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Consumer Product Safety Commission

16 CFR Part 1634

Standard for the Flammability of Residential Upholstered Furniture; Proposed Rule

CONSUMER PRODUCT SAFETY COMMISSION

16 CFR Part 1634

Standard for the Flammability of Residential Upholstered Furniture

AGENCY: Consumer Product Safety Commission.

ACTION: Notice of proposed rulemaking.

SUMMARY: The United States Consumer Product Safety Commission (''Commission'' or ''CPSC'') is proposing flammability standards for residential upholstered furniture under the Flammable Fabrics Act (''FFA''). The proposal would establish performance requirements and certification and labeling requirements for upholstered furniture. Manufacturers of upholstered furniture would choose one of two possible methods of compliance: They could use cover materials that are sufficiently smolder resistant to meet a cigarette ignition performance test; or they could place fire barriers that meet smoldering and open flame resistance tests between the cover fabric and interior filling materials. Manufacturers of upholstered furniture would be required to certify compliance with the standard and to comply with certain recordkeeping requirements as specified in the proposal.

DATES: Comments in response to this document must be received by the Commission not later than May 19, 2008.

Comments on elements of the proposed rule that, if issued in final form would constitute collection of information requirements under the Paperwork Reduction Act, may be filed with the Office of Management and Budget (''OMB'') and with the Commission. Comments will be received by OMB until May 5, 2008.

ADDRESSES: Comments should be filed by e-mail to *cpsc-os@cpsc.gov.* Comments also may be filed by telefacsimile to (301) 504–0127 or mailed, preferably in five copies, to the Office of the Secretary, Consumer Product Safety Commission, 4330 East West Highway, Bethesda, MD 20814, or delivered to the Office of the Secretary, Consumer Product Safety Commission, Room 502, 4330 East-West Highway, Bethesda, Maryland; telephone (301) 504–7530. Comments should be captioned ''Upholstered Furniture NPR.''

Comments to OMB should be directed to the Desk Officer for the Consumer Product Safety Commission, Office of Information and Regulatory Affairs, OMB, Washington, DC 20503. The Commission asks commenters to provide copies of such comments to the Commission's Office of the Secretary, with a caption or cover letter identifying the materials as comments submitted to OMB on the proposed collection of information requirements for the proposed upholstered furniture flammability standard.

The public may also request an opportunity to present comments orally. Such requests should be submitted to the Office of the Secretary of the Commission by e-mail, mail, fax or in person at the addresses or phone numbers listed above for the CPSC.

FOR FURTHER INFORMATION CONTACT: Dale R. Ray, Project Manager, Directorate for Economic Analysis, Consumer Product Safety Commission, 4330 East West Highway, Bethesda, MD 20814; telephone (301) 504–7704.

SUPPLEMENTARY INFORMATION:

A. Background

Regulatory/technical activity. In 1993 the National Association of State Fire Marshals (''NASFM'') petitioned the Commission to issue regulations under the FFA addressing upholstered furniture fire risks. NASFM requested that the Commission adopt three existing state of California standards.

The Commission granted the petition in part, and issued an advance notice of proposed rulemaking (''ANPR'') on June 15, 1994 on the specific risk of small open flame-ignited fires. 59 FR 30,735 (1994). The Commission denied the petition with respect to large open flame-ignited fires, and deferred action on the petition with respect to cigarette-ignited fires pending a CPSC staff evaluation of: (1) The level of voluntary conformance to existing voluntary industry guidelines, and (2) the overall level of cigarette ignition resistance among products on the market.

Following issuance of the 1994 ANPR, CPSC staff developed a draft performance standard and a test method to evaluate the small open flame performance of upholstered furniture. In October 1997, the staff forwarded a briefing package to the Commission concluding that a small open flame standard was feasible and could effectively reduce the risk to consumers, including both small open flame and cigarette ignitions. The staff recommended that the Commission defer action until the agency could gather additional scientific information to ensure that flame retardant (''FR'') upholstery fabric treatments that manufacturers might use would not result in adverse health effects. The staff recommended that the Commission defer action on the cigarette ignition portion of the 1993 NASFM petition pending a decision on open flame ignition. On October 5, 2001, NASFM withdrew the portion of the petition seeking Commission action with respect to cigarette-ignited fires.

In July of 2003 the CPSC staff recommended that the Commission issue an ANPR to expand the upholstered furniture proceeding to address ignition of upholstered furniture by both small open flames and by smoldering cigarettes. The Commission accepted the staff's recommendation, and the ANPR was published on October 23, 2003. 68 FR 60,619. The 2003 ANPR sought comment on issues relating to the kinds of standard provisions that might best address the upholstered furniture fire risk in its entirety.

The Commission received 13 written comments during the 60-day formal comment period following publication of the ANPR. Interested parties subsequently provided additional written submissions in the form of letters, position statements or presentations of technical data at meetings. A detailed discussion of significant comments received is provided in Section G of this preamble. In October 2004, the staff held a public meeting to present the direction of what would become the staff's 2005 draft standard. The staff analyzed comments received at that meeting as well. The proposed standard takes account of that analysis. Staff received comments on its 2005 draft standard, continued its research and analysis and developed a revised, 2007 draft proposal that focused primarily on preventing smoldering ignitions and reducing the need for flame retardant chemicals.[1] This notice presents the 2007 draft as the Commission's proposed standard.[2]

Overview of the proposed standard. The proposed standard establishes two possible approaches. Upholstered furniture can meet the proposed standard by having either (1) upholstery cover material that complies with the prescribed smoldering ignition

[1] The Commission staff briefing package discussing this proposal, Briefing Package: Regulatory Alternatives for Upholstered Furniture Flammability, November 2007, (the ''Staff Briefing Package'') is available on the Internet at: *http://www.cpsc.gov/library/foia/foia08/brief/briefing.html*. Copies may also be requested from the Commission's Office of the Secretary at the address shown above.

[2] Acting Chairman Nancy Nord and Commissioner Thomas H. Moore issued statements which are available from the Commission's Office of the Secretary (see **ADDRESSES** section of this notice) or from the Commission's Web site, *http://www.cpsc.gov/pr/statements.html*.

resistance test (referred to as ''Type I'' furniture) or (2) an interior fire barrier that complies with specified smoldering and small open flame ignition resistance tests (''Type II'' furniture). No requirements are prescribed for filling materials. The standard would become effective one year after issued in final form and would apply to upholstered furniture manufactured or imported on or after that date.

The performance tests prescribed in the proposed standard are conducted with the tested material installed in mockups that simulate the intersection of the seating area of an item of upholstered furniture. In addition to the material under test, the mockup is assembled using standardized upholstery test materials as defined in the proposed standard.

Manufacturers (including importers) of upholstered furniture would be required to certify that the article of upholstered furniture complies with the proposed standard and to maintain records demonstrating compliance with the applicable portions of the proposed standard. Upholstered furniture subject to the proposed standard would be required to be labeled with information identifying the manufacturer, the date of manufacture, the item and type of furniture, and a statement certifying that the article complies with applicable requirements of the standard.

B. Statutory Authority

This proceeding is conducted pursuant to Section 4 of the Flammable Fabrics Act (''FFA''), which authorizes the Commission to initiate proceedings for a flammability standard when it finds that such a standard is ''needed to protect the public against unreasonable risk of the occurrence of fire leading to death or personal injury, or significant property damage.'' 15 U.S.C. 1193(a).

Section 4 also sets forth the process by which the Commission may issue a flammability standard. As required in section 4(g), the Commission has issued an ANPR. 68 FR 60629. 15 U.S.C. 1193(g). The Commission has reviewed the comments submitted in response to the ANPR and now is issuing a notice of proposed rulemaking (''NPR'') containing the text of the proposed rule along with alternatives the Commission has considered and a preliminary regulatory analysis. 15 U.S.C. 1193(i). The Commission will consider comments provided in response to the NPR and decide whether to issue a final rule along with a final regulatory analysis. *Id.* 1193(j). The FFA also requires that when issuing a standard or regulation the Commission must provide an opportunity for interested persons to present their views orally. *Id.* 1193(d).

The Commission cannot issue a final rule unless it makes certain findings and includes these in the regulation. The Commission must find: (1) If an applicable voluntary standard has been adopted and implemented, that compliance with the voluntary standard is not likely to adequately reduce the risk of injury, or compliance with the voluntary standard is not likely to be substantial; (2) that benefits expected from the regulation bear a reasonable relationship to its costs; and (3) that the regulation imposes the least burdensome alternative that would adequately reduce the risk of injury. 15 U.S.C. 1193(j)(2). In addition, the Commission must find that the standard (1) is needed to adequately protect the public against the risk of the occurrence of fire leading to death, injury or significant property damage, (2) is reasonable, technologically practicable, and appropriate, (3) is limited to fabrics, related materials or products which present unreasonable risks, and (4) is stated in objective terms. *Id.* 1193(b).

C. The Product

The proposed standard applies to residential upholstered furniture. The proposal specifically requires testing of cover fabrics and, alternatively, barrier materials if they are used as a means of complying with the proposed standard. Upholstered furniture is defined for purposes of the proposed standard to include articles of interior seating furnishing intended for indoor use in a home or other residential occupancy that: (1) Consist in whole or in part of resilient cushioning materials (such as foam, batting, or related materials) covered by fabric or related materials; and (2) are constructed with a contiguous upholstered seat and back or arms. Included within the definition are products that are intended or promoted for indoor residential use for sitting or reclining upon, such as: Chairs, sofas, motion furniture, sleep sofas, home office furniture customarily offered for sale through retailers or otherwise available for residential use, and upholstered furniture intended for use in dormitories or other residential occupancies. Items excluded from the definition are: Furniture, such as patio chairs, intended solely for outdoor use; furniture without contiguous upholstered seating and backs and/or arm surfaces, such as ottomans, pillows or pads that are not sold with the article of furniture; commercial or industrial furniture not offered for sale through retailers or not otherwise available for residential use; furniture intended or sold solely for use in hotels and other short-term lodging and hospitality establishments; futons, flip chairs, the mattress portions of sleep sofas, and non-furniture infant or juvenile products such as walkers, strollers, high chairs or pillows.

Commission staff estimates that the proposed standard would affect more than 1,600 manufacturers and importers of upholstered furniture and the 100–200 textile manufacturers that derive a significant share of their revenues from household furniture fabrics. The staff estimates that the average useful life of upholstered furniture ranges from 15 to 17 years. Assuming that the expected life of a piece of upholstered furniture is about 16 years, the average number of upholstered furniture items in household use during 2002–2004 was about 447 million pieces. Upholstered furniture products and manufacturers are discussed in greater detail in section H, *Preliminary Regulatory Analysis*, of this preamble.

The top four companies accounted for nearly 35 percent of the total value of household upholstered furniture shipments in 2002; the 50 largest companies accounted for about 67 percent. The industry also includes many small companies. The staff estimates that nearly all of the affected firms (over 97 percent) would be classified as small businesses under Small Business Administration guidelines. The staff's initial analysis of the potential impact of the proposed standard on such ''small entities'' is provided in section I., *Initial Regulatory Flexibility Analysis*, of this preamble.

As discussed in section D of this preamble, the majority of deaths and injuries resulting from fires involving upholstered furniture were started by smoldering ignition sources (such as cigarettes). The staff's test data show that furniture covered with predominantly cellulosic fabrics (such as cotton and rayon) is much more likely to be involved in cigarette-ignited fires than furniture covered with predominantly thermoplastic fabrics (such as polyester, polyolefin, and nylon). The proposed standard focuses primarily on reducing deaths and injuries from smoldering ignited fires. Staff estimates that about 14 percent of currently-produced furniture items are likely to fail the proposed standard's smoldering ignition test for cover fabrics. These would primarily be items constructed with certain predominantly cellulosic fabrics; staff believes most of these fabrics could be modified to meet the proposed standard. Staff anticipates that most manufacturers are likely to bring these furniture items into

compliance by modifying the physical characteristics of the cover fabrics rather than by using flame retardant (FR) fabric treatments. Alternatively, manufacturers would have the option to meet the proposed standard by using barrier materials that pass open flame and smoldering ignition tests rather than changing the cover fabric.

D. Risk of Injury

Annual estimates of national fires and fire losses involving ignition of upholstered furniture are based on data from the U.S. Fire Administration's National Fire Incident Reporting System (''NFIRS'') and the National Fire Protection Administration's (''NFPA'') annual survey of fire departments.

National fire loss estimates for 2002–2004 indicated that upholstered furniture was the first item to ignite in an average 7,800 residential fires attended by the fire service annually during that period. These fires resulted in an average of 540 deaths, 870 injuries and $250 million in property loss each year.

Of these fires, the staff considers an estimated 3,500 fires, 280 deaths, 500 injuries, and $112 million property loss annually to be addressable by the proposed standard. Addressable here means the incidents were of a type that would be affected by the proposed standard (i.e., a fire that ignited upholstered furniture and that had a smoking material or small open flame heat source). Approximately 90% of estimated deaths, 65% of estimated injuries and 59% of property damage resulted from ignition by smoking materials, almost always cigarettes. The remaining addressable fires were started by small open flame sources. Among the addressable casualties, smoking materials accounted for about 260 deaths and 320 injuries annually. Small open flame fires accounted for about 30 deaths and 170 injuries annually.[3]

E. Other Upholstered Furniture Flammability Standards

1. California Regulatory Activity

California Technical Bulletin 117 (''TB–117''), the mandatory regulation for all upholstered furniture sold in that state, contains both smoldering and small open flame resistance performance requirements. Complying upholstered furniture is generally similar to furniture sold in other states, except that California furniture is typically made with FR resilient foam filling materials. In early 2002, the California Bureau of Home Furnishings and Thermal Insulation (BHFTI) released a draft revision of TB–117. This draft revision contained upgraded performance requirements for small open flame ignition resistance of filling materials, and a cover material test similar to that developed by the Commission staff in its 2001 draft small open flame standard. The TB–117 smoldering resistance provisions were not changed.

The California BHFTI has not proposed amendments to TB–117 to incorporate the 2002 draft revision. The BHFTI's comment on the Commission's October 23, 2003 ANPR expressed support for a uniform national standard. BHFTI recommended that the Commission consider adopting appropriate elements of the 2002 draft revised TB–117 into a proposed Commission rule. The proposed standard contains some requirements similar to provisions of TB–117.

2. United Kingdom Regulations

The U.K. Department of Trade and Industry (''DTI'') enforces the U.K. Furniture and Furnishings (Flammability) Regulations, issued in 1990. These regulations contain smoldering and open flame resistance requirements for residential upholstered furniture based on test methods in British Standard BS 5852. The CPSC proposed standard's fire barrier open flame test uses the apparatus and ignition source from the U.K. regulations.

3. Voluntary Standards Activity

Since the Commission's original ANPR on upholstered furniture was published in 1994, industry groups have been encouraged to develop voluntary flammability requirements through a recognized standards organization. The Upholstered Furniture Action Council (''UFAC'') voluntary industry program of cigarette ignition tests developed in the 1970s is embodied in ASTM E–1353 and other voluntary test methods. Commission staff estimates voluntary UFAC conformance at about 90% of furniture production. The UFAC voluntary program does not address small open flame ignitions. Aspects of the UFAC cigarette ignition resistance test methods, California BHF Technical Bulletins (TB) 116, 117, and 133, and British Standard BS–5852 have been adopted by various consensus voluntary standards organizations and industry groups, including ASTM International, the International Standards Organization, the National Fire Protection Association and the Business and Institutional Furniture Manufacturers of America, and have also been incorporated into some state and local fire codes. Some industry groups have suggested that the Commission should adopt the UFAC program as a proposed rule. As discussed in section G.1 of this preamble, the Commission concludes that mandating the UFAC guidelines would have little effect on reducing deaths and injuries related to upholstered furniture fires.

F. The Proposed Standard

In developing the proposed flammability standard to address ignitions of residential upholstered furniture, the Commission considered the available hazard information, existing standards development research together with the latest CPSC laboratory data, and technical information developed by other organizations. Economic, health and environmental factors were also considered.

1. Scope

The proposed standard contains flammability performance requirements for most residential upholstered furniture. The proposed standard applies to:

- Residential seating products intended for indoor use and constructed with contiguous upholstered seats and backs, such as chairs and sofas (including motion furniture and sleep sofas);
- Some home office furniture sold through retailers or otherwise available for household use; and
- Upholstered furniture used in dormitories or other residential occupancies.

The proposed standard does not apply to:

- Outdoor furniture, such as patio chairs;
- Articles without contiguous upholstered seating surfaces, such as ottomans, decorative pillows or pads, and many office chairs and dining chairs;
- Commercial or industrial furniture not intended or sold for household use;
- Furniture intended or sold solely for use in hotels and other temporary lodging and hospitality establishments;
- Futons, flip chairs, and the mattress components of sleep sofas; and
- Non-furniture juvenile products such as walkers, strollers, high chairs and pillows.

2. General Requirements

The proposed standard addresses resistance to ignition and limited fire growth by means of performance tests for cover fabrics and, alternatively, for

[3] Numbers do not add up to totals due to rounding.

barriers. The principal performance requirements of the proposed standard are intended to reduce the risk of fire from smoldering ignition. If barriers are chosen as the means of compliance, they must meet both small open flame and smoldering resistance requirements. The proposal adapts elements and variations of existing standards, including California Technical Bulletin 117, ASTM E–1353 (tests from the UFAC voluntary industry guidelines) and United Kingdom regulations (based on British Standard BS–5852).

The upholstered furniture tests are conducted using seating mockups of fabric and filling materials. The goal is to reduce the smolder propensity of cover materials and limit the mass loss from combustion (smoldering, melting, or flaming) of the mockup's interior filling materials. Pass/fail criteria are based on maximum acceptable combustion time and mass loss percentages within a 45 minute test period.

3. Cover Fabric Smoldering Resistance Test

In this test, fabrics are tested in combination with a standard polyurethane foam substrate. A lighted cigarette is placed in the seat/back crevice of the mockup and is allowed to burn its entire length. The mockup must not continue to smolder at the end of the 45 minute test or transition to flaming at any time during the test, and the foam substrate must not exceed the mass loss limit of 10%. Ten initial specimens are tested. If the 10 initial specimens meet these criteria, the cover fabric sample passes. If there is a failure in any one of the 10 initial specimens, the test must be repeated on an additional 20 specimens. At least 25 of the 30 specimens must meet the criteria.

4. Interior Fire Barrier Smoldering Resistance Test

In this test, the barrier is placed between a standard foam substrate and a standard cotton velvet cover fabric. A lighted cigarette is placed in the seat/back crevice of the mockup. The foam substrate must not exceed 1% mass loss by the end of the 45 minute test, and the mockup must not transition to open flaming at any time during the test. Ten initial specimens are tested. If all 10 initial specimens meet these criteria, the barrier sample passes. If any one of the ten fails, an additional 20 specimens are tested, and at least 25 of the 30 must meet the criteria.

5. Interior Fire Barrier Open Flame Resistance Test

The proposed standard also contains provisions for the open flame resistance of barriers. In addition to providing protection from small flame ignition, the open flame performance test contributes to the protection of materials from the progression of smoldering to flaming combustion.

In this test, the barrier is placed between a standard rayon cover fabric and standard foam substrate on a metal test frame. An open flame ignition source is applied to the seat/back crevice of the mockup. The mockup must not exceed 20% mass loss by the end of the 45 minute test. Again, 10 initial samples are tested. If there is a failure with any of the 10 specimens, an additional 20 specimens are tested, and at least 25 of the 30 must meet the criteria for the sample barrier to pass.

6. Administrative Requirements

In addition to flammability performance requirements, the proposed standard contains provisions relating to certification and recordkeeping, testing to support guaranties, and labeling of finished articles of upholstered furniture. These requirements are intended to help manufacturers, importers and suppliers ensure that their products comply, and to help the CPSC staff enforce the proposed performance standard. These provisions are contained in Subpart B of the proposed standard.

Under § 8 of the FFA, 15 U.S.C. 1197, producers of finished articles of upholstered furniture, i.e., manufacturers and importers, may rely on guaranties of compliance issued by material suppliers to avoid criminal prosecution in certain instances. However, manufacturers and importers are ultimately responsible under the proposal for compliance of the upholstered furniture products they produce and introduce into commerce. It is unlawful under the FFA to provide a false guaranty. While there are no specific sampling or production testing requirements in the proposed standard, the FFA requires that any guaranties be supported by reasonable and representative tests sufficient to establish that production units of materials meet the applicable tests.

The proposed standard requires that each finished article of upholstered furniture carry a permanent label: (1) Containing a statement certifying that it complies with the standard, identifying the ''Type'' of furniture (i.e., Type I or Type II); (2) identifying the manufacturer or importer; and (3) specifying the location and month and year of manufacture and model and lot number or other identifier applicable to the item. This information would be required to be separate from other label information. The label would help retailers and consumers identify products in the event of a recall or other corrective action.

G. Response to Comments on the ANPR and Subsequent Submissions

The Commission received 13 written comments during the 60-day formal comment period following publication of the ANPR in October 2003. Since that time, interested parties provided about 20 additional written submissions in the form of letters, position statements or technical presentations at public meetings. Further, the staff held or attended several public meetings with stakeholders to discuss issues of interest.

Many of the public comments addressed similar issues. These issues generally involved: (a) The scope, test methods and acceptance criteria of a possible proposed rule; (b) the potential benefits and costs of various alternatives; and (c) the potential use of flame retardant (FR) chemicals to comply with those alternatives. Some of the comments dealt specifically with the staff's 2001 and 2005 draft standards, options that contained more open flame performance requirements for upholstery materials than the proposed rule. A few of the comments dealt with the staff's 2007 draft proposal, which became the agency's proposed standard. The Commission considered all of the comments received since 2003 in developing the proposed rule.

1. Scope and Test Methods

Comment. Several industry, government and fire safety organizations provided comments on the general scope of a standard, mainly with respect to cigarette versus open flame ignition performance.

Under the 2003 ANPR, the staff developed multiple draft standards containing both smoldering and open flame requirements. The proposed rule places primary emphasis on smoldering ignition resistance, as a substantial majority of upholstered furniture-related deaths, injuries and property losses result from smoldering fires. Several furniture industry groups commented that the fire risk associated with open flame ignition has become so small that regulation in that area is unnecessary. They also commented that the science of open flame ignition behavior is so complex that substantial further research would be needed to support

any reasonable conclusions about the effectiveness and technical adequacy of any performance requirements. In addition, they opposed open flame ignition requirements on the basis that compliance costs would be unreasonably high. These groups recommended that the Commission proceed with rulemaking on smoldering ignition only, and that CPSC adopt the performance tests in the ASTM/UFAC voluntary guidelines in the proposed rule.

Other stakeholders, including representatives of fire safety organizations, state government and chemical industry groups, recommended that a federal rule contain both smoldering and open flame requirements, and stated that solutions are technically and economically feasible. Some commenters opposed any course that would reduce the current level of safety provided by the existing California regulation, Technical Bulletin (TB) 117. Other industry groups supported adoption of a smoldering standard and eventual consideration of open flame requirements in the future. The California Bureau of Home Furnishings and Thermal Insulation (BHFTI) recommended that CPSC consider adopting elements of the draft revised TB–117 published by BHFTI in 2002.

In 2004, an industry ''coalition'' of furniture producers and material suppliers developed a set of performance requirements for Commission consideration. The coalition proposal included: a small open flame test for cover fabrics, based on a modification of the Commission's Standard for the Flammability of Clothing Textiles (16 CFR Part 1610); smoldering and open flame tests for filling materials, based on the 2002 draft revision of California TB–117; an open flame test for fibrous (non-foam) ''cushion wraps,'' based on an existing U.K. regulation provision; ASTM/UFAC smoldering tests for cushion wraps; and an unspecified barrier test to be developed by CPSC. The staff evaluated the industry coalition proposal and questioned the effectiveness of some of the performance elements. Coalition members withdrew support for their proposal in 2005 as the CPSC staff was continuing its evaluation and considering other alternatives.

Response. The Commission recognizes that estimated residential upholstered furniture fire losses have declined over time, and that relatively few losses—e.g., about 10% of the addressable deaths—are attributable to open flame-ignited fires. Thus, relatively few open flame deaths and injuries could be averted, even under highly effective open flame requirements. The Commission notes, however, that large numbers of deaths and injuries remain. Since a substantial majority of these losses result from cigarette-ignited fires, the Commission agrees that a rule with primary emphasis on smoldering can have substantial safety benefits. Based on CPSC's laboratory research, the Commission also agrees that the ASTM/UFAC test method provides a useful basis for a standard, but does not agree that the ASTM/UFAC tests as implemented in the UFAC voluntary program would adequately achieve those benefits. While UFAC has contributed to fire safety by encouraging the use of smolder-resistant materials, the program allows the use of smolder-prone cover fabrics with polyurethane foam, and allows highly smolder-prone fabrics in combination with more smolder-resistant materials (e.g., polyester batting) underneath. These conforming combinations are not always adequate to prevent fire growth from smoldering ignitions.

CPSC laboratory testing demonstrated that smolder-prone fabrics can defeat the inherent smolder resistance of polyester batting, and that furniture mockup assemblies with highly smolder-prone fabrics can transition from smoldering to flaming combustion over time. Further, some lower-priced furniture may use UFAC-conforming but smolder-prone fabrics without smolder resistant batting. In addition, the UFAC tests may not be adequate to characterize the smoldering behavior of all upholstery materials; for example, UFAC's vertical char length performance metric does not always reflect the downward burning that typically occurs in polyurethane foam fillings. Additionally, the ASTM/UFAC method employs a draft-limiting enclosure that was designed to improve test repeatability but artificially restricts burning of the most smolder-prone fabrics. The non-time-limited UFAC tests may also adversely affect the repeatability of the test results. The Commission concludes that adopting the ASTM/UFAC tests without significant modification would have little effect on currently-produced upholstered furniture, and would therefore probably have negligible safety benefits beyond those already achieved under the voluntary industry program. Thus, the proposed rule has smoldering ignition requirements that are somewhat different from, and more stringent than, those of the UFAC guidelines. The proposed standard also contains open flame performance requirements for barriers; these barriers must protect interior filling materials from smolder-prone fabrics that may otherwise cause furniture to transition from smoldering to flaming combustion.

2. Standardized Test Materials

Comment. In addition to the CPSC staff's extensive studies on the suitability of various standard test materials, industry groups contributed research and submitted comments on the performance of standard cover fabrics and standard polyurethane foams specified in the CPSC staff's draft standards. Both the staff and industry noted the potential effects of interdependency of standard test materials, and the potential impact on test results of the observed variability in the performance of certain test materials. This variability chiefly related to a standard cotton velvet fabric specified in the open flame tests of the CPSC staff's 2005 draft standard; to a lesser extent, variability was observed in the behavior of the standard FR test foam used in the smoldering tests of the staff's 2005 draft. The comments generally recommended changes to the standard test materials or the test methods to eliminate the undesirable effects of standard material variability.

Response. The staff's research concluded that the variability identified in the performance of the standard fabric (and, in some cases, the standard non-FR foam) could adversely affect the repeatability and reproducibility of open flame tests, and could yield unacceptably inconsistent results. Similar inconsistencies were observed in the standard FR foam used in smoldering tests. Therefore, the staff revised the qualification requirements for standard test materials to ensure consistency. Further, in view of the hazard data and the complexity (including standard materials variability) of the open flame tests, the proposed rule eliminates the open flame tests for filling materials entirely, and retains standard fabrics for barrier tests only. This approach not only simplifies the proposed standard, but also eliminates the interdependency and variability issues raised by the commenters. The standard cotton velvet test fabric performs consistently in barrier smoldering tests, as does the standard rayon test fabric in barrier open flame tests. Since FR foam would not be needed to comply with the proposed rule, the rule specifies only standard non-FR foam in all tests.

3. Stringency of Requirements

Comment. Some industry groups opposed the CPSC staff's 2005 draft standard's open flame filling material tests in the absence of an open flame fabric test, and asserted that the 2005 draft's smoldering and open flame filling material requirements were too stringent for some lower-density foams to meet, even with FR treatment. Furniture industry commenters subsequently opposed any requirements that would be more stringent than those of the UFAC guidelines. Many commenters supported the concept of a barrier test option to afford flexibility to manufacturers and fabric suppliers, although some furniture industry groups opposed an open flame requirement for barriers and supported the UFAC smoldering requirement instead. Regarding the staff's 2007 draft proposal that became this proposed standard, some commenters argued that the stringent fabric smoldering requirements would require substantial re-engineering or FR treatment of fabrics. A number of commenters also recommended that CPSC study the effectiveness of reduced ignition propensity (IP), or ''fire-safe,'' cigarettes before proposing any flammability requirements for upholstered furniture.

Response. Many of these comments pertained to specific provisions of the open flame requirements of the CPSC staff's 2005 draft standard. The proposed standard does not contain open flame requirements for fabrics or fillings. As noted previously, CPSC's laboratory research on smoldering ignition indicates that several elements of the ASTM/UFAC voluntary approach would not be very effective at reducing the risk. The UFAC guidelines allow smolder-prone combinations of upholstery materials that would not adequately limit fire growth, either from smoldering or transition to flaming combustion. Since the proposed rule relies substantially on cover fabrics or barriers to protect interior filling materials, the proposed standard contains very stringent smoldering requirements, and requires that barriers provide protection regardless of cover fabric ignitability.

The Commission agrees that a significant proportion of predominantly cellulosic fabrics (i.e., chiefly cotton fiber content) would have to be modified or eliminated under the proposed standard. The Commission notes that these fabrics are the most smolder-prone materials used in upholstered furniture, and that many smolder-prone fabrics can sometimes overwhelm the inherent smolder resistance of synthetic filling materials like polyurethane foam or polyester batting. Thus, the proposed requirements are applied to those materials whose ignition behavior is the primary contributor to the risk.

The proposed standard would not prohibit fabric suppliers from using FR-treated fabrics to comply. However, furniture and textile industry representatives have stated a desire to avoid such products for aesthetic and cost reasons. Given the availability of non-FR alternatives, it is unlikely that fabric suppliers would use the FR treatments they said consumers would reject.

The Commission agrees that reduced ignition propensity cigarettes may be an effective means of reducing consumer product-related smoldering fires. Such reductions would likely occur irrespective of CPSC action on upholstered furniture. An increasing number of states (and Canada) have ''fire safe cigarette'' laws that now require or will require that only reduced-IP cigarettes be available for sale. Complying cigarettes would likely reduce, but would not eliminate, the risk of smoldering ignited upholstered furniture fires. The extent of any such reduction is unknown. The staff has initiated a study to review available state data and to conduct laboratory tests to evaluate the reduction in smoldering ignition propensity associated with reduced-IP cigarettes compared to conventional cigarettes. This work will help the Commission evaluate the potential effect of reduced-IP cigarettes on upholstered furniture fire losses.

4. Large Scale Validation Testing

Comment. Some stakeholders recommended that CPSC establish a correlation between its bench scale tests in the proposed rule and the performance of complying materials in larger or ''full'' scale tests that more reasonably represent the seating areas of finished articles of upholstered furniture. These large scale tests would help validate the results and potential effectiveness of the bench scale tests.

Response. The Commission agrees that large scale testing is a valuable source of information to help demonstrate the increased safety the proposed standard would provide. To supplement the CPSC staff's bench scale testing and limited large scale testing performed previously, the staff plans to sponsor such large scale tests. The Commission can use the results of these tests in developing a possible final rule.

5. Potential Benefits and Costs

Comment. Some industry groups submitted comments about the CPSC staff's draft preliminary regulatory analysis of potential benefits and costs associated with various regulatory alternatives. Most of these comments were from organizations that opposed various aspects of the CPSC staff's 2005 draft standard; some of the comments related to the staff's draft proposal that became the proposed standard.

