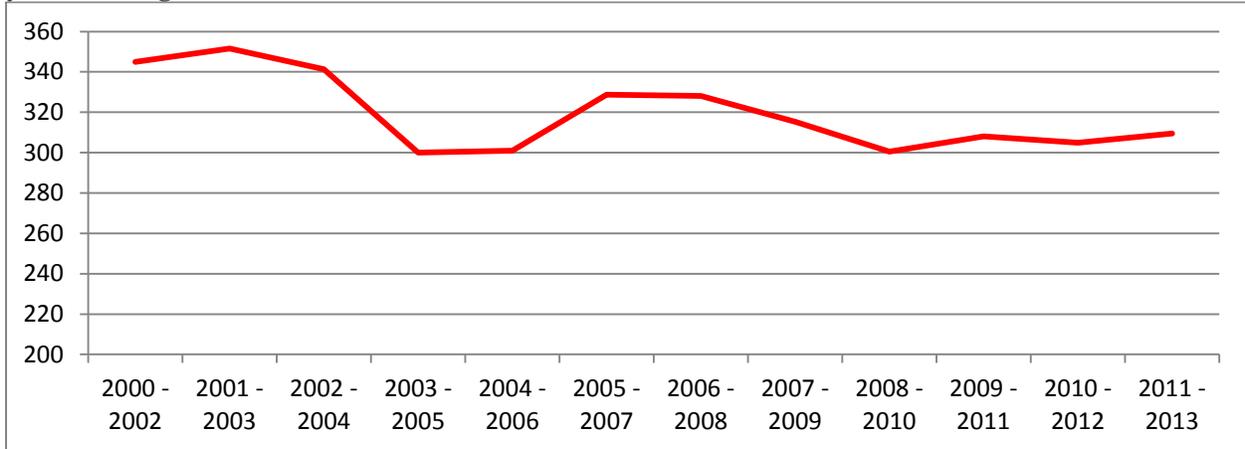
Figure 7 shows the addressable death estimates from 2000 to 2013.

Figure 7. NFIRS Mattress and Bedding Addressable Fire Death Estimates 2000 – 2013



As with the total mattress and bedding fire death estimates, using 3-year averages can help to smooth out the graph. Figure 8 shows the 3-year average estimates of addressable mattress and bedding fire deaths.

Figure 8. NFIRS Mattress and Bedding Addressable Fire Death Estimates 2000 – 2013, 3-year Averages



Figures 9 and 10 show the addressable injury estimates by individual year (Figure 9) and the 3-year averages (Figure 10).

Figure 9. NFIRS Mattress and Bedding Addressable Fire Injury Estimates 2000 – 2013

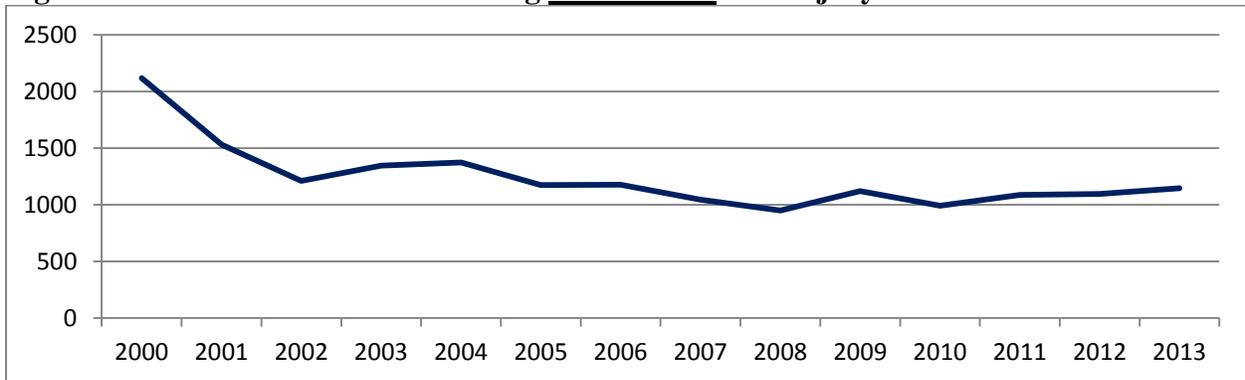
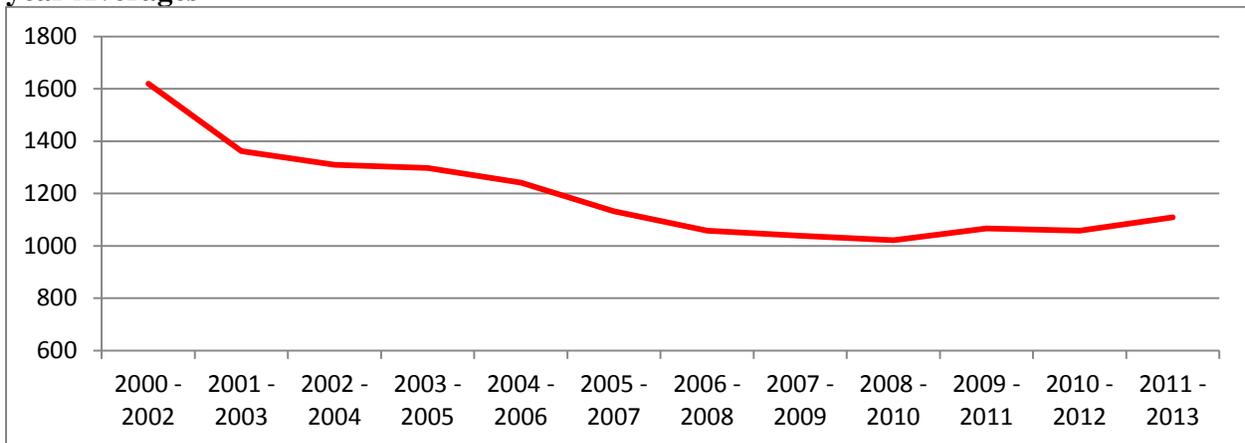


Figure 10. NFIRS Mattress and Bedding Addressable Fire Injury Estimates 2000 – 2013, 3-year Averages



The 3-year annual average estimates for the most three recent years available (2011 – 2013) are 310 addressable mattress and bedding fire deaths and 1,110 injuries.

