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United States
CONSUMER PRODUCT SAFETY COMMISSION
Washington, D.C. 20207

MEMORANDUM

DATE: November 15, 1996

TO : Dale R. Ray, ECPA
Project Manager, Upholstered Furniture
Through : Warren J. Prunella, AED, EC
FROM : Charles L. Smith, EC (504-0962, ext 1325)
SUBJECT : Economic Considerations for Upholstered Furniture Petition FP 93-1

This memorandum discusses economic issues associated with Petition FP 93-1 to develop a mandatory standard addressing the cigarette ignition hazards of upholstered furniture.

I. Background

In 1993 the National Association of State Fire Marshals (NASFM) petitioned the Consumer Product Safety Commission (CPSC) to initiate a proceeding to regulate cigarette ignition hazards associated with upholstered furniture. NASFM sought the adoption of California's Bureau of Home Furnishings Technical Bulletins 116 and 117 as mandatory requirements for upholstered furniture sold for consumer use in the U.S. Technical Bulletin 116 calls for testing cigarette ignition resistance by placing cigarettes on specified locations of finished pieces of furniture (or mock-ups containing the fabric and filling material that is used). Conformance with Technical Bulletin 116 is voluntary in the state. Technical Bulletin 117 (mandatory for furniture sold in California) requires testing of the fabric and filling material components used to make furniture to assure their resistance to cigarette ignition.[1]

To evaluate the merits of the NASFM petition regarding cigarette ignition of upholstered furniture, Commission staff developed a test program to determine the

[1] Hazards associated with small open flame ignitions of furniture, addressed by some aspects of Technical Bulletin 117, are being considered separately by the staff; that part of the petition was granted by the Commission, and an Advanced Notice of Proposed Rulemaking was published on June 15, 1994, in the Federal Register.

resistance of new furniture to cigarette ignition, and the extent to which furniture conforms with the provisions of the voluntary program developed by the Upholstered Furniture Action Council (UFAC).[2] The Directorate for Laboratory Sciences has prepared a report on their findings from these tests.[3] The agency also contracted for a survey of upholstered furniture manufacturers in 1995 to acquire information on upholstery fabrics, filling materials, and other components of upholstered furniture that could affect the likelihood that an item of furniture might ignite from a burning cigarette. The Directorate for Economic Analysis reported on the survey findings.[4] A report was prepared on the likelihood that furniture would ignite from cigarettes, combining the findings of the test data and survey results.[5]

This memorandum presents information on the upholstered furniture industry, the hazards that would be addressed by a cigarette ignition standard, and the potential impacts of such a standard on furniture manufacturers and consumers.

II. Manufacturers and Production

Slightly more than 1,000 U.S. companies manufacture upholstered household furniture as their primary product (Standard Industrial Classification 2512). Several hundred companies that primarily manufacture other products, such as wood household furniture, also make upholstered furniture, although they only accounted for 3 percent of upholstered household furniture shipments in 1992. The market is fairly

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[2] The program requires classification of upholstery fabrics into either "Class I" or "Class II," based on a 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.

[3] Gail Stafford and Linda Fansler, Directorate for Laboratory Sciences, Division of Engineering Laboratory, CPSC, "Upholstered Furniture Flammability Testing: Cigarette Ignition Data Analysis," July 17, 1996.

[4] Charles Smith, EC, CPSC, "Results of Surveys of Manufacturers of Upholstered Furniture," September 1996.

[5] Charles Smith, EC, and Linda Fansler, LSEL, CPSC, "Cigarette Ignition Propensity of Upholstered Furniture," October 1996.

concentrated among the larger firms. The top 4 companies accounted for 25 percent of the total value of upholstered furniture shipments in 1992, and the 50 largest companies accounted for 69 percent.[6] The industry includes many small establishments: the Bureau of the Census reports that, in 1992, more than half of all establishments manufacturing upholstered furniture as their primary product had fewer than 20 employees.