The comments on the staff's analysis of the 2005 draft standard generally asserted that the staff had overestimated potential benefits and understated potential costs. A 2006 furniture industry report on the staff's analysis of the 2005 draft standard and alternatives criticized the statistical methodology used to develop national fire loss estimates, and recommended different methods that would generally result in lower estimates of potential benefits of a flammability rule. The report also questioned other aspects of the staff's estimation of potential economic benefits of a standard, positing that staff overstated benefits by using effectiveness estimates and value-of-life estimates that were too high, discount rates that were too low, and incorrect assumptions about the distribution of smolder-prone furniture fabrics among smoking vs. non-smoking households.

The 2006 industry report also asserted that the staff understated costs to filling material suppliers and furniture manufacturers and importers, and recommended that the staff's sensitivity analysis consider all combinations of factors affecting benefits and costs unless those factors were mutually exclusive. Manufacturers of polyurethane foam raised some of the same cost issues, and discussed anticipated difficulties in producing consistently-complying foams at the lower densities often used in upholstered arms and other areas of furniture.

Regarding the CPSC staff's 2007 draft proposal, some textile industry representatives criticized the emphasis on cover fabric performance, and expressed concern that the standard would not regulate filling material performance. They also expressed concern that difficulties in modifying many fabrics, combined with the cost of ''double-upholstering'' furniture to incorporate interior barriers, may lead suppliers to use FR treatments to comply. One report prepared for an environmental group recommended that CPSC include in its analysis of the 2007 draft estimates of economic losses from

increased cancer risks associated with FR filling material additives.

Several stakeholders recommended that CPSC consider the effect of reduced ignition propensity (IP), or ''fire-safe'' cigarettes on the potential benefits of a possible upholstered furniture flammability standard. One report prepared for an environmental group presented an alternative calculation of benefits incorporating some different assumptions about reduced-IP cigarette effectiveness than those made by the CPSC staff in 2006. Some industry commenters suggested that as reduced-IP cigarettes came into wider use, a standard for upholstered furniture would no longer have net benefits to the public.

Response. Regarding fire loss estimation methodologies, the CPSC staff noted several biases and errors in the industry report's approach that would misrepresent the estimates of fire losses. The 2006 industry report's criticism of the staff's method did not consider the proper allocation of fire incidents with unknown fire causes. Further, the indirect estimating method recommended by the industry report incorrectly used estimates of the number of fires to estimate death and injuries, thereby introducing bias and understating deaths. The CPSC staff's method correctly used death and injury counts weighted with probability-based estimates for fire deaths and injuries. Another method suggested by the industry report wrongly excluded some in-scope deaths from the body of data used to make the estimates. The use of these recommended alternative methods would significantly understate fire losses, and would thereby understate the potential benefits of a flammability rule.

Regarding benefits projections, the preliminary regulatory analysis of the proposed rule estimated the monetary value of potential benefits using estimates of effectiveness based on CPSC laboratory tests of upholstered furniture mockup assemblies constructed with ignition resistant fabrics or barriers, and using adjustments to reflect the projected mix of products on the market and other factors. Large scale tests will help support the effectiveness estimates. However, the Commission staff has ample experience to date with upholstery material testing to estimate that the proposed rule would likely be highly effective (about 60%) at reducing fire deaths, injuries and property damage. Even considering the effectiveness estimates for the CPSC staff's 2005 draft standard, there is no basis for applying effectiveness rates for the U.K. regulations to a CPSC rule. Further, the sensitivity analysis in the preliminary regulatory analysis accounts for uncertainty in the estimates.

The Commission staff estimated the present value of future safety benefits using discount rates (3% and 7%) recommended by the Office of Management and Budget in its guidance on regulatory analyses. Also, CPSC's statistical value of life estimate ($5 million) and sensitivity analysis range ($3–7 million) is consistent with values cited in the economic literature and widely used in regulatory decision-making.

Regarding the distribution of upholstered furniture constructed with smolder prone fabrics among smoking vs. non-smoking households, the preliminary regulatory analysis assumed that furniture fabric types are distributed evenly among households. Smolder prone fabrics are often, but not always, used on the very high-priced, decorator furniture more commonly found in higher-income households that tend less often to be smoking households. However, anticipated market trends include potential future increases in predominantly-cotton fabrics in more moderately-priced furniture, especially among imports, which tends to be lower in price than domestic products. To the extent that furniture with smolder prone fabrics is more often found in higher-income households with lower smoking prevalence, the benefits of a flammability rule could be reduced somewhat. The preliminary regulatory analysis notes in its sensitivity analysis that the likely impact on benefits would be small.

The sensitivity analysis in the preliminary regulatory analysis considers the impact of a variety of factors on potential benefits and costs. Varying more than one factor at a time is generally appropriate when those factors are highly correlated, rather than whenever they are not mutually exclusive, as the 2006 industry report suggested. The sensitivity analysis does take into account some combinations of factors, but not all factors that could conceivably affect benefits and costs. However, even if all of the combinations of possible factors were considered together, estimated net benefits of the proposed standard would still total $100 million or more from a year's production of complying upholstered furniture.

The staff considered likely cost impacts on fabric, filling material and other upholstery material suppliers in analyzing the potential impacts of the proposed standard. Cost estimates were generally reported directly as provided by firms in the industry sectors affected although some cost estimates varied significantly among firms. The preliminary regulatory analysis recognized several areas of cost concern, including low-density polyurethane foam and loose filling materials (for the staff's 2005 draft standard) and certain 100% cotton fabrics (for the 2007 draft). The staff analysis noted that while most upholstered furniture fabrics would meet the proposed standard without modification, more than half of all predominantly cellulosic fabrics may fail the proposed standard fabric smoldering test. These smolder-prone fabrics are typically used with synthetic filling materials that would otherwise be generally smolder resistant; thus, the proposed standard targets those fabrics contributing most to the risk of smoldering ignition.

The staff also noted that some of the more expensive decorator fabrics that would fail the proposed fabric smoldering test already are used in furniture that employs multiple layers of upholstery materials, or ''double upholstering.'' Decorative fabric suppliers have long supported a barrier option for use with non-complying fabrics. For most articles of upholstered furniture, the barrier option incorporated into the proposed standard would involve substituting complying barriers for existing interior fabrics or battings; this would amount to a ''drop-in replacement'' of existing components for most barriered furniture, and would not require significant additional assembly labor costs.

The preliminary regulatory analysis estimates costs based on the assumption that some or all non-complying fabrics not used with barriers would be FR treated; however, it is unlikely that a significant proportion of fabrics would actually be treated; thus, material costs may be lower than estimated in the analysis. Compliance costs associated with re-engineering some heavier-weight, 100% cellulosic fiber fabrics may be significant for some firms, although fiber content modifications are made routinely by producers (sometimes as often as every six months) to reflect style trends in the market. Blended-fiber fabrics in particular could probably be readily modified without difficulty or significant disruption.

Under the staff's draft 2005 standard, FR foam fillings would likely be used to comply. One of the FRs currently used in foams meeting the existing California TB–117 may pose cancer and non-cancer chronic health risks. Pending

further study of these and other FR chemicals, the preliminary regulatory analysis of alternatives assumed that hazardous FRs would not be used to comply, and therefore did not include a calculation of possible disbenefits associated with potential use of any potentially hazardous filling material FRs. The proposed standard would not require the use of any FRs in foam or other interior filling materials.

The Commission considered the potential impact of reduced-IP cigarettes, and continues to study this matter. State requirements for such cigarettes may reduce upholstered furniture fire losses over time irrespective of CPSC action. The extent of the reduction is unknown. The preliminary regulatory analysis does specifically account for possible risk reductions associated with reduced-IP cigarettes. If, for example, reduced-IP cigarettes reduced the level of benefits of the proposed rule to half the estimated level, then projected net benefits would be reduced from $367–387 million to $155–177 million per year's worth of complying furniture production. Even at a 70% benefit reduction, estimated net benefits of the proposed rule would still approach $100 million.

6. Potential Use of FR Chemicals

Comment. The Commission received a number of comments either opposing or supporting the potential use of FR chemical technologies to meet a possible flammability rule. Most of these comments related to the staff's previous, 2005 draft standard, which would have required that resilient, fibrous and loose filling materials (typically made of polyurethane foam or polyester fiber) be open flame resistant. Some comments specifically opposed the use of polybrominated diphenyl ethers (PBDEs), and cited studies on the potential health and environmental risks related to these compounds. At least one of the major filling material FRs, penta-BDE, that was previously used to meet California TB–117's open flame requirements, has been discontinued. While most fillings would be FR-treated under the 2005 draft, the proposed standard does not contain filling material requirements, and FR additives would not be needed to comply.

Some environmental groups opposed any new regulations that may add to the environmental burden of FR chemicals, especially halogenated FRs containing bromine or chlorine. They contended that since some FRs are persistent in the environment, bioaccumulative in animals and potentially toxic to humans, and since there is a lack of data on some aspects of the potential effects on human health and environmental risks, the Commission should not encourage the use of these chemicals. Some of these groups supported the furniture industry position that CPSC should impose only smoldering ignition requirements, on the presumption that FRs would not be needed to meet these requirements. The environmental groups strongly supported the staff's 2007 draft proposal that became this proposed standard.

Furniture and filling material producers opposed significant increases in FR usage on the basis that their workers could be exposed to more FRs released from component materials. They were also concerned that state and local environmental regulations may curtail the availability of economically feasible FRs and may adversely affect manufacturers' ability to recycle scrap materials. Furniture and fabric manufacturers also contended that, in view of recent adverse publicity, consumers would prefer not to risk exposure to potentially toxic FRs. Some representatives of fabric suppliers have also expressed concern that any smolder resistance requirements more stringent than those in the UFAC voluntary guidelines would force many firms to use FR treatments on predominantly cotton fabrics to comply.

Chemical producers stated that safe and effective FR solutions are available to address the furniture risk. They noted that non-halogenated alternatives for filling materials are currently being offered or developed, as are ''inherently-FR'' fiber barriers that do not present a significant likelihood of consumer exposure.

Response. CPSC developed the proposed standard mindful of the continuing uncertainty about potential health and environmental effects of FR chemical usage, with an objective of achieving significant reductions in fire deaths and injuries from upholstered furniture fires caused by smoking materials while minimizing reliance on FR additives in fabrics and filling materials to meet that objective. While the available scientific data are sufficient to show that some FRs would not present significant health or environmental risks, the Commission agrees that insufficient data are available to be reasonably sure that other FRs would not present health risks if used in upholstered furniture. The staff's health risk assessment for foam filling materials concluded that the polyurethane foam FR most widely used to meet California TB–117 may not present chemical risks to consumers but identified significant data gaps; the risk assessment further indicated that another currently used filling material FR may present both cancer and non-cancer risks to consumers. On the other hand, the CPSC staff's health risk assessment for barriers concluded that several commercially available technologies, including inherently-FR fiber products, could be used without presenting appreciable health risks to the public.

Under the proposed standard, neither fabrics nor filling materials would need to incorporate FR additives to achieve compliance. While FR-treated fabrics would not be prohibited, many fabric suppliers have indicated they would likely either modify the fiber content or construction of their most smolder prone fabrics, or continue to offer non-complying fabrics for use exclusively with complying barriers in the finished article of furniture. Thus, the Commission anticipates that FR fabrics would be the least likely means of compliance with the proposed rule. Barriers could incorporate FR treatments, but barrier suppliers have reported that they would likely offer inherently-FR fiber materials that do not pose a risk of potential exposure for upholstered furniture applications, similar to those products designed to meet the Commission's open flame rule for mattresses (16 CFR part 1633). Barriers are projected to be used in only about 5% of all upholstered furniture; most of this usage would be in designer or higher-priced furniture for which the relatively higher cost of barriers would not be a significant factor.

The Commission plans to monitor the progress of ongoing studies on FR chemicals and to consider the results of those studies as the regulatory process continues. At the request of the staff, the National Toxicology Program (NTP) of the Department of Health and Human Services has undertaken a review of several FRs that could be used to meet CPSC flammability rules. The NTP review will be a relatively long-term project that contributes to the overall level of knowledge about FR chemicals among scientists and regulators.

H. Preliminary Regulatory Analysis

The Commission has preliminarily determined to issue a rule establishing a flammability standard addressing the ignition of upholstered furniture. Section 4(i) of the FFA requires that the Commission prepare a preliminary regulatory analysis for this action and that it be published with the proposed rule. 15 U.S.C. 1193(i). The following discussion, extracted from the staff's memorandum titled ''Preliminary

Regulatory Analysis of a Draft Proposed Flammability Rule to Address Ignitions of Upholstered Furniture,'' addresses this requirement.

1. Introduction

The history of this rulemaking is discussed in Section A, Background, of this preamble. This Preliminary Regulatory Analysis discusses the impacts of provisions specified in the Commission's proposed standard for upholstered furniture. It provides information on the products and industries that are likely to be affected by actions taken to reduce upholstered furniture fires. The analysis also discusses potential costs and benefits associated with requirements of the proposed standard and reasonable alternatives. This analysis also discusses potential effects on small firms and other market impacts.

2. The Proposed Standard: Scope and Provisions

The proposed standard contains smoldering ignition performance requirements for cover fabrics, and smoldering and open flame performance requirements for interior fire barriers (if they are used as the method of compliance). The proposed standard applies to finished or ready-to-assemble articles of upholstered furniture (such as upholstered sofas, loveseats, sofa beds, rockers, recliners, and other chairs) that are: primarily intended for indoor use in residences; constructed with an upholstered seating area, comprised of a contiguous upholstered seat and back or arm(s); and manufactured or imported after the effective date.

The proposed standard offers manufacturers two alternative methods to produce complying furniture. Furniture items can comply by being made with upholstery cover materials that pass the cover material smoldering ignition resistance test (designated as ''Type I upholstered furniture'' in the proposed standard). Alternatively, manufacturers may comply with the proposed standard by using a barrier material under the upholstery fabric that passes the standard's applicable barrier tests (''Type II upholstered furniture''). This option allows manufacturers to use non-complying upholstery fabrics.

3. Products and Industries Potentially Affected

The largest class of furniture products that would be affected is upholstered furniture on wood frames and dual purpose sleep furniture such as sofa beds, commonly bought for use in living rooms and family rooms. Other types of affected products include upholstered metal frame, reed, and rattan furniture.

Products referred to as ''Household Upholstered Furniture'' by the Census Bureau are classified in code 337121 of the North American Industrial Classification System (NAICS). This classification includes production of upholstered furniture on frames made of wood, metal, or other materials, as well as dual-purpose sleep furniture, such as convertible sofa beds. The 2002 Economic Census reports that 1,686 U.S. companies (with 1,946 establishments) manufactured upholstered household furniture or dual-purpose sleep furniture as their primary product.[4] Many other firms may also produce upholstered furniture as secondary products.

The Economic Census reports that the value of shipments of upholstered household furniture by U.S. firms in 2002 was $10.3 billion. The Annual Survey of Manufactures reported value of product shipments of $10.0 billion in 2003 and $9.55 billion in 2004.[5] The value of product shipments for 2005 was reported by the Census Bureau to have totaled $9.9 billion.

Although there are a large number of upholstered furniture manufacturers, the top four companies accounted for nearly 35 percent of the total value of household upholstered furniture shipments in 2002 (the latest year for which industry concentration ratio data are available); the 50 largest companies accounted for about 67 percent.[6] Reports from the trade press indicate that the industry has become more concentrated in the last ten years. Several firms have ceased operations; others have merged with larger companies through buyouts. The consolidation included Furniture Brands International's acquisition of HDM Furniture Industries (which included Henredon and Drexel Heritage) in 2001, and La-Z-Boy's acquisition of Ladd in January 2000 and Bauhaus and Alexvale in 1999. La-Z-Boy is the number one upholstered furniture manufacturer (by dollar volume), and Ladd, Bauhaus, and Alexvale all previously ranked in the top 30. Furniture Brands International is the second-leading domestic manufacturer of upholstered furniture, and companies it acquired were previously part of number four-ranked LifeStyle Furnishings, International, Ltd.

The industry also includes many small companies and establishments. The 2002 Economic Census reports that only 29 percent of upholstered furniture establishments (564 of 1,946) had 20 or more employees, and only 10 percent (200 establishments) had 100 or more. By some measures, such as the U.S. Small Business Administration's (SBA's) definition for qualification for small business loans, a furniture manufacturing company is considered to be ''small'' if it has fewer than 500 employees (at all of its establishments). This definition encompassed more than 97 percent of firms in the industry in 2002.[7]

Exports of upholstered furniture had a value of about $285 million in 2005, or almost 3 percent of the total value of shipments.[8] The value of imports of products categorized by the Census Bureau as NAICS 337121 was $2,792 million in 2005.[9] Therefore, there were net imports of about $2.5 billion. With estimated domestic shipments of $9.9 billion, these net imports resulted in total apparent consumption of upholstered furniture in 2005 (domestic shipments plus imports, minus the value of exports) of about $12.4 billion.

Imports have grown in recent years, accounting for about 22 percent of the value of total apparent consumption of residential upholstered furniture in 2005. By way of comparison, about 10 percent of the value of apparent consumption of upholstered household furniture in 1999 was imported. The leading country of origin is China, which accounted for about 52 percent of the value of imports in 2005 and nearly 63 percent of the value of imports in 2006. Mexico accounted for about 11 percent of imports in 2006; Italy about 8 percent, and; Canada about 5 percent. These four countries accounted for 86 percent of the total value of imported upholstered furniture in 2006.

The importance of China as a source for imports has grown significantly in recent years. China supplanted Italy as the leading country of origin in 2003, and by 2006 the value of imports from China was almost 6 times that of the second-ranked country of origin, Mexico. Italy had been the number one source for upholstered furniture imports

[4] U.S Census Bureau, U.S. Department of Commerce, 2002 Economic Census, report EC02–311–337121, ''Upholstered Household Furniture Manufacturing: 2002,'' September 2004.

[5] U.S Census Bureau, U.S. Department of Commerce, Value of Product Shipments: 2005, Annual Survey of Manufactures, November 2006.

[6] U.S Census Bureau, U.S. Department of Commerce, 2002 Economic Census, report EC02–31SR–1, ''Concentration Ratios: 2002,'' May 2006.

[7] Based on 2002 firm size data compiled by the United States Small Business Administration's Office of Advocacy which is available online at *http://www.sba.gov/advo/research/data.html*.

[8] U.S. Department of Commerce data.

[9] U.S. Department of Commerce and U.S. International Trade Commission data (c.i.f. cost basis).

for many years. The majority of units from both China and Italy in 2004 reportedly were upholstered in leather.[10] Although much of the gain in China's market share has been at the expense of Italian imports, some of the furniture imported from China is from plants that have been established by several major Italian firms. China has been the leading source of wood (non-upholstered) furniture imports and its growth as a source of upholstered furniture is expected to continue.

In addition to affecting manufacturers of residential upholstered furniture typically found in living room and family rooms, the proposed standard also includes dining room and kitchen chairs within its scope if they are made with contiguously upholstered seats and backs. Similarly upholstered desk chairs purchased for household use are also covered by the standard. Dining chairs are generally products of firms classified in the wood household furniture industry, NAICS 337122. The Economic Census reports that 4.8 million wood dining room chairs were shipped in 1997, with a value of shipments totaling about $526 million. In 2002, shipments fell to 2.9 million chairs, with a value of about $446 million. The decline in domestic shipments is attributable to significant increases in imports of wood furniture from China and other countries.

Census data are not reported separately for upholstered and non-upholstered dining chairs. In 1994, an industry-sponsored study surveyed participants in the voluntary industry program to improve the cigarette ignition resistance of furniture that was developed by the Upholstered Furniture Action Council (UFAC). Among the firms surveyed were manufacturers of upholstered dining room and kitchen seating. The study report estimated that the total value of shipments of such furniture that complied with the UFAC Program (and, therefore, had upholstered seats) was about $250 million for 1993.[11] Based on the value of 1992 shipments ($580 million), perhaps 3 to 4 million upholstered dining chairs were shipped by these UFAC participants. A great majority of these items may not have had upholstered backs, or they had upholstered backs that were not contiguous with upholstered seats. Other firms that are not participants in the UFAC Program also manufacture upholstered dining furniture. Given the limitations of the market data, the number of dining chairs produced annually that fall within the scope of the proposed standard cannot be estimated with much precision, although the total number of units is thought to be relatively small.

Annual domestic retail sales of all types of living room and family room upholstered furniture total about 30 to 33 million units with a value of over $20 billion. Furniture manufacturers, especially smaller firms, commonly market their products through independent sales representatives who provide information on the market, and get and service new retail accounts for manufacturers. Recently, some manufacturers have reduced their reliance on independent representatives by employing their own salespeople.

Besides purchasing from manufacturers through independent sales representatives or the manufacturers' own sales staff, retailers may purchase furniture from wholesale furniture distributors. These wholesalers purchase from perhaps 25 to 30 manufacturers of different types and styles of furniture. The sales staffs of the wholesalers then call on retailers within their areas. Dealing through local wholesalers that stock an assortment of furniture, and that also offer competitive prices, credit, and other services, is advantageous to many retailers, particularly smaller firms.[12]

According to the 2002 Census of Retail Trade, 19,403 retail establishments carried upholstered furniture as a product line.[13] Retail prices of upholstered furniture fall into a very broad range, depending on materials and manufacturing techniques used. Larger retailers are more likely to purchase directly from furniture manufacturers, and smaller firms are more likely to purchase through wholesale distributors. Increasingly in recent years, retailers have reportedly devoted more floor space to private labeled furniture imported directly from foreign manufacturers. In response, several of the larger domestic furniture manufacturers have opened or expanded their own retail outlets.

A review of trade publications indicates that approximately 100 to 200 domestic manufacturers derive a significant share of their revenues from fabric for residential upholstered furniture.[14] This number includes textile mills that produce finished upholstery fabric and textile finishers that purchase unfinished goods and perform additional processes, such as printing and dyeing. Like the upholstered furniture manufacturing industry, the 1990s saw consolidation of firms specializing in upholstery fabric production, with larger firms buying out competitors or divisions of competitors. However, in just the last few years the U.S. industry has been shaken by the decreased demand for domestically-produced fabric as a result of increased competition from imported upholstery fabric, the increased popularity of leather upholstery, and the dramatic increase in consumption of upholstered furniture imported from China. One of the largest marketers of upholstery fabrics in the U.S. reported that the trend to greater foreign competition and the entry of more converters of upholstery fabric (companies that purchase and resell fabrics) has resulted in greater fragmentation of the upholstery fabric industry in recent years, with lower barriers to entry, and an increase in competition based on price.[15]

Interior fabric revenues of the top 10 firms totaled more than $1.9 billion in 2002, based on a trade press survey.[16] These revenues included sales of fabrics other than those used in residential upholstery. A similar survey found that the top 10 upholstery fabric mills had combined revenues from interior fabric shipments of $2.4 billion.[17] In addition to declining sales for the leading U.S. upholstery fabric manufacturers, the difficult state of the industry is evidenced by recent bankruptcies of firms that were once industry leaders, such as Joan Fabrics (previously the number one upholstery manufacturer) and Quaker Fabric (previously the number three firm). Both of these firms ceased operations and their production facilities were liquidated in 2007.

Textile mills that make upholstery fabrics as their primary products are included in the North American NAICS code 313210. Of 663 firms in NAICS 313210 in 2002, only 63 (about 10 percent) had 500 or more employees. About 65 percent of the firms had fewer

[10] Industry analyst, Jerry Epperson, reported in Furniture Today, December 12, 2005. p. 66.

[11] Heiden Associates, Inc., ''Report on Survey of UFAC Members re: Compliance with Upholstered Furniture Cigarette Ignition Flammability Standard,'' December 15, 1994.

[12] Handbook of Furniture Manufacturing & Marketing, Volume 9, Wholesaling, AKTRIN Research Institute and High Point University, May 1994.

[13] U.S Census Bureau, U.S. Department of Commerce, 2002 Economic Census, report EC02–441–09 ''Furniture Stores: 2002,'' August 2004.

[14] Including the Directory of Manufacturers published by the former industry association, the American Textile Manufacturers Institute (ATMI).

[15] Culp, Inc., Annual Company report for the fiscal year ended April 29, 2007.

[16] ''U.S. fabric producers still standing despite import wave.'' Furniture/Today, Cahners Publishing, Greensboro, NC, June 2, 2003.

[17] ''Mastercraft buy puts Joan at top.'' Furniture/Today, Cahners Publishing, Greensboro, NC, June 1998.

than 20 employees.[18] The SBA considers firms with fewer than 1,000 employees to be small businesses for the purposes of programs administered by that agency. Although these data are indicative of the sizes of firms involved in the production of furniture upholstery fabrics, NAICS 313210 encompasses many firms that produce fabrics other than furniture upholstery. Nevertheless, it is likely that nearly all manufacturers of upholstery fabrics could be considered small businesses under SBA guidelines.

Fabric finishers also tend to be small. Finishers are firms that receive unfinished fabrics (''greige goods'' or ''gray goods'') and perform additional manufacturing processes (e.g., printing, dyeing, backcoating, needle-punching, and stain-guarding). Fabrics may be purchased by the finishers, or finished under contract to other firms that supply the fabrics. Fabric finishers are classified in NAICS code 313311. Of 1,016 broadwoven fabric finishing firms in NAICS 313311 in 2002, only 30 (3 percent) had 500 or more employees.[19] Only a few firms currently apply FR treatments to upholstery fabrics.

The U.S. Census Bureau reported that U.S. upholstery fabric production in 2004 was 284 million square yards (which is the equivalent of 189 million linear yards).[20] This production was 43 percent lower than 2002's reported production of 499 million square yards (332 million linear yards) of upholstery fabric.[21] The number of looms in operation for the production of these fabrics totaled 2,610 at the end of 2004, down 20 percent from 3,098 looms at the end of 2002. The major end-use markets for upholstery production are in upholstered furniture and automobile manufacturing. Upholstery fabrics are also used in the manufacture of window treatments and other home textiles. Based on a survey of upholstered furniture manufacturers by Ciprus, Ltd., about 233 million linear yards of upholstery fabric were consumed in the production of household furniture in 2001.[22] This total does not include leather and vinyl upholstery, which are estimated to have comprised about 30 percent of all furniture upholstery materials used in 2001. Therefore, total upholstery use for the domestic manufacture of residential upholstered furniture was about 333 million linear yards. Estimates of total annual upholstery fabric consumption based on average requirements for chairs and sofas/loveseats are 225 million linear yards.[23]

The U.S. Census Bureau's Economic Census report, Upholstered Household Furniture Manufacturing: 2002, included information on the costs of upholstery fabrics and other materials used in the production of upholstered household furniture in that year. The report placed the delivered cost of woven cotton upholstery fabrics (excluding ticking) at $312 million and the delivered cost of other woven upholstery fabrics, such as those made of rayon, nylon, and polyester (excluding ticking) at $802 million.[24] The combined total delivered cost of upholstery fabric of $1,114 million was about 22 percent of the total delivered cost of all materials used in upholstered furniture manufacturing in 2002 (which was, according to the Census Bureau, $5,107 million). Other upholstery cover materials include leather, which is not reported as a separate material category by the Bureau of the Census, and coated and laminated fabrics, which had a delivered cost of about $185 million in 2002. In its 2007 Annual Report, La-Z-Boy, the largest manufacturer of upholstered furniture in the U.S., reported that purchased cover materials (primarily fabric and leather) accounted for about 28 percent of the total cost of raw materials for its upholstery group.[25]

Until recent years, relatively little upholstery fabric was imported. A report by Keyser Ciprus, Ltd., estimated that 8 million linear yards of residential upholstery fabric were imported in 1997. That accounted for approximately 2 percent of total consumption of upholstery fabric for residential furniture production in that year.[26] However, as noted above, foreign upholstery fabric production facilities (located primarily in China) have expanded operations and imports of upholstery fabrics have grown substantially.

Much of the foreign production is from facilities that are owned or operated in partnership with U.S. textile firms. For example, Culp, Inc., reported that almost 60 percent of their sales of upholstery fabrics in their fiscal year ended April 29, 2007, consisted of fabrics produced in plants outside the U.S., compared to 17 percent of sales just two years before.[27] Culp owns and operates four upholstery plants in Shanghai, China, and markets other fabrics from third party sources which are also located in China. The firm only has one remaining upholstery fabric plant in the U.S., down from fourteen in 2000.[28] Culp's experience in shifting production to foreign plants has also been reported by other U.S. upholstery fabric manufacturers. In January 2007 Richloom Fabrics Group shifted production of its Berkshire Weaving upholstery line from its South Carolina plant to a facility in Shanghai.[29] Quaker Fabric Corporation also entered into business agreements in recent years with Asian firms to produce fabrics it designs. Quaker estimated that, industry-wide, about 42 percent of total domestic upholstery fabric sales (excluding automotive fabrics) were imported in 2004, versus only 11 percent in 2002. The company's management believed it was likely that the trend continued, and it estimated that about 60 percent of furniture upholstery fabric sales were imported by the end of 2006.[30] As noted above, Quaker Fabric, which had long been a major U.S. producer of upholstery fabric, could not successfully adjust its operations to meet the recent market shifts, and the firm liquidated its operations in 2007.

At least until recent years, exports of upholstery fabric were significant for many U.S. manufacturers. In the late 1990s as much as 20 percent of the upholstery fabric production by U.S. manufacturers in recent years may have been exported. As noted above, more upholstery fabric is being imported from China and other foreign sources in more recent years, and some major U.S. fabric

[18] Based on 2002 firm size data compiled by the United States Small Business Administration's Office of Advocacy which is available online at *http://www.sba.gov/advo/research/data.html.*

[19] *Ibid.*

[20] U.S. Census Bureau. *Current Industrial Reports, Broadwoven Fabrics (Gray):* 2004. MQ313T(04)–5. June 2005.

[21] U.S. Census Bureau. *Current Industrial Reports, Broadwoven Fabrics (Gray):* 2002. MQ313T(02)–5. June 2003.

[22] Ciprus Limited, LLC. *The North American Market for Contract & Residential Upholstery Fabric,* 2001.

[23] According to industry sources, an average of approximately 7 linear yards of fabric is needed to upholster chairs and 11 to 15 yards are needed for sofas. Based on about 31.5 million annual unit shipments (of which perhaps about 53 percent are sofas, sofabeds, and loveseats and about 47 percent are other chairs), estimated annual upholstery material requirements are about 321 million linear yards (about 217 million yards for sofas, sofabeds and loveseats plus 104 million yards for chairs).

[24] U.S. Census Bureau, *2002 Economic Census, Upholstered Household Furniture Manufacturing:* 2002, EC02–311–313311. September 2004.

[25] La-Z-Boy, Inc. *Annual Report for the Fiscal Year Ended April 28, 2007* (Form 10–K.) Page 5.

[26] Keyser Ciprus Limited, op. cit., p. 40.

[27] Culp, Inc. Annual company report for the fiscal year ended April 29, 2007. (Reportedly includes fabrics produced at Culp's Shanghai manufacturing plant and production sourced from other Asian firms.)

[28] Culp, Inc. Annual company report for the fiscal year ended April 23, 2000.

[29] Andrews, Susan M. ''Richloom moves production to China.'' Furniture/Today, December 18, 2006.

[30] Quaker Fabric Corp. *Annual Report for the Fiscal Year Ended December 30, 2006* (Form 10–K.).

manufacturers have established production facilities in China, or have established business relationships with Chinese firms to produce fabrics to their specifications and designs. These market changes could be expected to reduce exports by domestic firms from previous levels.

There is a growing practice, especially for leather, to purchase fully cut and sewn parts from areas outside of the United States including but not limited to: Argentina, Brazil, China, Italy, Thailand and Uruguay. This trend should continue given the lower labor costs in some of these areas and other existing economic conditions. La-Z-Boy reports that importing cut and sewn leather parts results in savings of 10 to 20 percent compared to domestic purchases and fabrication of these parts.[31] Cut and sewn ''kits'' reportedly are manufactured to the specifications of furniture manufacturers at facilities maintained by foreign fabric producers. Culp reports that it rapidly expanded its cut and sew operations in its Shanghai plants.[32]

CPSC-sponsored surveys of furniture manufacturers in 1981, 1984, and 1995, and commercial surveys in 1997, 2001, and 2006 [33] provided information on two characteristics of fabrics: fabric type and principal fiber (or material) type. Fabric Type refers to commonly-accepted descriptions of the ways in which fabrics are manufactured or of their distinctive characteristics. For the period covered by these surveys, manufacturers increased their use of jacquard and dobby fabrics, and decreased their use of velvet fabrics.[34] Usage of cotton prints and flocks fluctuated within fairly narrow ranges during the period, according to the surveys.