As with the total death and injury estimates, because the U.S. population increased between 2000 and 2013, it is useful to look at the addressable estimates per unit population. Figures 11 and 12 show the 3-year average estimates of addressable mattress and bedding fire deaths (Figure 11) and injuries (Figure 12) per million people.

Figure 11. NFIRS Mattress and Bedding Addressable Fire Death Estimates 2000 – 2013 per Million People, 3-year Averages

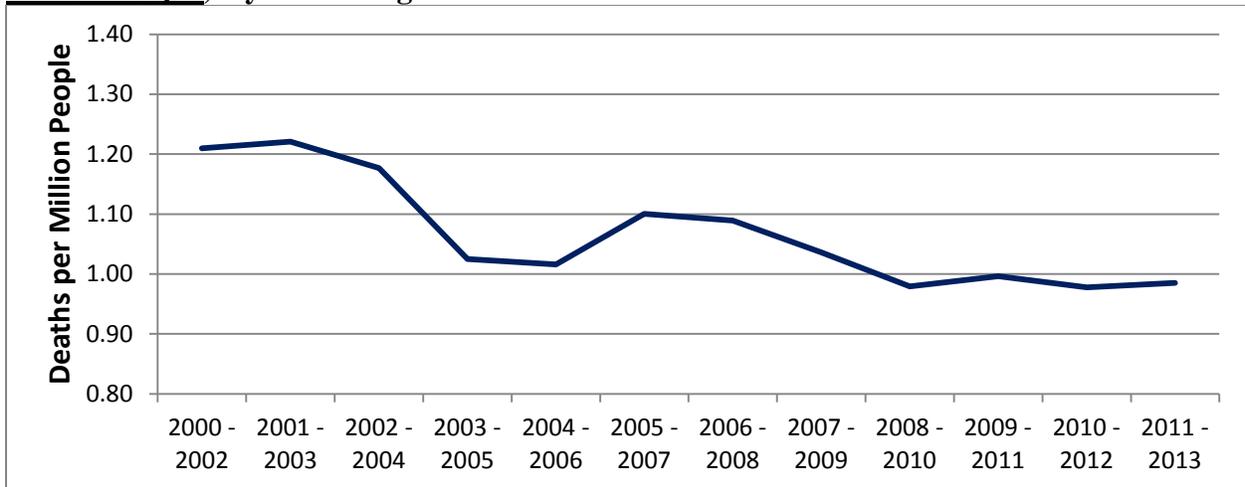
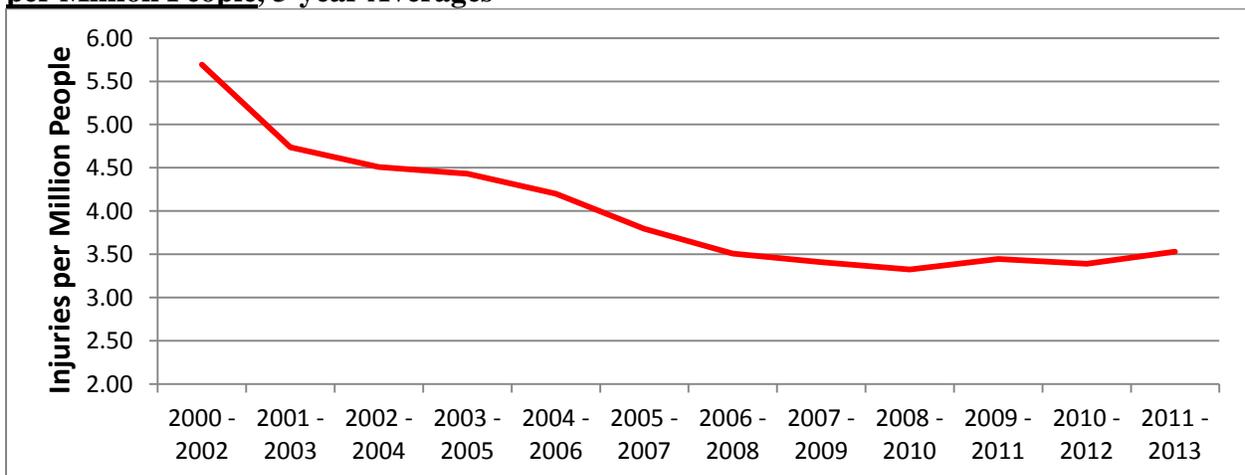


Figure 12. NFIRS Mattress and Bedding Addressable Fire Injuries Estimates 2000 – 2013 per Million People, 3-year Averages



Conclusions:

Years after the implementation of a Standard for the Flammability (Open-Flame) of Mattress Sets (16 CFR Part 1633), there are still large numbers of deaths and injuries due to mattress and bedding fires. There is an estimated annual average of 340 deaths and 1,150 injuries where a mattress or bedding was the item first ignited for the years 2011 to 2013. This is an estimated 16

percent of the home fire deaths and 9 percent of the home fire injuries for this period. An estimated 310 such deaths and 1,110 such injuries are deemed addressable by the standard. CPSC staff expects that as time passes and more compliant mattresses are purchased by consumers, more of these deaths and injuries will be prevented.

Mattress sales increased in 2005 and 2006 in the years before the standard was implemented. Then they declined in 2007, and declined much further in 2008 and 2009.¹⁹ This was likely the result of the housing market boom and crash coinciding with those periods. This may have caused the rate of penetration of compliant mattresses into U.S. households to be slower than CPSC staff anticipated. This, along with the continued increase in the U.S. population, may explain not seeing a greater decrease in annual estimates of mattress and bedding fire deaths and injuries.

Response to Comments:

In April 2015, the CPSC solicited comments on the Mattress Standard from the public. The CPSC received 16 written comments, one related to the fire loss estimates. That comment, from Lester Mesner, stated: “. . . All this requirement has accomplished is added cost not only to manufacturers, but to the government to try and maintain a standard that is completely unnecessary. I don’t have the specific statistics, but it is my understanding that fewer than a dozen people a year perish in fires that are started when a mattress catches on fire. So it was an overreaching requirement that costs both consumers and manufacturers millions of unnecessary dollars.”

The most recent fire loss estimates available show an average of 340 people die in mattress fires per year. Of items first ignited in home fires, mattresses and bedding are the products associated with the second most fire deaths. This is a large number of fire deaths and the standard was subject to a cost benefit analysis before being adopted. The estimated benefits far outweighed the estimated costs.

