

U.S. Consumer Product Safety Commission



# Regulatory Alternatives for Upholstered Furniture Flammability\*

CPSC Staff Briefing  
December 6, 2007

\*This information was prepared by the CPSC staff; it has not been reviewed or approved by, and does not necessarily represent the views of, the Commission.

# Background

- **October 2003 ANPR**
  - Expanded proceeding to address both smoldering & open flame
- **CPSC staff's 2005 draft standard**
  - Presented in January 2006 briefing package
- **Peer-reviewed CPSC staff technical reports**
  - Presented in November and December 2006 status updates
- **CPSC staff's 2007 alternative draft standard**
  - Developed as possible option in view of recent technical data and stakeholder comments

# November 2007 Briefing Package

- **Updates fire hazard data**
- **Summarizes stakeholder input, chiefly:**
  - Scope (e.g., smoldering vs. open flame) and technical issues (e.g. test methods)
  - FR chemical issues
- **Describes recent CPSC Laboratory testing**
- **Outlines specifications and technical rationale for staff's 2007 alternative draft**
- **Presents updated environmental assessment and regulatory analyses of principal alternatives**

# Fire Hazard Update

- **Average annual national fire loss estimates, 2002-2004 - addressable residential fires in which upholstered furniture was 1<sup>st</sup> item ignited:**
  - 3,500 non-intentional fires
  - 280 civilian deaths
  - 500 civilian injuries
  - \$112.5 million property damage
- **Annual average societal cost = \$1.6 billion**
- **90% of deaths and 65% of injuries resulted from smoking material-ignited fires**

# Stakeholder Recommendations

- **ANPR public comments**
- **July 2007 stakeholder meeting**
- **Scope and Test Method Issues:**
  - Smoldering vs. open flame ignition
  - UFAC guidelines for smoldering ignition
  - Controls for standard test materials
  - Fire barrier option
  - Large scale testing
  - Impact of Reduced-IP cigarettes

# Stakeholder Recommendations

- **FR Chemical Issues:**
  - Incomplete data on toxicity, exposure & environmental fate for some filling material FR additives
  - Inherently-FR fiber materials available (e.g., mattress technologies)
  - Standard should not increase use of fabric or filling material FR additives

# Recent CPSC Laboratory Testing

- Smolder-prone fabrics can lead to hazardous conditions -- progressive smoldering or transition to flaming combustion -- in as little as one hour, despite smolder resistance of polyurethane foam fillings
- Some inherently-FR fiber interior barriers (mattress technologies) can provide adequate protection for flammable fillings with burning cover fabrics
- Polyester layer can provide smolder resistance in combination with open flame-resistant barrier (as in mattresses)