Fiber (or material) Type refers to the fibers or materials used in the manufacture of the fabrics or upholstery. Most upholstery fabric fibers are classified as cellulosic (e.g. cotton and rayon) or thermoplastic (e.g., polyester, polyolefin, and nylon); other materials used to make upholstery include vinyl (which is coated on a base fabric), wool, and leather. Based on the 2006 Ciprus Limited survey, cellulosic fabrics currently account for about 25 percent of upholstered furniture upholstery covering materials. Thermoplastic fabrics account for 45 percent; leather, wool and vinyl-coated fabrics account for about 30 percent (mostly leather).

Review of the data on material types from the surveys conducted since 1981 indicates that the most notable changes over the years have been the increase in use of leather at the expense of both cellulosic and thermoplastic fibers. The Ciprus survey in 2001 found that about 30 percent of furniture covering materials used in that year was leather, significantly greater than found in the earlier surveys.[35] Fabrics made from predominantly cellulosic fibers include heavier-weight fabrics (such as cellulosic jacquards and velvets) and lighter-weight fabrics (mainly cotton prints). Analysis of survey data since 1981 indicates that heavier cellulosic fabrics have usually comprised about 15 to 20 percent of all upholstery covering yardage.

4. Characteristics of Furniture in U.S. Households

The number of furniture units in use is estimated with the CPSC Product Population Model, based on available annual sales data and industry estimates of the average product life of furniture.[36] Estimates are for sofas, loveseats, armchairs, recliners, convertible sofas and other upholstered furniture commonly found in residential living rooms, family rooms, and guest rooms.

Sales are defined as shipments from U.S. manufacturers plus net imports. Annual shipment data are available from the Economic Census published every five years (i.e., 2002, 1997, 1992 * * *) by the Bureau of the Census. For upholstered wood furniture and dual-purpose sleep furniture, the Economic Census usually provides information on unit shipments, by type (such as sofas, sleep sofas, rockers, recliners, and other chairs). For product categories for which unit shipment data were not available, we estimated unit shipments by assigning average per unit values to the Census data on value of shipments. Finally, estimates of net imports were added to shipments to estimate the total number of upholstered units sold to U.S. households. For the years in which Economic Census data are not available, shipment estimates were based on furniture shipment values published by the Department of Commerce in the Annual Survey of Manufactures.[37]

The CPSC's Product Population Model uses sales data and information on the average product life to estimate the numbers of items remaining in use in the years following their purchase by consumers. The estimated average useful life of upholstered furniture reportedly ranges from 15 to 17 years.[38] Based on the assumption that the expected life of a piece of upholstered furniture is 16 years, the average number of upholstered items in household use during 2002–2004 was about 447 million pieces.

Surveys of furniture manufacturers in the last several years show the shift towards thermoplastic fabrics peaked during the period of the mid-1980's to the mid-1990's. Information provided to the CPSC by the Upholstered Furniture Action Council (UFAC) showed that a significant shift to greater use of thermoplastic fabrics began in the 1950's, and became more pronounced in the 1970's.[39] These data on usage of different types of fabrics over the years can be used to characterize upholstery fabrics found on furniture in U.S. households. An estimated 31.2 percent of furniture in use in U.S. households during the period 2002–2004 was covered with fabrics predominantly made with cellulosic fabrics; an estimated 50.2 percent were covered with predominantly thermoplastic fabrics, and 18.6 percent were covered with other materials (mainly leather, wool, and vinyl-coated fabrics).

5. Expected Benefits of the Proposed Standard

The expected benefits of the proposed standard are estimated as the reduction in the societal costs associated with upholstered furniture fires that would be prevented by the standard. We estimate the benefits in several steps. First, the average annual societal costs of upholstered furniture fires are estimated, based on estimates of the aggregate annual costs of fire-related deaths, injuries, and property damage. These costs are differentiated by ignition source (i.e., cigarette vs. open flame ignition) and by fabric covering type (since different fabrics exhibit different ignition propensities). Societal costs are also estimated on a ''per product in use'' basis, based on

[31] La-Z-Boy. *op. cit.,* p. 4.

[32] Culp, Inc. Annual Company report for the fiscal year ended April 29, 2007.

[33] Keyser-Ciprus, Ltd. survey (1997) and Ciprus Limited, LLC, surveys (2001 and 2006).

[34] ''Jacquards'' and ''dobbies'' refer to the types of looms and weaves used to produce fabrics. Brocades, damasks, velvets, tapestry weaves, and matelasses are often jacquard-woven. Dobbie looms enable weaving of small, geometric figures as a regular pattern. Dobby looms produce patterns that are beyond the range of simple looms, but are somewhat limited compared to a jacquard loom, which has a wider range of pattern capabilities.

[35] Ciprus Limited. *op. cit.*

[36] M.L. Lahr and B.B. Gordon, Final Report on Product Life Model Feasibility and Development Study, Battelle Columbus Laboratories, July 14, 1980.

[37] Estimated shipments before 1967 were based on the Federal Reserve's annual furniture production index.

[38] Based on discussions between industry officials and Department of Commerce personnel.

[39] Report to the CPSC on the UFAC Voluntary Program, Upholstered Furniture Action Council, March 21, 1978.

estimates of the numbers of furniture items in use.

Second, since each furniture item is expected to remain in use for an average of 15 to 17 years, the present value of the product's estimated lifetime fire costs is estimated by summing the discounted annual costs over the item's expected useful life. The estimated annual societal costs that are expected to accrue over the furniture item's useful life are discounted at an annual rate of 3 percent. This rate is consistent with recommendations in the economic literature for discounting the costs and consequences of health programs.[40] Societal costs have also been estimated using a 7 percent discount rate, as recommended by the Office of Management and Budget (in addition to 3 percent) in its guidance to Federal agencies on the use of discounting in regulatory analysis (Circular A–4).

Third, the expected effectiveness of the proposed standard (i.e., the percentage reduction in fire losses) is estimated for each ignition source and upholstery cover type. As discussed below, effectiveness of the standard at reducing societal costs is based on judgments regarding improvements attributed to fabric treatments and effectiveness of barrier materials.

We begin the analysis by evaluating the societal costs of cigarette fires and the expected benefits associated with preventing these fires. This is followed with an evaluation of the societal costs and likely benefits associated with the prevention of open-flame ignited fires.

a. Expected Benefits From Reducing Cigarette Fire Losses

Societal costs of furniture fires started by cigarettes. The purpose of this section is to estimate the societal costs of cigarette-related upholstered furniture fires to use as the basis for estimating the cigarette benefits. In the next section, benefits are estimated as avoided societal costs. These costs are based on fire losses (deaths, injuries and property loss) estimated by the CPSC Directorate for Epidemiology, which relies on fire loss data acquired from the National Fire Protection (NFPA) annual survey of fire departments and the U.S. Fire Administration (USFA) National Fire Incident Reporting System (NFIRS). The most recent fire data available to make such estimates was for the 2002–2004 time period. Societal cost estimates are also differentiated by fabric cover types, which (as described below) exhibit different cigarette ignition propensities.

According to the CPSC's Directorate for Epidemiology, there was an average of 260 addressable civilian deaths and 320 nonfatal civilian injuries annually from fires started by cigarettes during the 2002–2004 time frame.[41] There was also an average of about $73 million annually (in 2005 dollars) in property losses from cigarette-ignited fires.[42] By combining the costs associated with deaths, injuries, and property damage, total societal costs can be estimated.

For analytic purposes staff assigns a value of $5 million as the value of a statistical life for the calculation of societal costs. The $5 million estimate is consistent with the general range of the value of a statistical life published in the literature, which generally falls in the $3 million to $7 million range.[43] Multiplying the annual estimate of about 260 deaths by the value of a statistical life of $5 million yields annual fatality costs of $1.3 billion.

Nonfatal injuries were assigned an average cost of $146,740 each. The basis for this estimate was the analysis of burn injury costs reported in the August 1993 report ''Societal Costs of Cigarette Fires,'' part of the research sponsored by the CPSC under the Fire Safe Cigarette Act of 1990.[44] [45] The $146,740 figure represents a weighted average of injury costs (including pain and suffering) for both hospitalized injuries and injuries treated and released. The estimate of 320 injuries annually results in societal costs of about $47 million.

As noted above, the proposed standard would also address about $70 million annually in property losses from fires started by cigarettes, based on estimates for the 2002–2004 period. Consequently, the total annual costs of cigarette-ignited fires addressed by the proposed standard amounted to an annual average of about $1,420 million ($1,300 million + $47 million + $73 million) during the 2002–2004 time period.

Information on the number of furniture items (i.e., separate pieces of furniture) in use provides a basis for estimating the costs of cigarette ignition fires on a per unit basis. The average estimated number of items of residential living room and family room upholstered furniture in use during the 2002–2004 time period was about 447 million units, based on an expected useful product life of 15–17 years. Given the annual societal costs and the number of furniture units in use, the annual societal cost per unit of furniture in use, resulting from cigarette ignition, amounted to about $3.18 ($1,420 million/447 million units of furniture). This per unit societal cost estimate represents an average across all furniture items in use. However, because different fabric coverings for furniture exhibit different ignition propensities, we can develop more precise estimates of per unit societal costs by accounting for the fabric cover.

Ignition testing of chairs by CPSC staff and others over the years has shown that the cigarette ignition hazard of furniture mainly involves chairs covered with fabrics that are predominantly woven from cellulosic fibers, i.e., cotton and rayon. Chair testing done by the CPSC staff and California's Bureau of Home Furnishings has shown that chairs covered with predominantly thermoplastic fabrics (e.g., polyester, polypropylene, and nylon) are much less likely to ignite from cigarettes. Chairs covered with some materials, such as leather, vinyl-coated fabrics, and wool fabrics are resistant to ignition from cigarettes. Given the disparity of ignition propensities, some types of furniture would be expected to result in greater societal costs from fires. Information relevant to the determination of average ignitability and estimation of societal costs for furniture covered with different types of materials is discussed below.

The results of the analysis described in this section (including estimates of market shares by fabric covering, estimates of ignition propensities and risk by fabric type, and estimates of

[40] For example: Viscusi, W.K., ''Discounting Health Effects for Medical Decisions,'' in *Valuing Health Care: Costs, Benefits, and Effectiveness of Pharmaceuticals and Medical Technologies,* ed. F.A. Sloan, 123–24. New York: Cambridge University Press. 1995. Also, Gold, Marthe R., et al., *Cost-Effectiveness in Health and Medicine.* New York: Oxford University Press. 1996.

[41] Miller, David. ''2002–2004 Fire Loss Estimates for Upholstered Furniture.'' Directorate for Epidemiology, U.S. Consumer Product Safety Commission, August 3, 2007 (Draft). The Directorate for Epidemiolgy based its estimates on a methodology that was refined to address concerns raised by the General Accounting Office (GAO) in a 1999 report, ''Consumer Product Safety Commission: Additional Steps Needed to Assess Fire Hazards of Upholstered Furniture.''

[42] Estimated average property losses of about $65 million for 2002–2004 (Miller, *op. cit.*) are expressed in 2004 dollars ($70 million) based on changes in the Producer Price Index for construction materials.

[43] Viscusi, W. Kip, ''The Value of Risks to Life and Health,'' Journal of Economic Literature, Vol. XXXI, December 1993, pp. 1912–1946.

[44] Zamula, William W., ''Costs for Non-Fatal, Addressable Residential Civilian Injuries Associated with Upholstered Furniture Fires.'' (Memorandum to Gregory B. Rodgers, AED, EC) Directorate for Economic Analysis, U.S. Consumer Product Safety Commission. September 6, 2007. (Costs are estimated in 2005 dollars.)

[45] Miller, Ted R., et al., ''Societal Costs of Cigarettes Fires,'' prepared for the U.S. Consumer Product Safety Commission under the Cigarette Safety Act of 1984, August 1993.

annual societal costs) are summarized in Table 1.

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Table 1.

Estimated Societal Costs of Cigarette Ignition of Upholstered Furniture, by Ignition Propensity of Cover Materials, for Furniture in Use During 2002-2004 *(in 2005 dollars)*

Type of Upholstery Cover Material	(1) % of Furniture in Use, 2002-2004	(2) Ignition Propensity[1]	(3) Weighted Ignition Propensity (1) x (2)	(4) % of Overall Risk [5]	(5) Annual Societal Costs per Unit	(6) Lifetime Societal Costs per Unit, Adjusted [6]
Severely Cigarette-Ignition-Prone Cellulosics [2]	12.0%	.521	.063	60.9%	$16.08	$140.04
Moderately Cigarette-Ignition-Prone Cellulosics [3]	5.8%	.322	.019	18.0%	$9.94	$86.60
Lower Cigarette-Ignition-Prone Cellulosics [4]	13.4%	.105	.014	13.7%	$3.24	$28.24
Thermoplastics	50.2%	.015	.008	7.3%	$0.47	$4.06
Leather, wool, vinyl-coated	18.6%	See note [7]	See note [7]	See note [7]	See note [7]	See note [7]

[1] Ignition Propensity is based on ignition testing of chairs performed by CPSC staff since 1980. These data are based on "ignition" being determined by char-length measurements. This large body of chair test data available to the staff is the best indication of relative ignition propensities of furniture.

[2] UFAC Class II (5.6% of fabrics) and Cellulosic UFAC Class I/NBS Class D Fabrics (6.4% of fabrics).

[3] UFAC Class I/NBS Class C Cellulosic Fabrics.

[4] Predominantly Cellulosic Class B Fabrics according to the NBS draft standard.

[5] The Percent of Overall Risk for each type of upholstery cover material (column 4) is calculated by dividing weighted ignition propensity (column 3) by the summation of the weighted ignition propensities (0.103).

[6] Based on a 3% discount rate.

[7] Based on limited laboratory testing data, leather, wool, and vinyl-coated fabrics are assumed to be highly resistant to ignition from cigarettes. Therefore, ignition propensity of these materials is small, but unknown, as are the annual and lifetime societal costs per unit covered with these materials.

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Estimates of the types of upholstery on furniture pieces found in households during 2002–2004 were derived from historical data from surveys in various years, estimates of annual sales of upholstered furniture, and calculations of the survival of furniture in years after purchase (using the CPSC's Product Population Model). Based on these sources, the Directorate for Economic Analysis estimates that 50.2 percent of the 447 million upholstered furniture items that were in use during 2002–2004 were covered with thermoplastic fabrics, 31.2 percent were covered with cellulosic fabrics, and 18.6 percent were covered with leather, vinyl-coated fabrics, or wool fabrics. These market shares are shown in Table 1, column 1.

Note that the market shares in the first three rows sum to the 31.2 percent of the furniture in use covered with cellulosic fabrics. However, because extensive testing data show that some cellulosic fabrics are more likely to ignite than others, this analysis also separates cellulosic fabrics into three categories according to their ignition propensities. The next several paragraphs describe this sub-categorization of cellulosic fabric coverings.

Testing by the CPSC laboratory using the proposed Upholstery Fabric Smoldering Ignition Test[46] indicates that upholstery cover materials which are most likely to fail the test are fabrics woven entirely of cellulosic fibers that are heavier than eight ounces per square yard. These fabrics are assumed to include all fabrics that would be classified as Class II fabrics under the UFAC Program as well as predominantly cellulosic fabrics that would be classified as Class I fabrics under the UFAC Program and Class C and D fabrics according to the proposed furniture flammability standard fabric test method developed by the National Bureau of Standards (NBS, now the National Institute of Standards and Technology) in the 1970s. Estimation of the percentage of fabrics that would fail the fabric test of the proposed standard, and assessment of the societal costs presented by different types of upholstery cover materials are, therefore, based on fabric and chair test data accumulated over the years.

Classification of cellulosic fabrics according to the test developed by UFAC (which classifies fabrics according to char length on the vertical surface when tested over standard non-FR polyurethane foam) and the test developed by NBS (which classifies fabrics according to char length when tested over a glass fiberboard substrate) have been used to categorize the ignition performance of cellulosic fabrics in this analysis. CPSC laboratory analyses since 1980 found that about 82 percent of cellulosic fabrics tested were Class I fabrics according to the fabric classification test of the UFAC Program (i.e., having a vertical char length of less than 1.75 inches), and 18 percent of cellulosic fabrics were UFAC Class II fabrics (i.e., having a vertical char length of 1.75 inches or greater). Assuming the tested fabrics were representative of cellulosic fabrics, 25.6 percent of all fabrics on furniture in use during 2002–2004 were UFAC Class I (31.2% that were covered with cellulosic fabrics × 82%) and 5.6 percent were UFAC Class II (31.2% × 18%).

Laboratory testing shows that the cover material smoldering resistance test of the proposed standard is more severe than the UFAC Fabric Classification Test.[47] Therefore, for the purposes of this analysis, UFAC Class II fabrics are assumed to fail the proposed fabric test without changes that would improve their ignition resistance. Limited testing also indicates that some portion of UFAC Class I fabrics will fail the fabric test of the proposed standard. Twenty-five percent of the Class I fabrics tested by the CPSC staff in 1980 and 1984 were found to be generally more ignition-prone Class D fabrics according to the NBS fabric classification test (i.e., sustaining chars of greater than 3 inches when tested over glass fiberboard). If we assume that such fabrics would fail the proposed standard's fabric test, an estimated 12 percent of fabrics found on furniture in 2002–2004 would have failed the test (5.6 percent which were UFAC Class II, plus 25 percent of the 25.6 percent of other cellulosic fabrics which were UFAC Class I. (Designated as ''Severely Ignition-Prone Cellulosics'' in Table 1.)

Fabrics assumed to pass the proposed standard include more moderately ignition-prone fabrics that are Class I according to the UFAC Fabric Classification test and Class C according to the NBS fabric test (i.e., sustaining chars of 1.5—3 inches when tested over glass fiberboard), and more ignition-resistant Class B cellulosic fabrics according to the NBS fabric test (which sustain char lengths of less than 1.5 inches when tested over glass fiberboard). The Class C fabrics accounted for an estimated 5.8 percent of fabrics found on furniture in 2002–2004 (22.5 percent of UFAC Class I cellulosic fabrics according to CPSC staff testing). These fabrics are designated as ''Moderately Ignition-Prone Cellulosics'' in Table 1. More ignition-resistant NBS Class B fabrics are estimated to have comprised 52.5 percent of UFAC Class I cellulosic fabrics, or 13.4 percent of all fabrics and covering materials found on upholstered items in 2002–2004. These fabrics are designated as ''Lower Ignition-Prone Cellulosics'' in Table 1.

Estimated ignition propensities for furniture covered with cellulosic fabrics are based on chair testing that was done in 1984 and 1994. Evaluating chair test results according to UFAC and NBS fabric classifications, 58.3 percent of test cigarettes were estimated to lead to ignitions for chairs covered with UFAC Class II fabrics. The estimated ignition propensity for test cigarettes on chairs covered with UFAC Class I, NBS Class D fabrics was 46.6 percent. Combining these two severely-ignition-prone fabric classes yields an average estimated ignition propensity of 52.1 percent (weighted by their 2002–2004 market shares). Cigarettes placed on furniture covered with moderately ignition-prone fabrics had an estimated 32.2 percent likelihood of resulting in ignition.[48] About 10.5 percent of test cigarettes were estimated to lead to ignitions for chairs covered with less ignition-prone cellulosic fabrics.[49] (See column 2 of Table 1.)

Because of less concern with the ignition propensity of thermoplastic fabrics, ignition testing data for such materials are more limited. Expanding chair test data to include tests conducted in 1980 led to an estimate that 1.5 percent of test cigarettes would result in ignition for furniture covered with thermoplastic fabrics. Additionally, based on limited laboratory ignition testing data, materials such as leather, wool fabrics, and vinyl-coated fabrics are assumed to be highly resistant to ignition from cigarettes.

The calculation of weighted ignition propensities of furniture covered with different types of fabrics is the product of the estimated market share of furniture in use in 2002–2004 for each type of fabric and its estimated ignition propensity. The estimated weighted ignition propensity was 0.063 for items covered with severely ignition-prone

[46] *The Upholstery Fabric Smoldering Ignition Test* is cigarette ignition testing of fabrics over a standard non-flame-retardant polyurethane foam substrate.

[47] Tao, Weiying, Ph.D. ''Evaluation of Test Method and Performance Criteria for Cigarette Ignition (Smoldering) Resistance of Upholstered Furniture Materials.'' Division of Electrical and Flammability Engineering, Directorate for Laboratory Sciences, U.S. Consumer Product Safety Commission. May 2005.

[48] UFAC Class I, NBS Class C cellulosic fabrics.

[49] NBS Class B cellulosic fabrics.

cellulosic fabrics (i.e., 12.0% share of the market × 52.1% ignition propensity); 0.019 for items covered with moderately ignition-prone cellulosic fabrics (5.8% × 32.2%); 0.014 for items covered with less ignition-prone cellulosic fabrics (13.4% × 10.5%); and .008 for items covered with thermoplastic fabrics (50.2% × 1.5%). (See column 3 of Table 1.)

The percent of total risk presented by furniture covered with different fabric types was derived by dividing estimated weighted ignition propensities by the sum of all weighted ignition propensities (which was about .103 for furniture in use in 2002–2004). Thus, as shown in the table, the more severely ignition-prone cellulosic fabrics [50] were estimated to account for 60.9 percent of the total risk (.063/.103); moderately ignition-prone cellulosic fabrics [51] accounted for an estimated 18.0 percent of the risk (.019/.103); less ignition-prone cellulosic fabrics accounted for about 13.7 percent of the risk (.014/.103); and thermoplastic fabrics accounted for about 7.3 percent of the risk (.008/.103). (See column 4 of Table 1.) [52]

The average annual societal costs associated with cigarette ignitions of each fabric type were estimated by dividing the product of estimated percent of total risk (above) and the total estimated average annual societal costs associated with cigarette ignition of furniture ($1,420 million) by the estimated number of units in use during 2002–2004 with each fabric type (447 million units in use × estimated market share). The average annual societal costs were estimated to be $16.08 for items covered with severely ignition-prone cellulosic fabrics (60.9% × $1,420 million/447 million × 12.0%); $9.94 for items covered with moderately ignition-prone cellulosic fabrics (18.0% × $1,420 million/447 million × 5.8%); $3.24 for items covered with less ignition-prone cellulosic fabrics (13.4% × $1,420 million/447 million × 13.7%); and $.46 for items covered with thermoplastic fabrics (7.3% × $1,420 million/447 million × 50.2%). (See column 5 of Table 1.)

The estimated lifetime societal costs per unit of furniture were calculated as the present value of the estimated annual societal costs over the expected product life of the item of furniture. The annual expected societal costs of cigarette ignition were assumed to apply each year that an item of furniture remains in household use. The CPSC's Product Population Model was used to calculate the likelihood that furniture items would remain in use in years after purchase. Annual societal costs per unit were multiplied by estimated probability of survival in subsequent years. The estimated stream of future expected societal costs were discounted to their present values, using a discount rate of 3 percent.

Available data suggest that other factors (in addition to changes in fabrics) have contributed to a decline in fires resulting from cigarette ignition of upholstered furniture over time. These factors include changes in smoking-related behavior of individuals, increased presence of smoke alarms, and changes in furniture filling materials. The present value estimates were further adjusted to account for an expected future decline in smoking-related fire incidents. This was done by forecasting future fire deaths by year, based on trends in deaths from cigarette ignitions of upholstered furniture during 1980–2004, and reducing the expected societal costs of cigarette ignited fires by the projected percentage reduction. This analysis found that expected lifetime societal costs, discounted to their present value using a 3 percent discount rate, should be reduced by approximately 28 percent. Thus, expected lifetime societal costs per unit of $195.31 for items covered with severely ignition-prone cellulosic fabrics were reduced to $140.04 after incorporating the trend data. Similar calculations led to estimates of lifetime societal costs of $86.60 for items covered with moderately ignition-prone cellulosic fabrics; $28.24 for items covered with less ignition-prone cellulosic fabrics; and $4.06 for items covered with thermoplastic fabrics. (See column 6 in Table 1.)

b. Expected Benefits

The analysis described above estimated the per unit hazard costs associated with the upholstery materials of different ignition propensities, based on the furniture in use during 2002–2004, the most recent time period for which fire data is available. However, as discussed in Section 4, the types of upholstery materials used in the production of furniture have changed over the years. Since the proposed standard would address risks associated with current production, projection of benefits requires estimating the societal costs associated with materials now being used to manufacture furniture. This is accomplished by estimating the percentage of furniture items currently made with covering materials of differing ignition propensities.

A 2006 survey of furniture manufacturers by Ciprus Limited provides information on consumption of cellulosic, thermoplastic, and leather covering materials in the production of furniture.[53] Using CPSC staff test data discussed above, the percentages of current production (as indicated by the Ciprus data) made with materials ranging from severely ignition-prone cellulosic fabrics to ignition resistant materials such as leather were estimated. These estimates are shown in column 1 of Table 2. The estimated percentage of upholstered items now made with severely ignition-prone cellulosic fabrics has fallen to 9.6 percent of annual production, from 12.0 percent estimated for furniture in use during 2002–2004. This is a 20 percent decrease in the relative use of the most ignition-prone class of fabrics. The use of other ignition-prone fabrics has also declined, in relative terms, while the use of generally ignition-resistant materials such as leather (estimated to be about 30 percent of current production) is 62 percent greater than found in household use in 2002–2004.

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[50] UFAC Class II and UFAC Class I/NBS Class D fabrics.

[51] NBS Class C cellulosic fabrics.

[52] Percent of total risk for each fabric type was calculated from estimates of market share and ignition propensity that were not rounded.

[53] Ciprus Limited, *op. cit.*

Table 2.

Cigarette Ignition Societal Costs and Estimated Benefits from Furniture Produced in a Year Under the 2007 Draft Standard

(in 2005 dollars)

Type of Upholstery Cover Material	(1) % of Annual Production	(2) Annual Units Produced	(3) Lifetime Societal Costs per Unit, Adjusted[1] (Table 1)	(4) Total Estimated Societal Costs[2] (million $) (2) x (3)	(5) Estimated Hazard Reduction	(6) Estimated Benefits per Unit (3) x (5)	(7) Total Estimated Benefits (million $) (2) x (6)
Severely Cigarette-Ignition-Prone Cellulosics	9.6%	2,934,901	$140.04	$411.0	79.8%	$111.80	$328.1
Moderately Cigarette-Ignition-Prone Cellulosics	4.6%	1,406,465	$86.60	$121.8	67.4%	$58.36	$82.1
Lower Cigarette-Ignition-Prone Cellulosics	10.8%	3,281,752	$28.24	$92.7	0%	$0	$0
Thermoplastics	44.8%	13,653,682	$4.06	$55.5	0%	$0	$0
Leather, wool, vinyl-coated	30.2%	9,223,200	**See note [3]**	**See note [3]**	0%	$0	$0
All Covering Materials	100.0%	30,500,000	$22.33	$681.0	--	$13.44	$410.2

[1] Based on a 3% discount rate; see Table 2a in Appendix A for calculations based on a 7% discount rate.

[2] Based on estimated annual production of 30.5 million pieces of upholstered furniture for household consumption.

[3] Based on limited testing data, leather, wool, and vinyl-coated fabrics are assumed to be highly resistant to ignition from cigarettes. Therefore, the societal costs associated with these covering materials are small but unknown.

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Column 2 of Table 2 shows the expected number of furniture units produced annually, by type of covering material, based on the market shares of the various fabric coverings (column 1) and an estimated 30.5 million furniture units produced. Column 3 provides the estimates of per unit lifetime societal costs derived in Table 1.

Based on current estimates of the types and quantity of furniture produced, the estimated total present value of the expected societal costs from cigarette fires is $681 million for furniture produced in a year, in the absence of a standard. (See column 4 of Table 2.) Total estimated societal costs involving furniture covered with severely ignition-prone cellulosic fabrics account for $411 million, or about 60 percent of the total. In contrast, thermoplastic fabrics, which are used to cover about 45 percent of all upholstered furniture produced, account for an estimated $55.5 million in societal costs, or only about 8 percent of the total.

A comparison of the ignition performance of upholstered chairs made with current fabrics with that of chairs made in compliance with the proposed standard would provide data to assess the likely reduction in ignition propensity that would result from the proposed standard. In the absence of such data, we can estimate the benefits of the standard by making reasonable judgments about improvements in ignition performance that would result from the use of complying materials.

Furniture currently manufactured with severely ignition-prone cellulosic fabrics could realize a reduction in societal costs per unit under the proposed standard to the equivalent of that now estimated for furniture covered by less ignition-prone cellulosic fabrics. This reduction would be attributable to improved ignition performance of fabrics or from the use of qualifying barriers. The reduction in lifetime societal costs per unit from $140.04 to $28.24 amounts to a hazard reduction of 79.8 percent (shown in column 5 of Table 2). We likewise assume that pre-standard societal costs estimated for moderately ignition-prone cellulosic fabrics (which are also expected to fail the proposed cover fabric test) would also likely fall to the level of estimated hazard costs associated with furniture covered with less ignition-prone fabrics. The estimated reduction from estimated lifetime societal costs of $86.60 to $28.24 would be a 67.4 percent reduction in the hazard presented (also shown in column 5). Since upholstered furniture items covered with less ignition-prone cellulosic fabrics and thermoplastic fabrics are expected to pass the proposed cover fabric test, and there are no requirements for filing materials under the proposed standard, furniture covered with those fabrics would not be expected to be associated with any reduction in their expected societal costs.

The estimated benefits per unit were calculated for each fabric class. (See column 6 of Table 2.) Per unit benefits of the proposed standard range from $0 for furniture covered with ignition-resistant fabrics such as thermoplastic or lower cigarette-ignition-prone cellulosics to an estimated $111.80 per unit for items currently covered by severely ignition-prone cellulosic fabrics. The benefits from ignition resistant materials such as leather, wool, and vinyl-coated fabrics are also expected to be $0.

The total estimated benefits of the proposed standard are calculated by multiplying estimated per unit benefits (shown in column 6) by the estimated annual units produced with each class of covering material (column 2). Based on these calculations, estimated benefits of the standard, in the form of expected lifetime reduction in societal costs associated with production of furniture in one year, discounted to their present value using a discount rate of 3 percent, total $410.2 million. About 80 percent of total estimated benefits are associated with the approximately 10 percent of furniture currently made with severely ignition-prone cellulosic fabrics.

As noted previously, OMB guidance to Federal agencies on the use of discounting in regulatory analysis recommends that future benefits (and costs) of federal regulations be presented using discount rates of 3 percent and 7 percent. Projected benefits from reductions in smoldering ignitions have an estimated present value of $309.1 million if future benefits are discounted at a 7% discount rate.

In addition to cigarette losses, the Directorate for Epidemiology estimated fire losses from small open-flame ignitions for the years 2002–2004.[54] During this time period, there were an average of 30 deaths and 170 nonfatal injuries annually from fires started by small open flames. There was also an average of about $50 million annually in property losses from small open flame-ignited fires during this time frame.[55]

Assuming a value of statistical life of $5 million,[56] the societal costs associated with the 30 deaths annually amounted to about $150 million. The 170 nonfatal injuries were assigned an average cost of $146,740 each,[57] resulting in societal costs of about $25 million. Adding in the $50 million annually in property losses from fires started from small open-flame ignition, the total annual costs of open-flame ignited fires addressed by the proposed standard amount to about $225 million ($150 million + $25 million + $50 million).

As in Table 1, these annual estimates of the open-flame losses are used to develop estimates of the lifetime societal costs of open-flame hazards per unit of furniture in use during 2002–2004, for each of the five fabric categories. The results are presented in Table 3.