¹⁹ Robert Squibb, “Open Flame Flammability Standard for Mattress and Mattress Sets Rule Review”, CPSC, August 2016.

Appendix: Codes Used to Identify Mattress and Bedding Fires/Addressability

Table 1
Standard Codes Used in Mattress and Bedding Fire Loss Estimates, Without Regard to Addressability

Heat Source	NFIRS Version 5.0 Codes
Smoking Materials	Cigarette (61) Pipe or cigar (62) Heat from undetermined smoking material (63)
Traditional Small Open Flame Sources	Match (64) Cigarette lighter (65) Candle (66)
Additional Small Open Flame Sources	Spark, ember or flame from operating equipment (11) Arcing (13) Hot ember or ash (43) Fireworks (54)
Other In-scope Heat Sources	Heat from powered equipment, other (10) Radiated, conducted heat from operating equipment (12) Hot or smoldering object, other (40) Heat, spark from friction (41) Molten, hot material (42) Model and amateur rockets (55) Heat from other open flame or smoking materials (60) Backfire from internal combustion engine (68) Chemical, natural heat source, other (70) Sunlight (71) Chemical reaction (72) Other static discharge (74)
Out-of-Scope Heat Sources	Heat source, other (00) Explosive, fireworks, other (50) Munitions (51) Blasting agent (53) Incendiary device (56) Lightning (73) Heat spread from another fire, other (80) Heat from direct flame, convection currents (81) Radiated heat from another fire (82) Flying brand, ember, spark (83) Conducted heat from another fire (84) Multiple heat sources including multiple ignitions (97)
Unknown Heat Sources	'UU', blank
Item First Ignited	
Mattress, Bedding	31 – Mattress, pillow 32 – Bedding; blanket, sheet, comforter
Not Mattress, Bedding	All codes except 31, 32, 'UU', and blank
Unknown Form of Material First Ignited	'UU', blank

Table 2.1
Mattress and Bedding Fire Edits to Define Addressability When Heat Source =
Traditional Small Open Flame (Candles, Matches, Lighters) or Smoking Material

Variable	Mattress/Bedding - Addressable (In-scope)	Mattress/Bedding – Not Addressable (Out-of-Scope)	Not Mattress/Bedding
Type of Material First Ignited	Other type of material ignited (00) Plastic (41) Natural product, other (50) Rubber, excluding synthetic rubbers (51) Leather (53) Grain, natural fiber, (preprocess) (55) Fabric, textile, fur, other (70) Fabric, fiber, cotton, blends, rayon, wool (71) Fur, silk, other fabric (74) Plastic coated fabric (77)		Flammable Gas (10 – 15) Flammable, Combustible Liquid (20 – 27) Volatile Solid or Chemical (30 – 38) Cork (52) Hay, straw (54) Coal, coke, briquettes, peat (56) Food, starch, excluding fat and grease (57) Tobacco (58) Wood or Paper - Processed (60 – 68) Wig (75) Human hair (76) Material compounded with oil, other (80) Linoleum (81) Oilcloth (82) Asphalt treated material (86) Multiple types of material first ignited (99)
Area of Origin	Area of origin, other (00) Corridor, mall (01) Exterior stairway, ramp, or fire escape (02) Interior stairway or ramp (03) Entrance way, lobby (05) Egress/exit, other (09) Assembly, Sales Areas (Groups or People) (10 – 17) Function Area (20 – 28) Technical Processing Areas (30 – 38) Storage area, other (40) Storage room, area, tank, or bin (41) Closet (42) Storage: supplies or tools; dead storage (43) Records storage room, storage vault (44) Shipping/receiving area; loading area, dock or bay (45) Vehicle storage area; garage, carport (47) Service facilities, other (50) Display window (56) Service, Equipment Areas (60 – 67) Structural area, other (70) Substructure area or space, crawl space (71) Exterior balcony, unenclosed porch (72) Ceiling & floor assembly, crawl		Escalator, exterior, interior (04) Chute/container – trash, rubbish, waste (46) Dumbwaiter or elevator shaft (51) Conduit, pipe, utility, or ventilation shaft (52) Light shaft (53) Chute; laundry or mail, excluding trash chutes (54) Duct: hvac, cable, exhaust, heating or AC (55) Conveyor (58) Awning (78) Transportation, Vehicle Area (80 – 86)

	<p>space between stories (73) Attic: vacant, crawl space above top story, cupola (74) Wall assembly (75) Wall surface: exterior (76) Roof surface: exterior (77) Other Area of Origin (90 – 98)</p>		
Factors Contrib. to Ignition	<p>Factor contributing to ignition, other (00) No factor contributing to ignition (NN) Misuse of material or product, other (10) Abandoned or discarded materials or products (11) Heat source too close to combustibles (12) Improper container or storage (18) Playing with heat source (19) Mechanical failure, malfunction, other (20) Automatic Control Failure (21) Manual control failure (22) Leak or break (23) Worn out (25) Improper fuel used (27) Water caused short-circuit arc (31) Short circuit arc from mechanical damage (32) Short circuit arc from defective, worn insulation (33) Arc from faulty contact, broken conductor (35) Arc, spark from operating equipment (36) Fluorescent light ballast (37) Installation Deficiency (40 – 44) Operational deficiency, other (50) Collision, knock down, run over, turn over (51) Accidentally turned on, not turned off (52) Equipment unattended (53) Failure to clean (55) Improper startup (56) Equipment used for not intended purpose (57) Equipment not being operated properly (58) Animal (66) Fire spread or control, other (70) Outside/open fire for debris or waste disposal (73) Outside/open fire for warming or cooking (74) Agriculture or land management (75)</p>	<p>Cutting, welding too close to combustible (13) Flammable liquid or gas spilled (14) Improper fueling technique (15) Flammable liquid used to kindle fire (16) Washing part, painting with flammable liquid (17) Backfire (26) Electrical failure, malfunction, other (30) Unspecified short-circuit arc (34) Equipment overloaded (54) Natural condition, other (60) High wind (61) Storm (62) High water including floods (63) Earthquake (64) Volcanic action (65) Exposure fire (71) Rekindle (72)</p>	

Equipment Involved in Ignition	Other equipment (000)	All other codes	
	No equipment (NNN)		
	Charcoal/utility lighter (872)		
	Cigarette/pipe lighter (873)		

Table 2.2
Mattress and Bedding Fire Edits to Define Addressability When Heat Source =
Additional Small Open Flame Sources and Other In-Scope Heat Sources