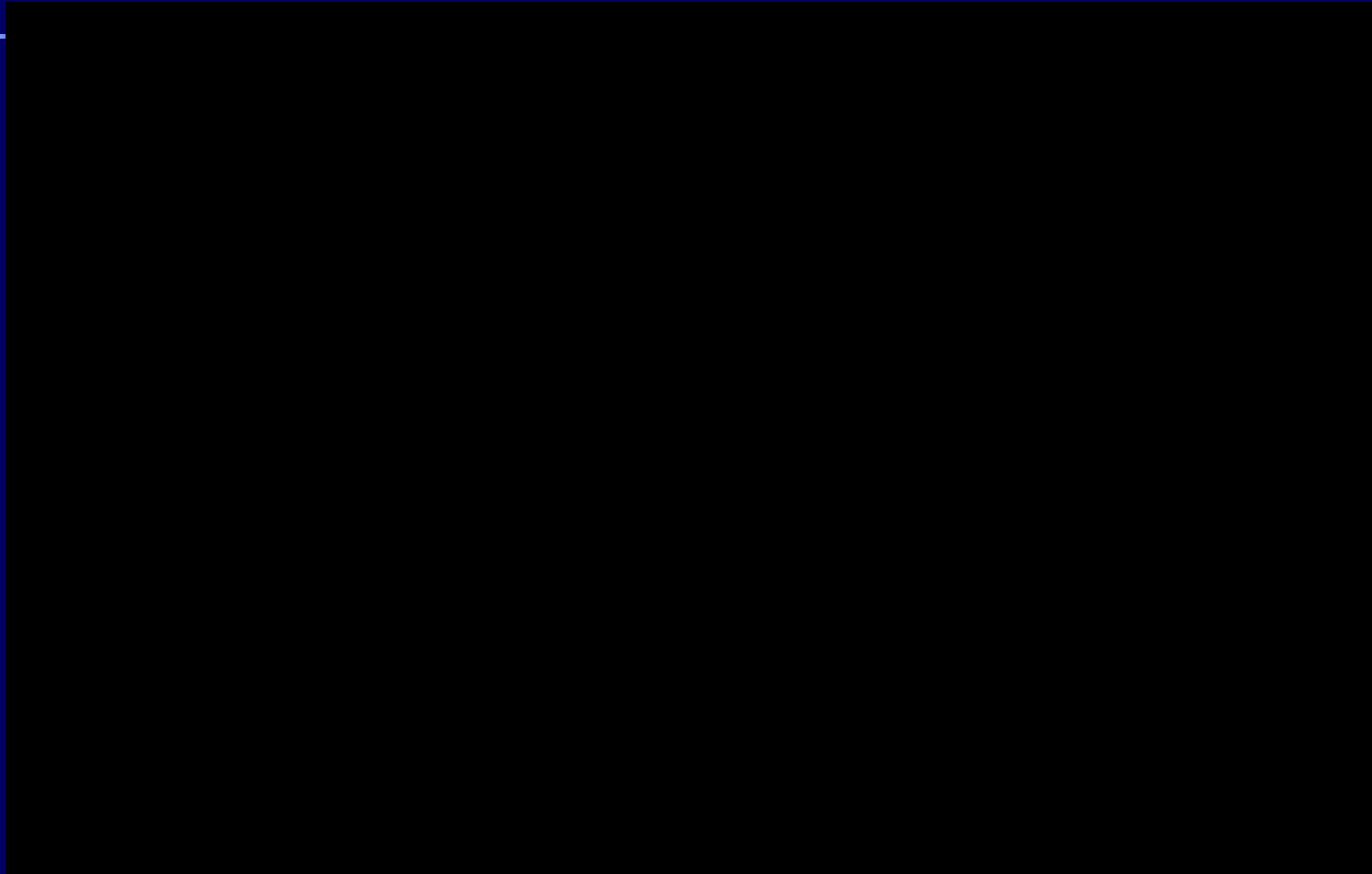
# Highly Smolder-Prone Fabric Over Non-FR Foam & Polyester Batting: Excessive Smoldering



Time = 45 min. after cigarette placement



# Highly Smolder-Prone Fabric Over Non-FR Foam: Transition to Flaming



Time = ~ 50 min. after cigarette placement

# Open Flame-Ignitable Fabric with Conventional Fillings vs. Interior Barrier



Time = 2:20 after flame placement



6 min

# Interior fire barriers protect fillings

(example: rayon/poly/cotton fabric over PAN fiber high-loft interior barrier over untreated polyurethane foam)



3 min



10 min

# CPSC Laboratory Findings: Standard Test Materials

- **Standard test materials must be controlled to maintain repeatability**
- **Cotton velvet test fabric too inconsistent in open flame tests; more consistent in smoldering tests**
- **FR foam too inconsistent in smoldering tests**

# CPSC Staff's 2007 Alternative Draft Standard: Development Factors

- **Consider stakeholder data & recommendations**
- **Incorporate findings of recent technical research**
- **Recognize FR chemical concerns**
- **Provide flexibility in compliance methods for manufacturers / importers**
- **Consider potential costs & benefits, seek burden-reducing alternatives**