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[54] Miller, David. *op. cit.*

[55] Estimated average property losses for 2002–2004 are expressed in 2005 dollars, based on changes in the Producer Price Index for construction materials.

[56] Viscusi, W. Kip, *op. cit.*

[57] Zamula, William W., *op. cit.* Injury costs are expressed in 2005 dollars.

Table 3.

Estimated Societal Costs from Small Open Flame Ignition of Upholstered Furniture for Furniture in Use During 2002-2004 *(in 2005 dollars)*

Type of Upholstery Cover Material	(1) % of Furniture in Use, 2002-2004	(2) Ignition Propensity	(3) Weighted Ignition Propensity (1) x (2)	(4) % of Overall Risk [1]	(5) Annual Societal Costs per Unit	(6) Lifetime Societal Costs per Unit [2]
Severely Cigarette-Ignition-Prone Cellulosics	12.0%	.93	.112	14.6%	$.61	$7.44
Moderately Cigarette-Ignition-Prone Cellulosics	5.8%	.93	.054	7.0%	$.61	$7.44
Lower Cigarette-Ignition-Prone Cellulosics	13.4%	.93	.125	16.4%	$.61	$7.44
Thermoplastics	50.2%	.94	.474	62.0%	$.62	$7.55
Leather, wool, vinyl-coated	18.6%	See note [3]	See note [3]	See note [3]	See note [3]	See note [3]

[1] The Percent of Overall Risk for each type of upholstery cover material (column 4) is calculated by dividing weighted ignition propensity (column 3) by the summation of the weighted ignition propensities (0.765).

[2] Based on a 3% discount rate.

[3] Based on limited laboratory testing data, leather, wool, and vinyl-coated fabrics are assumed to be highly resistant to ignition from small open flames. Therefore, ignition propensity of these materials is small, but unknown, as are the annual and lifetime societal costs per unit covered with these materials.

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Column 1 of Table 3 shows the proportions of furniture in each fabric material category, and is identical to the corresponding column in Table 1. Column 2 describes open-flame ignition propensities, based on small open flame ignition testing by the CPSC laboratory in 1996. In that testing, cellulosic and thermoplastic fabrics had nearly the same ignition propensity when subjected to a small flame for 20 seconds. Ignitions in 20 seconds or less were observed for 27 of 29 predominantly cellulosic fabrics (about 93 percent) and 17 of 18 predominantly thermoplastic fabrics (about 94 percent).[58]

Based on these ignition propensities and the estimated percentages of furniture in use comprised by upholstered items with cellulosic and thermoplastic fabrics, furniture covered with thermoplastic fabrics accounted for an estimated 62 percent of the overall risk of small open flame ignitions during 2002–2004; items covered with cellulosic fabrics accounted for an estimated 38 percent of the risk. While Table 3 separates cellulosic fabrics according to differences in their cigarette ignition propensities, for this analysis all cellulosic fabrics are assumed to have the same small open flame ignition propensity. The estimated percent of overall risk for each type of cellulosic fabric is, therefore, determined by market share. As with the risk of ignition by cigarettes, furniture covered by leather, wool, and vinyl-coated fabrics is assumed to be resistant to ignition from a 20-second exposure to a small open flame.

Following the same methodology described in Table 1, the average annual societal costs associated with small open flame ignitions of each fabric type were estimated by dividing the products of estimated percent of total risk and the total estimated average annual societal costs associated with small open flame ignition of furniture ($225 million) by the estimated number of units in use during 2002–2004 with each fabric type (447 million units in use × estimated market share). This approach resulted in estimated average annual societal costs of about $.62 for items covered with thermoplastic fabrics (62% × $225 million /447 million × 50.2%) and about $.61 for items covered with predominantly cellulosic fabrics (38% × $225 million/447 million × 31.2%). (See column 5 of Table 3.)

Finally, the lifetime societal costs (per unit of furniture) were estimated as the present value of the annual per unit societal costs over the expected product life of a furniture item. This present value estimate (shown in column 6), discounted at a rate of 3 percent, is about $7.55 for items covered with predominantly thermoplastic fabrics and $7.44 for items covered with predominantly cellulosic fabrics.

The estimated benefits associated with the prevention of open-flame fires are described in Table 4. The methodology is similar to that described for Table 2. Column 1 shows the current market shares, by fabric type, and Column 2 shows annual sales based on annual furniture shipments of 30.5 million units. Column 3 provides the estimates of per unit lifetime societal costs derived in Table 3, and Column 4 provides estimates of the aggregate societal costs of fires associated with open-flame ignition.

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[58] Based on testing data presented in Directorate for Laboratory Sciences memoranda dated October 3, 1996, through September 19, 1997, Tab D, ''Upholstered Furniture Flammability: Regulatory Options for Small Open Flame & Smoking Material Ignited Fires,'' October 24, 1997.

Table 4.

Small Open Flame Ignition Societal Costs and Estimated Benefits from Furniture Produced in a Year *(in 2005 dollars)*

Material	(1) % of Annual Production	(2) Annual Units Produced	(3) Lifetime Societal Costs per Unit[1] (Table 3)	(4) Total Estimated Societal Costs[2] (million $) (2) x (3)	(5) Estimated Hazard Reduction	(6) Estimated Benefits per Unit (3) x (5)	(7) Total Estimated Benefits (million $) (2) x (6)
Severely Cigarette-Ignition-Prone Cellulosics	9.6%	2,934,901	$7.44	$21.8	41% to 51%	$3.08 to $3.79	$9.0 to $11.1
Moderately Cigarette-Ignition-Prone Cellulosics	4.6%	1,406,465	$7.44	$10.5	0% to 25%	$0 to $1.86	$0 to $2.6
Lower Cigarette-Ignition-Prone Cellulosics	10.8%	3,281,752	$7.44	$24.4	0%	$0	$0
Thermoplastics	44.8%	13,653,682	$7.55	$103.0	0%	$0	$0
Leather, wool, vinyl-coated	30.2%	9,223,200	**See note [3]**	**See note [3]**	**See note [3]**	**See note [3]**	**See note [3]**
All Covering Materials	100.0%	30,500,000	$5.24	$159.8	--	$2.86	$9.0 to $13.8

[1] Based on a 3% discount rate; see Table 4a in Appendix A for calculations based on a 7% discount rate.

[2] Based on estimated annual production of 30.5 million pieces of upholstered furniture for U.S. household consumption.

[3] Based on limited testing data, leather, wool, and vinyl-coated fabrics are assumed to be highly resistant to ignition from small open flames. Therefore, the societal costs (and, hence, the potential benefits) associated with these covering materials are small but unknown.

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For the purposes of this analysis, we assume that about 40 percent of furniture currently manufactured with severely cigarette ignition-prone cellulosic fabrics (accounting for about 1.17 million units, or 3.8 percent of all furniture items) would be made with barrier materials. Complying barriers may reduce the open flame ignition hazards by about 90 percent, or $6.70 per unit, and benefits could total $7.9 million for furniture made with complying barriers.

Based on the assumption that 40 percent of severely cigarette ignition-prone cellulosic fabrics would be used with complying barriers, the remaining 60 percent of furniture currently manufactured with severely cigarette ignition-prone cellulosic fabrics (accounting for 5.8 percent of all furniture items) and the 4.6 percent of fabric yardage that is moderately cigarette ignition prone (combining for nearly 3.2 million units) would require other modifications or they would have to be dropped from use as upholstery cover materials. The methods of compliance chosen by manufacturers likely would affect the level of reduction in open flame ignition hazards. The implications of these decisions are discussed below.

Fabrics that do not pass the upholstery cover fabric smoldering ignition resistance test could be brought into compliance through treatments with FR chemicals. FR treatment of fabrics and filling materials to achieve compliance with the staff's 2005 draft standard might result in a 50 percent reduction in small open flame fire losses.[59] However, unlike the 2005 draft standard, the current proposed standard does not include provisions related to open flame ignition performance of filling materials, which in many cases would have required FR treatments to achieve compliance. Lacking this additional contribution to fire-retardance, the effectiveness of FR fabric treatments under the proposed standard at reducing the small open flame fire hazard probably would be lower. Consequently, the hazard reduction for furniture with FR-treated fabrics may be about 25 percent under the proposed standard. Per unit open flame ignition benefits would be about $1.86, and aggregate open flame benefits would be about $5.9 million, if manufacturers resort to FR treatment for all of the nearly 3.2 million units. From the standpoint of fabric type, the average hazard reduction for severely cigarette ignition-prone cellulosic fabrics would be 51 percent,[60] and the reduction for moderately cigarette ignition-prone cellulosic fabrics would be 25 percent. (See column 5 of Table 4.)

Alternatively, manufacturers would have the options of using fabrics that are reformulated with different fibers or dropping non-complying fabrics from use as furniture covers. In fact, this may be the preferred option for most manufacturers, given concerns with costs, FR exposure, aesthetic effects, and other issues. Open flame benefits would not be expected for such furniture items. If the use of FR-treatments of fabrics is 80 percent lower than assumed above, the number of units made with FR-treated fabrics would total about 630,000 and aggregate open flame benefits from furniture using FR-treated fabrics would be about $1.2 million, and total open flame benefits would be about $9 million. If all 630,000 units with FR fabric treatments involved severely cigarette ignition-prone fabrics, the average estimated hazard reduction for that category of fabrics would be about 41 percent.[61]

Based on the assumed range of furniture units that would be made with FR-treated fabrics, aggregate open flame benefits from the proposed standard range from about $9 million to $13.8 million, as shown in column 7 of Table 4. In accordance with OMB guidance that future benefits (and costs) of federal regulations be presented using discount rates of 3 percent and 7 percent, open flame benefits of the proposed standard have also been estimated to have a present value of $6.4 million to $9.9 million if future benefits are discounted at a 7 percent discount rate.

6. Expected Costs of the Proposed Standard

a. Costs Related to Upholstery Fabrics and Barrier Materials

Upholstery fabric and FR treatments. This section of the analysis presents information about the expected resource costs associated with the proposed standard. These costs include manufacturing costs incurred for materials, labor, testing, and recordkeeping, and distribution costs to wholesalers, distributors, and retailers. The estimates are expressed in 2005 dollars (as were estimated benefits). Cost estimates are limited to upholstered household furniture that may commonly be found in living rooms and family rooms. A relatively small number of other types of chairs that fall within the scope of the standard, such as a small percentage of dining chairs and desk chairs purchased by consumers, are excluded from this analysis.[62] Cost estimates are summarized in Table 5.

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[59] Smith, Charles, Directorate for Economic Analysis, CPSC, Preliminary Regulatory *Analysis of a Draft Proposed Flammability Rule to Address Ignitions of Upholstered Furniture,* November 2007.

[60] Based on 25% effectiveness x 60% of the fabrics being FR-treated and 90% x 40% that are made with barriers.

[61] Based on 25% effectiveness x 21.6% of the fabrics being FR-treated and 90% x 40% that are made with barriers.

[62] Those other items probably would incur relatively minor increases in costs because of the types of materials used, and smaller material requirements per unit of furniture.

Table 5.
Estimated Increase in Manufacturing Costs from the Staff's 2007 Draft Standard
(2005 Dollars)

Upholstery Covering Materials	Manufacturing Cost Increases per Unit, by Material Affected		(3) Compliance Verification Costs per Unit	(4) Distribution Costs per Unit	(5) Range of Total Costs Per Unit	(6) Annual Units Produced	(7) Aggregate Costs (million $)
	(1) FR Fabric	(2) Barriers			(Average)	(% of Total)	(midpoint)
Severely Cigarette-Ignition-Prone Fabrics	$6.61 to $11.28 (60% of type)	$15.90 to $22.05 (40% of type)	$0.10	$1.04 - $1.57	$11.47 to $17.26 ($14.36)	2,934,901 (9.6%)	$33.7- $50.7 ($42.2)
Moderately Cigarette-Ignition-Prone Cellulosic Fabrics	$6.61 to $11.28	n/a	$0.10	$0.67 - $1.14	$7.38 to $12.52 ($9.95)	1,406,465 (4.6%)	$10.4- $17.6 ($14.0)
Lower Cigarette-Ignition-Prone Cellulosic Fabrics	n/a	n/a	$0.10	$0.01	$.11	3,281,752 (10.8%)	$0.4
Thermoplastic Fabrics	n/a	n/a	$0.10	$0.01	$.11	13,653,682 (44.8%)	$1.5
Ignition Resistant Materials	n/a	n/a	$0.10	$0.01	$.11	9,223,200 (30.2%)	$1.0
Note: Estimates are based on assumption that all "Moderately Cigarette-Ignition-Prone Cellulosic fabrics" and 60% of "Severely Cigarette- Ignition-Prone Fabrics" (accounting for a combined 3.2 million units) would be FR-treated in order to comply with the draft standard. If reliance on FR-treatment would be reduced by 80%, an estimated 633,000 units would have FR fabric. Total estimated aggregate costs would be about $34 million annually.						30,500,000	$47.0 - $71.2 ($59.1)

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Fabrics failing the fabric test of the proposed standard could be treated with FR chemicals or be reformulated with fibers that enable passing results. Manufacturers would also be able to continue using fabrics without modifications if they use an acceptable barrier material (i.e., one that passes the proposed barrier tests) between the fabric and filling materials. For purposes of this analysis, the highly cigarette ignition-prone fabrics and moderately cigarette ignition-prone fabrics, estimated to combine for about 14.2 percent of total upholstery cover materials, are assumed to require modifications if their use is to continue under the proposed standard. As discussed previously, these modifications could include the use of FR treatments or barriers, or reformulating the fabrics in a way (such as increasing the thermoplastic fiber content) that will allow the fabrics to pass the smoldering test of the proposed standard.

Based on fabrics that have been tested by the CPSC laboratory, many of the fabrics that would fail the fabric test of the proposed standard are heavier weight (over eight ounces per square yard) fabrics that are made entirely of cellulosic fibers, such as cotton or rayon. Many of these fabrics could be treated with FR chemicals to enable them to pass the fabric test. Typically, fully upholstered chairs require about 7 linear yards of fabric, and sofas require 11 to 15 yards, depending on factors such as the need to match patterns (which results in more fabric waste in pattern cutting). The average increase in fabric costs could range from $.62 to $1.05 per linear yard for manufacturers, based on previous estimates for FR backcoating to achieve resistance to ignition from small open flames.[63] Also, although the proposed standard does not specify frequency of testing to assure compliance of treated fabrics with the fabric test, we assume that testing will be done to provide guaranties to furniture manufacturers. This testing could increase fabric costs an additional $.03 to $.06 per linear yard of fabric, on average. Therefore, total average manufacturing cost increases for furniture made with FR-treated upholstery fabrics under the proposed standard could range from $4.55 to $7.77 for chairs and $8.45 to $14.43 for sofas and loveseats.[64] Considering estimates of unit shipments of chairs and sofas (based on an analysis of Department of Commerce Economic Census data), the average manufacturing cost increase per item of furniture resulting from FR treatments of fabric is estimated to range from $6.61 to $11.28.[65] (See column 1 of Table 5.)

Barrier materials. Some furniture manufacturers may choose to offer fabrics that do not pass the fabric classification test by using an acceptable barrier material under the cover fabric. Based on barriers used in the UK to comply with the barrier test of that country's furniture flammability standard, the cost to manufacturers could range from $2.00 to $2.47 per linear yard (reportedly 54 to 59 inches in width) for standard FR barriers, and about $2.67 to $2.94 per linear yard for down-proof barriers (i.e. having yarns and weaves suitable for encasing down).[66] As with FR-treated cover fabrics, testing would be done to assure compliance with the barrier test of the proposed standard. However, given expected large production runs of barriers and the greater degree of uniformity of barrier materials compared to cover fabrics, additional testing costs to furniture manufacturers could be about $.01 per yard of barrier fabric.

The decision to use barriers as a means to comply with the standard is more likely to be taken by firms that serve the upper-end furniture market. These furniture items are more likely to be manufactured with interior fabrics between the cushioning materials and the upholstery covers. In a 1995 survey of furniture manufacturers, the CPSC found that about one-third of the seat, arm and back cushions were made with interior fabrics. Interior fabrics were used in an average of about 50 percent of cushions made by smaller firms, which are more likely to serve the upper-end market. To the extent that manufacturers already enclose filling materials in interliner fabrics, the FR barriers could be replacing untreated materials.

Cushions are usually purchased from fabricators that make them to the specifications of the furniture manufacturers. For seat cushions, the barrier alternative would result in a change in the interior fabric used by the cushion fabricators. For such items, barrier costs would be offset by the costs of the untreated materials, about $.30 per yard for standard interliner fabrics and $.80 per yard for down-proof interliner fabrics. Net increases in material costs, including costs for testing, would be about $1.71 to $2.18 per yard for standard fabrics and $1.88 to $2.15 per yard for down-proof fabrics. Cushions typically have sides that are about 24 inches long, and they are about 5 inches thick. Therefore, about one linear yard of 54-inch wide interior fabric would be used per seat cushion, and the cost increases per linear yard of material would also hold true for cost increases per cushion.

Barrier materials required for other parts of the seating areas of furniture items might require about two yards of material per chair and four yards per sofa. These areas may be less likely to have interliner fabrics currently than is the case with seat cushions. Therefore, increased material costs probably would be $2.01 to $2.48 per linear yard for standard FR barriers. These materials would increase material costs by about $4.02 to $4.96 for chairs and $8.04 to $9.92 for sofas. Adding the approximately $1.71 to $2.18 per cushion material cost increases from substituting the use of FR barriers for standard interliner materials, total increased material costs might be about $5.73 to $7.14 for chairs and $13.17 to $16.46 for sofas.

In addition to increased material costs, manufacturers would also be faced with additional costs related to labor needed to include FR barriers on parts of the upholstered items that are not currently made with interliner fabrics or battings. The additional labor required might average about 15 to 20 minutes per item.[67] Hourly labor costs, including benefits, are estimated to range from about $25 to $30.[68] Therefore, labor costs for the additional upholstery work could be about $6.25 to $10.00. Total increases in

[63] Smith, Charles. Directorate for Economic Analysis, CPSC, *Economic Analysis of Regulatory Options to Address Small Open Flame Ignitions of Upholstered Furniture,* October 2001. Note: Bureau of Labor Statistics reports virtually no change in Producer Price Index for job or commission finishing of cotton broadwoven fabrics from 2001–2005. Therefore, previous estimates are used in this analysis.

[64] Assuming average fabric yardage for sofas and loveseats is 13 linear yards.

[65] We estimate that in 1997, upholstered living room and family rooms furniture purchased for consumer use was comprised of about 15.6 million sofas, sofabeds, and loveseats (52.7%), and 14.0 million chairs (47.3%). Therefore: ($4.55 × 47.3%) + ($8.45 × 52.7%) = $6.61; and ($7.77 × 47.3%) + ($14.43 × 52.7%) = $11.28.

[66] Smith, Charles. *op. cit.*

[67] Based on a telephone conversation between a representative of Vanguard Furniture, and Charles Smith, Directorate for Economic Analysis, CPSC, on February 23, 2001.

[68] Although the Bureau of Labor Statistics National Compensation Survey reports that average upholsterer wages for the Hickory-Morganton-Lenoir, NC area were $17.03 per hour in 2005, we assume that wages and other labor costs are typically higher ($25-$30) for upholsterers that work for manufacturers using expensive decorative fabrics (which are more likely to be used with barrier materials). This assumption is supported by labor cost information provided by Vanguard Furniture, op. cit.

manufacturing costs (material and labor) are estimated to range from $11.98 to $17.14 for chairs and $19.42 to $26.46 for sofas and loveseats. The average increase in manufacturing costs per item of upholstered furniture that would be made with FR barriers is estimated to range from $15.90 to $22.05.[69] (See column 2 of Table 5.)

As noted above, highly cigarette ignition-prone fabrics, estimated to comprise 9.6 percent of total upholstery cover materials, could require the use of FR treatments or barriers if their use is to continue under the proposed standard. The use of barriers is more economically feasible with more expensive fabrics, such as those produced by members of the Decorative Fabrics Association (DFA). The DFA estimates that fabrics marketed by its members comprise perhaps 1.5 percent of total upholstery fabric yardage used to make furniture.[70] If 40 percent of highly cigarette ignition-prone fabrics (3.8% of all upholstery cover materials, i.e., more than just the 1.5 percent of fabric yardage reportedly marketed by DFA members) are assumed to be used with acceptable barrier materials under a standard, about 1.17 million furniture pieces annually might be made with barriers under a standard. The aggregate manufacturing cost increase related to use of complying barrier fabrics under these assumptions would range from about $18.7 million to $25.9 million.[71] If 60 percent of highly cigarette ignition-prone fabric yardage (covering 5.8% of all furniture items) is assumed to be treated with FR chemicals, the estimated aggregate increase in manufacturing costs from FR treatment of fabrics would range from $11.6 million to $19.9 million annually.[72] The combined aggregate costs of fabric treatments and barriers would total $30.3 million to $45.7 million annually.

In addition to costs associated with furniture covered with severely cigarette ignition-prone cellulosic fabrics, fabrics that are moderately cigarette ignition-prone could also be expected to require modifications in order to comply with the proposed standard's smoldering ignition test for cover materials. If these units (accounting for an estimated 4.6% of current furniture purchases by consumers) are also made with FR fabric treatments, material costs per unit would increase by $6.61 to $11.28, for an increase in estimated aggregate costs ranging from $9.3 million to $15.9 million annually. Total estimated material cost increases related to FR treatment of fabrics or the use of complying barriers would, therefore, range from about $39.6 million to $61.6 million annually.

It should be noted that these cost estimates could be considered to be the upper bound for material costs of the proposed standard, since manufacturers would have the less expensive alternative of substituting upholstery fabrics that pass the smoldering requirements for those that do not, without the application of FR chemicals or the use of barrier materials. If choosing these options were to reduce reliance on FR-treatments of fabric by 80 percent from that assumed in the above analysis, FR-treatment costs under the proposed standard could total about $6.3 million annually. Under this assumption, an estimated 2.1 percent of furniture items would be made with FR-treated fabrics; 3.8 percent would be made with barrier materials, and; 8.3 percent would be units in which fabrics were reformulated with more ignition-resistant fibers or otherwise switched to fabrics/covers that comply without treatments or barriers. In this scenario, aggregate costs of FR-treatment of fabrics and the use of barriers would be about $30.8 million.

b. Costs Related to Compliance Verification

Costs related to compliance verification will result from requirements placed on furniture manufacturers to maintain records and to apply a permanent label to the items.[73] Other resource costs of compliance verification include the costs of compliance and enforcement activities undertaken by CPSC staff. For purposes of this analysis we assume compliance verification costs of about $.10 per furniture unit. (See column 5 of Table 5.)

c. Distribution Costs

An additional cost of the proposed standard could be increases in costs to wholesalers, distributors, and retailers in the form of added storage, transportation, and inventory financing costs. Since furniture items that would be produced under the standard are not likely to be larger or heavier than pre-standard items, added storage and transportation costs are likely to be negligible. However, inventory financing costs will increase by the average cost of borrowing money, applied to the increase in the wholesale price of a furniture item over the average inventory holding time period. Since most furniture producers use just-in-time production and have small inventories of finished items, this additional cost will probably not exceed 10 percent of the increase in manufacturing costs. A 10 percent markup, therefore, is being used to measure these distribution costs. This yields a resource cost to the firms in the distribution chain averaging about $0.67–$1.14 per furniture item made with FR-treated fabrics and $1.60 to $2.22 per item made with barriers. The weighted range of estimated resource costs for furniture made with severely cigarette ignition-prone fabrics is $1.04 to $1.57 per unit of furniture.[74] (See column 4 of Table 5.) Aggregate costs associated with estimated increased inventory financing costs range from $4.2 million to $6.4 million annually. As discussed in Section 7 of this analysis, the proposed standard may lead to increases in retail prices of furniture greater than the 10 percent markup.

d. Summary of Expected Costs

Table 5 summarizes the results of the cost analyses. It illustrates the differing costs estimated to be incurred under the standard by furniture items covered with the different classifications of upholstery materials previously discussed in the societal costs and benefits section of this analysis. The estimated 14.2 percent of furniture items covered by severely and moderately cigarette-ignition-prone cellulosics would incur greater total and per unit costs under the proposed standard. We assume these fabrics would fail the upholstery cover fabric smoldering ignition resistance test of the proposed standard. Therefore, their continued use in furniture production would require the use of barrier materials that pass the barrier test of the proposed standard or other treatments. Furniture items covered with other types of upholstery materials should not require FR-treated fabrics or barriers. However, all units would incur minor compliance verification costs.

[69] We estimate that in 1997, upholstered living room and family rooms furniture purchased for consumer use was comprised of about 15.6 million sofas, sofabeds, and loveseats (52.7%), and 14.0 million chairs (47.3%). Therefore: ($11.98 × 47.3%) + ($19.42 × 52.7%) = $15.90; and ($17.14 × 47.3%) + ($26.46 × 52.7%) = $22.05.

[70] Information provided to the staff at a June 29, 2000, public meeting.

[71] (30.5 million units × 3.8% × $15.90) = $18.7 million; (30.5 million units × 3.8% × $22.05) = $25.9 million.

[72] (30.5 million units × 5.8% × $6.61) = $11.6 million; (30.5 million units × 5.8% × $11.28) = $19.9 million.

[73] Costs related to production testing are incorporated in the estimated material costs of the draft standard.

[74] Based on the assumption that 60% of these units will use FR-treated fabrics and 40% will use barriers.

Based on the estimated increases in manufacturing costs associated with changes in fabrics and the use of barriers, costs of compliance verification, and distribution costs, aggregate costs under the proposed standard are estimated to range from about $47 million to $71 million annually. The midpoints of the estimated ranges of costs total $59.1 million. As noted above, since changes in fiber contents of fabrics or dropping fabrics from selections offered by manufacturers will be an option available to manufacturers, the aggregate manufacturing costs related to FR treatments and barriers could be lower. Under an alternative assumption that the reliance on FR treatments of fabrics will be 80 percent lower, aggregate costs of the proposed standard would be about $34 million for one year's production of complying furniture.

7. Comparison of Costs and Benefits

a. Benefits and Costs of Proposed Standard

The expected benefits of the proposed standard, which will vary depending on the cigarette ignition propensity of the upholstery cover material used, were discussed in Section 5 of this analysis (and shown in Tables 2 and 4) and are summarized in Table 6. Table 6 shows the estimated benefits (per unit of furniture) in columns 1, 2, and 3. The benefits associated with bringing furniture pieces now covered with severely cigarette ignition-prone cellulosic fabrics into compliance are estimated to range from $114.88 to $115.59 per unit (comprised of $111.80 from reduced losses from furniture fires started by cigarettes and $3.08 to $3.79 from reduced losses from fires started by small open flames). The projected benefits resulting from modifications to furniture covered with moderately cigarette ignition-prone cellulosic fabrics range from $58.36 to $60.22 per unit. For both groups of fabrics the range in benefits is attributable to the effect of different assumptions of use of FR fabric treatments on open flame ignition benefits. Other types of covering materials are not expected to be associated with either cigarette or open flame benefits, since no modifications to fabrics or filling materials would be required to comply with the proposed standard.

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Table 6.

Estimated Costs and Benefits of the 2007 Draft Standard*

(Per Unit and Aggregate for Production in One Year, in 2005 Dollars)

Type of Upholstery Cover	Projected Benefits Per Unit, by Source of Ignition			(4) Costs Per Unit[1]	(5) Net Benefits per Unit[1]	(6) Annual Units Produced (% of Total)	(7) Total Net Benefits[1] (million $)	(8) Cumulative[1] Net Benefits (million $)
	(1) Cigarettes	(2) S.O.F.[1]	(3) Total[1] Benefits					
Severely Cigarette Ignition-Prone Fabrics	$111.80	$3.08 to $3.79	$114.88 to $115.59	$10.58 to $14.36	$101.23 to $104.30	2,934,901 (9.6%)	$297.1 to $306.1	$297.1 to $306.1
Moderately Cigarette Ignition-Prone Cellulosic Fabrics	$58.36	$0 to $1.86	$58.36 to $60.22	$.11 to $9.95	$50.27 To $58.25	1,406,465 (4.6%)	$70.7 to $81.9	$367.8 to $388.0
Lower Cigarette Ignition-Prone Cellulosic Fabrics[2]	$0	$0	$0	$.11	($0.11)	3,281,752 (10.8%)	($0.4)	$367.4 to $387.6
Thermoplastic Fabrics[2]	$0	$0	$0	$.11	($0.11)	13,653,682 (44.8%)	($1.5)	$365.9 to $386.1
Ignition Resistant Materials[2]	$0	$0	$0	$.11	($0.11)	9,223,200 (30.2%)	($1.0)	$364.9 to $385.1

[1] The ranges in estimated small open flame ignition benefits, costs per unit, and net benefits are attributable to different assumptions regarding use of FR fabric treatment as the chosen method of compliance.

* Present value estimates of future benefits are based on a 3 percent discount rate; see Table 6a in Appendix A for calculations based on a 7 percent discount rate.

[2] For purposes of the analysis, it was assumed that these categories of fabrics would comply with the proposed standard without modification. However, some fabrics or materials in these categories could contribute to the risk in some measure, and the categories cannot be sufficiently defined to be able to exclude such materials from the proposed standard's testing, recordkeeping and labeling provisions (and their associated costs).

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Table 6 also shows (in column 4) the midpoints of the ranges of estimated per unit costs of compliance with the proposed standard, which were discussed in Section 6 of this analysis. Estimated costs per unit of furniture covered with severely and moderately cigarette ignition-prone cellulosic fabrics are expressed as ranges based on different assumptions of the extent to which FR treatment would be used to achieve compliance. The higher cost estimates reflect the midpoint of costs estimated using an assumption that all of the affected fabrics are either FR treated or used with complying barriers. The lower cost estimates assume that reliance on FR treatments is reduced by 80 percent, as manufacturers comply through fabric fiber reformulation or dropping noncomplying fabrics from use as upholstery covers.

Table 6 also shows aggregate and cumulative net benefits associated with the proposed standard. The total net benefits shown in column 7 are the product of per unit net benefits and number of units produced annually by type of cover material. For example, the total estimated net benefits from furniture covered with moderately cigarette ignition-prone cellulosic fabrics range from $70.7 million to $81.9 million, given by the product of 1.4 million units produced and per unit net benefits of $50.27 to $58.25. The cumulative net benefits (shown in column 8 of Table 6) are calculated by the vertical summation of the ''Total Net Benefits'' column. Total net benefits of the proposed standard are estimated to range from $364.9 million to $385.1 million.

As noted in Table 6 and in previous sections of this analysis on benefits, expected benefits accruing in future years have been discounted to their present value using a 3 percent discount rate to reflect society's time preference. In accordance with OMB guidelines on benefits calculations, calculations have also been made using a 7 percent discount rate. Using this higher rate, total net benefits of the proposed standard are estimated to range from about $260 million to $281 million over the life of complying upholstered furniture produced in a year.[75] Analyses using both discount rates assume that manufacturers would use FR treatments in a manner that poses no additional risk of injury or adverse health effects to consumers.

[75] Aggregate benefits ranging from about $316 million to $319 million minus aggregate costs ranging from about $34 million to $59 million (midpoint of range).

b. Sensitivity Analysis

The previous discussion compares benefits and costs of the proposed standard using discount rates of 3 percent and 7 percent to express expected benefits accruing in the future in their present value, an estimated value of a statistical life of $5 million, and an estimated average cost of injury of $146,740. Net benefits were also estimated based on estimated increases in costs of producing and marketing furniture that complies with the proposed standard. In addition to these factors, the estimation of benefits was based on assumptions regarding the effectiveness of the standard at reducing losses from cigarette and small open flame ignitions. This section examines the effect of changing any of these assumptions on the expected net benefits that would result from compliance with the proposed standard. In all cases, the estimated net benefits of the proposed standard remain positive.