Variable	Mattress/Bedding - Addressable (In-scope)	Mattress/Bedding – Not Addressable (Out-of-Scope)	Not Mattress/Bedding
Type of Material First Ignited	Other type of material ignited (00) Plastic (41) Natural product, other (50) Rubber, excluding synthetic rubbers (51) Leather (53) Grain, natural fiber, (preprocess) (55) Fabric, textile, fur, other (70) Fabric, fiber, cotton, blends, rayon, wool (71) Fur, silk, other fabric (74) Plastic coated fabric (77)		Flammable Gas (10 – 15) Flammable, Combustible Liquid (20 – 27) Volatile Solid or Chemical (30 – 38) Cork (52) Hay, straw (54) Coal, coke, briquettes, peat (56) Food, starch, excluding fat and grease (57) Tobacco (58) Wood or Paper - Processed (60 – 68) Wig (75) Human hair (76) Material compounded with oil, other (80) Linoleum (81) Oilcloth (82) Asphalt treated material (86) Multiple types of material first ignited (99)
Area of Origin	Area of origin, other (00) Corridor, mall (01) Exterior stairway, ramp, or fire escape (02) Interior stairway or ramp (03) Entrance way, lobby (05) Egress/exit, other (09) Assembly, Sales Areas (Groups or People) (10 – 17) Function Area (20 – 28) Technical Processing Areas (30 – 38) Storage area, other (40) Storage room, area, tank, or bin (41) Closet (42) Storage: supplies or tools; dead storage (43) Records storage room, storage vault (44)		Escalator, exterior, interior (04) Chute/container – trash, rubbish, waste (46) Dumbwaiter or elevator shaft (51) Conduit, pipe, utility, or ventilation shaft (52) Light shaft (53) Chute; laundry or mail, excluding trash chutes (54) Duct: hvac, cable, exhaust, heating or AC (55) Conveyor (58) Awning (78) Transportation, Vehicle Area (80 – 86)

	Shipping/receiving area; loading area, dock or bay (45) Vehicle storage area; garage, carport (47) Service facilities, other (50) Display window (56) Service, Equipment Areas (60 – 67) Structural area, other (70) Substructure area or space, crawl space (71) Exterior balcony, unenclosed porch (72) Ceiling & floor assembly, crawl space between stories (73) Attic: vacant, crawl space above top story, cupola (74) Wall assembly (75) Wall surface: exterior (76) Roof surface: exterior (77) Other Area of Origin (90 – 98)		
Factors Contributing to Ignition	Factor contributing to ignition, other (00) No factor contributing to ignition (NN) Misuse of material or product, other (10) Abandoned or discarded materials or products (11) Heat source too close to combustibles (12) Cutting, welding too close to combustible (13) Improper container or storage (18) Playing with heat source (19) Mechanical failure, malfunction, other (20) Automatic Control Failure (21) Manual control failure (22) Leak or break (23) Worn out (25) Backfire (26) Improper fuel used (27) Electrical failure, malfunction, other (30) Water caused short-circuit arc (31) Short circuit arc from mechanical damage (32) Short circuit arc from defective, worn insulation (33) Unspecified short-circuit arc (34) Arc from faulty contact, broken conductor (35)	Flammable liquid or gas spilled (14) Improper fueling technique (15) Flammable liquid used to kindle fire (16) Washing part, painting with flammable liquid (17) Natural condition, other (60) High wind (61) Storm (62) High water including floods (63) Earthquake (64) Volcanic action (65) Exposure fire (71) Rekindle (72)	

	<p>Arc, spark from operating equipment (36) Fluorescent light ballast (37) Installation Deficiency (40 – 44)</p> <p>Operational deficiency, other (50) Collision, knock down, run over, turn over (51) Accidentally turned on, not turned off (52) Equipment unattended (53) Equipment overloaded (54) Failure to clean (55) Improper startup (56) Equipment used for not intended purpose (57) Equipment not being operated properly (58) Animal (66) Fire spread or control, other (70) Outside/open fire for debris or waste disposal (73) Outside/open fire for warming or cooking (74) Agriculture or land management (75)</p>		
Equipment Involved in Ignition	<p>Other equipment (000) No equipment (NNN) HVAC (100 – 152) Electric Distribution, Lighting, & Power Transfer (200 – 263) (except for 228 – Battery charger) Power tools, other (310) Power saw (311) Power lathe (312) Power shaper, router, jointer, planer (313) Power cutting tool (314) Power drill, screwdriver (315) Power sander, grinder, buffer, polisher (316) Power hammer, including jackhammers (317) Power nail gun, stud driver, stapler (318) Paint dipper (321) Paint flow coating machine (322) Paint mixing machine (323) Paint sprayer (324) Welding torch (331) Cutting torch (332) Hydraulic equipment, other (340)</p>	<p>Battery charger, rectifier (228) Shop or industrial equipment, other (300) Painting tools, other (320) Coating machine, including asphalt saturating (325) Burners (333) Soldering equipment (334) Atomizing equipment (343) Hoist, lift (346) Heat treating equipment (351) Incinerator (352) Industrial furnace, kiln (353) Tarpot, tar kettle (354) Casting, molding, forging equipment (355) Distilling equipment (356) Digester, reactor (357) Extractor, waste recovery machine (358) Conveyor (361) Power transfer equipment: ropes, cables, blocks (362) Power take-off (363) Powered valves (364) Bearing or brake (365) Printing press (376) Car washing equipment (377) Studio type TV camera (424)</p>	