# CPSC Staff's 2007 Alternative Draft Standard: Technical Rationale

- **Goal: protect interior filling materials, the primary fuel load in a fire**
- **Bench-scale test methods, with standard materials, reflect interactions of upholstery components**
- **Cessation of smoldering a primary objective**
- **Mass loss over time reflects involvement of fillings in both smoldering and open flame ignition behavior**
- **Performance requirements should address deficiencies of UFAC guidelines**
- **Stringent but technically feasible acceptance criteria for fabrics and barriers**

# CPSC Staff's 2007 Alternative Draft Standard: Key Concepts

- **Focuses on principal aspect of risk by limiting smoldering contribution of upholstery cover materials**
- **Fire barrier option provides some open flame protection, offers industry flexibility and preserves consumer choice**
- **Does not rely on FR additives to achieve compliance**
- **More effective than UFAC fabric classification approach**

# CPSC Staff 2007 Alternative Draft Standard for Upholstered Furniture Flammability: Summary of Draft Performance Requirements

Material	Test Description	Post-test Requirement
<b>Manufacturer selects cover fabrics meeting smoldering requirements</b>		
Cover fabrics / materials (Type I)	Modified ASTM / UFAC mockup; std non-FR foam substrate, std cigarette ignition source; 45 min. test	No smoldering Max. 10% substrate mass loss; No transition to flaming
<b>- OR - Manufacturer selects qualified interior fire barrier</b>		
Interior Barriers (Type II)	<b>Smolder Resistance:</b> Modified ASTM / UFAC mockup; std cotton velvet cover fabric, std non-FR foam substrate, std cigarette ignition source; 45 min. test	Max. 1% substrate mass loss
	<b>Open Flame Resistance:</b> BS 5852 mockup; std rayon cover fabric, std non-FR foam substrate, std (240 mm / 70 sec) open flame ignition source; 45 min. test	Max. 20% mockup assembly mass loss



# 2007 Alternative Draft Standard: Cover Material Smoldering Test

- **About 14% of existing fabrics expected to fail**
- **Options: re-engineered fabrics (e.g., modified fiber content), or furniture constructed with barriers; FR fabrics possible but unlikely**
- **Complying fabrics can be used with any filling materials**

# 2007 Alternative Draft Standard: Barrier Tests

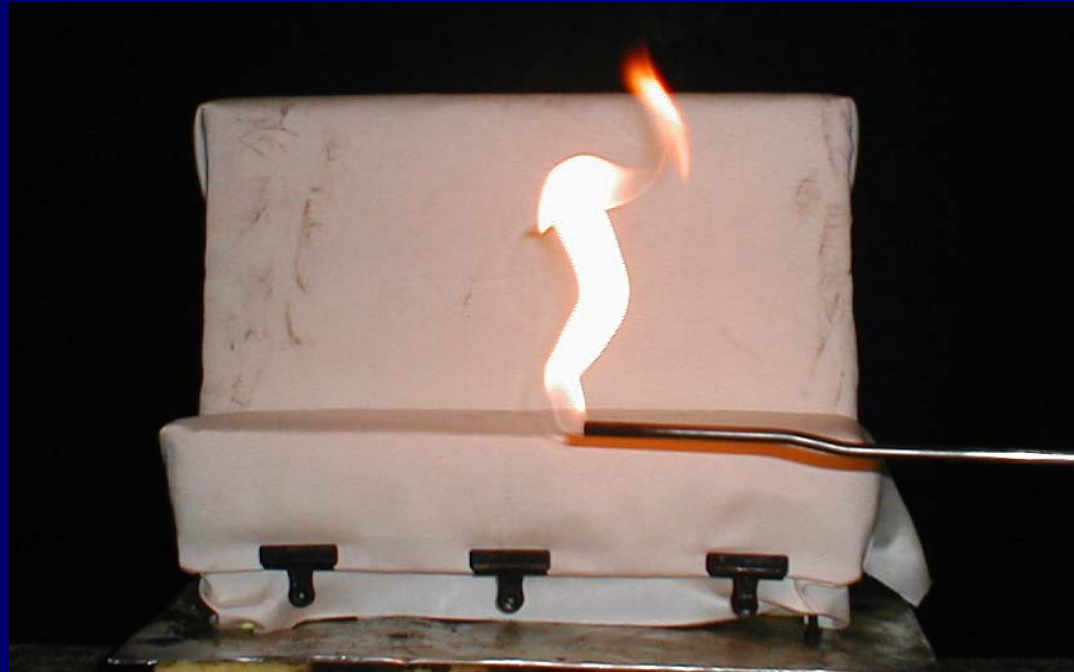
- **Smoldering & open flame tests**
- **Projected for use in about 5% of furniture**
- **High-loft battings with inherently-FR fiber, perhaps in combination with polyester layer**
- **Complying barriers can be used with any fabrics and filling materials**