Discount rates of 3 percent and 7 percent were used to express expected benefits accruing in the future in their present value. Using a 3 percent rate, total estimated benefits of the standard range from about $419 million to $424 million, the range of estimated total costs is about $34 million to $59 million, and total estimated net benefits range from about $365 million to $385 million. Using a 7 percent discount rate, the present value of benefits would range from about $316 million to $319 million, and total net benefits would range from about $260 million to $281 million.

Estimated benefits of the proposed standard were based on a value of a statistical life of $5 million. If benefits are calculated based on a lower bound of $3 million as the value for a statistical life,[76] total estimated benefits of the standard would range from about $267 million to $270 million using a 3 percent discount rate and about $201 million to $203 million using a 7 percent discount rate. Total estimated net benefits would range from about $211 million to $233 million using a 3 percent discount rate and $144 million to $167 million using a 7 percent discount rate. Alternatively, if a value of $7 million is assigned to a statistical life, the total estimated benefits would range from about $572 million to $578 million (at a 3% discount rate) and about $430 million to $435 million (at a 7% discount rate) and total estimated net benefits would range from about $519 million to $538 million (at a 3% discount rate) and $376 million to $396 million (at a 7% discount rate).

[76] Viscusi, W. Kip. *op. cit.*

Estimated benefits of the proposed standard are based on an average societal cost of $146,740 per injury. Changing the estimate used for the cost of injury will have minimal impact on the results, because the share of benefits from reduced injuries is less than 4 percent of total benefits. Hence, even if there were no reduction in injuries from the proposed standard, the total estimated benefits would be about $404 million to $409 million and total net benefits would be $350 million to $370 million using a 3 percent discount rate. Using a 7 percent discount rate, estimated benefits would range from about $305 million to $308 million and estimated net benefits would range from about $249 million to $271 million.

Section 6 of this analysis addresses the expected costs of the standard. Estimates of costs are based on judgments regarding changes to materials that will be required to meet performance tests of the proposed standard, the costs of those changes per unit, and the number of affected furniture items produced annually. Based on the midpoints of ranges of estimated cost impacts of material changes, and different assumptions of reliance on FR fabric treatments as a means to compliance, aggregate costs of the standard were estimated to be $34 million to $59 million for annual production of upholstered household furniture. With these costs, total estimated net benefits of the proposed standard range from about $365 million to $385 million using a 3 percent discount rate and $260 million to $281 million using a 7 percent discount rate. Even if we assume that the costs of the standard are twice those estimated in Section 6 (i.e., $68 million to $118 million) the standard would still have estimated net benefits ranging from about $306 million to $351 million from annual production of upholstered furniture if future benefits are discounted at 3 percent, and about $190 million to $237 million if a 7 percent discount rate is used.

Estimated benefits of the proposed standard were based on assumptions regarding the effectiveness at reducing societal costs of cigarette and small open flame ignitions of furniture. However, if we assume that the standard will have one-half the effectiveness that our estimated benefits are based upon, aggregate benefits would still range from about $210 million to $212 million, and net benefits would range from about $153 million to $176 million, using a 3 percent discount rate. Using a 7 percent discount rate, estimated benefits would

range from about $158 million to $160 million, and net benefits would range from about $100 million to $124 million.

c. Impact of the Proposed Standard on Retail Prices

The estimated costs of the proposed standard include the increased costs of materials, labor, and distribution directly attributable to the rule. It is likely that manufacturers will pass on at least some of the costs of complying with the standard to the consumer, in the form of higher retail prices. The actual increase in retail prices will depend on the price elasticity of demand for furniture products (i.e., the responsiveness of quantity demanded to the change in price). If demand is highly price elastic, then manufacturers will experience a relatively large decrease in sales of upholstered furniture products in response to a price increase, and their ability to pass on increased regulatory costs to the consumer is limited. If demand is price inelastic, consumers respond less intensely to price increases, enabling producers to successfully pass through cost increases.

Regarding the market for upholstered furniture, it is anticipated that demand is relatively price elastic in the short run, because consumers can usually postpone the purchase of a durable good. Increases in retail prices are thus likely to be limited. In the long run, demand is less elastic and any attempt to pass through increased costs is more likely to succeed. Consequently, increases in retail prices are more likely to be observed.

In the absence of information on the price elasticity of demand for upholstered furniture products, it is possible to make use of traditional industry markup rates to provide an upper bound estimate for retail price increases. Such estimates may be viewed as upper bound estimates because they do not reflect the price elasticity of demand. Moreover, traditional markups do not factor in the role of competition, which can also influence attempts to increase prices. Rather, the markup simply reflects the price that producers will want to charge based on historical accounting costs. As noted above, an increase in price will result in a reduction in sales and in the case of highly elastic demand, revenues will decline as well, which will tend to moderate attempts to increase retail prices.

According to industry sources, higher production costs for materials and labor could result in retail prices that are higher by a factor of 2.5, or 150 percent. Based on this markup, the average retail price impact of the proposed standard on furniture items made with FR treated fabrics could be about $23 (for perhaps 2 to 10 percent of all items), and the average retail price impact for furniture produced with barrier materials could be about $48 (for perhaps 4% of furniture items). The average retail price impact for furniture that will not be made with FR fabric treatments or barriers under fabrics (perhaps 86 to 94% of units), could be under $1 per unit. The average increase in retail prices for all upholstered furniture is estimated to be less than $5 per item, based on the traditional industry markup rates.

8. Alternatives to the Proposed Standard

a. The Staff's 2005 Draft Standard

The aggregate benefits of the staff's 2005 draft standard (i.e., the reduction in the societal costs associated with complying furniture), based on the annual sales of a little over 30 million furniture items, are expected to be about $597 million. Total aggregate costs of the 2005 draft standard for each year's production are estimated to range from about $167 million to $184 million, with a midpoint of about $176 million. Although the 2005 draft standard would be expected to increase the use of FR chemicals in the production of urethane foam cushioning and fabrics to achieve compliance, estimates assumed that these chemicals would be selected and used in a way that would not lead to appreciable societal costs. If the use of these chemicals would have adverse health or environmental impacts, the costs of the 2005 draft standard are understated. Estimated benefits and costs per unit would vary greatly depending on cover materials. Most units would incur costs related to FR-treatment of filling materials, and an estimated 10 percent of units covered with more ignition-prone fabrics would require modifications (FR-fabric treatment or FR barriers) that would lead to higher costs of compliance. Projected annual net benefits to society from the staff's 2005 draft standard total $421.5 million. A sensitivity analysis of several factors (value of life, injury costs, effectiveness, and costs) showed that alternative assumptions still yield substantially positive net benefits.

b. The Draft Small Open Flame Ignition Standard

As an alternative to the proposed standard, the Commission could adopt the standard drafted by CPSC staff in 2001 that focused on small open flame ignition of upholstered furniture. That draft standard was the subject of a staff briefing package submitted to the Commission in October 2001. Compliance with the draft small open flame standard would require the use of upholstery cover materials that do not sustain combustion following exposure to a small flame for 20 seconds, or, alternatively, the use of materials that would pass an open flame barrier test. The staff estimated that most fabrics would fail the 20-second flame test unless they would be treated with FR chemicals. Although the FR treatments under that standard specifically addressed small open flame ignition hazards, CPSC staff testing data also showed substantial improvement in cigarette ignition resistance. In fact, most of the estimated benefits of the small open flame standard were projected to result from reductions in societal losses from cigarette ignitions.

Based on estimated costs of compliance and estimated reductions in both small open flame and cigarette ignition hazards, adoption of the 2001 draft small open flame standard would result in estimated aggregate benefits totaling $651 million and aggregate costs of about $272 million from annual production of about 30.5 million pieces of upholstered furniture.[77] Therefore, estimated aggregate net benefits of the small open flame standard would be $379 million. This compares with estimated net benefits of $365 million to $385 million for the proposed standard.[78]

While the estimated net benefits of the proposed standard are relatively close to those estimated for the staff's 2001 draft small open flame standard, the costs associated with the proposed standard are substantially less. In fact, the estimated costs of the proposed standard (ranging from $34 million to $59 million) are 78 to 87 percent lower than the costs of the 2001 draft ($272 million). The difference is related, in large part, to the reduced level of treatment of upholstery fabric with FR chemicals. Unlike the proposed standard, which would result in the treatment of perhaps 2 to 10 percent of

[77] Smith, Charles, 2001 *op. cit.* Based on ''Best Estimates'' of reductions in ignition propensity and midpoints of estimated increases in manufacturing costs; as with the current analysis, distribution costs are estimated to be an additional 10 percent. The best estimate for cigarette ignition reduction involving cellulosic fabrics is 75%, based on 2003 estimates made by Mark Levenson, EPHA, CPSC.

[78] The net benefits of the staff's 2007 draft standard may also be underestimated. The difference does not take into account the likely heavier (and hence more costly) loadings of FR chemicals that would be needed to meet the 20-second open flame test of the alternative 2001 draft open flame standard. (For purposes of comparison, the FR treatment costs between these two alternatives were assumed to be the same.)

upholstery fabric coverings, nearly 66 percent of the upholstery covers would likely receive FR treatments to pass the 20-second open flame test of the CPSC staff's 2001 draft standard.

It should also be noted that retail price impacts of the proposed standard, reflecting the lower underlying costs, would also be substantially lower than under the staff's 2001 small open flame draft standard. Increases in the retail price of furniture may have some negative impact on sales. Higher prices may lead some consumers to delay the purchase of new furniture or lead them to buy it less frequently, and could potentially result in secondary impacts on the sales of furniture components and industry employment; such effects are likely to be more pronounced in the short run. While the impact of these price increases cannot be predicted with certainty, the higher costs of the 2001 open flame standard would likely have more pronounced effects. Additionally, while the retail price impact of the proposed standard will tend to fall most heavily on generally more expensive furniture items (i.e., those with the more expensive cellulosic fabrics), the alternative open flame standard would fall disproportionately on the more inexpensive furniture with thermoplastic fabrics, the fabrics less prone to cigarette ignition.

Finally, while FR chemicals could be used under both the proposed standard and the 2001 draft open flame standard, usage under the draft small open flame standard is likely to be much greater. Under the 2001 open flame standard the staff estimated that up to about 300 million linear yards of fabric could be FR-treated annually. Under the proposed standard, however, an estimated maximum of 65 million yards could potentially be treated.[79]

c. A Mandatory Standard Based on the UFAC Voluntary Program

As an alternative to the proposed standard, the Commission could adopt the provisions of the UFAC Voluntary Action Program as a mandatory standard. The Upholstered Furniture Action Council, or UFAC, was formed by major furniture industry associations in 1974, largely as a response to prospective CPSC actions on upholstered furniture. The UFAC Voluntary Action Program was developed in the late 1970's and amended as ''Phase 2'' in 1983. Tests for decorative trim were added to the program in 1993. The program requires classification of upholstery cover fabrics into either ''Class I'' or ''Class II,'' based on a cigarette ignition performance test. All conforming furniture must comply with specified construction criteria for welt cords, decking substrates, filling materials, and interior fabrics; and more cigarette ignition-prone Class II fabrics used with polyurethane foam seat cushions must have a barrier material between the fabric and foam that passes a barrier smoldering performance test. Conforming furniture is to be labeled with a UFAC tag.

The staff's last market evaluation of UFAC conformance was conducted in 1996. At that time, based on ignition testing of chairs purchased by the CPSC, the staff estimated that about 90 percent of upholstered furniture may have been produced in conformance with the UFAC program (including a majority of units produced by firms that did not participate in the UFAC program). Although the UFAC program is designed to prevent the use of furniture components that may be more likely to lead to cigarette ignition of the finished items, the program is not designed to predict the ignition performance of all UFAC furniture. CPSC staff testing found that some chairs that conformed to the UFAC program ignited from cigarettes, and some nonconforming chairs resisted ignition. The findings illustrated that cigarette-ignition resistance of upholstered furniture is more dependent on the fabrics and filling materials used, rather than on conformance with all aspects of the UFAC Program.[80]

Costs of mandating the requirements of the UFAC program should be minimal. Perhaps the major program element associated with costs is the requirement for a smolder-resistant barrier to be used under Class II fabrics when the seat cushion core is standard urethane foam. The primary barrier material for this purpose under the UFAC program is polyester fiberfill cushion wrap. Based on analysis of market data, fewer than 5 percent of upholstered furniture items are currently produced with Class II fabrics. The great majority of the seat cushions on these items already is made with polyester wraps, and, therefore, are conforming to the UFAC program. Incremental costs of using polyester wraps on all seat cushions covered with Class II fabrics could total less than $500,000.[81] Non-UFAC establishments surveyed in 1995 were found to be less likely than UFAC program participants to use heat-conducting welt cords in seat cushions. Welt cord that conforms to the UFAC program reportedly costs furniture manufacturers less than one cent more per yard, compared to comparable welt cord that does not conform to the UFAC program.[82] Incremental costs could be less than $.04 per seat cushion and $.07 or less per chair and $.15 or less per sofa, for items made with welt cord. Given what is believed to be the current high conformance rate, and the absence of welt cord in a substantial portion of upholstered furniture styles, incremental costs to substitute UFAC-compliant welt cord might total less than $200,000.[83] Other costs associated with changes in construction materials associated with the adoption of the UFAC program as a mandatory rule should be very minor. Incremental costs related to compliance enforcement should be low, since materials are already subject to verification testing to qualify as acceptable materials under the UFAC program and manufacturers already incur labeling costs under the UFAC program. However, it is possible that somewhat higher recordkeeping costs could be one of the major cost elements of mandating the UFAC program, given the minor costs related to materials. Total costs of compliance for adoption of the UFAC program as a mandatory standard could be under $5 million.

Benefits that would result from mandating compliance with the UFAC program would also be much smaller than estimated for other alternative performance standards discussed in this analysis. Most furniture covered with fabrics that would benefit most from a barrier of polyester fiberfill over urethane foam already are manufactured in that way. The cigarette-ignition resistance of nearly all upholstered items would not be significantly improved under this alternative. Although a minimal reduction in the

[79] Franklin, Robert. *Preliminary Environmental Assessment of a Draft Proposed Flammability Standard for Residential Upholstered Furniture.* November 2007.

[80] Charles Smith, Directorate for Economic Analysis, CPSC, and Linda Fansler, Directorate for Laboratory Sciences, *Cigarette Ignition Propensity of Upholstered Furniture,* November 1996.

[81] Based on the assumption that 5% of seat cushions with Class II fabrics (perhaps 150,000 cushions) would require polyester wraps.

[82] A representative of welt cord manufacturer, Petco-Sackner, reported during an October 17, 2007, telephone conversation with Charles Smith, Directorate for Economic Analysis, that UFAC welt cord is sold to furniture manufacturers for $32 per 1,000 yard reel, versus $25 per 1,000 yards for similar non-UFAC welt cord.

[83] If current UFAC conformance is about 90% and about 55% of units are made with welt cord (based on 1995 survey of manufacturers), average incremental welt cord costs of about $.11 per item would be applied to approximately 1.7 million units annually, with aggregate costs of about $185 million.

overall smoldering hazard (of less than 1%) could result in positive net benefits, the expected net benefits of adoption of the UFAC program as a mandatory standard would be minimal, and substantially below any other alternative performance standards discussed in this analysis.

d. A Mandatory Furniture Standard Based on the Revised Draft Provisions of California Technical Bulletin 117

In February 2002, California's Bureau of Home Furnishings published draft revisions to the state's Technical Bulletin (TB–117) that contains mandatory requirements for materials used in the manufacture of upholstered furniture sold in the state. Unlike the proposed standard, the revised California draft standard specifies open flame and smoldering ignition tests for filling materials (including urethane foam and loose filling materials). These filling materials requirements apply to all furniture items, including those covered in ignition resistant fabrics such as leather, wool and vinyl.

In addition, the revised draft TB–117 specifies a small open flame test for upholstery fabrics. The open flame test requires the 20 second application of a small open-flame to the crevice of a seat/back mock-up assembly of fabric over a standard flame-retardant polyurethane foam pad. The specimen fails if (1) weight loss exceeds 4 percent in the first 10 minutes, or (2) the specimen burns progressively before 10 minutes.

In the view of the Directorate for Engineering Sciences (ES), the open flame fabric test is less stringent than the open flame test for fabrics that was part of the CPSC staff's 2001 draft standard.[84] Nevertheless, ES believes that the great majority of fabrics currently used by the furniture industry would require modification in order to comply with the draft TB–117 test. This judgment is shared by the California Bureau of Home furnishings personnel, based on their testing experience.[85]

Based on testing by California's Bureau of Home Furnishings and the CPSC laboratory, it is reasonable to assume that the majority of cover materials are likely to fail the revised draft TB–117 open flame test, with the exception of ignition resistant cover materials (such as leather, wool, and vinyl-coated coverings) and some of the heavier-weight cellulosic fabrics. Consequently, for purposes of evaluating the costs and benefits of this alternative, we assume that two-thirds of the approximately 10 percent of cover materials that are severely ignition-prone cellulosic fabrics (which cover about 2 million units of furniture annually, or about 6% of all fabric coverings) would pass the draft TB–117 open flame fabric test. The remaining severely ignition-prone cellulosic fabrics (covering about 1 million furniture items) will be assumed to fail the test and therefore require FR treatment. An additional assumption is that all of the moderate- and lower-ignition prone cellulosics and thermoplastic cover materials (covering about 18 million furniture items annually, or about 60% of all furniture items produced) would fail the open flame fabric test and have to be treated. Thus, a total of about 19 million units of furniture would be covered in fabrics that would have to be treated in order to comply with the revised draft TB–117.

The primary costs of the revised draft TB–117 would be the costs of treating the filling materials (e.g., urethane foam and loose fill) and the cover fabrics that fail the open flame test. The per-unit costs of treating urethane foam and the loose fill could be similar to those estimated for the 2005 standard drafted by the CPSC staff. Consequently, the filling materials costs per item of furniture might amount to about $5.85 per unit. Since the TB–117 filling materials requirements would apply to all furniture items produced (including items using ignition resistant cover fabrics), the total filling materials costs would amount to about $178 million ($5.85 per unit × 30.5 million units). It is possible that additional costs would be required to treat fibrous filling materials under the revised draft TB–117, since the open flame test for that material could be more stringent than that drafted by the CPSC staff in 2005.

Based on the assumptions described above, approximately 19 million units of furniture would be covered in fabrics that fail the open flame fabric test and would therefore have to be treated. The estimated costs of FR treatments based on the 2001 CPSC staff draft open flame standard ranged from about $6.61 to $11.28 per average unit of furniture, with a midpoint of about $8.95 per item. If we assume that the incremental costs of FR-treated fabrics under TB–117 amount to about 75 to 100 percent of the costs estimated for the 2001 draft open flame standard, the midpoint of the resulting range of costs would be about $7.83 per item of furniture. Therefore, the aggregate costs of the FR treatment of fabrics might amount to about $151 million ($7.83 per item × 19.3 million items).

In summary, the costs of treating the filling materials and fabrics under TB–117 could amount to about $330 million annually or more ($178 million for filling materials and $151 million for fabrics). The associated compliance and distribution costs could bring the total up to about $370 million annually. This would be more than 6 times the estimated costs of the proposed standard, estimated to range from $34 million to $59 million.

The likely benefits that would result from adoption of the revised draft of TB–117 as a mandatory standard vary by cover material type. First consider the furniture covered by severely cigarette ignition-prone cellulosic fabrics (2.9 million units). Based on the assumptions described above, about 1 million of these furniture items will fail the open flame fabric test of the revised draft TB–117 and have to be treated. Since these furniture items will have fabric treatments as well as complying filling materials, it may be reasonable to assume that the benefits under the revised draft TB–117 would be comparable to those of the CPSC staff's 2005 draft standard (which would also have treated filling materials), about $118 per unit. Thus, the benefits from these items would amount to about $115 million ($118.05 per item × 978,300 items). Additionally, for the remaining 2.0 million units covered with severely cigarette ignition-prone fabrics that are not treated, the benefits would probably be no more than about half of the benefits associated with the treated units, or about $59 per unit. Thus, the benefits associated with these 2.0 million units with untreated fabrics might amount to about $115 million ($59.03 per unit × 1,956,600 units). Therefore, the total estimated benefits resulting from annual production of complying furniture upholstered with severely cigarette ignition-prone cellulosic fabrics would be about $231 million.

About 18.3 million units of furniture covered in moderately- and lower-ignition prone cellulosic fabrics and thermoplastic fabrics will also likely fail the open flame fabric test of the revised draft TB–117 and have to be treated. Under the staff's 2005 draft proposed standard, these furniture items would have treated filling materials, but not treated fabric coverings. For purposes of this analysis, we will assume that the benefits associated with the filling

[84] The 2001 CPSC draft standard required that there be no continuing combustion 15 minutes after a 20-second small flame application to a composite consisting of the fabric to be tested and non-FR urethane foam.

[85] Said Nurbakhsh, PhD, California Bureau of Home Furnishings, in a November 14, 2005, e-mail to Charles Smith, Directorate for Economic Analysis, CPSC.

materials tests of the revised draft TB–117 are similar to those of the CPSC staff's 2005 draft standard. Consequently, the estimated benefits associated with the revised draft TB–117 would be greater because the cover fabrics would also be treated. In other words, unlike the 2005 CPSC staff's draft standard, the benefits of treated filling materials would be augmented by the use of FR-treated fabrics under the revised draft TB–117. Since the estimated benefits for these furniture items under the staff's 2005 draft standard amount to about $251 million, the gross benefits associated with the revised draft TB–117 would be greater than $251 million. If we assume that the fabric treatments would reduce the remaining societal costs by about 50 percent, then the gross benefits for these 18.3 million units might amount to about $329 million ($251 million + 0.5 × ($408 million − $251 million)).[86]

Based on this analysis, the total benefits associated with the revised draft TB–117 might amount to about $560 million ($231 million from furniture covered with severely ignition prone fabrics and $329 million from furniture covered with other fabrics). These estimated benefits are greater than those associated with the proposed standard (estimated to range from $419 million to $424 million).

In summary, the estimated annual costs associated with the revised draft TB–117 may amount to about $370 million, and the estimated benefits may amount to about $560 million. Therefore, the estimated net benefits of this regulatory alternative are about $190 million. This compares to $365 million to $385 million in net benefits estimated to result from the proposed standard.

e. A Labeling Rule

A rule requiring hazard information to be presented on labels could be adopted by the Commission in addition to, or in lieu of, a standard. The costs of labeling would be just a few cents per item (based on reported labeling costs under the UFAC Voluntary Action Program and estimates provided by a label manufacturer). However, the impacts of such labeling on product safety are likely to be minimal. Labeling that warns of cigarette ignition hazards is unlikely to be effective, because labels are unlikely to be seen by consumers when the upholstered item is in use, and because there already is general public awareness of these hazards. Additionally, a warning label would not be likely to prevent fires started by children playing with lighters and matches, who are unlikely to read the statements provided.

f. Alternative Effective Date

Section 4 of the Flammable Fabrics Act states that standards or regulations shall become effective 12 months from the date of promulgation, unless the Commission finds that a different effective date is in the public interest. Because of the need for FR treatment of some fabrics used in the manufacture of furniture and the fact that furniture manufacturers carry stocks of fabrics, a longer period before the rule becomes effective, such as 18 months, could provide some firms additional time to use inventories of fabrics that would not pass the proposed standard's fabric test without FR treatment. However, given the small percentage of fabrics that will need to be treated (under 10%), it is unlikely that limiting the effective date to 12 months would substantially burden firms.

Additionally, several options might be available to furniture manufacturers that have fabric that does not comply with a regulatory alternative adopted by the CPSC as the effective date for the action approaches. They might send the remaining fabric yardage to contract finishers for backcoating with FR chemicals. They could use FR barrier materials beneath the untreated fabric, as allowed by that alternative method of compliance with the proposed standard. Also, they might sell the fabric to jobbers who would market it to furniture manufacturers that use FR barriers with untreated upholstery fabrics and for other end-uses that are not within the scope of the regulation. In view of the relatively small percentage of fabrics estimated to require FR treatments or other modifications, and other options available to furniture manufacturers, an effective date longer than 12 months from the date of promulgation might not be in the public interest.

g. Taking No Action

The Commission could determine that no rule is reasonably necessary to reduce the risk of fires associated with ignitions of upholstered furniture. Under this alternative, future societal losses would be determined by factors that affect the likelihood that ignition sources come in contact with upholstery and the ignition resistance of upholstery materials used by furniture manufacturers. For example, the apparently increasing use of ignition-resistant upholstery materials, such as leather, could reduce fires over time. Also, the state of California might adopt the draft revisions to its mandatory standard for upholstered furniture. Those revisions could result in reduced fire losses in that state, which accounts for perhaps 15 percent of the furniture market. Some furniture manufacturers might use materials that comply with some or all provisions of the California revised standard for all of their furniture production, which could reduce fire losses in other areas. Additionally, other political jurisdictions could impose requirements that would reduce future losses from furniture fires.

Factors other than furniture materials will also determine fire losses in the future. Some of these will tend to increase future losses (such as projected annual increases of about 1% in population and households) and others might decrease future losses (such as continued reductions in rates of smoking and alcohol consumption, increasing smoke alarm operability, information and education efforts, and installation of sprinkler systems in new construction).

Particularly noteworthy is the expected growth in the availability of cigarettes that reduce the probability of igniting upholstered furniture. Effective on June 28, 2004, the State of New York required all cigarettes sold in the state to self-extinguish if they are left unattended. Such cigarettes are expected to reduce greatly, but not eliminate, residential fires started by cigarettes. Similar legislation became effective in Vermont in 2006 and California, Oregon, and New Hampshire in 2007, and has been signed into law in 17 other states, with effective dates ranging from January 1, 2008, to January 1, 2010. Legislation has also been introduced in nine other states. By 2010, more than half of the U.S. population will be living in states with mandatory laws addressing the ignition propensity of cigarettes.[87] In addition to state actions, R.J. Reynolds Tobacco Company, the second-largest cigarette manufacturer with about one-third of the U.S. market, recently announced its intention to only market reduced ignition propensity cigarettes in the U.S. by the end of 2009.[88] This policy, combined with the increased imposition of state requirements, could spur other

[86] Based on estimates from tables 2, 4, and 6 in the November 2007 *Preliminary Regulatory Analysis.*

[87] Coalition for Fire-Safe Cigarettes, Legislative Updates. *http://www.firesafecigarettes.org* (referenced on September 19, 2007).

[88] Payne, Tommy J., Executive Vice President—Public Affairs, Reynolds American Inc., in a letter to James M. Shannon, National Fire Protection Association, October 25, 2007.

cigarette manufacturers to make similar business decisions.

If the Commission does not adopt a mandatory rule to address furniture flammability it is possible that a voluntary standard (perhaps through modifications to the existing UFAC Voluntary Action Program) could be developed based on the proposed standard, or based on other provisions, to address these hazards. However, no such voluntary standard currently exists. Moreover, the effort begun in 1996 through ASTM to establish a voluntary standard is currently inactive. Furthermore, comments submitted in response to the October 23, 2003, ANPR representing all segments of the affected industries supported mandatory federal regulation to address upholstered furniture flammability.

Thus, while furniture fires might decline with no CPSC action, there is no reason to believe that the decline would approach the proportion of fire losses that could be prevented with the proposed standard, or some of the other performance standard alternatives described in this analysis.

I. Initial Regulatory Flexibility Analysis

1. Introduction

The Regulatory Flexibility Act (''RFA'') requires that rules proposed by the Commission be reviewed for the potential economic impact on small entities, including small businesses. Section 603 of the RFA requires the Commission to prepare and make available for public comment an Initial Regulatory Flexibility Analysis describing the impact of the proposed rule on small entities and identifying impact-reducing alternatives. Accordingly, staff prepared an initial regulatory flexibility analysis for the proposed rule on upholstered furniture. A summary of the analysis follows.

2. Impact on Small Businesses and Other Small Entities

Summary of proposed requirements. The proposed standard will apply to finished or ready-to-assemble articles of upholstered furniture, as discussed earlier in this document. The proposed standard contains smoldering ignition performance requirements for cover fabrics, and smoldering and open flame performance requirements for interior fire barriers (if they are used as the method of compliance). Furniture items can comply by being made with upholstery cover materials that pass the cover material cigarette ignition test (designated as ''Type I upholstered furniture''). Alternatively, manufacturers may comply with the proposed standard by using a barrier material under the upholstery fabric that passes the standard's applicable barrier tests (''Type II upholstered furniture''). This option allows manufacturers to use non-complying upholstery fabrics.

In addition to flammability performance requirements, the proposed standard contains provisions relating to certification and recordkeeping, testing to support guaranties issued by material suppliers, and labeling of finished articles of upholstered furniture. These requirements are intended to help manufacturers, importers and suppliers ensure that their products comply, and to help the CPSC staff to enforce the performance standard.

The proposed standard provides that finished articles of upholstered furniture must carry a permanent label containing the manufacturer or importer name and location; month and year of manufacture; model identification; and type identification indicating the means of compliance (i.e., ''Type I'' or ''Type II''). This information must be separate from other label information. The label would help retailers and consumers identify products and materials, e.g., in the event of a recall or other corrective action.

In summary, all manufacturers and importers of upholstered furniture would be subject to the standard if it is adopted as a rule by the Commission. However, it is likely that the great majority of testing would be done by or for upholstery fabric suppliers. These results would then be used to support guaranties of compliance that will be provided to furniture manufacturers. Records would be prepared by those conducting tests (fabric and filling material manufacturer personnel or outside testing facilities); copies of reports and records would be maintained by upholstered furniture manufacturers and furniture importers. No special skills that are not already available to manufacturers and importers would be required to establish or verify compliance with the proposed rule.

Impact on small businesses. The proposed standard would apply to manufacturers and importers of upholstered furniture intended for sale to consumers. According to the Census Bureau's 2002 Economic Census, 1,686 U.S. companies (with 1,946 establishments) manufactured upholstered household furniture or dual-purpose sleep furniture as their primary product. Only 29 percent of upholstered furniture establishments (564 of 1,946) had 20 or more employees, and only 10 percent (200 establishments) had 100 or more. The U.S. Small Business Administration (SBA) considered a furniture manufacturing company to be ''small'' for purposes of qualification for small business loans if it has fewer than 500 employees (at all of its establishments). This definition encompassed more than 97 percent of firms in the industry in 2002.

The proposed standard will also affect manufacturers and finishers of upholstery fabrics and barrier materials used in the production of furniture. Although their products are not directly regulated by the draft proposed standard, it is expected that they will provide guaranties to furniture manufacturers regarding fabric ignition resistance. It is expected that about 10 percent of upholstery cover fabric yardage will require changes in production, such as the incorporation of flame retardant (FR) chemicals or changes in fibers, in order to pass the fabric test of the draft proposed standard. As noted above, non-complying fabrics could still be used with complying barrier materials. As with furniture manufacturers, the great majority of upholstery fabric manufacturers and fabric finishers are small businesses under SBA definitions.

The usual means of compliance with the proposed standard will be the use of fabrics that do not need FR treatments or barriers. More than 85 percent of all upholstered furniture items made under the proposed standard would be made with such materials. For these items, estimated average increased costs of the standard would be minor costs of a few cents per unit that are largely associated with compliance verification. For those units that comply as a result of FR treatment of fabrics or the use of barriers, estimated costs are higher, but are only estimated to involve less than 15 percent of total production. The increased resource costs associated with furniture using treated FR fabrics (i.e., the costs associated with materials, labor, and distribution) are expected to average about $9.95 per item of furniture; the increased costs associated with the use of barriers may amount to about $21 per unit.[89]

The cost impacts faced by firms using treated materials, including smaller manufacturers, would be proportionate to the yardage of treated upholstery fabrics or barrier materials used. Therefore, the costs of these methods of compliance are not expected to be borne disproportionately by smaller

[89] Cost estimates are weighted based on shipment data of larger items such as sofas and sofabeds (with higher costs) and smaller items such as chairs (with lower costs).

manufacturers of furniture. In addition, they should be able to pass at least some of these increased costs on to residential consumers. Small businesses that manufacture relatively inexpensive furniture that will require no fabric modifications should face only modest increases in expenses related to compliance verification, estimated to average $.11 per unit. For these reasons, it seems unlikely that the rule would have a significant impact on small furniture manufacturers.