	<p>Air compressor (341) Gas compressor (342) Atomizing equipment (343) Pump (344)</p> <p>Wet/dry vacuum (shop vacuum) (345) Powered jacking equipment (347) Drilling machinery or equipment (348) Picking, carding, weaving machine (371) Testing equipment (372) Gas regulator (373) Motor – separate (374) Internal combustion engine (non-vehicular) (375) Commercial or medical equipment, other (400) Dental, medical, or other powered bed or chair (411) Dental equipment, other (412) Dialysis equipment (413) Medical imaging equipment (414) Medical monitoring equipment (415) Oxygen administration equipment (416) Radiological equipment, X-ray, radiation therapy (417) Sterilizer: medical (418) Therapeutic equipment (419) Transmitter (421) Telephone switching gear, including PBX (422) TV monitor array (423) Vending machine (443) Kitchen & Cooking Equipment (600 – 656) (except for 653 – Garbage disposer) Electronic and Other Electrical Equipment (700 – 757) (except for 723 – Cash register and 727 – Postage, shipping meter equipment) Personal & Household Equipment (800 – 897) (except for 861 – Automatic door opener, 872 – Charcoal Lighter, and 873 – Cigarette lighter, pipe lighter</p>	<p>Studio type sound recording/modulating equipment (425) Radar equipment (426) Amusement ride equipment (431) Ski lift (432) Elevator or lift (433) Escalator (434) Microfilm, microfiche viewing equipment (441) Photo processing equipment (442) Vending machine (443) Non video arcade game (444) Water fountain, water cooler (445) Telescope (446)</p>	
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Table 2.3
Mattress and Bedding Fire Edits to Define Addressability When Heat Source =
Out-of-Scope Heat Sources

Variable	Mattress/Bedding - Addressable (In-scope)	Mattress/Bedding – Not Addressable (Out-of-Scope)	Not Mattress/Bedding
Type of Material First Ignited		Other type of material ignited (00) Plastic (41) Natural product, other (50) Rubber, excluding synthetic rubbers (51) Leather (53) Grain, natural fiber, (preprocess) (55) Fabric, textile, fur, other (70) Fabric, fiber, cotton, blends, rayon, wool (71) Fur, silk, other fabric (74) Plastic coated fabric (77)	Flammable Gas (10 – 15) Flammable, Combustible Liquid (20 – 27) Volatile Solid or Chemical (30 – 38) Cork (52) Hay, straw (54) Coal, coke, briquettes, peat (56) Food, starch, excluding fat and grease (57) Tobacco (58) Wood or Paper - Processed (60 – 68) Wig (75) Human hair (76) Material compounded with oil, other (80) Linoleum (81) Oilcloth (82) Asphalt treated material (86) Multiple types of material first ignited (99)
Area of Origin		Area of origin, other (00) Corridor, mall (01) Exterior stairway, ramp, or fire escape (02) Interior stairway or ramp (03) Entrance way, lobby (05) Egress/exit, other (09) Assembly, Sales Areas (Groups or People) (10 – 17) Function Area (20 – 28) Technical Processing Areas (30 – 38) Storage area, other (40) Storage room, area, tank, or bin (41) Closet (42) Storage: supplies or tools; dead storage (43) Records storage room, storage vault (44) Shipping/receiving area; loading area, dock or bay (45) Vehicle storage area; garage, carport (47) Service facilities, other (50)	Escalator, exterior, interior (04) Chute/container – trash, rubbish, waste (46) Dumbwaiter or elevator shaft (51) Conduit, pipe, utility, or ventilation shaft (52) Light shaft (53) Chute; laundry or mail, excluding trash chutes (54) Duct: hvac, cable, exhaust, heating or AC (55) Conveyor (58) Awning (78) Transportation, Vehicle Area (80 – 86)

		Display window (56) Service, Equipment Areas (60 – 67) Structural area, other (70) Substructure area or space, crawl space (71) Exterior balcony, unenclosed porch (72) Ceiling & floor assembly, crawl space between stories (73) Attic: vacant, crawl space above top story, cupola (74) Wall assembly (75) Wall surface: exterior (76) Roof surface: exterior (77) Other Area of Origin (90 – 98)	
Factors Contributing to Ignition		All codes	
Equipment Involved in Ignition		All codes	

TAB C: Memorandum from L. Scott “Staff Response to Comments Received in Response to *Federal Register* Notice ‘Regulatory Flexibility Act Section 610 Review of the Standard for the Flammability (Open Flame) of Mattress Sets,’” August 31, 2016



UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
BETHESDA, MD 20814

Memorandum

Date: August 31, 2016

TO: Lisa L. Scott, Project Manager, Rule Review of 16 CFR Part 1633
Directorate for Laboratory Sciences

THROUGH: Andrew G. Stadnik, P.E., Associate Executive Director
Directorate for Laboratory Sciences

Allyson Tenney, Director
Division of Engineering

FROM: Lisa L. Scott, Fire Protection Engineer
Directorate for Laboratory Sciences

SUBJECT: Staff Response to Comments Received in Response to *Federal Register* Notice
"Regulatory Flexibility Act Section 610 Review of the Standard for the
Flammability (Open Flame) of Mattress Sets"

In April 2015, the CPSC published a *Federal Register* notice²⁰ soliciting comments from the public about stakeholders' experiences with different aspects of the Mattress Standard. The CPSC received 16 written comments²¹ representing the views of mattress manufacturers, component manufacturers, fire safety representatives, third party testing bodies, environmental groups, and independent consumers. The following is a summary of the comments received at the conclusion of the 60-day comment period.

Safety and Effectiveness

1. *Do you believe that mattresses that comply with the Mattress Standard provide adequate safety from fires that may involve a mattress? Are there additional requirements or protections that could reduce the number of deaths and injuries resulting from mattress fires?*

Comment: Of the comments received, the consensus was overwhelmingly favorable regarding the safety and effectiveness of the Mattress Standard. Twelve parties express support for the standard. Only one commenter (Mesner) states that the rule should be rescinded. The commenter,

²⁰ "Regulatory Flexibility Act Section 610 Review of the Standard for the Flammability (Open Flame) of Mattress Sets," (80 *Federal Register* 18218; April 3, 2015).

²¹ The comments can be found at: <https://www.regulations.gov/docket?D=CPSC-2006-0011>.

a mattress manufacturer, cites unconfirmed statistics that “fewer than a dozen people a year perish in [mattress] fires” to assert that the rule is costly and unnecessary.

Response: The most recent fire death statistics available estimate that there were 63 deaths from open-flame ignition of mattresses in 2013. Staff believes the Mattress Standard is both effective and necessary. The cost/benefit analysis in the 2006 Briefing Package determined that the rule was both practicable and cost effective. The economic analysis conducted for this rule review reaffirmed the cost estimates of complying with the Mattress Standard.

Comment: One commenter (UL) questions the effectiveness of an ignited compliant mattress with bedclothes to allow for adequate egress time. The commenter suggests that more research is needed to explore this question about the variety of bedclothes in the market and the flammability profile of adjacent materials and furnishings.