# Mockup & Ignition Source for Cover Fabric & Barrier Smoldering Tests



**Standard cigarette ignition source, standard cotton sheeting covering cigarette, standard cotton velvet cover fabric (for barrier test), standard polyurethane foam substrate**

# Mockup & Ignition Source for Barrier Open Flame Test



**Nominal 240 mm flame, 70 sec. exposure,  
standard rayon cover fabric,  
standard polyurethane foam substrate**

# Flame Retardant Chemicals

- **CPSC staff's objective: reduce fire risk without imposing chemical risks**
- **CPSC flammability rule would be a performance standard, would not specify or require any FRs**
- **CPSC sponsored studies, staff risk assessments**
- **CPSC & EPA staffs continuing to discuss possible Significant New Use Rule**

# Environmental Assessment

- Under 2007 alternative draft standard, manufacturers & importers would likely choose options that do not involve FR additive use in fabrics or filling materials
- FR barriers (variation of mattress technology) would be used in small proportion of furniture
- Significant environmental impacts not likely

# Updated Preliminary Regulatory Analysis

- **Updated estimates of benefits & costs reflecting latest hazard data**
- **Comparative estimates for 5 principal regulatory options, including staff's 2007 alternative draft standard and mandating UFAC guidelines**

# Benefit / Cost Summary for 2007 Alternative Draft Standard

**Benefits range: \$419 to \$424 mil.**

**Cost range: \$ 32 to \$ 57 mil.**

**Net benefits = \$367 to \$387 mil.**

**Includes an estimated 170 deaths averted  
over the expected life of a year's  
complying production**



# Other Regulatory Options

- **CPSC staff's 2005 draft standard**
- **CPSC staff's 2001 draft standard**
- **California BHF's 2002 draft revised standard TB-117**
- **Mandate ASTM / UFAC voluntary guidelines**
- **No action / terminate proceeding**

# Reduced Ignition Propensity (IP) Cigarettes

- **22 states have passed legislation; 5 have regulations in effect**
- **Based on ASTM / NIST test method; 75% of tested cigarettes must not burn their entire length**
- **Data on effectiveness not yet available**
- **Staff analysis: if reduced-IP cigarettes eliminated 50% of furniture losses, a CPSC standard would still have substantial net benefits (~ \$155 mil. for 2007 alternative)**

# Small Business Impacts

- **Initial regulatory flexibility analysis required under Regulatory Flexibility Act**
  - Identify impacts on small entities
  - Consider alternatives to reduce impacts
- **Nearly all affected firms are small businesses**
- **2007 alternative draft standard designed to minimize potential impacts:**
  - Uses material tests instead of finished product tests
  - Provides compliance options, e.g., barriers
  - Does not require production testing

# CPSC Staff Conclusions

- **A flammability rule could effectively address the upholstered furniture fire risk**
  - Staff's 2007 alternative draft focuses on smoldering, the principal aspect of the risk; would also have some open flame benefits
- **Several regulatory alternatives would have substantial net benefits to the public**
- **Increased fire safety can be achieved without posing appreciable chemical-related health or environmental risks**
  - Staff's 2007 alternative draft would require no FR additives; mattress-technology FR barriers could be used

# Next Steps

- Possible NPR, evaluate public comments
- Continued technical research, including large scale testing
- Ongoing project to evaluate reduced-IP cigarettes
- Continued cooperation with EPA on FR chemical issues

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# Regulatory Alternatives for Upholstered Furniture Flammability

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