Many of the fabrics currently used by small furniture manufacturers that would fail the fabric test of the proposed standard are likely to be relatively expensive decorative fabrics. The proposed standard's option of using FR barrier materials would be a likely means of compliance for furniture made with such fabrics, and this option was requested by the segment of the industry using the more expensive decorative fabrics when the CPSC staff was drafting an open flame standard in 2001. Other fabrics used by these small furniture manufacturers could be brought into compliance with FR treatments at lower per unit costs, if their aesthetic qualities would not be significantly degraded by the processes. These alternative means of compliance would allow decorative fabrics to remain available to the upholstered furniture industry and the consuming public. Since the prices of fabrics that would be treated or used with barriers, and the furniture made with them, are likely to be considerably higher than average, the relative increases in per unit costs would be moderated for the small furniture manufacturers that use them. Additionally, discussions with upholstered furniture manufacturers producing the more expensive furniture using decorative fabrics suggest that the barrier option will substantially address their concerns with likely adverse aesthetic effects of FR treatments for many of these fabrics.

The estimated per unit costs of the proposed standard discussed above include relatively modest costs for recordkeeping (included in the estimated average compliance verification costs of about $.11 per item of furniture). The proposed standard would require furniture manufacturers to maintain records for a period of three years after items are produced. The records will include identification and description of the furniture items and materials used in their manufacture, contact information for material suppliers, and results of relevant material tests. Smaller firms with limited product lines are expected to bear lower costs than larger firms with broad product lines. In summary, the recordkeeping requirements of the proposed rule would not likely place a substantial burden on small businesses.

The proposed standard was also designed to minimize testing costs that would be imposed on small furniture manufacturers. Since they may rely on guaranties provided by fabric and barrier material suppliers, the proposed rule does not require firms to test composites of their fabrics and the range of actual cushioning materials. Such testing would significantly increase costs of the proposed standard, and would likely disproportionately affect small manufacturers of upholstered furniture. Nor does the proposed standard include a requirement for a small open flame test of cover fabrics. An open flame test requirement similar to the 2001 CPSC staff draft furniture flammability standard would have added substantially to costs faced by small furniture manufacturers.

Many of the fabrics that would fail the fabric test of the proposed standard are likely to be more expensive decorative fabrics. Based on information provided by the Decorative Fabrics Association, its members are generally among the smaller establishments that will be affected by the proposed rule. Partially in response to comments received from this segment of the industry, the CPSC staff included the provision for use of acceptable barrier materials as an alternative means of compliance. This alternative was sought by the industry because of concerns that aesthetic qualities of many decorative fabrics would be adversely affected by FR treatments. This alternative allows all upholstery fabrics manufactured by small textile firms to be used under the proposed standard, and is expected to substantially mitigate the impact of the proposed standard on their businesses.

Under the proposed standard, manufacturers are required to conduct reasonable and representative tests to support initial guaranties of compliance for their materials. However, the costs associated with these requirements are expected to be minimal since many of these costs are now incurred for products marketed for use as complying with voluntary standards or mandatory standards enforced by California and other jurisdictions. Manufacturers of upholstery fabrics already classify their fabrics using the UFAC fabric classification test, which is similar to the fabric test of the proposed standard.

Thus, small manufacturers of fabrics should only face minor incremental costs for testing under the proposed standard, compared to current industry practices. Furthermore, small manufacturers should be able to pass at least some of the additional costs of testing to furniture producers and jobbers that purchase their products. This information suggests that the testing necessary to provide guaranties of compliance by small manufacturers of fabrics and filling materials will not result in a substantial impact on such firms.

3. Alternatives and Their Possible Effect on Small Businesses

Alternatives considered by the Commission are discussed in the Preliminary Regulatory Analysis section of this preamble, Section H. As discussed therein, four alternative standards were considered by the Commission: A standard based on requirements drafted by the CPSC staff in 2005 that includes smoldering and open flame ignition performance tests for filling materials, in addition to smoldering tests for cover fabrics and tests for barrier materials; the 2001 draft small open flame standard developed by the CPSC staff; a standard based on mandating the provisions of the UFAC voluntary program, and; a standard based on the 2002 revised draft California furniture regulation (TB–117). Other regulatory options were also evaluated that might lessen the potential burden on industry, including small firms. These regulatory alternatives include extending the effective date beyond 12 months after promulgation, and adoption of warning label requirements. Another alternative for consideration was the reliance on a voluntary standard or taking no action.

The CPSC staff's 2005 draft standard would require the use of cover fabrics that meet cigarette ignition performance tests, and the use of urethane foam and fibrous filling materials that meet both cigarette ignition and open flame ignition performance tests. Under this alternative, manufacturers would have the option of using fire blocking barriers which pass tests of smoldering and open flame ignition resistance instead of using complying fabrics and filling materials. Under the staff's 2005 draft standard, the cost impacts faced by firms using treated materials, including smaller manufacturers, would be proportionate to the amounts of treated cushioning materials used, and yardage of treated upholstery fabrics or barrier materials used. Therefore, the costs of these methods of compliance would not be expected to be borne disproportionately by smaller manufacturers of furniture. In addition, small manufacturers should be able to pass at least some of their increased costs on to residential consumers. For

these reasons, it is unlikely that this alternative would have a significant impact on these small furniture manufacturers.

Like the proposed standard, many of the fabrics used by small furniture manufacturers that would fail the fabric test of the staff's 2005 draft standard are likely to be relatively expensive decorative fabrics. Therefore, the statements made above regarding impacts of the proposed standard would also apply under this regulatory alternative. Also like the proposed standard, the Directorate for Economic Analysis does not believe that the recordkeeping requirements of the 2005 draft standard place a substantial burden on small businesses, and the 2005 draft was also designed to minimize testing costs that would be imposed on small furniture manufacturers.

Under the 2005 draft standard, processes and materials will be readily available to small businesses that manufacture cushioning materials for the furniture industry.[90] The Directorate for Economic Analysis believes that consequently, since at least some of the cost increases are likely to be passed on to the furniture manufacturers that purchase the materials, a rule based on the 2005 draft standard would probably not have a significant impact on a substantial number of small businesses that manufacture cushioning materials subject to the rule. Nevertheless, ignition performance requirements for filling materials were not included in the proposed standard, which results in somewhat lower costs of compliance compared to the 2005 draft alternative.

Another alternative considered by the Commission was the standard drafted by the CPSC staff in 2001 that focused on small open flame ignition of upholstered furniture. That draft standard was the subject of a staff briefing package submitted to the Commission in October 2001. Compliance with the small open flame standard would require the use of upholstery cover materials that do not sustain combustion (over standard urethane foam) following exposure to a small flame for 20 seconds, or, alternatively, the use of materials that would pass a barrier test.

Based on current market data, the 2001 draft small open flame standard probably would require FR treatments for about 70 percent of all upholstery cover materials, or the use of acceptable barrier materials, compared with less than 10 percent of cover materials requiring such modifications under the proposed standard. The estimated net benefits of the 2001 draft small open flame standard are substantial, and in the range of total net benefits estimated for the proposed standard. However, the estimated costs of the alternative small open flame standard are perhaps 5-to-8 times those estimated for the proposed standard. The higher estimated costs of compliance for the draft small open flame standard would place greater burdens on all manufacturers, including smaller firms.

Unlike the proposed standard, the small open flame draft standard would require substantial production testing, which could disproportionately affect small upholstered furniture manufacturers with smaller production runs. Additionally, since up to 70 percent of upholstery fabric yardage could require FR treatments under the draft small open flame standard, there would be greater competition for the available fabric backcoating capacity. Smaller furniture and fabric producers, with smaller lots of fabrics to be treated, reportedly would be faced with difficulties in competing with larger firms for timely access to fabric finishing services for necessary FR treatments.

As another alternative, the Commission could adopt the provisions of the UFAC Voluntary Action Program as a mandatory standard. The Upholstered Furniture Action Council, or UFAC, was formed by major furniture industry associations in 1974, and the UFAC Voluntary Action Program was developed in the late 1970's and amended in later years. The program requires classification of upholstery cover fabrics into either ''Class I'' or ''Class II,'' based on a cigarette ignition performance test. All conforming furniture must comply with specified construction criteria for welt cords, decking substrates, filling materials, and interior fabrics; and more cigarette ignition-prone Class II fabrics used with polyurethane foam seat cushions must have a barrier material between the fabric and foam that passes a barrier performance test. Conforming furniture is to be labeled with a UFAC tag. In 1996 the CPSC staff estimated that about 90 percent of upholstered furniture may have been produced in conformance with the UFAC program (including a majority of units produced by firms that did not participate in the UFAC program). Costs of mandating the requirements of the UFAC program should be minimal. Perhaps the major program element associated with costs is the requirement for a smolder-resistant barrier to be used under Class II fabrics when the seat cushion core is standard urethane foam. The primary barrier material for this purpose under the UFAC program is polyester fiberfill cushion wrap. Based on analysis of market data, fewer than 5 percent of upholstered furniture items are currently produced with Class II fabrics. The great majority of the seat cushions on these items already are made with polyester wraps, and, therefore, are conforming to the UFAC program. Total annual costs of compliance for adoption of the UFAC program as a mandatory standard could be under $5 million.

Benefits that would result from mandating compliance with the UFAC program would also be much smaller than estimated for the proposed standard and other alternative performance standards considered by the Commission. Most furniture covered with fabrics that would benefit most from a barrier of polyester fiberfill over urethane foam already are manufactured in that way. The cigarette-ignition resistance of nearly all upholstered items would not be significantly improved under this alternative. The expected net benefits of adoption of the UFAC program as a mandatory standard would be minimal, and substantially below any other alternative performance standards discussed in this analysis.

In summary, a mandatory standard based on the UFAC voluntary program would have a minimal impact on small businesses; much smaller than the proposed standard. However, this regulatory alternative would not be expected to lead to a significant reduction in smoldering or open flame ignition hazards of upholstered furniture.

Another alternative standard considered by the Commission was a revised draft standard for upholstered furniture published by California's Bureau of Home Furnishings in 2002. The draft would revise the state's Technical Bulletin (TB–117) which contains mandatory requirements for materials used in the manufacture of upholstered furniture sold in the state. Unlike the proposed standard, the revised California draft standard specifies open flame and smoldering ignition tests for filling materials (including urethane foam and loose filling materials). However, unlike the staff's 2005 draft (which did include such requirements), the filling materials requirements apply to all furniture items, including those covered in ignition-resistant fabrics such as leather, wool and vinyl.

In addition to tests for filling materials, the revised draft TB–117 specifies a small open flame test for upholstery fabrics. The great majority of

[90] Smith, *op. cit.*

fabrics currently used by the furniture industry probably would require modification in order to comply with the draft TB–117 test. For purposes of evaluating the costs and benefits of this alternative, the Directorate for Economic Analysis assumes that about 60 percent of all furniture items produced would be covered in fabrics that would have to be treated in order to pass the fabric test specified in the revised draft TB–117. The combined costs of treating the filling materials and fabrics under the revised draft TB–117 and the associated compliance and distribution costs could total more than six times the estimated costs of the proposed standard. The higher estimated costs of compliance of a standard based on the revised draft TB–117 regulation would place greater burdens on all manufacturers, including smaller firms.

Additionally, since about 60 percent of upholstery fabric yardage could require FR treatments in order to comply with the open flame fabric test of the revised draft TB–117, there would be greater competition for the available fabric backcoating capacity, which could cause smaller furniture and fabric producers, with smaller lots of fabrics to be treated, to be faced with difficulties in competing with larger firms for timely access to fabric finishing services for necessary FR treatments.

In summary, a standard based on the revised draft California furniture flammability regulation, TB–117, probably would have a more substantial and more disproportionate impact on small businesses than the proposed standard. The Directorate for Economic Analysis estimates that the greater burden would not result in higher benefits than the proposed standard, and estimated net benefits from one year's production of upholstered furniture under the regulatory alternative are close to $200 million lower than the net benefits estimated to result from the proposed standard.

Section 4 of the Flammable Fabrics Act states that standards or regulations shall become effective 12 months from the date of promulgation, unless the Commission finds that a different effective date is in the public interest. Because of the need for FR treatment of some fabrics used in the manufacture of furniture and the fact that furniture manufacturers carry stocks of fabrics, a longer period before the rule becomes effective, such as 18 months, could provide some firms (including smaller firms) additional time to use inventories of fabrics that would not pass the proposed standard's fabric test without FR treatment. However, given the small percentage of fabrics that will need to be treated, it seems unlikely that setting an effective date of 12 months from the date of promulgation will substantially burden firms.

The Commission could also require hazard information to be presented on labels in addition to, or in lieu of, a standard. The costs of labeling would be just a few cents per item (based on reported labeling costs under the UFAC Voluntary Action Program and estimates provided by a label manufacturer), and thus, should not present significant costs to small furniture manufacturers. However, the impacts of such labeling on product safety are likely to be minimal. Labeling that warns of cigarette ignition hazards probably would not be effective, because labels are unlikely to be seen by consumers when the upholstered item is in use, and because there already is public awareness of these hazards. Additionally, a warning label would not be likely to prevent fires started by children playing with lighters and matches, who are unlikely to read, or be affected by, the statements provided.

If the Commission does not adopt a mandatory rule to address furniture flammability it is possible that a voluntary standard (perhaps through modifications to the existing UFAC Voluntary Action Program) could be developed based on the proposed standard or based on other provisions, such as the industry recommendations, to address these hazards. However, no such voluntary effort is currently ongoing. Moreover, the effort begun in 1996 through ASTM to establish a voluntary open flame standard is currently inactive. Furthermore, comments submitted in response to the October 23, 2003, ANPR representing all segments of the affected industries supported mandatory federal regulation to address upholstered furniture flammability.

The Commission also could have chosen to take no action. In this situation, future societal losses would be determined by factors that affect the likelihood that ignition sources come in contact with upholstery and the ignition resistance of upholstery materials used by furniture manufacturers. For example, the apparently increasing use of ignition-resistant upholstery materials, such as leather, could reduce fires over time. Also, the state of California might adopt the draft revisions to its mandatory standard for upholstered furniture. Those revisions could result in reduced fire losses in that state, which accounts for perhaps 15 percent of the furniture market. Some furniture manufacturers might use materials that comply with some or all provisions of the California revised standard for all of their furniture production, which could reduce fire losses in other areas. Additionally, other political jurisdictions could impose requirements that would reduce future losses from furniture fires.

Factors other than furniture materials will also determine fire losses in the future. Some of these will tend to increase future losses (such as projected annual increases of about 1% in population and households) and others might decrease future losses (such as continued reductions in rates of smoking and alcohol consumption, increasing smoke alarm operability, information and education efforts, and installation of sprinkler systems in new construction).

Particularly noteworthy is the expected growth in the availability of cigarettes that reduce the probability of igniting upholstered furniture. Effective on June 28, 2004, the State of New York required all cigarettes sold in the state to self-extinguish if they are left unattended. Such cigarettes are expected to reduce greatly, but not eliminate, residential fires started by cigarettes. Similar legislation became effective in Vermont in 2006 and California, Oregon, and New Hampshire in 2007, and has been signed into law in 17 other states, with effective dates ranging from January 1, 2008, to January 1, 2010. Legislation has also been introduced in nine other states. By 2010, more than half of the U.S. population will be living in states with mandatory laws addressing the ignition propensity of cigarettes.[91] In addition to state actions, R.J. Reynolds Tobacco Company, the second-largest cigarette manufacturer with about one-third of the U.S. market, recently announced its intention to only market reduced ignition propensity cigarettes in the U.S. by the end of 2009.[92] This policy, combined with the increased imposition of state requirements, could spur other cigarette manufacturers to make similar business decisions.

While furniture fires might decline with no CPSC action, there is no reason to believe that the decline would approach the proportion of fire losses that could be prevented with the proposed standard, or some of the other performance standard alternatives described in this analysis.

[91] Coalition for Fire-Safe Cigarettes, Legislative Updates. *http://www.firesafecigarettes.org* (referenced on September 19, 2007).

[92] Payne, Tommy J., Executive Vice President—Public Affairs, Reynolds American Inc., in a letter to James M. Shannon, National Fire Protection Association, October 25, 2007.

J. Paperwork Reduction Act

The proposed standard will require manufacturers (including importers) of upholstered furniture to perform testing and maintain records of testing. For this reason, the proposed rule contains ''collection of information requirements,'' as that term is used in the Paperwork Reduction Act, 44 U.S.C. 3501–3520. Therefore, the proposed rule is being submitted to the Office of Management and Budget (''OMB'') in accordance with 44 U.S.C. 3507(d) and implementing regulations codified at 5 CFR 1320.11. The estimated costs of these requirements are discussed below.

1. Costs of Testing

The proposed standard specifies that initial samples of 10 test specimens for each tested upholstery fabric and barrier material (or 25 of 30 total specimens if failures are recorded among the first 10), must pass the applicable tests in order to qualify the materials for use in upholstered furniture. Manufacturers of fabrics and barrier materials are expected to either perform the tests in their own facilities or send materials to third party testing facilities in order to support guaranties of compliance to furniture manufacturers. Some manufacturers of decorative fabrics that could not pass the proposed cover fabric test without FR treatments may choose to forego the costs of testing and market their products with the understanding that they would be used with complying barrier materials.

As noted above, approximately 100 to 200 domestic manufacturers derive a significant share of their revenues from fabric they produce or import for residential upholstered furniture. An average of about 50 samples per firm could support guaranties for fabrics sold to upholstered furniture manufacturers. A substantial majority of fabrics that would be subjected to tests would likely be qualified by passing results on the initial sample of 10 specimens. If the average cost per test were $50, the cost of testing a single fabric would amount to about $500, and the average testing costs per firm would be about $25,000. Aggregate fabric testing costs for the 100 to 200 domestic manufacturers would be $2.5 million to $5 million.

Guaranties for barrier materials would be supported by passing results on the proposed barrier tests for (1) open flame ignition resistance and (2) smoldering ignition resistance. Average costs to conduct each of these tests could be approximately $125 per test. Assuming barrier materials are qualified by the testing results for the initial samples of 20 specimens (10 for the open flame ignition resistance test and 10 for the smoldering ignition resistance test), total testing costs per barrier material marketed for use under the standard would be about $2,500. If barrier material manufacturers market an average of four guarantied products for use as barriers, total testing costs per firm would be about $10,000. If 15 firms issue guaranties for complying barriers, total costs related to barrier testing would be about $150,000. Thus, total testing costs for upholstery fabric and barrier materials could amount to about $2.65 million to $5.15 million.

Since firms could continue to market qualified fabrics and barriers without the need for additional testing, testing costs per firm could be lower in subsequent years under the standard.

2. Cost of Information Collection and Recordkeeping

In addition to upholstery fabric and barrier material testing, the proposed standard will require manufacturers to maintain detailed documentation of the test results and details of each test performed by or for that manufacturer. Records are required to be in English and kept at a location in the United States for a period of at least three years after production of the article of upholstered furniture certified by the test results ceases.

Costs of detailed testing documentation are included in the estimated costs of testing. Maintaining the testing documentation by manufacturers of fabrics and barrier materials could require an additional two hours of labor for each material that is certified or guarantied. As discussed above, maintaining records for perhaps 5,000 to 10,000 guarantied upholstery fabrics and 60 barrier materials could be required under the proposed standard. Perhaps two hours of labor could be required at a cost of about $26 per hour to maintain these records for each guarantied material. Therefore, total recordkeeping costs incurred by upholstery fabric and barrier material manufacturers could range from about $263,000 to $523,000 ($52 times 5,060 to 10,060 guaranties). Recordkeeping costs could average $2,600 for each upholstery fabric manufacturer and $208 for each barrier material manufacturer.

Upholstered furniture manufacturers would also maintain records of testing results for fabrics and barrier materials used in their production. Incremental costs related to recordkeeping would depend, in part, on the extent to which firms currently maintain records identifying upholstery fabrics and filling materials with finished items. Perhaps an average of about 40 hours per firm would be required to maintain records under the proposed standard. According to the 2002 Economic Census, 1,686 firms manufactured upholstered furniture as their primary product. At approximately $26 per hour, these firms would incur average costs of about $1,000 per firm to maintain records, and aggregate annual costs may be about $1.75 million. Thus, the total costs of information collection and recordkeeping could amount to about $2.0 million to $2.3 million.

K. Environmental Considerations

Usually, CPSC rules establishing performance requirements are considered to ''have little or no potential for affecting the human environment,'' and environmental assessments are not usually prepared for these rules (see 16 CFR 1021.5(c)(1)). However, because some alternatives to the proposed rule could result in more materials incorporating flame retardant (FR) chemicals, the Commission determined that a more thorough consideration of the potential for environmental impacts was warranted. The staff prepared a memorandum ''Environmental Assessment of Regulatory Alternatives for Addressing Upholstered Furniture Flammability'' (available on the Commission's Web site) which discusses the potential environmental effects of several regulatory alternatives for addressing the flammability of upholstered furniture. The staff's analysis concludes that, although available scientific data are lacking on some FR chemicals, there appears to be a number of promising methods that manufacturers could use to meet an upholstered furniture flammability standard without posing an unacceptable health risk to consumers or significantly affecting the environment. The staff's analysis was initiated when the primary regulatory alternative being considered was the staff's 2005 draft standard which would likely have caused manufacturers to use FR chemicals to meet certain provisions of that draft standard. As noted previously, the standard that the Commission is proposing was developed, in part, to minimize the need for manufacturers to use FR chemicals to comply with the standard. Only about 14 percent of the cover fabrics would require some modification to pass the proposed standard. The staff anticipates that most manufacturers will likely rely primarily on modifying cover fabrics (without using FR chemicals) or on barriers to meet the proposed performance requirements.

In accordance with the National Environmental Policy Act (''NEPA''), the Executive Director of CPSC has issued a Finding of No Significant Impact (''FONSI'') for the proposed upholstered furniture flammability standard. The FONSI is based on the staff's Environmental Assessment and concludes that there will be no significant impacts on the quality of the human environment as a result of the proposed upholstered furniture flammability standard. The Commission requests comments on both the Environmental Assessment and the FONSI.[93]

L. Executive Order 12988

According to Executive Order 12988 (February 5, 1996), agencies must state the preemptive effect, if any, of new regulations. The preemptive effect of this proposed regulation is as stated in section 16 of the FFA. 15 U.S.C. 1203(a).

M. Effective Date

The Commission proposes that the rule would become effective one year from publication of a final rule in the **Federal Register** and would apply to upholstered furniture manufactured on or after that date. The Commission believes that a one-year effective date should allow sufficient time for manufacturers to develop products for nationwide markets that will meet the proposed requirements. The Commission requests comments, especially from small businesses, on the proposed effective date and the impact it would have.

N. Proposed Findings

1. *General*. In order to issue a flammability standard under the FFA, the Commission must make certain findings and include these in the regulation, 15 U.S.C. 1193(j)(2). These findings are discussed in this section.

2. *Voluntary standards*. In the 1970s the Upholstered Furniture Action Council (UFAC) developed a voluntary industry program to assess the cigarette ignition propensity of upholstered furniture. The substance of the UFAC tests was then adopted in the ASTM E–1353 test method. CPSC staff estimates that approximately 90% of furniture production conforms to the UFAC voluntary program/ASTM E–1353 standards. However, while fire losses from cigarette-ignited upholstered furniture fires have been declining, a large number of deaths (260 annually) and injuries (320 annually) over the period 2002–2004 that could be addressed by the proposed rule remain. Moreover, CPSC laboratory testing has found that UFAC-conforming furniture can nevertheless ignite and burn when exposed to smoldering cigarettes. The Commission is unaware of any other adopted and implemented voluntary standards that address the risk of fire from upholstered furniture ignitions. Accordingly, the Commission finds that compliance with any adopted and implemented voluntary upholstered furniture flammability standard is not likely to result in the elimination or adequate reduction of the risk of injury from such fires.

3. *Relationship of benefits to costs*. The Commission estimates the potential discounted benefits of a year's production of upholstered furniture complying with the standard to range from about $419 million to $424 million (based on a 3 percent discount rate). Compliance costs range from an estimated $34 million to $59 million annually. Thus, projected net benefits of the proposed standard range from $363 million to $385 million. On this basis, the Commission finds that the expected benefits from the regulation bear a reasonable relationship to its costs.

4. *Least burdensome requirement*. The Commission considered proposing the following alternatives: the staff's 2005 draft standard, the staff's 2001 draft small open flame standard, revised requirements drafted by California, a rule based on the industry's voluntary program, and a ''no action'' alternative under which the status quo would continue to prevail. Although the staff's 2005 draft standard could result in substantial net benefits, it would impose significantly higher costs and would necessitate the increased use of FR chemicals. While the staff's 2001 draft small open flame standard would likely be more effective in reducing small open flame fire losses, it would also impose greater costs and necessitate an increase in FR chemicals (nearly 66 percent of upholstery covers would likely need to receive FR treatments to pass). A proposal based on California's TB 117 requirements, which contains provisions for both fabrics and filling materials, would likely have substantial annual costs (about $370 million) and would result in significantly lower net benefits (about $190 million) than the proposed standard. The fact that significant levels of annual deaths and injuries remain despite the existence of the voluntary standard and a high level of compliance with it demonstrate that both the alternatives of a rule based on the voluntary standard and the no action alternative are unlikely to result in adequate reduction or elimination of the risk. Therefore, the Commission finds that the proposed upholstered furniture flammability standard is the least burdensome requirement that would prevent or adequately reduce the risk of injury for which the regulation is being promulgated.

O. Conclusion

For the reasons stated in this preamble, the Commission preliminarily finds that a flammability standard for upholstered furniture is needed to adequately protect the public against the unreasonable risk of the occurrence of fire leading to death, injury, and significant property damage. The Commission also preliminarily finds that the standard is reasonable, technologically practicable, and appropriate. The Commission further finds that the standard is limited to the fabrics, related materials and products which present such unreasonable risks.

List of Subjects in 16 CFR Part 1634

Consumer protection, Flammable materials, Labeling, Upholstered furniture, Upholstered furniture materials, Records, Textiles, Warranties.

For the reasons stated in the preamble, the Commission proposes to amend Title 16 of the Code of Federal Regulations by adding part 1634 to read as follows:

PART 1634—STANDARD FOR THE FLAMMABILITY OF UPHOLSTERED FURNITURE AND UPHOLSTERED FURNITURE MATERIALS

Subpart A—General, Definitions, Performance Requirements

Sec.

1634.1 Purpose, scope and effective date.
1634.2 Definitions.
1634.3 General requirements.
1634.4 Upholstery cover fabric smoldering ignition resistance test.
1634.5 Interior fire barrier material smoldering ignition resistance test.
1634.6 Interior fire barrier material open flame ignition resistance test.

Subpart B—Requirements Applicable to Manufacturers, Labeling, Guaranties

1634.7 Requirements applicable to upholstered furniture material manufacturers.
1634.8 Labeling.
1634.9 Requirements applicable to guaranties under Section 8 of the FFA, 15 U.S.C. § 1197.

[93] Both of these documents are available from the Commission's Office of the Secretary (see **ADDRESSES** section above) or from the Commission's Web site at: *http://www.cpsc.gov/library/foia/foia08/brief/briefing.html.*

Subpart C—Test Apparatus and Materials for Smoldering Ignition Resistance Tests

1634.10 Test room.
1634.11 Specimen holder.
1634.12 Ignition source.
1634.13 Sheeting material.
1634.14 Standard polyurethane foam substrate.
1634.15 Standard cotton velvet cover fabric.
1634.16 Conditioning.

Subpart D—Test Facility, Exhaust System, and Cautions

1634.17 Test facility and exhaust system.
1634.18 Cautions.

Subpart E—Test Facility and Materials for Open Flame Ignition Resistance Tests

1634.19 Test room.
1634.20 Butane gas flame ignition source.
1634.21 Metal test frame.
1634.22 Standard rayon cover fabric.
1634.23 Open flame tests fabric cut-out dimensions.
1634.24 Standard polyurethane foam substrate.
1634.25 Conditioning.

Subpart F—Reupholstering

1634.26 Requirements applicable to reupholstering.

Figures

Figure 1 to Part 1634—Cigarette Ignition Specimen Holder—Base
Figure 2 to Part 1634—Cigarette Ignition Specimen Holder—Movable Horizontal Support Panel
Figure 3 to Part 1634—Mockup Assembly for Upholstery Cover Fabric Smoldering Ignition Resistance Test
Figure 4 to Part 1634—Mockup Assembly for Interior Fire Barrier Material Smoldering Ignition Resistance Test
Figure 5 to Part 1634—Cut-Out Template Dimensions for Open Flame Test
Figure 6 to Part 1634—Open Flame Metal Test Frame
Figure 7 to Part 1634—Mockup Assembly for Interior Fire Barrier Materials Open Flame Ignition Resistance Test

Authority: 15 U.S.C. 1193.

Subpart A—General, Definitions, Performance Requirements

§ 1634.1 Purpose, scope, and effective date.

(a) *Purpose.* This part 1634 establishes flammability limits that all upholstered furniture subject to this part must meet before sale or introduction into commerce. The purpose of these requirements is to reduce deaths and injuries associated with upholstered furniture fires.

(b) *Scope.* All upholstered furniture as defined in § 1634.2(a) manufactured or reupholstered on or after the effective date of this standard is subject to the requirements of this part.

(c) *Effective date.* The standard shall become effective on [the effective date of this standard] and shall apply to all upholstered furniture, as defined in 1643.2(a), manufactured or reupholstered on or after that date.

§ 1634.2 Definitions.

In addition to the definitions given in section 2 of the Flammable Fabrics Act as amended (15 U.S.C. 1191), the following definitions apply for purposes of this part 1634.

(a) *Upholstered furniture* means, for purposes of this part 1634, an article of seating furnishing intended for indoor use in a home or other residential occupancy that: consists in whole or in part of resilient cushioning materials (such as foam, batting, or related materials) enclosed within a covering consisting of fabric or related materials, such as leather; and is constructed with contiguous upholstered seat and back or arms(s).

(1) Items included in the scope of paragraph (a) of this section include, but are not limited to, products that are intended or promoted for indoor residential use for sitting or reclining upon, such as: chairs, sofas, motion furniture, sleep sofas, home office furniture customarily offered for sale through retailers or otherwise available for residential use, and upholstered furniture intended for use in dormitories or other residential occupancies. This includes the unattached cushions or pillows on such items if they are sold with the item of upholstered furniture.

(2) Items excluded from the scope of paragraph (a) of this section consist of: furniture, such as patio chairs, intended solely for outdoor use; furniture without contiguous upholstered seating and backs and/or arm surfaces, such as ottomans; pillows or pads that are not sold with an article of furniture; commercial or industrial furniture not offered for sale through retailers or not otherwise available for residential use; furniture intended or sold solely for use in hotels and other short-term lodging and hospitality establishments; futons, flip chairs, the mattress portions of sleep sofas; and infant or juvenile products such as walkers, strollers, high chairs, or pillows.

(b) *Type I* upholstered furniture means upholstered furniture that is constructed with an upholstery cover fabric or other material that covers the seating area and is certified to meet the performance requirements of § 1634.4.

(c) *Type II* upholstered furniture means upholstered furniture that is constructed with an interior fire barrier material that:

(1) Is located directly beneath the external covering material;

(2) Completely encases the filling material used in the seating area of the item of upholstered furniture; and

(3) Is certified to meet the performance requirements of §§ 1634.5 and 1634.6.

(d) *Manufacturer* means any entity that produces or reupholsters upholstered furniture or manufactures upholstered furniture materials subject to this part 1634. For purposes of this part, an importer of upholstered furniture is also a manufacturer. See subpart F of this part for additional information on reupholstering.

(e) *Produced* means, for the purposes of this part 1634, manufactured or imported.

(f) *Upholstery cover fabric* means the outermost layer of attached fabric or other material, such as leather, used to cover the seating area of the upholstered furniture item.

(g) *Crevice* means the location in the mockup formed by the intersection of the vertical and horizontal surfaces of the test mockup.