Response: The ignition source requirements of the Mattress Standard were based on a localized heat flux from burning bedclothes. The hazard scenario identified during the development of the Mattress Standard included burning bedclothes as an ignition source for mattresses and mattress sets. This scenario was included in the hazard assessment during the promulgation of the Mattress Standard.

2. *Do any aspects of the Mattress Standard need to be updated to improve effectiveness as a result of technological developments since the standard went into effect?*

Several commenters suggest technical and/or recordkeeping modifications as possible ways to reduce the costs associated with complying with the Mattress Standard. These are addressed in response to question number 11 below.

Costs and Impacts

3. *Are there any requirements of the Mattress Standard that are especially or unnecessarily costly and/or burdensome? Which ones? How might the Mattress Standard requirements be modified to reduce the costs or burdens on the industry without reducing the fire safety provided by the Mattress Standard?*

Four commenters specifically address the costs associated with complying with the Mattress Standard.

Comment: Two commenters (INDA and Tintoria Piana) assert the material costs for fire-blocking barrier fabrics (a common method for manufacturing mattresses that comply with the Mattress Standard) are not burdensome. INDA says fire-blocking barrier fabrics are available at multiple price points. The market demand and improved performance of the raw materials have both contributed to reduced costs compared to when the Mattress Standard went into effect. Both commenters estimate these costs are approximately half of what they were during early production years.

Response: Staff agrees. The Directorate for Economics (Tab A) determined that the cost of compliance with the mattress standard was estimated to be between \$8.66 and \$25.95 (in 2013 dollars) per mattress in the final regulatory flexibility analysis in 2006 and that the observed changes in current real wholesale prices do not show that CPSC substantially underestimated the cost of compliance with the standard.

Comment: One commenter (ISPA) requests that the conditioning period be reduced from 48 hours to 24 hours prior to testing. The commenter asserts the burden of manufacturer's personnel waiting at a test site for two days prior to testing could be reduced without impacting the performance of the mattresses in the test process. ISPA cites other consumer product standards that require only 24 hours of sample conditioning prior to testing.

Response: Staff disagrees. Many of the test methods cited as examples with shorter conditioning requirements are not applicable. Some are component or composite test methods with tests for materials that are thinner than a typical full scale mattress product. The temperature and humidity profiles of these thinner materials will stabilize more quickly than a complete mattress or foundation, thus enabling shorter conditioning times.²² Reducing the conditioning requirement could introduce variability to the test results. Other test methods cited in this comment are mechanical durability test methods that do not address flammability of the materials.

4. *Do you believe that any of the requirements in the Mattress Standard lead to a disproportionate burden on small entities? If so, which requirements lead to a disproportionate burden, and how? How might CPSC modify the Mattress Standard requirements to reduce the burden on small businesses or the industry without reducing the fire safety provided by the Mattress Standard?*

Two commenters responded directly on the burden specific to small entities.

Comment: Tintoria Piana does not believe there is a disproportionate burden on any entity now that the initial compliance work has been done after the Mattress Standard was first issued. The company states this is “the least burdensome requirement that would prevent or adequately reduce the risk of injury for which the regulation was promulgated.”

ISPA states that the prototype development process has the greatest potential to impose disproportionate burdens on small entities. However, ISPA further notes that the Mattress Standard provision for pooled prototypes “substantially reduced the new product development, testing, and recordkeeping costs that [small entities] ordinarily would have incurred themselves.”

Response: Staff agrees. Provisions to reduce the burden on small entities were considered during the development of the Mattress Standard. These comments affirm that the prototype pooling

²² Further analysis of the effect of humidity can be found in Ohlemiller, T. J., (2005). Effect of Laboratory Humidity on the Fire Test Performance of a Mattress; study for the U.S. Consumer Product Safety Commission. Gaithersburg, MD: National Institute of Standards and Technology.

provisions are effective at minimizing the burden, while still providing for improved flammability performance of mattresses and mattress sets.

Comment: ISPA states the additional costs required to comply with 16 C.F.R. part 1632 (Cigarette Ignition Standard) are potentially disproportionate on small entities.

Response: Staff will consider comments pertaining to the Cigarette Ignition Standard Advanced Notice of Proposed Rulemaking (ANPR) as directed by the Commission.²³

However, the Office of Compliance issued an Interim Enforcement Policy for Mattresses Subject to C.F.R. Parts 1632 and 1633 dated May 2006.²⁴ The CPSC Office of Compliance is exercising enforcement discretion to reduce the amount of testing required by the Cigarette Ignition Standard. The published guidance permits manufacturers to reduce testing from six mattress surfaces to two mattress surfaces for mattress prototypes created to comply with the Mattress Standard as part of the requirements for part 1633.

5. *What percent of the time and cost of mattress construction, including testing, does complying with the Mattress Standard represent? Do these percentages vary significantly depending on the type of mattress, geographical location, size of firm, or other factors? Which requirements in the Mattress Standard have the greatest impact on cost of production? The lowest impact on cost of production? Explain your response and provide supporting data, if possible.*

Comment: One commenter (ISPA) shares two specific comments in response to this question. Anecdotal reports from ISPA members indicate that there is little geographic effect on a manufacturer's ability to comply with the Mattress Standard. However, the commenter suggests that the cost of complying with the Mattress Standard is necessarily greater for smaller manufacturers because the costs are distributed over a smaller number of units produced than for a larger manufacturer.

Response: Staff agrees with both comments. CPSC staff addresses the cost burden on small entities in Tab A.

6. *Do manufacturers rely on information from suppliers or conduct their own testing when selecting and/or substituting (1) ticking materials, (2) component materials, (3) fire resistant materials, and/or (4) fire-blocking barrier materials? How does this impact decisions regarding prototyping (qualified or subordinate prototypes) of mattresses? How does material supply variability affect a manufacturer's*

²³ Advanced Notice of Proposed Rulemaking; Possible Revocation or Amendment of Standard for the Flammability of Mattresses and Mattress Pads (Cigarette Ignition) (70 *Federal Register* 36357; June 23, 2005).

²⁴ Interim Enforcement Policy for Mattresses Subject to 16 C.F.R. Parts 1632 and 1633, May 15, 2006, https://www.cpsc.gov/s3fs-public/pdfs/blk_media_InterimMattress.pdf

ability to consistently comply with the technical and recordkeeping requirements of the Mattress Standard?