The value of domestic shipments of upholstered household furniture in 1993 was a little over $6 billion. The value of imports in that year was about $325 million, or about 5 percent of total shipments. The leading country of origin for imported furniture was Italy, accounting for 52 percent of upholstered furniture imports. The total annual retail value of upholstered furniture bought by consumers exceeds $12 billion. The number of upholstered furniture pieces purchased annually by households generally is in the range of 25 to 30 million units.

About 260 companies reportedly participate in the UFAC Voluntary Action Program.[7] Most of the larger producers of furniture are believed to be UFAC participants. According to estimates provided by officials of upholstered furniture manufacturers surveyed by Heiden Associates in 1994 (under contract to UFAC), 85 to 88 percent of the total value of shipments of wood frame upholstered furniture in 1993 complied with the UFAC program. Adding sleep furniture to upholstered wood furniture brought estimated compliance up to 86 to 89 percent of the dollar value of shipments of these two major categories of upholstered furniture.[8] Heiden Associates' information on the value of shipments of UFAC firms is consistent with Dun & Bradstreet data acquired by the CPSC contractor for the 1995 survey of manufacturers. Also, the recent testing of furniture components by the Directorate for Laboratory Sciences to determine conformance with UFAC tests does not contradict

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[6] Bureau of the Census, U.S. Department of Commerce, 1992 Census of Manufactures, report MC92-S-2, "Concentration Ratios in Manufacturing."

[7] The 260 companies now participating in the UFAC program are fewer than the 376 firms that reportedly were involved in the middle-1980's. However, this change is most likely related to consolidation of firms within the industry. Also, the earlier enrollment may have included branch locations in addition to company headquarters.

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

the assertion that a high percentage of the total value of shipments of upholstered furniture conforms with the UFAC Program. An overall estimate of 90 percent conformance with the UFAC Program (if production by non-UFAC firms that technically is not certified is included) seems reasonable.

III. Potential Benefits of a Standard

In 1994 there were a total of 14,300 residential fires (from all ignition sources) involving upholstered furniture.[9] These fires resulted in an estimated 680 deaths, 1,780 injuries, and property losses of about $244 million. The estimated costs of upholstered furniture fires to society were nearly $4 billion. Fires started by cigarettes and other smoking materials accounted for 6,500 fires, 410 deaths, 960 injuries, and property losses of $107.8 million.[10] The societal costs associated with smoking material fires in which upholstered furniture was the first item ignited may have totaled about $2.3 billion in 1994, about 59 percent of all upholstered furniture fire hazard costs.[11] Based on Product Life Model estimates, there were nearly 400 million pieces of upholstered furniture in use in 1994. Annual hazard costs per unit averaged a little over $6. Based on an average product life of 14 years, and a discount rate of 5 percent, the discounted present value of hazard costs expected over the life of a piece of furniture averaged about $60 per unit in use in 1994.

Between 1980 and 1994, smoking material ignited fires involving upholstered furniture declined by 74 percent, deaths related to these fires declined by 64 percent, and injuries declined by 55 percent. The downward trend can be attributed to improvements in the general ignition resistance of furniture produced, as well as such other factors as increased presence of smoke detectors and sprinklers, and smaller proportions of the adult population that smoked cigarettes and drank alcohol. Because the number of fires declined more than deaths and injuries from 1980 to 1994, the

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[9] Kimberly Long, EHHA, CPSC, "National Fire Estimates for Smoking Material Ignited Upholstered Furniture Fires," October 1996 (Memorandum to Dale Ray, Project Manager, Upholstered Furniture).

[10] Property losses are 1994 dollars.

[11] Injury costs are based on "Societal Costs of Cigarette Fires," CPSC and National Public Services Research Institute, August 1993.

risks of death and injury per fire started by smoking materials increased. This indicates that the severity of the fires that do occur is increasing.