(h) *Interior fire barrier* means a fire-resistant material which is interposed between the upholstery cover fabric and any interior filling material.

(i) *Fire-resistant material* means a material capable of reducing the likelihood of ignition or delaying fire growth.

(j) *Flame retardant* means having a chemical coating or treatment added that imparts greater fire resistance.

(k) *Ignition* (for open flame testing) means continuous, self-sustaining combustion, characterized by the presence of any visible flaming, glowing, or smoldering, after removal of the ignition source.

(l) *Metal test frame* means the apparatus consisting of two rectangular metal frames used for assembly of seating area mockups in open flame ignition resistance tests. See subpart E of this part.

(m) *Mockup assembly* means the seating area mockup consisting of the component material to be evaluated and all required standard test materials, fully assembled in the appropriate specimen holder or metal test frame.

(n) *Sample* means a material to be tested for use in upholstered furniture subject to this part.

(o) *Seating area* means those portions of an item of upholstered furniture which a person may sit upon, or rest against while sitting, including the seat

and the inside of the back and arms of the item. The seating area includes such surfaces of any loose pillows or cushions that are not attached to the item of upholstered furniture but are sold with it.

(p) *Self-extinguishment* means the unassisted termination of any visible combustion within a defined time period after ignition source removal and before the specimen is completely consumed.

(q) *Sheeting material* means cotton sheeting fabric used to cover the cigarette ignition source in smoldering ignition resistance tests. See subpart C of this part.

(r) *Smolder* means combustion characterized by smoke production, without visible flame or glowing.

(s) *Specimen* means an individual piece of upholstery fabric or barrier material, as defined in paragraph (n) of this section, used in a mockup assembly for smoldering or open flame ignition testing.

(t) *Specimen holder* means the two wooden panels used for assembly of seating area mockups in smoldering ignition resistance tests. See subpart C of this part.

(u) *Standard polyurethane foam (SPUF) substrate* means the standard substrate used for the assembly of seating area mockups to evaluate materials used in upholstered furniture construction. See subparts C and E of this part.

(v) *Substrate* means the innermost material of the tested seating area mockup, representing the filling material used in upholstered furniture.

(w) *Warp or machine direction of the fabric* means the direction of yarns that run lengthwise, i.e., parallel to selvage, in woven fabrics.

§ 1634.3 General requirements.

(a) *Upholstered furniture.* Each item of upholstered furniture subject to this part shall comply with the performance requirements of this part applicable to the upholstered furniture materials required for that ''Type'' of upholstered furniture and all other applicable requirements of this part.

(b) *Guaranties.* Each guaranty issued under this part shall be in accordance with the applicable requirements of § 1634.9.

(c) *Summary of § 1634.4 through § 1634.6 tests.* The test methods set forth in §§ 1634.4 through 1634.6 measure the flammability performance (resistance to smoldering or small open flame ignition) of cover fabrics and fire barrier materials through a series of tests using small scale mockups representative of the typical construction of upholstered furniture.

(d) *Standard cover fabric cutting*—(1) *Smoldering test.* The vertical panel pieces shall be cut with the long dimension being in the warp direction and the top edge is defined such that the pile lays smooth when brushed from top to bottom. The horizontal panel pieces shall be cut with the long dimension being in the warp direction and the top edge is defined such that the pile lays smooth when brushed from top to bottom.

(2) *Open flame test.* The open flame test specimens shall be cut with the long dimension being in the warp direction (if applicable).

§ 1634.4 Upholstery cover fabric smoldering ignition resistance test.

(a) *Scope.* This test method is intended to measure the cigarette ignition resistance of upholstery cover fabrics used in upholstered furniture. This test applies to all upholstery cover fabrics to be used in Type I upholstered furniture.

(b) *Summary of test method.* Ten initial test specimens are required for the upholstery cover fabrics sample. Vertical and horizontal panels of a standard foam substrate are covered, using the upholstery cover fabric to be tested. These panels are placed in the specimen holders, and a lighted cigarette is placed in the crevice formed by the intersection of vertical and horizontal panels of each test assembly. Each cigarette is covered with a piece of sheeting fabric. The cigarettes are allowed to burn their entire length. Test measurements and observations are recorded during and after the 45-minute test duration. The mockup must not continue to smolder at the end of the test or transition to flaming at any time during the test, and the substrate must not exceed the mass loss limit. If the 10 initial specimens meet the performance criteria in paragraph (m) of this section, the cover fabric sample passes. If a failure is recorded in any of the 10 initial specimens, the test shall be repeated on an additional 20 specimens. At least 25 of the 30 specimens tested must meet the performance criteria of paragraph (m) of this section.

(c) *Significance and use.* This test method is designed to measure the resistance of an upholstery cover fabric to a smoldering ignition source when the fabric is placed over a standard polyurethane foam substrate.

(d) *Test apparatus and materials.* The test apparatus and materials used in this test are detailed in subpart C of this part.

(e) *Ignition source.* The ignition source is the standard cigarette specified in subpart C of this part.

(f) *Sheeting material.* Sheeting material shall be used to cover the standard test cigarettes. For testing, the fabric shall be cut into squares 127 × 127 mm (5.0 × 5.0 in). Use the sheeting material specified in subpart C of this part.

(g) *Standard polyurethane foam substrate.* Upholstery cover materials shall be tested in a specimen holder using standard polyurethane foam (SPUF) substrate. Use the SPUF substrate specified in subpart C of this Part.

(1) The SPUF substrate shall be cut into 203 × 203 × 76 mm (8.0 × 8.0 × 3.0 in) pieces for vertical panels and 127 × 203 × 76 mm (5.0 × 8.0 × 3.0 in) pieces for horizontal panels.

(2) Each SPUF substrate piece shall be hand crushed before use by wadding or balling up one time in the fist.

(3) On the data sheet, record the initial mass of each horizontal and vertical SPUF substrate piece to the nearest 0.1 grams.

(h) *Specimen holder.* The specimen holder shall consist of two wooden panels, each a nominal 203 × 203 mm (8.0 × 8.0 in) and nominal 19 mm (0.75 in) thickness, joined together at one edge. A moveable horizontal panel support shall be positioned on a centrally located guide. See subpart C and Figures 1 and 2.

(i) *Test facility and cautions.* The test facility, exhaust system, and cautions are detailed in subpart D of this part.

(j) *Conditioning.* All test specimens and standard test materials (including SPUF substrates, cigarettes, and sheeting material) shall be conditioned in accordance with subpart C of this part.

(k) *Test specimens*—(1) *Specimen requirements.* (i) From the upholstery cover fabric sample to be tested, initially 10 specimens shall be cut, comprised of vertical panels, each 203 × 432 mm (8.0 × 17.0 in), and horizontal panels, each 203 × 280 mm (8.0 × 11.0 in).

(ii) The vertical and horizontal panel cover fabric pieces shall be cut with the long dimension in the warp direction and such that the major areas of fabric variation will lie in the crevice of the mockup assembly.

(iii) The horizontal panel cover fabric pieces shall be mounted warp to warp with the vertical panel pieces such that the major areas of fabric variation will lie in the crevice of the mockup assembly.

(2) *Specimen mounting.* (i) For vertical panels, place the cover fabric on the 203 × 203 × 76 mm (8.0 × 8.0 × 3.0

in) SPUF substrate pieces, taking care that any areas of fabric variation mentioned in paragraph (k)(1) of this section are positioned such that they will form the crevice of the assembled mockup. The warp or machine direction of the fabric should run front to back on the mockup assembly. Attach the cover fabric to the SPUF substrate pieces with straight pins and pull the cover fabric smooth so that no air gaps exist between the fabric and SPUF substrate. Attach the cotton sheeting material to the vertical panels with straight pins so that the sheeting material will cover the cigarette when placed in the crevice, approximately 50 mm (2 in) from the top of the 203 mm (8.0 in) dimension.

(ii) For horizontal panels, place the cover fabric on the 127 x 203 x 76 mm (5.0 x 8.0 x 3.0 in) SPUF substrate pieces, taking care that any areas of fabric variation mentioned in paragraph (k)(1) of this section are on the edge which will form the crevice of the assembled mockup. The warp direction of the cover fabric shall run front to back on the mockup assembly. Attach the cover fabric to the SPUF substrate pieces with straight pins and pull the fabric smooth so that no air gaps exist between the fabric and foam substrate.

(iii) Place the assembled vertical and horizontal panels in the specimen holder. Press the horizontal panel against the vertical panel to create a straight-line crevice at the intersection. See Figure 3.

(l) *Test procedure.* (1) Place the assembled mockups a sufficient distance apart from each other to avoid heat transfer between samples.

(2) Light cigarettes so that no more than 4 mm (0.16 inch) is burned away and place one cigarette on each mockup crevice created by the intersection of the vertical and horizontal panels, such that the cigarette contacts both surfaces and is equidistant from the side edges of the test panels.

(3) Immediately after placement in the crevice of each mockup, cover cigarettes with cotton sheeting and run one finger over the sheet along the length of the covered cigarette to ensure good cover sheeting-to-cigarette contact and begin timer. If a test is inadvertently interrupted or a cigarette self-extinguishes on lighting, it shall be repeated from the beginning with a new cigarette.

(4) Continue testing for 45 minutes.

(5) At 45 minutes, if the mockup assembly is smoldering, record a failure for the mockup and extinguish with appropriate means and proceed to paragraph (m) of this section. See Subparts C and D of this part.

(6) Remove cotton sheeting fabric and remains of upholstery fabric from the substrate pieces.

(7) Carefully remove the SPUF substrate pieces, clean all carbonaceous char from panels with a brush.

(8) If the application of an extinguishing agent was not necessary or a gaseous extinguishing agent (e.g., carbon dioxide or nitrogen) was applied to the SPUF substrate, record the mass of the un-charred portions of the SPUF substrate pieces to the nearest 0.1 grams within 15 minutes and proceed to paragraph (m) of this section.

(m) *Pass/fail criteria.* (1) The sample passes the requirements of this test procedure if the following criteria are met:

(i) No mockup continues to smolder after the 45 minute test duration;

(ii) No mockup transitions to open flaming; and

(iii) No SPUF substrate (i.e., sum of both horizontal and vertical pieces) of any mockup assembly has more than 10% mass loss.

(2) If the 10 initial specimens meet the performance criteria of this paragraph (m), the cover fabric sample passes. If a failure is recorded in any of the 10 initial specimens, the test shall be repeated on an additional 20 specimens. At least 25 of the 30 specimens tested must meet the criteria of this paragraph.

(n) *Test report.* The test report shall include, at a minimum, the following information:

(1) Name and address of test laboratory;

(2) Date of the test(s);

(3) Name of the operator conducting the test;

(4) Complete description of the test specimens;

(5) Applicable smoldering and mass and data for each SPUF substrate piece from each mockup including:

(i) Mockup smoldering at 45 minutes (Yes/No);

(ii) Pre-test mass;

(iii) Post-test mass; and

(iv) The percent mass loss of the SPUF substrate of each mockup assembly.

(6) Statement of overall pass/fail results.

§ 1634.5 Interior fire barrier material smoldering ignition resistance test.

(a) *Scope.* This test method is intended to measure the cigarette ignition resistance of interior fire barrier materials used in upholstered furniture to be used in Type II upholstered furniture. This test method applies to fire-resistant materials including, but not limited to, all interior fabrics or high loft battings to be qualified as fire barriers.

(b) *Summary of test method.* Ten initial test specimens are required for the interior fire barrier sample. Vertical and horizontal panels of the interior fire barrier material to be tested are placed between a standard foam substrate and a standard cover fabric. The panels are placed in the specimen holders and a lighted cigarette is placed in the crevice formed by the intersection of the vertical and horizontal panels in each test assembly. Each cigarette is covered with a piece of sheeting fabric. The cigarettes are allowed to burn their full length. Test measurements and observations are recorded during and after the 45-minute test duration. The substrate must not exceed the mass loss limit at the end of the test and the mockup assembly must not transition to open flaming at anytime during the test. If the initial 10 specimens meet the performance criteria in paragraph (n) of this section, the interior fire barrier sample passes. If a failure is recorded in any of the 10 initial specimens, the test shall be repeated on an additional 20 specimens. The performance criteria of paragraph (n) of this section must be met on at least 25 of the 30 specimens tested.

(c) *Significance and use.* This test method is designed to measure the resistance of an interior fire barrier material to a smoldering ignition source when the barrier is placed between a standard cover fabric and a standard foam substrate.

(d) *Test apparatus and materials.* The test apparatus and materials are detailed in subpart C of this part.

(e) *Ignition source.* The ignition source is the standard cigarette specified in subpart C of this part.

(f) *Sheeting material.* Sheeting material shall be used to cover the standard test cigarettes. For testing, the fabric shall be cut into squares 127 x 127 mm (5.0 x 5.0 in). Use the sheeting material specified in subpart C of this part.

(g) *Standard cover fabric.* (1) The standard cover fabric represents a smolder-prone fabric. Use the standard cover fabric specified in subpart C of this part.

(2) From the standard cover fabric, initially 10 pieces shall be cut for vertical panels each 203 x 432 mm (8.0 x 17.0 in) and initially 10 pieces for horizontal panels each 203 x 280 mm (8.0 x 11.0 in).

(h) *Standard polyurethane foam substrate.* (1) Fire barrier materials shall be tested in a specimen holder using standard polyurethane foam (SPUF) substrate. Use the SPUF substrate specified in subpart C of this part.

(2) The SPUF substrate shall be cut into pieces 203 x 203 x 76 mm (8.0 x 8.0 x 3.0 in) for vertical panels and 127 x 203 x 76 mm (5.0 x 8.0 x 3.0 in) for horizontal panels.

(3) Each SPUF substrate piece shall be hand crushed before use by wadding or balling up one time in the fist.

(4) Record the initial mass to the nearest 0.1 grams of each horizontal and vertical SPUF substrate piece in the data sheet.

(i) *Specimen holder.* The specimen holder shall consist of two wooden panels, each a nominal 203 x 203 mm (8.0 x 8.0 in) and nominal 19 mm (0.75 in) thickness, joined together at one edge. A moveable horizontal panel support is positioned on a centrally located guide. See subpart C and Figures 1 and 2.

(j) *Test facility and cautions.* The test facility, exhaust system, and cautions are detailed in subpart D of this part.

(k) *Conditioning.* All test specimens and standard test materials (including SPUF substrates, cigarettes, and sheeting material) shall be conditioned in accordance with subpart C of this part.

(l) *Test specimens*–(1) *Test specimen requirements.* From the interior fire-barrier material sample to be tested, initially 10 specimens shall be cut, comprised of vertical panels each 203 x 356 mm (8.0 x 14.0 in) and horizontal panels each 203 x 229 mm (8.0 x 9.0 in). If the interior fire-barrier material is directional, the vertical panel pieces shall be cut with the long dimension being in the warp direction. The horizontal panel specimens shall be cut such that the short dimension is in the warp direction.

(2) *Specimen mounting.* (i) For vertical panels, place the 203 x 432 mm (8.0 x 17.0 in) standard cover fabric over the fire-barrier material on a 203 x 203 x 76 mm (8.0 x 8.0 x 3.0 in) SPUF substrate piece. The standard cover fabric and interior fire-barrier shall be oriented such that the top edges of these materials run from top to bottom. Attach with straight pins and pull smooth so that no air gaps exist. Attach the cotton sheeting material to the vertical panels with straight pins so that the sheeting material will cover the cigarette when placed in the crevice, approximately 50 mm (2.0 in) from the top of the panel.

(ii) For horizontal panels, place the 203 x 280 mm (8.0 x 11.0 in) standard cover fabric over the interior fire-barrier on the 127 x 203 x 76 mm (5.0 x 8.0 x 3.0 in) SPUF substrate pieces. The standard cover fabric and interior fire-barrier shall be oriented such that the top edges of these materials run from the crevice to the front. Attach with straight pins and pull smooth so that no air gaps exist.

(iii) Place the assembled vertical and horizontal panels in the specimen holders. Press the horizontal panel against the vertical panel to create a straight-line crevice at the intersection. See Figure 4.

(m) *Test procedure.* (1) Place the assembled mockups a sufficient distance apart from each other to avoid heat transfer between samples.

(2) Light cigarettes so that no more than 4 mm (0.16 inch) is burned away and place one cigarette on each mockup crevice created by the intersection of the vertical and horizontal panels, such that the cigarette contacts both surfaces and is equidistant from the side edges of the test panels.

(3) Immediately after placement in the crevice of each mockup, cover cigarettes with cotton sheeting and run one finger over the sheet along the length of the covered cigarette to ensure good cover sheeting-to-cigarette contact and begin timer. If a test is inadvertently interrupted or cigarette self extinguishes on lighting, it shall be repeated from the beginning with a new cigarette.

(4) Continue testing for 45 minutes.

(5) At 45 minutes, if the mockup assembly is smoldering, extinguish with appropriate means. See subparts C and D of this part.

(6) Remove cotton sheeting fabric, remains of standard cover fabric, and interior fire-barrier material from the substrate panels.

(7) Carefully remove the SPUF substrate test panels and clean all carbonaceous char from panels with a brush.

(8) If the mockup has self-extinguished by the end of the 45 minute test, or if a gaseous extinguishing agent (e.g. carbon dioxide or nitrogen) was applied to the mockup, record the mass of the un-charred portions of the SPUF substrate pieces to the nearest 0.1 grams within 15 minutes and proceed to § 1634.5(n).

(9) If a mass-adding extinguishing agent (e.g., water-based agent) was applied to the substrate, re-condition the SPUF substrate pieces as follows.

(i) Place the SPUF substrate pieces in the active flow of a laboratory air hood to dry for at least 24 hours.

(ii) Measure and record the mass of the SPUF substrate pieces to the nearest 0.1 gram.

(iii) Place the SPUF substrate pieces in the active flow of the laboratory air hood to dry for at least three additional hours.

(iv) Measure and record the mass of the SPUF substrate pieces to the nearest 0.1 gram and compare the measurement with the previous one.

(v) Repeat this procedure every three hours until the mass of the substrate pieces remains within a tolerance of 0.5% from the previous reading.

(vi) Re-condition the SPUF pieces according to paragraph (k) of this section.

(vii) Record the mass of the un-charred portions of the SPUF substrate pieces to the nearest 0.1 grams.

(n) *Pass/fail criteria.* (1) The sample passes the requirements of this test procedure if the following criteria are met:

(i) No SPUF substrate (i.e., sum of both horizontal and vertical pieces) of any specimen from a mockup assembly has more than 1% mass loss; and

(ii) No mockup assembly transitions to open flaming.

(2) If the 10 initial specimens meet the performance criteria of this paragraph (n), the interior fire-barrier sample passes. If a failure is recorded in any of the 10 initial specimens, the test shall be repeated on an additional 20 specimens. At least 25 of the 30 specimens tested must meet the performance criteria of this paragraph (n).

(o) *Test report.* The test report shall include, at a minimum, the following information:

(1) Name and address of test laboratory;

(2) Date of the test(s);

(3) Name of the operator conducting the test;

(4) Complete description of the test specimens;

(5) Mass data for each SPUF substrate piece from each mockup including:

(i) Pre-test mass;

(ii) Post-test mass; and

(iii) The percent mass loss of the SPUF substrate of each mockup assembly.

(6) Statement of overall pass/fail results.

§ 1634.6 Interior fire barrier material open flame ignition resistance test.

(a) *Scope.* This test procedure is intended to measure the open flame ignition resistance of interior fire-barrier materials to be used in Type II upholstered furniture. This test applies to materials including, but not limited to, interior fabrics or high loft battings to qualify them as fire-barriers.

(b) *Summary of test method.* Ten initial test specimens are required for the interior fire-barrier sample. The interior fire-barrier material to be tested is placed between a standard cover fabric and standard foam substrate and assembled on a metal test frame. An

open flame ignition source is applied to the crevice formed by the intersection of the seat/back surfaces of the mockup. Test measurements and observations are recorded during the 45-minute test duration. The mockup assembly must not exceed the mass loss limit. If the 10 initial specimens meet the performance criteria of paragraph (n) of this section, the interior fire-barrier sample passes. If a failure is recorded in any of the 10 initial specimens, the test shall be repeated on an additional 20 specimens. At least 25 of the 30 specimens tested must meet the performance criteria of paragraph (n) of this section.

(c) *Significance and use.* This test method is designed to measure the resistance of an interior fire-barrier material to an open flame ignition source when the barrier is placed between a standard cover fabric and a standard foam substrate.

(d) *Test apparatus and materials.* The test apparatus and materials are detailed in subpart E of this part.

(e) *Ignition source.* The ignition source is the nominal 240 mm butane gas flame described in subpart E of this part.

(f) *Standard cover fabric.* (1) The standard cover fabric represents a moderately flammable upholstery cover fabric. Use the standard cover fabric specified in subpart E of this part.

(2) The standard cover fabric size needed for each test is 1020 x 700 ± 10 mm (40 x 27.5 ± 0.4 in). From the standard cover fabric, cut triangular cut-outs centered 575 mm (22.5 in) from the top edge on both sides. The size of these cut-outs shall be approximately 55 x 135 ± 5 mm (2.1 x 5.25 ± 0.2 in) high. See subpart E of this part and Figure 5.

(g) *Standard polyurethane foam substrate.* (1) Interior fire-barrier materials shall be tested with a standard polyurethane foam (SPUF) substrate. Use the SPUF substrate specified in subpart E of this part.

(2) Two panels of the SPUF substrate shall be used. The vertical (back) block shall be 457 x 305 ± 5 mm (18.0 x 12.0 ± 0.2 in) x 76 ± 2 mm (3.0 ± 0.08 in) thick. The horizontal (seat) block shall be 457 x 83 ± 5 mm (18.0 x 3.25 ± 0.2 in) x 76 ± 2 mm (3.0 ± 0.08 in) thick.

(h) *Metal test frame.* The metal test frame shall consist of two rectangular metal frames locked at right angles to each other. A rod shall be continuous across the back of the metal test frame. See subpart E of this part and Figure 6.

(i) *Test facility and cautions.* The test facility, exhaust system and cautions are detailed in subpart D of this part.

(j) *Conditioning.* All test specimens and standard test materials shall be conditioned in accordance with subpart E of this part.

(k) *Test specimens.* (1) The interior fire-barrier specimen needed for each test is 1020 x 700 ± 10 mm (40 x 27.5 ± 0.4 in). From the interior fire-barrier specimen, cut triangular cut-outs centered 575 mm (22.5 in) from the top edge on both sides. The size of these cut-outs shall be approximately 55 x 135 ± 5 mm (2.1 x 5.25 ± 0.2 in) high. See subpart E of this part and Figure 5.

(2) If the interior fire-barrier material is directional, the specimen shall be cut with the long dimension (1020 mm, 40 in) being in the warp direction and the top edge is defined as appropriate.

(l) *Mockup assembly.* (1) Position the seat frame in the upright position. Adjust the horizontal and vertical (seat and back) panels by loosening the screws holding the two panels in place. Pull the horizontal panel forward and the vertical panel upwards creating a larger gap between the two panels at the crevice. Temporarily secure the two panels in place (expanded position).

(2) Lay the interior fire-barrier specimen flat and face up on the table. Lay the standard cover fabric on top, face up.

(3) Fold the two sides of the top (larger) section of fabric and fire-barrier specimen (from the cutout upwards) over the face of the standard cover fabric.

(4) Thread the folded standard cover fabric and fire-barrier specimen under the horizontal rod and pull them out from the back of the metal test frame until the cutouts are lined up with the horizontal rod.

(5) Thread the folded standard cover fabric and fire-barrier specimen back over the rod and pull them out from the front of the frame.

(6) Line up and pull both the top and bottom sections of the standard cover fabric and fire-barrier specimen so that the cutouts are lined up with the metal rod on both sides and the standard cover fabric and fire-barrier specimen are laying flat and free of folds and wrinkles.

(7) Place the larger SPUF block flush against the back metal frame and resting on the fire-barrier specimen. Loosen the screws holding the vertical (back) panel and lower the panel until the top of the panel is flush with the top of the larger SPUF foam block. Tighten the screws so that the vertical panel is secure.

(8) Lift the larger portion of both the fire-barrier specimen and standard cover fabric over the SPUF back block and secure them to the top of the back section of the metal frame using metal clips.

(9) Starting at the lowest part of the vertical section on one side, clip both the fire-barrier specimen and standard cover fabric to the frame. At the top corner, make a diagonal fold of the fire-barrier specimen separate from the standard cover fabric. Make a similar fold with the standard cover fabric and secure all the folded layers (both fire-barrier and standard cover fabric) to the frame with metal clips to the side of the test frame. Repeat for the other side.

(10) When the back section is completed, place the frame down so that the back of the frame is on the table.

(11) Lift up the smaller portion of the standard cover fabric and fire-barrier specimen and lay them flat on the back panel.

(12) Place the smaller SPUF block with the 83 mm (3.25 in) side flush against the seat section of the metal frame and press against the back panel. Loosen the screw holding the horizontal panel and move the panel until the panel is flush with the smaller SPUF foam block. Tighten the screws so that the horizontal panel is secure.

(13) Pull the smaller section of the fire-barrier specimen and standard cover fabric over the SPUF seat block and secure them to bottom front edge of the metal frame using metal clips.

(14) Re-position the assembly in the upright position.

(15) On one side, fold the unsecured front edge of the fire-barrier specimen back against the SPUF block. Then, make a diagonal fold with the unsecured top edge of fire-barrier specimen down on top of it. Repeat with the unsecured edges of standard cover fabric and clip to the bottom of the metal test frame. Repeat on the other side.

(16) Ensure that the standard cover fabric and fire-barrier specimens are smooth and under uniform tension at all locations to eliminate air gaps between the standard cover fabric, fire-barrier specimen, and the SPUF blocks. Do not allow a gap exceeding 3 mm (0.125 inch) along the seat/back crevice. See Figure 7.

(m) *Test procedure.* Have a means for extinguishing the specimen close at hand. A hand-held carbon dioxide extinguisher is adequate for most specimens; however, a water spray system should be available as a back-up, in case the carbon dioxide fails to completely extinguish the fire.

(1) *Pretest.* (i) Tare the scale with the empty metal test frame and clips or, if the scale does not have tare capability, record the mass of metal test frame and clips.

(ii) Assemble the mockup as described in paragraph (l) of this section.

(iii) Record the initial mass of the fabric/specimen/substrate assembly directly (if tared) or by subtraction (if not tared).

(iv) Calculate and record the mass corresponding to 20% mass loss of initial mass of the mockup assembly.

(2) *Lighting the igniter flame.* (i) Open the butane tank slowly and light the end of the burner tube. Adjust the gas flow to the appropriate rate to achieve a 240 mm flame. See subpart E of this part.

(ii) Allow the flame to stabilize for at least 2 minutes.

(3) *Starting and performing the test.* (i) Place the lit burner tube in the crevice of the mockup so that the end of the igniter is at the center of the mockup equidistant from either edge.

(ii) Apply the flame for 70 ± 1 seconds, then immediately remove ignition source from the mockup. Observe the mockup combustion behavior for 45 minutes.

(iii) Terminate a test run if any of the following conditions occurs:

(A) The mockup self-extinguishes;

(B) The 45 minute test duration has elapsed; or

(C) The mass of the mockup reaches more than 20% mass loss of the initial mass before 45 minutes have elapsed.

(n) *Pass/fail criterion.* (1) The sample passes if no mockup assembly has more than 20% mass loss at the end of the 45-minute test.

(2) If the 10 initial specimens meet the performance criterion, the interior fire-barrier sample passes. If a failure is recorded in any of the 10 initial specimens, the test shall be repeated on an additional 20 specimens. At least 25 of the 30 specimens tested must meet the performance criterion of this paragraph.

(o) *Test report.* The test report shall include, at a minimum, the following information:

(1) Name and address of the test laboratory;

(2) Date of the test(s);

(3) Name of operator conducting the test;

(4) Complete description of the test specimens;

(5) Mass data for the mockup including:

(i) Initial mass;

(ii) Mass corresponding to 20% mass loss of initial mass;

(iii) Time to reach the mass equal to 20% mass loss of the initial mass;

(iv) The percent mass loss of the mockup at 45 minutes.

(6) Statement of overall pass/fail results.

Subpart B—Requirements Applicable to Manufacturers, Labeling, Guaranties

§ 1634.7 Requirements applicable to upholstered furniture manufacturers.

(a) *General.* Each manufacturer (including importers) of upholstered furniture subject to this part shall ensure that each article of upholstered furniture it manufactures or imports for introduction into commerce complies with all applicable requirements of this part.

(b) *Label.* Each article of upholstered furniture subject to this part shall bear a label conforming to the requirements of § 1634.8.

(c) *Certification.* The certification statement specified on the label required by paragraph (b) of this section constitutes the manufacturer's certification that the article of upholstered furniture to which it is affixed complies with all applicable requirements of this part.

(d) *Basis for certification.* The manufacturer shall have an objectively reasonable basis for the certification required by paragraph (c) of this section. Examples of an objectively reasonable basis for certification are:

(1) Records of reasonable and representative tests demonstrating compliance with all applicable requirements of this part for each cover or barrier material required for the Type of furniture specified on the label required by § 1634.8; or

(2) Possession of guaranties meeting the requirements of § 1634.9 for each cover or barrier material required for the Type of furniture specified on the label required by § 1634.8 and maintaining that the manufacturer has not, by further processing, negatively affected the fire performance of any such cover or barrier material.

(e) *Records.* (1) Every upholstered furniture manufacturer (including importers) subject to this part shall maintain records of the test results and details of each test performed by or for that manufacturer (including failures) intended to support certification in accordance with paragraph (c) of this section. Details shall include all the information required in the Test Report in accordance with §§ 1634.4(n), 1634.5(o) and 1634.6(o).

(2) Records required by this paragraph (e) shall be in English and kept at a location in the United States.

(3) Records required by this paragraph (e) shall be maintained by the manufacturer during production of the upholstered furniture and for a period of at least three (3) years after production of the article of upholstered furniture ceases. These records shall be made available to Commission staff upon request.

(f) *Cessation of production.* If the manufacturer becomes aware of any information that indicates that any article of upholstered furniture manufactured by that manufacturer fails to comply with this part, the manufacturer shall cease production and distribution of such upholstered furniture until corrective action has been taken to ensure that further production will conform to all applicable requirements of this part.

(g) *Notification to upholstered furniture material suppliers.* An upholstered furniture manufacturer who becomes aware of information indicating that any cover or barrier material used, or intended to be used, in upholstered furniture produced by it fails to meet any applicable requirement of this part shall promptly inform the supplier of that material of the deficiency. (Upholstered furniture manufacturers are also reminded of the reporting requirements of § 15 of the Consumer Product Safety Act, 15 U.S.C. 2064, and implementing regulations at 16 CFR part 1115.)

§ 1634.8 Labeling.

(a) Each article of upholstered furniture subject to this part shall bear a permanent, conspicuous, and legible label containing:

(1) Name of the manufacturer (and importer, if any);

(2) Location of the manufacturer (and importer, if any), including street address, city and state;

(3) Month and year of manufacture;

(4) Model identification;

(5) Type identification (i.e., ''Type I'' or ''Type II''); and

(6) The statement ''The manufacturer hereby certifies that this article of upholstered furniture complies with all applicable requirements of 16 CFR part 1634''.

(b) The information required by paragraph (a) of this section shall be set forth separately from any other information appearing on the label. Other information, representations, or disclosures, appearing on labels required by this section or elsewhere on the item, shall not interfere with, minimize, detract from, or conflict with, the required information.

(c) No person shall remove or mutilate, or cause or participate in the removal or mutilation of, any label required by this section to be affixed to any article of upholstered furniture.

§ 1634.9 Requirements applicable to guaranties under section 8 of the FFA, 15 U.S.C. 1197.

(a) *General.* Either the manufacturer of a finished article of upholstered furniture subject to this part or the manufacturer of any cover or barrier material subject to this part may issue a guaranty in accordance with this section. The guaranty shall specify the classification(s) (Type I or II) of upholstered furniture for which the guaranty is intended to be valid.