Comment: The comments regarding component material supplies generally point to a cooperative effort between the material suppliers and the mattress manufacturers. INDA states its member companies work with manufacturers to meet their cost and performance requirements. Tintoria Piana suggests a cost distribution determined by the maturity of the product: Costs associated with the development of a new fire-blocking barrier product are borne by the supplier, while a manufacturer developing a new design will bear the costs associated with testing their new product. UL offers third party testing and certification of mattress components for use in mattress assemblies.

Response: These comments affirm CPSC staff's understanding of the shared responsibilities and distribution of costs across the industry for complying with the Mattress Standard

7. *Are the labeling and recordkeeping requirements in the Mattress Standard adequate, inadequate, or overly burdensome to meet the requirements of the standard?*

Comment: One commenter states that the commenter believes the labeling and record keeping requirements are adequate.

Response: Staff agrees.

Comment: One commenter (ISPA) believes that the recordkeeping requirements of the Mattress Standard could be less costly if they were combined with comparable provisions in 16 CFR part 1632 (the Cigarette Ignition Standard) or if the two standards were merged into one unified mattress standard. ISPA has previously requested that CPSC rescind part 1632.

Response: Staff will consider comments pertaining to the Cigarette Ignition Standard, including recordkeeping burdens of that standard when staff develops the next step for the ANPR.²⁵

8. *Please explain what materials are used by firms to meet the requirements of the standard and how do the various materials, or combinations of materials, compare in terms of cost?*

Comment: Three commenters state that a significant number of mattress manufacturers use fire-blocking barrier materials that are carefully selected to match the fuel load and price point of the mattress. The commenters estimate the cost for fire-blocking barrier materials to be between \$7.50 and \$20 per mattress set.

²⁵ Advanced Notice of Proposed Rulemaking; Possible Revocation or Amendment of Standard for the Flammability of Mattresses and Mattress Pads (Cigarette Ignition) (70 *Federal Register* 36357; June 23, 2005).

Comment: Five commenters noted that natural fibers intrinsically perform well when subjected to an open flame ignition. Likewise, natural latex foam also performs well to meet the performance requirements of the Mattress Standard. The commenters do not provide any cost information for these materials.

Response: Staff appreciates the additional insights provided by these commenters.

Clarity and Duplication

9. *Is there any aspect of the Mattress Standard that is unclear, needlessly complex, or duplicative? Do any portions of the standard overlap, duplicate, or conflict with other federal, state or local government rules? Most notably, do any portions of this standard overlap, duplicate, or conflict with CPSC's "Standard for the Flammability of Mattresses and Mattress Pads," as set forth at 16 C.F.R. part 1632? What benefits, if any, would CPSC, the regulated community, or other stakeholders gain from reviewing the interactions between that standard and the Mattress Standard along with the Mattress Standard's independent operation?*

Comments: Ten commenters have concerns related to 16 C.F.R. part 1632 (Cigarette Ignition Standard). Five of these commenters state that mattresses made with natural fibers intrinsically perform well when subjected to the open flame ignition source in the Mattress Standard. They contend that manufacturers should not be required to chemically treat their natural materials to comply with the Cigarette Ignition Standard. They assert the open flame Mattress Standard addresses the more severe fire threat and that complying with the Mattress Standard provides adequate safety.

Further, three additional commenters state that the Cigarette Ignition Standard does not provide additional safety for any type of mattress and should, therefore, be revoked or at least studied with the intent of revocation. (Tintoria, Anooshah, Morgan)

One commenter (ISPA) has previously requested that the Cigarette Ignition Standard be rescinded. ISPA cites additional costs, negligible safety improvements and increased testing risks (safety and environmental) associated with the Cigarette Ignition Standard. Alternatively, if the Cigarette Ignition Standard is not revoked, ISPA offers suggestions to make the Cigarette Ignition Standard more workable and less costly for manufacturers.

One commenter (UL) believes there is merit in evaluating the performance of mattresses to both smoldering and open flame ignition sources and advocates keeping the Cigarette Ignition Standard as an active standard.

Response: CPSC staff considers these comments as general support that the Mattress Standard addresses the risks associated with open flame ignition of mattresses and mattress sets. The comments requesting changes all focus on changes to or elimination of the Cigarette Ignition

Standard. Staff will consider comments pertaining to the Cigarette Ignition Standard when staff develops the next step for the ANPR.²⁶

10. Do other government entities, including other countries, have alternative fire safety standards? If so, how do they differ from CPSC's approach? Are these alternative approaches more effective? Please provide a copy of the alternative fire safety standard(s) or a citation to the standard(s).

Comment: One commenter notes that California had a mattress flammability regulation prior to the CPSC Mattress Standard. That standard, California Technical Bulletin 603 (TB 603), had a similar procedure but less severe performance requirement. The commenter notes the added cost of complying with the more restrictive Mattress Standard. The same commenter also notes that another California standard recently exempted crib mattresses from its scope and questions whether there should be different performance requirements for crib mattresses. It is unclear if the commenter advocates more or less severe requirements for crib mattresses.

Response: When the Mattress Standard went into effect in July 2007, California repealed TB 603 to defer to CPSC's Mattress Standard requirements. Both the CPSC Mattress Standard and the California TB 603 standard relied on research from the National Institute of Standards and Technology as the basis for their test methods. Staff considered other criteria during the development of the Mattress Standard, including TB 603. The criteria set forth in the Mattress Standard were specified to effectively and feasibly reduce the associated risks.

Comment: Both UL and ISPA cite alternative fire safety standards without commenting on their potential effectiveness for residential mattress flammability. UL cites several standards for testing mattresses used in public occupancies such as correctional facilities, dormitories, and hotels. ISPA cites several standards for maritime and transportation applications specifically excluded from the Mattress Standard. ISPA concludes that the narrow focus of the alternative methods cited means they have no relevance to the Mattress Standard.

Response: Staff agrees with ISPA. The other mattress fire safety standards cited apply to specific mattress applications, such as maritime, correctional, or motor vehicle applications, that are not within CPSC's jurisdiction. Many of the methods cited are similar in complexity to the Mattress Standard, but with different performance requirements.

11. Can any of the technical aspects of the Mattress Standard be expanded or clarified without reducing the fire safety provided by the standard? For example, should the measurement requirements in the standard be defined more clearly, such as uncertainty values associated with dimensions, flow, temperature/humidity, energy value, or other values?