The results of chair testing and surveys of fabrics and filling materials used to make furniture in the 1980's and 1990's show that furniture produced in more recent years is generally much more resistant to ignition by cigarettes, the most frequent source of ignition. Because of the long product life of furniture, many upholstered furniture fires in 1994 likely involved older furniture that was more prone to ignition. Therefore, the expected hazard costs that a mandatory standard would address would be less than the average societal fire costs for furniture in use. Since current furniture production has a lower propensity to ignite than the average for all furniture in use, reductions in fires, deaths, and injuries from levels in 1994 can be expected to continue into the future, even in the absence of a standard, as new furniture replaces more ignition-prone furniture. Unless the ignition resistance of furniture produced in the future changes, fire losses (from replacement of more ignition-prone furniture) would be expected to stabilize at the level attributable to the ignition propensity of current production. Of course, factors other than furniture materials will also determine losses in the future. Some of these will tend to increase future losses (such as projected annual increases of about 1 percent in population and households) and others might decrease future losses (such as continued reductions in rates of smoking and alcohol consumption).

The major factor shown to affect the likelihood that an item of furniture will ignite from cigarettes are the percentage of cellulosic (*e.g.*, cotton and rayon) fiber content. In cigarette ignition tests by the CPSC's engineering laboratory this year, only chairs covered with fabrics that were made either entirely or predominantly from cellulosic fibers (with the exception of the one chair with silk fabric) ignited. Overall, about 27 percent of cigarettes tested on seat cushions, back (or back pillow) crevices, side crevices, and welt edges of UFAC chairs covered with predominantly cellulosic fabrics led to ignitions.[12] The 1995 survey of upholstered furniture manufacturers found that an estimated 31 percent of fabric yardage used was predominantly cellulosic. Most of the other fabrics used are much less prone to ignition from cigarettes: thermoplastic fabrics, leather and wool, and vinyl-coated fabrics. Based on historical data on the

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[12] Smith and Fansler, *Op. Cit.* This report also notes that cellulosic fabrics weighing more than 8 ounces per yard were more likely to be associated with sustained ignitions from test cigarettes than lighter cellulosic fabrics.

use of predominantly cellulosic fabrics, the Directorate for Economic Analysis estimates that such fabrics comprised about 39 percent of all fabrics in use in 1994.[13] Assuming the cigarette ignition hazard is proportional to the use of predominantly cellulosic fabrics, current ***production*** could be about 20 percent less likely to ignite from cigarettes than furniture ***in use*** in 1994. The surveys of manufacturers also indicated greater use of more cigarette ignition resistant filling materials, reduced presence of non-heat-conducting welt cord, and somewhat less use of heavier weight cellulosic fabrics. These other factors might contribute to an average ignition propensity associated with current furniture production that is up to 25 percent lower than for furniture in use in 1994. On this basis, if all furniture in U.S. households had fabrics and filling materials like those found in the 1995 survey of manufacturers, annual hazard costs would have been estimated to range from $1.7 to $1.8 billion instead of $2.3 billion. Based on the results of chair testing in recent years we may reasonably attribute perhaps 95 percent of expected cigarette ignition hazard costs to the estimated 31 percent of furniture covered with predominantly cellulosic fabrics.[14] On this basis, the average expected present value of cigarette ignition hazard costs for furniture covered by cellulosic fabrics would be about $140 per item and about $4 per item for furniture covered with other fabrics.

IV. Potential Impacts of a Standard on Furniture Manufacturers and Consumers

The CPSC solicited public comments on the petition in an August 8, 1993, Federal Register notice. The petitioner and parties that submitted comments provided little information with which to estimate the costs associated with the mandatory component and finished item (or mockup) tests sought by the petition. Based on information developed when the CPSC staff considered a draft mandatory standard in

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[13] Charles Smith, EC, CPSC, analysis in support of work done by the Technical Study Group, Cigarette Safety Act of 1984, published as part of a report by John R. Hall Jr., "Expected Changes in Fire Damages from Reducing Cigarette Ignition Propensity," October 1987.