(b) *Tests to support guaranties.* Section 8 of the Flammable Fabrics Act, 15 U.S.C. 1197, requires that a guaranty thereunder ultimately be supported by reasonable and representative tests. Reasonable and representative tests for purposes of this part shall be tests performed sufficiently to demonstrate that the tested item conforms with each applicable requirement of this part.

Subpart C—Apparatus and Materials for Smoldering Ignition Resistance Tests

§ 1634.10 Test room.

(a) The test room shall have an appropriate fire protection suppression system. A suitable extinguishment system such as a water bottle fitted with a spray nozzle shall be provided to extinguish any ignited portions of the mockup assembly. Dry chemical extinguishing agents shall not be used to extinguish or suppress smoldering combustion since the chemicals add mass therefore increasing the post-test mass of the mockup remains. In addition, straight pins, staples, a razor, knife or scissors, a scale, and a brush and/or tongs may be needed to perform the tests.

(b) If conditions in the test room do not meet the conditioning specifications, then testing must be initiated within 10 minutes after the specimens are removed from the conditioning room.

§ 1634.11 Specimen holder.

The specimen holder shall consist of two wooden panels, each nominal 203 x 203 mm (8.0 x 8.0 in) and nominal 19 mm (0.75 in) thickness, joined together at one edge. A moveable horizontal panel support is positioned on a centrally located guide. See Figures 1 and 2.

§ 1634.12 Ignition source.

The ignition source for all smoldering tests shall be cigarettes without filter tips made from natural tobacco, 85 ± 2 mm (3.3 ± 0.1 in) long and with a packing density of 0.27 ± 0.02 g/cm^3 (0.16 ± 0.01 oz/in^3) and a total weight of 1.1 ± 0.1 g (0.039 ± 0.004 oz).

§ 1634.13 Sheeting material.

(a) The specifications of the sheeting material are as follows:

(1) Fiber content: 100% cotton

(2) Color: White

(3) Construction: Plain weave, 19–33 threads per square centimeter (120–210 threads per square inch)

(4) Weight/square yard: 125 ± 28 g/m^2 (3.7 ± 0.8 oz/yd^2).

(b) The sheeting shall be refurbished once before use with the following laundering procedure. The sheeting material shall be washed and dried one time in accordance with sections 8.2.2 and 8.2.3 of American Association of Textile Chemists and Colorists (AATCC) Test Method 124–2001 ''Appearance of Fabrics after Repeated Home Laundering.'' Washing shall be performed in accordance with sections 8.2.2 and 8.2.3 of AATCC Test Method 124–2001 using wash temperature (V) 60 ± 3 °C (140 ± 5 °F) specified in Table II of that method, and the water level, agitator speed, washing time, spin speed and final spin cycle specified in ''Normal/Cotton Sturdy'' in Table III of the method. A maximum wash load shall be 8 pounds. Drying shall be performed in accordance with section 8.3.1(A) of that test method, Tumble Dry, using the exhaust temperature (66° ± 5 °C; 150° ± 10 °F) and cool down time of 10 minutes specified in the ''Durable Press'' conditions of Table IV of the method.

§ 1634.14 Standard polyurethane foam substrate.

(a) The SPUF substrate is used for assembly of the mockups for evaluation of upholstery cover fabric and interior fire barriers and to qualify standard cover fabrics.

(b) *Flammability performance.* (1) Open flame performance. The SPUF shall be tested in accordance with the test procedures specified in § 1634.6, but without the use of the standard cover fabric and using a 5-second impingement of the 35 mm butane flame specified in § 1634.20(d). In three consecutive trials, using SPUF from the production lot to be qualified, the SPUF substrate shall have a mass loss that is greater than 20 percent in less than 120 seconds after removal of the ignition source.

(2) *Smoldering performance.* The SPUF shall be tested in accordance with the test procedures specified in § 1634.4, but without the use of a cover fabric. In three consecutive trials, using SPUF from the production lot to be qualified the SPUF substrate shall have a mass loss less than 1%.

(c) The SPUF substrate shall have the following specifications:

(1) Density: 1.8 lb/ft^3

(2) Indentation Load Deflection (ILD): 25 to 30

(3) Air permeability: Greater than 4.0 ft^3/min

(4) No flame-retardant chemical treatment as determined by post-production chemical analysis.

§ 1634.15 Standard cover fabric (cotton velvet) smoldering qualification for barrier test.

(a) *Flammability properties.* The standard cover fabric used in smoldering tests for interior fire barriers in accordance with § 1634.5, shall meet the following requirements: when tested directly over a qualified SPUF foam substrate following the procedure in § 1634.4, the substrate mass loss average of 10 test results shall be 50 ± 5%.

(b) The standard cover fabric shall also have weight/square yard: 10 oz/yd^2.

(c) A 100% cotton, velvet pile fabric of beige color, with no backcoating and treated with certain finishing chemicals involving a resin catalyst that contains small amounts of melamine, generally demonstrates the desired flammability performance characteristics specified.

§ 1634.16 Conditioning.

(a) All test specimens and standard test materials (including SPUF substrates, cigarettes, and sheeting material) shall be conditioned at a temperature of 21° ± 3 °C (70° ± 5 °F) and between 50% and 66% relative humidity for at least 24 hours prior to testing.

(b) If conditions in the test room do not meet these specifications, then testing must be initiated within 10 minutes after the specimens are removed from the conditioning room.

Subpart D—Test facility, exhaust system, and hazards

§ 1634.17 Test facility and exhaust system.

The room in which tests under this part are conducted shall have a volume greater than 20 m^3 in order to contain sufficient oxygen for testing, or if smaller, the room shall have a ventilation system permitting the necessary flow of air. During the pretest and testing period, airflow rates shall be maintained below 0.1 m/s, measured in the locality of the mockup assembly to provide adequate air movement without disturbing the burning behavior. Room ventilation rates before and during tests shall be maintained at about 200 ft^3/min. Airflow rates in this range have been shown to provide adequate oxygen without physically disturbing the burning behavior of the ignition source or the mockup assembly. In addition, the ventilation system of the test facility

shall be capable of extracting smoke and toxic combustion products generated during testing for health and safety reasons.

§ 1634.18 Hazards.

(a) Health and safety risks associated with conducting the required testing in accordance with this part 1634 exist. It is essential that suitable precautions be taken, which include the use of breathing apparatus and protective clothing. Products of combustion can be irritating and dangerous to test personnel. Test personnel should avoid exposure to smoke and gases produced during testing.

(b) A suitable means of fire extinguishment shall be at hand. When the termination point of the test has been reached and the fire is extinguished, the presence of a back-up fire extinguisher is recommended. It is often difficult to determine when combustion in a mockup assembly has ceased, even after an extinguishment action is taken, due to burning deep inside the specimens. Care should be taken that specimens are disposed of only when completely inert.

Subpart E—Test Facility and Materials for Open Flame Ignition Resistance Tests

§ 1634.19 Test room.

The test room shall be draft protected and equipped with a suitable ventilation system for exhausting smoke and any toxic gases generated during testing.

§ 1634.20 Butane gas flame ignition source.

(a) The butane gas flame ignition source shall be in accordance with the following specifications or equivalent:

(1) The burner tube shall consist of a stainless steel tube, 8.0 ± 0.1 mm (5/16 ± 0.004 inch) outside diameter, 6.5 ± 0.1 mm (0.256 ± 0.004 inch) internal diameter.

(2) The butane shall be ''C.P. Grade'' (chemically pure) butane, 99.0% purity.

(b) There shall be a means to control the flow rate of butane.

(c) In the open flame test of section 1634.6 a nominal 240 mm flame butane is required. The nominal 240 mm butane flame is obtained by establishing a flow rate of butane gas that is 350 ± 10 ml/min at 25 °C (77 °F) and 101.3 kPa (14.7 psi).

(d) In standard material qualification tests for SPUF and Rayon, a nominal 35 mm butane is required. The nominal 35 mm butane flame is obtained by establishing a flow rate of butane gas that is 45 ± 2 ml/min at 25 °C (77 °F) and 101.3 kPa (14.7 psi).

(e) Flame height is measured from the center end of the burner tube when held horizontally and the flame is allowed to burn freely in air.

§ 1634.21 Metal test frame.

(a) The metal test frame shall consist of two rectangular steel frames locked at right angles to each other (See Figure 6).

(b) The frames shall be made of nominal 25 mm x 25 mm (1 x 1 inch) steel angle 3 mm (0.125 inch) thick, and shall securely hold platforms of steel mesh set 6 ± 1 mm (0.25 ± 0.05 inch) below the front face of each test frame.

(c) An optional standard edging section around the steel mesh will provide protection and greater rigidity. The rod shall be continuous across the back of the apparatus.

§ 1634.22 Standard cover fabric (rayon) open flame qualification for barrier test.

(a) The standard cover fabric used in open flame tests for interior fire barriers shall be tested in accordance with the test procedures specified in § 1634.6 using a 20 second application of the 35 mm butane gas flame specified in § 1634.20. In five consecutive trials, the assembly mass loss must be greater than 40% at 5 minutes when tested with a qualified SPUF.

(b) The standard rayon cover fabric shall also:

(1) Be 100% bright regular rayon, scoured, 20/2 ring spun basket weave construction; and

(2) Have weight/square yard: 8.0 ± 0.5 oz/yd^2.

§ 1634.23 Open flame tests fabric cut-out dimensions.

The fabric cut-out dimensions needed for installing in the mockup assembly to conduct open flame tests are shown in Figure 5.

§ 1634.24 Standard polyurethane foam substrate.

(a) The SPUF substrate used for assembly of mockups shall meet the following flammability performance requirements.

(1) The SPUF shall be tested in accordance with the open flame test procedures specified in § 1634.6, but without the use of the standard cover fabric and using a 5-second impingement of the 35 mm butane flame specified in § 1634.20(d). In three consecutive trials, using SPUF from the production lot to be qualified, the SPUF substrate shall have a mass loss that is greater than 20 percent in less than 120 seconds after removal of the ignition source.

(2) The SPUF shall be tested in accordance with the smoldering test procedures specified in § 1634.4, but without the use of a cover fabric. In three consecutive trials, using SPUF from the production lot to be qualified the SPUF substrate shall have a mass loss less than 1%.

(b) The SPUF substrate shall have the following specifications:

(1) Density: 1.8 lb/ft^3

(2) Indentation Load Deflection (ILD): 25 to 30

(3) Air permeability: Greater than 4.0 ft^3/min

(4) No flame-retardant chemical treatment as determined by post production chemical analysis.

§ 1634.25 Conditioning.

(a) All test specimens and standard test materials shall be conditioned at a temperature of 21° ± 3 °C (70° ± 5 °F) and between 50% and 66% relative humidity for at least 24 hours prior to testing.

(b) If conditions in the test room do not meet the conditioning specifications, then testing must be initiated within 10 minutes after the specimens are removed from the conditioning room.

Subpart F—Reupholstering

§ 1634.26 Requirements applicable to reupholstering.

(a) Section 3 of the Flammable Fabrics Act (15 U.S.C. 1192) prohibits, among other things, the ''manufacture for sale'' of any product which fails to conform to an applicable standard issued under the FFA.

(b) Reupholstering upholstered furniture for sale is manufacturing upholstered furniture for sale and, therefore, is subject to the FFA and all applicable requirements of this part.

(c) Reupholstering is any replacing of upholstered furniture material that is subject to any applicable performance requirements of §§ 1634.4 through 1634.6.

(d) If the person who reupholsters the upholstered furniture intends to retain the reupholstered furniture for his or her own use, or if a customer hires the services of the reupholsterer and intends to take back the reupholstered furniture for his or her own use, ''manufacture for sale'' has not occurred and such an article of reupholstered furniture is not subject to this part.

(e) If an article of reupholstered furniture is sold or intended for sale, either by the reupholsterer or the owner of the upholstered furniture who hires the services of the reupholsterer, such a transaction is considered to be ''manufacture for sale'' and the article of upholstered furniture is subject to all applicable requirements of this part.

Dated: February 14, 2008.

Alberta E. Mills,

Acting Secretary, Consumer Product Safety Commission.

Note: The following appendix will not appear in the Code of Federal Regulations.

List of Relevant Documents

1. Briefing memorandum from Dale R. Ray, Project Manager, Directorate for Economic Analysis, to the Commission, ''Regulatory Alternatives for Upholstered Furniture Flammability,'' November 20, 2007.

2. Memorandum from Rohit Khanna & S. Mehta, Directorate for Engineering Sciences, to Dale R. Ray, Project Manager, Directorate for Economic Analysis, ''Technical Rationale Report for the Draft Standard for the Flammability of Upholstered Furniture,'' November 2007.

3. Memorandum from D. Miller, Directorate for Epidemiology, to Dale R. Ray, Project Manager, Directorate for Economic Analysis, ''Analysis of Laboratory Data for Upholstered Furniture,'' November 16, 2007.

4. Memorandum from Robert Franklin, EC, to Dale R. Ray, Project Manager, Directorate for Economic Analysis, Environmental Assessment of a Draft Proposed Flammability Standard for Residential Upholstered Furniture,'' November 2007.

5. Memorandum from Charles L. Smith, Directorate for Economic Analysis, to Dale R. Ray, Project Manager, ''Preliminary Regulatory Analysis of a Draft Proposed Flammability Rule to Address Ignitions of Upholstered Furniture,'' December 2007.

6. Memorandum from Charles L. Smith, Directorate for Economic Analysis, to Dale R. Ray, Project Manager, Directorate for Economic Analysis, ''Proposed Rulemaking on Upholstered Furniture Flammability, Initial Regulatory Flexibility Analysis,'' December 2007.

7. Memorandum from Martha A. Kosh, Office of the Secretary, to Directorate for Economic Analysis, ''Ignition of Upholstered Furniture by Small Open Flames and/or Smoldering Cigarettes,'' List of Comments on CF 04–2, December 29, 2003, revised October 19, 2004.

8. Memorandum from A. Bernatz, L. Fansler & L. Scott, to Dale R. Ray, Project Manager, Directorate for Economic Analysis, ''Test Program for Upholstery Fabrics and Fire Barriers,'' November 8, 2007.

9. Memorandum from P. Semple, Executive Director, to the Commission, ''Finding of No Significant Impact from Implementation of the Proposed Flammability Standard for Residential Upholstered Furniture,'' November 19, 2007.

10. Memorandum from W. Zamula, Directorate for Economic Analysis, to Dale R. Ray, Project Manager, Directorate for Economic Analysis, ''Costs for Non-Fatal, Addressable Residential Civilian Injuries Associated with Upholstered Furniture Fires,'' September 6, 2007.

BILLING CODE 6355–01–P

Figure 1 - Cigarette Ignition Specimen Holder - Base

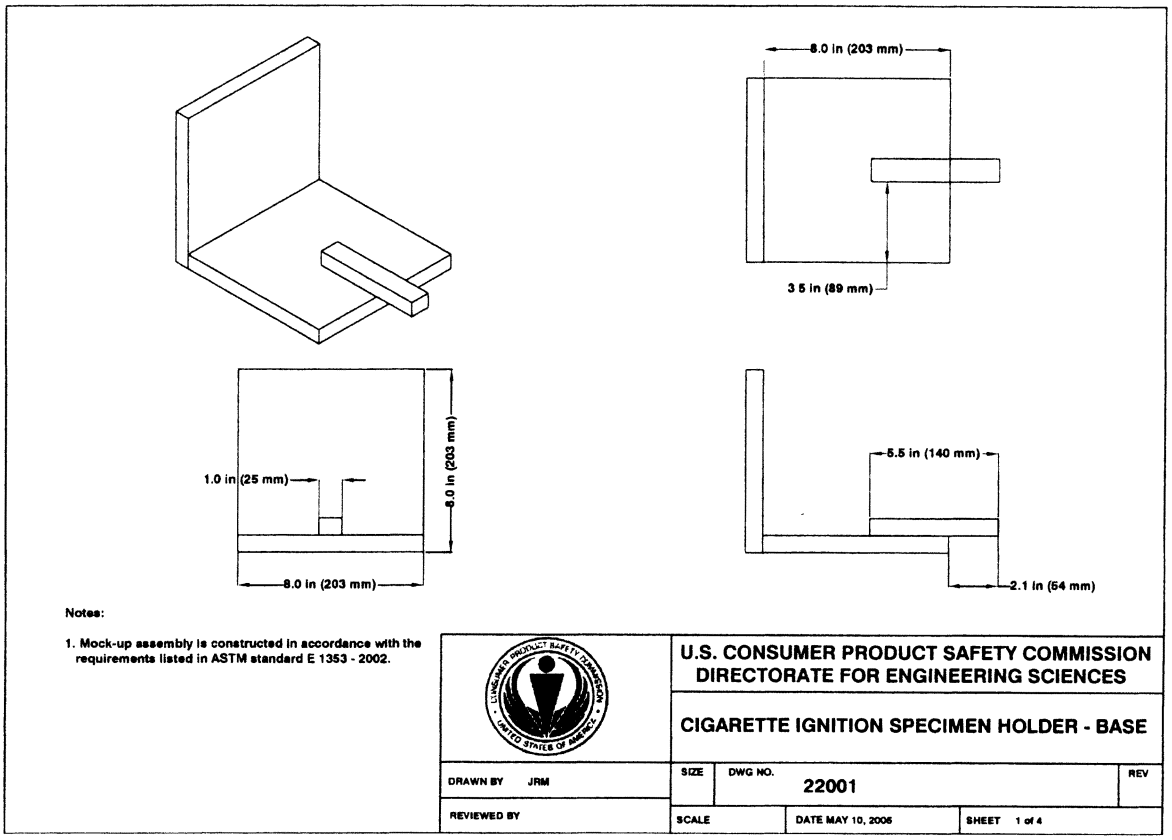


Figure 2 - Cigarette Ignition Specimen Holder - Movable Horizontal Support Panel

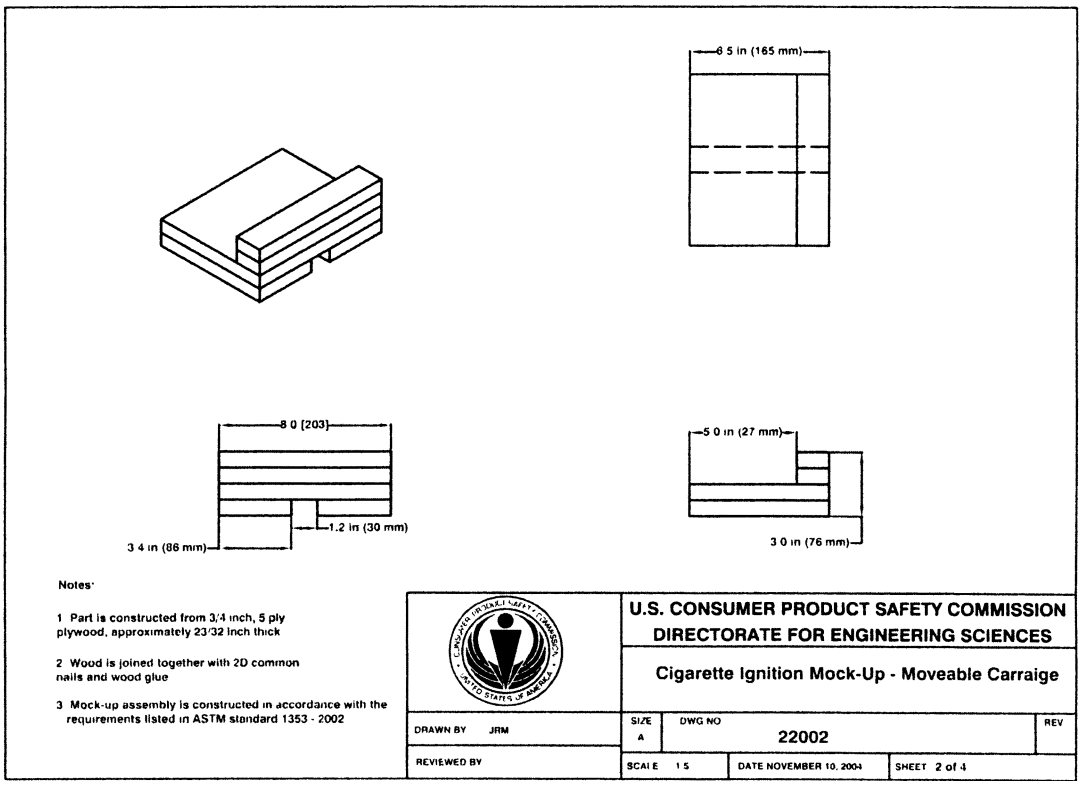


Figure 3 – Mockup Assembly for Upholstery Cover Fabric Smoldering Ignition Resistance Test

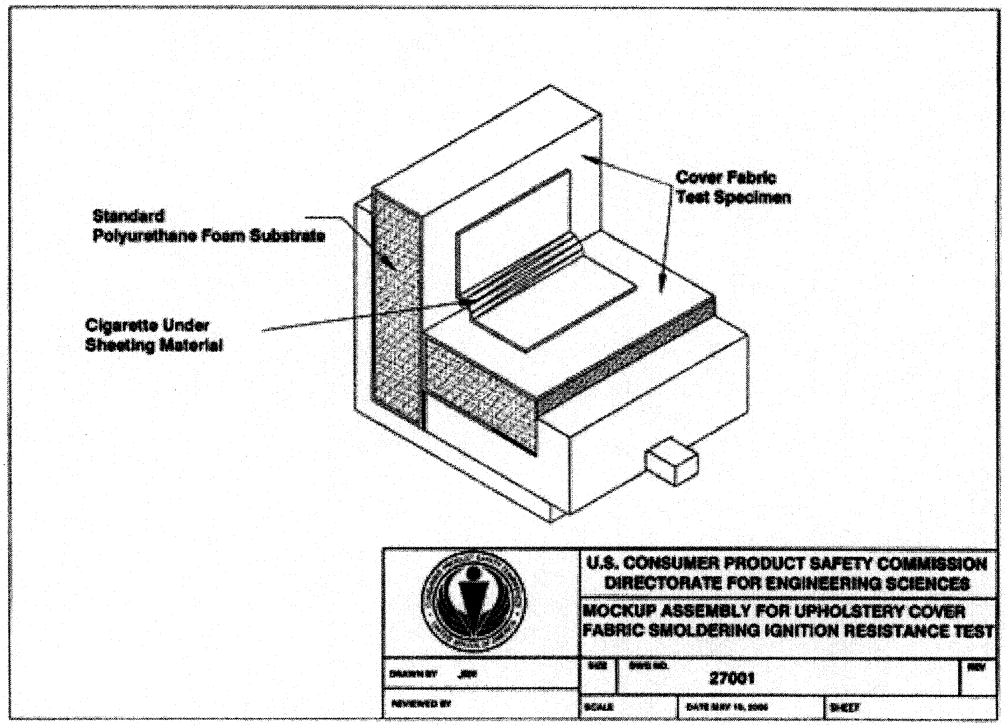


Figure 4 – Mockup Assembly for Interior Fire Barrier Material Smoldering Ignition Resistance Test

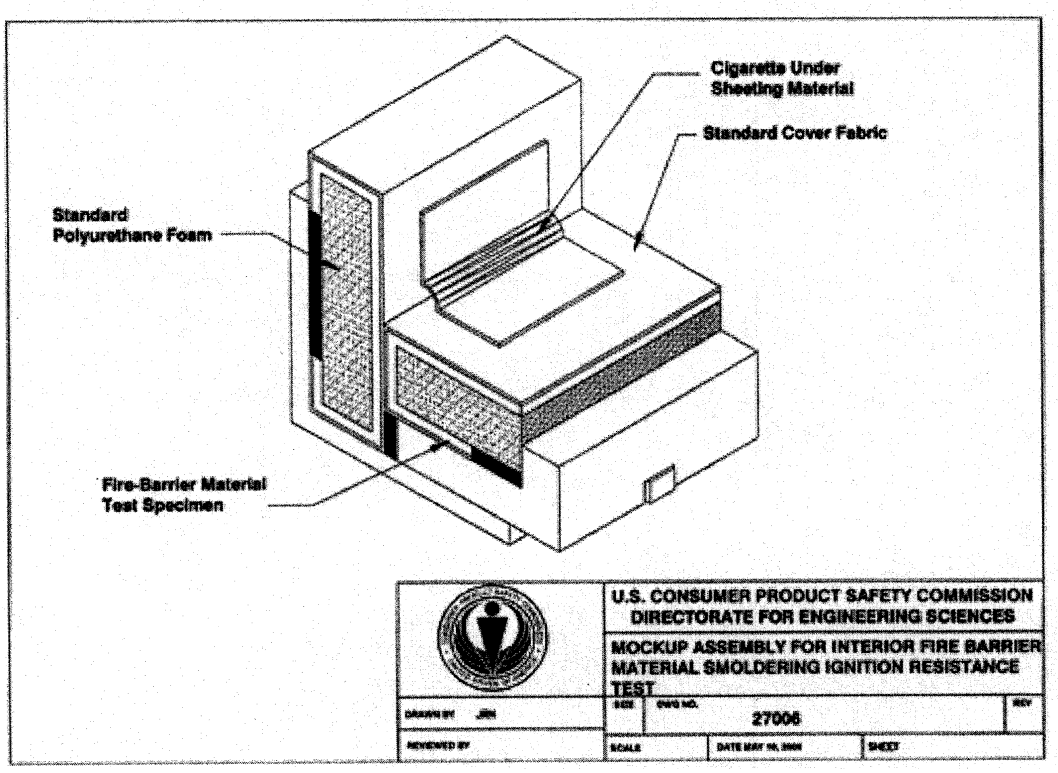


Figure 5 - Cut-Out Template Dimensions for Open Flame Test

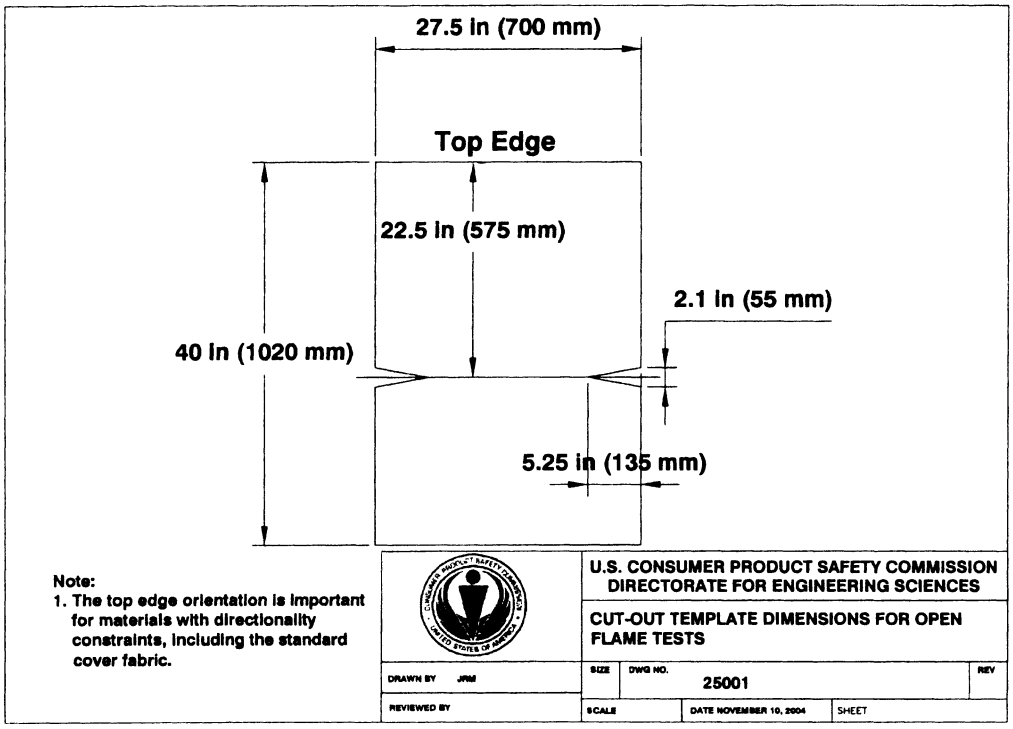
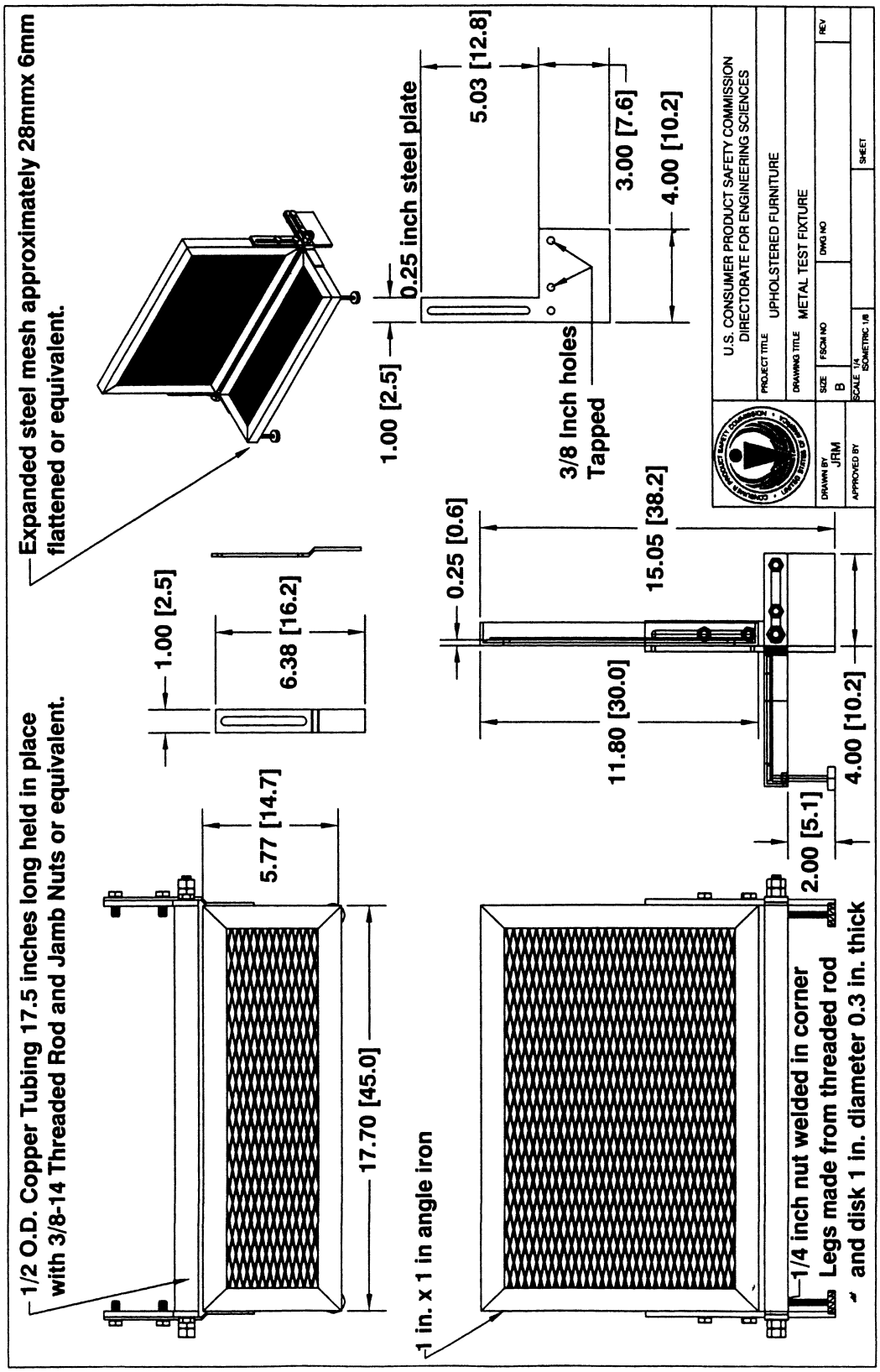


Figure 6 – Open Flame Metal Test Frame



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