²⁶ Advanced Notice of Proposed Rulemaking; Possible Revocation or Amendment of Standard for the Flammability of Mattresses and Mattress Pads (Cigarette Ignition) (70 *Federal Register* 36357; June 23, 2005).

Comment: One commenter (UL) suggests referencing ASTM E2067 “Standard Practice for Full-Scale Oxygen Consumption Calorimetry Fire Tests” to provide guidance on calorimetry measurement techniques. UL is concerned that the many variables required for accurate calorimetry measurements could be sensitive to different laboratory equipment and practices. UL is concerned these differences could lead to different test results among laboratories ASTM E2067 could provide guidance for laboratories to minimize some of the potential variables.

Response: Staff will consider providing additional references or guidance materials for industry testing laboratories. These could include references to the voluntary standards and clarification on instrumentation, procedures and calculations in either the Mattress Standard or in the CPSC Laboratory Test Manual²⁷ or additional guidance from the Office of Compliance.

Staff agrees there is merit in offering this type of guidance. However, staff believes the potential for “drastically different results” is overstated. Before the publication of the Mattress Standard in 2006, an inter-laboratory study was conducted. The data did show differences in the test results reported by the participating laboratories. However, the study suggested that, when the test procedures are correctly followed, it is the combined characteristics and resulting behavior of the mattress components chosen, mattress design, and consistency of the manufacturing processes that determines the test outcome. It is expected that as these processes have improved since the publication of the Mattress Standard, the consistency has also improved.

Outreach and Advocacy

12. Are CPSC's requirements in the Mattress Standard known to firms that manufacture new mattresses or renovate mattresses for sale, or import mattresses into the United States, including small firms and firms that build mattresses or import mattresses infrequently or in small lots? How could the requirements of the standard be more effectively communicated to such firms?

Comments: Four commenters claim that mattress manufacturers and retailers are well aware of the requirements of the Mattress Standard. Two commenters note that there is somewhat less compliance among renovators. One commenter (ISPA) suggested more coordination with state regulatory authorities that enforce bedding sanitation laws may be a way to educate and improve compliance within this segment.

Regarding imported mattresses, one commenter (Tintoria) states that there is widespread awareness and compliance within the import market. Another (ISPA) expresses a concern that many mattresses are imported without a foundation, but are then sold with a foundation at retail, calling into question the compliance of the mattress/foundation sets.

Response: Staff considers widespread industry awareness and compliance as overall validation of CPSC staff’s education efforts during the promulgation of the Mattress Standard. When the

²⁷ Laboratory Test Manual for 16 CFR Part 1633: Standard for the Flammability (Open Flame) of Mattress Sets, January 2011. <http://www.cpsc.gov/PageFiles/117388/labmanual.pdf>

Mattress Standard was first published, staff conducted a series of informational sessions to address industry concerns. The testing bodies that manufacturers use to conduct testing were all trained by CPSC staff to conduct the test, and they were visited by CPSC staff when the Mattress Standard was published in 2006. The CPSC Laboratory Test Manual²⁸ was published in 2011 to clarify the test procedure for test laboratories. Staff maintains a dedicated page on CPSC.gov for Mattress Flammability Information²⁹ and an email listserv³⁰ that interested parties may elect to join for periodic updates from CPSC.

CPSC staff sees a continued need for outreach to the industry to maintain awareness and compliance with the Mattress Standard. The segments of the industry with perceived lower compliance rates, and the industry as a whole, could benefit from renewed and updated outreach and educational support in the form of workshops, training, and other guidance.

13. If mattresses fail to comply with the Mattress Standard, is noncompliance more commonly the result of: (1) the manufacturer's lack of information (e.g., about the scope of the standard or the safety requirements); (2) manufacturing processes and techniques; (3) methods of assembly; (4) component selection and availability; (5) cost considerations; or (6) other factors? What can CPSC do to assist manufacturers with meeting the requirements of the standard? Please explain.

Comments: Three commenters all state that improper component selection and component variability is a primary reason for noncompliance. Additionally, manufacturing processes and assembly techniques are cited as other reasons for noncompliance. UL notes that other industries have benefitted from third party certification or quality assurance programs.

Response: The Mattress Standard is a mandatory federal performance standard. All products within the scope of the Mattress Standard need to comply with the requirements. CPSC staff will consider ways to improve awareness and encourage compliance in these segments of the industry.

Other comments:

Comment: Several commenters note that the Mattress Standard has spurred growth and innovation in different sectors within the mattress industry and imply that revoking or softening the requirements of the Mattress Standard would have a negative impact on those segments that have grown in response to the standard.

²⁸ Laboratory Test Manual for 16 CFR Part 1633: Standard for the Flammability (Open Flame) of Mattress Sets, January 2011. <http://www.cpsc.gov/PageFiles/117388/labmanual.pdf>

²⁹ <http://www.cpsc.gov/en/Business--Manufacturing/Business-Education/Business-Guidance/Mattresses/>

³⁰ <http://www.cpsc.gov/Newsroom/Subscribe/>

Response: Staff appreciates these comments and will consider them as further support that the Mattress Standard should be maintained.

Comment: Several commenters express concern about the lack of available mattresses that are manufactured without flame retardant (FR) chemicals. Several of these commenters cite the natural fire resistance of natural fibers but that the smoldering performance of these fibers often requires chemical treatment to comply with the Cigarette Ignition Standard. Others cite the application of FR chemicals being a concern without making a distinction between the open flame performance and the smoldering performance of the product.

Response: Both the Mattress Standard and the Cigarette Ignition Standard are performance-based standards and do not specify the use of specific components or methods to comply with the standards. CPSC staff is aware of many compliant models and prototypes of mattresses in the market that do not use any FR chemicals. There are also commercially available FR-treated barriers that can be used to meet both standards. Staff assessed these FR-treated barriers in the “Quantitative assessment of potential health effects from the use of fire retardant (FR) chemicals in mattresses,” in Tab D of the 2006 briefing package for the Mattress Standard.³¹ CPSC staff concluded that these commercially available FR-treated barriers can be used to meet the Mattress Standard, and they are not expected to pose any appreciable risk of health effects to consumers who sleep on mattresses using them.

³¹ Thomas and Brundage. Quantitative assessment of potential health effects from the use of flame retardant (FR) chemicals in mattresses. Briefing Package. Final Rule for the Flammability (Open Flame) of Mattress Sets. Tab D. 2006. <http://www.cpsc.gov/PageFiles/88208/matttabd.pdf>