[14] Although probably accounting for less than 2 percent of total fabric yardage used, chair testing indicates that silk fabrics might have no better resistance to cigarette ignition than cellulosic fabrics. Also, previous chair tests found that some chairs covered with predominantly thermoplastic fabrics resulted in sustained ignitions at one or more testing locations.

the 1970's, and on information about furniture intended for sale in California in recent years, relatively few modifications in furniture manufacturing materials may be necessary for most production to pass a mockup or finished item test similar to California's Technical Bulletin 116. This is because throughout the 1970's and into the 1990's the fabric and filling materials used to manufacture furniture generally shifted to those with greater resistance to ignition by cigarettes. The main effect of mandating requirements similar to Technical Bulletin 116 may be further shifts away from fabric types more prone to cigarette ignition, such as heavier cotton and rayon fabrics, towards more ignition resistant fabrics, such as those made with thermoplastic fibers. This would reduce consumer choice, and may have distributional effects within the textile industry.

Some furniture companies may incur additional manufacturing costs in order to retain fabrics in their product lines through the use of substrate materials that result in greater ignition resistance. In the project report to the Commission in 1987, the staff reported on industry efforts to develop foam cushioning materials with cigarette-ignition resistance superior to the flame-retardant foams complying with California's Technical Bulletin 117. Adoption of a mandatory standard requiring testing of finished items or mockups could accelerate efforts to develop such foams. Other means to continue to offer the same selection of fabrics and still pass a test might involve the use of interliners to improve ignition resistance. Interliners would entail costs for increased labor and material. Also, fabrics might be chemically treated with flame retardants to enable them to be used under the standard. Such treatments would increase costs of fabrics, and might affect the aesthetic characteristics. If prices of cellulosic fabrics increase relative to other fabrics and their desirable characteristics (such as appearance, "hand," and naturalness) are adversely affected by treatments, their purchases by consumers and use by furniture manufacturers would be expected to fall.

The 1995 survey of manufacturers also found that smaller manufacturers were more likely to use cellulosic fabrics. Therefore, a mandatory standard might also be expected to impose relatively higher increased costs for materials on smaller firms, unless they change their fabric selection.

A mandatory standard addressing cigarette ignition of finished chairs and the fabrics and materials used in their manufacture would likely have significant testing

and recordkeeping costs. Illustrative of this, the draft cigarette ignition standard considered by the CPSC staff in the 1970's included fabric classification testing, composite testing, and recordkeeping requirements. The estimated increase in manufacturing costs associated with compliance with these provisions was about $20 million in 1978. Adjusting these costs by the increase in the producer price index yields estimated costs of more than $30 million in current dollars. Markups of these costs might result in retail expenditures increasing over $75 million. The draft standard considered by the CPSC in the 1970's included a provision for fabric classification testing, which was intended to reduce the number of mockup tests required of furniture manufacturers. Although not a provision of Technical Bulletin 116, the inclusion of such a provision would mitigate testing cost impacts. Nevertheless, testing and recordkeeping costs would likely be disproportionately higher for smaller furniture manufacturers. Depending on how a standard accommodates furniture with fabric provided by the consumer ("Customer's Own Material" or "C.O.M." orders), firms for which such orders account for a significant percentage of their total production also might be disproportionately affected, since their average testing and recordkeeping costs per unit production would be higher.

V. Interdependency of Actions Addressing Cigarette and Open Flame Ignition Hazards on Prospective Benefits and Impacts on Industry

The benefits accruing from a standard addressing the cigarette ignition hazard are uncertain since changes in fabrics and other materials, such as greater use of thermoplastic fabrics, might increase the severity of fires that would still occur, including fires started by open flames. In fact, it is difficult to separate the benefits that might result from remedial measures aimed at cigarette ignition and the benefits from steps taken to reduce open flame ignitions. Since measures to reduce the latter hazard could also reduce the former, a combined approach may result in higher net benefits than addressing them one at a time. A combined approach might also be preferable from the standpoint of disruptions to the operations of furniture and upholstery fabric manufacturers. Perhaps even more important for upholstery fabric manufacturers, a combined approach provides forewarning that treatments may need to be developed addressing both cigarette and open flame ignition.